



## SAR EVALUATION REPORT

**Applicant Name:**

Samsung Electronics, Co. Ltd.  
129, Samsung-ro, Maetan dong,  
Yeongtong-gu, Suwon-si  
Gyeonggi-do 443-742, Korea

**Date of Testing:**

06/02/15 - 06/04/15

**Test Site/Location:**

PCTEST Lab, Columbia, MD, USA

**Document Serial No.:**

OY1505280998.A3L

**FCC ID:**

**A3LSMT357T**

**APPLICANT:**

**SAMSUNG ELECTRONICS, CO. LTD.**

**DUT Type:**

Portable Tablet

**Application Type:**

Certification

**FCC Rule Part(s):**

CFR §2.1093

**Model(s):**

SM-T357T

| Equipment Class                                   | Band & Mode      | Tx Frequency        | SAR              |
|---------------------------------------------------|------------------|---------------------|------------------|
|                                                   |                  |                     | 1 gm Body (W/kg) |
| PCB                                               | UMTS 850         | 826.40 - 846.60 MHz | 0.57             |
| PCB                                               | UMTS 1750        | 1712.4 - 1752.5 MHz | 0.59             |
| PCB                                               | UMTS 1900        | 1852.4 - 1907.6 MHz | 0.60             |
| PCB                                               | LTE Band 12      | 701.5 - 713.5 MHz   | 0.39             |
| PCB                                               | LTE Band 4 (AWS) | 1710.7 - 1754.3 MHz | 0.85             |
| PCB                                               | LTE Band 2 (PCS) | 1850.7 - 1909.3 MHz | 0.69             |
| DTS                                               | 2.4 GHz WLAN     | 2412 - 2462 MHz     | 0.59             |
| NII                                               | U-NII-1          | 5180 - 5240 MHz     |                  |
| NII                                               | U-NII-2A         | 5260 - 5320 MHz     | 0.63             |
| NII                                               | U-NII-2C         | 5500 - 5720 MHz     | 0.61             |
| NII                                               | U-NII-3          | 5745 - 5825 MHz     | 0.54             |
| DSS/DTS                                           | Bluetooth        | 2402 - 2480 MHz     | N/A              |
| <b>Simultaneous SAR per KDB 690783 D01v01r03:</b> |                  |                     | <b>1.48</b>      |

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>FCC ID:</b> A3LSMT357T                |  <b>SAR EVALUATION REPORT</b>  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Document S/N:</b><br>OY1505280998.A3L | <b>Test Dates:</b><br>06/02/15 - 06/04/15                                                                                                                                                              | <b>DUT Type:</b><br>Portable Tablet    |
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|                                          |                                                                                                                                   |                                     |                                                                                       |                                        |
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# 1 DEVICE UNDER TEST

## 1.1 Device Overview

| Band & Mode      | Operating Modes | Tx Frequency        |
|------------------|-----------------|---------------------|
| UMTS 850         | Data            | 826.40 - 846.60 MHz |
| UMTS 1750        | Data            | 1712.4 - 1752.5 MHz |
| UMTS 1900        | Data            | 1852.4 - 1907.6 MHz |
| LTE Band 12      | Data            | 701.5 - 713.5 MHz   |
| LTE Band 4 (AWS) | Data            | 1710.7 - 1754.3 MHz |
| LTE Band 2 (PCS) | Data            | 1850.7 - 1909.3 MHz |
| 2.4 GHz WLAN     | Data            | 2412 - 2462 MHz     |
| U-NII-1          | Data            | 5180 - 5240 MHz     |
| U-NII-2A         | Data            | 5260 - 5320 MHz     |
| U-NII-2C         | Data            | 5500 - 5720 MHz     |
| U-NII-3          | Data            | 5745 - 5825 MHz     |
| Bluetooth        | Data            | 2402 - 2480 MHz     |
| ANT+             | Data            | 2402 - 2480 MHz     |

## 1.2 Power Reduction for SAR

This device uses independent power reduction mechanisms for WLAN and PCB SAR compliance. The power reduction mechanisms are activated when the device is used in close proximity to the user's body.

Since the device is a full sized 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.

### Main Antenna Maximum Power

| Mode / Band            |         | Modulated Average (dBm) |               |               |               |
|------------------------|---------|-------------------------|---------------|---------------|---------------|
|                        |         | 3GPP<br>Rel 99          | 3GPP<br>Rel 5 | 3GPP<br>Rel 6 | 3GPP<br>Rel 8 |
|                        |         | WCDMA                   | HSDPA         | HSUPA         | DC-HSDPA      |
| UMTS Band 5 (850 MHz)  | Maximum | 23.5                    | 23.5          | 23.5          | 23.5          |
|                        | Nominal | 23.0                    | 23.0          | 23.0          | 23.0          |
| UMTS Band 4 (1750 MHz) | Maximum | 23.5                    | 23.5          | 23.5          | 23.5          |
|                        | Nominal | 23.0                    | 23.0          | 23.0          | 23.0          |
| UMTS Band 2 (1900 MHz) | Maximum | 23.5                    | 23.5          | 23.5          | 23.5          |
|                        | Nominal | 23.0                    | 23.0          | 23.0          | 23.0          |

|                                          |                                                                                                                                   |                                     |                                                                                       |                                        |
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| Mode / Band      |         | Modulated Average (dBm) |
|------------------|---------|-------------------------|
| LTE Band 12      | Maximum | <b>24.0</b>             |
|                  | Nominal | <b>23.5</b>             |
| LTE Band 4 (AWS) | Maximum | <b>24.0</b>             |
|                  | Nominal | <b>23.5</b>             |
| LTE Band 2 (PCS) | Maximum | <b>24.0</b>             |
|                  | Nominal | <b>23.5</b>             |

#### Main Antenna Reduced Power – Body at 0.0 cm

| Mode / Band            |         | Modulated Average (dBm) |               |               |               |
|------------------------|---------|-------------------------|---------------|---------------|---------------|
|                        |         | 3GPP<br>Rel 99          | 3GPP<br>Rel 5 | 3GPP<br>Rel 6 | 3GPP<br>Rel 8 |
|                        |         | WCDMA                   | HSDPA         | HSUPA         | DC-HSDPA      |
|                        |         |                         |               |               |               |
| UMTS Band 5 (850 MHz)  | Maximum | <b>18.1</b>             | <b>18.1</b>   | <b>18.1</b>   | <b>18.1</b>   |
|                        | Nominal | <b>17.6</b>             | <b>17.6</b>   | <b>17.6</b>   | <b>17.6</b>   |
| UMTS Band 4 (1750 MHz) | Maximum | <b>13.5</b>             | <b>13.5</b>   | <b>13.5</b>   | <b>13.5</b>   |
|                        | Nominal | <b>13.0</b>             | <b>13.0</b>   | <b>13.0</b>   | <b>13.0</b>   |
| UMTS Band 2 (1900 MHz) | Maximum | <b>12.0</b>             | <b>12.0</b>   | <b>12.0</b>   | <b>12.0</b>   |
|                        | Nominal | <b>11.5</b>             | <b>11.5</b>   | <b>11.5</b>   | <b>11.5</b>   |
| Mode / Band            |         | Modulated Average (dBm) |               |               |               |
| LTE Band 12            | Maximum | <b>20.0</b>             |               |               |               |
|                        | Nominal | <b>19.5</b>             |               |               |               |
| LTE Band 4 (AWS)       | Maximum | <b>13.7</b>             |               |               |               |
|                        | Nominal | <b>13.2</b>             |               |               |               |
| LTE Band 2 (PCS)       | Maximum | <b>12.3</b>             |               |               |               |
|                        | Nominal | <b>11.8</b>             |               |               |               |

#### WLAN/BT Antenna Maximum Power

| Mode / Band            |         | Modulated Average (dBm) |                  |
|------------------------|---------|-------------------------|------------------|
| IEEE 802.11b (2.4 GHz) | Maximum | <b>16.5</b>             |                  |
|                        | Nominal | <b>16.0</b>             |                  |
| IEEE 802.11g (2.4 GHz) | Maximum | <b>12.5</b>             |                  |
|                        | Nominal | <b>12.0</b>             |                  |
| IEEE 802.11n (2.4 GHz) | Maximum | <b>10.5</b>             |                  |
|                        | Nominal | <b>10.0</b>             |                  |
| Bluetooth              | Maximum | <b>9.5</b>              |                  |
|                        | Nominal | <b>9.0</b>              |                  |
| Bluetooth LE           | Maximum | <b>0.0</b>              |                  |
|                        | Nominal | <b>-0.5</b>             |                  |
| Mode / Band            |         | Modulated Average (dBm) |                  |
|                        |         | 20 MHz Bandwidth        | 40 MHz Bandwidth |
| IEEE 802.11a (5 GHz)   | Maximum | <b>11.5</b>             |                  |
|                        | Nominal | <b>11.0</b>             |                  |
| IEEE 802.11n (5 GHz)   | Maximum | <b>10.5</b>             | <b>10.5</b>      |
|                        | Nominal | <b>10.0</b>             | <b>10.0</b>      |

|                                   |                                                                                                                                                                                                        |                                 |
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### WLAN Antenna Reduced Power – Body at 0.0 cm

| Mode / Band            |         | Modulated Average (dBm) |                  |
|------------------------|---------|-------------------------|------------------|
| IEEE 802.11b (2.4 GHz) | Maximum | 11.5                    |                  |
|                        | Nominal | 11.0                    |                  |
| IEEE 802.11g (2.4 GHz) | Maximum | 10.5                    |                  |
|                        | Nominal | 10.0                    |                  |
| IEEE 802.11n (2.4 GHz) | Maximum | 9.5                     |                  |
|                        | Nominal | 9.0                     |                  |
| Mode / Band            |         | Modulated Average (dBm) |                  |
|                        |         | 20 MHz Bandwidth        | 40 MHz Bandwidth |
| IEEE 802.11a (5 GHz)   | Maximum | 6.5                     |                  |
|                        | Nominal | 6.0                     |                  |
| IEEE 802.11n (5 GHz)   | Maximum | 5.5                     | 7.5              |
|                        | Nominal | 5.0                     | 7.0              |

## 1.4 DUT Antenna Locations

The overall diagonal dimension of the device is > 200 mm. A diagram showing the locations of the device antennas can be found in Appendix F. Exact antenna dimensions and separation distances are shown in the Technical Descriptions in the FCC filing.

**Table 1-1**  
**Sides for SAR Testing**

| Mode             | Back | Top | Bottom | Right | Left |
|------------------|------|-----|--------|-------|------|
| UMTS 850         | Yes  | No  | Yes    | Yes   | No   |
| UMTS 1750        | Yes  | No  | Yes    | Yes   | No   |
| UMTS 1900        | Yes  | No  | Yes    | Yes   | No   |
| LTE Band 12      | Yes  | No  | Yes    | Yes   | No   |
| LTE Band 4 (AWS) | Yes  | No  | Yes    | Yes   | No   |
| LTE Band 2 (PCS) | Yes  | No  | Yes    | Yes   | No   |
| 2.4 GHz WLAN     | Yes  | Yes | No     | Yes   | No   |
| 5 GHz WLAN       | Yes  | Yes | No     | Yes   | No   |

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.

|                                   |                                                                                     |                              |                                                                                       |                                 |
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## 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 1-1 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 1-1**  
**Simultaneous Transmission Paths**

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 | Body |
|-----|--------------------------------|------|
| 1   | UMTS + 2.4 GHz WI-FI           | Yes  |
| 2   | UMTS + 5 GHz WI-FI             | Yes  |
| 3   | UMTS + 2.4 GHz Bluetooth       | Yes  |
| 4   | LTE + 2.4 GHz WI-FI            | Yes  |
| 5   | LTE + 5 GHz WI-FI              | Yes  |
| 6   | LTE + 2.4 GHz Bluetooth        | Yes  |

1. 2.4 GHz WLAN, 5 GHz WLAN, and 2.4 GHz Bluetooth share the same antenna path and cannot transmit simultaneously.
2. All licensed modes share the same antenna path and cannot transmit simultaneously.

## 1.6 Miscellaneous SAR Test Considerations

### (A) WIFI/BT

Per FCC KDB 447498 D01v05, the 1g 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 (rounded to the nearest mW) and the antenna to user separation distance, body-worn Bluetooth SAR was not required;  $[(9/5) * \sqrt{2.480}] = 2.8 < 3.0$ . Per KDB Publication 447498 D01v05, the maximum power of the channel was rounded to the nearest mW before calculation.

|                                          |                                                                                                                                   |                                     |                                                                                       |                                        |
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Since U-NII-1 and U-NII-2A bands have the same maximum output power and the highest reported SAR for U-NII-2A is less than 1.2 W/kg, SAR is not required for U-NII-1 band according to FCC KDB 248227 D01v02.

## (B) Licensed Transmitter(s)

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 D01v03.

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 D05v02r03.

## 1.7 Guidance Applied

- FCC KDB Publication 941225 D01v03, D05v02r03 (3G/4G)
- FCC KDB Publication 248227 D01v02 (SAR Considerations for 802.11 Devices)
- FCC KDB Publication 447498 D01v05r02 (General SAR Guidance)
- FCC KDB Publication 865664 D01v01r03, D02v01r01 (SAR Measurements up to 6 GHz)
- FCC KDB Publication 616217 D04v01r01 (Tablet SAR Considerations)

## 1.8 Device Serial Numbers

Several samples with identical hardware were used 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.

|                  | Maximum<br>Serial<br>Number | Reduced<br>Serial<br>Number |
|------------------|-----------------------------|-----------------------------|
| UMTS 850         | 11524                       | 01806                       |
| UMTS 1750        | 11524                       | 01798                       |
| UMTS 1900        | 11524                       | 01780                       |
| LTE Band 12      | 11524                       | 01806                       |
| LTE Band 4 (AWS) | 11524                       | 01780                       |
| LTE Band 2 (PCS) | 11490                       | 01806                       |
| 2.4 GHz WLAN     | 11490                       | 11490                       |
| 5 GHz WLAN       | 11516                       | 11516                       |

|                                          |                                                                                                                                                                                                        |                                        |
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## 2

## LTE INFORMATION

| LTE Information                                                                                                   |                                                                                                                                                                                                                                                                   |                |                |
|-------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------|
| FCC ID                                                                                                            | A3LSMT357T                                                                                                                                                                                                                                                        |                |                |
| Form Factor                                                                                                       | Portable Tablet                                                                                                                                                                                                                                                   |                |                |
| Frequency Range of each LTE transmission band                                                                     | LTE Band 12 (701.5 - 713.5 MHz)                                                                                                                                                                                                                                   |                |                |
|                                                                                                                   | LTE Band 4 (AWS) (1710.7 - 1754.3 MHz)                                                                                                                                                                                                                            |                |                |
|                                                                                                                   | LTE Band 2 (PCS) (1850.7 - 1909.3 MHz)                                                                                                                                                                                                                            |                |                |
| Channel Bandwidths                                                                                                | LTE Band 12: 5 MHz, 10 MHz                                                                                                                                                                                                                                        |                |                |
|                                                                                                                   | LTE Band 4 (AWS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz                                                                                                                                                                                                   |                |                |
|                                                                                                                   | LTE Band 2 (PCS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz                                                                                                                                                                                                   |                |                |
| Channel Numbers and Frequencies (MHz)                                                                             | Low                                                                                                                                                                                                                                                               | Mid            | High           |
| LTE Band 12: 5 MHz                                                                                                | 701.5 (23035)                                                                                                                                                                                                                                                     | 707.5 (23095)  | 713.5 (23155)  |
| LTE Band 12: 10 MHz                                                                                               | 704 (23060)                                                                                                                                                                                                                                                       | 707.5 (23095)  | 711 (23130)    |
| LTE Band 4 (AWS): 1.4 MHz                                                                                         | 1710.7 (19957)                                                                                                                                                                                                                                                    | 1732.5 (20175) | 1754.3 (20393) |
| LTE Band 4 (AWS): 3 MHz                                                                                           | 1711.5 (19965)                                                                                                                                                                                                                                                    | 1732.5 (20175) | 1753.5 (20385) |
| LTE Band 4 (AWS): 5 MHz                                                                                           | 1712.5 (19975)                                                                                                                                                                                                                                                    | 1732.5 (20175) | 1752.5 (20375) |
| LTE Band 4 (AWS): 10 MHz                                                                                          | 1715 (20000)                                                                                                                                                                                                                                                      | 1732.5 (20175) | 1750 (20350)   |
| LTE Band 4 (AWS): 15 MHz                                                                                          | 1717.5 (20025)                                                                                                                                                                                                                                                    | 1732.5 (20175) | 1747.5 (20325) |
| LTE Band 4 (AWS): 20 MHz                                                                                          | 1720 (20050)                                                                                                                                                                                                                                                      | 1732.5 (20175) | 1745 (20300)   |
| LTE Band 2 (PCS): 1.4 MHz                                                                                         | 1850.7 (18607)                                                                                                                                                                                                                                                    | 1880 (18900)   | 1909.3 (19193) |
| LTE Band 2 (PCS): 3 MHz                                                                                           | 1851.5 (18615)                                                                                                                                                                                                                                                    | 1880 (18900)   | 1908.5 (19185) |
| LTE Band 2 (PCS): 5 MHz                                                                                           | 1852.5 (18625)                                                                                                                                                                                                                                                    | 1880 (18900)   | 1907.5 (19175) |
| LTE Band 2 (PCS): 10 MHz                                                                                          | 1855 (18650)                                                                                                                                                                                                                                                      | 1880 (18900)   | 1905 (19150)   |
| LTE Band 2 (PCS): 15 MHz                                                                                          | 1857.5 (18675)                                                                                                                                                                                                                                                    | 1880 (18900)   | 1902.5 (19125) |
| LTE Band 2 (PCS): 20 MHz                                                                                          | 1860 (18700)                                                                                                                                                                                                                                                      | 1880 (18900)   | 1900 (19100)   |
| 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                                                                                                                                                                                                                                                               |                |                |
| LTE Release 10 Additional Information                                                                             | This device does not support full LTE Release 10 operations in the US. The following LTE Release 10 features are not supported: Carrier Aggregation, Relay, HetNet, Enhanced MIMO, eICI, WIFI Offloading, MDH, eMBMA, Cross-Carrier Scheduling, Enhanced SC-FDMA. |                |                |

|                                          |                                                                                                                                   |                                     |                                                                                       |                                        |
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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]

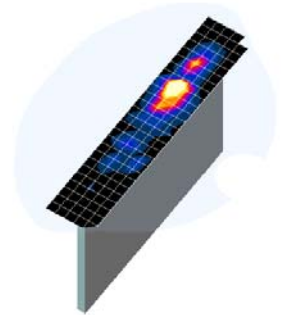
|                                   |                                                                                     |                              |                                                                                       |                                 |
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##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

\*Also compliant to IEEE 1528-2013 Table 6

|                                   |                                                                                     |                              |  |                                                                                       |                                 |
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## 5 SAR TESTING PROCEDURES

### 5.1 SAR Testing for Tablet per KDB Publication 616217 D04v01

This device can be used also in full sized tablet exposure conditions, due to its size. Per FCC KDB 616217, the back surface and edges of the tablet should be tested for SAR compliance with the tablet touching the phantom. The SAR Exclusion Threshold in KDB 447498 D01v05 can be applied to determine SAR test exclusion for adjacent edge configurations. The closest distance from the antenna to an adjacent tablet edge is used to determine if SAR testing is required for the adjacent edges, with the adjacent edge positioned against the phantom and the edge containing the antenna positioned perpendicular to the phantom.

### 5.2 Proximity Sensor Considerations

This device uses independent power reduction mechanisms to reduce powers in certain use conditions for both PCB and WLAN operations when the device is used close the user's body. There are no dependencies on either mechanism (i.e. the state of one mechanism does not affect the other).

While the device's antenna is within a certain distance of the user, the sensor activates and reduces the maximum output power allowed. However, the sensor is not active when the device is moved beyond the sensor triggering distance and the maximum output power is no longer limited. Therefore, an additional exposure condition is needed in the vicinity of the triggering distance to ensure SAR is compliant when the device is allowed to operate at a non-reduced output power level.

FCC KDB 616217 D04 Section 6 was used as a guideline for selecting SAR test distances for this device at these additional exposure conditions. Since the sensor activation distance for the back side of the device is 22 mm, a conservative distance of 21 mm was tested for SAR on the back side at maximum power for UMTS and LTE. Since the sensor activation distance for the top edge of the device is 19 mm, a conservative distance of 18 mm was tested for SAR on the back side at maximum power for UMTS and LTE. Since the sensor activation distance for the right edge of the device is 7 mm, a conservative distance of 6 mm was tested for SAR on the back side at maximum power for UMTS and LTE. Since the sensor activation distance for the back side of the device is 13 mm, a conservative distance of 12 mm was tested for SAR on the back side at maximum power for WLAN. Since the sensor activation distance for the top edge of the device is 6 mm, a conservative distance of 5 mm was tested for SAR on the top edge at maximum power for WLAN. Sensor triggering distance summary data is included in Appendix G.

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

|                                   |                                                                                                                                                                                                        |                                 |
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## 6 RF EXPOSURE LIMITS

### 6.1 Uncontrolled Environment

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

### 6.2 Controlled Environment

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

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

| HUMAN EXPOSURE LIMITS                                               |                                                                           |                                                                   |
|---------------------------------------------------------------------|---------------------------------------------------------------------------|-------------------------------------------------------------------|
|                                                                     | UNCONTROLLED ENVIRONMENT<br><i>General Population</i><br>(W/kg) or (mW/g) | CONTROLLED ENVIRONMENT<br><i>Occupational</i><br>(W/kg) or (mW/g) |
| <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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## 7 FCC MEASUREMENT PROCEDURES

Power measurements for licensed transmitters are performed using a base station simulator under digital average power.

### 7.1 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.

### 7.2 3G SAR Test Reduction Procedure

In FCC KDB Publication 941225 D01v03, certain transmission modes within a frequency band and wireless mode evaluated for SAR are defined as primary modes. The equivalent modes considered for SAR test reduction are denoted as secondary modes. When the maximum output power including tune-up tolerance specified for production units in a secondary mode is  $\leq 0.25$  dB higher than the primary mode or when the highest reported SAR of the primary mode, scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode, is  $\leq 1.2$  W/kg, SAR measurements are not required for the secondary mode. These criteria are referred to as the 3G SAR test reduction procedure. When the 3G SAR test reduction procedure is not satisfied, SAR measurements are additionally required for the secondary mode.

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

The following procedures are according to FCC KDB Publication 941225 D01v03 “3G SAR Measurement Procedures.”

The device is 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 are 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 is 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 deviates by more than 5%, the SAR test and drift measurements are repeated.

### 7.4 SAR Measurement Conditions for UMTS

#### 7.4.1 Output Power Verification

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, 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

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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.

#### 7.4.2 Body SAR Measurements

SAR for body exposure configurations is measured using the 12.2 kbps RMC with the TPC bits all “1s”. The 3G SAR test reduction procedure is applied to other spreading codes and multiple DPDCH<sub>n</sub> configurations supported by the handset with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured using an applicable RMC configuration with the corresponding spreading code or DPDCH<sub>n</sub>, for the highest reported SAR configuration in 12.2 kbps RMC.

#### 7.4.3 SAR Measurements with Rel 5 HSDPA

The 3G SAR test reduction procedure is applied to HSDPA body configurations with 12.2 kbps RMC as the primary mode. Otherwise, Body SAR for HSDPA is measured using an FRC with H-Set 1 in Sub-test 1 and a 12.2 kbps RMC configured in Test Loop Mode 1, for the highest reported SAR configuration in 12.2 kbps RMC without HSDPA. Handsets with both HSDPA and HSUPA are tested according to Release 6 HSPA test procedures.

#### 7.4.4 SAR Measurements with Rel 6 HSUPA

The 3G SAR test reduction procedure is applied to HSPA (HSUPA/HSDPA with RMC) body configurations with 12.2 kbps RMC as the primary mode. Otherwise, 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 and power control algorithm 2, according to the highest reported body SAR configuration in 12.2 kbps RMC without HSPA.

When VOIP applies to head exposure, the 3G SAR test reduction procedure is applied with 12.2 kbps RMC as the primary mode; otherwise, the same HSPA configuration used for body SAR measurements are applied to head exposure testing.

#### 7.4.5 SAR Measurement Conditions for DC-HSDPA

SAR is required for Rel. 8 DC-HSDPA when SAR is required for Rel. 5 HSDPA; otherwise, the 3G SAR test reduction procedure is applied to DC-HSDPA with 12.2 kbps RMC as the primary mode. Power is measured for DC-HSDPA according to the H-Set 12, FRC configuration in Table C.8.1.12 of 3GPP TS 34.121-1 to determine SAR test reduction. A primary and a secondary serving HS-DSCH Cell are required to perform the power measurement and for the results to be acceptable.

### 7.5 SAR Measurement Conditions for LTE

LTE modes are tested according to FCC KDB 941225 D05v02r03 publication. Establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluating SAR [4]. The R&S CMW500 or Anritsu MT8820C simulators are 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).

#### 7.5.1 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.

|                                   |                                                                                                                                                                                                        |                                 |
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## 7.5.2 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.

## 7.5.3 A-MPR

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

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

According to FCC KDB 941225 D05v02r03:

- a. Per Section 4.2.1, 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 4.2.2, SAR is required for 50% RB allocation using the largest bandwidth following the same procedures outlined in Section 4.2.1.
- c. Per Section 4.2.3, 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 4.2.4 and 4.3, 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 4.2.1 through 4.2.3 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.

## 7.6 SAR Testing with 802.11 Transmitters

The normal network operating configurations of 802.11 transmitters are not suitable for SAR measurements. 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 D01 DR02-41929 for more details.

### 7.6.1 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.

A periodic duty factor is required for current generation SAR systems to measure SAR. When 802.11 frame gaps are accounted for in the transmission, a maximum transmission duty factor of 92 - 96% is typically achievable in most test mode configurations. A minimum transmission duty factor of 85% is required to avoid certain hardware and device implementation issues related to wide range SAR

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scaling. The reported SAR is scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit.

### 7.6.2 U-NII-1 and U-NII-2A

For devices that operate in both U-NII-1 and U-NII-2A bands, when the same maximum output power is specified for both bands, SAR measurement using OFDM SAR test procedures is not required for U-NII-1 unless the highest reported SAR for U-NII-2A is  $> 1.2$  W/kg. When different maximum output powers are specified for the bands, SAR measurement for the U-NII band with the lower maximum output power is not required unless the highest reported SAR for the U-NII band with the higher maximum output power, adjusted by the ratio of lower to higher specified maximum output power for the two bands, is  $> 1.2$  W/kg.

### 7.6.3 U-NII-2C and U-NII-3

The frequency range covered by U-NII-2C and U-NII-3 is 380 MHz (5.47 – 5.85 GHz), which requires a minimum of at least two SAR probe calibration frequency points to support SAR measurements. When Terminal Doppler Weather Radar (TDWR) restriction applies, the channels at 5.60 – 5.65 GHz in U-NII-2C band must be disabled with acceptable mechanisms and documented in the equipment certification.

Unless band gap channels are permanently disabled, SAR must be considered for these channels. When band gap channels are disabled, each band is tested independently according to the normally required OFDM SAR measurement and probe calibration frequency points requirements.

### 7.6.4 2.4 GHz SAR Test Requirements

SAR is measured for 2.4 GHz 802.11b DSSS using either the fixed test position or, when applicable, the initial test position procedure. SAR test reduction is determined according to the following:

- 1) When the reported SAR of the highest measured maximum output power channel for the exposure configuration is  $\leq 0.8$  W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.
- 2) When the reported SAR is  $> 0.8$  W/kg, SAR is required for that position using the next highest measured output power channel. When any reported SAR is  $> 1.2$  W/kg, SAR is required for the third channel; i.e., all channels require testing.

2.4 GHz 802.11 g/n OFDM are additionally evaluated for SAR if the highest reported SAR for 802.11b, adjusted by the ratio of the OFDM to DSSS specified maximum output power, is  $> 1.2$  W/kg. When SAR is required for OFDM modes in 2.4 GHz band, the Initial Test Configuration Procedures should be followed.

### 7.6.5 OFDM Transmission Mode and SAR Test Channel Selection

For the 2.4 GHz and 5 GHz bands, when the same maximum output power was specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration with the largest channel bandwidth, lowest order modulation and lowest data rate. When the maximum output power of a channel is the same for equivalent OFDM configurations; for example, 802.11a, 802.11n and 802.11ac or 802.11g and 802.11n with the same channel bandwidth, modulation and data rate etc., the lower order 802.11 mode i.e., 802.11a, then 802.11n and 802.11ac or 802.11g then 802.11n, is used for SAR measurement. When the maximum output

|                                          |                                                                                                                                   |                                     |                                                                                       |                                        |
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power are the same for multiple test channels, either according to the default or additional power measurement requirements, SAR is measured using the channel closest to the middle of the frequency band or aggregated band. When there are multiple channels with the same maximum output power, SAR is measured using the higher number channel.

### 7.6.6 Initial Test Configuration Procedure

For OFDM, in both 2.4 and 5 GHz bands, an initial test configuration is determined for each frequency band and aggregated band, according to the transmission mode with the highest maximum output power specified for SAR measurements. When the same maximum output power is specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration(s) with the largest channel bandwidth, lowest order modulation, and lowest data rate. The channel of the transmission mode with the highest average RF output conducted power will be the initial test configuration.

When the reported SAR is  $\leq 0.8$  W/kg, no additional measurements on other test channels are required. Otherwise, SAR is evaluated using the subsequent highest average RF output channel until the reported SAR result is  $\leq 1.2$  W/kg or all channels are measured. When there are multiple untested channels having the same subsequent highest average RF output power, the channel with higher frequency from the lowest 802.11 mode is considered for SAR measurements (See Section 7.6.5).

### 7.6.7 Subsequent Test Configuration Procedures

For OFDM configurations in each frequency band and aggregated band, SAR is evaluated for initial test configuration using the fixed test position or the initial test position procedure. When the highest reported SAR (for the initial test configuration), adjusted by the ratio of the specified maximum output power of the subsequent test configuration to initial test configuration, is  $\leq 1.2$  W/kg, no additional SAR tests for the subsequent test configurations are required.

|                                   |                                                                                     |                              |                                                                                       |                                 |
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## 8 RF CONDUCTED POWERS

### 8.1 UMTS Conducted Powers

**Table 8-1**  
**Maximum Average RF Output Powers**

| 3GPP Release Version | Mode     | 3GPP 34.121 Subtest | Cellular Band [dBm] |       |       | AWS Band [dBm] |       |       | PCS Band [dBm] |       |       | 3GPP MPR [dB] |
|----------------------|----------|---------------------|---------------------|-------|-------|----------------|-------|-------|----------------|-------|-------|---------------|
|                      |          |                     | 4132                | 4183  | 4233  | 1312           | 1412  | 1862  | 9262           | 9400  | 9538  |               |
| 99                   | WCDMA    | 12.2 kbps RMC       | 22.86               | 22.91 | 22.94 | 22.88          | 22.93 | 22.87 | 22.68          | 22.79 | 22.84 | -             |
| 6                    | HSDPA    | Subtest 1           | 22.49               | 22.50 | 22.56 | 22.91          | 22.92 | 22.89 | 22.11          | 22.21 | 22.29 | 0             |
| 6                    |          | Subtest 2           | 22.44               | 22.49 | 22.56 | 22.89          | 22.88 | 22.93 | 22.14          | 22.27 | 22.33 | 0             |
| 6                    |          | Subtest 3           | 21.40               | 21.45 | 21.49 | 22.45          | 22.35 | 22.40 | 21.18          | 21.21 | 21.32 | 0.5           |
| 6                    |          | Subtest 4           | 21.34               | 21.40 | 21.50 | 22.41          | 22.38 | 22.42 | 21.08          | 21.23 | 21.29 | 0.5           |
| 6                    | HSUPA    | Subtest 1           | 21.54               | 21.56 | 21.68 | 21.63          | 21.89 | 21.91 | 21.54          | 21.56 | 21.62 | 0             |
| 6                    |          | Subtest 2           | 20.53               | 20.47 | 20.63 | 21.08          | 21.12 | 21.05 | 20.49          | 20.30 | 20.46 | 2             |
| 6                    |          | Subtest 3           | 20.76               | 20.95 | 20.97 | 21.77          | 21.62 | 21.68 | 20.89          | 21.06 | 21.29 | 1             |
| 6                    |          | Subtest 4           | 21.41               | 21.57 | 21.59 | 22.08          | 21.92 | 22.06 | 21.33          | 21.42 | 21.48 | 2             |
| 6                    | DC-HSDPA | Subtest 1           | 22.31               | 22.46 | 22.50 | 22.91          | 22.89 | 22.97 | 22.18          | 22.23 | 22.26 | 0             |
| 8                    |          | Subtest 2           | 22.45               | 22.52 | 22.52 | 23.15          | 23.12 | 23.35 | 22.57          | 22.68 | 22.82 | 0             |
| 8                    |          | Subtest 3           | 22.42               | 22.48 | 22.51 | 23.13          | 23.17 | 23.26 | 22.58          | 22.75 | 22.76 | 0             |
| 8                    |          | Subtest 4           | 21.39               | 21.43 | 21.54 | 22.77          | 22.81 | 22.91 | 21.56          | 21.67 | 21.82 | 0.5           |
| 8                    |          |                     | 21.43               | 21.52 | 21.52 | 22.76          | 22.80 | 22.97 | 21.47          | 21.66 | 21.78 | 0.5           |

**Table 8-2**  
**Reduced Average RF Output Powers – Body at 0.0 cm**

| 3GPP Release Version | Mode     | 3GPP 34.121 Subtest | Cellular Band [dBm] |       |       | AWS Band [dBm] |       |       | PCS Band [dBm] |       |       | 3GPP MPR [dB] |
|----------------------|----------|---------------------|---------------------|-------|-------|----------------|-------|-------|----------------|-------|-------|---------------|
|                      |          |                     | 4132                | 4183  | 4233  | 1312           | 1412  | 1862  | 9262           | 9400  | 9538  |               |
| 99                   | WCDMA    | 12.2 kbps RMC       | 17.34               | 17.34 | 17.30 | 13.31          | 13.06 | 13.29 | 11.60          | 11.75 | 11.20 | -             |
| 6                    | HSDPA    | Subtest 1           | 16.97               | 16.87 | 16.86 | 13.50          | 13.18 | 13.48 | 11.12          | 11.12 | 10.80 | 0             |
| 6                    |          | Subtest 2           | 16.88               | 16.96 | 16.88 | 13.49          | 13.18 | 13.44 | 11.11          | 11.12 | 10.78 | 0             |
| 6                    |          | Subtest 3           | 15.97               | 15.98 | 15.89 | 13.10          | 12.67 | 12.94 | 10.15          | 10.16 | 9.70  | 0.5           |
| 6                    |          | Subtest 4           | 15.97               | 15.87 | 15.88 | 13.19          | 12.65 | 12.91 | 10.15          | 10.16 | 9.66  | 0.5           |
| 6                    | HSUPA    | Subtest 1           | 16.28               | 16.10 | 16.29 | 12.80          | 12.20 | 12.63 | 11.01          | 11.10 | 10.13 | 0             |
| 6                    |          | Subtest 2           | 14.97               | 15.10 | 15.04 | 12.00          | 11.53 | 11.80 | 8.89           | 9.00  | 8.67  | 2             |
| 6                    |          | Subtest 3           | 14.88               | 14.65 | 14.70 | 12.88          | 12.33 | 12.58 | 8.51           | 8.56  | 8.50  | 1             |
| 6                    |          | Subtest 4           | 15.61               | 15.62 | 15.66 | 12.66          | 12.08 | 12.41 | 9.60           | 9.75  | 9.36  | 2             |
| 6                    | DC-HSDPA | Subtest 1           | 16.70               | 16.73 | 16.71 | 13.50          | 13.28 | 13.40 | 11.19          | 11.18 | 10.82 | 0             |
| 8                    |          | Subtest 2           | 16.72               | 16.71 | 16.68 | 13.50          | 12.93 | 13.35 | 11.50          | 11.28 | 11.27 | 0             |
| 8                    |          | Subtest 3           | 16.76               | 16.74 | 16.65 | 13.47          | 12.89 | 13.33 | 11.36          | 11.20 | 11.00 | 0             |
| 8                    |          | Subtest 4           | 15.93               | 16.01 | 15.72 | 12.99          | 12.40 | 12.81 | 10.44          | 10.25 | 9.80  | 0.5           |
| 8                    |          |                     | 15.90               | 16.00 | 15.92 | 12.99          | 12.39 | 12.82 | 10.41          | 10.24 | 9.78  | 0.5           |

#### 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
- The DUT supports UE category 24 for HSDPA

It is expected by the manufacturer that MPR for some HSPA subtests may be up to 2 dB more than specified by 3GPP, but also as low as 0 dB according to the chipset implementation in this model.



**Figure 8-1**  
**Power Measurement Setup**

|                                          |                                                                                                                                   |                                     |                                                                                       |                                        |
|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| FCC ID: A3LSMT357T                       |  <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>OY1505280998.A3L | <b>Test Dates:</b><br>06/02/15 - 06/04/15                                                                                         | <b>DUT Type:</b><br>Portable Tablet | Page 18 of 54                                                                         |                                        |

## 8.2 LTE Conducted Powers

### 8.2.1 LTE Band 12

**Table 8-3**  
**LTE Band 12 Conducted Powers - 10 MHz Bandwidth**  
**Maximum Power**

|     | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
|-----|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|---------------------------|----------|
| Mid | 707.5           | 23095   | 10              | QPSK       | 1       | 0         | 23.68                 | 0                         | 0        |
|     | 707.5           | 23095   | 10              | QPSK       | 1       | 25        | 23.66                 | 0                         | 0        |
|     | 707.5           | 23095   | 10              | QPSK       | 1       | 49        | 23.50                 | 0                         | 0        |
|     | 707.5           | 23095   | 10              | QPSK       | 25      | 0         | 22.51                 | 0-1                       | 1        |
|     | 707.5           | 23095   | 10              | QPSK       | 25      | 12        | 22.37                 | 0-1                       | 1        |
|     | 707.5           | 23095   | 10              | QPSK       | 25      | 25        | 22.39                 | 0-1                       | 1        |
|     | 707.5           | 23095   | 10              | QPSK       | 50      | 0         | 22.46                 | 0-1                       | 1        |
|     | 707.5           | 23095   | 10              | 16QAM      | 1       | 0         | 22.64                 | 0-1                       | 1        |
|     | 707.5           | 23095   | 10              | 16QAM      | 1       | 25        | 22.58                 | 0-1                       | 1        |
|     | 707.5           | 23095   | 10              | 16QAM      | 1       | 49        | 22.56                 | 0-1                       | 1        |
|     | 707.5           | 23095   | 10              | 16QAM      | 25      | 0         | 21.43                 | 0-2                       | 2        |
|     | 707.5           | 23095   | 10              | 16QAM      | 25      | 12        | 21.38                 | 0-2                       | 2        |
|     | 707.5           | 23095   | 10              | 16QAM      | 25      | 25        | 21.27                 | 0-2                       | 2        |
|     | 707.5           | 23095   | 10              | 16QAM      | 50      | 0         | 21.39                 | 0-2                       | 2        |

Note: LTE Band 12 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 8-4**  
**LTE Band 12 Conducted Powers - 5 MHz Bandwidth**  
**Maximum Power**

|     | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
|-----|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|---------------------------|----------|
| Low | 701.5           | 23035   | 5               | QPSK       | 1       | 0         | 23.66                 | 0                         | 0        |
|     | 701.5           | 23035   | 5               | QPSK       | 1       | 12        | 23.72                 | 0                         | 0        |
|     | 701.5           | 23035   | 5               | QPSK       | 1       | 24        | 23.80                 | 0                         | 0        |
|     | 701.5           | 23035   | 5               | QPSK       | 12      | 0         | 22.46                 | 0-1                       | 1        |
|     | 701.5           | 23035   | 5               | QPSK       | 12      | 6         | 22.44                 | 0-1                       | 1        |
|     | 701.5           | 23035   | 5               | QPSK       | 12      | 13        | 22.52                 | 0-1                       | 1        |
|     | 701.5           | 23035   | 5               | QPSK       | 25      | 0         | 22.41                 | 0-1                       | 1        |
|     | 701.5           | 23035   | 5               | 16-QAM     | 1       | 0         | 22.78                 | 0-1                       | 1        |
|     | 701.5           | 23035   | 5               | 16-QAM     | 1       | 12        | 22.81                 | 0-1                       | 1        |
|     | 701.5           | 23035   | 5               | 16-QAM     | 1       | 24        | 22.84                 | 0-1                       | 1        |
|     | 701.5           | 23035   | 5               | 16-QAM     | 12      | 0         | 21.40                 | 0-2                       | 2        |
|     | 701.5           | 23035   | 5               | 16-QAM     | 12      | 6         | 21.39                 | 0-2                       | 2        |
|     | 701.5           | 23035   | 5               | 16-QAM     | 12      | 13        | 21.42                 | 0-2                       | 2        |
|     | 701.5           | 23035   | 5               | 16-QAM     | 25      | 0         | 21.43                 | 0-2                       | 2        |

|     |       |       |   |        |    |    |       |     |   |
|-----|-------|-------|---|--------|----|----|-------|-----|---|
| Mid | 707.5 | 23095 | 5 | QPSK   | 1  | 0  | 23.67 | 0   | 0 |
|     | 707.5 | 23095 | 5 | QPSK   | 1  | 12 | 23.54 | 0   | 0 |
|     | 707.5 | 23095 | 5 | QPSK   | 1  | 24 | 23.32 | 0   | 0 |
|     | 707.5 | 23095 | 5 | QPSK   | 12 | 0  | 22.45 | 0-1 | 1 |
|     | 707.5 | 23095 | 5 | QPSK   | 12 | 6  | 22.41 | 0-1 | 1 |
|     | 707.5 | 23095 | 5 | QPSK   | 12 | 13 | 22.47 | 0-1 | 1 |
|     | 707.5 | 23095 | 5 | QPSK   | 25 | 0  | 22.41 | 0-1 | 1 |
|     | 707.5 | 23095 | 5 | 16-QAM | 1  | 0  | 22.53 | 0-1 | 1 |
|     | 707.5 | 23095 | 5 | 16-QAM | 1  | 12 | 22.52 | 0-1 | 1 |
|     | 707.5 | 23095 | 5 | 16-QAM | 1  | 24 | 22.46 | 0-1 | 1 |
|     | 707.5 | 23095 | 5 | 16-QAM | 12 | 0  | 21.37 | 0-2 | 2 |
|     | 707.5 | 23095 | 5 | 16-QAM | 12 | 6  | 21.32 | 0-2 | 2 |
|     | 707.5 | 23095 | 5 | 16-QAM | 12 | 13 | 21.31 | 0-2 | 2 |
|     | 707.5 | 23095 | 5 | 16-QAM | 25 | 0  | 21.34 | 0-2 | 2 |

|      |       |       |   |        |    |    |       |     |   |
|------|-------|-------|---|--------|----|----|-------|-----|---|
| High | 713.5 | 23155 | 5 | QPSK   | 1  | 0  | 23.55 | 0   | 0 |
|      | 713.5 | 23155 | 5 | QPSK   | 1  | 12 | 23.38 | 0   | 0 |
|      | 713.5 | 23155 | 5 | QPSK   | 1  | 24 | 23.71 | 0   | 0 |
|      | 713.5 | 23155 | 5 | QPSK   | 12 | 0  | 22.44 | 0-1 | 1 |
|      | 713.5 | 23155 | 5 | QPSK   | 12 | 6  | 22.51 | 0-1 | 1 |
|      | 713.5 | 23155 | 5 | QPSK   | 12 | 13 | 22.50 | 0-1 | 1 |
|      | 713.5 | 23155 | 5 | QPSK   | 25 | 0  | 22.53 | 0-1 | 1 |
|      | 713.5 | 23155 | 5 | 16-QAM | 1  | 0  | 22.52 | 0-1 | 1 |
|      | 713.5 | 23155 | 5 | 16-QAM | 1  | 12 | 22.66 | 0-1 | 1 |
|      | 713.5 | 23155 | 5 | 16-QAM | 1  | 24 | 22.63 | 0-1 | 1 |
|      | 713.5 | 23155 | 5 | 16-QAM | 12 | 0  | 21.43 | 0-2 | 2 |
|      | 713.5 | 23155 | 5 | 16-QAM | 12 | 6  | 21.41 | 0-2 | 2 |
|      | 713.5 | 23155 | 5 | 16-QAM | 12 | 13 | 21.38 | 0-2 | 2 |
|      | 713.5 | 23155 | 5 | 16-QAM | 25 | 0  | 21.42 | 0-2 | 2 |

|                                   |                                                                                     |                              |                                                                                       |                                 |
|-----------------------------------|-------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMT357T                |  | SAR EVALUATION REPORT        |  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>OY1505280998.A3L | Test Dates:<br>06/02/15 - 06/04/15                                                  | DUT Type:<br>Portable Tablet |                                                                                       | Page 19 of 54                   |

**Table 8-5**  
**LTE Band 12 Conducted Powers - 10 MHz Bandwidth**  
**Reduced Power – Body at 0.0 cm**

|     | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
|-----|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|---------------------------|----------|
| Mid | 707.5           | 23095   | 10              | QPSK       | 1       | 0         | 19.72                 | 0                         | 0        |
|     | 707.5           | 23095   | 10              | QPSK       | 1       | 25        | 19.86                 | 0                         | 0        |
|     | 707.5           | 23095   | 10              | QPSK       | 1       | 49        | 19.68                 | 0                         | 0        |
|     | 707.5           | 23095   | 10              | QPSK       | 25      | 0         | 18.67                 | 0-1                       | 1        |
|     | 707.5           | 23095   | 10              | QPSK       | 25      | 12        | 18.63                 | 0-1                       | 1        |
|     | 707.5           | 23095   | 10              | QPSK       | 25      | 25        | 18.53                 | 0-1                       | 1        |
|     | 707.5           | 23095   | 10              | QPSK       | 50      | 0         | 18.63                 | 0-1                       | 1        |
|     | 707.5           | 23095   | 10              | 16QAM      | 1       | 0         | 18.53                 | 0-1                       | 1        |
|     | 707.5           | 23095   | 10              | 16QAM      | 1       | 25        | 18.90                 | 0-1                       | 1        |
|     | 707.5           | 23095   | 10              | 16QAM      | 1       | 49        | 18.50                 | 0-1                       | 1        |
|     | 707.5           | 23095   | 10              | 16QAM      | 25      | 0         | 17.77                 | 0-2                       | 2        |
|     | 707.5           | 23095   | 10              | 16QAM      | 25      | 12        | 17.82                 | 0-2                       | 2        |
|     | 707.5           | 23095   | 10              | 16QAM      | 25      | 25        | 17.64                 | 0-2                       | 2        |
|     | 707.5           | 23095   | 10              | 16QAM      | 50      | 0         | 17.77                 | 0-2                       | 2        |

Note: LTE Band 12 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 8-6**  
**LTE Band 12 Conducted Powers - 5 MHz Bandwidth**  
**Reduced Power – Body at 0.0 cm**

|      | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
|------|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|---------------------------|----------|
| Low  | 701.5           | 23035   | 5               | QPSK       | 1       | 0         | 19.80                 | 0                         | 0        |
|      | 701.5           | 23035   | 5               | QPSK       | 1       | 12        | 20.00                 | 0                         | 0        |
|      | 701.5           | 23035   | 5               | QPSK       | 1       | 24        | 19.83                 | 0                         | 0        |
|      | 701.5           | 23035   | 5               | QPSK       | 12      | 0         | 18.66                 | 0-1                       | 1        |
|      | 701.5           | 23035   | 5               | QPSK       | 12      | 6         | 18.60                 | 0-1                       | 1        |
|      | 701.5           | 23035   | 5               | QPSK       | 12      | 13        | 18.72                 | 0-1                       | 1        |
|      | 701.5           | 23035   | 5               | QPSK       | 25      | 0         | 18.64                 | 0-1                       | 1        |
|      | 701.5           | 23035   | 5               | 16-QAM     | 1       | 0         | 18.79                 | 0-1                       | 1        |
|      | 701.5           | 23035   | 5               | 16-QAM     | 1       | 12        | 18.91                 | 0-1                       | 1        |
|      | 701.5           | 23035   | 5               | 16-QAM     | 1       | 24        | 18.75                 | 0-1                       | 1        |
|      | 701.5           | 23035   | 5               | 16-QAM     | 12      | 0         | 17.56                 | 0-2                       | 2        |
|      | 701.5           | 23035   | 5               | 16-QAM     | 12      | 6         | 17.58                 | 0-2                       | 2        |
|      | 701.5           | 23035   | 5               | 16-QAM     | 12      | 13        | 17.58                 | 0-2                       | 2        |
|      | 701.5           | 23035   | 5               | 16-QAM     | 25      | 0         | 17.68                 | 0-2                       | 2        |
| Mid  | 707.5           | 23095   | 5               | QPSK       | 1       | 0         | 19.77                 | 0                         | 0        |
|      | 707.5           | 23095   | 5               | QPSK       | 1       | 12        | 19.41                 | 0                         | 0        |
|      | 707.5           | 23095   | 5               | QPSK       | 1       | 24        | 19.65                 | 0                         | 0        |
|      | 707.5           | 23095   | 5               | QPSK       | 12      | 0         | 18.83                 | 0-1                       | 1        |
|      | 707.5           | 23095   | 5               | QPSK       | 12      | 6         | 18.55                 | 0-1                       | 1        |
|      | 707.5           | 23095   | 5               | QPSK       | 12      | 13        | 18.61                 | 0-1                       | 1        |
|      | 707.5           | 23095   | 5               | QPSK       | 25      | 0         | 18.63                 | 0-1                       | 1        |
|      | 707.5           | 23095   | 5               | 16-QAM     | 1       | 0         | 18.30                 | 0-1                       | 1        |
|      | 707.5           | 23095   | 5               | 16-QAM     | 1       | 12        | 18.27                 | 0-1                       | 1        |
|      | 707.5           | 23095   | 5               | 16-QAM     | 1       | 24        | 18.31                 | 0-1                       | 1        |
|      | 707.5           | 23095   | 5               | 16-QAM     | 12      | 0         | 17.64                 | 0-2                       | 2        |
|      | 707.5           | 23095   | 5               | 16-QAM     | 12      | 6         | 17.49                 | 0-2                       | 2        |
|      | 707.5           | 23095   | 5               | 16-QAM     | 12      | 13        | 17.45                 | 0-2                       | 2        |
|      | 707.5           | 23095   | 5               | 16-QAM     | 25      | 0         | 17.92                 | 0-2                       | 2        |
| High | 713.5           | 23155   | 5               | QPSK       | 1       | 0         | 19.57                 | 0                         | 0        |
|      | 713.5           | 23155   | 5               | QPSK       | 1       | 12        | 19.84                 | 0                         | 0        |
|      | 713.5           | 23155   | 5               | QPSK       | 1       | 24        | 19.73                 | 0                         | 0        |
|      | 713.5           | 23155   | 5               | QPSK       | 12      | 0         | 18.68                 | 0-1                       | 1        |
|      | 713.5           | 23155   | 5               | QPSK       | 12      | 6         | 18.73                 | 0-1                       | 1        |
|      | 713.5           | 23155   | 5               | QPSK       | 12      | 13        | 18.72                 | 0-1                       | 1        |
|      | 713.5           | 23155   | 5               | QPSK       | 25      | 0         | 18.73                 | 0-1                       | 1        |
|      | 713.5           | 23155   | 5               | 16-QAM     | 1       | 0         | 18.43                 | 0-1                       | 1        |
|      | 713.5           | 23155   | 5               | 16-QAM     | 1       | 12        | 19.00                 | 0-1                       | 1        |
|      | 713.5           | 23155   | 5               | 16-QAM     | 1       | 24        | 18.41                 | 0-1                       | 1        |
|      | 713.5           | 23155   | 5               | 16-QAM     | 12      | 0         | 17.68                 | 0-2                       | 2        |
|      | 713.5           | 23155   | 5               | 16-QAM     | 12      | 6         | 17.55                 | 0-2                       | 2        |
|      | 713.5           | 23155   | 5               | 16-QAM     | 12      | 13        | 17.73                 | 0-2                       | 2        |
|      | 713.5           | 23155   | 5               | 16-QAM     | 25      | 0         | 17.80                 | 0-2                       | 2        |

|                                   |                                                                                     |                              |                                                                                       |                                 |
|-----------------------------------|-------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMT357T                |  | SAR EVALUATION REPORT        |  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>OY1505280998.A3L | Test Dates:<br>06/02/15 - 06/04/15                                                  | DUT Type:<br>Portable Tablet | Page 20 of 54                                                                         |                                 |

## 8.2.2 LTE Band 4 (AWS)

**Table 8-7**  
**LTE Band 4 (AWS) Conducted Powers - 20 MHz Bandwidth**  
**Maximum Power**

|     | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
|-----|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|---------------------------|----------|
| Mid | 1732.5          | 20175   | 20              | QPSK       | 1       | 0         | 23.71                 | 0                         | 0        |
|     | 1732.5          | 20175   | 20              | QPSK       | 1       | 50        | 23.52                 | 0                         | 0        |
|     | 1732.5          | 20175   | 20              | QPSK       | 1       | 99        | 23.50                 | 0                         | 0        |
|     | 1732.5          | 20175   | 20              | QPSK       | 50      | 0         | 22.75                 | 0-1                       | 1        |
|     | 1732.5          | 20175   | 20              | QPSK       | 50      | 25        | 22.66                 | 0-1                       | 1        |
|     | 1732.5          | 20175   | 20              | QPSK       | 50      | 50        | 22.48                 | 0-1                       | 1        |
|     | 1732.5          | 20175   | 20              | QPSK       | 100     | 0         | 22.53                 | 0-1                       | 1        |
|     | 1732.5          | 20175   | 20              | 16QAM      | 1       | 0         | 22.68                 | 0-1                       | 1        |
|     | 1732.5          | 20175   | 20              | 16QAM      | 1       | 50        | 22.32                 | 0-1                       | 1        |
|     | 1732.5          | 20175   | 20              | 16QAM      | 1       | 99        | 22.25                 | 0-1                       | 1        |
|     | 1732.5          | 20175   | 20              | 16QAM      | 50      | 0         | 21.81                 | 0-2                       | 2        |
|     | 1732.5          | 20175   | 20              | 16QAM      | 50      | 25        | 21.48                 | 0-2                       | 2        |
|     | 1732.5          | 20175   | 20              | 16QAM      | 50      | 50        | 21.41                 | 0-2                       | 2        |
|     | 1732.5          | 20175   | 20              | 16QAM      | 100     | 0         | 21.65                 | 0-2                       | 2        |

Note: LTE Band 4 (AWS) at 20 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 8-8**  
**LTE Band 4 (AWS) Conducted Powers - 15 MHz Bandwidth**  
**Maximum Power**

|      | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
|------|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|---------------------------|----------|
| Low  | 1717.5          | 20025   | 15              | QPSK       | 1       | 0         | 24.00                 | 0                         | 0        |
|      | 1717.5          | 20025   | 15              | QPSK       | 1       | 36        | 23.79                 | 0                         | 0        |
|      | 1717.5          | 20025   | 15              | QPSK       | 1       | 74        | 23.78                 | 0                         | 0        |
|      | 1717.5          | 20025   | 15              | QPSK       | 36      | 0         | 22.70                 | 0-1                       | 1        |
|      | 1717.5          | 20025   | 15              | QPSK       | 36      | 18        | 22.68                 | 0-1                       | 1        |
|      | 1717.5          | 20025   | 15              | QPSK       | 36      | 37        | 22.76                 | 0-1                       | 1        |
|      | 1717.5          | 20025   | 15              | QPSK       | 75      | 0         | 22.75                 | 0-1                       | 1        |
|      | 1717.5          | 20025   | 15              | 16QAM      | 1       | 0         | 23.00                 | 0-1                       | 1        |
|      | 1717.5          | 20025   | 15              | 16QAM      | 1       | 36        | 22.34                 | 0-1                       | 1        |
|      | 1717.5          | 20025   | 15              | 16QAM      | 1       | 74        | 22.53                 | 0-1                       | 1        |
|      | 1717.5          | 20025   | 15              | 16QAM      | 36      | 0         | 21.65                 | 0-2                       | 2        |
|      | 1717.5          | 20025   | 15              | 16QAM      | 36      | 18        | 21.64                 | 0-2                       | 2        |
|      | 1717.5          | 20025   | 15              | 16QAM      | 36      | 37        | 21.65                 | 0-2                       | 2        |
|      | 1717.5          | 20025   | 15              | 16QAM      | 75      | 0         | 21.72                 | 0-2                       | 2        |
|      | 1732.5          | 20175   | 15              | QPSK       | 1       | 0         | 23.82                 | 0                         | 0        |
| Mid  | 1732.5          | 20175   | 15              | QPSK       | 1       | 36        | 23.89                 | 0                         | 0        |
|      | 1732.5          | 20175   | 15              | QPSK       | 1       | 74        | 23.90                 | 0                         | 0        |
|      | 1732.5          | 20175   | 15              | QPSK       | 36      | 0         | 22.78                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 15              | QPSK       | 36      | 18        | 22.67                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 15              | QPSK       | 36      | 37        | 22.63                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 15              | QPSK       | 75      | 0         | 22.73                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 15              | 16QAM      | 1       | 0         | 22.75                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 15              | 16QAM      | 1       | 36        | 22.20                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 15              | 16QAM      | 1       | 74        | 22.75                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 15              | 16QAM      | 36      | 0         | 21.73                 | 0-2                       | 2        |
|      | 1732.5          | 20175   | 15              | 16QAM      | 36      | 18        | 21.63                 | 0-2                       | 2        |
|      | 1732.5          | 20175   | 15              | 16QAM      | 36      | 37        | 21.70                 | 0-2                       | 2        |
|      | 1732.5          | 20175   | 15              | 16QAM      | 75      | 0         | 21.73                 | 0-2                       | 2        |
| High | 1747.5          | 20325   | 15              | QPSK       | 1       | 0         | 23.83                 | 0                         | 0        |
|      | 1747.5          | 20325   | 15              | QPSK       | 1       | 36        | 23.85                 | 0                         | 0        |
|      | 1747.5          | 20325   | 15              | QPSK       | 1       | 74        | 23.89                 | 0                         | 0        |
|      | 1747.5          | 20325   | 15              | QPSK       | 36      | 0         | 22.74                 | 0-1                       | 1        |
|      | 1747.5          | 20325   | 15              | QPSK       | 36      | 18        | 22.78                 | 0-1                       | 1        |
|      | 1747.5          | 20325   | 15              | QPSK       | 36      | 37        | 22.84                 | 0-1                       | 1        |
|      | 1747.5          | 20325   | 15              | QPSK       | 75      | 0         | 22.74                 | 0-1                       | 1        |
|      | 1747.5          | 20325   | 15              | 16QAM      | 1       | 0         | 22.99                 | 0-1                       | 1        |
|      | 1747.5          | 20325   | 15              | 16QAM      | 1       | 36        | 22.88                 | 0-1                       | 1        |
|      | 1747.5          | 20325   | 15              | 16QAM      | 1       | 74        | 22.91                 | 0-1                       | 1        |
|      | 1747.5          | 20325   | 15              | 16QAM      | 36      | 0         | 21.75                 | 0-2                       | 2        |
|      | 1747.5          | 20325   | 15              | 16QAM      | 36      | 18        | 21.65                 | 0-2                       | 2        |
|      | 1747.5          | 20325   | 15              | 16QAM      | 36      | 37        | 21.72                 | 0-2                       | 2        |
|      | 1747.5          | 20325   | 15              | 16QAM      | 75      | 0         | 21.75                 | 0-2                       | 2        |

|                                   |                                                                                                                                                                                                        |                                 |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMT357T                |  <b>SAR EVALUATION REPORT</b>  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>OY1505280998.A3L | Test Dates:<br>06/02/15 - 06/04/15                                                                                                                                                                     | DUT Type:<br>Portable Tablet    |
| Page 21 of 54                     |                                                                                                                                                                                                        |                                 |

**Table 8-9**  
**LTE Band 4 (AWS) Conducted Powers - 10 MHz Bandwidth**  
**Maximum Power**

|      | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
|------|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|---------------------------|----------|
| Low  | 1715            | 20000   | 10              | QPSK       | 1       | 0         | 24.00                 | 0                         | 0        |
|      | 1715            | 20000   | 10              | QPSK       | 1       | 25        | 23.81                 | 0                         | 0        |
|      | 1715            | 20000   | 10              | QPSK       | 1       | 49        | 23.92                 | 0                         | 0        |
|      | 1715            | 20000   | 10              | QPSK       | 25      | 0         | 22.76                 | 0-1                       | 1        |
|      | 1715            | 20000   | 10              | QPSK       | 25      | 12        | 22.75                 | 0-1                       | 1        |
|      | 1715            | 20000   | 10              | QPSK       | 25      | 25        | 22.76                 | 0-1                       | 1        |
|      | 1715            | 20000   | 10              | QPSK       | 50      | 0         | 22.67                 | 0-1                       | 1        |
|      | 1715            | 20000   | 10              | 16QAM      | 1       | 0         | 23.00                 | 0-1                       | 1        |
|      | 1715            | 20000   | 10              | 16QAM      | 1       | 25        | 22.15                 | 0-1                       | 1        |
|      | 1715            | 20000   | 10              | 16QAM      | 1       | 49        | 22.48                 | 0-1                       | 1        |
|      | 1715            | 20000   | 10              | 16QAM      | 25      | 0         | 21.84                 | 0-2                       | 2        |
|      | 1715            | 20000   | 10              | 16QAM      | 25      | 12        | 21.83                 | 0-2                       | 2        |
|      | 1715            | 20000   | 10              | 16QAM      | 25      | 25        | 21.61                 | 0-2                       | 2        |
|      | 1715            | 20000   | 10              | 16QAM      | 50      | 0         | 21.65                 | 0-2                       | 2        |
| Mid  | 1732.5          | 20175   | 10              | QPSK       | 1       | 0         | 23.93                 | 0                         | 0        |
|      | 1732.5          | 20175   | 10              | QPSK       | 1       | 25        | 23.88                 | 0                         | 0        |
|      | 1732.5          | 20175   | 10              | QPSK       | 1       | 49        | 24.00                 | 0                         | 0        |
|      | 1732.5          | 20175   | 10              | QPSK       | 25      | 0         | 22.85                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 10              | QPSK       | 25      | 12        | 22.78                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 10              | QPSK       | 25      | 25        | 22.68                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 10              | QPSK       | 50      | 0         | 22.78                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 10              | 16QAM      | 1       | 0         | 22.88                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 10              | 16QAM      | 1       | 25        | 22.86                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 10              | 16QAM      | 1       | 49        | 22.82                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 10              | 16QAM      | 25      | 0         | 21.75                 | 0-2                       | 2        |
|      | 1732.5          | 20175   | 10              | 16QAM      | 25      | 12        | 21.82                 | 0-2                       | 2        |
|      | 1732.5          | 20175   | 10              | 16QAM      | 25      | 25        | 21.67                 | 0-2                       | 2        |
|      | 1732.5          | 20175   | 10              | 16QAM      | 50      | 0         | 21.70                 | 0-2                       | 2        |
| High | 1750            | 20350   | 10              | QPSK       | 1       | 0         | 23.97                 | 0                         | 0        |
|      | 1750            | 20350   | 10              | QPSK       | 1       | 25        | 23.84                 | 0                         | 0        |
|      | 1750            | 20350   | 10              | QPSK       | 1       | 49        | 23.89                 | 0                         | 0        |
|      | 1750            | 20350   | 10              | QPSK       | 25      | 0         | 22.82                 | 0-1                       | 1        |
|      | 1750            | 20350   | 10              | QPSK       | 25      | 12        | 22.79                 | 0-1                       | 1        |
|      | 1750            | 20350   | 10              | QPSK       | 25      | 25        | 22.74                 | 0-1                       | 1        |
|      | 1750            | 20350   | 10              | QPSK       | 50      | 0         | 22.83                 | 0-1                       | 1        |
|      | 1750            | 20350   | 10              | 16QAM      | 1       | 0         | 22.98                 | 0-1                       | 1        |
|      | 1750            | 20350   | 10              | 16QAM      | 1       | 25        | 23.00                 | 0-1                       | 1        |
|      | 1750            | 20350   | 10              | 16QAM      | 1       | 49        | 22.95                 | 0-1                       | 1        |
|      | 1750            | 20350   | 10              | 16QAM      | 25      | 0         | 21.75                 | 0-2                       | 2        |
|      | 1750            | 20350   | 10              | 16QAM      | 25      | 12        | 21.79                 | 0-2                       | 2        |
|      | 1750            | 20350   | 10              | 16QAM      | 25      | 25        | 21.75                 | 0-2                       | 2        |
|      | 1750            | 20350   | 10              | 16QAM      | 50      | 0         | 21.84                 | 0-2                       | 2        |

**Table 8-10**  
**LTE Band 4 (AWS) Conducted Powers - 5 MHz Bandwidth**  
**Maximum Power**

|      | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
|------|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|---------------------------|----------|
| Low  | 1712.5          | 19975   | 5               | QPSK       | 1       | 0         | 23.91                 | 0                         | 0        |
|      | 1712.5          | 19975   | 5               | QPSK       | 1       | 12        | 23.67                 | 0                         | 0        |
|      | 1712.5          | 19975   | 5               | QPSK       | 1       | 24        | 23.59                 | 0                         | 0        |
|      | 1712.5          | 19975   | 5               | QPSK       | 12      | 0         | 22.66                 | 0-1                       | 1        |
|      | 1712.5          | 19975   | 5               | QPSK       | 12      | 6         | 22.72                 | 0-1                       | 1        |
|      | 1712.5          | 19975   | 5               | QPSK       | 12      | 13        | 22.64                 | 0-1                       | 1        |
|      | 1712.5          | 19975   | 5               | QPSK       | 25      | 0         | 22.70                 | 0-1                       | 1        |
|      | 1712.5          | 19975   | 5               | 16-QAM     | 1       | 0         | 22.83                 | 0-1                       | 1        |
|      | 1712.5          | 19975   | 5               | 16-QAM     | 1       | 12        | 23.00                 | 0-1                       | 1        |
|      | 1712.5          | 19975   | 5               | 16-QAM     | 1       | 24        | 22.85                 | 0-1                       | 1        |
|      | 1712.5          | 19975   | 5               | 16-QAM     | 12      | 0         | 21.40                 | 0-2                       | 2        |
|      | 1712.5          | 19975   | 5               | 16-QAM     | 12      | 6         | 21.43                 | 0-2                       | 2        |
|      | 1712.5          | 19975   | 5               | 16-QAM     | 12      | 13        | 21.56                 | 0-2                       | 2        |
|      | 1712.5          | 19975   | 5               | 16-QAM     | 25      | 0         | 21.52                 | 0-2                       | 2        |
| Mid  | 1732.5          | 20175   | 5               | QPSK       | 1       | 0         | 23.39                 | 0                         | 0        |
|      | 1732.5          | 20175   | 5               | QPSK       | 1       | 12        | 23.81                 | 0                         | 0        |
|      | 1732.5          | 20175   | 5               | QPSK       | 1       | 24        | 23.64                 | 0                         | 0        |
|      | 1732.5          | 20175   | 5               | QPSK       | 12      | 0         | 22.74                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 5               | QPSK       | 12      | 6         | 22.73                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 5               | QPSK       | 12      | 13        | 22.63                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 5               | QPSK       | 25      | 0         | 22.78                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 5               | 16-QAM     | 1       | 0         | 22.70                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 5               | 16-QAM     | 1       | 12        | 22.34                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 5               | 16-QAM     | 1       | 24        | 22.54                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 5               | 16-QAM     | 12      | 0         | 21.94                 | 0-2                       | 2        |
|      | 1732.5          | 20175   | 5               | 16-QAM     | 12      | 6         | 21.92                 | 0-2                       | 2        |
|      | 1732.5          | 20175   | 5               | 16-QAM     | 12      | 13        | 21.83                 | 0-2                       | 2        |
|      | 1732.5          | 20175   | 5               | 16-QAM     | 25      | 0         | 21.78                 | 0-2                       | 2        |
| High | 1752.5          | 20375   | 5               | QPSK       | 1       | 0         | 23.71                 | 0                         | 0        |
|      | 1752.5          | 20375   | 5               | QPSK       | 1       | 12        | 24.00                 | 0                         | 0        |
|      | 1752.5          | 20375   | 5               | QPSK       | 1       | 24        | 23.81                 | 0                         | 0        |
|      | 1752.5          | 20375   | 5               | QPSK       | 12      | 0         | 22.89                 | 0-1                       | 1        |
|      | 1752.5          | 20375   | 5               | QPSK       | 12      | 6         | 22.72                 | 0-1                       | 1        |
|      | 1752.5          | 20375   | 5               | QPSK       | 12      | 13        | 22.80                 | 0-1                       | 1        |
|      | 1752.5          | 20375   | 5               | QPSK       | 25      | 0         | 22.76                 | 0-1                       | 1        |
|      | 1752.5          | 20375   | 5               | 16-QAM     | 1       | 0         | 22.95                 | 0-1                       | 1        |
|      | 1752.5          | 20375   | 5               | 16-QAM     | 1       | 12        | 22.93                 | 0-1                       | 1        |
|      | 1752.5          | 20375   | 5               | 16-QAM     | 1       | 24        | 22.70                 | 0-1                       | 1        |
|      | 1752.5          | 20375   | 5               | 16-QAM     | 12      | 0         | 21.75                 | 0-2                       | 2        |
|      | 1752.5          | 20375   | 5               | 16-QAM     | 12      | 6         | 21.69                 | 0-2                       | 2        |
|      | 1752.5          | 20375   | 5               | 16-QAM     | 12      | 13        | 21.63                 | 0-2                       | 2        |
|      | 1752.5          | 20375   | 5               | 16-QAM     | 25      | 0         | 21.70                 | 0-2                       | 2        |

|                                   |                                                                                                                                                                                                        |                                 |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMT357T                |  <b>SAR EVALUATION REPORT</b>  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>OY1505280998.A3L | Test Dates:<br>06/02/15 - 06/04/15                                                                                                                                                                     | DUT Type:<br>Portable Tablet    |
| Page 22 of 54                     |                                                                                                                                                                                                        |                                 |

**Table 8-11**  
**LTE Band 4 (AWS) Conducted Powers - 3 MHz Bandwidth**  
**Maximum Power**

|      | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
|------|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|---------------------------|----------|
| Low  | 1711.5          | 19965   | 3               | QPSK       | 1       | 0         | 23.81                 | 0                         | 0        |
|      | 1711.5          | 19965   | 3               | QPSK       | 1       | 7         | 23.74                 | 0                         | 0        |
|      | 1711.5          | 19965   | 3               | QPSK       | 1       | 14        | 23.69                 | 0                         | 0        |
|      | 1711.5          | 19965   | 3               | QPSK       | 8       | 0         | 22.73                 | 0-1                       | 1        |
|      | 1711.5          | 19965   | 3               | QPSK       | 8       | 4         | 22.68                 | 0-1                       | 1        |
|      | 1711.5          | 19965   | 3               | QPSK       | 8       | 7         | 22.66                 | 0-1                       | 1        |
|      | 1711.5          | 19965   | 3               | QPSK       | 15      | 0         | 22.61                 | 0-1                       | 1        |
|      | 1711.5          | 19965   | 3               | 16-QAM     | 1       | 0         | 22.45                 | 0-1                       | 1        |
|      | 1711.5          | 19965   | 3               | 16-QAM     | 1       | 7         | 22.50                 | 0-1                       | 1        |
|      | 1711.5          | 19965   | 3               | 16-QAM     | 1       | 14        | 22.40                 | 0-1                       | 1        |
|      | 1711.5          | 19965   | 3               | 16-QAM     | 8       | 0         | 21.75                 | 0-2                       | 2        |
|      | 1711.5          | 19965   | 3               | 16-QAM     | 8       | 4         | 21.81                 | 0-2                       | 2        |
|      | 1711.5          | 19965   | 3               | 16-QAM     | 8       | 7         | 21.69                 | 0-2                       | 2        |
|      | 1711.5          | 19965   | 3               | 16-QAM     | 15      | 0         | 21.64                 | 0-2                       | 2        |
| Mid  | 1732.5          | 20175   | 3               | QPSK       | 1       | 0         | 23.88                 | 0                         | 0        |
|      | 1732.5          | 20175   | 3               | QPSK       | 1       | 7         | 23.84                 | 0                         | 0        |
|      | 1732.5          | 20175   | 3               | QPSK       | 1       | 14        | 23.77                 | 0                         | 0        |
|      | 1732.5          | 20175   | 3               | QPSK       | 8       | 0         | 22.75                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 3               | QPSK       | 8       | 4         | 22.77                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 3               | QPSK       | 8       | 7         | 22.68                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 3               | QPSK       | 15      | 0         | 22.76                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 3               | 16-QAM     | 1       | 0         | 22.71                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 3               | 16-QAM     | 1       | 7         | 22.63                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 3               | 16-QAM     | 1       | 14        | 22.64                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 3               | 16-QAM     | 8       | 0         | 21.58                 | 0-2                       | 2        |
|      | 1732.5          | 20175   | 3               | 16-QAM     | 8       | 4         | 21.73                 | 0-2                       | 2        |
|      | 1732.5          | 20175   | 3               | 16-QAM     | 8       | 7         | 21.64                 | 0-2                       | 2        |
|      | 1732.5          | 20175   | 3               | 16-QAM     | 15      | 0         | 21.69                 | 0-2                       | 2        |
| High | 1753.5          | 20385   | 3               | QPSK       | 1       | 0         | 23.93                 | 0                         | 0        |
|      | 1753.5          | 20385   | 3               | QPSK       | 1       | 7         | 23.91                 | 0                         | 0        |
|      | 1753.5          | 20385   | 3               | QPSK       | 1       | 14        | 23.88                 | 0                         | 0        |
|      | 1753.5          | 20385   | 3               | QPSK       | 8       | 0         | 22.77                 | 0-1                       | 1        |
|      | 1753.5          | 20385   | 3               | QPSK       | 8       | 4         | 22.78                 | 0-1                       | 1        |
|      | 1753.5          | 20385   | 3               | QPSK       | 8       | 7         | 22.71                 | 0-1                       | 1        |
|      | 1753.5          | 20385   | 3               | QPSK       | 15      | 0         | 22.82                 | 0-1                       | 1        |
|      | 1753.5          | 20385   | 3               | 16-QAM     | 1       | 0         | 22.98                 | 0-1                       | 1        |
|      | 1753.5          | 20385   | 3               | 16-QAM     | 1       | 7         | 23.00                 | 0-1                       | 1        |
|      | 1753.5          | 20385   | 3               | 16-QAM     | 1       | 14        | 22.96                 | 0-1                       | 1        |
|      | 1753.5          | 20385   | 3               | 16-QAM     | 8       | 0         | 21.87                 | 0-2                       | 2        |
|      | 1753.5          | 20385   | 3               | 16-QAM     | 8       | 4         | 21.77                 | 0-2                       | 2        |
|      | 1753.5          | 20385   | 3               | 16-QAM     | 8       | 7         | 21.72                 | 0-2                       | 2        |
|      | 1753.5          | 20385   | 3               | 16-QAM     | 15      | 0         | 21.36                 | 0-2                       | 2        |

