



## SAR EVALUATION REPORT

**Applicant Name:**

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Yeongtong-gu, Suwon-si  
Gyeonggi-do 443-742, Korea

**Date of Testing:**

04/17/14- 05/08/14

**Test Site/Location:**

PCTEST Lab, Columbia, MD, USA

**Document Serial No.:**

0Y1404170792-R1.A3L

**FCC ID:**

**A3LSMT235**

**APPLICANT:**

**SAMSUNG ELECTRONICS, CO. LTD.**

**DUT Type:**

Portable Tablet

**Application Type:**

Certification

**FCC Rule Part(s):**

CFR §2.1093

**Model(s):**

SM-T235

| Equipment Class                                   | Band & Mode        | Tx Frequency          | SAR              |                  |
|---------------------------------------------------|--------------------|-----------------------|------------------|------------------|
|                                                   |                    |                       | 1 gm Head (W/kg) | 1 gm Body (W/kg) |
| PCB                                               | GSM/GPRS/EDGE 850  | 824.20 - 848.80 MHz   | 0.38             | 0.53             |
| PCB                                               | GSM/GPRS/EDGE 1900 | 1850.20 - 1909.80 MHz | 0.19             | 1.02             |
| PCB                                               | UMTS 850           | 826.40 - 846.60 MHz   | 0.42             | 1.01             |
| PCB                                               | UMTS 1900          | 1852.4 - 1907.6 MHz   | 0.28             | 0.92             |
| PCB                                               | LTE Band 5 (Cell)  | 824.7 - 848.3 MHz     | 0.44             | 0.89             |
| DTS                                               | 2.4 GHz WLAN       | 2412 - 2462 MHz       | < 0.1            | 1.06             |
| DTS                                               | Bluetooth LE       | 2402 - 2480 MHz       | N/A              |                  |
| DTS                                               | 5.8 GHz WLAN       | 5745 - 5825 MHz       | < 0.1            | < 0.1            |
| NII                                               | 5.2 GHz WLAN       | 5180 - 5240 MHz       | < 0.1            | 0.13             |
| NII                                               | 5.3 GHz WLAN       | 5260 - 5320 MHz       | < 0.1            | 0.14             |
| NII                                               | 5.5 GHz WLAN       | 5500 - 5700 MHz       | < 0.1            | 0.10             |
| DSS                                               | Bluetooth          | 2402 - 2480 MHz       | N/A              | 0.44             |
| <b>Simultaneous SAR per KDB 690783 D01v01r02:</b> |                    |                       | 0.44             | 1.59             |

This revised Test Report (S/N: 0Y1404170792-R1.A3L) supersedes and replaces the previously issued test report on the same subject device 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 Section 1.7 of this report; 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.

  
Randy Ortanez  
President



|                                             |                                                                                     |                                     |                                                                                       |                                        |
|---------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
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| <b>Document S/N:</b><br>0Y1404170792-R1.A3L | <b>Test Dates:</b><br>04/17/14-05/08/14                                             | <b>DUT Type:</b><br>Portable Tablet |                                                                                       | Page 1 of 63                           |

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|                                             |                                                                                     |                                     |                                                                                       |                                        |
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# 1 DEVICE UNDER TEST

## 1.1 Device Overview

| Band & Mode        | Operating Modes | Tx Frequency          |
|--------------------|-----------------|-----------------------|
| GSM/GPRS/EDGE 850  | Voice/Data      | 824.20 - 848.80 MHz   |
| GSM/GPRS/EDGE 1900 | Voice/Data      | 1850.20 - 1909.80 MHz |
| UMTS 850           | Voice/Data      | 826.40 - 846.60 MHz   |
| UMTS 1900          | Voice/Data      | 1852.4 - 1907.6 MHz   |
| LTE Band 5 (Cell)  | Data            | 824.7 - 848.3 MHz     |
| 2.4 GHz WLAN       | Data            | 2412 - 2462 MHz       |
| 5.8 GHz WLAN       | Data            | 5745 - 5825 MHz       |
| 5.2 GHz WLAN       | Data            | 5180 - 5240 MHz       |
| 5.3 GHz WLAN       | Data            | 5260 - 5320 MHz       |
| 5.5 GHz WLAN       | Data            | 5500 - 5700 MHz       |
| Bluetooth          | Data            | 2402 - 2480 MHz       |

## 1.2 Power Reduction for SAR

This device uses proximity sensing mechanisms for SAR compliance. Powers are reduced when the device is held-to-ear (for voice or VoIP calls) and when it is used in close proximity to the user's body (tablet operations). The proximity sensors trigger power reduction for all voice and data modes. There are no body-worn accessories for this device.

The held-to-ear RF exposure conditions were evaluated at reduced power according to the Head SAR test positions described in IEEE 1528. Since the device is a full size tablet, the body SAR was evaluated per FCC KDB Publication 616217 D04 for full sized tablets.

## 1.3 Nominal and Maximum Output Power Specifications

This device operates using the following maximum and nominal output power specifications. SAR values were scaled to the maximum allowed power to determine compliance per KDB Publication 447498 D01v05.

### 1.3.1 Maximum Power

| Mode / Band        |         | Voice (dBm) | Burst Average GMSK (dBm) |            |            |            | Burst Average 8-PSK (dBm) |            |            |            |
|--------------------|---------|-------------|--------------------------|------------|------------|------------|---------------------------|------------|------------|------------|
|                    |         | 1 TX Slot   | 1 TX Slots               | 2 TX Slots | 3 TX Slots | 4 TX Slots | 1 TX Slots                | 2 TX Slots | 3 TX Slots | 4 TX Slots |
| GSM/GPRS/EDGE 850  | Maximum | 33.0        | 33.0                     | 31.5       | 30.5       | 29.0       | 25.5                      | 24.0       | 23.5       | 22.0       |
|                    | Nominal | 32.5        | 32.5                     | 31.0       | 30.0       | 28.5       | 25.0                      | 23.5       | 23.0       | 21.5       |
| GSM/GPRS/EDGE 1900 | Maximum | 30.0        | 30.0                     | 29.0       | 28.0       | 26.5       | 26.5                      | 25.0       | 23.5       | 22.0       |
|                    | Nominal | 29.5        | 29.5                     | 28.5       | 27.5       | 26.0       | 26.0                      | 24.5       | 23.0       | 21.5       |

|                                      |                                                                                     |                              |                                                                                       |                                 |
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| Mode / Band            |         | Modulated Average (dBm) |                  |                  |                     |
|------------------------|---------|-------------------------|------------------|------------------|---------------------|
|                        |         | 3GPP WCDMA Rel 99       | 3GPP HSDPA Rel 6 | 3GPP HSUPA Rel 6 | 3GPP DC-HSDPA Rel 8 |
| UMTS Band 5 (850 MHz)  | Maximum | 23.5                    | 23.0             | 22.5             | 23.0                |
|                        | Nominal | 23.0                    | 22.5             | 22.0             | 22.5                |
| UMTS Band 2 (1900 MHz) | Maximum | 24.0                    | 23.5             | 23.0             | 23.5                |
|                        | Nominal | 23.5                    | 23.0             | 22.5             | 23.0                |

| Mode / Band       |         | Modulated Average (dBm) |
|-------------------|---------|-------------------------|
| LTE Band 5 (Cell) | Maximum | 23.5                    |
|                   | Nominal | 23.0                    |

| Mode / Band            |         | Modulated Average (dBm) |
|------------------------|---------|-------------------------|
| IEEE 802.11b (2.4 GHz) | Maximum | 12.0                    |
|                        | Nominal | 11.5                    |
| IEEE 802.11g (2.4 GHz) | Maximum | 10.5                    |
|                        | Nominal | 10.0                    |
| IEEE 802.11n (2.4 GHz) | Maximum | 10.5                    |
|                        | Nominal | 10.0                    |
| IEEE 802.11a ( 5 GHz)  | Maximum | 9.5                     |
|                        | Nominal | 9.0                     |
| IEEE 802.11n (5 GHz)   | Maximum | 8.5                     |
|                        | Nominal | 8.0                     |
| Bluetooth              | Maximum | 12.0                    |
|                        | Nominal | 11.5                    |
| Bluetooth LE           | Maximum | 9.5                     |
|                        | Nominal | 9.0                     |

### 1.3.2 Reduced Power – Head and Body at 0mm:

| Mode / Band        |         | Voice (dBm) | Burst Average GMSK (dBm) |            |            |            | Burst Average 8-PSK (dBm) |            |            |            |
|--------------------|---------|-------------|--------------------------|------------|------------|------------|---------------------------|------------|------------|------------|
|                    |         | 1 TX Slot   | 1 TX Slots               | 2 TX Slots | 3 TX Slots | 4 TX Slots | 1 TX Slots                | 2 TX Slots | 3 TX Slots | 4 TX Slots |
| GSM/GPRS/EDGE 850  | Maximum | 22.5        | 22.5                     | 22.5       | 21.0       | 18.5       | 24.0                      | 22.5       | 20.5       | 19.0       |
|                    | Nominal | 22.0        | 22.0                     | 22.0       | 20.5       | 18.0       | 23.5                      | 22.0       | 20.0       | 18.5       |
| GSM/GPRS/EDGE 1900 | Maximum | 19.5        | 19.5                     | 18.5       | 16.5       | 15.5       | 19.5                      | 18.5       | 16.5       | 14.5       |
|                    | Nominal | 19.0        | 19.0                     | 18.0       | 16.0       | 15.0       | 19.0                      | 18.0       | 16.0       | 14.0       |

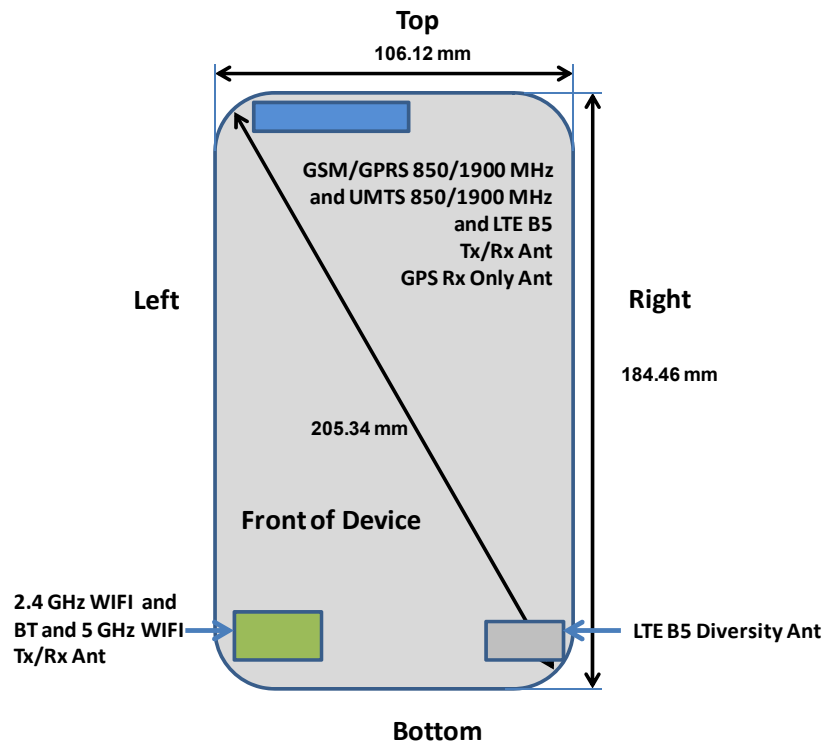
|                                      |                                                                                     |                              |                                                                                       |                                 |
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| Mode / Band            |         | Modulated Average (dBm) |                  |                  |                     |
|------------------------|---------|-------------------------|------------------|------------------|---------------------|
|                        |         | 3GPP WCDMA Rel 99       | 3GPP HSDPA Rel 6 | 3GPP HSUPA Rel 6 | 3GPP DC-HSDPA Rel 8 |
| UMTS Band 5 (850 MHz)  | Maximum | 19.5                    | 19.5             | 18.5             | 19.5                |
|                        | Nominal | 19.0                    | 19.0             | 18.0             | 19.0                |
| UMTS Band 2 (1900 MHz) | Maximum | 12.0                    | 12.0             | 11.0             | 12.0                |
|                        | Nominal | 11.5                    | 11.5             | 10.5             | 11.5                |

| Mode / Band       |         | Modulated Average (dBm) |
|-------------------|---------|-------------------------|
| LTE Band 5 (Cell) | Maximum | 18.0                    |
|                   | Nominal | 17.5                    |

## 1.4 DUT Antenna Locations



Note: Exact antenna dimensions and separation distances are shown in the Technical Descriptions in the FCC Filing.

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

|                                      |                                                                                     |                              |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
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**Table 1-1**  
**Mobile Body Sides for SAR Testing**

| Sides for Body SAR Testing |      |     |        |       |      |
|----------------------------|------|-----|--------|-------|------|
| Mode                       | Back | Top | Bottom | Right | Left |
| GPRS 850                   | Yes  | Yes | No     | Yes   | Yes  |
| GPRS 1900                  | Yes  | Yes | No     | Yes   | Yes  |
| UMTS 850                   | Yes  | Yes | No     | Yes   | Yes  |
| UMTS 1900                  | Yes  | Yes | No     | Yes   | Yes  |
| LTE Band 5 (Cell)          | Yes  | Yes | No     | Yes   | Yes  |
| 2.4 GHz WLAN               | Yes  | No  | Yes    | No    | Yes  |
| 5 GHz WLAN                 | Yes  | No  | Yes    | No    | Yes  |
| 2.4 GHz Bluetooth          | Yes  | No  | Yes    | No    | Yes  |

Note: Per FCC KDB 616217 D04v01r01, Particular DUT edges were not required to be evaluated for SAR based on the SAR exclusion threshold in KDB 447498 D01v05r01. The antenna document shows the distances between the transmit antennas and the edges of the device.

## 1.5 Simultaneous Transmission Capabilities

According to FCC KDB Publication 447498 D05v01, 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**

|                                             |                                                                                     |                                     |                                                                                       |                                        |
|---------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
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This device contains multiple transmitters that may operate simultaneously, and therefore requires a simultaneous transmission analysis according to FCC KDB Publication 447498 D01v05 3) procedures.

**Table 1-2**  
**Simultaneous Transmission Scenarios**

| No. | Capable Transmit Configuration      | Head | Body | Notes             |
|-----|-------------------------------------|------|------|-------------------|
| 1   | GSM voice + 2.4 GHz Wi-Fi           | Yes  | Yes  |                   |
| 2   | GSM voice + 5 GHz Wi-Fi             | Yes  | Yes  |                   |
| 3   | GSM voice + 2.4 GHz Bluetooth       | N/A  | Yes  |                   |
| 4   | UMTS voice/data + 2.4 GHz Wi-Fi     | Yes  | Yes  |                   |
| 5   | UMTS voice/data + 5 GHz Wi-Fi       | Yes  | Yes  |                   |
| 6   | UMTS voice/data + 2.4 GHz Bluetooth | N/A  | Yes  |                   |
| 7   | LTE + 2.4 GHz Wi-Fi                 | Yes  | Yes  |                   |
| 8   | LTE + 5 GHz Wi-Fi                   | N/A  | Yes  | 5 GHz WiFi Direct |
| 9   | LTE + 2.4 GHz Bluetooth             | N/A  | Yes  |                   |
| 10  | GPRS/EDGE data + 2.4 GHz Wi-Fi      | N/A  | Yes  |                   |
| 11  | GPRS/EDGE data + 5 GHz Wi-Fi        | N/A  | Yes  | 5 GHz WiFi Direct |
| 12  | GPRS/EDGE data + 2.4 GHz Bluetooth  | N/A  | Yes  |                   |

**Notes:**

1. 2.4 GHz WLAN, 2.4 GHz Bluetooth, and 5 GHz WLAN share the same antenna path and cannot transmit simultaneously.
2. When the user utilizes multiple services in UMTS 3G mode, it uses multi-Radio Access Bearer or multi-RAB. The power control is based on a physical control channel (Dedicated Physical Control Channel [DPCCH]) and power control will be adjusted to meet the needs of both services. Therefore, the UMTS+WLAN scenario also represents the UMTS Voice/DATA + WLAN Hotspot scenario.
3. Per the manufacturer, WIFI Direct is not expected to be used in conjunction with a held-to-ear. Therefore, there are no simultaneous transmission scenarios involving WIFI direct beyond that listed in the above table.
4. Per FCC KDB 616217 D04 4.3, when voice mode is limited to speaker mode or headset operations only for body operations, additional SAR testing for tablet voice use is not required. Therefore, voice standalone and simultaneous combinations are not evaluated for body configurations. Corresponding data modes are used for summation with Bluetooth when applicable.

## 1.6 SAR Test Exclusions Applied

### (A) Bluetooth

Per FCC KDB 447498 D01v05, the SAR exclusion threshold for distances <50mm is defined by the following equation:

$$\frac{\text{Max Power of Channel (mW)}}{\text{Test Separation Dist (mm)}} * \sqrt{\text{Frequency(GHz)}} \leq 3.0$$

Based on the maximum conducted power of Bluetooth LE (rounded to the nearest mW) and the antenna to user separation distance, Bluetooth LE SAR was not required;  $[(9/5) * \sqrt{2.44}] = 2.8 < 3.0$ . Per KDB Publication 447498 D01v05, the maximum power of the channel was rounded to the nearest mW before calculation.

### (B) Licensed Transmitter(s)

GSM/GPRS/EDGE DTM is not supported for US bands. Therefore, the GSM Voice modes in this report do not transmit simultaneously with GPRS/EDGE Data.

This device is only capable of QPSK HSUPA in the uplink. Therefore, no additional SAR tests are required beyond that described for devices with HSUPA in KDB 941225 D01v02.

|                                             |                                                                                     |                                     |                                                                                       |                                        |
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LTE SAR for the higher modulations and lower bandwidths were not tested since the maximum average output power of all required channels and configurations was not more than 0.5 dB higher than the highest bandwidth; and the reported LTE SAR for the highest bandwidth was less than 1.45 W/kg for all configurations according to FCC KDB 941225 D05v02.

## 1.7 Guidance Applied

- IEEE 1528-2003
- FCC KDB Publication 941225 D01-D06 (2G/3G/4G)
- FCC KDB Publication 248227 D01v01r02 (SAR Considerations for 802.11 Devices)
- FCC KDB Publication 447498 D01v05 (General SAR Guidance)
- FCC KDB Publication 865664 D01-D02 (SAR Measurements up to 6 GHz)
- FCC KDB Publication 616217 D04 (Tablet SAR Considerations)
- October 2013 TCB Workshop Notes (GPRS SAR Considerations)

## 1.8 Device Serial Numbers

| Mode               | Max Power Head Serial Number | Reduced Power Head Serial Number | Max Power Body Serial Number | Reduced Power Body Serial Number |
|--------------------|------------------------------|----------------------------------|------------------------------|----------------------------------|
| GSM/GPRS/EDGE 850  | N/A                          | FL-147-E                         | FL-147-C                     | FL-147-E                         |
| GSM/GPRS/EDGE 1900 | N/A                          | FL-147-F                         | FL-147-C                     | FL-147-F                         |
| UMTS 850           | N/A                          | FL-147-E                         | FL-147-C                     | FL-147-E                         |
| UMTS 1900          | N/A                          | FL-147-E                         | FL-147-C                     | FL-147-E                         |
| LTE Band 5 (Cell)  | N/A                          | FL-147-E                         | FL-147-C                     | FL-147-E                         |
| 2.4 GHz WLAN       | FL-147-C                     | N/A                              | FL-147-C                     | N/A                              |
| 5 GHz WLAN         | FL-147-C                     | N/A                              | FL-147-A                     | N/A                              |
| Bluetooth          | N/A                          | N/A                              | FL-147-C                     | N/A                              |

Several samples were used with identical hardware to support SAR testing. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.

|                                             |                                                                                     |                                     |                                                                                       |                                        |
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## 2 LTE INFORMATION

| LTE Information                                                                                                   |                                                  |               |               |
|-------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|---------------|---------------|
| <b>FCC ID</b>                                                                                                     | <b>A3LSMT235</b>                                 |               |               |
| Form Factor                                                                                                       | Portable Tablet                                  |               |               |
| Frequency Range of each LTE transmission band                                                                     | LTE Band 5 (Cell) (824.7 - 848.3 MHz)            |               |               |
| Channel Bandwidths                                                                                                | LTE Band 5 (Cell): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz |               |               |
| Channel Numbers and Frequencies (MHz)                                                                             | Low                                              | Mid           | High          |
| LTE Band 5 (Cell): 1.4 MHz                                                                                        | 824.7 (20407)                                    | 836.5 (20525) | 848.3 (20643) |
| LTE Band 5 (Cell): 3 MHz                                                                                          | 825.5 (20415)                                    | 836.5 (20525) | 847.5 (20635) |
| LTE Band 5 (Cell): 5 MHz                                                                                          | 826.5 (20425)                                    | 836.5 (20525) | 846.5 (20625) |
| LTE Band 5 (Cell): 10 MHz                                                                                         | 829 (20450)                                      | 836.5 (20525) | 844 (20600)   |
| UE Category                                                                                                       | 4                                                |               |               |
| Modulations Supported in UL                                                                                       | QPSK, 16QAM                                      |               |               |
| 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                                              |               |               |

|                                             |                                                                                     |                                     |                                                                                       |                                        |
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### 3 INTRODUCTION

The FCC and Industry Canada have adopted the guidelines for evaluating the environmental effects of radio frequency (RF) radiation in ET Docket 93-62 on Aug. 6, 1996 and Health Canada Safety Code 6 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 [22]. 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]

|                                             |                                                                                     |                                     |                                                                                       |                                        |
|---------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
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| <b>Document S/N:</b><br>0Y1404170792-R1.A3L | <b>Test Dates:</b><br>04/17/14-05/08/14                                             | <b>DUT Type:</b><br>Portable Tablet |                                                                                       | Page 10 of 63                          |

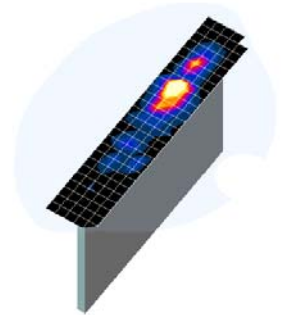
## 4

## DOSIMETRIC ASSESSMENT

### 4.1 Measurement Procedure

The evaluation was performed using the following procedure compliant to FCC KDB Publication 865664 D01v01 and IEEE 1528-2013:

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 and body interface and the horizontal grid resolution was determined per FCC KDB Publication 865664 D01v01 (See Table 4-1) and IEEE 1528-2013.
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 1g/10g cube evaluation. SAR at this fixed point was measured and used as a reference value.
3. Based on the area scan data, the peak of the region with maximum SAR was determined by spline interpolation. Around this point, a volume was assessed according to the measurement resolution and volume size requirements of FCC KDB Publication 865664 D01v01 (See Table 4-1) and IEEE 1528-2013. On the 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. SAR values at the inner surface of the phantom are extrapolated from the measured values along the line away from the surface with spacing no greater than that in Table 4-1. 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 4-1**  
Sample SAR Area Scan

**Table 4-1**  
Area and Zoom Scan Resolutions per FCC KDB Publication 865664 D01v01\*

| Frequency | Maximum Area Scan Resolution (mm)<br>( $\Delta x_{area}$ , $\Delta y_{area}$ ) | Maximum Zoom Scan Resolution (mm)<br>( $\Delta x_{zoom}$ , $\Delta y_{zoom}$ ) | Maximum Zoom Scan Spatial Resolution (mm) |                      |                               | Minimum Zoom Scan Volume (mm)<br>(x,y,z) |
|-----------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------|-------------------------------------------|----------------------|-------------------------------|------------------------------------------|
|           |                                                                                |                                                                                | Uniform Grid                              | Graded Grid          |                               |                                          |
|           |                                                                                |                                                                                |                                           | $\Delta z_{zoom}(n)$ | $\Delta z_{zoom}(1)^*$        |                                          |
| ≤ 2 GHz   | ≤ 15                                                                           | ≤ 8                                                                            | ≤ 5                                       | ≤ 4                  | ≤ 1.5* $\Delta z_{zoom}(n-1)$ | ≥ 30                                     |
| 2-3 GHz   | ≤ 12                                                                           | ≤ 5                                                                            | ≤ 5                                       | ≤ 4                  | ≤ 1.5* $\Delta z_{zoom}(n-1)$ | ≥ 30                                     |
| 3-4 GHz   | ≤ 12                                                                           | ≤ 5                                                                            | ≤ 4                                       | ≤ 3                  | ≤ 1.5* $\Delta z_{zoom}(n-1)$ | ≥ 28                                     |
| 4-5 GHz   | ≤ 10                                                                           | ≤ 4                                                                            | ≤ 3                                       | ≤ 2.5                | ≤ 1.5* $\Delta z_{zoom}(n-1)$ | ≥ 25                                     |
| 5-6 GHz   | ≤ 10                                                                           | ≤ 4                                                                            | ≤ 2                                       | ≤ 2                  | ≤ 1.5* $\Delta z_{zoom}(n-1)$ | ≥ 22                                     |

\*Also compliant to IEEE 1528-2013 Table 6

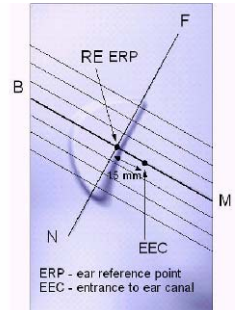
|                                      |                                                                                     |                              |  |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|------------------------------|--|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMT235                    |  | SAR EVALUATION REPORT        |  |  | Reviewed by:<br>Quality Manager |
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## 5

## DEFINITION OF REFERENCE POINTS

### 5.1 EAR REFERENCE POINT

Figure 5-2 shows the front, back and side views of the SAM Twin Phantom. The point “M” is the reference point for the center of the mouth, “LE” is the left ear reference point (ERP), and “RE” is the right ERP. The ERP is 15mm posterior to the entrance to the ear canal (EEC) along the B-M line (Back-Mouth), as shown in Figure 5-1. The plane passing through the two ear canals and M is defined as the Reference Plane. The line N-F (Neck-Front), also called the Reference Pivoting Line, is not perpendicular to the reference plane (see Figure 5-1). Line B-M is perpendicular to the N-F line. Both N-F and B-M lines are marked on the external phantom shell to facilitate handset positioning [5].



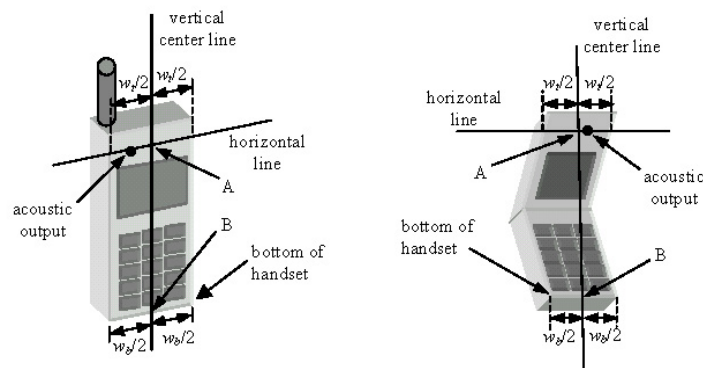
**Figure 5-1**  
Close-Up Side view  
of ERP

### 5.2 HANDSET REFERENCE POINTS

Two imaginary lines on the handset were established: the vertical centerline and the horizontal line. The test device was placed in a normal operating position with the acoustic output located along the “vertical centerline” on the front of the device aligned to the “ear reference point” (See Figure 5-3). The acoustic output was then located at the same level as the center of the ear reference point. The test device was positioned so that the “vertical centerline” was bisecting the front surface of the handset at its top and bottom edges, positioning the “ear reference point” on the outer surface of the both the left and right head phantoms on the ear reference point.



**Figure 5-2**  
Front, back and side view of SAM Twin Phantom



**Figure 5-3**  
Handset Vertical Center & Horizontal Line Reference Points

|                                      |                                                                                     |                              |                                                                                       |                                 |
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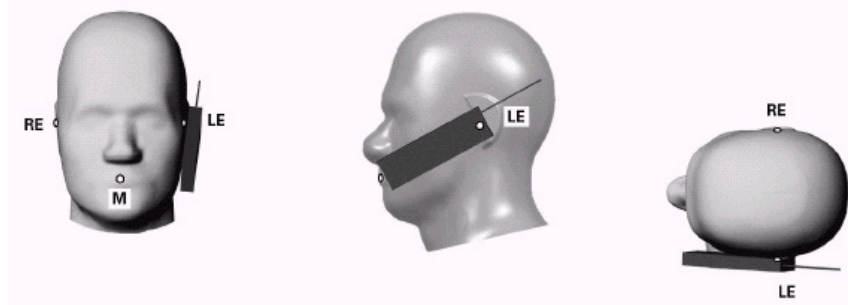
## 6 TEST CONFIGURATION POSITIONS FOR HANDSETS

### 6.1 Device Holder

The device holder is made out of low-loss POM material having the following dielectric parameters: relative permittivity  $\epsilon = 3$  and loss tangent  $\delta = 0.02$ .

### 6.2 Positioning for Cheek

1. The test device was positioned with the device close to the surface of the phantom such that point A is on the (virtual) extension of the line passing through points RE and LE on the phantom (see Figure 6-1), such that the plane defined by the vertical center line and the horizontal line of the phone is approximately parallel to the sagittal plane of the phantom.



**Figure 6-1 Front, Side and Top View of Cheek Position**

2. The handset was translated towards the phantom along the line passing through RE & LE until the handset touches the pinna.
3. While maintaining the handset in this plane, the handset was rotated around the LE-RE line until the vertical centerline was in the reference plane.
4. The phone was then rotated around the vertical centerline until the phone (horizontal line) was symmetrical with respect to the line NF.
5. While maintaining the vertical centerline in the reference plane, keeping point A on the line passing through RE and LE, and maintaining the device contact with the ear, the device was rotated about the NF line until any point on the handset made contact with a phantom point below the ear (cheek) (See Figure 6-2).

### 6.3 Positioning for Ear / 15° Tilt

With the test device aligned in the “Cheek Position”:

1. While maintaining the orientation of the phone, the phone was retracted parallel to the reference plane far enough to enable a rotation of the phone by 15 degrees.
2. The phone was then rotated around the horizontal line by 15 degrees.
3. While maintaining the orientation of the phone, the phone was moved parallel to the reference plane until any part of the handset touched the head. (In this position, point A was located on the line RE-LE). The tilted position is obtained when the contact is on the pinna. If the contact was at any location other than the pinna, the angle of the phone would then be reduced. In this situation, the tilted position was obtained when any part of the phone was in contact of the ear as well as a second part of the phone was in contact with the head (see Figure 6-2).

|                                      |                                                                                     |                              |                                                                                       |                                 |
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## 7 RF EXPOSURE LIMITS

### 7.1 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.

### 7.2 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 7-1**  
**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) |
| <b>Peak Spatial Average SAR</b><br>Head                             | 1.6                                                                       | 8.0                                                               |
| <b>Whole Body SAR</b>                                               | 0.08                                                                      | 0.4                                                               |
| <b>Peak Spatial Average SAR</b><br>Hands, Feet, Ankle, Wrists, etc. | 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.

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

### 8.1 Measured and Reported SAR

Per FCC KDB Publication 447498 D01v05, When SAR is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance. For simultaneous transmission, the measured aggregate SAR must be scaled according to the sum of the differences between the maximum tune-up tolerance and actual power used to test each transmitter. When SAR is measured at or scaled to the maximum tune-up tolerance limit, the results are referred to as *reported* SAR. The highest *reported* SAR results are identified on the grant of equipment authorization according to procedures in KDB 690783 D01v01r02.

### 8.2 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.

### 8.3 SAR Measurement Conditions for UMTS

#### 8.3.1 Output Power Verification

Maximum output power is measured on the High, Middle and Low channels for each applicable transmission band according to the general descriptions in section 5.2 of 3GPP TS 34.121, using the appropriate RMC or AMR with TPC (transmit power control) set to all "1s".

Maximum output power is verified on the High, Middle and Low channels according to the general descriptions in section 5.2 of 3GPP TS 34.121 (release 5), using the appropriate RMC with TPC (transmit power control) set to all "1s" or applying the required inner loop power control procedures to maintain maximum output power while HSUPA is active. Results for all applicable physical channel configurations (DPCCH, DPDCHn and spreading codes, HS-DPCCH etc) are tabulated in this test report. All configurations that are not supported by the DUT or cannot be measured due to technical or equipment limitations are identified.

|                                      |                                                                                     |                              |                                                                                       |                                 |
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### 8.3.2 Head SAR Measurements for Handsets

SAR for head exposure configurations is measured using the 12.2 kbps RMC with TPC bits configured to all "1s". SAR in AMR configurations is not required when the maximum average output of each RF channel for 12.2 kbps AMR is less than 0.25 dB higher than that measured in 12.2 kbps RMC. Otherwise, SAR is measured on the maximum output channel in 12.2 AMR with a 3.4 kbps SRB (signaling radio bearer) using the exposure configuration that resulted in the highest SAR for that RF channel in the 12.2 kbps RMC mode.

### 8.3.3 Body SAR Measurements

SAR for body exposure configurations is measured using the 12.2 kbps RMC with the TPC bits all "1s".

### 8.3.4 Procedures Used to Establish RF Signal for SAR HSDPA Data Devices

The following procedures are applicable to HSDPA data devices operating under 3GPP Release 5. Body exposure conditions are typically applicable to these devices, including handsets and data modems operating in various electronic devices. HSDPA operates in conjunction with UMTS and requires an active DPCH. The default test configuration is to measure SAR in UMTS without HSDPA, with an established radio link between the DUT and a communication test set with 12.2 kbps RMC mode configured in Test Loop Mode 1; and tested with HSDPA with FRC and a 12.2 kbps RMC using the highest SAR configuration in UMTS. SAR is selectively confirmed for other physical channel configurations according to output power, exposure conditions and device operating capabilities. Maximum output power is verified according to 3GPP TS 23.121 (Release 5) and SAR must be measured according to these maximum output conditions.

| Sub-Test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | $\beta_c$         | $\beta_d$         | $\beta_d$<br>(SF) | $\beta_c/\beta_d$ | $\beta_{HS}$<br>(Note 1,<br>Note 2) | CM (dB)<br>(Note 3) | MPR (dB)<br>(Note 3) |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------------------------|---------------------|----------------------|
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 2/15              | 15/15             | 64                | 2/15              | 4/15                                | 0.0                 | 0.0                  |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 12/15<br>(Note 4) | 15/15<br>(Note 4) | 64                | 12/15<br>(Note 4) | 24/15                               | 1.0                 | 0.0                  |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 15/15             | 8/15              | 64                | 15/8              | 30/15                               | 1.5                 | 0.5                  |
| 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 15/15             | 4/15              | 64                | 15/4              | 30/15                               | 1.5                 | 0.5                  |
| <p>Note 1: <math>\Delta_{ACK}</math>, <math>\Delta_{NACK}</math> and <math>\Delta_{CQI} = 8 \Leftrightarrow A_{HS} = \beta_{HS}/\beta_c = 30/15 \Leftrightarrow \beta_{HS} = 30/15 * \beta_c</math>.</p> <p>Note 2: For the HS-DPCCH power mask requirement test in clause 5.2C, 5.7A, and the Error Vector Magnitude (EVM) with HS-DPCCH test in clause 5.13.1A, and HSDPA EVM with phase discontinuity in clause 5.13.1AA, <math>\Delta_{ACK}</math> and <math>\Delta_{NACK} = 8</math> (<math>A_{HS} = 30/15</math>) with <math>\beta_{HS} = 30/15 * \beta_c</math>, and <math>\Delta_{CQI} = 7</math> (<math>A_{HS} = 24/15</math>) with <math>\beta_{HS} = 24/15 * \beta_c</math>.</p> <p>Note 3: CM = 1 for <math>\beta_c/\beta_d = 12/15</math>, <math>\beta_{HS}/\beta_c = 24/15</math>. For all other combinations of DPCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.</p> |                   |                   |                   |                   |                                     |                     |                      |

Figure 8-1  
Table C.10.1.4 of TS 234.121-1

### 8.3.5 SAR Measurement Conditions for HSUPA Data Devices

SAR for body exposure configurations are measured according to the 'Body SAR Measurements' procedures in the 'WCDMA Handsets' section of the KDB 941225 D01 FCC 3G document. In addition, Body SAR is also measured for HSPA when the maximum average output of each RF channel with HSPA active is at least ¼ dB higher of that measured without HSPA in 12.2 kbps RMC mode or the maximum SAR for 12.2 kbps RMC is above 75% of the SAR limit. Body SAR for HSPA is measured with E-DCH Sub-test 5, using H-Set 1 and QPSK for FRC and a 12.2 kbps RMC configured in Test Loop Mode 1 with power control algorithm 2, according to the highest body SAR configuration in 12.2 kbps RMC without HSPA. When VOIP is applicable for head exposure, SAR is not required when the maximum output of each RF channel with HSPA is less than ¼ dB

|                                             |                                                                                                                                   |                                     |                                                                                       |                                        |
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| <b>Document S/N:</b><br>0Y1404170792-R1.A3L | <b>Test Dates:</b><br>04/17/14-05/08/14                                                                                           | <b>DUT Type:</b><br>Portable Tablet |                                                                                       | Page 17 of 63                          |

higher than that measured using 12.2 kbps RMC; otherwise, the same HSPA configuration used for body measurements should be used to test for head exposure.

Due to inner loop power control requirements in HSPA, a commercial communication test set should be used for the output power and SAR tests. The 12.2 kbps RMC, FRC H-set 1 and EDCH configurations for HSPA should be configured according to the  $\beta$  values indicated below as well as other applicable procedures described in the 'WCDMA Handset' and 'Release 5 HSDPA Data Devices' sections of the FCC 3G document.

| Sub-test | $\beta_c$            | $\beta_d$            | $\beta_d$ (SF) | $\beta_c/\beta_d$    | $\beta_{\text{rel}}^{(1)}$ | $\beta_{\text{rel}}$ | $\beta_{\text{rel}}$                                       | $\beta_{\text{rel}}$ (SF) | $\beta_{\text{rel}}$ (codes) | CM <sup>(2)</sup> | MPR (dB) | AG <sup>(4)</sup> Index | E-TFCI |
|----------|----------------------|----------------------|----------------|----------------------|----------------------------|----------------------|------------------------------------------------------------|---------------------------|------------------------------|-------------------|----------|-------------------------|--------|
| 1        | 11/15 <sup>(3)</sup> | 15/15 <sup>(3)</sup> | 64             | 11/15 <sup>(3)</sup> | 22/15                      | 209/225              | 1039/225                                                   | 4                         | 1                            | 1.0               | 0.0      | 20                      | 75     |
| 2        | 6/15                 | 15/15                | 64             | 6/15                 | 12/15                      | 12/15                | 94/75                                                      | 4                         | 1                            | 3.0               | 2.0      | 12                      | 67     |
| 3        | 15/15                | 9/15                 | 64             | 15/9                 | 30/15                      | 30/15                | $\beta_{\text{rel}}: 47/15$<br>$\beta_{\text{rel}}: 47/15$ | 4                         | 2                            | 2.0               | 1.0      | 15                      | 92     |
| 4        | 2/15                 | 15/15                | 64             | 2/15                 | 4/15                       | 2/15                 | 56/75                                                      | 4                         | 1                            | 3.0               | 2.0      | 17                      | 71     |
| 5        | 15/15 <sup>(4)</sup> | 15/15 <sup>(4)</sup> | 64             | 15/15 <sup>(4)</sup> | 30/15                      | 24/15                | 134/15                                                     | 4                         | 1                            | 1.0               | 0.0      | 21                      | 81     |

Note 1:  $\Delta_{\text{ACK}}, \Delta_{\text{NACK}}$  and  $\Delta_{\text{OCH}} = 8 \Rightarrow A_{\text{IS}} = \beta_{\text{IS}}/\beta_c = 30/15 \Rightarrow \beta_{\text{IS}} = 30/15 * \beta_c$ .

Note 2: CM = 1 for  $\beta_c/\beta_d = 12/15, \beta_{\text{rel}}/\beta_c = 24/15$ . For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.

Note 3: For subtest 1 the  $\beta_c/\beta_d$  ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to  $\beta_c = 10/15$  and  $\beta_d = 15/15$ .

Note 4: For subtest 5 the  $\beta_c/\beta_d$  ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to  $\beta_c = 14/15$  and  $\beta_d = 15/15$ .

Note 5: Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Table 5.1g.

Note 6:  $\beta_{\text{rel}}$  can not be set directly; it is set by Absolute Grant Value.

### 8.3.6 SAR Measurement Conditions for DC-HSDPA

SAR test exclusion for DC-HSDPA devices is determined by power measurements according to the H-Set 12, Fixed Reference Channel (FRC) configuration in Table C.8.1.12 of 3GPP TS 34.121-1. A primary and a secondary serving HS-DSCH Cell are required to perform the power measurement and for the results to qualify for SAR test exclusion. DC-HSDPA uplink maximum output power measurements using the four Rel. 5 HSDPA subtests in Table C.10.1.4 of TS 23.4.121-1 is required.

When the maximum average output power of each RF channel with DC-HSDPA active is  $\leq 1/4$  dB higher than that measured using 12.2 kbps RMC, or the maximum reported SAR for 12.2 kbps RMC is  $\leq 75\%$  of the SAR limit, SAR evaluation for DC-HSDPA is not required

## 8.4 SAR Measurement Conditions for LTE

LTE modes were tested according to FCC KDB 941225 D05v02 publication. Please see notes after the tabulated 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. SAR tests were performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI).

### 8.4.1 Spectrum Plots for RB Configurations

A properly configured base station simulator was used for SAR tests and power measurements. Therefore, spectrum plots for RB configurations were not required to be included in this report.

### 8.4.2 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.

|                                      |                                                                                     |                              |                                                                                       |                                 |
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### 8.4.3 A-MPR

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

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

According to FCC KDB 941225 D05v02r01:

- a. Per Section 5.2.1, SAR is required for QPSK 1 RB Allocation for the largest bandwidth
  - i. The required channel and offset combination with the highest maximum output power is required for SAR.
  - ii. When the reported SAR is  $\leq 0.8$  W/kg, testing of the remaining RB offset configurations and required test channels is not required. Otherwise, SAR is required for the remaining required test channels using the RB offset configuration with highest output power for that channel.
  - iii. When the reported SAR for a required test channel is  $> 1.45$  W/kg, SAR is required for all RB offset configurations for that channel.
- b. Per Section 5.2.2, SAR is required for 50% RB allocation using the largest bandwidth following the same procedures outlined in Section 5.2.1.
- c. Per Section 5.2.3, QPSK SAR is not required for the 100% allocation when the highest maximum output power for the 100% allocation is less than the highest maximum output power of the 1 RB and 50% RB allocations and the reported SAR for the 1 RB and 50% RB allocations is  $< 0.8$  W/kg.
- d. Per Section 5.2.4 and 5.3, SAR tests for higher order modulations and lower bandwidths configurations are not required when the conducted power of the required test configurations determined by Sections 5.2.1 through 5.2.3 is less than or equal to  $\frac{1}{2}$  dB higher than the equivalent configuration using QPSK modulation and when the QPSK SAR for those configurations is  $< 1.45$  W/kg.

## 8.5 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 D01v01r02 for more details.

### 8.5.1 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.

### 8.5.2 Frequency Channel Configurations [24]

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.

|                                      |                                                                                     |                              |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
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For 5 GHz, the highest average RF output power channel across the default test channels at the lowest data rate was selected for SAR evaluation in 802.11a. When the adjacent channels are higher in power than the default channels, these “required channels” were considered instead of the default channels for SAR testing. 802.11n modes and higher data rates for 802.11a/n were evaluated only if the respective mode was higher than 0.25 dB or more than the 802.11a mode.

If the maximum extrapolated peak SAR of the zoom scan for the highest output channel was less than 1.6 W/kg and 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.

|                                             |                                                                                     |                                     |                                                                                       |                                        |
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## 9 RF CONDUCTED POWERS

### 9.1 GSM Conducted Powers

**Table 9-1**  
**Maximum GSM/GPRS/EDGE Average RF Conducted Powers**

|          |               | Maximum Burst-Averaged Output Power            |                            |                            |                            |                            |                            |                            |                            |                            |
|----------|---------------|------------------------------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
|          |               | Voice                                          | GPRS/EDGE Data (GMSK)      |                            |                            |                            | EDGE Data (8-PSK)          |                            |                            |                            |
| Band     | Channel       | GSM [dBm]<br>CS<br>(1 Slot)                    | GPRS [dBm]<br>1 Tx<br>Slot | GPRS [dBm]<br>2 Tx<br>Slot | GPRS [dBm]<br>3 Tx<br>Slot | GPRS [dBm]<br>4 Tx<br>Slot | EDGE [dBm]<br>1 Tx<br>Slot | EDGE [dBm]<br>2 Tx<br>Slot | EDGE [dBm]<br>3 Tx<br>Slot | EDGE [dBm]<br>4 Tx<br>Slot |
| GSM 850  | 128           | 32.32                                          | 32.35                      | 31.25                      | 30.18                      | 28.58                      | 24.87                      | 23.33                      | 23.11                      | 21.29                      |
|          | 190           | 32.53                                          | 32.56                      | 31.42                      | 30.38                      | 28.81                      | 24.86                      | 23.46                      | 23.12                      | 21.41                      |
|          | 251           | 32.57                                          | 32.58                      | 31.50                      | 30.48                      | 28.93                      | 25.07                      | 23.74                      | 23.28                      | 21.96                      |
| GSM 1900 | 512           | 29.42                                          | 29.42                      | 28.30                      | 27.20                      | 25.60                      | 26.08                      | 24.71                      | 23.14                      | 21.82                      |
|          | 661           | 30.00                                          | 30.00                      | 28.98                      | 27.96                      | 26.40                      | 25.79                      | 24.31                      | 22.90                      | 21.41                      |
|          | 810           | 29.93                                          | 29.91                      | 28.86                      | 27.82                      | 26.24                      | 26.08                      | 24.50                      | 23.11                      | 21.30                      |
|          |               | Calculated Maximum Frame-Averaged Output Power |                            |                            |                            |                            |                            |                            |                            |                            |
|          |               | Voice                                          | GPRS/EDGE Data (GMSK)      |                            |                            |                            | EDGE Data (8-PSK)          |                            |                            |                            |
| Band     | Channel       | GSM [dBm]<br>CS<br>(1 Slot)                    | GPRS [dBm]<br>1 Tx<br>Slot | GPRS [dBm]<br>2 Tx<br>Slot | GPRS [dBm]<br>3 Tx<br>Slot | GPRS [dBm]<br>4 Tx<br>Slot | EDGE [dBm]<br>1 Tx<br>Slot | EDGE [dBm]<br>2 Tx<br>Slot | EDGE [dBm]<br>3 Tx<br>Slot | EDGE [dBm]<br>4 Tx<br>Slot |
| GSM 850  | 128           | 23.29                                          | 23.32                      | 25.23                      | 25.92                      | 25.57                      | 15.84                      | 17.31                      | 18.85                      | 18.28                      |
|          | 190           | 23.50                                          | 23.53                      | 25.40                      | 26.12                      | 25.80                      | 15.83                      | 17.44                      | 18.86                      | 18.40                      |
|          | 251           | 23.54                                          | 23.55                      | 25.48                      | 26.22                      | 25.92                      | 16.04                      | 17.72                      | 19.02                      | 18.95                      |
| GSM 1900 | 512           | 20.39                                          | 20.39                      | 22.28                      | 22.94                      | 22.59                      | 17.05                      | 18.69                      | 18.88                      | 18.81                      |
|          | 661           | 20.97                                          | 20.97                      | 22.96                      | 23.70                      | 23.39                      | 16.76                      | 18.29                      | 18.64                      | 18.40                      |
|          | 810           | 20.90                                          | 20.88                      | 22.84                      | 23.56                      | 23.23                      | 17.05                      | 18.48                      | 18.85                      | 18.29                      |
| GSM 850  | Frame         | 23.47                                          | 23.47                      | 24.98                      | 25.74                      | 25.49                      | 15.97                      | 17.48                      | 18.74                      | 18.49                      |
| GSM 1900 | Avg. Targets: | 20.47                                          | 20.47                      | 22.48                      | 23.24                      | 22.99                      | 16.97                      | 18.48                      | 18.74                      | 18.49                      |

**Table 9-2**  
**Reduced GSM/GPRS/EDGE Average RF Conducted Powers**  
**Representing Head and Body at 0 mm**

|          |         | Maximum Burst-Averaged Output Power |                            |                            |                            |                            |                            |                            |                            |                            |
|----------|---------|-------------------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
|          |         | Voice                               | GPRS/EDGE Data (GMSK)      |                            |                            |                            | EDGE Data (8-PSK)          |                            |                            |                            |
| Band     | Channel | GSM [dBm]<br>CS<br>(1 Slot)         | GPRS [dBm]<br>1 Tx<br>Slot | GPRS [dBm]<br>2 Tx<br>Slot | GPRS [dBm]<br>3 Tx<br>Slot | GPRS [dBm]<br>4 Tx<br>Slot | EDGE [dBm]<br>1 Tx<br>Slot | EDGE [dBm]<br>2 Tx<br>Slot | EDGE [dBm]<br>3 Tx<br>Slot | EDGE [dBm]<br>4 Tx<br>Slot |
| GSM 850  | 128     | 21.89                               | 21.75                      | 21.70                      | 20.12                      | 17.81                      | 23.58                      | 21.80                      | 20.31                      | 18.30                      |
|          | 190     | 22.25                               | 22.04                      | 22.09                      | 20.56                      | 18.20                      | 23.63                      | 21.96                      | 20.50                      | 18.53                      |
|          | 251     | 22.31                               | 22.31                      | 22.35                      | 21.00                      | 18.50                      | 23.74                      | 22.30                      | 20.40                      | 18.73                      |
| GSM 1900 | 512     | 19.42                               | 18.56                      | 17.72                      | 15.55                      | 14.50                      | 19.30                      | 18.05                      | 16.08                      | 14.50                      |
|          | 661     | 19.50                               | 19.38                      | 18.45                      | 16.40                      | 15.25                      | 19.27                      | 17.72                      | 15.91                      | 14.11                      |
|          | 810     | 19.09                               | 19.08                      | 18.22                      | 16.08                      | 14.88                      | 19.50                      | 18.08                      | 16.08                      | 14.14                      |

|                                      |                                                                                     |                              |                                                                                       |                                 |
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|          |               | Calculated Maximum Frame-Averaged Output Power |                            |                            |                            |                            |                            |                            |                            |                            |
|----------|---------------|------------------------------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
|          |               | Voice                                          | GPRS/EDGE Data (GMSK)      |                            |                            |                            | EDGE Data (8-PSK)          |                            |                            |                            |
| Band     | Channel       | GSM [dBm]<br>CS<br>(1 Slot)                    | GPRS [dBm]<br>1 Tx<br>Slot | GPRS [dBm]<br>2 Tx<br>Slot | GPRS [dBm]<br>3 Tx<br>Slot | GPRS [dBm]<br>4 Tx<br>Slot | EDGE [dBm]<br>1 Tx<br>Slot | EDGE [dBm]<br>2 Tx<br>Slot | EDGE [dBm]<br>3 Tx<br>Slot | EDGE [dBm]<br>4 Tx<br>Slot |
| GSM 850  | 128           | 12.86                                          | 12.72                      | 15.68                      | <b>15.86</b>               | 14.80                      | 14.55                      | 15.78                      | 16.05                      | 15.29                      |
|          | 190           | 13.22                                          | 13.01                      | 16.07                      | <b>16.30</b>               | 15.19                      | 14.60                      | 15.94                      | 16.24                      | 15.52                      |
|          | 251           | 13.28                                          | 13.28                      | 16.33                      | <b>16.74</b>               | 15.49                      | 14.71                      | 16.28                      | 16.14                      | 15.72                      |
| GSM 1900 | 512           | 10.39                                          | 9.53                       | 11.70                      | 11.29                      | <b>11.49</b>               | 10.27                      | 12.03                      | 11.82                      | 11.49                      |
|          | 661           | 10.47                                          | 10.35                      | 12.43                      | 12.14                      | <b>12.24</b>               | 10.24                      | 11.70                      | 11.65                      | 11.10                      |
|          | 810           | 10.06                                          | 10.05                      | 12.20                      | 11.82                      | <b>11.87</b>               | 10.47                      | 12.06                      | 11.82                      | 11.13                      |
| GSM 850  | Frame         | 12.97                                          | 12.97                      | 15.98                      | <b>16.24</b>               | 14.99                      | 14.47                      | 15.98                      | 15.74                      | 15.49                      |
| GSM 1900 | Avg. Targets: | 9.97                                           | 9.97                       | 11.98                      | 11.74                      | <b>11.99</b>               | 9.97                       | 11.98                      | 11.74                      | 10.99                      |

Note:

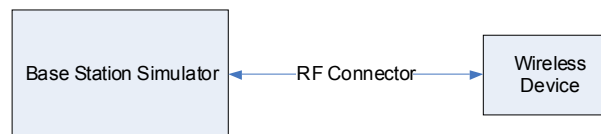
- Both burst-averaged and calculated frame-averaged powers are included. Frame-averaged power was calculated from the measured burst-averaged power by converting the slot powers into linear units and calculating the energy over 8 timeslots.
- The source-based frame-averaged output power was evaluated for all GPRS/EDGE slot configurations. The configuration with the highest target frame averaged output power was evaluated for body SAR. When the maximum frame-averaged powers are equivalent across two or more slots (within 0.25 dB), the configuration with the most number of time slots was tested.
- GPRS/EDGE (GMSK) output powers were measured with coding scheme setting of 1 (CS1) on the base station simulator. CS1 was configured to measure GPRS output power measurements and SAR to ensure GMSK modulation in the signal. Our Investigation has shown that CS1 - CS4 settings do not have any impact on the output levels or modulation in the GPRS modes.
- EDGE (8-PSK) output powers were measured with MCS7 on the base station simulator. MCS7 coding scheme was used to measure the output powers for EDGE since investigation has shown that choosing MCS7 coding scheme will ensure 8-PSK modulation. It has been shown that MCS levels that produce 8PSK modulation do not have an impact on output power.

**GSM Class: B**

**GPRS Multislot class: 33 (Max 4 Tx uplink slots)**

**EDGE Multislot class: 33 (Max 4 Tx uplink slots)**

**DTM Multislot Class: N/A**



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

|                                      |                                                                                     |                              |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
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## 9.2 UMTS Conducted Powers

**Table 9-3**  
**Maximum UMTS Average RF Conducted Powers**

| 3GPP Release Version | Mode     | 3GPP 34.121 Subtest | Cellular Band [dBm] |       |       | PCS Band [dBm] |       |       | 3GPP MPR [dB] |
|----------------------|----------|---------------------|---------------------|-------|-------|----------------|-------|-------|---------------|
|                      |          |                     | 4132                | 4183  | 4233  | 9262           | 9400  | 9538  |               |
| 99                   | WCDMA    | 12.2 kbps RMC       | 23.44               | 23.46 | 23.18 | 23.55          | 23.62 | 23.68 | -             |
| 99                   |          | 12.2 kbps AMR       | 23.41               | 23.34 | 23.40 | 23.40          | 23.54 | 23.71 | -             |
| 6                    | HSDPA    | Subtest 1           | 22.03               | 22.59 | 22.11 | 23.00          | 23.49 | 23.50 | 0             |
| 6                    |          | Subtest 2           | 21.59               | 22.13 | 22.35 | 22.54          | 22.41 | 22.70 | 0             |
| 6                    |          | Subtest 3           | 21.90               | 21.94 | 22.00 | 21.90          | 22.20 | 22.74 | 0.5           |
| 6                    |          | Subtest 4           | 21.47               | 21.58 | 22.16 | 22.50          | 22.41 | 23.00 | 0.5           |
| 6                    | HSUPA    | Subtest 1           | 21.41               | 21.64 | 21.96 | 21.00          | 21.66 | 21.53 | 0             |
| 6                    |          | Subtest 2           | 20.30               | 20.48 | 20.97 | 20.60          | 20.69 | 20.74 | 2             |
| 6                    |          | Subtest 3           | 21.03               | 21.39 | 21.69 | 21.03          | 21.44 | 21.78 | 1             |
| 6                    |          | Subtest 4           | 20.94               | 21.00 | 21.03 | 20.46          | 20.96 | 21.00 | 2             |
| 6                    |          | Subtest 5           | 21.26               | 21.62 | 21.61 | 22.06          | 22.57 | 22.29 | 0             |
| 8                    | DC-HSDPA | Subtest 1           | 22.92               | 22.85 | 22.64 | 23.17          | 23.30 | 23.28 | 0             |
| 8                    |          | Subtest 2           | 22.93               | 22.69 | 22.77 | 23.24          | 23.32 | 23.27 | 0             |
| 8                    |          | Subtest 3           | 21.89               | 21.74 | 21.73 | 22.31          | 22.34 | 22.38 | 0.5           |
| 8                    |          | Subtest 4           | 20.89               | 20.74 | 20.85 | 21.24          | 21.27 | 21.33 | 0.5           |

**Table 9-4**  
**Reduced UMTS Average RF Conducted Powers**  
**(Representing Head and Body at 0mm)**

| 3GPP Release Version | Mode     | 3GPP 34.121 Subtest | Cellular Band [dBm] |       |       | PCS Band [dBm] |       |       | 3GPP MPR [dB] |
|----------------------|----------|---------------------|---------------------|-------|-------|----------------|-------|-------|---------------|
|                      |          |                     | 4132                | 4183  | 4233  | 9262           | 9400  | 9538  |               |
| 99                   | WCDMA    | 12.2 kbps RMC       | 19.37               | 19.45 | 19.33 | 11.76          | 11.83 | 11.97 | -             |
| 99                   |          | 12.2 kbps AMR       | 19.30               | 19.38 | 19.26 | 11.72          | 11.50 | 11.96 | -             |
| 6                    | HSDPA    | Subtest 1           | 18.42               | 19.10 | 19.00 | 11.22          | 11.43 | 11.59 | 0             |
| 6                    |          | Subtest 2           | 18.36               | 19.03 | 18.90 | 11.22          | 11.43 | 11.59 | 0             |
| 6                    |          | Subtest 3           | 17.90               | 18.57 | 18.44 | 10.77          | 10.98 | 11.14 | 0.5           |
| 6                    |          | Subtest 4           | 17.93               | 18.99 | 18.57 | 10.56          | 11.00 | 11.18 | 0.5           |
| 6                    | HSUPA    | Subtest 1           | 17.54               | 18.43 | 18.18 | 10.13          | 10.52 | 10.66 | 0             |
| 6                    |          | Subtest 2           | 17.08               | 17.97 | 17.72 | 9.64           | 10.03 | 10.17 | 2             |
| 6                    |          | Subtest 3           | 16.85               | 17.74 | 17.49 | 10.43          | 10.62 | 10.84 | 1             |
| 6                    |          | Subtest 4           | 17.03               | 18.00 | 17.84 | 9.69           | 10.02 | 10.16 | 2             |
| 6                    |          | Subtest 5           | 17.50               | 18.31 | 18.06 | 10.00          | 10.51 | 10.78 | 0             |
| 8                    | DC-HSDPA | Subtest 1           | 18.41               | 19.16 | 18.94 | 11.12          | 11.40 | 11.53 | 0             |
| 8                    |          | Subtest 2           | 18.34               | 19.01 | 18.76 | 11.21          | 11.42 | 11.54 | 0             |
| 8                    |          | Subtest 3           | 17.57               | 18.63 | 18.45 | 10.79          | 11.00 | 11.16 | 0.5           |
| 8                    |          | Subtest 4           | 17.69               | 18.67 | 18.58 | 10.54          | 11.13 | 11.10 | 0.5           |

|                                      |                                                                                     |                              |  |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|------------------------------|--|---------------------------------------------------------------------------------------|---------------------------------|
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UMTS SAR was tested under RMC 12.2 kbps with HSPA Inactive per KDB Publication 941225 D01v02. HSPA SAR was not required since the average output power of the HSPA subtests was not more than 0.25 dB higher than the RMC level and SAR was less than 1.2 W/kg.

#### DC-HSDPA considerations

- 3GPP Specification 34.121-1 Release 8 Ver 8.10.0 was used for DC-HSDPA guidance
- H-Set 12 (QPSK) was confirmed to be used during DC-HSDPA measurements
- Measured maximum output powers for DC-HSDPA were not greater than 1/4 dB higher than the WCDMA 12.2 kbps RMC maximum output, as a result, SAR is not required for DC-HSDPA
- The DUT supports UE category 24 for HSDPA

It is expected by the manufacturer that MPR for some HSUPA subtests may be as low as 0 dB according to the chipset implementation in this model.



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

|                                             |                                                                                     |                                     |                                                                                       |                                        |
|---------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
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## 9.3 LTE Conducted Powers

**Table 9-5**  
**Maximum LTE Band 5 (Cell) Conducted Powers - 10 MHz Bandwidth**

|     | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
|-----|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|---------------------------|----------|
| Mid | 836.5           | 20525   | 10              | QPSK       | 1       | 0         | 23.29                 | 0                         | 0        |
|     | 836.5           | 20525   | 10              | QPSK       | 1       | 25        | 23.24                 | 0                         | 0        |
|     | 836.5           | 20525   | 10              | QPSK       | 1       | 49        | 23.19                 | 0                         | 0        |
|     | 836.5           | 20525   | 10              | QPSK       | 25      | 0         | 21.84                 | 0-1                       | 1        |
|     | 836.5           | 20525   | 10              | QPSK       | 25      | 12        | 21.79                 | 0-1                       | 1        |
|     | 836.5           | 20525   | 10              | QPSK       | 25      | 25        | 21.70                 | 0-1                       | 1        |
|     | 836.5           | 20525   | 10              | QPSK       | 50      | 0         | 21.83                 | 0-1                       | 1        |
|     | 836.5           | 20525   | 10              | 16QAM      | 1       | 0         | 22.23                 | 0-1                       | 1        |
|     | 836.5           | 20525   | 10              | 16QAM      | 1       | 25        | 22.30                 | 0-1                       | 1        |
|     | 836.5           | 20525   | 10              | 16QAM      | 1       | 49        | 22.19                 | 0-1                       | 1        |
|     | 836.5           | 20525   | 10              | 16QAM      | 25      | 0         | 20.84                 | 0-2                       | 2        |
|     | 836.5           | 20525   | 10              | 16QAM      | 25      | 12        | 20.80                 | 0-2                       | 2        |
|     | 836.5           | 20525   | 10              | 16QAM      | 25      | 25        | 20.77                 | 0-2                       | 2        |
|     | 836.5           | 20525   | 10              | 16QAM      | 50      | 0         | 20.63                 | 0-2                       | 2        |

Note: LTE Band 5 (Cell) at 10 MHz bandwidth does not support three non-overlapping channels. Per KDB Publication 941225 D05v02, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

**Table 9-6**  
**Maximum LTE Band 5 (Cell) Conducted Powers - 5 MHz Bandwidth**

|      | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
|------|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|---------------------------|----------|
| Low  | 826.5           | 20425   | 5               | QPSK       | 1       | 0         | 23.26                 | 0                         | 0        |
|      | 826.5           | 20425   | 5               | QPSK       | 1       | 12        | 23.21                 | 0                         | 0        |
|      | 826.5           | 20425   | 5               | QPSK       | 1       | 24        | 23.16                 | 0                         | 0        |
|      | 826.5           | 20425   | 5               | QPSK       | 12      | 0         | 21.81                 | 0-1                       | 1        |
|      | 826.5           | 20425   | 5               | QPSK       | 12      | 6         | 21.76                 | 0-1                       | 1        |
|      | 826.5           | 20425   | 5               | QPSK       | 12      | 13        | 21.74                 | 0-1                       | 1        |
|      | 826.5           | 20425   | 5               | QPSK       | 25      | 0         | 21.80                 | 0-1                       | 1        |
|      | 826.5           | 20425   | 5               | 16-QAM     | 1       | 0         | 22.20                 | 0-1                       | 1        |
|      | 826.5           | 20425   | 5               | 16-QAM     | 1       | 12        | 22.27                 | 0-1                       | 1        |
|      | 826.5           | 20425   | 5               | 16-QAM     | 1       | 24        | 22.16                 | 0-1                       | 1        |
|      | 826.5           | 20425   | 5               | 16-QAM     | 12      | 0         | 20.81                 | 0-2                       | 2        |
|      | 826.5           | 20425   | 5               | 16-QAM     | 12      | 6         | 20.81                 | 0-2                       | 2        |
|      | 826.5           | 20425   | 5               | 16-QAM     | 12      | 13        | 20.75                 | 0-2                       | 2        |
|      | 826.5           | 20425   | 5               | 16-QAM     | 25      | 0         | 20.69                 | 0-2                       | 2        |
| Mid  | 836.5           | 20525   | 5               | QPSK       | 1       | 0         | 23.32                 | 0                         | 0        |
|      | 836.5           | 20525   | 5               | QPSK       | 1       | 12        | 23.29                 | 0                         | 0        |
|      | 836.5           | 20525   | 5               | QPSK       | 1       | 24        | 23.22                 | 0                         | 0        |
|      | 836.5           | 20525   | 5               | QPSK       | 12      | 0         | 21.84                 | 0-1                       | 1        |
|      | 836.5           | 20525   | 5               | QPSK       | 12      | 6         | 21.82                 | 0-1                       | 1        |
|      | 836.5           | 20525   | 5               | QPSK       | 12      | 13        | 21.73                 | 0-1                       | 1        |
|      | 836.5           | 20525   | 5               | QPSK       | 25      | 0         | 21.86                 | 0-1                       | 1        |
|      | 836.5           | 20525   | 5               | 16-QAM     | 1       | 0         | 22.26                 | 0-1                       | 1        |
|      | 836.5           | 20525   | 5               | 16-QAM     | 1       | 12        | 22.36                 | 0-1                       | 1        |
|      | 836.5           | 20525   | 5               | 16-QAM     | 1       | 24        | 22.22                 | 0-1                       | 1        |
|      | 836.5           | 20525   | 5               | 16-QAM     | 12      | 0         | 20.87                 | 0-2                       | 2        |
|      | 836.5           | 20525   | 5               | 16-QAM     | 12      | 6         | 20.83                 | 0-2                       | 2        |
|      | 836.5           | 20525   | 5               | 16-QAM     | 12      | 13        | 20.80                 | 0-2                       | 2        |
|      | 836.5           | 20525   | 5               | 16-QAM     | 25      | 0         | 20.66                 | 0-2                       | 2        |
| High | 846.5           | 20625   | 5               | QPSK       | 1       | 0         | 23.27                 | 0                         | 0        |
|      | 846.5           | 20625   | 5               | QPSK       | 1       | 12        | 23.28                 | 0                         | 0        |
|      | 846.5           | 20625   | 5               | QPSK       | 1       | 24        | 23.17                 | 0                         | 0        |
|      | 846.5           | 20625   | 5               | QPSK       | 12      | 0         | 21.82                 | 0-1                       | 1        |
|      | 846.5           | 20625   | 5               | QPSK       | 12      | 6         | 21.77                 | 0-1                       | 1        |
|      | 846.5           | 20625   | 5               | QPSK       | 12      | 13        | 21.69                 | 0-1                       | 1        |
|      | 846.5           | 20625   | 5               | QPSK       | 25      | 0         | 21.81                 | 0-1                       | 1        |
|      | 846.5           | 20625   | 5               | 16-QAM     | 1       | 0         | 22.21                 | 0-1                       | 1        |
|      | 846.5           | 20625   | 5               | 16-QAM     | 1       | 12        | 22.28                 | 0-1                       | 1        |
|      | 846.5           | 20625   | 5               | 16-QAM     | 1       | 24        | 22.17                 | 0-1                       | 1        |
|      | 846.5           | 20625   | 5               | 16-QAM     | 12      | 0         | 20.82                 | 0-2                       | 2        |
|      | 846.5           | 20625   | 5               | 16-QAM     | 12      | 6         | 20.78                 | 0-2                       | 2        |
|      | 846.5           | 20625   | 5               | 16-QAM     | 12      | 13        | 20.75                 | 0-2                       | 2        |
|      | 846.5           | 20625   | 5               | 16-QAM     | 25      | 0         | 20.66                 | 0-2                       | 2        |

|                                      |                                                                                     |                              |                                                                                       |                                 |
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| FCC ID: A3LSMT235                    |  | SAR EVALUATION REPORT        |  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>0Y1404170792-R1.A3L | Test Dates:<br>04/17/14-05/08/14                                                    | DUT Type:<br>Portable Tablet |                                                                                       | Page 25 of 63                   |

**Table 9-7**  
**Maximum LTE Band 5 (Cell) Conducted Powers - 3 MHz Bandwidth**

|      | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
|------|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|---------------------------|----------|
| Low  | 825.5           | 20415   | 3               | QPSK       | 1       | 0         | 23.24                 | 0                         | 0        |
|      | 825.5           | 20415   | 3               | QPSK       | 1       | 7         | 23.19                 | 0                         | 0        |
|      | 825.5           | 20415   | 3               | QPSK       | 1       | 14        | 23.14                 | 0                         | 0        |
|      | 825.5           | 20415   | 3               | QPSK       | 8       | 0         | 21.79                 | 0-1                       | 1        |
|      | 825.5           | 20415   | 3               | QPSK       | 8       | 4         | 21.74                 | 0-1                       | 1        |
|      | 825.5           | 20415   | 3               | QPSK       | 8       | 7         | 21.72                 | 0-1                       | 1        |
|      | 825.5           | 20415   | 3               | QPSK       | 15      | 0         | 21.78                 | 0-1                       | 1        |
|      | 825.5           | 20415   | 3               | 16-QAM     | 1       | 0         | 22.18                 | 0-1                       | 1        |
|      | 825.5           | 20415   | 3               | 16-QAM     | 1       | 7         | 22.25                 | 0-1                       | 1        |
|      | 825.5           | 20415   | 3               | 16-QAM     | 1       | 14        | 22.14                 | 0-1                       | 1        |
|      | 825.5           | 20415   | 3               | 16-QAM     | 8       | 0         | 20.79                 | 0-2                       | 2        |
|      | 825.5           | 20415   | 3               | 16-QAM     | 8       | 4         | 20.79                 | 0-2                       | 2        |
|      | 825.5           | 20415   | 3               | 16-QAM     | 8       | 7         | 20.73                 | 0-2                       | 2        |
| Mid  | 836.5           | 20525   | 3               | QPSK       | 1       | 0         | 23.30                 | 0                         | 0        |
|      | 836.5           | 20525   | 3               | QPSK       | 1       | 7         | 23.27                 | 0                         | 0        |
|      | 836.5           | 20525   | 3               | QPSK       | 1       | 14        | 23.20                 | 0                         | 0        |
|      | 836.5           | 20525   | 3               | QPSK       | 8       | 0         | 21.82                 | 0-1                       | 1        |
|      | 836.5           | 20525   | 3               | QPSK       | 8       | 4         | 21.80                 | 0-1                       | 1        |
|      | 836.5           | 20525   | 3               | QPSK       | 8       | 7         | 21.71                 | 0-1                       | 1        |
|      | 836.5           | 20525   | 3               | QPSK       | 15      | 0         | 21.84                 | 0-1                       | 1        |
|      | 836.5           | 20525   | 3               | 16-QAM     | 1       | 0         | 22.24                 | 0-1                       | 1        |
|      | 836.5           | 20525   | 3               | 16-QAM     | 1       | 7         | 22.34                 | 0-1                       | 1        |
|      | 836.5           | 20525   | 3               | 16-QAM     | 1       | 14        | 22.20                 | 0-1                       | 1        |
|      | 836.5           | 20525   | 3               | 16-QAM     | 8       | 0         | 20.85                 | 0-2                       | 2        |
|      | 836.5           | 20525   | 3               | 16-QAM     | 8       | 4         | 20.81                 | 0-2                       | 2        |
|      | 836.5           | 20525   | 3               | 16-QAM     | 8       | 7         | 20.78                 | 0-2                       | 2        |
| High | 847.5           | 20635   | 3               | QPSK       | 1       | 0         | 23.25                 | 0                         | 0        |
|      | 847.5           | 20635   | 3               | QPSK       | 1       | 7         | 23.26                 | 0                         | 0        |
|      | 847.5           | 20635   | 3               | QPSK       | 1       | 14        | 23.15                 | 0                         | 0        |
|      | 847.5           | 20635   | 3               | QPSK       | 8       | 0         | 21.80                 | 0-1                       | 1        |
|      | 847.5           | 20635   | 3               | QPSK       | 8       | 4         | 21.75                 | 0-1                       | 1        |
|      | 847.5           | 20635   | 3               | QPSK       | 8       | 7         | 21.67                 | 0-1                       | 1        |
|      | 847.5           | 20635   | 3               | QPSK       | 15      | 0         | 21.79                 | 0-1                       | 1        |
|      | 847.5           | 20635   | 3               | 16-QAM     | 1       | 0         | 22.19                 | 0-1                       | 1        |
|      | 847.5           | 20635   | 3               | 16-QAM     | 1       | 7         | 22.26                 | 0-1                       | 1        |
|      | 847.5           | 20635   | 3               | 16-QAM     | 1       | 14        | 22.15                 | 0-1                       | 1        |
|      | 847.5           | 20635   | 3               | 16-QAM     | 8       | 0         | 20.80                 | 0-2                       | 2        |
|      | 847.5           | 20635   | 3               | 16-QAM     | 8       | 4         | 20.76                 | 0-2                       | 2        |
|      | 847.5           | 20635   | 3               | 16-QAM     | 8       | 7         | 20.73                 | 0-2                       | 2        |
|      | 847.5           | 20635   | 3               | 16-QAM     | 15      | 0         | 20.64                 | 0-2                       | 2        |

|                                      |                                                                                     |                              |                                                                                       |                                 |
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| FCC ID: A3LSMT235                    |  | SAR EVALUATION REPORT        |  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>0Y1404170792-R1.A3L | Test Dates:<br>04/17/14-05/08/14                                                    | DUT Type:<br>Portable Tablet |                                                                                       | Page 26 of 63                   |

**Table 9-8**  
**Maximum LTE Band 5 (Cell) Conducted Powers – 1.4 MHz Bandwidth**

|      | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
|------|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|---------------------------|----------|
| Low  | 824.7           | 20407   | 1.4             | QPSK       | 1       | 0         | 23.22                 | 0                         | 0        |
|      | 824.7           | 20407   | 1.4             | QPSK       | 1       | 2         | 23.17                 | 0                         | 0        |
|      | 824.7           | 20407   | 1.4             | QPSK       | 1       | 5         | 23.12                 | 0                         | 0        |
|      | 824.7           | 20407   | 1.4             | QPSK       | 3       | 0         | 23.10                 | 0                         | 0        |
|      | 824.7           | 20407   | 1.4             | QPSK       | 3       | 2         | 23.19                 | 0                         | 0        |
|      | 824.7           | 20407   | 1.4             | QPSK       | 3       | 3         | 23.02                 | 0                         | 0        |
|      | 824.7           | 20407   | 1.4             | QPSK       | 6       | 0         | 21.76                 | 0-1                       | 1        |
|      | 824.7           | 20407   | 1.4             | 16-QAM     | 1       | 0         | 22.16                 | 0-1                       | 1        |
|      | 824.7           | 20407   | 1.4             | 16-QAM     | 1       | 2         | 22.23                 | 0-1                       | 1        |
|      | 824.7           | 20407   | 1.4             | 16-QAM     | 1       | 5         | 22.12                 | 0-1                       | 1        |
|      | 824.7           | 20407   | 1.4             | 16-QAM     | 3       | 0         | 22.06                 | 0-1                       | 1        |
|      | 824.7           | 20407   | 1.4             | 16-QAM     | 3       | 2         | 22.17                 | 0-1                       | 1        |
|      | 824.7           | 20407   | 1.4             | 16-QAM     | 3       | 3         | 22.10                 | 0-1                       | 1        |
| Mid  | 836.5           | 20525   | 1.4             | QPSK       | 1       | 0         | 23.28                 | 0                         | 0        |
|      | 836.5           | 20525   | 1.4             | QPSK       | 1       | 2         | 23.25                 | 0                         | 0        |
|      | 836.5           | 20525   | 1.4             | QPSK       | 1       | 5         | 23.18                 | 0                         | 0        |
|      | 836.5           | 20525   | 1.4             | QPSK       | 3       | 0         | 23.10                 | 0                         | 0        |
|      | 836.5           | 20525   | 1.4             | QPSK       | 3       | 2         | 23.15                 | 0                         | 0        |
|      | 836.5           | 20525   | 1.4             | QPSK       | 3       | 3         | 23.06                 | 0                         | 0        |
|      | 836.5           | 20525   | 1.4             | QPSK       | 6       | 0         | 21.82                 | 0-1                       | 1        |
|      | 836.5           | 20525   | 1.4             | 16-QAM     | 1       | 0         | 22.22                 | 0-1                       | 1        |
|      | 836.5           | 20525   | 1.4             | 16-QAM     | 1       | 2         | 22.32                 | 0-1                       | 1        |
|      | 836.5           | 20525   | 1.4             | 16-QAM     | 1       | 5         | 22.18                 | 0-1                       | 1        |
|      | 836.5           | 20525   | 1.4             | 16-QAM     | 3       | 0         | 22.16                 | 0-1                       | 1        |
|      | 836.5           | 20525   | 1.4             | 16-QAM     | 3       | 2         | 22.20                 | 0-1                       | 1        |
|      | 836.5           | 20525   | 1.4             | 16-QAM     | 3       | 3         | 22.10                 | 0-1                       | 1        |
|      | 836.5           | 20525   | 1.4             | 16-QAM     | 6       | 0         | 20.62                 | 0-2                       | 2        |
| High | 848.3           | 20643   | 1.4             | QPSK       | 1       | 0         | 23.23                 | 0                         | 0        |
|      | 848.3           | 20643   | 1.4             | QPSK       | 1       | 2         | 23.24                 | 0                         | 0        |
|      | 848.3           | 20643   | 1.4             | QPSK       | 1       | 5         | 23.13                 | 0                         | 0        |
|      | 848.3           | 20643   | 1.4             | QPSK       | 3       | 0         | 23.02                 | 0                         | 0        |
|      | 848.3           | 20643   | 1.4             | QPSK       | 3       | 2         | 23.18                 | 0                         | 0        |
|      | 848.3           | 20643   | 1.4             | QPSK       | 3       | 3         | 23.06                 | 0                         | 0        |
|      | 848.3           | 20643   | 1.4             | QPSK       | 6       | 0         | 21.77                 | 0-1                       | 1        |
|      | 848.3           | 20643   | 1.4             | 16-QAM     | 1       | 0         | 22.17                 | 0-1                       | 1        |
|      | 848.3           | 20643   | 1.4             | 16-QAM     | 1       | 2         | 22.24                 | 0-1                       | 1        |
|      | 848.3           | 20643   | 1.4             | 16-QAM     | 1       | 5         | 22.13                 | 0-1                       | 1        |
|      | 848.3           | 20643   | 1.4             | 16-QAM     | 3       | 0         | 22.10                 | 0-1                       | 1        |
|      | 848.3           | 20643   | 1.4             | 16-QAM     | 3       | 2         | 22.15                 | 0-1                       | 1        |
|      | 848.3           | 20643   | 1.4             | 16-QAM     | 3       | 3         | 22.10                 | 0-1                       | 1        |
|      | 848.3           | 20643   | 1.4             | 16-QAM     | 6       | 0         | 20.62                 | 0-2                       | 2        |

|                                      |                                                                                     |                              |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMT235                    |  | SAR EVALUATION REPORT        |  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>0Y1404170792-R1.A3L | Test Dates:<br>04/17/14-05/08/14                                                    | DUT Type:<br>Portable Tablet |                                                                                       | Page 27 of 63                   |

**Table 9-9**  
**Reduced LTE Band 5 (Cell) Conducted Powers – 10 MHz Bandwidth**  
**Representing Head and Body at 0 mm**

|     | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
|-----|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|---------------------------|----------|
| Mid | 836.5           | 20525   | 10              | QPSK       | 1       | 0         | 17.85                 | 0                         | 0        |
|     | 836.5           | 20525   | 10              | QPSK       | 1       | 25        | 17.73                 | 0                         | 0        |
|     | 836.5           | 20525   | 10              | QPSK       | 1       | 49        | 17.93                 | 0                         | 0        |
|     | 836.5           | 20525   | 10              | QPSK       | 25      | 0         | 17.98                 | 0-1                       | 0        |
|     | 836.5           | 20525   | 10              | QPSK       | 25      | 12        | 17.97                 | 0-1                       | 0        |
|     | 836.5           | 20525   | 10              | QPSK       | 25      | 25        | 17.95                 | 0-1                       | 0        |
|     | 836.5           | 20525   | 10              | QPSK       | 50      | 0         | 17.90                 | 0-1                       | 0        |
|     | 836.5           | 20525   | 10              | 16QAM      | 1       | 0         | 17.98                 | 0-1                       | 0        |
|     | 836.5           | 20525   | 10              | 16QAM      | 1       | 25        | 17.96                 | 0-1                       | 0        |
|     | 836.5           | 20525   | 10              | 16QAM      | 1       | 49        | 17.92                 | 0-1                       | 0        |
|     | 836.5           | 20525   | 10              | 16QAM      | 25      | 0         | 17.68                 | 0-2                       | 0        |
|     | 836.5           | 20525   | 10              | 16QAM      | 25      | 12        | 17.70                 | 0-2                       | 0        |
|     | 836.5           | 20525   | 10              | 16QAM      | 25      | 25        | 17.66                 | 0-2                       | 0        |
|     | 836.5           | 20525   | 10              | 16QAM      | 50      | 0         | 17.68                 | 0-2                       | 0        |

Note: LTE Band 5 (Cell) at 10 MHz bandwidth does not support three non-overlapping channels. Per KDB Publication 941225 D05v02, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

**Table 9-10**  
**Reduced LTE Band 5 (Cell) Conducted Powers – 5 MHz Bandwidth**  
**Representing Head and Body at 0 mm**

|      | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
|------|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|---------------------------|----------|
| Low  | 826.5           | 20425   | 5               | QPSK       | 1       | 0         | 17.80                 | 0                         | 0        |
|      | 826.5           | 20425   | 5               | QPSK       | 1       | 12        | 17.68                 | 0                         | 0        |
|      | 826.5           | 20425   | 5               | QPSK       | 1       | 24        | 17.84                 | 0                         | 0        |
|      | 826.5           | 20425   | 5               | QPSK       | 12      | 0         | 17.93                 | 0-1                       | 0        |
|      | 826.5           | 20425   | 5               | QPSK       | 12      | 6         | 17.92                 | 0-1                       | 0        |
|      | 826.5           | 20425   | 5               | QPSK       | 12      | 13        | 17.90                 | 0-1                       | 0        |
|      | 826.5           | 20425   | 5               | QPSK       | 25      | 0         | 17.85                 | 0-1                       | 0        |
|      | 826.5           | 20425   | 5               | 16-QAM     | 1       | 0         | 17.90                 | 0-1                       | 0        |
|      | 826.5           | 20425   | 5               | 16-QAM     | 1       | 12        | 17.91                 | 0-1                       | 0        |
|      | 826.5           | 20425   | 5               | 16-QAM     | 1       | 24        | 17.87                 | 0-1                       | 0        |
|      | 826.5           | 20425   | 5               | 16-QAM     | 12      | 0         | 17.62                 | 0-2                       | 0        |
|      | 826.5           | 20425   | 5               | 16-QAM     | 12      | 6         | 17.65                 | 0-2                       | 0        |
|      | 826.5           | 20425   | 5               | 16-QAM     | 12      | 13        | 17.61                 | 0-2                       | 0        |
|      | 826.5           | 20425   | 5               | 16-QAM     | 25      | 0         | 17.63                 | 0-2                       | 0        |
| Mid  | 836.5           | 20525   | 5               | QPSK       | 1       | 0         | 17.84                 | 0                         | 0        |
|      | 836.5           | 20525   | 5               | QPSK       | 1       | 12        | 17.72                 | 0                         | 0        |
|      | 836.5           | 20525   | 5               | QPSK       | 1       | 24        | 17.92                 | 0                         | 0        |
|      | 836.5           | 20525   | 5               | QPSK       | 12      | 0         | 17.92                 | 0-1                       | 0        |
|      | 836.5           | 20525   | 5               | QPSK       | 12      | 6         | 17.96                 | 0-1                       | 0        |
|      | 836.5           | 20525   | 5               | QPSK       | 12      | 13        | 17.94                 | 0-1                       | 0        |
|      | 836.5           | 20525   | 5               | QPSK       | 25      | 0         | 17.89                 | 0-1                       | 0        |
|      | 836.5           | 20525   | 5               | 16-QAM     | 1       | 0         | 17.84                 | 0-1                       | 0        |
|      | 836.5           | 20525   | 5               | 16-QAM     | 1       | 12        | 17.95                 | 0-1                       | 0        |
|      | 836.5           | 20525   | 5               | 16-QAM     | 1       | 24        | 17.90                 | 0-1                       | 0        |
|      | 836.5           | 20525   | 5               | 16-QAM     | 12      | 0         | 17.67                 | 0-2                       | 0        |
|      | 836.5           | 20525   | 5               | 16-QAM     | 12      | 6         | 17.69                 | 0-2                       | 0        |
|      | 836.5           | 20525   | 5               | 16-QAM     | 12      | 13        | 17.65                 | 0-2                       | 0        |
|      | 836.5           | 20525   | 5               | 16-QAM     | 25      | 0         | 17.67                 | 0-2                       | 0        |
| High | 846.5           | 20625   | 5               | QPSK       | 1       | 0         | 17.82                 | 0                         | 0        |
|      | 846.5           | 20625   | 5               | QPSK       | 1       | 12        | 17.70                 | 0                         | 0        |
|      | 846.5           | 20625   | 5               | QPSK       | 1       | 24        | 17.90                 | 0                         | 0        |
|      | 846.5           | 20625   | 5               | QPSK       | 12      | 0         | 17.95                 | 0-1                       | 0        |
|      | 846.5           | 20625   | 5               | QPSK       | 12      | 6         | 17.94                 | 0-1                       | 0        |
|      | 846.5           | 20625   | 5               | QPSK       | 12      | 13        | 17.92                 | 0-1                       | 0        |
|      | 846.5           | 20625   | 5               | QPSK       | 25      | 0         | 17.87                 | 0-1                       | 0        |
|      | 846.5           | 20625   | 5               | 16-QAM     | 1       | 0         | 17.92                 | 0-1                       | 0        |
|      | 846.5           | 20625   | 5               | 16-QAM     | 1       | 12        | 17.93                 | 0-1                       | 0        |
|      | 846.5           | 20625   | 5               | 16-QAM     | 1       | 24        | 17.89                 | 0-1                       | 0        |
|      | 846.5           | 20625   | 5               | 16-QAM     | 12      | 0         | 17.65                 | 0-2                       | 0        |
|      | 846.5           | 20625   | 5               | 16-QAM     | 12      | 6         | 17.67                 | 0-2                       | 0        |
|      | 846.5           | 20625   | 5               | 16-QAM     | 12      | 13        | 17.63                 | 0-2                       | 0        |
|      | 846.5           | 20625   | 5               | 16-QAM     | 25      | 0         | 17.65                 | 0-2                       | 0        |

|                                      |                                                                                     |                              |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMT235                    |  | <b>SAR EVALUATION REPORT</b> |  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>0Y1404170792-R1.A3L | Test Dates:<br>04/17/14-05/08/14                                                    | DUT Type:<br>Portable Tablet |                                                                                       | Page 28 of 63                   |

**Table 9-11**  
**Reduced LTE Band 5 (Cell) Conducted Powers – 3 MHz Bandwidth**  
**Representing Head and Body at 0 mm**

|      | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
|------|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|---------------------------|----------|
| Low  | 825.5           | 20415   | 3               | QPSK       | 1       | 0         | 17.83                 | 0                         | 0        |
|      | 825.5           | 20415   | 3               | QPSK       | 1       | 7         | 17.71                 | 0                         | 0        |
|      | 825.5           | 20415   | 3               | QPSK       | 1       | 14        | 17.83                 | 0                         | 0        |
|      | 825.5           | 20415   | 3               | QPSK       | 8       | 0         | 17.96                 | 0-1                       | 0        |
|      | 825.5           | 20415   | 3               | QPSK       | 8       | 4         | 17.95                 | 0-1                       | 0        |
|      | 825.5           | 20415   | 3               | QPSK       | 8       | 7         | 17.93                 | 0-1                       | 0        |
|      | 825.5           | 20415   | 3               | QPSK       | 15      | 0         | 17.80                 | 0-1                       | 0        |
|      | 825.5           | 20415   | 3               | 16-QAM     | 1       | 0         | 17.93                 | 0-1                       | 0        |
|      | 825.5           | 20415   | 3               | 16-QAM     | 1       | 7         | 17.94                 | 0-1                       | 0        |
|      | 825.5           | 20415   | 3               | 16-QAM     | 1       | 14        | 17.91                 | 0-1                       | 0        |
|      | 825.5           | 20415   | 3               | 16-QAM     | 8       | 0         | 17.65                 | 0-2                       | 0        |
|      | 825.5           | 20415   | 3               | 16-QAM     | 8       | 4         | 17.68                 | 0-2                       | 0        |
|      | 825.5           | 20415   | 3               | 16-QAM     | 8       | 7         | 17.64                 | 0-2                       | 0        |
| Mid  | 825.5           | 20415   | 3               | 16-QAM     | 15      | 0         | 17.63                 | 0-2                       | 0        |
|      | 836.5           | 20525   | 3               | QPSK       | 1       | 0         | 17.87                 | 0                         | 0        |
|      | 836.5           | 20525   | 3               | QPSK       | 1       | 7         | 17.75                 | 0                         | 0        |
|      | 836.5           | 20525   | 3               | QPSK       | 1       | 14        | 17.65                 | 0                         | 0        |
|      | 836.5           | 20525   | 3               | QPSK       | 8       | 0         | 17.95                 | 0-1                       | 0        |
|      | 836.5           | 20525   | 3               | QPSK       | 8       | 4         | 17.90                 | 0-1                       | 0        |
|      | 836.5           | 20525   | 3               | QPSK       | 8       | 7         | 17.97                 | 0-1                       | 0        |
|      | 836.5           | 20525   | 3               | QPSK       | 15      | 0         | 17.92                 | 0-1                       | 0        |
|      | 836.5           | 20525   | 3               | 16-QAM     | 1       | 0         | 17.87                 | 0-1                       | 0        |
|      | 836.5           | 20525   | 3               | 16-QAM     | 1       | 7         | 17.98                 | 0-1                       | 0        |
|      | 836.5           | 20525   | 3               | 16-QAM     | 1       | 14        | 17.93                 | 0-1                       | 0        |
|      | 836.5           | 20525   | 3               | 16-QAM     | 8       | 0         | 17.70                 | 0-2                       | 0        |
|      | 836.5           | 20525   | 3               | 16-QAM     | 8       | 4         | 17.72                 | 0-2                       | 0        |
| High | 836.5           | 20525   | 3               | 16-QAM     | 8       | 7         | 17.68                 | 0-2                       | 0        |
|      | 836.5           | 20525   | 3               | 16-QAM     | 15      | 0         | 17.70                 | 0-2                       | 0        |
|      | 847.5           | 20635   | 3               | QPSK       | 1       | 0         | 17.85                 | 0                         | 0        |
|      | 847.5           | 20635   | 3               | QPSK       | 1       | 7         | 17.73                 | 0                         | 0        |
|      | 847.5           | 20635   | 3               | QPSK       | 1       | 14        | 17.93                 | 0                         | 0        |
|      | 847.5           | 20635   | 3               | QPSK       | 8       | 0         | 17.98                 | 0-1                       | 0        |
|      | 847.5           | 20635   | 3               | QPSK       | 8       | 4         | 17.97                 | 0-1                       | 0        |
|      | 847.5           | 20635   | 3               | QPSK       | 8       | 7         | 17.95                 | 0-1                       | 0        |
|      | 847.5           | 20635   | 3               | QPSK       | 15      | 0         | 17.90                 | 0-1                       | 0        |
|      | 847.5           | 20635   | 3               | 16-QAM     | 1       | 0         | 17.95                 | 0-1                       | 0        |
|      | 847.5           | 20635   | 3               | 16-QAM     | 1       | 7         | 17.96                 | 0-1                       | 0        |
|      | 847.5           | 20635   | 3               | 16-QAM     | 1       | 14        | 17.92                 | 0-1                       | 0        |
|      | 847.5           | 20635   | 3               | 16-QAM     | 8       | 0         | 17.68                 | 0-2                       | 0        |
|      | 847.5           | 20635   | 3               | 16-QAM     | 8       | 4         | 17.70                 | 0-2                       | 0        |
|      | 847.5           | 20635   | 3               | 16-QAM     | 8       | 7         | 17.66                 | 0-2                       | 0        |
|      | 847.5           | 20635   | 3               | 16-QAM     | 15      | 0         | 17.68                 | 0-2                       | 0        |

