



## SAR EVALUATION REPORT

**Applicant Name:**

LG Electronics MobileComm U.S.A., Inc.  
1000 Sylvan Avenue  
Englewood Cliffs, NJ 07632  
United States

**Date of Testing:**

12/10/2013 - 12/16/2013

**Test Site/Location:**

PCTEST Lab, Columbia, MD, USA

**Document Serial No.:**

0Y1312092369-R3.ZNF

**FCC ID:**

**ZNFVK810**

**APPLICANT:**

**LG ELECTRONICS MOBILECOMM U.S.A., INC.**

**DUT Type:**

Portable Tablet

**Application Type:**

Certification

**FCC Rule Part(s):**

CFR §2.1093

**Model(s):**

VK810, LGVK810, LG-VK810

| Equipment Class                                   | Band & Mode      | Tx Frequency        | Measured Conducted Power [dBm] | SAR              |
|---------------------------------------------------|------------------|---------------------|--------------------------------|------------------|
|                                                   |                  |                     |                                | 1 gm Body (W/kg) |
| TNB                                               | LTE Band 13      | 782 MHz             | 24.09                          | 0.84             |
| TNB                                               | LTE Band 4 (AWS) | 1712.5 - 1752.5 MHz | 24.18                          | 1.06             |
| DTS                                               | 2.4 GHz WLAN     | 2412 - 2462 MHz     | 10.96                          | 0.63             |
| DTS                                               | 5.8 GHz WLAN     | 5745 - 5825 MHz     | 8.81                           | 0.51             |
| NII                                               | 5.2 GHz WLAN     | 5180 - 5240 MHz     | 9.07                           | 0.24             |
| NII                                               | 5.3 GHz WLAN     | 5260 - 5320 MHz     | 9.20                           | 0.21             |
| NII                                               | 5.5 GHz WLAN     | 5500 - 5700 MHz     | 9.22                           | 0.34             |
| DSS/DTS                                           | Bluetooth        | 2402 - 2480 MHz     | 8.67                           | N/A              |
| <b>Simultaneous SAR per KDB 690783 D01v01r02:</b> |                  |                     |                                | <b>1.57</b>      |

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

This revised Test Report (S/N: 0Y1312092369-R3.ZNF) supersedes and replaces the previously issued test report on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

This wireless portable device has been shown to be capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in ANSI/IEEE C95.1-1992 and has been tested in accordance with the measurement procedures specified in Section 1.7 of this report; for North American frequency bands only.

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

  
Randy Ortanez  
President



|                                             |                                                                                                                                   |                                     |                                                                                       |                                        |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| FCC ID: ZNFVK810                            |  <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>0Y1312092369-R3.ZNF | <b>Test Dates:</b><br>12/10/2013 - 12/16/2013                                                                                     | <b>DUT Type:</b><br>Portable Tablet | Page 1 of 46                                                                          |                                        |

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# 1 DEVICE UNDER TEST

## 1.1 Device Overview

| Band & Mode      | Operating Modes | Tx Frequency        |
|------------------|-----------------|---------------------|
| LTE Band 13      | Data            | 782 MHz             |
| LTE Band 4 (AWS) | Data            | 1712.5 - 1752.5 MHz |
| 2.4 GHz WLAN     | Data            | 2412 - 2462 MHz     |
| 5.8 GHz WLAN     | Data            | 5745 - 5825 MHz     |
| 5.2 GHz WLAN     | Data            | 5180 - 5240 MHz     |
| 5.3 GHz WLAN     | Data            | 5260 - 5320 MHz     |
| 5.5 GHz WLAN     | Data            | 5500 - 5700 MHz     |
| Bluetooth        | Data            | 2402 - 2480 MHz     |

## 1.2 Power Reduction for SAR

This device uses a proximity sensor for SAR compliance. The capacitive grip sensor is activated when used in close proximity to the user's body. The capacitive sensor is only applicable for tablet operations. There are no body worn accessories for this device.

Since the device is a full tablet size, the Body SAR was evaluated per FCC KDB Publication 616217 D04v01 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.

With power backoff: capacitive sensor activated:

| Mode / Band      |         | Modulated Average (dBm) |
|------------------|---------|-------------------------|
| LTE Band 13      | Maximum | <b>20.2</b>             |
|                  | Nominal | <b>19.7</b>             |
| LTE Band 4 (AWS) | Maximum | <b>14.2</b>             |
|                  | Nominal | <b>13.7</b>             |

|                                      |                                                                                                                                                                                                        |                              |                                 |
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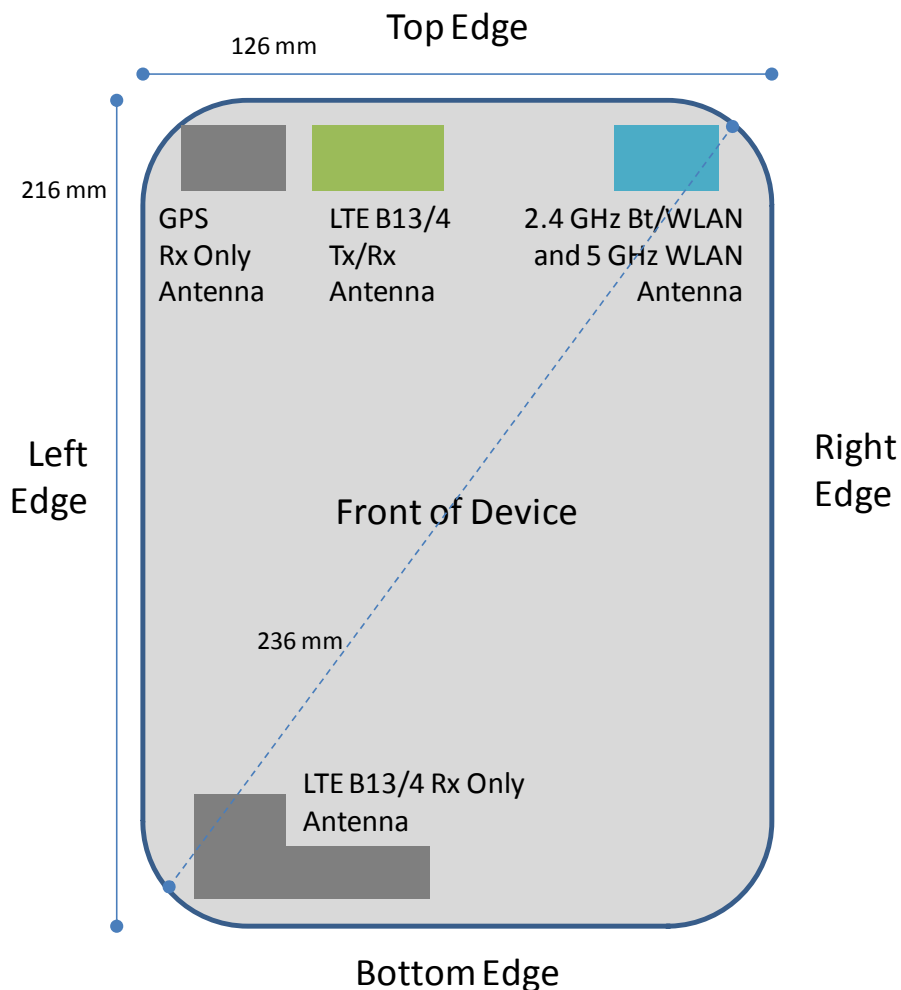
Max power: capacitive sensor not activated:

| Mode / Band      |         | Modulated Average (dBm) |
|------------------|---------|-------------------------|
| LTE Band 13      | Maximum | <b>24.2</b>             |
|                  | Nominal | <b>23.7</b>             |
| LTE Band 4 (AWS) | Maximum | <b>24.2</b>             |
|                  | Nominal | <b>23.7</b>             |

| Mode / Band            |         | Modulated Average (dBm) |
|------------------------|---------|-------------------------|
| IEEE 802.11b (2.4 GHz) | Maximum | <b>11.0</b>             |
|                        | Nominal | <b>10.0</b>             |
| IEEE 802.11g (2.4 GHz) | Maximum | <b>10.0</b>             |
|                        | Nominal | <b>9.0</b>              |
| IEEE 802.11n (2.4 GHz) | Maximum | <b>10.0</b>             |
|                        | Nominal | <b>9.0</b>              |
| IEEE 802.11a (5 GHz)   | Maximum | <b>9.5</b>              |
|                        | Nominal | <b>8.5</b>              |
| IEEE 802.11n (5 GHz)   | Maximum | <b>9.0</b>              |
|                        | Nominal | <b>8.0</b>              |
| Bluetooth              | Maximum | <b>9.5</b>              |
|                        | Nominal | <b>8.0</b>              |
| Bluetooth LE           | Maximum | <b>9.5</b>              |
|                        | Nominal | <b>8.0</b>              |

|                                             |                                                                                                                                   |                                     |                                                                                       |                                        |
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## 1.4 DUT Antenna Locations



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

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

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

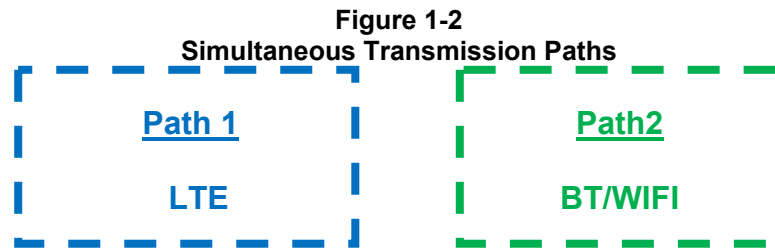
| Mode             | Back | Front | Top | Bottom | Right | Left |
|------------------|------|-------|-----|--------|-------|------|
| LTE Band 13      | Yes  | No    | Yes | No     | No    | Yes  |
| LTE Band 4 (AWS) | Yes  | No    | Yes | No     | No    | Yes  |
| 2.4 GHz WLAN     | Yes  | No    | Yes | No     | Yes   | No   |
| 5 GHz WLAN       | Yes  | No    | Yes | No     | Yes   | No   |

Note: Particular DUT edges were not required to be evaluated for SAR based on the SAR exclusion formula according to FCC KDB Publication 447498 D01.

|                                             |                                                                                                                                   |                                     |                                                                                                 |                                        |
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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 1-2 and are color-coded to indicate communication modes which share the same path. Modes which share the same transmission path cannot transmit simultaneously with one another.



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 | Notes |
|-----|--------------------------------|------|-------|
| 1   | LTE + 2.4 GHz WI-FI            | Yes  |       |
| 2   | LTE + 5 GHz WI-FI              | Yes  |       |
| 3   | LTE + 2.4 GHz Bluetooth        | Yes  |       |

Note: 2.4 GHz WI-FI, 2.4 GHz Bluetooth, and 5 GHz WI-FI share the same antenna path and cannot transmit simultaneously.

## 1.6 SAR Test Exclusions Applied

### (A) WIFI/BT

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

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

Based on the maximum conducted power of Bluetooth (rounded to the nearest mW) and the antenna to user separation distance, Bluetooth SAR was not required;  $[(9/5) * \sqrt{2.441}] = 2.8 < 3.0$ . Per KDB Publication 447498 D01v05, the maximum power of the channel was rounded to the nearest mW before calculation.

This device supports 20 MHz and 40 MHz Bandwidths for IEEE 802.11n for 5 GHz WIFI only. IEEE 802.11n was not evaluated for SAR since the average output power of 20 MHz and 40 MHz bandwidths was not more than 0.25 dB higher than the average output power of IEEE 802.11a.

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

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

### 1.7 Guidance Applied

- FCC KDB Publication 941225 D05v02r03 (LTE)
- FCC KDB Publication 248227 D01v01r02 (SAR Considerations for 802.11 Devices)
- FCC KDB Publication 447498 D01v05r01 (General SAR Guidance)
- FCC KDB Publication 865664 D01v01r02 - D02v01r01 (SAR Measurements up to 6 GHz)
- FCC KDB Publication 616217 D04v01r01 (Tablet SAR Consideration)

### 1.8 Device Serial Numbers

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

|                  | Body Maximum Power<br>Serial Number | Body Reduced Power<br>Serial Number |
|------------------|-------------------------------------|-------------------------------------|
| LTE Band 13      | 0912-4                              | 0912-8                              |
| LTE Band 4 (AWS) | 0912-7                              | 0912-8                              |
| 2.4 GHz WLAN     | 0912-6                              | -                                   |
| 5 GHz WLAN       | 0912-6                              | -                                   |

|                                             |                                                                                                                                   |                                     |                                                                                       |                                        |
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## 2 LTE INFORMATION

| LTE Information                                                                                                   |                                                 |                |                |
|-------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|----------------|----------------|
| <b>FCC ID</b>                                                                                                     | <b>ZNFVK810</b>                                 |                |                |
| Form Factor                                                                                                       | Portable Tablet                                 |                |                |
| Frequency Range of each LTE transmission band                                                                     | LTE Band 13 (782 MHz)                           |                |                |
|                                                                                                                   | LTE Band 4 (AWS) (1712.5 - 1752.5 MHz)          |                |                |
| Channel Bandwidths                                                                                                | LTE Band 13: 10 MHz                             |                |                |
|                                                                                                                   | LTE Band 4 (AWS): 5 MHz, 10 MHz, 15 MHz, 20 MHz |                |                |
| Channel Numbers and Frequencies (MHz)                                                                             | Low                                             | Mid            | High           |
| LTE Band 13: 10 MHz                                                                                               | 782 (23230)                                     | 782 (23230)    | 782 (23230)    |
| 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)   |
| UE Category                                                                                                       | 3                                               |                |                |
| Modulations Supported in UL                                                                                       | QPSK, 16QAM                                     |                |                |
| LTE MPR Permanently implemented per 3GPP TS 36.101 section 6.2.3~6.2.5? (manufacturer attestation to be provided) | YES                                             |                |                |
| A-MPR (Additional MPR) disabled for SAR Testing?                                                                  | YES                                             |                |                |

|                                             |                                                                                                                                   |                                     |                                                                                       |                                        |
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### 3 INTRODUCTION

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

The safety limits used for the environmental evaluation measurements are based on the criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate (SAR) in IEEE/ANSI C95.1-1992 Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz [3] and Health Canada RF Exposure Guidelines Safety Code 6 [22]. The measurement procedure described in IEEE/ANSI C95.3-2002 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave [4] is used for guidance in measuring the Specific Absorption Rate (SAR) due to the RF radiation exposure from the Equipment Under Test (EUT). These criteria for SAR evaluation are similar to those recommended by the International Committee for Non-Ionizing Radiation Protection (ICNIRP) in Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields,” Report No. Vol 74. SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards.

#### 3.1 SAR Definition

Specific Absorption Rate is defined as the time derivative (rate) of the incremental energy (dU) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dV) of a given density ( $\rho$ ). It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body (see Equation 3-1).

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

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

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

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

where:

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

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

|                                             |                                                                                                                                   |                                     |                                                                                       |                                        |
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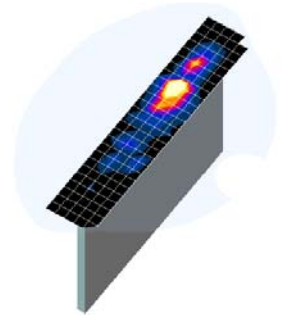
## 4

## 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 RF EXPOSURE LIMITS

### 5.1 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.

### 5.2 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 5-1**  
**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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### 6.1 SAR Testing for Tablet per KDB Publication 616217 D04v01

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.

### 6.2 Additional Test Positions due to Proximity Sensor Considerations

This device uses a proximity sensor to reduce data powers in tablet-device use conditions. While the device is touching the user on the antenna, the proximity sensors activate and thus reduce the maximum output power allowed. However, when the device is moved beyond the sensor triggering distance, the sensors de-activate and thus 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 capacitive proximity sensor activation distance for the back side and top edge of the device is 13 mm, a conservative distance of 12 mm was tested for SAR on the back side and top edge at maximum power. Sensor triggering distance summary data is included in Appendix G. The capacitive proximity sensor does not trigger power reduction from the front of the device. There is no proximity sensor power reduction mechanism for WLAN and BT modes.

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

|                                             |                                                                                                                                   |                                     |                                                                                       |                                        |
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## 7 FCC MEASUREMENT PROCEDURES

Power measurements were 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 Procedures Used to Establish RF Signal for SAR

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

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

### 7.3 SAR Measurement Conditions for LTE

LTE modes were tested according to FCC KDB 941225 D05v02 publication. Please see notes after the tabulated SAR data for required test configurations. Establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluating SAR [4]. The R&S CMW500 was used for LTE output power measurements and SAR testing. Closed loop power control was used so the UE transmits with maximum output power during SAR testing. SAR tests were performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI).

#### 7.3.1 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.

#### 7.3.2 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.

#### 7.3.3 A-MPR

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

|                                             |                                                                                                                                   |                                     |                                                                                       |                                        |
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### 7.3.4 Required RB Size and RB Offsets for SAR Testing

According to FCC KDB 941225 D05v02r01:

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

## 7.4 SAR Testing with 802.11 Transmitters

Normal network operating configurations are not suitable for measuring the SAR of 802.11 a/b/g/n transmitters. Unpredictable fluctuations in network traffic and antenna diversity conditions can introduce undesirable variations in SAR results. The SAR for these devices should be measured using chipset based test mode software to ensure the results are consistent and reliable. See KDB Publication 248227 D01v01r02 for more details.

### 7.4.1 General Device Setup

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

|                                             |                                                                                                                                   |                                     |                                                                                       |                                        |
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### 7.4.2 Frequency Channel Configurations [24]

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

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

If the maximum extrapolated peak SAR of the zoom scan for the highest output channel was less than 1.6 W/kg and if the 1g averaged SAR was less than 0.8 W/kg, SAR testing was not required for the other test channels in the band.

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

### 8.1 LTE Conducted Powers

#### 8.1.1 LTE Band 13

**Table 8-1**  
**Maximum LTE Band 13 Conducted Powers - 10 MHz Bandwidth**  
**Representing Capacitive Sensor Not Active**

|     | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | Target MPR [dB] | MPR Allowed per 3GPP [dB] |
|-----|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|-----------------|---------------------------|
| Mid | 782.0           | 23230   | 10              | QPSK       | 1       | 0         | 24.08                 | 0               | 0                         |
|     | 782.0           | 23230   | 10              | QPSK       | 1       | 25        | <b>24.09</b>          | 0               | 0                         |
|     | 782.0           | 23230   | 10              | QPSK       | 1       | 49        | 24.01                 | 0               | 0                         |
|     | 782.0           | 23230   | 10              | QPSK       | 25      | 0         | 23.13                 | 1               | 0-1                       |
|     | 782.0           | 23230   | 10              | QPSK       | 25      | 12        | 23.18                 | 1               | 0-1                       |
|     | 782.0           | 23230   | 10              | QPSK       | 25      | 25        | <b>23.19</b>          | 1               | 0-1                       |
|     | 782.0           | 23230   | 10              | QPSK       | 50      | 0         | 23.07                 | 1               | 0-1                       |
|     | 782.0           | 23230   | 10              | 16QAM      | 1       | 0         | 23.18                 | 1               | 0-1                       |
|     | 782.0           | 23230   | 10              | 16QAM      | 1       | 25        | 23.19                 | 1               | 0-1                       |
|     | 782.0           | 23230   | 10              | 16QAM      | 1       | 49        | 23.13                 | 1               | 0-1                       |
|     | 782.0           | 23230   | 10              | 16QAM      | 25      | 0         | 22.15                 | 2               | 0-2                       |
|     | 782.0           | 23230   | 10              | 16QAM      | 25      | 12        | 22.20                 | 2               | 0-2                       |
|     | 782.0           | 23230   | 10              | 16QAM      | 25      | 25        | 22.17                 | 2               | 0-2                       |
|     | 782.0           | 23230   | 10              | 16QAM      | 50      | 0         | 22.07                 | 2               | 0-2                       |

**Table 8-2**  
**Reduced LTE Band 13 Conducted Powers - 10 MHz Bandwidth**  
**Representing Capacitive Sensor Active**

|     | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | Target MPR [dB] | MPR Allowed per 3GPP [dB] |
|-----|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|-----------------|---------------------------|
| Mid | 782.0           | 23230   | 10              | QPSK       | 1       | 0         | <b>20.12</b>          | 0               | 0                         |
|     | 782.0           | 23230   | 10              | QPSK       | 1       | 25        | 20.09                 | 0               | 0                         |
|     | 782.0           | 23230   | 10              | QPSK       | 1       | 49        | 20.11                 | 0               | 0                         |
|     | 782.0           | 23230   | 10              | QPSK       | 25      | 0         | 20.00                 | 0               | 0-1                       |
|     | 782.0           | 23230   | 10              | QPSK       | 25      | 12        | <b>20.09</b>          | 0               | 0-1                       |
|     | 782.0           | 23230   | 10              | QPSK       | 25      | 25        | 20.07                 | 0               | 0-1                       |
|     | 782.0           | 23230   | 10              | QPSK       | 50      | 0         | 20.06                 | 0               | 0-1                       |
|     | 782.0           | 23230   | 10              | 16QAM      | 1       | 0         | 20.19                 | 0               | 0-1                       |
|     | 782.0           | 23230   | 10              | 16QAM      | 1       | 25        | 20.20                 | 0               | 0-1                       |
|     | 782.0           | 23230   | 10              | 16QAM      | 1       | 49        | 20.18                 | 0               | 0-1                       |
|     | 782.0           | 23230   | 10              | 16QAM      | 25      | 0         | 19.93                 | 0               | 0-2                       |
|     | 782.0           | 23230   | 10              | 16QAM      | 25      | 12        | 20.06                 | 0               | 0-2                       |
|     | 782.0           | 23230   | 10              | 16QAM      | 25      | 25        | 20.10                 | 0               | 0-2                       |
|     | 782.0           | 23230   | 10              | 16QAM      | 50      | 0         | 19.91                 | 0               | 0-2                       |

|                                      |                                                                                                                                   |                              |                                                                                                 |                                 |
|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------|-------------------------------------------------------------------------------------------------|---------------------------------|
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## 8.1.2

## LTE Band 4 (AWS)

**Table 8-3**  
**Maximum LTE Band 4 (AWS) Conducted Powers - 20 MHz Bandwidth**  
**Representing Capacitive Sensor Not Active**

|     | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | Target MPR [dB] | MPR Allowed per 3GPP [dB] |
|-----|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|-----------------|---------------------------|
| Mid | 1732.5          | 20175   | 20              | QPSK       | 1       | 0         | 24.12                 | 0               | 0                         |
|     | 1732.5          | 20175   | 20              | QPSK       | 1       | 50        | 24.15                 | 0               | 0                         |
|     | 1732.5          | 20175   | 20              | QPSK       | 1       | 99        | <b>24.18</b>          | 0               | 0                         |
|     | 1732.5          | 20175   | 20              | QPSK       | 50      | 0         | 23.09                 | 1               | 0-1                       |
|     | 1732.5          | 20175   | 20              | QPSK       | 50      | 25        | 23.13                 | 1               | 0-1                       |
|     | 1732.5          | 20175   | 20              | QPSK       | 50      | 50        | <b>23.17</b>          | 1               | 0-1                       |
|     | 1732.5          | 20175   | 20              | QPSK       | 100     | 0         | 23.11                 | 1               | 0-1                       |
|     | 1732.5          | 20175   | 20              | 16QAM      | 1       | 0         | 22.93                 | 1               | 0-1                       |
|     | 1732.5          | 20175   | 20              | 16QAM      | 1       | 50        | 22.95                 | 1               | 0-1                       |
|     | 1732.5          | 20175   | 20              | 16QAM      | 1       | 99        | 23.05                 | 1               | 0-1                       |
|     | 1732.5          | 20175   | 20              | 16QAM      | 50      | 0         | 21.94                 | 2               | 0-2                       |
|     | 1732.5          | 20175   | 20              | 16QAM      | 50      | 25        | 21.95                 | 2               | 0-2                       |
|     | 1732.5          | 20175   | 20              | 16QAM      | 50      | 50        | 21.97                 | 2               | 0-2                       |
|     | 1732.5          | 20175   | 20              | 16QAM      | 100     | 0         | 22.02                 | 2               | 0-2                       |

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.

|                                      |                                                                                                                                                                                                        |                              |                                 |
|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------------------|
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**Table 8-4**  
**Maximum LTE Band 4 (AWS) Conducted Powers - 15 MHz Bandwidth**  
**Representing Capacitive Sensor Not Active**

|      | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | Target MPR [dB] | MPR Allowed per 3GPP [dB] |
|------|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|-----------------|---------------------------|
| Low  | 1717.5          | 20025   | 15              | QPSK       | 1       | 0         | 24.01                 | 0               | 0                         |
|      | 1717.5          | 20025   | 15              | QPSK       | 1       | 36        | 24.03                 | 0               | 0                         |
|      | 1717.5          | 20025   | 15              | QPSK       | 1       | 74        | 23.98                 | 0               | 0                         |
|      | 1717.5          | 20025   | 15              | QPSK       | 36      | 0         | 22.97                 | 1               | 0-1                       |
|      | 1717.5          | 20025   | 15              | QPSK       | 36      | 18        | 22.92                 | 1               | 0-1                       |
|      | 1717.5          | 20025   | 15              | QPSK       | 36      | 37        | 22.89                 | 1               | 0-1                       |
|      | 1717.5          | 20025   | 15              | QPSK       | 75      | 0         | 22.86                 | 1               | 0-1                       |
|      | 1717.5          | 20025   | 15              | 16QAM      | 1       | 0         | 23.05                 | 1               | 0-1                       |
|      | 1717.5          | 20025   | 15              | 16QAM      | 1       | 36        | 22.98                 | 1               | 0-1                       |
|      | 1717.5          | 20025   | 15              | 16QAM      | 1       | 74        | 23.01                 | 1               | 0-1                       |
|      | 1717.5          | 20025   | 15              | 16QAM      | 36      | 0         | 21.91                 | 2               | 0-2                       |
|      | 1717.5          | 20025   | 15              | 16QAM      | 36      | 18        | 21.93                 | 2               | 0-2                       |
| Mid  | 1717.5          | 20025   | 15              | 16QAM      | 36      | 37        | 21.90                 | 2               | 0-2                       |
|      | 1717.5          | 20025   | 15              | 16QAM      | 75      | 0         | 21.81                 | 2               | 0-2                       |
|      | 1732.5          | 20175   | 15              | QPSK       | 1       | 0         | 24.11                 | 0               | 0                         |
|      | 1732.5          | 20175   | 15              | QPSK       | 1       | 36        | 24.19                 | 0               | 0                         |
|      | 1732.5          | 20175   | 15              | QPSK       | 1       | 74        | 24.20                 | 0               | 0                         |
|      | 1732.5          | 20175   | 15              | QPSK       | 36      | 0         | 23.01                 | 1               | 0-1                       |
|      | 1732.5          | 20175   | 15              | QPSK       | 36      | 18        | 23.03                 | 1               | 0-1                       |
|      | 1732.5          | 20175   | 15              | QPSK       | 36      | 37        | 23.06                 | 1               | 0-1                       |
|      | 1732.5          | 20175   | 15              | QPSK       | 75      | 0         | 22.96                 | 1               | 0-1                       |
|      | 1732.5          | 20175   | 15              | 16QAM      | 1       | 0         | 22.70                 | 1               | 0-1                       |
|      | 1732.5          | 20175   | 15              | 16QAM      | 1       | 36        | 22.71                 | 1               | 0-1                       |
|      | 1732.5          | 20175   | 15              | 16QAM      | 1       | 74        | 22.74                 | 1               | 0-1                       |
| High | 1732.5          | 20175   | 15              | 16QAM      | 36      | 0         | 21.94                 | 2               | 0-2                       |
|      | 1732.5          | 20175   | 15              | 16QAM      | 36      | 18        | 21.93                 | 2               | 0-2                       |
|      | 1732.5          | 20175   | 15              | 16QAM      | 36      | 37        | 21.99                 | 2               | 0-2                       |
|      | 1732.5          | 20175   | 15              | 16QAM      | 75      | 0         | 21.93                 | 2               | 0-2                       |
|      | 1747.5          | 20325   | 15              | QPSK       | 1       | 0         | 24.20                 | 0               | 0                         |
|      | 1747.5          | 20325   | 15              | QPSK       | 1       | 36        | 24.19                 | 0               | 0                         |
|      | 1747.5          | 20325   | 15              | QPSK       | 1       | 74        | 24.17                 | 0               | 0                         |
|      | 1747.5          | 20325   | 15              | QPSK       | 36      | 0         | 23.09                 | 1               | 0-1                       |
|      | 1747.5          | 20325   | 15              | QPSK       | 36      | 18        | 23.01                 | 1               | 0-1                       |
|      | 1747.5          | 20325   | 15              | QPSK       | 36      | 37        | 23.04                 | 1               | 0-1                       |
|      | 1747.5          | 20325   | 15              | QPSK       | 75      | 0         | 22.98                 | 1               | 0-1                       |
|      | 1747.5          | 20325   | 15              | 16QAM      | 1       | 0         | 22.87                 | 1               | 0-1                       |
|      | 1747.5          | 20325   | 15              | 16QAM      | 1       | 36        | 22.76                 | 1               | 0-1                       |
|      | 1747.5          | 20325   | 15              | 16QAM      | 1       | 74        | 22.82                 | 1               | 0-1                       |
|      | 1747.5          | 20325   | 15              | 16QAM      | 36      | 0         | 22.09                 | 2               | 0-2                       |
|      | 1747.5          | 20325   | 15              | 16QAM      | 36      | 18        | 21.98                 | 2               | 0-2                       |
|      | 1747.5          | 20325   | 15              | 16QAM      | 36      | 37        | 21.96                 | 2               | 0-2                       |
|      | 1747.5          | 20325   | 15              | 16QAM      | 75      | 0         | 21.81                 | 2               | 0-2                       |

|                                      |                                                                                                                                                  |                              |                                                                                       |                                 |
|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
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| Document S/N:<br>0Y1312092369-R3.ZNF | Test Dates:<br>12/10/2013 - 12/16/2013                                                                                                           | DUT Type:<br>Portable Tablet | Page 18 of 46                                                                         |                                 |

**Table 8-5**  
**Maximum LTE Band 4 (AWS) Conducted Powers - 10 MHz Bandwidth**  
**Representing Capacitive Sensor Not Active**

|      | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | Target MPR [dB] | MPR Allowed per 3GPP [dB] |
|------|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|-----------------|---------------------------|
| Low  | 1715            | 20000   | 10              | QPSK       | 1       | 0         | 24.07                 | 0               | 0                         |
|      | 1715            | 20000   | 10              | QPSK       | 1       | 25        | 23.96                 | 0               | 0                         |
|      | 1715            | 20000   | 10              | QPSK       | 1       | 49        | 23.95                 | 0               | 0                         |
|      | 1715            | 20000   | 10              | QPSK       | 25      | 0         | 22.98                 | 1               | 0-1                       |
|      | 1715            | 20000   | 10              | QPSK       | 25      | 12        | 22.98                 | 1               | 0-1                       |
|      | 1715            | 20000   | 10              | QPSK       | 25      | 25        | 23.07                 | 1               | 0-1                       |
|      | 1715            | 20000   | 10              | QPSK       | 50      | 0         | 23.01                 | 1               | 0-1                       |
|      | 1715            | 20000   | 10              | 16QAM      | 1       | 0         | 23.05                 | 1               | 0-1                       |
|      | 1715            | 20000   | 10              | 16QAM      | 1       | 25        | 22.97                 | 1               | 0-1                       |
|      | 1715            | 20000   | 10              | 16QAM      | 1       | 49        | 22.91                 | 1               | 0-1                       |
|      | 1715            | 20000   | 10              | 16QAM      | 25      | 0         | 21.90                 | 2               | 0-2                       |
|      | 1715            | 20000   | 10              | 16QAM      | 25      | 12        | 21.94                 | 2               | 0-2                       |
| Mid  | 1732.5          | 20175   | 10              | QPSK       | 25      | 25        | 21.98                 | 2               | 0-2                       |
|      | 1715            | 20000   | 10              | 16QAM      | 50      | 0         | 21.93                 | 2               | 0-2                       |
|      | 1732.5          | 20175   | 10              | QPSK       | 1       | 0         | 24.14                 | 0               | 0                         |
|      | 1732.5          | 20175   | 10              | QPSK       | 1       | 25        | 24.15                 | 0               | 0                         |
|      | 1732.5          | 20175   | 10              | QPSK       | 1       | 49        | 24.18                 | 0               | 0                         |
|      | 1732.5          | 20175   | 10              | QPSK       | 25      | 0         | 23.06                 | 1               | 0-1                       |
|      | 1732.5          | 20175   | 10              | QPSK       | 25      | 12        | 23.17                 | 1               | 0-1                       |
|      | 1732.5          | 20175   | 10              | QPSK       | 25      | 25        | 23.20                 | 1               | 0-1                       |
|      | 1732.5          | 20175   | 10              | QPSK       | 50      | 0         | 23.01                 | 1               | 0-1                       |
|      | 1732.5          | 20175   | 10              | 16QAM      | 1       | 0         | 22.75                 | 1               | 0-1                       |
|      | 1732.5          | 20175   | 10              | 16QAM      | 1       | 25        | 22.80                 | 1               | 0-1                       |
|      | 1732.5          | 20175   | 10              | 16QAM      | 1       | 49        | 22.77                 | 1               | 0-1                       |
| High | 1732.5          | 20175   | 10              | 16QAM      | 25      | 0         | 22.05                 | 2               | 0-2                       |
|      | 1732.5          | 20175   | 10              | 16QAM      | 25      | 12        | 22.07                 | 2               | 0-2                       |
|      | 1732.5          | 20175   | 10              | 16QAM      | 25      | 25        | 22.11                 | 2               | 0-2                       |
|      | 1732.5          | 20175   | 10              | 16QAM      | 50      | 0         | 22.00                 | 2               | 0-2                       |
|      | 1750            | 20350   | 10              | QPSK       | 1       | 0         | 24.03                 | 0               | 0                         |
|      | 1750            | 20350   | 10              | QPSK       | 1       | 25        | 24.07                 | 0               | 0                         |
|      | 1750            | 20350   | 10              | QPSK       | 1       | 49        | 23.97                 | 0               | 0                         |
|      | 1750            | 20350   | 10              | QPSK       | 25      | 0         | 23.17                 | 1               | 0-1                       |
|      | 1750            | 20350   | 10              | QPSK       | 25      | 12        | 23.16                 | 1               | 0-1                       |
|      | 1750            | 20350   | 10              | QPSK       | 25      | 25        | 23.15                 | 1               | 0-1                       |
|      | 1750            | 20350   | 10              | QPSK       | 50      | 0         | 23.08                 | 1               | 0-1                       |
|      | 1750            | 20350   | 10              | 16QAM      | 1       | 0         | 22.82                 | 1               | 0-1                       |
|      | 1750            | 20350   | 10              | 16QAM      | 1       | 25        | 22.86                 | 1               | 0-1                       |
|      | 1750            | 20350   | 10              | 16QAM      | 1       | 49        | 22.75                 | 1               | 0-1                       |
|      | 1750            | 20350   | 10              | 16QAM      | 25      | 0         | 22.07                 | 2               | 0-2                       |
|      | 1750            | 20350   | 10              | 16QAM      | 25      | 12        | 22.04                 | 2               | 0-2                       |
|      | 1750            | 20350   | 10              | 16QAM      | 25      | 25        | 22.01                 | 2               | 0-2                       |
|      | 1750            | 20350   | 10              | 16QAM      | 50      | 0         | 21.92                 | 2               | 0-2                       |

|                                      |                                                                                                                                                                                                        |                                 |
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| FCC ID: ZNFVK810                     |  <b>SAR EVALUATION REPORT</b>  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>0Y1312092369-R3.ZNF | Test Dates:<br>12/10/2013 - 12/16/2013                                                                                                                                                                 | DUT Type:<br>Portable Tablet    |
| Page 19 of 46                        |                                                                                                                                                                                                        |                                 |

**Table 8-6**  
**Maximum LTE Band 4 (AWS) Conducted Powers - 5 MHz Bandwidth**  
**Representing Capacitive Sensor Not Active**

|      | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | Target MPR [dB] | MPR Allowed per 3GPP [dB] |
|------|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|-----------------|---------------------------|
| Low  | 1712.5          | 19975   | 5               | QPSK       | 1       | 0         | 24.16                 | 0               | 0                         |
|      | 1712.5          | 19975   | 5               | QPSK       | 1       | 12        | 24.12                 | 0               | 0                         |
|      | 1712.5          | 19975   | 5               | QPSK       | 1       | 24        | 24.04                 | 0               | 0                         |
|      | 1712.5          | 19975   | 5               | QPSK       | 12      | 0         | 23.17                 | 1               | 0-1                       |
|      | 1712.5          | 19975   | 5               | QPSK       | 12      | 6         | 23.12                 | 1               | 0-1                       |
|      | 1712.5          | 19975   | 5               | QPSK       | 12      | 13        | 23.09                 | 1               | 0-1                       |
|      | 1712.5          | 19975   | 5               | QPSK       | 25      | 0         | 23.01                 | 1               | 0-1                       |
|      | 1712.5          | 19975   | 5               | 16-QAM     | 1       | 0         | 22.91                 | 1               | 0-1                       |
|      | 1712.5          | 19975   | 5               | 16-QAM     | 1       | 12        | 22.76                 | 1               | 0-1                       |
|      | 1712.5          | 19975   | 5               | 16-QAM     | 1       | 24        | 22.73                 | 1               | 0-1                       |
|      | 1712.5          | 19975   | 5               | 16-QAM     | 12      | 0         | 22.15                 | 2               | 0-2                       |
|      | 1712.5          | 19975   | 5               | 16-QAM     | 12      | 6         | 22.10                 | 2               | 0-2                       |
| Mid  | 1712.5          | 19975   | 5               | 16-QAM     | 12      | 13        | 22.03                 | 2               | 0-2                       |
|      | 1712.5          | 19975   | 5               | 16-QAM     | 25      | 0         | 21.90                 | 2               | 0-2                       |
|      | 1732.5          | 20175   | 5               | QPSK       | 1       | 0         | 24.04                 | 0               | 0                         |
|      | 1732.5          | 20175   | 5               | QPSK       | 1       | 12        | 24.05                 | 0               | 0                         |
|      | 1732.5          | 20175   | 5               | QPSK       | 1       | 24        | 24.08                 | 0               | 0                         |
|      | 1732.5          | 20175   | 5               | QPSK       | 12      | 0         | 23.09                 | 1               | 0-1                       |
|      | 1732.5          | 20175   | 5               | QPSK       | 12      | 6         | 23.14                 | 1               | 0-1                       |
|      | 1732.5          | 20175   | 5               | QPSK       | 12      | 13        | 23.16                 | 1               | 0-1                       |
|      | 1732.5          | 20175   | 5               | QPSK       | 25      | 0         | 23.11                 | 1               | 0-1                       |
|      | 1732.5          | 20175   | 5               | 16-QAM     | 1       | 0         | 22.74                 | 1               | 0-1                       |
|      | 1732.5          | 20175   | 5               | 16-QAM     | 1       | 12        | 22.75                 | 1               | 0-1                       |
|      | 1732.5          | 20175   | 5               | 16-QAM     | 1       | 24        | 22.73                 | 1               | 0-1                       |
| High | 1732.5          | 20175   | 5               | 16-QAM     | 12      | 0         | 22.19                 | 2               | 0-2                       |
|      | 1732.5          | 20175   | 5               | 16-QAM     | 12      | 6         | 22.15                 | 2               | 0-2                       |
|      | 1732.5          | 20175   | 5               | 16-QAM     | 12      | 13        | 22.17                 | 2               | 0-2                       |
|      | 1732.5          | 20175   | 5               | 16-QAM     | 25      | 0         | 22.09                 | 2               | 0-2                       |
|      | 1752.5          | 20375   | 5               | QPSK       | 1       | 0         | 24.18                 | 0               | 0                         |
|      | 1752.5          | 20375   | 5               | QPSK       | 1       | 12        | 24.10                 | 0               | 0                         |
|      | 1752.5          | 20375   | 5               | QPSK       | 1       | 24        | 24.08                 | 0               | 0                         |
|      | 1752.5          | 20375   | 5               | QPSK       | 12      | 0         | 23.13                 | 1               | 0-1                       |
|      | 1752.5          | 20375   | 5               | QPSK       | 12      | 6         | 23.14                 | 1               | 0-1                       |
|      | 1752.5          | 20375   | 5               | QPSK       | 12      | 13        | 23.10                 | 1               | 0-1                       |
|      | 1752.5          | 20375   | 5               | QPSK       | 25      | 0         | 23.08                 | 1               | 0-1                       |
|      | 1752.5          | 20375   | 5               | 16-QAM     | 1       | 0         | 22.93                 | 1               | 0-1                       |
|      | 1752.5          | 20375   | 5               | 16-QAM     | 1       | 12        | 22.91                 | 1               | 0-1                       |
|      | 1752.5          | 20375   | 5               | 16-QAM     | 1       | 24        | 22.84                 | 1               | 0-1                       |
|      | 1752.5          | 20375   | 5               | 16-QAM     | 12      | 0         | 22.15                 | 2               | 0-2                       |
|      | 1752.5          | 20375   | 5               | 16-QAM     | 12      | 6         | 22.05                 | 2               | 0-2                       |
|      | 1752.5          | 20375   | 5               | 16-QAM     | 12      | 13        | 22.14                 | 2               | 0-2                       |
|      | 1752.5          | 20375   | 5               | 16-QAM     | 25      | 0         | 21.91                 | 2               | 0-2                       |

|                                      |                                                                                                                                                  |                              |                                                                                       |                                 |
|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: ZNFVK810                     |  <b>PCTEST</b><br><small>ENGINEERING LABORATORY, INC.</small> | <b>SAR EVALUATION REPORT</b> |  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>0Y1312092369-R3.ZNF | Test Dates:<br>12/10/2013 - 12/16/2013                                                                                                           | DUT Type:<br>Portable Tablet | Page 20 of 46                                                                         |                                 |