**Table 8-12**  
**LTE Band 4 (AWS) Conducted Powers - 1.4 MHz Bandwidth**  
**Maximum Power**

|      | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
|------|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|---------------------------|----------|
| Low  | 1710.7          | 19957   | 1.4             | QPSK       | 1       | 0         | 23.99                 | 0                         | 0        |
|      | 1710.7          | 19957   | 1.4             | QPSK       | 1       | 2         | 24.00                 | 0                         | 0        |
|      | 1710.7          | 19957   | 1.4             | QPSK       | 1       | 5         | 23.96                 | 0                         | 0        |
|      | 1710.7          | 19957   | 1.4             | QPSK       | 3       | 0         | 23.87                 | 0                         | 0        |
|      | 1710.7          | 19957   | 1.4             | QPSK       | 3       | 2         | 23.74                 | 0                         | 0        |
|      | 1710.7          | 19957   | 1.4             | QPSK       | 3       | 3         | 23.81                 | 0                         | 0        |
|      | 1710.7          | 19957   | 1.4             | QPSK       | 6       | 0         | 22.72                 | 0-1                       | 1        |
|      | 1710.7          | 19957   | 1.4             | 16-QAM     | 1       | 0         | 22.11                 | 0-1                       | 1        |
|      | 1710.7          | 19957   | 1.4             | 16-QAM     | 1       | 2         | 22.23                 | 0-1                       | 1        |
|      | 1710.7          | 19957   | 1.4             | 16-QAM     | 1       | 5         | 22.10                 | 0-1                       | 1        |
|      | 1710.7          | 19957   | 1.4             | 16-QAM     | 3       | 0         | 22.37                 | 0-1                       | 1        |
|      | 1710.7          | 19957   | 1.4             | 16-QAM     | 3       | 2         | 22.48                 | 0-1                       | 1        |
|      | 1710.7          | 19957   | 1.4             | 16-QAM     | 3       | 3         | 22.56                 | 0-1                       | 1        |
|      | 1710.7          | 19957   | 1.4             | 16-QAM     | 6       | 0         | 21.60                 | 0-2                       | 2        |
| Mid  | 1732.5          | 20175   | 1.4             | QPSK       | 1       | 0         | 24.00                 | 0                         | 0        |
|      | 1732.5          | 20175   | 1.4             | QPSK       | 1       | 2         | 23.96                 | 0                         | 0        |
|      | 1732.5          | 20175   | 1.4             | QPSK       | 1       | 5         | 23.99                 | 0                         | 0        |
|      | 1732.5          | 20175   | 1.4             | QPSK       | 3       | 0         | 23.68                 | 0                         | 0        |
|      | 1732.5          | 20175   | 1.4             | QPSK       | 3       | 2         | 23.84                 | 0                         | 0        |
|      | 1732.5          | 20175   | 1.4             | QPSK       | 3       | 3         | 23.67                 | 0                         | 0        |
|      | 1732.5          | 20175   | 1.4             | QPSK       | 6       | 0         | 22.73                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 1.4             | 16-QAM     | 1       | 0         | 22.90                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 1.4             | 16-QAM     | 1       | 2         | 22.92                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 1.4             | 16-QAM     | 1       | 5         | 22.73                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 1.4             | 16-QAM     | 3       | 0         | 22.85                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 1.4             | 16-QAM     | 3       | 2         | 22.79                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 1.4             | 16-QAM     | 3       | 3         | 22.63                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 1.4             | 16-QAM     | 6       | 0         | 21.97                 | 0-2                       | 2        |
| High | 1754.3          | 20393   | 1.4             | QPSK       | 1       | 0         | 23.85                 | 0                         | 0        |
|      | 1754.3          | 20393   | 1.4             | QPSK       | 1       | 2         | 23.91                 | 0                         | 0        |
|      | 1754.3          | 20393   | 1.4             | QPSK       | 1       | 5         | 23.99                 | 0                         | 0        |
|      | 1754.3          | 20393   | 1.4             | QPSK       | 3       | 0         | 23.76                 | 0                         | 0        |
|      | 1754.3          | 20393   | 1.4             | QPSK       | 3       | 2         | 23.75                 | 0                         | 0        |
|      | 1754.3          | 20393   | 1.4             | QPSK       | 3       | 3         | 23.80                 | 0                         | 0        |
|      | 1754.3          | 20393   | 1.4             | QPSK       | 6       | 0         | 22.78                 | 0-1                       | 1        |
|      | 1754.3          | 20393   | 1.4             | 16-QAM     | 1       | 0         | 22.90                 | 0-1                       | 1        |
|      | 1754.3          | 20393   | 1.4             | 16-QAM     | 1       | 2         | 23.00                 | 0-1                       | 1        |
|      | 1754.3          | 20393   | 1.4             | 16-QAM     | 1       | 5         | 22.95                 | 0-1                       | 1        |
|      | 1754.3          | 20393   | 1.4             | 16-QAM     | 3       | 0         | 22.96                 | 0-1                       | 1        |
|      | 1754.3          | 20393   | 1.4             | 16-QAM     | 3       | 2         | 22.84                 | 0-1                       | 1        |
|      | 1754.3          | 20393   | 1.4             | 16-QAM     | 3       | 3         | 22.85                 | 0-1                       | 1        |
|      | 1754.3          | 20393   | 1.4             | 16-QAM     | 6       | 0         | 22.00                 | 0-2                       | 2        |

|                                   |                                                                                                                                                                                                        |                                 |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMT357T                |  <b>SAR EVALUATION REPORT</b>  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>OY1505280998.A3L | Test Dates:<br>06/02/15 - 06/04/15                                                                                                                                                                     | DUT Type:<br>Portable Tablet    |
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**Table 8-13**  
**LTE Band 4 (AWS) Conducted Powers - 20 MHz Bandwidth**  
**Reduced Power – Body at 0.0 cm**

|     | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
|-----|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|---------------------------|----------|
| Mid | 1732.5          | 20175   | 20              | QPSK       | 1       | 0         | 13.60                 | 0                         | 0        |
|     | 1732.5          | 20175   | 20              | QPSK       | 1       | 50        | 13.15                 | 0                         | 0        |
|     | 1732.5          | 20175   | 20              | QPSK       | 1       | 99        | 13.32                 | 0                         | 0        |
|     | 1732.5          | 20175   | 20              | QPSK       | 50      | 0         | 12.03                 | 0-1                       | 1        |
|     | 1732.5          | 20175   | 20              | QPSK       | 50      | 25        | 11.87                 | 0-1                       | 1        |
|     | 1732.5          | 20175   | 20              | QPSK       | 50      | 50        | 11.80                 | 0-1                       | 1        |
|     | 1732.5          | 20175   | 20              | QPSK       | 100     | 0         | 11.87                 | 0-1                       | 1        |
|     | 1732.5          | 20175   | 20              | 16QAM      | 1       | 0         | 12.60                 | 0-1                       | 1        |
|     | 1732.5          | 20175   | 20              | 16QAM      | 1       | 50        | 12.41                 | 0-1                       | 1        |
|     | 1732.5          | 20175   | 20              | 16QAM      | 1       | 99        | 12.64                 | 0-1                       | 1        |
|     | 1732.5          | 20175   | 20              | 16QAM      | 50      | 0         | 11.34                 | 0-2                       | 2        |
|     | 1732.5          | 20175   | 20              | 16QAM      | 50      | 25        | 11.04                 | 0-2                       | 2        |
|     | 1732.5          | 20175   | 20              | 16QAM      | 50      | 50        | 11.05                 | 0-2                       | 2        |
|     | 1732.5          | 20175   | 20              | 16QAM      | 100     | 0         | 10.96                 | 0-2                       | 2        |

Note: LTE Band 4 (AWS) at 20 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 8-14**  
**LTE Band 4 (AWS) Conducted Powers - 15 MHz Bandwidth**  
**Reduced Power – Body at 0.0 cm**

|      | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
|------|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|---------------------------|----------|
| Low  | 1717.5          | 20025   | 15              | QPSK       | 1       | 0         | 13.50                 | 0                         | 0        |
|      | 1717.5          | 20025   | 15              | QPSK       | 1       | 36        | 12.79                 | 0                         | 0        |
|      | 1717.5          | 20025   | 15              | QPSK       | 1       | 74        | 13.20                 | 0                         | 0        |
|      | 1717.5          | 20025   | 15              | QPSK       | 36      | 0         | 11.77                 | 0-1                       | 1        |
|      | 1717.5          | 20025   | 15              | QPSK       | 36      | 18        | 11.79                 | 0-1                       | 1        |
|      | 1717.5          | 20025   | 15              | QPSK       | 36      | 37        | 11.74                 | 0-1                       | 1        |
|      | 1717.5          | 20025   | 15              | QPSK       | 75      | 0         | 11.76                 | 0-1                       | 1        |
|      | 1717.5          | 20025   | 15              | 16QAM      | 1       | 0         | 12.49                 | 0-1                       | 1        |
|      | 1717.5          | 20025   | 15              | 16QAM      | 1       | 36        | 11.70                 | 0-1                       | 1        |
|      | 1717.5          | 20025   | 15              | 16QAM      | 1       | 74        | 12.25                 | 0-1                       | 1        |
|      | 1717.5          | 20025   | 15              | 16QAM      | 36      | 0         | 10.82                 | 0-2                       | 2        |
|      | 1717.5          | 20025   | 15              | 16QAM      | 36      | 18        | 10.79                 | 0-2                       | 2        |
|      | 1717.5          | 20025   | 15              | 16QAM      | 36      | 37        | 10.76                 | 0-2                       | 2        |
|      | 1717.5          | 20025   | 15              | 16QAM      | 75      | 0         | 10.80                 | 0-2                       | 2        |
| Mid  | 1732.5          | 20175   | 15              | QPSK       | 1       | 0         | 13.32                 | 0                         | 0        |
|      | 1732.5          | 20175   | 15              | QPSK       | 1       | 36        | 13.24                 | 0                         | 0        |
|      | 1732.5          | 20175   | 15              | QPSK       | 1       | 74        | 13.04                 | 0                         | 0        |
|      | 1732.5          | 20175   | 15              | QPSK       | 36      | 0         | 11.90                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 15              | QPSK       | 36      | 18        | 11.93                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 15              | QPSK       | 36      | 37        | 11.82                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 15              | QPSK       | 75      | 0         | 11.85                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 15              | 16QAM      | 1       | 0         | 12.29                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 15              | 16QAM      | 1       | 36        | 12.08                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 15              | 16QAM      | 1       | 74        | 11.88                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 15              | 16QAM      | 36      | 0         | 10.87                 | 0-2                       | 2        |
|      | 1732.5          | 20175   | 15              | 16QAM      | 36      | 18        | 10.94                 | 0-2                       | 2        |
|      | 1732.5          | 20175   | 15              | 16QAM      | 36      | 37        | 10.82                 | 0-2                       | 2        |
|      | 1732.5          | 20175   | 15              | 16QAM      | 75      | 0         | 10.83                 | 0-2                       | 2        |
| High | 1747.5          | 20325   | 15              | QPSK       | 1       | 0         | 13.50                 | 0                         | 0        |
|      | 1747.5          | 20325   | 15              | QPSK       | 1       | 36        | 12.73                 | 0                         | 0        |
|      | 1747.5          | 20325   | 15              | QPSK       | 1       | 74        | 13.35                 | 0                         | 0        |
|      | 1747.5          | 20325   | 15              | QPSK       | 36      | 0         | 11.90                 | 0-1                       | 1        |
|      | 1747.5          | 20325   | 15              | QPSK       | 36      | 18        | 11.74                 | 0-1                       | 1        |
|      | 1747.5          | 20325   | 15              | QPSK       | 36      | 37        | 11.89                 | 0-1                       | 1        |
|      | 1747.5          | 20325   | 15              | QPSK       | 75      | 0         | 11.90                 | 0-1                       | 1        |
|      | 1747.5          | 20325   | 15              | 16QAM      | 1       | 0         | 12.47                 | 0-1                       | 1        |
|      | 1747.5          | 20325   | 15              | 16QAM      | 1       | 36        | 11.77                 | 0-1                       | 1        |
|      | 1747.5          | 20325   | 15              | 16QAM      | 1       | 74        | 12.37                 | 0-1                       | 1        |
|      | 1747.5          | 20325   | 15              | 16QAM      | 36      | 0         | 10.86                 | 0-2                       | 2        |
|      | 1747.5          | 20325   | 15              | 16QAM      | 36      | 18        | 10.78                 | 0-2                       | 2        |
|      | 1747.5          | 20325   | 15              | 16QAM      | 36      | 37        | 10.99                 | 0-2                       | 2        |
|      | 1747.5          | 20325   | 15              | 16QAM      | 75      | 0         | 10.74                 | 0-2                       | 2        |

|                                   |                                                                                     |                              |                                                                                       |                                 |
|-----------------------------------|-------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMT357T                |  | SAR EVALUATION REPORT        |  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>OY1505280998.A3L | Test Dates:<br>06/02/15 - 06/04/15                                                  | DUT Type:<br>Portable Tablet | Page 24 of 54                                                                         |                                 |

**Table 8-15**  
**LTE Band 4 (AWS) Conducted Powers - 10 MHz Bandwidth**  
**Reduced Power – Body at 0.0 cm**

|      | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
|------|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|---------------------------|----------|
| Low  | 1715            | 20000   | 10              | QPSK       | 1       | 0         | 13.29                 | 0                         | 0        |
|      | 1715            | 20000   | 10              | QPSK       | 1       | 25        | 12.74                 | 0                         | 0        |
|      | 1715            | 20000   | 10              | QPSK       | 1       | 49        | 13.18                 | 0                         | 0        |
|      | 1715            | 20000   | 10              | QPSK       | 25      | 0         | 11.80                 | 0-1                       | 1        |
|      | 1715            | 20000   | 10              | QPSK       | 25      | 12        | 11.72                 | 0-1                       | 1        |
|      | 1715            | 20000   | 10              | QPSK       | 25      | 25        | 11.74                 | 0-1                       | 1        |
|      | 1715            | 20000   | 10              | QPSK       | 50      | 0         | 11.72                 | 0-1                       | 1        |
|      | 1715            | 20000   | 10              | 16QAM      | 1       | 0         | 12.39                 | 0-1                       | 1        |
|      | 1715            | 20000   | 10              | 16QAM      | 1       | 25        | 11.77                 | 0-1                       | 1        |
|      | 1715            | 20000   | 10              | 16QAM      | 1       | 49        | 12.31                 | 0-1                       | 1        |
|      | 1715            | 20000   | 10              | 16QAM      | 25      | 0         | 10.82                 | 0-2                       | 2        |
|      | 1715            | 20000   | 10              | 16QAM      | 25      | 12        | 10.79                 | 0-2                       | 2        |
|      | 1715            | 20000   | 10              | 16QAM      | 25      | 25        | 10.80                 | 0-2                       | 2        |
|      | 1715            | 20000   | 10              | 16QAM      | 50      | 0         | 10.76                 | 0-2                       | 2        |
|      | 1732.5          | 20175   | 10              | QPSK       | 1       | 0         | 13.00                 | 0                         | 0        |
| Mid  | 1732.5          | 20175   | 10              | QPSK       | 1       | 25        | 13.00                 | 0                         | 0        |
|      | 1732.5          | 20175   | 10              | QPSK       | 1       | 49        | 12.81                 | 0                         | 0        |
|      | 1732.5          | 20175   | 10              | QPSK       | 25      | 0         | 11.83                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 10              | QPSK       | 25      | 12        | 11.90                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 10              | QPSK       | 25      | 25        | 11.91                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 10              | QPSK       | 50      | 0         | 11.77                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 10              | 16QAM      | 1       | 0         | 12.24                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 10              | 16QAM      | 1       | 25        | 12.26                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 10              | 16QAM      | 1       | 49        | 11.89                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 10              | 16QAM      | 25      | 0         | 10.85                 | 0-2                       | 2        |
|      | 1732.5          | 20175   | 10              | 16QAM      | 25      | 12        | 10.92                 | 0-2                       | 2        |
|      | 1732.5          | 20175   | 10              | 16QAM      | 25      | 25        | 10.88                 | 0-2                       | 2        |
|      | 1732.5          | 20175   | 10              | 16QAM      | 50      | 0         | 10.83                 | 0-2                       | 2        |
|      | 1750            | 20350   | 10              | QPSK       | 1       | 0         | 13.16                 | 0                         | 0        |
|      | 1750            | 20350   | 10              | QPSK       | 1       | 25        | 12.70                 | 0                         | 0        |
| High | 1750            | 20350   | 10              | QPSK       | 1       | 49        | 12.96                 | 0                         | 0        |
|      | 1750            | 20350   | 10              | QPSK       | 25      | 0         | 11.79                 | 0-1                       | 1        |
|      | 1750            | 20350   | 10              | QPSK       | 25      | 12        | 11.86                 | 0-1                       | 1        |
|      | 1750            | 20350   | 10              | QPSK       | 25      | 25        | 12.03                 | 0-1                       | 1        |
|      | 1750            | 20350   | 10              | QPSK       | 50      | 0         | 11.76                 | 0-1                       | 1        |
|      | 1750            | 20350   | 10              | 16QAM      | 1       | 0         | 12.38                 | 0-1                       | 1        |
|      | 1750            | 20350   | 10              | 16QAM      | 1       | 25        | 11.72                 | 0-1                       | 1        |
|      | 1750            | 20350   | 10              | 16QAM      | 1       | 49        | 12.27                 | 0-1                       | 1        |
|      | 1750            | 20350   | 10              | 16QAM      | 25      | 0         | 10.76                 | 0-2                       | 2        |
|      | 1750            | 20350   | 10              | 16QAM      | 25      | 12        | 10.83                 | 0-2                       | 2        |
|      | 1750            | 20350   | 10              | 16QAM      | 25      | 25        | 11.06                 | 0-2                       | 2        |
|      | 1750            | 20350   | 10              | 16QAM      | 50      | 0         | 10.72                 | 0-2                       | 2        |

**Table 8-16**  
**LTE Band 4 (AWS) Conducted Powers - 5 MHz Bandwidth**  
**Reduced Power – Body at 0.0 cm**

|      | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
|------|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|---------------------------|----------|
| Low  | 1712.5          | 19975   | 5               | QPSK       | 1       | 0         | 12.91                 | 0                         | 0        |
|      | 1712.5          | 19975   | 5               | QPSK       | 1       | 12        | 12.70                 | 0                         | 0        |
|      | 1712.5          | 19975   | 5               | QPSK       | 1       | 24        | 12.84                 | 0                         | 0        |
|      | 1712.5          | 19975   | 5               | QPSK       | 12      | 0         | 11.79                 | 0-1                       | 1        |
|      | 1712.5          | 19975   | 5               | QPSK       | 12      | 6         | 11.72                 | 0-1                       | 1        |
|      | 1712.5          | 19975   | 5               | QPSK       | 12      | 13        | 11.70                 | 0-1                       | 1        |
|      | 1712.5          | 19975   | 5               | QPSK       | 25      | 0         | 11.74                 | 0-1                       | 1        |
|      | 1712.5          | 19975   | 5               | 16-QAM     | 1       | 0         | 12.27                 | 0-1                       | 1        |
|      | 1712.5          | 19975   | 5               | 16-QAM     | 1       | 12        | 11.73                 | 0-1                       | 1        |
|      | 1712.5          | 19975   | 5               | 16-QAM     | 1       | 24        | 12.16                 | 0-1                       | 1        |
|      | 1712.5          | 19975   | 5               | 16-QAM     | 12      | 0         | 10.83                 | 0-2                       | 2        |
|      | 1712.5          | 19975   | 5               | 16-QAM     | 12      | 6         | 10.74                 | 0-2                       | 2        |
|      | 1712.5          | 19975   | 5               | 16-QAM     | 12      | 13        | 10.72                 | 0-2                       | 2        |
|      | 1712.5          | 19975   | 5               | 16-QAM     | 25      | 0         | 10.72                 | 0-2                       | 2        |
|      | 1732.5          | 20175   | 5               | QPSK       | 1       | 0         | 13.00                 | 0                         | 0        |
| Mid  | 1732.5          | 20175   | 5               | QPSK       | 1       | 12        | 13.08                 | 0                         | 0        |
|      | 1732.5          | 20175   | 5               | QPSK       | 1       | 24        | 12.99                 | 0                         | 0        |
|      | 1732.5          | 20175   | 5               | QPSK       | 12      | 0         | 11.73                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 5               | QPSK       | 12      | 6         | 11.83                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 5               | QPSK       | 12      | 13        | 11.90                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 5               | QPSK       | 25      | 0         | 11.81                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 5               | 16-QAM     | 1       | 0         | 12.01                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 5               | 16-QAM     | 1       | 12        | 12.32                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 5               | 16-QAM     | 1       | 24        | 12.02                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 5               | 16-QAM     | 12      | 0         | 10.79                 | 0-2                       | 2        |
|      | 1732.5          | 20175   | 5               | 16-QAM     | 12      | 6         | 10.92                 | 0-2                       | 2        |
|      | 1732.5          | 20175   | 5               | 16-QAM     | 12      | 13        | 11.01                 | 0-2                       | 2        |
|      | 1732.5          | 20175   | 5               | 16-QAM     | 25      | 0         | 10.90                 | 0-2                       | 2        |
|      | 1752.5          | 20375   | 5               | QPSK       | 1       | 0         | 13.07                 | 0                         | 0        |
|      | 1752.5          | 20375   | 5               | QPSK       | 1       | 12        | 12.73                 | 0                         | 0        |
| High | 1752.5          | 20375   | 5               | QPSK       | 1       | 24        | 13.23                 | 0                         | 0        |
|      | 1752.5          | 20375   | 5               | QPSK       | 12      | 0         | 11.73                 | 0-1                       | 1        |
|      | 1752.5          | 20375   | 5               | QPSK       | 12      | 6         | 11.93                 | 0-1                       | 1        |
|      | 1752.5          | 20375   | 5               | QPSK       | 12      | 13        | 11.80                 | 0-1                       | 1        |
|      | 1752.5          | 20375   | 5               | QPSK       | 25      | 0         | 11.82                 | 0-1                       | 1        |
|      | 1752.5          | 20375   | 5               | 16-QAM     | 1       | 0         | 11.84                 | 0-1                       | 1        |
|      | 1752.5          | 20375   | 5               | 16-QAM     | 1       | 12        | 12.38                 | 0-1                       | 1        |
|      | 1752.5          | 20375   | 5               | 16-QAM     | 1       | 24        | 12.11                 | 0-1                       | 1        |
|      | 1752.5          | 20375   | 5               | 16-QAM     | 12      | 0         | 10.74                 | 0-2                       | 2        |
|      | 1752.5          | 20375   | 5               | 16-QAM     | 12      | 6         | 10.98                 | 0-2                       | 2        |
|      | 1752.5          | 20375   | 5               | 16-QAM     | 12      | 13        | 10.78                 | 0-2                       | 2        |
|      | 1752.5          | 20375   | 5               | 16-QAM     | 25      | 0         | 10.84                 | 0-2                       | 2        |

**Table 8-17**  
**LTE Band 4 (AWS) Conducted Powers - 3 MHz Bandwidth**  
**Reduced Power – Body at 0.0 cm**

|      | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
|------|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|---------------------------|----------|
| Low  | 1711.5          | 19965   | 3               | QPSK       | 1       | 0         | 12.92                 | 0                         | 0        |
|      | 1711.5          | 19965   | 3               | QPSK       | 1       | 7         | 12.86                 | 0                         | 0        |
|      | 1711.5          | 19965   | 3               | QPSK       | 1       | 14        | 12.89                 | 0                         | 0        |
|      | 1711.5          | 19965   | 3               | QPSK       | 8       | 0         | 11.83                 | 0-1                       | 1        |
|      | 1711.5          | 19965   | 3               | QPSK       | 8       | 4         | 11.80                 | 0-1                       | 1        |
|      | 1711.5          | 19965   | 3               | QPSK       | 8       | 7         | 11.79                 | 0-1                       | 1        |
|      | 1711.5          | 19965   | 3               | QPSK       | 15      | 0         | 11.80                 | 0-1                       | 1        |
|      | 1711.5          | 19965   | 3               | 16-QAM     | 1       | 0         | 12.17                 | 0-1                       | 1        |
|      | 1711.5          | 19965   | 3               | 16-QAM     | 1       | 7         | 12.24                 | 0-1                       | 1        |
|      | 1711.5          | 19965   | 3               | 16-QAM     | 1       | 14        | 11.92                 | 0-1                       | 1        |
|      | 1711.5          | 19965   | 3               | 16-QAM     | 8       | 0         | 10.87                 | 0-2                       | 2        |
|      | 1711.5          | 19965   | 3               | 16-QAM     | 8       | 4         | 10.87                 | 0-2                       | 2        |
|      | 1711.5          | 19965   | 3               | 16-QAM     | 8       | 7         | 10.83                 | 0-2                       | 2        |
|      | 1711.5          | 19965   | 3               | 16-QAM     | 15      | 0         | 10.84                 | 0-2                       | 2        |
|      | 1732.5          | 20175   | 3               | QPSK       | 1       | 0         | 12.84                 | 0                         | 0        |
| Mid  | 1732.5          | 20175   | 3               | QPSK       | 1       | 7         | 12.93                 | 0                         | 0        |
|      | 1732.5          | 20175   | 3               | QPSK       | 1       | 14        | 13.09                 | 0                         | 0        |
|      | 1732.5          | 20175   | 3               | QPSK       | 8       | 0         | 11.90                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 3               | QPSK       | 8       | 4         | 11.88                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 3               | QPSK       | 8       | 7         | 11.88                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 3               | QPSK       | 15      | 0         | 11.84                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 3               | 16-QAM     | 1       | 0         | 12.09                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 3               | 16-QAM     | 1       | 7         | 12.29                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 3               | 16-QAM     | 1       | 14        | 12.23                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 3               | 16-QAM     | 8       | 0         | 10.90                 | 0-2                       | 2        |
|      | 1732.5          | 20175   | 3               | 16-QAM     | 8       | 4         | 10.89                 | 0-2                       | 2        |
|      | 1732.5          | 20175   | 3               | 16-QAM     | 8       | 7         | 10.89                 | 0-2                       | 2        |
|      | 1732.5          | 20175   | 3               | 16-QAM     | 15      | 0         | 10.90                 | 0-2                       | 2        |
|      | 1753.5          | 20385   | 3               | QPSK       | 1       | 0         | 13.00                 | 0                         | 0        |
|      | 1753.5          | 20385   | 3               | QPSK       | 1       | 7         | 12.90                 | 0                         | 0        |
| High | 1753.5          | 20385   | 3               | QPSK       | 1       | 14        | 13.04                 | 0                         | 0        |
|      | 1753.5          | 20385   | 3               | QPSK       | 8       | 0         | 11.94                 | 0-1                       | 1        |
|      | 1753.5          | 20385   | 3               | QPSK       | 8       | 4         | 11.85                 | 0-1                       | 1        |
|      | 1753.5          | 20385   | 3               | QPSK       | 8       | 7         | 11.83                 | 0-1                       | 1        |
|      | 1753.5          | 20385   | 3               | QPSK       | 15      | 0         | 11.82                 | 0-1                       | 1        |
|      | 1753.5          | 20385   | 3               | 16-QAM     | 1       | 0         | 12.24                 | 0-1                       | 1        |
|      | 1753.5          | 20385   | 3               | 16-QAM     | 1       | 7         | 12.29                 | 0-1                       | 1        |
|      | 1753.5          | 20385   | 3               | 16-QAM     | 1       | 14        | 12.15                 | 0-1                       | 1        |
|      | 1753.5          | 20385   | 3               | 16-QAM     | 8       | 0         | 10.94                 | 0-2                       | 2        |
|      | 1753.5          | 20385   | 3               | 16-QAM     | 8       | 4         | 10.84                 | 0-2                       | 2        |
|      | 1753.5          | 20385   | 3               | 16-QAM     | 8       | 7         | 10.82                 | 0-2                       | 2        |
|      | 1753.5          | 20385   | 3               | 16-QAM     | 15      | 0         | 10.84                 | 0-2                       | 2        |

**Table 8-18**  
**LTE Band 4 (AWS) Conducted Powers – 1.4 MHz Bandwidth**  
**Reduced Power – Body at 0.0 cm**

|      | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
|------|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|---------------------------|----------|
| Low  | 1710.7          | 19957   | 1.4             | QPSK       | 1       | 0         | 13.12                 | 0                         | 0        |
|      | 1710.7          | 19957   | 1.4             | QPSK       | 1       | 2         | 13.33                 | 0                         | 0        |
|      | 1710.7          | 19957   | 1.4             | QPSK       | 1       | 5         | 12.94                 | 0                         | 0        |
|      | 1710.7          | 19957   | 1.4             | QPSK       | 3       | 0         | 12.85                 | 0                         | 0        |
|      | 1710.7          | 19957   | 1.4             | QPSK       | 3       | 2         | 12.88                 | 0                         | 0        |
|      | 1710.7          | 19957   | 1.4             | QPSK       | 3       | 3         | 12.84                 | 0                         | 0        |
|      | 1710.7          | 19957   | 1.4             | QPSK       | 6       | 0         | 11.89                 | 0-1                       | 1        |
|      | 1710.7          | 19957   | 1.4             | 16-QAM     | 1       | 0         | 12.07                 | 0-1                       | 1        |
|      | 1710.7          | 19957   | 1.4             | 16-QAM     | 1       | 2         | 12.29                 | 0-1                       | 1        |
|      | 1710.7          | 19957   | 1.4             | 16-QAM     | 1       | 5         | 12.02                 | 0-1                       | 1        |
|      | 1710.7          | 19957   | 1.4             | 16-QAM     | 3       | 0         | 11.94                 | 0-1                       | 1        |
|      | 1710.7          | 19957   | 1.4             | 16-QAM     | 3       | 2         | 11.92                 | 0-1                       | 1        |
|      | 1710.7          | 19957   | 1.4             | 16-QAM     | 3       | 3         | 11.84                 | 0-1                       | 1        |
|      | 1710.7          | 19957   | 1.4             | 16-QAM     | 6       | 0         | 10.93                 | 0-2                       | 2        |
|      | 1732.5          | 20175   | 1.4             | QPSK       | 1       | 0         | 13.02                 | 0                         | 0        |
| Mid  | 1732.5          | 20175   | 1.4             | QPSK       | 1       | 2         | 13.28                 | 0                         | 0        |
|      | 1732.5          | 20175   | 1.4             | QPSK       | 1       | 5         | 13.09                 | 0                         | 0        |
|      | 1732.5          | 20175   | 1.4             | QPSK       | 3       | 0         | 12.83                 | 0                         | 0        |
|      | 1732.5          | 20175   | 1.4             | QPSK       | 3       | 2         | 12.86                 | 0                         | 0        |
|      | 1732.5          | 20175   | 1.4             | QPSK       | 3       | 3         | 12.90                 | 0                         | 0        |
|      | 1732.5          | 20175   | 1.4             | QPSK       | 6       | 0         | 11.81                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 1.4             | 16-QAM     | 1       | 0         | 12.08                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 1.4             | 16-QAM     | 1       | 2         | 12.24                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 1.4             | 16-QAM     | 1       | 5         | 12.04                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 1.4             | 16-QAM     | 3       | 0         | 11.89                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 1.4             | 16-QAM     | 3       | 2         | 11.92                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 1.4             | 16-QAM     | 3       | 3         | 11.89                 | 0-1                       | 1        |
|      | 1732.5          | 20175   | 1.4             | 16-QAM     | 6       | 0         | 10.92                 | 0-2                       | 2        |
|      | 1754.3          | 20393   | 1.4             | QPSK       | 1       | 0         | 12.91                 | 0                         | 0        |
|      | 1754.3          | 20393   | 1.4             | QPSK       | 1       | 2         | 12.92                 | 0                         | 0        |
| High | 1754.3          | 20393   | 1.4             | QPSK       | 1       | 5         | 12.91                 | 0                         | 0        |
|      | 1754.3          | 20393   | 1.4             | QPSK       | 3       | 0         | 12.78                 | 0                         | 0        |
|      | 1754.3          | 20393   | 1.4             | QPSK       | 3       | 2         | 12.86                 | 0                         | 0        |
|      | 1754.3          | 20393   | 1.4             | QPSK       | 3       | 3         | 12.82                 | 0                         | 0        |
|      | 1754.3          | 20393   | 1.4             | QPSK       | 6       | 0         | 11.82                 | 0-1                       | 1        |
|      | 1754.3          | 20393   | 1.4             | 16-QAM     | 1       | 0         | 12.05                 | 0-1                       | 1        |
|      | 1754.3          | 20393   | 1.4             | 16-QAM     | 1       | 2         | 12.17                 | 0-1                       | 1        |
|      | 1754.3          | 20393   | 1.4             | 16-QAM     | 1       | 5         | 12.00                 | 0-1                       | 1        |
|      | 1754.3          | 20393   | 1.4             | 16-QAM     | 3       | 0         | 11.90                 | 0-1                       | 1        |
|      | 1754.3          | 20393   | 1.4             | 16-QAM     | 3       | 2         | 11.91                 | 0-1                       | 1        |
|      | 1754.3          | 20393   | 1.4             | 16-QAM     | 3       | 3         | 11.82                 | 0-1                       | 1        |
|      | 1754.3          | 20393   | 1.4             | 16-QAM     | 6       | 0         | 10.82                 | 0-2                       | 2        |

|                                   |                                                                                                                                                                                                        |                                 |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMT357T                |  <b>SAR EVALUATION REPORT</b>  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>OY1505280998.A3L | Test Dates:<br>06/02/15 - 06/04/15                                                                                                                                                                     | DUT Type:<br>Portable Tablet    |
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## 8.2.3 LTE Band 2 (PCS)

**Table 8-19**  
**LTE Band 2 (PCS) Conducted Powers - 20 MHz Bandwidth**  
**Maximum Power**

|      | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
|------|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|---------------------------|----------|
| Low  | 1860            | 18700   | 20              | QPSK       | 1       | 0         | 23.05                 | 0                         | 0        |
|      | 1860            | 18700   | 20              | QPSK       | 1       | 50        | 23.00                 | 0                         | 0        |
|      | 1860            | 18700   | 20              | QPSK       | 1       | 99        | 23.11                 | 0                         | 0        |
|      | 1860            | 18700   | 20              | QPSK       | 50      | 0         | 22.13                 | 0-1                       | 1        |
|      | 1860            | 18700   | 20              | QPSK       | 50      | 25        | 22.00                 | 0-1                       | 1        |
|      | 1860            | 18700   | 20              | QPSK       | 50      | 50        | 22.01                 | 0-1                       | 1        |
|      | 1860            | 18700   | 20              | QPSK       | 100     | 0         | 22.04                 | 0-1                       | 1        |
|      | 1860            | 18700   | 20              | 16QAM      | 1       | 0         | 22.37                 | 0-1                       | 1        |
|      | 1860            | 18700   | 20              | 16QAM      | 1       | 50        | 22.02                 | 0-1                       | 1        |
|      | 1860            | 18700   | 20              | 16QAM      | 1       | 99        | 22.50                 | 0-1                       | 1        |
|      | 1860            | 18700   | 20              | 16QAM      | 50      | 0         | 21.15                 | 0-2                       | 2        |
|      | 1860            | 18700   | 20              | 16QAM      | 50      | 25        | 21.00                 | 0-2                       | 2        |
|      | 1860            | 18700   | 20              | 16QAM      | 50      | 50        | 21.04                 | 0-2                       | 2        |
|      | 1860            | 18700   | 20              | 16QAM      | 100     | 0         | 21.00                 | 0-2                       | 2        |
|      | 1880.0          | 18900   | 20              | QPSK       | 1       | 0         | 23.62                 | 0                         | 0        |
|      | 1880.0          | 18900   | 20              | QPSK       | 1       | 50        | 23.25                 | 0                         | 0        |
|      | 1880.0          | 18900   | 20              | QPSK       | 1       | 99        | 23.25                 | 0                         | 0        |
| Mid  | 1880.0          | 18900   | 20              | QPSK       | 50      | 0         | 22.24                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 20              | QPSK       | 50      | 25        | 22.17                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 20              | QPSK       | 50      | 50        | 22.16                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 20              | QPSK       | 100     | 0         | 22.19                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 20              | 16QAM      | 1       | 0         | 22.48                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 20              | 16QAM      | 1       | 50        | 22.25                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 20              | 16QAM      | 1       | 99        | 22.26                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 20              | 16QAM      | 50      | 0         | 21.38                 | 0-2                       | 2        |
|      | 1880.0          | 18900   | 20              | 16QAM      | 50      | 25        | 21.31                 | 0-2                       | 2        |
|      | 1880.0          | 18900   | 20              | 16QAM      | 50      | 50        | 21.29                 | 0-2                       | 2        |
|      | 1880.0          | 18900   | 20              | 16QAM      | 100     | 0         | 21.27                 | 0-2                       | 2        |
| High | 1900            | 19100   | 20              | QPSK       | 1       | 0         | 23.24                 | 0                         | 0        |
|      | 1900            | 19100   | 20              | QPSK       | 1       | 50        | 23.61                 | 0                         | 0        |
|      | 1900            | 19100   | 20              | QPSK       | 1       | 99        | 23.30                 | 0                         | 0        |
|      | 1900            | 19100   | 20              | QPSK       | 50      | 0         | 22.28                 | 0-1                       | 1        |
|      | 1900            | 19100   | 20              | QPSK       | 50      | 25        | 22.31                 | 0-1                       | 1        |
|      | 1900            | 19100   | 20              | QPSK       | 50      | 50        | 22.28                 | 0-1                       | 1        |
|      | 1900            | 19100   | 20              | QPSK       | 100     | 0         | 22.30                 | 0-1                       | 1        |
|      | 1900            | 19100   | 20              | 16QAM      | 1       | 0         | 22.29                 | 0-1                       | 1        |
|      | 1900            | 19100   | 20              | 16QAM      | 1       | 50        | 22.30                 | 0-1                       | 1        |
|      | 1900            | 19100   | 20              | 16QAM      | 1       | 99        | 22.54                 | 0-1                       | 1        |
|      | 1900            | 19100   | 20              | 16QAM      | 50      | 0         | 21.35                 | 0-2                       | 2        |
|      | 1900            | 19100   | 20              | 16QAM      | 50      | 25        | 21.34                 | 0-2                       | 2        |
|      | 1900            | 19100   | 20              | 16QAM      | 50      | 50        | 21.36                 | 0-2                       | 2        |
|      | 1900            | 19100   | 20              | 16QAM      | 100     | 0         | 21.34                 | 0-2                       | 2        |

**Table 8-20**  
**LTE Band 2 (PCS) Conducted Powers - 15 MHz Bandwidth**  
**Maximum Power**

|      | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
|------|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|---------------------------|----------|
| Low  | 1857.5          | 18675   | 15              | QPSK       | 1       | 0         | 23.70                 | 0                         | 0        |
|      | 1857.5          | 18675   | 15              | QPSK       | 1       | 36        | 23.13                 | 0                         | 0        |
|      | 1857.5          | 18675   | 15              | QPSK       | 1       | 74        | 23.26                 | 0                         | 0        |
|      | 1857.5          | 18675   | 15              | QPSK       | 36      | 0         | 22.43                 | 0-1                       | 1        |
|      | 1857.5          | 18675   | 15              | QPSK       | 36      | 18        | 22.15                 | 0-1                       | 1        |
|      | 1857.5          | 18675   | 15              | QPSK       | 36      | 37        | 22.03                 | 0-1                       | 1        |
|      | 1857.5          | 18675   | 15              | QPSK       | 75      | 0         | 22.08                 | 0-1                       | 1        |
|      | 1857.5          | 18675   | 15              | 16QAM      | 1       | 0         | 22.76                 | 0-1                       | 1        |
|      | 1857.5          | 18675   | 15              | 16QAM      | 1       | 36        | 22.60                 | 0-1                       | 1        |
|      | 1857.5          | 18675   | 15              | 16QAM      | 1       | 74        | 22.49                 | 0-1                       | 1        |
|      | 1857.5          | 18675   | 15              | 16QAM      | 36      | 0         | 21.24                 | 0-2                       | 2        |
|      | 1857.5          | 18675   | 15              | 16QAM      | 36      | 18        | 21.04                 | 0-2                       | 2        |
|      | 1857.5          | 18675   | 15              | 16QAM      | 36      | 37        | 21.09                 | 0-2                       | 2        |
|      | 1857.5          | 18675   | 15              | 16QAM      | 75      | 0         | 21.15                 | 0-2                       | 2        |
| Mid  | 1880.0          | 18900   | 15              | QPSK       | 1       | 0         | 23.86                 | 0                         | 0        |
|      | 1880.0          | 18900   | 15              | QPSK       | 1       | 36        | 23.24                 | 0                         | 0        |
|      | 1880.0          | 18900   | 15              | QPSK       | 1       | 74        | 23.56                 | 0                         | 0        |
|      | 1880.0          | 18900   | 15              | QPSK       | 36      | 0         | 22.37                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 15              | QPSK       | 36      | 18        | 22.31                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 15              | QPSK       | 36      | 37        | 22.36                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 15              | QPSK       | 75      | 0         | 22.25                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 15              | 16QAM      | 1       | 0         | 22.66                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 15              | 16QAM      | 1       | 36        | 22.10                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 15              | 16QAM      | 1       | 74        | 22.37                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 15              | 16QAM      | 36      | 0         | 21.45                 | 0-2                       | 2        |
|      | 1880.0          | 18900   | 15              | 16QAM      | 36      | 18        | 21.20                 | 0-2                       | 2        |
|      | 1880.0          | 18900   | 15              | 16QAM      | 36      | 37        | 21.35                 | 0-2                       | 2        |
|      | 1880.0          | 18900   | 15              | 16QAM      | 75      | 0         | 21.33                 | 0-2                       | 2        |
| High | 1902.5          | 19125   | 15              | QPSK       | 1       | 0         | 23.41                 | 0                         | 0        |
|      | 1902.5          | 19125   | 15              | QPSK       | 1       | 36        | 23.26                 | 0                         | 0        |
|      | 1902.5          | 19125   | 15              | QPSK       | 1       | 74        | 23.50                 | 0                         | 0        |
|      | 1902.5          | 19125   | 15              | QPSK       | 36      | 0         | 22.37                 | 0-1                       | 1        |
|      | 1902.5          | 19125   | 15              | QPSK       | 36      | 18        | 22.35                 | 0-1                       | 1        |
|      | 1902.5          | 19125   | 15              | QPSK       | 36      | 37        | 22.43                 | 0-1                       | 1        |
|      | 1902.5          | 19125   | 15              | QPSK       | 75      | 0         | 22.44                 | 0-1                       | 1        |
|      | 1902.5          | 19125   | 15              | 16QAM      | 1       | 0         | 22.73                 | 0-1                       | 1        |
|      | 1902.5          | 19125   | 15              | 16QAM      | 1       | 36        | 22.70                 | 0-1                       | 1        |
|      | 1902.5          | 19125   | 15              | 16QAM      | 1       | 74        | 22.68                 | 0-1                       | 1        |
|      | 1902.5          | 19125   | 15              | 16QAM      | 36      | 0         | 21.39                 | 0-2                       | 2        |
|      | 1902.5          | 19125   | 15              | 16QAM      | 36      | 18        | 21.37                 | 0-2                       | 2        |
|      | 1902.5          | 19125   | 15              | 16QAM      | 36      | 37        | 21.55                 | 0-2                       | 2        |
|      | 1902.5          | 19125   | 15              | 16QAM      | 75      | 0         | 21.46                 | 0-2                       | 2        |

|                                   |                                                                                                                                                                                                        |                                 |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMT357T                |  <b>SAR EVALUATION REPORT</b>  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>OY1505280998.A3L | Test Dates:<br>06/02/15 - 06/04/15                                                                                                                                                                     | DUT Type:<br>Portable Tablet    |
| Page 27 of 54                     |                                                                                                                                                                                                        |                                 |

**Table 8-21**  
**LTE Band 2 (PCS) Conducted Powers - 10 MHz Bandwidth**  
**Maximum Power**

|      | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
|------|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|---------------------------|----------|
| Low  | 1855            | 18650   | 10              | QPSK       | 1       | 0         | 23.52                 | 0                         | 0        |
|      | 1855            | 18650   | 10              | QPSK       | 1       | 25        | 23.48                 | 0                         | 0        |
|      | 1855            | 18650   | 10              | QPSK       | 1       | 49        | 23.18                 | 0                         | 0        |
|      | 1855            | 18650   | 10              | QPSK       | 25      | 0         | 22.23                 | 0-1                       | 1        |
|      | 1855            | 18650   | 10              | QPSK       | 25      | 12        | 22.14                 | 0-1                       | 1        |
|      | 1855            | 18650   | 10              | QPSK       | 25      | 25        | 22.00                 | 0-1                       | 1        |
|      | 1855            | 18650   | 10              | QPSK       | 50      | 0         | 22.10                 | 0-1                       | 1        |
|      | 1855            | 18650   | 10              | 16QAM      | 1       | 0         | 22.52                 | 0-1                       | 1        |
|      | 1855            | 18650   | 10              | 16QAM      | 1       | 25        | 22.30                 | 0-1                       | 1        |
|      | 1855            | 18650   | 10              | 16QAM      | 1       | 49        | 22.23                 | 0-1                       | 1        |
|      | 1855            | 18650   | 10              | 16QAM      | 25      | 0         | 21.30                 | 0-2                       | 2        |
|      | 1855            | 18650   | 10              | 16QAM      | 25      | 12        | 21.24                 | 0-2                       | 2        |
|      | 1855            | 18650   | 10              | 16QAM      | 25      | 25        | 21.06                 | 0-2                       | 2        |
|      | 1855            | 18650   | 10              | 16QAM      | 50      | 0         | 21.06                 | 0-2                       | 2        |
| Mid  | 1880.0          | 18900   | 10              | QPSK       | 1       | 0         | 23.78                 | 0                         | 0        |
|      | 1880.0          | 18900   | 10              | QPSK       | 1       | 25        | 23.16                 | 0                         | 0        |
|      | 1880.0          | 18900   | 10              | QPSK       | 1       | 49        | 23.66                 | 0                         | 0        |
|      | 1880.0          | 18900   | 10              | QPSK       | 25      | 0         | 22.32                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 10              | QPSK       | 25      | 12        | 22.13                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 10              | QPSK       | 25      | 25        | 22.21                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 10              | QPSK       | 50      | 0         | 22.17                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 10              | 16QAM      | 1       | 0         | 22.52                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 10              | 16QAM      | 1       | 25        | 22.42                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 10              | 16QAM      | 1       | 49        | 22.36                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 10              | 16QAM      | 25      | 0         | 21.23                 | 0-2                       | 2        |
|      | 1880.0          | 18900   | 10              | 16QAM      | 25      | 12        | 21.18                 | 0-2                       | 2        |
|      | 1880.0          | 18900   | 10              | 16QAM      | 25      | 25        | 21.27                 | 0-2                       | 2        |
|      | 1880.0          | 18900   | 10              | 16QAM      | 50      | 0         | 21.27                 | 0-2                       | 2        |
| High | 1905            | 19150   | 10              | QPSK       | 1       | 0         | 23.62                 | 0                         | 0        |
|      | 1905            | 19150   | 10              | QPSK       | 1       | 25        | 23.50                 | 0                         | 0        |
|      | 1905            | 19150   | 10              | QPSK       | 1       | 49        | 23.67                 | 0                         | 0        |
|      | 1905            | 19150   | 10              | QPSK       | 25      | 0         | 22.28                 | 0-1                       | 1        |
|      | 1905            | 19150   | 10              | QPSK       | 25      | 12        | 22.27                 | 0-1                       | 1        |
|      | 1905            | 19150   | 10              | QPSK       | 25      | 25        | 22.19                 | 0-1                       | 1        |
|      | 1905            | 19150   | 10              | QPSK       | 50      | 0         | 22.28                 | 0-1                       | 1        |
|      | 1905            | 19150   | 10              | 16QAM      | 1       | 0         | 22.23                 | 0-1                       | 1        |
|      | 1905            | 19150   | 10              | 16QAM      | 1       | 25        | 21.92                 | 0-1                       | 1        |
|      | 1905            | 19150   | 10              | 16QAM      | 1       | 49        | 22.14                 | 0-1                       | 1        |
|      | 1905            | 19150   | 10              | 16QAM      | 25      | 0         | 21.46                 | 0-2                       | 2        |
|      | 1905            | 19150   | 10              | 16QAM      | 25      | 12        | 21.56                 | 0-2                       | 2        |
|      | 1905            | 19150   | 10              | 16QAM      | 25      | 25        | 21.39                 | 0-2                       | 2        |
|      | 1905            | 19150   | 10              | 16QAM      | 50      | 0         | 21.30                 | 0-2                       | 2        |

**Table 8-22**  
**LTE Band 2 (PCS) Conducted Powers - 5 MHz Bandwidth**  
**Maximum Power**

|      | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
|------|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|---------------------------|----------|
| Low  | 1852.5          | 18625   | 5               | QPSK       | 1       | 0         | 23.43                 | 0                         | 0        |
|      | 1852.5          | 18625   | 5               | QPSK       | 1       | 12        | 22.91                 | 0                         | 0        |
|      | 1852.5          | 18625   | 5               | QPSK       | 1       | 24        | 23.26                 | 0                         | 0        |
|      | 1852.5          | 18625   | 5               | QPSK       | 12      | 0         | 22.18                 | 0-1                       | 1        |
|      | 1852.5          | 18625   | 5               | QPSK       | 12      | 6         | 22.17                 | 0-1                       | 1        |
|      | 1852.5          | 18625   | 5               | QPSK       | 12      | 13        | 21.99                 | 0-1                       | 1        |
|      | 1852.5          | 18625   | 5               | QPSK       | 25      | 0         | 22.09                 | 0-1                       | 1        |
|      | 1852.5          | 18625   | 5               | 16-QAM     | 1       | 0         | 22.09                 | 0-1                       | 1        |
|      | 1852.5          | 18625   | 5               | 16-QAM     | 1       | 12        | 22.29                 | 0-1                       | 1        |
|      | 1852.5          | 18625   | 5               | 16-QAM     | 1       | 24        | 21.99                 | 0-1                       | 1        |
|      | 1852.5          | 18625   | 5               | 16-QAM     | 12      | 0         | 21.15                 | 0-2                       | 2        |
|      | 1852.5          | 18625   | 5               | 16-QAM     | 12      | 6         | 21.02                 | 0-2                       | 2        |
|      | 1852.5          | 18625   | 5               | 16-QAM     | 12      | 13        | 20.96                 | 0-2                       | 2        |
|      | 1852.5          | 18625   | 5               | 16-QAM     | 25      | 0         | 21.21                 | 0-2                       | 2        |
| Mid  | 1880.0          | 18900   | 5               | QPSK       | 1       | 0         | 23.28                 | 0                         | 0        |
|      | 1880.0          | 18900   | 5               | QPSK       | 1       | 12        | 23.35                 | 0                         | 0        |
|      | 1880.0          | 18900   | 5               | QPSK       | 1       | 24        | 23.39                 | 0                         | 0        |
|      | 1880.0          | 18900   | 5               | QPSK       | 12      | 0         | 22.15                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 5               | QPSK       | 12      | 6         | 22.18                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 5               | QPSK       | 12      | 13        | 22.14                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 5               | QPSK       | 25      | 0         | 22.14                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 5               | 16-QAM     | 1       | 0         | 22.32                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 5               | 16-QAM     | 1       | 12        | 22.06                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 5               | 16-QAM     | 1       | 24        | 22.19                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 5               | 16-QAM     | 12      | 0         | 21.14                 | 0-2                       | 2        |
|      | 1880.0          | 18900   | 5               | 16-QAM     | 12      | 6         | 21.10                 | 0-2                       | 2        |
|      | 1880.0          | 18900   | 5               | 16-QAM     | 12      | 13        | 21.11                 | 0-2                       | 2        |
|      | 1880.0          | 18900   | 5               | 16-QAM     | 25      | 0         | 21.15                 | 0-2                       | 2        |
| High | 1907.5          | 19175   | 5               | QPSK       | 1       | 0         | 23.38                 | 0                         | 0        |
|      | 1907.5          | 19175   | 5               | QPSK       | 1       | 12        | 23.42                 | 0                         | 0        |
|      | 1907.5          | 19175   | 5               | QPSK       | 1       | 24        | 23.48                 | 0                         | 0        |
|      | 1907.5          | 19175   | 5               | QPSK       | 12      | 0         | 22.25                 | 0-1                       | 1        |
|      | 1907.5          | 19175   | 5               | QPSK       | 12      | 6         | 22.34                 | 0-1                       | 1        |
|      | 1907.5          | 19175   | 5               | QPSK       | 12      | 13        | 22.31                 | 0-1                       | 1        |
|      | 1907.5          | 19175   | 5               | QPSK       | 25      | 0         | 22.27                 | 0-1                       | 1        |
|      | 1907.5          | 19175   | 5               | 16-QAM     | 1       | 0         | 21.97                 | 0-1                       | 1        |
|      | 1907.5          | 19175   | 5               | 16-QAM     | 1       | 12        | 22.51                 | 0-1                       | 1        |
|      | 1907.5          | 19175   | 5               | 16-QAM     | 1       | 24        | 22.04                 | 0-1                       | 1        |
|      | 1907.5          | 19175   | 5               | 16-QAM     | 12      | 0         | 21.24                 | 0-2                       | 2        |
|      | 1907.5          | 19175   | 5               | 16-QAM     | 12      | 6         | 21.28                 | 0-2                       | 2        |
|      | 1907.5          | 19175   | 5               | 16-QAM     | 12      | 13        | 21.08                 | 0-2                       | 2        |
|      | 1907.5          | 19175   | 5               | 16-QAM     | 25      | 0         | 21.28                 | 0-2                       | 2        |

|                                   |                                                                                     |                              |                                                                                       |                                 |
|-----------------------------------|-------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMT357T                |  | SAR EVALUATION REPORT        |  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>OY1505280998.A3L | Test Dates:<br>06/02/15 - 06/04/15                                                  | DUT Type:<br>Portable Tablet | Page 28 of 54                                                                         |                                 |

**Table 8-23**  
**LTE Band 2 (PCS) Conducted Powers - 3 MHz Bandwidth**  
**Maximum Power**

|      | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
|------|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|---------------------------|----------|
| Low  | 1851.5          | 18615   | 3               | QPSK       | 1       | 0         | 23.30                 | 0                         | 0        |
|      | 1851.5          | 18615   | 3               | QPSK       | 1       | 7         | 23.37                 | 0                         | 0        |
|      | 1851.5          | 18615   | 3               | QPSK       | 1       | 14        | 23.12                 | 0                         | 0        |
|      | 1851.5          | 18615   | 3               | QPSK       | 8       | 0         | 22.21                 | 0-1                       | 1        |
|      | 1851.5          | 18615   | 3               | QPSK       | 8       | 4         | 22.10                 | 0-1                       | 1        |
|      | 1851.5          | 18615   | 3               | QPSK       | 8       | 7         | 22.11                 | 0-1                       | 1        |
|      | 1851.5          | 18615   | 3               | QPSK       | 15      | 0         | 22.13                 | 0-1                       | 1        |
|      | 1851.5          | 18615   | 3               | 16-QAM     | 1       | 0         | 22.40                 | 0-1                       | 1        |
|      | 1851.5          | 18615   | 3               | 16-QAM     | 1       | 7         | 22.33                 | 0-1                       | 1        |
|      | 1851.5          | 18615   | 3               | 16-QAM     | 1       | 14        | 22.41                 | 0-1                       | 1        |
|      | 1851.5          | 18615   | 3               | 16-QAM     | 8       | 0         | 21.05                 | 0-2                       | 2        |
|      | 1851.5          | 18615   | 3               | 16-QAM     | 8       | 4         | 20.95                 | 0-2                       | 2        |
|      | 1851.5          | 18615   | 3               | 16-QAM     | 8       | 7         | 21.37                 | 0-2                       | 2        |
|      | 1851.5          | 18615   | 3               | 16-QAM     | 15      | 0         | 21.30                 | 0-2                       | 2        |
|      | 1880.0          | 18900   | 3               | QPSK       | 1       | 0         | 23.31                 | 0                         | 0        |
| Mid  | 1880.0          | 18900   | 3               | QPSK       | 1       | 7         | 23.47                 | 0                         | 0        |
|      | 1880.0          | 18900   | 3               | QPSK       | 1       | 14        | 23.30                 | 0                         | 0        |
|      | 1880.0          | 18900   | 3               | QPSK       | 8       | 0         | 22.22                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 3               | QPSK       | 8       | 4         | 22.19                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 3               | QPSK       | 8       | 7         | 22.20                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 3               | QPSK       | 15      | 0         | 22.21                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 3               | 16-QAM     | 1       | 0         | 22.46                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 3               | 16-QAM     | 1       | 7         | 22.53                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 3               | 16-QAM     | 1       | 14        | 22.36                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 3               | 16-QAM     | 8       | 0         | 21.27                 | 0-2                       | 2        |
|      | 1880.0          | 18900   | 3               | 16-QAM     | 8       | 4         | 21.31                 | 0-2                       | 2        |
|      | 1880.0          | 18900   | 3               | 16-QAM     | 8       | 7         | 21.31                 | 0-2                       | 2        |
|      | 1880.0          | 18900   | 3               | 16-QAM     | 15      | 0         | 21.01                 | 0-2                       | 2        |
|      | 1908.5          | 19185   | 3               | QPSK       | 1       | 0         | 23.63                 | 0                         | 0        |
|      | 1908.5          | 19185   | 3               | QPSK       | 1       | 7         | 23.64                 | 0                         | 0        |
| High | 1908.5          | 19185   | 3               | QPSK       | 1       | 14        | 23.56                 | 0                         | 0        |
|      | 1908.5          | 19185   | 3               | QPSK       | 8       | 0         | 22.29                 | 0-1                       | 1        |
|      | 1908.5          | 19185   | 3               | QPSK       | 8       | 4         | 22.25                 | 0-1                       | 1        |
|      | 1908.5          | 19185   | 3               | QPSK       | 8       | 7         | 22.29                 | 0-1                       | 1        |
|      | 1908.5          | 19185   | 3               | QPSK       | 15      | 0         | 22.23                 | 0-1                       | 1        |
|      | 1908.5          | 19185   | 3               | 16-QAM     | 1       | 0         | 22.02                 | 0-1                       | 1        |
|      | 1908.5          | 19185   | 3               | 16-QAM     | 1       | 7         | 22.57                 | 0-1                       | 1        |
|      | 1908.5          | 19185   | 3               | 16-QAM     | 1       | 14        | 22.40                 | 0-1                       | 1        |
|      | 1908.5          | 19185   | 3               | 16-QAM     | 8       | 0         | 21.43                 | 0-2                       | 2        |
|      | 1908.5          | 19185   | 3               | 16-QAM     | 8       | 4         | 21.28                 | 0-2                       | 2        |
|      | 1908.5          | 19185   | 3               | 16-QAM     | 8       | 7         | 21.29                 | 0-2                       | 2        |
|      | 1908.5          | 19185   | 3               | 16-QAM     | 15      | 0         | 21.17                 | 0-2                       | 2        |

**Table 8-24**  
**LTE Band 2 (PCS) Conducted Powers -1.4 MHz Bandwidth**  
**Maximum Power**

|      | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
|------|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|---------------------------|----------|
| Low  | 1850.7          | 18607   | 1.4             | QPSK       | 1       | 0         | 23.30                 | 0                         | 0        |
|      | 1850.7          | 18607   | 1.4             | QPSK       | 1       | 2         | 23.22                 | 0                         | 0        |
|      | 1850.7          | 18607   | 1.4             | QPSK       | 1       | 5         | 23.43                 | 0                         | 0        |
|      | 1850.7          | 18607   | 1.4             | QPSK       | 3       | 0         | 23.26                 | 0                         | 0        |
|      | 1850.7          | 18607   | 1.4             | QPSK       | 3       | 2         | 23.31                 | 0                         | 0        |
|      | 1850.7          | 18607   | 1.4             | QPSK       | 3       | 3         | 23.22                 | 0                         | 0        |
|      | 1850.7          | 18607   | 1.4             | QPSK       | 6       | 0         | 22.49                 | 0-1                       | 1        |
|      | 1850.7          | 18607   | 1.4             | 16-QAM     | 1       | 0         | 22.41                 | 0-1                       | 1        |
|      | 1850.7          | 18607   | 1.4             | 16-QAM     | 1       | 2         | 22.46                 | 0-1                       | 1        |
|      | 1850.7          | 18607   | 1.4             | 16-QAM     | 1       | 5         | 22.31                 | 0-1                       | 1        |
|      | 1850.7          | 18607   | 1.4             | 16-QAM     | 3       | 0         | 22.41                 | 0-1                       | 1        |
|      | 1850.7          | 18607   | 1.4             | 16-QAM     | 3       | 2         | 22.39                 | 0-1                       | 1        |
|      | 1850.7          | 18607   | 1.4             | 16-QAM     | 3       | 3         | 22.35                 | 0-1                       | 1        |
|      | 1850.7          | 18607   | 1.4             | 16-QAM     | 6       | 0         | 21.50                 | 0-2                       | 2        |
| Mid  | 1880.0          | 18900   | 1.4             | QPSK       | 1       | 0         | 23.26                 | 0                         | 0        |
|      | 1880.0          | 18900   | 1.4             | QPSK       | 1       | 2         | 23.31                 | 0                         | 0        |
|      | 1880.0          | 18900   | 1.4             | QPSK       | 1       | 5         | 23.37                 | 0                         | 0        |
|      | 1880.0          | 18900   | 1.4             | QPSK       | 3       | 0         | 23.22                 | 0                         | 0        |
|      | 1880.0          | 18900   | 1.4             | QPSK       | 3       | 2         | 23.09                 | 0                         | 0        |
|      | 1880.0          | 18900   | 1.4             | QPSK       | 3       | 3         | 23.20                 | 0                         | 0        |
|      | 1880.0          | 18900   | 1.4             | QPSK       | 6       | 0         | 22.17                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 1.4             | 16-QAM     | 1       | 0         | 22.19                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 1.4             | 16-QAM     | 1       | 2         | 22.35                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 1.4             | 16-QAM     | 1       | 5         | 22.21                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 1.4             | 16-QAM     | 3       | 0         | 22.16                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 1.4             | 16-QAM     | 3       | 2         | 22.20                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 1.4             | 16-QAM     | 3       | 3         | 22.19                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 1.4             | 16-QAM     | 6       | 0         | 21.24                 | 0-2                       | 2        |
| High | 1909.3          | 19193   | 1.4             | QPSK       | 1       | 0         | 23.35                 | 0                         | 0        |
|      | 1909.3          | 19193   | 1.4             | QPSK       | 1       | 2         | 23.55                 | 0                         | 0        |
|      | 1909.3          | 19193   | 1.4             | QPSK       | 1       | 5         | 23.40                 | 0                         | 0        |
|      | 1909.3          | 19193   | 1.4             | QPSK       | 3       | 0         | 23.36                 | 0                         | 0        |
|      | 1909.3          | 19193   | 1.4             | QPSK       | 3       | 2         | 23.30                 | 0                         | 0        |
|      | 1909.3          | 19193   | 1.4             | QPSK       | 3       | 3         | 23.35                 | 0                         | 0        |
|      | 1909.3          | 19193   | 1.4             | QPSK       | 6       | 0         | 22.40                 | 0-1                       | 1        |
|      | 1909.3          | 19193   | 1.4             | 16-QAM     | 1       | 0         | 22.36                 | 0-1                       | 1        |
|      | 1909.3          | 19193   | 1.4             | 16-QAM     | 1       | 2         | 22.53                 | 0-1                       | 1        |
|      | 1909.3          | 19193   | 1.4             | 16-QAM     | 1       | 5         | 22.56                 | 0-1                       | 1        |
|      | 1909.3          | 19193   | 1.4             | 16-QAM     | 3       | 0         | 22.26                 | 0-1                       | 1        |
|      | 1909.3          | 19193   | 1.4             | 16-QAM     | 3       | 2         | 22.18                 | 0-1                       | 1        |
|      | 1909.3          | 19193   | 1.4             | 16-QAM     | 3       | 3         | 22.16                 | 0-1                       | 1        |
|      | 1909.3          | 19193   | 1.4             | 16-QAM     | 6       | 0         | 21.48                 | 0-2                       | 2        |

|                                   |                                                                                                                                                                                                        |                                 |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMT357T                |  <b>SAR EVALUATION REPORT</b>  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>OY1505280998.A3L | Test Dates:<br>06/02/15 - 06/04/15                                                                                                                                                                     | DUT Type:<br>Portable Tablet    |
| Page 29 of 54                     |                                                                                                                                                                                                        |                                 |

**Table 8-25**  
**LTE Band 2 (PCS) Conducted Powers - 20 MHz Bandwidth**  
**Reduced Power – Body at 0.0 cm**

|      | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
|------|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|---------------------------|----------|
| Low  | 1860            | 18700   | 20              | QPSK       | 1       | 0         | 12.03                 | 0                         | 0        |
|      | 1860            | 18700   | 20              | QPSK       | 1       | 50        | 11.38                 | 0                         | 0        |
|      | 1860            | 18700   | 20              | QPSK       | 1       | 99        | 12.22                 | 0                         | 0        |
|      | 1860            | 18700   | 20              | QPSK       | 50      | 0         | 10.55                 | 0-1                       | 1        |
|      | 1860            | 18700   | 20              | QPSK       | 50      | 25        | 10.62                 | 0-1                       | 1        |
|      | 1860            | 18700   | 20              | QPSK       | 50      | 50        | 10.70                 | 0-1                       | 1        |
|      | 1860            | 18700   | 20              | QPSK       | 100     | 0         | 10.63                 | 0-1                       | 1        |
|      | 1860            | 18700   | 20              | 16QAM      | 1       | 0         | 11.27                 | 0-1                       | 1        |
|      | 1860            | 18700   | 20              | 16QAM      | 1       | 50        | 10.76                 | 0-1                       | 1        |
|      | 1860            | 18700   | 20              | 16QAM      | 1       | 99        | 11.30                 | 0-1                       | 1        |
|      | 1860            | 18700   | 20              | 16QAM      | 50      | 0         | 9.76                  | 0-2                       | 2        |
|      | 1860            | 18700   | 20              | 16QAM      | 50      | 25        | 9.63                  | 0-2                       | 2        |
|      | 1860            | 18700   | 20              | 16QAM      | 50      | 50        | 9.71                  | 0-2                       | 2        |
|      | 1860            | 18700   | 20              | 16QAM      | 100     | 0         | 10.25                 | 0-2                       | 2        |
|      | 1880.0          | 18900   | 20              | QPSK       | 1       | 0         | 12.30                 | 0                         | 0        |
|      | 1880.0          | 18900   | 20              | QPSK       | 1       | 50        | 11.83                 | 0                         | 0        |
| Mid  | 1880.0          | 18900   | 20              | QPSK       | 1       | 99        | 12.28                 | 0                         | 0        |
|      | 1880.0          | 18900   | 20              | QPSK       | 50      | 0         | 10.63                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 20              | QPSK       | 50      | 25        | 10.75                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 20              | QPSK       | 50      | 50        | 10.79                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 20              | QPSK       | 100     | 0         | 10.65                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 20              | 16QAM      | 1       | 0         | 11.29                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 20              | 16QAM      | 1       | 50        | 11.04                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 20              | 16QAM      | 1       | 99        | 11.30                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 20              | 16QAM      | 50      | 0         | 9.84                  | 0-2                       | 2        |
|      | 1880.0          | 18900   | 20              | 16QAM      | 50      | 25        | 9.93                  | 0-2                       | 2        |
|      | 1880.0          | 18900   | 20              | 16QAM      | 50      | 50        | 9.96                  | 0-2                       | 2        |
|      | 1880.0          | 18900   | 20              | 16QAM      | 100     | 0         | 9.87                  | 0-2                       | 2        |
| High | 1900            | 19100   | 20              | QPSK       | 1       | 0         | 11.92                 | 0                         | 0        |
|      | 1900            | 19100   | 20              | QPSK       | 1       | 50        | 11.35                 | 0                         | 0        |
|      | 1900            | 19100   | 20              | QPSK       | 1       | 99        | 11.96                 | 0                         | 0        |
|      | 1900            | 19100   | 20              | QPSK       | 50      | 0         | 10.81                 | 0-1                       | 1        |
|      | 1900            | 19100   | 20              | QPSK       | 50      | 25        | 10.68                 | 0-1                       | 1        |
|      | 1900            | 19100   | 20              | QPSK       | 50      | 50        | 10.45                 | 0-1                       | 1        |
|      | 1900            | 19100   | 20              | QPSK       | 100     | 0         | 10.55                 | 0-1                       | 1        |
|      | 1900            | 19100   | 20              | 16QAM      | 1       | 0         | 11.11                 | 0-1                       | 1        |
|      | 1900            | 19100   | 20              | 16QAM      | 1       | 50        | 10.50                 | 0-1                       | 1        |
|      | 1900            | 19100   | 20              | 16QAM      | 1       | 99        | 11.11                 | 0-1                       | 1        |
|      | 1900            | 19100   | 20              | 16QAM      | 50      | 0         | 9.94                  | 0-2                       | 2        |
|      | 1900            | 19100   | 20              | 16QAM      | 50      | 25        | 9.67                  | 0-2                       | 2        |
|      | 1900            | 19100   | 20              | 16QAM      | 50      | 50        | 9.45                  | 0-2                       | 2        |
|      | 1900            | 19100   | 20              | 16QAM      | 100     | 0         | 9.56                  | 0-2                       | 2        |

**Table 8-26**  
**LTE Band 2 (PCS) Conducted Powers - 15 MHz Bandwidth**  
**Reduced Power – Body at 0.0 cm**

|      | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
|------|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|---------------------------|----------|
| Low  | 1857.5          | 18675   | 15              | QPSK       | 1       | 0         | 11.73                 | 0                         | 0        |
|      | 1857.5          | 18675   | 15              | QPSK       | 1       | 36        | 11.52                 | 0                         | 0        |
|      | 1857.5          | 18675   | 15              | QPSK       | 1       | 74        | 12.00                 | 0                         | 0        |
|      | 1857.5          | 18675   | 15              | QPSK       | 36      | 0         | 10.44                 | 0-1                       | 1        |
|      | 1857.5          | 18675   | 15              | QPSK       | 36      | 18        | 10.40                 | 0-1                       | 1        |
|      | 1857.5          | 18675   | 15              | QPSK       | 36      | 37        | 10.48                 | 0-1                       | 1        |
|      | 1857.5          | 18675   | 15              | QPSK       | 75      | 0         | 10.56                 | 0-1                       | 1        |
|      | 1857.5          | 18675   | 15              | 16QAM      | 1       | 0         | 10.89                 | 0-1                       | 1        |
|      | 1857.5          | 18675   | 15              | 16QAM      | 1       | 36        | 10.66                 | 0-1                       | 1        |
|      | 1857.5          | 18675   | 15              | 16QAM      | 1       | 74        | 11.30                 | 0-1                       | 1        |
|      | 1857.5          | 18675   | 15              | 16QAM      | 36      | 0         | 9.41                  | 0-2                       | 2        |
|      | 1857.5          | 18675   | 15              | 16QAM      | 36      | 18        | 9.41                  | 0-2                       | 2        |
|      | 1857.5          | 18675   | 15              | 16QAM      | 36      | 37        | 9.46                  | 0-2                       | 2        |
|      | 1857.5          | 18675   | 15              | 16QAM      | 75      | 0         | 9.53                  | 0-2                       | 2        |
| Mid  | 1880.0          | 18900   | 15              | QPSK       | 1       | 0         | 11.96                 | 0                         | 0        |
|      | 1880.0          | 18900   | 15              | QPSK       | 1       | 36        | 11.67                 | 0                         | 0        |
|      | 1880.0          | 18900   | 15              | QPSK       | 1       | 74        | 12.30                 | 0                         | 0        |
|      | 1880.0          | 18900   | 15              | QPSK       | 36      | 0         | 10.76                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 15              | QPSK       | 36      | 18        | 10.66                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 15              | QPSK       | 36      | 37        | 10.96                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 15              | QPSK       | 75      | 0         | 10.72                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 15              | 16QAM      | 1       | 0         | 10.82                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 15              | 16QAM      | 1       | 36        | 10.70                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 15              | 16QAM      | 1       | 74        | 11.29                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 15              | 16QAM      | 36      | 0         | 9.71                  | 0-2                       | 2        |
|      | 1880.0          | 18900   | 15              | 16QAM      | 36      | 18        | 9.69                  | 0-2                       | 2        |
|      | 1880.0          | 18900   | 15              | 16QAM      | 36      | 37        | 9.90                  | 0-2                       | 2        |
|      | 1880.0          | 18900   | 15              | 16QAM      | 75      | 0         | 9.79                  | 0-2                       | 2        |
| High | 1902.5          | 19125   | 15              | QPSK       | 1       | 0         | 11.98                 | 0                         | 0        |
|      | 1902.5          | 19125   | 15              | QPSK       | 1       | 36        | 11.57                 | 0                         | 0        |
|      | 1902.5          | 19125   | 15              | QPSK       | 1       | 74        | 12.26                 | 0                         | 0        |
|      | 1902.5          | 19125   | 15              | QPSK       | 36      | 0         | 10.73                 | 0-1                       | 1        |
|      | 1902.5          | 19125   | 15              | QPSK       | 36      | 18        | 10.71                 | 0-1                       | 1        |
|      | 1902.5          | 19125   | 15              | QPSK       | 36      | 37        | 10.85                 | 0-1                       | 1        |
|      | 1902.5          | 19125   | 15              | QPSK       | 75      | 0         | 10.79                 | 0-1                       | 1        |
|      | 1902.5          | 19125   | 15              | 16QAM      | 1       | 0         | 10.90                 | 0-1                       | 1        |
|      | 1902.5          | 19125   | 15              | 16QAM      | 1       | 36        | 10.69                 | 0-1                       | 1        |
|      | 1902.5          | 19125   | 15              | 16QAM      | 1       | 74        | 11.21                 | 0-1                       | 1        |
|      | 1902.5          | 19125   | 15              | 16QAM      | 36      | 0         | 9.76                  | 0-2                       | 2        |
|      | 1902.5          | 19125   | 15              | 16QAM      | 36      | 18        | 9.77                  | 0-2                       | 2        |
|      | 1902.5          | 19125   | 15              | 16QAM      | 36      | 37        | 9.79                  | 0-2                       | 2        |
|      | 1902.5          | 19125   | 15              | 16QAM      | 75      | 0         | 9.80                  | 0-2                       | 2        |

|                                   |                                                                                     |                              |                                                                                       |                                 |
|-----------------------------------|-------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMT357T                |  | SAR EVALUATION REPORT        |  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>OY1505280998.A3L | Test Dates:<br>06/02/15 - 06/04/15                                                  | DUT Type:<br>Portable Tablet | Page 30 of 54                                                                         |                                 |