**Table 9-12**  
**Reduced LTE Band 5 (Cell) Conducted Powers – 1.4 MHz Bandwidth**  
**Representing Head and Body at 0 mm**

|      | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
|------|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|---------------------------|----------|
| Low  | 824.7           | 20407   | 1.4             | QPSK       | 1       | 0         | 17.78                 | 0                         | 0        |
|      | 824.7           | 20407   | 1.4             | QPSK       | 1       | 2         | 17.66                 | 0                         | 0        |
|      | 824.7           | 20407   | 1.4             | QPSK       | 1       | 5         | 17.86                 | 0                         | 0        |
|      | 824.7           | 20407   | 1.4             | QPSK       | 3       | 0         | 17.91                 | 0                         | 0        |
|      | 824.7           | 20407   | 1.4             | QPSK       | 3       | 2         | 17.90                 | 0                         | 0        |
|      | 824.7           | 20407   | 1.4             | QPSK       | 3       | 3         | 17.88                 | 0                         | 0        |
|      | 824.7           | 20407   | 1.4             | QPSK       | 6       | 0         | 17.83                 | 0-1                       | 0        |
|      | 824.7           | 20407   | 1.4             | 16-QAM     | 1       | 0         | 17.91                 | 0-1                       | 0        |
|      | 824.7           | 20407   | 1.4             | 16-QAM     | 1       | 2         | 17.89                 | 0-1                       | 0        |
|      | 824.7           | 20407   | 1.4             | 16-QAM     | 1       | 5         | 17.85                 | 0-1                       | 0        |
|      | 824.7           | 20407   | 1.4             | 16-QAM     | 3       | 0         | 17.61                 | 0-1                       | 0        |
|      | 824.7           | 20407   | 1.4             | 16-QAM     | 3       | 2         | 17.63                 | 0-1                       | 0        |
|      | 824.7           | 20407   | 1.4             | 16-QAM     | 3       | 3         | 17.59                 | 0-1                       | 0        |
|      | 824.7           | 20407   | 1.4             | 16-QAM     | 6       | 0         | 17.61                 | 0-2                       | 0        |
| Mid  | 836.5           | 20525   | 1.4             | QPSK       | 1       | 0         | 17.82                 | 0                         | 0        |
|      | 836.5           | 20525   | 1.4             | QPSK       | 1       | 2         | 17.70                 | 0                         | 0        |
|      | 836.5           | 20525   | 1.4             | QPSK       | 1       | 5         | 17.90                 | 0                         | 0        |
|      | 836.5           | 20525   | 1.4             | QPSK       | 3       | 0         | 17.95                 | 0                         | 0        |
|      | 836.5           | 20525   | 1.4             | QPSK       | 3       | 2         | 17.94                 | 0                         | 0        |
|      | 836.5           | 20525   | 1.4             | QPSK       | 3       | 3         | 17.92                 | 0                         | 0        |
|      | 836.5           | 20525   | 1.4             | QPSK       | 6       | 0         | 17.87                 | 0-1                       | 0        |
|      | 836.5           | 20525   | 1.4             | 16-QAM     | 1       | 0         | 17.95                 | 0-1                       | 0        |
|      | 836.5           | 20525   | 1.4             | 16-QAM     | 1       | 2         | 17.93                 | 0-1                       | 0        |
|      | 836.5           | 20525   | 1.4             | 16-QAM     | 1       | 5         | 17.89                 | 0-1                       | 0        |
|      | 836.5           | 20525   | 1.4             | 16-QAM     | 3       | 0         | 17.65                 | 0-1                       | 0        |
|      | 836.5           | 20525   | 1.4             | 16-QAM     | 3       | 2         | 17.67                 | 0-1                       | 0        |
|      | 836.5           | 20525   | 1.4             | 16-QAM     | 3       | 3         | 17.63                 | 0-1                       | 0        |
|      | 836.5           | 20525   | 1.4             | 16-QAM     | 6       | 0         | 17.65                 | 0-2                       | 0        |
| High | 848.3           | 20643   | 1.4             | QPSK       | 1       | 0         | 17.80                 | 0                         | 0        |
|      | 848.3           | 20643   | 1.4             | QPSK       | 1       | 2         | 17.68                 | 0                         | 0        |
|      | 848.3           | 20643   | 1.4             | QPSK       | 1       | 5         | 17.88                 | 0                         | 0        |
|      | 848.3           | 20643   | 1.4             | QPSK       | 3       | 0         | 17.93                 | 0                         | 0        |
|      | 848.3           | 20643   | 1.4             | QPSK       | 3       | 2         | 17.92                 | 0                         | 0        |
|      | 848.3           | 20643   | 1.4             | QPSK       | 3       | 3         | 17.90                 | 0                         | 0        |
|      | 848.3           | 20643   | 1.4             | QPSK       | 6       | 0         | 17.85                 | 0-1                       | 0        |
|      | 848.3           | 20643   | 1.4             | 16-QAM     | 1       | 0         | 17.93                 | 0-1                       | 0        |
|      | 848.3           | 20643   | 1.4             | 16-QAM     | 1       | 2         | 17.91                 | 0-1                       | 0        |
|      | 848.3           | 20643   | 1.4             | 16-QAM     | 1       | 5         | 17.87                 | 0-1                       | 0        |
|      | 848.3           | 20643   | 1.4             | 16-QAM     | 3       | 0         | 17.63                 | 0-1                       | 0        |
|      | 848.3           | 20643   | 1.4             | 16-QAM     | 3       | 2         | 17.65                 | 0-1                       | 0        |
|      | 848.3           | 20643   | 1.4             | 16-QAM     | 3       | 3         | 17.61                 | 0-1                       | 0        |
|      | 848.3           | 20643   | 1.4             | 16-QAM     | 6       | 0         | 17.63                 | 0-2                       | 0        |

|                                             |                                                                                                                                   |                                     |                                                                                       |                                        |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| FCC ID: A3LSMT235                           |  <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>0Y1404170792-R1.A3L | <b>Test Dates:</b><br>04/17/14-05/08/14                                                                                           | <b>DUT Type:</b><br>Portable Tablet |                                                                                       | Page 30 of 63                          |

## 9.4 WLAN/Bluetooth Conducted Powers

**Table 9-13**  
**IEEE 802.11b Average RF Power**

| Mode    | Freq [MHz] | Channel | 802.11b Conducted Power [dBm] |       |       |       |
|---------|------------|---------|-------------------------------|-------|-------|-------|
|         |            |         | Data Rate [Mbps]              |       |       |       |
|         |            |         | 1                             | 2     | 5.5   | 11    |
| 802.11b | 2412       | 1*      | 11.67                         | 11.73 | 11.80 | 11.76 |
| 802.11b | 2437       | 6*      | 11.69                         | 11.78 | 11.85 | 11.81 |
| 802.11b | 2462       | 11*     | 11.71                         | 11.69 | 11.77 | 11.75 |

**Table 9-14**  
**IEEE 802.11g Average RF Power**

| Mode    | Freq [MHz] | Channel | 802.11g Conducted Power [dBm] |       |       |       |       |       |       |       |
|---------|------------|---------|-------------------------------|-------|-------|-------|-------|-------|-------|-------|
|         |            |         | Data Rate [Mbps]              |       |       |       |       |       |       |       |
|         |            |         | 6                             | 9     | 12    | 18    | 24    | 36    | 48    | 54    |
| 802.11g | 2412       | 1       | 10.18                         | 10.25 | 10.20 | 10.33 | 10.21 | 10.20 | 10.15 | 10.24 |
| 802.11g | 2437       | 6       | 9.51                          | 9.54  | 9.51  | 9.64  | 9.56  | 9.61  | 9.52  | 9.52  |
| 802.11g | 2462       | 11      | 9.73                          | 9.80  | 9.81  | 9.76  | 9.85  | 9.80  | 9.71  | 9.73  |

**Table 9-15**  
**IEEE 802.11n Average RF Power**

| Mode    | Freq [MHz] | Channel | 802.11n (2.4GHz) Conducted Power [dBm] |       |       |       |       |       |       |       |
|---------|------------|---------|----------------------------------------|-------|-------|-------|-------|-------|-------|-------|
|         |            |         | Data Rate [Mbps]                       |       |       |       |       |       |       |       |
|         |            |         | 6.5                                    | 13    | 19.5  | 26    | 39    | 52    | 58.5  | 65    |
| 802.11n | 2412       | 1       | 9.83                                   | 9.86  | 9.85  | 9.82  | 9.82  | 9.90  | 9.82  | 9.87  |
| 802.11n | 2437       | 6       | 9.42                                   | 9.49  | 9.44  | 9.33  | 9.36  | 9.28  | 9.41  | 9.18  |
| 802.11n | 2462       | 11      | 10.24                                  | 10.23 | 10.30 | 10.21 | 10.24 | 10.27 | 10.34 | 10.20 |

|                                      |                                                                                     |                              |  |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|------------------------------|--|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMT235                    |  | SAR EVALUATION REPORT        |  |  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>0Y1404170792-R1.A3L | Test Dates:<br>04/17/14-05/08/14                                                    | DUT Type:<br>Portable Tablet |  |                                                                                       | Page 31 of 63                   |

**Table 9-16**  
**IEEE 802.11a Average RF Power**

| Mode    | Freq [MHz] | Channel | 802.11a Conducted Power [dBm] |      |      |      |      |      |      |      |
|---------|------------|---------|-------------------------------|------|------|------|------|------|------|------|
|         |            |         | Data Rate [Mbps]              |      |      |      |      |      |      |      |
|         |            |         | 6                             | 9    | 12   | 18   | 24   | 36   | 48   | 54   |
| 802.11a | 5180       | 36*     | 8.91                          | 8.94 | 8.98 | 8.83 | 9.06 | 8.99 | 9.05 | 8.95 |
| 802.11a | 5200       | 40      | 8.91                          | 8.97 | 8.96 | 8.88 | 9.16 | 8.98 | 9.06 | 9.03 |
| 802.11a | 5220       | 44      | 8.95                          | 8.95 | 9.06 | 8.85 | 9.07 | 9.03 | 9.12 | 9.00 |
| 802.11a | 5240       | 48*     | 9.08                          | 9.09 | 9.14 | 9.03 | 9.26 | 9.22 | 9.22 | 9.17 |
| 802.11a | 5260       | 52*     | 8.64                          | 8.77 | 8.70 | 8.68 | 8.74 | 8.81 | 8.78 | 8.78 |
| 802.11a | 5280       | 56      | 8.61                          | 8.77 | 8.70 | 8.66 | 8.66 | 8.70 | 8.70 | 8.77 |
| 802.11a | 5300       | 60      | 8.75                          | 8.85 | 8.87 | 8.72 | 8.88 | 8.91 | 8.90 | 8.85 |
| 802.11a | 5320       | 64*     | 8.87                          | 9.05 | 8.90 | 8.89 | 9.00 | 9.05 | 8.98 | 9.02 |
| 802.11a | 5500       | 100     | 8.85                          | 8.76 | 8.79 | 8.76 | 8.80 | 8.87 | 8.82 | 8.88 |
| 802.11a | 5520       | 104*    | 8.67                          | 8.65 | 8.62 | 8.59 | 8.59 | 8.69 | 8.66 | 8.74 |
| 802.11a | 5540       | 108     | 8.68                          | 8.62 | 8.63 | 8.65 | 8.62 | 8.71 | 8.69 | 8.75 |
| 802.11a | 5560       | 112     | 8.79                          | 8.81 | 8.75 | 8.76 | 8.85 | 8.86 | 8.77 | 8.86 |
| 802.11a | 5580       | 116*    | 8.78                          | 8.73 | 8.71 | 8.75 | 8.83 | 8.87 | 8.87 | 8.80 |
| 802.11a | 5600       | 120     | N/A                           | N/A  | N/A  | N/A  | N/A  | N/A  | N/A  | N/A  |
| 802.11a | 5620       | 124     | N/A                           | N/A  | N/A  | N/A  | N/A  | N/A  | N/A  | N/A  |
| 802.11a | 5640       | 128     | N/A                           | N/A  | N/A  | N/A  | N/A  | N/A  | N/A  | N/A  |
| 802.11a | 5660       | 132     | 8.62                          | 8.63 | 8.63 | 8.54 | 8.59 | 8.74 | 8.63 | 8.66 |
| 802.11a | 5680       | 136*    | 8.58                          | 8.56 | 8.63 | 8.51 | 8.55 | 8.63 | 8.56 | 8.72 |
| 802.11a | 5700       | 140     | 8.70                          | 8.66 | 8.66 | 8.58 | 8.69 | 8.76 | 8.74 | 8.76 |
| 802.11a | 5745       | 149*    | 8.79                          | 8.94 | 8.74 | 8.79 | 8.83 | 8.89 | 8.92 | 8.84 |
| 802.11a | 5765       | 153     | 8.80                          | 8.91 | 8.80 | 8.81 | 8.84 | 8.91 | 8.91 | 8.87 |
| 802.11a | 5785       | 157*    | 8.72                          | 8.82 | 8.69 | 8.65 | 8.85 | 8.87 | 8.79 | 8.81 |
| 802.11a | 5805       | 161     | 8.76                          | 8.96 | 8.77 | 8.70 | 8.85 | 8.90 | 8.90 | 8.79 |
| 802.11a | 5825       | 165*    | 8.75                          | 8.85 | 8.72 | 8.76 | 8.87 | 8.92 | 8.91 | 8.79 |

Per FCC KDB Publication 443999 and RSS-210 A9.2(3), transmission on channels which overlap the 5600-5650 MHz is prohibited as a client. This device does not transmit any beacons or initiate any transmissions in 5.3 and 5.5 GHz Band.

(\*) – indicates default channels per KDB Publication 248227 D01v01r02. When the adjacent channels are higher in power than the default channels, these “required channels” are considered for SAR testing instead of the default channels.

|                                             |                                                                                                                                   |                                     |                                                                                       |                                        |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| FCC ID: A3LSMT235                           |  <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>0Y1404170792-R1.A3L | <b>Test Dates:</b><br>04/17/14-05/08/14                                                                                           | <b>DUT Type:</b><br>Portable Tablet |                                                                                       | Page 32 of 63                          |

**Table 9-17**  
**IEEE 802.11n Average RF Power – 20 MHz Bandwidth**

| Mode    | Freq [MHz] | Channel | 20MHz BW 802.11n (5GHz) Conducted Power [dBm] |      |      |      |      |      |      |      |
|---------|------------|---------|-----------------------------------------------|------|------|------|------|------|------|------|
|         |            |         | Data Rate [Mbps]                              |      |      |      |      |      |      |      |
|         |            |         | 6.5                                           | 13   | 19.5 | 26   | 39   | 52   | 58.5 | 65   |
| 802.11n | 5180       | 36      | 8.23                                          | 8.19 | 8.36 | 8.29 | 8.21 | 8.19 | 8.24 | 8.25 |
| 802.11n | 5200       | 40      | 8.33                                          | 8.25 | 8.44 | 8.41 | 8.33 | 8.30 | 8.36 | 8.37 |
| 802.11n | 5220       | 44      | 8.36                                          | 8.29 | 8.47 | 8.42 | 8.39 | 8.27 | 8.35 | 8.32 |
| 802.11n | 5240       | 48      | 8.47                                          | 8.45 | 8.48 | 8.49 | 8.49 | 8.35 | 8.48 | 8.45 |
| 802.11n | 5260       | 52      | 8.44                                          | 8.01 | 8.18 | 8.21 | 8.25 | 8.43 | 8.38 | 8.39 |
| 802.11n | 5280       | 56      | 8.46                                          | 8.06 | 8.16 | 8.17 | 8.21 | 8.46 | 8.32 | 8.43 |
| 802.11n | 5300       | 60      | 8.37                                          | 8.00 | 8.06 | 8.10 | 8.18 | 8.34 | 8.33 | 8.33 |
| 802.11n | 5320       | 64      | 8.25                                          | 7.81 | 7.99 | 8.04 | 8.02 | 8.25 | 8.25 | 8.18 |
| 802.11n | 5500       | 100     | 8.08                                          | 8.14 | 8.23 | 8.25 | 8.33 | 8.35 | 8.32 | 8.41 |
| 802.11n | 5520       | 104     | 8.08                                          | 8.13 | 8.26 | 8.25 | 8.36 | 8.40 | 8.34 | 8.47 |
| 802.11n | 5540       | 108     | 8.07                                          | 8.15 | 8.21 | 8.19 | 8.33 | 8.33 | 8.29 | 8.44 |
| 802.11n | 5560       | 112     | 8.04                                          | 8.17 | 8.13 | 8.29 | 8.23 | 8.33 | 8.27 | 8.40 |
| 802.11n | 5580       | 116     | 8.10                                          | 8.19 | 8.33 | 8.21 | 8.36 | 8.40 | 8.31 | 8.40 |
| 802.11n | 5600       | 120     | N/A                                           | N/A  | N/A  | N/A  | N/A  | N/A  | N/A  | N/A  |
| 802.11n | 5620       | 124     | N/A                                           | N/A  | N/A  | N/A  | N/A  | N/A  | N/A  | N/A  |
| 802.11n | 5640       | 128     | N/A                                           | N/A  | N/A  | N/A  | N/A  | N/A  | N/A  | N/A  |
| 802.11n | 5660       | 132     | 7.97                                          | 8.11 | 8.07 | 8.20 | 8.23 | 8.27 | 8.25 | 8.31 |
| 802.11n | 5680       | 136     | 8.02                                          | 8.08 | 8.15 | 8.20 | 8.31 | 8.23 | 8.28 | 8.27 |
| 802.11n | 5700       | 140     | 8.00                                          | 8.05 | 8.13 | 8.16 | 8.21 | 8.28 | 8.21 | 8.33 |
| 802.11n | 5745       | 149     | 7.63                                          | 7.60 | 7.75 | 7.81 | 7.86 | 7.92 | 7.79 | 7.83 |
| 802.11n | 5765       | 153     | 7.62                                          | 7.53 | 7.82 | 7.82 | 7.76 | 7.92 | 7.76 | 7.83 |
| 802.11n | 5785       | 157     | 7.63                                          | 7.63 | 7.72 | 7.77 | 7.94 | 7.87 | 7.78 | 7.83 |
| 802.11n | 5805       | 161     | 7.61                                          | 7.59 | 7.66 | 7.72 | 7.87 | 7.86 | 7.82 | 7.87 |
| 802.11n | 5825       | 165     | 7.60                                          | 7.54 | 7.76 | 7.86 | 7.78 | 7.96 | 7.75 | 7.78 |

Per FCC KDB Publication 443999 and RSS-210 A9.2(3), transmission on channels which overlap the 5600-5650 MHz is prohibited as a client. This device does not transmit any beacons or initiate any transmissions in 5.3 and 5.5 GHz Band

**Table 9-18**  
**IEEE 802.11n Average RF Power – 40 MHz Bandwidth**

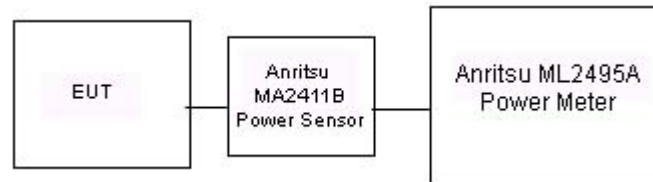
| Mode    | Freq [MHz] | Channel | 40MHz BW 802.11n (5GHz) Conducted Power [dBm] |      |      |      |      |      |       |      |
|---------|------------|---------|-----------------------------------------------|------|------|------|------|------|-------|------|
|         |            |         | Data Rate [Mbps]                              |      |      |      |      |      |       |      |
|         |            |         | 13.5                                          | 27   | 40.5 | 54   | 81   | 108  | 121.5 | 135  |
| 802.11n | 5190       | 38      | 7.59                                          | 7.63 | 7.41 | 7.86 | 7.79 | 7.83 | 7.85  | 7.77 |
| 802.11n | 5230       | 46      | 7.63                                          | 7.60 | 7.53 | 7.93 | 7.77 | 7.87 | 7.87  | 7.80 |
| 802.11n | 5270       | 54      | 7.66                                          | 7.46 | 7.58 | 7.93 | 7.89 | 7.86 | 7.88  | 7.82 |
| 802.11n | 5310       | 62      | 7.50                                          | 7.29 | 7.42 | 7.77 | 7.68 | 7.62 | 7.72  | 7.61 |
| 802.11n | 5510       | 102     | 8.09                                          | 8.19 | 8.22 | 8.46 | 8.31 | 8.29 | 8.41  | 8.38 |
| 802.11n | 5550       | 110     | 8.06                                          | 8.18 | 8.20 | 8.45 | 8.37 | 8.28 | 8.46  | 8.32 |
| 802.11n | 5590       | 118     | N/A                                           | N/A  | N/A  | N/A  | N/A  | N/A  | N/A   | N/A  |
| 802.11n | 5630       | 126     | N/A                                           | N/A  | N/A  | N/A  | N/A  | N/A  | N/A   | N/A  |
| 802.11n | 5670       | 134     | 7.99                                          | 8.08 | 8.18 | 8.35 | 8.16 | 8.15 | 8.26  | 8.34 |
| 802.11n | 5755       | 151     | 8.20                                          | 8.33 | 8.38 | 8.19 | 8.46 | 8.45 | 8.41  | 8.46 |
| 802.11n | 5795       | 159     | 8.31                                          | 8.38 | 8.48 | 8.43 | 8.39 | 8.41 | 8.45  | 8.47 |

|                                      |                                                                                                                                   |                              |                                                                                       |                                 |
|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMT235                    |  <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>SAR EVALUATION REPORT</b> |  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>0Y1404170792-R1.A3L | Test Dates:<br>04/17/14-05/08/14                                                                                                  | DUT Type:<br>Portable Tablet |                                                                                       | Page 33 of 63                   |

Per FCC KDB Publication 443999 and RSS-210 A9.2(3), transmission on channels which overlap the 5600-5650 MHz is prohibited as a client. This device does not transmit any beacons or initiate any transmissions in 5.3 and 5.5 GHz Band

Justification for reduced test configurations for WIFI channels per KDB Publication 248227 D01v01r02 and October 2012/April 2013 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.
- For 5 GHz, highest average RF output power channel for the lowest data rate for IEEE 802.11a were selected for SAR evaluation. Other IEEE 802.11 modes (including 802.11n 20 MHz and 40 MHz) 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 802.11a mode.
- When the maximum extrapolated peak SAR of the zoom scan for the maximum output channel is <1.6 W/kg and the reported 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

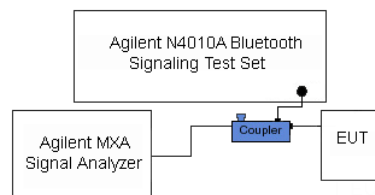


**Figure 9-3**  
**Power Measurement Setup**

|                                             |                                                                                     |                                     |                                                                                       |                                        |
|---------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> A3LSMT235                    |  | <b>SAR EVALUATION REPORT</b>        |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Document S/N:</b><br>0Y1404170792-R1.A3L | <b>Test Dates:</b><br>04/17/14-05/08/14                                             | <b>DUT Type:</b><br>Portable Tablet |                                                                                       | Page 34 of 63                          |

**Table 9-20**  
**Bluetooth RF Conducted Powers**

| Frequency<br>[MHz] | Data<br>Rate<br>[Mbps] | Channel<br>No. | Avg Conducted<br>Power |        |
|--------------------|------------------------|----------------|------------------------|--------|
|                    |                        |                | [dBm]                  | [mW]   |
| 2402               | 1.0                    | 0              | 10.88                  | 12.234 |
| 2441               | 1.0                    | 39             | <b>11.69</b>           | 14.753 |
| 2480               | 1.0                    | 78             | 11.25                  | 13.330 |
| 2402               | 2.0                    | 0              | 8.16                   | 6.542  |
| 2441               | 2.0                    | 39             | 9.54                   | 8.989  |
| 2480               | 2.0                    | 78             | 7.93                   | 6.211  |
| 2402               | 3.0                    | 0              | 8.19                   | 6.599  |
| 2441               | 3.0                    | 39             | 9.60                   | 9.128  |
| 2480               | 3.0                    | 78             | 8.09                   | 6.445  |



**Figure 9-4**  
**Power Measurement Setup**

|                                             |                                                                                     |                                     |                                                                                       |                                        |
|---------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> A3LSMT235                    |  | <b>SAR EVALUATION REPORT</b>        |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Document S/N:</b><br>0Y1404170792-R1.A3L | <b>Test Dates:</b><br>04/17/14-05/08/14                                             | <b>DUT Type:</b><br>Portable Tablet | Page 35 of 63                                                                         |                                        |

## 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 $\epsilon$ |
|------------------------------------|-------------|-------------------------------------|--------------------------|---------------------------------------|------------------------------------------|-------------------------------------|----------------------------------------|----------------|------------------|
| 4/21/2014                          | 835H        | 23.8                                | 820                      | 0.886                                 | 40.076                                   | 0.899                               | 41.578                                 | -1.45%         | -3.61%           |
|                                    |             |                                     | 835                      | 0.900                                 | 39.901                                   | 0.900                               | 41.500                                 | 0.00%          | -3.85%           |
|                                    |             |                                     | 850                      | 0.913                                 | 39.670                                   | 0.916                               | 41.500                                 | -0.33%         | -4.41%           |
| 5/7/2014                           | 1900H       | 24.5                                | 1850                     | 1.349                                 | 39.810                                   | 1.400                               | 40.000                                 | -3.64%         | -0.47%           |
|                                    |             |                                     | 1880                     | 1.379                                 | 39.682                                   | 1.400                               | 40.000                                 | -1.50%         | -0.79%           |
|                                    |             |                                     | 1910                     | 1.409                                 | 39.558                                   | 1.400                               | 40.000                                 | 0.64%          | -1.11%           |
| 4/17/2014                          | 2450H       | 22.5                                | 2401                     | 1.745                                 | 38.163                                   | 1.756                               | 39.287                                 | -0.63%         | -2.86%           |
|                                    |             |                                     | 2450                     | 1.798                                 | 37.988                                   | 1.800                               | 39.200                                 | -0.11%         | -3.09%           |
|                                    |             |                                     | 2499                     | 1.852                                 | 37.854                                   | 1.853                               | 39.138                                 | -0.05%         | -3.28%           |
| 04/23/2014                         | 5200H-5800H | 24.4                                | 5200                     | 4.480                                 | 36.870                                   | 4.655                               | 35.986                                 | -3.76%         | 2.46%            |
|                                    |             |                                     | 5240                     | 4.531                                 | 36.821                                   | 4.696                               | 35.940                                 | -3.51%         | 2.45%            |
|                                    |             |                                     | 5300                     | 4.583                                 | 36.745                                   | 4.758                               | 35.871                                 | -3.68%         | 2.44%            |
|                                    |             |                                     | 5320                     | 4.597                                 | 36.706                                   | 4.778                               | 35.849                                 | -3.79%         | 2.39%            |
|                                    |             |                                     | 5500                     | 4.781                                 | 36.534                                   | 4.963                               | 35.643                                 | -3.67%         | 2.50%            |
|                                    |             |                                     | 5765                     | 5.052                                 | 36.217                                   | 5.234                               | 35.340                                 | -3.48%         | 2.48%            |
|                                    |             |                                     | 5800                     | 5.060                                 | 36.154                                   | 5.270                               | 35.300                                 | -3.98%         | 2.42%            |
| 5/5/2014                           | 835B        | 22.6                                | 820                      | 0.996                                 | 53.867                                   | 0.969                               | 55.258                                 | 2.79%          | -2.52%           |
|                                    |             |                                     | 835                      | 1.011                                 | 53.677                                   | 0.970                               | 55.200                                 | 4.23%          | -2.76%           |
|                                    |             |                                     | 850                      | 1.025                                 | 53.516                                   | 0.988                               | 55.154                                 | 3.74%          | -2.97%           |
| 4/28/2014                          | 1900B       | 23.1                                | 1850                     | 1.488                                 | 51.619                                   | 1.520                               | 53.300                                 | -2.11%         | -3.15%           |
|                                    |             |                                     | 1880                     | 1.522                                 | 51.517                                   | 1.520                               | 53.300                                 | 0.13%          | -3.35%           |
|                                    |             |                                     | 1910                     | 1.557                                 | 51.378                                   | 1.520                               | 53.300                                 | 2.43%          | -3.61%           |
| 5/5/2014                           | 1900B       | 22.5                                | 1850                     | 1.496                                 | 53.215                                   | 1.520                               | 53.300                                 | -1.58%         | -0.16%           |
|                                    |             |                                     | 1880                     | 1.531                                 | 53.126                                   | 1.520                               | 53.300                                 | 0.72%          | -0.33%           |
|                                    |             |                                     | 1910                     | 1.568                                 | 53.028                                   | 1.520                               | 53.300                                 | 3.16%          | -0.51%           |
| 5/8/2014                           | 1900B       | 23.6                                | 1850                     | 1.472                                 | 52.600                                   | 1.520                               | 53.300                                 | -3.16%         | -1.31%           |
|                                    |             |                                     | 1880                     | 1.504                                 | 52.479                                   | 1.520                               | 53.300                                 | -1.05%         | -1.54%           |
|                                    |             |                                     | 1910                     | 1.539                                 | 52.367                                   | 1.520                               | 53.300                                 | 1.25%          | -1.75%           |
| 4/21/2014                          | 2450B       | 22.8                                | 2401                     | 1.968                                 | 51.220                                   | 1.903                               | 52.765                                 | 3.42%          | -2.93%           |
|                                    |             |                                     | 2450                     | 2.032                                 | 50.970                                   | 1.950                               | 52.700                                 | 4.21%          | -3.28%           |
|                                    |             |                                     | 2499                     | 2.100                                 | 50.831                                   | 2.019                               | 52.638                                 | 4.01%          | -3.43%           |
| 04/25/2014                         | 5200B-5800B | 22.9                                | 5200                     | 5.456                                 | 46.973                                   | 5.299                               | 49.014                                 | 2.96%          | -4.16%           |
|                                    |             |                                     | 5240                     | 5.507                                 | 46.903                                   | 5.346                               | 48.960                                 | 3.01%          | -4.20%           |
|                                    |             |                                     | 5300                     | 5.573                                 | 46.793                                   | 5.416                               | 48.879                                 | 2.90%          | -4.27%           |
|                                    |             |                                     | 5320                     | 5.603                                 | 46.756                                   | 5.439                               | 48.851                                 | 3.02%          | -4.29%           |
|                                    |             |                                     | 5500                     | 5.852                                 | 46.471                                   | 5.650                               | 48.607                                 | 3.58%          | -4.39%           |
|                                    |             |                                     | 5765                     | 6.233                                 | 46.041                                   | 5.959                               | 48.248                                 | 4.60%          | -4.57%           |
|                                    |             |                                     | 5800                     | 6.280                                 | 45.944                                   | 6.000                               | 48.200                                 | 4.67%          | -4.68%           |

The above measured tissue parameters were used in the DASY software. The DASY software was used to perform interpolation to determine the dielectric parameters at the SAR test device frequencies (per KDB 865664 and IEEE 1528-2013 6.6.1.2). The tissue parameters listed in the SAR test plots may slightly differ from the table above due to significant digit rounding in the software.

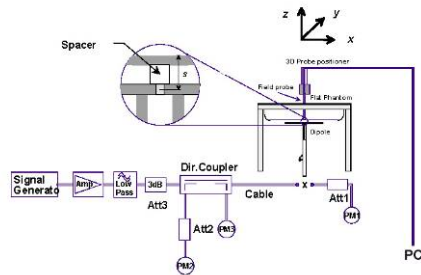
|                                             |                                                                                     |                                     |                                                                                       |                                        |
|---------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| FCC ID: A3LSMT235                           |  | <b>SAR EVALUATION REPORT</b>        |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Document S/N:</b><br>0Y1404170792-R1.A3L | <b>Test Dates:</b><br>04/17/14-05/08/14                                             | <b>DUT Type:</b><br>Portable Tablet |                                                                                       | Page 36 of 63                          |

## 10.2 Test System Verification

Prior to SAR assessment, the system is verified to  $\pm 10\%$  of the SAR measurement on the reference dipole at the time of calibration by the calibration facility. Full system validation status and result summary can be found in Appendix E.

**Table 10-2**  
**System Verification Results**

| System Verification<br>TARGET & MEASURED |                        |             |            |                |                  |                 |           |          |                                   |                                     |                                         |                             |
|------------------------------------------|------------------------|-------------|------------|----------------|------------------|-----------------|-----------|----------|-----------------------------------|-------------------------------------|-----------------------------------------|-----------------------------|
| SAR System #                             | 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 <sub>1g</sub> (%) |
| E                                        | 835                    | HEAD        | 04/21/2014 | 23.8           | 22.5             | 0.100           | 4d132     | 3914     | 0.985                             | 9.200                               | 9.850                                   | 7.07%                       |
| K                                        | 1900                   | HEAD        | 05/07/2014 | 23.4           | 24.5             | 0.100           | 5d149     | 3333     | 3.970                             | 40.400                              | 39.700                                  | -1.73%                      |
| K                                        | 2450                   | HEAD        | 04/17/2014 | 24.3           | 22.6             | 0.100           | 797       | 3287     | 5.400                             | 51.800                              | 54.000                                  | 4.25%                       |
| E                                        | 5200                   | HEAD        | 04/23/2014 | 24.5           | 24.4             | 0.100           | 1057      | 3914     | 7.420                             | 78.000                              | 74.200                                  | -4.87%                      |
| E                                        | 5300                   | HEAD        | 04/23/2014 | 24.5           | 24.3             | 0.100           | 1057      | 3914     | 8.290                             | 83.000                              | 82.900                                  | -0.12%                      |
| E                                        | 5500                   | HEAD        | 04/23/2014 | 24.4           | 24.3             | 0.100           | 1057      | 3914     | 7.890                             | 84.300                              | 78.900                                  | -6.41%                      |
| E                                        | 5800                   | HEAD        | 04/23/2014 | 24.5           | 24.4             | 0.100           | 1057      | 3914     | 7.770                             | 79.300                              | 77.700                                  | -2.02%                      |
| D                                        | 835                    | BODY        | 05/05/2014 | 23.5           | 22.6             | 0.100           | 4d119     | 3022     | 0.988                             | 9.340                               | 9.880                                   | 5.78%                       |
| H                                        | 1900                   | BODY        | 04/28/2014 | 23.4           | 23.1             | 0.100           | 5d149     | 3589     | 3.970                             | 40.500                              | 39.700                                  | -1.98%                      |
| E                                        | 1900                   | BODY        | 05/05/2014 | 23.5           | 22.5             | 0.100           | 5d149     | 3914     | 4.110                             | 40.500                              | 41.100                                  | 1.48%                       |
| E                                        | 1900                   | BODY        | 05/08/2014 | 24.3           | 23.6             | 0.100           | 5d149     | 3914     | 4.110                             | 40.500                              | 41.100                                  | 1.48%                       |
| G                                        | 2450                   | BODY        | 04/21/2014 | 24.3           | 23.0             | 0.100           | 797       | 3258     | 4.900                             | 49.400                              | 49.000                                  | -0.81%                      |
| A                                        | 5200                   | BODY        | 04/25/2014 | 23.4           | 21.8             | 0.100           | 1007      | 3920     | 7.740                             | 72.600                              | 77.400                                  | 6.61%                       |
| A                                        | 5300                   | BODY        | 04/25/2014 | 23.4           | 21.8             | 0.100           | 1007      | 3920     | 7.970                             | 74.700                              | 79.700                                  | 6.69%                       |
| A                                        | 5500                   | BODY        | 04/25/2014 | 23.4           | 21.8             | 0.100           | 1007      | 3920     | 7.890                             | 75.900                              | 78.900                                  | 3.95%                       |
| A                                        | 5800                   | BODY        | 04/25/2014 | 23.4           | 21.8             | 0.100           | 1007      | 3920     | 7.580                             | 72.900                              | 75.800                                  | 3.98%                       |



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



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

|                                      |                                                                                     |                              |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMT235                    |  | SAR EVALUATION REPORT        |  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>0Y1404170792-R1.A3L | Test Dates:<br>04/17/14-05/08/14                                                    | DUT Type:<br>Portable Tablet |                                                                                       | Page 37 of 63                   |

# 11 SAR DATA SUMMARY

## 11.1 Standalone Head SAR Data

**Table 11-1  
GSM 850 Head SAR**

| MEASUREMENT RESULTS                                                                               |     |           |         |                             |                       |                  |                                                 |               |                      |            |          |                |                 |        |
|---------------------------------------------------------------------------------------------------|-----|-----------|---------|-----------------------------|-----------------------|------------------|-------------------------------------------------|---------------|----------------------|------------|----------|----------------|-----------------|--------|
| FREQUENCY                                                                                         |     | Mode/Band | Service | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Side                                            | Test Position | Device Serial Number | Duty Cycle | SAR (1g) | Scaling Factor | Scaled SAR (1g) | Plot # |
| MHz                                                                                               | Ch. |           |         |                             |                       |                  |                                                 |               |                      |            | (W/kg)   |                | (W/kg)          |        |
| 836.60                                                                                            | 190 | GSM850    | GSM     | 22.5                        | 22.25                 | 0.03             | Right                                           | Cheek         | FL-147-E             | 1:8.3      | 0.360    | 1.059          | 0.381           | A1     |
| 836.60                                                                                            | 190 | GSM850    | GSM     | 22.5                        | 22.25                 | 0.06             | Right                                           | Tilt          | FL-147-E             | 1:8.3      | 0.250    | 1.059          | 0.265           |        |
| 836.60                                                                                            | 190 | GSM850    | GSM     | 22.5                        | 22.25                 | 0.00             | Left                                            | Cheek         | FL-147-E             | 1:8.3      | 0.229    | 1.059          | 0.243           |        |
| 836.60                                                                                            | 190 | GSM850    | GSM     | 22.5                        | 22.25                 | 0.01             | Left                                            | Tilt          | FL-147-E             | 1:8.3      | 0.155    | 1.059          | 0.164           |        |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population |     |           |         |                             |                       |                  | Head<br>1.6 W/kg (mW/g)<br>averaged over 1 gram |               |                      |            |          |                |                 |        |

**Table 11-2  
GSM 1900 Head SAR**

| MEASUREMENT RESULTS                                                                               |     |           |         |                             |                       |                  |       |                                                 |                      |            |          |                |                 |        |
|---------------------------------------------------------------------------------------------------|-----|-----------|---------|-----------------------------|-----------------------|------------------|-------|-------------------------------------------------|----------------------|------------|----------|----------------|-----------------|--------|
| FREQUENCY                                                                                         |     | Mode/Band | Service | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Side  | Test Position                                   | Device Serial Number | Duty Cycle | SAR (1g) | Scaling Factor | Scaled SAR (1g) | Plot # |
| MHz                                                                                               | Ch. |           |         |                             |                       |                  |       |                                                 |                      |            | (W/kg)   |                | (W/kg)          |        |
| 1880.00                                                                                           | 661 | GSM 1900  | GSM     | 19.5                        | 19.50                 | 0.07             | Right | Cheek                                           | FL-147-F             | 1:8.3      | 0.187    | 1.000          | 0.187           | A2     |
| 1880.00                                                                                           | 661 | GSM 1900  | GSM     | 19.5                        | 19.50                 | 0.07             | Right | Tilt                                            | FL-147-F             | 1:8.3      | 0.181    | 1.000          | 0.181           |        |
| 1880.00                                                                                           | 661 | GSM 1900  | GSM     | 19.5                        | 19.50                 | 0.03             | Left  | Cheek                                           | FL-147-F             | 1:8.3      | 0.077    | 1.000          | 0.077           |        |
| 1880.00                                                                                           | 661 | GSM 1900  | GSM     | 19.5                        | 19.50                 | 0.02             | Left  | Tilt                                            | FL-147-F             | 1:8.3      | 0.068    | 1.000          | 0.068           |        |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population |     |           |         |                             |                       |                  |       | Head<br>1.6 W/kg (mW/g)<br>averaged over 1 gram |                      |            |          |                |                 |        |

**Table 11-3  
UMTS 850 Head SAR**

| MEASUREMENT RESULTS                                                                               |      |           |         |                             |                       |                  |       |                                                 |                      |            |          |                |                 |        |
|---------------------------------------------------------------------------------------------------|------|-----------|---------|-----------------------------|-----------------------|------------------|-------|-------------------------------------------------|----------------------|------------|----------|----------------|-----------------|--------|
| FREQUENCY                                                                                         |      | Mode/Band | Service | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Side  | Test Position                                   | Device Serial Number | Duty Cycle | SAR (1g) | Scaling Factor | Scaled SAR (1g) | Plot # |
| MHz                                                                                               | Ch.  |           |         |                             |                       |                  |       |                                                 |                      |            | (W/kg)   |                | (W/kg)          |        |
| 836.60                                                                                            | 4183 | UMTS 850  | RMC     | 19.5                        | 19.45                 | 0.05             | Right | Cheek                                           | FL-147-E             | 1:1        | 0.410    | 1.012          | 0.415           | A3     |
| 836.60                                                                                            | 4183 | UMTS 850  | RMC     | 19.5                        | 19.45                 | 0.04             | Right | Tilt                                            | FL-147-E             | 1:1        | 0.259    | 1.012          | 0.262           |        |
| 836.60                                                                                            | 4183 | UMTS 850  | RMC     | 19.5                        | 19.45                 | 0.04             | Left  | Cheek                                           | FL-147-E             | 1:1        | 0.224    | 1.012          | 0.227           |        |
| 836.60                                                                                            | 4183 | UMTS 850  | RMC     | 19.5                        | 19.45                 | 0.02             | Left  | Tilt                                            | FL-147-E             | 1:1        | 0.167    | 1.012          | 0.169           |        |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population |      |           |         |                             |                       |                  |       | Head<br>1.6 W/kg (mW/g)<br>averaged over 1 gram |                      |            |          |                |                 |        |

|                                      |                                                                                     |                              |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMT235                    |  | SAR EVALUATION REPORT        |  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>0Y1404170792-R1.A3L | Test Dates:<br>04/17/14-05/08/14                                                    | DUT Type:<br>Portable Tablet |                                                                                       | Page 38 of 63                   |

**Table 11-4**  
**UMTS 1900 Head SAR**

| MEASUREMENT RESULTS                                                                               |      |           |         |                             |                       |                  |       |                                                 |                      |            |          |                |                 |        |
|---------------------------------------------------------------------------------------------------|------|-----------|---------|-----------------------------|-----------------------|------------------|-------|-------------------------------------------------|----------------------|------------|----------|----------------|-----------------|--------|
| FREQUENCY                                                                                         |      | Mode/Band | Service | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Side  | Test Position                                   | Device Serial Number | Duty Cycle | SAR (1g) | Scaling Factor | Scaled SAR (1g) | Plot # |
| MHz                                                                                               | Ch.  |           |         |                             |                       |                  |       |                                                 |                      |            | (W/kg)   |                | (W/kg)          |        |
| 1880.00                                                                                           | 9400 | UMTS 1900 | RMC     | 12.0                        | 11.83                 | 0.02             | Right | Cheek                                           | FL-147-E             | 1:1        | 0.273    | 1.040          | 0.284           | A4     |
| 1880.00                                                                                           | 9400 | UMTS 1900 | RMC     | 12.0                        | 11.83                 | 0.02             | Right | Tilt                                            | FL-147-E             | 1:1        | 0.254    | 1.040          | 0.264           |        |
| 1880.00                                                                                           | 9400 | UMTS 1900 | RMC     | 12.0                        | 11.83                 | 0.12             | Left  | Cheek                                           | FL-147-E             | 1:1        | 0.105    | 1.040          | 0.109           |        |
| 1880.00                                                                                           | 9400 | UMTS 1900 | RMC     | 12.0                        | 11.83                 | 0.17             | Left  | Tilt                                            | FL-147-E             | 1:1        | 0.090    | 1.040          | 0.094           |        |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population |      |           |         |                             |                       |                  |       | Head<br>1.6 W/kg (mW/g)<br>averaged over 1 gram |                      |            |          |                |                 |        |

**Table 11-5**  
**LTE Band 5 (Cell) Head SAR**

| MEASUREMENT RESULTS                                                                               |       |      |                   |                             |                       |                  |          |      |               |                                                 |         |           |                      |            |          |                |                 |        |    |
|---------------------------------------------------------------------------------------------------|-------|------|-------------------|-----------------------------|-----------------------|------------------|----------|------|---------------|-------------------------------------------------|---------|-----------|----------------------|------------|----------|----------------|-----------------|--------|----|
| FREQUENCY                                                                                         |       | Mode | Bandwidth [MHz]   | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | MPR [dB] | Side | Test Position | Modulation                                      | RB Size | RB Offset | Device Serial Number | Duty Cycle | SAR (1g) | Scaling Factor | Scaled SAR (1g) | Plot # |    |
| MHz                                                                                               | Ch.   |      |                   |                             |                       |                  |          |      |               |                                                 |         |           |                      |            | (W/kg)   |                | (W/kg)          |        |    |
| 836.50                                                                                            | 20525 | Mid  | LTE Band 5 (Cell) | 10                          | 18.0                  | 17.93            | 0.04     | 0    | Right         | Cheek                                           | QPSK    | 1         | 49                   | FL-147-E   | 1:1      | 0.434          | 1.016           | 0.441  | A5 |
| 836.50                                                                                            | 20525 | Mid  | LTE Band 5 (Cell) | 10                          | 18.0                  | 17.98            | 0.04     | 0    | Right         | Cheek                                           | QPSK    | 25        | 0                    | FL-147-E   | 1:1      | 0.414          | 1.005           | 0.416  |    |
| 836.50                                                                                            | 20525 | Mid  | LTE Band 5 (Cell) | 10                          | 18.0                  | 17.93            | 0.09     | 0    | Right         | Tilt                                            | QPSK    | 1         | 49                   | FL-147-E   | 1:1      | 0.269          | 1.016           | 0.273  |    |
| 836.50                                                                                            | 20525 | Mid  | LTE Band 5 (Cell) | 10                          | 18.0                  | 17.98            | 0.06     | 0    | Right         | Tilt                                            | QPSK    | 25        | 0                    | FL-147-E   | 1:1      | 0.265          | 1.005           | 0.266  |    |
| 836.50                                                                                            | 20525 | Mid  | LTE Band 5 (Cell) | 10                          | 18.0                  | 17.93            | 0.01     | 0    | Left          | Cheek                                           | QPSK    | 1         | 49                   | FL-147-E   | 1:1      | 0.236          | 1.016           | 0.240  |    |
| 836.50                                                                                            | 20525 | Mid  | LTE Band 5 (Cell) | 10                          | 18.0                  | 17.98            | 0.00     | 0    | Left          | Cheek                                           | QPSK    | 25        | 0                    | FL-147-E   | 1:1      | 0.228          | 1.005           | 0.229  |    |
| 836.50                                                                                            | 20525 | Mid  | LTE Band 5 (Cell) | 10                          | 18.0                  | 17.93            | 0.02     | 0    | Left          | Tilt                                            | QPSK    | 1         | 49                   | FL-147-E   | 1:1      | 0.176          | 1.016           | 0.179  |    |
| 836.50                                                                                            | 20525 | Mid  | LTE Band 5 (Cell) | 10                          | 18.0                  | 17.98            | 0.02     | 0    | Left          | Tilt                                            | QPSK    | 25        | 0                    | FL-147-E   | 1:1      | 0.170          | 1.005           | 0.171  |    |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population |       |      |                   |                             |                       |                  |          |      |               | Head<br>1.6 W/kg (mW/g)<br>averaged over 1 gram |         |           |                      |            |          |                |                 |        |    |

**Table 11-6**  
**DTS Head SAR**

| MEASUREMENT RESULTS                                                                               |     |              |         |                             |                       |                  |       |                                                 |                      |                  |            |          |                |                 |        |
|---------------------------------------------------------------------------------------------------|-----|--------------|---------|-----------------------------|-----------------------|------------------|-------|-------------------------------------------------|----------------------|------------------|------------|----------|----------------|-----------------|--------|
| FREQUENCY                                                                                         |     | Mode         | Service | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Side  | Test Position                                   | Device Serial Number | Data Rate (Mbps) | Duty Cycle | SAR (1g) | Scaling Factor | Scaled SAR (1g) | Plot # |
| MHz                                                                                               | Ch. |              |         |                             |                       |                  |       |                                                 |                      |                  |            | (W/kg)   |                | (W/kg)          |        |
| 2462                                                                                              | 11  | IEEE 802.11b | DSSS    | 12.0                        | 11.71                 | 0.12             | Right | Cheek                                           | FL-147-C             | 1                | 1:1        | 0.003    | 1.069          | 0.003           | A6     |
| 2462                                                                                              | 11  | IEEE 802.11b | DSSS    | 12.0                        | 11.71                 | 0.17             | Right | Tilt                                            | FL-147-C             | 1                | 1:1        | 0.001    | 1.069          | 0.001           |        |
| 2462                                                                                              | 11  | IEEE 802.11b | DSSS    | 12.0                        | 11.71                 | 0.04             | Left  | Cheek                                           | FL-147-C             | 1                | 1:1        | 0.003    | 1.069          | 0.003           |        |
| 2462                                                                                              | 11  | IEEE 802.11b | DSSS    | 12.0                        | 11.71                 | 0.14             | Left  | Tilt                                            | FL-147-C             | 1                | 1:1        | 0.003    | 1.069          | 0.003           |        |
| 5765                                                                                              | 153 | IEEE 802.11a | OFDM    | 9.5                         | 8.80                  | 0.00             | Right | Cheek                                           | FL-147-C             | 6                | 1:1        | 0.000    | 1.175          | 0.000           |        |
| 5765                                                                                              | 153 | IEEE 802.11a | OFDM    | 9.5                         | 8.80                  | 0.00             | Right | Tilt                                            | FL-147-C             | 6                | 1:1        | 0.000    | 1.175          | 0.000           |        |
| 5765                                                                                              | 153 | IEEE 802.11a | OFDM    | 9.5                         | 8.80                  | 0.00             | Left  | Cheek                                           | FL-147-C             | 6                | 1:1        | 0.000    | 1.175          | 0.000           |        |
| 5765                                                                                              | 153 | IEEE 802.11a | OFDM    | 9.5                         | 8.80                  | -0.09            | Left  | Tilt                                            | FL-147-C             | 6                | 1:1        | 0.001    | 1.175          | 0.001           | A7     |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population |     |              |         |                             |                       |                  |       | Head<br>1.6 W/kg (mW/g)<br>averaged over 1 gram |                      |                  |            |          |                |                 |        |

|                                      |                                                                                     |                              |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMT235                    |  | <b>SAR EVALUATION REPORT</b> |  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>0Y1404170792-R1.A3L | Test Dates:<br>04/17/14-05/08/14                                                    | DUT Type:<br>Portable Tablet |                                                                                       | Page 39 of 63                   |

**Table 11-7  
NII Head SAR**

| MEASUREMENT RESULTS                                                                               |     |              |         |                             |                       |                  |                                                 |               |                      |                  |            |          |                |                 |        |
|---------------------------------------------------------------------------------------------------|-----|--------------|---------|-----------------------------|-----------------------|------------------|-------------------------------------------------|---------------|----------------------|------------------|------------|----------|----------------|-----------------|--------|
| FREQUENCY                                                                                         |     | Mode         | Service | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Side                                            | Test Position | Device Serial Number | Data Rate (Mbps) | Duty Cycle | SAR (1g) | Scaling Factor | Scaled SAR (1g) | Plot # |
| MHz                                                                                               | Ch. |              |         |                             |                       |                  |                                                 |               |                      |                  |            | (W/kg)   |                | (W/kg)          |        |
| 5240                                                                                              | 48  | IEEE 802.11a | OFDM    | 9.5                         | 9.08                  | 0.00             | Right                                           | Cheek         | FL-147-C             | 6                | 1:1        | 0.000    | 1.102          | 0.000           |        |
| 5240                                                                                              | 48  | IEEE 802.11a | OFDM    | 9.5                         | 9.08                  | 0.00             | Right                                           | Tilt          | FL-147-C             | 6                | 1:1        | 0.000    | 1.102          | 0.000           |        |
| 5240                                                                                              | 48  | IEEE 802.11a | OFDM    | 9.5                         | 9.08                  | 0.00             | Left                                            | Cheek         | FL-147-C             | 6                | 1:1        | 0.001    | 1.102          | 0.001           | A8     |
| 5240                                                                                              | 48  | IEEE 802.11a | OFDM    | 9.5                         | 9.08                  | -0.09            | Left                                            | Tilt          | FL-147-C             | 6                | 1:1        | 0.000    | 1.102          | 0.000           |        |
| 5320                                                                                              | 64  | IEEE 802.11a | OFDM    | 9.5                         | 8.87                  | 0.00             | Right                                           | Cheek         | FL-147-C             | 6                | 1:1        | 0.000    | 1.156          | 0.000           |        |
| 5320                                                                                              | 64  | IEEE 802.11a | OFDM    | 9.5                         | 8.87                  | 0.00             | Right                                           | Tilt          | FL-147-C             | 6                | 1:1        | 0.000    | 1.156          | 0.000           |        |
| 5320                                                                                              | 64  | IEEE 802.11a | OFDM    | 9.5                         | 8.87                  | 0.00             | Left                                            | Cheek         | FL-147-C             | 6                | 1:1        | 0.000    | 1.156          | 0.000           |        |
| 5320                                                                                              | 64  | IEEE 802.11a | OFDM    | 9.5                         | 8.87                  | 0.00             | Left                                            | Tilt          | FL-147-C             | 6                | 1:1        | 0.000    | 1.156          | 0.000           |        |
| 5500                                                                                              | 100 | IEEE 802.11a | OFDM    | 9.5                         | 8.85                  | 0.00             | Right                                           | Cheek         | FL-147-C             | 6                | 1:1        | 0.000    | 1.161          | 0.000           |        |
| 5500                                                                                              | 100 | IEEE 802.11a | OFDM    | 9.5                         | 8.85                  | 0.00             | Right                                           | Tilt          | FL-147-C             | 6                | 1:1        | 0.000    | 1.161          | 0.000           |        |
| 5500                                                                                              | 100 | IEEE 802.11a | OFDM    | 9.5                         | 8.85                  | 0.00             | Left                                            | Cheek         | FL-147-C             | 6                | 1:1        | 0.000    | 1.161          | 0.000           |        |
| 5500                                                                                              | 100 | IEEE 802.11a | OFDM    | 9.5                         | 8.85                  | 0.00             | Left                                            | Tilt          | FL-147-C             | 6                | 1:1        | 0.001    | 1.161          | 0.001           |        |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population |     |              |         |                             |                       |                  | Head<br>1.6 W/kg (mW/g)<br>averaged over 1 gram |               |                      |                  |            |          |                |                 |        |

|                                             |                                                                                     |                                     |                                                                                       |                                        |
|---------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| FCC ID: A3LSMT235                           |  | <b>SAR EVALUATION REPORT</b>        |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Document S/N:</b><br>0Y1404170792-R1.A3L | <b>Test Dates:</b><br>04/17/14-05/08/14                                             | <b>DUT Type:</b><br>Portable Tablet |                                                                                       | Page 40 of 63                          |

## 11.2 Standalone Body SAR Data

**Table 11-8**  
**GPRS/UMTS Body SAR Data**

| MEASUREMENT RESULTS                                                                               |      |           |         |                             |                       |                  |                                                 |                      |                 |            |       |          |                |                 |        |
|---------------------------------------------------------------------------------------------------|------|-----------|---------|-----------------------------|-----------------------|------------------|-------------------------------------------------|----------------------|-----------------|------------|-------|----------|----------------|-----------------|--------|
| FREQUENCY                                                                                         |      | Mode      | Service | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Spacing                                         | Device Serial Number | # of GPRS Slots | Duty Cycle | Side  | SAR (1g) | Scaling Factor | Scaled SAR (1g) | Plot # |
| MHz                                                                                               | Ch.  |           |         |                             |                       |                  |                                                 |                      |                 |            |       | (W/kg)   |                | (W/kg)          |        |
| 836.60                                                                                            | 190  | GSM 850   | GPRS    | 30.5                        | 30.38                 | 0.02             | 18 mm                                           | FL-147-C             | 3               | 1:2.76     | back  | 0.279    | 1.028          | 0.287           |        |
| 836.60                                                                                            | 190  | GSM 850   | GPRS    | 30.5                        | 30.38                 | 0.11             | 15 mm                                           | FL-147-C             | 3               | 1:2.76     | top   | 0.186    | 1.028          | 0.191           |        |
| 836.60                                                                                            | 190  | GSM 850   | GPRS    | 30.5                        | 30.38                 | -0.08            | 0 mm                                            | FL-147-C             | 3               | 1:2.76     | right | 0.186    | 1.028          | 0.191           |        |
| 836.60                                                                                            | 190  | GSM 850   | GPRS    | 30.5                        | 30.38                 | -0.11            | 0 mm                                            | FL-147-C             | 3               | 1:2.76     | left  | 0.387    | 1.028          | 0.398           |        |
| 848.80                                                                                            | 251  | GSM 850   | GPRS    | 21.0                        | 21.00                 | 0.00             | 0 mm                                            | FL-147-E             | 3               | 1:2.76     | back  | 0.528    | 1.000          | 0.528           | A9     |
| 848.80                                                                                            | 251  | GSM 850   | GPRS    | 21.0                        | 21.00                 | -0.01            | 0 mm                                            | FL-147-E             | 3               | 1:2.76     | top   | 0.255    | 1.000          | 0.255           |        |
| 1850.20                                                                                           | 512  | GSM 1900  | GPRS    | 28.0                        | 27.20                 | -0.03            | 18 mm                                           | FL-147-C             | 3               | 1:2.76     | back  | 0.595    | 1.076          | 0.640           |        |
| 1880.00                                                                                           | 661  | GSM 1900  | GPRS    | 28.0                        | 27.96                 | 0.01             | 18 mm                                           | FL-147-C             | 3               | 1:2.76     | back  | 0.811    | 1.009          | 0.818           |        |
| 1909.80                                                                                           | 810  | GSM 1900  | GPRS    | 28.0                        | 27.82                 | -0.06            | 18 mm                                           | FL-147-C             | 3               | 1:2.76     | back  | 0.980    | 1.042          | 1.021           | A10    |
| 1880.00                                                                                           | 661  | GSM 1900  | GPRS    | 28.0                        | 27.96                 | 0.03             | 15 mm                                           | FL-147-C             | 3               | 1:2.76     | top   | 0.728    | 1.009          | 0.735           |        |
| 1880.00                                                                                           | 661  | GSM 1900  | GPRS    | 28.0                        | 27.96                 | -0.04            | 0 mm                                            | FL-147-C             | 3               | 1:2.76     | right | 0.171    | 1.009          | 0.173           |        |
| 1880.00                                                                                           | 661  | GSM 1900  | GPRS    | 28.0                        | 27.96                 | -0.04            | 0 mm                                            | FL-147-C             | 3               | 1:2.76     | left  | 0.500    | 1.009          | 0.505           |        |
| 1880.00                                                                                           | 661  | GSM 1900  | GPRS    | 15.5                        | 15.25                 | -0.04            | 0 mm                                            | FL-147-F             | 4               | 1:2.076    | back  | 0.690    | 1.059          | 0.731           |        |
| 1880.00                                                                                           | 661  | GSM 1900  | GPRS    | 15.5                        | 15.25                 | 0.01             | 0 mm                                            | FL-147-F             | 4               | 1:2.076    | top   | 0.436    | 1.059          | 0.462           |        |
| 1909.80                                                                                           | 810  | GSM 1900  | GPRS    | 28.0                        | 27.82                 | 0.02             | 18 mm                                           | FL-147-C             | 3               | 1:2.76     | back  | 0.861    | 1.042          | 0.897           |        |
| 836.60                                                                                            | 4183 | UMTS 850  | RMC     | 23.5                        | 23.46                 | -0.10            | 18 mm                                           | FL-147-C             | N/A             | 1:1        | back  | 0.250    | 1.009          | 0.252           |        |
| 836.60                                                                                            | 4183 | UMTS 850  | RMC     | 23.5                        | 23.46                 | 0.00             | 15 mm                                           | FL-147-C             | N/A             | 1:1        | top   | 0.204    | 1.009          | 0.206           |        |
| 836.60                                                                                            | 4183 | UMTS 850  | RMC     | 23.5                        | 23.46                 | 0.03             | 0 mm                                            | FL-147-C             | N/A             | 1:1        | right | 0.181    | 1.009          | 0.183           |        |
| 836.60                                                                                            | 4183 | UMTS 850  | RMC     | 23.5                        | 23.46                 | -0.02            | 0 mm                                            | FL-147-C             | N/A             | 1:1        | left  | 0.342    | 1.009          | 0.345           |        |
| 826.40                                                                                            | 4132 | UMTS 850  | RMC     | 19.5                        | 19.37                 | -0.02            | 0 mm                                            | FL-147-E             | N/A             | 1:1        | back  | 0.949    | 1.030          | 0.977           |        |
| 836.60                                                                                            | 4183 | UMTS 850  | RMC     | 19.5                        | 19.45                 | 0.01             | 0 mm                                            | FL-147-E             | N/A             | 1:1        | back  | 0.910    | 1.012          | 0.921           |        |
| 846.60                                                                                            | 4233 | UMTS 850  | RMC     | 19.5                        | 19.33                 | 0.01             | 0 mm                                            | FL-147-E             | N/A             | 1:1        | back  | 0.881    | 1.040          | 0.916           |        |
| 836.60                                                                                            | 4183 | UMTS 850  | RMC     | 19.5                        | 19.45                 | -0.01            | 0 mm                                            | FL-147-E             | N/A             | 1:1        | top   | 0.502    | 1.012          | 0.508           |        |
| 826.40                                                                                            | 4132 | UMTS 850  | RMC     | 19.5                        | 19.37                 | -0.01            | 0 mm                                            | FL-147-E             | N/A             | 1:1        | back  | 0.980    | 1.030          | 1.009           | A11    |
| 1880.00                                                                                           | 9400 | UMTS 1900 | RMC     | 24.0                        | 23.62                 | -0.02            | 18 mm                                           | FL-147-C             | N/A             | 1:1        | back  | 0.709    | 1.091          | 0.774           |        |
| 1880.00                                                                                           | 9400 | UMTS 1900 | RMC     | 24.0                        | 23.62                 | 0.05             | 15 mm                                           | FL-147-C             | N/A             | 1:1        | top   | 0.698    | 1.091          | 0.762           |        |
| 1880.00                                                                                           | 9400 | UMTS 1900 | RMC     | 24.0                        | 23.62                 | -0.03            | 0 mm                                            | FL-147-C             | N/A             | 1:1        | right | 0.215    | 1.091          | 0.235           |        |
| 1880.00                                                                                           | 9400 | UMTS 1900 | RMC     | 24.0                        | 23.62                 | -0.03            | 0 mm                                            | FL-147-C             | N/A             | 1:1        | left  | 0.579    | 1.091          | 0.632           |        |
| 1852.40                                                                                           | 9262 | UMTS 1900 | RMC     | 12.0                        | 11.76                 | 0.00             | 0 mm                                            | FL-147-E             | N/A             | 1:1        | back  | 0.799    | 1.057          | 0.845           |        |
| 1880.00                                                                                           | 9400 | UMTS 1900 | RMC     | 12.0                        | 11.83                 | 0.01             | 0 mm                                            | FL-147-E             | N/A             | 1:1        | back  | 0.854    | 1.040          | 0.888           |        |
| 1907.60                                                                                           | 9538 | UMTS 1900 | RMC     | 12.0                        | 11.97                 | 0.00             | 0 mm                                            | FL-147-E             | N/A             | 1:1        | back  | 0.918    | 1.007          | 0.924           | A12    |
| 1880.00                                                                                           | 9400 | UMTS 1900 | RMC     | 12.0                        | 11.83                 | -0.09            | 0 mm                                            | FL-147-E             | N/A             | 1:1        | top   | 0.457    | 1.040          | 0.475           |        |
| 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: A3LSMT235                    |  | SAR EVALUATION REPORT        |  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>0Y1404170792-R1.A3L | Test Dates:<br>04/17/14-05/08/14                                                    | DUT Type:<br>Portable Tablet |                                                                                       | Page 41 of 63                   |

**Table 11-9**  
**LTE Band 5 (Cell) Body SAR**

| MEASUREMENT RESULTS                      |       |      |                   |                              |                       |                  |          |                      |            |         |           |         |       |            |          |                |                 |        |     |
|------------------------------------------|-------|------|-------------------|------------------------------|-----------------------|------------------|----------|----------------------|------------|---------|-----------|---------|-------|------------|----------|----------------|-----------------|--------|-----|
| FREQUENCY                                |       | Mode | Bandwidth [MHz]   | Maxim um Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | MPR [dB] | Device Serial Number | Modulation | RB Size | RB Offset | Spacing | Slide | Duty Cycle | SAR (1g) | Scaling Factor | Scaled SAR (1g) | Plot # |     |
| MHz                                      | Ch.   |      |                   |                              |                       |                  |          |                      |            |         |           |         |       |            | (W/kg)   |                | (W/kg)          |        |     |
| 836.50                                   | 20525 | Mid  | LTE Band 5 (Cell) | 10                           | 23.5                  | 23.29            | 0.03     | 0                    | FL-147-C   | QPSK    | 1         | 0       | 18 mm | back       | 1:1      | 0.353          | 1.050           | 0.371  |     |
| 836.50                                   | 20525 | Mid  | LTE Band 5 (Cell) | 10                           | 22.5                  | 21.84            | 0.02     | 1                    | FL-147-C   | QPSK    | 25        | 0       | 18 mm | back       | 1:1      | 0.247          | 1.164           | 0.288  |     |
| 836.50                                   | 20525 | Mid  | LTE Band 5 (Cell) | 10                           | 23.5                  | 23.29            | 0.09     | 0                    | FL-147-C   | QPSK    | 1         | 0       | 15 mm | top        | 1:1      | 0.226          | 1.050           | 0.237  |     |
| 836.50                                   | 20525 | Mid  | LTE Band 5 (Cell) | 10                           | 22.5                  | 21.84            | -0.04    | 1                    | FL-147-C   | QPSK    | 25        | 0       | 15 mm | top        | 1:1      | 0.147          | 1.164           | 0.171  |     |
| 836.50                                   | 20525 | Mid  | LTE Band 5 (Cell) | 10                           | 23.5                  | 23.29            | -0.01    | 0                    | FL-147-C   | QPSK    | 1         | 0       | 0 mm  | right      | 1:1      | 0.155          | 1.050           | 0.163  |     |
| 836.50                                   | 20525 | Mid  | LTE Band 5 (Cell) | 10                           | 22.5                  | 21.84            | 0.03     | 1                    | FL-147-C   | QPSK    | 25        | 0       | 0 mm  | right      | 1:1      | 0.118          | 1.164           | 0.137  |     |
| 836.50                                   | 20525 | Mid  | LTE Band 5 (Cell) | 10                           | 23.5                  | 23.29            | 0.03     | 0                    | FL-147-C   | QPSK    | 1         | 0       | 0 mm  | left       | 1:1      | 0.326          | 1.050           | 0.342  |     |
| 836.50                                   | 20525 | Mid  | LTE Band 5 (Cell) | 10                           | 22.5                  | 21.84            | 0.00     | 1                    | FL-147-C   | QPSK    | 25        | 0       | 0 mm  | left       | 1:1      | 0.240          | 1.164           | 0.279  |     |
| 836.50                                   | 20525 | Mid  | LTE Band 5 (Cell) | 10                           | 18.0                  | 17.93            | -0.02    | 0                    | FL-147-E   | QPSK    | 1         | 49      | 0 mm  | back       | 1:1      | 0.837          | 1.016           | 0.850  |     |
| 836.50                                   | 20525 | Mid  | LTE Band 5 (Cell) | 10                           | 18.0                  | 17.98            | 0.00     | 0                    | FL-147-E   | QPSK    | 25        | 0       | 0 mm  | back       | 1:1      | 0.858          | 1.005           | 0.862  |     |
| 836.50                                   | 20525 | Mid  | LTE Band 5 (Cell) | 10                           | 18.0                  | 17.90            | 0.00     | 0                    | FL-147-E   | QPSK    | 50        | 0       | 0 mm  | back       | 1:1      | 0.865          | 1.023           | 0.885  | A13 |
| 836.50                                   | 20525 | Mid  | LTE Band 5 (Cell) | 10                           | 18.0                  | 17.93            | 0.03     | 0                    | FL-147-E   | QPSK    | 1         | 49      | 0 mm  | top        | 1:1      | 0.441          | 1.016           | 0.448  |     |
| 836.50                                   | 20525 | Mid  | LTE Band 5 (Cell) | 10                           | 18.0                  | 17.98            | 0.03     | 0                    | FL-147-E   | QPSK    | 25        | 0       | 0 mm  | top        | 1:1      | 0.451          | 1.005           | 0.453  |     |
| 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 11-10**  
**DTS Body SAR**

| MEASUREMENT RESULTS                      |     |              |         |                             |                       |                  |                      |                      |                  |        |            |          |                |                 |        |
|------------------------------------------|-----|--------------|---------|-----------------------------|-----------------------|------------------|----------------------|----------------------|------------------|--------|------------|----------|----------------|-----------------|--------|
| FREQUENCY                                |     | Mode         | Service | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Spacing              | Device Serial Number | Data Rate (Mbps) | Side   | Duty Cycle | SAR (1g) | Scaling Factor | Scaled SAR (1g) | Plot # |
| MHz                                      | Ch. |              |         |                             |                       |                  |                      |                      |                  |        |            | (W/kg)   |                | (W/kg)          |        |
| 2412                                     | 1   | IEEE 802.11b | DSSS    | 12.0                        | 11.67                 | -0.17            | 0 mm                 | FL-147-C             | 1                | back   | 1:1        | 0.943    | 1.079          | 1.017           |        |
| 2437                                     | 6   | IEEE 802.11b | DSSS    | 12.0                        | 11.69                 | -0.03            | 0 mm                 | FL-147-C             | 1                | back   | 1:1        | 0.861    | 1.074          | 0.925           |        |
| 2462                                     | 11  | IEEE 802.11b | DSSS    | 12.0                        | 11.71                 | -0.05            | 0 mm                 | FL-147-C             | 1                | back   | 1:1        | 0.822    | 1.069          | 0.879           |        |
| 2462                                     | 11  | IEEE 802.11b | DSSS    | 12.0                        | 11.71                 | -0.14            | 0 mm                 | FL-147-C             | 1                | bottom | 1:1        | 0.412    | 1.069          | 0.440           |        |
| 2462                                     | 11  | IEEE 802.11b | DSSS    | 12.0                        | 11.71                 | 0.09             | 0 mm                 | FL-147-C             | 1                | left   | 1:1        | 0.009    | 1.069          | 0.010           |        |
| 2412                                     | 1   | IEEE 802.11b | DSSS    | 12.0                        | 11.67                 | -0.06            | 0 mm                 | FL-147-C             | 1                | back   | 1:1        | 0.981    | 1.079          | 1.058           | A14    |
| 5765                                     | 153 | IEEE 802.11a | OFDM    | 9.5                         | 8.80                  | 0.18             | 0 mm                 | FL-147-A             | 6                | back   | 1:1        | 0.024    | 1.175          | 0.028           | A15    |
| 5765                                     | 153 | IEEE 802.11a | OFDM    | 9.5                         | 8.80                  | -0.11            | 0 mm                 | FL-147-A             | 6                | bottom | 1:1        | 0.005    | 1.175          | 0.006           |        |
| 5765                                     | 153 | IEEE 802.11a | OFDM    | 9.5                         | 8.80                  | 0.16             | 0 mm                 | FL-147-A             | 6                | left   | 1:1        | 0.005    | 1.175          | 0.006           |        |
| 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: Variability test is highlighted blue in the above table.

|                                      |                                                                                     |                              |                                                                                       |                                 |
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| Document S/N:<br>0Y1404170792-R1.A3L | Test Dates:<br>04/17/14-05/08/14                                                    | DUT Type:<br>Portable Tablet |                                                                                       | Page 42 of 63                   |

**Table 11-11  
NII Body SAR**

| MEASUREMENT RESULTS                                                                               |     |              |         |                             |                       |                  |                                                 |                      |                  |        |            |          |                |                 |        |
|---------------------------------------------------------------------------------------------------|-----|--------------|---------|-----------------------------|-----------------------|------------------|-------------------------------------------------|----------------------|------------------|--------|------------|----------|----------------|-----------------|--------|
| FREQUENCY                                                                                         |     | Mode         | Service | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Spacing                                         | Device Serial Number | Data Rate (Mbps) | Side   | Duty Cycle | SAR (1g) | Scaling Factor | Scaled SAR (1g) | Plot # |
| MHz                                                                                               | Ch. |              |         |                             |                       |                  |                                                 |                      |                  |        |            | (W/kg)   |                | (W/kg)          |        |
| 5240                                                                                              | 48  | IEEE 802.11a | OFDM    | 9.5                         | 9.08                  | 0.20             | 0 mm                                            | FL-147-A             | 6                | back   | 1:1        | 0.119    | 1.102          | 0.131           |        |
| 5240                                                                                              | 48  | IEEE 802.11a | OFDM    | 9.5                         | 9.08                  | -0.13            | 0 mm                                            | FL-147-A             | 6                | bottom | 1:1        | 0.030    | 1.102          | 0.033           |        |
| 5240                                                                                              | 48  | IEEE 802.11a | OFDM    | 9.5                         | 9.08                  | 0.13             | 0 mm                                            | FL-147-A             | 6                | left   | 1:1        | 0.024    | 1.102          | 0.026           |        |
| 5320                                                                                              | 64  | IEEE 802.11a | OFDM    | 9.5                         | 8.87                  | 0.13             | 0 mm                                            | FL-147-A             | 6                | back   | 1:1        | 0.120    | 1.156          | 0.139           | A16    |
| 5320                                                                                              | 64  | IEEE 802.11a | OFDM    | 9.5                         | 8.87                  | -0.17            | 0 mm                                            | FL-147-A             | 6                | bottom | 1:1        | 0.030    | 1.156          | 0.035           |        |
| 5320                                                                                              | 64  | IEEE 802.11a | OFDM    | 9.5                         | 8.87                  | 0.18             | 0 mm                                            | FL-147-A             | 6                | left   | 1:1        | 0.024    | 1.156          | 0.028           |        |
| 5500                                                                                              | 100 | IEEE 802.11a | OFDM    | 9.5                         | 8.85                  | 0.03             | 0 mm                                            | FL-147-A             | 6                | back   | 1:1        | 0.082    | 1.161          | 0.095           |        |
| 5500                                                                                              | 100 | IEEE 802.11a | OFDM    | 9.5                         | 8.85                  | -0.11            | 0 mm                                            | FL-147-A             | 6                | bottom | 1:1        | 0.018    | 1.161          | 0.021           |        |
| 5500                                                                                              | 100 | IEEE 802.11a | OFDM    | 9.5                         | 8.85                  | 0.18             | 0 mm                                            | FL-147-A             | 6                | left   | 1:1        | 0.017    | 1.161          | 0.020           |        |
| 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 |                      |                  |        |            |          |                |                 |        |

**Table 11-12  
DSS Body SAR**

| MEASUREMENT RESULTS                                                                               |     |           |         |                             |                       |                  |                                                 |                      |                  |        |            |          |                |                 |        |
|---------------------------------------------------------------------------------------------------|-----|-----------|---------|-----------------------------|-----------------------|------------------|-------------------------------------------------|----------------------|------------------|--------|------------|----------|----------------|-----------------|--------|
| FREQUENCY                                                                                         |     | Mode      | Service | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Spacing                                         | Device Serial Number | Data Rate (Mbps) | Side   | Duty Cycle | SAR (1g) | Scaling Factor | Scaled SAR (1g) | Plot # |
| MHz                                                                                               | Ch. |           |         |                             |                       |                  |                                                 |                      |                  |        |            | (W/kg)   |                | (W/kg)          |        |
| 2441                                                                                              | 39  | Bluetooth | FHSS    | 12.0                        | 11.69                 | -0.09            | 0 mm                                            | FL-147-C             | 1                | back   | 1:1        | 0.406    | 1.074          | 0.436           | A17    |
| 2441                                                                                              | 39  | Bluetooth | FHSS    | 12.0                        | 11.69                 | -0.15            | 0 mm                                            | FL-147-C             | 1                | bottom | 1:1        | 0.269    | 1.074          | 0.289           |        |
| 2441                                                                                              | 39  | Bluetooth | FHSS    | 12.0                        | 11.69                 | 0.11             | 0 mm                                            | FL-147-C             | 1                | left   | 1:1        | 0.007    | 1.074          | 0.008           |        |
| 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 |                      |                  |        |            |          |                |                 |        |

### 11.3 SAR Test Notes

**General Notes:**

1. The test data reported are the worst-case SAR values according to test procedures specified in IEEE 1528-2003, FCC KDB 616217 D04, and FCC KDB Publication 447498 D01v05.
2. Batteries are fully charged at the beginning of the SAR measurements.
3. Liquid tissue depth was at least 15.0 cm for all frequencies.
4. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
5. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB Publication 447498 D01v05.
6. Per FCC KDB 865664 D01v01, variability SAR test was performed when the measured SAR result for a frequency band were greater than 0.8 W/kg. Repeat SAR measurement is highlighted blue in the table above for clarity. Please see Section 13 for variability analysis.
7. Per FCC KDB 616217 D04 Section 4.3, SAR tests are required for the back surface and edges of the tablet with the tablet touching the phantom. The SAR Exclusion Threshold in FCC KDB 447498 D01v05 was applied to determine SAR test exclusion for adjacent edge configurations. SAR tests were required for top, right and left edge for the main antenna and bottom and left edge for the BT/WLAN antenna.
8. Head SAR testing was required for this tablet because it has a speaker/receiver and microphone positioning that allows for a held-to-ear configuration usage. All head SAR tests were performed at reduced power levels for all modes.

|                                             |                                                                                     |                                     |                                                                                       |                                        |
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| <b>Document S/N:</b><br>0Y1404170792-R1.A3L | <b>Test Dates:</b><br>04/17/14-05/08/14                                             | <b>DUT Type:</b><br>Portable Tablet |                                                                                       | Page 43 of 63                          |

#### GSM Test Notes:

1. Justification for reduced test configurations per KDB Publication 941225 D03v01 and October 2013 TCB Workshop Notes: The source-based frame-averaged output power was evaluated for all GPRS/EDGE slot configurations. The configuration with the highest target frame averaged output power was evaluated for body SAR. When the maximum frame-averaged powers are equivalent across two or more slots (within 0.25 dB), the configuration with the most number of time slots was tested.
2. Per FCC KDB Publication 447498 D01v05, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is  $\leq 0.8$  W/kg then testing at the other channels is not required for such test configuration(s). When the maximum output power variation across the required test channels is  $> \frac{1}{2}$  dB, instead of the middle channel, the highest output power channel was used.

#### UMTS Notes:

1. UMTS mode in was tested under RMC 12.2 kbps with HSPA Inactive per KDB Publication 941225 D01v02. HSPA SAR was not required since the average output power of the HSPA subtests was not more than 0.25 dB higher than the RMC level and SAR was less than 1.2 W/kg.
2. Per FCC KDB Publication 447498 D01v05, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is  $\leq 0.8$  W/kg then testing at the other channels is not required for such test configuration(s). When the maximum output power variation across the required test channels is  $> \frac{1}{2}$  dB, instead of the middle channel, the highest output power channel was used.

#### LTE Notes:

1. LTE Considerations: LTE test configurations are determined according to SAR Evaluation Considerations for LTE Devices in FCC KDB Publication 941225 D05v02r01. The general test procedures used for testing can be found in Section 8.4.4.
2. 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.
3. A-MPR was disabled for all SAR tests by setting NS=01 on the base station simulator. SAR tests were performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI).

#### WLAN/BT Notes:

1. Justification for reduced test configurations for WIFI channels per KDB Publication 248227 D01v01r02 and October 2012 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. Justification for reduced test configurations for WIFI channels per KDB Publication 248227 D01v01r02 and October 2012 FCC/TCB Meeting Notes for 5 GHz WIFI: Highest average RF output power channel for the lowest data rate was selected for SAR evaluation in 802.11a. Other IEEE 802.11 modes (including 802.11n) 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 802.11a mode.
3. WIFI transmission was verified using an uncalibrated spectrum analyzer.
4. When the maximum extrapolated peak SAR of the zoom scan for the maximum output channel is  $> 1.6$  W/kg or the reported 1g averaged SAR is  $> 0.8$  W/kg, SAR testing on other default channels was required.
5. There is no proximity sensor power reduction mechanism applied for WIFI/BT modes.
6. The Bluetooth highest average output power channel was tested for SAR.

|                                      |                                                                                     |                              |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
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## 12 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

### 12.1 Introduction

The following procedures adopted from FCC KDB Publication 447498 D01v05 are applicable to handsets with built-in unlicensed transmitters such as 802.11a/b/g/n and Bluetooth devices which may simultaneously transmit with the licensed transmitter.

### 12.2 Simultaneous Transmission Procedures

This device contains transmitters that may operate simultaneously. Therefore simultaneous transmission analysis is required. Per FCC KDB 447498 D01v05 IV.C.1.iii and IEEE 1528-2013 Section 6.3.4.1.2, simultaneous transmission SAR test exclusion may be applied when the sum of the 1-g SAR for all the simultaneous transmitting antennas in a specific physical test configuration is  $\leq 1.6$  W/kg. When standalone SAR is not required to be measured, per FCC KDB 447498 D01v05 4.3.2 2), the following equation must be used to estimate the standalone 1g SAR for simultaneous transmission assessment involving that transmitter.

$$\text{Estimated SAR} = \frac{\sqrt{f(\text{GHz})}}{7.5} * \frac{(\text{Max Power of channel, mW})}{\text{Min. Separation Distance, mm}}$$

**Table 12-1**  
**Estimated SAR**

| Mode         | Frequency | Maximum Allowed Power | Separation Distance (Body) | Estimated SAR (Body) |
|--------------|-----------|-----------------------|----------------------------|----------------------|
|              | [MHz]     | [dBm]                 | [mm]                       | [W/kg]               |
| Bluetooth LE | 2440      | 9.50                  | 5*                         | <b>0.375</b>         |

Note:

1. Held-to ear configurations are not applicable to Bluetooth operations and therefore were not considered for simultaneous transmission.
2. Per KDB Publication 447498 D01v05, the maximum power of the channel was rounded to the nearest mW before calculation.
3. (\*) – Per FCC KDB 447498, when the test separation distance is < 5 mm, a distance of 5 mm is applied to determine estimated SAR.

### 12.3 Head SAR Simultaneous Transmission Analysis

**Table 12-2**  
**Simultaneous Transmission Scenario with 2.4 GHz WLAN (Held to Ear)**

| Simult Tx | Configuration | GSM 850 SAR (W/kg) | 2.4 GHz WLAN SAR (W/kg) | Σ SAR (W/kg) | Simult Tx | Configuration | GSM 1900 SAR (W/kg) | 2.4 GHz WLAN SAR (W/kg) | Σ SAR (W/kg) |
|-----------|---------------|--------------------|-------------------------|--------------|-----------|---------------|---------------------|-------------------------|--------------|
| Head SAR  | Right Cheek   | 0.381              | 0.003                   | <b>0.384</b> | Head SAR  | Right Cheek   | 0.187               | 0.003                   | <b>0.190</b> |
|           | Right Tilt    | 0.265              | 0.001                   | 0.266        |           | Right Tilt    | 0.181               | 0.001                   | 0.182        |
|           | Left Cheek    | 0.243              | 0.003                   | 0.246        |           | Left Cheek    | 0.077               | 0.003                   | 0.080        |
|           | Left Tilt     | 0.164              | 0.003                   | 0.167        |           | Left Tilt     | 0.068               | 0.003                   | 0.071        |

|                                             |                                                                                     |                                     |                                                                                       |                                        |
|---------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
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| Simult Tx | Configuration | UMTS 850 SAR (W/kg) | 2.4 GHz WLAN SAR (W/kg) | Σ SAR (W/kg) | Simult Tx | Configuration | UMTS 1900 SAR (W/kg) | 2.4 GHz WLAN SAR (W/kg) | Σ SAR (W/kg) |
|-----------|---------------|---------------------|-------------------------|--------------|-----------|---------------|----------------------|-------------------------|--------------|
| Head SAR  | Right Cheek   | 0.415               | 0.003                   | <b>0.418</b> | Head SAR  | Right Cheek   | 0.284                | 0.003                   | <b>0.287</b> |
|           | Right Tilt    | 0.262               | 0.001                   | 0.263        |           | Right Tilt    | 0.264                | 0.001                   | 0.265        |
|           | Left Cheek    | 0.227               | 0.003                   | 0.230        |           | Left Cheek    | 0.109                | 0.003                   | 0.112        |
|           | Left Tilt     | 0.169               | 0.003                   | 0.172        |           | Left Tilt     | 0.094                | 0.003                   | 0.097        |

| Simult Tx | Configuration | LTE Band 5 (Cell) SAR (W/kg) | 2.4 GHz WLAN SAR (W/kg) | Σ SAR (W/kg) |
|-----------|---------------|------------------------------|-------------------------|--------------|
| Head SAR  | Right Cheek   | 0.441                        | 0.003                   | <b>0.444</b> |
|           | Right Tilt    | 0.273                        | 0.001                   | 0.274        |
|           | Left Cheek    | 0.240                        | 0.003                   | 0.243        |
|           | Left Tilt     | 0.179                        | 0.003                   | 0.182        |

**Table 12-3**  
**Simultaneous Transmission Scenario with 5 GHz WLAN (Held to Ear)**

| Simult Tx | Configuration | GSM 850 SAR (W/kg) | 5 GHz WLAN SAR (W/kg) | Σ SAR (W/kg) | Simult Tx | Configuration | GSM 1900 SAR (W/kg) | 5 GHz WLAN SAR (W/kg) | Σ SAR (W/kg) |
|-----------|---------------|--------------------|-----------------------|--------------|-----------|---------------|---------------------|-----------------------|--------------|
| Head SAR  | Right Cheek   | 0.381              | 0.000                 | <b>0.381</b> | Head SAR  | Right Cheek   | 0.187               | 0.000                 | <b>0.187</b> |
|           | Right Tilt    | 0.265              | 0.000                 | 0.265        |           | Right Tilt    | 0.181               | 0.000                 | 0.181        |
|           | Left Cheek    | 0.243              | 0.001                 | 0.244        |           | Left Cheek    | 0.077               | 0.001                 | 0.078        |
|           | Left Tilt     | 0.164              | 0.001                 | 0.165        |           | Left Tilt     | 0.068               | 0.001                 | 0.069        |

| Simult Tx | Configuration | UMTS 850 SAR (W/kg) | 5 GHz WLAN SAR (W/kg) | Σ SAR (W/kg) | Simult Tx | Configuration | UMTS 1900 SAR (W/kg) | 5 GHz WLAN SAR (W/kg) | Σ SAR (W/kg) |
|-----------|---------------|---------------------|-----------------------|--------------|-----------|---------------|----------------------|-----------------------|--------------|
| Head SAR  | Right Cheek   | 0.415               | 0.000                 | <b>0.415</b> | Head SAR  | Right Cheek   | 0.284                | 0.000                 | <b>0.284</b> |
|           | Right Tilt    | 0.262               | 0.000                 | 0.262        |           | Right Tilt    | 0.264                | 0.000                 | 0.264        |
|           | Left Cheek    | 0.227               | 0.001                 | 0.228        |           | Left Cheek    | 0.109                | 0.001                 | 0.110        |
|           | Left Tilt     | 0.169               | 0.001                 | 0.170        |           | Left Tilt     | 0.094                | 0.001                 | 0.095        |

|                                             |                                                                                     |                                     |                                                                                       |                                        |
|---------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> A3LSMT235                    |  | <b>SAR EVALUATION REPORT</b>        |  | <b>Reviewed by:</b><br>Quality Manager |
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## 12.4 Body Simultaneous Transmission Analysis

**Table 12-4**  
**Simultaneous Transmission Scenario with 2.4 GHz WLAN (Body at 0.0 cm)**

| Simult Tx | Configuration | GSM 850 SAR (W/kg)  | 2.4 GHz WLAN SAR (W/kg) | Σ SAR (W/kg)  | SPLSR                        | Simult Tx               | Configuration | GSM 1900 SAR (W/kg)  | 2.4 GHz WLAN SAR (W/kg) | Σ SAR (W/kg) | SPLSR |
|-----------|---------------|---------------------|-------------------------|---------------|------------------------------|-------------------------|---------------|----------------------|-------------------------|--------------|-------|
| Body SAR  | Back          | 0.528               | 1.058                   | 1.586         | N/A                          | Body SAR                | Back          | 0.731                | 1.058                   | See note 1   | 0.01  |
|           | Top           | 0.255               | 0.400                   | 0.655         | N/A                          |                         | Top           | 0.462                | 0.400                   | 0.862        | N/A   |
|           | Bottom        | 0.400               | 0.440                   | 0.840         | N/A                          |                         | Bottom        | 0.400                | 0.440                   | 0.840        | N/A   |
|           | Right         | 0.191               | 0.400                   | 0.591         | N/A                          |                         | Right         | 0.173                | 0.400                   | 0.573        | N/A   |
|           | Left          | 0.398               | 0.010                   | 0.408         | N/A                          |                         | Left          | 0.505                | 0.010                   | 0.515        | N/A   |
| Simult Tx | Configuration | UMTS 850 SAR (W/kg) | 2.4 GHz WLAN SAR (W/kg) | Σ SAR (W/kg)  | SPLSR                        | Simult Tx               | Configuration | UMTS 1900 SAR (W/kg) | 2.4 GHz WLAN SAR (W/kg) | Σ SAR (W/kg) | SPLSR |
| Body SAR  | Back          | 1.009               | 1.058                   | See note 1    | 0.02                         | Body SAR                | Back          | 0.924                | 1.058                   | See note 1   | 0.02  |
|           | Top           | 0.508               | 0.400                   | 0.908         | N/A                          |                         | Top           | 0.475                | 0.400                   | 0.875        | N/A   |
|           | Bottom        | 0.400               | 0.440                   | 0.840         | N/A                          |                         | Bottom        | 0.400                | 0.440                   | 0.840        | N/A   |
|           | Right         | 0.183               | 0.400                   | 0.583         | N/A                          |                         | Right         | 0.235                | 0.400                   | 0.635        | N/A   |
|           | Left          | 0.345               | 0.010                   | 0.355         | N/A                          |                         | Left          | 0.632                | 0.010                   | 0.642        | N/A   |
|           |               |                     | Simult Tx               | Configuration | LTE Band 5 (Cell) SAR (W/kg) | 2.4 GHz WLAN SAR (W/kg) | Σ SAR (W/kg)  | SPLSR                |                         |              |       |
|           |               |                     | Body SAR                | Back          | 0.885                        | 1.058                   | See note 1    | 0.02                 |                         |              |       |
|           |               |                     |                         | Top           | 0.453                        | 0.400                   | 0.853         | N/A                  |                         |              |       |
|           |               |                     |                         | Bottom        | 0.400                        | 0.440                   | 0.840         | N/A                  |                         |              |       |
|           |               |                     |                         | Right         | 0.163                        | 0.400                   | 0.563         | N/A                  |                         |              |       |
|           |               |                     |                         | Left          | 0.342                        | 0.010                   | 0.352         | N/A                  |                         |              |       |

**Table 12-5**  
**Simultaneous Transmission Scenario with 5 GHz WLAN (Body at 0.0 cm)**

| Simultaneous Transmission Scenario with 5 GHz WLAN (Body at 0.6 cm) |               |                     |                       |                              |                       |               |                      |                       |              |
|---------------------------------------------------------------------|---------------|---------------------|-----------------------|------------------------------|-----------------------|---------------|----------------------|-----------------------|--------------|
| Simult Tx                                                           | Configuration | GSM 850 SAR (W/kg)  | 5 GHz WLAN SAR (W/kg) | Σ SAR (W/kg)                 | Simult Tx             | Configuration | GSM 1900 SAR (W/kg)  | 5 GHz WLAN SAR (W/kg) | Σ SAR (W/kg) |
| Body SAR                                                            | Back          | 0.528               | 0.139                 | <b>0.667</b>                 | Body SAR              | Back          | 0.731                | 0.139                 | <b>0.870</b> |
|                                                                     | Top           | 0.255               | 0.400                 | 0.655                        |                       | Top           | 0.462                | 0.400                 | 0.862        |
|                                                                     | Bottom        | 0.400               | 0.035                 | 0.435                        |                       | Bottom        | 0.400                | 0.035                 | 0.435        |
|                                                                     | Right         | 0.191               | 0.400                 | 0.591                        |                       | Right         | 0.173                | 0.400                 | 0.573        |
|                                                                     | Left          | 0.398               | 0.028                 | 0.426                        |                       | Left          | 0.505                | 0.028                 | 0.533        |
| Simult Tx                                                           | Configuration | UMTS 850 SAR (W/kg) | 5 GHz WLAN SAR (W/kg) | Σ SAR (W/kg)                 | Simult Tx             | Configuration | UMTS 1900 SAR (W/kg) | 5 GHz WLAN SAR (W/kg) | Σ SAR (W/kg) |
| Body SAR                                                            | Back          | 1.009               | 0.139                 | <b>1.148</b>                 | Body SAR              | Back          | 0.924                | 0.139                 | <b>1.063</b> |
|                                                                     | Top           | 0.508               | 0.400                 | 0.908                        |                       | Top           | 0.475                | 0.400                 | 0.875        |
|                                                                     | Bottom        | 0.400               | 0.035                 | 0.435                        |                       | Bottom        | 0.400                | 0.035                 | 0.435        |
|                                                                     | Right         | 0.183               | 0.400                 | 0.583                        |                       | Right         | 0.235                | 0.400                 | 0.635        |
|                                                                     | Left          | 0.345               | 0.028                 | 0.373                        |                       | Left          | 0.632                | 0.028                 | 0.660        |
|                                                                     |               | Simult Tx           | Configuration         | LTE Band 5 (Cell) SAR (W/kg) | 5 GHz WLAN SAR (W/kg) | Σ SAR (W/kg)  |                      |                       |              |
| Body SAR                                                            |               | Back                | 0.885                 | 0.139                        | <b>1.024</b>          |               |                      |                       |              |
|                                                                     |               | Top                 | 0.453                 | 0.400                        | 0.853                 |               |                      |                       |              |
|                                                                     |               | Bottom              | 0.400                 | 0.035                        | 0.435                 |               |                      |                       |              |
|                                                                     |               | Right               | 0.163                 | 0.400                        | 0.563                 |               |                      |                       |              |
|                                                                     |               | Left                | 0.342                 | 0.028                        | 0.370                 |               |                      |                       |              |

|                                             |                                                                                     |                                     |                                                                                       |                                        |
|---------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
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**Table 12-6**  
**Simultaneous Transmission Scenario with Bluetooth (Body at 0.0 cm)**

| Simult Tx | Configuration | GSM 850 SAR (W/kg)  | Bluetooth SAR (W/kg) | Σ SAR (W/kg) | Simult Tx | Configuration | GSM 1900 SAR (W/kg)  | Bluetooth SAR (W/kg) | Σ SAR (W/kg) |
|-----------|---------------|---------------------|----------------------|--------------|-----------|---------------|----------------------|----------------------|--------------|
| Body SAR  | Back          | 0.528               | 0.436                | <b>0.964</b> | Body SAR  | Back          | 0.731                | 0.436                | <b>1.167</b> |
|           | Top           | 0.255               | 0.400                | 0.655        |           | Top           | 0.462                | 0.400                | 0.862        |
|           | Bottom        | 0.400               | 0.375                | 0.775        |           | Bottom        | 0.400                | 0.375                | 0.775        |
|           | Right         | 0.191               | 0.400                | 0.591        |           | Right         | 0.173                | 0.400                | 0.573        |
|           | Left          | 0.398               | 0.375                | 0.773        |           | Left          | 0.505                | 0.375                | 0.880        |
| Simult Tx | Configuration | UMTS 850 SAR (W/kg) | Bluetooth SAR (W/kg) | Σ SAR (W/kg) | Simult Tx | Configuration | UMTS 1900 SAR (W/kg) | Bluetooth SAR (W/kg) | Σ SAR (W/kg) |
| Body SAR  | Back          | 1.009               | 0.436                | <b>1.445</b> | Body SAR  | Back          | 0.924                | 0.436                | <b>1.360</b> |
|           | Top           | 0.508               | 0.400                | 0.908        |           | Top           | 0.475                | 0.400                | 0.875        |
|           | Bottom        | 0.400               | 0.375                | 0.775        |           | Bottom        | 0.400                | 0.375                | 0.775        |
|           | Right         | 0.183               | 0.400                | 0.583        |           | Right         | 0.235                | 0.400                | 0.635        |
|           | Left          | 0.345               | 0.375                | 0.720        |           | Left          | 0.632                | 0.375                | 1.007        |

| Simult Tx | Configuration | LTE Band 5 (Cell) SAR (W/kg) | Bluetooth SAR (W/kg) | Σ SAR (W/kg) |
|-----------|---------------|------------------------------|----------------------|--------------|
| Body SAR  | Back          | 0.885                        | 0.436                | <b>1.321</b> |
|           | Top           | 0.453                        | 0.400                | 0.853        |
|           | Bottom        | 0.400                        | 0.375                | 0.775        |
|           | Right         | 0.163                        | 0.400                | 0.563        |
|           | Left          | 0.342                        | 0.375                | 0.717        |

Estimated Bluetooth LE values are used for Bottom and Left edges instead of the measured Bluetooth values since estimated Bluetooth LE SAR is greater than measured Bluetooth SAR for these configurations.