**Table 8-7**  
**Reduced LTE Band 4 (AWS) Conducted Powers - 20 MHz Bandwidth**  
**Representing Capacitive Sensor Active**

|     | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | Target MPR [dB] | MPR Allowed per 3GPP [dB] |
|-----|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|-----------------|---------------------------|
| Mid | 1732.5          | 20175   | 20              | QPSK       | 1       | 0         | 13.92                 | 0               | 0                         |
|     | 1732.5          | 20175   | 20              | QPSK       | 1       | 50        | <b>14.20</b>          | 0               | 0                         |
|     | 1732.5          | 20175   | 20              | QPSK       | 1       | 99        | 13.91                 | 0               | 0                         |
|     | 1732.5          | 20175   | 20              | QPSK       | 50      | 0         | 14.11                 | 0               | 0-1                       |
|     | 1732.5          | 20175   | 20              | QPSK       | 50      | 25        | 14.17                 | 0               | 0-1                       |
|     | 1732.5          | 20175   | 20              | QPSK       | 50      | 50        | <b>14.20</b>          | 0               | 0-1                       |
|     | 1732.5          | 20175   | 20              | QPSK       | 100     | 0         | 13.90                 | 0               | 0-1                       |
|     | 1732.5          | 20175   | 20              | 16QAM      | 1       | 0         | 13.86                 | 0               | 0-1                       |
|     | 1732.5          | 20175   | 20              | 16QAM      | 1       | 50        | 14.09                 | 0               | 0-1                       |
|     | 1732.5          | 20175   | 20              | 16QAM      | 1       | 99        | 13.81                 | 0               | 0-1                       |
|     | 1732.5          | 20175   | 20              | 16QAM      | 50      | 0         | 13.81                 | 0               | 0-2                       |
|     | 1732.5          | 20175   | 20              | 16QAM      | 50      | 25        | 13.84                 | 0               | 0-2                       |
|     | 1732.5          | 20175   | 20              | 16QAM      | 50      | 50        | 13.88                 | 0               | 0-2                       |
|     | 1732.5          | 20175   | 20              | 16QAM      | 100     | 0         | 13.81                 | 0               | 0-2                       |

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.

|                                      |                                                                                                                                                  |                              |                                                                                       |                                 |
|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: ZNFVK810                     |  <b>PCTEST</b><br><small>ENGINEERING LABORATORY, INC.</small> | SAR EVALUATION REPORT        |  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>0Y1312092369-R3.ZNF | Test Dates:<br>12/10/2013 - 12/16/2013                                                                                                           | DUT Type:<br>Portable Tablet |                                                                                       | Page 21 of 46                   |

**Table 8-8**  
**Reduced LTE Band 4 (AWS) Conducted Powers - 15 MHz Bandwidth**  
**Representing Capacitive Sensor Active**

|      | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | Target MPR [dB] | MPR Allowed per 3GPP [dB] |
|------|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|-----------------|---------------------------|
| Low  | 1717.5          | 20025   | 15              | QPSK       | 1       | 0         | 13.85                 | 0               | 0                         |
|      | 1717.5          | 20025   | 15              | QPSK       | 1       | 36        | 13.88                 | 0               | 0                         |
|      | 1717.5          | 20025   | 15              | QPSK       | 1       | 74        | 13.90                 | 0               | 0                         |
|      | 1717.5          | 20025   | 15              | QPSK       | 36      | 0         | 13.88                 | 0               | 0-1                       |
|      | 1717.5          | 20025   | 15              | QPSK       | 36      | 18        | 13.86                 | 0               | 0-1                       |
|      | 1717.5          | 20025   | 15              | QPSK       | 36      | 37        | 13.94                 | 0               | 0-1                       |
|      | 1717.5          | 20025   | 15              | QPSK       | 75      | 0         | 13.89                 | 0               | 0-1                       |
|      | 1717.5          | 20025   | 15              | 16QAM      | 1       | 0         | 14.00                 | 0               | 0-1                       |
|      | 1717.5          | 20025   | 15              | 16QAM      | 1       | 36        | 14.09                 | 0               | 0-1                       |
|      | 1717.5          | 20025   | 15              | 16QAM      | 1       | 74        | 14.19                 | 0               | 0-1                       |
|      | 1717.5          | 20025   | 15              | 16QAM      | 36      | 0         | 13.74                 | 0               | 0-2                       |
|      | 1717.5          | 20025   | 15              | 16QAM      | 36      | 18        | 13.77                 | 0               | 0-2                       |
| Mid  | 1717.5          | 20025   | 15              | 16QAM      | 36      | 37        | 13.86                 | 0               | 0-2                       |
|      | 1717.5          | 20025   | 15              | 16QAM      | 75      | 0         | 13.74                 | 0               | 0-2                       |
|      | 1732.5          | 20175   | 15              | QPSK       | 1       | 0         | 13.90                 | 0               | 0                         |
|      | 1732.5          | 20175   | 15              | QPSK       | 1       | 36        | 13.94                 | 0               | 0                         |
|      | 1732.5          | 20175   | 15              | QPSK       | 1       | 74        | 13.81                 | 0               | 0                         |
|      | 1732.5          | 20175   | 15              | QPSK       | 36      | 0         | 13.91                 | 0               | 0-1                       |
|      | 1732.5          | 20175   | 15              | QPSK       | 36      | 18        | 14.01                 | 0               | 0-1                       |
|      | 1732.5          | 20175   | 15              | QPSK       | 36      | 37        | 13.93                 | 0               | 0-1                       |
|      | 1732.5          | 20175   | 15              | QPSK       | 75      | 0         | 13.94                 | 0               | 0-1                       |
|      | 1732.5          | 20175   | 15              | 16QAM      | 1       | 0         | 13.93                 | 0               | 0-1                       |
|      | 1732.5          | 20175   | 15              | 16QAM      | 1       | 36        | 13.94                 | 0               | 0-1                       |
|      | 1732.5          | 20175   | 15              | 16QAM      | 1       | 74        | 13.78                 | 0               | 0-1                       |
| High | 1732.5          | 20175   | 15              | 16QAM      | 36      | 0         | 13.73                 | 0               | 0-2                       |
|      | 1732.5          | 20175   | 15              | 16QAM      | 36      | 18        | 13.78                 | 0               | 0-2                       |
|      | 1732.5          | 20175   | 15              | 16QAM      | 36      | 37        | 13.74                 | 0               | 0-2                       |
|      | 1732.5          | 20175   | 15              | 16QAM      | 75      | 0         | 14.09                 | 0               | 0-2                       |
|      | 1747.5          | 20325   | 15              | QPSK       | 1       | 0         | 13.86                 | 0               | 0                         |
|      | 1747.5          | 20325   | 15              | QPSK       | 1       | 36        | 13.86                 | 0               | 0                         |
|      | 1747.5          | 20325   | 15              | QPSK       | 1       | 74        | 13.88                 | 0               | 0                         |
|      | 1747.5          | 20325   | 15              | QPSK       | 36      | 0         | 13.82                 | 0               | 0-1                       |
|      | 1747.5          | 20325   | 15              | QPSK       | 36      | 18        | 13.81                 | 0               | 0-1                       |
|      | 1747.5          | 20325   | 15              | QPSK       | 36      | 37        | 13.91                 | 0               | 0-1                       |
|      | 1747.5          | 20325   | 15              | QPSK       | 75      | 0         | 13.84                 | 0               | 0-1                       |
|      | 1747.5          | 20325   | 15              | 16QAM      | 1       | 0         | 13.83                 | 0               | 0-1                       |
|      | 1747.5          | 20325   | 15              | 16QAM      | 1       | 36        | 13.80                 | 0               | 0-1                       |
|      | 1747.5          | 20325   | 15              | 16QAM      | 1       | 74        | 13.96                 | 0               | 0-1                       |
|      | 1747.5          | 20325   | 15              | 16QAM      | 36      | 0         | 13.73                 | 0               | 0-2                       |
|      | 1747.5          | 20325   | 15              | 16QAM      | 36      | 18        | 13.76                 | 0               | 0-2                       |
|      | 1747.5          | 20325   | 15              | 16QAM      | 36      | 37        | 13.84                 | 0               | 0-2                       |
|      | 1747.5          | 20325   | 15              | 16QAM      | 75      | 0         | 13.71                 | 0               | 0-2                       |
|      |                 |         |                 |            |         |           |                       |                 |                           |
|      |                 |         |                 |            |         |           |                       |                 |                           |

|                                      |                                                                                                                                                  |                              |                                                                                       |                                 |
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| FCC ID: ZNFVK810                     |  <b>PCTEST</b><br><small>ENGINEERING LABORATORY, INC.</small> | <b>SAR EVALUATION REPORT</b> |  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>0Y1312092369-R3.ZNF | Test Dates:<br>12/10/2013 - 12/16/2013                                                                                                           | DUT Type:<br>Portable Tablet |                                                                                       | Page 22 of 46                   |

**Table 8-9**  
**Reduced LTE Band 4 (AWS) Conducted Powers - 10 MHz Bandwidth**  
**Representing Capacitive Sensor Active**

|      | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | Target MPR [dB] | MPR Allowed per 3GPP [dB] |
|------|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|-----------------|---------------------------|
| Low  | 1715            | 20000   | 10              | QPSK       | 1       | 0         | 13.83                 | 0               | 0                         |
|      | 1715            | 20000   | 10              | QPSK       | 1       | 25        | 13.82                 | 0               | 0                         |
|      | 1715            | 20000   | 10              | QPSK       | 1       | 49        | 13.85                 | 0               | 0                         |
|      | 1715            | 20000   | 10              | QPSK       | 25      | 0         | 13.96                 | 0               | 0-1                       |
|      | 1715            | 20000   | 10              | QPSK       | 25      | 12        | 13.90                 | 0               | 0-1                       |
|      | 1715            | 20000   | 10              | QPSK       | 25      | 25        | 13.96                 | 0               | 0-1                       |
|      | 1715            | 20000   | 10              | QPSK       | 50      | 0         | 13.99                 | 0               | 0-1                       |
|      | 1715            | 20000   | 10              | 16QAM      | 1       | 0         | 14.11                 | 0               | 0-1                       |
|      | 1715            | 20000   | 10              | 16QAM      | 1       | 25        | 14.06                 | 0               | 0-1                       |
|      | 1715            | 20000   | 10              | 16QAM      | 1       | 49        | 14.19                 | 0               | 0-1                       |
|      | 1715            | 20000   | 10              | 16QAM      | 25      | 0         | 13.86                 | 0               | 0-2                       |
|      | 1715            | 20000   | 10              | 16QAM      | 25      | 12        | 13.79                 | 0               | 0-2                       |
| Mid  | 1732.5          | 20175   | 10              | QPSK       | 25      | 25        | 13.85                 | 0               | 0-2                       |
|      | 1715            | 20000   | 10              | 16QAM      | 50      | 0         | 13.87                 | 0               | 0-2                       |
|      | 1732.5          | 20175   | 10              | QPSK       | 1       | 0         | 13.81                 | 0               | 0                         |
|      | 1732.5          | 20175   | 10              | QPSK       | 1       | 25        | 13.83                 | 0               | 0                         |
|      | 1732.5          | 20175   | 10              | QPSK       | 1       | 49        | 13.87                 | 0               | 0                         |
|      | 1732.5          | 20175   | 10              | QPSK       | 25      | 0         | 13.88                 | 0               | 0-1                       |
|      | 1732.5          | 20175   | 10              | QPSK       | 25      | 12        | 13.90                 | 0               | 0-1                       |
|      | 1732.5          | 20175   | 10              | QPSK       | 25      | 25        | 13.86                 | 0               | 0-1                       |
|      | 1732.5          | 20175   | 10              | QPSK       | 50      | 0         | 13.84                 | 0               | 0-1                       |
|      | 1732.5          | 20175   | 10              | 16QAM      | 1       | 0         | 13.81                 | 0               | 0-1                       |
|      | 1732.5          | 20175   | 10              | 16QAM      | 1       | 25        | 13.79                 | 0               | 0-1                       |
|      | 1732.5          | 20175   | 10              | 16QAM      | 1       | 49        | 13.72                 | 0               | 0-1                       |
| High | 1732.5          | 20175   | 10              | 16QAM      | 25      | 0         | 13.71                 | 0               | 0-2                       |
|      | 1732.5          | 20175   | 10              | 16QAM      | 25      | 12        | 13.73                 | 0               | 0-2                       |
|      | 1732.5          | 20175   | 10              | 16QAM      | 25      | 25        | 13.72                 | 0               | 0-2                       |
|      | 1732.5          | 20175   | 10              | 16QAM      | 50      | 0         | 13.71                 | 0               | 0-2                       |
|      | 1750            | 20350   | 10              | QPSK       | 1       | 0         | 13.98                 | 0               | 0                         |
|      | 1750            | 20350   | 10              | QPSK       | 1       | 25        | 14.07                 | 0               | 0                         |
|      | 1750            | 20350   | 10              | QPSK       | 1       | 49        | 14.01                 | 0               | 0                         |
|      | 1750            | 20350   | 10              | QPSK       | 25      | 0         | 13.84                 | 0               | 0-1                       |
|      | 1750            | 20350   | 10              | QPSK       | 25      | 12        | 13.88                 | 0               | 0-1                       |
|      | 1750            | 20350   | 10              | QPSK       | 25      | 25        | 14.11                 | 0               | 0-1                       |
|      | 1750            | 20350   | 10              | QPSK       | 50      | 0         | 14.00                 | 0               | 0-1                       |
|      | 1750            | 20350   | 10              | 16QAM      | 1       | 0         | 14.04                 | 0               | 0-1                       |
|      | 1750            | 20350   | 10              | 16QAM      | 1       | 25        | 14.06                 | 0               | 0-1                       |
|      | 1750            | 20350   | 10              | 16QAM      | 1       | 49        | 14.15                 | 0               | 0-1                       |
|      | 1750            | 20350   | 10              | 16QAM      | 25      | 0         | 13.79                 | 0               | 0-2                       |
|      | 1750            | 20350   | 10              | 16QAM      | 25      | 12        | 13.96                 | 0               | 0-2                       |
|      | 1750            | 20350   | 10              | 16QAM      | 25      | 25        | 14.12                 | 0               | 0-2                       |
|      | 1750            | 20350   | 10              | 16QAM      | 50      | 0         | 13.91                 | 0               | 0-2                       |

|                                      |                                                                                                                                                  |                              |                                                                                       |                                 |
|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: ZNFVK810                     |  <b>PCTEST</b><br><small>ENGINEERING LABORATORY, INC.</small> | <b>SAR EVALUATION REPORT</b> |  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>0Y1312092369-R3.ZNF | Test Dates:<br>12/10/2013 - 12/16/2013                                                                                                           | DUT Type:<br>Portable Tablet | Page 23 of 46                                                                         |                                 |

**Table 8-10**  
**Reduced LTE Band 4 (AWS) Conducted Powers - 5 MHz Bandwidth**  
**Representing Capacitive Sensor Active**

|      | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | Target MPR [dB] | MPR Allowed per 3GPP [dB] |
|------|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|-----------------|---------------------------|
| Low  | 1712.5          | 19975   | 5               | QPSK       | 1       | 0         | 13.83                 | 0               | 0                         |
|      | 1712.5          | 19975   | 5               | QPSK       | 1       | 12        | 13.92                 | 0               | 0                         |
|      | 1712.5          | 19975   | 5               | QPSK       | 1       | 24        | 13.84                 | 0               | 0                         |
|      | 1712.5          | 19975   | 5               | QPSK       | 12      | 0         | 13.95                 | 0               | 0-1                       |
|      | 1712.5          | 19975   | 5               | QPSK       | 12      | 6         | 14.00                 | 0               | 0-1                       |
|      | 1712.5          | 19975   | 5               | QPSK       | 12      | 13        | 13.91                 | 0               | 0-1                       |
|      | 1712.5          | 19975   | 5               | QPSK       | 25      | 0         | 13.98                 | 0               | 0-1                       |
|      | 1712.5          | 19975   | 5               | 16-QAM     | 1       | 0         | 13.95                 | 0               | 0-1                       |
|      | 1712.5          | 19975   | 5               | 16-QAM     | 1       | 12        | 13.81                 | 0               | 0-1                       |
|      | 1712.5          | 19975   | 5               | 16-QAM     | 1       | 24        | 13.77                 | 0               | 0-1                       |
|      | 1712.5          | 19975   | 5               | 16-QAM     | 12      | 0         | 14.00                 | 0               | 0-2                       |
|      | 1712.5          | 19975   | 5               | 16-QAM     | 12      | 6         | 13.94                 | 0               | 0-2                       |
| Mid  | 1712.5          | 19975   | 5               | 16-QAM     | 12      | 13        | 13.84                 | 0               | 0-2                       |
|      | 1712.5          | 19975   | 5               | 16-QAM     | 25      | 0         | 13.78                 | 0               | 0-2                       |
|      | 1732.5          | 20175   | 5               | QPSK       | 1       | 0         | 13.82                 | 0               | 0                         |
|      | 1732.5          | 20175   | 5               | QPSK       | 1       | 12        | 13.93                 | 0               | 0                         |
|      | 1732.5          | 20175   | 5               | QPSK       | 1       | 24        | 13.81                 | 0               | 0                         |
|      | 1732.5          | 20175   | 5               | QPSK       | 12      | 0         | 13.85                 | 0               | 0-1                       |
|      | 1732.5          | 20175   | 5               | QPSK       | 12      | 6         | 13.83                 | 0               | 0-1                       |
|      | 1732.5          | 20175   | 5               | QPSK       | 12      | 13        | 13.88                 | 0               | 0-1                       |
|      | 1732.5          | 20175   | 5               | QPSK       | 25      | 0         | 13.84                 | 0               | 0-1                       |
|      | 1732.5          | 20175   | 5               | 16-QAM     | 1       | 0         | 13.98                 | 0               | 0-1                       |
|      | 1732.5          | 20175   | 5               | 16-QAM     | 1       | 12        | 14.13                 | 0               | 0-1                       |
|      | 1732.5          | 20175   | 5               | 16-QAM     | 1       | 24        | 13.98                 | 0               | 0-1                       |
| High | 1732.5          | 20175   | 5               | 16-QAM     | 12      | 0         | 13.79                 | 0               | 0-2                       |
|      | 1732.5          | 20175   | 5               | 16-QAM     | 12      | 6         | 13.74                 | 0               | 0-2                       |
|      | 1732.5          | 20175   | 5               | 16-QAM     | 12      | 13        | 13.75                 | 0               | 0-2                       |
|      | 1732.5          | 20175   | 5               | 16-QAM     | 25      | 0         | 13.76                 | 0               | 0-2                       |
|      | 1752.5          | 20375   | 5               | QPSK       | 1       | 0         | 13.95                 | 0               | 0                         |
|      | 1752.5          | 20375   | 5               | QPSK       | 1       | 12        | 14.05                 | 0               | 0                         |
|      | 1752.5          | 20375   | 5               | QPSK       | 1       | 24        | 13.85                 | 0               | 0                         |
|      | 1752.5          | 20375   | 5               | QPSK       | 12      | 0         | 13.87                 | 0               | 0-1                       |
|      | 1752.5          | 20375   | 5               | QPSK       | 12      | 6         | 13.93                 | 0               | 0-1                       |
|      | 1752.5          | 20375   | 5               | QPSK       | 12      | 13        | 14.04                 | 0               | 0-1                       |
|      | 1752.5          | 20375   | 5               | QPSK       | 25      | 0         | 13.90                 | 0               | 0-1                       |
|      | 1752.5          | 20375   | 5               | 16-QAM     | 1       | 0         | 14.03                 | 0               | 0-1                       |
|      | 1752.5          | 20375   | 5               | 16-QAM     | 1       | 12        | 14.17                 | 0               | 0-1                       |
|      | 1752.5          | 20375   | 5               | 16-QAM     | 1       | 24        | 13.95                 | 0               | 0-1                       |
|      | 1752.5          | 20375   | 5               | 16-QAM     | 12      | 0         | 14.02                 | 0               | 0-2                       |
|      | 1752.5          | 20375   | 5               | 16-QAM     | 12      | 6         | 14.06                 | 0               | 0-2                       |
|      | 1752.5          | 20375   | 5               | 16-QAM     | 12      | 13        | 14.13                 | 0               | 0-2                       |
|      | 1752.5          | 20375   | 5               | 16-QAM     | 25      | 0         | 13.96                 | 0               | 0-2                       |

|                                      |                                                                                                                                                  |                              |                                                                                       |                                 |
|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
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| Document S/N:<br>0Y1312092369-R3.ZNF | Test Dates:<br>12/10/2013 - 12/16/2013                                                                                                           | DUT Type:<br>Portable Tablet | Page 24 of 46                                                                         |                                 |

## 8.2 WLAN Conducted Powers

**Table 8-11**  
**IEEE 802.11b Average RF Power**

| Mode    | Freq [MHz] | Channel | 802.11b Conducted Power [dBm] |       |       |       |
|---------|------------|---------|-------------------------------|-------|-------|-------|
|         |            |         | Data Rate [Mbps]              |       |       |       |
|         |            |         | 1                             | 2     | 5.5   | 11    |
| 802.11b | 2412       | 1*      | 10.80                         | 10.79 | 10.67 | 10.67 |
| 802.11b | 2437       | 6*      | 10.95                         | 10.92 | 10.86 | 10.91 |
| 802.11b | 2462       | 11*     | 10.96                         | 10.97 | 10.94 | 10.92 |

**Table 8-12**  
**IEEE 802.11g Average RF Power**

| Mode    | Freq [MHz] | Channel | 802.11g Conducted Power [dBm] |      |      |      |      |      |      |      |
|---------|------------|---------|-------------------------------|------|------|------|------|------|------|------|
|         |            |         | Data Rate [Mbps]              |      |      |      |      |      |      |      |
|         |            |         | 6                             | 9    | 12   | 18   | 24   | 36   | 48   | 54   |
| 802.11g | 2412       | 1       | 9.54                          | 9.51 | 9.51 | 9.57 | 9.49 | 9.53 | 9.55 | 9.56 |
| 802.11g | 2437       | 6       | 9.71                          | 9.65 | 9.71 | 9.68 | 9.70 | 9.70 | 9.69 | 9.82 |
| 802.11g | 2462       | 11      | 9.78                          | 9.74 | 9.77 | 9.84 | 9.75 | 9.73 | 9.77 | 9.83 |

**Table 8-13**  
**IEEE 802.11n Average RF Power**

| Mode    | Freq [MHz] | Channel | 802.11n (2.4GHz) Conducted Power [dBm] |      |      |      |      |      |      |      |
|---------|------------|---------|----------------------------------------|------|------|------|------|------|------|------|
|         |            |         | Data Rate [Mbps]                       |      |      |      |      |      |      |      |
|         |            |         | 6.5                                    | 13   | 19.5 | 26   | 39   | 52   | 58.5 | 65   |
| 802.11n | 2412       | 1       | 9.58                                   | 9.53 | 9.55 | 9.53 | 9.41 | 9.52 | 9.75 | 9.57 |
| 802.11n | 2437       | 6       | 9.73                                   | 9.76 | 9.74 | 9.77 | 9.49 | 9.76 | 9.72 | 9.75 |
| 802.11n | 2462       | 11      | 9.80                                   | 9.84 | 9.84 | 9.80 | 9.73 | 9.80 | 9.81 | 9.88 |

|                                      |                                                                                                                                   |                              |                                                                                       |                                 |
|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
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| Document S/N:<br>0Y1312092369-R3.ZNF | Test Dates:<br>12/10/2013 - 12/16/2013                                                                                            | DUT Type:<br>Portable Tablet |                                                                                       | Page 25 of 46                   |

**Table 8-14**  
**IEEE 802.11a Average RF Power**

| Mode    | Freq [MHz] | Channel | 802.11a Conducted Power [dBm] |      |      |      |      |      |      |      |
|---------|------------|---------|-------------------------------|------|------|------|------|------|------|------|
|         |            |         | Data Rate [Mbps]              |      |      |      |      |      |      |      |
|         |            |         | 6                             | 9    | 12   | 18   | 24   | 36   | 48   | 54   |
| 802.11a | 5180       | 36*     | 8.55                          | 8.53 | 8.58 | 8.64 | 8.47 | 8.56 | 8.28 | 8.36 |
| 802.11a | 5200       | 40      | 8.54                          | 8.47 | 8.57 | 8.71 | 8.43 | 8.50 | 8.30 | 8.38 |
| 802.11a | 5220       | 44      | 9.07                          | 9.01 | 9.09 | 9.24 | 8.99 | 9.06 | 8.74 | 8.91 |
| 802.11a | 5240       | 48*     | 8.97                          | 8.99 | 8.93 | 9.05 | 8.84 | 9.03 | 8.70 | 8.74 |
| 802.11a | 5260       | 52*     | 9.14                          | 9.29 | 9.20 | 9.26 | 9.14 | 8.91 | 9.08 | 9.18 |
| 802.11a | 5280       | 56      | 9.20                          | 9.38 | 9.28 | 9.36 | 9.26 | 8.91 | 9.14 | 9.28 |
| 802.11a | 5300       | 60      | 9.05                          | 9.15 | 9.11 | 9.13 | 9.14 | 8.79 | 8.94 | 9.11 |
| 802.11a | 5320       | 64*     | 9.04                          | 9.29 | 9.18 | 9.16 | 9.08 | 8.80 | 9.03 | 9.12 |
| 802.11a | 5500       | 100     | 9.17                          | 9.12 | 9.02 | 9.10 | 9.05 | 9.03 | 8.86 | 8.88 |
| 802.11a | 5520       | 104*    | 9.22                          | 9.16 | 9.14 | 9.16 | 9.18 | 9.06 | 8.90 | 8.98 |
| 802.11a | 5540       | 108     | 8.97                          | 8.95 | 8.88 | 8.87 | 8.84 | 8.84 | 8.69 | 8.65 |
| 802.11a | 5560       | 112     | 8.95                          | 8.93 | 8.77 | 8.91 | 8.90 | 8.80 | 8.61 | 8.71 |
| 802.11a | 5580       | 116*    | 9.16                          | 9.06 | 9.01 | 9.15 | 9.08 | 8.99 | 8.84 | 8.96 |
| 802.11a | 5600       | 120     | N/A                           | N/A  | N/A  | N/A  | N/A  | N/A  | N/A  | N/A  |
| 802.11a | 5620       | 124     | N/A                           | N/A  | N/A  | N/A  | N/A  | N/A  | N/A  | N/A  |
| 802.11a | 5640       | 128     | N/A                           | N/A  | N/A  | N/A  | N/A  | N/A  | N/A  | N/A  |
| 802.11a | 5660       | 132     | 8.51                          | 8.52 | 8.37 | 8.45 | 8.41 | 8.35 | 8.19 | 8.27 |
| 802.11a | 5680       | 136*    | 8.57                          | 8.54 | 8.35 | 8.52 | 8.49 | 8.51 | 8.27 | 8.35 |
| 802.11a | 5700       | 140     | 8.52                          | 8.49 | 8.40 | 8.50 | 8.42 | 8.44 | 8.24 | 8.27 |
| 802.11a | 5745       | 149*    | 8.65                          | 8.72 | 8.68 | 8.72 | 8.73 | 8.68 | 8.55 | 8.48 |
| 802.11a | 5765       | 153     | 8.54                          | 8.60 | 8.58 | 8.62 | 8.61 | 8.52 | 8.43 | 8.46 |
| 802.11a | 5785       | 157*    | 8.81                          | 8.95 | 8.85 | 8.84 | 8.92 | 8.84 | 8.69 | 8.59 |
| 802.11a | 5805       | 161*    | 8.79                          | 8.86 | 8.87 | 8.86 | 8.94 | 8.82 | 8.77 | 8.68 |
| 802.11a | 5825       | 165     | 8.53                          | 8.53 | 8.61 | 8.66 | 8.62 | 8.60 | 8.45 | 8.38 |

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

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

|                                      |                                                                                                                                   |                              |                                                                                       |                                 |
|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
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| Document S/N:<br>0Y1312092369-R3.ZNF | Test Dates:<br>12/10/2013 - 12/16/2013                                                                                            | DUT Type:<br>Portable Tablet |                                                                                       | Page 26 of 46                   |

**Table 8-15**  
**IEEE 802.11n Average RF Power – 20 MHz Bandwidth**

| Mode    | Freq [MHz] | Channel | 20MHz BW 802.11n (5GHz) Conducted Power [dBm] |      |      |      |      |      |      |      |
|---------|------------|---------|-----------------------------------------------|------|------|------|------|------|------|------|
|         |            |         | Data Rate [Mbps]                              |      |      |      |      |      |      |      |
|         |            |         | 6.5                                           | 13   | 19.5 | 26   | 39   | 52   | 58.5 | 65   |
| 802.11n | 5180       | 36      | 7.82                                          | 7.85 | 7.92 | 7.71 | 7.76 | 7.68 | 7.68 | 7.65 |
| 802.11n | 5200       | 40      | 8.07                                          | 8.16 | 8.19 | 8.03 | 7.99 | 8.01 | 7.97 | 7.91 |
| 802.11n | 5220       | 44      | 8.06                                          | 8.08 | 8.20 | 8.05 | 7.97 | 7.98 | 7.93 | 7.90 |
| 802.11n | 5240       | 48      | 7.98                                          | 8.08 | 8.17 | 7.86 | 7.96 | 7.80 | 7.79 | 7.73 |
| 802.11n | 5260       | 52      | 8.17                                          | 8.19 | 8.21 | 8.10 | 8.20 | 8.03 | 8.03 | 8.10 |
| 802.11n | 5280       | 56      | 8.35                                          | 8.37 | 8.47 | 8.27 | 8.46 | 8.23 | 8.26 | 8.25 |
| 802.11n | 5300       | 60      | 8.13                                          | 8.18 | 8.20 | 8.14 | 8.17 | 7.95 | 7.96 | 8.06 |
| 802.11n | 5320       | 64      | 8.14                                          | 8.19 | 8.27 | 8.06 | 8.14 | 8.04 | 7.93 | 8.04 |
| 802.11n | 5500       | 100     | 8.42                                          | 8.34 | 8.40 | 8.32 | 8.34 | 8.15 | 8.28 | 8.16 |
| 802.11n | 5520       | 104     | 8.21                                          | 8.03 | 8.20 | 8.02 | 8.11 | 7.97 | 8.08 | 7.94 |
| 802.11n | 5540       | 108     | 8.54                                          | 8.46 | 8.54 | 8.41 | 8.42 | 8.22 | 8.34 | 8.30 |
| 802.11n | 5560       | 112     | 8.37                                          | 8.24 | 8.38 | 8.19 | 8.21 | 8.08 | 8.17 | 8.15 |
| 802.11n | 5580       | 116     | 8.31                                          | 8.26 | 8.34 | 8.17 | 8.28 | 8.02 | 8.12 | 8.05 |
| 802.11n | 5600       | 120     | N/A                                           | N/A  | N/A  | N/A  | N/A  | N/A  | N/A  | N/A  |
| 802.11n | 5620       | 124     | N/A                                           | N/A  | N/A  | N/A  | N/A  | N/A  | N/A  | N/A  |
| 802.11n | 5640       | 128     | N/A                                           | N/A  | N/A  | N/A  | N/A  | N/A  | N/A  | N/A  |
| 802.11n | 5660       | 132     | 8.01                                          | 7.98 | 8.07 | 7.89 | 7.90 | 7.76 | 7.86 | 7.74 |
| 802.11n | 5680       | 136     | 7.60                                          | 7.47 | 7.61 | 7.42 | 7.57 | 7.33 | 7.54 | 7.30 |
| 802.11n | 5700       | 140     | 7.81                                          | 7.72 | 7.77 | 7.72 | 7.73 | 7.64 | 7.65 | 7.60 |
| 802.11n | 5745       | 149     | 7.90                                          | 7.81 | 7.74 | 7.73 | 7.74 | 7.67 | 7.61 | 7.49 |
| 802.11n | 5765       | 153     | 7.83                                          | 7.77 | 7.70 | 7.69 | 7.70 | 7.61 | 7.52 | 7.47 |
| 802.11n | 5785       | 157     | 8.22                                          | 8.09 | 8.08 | 8.08 | 7.97 | 8.03 | 7.93 | 7.77 |
| 802.11n | 5805       | 161     | 8.02                                          | 7.89 | 7.84 | 7.87 | 7.83 | 7.75 | 7.72 | 7.66 |
| 802.11n | 5825       | 165     | 7.94                                          | 7.77 | 7.78 | 7.75 | 7.72 | 7.65 | 7.65 | 7.54 |

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

|                                      |                                                                                                                                   |                              |                                                                                                 |                                 |
|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------|-------------------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: ZNFVK810                     |  <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>SAR EVALUATION REPORT</b> |  <b>LG</b> | Reviewed by:<br>Quality Manager |
| Document S/N:<br>0Y1312092369-R3.ZNF | Test Dates:<br>12/10/2013 - 12/16/2013                                                                                            | DUT Type:<br>Portable Tablet |                                                                                                 | Page 27 of 46                   |

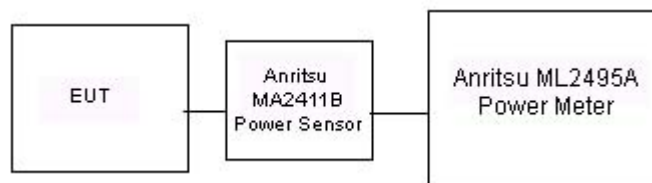
**Table 8-16**  
**IEEE 802.11n Average RF Power – 40 MHz Bandwidth**

| Mode    | Freq [MHz] | Channel | 40MHz BW 802.11n (5GHz) Conducted Power [dBm] |      |      |      |      |      |       |      |
|---------|------------|---------|-----------------------------------------------|------|------|------|------|------|-------|------|
|         |            |         | Data Rate [Mbps]                              |      |      |      |      |      |       |      |
|         |            |         | 13.5                                          | 27   | 40.5 | 54   | 81   | 108  | 121.5 | 135  |
| 802.11n | 5190       | 38      | 7.92                                          | 7.76 | 7.98 | 7.60 | 7.51 | 7.69 | 7.62  | 7.51 |
| 802.11n | 5230       | 46      | 8.07                                          | 7.96 | 8.15 | 7.73 | 7.61 | 7.81 | 7.75  | 7.58 |
| 802.11n | 5270       | 54      | 8.33                                          | 8.35 | 8.48 | 8.34 | 8.31 | 8.07 | 8.07  | 8.14 |
| 802.11n | 5310       | 62      | 8.23                                          | 8.16 | 8.34 | 8.30 | 8.23 | 8.00 | 7.98  | 8.04 |
| 802.11n | 5510       | 102     | 8.21                                          | 7.95 | 7.95 | 7.92 | 7.82 | 7.89 | 7.66  | 7.85 |
| 802.11n | 5550       | 110     | 8.69                                          | 8.42 | 8.41 | 8.46 | 8.34 | 8.33 | 8.16  | 8.29 |
| 802.11n | 5590       | 118     | N/A                                           | N/A  | N/A  | N/A  | N/A  | N/A  | N/A   | N/A  |
| 802.11n | 5630       | 126     | N/A                                           | N/A  | N/A  | N/A  | N/A  | N/A  | N/A   | N/A  |
| 802.11n | 5670       | 134     | 7.97                                          | 7.72 | 7.66 | 7.68 | 7.61 | 7.61 | 7.46  | 7.63 |
| 802.11n | 5755       | 151     | 8.10                                          | 8.12 | 8.17 | 8.06 | 7.88 | 7.92 | 7.83  | 8.04 |
| 802.11n | 5795       | 159     | 8.59                                          | 8.64 | 8.73 | 8.61 | 8.31 | 8.39 | 8.30  | 8.59 |

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

Justification for reduced test configurations for WIFI channels per KDB Publication 248227 D01v01r02 and October 2012/April 2013 FCC/TCB Meeting Notes:

- For 2.4 GHz, highest average RF output power channel for the lowest data rate for IEEE 802.11b were selected for SAR evaluation. Other IEEE 802.11 modes (including 802.11g/n) were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11b mode.
- For 5 GHz, highest average RF output power channel for the lowest data rate for IEEE 802.11a were selected for SAR evaluation. Other IEEE 802.11 modes (including 802.11n 20 MHz and 40 MHz) were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11a mode.
- When the maximum extrapolated peak SAR of the zoom scan for the maximum output channel is <1.6 W/kg and the reported 1g averaged SAR is <0.8 W/kg, SAR testing on other channels is not required. Otherwise, the other default (or corresponding required) test channels were additionally tested using the lowest data rate.
- The bolded data rate and channel above were tested for SAR.



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

|                                      |                                                                                                                                   |                              |                                                                                       |                                 |
|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: ZNFVK810                     |  <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>SAR EVALUATION REPORT</b> |  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>0Y1312092369-R3.ZNF | Test Dates:<br>12/10/2013 - 12/16/2013                                                                                            | DUT Type:<br>Portable Tablet | Page 28 of 46                                                                         |                                 |

## 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 $\epsilon$ |
|------------------------------------|-------------|-------------------------------------|--------------------------|---------------------------------------|------------------------------------------|-------------------------------------|----------------------------------------|----------------|------------------|
| 12/10/2013                         | 740B        | 22.8                                | 740                      | 0.954                                 | 55.703                                   | 0.963                               | 55.570                                 | -0.93%         | 0.24%            |
|                                    |             |                                     | 755                      | 0.968                                 | 55.573                                   | 0.964                               | 55.512                                 | 0.41%          | 0.11%            |
|                                    |             |                                     | 770                      | 0.983                                 | 55.434                                   | 0.965                               | 55.453                                 | 1.87%          | -0.03%           |
|                                    |             |                                     | 785                      | 0.998                                 | 55.317                                   | 0.966                               | 55.395                                 | 3.31%          | -0.14%           |
| 12/12/2013                         | 1750B       | 22.1                                | 1710                     | 1.425                                 | 52.806                                   | 1.463                               | 53.537                                 | -2.60%         | -1.37%           |
|                                    |             |                                     | 1750                     | 1.468                                 | 52.630                                   | 1.488                               | 53.432                                 | -1.34%         | -1.50%           |
|                                    |             |                                     | 1790                     | 1.511                                 | 52.514                                   | 1.514                               | 53.326                                 | -0.20%         | -1.52%           |
| 12/12/2013                         | 2450B       | 23.3                                | 2401                     | 1.891                                 | 52.927                                   | 1.903                               | 52.765                                 | -0.63%         | 0.31%            |
|                                    |             |                                     | 2450                     | 1.958                                 | 52.752                                   | 1.950                               | 52.700                                 | 0.41%          | 0.10%            |
|                                    |             |                                     | 2499                     | 2.025                                 | 52.586                                   | 2.019                               | 52.638                                 | 0.30%          | -0.10%           |
| 12/16/2013                         | 5200B-5800B | 21.5                                | 5200                     | 5.479                                 | 47.016                                   | 5.299                               | 49.014                                 | 3.40%          | -4.08%           |
|                                    |             |                                     | 5220                     | 5.507                                 | 47.018                                   | 5.323                               | 48.987                                 | 3.46%          | -4.02%           |
|                                    |             |                                     | 5280                     | 5.585                                 | 46.874                                   | 5.393                               | 48.906                                 | 3.56%          | -4.15%           |
|                                    |             |                                     | 5300                     | 5.615                                 | 46.838                                   | 5.416                               | 48.879                                 | 3.67%          | -4.18%           |
|                                    |             |                                     | 5500                     | 5.853                                 | 46.511                                   | 5.650                               | 48.607                                 | 3.59%          | -4.31%           |
|                                    |             |                                     | 5520                     | 5.876                                 | 46.475                                   | 5.673                               | 48.580                                 | 3.58%          | -4.33%           |
|                                    |             |                                     | 5580                     | 5.959                                 | 46.354                                   | 5.743                               | 48.499                                 | 3.76%          | -4.42%           |
|                                    |             |                                     | 5600                     | 5.982                                 | 46.338                                   | 5.766                               | 48.471                                 | 3.75%          | -4.40%           |
|                                    |             |                                     | 5680                     | 6.093                                 | 46.184                                   | 5.860                               | 48.363                                 | 3.98%          | -4.51%           |
|                                    |             |                                     | 5745                     | 6.183                                 | 46.021                                   | 5.936                               | 48.275                                 | 4.16%          | -4.67%           |
|                                    |             |                                     | 5785                     | 6.245                                 | 45.968                                   | 5.982                               | 48.220                                 | 4.40%          | -4.67%           |
|                                    |             |                                     | 5800                     | 6.255                                 | 45.935                                   | 6.000                               | 48.200                                 | 4.25%          | -4.70%           |
|                                    |             |                                     | 5805                     | 6.275                                 | 45.960                                   | 6.006                               | 48.193                                 | 4.48%          | -4.63%           |

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

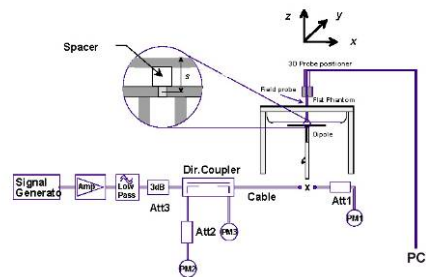
|                                             |                                                                                                                                   |                                     |                                                                                       |                                        |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| FCC ID: ZNFVK810                            |  <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>0Y1312092369-R3.ZNF | <b>Test Dates:</b><br>12/10/2013 - 12/16/2013                                                                                     | <b>DUT Type:</b><br>Portable Tablet |                                                                                       | Page 29 of 46                          |

## 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> (%) |
| B                                        | 750                    | BODY        | 12/10/2013 | 23.2           | 22.8             | 0.100           | 1054      | 3288     | 0.877                             | 8.720                               | 8.770                                   | 0.57%                       |
| I                                        | 1750                   | BODY        | 12/12/2013 | 22.3           | 22.1             | 0.100           | 1051      | 3319     | 3.520                             | 37.800                              | 35.200                                  | -6.88%                      |
| D                                        | 2450                   | BODY        | 12/12/2013 | 23.8           | 23.3             | 0.100           | 797       | 3022     | 4.860                             | 49.600                              | 48.600                                  | -2.02%                      |
| A                                        | 5200                   | BODY        | 12/16/2013 | 22.7           | 21.4             | 0.100           | 1057      | 3589     | 7.590                             | 75.500                              | 75.900                                  | 0.53%                       |
| A                                        | 5300                   | BODY        | 12/16/2013 | 22.7           | 21.4             | 0.100           | 1057      | 3589     | 7.910                             | 75.300                              | 79.100                                  | 5.05%                       |
| A                                        | 5500                   | BODY        | 12/16/2013 | 22.7           | 21.4             | 0.100           | 1057      | 3589     | 8.150                             | 80.800                              | 81.500                                  | 0.87%                       |
| A                                        | 5600                   | BODY        | 12/16/2013 | 22.7           | 21.4             | 0.100           | 1057      | 3589     | 8.380                             | 80.300                              | 83.800                                  | 4.36%                       |
| A                                        | 5800                   | BODY        | 12/16/2013 | 22.7           | 21.4             | 0.100           | 1057      | 3589     | 7.390                             | 75.100                              | 73.900                                  | -1.60%                      |



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



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

|                                      |                                                                                                                                   |                              |                                                                                                 |                                 |
|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------|-------------------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: ZNFVK810                     |  <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>SAR EVALUATION REPORT</b> |  <b>LG</b> | Reviewed by:<br>Quality Manager |
| Document S/N:<br>0Y1312092369-R3.ZNF | Test Dates:<br>12/10/2013 - 12/16/2013                                                                                            | DUT Type:<br>Portable Tablet |                                                                                                 | Page 30 of 46                   |

# 10 SAR DATA SUMMARY

## 10.1 Standalone Body SAR Data

**Table 10-1**  
**LTE Band 13 SAR**

| MEASUREMENT RESULTS                      |       |      |                 |                            |                       |                  |          |                      |            |         |           |         |       |            |          |                |                 |        |    |
|------------------------------------------|-------|------|-----------------|----------------------------|-----------------------|------------------|----------|----------------------|------------|---------|-----------|---------|-------|------------|----------|----------------|-----------------|--------|----|
| FREQUENCY                                |       | Mode | Bandwidth [MHz] | Maxium 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)          |        |    |
| 782.00                                   | 23230 | Mid  | LTE Band 13     | 10                         | 24.2                  | 24.09            | 0.00     | 0                    | 0912-4     | QPSK    | 1         | 25      | 12 mm | back       | 1:1      | 0.629          | 1.026           | 0.645  | A1 |
| 782.00                                   | 23230 | Mid  | LTE Band 13     | 10                         | 23.2                  | 23.19            | 0.01     | 1                    | 0912-4     | QPSK    | 25        | 25      | 12 mm | back       | 1:1      | 0.502          | 1.002           | 0.503  |    |
| 782.00                                   | 23230 | Mid  | LTE Band 13     | 10                         | 24.2                  | 24.09            | -0.08    | 0                    | 0912-4     | QPSK    | 1         | 25      | 12 mm | top        | 1:1      | 0.271          | 1.026           | 0.278  |    |
| 782.00                                   | 23230 | Mid  | LTE Band 13     | 10                         | 23.2                  | 23.19            | -0.03    | 1                    | 0912-4     | QPSK    | 25        | 25      | 12 mm | top        | 1:1      | 0.216          | 1.002           | 0.216  |    |
| 782.00                                   | 23230 | Mid  | LTE Band 13     | 10                         | 24.2                  | 24.09            | 0.00     | 0                    | 0912-4     | QPSK    | 1         | 25      | 0 mm  | left       | 1:1      | 0.288          | 1.026           | 0.295  |    |
| 782.00                                   | 23230 | Mid  | LTE Band 13     | 10                         | 23.2                  | 23.19            | 0.08     | 1                    | 0912-4     | QPSK    | 25        | 25      | 0 mm  | left       | 1:1      | 0.247          | 1.002           | 0.247  |    |
| 782.00                                   | 23230 | Mid  | LTE Band 13     | 10                         | 20.2                  | 20.12            | -0.01    | 0                    | 0912-8     | QPSK    | 1         | 0       | 0 mm  | back       | 1:1      | 0.821          | 1.019           | 0.837  |    |
| 782.00                                   | 23230 | Mid  | LTE Band 13     | 10                         | 20.2                  | 20.09            | -0.02    | 0                    | 0912-8     | QPSK    | 25        | 12      | 0 mm  | back       | 1:1      | 0.685          | 1.026           | 0.703  |    |
| 782.00                                   | 23230 | Mid  | LTE Band 13     | 10                         | 20.2                  | 20.06            | -0.03    | 0                    | 0912-8     | QPSK    | 50        | 0       | 0 mm  | back       | 1:1      | 0.694          | 1.033           | 0.717  |    |
| 782.00                                   | 23230 | Mid  | LTE Band 13     | 10                         | 20.2                  | 20.12            | -0.01    | 0                    | 0912-8     | QPSK    | 1         | 0       | 0 mm  | top        | 1:1      | 0.292          | 1.019           | 0.298  |    |
| 782.00                                   | 23230 | Mid  | LTE Band 13     | 10                         | 20.2                  | 20.09            | 0.02     | 0                    | 0912-8     | QPSK    | 25        | 12      | 0 mm  | top        | 1:1      | 0.267          | 1.026           | 0.274  |    |
| 782.00                                   | 23230 | Mid  | LTE Band 13     | 10                         | 20.2                  | 20.12            | 0.00     | 0                    | 0912-8     | QPSK    | 1         | 0       | 0 mm  | back       | 1:1      | 0.809          | 1.019           | 0.824  |    |
| 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: Blue entry represents variability measurement.