**Table 8-27**  
**LTE Band 2 (PCS) Conducted Powers - 10 MHz Bandwidth**  
**Reduced Power – Body at 0.0 cm**

|      | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
|------|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|---------------------------|----------|
| Low  | 1855            | 18650   | 10              | QPSK       | 1       | 0         | 11.80                 | 0                         | 0        |
|      | 1855            | 18650   | 10              | QPSK       | 1       | 25        | 11.32                 | 0                         | 0        |
|      | 1855            | 18650   | 10              | QPSK       | 1       | 49        | 11.76                 | 0                         | 0        |
|      | 1855            | 18650   | 10              | QPSK       | 25      | 0         | 10.57                 | 0-1                       | 1        |
|      | 1855            | 18650   | 10              | QPSK       | 25      | 12        | 10.49                 | 0-1                       | 1        |
|      | 1855            | 18650   | 10              | QPSK       | 25      | 25        | 10.57                 | 0-1                       | 1        |
|      | 1855            | 18650   | 10              | QPSK       | 50      | 0         | 10.48                 | 0-1                       | 1        |
|      | 1855            | 18650   | 10              | 16QAM      | 1       | 0         | 11.00                 | 0-1                       | 1        |
|      | 1855            | 18650   | 10              | 16QAM      | 1       | 25        | 10.44                 | 0-1                       | 1        |
|      | 1855            | 18650   | 10              | 16QAM      | 1       | 49        | 11.15                 | 0-1                       | 1        |
|      | 1855            | 18650   | 10              | 16QAM      | 25      | 0         | 9.31                  | 0-2                       | 2        |
|      | 1855            | 18650   | 10              | 16QAM      | 25      | 12        | 9.58                  | 0-2                       | 2        |
|      | 1855            | 18650   | 10              | 16QAM      | 25      | 25        | 9.59                  | 0-2                       | 2        |
|      | 1855            | 18650   | 10              | 16QAM      | 50      | 0         | 9.50                  | 0-2                       | 2        |
| Mid  | 1880.0          | 18900   | 10              | QPSK       | 1       | 0         | 11.78                 | 0                         | 0        |
|      | 1880.0          | 18900   | 10              | QPSK       | 1       | 25        | 11.52                 | 0                         | 0        |
|      | 1880.0          | 18900   | 10              | QPSK       | 1       | 49        | 12.25                 | 0                         | 0        |
|      | 1880.0          | 18900   | 10              | QPSK       | 25      | 0         | 10.51                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 10              | QPSK       | 25      | 12        | 10.54                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 10              | QPSK       | 25      | 25        | 10.89                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 10              | QPSK       | 50      | 0         | 10.52                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 10              | 16QAM      | 1       | 0         | 11.28                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 10              | 16QAM      | 1       | 25        | 10.95                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 10              | 16QAM      | 1       | 49        | 11.23                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 10              | 16QAM      | 25      | 0         | 9.57                  | 0-2                       | 2        |
|      | 1880.0          | 18900   | 10              | 16QAM      | 25      | 12        | 9.52                  | 0-2                       | 2        |
|      | 1880.0          | 18900   | 10              | 16QAM      | 25      | 25        | 9.74                  | 0-2                       | 2        |
|      | 1880.0          | 18900   | 10              | 16QAM      | 50      | 0         | 9.61                  | 0-2                       | 2        |
| High | 1905            | 19150   | 10              | QPSK       | 1       | 0         | 11.89                 | 0                         | 0        |
|      | 1905            | 19150   | 10              | QPSK       | 1       | 25        | 11.30                 | 0                         | 0        |
|      | 1905            | 19150   | 10              | QPSK       | 1       | 49        | 12.06                 | 0                         | 0        |
|      | 1905            | 19150   | 10              | QPSK       | 25      | 0         | 10.55                 | 0-1                       | 1        |
|      | 1905            | 19150   | 10              | QPSK       | 25      | 12        | 10.57                 | 0-1                       | 1        |
|      | 1905            | 19150   | 10              | QPSK       | 25      | 25        | 10.51                 | 0-1                       | 1        |
|      | 1905            | 19150   | 10              | QPSK       | 50      | 0         | 10.56                 | 0-1                       | 1        |
|      | 1905            | 19150   | 10              | 16QAM      | 1       | 0         | 11.04                 | 0-1                       | 1        |
|      | 1905            | 19150   | 10              | 16QAM      | 1       | 25        | 10.41                 | 0-1                       | 1        |
|      | 1905            | 19150   | 10              | 16QAM      | 1       | 49        | 11.29                 | 0-1                       | 1        |
|      | 1905            | 19150   | 10              | 16QAM      | 25      | 0         | 9.63                  | 0-2                       | 2        |
|      | 1905            | 19150   | 10              | 16QAM      | 25      | 12        | 9.66                  | 0-2                       | 2        |
|      | 1905            | 19150   | 10              | 16QAM      | 25      | 25        | 9.55                  | 0-2                       | 2        |
|      | 1905            | 19150   | 10              | 16QAM      | 50      | 0         | 9.65                  | 0-2                       | 2        |

**Table 8-28**  
**LTE Band 2 (PCS) Conducted Powers - 5 MHz Bandwidth**  
**Reduced Power – Body at 0.0 cm**

|      | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
|------|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|---------------------------|----------|
| Low  | 1852.5          | 18625   | 5               | QPSK       | 1       | 0         | 11.73                 | 0                         | 0        |
|      | 1852.5          | 18625   | 5               | QPSK       | 1       | 12        | 11.49                 | 0                         | 0        |
|      | 1852.5          | 18625   | 5               | QPSK       | 1       | 24        | 11.70                 | 0                         | 0        |
|      | 1852.5          | 18625   | 5               | QPSK       | 12      | 0         | 10.40                 | 0-1                       | 1        |
|      | 1852.5          | 18625   | 5               | QPSK       | 12      | 6         | 10.34                 | 0-1                       | 1        |
|      | 1852.5          | 18625   | 5               | QPSK       | 12      | 13        | 10.42                 | 0-1                       | 1        |
|      | 1852.5          | 18625   | 5               | QPSK       | 25      | 0         | 10.37                 | 0-1                       | 1        |
|      | 1852.5          | 18625   | 5               | 16-QAM     | 1       | 0         | 11.22                 | 0-1                       | 1        |
|      | 1852.5          | 18625   | 5               | 16-QAM     | 1       | 12        | 10.62                 | 0-1                       | 1        |
|      | 1852.5          | 18625   | 5               | 16-QAM     | 1       | 24        | 11.16                 | 0-1                       | 1        |
|      | 1852.5          | 18625   | 5               | 16-QAM     | 12      | 0         | 9.63                  | 0-2                       | 2        |
|      | 1852.5          | 18625   | 5               | 16-QAM     | 12      | 6         | 9.59                  | 0-2                       | 2        |
|      | 1852.5          | 18625   | 5               | 16-QAM     | 12      | 13        | 9.55                  | 0-2                       | 2        |
|      | 1852.5          | 18625   | 5               | 16-QAM     | 25      | 0         | 9.51                  | 0-2                       | 2        |
| Mid  | 1880.0          | 18900   | 5               | QPSK       | 1       | 0         | 11.93                 | 0                         | 0        |
|      | 1880.0          | 18900   | 5               | QPSK       | 1       | 12        | 11.47                 | 0                         | 0        |
|      | 1880.0          | 18900   | 5               | QPSK       | 1       | 24        | 12.06                 | 0                         | 0        |
|      | 1880.0          | 18900   | 5               | QPSK       | 12      | 0         | 10.58                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 5               | QPSK       | 12      | 6         | 10.64                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 5               | QPSK       | 12      | 13        | 10.67                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 5               | QPSK       | 25      | 0         | 10.73                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 5               | 16-QAM     | 1       | 0         | 10.98                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 5               | 16-QAM     | 1       | 12        | 10.68                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 5               | 16-QAM     | 1       | 24        | 11.21                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 5               | 16-QAM     | 12      | 0         | 9.73                  | 0-2                       | 2        |
|      | 1880.0          | 18900   | 5               | 16-QAM     | 12      | 6         | 9.77                  | 0-2                       | 2        |
|      | 1880.0          | 18900   | 5               | 16-QAM     | 12      | 13        | 9.68                  | 0-2                       | 2        |
|      | 1880.0          | 18900   | 5               | 16-QAM     | 25      | 0         | 9.77                  | 0-2                       | 2        |
| High | 1907.5          | 19175   | 5               | QPSK       | 1       | 0         | 11.64                 | 0                         | 0        |
|      | 1907.5          | 19175   | 5               | QPSK       | 1       | 12        | 11.30                 | 0                         | 0        |
|      | 1907.5          | 19175   | 5               | QPSK       | 1       | 24        | 11.63                 | 0                         | 0        |
|      | 1907.5          | 19175   | 5               | QPSK       | 12      | 0         | 10.45                 | 0-1                       | 1        |
|      | 1907.5          | 19175   | 5               | QPSK       | 12      | 6         | 10.46                 | 0-1                       | 1        |
|      | 1907.5          | 19175   | 5               | QPSK       | 12      | 13        | 10.50                 | 0-1                       | 1        |
|      | 1907.5          | 19175   | 5               | QPSK       | 25      | 0         | 10.46                 | 0-1                       | 1        |
|      | 1907.5          | 19175   | 5               | 16-QAM     | 1       | 0         | 10.90                 | 0-1                       | 1        |
|      | 1907.5          | 19175   | 5               | 16-QAM     | 1       | 12        | 10.68                 | 0-1                       | 1        |
|      | 1907.5          | 19175   | 5               | 16-QAM     | 1       | 24        | 11.09                 | 0-1                       | 1        |
|      | 1907.5          | 19175   | 5               | 16-QAM     | 12      | 0         | 9.51                  | 0-2                       | 2        |
|      | 1907.5          | 19175   | 5               | 16-QAM     | 12      | 6         | 9.50                  | 0-2                       | 2        |
|      | 1907.5          | 19175   | 5               | 16-QAM     | 12      | 13        | 9.52                  | 0-2                       | 2        |
|      | 1907.5          | 19175   | 5               | 16-QAM     | 25      | 0         | 9.52                  | 0-2                       | 2        |

|                                   |                                                                                     |                              |                                                                                       |                                 |
|-----------------------------------|-------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMT357T                |  | SAR EVALUATION REPORT        |  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>OY1505280998.A3L | Test Dates:<br>06/02/15 - 06/04/15                                                  | DUT Type:<br>Portable Tablet | Page 31 of 54                                                                         |                                 |

**Table 8-29**  
**LTE Band 2 (PCS) Conducted Powers - 3 MHz Bandwidth**  
**Reduced Power – Body at 0.0 cm**

|      | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
|------|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|---------------------------|----------|
| Low  | 1851.5          | 18615   | 3               | QPSK       | 1       | 0         | 11.69                 | 0                         | 0        |
|      | 1851.5          | 18615   | 3               | QPSK       | 1       | 7         | 11.34                 | 0                         | 0        |
|      | 1851.5          | 18615   | 3               | QPSK       | 1       | 14        | 11.57                 | 0                         | 0        |
|      | 1851.5          | 18615   | 3               | QPSK       | 8       | 0         | 10.38                 | 0-1                       | 1        |
|      | 1851.5          | 18615   | 3               | QPSK       | 8       | 4         | 10.45                 | 0-1                       | 1        |
|      | 1851.5          | 18615   | 3               | QPSK       | 8       | 7         | 10.44                 | 0-1                       | 1        |
|      | 1851.5          | 18615   | 3               | QPSK       | 15      | 0         | 10.48                 | 0-1                       | 1        |
|      | 1851.5          | 18615   | 3               | 16-QAM     | 1       | 0         | 11.28                 | 0-1                       | 1        |
|      | 1851.5          | 18615   | 3               | 16-QAM     | 1       | 7         | 10.98                 | 0-1                       | 1        |
|      | 1851.5          | 18615   | 3               | 16-QAM     | 1       | 14        | 11.21                 | 0-1                       | 1        |
|      | 1851.5          | 18615   | 3               | 16-QAM     | 8       | 0         | 9.58                  | 0-2                       | 2        |
|      | 1851.5          | 18615   | 3               | 16-QAM     | 8       | 4         | 9.54                  | 0-2                       | 2        |
|      | 1851.5          | 18615   | 3               | 16-QAM     | 8       | 7         | 9.55                  | 0-2                       | 2        |
|      | 1851.5          | 18615   | 3               | 16-QAM     | 15      | 0         | 9.55                  | 0-2                       | 2        |
| Mid  | 1880.0          | 18900   | 3               | QPSK       | 1       | 0         | 11.76                 | 0                         | 0        |
|      | 1880.0          | 18900   | 3               | QPSK       | 1       | 7         | 11.65                 | 0                         | 0        |
|      | 1880.0          | 18900   | 3               | QPSK       | 1       | 14        | 12.09                 | 0                         | 0        |
|      | 1880.0          | 18900   | 3               | QPSK       | 8       | 0         | 10.63                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 3               | QPSK       | 8       | 4         | 10.70                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 3               | QPSK       | 8       | 7         | 10.72                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 3               | QPSK       | 15      | 0         | 10.74                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 3               | 16-QAM     | 1       | 0         | 11.06                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 3               | 16-QAM     | 1       | 7         | 10.87                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 3               | 16-QAM     | 1       | 14        | 11.18                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 3               | 16-QAM     | 8       | 0         | 9.80                  | 0-2                       | 2        |
|      | 1880.0          | 18900   | 3               | 16-QAM     | 8       | 4         | 9.74                  | 0-2                       | 2        |
|      | 1880.0          | 18900   | 3               | 16-QAM     | 8       | 7         | 9.86                  | 0-2                       | 2        |
|      | 1880.0          | 18900   | 3               | 16-QAM     | 15      | 0         | 9.84                  | 0-2                       | 2        |
| High | 1908.5          | 19185   | 3               | QPSK       | 1       | 0         | 12.01                 | 0                         | 0        |
|      | 1908.5          | 19185   | 3               | QPSK       | 1       | 7         | 11.72                 | 0                         | 0        |
|      | 1908.5          | 19185   | 3               | QPSK       | 1       | 14        | 11.81                 | 0                         | 0        |
|      | 1908.5          | 19185   | 3               | QPSK       | 8       | 0         | 10.76                 | 0-1                       | 1        |
|      | 1908.5          | 19185   | 3               | QPSK       | 8       | 4         | 10.80                 | 0-1                       | 1        |
|      | 1908.5          | 19185   | 3               | QPSK       | 8       | 7         | 10.87                 | 0-1                       | 1        |
|      | 1908.5          | 19185   | 3               | QPSK       | 15      | 0         | 10.85                 | 0-1                       | 1        |
|      | 1908.5          | 19185   | 3               | 16-QAM     | 1       | 0         | 11.01                 | 0-1                       | 1        |
|      | 1908.5          | 19185   | 3               | 16-QAM     | 1       | 7         | 10.73                 | 0-1                       | 1        |
|      | 1908.5          | 19185   | 3               | 16-QAM     | 1       | 14        | 10.83                 | 0-1                       | 1        |
|      | 1908.5          | 19185   | 3               | 16-QAM     | 8       | 0         | 9.65                  | 0-2                       | 2        |
|      | 1908.5          | 19185   | 3               | 16-QAM     | 8       | 4         | 9.62                  | 0-2                       | 2        |
|      | 1908.5          | 19185   | 3               | 16-QAM     | 8       | 7         | 9.88                  | 0-2                       | 2        |
|      | 1908.5          | 19185   | 3               | 16-QAM     | 15      | 0         | 9.97                  | 0-2                       | 2        |

**Table 8-30**  
**LTE Band 2 (PCS) Conducted Powers – 1.4 MHz Bandwidth**  
**Reduced Power – Body at 0.0 cm**

|      | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
|------|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|---------------------------|----------|
| Low  | 1850.7          | 18607   | 1.4             | QPSK       | 1       | 0         | 11.41                 | 0                         | 0        |
|      | 1850.7          | 18607   | 1.4             | QPSK       | 1       | 2         | 11.63                 | 0                         | 0        |
|      | 1850.7          | 18607   | 1.4             | QPSK       | 1       | 5         | 11.38                 | 0                         | 0        |
|      | 1850.7          | 18607   | 1.4             | QPSK       | 3       | 0         | 11.36                 | 0                         | 0        |
|      | 1850.7          | 18607   | 1.4             | QPSK       | 3       | 2         | 11.41                 | 0                         | 0        |
|      | 1850.7          | 18607   | 1.4             | QPSK       | 3       | 3         | 11.40                 | 0                         | 0        |
|      | 1850.7          | 18607   | 1.4             | QPSK       | 6       | 0         | 10.36                 | 0-1                       | 1        |
|      | 1850.7          | 18607   | 1.4             | 16-QAM     | 1       | 0         | 10.74                 | 0-1                       | 1        |
|      | 1850.7          | 18607   | 1.4             | 16-QAM     | 1       | 2         | 10.82                 | 0-1                       | 1        |
|      | 1850.7          | 18607   | 1.4             | 16-QAM     | 1       | 5         | 10.63                 | 0-1                       | 1        |
|      | 1850.7          | 18607   | 1.4             | 16-QAM     | 3       | 0         | 10.39                 | 0-1                       | 1        |
|      | 1850.7          | 18607   | 1.4             | 16-QAM     | 3       | 2         | 10.44                 | 0-1                       | 1        |
|      | 1850.7          | 18607   | 1.4             | 16-QAM     | 3       | 3         | 10.36                 | 0-1                       | 1        |
|      | 1850.7          | 18607   | 1.4             | 16-QAM     | 6       | 0         | 9.31                  | 0-2                       | 2        |
| Mid  | 1880.0          | 18900   | 1.4             | QPSK       | 1       | 0         | 11.65                 | 0                         | 0        |
|      | 1880.0          | 18900   | 1.4             | QPSK       | 1       | 2         | 11.88                 | 0                         | 0        |
|      | 1880.0          | 18900   | 1.4             | QPSK       | 1       | 5         | 11.65                 | 0                         | 0        |
|      | 1880.0          | 18900   | 1.4             | QPSK       | 3       | 0         | 11.40                 | 0                         | 0        |
|      | 1880.0          | 18900   | 1.4             | QPSK       | 3       | 2         | 11.46                 | 0                         | 0        |
|      | 1880.0          | 18900   | 1.4             | QPSK       | 3       | 3         | 11.44                 | 0                         | 0        |
|      | 1880.0          | 18900   | 1.4             | QPSK       | 6       | 0         | 10.49                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 1.4             | 16-QAM     | 1       | 0         | 10.98                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 1.4             | 16-QAM     | 1       | 2         | 11.14                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 1.4             | 16-QAM     | 1       | 5         | 10.97                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 1.4             | 16-QAM     | 3       | 0         | 10.72                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 1.4             | 16-QAM     | 3       | 2         | 10.77                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 1.4             | 16-QAM     | 3       | 3         | 10.72                 | 0-1                       | 1        |
|      | 1880.0          | 18900   | 1.4             | 16-QAM     | 6       | 0         | 9.59                  | 0-2                       | 2        |
| High | 1909.3          | 19193   | 1.4             | QPSK       | 1       | 0         | 11.85                 | 0                         | 0        |
|      | 1909.3          | 19193   | 1.4             | QPSK       | 1       | 2         | 11.93                 | 0                         | 0        |
|      | 1909.3          | 19193   | 1.4             | QPSK       | 1       | 5         | 11.72                 | 0                         | 0        |
|      | 1909.3          | 19193   | 1.4             | QPSK       | 3       | 0         | 11.58                 | 0                         | 0        |
|      | 1909.3          | 19193   | 1.4             | QPSK       | 3       | 2         | 11.63                 | 0                         | 0        |
|      | 1909.3          | 19193   | 1.4             | QPSK       | 3       | 3         | 11.62                 | 0                         | 0        |
|      | 1909.3          | 19193   | 1.4             | QPSK       | 6       | 0         | 10.60                 | 0-1                       | 1        |
|      | 1909.3          | 19193   | 1.4             | 16-QAM     | 1       | 0         | 10.67                 | 0-1                       | 1        |
|      | 1909.3          | 19193   | 1.4             | 16-QAM     | 1       | 2         | 10.82                 | 0-1                       | 1        |
|      | 1909.3          | 19193   | 1.4             | 16-QAM     | 1       | 5         | 10.67                 | 0-1                       | 1        |
|      | 1909.3          | 19193   | 1.4             | 16-QAM     | 3       | 0         | 10.42                 | 0-1                       | 1        |
|      | 1909.3          | 19193   | 1.4             | 16-QAM     | 3       | 2         | 10.50                 | 0-1                       | 1        |
|      | 1909.3          | 19193   | 1.4             | 16-QAM     | 3       | 3         | 10.43                 | 0-1                       | 1        |
|      | 1909.3          | 19193   | 1.4             | 16-QAM     | 6       | 0         | 9.42                  | 0-2                       | 2        |

|                                   |                                                                                                                                                                                                        |                                 |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMT357T                |  <b>SAR EVALUATION REPORT</b>  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>OY1505280998.A3L | Test Dates:<br>06/02/15 - 06/04/15                                                                                                                                                                     | DUT Type:<br>Portable Tablet    |
| Page 32 of 54                     |                                                                                                                                                                                                        |                                 |

### 8.3 WLAN Conducted Powers

**Table 8-31**  
**2.4 GHz Average RF Power**  
**Maximum Power**

| Freq [MHz] | Channel | 2.4GHz Conducted Power [dBm] |         |
|------------|---------|------------------------------|---------|
|            |         | IEEE Transmission Mode       |         |
|            |         | 802.11b                      | 802.11g |
| 2412       | 1       | 16.01                        | 11.87   |
| 2437       | 6       | 16.12                        | 11.93   |
| 2462       | 11      | 16.23                        | 12.27   |

**Table 8-32**  
**2.4 GHz Average RF Power**  
**Reduced Power – Body at 0.0 cm**

| Freq [MHz] | Channel | 2.4GHz Conducted Power [dBm] |         |
|------------|---------|------------------------------|---------|
|            |         | IEEE Transmission Mode       |         |
|            |         | 802.11b                      | 802.11g |
| 2412       | 1       | 11.49                        | 10.34   |
| 2437       | 6       | 11.13                        | 10.40   |
| 2462       | 11      | 11.08                        | 9.79    |

**Table 8-33**  
**5 GHz (20 MHz Bandwidth) Average RF Power**  
**Maximum Power**

| Freq [MHz] | Channel | 5GHz (20MHz) Conducted Power [dBm] |
|------------|---------|------------------------------------|
|            |         | IEEE Transmission Mode             |
|            |         | 802.11a                            |
| 5180       | 36      | 11.39                              |
| 5200       | 40      | 11.37                              |
| 5220       | 44      | 11.48                              |
| 5240       | 48      | 11.38                              |
| 5260       | 52      | 11.41                              |
| 5280       | 56      | 11.46                              |
| 5300       | 60      | 11.48                              |
| 5320       | 64      | 11.47                              |
| 5500       | 100     | 11.44                              |
| 5580       | 116     | 11.06                              |
| 5660       | 132     | 11.17                              |
| 5720       | 144     | 11.38                              |
| 5745       | 149     | 11.40                              |
| 5785       | 157     | 11.28                              |
| 5825       | 165     | 11.29                              |

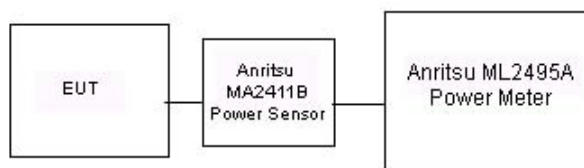
|                                          |                                                                                                                                   |                                     |                                                                                                      |                                        |
|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|------------------------------------------------------------------------------------------------------|----------------------------------------|
| FCC ID: A3LSMT357T                       |  <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>SAR EVALUATION REPORT</b>        |  <b>SAMSUNG</b> | <b>Reviewed by:</b><br>Quality Manager |
| <b>Document S/N:</b><br>OY1505280998.A3L | <b>Test Dates:</b><br>06/02/15 - 06/04/15                                                                                         | <b>DUT Type:</b><br>Portable Tablet | Page 33 of 54                                                                                        |                                        |

**Table 8-34**  
**5 GHz (40 MHz Bandwidth) Average RF Power**  
**Reduced Power – Body at 0.0 cm**

| Freq [MHz] | Channel | 5GHz (40MHz)<br>Conducted Power |
|------------|---------|---------------------------------|
|            |         | IEEE Transmission<br>Mode       |
|            |         | 802.11n                         |
| 5190       | 38      | 6.76                            |
| 5230       | 46      | 6.75                            |
| 5270       | 54      | <b>6.78</b>                     |
| 5310       | 62      | 6.70                            |
| 5510       | 102     | 6.60                            |
| 5550       | 110     | 7.24                            |
| 5670       | 134     | <b>7.44</b>                     |
| 5710       | 142     | 7.31                            |
| 5755       | 151     | <b>6.63</b>                     |
| 5795       | 159     | 6.56                            |

Justification for test configurations for WLAN per KDB Publication 248227 D01v02:

- Power measurements were performed for the transmission mode configuration with the highest maximum output power specified for production units.
- For transmission modes with the same maximum output power specification, powers were measured for the largest channel bandwidth, lowest order modulation and lowest data rate.
- For transmission modes with identical maximum specified output power, channel bandwidth, modulation and data rates, power measurements were required for all identical configurations.
- For each transmission mode configuration, powers were measured for the highest and lowest channels; and at the mid-band channel(s) when there were at least 3 channels supported. For configurations with multiple mid-band channels, due to an even number of channels, both channels were measured.
- The bolded data rate and channel above were tested for SAR.



**Figure 8-2**  
**Power Measurement Setup**

|                                   |                                                                                                                                                                                                        |                                 |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMT357T                |  <b>SAR EVALUATION REPORT</b>  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>0Y1505280998.A3L | Test Dates:<br>06/02/15 - 06/04/15                                                                                                                                                                     | DUT Type:<br>Portable Tablet    |

## 9 SYSTEM VERIFICATION

### 9.1 Tissue Verification

**Table 9-1  
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 $\epsilon$ |
|------------------------------------|-------------|-------------------------------------|--------------------------|---------------------------------------|------------------------------------------|-------------------------------------|----------------------------------------|----------------|------------------|
| 06/02/15                           | 750B        | 21.6                                | 700                      | 0.914                                 | 56.166                                   | 0.959                               | 55.726                                 | -4.69%         | 0.79%            |
|                                    |             |                                     | 710                      | 0.920                                 | 56.082                                   | 0.960                               | 55.687                                 | -4.17%         | 0.71%            |
|                                    |             |                                     | 740                      | 0.946                                 | 55.758                                   | 0.963                               | 55.570                                 | -1.77%         | 0.34%            |
|                                    |             |                                     | 755                      | 0.960                                 | 55.560                                   | 0.964                               | 55.512                                 | -0.41%         | 0.09%            |
| 06/04/15                           | 835B        | 20.2                                | 820                      | 1.003                                 | 55.144                                   | 0.969                               | 55.258                                 | 3.51%          | -0.21%           |
|                                    |             |                                     | 835                      | 1.018                                 | 55.002                                   | 0.970                               | 55.200                                 | 4.95%          | -0.36%           |
|                                    |             |                                     | 850                      | 1.033                                 | 54.851                                   | 0.988                               | 55.154                                 | 4.55%          | -0.55%           |
| 06/04/15                           | 1750B       | 22.0                                | 1710                     | 1.441                                 | 51.885                                   | 1.463                               | 53.537                                 | -1.50%         | -3.09%           |
|                                    |             |                                     | 1750                     | 1.485                                 | 51.684                                   | 1.488                               | 53.432                                 | -0.20%         | -3.27%           |
|                                    |             |                                     | 1790                     | 1.531                                 | 51.535                                   | 1.514                               | 53.326                                 | 1.12%          | -3.36%           |
| 06/04/15                           | 1900B       | 21.7                                | 1850                     | 1.491                                 | 51.966                                   | 1.520                               | 53.300                                 | -1.91%         | -2.50%           |
|                                    |             |                                     | 1880                     | 1.528                                 | 51.803                                   | 1.520                               | 53.300                                 | 0.53%          | -2.81%           |
|                                    |             |                                     | 1910                     | 1.558                                 | 51.757                                   | 1.520                               | 53.300                                 | 2.50%          | -2.89%           |
| 06/03/15                           | 2450B       | 22.0                                | 2401                     | 1.942                                 | 50.647                                   | 1.903                               | 52.765                                 | 2.05%          | -4.01%           |
|                                    |             |                                     | 2450                     | 2.008                                 | 50.462                                   | 1.950                               | 52.700                                 | 2.97%          | -4.25%           |
|                                    |             |                                     | 2499                     | 2.068                                 | 50.278                                   | 2.019                               | 52.638                                 | 2.43%          | -4.48%           |
| 06/03/15                           | 5200B-5800B | 21.4                                | 5260                     | 5.203                                 | 48.135                                   | 5.369                               | 48.933                                 | -3.09%         | -1.63%           |
|                                    |             |                                     | 5280                     | 5.228                                 | 48.110                                   | 5.393                               | 48.906                                 | -3.06%         | -1.63%           |
|                                    |             |                                     | 5300                     | 5.248                                 | 48.083                                   | 5.416                               | 48.879                                 | -3.10%         | -1.63%           |
|                                    |             |                                     | 5500                     | 5.495                                 | 47.779                                   | 5.650                               | 48.607                                 | -2.74%         | -1.70%           |
|                                    |             |                                     | 5600                     | 5.621                                 | 47.640                                   | 5.766                               | 48.471                                 | -2.51%         | -1.71%           |
|                                    |             |                                     | 5660                     | 5.718                                 | 47.511                                   | 5.837                               | 48.390                                 | -2.04%         | -1.82%           |
|                                    |             |                                     | 5680                     | 5.749                                 | 47.507                                   | 5.860                               | 48.363                                 | -1.89%         | -1.77%           |
|                                    |             |                                     | 5745                     | 5.822                                 | 47.405                                   | 5.936                               | 48.275                                 | -1.92%         | -1.80%           |
|                                    |             |                                     | 5765                     | 5.854                                 | 47.386                                   | 5.959                               | 48.248                                 | -1.76%         | -1.79%           |
|                                    |             |                                     | 5800                     | 5.914                                 | 47.336                                   | 6.000                               | 48.200                                 | -1.43%         | -1.79%           |

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 Publication 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.

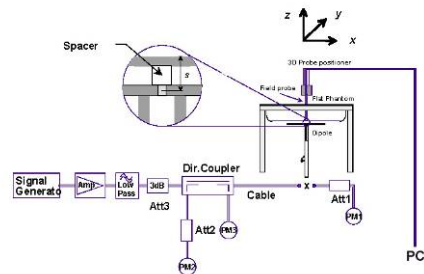
|                                          |                                                                                     |                                     |                                                                                       |                                        |
|------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| FCC ID: A3LSMT357T                       |  | <b>SAR EVALUATION REPORT</b>        |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Document S/N:</b><br>0Y1505280998.A3L | <b>Test Dates:</b><br>06/02/15 - 06/04/15                                           | <b>DUT Type:</b><br>Portable Tablet |                                                                                       | Page 35 of 54                          |

## 9.2 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 9-2**  
**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> (%) |
| J                                        | 750                    | BODY        | 06/02/2015 | 19.0           | 21.6             | 0.200           | 1003      | 3319     | 1.710                             | 8.460                               | 8.550                                   | 1.06%                       |
| I                                        | 835                    | BODY        | 06/04/2015 | 22.7           | 22.0             | 0.100           | 4d133     | 3213     | 0.883                             | 9.350                               | 8.830                                   | -5.56%                      |
| H                                        | 1750                   | BODY        | 06/04/2015 | 21.5           | 22.0             | 0.100           | 1051      | 3263     | 3.820                             | 37.100                              | 38.200                                  | 2.96%                       |
| B                                        | 1900                   | BODY        | 06/04/2015 | 22.0           | 21.7             | 0.100           | 5d148     | 3334     | 4.040                             | 40.200                              | 40.400                                  | 0.50%                       |
| D                                        | 2450                   | BODY        | 06/03/2015 | 21.1           | 21.0             | 0.100           | 719       | 3209     | 5.400                             | 51.800                              | 54.000                                  | 4.25%                       |
| E                                        | 5300                   | BODY        | 06/03/2015 | 22.1           | 21.2             | 0.050           | 1057      | 3589     | 3.910                             | 74.200                              | 78.200                                  | 5.39%                       |
| E                                        | 5500                   | BODY        | 06/03/2015 | 22.2           | 21.3             | 0.050           | 1057      | 3589     | 3.680                             | 79.200                              | 73.600                                  | -7.07%                      |
| E                                        | 5600                   | BODY        | 06/03/2015 | 22.1           | 21.3             | 0.050           | 1057      | 3589     | 3.960                             | 77.700                              | 79.200                                  | 1.93%                       |
| E                                        | 5800                   | BODY        | 06/03/2015 | 22.1           | 21.2             | 0.050           | 1057      | 3589     | 3.410                             | 75.100                              | 68.200                                  | -9.19%                      |



**Figure 9-1**  
**System Verification Setup Diagram**



**Figure 9-2**  
**System Verification Setup Photo**

|                                          |                                                                                                                                   |                                     |                                                                                       |                                        |
|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| FCC ID: A3LSMT357T                       |  <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>0Y1505280998.A3L | <b>Test Dates:</b><br>06/02/15 - 06/04/15                                                                                         | <b>DUT Type:</b><br>Portable Tablet | Page 36 of 54                                                                         |                                        |

# 10 SAR DATA SUMMARY

## 10.1 Standalone Body SAR Data

**Table 10-1**  
**UMTS Body SAR Data**

| MEASUREMENT RESULTS                                                                               |      |           |         |                             |                       |                  |                                                 |                      |            |        |          |                |                 |        |
|---------------------------------------------------------------------------------------------------|------|-----------|---------|-----------------------------|-----------------------|------------------|-------------------------------------------------|----------------------|------------|--------|----------|----------------|-----------------|--------|
| FREQUENCY                                                                                         |      | Mode      | Service | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Spacing                                         | Device Serial Number | Duty Cycle | Side   | SAR (1g) | Scaling Factor | Scaled SAR (1g) | Plot # |
| MHz                                                                                               | Ch.  |           |         |                             |                       |                  |                                                 |                      |            |        | (W/kg)   |                | (W/kg)          |        |
| 836.60                                                                                            | 4183 | UMTS 850  | RMC     | 23.5                        | 22.91                 | 0.05             | 21 mm                                           | 11524                | 1:1        | back   | 0.292    | 1.146          | 0.335           |        |
| 836.60                                                                                            | 4183 | UMTS 850  | RMC     | 23.5                        | 22.91                 | -0.05            | 18 mm                                           | 11524                | 1:1        | bottom | 0.020    | 1.146          | 0.023           |        |
| 836.60                                                                                            | 4183 | UMTS 850  | RMC     | 23.5                        | 22.91                 | 0.11             | 6 mm                                            | 11524                | 1:1        | right  | 0.137    | 1.146          | 0.157           |        |
| 836.60                                                                                            | 4183 | UMTS 850  | RMC     | 18.1                        | 17.34                 | -0.01            | 0 mm                                            | 01806                | 1:1        | back   | 0.478    | 1.191          | 0.569           | A1     |
| 836.60                                                                                            | 4183 | UMTS 850  | RMC     | 18.1                        | 17.34                 | 0.08             | 0 mm                                            | 01806                | 1:1        | bottom | 0.159    | 1.191          | 0.189           |        |
| 836.60                                                                                            | 4183 | UMTS 850  | RMC     | 18.1                        | 17.34                 | 0.03             | 0 mm                                            | 01806                | 1:1        | right  | 0.133    | 1.191          | 0.158           |        |
| 1732.40                                                                                           | 1412 | UMTS 1750 | RMC     | 23.5                        | 22.93                 | 0.12             | 21 mm                                           | 11524                | 1:1        | back   | 0.443    | 1.140          | 0.505           |        |
| 1732.40                                                                                           | 1412 | UMTS 1750 | RMC     | 23.5                        | 22.93                 | -0.01            | 18 mm                                           | 11524                | 1:1        | bottom | 0.325    | 1.140          | 0.371           |        |
| 1732.40                                                                                           | 1412 | UMTS 1750 | RMC     | 23.5                        | 22.93                 | 0.00             | 6 mm                                            | 11524                | 1:1        | right  | 0.415    | 1.140          | 0.473           |        |
| 1732.40                                                                                           | 1412 | UMTS 1750 | RMC     | 13.5                        | 13.06                 | -0.02            | 0 mm                                            | 01798                | 1:1        | back   | 0.535    | 1.107          | 0.592           | A2     |
| 1732.40                                                                                           | 1412 | UMTS 1750 | RMC     | 13.5                        | 13.06                 | -0.01            | 0 mm                                            | 01798                | 1:1        | bottom | 0.181    | 1.107          | 0.200           |        |
| 1732.40                                                                                           | 1412 | UMTS 1750 | RMC     | 13.5                        | 13.06                 | 0.02             | 0 mm                                            | 01798                | 1:1        | right  | 0.075    | 1.107          | 0.083           |        |
| 1880.00                                                                                           | 9400 | UMTS 1900 | RMC     | 23.5                        | 22.79                 | -0.02            | 21 mm                                           | 11524                | 1:1        | back   | 0.413    | 1.178          | 0.487           |        |
| 1880.00                                                                                           | 9400 | UMTS 1900 | RMC     | 23.5                        | 22.79                 | 0.08             | 18 mm                                           | 11524                | 1:1        | bottom | 0.461    | 1.178          | 0.543           |        |
| 1880.00                                                                                           | 9400 | UMTS 1900 | RMC     | 23.5                        | 22.79                 | 0.02             | 6 mm                                            | 11524                | 1:1        | right  | 0.449    | 1.178          | 0.529           |        |
| 1880.00                                                                                           | 9400 | UMTS 1900 | RMC     | 12.0                        | 11.75                 | 0.11             | 0 mm                                            | 01780                | 1:1        | back   | 0.570    | 1.059          | 0.604           | A3     |
| 1880.00                                                                                           | 9400 | UMTS 1900 | RMC     | 12.0                        | 11.75                 | 0.14             | 0 mm                                            | 01780                | 1:1        | bottom | 0.253    | 1.059          | 0.268           |        |
| 1880.00                                                                                           | 9400 | UMTS 1900 | RMC     | 12.0                        | 11.75                 | 0.06             | 0 mm                                            | 01780                | 1:1        | right  | 0.078    | 1.059          | 0.083           |        |
| 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 10-2**  
**LTE Band 12 Body SAR**

| MEASUREMENT RESULTS                                   |       |        |             |                 |                             |                       |                  |                                                 |                      |            |         |           |         |        |            |          |                |                 |        |
|-------------------------------------------------------|-------|--------|-------------|-----------------|-----------------------------|-----------------------|------------------|-------------------------------------------------|----------------------|------------|---------|-----------|---------|--------|------------|----------|----------------|-----------------|--------|
| FREQUENCY                                             |       |        | Mode        | Bandwidth [MHz] | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | MPR [dB]                                        | Device Serial Number | Modulation | RB Size | RB Offset | Spacing | Side   | Duty Cycle | SAR (1g) | Scaling Factor | Scaled SAR (1g) | Plot # |
| MHz                                                   | Ch.   | (W/kg) |             |                 |                             |                       |                  |                                                 |                      |            |         |           |         |        |            | (W/kg)   |                |                 |        |
| 707.50                                                | 23095 | Mid    | LTE Band 12 | 10              | 24.0                        | 23.68                 | 0.15             | 0                                               | 11524                | QPSK       | 1       | 0         | 21 mm   | back   | 1:1        | 0.259    | 1.076          | 0.279           |        |
| 707.50                                                | 23095 | Mid    | LTE Band 12 | 10              | 23.0                        | 22.51                 | -0.05            | 1                                               | 11524                | QPSK       | 25      | 0         | 21 mm   | back   | 1:1        | 0.202    | 1.119          | 0.226           |        |
| 707.50                                                | 23095 | Mid    | LTE Band 12 | 10              | 24.0                        | 23.68                 | -0.05            | 0                                               | 11524                | QPSK       | 1       | 0         | 18 mm   | bottom | 1:1        | 0.100    | 1.076          | 0.108           |        |
| 707.50                                                | 23095 | Mid    | LTE Band 12 | 10              | 23.0                        | 22.51                 | -0.03            | 1                                               | 11524                | QPSK       | 25      | 0         | 18 mm   | bottom | 1:1        | 0.083    | 1.119          | 0.093           |        |
| 707.50                                                | 23095 | Mid    | LTE Band 12 | 10              | 24.0                        | 23.68                 | -0.14            | 0                                               | 11524                | QPSK       | 1       | 0         | 6 mm    | right  | 1:1        | 0.178    | 1.076          | 0.192           |        |
| 707.50                                                | 23095 | Mid    | LTE Band 12 | 10              | 23.0                        | 22.51                 | 0.10             | 1                                               | 11524                | QPSK       | 25      | 0         | 6 mm    | right  | 1:1        | 0.130    | 1.119          | 0.145           |        |
| 707.50                                                | 23095 | Mid    | LTE Band 12 | 10              | 20.0                        | 19.86                 | 0.13             | 0                                               | 01806                | QPSK       | 1       | 25        | 0 mm    | back   | 1:1        | 0.375    | 1.033          | 0.387           | A4     |
| 707.50                                                | 23095 | Mid    | LTE Band 12 | 10              | 19.0                        | 18.67                 | 0.14             | 1                                               | 01806                | QPSK       | 25      | 0         | 0 mm    | back   | 1:1        | 0.310    | 1.079          | 0.334           |        |
| 707.50                                                | 23095 | Mid    | LTE Band 12 | 10              | 20.0                        | 19.86                 | 0.00             | 0                                               | 01806                | QPSK       | 1       | 25        | 0 mm    | bottom | 1:1        | 0.112    | 1.033          | 0.116           |        |
| 707.50                                                | 23095 | Mid    | LTE Band 12 | 10              | 19.0                        | 18.67                 | -0.02            | 1                                               | 01806                | QPSK       | 25      | 0         | 0 mm    | bottom | 1:1        | 0.094    | 1.079          | 0.101           |        |
| 707.50                                                | 23095 | Mid    | LTE Band 12 | 10              | 20.0                        | 19.86                 | -0.21            | 0                                               | 01806                | QPSK       | 1       | 25        | 0 mm    | right  | 1:1        | 0.090    | 1.033          | 0.093           |        |
| 707.50                                                | 23095 | Mid    | LTE Band 12 | 10              | 19.0                        | 18.67                 | 0.04             | 1                                               | 01806                | QPSK       | 25      | 0         | 0 mm    | right  | 1:1        | 0.080    | 1.079          | 0.086           |        |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak |       |        |             |                 |                             |                       |                  | Body<br>1.6 W/kg (mW/g)<br>averaged over 1 gram |                      |            |         |           |         |        |            |          |                |                 |        |
| Uncontrolled Exposure/General Population              |       |        |             |                 |                             |                       |                  |                                                 |                      |            |         |           |         |        |            |          |                |                 |        |

|                                          |                                                                                                                                   |                                     |                                                                                       |                                        |
|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| FCC ID: A3LSMT357T                       |  <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>OY1505280998.A3L | <b>Test Dates:</b><br>06/02/15 - 06/04/15                                                                                         | <b>DUT Type:</b><br>Portable Tablet | Page 37 of 54                                                                         |                                        |

**Table 10-3**  
**LTE Band 4 (AWS) Body SAR**

| MEASUREMENT RESULTS                      |       |      |                  |                             |                       |                  |          |                      |            |         |           |         |       |            |          |                |                 |        |    |
|------------------------------------------|-------|------|------------------|-----------------------------|-----------------------|------------------|----------|----------------------|------------|---------|-----------|---------|-------|------------|----------|----------------|-----------------|--------|----|
| FREQUENCY                                |       | Mode | Bandwidth [MHz]  | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | MPR [dB] | Device Serial Number | Modulation | RB Size | RB Offset | Spacing | Side  | Duty Cycle | SAR (1g) | Scaling Factor | Scaled SAR (1g) | Plot # |    |
| MHz                                      | Ch.   |      |                  |                             |                       |                  |          |                      |            |         |           |         |       |            | (W/kg)   |                | (W/kg)          |        |    |
| 1732.50                                  | 20175 | Mid  | LTE Band 4 (AWS) | 20                          | 24.0                  | 23.71            | -0.02    | 0                    | 11524      | QPSK    | 1         | 0       | 21 mm | back       | 1:1      | 0.400          | 1.069           | 0.428  |    |
| 1732.50                                  | 20175 | Mid  | LTE Band 4 (AWS) | 20                          | 23.0                  | 22.75            | 0.02     | 1                    | 11524      | QPSK    | 50        | 0       | 21 mm | back       | 1:1      | 0.322          | 1.059           | 0.341  |    |
| 1732.50                                  | 20175 | Mid  | LTE Band 4 (AWS) | 20                          | 24.0                  | 23.71            | 0.00     | 0                    | 11524      | QPSK    | 1         | 0       | 18 mm | bottom     | 1:1      | 0.322          | 1.069           | 0.344  |    |
| 1732.50                                  | 20175 | Mid  | LTE Band 4 (AWS) | 20                          | 23.0                  | 22.75            | 0.04     | 1                    | 11524      | QPSK    | 50        | 0       | 18 mm | bottom     | 1:1      | 0.239          | 1.059           | 0.253  |    |
| 1732.50                                  | 20175 | Mid  | LTE Band 4 (AWS) | 20                          | 24.0                  | 23.71            | 0.10     | 0                    | 11524      | QPSK    | 1         | 0       | 6 mm  | right      | 1:1      | 0.461          | 1.069           | 0.493  |    |
| 1732.50                                  | 20175 | Mid  | LTE Band 4 (AWS) | 20                          | 23.0                  | 22.75            | 0.05     | 1                    | 11524      | QPSK    | 50        | 0       | 6 mm  | right      | 1:1      | 0.340          | 1.059           | 0.360  |    |
| 1732.50                                  | 20175 | Mid  | LTE Band 4 (AWS) | 20                          | 13.7                  | 13.60            | -0.11    | 0                    | 01780      | QPSK    | 1         | 0       | 0 mm  | back       | 1:1      | 0.831          | 1.023           | 0.850  | A5 |
| 1732.50                                  | 20175 | Mid  | LTE Band 4 (AWS) | 20                          | 12.7                  | 12.03            | 0.02     | 1                    | 01780      | QPSK    | 50        | 0       | 0 mm  | back       | 1:1      | 0.577          | 1.167           | 0.673  |    |
| 1732.50                                  | 20175 | Mid  | LTE Band 4 (AWS) | 20                          | 12.7                  | 11.87            | -0.08    | 1                    | 01780      | QPSK    | 100       | 0       | 0 mm  | back       | 1:1      | 0.581          | 1.211           | 0.704  |    |
| 1732.50                                  | 20175 | Mid  | LTE Band 4 (AWS) | 20                          | 13.7                  | 13.60            | -0.16    | 0                    | 01780      | QPSK    | 1         | 0       | 0 mm  | bottom     | 1:1      | 0.224          | 1.023           | 0.229  |    |
| 1732.50                                  | 20175 | Mid  | LTE Band 4 (AWS) | 20                          | 12.7                  | 12.03            | 0.06     | 1                    | 01780      | QPSK    | 50        | 0       | 0 mm  | bottom     | 1:1      | 0.163          | 1.167           | 0.190  |    |
| 1732.50                                  | 20175 | Mid  | LTE Band 4 (AWS) | 20                          | 13.7                  | 13.60            | 0.17     | 0                    | 01780      | QPSK    | 1         | 0       | 0 mm  | right      | 1:1      | 0.129          | 1.023           | 0.132  |    |
| 1732.50                                  | 20175 | Mid  | LTE Band 4 (AWS) | 20                          | 12.7                  | 12.03            | 0.04     | 1                    | 01780      | QPSK    | 50        | 0       | 0 mm  | right      | 1:1      | 0.090          | 1.167           | 0.105  |    |
| 1732.50                                  | 20175 | Mid  | LTE Band 4 (AWS) | 20                          | 13.7                  | 13.60            | 0.01     | 0                    | 01780      | QPSK    | 1         | 0       | 0 mm  | back       | 1:1      | 0.817          | 1.023           | 0.836  |    |
| 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 data is highlighted blue in the table above.

**Table 10-4**  
**LTE Band 2 (PCS) Body SAR**

| MEASUREMENT RESULTS                                                                               |       |      |                  |                             |                       |                  |          |                      |                                                 |         |           |         |       |            |          |                |                 |        |    |
|---------------------------------------------------------------------------------------------------|-------|------|------------------|-----------------------------|-----------------------|------------------|----------|----------------------|-------------------------------------------------|---------|-----------|---------|-------|------------|----------|----------------|-----------------|--------|----|
| FREQUENCY                                                                                         |       | Mode | Bandwidth [MHz]  | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | MPR [dB] | Device Serial Number | Modulation                                      | RB Size | RB Offset | Spacing | Side  | Duty Cycle | SAR (1g) | Scaling Factor | Scaled SAR (1g) | Plot # |    |
| MHz                                                                                               | Ch.   |      |                  |                             |                       |                  |          |                      |                                                 |         |           |         |       |            | (W/kg)   |                | (W/kg)          |        |    |
| 1880.00                                                                                           | 18900 | Mid  | LTE Band 2 (PCS) | 20                          | 24.0                  | 23.62            | -0.01    | 0                    | 11490                                           | QPSK    | 1         | 0       | 21 mm | back       | 1:1      | 0.437          | 1.091           | 0.477  |    |
| 1900.00                                                                                           | 19100 | High | LTE Band 2 (PCS) | 20                          | 23.0                  | 22.31            | 0.03     | 1                    | 11490                                           | QPSK    | 50        | 25      | 21 mm | back       | 1:1      | 0.350          | 1.172           | 0.410  |    |
| 1880.00                                                                                           | 18900 | Mid  | LTE Band 2 (PCS) | 20                          | 24.0                  | 23.62            | -0.03    | 0                    | 11490                                           | QPSK    | 1         | 0       | 18 mm | bottom     | 1:1      | 0.513          | 1.091           | 0.560  |    |
| 1900.00                                                                                           | 19100 | High | LTE Band 2 (PCS) | 20                          | 23.0                  | 22.31            | -0.01    | 1                    | 11490                                           | QPSK    | 50        | 25      | 18 mm | bottom     | 1:1      | 0.407          | 1.172           | 0.477  |    |
| 1880.00                                                                                           | 18900 | Mid  | LTE Band 2 (PCS) | 20                          | 24.0                  | 23.62            | -0.12    | 0                    | 11490                                           | QPSK    | 1         | 0       | 6 mm  | right      | 1:1      | 0.469          | 1.091           | 0.512  |    |
| 1900.00                                                                                           | 19100 | High | LTE Band 2 (PCS) | 20                          | 23.0                  | 22.31            | 0.09     | 1                    | 11490                                           | QPSK    | 50        | 25      | 6 mm  | right      | 1:1      | 0.401          | 1.172           | 0.470  |    |
| 1880.00                                                                                           | 18900 | Mid  | LTE Band 2 (PCS) | 20                          | 12.3                  | 12.30            | 0.08     | 0                    | 01806                                           | QPSK    | 1         | 0       | 0 mm  | back       | 1:1      | 0.678          | 1.000           | 0.678  |    |
| 1900.00                                                                                           | 19100 | High | LTE Band 2 (PCS) | 20                          | 11.3                  | 10.81            | 0.01     | 1                    | 01806                                           | QPSK    | 50        | 0       | 0 mm  | back       | 1:1      | 0.467          | 1.119           | 0.523  |    |
| 1880.00                                                                                           | 18900 | Mid  | LTE Band 2 (PCS) | 20                          | 12.3                  | 12.30            | 0.02     | 0                    | 01806                                           | QPSK    | 1         | 0       | 0 mm  | bottom     | 1:1      | 0.688          | 1.000           | 0.688  | A6 |
| 1900.00                                                                                           | 19100 | High | LTE Band 2 (PCS) | 20                          | 11.3                  | 10.81            | 0.01     | 1                    | 01806                                           | QPSK    | 50        | 0       | 0 mm  | bottom     | 1:1      | 0.254          | 1.119           | 0.284  |    |
| 1880.00                                                                                           | 18900 | Mid  | LTE Band 2 (PCS) | 20                          | 12.3                  | 12.30            | 0.01     | 0                    | 01806                                           | QPSK    | 1         | 0       | 0 mm  | right      | 1:1      | 0.119          | 1.000           | 0.119  |    |
| 1900.00                                                                                           | 19100 | High | LTE Band 2 (PCS) | 20                          | 11.3                  | 10.81            | -0.12    | 1                    | 01806                                           | QPSK    | 50        | 0       | 0 mm  | right      | 1:1      | 0.078          | 1.119           | 0.087  |    |
| 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: A3LSMT357T                |  | SAR EVALUATION REPORT        |  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>OY1505280998.A3L | Test Dates:<br>06/02/15 - 06/04/15                                                  | DUT Type:<br>Portable Tablet |                                                                                       | Page 38 of 54                   |

**Table 10-5**  
**WLAN Body SAR**

| MEASUREMENT RESULTS                      |     |         |         |                 |                             |                       |                  |                      |                      |                  |       |                |          |                        |                             |                 |        |
|------------------------------------------|-----|---------|---------|-----------------|-----------------------------|-----------------------|------------------|----------------------|----------------------|------------------|-------|----------------|----------|------------------------|-----------------------------|-----------------|--------|
| FREQUENCY                                |     | Mode    | Service | Bandwidth [MHz] | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Spacing              | Device Serial Number | Data Rate (Mbps) | Side  | Duty Cycle (%) | SAR (1g) | Scaling Factor (Power) | Scaling Factor (Duty Cycle) | Scaled SAR (1g) | Plot # |
| MHz                                      | Ch. |         |         |                 |                             |                       |                  |                      |                      |                  |       |                | (W/kg)   |                        |                             | (W/kg)          |        |
| 2462                                     | 11  | 802.11b | DSSS    | 22              | 16.5                        | 16.23                 | -0.01            | 12 mm                | 11490                | 1                | back  | 99.6           | 0.219    | 1.064                  | 1.004                       | 0.234           |        |
| 2462                                     | 11  | 802.11b | DSSS    | 22              | 16.5                        | 16.23                 | 0.02             | 5 mm                 | 11490                | 1                | top   | 99.6           | 0.141    | 1.064                  | 1.004                       | 0.151           |        |
| 2462                                     | 11  | 802.11b | DSSS    | 22              | 16.5                        | 16.23                 | 0.14             | 0 mm                 | 11490                | 1                | right | 99.6           | 0.318    | 1.064                  | 1.004                       | 0.339           |        |
| 2412                                     | 1   | 802.11b | DSSS    | 20              | 11.5                        | 11.49                 | 0.06             | 0 mm                 | 11490                | 1                | back  | 99.6           | 0.591    | 1.002                  | 1.004                       | 0.594           | A7     |
| 2412                                     | 1   | 802.11b | DSSS    | 20              | 11.5                        | 11.49                 | 0.10             | 0 mm                 | 11490                | 1                | top   | 99.6           | 0.057    | 1.002                  | 1.004                       | 0.057           |        |
| 5300                                     | 60  | 802.11a | OFDM    | 20              | 11.5                        | 11.48                 | -0.05            | 12 mm                | 11516                | 6                | back  | 98.5           | 0.104    | 1.005                  | 1.015                       | 0.107           |        |
| 5300                                     | 60  | 802.11a | OFDM    | 20              | 11.5                        | 11.48                 | -0.10            | 5 mm                 | 11516                | 6                | top   | 98.5           | 0.306    | 1.005                  | 1.015                       | 0.313           |        |
| 5300                                     | 60  | 802.11a | OFDM    | 20              | 11.5                        | 11.48                 | 0.05             | 0 mm                 | 11516                | 6                | right | 98.5           | 0.044    | 1.005                  | 1.015                       | 0.045           |        |
| 5270                                     | 54  | 802.11n | OFDM    | 40              | 7.5                         | 6.78                  | -0.02            | 0 mm                 | 11516                | 13.5             | back  | 98.2           | 0.523    | 1.180                  | 1.018                       | 0.628           |        |
| 5270                                     | 54  | 802.11n | OFDM    | 40              | 7.5                         | 6.78                  | -0.09            | 0 mm                 | 11516                | 13.5             | top   | 98.2           | 0.210    | 1.180                  | 1.018                       | 0.252           |        |
| 5500                                     | 100 | 802.11a | OFDM    | 20              | 11.5                        | 11.44                 | -0.14            | 12 mm                | 11516                | 6                | back  | 98.5           | 0.106    | 1.014                  | 1.015                       | 0.109           |        |
| 5500                                     | 100 | 802.11a | OFDM    | 20              | 11.5                        | 11.44                 | 0.08             | 5 mm                 | 11516                | 6                | top   | 98.5           | 0.370    | 1.014                  | 1.015                       | 0.381           |        |
| 5500                                     | 100 | 802.11a | OFDM    | 20              | 11.5                        | 11.44                 | 0.17             | 0 mm                 | 11516                | 6                | right | 98.5           | 0.079    | 1.014                  | 1.015                       | 0.081           |        |
| 5670                                     | 134 | 802.11n | OFDM    | 40              | 7.5                         | 7.44                  | -0.16            | 0 mm                 | 11516                | 13.5             | back  | 98.2           | 0.590    | 1.014                  | 1.018                       | 0.609           | A8     |
| 5670                                     | 134 | 802.11n | OFDM    | 40              | 7.5                         | 7.44                  | 0.14             | 0 mm                 | 11516                | 13.5             | top   | 98.2           | 0.275    | 1.014                  | 1.018                       | 0.284           |        |
| 5745                                     | 149 | 802.11a | OFDM    | 20              | 11.5                        | 11.40                 | 0.05             | 12 mm                | 11516                | 6                | back  | 98.5           | 0.089    | 1.023                  | 1.015                       | 0.092           |        |
| 5745                                     | 149 | 802.11a | OFDM    | 20              | 11.5                        | 11.40                 | 0.07             | 5 mm                 | 11516                | 6                | top   | 98.5           | 0.349    | 1.023                  | 1.015                       | 0.362           |        |
| 5745                                     | 149 | 802.11a | OFDM    | 20              | 11.5                        | 11.40                 | -0.17            | 0 mm                 | 11516                | 6                | right | 98.5           | 0.133    | 1.023                  | 1.015                       | 0.138           |        |
| 5755                                     | 151 | 802.11n | OFDM    | 40              | 7.5                         | 6.63                  | -0.14            | 0 mm                 | 11516                | 13.5             | back  | 98.2           | 0.436    | 1.222                  | 1.018                       | 0.543           |        |
| 5755                                     | 151 | 802.11n | OFDM    | 40              | 7.5                         | 6.63                  | 0.20             | 0 mm                 | 11516                | 13.5             | top   | 98.2           | 0.201    | 1.222                  | 1.018                       | 0.250           |        |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT    |     |         |         |                 |                             |                       |                  | Body                 |                      |                  |       |                |          |                        |                             |                 |        |
| Spatial Peak                             |     |         |         |                 |                             |                       |                  | 1.6 W/kg (mW/g)      |                      |                  |       |                |          |                        |                             |                 |        |
| Uncontrolled Exposure/General Population |     |         |         |                 |                             |                       |                  | averaged over 1 gram |                      |                  |       |                |          |                        |                             |                 |        |

## 10.2 SAR Test Notes

### General Notes:

- The test data reported are the worst-case SAR values according to test procedures specified in FCC KDB Publication 616217 D04v01r01 and FCC KDB Publication 447498 D01v05.
- Batteries are fully charged at the beginning of the SAR measurements.
- Liquid tissue depth was at least 15.0 cm for all frequencies.
- 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.
- SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB Publication 447498 D01v05.
- Per FCC KDB 865664 D01 v01, variability SAR tests were performed when the measured SAR results for a frequency band were greater than 0.8 W/kg. Repeated SAR measurements are highlighted in the tables above for clarity. Please see Section 12 for variability analysis.
- 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 bottom and right edges for the main antenna, and were required for top and right edges for the WLAN/BT antenna.

|                                   |                                                                                                                                                                                                        |                                 |
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UMTS Notes:

1. UMTS mode was tested under RMC 12.2 kbps with HSPA Inactive per KDB Publication 941225 D01v03. HSPA SAR was not required per 3G Test Reduction Procedures.
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 D05v02r03. The general test procedures used for testing can be found in Section 7.5.4.
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 Notes:

1. Justification for test configurations for WLAN per KDB Publication 248227 D01v02 for 2.4 GHz WIFI operations, the highest measured maximum output power channel for DSSS was selected for SAR measurement. SAR for OFDM modes (2.4 GHz 802.11g/n) was not required due to the maximum allowed powers and the highest reported DSSS SAR. See Section 7.6.4 for more information.
2. Justification for test configurations for WLAN per KDB Publication 248227 D01v02 for 5 GHz WIFI operations, the initial test configuration was selected according to the transmission mode with the highest maximum allowed powers. Other transmission modes were not investigated since the highest reported SAR for initial test configuration adjusted by the ratio of maximum output powers is less than 1.2 W/kg. See Section 7.6.5 for more information.
3. When the maximum reported 1g averaged SAR is  $\leq 0.8$  W/kg, SAR testing on additional channels was not required. Otherwise, SAR for the next highest output power channel was required until the reported SAR result was  $\leq 1.20$  W/kg or all test channels were measured.
4. The device was configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools. The reported SAR was scaled to the 100% transmission duty factor to determine EMC compliance. Procedures used to measure the duty factor are identical to that in the associated EMC test reports.

|                                   |                                                                                                                                                                                                        |                                 |
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|                                   |                                                                                                                                                                                                        | Page 40 of 54                   |

# 11 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

## 11.1 Introduction

The following procedures adopted from FCC KDB Publication 447498 D01v05r02 are applicable to devices with built-in unlicensed transmitters such as 802.11 and Bluetooth devices which may simultaneously transmit with the licensed transmitter.

## 11.2 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. The different test positions in an exposure condition may be considered collectively to determine SAR test exclusion according to the sum of 1-g or 10-g SAR.

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 11-1**  
**Estimated SAR**

| Mode      | Configuration    | Frequency | Maximum Allowed Power | Test Separation Distance | Actual Antenna Separation Distance | Estimated SAR |
|-----------|------------------|-----------|-----------------------|--------------------------|------------------------------------|---------------|
|           |                  | [MHz]     | [dBm]                 | [mm]                     | [mm]                               | [W/kg]        |
| Bluetooth | Back side touch* | 2480      | 9.50                  | 0                        | 5                                  | 0.378         |
| Bluetooth | Top edge touch   | 2480      | 9.50                  | 0                        | 12                                 | 0.157         |
| Bluetooth | Right edge touch | 2480      | 9.50                  | 0                        | 14.5                               | 0.130         |
| Bluetooth | Back side        | 2480      | 9.50                  | 21                       | 21                                 | 0.090         |
| Bluetooth | Right edge       | 2480      | 9.50                  | 6                        | 20.5                               | 0.092         |

**Notes:**

1. The estimated SAR is calculated using the Actual Antenna Separation Distance. This distance is the summation of the separation from the antenna to the device side/edge and the separation of the device to the phantom. Exact antenna dimensions and separation distances are shown in the Technical Descriptions in the FCC filing.
2. Per FCC KDB Publication 447498 D01v05, the maximum power of the channel was rounded to the nearest mW before calculation.
3. (\*) – Per FCC KDB Publication 447498, when the antenna separation distance is < 5 mm, a distance of 5 mm is applied to determine estimated SAR.
4. When the antenna separation distance was > 50 mm, an estimated SAR of 0.4 W/kg was used to determine the simultaneous transmission SAR exclusion, for configurations excluded per FCC KDB Publication 447498 D01v05.

|                                   |                                    |                                                                                                                                                                                                        |  |                                 |
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## 11.3 Body SAR Simultaneous Transmission Analysis

**Table 11-2**  
**Simultaneous Transmission Scenario with 2.4 GHz WLAN (Body at 0.0 cm)**

| Simult Tx | Configuration | UMTS 850 SAR (W/kg)         | 2.4 GHz WLAN SAR (W/kg) | Σ SAR (W/kg) | Simult Tx | Configuration | UMTS 1750 SAR (W/kg)        | 2.4 GHz WLAN SAR (W/kg) | Σ SAR (W/kg) |
|-----------|---------------|-----------------------------|-------------------------|--------------|-----------|---------------|-----------------------------|-------------------------|--------------|
| Body SAR  | Back          | 0.569                       | 0.594                   | <b>1.163</b> | Body SAR  | Back          | 0.592                       | 0.594                   | <b>1.186</b> |
|           | Top           | 0.400                       | 0.057                   | 0.457        |           | Top           | 0.400                       | 0.057                   | 0.457        |
|           | Bottom        | 0.189                       | 0.400                   | 0.589        |           | Bottom        | 0.200                       | 0.400                   | 0.600        |
|           | Right         | 0.158                       | 0.339                   | 0.497        |           | Right         | 0.083                       | 0.339                   | 0.422        |
|           | Left          | 0.400                       | 0.400                   | 0.800        |           | Left          | 0.400                       | 0.400                   | 0.800        |
| Simult Tx | Configuration | UMTS 1900 SAR (W/kg)        | 2.4 GHz WLAN SAR (W/kg) | Σ SAR (W/kg) | Simult Tx | Configuration | LTE Band 12 SAR (W/kg)      | 2.4 GHz WLAN SAR (W/kg) | Σ SAR (W/kg) |
| Body SAR  | Back          | 0.604                       | 0.594                   | <b>1.198</b> | Body SAR  | Back          | 0.387                       | 0.594                   | <b>0.981</b> |
|           | Top           | 0.400                       | 0.057                   | 0.457        |           | Top           | 0.400                       | 0.057                   | 0.457        |
|           | Bottom        | 0.268                       | 0.400                   | 0.668        |           | Bottom        | 0.116                       | 0.400                   | 0.516        |
|           | Right         | 0.083                       | 0.339                   | 0.422        |           | Right         | 0.093                       | 0.339                   | 0.432        |
|           | Left          | 0.400                       | 0.400                   | 0.800        |           | Left          | 0.400                       | 0.400                   | 0.800        |
| Simult Tx | Configuration | LTE Band 4 (AWS) SAR (W/kg) | 2.4 GHz WLAN SAR (W/kg) | Σ SAR (W/kg) | Simult Tx | Configuration | LTE Band 2 (PCS) SAR (W/kg) | 2.4 GHz WLAN SAR (W/kg) | Σ SAR (W/kg) |
| Body SAR  | Back          | 0.850                       | 0.594                   | <b>1.444</b> | Body SAR  | Back          | 0.678                       | 0.594                   | <b>1.272</b> |
|           | Top           | 0.400                       | 0.057                   | 0.457        |           | Top           | 0.400                       | 0.057                   | 0.457        |
|           | Bottom        | 0.229                       | 0.400                   | 0.629        |           | Bottom        | 0.688                       | 0.400                   | 1.088        |
|           | Right         | 0.132                       | 0.339                   | 0.471        |           | Right         | 0.119                       | 0.339                   | 0.458        |
|           | Left          | 0.400                       | 0.400                   | 0.800        |           | Left          | 0.400                       | 0.400                   | 0.800        |

|                                          |                                                                                                                                   |                                     |                                                                                       |                                        |
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**Table 11-3**  
**Simultaneous Transmission Scenario with 5 GHz WLAN (Body at 0.0 cm)**

| Simult Tx | Configuration | UMTS 850 SAR (W/kg)         | 5 GHz WLAN SAR (W/kg) | Σ SAR (W/kg) | Simult Tx | Configuration | UMTS 1750 SAR (W/kg)        | 5 GHz WLAN SAR (W/kg) | Σ SAR (W/kg) |
|-----------|---------------|-----------------------------|-----------------------|--------------|-----------|---------------|-----------------------------|-----------------------|--------------|
| Body SAR  | Back          | 0.569                       | 0.628                 | <b>1.197</b> | Body SAR  | Back          | 0.592                       | 0.628                 | <b>1.220</b> |
|           | Top           | 0.400                       | 0.284                 | 0.684        |           | Top           | 0.400                       | 0.284                 | 0.684        |
|           | Bottom        | 0.189                       | 0.400                 | 0.589        |           | Bottom        | 0.200                       | 0.400                 | 0.600        |
|           | Right         | 0.158                       | 0.138                 | 0.296        |           | Right         | 0.083                       | 0.138                 | 0.221        |
|           | Left          | 0.400                       | 0.400                 | 0.800        |           | Left          | 0.400                       | 0.400                 | 0.800        |
| Simult Tx | Configuration | UMTS 1900 SAR (W/kg)        | 5 GHz WLAN SAR (W/kg) | Σ SAR (W/kg) | Simult Tx | Configuration | LTE Band 12 SAR (W/kg)      | 5 GHz WLAN SAR (W/kg) | Σ SAR (W/kg) |
| Body SAR  | Back          | 0.604                       | 0.628                 | <b>1.232</b> | Body SAR  | Back          | 0.387                       | 0.628                 | <b>1.015</b> |
|           | Top           | 0.400                       | 0.284                 | 0.684        |           | Top           | 0.400                       | 0.284                 | 0.684        |
|           | Bottom        | 0.268                       | 0.400                 | 0.668        |           | Bottom        | 0.116                       | 0.400                 | 0.516        |
|           | Right         | 0.083                       | 0.138                 | 0.221        |           | Right         | 0.093                       | 0.138                 | 0.231        |
|           | Left          | 0.400                       | 0.400                 | 0.800        |           | Left          | 0.400                       | 0.400                 | 0.800        |
| Simult Tx | Configuration | LTE Band 4 (AWS) SAR (W/kg) | 5 GHz WLAN SAR (W/kg) | Σ SAR (W/kg) | Simult Tx | Configuration | LTE Band 2 (PCS) SAR (W/kg) | 5 GHz WLAN SAR (W/kg) | Σ SAR (W/kg) |
| Body SAR  | Back          | 0.850                       | 0.628                 | <b>1.478</b> | Body SAR  | Back          | 0.678                       | 0.628                 | <b>1.306</b> |
|           | Top           | 0.400                       | 0.284                 | 0.684        |           | Top           | 0.400                       | 0.284                 | 0.684        |
|           | Bottom        | 0.229                       | 0.400                 | 0.629        |           | Bottom        | 0.688                       | 0.400                 | 1.088        |
|           | Right         | 0.132                       | 0.138                 | 0.270        |           | Right         | 0.119                       | 0.138                 | 0.257        |
|           | Left          | 0.400                       | 0.400                 | 0.800        |           | Left          | 0.400                       | 0.400                 | 0.800        |

**Table 11-4**  
**Simultaneous Transmission Scenario with Bluetooth (Body at 0.0 cm)**

| Simult Tx | Configuration | UMTS 850 SAR (W/kg)         | Bluetooth SAR (W/kg) | Σ SAR (W/kg) | Simult Tx | Configuration | UMTS 1750 SAR (W/kg)        | Bluetooth SAR (W/kg) | Σ SAR (W/kg) |
|-----------|---------------|-----------------------------|----------------------|--------------|-----------|---------------|-----------------------------|----------------------|--------------|
| Body SAR  | Back          | 0.569                       | 0.378                | <b>0.947</b> | Body SAR  | Back          | 0.592                       | 0.378                | <b>0.970</b> |
|           | Top           | 0.400                       | 0.157                | 0.557        |           | Top           | 0.400                       | 0.157                | 0.557        |
|           | Bottom        | 0.189                       | 0.400                | 0.589        |           | Bottom        | 0.200                       | 0.400                | 0.600        |
|           | Right         | 0.158                       | 0.130                | 0.288        |           | Right         | 0.083                       | 0.130                | 0.213        |
|           | Left          | 0.400                       | 0.400                | 0.800        |           | Left          | 0.400                       | 0.400                | 0.800        |
| Simult Tx | Configuration | UMTS 1900 SAR (W/kg)        | Bluetooth SAR (W/kg) | Σ SAR (W/kg) | Simult Tx | Configuration | LTE Band 12 SAR (W/kg)      | Bluetooth SAR (W/kg) | Σ SAR (W/kg) |
| Body SAR  | Back          | 0.604                       | 0.378                | <b>0.982</b> | Body SAR  | Back          | 0.387                       | 0.378                | 0.765        |
|           | Top           | 0.400                       | 0.157                | 0.557        |           | Top           | 0.400                       | 0.157                | 0.557        |
|           | Bottom        | 0.268                       | 0.400                | 0.668        |           | Bottom        | 0.116                       | 0.400                | 0.516        |
|           | Right         | 0.083                       | 0.130                | 0.213        |           | Right         | 0.093                       | 0.130                | 0.223        |
|           | Left          | 0.400                       | 0.400                | 0.800        |           | Left          | 0.400                       | 0.400                | <b>0.800</b> |
| Simult Tx | Configuration | LTE Band 4 (AWS) SAR (W/kg) | Bluetooth SAR (W/kg) | Σ SAR (W/kg) | Simult Tx | Configuration | LTE Band 2 (PCS) SAR (W/kg) | Bluetooth SAR (W/kg) | Σ SAR (W/kg) |
| Body SAR  | Back          | 0.850                       | 0.378                | <b>1.228</b> | Body SAR  | Back          | 0.678                       | 0.378                | 1.056        |
|           | Top           | 0.400                       | 0.157                | 0.557        |           | Top           | 0.400                       | 0.157                | 0.557        |
|           | Bottom        | 0.229                       | 0.400                | 0.629        |           | Bottom        | 0.688                       | 0.400                | <b>1.088</b> |
|           | Right         | 0.132                       | 0.130                | 0.262        |           | Right         | 0.119                       | 0.130                | 0.249        |
|           | Left          | 0.400                       | 0.400                | 0.800        |           | Left          | 0.400                       | 0.400                | 0.800        |

|                                   |                                                                                                                                                                                                        |                                 |
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**Table 11-5**  
**Simultaneous Transmission Scenario with 2.4 GHz WLAN (Body at 2.1 cm)**

| Configuration | Mode             | 3G/4G SAR (W/kg) | 2.4 GHz WLAN SAR (W/kg) | $\Sigma$ SAR (W/kg) |
|---------------|------------------|------------------|-------------------------|---------------------|
| Back Side     | UMTS 850         | 0.335            | < 0.234                 | < 0.569             |
| Back Side     | UMTS 1750        | 0.505            | < 0.234                 | < 0.739             |
| Back Side     | UMTS 1900        | 0.487            | < 0.234                 | < 0.721             |
| Back Side     | LTE Band 12      | 0.279            | < 0.234                 | < 0.513             |
| Back Side     | LTE Band 4 (AWS) | 0.428            | < 0.234                 | < 0.662             |
| Back Side     | LTE Band 2 (PCS) | 0.477            | < 0.234                 | < 0.711             |

**Table 11-6**  
**Simultaneous Transmission Scenario with 5 GHz WLAN (Body at 2.1 cm)**

| Configuration | Mode             | 3G/4G SAR (W/kg) | 5 GHz WLAN SAR (W/kg) | $\Sigma$ SAR (W/kg) |
|---------------|------------------|------------------|-----------------------|---------------------|
| Back Side     | UMTS 850         | 0.335            | < 0.109               | < 0.444             |
| Back Side     | UMTS 1750        | 0.505            | < 0.109               | < 0.614             |
| Back Side     | UMTS 1900        | 0.487            | < 0.109               | < 0.596             |
| Back Side     | LTE Band 12      | 0.279            | < 0.109               | < 0.388             |
| Back Side     | LTE Band 4 (AWS) | 0.428            | < 0.109               | < 0.537             |
| Back Side     | LTE Band 2 (PCS) | 0.477            | < 0.109               | < 0.586             |

**Table 11-7**  
**Simultaneous Transmission Scenario with Bluetooth (Body at 2.1 cm)**

| Configuration | Mode             | 3G/4G SAR (W/kg) | Bluetooth SAR (W/kg) | $\Sigma$ SAR (W/kg) |
|---------------|------------------|------------------|----------------------|---------------------|
| Back Side     | UMTS 850         | 0.335            | 0.090                | 0.425               |
| Back Side     | UMTS 1750        | 0.505            | 0.090                | 0.595               |
| Back Side     | UMTS 1900        | 0.487            | 0.090                | 0.577               |
| Back Side     | LTE Band 12      | 0.279            | 0.090                | 0.369               |
| Back Side     | LTE Band 4 (AWS) | 0.428            | 0.090                | 0.518               |
| Back Side     | LTE Band 2 (PCS) | 0.477            | 0.090                | 0.567               |

**Table 11-8**  
**Simultaneous Transmission Scenario with 2.4 GHz WLAN (Body at 1.8 cm)**

| Configuration | Mode             | 3G/4G SAR (W/kg) | 2.4 GHz WLAN SAR (W/kg) | $\Sigma$ SAR (W/kg) |
|---------------|------------------|------------------|-------------------------|---------------------|
| Bottom Edge   | UMTS 850         | 0.023            | 0.400                   | 0.423               |
| Bottom Edge   | UMTS 1750        | 0.371            | 0.400                   | 0.771               |
| Bottom Edge   | UMTS 1900        | 0.543            | 0.400                   | 0.943               |
| Bottom Edge   | LTE Band 12      | 0.108            | 0.400                   | 0.508               |
| Bottom Edge   | LTE Band 4 (AWS) | 0.344            | 0.400                   | 0.744               |
| Bottom Edge   | LTE Band 2 (PCS) | 0.560            | 0.400                   | 0.960               |

|                                          |                                                                                     |                                     |                                                                                       |                                        |
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**Table 11-9**  
**Simultaneous Transmission Scenario with 5 GHz WLAN (Body at 1.8 cm)**

| Configuration | Mode             | 3G/4G SAR (W/kg) | 5 GHz WLAN SAR (W/kg) | $\Sigma$ SAR (W/kg) |
|---------------|------------------|------------------|-----------------------|---------------------|
| Bottom Edge   | UMTS 850         | 0.023            | 0.400                 | 0.423               |
| Bottom Edge   | UMTS 1750        | 0.371            | 0.400                 | 0.771               |
| Bottom Edge   | UMTS 1900        | 0.543            | 0.400                 | 0.943               |
| Bottom Edge   | LTE Band 12      | 0.108            | 0.400                 | 0.508               |
| Bottom Edge   | LTE Band 4 (AWS) | 0.344            | 0.400                 | 0.744               |
| Bottom Edge   | LTE Band 2 (PCS) | 0.560            | 0.400                 | 0.960               |

**Table 11-10**  
**Simultaneous Transmission Scenario with Bluetooth (Body at 1.8 cm)**

| Configuration | Mode             | 3G/4G SAR (W/kg) | Bluetooth SAR (W/kg) | $\Sigma$ SAR (W/kg) |
|---------------|------------------|------------------|----------------------|---------------------|
| Bottom Edge   | UMTS 850         | 0.023            | 0.400                | 0.423               |
| Bottom Edge   | UMTS 1750        | 0.371            | 0.400                | 0.771               |
| Bottom Edge   | UMTS 1900        | 0.543            | 0.400                | 0.943               |
| Bottom Edge   | LTE Band 12      | 0.108            | 0.400                | 0.508               |
| Bottom Edge   | LTE Band 4 (AWS) | 0.344            | 0.400                | 0.744               |
| Bottom Edge   | LTE Band 2 (PCS) | 0.560            | 0.400                | 0.960               |

**Table 11-11**  
**Simultaneous Transmission Scenario with 2.4 GHz WLAN (Body at 0.6 cm)**

| Configuration | Mode             | 3G/4G SAR (W/kg) | 2.4 GHz WLAN SAR (W/kg) | $\Sigma$ SAR (W/kg) |
|---------------|------------------|------------------|-------------------------|---------------------|
| Right Edge    | UMTS 850         | 0.157            | < 0.339                 | < 0.496             |
| Right Edge    | UMTS 1750        | 0.473            | < 0.339                 | < 0.812             |
| Right Edge    | UMTS 1900        | 0.529            | < 0.339                 | < 0.868             |
| Right Edge    | LTE Band 12      | 0.192            | < 0.339                 | < 0.531             |
| Right Edge    | LTE Band 4 (AWS) | 0.493            | < 0.339                 | < 0.832             |
| Right Edge    | LTE Band 2 (PCS) | 0.512            | < 0.339                 | < 0.851             |

**Table 11-12**  
**Simultaneous Transmission Scenario with 5 GHz WLAN (Body at 0.6 cm)**

| Configuration | Mode             | 3G/4G SAR (W/kg) | 5 GHz WLAN SAR (W/kg) | $\Sigma$ SAR (W/kg) |
|---------------|------------------|------------------|-----------------------|---------------------|
| Right Edge    | UMTS 850         | 0.157            | < 0.138               | < 0.295             |
| Right Edge    | UMTS 1750        | 0.473            | < 0.138               | < 0.611             |
| Right Edge    | UMTS 1900        | 0.529            | < 0.138               | < 0.667             |
| Right Edge    | LTE Band 12      | 0.192            | < 0.138               | < 0.330             |
| Right Edge    | LTE Band 4 (AWS) | 0.493            | < 0.138               | < 0.631             |
| Right Edge    | LTE Band 2 (PCS) | 0.512            | < 0.138               | < 0.650             |

|                                          |                                                                                     |                                     |                                                                                       |                                        |
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**Table 11-13**  
**Simultaneous Transmission Scenario with Bluetooth (Body at 0.6 cm)**

| Configuration | Mode             | 3G/4G SAR (W/kg) | Bluetooth SAR (W/kg) | $\Sigma$ SAR (W/kg) |
|---------------|------------------|------------------|----------------------|---------------------|
| Right Edge    | UMTS 850         | 0.157            | 0.092                | 0.249               |
| Right Edge    | UMTS 1750        | 0.473            | 0.092                | 0.565               |
| Right Edge    | UMTS 1900        | 0.529            | 0.092                | 0.621               |
| Right Edge    | LTE Band 12      | 0.192            | 0.092                | 0.284               |
| Right Edge    | LTE Band 4 (AWS) | 0.493            | 0.092                | 0.585               |
| Right Edge    | LTE Band 2 (PCS) | 0.512            | 0.092                | 0.604               |

**Table 11-14**  
**Simultaneous Transmission Scenario with 2.4 GHz WLAN (Body at 1.2 cm)**

| Configuration | Mode             | 3G/4G SAR (W/kg) | 2.4 GHz WLAN SAR (W/kg) | $\Sigma$ SAR (W/kg) |
|---------------|------------------|------------------|-------------------------|---------------------|
| Back Side     | UMTS 850         | < 0.569          | 0.234                   | < 0.803             |
| Back Side     | UMTS 1750        | < 0.592          | 0.234                   | < 0.826             |
| Back Side     | UMTS 1900        | < 0.604          | 0.234                   | < 0.838             |
| Back Side     | LTE Band 12      | < 0.387          | 0.234                   | < 0.621             |
| Back Side     | LTE Band 4 (AWS) | < 0.850          | 0.234                   | < 1.084             |
| Back Side     | LTE Band 2 (PCS) | < 0.678          | 0.234                   | < 0.912             |

**Table 11-15**  
**Simultaneous Transmission Scenario with 5 GHz WLAN (Body at 1.2 cm)**

| Configuration | Mode             | 3G/4G SAR (W/kg) | 5 GHz WLAN SAR (W/kg) | $\Sigma$ SAR (W/kg) |
|---------------|------------------|------------------|-----------------------|---------------------|
| Back Side     | UMTS 850         | < 0.569          | 0.109                 | < 0.678             |
| Back Side     | UMTS 1750        | < 0.592          | 0.109                 | < 0.701             |
| Back Side     | UMTS 1900        | < 0.604          | 0.109                 | < 0.713             |
| Back Side     | LTE Band 12      | < 0.387          | 0.109                 | < 0.496             |
| Back Side     | LTE Band 4 (AWS) | < 0.850          | 0.109                 | < 0.959             |
| Back Side     | LTE Band 2 (PCS) | < 0.678          | 0.109                 | < 0.787             |

**Table 11-16**  
**Simultaneous Transmission Scenario with 2.4 GHz WLAN (Body at 0.5 cm)**

| Configuration | Mode             | 3G/4G SAR (W/kg) | 2.4 GHz WLAN SAR (W/kg) | $\Sigma$ SAR (W/kg) |
|---------------|------------------|------------------|-------------------------|---------------------|
| Top Edge      | UMTS 850         | 0.400            | 0.151                   | 0.551               |
| Top Edge      | UMTS 1750        | 0.400            | 0.151                   | 0.551               |
| Top Edge      | UMTS 1900        | 0.400            | 0.151                   | 0.551               |
| Top Edge      | LTE Band 12      | 0.400            | 0.151                   | 0.551               |
| Top Edge      | LTE Band 4 (AWS) | 0.400            | 0.151                   | 0.551               |
| Top Edge      | LTE Band 2 (PCS) | 0.400            | 0.151                   | 0.551               |

|                                          |                                                                                     |                                     |                                                                                       |                                        |
|------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
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**Table 11-17**  
**Simultaneous Transmission Scenario with 5 GHz WLAN (Body at 0.5 cm)**

| Configuration | Mode             | 3G/4G SAR (W/kg) | 5 GHz WLAN SAR (W/kg) | $\Sigma$ SAR (W/kg) |
|---------------|------------------|------------------|-----------------------|---------------------|
| Top Edge      | UMTS 850         | 0.400            | 0.381                 | 0.781               |
| Top Edge      | UMTS 1750        | 0.400            | 0.381                 | 0.781               |
| Top Edge      | UMTS 1900        | 0.400            | 0.381                 | 0.781               |
| Top Edge      | LTE Band 12      | 0.400            | 0.381                 | 0.781               |
| Top Edge      | LTE Band 4 (AWS) | 0.400            | 0.381                 | 0.781               |
| Top Edge      | LTE Band 2 (PCS) | 0.400            | 0.381                 | 0.781               |

**Notes:**

1. For SAR summation for body (back side at 21 mm), WLAN SAR values for 12 mm were used since the 12 mm test distance for WLAN SAR was more conservative. "<" denotes that the 12 mm WLAN SAR values were used for summation purposes.
2. For SAR summation for body (right edge at 6 mm), WLAN SAR values for 0 mm were used since the 0 mm test distance for WLAN SAR was more conservative. "<" denotes that the 0 mm WLAN SAR values were used for summation purposes.
3. For SAR summation for body (back side at 12 mm), UMTS/LTE SAR values for 0 mm were used since the 0 mm test distance for UMTS/LTE SAR was more conservative. "<" denotes that the 0 mm UMTS/LTE SAR values were used for summation purposes.