**Table 12-7**  
**Simultaneous Transmission Scenario with 2.4 GHz WLAN (Body at 1.8 cm)**

| Configuration | Mode       | 2G/3G/4G SAR (W/kg) | 2.4 GHz WLAN SAR (W/kg) | Σ SAR (W/kg)      | SPLSR  |
|---------------|------------|---------------------|-------------------------|-------------------|--------|
| Back Side     | GSM 850    | 0.287               | < 1.058                 | < 1.345           | N/A    |
| Back Side     | GSM 1900   | 1.021               | < 1.058                 | <b>See note 1</b> | < 0.02 |
| Back Side     | UMTS 850   | 0.252               | < 1.058                 | < 1.31            | N/A    |
| Back Side     | UMTS 1900  | 0.774               | < 1.058                 | <b>See note 1</b> | < 0.01 |
| Back Side     | LTE Band 5 | 0.371               | < 1.058                 | < 1.429           | N/A    |

|                                             |                                                                                     |                                     |                                                                                       |                                        |
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**Table 12-8**  
**Simultaneous Transmission Scenario with 5 GHz WLAN (Body at 1.8 cm)**

| Configuration | Mode       | 2G/3G/4G SAR (W/kg) | 5 GHz WLAN SAR (W/kg) | $\Sigma$ SAR (W/kg) |
|---------------|------------|---------------------|-----------------------|---------------------|
| Back Side     | GSM 850    | 0.287               | < 0.139               | < 0.426             |
| Back Side     | GSM 1900   | 1.021               | < 0.139               | < 1.16              |
| Back Side     | UMTS 850   | 0.252               | < 0.139               | < 0.391             |
| Back Side     | UMTS 1900  | 0.774               | < 0.139               | < 0.913             |
| Back Side     | LTE Band 5 | 0.371               | < 0.139               | < 0.51              |

**Table 12-9**  
**Simultaneous Transmission Scenario with Bluetooth (Body at 1.8 cm)**

| Configuration | Mode       | 2G/3G/4G SAR (W/kg) | Bluetooth SAR (W/kg) | $\Sigma$ SAR (W/kg) |
|---------------|------------|---------------------|----------------------|---------------------|
| Back Side     | GSM 850    | 0.287               | < 0.436              | < 0.723             |
| Back Side     | GSM 1900   | 1.021               | < 0.436              | < 1.457             |
| Back Side     | UMTS 850   | 0.252               | < 0.436              | < 0.688             |
| Back Side     | UMTS 1900  | 0.774               | < 0.436              | < 1.21              |
| Back Side     | LTE Band 5 | 0.371               | < 0.436              | < 0.807             |

**Table 12-10**  
**Simultaneous Transmission Scenario with 2.4 GHz WLAN (Body at 1.5 cm)**

| Configuration | Mode       | 2G/3G/4G SAR (W/kg) | 2.4 GHz WLAN SAR (W/kg) | $\Sigma$ SAR (W/kg) |
|---------------|------------|---------------------|-------------------------|---------------------|
| Top Edge      | GSM 850    | 0.191               | 0.400                   | 0.591               |
| Top Edge      | GSM 1900   | 0.735               | 0.400                   | 1.135               |
| Top Edge      | UMTS 850   | 0.206               | 0.400                   | 0.606               |
| Top Edge      | UMTS 1900  | 0.762               | 0.400                   | 1.162               |
| Top Edge      | LTE Band 5 | 0.237               | 0.400                   | 0.637               |

|                                             |                                                                                     |                                     |                                                                                       |                                        |
|---------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
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| <b>Document S/N:</b><br>0Y1404170792-R1.A3L | <b>Test Dates:</b><br>04/17/14-05/08/14                                             | <b>DUT Type:</b><br>Portable Tablet |                                                                                       | Page 49 of 63                          |

**Table 12-11**  
**Simultaneous Transmission Scenario with 5 GHz WLAN (Body at 1.5 cm)**

| Configuration | Mode       | 2G/3G/4G SAR (W/kg) | 5 GHz WLAN SAR (W/kg) | $\Sigma$ SAR (W/kg) |
|---------------|------------|---------------------|-----------------------|---------------------|
| Top Edge      | GSM 850    | 0.191               | 0.400                 | 0.591               |
| Top Edge      | GSM 1900   | 0.735               | 0.400                 | 1.135               |
| Top Edge      | UMTS 850   | 0.206               | 0.400                 | 0.606               |
| Top Edge      | UMTS 1900  | 0.762               | 0.400                 | 1.162               |
| Top Edge      | LTE Band 5 | 0.237               | 0.400                 | 0.637               |

**Table 12-12**  
**Simultaneous Transmission Scenario with Bluetooth (Body at 1.5 cm)**

| Configuration | Mode       | 2G/3G/4G SAR (W/kg) | Bluetooth SAR (W/kg) | $\Sigma$ SAR (W/kg) |
|---------------|------------|---------------------|----------------------|---------------------|
| Top Edge      | GSM 850    | 0.191               | 0.400                | 0.591               |
| Top Edge      | GSM 1900   | 0.735               | 0.400                | 1.135               |
| Top Edge      | UMTS 850   | 0.206               | 0.400                | 0.606               |
| Top Edge      | UMTS 1900  | 0.762               | 0.400                | 1.162               |
| Top Edge      | LTE Band 5 | 0.237               | 0.400                | 0.637               |

Notes:

1. No evaluation was performed to determine the aggregate 1g SAR for these configurations as the SPLS ratio between the antenna pairs was not higher than 0.04 per FCC KDB 447498 D01v05. See Section 12.5 for detailed SPLS ratio analysis.
2. When the test separation distance was > 50 mm, an estimated SAR of 0.4 W/kg was used to determine simultaneous transmission SAR exclusion, for configuration excluded per FCC KDB 447498 D01v05. Therefore, an estimated SAR of 0.4 W/kg for 2.4 GHz WLAN, 5 GHz WLAN, and Bluetooth was used to evaluate the simultaneous sums in **Table 12-4**, **Table 12-5**, **Table 12-6**, **Table 12-10**, **Table 12-11**, and **Table 12-12**.
3. For SAR summations for body 1.8 cm, 2.4 GHz WLAN, Bluetooth and 5GHz WLAN SAR values for 0.0 cm were used since the 0.0 cm test distance for 2.4 GHz WLAN, Bluetooth and 5GHz WLAN were more conservative. "<" denotes that the 0.0 cm 2.4 GHz WLAN, Bluetooth and 5GHz WLAN SAR values were used for summation purposes.
4. Per FCC KDB 616217 D04 4.3, when the voice mode is limited to speaker mode or headset operations only for body configurations, additional SAR testing for tablet voice use is not required. Therefore voice standalone and simultaneous combinations with Bluetooth are not evaluated for body configurations.

|                                             |                                                                                                                                   |                                     |                                                                                       |                                        |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
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## 12.5 SPLSR Evaluation and Analysis

Per FCC KDB Publication 447498 D01v05, when the sum of the standalone transmitters is more than 1.6 W/kg, the SAR sum to peak locations can be analyzed to determine SAR distribution overlaps. When the SAR peak to location ratio (shown below) for each pair of antennas is  $\leq 0.04$ , simultaneous SAR evaluation is not required. The distance between the transmitters was calculated using the following formula.

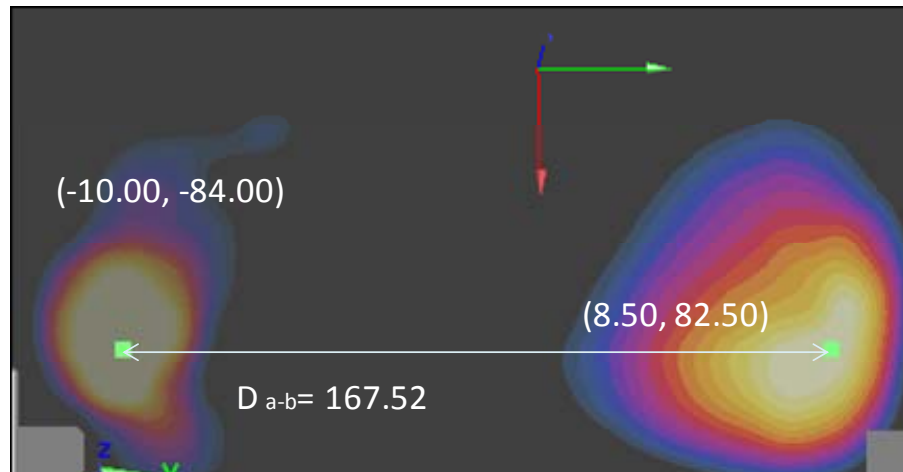
$$\text{Distance}_{\text{Tx1} - \text{Tx2}} = R_i = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2 + (z_1 - z_2)^2}$$

$$\text{SPLS Ratio} = \frac{(SAR_1 + SAR_2)^{1.5}}{R_i}$$

The sum of the standalone SAR values was above 1.6 W/kg for the Body Back side configuration at a separation distance of 0 mm with GPRS 1900 MHz antenna operating at limited output power with 2.4 GHz WIFI.

**Table 12-13**  
**Peak SAR Locations for Body Back Side at 0 mm GPRS 1900 MHz and 2.4 GHz WLAN**

| Mode/Band     | x (mm) | y (mm) |
|---------------|--------|--------|
| GPRS 1900 MHz | 8.50   | 82.50  |
| 802.11b       | -10.00 | -84.00 |



**Figure 12-1**  
**Peak SAR Locations of 2.4 GHz WLAN and GPRS 1900 MHz**

**Table 12-14**  
**SAR Sum to Peak Location Separation Ratio Calculation**

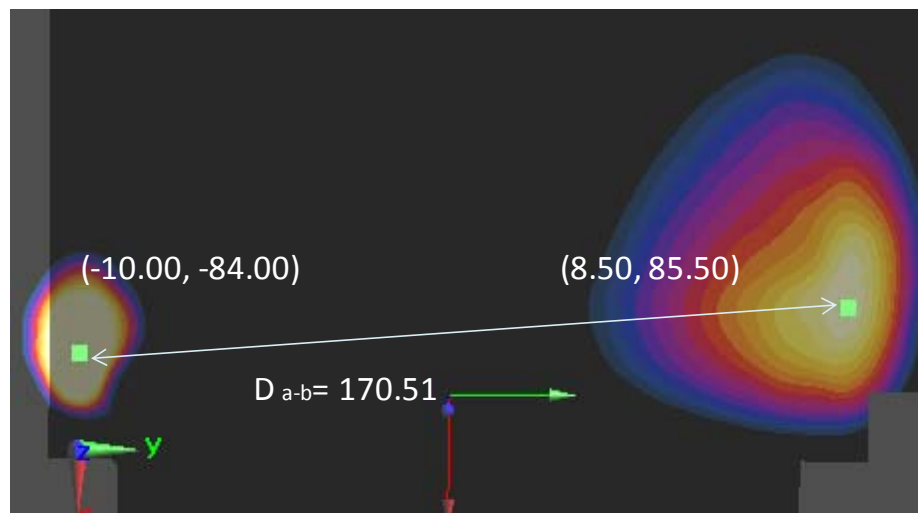
| Antenna Pair  |         | Standalone 1g SAR (W/kg) |       | Standalone SAR Sum (W/kg) | Peak SAR Separation Distance (mm) | SPLS Ratio                             |
|---------------|---------|--------------------------|-------|---------------------------|-----------------------------------|----------------------------------------|
| Ant "a"       | Ant "b" | a                        | b     | a+b                       | D <sub>a-b</sub>                  | (a+b) <sup>1.5</sup> /D <sub>a-b</sub> |
| GPRS 1900 MHz | 802.11b | 0.731                    | 1.058 | 1.789                     | 167.52                            | 0.01                                   |

|                                      |                                                                                     |                              |  |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|------------------------------|--|---------------------------------------------------------------------------------------|---------------------------------|
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The sum of the standalone SAR values was above 1.6 W/kg for the Body Back side configuration at a separation distance of 0 mm with UMTS 850 MHz antenna operating at limited output power with 2.4 GHz WIFI.

**Table 12-15**  
**Peak SAR Locations for Body Back Side at 0 mm UMTS 850 MHz and 2.4 GHz WLAN**

| Mode/Band    | x (mm) | y (mm) |
|--------------|--------|--------|
| UMTS 850 MHz | 8.50   | 85.50  |
| 802.11b      | -10.00 | -84.00 |



**Figure 12-2**  
**Peak SAR Locations of 2.4 GHz WLAN and UMTS 850 MHz**

**Table 12-16**  
**SAR Sum to Peak Location Separation Ratio Calculation**

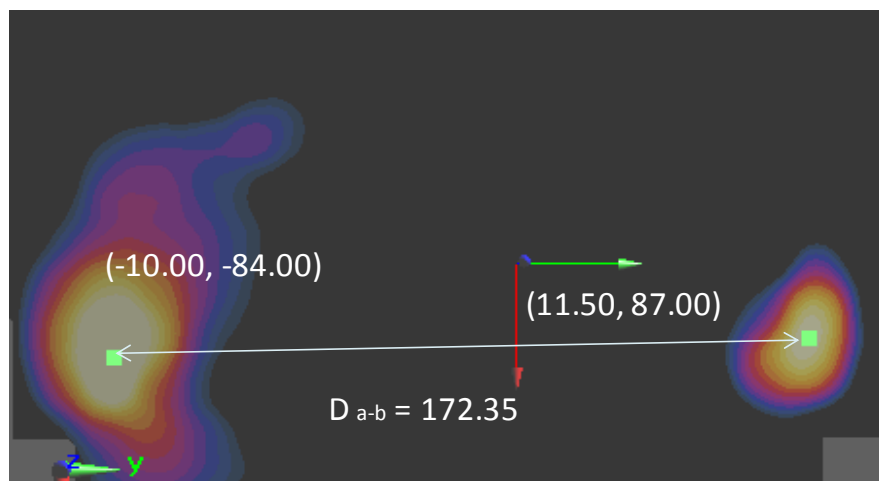
| Antenna Pair |         | Standalone 1g SAR (W/kg) |       | Standalone SAR Sum (W/kg) | Peak SAR Separation Distance (mm) | SPLS Ratio            |
|--------------|---------|--------------------------|-------|---------------------------|-----------------------------------|-----------------------|
| Ant "a"      | Ant "b" | a                        | b     | a+b                       | $D_{a-b}$                         | $(a+b)^{1.5}/D_{a-b}$ |
| UMTS 850 MHz | 802.11b | 1.009                    | 1.058 | 2.067                     | 170.51                            | 0.02                  |

|                                             |                                                                                     |                                     |  |                                                                                       |                                        |
|---------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------|--|---------------------------------------------------------------------------------------|----------------------------------------|
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| <b>Document S/N:</b><br>0Y1404170792-R1.A3L | <b>Test Dates:</b><br>04/17/14-05/08/14                                             | <b>DUT Type:</b><br>Portable Tablet |  |                                                                                       | Page 52 of 63                          |

The sum of the standalone SAR values was above 1.6 W/kg for the Body Back side configuration at a separation distance of 0 mm with UMTS 1900 MHz antenna operating at limited output power with 2.4 GHz WIFI.

**Table 12-17**  
**Peak SAR Locations for Body Back Side at 0 mm UMTS 1900 MHz and 2.4 GHz WLAN**

| Mode/Band     | x (mm) | y (mm) |
|---------------|--------|--------|
| UMTS 1900 MHz | 11.50  | 87.00  |
| 802.11b       | -10.00 | -84.00 |



**Figure 12-3**  
**Peak SAR Locations of 2.4 GHz WLAN and UMTS 1900 MHz**

**Table 12-18**  
**SAR Sum to Peak Location Separation Ratio Calculation**

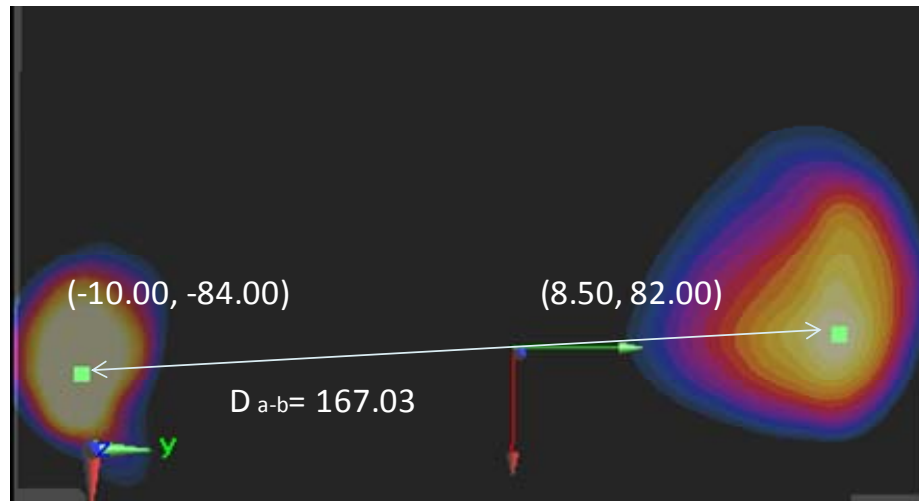
| Antenna Pair  |         | Standalone 1g SAR (W/kg) |       | Standalone SAR Sum (W/kg) | Peak SAR Separation Distance (mm) | SPLS Ratio            |
|---------------|---------|--------------------------|-------|---------------------------|-----------------------------------|-----------------------|
| Ant "a"       | Ant "b" | a                        | b     | a+b                       | $D_{a-b}$                         | $(a+b)^{1.5}/D_{a-b}$ |
| UMTS 1900 MHz | 802.11b | 0.924                    | 1.058 | 1.982                     | 172.35                            | 0.02                  |

|                                             |                                                                                     |                                     |                                                                                       |                                        |
|---------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
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| <b>Document S/N:</b><br>0Y1404170792-R1.A3L | <b>Test Dates:</b><br>04/17/14-05/08/14                                             | <b>DUT Type:</b><br>Portable Tablet |                                                                                       | Page 53 of 63                          |

The sum of the standalone SAR values was above 1.6 W/kg for the Body Back side configuration at a separation distance of 0 mm with LTE band 5 antenna operating at limited output power with 2.4 GHz WIFI.

**Table 12-18**  
**Peak SAR Locations for Body Back Side at 0 mm LTE band 5 and 2.4 GHz WLAN**

| Mode/Band  | x (mm) | y (mm) |
|------------|--------|--------|
| LTE band 5 | 8.50   | 82.00  |
| 802.11b    | -10.00 | -84.00 |



**Figure 12-4**  
**Peak SAR Locations of 2.4 GHz WLAN and LTE band 5**

**Table 12-19**  
**SAR Sum to Peak Location Separation Ratio Calculation**

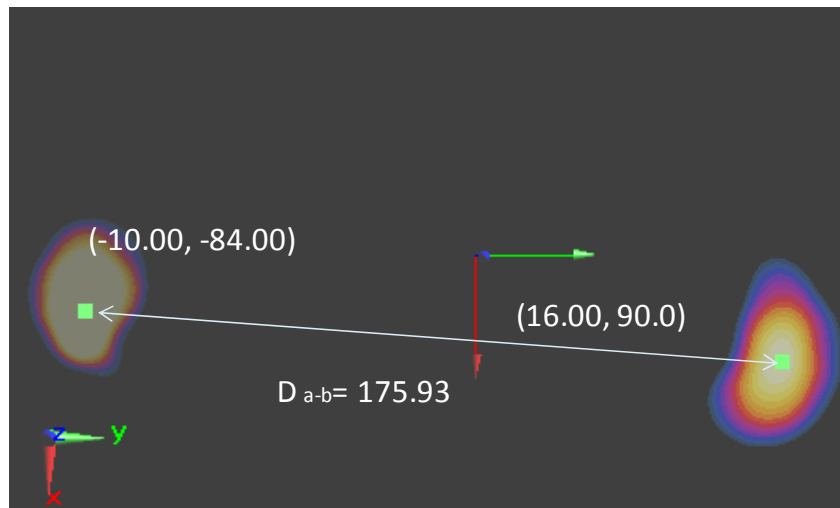
| Antenna Pair |         | Standalone 1g SAR (W/kg) |       | Standalone SAR Sum (W/kg) | Peak SAR Separation Distance (mm) | SPLS Ratio            |
|--------------|---------|--------------------------|-------|---------------------------|-----------------------------------|-----------------------|
| Ant "a"      | Ant "b" | a                        | b     | a+b                       | $D_{a-b}$                         | $(a+b)^{1.5}/D_{a-b}$ |
| LTE band 5   | 802.11b | 0.885                    | 1.058 | 1.943                     | 167.03                            | 0.02                  |

|                                             |                                                                                     |                                     |  |                                                                                       |                                        |
|---------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------|--|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> A3LSMT235                    |  | <b>SAR EVALUATION REPORT</b>        |  |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Document S/N:</b><br>0Y1404170792-R1.A3L | <b>Test Dates:</b><br>04/17/14-05/08/14                                             | <b>DUT Type:</b><br>Portable Tablet |  |                                                                                       | Page 54 of 63                          |

The sum of the standalone SAR values was above 1.6 W/kg for the Body Back side configuration at a separation distance of 18 mm with GPRS 1900 MHz antenna operating at maximum output power with 2.4 GHz WIFI.

**Table 12-20**  
**Peak SAR Locations for Body Back Side at 18 mm GPRS 1900 MHz and 2.4 GHz WLAN**

| Mode/Band     | x (mm) | y (mm) |
|---------------|--------|--------|
| GPRS 1900 MHz | 16.00  | 90.00  |
| 802.11b       | -10.00 | -84.00 |



**Figure 12-5**  
**Peak SAR Locations of 2.4 GHz WLAN and GPRS 1900 MHz**

**Table 12-21**  
**SAR Sum to Peak Location Separation Ratio Calculation**

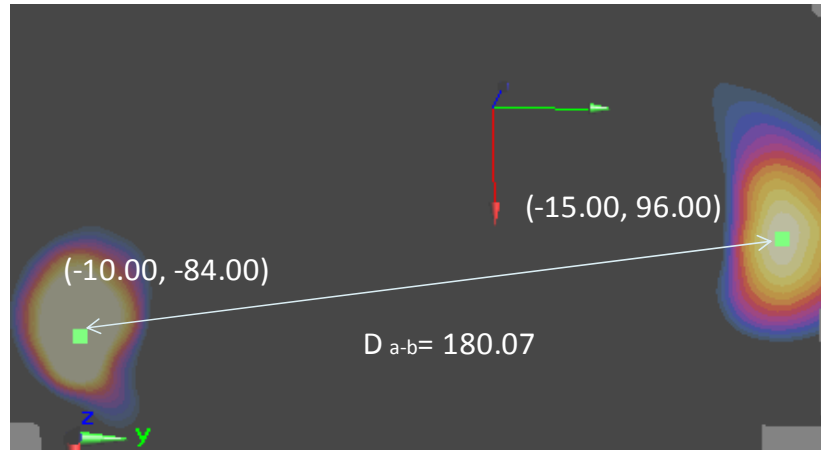
| Antenna Pair  |         | Standalone 1g SAR (W/kg) |        | Standalone SAR Sum (W/kg) | Peak SAR Separation Distance (mm) | SPLS Ratio                             |
|---------------|---------|--------------------------|--------|---------------------------|-----------------------------------|----------------------------------------|
| Ant "a"       | Ant "b" | a                        | b      | a+b                       | D <sub>a-b</sub>                  | (a+b) <sup>1.5</sup> /D <sub>a-b</sub> |
| GPRS 1900 MHz | 802.11b | 1.021                    | <1.058 | <2.079                    | 175.93                            | <0.02                                  |

|                                      |                                                                                     |                              |  |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|------------------------------|--|---------------------------------------------------------------------------------------|---------------------------------|
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The sum of the standalone SAR values was above 1.6 W/kg for the Body Back side configuration at a separation distance of 18 mm with UMTS 1900 MHz antenna operating at maximum output power with 2.4 GHz WIFI.

**Table 12-22**  
**Peak SAR Locations for Body Back Side at 18 mm UMTS 1900 MHz and 2.4 GHz WLAN**

| Mode/Band     | x (mm) | y (mm) |
|---------------|--------|--------|
| UMTS 1900 MHz | -15.00 | 96.00  |
| 802.11b       | -10.00 | -84.00 |



**Figure 12-6**  
**Peak SAR Locations of 2.4 GHz WLAN and UMTS 1900 MHz**

**Table 12-23**  
**SAR Sum to Peak Location Separation Ratio Calculation**

| Antenna Pair  |         | Standalone 1g SAR (W/kg) |        | Standalone SAR Sum (W/kg) | Peak SAR Separation Distance (mm) | SPLS Ratio            |
|---------------|---------|--------------------------|--------|---------------------------|-----------------------------------|-----------------------|
| Ant "a"       | Ant "b" | a                        | b      | a+b                       | $D_{a-b}$                         | $(a+b)^{1.5}/D_{a-b}$ |
| UMTS 1900 MHz | 802.11b | 0.774                    | <1.058 | <1.832                    | 180.07                            | <0.01                 |

## 12.6 Simultaneous Transmission Conclusion

The above numerical summed SAR and SPLSR analysis results for all the worst-case simultaneous transmission conditions were below the SAR limit. Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit and therefore no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D01v05 and IEEE 1528-2013 Section 6.3.4.1.2.

|                                             |                                                                                     |                                     |                                                                                       |                                        |
|---------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
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| <b>Document S/N:</b><br>0Y1404170792-R1.A3L | <b>Test Dates:</b><br>04/17/14-05/08/14                                             | <b>DUT Type:</b><br>Portable Tablet |                                                                                       | Page 56 of 63                          |

## 13 SAR MEASUREMENT VARIABILITY

### 13.1 Measurement Variability

Per FCC KDB Publication 865664 D01v01, SAR measurement variability was assessed for each frequency band, which was determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media were required for SAR measurements in a frequency band, the variability measurement procedures were applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium. These additional measurements were repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device was returned to ambient conditions (normal room temperature) with the battery fully charged before it was re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

SAR Measurement Variability was assessed using the following procedures for each frequency band:

- 1) When the original highest measured SAR is  $\geq 0.80$  W/kg, the measurement was repeated once.
- 2) A second repeated measurement was performed only if the ratio of largest to smallest SAR for the original and first repeated measurements was  $> 1.20$  or when the original or repeated measurement was  $\geq 1.45$  W/kg ( $\sim 10\%$  from the 1-g SAR limit).
- 3) A third repeated measurement was performed only if the original, first or second repeated measurement was  $\geq 1.5$  W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is  $> 1.20$ .
- 4) Repeated measurements are not required when the original highest measured SAR is  $< 0.80$  W/kg

**Table 13-1**  
**Body SAR Measurement Variability Result**

| BODY VARIABILITY RESULTS                 |           |      |              |         |                 |                  |      |                      |                   |                       |       |                       |       |                       |       |
|------------------------------------------|-----------|------|--------------|---------|-----------------|------------------|------|----------------------|-------------------|-----------------------|-------|-----------------------|-------|-----------------------|-------|
| Band                                     | FREQUENCY |      | Mode         | Service | # of Time Slots | Data Rate (Mbps) | Side | Spacing              | Measured SAR (1g) | 1st Repeated SAR (1g) | Ratio | 2nd Repeated SAR (1g) | Ratio | 3rd Repeated SAR (1g) | Ratio |
|                                          | MHz       | Ch.  |              |         |                 |                  |      |                      | (W/kg)            | (W/kg)                |       | (W/kg)                |       | (W/kg)                |       |
| 1900                                     | 1909.80   | 810  | GSM 1900     | GPRS    | 3               | N/A              | back | 18 mm                | 0.980             | 0.861                 | 1.14  | N/A                   | N/A   | N/A                   | N/A   |
| 835                                      | 826.40    | 4132 | UMTS 850     | RMC     | N/A             | N/A              | back | 0 mm                 | 0.949             | 0.980                 | 1.03  | N/A                   | N/A   | N/A                   | N/A   |
| 2450                                     | 2412.00   | 1    | IEEE 802.11b | DSSS    | N/A             | 1                | back | 0 mm                 | 0.943             | 0.981                 | 1.04  | N/A                   | N/A   | N/A                   | N/A   |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT    |           |      |              |         |                 |                  |      | Body                 |                   |                       |       |                       |       |                       |       |
| Spatial Peak                             |           |      |              |         |                 |                  |      | 1.6 W/kg (mW/g)      |                   |                       |       |                       |       |                       |       |
| Uncontrolled Exposure/General Population |           |      |              |         |                 |                  |      | averaged over 1 gram |                   |                       |       |                       |       |                       |       |

### 13.2 Measurement Uncertainty

The measured SAR was  $< 1.5$  W/kg for all frequency bands. Therefore, per KDB Publication 865664 D01v01, the extended measurement uncertainty analysis per IEEE 1528-2003 was not required.

|                                      |                                                                                     |                              |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
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# 14 EQUIPMENT LIST

| Manufacturer       | Model      | Description                        | Cal Date   | Cal Interval | Cal Due    | Serial Number |
|--------------------|------------|------------------------------------|------------|--------------|------------|---------------|
| Agilent            | E5515C     | Wireless Communications Test Set   | 3/18/2014  | Annual       | 3/18/2015  | GB46110872    |
| Agilent            | N9020A     | MXA Signal Analyzer                | 10/29/2013 | Annual       | 10/29/2014 | US46470561    |
| Agilent            | N4010A     | Wireless Connectivity Test Set     | N/A        | N/A          | N/A        | GB46170464    |
| Agilent            | 8753ES     | S-Parameter Network Analyzer       | 10/29/2013 | Annual       | 10/29/2014 | US39170122    |
| Amplifier Research | 15S1G6     | Amplifier                          | CBT        | N/A          | CBT        | 433974        |
| Amplifier Research | 15S1G6     | Amplifier                          | CBT        | N/A          | CBT        | 433975        |
| Amplifier Research | 15S1G6     | Amplifier                          | CBT        | N/A          | CBT        | 433978        |
| Anritsu            | MA2481A    | Power Sensor                       | 10/30/2013 | Annual       | 10/30/2014 | 5605          |
| Anritsu            | MA2411B    | Pulse Power Sensor                 | 11/14/2013 | Annual       | 11/14/2014 | 1126066       |
| Anritsu            | MT8820C    | Radio Communication Analyzer       | 6/28/2013  | Annual       | 6/28/2014  | 6201240328    |
| Anritsu            | MA24106A   | USB Power Sensor                   | 12/18/2013 | Annual       | 12/18/2014 | 1344556       |
| Anritsu            | MA24106A   | USB Power Sensor                   | 12/18/2013 | Annual       | 12/18/2014 | 1344559       |
| Fisher Scientific  | 15-078J    | Long Stem Thermometer              | 1/7/2013   | Biennial     | 1/7/2015   | 130018204     |
| Fisher Scientific  | 15-077-960 | Digital Thermometer                | 12/4/2013  | Biennial     | 12/4/2015  | 130764551     |
| Fisher Scientific  | 15-077-960 | Digital Thermometer                | 12/4/2013  | Biennial     | 12/4/2015  | 130764558     |
| Fisher Scientific  | S407993    | Long Stem Thermometer              | 11/4/2013  | Biennial     | 11/4/2015  | 130671826     |
| Fisher Scientific  | S407993    | Long Stem Thermometer              | 11/4/2013  | Biennial     | 11/4/2015  | 130671801     |
| Gigatronics        | 8651A      | Universal Power Meter              | 10/30/2013 | Annual       | 10/30/2014 | 8650319       |
| MCL                | BW-N6W5+   | 6dB Attenuator                     | CBT        | N/A          | CBT        | 1139          |
| MiniCircuits       | SLP-2400+  | Low Pass Filter                    | CBT        | N/A          | CBT        | R8979500903   |
| MiniCircuits       | VLF-6000+  | Low Pass Filter                    | CBT        | N/A          | CBT        | N/A           |
| Mini-Circuits      | NLP-2950+  | Low Pass Filter DC to 2700 MHz     | CBT        | N/A          | CBT        | N/A           |
| Pasternack         | PE2208-6   | Bidirectional Coupler              | CBT        | N/A          | CBT        | N/A           |
| Pasternack         | PE2209-10  | Bidirectional Coupler              | CBT        | N/A          | CBT        | N/A           |
| Rohde & Schwarz    | CMU200     | Base Station Simulator             | 9/23/2013  | Annual       | 9/23/2014  | 109892        |
| Rohde & Schwarz    | NRVD       | Dual Channel Power Meter           | 10/12/2012 | Biennial     | 10/12/2014 | 101695        |
| Rohde & Schwarz    | CMW500     | LTE Radio Communication Tester     | 10/4/2013  | Biennial     | 10/4/2015  | 103962        |
| Seekonk            | NC-100     | Torque Wrench                      | 3/18/2014  | Biennial     | 3/18/2016  | N/A           |
| SPEAG              | DAKS-3.5   | Portable Dielectric Assessment Kit | 8/18/2013  | Annual       | 8/18/2014  | 1008          |
| SPEAG              | D2450V2    | 2450 MHz SAR Dipole                | 1/21/2014  | Annual       | 1/21/2015  | 797           |
| SPEAG              | D5GHzV2    | 5 GHz SAR Dipole                   | 9/23/2013  | Annual       | 9/23/2014  | 1007          |
| SPEAG              | D5GHzV2    | 5 GHz SAR Dipole                   | 1/27/2014  | Annual       | 1/27/2015  | 1057          |
| SPEAG              | DAE4       | Dasy Data Acquisition Electronics  | 2/26/2014  | Annual       | 2/26/2015  | 665           |
| SPEAG              | DAE4       | Dasy Data Acquisition Electronics  | 12/12/2013 | Annual       | 12/12/2014 | 649           |
| SPEAG              | ES3DV2     | SAR Probe                          | 8/22/2013  | Annual       | 8/22/2014  | 3022          |
| SPEAG              | EX3DV4     | SAR Probe                          | 1/29/2014  | Annual       | 1/29/2015  | 3589          |
| SPEAG              | ES3DV3     | SAR Probe                          | 2/25/2014  | Annual       | 2/25/2015  | 3258          |
| SPEAG              | DAE4       | Dasy Data Acquisition Electronics  | 1/22/2014  | Annual       | 1/22/2015  | 1272          |
| SPEAG              | D835V2     | 835 MHz SAR Dipole                 | 4/7/2014   | Annual       | 4/7/2015   | 4d119         |
| SPEAG              | D1900V2    | 1900 MHz SAR Dipole                | 7/22/2013  | Annual       | 7/22/2014  | 5d149         |
| SPEAG              | DAE4       | Dasy Data Acquisition Electronics  | 11/19/2013 | Annual       | 11/19/2014 | 1333          |
| SPEAG              | D835V2     | 835 MHz SAR Dipole                 | 1/22/2014  | Annual       | 1/22/2015  | 4d132         |
| SPEAG              | DAE4       | Dasy Data Acquisition Electronics  | 8/21/2013  | Annual       | 8/21/2014  | 1322          |
| SPEAG              | ES3DV3     | SAR Probe                          | 11/20/2013 | Annual       | 11/20/2014 | 3287          |
| SPEAG              | EX3DV4     | SAR Probe                          | 12/18/2013 | Annual       | 12/18/2014 | 3920          |
| SPEAG              | EX3DV4     | SAR Probe                          | 10/23/2013 | Annual       | 10/23/2014 | 3914          |
| SPEAG              | DAE4       | Dasy Data Acquisition Electronics  | 11/19/2013 | Annual       | 11/19/2014 | 1408          |
| SPEAG              | ES3DV3     | SAR Probe                          | 11/22/2013 | Annual       | 11/22/2014 | 3333          |

Note: CBT (Calibrated Before Testing). Prior to testing, the measurement paths containing a cable, amplifier, attenuator, 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.

|                                             |                                                                                     |                                     |                                                                                       |                                        |
|---------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
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## 15 MEASUREMENT UNCERTAINTIES

Applicable for frequencies less than 3000 MHz.

| a                                                                             | b                    | c             | d              | e=<br>f(d,k) | f                     | g                        | h =<br>c x f/e                 | i =<br>c x g/e                   | k              |
|-------------------------------------------------------------------------------|----------------------|---------------|----------------|--------------|-----------------------|--------------------------|--------------------------------|----------------------------------|----------------|
| Uncertainty<br>Component                                                      | IEEE<br>1528<br>Sec. | Tol.<br>(± %) | Prob.<br>Dist. | Div.         | c <sub>i</sub><br>1gm | c <sub>i</sub><br>10 gms | 1gm<br>u <sub>i</sub><br>(± %) | 10gms<br>u <sub>i</sub><br>(± %) | v <sub>i</sub> |
| <b>Measurement System</b>                                                     |                      |               |                |              |                       |                          |                                |                                  |                |
| Probe Calibration                                                             | E.2.1                | 6.0           | N              | 1            | 1.0                   | 1.0                      | 6.0                            | 6.0                              | ∞              |
| Axial Isotropy                                                                | E.2.2                | 0.25          | N              | 1            | 0.7                   | 0.7                      | 0.2                            | 0.2                              | ∞              |
| Hemishperical Isotropy                                                        | E.2.2                | 1.3           | N              | 1            | 1.0                   | 1.0                      | 1.3                            | 1.3                              | ∞              |
| Boundary Effect                                                               | E.2.3                | 0.4           | N              | 1            | 1.0                   | 1.0                      | 0.4                            | 0.4                              | ∞              |
| Linearity                                                                     | E.2.4                | 0.3           | N              | 1            | 1.0                   | 1.0                      | 0.3                            | 0.3                              | ∞              |
| System Detection Limits                                                       | E.2.5                | 5.1           | N              | 1            | 1.0                   | 1.0                      | 5.1                            | 5.1                              | ∞              |
| Readout Electronics                                                           | E.2.6                | 1.0           | N              | 1            | 1.0                   | 1.0                      | 1.0                            | 1.0                              | ∞              |
| Response Time                                                                 | E.2.7                | 0.8           | R              | 1.73         | 1.0                   | 1.0                      | 0.5                            | 0.5                              | ∞              |
| Integration Time                                                              | E.2.8                | 2.6           | R              | 1.73         | 1.0                   | 1.0                      | 1.5                            | 1.5                              | ∞              |
| RF Ambient Conditions                                                         | E.6.1                | 3.0           | R              | 1.73         | 1.0                   | 1.0                      | 1.7                            | 1.7                              | ∞              |
| Probe Positioner Mechanical Tolerance                                         | E.6.2                | 0.4           | R              | 1.73         | 1.0                   | 1.0                      | 0.2                            | 0.2                              | ∞              |
| Probe Positioning w/ respect to Phantom                                       | E.6.3                | 2.9           | R              | 1.73         | 1.0                   | 1.0                      | 1.7                            | 1.7                              | ∞              |
| Extrapolation, Interpolation & Integration algorithms for 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

|                                      |                                                                                     |                              |                                                                                       |                                 |
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Applicable for frequencies up to 6 GHz.

| a                                                                             | b                    | c             | d              | e=<br>f(d,k) | f                     | g                        | h =<br>c x f/e                 | i =<br>c x g/e                   | k              |
|-------------------------------------------------------------------------------|----------------------|---------------|----------------|--------------|-----------------------|--------------------------|--------------------------------|----------------------------------|----------------|
| Uncertainty<br>Component                                                      | IEEE<br>1528<br>Sec. | Tol.<br>(± %) | Prob.<br>Dist. | Div.         | c <sub>i</sub><br>1gm | c <sub>i</sub><br>10 gms | 1gm<br>u <sub>i</sub><br>(± %) | 10gms<br>u <sub>i</sub><br>(± %) | v <sub>i</sub> |
| <b>Measurement System</b>                                                     |                      |               |                |              |                       |                          |                                |                                  |                |
| Probe Calibration                                                             | E.2.1                | 6.55          | N              | 1            | 1.0                   | 1.0                      | 6.6                            | 6.6                              | ∞              |
| Axial Isotropy                                                                | E.2.2                | 0.25          | N              | 1            | 0.7                   | 0.7                      | 0.2                            | 0.2                              | ∞              |
| Hemishperical Isotropy                                                        | E.2.2                | 1.3           | N              | 1            | 1.0                   | 1.0                      | 1.3                            | 1.3                              | ∞              |
| Boundary Effect                                                               | E.2.3                | 0.4           | N              | 1            | 1.0                   | 1.0                      | 0.4                            | 0.4                              | ∞              |
| Linearity                                                                     | E.2.4                | 0.3           | N              | 1            | 1.0                   | 1.0                      | 0.3                            | 0.3                              | ∞              |
| System Detection Limits                                                       | E.2.5                | 5.1           | N              | 1            | 1.0                   | 1.0                      | 5.1                            | 5.1                              | ∞              |
| Readout Electronics                                                           | E.2.6                | 1.0           | N              | 1            | 1.0                   | 1.0                      | 1.0                            | 1.0                              | ∞              |
| Response Time                                                                 | E.2.7                | 0.8           | R              | 1.73         | 1.0                   | 1.0                      | 0.5                            | 0.5                              | ∞              |
| Integration Time                                                              | E.2.8                | 2.6           | R              | 1.73         | 1.0                   | 1.0                      | 1.5                            | 1.5                              | ∞              |
| RF Ambient Conditions                                                         | E.6.1                | 3.0           | R              | 1.73         | 1.0                   | 1.0                      | 1.7                            | 1.7                              | ∞              |
| Probe Positioner Mechanical Tolerance                                         | E.6.2                | 0.4           | R              | 1.73         | 1.0                   | 1.0                      | 0.2                            | 0.2                              | ∞              |
| Probe Positioning w/ respect to Phantom                                       | E.6.3                | 2.9           | R              | 1.73         | 1.0                   | 1.0                      | 1.7                            | 1.7                              | ∞              |
| Extrapolation, Interpolation & Integration algorithms for Max. SAR Evaluation | E.5                  | 1.0           | R              | 1.73         | 1.0                   | 1.0                      | 0.6                            | 0.6                              | ∞              |
| <b>Test Sample Related</b>                                                    |                      |               |                |              |                       |                          |                                |                                  |                |
| Test Sample Positioning                                                       | E.4.2                | 6.0           | N              | 1            | 1.0                   | 1.0                      | 6.0                            | 6.0                              | 287            |
| Device Holder Uncertainty                                                     | E.4.1                | 3.32          | R              | 1.73         | 1.0                   | 1.0                      | 1.9                            | 1.9                              | ∞              |
| Output Power Variation - SAR drift measurement                                | 6.6.2                | 5.0           | R              | 1.73         | 1.0                   | 1.0                      | 2.9                            | 2.9                              | ∞              |
| <b>Phantom &amp; Tissue Parameters</b>                                        |                      |               |                |              |                       |                          |                                |                                  |                |
| Phantom Uncertainty (Shape & Thickness tolerances)                            | E.3.1                | 4.0           | R              | 1.73         | 1.0                   | 1.0                      | 2.3                            | 2.3                              | ∞              |
| Liquid Conductivity - deviation from target values                            | E.3.2                | 5.0           | R              | 1.73         | 0.64                  | 0.43                     | 1.8                            | 1.2                              | ∞              |
| Liquid Conductivity - measurement uncertainty                                 | E.3.3                | 3.8           | N              | 1            | 0.64                  | 0.43                     | 2.4                            | 1.6                              | 6              |
| Liquid Permittivity - deviation from target values                            | E.3.2                | 5.0           | R              | 1.73         | 0.60                  | 0.49                     | 1.7                            | 1.4                              | ∞              |
| Liquid Permittivity - measurement uncertainty                                 | E.3.3                | 4.5           | N              | 1            | 0.60                  | 0.49                     | 2.7                            | 2.2                              | 6              |
| <b>Combined Standard Uncertainty (k=1)</b>                                    |                      |               |                |              |                       |                          | RSS                            | 12.4                             | 12.0           |
| <b>Expanded Uncertainty</b><br>(95% CONFIDENCE LEVEL)                         |                      |               |                |              |                       |                          | k=2                            | 24.7                             | 24.0           |

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

|                                             |                                                                                     |                                     |                                                                                       |                                        |
|---------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| FCC ID: A3LSMT235                           |  | <b>SAR EVALUATION REPORT</b>        |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Document S/N:</b><br>0Y1404170792-R1.A3L | <b>Test Dates:</b><br>04/17/14-05/08/14                                             | <b>DUT Type:</b><br>Portable Tablet |                                                                                       | Page 60 of 63                          |

## 16 CONCLUSION

### 16.1 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> A3LSMT235                    |  | <b>SAR EVALUATION REPORT</b>        |  | <b>Reviewed by:</b><br>Quality Manager |
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|                                             |                                                                                     |                                     |                                                                                       |                                        |
|---------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> A3LSMT235                    |  | <b>SAR EVALUATION REPORT</b>        |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Document S/N:</b><br>0Y1404170792-R1.A3L | <b>Test Dates:</b><br>04/17/14-05/08/14                                             | <b>DUT Type:</b><br>Portable Tablet |                                                                                       | Page 62 of 63                          |

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|                                             |                                                                                     |                                     |                                                                                       |                                        |
|---------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> A3LSMT235                    |  | <b>SAR EVALUATION REPORT</b>        |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Document S/N:</b><br>0Y1404170792-R1.A3L | <b>Test Dates:</b><br>04/17/14-05/08/14                                             | <b>DUT Type:</b><br>Portable Tablet |                                                                                       | Page 63 of 63                          |

## APPENDIX A: SAR TEST DATA

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMT235; Type: Portable Tablet; Serial: FL-147-E**

Communication System: UID-0, GSM; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium: 835 Head Medium parameters used (interpolated):

$f = 836.6 \text{ MHz}$ ;  $\sigma = 0.901 \text{ S/m}$ ;  $\epsilon_r = 39.876$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 04-21-2014; Ambient Temp: 23.8°C; Tissue Temp: 22.5°C

Probe: EX3DV4 - SN3914; ConvF(9.34, 9.34, 9.34); Calibrated: 10/23/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1333; Calibrated: 11/19/2013

Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Mode: GSM 850, Right Head, Cheek, Mid.ch**

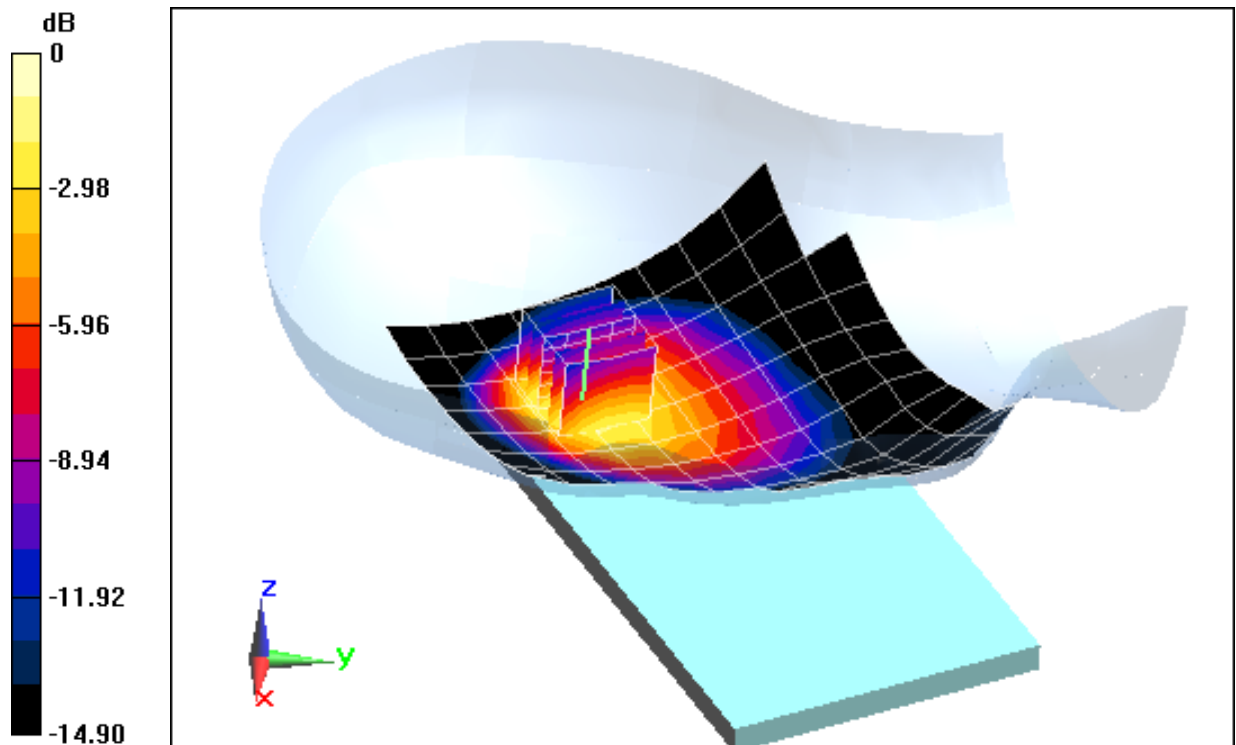
**Area Scan (11x15x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

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

Reference Value = 20.560 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 0.593 W/kg

**SAR(1 g) = 0.360 W/kg**



0 dB = 0.387 W/kg = -4.12 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMT235; Type: Portable Tablet; Serial: FL-147-F**

Communication System: UID 0, GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium: 1900 Head Medium parameters used:

$f = 1880 \text{ MHz}$ ;  $\sigma = 1.379 \text{ S/m}$ ;  $\epsilon_r = 39.682$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 05-07-2014; Ambient Temp: 23.4°C; Tissue Temp: 24.5°C

Probe: ES3DV3 - SN3333; ConvF(5.05, 5.05, 5.05); Calibrated: 11/22/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1408; Calibrated: 11/19/2013

Phantom: SAM with CRP v4.0; Type: QD000P40CD; Serial: TP:1797

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Mode: GSM 1900, Right Head, Cheek, Mid.ch**

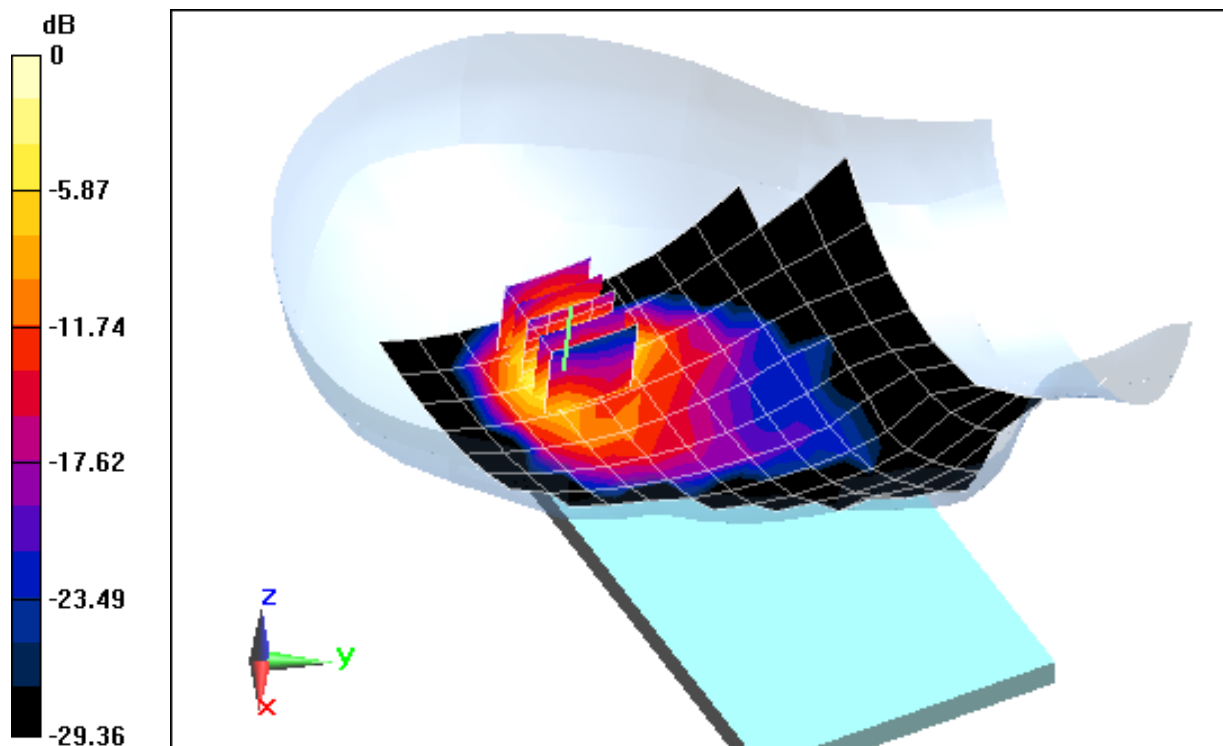
**Area Scan (12x17x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

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

Reference Value = 11.075 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 0.380 W/kg

**SAR(1 g) = 0.187 W/kg**



0 dB = 0.216 W/kg = -6.66 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMT235; Type: Portable Tablet; Serial: FL-147-E**

Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1

Medium: 835 Head Medium parameters used (interpolated):

$f = 836.6 \text{ MHz}$ ;  $\sigma = 0.901 \text{ S/m}$ ;  $\epsilon_r = 39.876$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 04-21-2014; Ambient Temp: 23.8°C; Tissue Temp: 22.5°C

Probe: EX3DV4 - SN3914; ConvF(9.34, 9.34, 9.34); Calibrated: 10/23/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1333; Calibrated: 11/19/2013

Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Mode: UMTS 850, Right Head, Cheek, Mid.ch**

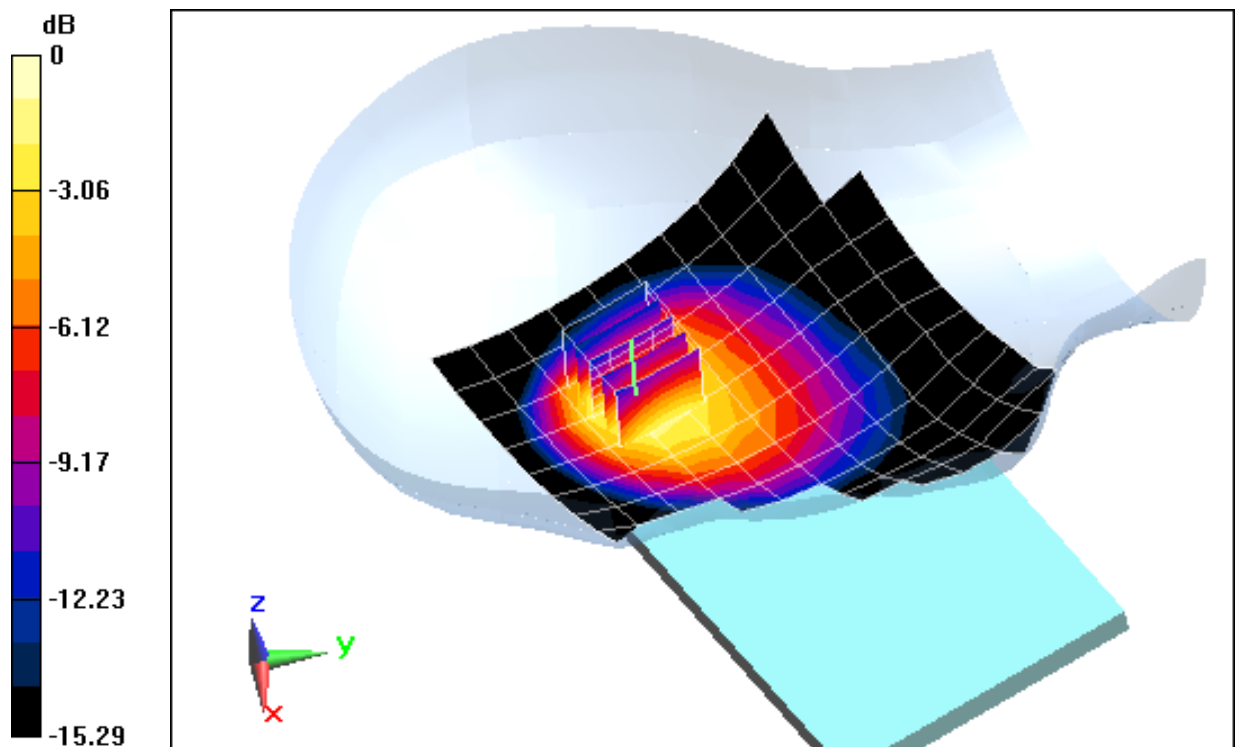
**Area Scan (11x15x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

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

Reference Value = 21.565 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 0.691 W/kg

**SAR(1 g) = 0.410 W/kg**



0 dB = 0.444 W/kg = -3.53 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMT235; Type: Portable Tablet; Serial: FL-147-E**

Communication System: UID 0, UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Head Medium parameters used:

$f = 1880 \text{ MHz}$ ;  $\sigma = 1.379 \text{ S/m}$ ;  $\epsilon_r = 39.682$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 05-07-2014; Ambient Temp: 23.4°C; Tissue Temp: 24.5°C

Probe: ES3DV3 - SN3333; ConvF(5.05, 5.05, 5.05); Calibrated: 11/22/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1408; Calibrated: 11/19/2013

Phantom: SAM with CRP v4.0; Type: QD000P40CD; Serial: TP:1797

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Mode: UMTS 1900, Right Head, Cheek, Mid.ch**

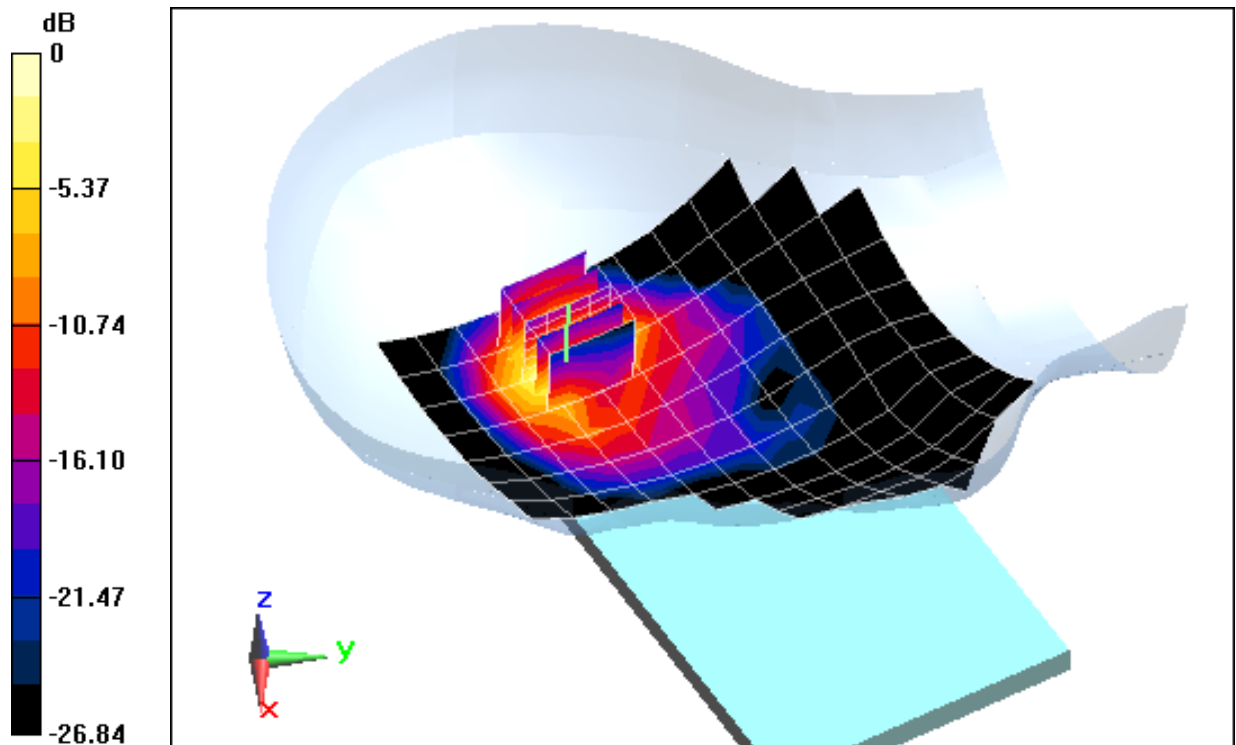
**Area Scan (12x15x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

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

Reference Value = 14.732 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.563 W/kg

**SAR(1 g) = 0.273 W/kg**



0 dB = 0.325 W/kg = -4.88 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMT235; Type: Portable Tablet; Serial: FL-147-E**

Communication System: UID -0, LTE Band 5 (Cell.); Frequency: 836.5 MHz; Duty Cycle: 1:1

Medium: 835 Head Medium parameters used (interpolated):

$f = 836.5 \text{ MHz}$ ;  $\sigma = 0.901 \text{ S/m}$ ;  $\epsilon_r = 39.878$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 04-21-2014; Ambient Temp: 23.8°C; Tissue Temp: 22.5°C

Probe: EX3DV4 - SN3914; ConvF(9.34, 9.34, 9.34); Calibrated: 10/23/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1333; Calibrated: 11/19/2013

Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Mode: LTE Band 5 (Cell.), Right Head, Cheek, Mid.ch,  
10 MHz Bandwidth, QPSK, 1 RB, 49 RB Offset**

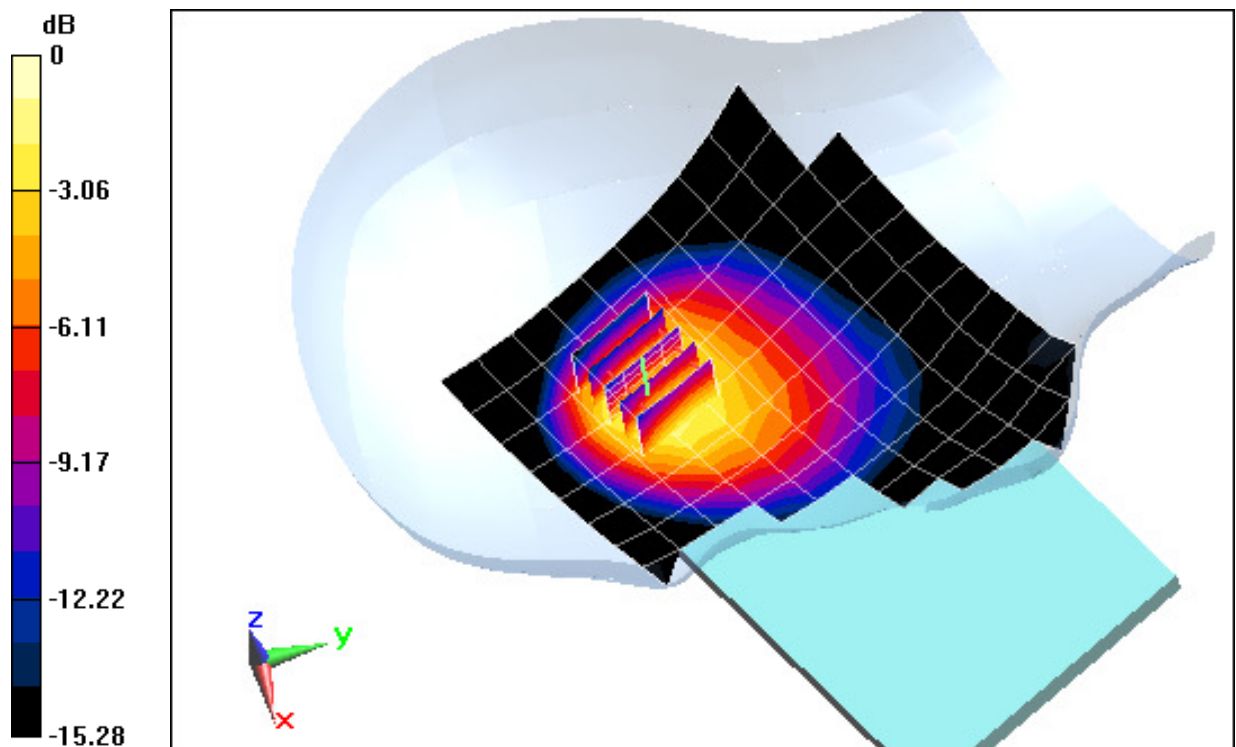
**Area Scan (11x15x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

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

Reference Value = 23.456 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 0.721 W/kg

**SAR(1 g) = 0.434 W/kg**



0 dB = 0.466 W/kg = -3.32 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMT235; Type: Portable Tablet; Serial: FL-147-C**

Communication System: UID 0, IEEE 802.11b; Frequency: 2462 MHz; Duty Cycle: 1:1

Medium: 2450 Head Medium parameters used (interpolated):

$f = 2462 \text{ MHz}$ ;  $\sigma = 1.811 \text{ S/m}$ ;  $\epsilon_r = 37.955$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 04-17-2014; Ambient Temp: 24.3°C; Tissue Temp: 22.6°C

Probe: ES3DV3 - SN3287; ConvF(4.43, 4.43, 4.43); Calibrated: 11/20/2013;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1408; Calibrated: 11/19/2013

Phantom: SAM with CRP v4.0; Type: QD000P40CD; Serial: TP:1797

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Mode: IEEE 802.11b, Right Head, Cheek, Ch 11, 1 Mbps**

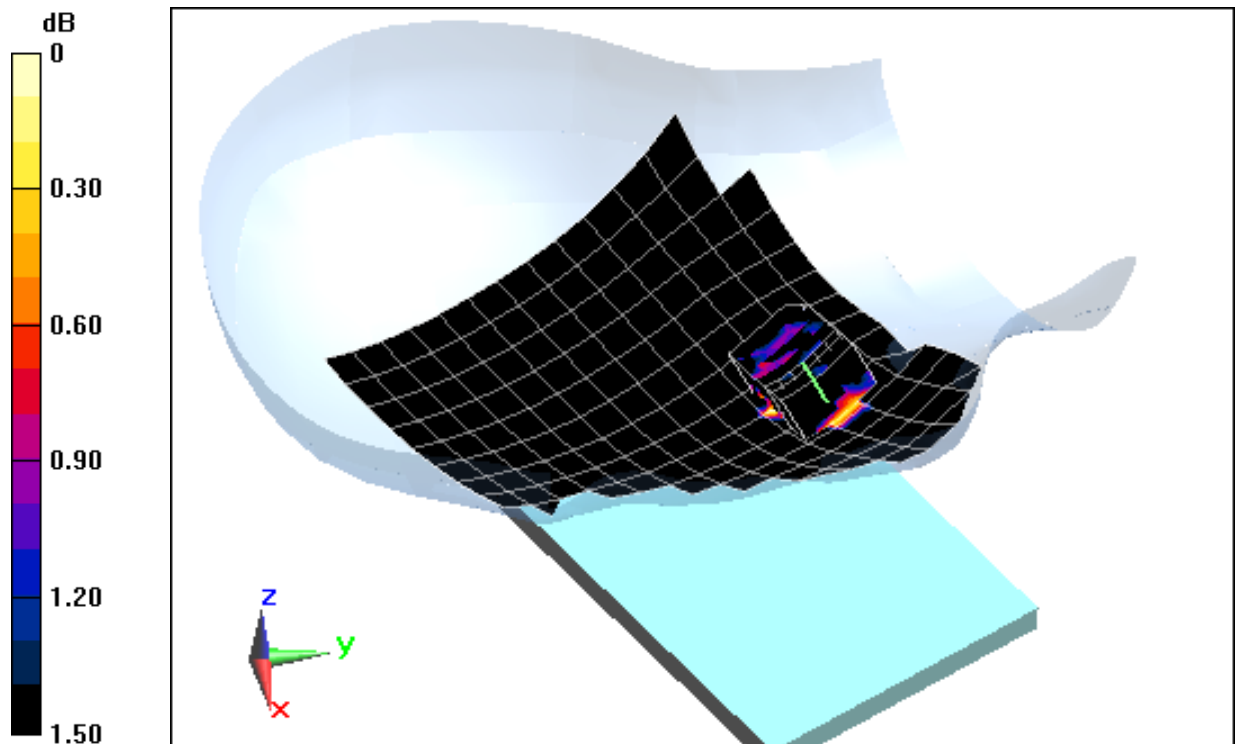
**Area Scan (14x21x1):** Measurement grid:  $dx=12\text{mm}$ ,  $dy=12\text{mm}$

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

Reference Value = 1.237 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 0.00779 W/kg

**SAR(1 g) = 0.003 W/kg**



0 dB = 0.00449 W/kg = -23.48 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMT235; Type: Portable Tablet; Serial: FL-147-C**

Communication System: UID 0, IEEE 802.11a; Frequency: 5765 MHz; Duty Cycle: 1:1

Medium: 5 GHz Head Medium parameters used:

$f = 5765 \text{ MHz}$ ;  $\sigma = 5.052 \text{ S/m}$ ;  $\epsilon_r = 36.217$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 04-23-2014; Ambient Temp: 24.5°C; Tissue Temp: 24.4°C

Probe: EX3DV4 - SN3914; ConvF(4.52, 4.52, 4.52); Calibrated: 10/23/2013;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1333; Calibrated: 11/19/2013

Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Mode: IEEE 802.11a, 5.8 GHz, Left Head, Tilt, Ch 153, 6 Mbps**

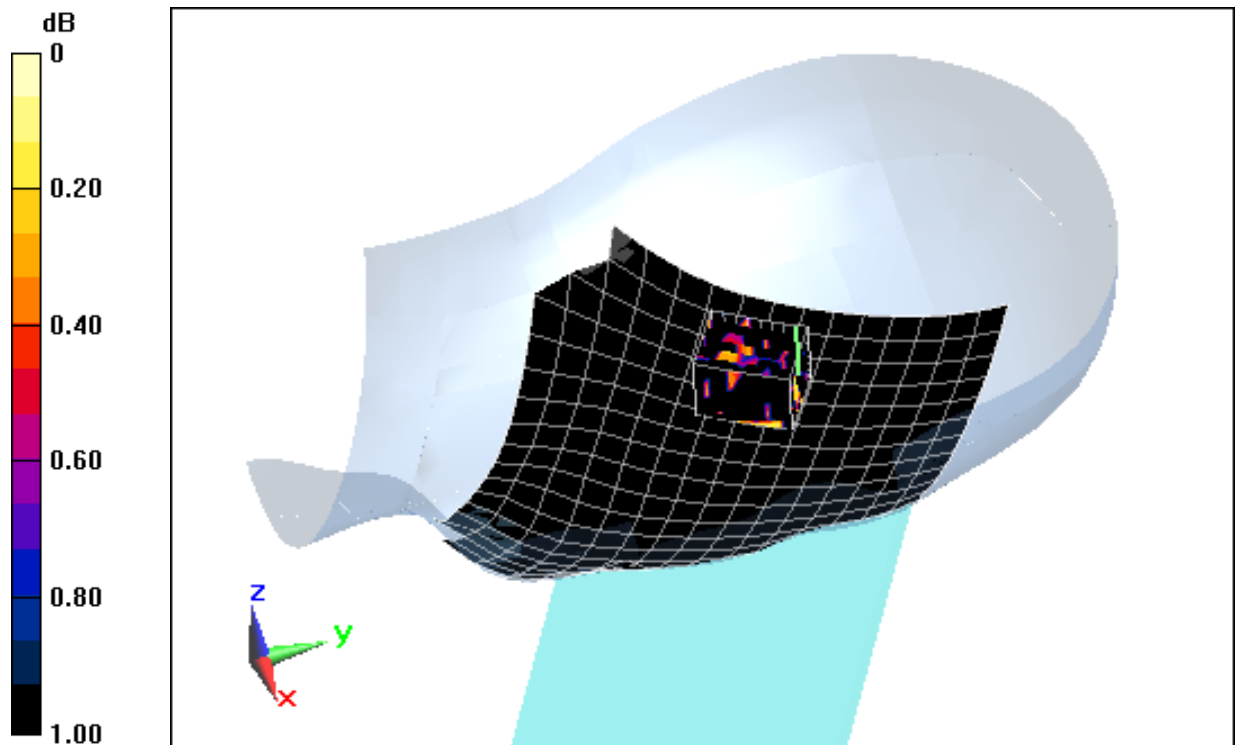
**Area Scan (16x22x1):** Measurement grid:  $dx=10\text{mm}$ ,  $dy=10\text{mm}$

**Zoom Scan (9x7x7)/Cube 0:** Measurement grid:  $dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=1.4\text{mm}$ ; Graded Ratio: 1.4

Reference Value = 1.066 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 0.0460 W/kg

**SAR(1 g) = 0.00125 W/kg**



0 dB = 0.0469 W/kg = -13.29 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMT235; Type: Portable Tablet; Serial: FL-147-C**

Communication System: UID 0, IEEE 802.11a; Frequency: 5240 MHz; Duty Cycle: 1:1

Medium: 5 GHz Head Medium parameters used:

$f = 5240 \text{ MHz}$ ;  $\sigma = 4.531 \text{ S/m}$ ;  $\epsilon_r = 36.821$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 04-23-2014; Ambient Temp: 24.5°C; Tissue Temp: 24.4°C

Probe: EX3DV4 - SN3914; ConvF(4.99, 4.99, 4.99); Calibrated: 10/23/2013;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1333; Calibrated: 11/19/2013

Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Mode: IEEE 802.11a, 5.2 GHz, Left Head, Cheek, Ch 48, 6 Mbps**

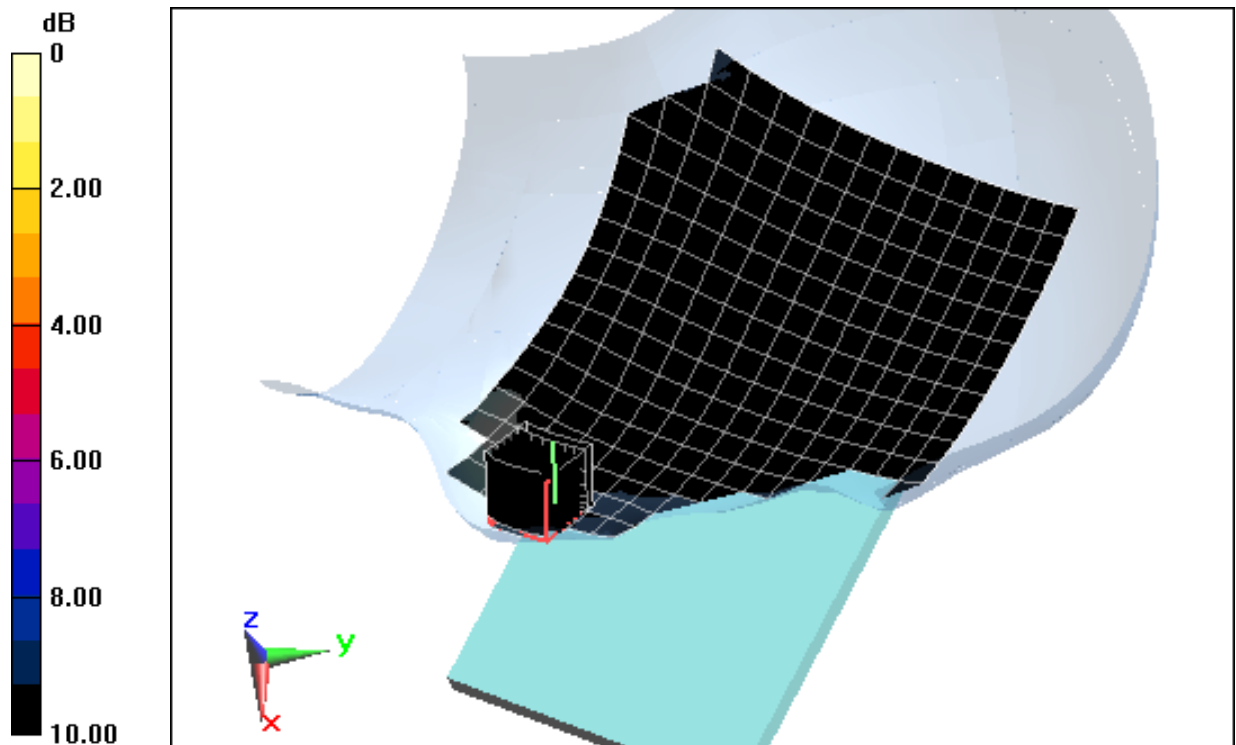
**Area Scan (16x22x1):** Measurement grid:  $dx=10\text{mm}$ ,  $dy=10\text{mm}$

**Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=1.4\text{mm}$ ; Graded Ratio: 1.4

Reference Value = 0 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 0.0300 W/kg

**SAR(1 g) = 0.000867 W/kg**



0 dB = 0.00873 W/kg = -20.59 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMT235; Type: Portable Tablet; Serial: FL-147-E**

Communication System: UID 0, GSM GPRS; 3 Tx slots; Frequency: 848.8 MHz; Duty Cycle: 1:2.76

Medium: 835 Body Medium parameters used (interpolated):

$f = 848.8 \text{ MHz}$ ;  $\sigma = 1.024 \text{ S/m}$ ;  $\epsilon_r = 53.529$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0 mm

Test Date: 05-05-2014; Ambient Temp: 23.5°C; Tissue Temp: 22.6°C

Probe: ES3DV2 - SN3022; ConvF(5.91, 5.91, 5.91); Calibrated: 8/22/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1322; Calibrated: 8/21/2013

Phantom: SAM v5.0 Left; Type: QD000P40CD; Serial: TP: 1687

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Mode: GPRS 850, Body SAR, Back side, High.ch, 3 Tx Slots**

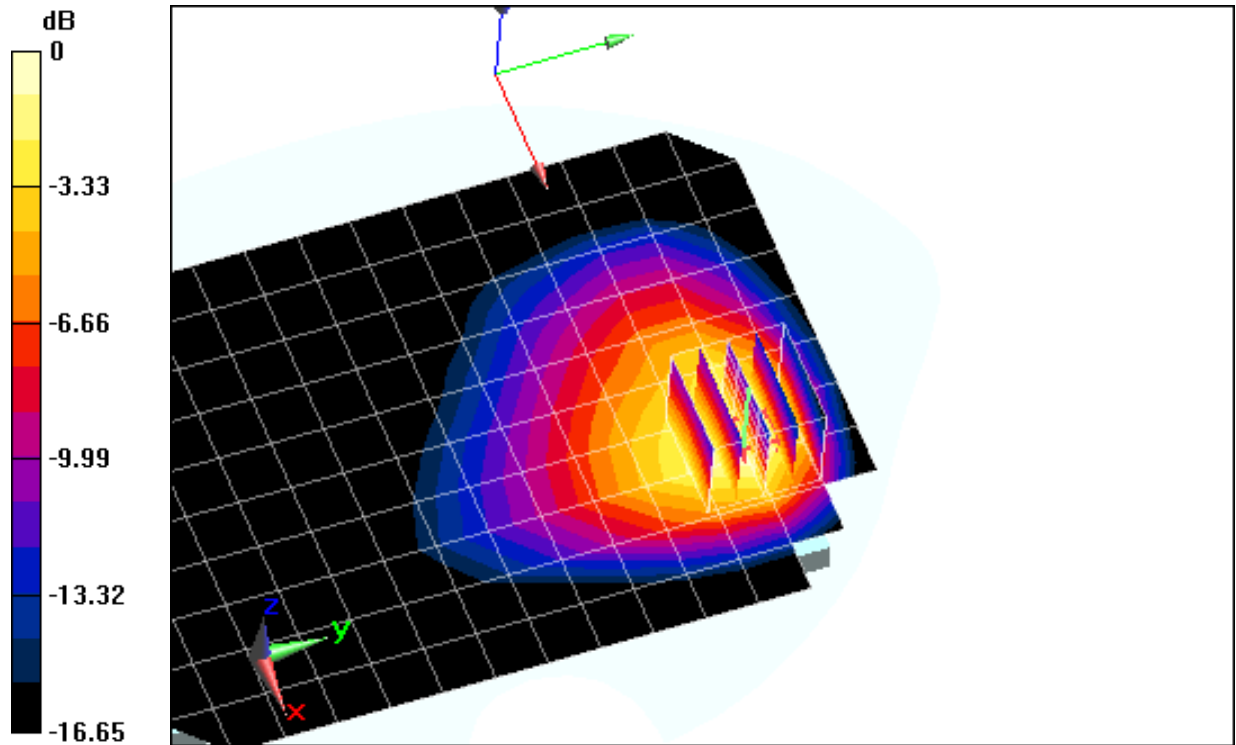
**Area Scan (11x15x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

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

Reference Value = 23.513 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 1.02 W/kg

**SAR(1 g) = 0.528 W/kg**



0 dB = 0.560 W/kg = -2.52 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMT235; Type: Portable Tablet; Serial: FL-147-C**

Communication System: UID 0, GSM GPRS; 3 Tx slots, Frequency: 1909.8 MHz; Duty Cycle: 1:2.76

Medium: 1900 Body Medium parameters used:

$f = 1910 \text{ MHz}$ ;  $\sigma = 1.557 \text{ S/m}$ ;  $\epsilon_r = 51.378$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 18 mm

Test Date: 04-28-2014; Ambient Temp: 23.4°C; Tissue Temp: 23.1°C

Probe: EX3DV4 - SN3589; ConvF(6.54, 6.54, 6.54); Calibrated: 1/29/2014;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/22/2014

Phantom: ELI left; Type: QDOVA002AA; Serial: TP:1202

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Mode: GPRS 1900, Body SAR, Back side, High.ch, 3 Tx Slots**

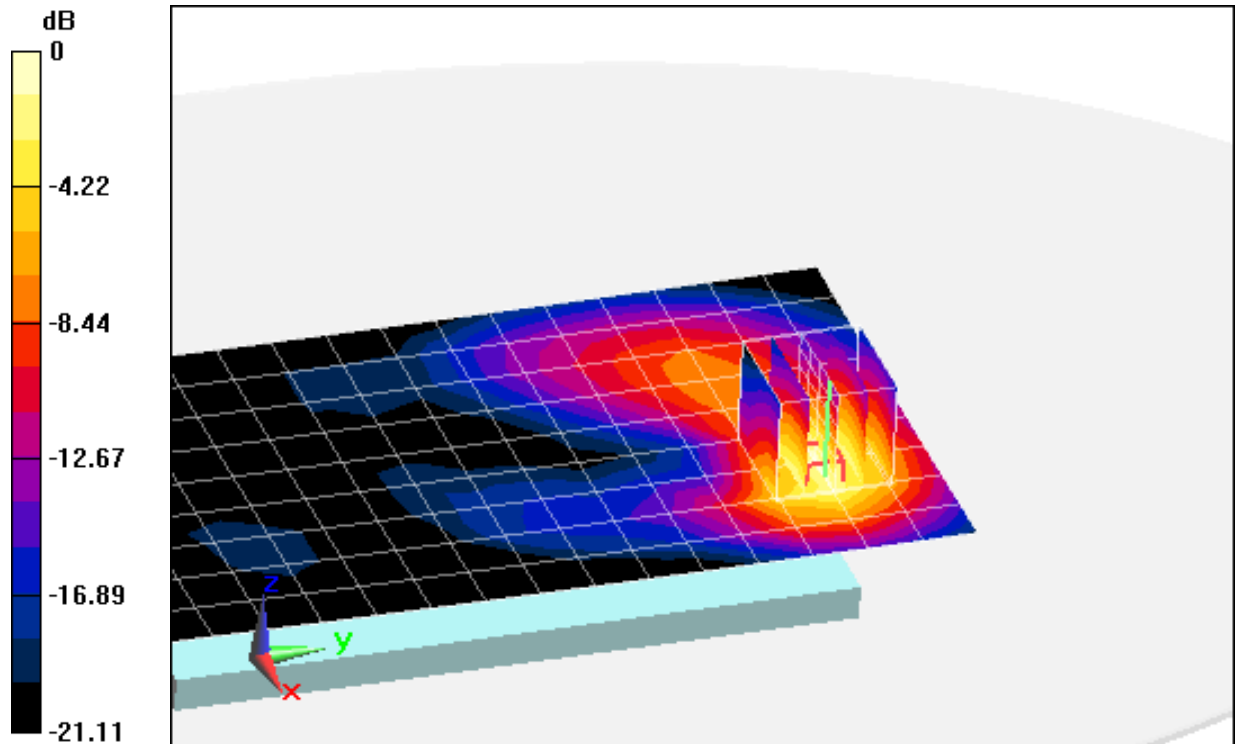
**Area Scan (10x17x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

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

Reference Value = 25.702 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 1.69 W/kg

**SAR(1 g) = 0.980 W/kg**



0 dB = 1.07 W/kg = 0.29 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMT235; Type: Portable Tablet; Serial: FL-147-E**

Communication System: UID 0, UMTS; Frequency: 826.4 MHz; Duty Cycle: 1:1

Medium: 835 Body Medium parameters used (interpolated):

$f = 826.4 \text{ MHz}$ ;  $\sigma = 1.002 \text{ S/m}$ ;  $\epsilon_r = 53.786$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0 mm

Test Date: 05-05-2014; Ambient Temp: 23.5°C; Tissue Temp: 22.6°C

Probe: ES3DV2 - SN3022; ConvF(5.91, 5.91, 5.91); Calibrated: 8/22/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1322; Calibrated: 8/21/2013

Phantom: SAM v5.0 Left; Type: QD000P40CD; Serial: TP: 1687

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Mode: UMTS 850, Body SAR, Back side, Low.ch**