**Table 10-2**  
**LTE Band 4 (AWS) 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                          | 24.2                  | 24.18            | 0.00     | 0                    | 0912-7                                  | QPSK    | 1         | 99      | 12 mm | back       | 1:1      | 0.565          | 1.005           | 0.568  |    |
| 1732.50                                  | 20175 | Mid  | LTE Band 4 (AWS) | 20                          | 23.2                  | 23.17            | 0.03     | 1                    | 0912-7                                  | QPSK    | 50        | 50      | 12 mm | back       | 1:1      | 0.438          | 1.007           | 0.441  |    |
| 1732.50                                  | 20175 | Mid  | LTE Band 4 (AWS) | 20                          | 24.2                  | 24.18            | 0.00     | 0                    | 0912-7                                  | QPSK    | 1         | 99      | 12 mm | top        | 1:1      | 0.296          | 1.005           | 0.297  |    |
| 1732.50                                  | 20175 | Mid  | LTE Band 4 (AWS) | 20                          | 23.2                  | 23.17            | 0.04     | 1                    | 0912-7                                  | QPSK    | 50        | 50      | 12 mm | top        | 1:1      | 0.247          | 1.007           | 0.249  |    |
| 1732.50                                  | 20175 | Mid  | LTE Band 4 (AWS) | 20                          | 24.2                  | 24.18            | 0.15     | 0                    | 0912-7                                  | QPSK    | 1         | 99      | 0 mm  | left       | 1:1      | 0.130          | 1.005           | 0.131  |    |
| 1732.50                                  | 20175 | Mid  | LTE Band 4 (AWS) | 20                          | 23.2                  | 23.17            | -0.04    | 1                    | 0912-7                                  | QPSK    | 50        | 50      | 0 mm  | left       | 1:1      | 0.110          | 1.007           | 0.111  |    |
| 1732.50                                  | 20175 | Mid  | LTE Band 4 (AWS) | 20                          | 14.2                  | 14.20            | 0.02     | 0                    | 0912-8                                  | QPSK    | 1         | 50      | 0 mm  | back       | 1:1      | 1.000          | 1.000           | 1.000  | A2 |
| 1732.50                                  | 20175 | Mid  | LTE Band 4 (AWS) | 20                          | 14.2                  | 14.20            | -0.08    | 0                    | 0912-8                                  | QPSK    | 50        | 50      | 0 mm  | back       | 1:1      | 0.964          | 1.000           | 0.964  |    |
| 1732.50                                  | 20175 | Mid  | LTE Band 4 (AWS) | 20                          | 14.2                  | 13.90            | -0.10    | 0                    | 0912-8                                  | QPSK    | 100       | 0       | 0 mm  | back       | 1:1      | 0.987          | 1.072           | 1.058  |    |
| 1732.50                                  | 20175 | Mid  | LTE Band 4 (AWS) | 20                          | 14.2                  | 14.20            | 0.00     | 0                    | 0912-8                                  | QPSK    | 1         | 50      | 0 mm  | top        | 1:1      | 0.150          | 1.000           | 0.150  |    |
| 1732.50                                  | 20175 | Mid  | LTE Band 4 (AWS) | 20                          | 14.2                  | 14.20            | 0.00     | 0                    | 0912-8                                  | QPSK    | 50        | 50      | 0 mm  | top        | 1:1      | 0.115          | 1.000           | 0.115  |    |
| 1732.50                                  | 20175 | Mid  | LTE Band 4 (AWS) | 20                          | 14.2                  | 14.20            | 0.04     | 0                    | 0912-8                                  | QPSK    | 1         | 50      | 0 mm  | back       | 1:1      | 1.000          | 1.000           | 1.000  |    |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT    |       |      |                  |                             |                       |                  |          |                      |                                         |         |           |         |       |            |          |                |                 |        |    |
| Spatial Peak                             |       |      |                  |                             |                       |                  |          |                      | Body                                    |         |           |         |       |            |          |                |                 |        |    |
| Uncontrolled Exposure/General Population |       |      |                  |                             |                       |                  |          |                      | 1.6 W/kg (mW/g)<br>averaged over 1 gram |         |           |         |       |            |          |                |                 |        |    |

Note: Blue entry represents variability measurement.

|                                      |                                                                                     |                              |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: ZNFVK810                     |  | SAR EVALUATION REPORT        |  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>OY1312092369-R3.ZNF | Test Dates:<br>12/10/2013 - 12/16/2013                                              | DUT Type:<br>Portable Tablet |                                                                                       | Page 31 of 46                   |

**Table 10-3  
WLAN SAR**

| MEASUREMENT RESULTS                                                                               |     |              |         |                             |                       |                  |                                                 |                      |                  |       |            |          |                |                 |        |
|---------------------------------------------------------------------------------------------------|-----|--------------|---------|-----------------------------|-----------------------|------------------|-------------------------------------------------|----------------------|------------------|-------|------------|----------|----------------|-----------------|--------|
| FREQUENCY                                                                                         |     | Mode         | Service | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Spacing                                         | Device Serial Number | Data Rate (Mbps) | Side  | Duty Cycle | SAR (1g) | Scaling Factor | Scaled SAR (1g) | Plot # |
| MHz                                                                                               | Ch. |              |         |                             |                       |                  |                                                 |                      |                  |       |            | (W/kg)   |                | (W/kg)          |        |
| 2462                                                                                              | 11  | IEEE 802.11b | DSSS    | 11.0                        | 10.96                 | 0.04             | 0 mm                                            | 0912-6               | 1                | back  | 1:1        | 0.620    | 1.009          | 0.626           | A3     |
| 2462                                                                                              | 11  | IEEE 802.11b | DSSS    | 11.0                        | 10.96                 | 0.01             | 0 mm                                            | 0912-6               | 1                | top   | 1:1        | 0.073    | 1.009          | 0.074           |        |
| 2462                                                                                              | 11  | IEEE 802.11b | DSSS    | 11.0                        | 10.96                 | 0.03             | 0 mm                                            | 0912-6               | 1                | right | 1:1        | 0.329    | 1.009          | 0.332           |        |
| 5745                                                                                              | 149 | IEEE 802.11a | OFDM    | 9.5                         | 8.65                  | -0.06            | 0 mm                                            | 0912-6               | 6                | back  | 1:1        | 0.265    | 1.216          | 0.322           |        |
| 5785                                                                                              | 157 | IEEE 802.11a | OFDM    | 9.5                         | 8.81                  | 0.09             | 0 mm                                            | 0912-6               | 6                | back  | 1:1        | 0.435    | 1.172          | 0.510           | A4     |
| 5805                                                                                              | 161 | IEEE 802.11a | OFDM    | 9.5                         | 8.79                  | -0.02            | 0 mm                                            | 0912-6               | 6                | back  | 1:1        | 0.383    | 1.178          | 0.451           |        |
| 5785                                                                                              | 157 | IEEE 802.11a | OFDM    | 9.5                         | 8.81                  | -0.11            | 0 mm                                            | 0912-6               | 6                | top   | 1:1        | 0.304    | 1.172          | 0.356           |        |
| 5785                                                                                              | 157 | IEEE 802.11a | OFDM    | 9.5                         | 8.81                  | 0.00             | 0 mm                                            | 0912-6               | 6                | right | 1:1        | 0.081    | 1.172          | 0.095           |        |
| 5220                                                                                              | 44  | IEEE 802.11a | OFDM    | 9.5                         | 9.07                  | 0.02             | 0 mm                                            | 0912-6               | 6                | back  | 1:1        | 0.140    | 1.104          | 0.155           |        |
| 5220                                                                                              | 44  | IEEE 802.11a | OFDM    | 9.5                         | 9.07                  | -0.12            | 0 mm                                            | 0912-6               | 6                | top   | 1:1        | 0.214    | 1.104          | 0.236           |        |
| 5220                                                                                              | 44  | IEEE 802.11a | OFDM    | 9.5                         | 9.07                  | 0.08             | 0 mm                                            | 0912-6               | 6                | right | 1:1        | 0.053    | 1.104          | 0.059           |        |
| 5280                                                                                              | 56  | IEEE 802.11a | OFDM    | 9.5                         | 9.20                  | 0.17             | 0 mm                                            | 0912-6               | 6                | back  | 1:1        | 0.155    | 1.072          | 0.166           |        |
| 5280                                                                                              | 56  | IEEE 802.11a | OFDM    | 9.5                         | 9.20                  | -0.05            | 0 mm                                            | 0912-6               | 6                | top   | 1:1        | 0.197    | 1.072          | 0.211           |        |
| 5280                                                                                              | 56  | IEEE 802.11a | OFDM    | 9.5                         | 9.20                  | 0.11             | 0 mm                                            | 0912-6               | 6                | right | 1:1        | 0.057    | 1.072          | 0.061           |        |
| 5520                                                                                              | 104 | IEEE 802.11a | OFDM    | 9.5                         | 9.22                  | -0.12            | 0 mm                                            | 0912-6               | 6                | back  | 1:1        | 0.248    | 1.067          | 0.265           |        |
| 5580                                                                                              | 116 | IEEE 802.11a | OFDM    | 9.5                         | 9.16                  | -0.04            | 0 mm                                            | 0912-6               | 6                | back  | 1:1        | 0.199    | 1.081          | 0.215           |        |
| 5680                                                                                              | 136 | IEEE 802.11a | OFDM    | 9.5                         | 8.57                  | -0.05            | 0 mm                                            | 0912-6               | 6                | back  | 1:1        | 0.275    | 1.239          | 0.341           | A5     |
| 5520                                                                                              | 104 | IEEE 802.11a | OFDM    | 9.5                         | 9.22                  | 0.04             | 0 mm                                            | 0912-6               | 6                | top   | 1:1        | 0.272    | 1.067          | 0.290           |        |
| 5520                                                                                              | 104 | IEEE 802.11a | OFDM    | 9.5                         | 9.22                  | 0.10             | 0 mm                                            | 0912-6               | 6                | right | 1:1        | 0.088    | 1.067          | 0.094           |        |
| 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 |                      |                  |       |            |          |                |                 |        |

## 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 D04 and FCC KDB Publication 447498 D01v05.
- Batteries are fully charged at the beginning of the SAR measurements. A standard battery was used for all 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 top and left edge for the main antenna and top and right edge for the BT/WLAN antenna.

|                                      |                                                                                                                                                                                                        |                                 |
|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
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**LTE Notes:**

1. LTE Considerations: LTE test configurations are determined according to SAR Evaluation Considerations for LTE Devices in FCC KDB Publication 941225 D05v02r01. The general test procedures used for testing can be found in Section 7.3.4.
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 reduced test configurations for WIFI channels per KDB Publication 248227 D01v01r02 and October 2012 FCC/TCB Meeting Notes for 2.4 GHz WIFI: Highest average RF output power channel for the lowest data rate was selected for SAR evaluation in 802.11b. Other IEEE 802.11 modes (including 802.11g/n) were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11b mode.
2. Justification for reduced test configurations for WIFI channels per KDB Publication 248227 D01v01r02 and October 2012 FCC/TCB Meeting Notes for 5 GHz WIFI: Highest average RF output power channel for the lowest data rate was selected for SAR evaluation in 802.11a. Other IEEE 802.11 modes (including 802.11n 20 MHz and 40 MHz bandwidths) were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11a mode.
3. WIFI transmission was verified using an uncalibrated spectrum analyzer.
4. When the maximum extrapolated peak SAR of the zoom scan for the maximum output channel is >1.6 W/kg or the reported 1g averaged SAR is >0.8 W/kg, SAR testing on other default channels was required.
5. There is no proximity sensor power reduction mechanism applied for WIFI/BT modes.

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

## 11.1 Introduction

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

## 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. 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 | Separation Distance (Body) | Estimated SAR (Body) |
|-----------|---------------------|-----------|-----------------------|----------------------------|----------------------|
|           |                     | [MHz]     | [dBm]                 | [mm]                       | [W/kg]               |
| Bluetooth | Touching            | 2441      | 9.50                  | 5                          | <b>0.375</b>         |
| Bluetooth | Back Side, Top Edge | 2441      | 9.50                  | 12                         | <b>0.156</b>         |

Notes:

- Per KDB Publication 447498 D01v05, the maximum power of the channel was rounded to the nearest mW before calculation.
- Per FCC KDB 447498, when the test separation distance is < 5 mm, a distance of 5 mm is applied to determine estimated SAR.

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

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

| Simult Tx | Configuration | LTE Band 13 SAR (W/kg)      | 2.4 GHz WLAN SAR (W/kg) | $\Sigma$ SAR (W/kg) | SPLSR |
|-----------|---------------|-----------------------------|-------------------------|---------------------|-------|
| Body SAR  | Back          | 0.837                       | 0.626                   | <b>1.463</b>        | N/A   |
|           | Top           | 0.298                       | 0.074                   | 0.372               | N/A   |
|           | Bottom        | 0.400                       | 0.400                   | 0.800               | N/A   |
|           | Right         | 0.400                       | 0.332                   | 0.732               | N/A   |
|           | Left          | 0.295                       | 0.400                   | 0.695               | N/A   |
| Simult Tx | Configuration | LTE Band 4 (AWS) SAR (W/kg) | 2.4 GHz WLAN SAR (W/kg) | $\Sigma$ SAR (W/kg) | SPLSR |
| Body SAR  | Back          | 1.058                       | 0.626                   | See note 1          | 0.03  |
|           | Top           | 0.150                       | 0.074                   | 0.224               | N/A   |
|           | Bottom        | 0.400                       | 0.400                   | <b>0.800</b>        | N/A   |
|           | Right         | 0.400                       | 0.332                   | 0.732               | N/A   |
|           | Left          | 0.131                       | 0.400                   | 0.531               | N/A   |

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

| Simult Tx | Configuration | LTE Band 13 SAR (W/kg)      | 5 GHz WLAN SAR (W/kg) | $\Sigma$ SAR (W/kg) |
|-----------|---------------|-----------------------------|-----------------------|---------------------|
| Body SAR  | Back          | 0.837                       | 0.510                 | <b>1.347</b>        |
|           | Top           | 0.298                       | 0.356                 | 0.654               |
|           | Bottom        | 0.400                       | 0.400                 | 0.800               |
|           | Right         | 0.400                       | 0.095                 | 0.495               |
|           | Left          | 0.295                       | 0.400                 | 0.695               |
| Simult Tx | Configuration | LTE Band 4 (AWS) SAR (W/kg) | 5 GHz WLAN SAR (W/kg) | $\Sigma$ SAR (W/kg) |
| Body SAR  | Back          | 1.058                       | 0.510                 | <b>1.568</b>        |
|           | Top           | 0.150                       | 0.356                 | 0.506               |
|           | Bottom        | 0.400                       | 0.400                 | 0.800               |
|           | Right         | 0.400                       | 0.095                 | 0.495               |
|           | Left          | 0.131                       | 0.400                 | 0.531               |

|                                             |                                                                                                                                   |                                     |                                                                                       |                                        |
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**Table 11-4**  
**Simultaneous Transmission Scenario (2.4 GHz Bluetooth Body at 0.0 cm)**

| Simult Tx | Configuration | LTE Band 13 SAR (W/kg)      | Bluetooth SAR (W/kg) | Σ SAR (W/kg) |
|-----------|---------------|-----------------------------|----------------------|--------------|
| Body SAR  | Back          | 0.837                       | 0.375                | <b>1.212</b> |
|           | Top           | 0.298                       | 0.375                | 0.673        |
|           | Bottom        | 0.400                       | 0.400                | 0.800        |
|           | Right         | 0.400                       | 0.375                | 0.775        |
|           | Left          | 0.295                       | 0.400                | 0.695        |
| Simult Tx | Configuration | LTE Band 4 (AWS) SAR (W/kg) | Bluetooth SAR (W/kg) | Σ SAR (W/kg) |
| Body SAR  | Back          | 1.058                       | 0.375                | <b>1.433</b> |
|           | Top           | 0.150                       | 0.375                | 0.525        |
|           | Bottom        | 0.400                       | 0.400                | 0.800        |
|           | Right         | 0.400                       | 0.375                | 0.775        |
|           | Left          | 0.131                       | 0.400                | 0.531        |

Note: Bluetooth SAR was not required to be measured per FCC KDB 447498. Estimated SAR results were used in the above table to determine simultaneous transmission SAR test exclusion.

**Table 11-5**  
**Simultaneous Transmission Scenario (2.4 GHz WLAN Back Side at 1.2 cm)**

| Configuration | Mode             | LTE SAR (W/kg) | 2.4 GHz WLAN SAR (W/kg) | Σ SAR (W/kg)      |
|---------------|------------------|----------------|-------------------------|-------------------|
| Back Side     | LTE Band 13      | 0.645          | < 0.626                 | <b>&lt; 1.271</b> |
| Back Side     | LTE Band 4 (AWS) | 0.568          | < 0.626                 | < 1.194           |

**Table 11-6**  
**Simultaneous Transmission Scenario (5 GHz WLAN Back Side at 1.2 cm)**

| Configuration | Mode             | LTE SAR (W/kg) | 5 GHz WLAN SAR (W/kg) | Σ SAR (W/kg)      |
|---------------|------------------|----------------|-----------------------|-------------------|
| Back Side     | LTE Band 13      | 0.645          | < 0.510               | <b>&lt; 1.155</b> |
| Back Side     | LTE Band 4 (AWS) | 0.568          | < 0.510               | < 1.078           |

|                                      |                                                                                                                                   |                              |                                                                                                 |                                 |
|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------|-------------------------------------------------------------------------------------------------|---------------------------------|
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**Table 11-7**  
**Simultaneous Transmission Scenario (2.4 GHz Bluetooth Back Side at 1.2 cm)**

| Configuration | Mode             | LTE SAR<br>(W/kg) | Bluetooth<br>SAR<br>(W/kg) | Σ SAR<br>(W/kg) |
|---------------|------------------|-------------------|----------------------------|-----------------|
| Back Side     | LTE Band 13      | 0.645             | 0.156                      | <b>0.801</b>    |
| Back Side     | LTE Band 4 (AWS) | 0.568             | 0.156                      | 0.724           |

Note: Bluetooth SAR was not required to be measured per FCC KDB 447498. Estimated SAR results were used in the above table to determine simultaneous transmission SAR test exclusion.

**Table 11-8**  
**Simultaneous Transmission Scenario (2.4 GHz WLAN Top Edge at 1.2 cm)**

| Configuration | Mode             | LTE SAR<br>(W/kg) | 2.4 GHz<br>WLAN<br>SAR<br>(W/kg) | Σ SAR<br>(W/kg)   |
|---------------|------------------|-------------------|----------------------------------|-------------------|
| Top Edge      | LTE Band 13      | 0.278             | < 0.074                          | <b>&lt; 0.352</b> |
| Top Edge      | LTE Band 4 (AWS) | 0.131             | < 0.074                          | < 0.205           |

**Table 11-9**  
**Simultaneous Transmission Scenario (5 GHz WLAN Top Edge at 1.2 cm)**

| Configuration | Mode             | LTE SAR<br>(W/kg) | 5 GHz<br>WLAN<br>SAR<br>(W/kg) | Σ SAR<br>(W/kg)   |
|---------------|------------------|-------------------|--------------------------------|-------------------|
| Top Edge      | LTE Band 13      | 0.278             | < 0.356                        | <b>&lt; 0.634</b> |
| Top Edge      | LTE Band 4 (AWS) | 0.131             | < 0.356                        | < 0.487           |

**Table 11-10**  
**Simultaneous Transmission Scenario (2.4 GHz Bluetooth Top Edge at 1.2 cm)**

| Configuration | Mode             | LTE SAR<br>(W/kg) | Bluetooth<br>SAR<br>(W/kg) | Σ SAR<br>(W/kg) |
|---------------|------------------|-------------------|----------------------------|-----------------|
| Top Edge      | LTE Band 13      | 0.278             | 0.156                      | <b>0.434</b>    |
| Top Edge      | LTE Band 4 (AWS) | 0.131             | 0.156                      | 0.287           |

|                                      |                                                                                                                                   |                              |                                                                                                 |                                 |
|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------|-------------------------------------------------------------------------------------------------|---------------------------------|
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Note:

1. No evaluation was performed to determine the aggregate 1g SAR for these configurations as the SPLS ratio between the antenna pairs was not higher than 0.04 per FCC KDB 447498 D01v05. See Section 11.4 for detailed SPLS ratio analysis.
2. When the test separation distance was > 50 mm, an estimated SAR of 0.4 W/kg was used to determine simultaneous transmission SAR exclusion, for configurations excluded per FCC KDB Publication 447498 D01v05. When the test separation distance was < 50 mm, an estimated SAR was determined per FCC KDB Publication 447498 D01v05.
3. For SAR summations for body 1.2 cm, WLAN SAR values for 0.0 cm were used since the 0.0 cm test distance for WLAN was more conservative. "<" denotes that the 0.0 cm WLAN SAR values were used for summation purposes.
4. The worst case 5 GHz WLAN reported SAR for each configuration was used for SAR summation, regardless of whether the WLAN channel has WIFI Direct/WIFI Display capability. Therefore, the summations above represent the absolute worst case for simultaneous transmission with 5 GHz WLAN.

## 11.4 SPLSR Evaluation and Analysis

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

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

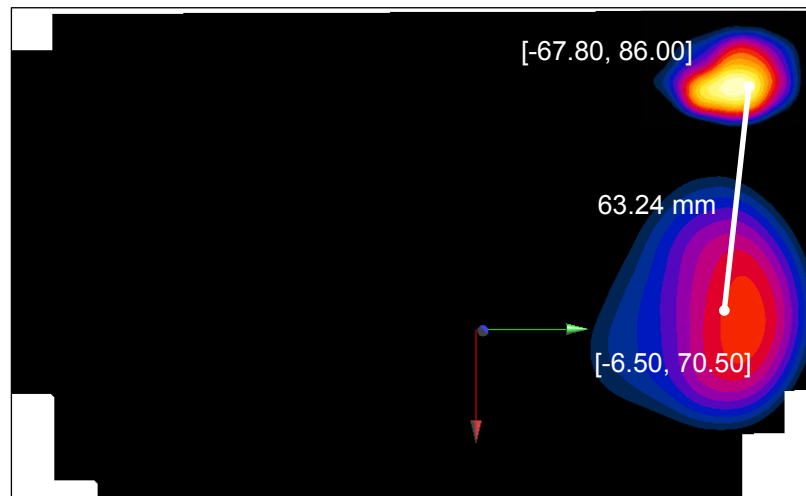
$$\text{SPLS Ratio} = \frac{(SAR_1 + SAR_2)^{1.5}}{R_i}$$

|                                             |                                                                                                                                   |                                     |                                                                                       |                                        |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
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The sum of the standalone SAR values was above 1.6 W/kg for the Body Back side configuration at a separation distance of 0 mm with LTE Band 4 (AWS) antenna operating at limited output power with 2.4 GHz WIFI.

**Table 11-11**  
**Peak SAR Locations for Body Back Side at 0 mm LTE Band 4 (AWS) and 2.4 GHz WLAN**

| Mode/Band        | x (mm) | y (mm) |
|------------------|--------|--------|
| LTE Band 4 (AWS) | -6.50  | 70.50  |
| 2.4 GHz WLAN     | -67.80 | 86.00  |



**Figure 11-1**  
**Peak SAR Locations of 2.4 GHz WLAN and LTE Band 4 (AWS)**

**Table 11-12**  
**SAR Sum to Peak Location Separation Ratio Calculation**

| Antenna Pair     |              | Standalone 1g SAR (W/kg) |       | Standalone SAR Sum (W/kg) | Peak SAR Separation Distance (mm) | SPLS Ratio            |
|------------------|--------------|--------------------------|-------|---------------------------|-----------------------------------|-----------------------|
| Ant "a"          | Ant "b"      | a                        | b     | a+b                       | $D_{a-b}$                         | $(a+b)^{1.5}/D_{a-b}$ |
| LTE Band 4 (AWS) | 2.4 GHz WLAN | 1.058                    | 0.626 | 1.684                     | 63.24                             | 0.03                  |

## 11.5 Simultaneous Transmission Conclusion

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

|                                             |                                                                                                                                   |                                     |                                                                                       |                                        |
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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 (~ 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)                |       |
| 750                                                                                               | 782.00    | 23230 | LTE Band 13      | QPSK, 1 RB, 0 RB Offset  | back | 0 mm    | 0.821                                           | 0.809                 | 1.01  | N/A                   | N/A   | N/A                   | N/A   |
| 1750                                                                                              | 1732.50   | 20175 | LTE Band 4 (AWS) | QPSK, 1 RB, 50 RB Offset | back | 0 mm    | 1.000                                           | 1.000                 | 1.00  | 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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| <b>Document S/N:</b><br>0Y1312092369-R3.ZNF | <b>Test Dates:</b><br>12/10/2013 - 12/16/2013                                                                                     | <b>DUT Type:</b><br>Portable Tablet | Page 40 of 46                                                                         |                                        |

# 13 EQUIPMENT LIST

| Manufacturer       | Model           | Description                                   | Cal Date   | Cal Interval | Cal Due    | Serial Number |
|--------------------|-----------------|-----------------------------------------------|------------|--------------|------------|---------------|
| Agilent            | 8594A           | (9kHz-2.9GHz) Spectrum Analyzer               | N/A        | N/A          | N/A        | 3051A00187    |
| Agilent            | 8753E           | (30kHz-6GHz) Network Analyzer                 | 4/16/2013  | Annual       | 4/16/2014  | JP38020182    |
| Agilent            | E8257D          | (250kHz-20GHz) Signal Generator               | 4/16/2013  | Annual       | 4/16/2014  | MY45470194    |
| Agilent            | 8648D           | (9kHz-4GHz) Signal Generator                  | 4/17/2013  | Annual       | 4/17/2014  | 3629U00687    |
| Agilent            | 8753E           | (30kHz-6GHz) Network Analyzer                 | 7/23/2013  | Annual       | 7/23/2014  | US37390350    |
| Agilent            | 85070C          | Dielectric Probe Kit                          | 2/14/2013  | Annual       | 2/14/2014  | MY44300633    |
| Agilent            | 85047A          | S-Parameter Test Set                          | N/A        | N/A          | N/A        | 2904A00579    |
| Agilent            | 8753ES          | S-Parameter Network Analyzer                  | 10/29/2013 | Annual       | 10/29/2014 | US39170122    |
| Amplifier Research | 551G4           | 5W, 800MHz-4.2GHz                             | CBT        | N/A          | CBT        | 21910         |
| Anritsu            | MA2481A         | Power Sensor                                  | 2/14/2013  | Annual       | 2/14/2014  | 5318          |
| Anritsu            | ML2438A         | Power Meter                                   | 2/14/2013  | Annual       | 2/14/2014  | 1190013       |
| Anritsu            | ML2438A         | Power Meter                                   | 2/14/2013  | Annual       | 2/14/2014  | 98150041      |
| Anritsu            | MA2481A         | Power Sensor                                  | 2/14/2013  | Annual       | 2/14/2014  | 5821          |
| Anritsu            | MA2481A         | Power Sensor                                  | 10/30/2013 | Annual       | 10/30/2014 | 5605          |
| Anritsu            | MA2481A         | Power Sensor                                  | 2/14/2013  | Annual       | 2/14/2014  | 2400          |
| Anritsu            | ML2495A         | Power Meter                                   | 10/31/2013 | Annual       | 10/31/2014 | 1039008       |
| Anritsu            | ML2496A         | Power Meter                                   | 11/14/2013 | Annual       | 11/14/2014 | 1138001       |
| Anritsu            | MA2411B         | Pulse Power Sensor                            | 11/14/2013 | Annual       | 11/14/2014 | 1126066       |
| Anritsu            | MT8820C         | Radio Communication Analyzer                  | 6/28/2013  | Annual       | 6/28/2014  | 6201240328    |
| COMTECH            | AR85729-5/5759B | Solid State Amplifier                         | CBT        | N/A          | CBT        | M3W1A00-1002  |
| COMTECH            | AR85729-5       | Solid State Amplifier                         | CBT        | N/A          | CBT        | M155A00-009   |
| Control Company    | 36934-158       | Wall-Mounted Thermometer                      | 1/4/2012   | Biennial     | 1/4/2014   | 122014497     |
| Control Company    | 4353            | Long Stem Thermometer                         | 9/25/2012  | Biennial     | 9/25/2014  | 122539615     |
| Fisher Scientific  | 15-077-960      | Thermometer                                   | 11/6/2012  | Biennial     | 11/6/2014  | 122640025     |
| Gigatronics        | 80701A          | (0.05-18GHz) Power Sensor                     | 10/30/2013 | Annual       | 10/30/2014 | 1833460       |
| Gigatronics        | 8651A           | Universal Power Meter                         | 10/30/2013 | Annual       | 10/30/2014 | 8650319       |
| MCL                | BW-N6W5+        | 6dB Attenuator                                | CBT        | N/A          | CBT        | 1139          |
| MiniCircuits       | SLP-2400+       | Low Pass Filter                               | CBT        | N/A          | CBT        | R8979500903   |
| MiniCircuits       | VLF-6000+       | Low Pass Filter                               | CBT        | N/A          | CBT        | N/A           |
| 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      | BW-N20W5        | Power Attenuator                              | CBT        | N/A          | CBT        | 1226          |
| Narda              | 4772-3          | Attenuator (3dB)                              | CBT        | N/A          | CBT        | 9406          |
| Narda              | BW-S3W2         | Attenuator (3dB)                              | CBT        | N/A          | CBT        | 120           |
| Narda              | 4014C-6         | 4 - 8 GHz SMA 6 dB Directional Coupler        | CBT        | N/A          | CBT        | N/A           |
| Pasternack         | PE2208-6        | Bidirectional Coupler                         | CBT        | N/A          | CBT        | N/A           |
| Pasternack         | PE2209-10       | Bidirectional Coupler                         | CBT        | N/A          | CBT        | N/A           |
| Rohde & Schwarz    | NRVD            | Dual Channel Power Meter                      | 10/12/2012 | Biennial     | 10/12/2014 | 101695        |
| Rohde & Schwarz    | NRVS            | Single Channel Power Meter                    | 10/31/2013 | Annual       | 10/31/2014 | 835360/0079   |
| Rohde & Schwarz    | NRV-232         | Peak Power Sensor                             | 10/12/2012 | Biennial     | 10/12/2014 | 836019/013    |
| Rohde & Schwarz    | SMIQ03B         | Signal Generator                              | 4/17/2013  | Annual       | 4/17/2014  | DE27259       |
| Rohde & Schwarz    | CMW500          | LTE Radio Communication Tester                | 10/16/2013 | Annual       | 10/16/2014 | 100976        |
| Rohde & Schwarz    | SME06           | Signal Generator                              | 10/30/2013 | Annual       | 10/30/2014 | 832026        |
| Seekonk            | NC-100          | Torque Wrench (8" lb)                         | 11/29/2011 | Triennial    | 11/29/2014 | 21053         |
| SPEAG              | D1750V2         | 1750 MHz SAR Dipole                           | 4/30/2013  | Annual       | 4/30/2014  | 1051          |
| SPEAG              | D2450V2         | 2450 MHz SAR Dipole                           | 1/8/2013   | Annual       | 1/8/2014   | 797           |
| SPEAG              | D5GHzV2         | 5 GHz SAR Dipole                              | 1/11/2013  | Annual       | 1/11/2014  | 1057          |
| SPEAG              | D750V3          | 750 MHz Dipole                                | 3/18/2013  | Annual       | 3/18/2014  | 1054          |
| SPEAG              | DAE4            | Dasy Data Acquisition Electronics             | 1/17/2013  | Annual       | 1/17/2014  | 1272          |
| SPEAG              | DAE4            | Dasy Data Acquisition Electronics             | 9/17/2013  | Annual       | 9/17/2014  | 1323          |
| SPEAG              | DAE4            | Dasy Data Acquisition Electronics             | 8/21/2013  | Annual       | 8/21/2014  | 1322          |
| SPEAG              | DAE4            | Dasy Data Acquisition Electronics             | 4/22/2013  | Annual       | 4/22/2014  | 1368          |
| SPEAG              | DAK-3.5         | Dielectric Assessment Kit                     | 5/14/2013  | Annual       | 5/14/2014  | 1070          |
| SPEAG              | ES3DV2          | SAR Probe                                     | 8/22/2013  | Annual       | 8/22/2014  | 3022          |
| SPEAG              | ES3DV3          | SAR Probe                                     | 9/23/2013  | Annual       | 9/23/2014  | 3288          |
| SPEAG              | ES3DV3          | SAR Probe                                     | 4/29/2013  | Annual       | 4/29/2014  | 3319          |
| SPEAG              | EX3DV4          | SAR Probe                                     | 1/17/2013  | Annual       | 1/17/2014  | 3589          |
| Tektronix          | RSA6114A        | Real Time Spectrum Analyzer                   | 4/17/2013  | Annual       | 4/17/2014  | B010177       |
| VWR                | 23226-658       | Long Stem Thermometer                         | 3/30/2012  | Biennial     | 3/30/2014  | 122179874     |
| VWR                | 23226-658       | Long Stem Thermometer                         | 5/16/2012  | Biennial     | 5/16/2014  | 122295544     |
| VWR                | 36934-158       | Digital Thermometer                           | 8/8/2013   | Annual       | 8/8/2014   | 130258636     |

## Notes:

- 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.
- Agilent S-parameter Test Set (S/N 2904A00579) set does not require individual calibration since it is calibrated as part of the VNA system (Agilent 8753E Network Analyzer).
- Agilent Spectrum Analyzer (S/N 3051A00187) does not require calibration since it is used for verification of WLAN transmission only, not for calibrated measurements.

|                                      |                                                                                     |                              |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: ZNFVK810                     |  | SAR EVALUATION REPORT        |  | Reviewed by:<br>Quality Manager |
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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<br>Max. SAR Evaluation | E.5                  | 1.0           | R              | 1.73         | 1.0                   | 1.0                      | 0.6                            | 0.6                              | ∞              |
| <b>Test Sample Related</b>                                                       |                      |               |                |              |                       |                          |                                |                                  |                |
| Test Sample Positioning                                                          | E.4.2                | 6.0           | N              | 1            | 1.0                   | 1.0                      | 6.0                            | 6.0                              | 287            |
| Device Holder Uncertainty                                                        | E.4.1                | 3.32          | R              | 1.73         | 1.0                   | 1.0                      | 1.9                            | 1.9                              | ∞              |
| Output Power Variation - SAR drift measurement                                   | 6.6.2                | 5.0           | R              | 1.73         | 1.0                   | 1.0                      | 2.9                            | 2.9                              | ∞              |
| <b>Phantom &amp; Tissue Parameters</b>                                           |                      |               |                |              |                       |                          |                                |                                  |                |
| Phantom Uncertainty (Shape & Thickness tolerances)                               | E.3.1                | 4.0           | R              | 1.73         | 1.0                   | 1.0                      | 2.3                            | 2.3                              | ∞              |
| Liquid Conductivity - deviation from target values                               | E.3.2                | 5.0           | R              | 1.73         | 0.64                  | 0.43                     | 1.8                            | 1.2                              | ∞              |
| Liquid Conductivity - measurement uncertainty                                    | E.3.3                | 3.8           | N              | 1            | 0.64                  | 0.43                     | 2.4                            | 1.6                              | 6              |
| Liquid Permittivity - deviation from target values                               | E.3.2                | 5.0           | R              | 1.73         | 0.60                  | 0.49                     | 1.7                            | 1.4                              | ∞              |
| Liquid Permittivity - measurement uncertainty                                    | E.3.3                | 4.5           | N              | 1            | 0.60                  | 0.49                     | 2.7                            | 2.2                              | 6              |
| <b>Combined Standard Uncertainty (k=1)</b>                                       |                      |               |                |              |                       |                          | RSS                            | 12.1                             | 11.7           |
| <b>Expanded Uncertainty</b><br>(95% CONFIDENCE LEVEL)                            |                      |               |                |              |                       |                          | k=2                            | 24.2                             | 23.5           |
|                                                                                  |                      |               |                |              |                       |                          |                                |                                  | 299            |

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

|                                             |                                                                                                                                   |                                     |                                                                                       |                                        |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
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| <b>Document S/N:</b><br>OY1312092369-R3.ZNF | <b>Test Dates:</b><br>12/10/2013 - 12/16/2013                                                                                     | <b>DUT Type:</b><br>Portable Tablet | Page 42 of 46                                                                         |                                        |

Applicable for frequencies up to 6 GHz.