#### 11.4 Simultaneous Transmission Conclusion

The above numerical summed SAR 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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## 12 SAR MEASUREMENT VARIABILITY

### 12.1 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 12-1**  
**Body SAR Measurement Variability Results**

| BODY VARIABILITY RESULTS                                                                          |           |       |                  |                         |      |                                                 |                   |                       |       |                       |       |                       |       |
|---------------------------------------------------------------------------------------------------|-----------|-------|------------------|-------------------------|------|-------------------------------------------------|-------------------|-----------------------|-------|-----------------------|-------|-----------------------|-------|
| Band                                                                                              | FREQUENCY |       | Mode             | Service                 | 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)                |       |
| 1750                                                                                              | 1732.50   | 20175 | LTE Band 4 (AWS) | QPSK, 1 RB, 0 RB Offset | back | 0 mm                                            | 0.831             | 0.817                 | 1.02  | N/A                   | N/A   | N/A                   | N/A   |
| 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 |                   |                       |       |                       |       |                       |       |

### 12.2 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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# 13 EQUIPMENT LIST

| Manufacturer       | Model           | Description                                   | Cal Date   | Cal Interval | Cal Due    | Serial Number |
|--------------------|-----------------|-----------------------------------------------|------------|--------------|------------|---------------|
| SPEAG              | DAKS-3.5        | Portable Dielectric Assessment Kit            | 8/12/2014  | Annual       | 8/12/2015  | 1041          |
| SPEAG              | DAK-3.5         | Dielectric Assessment Kit                     | 10/21/2014 | Annual       | 10/21/2015 | 1091          |
| SPEAG              | D750V3          | 750 MHz Dipole                                | 1/16/2015  | Annual       | 1/16/2016  | 1003          |
| SPEAG              | D835V2          | 835 MHz SAR Dipole                            | 7/24/2014  | Annual       | 7/24/2015  | 4d133         |
| SPEAG              | D1750V2         | 1750 MHz SAR Dipole                           | 4/15/2015  | Annual       | 4/15/2016  | 1051          |
| SPEAG              | D1900V2         | 1900 MHz SAR Dipole                           | 2/18/2015  | Annual       | 2/18/2016  | 5d148         |
| SPEAG              | D2450V2         | 2450 MHz SAR Dipole                           | 8/11/2014  | Annual       | 8/11/2015  | 719           |
| SPEAG              | D5GHZV2         | 5 GHz SAR Dipole                              | 1/21/2015  | Annual       | 1/21/2016  | 1057          |
| SPEAG              | ES3DV3          | SAR Probe                                     | 3/19/2015  | Annual       | 3/19/2016  | 3319          |
| SPEAG              | ES3DV3          | SAR Probe                                     | 1/20/2015  | Annual       | 1/20/2016  | 3213          |
| SPEAG              | ES3DV3          | SAR Probe                                     | 5/20/2015  | Annual       | 5/20/2016  | 3263          |
| SPEAG              | ES3DV3          | SAR Probe                                     | 12/16/2014 | Annual       | 12/16/2015 | 3334          |
| SPEAG              | ES3DV3          | SAR Probe                                     | 3/19/2015  | Annual       | 3/19/2016  | 3209          |
| SPEAG              | EX3DV4          | SAR Probe                                     | 1/22/2015  | Annual       | 1/22/2016  | 3589          |
| SPEAG              | DAE4            | Dasy Data Acquisition Electronics             | 3/13/2015  | Annual       | 3/13/2016  | 1368          |
| SPEAG              | DAE4            | Dasy Data Acquisition Electronics             | 1/19/2015  | Annual       | 1/19/2016  | 1407          |
| SPEAG              | DAE4            | Dasy Data Acquisition Electronics             | 5/22/2015  | Annual       | 5/22/2016  | 859           |
| SPEAG              | DAE4            | Dasy Data Acquisition Electronics             | 12/12/2014 | Annual       | 12/12/2015 | 1415          |
| SPEAG              | DAE4            | Dasy Data Acquisition Electronics             | 3/13/2015  | Annual       | 3/13/2016  | 1334          |
| SPEAG              | DAE4            | Dasy Data Acquisition Electronics             | 9/17/2014  | Annual       | 9/17/2015  | 1323          |
| Agilent            | 8753ES          | S-Parameter Network Analyzer                  | 1/20/2015  | Annual       | 1/20/2016  | US39170122    |
| Agilent            | N5182A          | MXG Vector Signal Generator                   | 3/16/2015  | Annual       | 3/16/2016  | MY47420651    |
| Agilent            | E4438C          | ESG Vector Signal Generator                   | 4/1/2014   | Biennial     | 4/1/2016   | MY47270002    |
| Agilent            | 8753ES          | Network Analyzer                              | 3/20/2015  | Annual       | 3/20/2016  | MY40001472    |
| Agilent            | 8753ES          | S-Parameter Network Analyzer                  | 3/12/2015  | Annual       | 3/12/2016  | MY40006070    |
| Agilent            | E4438C          | ESG Vector Signal Generator                   | 3/12/2015  | Annual       | 3/12/2016  | MY45090700    |
| Agilent            | E4438C          | ESG Vector Signal Generator                   | 3/15/2015  | Annual       | 3/15/2016  | MY45091346    |
| Agilent            | 8753E           | (30kHz-6GHz) Network Analyzer                 | 12/30/2014 | Annual       | 12/30/2015 | JP38020182    |
| Agilent            | 8594A           | (9kHz-2.9GHz) Spectrum Analyzer               | N/A        | N/A          | N/A        | 3051A00187    |
| Agilent            | E8257D          | (250kHz-20GHz) Signal Generator               | 3/15/2015  | Annual       | 3/15/2016  | MY45470194    |
| Agilent            | N9020A          | MXA Signal Analyzer                           | 10/27/2014 | Annual       | 10/27/2015 | US46470561    |
| Amplifier Research | 1551G6          | Amplifier                                     | CBT        | N/A          | CBT        | 433975        |
| Amplifier Research | 1551G6          | Amplifier                                     | CBT        | N/A          | CBT        | 433974        |
| Amplifier Research | 1551G6          | Amplifier                                     | CBT        | N/A          | CBT        | 433977        |
| Anritsu            | ML2438A         | Power Meter                                   | 3/13/2015  | Annual       | 3/13/2016  | 1190013       |
| Anritsu            | MA2411B         | Pulse Power Sensor                            | 11/17/2014 | Annual       | 11/17/2015 | 1207364       |
| Anritsu            | MA2411B         | Pulse Power Sensor                            | 11/17/2014 | Annual       | 11/17/2015 | 1126066       |
| Anritsu            | MA24106A        | USB Power Sensor                              | 3/11/2015  | Annual       | 3/11/2016  | 1349514       |
| Anritsu            | MA24106A        | USB Power Sensor                              | 3/11/2015  | Annual       | 3/11/2016  | 1344557       |
| Anritsu            | MA24106A        | USB Power Sensor                              | 3/11/2015  | Annual       | 3/11/2016  | 1349509       |
| Anritsu            | MA24106A        | USB Power Sensor                              | 3/2/2015   | Annual       | 3/2/2016   | 1349503       |
| Anritsu            | MA2481A         | Power Sensor                                  | 3/11/2015  | Annual       | 3/11/2016  | 5318          |
| Anritsu            | ML2496A         | Power Meter                                   | 3/13/2015  | Annual       | 3/13/2016  | 1306009       |
| Anritsu            | ML2496A         | Power Meter                                   | 3/13/2015  | Annual       | 3/13/2016  | 1351001       |
| Anritsu            | MA2481A         | Power Sensor                                  | 3/10/2015  | Annual       | 3/10/2016  | 2400          |
| Anritsu            | MT8820C         | Radio Communication Analyzer                  | 11/18/2014 | Annual       | 11/18/2015 | 6201300731    |
| Anritsu            | MA2481A         | Power Sensor                                  | 3/10/2015  | Annual       | 3/10/2016  | 5821          |
| Anritsu            | MA2481A         | Power Sensor                                  | 3/10/2015  | Annual       | 3/10/2016  | 5605          |
| Anritsu            | ML2438A         | Power Meter                                   | 3/13/2015  | Annual       | 3/13/2016  | 1070030       |
| Anritsu            | ML2495A         | Power Meter                                   | 10/31/2013 | Biennial     | 10/31/2015 | 1039008       |
| COMTECH            | AR85729-5       | Solid State Amplifier                         | CBT        | N/A          | CBT        | M155A00-009   |
| COMTECH            | AR85729-5/5759B | Solid State Amplifier                         | CBT        | N/A          | CBT        | M3W1A00-1002  |
| Control Company    | 4353            | Long Stem Thermometer                         | 1/22/2015  | Biennial     | 1/22/2017  | 150053029     |
| Control Company    | 4040            | Digital Thermometer                           | 3/15/2015  | Biennial     | 3/15/2017  | 150194898     |
| Control Company    | 4040            | Digital Thermometer                           | 3/18/2015  | Biennial     | 3/18/2017  | 150194895     |
| Control Company    | 4353            | Long Stem Thermometer                         | 1/22/2015  | Biennial     | 1/22/2017  | 150053042     |
| 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           |
| MiniCircuits       | VLF-6000+       | Low Pass Filter                               | CBT        | N/A          | CBT        | N/A           |
| Mini-Circuits      | BW-N20W5+       | DC to 18 GHz Precision Fixed 20 dB Attenuator | CBT        | N/A          | CBT        | N/A           |
| Mini-Circuits      | NLP-1200+       | Low Pass Filter DC to 1000 MHz                | CBT        | N/A          | CBT        | N/A           |
| Mini-Circuits      | NLP-2950+       | Low Pass Filter DC to 2700 MHz                | CBT        | N/A          | CBT        | N/A           |
| Mini-Circuits      | BW-N20W5        | Power Attenuator                              | CBT        | N/A          | CBT        | 1226          |
| Mitutoyo           | CD-6°CSX        | Digital Caliper                               | 5/8/2014   | Biennial     | 5/8/2016   | 13264165      |
| Narda              | 4772-3          | Attenuator (3dB)                              | CBT        | N/A          | CBT        | 9406          |
| Narda              | 4014C-6         | 4 - 8 GHz SMA 6 dB Directional Coupler        | CBT        | N/A          | CBT        | N/A           |
| Narda              | BW-S3W2         | Attenuator (3dB)                              | CBT        | N/A          | CBT        | 120           |
| Pasternack         | PE2209-10       | Bidirectional Coupler                         | CBT        | N/A          | CBT        | N/A           |
| Pasternack         | PE2208-6        | Bidirectional Coupler                         | CBT        | N/A          | CBT        | N/A           |
| Rohde & Schwarz    | CMW500          | Radio Communication Tester                    | 4/8/2015   | Annual       | 4/8/2016   | 140148        |
| Rohde & Schwarz    | CMW500          | Radio Communication Tester                    | 5/28/2015  | Annual       | 5/28/2016  | 102060        |
| Rohde & Schwarz    | CMU200          | Base Station Simulator                        | 6/3/2015   | Annual       | 6/3/2016   | 109892        |
| Rohde & Schwarz    | CMW500          | Radio Communication tester                    | 5/5/2015   | Annual       | 5/5/2016   | 140144        |
| Seekonk            | NC-100          | Torque Wrench                                 | 3/18/2014  | Biennial     | 3/18/2016  | N/A           |
| Seekonk            | NC-100          | Torque Wrench 5/16", 8" lbs                   | 3/18/2014  | Biennial     | 3/18/2016  | N/A           |
| SPEAG              | MDA4LAP         | Laptop Holder                                 | N/A        | N/A          | N/A        | 001 CD        |
| VWR                | 36934-158       | Wall-Mounted Thermometer                      | 4/29/2014  | Biennial     | 4/29/2016  | 111859323     |
| VWR                | 36934-158       | Wall-Mounted Thermometer                      | 4/29/2014  | Biennial     | 4/29/2016  | 111859332     |

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

|                                   |                                                                                                                                                                                                        |                              |                                 |
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## 14 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>                                                   |                      |               |                |              |                       |                          | k=2                            | 24.2                             | 23.5           |
| (95% CONFIDENCE LEVEL)                                                        |                      |               |                |              |                       |                          |                                |                                  |                |

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

|                                          |                                                                                                                                   |                                     |                                                                                       |                                        |
|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| FCC ID: A3LSMT357T                       |  <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>OY1505280998.A3L | <b>Test Dates:</b><br>06/02/15 - 06/04/15                                                                                         | <b>DUT Type:</b><br>Portable Tablet | Page 50 of 54                                                                         |                                        |

Applicable for frequencies up to 6 GHz.

| a                                                                             | b                    | c             | d              | e=<br>f(d,k) | f                     | g                        | h =<br>c x i/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

|                                          |                                                                                                                                   |                                     |                                                                                       |                                        |
|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
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| <b>Document S/N:</b><br>OY1505280998.A3L | <b>Test Dates:</b><br>06/02/15 - 06/04/15                                                                                         | <b>DUT Type:</b><br>Portable Tablet | Page 51 of 54                                                                         |                                        |

## 15 CONCLUSION

### 15.1 Measurement Conclusion

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

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

|                                          |                                                                                                                                   |                                     |                                                                                       |                                        |
|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
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| <b>Document S/N:</b><br>0Y1505280998.A3L | <b>Test Dates:</b><br>06/02/15 - 06/04/15                                                                                         | <b>DUT Type:</b><br>Portable Tablet |                                                                                       | Page 52 of 54                          |

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|                                          |                                                                                                                                   |                                     |                                                                                       |                                        |
|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
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| <b>Document S/N:</b><br>OY1505280998.A3L | <b>Test Dates:</b><br>06/02/15 - 06/04/15                                                                                         | <b>DUT Type:</b><br>Portable Tablet |                                                                                       | Page 53 of 54                          |

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|                                   |                                                                                                                                                                                                        |                              |                                 |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------------------|
| FCC ID: A3LSMT357T                |  <b>SAR EVALUATION REPORT</b>  |                              | Reviewed by:<br>Quality Manager |
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## APPENDIX A: SAR TEST DATA

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMT357T; Type: Portable Tablet; Serial: 01806**

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

Medium: 835 Body, Medium parameters used (interpolated):

$f = 836.6 \text{ MHz}$ ;  $\sigma = 1.02 \text{ S/m}$ ;  $\epsilon_r = 54.986$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 06-04-2015; Ambient Temp: 22.7°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3213; ConvF(6.07, 6.07, 6.07); Calibrated: 1/20/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1407; Calibrated: 4/20/2015

Phantom: ELI Left v6.0; Type: QDOVA003AA; Serial: TP:1202

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

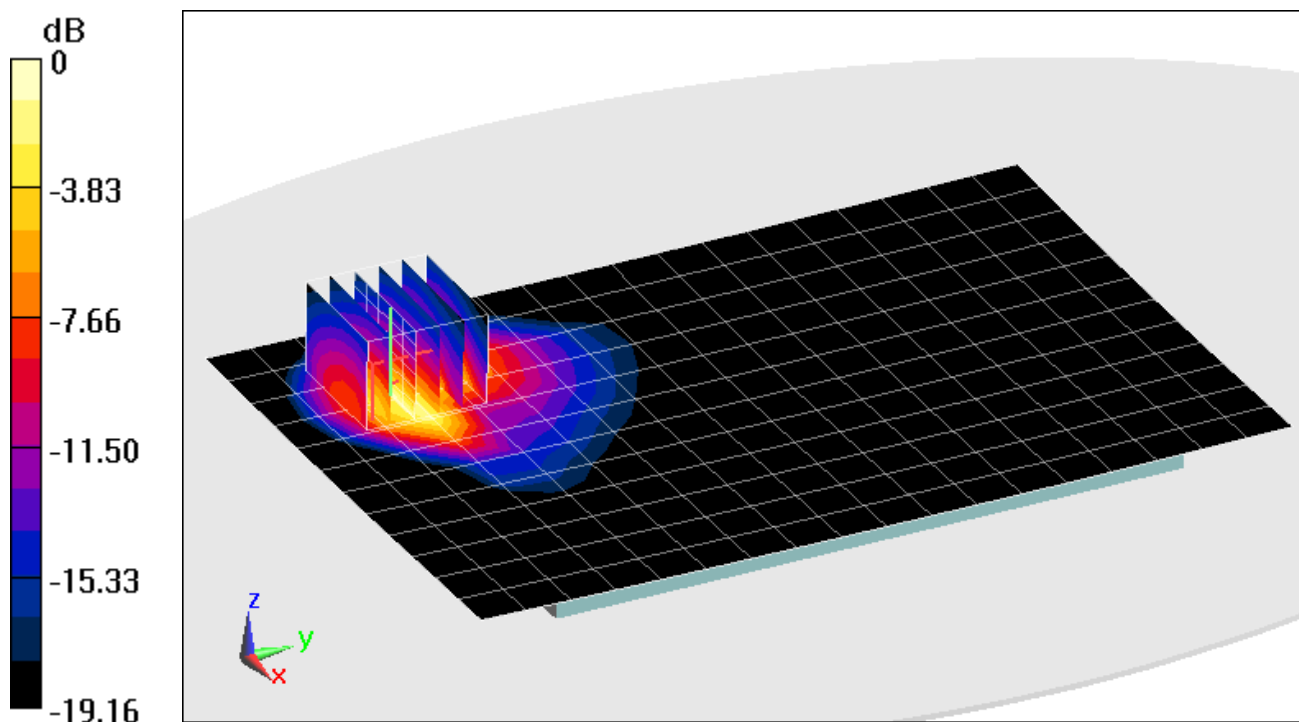
**Area Scan (13x19x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

**Zoom Scan (6x6x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 21.56 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 1.18 W/kg

**SAR(1 g) = 0.478 W/kg**



0 dB = 0.722 W/kg = -1.41 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMT357T; Type: Portable Tablet; Serial: 01798**

Communication System: UID 0, UMTS; Frequency: 1732.4 MHz; Duty Cycle: 1:1

Medium: 1750 Body, Medium parameters used (interpolated):

$f = 1732.4 \text{ MHz}$ ;  $\sigma = 1.466 \text{ S/m}$ ;  $\epsilon_r = 51.772$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 06-04-2015; Ambient Temp: 21.5°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3263; ConvF(4.88, 4.88, 4.88); Calibrated: 5/20/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 5/22/2015

Phantom: SAM with CRP v5.0 (Right); Type: QD000P40CD; Serial: TP:1759

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: UMTS 1750, Body SAR, Back side, Mid.ch**

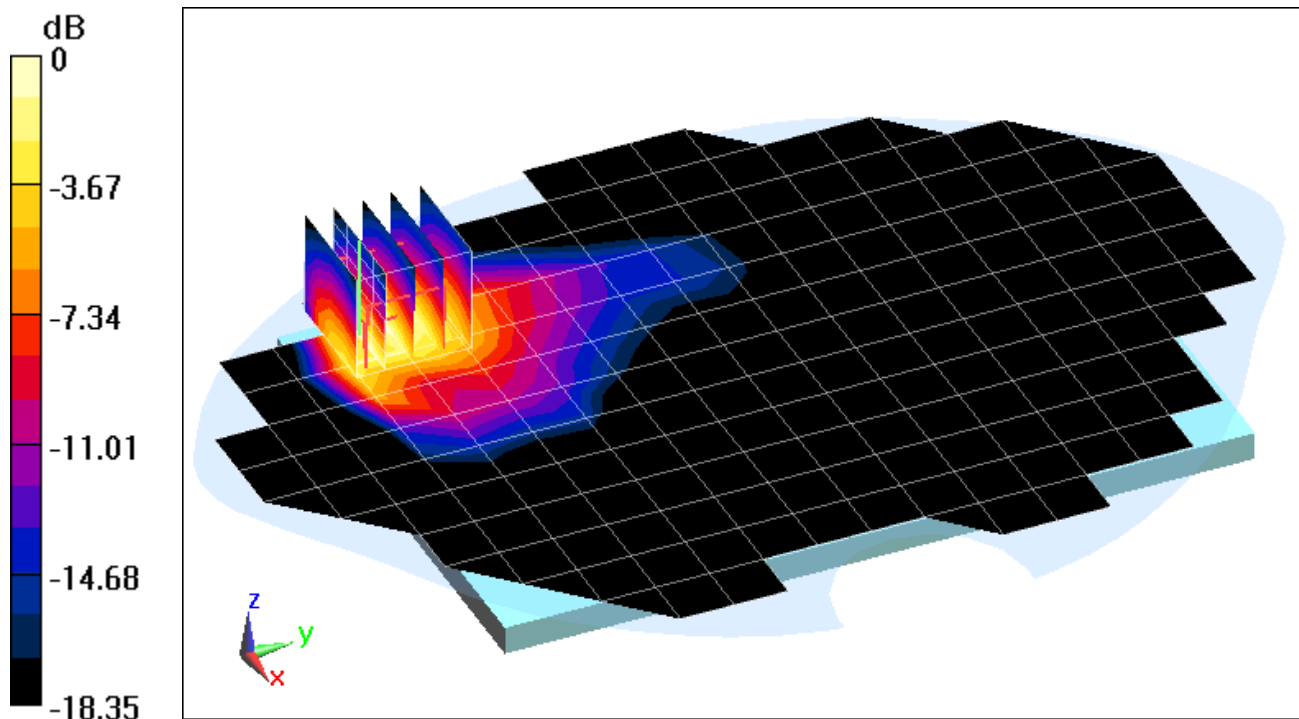
**Area Scan (15x19x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

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

Reference Value = 19.60 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 1.14 W/kg

**SAR(1 g) = 0.535 W/kg**



0 dB = 0.644 W/kg = -1.91 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMT357T; Type: Portable Tablet; Serial: 01780**

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

Medium: 1900 Body, Medium parameters used:

$f = 1880 \text{ MHz}$ ;  $\sigma = 1.528 \text{ S/m}$ ;  $\epsilon_r = 51.803$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 06-04-2015; Ambient Temp: 22.0°C; Tissue Temp: 21.7°C

Probe: ES3DV3 - SN3334; ConvF(4.73, 4.73, 4.73); Calibrated: 12/16/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1415; Calibrated: 12/12/2014

Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1158

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

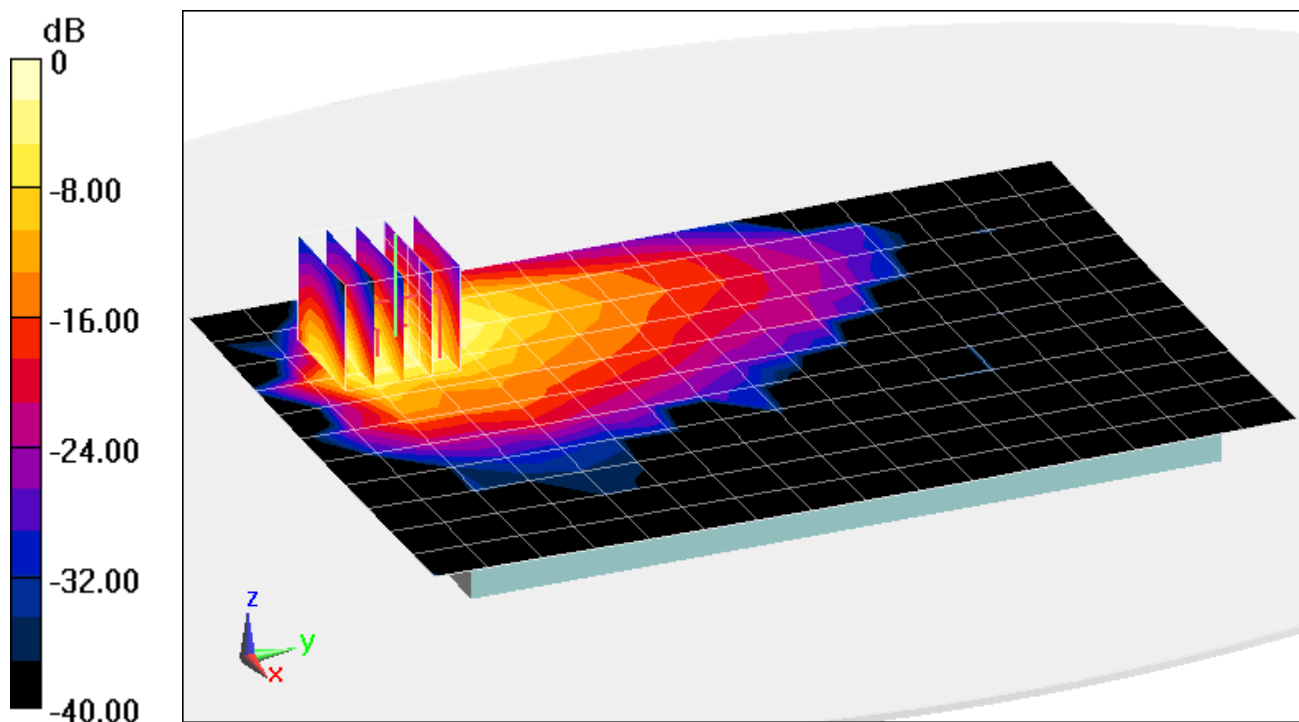
**Area Scan (12x17x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

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

Reference Value = 12.11 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 1.12 W/kg

**SAR(1 g) = 0.570 W/kg**



0 dB = 0.735 W/kg = -1.34 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMT357T; Type: Portable Tablet; Serial: 01806**

Communication System: UID 0, LTE Band 12; Frequency: 707.5 MHz; Duty Cycle: 1:1

Medium: 750 Body, Medium parameters used (interpolated):

$f = 707.5$  MHz;  $\sigma = 0.919$  S/m;  $\epsilon_r = 56.103$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 06-02-2015; Ambient Temp: 19.0°C; Tissue Temp: 21.6°C

Probe: ES3DV3 - SN3319; ConvF(6.1, 6.1, 6.1); Calibrated: 3/19/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1368; Calibrated: 3/13/2015

Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1226

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: LTE Band 12, Body SAR, Back side, Mid.ch,  
10 MHz Bandwidth, QPSK, 1 RB, 25 RB Offset**

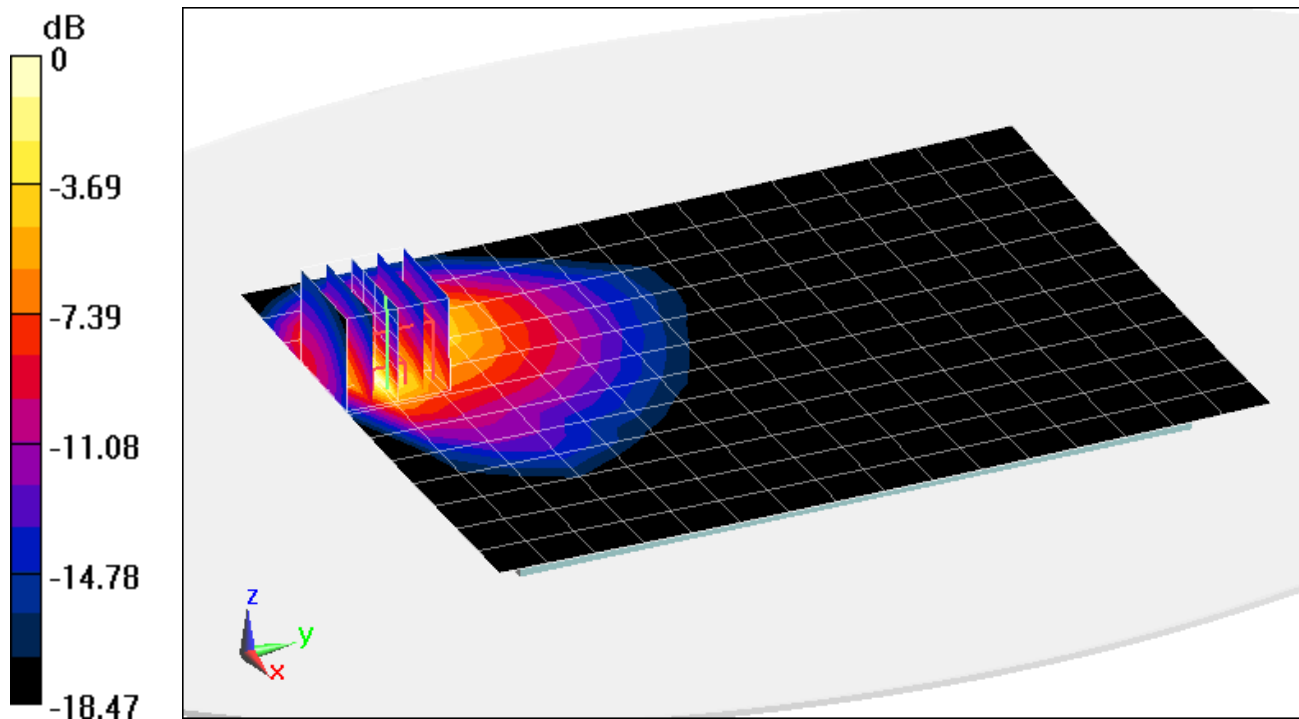
**Area Scan (13x17x1):** Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 20.10 V/m; Power Drift = 0.13 dB

Peak SAR (extrapolated) = 1.27 W/kg

**SAR(1 g) = 0.375 W/kg**



0 dB = 0.585 W/kg = -2.33 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMT357T; Type: Portable Tablet; Serial: 01780**

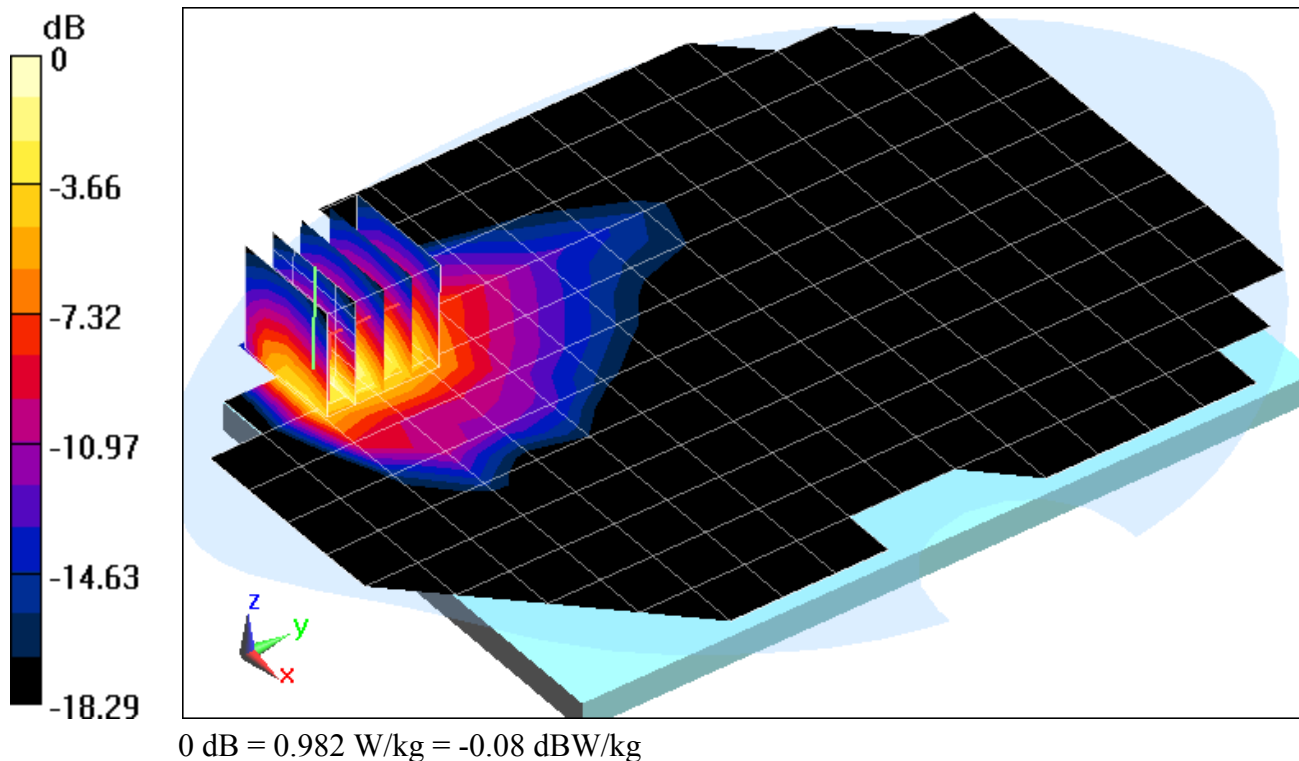
Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1  
Medium: 1750 Body, Medium parameters used (interpolated):  
 $f = 1732.5 \text{ MHz}$ ;  $\sigma = 1.466 \text{ S/m}$ ;  $\epsilon_r = 51.772$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 06-04-2015; Ambient Temp: 21.5°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3263; ConvF(4.88, 4.88, 4.88); Calibrated: 5/20/2015;  
Sensor-Surface: 3mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn859; Calibrated: 5/22/2015  
Phantom: SAM with CRP v5.0 (Right); Type: QD000P40CD; Serial: TP:1759  
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: LTE Band 4 (AWS), Body SAR, Back side, Mid.ch,  
20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset**

**Area Scan (13x17x1):** 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 = 24.39 V/m; Power Drift = -0.11 dB  
Peak SAR (extrapolated) = 1.79 W/kg  
**SAR(1 g) = 0.831 W/kg**



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMT357T; Type: Portable Tablet; Serial: 01806**

Communication System: UID 0, LTE Band 2 (PCS); Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Body, Medium parameters used:

$f = 1880 \text{ MHz}$ ;  $\sigma = 1.528 \text{ S/m}$ ;  $\epsilon_r = 51.803$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 06-04-2015; Ambient Temp: 22.0°C; Tissue Temp: 21.7°C

Probe: ES3DV3 - SN3334; ConvF(4.73, 4.73, 4.73); Calibrated: 12/16/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1415; Calibrated: 12/12/2014

Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1158

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: LTE Band 2 (PCS), Body SAR, Bottom Edge, Mid.ch,  
20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset**

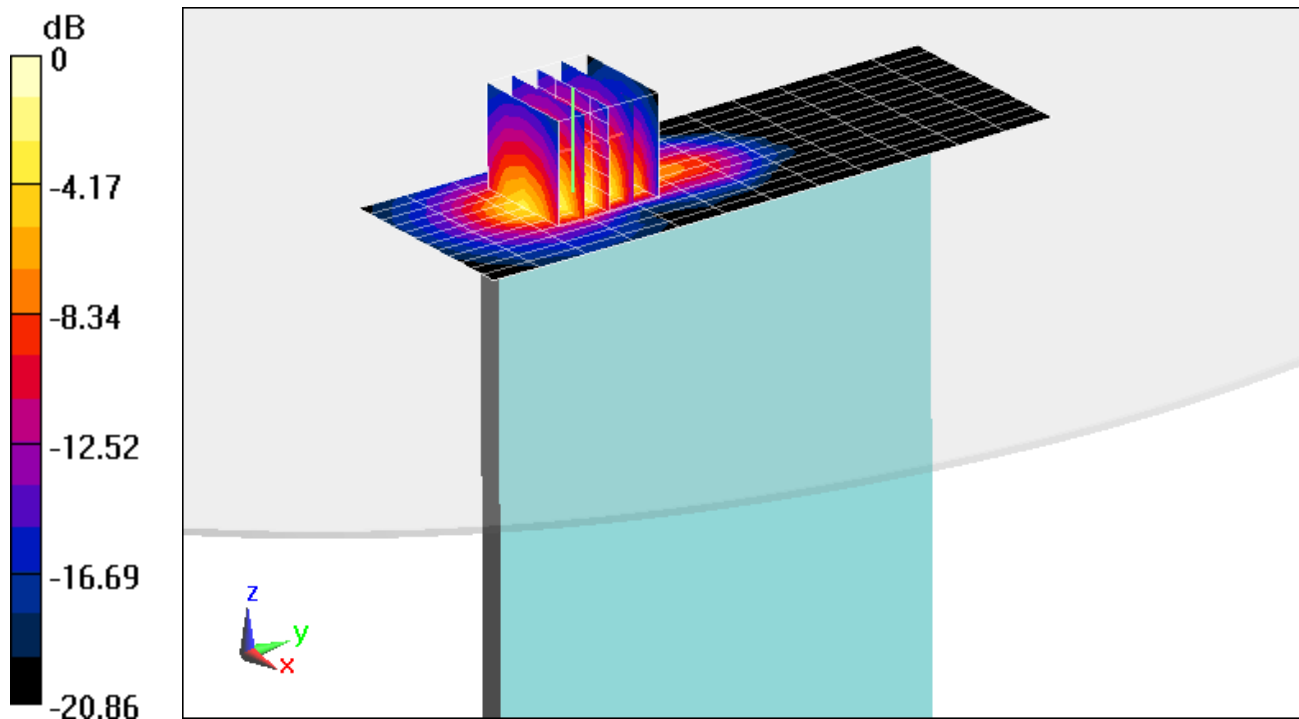
**Area Scan (13x13x1):** Measurement grid: dx=5mm, dy=15mm

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

Reference Value = 22.73 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 1.31 W/kg

**SAR(1 g) = 0.688 W/kg**



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

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMT357T; Type: Portable Tablet; Serial: 11490**

Communication System: UID 0, IEEE 802.11b; Frequency: 2412 MHz; Duty Cycle: 1:1  
Medium: 2450 Body, Medium parameters used (interpolated):  
 $f = 2412 \text{ MHz}$ ;  $\sigma = 1.957 \text{ S/m}$ ;  $\epsilon_r = 50.605$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 06-03-2015; Ambient Temp: 21.1°C; Tissue Temp: 21.0°C

Probe: ES3DV3 - SN3209; ConvF(4.12, 4.12, 4.12); Calibrated: 3/19/2015;  
Sensor-Surface: 3mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn1334; Calibrated: 3/13/2015  
Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646  
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

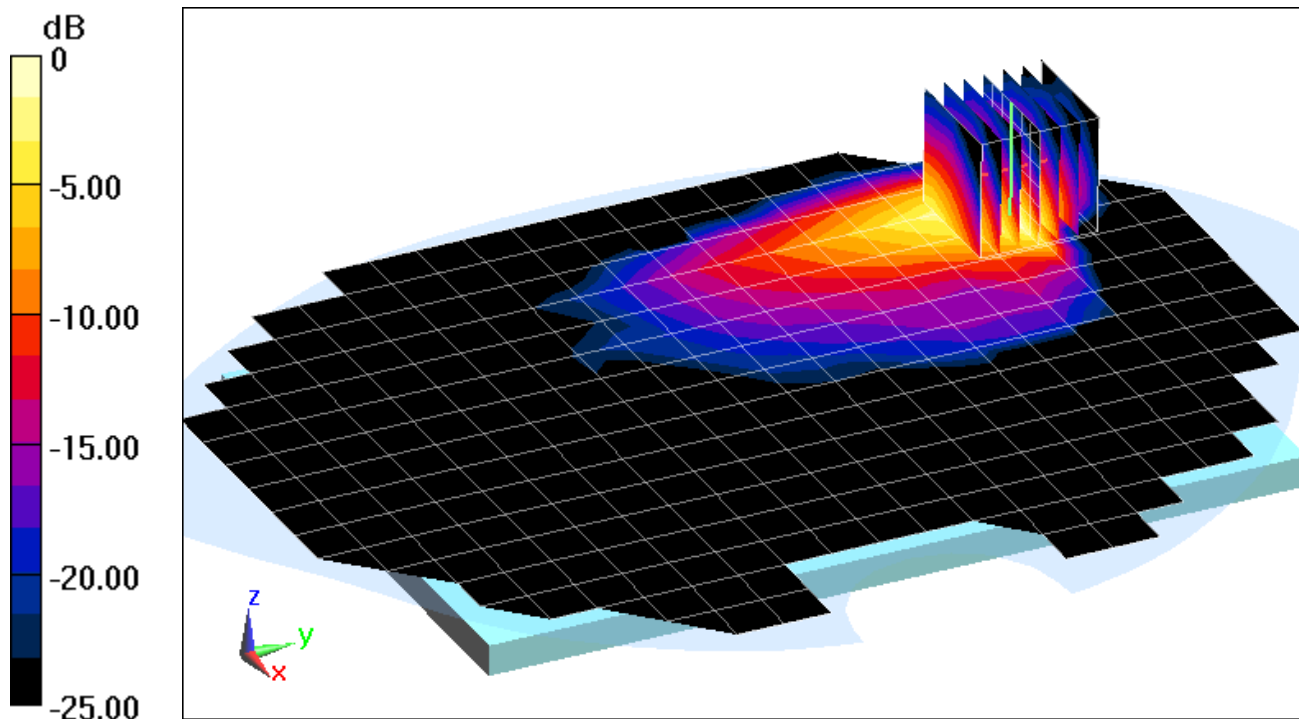
**Area Scan (17x22x1):** Measurement grid:  $dx=12\text{mm}$ ,  $dy=12\text{mm}$

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

Reference Value = 18.47 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 1.59 W/kg

**SAR(1 g) = 0.591 W/kg**



0 dB = 0.720 W/kg = -1.43 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMT357T; Type: Portable Tablet; Serial: 11516**

Communication System: UID 0, IEEE 802.11n; Frequency: 5670 MHz; Duty Cycle: 1:1

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

$f = 5670 \text{ MHz}$ ;  $\sigma = 5.733 \text{ S/m}$ ;  $\epsilon_r = 47.509$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 06-03-2015; Ambient Temp: 22.1°C; Tissue Temp: 21.3°C

Probe: EX3DV4 - SN3589; ConvF(3.42, 3.42, 3.42); Calibrated: 1/22/2015;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 9/17/2014

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

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: IEEE 802.11n, 5.5 - 5.7GHz GHz, 40 MHz Bandwidth,  
Body SAR, Ch 134, 13.5 Mbps, Back Side**

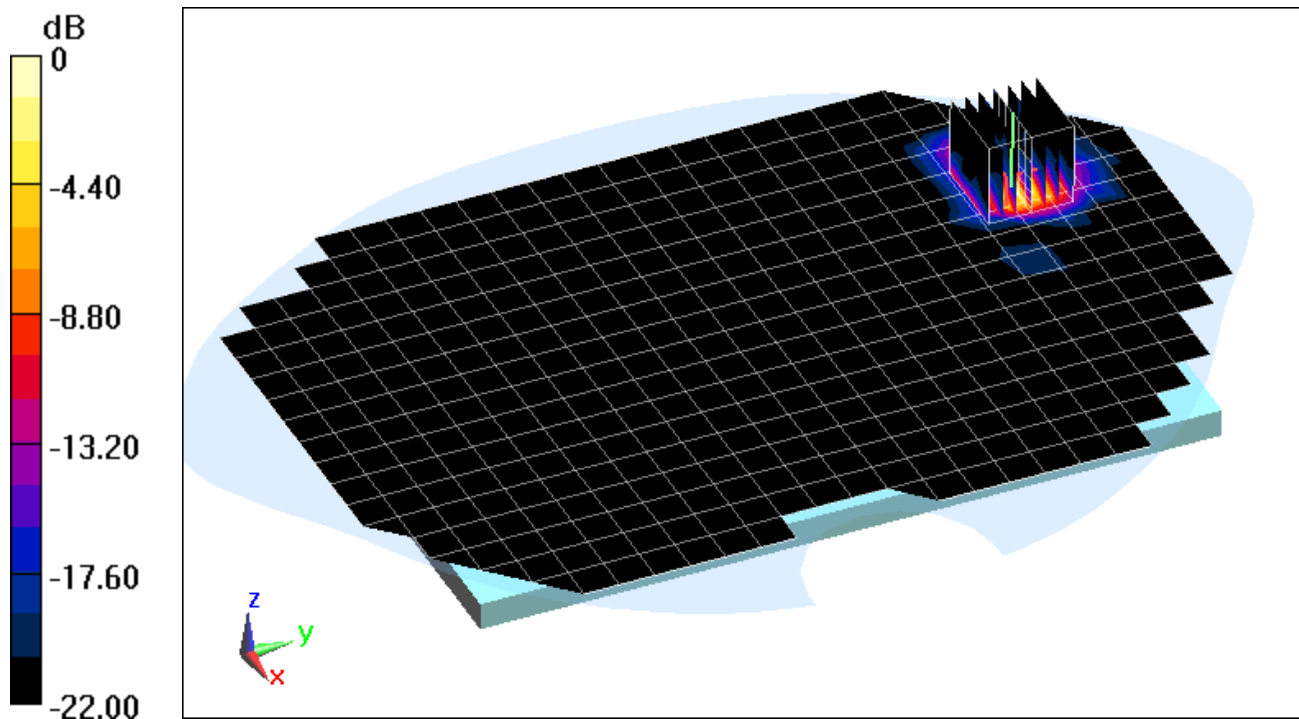
**Area Scan (11x11x1):** Measurement grid: dx=10mm, dy=10mm

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

Reference Value = 9.291 V/m; Power Drift = -0.16 dB

Peak SAR (extrapolated) = 3.24 W/kg

**SAR(1 g) = 0.590 W/kg**



0 dB = 1.72 W/kg = 2.36 dBW/kg

## APPENDIX B: SYSTEM VERIFICATION

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: SAR Dipole 750 MHz; Type: D750V3; Serial: 1003**

Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium: 750 Body, Medium parameters used (interpolated):

$f = 750 \text{ MHz}$ ;  $\sigma = 0.955 \text{ S/m}$ ;  $\epsilon_r = 55.626$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 06-02-2015; Ambient Temp: 19.0°C; Tissue Temp: 21.6°C

Probe: ES3DV3 - SN3319; ConvF(6.1, 6.1, 6.1); Calibrated: 3/19/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1368; Calibrated: 3/13/2015

Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1226

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## 750 MHz System Verification

**Area Scan (7x15x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

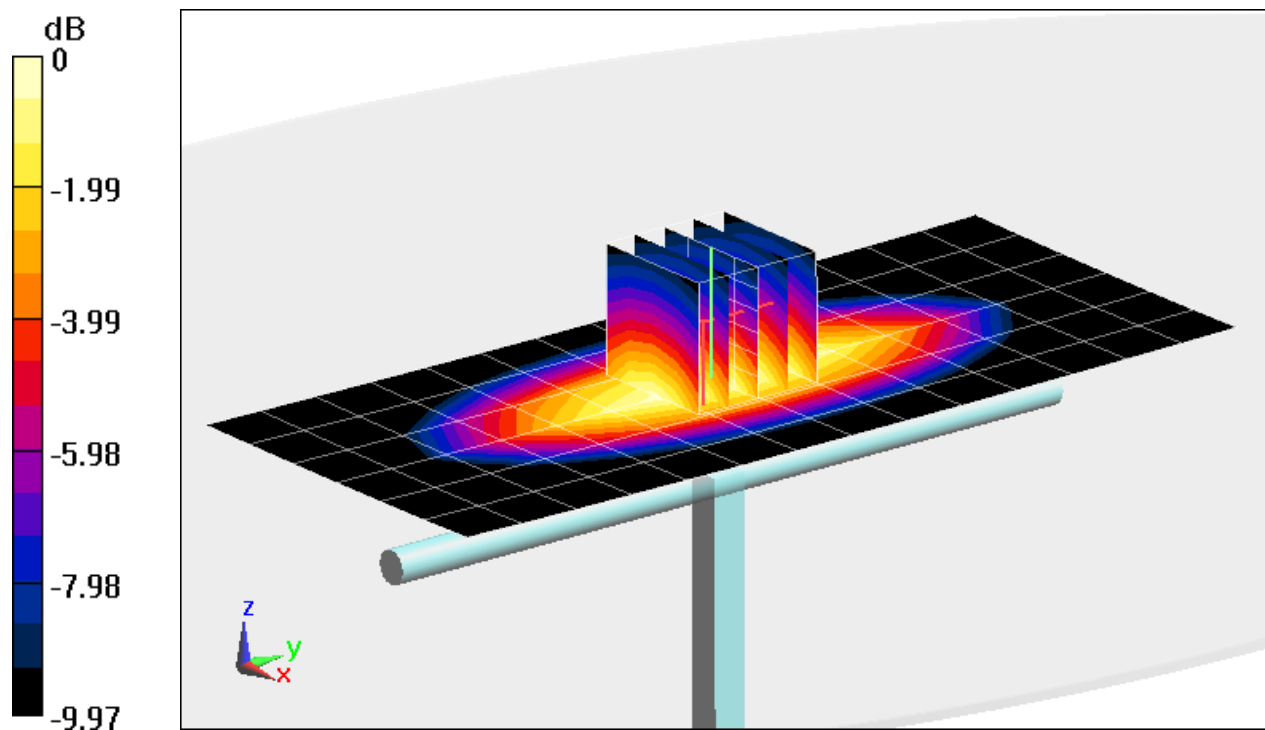
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Input Power: 23.0 dBm (200 mW)

Peak SAR (extrapolated) = 2.49 W/kg

**SAR(1 g) = 1.71 W/kg**

Deviation(1 g): 1.06%



0 dB = 1.99 W/kg = 2.99 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: SAR Dipole 835 MHz; Type: D835V2; Serial: 4d133**

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

Medium: 835 Body, Medium parameters used:

$f = 835 \text{ MHz}$ ;  $\sigma = 1.018 \text{ S/m}$ ;  $\epsilon_r = 55.002$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 06-04-2015; Ambient Temp: 22.7°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3213; ConvF(6.07, 6.07, 6.07); Calibrated: 1/20/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1407; Calibrated: 4/20/2015

Phantom: ELI Left v6.0; Type: QDOVA003AA; Serial: TP:1202

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## 835 MHz System Verification

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

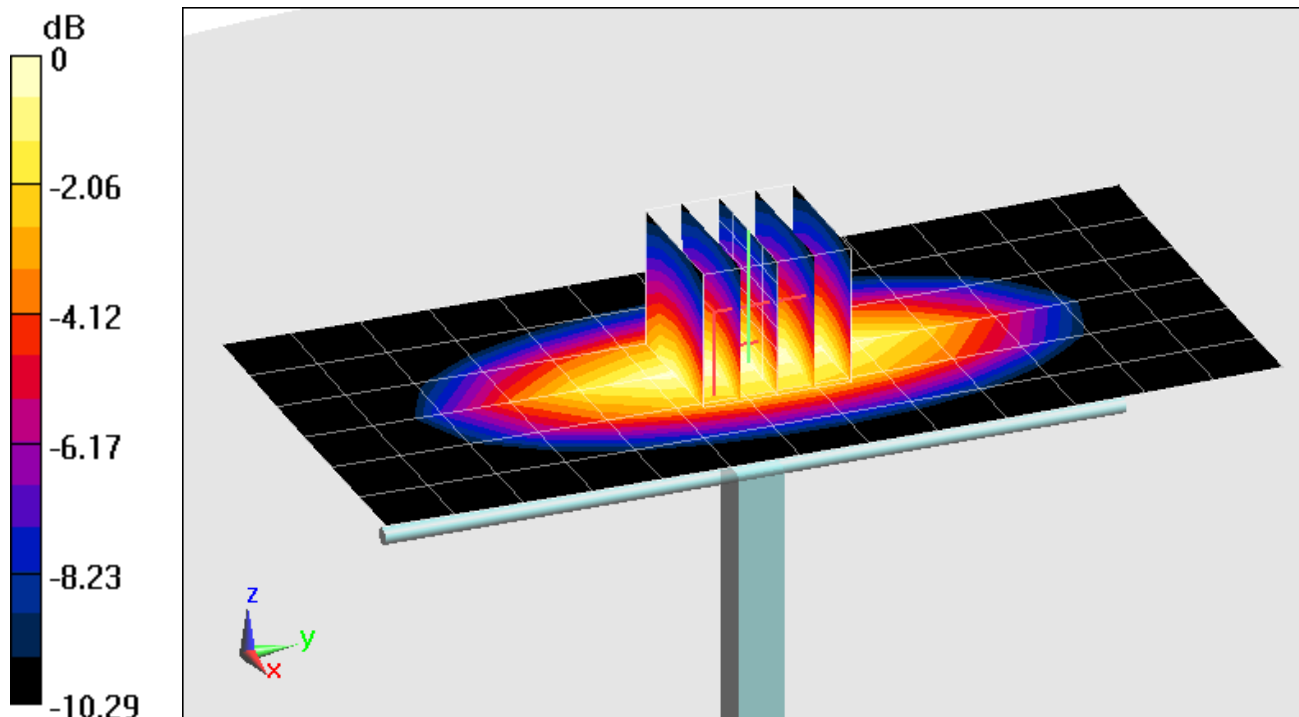
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Input Power: 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 1.28 W/kg

**SAR(1 g) = 0.883 W/kg**

Deviation(1 g): -5.56%



0 dB = 1.03 W/kg = 0.13 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: SAR Dipole 1750 MHz; Type: D1750V2; Serial: 1051**

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium: 1750 Body, Medium parameters used:

$f = 1750$  MHz;  $\sigma = 1.485$  S/m;  $\epsilon_r = 51.684$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-04-2015; Ambient Temp: 21.5°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3263; ConvF(4.88, 4.88, 4.88); Calibrated: 5/20/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 5/22/2015

Phantom: SAM with CRP v5.0 (Right); Type: QD000P40CD; Serial: TP:1759

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## 1750 MHz System Verification

**Area Scan (11x11x1):** Measurement grid: dx=10mm, dy=10mm

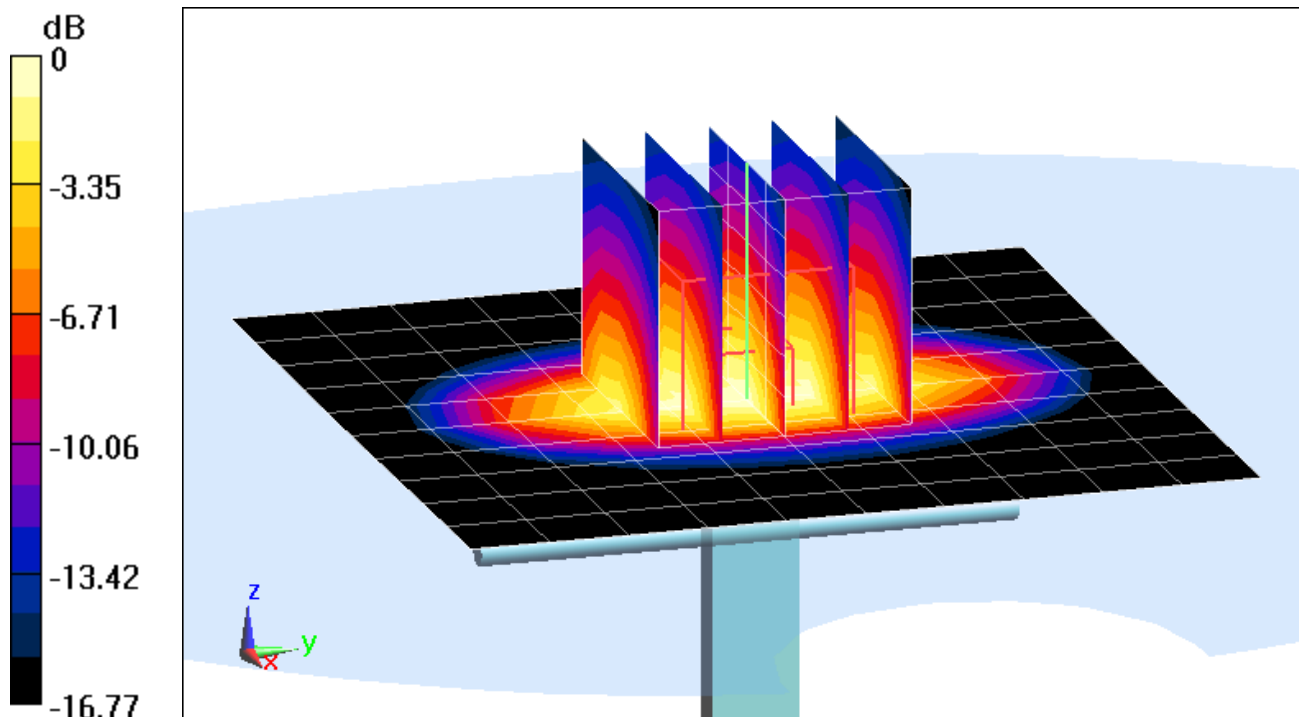
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Input Power: 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 6.70 W/kg

**SAR(1 g) = 3.82 W/kg**

Deviation(1 g): 2.96%



0 dB = 4.66 W/kg = 6.68 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: SAR Dipole 1900 MHz; Type: D1900V2; Serial: 5d148**

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

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

$f = 1900 \text{ MHz}$ ;  $\sigma = 1.548 \text{ S/m}$ ;  $\epsilon_r = 51.772$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-04-2015; Ambient Temp: 22.0°C; Tissue Temp: 21.7°C

Probe: ES3DV3 - SN3334; ConvF(4.73, 4.73, 4.73); Calibrated: 12/16/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1415; Calibrated: 12/12/2014

Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1158

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## 1900 MHz System Verification

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

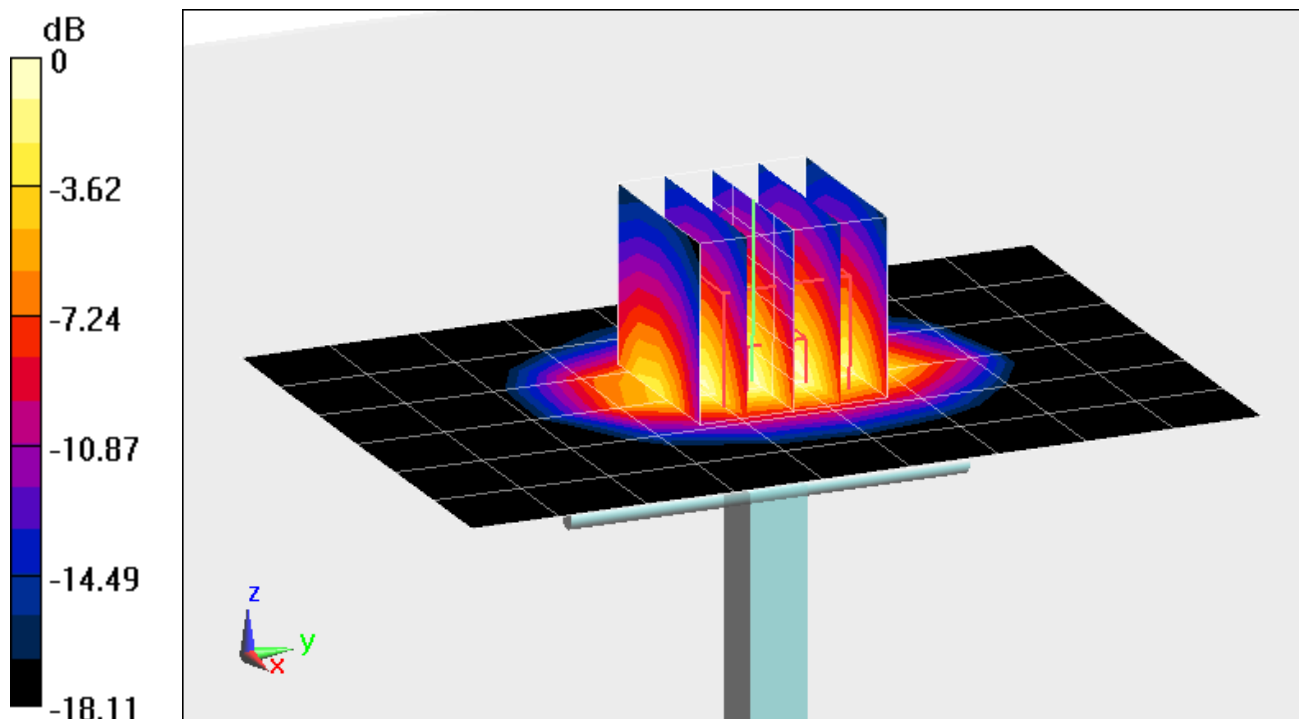
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Input Power: 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 7.24 W/kg

**SAR(1 g) = 4.04 W/kg**

Deviation(1 g): 0.50%



0 dB = 4.91 W/kg = 6.91 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: SAR Dipole 2450 MHz; Type: D2450V2; Serial: 719**

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

Medium: 2450 Body, Medium parameters used:

$f = 2450 \text{ MHz}$ ;  $\sigma = 2.008 \text{ S/m}$ ;  $\epsilon_r = 50.462$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-03-2015; Ambient Temp: 21.1°C; Tissue Temp: 21.0°C

Probe: ES3DV3 - SN3209; ConvF(4.12, 4.12, 4.12); Calibrated: 3/19/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1334; Calibrated: 3/13/2015

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

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## 2450 MHz System Verification

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

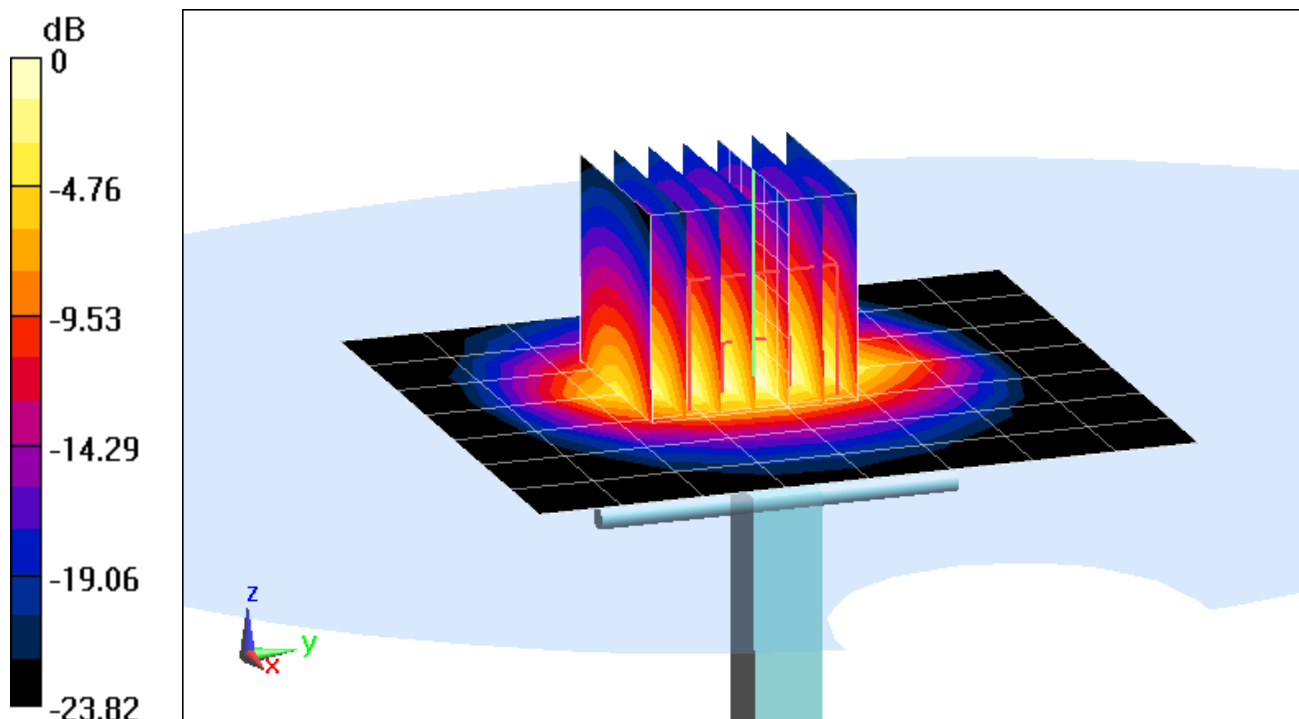
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Input Power: 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 11.8 W/kg

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

Deviation(1 g): 4.25%



0 dB = 7.15 W/kg = 8.54 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

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

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

Medium: 5 GHz Body, Medium parameters used:

$f = 5300 \text{ MHz}$ ;  $\sigma = 5.248 \text{ S/m}$ ;  $\epsilon_r = 48.083$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-03-2015; Ambient Temp: 22.1°C; Tissue Temp: 21.2°C

Probe: EX3DV4 - SN3589; ConvF(3.79, 3.79, 3.79); Calibrated: 1/22/2015;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 9/17/2014

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

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## 5300 MHz System Verification

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

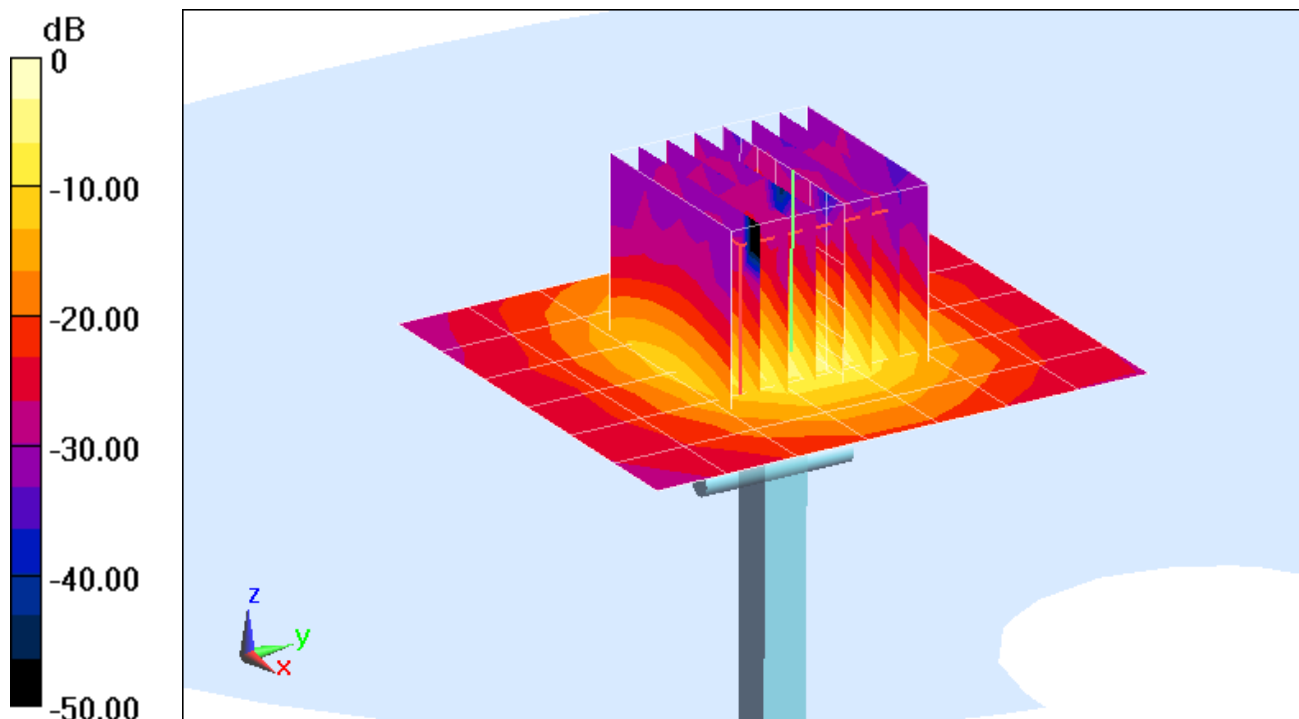
**Zoom Scan (8x8x7)/Cube 0:** Measurement grid:  $dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=1.4\text{mm}$ ; Graded Ratio: 1.4

Input Power: 17.0 dBm (50 mW)

Peak SAR (extrapolated) = 16.2 W/kg

**SAR(1 g) = 3.91 W/kg**

Deviation(1 g): 5.39%



0 dB = 9.31 W/kg = 9.69 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

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

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

Medium: 5 GHz Body, Medium parameters used:

$f = 5500 \text{ MHz}$ ;  $\sigma = 5.495 \text{ S/m}$ ;  $\epsilon_r = 47.779$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-03-2015; Ambient Temp: 22.2°C; Tissue Temp: 21.3°C