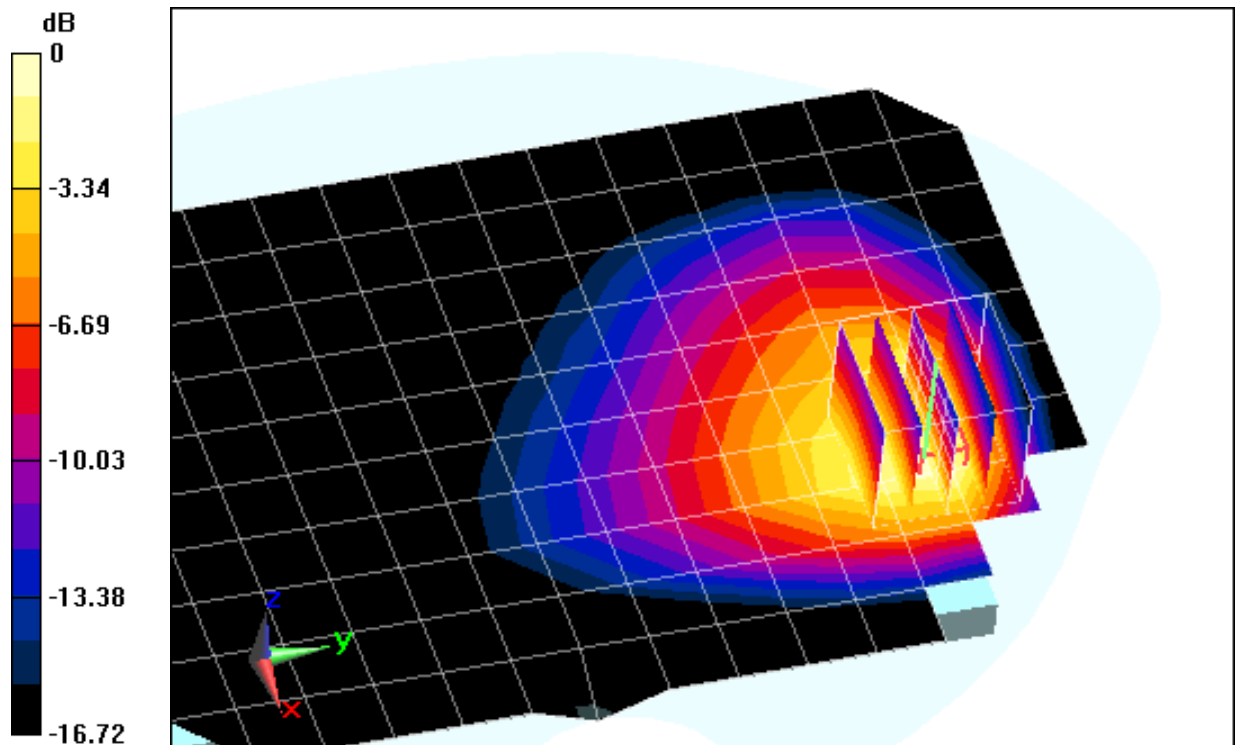
**Area Scan (11x15x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

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

Reference Value = 30.966 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 1.94 W/kg

**SAR(1 g) = 0.980 W/kg**



0 dB = 1.04 W/kg = 0.17 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMT235; Type: Portable Tablet; Serial: FL-147-E**

Communication System: UID 0, UMTS, Frequency: 1907.6 MHz; Duty Cycle: 1:1

Medium: 1900 Body Medium parameters used:

$f = 1907.6 \text{ MHz}$ ;  $\sigma = 1.565 \text{ S/m}$ ;  $\epsilon_r = 53.036$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0 mm

Test Date: 05-05-2014; Ambient Temp: 23.5°C; Tissue Temp: 22.5°C

Probe: EX3DV4 - SN3914; ConvF(7.51, 7.51, 7.51); Calibrated: 10/23/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1333; Calibrated: 11/19/2013

Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Mode: UMTS 1900, Body SAR, Back side, High ch.**

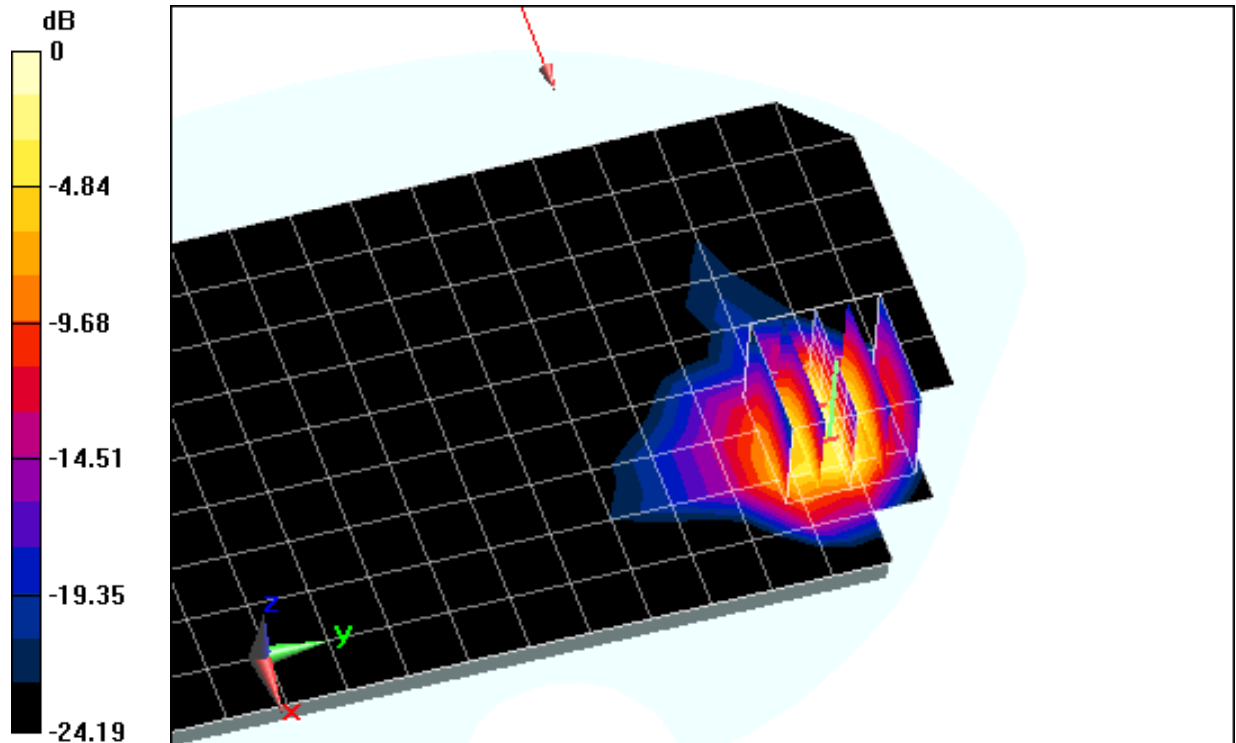
**Area Scan (10x17x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

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

Reference Value = 24.283 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 1.95 W/kg

**SAR(1 g) = 0.918 W/kg**



0 dB = 1.09 W/kg = 0.37 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMT235; Type: Portable Tablet; Serial: FL-147-E**

Communication System: UID 0, LTE Band 5; Frequency: 836.5 MHz; Duty Cycle: 1:1

Medium: 835 Body Medium parameters used (interpolated):

$f = 836.5 \text{ MHz}$ ;  $\sigma = 1.012 \text{ S/m}$ ;  $\epsilon_r = 53.661$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0 mm

Test Date: 05-05-2014; Ambient Temp: 23.5°C; Tissue Temp: 22.6°C

Probe: ES3DV2 - SN3022; ConvF(5.91, 5.91, 5.91); Calibrated: 8/22/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1322; Calibrated: 8/21/2013

Phantom: SAM v5.0 Left; Type: QD000P40CD; Serial: TP: 1687

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Mode: LTE Band 5 (Cell.), Body SAR, Back side, Mid.ch,  
10 MHz Bandwidth, QPSK, 50 RB, 0 RB Offset**

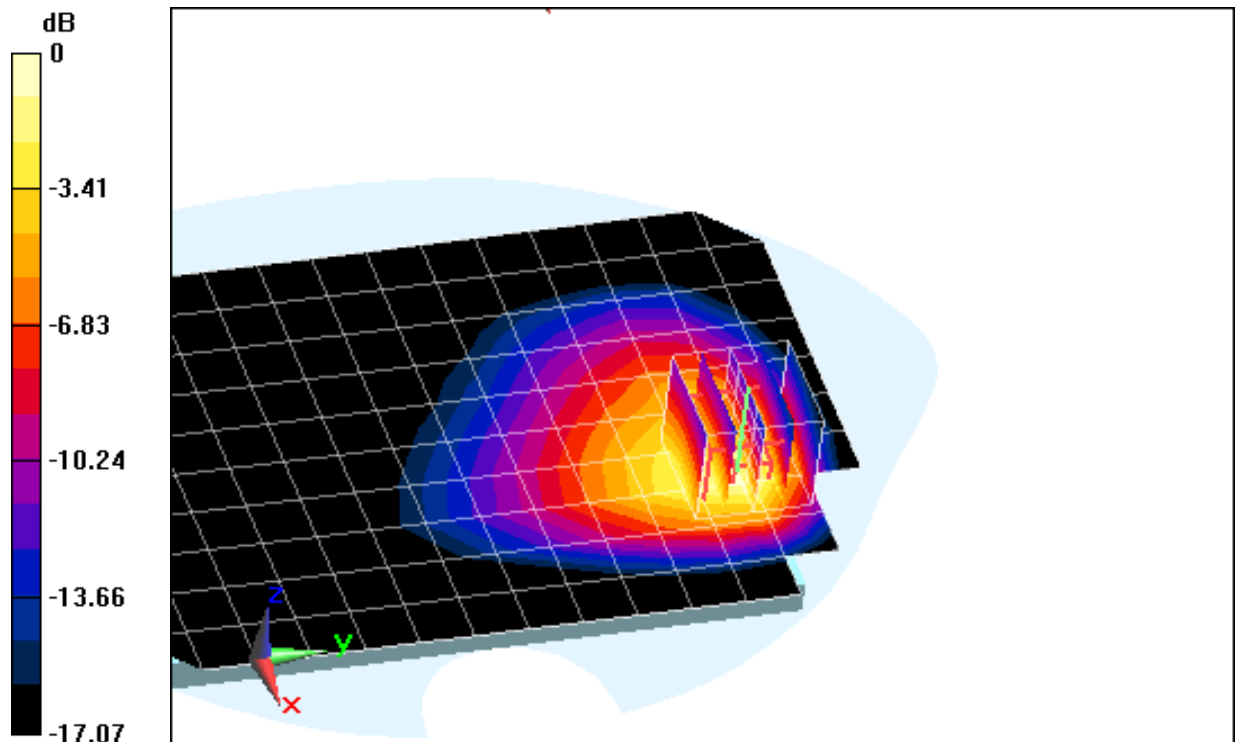
**Area Scan (11x15x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

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

Reference Value = 30.649 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 1.75 W/kg

**SAR(1 g) = 0.865 W/kg**



0 dB = 0.921 W/kg = -0.36 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMT235; Type: Portable Tablet; Serial: FL-147-C**

Communication System: UID 0, IEEE 802.11b; Frequency: 2412 MHz; Duty Cycle: 1:1

Medium: 2450 Body Medium parameters used (interpolated):

$f = 2412 \text{ MHz}$ ;  $\sigma = 1.982 \text{ S/m}$ ;  $\epsilon_r = 51.164$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0 mm

Test Date: 04-21-2014; Ambient Temp: 24.3°C; Tissue Temp: 23.0°C

Probe: ES3DV3 - SN3258; ConvF(4.14, 4.14, 4.14); Calibrated: 2/25/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 2/26/2014

Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP-1158

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Mode: IEEE 802.11b, Body SAR, Ch 1, 1 Mbps, Back Side**

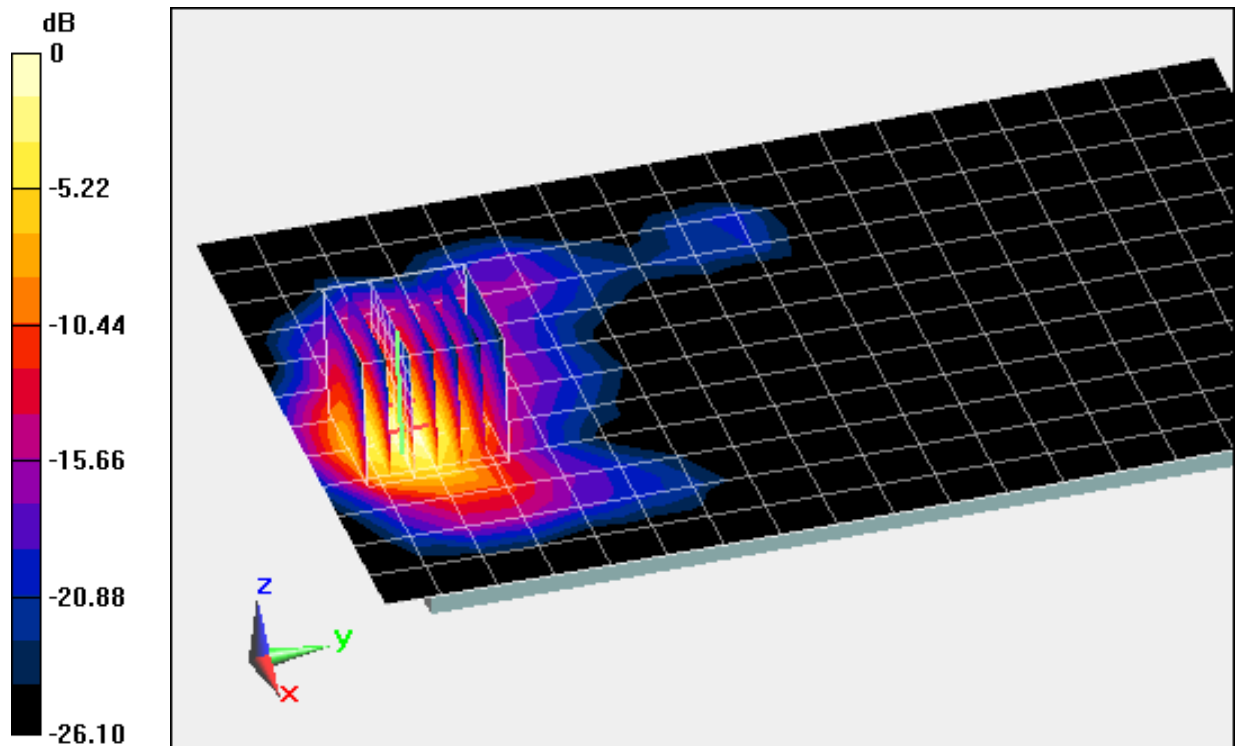
**Area Scan (13x19x1):** Measurement grid:  $dx=12\text{mm}$ ,  $dy=12\text{mm}$

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

Reference Value = 22.561 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 2.61 W/kg

**SAR(1 g) = 0.981 W/kg**



0 dB = 1.36 W/kg = 1.34 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMT235; Type: Portable Tablet; Serial: FL-147-A**

Communication System: UID 0, IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5765 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body Medium parameters used:

$f = 5765 \text{ MHz}$ ;  $\sigma = 6.233 \text{ S/m}$ ;  $\epsilon_r = 46.041$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0 mm

Test Date: 04-25-2014; Ambient Temp: 23.4°C; Tissue Temp: 21.8°C

Probe: EX3DV4 - SN3920; ConvF(4, 4, 4); Calibrated: 12/18/2013;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 12/12/2013

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

**Mode: IEEE 802.11a, 5.8 GHz, Body SAR, Ch 153, 6 Mbps, Back Side**

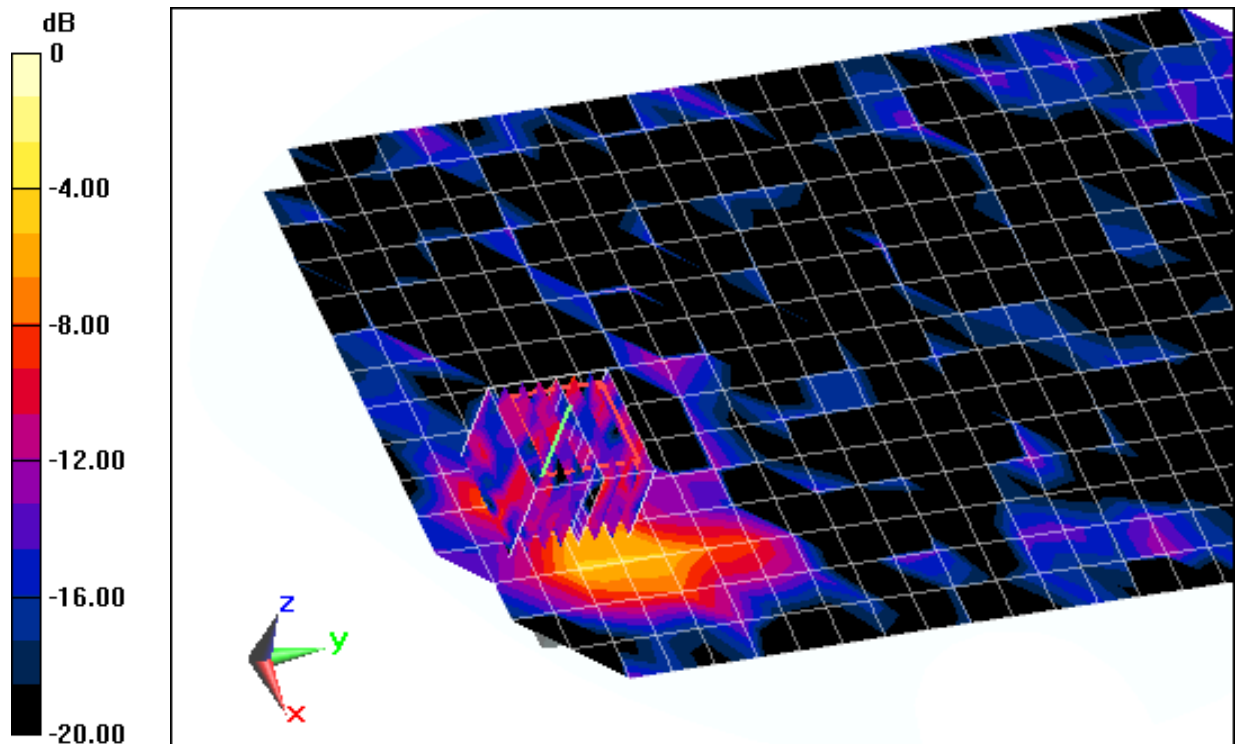
**Area Scan (16x24x1):** Measurement grid:  $dx=10\text{mm}$ ,  $dy=10\text{mm}$

**Zoom Scan (8x8x7)/Cube 0:** Measurement grid:  $dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=1.4\text{mm}$ ; Graded Ratio: 1.4

Reference Value = 1.905 V/m; Power Drift = 0.18 dB

Peak SAR (extrapolated) = 0.186 W/kg

**SAR(1 g) = 0.024 W/kg**



0 dB = 0.102 W/kg = -9.91 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMT235; Type: Portable Tablet; Serial: FL-147-A**

Communication System: UID 0, IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5320 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body Medium parameters used:

$f = 5320 \text{ MHz}$ ;  $\sigma = 5.603 \text{ S/m}$ ;  $\epsilon_r = 46.756$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0 mm

Test Date: 04-25-2014; Ambient Temp: 23.4°C; Tissue Temp: 21.8°C

Probe: EX3DV4 - SN3920; ConvF(4.11, 4.11, 4.11); Calibrated: 12/18/2013;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 12/12/2013

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

**Mode: IEEE 802.11a, 5.3 GHz, Body SAR, Ch 64, 6 Mbps, Back Side**

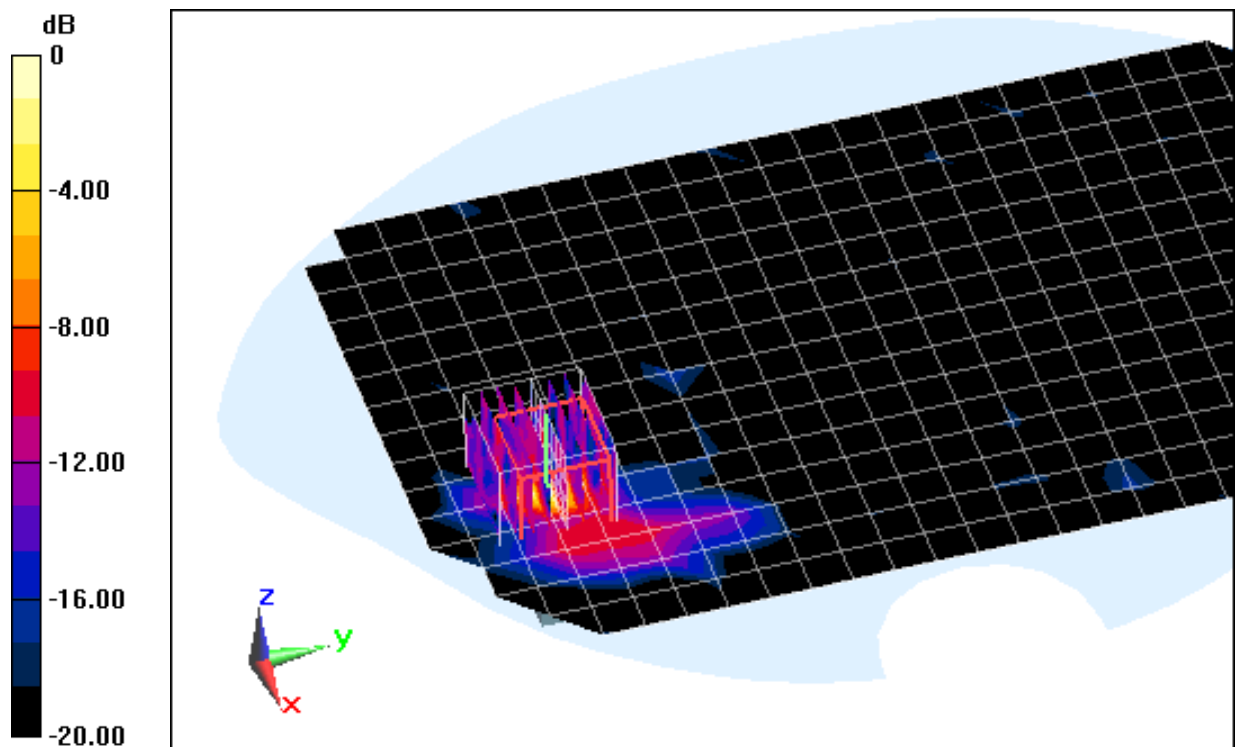
**Area Scan (16x24x1):** Measurement grid:  $dx=10\text{mm}$ ,  $dy=10\text{mm}$

**Zoom Scan (8x8x7)/Cube 0:** Measurement grid:  $dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=1.4\text{mm}$ ; Graded Ratio: 1.4

Reference Value = 5.283 V/m; Power Drift = 0.13 dB

Peak SAR (extrapolated) = 0.657 W/kg

**SAR(1 g) = 0.120 W/kg**



0 dB = 0.284 W/kg = -5.47 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMT235; Type: Portable Tablet; Serial: FL-147-C**

Communication System: UID 0, Bluetooth ; Frequency: 2441 MHz; Duty Cycle: 1:1

Medium: 2450 Body Medium parameters used (interpolated):

$f = 2441 \text{ MHz}$ ;  $\sigma = 2.02 \text{ S/m}$ ;  $\epsilon_r = 51.016$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0 mm

Test Date: 04-21-2014; Ambient Temp: 24.3°C; Tissue Temp: 23.0°C

Probe: ES3DV3 - SN3258; ConvF(4.14, 4.14, 4.14); Calibrated: 2/25/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 2/26/2014

Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP-1158

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Mode: Bluetooth, Body SAR, Ch 39, 1 Mbps, Back Side**

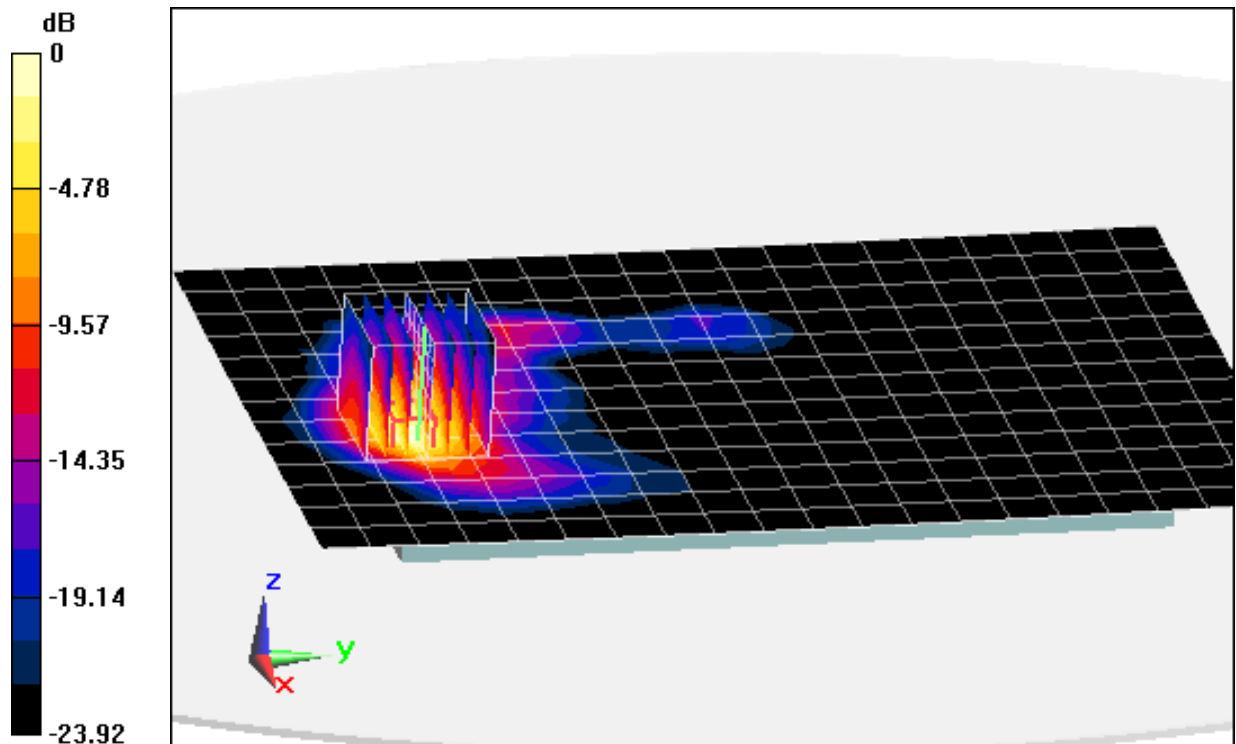
**Area Scan (14x21x1):** Measurement grid:  $dx=12\text{mm}$ ,  $dy=12\text{mm}$

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

Reference Value = 15.685 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 1.03 W/kg

**SAR(1 g) = 0.406 W/kg**



0 dB = 0.557 W/kg = -2.54 dBW/kg

## APPENDIX B: SYSTEM VERIFICATION

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d132**

Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: 835 Head Medium parameters used:

$f = 835 \text{ MHz}$ ;  $\sigma = 0.9 \text{ S/m}$ ;  $\epsilon_r = 39.901$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 04-21-2014; Ambient Temp: 23.8°C; Tissue Temp: 22.5°C

Probe: EX3DV4 - SN3914; ConvF(9.34, 9.34, 9.34); Calibrated: 10/23/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1333; Calibrated: 11/19/2013

Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

## 835 MHz System Verification

**Area Scan (7x14x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

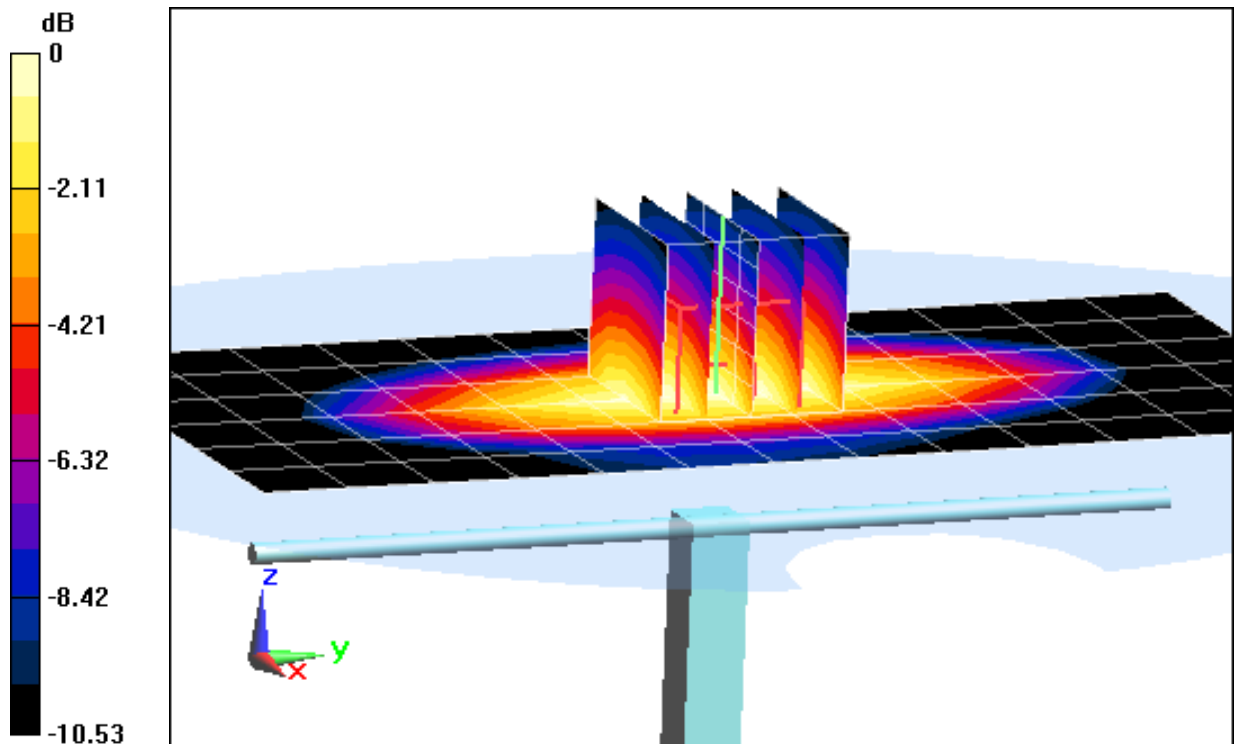
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Input Power: 20 dBm (100 mW)

Peak SAR (extrapolated) = 1.47 W/kg

**SAR(1 g) = 0.985 W/kg**

Deviation: 7.07%



# PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: 1900 Head Medium parameters used (interpolated):

$f = 1900 \text{ MHz}$ ;  $\sigma = 1.399 \text{ S/m}$ ;  $\epsilon_r = 39.599$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 05-07-2014; Ambient Temp: 23.4°C; Tissue Temp: 24.5°C

Probe: ES3DV3 - SN3333; ConvF(5.05, 5.05, 5.05); Calibrated: 11/22/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1408; Calibrated: 11/19/2013

Phantom: SAM with CRP v4.0; Type: QD000P40CD; Serial: TP:1797

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

## 1900 MHz System Verification

**Area Scan (7x10x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

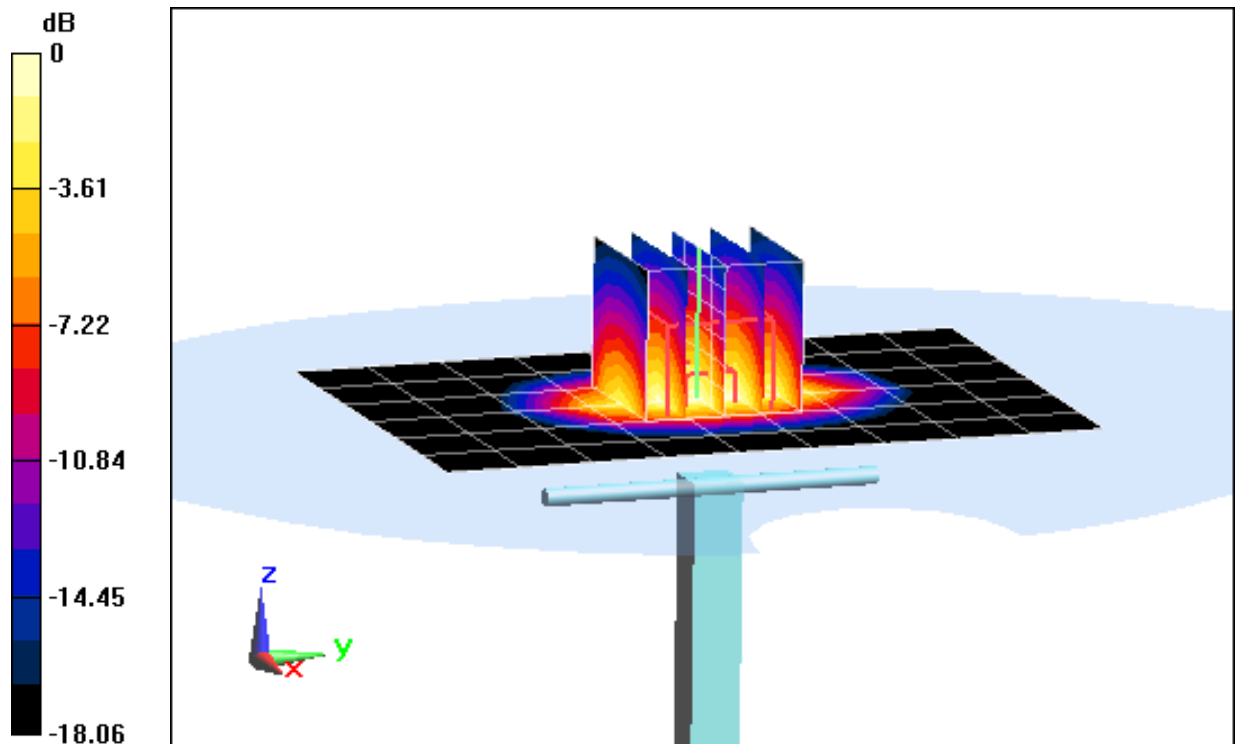
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Input Power: 20 dBm (100 mW)

Peak SAR (extrapolated) = 7.48 W/kg

**SAR(1 g) = 3.97 W/kg**

Deviation: -1.73%



0 dB = 4.45 W/kg = 6.48 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: 2450 Head Medium parameters used:

$f = 2450 \text{ MHz}$ ;  $\sigma = 1.798 \text{ S/m}$ ;  $\epsilon_r = 37.988$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-17-2014; Ambient Temp: 24.3°C; Tissue Temp: 22.6°C

Probe: ES3DV3 - SN3287; ConvF(4.43, 4.43, 4.43); Calibrated: 11/20/2013;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1408; Calibrated: 11/19/2013

Phantom: SAM with CRP v4.0; Type: QD000P40CD; Serial: TP:1797

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

## 2450 MHz System Verification

**Area Scan (8x9x1):** Measurement grid:  $dx=12\text{mm}$ ,  $dy=12\text{mm}$

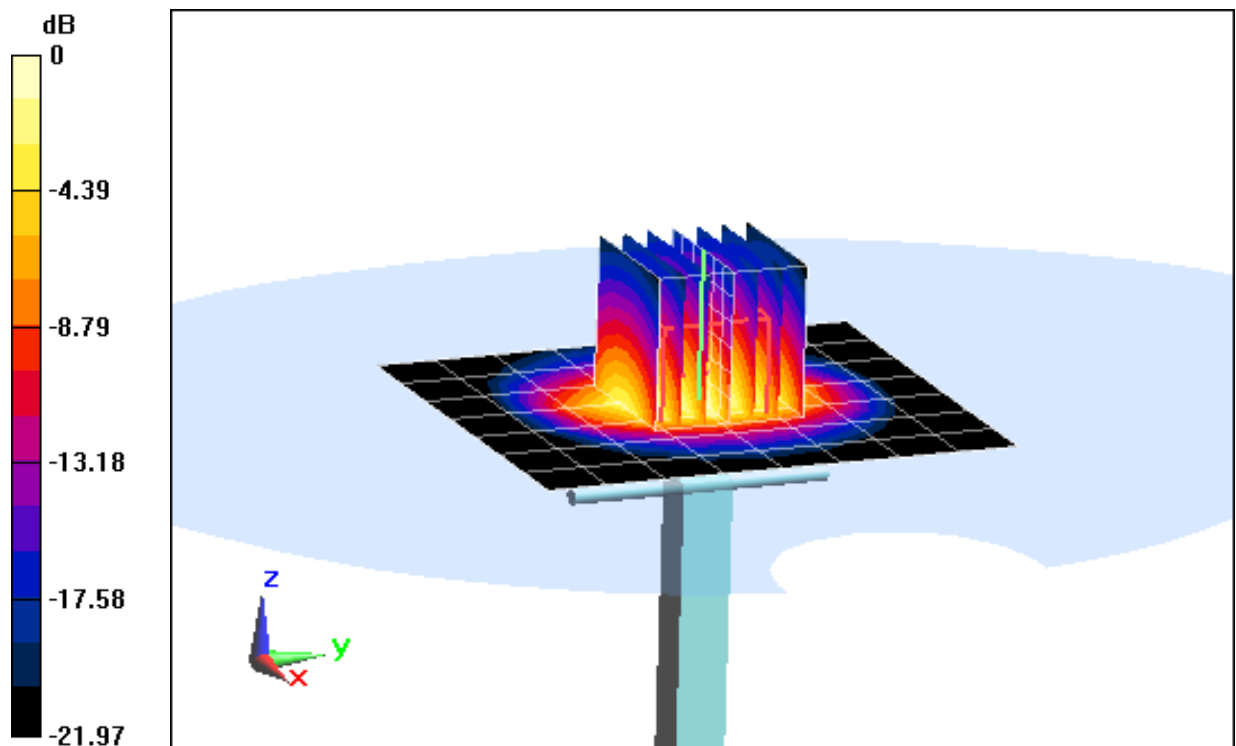
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Input Power: 20 dBm (100 mW)

Peak SAR (extrapolated) = 11.1 W/kg

**SAR(1 g) = 5.4 W/kg**

Deviation: 4.25%



# PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 5200 MHz; Duty Cycle: 1:1

Medium: 5 GHz Head Medium parameters used:

$f = 5200 \text{ MHz}$ ;  $\sigma = 4.48 \text{ S/m}$ ;  $\epsilon_r = 36.87$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-23-2014; Ambient Temp: 24.5°C; Tissue Temp: 24.4°C

Probe: EX3DV4 - SN3914; ConvF(4.99, 4.99, 4.99); Calibrated: 10/23/2013;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1333; Calibrated: 11/19/2013

Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

## 5200 MHz System Verification

**Area Scan (7x7x1):** Measurement grid:  $dx=10\text{mm}$ ,  $dy=10\text{mm}$

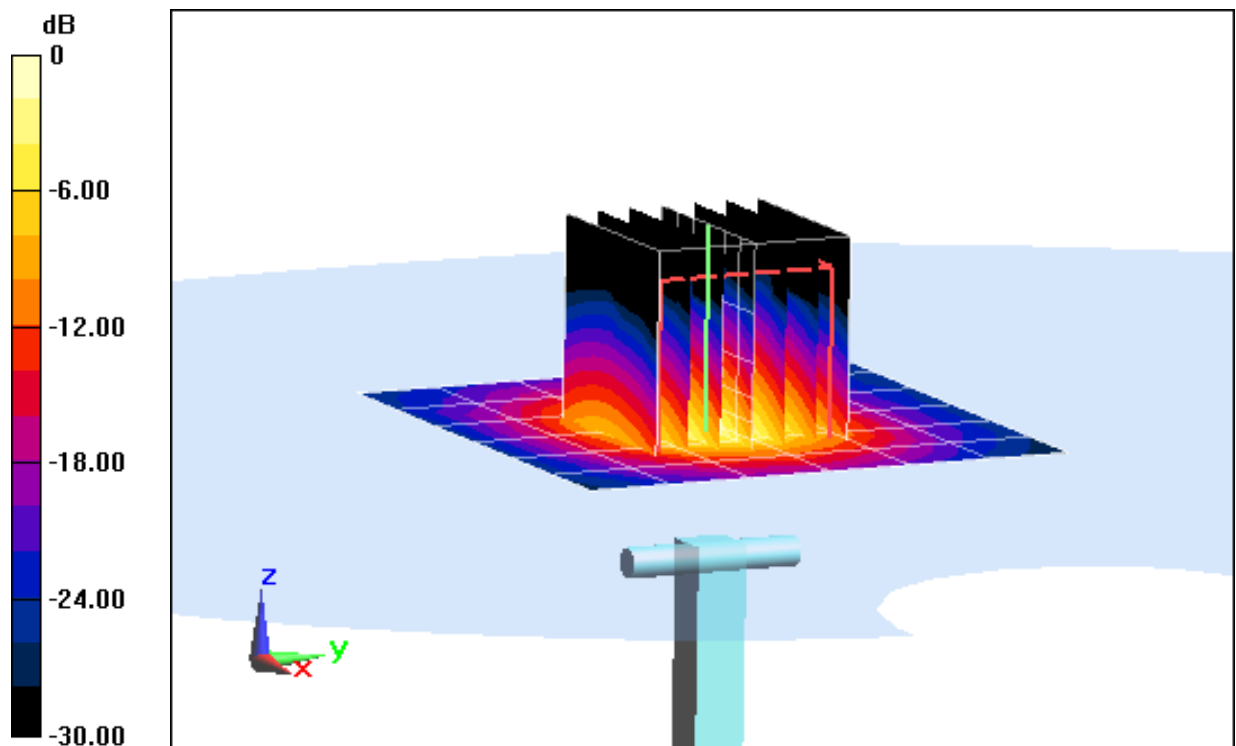
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=1.4\text{mm}$ ; Graded Ratio: 1.4

Input Power: 20 dBm (100 mW)

Peak SAR (extrapolated) = 30.5 W/kg

**SAR(1 g) = 7.42 W/kg**

Deviation: -4.87%



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 5300 MHz; Type: D5GHzV2; Serial: 1057**

Communication System: UID 0, CW; Frequency: 5300 MHz; Duty Cycle: 1:1

Medium: 5 GHz Head Medium parameters used:

$f = 5300 \text{ MHz}$ ;  $\sigma = 4.583 \text{ S/m}$ ;  $\epsilon_r = 36.745$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-23-2014; Ambient Temp: 24.5°C; Tissue Temp: 24.3°C

Probe: EX3DV4 - SN3914; ConvF(4.82, 4.82, 4.82); Calibrated: 10/23/2013;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1333; Calibrated: 11/19/2013

Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

## 5300 MHz System Verification

**Area Scan (7x8x1):** Measurement grid:  $dx=10\text{mm}$ ,  $dy=10\text{mm}$

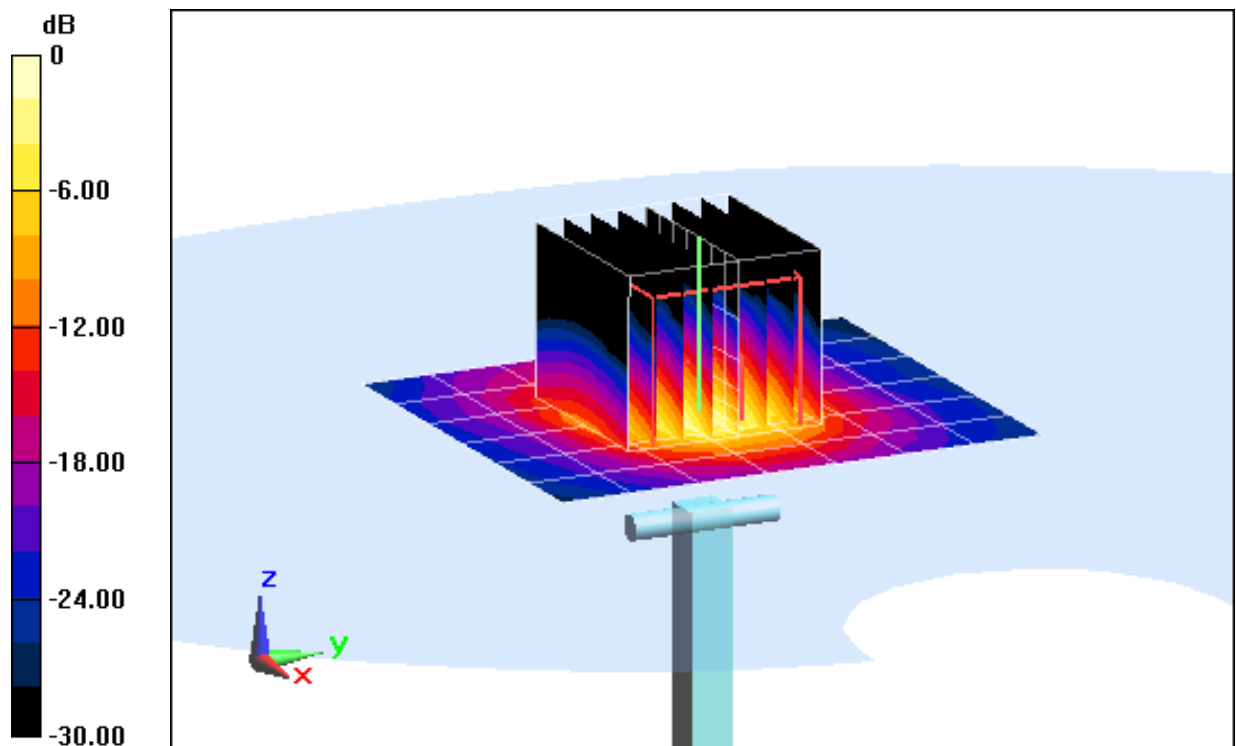
**Zoom Scan (8x8x7)/Cube 0:** Measurement grid:  $dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=1.4\text{mm}$ ; Graded Ratio: 1.4

Input Power: 20 dBm (100 mW)

Peak SAR (extrapolated) = 35.4 W/kg

**SAR(1 g) = 8.29 W/kg**

Deviation: -0.12%



0 dB = 18.1 W/kg = 12.58 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 5500 MHz; Duty Cycle: 1:1

Medium: 5 GHz Head Medium parameters used:

$f = 5500 \text{ MHz}$ ;  $\sigma = 4.781 \text{ S/m}$ ;  $\epsilon_r = 36.534$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-23-2014; Ambient Temp: 24.4°C; Tissue Temp: 24.3°C

Probe: EX3DV4 - SN3914; ConvF(4.55, 4.55, 4.55); Calibrated: 10/23/2013;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1333; Calibrated: 11/19/2013

Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

## 5500 MHz System Verification

**Area Scan (7x7x1):** Measurement grid:  $dx=10\text{mm}$ ,  $dy=10\text{mm}$

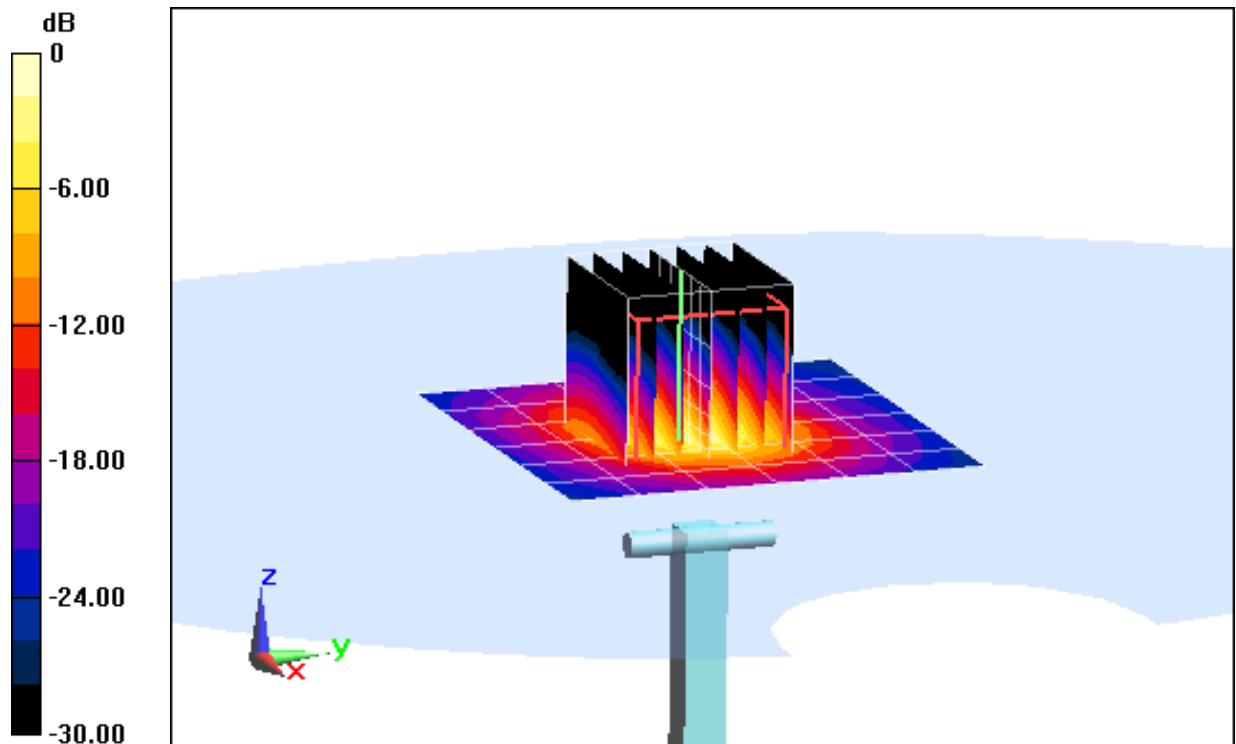
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=1.4\text{mm}$ ; Graded Ratio: 1.4

Input Power: 20 dBm (100 mW)

Peak SAR (extrapolated) = 34.1 W/kg

**SAR(1 g) = 7.89 W/kg**

Deviation: -6.41%



0 dB = 18.6 W/kg = 12.70 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 5800 MHz; Duty Cycle: 1:1

Medium: 5 GHz Head Medium parameters used:

$f = 5800 \text{ MHz}$ ;  $\sigma = 5.06 \text{ S/m}$ ;  $\epsilon_r = 36.154$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-23-2014; Ambient Temp: 24.5°C; Tissue Temp: 24.4°C

Probe: EX3DV4 - SN3914; ConvF(4.52, 4.52, 4.52); Calibrated: 10/23/2013;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1333; Calibrated: 11/19/2013

Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

## 5800 MHz System Verification

**Area Scan (7x7x1):** Measurement grid:  $dx=10\text{mm}$ ,  $dy=10\text{mm}$

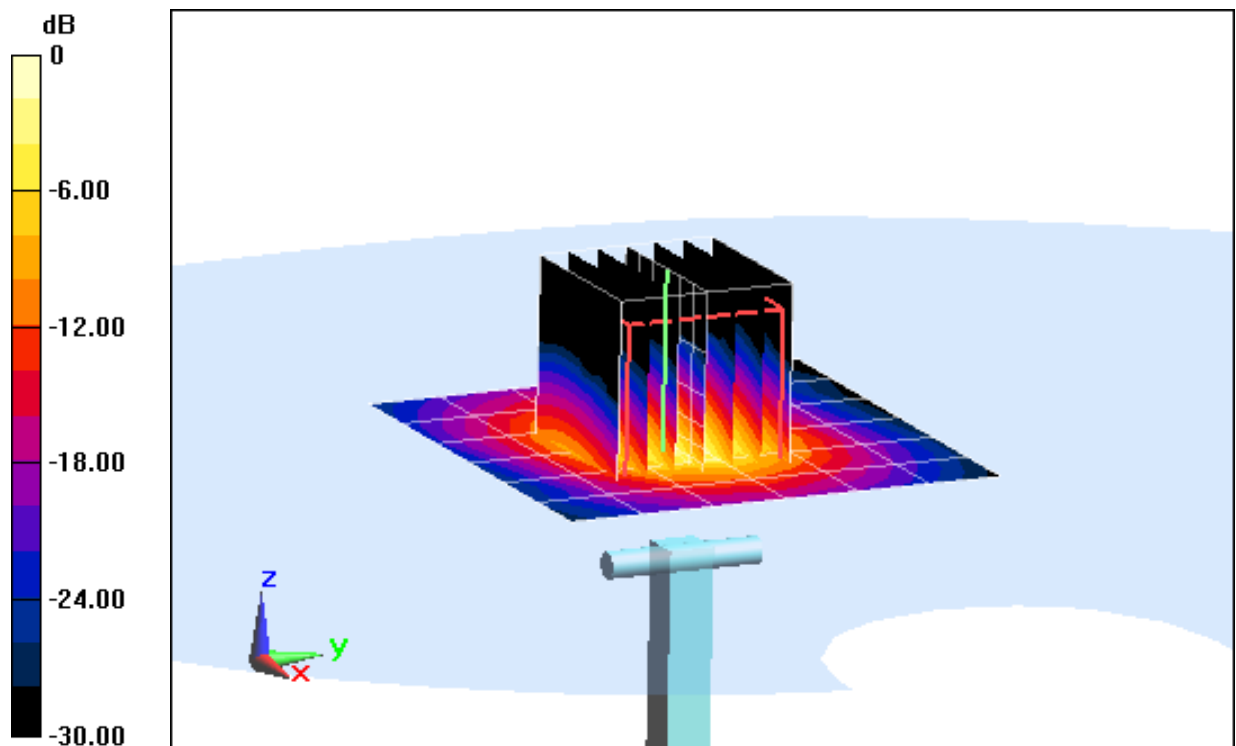
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=1.4\text{mm}$ ; Graded Ratio: 1.4

Input Power: 20 dBm (100 mW)

Peak SAR (extrapolated) = 36 W/kg

**SAR(1 g) = 7.77 W/kg**

Deviation: -2.02%



0 dB = 20.4 W/kg = 13.10 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: 835 Body Medium parameters used:

$f = 835 \text{ MHz}$ ;  $\sigma = 1.011 \text{ S/m}$ ;  $\epsilon_r = 53.677$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 05-05-2014; Ambient Temp: 23.5°C; Tissue Temp: 22.6°C

Probe: ES3DV2 - SN3022; ConvF(5.91, 5.91, 5.91); Calibrated: 8/22/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1322; Calibrated: 8/21/2013

Phantom: SAM v5.0 Left; Type: QD000P40CD; Serial: TP: 1687

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

## 835 MHz System Verification

**Area Scan (7x14x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

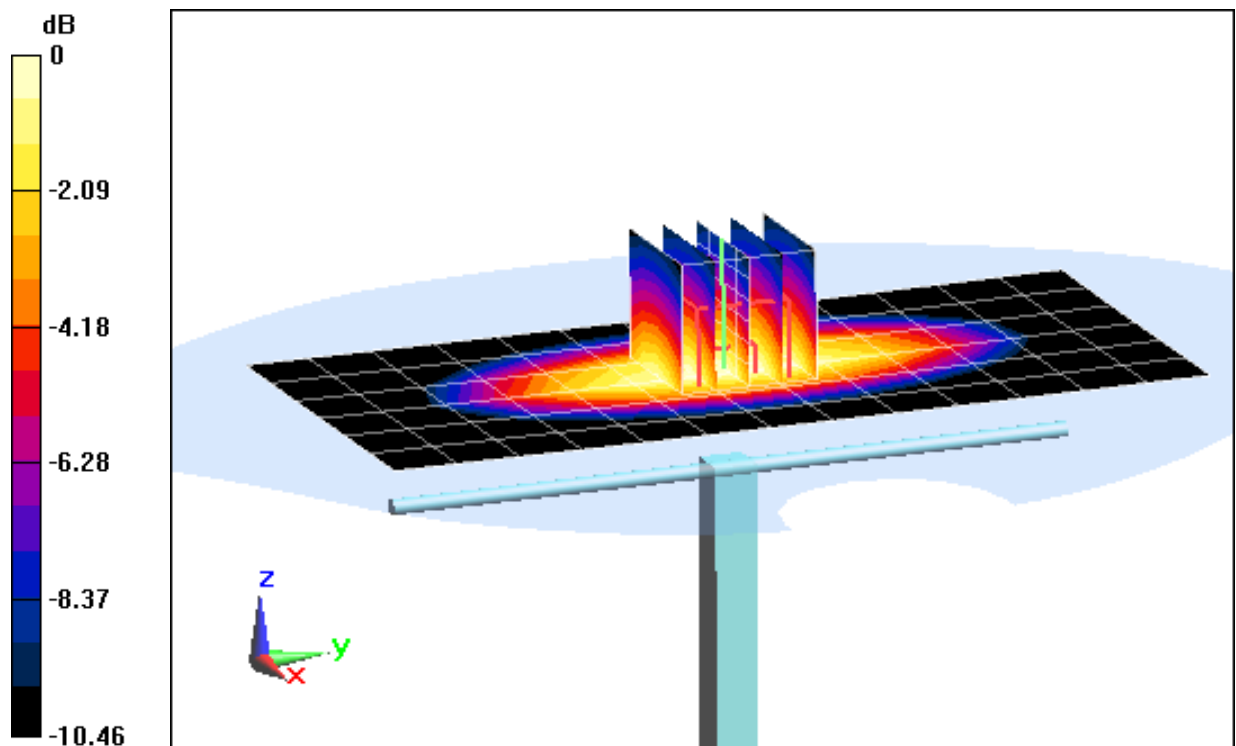
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Input Power: 20 dBm (100 mW)

Peak SAR (extrapolated) = 1.43 W/kg

**SAR(1 g) = 0.988 W/kg**

Deviation: 5.78%



0 dB = 1.07 W/kg = 0.29 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: 1900 Body Medium parameters used (interpolated):

$f = 1900 \text{ MHz}$ ;  $\sigma = 1.545 \text{ S/m}$ ;  $\epsilon_r = 51.424$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-28-2014; Ambient Temp: 23.4°C; Tissue Temp: 23.1°C

Probe: EX3DV4 - SN3589; ConvF(6.54, 6.54, 6.54); Calibrated: 1/29/2014;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/22/2014

Phantom: ELI left; Type: QDOVA002AA; Serial: TP:1202

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

## 1900 MHz System Verification

**Area Scan (7x10x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

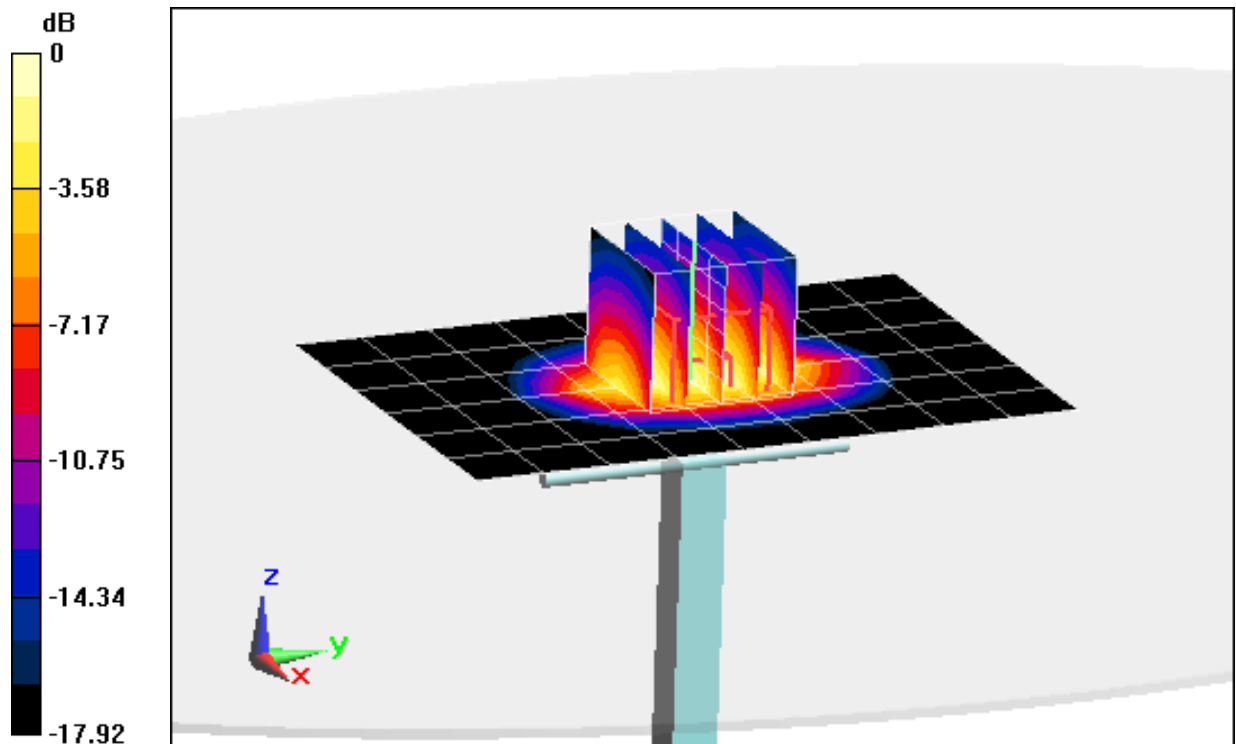
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Input Power: 20 dBm (100 mW)

Peak SAR (extrapolated) = 7.35 W/kg

**SAR(1 g) = 3.97 W/kg**

Deviation: -1.98%



0 dB = 4.44 W/kg = 6.47 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: 1900 Body Medium parameters used (interpolated):

$f = 1900 \text{ MHz}$ ;  $\sigma = 1.556 \text{ S/m}$ ;  $\epsilon_r = 53.061$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 05-05-2014; Ambient Temp: 23.5°C; Tissue Temp: 22.5°C

Probe: EX3DV4 - SN3914; ConvF(7.51, 7.51, 7.51); Calibrated: 10/23/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1333; Calibrated: 11/19/2013

Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

## 1900 MHz System Verification

**Area Scan (7x10x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

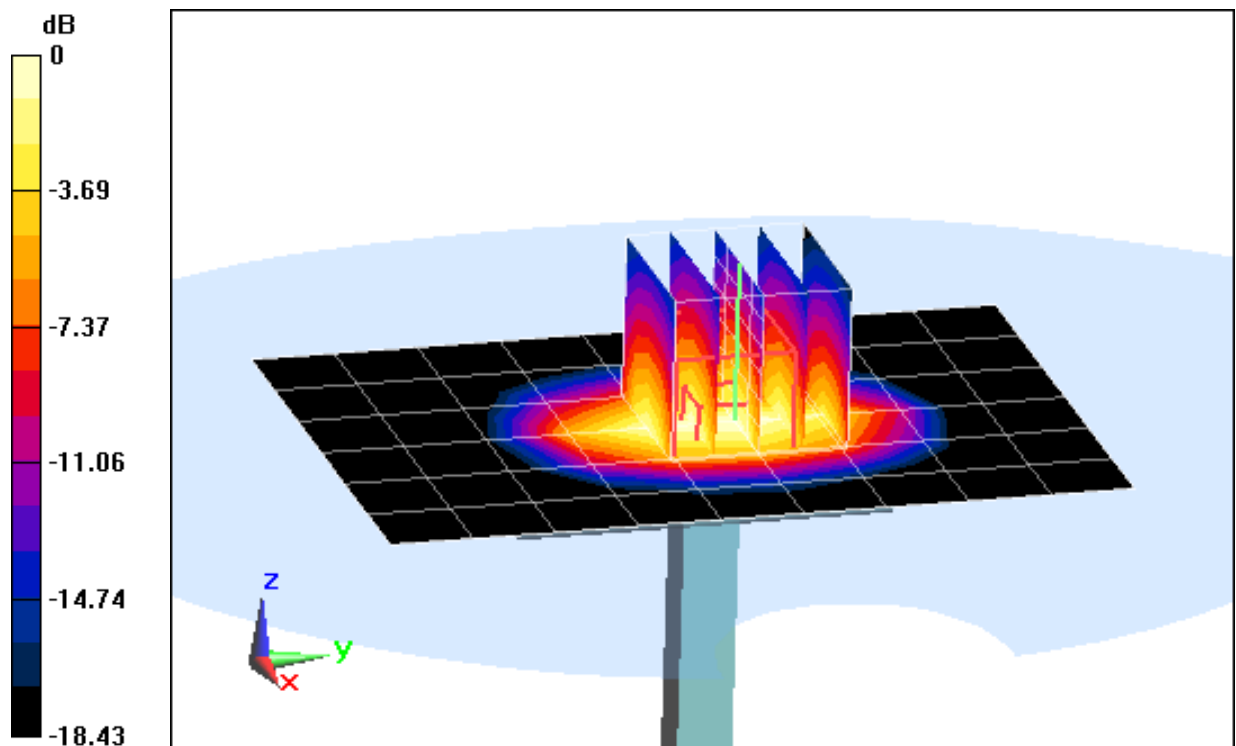
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Input Power: 20 dBm (100 mW)

Peak SAR (extrapolated) = 7.51 W/kg

**SAR(1 g) = 4.11 W/kg**

Deviation: 1.48%



0 dB = 4.45 W/kg = 6.48 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: 2450 Body Medium parameters used:

$f = 2450 \text{ MHz}$ ;  $\sigma = 2.032 \text{ S/m}$ ;  $\epsilon_r = 50.97$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-21-2014; Ambient Temp: 24.3°C; Tissue Temp: 23.0°C

Probe: ES3DV3 - SN3258; ConvF(4.14, 4.14, 4.14); Calibrated: 2/25/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 2/26/2014

Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP-1158

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

## 2450 MHz System Verification

**Area Scan (8x9x1):** Measurement grid:  $dx=12\text{mm}$ ,  $dy=12\text{mm}$

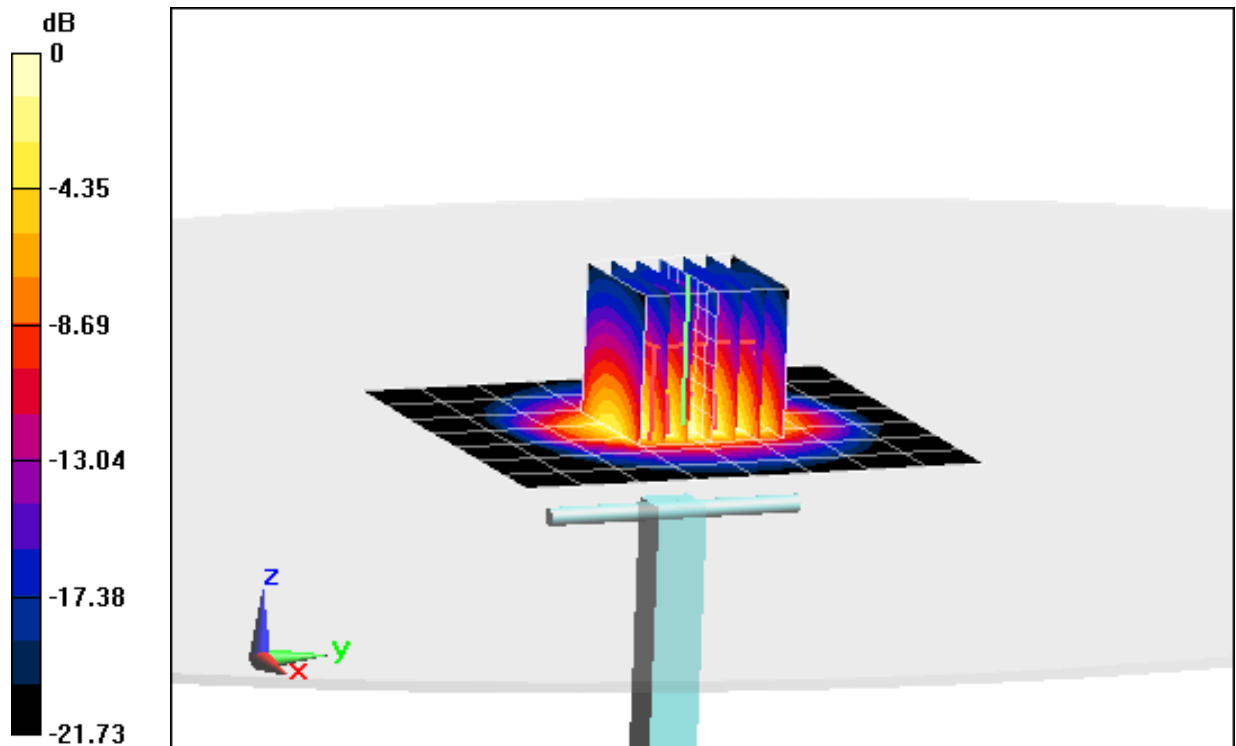
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Input Power: 20 dBm (100 mW)

Peak SAR (extrapolated) = 10.4 W/kg

**SAR(1 g) = 4.9 W/kg**

Deviation: -0.81%



0 dB = 6.49 W/kg = 8.12 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 5200 MHz; Type: D5GHzV2; Serial: 1007**

Communication System: UID 0, CW; Frequency: 5200 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body Medium parameters used:

$f = 5200 \text{ MHz}$ ;  $\sigma = 5.456 \text{ S/m}$ ;  $\epsilon_r = 46.973$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-25-2014; Ambient Temp: 23.4°C; Tissue Temp: 21.8°C

Probe: EX3DV4 - SN3920; ConvF(4.23, 4.23, 4.23); Calibrated: 12/18/2013;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 12/12/2013

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

## 5200MHz System Verification

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

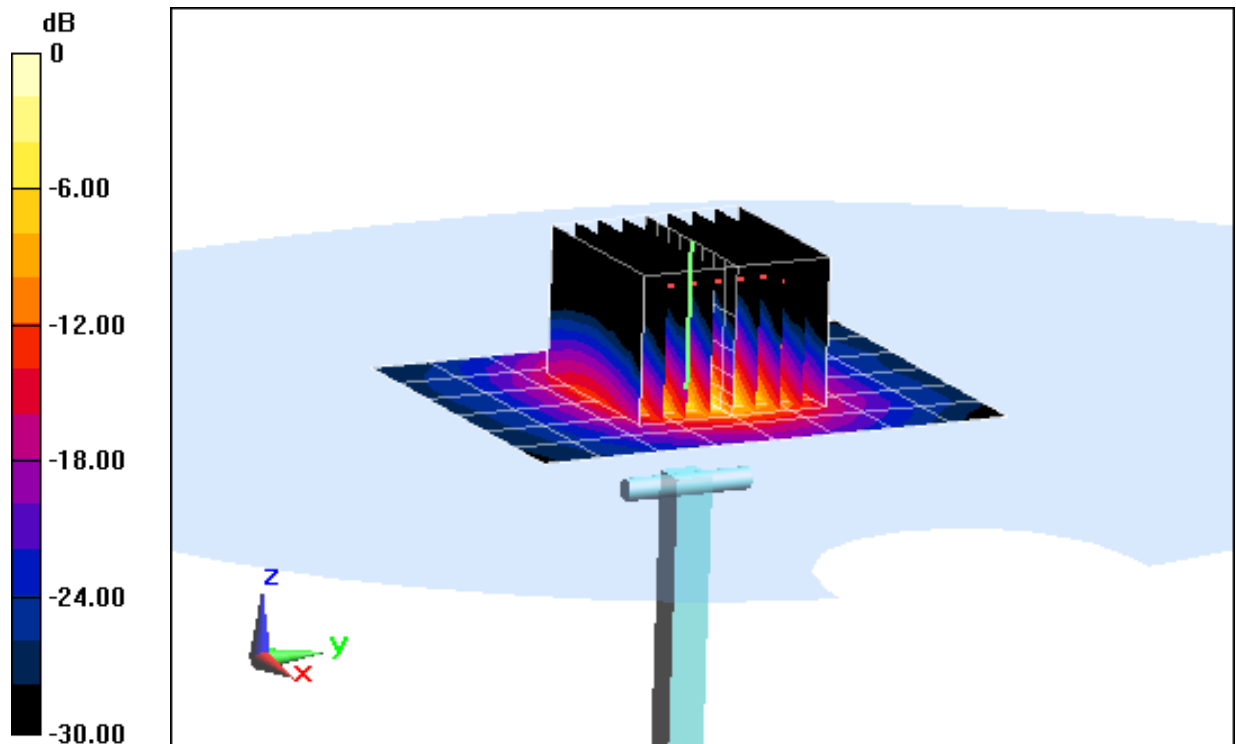
**Zoom Scan (9x9x7)/Cube 0:** Measurement grid:  $dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=1.4\text{mm}$ ; Graded Ratio: 1.4

Input Power: 20 dBm (100 mW)

Peak SAR (extrapolated) = 30.8 W/kg

**SAR(1 g) = 7.74 W/kg**

Deviation: 6.61%



0 dB = 19.7 W/kg = 12.94 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 5300 MHz; Type: D5GHzV2; Serial: 1007**

Communication System: UID 0, CW; Frequency: 5300 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body Medium parameters used:

$f = 5300 \text{ MHz}$ ;  $\sigma = 5.573 \text{ S/m}$ ;  $\epsilon_r = 46.793$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-25-2014; Ambient Temp: 23.4°C; Tissue Temp: 21.8°C

Probe: EX3DV4 - SN3920; ConvF(4.11, 4.11, 4.11); Calibrated: 12/18/2013;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 12/12/2013

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

## 5300MHz System Verification

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

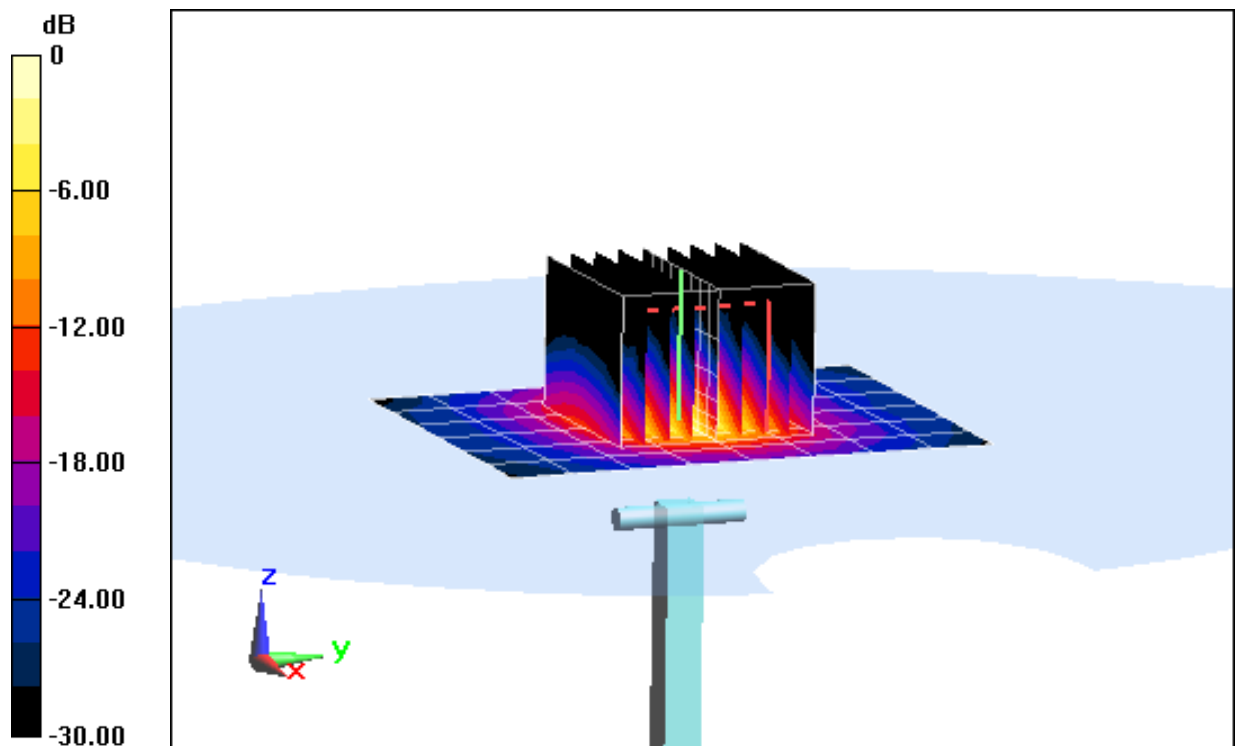
**Zoom Scan (9x9x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4

Input Power: 20 dBm (100 mW)

Peak SAR (extrapolated) = 32.9 W/kg

**SAR(1 g) = 7.97 W/kg**

Deviation: 6.69%



0 dB = 20.7 W/kg = 13.16 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 5500 MHz; Type: D5GHzV2; Serial: 1007**

Communication System: UID 0, CW; Frequency: 5500 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body Medium parameters used:

$f = 5500 \text{ MHz}$ ;  $\sigma = 5.852 \text{ S/m}$ ;  $\epsilon_r = 46.471$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-25-2014; Ambient Temp: 23.4°C; Tissue Temp: 21.8°C

Probe: EX3DV4 - SN3920; ConvF(3.8, 3.8, 3.8); Calibrated: 12/18/2013;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 12/12/2013

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

## 5500MHz System Verification

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

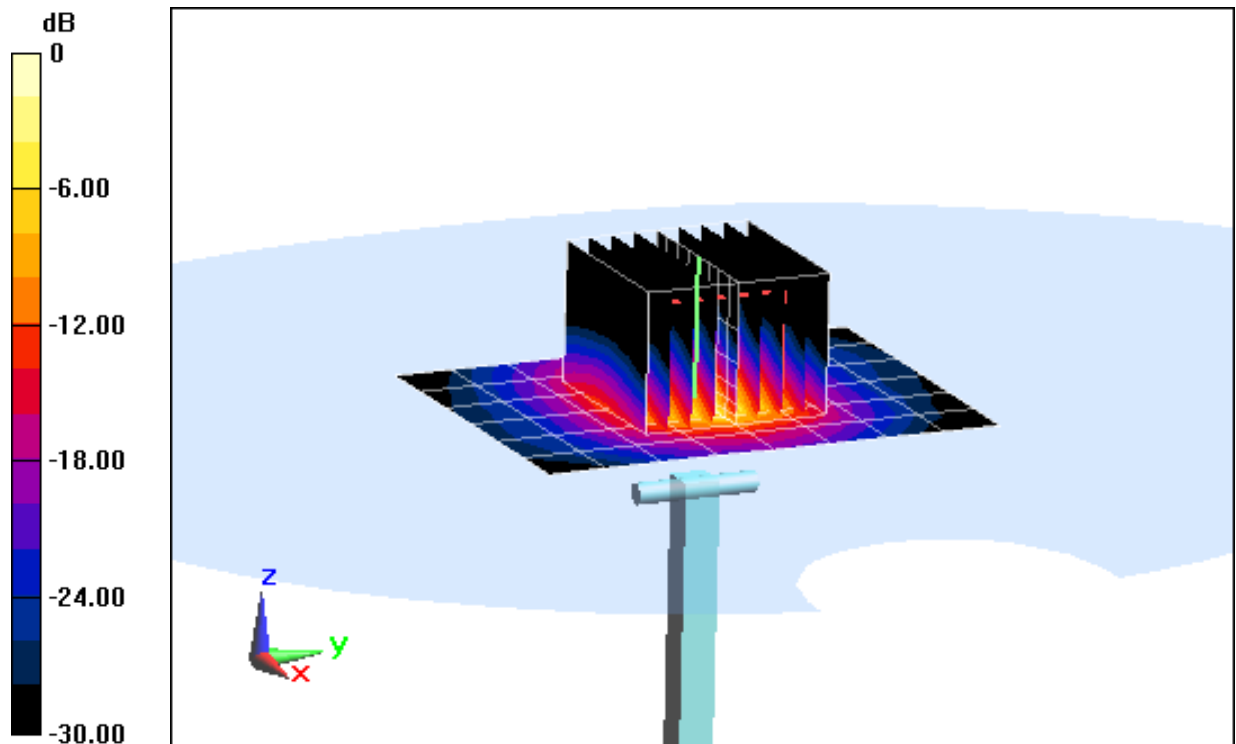
**Zoom Scan (9x9x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4

Input Power: 20 dBm (100 mW)

Peak SAR (extrapolated) = 35.1 W/kg

**SAR(1 g) = 7.89 W/kg**

Deviation: 3.95%



0 dB = 21.3 W/kg = 13.28 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 5800 MHz; Type: D5GHzV2; Serial: 1007**

Communication System: UID 0, CW; Frequency: 5800 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body Medium parameters used:

$f = 5800 \text{ MHz}$ ;  $\sigma = 6.28 \text{ S/m}$ ;  $\epsilon_r = 45.944$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-25-2014; Ambient Temp: 23.4°C; Tissue Temp: 21.8°C

Probe: EX3DV4 - SN3920; ConvF(4, 4, 4); Calibrated: 12/18/2013;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 12/12/2013

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

## 5800MHz System Verification

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

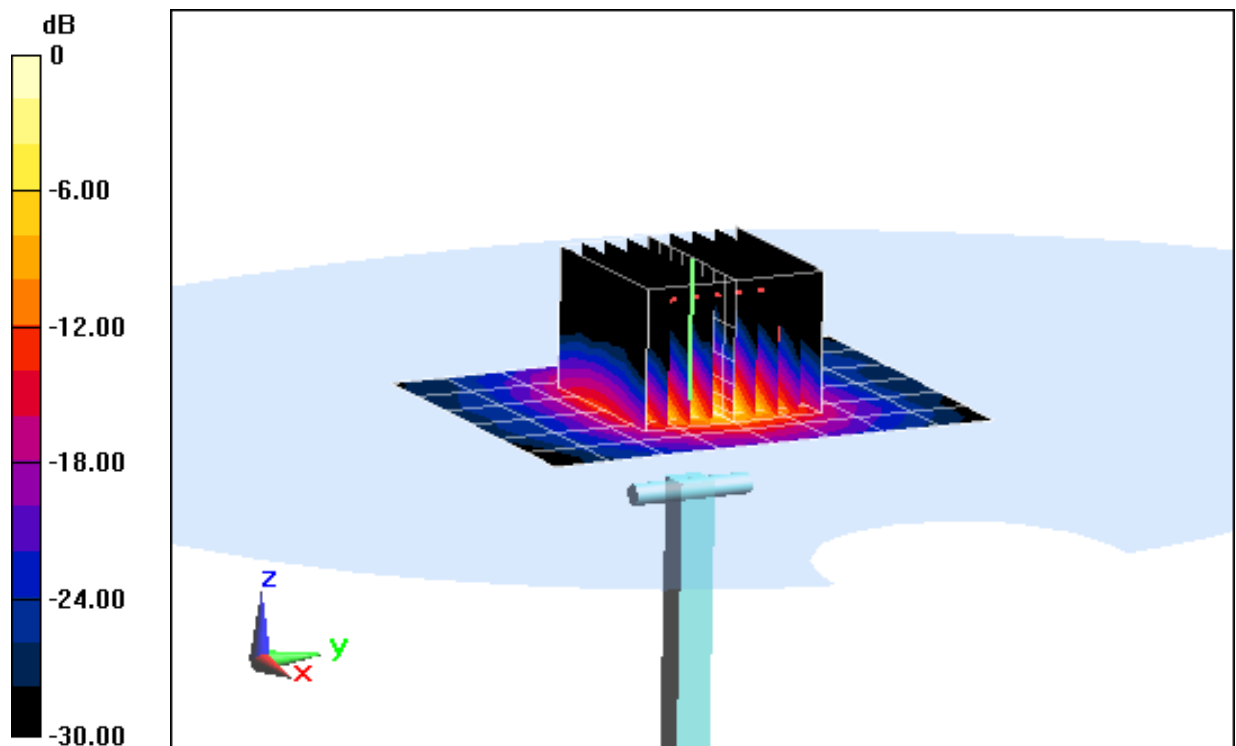
**Zoom Scan (9x9x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4

Input Power: 20 dBm (100 mW)

Peak SAR (extrapolated) = 33.7 W/kg

**SAR(1 g) = 7.58 W/kg**

Deviation: 3.98%



0 dB = 20.0 W/kg = 13.01 dBW/kg

## 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: **EX3-3914\_Oct13**

## CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:3914**

Calibration procedure(s) **QA CAL-01 v3, QA CAL-14 v4, QA CAL-23 v5, QA CAL-25 v6**  
 Calibration procedure for dosimetric E-field probes

Calibration date: **October 23, 2013**

*VCC*  
*11/20/2013*

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      | 04-Apr-13 (No. 217-01733)         | Apr-14                 |
| Power sensor E4412A        | MY41498087      | 04-Apr-13 (No. 217-01733)         | Apr-14                 |
| Reference 3 dB Attenuator  | SN: S5054 (3c)  | 04-Apr-13 (No. 217-01737)         | Apr-14                 |
| Reference 20 dB Attenuator | SN: S5277 (20x) | 04-Apr-13 (No. 217-01735)         | Apr-14                 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 04-Apr-13 (No. 217-01738)         | Apr-14                 |
| Reference Probe ES3DV2     | SN: 3013        | 28-Dec-12 (No. ES3-3013_Dec12)    | Dec-13                 |
| DAE4                       | SN: 660         | 4-Sep-13 (No. DAE4-660_Sep13)     | Sep-14                 |
| Secondary Standards        | ID              | Check Date (in house)             | Scheduled Check        |
| RF generator HP 8648C      | US3642U01700    | 4-Aug-99 (in house check Apr-13)  | In house check: Apr-15 |
| Network Analyzer HP 8753E  | US37390585      | 18-Oct-01 (in house check Oct-13) | In house check: Oct-14 |

|                                                                                                                 | Name          | Function              | Signature            |
|-----------------------------------------------------------------------------------------------------------------|---------------|-----------------------|----------------------|
| Calibrated by:                                                                                                  | Leif Klysner  | Laboratory Technician | <i>Leif Klysner</i>  |
| Approved by:                                                                                                    | Katja Pokovic | Technical Manager     | <i>Katja Pokovic</i> |
| Issued: October 25, 2013                                                                                        |               |                       |                      |
| This calibration certificate shall not be reproduced except in full without written approval of the laboratory. |               |                       |                      |

*PC# 81072*



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                                                                                                                                |
| 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, D               | 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 |
| Connector Angle          | information used in DASY system to align probe sensor X to the robot coordinate system                                                                  |

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

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- 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>; D<sub>x,y,z</sub>; VR<sub>x,y,z</sub>; A, B, C, D** 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.
- Connector Angle**: The angle is assessed using the information gained by determining the NORM<sub>x</sub> (no uncertainty required).