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

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

|                                      |                                                                                                                                                                                                        |                              |                                 |
|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------------------|
| FCC ID: ZNFVK810                     |  <b>SAR EVALUATION REPORT</b>  |                              | Reviewed by:<br>Quality Manager |
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## 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>0Y1312092369-R3.ZNF | <b>Test Dates:</b><br>12/10/2013 - 12/16/2013                                                                                     | <b>DUT Type:</b><br>Portable Tablet |                                                                                       | Page 44 of 46                          |

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|                                             |                                                                                                                                   |                                     |                                                                                       |                                        |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
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- [25] FCC SAR Considerations for Handsets with Multiple Transmitters and Antennas, KDB Publications 648474 D02-D04
- [26] FCC SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers, FCC KDB Publication 616217 D04
- [27] FCC SAR Measurement and Reporting Requirements for 100MHz – 6 GHz, KDB Publications 865664 D01-D02
- [28] FCC General RF Exposure Guidance and SAR Procedures for Dongles, KDB Publication 447498, D01-D02
- [29] Anexo à Resolução No. 533, de 10 de Setembro de 2009.
- [30] IEC 62209-2, Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz), Mar. 2010.

|                                      |                                                                                                                                                                                                        |                              |                                 |
|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------------------|
| FCC ID: ZNFVK810                     |  <b>SAR EVALUATION REPORT</b>  |                              | Reviewed by:<br>Quality Manager |
| Document S/N:<br>0Y1312092369-R3.ZNF | Test Dates:<br>12/10/2013 - 12/16/2013                                                                                                                                                                 | DUT Type:<br>Portable Tablet | Page 46 of 46                   |

## APPENDIX A: SAR TEST DATA

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: ZNFVK810; Type: Portable Tablet; Serial: 0912-8**

Communication System: UID 0, LTE RF; Frequency: 782 MHz; Duty Cycle: 1:1

Medium: 770 Body Medium parameters used (interpolated):

$f = 782 \text{ MHz}$ ;  $\sigma = 0.995 \text{ S/m}$ ;  $\epsilon_r = 55.34$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 12-10-2013; Ambient Temp: 23.2°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3288; ConvF(6.25, 6.25, 6.25); Calibrated: 9/23/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 9/17/2013

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

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

**Mode: LTE Band 13, Body SAR, Back side, Mid.ch**

**10 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset**

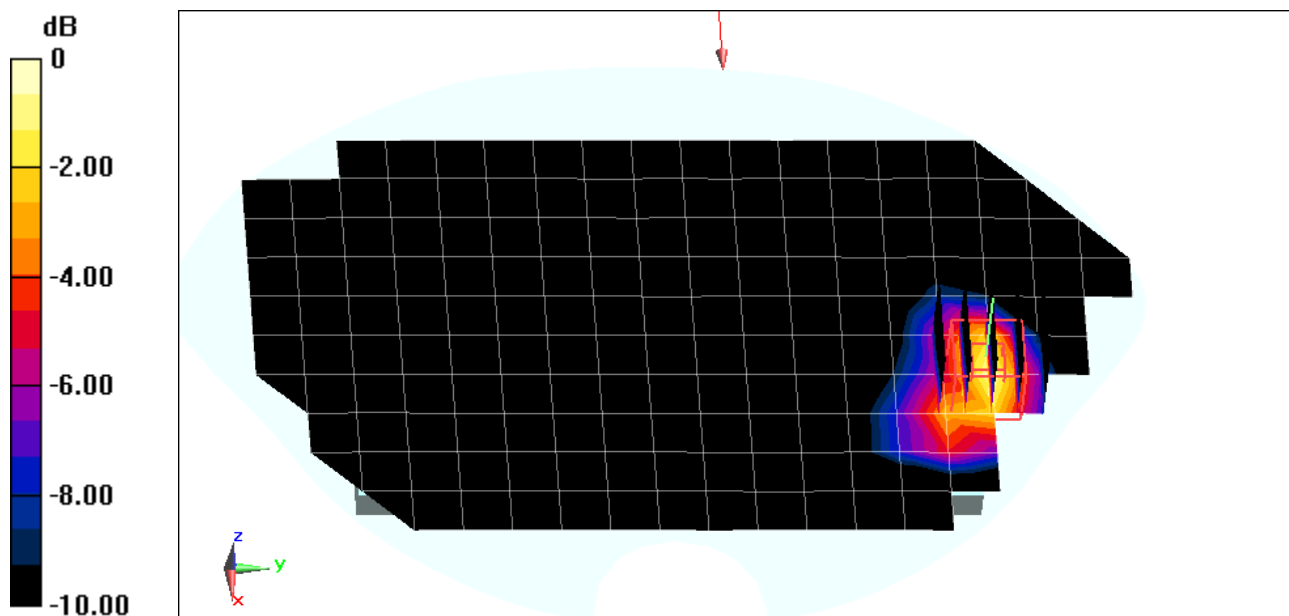
**Area Scan (11x19x1):** Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 30.092 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 2.12 W/kg

**SAR(1 g) = 0.821 W/kg**



0 dB = 0.958 W/kg = -0.19 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: ZNFVK810; Type: Portable Tablet; Serial: 0912-8**

Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1

Medium: 1750 Body Medium parameters used (interpolated):

$f = 1732.5 \text{ MHz}$ ;  $\sigma = 1.449 \text{ S/m}$ ;  $\epsilon_r = 52.707$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 12-12-2013; Ambient Temp: 22.3°C; Tissue Temp: 22.1°C

Probe: ES3DV3 - SN3319; ConvF(5.22, 5.22, 5.22); Calibrated: 6/28/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1368; Calibrated: 4/22/2013

Phantom: SAM front; Type: QD000P40CD; Serial: TP:1759

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

**Mode: LTE Band 4 (AWS), Body SAR, Back side, Mid.ch**  
**20 MHz Bandwidth, QPSK, 1 RB, 50 RB Offset**

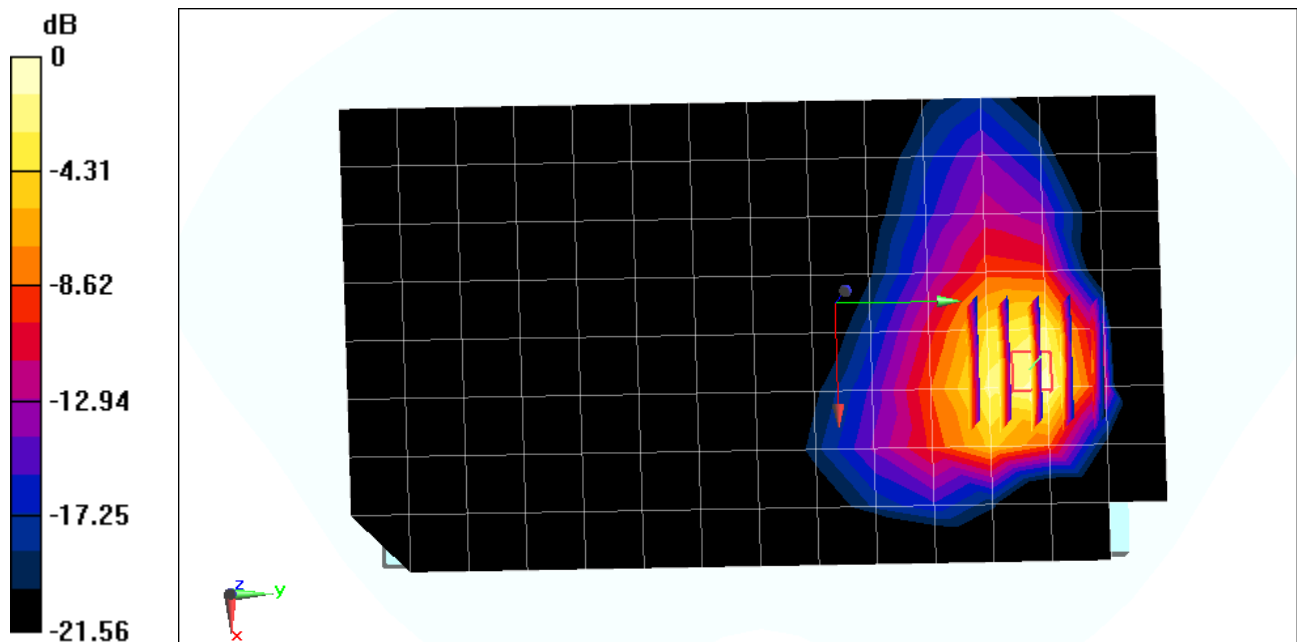
**Area Scan (9x15x1):** Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 27.562 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 2.20 W/kg

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



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

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: ZNFVK810; Type: Portable Tablet; Serial: 0912-6**

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

Medium: 2450 Body Medium parameters used (interpolated):

$f = 2462 \text{ MHz}$ ;  $\sigma = 1.974 \text{ S/m}$ ;  $\epsilon_r = 52.711$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 12-12-2013; Ambient Temp: 23.8°C; Tissue Temp: 23.3°C

Probe: ES3DV2 - SN3022; ConvF(4.01, 4.01, 4.01); Calibrated: 8/22/2013;

Sensor-Surface: 3mm (Mechanical Surface Detection)

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

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

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

**Mode: IEEE 802.11b, Body SAR, Ch 11, 1 Mbps, Back Side**

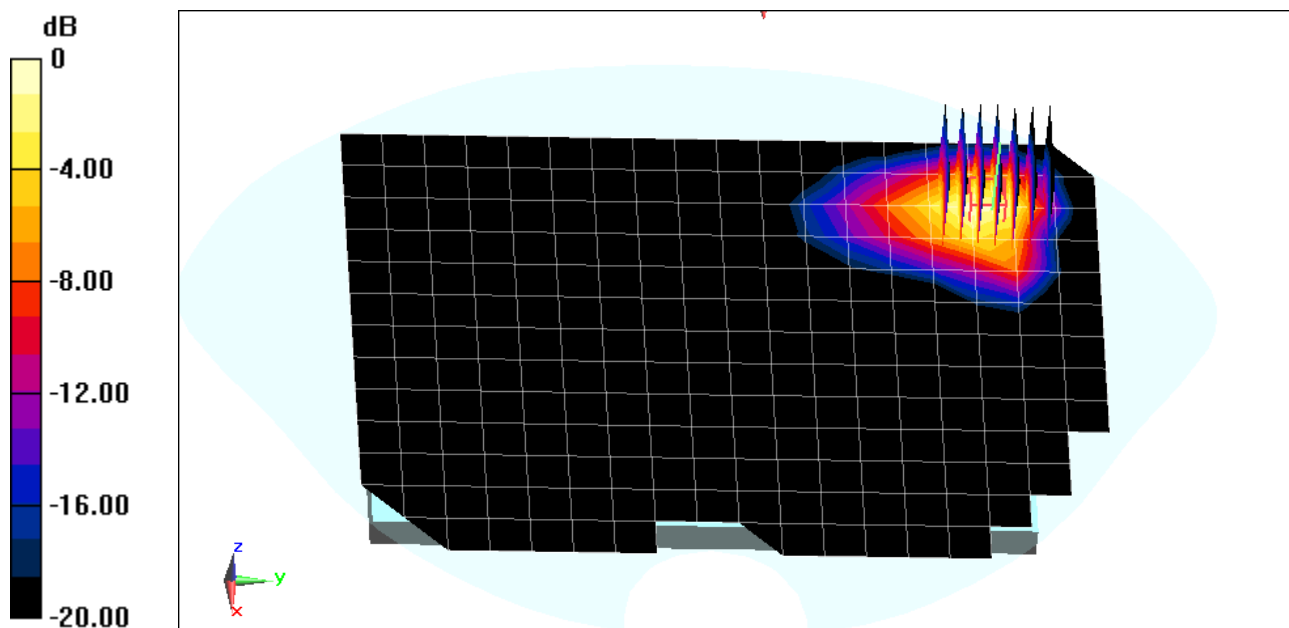
**Area Scan (14x19x1):** Measurement grid:  $dx=12\text{mm}$ ,  $dy=12\text{mm}$

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

Reference Value = 18.292 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 1.41 W/kg

**SAR(1 g) = 0.620 W/kg**



0 dB = 0.788 W/kg = -1.03 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: ZNFVK810; Type: Portable Tablet; Serial: 0912-6**

Communication System: UID 0, IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5785 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body Medium parameters used:

$f = 5785 \text{ MHz}$ ;  $\sigma = 6.245 \text{ S/m}$ ;  $\epsilon_r = 45.968$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 12-16-2013; Ambient Temp: 22.7°C; Tissue Temp: 21.4°C

Probe: EX3DV4 - SN3589; ConvF(3.66, 3.66, 3.66); Calibrated: 1/17/2013;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/17/2013

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

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

**Mode: IEEE 802.11a, 5.8 GHz, Body SAR, Ch 157, 6 Mbps, Back Side**

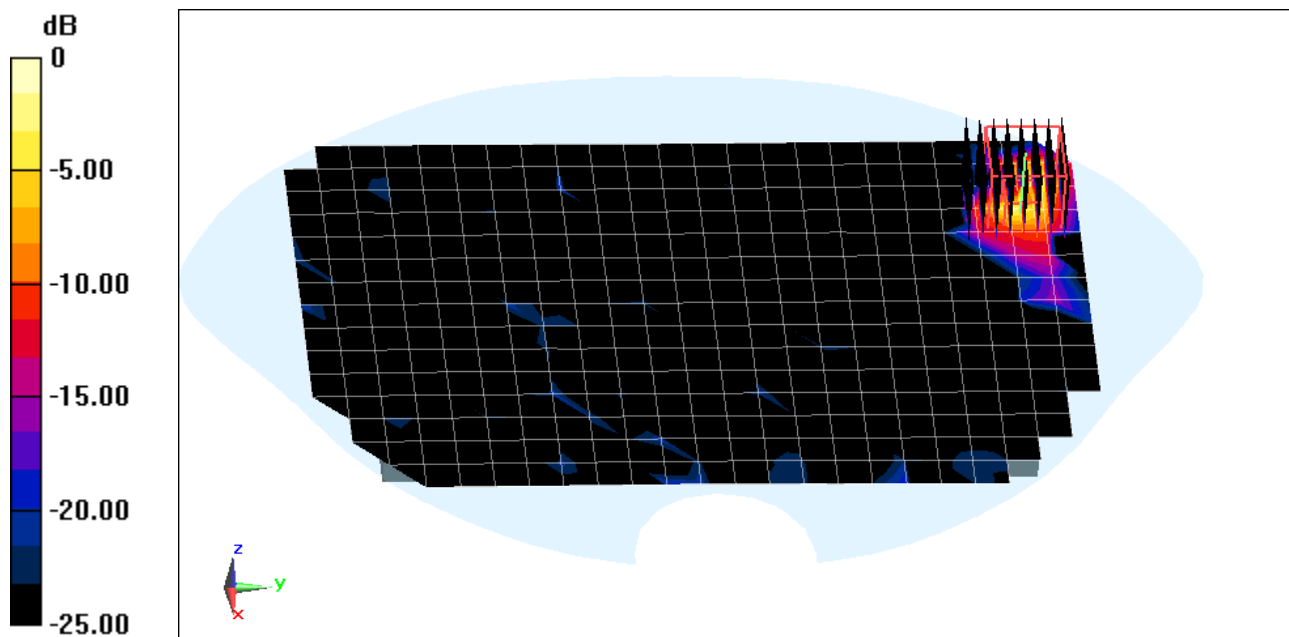
**Area Scan (16x24x1):** Measurement grid: dx=10mm, dy=10mm

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

Reference Value = 8.576 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 2.88 W/kg

**SAR(1 g) = 0.435 W/kg**



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

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: ZNFVK810; Type: Portable Tablet; Serial: 0912-6**

Communication System: UID 0, IEEE 802.11a 5.2-5.8 GHz Band, Frequency: 5680 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body Medium parameters used:

$f = 5680 \text{ MHz}$ ;  $\sigma = 6.093 \text{ S/m}$ ;  $\epsilon_r = 46.184$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 12-16-2013; Ambient Temp: 22.7°C; Tissue Temp: 21.4°C

Probe: EX3DV4 - SN3589; ConvF(3.32, 3.32, 3.32); Calibrated: 1/17/2013;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/17/2013

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

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

**Mode: IEEE 802.11a, 5.5 GHz, Body SAR, Ch 136, 6 Mbps, Back Side**

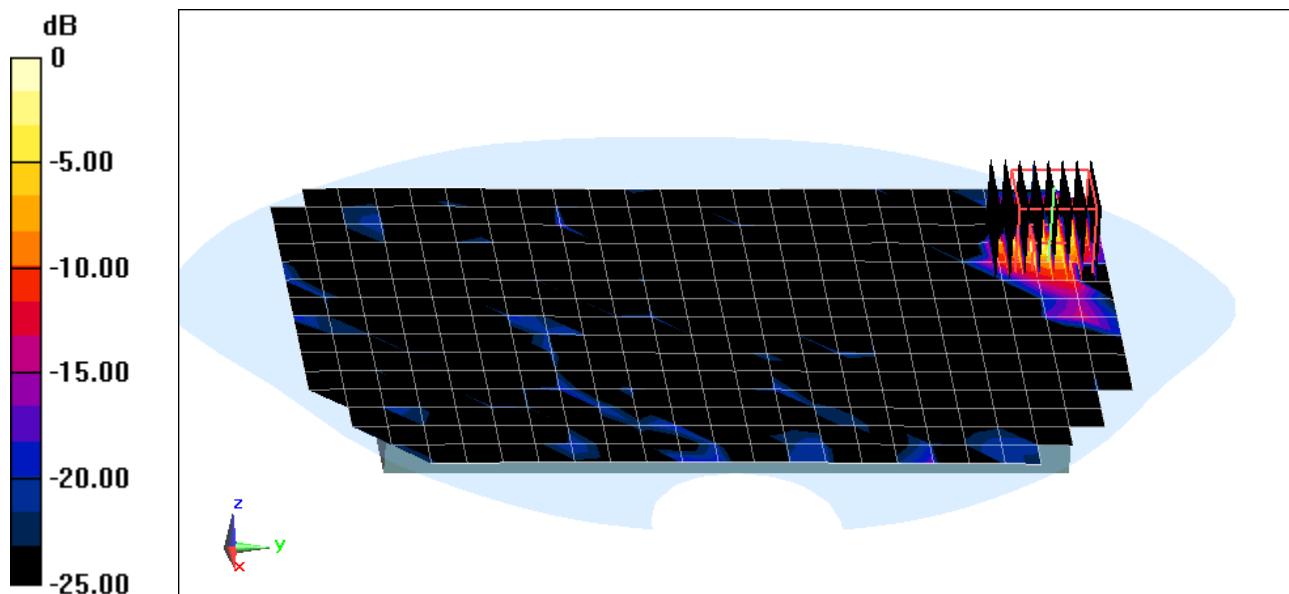
**Area Scan (16x24x1):** Measurement grid: dx=10mm, dy=10mm

**Zoom Scan (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm, Graded Ratio=1.4

Reference Value = 4.130 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 1.60 W/kg

**SAR(1 g) = 0.275 W/kg**



0 dB = 0.937 W/kg = -0.28 dBW/kg

## APPENDIX B: SYSTEM VERIFICATION

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 750 MHz; Type: D750V3; Serial: 1054**

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

Medium: 740 Body Medium parameters used (interpolated):

$f = 750 \text{ MHz}$ ;  $\sigma = 0.963 \text{ S/m}$ ;  $\epsilon_r = 55.616$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 12-10-2013; Ambient Temp: 23.2°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3288; ConvF(6.25, 6.25, 6.25); Calibrated: 9/23/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 9/17/2013

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

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

## 750 MHz System Verification

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

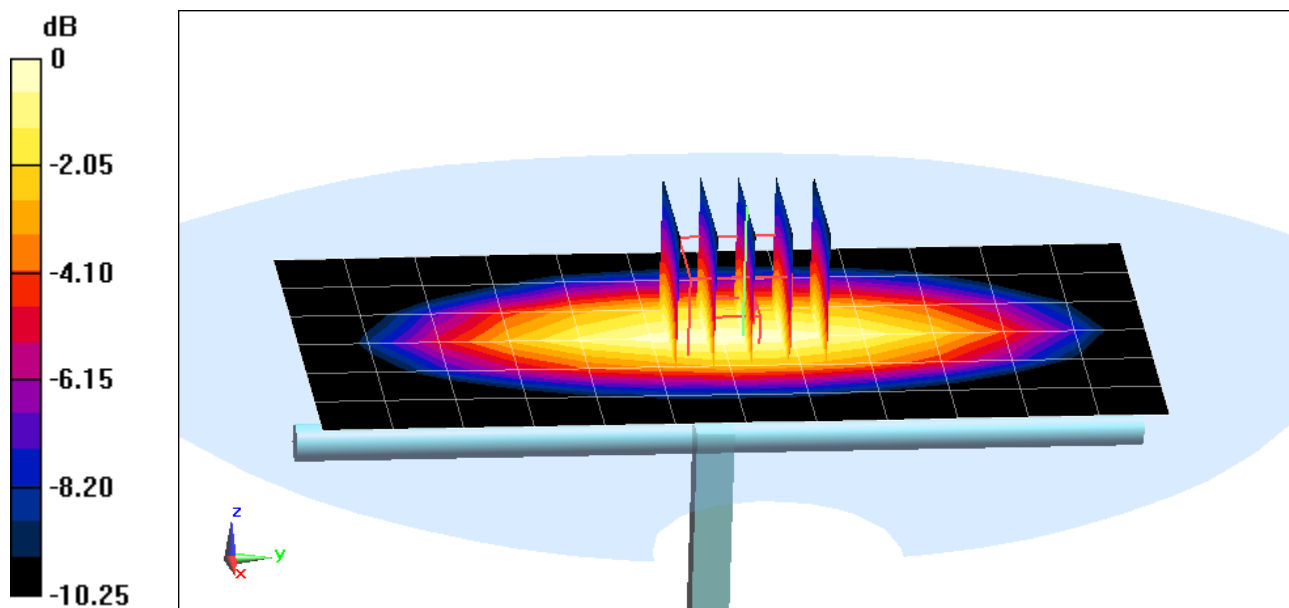
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 1.29 W/kg

**SAR(1 g) = 0.877 W/kg**

Deviation = 0.57 %



0 dB = 0.937 W/kg = -0.28 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: 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:

$f = 1750 \text{ MHz}$ ;  $\sigma = 1.468 \text{ S/m}$ ;  $\epsilon_r = 52.63$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-12-2013; Ambient Temp: 22.3°C; Tissue Temp: 22.1°C

Probe: ES3DV3 - SN3319; ConvF(5.22, 5.22, 5.22); Calibrated: 6/28/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1368; Calibrated: 4/22/2013

Phantom: SAM front; Type: QD000P40CD; Serial: TP:1759

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

## 1750 MHz System Verification

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

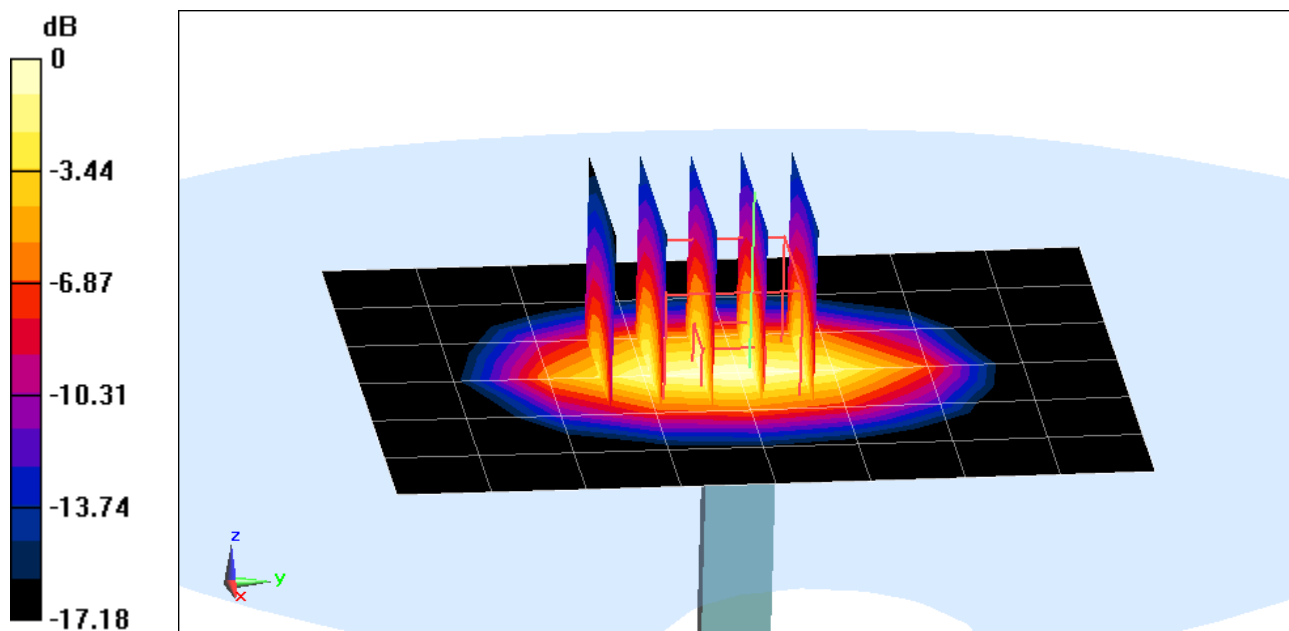
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 6.71 W/kg

**SAR(1 g) = 3.52 W/kg**

Deviation = -6.88 %



0 dB = 3.85 W/kg = 5.85 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

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

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

Medium: 2450 Body Medium parameters used:

$f = 2450 \text{ MHz}$ ;  $\sigma = 1.958 \text{ S/m}$ ;  $\epsilon_r = 52.752$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-12-2013; Ambient Temp: 23.8°C; Tissue Temp: 23.3°C

Probe: ES3DV2 - SN3022; ConvF(4.01, 4.01, 4.01); Calibrated: 8/22/2013;

Sensor-Surface: 3mm (Mechanical Surface Detection)

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

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

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

## 2450 MHz System Verification

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

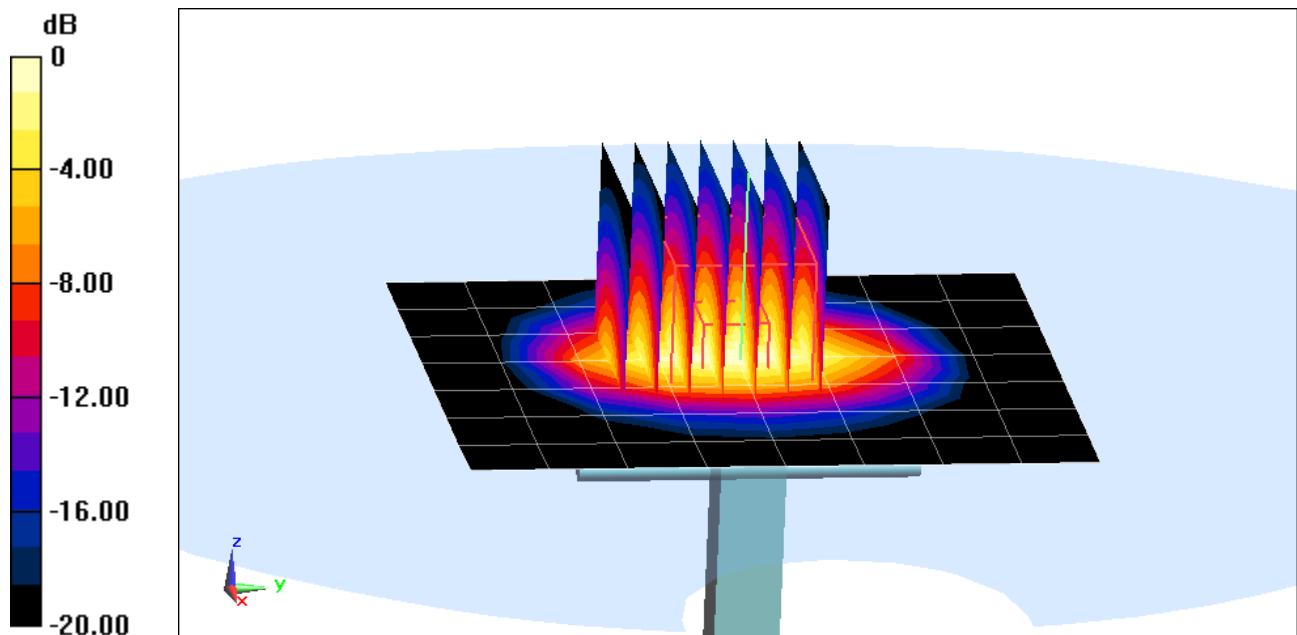
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 10.4 W/kg

**SAR(1 g) = 4.86 W/kg**

Deviation = -2.02 %



0 dB = 6.30 W/kg = 7.99 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

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

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

Medium: 5 GHz Body Medium parameters used:

$f = 5200 \text{ MHz}$ ;  $\sigma = 5.479 \text{ S/m}$ ;  $\epsilon_r = 47.016$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-16-2013; Ambient Temp: 22.7°C; Tissue Temp: 21.4°C

Probe: EX3DV4 - SN3589; ConvF(3.99, 3.99, 3.99); Calibrated: 1/17/2013;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/17/2013

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

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

## 5200 MHz System Verification

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

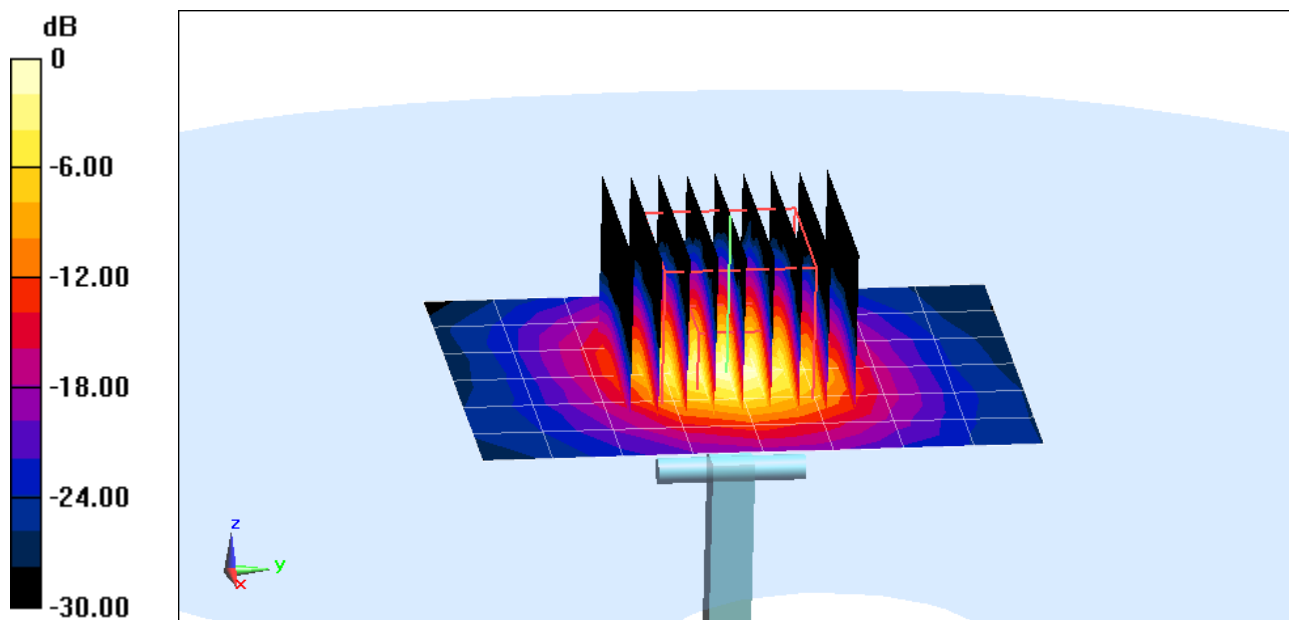
**Zoom Scan (9x9x7)/Cube 0:** Measurement grid:  $dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=1.4\text{mm}$ , Graded Ratio=1.4

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 31.6 W/kg

**SAR(1 g) = 7.59 W/kg**

Deviation = 0.53 %



0 dB = 18.5 W/kg = 12.67 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

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

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

Medium: 5 GHz Body Medium parameters used:

$f = 5300 \text{ MHz}$ ;  $\sigma = 5.615 \text{ S/m}$ ;  $\epsilon_r = 46.838$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-16-2013; Ambient Temp: 22.7°C; Tissue Temp: 21.4°C

Probe: EX3DV4 - SN3589; ConvF(3.81, 3.81, 3.81); Calibrated: 1/17/2013;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/17/2013

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

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

## 5300 MHz System Verification

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

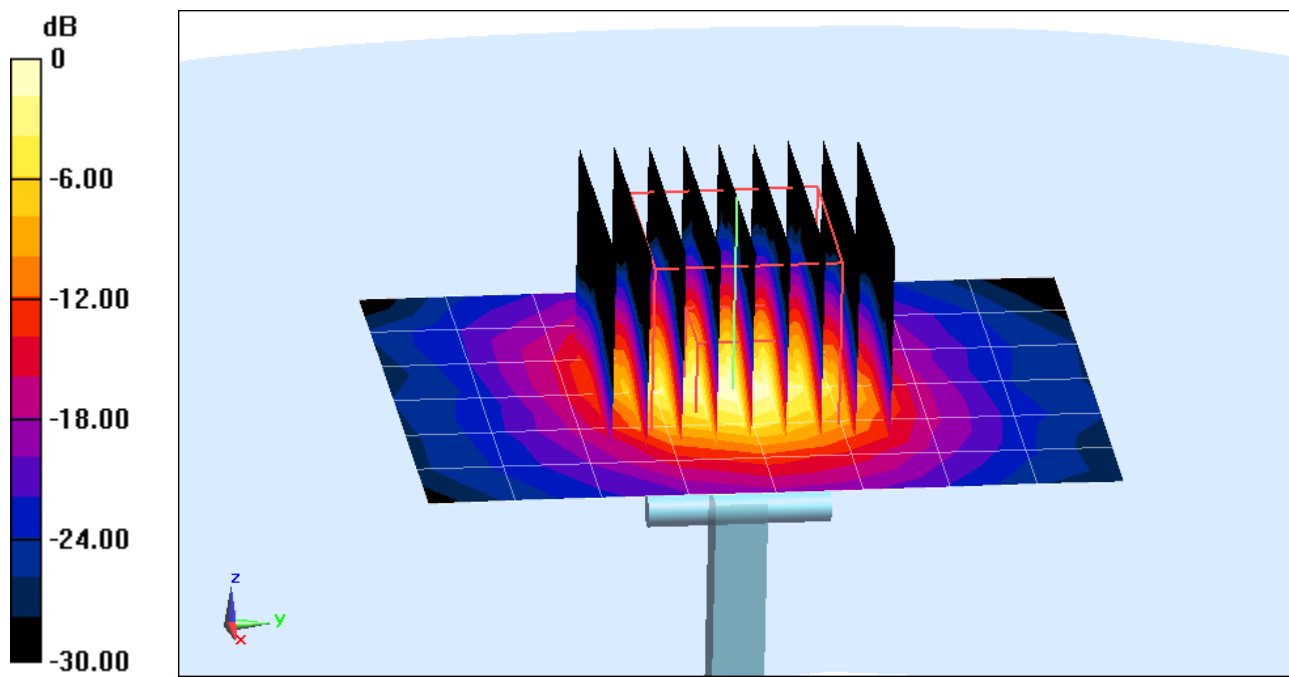
**Zoom Scan (9x9x7)/Cube 0:** Measurement grid:  $dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=1.4\text{mm}$ , Graded Ratio=1.4

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 34.3 W/kg

**SAR(1 g) = 7.91 W/kg**

Deviation = 5.05 %



0 dB = 19.1 W/kg = 12.81 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

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

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

Medium: 5 GHz Body Medium parameters used:

$f = 5500 \text{ MHz}$ ;  $\sigma = 5.853 \text{ S/m}$ ;  $\epsilon_r = 46.511$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-16-2013; Ambient Temp: 22.7°C; Tissue Temp: 21.4°C

Probe: EX3DV4 - SN3589; ConvF(3.52, 3.52, 3.52); Calibrated: 1/17/2013;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/17/2013

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

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

## 5500 MHz System Verification

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

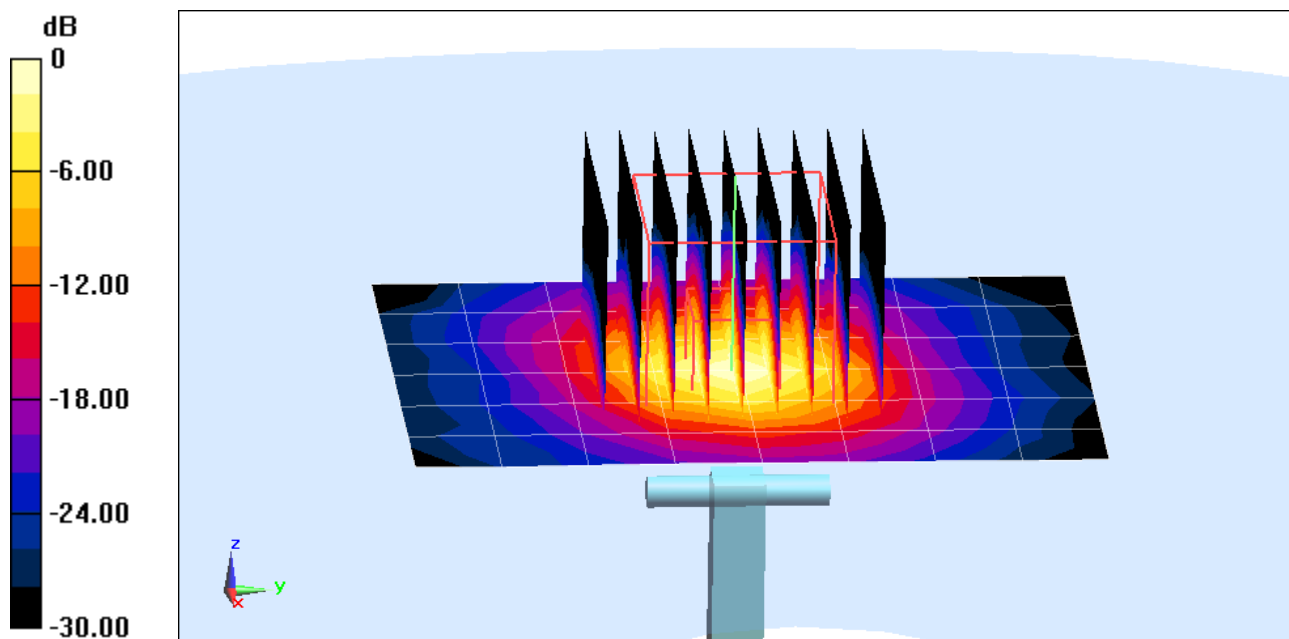
**Zoom Scan (9x9x7)/Cube 0:** Measurement grid:  $dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=1.4\text{mm}$ , Graded Ratio=1.4

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 36.4 W/kg

**SAR(1 g) = 8.15 W/kg**

Deviation = 0.87 %



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: 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:

$f = 5600 \text{ MHz}$ ;  $\sigma = 5.982 \text{ S/m}$ ;  $\epsilon_r = 46.338$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-16-2013; Ambient Temp: 22.7°C; Tissue Temp: 21.4°C

Probe: EX3DV4 - SN3589; ConvF(3.32, 3.32, 3.32); Calibrated: 1/17/2013;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/17/2013

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

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

## 5600 MHz System Verification

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

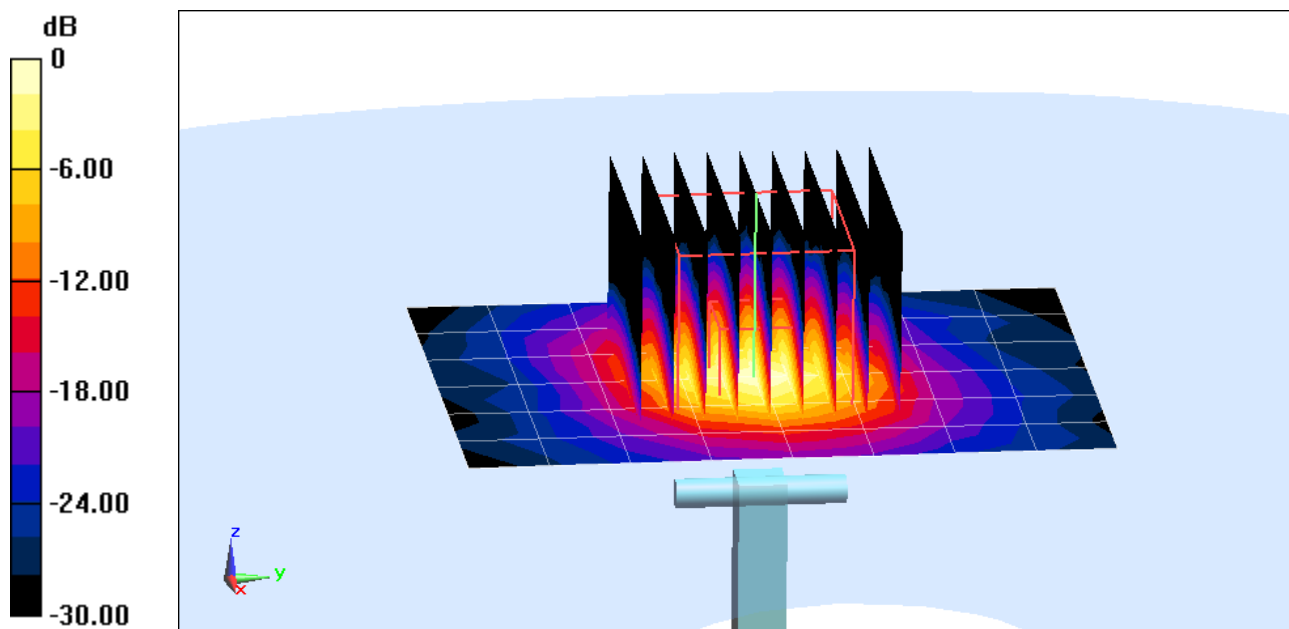
**Zoom Scan (9x9x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm, Graded Ratio=1.4

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 36.5 W/kg

**SAR(1 g) = 8.38 W/kg**

Deviation = 4.36 %



0 dB = 20.8 W/kg = 13.18 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

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

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

Medium: 5 GHz Body Medium parameters used:

$f = 5800 \text{ MHz}$ ;  $\sigma = 6.255 \text{ S/m}$ ;  $\epsilon_r = 45.935$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-16-2013; Ambient Temp: 22.7°C; Tissue Temp: 21.4°C

Probe: EX3DV4 - SN3589; ConvF(3.66, 3.66, 3.66); Calibrated: 1/17/2013;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/17/2013

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

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

## 5800 MHz System Verification

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

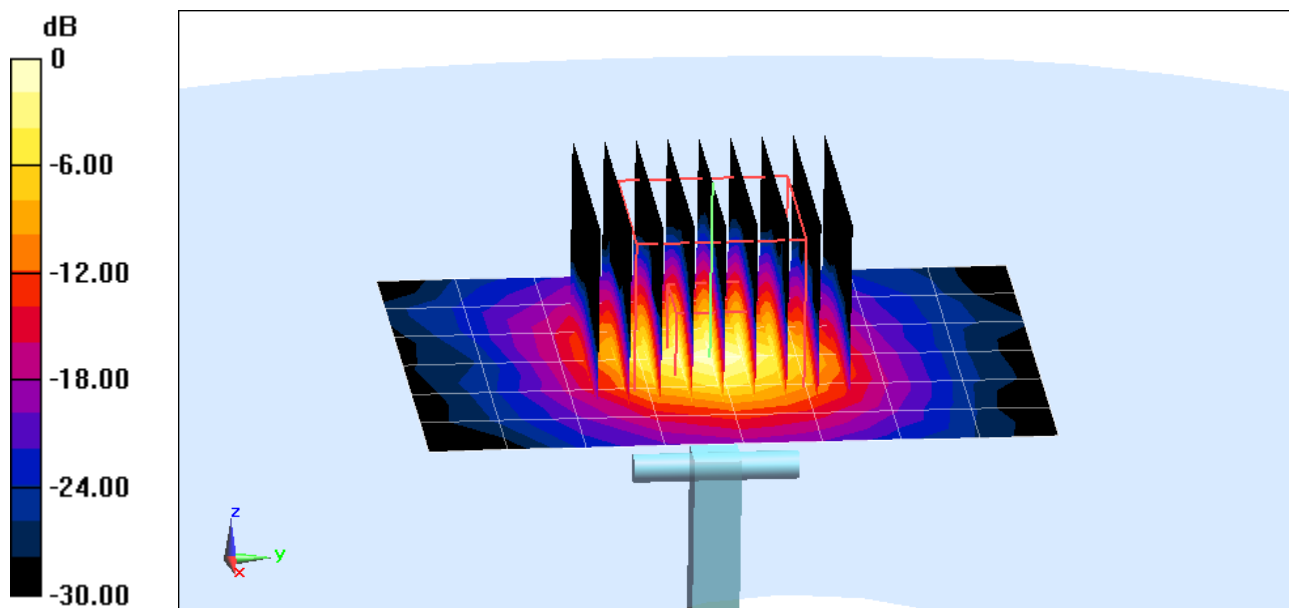
**Zoom Scan (9x9x7)/Cube 0:** Measurement grid:  $dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=1.4\text{mm}$ , Graded Ratio=1.4