Probe: EX3DV4 - SN3589; ConvF(3.65, 3.65, 3.65); Calibrated: 1/22/2015;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 9/17/2014

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

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## 5500 MHz System Verification

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

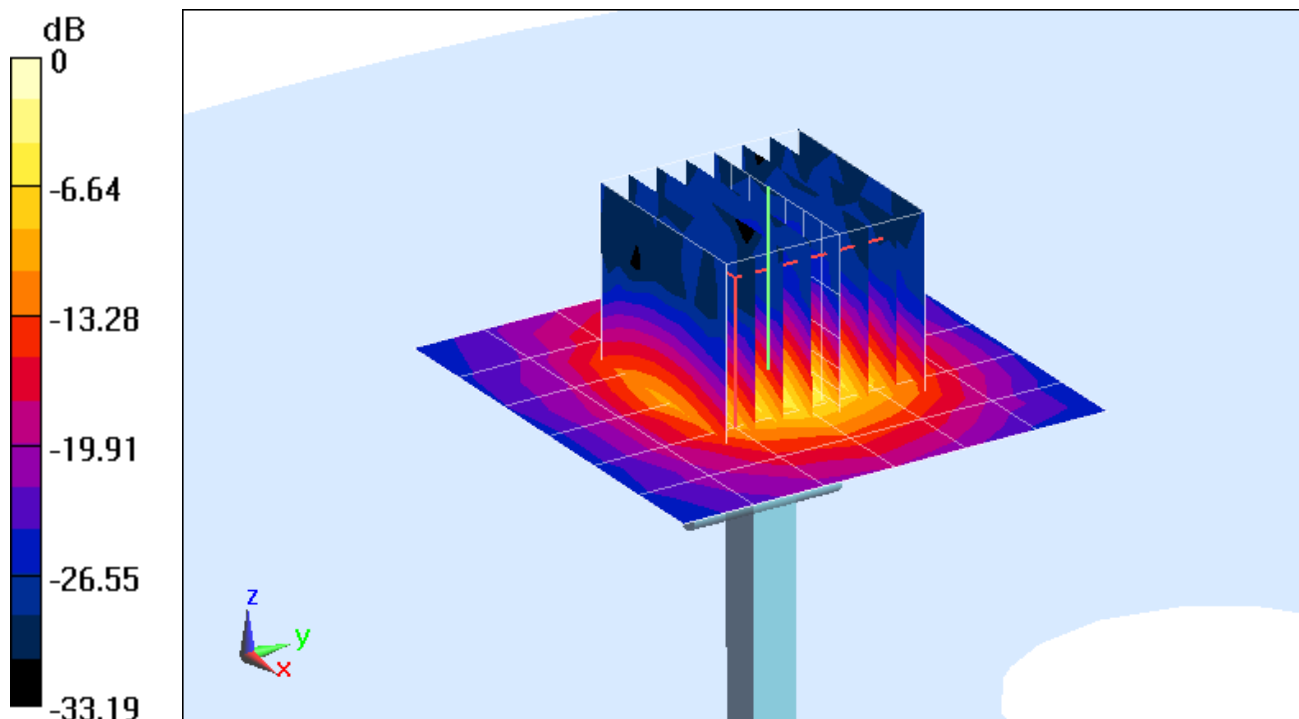
**Zoom Scan (8x8x7)/Cube 0:** Measurement grid:  $dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=1.4\text{mm}$ ; Graded Ratio: 1.4

Input Power: 17.0 dBm (50 mW)

Peak SAR (extrapolated) = 16.1 W/kg

**SAR(1 g) = 3.68 W/kg**

Deviation(1 g): -7.07%



0 dB = 8.74 W/kg = 9.42 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: SAR Dipole 5600 MHz; Type: D5GHzV2; Serial: 1057**

Communication System: UID 0, CW; Frequency: 5600 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body, Medium parameters used:

$f = 5600 \text{ MHz}$ ;  $\sigma = 5.621 \text{ S/m}$ ;  $\epsilon_r = 47.64$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-03-2015; Ambient Temp: 22.1°C; Tissue Temp: 21.3°C

Probe: EX3DV4 - SN3589; ConvF(3.42, 3.42, 3.42); Calibrated: 1/22/2015;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 9/17/2014

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

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## 5600 MHz System Verification

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

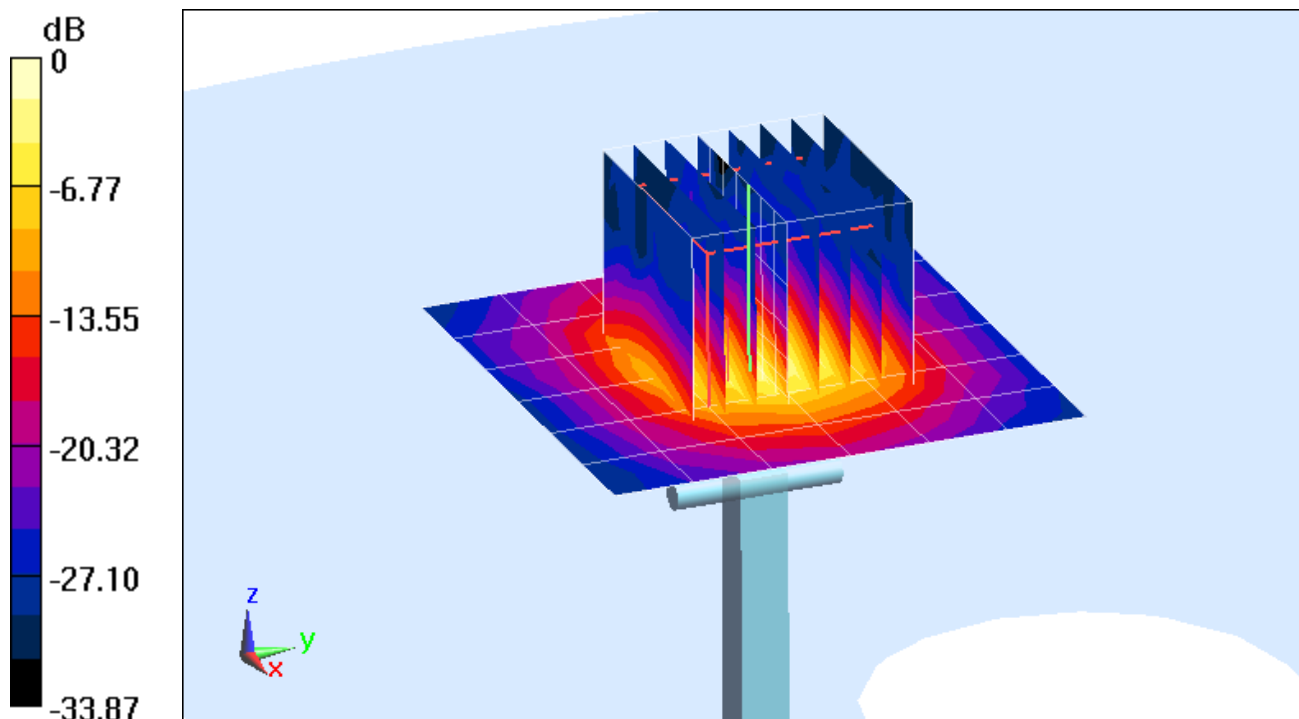
**Zoom Scan (8x8x7)/Cube 0:** Measurement grid:  $dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=1.4\text{mm}$ ; Graded Ratio: 1.4

Input Power: 17.0 dBm (50 mW)

Peak SAR (extrapolated) = 17.1 W/kg

**SAR(1 g) = 3.96 W/kg**

Deviation(1 g): 1.93%



0 dB = 9.56 W/kg = 9.80 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

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

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

Medium: 5 GHz Body, Medium parameters used:

$f = 5800 \text{ MHz}$ ;  $\sigma = 5.914 \text{ S/m}$ ;  $\epsilon_r = 47.336$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-03-2015; Ambient Temp: 22.1°C; Tissue Temp: 21.2°C

Probe: EX3DV4 - SN3589; ConvF(3.79, 3.79, 3.79); Calibrated: 1/22/2015;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 9/17/2014

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

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## 5800 MHz System Verification

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

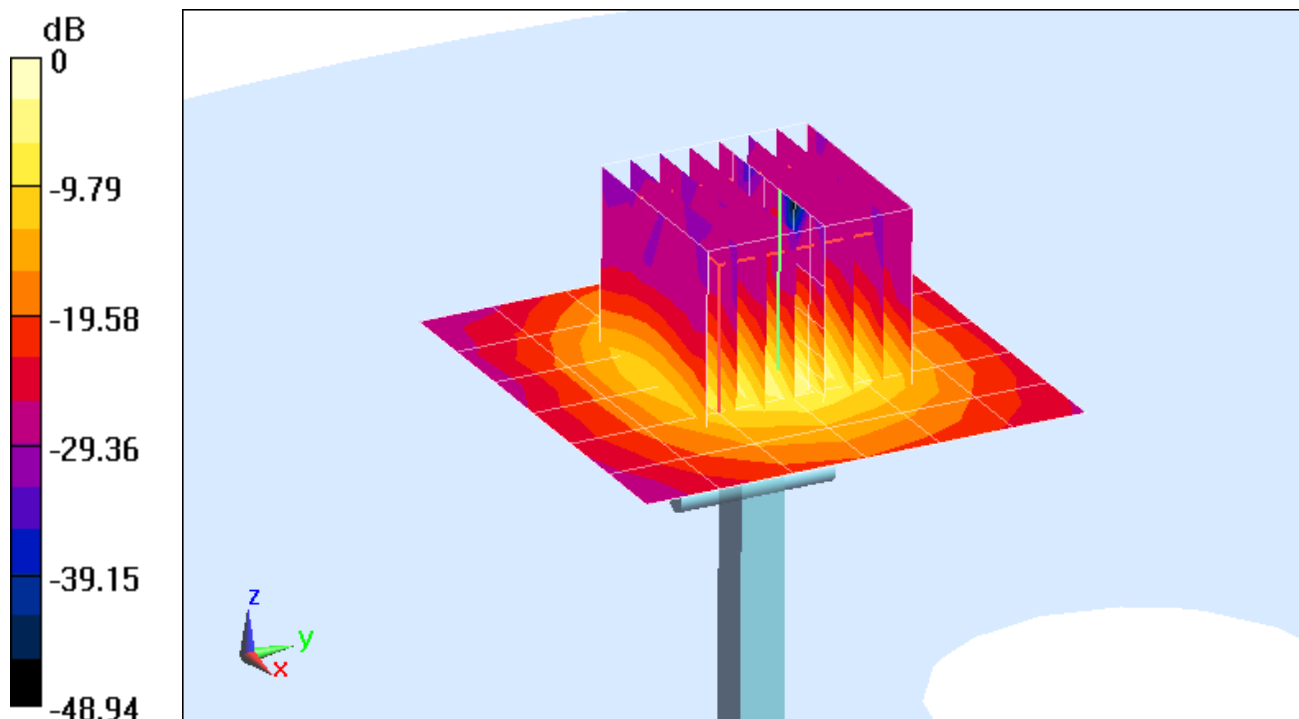
**Zoom Scan (8x8x7)/Cube 0:** Measurement grid:  $dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=1.4\text{mm}$ ; Graded Ratio: 1.4

Input Power: 17.0 dBm (50 mW)

Peak SAR (extrapolated) = 15.5 W/kg

**SAR(1 g) = 3.41 W/kg**

Deviation(1 g): -9.19%



0 dB = 8.24 W/kg = 9.16 dBW/kg

## APPENDIX C: PROBE CALIBRATION



Accreditation No.: **SCS 0108**

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

Certificate No: **D750V3-1003\_Jan15**

Client **PC Test**

## CALIBRATION CERTIFICATE

Object **D750V3 - SN: 1003**

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

CC  
2/3/15

Calibration date: **January 16, 2015**

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         | 07-Oct-14 (No. 217-02020)         | Oct-15                 |
| Power sensor HP 8481A       | US37292783         | 07-Oct-14 (No. 217-02020)         | Oct-15                 |
| Power sensor HP 8481A       | MY41092317         | 07-Oct-14 (No. 217-02021)         | Oct-15                 |
| 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-14 (No. ES3-3205_Dec14)    | Dec-15                 |
| DAE4                        | SN: 601            | 18-Aug-14 (No. DAE4-601_Aug14)    | Aug-15                 |
| 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-14) | In house check: Oct-15 |

Calibrated by: **Name** Michael Weber **Function** Laboratory Technician

Signature

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

Issued: January 19, 2015

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



Accredited by the Swiss Accreditation Service (SAS)  
The Swiss Accreditation Service is one of the signatories to the EA  
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

**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                  | V52.8.8     |
| Extrapolation                | Advanced Extrapolation |             |
| Phantom                      | Modular Flat Phantom   |             |
| Distance Dipole Center - TSL | 15 mm                  | with Spacer |
| Zoom Scan Resolution         | dx, dy, dz = 5 mm      |             |
| Frequency                    | 750 MHz $\pm$ 1 MHz    |             |

## Head TSL parameters

The following parameters and calculations were applied.

|                                         | Temperature         | Permittivity   | Conductivity         |
|-----------------------------------------|---------------------|----------------|----------------------|
| Nominal Head TSL parameters             | 22.0 °C             | 41.9           | 0.89 mho/m           |
| Measured Head TSL parameters            | (22.0 $\pm$ 0.2) °C | 41.7 $\pm$ 6 % | 0.91 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 | 2.06 W/kg                    |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | 8.09 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 | 1.35 W/kg                    |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 5.32 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             | 55.5           | 0.96 mho/m           |
| Measured Body TSL parameters            | (22.0 $\pm$ 0.2) °C | 56.0 $\pm$ 6 % | 0.99 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 | 2.16 W/kg                    |
| SAR for nominal Body TSL parameters                   | normalized to 1W   | 8.46 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 | 1.42 W/kg                    |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | 5.58 W/kg $\pm$ 16.5 % (k=2) |

## Appendix (Additional assessments outside the scope of SCS0108)

### Antenna Parameters with Head TSL

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 53.7 $\Omega$ - 1.4 j $\Omega$ |
| Return Loss                          | - 28.5 dB                      |

### Antenna Parameters with Body TSL

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 48.3 $\Omega$ - 3.8 j $\Omega$ |
| Return Loss                          | - 27.5 dB                      |

### General Antenna Parameters and Design

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.043 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 21, 2009 |

## DASY5 Validation Report for Head TSL

Date: 16.01.2015

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1003**

Communication System: UID 0 - CW; Frequency: 750 MHz

Medium parameters used:  $f = 750 \text{ MHz}$ ;  $\sigma = 0.91 \text{ S/m}$ ;  $\epsilon_r = 41.7$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.44, 6.44, 6.44); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

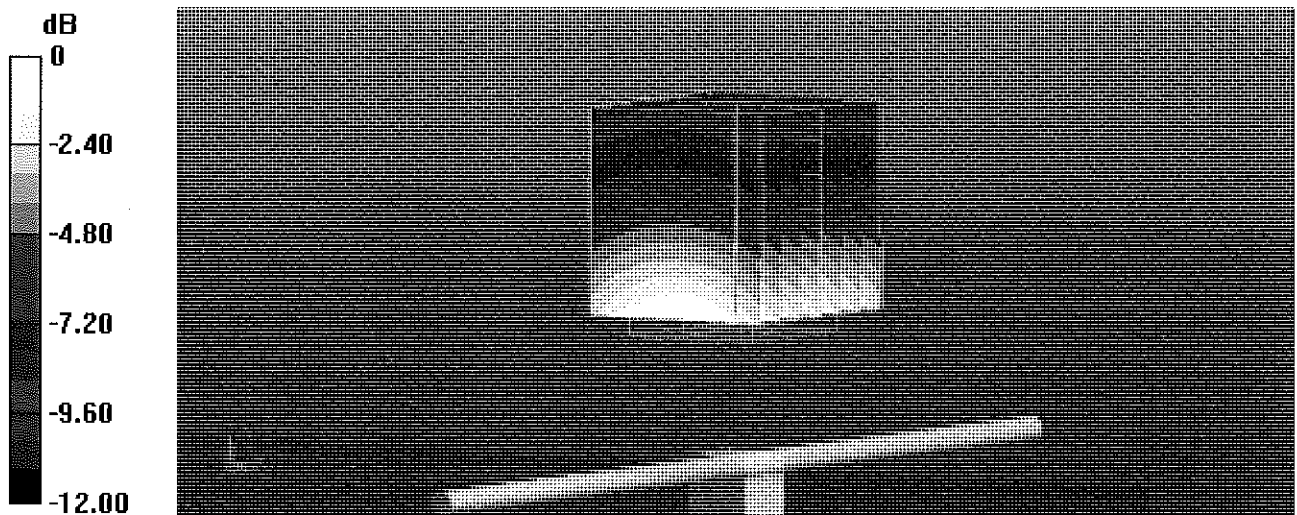
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 53.08 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 3.05 W/kg

**SAR(1 g) = 2.06 W/kg; SAR(10 g) = 1.35 W/kg**

Maximum value of SAR (measured) = 2.41 W/kg

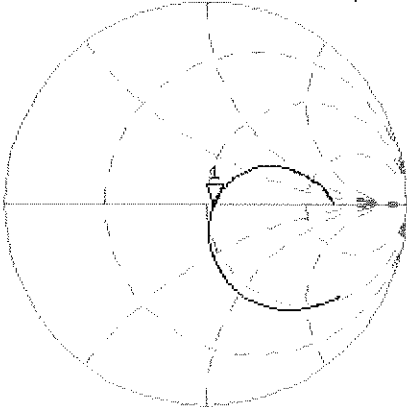


0 dB = 2.41 W/kg = 3.82 dBW/kg

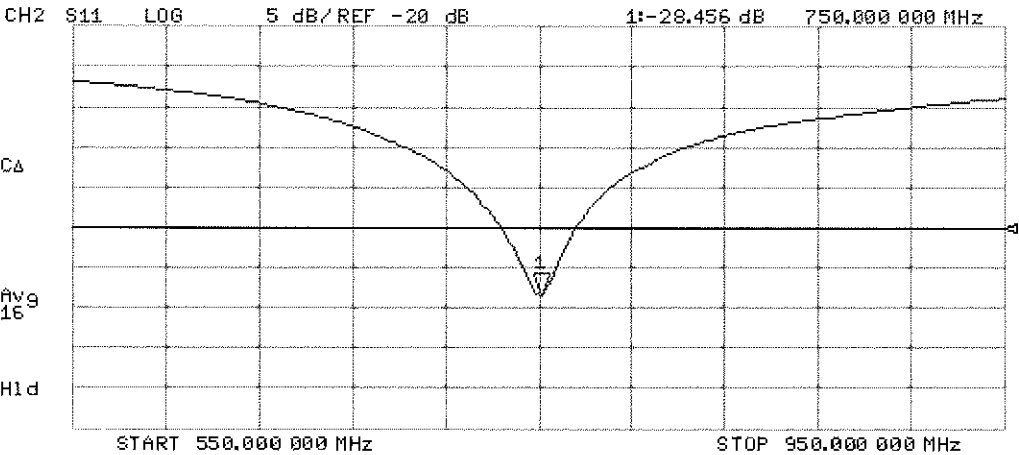
Impedance Measurement Plot for Head TSL

16 Jan 2015 16:07:22  
[CH1] S11 1 U FS 1: 53.666  $\Omega$  -1.3730  $\Delta$  154.55 pF 750.000 000 MHz

\*  
Del  
CA



Avg  
16  
H1d



## DASY5 Validation Report for Body TSL

Date: 16.01.2015

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1003**

Communication System: UID 0 - CW; Frequency: 750 MHz

Medium parameters used:  $f = 750$  MHz;  $\sigma = 0.99$  S/m;  $\epsilon_r = 56$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.21, 6.21, 6.21); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

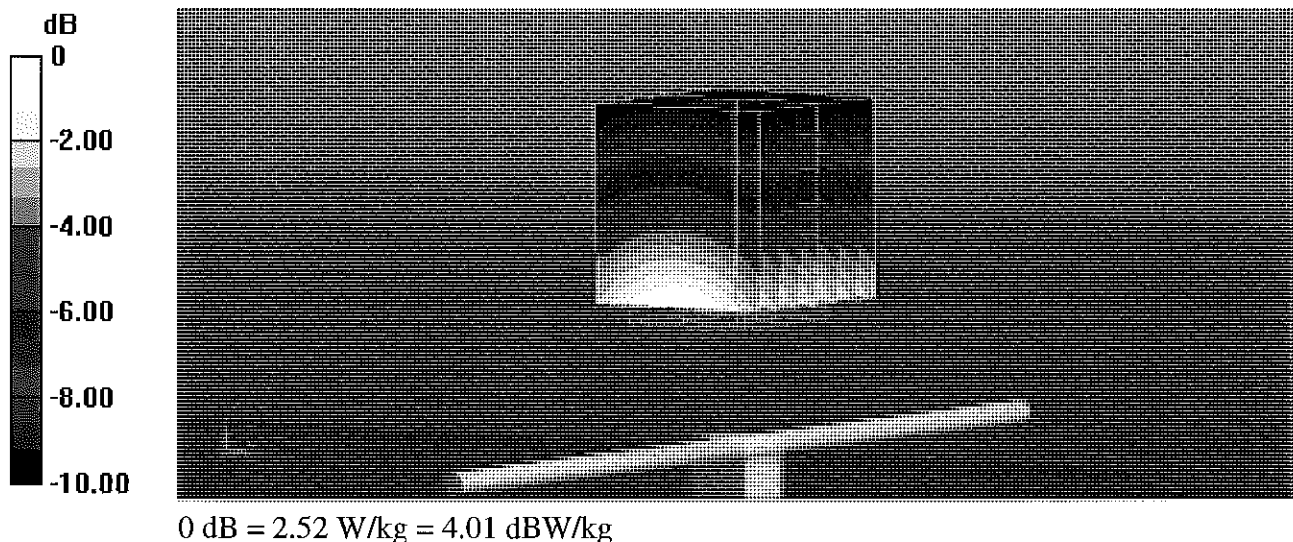
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 52.21 V/m; Power Drift = -0.00 dB

Peak SAR (extrapolated) = 3.16 W/kg

**SAR(1 g) = 2.16 W/kg; SAR(10 g) = 1.42 W/kg**

Maximum value of SAR (measured) = 2.52 W/kg

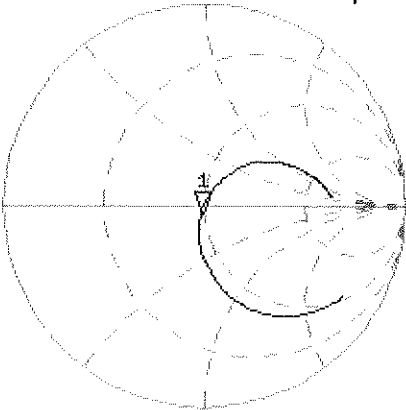


Impedance Measurement Plot for Body TSL

16 Jan 2015 13:37:35

CH1 S11 1 U FS 1: 48.268  $\Omega$  -3.7676  $\Omega$  56.324 pF 750.000 000 MHz

\*  
De1  
CA

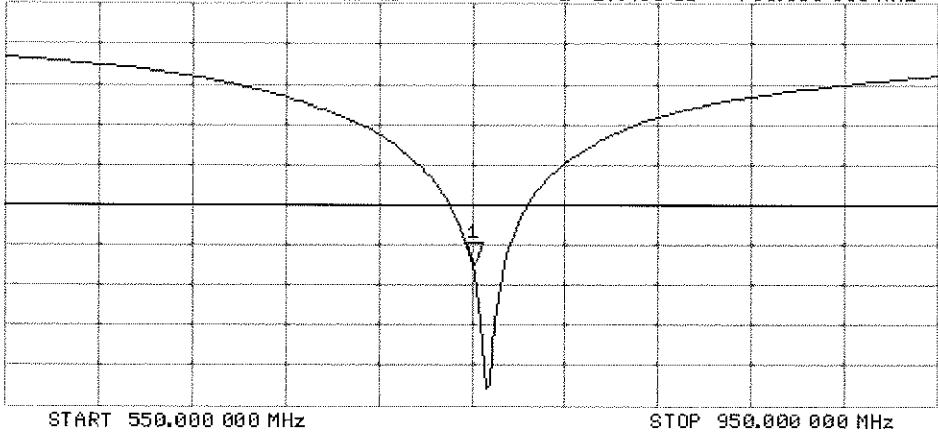


Avg  
16  
H1d

CH2 S11 LOG 5 dB/REF -20 dB 1:-27.498 dB 750.000 000 MHz

CA

Avg  
16  
H1d





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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **PC Test**

Certificate No: **D835V2-4d133\_Jul14**

## CALIBRATION CERTIFICATE

Object **D835V2 - SN: 4d133**

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

CC  
W/CM

Calibration date: **July 24, 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            | 30-Apr-14 (No. DAE4-601_Apr14) | Apr-15                |

| 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 8763E | US37390585 S4206 | 18-Oct-01 (in house check Oct-13) | In house check: Oct-14 |

Calibrated by: **Name** **Function**  
**Jeton Kastrali** **Laboratory Technician**

Signature

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

Issued: July 24, 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:**

- 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                  | V52.8.8     |
| Extrapolation                | Advanced Extrapolation |             |
| Phantom                      | Modular Flat Phantom   |             |
| Distance Dipole Center - TSL | 15 mm                  | with Spacer |
| Zoom Scan Resolution         | dx, dy, dz = 5 mm      |             |
| Frequency                    | 835 MHz $\pm$ 1 MHz    |             |

## Head TSL parameters

The following parameters and calculations were applied.

|                                         | Temperature         | Permittivity   | Conductivity         |
|-----------------------------------------|---------------------|----------------|----------------------|
| Nominal Head TSL parameters             | 22.0 °C             | 41.5           | 0.90 mho/m           |
| Measured Head TSL parameters            | (22.0 $\pm$ 0.2) °C | 41.1 $\pm$ 6 % | 0.94 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   | 9.20 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 | 1.53 W/kg                    |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 5.96 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 | 53.8 $\pm$ 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   | 9.35 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 (Additional assessments outside the scope of SCS108)

### Antenna Parameters with Head TSL

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 51.6 $\Omega$ - 1.0 j $\Omega$ |
| Return Loss                          | - 34.7 dB                      |

### Antenna Parameters with Body TSL

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 47.8 $\Omega$ - 3.3 j $\Omega$ |
| Return Loss                          | - 27.8 dB                      |

### General Antenna Parameters and Design

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.395 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: 24.07.2014

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d133**

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

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.94 \text{ S/m}$ ;  $\epsilon_r = 41.1$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

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: 30.04.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

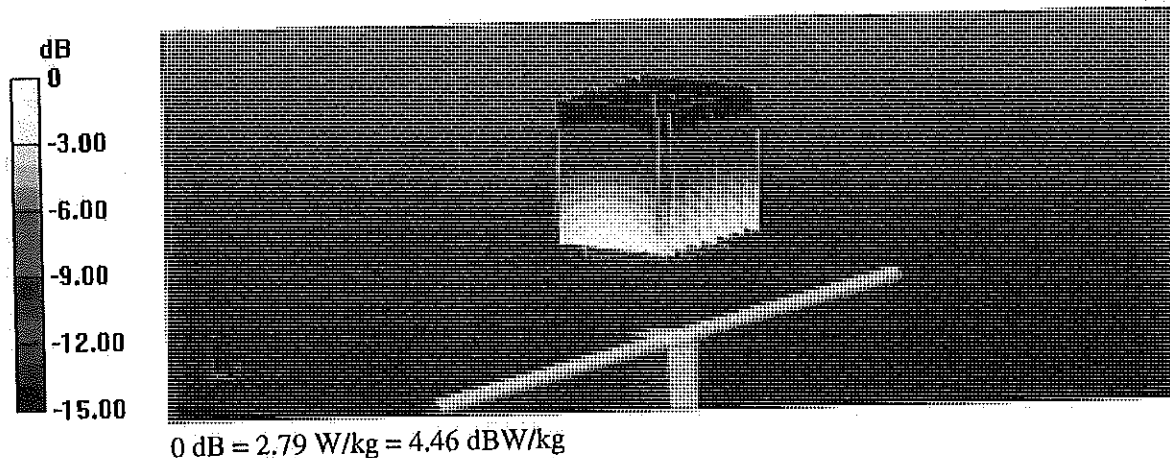
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 56.07 V/m; Power Drift = 0.03 dB

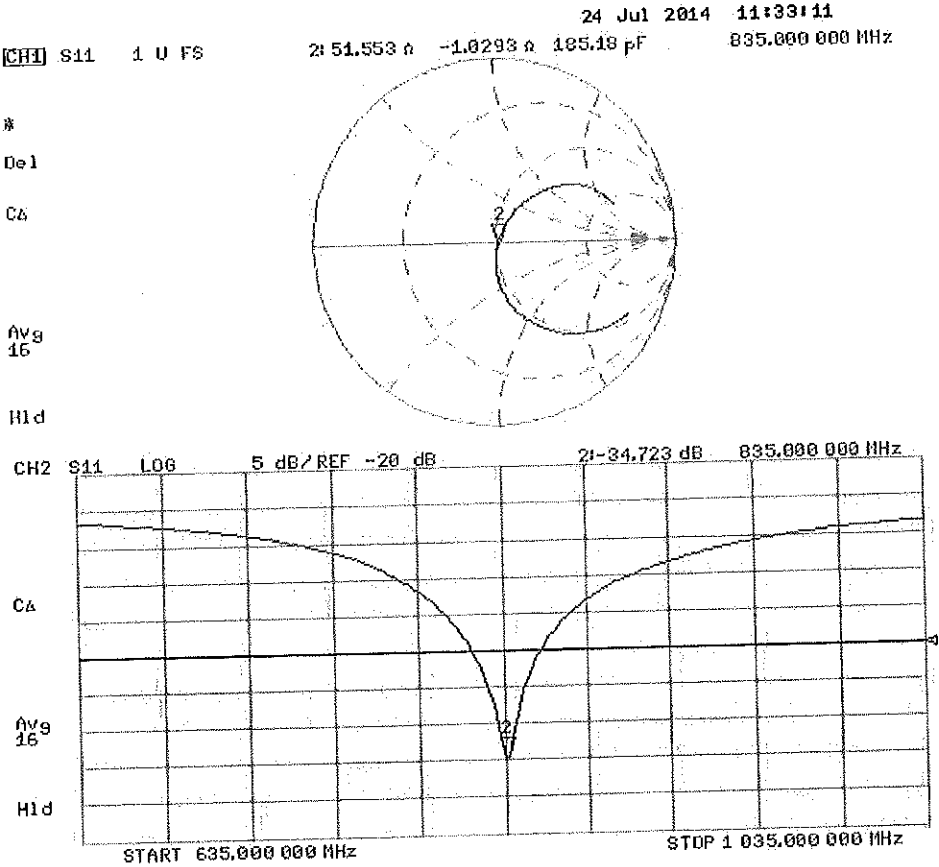
Peak SAR (extrapolated) = 3.58 W/kg

**SAR(1 g) = 2.38 W/kg; SAR(10 g) = 1.53 W/kg**

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



Impedance Measurement Plot for Head TSL



## DASY5 Validation Report for Body TSL

Date: 17.07.2014

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d133**

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

Medium parameters used:  $f = 835$  MHz;  $\sigma = 1.02$  S/m;  $\epsilon_r = 53.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

### 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: 30.04.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

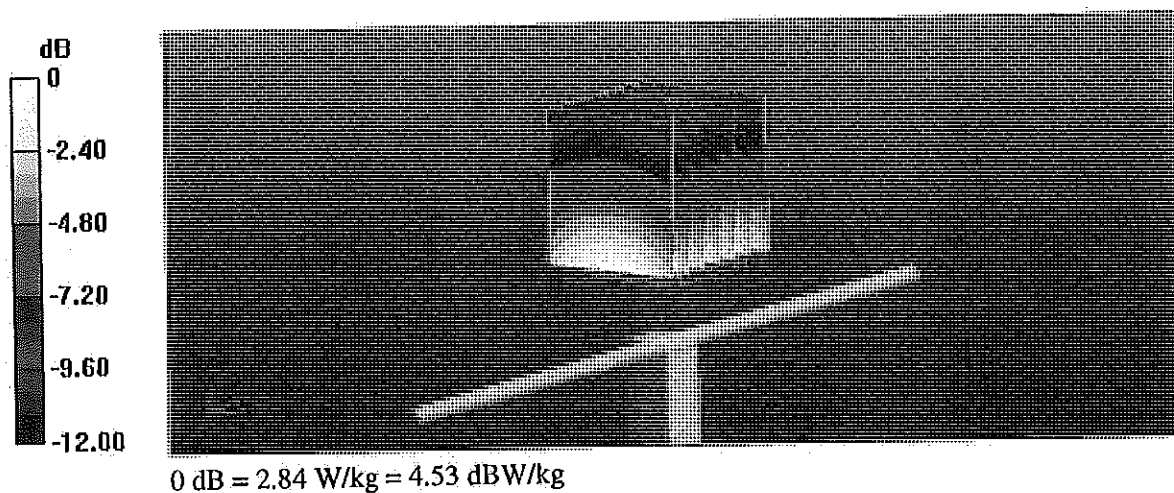
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 54.61 V/m; Power Drift = -0.01 dB

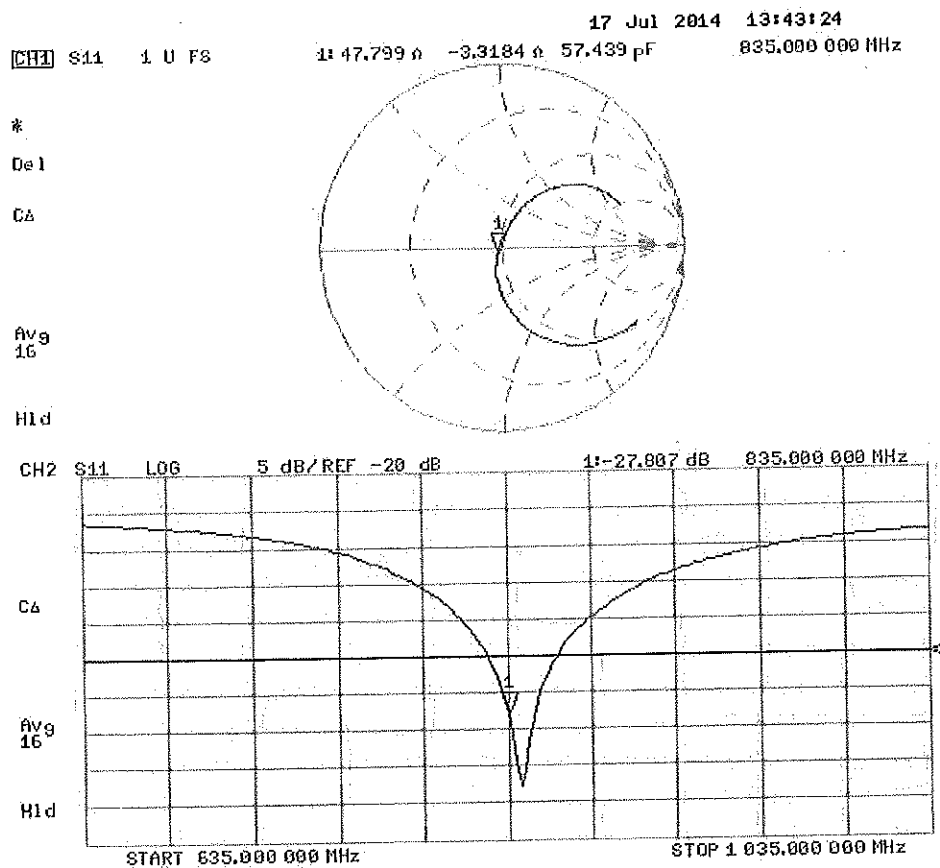
Peak SAR (extrapolated) = 3.59 W/kg

**SAR(1 g) = 2.44 W/kg; SAR(10 g) = 1.59 W/kg**

Maximum value of SAR (measured) = 2.84 W/kg



# Impedance Measurement Plot for Body TSL





Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 0108**

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: **D1750V2-1051\_Apr15**

## CALIBRATION CERTIFICATE

Object **D1750V2 - SN:1051**

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

PM ✓  
 4/29/15

Calibration date: **April 15, 2015**

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         | 07-Oct-14 (No. 217-02020)         | Oct-15                 |
| Power sensor HP 8481A       | US37292783         | 07-Oct-14 (No. 217-02020)         | Oct-15                 |
| Power sensor HP 8481A       | MY41092317         | 07-Oct-14 (No. 217-02021)         | Oct-15                 |
| Reference 20 dB Attenuator  | SN: 5058 (20k)     | 01-Apr-15 (No. 217-02131)         | Mar-16                 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 01-Apr-15 (No. 217-02134)         | Mar-16                 |
| Reference Probe ES3DV3      | SN: 3205           | 30-Dec-14 (No. ES3-3205_Dec14)    | Dec-15                 |
| DAE4                        | SN: 601            | 18-Aug-14 (No. DAE4-601_Aug14)    | Aug-15                 |
| 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-14) | In house check: Oct-15 |

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

Signature

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

Issued: April 15, 2015

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Accreditation No.: **SCS 0108**

**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                  | V52.8.8     |
| Extrapolation                | Advanced Extrapolation |             |
| Phantom                      | Modular Flat Phantom   |             |
| Distance Dipole Center - TSL | 10 mm                  | with Spacer |
| Zoom Scan Resolution         | dx, dy, dz = 5 mm      |             |
| Frequency                    | 1750 MHz $\pm$ 1 MHz   |             |

## Head TSL parameters

The following parameters and calculations were applied.

|                                         | Temperature         | Permittivity   | Conductivity         |
|-----------------------------------------|---------------------|----------------|----------------------|
| Nominal Head TSL parameters             | 22.0 °C             | 40.1           | 1.37 mho/m           |
| Measured Head TSL parameters            | (22.0 $\pm$ 0.2) °C | 38.9 $\pm$ 6 % | 1.35 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 | 9.04 W/kg                    |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | 36.2 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 | 4.80 W/kg                    |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 19.2 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             | 53.4           | 1.49 mho/m           |
| Measured Body TSL parameters            | (22.0 $\pm$ 0.2) °C | 51.5 $\pm$ 6 % | 1.48 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 | 9.32 W/kg                    |
| SAR for nominal Body TSL parameters                   | normalized to 1W   | 37.1 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 | 5.01 W/kg                    |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | 20.0 W/kg $\pm$ 16.5 % (k=2) |

## Appendix (Additional assessments outside the scope of SCS 0108)

### Antenna Parameters with Head TSL

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 51.3 $\Omega$ - 0.2 j $\Omega$ |
| Return Loss                          | - 37.5 dB                      |

### Antenna Parameters with Body TSL

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 46.9 $\Omega$ + 0.3 j $\Omega$ |
| Return Loss                          | - 29.9 dB                      |

### General Antenna Parameters and Design

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.221 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 | February 19, 2010 |

## DASY5 Validation Report for Head TSL

Date: 15.04.2015

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN:1051**

Communication System: UID 0 - CW; Frequency: 1750 MHz

Medium parameters used:  $f = 1750$  MHz;  $\sigma = 1.35$  S/m;  $\epsilon_r = 38.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.2, 5.2, 5.2); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

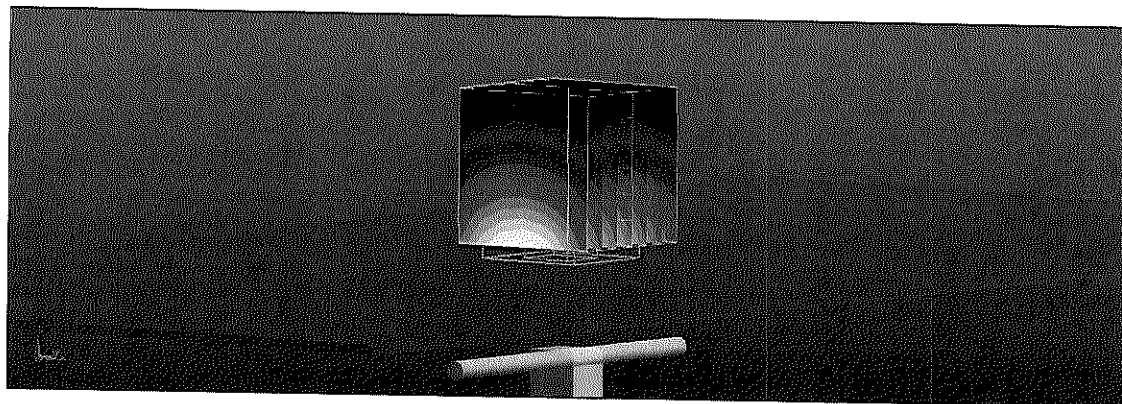
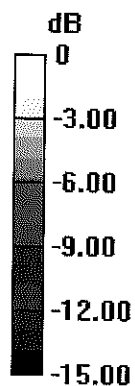
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 94.99 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 16.3 W/kg

**SAR(1 g) = 9.04 W/kg; SAR(10 g) = 4.8 W/kg**

Maximum value of SAR (measured) = 11.5 W/kg

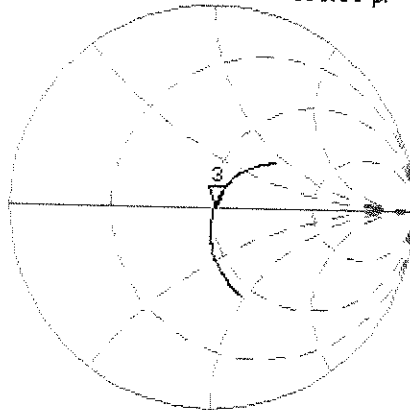


0 dB = 11.5 W/kg = 10.61 dBW/kg

# Impedance Measurement Plot for Head TSL

CH1 S11 1 U FS 15 Apr 2015 12:25:31  
 3: 51.330  $\Omega$  -248.05 m $\Omega$  365.65 pF 1 750.000 000 MHz

\*  
 Del  
 C $\Delta$



Avg  
 15

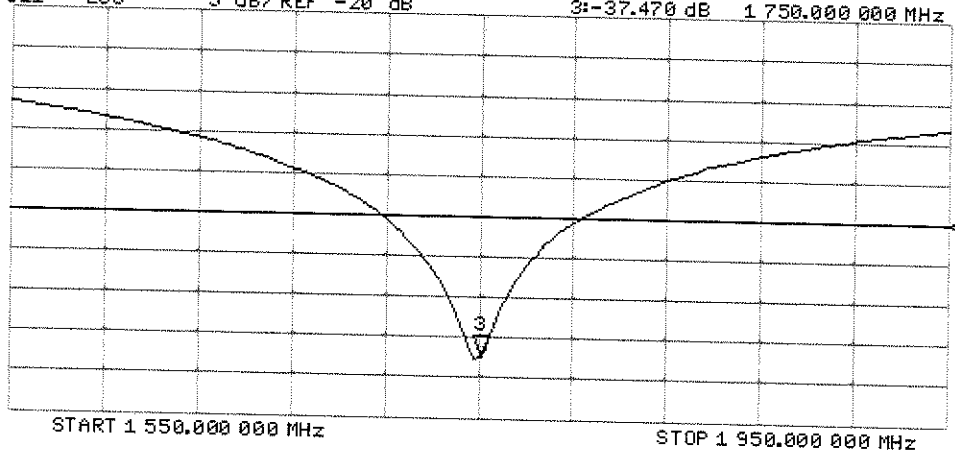
H1d

CH2 S11 LOG 5 dB/REF -20 dB 3:-37.470 dB 1 750.000 000 MHz

C $\Delta$

Avg  
 15

H1d



## DASY5 Validation Report for Body TSL

Date: 15.04.2015

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN:1051**

Communication System: UID 0 - CW; Frequency: 1750 MHz

Medium parameters used:  $f = 1750$  MHz;  $\sigma = 1.48$  S/m;  $\epsilon_r = 51.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.88, 4.88, 4.88); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

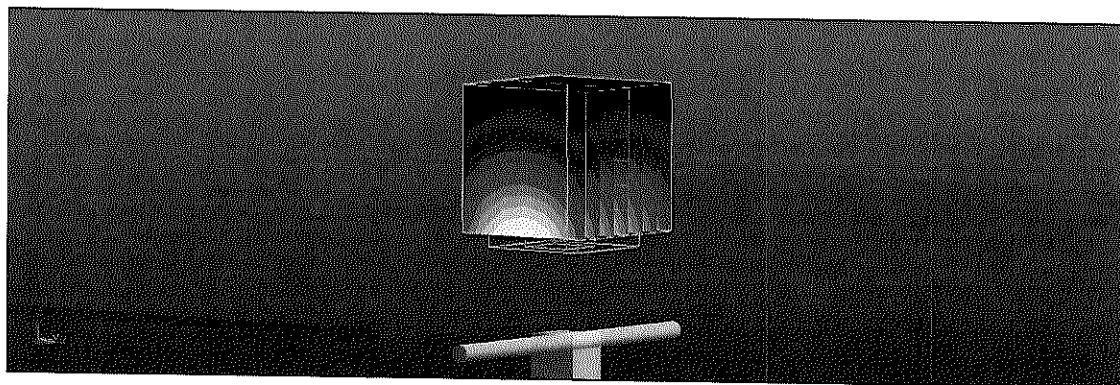
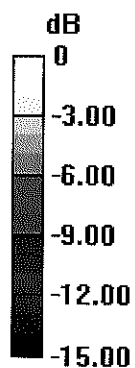
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 92.87 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 16.0 W/kg

**SAR(1 g) = 9.32 W/kg; SAR(10 g) = 5.01 W/kg**

Maximum value of SAR (measured) = 11.7 W/kg

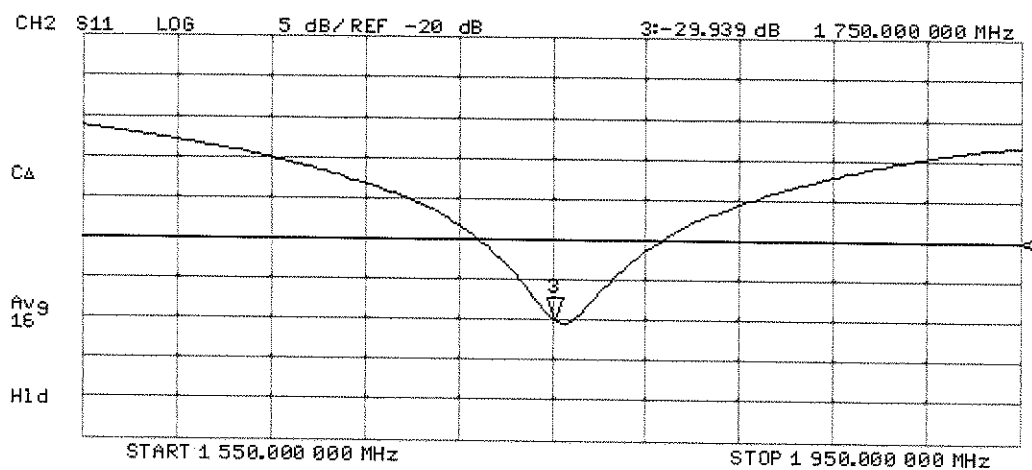
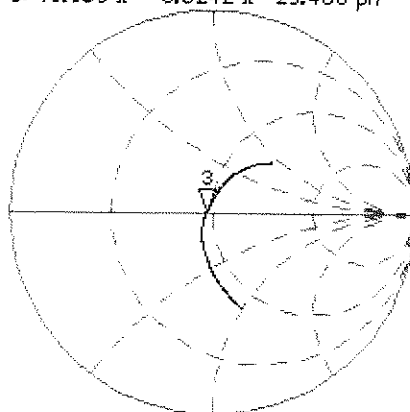


0 dB = 11.7 W/kg = 10.68 dBW/kg

# Impedance Measurement Plot for Body TSL

15 Apr 2015 12:23:57  
 [CH1] S11 1 U FS 3: 46.930  $\Omega$  0.3242  $\Omega$  29.486 pH 1 750.000 000 MHz

\*  
 Del  
 Ca  
 Avg  
 16  
 H1d





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 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **D1900V2-5d148\_Feb15**

## CALIBRATION CERTIFICATE

Object **D1900V2 - SN: 5d148**

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

CC ✓  
 3/6/15

Calibration date: **February 18, 2015**

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         | 07-Oct-14 (No. 217-02020)         | Oct-15                 |
| Power sensor HP 8481A       | US37292783         | 07-Oct-14 (No. 217-02020)         | Oct-15                 |
| Power sensor HP 8481A       | MY41092317         | 07-Oct-14 (No. 217-02021)         | Oct-15                 |
| 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-14 (No. ES3-3205_Dec14)    | Dec-15                 |
| DAE4                        | SN: 601            | 18-Aug-14 (No. DAE4-601_Aug14)    | Aug-15                 |
| 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-14) | In house check: Oct-15 |

Calibrated by: **Michael Weber**      Name: **Michael Weber**      Function: **Laboratory Technician**

Signature

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

Issued: February 18, 2015

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 0108**

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

**Glossary:**

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

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

- IEEE Std 1528-2013, "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                  | V52.8.8     |
| Extrapolation                | Advanced Extrapolation |             |
| Phantom                      | Modular Flat Phantom   |             |
| Distance Dipole Center - TSL | 10 mm                  | with Spacer |
| Zoom Scan Resolution         | dx, dy, dz = 5 mm      |             |
| Frequency                    | 1900 MHz $\pm$ 1 MHz   |             |

## Head TSL parameters

The following parameters and calculations were applied.

|                                         | Temperature         | Permittivity   | Conductivity         |
|-----------------------------------------|---------------------|----------------|----------------------|
| Nominal Head TSL parameters             | 22.0 °C             | 40.0           | 1.40 mho/m           |
| Measured Head TSL parameters            | (22.0 $\pm$ 0.2) °C | 39.1 $\pm$ 6 % | 1.42 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 | 10.3 W/kg                    |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | 40.6 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 | 5.37 W/kg                    |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 21.3 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             | 53.3           | 1.52 mho/m           |
| Measured Body TSL parameters            | (22.0 $\pm$ 0.2) °C | 53.1 $\pm$ 6 % | 1.53 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 | 10.1 W/kg                    |
| SAR for nominal Body TSL parameters                   | normalized to 1W   | 40.2 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 | 5.40 W/kg                    |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | 21.5 W/kg $\pm$ 16.5 % (k=2) |

## Appendix (Additional assessments outside the scope of SCS0108)

### Antenna Parameters with Head TSL

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 52.4 $\Omega$ + 6.2 j $\Omega$ |
| Return Loss                          | - 23.8 dB                      |

### Antenna Parameters with Body TSL

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 48.2 $\Omega$ + 6.6 j $\Omega$ |
| Return Loss                          | - 23.1 dB                      |

### General Antenna Parameters and Design

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.198 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: 18.02.2015

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d148**

Communication System: UID 0 - CW; Frequency: 1900 MHz

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.42$  S/m;  $\epsilon_r = 39.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5, 5, 5); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

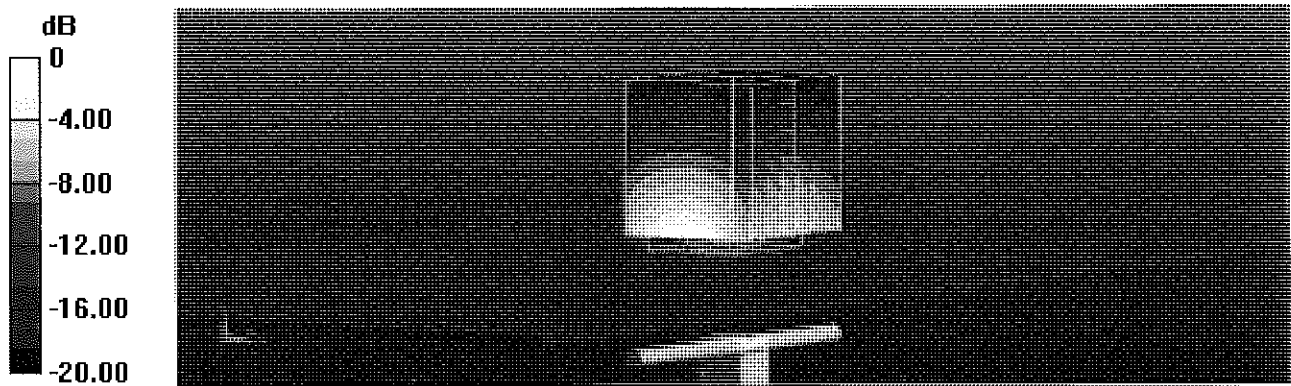
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 98.30 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 18.8 W/kg

**SAR(1 g) = 10.3 W/kg; SAR(10 g) = 5.37 W/kg**

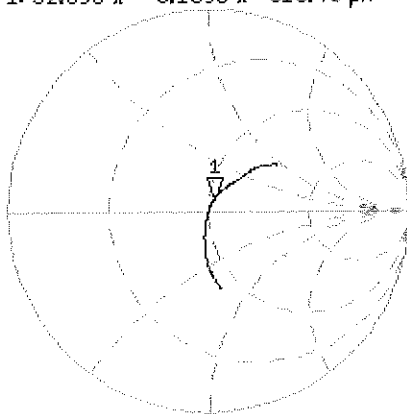
Maximum value of SAR (measured) = 13.0 W/kg



# Impedance Measurement Plot for Head TSL

18 Feb 2015 13:12:24  
 CH1 S11 1 U FS 1: 52.393  $\Omega$  6.1895  $\Omega$  518.46  $\mu\text{H}$  1 900.000 000 MHz

\*  
 Del  
 CA



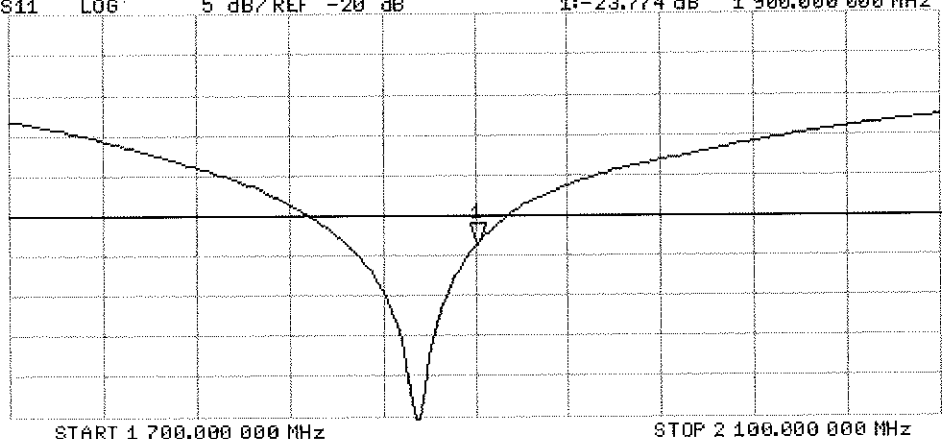
Avg  
 16  
 H1d

CH2 S11 LOG 5 dB/REF -20 dB 1: -23.774 dB 1 900.000 000 MHz

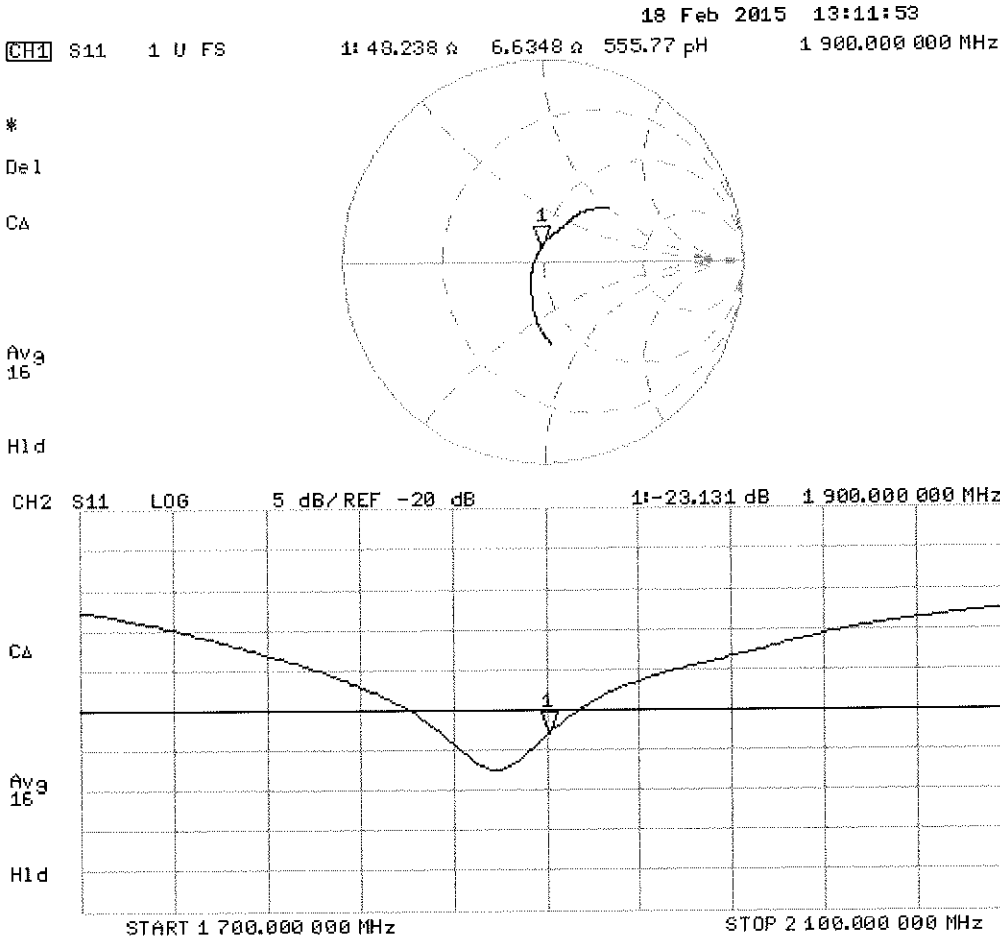
CA

Avg  
 16

H1d



Impedance Measurement Plot for Body TSL



## DASY5 Validation Report for Body TSL

Date: 18.02.2015

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d148**

Communication System: UID 0 - CW; Frequency: 1900 MHz

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.53$  S/m;  $\epsilon_r = 53.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.65, 4.65, 4.65); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

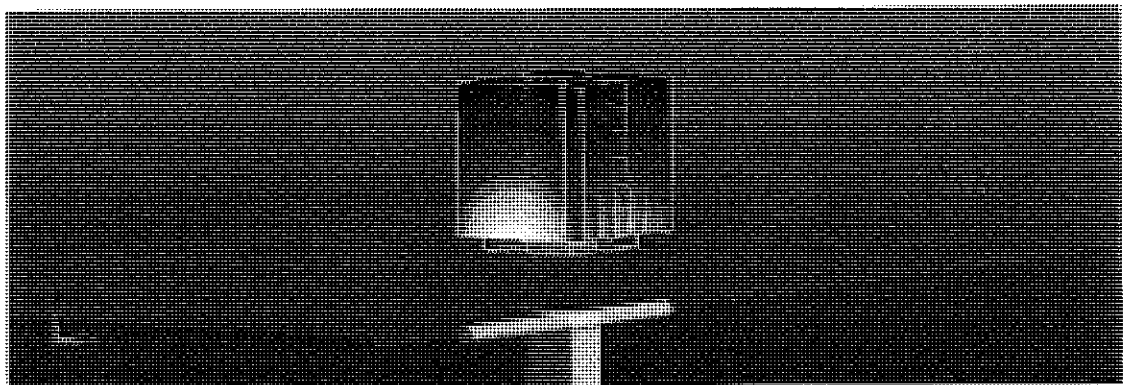
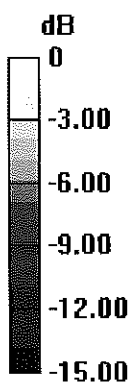
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 95.79 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 17.2 W/kg

**SAR(1 g) = 10.1 W/kg; SAR(10 g) = 5.4 W/kg**

Maximum value of SAR (measured) = 12.7 W/kg



0 dB = 12.7 W/kg = 11.04 dBW/kg



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Accreditation No.: **SCS 108**

Client **PC Test**

Certificate No: **D2450V2-719\_Aug14**

## CALIBRATION CERTIFICATE

Object **D2450V2 - SN: 719**

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

Calibration date: **August 11, 2014**

✓ KOK  
9/8/14

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 ( $22 \pm 3$ )°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            | 30-Apr-14 (No. DAE4-601_Apr14)    | Apr-15                 |
| 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: **Michael Weber** Function: **Laboratory Technician**

Signature

*M. Weber*

Approved by: **Katja Pokovic** Technical Manager

*Katja Pokovic*

Issued: August 12, 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.

|                                     |                        |             |
|-------------------------------------|------------------------|-------------|
| <b>DASY Version</b>                 | DASY5                  | V52.8.8     |
| <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>                    | 2450 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             | 39.2           | 1.80 mho/m           |
| <b>Measured Head TSL parameters</b>            | (22.0 $\pm$ 0.2) °C | 38.0 $\pm$ 6 % | 1.82 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 | 13.2 W/kg                                      |
| SAR for nominal Head TSL parameters                         | normalized to 1W   | <b>52.1 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 | 6.09 W/kg                                      |
| SAR for nominal Head TSL parameters                           | normalized to 1W   | <b>24.2 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             | 52.7           | 1.95 mho/m           |
| <b>Measured Body TSL parameters</b>            | (22.0 $\pm$ 0.2) °C | 50.5 $\pm$ 6 % | 2.02 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 | 13.3 W/kg                                      |
| SAR for nominal Body TSL parameters                         | normalized to 1W   | <b>51.8 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 | 6.10 W/kg                                      |
| SAR for nominal Body TSL parameters                           | normalized to 1W   | <b>24.0 W/kg <math>\pm</math> 16.5 % (k=2)</b> |

## Appendix (Additional assessments outside the scope of SCS108)

### Antenna Parameters with Head TSL

|                                      |                             |
|--------------------------------------|-----------------------------|
| Impedance, transformed to feed point | $54.9 \Omega + 3.0 j\Omega$ |
| Return Loss                          | - 25.2 dB                   |

### Antenna Parameters with Body TSL

|                                      |                             |
|--------------------------------------|-----------------------------|
| Impedance, transformed to feed point | $50.9 \Omega + 5.8 j\Omega$ |
| Return Loss                          | - 24.7 dB                   |

### General Antenna Parameters and Design

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.149 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 | September 10, 2002 |

## DASY5 Validation Report for Head TSL

Date: 11.08.2014

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 719**

Communication System: UID 0 - CW; Frequency: 2450 MHz

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.82$  S/m;  $\epsilon_r = 38$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

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: 30.04.2014
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

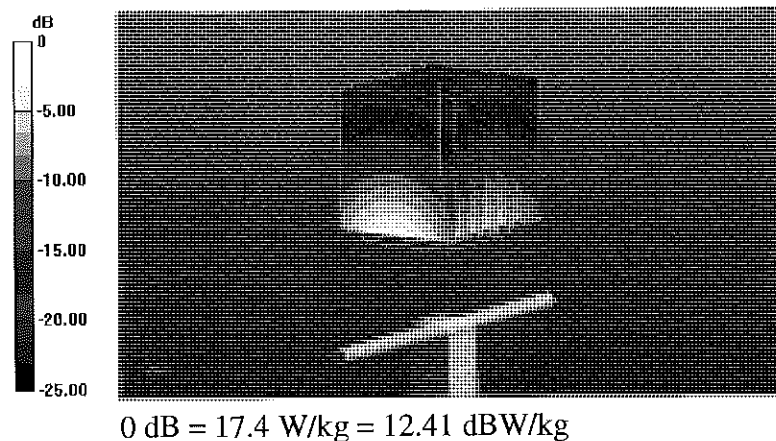
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 101.6 V/m; Power Drift = 0.03 dB

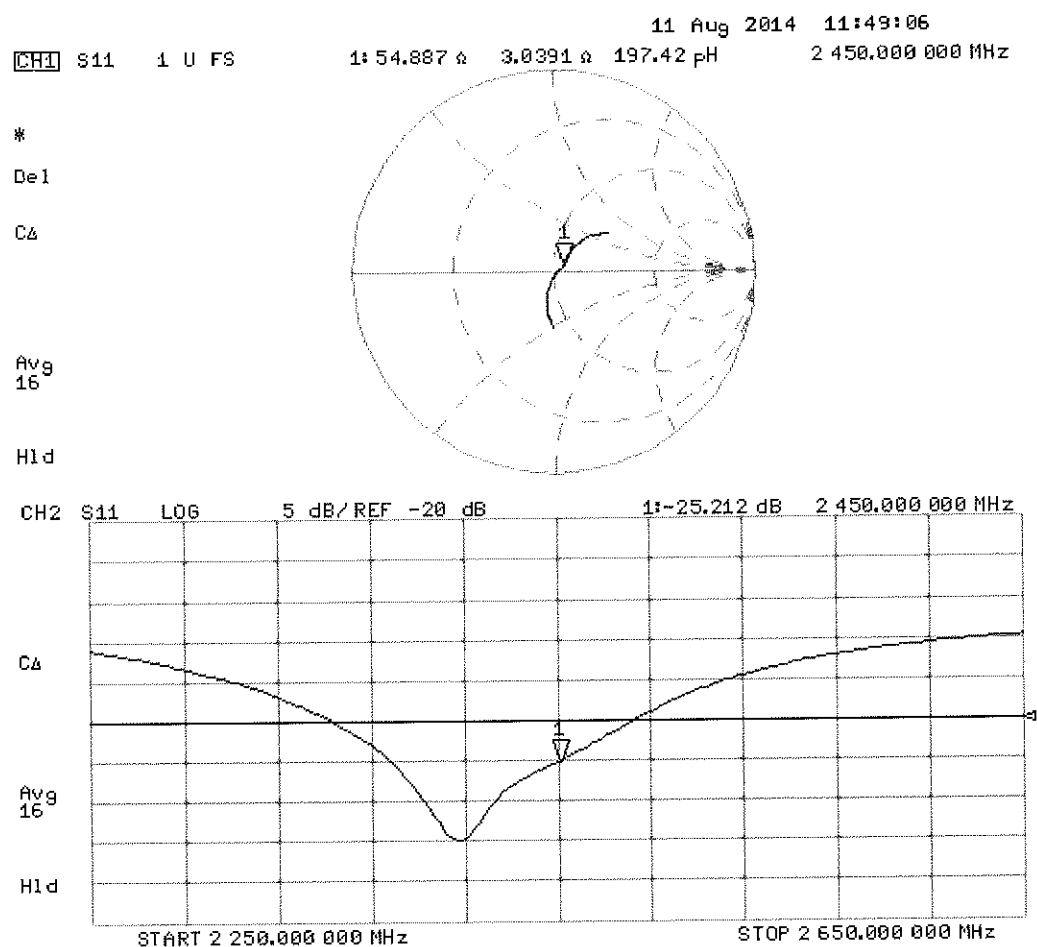
Peak SAR (extrapolated) = 27.5 W/kg

**SAR(1 g) = 13.2 W/kg; SAR(10 g) = 6.09 W/kg**

Maximum value of SAR (measured) = 17.4 W/kg



# Impedance Measurement Plot for Head TSL



## DASY5 Validation Report for Body TSL

Date: 11.08.2014

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 719**

Communication System: UID 0 - CW; Frequency: 2450 MHz

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 2.02$  S/m;  $\epsilon_r = 50.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

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: 30.04.2014
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

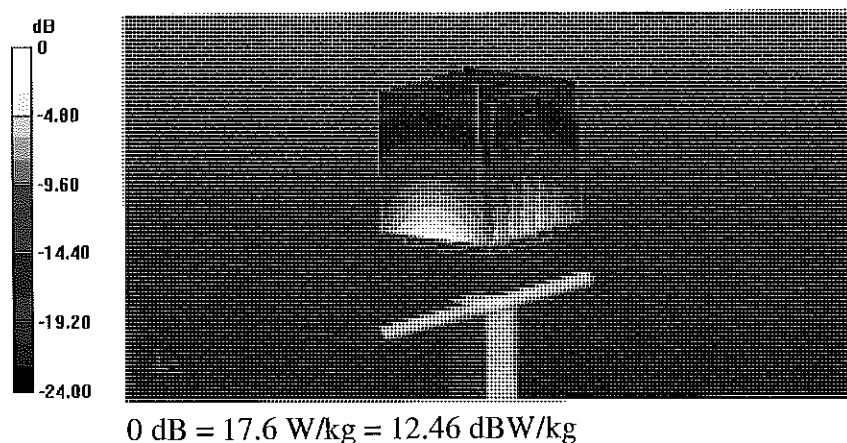
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.08 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 27.9 W/kg

**SAR(1 g) = 13.3 W/kg; SAR(10 g) = 6.1 W/kg**

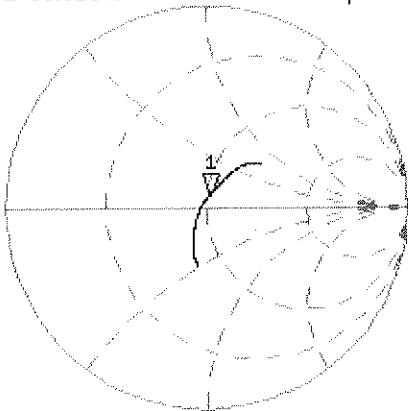
Maximum value of SAR (measured) = 17.6 W/kg



Impedance Measurement Plot for Body TSL

11 Aug 2014 11:48:32  
[CH1] S11 1 U FS 1: 50.928  $\angle$  5.8223  $\angle$  378.22 pH 2 450.000 000 MHz

\*  
De1  
CA



Avg  
15

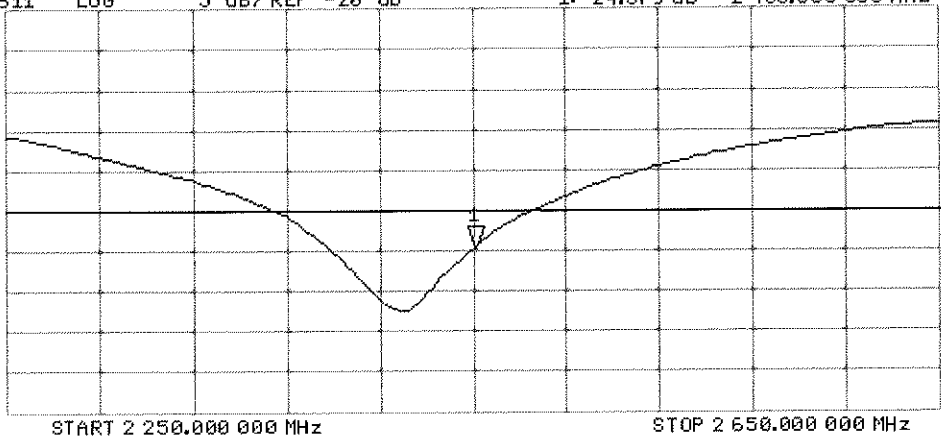
H1d

CH2 S11 LOG 5 dB/REF -20 dB 1: -24.679 dB 2 450.000 000 MHz

CA

Avg  
15

H1d





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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 0108**

Client **PC Test**

Certificate No: **D5GHzV2-1057\_Jan15**

## CALIBRATION CERTIFICATE

Object **D5GHzV2 - SN:1057**

Calibration procedure(s) **QA CAL-22.v2**  
**Calibration procedure for dipole validation kits between 3-6 GHz**

CC  
2/3/15

Calibration date: **January 21, 2015**

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         | 07-Oct-14 (No. 217-02020)         | Oct-15                 |
| Power sensor HP 8481A       | US37292783         | 07-Oct-14 (No. 217-02020)         | Oct-15                 |
| Power sensor HP 8481A       | MY41092317         | 07-Oct-14 (No. 217-02021)         | Oct-15                 |
| 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 EX3DV4      | SN: 3503           | 30-Dec-14 (No. EX3-3503_Dec14)    | Dec-15                 |
| DAE4                        | SN: 601            | 18-Aug-14 (No. DAE4-601_Aug14)    | Aug-15                 |
| 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-14) | In house check: Oct-15 |

Calibrated by: **Name** Michael Weber **Function** Laboratory Technician

Signature

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

Issued: January 22, 2015

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



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Accreditation No.: **SCS 0108**

**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                                                                                                                | V52.8.8                          |
| <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 | 36.3 $\pm$ 6 % | 4.56 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 | 8.14 W/kg                                      |
| SAR for nominal Head TSL parameters                         | normalized to 1W   | <b>81.5 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 | 2.31 W/kg                                      |
| SAR for nominal Head TSL parameters                           | normalized to 1W   | <b>23.1 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 | 36.1 ± 6 %   | 4.66 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 | 8.47 W/kg                         |
| SAR for nominal Head TSL parameters                         | normalized to 1W   | <b>84.7 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 | 2.41 W/kg                       |
| SAR for nominal Head TSL parameters                           | normalized to 1W   | <b>24.1 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 | 35.9 ± 6 %   | 4.86 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 | 8.43 W/kg                       |
| SAR for nominal Head TSL parameters                         | normalized to 1W   | <b>84.3 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 | 2.38 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 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 | 35.6 ± 6 %   | 4.97 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 | 8.38 W/kg                       |
| SAR for nominal Head TSL parameters                         | normalized to 1W   | <b>83.8 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 | 2.37 W/kg                       |
| SAR for nominal Head TSL parameters                           | normalized to 1W   | <b>23.7 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 | 35.4 ± 6 %   | 5.18 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 | 8.11 W/kg                       |
| SAR for nominal Head TSL parameters                         | normalized to 1W   | <b>81.1 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 | 2.29 W/kg                       |
| SAR for nominal Head TSL parameters                           | normalized to 1W   | <b>22.9 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 | 49.4 ± 6 %   | 5.42 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 | 7.37 W/kg                       |
| SAR for nominal Body TSL parameters                         | normalized to 1W   | <b>73.9 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 | 2.05 W/kg                       |
| SAR for nominal Body TSL parameters                           | normalized to 1W   | <b>20.6 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 | 49.2 ± 6 %   | 5.55 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 | 7.41 W/kg                       |
| SAR for nominal Body TSL parameters                         | normalized to 1W   | <b>74.2 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 | 2.08 W/kg                       |
| SAR for nominal Body TSL parameters                           | normalized to 1W   | <b>20.9 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 | 48.9 ± 6 %   | 5.82 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 | 7.90 W/kg                       |
| SAR for nominal Body TSL parameters                         | normalized to 1W   | <b>79.2 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 | 2.19 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 | 48.7 ± 6 %   | 5.96 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>77.7 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 | 2.14 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 | 48.4 ± 6 %   | 6.25 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 | 7.49 W/kg                       |
| SAR for nominal Body TSL parameters                         | normalized to 1W   | <b>75.1 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 | 2.06 W/kg                       |
| SAR for nominal Body TSL parameters                           | normalized to 1W   | <b>20.6 W/kg ± 19.5 % (k=2)</b> |

## Appendix (Additional assessments outside the scope of SCS0108)

### Antenna Parameters with Head TSL at 5200 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 49.0 $\Omega$ - 9.4 j $\Omega$ |
| Return Loss                          | - 20.4 dB                      |

### Antenna Parameters with Head TSL at 5300 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 48.3 $\Omega$ - 4.2 j $\Omega$ |
| Return Loss                          | - 26.8 dB                      |

### Antenna Parameters with Head TSL at 5500 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 49.2 $\Omega$ - 5.0 j $\Omega$ |
| Return Loss                          | - 25.9 dB                      |

### Antenna Parameters with Head TSL at 5600 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 54.4 $\Omega$ - 4.8 j $\Omega$ |
| Return Loss                          | - 24.1 dB                      |

### Antenna Parameters with Head TSL at 5800 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 51.8 $\Omega$ - 2.6 j $\Omega$ |
| Return Loss                          | - 30.1 dB                      |

### Antenna Parameters with Body TSL at 5200 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 48.2 $\Omega$ - 8.4 j $\Omega$ |
| Return Loss                          | - 21.2 dB                      |