# Probe EX3DV4

## SN:3914

Manufactured: December 18, 2012  
Calibrated: October 23, 2013

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

# DASY/EASY - Parameters of Probe: EX3DV4 - SN:3914

## Basic Calibration Parameters

|                                                           | Sensor X | Sensor Y | Sensor Z | Unc (k=2)     |
|-----------------------------------------------------------|----------|----------|----------|---------------|
| Norm ( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>A</sup> | 0.47     | 0.49     | 0.51     | $\pm 10.1 \%$ |
| DCP (mV) <sup>B</sup>                                     | 99.2     | 98.9     | 98.2     |               |

## Modulation Calibration Parameters

| UID       | Communication System Name                |   | A<br>dB | B<br>dB $\sqrt{\mu\text{V}}$ | C    | D<br>dB | VR<br>mV | Unc <sup>E</sup><br>(k=2) |
|-----------|------------------------------------------|---|---------|------------------------------|------|---------|----------|---------------------------|
| 0         | CW                                       | X | 0.0     | 0.0                          | 1.0  | 0.00    | 158.3    | $\pm 3.0 \%$              |
|           |                                          | Y | 0.0     | 0.0                          | 1.0  |         | 154.6    |                           |
|           |                                          | Z | 0.0     | 0.0                          | 1.0  |         | 170.8    |                           |
| 10010-CAA | SAR Validation (Square, 100ms, 10ms)     | X | 0.71    | 53.3                         | 6.1  | 10.00   | 48.4     | $\pm 2.5 \%$              |
|           |                                          | Y | 2.43    | 67.0                         | 13.8 |         | 39.9     |                           |
|           |                                          | Z | 4.18    | 68.7                         | 13.8 |         | 45.7     |                           |
| 10011-CAA | UMTS-FDD (WCDMA)                         | X | 3.05    | 64.4                         | 16.5 | 2.91    | 122.4    | $\pm 0.5 \%$              |
|           |                                          | Y | 3.31    | 66.5                         | 18.2 |         | 123.5    |                           |
|           |                                          | Z | 3.34    | 66.3                         | 17.8 |         | 136.6    |                           |
| 10012-CAA | IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps) | X | 2.49    | 64.8                         | 16.1 | 1.87    | 120.6    | $\pm 0.5 \%$              |
|           |                                          | Y | 2.94    | 68.6                         | 18.7 |         | 123.6    |                           |
|           |                                          | Z | 2.63    | 65.9                         | 17.0 |         | 135.4    |                           |
| 10021-DAA | GSM-FDD (TDMA, GMSK)                     | X | 1.52    | 61.5                         | 10.9 | 9.39    | 83.6     | $\pm 1.2 \%$              |
|           |                                          | Y | 2.22    | 67.4                         | 15.0 |         | 116.0    |                           |
|           |                                          | Z | 2.47    | 66.8                         | 14.7 |         | 95.9     |                           |
| 10023-DAA | GPRS-FDD (TDMA, GMSK, TN 0)              | X | 1.73    | 63.3                         | 11.9 | 9.57    | 81.5     | $\pm 1.7 \%$              |
|           |                                          | Y | 2.11    | 66.2                         | 14.2 |         | 111.8    |                           |
|           |                                          | Z | 2.76    | 69.0                         | 16.0 |         | 93.6     |                           |
| 10024-DAA | GPRS-FDD (TDMA, GMSK, TN 0-1)            | X | 1.34    | 62.1                         | 9.4  | 6.56    | 121.0    | $\pm 1.2 \%$              |
|           |                                          | Y | 4.24    | 78.6                         | 17.9 |         | 130.0    |                           |
|           |                                          | Z | 2.91    | 70.7                         | 14.9 |         | 141.4    |                           |
| 10027-DAA | GPRS-FDD (TDMA, GMSK, TN 0-1-2)          | X | 1.25    | 63.5                         | 9.7  | 4.80    | 143.5    | $\pm 1.4 \%$              |
|           |                                          | Y | 1.59    | 66.9                         | 12.2 |         | 149.7    |                           |
|           |                                          | Z | 2.98    | 71.5                         | 14.0 |         | 123.3    |                           |
| 10028-DAA | GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)        | X | 0.51    | 58.3                         | 7.4  | 3.55    | 113.4    | $\pm 1.2 \%$              |
|           |                                          | Y | 25.43   | 100.0                        | 22.6 |         | 121.3    |                           |
|           |                                          | Z | 38.67   | 97.5                         | 20.6 |         | 133.3    |                           |
| 10032-CAA | IEEE 802.15.1 Bluetooth (GFSK, DH5)      | X | 0.28    | 58.6                         | 5.3  | 1.16    | 134.7    | $\pm 0.9 \%$              |
|           |                                          | Y | 65.75   | 99.6                         | 18.6 |         | 141.3    |                           |
|           |                                          | Z | 0.20    | 55.6                         | 4.1  |         | 112.1    |                           |
| 10039-CAA | CDMA2000 (1xRTT, RC1)                    | X | 4.33    | 64.6                         | 17.4 | 4.57    | 113.8    | $\pm 0.7 \%$              |
|           |                                          | Y | 4.55    | 66.0                         | 18.6 |         | 120.8    |                           |
|           |                                          | Z | 4.85    | 66.2                         | 18.4 |         | 135.9    |                           |
| 10062-CAA | IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps) | X | 9.83    | 67.6                         | 20.7 | 8.68    | 109.0    | $\pm 2.5 \%$              |
|           |                                          | Y | 10.06   | 68.4                         | 21.5 |         | 118.2    |                           |
|           |                                          | Z | 10.66   | 69.2                         | 21.7 |         | 134.0    |                           |

|           |                                               |   |       |      |      |      |       |        |
|-----------|-----------------------------------------------|---|-------|------|------|------|-------|--------|
| 10081-CAA | CDMA2000 (1xRTT, RC3)                         | X | 3.59  | 63.9 | 16.9 | 3.97 | 113.6 | ±0.7 % |
|           |                                               | Y | 3.84  | 65.6 | 18.2 |      | 119.6 |        |
|           |                                               | Z | 3.95  | 65.4 | 17.8 |      | 134.5 |        |
| 10098-CAA | UMTS-FDD (HSUPA, Subtest 2)                   | X | 4.41  | 65.2 | 17.3 | 3.98 | 126.0 | ±0.7 % |
|           |                                               | Y | 4.73  | 66.9 | 18.6 |      | 132.5 |        |
|           |                                               | Z | 4.51  | 65.5 | 17.7 |      | 105.6 |        |
| 10100-CAB | LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)      | X | 6.26  | 66.2 | 18.6 | 5.67 | 130.5 | ±1.2 % |
|           |                                               | Y | 6.61  | 67.7 | 19.8 |      | 139.3 |        |
|           |                                               | Z | 6.21  | 66.0 | 18.7 |      | 107.7 |        |
| 10108-CAB | LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)      | X | 6.13  | 65.8 | 18.6 | 5.80 | 126.3 | ±1.2 % |
|           |                                               | Y | 6.40  | 67.1 | 19.6 |      | 135.6 |        |
|           |                                               | Z | 6.10  | 65.5 | 18.5 |      | 107.4 |        |
| 10110-CAB | LTE-FDD (SC-FDMA, 100% RB, 5 MHz, QPSK)       | X | 5.78  | 65.3 | 18.3 | 5.75 | 123.1 | ±1.2 % |
|           |                                               | Y | 5.97  | 66.3 | 19.2 |      | 131.5 |        |
|           |                                               | Z | 5.86  | 65.3 | 18.4 |      | 104.9 |        |
| 10114-CAA | IEEE 802.11n (HT Greenfield, 13.5 Mbps, BPSK) | X | 9.92  | 67.7 | 20.3 | 8.10 | 115.7 | ±2.5 % |
|           |                                               | Y | 10.25 | 68.7 | 21.2 |      | 126.8 |        |
|           |                                               | Z | 10.71 | 69.4 | 21.3 |      | 146.0 |        |
| 10117-CAA | IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)      | X | 9.95  | 67.8 | 20.3 | 8.07 | 116.6 | ±2.5 % |
|           |                                               | Y | 10.26 | 68.7 | 21.1 |      | 128.3 |        |
|           |                                               | Z | 10.70 | 69.4 | 21.3 |      | 146.9 |        |
| 10151-CAB | LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)       | X | 7.19  | 67.3 | 21.5 | 9.28 | 145.0 | ±2.2 % |
|           |                                               | Y | 7.40  | 68.3 | 22.4 |      | 110.8 |        |
|           |                                               | Z | 7.79  | 68.4 | 22.0 |      | 128.0 |        |
| 10154-CAB | LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)       | X | 5.79  | 65.3 | 18.3 | 5.75 | 124.2 | ±1.2 % |
|           |                                               | Y | 6.03  | 66.5 | 19.4 |      | 131.9 |        |
|           |                                               | Z | 6.29  | 66.9 | 19.3 |      | 149.7 |        |
| 10160-CAB | LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)       | X | 6.23  | 65.9 | 18.6 | 5.82 | 128.3 | ±1.2 % |
|           |                                               | Y | 6.51  | 67.2 | 19.7 |      | 136.9 |        |
|           |                                               | Z | 6.24  | 65.7 | 18.6 |      | 107.3 |        |
| 10169-CAB | LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)         | X | 4.83  | 66.0 | 18.9 | 5.73 | 147.5 | ±1.2 % |
|           |                                               | Y | 4.72  | 65.8 | 19.2 |      | 113.8 |        |
|           |                                               | Z | 5.03  | 66.1 | 19.1 |      | 129.7 |        |
| 10172-CAB | LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)         | X | 5.83  | 69.2 | 22.8 | 9.21 | 149.9 | ±1.9 % |
|           |                                               | Y | 5.81  | 69.4 | 23.4 |      | 120.3 |        |
|           |                                               | Z | 6.38  | 70.0 | 23.2 |      | 137.2 |        |
| 10175-CAB | LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)         | X | 4.86  | 66.1 | 18.9 | 5.72 | 149.8 | ±1.2 % |
|           |                                               | Y | 4.72  | 65.8 | 19.2 |      | 113.3 |        |
|           |                                               | Z | 5.09  | 66.4 | 19.1 |      | 126.0 |        |
| 10181-CAB | LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)         | X | 4.83  | 66.0 | 18.9 | 5.72 | 146.3 | ±1.2 % |
|           |                                               | Y | 4.69  | 65.6 | 19.1 |      | 112.2 |        |
|           |                                               | Z | 5.02  | 66.1 | 19.0 |      | 125.1 |        |
| 10193-CAA | IEEE 802.11n (HT Greenfield, 6.5 Mbps, BPSK)  | X | 9.51  | 67.4 | 20.2 | 8.09 | 108.6 | ±2.5 % |
|           |                                               | Y | 9.72  | 68.1 | 20.9 |      | 118.2 |        |
|           |                                               | Z | 10.30 | 68.9 | 21.1 |      | 135.0 |        |

|           |                                                           |   |       |      |      |      |       |        |
|-----------|-----------------------------------------------------------|---|-------|------|------|------|-------|--------|
| 10196-CAA | IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)                   | X | 9.52  | 67.4 | 20.2 | 8.10 | 111.6 | ±2.5 % |
|           |                                                           | Y | 9.79  | 68.3 | 21.1 |      | 121.3 |        |
|           |                                                           | Z | 10.30 | 68.9 | 21.2 |      | 139.2 |        |
| 10219-CAA | IEEE 802.11n (HT Mixed, 7.2 Mbps, BPSK)                   | X | 9.47  | 67.4 | 20.2 | 8.03 | 111.8 | ±2.2 % |
|           |                                                           | Y | 9.67  | 68.3 | 21.0 |      | 120.0 |        |
|           |                                                           | Z | 10.20 | 68.9 | 21.1 |      | 138.0 |        |
| 10222-CAA | IEEE 802.11n (HT Mixed, 15 Mbps, BPSK)                    | X | 9.96  | 67.9 | 20.4 | 8.06 | 118.4 | ±2.5 % |
|           |                                                           | Y | 10.25 | 68.8 | 21.2 |      | 128.2 |        |
|           |                                                           | Z | 10.65 | 69.3 | 21.3 |      | 144.5 |        |
| 10225-CAA | UMTS-FDD (HSPA+)                                          | X | 6.96  | 66.7 | 18.9 | 5.97 | 140.0 | ±1.4 % |
|           |                                                           | Y | 7.23  | 67.9 | 20.0 |      | 148.9 |        |
|           |                                                           | Z | 7.03  | 66.4 | 18.9 |      | 115.6 |        |
| 10237-CAB | LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)                     | X | 5.51  | 67.5 | 21.8 | 9.21 | 114.2 | ±1.9 % |
|           |                                                           | Y | 5.82  | 69.4 | 23.4 |      | 123.0 |        |
|           |                                                           | Z | 6.49  | 70.6 | 23.6 |      | 140.2 |        |
| 10252-CAB | LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)                   | X | 6.83  | 67.1 | 21.4 | 9.24 | 136.6 | ±1.9 % |
|           |                                                           | Y | 7.30  | 69.4 | 23.2 |      | 147.3 |        |
|           |                                                           | Z | 7.36  | 68.1 | 22.0 |      | 117.5 |        |
| 10267-CAB | LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK)                  | X | 7.26  | 67.5 | 21.6 | 9.30 | 142.7 | ±1.9 % |
|           |                                                           | Y | 7.44  | 68.4 | 22.4 |      | 110.5 |        |
|           |                                                           | Z | 7.84  | 68.7 | 22.2 |      | 122.6 |        |
| 10274-CAA | UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.10)                 | X | 5.86  | 66.2 | 18.2 | 4.87 | 135.4 | ±0.9 % |
|           |                                                           | Y | 6.12  | 67.5 | 19.2 |      | 142.3 |        |
|           |                                                           | Z | 5.91  | 65.9 | 18.2 |      | 107.6 |        |
| 10275-CAA | UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.4)                  | X | 4.17  | 64.8 | 17.3 | 3.96 | 115.6 | ±0.7 % |
|           |                                                           | Y | 4.42  | 66.4 | 18.5 |      | 124.6 |        |
|           |                                                           | Z | 4.47  | 66.0 | 18.0 |      | 132.6 |        |
| 10291-AAA | CDMA2000, RC3, SO55, Full Rate                            | X | 3.36  | 64.7 | 17.1 | 3.46 | 109.4 | ±0.5 % |
|           |                                                           | Y | 3.55  | 66.2 | 18.3 |      | 118.2 |        |
|           |                                                           | Z | 3.60  | 65.6 | 17.7 |      | 120.9 |        |
| 10292-AAA | CDMA2000, RC3, SO32, Full Rate                            | X | 3.34  | 64.9 | 17.2 | 3.39 | 110.1 | ±0.5 % |
|           |                                                           | Y | 3.57  | 66.7 | 18.5 |      | 121.0 |        |
|           |                                                           | Z | 3.54  | 65.6 | 17.7 |      | 123.9 |        |
| 10297-AAA | LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)                   | X | 6.14  | 65.8 | 18.6 | 5.81 | 125.1 | ±1.2 % |
|           |                                                           | Y | 6.44  | 67.2 | 19.7 |      | 135.7 |        |
|           |                                                           | Z | 6.52  | 67.0 | 19.3 |      | 142.2 |        |
| 10311-AAA | LTE-FDD (SC-FDMA, 100% RB, 15 MHz, QPSK)                  | X | 6.76  | 66.6 | 19.1 | 6.06 | 131.8 | ±1.4 % |
|           |                                                           | Y | 7.03  | 67.8 | 20.0 |      | 142.5 |        |
|           |                                                           | Z | 7.15  | 67.7 | 19.7 |      | 148.6 |        |
| 10315-AAA | IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 96pc duty cycle) | X | 2.42  | 64.6 | 16.1 | 1.71 | 116.8 | ±0.5 % |
|           |                                                           | Y | 3.00  | 69.3 | 19.0 |      | 126.9 |        |
|           |                                                           | Z | 2.61  | 66.3 | 17.2 |      | 128.2 |        |
| 10317-AAA | IEEE 802.11a WiFi 5 GHz (OFDM, 6 Mbps, 96pc duty cycle)   | X | 9.71  | 67.6 | 20.5 | 8.36 | 111.7 | ±2.5 % |
|           |                                                           | Y | 9.99  | 68.6 | 21.4 |      | 122.2 |        |
|           |                                                           | Z | 10.38 | 68.9 | 21.3 |      | 129.5 |        |

|           |                                                     |   |       |      |      |      |       |        |
|-----------|-----------------------------------------------------|---|-------|------|------|------|-------|--------|
| 10400-AAA | IEEE 802.11ac WiFi (20MHz, 64-QAM, 99pc duty cycle) | X | 9.83  | 67.8 | 20.6 | 8.37 | 112.9 | ±2.5 % |
|           |                                                     | Y | 10.09 | 68.7 | 21.4 |      | 123.9 |        |
|           |                                                     | Z | 10.48 | 68.9 | 21.3 |      | 130.5 |        |
| 10402-AAA | IEEE 802.11ac WiFi (80MHz, 64-QAM, 99pc duty cycle) | X | 10.61 | 68.3 | 20.7 | 8.53 | 121.1 | ±2.5 % |
|           |                                                     | Y | 11.25 | 70.0 | 21.9 |      | 135.4 |        |
|           |                                                     | Z | 11.15 | 69.4 | 21.4 |      | 137.4 |        |
| 10403-AAA | CDMA2000 (1xEV-DO, Rev. 0)                          | X | 4.51  | 67.4 | 17.8 | 3.76 | 119.2 | ±0.5 % |
|           |                                                     | Y | 4.91  | 69.5 | 19.3 |      | 128.3 |        |
|           |                                                     | Z | 4.84  | 67.5 | 18.1 |      | 135.4 |        |
| 10404-AAA | CDMA2000 (1xEV-DO, Rev. A)                          | X | 4.51  | 67.7 | 18.0 | 3.77 | 117.4 | ±0.5 % |
|           |                                                     | Y | 4.92  | 69.8 | 19.5 |      | 125.4 |        |
|           |                                                     | Z | 4.71  | 67.3 | 18.0 |      | 131.9 |        |

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 8 and 9).

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

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

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3914

### 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 <sup>G</sup> | Depth <sup>G</sup> (mm) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|--------------------|-------------------------|-------------|
| 750                  | 41.9                               | 0.89                            | 9.70    | 9.70    | 9.70    | 0.34               | 1.01                    | ± 12.0 %    |
| 835                  | 41.5                               | 0.90                            | 9.34    | 9.34    | 9.34    | 0.67               | 0.67                    | ± 12.0 %    |
| 1750                 | 40.1                               | 1.37                            | 7.99    | 7.99    | 7.99    | 0.79               | 0.56                    | ± 12.0 %    |
| 1900                 | 40.0                               | 1.40                            | 7.69    | 7.69    | 7.69    | 0.80               | 0.58                    | ± 12.0 %    |
| 2450                 | 39.2                               | 1.80                            | 6.95    | 6.95    | 6.95    | 0.41               | 0.77                    | ± 12.0 %    |
| 2600                 | 39.0                               | 1.96                            | 6.79    | 6.79    | 6.79    | 0.40               | 0.82                    | ± 12.0 %    |
| 5200                 | 36.0                               | 4.66                            | 4.99    | 4.99    | 4.99    | 0.30               | 1.80                    | ± 13.1 %    |
| 5300                 | 35.9                               | 4.76                            | 4.82    | 4.82    | 4.82    | 0.30               | 1.80                    | ± 13.1 %    |
| 5500                 | 35.6                               | 4.96                            | 4.55    | 4.55    | 4.55    | 0.35               | 1.80                    | ± 13.1 %    |
| 5600                 | 35.5                               | 5.07                            | 4.37    | 4.37    | 4.37    | 0.35               | 1.80                    | ± 13.1 %    |
| 5800                 | 35.3                               | 5.27                            | 4.52    | 4.52    | 4.52    | 0.35               | 1.80                    | ± 13.1 %    |

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

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

<sup>G</sup> Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3914

### 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 <sup>G</sup> | Depth <sup>G</sup> (mm) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|--------------------|-------------------------|-------------|
| 750                  | 55.5                               | 0.96                            | 9.39    | 9.39    | 9.39    | 0.63               | 0.74                    | ± 12.0 %    |
| 835                  | 55.2                               | 0.97                            | 9.31    | 9.31    | 9.31    | 0.56               | 0.76                    | ± 12.0 %    |
| 1750                 | 53.4                               | 1.49                            | 7.89    | 7.89    | 7.89    | 0.32               | 1.03                    | ± 12.0 %    |
| 1900                 | 53.3                               | 1.52                            | 7.51    | 7.51    | 7.51    | 0.51               | 0.76                    | ± 12.0 %    |
| 2450                 | 52.7                               | 1.95                            | 7.02    | 7.02    | 7.02    | 0.80               | 0.50                    | ± 12.0 %    |
| 2600                 | 52.5                               | 2.16                            | 6.81    | 6.81    | 6.81    | 0.80               | 0.50                    | ± 12.0 %    |
| 5200                 | 49.0                               | 5.30                            | 4.52    | 4.52    | 4.52    | 0.35               | 1.90                    | ± 13.1 %    |
| 5300                 | 48.9                               | 5.42                            | 4.32    | 4.32    | 4.32    | 0.35               | 1.90                    | ± 13.1 %    |
| 5500                 | 48.6                               | 5.65                            | 4.07    | 4.07    | 4.07    | 0.35               | 1.90                    | ± 13.1 %    |
| 5600                 | 48.5                               | 5.77                            | 3.97    | 3.97    | 3.97    | 0.35               | 1.90                    | ± 13.1 %    |
| 5800                 | 48.2                               | 6.00                            | 4.14    | 4.14    | 4.14    | 0.40               | 1.90                    | ± 13.1 %    |

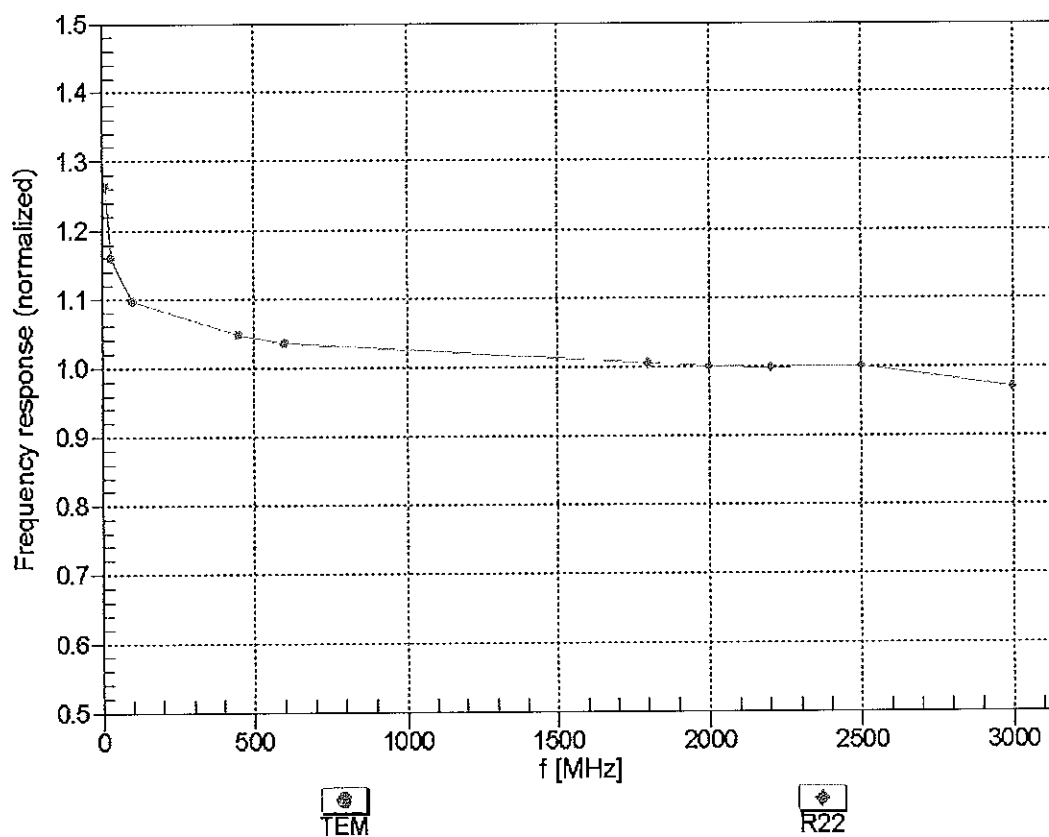
<sup>C</sup> Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

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

<sup>G</sup> Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

## Frequency Response of E-Field

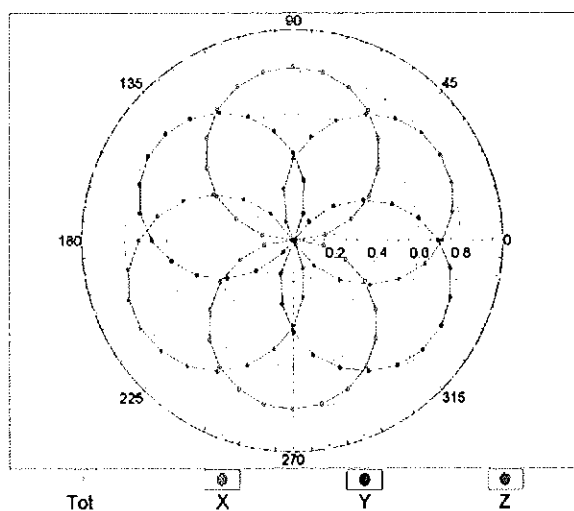
(TEM-Cell: ifi110 EXX, Waveguide: R22)



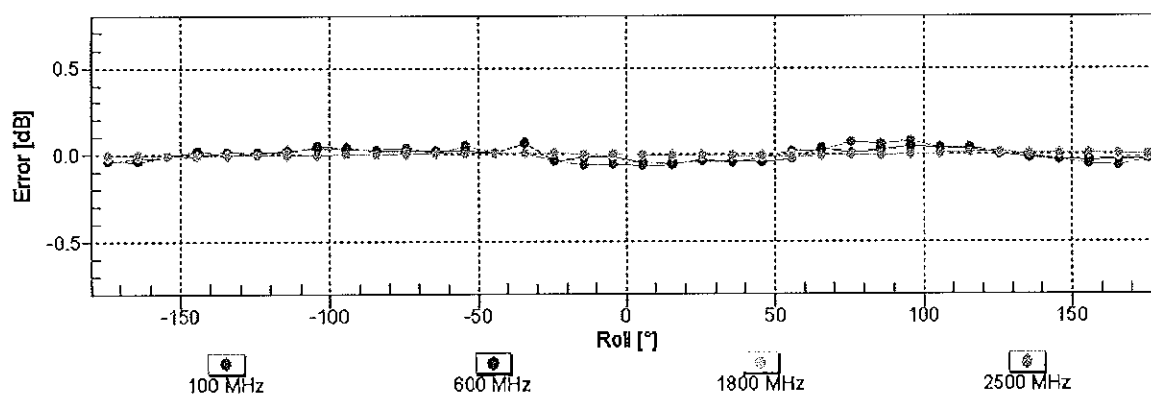
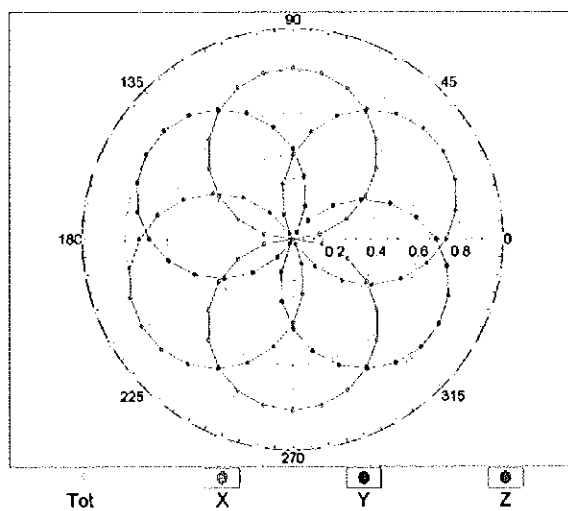
Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  ( $k=2$ )

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

$f=600$  MHz, TEM

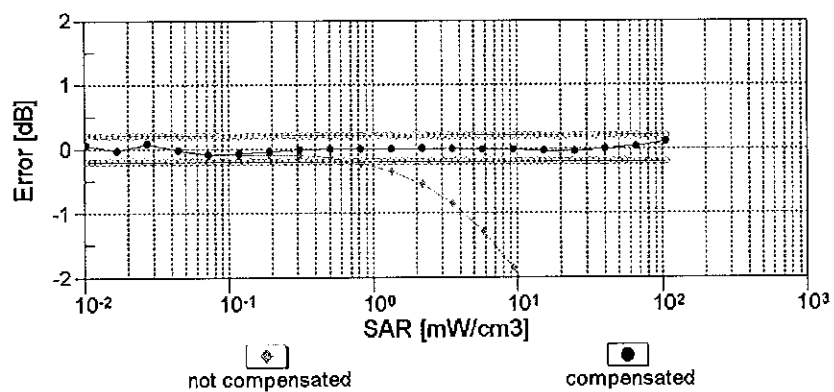
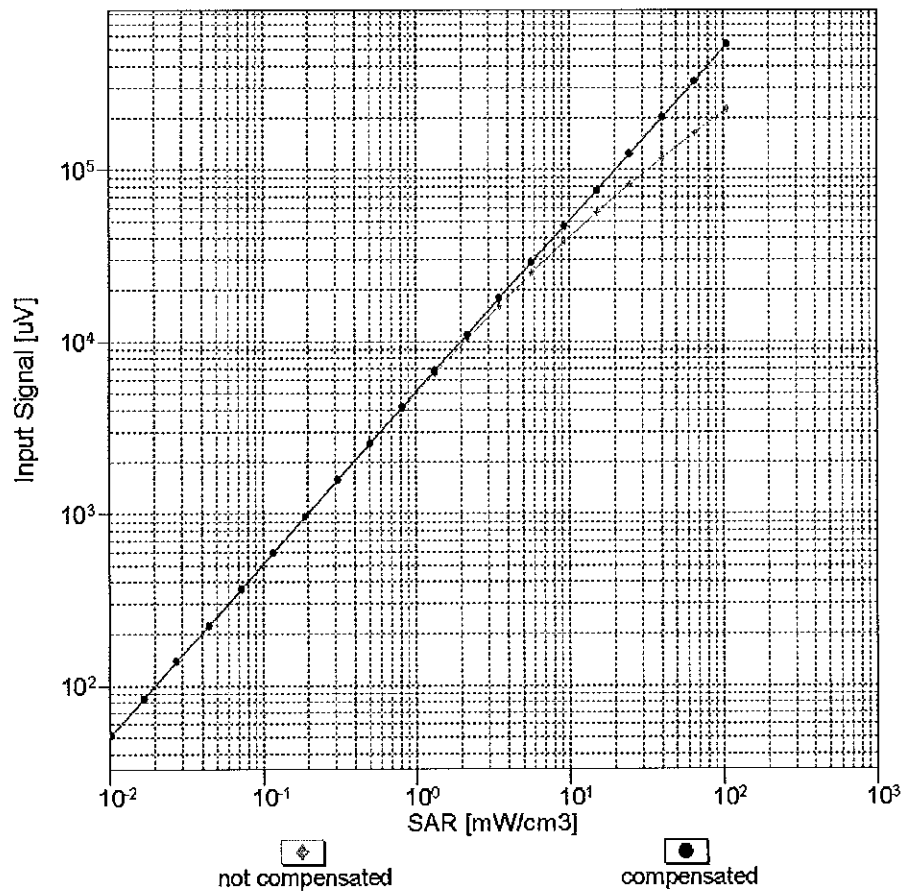


$f=1800$  MHz, R22



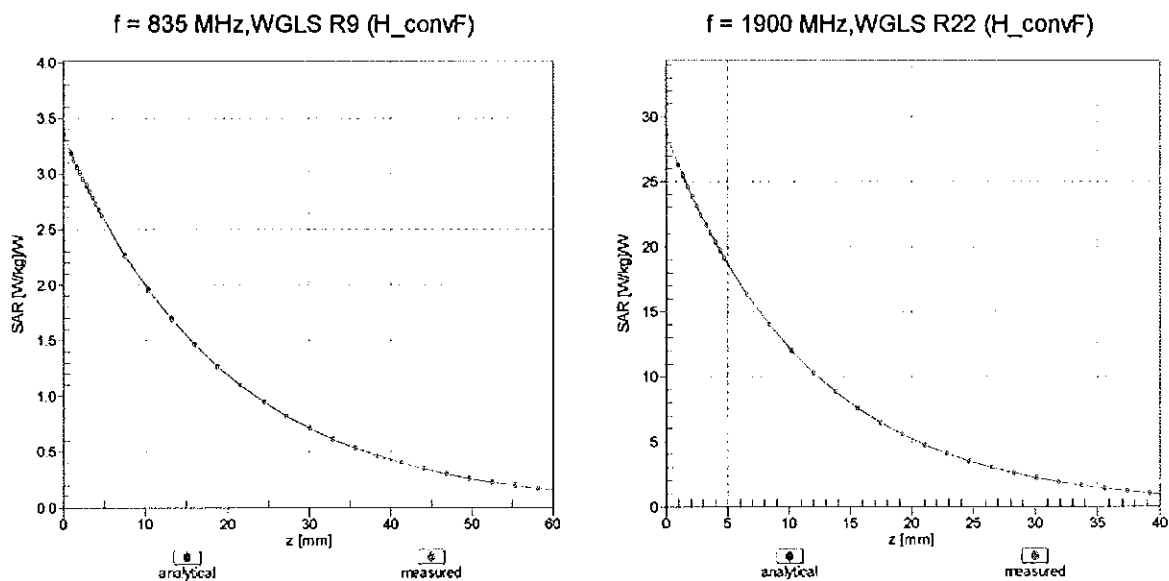
Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

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



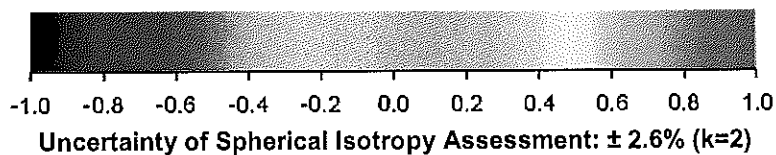
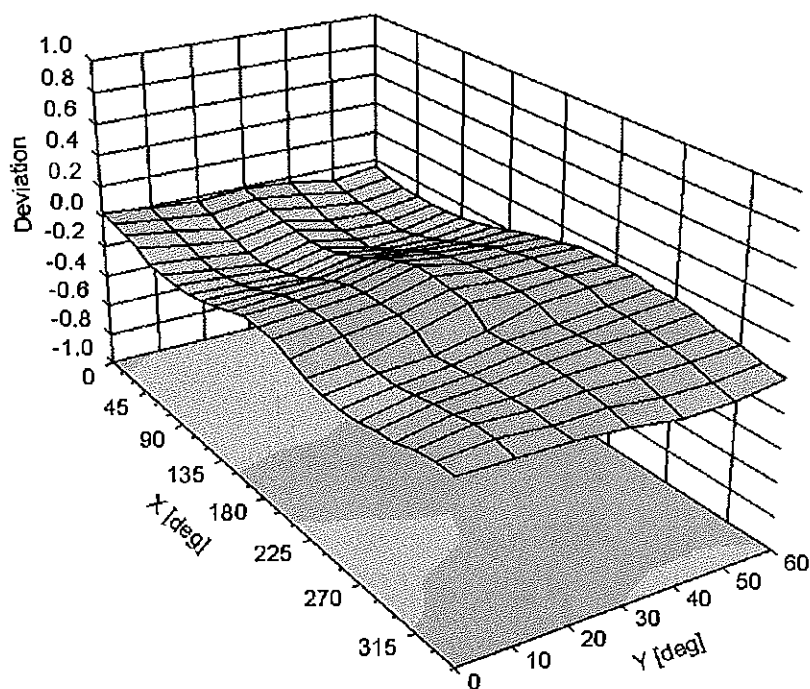
Uncertainty of Linearity Assessment:  $\pm 0.6\%$  ( $k=2$ )

## Conversion Factor Assessment



## Deviation from Isotropy in Liquid

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



## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3914

### Other Probe Parameters

|                                               |            |
|-----------------------------------------------|------------|
| Sensor Arrangement                            | Triangular |
| Connector Angle (°)                           | -24.3      |
| Mechanical Surface Detection Mode             | enabled    |
| Optical Surface Detection Mode                | disabled   |
| Probe Overall Length                          | 337 mm     |
| Probe Body Diameter                           | 10 mm      |
| Tip Length                                    | 9 mm       |
| Tip Diameter                                  | 2.5 mm     |
| Probe Tip to Sensor X Calibration Point       | 1 mm       |
| Probe Tip to Sensor Y Calibration Point       | 1 mm       |
| Probe Tip to Sensor Z Calibration Point       | 1 mm       |
| Recommended Measurement Distance from Surface | 2 mm       |



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: **D835V2-4d132\_Jan14**

## CALIBRATION CERTIFICATE

Object **D835V2 - SN: 4d132**

Calibration procedure(s) **QA CAL-05.v9**  
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: **January 22, 2014**

CC  
21/14 ✓

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         | 09-Oct-13 (No. 217-01827)         | Oct-14                 |
| Power sensor HP 8481A       | US37292783         | 09-Oct-13 (No. 217-01827)         | Oct-14                 |
| Power sensor HP 8481A       | MY41092317         | 09-Oct-13 (No. 217-01828)         | Oct-14                 |
| Reference 20 dB Attenuator  | SN: 5058 (20k)     | 04-Apr-13 (No. 217-01736)         | Apr-14                 |
| Type-N mismatch combination | SN: 5047.3 / 06327 | 04-Apr-13 (No. 217-01739)         | Apr-14                 |
| Reference Probe ES3DV3      | SN: 3205           | 30-Dec-13 (No. ES3-3205_Dec13)    | Dec-14                 |
| DAE4                        | SN: 601            | 25-Apr-13 (No. DAE4-601_Apr13)    | Apr-14                 |
| Secondary Standards         | ID #               | Check Date (in house)             | Scheduled Check        |
| RF generator R&S SMT-06     | 100005             | 04-Aug-99 (in house check Oct-13) | In house check: Oct-16 |
| Network Analyzer HP 8753E   | US37390585 S4206   | 18-Oct-01 (in house check Oct-13) | In house check: Oct-14 |

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

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

Issued: January 22, 2014

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Accreditation No.: **SCS 108**

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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 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- 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
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

**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                  | V52.8.7     |
| 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 | 40.6 $\pm$ 6 % | 0.93 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 | 2.37 W/kg                    |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | 9.20 W/kg $\pm$ 17.0 % (k=2) |

|                                                         |                    |                              |
|---------------------------------------------------------|--------------------|------------------------------|
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | condition          |                              |
| SAR measured                                            | 250 mW input power | 1.54 W/kg                    |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 6.02 W/kg $\pm$ 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 | 53.6 $\pm$ 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 | 2.41 W/kg                    |
| SAR for nominal Body TSL parameters                   | normalized to 1W   | 9.31 W/kg $\pm$ 17.0 % (k=2) |

|                                                         |                    |                              |
|---------------------------------------------------------|--------------------|------------------------------|
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL | condition          |                              |
| SAR measured                                            | 250 mW input power | 1.56 W/kg                    |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | 6.08 W/kg $\pm$ 16.5 % (k=2) |

## Appendix

### Antenna Parameters with Head TSL

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 51.9 $\Omega$ - 1.4 j $\Omega$ |
| Return Loss                          | - 32.9 dB                      |

### Antenna Parameters with Body TSL

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 47.0 $\Omega$ - 2.9 j $\Omega$ |
| Return Loss                          | - 27.4 dB                      |

### General Antenna Parameters and Design

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.389 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 | July 22, 2011 |

## DASY5 Validation Report for Head TSL

Date: 22.01.2014

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d132**

Communication System: UID 0 - CW; Frequency: 835 MHz

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.93 \text{ S/m}$ ;  $\epsilon_r = 40.6$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.22, 6.22, 6.22); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

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

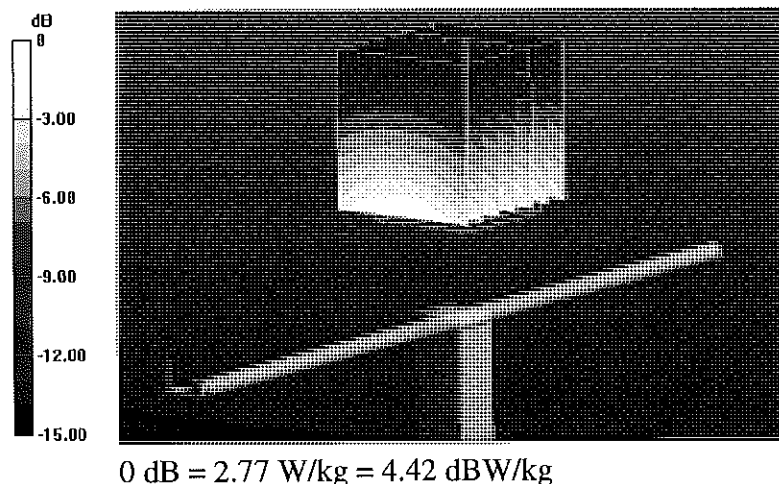
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 58.681 V/m; Power Drift = 0.02 dB

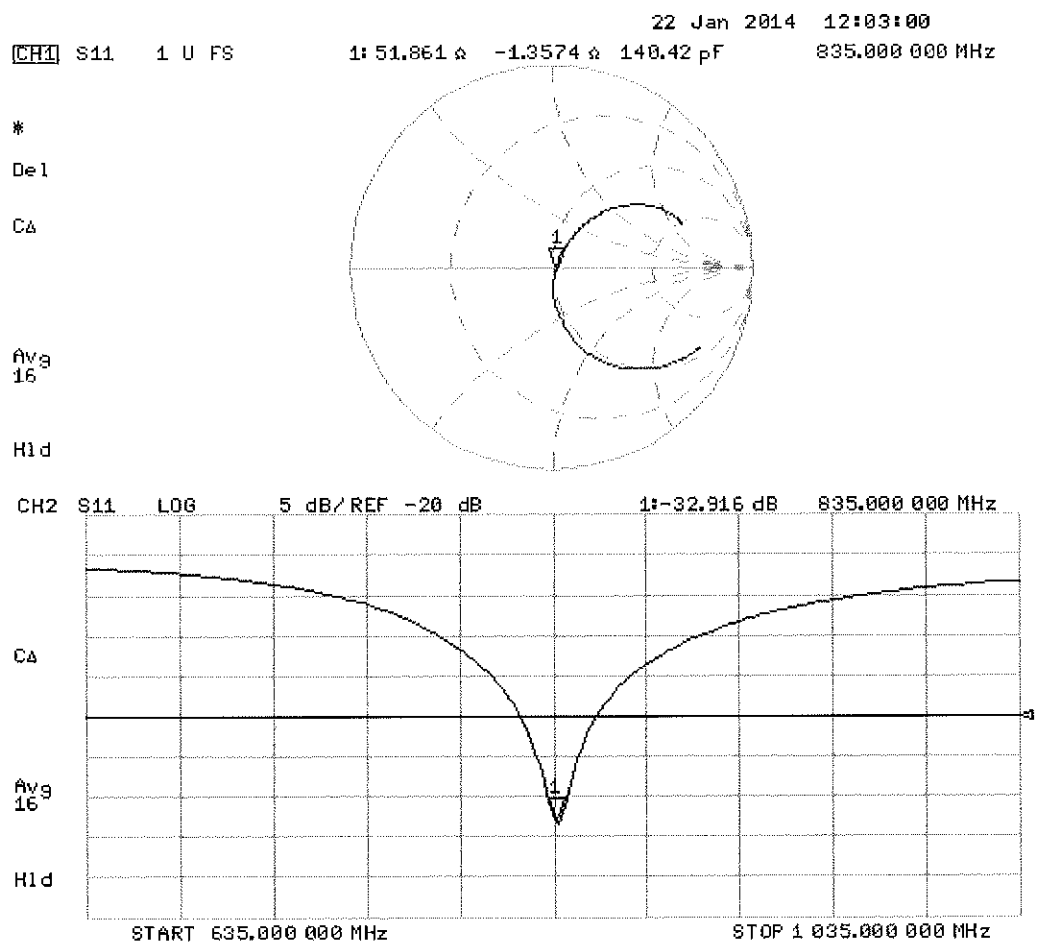
Peak SAR (extrapolated) = 3.56 W/kg

**SAR(1 g) = 2.37 W/kg; SAR(10 g) = 1.54 W/kg**

Maximum value of SAR (measured) = 2.77 W/kg



## Impedance Measurement Plot for Head TSL



## DASY5 Validation Report for Body TSL

Date: 20.01.2014

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d132**

Communication System: UID 0 - CW; Frequency: 835 MHz

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 1.007 \text{ S/m}$ ;  $\epsilon_r = 53.6$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.09, 6.09, 6.09); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

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

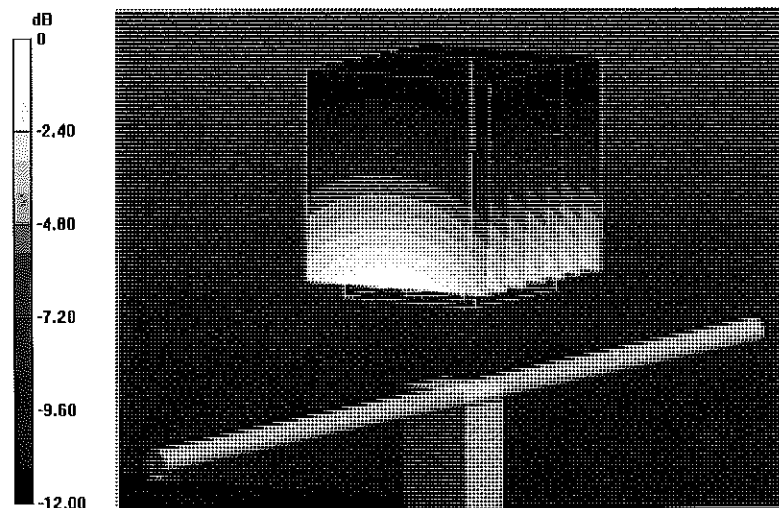
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 54.687 V/m; Power Drift = -0.00 dB

Peak SAR (extrapolated) = 3.57 W/kg

**SAR(1 g) = 2.41 W/kg; SAR(10 g) = 1.56 W/kg**

Maximum value of SAR (measured) = 2.79 W/kg



0 dB = 2.79 W/kg = 4.46 dBW/kg

## Impedance Measurement Plot for Body TSL

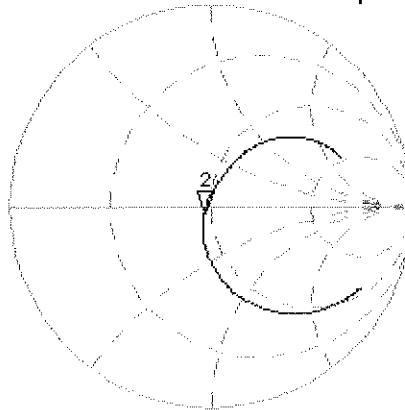
20 Jan 2014 10:35:09  
[CH1] S11 1 U FS 2: 46.990  $\Omega$  -2.8711  $\Omega$  66.388 pF 835.000 000 MHz

\*  
De1

CΔ

Avg  
16

H1d

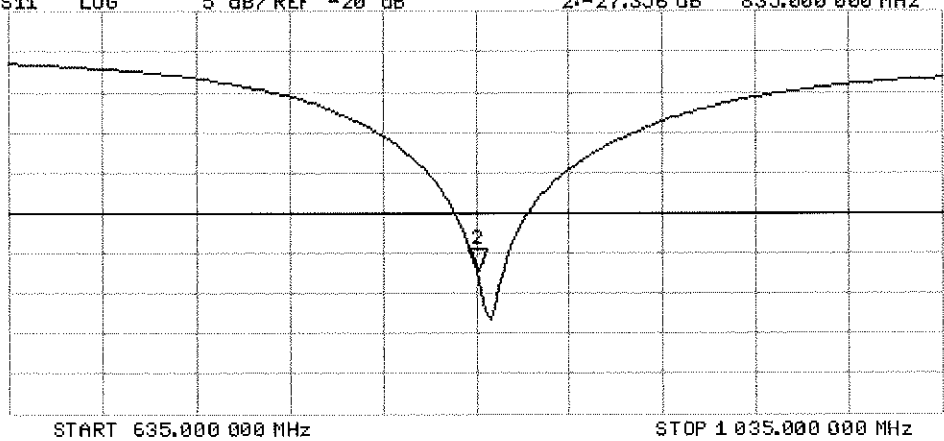


CH2 S11 LOG 5 dB/REF -20 dB 21-27.356 dB 835.000 000 MHz

CΔ

Avg  
16

H1d





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Client **PC Test**

Certificate No: **ES3-3333\_Nov13**

## CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3333**

Calibration procedure(s) **QA CAL-01 v5, QA CAL-23 v5, QA CAL-25 v5  
 Calibration procedure for dosimetric E-field probes**

Calibration date: **November 22, 2013**

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)

*KOK  
11/14*

| Primary Standards          | ID              | Cal Date (Certificate No.)        | Scheduled Calibration  |
|----------------------------|-----------------|-----------------------------------|------------------------|
| Power meter E4419B         | GB41293874      | 04-Apr-13 (No. 217-01733)         | Apr-14                 |
| Power sensor E4412A        | MY41498087      | 04-Apr-13 (No. 217-01733)         | Apr-14                 |
| Reference 3 dB Attenuator  | SN: S5054 (3c)  | 04-Apr-13 (No. 217-01737)         | Apr-14                 |
| Reference 20 dB Attenuator | SN: S5277 (20x) | 04-Apr-13 (No. 217-01735)         | Apr-14                 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 04-Apr-13 (No. 217-01738)         | Apr-14                 |
| Reference Probe ES3DV2     | SN: 3013        | 28-Dec-12 (No. ES3-3013_Dec12)    | Dec-13                 |
| DAE4                       | SN: 660         | 4-Sep-13 (No. DAE4-660_Sep13)     | Sep-14                 |
| Secondary Standards        | ID              | Check Date (in house)             | Scheduled Check        |
| RF generator HP 8648C      | US3642U01700    | 4-Aug-99 (in house check Apr-13)  | In house check: Apr-15 |
| Network Analyzer HP 8753E  | US37390585      | 18-Oct-01 (in house check Oct-13) | In house check: Oct-14 |

|                |                               |                                          |               |
|----------------|-------------------------------|------------------------------------------|---------------|
| 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> |

Issued: November 25, 2013

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### Glossary:

|                          |                                                                                                                                                         |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| TSL                      | tissue simulating liquid                                                                                                                                |
| NORM <sub>x,y,z</sub>    | sensitivity in free space                                                                                                                               |
| ConvF                    | sensitivity in TSL / NORM <sub>x,y,z</sub>                                                                                                              |
| DCP                      | diode compression point                                                                                                                                 |
| CF                       | crest factor (1/duty_cycle) of the RF signal                                                                                                            |
| A, B, C, D               | 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 |
| Connector Angle          | information used in DASY system to align probe sensor X to the robot coordinate system                                                                  |

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

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- 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>; D<sub>x,y,z</sub>; VR<sub>x,y,z</sub>**: A, B, C, D 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.
- Connector Angle**: The angle is assessed using the information gained by determining the NORM<sub>x</sub> (no uncertainty required).

# Probe ES3DV3

## SN:3333

Manufactured: January 24, 2012  
Calibrated: November 22, 2013

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

## DASY/EASY - Parameters of Probe: ES3DV3 - SN:3333

### Basic Calibration Parameters

|                                                           | Sensor X | Sensor Y | Sensor Z | Unc (k=2)     |
|-----------------------------------------------------------|----------|----------|----------|---------------|
| Norm ( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>A</sup> | 1.08     | 0.90     | 0.88     | $\pm 10.1 \%$ |
| DCP (mV) <sup>B</sup>                                     | 104.9    | 103.3    | 101.7    |               |

### Modulation Calibration Parameters

| UID | Communication System Name |   | A<br>dB | B<br>dB $\sqrt{\mu\text{V}}$ | C   | D<br>dB | VR<br>mV | Unc <sup>E</sup><br>(k=2) |
|-----|---------------------------|---|---------|------------------------------|-----|---------|----------|---------------------------|
| 0   | CW                        | X | 0.0     | 0.0                          | 1.0 | 0.00    | 140.9    | $\pm 2.2 \%$              |
|     |                           | Y | 0.0     | 0.0                          | 1.0 |         | 132.0    |                           |
|     |                           | Z | 0.0     | 0.0                          | 1.0 |         | 170.3    |                           |

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:3333

### 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 <sup>G</sup> | Depth <sup>G</sup> (mm) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|--------------------|-------------------------|-------------|
| 750                  | 41.9                               | 0.89                            | 6.56    | 6.56    | 6.56    | 0.44               | 1.54                    | ± 12.0 %    |
| 850                  | 41.5                               | 0.92                            | 6.30    | 6.30    | 6.30    | 0.46               | 1.48                    | ± 12.0 %    |
| 1750                 | 40.1                               | 1.37                            | 5.23    | 5.23    | 5.23    | 0.77               | 1.17                    | ± 12.0 %    |
| 1900                 | 40.0                               | 1.40                            | 5.05    | 5.05    | 5.05    | 0.80               | 1.19                    | ± 12.0 %    |
| 2450                 | 39.2                               | 1.80                            | 4.42    | 4.42    | 4.42    | 0.74               | 1.31                    | ± 12.0 %    |
| 2600                 | 39.0                               | 1.96                            | 4.28    | 4.28    | 4.28    | 0.80               | 1.30                    | ± 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.

<sup>G</sup> Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

## DASY/EASY - Parameters of Probe: ES3DV3 - SN:3333

### 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 <sup>G</sup> | Depth <sup>G</sup> (mm) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|--------------------|-------------------------|-------------|
| 750                  | 55.5                               | 0.96                            | 6.11    | 6.11    | 6.11    | 0.33               | 1.90                    | ± 12.0 %    |
| 850                  | 55.2                               | 0.99                            | 6.07    | 6.07    | 6.07    | 0.80               | 1.19                    | ± 12.0 %    |
| 1750                 | 53.4                               | 1.49                            | 4.95    | 4.95    | 4.95    | 0.80               | 1.26                    | ± 12.0 %    |
| 1900                 | 53.3                               | 1.52                            | 4.71    | 4.71    | 4.71    | 0.49               | 1.54                    | ± 12.0 %    |
| 2450                 | 52.7                               | 1.95                            | 4.22    | 4.22    | 4.22    | 0.80               | 0.95                    | ± 12.0 %    |
| 2600                 | 52.5                               | 2.16                            | 4.16    | 4.16    | 4.16    | 0.80               | 1.07                    | ± 12.0 %    |

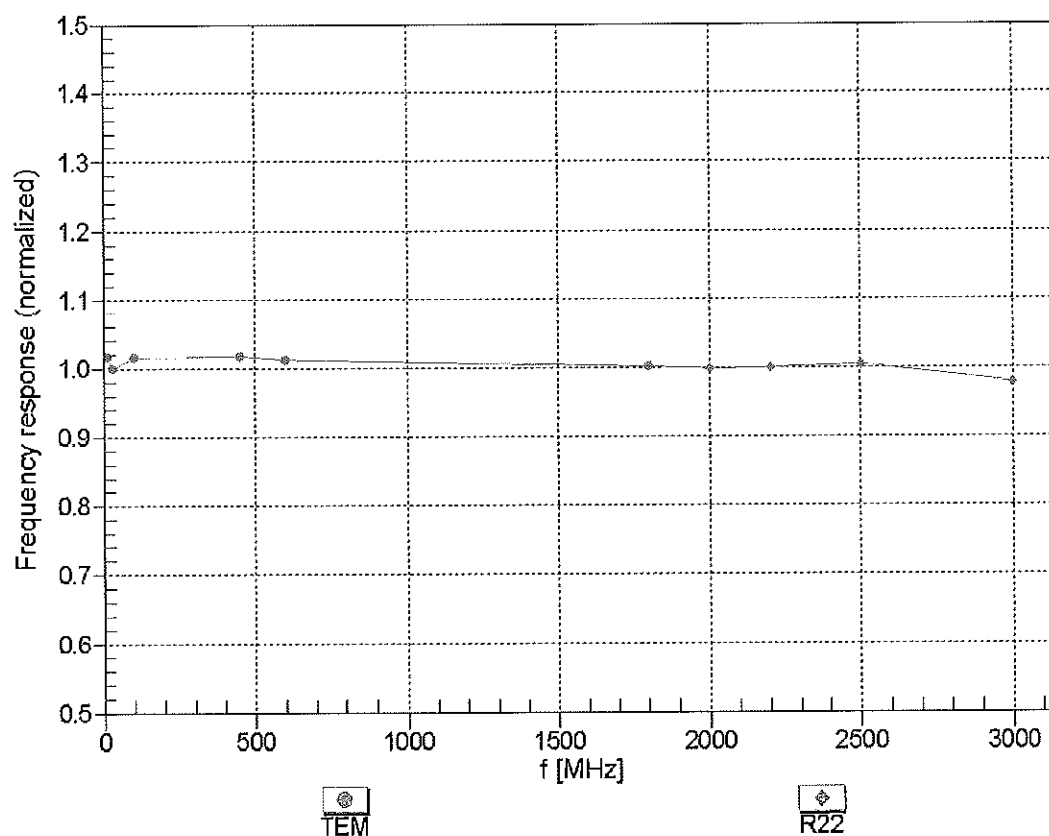
<sup>C</sup> Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

<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.

<sup>G</sup> Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

## Frequency Response of E-Field

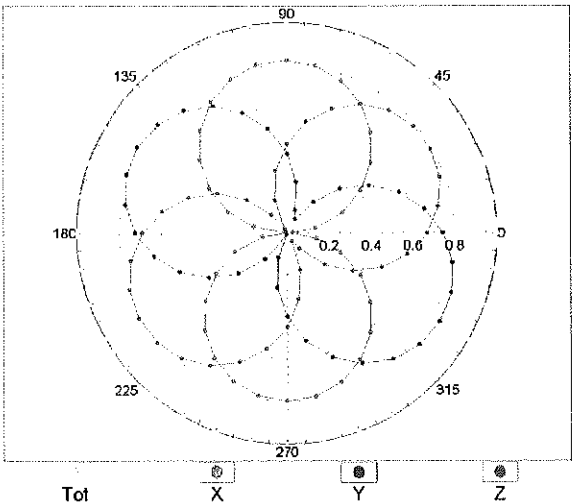
(TEM-Cell:ifi110 EXX, Waveguide: R22)



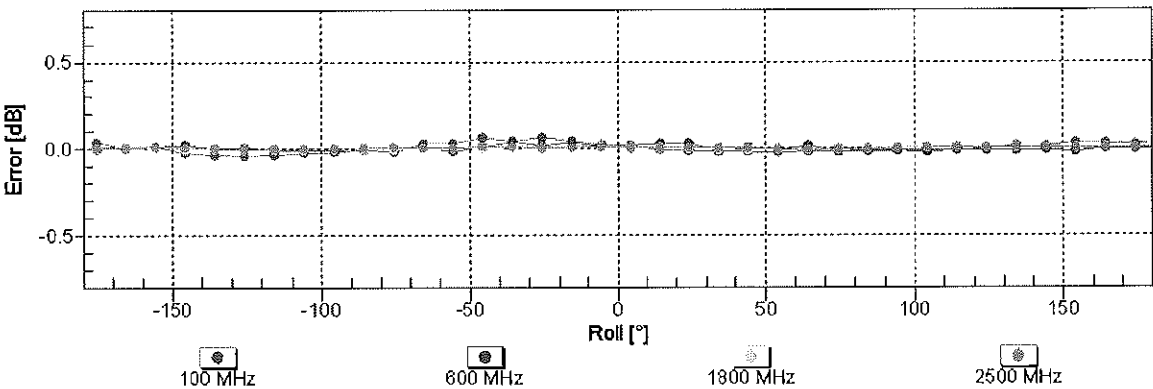
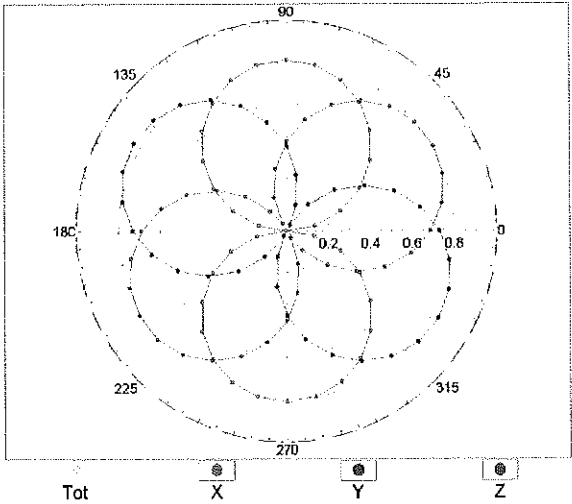
Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  (k=2)

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

f=600 MHz,TEM

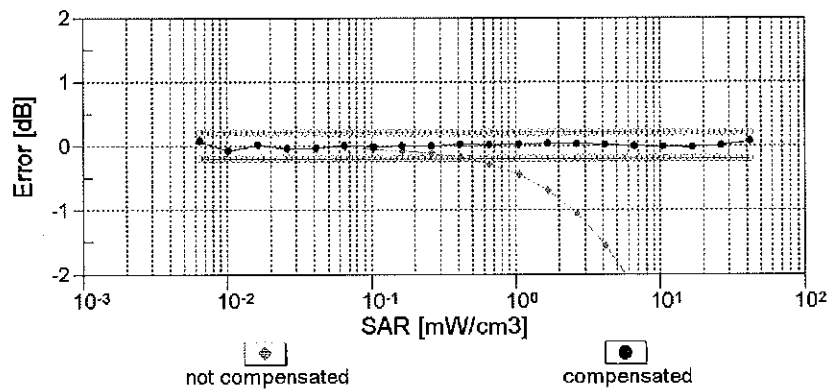
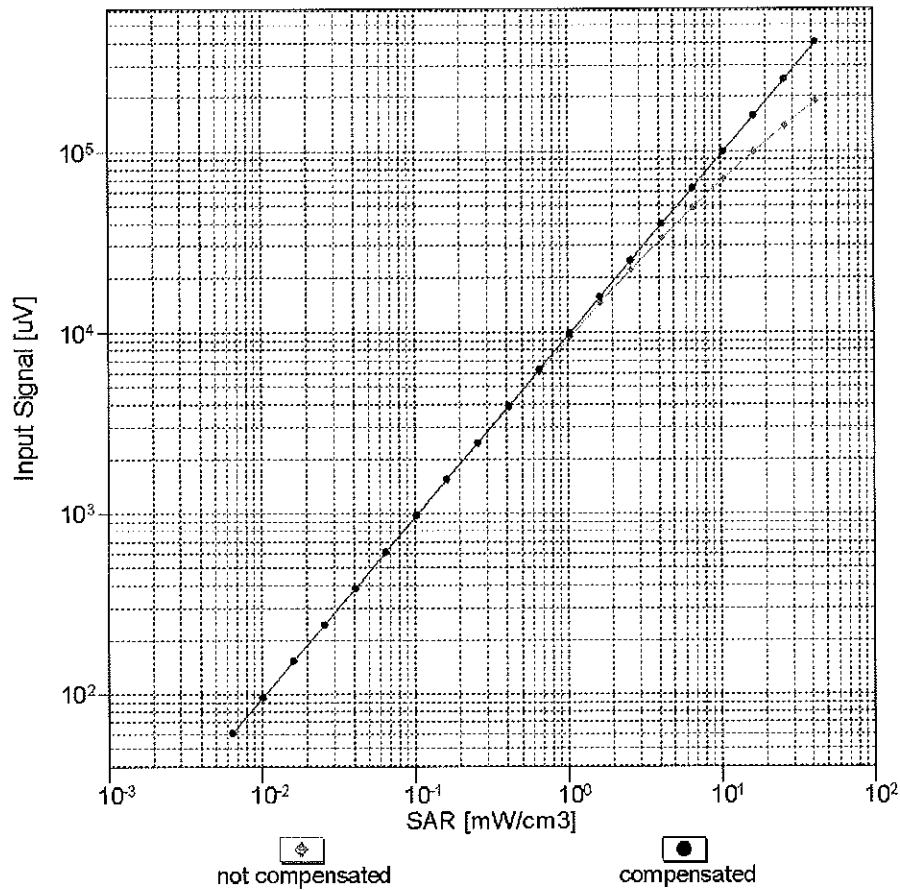


f=1800 MHz,R22



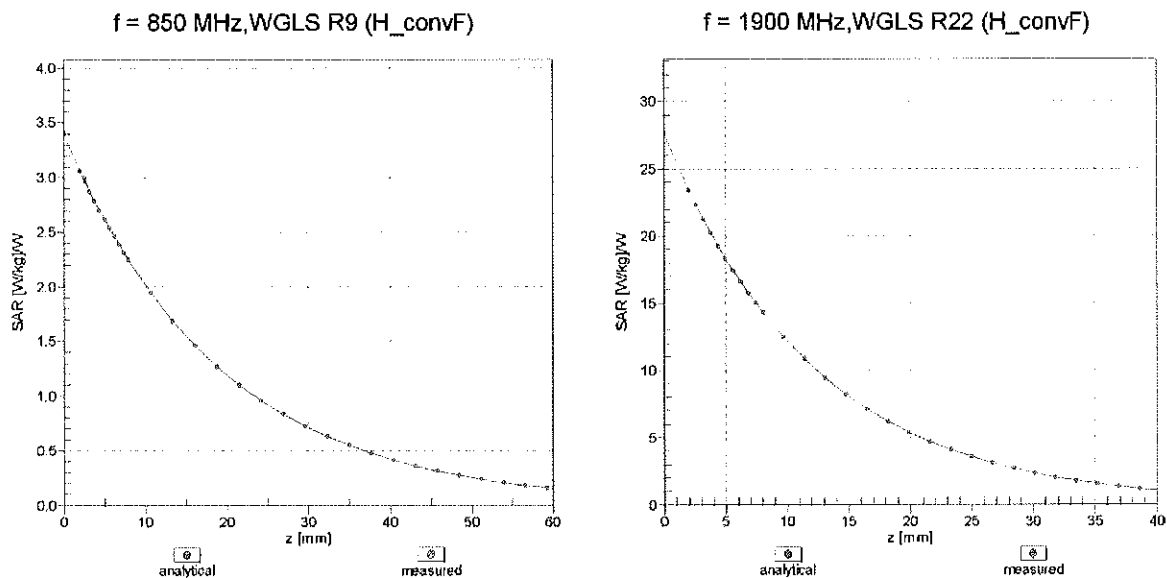
Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

Dynamic Range f(SAR<sub>head</sub>)  
(TEM cell , f = 900 MHz)



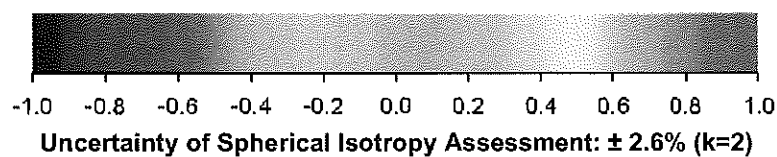
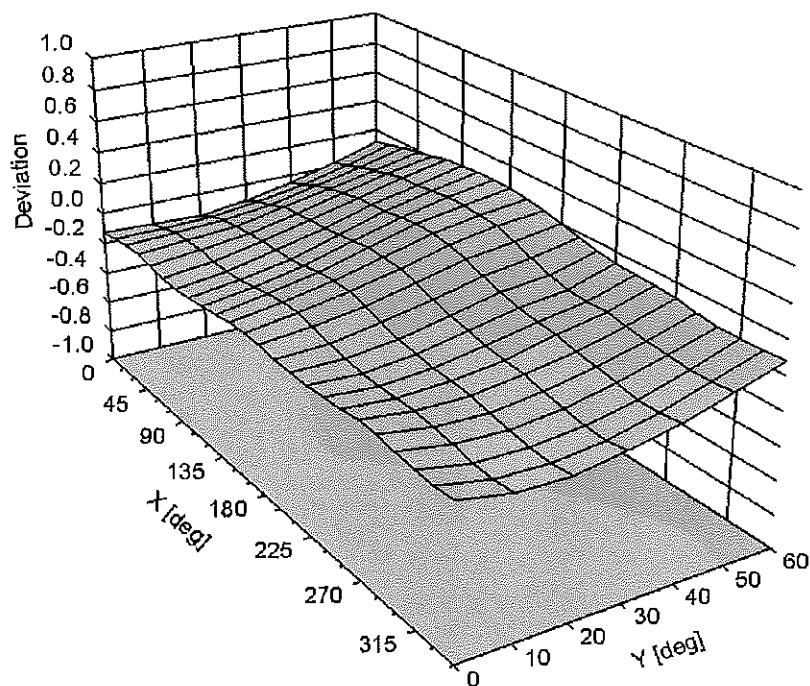
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

## Conversion Factor Assessment



## Deviation from Isotropy in Liquid

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



## DASY/EASY - Parameters of Probe: ES3DV3 - SN:3333

### Other Probe Parameters

|                                               |            |
|-----------------------------------------------|------------|
| Sensor Arrangement                            | Triangular |
| Connector Angle (°)                           | -35.7      |
| 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       |



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 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **PC Test**

Certificate No: **D1900V2-5d149\_Jul13**

## CALIBRATION CERTIFICATE

Object **D1900V2 - SN: 5d149**

Calibration procedure(s) **QA CAL-05.v9**  
**Calibration procedure for dipole validation kits above 700 MHz**

Calibration date: **July 22, 2013**

✓  
 KOK  
 8/19/13

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         | 01-Nov-12 (No. 217-01640)         | Oct-13                 |
| Power sensor HP 8481A       | US37292783         | 01-Nov-12 (No. 217-01640)         | Oct-13                 |
| Reference 20 dB Attenuator  | SN: 5058 (20k)     | 04-Apr-13 (No. 217-01736)         | Apr-14                 |
| Type-N mismatch combination | SN: 5047.3 / 06327 | 04-Apr-13 (No. 217-01739)         | Apr-14                 |
| Reference Probe ES3DV3      | SN: 3205           | 28-Dec-12 (No. ES3-3205_Dec12)    | Dec-13                 |
| DAE4                        | SN: 601            | 25-Apr-13 (No. DAE4-601_Apr13)    | Apr-14                 |
| 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-12) | In house check: Oct-13 |

|                |                |                       |                  |
|----------------|----------------|-----------------------|------------------|
|                | <b>Name</b>    | <b>Function</b>       | <b>Signature</b> |
| Calibrated by: | Jeton Kastrali | Laboratory Technician |                  |
| Approved by:   | Katja Pokovic  | Technical Manager     |                  |

Issued: July 22, 2013

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



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Accreditation No.: **SCS 108**

**Glossary:**

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

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

- 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.

|                                     |                        |             |
|-------------------------------------|------------------------|-------------|
| <b>DASY Version</b>                 | DASY5                  | V52.8.7     |
| <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 | 38.9 $\pm$ 6 % | 1.36 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 | 9.99 W/kg                                      |
| SAR for nominal Head TSL parameters                         | normalized to 1W   | <b>40.4 W/kg <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 | 5.28 W/kg                                      |
| SAR for nominal Head TSL parameters                           | normalized to 1W   | <b>21.3 W/kg <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 | 53.4 $\pm$ 6 % | 1.49 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 | 10.0 W/kg                                      |
| SAR for nominal Body TSL parameters                         | normalized to 1W   | <b>40.5 W/kg <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 | 5.36 W/kg                                      |
| SAR for nominal Body TSL parameters                           | normalized to 1W   | <b>21.6 W/kg <math>\pm</math> 16.5 % (k=2)</b> |

## Appendix

### Antenna Parameters with Head TSL

|                                      |                               |
|--------------------------------------|-------------------------------|
| Impedance, transformed to feed point | $52.9\ \Omega + 6.0\ j\Omega$ |
| Return Loss                          | - 23.8 dB                     |

### Antenna Parameters with Body TSL

|                                      |                               |
|--------------------------------------|-------------------------------|
| Impedance, transformed to feed point | $48.5\ \Omega + 6.4\ j\Omega$ |
| Return Loss                          | - 23.5 dB                     |

### General Antenna Parameters and Design

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.196 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: 22.07.2013

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW ; Frequency: 1900 MHz

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.36$  S/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(4.98, 4.98, 4.98); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

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

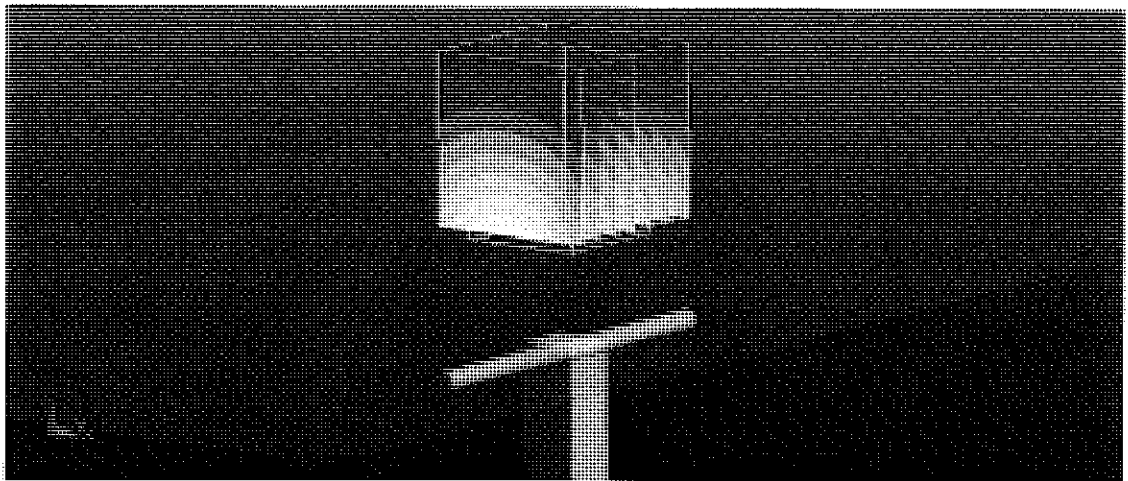
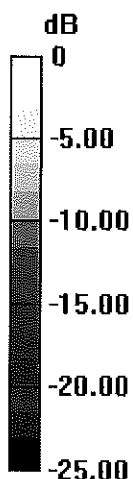
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.173 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 18.0 W/kg

**SAR(1 g) = 9.99 W/kg; SAR(10 g) = 5.28 W/kg**

Maximum value of SAR (measured) = 12.4 W/kg



0 dB = 12.4 W/kg = 10.93 dBW/kg

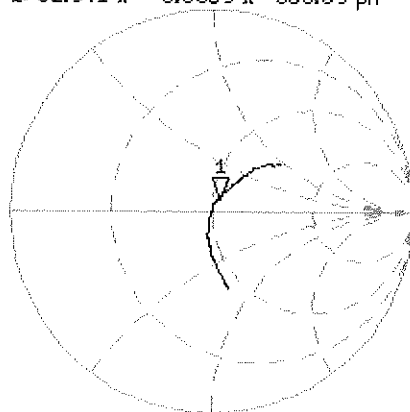
# Impedance Measurement Plot for Head TSL

22 Jul 2013 11:59:34  
 CH1 S11 1 U FS 1: 52.941  $\Omega$  6.0059  $\Omega$  503.09  $\mu\text{H}$  1 900.000 000 MHz

\*  
 Del  
 CA

Avg  
 16

H1d

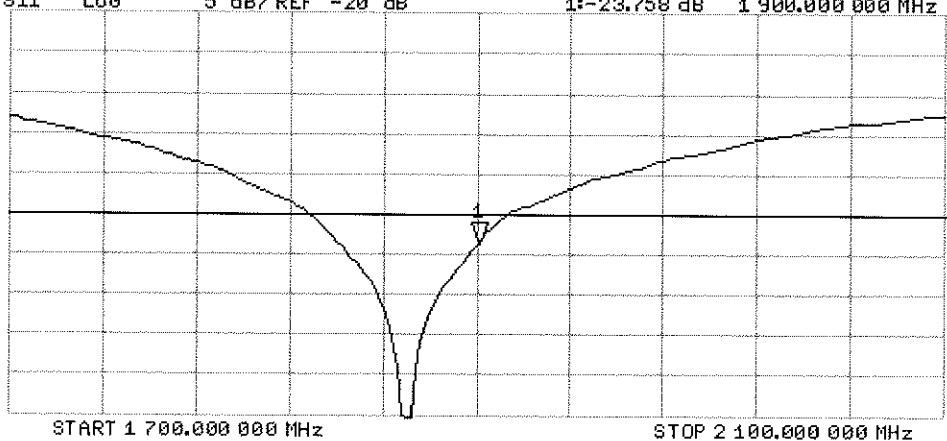


CH2 S11 LOG 5 dB/REF -20 dB 1:-23.758 dB 1 900.000 000 MHz

CA

Avg  
 16

H1d



## DASY5 Validation Report for Body TSL

Date: 22.07.2013

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW ; Frequency: 1900 MHz

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.49$  S/m;  $\epsilon_r = 53.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.6, 4.6, 4.6); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

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

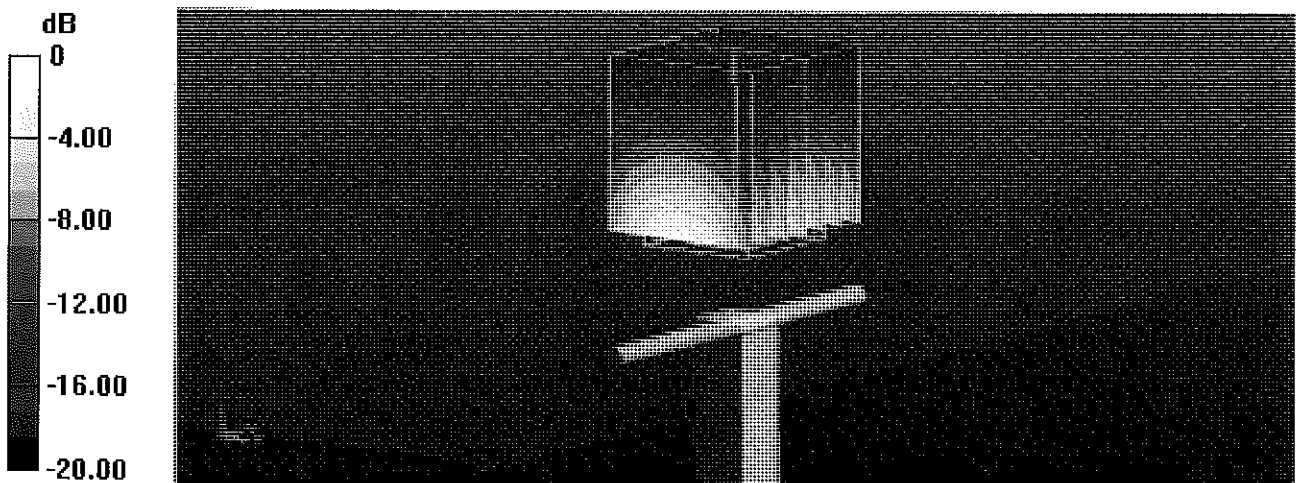
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.173 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 17.0 W/kg

**SAR(1 g) = 10 W/kg; SAR(10 g) = 5.36 W/kg**

Maximum value of SAR (measured) = 12.6 W/kg

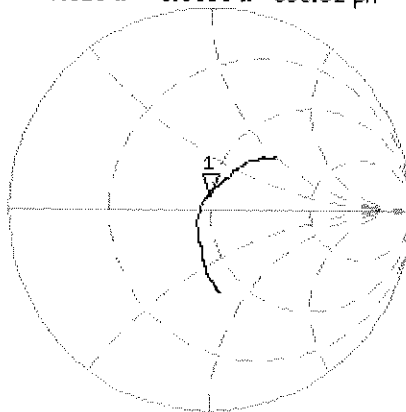


0 dB = 12.6 W/kg = 11.00 dBW/kg

## Impedance Measurement Plot for Body TSL

22 Jul 2013 11:32:14  
[CH1] S11 1 U FS 1: 48.525  $\Delta$  6.3906  $\Delta$  535.32  $\mu$ H 1 900.000 000 MHz

\*  
De1  
CA



Avg  
16

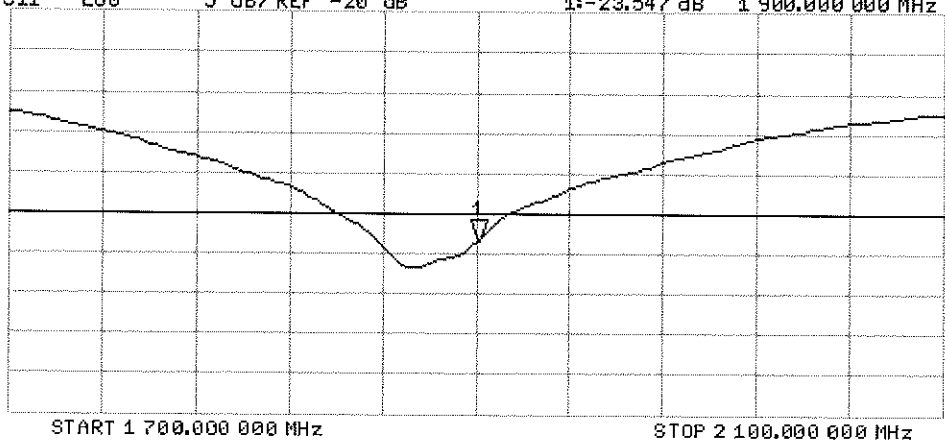
H1d

CH2 S11 LOG 5 dB/REF -20 dB 1: -23.547 dB 1 900.000 000 MHz

CA

Avg  
16

H1d





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Accreditation No.: **SCS 108**

Client **PC Test**

Certificate No: **ES3-3287\_Nov13**

## CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3287**

Calibration procedure(s) **QA CAL-01.v9, QA CAL-23.v5, QA CAL-25.v6**  
**Calibration procedure for dosimetric E-field probes**

Calibration date: **November 20, 2013**

CC  
11/20/2013

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      | 04-Apr-13 (No. 217-01733)         | Apr-14                 |
| Power sensor E4412A        | MY41498087      | 04-Apr-13 (No. 217-01733)         | Apr-14                 |
| Reference 3 dB Attenuator  | SN: S5054 (3c)  | 04-Apr-13 (No. 217-01737)         | Apr-14                 |
| Reference 20 dB Attenuator | SN: S5277 (20x) | 04-Apr-13 (No. 217-01735)         | Apr-14                 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 04-Apr-13 (No. 217-01738)         | Apr-14                 |
| Reference Probe ES3DV2     | SN: 3013        | 28-Dec-12 (No. ES3-3013_Dec12)    | Dec-13                 |
| DAE4                       | SN: 660         | 4-Sep-13 (No. DAE4-660_Sep13)     | Sep-14                 |
| Secondary Standards        | ID              | Check Date (in house)             | Scheduled Check        |
| RF generator HP 8648C      | US3642U01700    | 4-Aug-99 (in house check Apr-13)  | In house check: Apr-15 |
| Network Analyzer HP 8753E  | US37390585      | 18-Oct-01 (in house check Oct-13) | In house check: Oct-14 |

|                                                                                                                 | Name          | Function              | Signature |
|-----------------------------------------------------------------------------------------------------------------|---------------|-----------------------|-----------|
| Calibrated by:                                                                                                  | Leif Klysner  | Laboratory Technician |           |
| Approved by:                                                                                                    | Kalja Pokovic | Technical Manager     |           |
| Issued: November 20, 2013                                                                                       |               |                       |           |
| This calibration certificate shall not be reproduced except in full without written approval of the laboratory. |               |                       |           |



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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, D               | 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 |
| Connector Angle          | information used in DASY system to align probe sensor X to the robot coordinate system                                                                  |

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

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- 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>; D<sub>x,y,z</sub>; VR<sub>x,y,z</sub>**: A, B, C, D 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.
- Connector Angle**: The angle is assessed using the information gained by determining the NORM<sub>x</sub> (no uncertainty required).

# Probe ES3DV3

## SN:3287

Manufactured: June 7, 2010  
Calibrated: November 20, 2013

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 ( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>A</sup> | 1.31     | 1.25     | 1.25     | $\pm 10.1 \%$ |
| DCP (mV) <sup>B</sup>                                     | 102.6    | 102.5    | 100.4    |               |

## Modulation Calibration Parameters

| UID       | Communication System Name                |   | A<br>dB | B<br>dB $\sqrt{\mu\text{V}}$ | C    | D<br>dB | VR<br>mV | Unc <sup>E</sup><br>(k=2) |
|-----------|------------------------------------------|---|---------|------------------------------|------|---------|----------|---------------------------|
| 0         | CW                                       | X | 0.0     | 0.0                          | 1.0  | 0.00    | 157.3    | $\pm 2.7 \%$              |
|           |                                          | Y | 0.0     | 0.0                          | 1.0  |         | 159.9    |                           |
|           |                                          | Z | 0.0     | 0.0                          | 1.0  |         | 152.5    |                           |
| 10010-CAA | SAR Validation (Square, 100ms, 10ms)     | X | 2.23    | 57.9                         | 9.9  | 10.00   | 45.7     | $\pm 1.4 \%$              |
|           |                                          | Y | 2.13    | 57.6                         | 9.8  |         | 46.6     |                           |
|           |                                          | Z | 3.31    | 61.1                         | 11.8 |         | 47.6     |                           |
| 10011-CAA | UMTS-FDD (WCDMA)                         | X | 3.25    | 66.3                         | 17.9 | 2.91    | 124.8    | $\pm 0.5 \%$              |
|           |                                          | Y | 3.16    | 65.7                         | 17.4 |         | 127.4    |                           |
|           |                                          | Z | 3.15    | 65.5                         | 17.4 |         | 122.8    |                           |
| 10012-CAA | IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps) | X | 3.08    | 68.7                         | 18.3 | 1.87    | 127.2    | $\pm 0.7 \%$              |
|           |                                          | Y | 3.03    | 68.2                         | 17.9 |         | 129.4    |                           |
|           |                                          | Z | 2.87    | 67.0                         | 17.3 |         | 126.5    |                           |
| 10021-DAA | GSM-FDD (TDMA, GMSK)                     | X | 15.99   | 90.6                         | 25.0 | 9.39    | 99.9     | $\pm 1.2 \%$              |
|           |                                          | Y | 12.41   | 86.6                         | 23.6 |         | 101.5    |                           |
|           |                                          | Z | 29.18   | 99.9                         | 28.5 |         | 109.2    |                           |
| 10023-DAA | GPRS-FDD (TDMA, GMSK, TN 0)              | X | 25.67   | 98.9                         | 27.8 | 9.57    | 97.9     | $\pm 1.7 \%$              |
|           |                                          | Y | 14.20   | 88.5                         | 24.3 |         | 100.6    |                           |
|           |                                          | Z | 27.68   | 99.8                         | 28.8 |         | 107.7    |                           |
| 10024-DAA | GPRS-FDD (TDMA, GMSK, TN 0-1)            | X | 42.95   | 99.6                         | 24.9 | 6.56    | 124.4    | $\pm 1.4 \%$              |
|           |                                          | Y | 45.27   | 99.9                         | 24.8 |         | 128.8    |                           |
|           |                                          | Z | 42.64   | 99.6                         | 25.5 |         | 135.7    |                           |
| 10027-DAA | GPRS-FDD (TDMA, GMSK, TN 0-1-2)          | X | 27.78   | 91.3                         | 21.1 | 4.80    | 136.0    | $\pm 1.4 \%$              |
|           |                                          | Y | 32.74   | 93.9                         | 21.9 |         | 146.6    |                           |
|           |                                          | Z | 23.93   | 89.5                         | 21.1 |         | 144.8    |                           |
| 10028-DAA | GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)        | X | 59.17   | 99.6                         | 22.4 | 3.55    | 142.5    | $\pm 1.2 \%$              |
|           |                                          | Y | 78.76   | 99.7                         | 21.7 |         | 104.9    |                           |
|           |                                          | Z | 38.06   | 94.2                         | 21.4 |         | 148.8    |                           |
| 10032-CAA | IEEE 802.15.1 Bluetooth (GFSK, DH5)      | X | 93.35   | 99.7                         | 19.5 | 1.16    | 108.1    | $\pm 0.9 \%$              |
|           |                                          | Y | 96.67   | 94.0                         | 16.9 |         | 114.7    |                           |
|           |                                          | Z | 98.17   | 96.2                         | 18.2 |         | 108.9    |                           |
| 10039-CAA | CDMA2000 (1xRTT, RC1)                    | X | 4.84    | 66.7                         | 18.8 | 4.57    | 126.5    | $\pm 0.9 \%$              |
|           |                                          | Y | 4.83    | 66.6                         | 18.6 |         | 134.4    |                           |
|           |                                          | Z | 4.76    | 66.0                         | 18.3 |         | 125.9    |                           |
| 10081-CAA | CDMA2000 (1xRTT, RC3)                    | X | 4.00    | 66.2                         | 18.5 | 3.97    | 121.9    | $\pm 0.7 \%$              |
|           |                                          | Y | 3.91    | 65.5                         | 17.9 |         | 128.9    |                           |
|           |                                          | Z | 3.88    | 65.2                         | 17.8 |         | 120.7    |                           |

|           |                                          |   |       |      |      |      |       |        |
|-----------|------------------------------------------|---|-------|------|------|------|-------|--------|
| 10098-CAA | UMTS-FDD (HSUPA, Subtest 2)              | X | 4.66  | 66.6 | 18.4 | 3.98 | 132.5 | ±0.7 % |
|           |                                          | Y | 4.66  | 66.5 | 18.2 |      | 141.3 |        |
|           |                                          | Z | 4.54  | 65.9 | 17.9 |      | 130.7 |        |
| 10100-CAB | LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK) | X | 6.65  | 68.3 | 20.1 | 5.67 | 139.5 | ±1.4 % |
|           |                                          | Y | 6.69  | 68.3 | 19.9 |      | 148.9 |        |
|           |                                          | Z | 6.60  | 67.9 | 19.8 |      | 137.5 |        |
| 10108-CAB | LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK) | X | 6.52  | 67.8 | 20.0 | 5.80 | 137.3 | ±1.4 % |
|           |                                          | Y | 6.53  | 67.6 | 19.7 |      | 147.5 |        |
|           |                                          | Z | 6.51  | 67.6 | 19.8 |      | 135.3 |        |
| 10110-CAB | LTE-FDD (SC-FDMA, 100% RB, 5 MHz, QPSK)  | X | 6.19  | 67.2 | 19.7 | 5.75 | 134.3 | ±1.2 % |
|           |                                          | Y | 6.24  | 67.3 | 19.6 |      | 142.9 |        |
|           |                                          | Z | 6.23  | 67.1 | 19.6 |      | 132.3 |        |
| 10151-CAB | LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)  | X | 11.56 | 79.1 | 27.9 | 9.28 | 130.1 | ±3.0 % |
|           |                                          | Y | 11.01 | 76.8 | 26.2 |      | 141.9 |        |
|           |                                          | Z | 12.98 | 81.2 | 28.7 |      | 135.7 |        |
| 10154-CAB | LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)  | X | 6.25  | 67.4 | 19.8 | 5.75 | 135.1 | ±1.2 % |
|           |                                          | Y | 6.17  | 66.9 | 19.3 |      | 143.6 |        |
|           |                                          | Z | 6.16  | 66.8 | 19.4 |      | 132.8 |        |
| 10160-CAB | LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)  | X | 6.66  | 67.8 | 20.0 | 5.82 | 140.3 | ±1.4 % |
|           |                                          | Y | 6.72  | 67.9 | 19.9 |      | 148.8 |        |
|           |                                          | Z | 6.66  | 67.6 | 19.8 |      | 137.4 |        |
| 10169-CAB | LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)    | X | 5.05  | 66.7 | 19.5 | 5.73 | 117.8 | ±0.9 % |
|           |                                          | Y | 4.93  | 66.0 | 18.9 |      | 125.0 |        |
|           |                                          | Z | 5.08  | 66.3 | 19.3 |      | 116.3 |        |
| 10172-CAB | LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)    | X | 8.47  | 76.8 | 26.9 | 9.21 | 100.3 | ±2.2 % |
|           |                                          | Y | 8.06  | 74.6 | 25.3 |      | 107.5 |        |
|           |                                          | Z | 9.43  | 78.2 | 27.4 |      | 102.5 |        |
| 10175-CAB | LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)    | X | 4.98  | 66.3 | 19.3 | 5.72 | 118.2 | ±0.9 % |
|           |                                          | Y | 4.96  | 66.1 | 19.0 |      | 119.9 |        |
|           |                                          | Z | 5.03  | 66.1 | 19.1 |      | 116.1 |        |
| 10181-CAB | LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)    | X | 5.06  | 66.7 | 19.6 | 5.72 | 118.7 | ±0.9 % |
|           |                                          | Y | 4.97  | 66.2 | 19.1 |      | 120.0 |        |
|           |                                          | Z | 5.03  | 66.1 | 19.1 |      | 116.3 |        |
| 10225-CAA | UMTS-FDD (HSPA+)                         | X | 6.78  | 66.1 | 18.9 | 5.97 | 105.3 | ±1.2 % |
|           |                                          | Y | 6.68  | 65.7 | 18.6 |      | 106.8 |        |
|           |                                          | Z | 7.32  | 67.6 | 19.7 |      | 148.0 |        |
| 10237-CAB | LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)    | X | 8.56  | 77.1 | 27.1 | 9.21 | 100.8 | ±1.9 % |
|           |                                          | Y | 8.33  | 75.8 | 26.1 |      | 103.8 |        |
|           |                                          | Z | 9.39  | 78.0 | 27.3 |      | 101.9 |        |
| 10252-CAB | LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)  | X | 10.58 | 77.8 | 27.4 | 9.24 | 123.3 | ±2.5 % |
|           |                                          | Y | 10.48 | 76.9 | 26.5 |      | 128.1 |        |
|           |                                          | Z | 11.79 | 79.6 | 28.0 |      | 127.0 |        |
| 10267-CAB | LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK) | X | 11.52 | 79.1 | 27.9 | 9.30 | 130.1 | ±2.7 % |
|           |                                          | Y | 11.24 | 77.7 | 26.9 |      | 136.0 |        |
|           |                                          | Z | 12.96 | 81.2 | 28.8 |      | 134.8 |        |

|           |                                                           |   |      |      |      |      |       |        |
|-----------|-----------------------------------------------------------|---|------|------|------|------|-------|--------|
| 10274-CAA | UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.10)                 | X | 6.14 | 67.4 | 19.0 | 4.87 | 145.5 | ±1.2 % |
|           |                                                           | Y | 6.19 | 67.4 | 19.0 |      | 149.2 |        |
|           |                                                           | Z | 6.10 | 66.9 | 18.8 |      | 142.3 |        |
| 10275-CAA | UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.4)                  | X | 4.41 | 66.4 | 18.3 | 3.96 | 126.4 | ±0.7 % |
|           |                                                           | Y | 4.43 | 66.3 | 18.2 |      | 130.4 |        |
|           |                                                           | Z | 4.36 | 65.9 | 18.0 |      | 123.8 |        |
| 10291-AAA | CDMA2000, RC3, SO55, Full Rate                            | X | 3.57 | 65.9 | 17.9 | 3.46 | 120.0 | ±0.5 % |
|           |                                                           | Y | 3.55 | 65.6 | 17.6 |      | 121.7 |        |
|           |                                                           | Z | 3.50 | 65.1 | 17.5 |      | 117.2 |        |
| 10292-AAA | CDMA2000, RC3, SO32, Full Rate                            | X | 3.55 | 66.1 | 18.0 | 3.39 | 121.3 | ±0.5 % |
|           |                                                           | Y | 3.54 | 66.0 | 17.8 |      | 123.6 |        |
|           |                                                           | Z | 3.45 | 65.2 | 17.4 |      | 118.9 |        |
| 10297-AAA | LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)                   | X | 6.53 | 67.8 | 20.0 | 5.81 | 136.2 | ±1.2 % |
|           |                                                           | Y | 6.48 | 67.5 | 19.6 |      | 139.3 |        |
|           |                                                           | Z | 6.52 | 67.6 | 19.8 |      | 134.1 |        |
| 10311-AAA | LTE-FDD (SC-FDMA, 100% RB, 15 MHz, QPSK)                  | X | 7.12 | 68.4 | 20.4 | 6.06 | 141.7 | ±1.4 % |
|           |                                                           | Y | 7.11 | 68.3 | 20.1 |      | 145.3 |        |
|           |                                                           | Z | 7.14 | 68.4 | 20.3 |      | 139.8 |        |
| 10315-AAA | IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 96pc duty cycle) | X | 2.79 | 67.6 | 18.0 | 1.71 | 125.5 | ±0.5 % |
|           |                                                           | Y | 2.71 | 66.9 | 17.3 |      | 128.2 |        |
|           |                                                           | Z | 2.64 | 66.2 | 17.0 |      | 123.5 |        |
| 10403-AAA | CDMA2000 (1xEV-DO, Rev. 0)                                | X | 4.78 | 67.5 | 18.3 | 3.76 | 130.6 | ±0.5 % |
|           |                                                           | Y | 4.77 | 67.5 | 18.2 |      | 133.8 |        |
|           |                                                           | Z | 4.65 | 66.5 | 17.8 |      | 130.0 |        |
| 10404-AAA | CDMA2000 (1xEV-DO, Rev. A)                                | X | 4.83 | 68.2 | 18.6 | 3.77 | 129.2 | ±0.7 % |
|           |                                                           | Y | 4.68 | 67.4 | 18.0 |      | 131.9 |        |
|           |                                                           | Z | 4.52 | 66.3 | 17.7 |      | 128.7 |        |

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 7 and 8).

<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 <sup>G</sup> | Depth <sup>G</sup> (mm) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|--------------------|-------------------------|-------------|
| 750                  | 41.9                               | 0.89                            | 6.52    | 6.52    | 6.52    | 0.47               | 1.46                    | ± 12.0 %    |
| 835                  | 41.5                               | 0.90                            | 6.30    | 6.30    | 6.30    | 0.40               | 1.59                    | ± 12.0 %    |
| 1750                 | 40.1                               | 1.37                            | 5.27    | 5.27    | 5.27    | 0.63               | 1.34                    | ± 12.0 %    |
| 1900                 | 40.0                               | 1.40                            | 5.08    | 5.08    | 5.08    | 0.62               | 1.37                    | ± 12.0 %    |
| 2450                 | 39.2                               | 1.80                            | 4.43    | 4.43    | 4.43    | 0.79               | 1.28                    | ± 12.0 %    |
| 2600                 | 39.0                               | 1.96                            | 4.29    | 4.29    | 4.29    | 0.77               | 1.38                    | ± 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.