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 35.7 W/kg

**SAR(1 g) = 7.39 W/kg**

Deviation = -1.60 %



0 dB = 18.7 W/kg = 12.72 dBW/kg

## APPENDIX C: PROBE CALIBRATION



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

Accreditation No.: **SCS 108**

Client **PC Test**

Certificate No: **D1750V2-1051\_Apr13**

## CALIBRATION CERTIFICATE

Object **D1750V2 - SN: 1051**

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

Calibration date: **April 30, 2013**

✓  
 LOK  
 5/8/13

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

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

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards           | ID #               | Cal Date (Certificate No.)        | Scheduled Calibration  |
|-----------------------------|--------------------|-----------------------------------|------------------------|
| Power meter EPM-442A        | GB37480704         | 01-Nov-12 (No. 217-01640)         | Oct-13                 |
| Power sensor HP 8481A       | US37292783         | 01-Nov-12 (No. 217-01640)         | Oct-13                 |
| Reference 20 dB Attenuator  | SN: 5058 (20k)     | 04-Apr-13 (No. 217-01736)         | Apr-14                 |
| Type-N mismatch combination | SN: 5047.3 / 06327 | 04-Apr-13 (No. 217-01739)         | Apr-14                 |
| Reference Probe ES3DV3      | SN: 3205           | 28-Dec-12 (No. ES3-3205_Dec12)    | Dec-13                 |
| DAE4                        | SN: 601            | 25-Apr-13 (No. DAE4-601_Apr13)    | Apr-14                 |
| Secondary Standards         | ID #               | Check Date (in house)             | Scheduled Check        |
| Power sensor HP 8481A       | MY41092317         | 18-Oct-02 (in house check Oct-11) | In house check: Oct-13 |
| RF generator R&S SMT-06     | 100005             | 04-Aug-99 (in house check Oct-11) | In house check: Oct-13 |
| Network Analyzer HP 8753E   | US37390585 S4206   | 18-Oct-01 (in house check Oct-12) | In house check: Oct-13 |

Calibrated by: **Claudio Leubler**      Name: **Claudio Leubler**      Function: **Laboratory Technician**

Signature

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

Issued: April 30, 2013

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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 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

### Additional Documentation:

- DASY4/5 System Handbook

### Methods Applied and Interpretation of Parameters:

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

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

## Measurement Conditions

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

|                                     |                        |             |
|-------------------------------------|------------------------|-------------|
| <b>DASY Version</b>                 | DASY5                  | V52.8.6     |
| <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>                    | 1750 MHz $\pm$ 1 MHz   |             |

## Head TSL parameters

The following parameters and calculations were applied.

|                                                | Temperature         | Permittivity   | Conductivity         |
|------------------------------------------------|---------------------|----------------|----------------------|
| <b>Nominal Head TSL parameters</b>             | 22.0 °C             | 40.1           | 1.37 mho/m           |
| <b>Measured Head TSL parameters</b>            | (22.0 $\pm$ 0.2) °C | 39.1 $\pm$ 6 % | 1.33 mho/m $\pm$ 6 % |
| <b>Head TSL temperature change during test</b> | < 0.5 °C            | ----           | ----                 |

## SAR result with Head TSL

| <b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b> | Condition          |                                                |
|-------------------------------------------------------------|--------------------|------------------------------------------------|
| SAR measured                                                | 250 mW input power | 9.01 W/kg                                      |
| SAR for nominal Head TSL parameters                         | normalized to 1W   | <b>36.5 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 | 4.83 W/kg                                      |
| SAR for nominal Head TSL parameters                           | normalized to 1W   | <b>19.5 W/kg <math>\pm</math> 16.5 % (k=2)</b> |

## Body TSL parameters

The following parameters and calculations were applied.

|                                                | Temperature         | Permittivity   | Conductivity         |
|------------------------------------------------|---------------------|----------------|----------------------|
| <b>Nominal Body TSL parameters</b>             | 22.0 °C             | 53.4           | 1.49 mho/m           |
| <b>Measured Body TSL parameters</b>            | (22.0 $\pm$ 0.2) °C | 51.8 $\pm$ 6 % | 1.50 mho/m $\pm$ 6 % |
| <b>Body TSL temperature change during test</b> | < 0.5 °C            | ----           | ----                 |

## SAR result with Body TSL

| <b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Body TSL</b> | Condition          |                                                |
|-------------------------------------------------------------|--------------------|------------------------------------------------|
| SAR measured                                                | 250 mW input power | 9.55 W/kg                                      |
| SAR for nominal Body TSL parameters                         | normalized to 1W   | <b>37.8 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 | 5.13 W/kg                                      |
| SAR for nominal Body TSL parameters                           | normalized to 1W   | <b>20.4 W/kg <math>\pm</math> 16.5 % (k=2)</b> |

## Appendix

### Antenna Parameters with Head TSL

|                                      |                             |
|--------------------------------------|-----------------------------|
| Impedance, transformed to feed point | $50.9 \Omega + 0.3 j\Omega$ |
| Return Loss                          | - 40.7 dB                   |

### Antenna Parameters with Body TSL

|                                      |                             |
|--------------------------------------|-----------------------------|
| Impedance, transformed to feed point | $47.0 \Omega + 0.4 j\Omega$ |
| Return Loss                          | - 30.1 dB                   |

### General Antenna Parameters and Design

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.222 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: 30.04.2013

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;  $\sigma = 1.33$  S/m;  $\epsilon_r = 39.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.18, 5.18, 5.18); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.6(1115); SEMCAD X 14.6.9(7117)

### **Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (8x7x7)/Cube 0:**

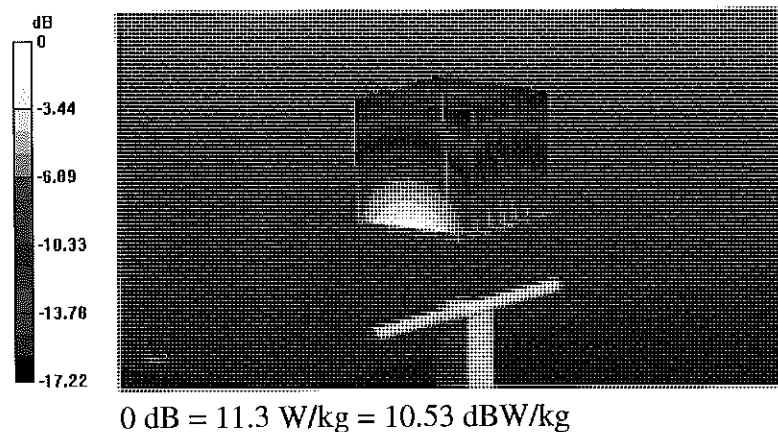
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 90.104 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 16.0 W/kg

**SAR(1 g) = 9.01 W/kg; SAR(10 g) = 4.83 W/kg**

Maximum value of SAR (measured) = 11.3 W/kg



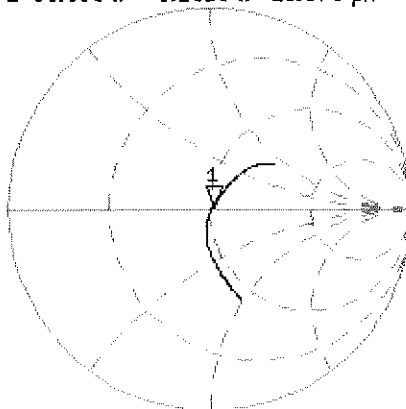
# Impedance Measurement Plot for Head TSL

30 Apr 2013 12:59:57  
 [CH1] S11 1 U FS 1: 50.889  $\Omega$  0.2813  $\Omega$  25.578  $\mu\text{H}$  1 750.000 000 MHz

\*  
 Del  
 C $\Delta$

Avs  
 4

H1d

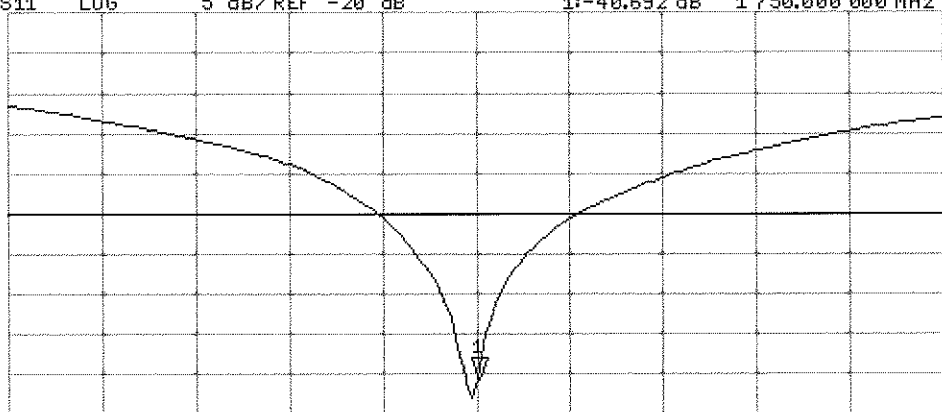


CH2 S11 LOG 5 dB/REF -20 dB 1:-40.692 dB 1 750.000 000 MHz

C $\Delta$

Avs  
 4

H1d



START 1 550.000 000 MHz

STOP 1 950.000 000 MHz

## DASY5 Validation Report for Body TSL

Date: 30.04.2013

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;  $\sigma = 1.5$  S/m;  $\epsilon_r = 51.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.83, 4.83, 4.83); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.6(1115); SEMCAD X 14.6.9(7117)

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

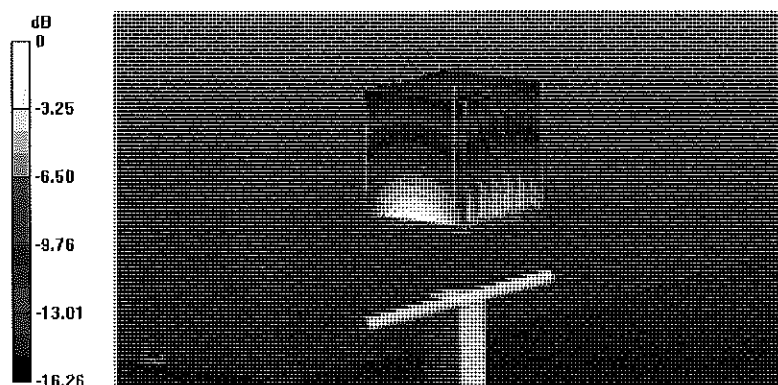
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 93.473 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 16.4 W/kg

**SAR(1 g) = 9.55 W/kg; SAR(10 g) = 5.13 W/kg**

Maximum value of SAR (measured) = 12.0 W/kg

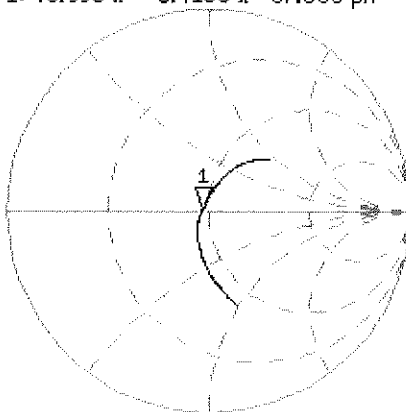


0 dB = 12.0 W/kg = 10.79 dBW/kg

# Impedance Measurement Plot for Body TSL

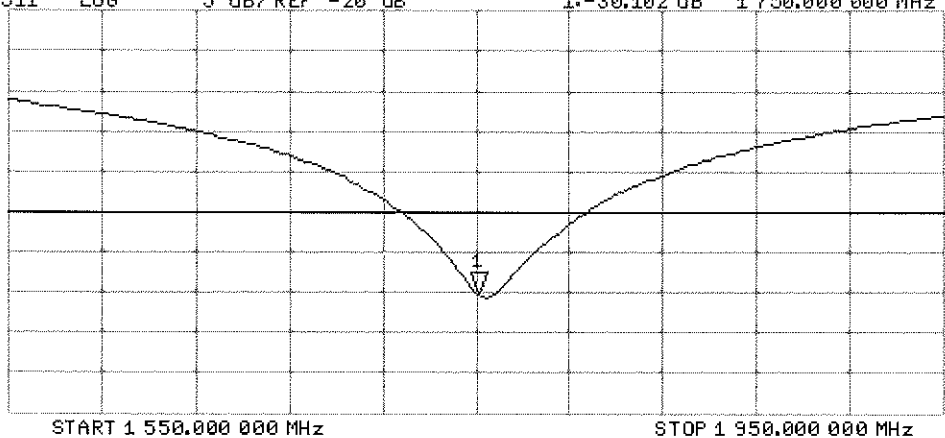
30 Apr 2013 12:59:14  
 [CH1] S11 1 U FS 1: 46.998  $\Omega$  0.4160  $\Omega$  37.835 pF 1 750.000 000 MHz

\*  
 Del  
 CA  
 Avg  
 16  
 H1d



CH2 S11 LOG 5 dB/REF -20 dB 1:-30.102 dB 1 750.000 000 MHz

CA  
 Avg  
 16  
 H1d





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Client **PC Test**

Certificate No: **D2450V2-797\_Jan13**

## CALIBRATION CERTIFICATE

Object **D2450V2 - SN: 797**

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

Calibration date: **January 08, 2013**

✓  
KOK  
1/28/13

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

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

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards           | ID #               | Cal Date (Certificate No.)        | Scheduled Calibration  |
|-----------------------------|--------------------|-----------------------------------|------------------------|
| Power meter EPM-442A        | GB37480704         | 01-Nov-12 (No. 217-01640)         | Oct-13                 |
| Power sensor HP 8481A       | US37292783         | 01-Nov-12 (No. 217-01640)         | Oct-13                 |
| Reference 20 dB Attenuator  | SN: 5058 (20k)     | 27-Mar-12 (No. 217-01530)         | Apr-13                 |
| Type-N mismatch combination | SN: 5047.3 / 06327 | 27-Mar-12 (No. 217-01533)         | Apr-13                 |
| Reference Probe ES3DV3      | SN: 3205           | 28-Dec-12 (No. ES3-3205_Dec12)    | Dec-13                 |
| DAE4                        | SN: 601            | 27-Jun-12 (No. DAE4-601_Jun12)    | Jun-13                 |
| Secondary Standards         | ID #               | Check Date (in house)             | Scheduled Check        |
| Power sensor HP 8481A       | MY41092317         | 18-Oct-02 (in house check Oct-11) | In house check: Oct-13 |
| RF generator R&S SMT-06     | 100005             | 04-Aug-99 (in house check Oct-11) | In house check: Oct-13 |
| Network Analyzer HP 8753E   | US37390585 S4206   | 18-Oct-01 (in house check Oct-12) | In house check: Oct-13 |

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

Issued: January 8, 2013

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Accreditation No.: **SCS 108**

### Glossary:

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

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

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

### Additional Documentation:

- DASY4/5 System Handbook

### Methods Applied and Interpretation of Parameters:

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

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

## Measurement Conditions

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

|                              |                        |             |
|------------------------------|------------------------|-------------|
| DASY Version                 | DASY5                  | V52.8.4     |
| Extrapolation                | Advanced Extrapolation |             |
| Phantom                      | Modular Flat Phantom   |             |
| Distance Dipole Center - TSL | 10 mm                  | with Spacer |
| Zoom Scan Resolution         | dx, dy, dz = 5 mm      |             |
| Frequency                    | 2450 MHz $\pm$ 1 MHz   |             |

## Head TSL parameters

The following parameters and calculations were applied.

|                                         | Temperature         | Permittivity   | Conductivity         |
|-----------------------------------------|---------------------|----------------|----------------------|
| Nominal Head TSL parameters             | 22.0 °C             | 39.2           | 1.80 mho/m           |
| Measured Head TSL parameters            | (22.0 $\pm$ 0.2) °C | 37.9 $\pm$ 6 % | 1.85 mho/m $\pm$ 6 % |
| Head TSL temperature change during test | < 0.5 °C            | ----           | ----                 |

## SAR result with Head TSL

|                                                       |                    |                              |
|-------------------------------------------------------|--------------------|------------------------------|
| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL | Condition          |                              |
| SAR measured                                          | 250 mW input power | 13.4 W/kg                    |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | 52.5 W/kg $\pm$ 17.0 % (k=2) |

|                                                         |                    |                              |
|---------------------------------------------------------|--------------------|------------------------------|
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | condition          |                              |
| SAR measured                                            | 250 mW input power | 6.20 W/kg                    |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 24.5 W/kg $\pm$ 16.5 % (k=2) |

## Body TSL parameters

The following parameters and calculations were applied.

|                                         | Temperature         | Permittivity   | Conductivity         |
|-----------------------------------------|---------------------|----------------|----------------------|
| Nominal Body TSL parameters             | 22.0 °C             | 52.7           | 1.95 mho/m           |
| Measured Body TSL parameters            | (22.0 $\pm$ 0.2) °C | 50.5 $\pm$ 6 % | 2.01 mho/m $\pm$ 6 % |
| Body TSL temperature change during test | < 0.5 °C            | ----           | ----                 |

## SAR result with Body TSL

|                                                       |                    |                              |
|-------------------------------------------------------|--------------------|------------------------------|
| SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL | Condition          |                              |
| SAR measured                                          | 250 mW input power | 12.7 W/kg                    |
| SAR for nominal Body TSL parameters                   | normalized to 1W   | 49.6 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 | 5.88 W/kg                    |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | 23.2 W/kg $\pm$ 16.5 % (k=2) |

## Appendix

### Antenna Parameters with Head TSL

|                                      |                             |
|--------------------------------------|-----------------------------|
| Impedance, transformed to feed point | $53.3 \Omega + 3.1 j\Omega$ |
| Return Loss                          | - 27.1 dB                   |

### Antenna Parameters with Body TSL

|                                      |                             |
|--------------------------------------|-----------------------------|
| Impedance, transformed to feed point | $49.1 \Omega + 4.9 j\Omega$ |
| Return Loss                          | - 26.0 dB                   |

### General Antenna Parameters and Design

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.152 ns |
|----------------------------------|----------|

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

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

### Additional EUT Data

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

## DASY5 Validation Report for Head TSL

Date: 08.01.2013

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 2450 MHz

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.85$  S/m;  $\epsilon_r = 37.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.52, 4.52, 4.52); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.4(1052); SEMCAD X 14.6.8(7028)

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

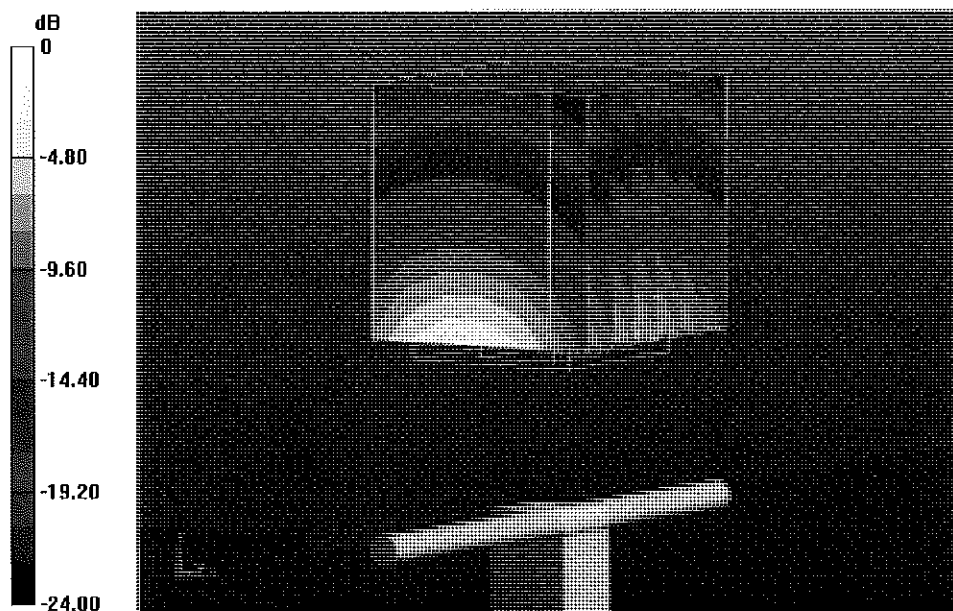
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 99.154 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 27.8 W/kg

**SAR(1 g) = 13.4 W/kg; SAR(10 g) = 6.2 W/kg**

Maximum value of SAR (measured) = 17.0 W/kg

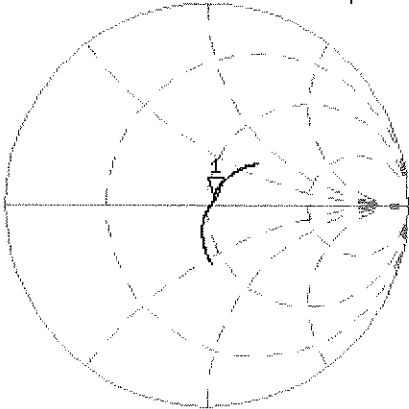


0 dB = 17.0 W/kg = 12.30 dBW/kg

Impedance Measurement Plot for Head TSL

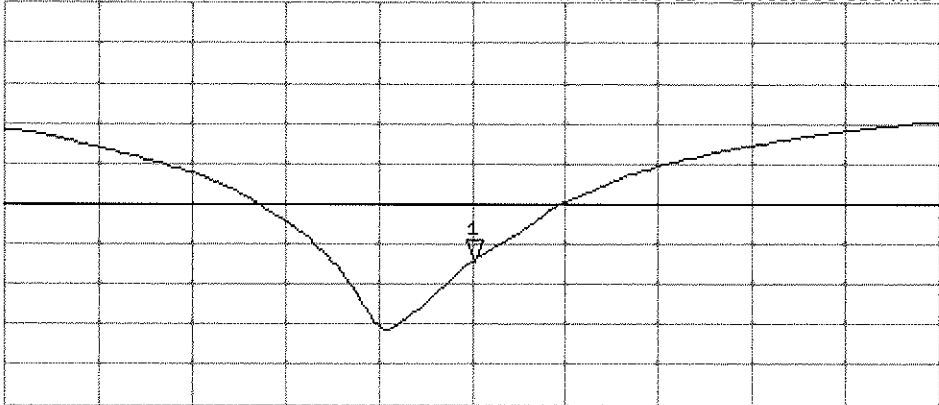
8 Jan 2013 12:37:14  
CH1 S11 1 U FS 1: 53.346  $\angle$  3.0762  $\angle$  199.83 pH 2 450.000 000 MHz

\*  
De1  
Cor  
Avg  
16  
H1d



CH2 S11 LOG 5 dB/REF -20 dB 1: -27.136 dB 2 450.000 000 MHz

Cor  
Avg  
16  
H1d



## DASY5 Validation Report for Body TSL

Date: 08.01.2013

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 2450 MHz

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 2.01$  S/m;  $\epsilon_r = 50.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.42, 4.42, 4.42); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.4(1052); SEMCAD X 14.6.8(7028)

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

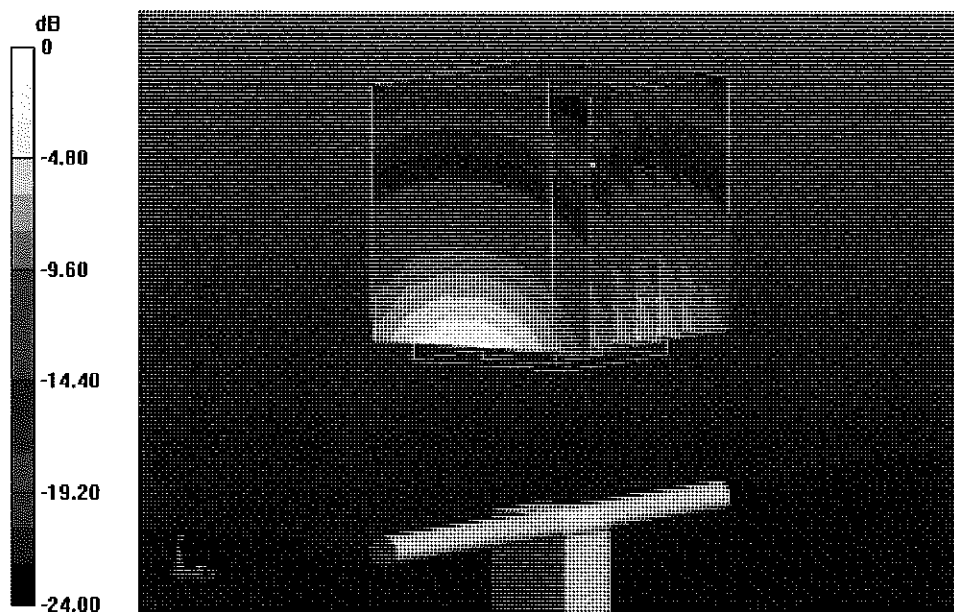
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 93.935 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 26.7 W/kg

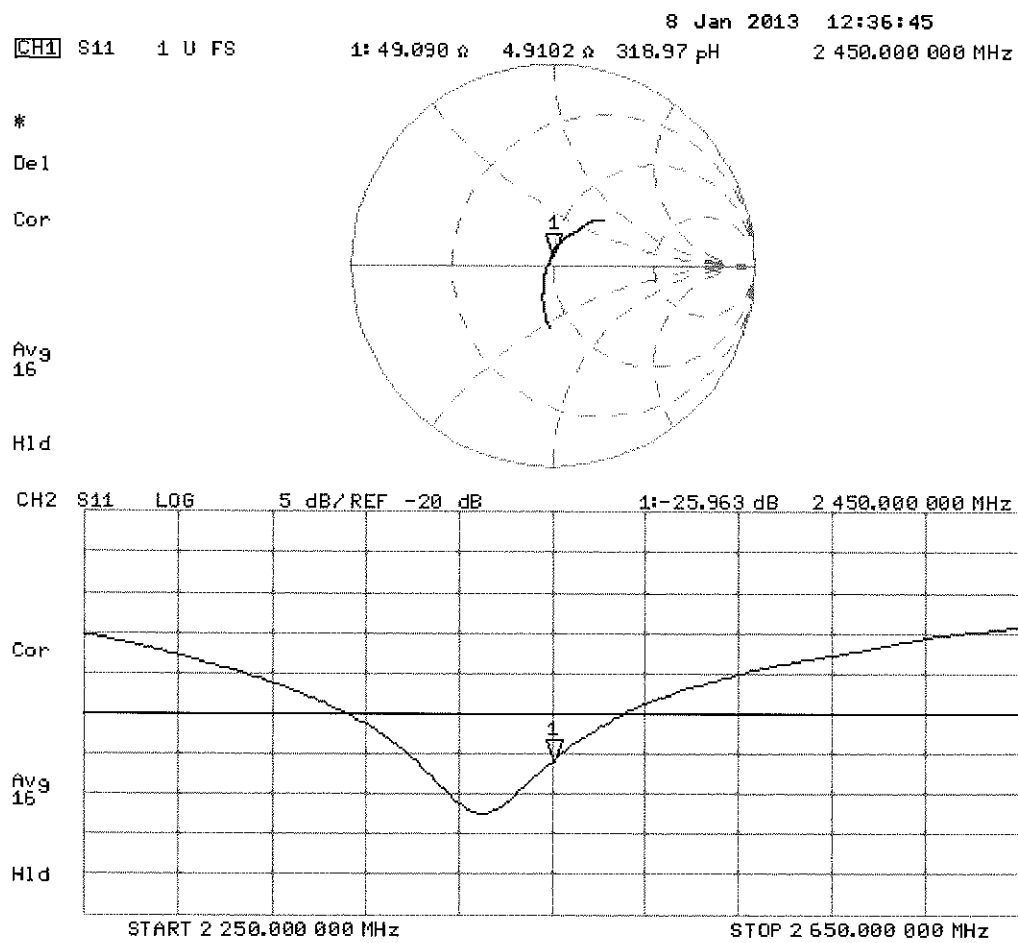
**SAR(1 g) = 12.7 W/kg; SAR(10 g) = 5.88 W/kg**

Maximum value of SAR (measured) = 16.7 W/kg



0 dB = 16.7 W/kg = 12.23 dBW/kg

Impedance Measurement Plot for Body TSL





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

Accreditation No.: **SCS 108**

Client **PC Test**

Certificate No: **D5GHzV2-1057\_Jan13**

## CALIBRATION CERTIFICATE

Object **D5GHzV2 - SN: 1057**

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

Calibration date: **January 11, 2013**

✓  
KOK  
1/29/13

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

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

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards           | ID #               | Cal Date (Certificate No.)        | Scheduled Calibration  |
|-----------------------------|--------------------|-----------------------------------|------------------------|
| Power meter EPM-442A        | GB37480704         | 01-Nov-12 (No. 217-01640)         | Oct-13                 |
| Power sensor HP 8481A       | US37292783         | 01-Nov-12 (No. 217-01640)         | Oct-13                 |
| Reference 20 dB Attenuator  | SN: 5058 (20k)     | 27-Mar-12 (No. 217-01530)         | Apr-13                 |
| Type-N mismatch combination | SN: 5047.3 / 06327 | 27-Mar-12 (No. 217-01533)         | Apr-13                 |
| Reference Probe EX3DV4      | SN: 3503           | 28-Dec-12 (No. EX3-3503_Dec12)    | Dec-13                 |
| DAE4                        | SN: 601            | 27-Jun-12 (No. DAE4-601_Jun12)    | Jun-13                 |
| Secondary Standards         | ID #               | Check Date (in house)             | Scheduled Check        |
| Power sensor HP 8481A       | MY41092317         | 18-Oct-02 (in house check Oct-11) | In house check: Oct-13 |
| RF generator R&S SMT-06     | 100005             | 04-Aug-99 (in house check Oct-11) | In house check: Oct-13 |
| Network Analyzer HP 8753E   | US37390585 S4206   | 18-Oct-01 (in house check Oct-12) | In house check: Oct-13 |

Calibrated by: **Israe El-Naouq**      Name: **Israe El-Naouq**      Function: **Laboratory Technician**

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

Signature  
*Israe El-Naouq*  
*Katja Pokovic*

Issued: January 11, 2013

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



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

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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:

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

### Additional Documentation:

- c) DASY4/5 System Handbook

### Methods Applied and Interpretation of Parameters:

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

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                                                                                                                | V52.8.5                          |
| <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 | 34.6 $\pm$ 6 % | 4.50 mho/m $\pm$ 6 % |
| <b>Head TSL temperature change during test</b> | < 0.5 °C            | ----           | ----                 |

## SAR result with Head TSL at 5200 MHz

|                                                             |                    |                                                |
|-------------------------------------------------------------|--------------------|------------------------------------------------|
| <b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b> | Condition          |                                                |
| SAR measured                                                | 100 mW input power | 7.66 W/kg                                      |
| SAR for nominal Head TSL parameters                         | normalized to 1W   | <b>75.9 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 | 2.17 W/kg                                      |
| SAR for nominal Head TSL parameters                           | normalized to 1W   | <b>21.4 W/kg <math>\pm</math> 19.5 % (k=2)</b> |

### Head TSL parameters at 5300 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Head TSL parameters             | 22.0 °C         | 35.9         | 4.76 mho/m       |
| Measured Head TSL parameters            | (22.0 ± 0.2) °C | 34.5 ± 6 %   | 4.60 mho/m ± 6 % |
| Head TSL temperature change during test | < 0.5 °C        | ----         | ----             |

### SAR result with Head TSL at 5300 MHz

|                                                       |                    |                            |
|-------------------------------------------------------|--------------------|----------------------------|
| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL | Condition          |                            |
| SAR measured                                          | 100 mW input power | 7.76 W/kg                  |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | 76.9 W / kg ± 19.9 % (k=2) |

|                                                         |                    |                          |
|---------------------------------------------------------|--------------------|--------------------------|
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | condition          |                          |
| SAR measured                                            | 100 mW input power | 2.22 W/kg                |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 21.9 W/kg ± 19.5 % (k=2) |

### Head TSL parameters at 5500 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Head TSL parameters             | 22.0 °C         | 35.6         | 4.96 mho/m       |
| Measured Head TSL parameters            | (22.0 ± 0.2) °C | 34.2 ± 6 %   | 4.79 mho/m ± 6 % |
| Head TSL temperature change during test | < 0.5 °C        | ----         | ----             |

### SAR result with Head TSL at 5500 MHz

|                                                       |                    |                          |
|-------------------------------------------------------|--------------------|--------------------------|
| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL | Condition          |                          |
| SAR measured                                          | 100 mW input power | 8.09 W/kg                |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | 80.1 W/kg ± 19.9 % (k=2) |

|                                                         |                    |                          |
|---------------------------------------------------------|--------------------|--------------------------|
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | condition          |                          |
| SAR measured                                            | 100 mW input power | 2.28 W/kg                |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 22.5 W/kg ± 19.5 % (k=2) |

### Head TSL parameters at 5600 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Head TSL parameters             | 22.0 °C         | 35.5         | 5.07 mho/m       |
| Measured Head TSL parameters            | (22.0 ± 0.2) °C | 34.1 ± 6 %   | 4.88 mho/m ± 6 % |
| Head TSL temperature change during test | < 0.5 °C        | ----         | ----             |

### SAR result with Head TSL at 5600 MHz

|                                                       |                    |                          |
|-------------------------------------------------------|--------------------|--------------------------|
| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL | Condition          |                          |
| SAR measured                                          | 100 mW input power | 8.12 W/kg                |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | 80.4 W/kg ± 19.9 % (k=2) |

|                                                         |                    |                          |
|---------------------------------------------------------|--------------------|--------------------------|
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | condition          |                          |
| SAR measured                                            | 100 mW input power | 2.30 W/kg                |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 22.7 W/kg ± 19.5 % (k=2) |

### 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 | 33.8 ± 6 %   | 5.09 mho/m ± 6 % |
| Head TSL temperature change during test | < 0.5 °C        | ----         | ----             |

### SAR result with Head TSL at 5800 MHz

|                                                       |                    |                          |
|-------------------------------------------------------|--------------------|--------------------------|
| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL | Condition          |                          |
| SAR measured                                          | 100 mW input power | 7.69 W/kg                |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | 76.1 W/kg ± 19.9 % (k=2) |

|                                                         |                    |                          |
|---------------------------------------------------------|--------------------|--------------------------|
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | condition          |                          |
| SAR measured                                            | 100 mW input power | 2.17 W/kg                |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 21.4 W/kg ± 19.5 % (k=2) |

### Body TSL parameters at 5200 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Body TSL parameters             | 22.0 °C         | 49.0         | 5.30 mho/m       |
| Measured Body TSL parameters            | (22.0 ± 0.2) °C | 47.0 ± 6 %   | 5.42 mho/m ± 6 % |
| Body TSL temperature change during test | < 0.5 °C        | ----         | ----             |

### SAR result with Body TSL at 5200 MHz

|                                                       |                    |                          |
|-------------------------------------------------------|--------------------|--------------------------|
| SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL | Condition          |                          |
| SAR measured                                          | 100 mW input power | 7.61 W/kg                |
| SAR for nominal Body TSL parameters                   | normalized to 1W   | 75.5 W/kg ± 19.9 % (k=2) |

|                                                         |                    |                          |
|---------------------------------------------------------|--------------------|--------------------------|
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL | condition          |                          |
| SAR measured                                            | 100 mW input power | 2.13 W/kg                |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | 21.1 W/kg ± 19.5 % (k=2) |

### 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 | 46.8 ± 6 %   | 5.55 mho/m ± 6 % |
| Body TSL temperature change during test | < 0.5 °C        | ----         | ----             |

### SAR result with Body TSL at 5300 MHz

|                                                       |                    |                          |
|-------------------------------------------------------|--------------------|--------------------------|
| SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL | Condition          |                          |
| SAR measured                                          | 100 mW input power | 7.59 W/kg                |
| SAR for nominal Body TSL parameters                   | normalized to 1W   | 75.3 W/kg ± 19.9 % (k=2) |

|                                                         |                    |                          |
|---------------------------------------------------------|--------------------|--------------------------|
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL | condition          |                          |
| SAR measured                                            | 100 mW input power | 2.13 W/kg                |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | 21.1 W/kg ± 19.5 % (k=2) |

### Body TSL parameters at 5500 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Body TSL parameters             | 22.0 °C         | 48.6         | 5.65 mho/m       |
| Measured Body TSL parameters            | (22.0 ± 0.2) °C | 46.5 ± 6 %   | 5.81 mho/m ± 6 % |
| Body TSL temperature change during test | < 0.5 °C        | ----         | ----             |

### SAR result with Body TSL at 5500 MHz

|                                                       |                    |                                 |
|-------------------------------------------------------|--------------------|---------------------------------|
| SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL | Condition          |                                 |
| SAR measured                                          | 100 mW input power | 8.14 W/kg                       |
| SAR for nominal Body TSL parameters                   | normalized to 1W   | <b>80.8 W/kg ± 19.9 % (k=2)</b> |

|                                                         |                    |                                 |
|---------------------------------------------------------|--------------------|---------------------------------|
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL | condition          |                                 |
| SAR measured                                            | 100 mW input power | 2.26 W/kg                       |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | <b>22.4 W/kg ± 19.5 % (k=2)</b> |

### Body TSL parameters at 5600 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Body TSL parameters             | 22.0 °C         | 48.5         | 5.77 mho/m       |
| Measured Body TSL parameters            | (22.0 ± 0.2) °C | 46.3 ± 6 %   | 5.94 mho/m ± 6 % |
| Body TSL temperature change during test | < 0.5 °C        | ----         | ----             |

### SAR result with Body TSL at 5600 MHz

|                                                       |                    |                                 |
|-------------------------------------------------------|--------------------|---------------------------------|
| SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL | Condition          |                                 |
| SAR measured                                          | 100 mW input power | 8.10 W/kg                       |
| SAR for nominal Body TSL parameters                   | normalized to 1W   | <b>80.3 W/kg ± 19.9 % (k=2)</b> |

|                                                         |                    |                                 |
|---------------------------------------------------------|--------------------|---------------------------------|
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL | condition          |                                 |
| SAR measured                                            | 100 mW input power | 2.25 W/kg                       |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | <b>22.3 W/kg ± 19.5 % (k=2)</b> |

### Body TSL parameters at 5800 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Body TSL parameters             | 22.0 °C         | 48.2         | 6.00 mho/m       |
| Measured Body TSL parameters            | (22.0 ± 0.2) °C | 46.0 ± 6 %   | 6.21 mho/m ± 6 % |
| Body TSL temperature change during test | < 0.5 °C        | ----         | ----             |

### SAR result with Body TSL at 5800 MHz

| SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL | Condition          |                          |
|-------------------------------------------------------|--------------------|--------------------------|
| SAR measured                                          | 100 mW input power | 7.57 W/kg                |
| SAR for nominal Body TSL parameters                   | normalized to 1W   | 75.1 W/kg ± 19.9 % (k=2) |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL | condition          |                          |
|---------------------------------------------------------|--------------------|--------------------------|
| SAR measured                                            | 100 mW input power | 2.09 W/kg                |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | 20.7 W/kg ± 19.5 % (k=2) |

## Appendix

### Antenna Parameters with Head TSL at 5200 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 50.5 $\Omega$ - 9.8 j $\Omega$ |
| Return Loss                          | - 20.3 dB                      |

### Antenna Parameters with Head TSL at 5300 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 48.5 $\Omega$ - 4.5 j $\Omega$ |
| Return Loss                          | - 26.4 dB                      |

### Antenna Parameters with Head TSL at 5500 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 50.6 $\Omega$ - 5.8 j $\Omega$ |
| Return Loss                          | - 24.8 dB                      |

### Antenna Parameters with Head TSL at 5600 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 53.9 $\Omega$ - 3.8 j $\Omega$ |
| Return Loss                          | - 25.6 dB                      |

### Antenna Parameters with Head TSL at 5800 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 52.5 $\Omega$ - 4.4 j $\Omega$ |
| Return Loss                          | - 26.1 dB                      |

### Antenna Parameters with Body TSL at 5200 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 49.3 $\Omega$ - 7.9 j $\Omega$ |
| Return Loss                          | - 22.0 dB                      |

### Antenna Parameters with Body TSL at 5300 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 48.7 $\Omega$ - 3.2 j $\Omega$ |
| Return Loss                          | - 29.2 dB                      |

### Antenna Parameters with Body TSL at 5500 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 51.2 $\Omega$ - 4.8 j $\Omega$ |
| Return Loss                          | - 26.2 dB                      |

### Antenna Parameters with Body TSL at 5600 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 53.6 $\Omega$ - 2.1 j $\Omega$ |
| Return Loss                          | - 27.9 dB                      |

## Antenna Parameters with Body TSL at 5800 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 53.3 $\Omega$ - 2.9 j $\Omega$ |
| Return Loss                          | - 27.4 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: 11.01.2013

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 5200 MHz, Frequency: 5300 MHz, Frequency: 5500 MHz, Frequency: 5600 MHz, Frequency: 5800 MHz

Medium parameters used:  $f = 5200$  MHz;  $\sigma = 4.5$  S/m;  $\epsilon_r = 34.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5300$  MHz;  $\sigma = 4.6$  S/m;  $\epsilon_r = 34.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5500$  MHz;  $\sigma = 4.79$  S/m;  $\epsilon_r = 34.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5600$  MHz;  $\sigma = 4.88$  S/m;  $\epsilon_r = 34.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5800$  MHz;  $\sigma = 5.09$  S/m;  $\epsilon_r = 33.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.41, 5.41, 5.41); Calibrated: 28.12.2012, ConvF(5.1, 5.1, 5.1); Calibrated: 28.12.2012, ConvF(4.91, 4.91, 4.91); Calibrated: 28.12.2012, ConvF(4.76, 4.76, 4.76); Calibrated: 28.12.2012, ConvF(4.81, 4.81, 4.81); Calibrated: 28.12.2012;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.5(1059); SEMCAD X 14.6.8(7028)