### Antenna Parameters with Body TSL at 5300 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 48.6 $\Omega$ - 3.6 j $\Omega$ |
| Return Loss                          | - 28.2 dB                      |

### Antenna Parameters with Body TSL at 5500 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 49.4 $\Omega$ - 4.1 j $\Omega$ |
| Return Loss                          | - 27.6 dB                      |

### Antenna Parameters with Body TSL at 5600 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 55.1 $\Omega$ - 4.0 j $\Omega$ |
| Return Loss                          | - 24.2 dB                      |

### Antenna Parameters with Body TSL at 5800 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 51.6 $\Omega$ - 1.6 j $\Omega$ |
| Return Loss                          | - 33.0 dB                      |

### General Antenna Parameters and Design

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.202 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: 21.01.2015

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;  $\sigma = 4.56$  S/m;  $\epsilon_r = 36.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5300$  MHz;  $\sigma = 4.66$  S/m;  $\epsilon_r = 36.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5500$  MHz;  $\sigma = 4.86$  S/m;  $\epsilon_r = 35.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5600$  MHz;  $\sigma = 4.97$  S/m;  $\epsilon_r = 35.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5800$  MHz;  $\sigma = 5.18$  S/m;  $\epsilon_r = 35.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.51, 5.51, 5.51); Calibrated: 30.12.2014, ConvF(5.21, 5.21, 5.21); Calibrated: 30.12.2014, ConvF(5.12, 5.12, 5.12); Calibrated: 30.12.2014, ConvF(4.92, 4.92, 4.92); Calibrated: 30.12.2014, ConvF(4.9, 4.9, 4.9); Calibrated: 30.12.2014;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**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 = 65.51 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 29.8 W/kg

**SAR(1 g) = 8.14 W/kg; SAR(10 g) = 2.31 W/kg**

Maximum value of SAR (measured) = 19.3 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 = 65.30 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 32.1 W/kg

**SAR(1 g) = 8.47 W/kg; SAR(10 g) = 2.41 W/kg**

Maximum value of SAR (measured) = 20.4 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 = 64.33 V/m; Power Drift = 0.07 dB

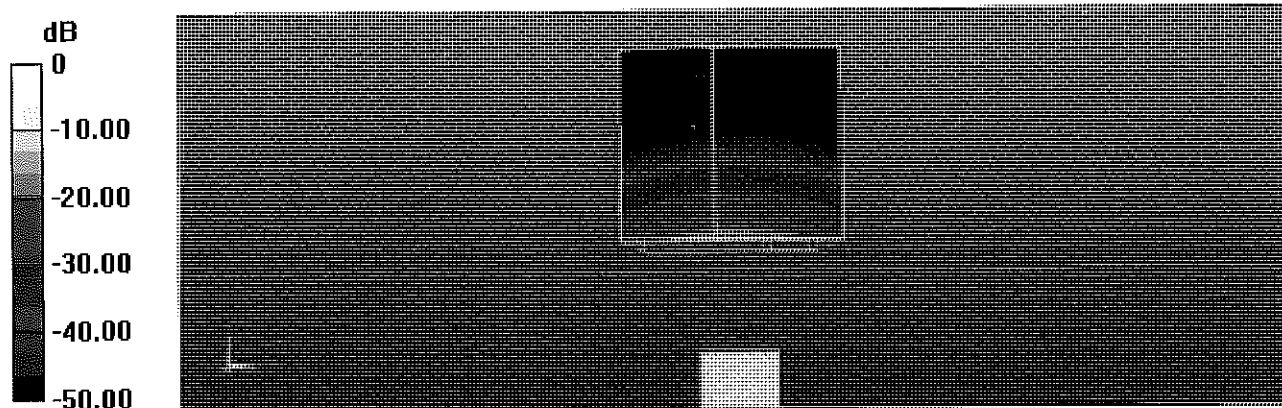
Peak SAR (extrapolated) = 33.5 W/kg

**SAR(1 g) = 8.43 W/kg; SAR(10 g) = 2.38 W/kg**

Maximum value of SAR (measured) = 20.6 W/kg

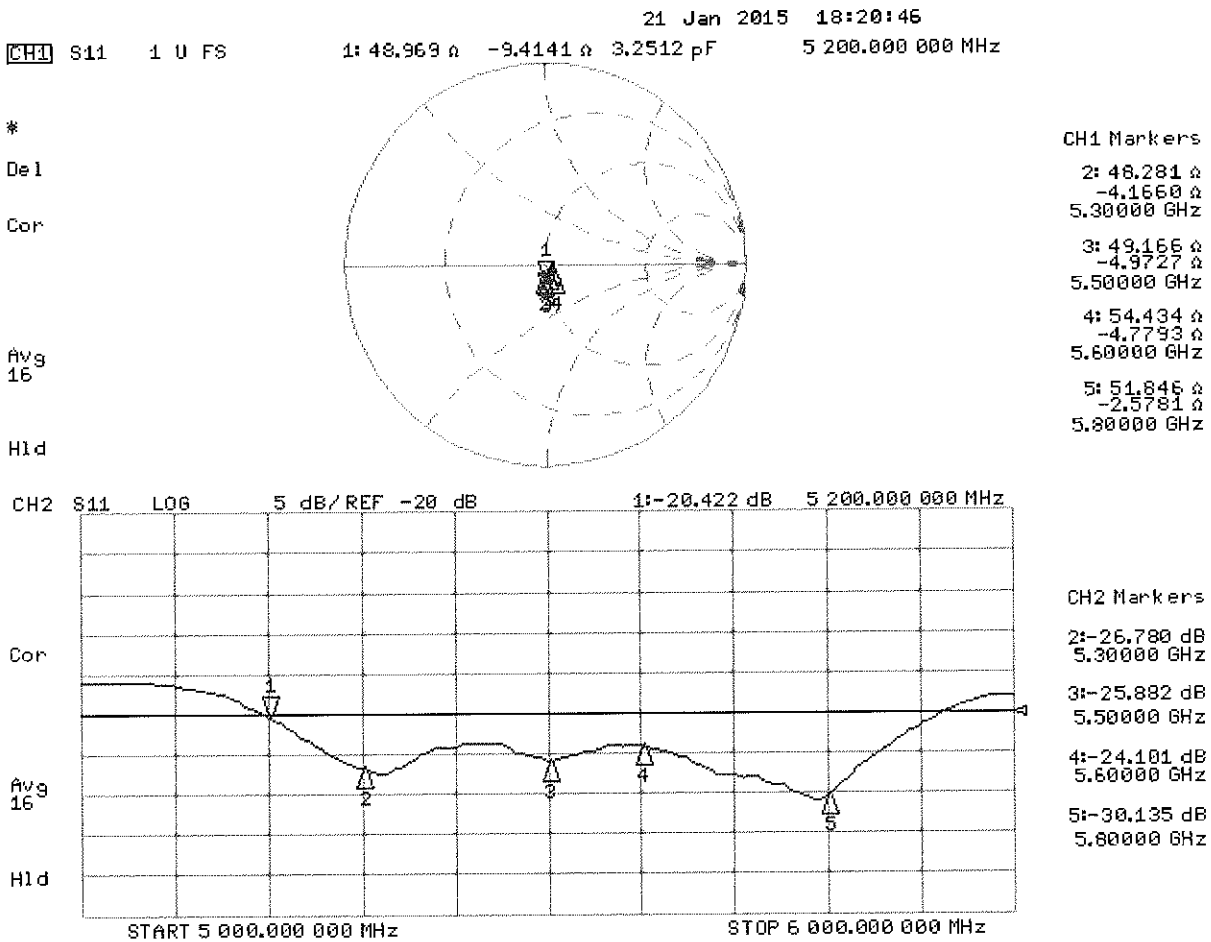
**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm  
Reference Value = 64.47 V/m; Power Drift = 0.09 dB  
Peak SAR (extrapolated) = 33.5 W/kg  
**SAR(1 g) = 8.38 W/kg; SAR(10 g) = 2.37 W/kg**  
Maximum value of SAR (measured) = 20.2 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 = 62.34 V/m; Power Drift = 0.06 dB  
Peak SAR (extrapolated) = 33.8 W/kg  
**SAR(1 g) = 8.11 W/kg; SAR(10 g) = 2.29 W/kg**  
Maximum value of SAR (measured) = 19.8 W/kg



0 dB = 19.3 W/kg = 12.86 dBW/kg

Impedance Measurement Plot for Head TSL



## DASY5 Validation Report for Body TSL

Date: 20.01.2015

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;  $\sigma = 5.42$  S/m;  $\epsilon_r = 49.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5300$  MHz;  $\sigma = 5.55$  S/m;  $\epsilon_r = 49.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5500$  MHz;  $\sigma = 5.82$  S/m;  $\epsilon_r = 48.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5600$  MHz;  $\sigma = 5.96$  S/m;  $\epsilon_r = 48.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5800$  MHz;  $\sigma = 6.25$  S/m;  $\epsilon_r = 48.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(4.95, 4.95, 4.95); Calibrated: 30.12.2014, ConvF(4.78, 4.78, 4.78); Calibrated: 30.12.2014, ConvF(4.45, 4.45, 4.45); Calibrated: 30.12.2014, ConvF(4.35, 4.35, 4.35); Calibrated: 30.12.2014, ConvF(4.32, 4.32, 4.32); Calibrated: 30.12.2014;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**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 = 58.76 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 28.9 W/kg

**SAR(1 g) = 7.37 W/kg; SAR(10 g) = 2.05 W/kg**

Maximum value of SAR (measured) = 17.4 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 = 58.35 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 29.8 W/kg

**SAR(1 g) = 7.41 W/kg; SAR(10 g) = 2.08 W/kg**

Maximum value of SAR (measured) = 17.6 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 = 59.04 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 33.7 W/kg

**SAR(1 g) = 7.9 W/kg; SAR(10 g) = 2.19 W/kg**

Maximum value of SAR (measured) = 19.2 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 = 57.74 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 34.1 W/kg

**SAR(1 g) = 7.75 W/kg; SAR(10 g) = 2.14 W/kg**

Maximum value of SAR (measured) = 19.1 W/kg

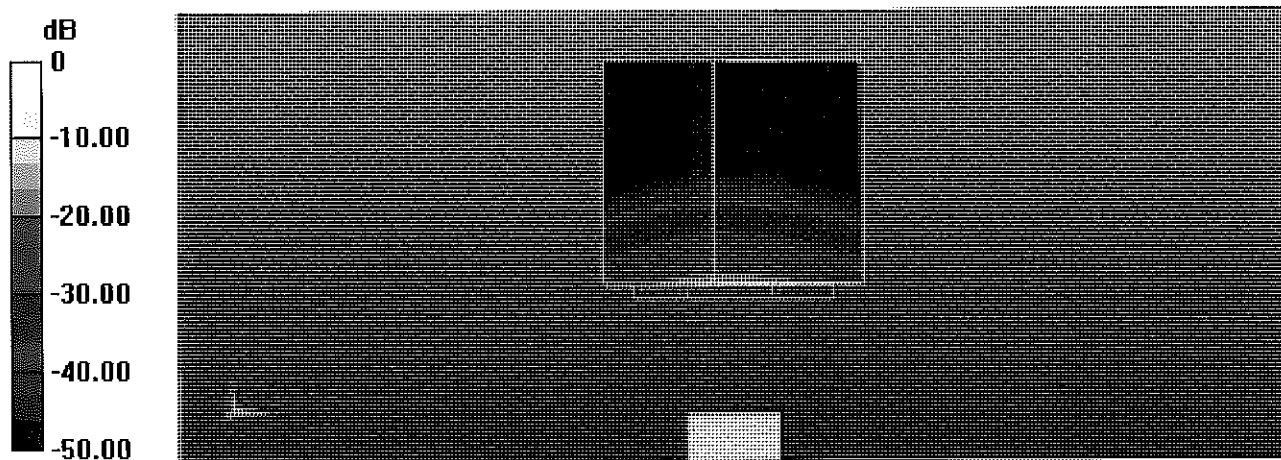
**Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 55.86 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 34.7 W/kg

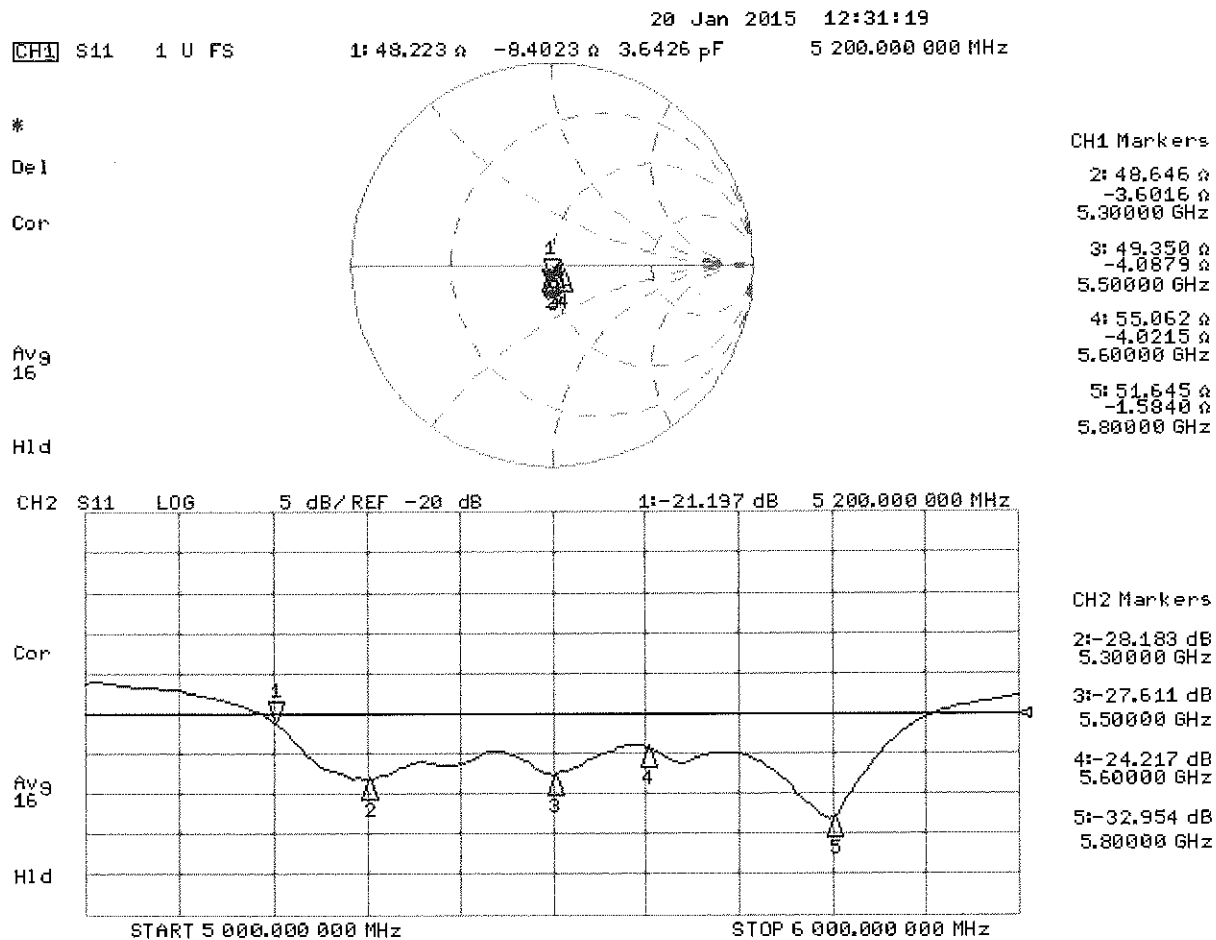
**SAR(1 g) = 7.49 W/kg; SAR(10 g) = 2.06 W/kg**

Maximum value of SAR (measured) = 18.6 W/kg



0 dB = 17.4 W/kg = 12.41 dBW/kg

Impedance Measurement Plot for Body TSL





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 0108**

Client **PC Test**

Certificate No: **ES3-3319\_Mar15**

## CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3319**

Calibration procedure(s) **QA CAL-01.v9, QA CAL-23.v5, QA CAL-25.v6**  
**Calibration procedure for dosimetric E-field probes**

Calibration date: **March 19, 2015**

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      | 03-Apr-14 (No. 217-01911)         | Apr-15                 |
| Power sensor E4412A        | MY41498087      | 03-Apr-14 (No. 217-01911)         | Apr-15                 |
| Reference 3 dB Attenuator  | SN: S5054 (3c)  | 03-Apr-14 (No. 217-01915)         | Apr-15                 |
| Reference 20 dB Attenuator | SN: S5277 (20x) | 03-Apr-14 (No. 217-01919)         | Apr-15                 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 03-Apr-14 (No. 217-01920)         | Apr-15                 |
| Reference Probe ES3DV2     | SN: 3013        | 30-Dec-14 (No. ES3-3013_Dec14)    | Dec-15                 |
| DAE4                       | SN: 660         | 14-Jan-15 (No. DAE4-660_Jan15)    | Jan-16                 |
| 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-14) | In house check: Oct-15 |

|                                                                                                                 |                              |                                          |                        |
|-----------------------------------------------------------------------------------------------------------------|------------------------------|------------------------------------------|------------------------|
| Calibrated by:                                                                                                  | Name<br><b>Israe Elnaouq</b> | Function<br><b>Laboratory Technician</b> | Signature<br>          |
| Approved by:                                                                                                    | <b>Katja Pokovic</b>         | <b>Technical Manager</b>                 |                        |
|                                                                                                                 |                              |                                          | Issued: March 19, 2015 |
| This calibration certificate shall not be reproduced except in full without written approval of the laboratory. |                              |                                          |                        |



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Accreditation No.: **SCS 0108**

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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<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.
- Connector Angle**: The angle is assessed using the information gained by determining the NORM<sub>x</sub> (no uncertainty required).

# Probe ES3DV3

## SN:3319

Manufactured: January 10, 2012  
Calibrated: March 19, 2015

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

# DASY/EASY - Parameters of Probe: ES3DV3 - SN:3319

## Basic Calibration Parameters

|                                       | Sensor X | Sensor Y | Sensor Z | Unc (k=2) |
|---------------------------------------|----------|----------|----------|-----------|
| Norm ( $\mu V/(V/m)^2$ ) <sup>A</sup> | 1.12     | 1.08     | 1.15     | ± 10.1 %  |
| DCP (mV) <sup>B</sup>                 | 104.4    | 106.0    | 104.4    |           |

## 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    | 176.1    | ±3.3 %                    |
|           |                                               | Y | 0.0     | 0.0                    | 1.0  |         | 192.7    |                           |
|           |                                               | Z | 0.0     | 0.0                    | 1.0  |         | 174.6    |                           |
| 10010-CAA | SAR Validation (Square, 100ms, 10ms)          | X | 3.26    | 64.8                   | 13.4 | 10.00   | 41.7     | ±1.9 %                    |
|           |                                               | Y | 2.66    | 62.2                   | 11.7 |         | 39.5     |                           |
|           |                                               | Z | 3.51    | 64.8                   | 13.2 |         | 42.1     |                           |
| 10011-CAB | UMTS-FDD (WCDMA)                              | X | 3.47    | 68.1                   | 19.1 | 2.91    | 142.9    | ±0.5 %                    |
|           |                                               | Y | 3.37    | 67.9                   | 19.1 |         | 133.0    |                           |
|           |                                               | Z | 3.57    | 68.7                   | 19.4 |         | 138.6    |                           |
| 10012-CAB | IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)      | X | 3.48    | 71.8                   | 20.2 | 1.87    | 143.9    | ±0.7 %                    |
|           |                                               | Y | 3.23    | 70.9                   | 19.9 |         | 134.6    |                           |
|           |                                               | Z | 3.68    | 72.8                   | 20.6 |         | 140.5    |                           |
| 10013-CAB | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps) | X | 11.18   | 70.5                   | 23.1 | 9.46    | 143.4    | ±3.3 %                    |
|           |                                               | Y | 10.98   | 70.5                   | 23.2 |         | 129.9    |                           |
|           |                                               | Z | 11.19   | 70.6                   | 23.1 |         | 138.8    |                           |
| 10021-DAB | GSM-FDD (TDMA, GMSK)                          | X | 15.55   | 92.7                   | 26.1 | 9.39    | 126.5    | ±1.7 %                    |
|           |                                               | Y | 21.21   | 98.0                   | 27.2 |         | 142.0    |                           |
|           |                                               | Z | 19.50   | 96.1                   | 27.0 |         | 125.4    |                           |
| 10023-DAB | GPRS-FDD (TDMA, GMSK, TN 0)                   | X | 23.54   | 100.0                  | 28.4 | 9.57    | 142.6    | ±2.2 %                    |
|           |                                               | Y | 23.24   | 99.9                   | 28.0 |         | 137.4    |                           |
|           |                                               | Z | 23.57   | 99.6                   | 28.2 |         | 139.7    |                           |
| 10024-DAB | GPRS-FDD (TDMA, GMSK, TN 0-1)                 | X | 17.00   | 90.2                   | 22.7 | 6.56    | 128.9    | ±2.2 %                    |
|           |                                               | Y | 35.20   | 99.7                   | 24.9 |         | 148.2    |                           |
|           |                                               | Z | 33.12   | 99.6                   | 25.4 |         | 123.8    |                           |
| 10027-DAB | GPRS-FDD (TDMA, GMSK, TN 0-1-2)               | X | 44.20   | 99.6                   | 23.6 | 4.80    | 146.0    | ±1.9 %                    |
|           |                                               | Y | 49.99   | 99.9                   | 23.0 |         | 136.6    |                           |
|           |                                               | Z | 41.43   | 99.6                   | 23.9 |         | 141.4    |                           |
| 10028-DAB | GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)             | X | 46.56   | 99.7                   | 22.7 | 3.55    | 127.7    | ±2.2 %                    |
|           |                                               | Y | 58.11   | 99.8                   | 21.9 |         | 145.3    |                           |
|           |                                               | Z | 55.65   | 99.6                   | 22.2 |         | 124.3    |                           |
| 10032-CAA | IEEE 802.15.1 Bluetooth (GFSK, DH5)           | X | 34.25   | 99.4                   | 21.1 | 1.16    | 140.3    | ±1.7 %                    |
|           |                                               | Y | 40.72   | 100.0                  | 20.6 |         | 135.7    |                           |
|           |                                               | Z | 45.39   | 100.0                  | 20.8 |         | 136.4    |                           |
| 10100-CAB | LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)      | X | 6.30    | 67.1                   | 19.5 | 5.67    | 127.4    | ±1.4 %                    |
|           |                                               | Y | 6.58    | 68.4                   | 20.3 |         | 149.0    |                           |
|           |                                               | Z | 6.55    | 68.0                   | 19.9 |         | 146.3    |                           |

|           |                                          |   |       |      |      |      |       |        |
|-----------|------------------------------------------|---|-------|------|------|------|-------|--------|
| 10103-CAB | LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK) | X | 10.47 | 75.6 | 25.8 | 9.29 | 146.6 | ±3.0 % |
|           |                                          | Y | 10.18 | 75.8 | 26.3 |      | 136.2 |        |
|           |                                          | Z | 10.38 | 75.3 | 25.6 |      | 140.8 |        |
| 10108-CAC | LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK) | X | 6.18  | 66.6 | 19.4 | 5.80 | 126.9 | ±1.4 % |
|           |                                          | Y | 6.40  | 67.8 | 20.1 |      | 147.0 |        |
|           |                                          | Z | 6.44  | 67.6 | 19.9 |      | 145.7 |        |
| 10117-CAB | IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK) | X | 10.24 | 69.0 | 21.3 | 8.07 | 142.7 | ±2.5 % |
|           |                                          | Y | 10.25 | 69.2 | 21.5 |      | 136.7 |        |
|           |                                          | Z | 10.16 | 68.8 | 21.2 |      | 136.6 |        |
| 10151-CAB | LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)  | X | 9.85  | 74.8 | 25.6 | 9.28 | 140.8 | ±3.0 % |
|           |                                          | Y | 9.49  | 74.7 | 25.9 |      | 130.5 |        |
|           |                                          | Z | 9.90  | 74.8 | 25.6 |      | 136.8 |        |
| 10154-CAC | LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)  | X | 6.13  | 67.1 | 19.7 | 5.75 | 146.6 | ±1.4 % |
|           |                                          | Y | 6.11  | 67.4 | 19.9 |      | 147.7 |        |
|           |                                          | Z | 6.12  | 67.1 | 19.7 |      | 142.3 |        |
| 10160-CAB | LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)  | X | 6.33  | 66.7 | 19.4 | 5.82 | 128.9 | ±1.4 % |
|           |                                          | Y | 6.33  | 67.1 | 19.7 |      | 128.7 |        |
|           |                                          | Z | 6.57  | 67.6 | 19.9 |      | 147.4 |        |
| 10169-CAB | LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)    | X | 4.89  | 66.4 | 19.5 | 5.73 | 127.5 | ±1.2 % |
|           |                                          | Y | 4.99  | 67.5 | 20.2 |      | 149.3 |        |
|           |                                          | Z | 5.09  | 67.3 | 20.0 |      | 145.1 |        |
| 10172-CAB | LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)    | X | 7.99  | 75.8 | 26.3 | 9.21 | 127.6 | ±2.7 % |
|           |                                          | Y | 9.29  | 81.7 | 29.6 |      | 149.8 |        |
|           |                                          | Z | 8.04  | 75.8 | 26.3 |      | 123.6 |        |
| 10175-CAC | LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)    | X | 5.08  | 67.3 | 20.0 | 5.72 | 149.3 | ±1.4 % |
|           |                                          | Y | 5.00  | 67.6 | 20.3 |      | 145.0 |        |
|           |                                          | Z | 5.09  | 67.3 | 20.0 |      | 145.0 |        |
| 10181-CAB | LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)    | X | 5.08  | 67.3 | 20.0 | 5.72 | 148.5 | ±1.4 % |
|           |                                          | Y | 5.06  | 67.9 | 20.4 |      | 147.1 |        |
|           |                                          | Z | 5.11  | 67.4 | 20.0 |      | 144.8 |        |
| 10196-CAB | IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)  | X | 9.89  | 68.7 | 21.2 | 8.10 | 134.6 | ±2.2 % |
|           |                                          | Y | 9.84  | 68.9 | 21.4 |      | 130.4 |        |
|           |                                          | Z | 9.82  | 68.5 | 21.1 |      | 130.4 |        |
| 10225-CAB | UMTS-FDD (HSPA+)                         | X | 7.02  | 67.1 | 19.5 | 5.97 | 138.0 | ±1.4 % |
|           |                                          | Y | 6.88  | 67.0 | 19.5 |      | 133.2 |        |
|           |                                          | Z | 7.01  | 67.1 | 19.5 |      | 134.6 |        |
| 10237-CAB | LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)    | X | 8.01  | 75.9 | 26.4 | 9.21 | 128.0 | ±2.7 % |
|           |                                          | Y | 9.39  | 82.1 | 29.9 |      | 149.7 |        |
|           |                                          | Z | 8.34  | 76.9 | 26.9 |      | 129.1 |        |
| 10252-CAB | LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)  | X | 9.05  | 73.6 | 25.1 | 9.24 | 130.6 | ±3.0 % |
|           |                                          | Y | 8.76  | 73.7 | 25.5 |      | 123.6 |        |
|           |                                          | Z | 9.10  | 73.6 | 25.1 |      | 127.8 |        |
| 10267-CAB | LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK) | X | 9.81  | 74.7 | 25.6 | 9.30 | 139.3 | ±3.0 % |
|           |                                          | Y | 9.50  | 74.8 | 25.9 |      | 130.7 |        |
|           |                                          | Z | 9.81  | 74.6 | 25.5 |      | 135.0 |        |

|           |                                                               |   |       |      |      |      |       |        |
|-----------|---------------------------------------------------------------|---|-------|------|------|------|-------|--------|
| 10275-CAB | UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.4)                      | X | 4.49  | 67.1 | 18.9 | 3.96 | 140.1 | ±0.7 % |
|           |                                                               | Y | 4.46  | 67.2 | 19.0 |      | 137.6 |        |
|           |                                                               | Z | 4.52  | 67.1 | 18.9 |      | 137.1 |        |
| 10291-AAB | CDMA2000, RC3, SO55, Full Rate                                | X | 3.68  | 67.0 | 18.8 | 3.46 | 129.3 | ±0.7 % |
|           |                                                               | Y | 3.64  | 67.3 | 19.0 |      | 130.3 |        |
|           |                                                               | Z | 3.84  | 67.9 | 19.2 |      | 148.6 |        |
| 10292-AAB | CDMA2000, RC3, SO32, Full Rate                                | X | 3.64  | 67.2 | 18.8 | 3.39 | 131.8 | ±0.5 % |
|           |                                                               | Y | 3.60  | 67.4 | 19.1 |      | 128.2 |        |
|           |                                                               | Z | 3.71  | 67.5 | 19.0 |      | 128.0 |        |
| 10297-AAA | LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)                       | X | 6.43  | 67.5 | 19.9 | 5.81 | 147.2 | ±1.7 % |
|           |                                                               | Y | 6.39  | 67.7 | 20.0 |      | 145.4 |        |
|           |                                                               | Z | 6.42  | 67.5 | 19.8 |      | 143.2 |        |
| 10311-AAA | LTE-FDD (SC-FDMA, 100% RB, 15 MHz, QPSK)                      | X | 6.73  | 67.1 | 19.7 | 6.06 | 129.7 | ±1.4 % |
|           |                                                               | Y | 6.75  | 67.5 | 19.9 |      | 130.8 |        |
|           |                                                               | Z | 6.75  | 67.3 | 19.7 |      | 126.2 |        |
| 10400-AAB | IEEE 802.11ac WiFi (20MHz, 64-QAM, 99pc duty cycle)           | X | 10.14 | 68.9 | 21.5 | 8.37 | 136.7 | ±2.5 % |
|           |                                                               | Y | 10.23 | 69.5 | 22.0 |      | 136.5 |        |
|           |                                                               | Z | 10.13 | 68.9 | 21.5 |      | 132.8 |        |
| 10403-AAB | CDMA2000 (1xEV-DO, Rev. 0)                                    | X | 4.97  | 69.2 | 19.3 | 3.76 | 143.5 | ±0.5 % |
|           |                                                               | Y | 4.87  | 69.3 | 19.4 |      | 141.0 |        |
|           |                                                               | Z | 5.02  | 69.2 | 19.3 |      | 139.6 |        |
| 10404-AAB | CDMA2000 (1xEV-DO, Rev. A)                                    | X | 4.91  | 69.3 | 19.4 | 3.77 | 139.8 | ±0.7 % |
|           |                                                               | Y | 4.67  | 68.9 | 19.1 |      | 138.9 |        |
|           |                                                               | Z | 4.89  | 69.1 | 19.3 |      | 137.1 |        |
| 10415-AAA | IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 99pc duty cycle)     | X | 2.93  | 70.1 | 19.6 | 1.54 | 137.8 | ±0.7 % |
|           |                                                               | Y | 2.84  | 69.8 | 19.6 |      | 138.2 |        |
|           |                                                               | Z | 3.04  | 70.8 | 19.9 |      | 134.2 |        |
| 10416-AAA | IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 99pc duty cycle) | X | 9.94  | 68.7 | 21.3 | 8.23 | 134.6 | ±2.2 % |
|           |                                                               | Y | 10.00 | 69.1 | 21.7 |      | 134.1 |        |
|           |                                                               | Z | 9.89  | 68.5 | 21.2 |      | 130.1 |        |

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:3319

### 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                            | 6.69    | 6.69    | 6.69    | 0.40               | 1.70                    | ± 12.0 %    |
| 835                  | 41.5                               | 0.90                            | 6.41    | 6.41    | 6.41    | 0.43               | 1.62                    | ± 12.0 %    |
| 1750                 | 40.1                               | 1.37                            | 5.29    | 5.29    | 5.29    | 0.80               | 1.16                    | ± 12.0 %    |
| 1900                 | 40.0                               | 1.40                            | 5.10    | 5.10    | 5.10    | 0.80               | 1.24                    | ± 12.0 %    |
| 2300                 | 39.5                               | 1.67                            | 4.77    | 4.77    | 4.77    | 0.64               | 1.38                    | ± 12.0 %    |
| 2450                 | 39.2                               | 1.80                            | 4.55    | 4.55    | 4.55    | 0.80               | 1.29                    | ± 12.0 %    |
| 2600                 | 39.0                               | 1.96                            | 4.39    | 4.39    | 4.39    | 0.80               | 1.31                    | ± 12.0 %    |

<sup>C</sup> Frequency validity above 300 MHz 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. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

<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:3319

### 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 (mm) <sup>G</sup> | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|--------------------|-------------------------|-------------|
| 750                  | 55.5                               | 0.96                            | 6.10    | 6.10    | 6.10    | 0.34               | 1.80                    | ± 12.0 %    |
| 835                  | 55.2                               | 0.97                            | 6.07    | 6.07    | 6.07    | 0.47               | 1.56                    | ± 12.0 %    |
| 1750                 | 53.4                               | 1.49                            | 4.83    | 4.83    | 4.83    | 0.70               | 1.36                    | ± 12.0 %    |
| 1900                 | 53.3                               | 1.52                            | 4.53    | 4.53    | 4.53    | 0.71               | 1.39                    | ± 12.0 %    |
| 2300                 | 52.9                               | 1.81                            | 4.24    | 4.24    | 4.24    | 0.80               | 1.26                    | ± 12.0 %    |
| 2450                 | 52.7                               | 1.95                            | 4.11    | 4.11    | 4.11    | 0.80               | 1.10                    | ± 12.0 %    |
| 2600                 | 52.5                               | 2.16                            | 3.90    | 3.90    | 3.90    | 0.80               | 1.11                    | ± 12.0 %    |

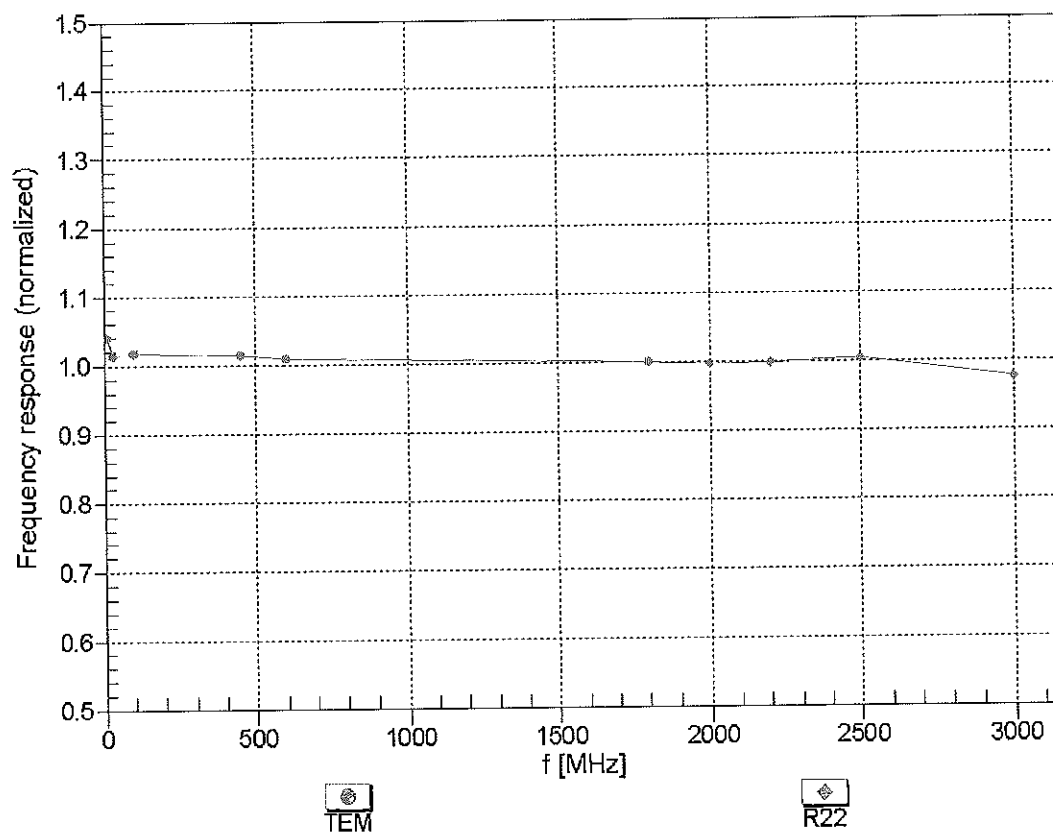
<sup>C</sup> Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

<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)

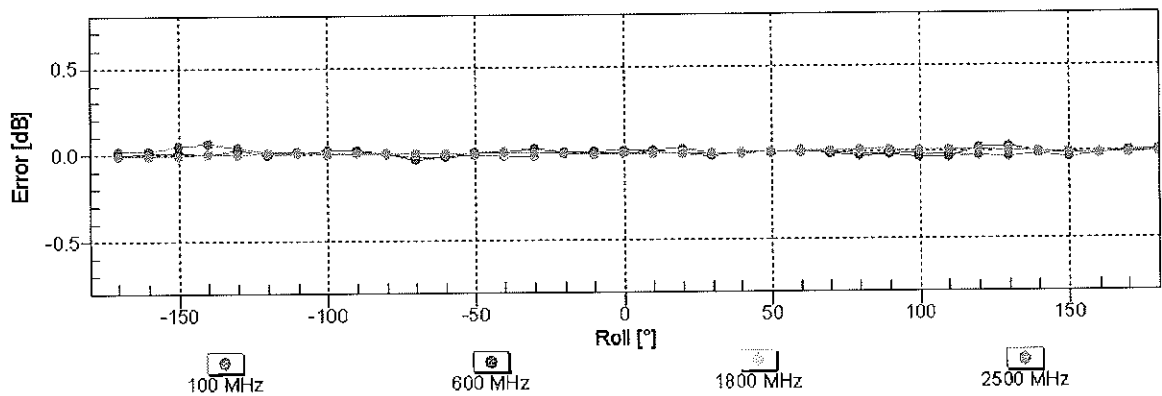
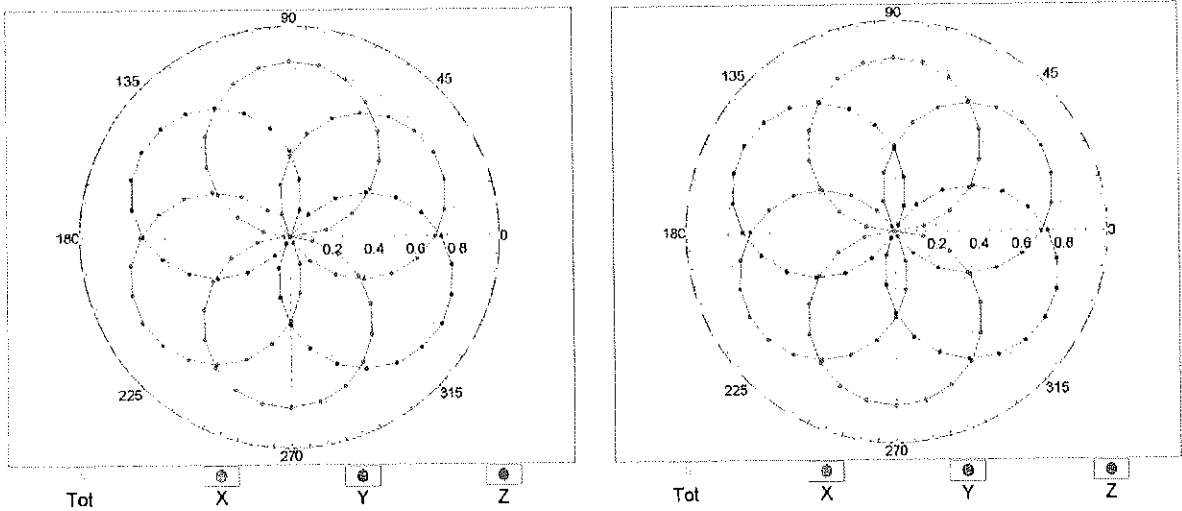


Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  ( $k=2$ )

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

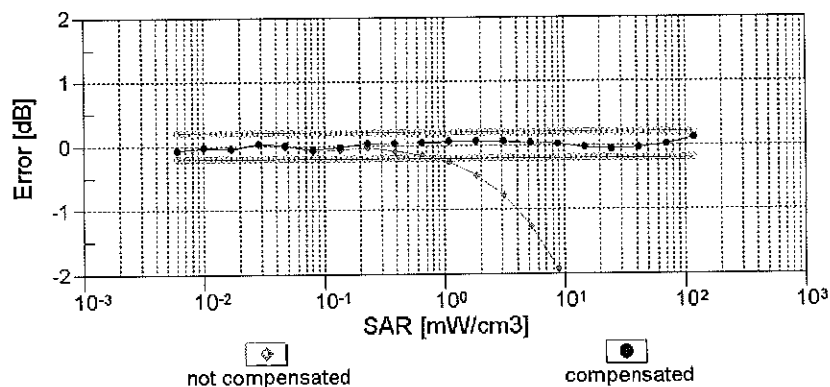
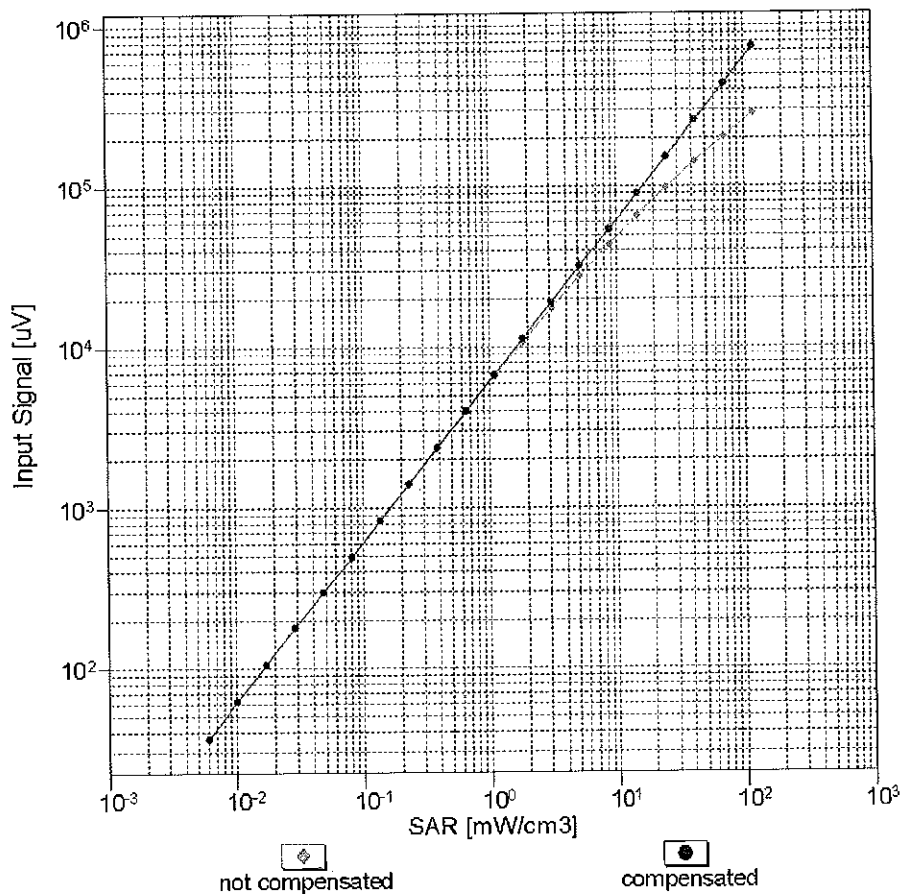
f=600 MHz,TEM

f=1800 MHz,R22



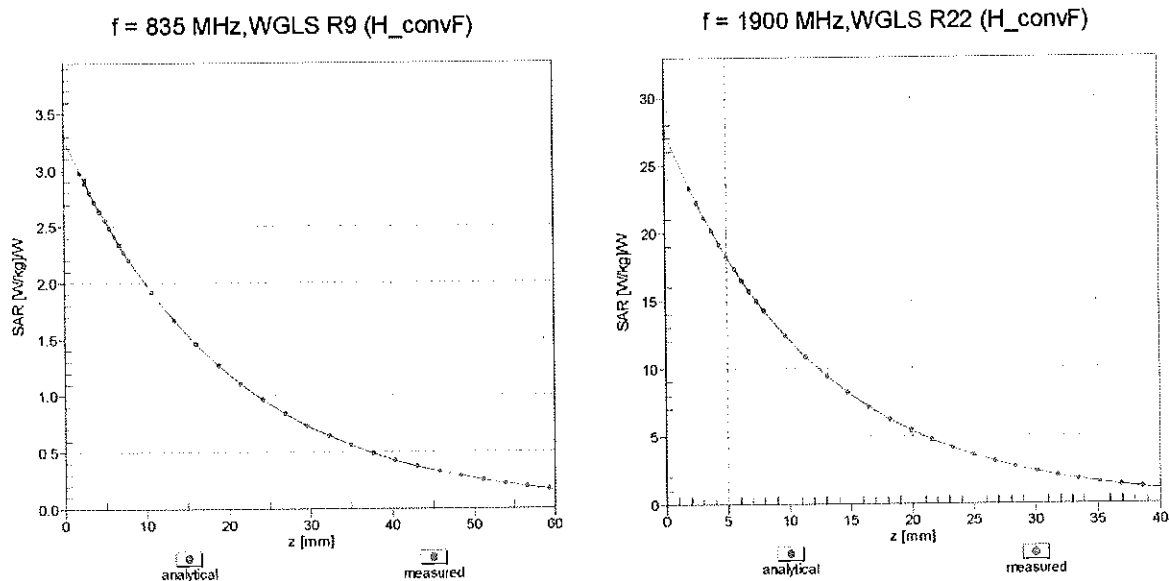
Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

# Dynamic Range $f(\text{SAR}_{\text{head}})$ (TEM cell , $f_{\text{eval}} = 1900 \text{ MHz}$ )



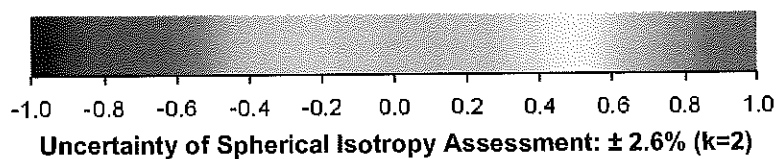
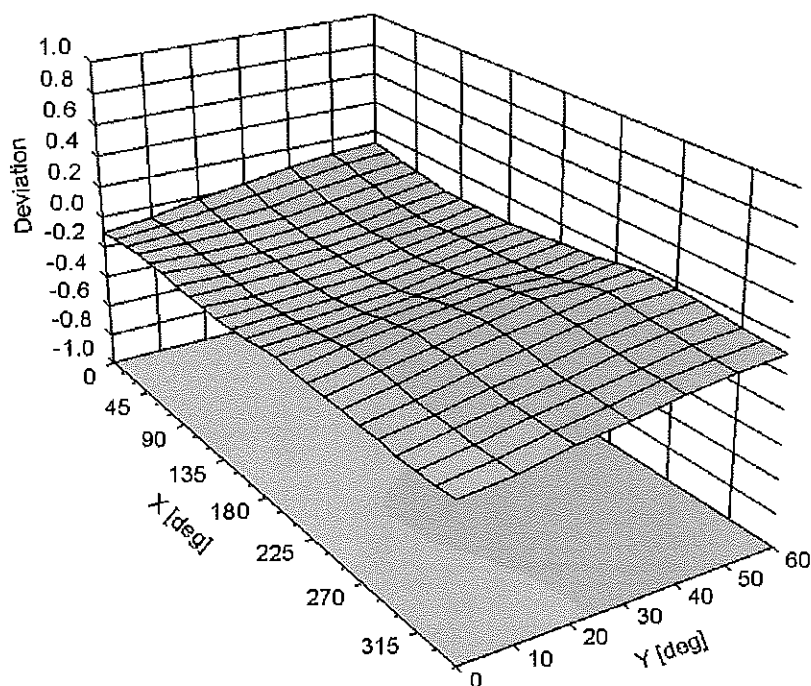
Uncertainty of Linearity Assessment:  $\pm 0.6\%$  ( $k=2$ )

## Conversion Factor Assessment



## Deviation from Isotropy in Liquid

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



**DASY/EASY - Parameters of Probe: ES3DV3 - SN:3319****Other Probe Parameters**

|                                               |            |
|-----------------------------------------------|------------|
| Sensor Arrangement                            | Triangular |
| Connector Angle (°)                           | -120.2     |
| 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 0108**

Client **PC Test**

Certificate No: **ES3-3213\_Jan15**

## CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3213**

Calibration procedure(s) **QA CAL-01.v9, QA CAL-23.v5, QA CAL-25.v6**  
**Calibration procedure for dosimetric E-field probes**

CC  
 1/30/15

Calibration date: **January 20, 2015**

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      | 03-Apr-14 (No. 217-01911)         | Apr-15                 |
| Power sensor E4412A        | MY41498087      | 03-Apr-14 (No. 217-01911)         | Apr-15                 |
| Reference 3 dB Attenuator  | SN: S5054 (3c)  | 03-Apr-14 (No. 217-01915)         | Apr-15                 |
| Reference 20 dB Attenuator | SN: S5277 (20x) | 03-Apr-14 (No. 217-01919)         | Apr-15                 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 03-Apr-14 (No. 217-01920)         | Apr-15                 |
| Reference Probe ES3DV2     | SN: 3013        | 30-Dec-14 (No. ES3-3013_Dec14)    | Dec-15                 |
| DAE4                       | SN: 660         | 14-Jan-15 (No. DAE4-660_Jan15)    | Jan-16                 |
| 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-14) | In house check: Oct-15 |

|                                                                                                                                                        |                       |                                   |               |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-----------------------------------|---------------|
| Calibrated by:                                                                                                                                         | Name<br>Israe Elnaouq | Function<br>Laboratory Technician | Signature<br> |
| Approved by:                                                                                                                                           | Katja Pokovic         | Technical Manager                 |               |
| <p>Issued: January 22, 2015</p> <p>This calibration certificate shall not be reproduced except in full without written approval of the laboratory.</p> |                       |                                   |               |



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Accreditation No.: **SCS 0108**

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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:3213

Manufactured: October 14, 2008  
Calibrated: January 20, 2015

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

## DASY/EASY - Parameters of Probe: ES3DV3 - SN:3213

### Basic Calibration Parameters

|                                       | Sensor X | Sensor Y | Sensor Z | Unc (k=2) |
|---------------------------------------|----------|----------|----------|-----------|
| Norm ( $\mu V/(V/m)^2$ ) <sup>A</sup> | 1.49     | 1.37     | 1.34     | ± 10.1 %  |
| DCP (mV) <sup>B</sup>                 | 99.9     | 101.8    | 101.4    |           |

### 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    | 169.8    | ±3.8 %                    |
|               |                                               | Y | 0.0     | 0.0                    | 1.0  |         | 215.4    |                           |
|               |                                               | Z | 0.0     | 0.0                    | 1.0  |         | 214.5    |                           |
| 10010-<br>CAA | SAR Validation (Square, 100ms, 10ms)          | X | 1.84    | 57.8                   | 10.2 | 10.00   | 47.4     | ±1.9 %                    |
|               |                                               | Y | 1.82    | 58.6                   | 10.3 |         | 44.3     |                           |
|               |                                               | Z | 1.65    | 57.3                   | 9.2  |         | 44.2     |                           |
| 10011-<br>CAB | UMTS-FDD (WCDMA)                              | X | 3.32    | 66.8                   | 18.5 | 2.91    | 135.8    | ±0.5 %                    |
|               |                                               | Y | 3.18    | 66.4                   | 18.2 |         | 127.9    |                           |
|               |                                               | Z | 3.21    | 66.5                   | 18.2 |         | 128.1    |                           |
| 10012-<br>CAB | IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)      | X | 2.90    | 68.1                   | 18.4 | 1.87    | 137.2    | ±0.7 %                    |
|               |                                               | Y | 2.97    | 69.2                   | 19.0 |         | 130.1    |                           |
|               |                                               | Z | 2.80    | 68.0                   | 18.4 |         | 129.9    |                           |
| 10013-<br>CAB | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps) | X | 11.40   | 71.2                   | 23.7 | 9.46    | 135.1    | ±3.8 %                    |
|               |                                               | Y | 11.25   | 71.3                   | 23.9 |         | 124.2    |                           |
|               |                                               | Z | 10.96   | 70.3                   | 23.2 |         | 124.8    |                           |
| 10021-<br>DAB | GSM-FDD (TDMA, GMSK)                          | X | 18.25   | 96.6                   | 27.2 | 9.39    | 140.4    | ±1.7 %                    |
|               |                                               | Y | 21.48   | 99.9                   | 28.2 |         | 133.3    |                           |
|               |                                               | Z | 11.76   | 89.4                   | 24.5 |         | 127.3    |                           |
| 10023-<br>DAB | GPRS-FDD (TDMA, GMSK, TN 0)                   | X | 13.12   | 91.7                   | 26.0 | 9.57    | 126.4    | ±1.9 %                    |
|               |                                               | Y | 17.05   | 95.2                   | 26.6 |         | 127.3    |                           |
|               |                                               | Z | 8.91    | 85.2                   | 23.3 |         | 118.8    |                           |
| 10024-<br>DAB | GPRS-FDD (TDMA, GMSK, TN 0-1)                 | X | 34.78   | 100.0                  | 25.2 | 6.56    | 116.4    | ±1.7 %                    |
|               |                                               | Y | 33.37   | 99.5                   | 24.8 |         | 111.7    |                           |
|               |                                               | Z | 34.11   | 99.5                   | 24.6 |         | 110.5    |                           |
| 10027-<br>DAB | GPRS-FDD (TDMA, GMSK, TN 0-1-2)               | X | 37.18   | 99.7                   | 24.0 | 4.80    | 131.2    | ±1.7 %                    |
|               |                                               | Y | 44.91   | 99.8                   | 23.3 |         | 127.4    |                           |
|               |                                               | Z | 41.51   | 99.7                   | 23.2 |         | 125.0    |                           |
| 10028-<br>DAB | GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)             | X | 48.95   | 99.5                   | 22.4 | 3.55    | 140.9    | ±1.7 %                    |
|               |                                               | Y | 67.41   | 99.8                   | 21.5 |         | 137.8    |                           |
|               |                                               | Z | 56.45   | 100.0                  | 21.9 |         | 135.0    |                           |
| 10032-<br>CAA | IEEE 802.15.1 Bluetooth (GFSK, DH5)           | X | 20.23   | 99.3                   | 22.1 | 1.16    | 111.3    | ±1.2 %                    |
|               |                                               | Y | 32.72   | 99.5                   | 20.6 |         | 109.6    |                           |
|               |                                               | Z | 48.57   | 100.0                  | 20.0 |         | 108.8    |                           |
| 10100-<br>CAB | LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)      | X | 6.60    | 67.9                   | 20.0 | 5.67    | 144.6    | ±1.2 %                    |
|               |                                               | Y | 6.55    | 68.2                   | 20.2 |         | 142.7    |                           |
|               |                                               | Z | 6.50    | 67.8                   | 19.9 |         | 141.5    |                           |

|           |                                          |   |       |      |      |      |       |        |
|-----------|------------------------------------------|---|-------|------|------|------|-------|--------|
| 10103-CAB | LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK) | X | 10.34 | 75.7 | 26.2 | 9.29 | 133.2 | ±2.5 % |
|           |                                          | Y | 10.31 | 76.5 | 26.9 |      | 128.2 |        |
|           |                                          | Z | 9.74  | 74.5 | 25.6 |      | 127.1 |        |
| 10108-CAC | LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK) | X | 6.50  | 67.6 | 20.0 | 5.80 | 142.8 | ±1.2 % |
|           |                                          | Y | 6.41  | 67.7 | 20.1 |      | 140.3 |        |
|           |                                          | Z | 6.41  | 67.6 | 19.9 |      | 140.2 |        |
| 10117-CAB | IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK) | X | 10.36 | 69.2 | 21.6 | 8.07 | 132.8 | ±2.7 % |
|           |                                          | Y | 10.42 | 69.7 | 21.9 |      | 131.4 |        |
|           |                                          | Z | 10.22 | 69.1 | 21.4 |      | 130.0 |        |
| 10151-CAB | LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)  | X | 9.65  | 74.6 | 25.8 | 9.28 | 127.9 | ±2.5 % |
|           |                                          | Y | 9.66  | 75.6 | 26.7 |      | 123.7 |        |
|           |                                          | Z | 9.14  | 73.6 | 25.3 |      | 122.7 |        |
| 10154-CAC | LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)  | X | 6.14  | 66.9 | 19.6 | 5.75 | 139.3 | ±1.4 % |
|           |                                          | Y | 6.08  | 67.2 | 19.9 |      | 138.5 |        |
|           |                                          | Z | 6.05  | 66.9 | 19.6 |      | 137.3 |        |
| 10160-CAB | LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)  | X | 6.58  | 67.5 | 19.9 | 5.82 | 144.3 | ±1.4 % |
|           |                                          | Y | 6.54  | 67.8 | 20.1 |      | 143.7 |        |
|           |                                          | Z | 6.50  | 67.5 | 19.8 |      | 142.1 |        |
| 10169-CAB | LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)    | X | 4.93  | 66.1 | 19.3 | 5.73 | 120.6 | ±0.9 % |
|           |                                          | Y | 4.93  | 66.7 | 19.8 |      | 120.9 |        |
|           |                                          | Z | 4.85  | 66.3 | 19.5 |      | 118.9 |        |
| 10172-CAB | LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)    | X | 8.93  | 79.5 | 28.6 | 9.21 | 140.8 | ±2.5 % |
|           |                                          | Y | 9.60  | 82.9 | 30.6 |      | 139.9 |        |
|           |                                          | Z | 8.30  | 78.2 | 27.9 |      | 136.6 |        |
| 10175-CAC | LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)    | X | 4.90  | 66.0 | 19.3 | 5.72 | 118.8 | ±0.9 % |
|           |                                          | Y | 4.93  | 66.8 | 19.8 |      | 120.2 |        |
|           |                                          | Z | 4.81  | 66.1 | 19.3 |      | 116.6 |        |
| 10181-CAB | LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)    | X | 4.92  | 66.1 | 19.3 | 5.72 | 119.0 | ±0.9 % |
|           |                                          | Y | 4.92  | 66.6 | 19.8 |      | 120.5 |        |
|           |                                          | Z | 4.77  | 65.8 | 19.2 |      | 115.8 |        |
| 10196-CAB | IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)  | X | 9.93  | 68.7 | 21.4 | 8.10 | 125.0 | ±2.5 % |
|           |                                          | Y | 10.06 | 69.4 | 21.9 |      | 128.3 |        |
|           |                                          | Z | 9.78  | 68.5 | 21.2 |      | 120.5 |        |
| 10225-CAB | UMTS-FDD (HSPA+)                         | X | 6.66  | 65.7 | 18.8 | 5.97 | 106.5 | ±0.9 % |
|           |                                          | Y | 6.81  | 66.6 | 19.3 |      | 112.3 |        |
|           |                                          | Z | 6.64  | 66.0 | 18.9 |      | 108.0 |        |
| 10237-CAB | LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)    | X | 8.91  | 79.4 | 28.5 | 9.21 | 141.4 | ±2.2 % |
|           |                                          | Y | 9.39  | 82.3 | 30.4 |      | 146.7 |        |
|           |                                          | Z | 8.40  | 78.5 | 28.2 |      | 141.2 |        |
| 10252-CAB | LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)  | X | 8.84  | 73.3 | 25.2 | 9.24 | 119.1 | ±2.7 % |
|           |                                          | Y | 8.94  | 74.6 | 26.3 |      | 118.6 |        |
|           |                                          | Z | 8.39  | 72.4 | 24.7 |      | 114.0 |        |
| 10267-CAB | LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK) | X | 9.62  | 74.6 | 25.8 | 9.30 | 126.2 | ±2.7 % |
|           |                                          | Y | 9.77  | 76.0 | 26.9 |      | 126.1 |        |
|           |                                          | Z | 9.10  | 73.4 | 25.2 |      | 121.4 |        |

|           |                                                               |   |       |      |      |      |       |        |
|-----------|---------------------------------------------------------------|---|-------|------|------|------|-------|--------|
| 10275-CAB | UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.4)                      | X | 4.43  | 66.4 | 18.5 | 3.96 | 132.5 | ±0.7 % |
|           |                                                               | Y | 4.37  | 66.6 | 18.6 |      | 134.1 |        |
|           |                                                               | Z | 4.40  | 66.7 | 18.6 |      | 130.5 |        |
| 10291-AAB | CDMA2000, RC3, SO55, Full Rate                                | X | 3.63  | 66.4 | 18.4 | 3.46 | 122.5 | ±0.5 % |
|           |                                                               | Y | 3.54  | 66.5 | 18.5 |      | 124.9 |        |
|           |                                                               | Z | 3.55  | 66.3 | 18.3 |      | 121.4 |        |
| 10292-AAB | CDMA2000, RC3, SO32, Full Rate                                | X | 3.49  | 65.9 | 18.1 | 3.39 | 125.1 | ±0.5 % |
|           |                                                               | Y | 3.52  | 66.7 | 18.6 |      | 126.1 |        |
|           |                                                               | Z | 3.51  | 66.5 | 18.4 |      | 123.8 |        |
| 10297-AAA | LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)                       | X | 6.49  | 67.6 | 19.9 | 5.81 | 143.1 | ±1.4 % |
|           |                                                               | Y | 6.49  | 68.0 | 20.3 |      | 142.3 |        |
|           |                                                               | Z | 6.42  | 67.6 | 19.9 |      | 144.3 |        |
| 10311-AAA | LTE-FDD (SC-FDMA, 100% RB, 15 MHz, QPSK)                      | X | 7.06  | 68.1 | 20.2 | 6.06 | 147.6 | ±1.7 % |
|           |                                                               | Y | 7.09  | 68.7 | 20.7 |      | 148.2 |        |
|           |                                                               | Z | 7.03  | 68.3 | 20.4 |      | 149.8 |        |
| 10403-AAB | CDMA2000 (1xEV-DO, Rev. 0)                                    | X | 4.66  | 67.4 | 18.4 | 3.76 | 135.3 | ±0.5 % |
|           |                                                               | Y | 4.69  | 68.1 | 18.7 |      | 134.9 |        |
|           |                                                               | Z | 4.72  | 68.2 | 18.7 |      | 136.5 |        |
| 10404-AAB | CDMA2000 (1xEV-DO, Rev. A)                                    | X | 4.58  | 67.4 | 18.3 | 3.77 | 133.4 | ±0.5 % |
|           |                                                               | Y | 4.68  | 68.4 | 18.9 |      | 132.8 |        |
|           |                                                               | Z | 4.58  | 67.9 | 18.5 |      | 135.4 |        |
| 10415-AAA | IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 99pc duty cycle)     | X | 2.41  | 65.7 | 17.2 | 1.54 | 131.4 | ±0.7 % |
|           |                                                               | Y | 2.42  | 66.4 | 17.7 |      | 131.3 |        |
|           |                                                               | Z | 2.59  | 67.7 | 18.2 |      | 134.1 |        |
| 10416-AAA | IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 99pc duty cycle) | X | 10.06 | 68.9 | 21.5 | 8.23 | 127.6 | ±2.7 % |
|           |                                                               | Y | 10.12 | 69.5 | 22.0 |      | 126.3 |        |
|           |                                                               | Z | 10.04 | 69.1 | 21.7 |      | 129.7 |        |

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:3213

### 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                            | 6.45    | 6.45    | 6.45    | 0.57               | 1.37                    | ± 12.0 %    |
| 835                  | 41.5                               | 0.90                            | 6.26    | 6.26    | 6.26    | 0.65               | 1.26                    | ± 12.0 %    |
| 1750                 | 40.1                               | 1.37                            | 5.22    | 5.22    | 5.22    | 0.47               | 1.47                    | ± 12.0 %    |
| 1900                 | 40.0                               | 1.40                            | 5.06    | 5.06    | 5.06    | 0.80               | 1.14                    | ± 12.0 %    |
| 2450                 | 39.2                               | 1.80                            | 4.54    | 4.54    | 4.54    | 0.78               | 1.22                    | ± 12.0 %    |
| 2600                 | 39.0                               | 1.96                            | 4.33    | 4.33    | 4.33    | 0.80               | 1.28                    | ± 12.0 %    |

<sup>c</sup> Frequency validity above 300 MHz 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. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

<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:3213

### 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    | 0.71               | 1.24                    | ± 12.0 %    |
| 835                  | 55.2                               | 0.97                            | 6.07    | 6.07    | 6.07    | 0.35               | 1.86                    | ± 12.0 %    |
| 1750                 | 53.4                               | 1.49                            | 4.93    | 4.93    | 4.93    | 0.51               | 1.47                    | ± 12.0 %    |
| 1900                 | 53.3                               | 1.52                            | 4.72    | 4.72    | 4.72    | 0.80               | 1.20                    | ± 12.0 %    |
| 2450                 | 52.7                               | 1.95                            | 4.37    | 4.37    | 4.37    | 0.71               | 1.12                    | ± 12.0 %    |
| 2600                 | 52.5                               | 2.16                            | 4.20    | 4.20    | 4.20    | 0.66               | 0.95                    | ± 12.0 %    |

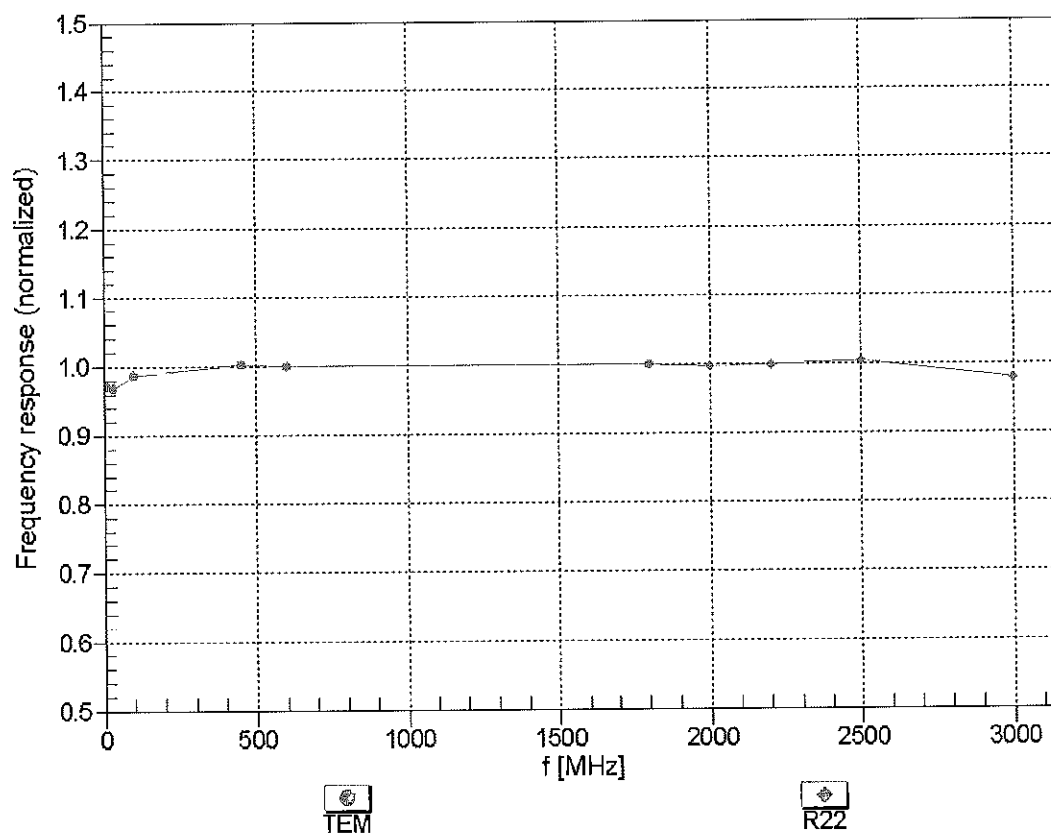
<sup>c</sup> Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

<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

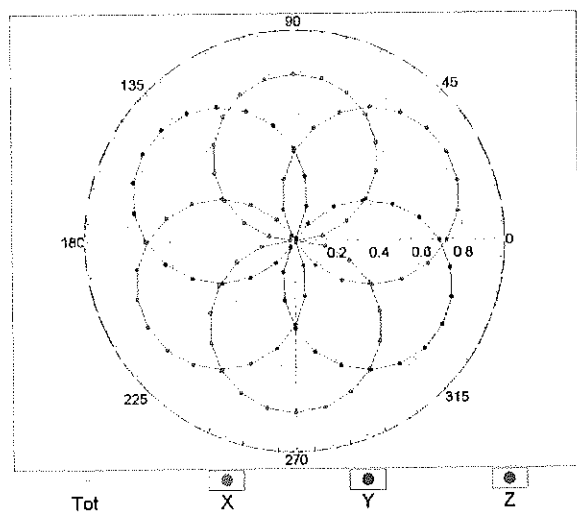
(TEM-Cell:ifi110 EXX, Waveguide: R22)



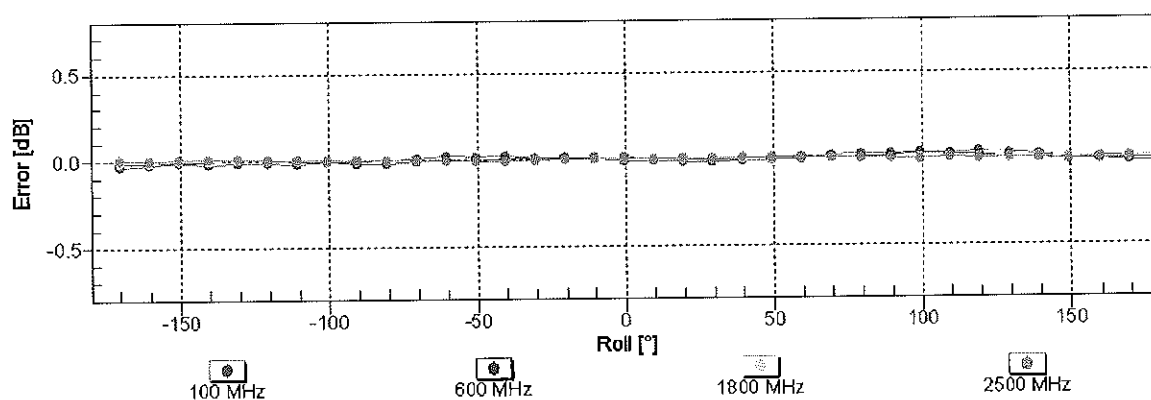
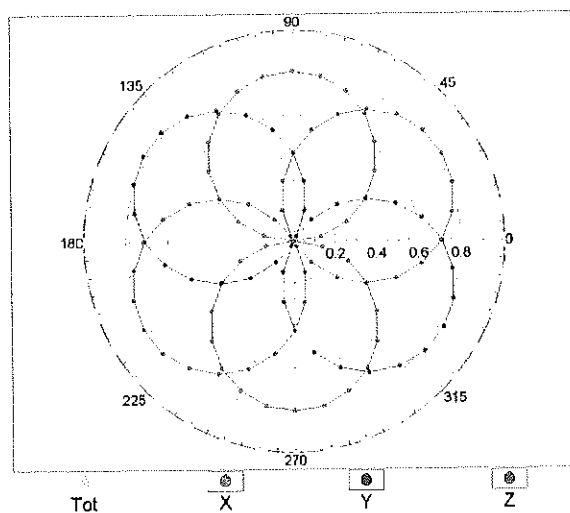
Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  (k=2)

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

f=600 MHz,TEM

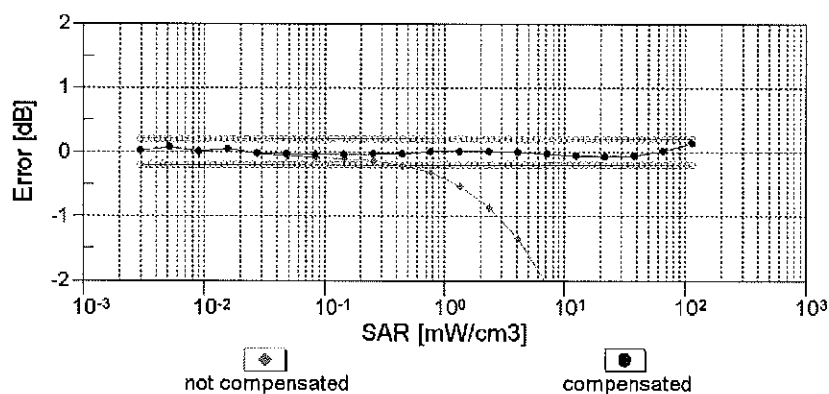
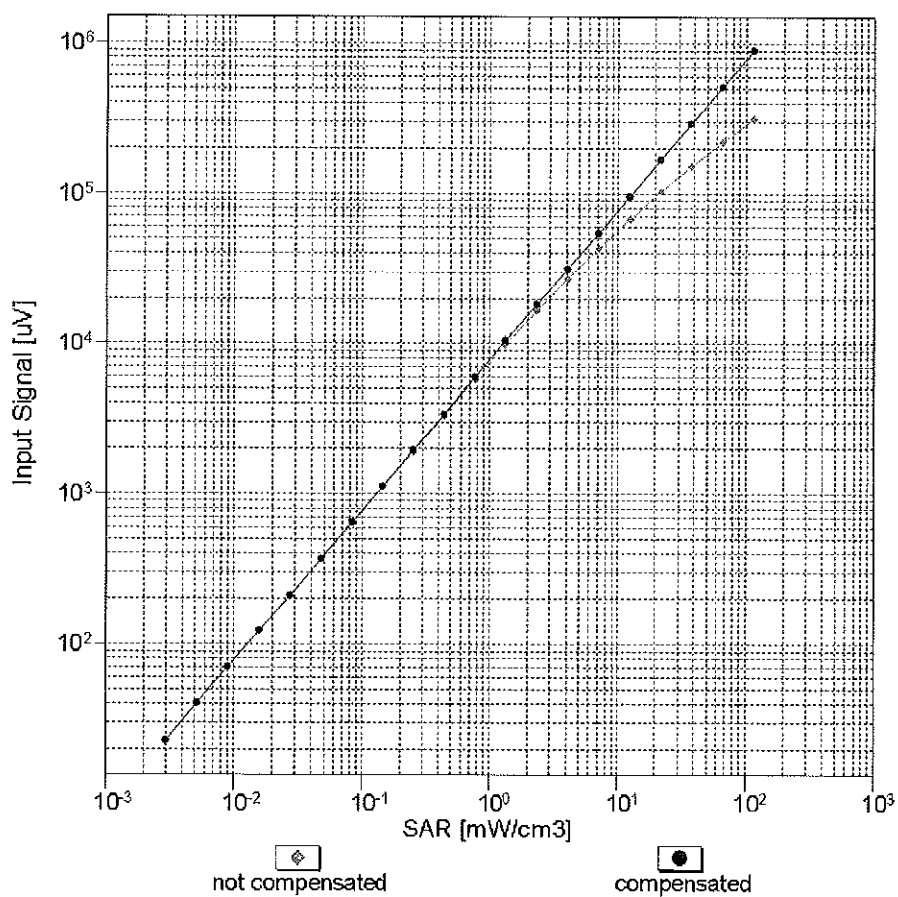


f=1800 MHz,R22



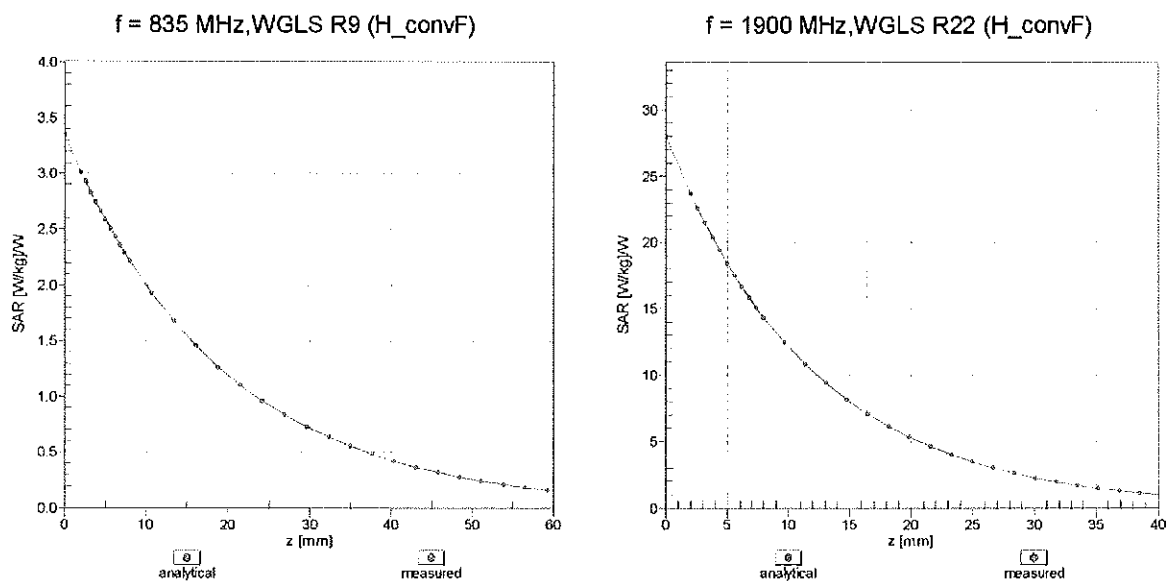
Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