<sup>G</sup> Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

## 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 <sup>G</sup> | Depth <sup>G</sup> (mm) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|--------------------|-------------------------|-------------|
| 750                  | 55.5                               | 0.96                            | 6.09    | 6.09    | 6.09    | 0.55               | 1.37                    | ± 12.0 %    |
| 835                  | 55.2                               | 0.97                            | 6.04    | 6.04    | 6.04    | 0.55               | 1.39                    | ± 12.0 %    |
| 1750                 | 53.4                               | 1.49                            | 4.93    | 4.93    | 4.93    | 0.39               | 1.73                    | ± 12.0 %    |
| 1900                 | 53.3                               | 1.52                            | 4.67    | 4.67    | 4.67    | 0.38               | 1.75                    | ± 12.0 %    |
| 2450                 | 52.7                               | 1.95                            | 4.17    | 4.17    | 4.17    | 0.60               | 1.20                    | ± 12.0 %    |
| 2600                 | 52.5                               | 2.16                            | 4.00    | 4.00    | 4.00    | 0.60               | 1.10                    | ± 12.0 %    |

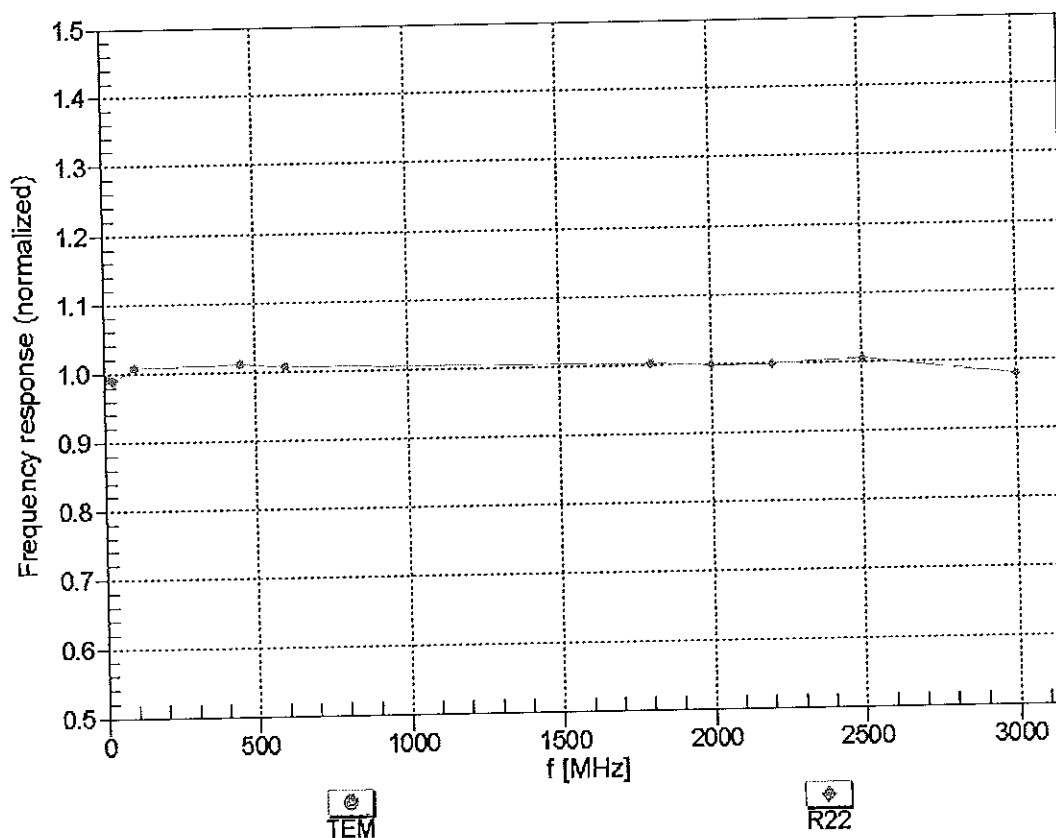
<sup>C</sup> Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

<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.

<sup>G</sup> Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

## Frequency Response of E-Field

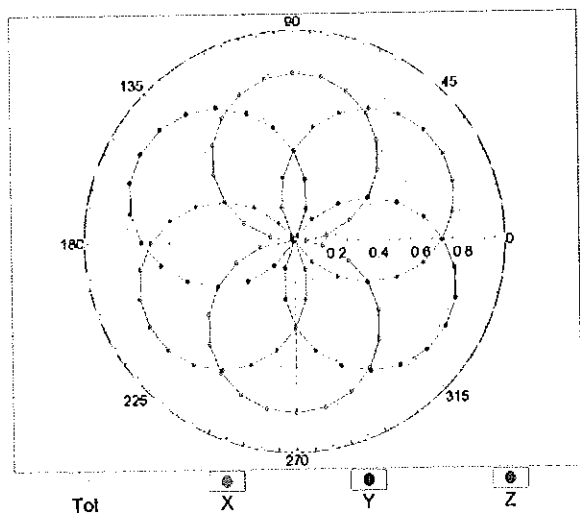
(TEM-Cell:ifi110 EXX, Waveguide: R22)



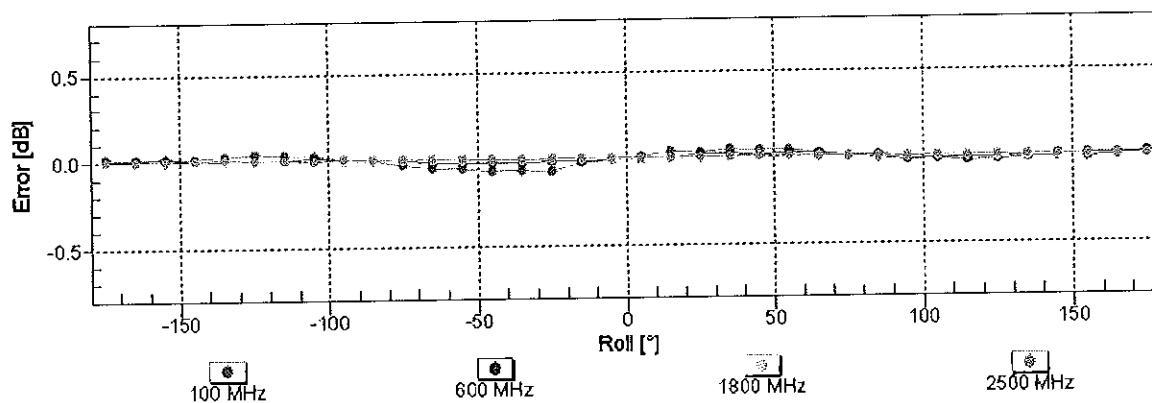
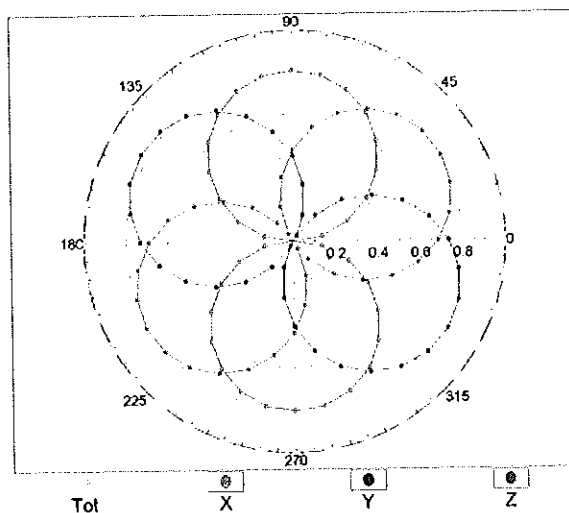
Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  ( $k=2$ )

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

f=600 MHz,TEM



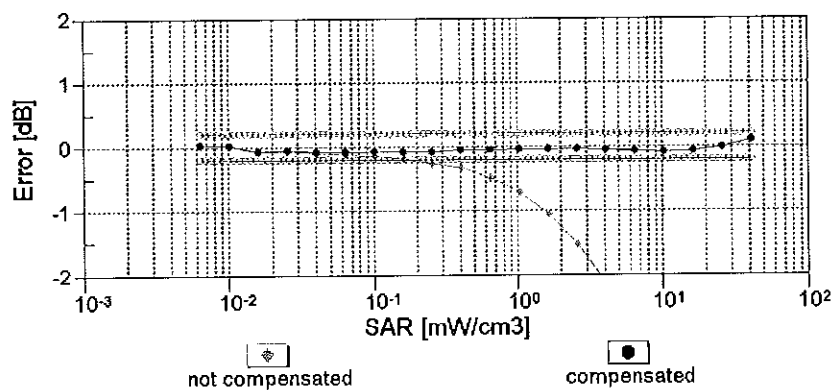
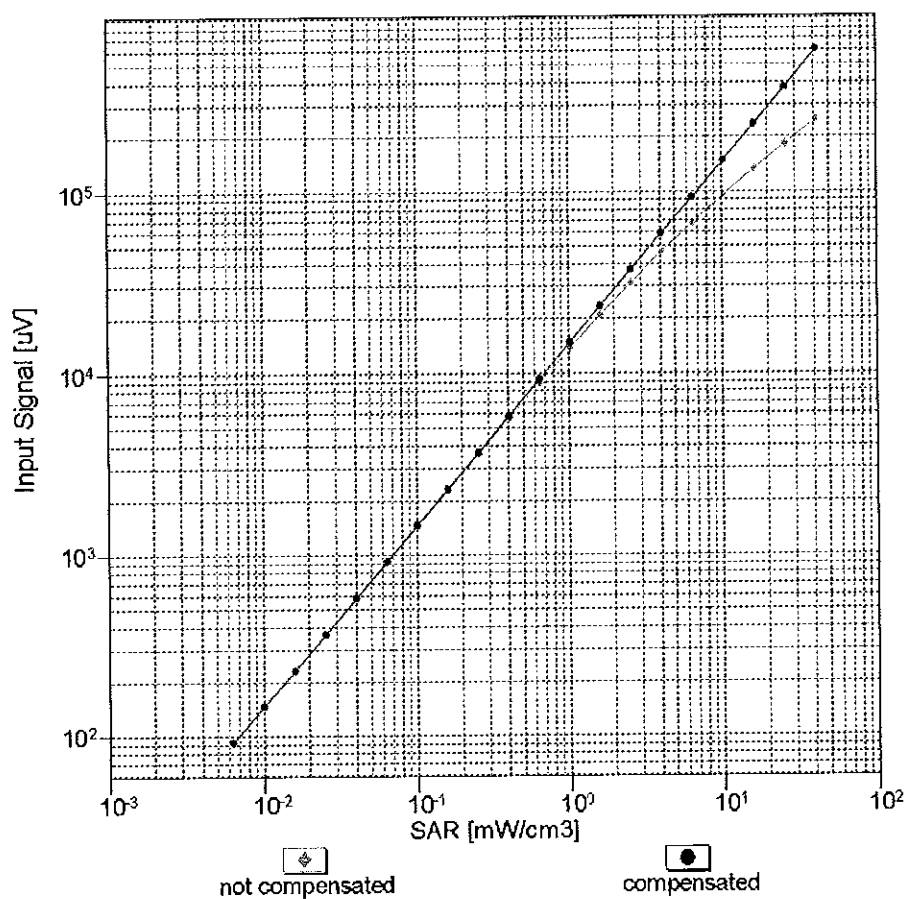
f=1800 MHz,R22



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

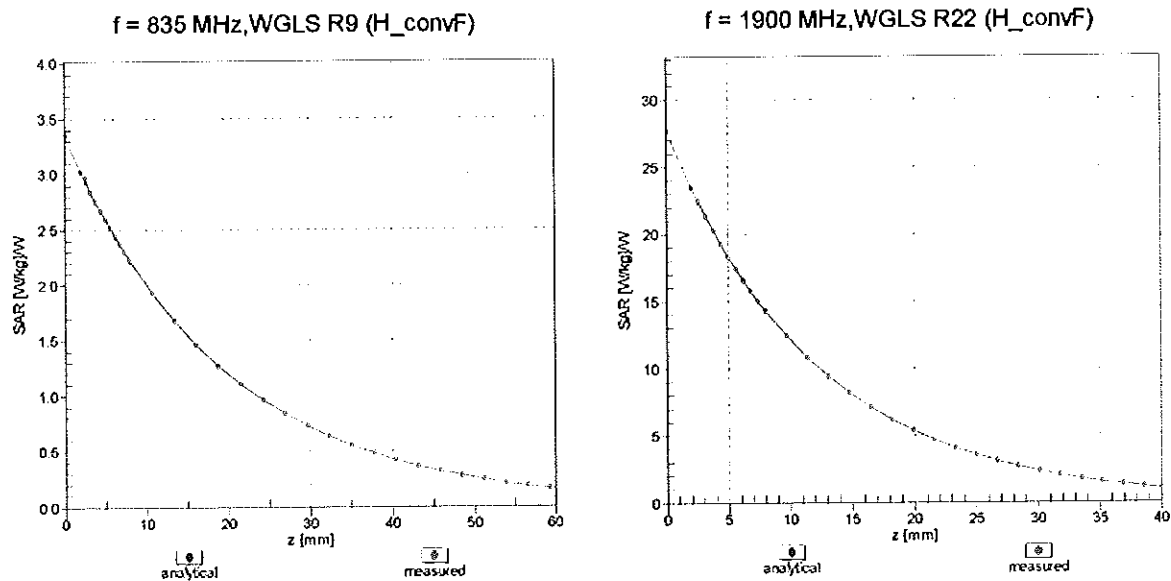
# Dynamic Range f(SAR<sub>head</sub>)

(TEM cell , f = 900 MHz)



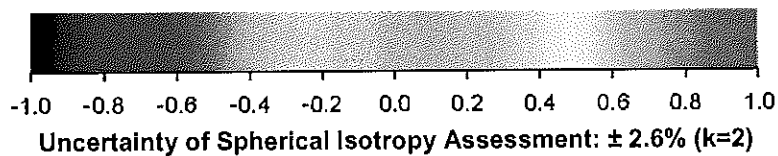
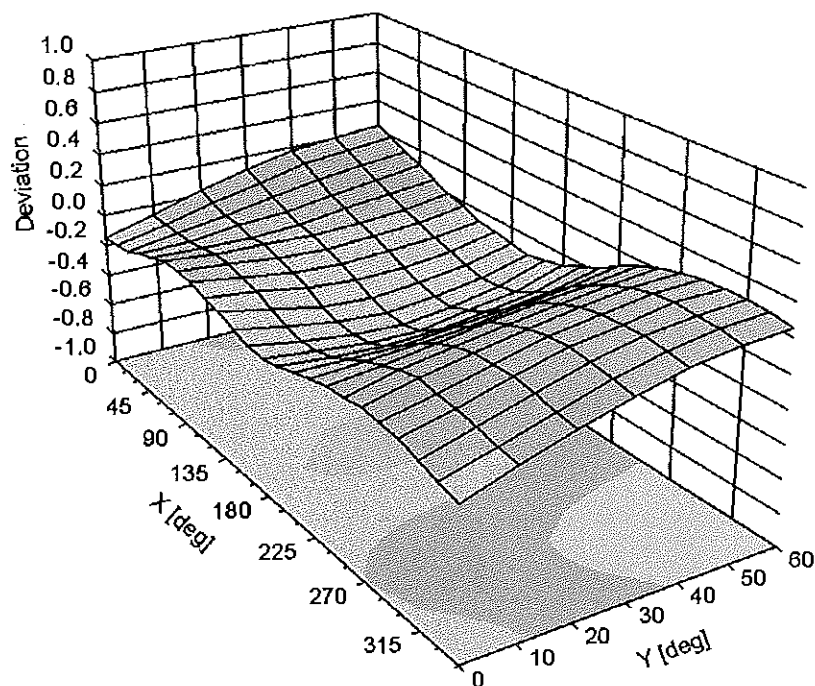
Uncertainty of Linearity Assessment:  $\pm 0.6\%$  (k=2)

## Conversion Factor Assessment



## Deviation from Isotropy in Liquid

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



**DASY/EASY - Parameters of Probe: ES3DV3 - SN:3287****Other Probe Parameters**

|                                               |            |
|-----------------------------------------------|------------|
| Sensor Arrangement                            | Triangular |
| Connector Angle (°)                           | -15        |
| 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       |



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 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: **D2450V2-797\_Jan14**

## CALIBRATION CERTIFICATE

Object **D2450V2 - SN: 797**

Calibration procedure(s) **QA CAL-05.v9**  
**Calibration procedure for dipole validation kits above 700 MHz**

Calibration date: **January 21, 2014**

CC ✓  
2/5/14

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         | 09-Oct-13 (No. 217-01827)         | Oct-14                 |
| Power sensor HP 8481A       | US37292783         | 09-Oct-13 (No. 217-01827)         | Oct-14                 |
| Power sensor HP 8481A       | MY41092317         | 09-Oct-13 (No. 217-01828)         | Oct-14                 |
| Reference 20 dB Attenuator  | SN: 5058 (20k)     | 04-Apr-13 (No. 217-01736)         | Apr-14                 |
| Type-N mismatch combination | SN: 5047.3 / 06327 | 04-Apr-13 (No. 217-01739)         | Apr-14                 |
| Reference Probe ES3DV3      | SN: 3205           | 30-Dec-13 (No. ES3-3205_Dec13)    | Dec-14                 |
| DAE4                        | SN: 601            | 25-Apr-13 (No. DAE4-601_Apr13)    | Apr-14                 |
| Secondary Standards         | ID #               | Check Date (in house)             | Scheduled Check        |
| RF generator R&S SMT-06     | 100005             | 04-Aug-99 (in house check Oct-13) | In house check: Oct-16 |
| Network Analyzer HP 8753E   | US37390585 S4206   | 18-Oct-01 (in house check Oct-13) | In house check: Oct-14 |

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

Issued: January 21, 2014

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



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Accreditation No.: **SCS 108**

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### Glossary:

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

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

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- 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
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

### 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                  | V52.8.7     |
| 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 | 38.7 $\pm$ 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 | 13.2 W/kg                    |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | 51.8 W/kg $\pm$ 17.0 % (k=2) |

|                                                         |                    |                              |
|---------------------------------------------------------|--------------------|------------------------------|
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | condition          |                              |
| SAR measured                                            | 250 mW input power | 6.13 W/kg                    |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 24.3 W/kg $\pm$ 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 | 51.3 $\pm$ 6 % | 2.04 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 | 12.7 W/kg                    |
| SAR for nominal Body TSL parameters                   | normalized to 1W   | 49.4 W/kg $\pm$ 17.0 % (k=2) |

|                                                         |                    |                              |
|---------------------------------------------------------|--------------------|------------------------------|
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL | condition          |                              |
| SAR measured                                            | 250 mW input power | 5.86 W/kg                    |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | 23.1 W/kg $\pm$ 16.5 % (k=2) |

## Appendix

### Antenna Parameters with Head TSL

|                                      |                             |
|--------------------------------------|-----------------------------|
| Impedance, transformed to feed point | $53.5 \Omega + 3.2 j\Omega$ |
| Return Loss                          | - 26.7 dB                   |

### Antenna Parameters with Body TSL

|                                      |                             |
|--------------------------------------|-----------------------------|
| Impedance, transformed to feed point | $50.0 \Omega + 4.9 j\Omega$ |
| Return Loss                          | - 26.2 dB                   |

### General Antenna Parameters and Design

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

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. 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 | January 24, 2006 |

## DASY5 Validation Report for Head TSL

Date: 21.01.2014

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 2450 MHz

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.86$  S/m;  $\epsilon_r = 38.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.53, 4.53, 4.53); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

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

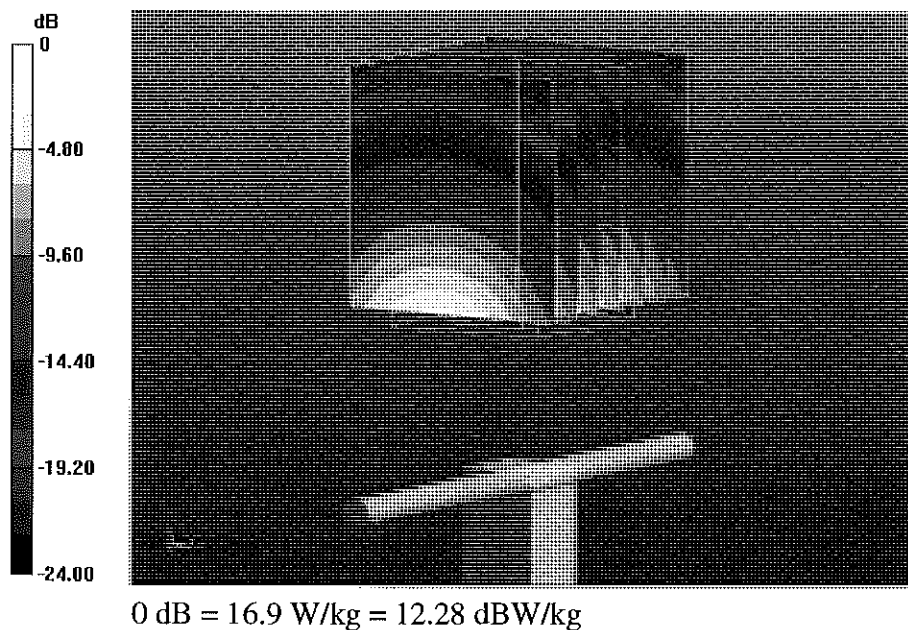
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 99.151 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 27.5 W/kg

**SAR(1 g) = 13.2 W/kg; SAR(10 g) = 6.13 W/kg**

Maximum value of SAR (measured) = 16.9 W/kg



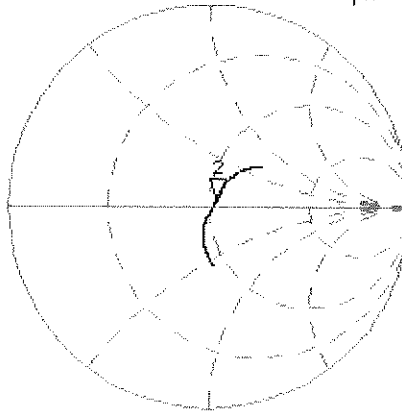
# Impedance Measurement Plot for Head TSL

21 Jan 2014 11:31:52  
 [CH1] S11 1 U FS 2: 53.512  $\angle$  3.2285  $\angle$  209.73 pH 2 450.000 000 MHz

\*  
 Del  
 CA

Avg  
 16

H1d

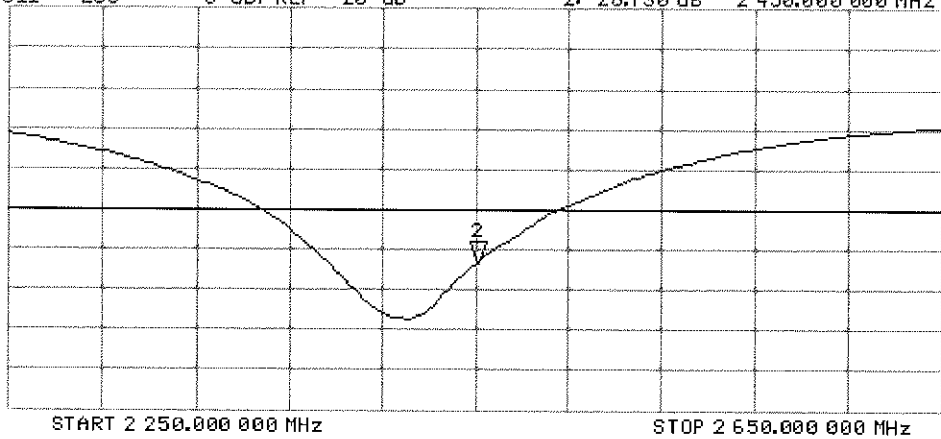


CH2 S11 LOG 5 dB/REF -20 dB 2:-26.730 dB 2 450.000 000 MHz

CA

Avg  
 16

H1d



## DASY5 Validation Report for Body TSL

Date: 21.01.2014

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 2450 MHz

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 2.04$  S/m;  $\epsilon_r = 51.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.35, 4.35, 4.35); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

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

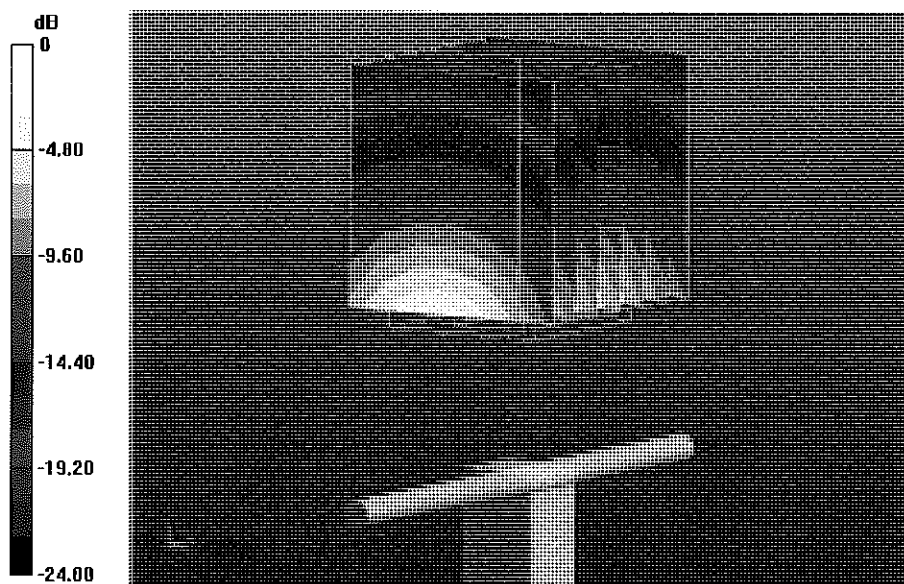
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 93.709 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 26.4 W/kg

**SAR(1 g) = 12.7 W/kg; SAR(10 g) = 5.86 W/kg**

Maximum value of SAR (measured) = 16.8 W/kg

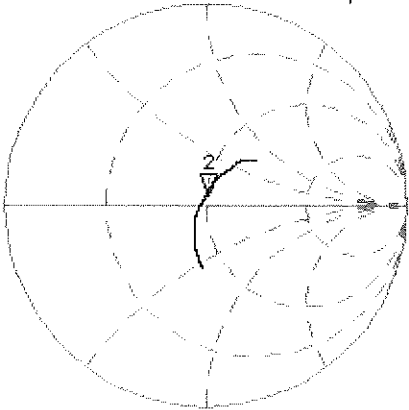


0 dB = 16.8 W/kg = 12.25 dBW/kg

Impedance Measurement Plot for Body TSL

21 Jan 2014 11:31:29  
CH1 S11 1 U FS 2: 49.994  $\Omega$  4.9258  $\Omega$  319.98  $\mu\text{H}$  2 450.000 000 MHz

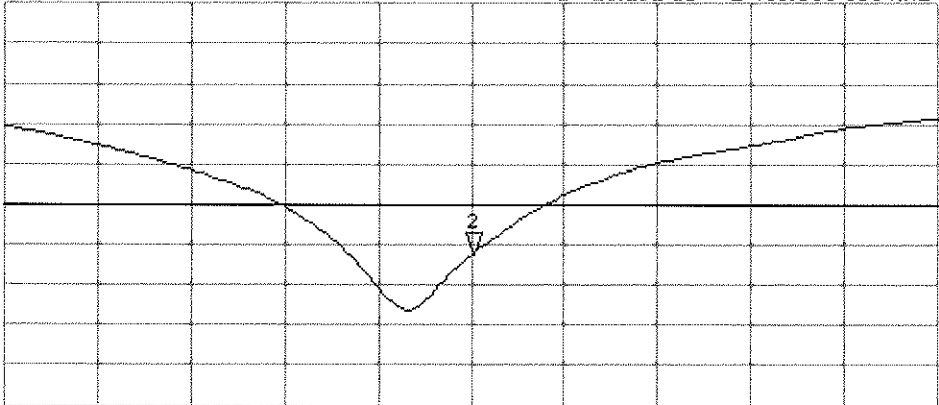
\*  
Del  
CA



Avg  
16  
H1d

CH2 S11 LOG 5 dB/REF -20 dB 2:-26.162 dB 2 450.000 000 MHz

CA  
Avg  
16  
H1d



START 2 250.000 000 MHz STOP 2 450.000 000 MHz



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: **D5GHzV2-1057\_Jan14**

## CALIBRATION CERTIFICATE

Object **D5GHzV2 - SN: 1057**

Calibration procedure(s) **QA CAL-22.v2**  
**Calibration procedure for dipole validation kits between 3-6 GHz**

Calibration date: **January 27, 2014**

CC  
2/5/14 ✓

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         | 09-Oct-13 (No. 217-01827)         | Oct-14                 |
| Power sensor HP 8481A       | US37292783         | 09-Oct-13 (No. 217-01827)         | Oct-14                 |
| Power sensor HP 8481A       | MY41092317         | 09-Oct-13 (No. 217-01828)         | Oct-14                 |
| Reference 20 dB Attenuator  | SN: 5058 (20k)     | 04-Apr-13 (No. 217-01736)         | Apr-14                 |
| Type-N mismatch combination | SN: 5047.3 / 06327 | 04-Apr-13 (No. 217-01739)         | Apr-14                 |
| Reference Probe EX3DV4      | SN: 3503           | 30-Dec-13 (No. EX3-3503_Dec13)    | Dec-14                 |
| DAE4                        | SN: 601            | 25-Apr-13 (No. DAE4-601_Apr13)    | Apr-14                 |
| Secondary Standards         | ID #               | Check Date (in house)             | Scheduled Check        |
| RF generator R&S SMT-06     | 100005             | 04-Aug-99 (in house check Oct-13) | In house check: Oct-16 |
| Network Analyzer HP 8753E   | US37390585 S4206   | 18-Oct-01 (in house check Oct-13) | In house check: Oct-14 |

Calibrated by: **Israe El-Naouq** **Laboratory Technician**

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

Signature

*Israe El-Naouq*  
*Katja Pokovic*

Issued: January 27, 2014

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



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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:

- IEC 62209-2, "Evaluation of Human Exposure to Radio Frequency Fields from Handheld and Body-Mounted Wireless Communication Devices in the Frequency Range of 30 MHz to 6 GHz: Human models, Instrumentation, and Procedures"; Part 2: "Procedure to determine the Specific Absorption Rate (SAR) for including accessories and multiple transmitters", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"
- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013

### 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.

|                                     |                                                                                                                      |                                  |
|-------------------------------------|----------------------------------------------------------------------------------------------------------------------|----------------------------------|
| <b>DASY Version</b>                 | DASY5                                                                                                                | V52.8.7                          |
| <b>Extrapolation</b>                | Advanced Extrapolation                                                                                               |                                  |
| <b>Phantom</b>                      | Modular Flat Phantom V5.0                                                                                            |                                  |
| <b>Distance Dipole Center - TSL</b> | 10 mm                                                                                                                | with Spacer                      |
| <b>Zoom Scan Resolution</b>         | dx, dy = 4.0 mm, dz = 1.4 mm                                                                                         | Graded Ratio = 1.4 (Z direction) |
| <b>Frequency</b>                    | 5200 MHz $\pm$ 1 MHz<br>5300 MHz $\pm$ 1 MHz<br>5500 MHz $\pm$ 1 MHz<br>5600 MHz $\pm$ 1 MHz<br>5800 MHz $\pm$ 1 MHz |                                  |

## Head TSL parameters at 5200 MHz

The following parameters and calculations were applied.

|                                                | Temperature         | Permittivity   | Conductivity         |
|------------------------------------------------|---------------------|----------------|----------------------|
| <b>Nominal Head TSL parameters</b>             | 22.0 °C             | 36.0           | 4.66 mho/m           |
| <b>Measured Head TSL parameters</b>            | (22.0 $\pm$ 0.2) °C | 35.0 $\pm$ 6 % | 4.45 mho/m $\pm$ 6 % |
| <b>Head TSL temperature change during test</b> | < 0.5 °C            | ----           | ----                 |

## SAR result with Head TSL at 5200 MHz

|                                                             |                    |                                                |
|-------------------------------------------------------------|--------------------|------------------------------------------------|
| <b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b> | Condition          |                                                |
| SAR measured                                                | 100 mW input power | 7.85 W/kg                                      |
| SAR for nominal Head TSL parameters                         | normalized to 1W   | <b>78.0 W/kg <math>\pm</math> 19.9 % (k=2)</b> |

|                                                               |                    |                                                |
|---------------------------------------------------------------|--------------------|------------------------------------------------|
| <b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b> | condition          |                                                |
| SAR measured                                                  | 100 mW input power | 2.25 W/kg                                      |
| SAR for nominal Head TSL parameters                           | normalized to 1W   | <b>22.3 W/kg <math>\pm</math> 19.5 % (k=2)</b> |

### Head TSL parameters at 5300 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Head TSL parameters             | 22.0 °C         | 35.9         | 4.76 mho/m       |
| Measured Head TSL parameters            | (22.0 ± 0.2) °C | 34.9 ± 6 %   | 4.54 mho/m ± 6 % |
| Head TSL temperature change during test | < 0.5 °C        | ----         | ----             |

### SAR result with Head TSL at 5300 MHz

| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL | Condition          |                                   |
|-------------------------------------------------------|--------------------|-----------------------------------|
| SAR measured                                          | 100 mW input power | 8.36 W/kg                         |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | <b>83.0 W / kg ± 19.9 % (k=2)</b> |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | condition          |                                 |
|---------------------------------------------------------|--------------------|---------------------------------|
| SAR measured                                            | 100 mW input power | 2.40 W/kg                       |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | <b>23.8 W/kg ± 19.5 % (k=2)</b> |

### Head TSL parameters at 5500 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Head TSL parameters             | 22.0 °C         | 35.6         | 4.96 mho/m       |
| Measured Head TSL parameters            | (22.0 ± 0.2) °C | 34.6 ± 6 %   | 4.74 mho/m ± 6 % |
| Head TSL temperature change during test | < 0.5 °C        | ----         | ----             |

### SAR result with Head TSL at 5500 MHz

| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL | Condition          |                                 |
|-------------------------------------------------------|--------------------|---------------------------------|
| SAR measured                                          | 100 mW input power | 8.50 W/kg                       |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | <b>84.3 W/kg ± 19.9 % (k=2)</b> |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | condition          |                                 |
|---------------------------------------------------------|--------------------|---------------------------------|
| SAR measured                                            | 100 mW input power | 2.42 W/kg                       |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | <b>24.0 W/kg ± 19.5 % (k=2)</b> |

### Head TSL parameters at 5600 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Head TSL parameters             | 22.0 °C         | 35.5         | 5.07 mho/m       |
| Measured Head TSL parameters            | (22.0 ± 0.2) °C | 34.5 ± 6 %   | 4.86 mho/m ± 6 % |
| Head TSL temperature change during test | < 0.5 °C        | ----         | ----             |

### SAR result with Head TSL at 5600 MHz

|                                                             |                    |                                 |
|-------------------------------------------------------------|--------------------|---------------------------------|
| <b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b> | Condition          |                                 |
| SAR measured                                                | 100 mW input power | 8.42 W/kg                       |
| SAR for nominal Head TSL parameters                         | normalized to 1W   | <b>83.5 W/kg ± 19.9 % (k=2)</b> |

|                                                               |                    |                                 |
|---------------------------------------------------------------|--------------------|---------------------------------|
| <b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b> | condition          |                                 |
| SAR measured                                                  | 100 mW input power | 2.40 W/kg                       |
| SAR for nominal Head TSL parameters                           | normalized to 1W   | <b>23.8 W/kg ± 19.5 % (k=2)</b> |

### Head TSL parameters at 5800 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Head TSL parameters             | 22.0 °C         | 35.3         | 5.27 mho/m       |
| Measured Head TSL parameters            | (22.0 ± 0.2) °C | 34.2 ± 6 %   | 5.07 mho/m ± 6 % |
| Head TSL temperature change during test | < 0.5 °C        | ----         | ----             |

### SAR result with Head TSL at 5800 MHz

|                                                             |                    |                                 |
|-------------------------------------------------------------|--------------------|---------------------------------|
| <b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b> | Condition          |                                 |
| SAR measured                                                | 100 mW input power | 8.00 W/kg                       |
| SAR for nominal Head TSL parameters                         | normalized to 1W   | <b>79.3 W/kg ± 19.9 % (k=2)</b> |

|                                                               |                    |                                 |
|---------------------------------------------------------------|--------------------|---------------------------------|
| <b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b> | condition          |                                 |
| SAR measured                                                  | 100 mW input power | 2.28 W/kg                       |
| SAR for nominal Head TSL parameters                           | normalized to 1W   | <b>22.6 W/kg ± 19.5 % (k=2)</b> |

### Body TSL parameters at 5200 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Body TSL parameters             | 22.0 °C         | 49.0         | 5.30 mho/m       |
| Measured Body TSL parameters            | (22.0 ± 0.2) °C | 47.3 ± 6 %   | 5.44 mho/m ± 6 % |
| Body TSL temperature change during test | < 0.5 °C        | ----         | ----             |

### SAR result with Body TSL at 5200 MHz

| SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL | Condition          |                                 |
|-------------------------------------------------------|--------------------|---------------------------------|
| SAR measured                                          | 100 mW input power | 7.58 W/kg                       |
| SAR for nominal Body TSL parameters                   | normalized to 1W   | <b>75.3 W/kg ± 19.9 % (k=2)</b> |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL | condition          |                                 |
|---------------------------------------------------------|--------------------|---------------------------------|
| SAR measured                                            | 100 mW input power | 2.12 W/kg                       |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | <b>21.0 W/kg ± 19.5 % (k=2)</b> |

### Body TSL parameters at 5300 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Body TSL parameters             | 22.0 °C         | 48.9         | 5.42 mho/m       |
| Measured Body TSL parameters            | (22.0 ± 0.2) °C | 47.2 ± 6 %   | 5.57 mho/m ± 6 % |
| Body TSL temperature change during test | < 0.5 °C        | ----         | ----             |

### SAR result with Body TSL at 5300 MHz

| SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL | Condition          |                                 |
|-------------------------------------------------------|--------------------|---------------------------------|
| SAR measured                                          | 100 mW input power | 7.79 W/kg                       |
| SAR for nominal Body TSL parameters                   | normalized to 1W   | <b>77.4 W/kg ± 19.9 % (k=2)</b> |

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

### Body TSL parameters at 5500 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Body TSL parameters             | 22.0 °C         | 48.6         | 5.65 mho/m       |
| Measured Body TSL parameters            | (22.0 ± 0.2) °C | 46.8 ± 6 %   | 5.84 mho/m ± 6 % |
| Body TSL temperature change during test | < 0.5 °C        | ----         | ----             |

### SAR result with Body TSL at 5500 MHz

|                                                             |                    |                                 |
|-------------------------------------------------------------|--------------------|---------------------------------|
| <b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Body TSL</b> | Condition          |                                 |
| SAR measured                                                | 100 mW input power | 7.96 W/kg                       |
| SAR for nominal Body TSL parameters                         | normalized to 1W   | <b>79.1 W/kg ± 19.9 % (k=2)</b> |

|                                                               |                    |                                 |
|---------------------------------------------------------------|--------------------|---------------------------------|
| <b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Body TSL</b> | condition          |                                 |
| SAR measured                                                  | 100 mW input power | 2.22 W/kg                       |
| SAR for nominal Body TSL parameters                           | normalized to 1W   | <b>22.0 W/kg ± 19.5 % (k=2)</b> |

### Body TSL parameters at 5600 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Body TSL parameters             | 22.0 °C         | 48.5         | 5.77 mho/m       |
| Measured Body TSL parameters            | (22.0 ± 0.2) °C | 46.6 ± 6 %   | 5.98 mho/m ± 6 % |
| Body TSL temperature change during test | < 0.5 °C        | ----         | ----             |

### SAR result with Body TSL at 5600 MHz

|                                                             |                    |                                 |
|-------------------------------------------------------------|--------------------|---------------------------------|
| <b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Body TSL</b> | Condition          |                                 |
| SAR measured                                                | 100 mW input power | 8.07 W/kg                       |
| SAR for nominal Body TSL parameters                         | normalized to 1W   | <b>80.2 W/kg ± 19.9 % (k=2)</b> |

|                                                               |                    |                                 |
|---------------------------------------------------------------|--------------------|---------------------------------|
| <b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Body TSL</b> | condition          |                                 |
| SAR measured                                                  | 100 mW input power | 2.24 W/kg                       |
| SAR for nominal Body TSL parameters                           | normalized to 1W   | <b>22.2 W/kg ± 19.5 % (k=2)</b> |

### Body TSL parameters at 5800 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Body TSL parameters             | 22.0 °C         | 48.2         | 6.00 mho/m       |
| Measured Body TSL parameters            | (22.0 ± 0.2) °C | 46.3 ± 6 %   | 6.23 mho/m ± 6 % |
| Body TSL temperature change during test | < 0.5 °C        | ----         | ----             |

### SAR result with Body TSL at 5800 MHz

|                                                             |                    |                                 |
|-------------------------------------------------------------|--------------------|---------------------------------|
| <b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Body TSL</b> | Condition          |                                 |
| SAR measured                                                | 100 mW input power | 7.48 W/kg                       |
| SAR for nominal Body TSL parameters                         | normalized to 1W   | <b>74.3 W/kg ± 19.9 % (k=2)</b> |

|                                                               |                    |                                 |
|---------------------------------------------------------------|--------------------|---------------------------------|
| <b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Body TSL</b> | condition          |                                 |
| SAR measured                                                  | 100 mW input power | 2.06 W/kg                       |
| SAR for nominal Body TSL parameters                           | normalized to 1W   | <b>20.4 W/kg ± 19.5 % (k=2)</b> |

## Appendix

### Antenna Parameters with Head TSL at 5200 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 43.1 $\Omega$ - 4.6 j $\Omega$ |
| Return Loss                          | - 21.0 dB                      |

### Antenna Parameters with Head TSL at 5300 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 46.5 $\Omega$ - 1.3 j $\Omega$ |
| Return Loss                          | - 28.1 dB                      |

### Antenna Parameters with Head TSL at 5500 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 46.2 $\Omega$ - 2.5 j $\Omega$ |
| Return Loss                          | - 26.4 dB                      |

### Antenna Parameters with Head TSL at 5600 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 48.9 $\Omega$ - 5.7 j $\Omega$ |
| Return Loss                          | - 24.6 dB                      |

### Antenna Parameters with Head TSL at 5800 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 48.7 $\Omega$ - 3.1 j $\Omega$ |
| Return Loss                          | - 29.5 dB                      |

### Antenna Parameters with Body TSL at 5200 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 49.4 $\Omega$ - 7.7 j $\Omega$ |
| Return Loss                          | - 22.2 dB                      |

### Antenna Parameters with Body TSL at 5300 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 49.6 $\Omega$ - 3.0 j $\Omega$ |
| Return Loss                          | - 30.3 dB                      |

### Antenna Parameters with Body TSL at 5500 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 50.8 $\Omega$ - 3.9 j $\Omega$ |
| Return Loss                          | - 28.0 dB                      |

### Antenna Parameters with Body TSL at 5600 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 55.4 $\Omega$ - 2.5 j $\Omega$ |
| Return Loss                          | - 25.0 dB                      |

### Antenna Parameters with Body TSL at 5800 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 52.3 $\Omega$ - 0.7 j $\Omega$ |
| Return Loss                          | - 32.5 dB                      |

### General Antenna Parameters and Design

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.186 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 | November 27, 2006 |

## DASY5 Validation Report for Head TSL

Date: 27.01.2014

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 5200 MHz, Frequency: 5300 MHz, Frequency: 5500 MHz, Frequency: 5600 MHz, Frequency: 5800 MHz

Medium parameters used:  $f = 5200$  MHz;  $\sigma = 4.45$  S/m;  $\epsilon_r = 35$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5300$  MHz;  $\sigma = 4.54$  S/m;  $\epsilon_r = 34.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5500$  MHz;  $\sigma = 4.74$  S/m;  $\epsilon_r = 34.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5600$  MHz;  $\sigma = 4.86$  S/m;  $\epsilon_r = 34.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5800$  MHz;  $\sigma = 5.07$  S/m;  $\epsilon_r = 34.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.52, 5.52, 5.52); Calibrated: 30.12.2013, ConvF(5.2, 5.2, 5.2); Calibrated: 30.12.2013, ConvF(5.01, 5.01, 5.01); Calibrated: 30.12.2013, ConvF(4.86, 4.86, 4.86); Calibrated: 30.12.2013, ConvF(4.91, 4.91, 4.91); Calibrated: 30.12.2013;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 63.497 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 28.2 W/kg

**SAR(1 g) = 7.85 W/kg; SAR(10 g) = 2.25 W/kg**

Maximum value of SAR (measured) = 18.6 W/kg

**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5300 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 64.444 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 31.2 W/kg

**SAR(1 g) = 8.36 W/kg; SAR(10 g) = 2.4 W/kg**

Maximum value of SAR (measured) = 20.1 W/kg

**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 63.807 V/m; Power Drift = 0.07 dB

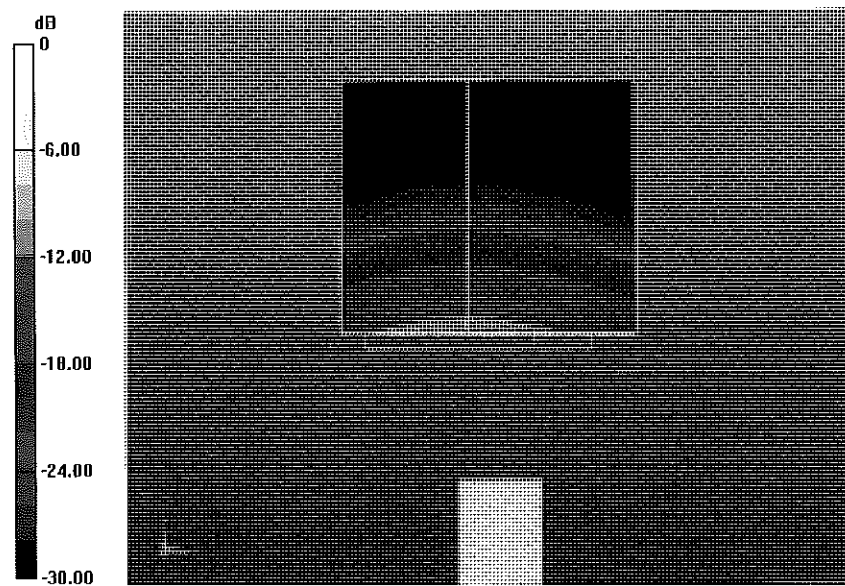
Peak SAR (extrapolated) = 33.0 W/kg

**SAR(1 g) = 8.5 W/kg; SAR(10 g) = 2.42 W/kg**

Maximum value of SAR (measured) = 20.8 W/kg

**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm  
Reference Value = 63.194 V/m; Power Drift = 0.06 dB  
Peak SAR (extrapolated) = 33.2 W/kg  
SAR(1 g) = 8.42 W/kg; SAR(10 g) = 2.4 W/kg

**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm  
Reference Value = 60.646 V/m; Power Drift = 0.08 dB  
Peak SAR (extrapolated) = 32.9 W/kg  
SAR(1 g) = 8 W/kg; SAR(10 g) = 2.28 W/kg  
Maximum value of SAR (measured) = 19.9 W/kg

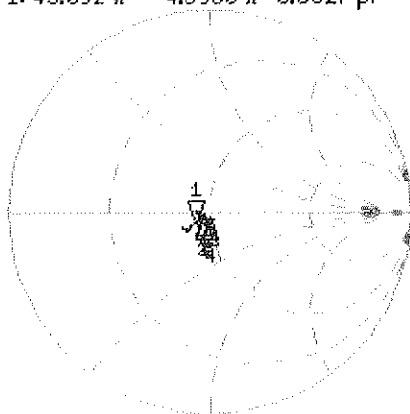


0 dB = 19.9 W/kg = 12.99 dBW/kg

# Impedance Measurement Plot for Head TSL

27 Jan 2014 17:12:04  
 CH1 S11 1 U FS 1: 43.092  $\Omega$  -4.5938  $\Omega$  6.6627 pF 5 200.000 000 MHz

\*  
 Del  
 Cor  
 Avg  
 16  
 H1d

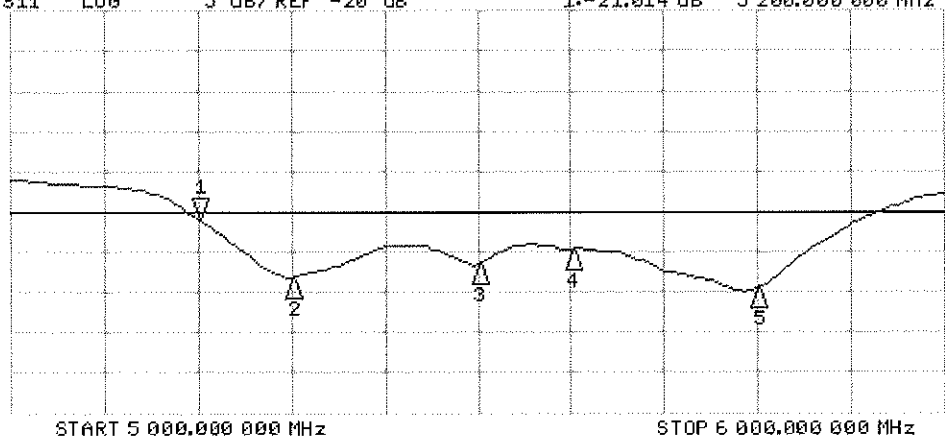


CH1 Markers

2: 46.475  $\Omega$   
 -1.3496  $\Omega$   
 5.30000 GHz  
 3: 46.150  $\Omega$   
 -2.5078  $\Omega$   
 5.50000 GHz  
 4: 48.900  $\Omega$   
 -5.6932  $\Omega$   
 5.60000 GHz  
 5: 48.734  $\Omega$   
 -3.0762  $\Omega$   
 5.80000 GHz

CH2 S11 LOG 5 dB/REF -20 dB 1: -21.014 dB 5 200.000 000 MHz

Del  
 Cor  
 Avg  
 16  
 H1d



CH2 Markers

2: -28.145 dB  
 5.30000 GHz  
 3: -26.415 dB  
 5.50000 GHz  
 4: -24.640 dB  
 5.60000 GHz  
 5: -29.464 dB  
 5.80000 GHz

## DASY5 Validation Report for Body TSL

Date: 24.01.2014

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 5200 MHz, Frequency: 5300 MHz, Frequency: 5500 MHz, Frequency: 5600 MHz, Frequency: 5800 MHz

Medium parameters used:  $f = 5200$  MHz;  $\sigma = 5.44$  S/m;  $\epsilon_r = 47.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5300$  MHz;  $\sigma = 5.57$  S/m;  $\epsilon_r = 47.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5500$  MHz;  $\sigma = 5.84$  S/m;  $\epsilon_r = 46.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5600$  MHz;  $\sigma = 5.98$  S/m;  $\epsilon_r = 46.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5800$  MHz;  $\sigma = 6.23$  S/m;  $\epsilon_r = 46.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.01, 5.01, 5.01); Calibrated: 30.12.2013, ConvF(4.76, 4.76, 4.76); Calibrated: 30.12.2013, ConvF(4.52, 4.52, 4.52); Calibrated: 30.12.2013, ConvF(4.3, 4.3, 4.3); Calibrated: 30.12.2013, ConvF(4.47, 4.47, 4.47); Calibrated: 30.12.2013;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

**Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 58.809 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 30.1 W/kg

**SAR(1 g) = 7.58 W/kg; SAR(10 g) = 2.12 W/kg**

Maximum value of SAR (measured) = 18.2 W/kg

**Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5300 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 58.585 V/m; Power Drift = -0.00 dB

Peak SAR (extrapolated) = 32.2 W/kg

**SAR(1 g) = 7.79 W/kg; SAR(10 g) = 2.17 W/kg**

Maximum value of SAR (measured) = 19.1 W/kg

**Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 58.364 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 34.4 W/kg

**SAR(1 g) = 7.96 W/kg; SAR(10 g) = 2.22 W/kg**

Maximum value of SAR (measured) = 19.4 W/kg

**Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 57.864 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 35.8 W/kg

**SAR(1 g) = 8.07 W/kg; SAR(10 g) = 2.24 W/kg**

Maximum value of SAR (measured) = 19.8 W/kg

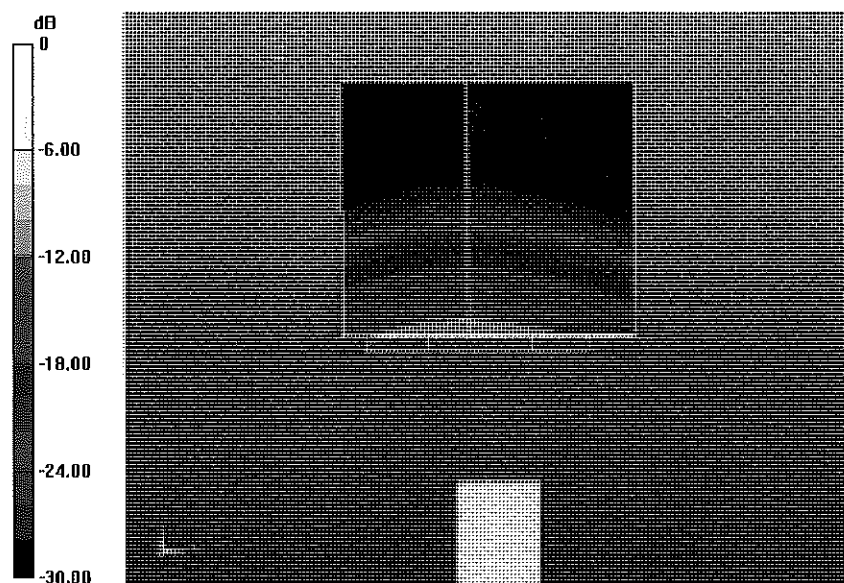
**Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 54.817 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 35.1 W/kg

**SAR(1 g) = 7.48 W/kg; SAR(10 g) = 2.06 W/kg**

Maximum value of SAR (measured) = 18.8 W/kg

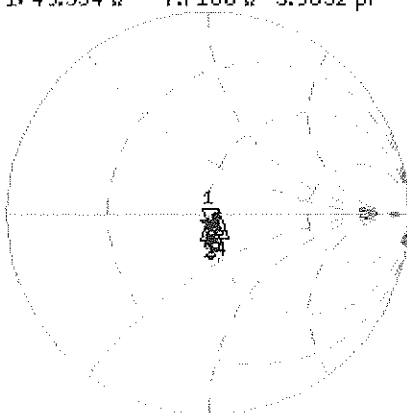


0 dB = 18.8 W/kg = 12.74 dBW/kg

# Impedance Measurement Plot for Body TSL

24 Jan 2014 15:50:22  
**CH1** S11 1 U FS 1: 49.354  $\Omega$  -7.7188  $\Omega$  3.9652 pF 5 200.000 000 MHz

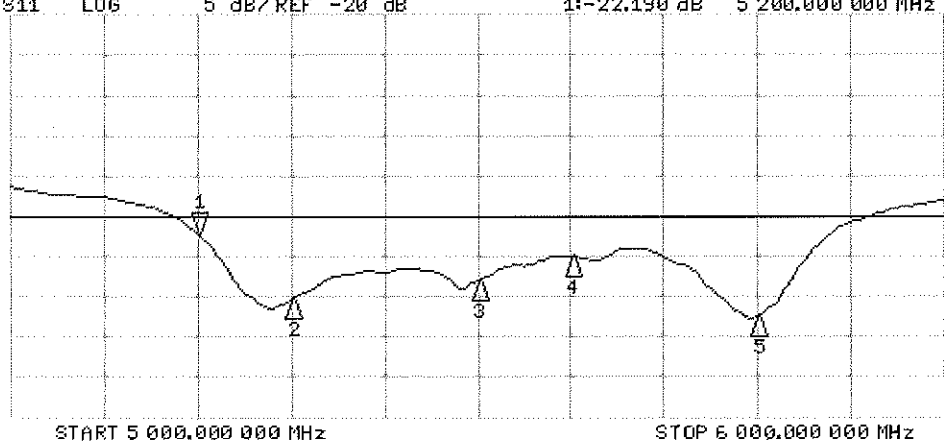
\*  
 Del  
 Cor  
 Avg  
 16  
 H1d



CH1 Markers  
 2: 49.559  $\Omega$   
 -3.0176  $\Omega$   
 5.30000 GHz  
 3: 50.793  $\Omega$   
 -3.9160  $\Omega$   
 5.50000 GHz  
 4: 55.393  $\Omega$   
 -2.5176  $\Omega$   
 5.60000 GHz  
 5: 52.320  $\Omega$   
 -716.80 m $\Omega$   
 5.80000 GHz

CH2 S11 L06 5 dB/REF -20 dB 1:-22.190 dB 5 200.000 000 MHz

Cor  
 Avg  
 16  
 H1d



CH2 Markers  
 2:-30.277 dB  
 5.30000 GHz  
 3:-28.039 dB  
 5.50000 GHz  
 4:-24.960 dB  
 5.60000 GHz  
 5:-32.401 dB  
 5.80000 GHz



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 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **PC Test**

Certificate No: **ES3-3022\_Aug13**

## CALIBRATION CERTIFICATE

Object **ES3DV2 - SN:3022**

Calibration procedure(s) **QA CAL-01.v9, QA CAL-23.v5, QA CAL-25.v6**  
**Calibration procedure for dosimetric E-field probes**

Calibration date: **August 22, 2013**

*UTC*  
*9/13/13*

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      | 04-Apr-13 (No. 217-01733)         | Apr-14                 |
| Power sensor E4412A        | MY41498087      | 04-Apr-13 (No. 217-01733)         | Apr-14                 |
| Reference 3 dB Attenuator  | SN: S5054 (3c)  | 04-Apr-13 (No. 217-01737)         | Apr-14                 |
| Reference 20 dB Attenuator | SN: S5277 (20x) | 04-Apr-13 (No. 217-01735)         | Apr-14                 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 04-Apr-13 (No. 217-01738)         | Apr-14                 |
| Reference Probe ES3DV2     | SN: 3013        | 28-Dec-12 (No. ES3-3013_Dec12)    | Dec-13                 |
| DAE4                       | SN: 660         | 31-Jan-13 (No. DAE4-660_Jan13)    | Jan-14                 |
| Secondary Standards        | ID              | Check Date (in house)             | Scheduled Check        |
| RF generator HP 8648C      | US3642U01700    | 4-Aug-99 (in house check Apr-13)  | In house check: Apr-15 |
| Network Analyzer HP 8753E  | US37390585      | 18-Oct-01 (in house check Oct-12) | In house check: Oct-13 |

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

Issued: August 23, 2013

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



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 Multilateral Agreement for the recognition of calibration certificates

### 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, D               | 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>; D<sub>x,y,z</sub>; VR<sub>x,y,z</sub>**: A, B, C, D are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for  $f \leq 800$  MHz) and inside waveguide using analytical field distributions based on power measurements for  $f > 800$  MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM<sub>x,y,z</sub> \* ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from  $\pm 50$  MHz to  $\pm 100$  MHz.
- Spherical isotropy (3D deviation from isotropy)**: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

# Probe ES3DV2

## SN:3022

Manufactured: April 15, 2003  
Calibrated: August 22, 2013

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

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

### Basic Calibration Parameters

|                                                           | Sensor X | Sensor Y | Sensor Z | Unc (k=2) |
|-----------------------------------------------------------|----------|----------|----------|-----------|
| Norm ( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>A</sup> | 1.00     | 1.04     | 0.99     | ± 10.1 %  |
| DCP (mV) <sup>B</sup>                                     | 100.7    | 97.4     | 99.7     |           |

### Modulation Calibration Parameters

| UID | Communication System Name |   | A<br>dB | B<br>dB $\sqrt{\mu\text{V}}$ | C   | D<br>dB | VR<br>mV | Unc <sup>E</sup><br>(k=2) |
|-----|---------------------------|---|---------|------------------------------|-----|---------|----------|---------------------------|
| 0   | CW                        | X | 0.0     | 0.0                          | 1.0 | 0.00    | 178.6    | ±3.0 %                    |
|     |                           | Y | 0.0     | 0.0                          | 1.0 |         | 141.9    |                           |
|     |                           | Z | 0.0     | 0.0                          | 1.0 |         | 134.7    |                           |

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: ES3DV2 - SN:3022

### 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                            | 6.21    | 6.21    | 6.21    | 0.19  | 2.37       | ± 12.0 %    |
| 835                  | 41.5                               | 0.90                            | 6.09    | 6.09    | 6.09    | 0.30  | 1.70       | ± 12.0 %    |
| 1750                 | 40.1                               | 1.37                            | 5.19    | 5.19    | 5.19    | 0.65  | 1.23       | ± 12.0 %    |
| 1900                 | 40.0                               | 1.40                            | 5.03    | 5.03    | 5.03    | 0.51  | 1.43       | ± 12.0 %    |
| 2450                 | 39.2                               | 1.80                            | 4.36    | 4.36    | 4.36    | 0.51  | 1.51       | ± 12.0 %    |
| 2600                 | 39.0                               | 1.96                            | 4.16    | 4.16    | 4.16    | 0.74  | 1.29       | ± 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: ES3DV2 - SN:3022

### Calibration Parameter Determined in Body Tissue Simulating Media

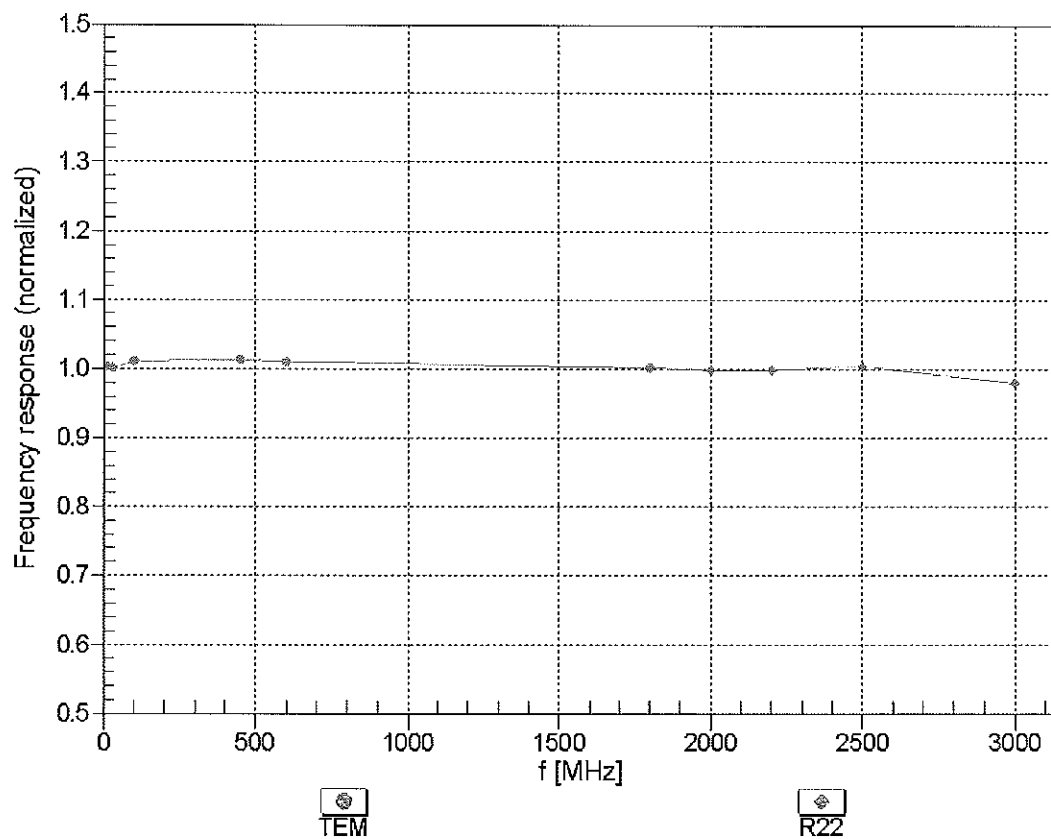
| f (MHz) <sup>C</sup> | Relative Permittivity <sup>F</sup> | Conductivity (S/m) <sup>F</sup> | ConvF X | ConvF Y | ConvF Z | Alpha | Depth (mm) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|-------|------------|-------------|
| 750                  | 55.5                               | 0.96                            | 5.92    | 5.92    | 5.92    | 0.24  | 1.99       | ± 12.0 %    |
| 835                  | 55.2                               | 0.97                            | 5.91    | 5.91    | 5.91    | 0.29  | 1.85       | ± 12.0 %    |
| 1750                 | 53.4                               | 1.49                            | 4.75    | 4.75    | 4.75    | 0.52  | 1.52       | ± 12.0 %    |
| 1900                 | 53.3                               | 1.52                            | 4.49    | 4.49    | 4.49    | 0.49  | 1.56       | ± 12.0 %    |
| 2450                 | 52.7                               | 1.95                            | 4.01    | 4.01    | 4.01    | 0.70  | 1.02       | ± 12.0 %    |
| 2600                 | 52.5                               | 2.16                            | 3.85    | 3.85    | 3.85    | 0.58  | 0.90       | ± 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

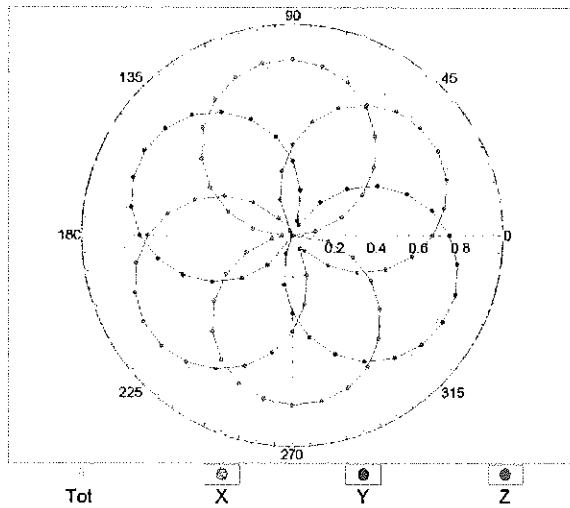
(TEM-Cell:ifi110 EXX, Waveguide: R22)



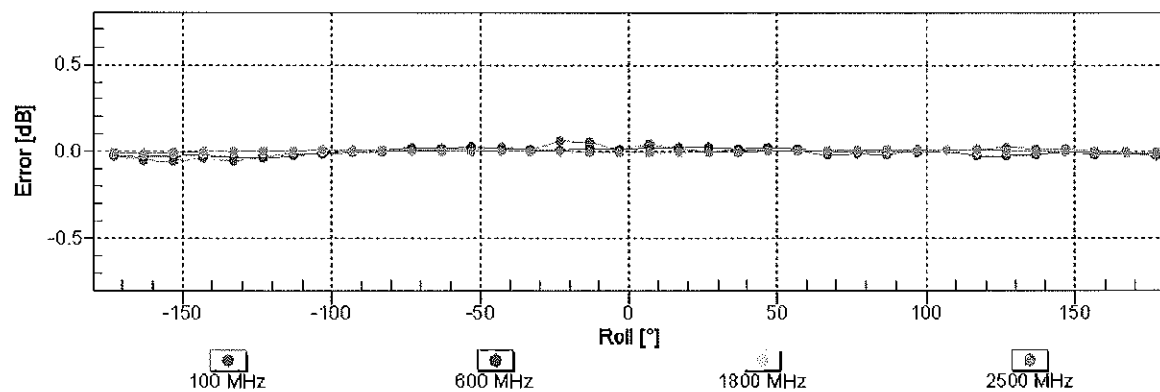
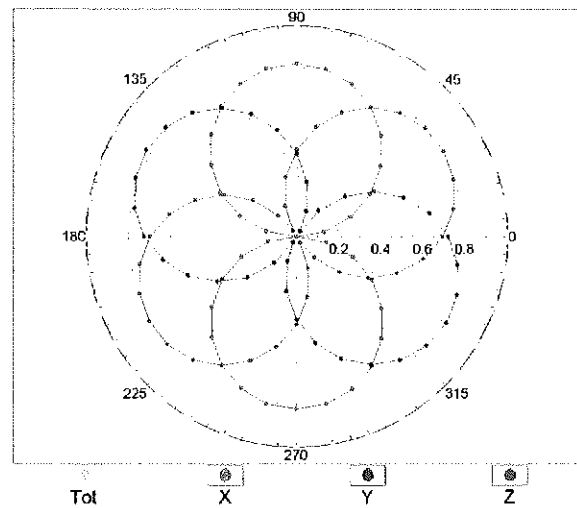
Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  (k=2)

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

f=600 MHz,TEM

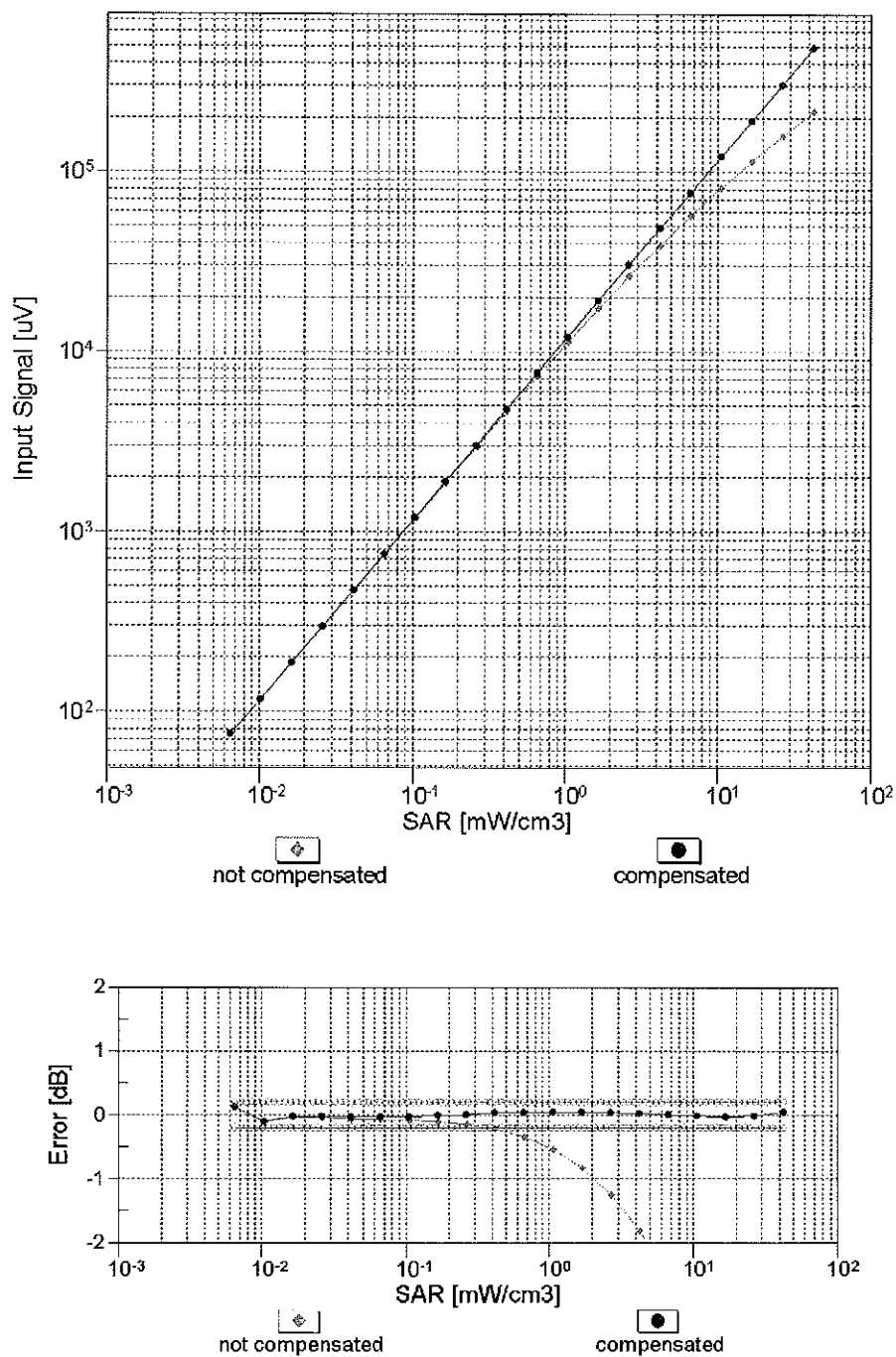


f=1800 MHz,R22



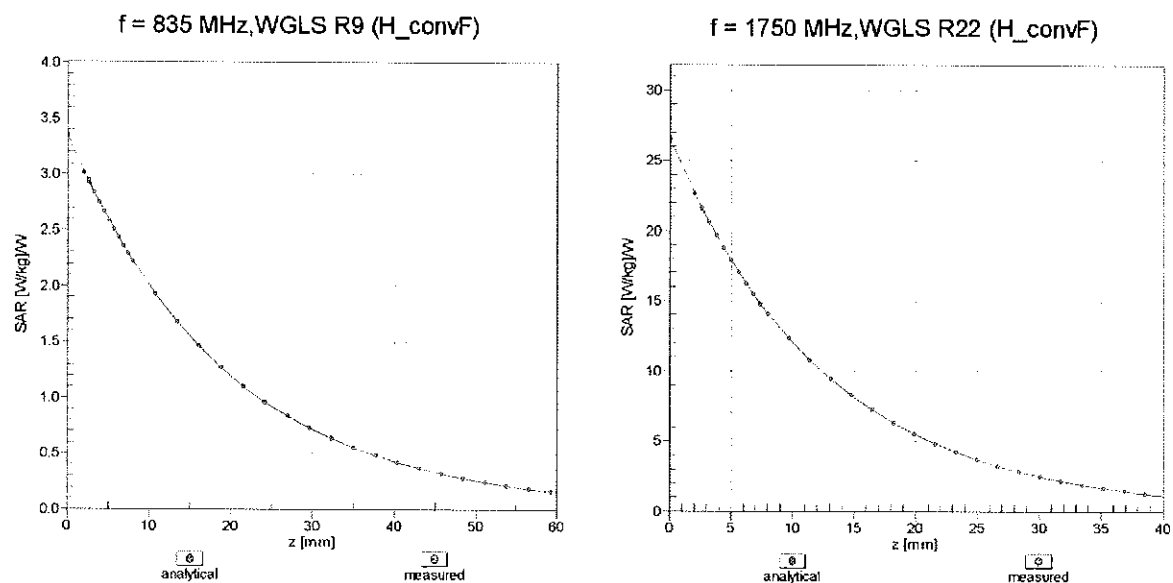
Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

# Dynamic Range f(SAR<sub>head</sub>) (TEM cell , f = 900 MHz)



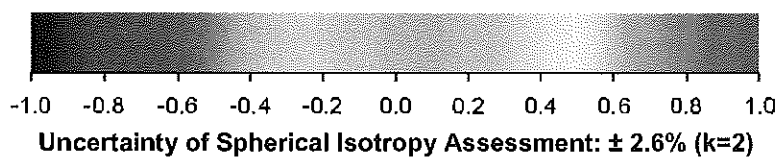
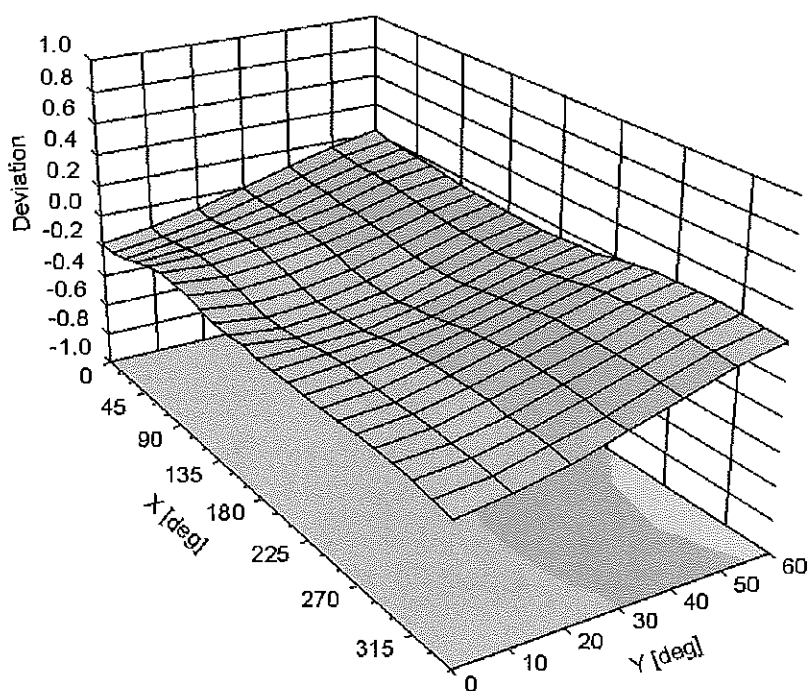
Uncertainty of Linearity Assessment:  $\pm 0.6\%$  (k=2)

## Conversion Factor Assessment



## Deviation from Isotropy in Liquid

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



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

### Other Probe Parameters

|                                               |            |
|-----------------------------------------------|------------|
| Sensor Arrangement                            | Triangular |
| Connector Angle (°)                           | -83.1      |
| 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       |



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Accreditation No.: **SCS 108**

Client **PC Test**

Certificate No: **D835V2-4d119\_Apr14**

## CALIBRATION CERTIFICATE

Object **D835V2 - SN: 4d119**

Calibration procedure(s) **QA CAL-05.v9**  
**Calibration procedure for dipole validation kits above 700 MHz**

CCV  
4/25/14

Calibration date: **April 07, 2014**

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         | 09-Oct-13 (No. 217-01827)         | Oct-14                 |
| Power sensor HP 8481A       | US37292783         | 09-Oct-13 (No. 217-01827)         | Oct-14                 |
| Power sensor HP 8481A       | MY41092317         | 09-Oct-13 (No. 217-01828)         | Oct-14                 |
| Reference 20 dB Attenuator  | SN: 5058 (20k)     | 03-Apr-14 (No. 217-01918)         | Apr-15                 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 03-Apr-14 (No. 217-01921)         | Apr-15                 |
| Reference Probe ES3DV3      | SN: 3205           | 30-Dec-13 (No. ES3-3205_Dec13)    | Dec-14                 |
| DAE4                        | SN: 601            | 25-Apr-13 (No. DAE4-601_Apr13)    | Apr-14                 |
| Secondary Standards         | ID #               | Check Date (in house)             | Scheduled Check        |
| RF generator R&S SMT-06     | 100005             | 04-Aug-99 (in house check Oct-13) | In house check: Oct-16 |
| Network Analyzer HP 8753E   | US37390585 S4206   | 18-Oct-01 (in house check Oct-13) | In house check: Oct-14 |

Calibrated by: **Name** **Function** **Signature**  
**Leif Klysner** **Laboratory Technician**

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

Issued: April 9, 2014

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



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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 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- 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) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

**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.

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                  | V52.8.7     |
| 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 | 41.6 $\pm$ 6 % | 0.94 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 | 2.38 W/kg                    |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | 9.22 W/kg $\pm$ 17.0 % (k=2) |

|                                                         |                    |                              |
|---------------------------------------------------------|--------------------|------------------------------|
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | condition          |                              |
| SAR measured                                            | 250 mW input power | 1.53 W/kg                    |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 5.97 W/kg $\pm$ 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 | 53.6 $\pm$ 6 % | 1.02 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 | 2.44 W/kg                    |
| SAR for nominal Body TSL parameters                   | normalized to 1W   | 9.34 W/kg $\pm$ 17.0 % (k=2) |

|                                                         |                    |                              |
|---------------------------------------------------------|--------------------|------------------------------|
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL | condition          |                              |
| SAR measured                                            | 250 mW input power | 1.59 W/kg                    |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | 6.15 W/kg $\pm$ 16.5 % (k=2) |

## Appendix

### Antenna Parameters with Head TSL

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 51.2 $\Omega$ - 1.6 j $\Omega$ |
| Return Loss                          | - 34.0 dB                      |

### Antenna Parameters with Body TSL

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 46.3 $\Omega$ - 4.5 j $\Omega$ |
| Return Loss                          | - 24.4 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: 07.04.2014

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 835 MHz

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.94$  S/m;  $\epsilon_r = 41.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.22, 6.22, 6.22); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

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

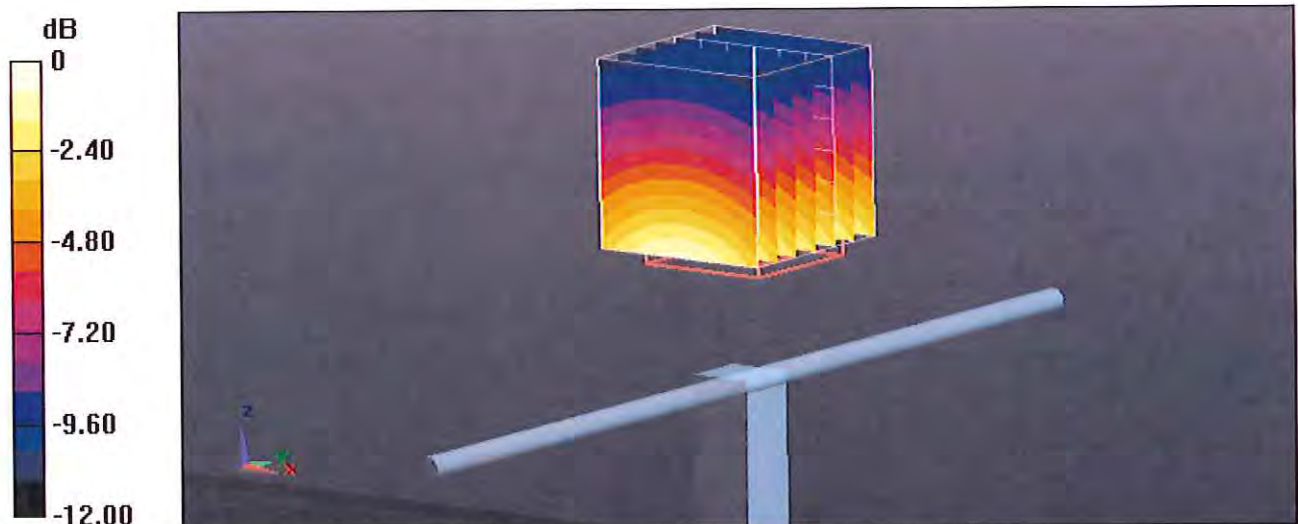
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 56.289 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 3.59 W/kg

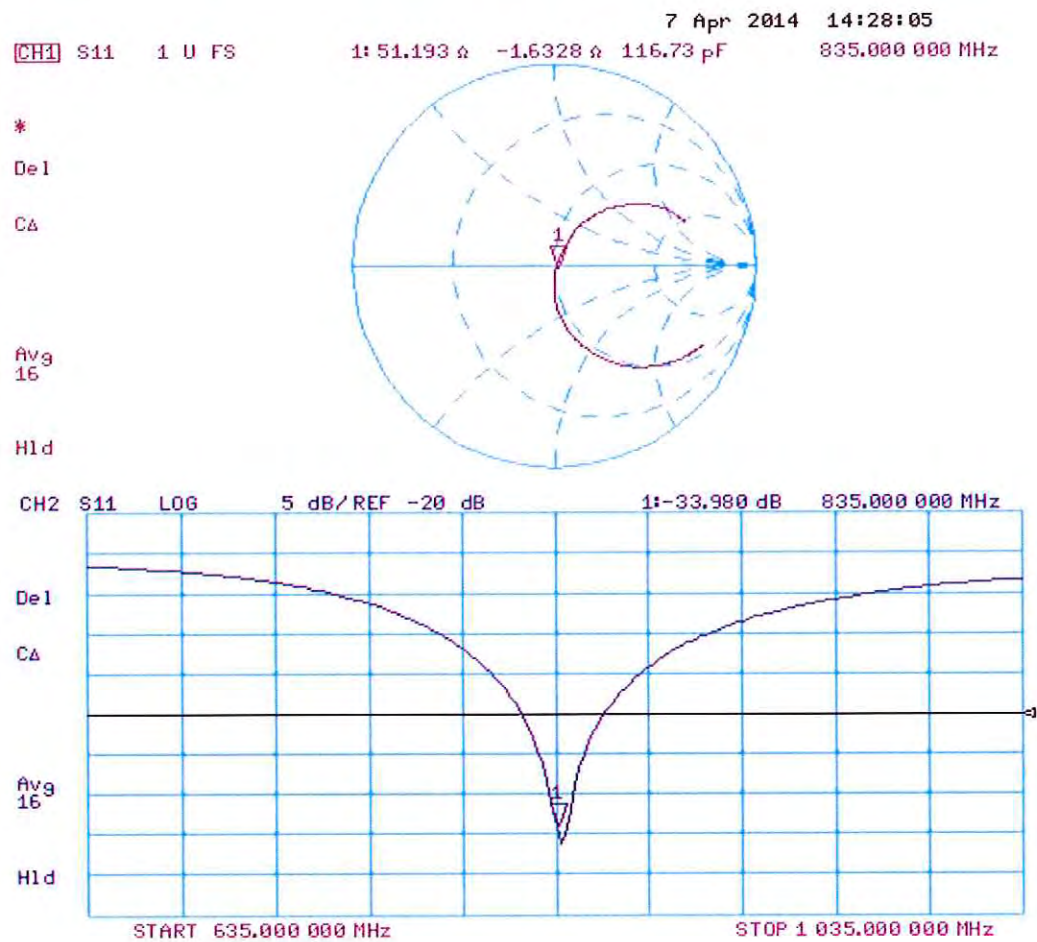
**SAR(1 g) = 2.38 W/kg; SAR(10 g) = 1.53 W/kg**

Maximum value of SAR (measured) = 2.80 W/kg



0 dB = 2.80 W/kg = 4.47 dBW/kg

### Impedance Measurement Plot for Head TSL



## DASY5 Validation Report for Body TSL

Date: 07.04.2014

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 835 MHz

Medium parameters used:  $f = 835$  MHz;  $\sigma = 1.02$  S/m;  $\epsilon_r = 53.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.09, 6.09, 6.09); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

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

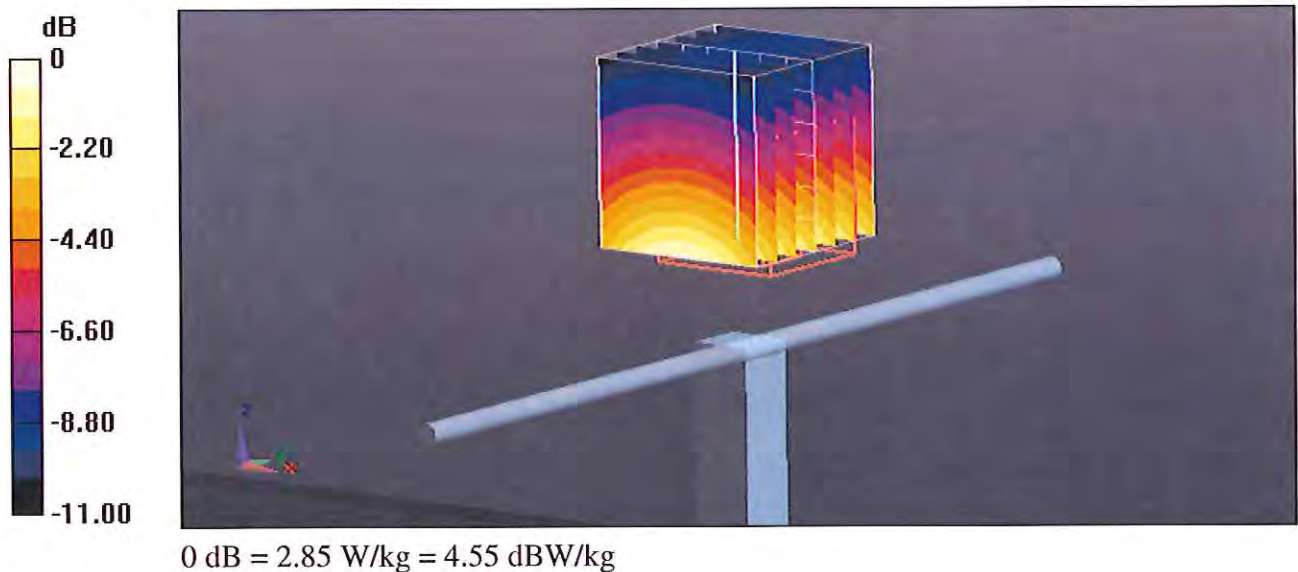
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 54.594 V/m; Power Drift = -0.01 dB

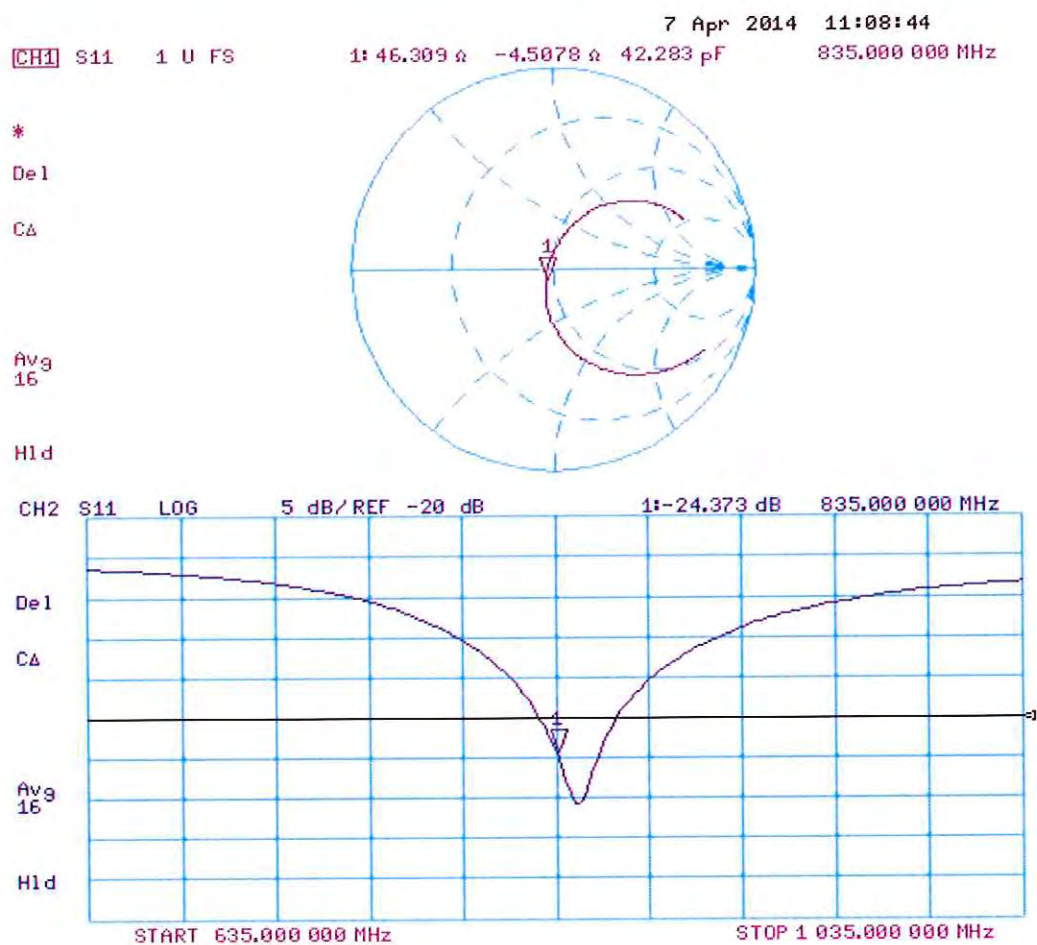
Peak SAR (extrapolated) = 3.61 W/kg

**SAR(1 g) = 2.44 W/kg; SAR(10 g) = 1.59 W/kg**

Maximum value of SAR (measured) = 2.85 W/kg



# Impedance Measurement Plot for Body TSL





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Accreditation No.: **SCS 108**

Client **PC Test**

Certificate No: **EX3-3589\_Jan14**

## CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:3589**

Calibration procedure(s) **QA CAL-01.v9, QA CAL-14.v4, QA CAL-23.v5, QA CAL-25.v6**  
**Calibration procedure for dosimetric E-field probes**

Calibration date: **January 29, 2014**

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      | 04-Apr-13 (No. 217-01733)         | Apr-14                 |
| Power sensor E4412A        | MY41498087      | 04-Apr-13 (No. 217-01733)         | Apr-14                 |
| Reference 3 dB Attenuator  | SN: S5054 (3c)  | 04-Apr-13 (No. 217-01737)         | Apr-14                 |
| Reference 20 dB Attenuator | SN: S5277 (20x) | 04-Apr-13 (No. 217-01735)         | Apr-14                 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 04-Apr-13 (No. 217-01738)         | Apr-14                 |
| Reference Probe ES3DV2     | SN: 3013        | 30-Dec-13 (No. ES3-3013_Dec13)    | Dec-14                 |
| DAE4                       | SN: 660         | 13-Dec-13 (No. DAE4-660_Dec13)    | Dec-14                 |
| Secondary Standards        | ID              | Check Date (in house)             | Scheduled Check        |
| RF generator HP 8648C      | US3642U01700    | 4-Aug-99 (in house check Apr-13)  | In house check: Apr-16 |
| Network Analyzer HP 8753E  | US37390585      | 18-Oct-01 (in house check Oct-13) | In house check: Oct-14 |

|                |                                |                                          |               |
|----------------|--------------------------------|------------------------------------------|---------------|
| 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>                 |               |

Issued: January 30, 2014

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### Glossary:

|                          |                                                                                                                                                         |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| TSL                      | tissue simulating liquid                                                                                                                                |
| NORM <sub>x,y,z</sub>    | sensitivity in free space                                                                                                                               |
| ConvF                    | sensitivity in TSL / NORM <sub>x,y,z</sub>                                                                                                              |
| DCP                      | diode compression point                                                                                                                                 |
| CF                       | crest factor (1/duty_cycle) of the RF signal                                                                                                            |
| A, B, C, D               | 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 |
| Connector Angle          | information used in DASY system to align probe sensor X to the robot coordinate system                                                                  |

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

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- 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>; D<sub>x,y,z</sub>; VR<sub>x,y,z</sub>**: A, B, C, D 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.
- Connector Angle**: The angle is assessed using the information gained by determining the NORM<sub>x</sub> (no uncertainty required).