**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 63.671 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 29.4 W/kg

**SAR(1 g) = 7.66 W/kg; SAR(10 g) = 2.17 W/kg**

Maximum value of SAR (measured) = 18.5 W/kg

**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5300 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 63.473 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 30.3 W/kg

**SAR(1 g) = 7.76 W/kg; SAR(10 g) = 2.22 W/kg**

Maximum value of SAR (measured) = 18.8 W/kg

**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 63.735 V/m; Power Drift = 0.08 dB

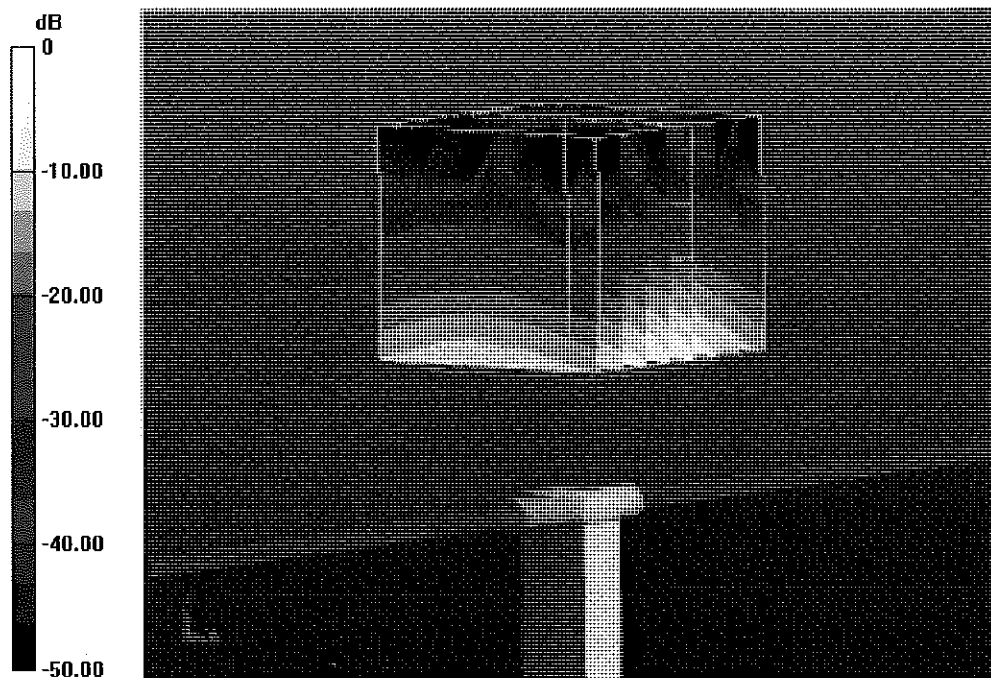
Peak SAR (extrapolated) = 33.2 W/kg

**SAR(1 g) = 8.09 W/kg; SAR(10 g) = 2.28 W/kg**

Maximum value of SAR (measured) = 20.1 W/kg

**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm  
Reference Value = 63.848 V/m; Power Drift = 0.09 dB  
Peak SAR (extrapolated) = 33.5 W/kg  
**SAR(1 g) = 8.12 W/kg; SAR(10 g) = 2.3 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 = 60.467 V/m; Power Drift = 0.08 dB  
Peak SAR (extrapolated) = 33.3 W/kg  
**SAR(1 g) = 7.69 W/kg; SAR(10 g) = 2.17 W/kg**  
Maximum value of SAR (measured) = 19.4 W/kg



0 dB = 19.4 W/kg = 12.88 dBW/kg

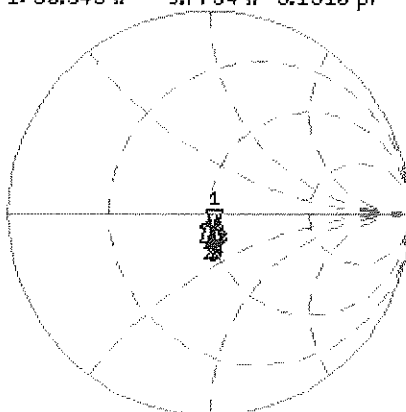
# Impedance Measurement Plot for Head TSL

11 Jan 2013 09:26:56  
 [CH1] S11 1 U FS 1: 50.543  $\Omega$  -9.7754  $\Omega$  3.1310 pF 5 200.000 000 MHz

\*  
 Del  
 CA

Avg  
 16

H1 d



CH1 Markers

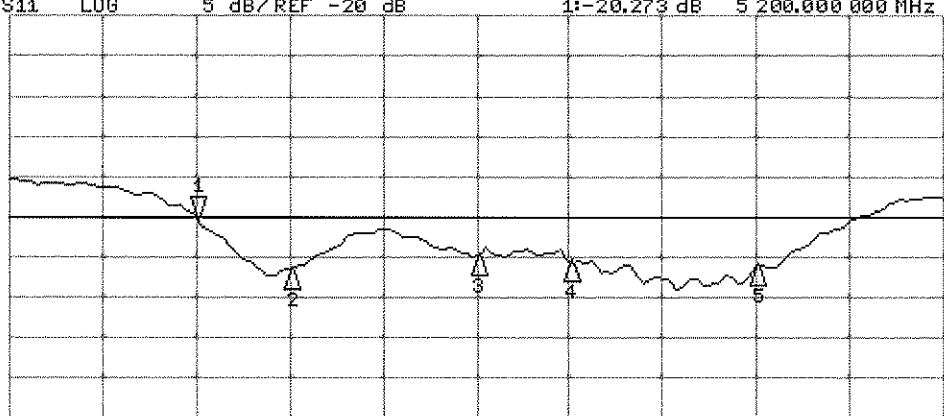
2: 48.508  $\Omega$   
 -4.4805  $\Omega$   
 5.30000 GHz  
 3: 50.617  $\Omega$   
 -5.7559  $\Omega$   
 5.50000 GHz  
 4: 53.891  $\Omega$   
 -3.8418  $\Omega$   
 5.60000 GHz  
 5: 52.500  $\Omega$   
 -4.4160  $\Omega$   
 5.80000 GHz

CH2 S11 LOG 5 dB/REF -20 dB 1: -20.273 dB 5 200.000 000 MHz

CA

Avg  
 16

H1 d



CH2 Markers

2: -25.396 dB  
 5.30000 GHz  
 3: -24.818 dB  
 5.50000 GHz  
 4: -25.573 dB  
 5.60000 GHz  
 5: -26.115 dB  
 5.80000 GHz

START 5 000.000 000 MHz

STOP 6 000.000 000 MHz

## DASY5 Validation Report for Body TSL

Date: 10.01.2013

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: 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;  $\epsilon_r = 47$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5300$  MHz;  $\sigma = 5.55$  S/m;  $\epsilon_r = 46.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5500$  MHz;  $\sigma = 5.81$  S/m;  $\epsilon_r = 46.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5600$  MHz;  $\sigma = 5.94$  S/m;  $\epsilon_r = 46.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5800$  MHz;  $\sigma = 6.21$  S/m;  $\epsilon_r = 46$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(4.91, 4.91, 4.91); Calibrated: 28.12.2012, ConvF(4.67, 4.67, 4.67); Calibrated: 28.12.2012, ConvF(4.43, 4.43, 4.43); Calibrated: 28.12.2012, ConvF(4.22, 4.22, 4.22); Calibrated: 28.12.2012, ConvF(4.38, 4.38, 4.38); Calibrated: 28.12.2012;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.5(1059); SEMCAD X 14.6.8(7028)

**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 = 59.074 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 30.4 W/kg

**SAR(1 g) = 7.61 W/kg; SAR(10 g) = 2.13 W/kg**

Maximum value of SAR (measured) = 18.0 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 = 58.924 V/m; Power Drift = -0.00 dB

Peak SAR (extrapolated) = 30.9 W/kg

**SAR(1 g) = 7.59 W/kg; SAR(10 g) = 2.13 W/kg**

Maximum value of SAR (measured) = 17.9 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 = 59.561 V/m; Power Drift = -0.01 dB

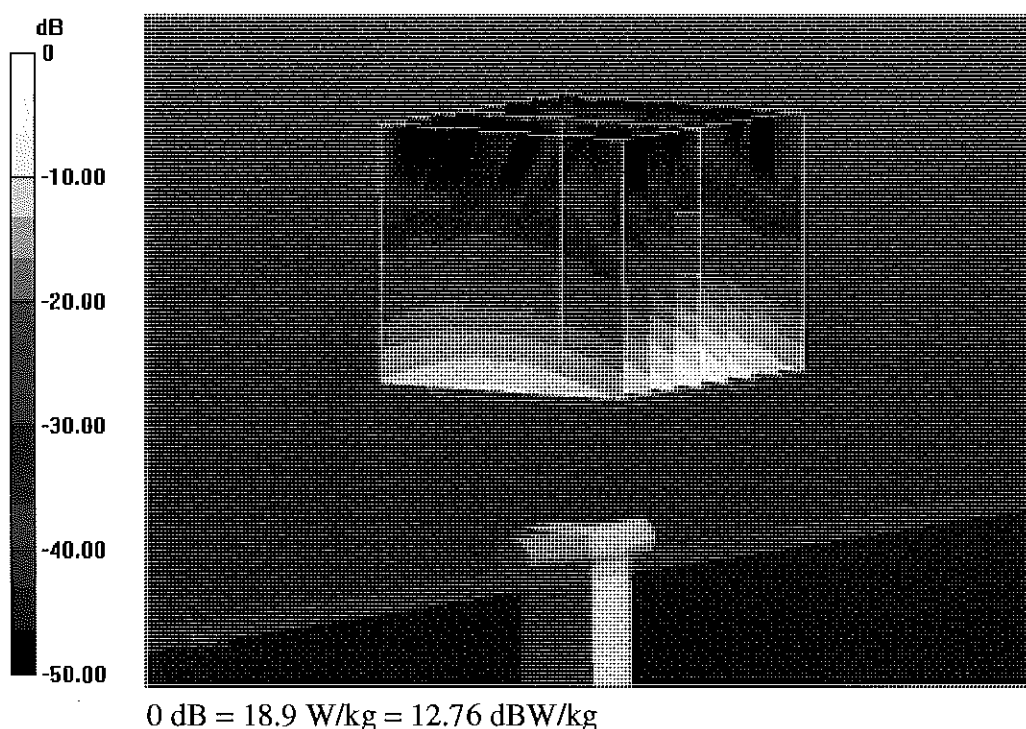
Peak SAR (extrapolated) = 35.3 W/kg

**SAR(1 g) = 8.14 W/kg; SAR(10 g) = 2.26 W/kg**

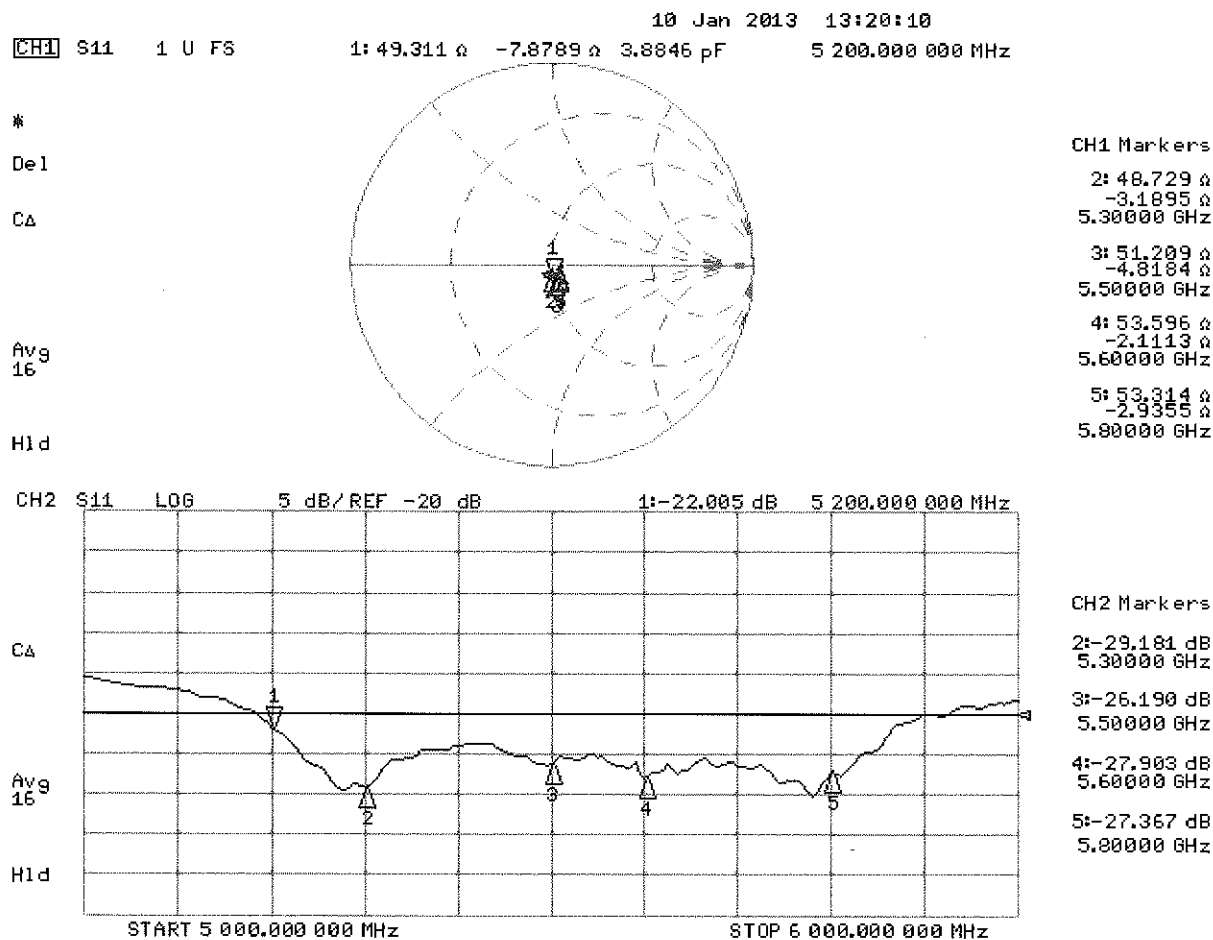
Maximum value of SAR (measured) = 19.7 W/kg

**Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm  
Reference Value = 58.884 V/m; Power Drift = -0.02 dB  
Peak SAR (extrapolated) = 36.3 W/kg  
**SAR(1 g) = 8.1 W/kg; SAR(10 g) = 2.25 W/kg**  
Maximum value of SAR (measured) = 20.0 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 = 55.753 V/m; Power Drift = -0.00 dB  
Peak SAR (extrapolated) = 35.6 W/kg  
**SAR(1 g) = 7.57 W/kg; SAR(10 g) = 2.09 W/kg**  
Maximum value of SAR (measured) = 18.9 W/kg



# Impedance Measurement Plot for Body TSL





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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **PC Test**

Certificate No: **D750V3-1054\_Mar13**

## CALIBRATION CERTIFICATE

Object **D750V3 - SN: 1054**

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

Calibration date: **March 18, 2013**

✓ KOK  
3/22/13

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

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

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards           | ID #               | Cal Date (Certificate No.)        | Scheduled Calibration  |
|-----------------------------|--------------------|-----------------------------------|------------------------|
| Power meter EPM-442A        | GB37480704         | 01-Nov-12 (No. 217-01640)         | Oct-13                 |
| Power sensor HP 8481A       | US37292783         | 01-Nov-12 (No. 217-01640)         | Oct-13                 |
| Reference 20 dB Attenuator  | SN: 5058 (20k)     | 27-Mar-12 (No. 217-01530)         | Apr-13                 |
| Type-N mismatch combination | SN: 5047.3 / 06327 | 27-Mar-12 (No. 217-01533)         | Apr-13                 |
| Reference Probe ES3DV3      | SN: 3205           | 28-Dec-12 (No. ES3-3205_Dec12)    | Dec-13                 |
| DAE4                        | SN: 601            | 27-Jun-12 (No. DAE4-601_Jun12)    | Jun-13                 |
| Secondary Standards         | ID #               | Check Date (in house)             | Scheduled Check        |
| Power sensor HP 8481A       | MY41092317         | 18-Oct-02 (in house check Oct-11) | In house check: Oct-13 |
| RF generator R&S SMT-06     | 100005             | 04-Aug-99 (in house check Oct-11) | In house check: Oct-13 |
| Network Analyzer HP 8753E   | US37390585 S4206   | 18-Oct-01 (in house check Oct-12) | In house check: Oct-13 |

Calibrated by: **Israe El-Naouq** **Israe El-Naouq** **Israe El-Naouq**  
Name Function Laboratory Technician

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

Signature

Issued: March 18, 2013

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



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

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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 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

### Additional Documentation:

- DASY4/5 System Handbook

### Methods Applied and Interpretation of Parameters:

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

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

## Measurement Conditions

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

|                                     |                        |             |
|-------------------------------------|------------------------|-------------|
| <b>DASY Version</b>                 | DASY5                  | V52.8.5     |
| <b>Extrapolation</b>                | Advanced Extrapolation |             |
| <b>Phantom</b>                      | Modular Flat Phantom   |             |
| <b>Distance Dipole Center - TSL</b> | 15 mm                  | with Spacer |
| <b>Zoom Scan Resolution</b>         | dx, dy, dz = 5 mm      |             |
| <b>Frequency</b>                    | 750 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             | 41.9           | 0.89 mho/m           |
| <b>Measured Head TSL parameters</b>            | (22.0 $\pm$ 0.2) °C | 41.1 $\pm$ 6 % | 0.92 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 | 2.19 W/kg                                      |
| SAR for nominal Head TSL parameters                         | normalized to 1W   | <b>8.50 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 | 1.42 W/kg                                      |
| SAR for nominal Head TSL parameters                           | normalized to 1W   | <b>5.55 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             | 55.5           | 0.96 mho/m           |
| <b>Measured Body TSL parameters</b>            | (22.0 $\pm$ 0.2) °C | 54.2 $\pm$ 6 % | 1.00 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 | 2.26 W/kg                                      |
| SAR for nominal Body TSL parameters                         | normalized to 1W   | <b>8.72 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 | 1.48 W/kg                                      |
| SAR for nominal Body TSL parameters                           | normalized to 1W   | <b>5.75 W/kg <math>\pm</math> 16.5 % (k=2)</b> |

## Appendix

### Antenna Parameters with Head TSL

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 54.4 $\Omega$ - 0.9 j $\Omega$ |
| Return Loss                          | - 27.2 dB                      |

### Antenna Parameters with Body TSL

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 49.7 $\Omega$ - 2.7 j $\Omega$ |
| Return Loss                          | - 31.4 dB                      |

### General Antenna Parameters and Design

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.034 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 08, 2011 |

## DASY5 Validation Report for Head TSL

Date: 18.03.2013

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1054**

Communication System: CW; Frequency: 750 MHz

Medium parameters used:  $f = 750 \text{ MHz}$ ;  $\sigma = 0.92 \text{ S/m}$ ;  $\epsilon_r = 41.1$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.28, 6.28, 6.28); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.5(1059); SEMCAD X 14.6.8(7028)

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

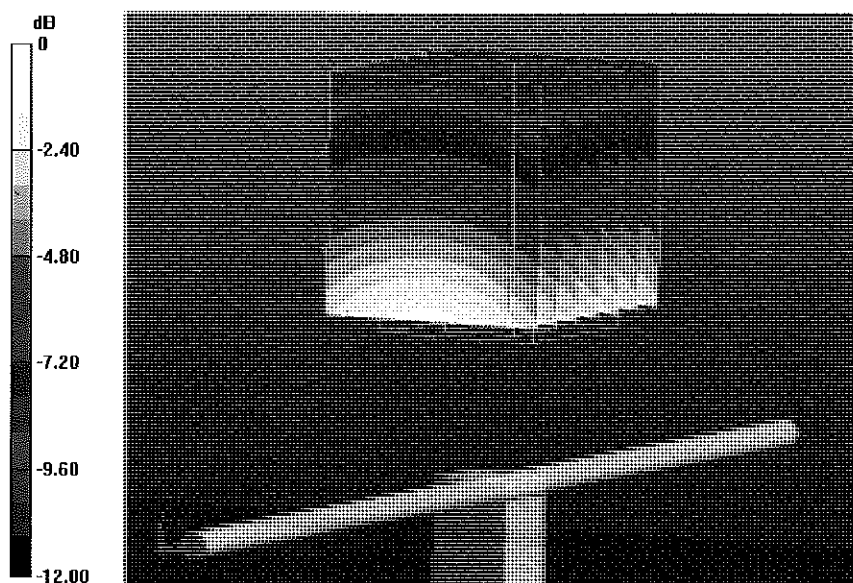
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $52.772 \text{ V/m}$ ; Power Drift =  $0.03 \text{ dB}$

Peak SAR (extrapolated) =  $3.33 \text{ W/kg}$

**SAR(1 g) =  $2.19 \text{ W/kg}$ ; SAR(10 g) =  $1.42 \text{ W/kg}$**

Maximum value of SAR (measured) =  $2.55 \text{ W/kg}$

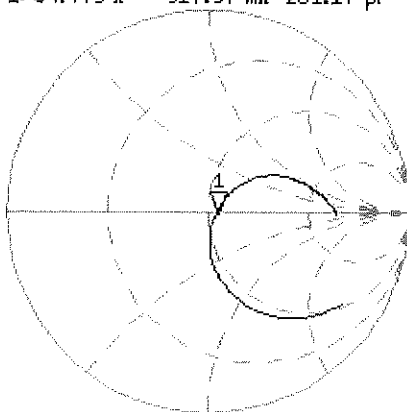


0 dB =  $2.55 \text{ W/kg}$  =  $4.07 \text{ dBW/kg}$

# Impedance Measurement Plot for Head TSL

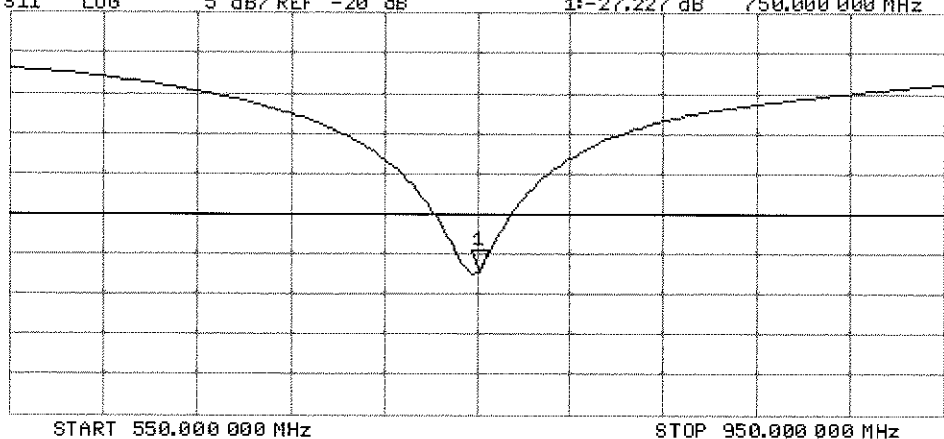
18 Mar 2013 13:14:09  
**CH1** S11 1 U FS 1: 54.449  $\Omega$  -917.97 m $\Omega$  231.17 pF 750.000 000 MHz

\*  
 Del  
 CA  
 Avg  
 16  
 H1 d



CH2 S11 LOG 5 dB/REF -20 dB 1:-27.227 dB 750.000 000 MHz

CA  
 Avg  
 16  
 H1 d



## DASY5 Validation Report for Body TSL

Date: 18.03.2013

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1054**

Communication System: CW; Frequency: 750 MHz

Medium parameters used:  $f = 750 \text{ MHz}$ ;  $\sigma = 1 \text{ S/m}$ ;  $\epsilon_r = 54.2$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.11, 6.11, 6.11); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.5(1059); SEMCAD X 14.6.8(7028)

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

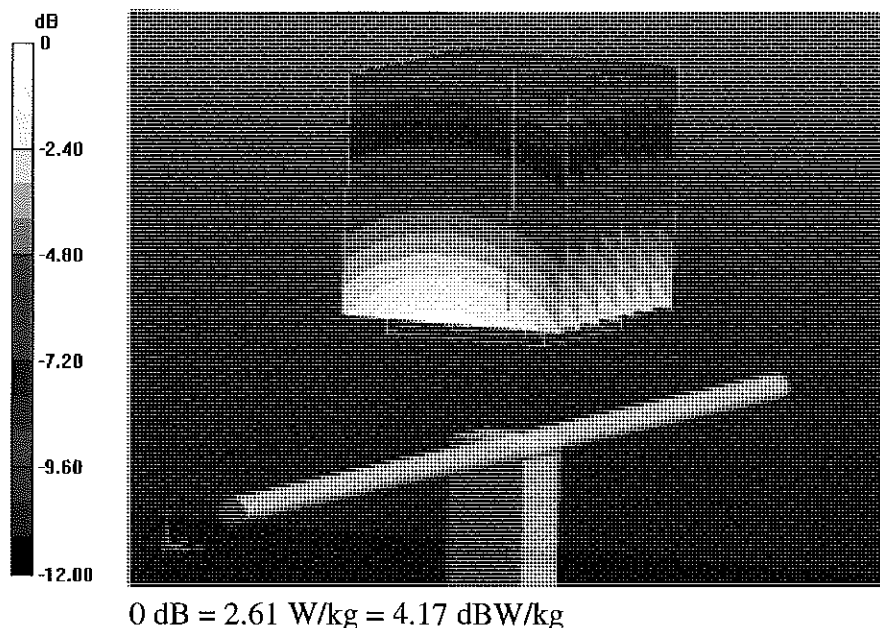
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 52.772 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 3.32 W/kg

**SAR(1 g) = 2.26 W/kg; SAR(10 g) = 1.48 W/kg**

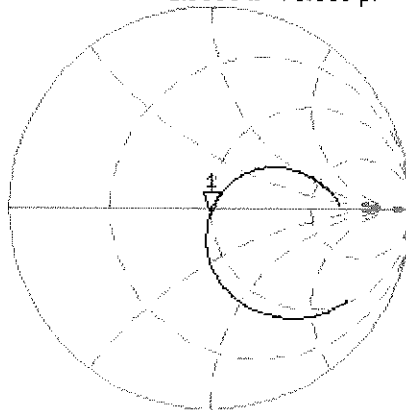
Maximum value of SAR (measured) = 2.61 W/kg



# Impedance Measurement Plot for Body TSL

18 Mar 2013 12:24:11  
 CH1 S11 1 U FS 1: 49.717  $\angle$  -2.6553  $\angle$  79.890 pF 750.000 000 MHz

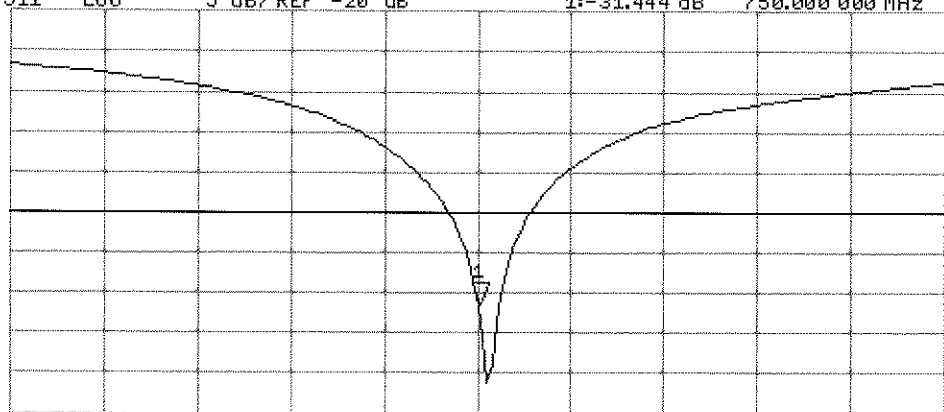
\*  
 Del  
 CA



Av9  
 16  
 H1d

CH2 S11 LOG 5 dB/REF -20 dB 1: -31.444 dB 750.000 000 MHz

CA



Av9  
 16  
 H1d



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 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **PC Test**

Certificate No: **ES3-3022\_Aug13**

## CALIBRATION CERTIFICATE

Object **ES3DV2 - SN:3022**

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

Calibration date: **August 22, 2013**

*UTC*  
*9/13/13*

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

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

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards          | ID              | Cal Date (Certificate No.)        | Scheduled Calibration  |
|----------------------------|-----------------|-----------------------------------|------------------------|
| Power meter E4419B         | GB41293874      | 04-Apr-13 (No. 217-01733)         | Apr-14                 |
| Power sensor E4412A        | MY41498087      | 04-Apr-13 (No. 217-01733)         | Apr-14                 |
| Reference 3 dB Attenuator  | SN: S5054 (3c)  | 04-Apr-13 (No. 217-01737)         | Apr-14                 |
| Reference 20 dB Attenuator | SN: S5277 (20x) | 04-Apr-13 (No. 217-01735)         | Apr-14                 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 04-Apr-13 (No. 217-01738)         | Apr-14                 |
| Reference Probe ES3DV2     | SN: 3013        | 28-Dec-12 (No. ES3-3013_Dec12)    | Dec-13                 |
| DAE4                       | SN: 660         | 31-Jan-13 (No. DAE4-660_Jan13)    | Jan-14                 |
| Secondary Standards        | ID              | Check Date (in house)             | Scheduled Check        |
| RF generator HP 8648C      | US3642U01700    | 4-Aug-99 (in house check Apr-13)  | In house check: Apr-15 |
| Network Analyzer HP 8753E  | US37390585      | 18-Oct-01 (in house check Oct-12) | In house check: Oct-13 |

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

Issued: August 23, 2013

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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                                                                                                                                |
| NORM <sub>x,y,z</sub>    | sensitivity in free space                                                                                                                               |
| ConvF                    | sensitivity in TSL / NORM <sub>x,y,z</sub>                                                                                                              |
| DCP                      | diode compression point                                                                                                                                 |
| CF                       | crest factor (1/duty_cycle) of the RF signal                                                                                                            |
| A, B, C, D               | modulation dependent linearization parameters                                                                                                           |
| Polarization $\varphi$   | $\varphi$ rotation around probe axis                                                                                                                    |
| Polarization $\vartheta$ | $\vartheta$ rotation around an axis that is in the plane normal to probe axis (at measurement center),<br>i.e., $\vartheta = 0$ is normal to probe axis |

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

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

### Methods Applied and Interpretation of Parameters:

- NORM<sub>x,y,z</sub>**: Assessed for E-field polarization  $\vartheta = 0$  ( $f \leq 900$  MHz in TEM-cell;  $f > 1800$  MHz: R22 waveguide). NORM<sub>x,y,z</sub> are only intermediate values, i.e., the uncertainties of NORM<sub>x,y,z</sub> does not affect the  $E^2$ -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.

# Probe ES3DV2

## SN:3022

Manufactured: April 15, 2003  
Calibrated: August 22, 2013

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

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

### Basic Calibration Parameters

|                                                           | Sensor X | Sensor Y | Sensor Z | Unc (k=2) |
|-----------------------------------------------------------|----------|----------|----------|-----------|
| Norm ( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>A</sup> | 1.00     | 1.04     | 0.99     | ± 10.1 %  |
| DCP (mV) <sup>B</sup>                                     | 100.7    | 97.4     | 99.7     |           |

### Modulation Calibration Parameters

| UID | Communication System Name |   | A<br>dB | B<br>dB $\sqrt{\mu\text{V}}$ | C   | D<br>dB | VR<br>mV | Unc <sup>E</sup><br>(k=2) |
|-----|---------------------------|---|---------|------------------------------|-----|---------|----------|---------------------------|
| 0   | CW                        | X | 0.0     | 0.0                          | 1.0 | 0.00    | 178.6    | ±3.0 %                    |
|     |                           | Y | 0.0     | 0.0                          | 1.0 |         | 141.9    |                           |
|     |                           | Z | 0.0     | 0.0                          | 1.0 |         | 134.7    |                           |

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

<sup>A</sup> The uncertainties of NormX,Y,Z do not affect the E<sup>2</sup>-field uncertainty inside TSL (see Pages 5 and 6).

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

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

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

### Calibration Parameter Determined in Head Tissue Simulating Media

| f (MHz) <sup>C</sup> | Relative Permittivity <sup>F</sup> | Conductivity (S/m) <sup>F</sup> | ConvF X | ConvF Y | ConvF Z | Alpha | Depth (mm) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|-------|------------|-------------|
| 750                  | 41.9                               | 0.89                            | 6.21    | 6.21    | 6.21    | 0.19  | 2.37       | ± 12.0 %    |
| 835                  | 41.5                               | 0.90                            | 6.09    | 6.09    | 6.09    | 0.30  | 1.70       | ± 12.0 %    |
| 1750                 | 40.1                               | 1.37                            | 5.19    | 5.19    | 5.19    | 0.65  | 1.23       | ± 12.0 %    |
| 1900                 | 40.0                               | 1.40                            | 5.03    | 5.03    | 5.03    | 0.51  | 1.43       | ± 12.0 %    |
| 2450                 | 39.2                               | 1.80                            | 4.36    | 4.36    | 4.36    | 0.51  | 1.51       | ± 12.0 %    |
| 2600                 | 39.0                               | 1.96                            | 4.16    | 4.16    | 4.16    | 0.74  | 1.29       | ± 12.0 %    |

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

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

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

### Calibration Parameter Determined in Body Tissue Simulating Media

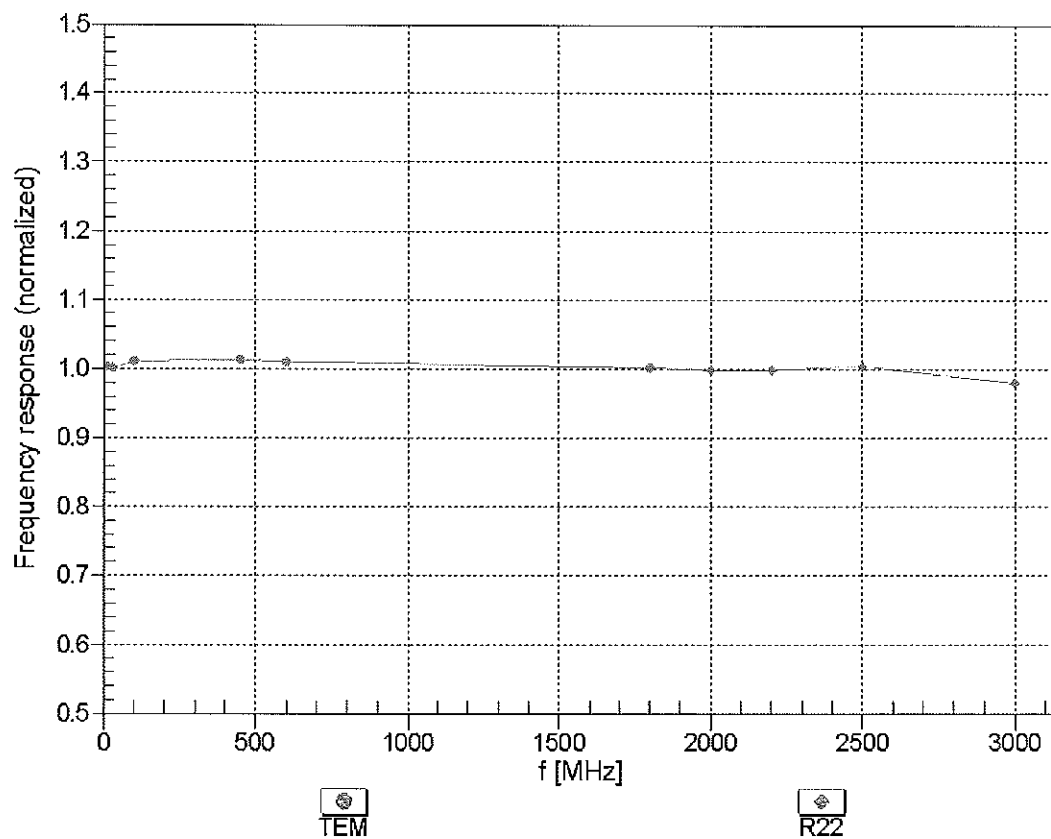
| f (MHz) <sup>C</sup> | Relative Permittivity <sup>F</sup> | Conductivity (S/m) <sup>F</sup> | ConvF X | ConvF Y | ConvF Z | Alpha | Depth (mm) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|-------|------------|-------------|
| 750                  | 55.5                               | 0.96                            | 5.92    | 5.92    | 5.92    | 0.24  | 1.99       | ± 12.0 %    |
| 835                  | 55.2                               | 0.97                            | 5.91    | 5.91    | 5.91    | 0.29  | 1.85       | ± 12.0 %    |
| 1750                 | 53.4                               | 1.49                            | 4.75    | 4.75    | 4.75    | 0.52  | 1.52       | ± 12.0 %    |
| 1900                 | 53.3                               | 1.52                            | 4.49    | 4.49    | 4.49    | 0.49  | 1.56       | ± 12.0 %    |
| 2450                 | 52.7                               | 1.95                            | 4.01    | 4.01    | 4.01    | 0.70  | 1.02       | ± 12.0 %    |
| 2600                 | 52.5                               | 2.16                            | 3.85    | 3.85    | 3.85    | 0.58  | 0.90       | ± 12.0 %    |

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

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

## Frequency Response of E-Field

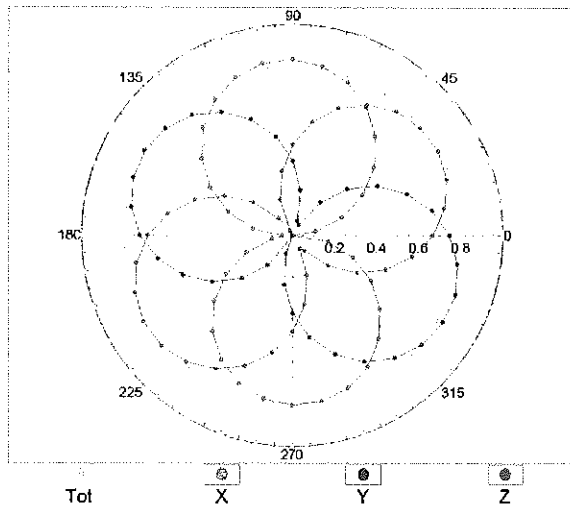
(TEM-Cell:ifi110 EXX, Waveguide: R22)



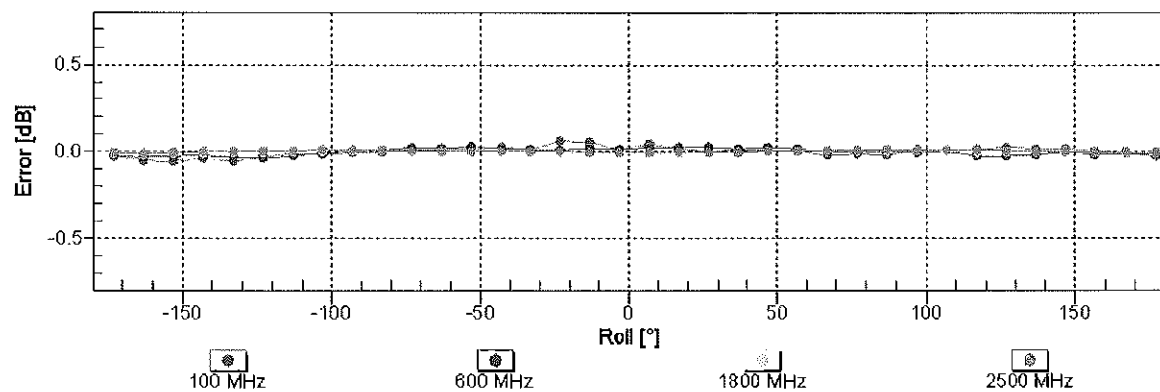
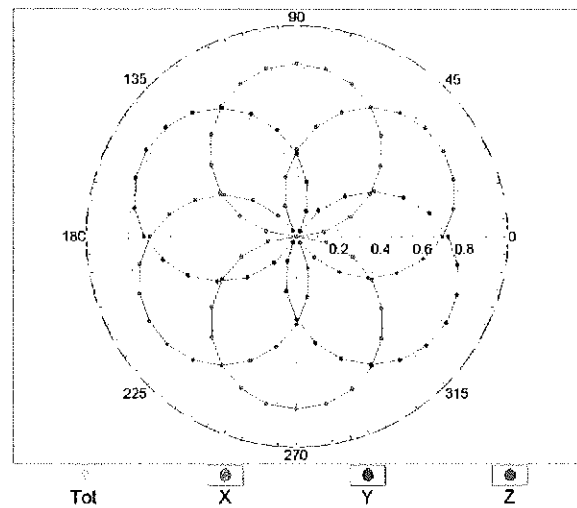
Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  (k=2)