# **Dynamic Range $f(\text{SAR}_{\text{head}})$** (TEM cell , $f_{\text{eval}} = 1900 \text{ MHz}$ )



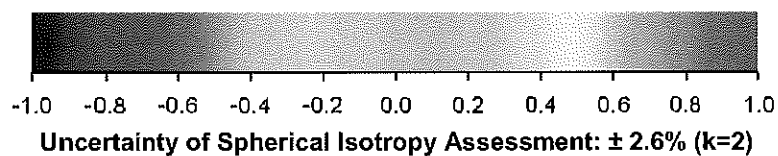
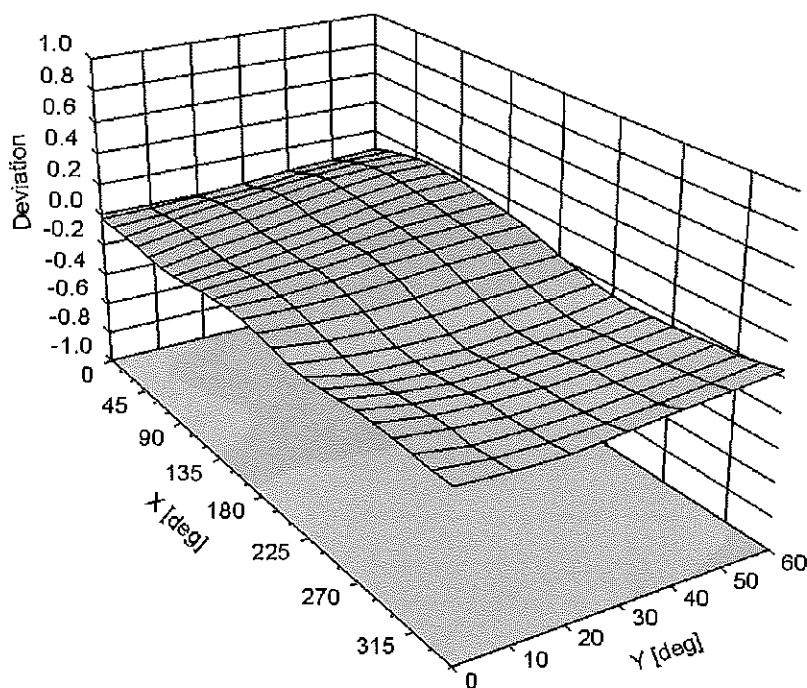
**Uncertainty of Linearity Assessment:  $\pm 0.6\%$  ( $k=2$ )**

## Conversion Factor Assessment



## Deviation from Isotropy in Liquid

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



## DASY/EASY - Parameters of Probe: ES3DV3 - SN:3213

### Other Probe Parameters

|                                               |            |
|-----------------------------------------------|------------|
| Sensor Arrangement                            | Triangular |
| Connector Angle (°)                           | -70.6      |
| 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 0108**

Client **PC Test**

Certificate No: **ES3-3263\_May15**

## CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3263**

Calibration procedure(s) **QA CAL-01.v9, QA CAL-23.v5, QA CAL-25.v6**  
**Calibration procedure for dosimetric E-field probes**

Calibration date: **May 20, 2015**

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      | 01-Apr-15 (No. 217-02128)         | Mar-16                 |
| Power sensor E4412A        | MY41498087      | 01-Apr-15 (No. 217-02128)         | Mar-16                 |
| Reference 3 dB Attenuator  | SN: S5054 (3c)  | 01-Apr-15 (No. 217-02129)         | Mar-16                 |
| Reference 20 dB Attenuator | SN: S5277 (20x) | 01-Apr-15 (No. 217-02132)         | Mar-16                 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 01-Apr-15 (No. 217-02133)         | Mar-16                 |
| Reference Probe ES3DV2     | SN: 3013        | 30-Dec-14 (No. ES3-3013_Dec14)    | Dec-15                 |
| DAE4                       | SN: 660         | 14-Jan-15 (No. DAE4-660_Jan15)    | Jan-16                 |
| 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-14) | In house check: Oct-15 |

|                |                              |                                          |               |
|----------------|------------------------------|------------------------------------------|---------------|
| Calibrated by: | Name<br><b>Leif Klysner</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: May 19, 2015

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 5/28/15



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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 $\phi$      | $\phi$ 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:3263

Manufactured: January 25, 2010  
Calibrated: May 20, 2015

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

# DASY/EASY - Parameters of Probe: ES3DV3 - SN:3263

## Basic Calibration Parameters

|                                                           | Sensor X | Sensor Y | Sensor Z | Unc (k=2)     |
|-----------------------------------------------------------|----------|----------|----------|---------------|
| Norm ( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>A</sup> | 1.21     | 1.25     | 1.13     | $\pm 10.1 \%$ |
| DCP (mV) <sup>B</sup>                                     | 106.1    | 103.6    | 108.3    |               |

## 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    | 205.3    | $\pm 3.3 \%$              |
|           |                                               | Y | 0.0     | 0.0                          | 1.0  |         | 207.3    |                           |
|           |                                               | Z | 0.0     | 0.0                          | 1.0  |         | 199.5    |                           |
| 10010-CAA | SAR Validation (Square, 100ms, 10ms)          | X | 1.83    | 58.4                         | 9.4  | 10.00   | 41.2     | $\pm 1.4 \%$              |
|           |                                               | Y | 3.88    | 63.3                         | 12.9 |         | 47.5     |                           |
|           |                                               | Z | 1.42    | 56.8                         | 8.7  |         | 39.5     |                           |
| 10011-CAB | UMTS-FDD (WCDMA)                              | X | 3.27    | 67.4                         | 18.6 | 2.91    | 140.1    | $\pm 0.7 \%$              |
|           |                                               | Y | 3.39    | 67.5                         | 18.7 |         | 142.7    |                           |
|           |                                               | Z | 3.32    | 67.6                         | 18.6 |         | 136.9    |                           |
| 10012-CAB | IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)      | X | 2.85    | 68.8                         | 18.8 | 1.87    | 142.2    | $\pm 0.7 \%$              |
|           |                                               | Y | 3.38    | 70.7                         | 19.5 |         | 144.8    |                           |
|           |                                               | Z | 3.07    | 70.0                         | 19.1 |         | 138.1    |                           |
| 10013-CAB | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps) | X | 10.99   | 70.8                         | 23.4 | 9.46    | 135.9    | $\pm 2.5 \%$              |
|           |                                               | Y | 11.36   | 70.3                         | 22.8 |         | 124.7    |                           |
|           |                                               | Z | 10.57   | 70.0                         | 22.9 |         | 129.4    |                           |
| 10021-DAB | GSM-FDD (TDMA, GMSK)                          | X | 9.38    | 84.7                         | 22.1 | 9.39    | 139.8    | $\pm 1.9 \%$              |
|           |                                               | Y | 27.79   | 100.0                        | 28.7 |         | 129.4    |                           |
|           |                                               | Z | 9.29    | 86.8                         | 23.8 |         | 134.5    |                           |
| 10023-DAB | GPRS-FDD (TDMA, GMSK, TN 0)                   | X | 9.63    | 84.9                         | 22.1 | 9.57    | 134.1    | $\pm 2.5 \%$              |
|           |                                               | Y | 25.29   | 98.2                         | 28.2 |         | 124.0    |                           |
|           |                                               | Z | 9.65    | 87.7                         | 24.3 |         | 128.2    |                           |
| 10024-DAB | GPRS-FDD (TDMA, GMSK, TN 0-1)                 | X | 16.20   | 88.9                         | 21.0 | 6.56    | 145.2    | $\pm 1.4 \%$              |
|           |                                               | Y | 41.82   | 99.7                         | 25.6 |         | 128.5    |                           |
|           |                                               | Z | 24.57   | 96.8                         | 24.1 |         | 142.0    |                           |
| 10027-DAB | GPRS-FDD (TDMA, GMSK, TN 0-1-2)               | X | 55.77   | 99.6                         | 22.1 | 4.80    | 138.5    | $\pm 2.2 \%$              |
|           |                                               | Y | 53.39   | 99.7                         | 23.9 |         | 140.5    |                           |
|           |                                               | Z | 40.28   | 99.6                         | 23.2 |         | 134.3    |                           |
| 10028-DAB | GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)             | X | 81.43   | 99.8                         | 20.7 | 3.55    | 148.6    | $\pm 1.7 \%$              |
|           |                                               | Y | 60.49   | 99.7                         | 22.9 |         | 146.0    |                           |
|           |                                               | Z | 62.69   | 99.6                         | 21.2 |         | 145.0    |                           |
| 10032-CAA | IEEE 802.15.1 Bluetooth (GFSK, DH5)           | X | 96.06   | 93.7                         | 16.0 | 1.16    | 140.3    | $\pm 1.9 \%$              |
|           |                                               | Y | 77.08   | 99.9                         | 20.1 |         | 149.0    |                           |
|           |                                               | Z | 99.64   | 99.9                         | 18.6 |         | 138.0    |                           |
| 10100-CAB | LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)      | X | 6.24    | 67.2                         | 19.6 | 5.67    | 131.7    | $\pm 1.4 \%$              |
|           |                                               | Y | 6.39    | 67.3                         | 19.5 |         | 133.8    |                           |
|           |                                               | Z | 6.19    | 67.2                         | 19.6 |         | 126.8    |                           |

|           |                                          |   |       |      |      |      |       |        |
|-----------|------------------------------------------|---|-------|------|------|------|-------|--------|
| 10103-CAB | LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK) | X | 10.13 | 76.3 | 26.6 | 9.29 | 142.6 | ±2.7 % |
|           |                                          | Y | 12.07 | 77.9 | 26.6 |      | 138.9 |        |
|           |                                          | Z | 9.41  | 74.3 | 25.6 |      | 134.1 |        |
| 10108-CAC | LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK) | X | 6.13  | 66.9 | 19.5 | 5.80 | 129.6 | ±1.4 % |
|           |                                          | Y | 6.35  | 67.1 | 19.5 |      | 133.7 |        |
|           |                                          | Z | 6.39  | 68.0 | 20.1 |      | 150.0 |        |
| 10117-CAB | IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK) | X | 10.34 | 69.6 | 21.7 | 8.07 | 147.0 | ±1.9 % |
|           |                                          | Y | 10.05 | 68.3 | 20.9 |      | 123.4 |        |
|           |                                          | Z | 10.08 | 69.1 | 21.3 |      | 138.2 |        |
| 10151-CAB | LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)  | X | 9.44  | 75.3 | 26.3 | 9.28 | 137.0 | ±3.5 % |
|           |                                          | Y | 11.36 | 76.9 | 26.3 |      | 134.5 |        |
|           |                                          | Z | 8.85  | 73.5 | 25.3 |      | 130.3 |        |
| 10154-CAC | LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)  | X | 5.79  | 66.2 | 19.2 | 5.75 | 126.9 | ±1.2 % |
|           |                                          | Y | 6.05  | 66.5 | 19.3 |      | 130.9 |        |
|           |                                          | Z | 5.92  | 66.9 | 19.5 |      | 145.5 |        |
| 10160-CAB | LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)  | X | 6.25  | 66.9 | 19.5 | 5.82 | 131.8 | ±1.4 % |
|           |                                          | Y | 6.47  | 67.0 | 19.5 |      | 135.4 |        |
|           |                                          | Z | 6.09  | 66.5 | 19.3 |      | 127.5 |        |
| 10169-CAB | LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)    | X | 4.78  | 66.7 | 19.7 | 5.73 | 130.0 | ±1.2 % |
|           |                                          | Y | 5.14  | 66.7 | 19.5 |      | 135.0 |        |
|           |                                          | Z | 4.83  | 67.1 | 19.9 |      | 147.9 |        |
| 10172-CAB | LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)    | X | 8.63  | 80.4 | 29.1 | 9.21 | 147.7 | ±2.7 % |
|           |                                          | Y | 9.72  | 78.5 | 27.2 |      | 123.9 |        |
|           |                                          | Z | 7.63  | 76.7 | 27.2 |      | 142.5 |        |
| 10175-CAC | LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)    | X | 4.75  | 66.6 | 19.6 | 5.72 | 128.2 | ±1.2 % |
|           |                                          | Y | 5.12  | 66.6 | 19.5 |      | 134.3 |        |
|           |                                          | Z | 4.87  | 67.1 | 19.9 |      | 148.0 |        |
| 10181-CAB | LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)    | X | 4.76  | 66.6 | 19.6 | 5.72 | 127.9 | ±1.2 % |
|           |                                          | Y | 5.12  | 66.6 | 19.5 |      | 134.5 |        |
|           |                                          | Z | 4.87  | 67.3 | 20.0 |      | 147.0 |        |
| 10196-CAB | IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)  | X | 9.87  | 69.1 | 21.6 | 8.10 | 135.8 | ±2.2 % |
|           |                                          | Y | 10.19 | 69.1 | 21.4 |      | 145.3 |        |
|           |                                          | Z | 9.65  | 68.8 | 21.3 |      | 130.5 |        |
| 10225-CAB | UMTS-FDD (HSPA+)                         | X | 6.90  | 67.2 | 19.5 | 5.97 | 139.2 | ±1.7 % |
|           |                                          | Y | 7.22  | 67.3 | 19.6 |      | 148.0 |        |
|           |                                          | Z | 6.75  | 67.0 | 19.4 |      | 134.1 |        |
| 10237-CAB | LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)    | X | 8.68  | 80.6 | 29.2 | 9.21 | 148.0 | ±3.0 % |
|           |                                          | Y | 9.82  | 78.8 | 27.3 |      | 125.0 |        |
|           |                                          | Z | 7.85  | 77.6 | 27.7 |      | 143.5 |        |
| 10252-CAB | LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)  | X | 8.56  | 73.7 | 25.6 | 9.24 | 126.6 | ±3.5 % |
|           |                                          | Y | 10.58 | 76.0 | 25.9 |      | 126.3 |        |
|           |                                          | Z | 8.84  | 74.8 | 26.1 |      | 146.7 |        |
| 10267-CAB | LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK) | X | 9.24  | 74.6 | 25.9 | 9.30 | 133.6 | ±3.3 % |
|           |                                          | Y | 11.38 | 76.9 | 26.2 |      | 134.3 |        |
|           |                                          | Z | 8.79  | 73.2 | 25.1 |      | 128.6 |        |

|           |                                                               |   |       |      |      |      |       |        |
|-----------|---------------------------------------------------------------|---|-------|------|------|------|-------|--------|
| 10275-CAB | UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.4)                      | X | 4.39  | 67.0 | 18.9 | 3.96 | 143.8 | ±0.9 % |
|           |                                                               | Y | 4.55  | 67.1 | 18.8 |      | 147.3 |        |
|           |                                                               | Z | 4.42  | 67.4 | 19.0 |      | 139.9 |        |
| 10291-AAB | CDMA2000, RC3, SO55, Full Rate                                | X | 3.59  | 67.2 | 18.9 | 3.46 | 132.2 | ±0.5 % |
|           |                                                               | Y | 3.68  | 66.7 | 18.5 |      | 136.0 |        |
|           |                                                               | Z | 3.57  | 67.1 | 18.6 |      | 128.5 |        |
| 10292-AAB | CDMA2000, RC3, SO32, Full Rate                                | X | 3.50  | 67.0 | 18.7 | 3.39 | 134.0 | ±0.7 % |
|           |                                                               | Y | 3.62  | 66.6 | 18.4 |      | 138.6 |        |
|           |                                                               | Z | 3.50  | 67.2 | 18.7 |      | 129.8 |        |
| 10297-AAA | LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)                       | X | 6.11  | 66.8 | 19.4 | 5.81 | 127.7 | ±1.4 % |
|           |                                                               | Y | 6.33  | 67.0 | 19.5 |      | 132.1 |        |
|           |                                                               | Z | 6.28  | 67.6 | 19.9 |      | 146.6 |        |
| 10311-AAA | LTE-FDD (SC-FDMA, 100% RB, 15 MHz, QPSK)                      | X | 6.71  | 67.5 | 19.9 | 6.06 | 134.2 | ±1.7 % |
|           |                                                               | Y | 6.93  | 67.7 | 19.9 |      | 138.0 |        |
|           |                                                               | Z | 6.57  | 67.2 | 19.6 |      | 128.0 |        |
| 10400-AAC | IEEE 802.11ac WiFi (20MHz, 64-QAM, 99pc duty cycle)           | X | 10.17 | 69.5 | 21.9 | 8.37 | 138.5 | ±2.5 % |
|           |                                                               | Y | 10.55 | 69.5 | 21.8 |      | 148.0 |        |
|           |                                                               | Z | 9.92  | 69.0 | 21.6 |      | 132.5 |        |
| 10403-AAB | CDMA2000 (1xEV-DO, Rev. 0)                                    | X | 4.79  | 69.2 | 19.1 | 3.76 | 144.1 | ±0.7 % |
|           |                                                               | Y | 4.71  | 67.0 | 18.2 |      | 129.2 |        |
|           |                                                               | Z | 4.72  | 69.3 | 19.2 |      | 139.3 |        |
| 10404-AAB | CDMA2000 (1xEV-DO, Rev. A)                                    | X | 4.69  | 69.2 | 19.2 | 3.77 | 142.1 | ±0.7 % |
|           |                                                               | Y | 4.71  | 67.5 | 18.5 |      | 126.7 |        |
|           |                                                               | Z | 4.51  | 68.6 | 18.8 |      | 137.3 |        |
| 10415-AAA | IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 99pc duty cycle)     | X | 2.55  | 68.0 | 18.5 | 1.54 | 141.7 | ±0.7 % |
|           |                                                               | Y | 2.67  | 68.4 | 18.6 |      | 144.0 |        |
|           |                                                               | Z | 2.98  | 70.8 | 19.5 |      | 138.0 |        |
| 10416-AAA | IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 99pc duty cycle) | X | 10.01 | 69.3 | 21.8 | 8.23 | 137.3 | ±2.5 % |
|           |                                                               | Y | 10.31 | 69.3 | 21.6 |      | 146.0 |        |
|           |                                                               | Z | 9.69  | 68.8 | 21.4 |      | 129.9 |        |

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 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:3263

### 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                            | 6.27    | 6.27    | 6.27    | 0.29               | 1.87                    | ± 12.0 %    |
| 835                  | 41.5                               | 0.90                            | 6.18    | 6.18    | 6.18    | 0.49               | 1.42                    | ± 12.0 %    |
| 1750                 | 40.1                               | 1.37                            | 5.27    | 5.27    | 5.27    | 0.49               | 1.46                    | ± 12.0 %    |
| 1900                 | 40.0                               | 1.40                            | 4.96    | 4.96    | 4.96    | 0.66               | 1.28                    | ± 12.0 %    |
| 2300                 | 39.5                               | 1.67                            | 4.63    | 4.63    | 4.63    | 0.58               | 1.41                    | ± 12.0 %    |
| 2450                 | 39.2                               | 1.80                            | 4.40    | 4.40    | 4.40    | 0.71               | 1.34                    | ± 12.0 %    |
| 2600                 | 39.0                               | 1.96                            | 4.25    | 4.25    | 4.25    | 0.80               | 1.25                    | ± 12.0 %    |

<sup>C</sup> Frequency validity above 300 MHz 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. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

<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:3263

### 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                            | 6.07    | 6.07    | 6.07    | 0.53               | 1.42                    | ± 12.0 %    |
| 835                  | 55.2                               | 0.97                            | 6.08    | 6.08    | 6.08    | 0.57               | 1.36                    | ± 12.0 %    |
| 1750                 | 53.4                               | 1.49                            | 4.88    | 4.88    | 4.88    | 0.54               | 1.50                    | ± 12.0 %    |
| 1900                 | 53.3                               | 1.52                            | 4.66    | 4.66    | 4.66    | 0.56               | 1.51                    | ± 12.0 %    |
| 2300                 | 52.9                               | 1.81                            | 4.42    | 4.42    | 4.42    | 0.69               | 1.33                    | ± 12.0 %    |
| 2450                 | 52.7                               | 1.95                            | 4.28    | 4.28    | 4.28    | 0.80               | 1.08                    | ± 12.0 %    |
| 2600                 | 52.5                               | 2.16                            | 4.11    | 4.11    | 4.11    | 0.80               | 1.09                    | ± 12.0 %    |

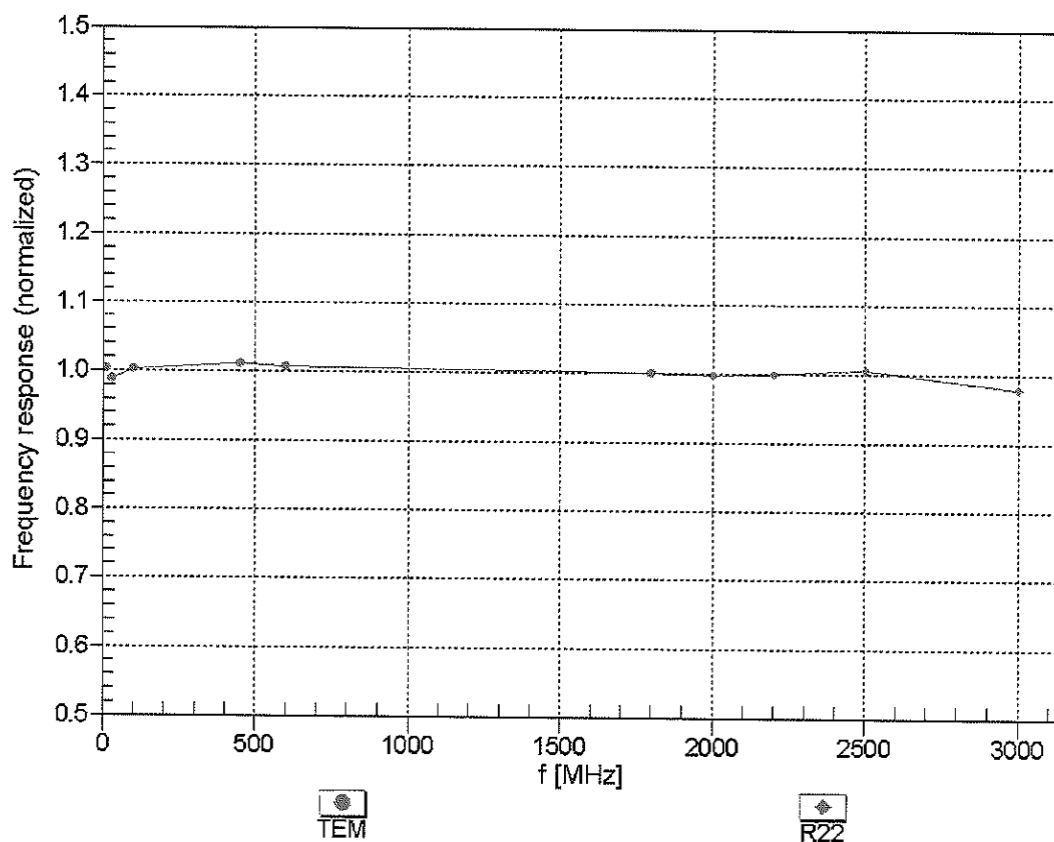
<sup>C</sup> Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

<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

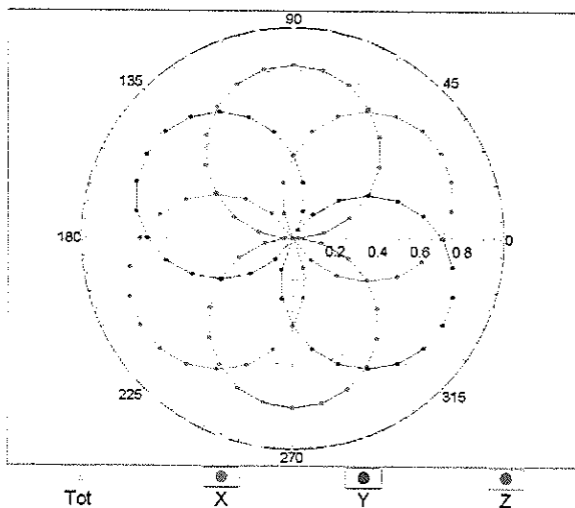
(TEM-Cell:ifi110 EXX, Waveguide: R22)



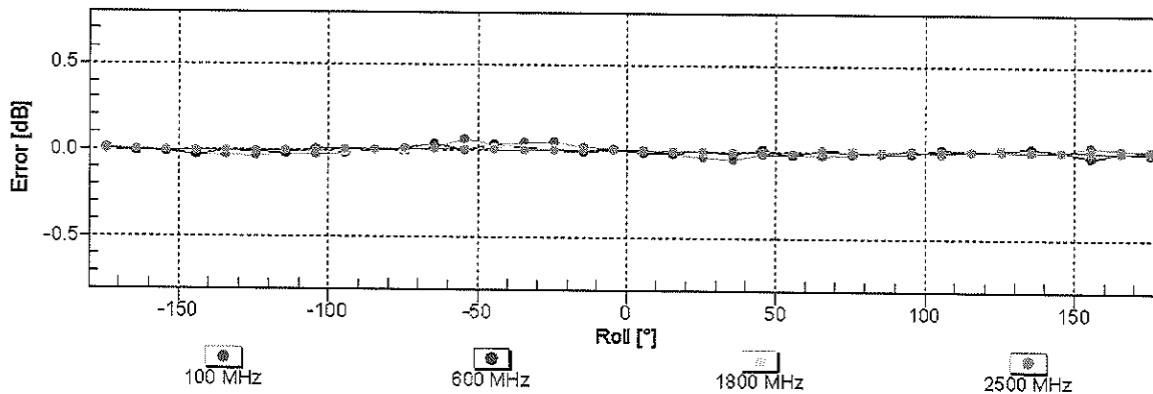
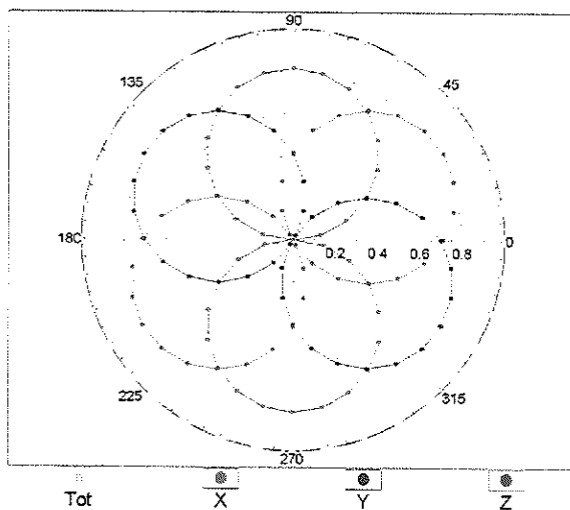
Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  ( $k=2$ )

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

f=600 MHz,TEM

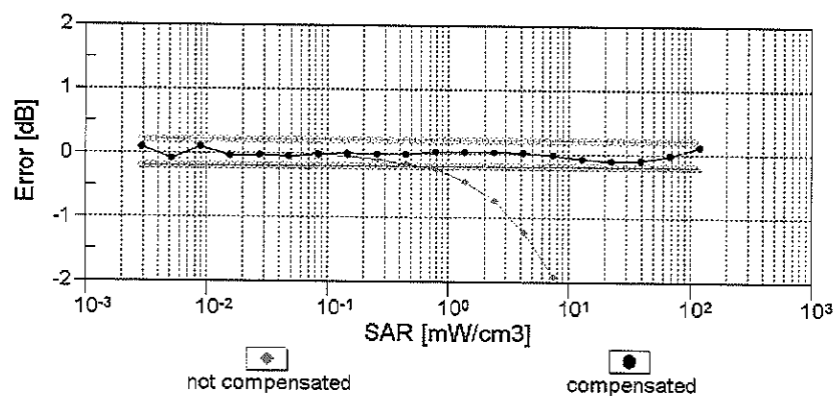
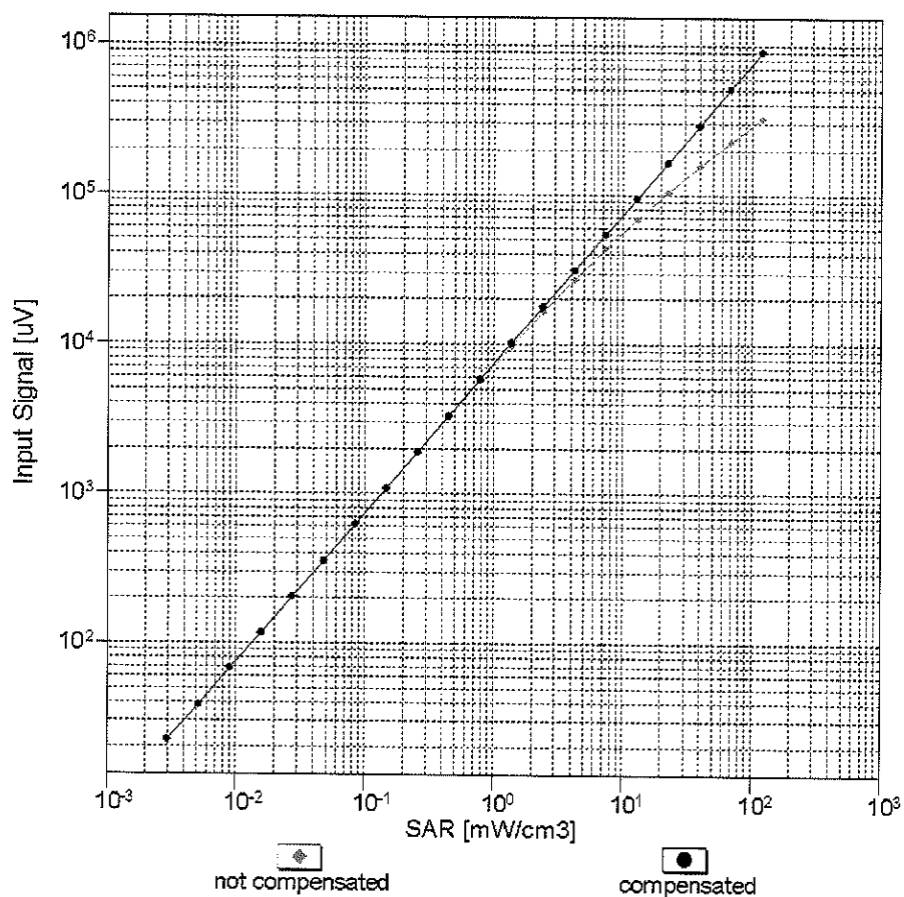


f=1800 MHz,R22



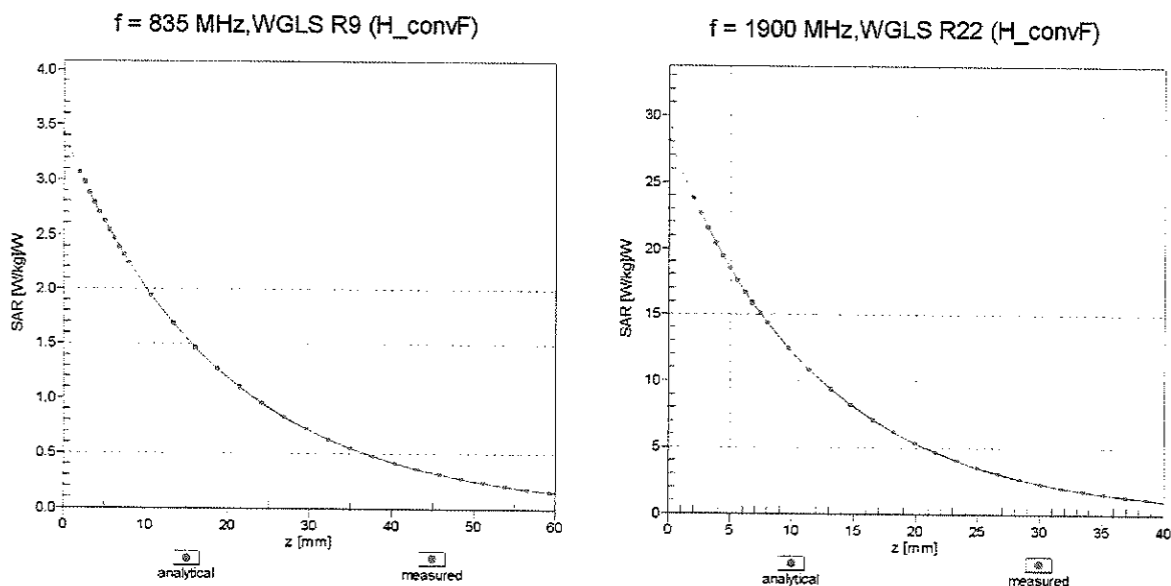
Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

# Dynamic Range $f(\text{SAR}_{\text{head}})$ (TEM cell, $f_{\text{eval}} = 1900 \text{ MHz}$ )



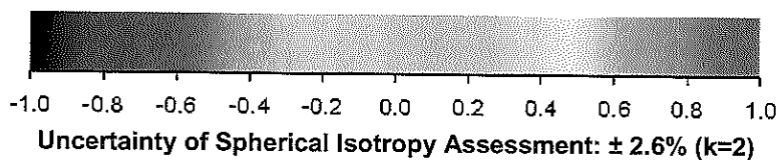
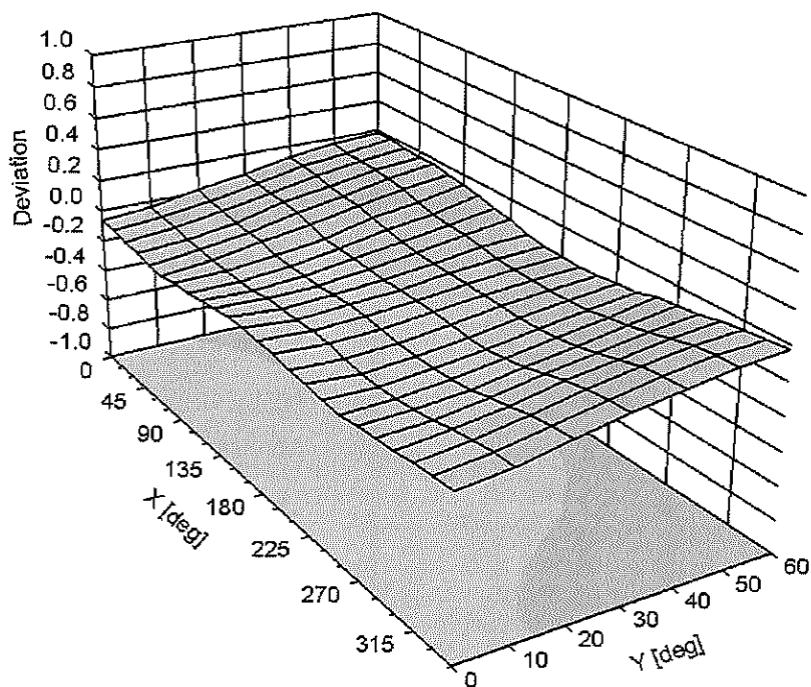
Uncertainty of Linearity Assessment:  $\pm 0.6\%$  ( $k=2$ )

## Conversion Factor Assessment



## Deviation from Isotropy in Liquid

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



## DASY/EASY - Parameters of Probe: ES3DV3 - SN:3263

### Other Probe Parameters

|                                               |            |
|-----------------------------------------------|------------|
| Sensor Arrangement                            | Triangular |
| Connector Angle (°)                           | 65.6       |
| 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       |

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



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 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **PC Test**

Certificate No: **ES3-3334\_Dec14**

## CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3334**

Calibration procedure(s) **QA CAL-01.v9, QA CAL-23.v5, QA CAL-25.v6**  
 Calibration procedure for dosimetric E-field probes

CC  
 12/31/14

Calibration date: **December 16, 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      | 03-Apr-14 (No. 217-01911)         | Apr-15                 |
| Power sensor E4412A        | MY41498087      | 03-Apr-14 (No. 217-01911)         | Apr-15                 |
| Reference 3 dB Attenuator  | SN: S5054 (3c)  | 03-Apr-14 (No. 217-01915)         | Apr-15                 |
| Reference 20 dB Attenuator | SN: S5277 (20x) | 03-Apr-14 (No. 217-01919)         | Apr-15                 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 03-Apr-14 (No. 217-01920)         | Apr-15                 |
| Reference Probe ES3DV2     | SN: 3013        | 30-Dec-13 (No. ES3-3013_Dec13)    | Dec-14                 |
| DAE4                       | SN: 789         | 30-Apr-14 (No. DAE4-789_Apr14)    | Apr-15                 |
| 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-14) | In house check: Oct-15 |

|                |                      |                                   |                           |
|----------------|----------------------|-----------------------------------|---------------------------|
| Calibrated by: | Name<br>Leif Klysner | Function<br>Laboratory Technician | Signature<br>             |
| Approved by:   | Katja Pokovic        | Technical Manager                 |                           |
|                |                      |                                   | Issued: December 16, 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                                                                                                                                |
| 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<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.
- Connector Angle**: The angle is assessed using the information gained by determining the NORM<sub>x</sub> (no uncertainty required).

# Probe ES3DV3

## SN:3334

|               |                   |
|---------------|-------------------|
| Manufactured: | January 24, 2012  |
| Repaired:     | December 9, 2014  |
| Calibrated:   | December 16, 2014 |

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

## DASY/EASY - Parameters of Probe: ES3DV3 - SN:3334

### Basic Calibration Parameters

|                                                           | Sensor X | Sensor Y | Sensor Z | Unc (k=2)     |
|-----------------------------------------------------------|----------|----------|----------|---------------|
| Norm ( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>A</sup> | 1.04     | 1.05     | 1.01     | $\pm 10.1 \%$ |
| DCP (mV) <sup>B</sup>                                     | 106.5    | 105.0    | 105.6    |               |

### 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    | 188.0    | $\pm 3.0 \%$              |
|           |                                               | Y | 0.0     | 0.0                          | 1.0  |         | 183.2    |                           |
|           |                                               | Z | 0.0     | 0.0                          | 1.0  |         | 181.8    |                           |
| 10010-CAA | SAR Validation (Square, 100ms, 10ms)          | X | 4.61    | 67.2                         | 13.7 | 10.00   | 38.4     | $\pm 1.4 \%$              |
|           |                                               | Y | 20.36   | 82.7                         | 18.7 |         | 38.0     |                           |
|           |                                               | Z | 17.55   | 80.3                         | 17.6 |         | 37.0     |                           |
| 10011-CAB | UMTS-FDD (WCDMA)                              | X | 3.56    | 68.4                         | 19.1 | 2.91    | 148.4    | $\pm 0.7 \%$              |
|           |                                               | Y | 3.44    | 68.1                         | 19.2 |         | 146.9    |                           |
|           |                                               | Z | 3.52    | 68.3                         | 19.1 |         | 144.7    |                           |
| 10012-CAB | IEEE 802.11b WIFI 2.4 GHz (DSSS, 1 Mbps)      | X | 3.54    | 71.9                         | 20.0 | 1.87    | 148.0    | $\pm 0.7 \%$              |
|           |                                               | Y | 3.51    | 72.2                         | 20.5 |         | 148.9    |                           |
|           |                                               | Z | 3.80    | 73.3                         | 20.6 |         | 144.6    |                           |
| 10013-CAB | IEEE 802.11g WIFI 2.4 GHz (DSSS-OFDM, 6 Mbps) | X | 11.39   | 71.1                         | 23.3 | 9.46    | 149.8    | $\pm 3.8 \%$              |
|           |                                               | Y | 11.54   | 71.8                         | 24.0 |         | 149.5    |                           |
|           |                                               | Z | 11.11   | 70.5                         | 23.0 |         | 141.6    |                           |
| 10021-DAB | GSM-FDD (TDMA, GMSK)                          | X | 15.29   | 91.3                         | 25.0 | 9.39    | 131.9    | $\pm 1.7 \%$              |
|           |                                               | Y | 24.16   | 100.0                        | 28.4 |         | 142.8    |                           |
|           |                                               | Z | 13.05   | 89.2                         | 24.5 |         | 126.5    |                           |
| 10023-DAB | GPRS-FDD (TDMA, GMSK, TN 0)                   | X | 16.07   | 91.7                         | 25.1 | 9.57    | 144.0    | $\pm 2.2 \%$              |
|           |                                               | Y | 19.00   | 95.3                         | 26.8 |         | 136.4    |                           |
|           |                                               | Z | 13.93   | 89.8                         | 24.6 |         | 141.0    |                           |
| 10024-DAB | GPRS-FDD (TDMA, GMSK, TN 0-1)                 | X | 19.98   | 91.0                         | 22.4 | 6.56    | 134.2    | $\pm 1.9 \%$              |
|           |                                               | Y | 34.78   | 99.7                         | 25.5 |         | 145.0    |                           |
|           |                                               | Z | 29.89   | 96.8                         | 24.1 |         | 129.8    |                           |
| 10027-DAB | GPRS-FDD (TDMA, GMSK, TN 0-1-2)               | X | 56.30   | 99.7                         | 22.8 | 4.80    | 125.2    | $\pm 1.9 \%$              |
|           |                                               | Y | 41.16   | 99.6                         | 23.9 |         | 131.2    |                           |
|           |                                               | Z | 50.78   | 99.8                         | 23.1 |         | 147.6    |                           |
| 10028-DAB | GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)             | X | 49.35   | 99.7                         | 22.5 | 3.55    | 133.2    | $\pm 2.2 \%$              |
|           |                                               | Y | 46.49   | 99.6                         | 22.9 |         | 139.2    |                           |
|           |                                               | Z | 58.21   | 99.7                         | 22.0 |         | 129.4    |                           |
| 10032-CAA | IEEE 802.15.1 Bluetooth (GFSK, DH5)           | X | 56.54   | 100.0                        | 20.2 | 1.16    | 128.0    | $\pm 1.7 \%$              |
|           |                                               | Y | 20.03   | 99.3                         | 22.4 |         | 130.3    |                           |
|           |                                               | Z | 84.01   | 100.0                        | 19.4 |         | 141.0    |                           |
| 10100-CAB | LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)      | X | 6.44    | 67.6                         | 19.6 | 5.67    | 138.5    | $\pm 1.4 \%$              |
|           |                                               | Y | 6.50    | 67.9                         | 20.0 |         | 142.1    |                           |
|           |                                               | Z | 6.31    | 67.2                         | 19.4 |         | 129.4    |                           |

|           |                                          |   |       |      |      |      |       |        |
|-----------|------------------------------------------|---|-------|------|------|------|-------|--------|
| 10103-CAB | LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK) | X | 9.77  | 73.6 | 24.6 | 9.29 | 129.6 | ±3.3 % |
|           |                                          | Y | 10.52 | 76.0 | 26.3 |      | 132.1 |        |
|           |                                          | Z | 10.21 | 75.0 | 25.4 |      | 147.7 |        |
| 10108-CAC | LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK) | X | 6.36  | 67.2 | 19.6 | 5.80 | 136.8 | ±1.4 % |
|           |                                          | Y | 6.31  | 67.3 | 19.8 |      | 137.2 |        |
|           |                                          | Z | 6.20  | 66.7 | 19.3 |      | 128.8 |        |
| 10117-CAB | IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK) | X | 9.96  | 68.3 | 20.8 | 8.07 | 126.5 | ±2.5 % |
|           |                                          | Y | 10.12 | 68.8 | 21.3 |      | 126.6 |        |
|           |                                          | Z | 10.22 | 69.0 | 21.2 |      | 143.7 |        |
| 10151-CAB | LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)  | X | 9.29  | 73.0 | 24.4 | 9.28 | 125.3 | ±3.3 % |
|           |                                          | Y | 9.65  | 74.5 | 25.6 |      | 124.4 |        |
|           |                                          | Z | 9.65  | 74.3 | 25.2 |      | 141.1 |        |
| 10154-CAC | LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)  | X | 6.03  | 66.7 | 19.3 | 5.75 | 132.7 | ±1.4 % |
|           |                                          | Y | 5.97  | 66.7 | 19.5 |      | 132.7 |        |
|           |                                          | Z | 6.17  | 67.3 | 19.7 |      | 148.3 |        |
| 10160-CAB | LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)  | X | 6.47  | 67.2 | 19.5 | 5.82 | 138.1 | ±1.4 % |
|           |                                          | Y | 6.44  | 67.3 | 19.8 |      | 138.2 |        |
|           |                                          | Z | 6.27  | 66.6 | 19.2 |      | 126.8 |        |
| 10169-CAB | LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)    | X | 5.03  | 66.9 | 19.6 | 5.73 | 137.2 | ±1.2 % |
|           |                                          | Y | 4.97  | 67.0 | 19.9 |      | 135.7 |        |
|           |                                          | Z | 4.91  | 66.5 | 19.5 |      | 127.1 |        |
| 10172-CAB | LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)    | X | 8.53  | 77.4 | 26.9 | 9.21 | 142.4 | ±2.7 % |
|           |                                          | Y | 9.59  | 81.3 | 29.3 |      | 142.3 |        |
|           |                                          | Z | 7.78  | 75.0 | 25.7 |      | 126.7 |        |
| 10175-CAC | LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)    | X | 5.02  | 67.0 | 19.7 | 5.72 | 131.8 | ±1.2 % |
|           |                                          | Y | 4.98  | 67.0 | 19.9 |      | 136.1 |        |
|           |                                          | Z | 4.95  | 66.8 | 19.6 |      | 128.1 |        |
| 10181-CAB | LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)    | X | 4.99  | 66.8 | 19.6 | 5.72 | 131.2 | ±1.2 % |
|           |                                          | Y | 4.99  | 67.1 | 20.0 |      | 136.2 |        |
|           |                                          | Z | 4.92  | 66.6 | 19.5 |      | 127.9 |        |
| 10196-CAB | IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)  | X | 9.98  | 68.8 | 21.2 | 8.10 | 141.7 | ±2.5 % |
|           |                                          | Y | 10.14 | 69.5 | 21.8 |      | 147.2 |        |
|           |                                          | Z | 9.85  | 68.6 | 21.1 |      | 137.5 |        |
| 10225-CAB | UMTS-FDD (HSPA+)                         | X | 7.17  | 67.5 | 19.6 | 5.97 | 146.0 | ±1.4 % |
|           |                                          | Y | 7.13  | 67.7 | 19.9 |      | 149.9 |        |
|           |                                          | Z | 7.12  | 67.5 | 19.6 |      | 142.9 |        |
| 10237-CAB | LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)    | X | 8.29  | 76.6 | 26.5 | 9.21 | 136.1 | ±2.7 % |
|           |                                          | Y | 9.60  | 81.4 | 29.3 |      | 142.3 |        |
|           |                                          | Z | 7.98  | 75.8 | 26.1 |      | 132.9 |        |
| 10252-CAB | LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)  | X | 9.27  | 74.1 | 25.1 | 9.24 | 139.1 | ±3.3 % |
|           |                                          | Y | 10.25 | 77.5 | 27.4 |      | 146.3 |        |
|           |                                          | Z | 9.07  | 73.7 | 25.0 |      | 135.8 |        |
| 10267-CAB | LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK) | X | 9.95  | 74.9 | 25.4 | 9.30 | 147.0 | ±3.3 % |
|           |                                          | Y | 9.80  | 75.0 | 25.9 |      | 125.9 |        |
|           |                                          | Z | 9.74  | 74.6 | 25.4 |      | 143.8 |        |

|           |                                                               |   |       |      |      |      |       |        |
|-----------|---------------------------------------------------------------|---|-------|------|------|------|-------|--------|
| 10275-CAB | UMTS-FDD (HSUPA, Sublest 5, 3GPP Rel8.4)                      | X | 4.63  | 67.6 | 19.0 | 3.96 | 147.5 | ±0.7 % |
|           |                                                               | Y | 4.41  | 66.9 | 18.9 |      | 129.5 |        |
|           |                                                               | Z | 4.61  | 67.6 | 19.1 |      | 148.1 |        |
| 10291-AAB | CDMA2000, RC3, SO55, Full Rate                                | X | 3.83  | 67.7 | 19.0 | 3.46 | 133.7 | ±0.7 % |
|           |                                                               | Y | 3.71  | 67.4 | 19.0 |      | 139.0 |        |
|           |                                                               | Z | 3.86  | 68.1 | 19.2 |      | 133.7 |        |
| 10292-AAB | CDMA2000, RC3, SO32, Full Rate                                | X | 3.85  | 68.2 | 19.2 | 3.39 | 136.7 | ±0.5 % |
|           |                                                               | Y | 3.67  | 67.5 | 19.1 |      | 141.3 |        |
|           |                                                               | Z | 3.75  | 67.8 | 19.0 |      | 136.2 |        |
| 10297-AAA | LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)                       | X | 6.31  | 67.1 | 19.5 | 5.81 | 130.6 | ±1.4 % |
|           |                                                               | Y | 6.32  | 67.3 | 19.8 |      | 135.1 |        |
|           |                                                               | Z | 6.24  | 66.9 | 19.4 |      | 129.2 |        |
| 10311-AAA | LTE-FDD (SC-FDMA, 100% RB, 15 MHz, QPSK)                      | X | 6.85  | 67.5 | 19.8 | 6.06 | 135.1 | ±1.4 % |
|           |                                                               | Y | 6.90  | 67.9 | 20.2 |      | 141.5 |        |
|           |                                                               | Z | 6.82  | 67.5 | 19.8 |      | 135.1 |        |
| 10403-AAB | CDMA2000 (1xEV-DO, Rev. 0)                                    | X | 5.04  | 69.1 | 19.1 | 3.76 | 126.0 | ±0.5 % |
|           |                                                               | Y | 4.90  | 69.0 | 19.3 |      | 129.6 |        |
|           |                                                               | Z | 5.11  | 69.7 | 19.4 |      | 125.8 |        |
| 10404-AAB | CDMA2000 (1xEV-DO, Rev. A)                                    | X | 5.05  | 69.6 | 19.4 | 3.77 | 147.1 | ±0.7 % |
|           |                                                               | Y | 4.84  | 69.2 | 19.5 |      | 127.8 |        |
|           |                                                               | Z | 5.15  | 70.1 | 19.6 |      | 143.3 |        |
| 10415-AAA | IEEE 802.11b WIFI 2.4 GHz (DSSS, 1 Mbps, 99pc duty cycle)     | X | 3.13  | 71.2 | 19.9 | 1.54 | 144.5 | ±0.5 % |
|           |                                                               | Y | 2.93  | 70.4 | 19.9 |      | 149.8 |        |
|           |                                                               | Z | 3.18  | 71.6 | 20.1 |      | 141.4 |        |
| 10416-AAA | IEEE 802.11g WIFI 2.4 GHz (ERP-OFDM, 6 Mbps, 99pc duty cycle) | X | 10.11 | 69.0 | 21.4 | 8.23 | 144.3 | ±2.5 % |
|           |                                                               | Y | 10.21 | 69.6 | 21.9 |      | 148.3 |        |
|           |                                                               | Z | 9.99  | 68.9 | 21.3 |      | 141.1 |        |

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:3334

### 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                            | 6.51    | 6.51    | 6.51    | 0.80               | 1.17                    | ± 12.0 %    |
| 835                  | 41.5                               | 0.90                            | 6.25    | 6.25    | 6.25    | 0.38               | 1.58                    | ± 12.0 %    |
| 1750                 | 40.1                               | 1.37                            | 5.21    | 5.21    | 5.21    | 0.43               | 1.63                    | ± 12.0 %    |
| 1900                 | 40.0                               | 1.40                            | 5.03    | 5.03    | 5.03    | 0.53               | 1.45                    | ± 12.0 %    |
| 2450                 | 39.2                               | 1.80                            | 4.51    | 4.51    | 4.51    | 0.80               | 1.26                    | ± 12.0 %    |
| 2600                 | 39.0                               | 1.96                            | 4.31    | 4.31    | 4.31    | 0.79               | 1.27                    | ± 12.0 %    |

<sup>c</sup> Frequency validity above 300 MHz 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. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

<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:3334

### 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>d</sup> (mm) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|--------------------|-------------------------|-------------|
| 750                  | 55.5                               | 0.96                            | 6.09    | 6.09    | 6.09    | 0.49               | 1.47                    | ± 12.0 %    |
| 835                  | 55.2                               | 0.97                            | 6.14    | 6.14    | 6.14    | 0.69               | 1.27                    | ± 12.0 %    |
| 1750                 | 53.4                               | 1.49                            | 4.94    | 4.94    | 4.94    | 0.80               | 1.24                    | ± 12.0 %    |
| 1900                 | 53.3                               | 1.52                            | 4.73    | 4.73    | 4.73    | 0.62               | 1.44                    | ± 12.0 %    |
| 2450                 | 52.7                               | 1.95                            | 4.28    | 4.28    | 4.28    | 0.80               | 1.13                    | ± 12.0 %    |
| 2600                 | 52.5                               | 2.16                            | 4.16    | 4.16    | 4.16    | 0.75               | 1.25                    | ± 12.0 %    |

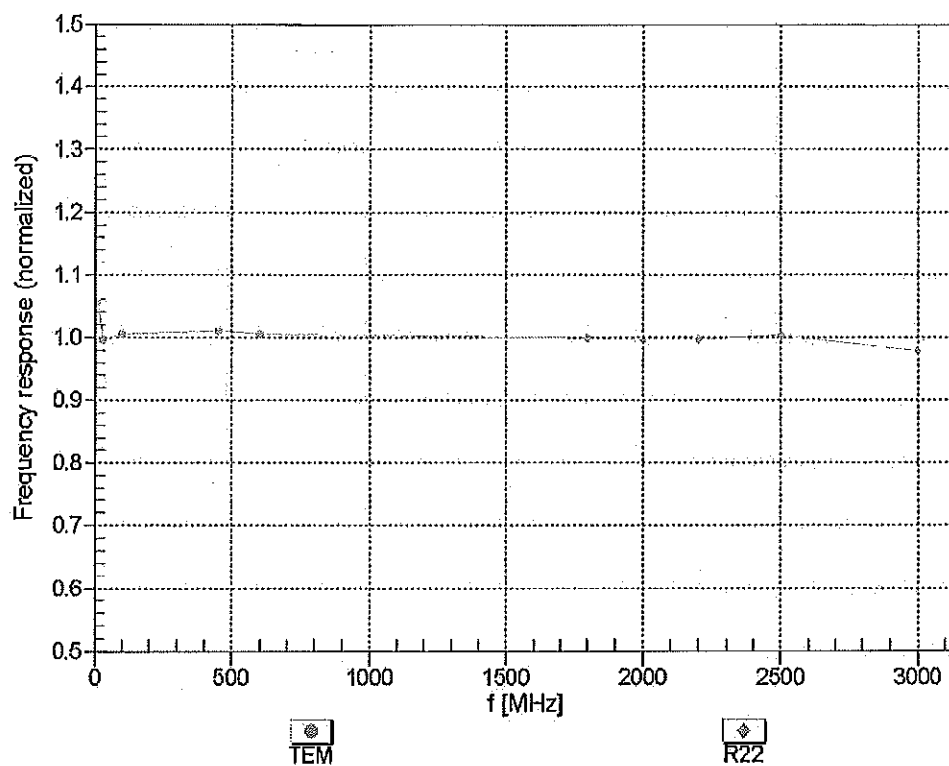
<sup>c</sup> Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

<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)

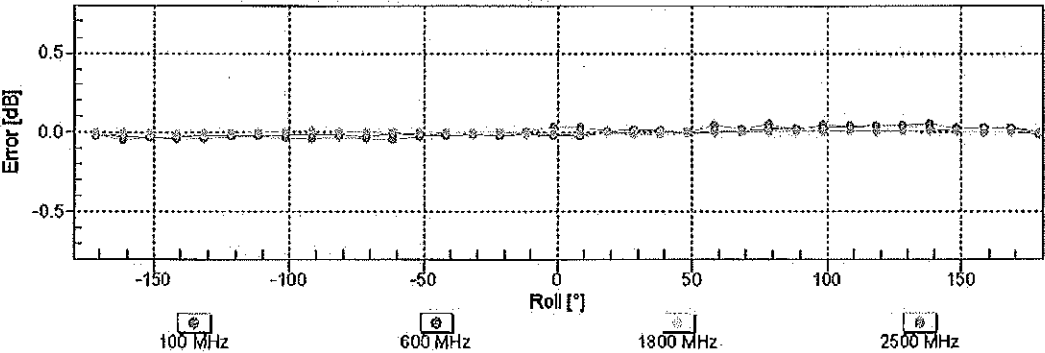
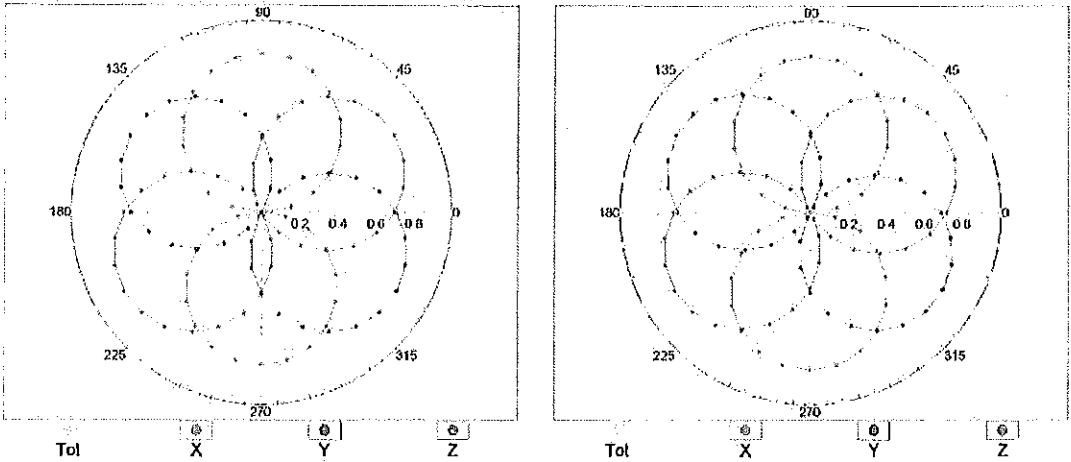


Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  ( $k=2$ )

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

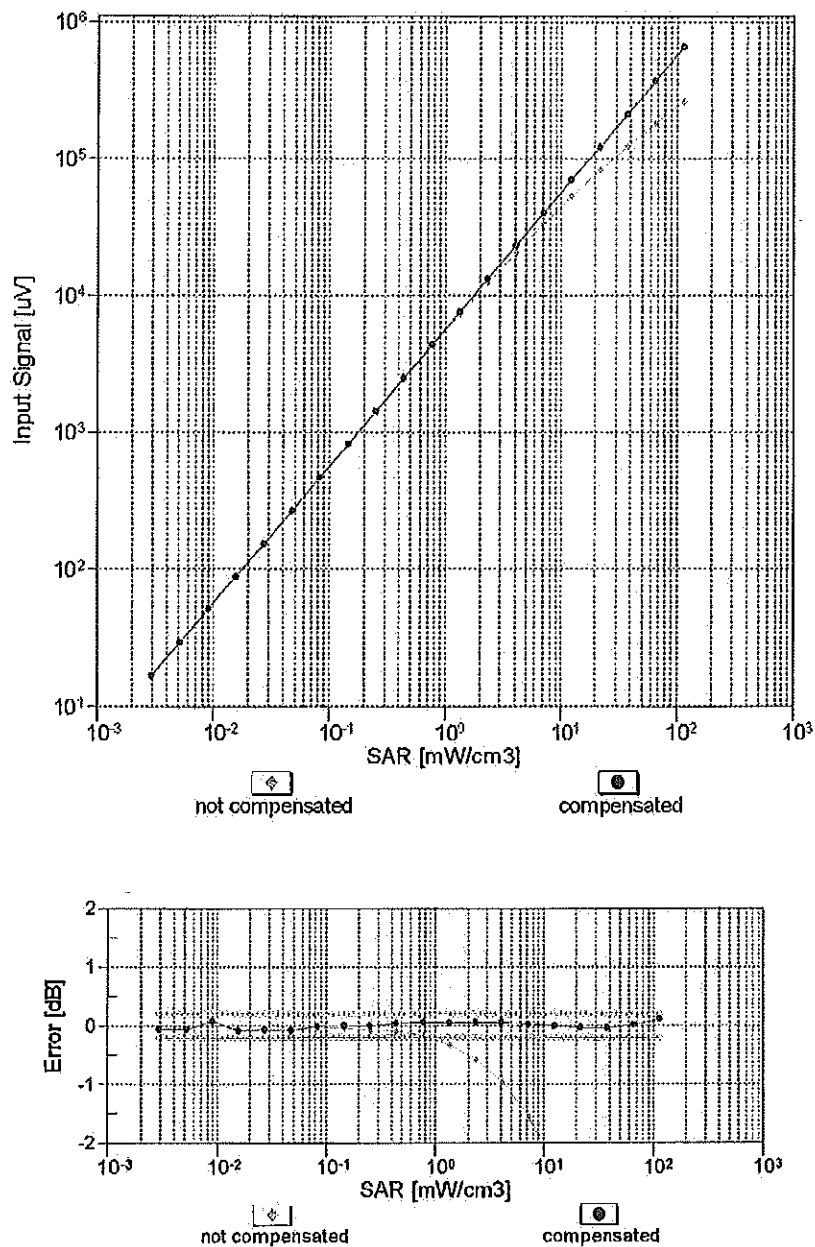
f=600 MHz,TEM

f=1800 MHz,R22



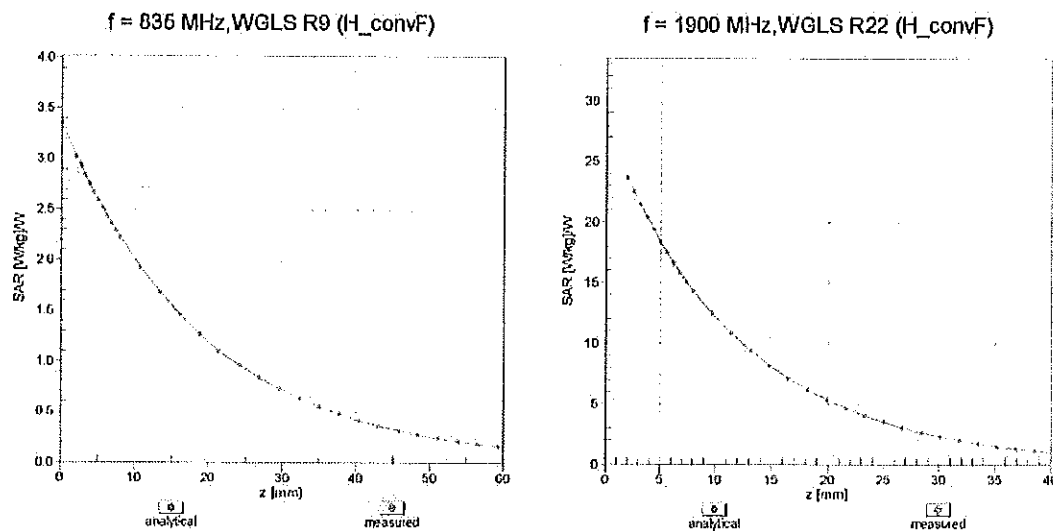
Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

# Dynamic Range $f(\text{SAR}_{\text{head}})$ (TEM cell, $f_{\text{eval}} = 1900 \text{ MHz}$ )



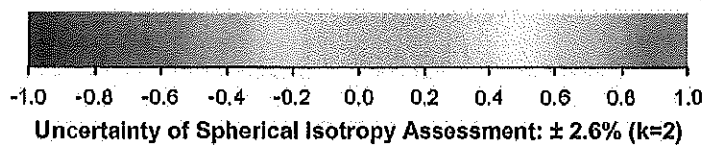
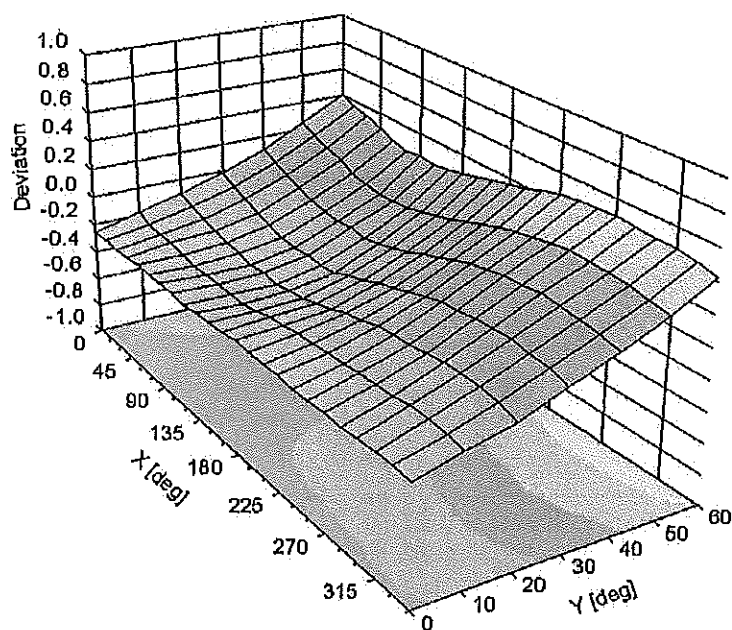
Uncertainty of Linearity Assessment:  $\pm 0.6\%$  ( $k=2$ )

## Conversion Factor Assessment



## Deviation from Isotropy in Liquid

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



**DASY/EASY - Parameters of Probe: ES3DV3 - SN:3334****Other Probe Parameters**

|                                               |            |
|-----------------------------------------------|------------|
| Sensor Arrangement                            | Triangular |
| Connector Angle (°)                           | 18.5       |
| 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 0108**

Client **PC Test**

Certificate No: **ES3-3209\_Mar15**

## CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3209**

Calibration procedure(s) **QA CAL-01.v9, QA CAL-23.v5, QA CAL-25.v6**  
**Calibration procedure for dosimetric E-field probes**

Calibration date: **March 19, 2015**

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      | 03-Apr-14 (No. 217-01911)         | Apr-15                 |
| Power sensor E4412A        | MY41498087      | 03-Apr-14 (No. 217-01911)         | Apr-15                 |
| Reference 3 dB Attenuator  | SN: S5054 (3c)  | 03-Apr-14 (No. 217-01915)         | Apr-15                 |
| Reference 20 dB Attenuator | SN: S5277 (20x) | 03-Apr-14 (No. 217-01919)         | Apr-15                 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 03-Apr-14 (No. 217-01920)         | Apr-15                 |
| Reference Probe ES3DV2     | SN: 3013        | 30-Dec-14 (No. ES3-3013_Dec14)    | Dec-15                 |
| DAE4                       | SN: 660         | 14-Jan-15 (No. DAE4-660_Jan15)    | Jan-16                 |
| 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-14) | In house check: Oct-15 |

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

Issued: March 19, 2015

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



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Accreditation No.: **SCS 0108**

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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 ES3DV3

## SN:3209

Manufactured: October 14, 2008  
Calibrated: March 19, 2015

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

# DASY/EASY - Parameters of Probe: ES3DV3 - SN:3209

## Basic Calibration Parameters

|                                       | Sensor X | Sensor Y | Sensor Z | Unc (k=2) |
|---------------------------------------|----------|----------|----------|-----------|
| Norm ( $\mu V/(V/m)^2$ ) <sup>A</sup> | 1.35     | 1.33     | 1.14     | ± 10.1 %  |
| DCP (mV) <sup>B</sup>                 | 102.0    | 100.9    | 103.3    |           |

## 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    | 214.5    | ±3.5 %                    |
|               |                                               | Y | 0.0     | 0.0                    | 1.0  |         | 192.6    |                           |
|               |                                               | Z | 0.0     | 0.0                    | 1.0  |         | 199.1    |                           |
| 10010-<br>CAA | SAR Validation (Square, 100ms, 10ms)          | X | 2.61    | 65.1                   | 12.2 | 10.00   | 42.3     | ±1.7 %                    |
|               |                                               | Y | 1.39    | 57.8                   | 8.9  |         | 42.7     |                           |
|               |                                               | Z | 4.57    | 70.3                   | 14.0 |         | 38.3     |                           |
| 10011-<br>CAB | UMTS-FDD (WCDMA)                              | X | 3.12    | 66.3                   | 18.1 | 2.91    | 130.3    | ±0.7 %                    |
|               |                                               | Y | 3.08    | 65.6                   | 17.5 |         | 132.2    |                           |
|               |                                               | Z | 3.32    | 67.7                   | 19.0 |         | 137.6    |                           |
| 10012-<br>CAB | IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)      | X | 2.54    | 66.8                   | 17.8 | 1.87    | 131.1    | ±0.7 %                    |
|               |                                               | Y | 2.67    | 67.1                   | 17.7 |         | 131.6    |                           |
|               |                                               | Z | 2.85    | 69.2                   | 19.1 |         | 138.0    |                           |
| 10013-<br>CAB | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps) | X | 10.78   | 70.5                   | 23.4 | 9.46    | 146.9    | ±2.7 %                    |
|               |                                               | Y | 10.39   | 69.2                   | 22.5 |         | 123.5    |                           |
|               |                                               | Z | 10.50   | 69.9                   | 23.1 |         | 128.4    |                           |
| 10021-<br>DAB | GSM-FDD (TDMA, GMSK)                          | X | 3.65    | 74.2                   | 17.7 | 9.39    | 130.0    | ±1.9 %                    |
|               |                                               | Y | 6.62    | 83.5                   | 22.0 |         | 149.4    |                           |
|               |                                               | Z | 4.25    | 76.8                   | 19.2 |         | 136.2    |                           |
| 10023-<br>DAB | GPRS-FDD (TDMA, GMSK, TN 0)                   | X | 3.95    | 75.3                   | 18.4 | 9.57    | 138.8    | ±2.5 %                    |
|               |                                               | Y | 4.99    | 78.2                   | 19.8 |         | 143.3    |                           |
|               |                                               | Z | 4.11    | 75.8                   | 18.9 |         | 129.3    |                           |
| 10024-<br>DAB | GPRS-FDD (TDMA, GMSK, TN 0-1)                 | X | 6.44    | 80.3                   | 17.7 | 6.56    | 135.0    | ±1.7 %                    |
|               |                                               | Y | 3.76    | 73.7                   | 16.0 |         | 144.2    |                           |
|               |                                               | Z | 11.61   | 88.5                   | 20.7 |         | 148.0    |                           |
| 10027-<br>DAB | GPRS-FDD (TDMA, GMSK, TN 0-1-2)               | X | 43.77   | 99.9                   | 21.8 | 4.80    | 131.8    | ±1.7 %                    |
|               |                                               | Y | 13.95   | 87.5                   | 19.0 |         | 142.7    |                           |
|               |                                               | Z | 39.96   | 99.9                   | 22.1 |         | 145.6    |                           |
| 10028-<br>DAB | GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)             | X | 62.88   | 99.8                   | 20.4 | 3.55    | 144.5    | ±2.2 %                    |
|               |                                               | Y | 2.45    | 70.4                   | 12.9 |         | 130.3    |                           |
|               |                                               | Z | 80.83   | 99.9                   | 19.9 |         | 135.1    |                           |
| 10032-<br>CAA | IEEE 802.15.1 Bluetooth (GFSK, DH5)           | X | 0.32    | 58.4                   | 4.3  | 1.16    | 144.1    | ±1.9 %                    |
|               |                                               | Y | 16.25   | 79.9                   | 12.1 |         | 129.5    |                           |
|               |                                               | Z | 95.90   | 91.1                   | 14.4 |         | 134.6    |                           |
| 10100-<br>CAB | LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)      | X | 6.32    | 67.4                   | 19.8 | 5.67    | 138.3    | ±1.4 %                    |
|               |                                               | Y | 6.35    | 67.3                   | 19.5 |         | 144.4    |                           |
|               |                                               | Z | 6.20    | 67.1                   | 19.6 |         | 127.7    |                           |

|           |                                          |   |       |      |      |      |       |        |
|-----------|------------------------------------------|---|-------|------|------|------|-------|--------|
| 10103-CAB | LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK) | X | 8.72  | 73.1 | 25.3 | 9.29 | 138.6 | ±2.7 % |
|           |                                          | Y | 8.88  | 72.9 | 24.9 |      | 147.9 |        |
|           |                                          | Z | 8.48  | 72.3 | 24.9 |      | 127.4 |        |
| 10108-CAC | LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK) | X | 6.14  | 66.9 | 19.6 | 5.80 | 136.2 | ±1.7 % |
|           |                                          | Y | 6.20  | 66.8 | 19.4 |      | 142.8 |        |
|           |                                          | Z | 6.10  | 66.8 | 19.6 |      | 126.2 |        |
| 10117-CAB | IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK) | X | 10.05 | 68.9 | 21.4 | 8.07 | 126.8 | ±2.2 % |
|           |                                          | Y | 9.98  | 68.5 | 21.1 |      | 132.4 |        |
|           |                                          | Z | 10.23 | 69.4 | 21.7 |      | 140.4 |        |
| 10151-CAB | LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)  | X | 8.16  | 72.2 | 25.0 | 9.28 | 133.6 | ±2.7 % |
|           |                                          | Y | 8.33  | 72.0 | 24.5 |      | 142.6 |        |
|           |                                          | Z | 8.40  | 73.1 | 25.6 |      | 147.5 |        |
| 10154-CAC | LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)  | X | 5.83  | 66.5 | 19.4 | 5.75 | 133.1 | ±1.4 % |
|           |                                          | Y | 5.89  | 66.3 | 19.2 |      | 139.3 |        |
|           |                                          | Z | 6.00  | 67.2 | 19.9 |      | 146.5 |        |
| 10160-CAB | LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)  | X | 6.26  | 66.9 | 19.6 | 5.82 | 138.8 | ±1.7 % |
|           |                                          | Y | 6.34  | 67.0 | 19.5 |      | 145.1 |        |
|           |                                          | Z | 6.22  | 66.9 | 19.7 |      | 128.8 |        |
| 10169-CAB | LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)    | X | 4.77  | 66.7 | 19.8 | 5.73 | 135.9 | ±1.4 % |
|           |                                          | Y | 4.89  | 66.6 | 19.5 |      | 141.8 |        |
|           |                                          | Z | 4.85  | 66.8 | 19.9 |      | 128.3 |        |
| 10172-CAB | LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)    | X | 6.77  | 75.0 | 26.9 | 9.21 | 144.2 | ±2.5 % |
|           |                                          | Y | 6.56  | 72.6 | 25.2 |      | 131.1 |        |
|           |                                          | Z | 6.68  | 74.0 | 26.4 |      | 137.1 |        |
| 10175-CAC | LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)    | X | 4.80  | 66.9 | 19.9 | 5.72 | 135.2 | ±1.4 % |
|           |                                          | Y | 4.87  | 66.5 | 19.5 |      | 140.6 |        |
|           |                                          | Z | 5.03  | 67.7 | 20.4 |      | 149.4 |        |
| 10181-CAB | LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)    | X | 4.77  | 66.7 | 19.8 | 5.72 | 134.7 | ±1.2 % |
|           |                                          | Y | 4.88  | 66.5 | 19.5 |      | 140.6 |        |
|           |                                          | Z | 4.84  | 66.8 | 19.9 |      | 127.8 |        |
| 10196-CAB | IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)  | X | 9.97  | 69.5 | 21.9 | 8.10 | 145.2 | ±2.2 % |
|           |                                          | Y | 9.60  | 68.2 | 21.0 |      | 125.1 |        |
|           |                                          | Z | 9.80  | 69.1 | 21.7 |      | 133.9 |        |
| 10225-CAB | UMTS-FDD (HSPA+)                         | X | 6.95  | 67.5 | 19.8 | 5.97 | 147.3 | ±1.4 % |
|           |                                          | Y | 6.73  | 66.4 | 19.1 |      | 128.7 |        |
|           |                                          | Z | 6.89  | 67.4 | 19.8 |      | 137.2 |        |
| 10237-CAB | LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)    | X | 6.85  | 75.4 | 27.2 | 9.21 | 146.0 | ±2.5 % |
|           |                                          | Y | 6.54  | 72.5 | 25.1 |      | 131.6 |        |
|           |                                          | Z | 6.76  | 74.4 | 26.6 |      | 138.2 |        |
| 10252-CAB | LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)  | X | 7.58  | 71.3 | 24.6 | 9.24 | 126.6 | ±2.5 % |
|           |                                          | Y | 7.73  | 71.1 | 24.2 |      | 133.3 |        |
|           |                                          | Z | 7.82  | 72.4 | 25.3 |      | 139.0 |        |
| 10267-CAB | LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK) | X | 8.18  | 72.2 | 25.1 | 9.30 | 133.6 | ±2.7 % |
|           |                                          | Y | 8.35  | 72.0 | 24.6 |      | 141.1 |        |
|           |                                          | Z | 8.42  | 73.2 | 25.6 |      | 147.0 |        |

|           |                                                               |   |       |      |      |      |       |        |
|-----------|---------------------------------------------------------------|---|-------|------|------|------|-------|--------|
| 10275-CAB | UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.4)                      | X | 4.22  | 66.1 | 18.4 | 3.96 | 128.8 | ±0.9 % |
|           |                                                               | Y | 4.24  | 65.9 | 18.1 |      | 133.8 |        |
|           |                                                               | Z | 4.39  | 67.1 | 19.0 |      | 141.7 |        |
| 10291-AAB | CDMA2000, RC3, SO55, Full Rate                                | X | 3.51  | 66.7 | 18.6 | 3.46 | 140.9 | ±0.7 % |
|           |                                                               | Y | 3.52  | 66.2 | 18.1 |      | 143.4 |        |
|           |                                                               | Z | 3.58  | 67.2 | 19.0 |      | 131.7 |        |
| 10292-AAB | CDMA2000, RC3, SO32, Full Rate                                | X | 3.45  | 66.7 | 18.5 | 3.39 | 142.0 | ±0.7 % |
|           |                                                               | Y | 3.50  | 66.4 | 18.2 |      | 146.9 |        |
|           |                                                               | Z | 3.61  | 67.8 | 19.3 |      | 132.2 |        |
| 10297-AAA | LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)                       | X | 6.15  | 66.9 | 19.6 | 5.81 | 136.3 | ±1.4 % |
|           |                                                               | Y | 6.20  | 66.8 | 19.4 |      | 140.3 |        |
|           |                                                               | Z | 6.11  | 66.8 | 19.6 |      | 126.6 |        |
| 10311-AAA | LTE-FDD (SC-FDMA, 100% RB, 15 MHz, QPSK)                      | X | 6.80  | 67.8 | 20.1 | 6.06 | 143.2 | ±1.7 % |
|           |                                                               | Y | 6.80  | 67.5 | 19.9 |      | 147.4 |        |
|           |                                                               | Z | 6.71  | 67.6 | 20.1 |      | 131.9 |        |
| 10400-AAB | IEEE 802.11ac WiFi (20MHz, 64-QAM, 99pc duty cycle)           | X | 10.31 | 70.0 | 22.4 | 8.37 | 147.9 | ±3.0 % |
|           |                                                               | Y | 9.88  | 68.5 | 21.3 |      | 127.2 |        |
|           |                                                               | Z | 10.13 | 69.5 | 22.1 |      | 135.8 |        |
| 10403-AAB | CDMA2000 (1xEV-DO, Rev. 0)                                    | X | 4.60  | 68.6 | 18.9 | 3.76 | 128.2 | ±0.5 % |
|           |                                                               | Y | 4.58  | 67.9 | 18.4 |      | 134.2 |        |
|           |                                                               | Z | 4.86  | 69.6 | 19.5 |      | 142.6 |        |
| 10404-AAB | CDMA2000 (1xEV-DO, Rev. A)                                    | X | 4.57  | 68.9 | 19.1 | 3.77 | 149.7 | ±0.5 % |
|           |                                                               | Y | 4.51  | 68.0 | 18.5 |      | 132.3 |        |
|           |                                                               | Z | 4.78  | 69.6 | 19.5 |      | 140.3 |        |
| 10415-AAA | IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 99pc duty cycle)     | X | 2.47  | 67.0 | 17.9 | 1.54 | 128.1 | ±0.7 % |
|           |                                                               | Y | 2.46  | 66.4 | 17.4 |      | 132.5 |        |
|           |                                                               | Z | 2.72  | 69.1 | 19.2 |      | 140.6 |        |
| 10416-AAA | IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 99pc duty cycle) | X | 10.12 | 69.7 | 22.1 | 8.23 | 146.8 | ±2.7 % |
|           |                                                               | Y | 9.66  | 68.2 | 21.1 |      | 125.0 |        |
|           |                                                               | Z | 9.91  | 69.2 | 21.8 |      | 134.3 |        |

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 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:3209

### 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                            | 6.34    | 6.34    | 6.34    | 0.29               | 2.02                    | ± 12.0 %    |
| 835                  | 41.5                               | 0.90                            | 6.04    | 6.04    | 6.04    | 0.23               | 2.57                    | ± 12.0 %    |
| 1750                 | 40.1                               | 1.37                            | 5.23    | 5.23    | 5.23    | 0.80               | 1.08                    | ± 12.0 %    |
| 1900                 | 40.0                               | 1.40                            | 5.05    | 5.05    | 5.05    | 0.10               | 2.40                    | ± 12.0 %    |
| 2300                 | 39.5                               | 1.67                            | 4.76    | 4.76    | 4.76    | 0.70               | 1.27                    | ± 12.0 %    |
| 2450                 | 39.2                               | 1.80                            | 4.53    | 4.53    | 4.53    | 0.80               | 1.22                    | ± 12.0 %    |
| 2600                 | 39.0                               | 1.96                            | 4.36    | 4.36    | 4.36    | 0.75               | 1.31                    | ± 12.0 %    |

<sup>C</sup> Frequency validity above 300 MHz 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. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

<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:3209

### Calibration Parameter Determined in Body Tissue Simulating Media

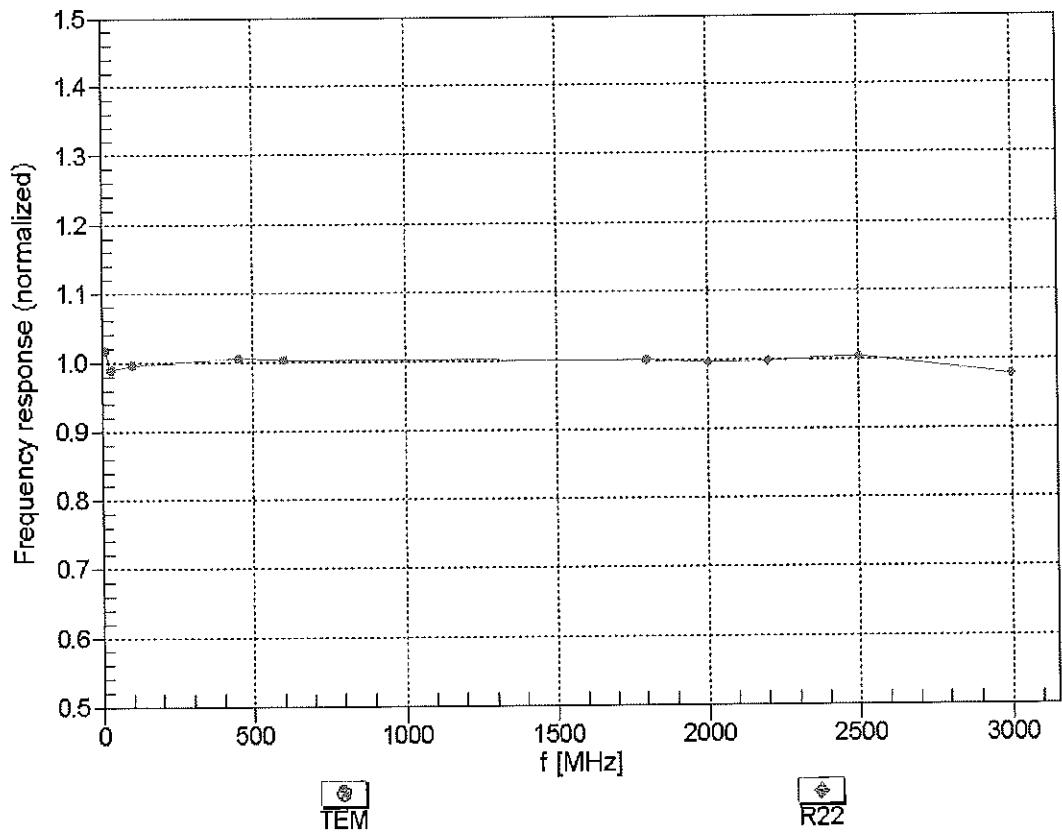
| f (MHz) <sup>C</sup> | Relative Permittivity <sup>F</sup> | Conductivity (S/m) <sup>F</sup> | ConvF X | ConvF Y | ConvF Z | Alpha <sup>G</sup> | Depth <sup>G</sup> (mm) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|--------------------|-------------------------|-------------|
| 750                  | 55.5                               | 0.96                            | 6.12    | 6.12    | 6.12    | 0.34               | 1.81                    | ± 12.0 %    |
| 835                  | 55.2                               | 0.97                            | 6.07    | 6.07    | 6.07    | 0.37               | 1.79                    | ± 12.0 %    |
| 1750                 | 53.4                               | 1.49                            | 4.86    | 4.86    | 4.86    | 0.67               | 1.43                    | ± 12.0 %    |
| 1900                 | 53.3                               | 1.52                            | 4.57    | 4.57    | 4.57    | 0.57               | 1.53                    | ± 12.0 %    |
| 2300                 | 52.9                               | 1.81                            | 4.28    | 4.28    | 4.28    | 0.80               | 1.19                    | ± 12.0 %    |
| 2450                 | 52.7                               | 1.95                            | 4.12    | 4.12    | 4.12    | 0.72               | 1.15                    | ± 12.0 %    |
| 2600                 | 52.5                               | 2.16                            | 3.92    | 3.92    | 3.92    | 0.80               | 1.10                    | ± 12.0 %    |

<sup>C</sup> Frequency validity above 300 MHz 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. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

<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.