# Probe EX3DV4

## SN:3589

Manufactured: March 30, 2006  
Calibrated: January 29, 2014

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

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3589

### Basic Calibration Parameters

|                                       | Sensor X | Sensor Y | Sensor Z | Unc (k=2) |
|---------------------------------------|----------|----------|----------|-----------|
| Norm ( $\mu V/(V/m)^2$ ) <sup>A</sup> | 0.46     | 0.40     | 0.40     | ± 10.1 %  |
| DCP (mV) <sup>B</sup>                 | 101.2    | 100.8    | 98.0     |           |

### Modulation Calibration Parameters

| UID       | Communication System Name                |   | A<br>dB | B<br>dB $\sqrt{\mu V}$ | C    | D<br>dB | VR<br>mV | Unc <sup>E</sup><br>(k=2) |
|-----------|------------------------------------------|---|---------|------------------------|------|---------|----------|---------------------------|
| 0         | CW                                       | X | 0.0     | 0.0                    | 1.0  | 0.00    | 150.4    | ±3.8 %                    |
|           |                                          | Y | 0.0     | 0.0                    | 1.0  |         | 142.3    |                           |
|           |                                          | Z | 0.0     | 0.0                    | 1.0  |         | 171.7    |                           |
| 10010-CAA | SAR Validation (Square, 100ms, 10ms)     | X | 6.00    | 69.5                   | 14.2 | 10.00   | 42.1     | ±0.9 %                    |
|           |                                          | Y | 7.03    | 71.8                   | 15.0 |         | 40.3     |                           |
|           |                                          | Z | 3.33    | 64.6                   | 12.1 |         | 44.6     |                           |
| 10011-CAA | UMTS-FDD (WCDMA)                         | X | 3.26    | 66.2                   | 17.8 | 2.91    | 117.6    | ±0.9 %                    |
|           |                                          | Y | 3.38    | 66.8                   | 18.2 |         | 113.0    |                           |
|           |                                          | Z | 2.79    | 62.4                   | 14.7 |         | 133.2    |                           |
| 10012-CAA | IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps) | X | 2.77    | 66.8                   | 17.4 | 1.87    | 117.4    | ±0.7 %                    |
|           |                                          | Y | 3.22    | 69.6                   | 18.8 |         | 113.5    |                           |
|           |                                          | Z | 2.22    | 62.0                   | 13.8 |         | 135.2    |                           |
| 10021-DAA | GSM-FDD (TDMA, GMSK)                     | X | 3.61    | 69.7                   | 16.6 | 9.39    | 91.2     | ±1.7 %                    |
|           |                                          | Y | 5.48    | 77.1                   | 19.6 |         | 125.1    |                           |
|           |                                          | Z | 2.18    | 62.5                   | 12.6 |         | 75.3     |                           |
| 10023-DAA | GPRS-FDD (TDMA, GMSK, TN 0)              | X | 3.01    | 66.4                   | 14.9 | 9.57    | 86.1     | ±2.7 %                    |
|           |                                          | Y | 7.02    | 82.0                   | 22.0 |         | 120.5    |                           |
|           |                                          | Z | 2.13    | 62.9                   | 12.7 |         | 71.4     |                           |
| 10024-DAA | GPRS-FDD (TDMA, GMSK, TN 0-1)            | X | 18.01   | 91.8                   | 22.6 | 6.56    | 132.3    | ±1.7 %                    |
|           |                                          | Y | 8.55    | 83.0                   | 19.9 |         | 134.3    |                           |
|           |                                          | Z | 4.04    | 72.4                   | 15.7 |         | 139.6    |                           |
| 10027-DAA | GPRS-FDD (TDMA, GMSK, TN 0-1-2)          | X | 4.70    | 74.7                   | 15.9 | 4.80    | 107.5    | ±1.7 %                    |
|           |                                          | Y | 4.94    | 76.1                   | 16.4 |         | 107.8    |                           |
|           |                                          | Z | 2.97    | 68.7                   | 12.8 |         | 127.1    |                           |
| 10028-DAA | GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)        | X | 67.89   | 99.9                   | 21.4 | 3.55    | 114.7    | ±2.7 %                    |
|           |                                          | Y | 48.02   | 99.7                   | 21.9 |         | 116.6    |                           |
|           |                                          | Z | 1.36    | 61.4                   | 7.8  |         | 134.4    |                           |
| 10032-CAA | IEEE 802.15.1 Bluetooth (GFSK, DH5)      | X | 97.41   | 97.0                   | 17.7 | 1.16    | 129.2    | ±3.0 %                    |
|           |                                          | Y | 71.47   | 99.8                   | 19.3 |         | 130.9    |                           |
|           |                                          | Z | 0.29    | 53.5                   | 0.9  |         | 109.2    |                           |
| 10039-CAA | CDMA2000 (1xRTT, RC1)                    | X | 4.62    | 65.4                   | 18.0 | 4.57    | 113.0    | ±1.7 %                    |
|           |                                          | Y | 4.74    | 66.1                   | 18.4 |         | 111.5    |                           |
|           |                                          | Z | 4.22    | 63.3                   | 15.9 |         | 133.6    |                           |
| 10062-CAA | IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps) | X | 10.10   | 67.8                   | 20.8 | 8.68    | 108.0    | ±2.7 %                    |
|           |                                          | Y | 10.07   | 68.1                   | 21.1 |         | 108.1    |                           |
|           |                                          | Z | 10.03   | 67.6                   | 20.2 |         | 130.3    |                           |

|           |                                               |   |       |      |      |      |       |        |
|-----------|-----------------------------------------------|---|-------|------|------|------|-------|--------|
| 10098-CAA | UMTS-FDD (HSUPA, Subtest 2)                   | X | 4.53  | 65.7 | 17.8 | 3.98 | 122.5 | ±0.9 % |
|           |                                               | Y | 4.72  | 66.6 | 18.4 |      | 123.1 |        |
|           |                                               | Z | 4.38  | 64.5 | 16.7 |      | 147.3 |        |
| 10100-CAB | LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)      | X | 6.32  | 66.5 | 18.8 | 5.67 | 126.9 | ±1.2 % |
|           |                                               | Y | 6.50  | 67.2 | 19.4 |      | 128.9 |        |
|           |                                               | Z | 5.80  | 64.3 | 17.3 |      | 107.2 |        |
| 10108-CAB | LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)      | X | 6.22  | 66.1 | 18.8 | 5.80 | 124.2 | ±1.7 % |
|           |                                               | Y | 6.39  | 66.9 | 19.4 |      | 126.7 |        |
|           |                                               | Z | 6.10  | 65.2 | 17.7 |      | 149.4 |        |
| 10110-CAB | LTE-FDD (SC-FDMA, 100% RB, 5 MHz, QPSK)       | X | 5.94  | 65.8 | 18.7 | 5.75 | 121.3 | ±1.7 % |
|           |                                               | Y | 6.05  | 66.3 | 19.1 |      | 123.1 |        |
|           |                                               | Z | 5.80  | 65.0 | 17.7 |      | 144.5 |        |
| 10114-CAA | IEEE 802.11n (HT Greenfield, 13.5 Mbps, BPSK) | X | 10.01 | 67.7 | 20.3 | 8.10 | 113.9 | ±2.5 % |
|           |                                               | Y | 10.16 | 68.3 | 20.8 |      | 117.0 |        |
|           |                                               | Z | 9.96  | 67.5 | 19.8 |      | 135.3 |        |
| 10117-CAA | IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)      | X | 10.07 | 67.9 | 20.4 | 8.07 | 115.2 | ±2.5 % |
|           |                                               | Y | 10.16 | 68.2 | 20.7 |      | 118.4 |        |
|           |                                               | Z | 10.02 | 67.7 | 19.9 |      | 138.0 |        |
| 10151-CAB | LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)       | X | 7.89  | 68.4 | 21.8 | 9.28 | 108.1 | ±1.9 % |
|           |                                               | Y | 8.15  | 69.7 | 22.8 |      | 109.4 |        |
|           |                                               | Z | 7.38  | 66.5 | 20.4 |      | 123.2 |        |
| 10154-CAB | LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)       | X | 5.94  | 65.7 | 18.6 | 5.75 | 122.1 | ±1.7 % |
|           |                                               | Y | 6.03  | 66.3 | 19.0 |      | 122.5 |        |
|           |                                               | Z | 5.79  | 65.0 | 17.7 |      | 144.0 |        |
| 10160-CAB | LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)       | X | 6.38  | 66.3 | 18.9 | 5.82 | 126.0 | ±1.7 % |
|           |                                               | Y | 6.54  | 67.0 | 19.4 |      | 128.2 |        |
|           |                                               | Z | 6.16  | 65.3 | 17.8 |      | 146.9 |        |
| 10169-CAB | LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)         | X | 5.17  | 66.5 | 19.2 | 5.73 | 149.7 | ±1.2 % |
|           |                                               | Y | 4.95  | 65.8 | 19.0 |      | 108.3 |        |
|           |                                               | Z | 4.64  | 63.9 | 17.1 |      | 125.3 |        |
| 10172-CAB | LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)         | X | 6.79  | 70.4 | 23.0 | 9.21 | 120.6 | ±3.0 % |
|           |                                               | Y | 6.96  | 72.0 | 24.2 |      | 122.8 |        |
|           |                                               | Z | 6.43  | 69.3 | 22.0 |      | 136.7 |        |
| 10175-CAB | LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)         | X | 5.15  | 66.4 | 19.1 | 5.72 | 143.0 | ±1.4 % |
|           |                                               | Y | 5.23  | 67.1 | 19.6 |      | 145.8 |        |
|           |                                               | Z | 4.60  | 63.7 | 17.0 |      | 121.1 |        |
| 10181-CAB | LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)         | X | 5.11  | 66.2 | 19.0 | 5.72 | 141.0 | ±1.4 % |
|           |                                               | Y | 5.27  | 67.3 | 19.7 |      | 144.9 |        |
|           |                                               | Z | 4.54  | 63.4 | 16.8 |      | 119.2 |        |
| 10193-CAA | IEEE 802.11n (HT Greenfield, 6.5 Mbps, BPSK)  | X | 9.57  | 67.1 | 20.1 | 8.09 | 102.2 | ±2.2 % |
|           |                                               | Y | 9.59  | 67.4 | 20.4 |      | 105.3 |        |
|           |                                               | Z | 9.73  | 67.6 | 20.0 |      | 129.6 |        |
| 10196-CAA | IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)       | X | 9.61  | 67.3 | 20.2 | 8.10 | 104.6 | ±2.5 % |
|           |                                               | Y | 9.63  | 67.6 | 20.5 |      | 107.8 |        |
|           |                                               | Z | 9.63  | 67.3 | 19.8 |      | 130.9 |        |

|           |                                                           |   |       |      |      |      |       |        |
|-----------|-----------------------------------------------------------|---|-------|------|------|------|-------|--------|
| 10219-CAA | IEEE 802.11n (HT Mixed, 7.2 Mbps, BPSK)                   | X | 9.61  | 67.5 | 20.3 | 8.03 | 109.2 | ±2.7 % |
|           |                                                           | Y | 9.54  | 67.5 | 20.4 |      | 107.4 |        |
|           |                                                           | Z | 9.53  | 67.2 | 19.7 |      | 130.7 |        |
| 10222-CAA | IEEE 802.11n (HT Mixed, 15 Mbps, BPSK)                    | X | 10.00 | 67.8 | 20.4 | 8.06 | 114.1 | ±2.7 % |
|           |                                                           | Y | 10.01 | 68.0 | 20.6 |      | 112.3 |        |
|           |                                                           | Z | 9.96  | 67.6 | 19.9 |      | 137.1 |        |
| 10225-CAA | UMTS-FDD (HSPA+)                                          | X | 7.18  | 66.9 | 19.2 | 5.97 | 137.5 | ±1.4 % |
|           |                                                           | Y | 7.25  | 67.4 | 19.5 |      | 134.4 |        |
|           |                                                           | Z | 6.48  | 64.4 | 17.3 |      | 114.6 |        |
| 10237-CAB | LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)                     | X | 6.93  | 71.0 | 23.5 | 9.21 | 123.5 | ±3.0 % |
|           |                                                           | Y | 6.88  | 71.6 | 24.0 |      | 119.3 |        |
|           |                                                           | Z | 6.63  | 70.1 | 22.4 |      | 141.3 |        |
| 10252-CAB | LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)                   | X | 8.19  | 70.5 | 23.1 | 9.24 | 142.9 | ±2.5 % |
|           |                                                           | Y | 8.46  | 72.0 | 24.2 |      | 143.3 |        |
|           |                                                           | Z | 7.10  | 67.0 | 20.8 |      | 119.9 |        |
| 10267-CAB | LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK)                  | X | 7.83  | 68.1 | 21.6 | 9.30 | 104.2 | ±2.2 % |
|           |                                                           | Y | 8.07  | 69.4 | 22.7 |      | 103.0 |        |
|           |                                                           | Z | 7.49  | 67.2 | 20.9 |      | 125.2 |        |
| 10274-CAA | UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.10)                 | X | 5.96  | 66.2 | 18.3 | 4.87 | 128.1 | ±1.7 % |
|           |                                                           | Y | 6.12  | 67.0 | 18.8 |      | 126.0 |        |
|           |                                                           | Z | 5.31  | 63.8 | 16.4 |      | 110.2 |        |
| 10275-CAA | UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.4)                  | X | 4.30  | 65.5 | 17.8 | 3.96 | 110.5 | ±1.2 % |
|           |                                                           | Y | 4.47  | 66.4 | 18.4 |      | 110.3 |        |
|           |                                                           | Z | 3.92  | 63.1 | 15.6 |      | 135.7 |        |
| 10291-AAA | CDMA2000, RC3, SO55, Full Rate                            | X | 3.59  | 65.7 | 17.7 | 3.46 | 138.1 | ±1.2 % |
|           |                                                           | Y | 3.85  | 67.2 | 18.6 |      | 146.7 |        |
|           |                                                           | Z | 3.08  | 61.7 | 14.7 |      | 123.3 |        |
| 10292-AAA | CDMA2000, RC3, SO32, Full Rate                            | X | 3.59  | 66.0 | 17.8 | 3.39 | 144.2 | ±0.9 % |
|           |                                                           | Y | 3.83  | 67.5 | 18.7 |      | 148.4 |        |
|           |                                                           | Z | 3.18  | 63.1 | 15.7 |      | 128.6 |        |
| 10297-AAA | LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)                   | X | 6.13  | 65.8 | 18.7 | 5.81 | 116.5 | ±1.7 % |
|           |                                                           | Y | 6.30  | 66.6 | 19.2 |      | 119.4 |        |
|           |                                                           | Z | 6.20  | 65.9 | 18.4 |      | 145.6 |        |
| 10311-AAA | LTE-FDD (SC-FDMA, 100% RB, 15 MHz, QPSK)                  | X | 6.70  | 66.4 | 19.0 | 6.06 | 122.5 | ±1.4 % |
|           |                                                           | Y | 6.92  | 67.3 | 19.6 |      | 124.5 |        |
|           |                                                           | Z | 6.28  | 65.0 | 17.9 |      | 103.7 |        |
| 10315-AAA | IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 96pc duty cycle) | X | 2.66  | 66.7 | 17.4 | 1.71 | 109.5 | ±0.7 % |
|           |                                                           | Y | 3.18  | 70.0 | 19.2 |      | 111.5 |        |
|           |                                                           | Z | 2.08  | 61.6 | 13.4 |      | 134.4 |        |
| 10317-AAA | IEEE 802.11a WiFi 5 GHz (OFDM, 6 Mbps, 96pc duty cycle)   | X | 9.78  | 67.4 | 20.4 | 8.36 | 103.5 | ±2.5 % |
|           |                                                           | Y | 9.81  | 67.7 | 20.7 |      | 107.1 |        |
|           |                                                           | Z | 9.86  | 67.6 | 20.3 |      | 129.5 |        |
| 10400-AAA | IEEE 802.11ac WiFi (20MHz, 64-QAM, 99pc duty cycle)       | X | 9.86  | 67.5 | 20.4 | 8.37 | 104.9 | ±2.7 % |
|           |                                                           | Y | 9.93  | 67.9 | 20.8 |      | 107.9 |        |
|           |                                                           | Z | 9.97  | 67.7 | 20.2 |      | 134.3 |        |

|           |                                                     |   |       |      |      |      |       |        |
|-----------|-----------------------------------------------------|---|-------|------|------|------|-------|--------|
| 10402-AAA | IEEE 802.11ac WiFi (80MHz, 64-QAM, 99pc duty cycle) | X | 10.47 | 67.9 | 20.5 | 8.53 | 109.9 | ±3.0 % |
|           |                                                     | Y | 10.86 | 68.8 | 21.1 |      | 116.0 |        |
|           |                                                     | Z | 10.68 | 68.2 | 20.4 |      | 142.5 |        |
| 10403-AAA | CDMA2000 (1xEV-DO, Rev. 0)                          | X | 4.74  | 67.0 | 17.9 | 3.76 | 114.9 | ±0.9 % |
|           |                                                     | Y | 5.02  | 68.5 | 18.7 |      | 116.6 |        |
|           |                                                     | Z | 4.23  | 64.4 | 15.8 |      | 145.1 |        |
| 10404-AAA | CDMA2000 (1xEV-DO, Rev. A)                          | X | 4.71  | 67.1 | 17.9 | 3.77 | 112.3 | ±1.4 % |
|           |                                                     | Y | 4.95  | 68.5 | 18.7 |      | 115.0 |        |
|           |                                                     | Z | 4.01  | 63.4 | 15.1 |      | 138.9 |        |

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 8 and 9).

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

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

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3589

### 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 <sup>G</sup> | Depth <sup>G</sup> (mm) | Uct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|--------------------|-------------------------|------------|
| 750                  | 41.9                               | 0.89                            | 8.86    | 8.86    | 8.86    | 0.80               | 0.62                    | ± 12.0 %   |
| 835                  | 41.5                               | 0.90                            | 8.49    | 8.49    | 8.49    | 0.45               | 0.82                    | ± 12.0 %   |
| 1750                 | 40.1                               | 1.37                            | 7.31    | 7.31    | 7.31    | 0.80               | 0.60                    | ± 12.0 %   |
| 1900                 | 40.0                               | 1.40                            | 7.05    | 7.05    | 7.05    | 0.52               | 0.73                    | ± 12.0 %   |
| 2450                 | 39.2                               | 1.80                            | 6.45    | 6.45    | 6.45    | 0.29               | 1.08                    | ± 12.0 %   |
| 2600                 | 39.0                               | 1.96                            | 6.24    | 6.24    | 6.24    | 0.76               | 0.62                    | ± 12.0 %   |
| 5200                 | 36.0                               | 4.66                            | 4.78    | 4.78    | 4.78    | 0.30               | 1.80                    | ± 13.1 %   |
| 5300                 | 35.9                               | 4.76                            | 4.58    | 4.58    | 4.58    | 0.30               | 1.80                    | ± 13.1 %   |
| 5500                 | 35.6                               | 4.96                            | 4.44    | 4.44    | 4.44    | 0.31               | 1.80                    | ± 13.1 %   |
| 5600                 | 35.5                               | 5.07                            | 4.20    | 4.20    | 4.20    | 0.35               | 1.80                    | ± 13.1 %   |
| 5800                 | 35.3                               | 5.27                            | 4.39    | 4.39    | 4.39    | 0.32               | 1.80                    | ± 13.1 %   |

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

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

<sup>G</sup> Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3589

### Calibration Parameter Determined in Body Tissue Simulating Media

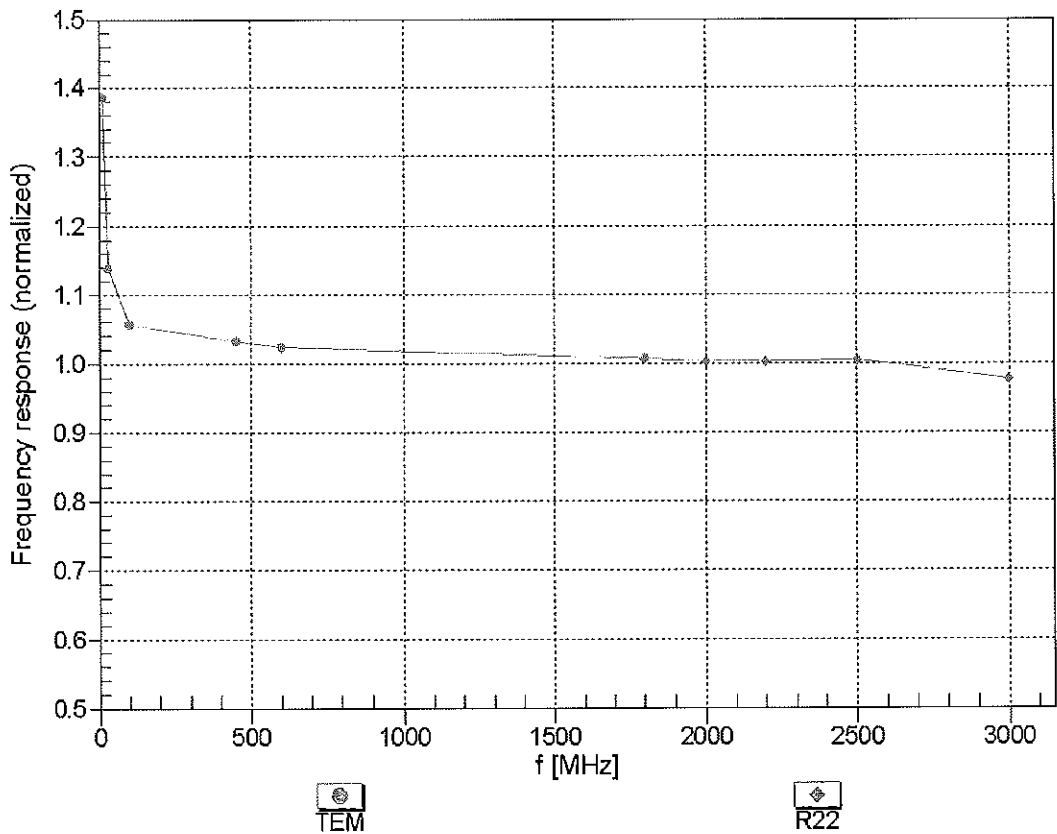
| f (MHz) <sup>C</sup> | Relative Permittivity <sup>F</sup> | Conductivity (S/m) <sup>F</sup> | ConvF X | ConvF Y | ConvF Z | Alpha <sup>G</sup> | Depth <sup>G</sup> (mm) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|--------------------|-------------------------|-------------|
| 750                  | 55.5                               | 0.96                            | 8.34    | 8.34    | 8.34    | 0.66               | 0.72                    | ± 12.0 %    |
| 835                  | 55.2                               | 0.97                            | 8.29    | 8.29    | 8.29    | 0.31               | 1.11                    | ± 12.0 %    |
| 1750                 | 53.4                               | 1.49                            | 6.68    | 6.68    | 6.68    | 0.80               | 0.61                    | ± 12.0 %    |
| 1900                 | 53.3                               | 1.52                            | 6.54    | 6.54    | 6.54    | 0.72               | 0.64                    | ± 12.0 %    |
| 2450                 | 52.7                               | 1.95                            | 6.26    | 6.26    | 6.26    | 0.80               | 0.57                    | ± 12.0 %    |
| 2600                 | 52.5                               | 2.16                            | 6.08    | 6.08    | 6.08    | 0.68               | 0.50                    | ± 12.0 %    |
| 5200                 | 49.0                               | 5.30                            | 4.19    | 4.19    | 4.19    | 0.38               | 1.90                    | ± 13.1 %    |
| 5300                 | 48.9                               | 5.42                            | 3.98    | 3.98    | 3.98    | 0.38               | 1.90                    | ± 13.1 %    |
| 5500                 | 48.6                               | 5.65                            | 3.76    | 3.76    | 3.76    | 0.42               | 1.90                    | ± 13.1 %    |
| 5600                 | 48.5                               | 5.77                            | 3.81    | 3.81    | 3.81    | 0.30               | 1.90                    | ± 13.1 %    |
| 5800                 | 48.2                               | 6.00                            | 3.97    | 3.97    | 3.97    | 0.43               | 1.90                    | ± 13.1 %    |

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

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

<sup>G</sup> Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

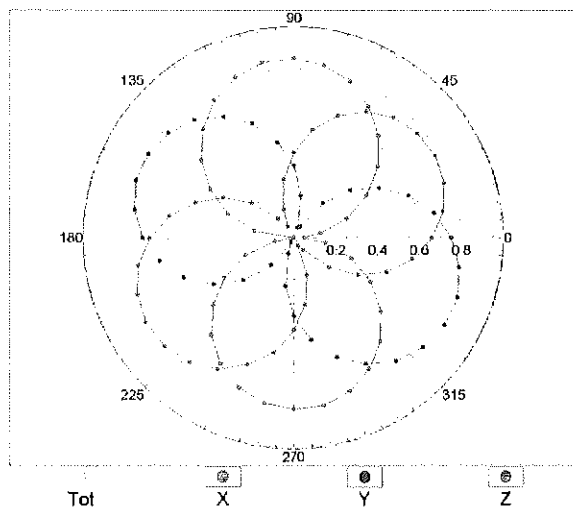
**Frequency Response of E-Field**  
(TEM-Cell:ifi110 EXX, Waveguide: R22)



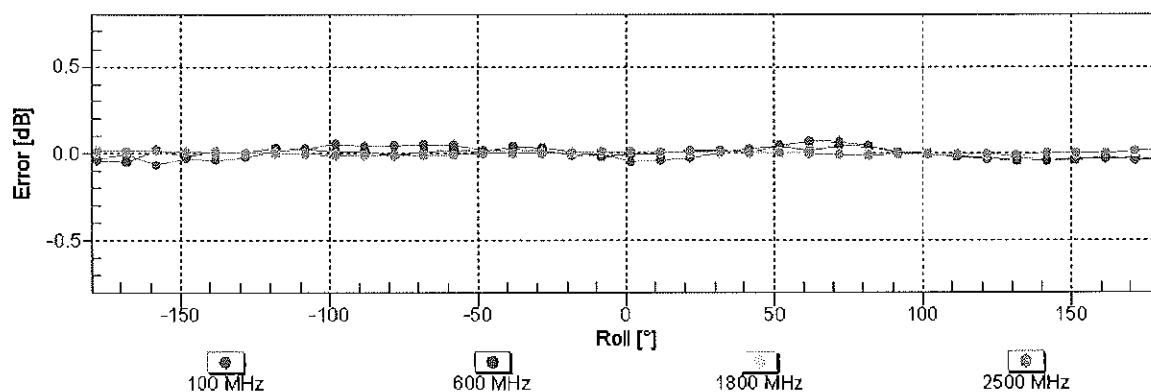
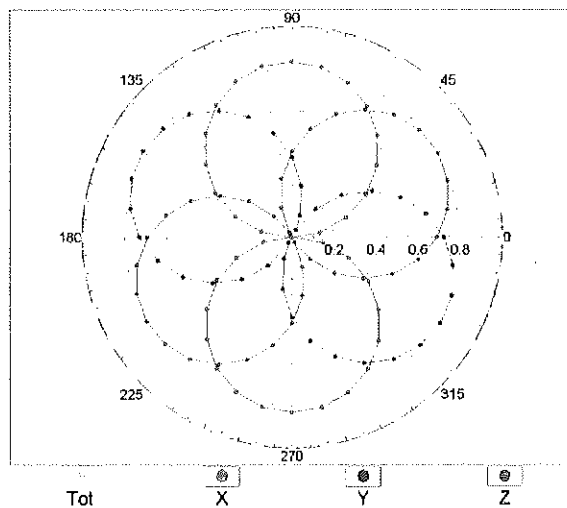
Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  (k=2)

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

f=600 MHz,TEM



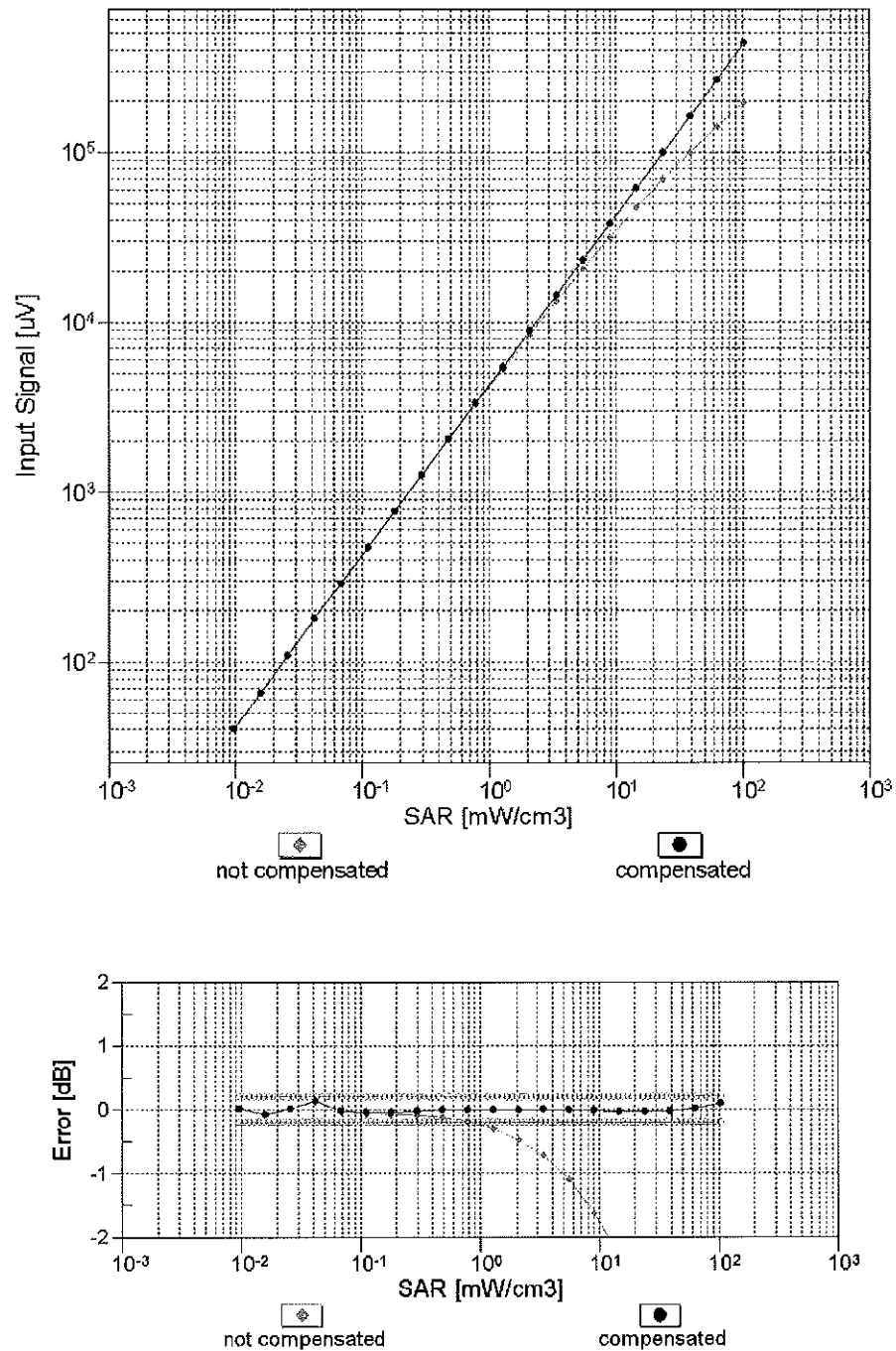
f=1800 MHz,R22



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

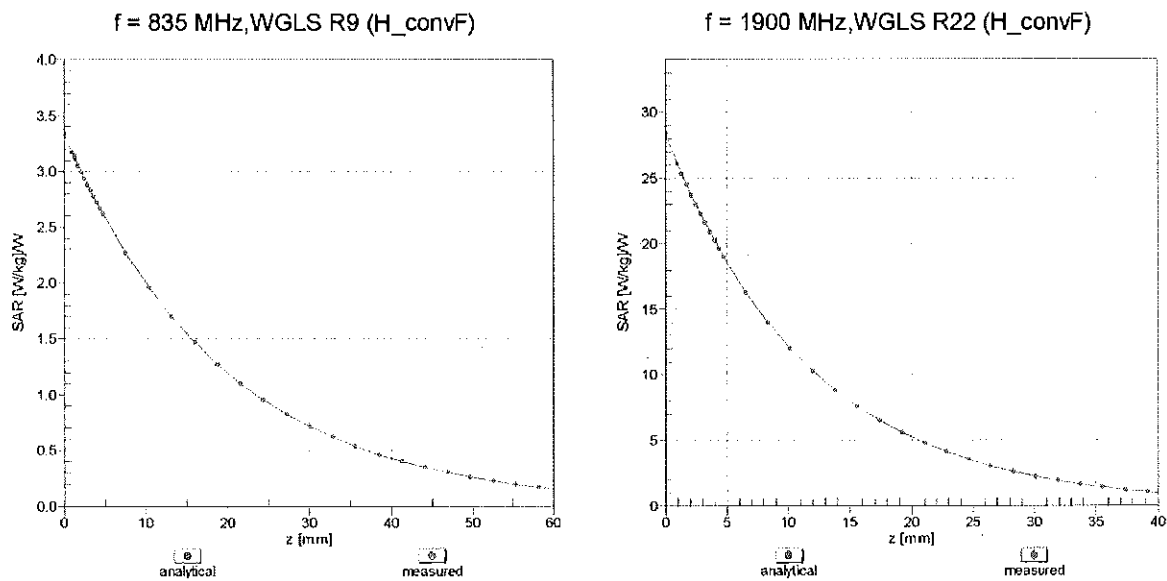
## Dynamic Range f(SAR<sub>head</sub>)

(TEM cell , f = 900 MHz)

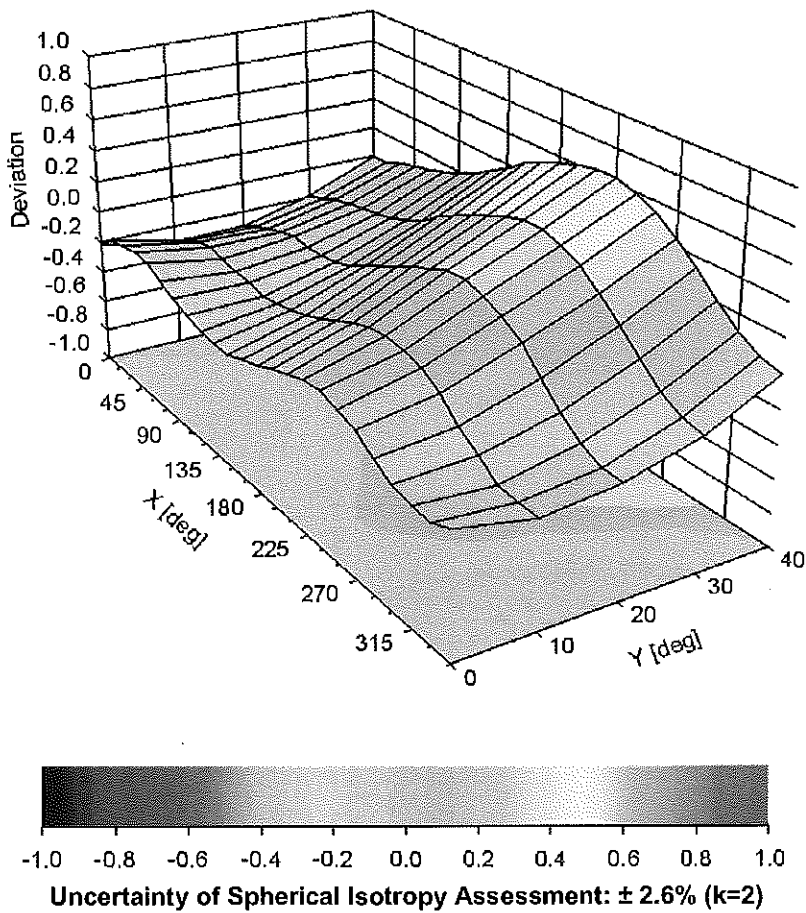


Uncertainty of Linearity Assessment:  $\pm 0.6\%$  ( $k=2$ )

# Conversion Factor Assessment



## Deviation from Isotropy in Liquid Error ( $\phi, \vartheta$ ), f = 900 MHz



## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3589

### Other Probe Parameters

|                                               |            |
|-----------------------------------------------|------------|
| Sensor Arrangement                            | Triangular |
| Connector Angle (°)                           | -38.2      |
| Mechanical Surface Detection Mode             | enabled    |
| Optical Surface Detection Mode                | disabled   |
| Probe Overall Length                          | 337 mm     |
| Probe Body Diameter                           | 10 mm      |
| Tip Length                                    | 9 mm       |
| Tip Diameter                                  | 2.5 mm     |
| Probe Tip to Sensor X Calibration Point       | 1 mm       |
| Probe Tip to Sensor Y Calibration Point       | 1 mm       |
| Probe Tip to Sensor Z Calibration Point       | 1 mm       |
| Recommended Measurement Distance from Surface | 2 mm       |



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: **ES3-3258\_Feb14**

## CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3258**

Calibration procedure(s) **QA CAL-01.v9, QA CAL-23.v5, QA CAL-25.v6**  
**Calibration procedure for dosimetric E-field probes**

CCV  
 3/6/14

Calibration date: **February 25, 2014**

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 E4419B         | GB41293874      | 04-Apr-13 (No. 217-01733)         | Apr-14                 |
| Power sensor E4412A        | MY41498087      | 04-Apr-13 (No. 217-01733)         | Apr-14                 |
| Reference 3 dB Attenuator  | SN: S5054 (3c)  | 04-Apr-13 (No. 217-01737)         | Apr-14                 |
| Reference 20 dB Attenuator | SN: S5277 (20x) | 04-Apr-13 (No. 217-01735)         | Apr-14                 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 04-Apr-13 (No. 217-01738)         | Apr-14                 |
| Reference Probe ES3DV2     | SN: 3013        | 30-Dec-13 (No. ES3-3013_Dec13)    | Dec-14                 |
| DAE4                       | SN: 660         | 13-Dec-13 (No. DAE4-660_Dec13)    | Dec-14                 |
| Secondary Standards        | ID              | Check Date (in house)             | Scheduled Check        |
| RF generator HP 8648C      | US3642U01700    | 4-Aug-99 (in house check Apr-13)  | In house check: Apr-16 |
| Network Analyzer HP 8753E  | US37390585      | 18-Oct-01 (in house check Oct-13) | In house check: Oct-14 |

|                                                                                                                 |                               |                                          |                           |
|-----------------------------------------------------------------------------------------------------------------|-------------------------------|------------------------------------------|---------------------------|
| 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 27, 2014 |
| This calibration certificate shall not be reproduced except in full without written approval of the laboratory. |                               |                                          |                           |



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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                                                                                                                                |
| 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, D               | 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 |
| Connector Angle          | information used in DASY system to align probe sensor X to the robot coordinate system                                                                  |

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

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- 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>; D<sub>x,y,z</sub>; VR<sub>x,y,z</sub>**: A, B, C, D 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.
- Connector Angle**: The angle is assessed using the information gained by determining the NORM<sub>x</sub> (no uncertainty required).

# Probe ES3DV3

## SN:3258

Manufactured: January 25, 2010  
Calibrated: February 25, 2014

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 ( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>A</sup> | 1.29     | 1.19     | 1.23     | $\pm 10.1 \%$ |
| DCP (mV) <sup>B</sup>                                     | 104.5    | 107.0    | 103.0    |               |

## Modulation Calibration Parameters

| UID           | Communication System Name                |   | A<br>dB | B<br>dB $\sqrt{\mu\text{V}}$ | C    | D<br>dB | VR<br>mV | Unc <sup>E</sup><br>(k=2) |
|---------------|------------------------------------------|---|---------|------------------------------|------|---------|----------|---------------------------|
| 0             | CW                                       | X | 0.0     | 0.0                          | 1.0  | 0.00    | 222.4    | $\pm 3.8 \%$              |
|               |                                          | Y | 0.0     | 0.0                          | 1.0  |         | 202.2    |                           |
|               |                                          | Z | 0.0     | 0.0                          | 1.0  |         | 207.1    |                           |
| 10010-<br>CAA | SAR Validation (Square, 100ms, 10ms)     | X | 5.09    | 65.6                         | 14.1 | 10.00   | 44.8     | $\pm 1.9 \%$              |
|               |                                          | Y | 1.68    | 57.4                         | 9.3  |         | 40.7     |                           |
|               |                                          | Z | 4.01    | 62.4                         | 13.0 |         | 51.1     |                           |
| 10011-<br>CAB | UMTS-FDD (WCDMA)                         | X | 3.34    | 67.5                         | 18.9 | 2.91    | 131.2    | $\pm 0.5 \%$              |
|               |                                          | Y | 3.43    | 67.9                         | 18.7 |         | 137.1    |                           |
|               |                                          | Z | 3.42    | 67.8                         | 19.0 |         | 146.0    |                           |
| 10012-<br>CAA | IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps) | X | 3.40    | 70.9                         | 19.8 | 1.87    | 134.2    | $\pm 0.7 \%$              |
|               |                                          | Y | 3.19    | 70.2                         | 19.2 |         | 137.9    |                           |
|               |                                          | Z | 3.46    | 70.8                         | 19.6 |         | 149.6    |                           |
| 10021-<br>DAB | GSM-FDD (TDMA, GMSK)                     | X | 30.24   | 99.7                         | 28.7 | 9.39    | 131.2    | $\pm 1.4 \%$              |
|               |                                          | Y | 12.91   | 88.5                         | 23.9 |         | 147.5    |                           |
|               |                                          | Z | 30.37   | 99.5                         | 28.9 |         | 128.0    |                           |
| 10023-<br>DAB | GPRS-FDD (TDMA, GMSK, TN 0)              | X | 29.88   | 100.0                        | 29.0 | 9.57    | 123.0    | $\pm 1.9 \%$              |
|               |                                          | Y | 16.02   | 92.5                         | 25.4 |         | 140.7    |                           |
|               |                                          | Z | 30.01   | 100.0                        | 29.4 |         | 125.8    |                           |
| 10024-<br>DAB | GPRS-FDD (TDMA, GMSK, TN 0-1)            | X | 44.57   | 99.7                         | 25.9 | 6.56    | 119.6    | $\pm 1.7 \%$              |
|               |                                          | Y | 28.97   | 95.3                         | 23.2 |         | 127.6    |                           |
|               |                                          | Z | 43.72   | 99.8                         | 26.3 |         | 120.1    |                           |
| 10027-<br>DAB | GPRS-FDD (TDMA, GMSK, TN 0-1-2)          | X | 53.52   | 99.7                         | 24.4 | 4.80    | 129.4    | $\pm 2.2 \%$              |
|               |                                          | Y | 54.55   | 99.9                         | 22.9 |         | 143.3    |                           |
|               |                                          | Z | 51.63   | 99.7                         | 24.8 |         | 127.5    |                           |
| 10028-<br>DAB | GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)        | X | 58.93   | 99.8                         | 23.4 | 3.55    | 133.4    | $\pm 2.2 \%$              |
|               |                                          | Y | 77.54   | 99.7                         | 21.3 |         | 125.3    |                           |
|               |                                          | Z | 56.64   | 99.8                         | 23.8 |         | 130.8    |                           |
| 10032-<br>CAA | IEEE 802.15.1 Bluetooth (GFSK, DH5)      | X | 47.03   | 99.5                         | 21.3 | 1.16    | 136.3    | $\pm 1.7 \%$              |
|               |                                          | Y | 95.86   | 95.2                         | 17.1 |         | 138.2    |                           |
|               |                                          | Z | 39.68   | 100.0                        | 22.2 |         | 132.3    |                           |
| 10039-<br>CAB | CDMA2000 (1xRTT, RC1)                    | X | 4.84    | 66.8                         | 19.1 | 4.57    | 131.3    | $\pm 0.9 \%$              |
|               |                                          | Y | 4.75    | 67.0                         | 18.9 |         | 135.2    |                           |
|               |                                          | Z | 4.86    | 66.7                         | 19.0 |         | 127.2    |                           |

|           |                                               |   |       |      |      |      |       |        |
|-----------|-----------------------------------------------|---|-------|------|------|------|-------|--------|
| 10081-CAB | CDMA2000 (1xRTT, RC3)                         | X | 4.06  | 66.8 | 19.0 | 3.97 | 148.4 | ±0.7 % |
|           |                                               | Y | 3.96  | 66.6 | 18.6 |      | 134.7 |        |
|           |                                               | Z | 4.13  | 66.9 | 19.1 |      | 143.4 |        |
| 10098-CAB | UMTS-FDD (HSUPA, Subtest 2)                   | X | 4.63  | 66.8 | 18.7 | 3.98 | 137.3 | ±0.7 % |
|           |                                               | Y | 4.75  | 67.5 | 18.8 |      | 148.4 |        |
|           |                                               | Z | 4.65  | 66.7 | 18.7 |      | 133.2 |        |
| 10100-CAB | LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)      | X | 6.66  | 68.5 | 20.3 | 5.67 | 144.0 | ±1.2 % |
|           |                                               | Y | 6.27  | 67.1 | 19.3 |      | 130.6 |        |
|           |                                               | Z | 6.62  | 68.2 | 20.1 |      | 140.5 |        |
| 10108-CAB | LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)      | X | 6.53  | 68.0 | 20.2 | 5.80 | 142.6 | ±1.4 % |
|           |                                               | Y | 6.17  | 66.8 | 19.3 |      | 129.2 |        |
|           |                                               | Z | 6.52  | 67.8 | 20.1 |      | 139.0 |        |
| 10110-CAB | LTE-FDD (SC-FDMA, 100% RB, 5 MHz, QPSK)       | X | 6.19  | 67.3 | 19.9 | 5.75 | 137.9 | ±1.4 % |
|           |                                               | Y | 6.12  | 67.3 | 19.6 |      | 149.5 |        |
|           |                                               | Z | 6.19  | 67.1 | 19.8 |      | 136.1 |        |
| 10114-CAA | IEEE 802.11n (HT Greenfield, 13.5 Mbps, BPSK) | X | 10.49 | 69.5 | 21.7 | 8.10 | 132.4 | ±2.5 % |
|           |                                               | Y | 10.23 | 69.1 | 21.3 |      | 144.3 |        |
|           |                                               | Z | 10.45 | 69.3 | 21.6 |      | 129.5 |        |
| 10117-CAA | IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)      | X | 10.46 | 69.5 | 21.7 | 8.07 | 133.9 | ±2.5 % |
|           |                                               | Y | 10.26 | 69.2 | 21.3 |      | 147.4 |        |
|           |                                               | Z | 10.47 | 69.4 | 21.7 |      | 130.5 |        |
| 10151-CAB | LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)       | X | 11.61 | 77.4 | 26.8 | 9.28 | 118.8 | ±3.0 % |
|           |                                               | Y | 9.89  | 75.2 | 25.7 |      | 144.9 |        |
|           |                                               | Z | 12.01 | 77.8 | 26.9 |      | 119.6 |        |
| 10154-CAB | LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)       | X | 6.20  | 67.3 | 19.9 | 5.75 | 139.2 | ±1.2 % |
|           |                                               | Y | 5.86  | 66.2 | 19.0 |      | 128.5 |        |
|           |                                               | Z | 6.22  | 67.3 | 19.9 |      | 136.3 |        |
| 10160-CAB | LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)       | X | 6.63  | 67.8 | 20.1 | 5.82 | 144.1 | ±1.4 % |
|           |                                               | Y | 6.31  | 66.8 | 19.3 |      | 133.1 |        |
|           |                                               | Z | 6.66  | 67.7 | 20.0 |      | 140.9 |        |
| 10169-CAB | LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)         | X | 5.25  | 67.5 | 20.2 | 5.73 | 143.6 | ±1.2 % |
|           |                                               | Y | 4.92  | 66.7 | 19.5 |      | 131.0 |        |
|           |                                               | Z | 5.29  | 67.4 | 20.2 |      | 140.7 |        |
| 10172-CAB | LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)         | X | 13.49 | 87.5 | 31.6 | 9.21 | 139.0 | ±2.7 % |
|           |                                               | Y | 7.83  | 75.5 | 26.0 |      | 124.9 |        |
|           |                                               | Z | 13.47 | 86.5 | 31.1 |      | 137.8 |        |
| 10175-CAB | LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)         | X | 5.22  | 67.4 | 20.1 | 5.72 | 144.3 | ±1.4 % |
|           |                                               | Y | 5.08  | 67.5 | 19.9 |      | 147.9 |        |
|           |                                               | Z | 5.26  | 67.2 | 20.0 |      | 139.6 |        |
| 10181-CAB | LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)         | X | 5.24  | 67.5 | 20.1 | 5.72 | 144.5 | ±1.2 % |
|           |                                               | Y | 5.06  | 67.4 | 19.8 |      | 147.0 |        |
|           |                                               | Z | 5.29  | 67.3 | 20.1 |      | 139.2 |        |

|           |                                              |   |       |      |      |      |       |        |
|-----------|----------------------------------------------|---|-------|------|------|------|-------|--------|
| 10193-CAA | IEEE 802.11n (HT Greenfield, 6.5 Mbps, BPSK) | X | 10.12 | 69.1 | 21.6 | 8.09 | 128.8 | ±2.2 % |
|           |                                              | Y | 9.76  | 68.4 | 21.0 |      | 132.8 |        |
|           |                                              | Z | 10.08 | 68.9 | 21.5 |      | 123.4 |        |
| 10196-CAA | IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)      | X | 10.15 | 69.2 | 21.7 | 8.10 | 130.2 | ±2.2 % |
|           |                                              | Y | 9.77  | 68.5 | 21.0 |      | 134.1 |        |
|           |                                              | Z | 10.10 | 69.0 | 21.5 |      | 124.0 |        |
| 10219-CAA | IEEE 802.11n (HT Mixed, 7.2 Mbps, BPSK)      | X | 10.02 | 69.0 | 21.5 | 8.03 | 128.7 | ±2.2 % |
|           |                                              | Y | 9.67  | 68.5 | 21.0 |      | 133.3 |        |
|           |                                              | Z | 10.02 | 68.9 | 21.5 |      | 123.9 |        |
| 10222-CAA | IEEE 802.11n (HT Mixed, 15 Mbps, BPSK)       | X | 10.46 | 69.6 | 21.7 | 8.06 | 134.0 | ±2.2 % |
|           |                                              | Y | 10.09 | 68.8 | 21.1 |      | 139.7 |        |
|           |                                              | Z | 10.40 | 69.3 | 21.6 |      | 128.7 |        |
| 10225-CAB | UMTS-FDD (HSPA+)                             | X | 7.09  | 67.1 | 19.6 | 5.97 | 131.2 | ±1.4 % |
|           |                                              | Y | 6.98  | 67.2 | 19.4 |      | 138.0 |        |
|           |                                              | Z | 7.06  | 66.8 | 19.4 |      | 127.2 |        |
| 10237-CAB | LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)        | X | 13.63 | 87.8 | 31.7 | 9.21 | 141.6 | ±3.0 % |
|           |                                              | Y | 7.85  | 75.5 | 26.0 |      | 126.5 |        |
|           |                                              | Z | 13.99 | 87.7 | 31.6 |      | 141.4 |        |
| 10252-CAB | LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)      | X | 12.86 | 81.4 | 28.9 | 9.24 | 142.1 | ±3.0 % |
|           |                                              | Y | 8.91  | 73.4 | 24.8 |      | 129.9 |        |
|           |                                              | Z | 13.15 | 81.4 | 28.8 |      | 142.0 |        |
| 10267-CAB | LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK)     | X | 11.63 | 77.5 | 26.8 | 9.30 | 118.7 | ±3.0 % |
|           |                                              | Y | 9.62  | 74.3 | 25.2 |      | 138.4 |        |
|           |                                              | Z | 11.96 | 77.7 | 26.9 |      | 119.3 |        |
| 10274-CAB | UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.10)    | X | 6.14  | 67.4 | 19.3 | 4.87 | 149.9 | ±0.9 % |
|           |                                              | Y | 5.90  | 66.9 | 18.7 |      | 132.8 |        |
|           |                                              | Z | 6.20  | 67.5 | 19.3 |      | 146.6 |        |
| 10275-CAB | UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.4)     | X | 4.45  | 66.9 | 18.9 | 3.96 | 130.1 | ±0.7 % |
|           |                                              | Y | 4.50  | 67.2 | 18.8 |      | 137.9 |        |
|           |                                              | Z | 4.64  | 67.6 | 19.3 |      | 149.2 |        |
| 10291-AAB | CDMA2000, RC3, SO55, Full Rate               | X | 3.79  | 67.5 | 19.2 | 3.46 | 145.3 | ±0.7 % |
|           |                                              | Y | 3.74  | 67.5 | 18.9 |      | 128.2 |        |
|           |                                              | Z | 3.78  | 67.3 | 19.1 |      | 139.1 |        |
| 10292-AAB | CDMA2000, RC3, SO32, Full Rate               | X | 3.77  | 67.8 | 19.3 | 3.39 | 147.0 | ±0.5 % |
|           |                                              | Y | 3.69  | 67.7 | 18.9 |      | 130.1 |        |
|           |                                              | Z | 3.73  | 67.3 | 19.0 |      | 141.3 |        |
| 10297-AAA | LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)      | X | 6.52  | 67.9 | 20.1 | 5.81 | 141.4 | ±1.4 % |
|           |                                              | Y | 6.41  | 67.6 | 19.7 |      | 147.4 |        |
|           |                                              | Z | 6.51  | 67.7 | 20.1 |      | 135.4 |        |
| 10311-AAA | LTE-FDD (SC-FDMA, 100% RB, 15 MHz, QPSK)     | X | 7.17  | 68.7 | 20.7 | 6.06 | 147.7 | ±1.4 % |
|           |                                              | Y | 6.69  | 67.2 | 19.6 |      | 128.6 |        |
|           |                                              | Z | 7.12  | 68.4 | 20.5 |      | 142.0 |        |

|           |                                                           |   |      |      |      |      |       |        |
|-----------|-----------------------------------------------------------|---|------|------|------|------|-------|--------|
| 10315-AAA | IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 96pc duty cycle) | X | 3.04 | 70.0 | 19.6 | 1.71 | 129.8 | ±0.5 % |
|           |                                                           | Y | 3.25 | 71.3 | 19.7 |      | 136.9 |        |
|           |                                                           | Z | 3.09 | 69.9 | 19.5 |      | 148.7 |        |
| 10403-AAB | CDMA2000 (1xEV-DO, Rev. 0)                                | X | 4.73 | 67.3 | 18.6 | 3.76 | 135.7 | ±0.5 % |
|           |                                                           | Y | 4.93 | 69.1 | 19.0 |      | 141.5 |        |
|           |                                                           | Z | 4.73 | 67.1 | 18.4 |      | 132.7 |        |
| 10404-AAB | CDMA2000 (1xEV-DO, Rev. A)                                | X | 4.67 | 67.5 | 18.6 | 3.77 | 134.0 | ±0.5 % |
|           |                                                           | Y | 4.92 | 69.4 | 19.1 |      | 139.8 |        |
|           |                                                           | Z | 4.65 | 67.1 | 18.5 |      | 130.7 |        |

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 8 and 9).

<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 <sup>G</sup> | Depth <sup>G</sup> (mm) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|--------------------|-------------------------|-------------|
| 750                  | 41.9                               | 0.89                            | 6.53    | 6.53    | 6.53    | 0.40               | 1.60                    | ± 12.0 %    |
| 835                  | 41.5                               | 0.90                            | 6.27    | 6.27    | 6.27    | 0.80               | 1.17                    | ± 12.0 %    |
| 1750                 | 40.1                               | 1.37                            | 5.19    | 5.19    | 5.19    | 0.80               | 1.10                    | ± 12.0 %    |
| 1900                 | 40.0                               | 1.40                            | 5.04    | 5.04    | 5.04    | 0.68               | 1.27                    | ± 12.0 %    |
| 2450                 | 39.2                               | 1.80                            | 4.52    | 4.52    | 4.52    | 0.78               | 1.23                    | ± 12.0 %    |
| 2600                 | 39.0                               | 1.96                            | 4.34    | 4.34    | 4.34    | 0.76               | 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.

<sup>G</sup> Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

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

### Calibration Parameter Determined in Body Tissue Simulating Media

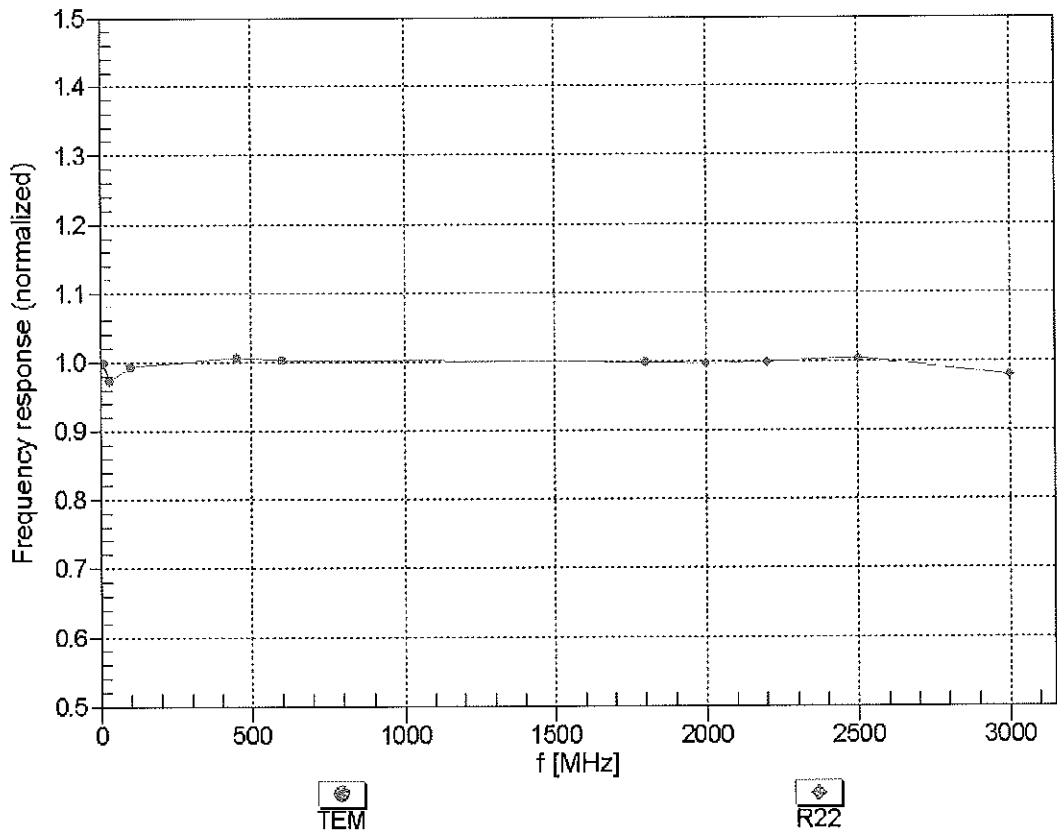
| f (MHz) <sup>C</sup> | Relative Permittivity <sup>F</sup> | Conductivity (S/m) <sup>F</sup> | ConvF X | ConvF Y | ConvF Z | Alpha <sup>G</sup> | Depth <sup>G</sup> (mm) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|--------------------|-------------------------|-------------|
| 750                  | 55.5                               | 0.96                            | 6.15    | 6.15    | 6.15    | 0.61               | 1.32                    | ± 12.0 %    |
| 835                  | 55.2                               | 0.97                            | 6.11    | 6.11    | 6.11    | 0.80               | 1.15                    | ± 12.0 %    |
| 1750                 | 53.4                               | 1.49                            | 4.83    | 4.83    | 4.83    | 0.47               | 1.74                    | ± 12.0 %    |
| 1900                 | 53.3                               | 1.52                            | 4.61    | 4.61    | 4.61    | 0.55               | 1.59                    | ± 12.0 %    |
| 2450                 | 52.7                               | 1.95                            | 4.14    | 4.14    | 4.14    | 0.80               | 1.11                    | ± 12.0 %    |
| 2600                 | 52.5                               | 2.16                            | 3.91    | 3.91    | 3.91    | 0.80               | 1.00                    | ± 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.

<sup>G</sup> Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

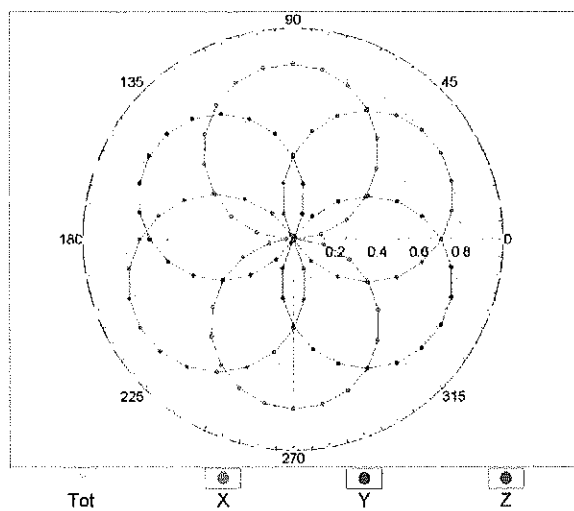
**Frequency Response of E-Field**  
(TEM-Cell:ifi110 EXX, Waveguide: R22)



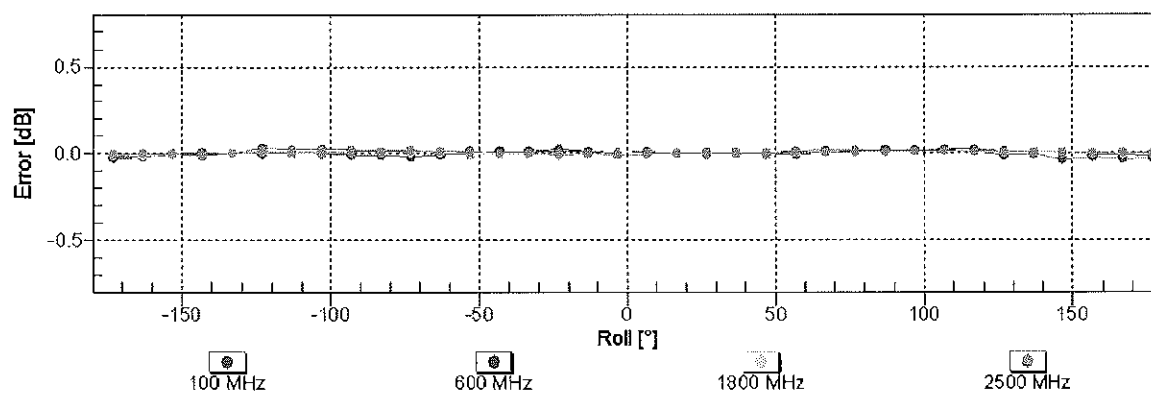
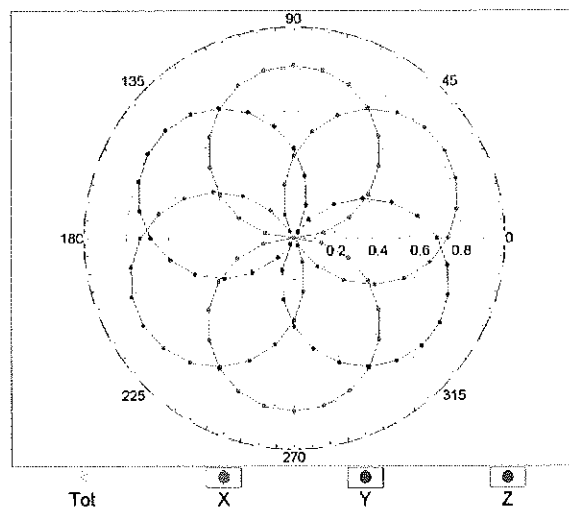
Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  ( $k=2$ )

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

f=600 MHz,TEM



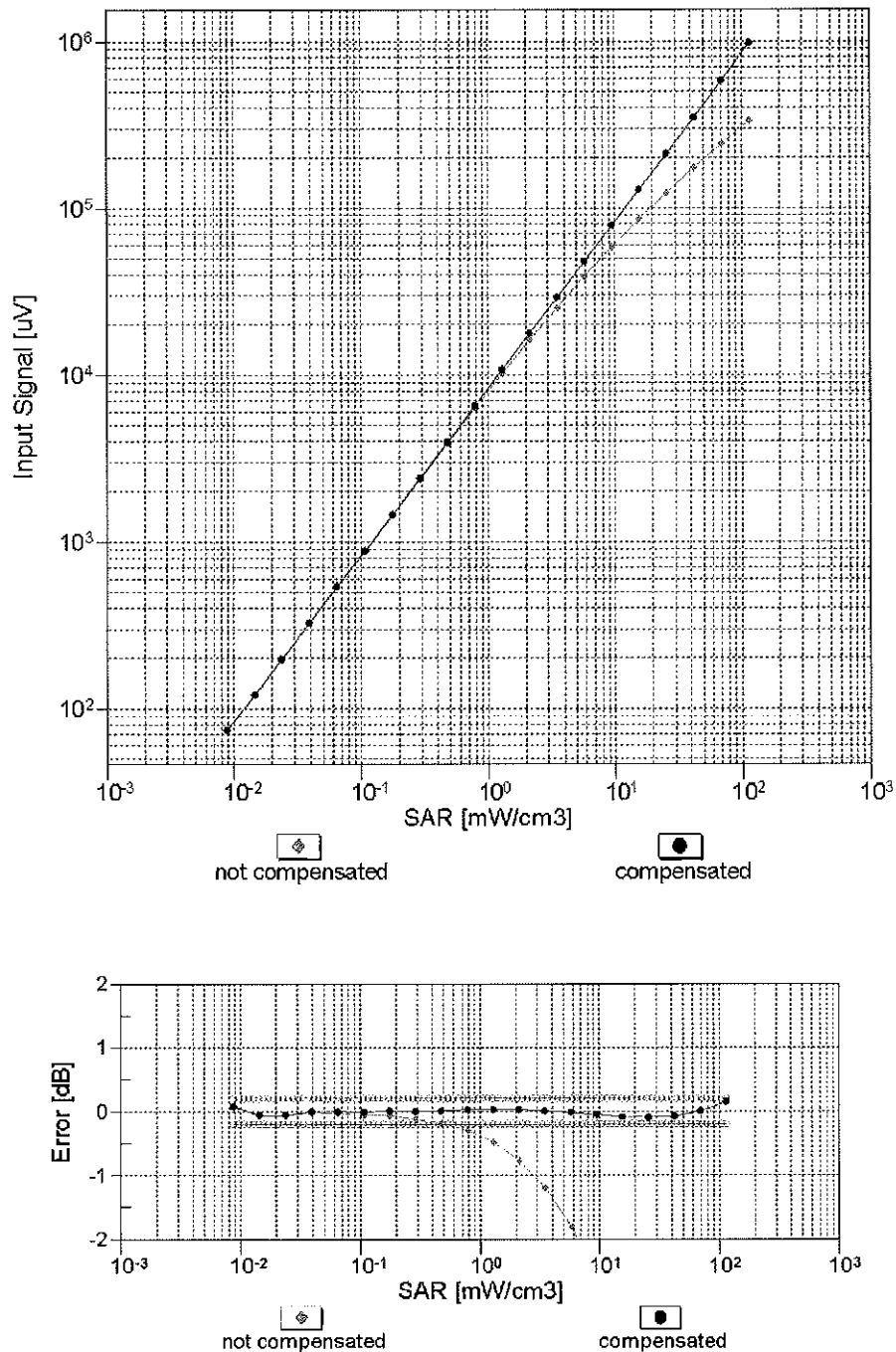
f=1800 MHz,R22



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

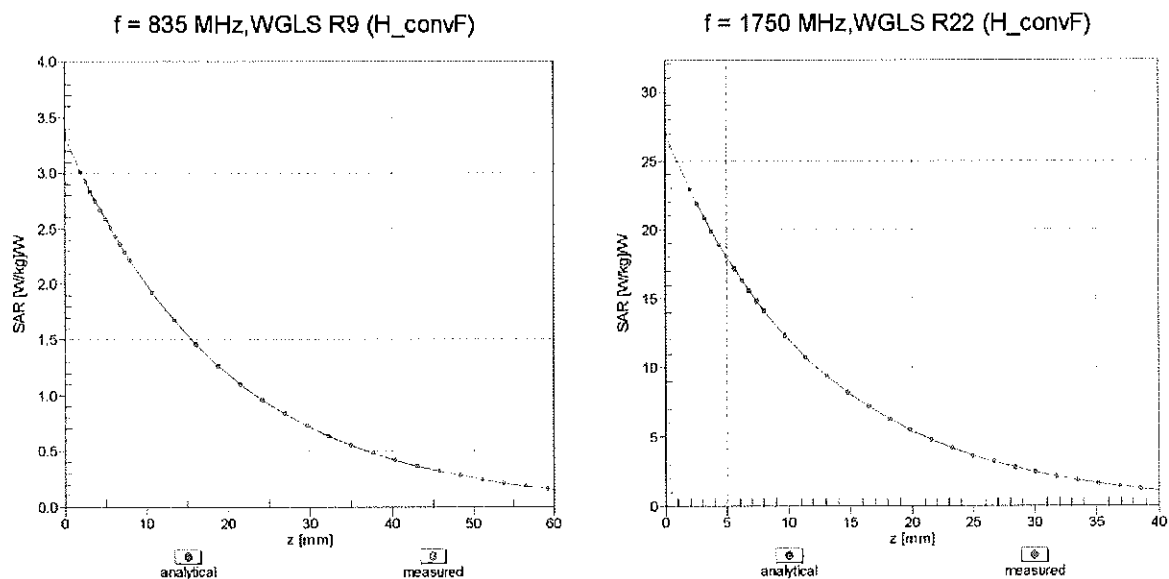
# Dynamic Range f(SAR<sub>head</sub>)

(TEM cell , f<sub>eval</sub>= 1900 MHz)



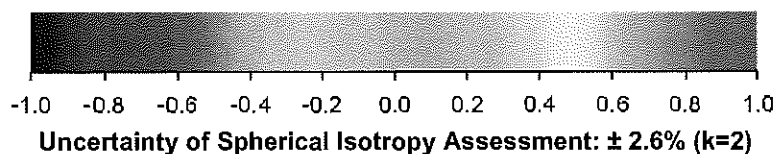
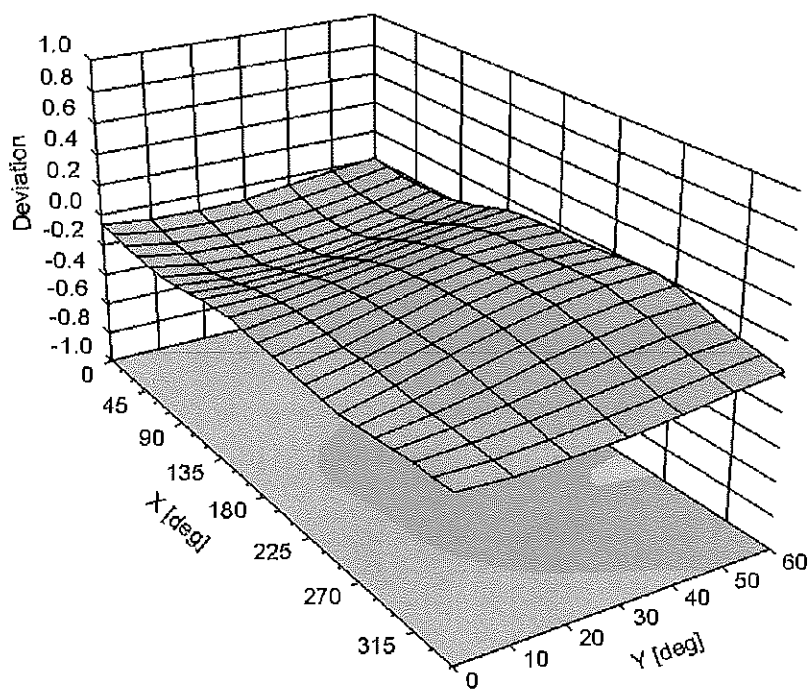
Uncertainty of Linearity Assessment:  $\pm 0.6\%$  (k=2)

## Conversion Factor Assessment



## Deviation from Isotropy in Liquid

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



**DASY/EASY - Parameters of Probe: ES3DV3 - SN:3258****Other Probe Parameters**

|                                               |            |
|-----------------------------------------------|------------|
| Sensor Arrangement                            | Triangular |
| Connector Angle (°)                           | -123.1     |
| 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: **EX3-3920\_Dec13**

## CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:3920**

Calibration procedure(s) **QA CAL-01.v9, QA CAL-14.v4, QA CAL-23.v5, QA CAL-25.v6**  
**Calibration procedure for dosimetric E-field probes**

Calibration date: **December 18, 2013**

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      | 04-Apr-13 (No. 217-01733)         | Apr-14                 |
| Power sensor E4412A        | MY41498087      | 04-Apr-13 (No. 217-01733)         | Apr-14                 |
| Reference 3 dB Attenuator  | SN: S5054 (3c)  | 04-Apr-13 (No. 217-01737)         | Apr-14                 |
| Reference 20 dB Attenuator | SN: S5277 (20x) | 04-Apr-13 (No. 217-01735)         | Apr-14                 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 04-Apr-13 (No. 217-01738)         | Apr-14                 |
| Reference Probe ES3DV2     | SN: 3013        | 28-Dec-12 (No. ES3-3013_Dec12)    | Dec-13                 |
| DAE4                       | SN: 660         | 13-Dec-13 (No. DAE4-660_Dec13)    | Dec-14                 |
| Secondary Standards        | ID              | Check Date (in house)             | Scheduled Check        |
| RF generator HP 8648C      | US3642U01700    | 4-Aug-99 (in house check Apr-13)  | In house check: Apr-15 |
| Network Analyzer HP 8753E  | US37390585      | 18-Oct-01 (in house check Oct-13) | In house check: Oct-14 |

|                                                                                                                 | Name          | Function              | Signature |
|-----------------------------------------------------------------------------------------------------------------|---------------|-----------------------|-----------|
| Calibrated by:                                                                                                  | Leif Klysner  | Laboratory Technician |           |
| Approved by:                                                                                                    | Katja Pokovic | Technical Manager     |           |
| Issued: December 19, 2013                                                                                       |               |                       |           |
| 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                                                                                                                                |
| 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, D               | 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 |
| Connector Angle          | information used in DASY system to align probe sensor X to the robot coordinate system                                                                  |

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

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- 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>; D<sub>x,y,z</sub>; VR<sub>x,y,z</sub>; A, B, C, D** 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.
- Connector Angle**: The angle is assessed using the information gained by determining the NORM<sub>x</sub> (no uncertainty required).

# Probe EX3DV4

## SN:3920

Manufactured: December 18, 2012  
Calibrated: December 18, 2013

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

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3920

### Basic Calibration Parameters

|                                                    | Sensor X | Sensor Y | Sensor Z | Unc (k=2)    |
|----------------------------------------------------|----------|----------|----------|--------------|
| Norm ( $\mu\text{V}/(\text{V/m})^2$ ) <sup>A</sup> | 0.34     | 0.50     | 0.49     | $\pm 10.1\%$ |
| DCP (mV) <sup>B</sup>                              | 102.9    | 99.5     | 98.3     |              |

### Modulation Calibration Parameters

| UID       | Communication System Name                |   | A<br>dB | B<br>dB $\sqrt{\mu\text{V}}$ | C    | D<br>dB | VR<br>mV | Unc <sup>E</sup><br>(k=2) |
|-----------|------------------------------------------|---|---------|------------------------------|------|---------|----------|---------------------------|
| 0         | CW                                       | X | 0.0     | 0.0                          | 1.0  | 0.00    | 182.5    | $\pm 2.7\%$               |
|           |                                          | Y | 0.0     | 0.0                          | 1.0  |         | 164.9    |                           |
|           |                                          | Z | 0.0     | 0.0                          | 1.0  |         | 153.0    |                           |
| 10010-CAA | SAR Validation (Square, 100ms, 10ms)     | X | 0.76    | 53.8                         | 6.5  | 10.00   | 44.1     | $\pm 2.2\%$               |
|           |                                          | Y | 2.33    | 62.8                         | 11.4 |         | 43.7     |                           |
|           |                                          | Z | 1.15    | 55.6                         | 7.5  |         | 53.0     |                           |
| 10011-CAA | UMTS-FDD (WCDMA)                         | X | 3.36    | 66.5                         | 17.5 | 2.91    | 142.4    | $\pm 0.5\%$               |
|           |                                          | Y | 3.15    | 65.0                         | 16.7 |         | 131.4    |                           |
|           |                                          | Z | 3.26    | 66.0                         | 17.7 |         | 121.6    |                           |
| 10012-CAA | IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps) | X | 2.69    | 66.4                         | 16.9 | 1.87    | 138.1    | $\pm 0.5\%$               |
|           |                                          | Y | 2.56    | 65.1                         | 16.2 |         | 130.7    |                           |
|           |                                          | Z | 2.72    | 66.6                         | 17.2 |         | 121.4    |                           |
| 10021-DAA | GSM-FDD (TDMA, GMSK)                     | X | 2.06    | 63.4                         | 11.7 | 9.39    | 99.7     | $\pm 1.9\%$               |
|           |                                          | Y | 2.43    | 66.1                         | 14.1 |         | 94.7     |                           |
|           |                                          | Z | 2.90    | 69.9                         | 16.1 |         | 121.8    |                           |
| 10023-DAA | GPRS-FDD (TDMA, GMSK, TN 0)              | X | 1.94    | 62.4                         | 11.3 | 9.57    | 95.1     | $\pm 1.9\%$               |
|           |                                          | Y | 2.31    | 64.8                         | 13.1 |         | 90.1     |                           |
|           |                                          | Z | 2.98    | 70.4                         | 16.4 |         | 117.0    |                           |
| 10024-DAA | GPRS-FDD (TDMA, GMSK, TN 0-1)            | X | 2.19    | 67.1                         | 12.2 | 6.56    | 140.1    | $\pm 1.4\%$               |
|           |                                          | Y | 2.35    | 67.0                         | 12.9 |         | 134.0    |                           |
|           |                                          | Z | 3.45    | 73.5                         | 16.1 |         | 131.4    |                           |
| 10027-DAA | GPRS-FDD (TDMA, GMSK, TN 0-1-2)          | X | 1.18    | 61.7                         | 8.5  | 4.80    | 121.6    | $\pm 1.2\%$               |
|           |                                          | Y | 1.57    | 63.4                         | 10.0 |         | 116.0    |                           |
|           |                                          | Z | 1.57    | 65.5                         | 11.9 |         | 109.2    |                           |
| 10028-DAA | GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)        | X | 3.80    | 74.5                         | 13.3 | 3.55    | 130.3    | $\pm 0.9\%$               |
|           |                                          | Y | 1.00    | 60.5                         | 8.0  |         | 123.9    |                           |
|           |                                          | Z | 1.58    | 66.1                         | 11.1 |         | 119.0    |                           |
| 10032-CAA | IEEE 802.15.1 Bluetooth (GFSK, DH5)      | X | 0.18    | 55.2                         | 3.4  | 1.16    | 111.6    | $\pm 0.7\%$               |
|           |                                          | Y | 0.34    | 57.4                         | 4.4  |         | 143.6    |                           |
|           |                                          | Z | 0.40    | 59.2                         | 5.7  |         | 136.6    |                           |
| 10039-CAA | CDMA2000 (1xRTT, RC1)                    | X | 4.49    | 65.9                         | 18.1 | 4.57    | 131.8    | $\pm 0.9\%$               |
|           |                                          | Y | 4.57    | 65.1                         | 17.5 |         | 123.0    |                           |
|           |                                          | Z | 4.66    | 65.9                         | 18.3 |         | 118.6    |                           |
| 10062-CAA | IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps) | X | 10.09   | 68.6                         | 21.3 | 8.68    | 126.5    | $\pm 2.5\%$               |
|           |                                          | Y | 10.31   | 68.5                         | 21.1 |         | 121.9    |                           |
|           |                                          | Z | 10.12   | 68.3                         | 21.3 |         | 115.8    |                           |

|           |                                               |   |       |      |      |      |       |        |
|-----------|-----------------------------------------------|---|-------|------|------|------|-------|--------|
| 10098-CAA | UMTS-FDD (HSUPA, Subtest 2)                   | X | 4.64  | 66.6 | 18.1 | 3.98 | 144.6 | ±0.7 % |
|           |                                               | Y | 4.54  | 65.4 | 17.4 |      | 133.9 |        |
|           |                                               | Z | 4.60  | 66.1 | 18.0 |      | 128.0 |        |
| 10100-CAB | LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)      | X | 6.00  | 65.5 | 18.3 | 5.67 | 104.2 | ±1.4 % |
|           |                                               | Y | 6.44  | 66.7 | 18.8 |      | 138.2 |        |
|           |                                               | Z | 6.54  | 67.4 | 19.4 |      | 134.7 |        |
| 10108-CAB | LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)      | X | 6.37  | 67.0 | 19.2 | 5.80 | 149.0 | ±1.4 % |
|           |                                               | Y | 6.40  | 66.6 | 18.9 |      | 141.2 |        |
|           |                                               | Z | 6.40  | 66.9 | 19.4 |      | 132.1 |        |
| 10110-CAB | LTE-FDD (SC-FDMA, 100% RB, 5 MHz, QPSK)       | X | 5.96  | 66.3 | 18.9 | 5.75 | 142.3 | ±1.4 % |
|           |                                               | Y | 6.05  | 66.1 | 18.7 |      | 136.6 |        |
|           |                                               | Z | 6.03  | 66.3 | 19.1 |      | 128.2 |        |
| 10114-CAA | IEEE 802.11n (HT Greenfield, 13.5 Mbps, BPSK) | X | 10.28 | 68.7 | 20.9 | 8.10 | 137.3 | ±2.5 % |
|           |                                               | Y | 10.32 | 68.5 | 20.7 |      | 131.3 |        |
|           |                                               | Z | 10.24 | 68.5 | 20.9 |      | 124.5 |        |
| 10117-CAA | IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)      | X | 10.29 | 68.8 | 20.9 | 8.07 | 138.5 | ±2.5 % |
|           |                                               | Y | 10.34 | 68.6 | 20.8 |      | 131.9 |        |
|           |                                               | Z | 10.26 | 68.5 | 20.9 |      | 125.5 |        |
| 10151-CAB | LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)       | X | 7.20  | 67.5 | 21.6 | 9.28 | 118.6 | ±2.2 % |
|           |                                               | Y | 7.59  | 67.9 | 21.6 |      | 116.7 |        |
|           |                                               | Z | 7.78  | 69.2 | 22.7 |      | 110.7 |        |
| 10154-CAB | LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)       | X | 5.98  | 66.4 | 18.9 | 5.75 | 142.7 | ±1.2 % |
|           |                                               | Y | 5.97  | 65.7 | 18.4 |      | 132.7 |        |
|           |                                               | Z | 6.06  | 66.4 | 19.1 |      | 128.6 |        |
| 10160-CAB | LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)       | X | 6.41  | 66.8 | 19.1 | 5.82 | 147.7 | ±1.4 % |
|           |                                               | Y | 6.48  | 66.5 | 18.8 |      | 137.3 |        |
|           |                                               | Z | 6.53  | 67.0 | 19.4 |      | 134.9 |        |
| 10169-CAB | LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)         | X | 4.59  | 65.5 | 18.6 | 5.73 | 120.3 | ±1.2 % |
|           |                                               | Y | 4.76  | 65.0 | 18.2 |      | 113.9 |        |
|           |                                               | Z | 4.82  | 65.6 | 18.9 |      | 112.0 |        |
| 10172-CAB | LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)         | X | 5.77  | 69.3 | 22.7 | 9.21 | 128.1 | ±1.9 % |
|           |                                               | Y | 6.15  | 69.3 | 22.6 |      | 123.8 |        |
|           |                                               | Z | 6.22  | 70.3 | 23.6 |      | 120.8 |        |
| 10175-CAB | LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)         | X | 4.62  | 65.6 | 18.7 | 5.72 | 120.2 | ±0.9 % |
|           |                                               | Y | 4.75  | 65.0 | 18.2 |      | 113.5 |        |
|           |                                               | Z | 4.80  | 65.6 | 18.8 |      | 110.7 |        |
| 10181-CAB | LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)         | X | 4.57  | 65.4 | 18.6 | 5.72 | 118.9 | ±0.9 % |
|           |                                               | Y | 4.72  | 64.8 | 18.1 |      | 113.1 |        |
|           |                                               | Z | 4.81  | 65.6 | 18.8 |      | 110.4 |        |
| 10193-CAA | IEEE 802.11n (HT Greenfield, 6.5 Mbps, BPSK)  | X | 9.77  | 68.3 | 20.8 | 8.09 | 128.1 | ±2.5 % |
|           |                                               | Y | 9.84  | 67.9 | 20.5 |      | 117.1 |        |
|           |                                               | Z | 9.80  | 68.1 | 20.8 |      | 116.6 |        |
| 10196-CAA | IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)       | X | 9.78  | 68.4 | 20.8 | 8.10 | 128.4 | ±2.5 % |
|           |                                               | Y | 9.86  | 68.0 | 20.5 |      | 120.3 |        |
|           |                                               | Z | 9.82  | 68.1 | 20.9 |      | 119.1 |        |

|           |                                                           |   |       |      |      |      |       |        |
|-----------|-----------------------------------------------------------|---|-------|------|------|------|-------|--------|
| 10219-CAA | IEEE 802.11n (HT Mixed, 7.2 Mbps, BPSK)                   | X | 9.70  | 68.4 | 20.8 | 8.03 | 128.0 | ±2.5 % |
|           |                                                           | Y | 9.79  | 68.0 | 20.5 |      | 119.6 |        |
|           |                                                           | Z | 9.72  | 68.1 | 20.8 |      | 118.7 |        |
| 10222-CAA | IEEE 802.11n (HT Mixed, 15 Mbps, BPSK)                    | X | 10.27 | 68.8 | 20.9 | 8.06 | 137.0 | ±2.5 % |
|           |                                                           | Y | 10.18 | 68.3 | 20.6 |      | 125.2 |        |
|           |                                                           | Z | 10.20 | 68.5 | 20.9 |      | 124.8 |        |
| 10225-CAA | UMTS-FDD (HSPA+)                                          | X | 6.64  | 66.1 | 18.7 | 5.97 | 108.8 | ±1.4 % |
|           |                                                           | Y | 7.23  | 67.1 | 19.1 |      | 148.9 |        |
|           |                                                           | Z | 7.31  | 67.7 | 19.7 |      | 146.5 |        |
| 10237-CAB | LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)                     | X | 5.82  | 69.6 | 23.0 | 9.21 | 130.2 | ±1.9 % |
|           |                                                           | Y | 6.14  | 69.2 | 22.6 |      | 123.9 |        |
|           |                                                           | Z | 6.25  | 70.4 | 23.7 |      | 122.2 |        |
| 10252-CAB | LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)                   | X | 6.85  | 67.5 | 21.7 | 9.24 | 112.9 | ±2.2 % |
|           |                                                           | Y | 7.54  | 69.0 | 22.4 |      | 149.2 |        |
|           |                                                           | Z | 7.80  | 70.6 | 23.7 |      | 147.3 |        |
| 10267-CAB | LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK)                  | X | 7.23  | 67.6 | 21.6 | 9.30 | 118.3 | ±2.2 % |
|           |                                                           | Y | 7.55  | 67.7 | 21.5 |      | 111.5 |        |
|           |                                                           | Z | 7.79  | 69.2 | 22.7 |      | 109.6 |        |
| 10274-CAA | UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.10)                 | X | 5.64  | 65.9 | 18.1 | 4.87 | 105.5 | ±1.2 % |
|           |                                                           | Y | 6.04  | 66.4 | 18.2 |      | 142.6 |        |
|           |                                                           | Z | 6.09  | 66.9 | 18.7 |      | 138.4 |        |
| 10275-CAA | UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.4)                  | X | 4.42  | 66.3 | 18.1 | 3.96 | 135.8 | ±0.7 % |
|           |                                                           | Y | 4.26  | 65.0 | 17.3 |      | 119.3 |        |
|           |                                                           | Z | 4.40  | 65.9 | 18.0 |      | 120.4 |        |
| 10291-AAA | CDMA2000, RC3, SO55, Full Rate                            | X | 3.62  | 66.7 | 18.1 | 3.46 | 123.6 | ±0.7 % |
|           |                                                           | Y | 3.38  | 64.3 | 16.7 |      | 112.5 |        |
|           |                                                           | Z | 3.59  | 66.0 | 17.9 |      | 114.3 |        |
| 10292-AAA | CDMA2000, RC3, SO32, Full Rate                            | X | 3.46  | 66.0 | 17.7 | 3.39 | 127.3 | ±0.5 % |
|           |                                                           | Y | 3.35  | 64.5 | 16.8 |      | 113.7 |        |
|           |                                                           | Z | 3.50  | 65.7 | 17.7 |      | 115.4 |        |
| 10297-AAA | LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)                   | X | 6.35  | 66.9 | 19.2 | 5.81 | 145.7 | ±1.2 % |
|           |                                                           | Y | 6.26  | 66.1 | 18.7 |      | 129.2 |        |
|           |                                                           | Z | 6.42  | 67.0 | 19.4 |      | 131.3 |        |
| 10311-AAA | LTE-FDD (SC-FDMA, 100% RB, 15 MHz, QPSK)                  | X | 6.45  | 65.9 | 18.7 | 6.06 | 103.7 | ±1.7 % |
|           |                                                           | Y | 6.90  | 66.9 | 19.1 |      | 137.2 |        |
|           |                                                           | Z | 7.04  | 67.7 | 19.8 |      | 137.5 |        |
| 10315-AAA | IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 96pc duty cycle) | X | 2.85  | 67.8 | 17.7 | 1.71 | 135.6 | ±0.5 % |
|           |                                                           | Y | 2.45  | 64.7 | 16.0 |      | 121.4 |        |
|           |                                                           | Z | 2.75  | 67.3 | 17.6 |      | 122.1 |        |
| 10317-AAA | IEEE 802.11a WiFi 5 GHz (OFDM, 6 Mbps, 96pc duty cycle)   | X | 9.93  | 68.5 | 21.0 | 8.36 | 128.1 | ±2.7 % |
|           |                                                           | Y | 10.02 | 68.1 | 20.7 |      | 117.9 |        |
|           |                                                           | Z | 10.01 | 68.3 | 21.1 |      | 119.4 |        |
| 10400-AAA | IEEE 802.11ac WiFi (20MHz, 64-QAM, 99pc duty cycle)       | X | 10.09 | 68.8 | 21.2 | 8.37 | 134.9 | ±2.5 % |
|           |                                                           | Y | 10.16 | 68.3 | 20.8 |      | 119.8 |        |
|           |                                                           | Z | 10.14 | 68.5 | 21.2 |      | 121.0 |        |

|           |                                                     |   |       |      |      |      |       |        |
|-----------|-----------------------------------------------------|---|-------|------|------|------|-------|--------|
| 10402-AAA | IEEE 802.11ac WiFi (80MHz, 64-QAM, 99pc duty cycle) | X | 11.18 | 69.8 | 21.5 | 8.53 | 147.1 | ±2.7 % |
|           |                                                     | Y | 10.79 | 68.6 | 20.8 |      | 126.5 |        |
|           |                                                     | Z | 11.17 | 69.6 | 21.6 |      | 131.4 |        |
| 10403-AAA | CDMA2000 (1xEV-DO, Rev. 0)                          | X | 4.83  | 69.6 | 18.9 | 3.76 | 139.6 | ±0.5 % |
|           |                                                     | Y | 4.70  | 67.1 | 17.6 |      | 128.1 |        |
|           |                                                     | Z | 4.90  | 68.4 | 18.6 |      | 127.8 |        |
| 10404-AAA | CDMA2000 (1xEV-DO, Rev. A)                          | X | 4.73  | 69.5 | 18.9 | 3.77 | 134.8 | ±0.5 % |
|           |                                                     | Y | 4.62  | 67.1 | 17.7 |      | 124.9 |        |
|           |                                                     | Z | 4.67  | 67.7 | 18.1 |      | 125.9 |        |

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 8 and 9).