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

f=600 MHz,TEM

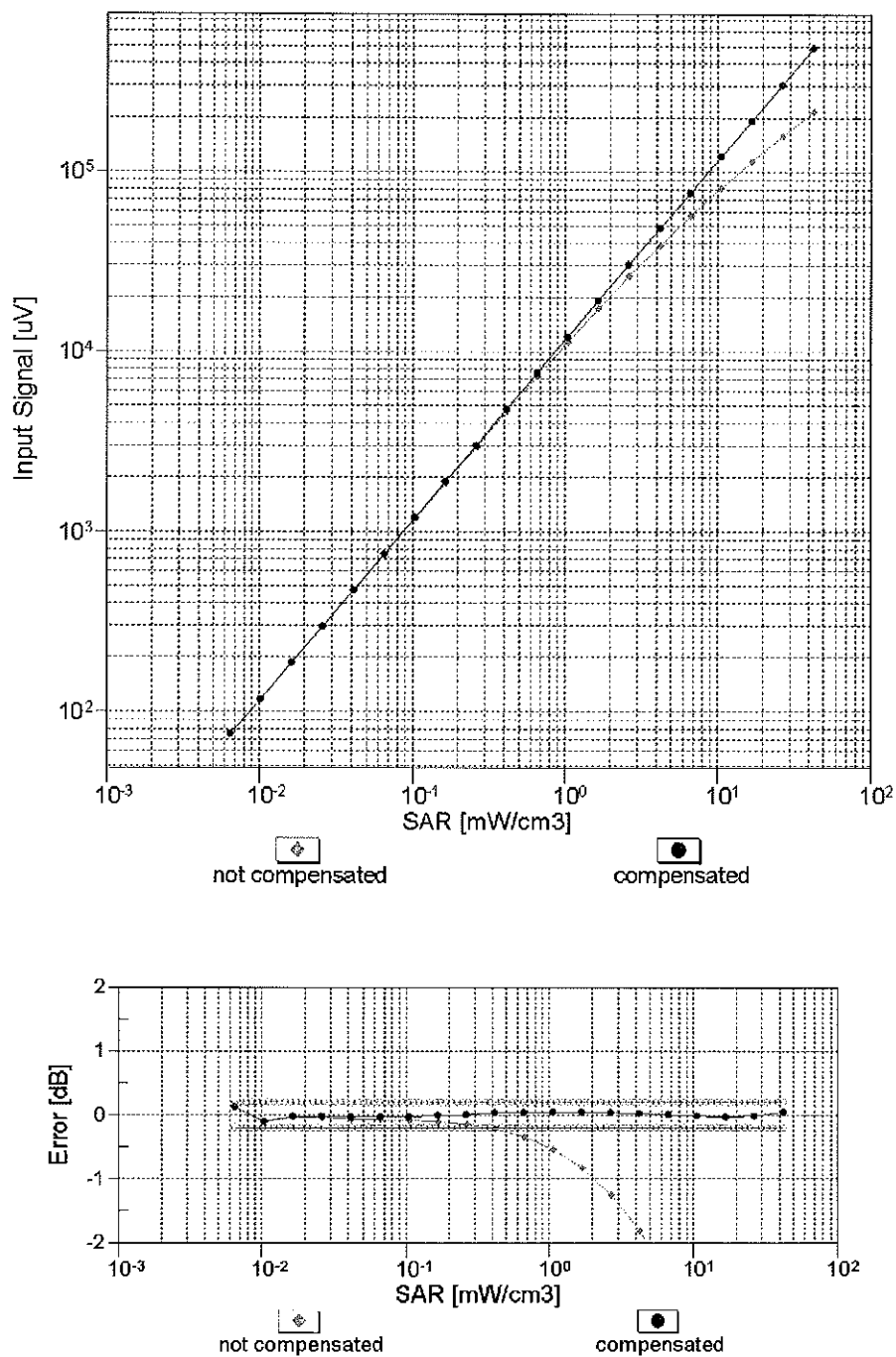


f=1800 MHz,R22



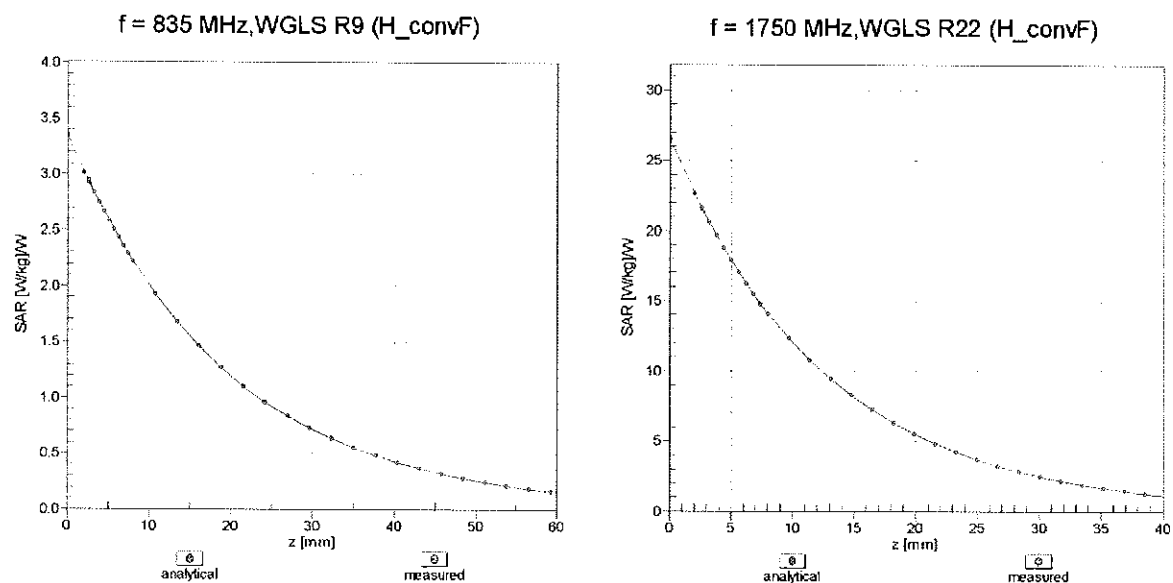
Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

# Dynamic Range f(SAR<sub>head</sub>) (TEM cell , f = 900 MHz)



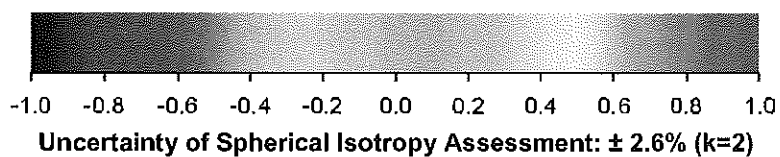
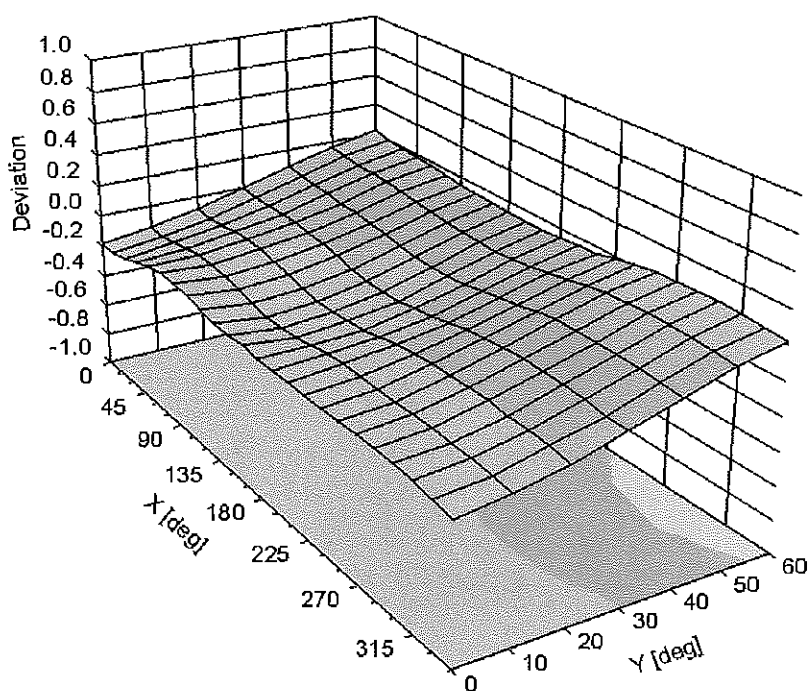
Uncertainty of Linearity Assessment:  $\pm 0.6\%$  (k=2)

## Conversion Factor Assessment



## Deviation from Isotropy in Liquid

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



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

### Other Probe Parameters

|                                               |            |
|-----------------------------------------------|------------|
| Sensor Arrangement                            | Triangular |
| Connector Angle (°)                           | -83.1      |
| Mechanical Surface Detection Mode             | enabled    |
| Optical Surface Detection Mode                | disabled   |
| Probe Overall Length                          | 337 mm     |
| Probe Body Diameter                           | 10 mm      |
| Tip Length                                    | 10 mm      |
| Tip Diameter                                  | 4 mm       |
| Probe Tip to Sensor X Calibration Point       | 2 mm       |
| Probe Tip to Sensor Y Calibration Point       | 2 mm       |
| Probe Tip to Sensor Z Calibration Point       | 2 mm       |
| Recommended Measurement Distance from Surface | 3 mm       |



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Accreditation No.: **SCS 108**

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

Client **PC Test**

Certificate No: **ES3-3319\_Apr13**

## CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3319**

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

Calibration date: **April 29, 2013**

VCC  
6/14/13

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

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

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards          | ID              | Cal Date (Certificate No.)        | Scheduled Calibration  |
|----------------------------|-----------------|-----------------------------------|------------------------|
| Power meter E4419B         | GB41293874      | 04-Apr-13 (No. 217-01733)         | Apr-14                 |
| Power sensor E4412A        | MY41498087      | 04-Apr-13 (No. 217-01733)         | Apr-14                 |
| Reference 3 dB Attenuator  | SN: S5054 (3c)  | 04-Apr-13 (No. 217-01737)         | Apr-14                 |
| Reference 20 dB Attenuator | SN: S5277 (20x) | 04-Apr-13 (No. 217-01735)         | Apr-14                 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 04-Apr-13 (No. 217-01738)         | Apr-14                 |
| Reference Probe ES3DV2     | SN: 3013        | 28-Dec-12 (No. ES3-3013_Dec12)    | Dec-13                 |
| DAE4                       | SN: 660         | 31-Jan-13 (No. DAE4-660_Jan13)    | Jan-14                 |
| Secondary Standards        | ID              | Check Date (in house)             | Scheduled Check        |
| RF generator HP 8648C      | US3642U01700    | 4-Aug-99 (in house check Apr-13)  | In house check: Apr-15 |
| Network Analyzer HP 8753E  | US37390585      | 18-Oct-01 (in house check Oct-12) | In house check: Oct-13 |

|                                                                                                                 | Name          | Function              | Signature              |
|-----------------------------------------------------------------------------------------------------------------|---------------|-----------------------|------------------------|
| Calibrated by:                                                                                                  | Dimce Iliev   | Laboratory Technician |                        |
| Approved by:                                                                                                    | Katja Pokovic | Technical Manager     |                        |
|                                                                                                                 |               |                       | Issued: April 29, 2013 |
| This calibration certificate shall not be reproduced except in full without written approval of the laboratory. |               |                       |                        |



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 Multilateral Agreement for the recognition of calibration certificates

### Glossary:

|                          |                                                                                                                                                         |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| TSL                      | tissue simulating liquid                                                                                                                                |
| NORM <sub>x,y,z</sub>    | sensitivity in free space                                                                                                                               |
| ConvF                    | sensitivity in TSL / NORM <sub>x,y,z</sub>                                                                                                              |
| DCP                      | diode compression point                                                                                                                                 |
| CF                       | crest factor (1/duty_cycle) of the RF signal                                                                                                            |
| A, B, C, D               | modulation dependent linearization parameters                                                                                                           |
| Polarization $\phi$      | $\phi$ rotation around probe axis                                                                                                                       |
| Polarization $\vartheta$ | $\vartheta$ rotation around an axis that is in the plane normal to probe axis (at measurement center),<br>i.e., $\vartheta = 0$ is normal to probe axis |

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

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

### Methods Applied and Interpretation of Parameters:

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

# Probe ES3DV3

## SN:3319

Manufactured: January 10, 2012  
Calibrated: April 29, 2013

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 ( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>A</sup> | 1.12     | 1.20     | 1.22     | ± 10.1 %  |
| DCP (mV) <sup>B</sup>                                     | 100.7    | 102.6    | 102.4    |           |

### Modulation Calibration Parameters

| UID | Communication System Name |   | A<br>dB | B<br>dB/ $\mu\text{V}$ | 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    | 152.0    | ±3.8 %                    |
|     |                           | Y | 0.0     | 0.0                    | 1.0 |         | 159.0    |                           |
|     |                           | Z | 0.0     | 0.0                    | 1.0 |         | 149.8    |                           |

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

<sup>A</sup> The uncertainties of NormX,Y,Z do not affect the  $E^2$ -field uncertainty inside TSL (see Pages 5 and 6).

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

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

## DASY/EASY - Parameters of Probe: ES3DV3 - SN: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 | Depth (mm) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|-------|------------|-------------|
| 750                  | 41.9                               | 0.89                            | 6.49    | 6.49    | 6.49    | 0.28  | 1.97       | ± 12.0 %    |
| 850                  | 41.5                               | 0.92                            | 6.23    | 6.23    | 6.23    | 0.42  | 1.57       | ± 12.0 %    |
| 1900                 | 40.0                               | 1.40                            | 5.22    | 5.22    | 5.22    | 0.80  | 1.24       | ± 12.0 %    |
| 2450                 | 39.2                               | 1.80                            | 4.57    | 4.57    | 4.57    | 0.80  | 1.32       | ± 12.0 %    |

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

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

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

### Calibration Parameter Determined in Body Tissue Simulating Media

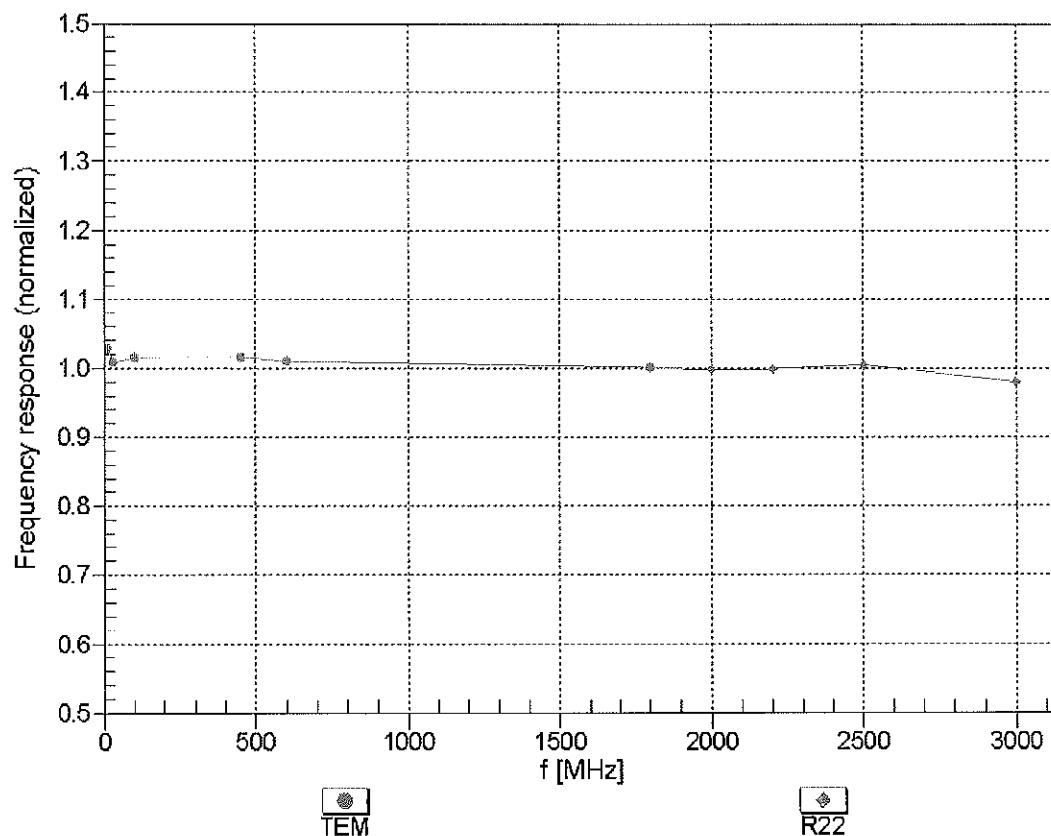
| f (MHz) <sup>C</sup> | Relative Permittivity <sup>F</sup> | Conductivity (S/m) <sup>F</sup> | ConvF X | ConvF Y | ConvF Z | Alpha | Depth (mm) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|-------|------------|-------------|
| 750                  | 55.5                               | 0.96                            | 6.30    | 6.30    | 6.30    | 0.45  | 1.53       | ± 12.0 %    |
| 850                  | 55.2                               | 0.99                            | 6.15    | 6.15    | 6.15    | 0.42  | 1.65       | ± 12.0 %    |
| 1900                 | 53.3                               | 1.52                            | 4.85    | 4.85    | 4.85    | 0.63  | 1.49       | ± 12.0 %    |
| 2450                 | 52.7                               | 1.95                            | 4.32    | 4.32    | 4.32    | 0.69  | 1.20       | ± 12.0 %    |

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

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

## Frequency Response of E-Field

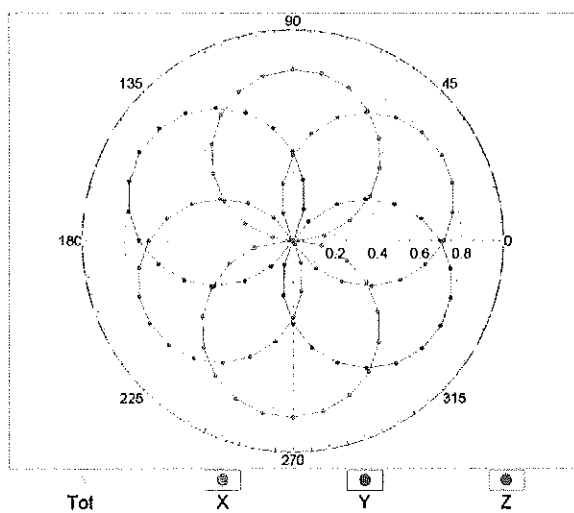
(TEM-Cell:ifi110 EXX, Waveguide: R22)



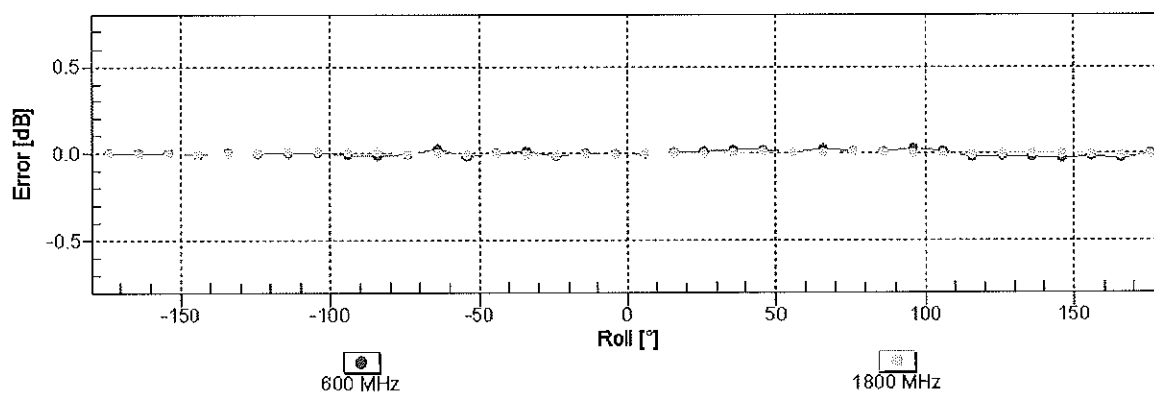
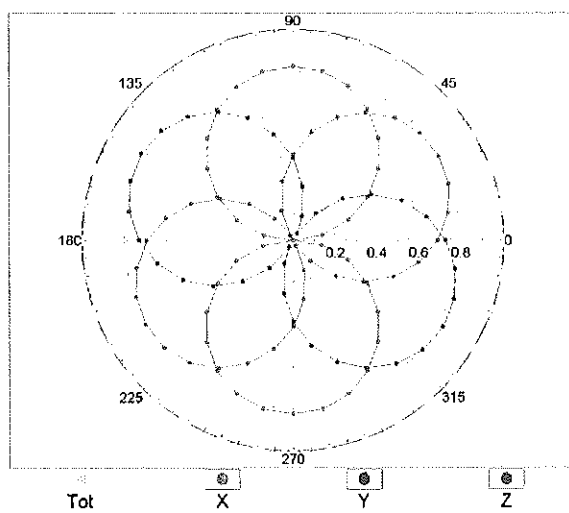
Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  (k=2)

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

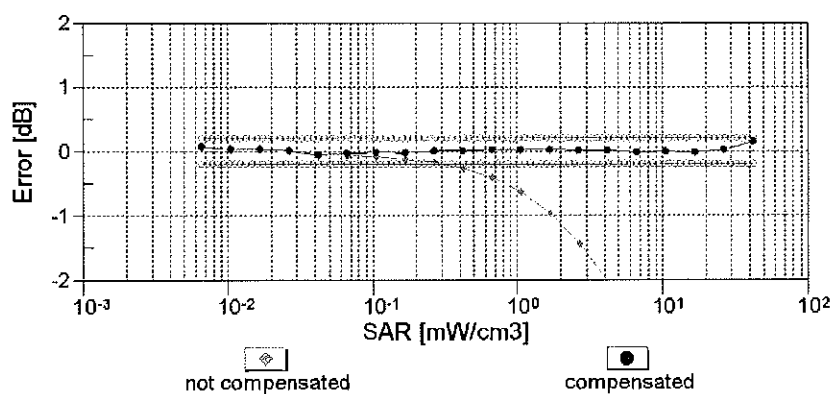
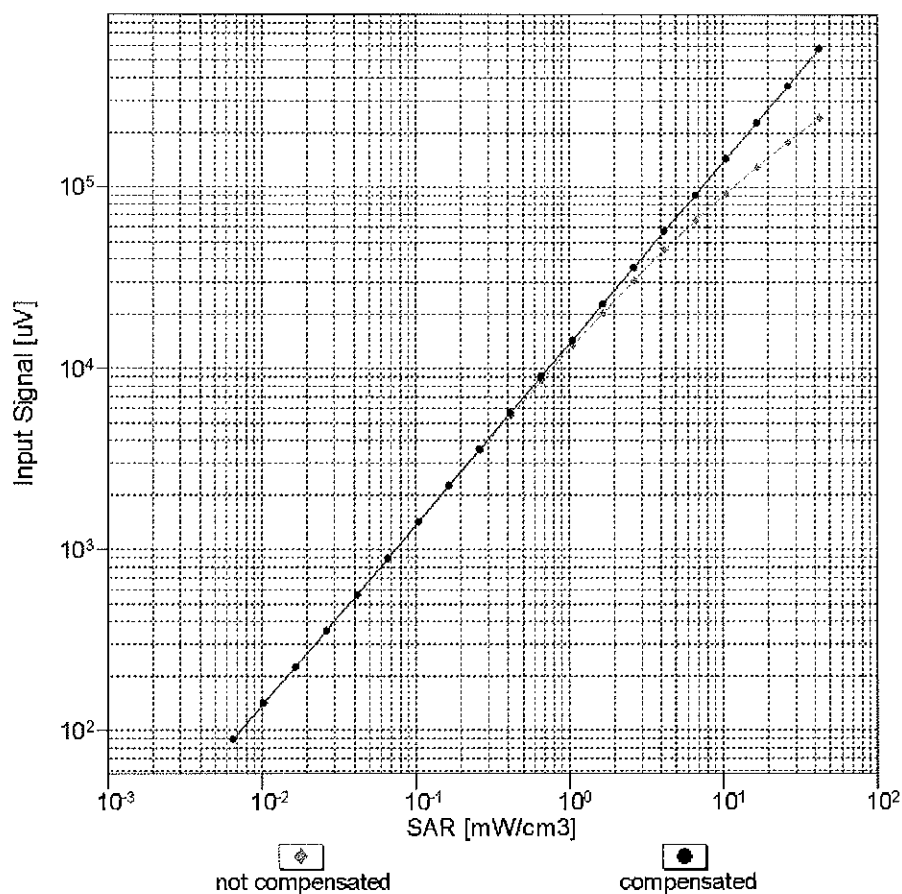
f=600 MHz,TEM



f=1800 MHz,R22

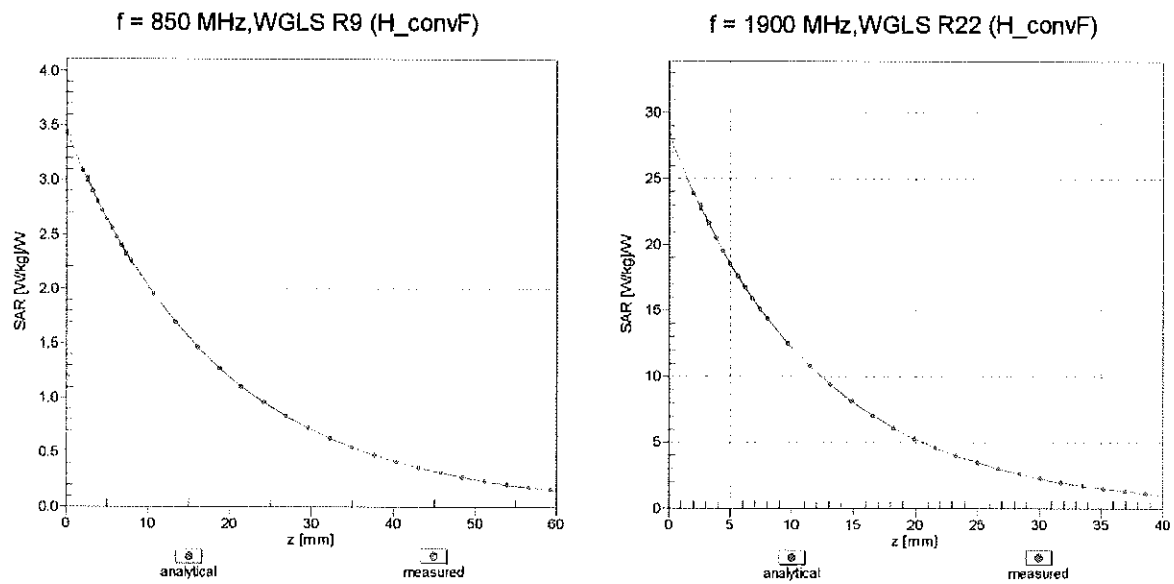
**Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )**

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



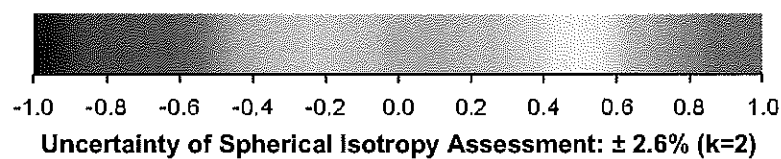
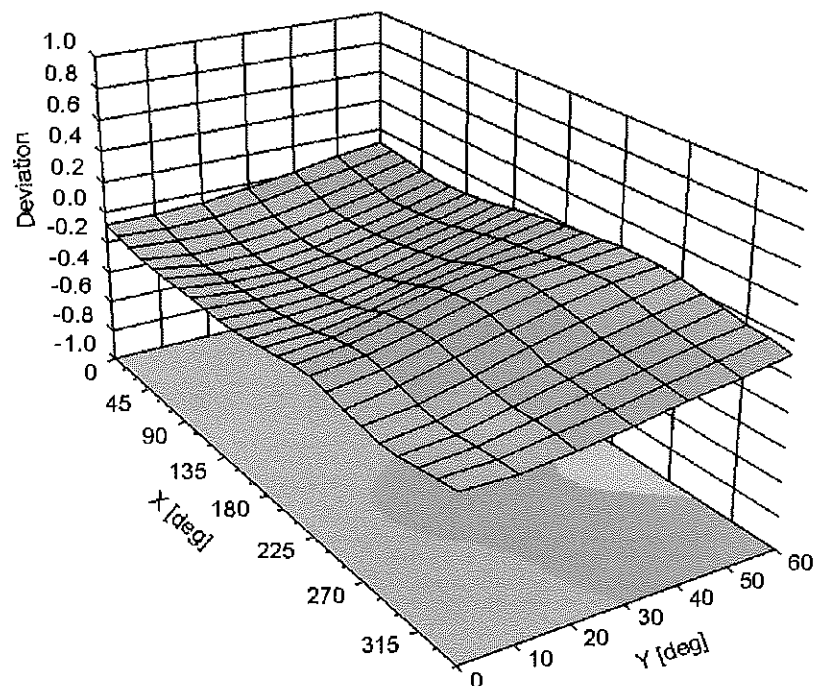
Uncertainty of Linearity Assessment:  $\pm 0.6\%$  ( $k=2$ )

## Conversion Factor Assessment



## Deviation from Isotropy in Liquid

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



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

### Other Probe Parameters

|                                               |            |
|-----------------------------------------------|------------|
| Sensor Arrangement                            | Triangular |
| Connector Angle (°)                           | -104.1     |
| Mechanical Surface Detection Mode             | enabled    |
| Optical Surface Detection Mode                | disabled   |
| Probe Overall Length                          | 337 mm     |
| Probe Body Diameter                           | 10 mm      |
| Tip Length                                    | 10 mm      |
| Tip Diameter                                  | 4 mm       |
| Probe Tip to Sensor X Calibration Point       | 2 mm       |
| Probe Tip to Sensor Y Calibration Point       | 2 mm       |
| Probe Tip to Sensor Z Calibration Point       | 2 mm       |
| Recommended Measurement Distance from Surface | 3 mm       |

## **Additional Conversion Factors**

**for Dosimetric E-Field Probe**

Type:

**ES3DV3**

Serial Number:

**3319**

Place of Assessment:

**Zurich**

Date of Assessment:

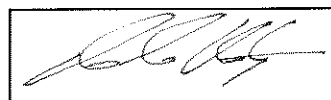
**June 19, 2013**

Probe Calibration Date:

**April 29, 2013**

Schmid & Partner Engineering AG hereby certifies that conversion factor(s) of this probe have been evaluated on the date indicated above. The assessment was performed using the FDTD numerical code SEMCAD of Schmid & Partner Engineering AG. The evaluation is coupled with measured conversion factors (probe calibration date indicated above). The uncertainty of the numerical assessment is based on the extrapolation from measured value at 835 MHz or at 1900 MHz.

Assessed by:



✓  
KOK  
6/25/13

## Dosimetric E-Field Probe ES3DV3 SN:3319

Conversion factor ( $\pm$  standard deviation)

1750  $\pm$  50 MHz      *ConvF*      5.59  $\pm$  7 %

$\epsilon_r = 40.1 \pm 5\%$   
 $\sigma = 1.37 \pm 5\%$  mho/m  
(head tissue)

1750  $\pm$  50 MHz      *ConvF*      5.22  $\pm$  7 %

$\epsilon_r = 53.4 \pm 5\%$   
 $\sigma = 1.49 \pm 5\%$  mho/m  
(body tissue)

### Important Note:

For numerically assessed probe conversion factors, parameters Alpha and Delta in the DASY software must have the following entries: Alpha = 0 and Delta = 1.

Please see also DASY Manual.



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

Accreditation No.: **SCS 108**

Client **PC Test**

Certificate No: **ES3-3288\_Sep13/2**

## **CALIBRATION CERTIFICATE (Replacement of No: ES3-3288\_Sep13)**

Object **ES3DV3 - SN:3288**

CCV  
 10/4/13

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

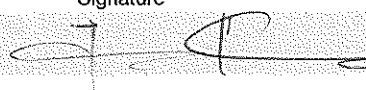
Calibration date: **September 23, 2013**

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

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

Calibration Equipment used (M&TE critical for calibration)

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

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

Issued: October 4, 2013

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

# Probe ES3DV3

## SN:3288

Manufactured: July 6, 2010  
Calibrated: September 23, 2013

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



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

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

### Glossary:

|                          |                                                                                                                                                         |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| TSL                      | tissue simulating liquid                                                                                                                                |
| NORM <sub>x,y,z</sub>    | sensitivity in free space                                                                                                                               |
| ConvF                    | sensitivity in TSL / NORM <sub>x,y,z</sub>                                                                                                              |
| DCP                      | diode compression point                                                                                                                                 |
| CF                       | crest factor (1/duty_cycle) of the RF signal                                                                                                            |
| A, B, C, D               | modulation dependent linearization parameters                                                                                                           |
| Polarization $\varphi$   | $\varphi$ rotation around probe axis                                                                                                                    |
| Polarization $\vartheta$ | $\vartheta$ rotation around an axis that is in the plane normal to probe axis (at measurement center),<br>i.e., $\vartheta = 0$ is normal to probe axis |

### 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.

## DASY/EASY - Parameters of Probe: ES3DV3 - SN:3288

### Basic Calibration Parameters

|                                                           | Sensor X | Sensor Y | Sensor Z | Unc (k=2) |
|-----------------------------------------------------------|----------|----------|----------|-----------|
| Norm ( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>A</sup> | 0.87     | 0.97     | 0.75     | ± 10.1 %  |
| DCP (mV) <sup>B</sup>                                     | 103.3    | 103.2    | 100.2    |           |

### Modulation Calibration Parameters

| UID | Communication System Name |   | A<br>dB | B<br>dB $\sqrt{\mu\text{V}}$ | C   | D<br>dB | VR<br>mV | Unc <sup>E</sup><br>(k=2) |
|-----|---------------------------|---|---------|------------------------------|-----|---------|----------|---------------------------|
| 0   | CW                        | X | 0.0     | 0.0                          | 1.0 | 0.00    | 171.1    | ±3.5 %                    |
|     |                           | Y | 0.0     | 0.0                          | 1.0 |         | 135.0    |                           |
|     |                           | Z | 0.0     | 0.0                          | 1.0 |         | 154.3    |                           |

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<sup>2</sup>-field uncertainty inside TSL (see Pages 5 and 6).

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

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

## DASY/EASY - Parameters of Probe: ES3DV3 - SN:3288

### Calibration Parameter Determined in Head Tissue Simulating Media

| f (MHz) <sup>C</sup> | Relative Permittivity <sup>F</sup> | Conductivity (S/m) <sup>F</sup> | ConvF X | ConvF Y | ConvF Z | Alpha | Depth (mm) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|-------|------------|-------------|
| 750                  | 41.9                               | 0.89                            | 6.56    | 6.56    | 6.56    | 0.32  | 1.89       | ± 12.0 %    |
| 835                  | 41.5                               | 0.90                            | 6.37    | 6.37    | 6.37    | 0.34  | 1.82       | ± 12.0 %    |
| 1750                 | 40.1                               | 1.37                            | 5.67    | 5.67    | 5.67    | 0.56  | 1.51       | ± 12.0 %    |
| 1900                 | 40.0                               | 1.40                            | 5.47    | 5.47    | 5.47    | 0.80  | 1.29       | ± 12.0 %    |
| 2450                 | 39.2                               | 1.80                            | 4.63    | 4.63    | 4.63    | 0.80  | 1.34       | ± 12.0 %    |
| 2600                 | 39.0                               | 1.96                            | 4.55    | 4.55    | 4.55    | 0.80  | 1.41       | ± 12.0 %    |

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

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

## DASY/EASY - Parameters of Probe: ES3DV3 - SN:3288

### Calibration Parameter Determined in Body Tissue Simulating Media

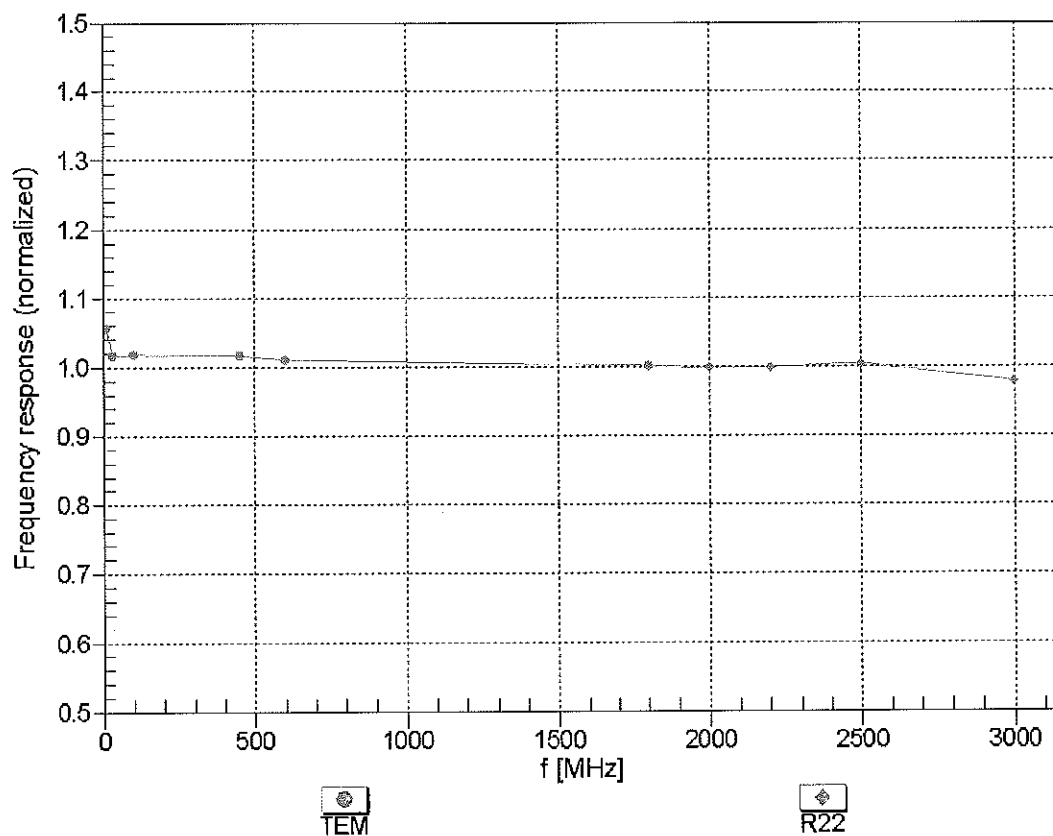
| f (MHz) <sup>C</sup> | Relative Permittivity <sup>F</sup> | Conductivity (S/m) <sup>F</sup> | ConvF X | ConvF Y | ConvF Z | Alpha | Depth (mm) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|-------|------------|-------------|
| 750                  | 55.5                               | 0.96                            | 6.25    | 6.25    | 6.25    | 0.70  | 1.27       | ± 12.0 %    |
| 835                  | 55.2                               | 0.97                            | 6.27    | 6.27    | 6.27    | 0.75  | 1.22       | ± 12.0 %    |
| 1750                 | 53.4                               | 1.49                            | 5.10    | 5.10    | 5.10    | 0.59  | 1.46       | ± 12.0 %    |
| 1900                 | 53.3                               | 1.52                            | 4.82    | 4.82    | 4.82    | 0.53  | 1.54       | ± 12.0 %    |
| 2450                 | 52.7                               | 1.95                            | 4.37    | 4.37    | 4.37    | 0.80  | 1.02       | ± 12.0 %    |
| 2600                 | 52.5                               | 2.16                            | 4.14    | 4.14    | 4.14    | 0.64  | 0.94       | ± 12.0 %    |

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

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

## Frequency Response of E-Field

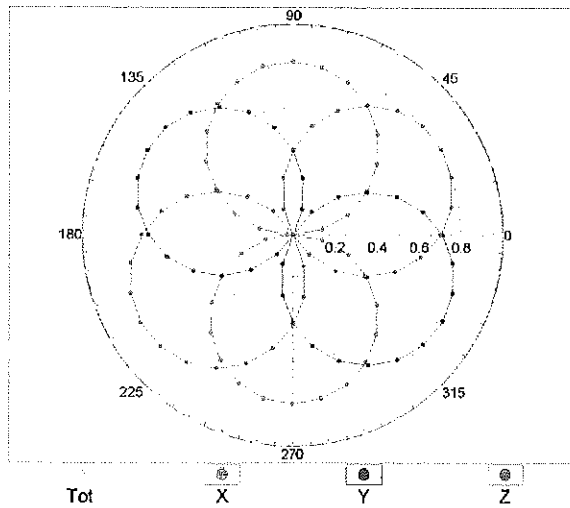
(TEM-Cell:ifi110 EXX, Waveguide: R22)



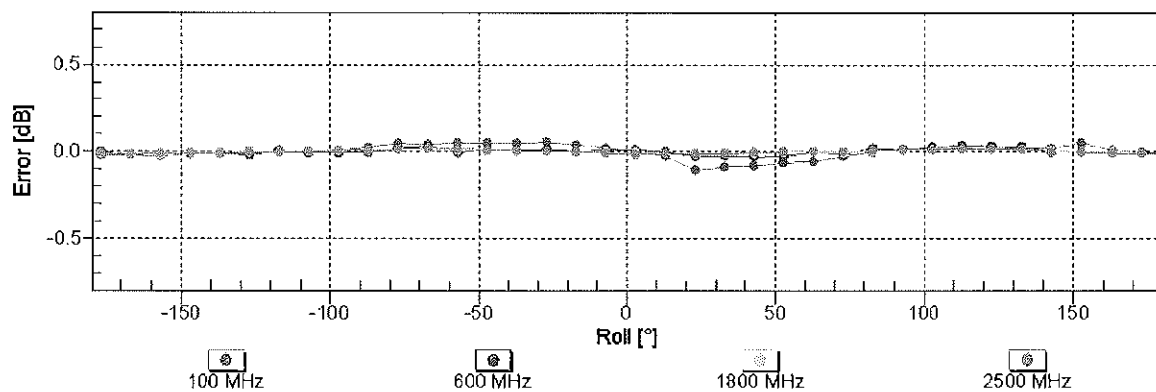
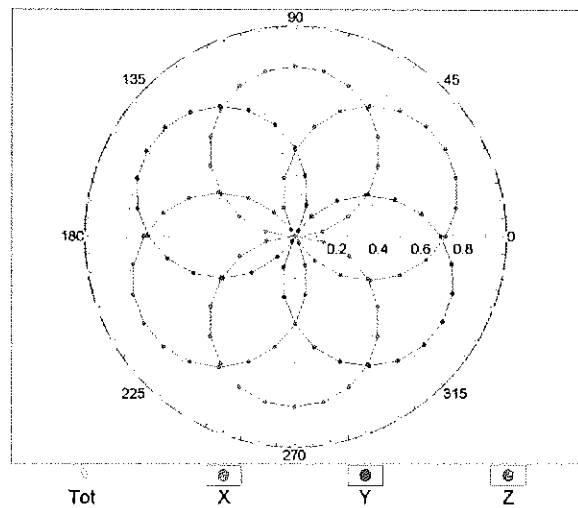
Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  ( $k=2$ )