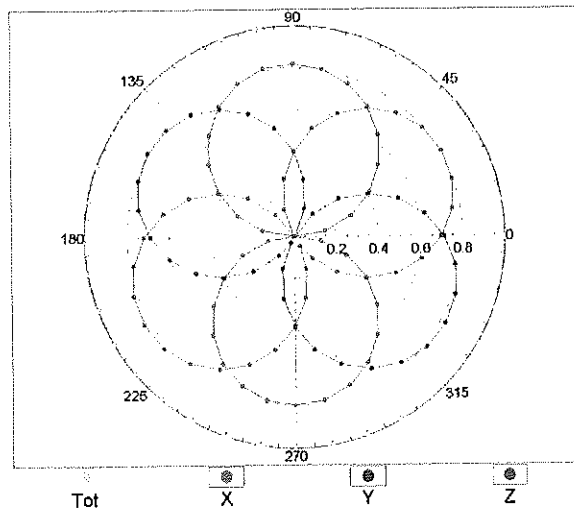
**Frequency Response of E-Field**  
(TEM-Cell:ifi110 EXX, Waveguide: R22)



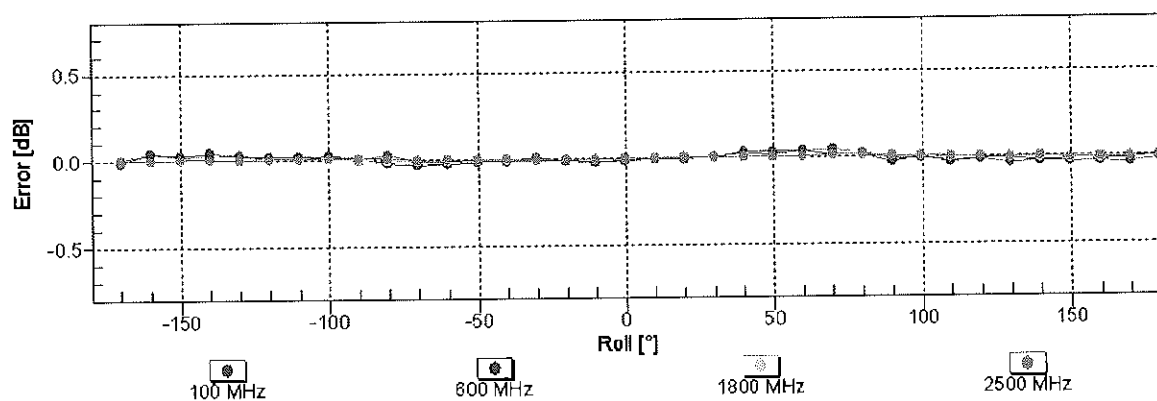
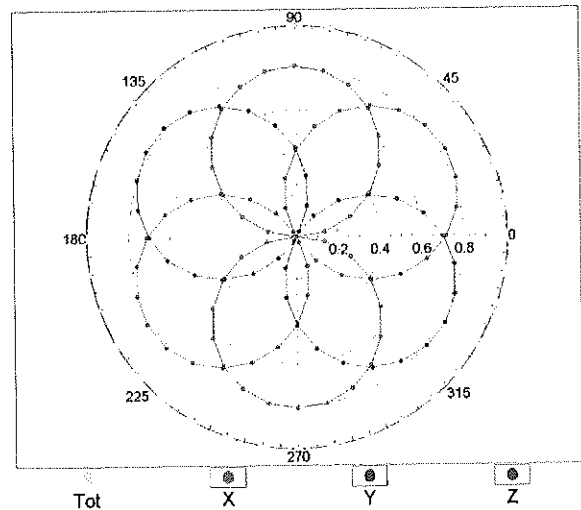
**Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  (k=2)**

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

f=600 MHz,TEM

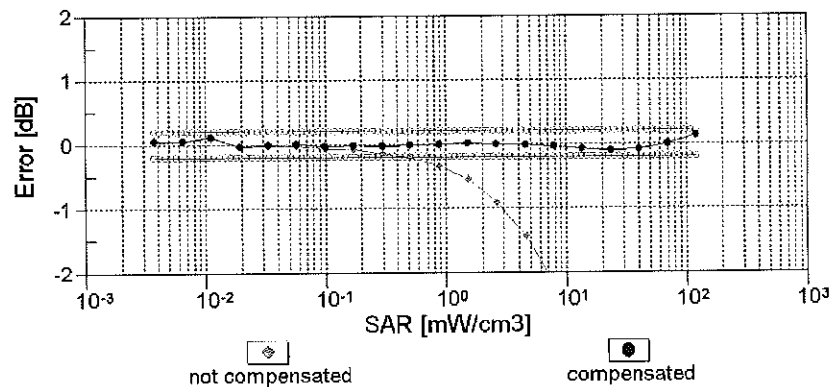
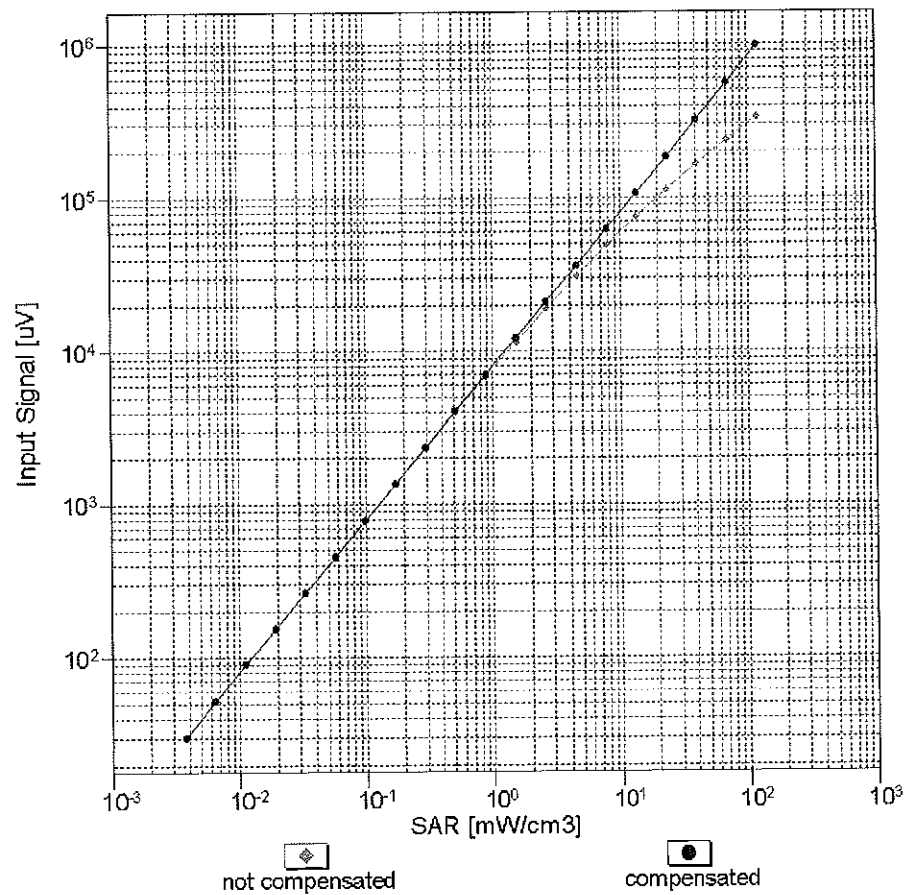


f=1800 MHz,R22



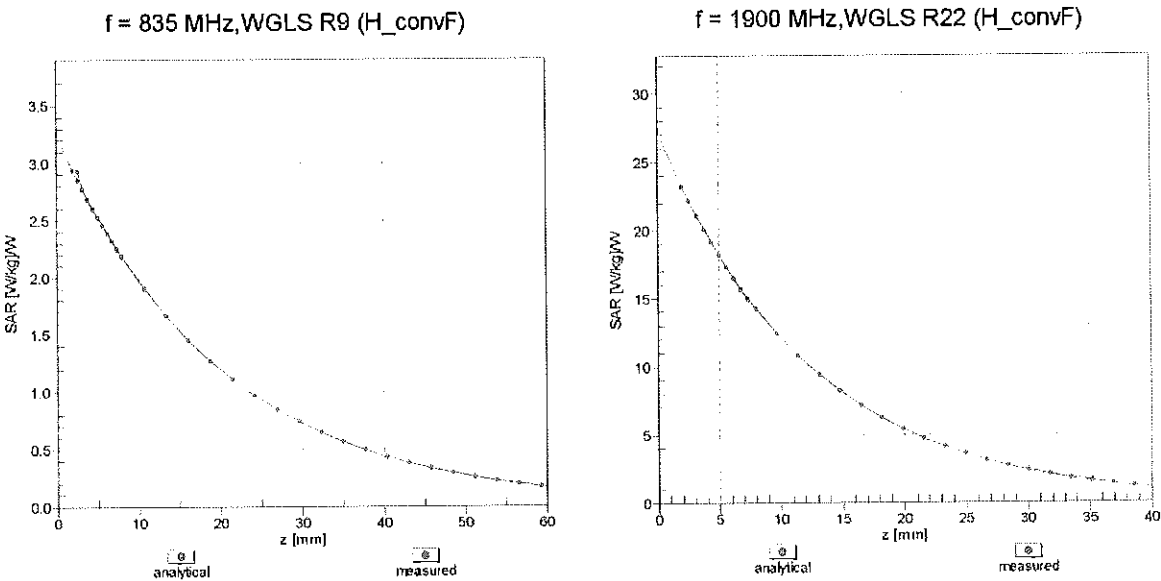
Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

**Dynamic Range f(SAR<sub>head</sub>)**  
(TEM cell , f<sub>eval</sub>= 1900 MHz)

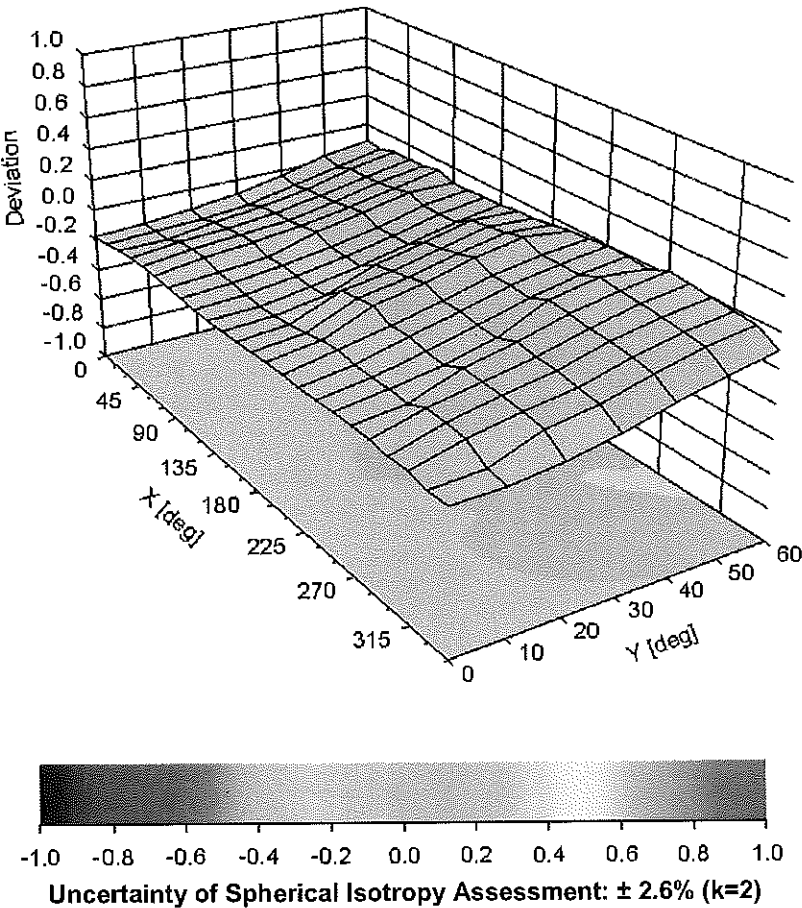


**Uncertainty of Linearity Assessment:  $\pm 0.6\%$  ( $k=2$ )**

# Conversion Factor Assessment



## Deviation from Isotropy in Liquid Error ( $\phi$ , $\theta$ ), f = 900 MHz



## DASY/EASY - Parameters of Probe: ES3DV3 - SN:3209

### Other Probe Parameters

|                                               |            |
|-----------------------------------------------|------------|
| Sensor Arrangement                            | Triangular |
| Connector Angle (°)                           | -40.3      |
| 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 0108**

Client **PC Test**

Certificate No: **EX3-3589\_Jan15**

## 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**

CC  
 1/30/15

Calibration date: **January 22, 2015**

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      | 03-Apr-14 (No. 217-01911)         | Apr-15                 |
| Power sensor E4412A        | MY41498087      | 03-Apr-14 (No. 217-01911)         | Apr-15                 |
| Reference 3 dB Attenuator  | SN: S5054 (3c)  | 03-Apr-14 (No. 217-01915)         | Apr-15                 |
| Reference 20 dB Attenuator | SN: S5277 (20x) | 03-Apr-14 (No. 217-01919)         | Apr-15                 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 03-Apr-14 (No. 217-01920)         | Apr-15                 |
| Reference Probe ES3DV2     | SN: 3013        | 30-Dec-14 (No. ES3-3013_Dec14)    | Dec-15                 |
| DAE4                       | SN: 660         | 14-Jan-15 (No. DAE4-660_Jan15)    | Jan-16                 |
| 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-14) | In house check: Oct-15 |

|                                                                                                                 |                         |                                   |                          |
|-----------------------------------------------------------------------------------------------------------------|-------------------------|-----------------------------------|--------------------------|
| Calibrated by:                                                                                                  | Name<br>Claudio Leubler | Function<br>Laboratory Technician | Signature<br>            |
| Approved by:                                                                                                    | Katja Pokovic           | Technical Manager                 |                          |
|                                                                                                                 |                         |                                   | Issued: January 26, 2015 |
| This calibration certificate shall not be reproduced except in full without written approval of the laboratory. |                         |                                   |                          |



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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 0108**

### 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<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.
- 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 22, 2015

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 ( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>A</sup> | 0.46     | 0.41     | 0.39     | $\pm 10.1 \%$ |
| DCP (mV) <sup>B</sup>                                     | 103.1    | 102.4    | 104.4    |               |

### 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    | 146.6    | $\pm 3.3 \%$              |
|               |                                                         | Y | 0.0     | 0.0                          | 1.0  |         | 143.1    |                           |
|               |                                                         | Z | 0.0     | 0.0                          | 1.0  |         | 170.4    |                           |
| 10010-<br>CAA | SAR Validation (Square, 100ms, 10ms)                    | X | 16.82   | 80.0                         | 16.9 | 10.00   | 39.1     | $\pm 0.7 \%$              |
|               |                                                         | Y | 7.79    | 73.4                         | 15.1 |         | 39.0     |                           |
|               |                                                         | Z | 2.50    | 64.1                         | 12.2 |         | 43.2     |                           |
| 10012-<br>CAB | IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)                | X | 3.02    | 68.9                         | 18.6 | 1.87    | 115.1    | $\pm 0.7 \%$              |
|               |                                                         | Y | 3.08    | 69.3                         | 18.8 |         | 114.1    |                           |
|               |                                                         | Z | 3.07    | 70.1                         | 19.4 |         | 134.9    |                           |
| 10013-<br>CAB | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps)           | X | 10.36   | 68.2                         | 21.5 | 9.46    | 104.8    | $\pm 2.5 \%$              |
|               |                                                         | Y | 10.20   | 68.2                         | 21.6 |         | 104.2    |                           |
|               |                                                         | Z | 10.36   | 68.6                         | 21.7 |         | 122.2    |                           |
| 10032-<br>CAA | IEEE 802.15.1 Bluetooth (GFSK, DH5)                     | X | 79.80   | 100.0                        | 18.7 | 1.16    | 134.5    | $\pm 0.9 \%$              |
|               |                                                         | Y | 98.53   | 99.4                         | 18.2 |         | 133.2    |                           |
|               |                                                         | Z | 0.27    | 57.7                         | 4.8  |         | 113.6    |                           |
| 10062-<br>CAB | IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)                | X | 9.91    | 67.7                         | 20.7 | 8.68    | 104.8    | $\pm 2.2 \%$              |
|               |                                                         | Y | 9.83    | 67.7                         | 20.9 |         | 105.4    |                           |
|               |                                                         | Z | 10.08   | 68.3                         | 21.1 |         | 126.6    |                           |
| 10103-<br>CAB | LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK)                | X | 7.73    | 67.7                         | 21.4 | 9.29    | 106.3    | $\pm 1.9 \%$              |
|               |                                                         | Y | 8.16    | 69.5                         | 22.6 |         | 106.5    |                           |
|               |                                                         | Z | 7.50    | 67.6                         | 21.5 |         | 121.6    |                           |
| 10117-<br>CAB | IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)                | X | 9.91    | 67.7                         | 20.3 | 8.07    | 112.1    | $\pm 1.9 \%$              |
|               |                                                         | Y | 9.90    | 67.8                         | 20.5 |         | 111.8    |                           |
|               |                                                         | Z | 10.04   | 68.2                         | 20.6 |         | 134.2    |                           |
| 10151-<br>CAB | LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)                 | X | 7.99    | 69.5                         | 22.6 | 9.28    | 146.2    | $\pm 2.2 \%$              |
|               |                                                         | Y | 8.43    | 71.4                         | 23.8 |         | 148.8    |                           |
|               |                                                         | Z | 7.09    | 66.7                         | 21.0 |         | 116.8    |                           |
| 10172-<br>CAB | LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)                   | X | 6.34    | 69.7                         | 22.8 | 9.21    | 118.1    | $\pm 1.7 \%$              |
|               |                                                         | Y | 6.41    | 70.8                         | 23.7 |         | 115.8    |                           |
|               |                                                         | Z | 6.10    | 69.1                         | 22.6 |         | 132.9    |                           |
| 10196-<br>CAB | IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)                 | X | 9.49    | 67.3                         | 20.2 | 8.10    | 101.7    | $\pm 1.9 \%$              |
|               |                                                         | Y | 9.44    | 67.3                         | 20.3 |         | 106.1    |                           |
|               |                                                         | Z | 9.71    | 68.1                         | 20.6 |         | 127.1    |                           |
| 10317-<br>AAB | IEEE 802.11a WiFi 5 GHz (OFDM, 6 Mbps, 96pc duty cycle) | X | 9.70    | 67.5                         | 20.5 | 8.36    | 102.8    | $\pm 2.2 \%$              |
|               |                                                         | Y | 9.68    | 67.7                         | 20.7 |         | 108.0    |                           |
|               |                                                         | Z | 9.97    | 68.5                         | 21.0 |         | 127.5    |                           |

|           |                                                               |   |       |      |      |      |       |        |
|-----------|---------------------------------------------------------------|---|-------|------|------|------|-------|--------|
| 10400-AAB | IEEE 802.11ac WiFi (20MHz, 64-QAM, 99pc duty cycle)           | X | 9.73  | 67.5 | 20.4 | 8.37 | 102.2 | ±1.9 % |
|           |                                                               | Y | 9.78  | 67.8 | 20.7 |      | 109.0 |        |
|           |                                                               | Z | 10.00 | 68.4 | 20.9 |      | 129.9 |        |
| 10401-AAB | IEEE 802.11ac WiFi (40MHz, 64-QAM, 99pc duty cycle)           | X | 10.39 | 67.9 | 20.7 | 8.60 | 108.7 | ±2.2 % |
|           |                                                               | Y | 10.63 | 68.6 | 21.2 |      | 117.4 |        |
|           |                                                               | Z | 10.71 | 68.9 | 21.2 |      | 138.2 |        |
| 10402-AAB | IEEE 802.11ac WiFi (80MHz, 64-QAM, 99pc duty cycle)           | X | 10.38 | 67.8 | 20.5 | 8.53 | 107.9 | ±2.2 % |
|           |                                                               | Y | 10.82 | 69.0 | 21.2 |      | 119.6 |        |
|           |                                                               | Z | 10.65 | 68.6 | 20.9 |      | 137.1 |        |
| 10415-AAA | IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 99pc duty cycle)     | X | 3.06  | 70.1 | 19.2 | 1.54 | 108.9 | ±0.7 % |
|           |                                                               | Y | 3.37  | 71.8 | 19.9 |      | 116.8 |        |
|           |                                                               | Z | 2.93  | 69.8 | 19.1 |      | 135.5 |        |
| 10416-AAA | IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 99pc duty cycle) | X | 10.23 | 69.0 | 21.2 | 8.23 | 149.0 | ±2.2 % |
|           |                                                               | Y | 9.64  | 67.7 | 20.7 |      | 109.5 |        |
|           |                                                               | Z | 9.67  | 67.8 | 20.5 |      | 125.2 |        |
| 10417-AAA | IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 99pc duty cycle)     | X | 9.56  | 67.3 | 20.3 | 8.23 | 101.7 | ±1.9 % |
|           |                                                               | Y | 9.64  | 67.8 | 20.7 |      | 109.6 |        |
|           |                                                               | Z | 9.79  | 68.1 | 20.7 |      | 128.3 |        |

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 6 and 7).

<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) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|--------------------|-------------------------|-------------|
| 2450                 | 39.2                               | 1.80                            | 6.48    | 6.48    | 6.48    | 0.39               | 0.82                    | ± 12.0 %    |
| 2600                 | 39.0                               | 1.96                            | 6.30    | 6.30    | 6.30    | 0.38               | 0.89                    | ± 12.0 %    |
| 5200                 | 36.0                               | 4.66                            | 4.66    | 4.66    | 4.66    | 0.35               | 1.80                    | ± 13.1 %    |
| 5300                 | 35.9                               | 4.76                            | 4.43    | 4.43    | 4.43    | 0.35               | 1.80                    | ± 13.1 %    |
| 5500                 | 35.6                               | 4.96                            | 4.23    | 4.23    | 4.23    | 0.40               | 1.80                    | ± 13.1 %    |
| 5600                 | 35.5                               | 5.07                            | 4.03    | 4.03    | 4.03    | 0.40               | 1.80                    | ± 13.1 %    |
| 5800                 | 35.3                               | 5.27                            | 4.19    | 4.19    | 4.19    | 0.40               | 1.80                    | ± 13.1 %    |

<sup>C</sup> Frequency validity above 300 MHz 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. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

<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) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|--------------------|-------------------------|-------------|
| 2450                 | 52.7                               | 1.95                            | 6.60    | 6.60    | 6.60    | 0.80               | 0.57                    | ± 12.0 %    |
| 2600                 | 52.5                               | 2.16                            | 6.36    | 6.36    | 6.36    | 0.80               | 0.50                    | ± 12.0 %    |
| 5200                 | 49.0                               | 5.30                            | 4.01    | 4.01    | 4.01    | 0.45               | 1.90                    | ± 13.1 %    |
| 5300                 | 48.9                               | 5.42                            | 3.79    | 3.79    | 3.79    | 0.45               | 1.90                    | ± 13.1 %    |
| 5500                 | 48.6                               | 5.65                            | 3.65    | 3.65    | 3.65    | 0.45               | 1.90                    | ± 13.1 %    |
| 5600                 | 48.5                               | 5.77                            | 3.42    | 3.42    | 3.42    | 0.50               | 1.90                    | ± 13.1 %    |
| 5800                 | 48.2                               | 6.00                            | 3.79    | 3.79    | 3.79    | 0.50               | 1.90                    | ± 13.1 %    |

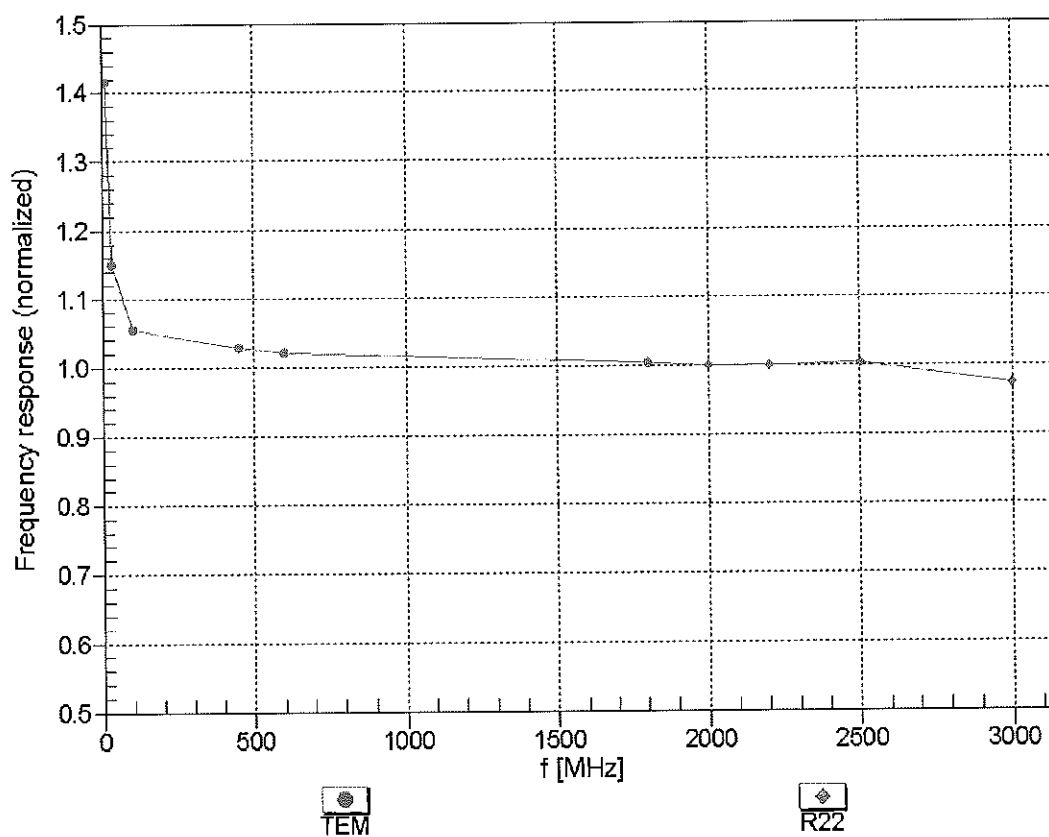
<sup>c</sup> Frequency validity above 300 MHz of  $\pm 100$  MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to  $\pm 50$  MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is  $\pm 10$ , 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to  $\pm 110$  MHz.

<sup>F</sup> At frequencies below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) can be relaxed to  $\pm 10\%$  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  $\pm 5\%$ . 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  $\pm 1\%$  for frequencies below 3 GHz and below  $\pm 2\%$  for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

## Frequency Response of E-Field

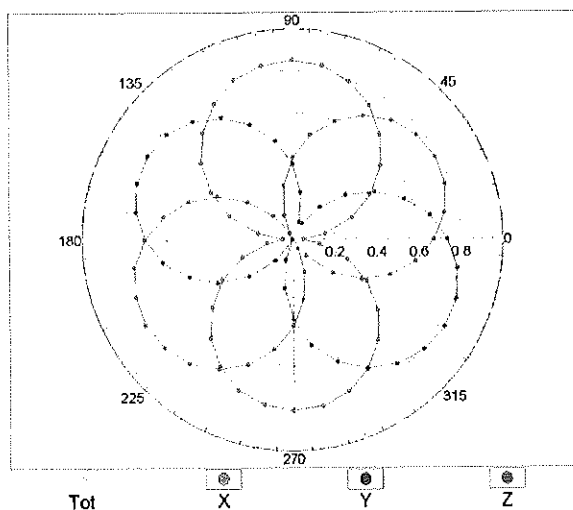
(TEM-Cell:ifi110 EXX, Waveguide: R22)



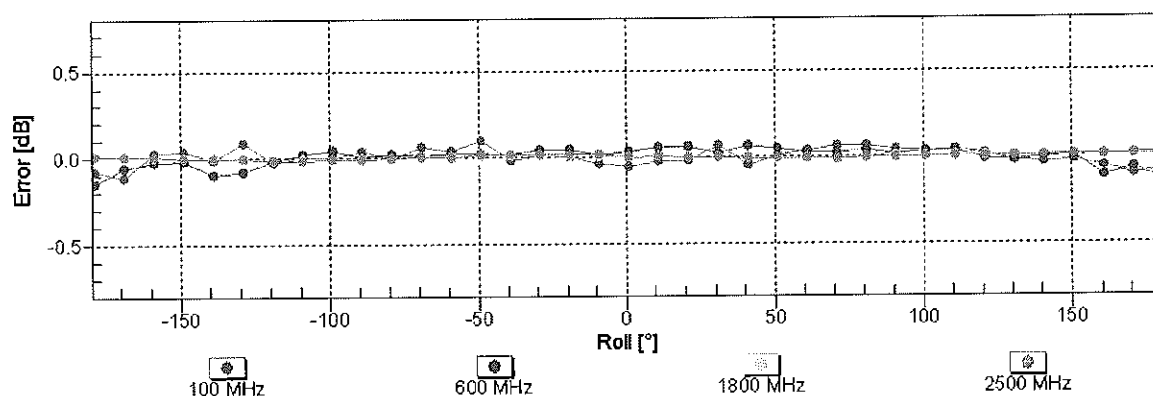
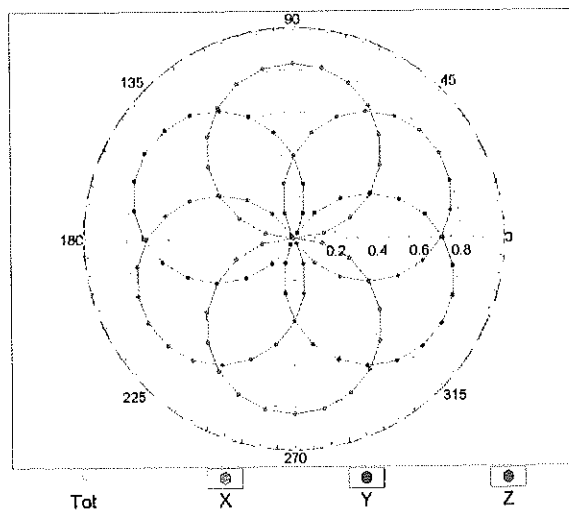
Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  ( $k=2$ )

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

f=600 MHz,TEM

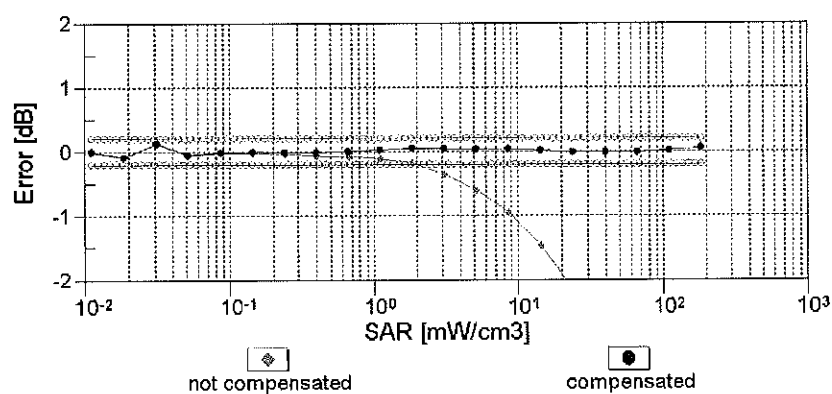
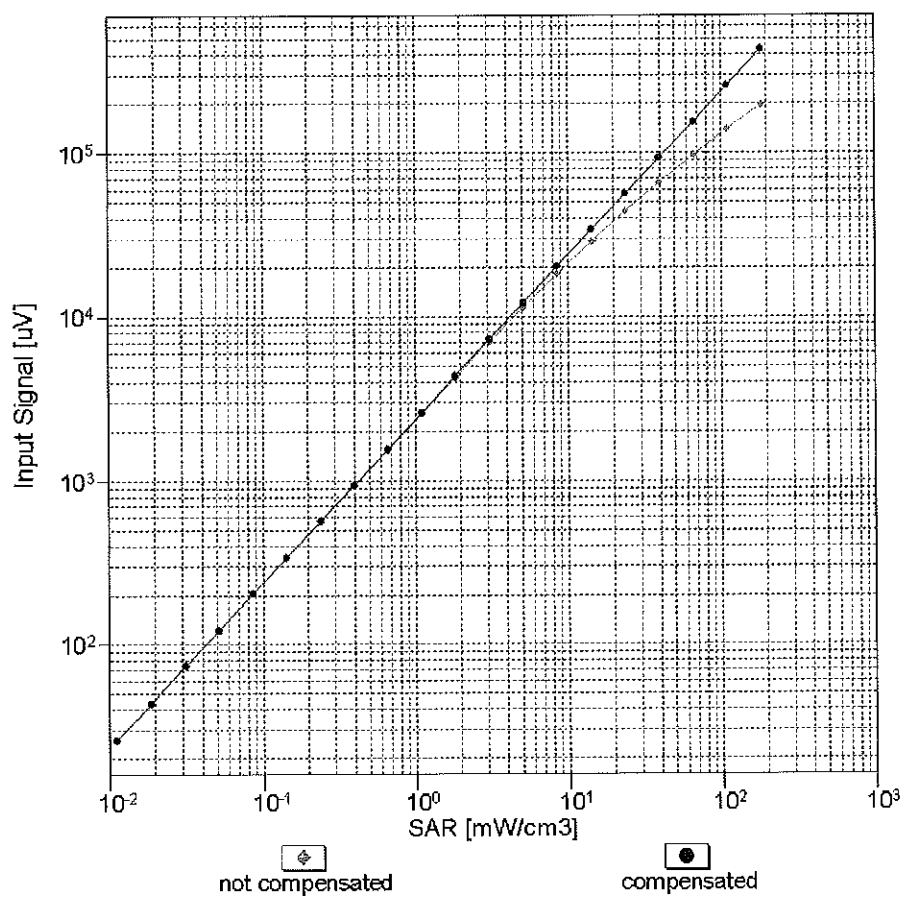


f=1800 MHz,R22



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

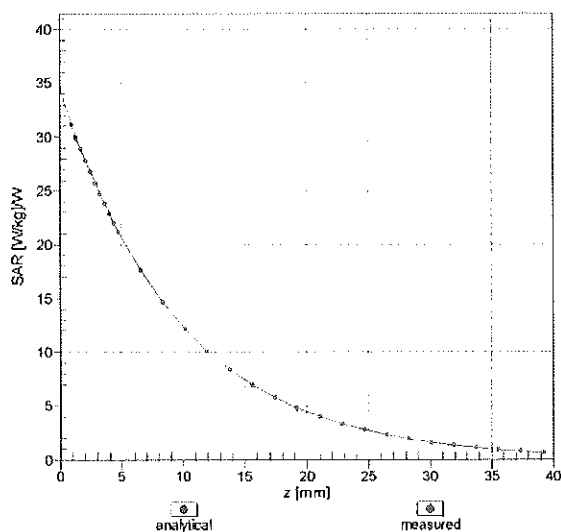
# **Dynamic Range $f(\text{SAR}_{\text{head}})$** **(TEM cell , $f_{\text{eval}} = 1900 \text{ MHz}$ )**



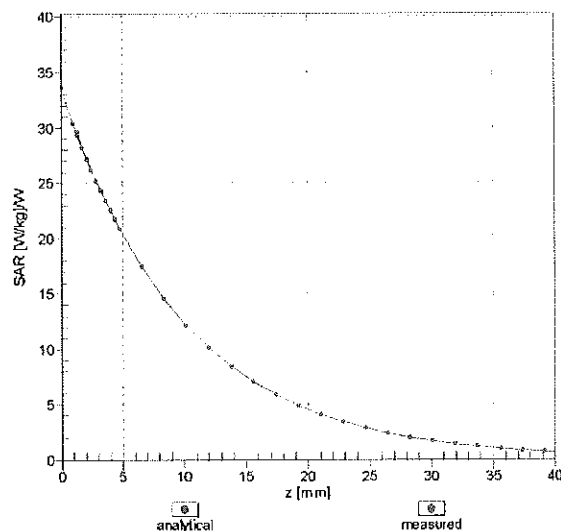
**Uncertainty of Linearity Assessment:  $\pm 0.6\%$  ( $k=2$ )**

## Conversion Factor Assessment

$f = 2450 \text{ MHz}$ , WGLS R22 (H\_convF)

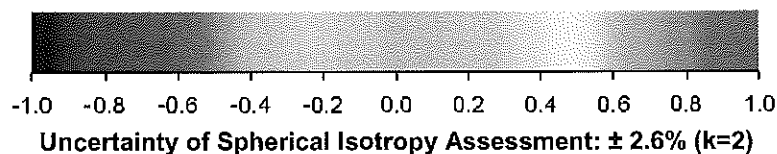
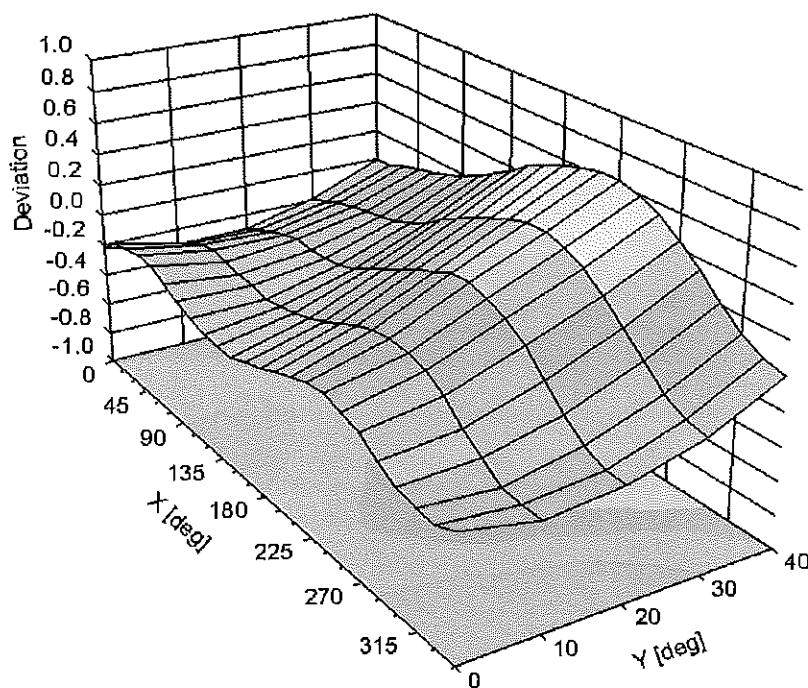


$f = 2450 \text{ MHz}$ , WGLS R22 (M\_convF)



## Deviation from Isotropy in Liquid

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



## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3589

### Other Probe Parameters

|                                               |            |
|-----------------------------------------------|------------|
| Sensor Arrangement                            | Triangular |
| Connector Angle (°)                           | -39.1      |
| 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 | 1.4 mm     |

## APPENDIX D: SAR TISSUE SPECIFICATIONS

Measurement Procedure for Tissue verification:

- 3) The network analyzer and probe system was configured and calibrated.
- 4) 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.
- 5) The complex admittance with respect to the probe aperture was measured
- 6) 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)           | 750        | 835   | 1750 | 1900  | 2450 | 5200-5800 |
|---------------------------|------------|-------|------|-------|------|-----------|
| Tissue                    | Body       | Body  | Body | Body  | Body | Body      |
| Ingredients (% by weight) |            |       |      |       |      |           |
| Bactericide               | See page 2 | 0.1   |      |       |      |           |
| DGBE                      |            |       | 31   | 29.44 | 26.7 |           |
| HEC                       |            | 1     |      |       |      |           |
| NaCl                      |            | 0.94  | 0.2  | 0.39  | 0.1  |           |
| Sucrose                   |            | 44.9  |      |       |      |           |
| Polysorbate (Tween) 80    |            |       |      |       |      | 20        |
| Water                     |            | 53.06 | 68.8 | 70.17 | 73.2 | 80        |

|                                           |                                     |                                                                                     |                              |                                                                                       |                                        |
|-------------------------------------------|-------------------------------------|-------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b>                            | A3LSMT357T                          |  | <b>SAR EVALUATION REPORT</b> |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Test Dates:</b><br>06/02/15 - 06/04/15 | <b>DUT Type:</b><br>Portable Tablet |                                                                                     |                              |                                                                                       | APPENDIX D:<br>Page 1 of 2             |

## 2 Composition / Information on ingredients

The Item is composed of the following ingredients:

|                                                                  |                                                                                                                                                     |
|------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| H <sub>2</sub> O                                                 | Water, 35 – 58%                                                                                                                                     |
| Sucrose                                                          | Sugar, white, refined, 40 – 60%                                                                                                                     |
| NaCl                                                             | Sodium Chloride, 0 – 6%                                                                                                                             |
| Hydroxyethyl-cellulose                                           | Medium Viscosity (CAS# 9004-62-0), <0.3%                                                                                                            |
| Preventol-D7                                                     | Preservative: aqueous preparation, (CAS# 55965-84-9), containing 5-chloro-2-methyl-3(2H)-isothiazolone and 2-methyl-3(2H)-isothiazolone, 0.1 – 0.7% |
| Relevant for safety; Refer to the respective Safety Data Sheet*. |                                                                                                                                                     |

**Figure D-1**

### Composition of 750 MHz Body Tissue Equivalent Matter

**Note:** 750MHz 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    | Body Tissue Simulating Liquid (MSL750V2) |
| Product No.  | SL AAM 075 AA (Charge: 130828-1)         |
| 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.

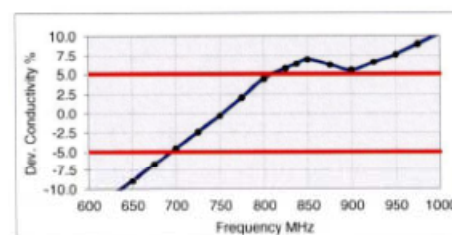
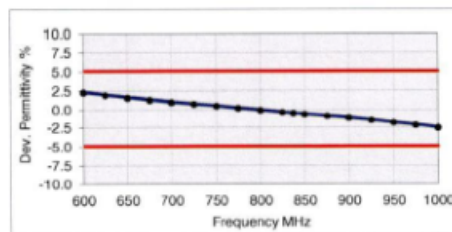
#### Test Condition

|                 |                                                             |
|-----------------|-------------------------------------------------------------|
| Ambient         | Environment temperatur ( $22 \pm 3$ )°C and humidity < 70%. |
| TSL Temperature | 22°C                                                        |
| Test Date       | 28-Aug-13                                                   |
| Operator        | IEN                                                         |

#### Additional Information

|                   |                         |
|-------------------|-------------------------|
| TSL Density       | 1.212 g/cm <sup>3</sup> |
| TSL Heat-capacity | 3.006 kJ/(kg*K)         |

| f [MHz] | Measured |        |       | Target |       | Diff. to Target [%] |                 |
|---------|----------|--------|-------|--------|-------|---------------------|-----------------|
|         | HP-e'    | HP-e'' | sigma | eps    | sigma | $\Delta$ -eps       | $\Delta$ -sigma |
| 600     | 57.4     | 24.76  | 0.83  | 56.1   | 0.95  | 2.3                 | -13.2           |
| 625     | 57.1     | 24.42  | 0.85  | 56.0   | 0.95  | 2.0                 | -11.0           |
| 650     | 56.8     | 24.09  | 0.87  | 55.9   | 0.96  | 1.6                 | -8.9            |
| 675     | 56.6     | 23.80  | 0.89  | 55.8   | 0.96  | 1.3                 | -6.7            |
| 700     | 56.3     | 23.52  | 0.92  | 55.7   | 0.96  | 1.0                 | -4.5            |
| 725     | 56.1     | 23.27  | 0.94  | 55.6   | 0.96  | 0.8                 | -2.4            |
| 750     | 55.8     | 23.03  | 0.96  | 55.5   | 0.96  | 0.5                 | -0.3            |
| 775     | 55.6     | 22.87  | 0.99  | 55.4   | 0.97  | 0.2                 | 2.1             |
| 800     | 55.3     | 22.71  | 1.01  | 55.3   | 0.97  | -0.1                | 4.5             |
| 825     | 55.1     | 22.54  | 1.03  | 55.2   | 0.98  | -0.3                | 5.8             |
| 838     | 54.9     | 22.45  | 1.05  | 55.2   | 0.98  | -0.5                | 6.4             |
| 850     | 54.8     | 22.37  | 1.06  | 55.2   | 0.99  | -0.6                | 7.0             |
| 875     | 54.6     | 22.25  | 1.08  | 55.1   | 1.02  | -0.9                | 6.2             |
| 900     | 54.4     | 22.13  | 1.11  | 55.0   | 1.05  | -1.1                | 5.5             |
| 925     | 54.2     | 22.02  | 1.13  | 55.0   | 1.06  | -1.5                | 6.6             |
| 950     | 53.9     | 21.91  | 1.16  | 54.9   | 1.08  | -1.8                | 7.7             |
| 975     | 53.7     | 21.84  | 1.18  | 54.9   | 1.09  | -2.2                | 9.0             |
| 1000    | 53.5     | 21.77  | 1.21  | 54.8   | 1.10  | -2.5                | 10.3            |



**Figure D-2**

### 750MHz Body Tissue Equivalent Matter

|                                    |                              |                                                                                     |                       |                                                                                       |                                 |
|------------------------------------|------------------------------|-------------------------------------------------------------------------------------|-----------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID:                            | A3LSMT357T                   |  | SAR EVALUATION REPORT |  | Reviewed by:<br>Quality Manager |
| Test Dates:<br>06/02/15 - 06/04/15 | DUT Type:<br>Portable Tablet |                                                                                     |                       |                                                                                       | APPENDIX D:<br>Page 2 of 2      |

## 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 |             |      |
|--------------|-------------|-----------|----------|------------|------------------|------|-------|--------|---------------|-----------------|----------------|-----------------|-------------|------|
|              |             |           |          |            |                  |      | (σ)   | (εr)   | SENSITIVITY   | PROBE LINEARITY | PROBE ISOTROPY | MOD. TYPE       | DUTY FACTOR | PAR  |
| J            | 750         | 5/27/2015 | 3319     | ES3DV3     | 750              | Body | 0.948 | 53.966 | PASS          | PASS            | PASS           | N/A             | N/A         | N/A  |
| I            | 835         | 5/30/2015 | 3213     | ES3DV3     | 835              | Body | 0.987 | 53.378 | PASS          | PASS            | PASS           | GMSK            | PASS        | N/A  |
| H            | 1750        | 6/2/2015  | 3263     | ES3DV3     | 1750             | Body | 1.471 | 51.851 | PASS          | PASS            | PASS           | N/A             | N/A         | N/A  |
| B            | 1900        | 1/6/2015  | 3334     | ES3DV3     | 1900             | Body | 1.582 | 53.069 | PASS          | PASS            | PASS           | GMSK            | PASS        | N/A  |
| D            | 2450        | 4/9/2015  | 3209     | ES3DV3     | 2450             | Body | 1.947 | 51.280 | PASS          | PASS            | PASS           | OFDM            | N/A         | PASS |
| E            | 5300        | 4/20/2015 | 3589     | EX3DV4     | 5300             | Body | 5.460 | 48.600 | PASS          | PASS            | PASS           | OFDM            | N/A         | PASS |
| E            | 5500        | 4/20/2015 | 3589     | EX3DV4     | 5500             | Body | 5.724 | 48.274 | PASS          | PASS            | PASS           | OFDM            | N/A         | PASS |
| E            | 5600        | 4/20/2015 | 3589     | EX3DV4     | 5600             | Body | 5.871 | 48.129 | PASS          | PASS            | PASS           | OFDM            | N/A         | PASS |
| E            | 5800        | 4/20/2015 | 3589     | EX3DV4     | 5800             | Body | 6.150 | 47.795 | PASS          | PASS            | PASS           | OFDM            | N/A         | PASS |

NOTE: While the probes have been calibrated for both 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: A3LSMT357T                        |  <b>SAR EVALUATION REPORT</b>  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Test Dates:</b><br>06/02/15 - 06/04/15 | <b>DUT Type:</b><br>Portable Tablet                                                                                                                                                                    | <b>APPENDIX E:</b><br>Page 1 of 1      |

## APPENDIX G: SENSOR TRIGGERING DATA SUMMARY

|                                               |                                                                                                                                   |                              |                                                                                       |                                        |
|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> A3LSMT357T                     |  <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>SAR EVALUATION REPORT</b> |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Test Dates:</b><br>06/02/2015 – 06/04/2015 | <b>DUT Type:</b><br>Portable Tablet                                                                                               |                              |                                                                                       | <b>APPENDIX G:</b><br>Page 1 of 7      |

## A3LSMT357T 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 side, top edge, bottom edge, and right 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> A3LSMT357T                     |  <b>SAR EVALUATION REPORT</b>  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Test Dates:</b><br>06/02/2015 – 06/04/2015 | <b>DUT Type:</b><br>Portable Tablet                                                                                                                                                                    | <b>APPENDIX G:</b><br>Page 2 of 7      |

## Back Side (Main Antenna)

Moving device toward the phantom:

| KDB 616217 6.2.6 Measured Power [dBm] |       |       |       |       |       |       |       |       |       |       |       |
|---------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Distance[mm]                          | 27    | 26    | 25    | 24    | 23    | 22    | 21    | 20    | 19    | 18    | 17    |
| UMTS V                                | 23.42 | 23.37 | 23.43 | 23.17 | 23.35 | 17.75 | 17.72 | 18.05 | 17.98 | 17.88 | 17.77 |
| UMTS IV                               | 23.33 | 23.21 | 23.45 | 23.34 | 23.25 | 13.36 | 13.32 | 13.33 | 13.21 | 13.21 | 13.24 |
| UMTS II                               | 23.39 | 23.40 | 23.37 | 23.41 | 23.35 | 11.68 | 11.88 | 11.94 | 11.60 | 11.88 | 11.90 |
| LTE B12                               | 23.75 | 23.93 | 23.88 | 23.83 | 23.78 | 19.62 | 19.73 | 19.71 | 19.66 | 19.77 | 19.89 |
| LTE B4                                | 23.90 | 23.94 | 23.80 | 23.93 | 23.73 | 13.61 | 13.64 | 13.63 | 13.62 | 13.49 | 13.44 |
| LTE B2                                | 23.91 | 23.87 | 23.93 | 23.90 | 23.72 | 11.93 | 12.24 | 11.97 | 12.06 | 11.99 | 12.08 |

Moving device away from the phantom:

| KDB 616217 6.2.8 Measured Power [dBm] |       |       |       |       |       |       |       |       |       |       |       |
|---------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Distance[mm]                          | 27    | 26    | 25    | 24    | 23    | 22    | 21    | 20    | 19    | 18    | 17    |
| UMTS V                                | 23.19 | 23.12 | 23.44 | 23.39 | 23.40 | 17.88 | 17.81 | 17.99 | 17.94 | 17.79 | 18.02 |
| UMTS IV                               | 23.31 | 23.40 | 23.31 | 23.24 | 23.24 | 13.44 | 13.25 | 13.30 | 13.13 | 13.45 | 13.21 |
| UMTS II                               | 23.37 | 23.32 | 23.12 | 23.14 | 23.28 | 11.63 | 11.69 | 11.73 | 11.81 | 11.88 | 11.68 |
| LTE B12                               | 23.66 | 23.80 | 23.75 | 23.71 | 23.93 | 19.92 | 19.95 | 19.63 | 19.78 | 19.60 | 19.82 |
| LTE B4                                | 23.76 | 23.73 | 23.89 | 23.67 | 23.86 | 13.44 | 13.46 | 13.50 | 13.56 | 13.50 | 13.61 |
| LTE B2                                | 23.92 | 23.88 | 23.66 | 23.80 | 23.95 | 12.08 | 11.96 | 12.10 | 12.21 | 11.92 | 11.93 |

Based on the most conservative measured triggering distance of 22 mm, additional SAR measurements were required at 21 mm from the back side for the above modes/bands.

|                                               |                                                                                                                                   |                              |                                                                                       |                                        |
|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
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| <b>Test Dates:</b><br>06/02/2015 – 06/04/2015 | <b>DUT Type:</b><br>Portable Tablet                                                                                               |                              |                                                                                       | <b>APPENDIX G:</b><br>Page 3 of 7      |

## Back Side (WLAN Antenna)

Moving device toward the phantom:

| KDB 616217 6.2.6 Measured Power [dBm] |       |       |       |       |       |       |       |       |       |       |       |
|---------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Distance[mm]                          | 18    | 17    | 16    | 15    | 14    | 13    | 12    | 11    | 10    | 9     | 8     |
| IEEE 802.11b                          | 16.37 | 16.28 | 16.23 | 16.42 | 16.44 | 11.27 | 11.34 | 11.15 | 11.14 | 11.17 | 11.35 |
| IEEE 802.11g                          | 12.42 | 12.33 | 12.32 | 12.11 | 12.11 | 10.36 | 10.34 | 10.18 | 10.43 | 10.25 | 10.40 |
| IEEE 802.11n (2.4GHz)                 | 10.13 | 10.13 | 10.34 | 10.42 | 10.19 | 9.45  | 9.42  | 9.22  | 9.28  | 9.39  | 9.17  |
| IEEE 802.11a                          | 11.43 | 11.29 | 11.32 | 11.41 | 11.24 | 6.22  | 6.12  | 6.34  | 6.43  | 6.25  | 6.40  |
| IEEE 802.11n (5GHz, 20MHz BW)         | 10.43 | 10.24 | 10.30 | 10.12 | 10.34 | 5.42  | 5.15  | 5.39  | 5.38  | 5.12  | 5.44  |
| IEEE 802.11n (5GHz, 40MHz BW)         | 10.37 | 10.19 | 10.44 | 10.29 | 10.43 | 7.10  | 7.17  | 7.14  | 7.45  | 7.26  | 7.33  |

Moving device away from the phantom:

| KDB 616217 6.2.8 Measured Power [dBm] |       |       |       |       |       |       |       |       |       |       |       |
|---------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Distance[mm]                          | 18    | 17    | 16    | 15    | 14    | 13    | 12    | 11    | 10    | 9     | 8     |
| IEEE 802.11b                          | 16.43 | 16.42 | 16.19 | 16.34 | 16.13 | 11.40 | 11.20 | 11.22 | 11.39 | 11.38 | 11.18 |
| IEEE 802.11g                          | 12.18 | 12.41 | 12.20 | 12.32 | 12.27 | 10.35 | 10.41 | 10.38 | 10.36 | 10.38 | 10.25 |
| IEEE 802.11n (2.4GHz)                 | 10.24 | 10.18 | 10.10 | 10.22 | 10.27 | 9.18  | 9.32  | 9.16  | 9.12  | 9.11  | 9.35  |
| IEEE 802.11a                          | 11.15 | 11.32 | 11.31 | 11.43 | 11.29 | 6.34  | 6.25  | 6.38  | 6.18  | 6.29  | 6.15  |
| IEEE 802.11n (5GHz, 20MHz BW)         | 10.25 | 10.26 | 10.15 | 10.45 | 10.13 | 5.12  | 5.17  | 5.43  | 5.15  | 5.29  | 5.31  |
| IEEE 802.11n (5GHz, 40MHz BW)         | 10.31 | 10.11 | 10.42 | 10.23 | 10.35 | 7.33  | 7.28  | 7.24  | 7.27  | 7.43  | 7.28  |

Based on the most conservative measured triggering distance of 13 mm, additional SAR measurements were required at 12 mm from the back side for the above modes/bands.

|                                               |                                                                                                                                   |                              |                                                                                       |                                        |
|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
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| <b>Test Dates:</b><br>06/02/2015 – 06/04/2015 | <b>DUT Type:</b><br>Portable Tablet                                                                                               |                              |                                                                                       | <b>APPENDIX G:</b><br>Page 4 of 7      |

## Top Edge (WLAN Antenna)

Moving device toward the phantom:

| KDB 616217 6.2.6 Measured Power [dBm] |       |       |       |       |       |       |       |       |       |       |       |
|---------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Distance[mm]                          | 11    | 10    | 9     | 8     | 7     | 6     | 5     | 4     | 3     | 2     | 1     |
| IEEE 802.11b                          | 16.28 | 16.17 | 16.28 | 16.40 | 16.25 | 11.13 | 11.17 | 11.29 | 11.27 | 11.11 | 11.24 |
| IEEE 802.11g                          | 12.32 | 12.35 | 12.11 | 12.33 | 12.43 | 10.29 | 10.30 | 10.27 | 10.44 | 10.16 | 10.44 |
| IEEE 802.11n (2.4GHz)                 | 10.35 | 10.44 | 10.24 | 10.22 | 10.14 | 9.36  | 9.44  | 9.23  | 9.11  | 9.10  | 9.12  |
| IEEE 802.11a                          | 11.30 | 11.42 | 11.42 | 11.24 | 11.32 | 6.34  | 6.45  | 6.37  | 6.29  | 6.24  | 6.37  |
| IEEE 802.11n (5GHz, 20MHz BW)         | 10.43 | 10.25 | 10.30 | 10.29 | 10.25 | 5.23  | 5.25  | 5.39  | 5.35  | 5.44  | 5.43  |
| IEEE 802.11n (5GHz, 40MHz BW)         | 10.23 | 10.40 | 10.21 | 10.23 | 10.26 | 7.17  | 7.21  | 7.38  | 7.24  | 7.29  | 7.37  |

Moving device away from the phantom:

| KDB 616217 6.2.8 Measured Power [dBm] |       |       |       |       |       |       |       |       |       |       |       |
|---------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Distance[mm]                          | 11    | 10    | 9     | 8     | 7     | 6     | 5     | 4     | 3     | 2     | 1     |
| IEEE 802.11b                          | 16.22 | 16.22 | 16.33 | 16.15 | 16.41 | 11.30 | 11.13 | 11.27 | 11.16 | 11.19 | 11.36 |
| IEEE 802.11g                          | 12.19 | 12.17 | 12.31 | 12.34 | 12.24 | 10.14 | 10.45 | 10.21 | 10.16 | 10.41 | 10.16 |
| IEEE 802.11n (2.4GHz)                 | 10.34 | 10.31 | 10.42 | 10.19 | 10.29 | 9.36  | 9.31  | 9.40  | 9.10  | 9.25  | 9.27  |
| IEEE 802.11a                          | 11.15 | 11.24 | 11.43 | 11.26 | 11.25 | 6.27  | 6.26  | 6.41  | 6.39  | 6.42  | 6.25  |
| IEEE 802.11n (5GHz, 20MHz BW)         | 10.39 | 10.20 | 10.41 | 10.32 | 10.44 | 5.44  | 5.17  | 5.30  | 5.29  | 5.13  | 5.29  |
| IEEE 802.11n (5GHz, 40MHz BW)         | 10.23 | 10.15 | 10.11 | 10.31 | 10.41 | 7.41  | 7.27  | 7.45  | 7.15  | 7.12  | 7.28  |

Based on the most conservative measured triggering distance of 6 mm, additional SAR measurements were required at 5 mm from the top edge for the above modes/bands.

|                                               |                                                                                                                                   |                              |                                                                                       |                                        |
|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
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| <b>Test Dates:</b><br>06/02/2015 – 06/04/2015 | <b>DUT Type:</b><br>Portable Tablet                                                                                               |                              |                                                                                       | <b>APPENDIX G:</b><br>Page 5 of 7      |

## Bottom Edge (Main Antenna)

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    |
| UMTS V                                | 23.43 | 23.26 | 23.21 | 23.24 | 23.31 | 17.99 | 17.78 | 17.79 | 17.83 | 17.84 | 17.93 |
| UMTS IV                               | 23.29 | 23.20 | 23.36 | 23.41 | 23.12 | 13.23 | 13.45 | 13.13 | 13.24 | 13.23 | 13.24 |
| UMTS II                               | 23.40 | 23.26 | 23.41 | 23.39 | 23.27 | 11.81 | 11.85 | 11.88 | 11.74 | 11.71 | 11.92 |
| LTE B12                               | 23.82 | 23.63 | 23.74 | 23.84 | 23.80 | 19.76 | 19.80 | 19.80 | 19.65 | 19.93 | 19.73 |
| LTE B4                                | 23.73 | 23.86 | 23.84 | 23.63 | 23.80 | 13.36 | 13.60 | 13.36 | 13.65 | 13.32 | 13.57 |
| LTE B2                                | 23.83 | 23.88 | 23.86 | 23.80 | 23.67 | 12.01 | 12.07 | 11.96 | 12.03 | 12.11 | 12.23 |

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    |
| UMTS V                                | 23.29 | 23.23 | 23.43 | 23.41 | 23.25 | 17.74 | 17.84 | 17.75 | 18.05 | 17.79 | 17.79 |
| UMTS IV                               | 23.36 | 23.13 | 23.32 | 23.26 | 23.20 | 13.27 | 13.37 | 13.31 | 13.12 | 13.37 | 13.11 |
| UMTS II                               | 23.20 | 23.18 | 23.27 | 23.24 | 23.32 | 11.64 | 11.84 | 11.93 | 11.75 | 11.82 | 11.75 |
| LTE B12                               | 23.60 | 23.83 | 23.67 | 23.64 | 23.81 | 19.80 | 19.72 | 19.67 | 19.66 | 19.70 | 19.61 |
| LTE B4                                | 23.89 | 23.86 | 23.92 | 23.61 | 23.69 | 13.34 | 13.50 | 13.59 | 13.30 | 13.62 | 13.56 |
| LTE B2                                | 23.66 | 23.71 | 23.69 | 23.60 | 23.70 | 12.22 | 12.04 | 12.19 | 12.06 | 12.01 | 12.23 |

Based on the most conservative measured triggering distance of 19 mm, additional SAR measurements were required at 18 mm from the bottom edge for the above modes/bands.

|                                               |                                                                                                                                   |                              |                                                                                       |                                        |
|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
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| <b>Test Dates:</b><br>06/02/2015 – 06/04/2015 | <b>DUT Type:</b><br>Portable Tablet                                                                                               |                              |                                                                                       | <b>APPENDIX G:</b><br>Page 6 of 7      |

## Right Edge (Main Antenna)

Moving device toward the phantom:

| KDB 616217 6.2.6 Measured Power [dBm] |       |       |       |       |       |       |       |       |       |       |       |
|---------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Distance[mm]                          | 12    | 11    | 10    | 9     | 8     | 7     | 6     | 5     | 4     | 3     | 2     |
| UMTS V                                | 23.19 | 23.20 | 23.24 | 23.15 | 23.14 | 17.83 | 17.73 | 18.05 | 18.02 | 17.75 | 17.81 |
| UMTS IV                               | 23.15 | 23.16 | 23.21 | 23.14 | 23.21 | 13.31 | 13.45 | 13.16 | 13.27 | 13.38 | 13.18 |
| UMTS II                               | 23.29 | 23.38 | 23.23 | 23.39 | 23.23 | 11.63 | 11.85 | 11.76 | 11.92 | 11.85 | 11.81 |
| LTE B12                               | 23.77 | 23.87 | 23.72 | 23.87 | 23.70 | 19.71 | 19.80 | 19.76 | 19.67 | 19.63 | 19.83 |
| LTE B4                                | 23.73 | 23.60 | 23.73 | 23.71 | 23.63 | 13.50 | 13.51 | 13.44 | 13.36 | 13.63 | 13.55 |
| LTE B2                                | 23.95 | 23.66 | 23.92 | 23.95 | 23.89 | 11.94 | 12.08 | 11.91 | 12.02 | 12.11 | 12.17 |

Moving device away from the phantom:

| KDB 616217 6.2.8 Measured Power [dBm] |       |       |       |       |       |       |       |       |       |       |       |
|---------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Distance[mm]                          | 12    | 11    | 10    | 9     | 8     | 7     | 6     | 5     | 4     | 3     | 2     |
| UMTS V                                | 23.36 | 23.24 | 23.17 | 23.45 | 23.35 | 17.73 | 17.79 | 17.75 | 17.87 | 17.87 | 18.01 |
| UMTS IV                               | 23.19 | 23.31 | 23.22 | 23.14 | 23.30 | 13.13 | 13.40 | 13.42 | 13.14 | 13.44 | 13.33 |
| UMTS II                               | 23.17 | 23.20 | 23.32 | 23.32 | 23.45 | 11.75 | 11.90 | 11.78 | 11.73 | 11.83 | 11.61 |
| LTE B12                               | 23.82 | 23.68 | 23.95 | 23.64 | 23.82 | 19.63 | 19.86 | 19.60 | 19.62 | 19.69 | 19.71 |
| LTE B4                                | 23.61 | 23.70 | 23.81 | 23.62 | 23.60 | 13.41 | 13.49 | 13.41 | 13.42 | 13.63 | 13.46 |
| LTE B2                                | 23.79 | 23.86 | 23.68 | 23.78 | 23.61 | 12.14 | 12.08 | 12.02 | 12.07 | 12.17 | 12.04 |

Based on the most conservative measured triggering distance of 7 mm, additional SAR measurements were required at 6 mm from the right edge for the above modes/bands.

|                                               |                                                                                                                                   |                              |                                                                                       |                                        |
|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
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| <b>Test Dates:</b><br>06/02/2015 – 06/04/2015 | <b>DUT Type:</b><br>Portable Tablet                                                                                               |                              |                                                                                       | <b>APPENDIX G:</b><br>Page 7 of 7      |