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

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

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3920

### 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 <sup>G</sup> | Depth <sup>G</sup> (mm) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|--------------------|-------------------------|-------------|
| 750                  | 41.9                               | 0.89                            | 10.05   | 10.05   | 10.05   | 0.27               | 1.13                    | ± 12.0 %    |
| 835                  | 41.5                               | 0.90                            | 9.69    | 9.69    | 9.69    | 0.50               | 0.76                    | ± 12.0 %    |
| 1750                 | 40.1                               | 1.37                            | 7.91    | 7.91    | 7.91    | 0.72               | 0.62                    | ± 12.0 %    |
| 1900                 | 40.0                               | 1.40                            | 7.70    | 7.70    | 7.70    | 0.77               | 0.61                    | ± 12.0 %    |
| 2450                 | 39.2                               | 1.80                            | 6.98    | 6.98    | 6.98    | 0.37               | 0.86                    | ± 12.0 %    |
| 2600                 | 39.0                               | 1.96                            | 6.74    | 6.74    | 6.74    | 0.34               | 0.97                    | ± 12.0 %    |
| 5200                 | 36.0                               | 4.66                            | 4.87    | 4.87    | 4.87    | 0.40               | 1.80                    | ± 13.1 %    |
| 5300                 | 35.9                               | 4.76                            | 4.66    | 4.66    | 4.66    | 0.40               | 1.80                    | ± 13.1 %    |
| 5500                 | 35.6                               | 4.96                            | 4.54    | 4.54    | 4.54    | 0.40               | 1.80                    | ± 13.1 %    |
| 5600                 | 35.5                               | 5.07                            | 4.37    | 4.37    | 4.37    | 0.40               | 1.80                    | ± 13.1 %    |
| 5800                 | 35.3                               | 5.27                            | 4.11    | 4.11    | 4.11    | 0.50               | 1.80                    | ± 13.1 %    |

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

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

<sup>G</sup> Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3920

### 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 <sup>G</sup> | Depth <sup>G</sup> (mm) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|--------------------|-------------------------|-------------|
| 750                  | 55.5                               | 0.96                            | 9.54    | 9.54    | 9.54    | 0.32               | 1.07                    | ± 12.0 %    |
| 835                  | 55.2                               | 0.97                            | 9.47    | 9.47    | 9.47    | 0.45               | 0.85                    | ± 12.0 %    |
| 1750                 | 53.4                               | 1.49                            | 7.77    | 7.77    | 7.77    | 0.59               | 0.74                    | ± 12.0 %    |
| 1900                 | 53.3                               | 1.52                            | 7.50    | 7.50    | 7.50    | 0.37               | 0.91                    | ± 12.0 %    |
| 2450                 | 52.7                               | 1.95                            | 7.18    | 7.18    | 7.18    | 0.80               | 0.56                    | ± 12.0 %    |
| 2600                 | 52.5                               | 2.16                            | 6.91    | 6.91    | 6.91    | 0.80               | 0.57                    | ± 12.0 %    |
| 5200                 | 49.0                               | 5.30                            | 4.23    | 4.23    | 4.23    | 0.50               | 1.90                    | ± 13.1 %    |
| 5300                 | 48.9                               | 5.42                            | 4.11    | 4.11    | 4.11    | 0.50               | 1.90                    | ± 13.1 %    |
| 5500                 | 48.6                               | 5.65                            | 3.80    | 3.80    | 3.80    | 0.50               | 1.90                    | ± 13.1 %    |
| 5600                 | 48.5                               | 5.77                            | 3.62    | 3.62    | 3.62    | 0.50               | 1.90                    | ± 13.1 %    |
| 5800                 | 48.2                               | 6.00                            | 4.00    | 4.00    | 4.00    | 0.50               | 1.90                    | ± 13.1 %    |

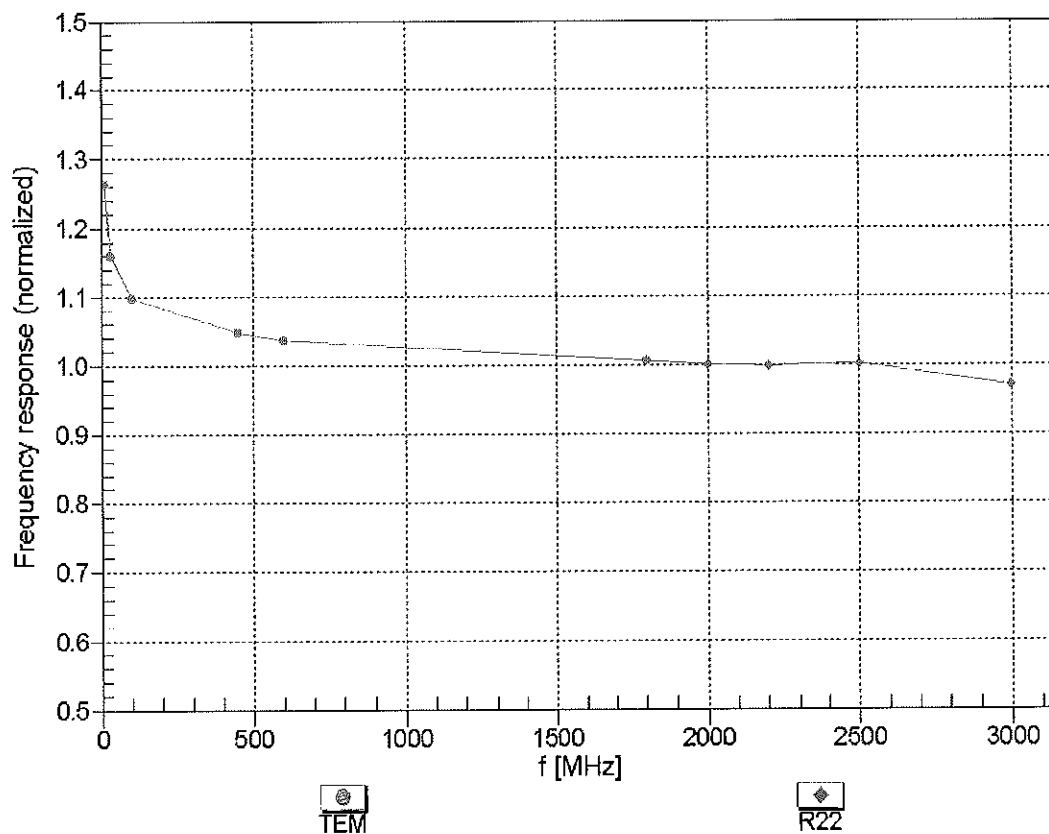
<sup>C</sup> Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

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

<sup>G</sup> Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

## Frequency Response of E-Field

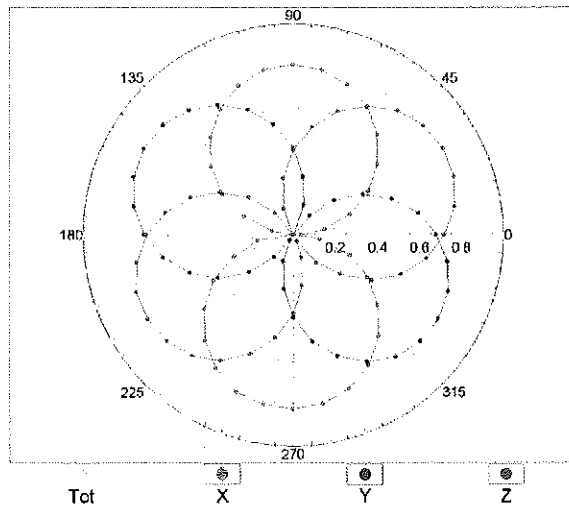
(TEM-Cell:ifi110 EXX, Waveguide: R22)



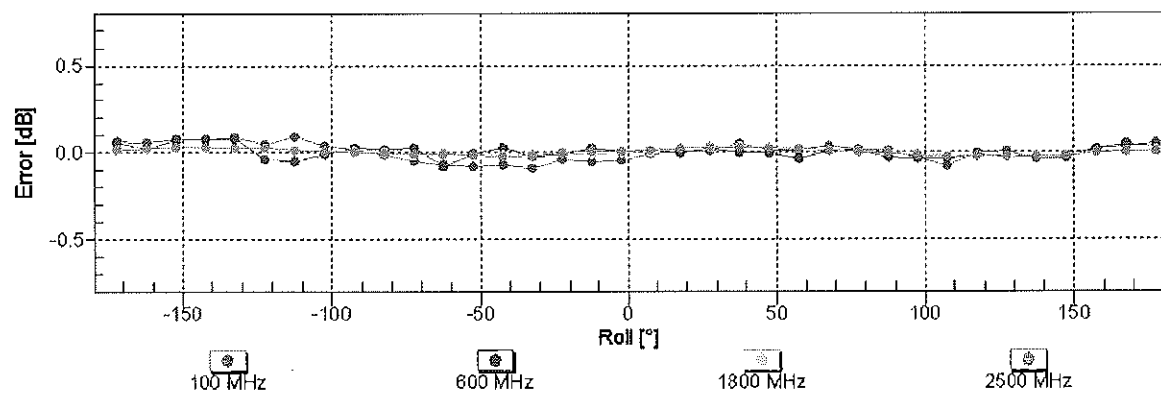
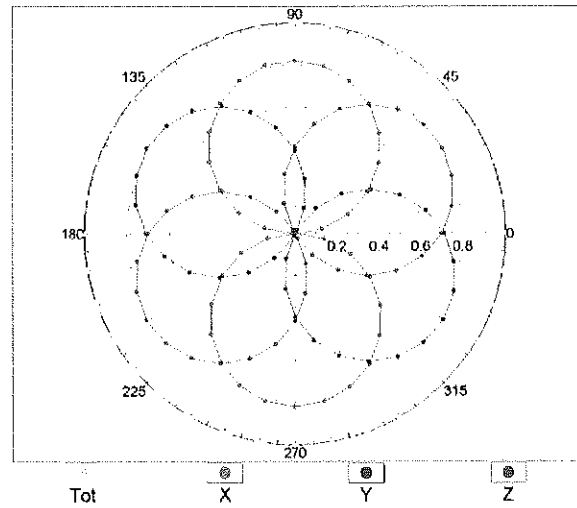
Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  ( $k=2$ )

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

$f=600$  MHz, TEM

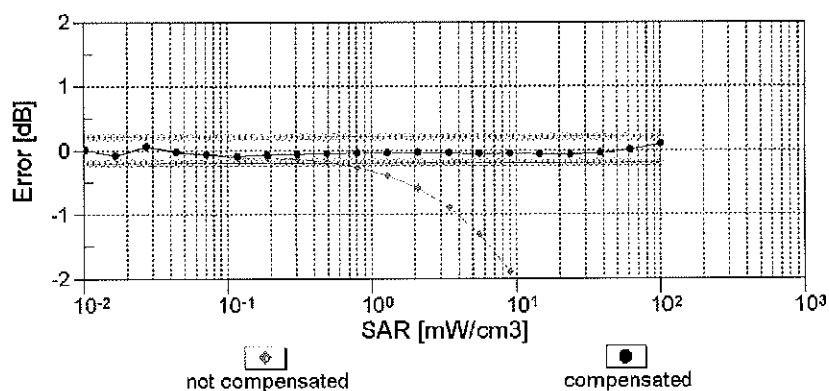
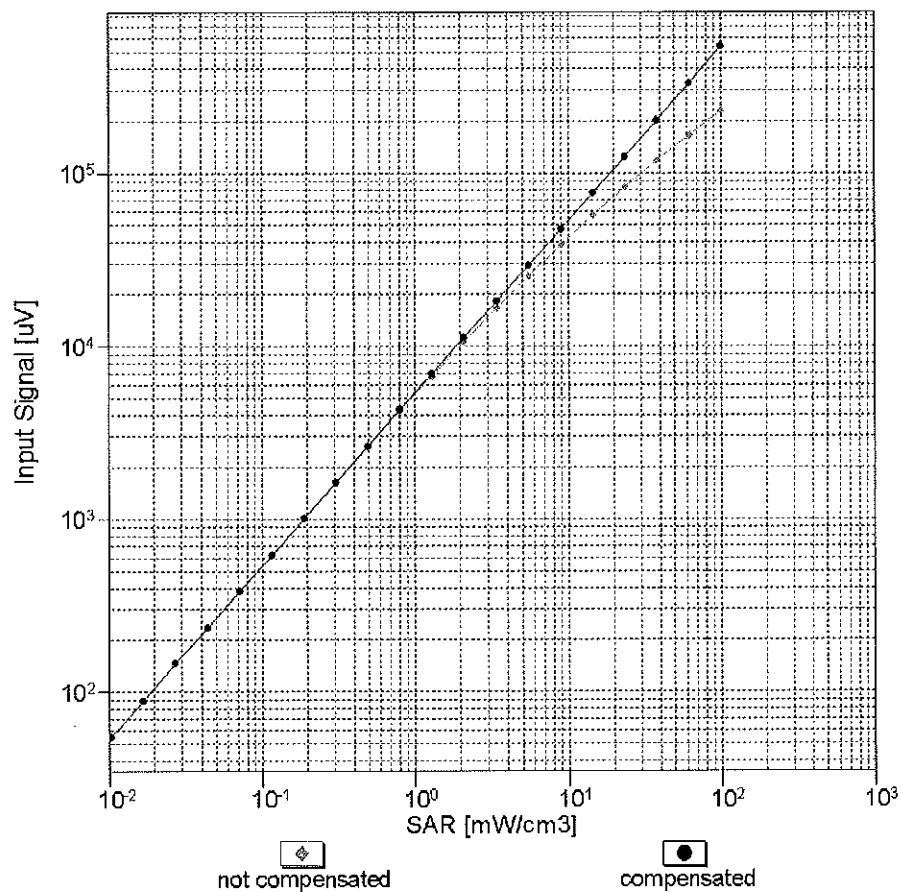


$f=1800$  MHz, R22



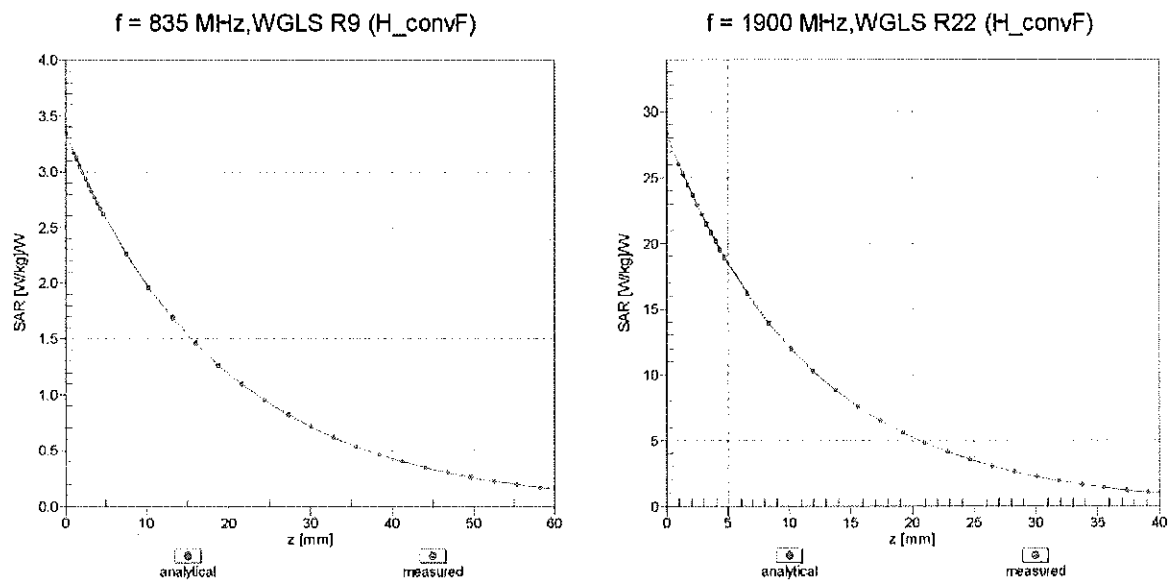
Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

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



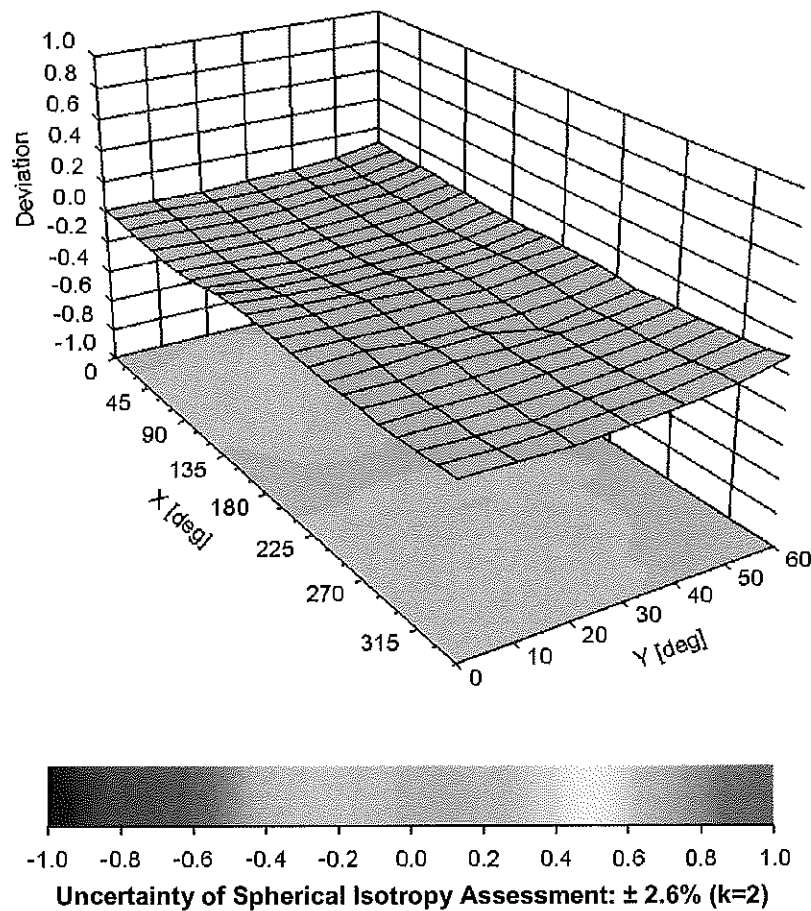
Uncertainty of Linearity Assessment:  $\pm 0.6\%$  ( $k=2$ )

# Conversion Factor Assessment



## Deviation from Isotropy in Liquid

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



## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3920

### Other Probe Parameters

|                                               |            |
|-----------------------------------------------|------------|
| Sensor Arrangement                            | Triangular |
| Connector Angle (°)                           | -22.4      |
| Mechanical Surface Detection Mode             | enabled    |
| Optical Surface Detection Mode                | disabled   |
| Probe Overall Length                          | 337 mm     |
| Probe Body Diameter                           | 10 mm      |
| Tip Length                                    | 9 mm       |
| Tip Diameter                                  | 2.5 mm     |
| Probe Tip to Sensor X Calibration Point       | 1 mm       |
| Probe Tip to Sensor Y Calibration Point       | 1 mm       |
| Probe Tip to Sensor Z Calibration Point       | 1 mm       |
| Recommended Measurement Distance from Surface | 2 mm       |



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Accreditation No.: **SCS 108**

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: **D5GHzV2-1007\_Sep13/2**

## CALIBRATION CERTIFICATE (Replacement of No: D5GHzV2-1007\_Sep13)

Object **D5GHzV2 - SN: 1007**

Calibration procedure(s) **QA CAL-22.v2**  
 Calibration procedure for dipole validation kits between 3-6 GHz

CC✓  
 10/15/13

Calibration date: **September 23, 2013**

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         | 01-Nov-12 (No. 217-01640)         | Oct-13                 |
| Power sensor HP 8481A       | US37292783         | 01-Nov-12 (No. 217-01640)         | Oct-13                 |
| Reference 20 dB Attenuator  | SN: 5058 (20k)     | 04-Apr-13 (No. 217-01736)         | Apr-14                 |
| Type-N mismatch combination | SN: 5047.3 / 06327 | 04-Apr-13 (No. 217-01739)         | Apr-14                 |
| Reference Probe EX3DV4      | SN: 3503           | 28-Dec-12 (No. EX3-3503_Dec12)    | Dec-13                 |
| DAE4                        | SN: 601            | 25-Apr-13 (No. DAE4-601_Apr13)    | Apr-14                 |
| 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-12) | In house check: Oct-13 |

Calibrated by: **Leif Klysner** Function: **Laboratory Technician**

Signature

Approved by: **Katja Pokovic** Technical Manager

Issued: October 4, 2013

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



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Accreditation No.: **SCS 108**

### Glossary:

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

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

- IEC 62209-2, "Evaluation of Human Exposure to Radio Frequency Fields from Handheld and Body-Mounted Wireless Communication Devices in the Frequency Range of 30 MHz to 6 GHz: Human models, Instrumentation, and Procedures"; Part 2: "Procedure to determine the Specific Absorption Rate (SAR) for including accessories and multiple transmitters", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"
- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013

### 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.

|                                     |                                                                                                                      |                                  |
|-------------------------------------|----------------------------------------------------------------------------------------------------------------------|----------------------------------|
| <b>DASY Version</b>                 | DASY5                                                                                                                | V52.8.7                          |
| <b>Extrapolation</b>                | Advanced Extrapolation                                                                                               |                                  |
| <b>Phantom</b>                      | Modular Flat Phantom V5.0                                                                                            |                                  |
| <b>Distance Dipole Center - TSL</b> | 10 mm                                                                                                                | with Spacer                      |
| <b>Zoom Scan Resolution</b>         | dx, dy = 4.0 mm, dz = 1.4 mm                                                                                         | Graded Ratio = 1.4 (Z direction) |
| <b>Frequency</b>                    | 5200 MHz $\pm$ 1 MHz<br>5300 MHz $\pm$ 1 MHz<br>5500 MHz $\pm$ 1 MHz<br>5600 MHz $\pm$ 1 MHz<br>5800 MHz $\pm$ 1 MHz |                                  |

## Head TSL parameters at 5200 MHz

The following parameters and calculations were applied.

|                                                | Temperature         | Permittivity   | Conductivity         |
|------------------------------------------------|---------------------|----------------|----------------------|
| <b>Nominal Head TSL parameters</b>             | 22.0 °C             | 36.0           | 4.66 mho/m           |
| <b>Measured Head TSL parameters</b>            | (22.0 $\pm$ 0.2) °C | 35.8 $\pm$ 6 % | 4.48 mho/m $\pm$ 6 % |
| <b>Head TSL temperature change during test</b> | < 0.5 °C            | ----           | ----                 |

## SAR result with Head TSL at 5200 MHz

| <b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b> | Condition          |                              |
|-------------------------------------------------------------|--------------------|------------------------------|
| SAR measured                                                | 100 mW input power | 7.77 W/kg                    |
| SAR for nominal Head TSL parameters                         | normalized to 1W   | 77.5 W/kg $\pm$ 19.9 % (k=2) |

| <b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b> | condition          |                              |
|---------------------------------------------------------------|--------------------|------------------------------|
| SAR measured                                                  | 100 mW input power | 2.23 W/kg                    |
| SAR for nominal Head TSL parameters                           | normalized to 1W   | 22.2 W/kg $\pm$ 19.5 % (k=2) |

### Head TSL parameters at 5300 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Head TSL parameters             | 22.0 °C         | 35.9         | 4.76 mho/m       |
| Measured Head TSL parameters            | (22.0 ± 0.2) °C | 35.6 ± 6 %   | 4.62 mho/m ± 6 % |
| Head TSL temperature change during test | < 0.5 °C        | ----         | ----             |

### SAR result with Head TSL at 5300 MHz

|                                                             |                    |                                   |
|-------------------------------------------------------------|--------------------|-----------------------------------|
| <b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b> | Condition          |                                   |
| SAR measured                                                | 100 mW input power | 8.04 W/kg                         |
| SAR for nominal Head TSL parameters                         | normalized to 1W   | <b>80.2 W / kg ± 19.9 % (k=2)</b> |

|                                                               |                    |                                 |
|---------------------------------------------------------------|--------------------|---------------------------------|
| <b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b> | condition          |                                 |
| SAR measured                                                  | 100 mW input power | 2.30 W/kg                       |
| SAR for nominal Head TSL parameters                           | normalized to 1W   | <b>22.9 W/kg ± 19.5 % (k=2)</b> |

### Head TSL parameters at 5500 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Head TSL parameters             | 22.0 °C         | 35.6         | 4.96 mho/m       |
| Measured Head TSL parameters            | (22.0 ± 0.2) °C | 35.4 ± 6 %   | 4.76 mho/m ± 6 % |
| Head TSL temperature change during test | < 0.5 °C        | ----         | ----             |

### SAR result with Head TSL at 5500 MHz

|                                                             |                    |                                 |
|-------------------------------------------------------------|--------------------|---------------------------------|
| <b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b> | Condition          |                                 |
| SAR measured                                                | 100 mW input power | 8.17 W/kg                       |
| SAR for nominal Head TSL parameters                         | normalized to 1W   | <b>81.4 W/kg ± 19.9 % (k=2)</b> |

|                                                               |                    |                                 |
|---------------------------------------------------------------|--------------------|---------------------------------|
| <b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b> | condition          |                                 |
| SAR measured                                                  | 100 mW input power | 2.32 W/kg                       |
| SAR for nominal Head TSL parameters                           | normalized to 1W   | <b>23.1 W/kg ± 19.5 % (k=2)</b> |

### Head TSL parameters at 5600 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Head TSL parameters             | 22.0 °C         | 35.5         | 5.07 mho/m       |
| Measured Head TSL parameters            | (22.0 ± 0.2) °C | 35.2 ± 6 %   | 4.86 mho/m ± 6 % |
| Head TSL temperature change during test | < 0.5 °C        | ----         | ----             |

### SAR result with Head TSL at 5600 MHz

|                                                             |                    |                                 |
|-------------------------------------------------------------|--------------------|---------------------------------|
| <b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b> | Condition          |                                 |
| SAR measured                                                | 100 mW input power | 8.03 W/kg                       |
| SAR for nominal Head TSL parameters                         | normalized to 1W   | <b>80.0 W/kg ± 19.9 % (k=2)</b> |

|                                                               |                    |                                 |
|---------------------------------------------------------------|--------------------|---------------------------------|
| <b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b> | condition          |                                 |
| SAR measured                                                  | 100 mW input power | 2.28 W/kg                       |
| SAR for nominal Head TSL parameters                           | normalized to 1W   | <b>22.7 W/kg ± 19.5 % (k=2)</b> |

### Head TSL parameters at 5800 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Head TSL parameters             | 22.0 °C         | 35.3         | 5.27 mho/m       |
| Measured Head TSL parameters            | (22.0 ± 0.2) °C | 35.0 ± 6 %   | 5.07 mho/m ± 6 % |
| Head TSL temperature change during test | < 0.5 °C        | ----         | ----             |

### SAR result with Head TSL at 5800 MHz

|                                                             |                    |                                 |
|-------------------------------------------------------------|--------------------|---------------------------------|
| <b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b> | Condition          |                                 |
| SAR measured                                                | 100 mW input power | 7.78 W/kg                       |
| SAR for nominal Head TSL parameters                         | normalized to 1W   | <b>77.5 W/kg ± 19.9 % (k=2)</b> |

|                                                               |                    |                                 |
|---------------------------------------------------------------|--------------------|---------------------------------|
| <b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b> | condition          |                                 |
| SAR measured                                                  | 100 mW input power | 2.20 W/kg                       |
| SAR for nominal Head TSL parameters                           | normalized to 1W   | <b>21.9 W/kg ± 19.5 % (k=2)</b> |

### Body TSL parameters at 5200 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Body TSL parameters             | 22.0 °C         | 49.0         | 5.30 mho/m       |
| Measured Body TSL parameters            | (22.0 ± 0.2) °C | 48.3 ± 6 %   | 5.36 mho/m ± 6 % |
| Body TSL temperature change during test | < 0.5 °C        | ----         | ----             |

### SAR result with Body TSL at 5200 MHz

|                                                             |                    |                                 |
|-------------------------------------------------------------|--------------------|---------------------------------|
| <b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Body TSL</b> | Condition          |                                 |
| SAR measured                                                | 100 mW input power | 7.28 W/kg                       |
| SAR for nominal Body TSL parameters                         | normalized to 1W   | <b>72.6 W/kg ± 19.9 % (k=2)</b> |

|                                                               |                    |                                 |
|---------------------------------------------------------------|--------------------|---------------------------------|
| <b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Body TSL</b> | condition          |                                 |
| SAR measured                                                  | 100 mW input power | 2.03 W/kg                       |
| SAR for nominal Body TSL parameters                           | normalized to 1W   | <b>20.2 W/kg ± 19.5 % (k=2)</b> |

### Body TSL parameters at 5300 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Body TSL parameters             | 22.0 °C         | 48.9         | 5.42 mho/m       |
| Measured Body TSL parameters            | (22.0 ± 0.2) °C | 48.1 ± 6 %   | 5.56 mho/m ± 6 % |
| Body TSL temperature change during test | < 0.5 °C        | ----         | ----             |

### SAR result with Body TSL at 5300 MHz

|                                                             |                    |                                 |
|-------------------------------------------------------------|--------------------|---------------------------------|
| <b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Body TSL</b> | Condition          |                                 |
| SAR measured                                                | 100 mW input power | 7.49 W/kg                       |
| SAR for nominal Body TSL parameters                         | normalized to 1W   | <b>74.7 W/kg ± 19.9 % (k=2)</b> |

|                                                               |                    |                                 |
|---------------------------------------------------------------|--------------------|---------------------------------|
| <b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Body TSL</b> | condition          |                                 |
| SAR measured                                                  | 100 mW input power | 2.09 W/kg                       |
| SAR for nominal Body TSL parameters                           | normalized to 1W   | <b>20.8 W/kg ± 19.5 % (k=2)</b> |

### Body TSL parameters at 5500 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Body TSL parameters             | 22.0 °C         | 48.6         | 5.65 mho/m       |
| Measured Body TSL parameters            | (22.0 ± 0.2) °C | 47.8 ± 6 %   | 5.75 mho/m ± 6 % |
| Body TSL temperature change during test | < 0.5 °C        | ----         | ----             |

### SAR result with Body TSL at 5500 MHz

|                                                             |                    |                                 |
|-------------------------------------------------------------|--------------------|---------------------------------|
| <b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Body TSL</b> | Condition          |                                 |
| SAR measured                                                | 100 mW input power | 7.61 W/kg                       |
| SAR for nominal Body TSL parameters                         | normalized to 1W   | <b>75.9 W/kg ± 19.9 % (k=2)</b> |

|                                                               |                    |                                 |
|---------------------------------------------------------------|--------------------|---------------------------------|
| <b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Body TSL</b> | condition          |                                 |
| SAR measured                                                  | 100 mW input power | 2.11 W/kg                       |
| SAR for nominal Body TSL parameters                           | normalized to 1W   | <b>21.0 W/kg ± 19.5 % (k=2)</b> |

### Body TSL parameters at 5600 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Body TSL parameters             | 22.0 °C         | 48.5         | 5.77 mho/m       |
| Measured Body TSL parameters            | (22.0 ± 0.2) °C | 47.6 ± 6 %   | 5.88 mho/m ± 6 % |
| Body TSL temperature change during test | < 0.5 °C        | ----         | ----             |

### SAR result with Body TSL at 5600 MHz

|                                                             |                    |                                 |
|-------------------------------------------------------------|--------------------|---------------------------------|
| <b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Body TSL</b> | Condition          |                                 |
| SAR measured                                                | 100 mW input power | 7.75 W/kg                       |
| SAR for nominal Body TSL parameters                         | normalized to 1W   | <b>77.3 W/kg ± 19.9 % (k=2)</b> |

|                                                               |                    |                                 |
|---------------------------------------------------------------|--------------------|---------------------------------|
| <b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Body TSL</b> | condition          |                                 |
| SAR measured                                                  | 100 mW input power | 2.16 W/kg                       |
| SAR for nominal Body TSL parameters                           | normalized to 1W   | <b>21.5 W/kg ± 19.5 % (k=2)</b> |

### Body TSL parameters at 5800 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Body TSL parameters             | 22.0 °C         | 48.2         | 6.00 mho/m       |
| Measured Body TSL parameters            | (22.0 ± 0.2) °C | 47.3 ± 6 %   | 6.17 mho/m ± 6 % |
| Body TSL temperature change during test | < 0.5 °C        | ----         | ----             |

### SAR result with Body TSL at 5800 MHz

|                                                             |                    |                                 |
|-------------------------------------------------------------|--------------------|---------------------------------|
| <b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Body TSL</b> | Condition          |                                 |
| SAR measured                                                | 100 mW input power | 7.31 W/kg                       |
| SAR for nominal Body TSL parameters                         | normalized to 1W   | <b>72.9 W/kg ± 19.9 % (k=2)</b> |

|                                                               |                    |                                 |
|---------------------------------------------------------------|--------------------|---------------------------------|
| <b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Body TSL</b> | condition          |                                 |
| SAR measured                                                  | 100 mW input power | 2.02 W/kg                       |
| SAR for nominal Body TSL parameters                           | normalized to 1W   | <b>20.1 W/kg ± 19.5 % (k=2)</b> |

## Appendix

### Antenna Parameters with Head TSL at 5200 MHz

|                                      |                                 |
|--------------------------------------|---------------------------------|
| Impedance, transformed to feed point | 52.4 $\Omega$ - 11.0 j $\Omega$ |
| Return Loss                          | - 19.2 dB                       |

### Antenna Parameters with Head TSL at 5300 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 56.8 $\Omega$ - 4.4 j $\Omega$ |
| Return Loss                          | - 22.3 dB                      |

### Antenna Parameters with Head TSL at 5500 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 48.8 $\Omega$ - 5.4 j $\Omega$ |
| Return Loss                          | - 25.1 dB                      |

### Antenna Parameters with Head TSL at 5600 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 57.3 $\Omega$ - 8.7 j $\Omega$ |
| Return Loss                          | - 19.5 dB                      |

### Antenna Parameters with Head TSL at 5800 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 56.9 $\Omega$ + 1.6 j $\Omega$ |
| Return Loss                          | - 23.5 dB                      |

### Antenna Parameters with Body TSL at 5200 MHz

|                                      |                                 |
|--------------------------------------|---------------------------------|
| Impedance, transformed to feed point | 53.1 $\Omega$ - 10.3 j $\Omega$ |
| Return Loss                          | - 19.7 dB                       |

### Antenna Parameters with Body TSL at 5300 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 54.3 $\Omega$ - 1.5 j $\Omega$ |
| Return Loss                          | - 27.2 dB                      |

### Antenna Parameters with Body TSL at 5500 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 49.7 $\Omega$ - 3.6 j $\Omega$ |
| Return Loss                          | - 28.7 dB                      |

### Antenna Parameters with Body TSL at 5600 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 58.2 $\Omega$ - 5.2 j $\Omega$ |
| Return Loss                          | - 20.9 dB                      |

### Antenna Parameters with Body TSL at 5800 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 58.7 $\Omega$ + 3.9 j $\Omega$ |
| Return Loss                          | - 21.1 dB                      |

### General Antenna Parameters and Design

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.201 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 | August 28, 2003 |

## DASY5 Validation Report for Head TSL

Date: 23.09.2013

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1007**

Communication System: UID 0 - CW ; Frequency: 5200 MHz, Frequency: 5300 MHz, Frequency: 5500 MHz, Frequency: 5600 MHz, Frequency: 5800 MHz

Medium parameters used:  $f = 5200$  MHz;  $\sigma = 4.48$  S/m;  $\epsilon_r = 35.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5300$  MHz;  $\sigma = 4.62$  S/m;  $\epsilon_r = 35.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5500$  MHz;  $\sigma = 4.76$  S/m;  $\epsilon_r = 35.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5600$  MHz;  $\sigma = 4.86$  S/m;  $\epsilon_r = 35.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5800$  MHz;  $\sigma = 5.07$  S/m;  $\epsilon_r = 35$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.41, 5.41, 5.41); Calibrated: 28.12.2012, ConvF(5.1, 5.1, 5.1); Calibrated: 28.12.2012, ConvF(4.91, 4.91, 4.91); Calibrated: 28.12.2012, ConvF(4.76, 4.76, 4.76); Calibrated: 28.12.2012, ConvF(4.81, 4.81, 4.81); Calibrated: 28.12.2012;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 63.505 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 28.1 W/kg

**SAR(1 g) = 7.77 W/kg; SAR(10 g) = 2.23 W/kg**

Maximum value of SAR (measured) = 18.1 W/kg

**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5300 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 63.817 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 29.7 W/kg

**SAR(1 g) = 8.04 W/kg; SAR(10 g) = 2.3 W/kg**

Maximum value of SAR (measured) = 18.7 W/kg

**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 64.029 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 32.0 W/kg

**SAR(1 g) = 8.17 W/kg; SAR(10 g) = 2.32 W/kg**

Maximum value of SAR (measured) = 19.7 W/kg

**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 63.403 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 31.3 W/kg

**SAR(1 g) = 8.03 W/kg; SAR(10 g) = 2.28 W/kg**

Maximum value of SAR (measured) = 19.3 W/kg

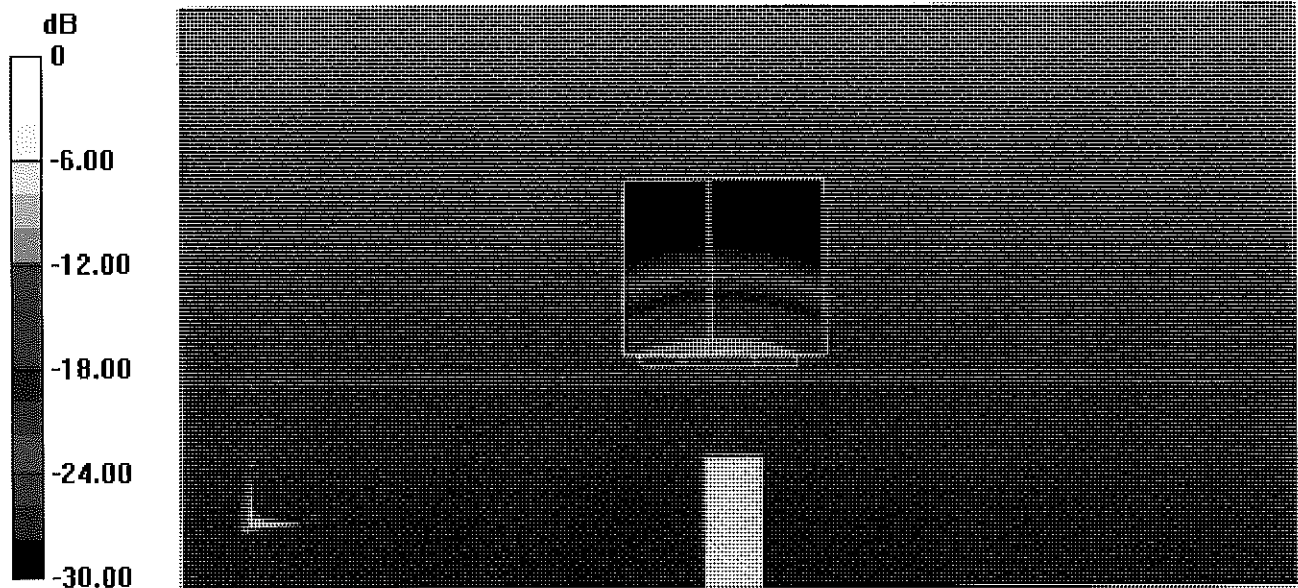
**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 60.987 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 31.9 W/kg

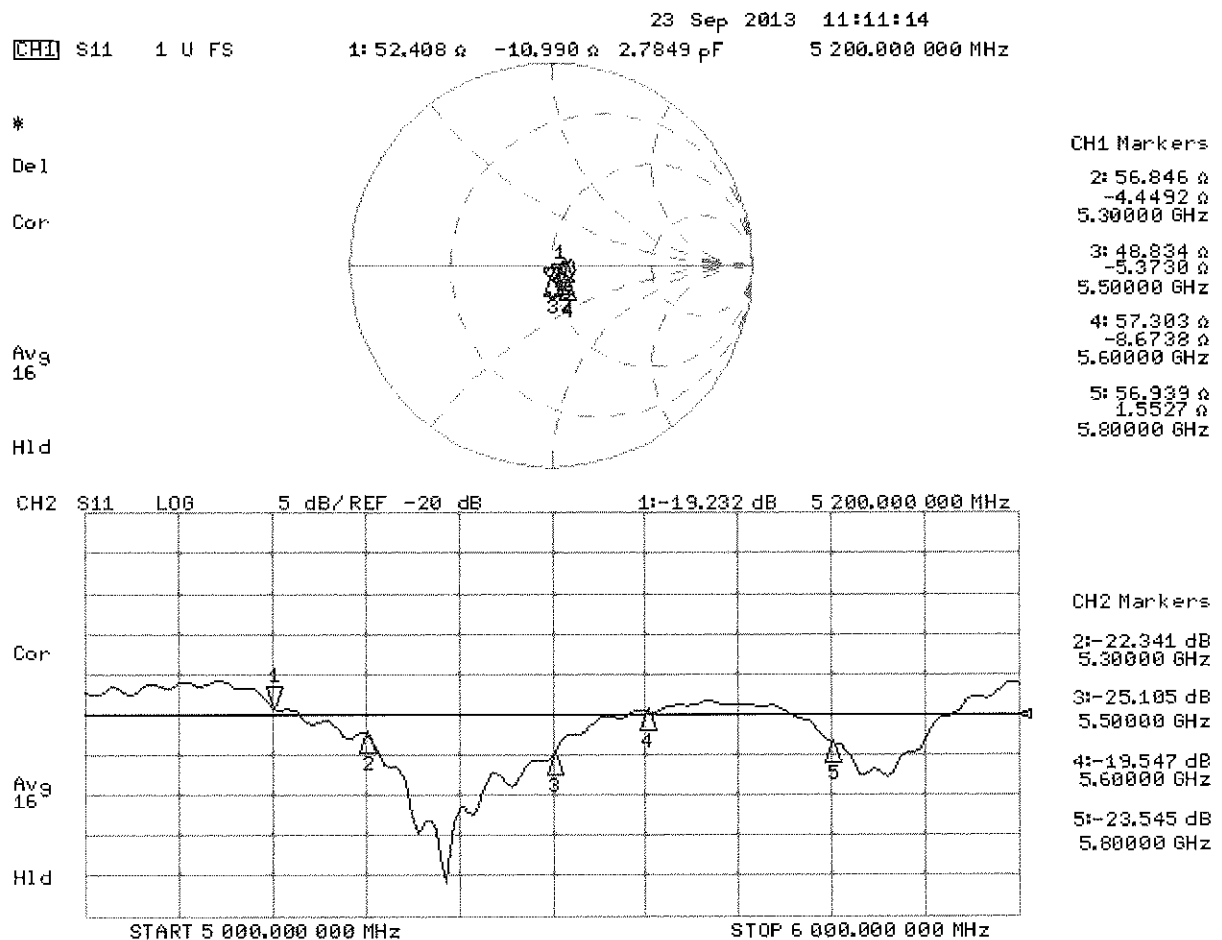
**SAR(1 g) = 7.78 W/kg; SAR(10 g) = 2.2 W/kg**

Maximum value of SAR (measured) = 19.0 W/kg



0 dB = 19.0 W/kg = 12.79 dBW/kg

# Impedance Measurement Plot for Head TSL



## DASY5 Validation Report for Body TSL

Date: 20.09.2013

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1007**

Communication System: UID 0 - CW ; Frequency: 5200 MHz, Frequency: 5300 MHz, Frequency: 5500 MHz, Frequency: 5600 MHz, Frequency: 5800 MHz

Medium parameters used:  $f = 5200$  MHz;  $\sigma = 5.36$  S/m;  $\epsilon_r = 48.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5300$  MHz;  $\sigma = 5.56$  S/m;  $\epsilon_r = 48.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5500$  MHz;  $\sigma = 5.75$  S/m;  $\epsilon_r = 47.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5600$  MHz;  $\sigma = 5.88$  S/m;  $\epsilon_r = 47.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5800$  MHz;  $\sigma = 6.17$  S/m;  $\epsilon_r = 47.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(4.91, 4.91, 4.91); Calibrated: 28.12.2012, ConvF(4.67, 4.67, 4.67); Calibrated: 28.12.2012, ConvF(4.43, 4.43, 4.43); Calibrated: 28.12.2012, ConvF(4.22, 4.22, 4.22); Calibrated: 28.12.2012, ConvF(4.38, 4.38, 4.38); Calibrated: 28.12.2012;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

**Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 58.606 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 28.6 W/kg

**SAR(1 g) = 7.28 W/kg; SAR(10 g) = 2.03 W/kg**

Maximum value of SAR (measured) = 17.2 W/kg

**Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5300 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 58.305 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 30.3 W/kg

**SAR(1 g) = 7.49 W/kg; SAR(10 g) = 2.09 W/kg**

Maximum value of SAR (measured) = 17.8 W/kg

**Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 58.471 V/m; Power Drift = -0.00 dB

Peak SAR (extrapolated) = 32.4 W/kg

**SAR(1 g) = 7.61 W/kg; SAR(10 g) = 2.11 W/kg**

Maximum value of SAR (measured) = 18.5 W/kg

**Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 58.333 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 33.8 W/kg

**SAR(1 g) = 7.75 W/kg; SAR(10 g) = 2.16 W/kg**

Maximum value of SAR (measured) = 19.1 W/kg

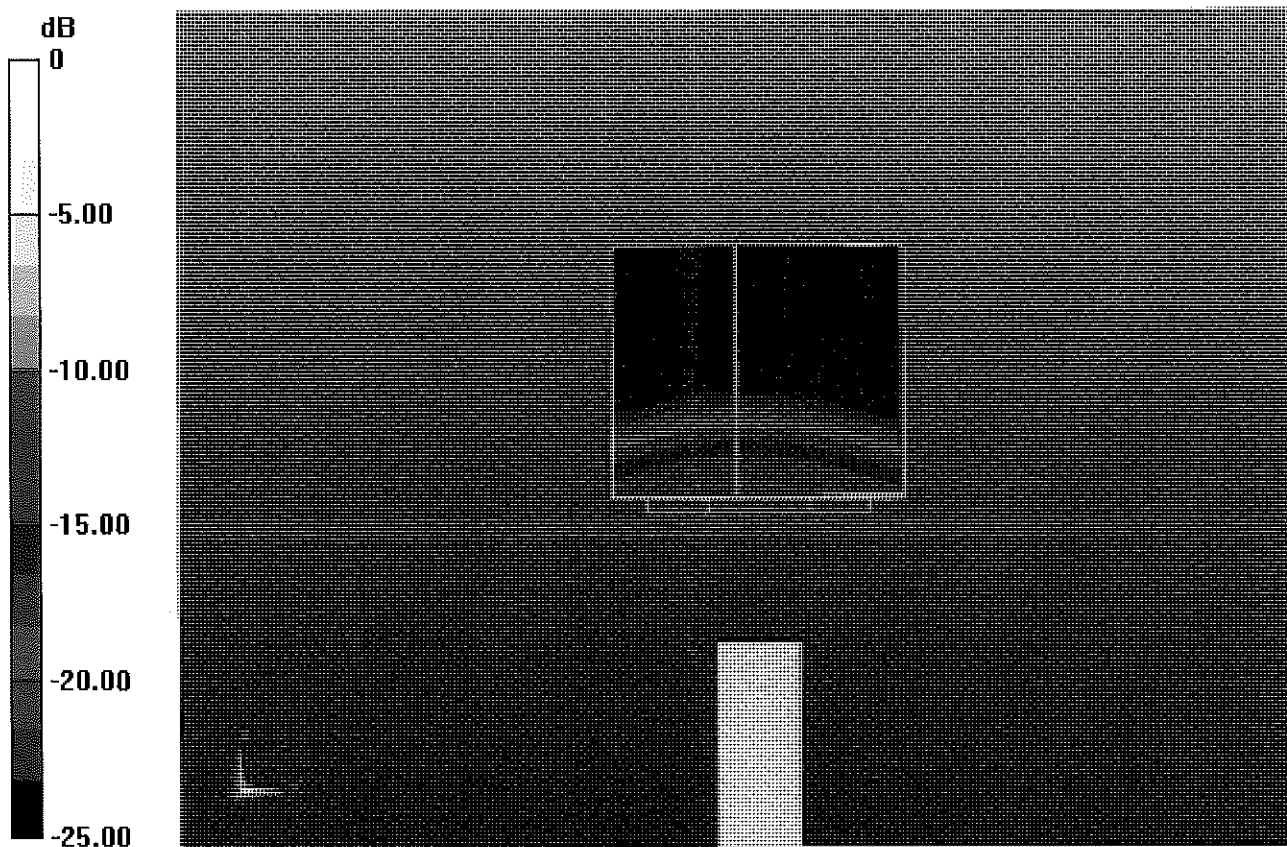
**Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 55.389 V/m; Power Drift = 0.00 dB

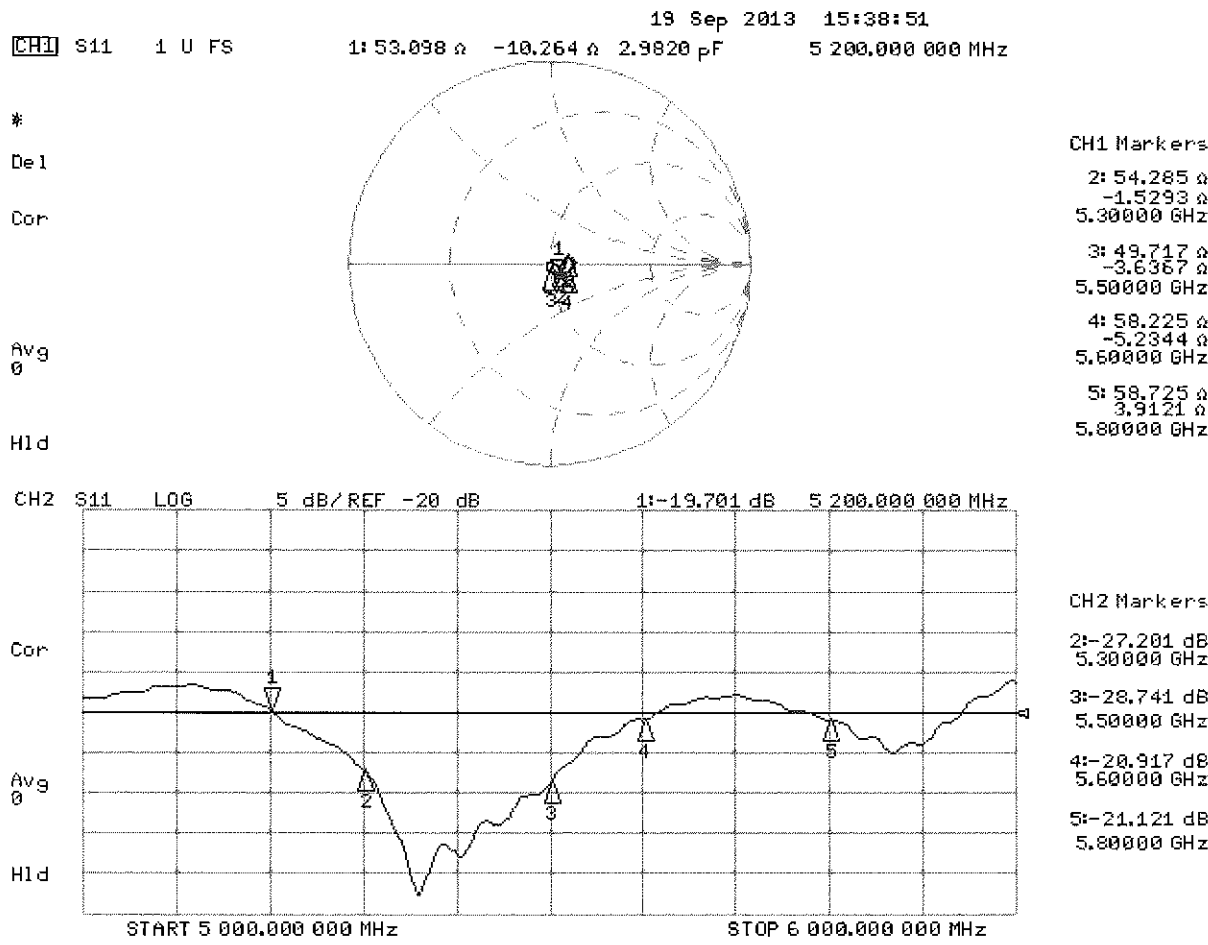
Peak SAR (extrapolated) = 34.1 W/kg

**SAR(1 g) = 7.31 W/kg; SAR(10 g) = 2.02 W/kg**

Maximum value of SAR (measured) = 18.3 W/kg



Impedance Measurement Plot for Body TSL



## APPENDIX D: SAR TISSUE SPECIFICATIONS

Measurement Procedure for Tissue verification:

- 1) The network analyzer and probe system was configured and calibrated.
- 2) The probe was immersed in the tissue. The tissue 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  $j = \sqrt{-1}$ .

**Table D-I**  
**Composition of the Tissue Equivalent Matter**

| Frequency (MHz)           | 835   | 835   | 1900  | 1900  | 2450       | 2450 | 5200-5800  | 5200-5800 |
|---------------------------|-------|-------|-------|-------|------------|------|------------|-----------|
| Tissue                    | Head  | Body  | Head  | Body  | Head       | Body | Head       | Body      |
| Ingredients (% by weight) |       |       |       |       |            |      |            |           |
| Bactericide               | 0.1   | 0.1   |       |       | See Page 2 |      | See Page 3 |           |
| DGBE                      |       |       | 44.92 | 29.44 |            | 26.7 |            |           |
| HEC                       | 1     | 1     |       |       |            |      |            |           |
| NaCl                      | 1.45  | 0.94  | 0.18  | 0.39  |            | 0.1  |            |           |
| Sucrose                   | 57    | 44.9  |       |       |            |      |            |           |
| Polysorbate (Tween) 80    |       |       |       |       |            |      |            | 20        |
| Water                     | 40.45 | 53.06 | 54.9  | 70.17 |            | 73.2 |            | 80        |

|                                        |                                                                                     |                       |                                                                                       |                                 |
|----------------------------------------|-------------------------------------------------------------------------------------|-----------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMT235                      |  | SAR EVALUATION REPORT |  | Reviewed by:<br>Quality Manager |
| Test Dates:<br>04/17/2014 - 05/08/2014 | DUT Type:<br>Portable Tablet                                                        |                       |                                                                                       | APPENDIX D:<br>Page 1 of 3      |

## 2 Composition / Information on ingredients

The Item is composed of the following ingredients:

|                                               |                                                                                                                       |
|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| H <sub>2</sub> O                              | Water, 52 – 75%                                                                                                       |
| C <sub>8</sub> H <sub>18</sub> O <sub>3</sub> | Diethylene glycol monobutyl ether (DGBE), 25 – 48%<br>(CAS-No. 112-34-5, EC-No. 203-961-6, EC-index-No. 603-096-00-8) |
| NaCl                                          | Relevant for safety; Refer to the respective Safety Data Sheet*.<br>Sodium Chloride, <1.0%                            |

Figure D-1

### Composition of 2.4 GHz Head Tissue Equivalent Matter

**Note:** 2.4 GHz head liquid recipes are proprietary SPEAG. Since the composition is approximate to the actual liquids utilized, the manufacturer tissue-equivalent liquid data sheets are provided below.

#### Measurement Certificate / Material Test

|              |                                           |
|--------------|-------------------------------------------|
| Item Name    | Head Tissue Simulating Liquid (HSL2450V2) |
| Product No.  | SL AAH 245 BA (Charge: 130212-2)          |
| Manufacturer | SPEAG                                     |

#### Measurement Method

TSL dielectric parameters measured using calibrated OCP probe.

#### Setup Validation

Validation results were within  $\pm 2.5\%$  towards the target values of Methanol.

#### Target Parameters

Target parameters as defined in the IEEE 1528 and IEC 62209 compliance standards.

#### Test Condition

|                 |                                                                         |
|-----------------|-------------------------------------------------------------------------|
| Ambient         | Environment temperature ( $22 \pm 3^\circ\text{C}$ and humidity < 70%). |
| TSL Temperature | $23^\circ\text{C}$                                                      |
| Test Date       | 13-Feb-13                                                               |
| Operator        | DI                                                                      |

#### Additional Information

|                   |                         |
|-------------------|-------------------------|
| TSL Density       | 0.988 g/cm <sup>3</sup> |
| TSL Heat-capacity | 3.680 kJ/(kg*K)         |

| f (MHz) | Measured |       |       | Target |       | Diff. to Target [%] |         |
|---------|----------|-------|-------|--------|-------|---------------------|---------|
|         | HP-e*    | HP-e* | sigma | eps    | sigma | Δ-eps               | Δ-sigma |
| 1900    | 40.4     | 11.94 | 1.26  | 40.0   | 1.40  | 1.0                 | -9.9    |
| 1925    | 40.3     | 12.02 | 1.29  | 40.0   | 1.40  | 0.7                 | -8.0    |
| 1950    | 40.2     | 12.11 | 1.31  | 40.0   | 1.40  | 0.5                 | -6.2    |
| 1975    | 40.1     | 12.20 | 1.34  | 40.0   | 1.40  | 0.2                 | -4.2    |
| 2000    | 40.0     | 12.29 | 1.37  | 40.0   | 1.40  | -0.1                | -2.3    |
| 2025    | 39.9     | 12.39 | 1.40  | 40.0   | 1.42  | -0.2                | -1.9    |
| 2050    | 39.8     | 12.49 | 1.42  | 39.9   | 1.44  | -0.4                | -1.4    |
| 2075    | 39.6     | 12.57 | 1.45  | 39.9   | 1.47  | -0.6                | -1.1    |
| 2100    | 39.5     | 12.65 | 1.48  | 39.8   | 1.49  | -0.7                | -0.7    |
| 2125    | 39.4     | 12.74 | 1.51  | 39.8   | 1.51  | -0.9                | -0.4    |
| 2150    | 39.3     | 12.82 | 1.53  | 39.7   | 1.53  | -1.0                | 0.0     |
| 2175    | 39.2     | 12.89 | 1.56  | 39.7   | 1.56  | -1.2                | 0.3     |
| 2200    | 39.1     | 12.97 | 1.59  | 39.6   | 1.58  | -1.3                | 0.6     |
| 2225    | 39.0     | 13.04 | 1.61  | 39.6   | 1.60  | -1.5                | 0.9     |
| 2250    | 38.9     | 13.11 | 1.64  | 39.6   | 1.62  | -1.7                | 1.2     |
| 2275    | 38.8     | 13.20 | 1.67  | 39.5   | 1.64  | -1.8                | 1.6     |
| 2300    | 38.7     | 13.28 | 1.70  | 39.5   | 1.67  | -2.0                | 2.0     |
| 2325    | 38.6     | 13.35 | 1.73  | 39.4   | 1.69  | -2.1                | 2.3     |
| 2350    | 38.5     | 13.42 | 1.75  | 39.4   | 1.71  | -2.3                | 2.6     |
| 2375    | 38.4     | 13.50 | 1.78  | 39.3   | 1.73  | -2.4                | 2.9     |
| 2400    | 38.3     | 13.58 | 1.81  | 39.3   | 1.76  | -2.6                | 3.3     |
| 2425    | 38.2     | 13.65 | 1.84  | 39.2   | 1.78  | -2.7                | 3.6     |
| 2450    | 38.1     | 13.73 | 1.87  | 39.2   | 1.80  | -2.9                | 4.0     |
| 2475    | 38.0     | 13.79 | 1.90  | 39.2   | 1.83  | -3.1                | 3.9     |
| 2500    | 37.9     | 13.85 | 1.93  | 39.1   | 1.85  | -3.3                | 3.9     |
| 2525    | 37.8     | 13.94 | 1.96  | 39.1   | 1.88  | -3.4                | 4.0     |
| 2550    | 37.7     | 14.02 | 1.99  | 39.1   | 1.91  | -3.6                | 4.2     |
| 2575    | 37.6     | 14.09 | 2.02  | 39.0   | 1.94  | -3.8                | 4.3     |
| 2600    | 37.5     | 14.17 | 2.05  | 39.0   | 1.96  | -4.0                | 4.4     |
| 2625    | 37.4     | 14.23 | 2.08  | 39.0   | 1.99  | -4.2                | 4.4     |
| 2650    | 37.3     | 14.29 | 2.11  | 38.9   | 2.02  | -4.3                | 4.4     |
| 2675    | 37.1     | 14.36 | 2.14  | 38.9   | 2.05  | -4.5                | 4.5     |
| 2700    | 37.0     | 14.43 | 2.17  | 38.9   | 2.07  | -4.8                | 4.6     |

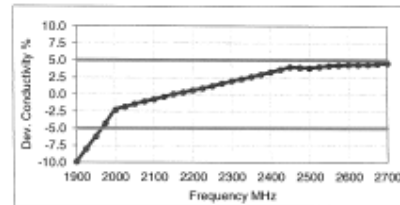
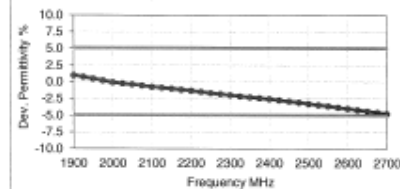


Figure D-2

### 2.4 GHz Head Tissue Equivalent Matter

|                                        |                                                                                     |                       |                                                                                       |                                 |
|----------------------------------------|-------------------------------------------------------------------------------------|-----------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMT235                      |  | SAR EVALUATION REPORT |  | Reviewed by:<br>Quality Manager |
| Test Dates:<br>04/17/2014 - 05/08/2014 | DUT Type:<br>Portable Tablet                                                        |                       |                                                                                       | APPENDIX D:<br>Page 2 of 3      |

## 2 Composition / Information on ingredients

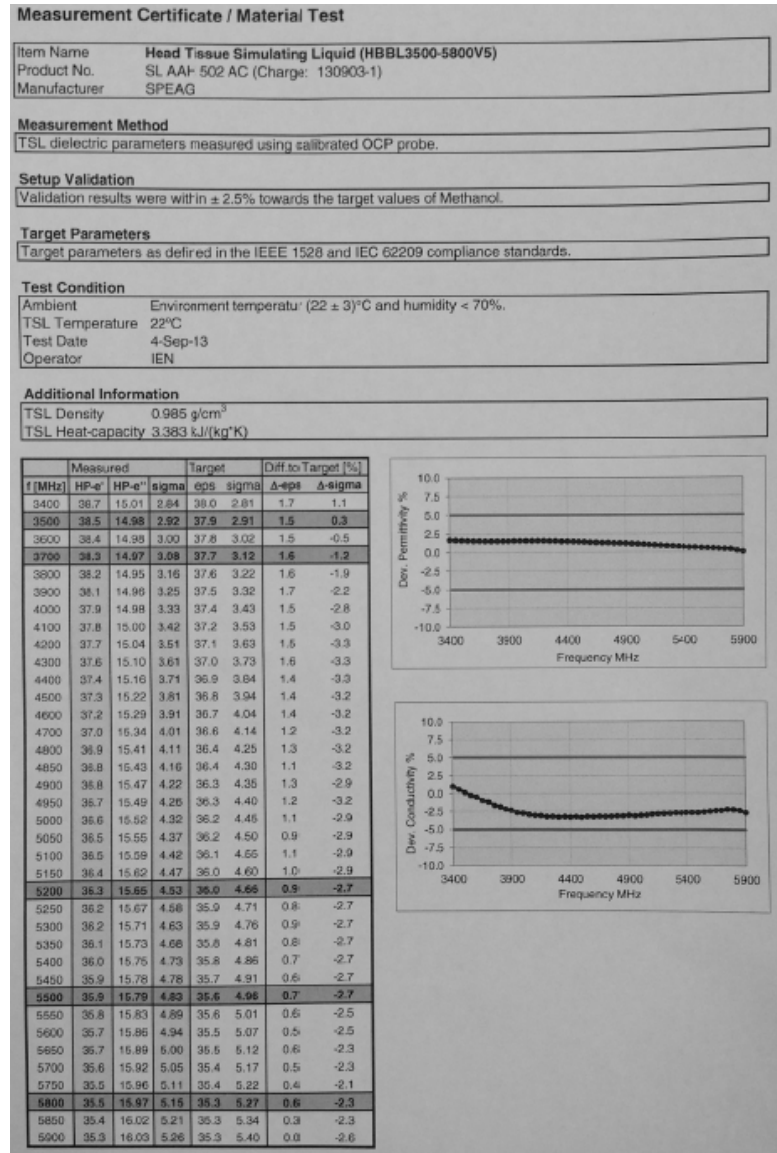
The Item is composed of the following ingredients:

|             |          |
|-------------|----------|
| Water       | 50 – 65% |
| Mineral oil | 10 – 30% |
| Emulsifiers | 8 – 25%  |
| Sodium salt | 0 – 1.5% |

**Figure D-3**

### Composition of 5 GHz Head Tissue Equivalent Matter

**Note:** 5GHz head liquid recipes are proprietary SPEAG. Since the composition is approximate to the actual liquids utilized, the manufacturer tissue-equivalent liquid data sheets are provided below.



**Figure D-4**

### 5GHz Head Tissue Equivalent Matter

|                                        |                                                                                     |                       |                                                                                       |                                 |
|----------------------------------------|-------------------------------------------------------------------------------------|-----------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMT235                      |  | SAR EVALUATION REPORT |  | Reviewed by:<br>Quality Manager |
| Test Dates:<br>04/17/2014 - 05/08/2014 | DUT Type:<br>Portable Tablet                                                        |                       |                                                                                       | APPENDIX D:<br>Page 3 of 3      |

## APPENDIX E: SAR SYSTEM VALIDATION

Per FCC KDB 865664 D02v01, SAR system validation status should be documented to confirm measurement accuracy. The SAR systems (including SAR probes, system components and software versions) used for this device were validated against its performance specifications prior to the SAR measurements. Reference dipoles were used with the required tissue- equivalent media for system validation, according to the procedures outlined in FCC KDB 865664 D01 v01 and IEEE 1528-2013. Since SAR probe calibrations are frequency dependent, each probe calibration point was validated at a frequency within the valid frequency range of the probe calibration point, using the system that normally operates with the probe for routine SAR measurements and according to the required tissue-equivalent media.

A tabulated summary of the system validation status including the validation date(s), measurement frequencies, SAR probes and tissue dielectric parameters has been included.

**Table E-I**  
**SAR System Validation Summary**

| SAR SYSTEM # | FREQ. [MHz] | DATE       | PROBE SN | PROBE TYPE | PROBE CAL. POINT |      | COND.        | PERM.            | CW VALIDATION |                 |                | MOD. VALIDATION |             |      |
|--------------|-------------|------------|----------|------------|------------------|------|--------------|------------------|---------------|-----------------|----------------|-----------------|-------------|------|
|              |             |            |          |            |                  |      | ( $\sigma$ ) | ( $\epsilon_r$ ) | SENSI- TIVITY | PROBE LINEARITY | PROBE ISOTROPY | MOD. TYPE       | DUTY FACTOR | PAR  |
| E            | 835         | 12/31/2013 | 3914     | EX3DV4     | 835              | Head | 0.909        | 40.02            | PASS          | PASS            | PASS           | GMSK            | PASS        | N/A  |
| K            | 1900        | 1/15/2014  | 3333     | ES3DV3     | 1900             | Head | 1.400        | 39.37            | PASS          | PASS            | PASS           | GMSK            | PASS        | N/A  |
| K            | 2450        | 2/8/2014   | 3287     | ES3DV3     | 2450             | Head | 1.832        | 38.03            | PASS          | PASS            | PASS           | OFDM            | N/A         | PASS |
| E            | 5200        | 12/3/2013  | 3914     | EX3DV4     | 5200             | Head | 4.482        | 34.70            | PASS          | PASS            | PASS           | OFDM            | N/A         | PASS |
| E            | 5300        | 12/3/2013  | 3914     | EX3DV4     | 5300             | Head | 4.604        | 34.60            | PASS          | PASS            | PASS           | OFDM            | N/A         | PASS |
| E            | 5500        | 12/3/2013  | 3914     | EX3DV4     | 5500             | Head | 4.821        | 34.28            | PASS          | PASS            | PASS           | OFDM            | N/A         | PASS |
| E            | 5800        | 12/3/2013  | 3914     | EX3DV4     | 5800             | Head | 5.133        | 33.89            | PASS          | PASS            | PASS           | OFDM            | N/A         | PASS |
| D            | 835         | 10/8/2013  | 3022     | ES3DV2     | 835              | Body | 1.012        | 53.65            | PASS          | PASS            | PASS           | GMSK            | PASS        | N/A  |
| E            | 1900        | 12/18/2013 | 3914     | EX3DV4     | 1900             | Body | 1.579        | 51.41            | PASS          | PASS            | PASS           | GMSK            | PASS        | N/A  |
| H            | 1900        | 3/17/2014  | 3589     | EX3DV4     | 1900             | Body | 1.577        | 52.62            | PASS          | PASS            | PASS           | GMSK            | PASS        | N/A  |
| G            | 2450        | 3/5/2014   | 3258     | ES3DV3     | 2450             | Body | 2.044        | 51.30            | PASS          | PASS            | PASS           | OFDM            | N/A         | PASS |
| A            | 5200        | 1/13/2014  | 3920     | EX3DV4     | 5200             | Body | 5.344        | 47.27            | PASS          | PASS            | PASS           | OFDM            | N/A         | PASS |
| A            | 5300        | 1/13/2014  | 3920     | EX3DV4     | 5300             | Body | 5.500        | 46.91            | PASS          | PASS            | PASS           | OFDM            | N/A         | PASS |
| A            | 5500        | 1/13/2014  | 3920     | EX3DV4     | 5500             | Body | 5.826        | 46.38            | PASS          | PASS            | PASS           | OFDM            | N/A         | PASS |
| A            | 5800        | 1/23/2014  | 3920     | EX3DV4     | 5800             | Body | 6.282        | 46.05            | PASS          | PASS            | PASS           | OFDM            | N/A         | PASS |

NOTE: While the probes have been calibrated for both a CW and modulated signals, all measurements were performed using communication systems calibrated for CW signals only. Modulations in the table above represent test configurations for which the measurement system has been validated per FCC KDB Publication 865664 D01v01 for scenarios when CW probe calibrations are used with other signal types. SAR systems were validated for modulated signals with a periodic duty cycle, such as GMSK, or with a high peak to average ratio (>5 dB), such as OFDM according to KDB 865664.

|                                    |                                                                                     |                       |                                                                                       |                                 |
|------------------------------------|-------------------------------------------------------------------------------------|-----------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMT235                  |  | SAR EVALUATION REPORT |  | Reviewed by:<br>Quality Manager |
| Test Dates:<br>04/17/14 – 05/08/14 | DUT Type:<br>Portable Tablet                                                        |                       |                                                                                       | APPENDIX E:<br>Page 1 of 1      |

## APPENDIX G: SENSOR TRIGGERING DATA SUMMARY

|                                               |                                                                                                                                   |                              |                                                                                       |                                        |
|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> A3LSMT235                      |  <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>SAR EVALUATION REPORT</b> |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Test Dates:</b><br>04/17/2014 – 05/08/2014 | <b>DUT Type:</b><br>Portable Tablet                                                                                               |                              |                                                                                       | <b>APPENDIX G:</b><br>Page 1 of 4      |

## A3LSMT235 Sensor Triggering Data Summary

Per FCC KDB Publication 616217 D04v01, this device was tested by the manufacturer to determine the proximity sensor triggering distances for the back and top edge of the device. The measured output power within  $\pm 5$  mm of the triggering points (or until touching the phantom) is included for back side and each applicable edge.

To ensure all production units are compliant it is necessary to test SAR at a distance 1 mm less than the smallest distance from the device and SAR phantom (determined from these triggering tests according to the KDB 616217 D04v01) with the device at maximum output power without power reduction. These SAR Tests are included in addition to the SAR tests for the device touching the SAR phantom, with reduced power.

The operational description contains information explaining how this device remains compliant in the event of a sensor malfunction.

|                                               |                                                                                                                                                                                                        |                                        |
|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> A3LSMT235                      |  <b>SAR EVALUATION REPORT</b>  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Test Dates:</b><br>04/17/2014 – 05/08/2014 | <b>DUT Type:</b><br>Portable Tablet                                                                                                                                                                    | <b>APPENDIX G:</b><br>Page 2 of 4      |

## Back Side

Moving device toward the phantom:

| KDB 616217 6.2.6 Measured Power [dBm] |       |       |       |       |       |       |       |       |       |       |       |
|---------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Distance[mm]                          | 24    | 23    | 22    | 21    | 20    | 19    | 18    | 17    | 16    | 15    | 14    |
| GSM850                                | 32.65 | 32.69 | 32.82 | 32.72 | 32.74 | 22.1  | 22.2  | 22.43 | 22.12 | 22.38 | 22.1  |
| GSM1900                               | 29.61 | 29.64 | 29.68 | 29.84 | 29.9  | 19.26 | 19.36 | 19.28 | 19.25 | 19.35 | 19.42 |
| GPRS 850 1Tx                          | 32.72 | 32.64 | 32.82 | 32.6  | 32.7  | 22.38 | 22.15 | 22.42 | 22.16 | 22.24 | 22.36 |
| GPRS 850 2Tx                          | 31.36 | 31.16 | 31.31 | 31.37 | 31.34 | 22.12 | 22.34 | 22.25 | 22.21 | 22.45 | 22.24 |
| GPRS 850 3Tx                          | 30.21 | 30.37 | 30.25 | 30.36 | 30.32 | 20.61 | 20.94 | 20.72 | 20.87 | 20.73 | 20.85 |
| GPRS 850 4Tx                          | 28.64 | 28.66 | 28.93 | 28.77 | 28.69 | 18.15 | 18.33 | 18.34 | 18.32 | 18.15 | 18.15 |
| GPRS 1900 1Tx                         | 29.63 | 29.73 | 29.65 | 29.83 | 29.62 | 19.41 | 19.21 | 19.14 | 19.27 | 19.29 | 19.23 |
| GPRS 1900 2Tx                         | 28.69 | 28.74 | 28.82 | 28.92 | 28.61 | 18.21 | 18.14 | 18.15 | 18.21 | 18.1  | 18.41 |
| GPRS 1900 3Tx                         | 27.72 | 27.91 | 27.9  | 27.81 | 27.68 | 16.21 | 16.44 | 16.31 | 16.15 | 16.37 | 16.4  |
| GPRS 1900 4Tx                         | 26.39 | 26.32 | 26.3  | 26.43 | 26.37 | 15.3  | 15.36 | 15.12 | 15.4  | 15.35 | 15.39 |
| WCDMA 850                             | 23.22 | 23.25 | 23.12 | 23.35 | 23.34 | 19.33 | 19.13 | 19.24 | 19.34 | 19.16 | 19.43 |
| WCDMA 1900                            | 23.78 | 23.72 | 23.67 | 23.77 | 23.63 | 11.94 | 11.9  | 11.86 | 11.94 | 11.81 | 11.84 |
| EDGE850 1Tx                           | 25.29 | 25.19 | 25.36 | 25.26 | 25.23 | 23.65 | 23.64 | 23.93 | 23.66 | 23.63 | 23.72 |
| EDGE850 2Tx                           | 23.7  | 23.74 | 23.73 | 23.79 | 23.74 | 22.14 | 22.17 | 22.22 | 22.25 | 22.37 | 22.37 |
| EDGE850 3Tx                           | 23.21 | 23.18 | 23.18 | 23.19 | 23.28 | 20.42 | 20.16 | 20.15 | 20.4  | 20.44 | 20.14 |
| EDGE850 4Tx                           | 21.87 | 21.82 | 21.72 | 21.82 | 21.63 | 18.89 | 18.72 | 18.87 | 18.73 | 18.85 | 18.64 |
| EDGE1900 1Tx                          | 26.4  | 26.13 | 26.12 | 26.24 | 26.38 | 19.19 | 19.16 | 19.26 | 19.41 | 19.33 | 19.43 |
| EDGE1900 2Tx                          | 24.87 | 24.69 | 24.77 | 24.9  | 24.94 | 18.26 | 18.18 | 18.28 | 18.22 | 18.3  | 18.39 |
| EDGE1900 3Tx                          | 23.28 | 23.42 | 23.12 | 23.19 | 23.21 | 16.31 | 16.32 | 16.3  | 16.27 | 16.31 | 16.13 |
| EDGE1900 4Tx                          | 21.78 | 21.78 | 21.71 | 21.74 | 21.89 | 14.21 | 14.26 | 14.2  | 14.18 | 14.22 | 14.22 |
| LTE B5                                | 23.19 | 23.25 | 23.15 | 23.13 | 23.23 | 17.76 | 17.92 | 17.68 | 17.72 | 17.81 | 17.93 |

Moving device away from the phantom:

| KDB 616217 6.2.8 Measured Power [dBm] |       |       |       |       |       |       |       |       |       |       |       |
|---------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Distance[mm]                          | 24    | 23    | 22    | 21    | 20    | 19    | 18    | 17    | 16    | 15    | 14    |
| GSM850                                | 32.87 | 32.77 | 32.64 | 32.91 | 32.83 | 22.13 | 22.35 | 22.23 | 22.44 | 22.2  | 22.22 |
| GSM1900                               | 29.85 | 29.87 | 29.63 | 29.85 | 29.89 | 19.29 | 19.29 | 19.33 | 19.45 | 19.15 | 19.34 |
| GPRS 850 1Tx                          | 32.89 | 32.86 | 32.69 | 32.85 | 32.73 | 22.35 | 22.27 | 22.12 | 22.18 | 22.23 | 22.16 |
| GPRS 850 2Tx                          | 31.19 | 31.1  | 31.45 | 31.31 | 31.43 | 22.39 | 22.17 | 22.3  | 22.22 | 22.23 | 22.16 |
| GPRS 850 3Tx                          | 30.45 | 30.4  | 30.2  | 30.34 | 30.32 | 20.6  | 20.68 | 20.75 | 20.81 | 20.94 | 20.8  |
| GPRS 850 4Tx                          | 28.87 | 28.91 | 28.65 | 28.6  | 28.94 | 18.33 | 18.25 | 18.1  | 18.18 | 18.33 | 18.16 |
| GPRS 1900 1Tx                         | 29.89 | 29.88 | 29.95 | 29.72 | 29.73 | 19.32 | 19.3  | 19.37 | 19.17 | 19.21 | 19.44 |
| GPRS 1900 2Tx                         | 28.9  | 28.73 | 28.91 | 28.86 | 28.72 | 18.34 | 18.42 | 18.32 | 18.45 | 18.45 | 18.29 |
| GPRS 1900 3Tx                         | 27.88 | 27.89 | 27.76 | 27.93 | 27.76 | 16.16 | 16.29 | 16.39 | 16.22 | 16.32 | 16.26 |
| GPRS 1900 4Tx                         | 26.26 | 26.23 | 26.16 | 26.33 | 26.13 | 15.29 | 15.22 | 15.16 | 15.37 | 15.16 | 15.35 |
| WCDMA 850                             | 23.19 | 23.27 | 23.15 | 23.29 | 23.19 | 19.21 | 19.4  | 19.36 | 19.11 | 19.14 | 19.11 |
| WCDMA 1900                            | 23.93 | 23.7  | 23.82 | 23.86 | 23.8  | 11.92 | 11.6  | 11.79 | 11.85 | 11.71 | 11.78 |
| EDGE850 1Tx                           | 25.17 | 25.21 | 25.33 | 25.1  | 25.15 | 23.79 | 23.65 | 23.75 | 23.95 | 23.72 | 23.82 |
| EDGE850 2Tx                           | 23.8  | 23.63 | 23.77 | 23.86 | 23.82 | 22.44 | 22.33 | 22.38 | 22.18 | 22.42 | 22.1  |
| EDGE850 3Tx                           | 23.23 | 23.33 | 23.17 | 23.16 | 23.2  | 20.22 | 20.35 | 20.32 | 20.19 | 20.43 | 20.1  |
| EDGE850 4Tx                           | 21.73 | 21.67 | 21.94 | 21.68 | 21.83 | 18.89 | 18.64 | 18.72 | 18.62 | 18.87 | 18.76 |
| EDGE1900 1Tx                          | 26.39 | 26.22 | 26.27 | 26.32 | 26.41 | 19.14 | 19.24 | 19.39 | 19.15 | 19.35 | 19.11 |
| EDGE1900 2Tx                          | 24.71 | 24.81 | 24.81 | 24.77 | 24.74 | 18.36 | 18.24 | 18.35 | 18.11 | 18.37 | 18.4  |
| EDGE1900 3Tx                          | 23.42 | 23.44 | 23.22 | 23.23 | 23.27 | 16.38 | 16.32 | 16.34 | 16.3  | 16.36 | 16.42 |
| EDGE1900 4Tx                          | 21.76 | 21.7  | 21.68 | 21.61 | 21.67 | 14.22 | 14.12 | 14.21 | 14.1  | 14.15 | 14.25 |
| LTE B5                                | 23.37 | 23.19 | 23.29 | 23.45 | 23.28 | 17.95 | 17.91 | 17.74 | 17.93 | 17.89 | 17.7  |

Based on the most conservative measured triggering distance of 19 mm, additional SAR measurements were required at 18 mm from the back side.

|                                               |                                                                                                                                   |                              |                                                                                       |                                        |
|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| FCC ID: A3LSMT235                             |  <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>SAR EVALUATION REPORT</b> |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Test Dates:</b><br>04/17/2014 – 05/08/2014 | <b>DUT Type:</b><br>Portable Tablet                                                                                               |                              |                                                                                       | <b>APPENDIX G:</b><br>Page 3 of 4      |

## Top Edge

Moving device toward the phantom:

| KDB 616217 6.2.6 Measured Power [dBm] |       |       |       |       |       |       |       |       |       |       |       |
|---------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Distance[mm]                          | 21    | 20    | 19    | 18    | 17    | 16    | 15    | 14    | 13    | 12    | 11    |
| GSM850                                | 32.8  | 32.91 | 32.74 | 32.94 | 32.68 | 22.42 | 22.32 | 22.13 | 22.12 | 22.29 | 22.32 |
| GSM1900                               | 29.74 | 29.69 | 29.84 | 29.92 | 29.85 | 19.4  | 19.15 | 19.11 | 19.4  | 19.43 | 19.35 |
| GPRS 850 1Tx                          | 32.71 | 32.92 | 32.75 | 32.75 | 32.95 | 22.35 | 22.38 | 22.3  | 22.21 | 22.14 | 22.21 |
| GPRS 850 2Tx                          | 31.44 | 31.13 | 31.3  | 31.22 | 31.23 | 22.43 | 22.27 | 22.1  | 22.18 | 22.29 | 22.25 |
| GPRS 850 3Tx                          | 30.29 | 30.23 | 30.34 | 30.33 | 30.42 | 20.81 | 20.89 | 20.72 | 20.93 | 20.84 | 20.66 |
| GPRS 850 4Tx                          | 28.94 | 28.76 | 28.79 | 28.85 | 28.83 | 18.1  | 18.19 | 18.31 | 18.13 | 18.3  | 18.32 |
| GPRS 1900 1Tx                         | 29.75 | 29.92 | 29.91 | 29.85 | 29.76 | 19.29 | 19.26 | 19.28 | 19.44 | 19.19 | 19.39 |
| GPRS 1900 2Tx                         | 28.85 | 28.76 | 28.9  | 28.67 | 28.83 | 18.45 | 18.32 | 18.4  | 18.4  | 18.28 | 18.37 |
| GPRS 1900 3Tx                         | 27.89 | 27.81 | 27.63 | 27.6  | 27.91 | 16.37 | 16.32 | 16.37 | 16.31 | 16.44 | 16.36 |
| GPRS 1900 4Tx                         | 26.25 | 26.38 | 26.11 | 26.37 | 26.18 | 15.42 | 15.26 | 15.35 | 15.45 | 15.42 | 15.24 |
| WCDMA 850                             | 23.38 | 23.1  | 23.44 | 23.25 | 23.44 | 19.45 | 19.13 | 19.34 | 19.35 | 19.32 | 19.45 |
| WCDMA 1900                            | 23.64 | 23.69 | 23.9  | 23.63 | 23.88 | 11.75 | 11.8  | 11.76 | 11.73 | 11.95 | 11.82 |
| EDGE850 1Tx                           | 25.13 | 25.19 | 25.14 | 25.43 | 25.17 | 23.66 | 23.67 | 23.8  | 23.69 | 23.64 | 23.69 |
| EDGE850 2Tx                           | 23.83 | 23.86 | 23.63 | 23.6  | 23.73 | 22.3  | 22.33 | 22.35 | 22.33 | 22.39 | 22.34 |
| EDGE850 3Tx                           | 23.15 | 23.17 | 23.3  | 23.35 | 23.24 | 20.35 | 20.17 | 20.33 | 20.41 | 20.15 | 20.23 |
| EDGE850 4Tx                           | 21.7  | 21.72 | 21.71 | 21.69 | 21.92 | 18.78 | 18.9  | 18.95 | 18.64 | 18.83 | 18.95 |
| EDGE1900 1Tx                          | 26.11 | 26.41 | 26.36 | 26.14 | 26.36 | 19.28 | 19.38 | 19.2  | 19.36 | 19.33 | 19.2  |
| EDGE1900 2Tx                          | 24.82 | 24.78 | 24.87 | 24.61 | 24.82 | 18.43 | 18.42 | 18.18 | 18.33 | 18.41 | 18.42 |
| EDGE1900 3Tx                          | 23.24 | 23.21 | 23.34 | 23.38 | 23.13 | 16.38 | 16.36 | 16.11 | 16.25 | 16.11 | 16.16 |
| EDGE1900 4Tx                          | 21.78 | 21.92 | 21.85 | 21.74 | 21.85 | 14.32 | 14.39 | 14.39 | 14.23 | 14.3  | 14.36 |
| LTE B5                                | 23.24 | 23.26 | 23.29 | 23.17 | 23.34 | 17.62 | 17.86 | 17.86 | 17.65 | 17.72 | 17.84 |

Moving device away from the phantom:

| KDB 616217 6.2.8 Measured Power [dBm] |       |       |       |       |       |       |       |       |       |       |       |
|---------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Distance[mm]                          | 21    | 20    | 19    | 18    | 17    | 16    | 15    | 14    | 13    | 12    | 11    |
| GSM850                                | 32.82 | 32.88 | 32.64 | 32.65 | 32.81 | 22.42 | 22.38 | 22.19 | 22.11 | 22.1  | 22.43 |
| GSM1900                               | 29.65 | 29.87 | 29.7  | 29.8  | 29.72 | 19.43 | 19.18 | 19.2  | 19.22 | 19.32 | 19.28 |
| GPRS 850 1Tx                          | 32.79 | 32.92 | 32.85 | 32.72 | 32.63 | 22.44 | 22.19 | 22.13 | 22.42 | 22.28 | 22.34 |
| GPRS 850 2Tx                          | 31.2  | 31.35 | 31.36 | 31.45 | 31.19 | 22.15 | 22.14 | 22.27 | 22.34 | 22.26 | 22.26 |
| GPRS 850 3Tx                          | 30.38 | 30.23 | 30.43 | 30.32 | 30.12 | 20.76 | 20.94 | 20.76 | 20.86 | 20.68 | 20.64 |
| GPRS 850 4Tx                          | 28.68 | 28.79 | 28.62 | 28.91 | 28.64 | 18.4  | 18.12 | 18.25 | 18.45 | 18.42 | 18.22 |
| GPRS 1900 1Tx                         | 29.72 | 29.8  | 29.64 | 29.76 | 29.75 | 19.26 | 19.27 | 19.29 | 19.37 | 19.45 | 19.14 |
| GPRS 1900 2Tx                         | 28.79 | 28.68 | 28.66 | 28.67 | 28.71 | 18.36 | 18.33 | 18.44 | 18.18 | 18.15 | 18.13 |
| GPRS 1900 3Tx                         | 27.71 | 27.93 | 27.83 | 27.84 | 27.81 | 16.4  | 16.23 | 16.33 | 16.44 | 16.34 | 16.15 |
| GPRS 1900 4Tx                         | 26.1  | 26.35 | 26.22 | 26.12 | 26.28 | 15.41 | 15.31 | 15.3  | 15.22 | 15.15 | 15.42 |
| WCDMA 850                             | 23.36 | 23.27 | 23.16 | 23.23 | 23.18 | 19.37 | 19.36 | 19.1  | 19.29 | 19.22 | 19.31 |
| WCDMA 1900                            | 23.85 | 23.69 | 23.66 | 23.88 | 23.88 | 11.77 | 11.71 | 11.78 | 11.67 | 11.76 | 11.81 |
| EDGE850 1Tx                           | 25.45 | 25.45 | 25.35 | 25.11 | 25.43 | 23.91 | 23.89 | 23.9  | 23.79 | 23.68 | 23.95 |
| EDGE850 2Tx                           | 23.72 | 23.62 | 23.82 | 23.95 | 23.86 | 22.15 | 22.34 | 22.13 | 22.12 | 22.19 | 22.15 |
| EDGE850 3Tx                           | 23.13 | 23.11 | 23.24 | 23.28 | 23.11 | 20.26 | 20.41 | 20.23 | 20.43 | 20.25 | 20.42 |
| EDGE850 4Tx                           | 21.8  | 21.93 | 21.6  | 21.76 | 21.72 | 18.7  | 18.69 | 18.9  | 18.75 | 18.61 | 18.89 |
| EDGE1900 1Tx                          | 26.25 | 26.41 | 26.35 | 26.41 | 26.15 | 19.33 | 19.24 | 19.19 | 19.34 | 19.15 | 19.35 |
| EDGE1900 2Tx                          | 24.8  | 24.95 | 24.89 | 24.65 | 24.92 | 18.25 | 18.44 | 18.39 | 18.37 | 18.35 | 18.39 |
| EDGE1900 3Tx                          | 23.31 | 23.32 | 23.33 | 23.4  | 23.15 | 16.12 | 16.39 | 16.22 | 16.35 | 16.45 | 16.22 |
| EDGE1900 4Tx                          | 21.89 | 21.92 | 21.93 | 21.6  | 21.62 | 14.13 | 14.12 | 14.44 | 14.44 | 14.45 | 14.28 |
| LTE B5                                | 23.36 | 23.18 | 23.13 | 23.19 | 23.34 | 17.8  | 17.64 | 17.71 | 17.64 | 17.86 | 17.78 |

Based on the most conservative measured triggering distance of 16 mm, additional SAR measurements were required at 15 mm from the top edge.

|                                               |                                                                                                                                   |                              |                                                                                       |                                        |
|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| FCC ID: A3LSMT235                             |  <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>SAR EVALUATION REPORT</b> |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Test Dates:</b><br>04/17/2014 – 05/08/2014 | <b>DUT Type:</b><br>Portable Tablet                                                                                               |                              |                                                                                       | <b>APPENDIX G:</b><br>Page 4 of 4      |