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

f=600 MHz,TEM

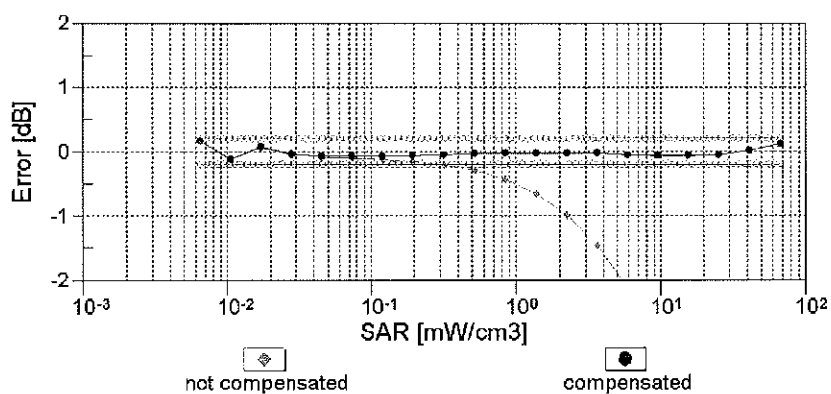
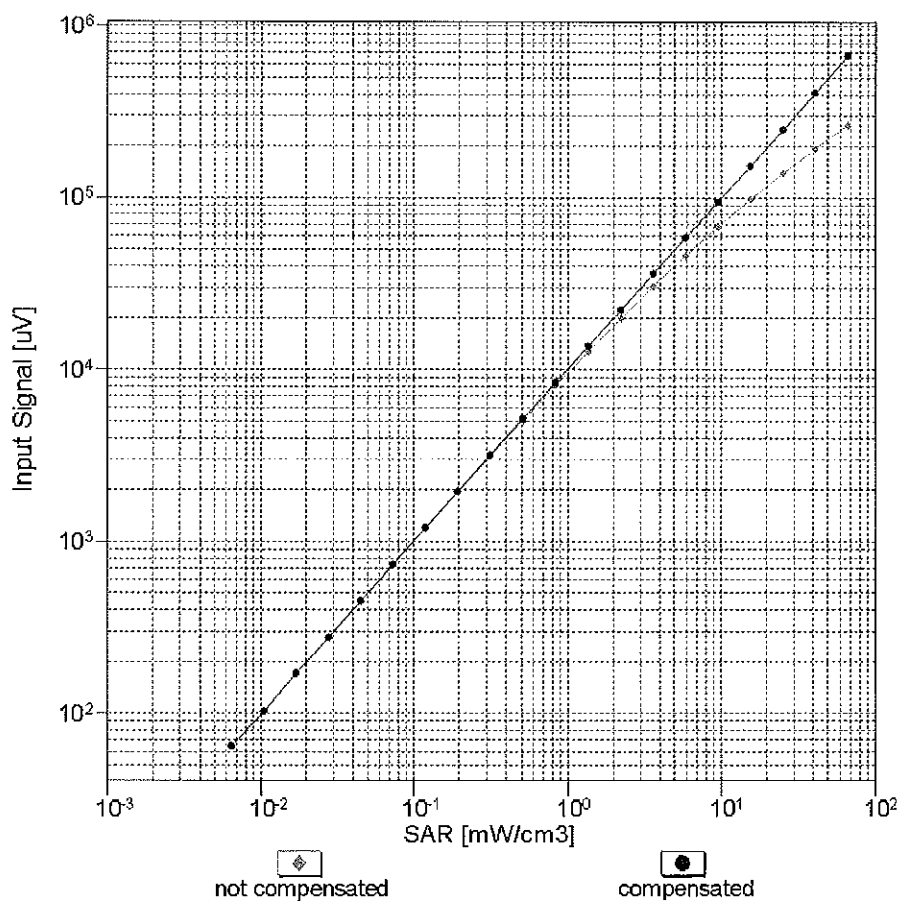


f=1800 MHz,R22



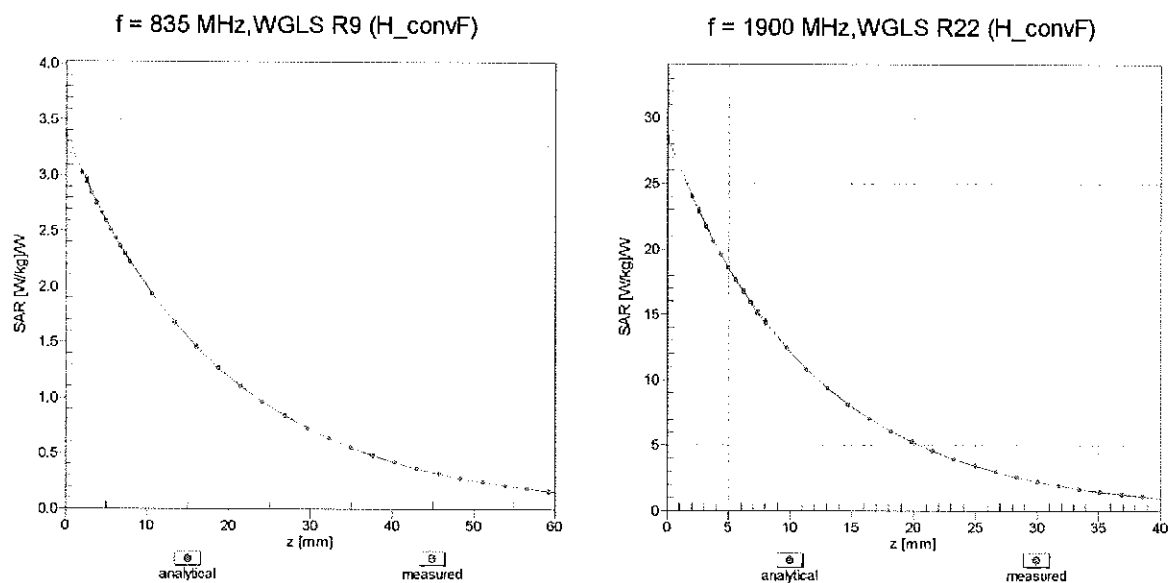
Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

# Dynamic Range f(SAR<sub>head</sub>) (TEM cell , f = 900 MHz)



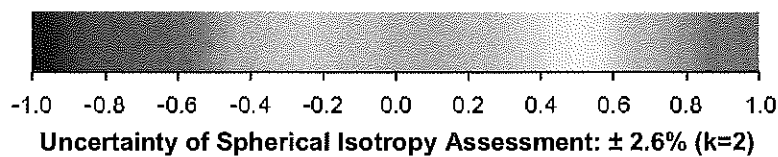
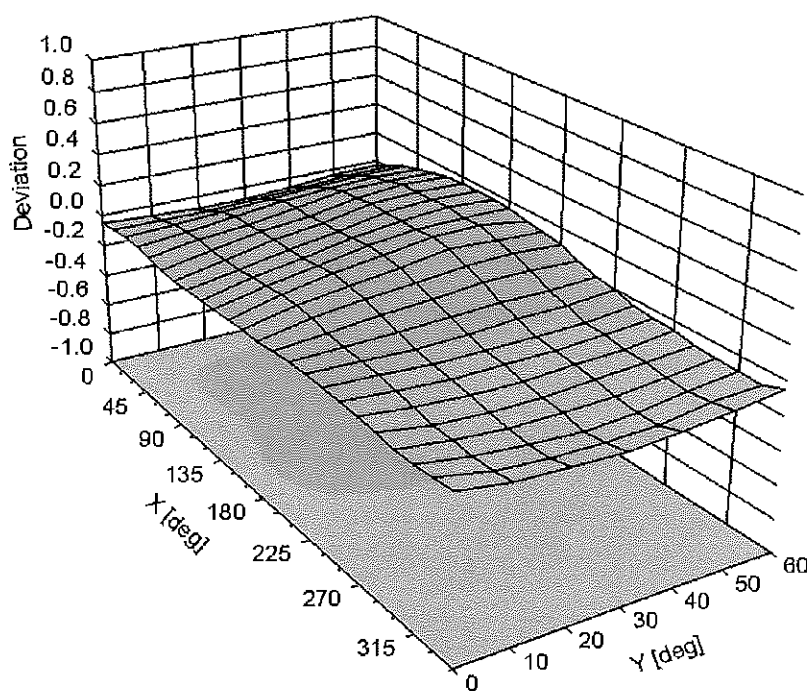
Uncertainty of Linearity Assessment:  $\pm 0.6\%$  (k=2)

## Conversion Factor Assessment



## Deviation from Isotropy in Liquid

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



## DASY/EASY - Parameters of Probe: ES3DV3 - SN:3288

### Other Probe Parameters

|                                               |            |
|-----------------------------------------------|------------|
| Sensor Arrangement                            | Triangular |
| Connector Angle (°)                           | -127.1     |
| Mechanical Surface Detection Mode             | enabled    |
| Optical Surface Detection Mode                | disabled   |
| Probe Overall Length                          | 337 mm     |
| Probe Body Diameter                           | 10 mm      |
| Tip Length                                    | 10 mm      |
| Tip Diameter                                  | 4 mm       |
| Probe Tip to Sensor X Calibration Point       | 2 mm       |
| Probe Tip to Sensor Y Calibration Point       | 2 mm       |
| Probe Tip to Sensor Z Calibration Point       | 2 mm       |
| Recommended Measurement Distance from Surface | 3 mm       |



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Accreditation No.: **SCS 108**

Client **PC Test**

Certificate No: **EX3-3589 Jan13**

## CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:3589**

Calibration procedure(s) **QA CAL-01.v8, QA CAL-14.v3, QA CAL-23.v4, QA CAL-25.v4**  
**Calibration procedure for dosimetric E-field probes**

Calibration date: **January 17, 2013**

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

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

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards          | ID              | Cal Date (Certificate No.)        | Scheduled Calibration  |
|----------------------------|-----------------|-----------------------------------|------------------------|
| Power meter E4419B         | GB41293874      | 29-Mar-12 (No. 217-01508)         | Apr-13                 |
| Power sensor E4412A        | MY41498087      | 29-Mar-12 (No. 217-01508)         | Apr-13                 |
| Reference 3 dB Attenuator  | SN: S5054 (3c)  | 27-Mar-12 (No. 217-01531)         | Apr-13                 |
| Reference 20 dB Attenuator | SN: S5086 (20b) | 27-Mar-12 (No. 217-01529)         | Apr-13                 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 27-Mar-12 (No. 217-01532)         | Apr-13                 |
| Reference Probe ES3DV2     | SN: 3013        | 28-Dec-12 (No. ES3-3013_Dec12)    | Dec-13                 |
| DAE4                       | SN: 660         | 20-Jun-12 (No. DAE4-660_Jun12)    | Jun-13                 |
| Secondary Standards        | ID              | Check Date (in house)             | Scheduled Check        |
| RF generator HP 8648C      | US3642U01700    | 4-Aug-99 (in house check Apr-11)  | In house check: Apr-13 |
| Network Analyzer HP 8753E  | US37390585      | 18-Oct-01 (in house check Oct-12) | In house check: Oct-13 |

|                                                                                                                 | Name           | Function              | Signature |
|-----------------------------------------------------------------------------------------------------------------|----------------|-----------------------|-----------|
| Calibrated by:                                                                                                  | Jeton Kastrati | Laboratory Technician |           |
| Approved by:                                                                                                    | Katja Pokovic  | Technical Manager     |           |
| Issued: January 17, 2013                                                                                        |                |                       |           |
| This calibration certificate shall not be reproduced except in full without written approval of the laboratory. |                |                       |           |



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

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

### Glossary:

|                          |                                                                                                                                                         |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| TSL                      | tissue simulating liquid                                                                                                                                |
| NORM <sub>x,y,z</sub>    | sensitivity in free space                                                                                                                               |
| ConvF                    | sensitivity in TSL / NORM <sub>x,y,z</sub>                                                                                                              |
| DCP                      | diode compression point                                                                                                                                 |
| CF                       | crest factor (1/duty_cycle) of the RF signal                                                                                                            |
| A, B, C, D               | modulation dependent linearization parameters                                                                                                           |
| Polarization $\phi$      | $\phi$ rotation around probe axis                                                                                                                       |
| Polarization $\vartheta$ | $\vartheta$ rotation around an axis that is in the plane normal to probe axis (at measurement center),<br>i.e., $\vartheta = 0$ is normal to probe axis |

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

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

### Methods Applied and Interpretation of Parameters:

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

# Probe EX3DV4

## SN:3589

Manufactured: March 30, 2006  
Calibrated: January 17, 2013

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     | 0.40     | 0.40     | ± 10.1 %  |
| DCP (mV) <sup>B</sup>                                     | 100.5    | 103.8    | 99.6     |           |

### 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    | 165.8    | ±3.3 %                    |
|     |                           | Y | 0.0     | 0.0                          | 1.0 |         | 134.3    |                           |
|     |                           | Z | 0.0     | 0.0                          | 1.0 |         | 140.5    |                           |

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

<sup>A</sup> The uncertainties of NormX,Y,Z do not affect the E<sup>2</sup>-field uncertainty inside TSL (see Pages 5 and 6).

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

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

## DASY/EASY - Parameters of Probe: EX3DV4 - SN: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 | Depth (mm) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|-------|------------|-------------|
| 750                  | 41.9                               | 0.89                            | 8.70    | 8.70    | 8.70    | 0.39  | 0.96       | ± 12.0 %    |
| 835                  | 41.5                               | 0.90                            | 8.40    | 8.40    | 8.40    | 0.52  | 0.74       | ± 12.0 %    |
| 1750                 | 40.1                               | 1.37                            | 7.34    | 7.34    | 7.34    | 0.45  | 0.93       | ± 12.0 %    |
| 1900                 | 40.0                               | 1.40                            | 7.09    | 7.09    | 7.09    | 0.80  | 0.65       | ± 12.0 %    |
| 2450                 | 39.2                               | 1.80                            | 6.37    | 6.37    | 6.37    | 0.39  | 0.97       | ± 12.0 %    |
| 2600                 | 39.0                               | 1.96                            | 6.19    | 6.19    | 6.19    | 0.30  | 1.12       | ± 12.0 %    |
| 5200                 | 36.0                               | 4.66                            | 4.48    | 4.48    | 4.48    | 0.45  | 1.80       | ± 13.1 %    |
| 5300                 | 35.9                               | 4.76                            | 4.27    | 4.27    | 4.27    | 0.45  | 1.80       | ± 13.1 %    |
| 5500                 | 35.6                               | 4.96                            | 4.14    | 4.14    | 4.14    | 0.50  | 1.80       | ± 13.1 %    |
| 5600                 | 35.5                               | 5.07                            | 3.81    | 3.81    | 3.81    | 0.55  | 1.80       | ± 13.1 %    |
| 5800                 | 35.3                               | 5.27                            | 3.85    | 3.85    | 3.85    | 0.55  | 1.80       | ± 13.1 %    |

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

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

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3589

### Calibration Parameter Determined in Body Tissue Simulating Media

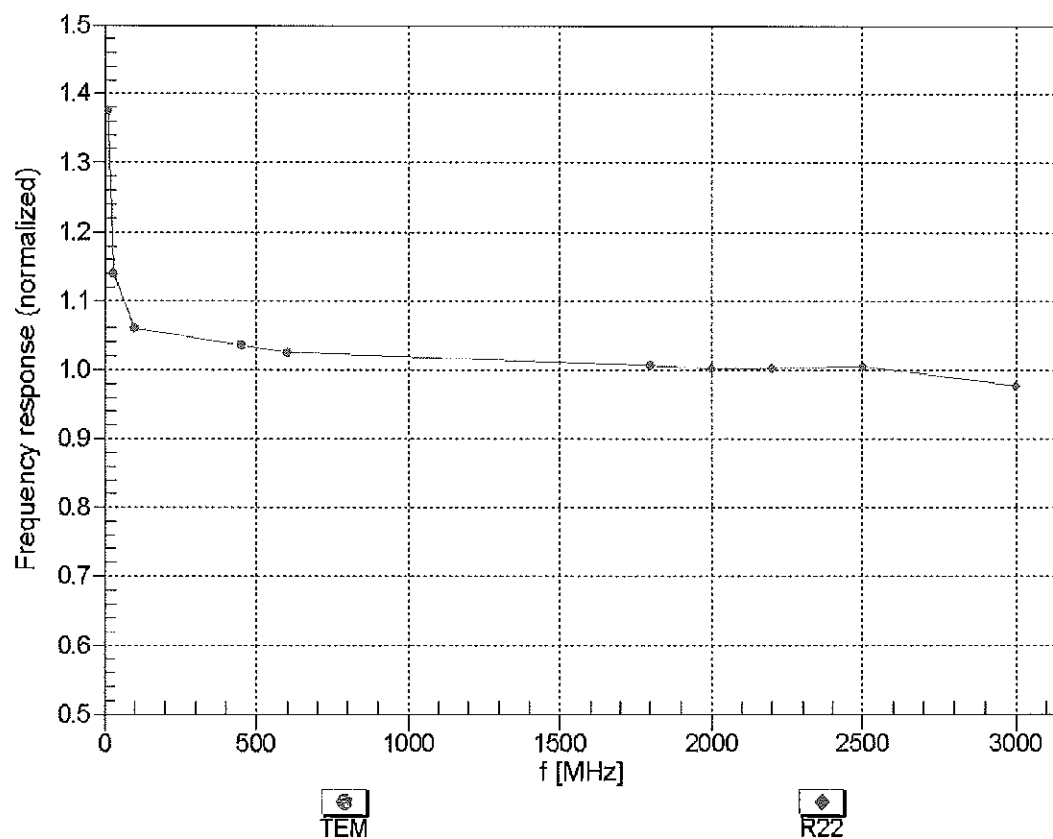
| f (MHz) <sup>C</sup> | Relative Permittivity <sup>F</sup> | Conductivity (S/m) <sup>F</sup> | ConvF X | ConvF Y | ConvF Z | Alpha | Depth (mm) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|-------|------------|-------------|
| 750                  | 55.5                               | 0.96                            | 8.59    | 8.59    | 8.59    | 0.49  | 0.86       | ± 12.0 %    |
| 835                  | 55.2                               | 0.97                            | 8.43    | 8.43    | 8.43    | 0.38  | 1.05       | ± 12.0 %    |
| 1750                 | 53.4                               | 1.49                            | 7.87    | 7.87    | 7.87    | 0.44  | 0.89       | ± 12.0 %    |
| 1900                 | 53.3                               | 1.52                            | 7.46    | 7.46    | 7.46    | 0.58  | 0.75       | ± 12.0 %    |
| 2450                 | 52.7                               | 1.95                            | 7.07    | 7.07    | 7.07    | 0.80  | 0.50       | ± 12.0 %    |
| 2600                 | 52.5                               | 2.16                            | 6.68    | 6.68    | 6.68    | 0.80  | 0.50       | ± 12.0 %    |
| 5200                 | 49.0                               | 5.30                            | 3.99    | 3.99    | 3.99    | 0.50  | 1.90       | ± 13.1 %    |
| 5300                 | 48.9                               | 5.42                            | 3.81    | 3.81    | 3.81    | 0.50  | 1.90       | ± 13.1 %    |
| 5500                 | 48.6                               | 5.65                            | 3.52    | 3.52    | 3.52    | 0.55  | 1.90       | ± 13.1 %    |
| 5600                 | 48.5                               | 5.77                            | 3.32    | 3.32    | 3.32    | 0.60  | 1.90       | ± 13.1 %    |
| 5800                 | 48.2                               | 6.00                            | 3.66    | 3.66    | 3.66    | 0.60  | 1.90       | ± 13.1 %    |

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

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

## Frequency Response of E-Field

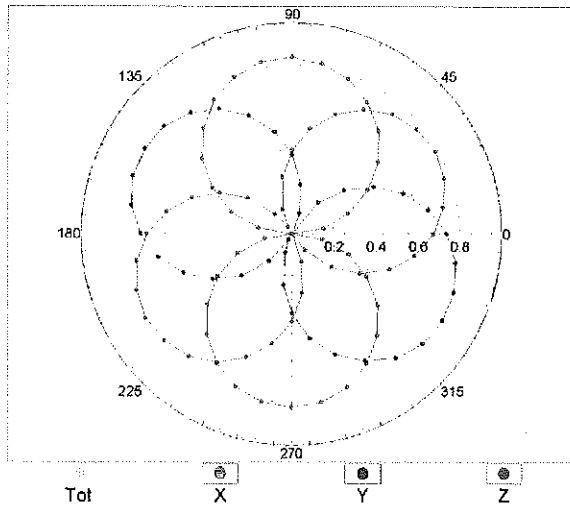
(TEM-Cell:ifi110 EXX, Waveguide: R22)



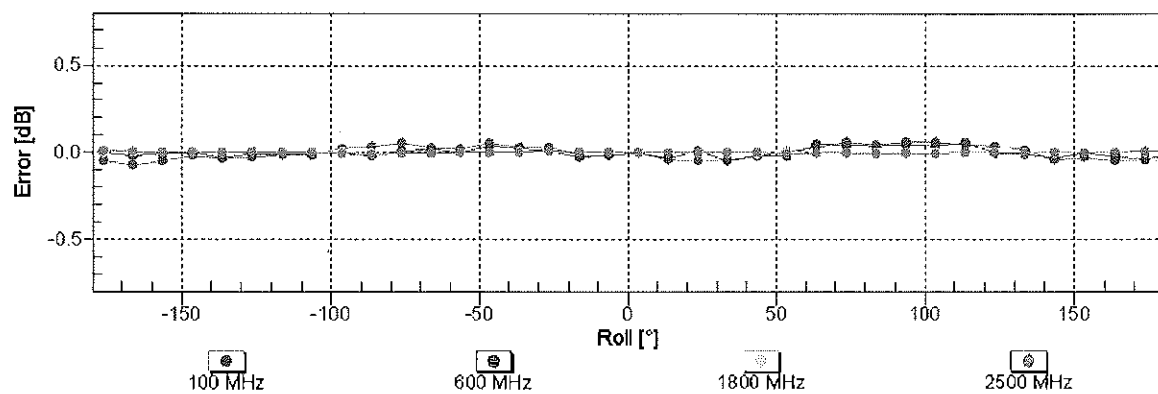
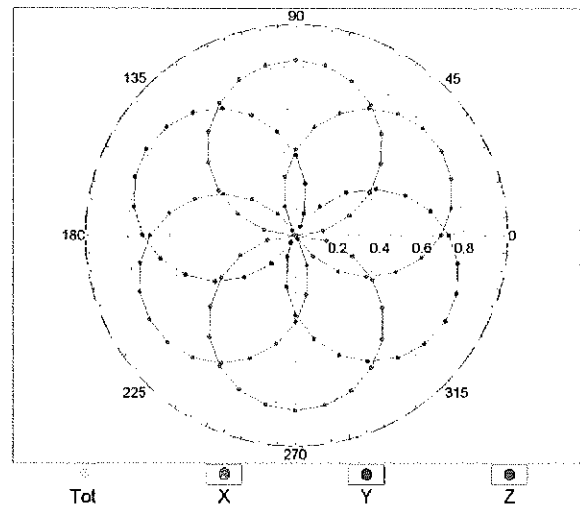
Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  (k=2)

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

f=600 MHz,TEM



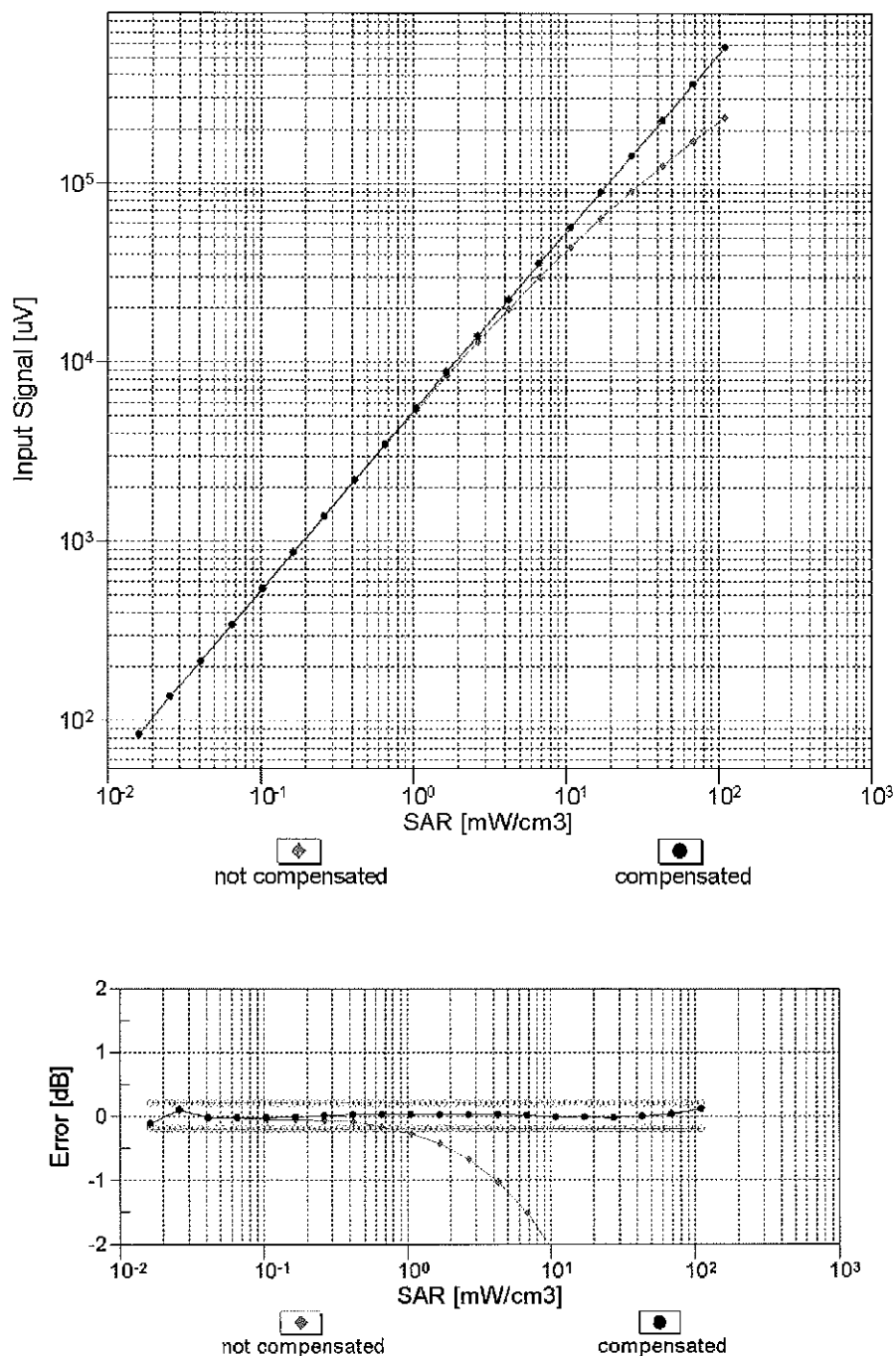
f=1800 MHz,R22



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

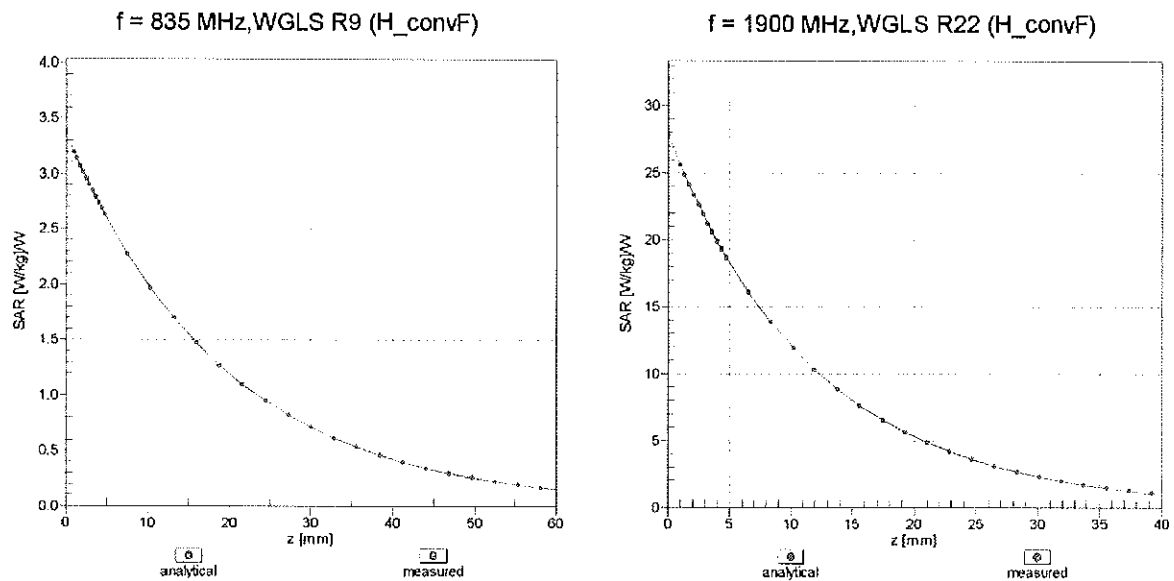
## Dynamic Range f(SAR<sub>head</sub>)

(TEM cell , f = 900 MHz)



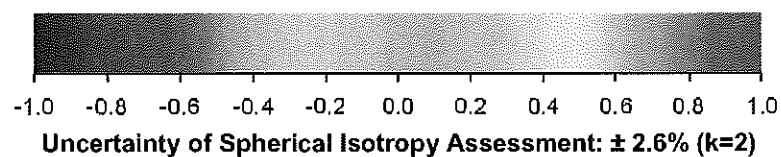
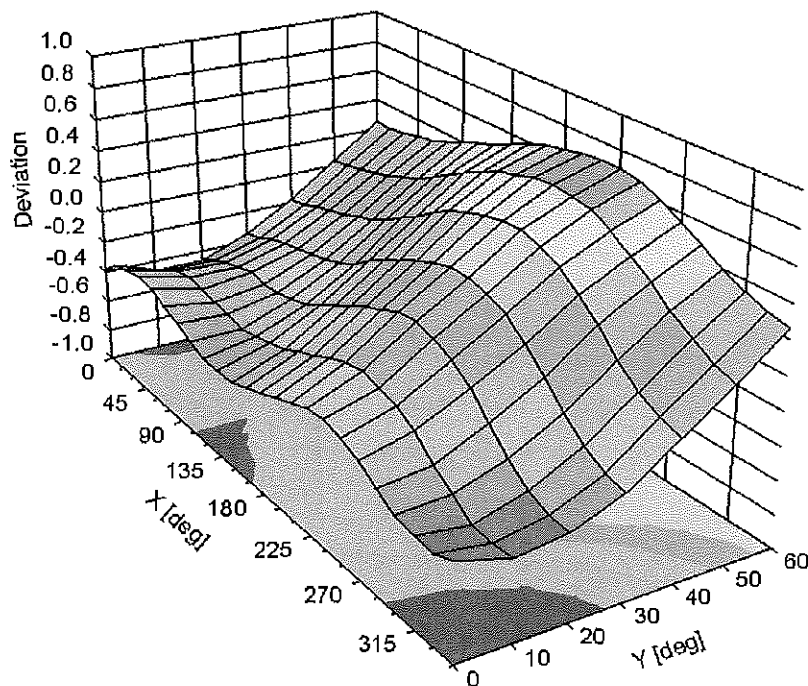
Uncertainty of Linearity Assessment:  $\pm 0.6\%$  (k=2)

## Conversion Factor Assessment



## Deviation from Isotropy in Liquid

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



## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3589

### Other Probe Parameters

|                                               |            |
|-----------------------------------------------|------------|
| Sensor Arrangement                            | Triangular |
| Connector Angle (°)                           | -26.4      |
| Mechanical Surface Detection Mode             | enabled    |
| Optical Surface Detection Mode                | disabled   |
| Probe Overall Length                          | 337 mm     |
| Probe Body Diameter                           | 10 mm      |
| Tip Length                                    | 9 mm       |
| Tip Diameter                                  | 2.5 mm     |
| Probe Tip to Sensor X Calibration Point       | 1 mm       |
| Probe Tip to Sensor Y Calibration Point       | 1 mm       |
| Probe Tip to Sensor Z Calibration Point       | 1 mm       |
| Recommended Measurement Distance from Surface | 2 mm       |

## APPENDIX D: SAR TISSUE SPECIFICATIONS

Measurement Procedure for Tissue verification:

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

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

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

**Table D-I**  
**Composition of the Tissue Equivalent Matter**

| Frequency (MHz)           | 750           | 1750 | 2450 | 5200-5800 |
|---------------------------|---------------|------|------|-----------|
| Tissue                    | Body          | Body | Body | Body      |
| Ingredients (% by weight) |               |      |      |           |
| DGBE                      | See<br>Page 2 | 31   | 26.7 |           |
| NaCl                      |               | 0.2  | 0.1  |           |
| Polysorbate (Tween) 80    |               |      |      | 20        |
| Water                     |               | 68.8 | 73.2 | 80        |

|                                        |                                                                                                                                   |                            |                                                                                                 |                                 |
|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|----------------------------|-------------------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: ZNFVK810                       |  <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | SAR EVALUATION REPORT      |  <b>LG</b> | Reviewed by:<br>Quality Manager |
| Test Dates:<br>12/10/2013 - 12/16/2013 | DUT Type:<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 (MSL750) |
| Product No.  | SL AAM 075 AA (Charge: 111130-3)       |
| Manufacturer | SPEAG                                  |

#### Measurement Method

TSL dielectric parameters measured using calibrated OCP probe (type DAK).

#### Target Parameters

Target parameters as defined in the IEEE 1528 and IEC 62209 compliance standards.

#### Test Condition

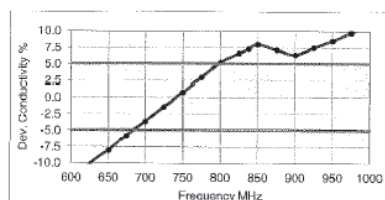
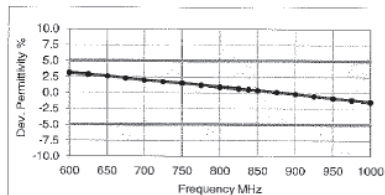
Ambient Condition 22°C ; 30% humidity  
TSL Temperature 22°C  
Test Date 7-Dec-11

#### Additional Information

TSL Density 1.212 g/cm<sup>3</sup>  
TSL Heat-capacity 3.006 kJ/(kg\*K)

#### Results

| f [MHz] | Measured |        |       | Target |       |      | Diff. to Target [%] |         |
|---------|----------|--------|-------|--------|-------|------|---------------------|---------|
|         | HP-e'    | HP-e'' | sigma | eps    | sigma |      | Δ-eps               | Δ-sigma |
| 600     | 57.9     | 25.01  | 0.83  | 56.1   | 0.95  | 3.1  | -12.3               |         |
| 625     | 57.8     | 24.66  | 0.86  | 56.0   | 0.95  | 2.9  | -10.1               |         |
| 650     | 57.4     | 24.31  | 0.88  | 55.9   | 0.96  | 2.6  | -8.0                |         |
| 675     | 57.1     | 24.02  | 0.90  | 55.8   | 0.96  | 2.3  | -5.8                |         |
| 700     | 56.8     | 23.74  | 0.92  | 55.7   | 0.96  | 2.0  | -3.7                |         |
| 725     | 56.6     | 23.50  | 0.95  | 55.6   | 0.96  | 1.7  | -1.5                |         |
| 750     | 56.4     | 23.26  | 0.97  | 55.5   | 0.96  | 1.5  | 0.8                 |         |
| 775     | 56.1     | 23.06  | 0.99  | 55.4   | 0.97  | 1.2  | 3.0                 |         |
| 800     | 55.8     | 22.86  | 1.02  | 55.3   | 0.97  | 0.9  | 5.2                 |         |
| 825     | 55.6     | 22.72  | 1.04  | 55.2   | 0.98  | 0.6  | 6.6                 |         |
| 850     | 55.5     | 22.64  | 1.05  | 55.2   | 0.98  | 0.5  | 7.3                 |         |
| 875     | 55.4     | 22.57  | 1.07  | 55.2   | 0.98  | 0.4  | 8.0                 |         |
| 900     | 55.1     | 22.44  | 1.09  | 55.1   | 1.02  | 0.1  | 7.2                 |         |
| 925     | 54.9     | 22.31  | 1.12  | 55.0   | 1.05  | -0.2 | 6.4                 |         |
| 950     | 54.7     | 22.20  | 1.14  | 55.0   | 1.06  | -0.5 | 7.5                 |         |
| 975     | 54.5     | 22.09  | 1.17  | 54.9   | 1.08  | -0.9 | 8.5                 |         |
| 1000    | 54.3     | 21.99  | 1.19  | 54.9   | 1.09  | -1.2 | 9.7                 |         |
| 1000    | 54.1     | 21.89  | 1.22  | 54.8   | 1.10  | -1.4 | 10.9                |         |



**Figure D-2**

### 750MHz Body Tissue Equivalent Matter

|                                        |                                                                                     |                            |                                                                                       |                                 |
|----------------------------------------|-------------------------------------------------------------------------------------|----------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: ZNFVK810                       |  | SAR EVALUATION REPORT      |  | Reviewed by:<br>Quality Manager |
| Test Dates:<br>12/10/2013 - 12/16/2013 | 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 |             |      |
|--------------|-------------|------------|----------|------------|------------------|------|--------------|------------------|---------------|-----------------|----------------|-----------------|-------------|------|
|              |             |            |          |            |                  |      | ( $\sigma$ ) | ( $\epsilon_r$ ) | SENSI- TIVITY | PROBE LINEARITY | PROBE ISOTROPY | MOD. TYPE       | DUTY FACTOR | PAR  |
| B            | 750         | 11/5/2013  | 3288     | ES3DV3     | 750              | Body | 0.953        | 56.47            | PASS          | PASS            | PASS           | N/A             | N/A         | N/A  |
| I            | 1750        | 7/2/2013   | 3319     | ES3DV3     | 1750             | Body | 1.468        | 52.87            | PASS          | PASS            | PASS           | N/A             | N/A         | N/A  |
| D            | 2450        | 10/11/2013 | 3022     | ES3DV2     | 2450             | Body | 2.008        | 52.50            | PASS          | PASS            | PASS           | OFDM            | N/A         | PASS |
| A            | 5200        | 1/23/2013  | 3589     | EX3DV4     | 5200             | Body | 5.292        | 47.85            | PASS          | PASS            | PASS           | OFDM            | N/A         | PASS |
| A            | 5300        | 1/23/2013  | 3589     | EX3DV4     | 5300             | Body | 5.477        | 47.47            | PASS          | PASS            | PASS           | OFDM            | N/A         | PASS |
| A            | 5500        | 1/23/2013  | 3589     | EX3DV4     | 5500             | Body | 5.729        | 47.03            | PASS          | PASS            | PASS           | OFDM            | N/A         | PASS |
| A            | 5600        | 1/23/2013  | 3589     | EX3DV4     | 5600             | Body | 5.916        | 46.70            | PASS          | PASS            | PASS           | OFDM            | N/A         | PASS |
| A            | 5800        | 1/23/2013  | 3589     | EX3DV4     | 5800             | Body | 6.233        | 46.20            | PASS          | PASS            | PASS           | OFDM            | N/A         | PASS |

NOTE: While the probes have been calibrated for both a CW and modulated signals, all measurements were performed using communication systems calibrated for CW signals only. Modulations in the table above represent test configurations for which the measurement system has been validated per FCC KDB Publication 865664 D01v01 for scenarios when CW probe calibrations are used with other signal types. SAR systems were validated for modulated signals with a periodic duty cycle, such as GMSK, or with a high peak to average ratio (>5 dB), such as OFDM according to KDB 865664.

|                                        |                                                                                                                                   |                            |                                                                                       |                                 |
|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|----------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: ZNFVK810                       |  <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | SAR EVALUATION REPORT      |  | Reviewed by:<br>Quality Manager |
| Test Dates:<br>12/10/2013 - 12/16/2013 | DUT Type:<br>Portable Tablet                                                                                                      | APPENDIX E:<br>Page 1 of 1 |                                                                                       |                                 |

## APPENDIX G: SENSOR TRIGGERING DATA SUMMARY

|                                               |                                                                                                                                   |                              |                                                                                       |                                        |
|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> ZNFVK810                       |  <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>SAR EVALUATION REPORT</b> |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Test Dates:</b><br>12/10/2013 – 12/16/2013 | <b>DUT Type:</b><br>Portable Tablet                                                                                               |                              |                                                                                       | <b>APPENDIX G:</b><br>Page G1 of G3    |

## ZNFVK810 Sensor Triggering Data Summary

Per FCC KDB Publication 616217 D04, this device was tested by the manufacturer to determine the proximity sensor triggering distances for the back side and top edge of the device. The measured output power within  $\pm 5$  mm of the triggering points (or until touching the phantom) is included for back side and each applicable edge.

To ensure all production units are compliant it is necessary to test SAR at a distance 1mm less than the smallest distance from the device and SAR phantom (determined from these triggering tests according to the KDB 616217 D04) with the device at maximum output power without power reduction. These additional SAR Tests are included additionally 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.

### Back Side

Moving device toward the phantom:

| KDB 616217 6.2.6<br>Measured Power [dBm] |       |       |       |       |       |       |       |       |       |       |       |
|------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Distance [mm]                            | 18    | 17    | 16    | 15    | 14    | 13    | 12    | 11    | 10    | 9     | 8     |
| LTE B13                                  | 24.20 | 24.20 | 24.20 | 24.20 | 24.20 | 20.20 | 20.20 | 20.20 | 20.20 | 20.20 | 20.20 |
| LTE B4                                   | 24.20 | 24.20 | 24.20 | 24.20 | 24.20 | 14.20 | 14.20 | 14.20 | 14.20 | 14.20 | 14.20 |

Moving device away from the phantom:

| KDB 616217 6.2.8     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Measured Power [dBm] |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Distance [mm]        | 24    | 21    | 18    | 17    | 16    | 15    | 14    | 13    | 12    | 11    | 10    | 9     | 6     | 0     |
| LTE B13              | 24.20 | 24.20 | 24.20 | 24.20 | 24.20 | 24.20 | 24.20 | 20.20 | 20.20 | 20.20 | 20.20 | 20.20 | 20.20 | 20.20 |
| LTE B4               | 24.20 | 24.20 | 24.20 | 24.20 | 24.20 | 24.20 | 24.20 | 14.20 | 14.20 | 14.20 | 14.20 | 14.20 | 14.20 | 14.20 |

Based on the most conservative measured triggering distance of 13 mm, additional SAR measurements were required at 12 mm from the back side.

|                                               |                                                                                                                                   |                              |                                                                                       |                                        |
|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| FCC ID: ZNFVK810                              |  <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>SAR EVALUATION REPORT</b> |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Test Dates:</b><br>12/10/2013 – 12/16/2013 | <b>DUT Type:</b><br>Portable Tablet                                                                                               |                              |                                                                                       | <b>APPENDIX G:</b><br>Page G2 of G3    |

## Top Edge

Moving device toward the phantom:

| KDB 616217 6.2.6<br>Measured Power [dBm] |       |       |       |       |       |       |       |       |       |       |       |
|------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Distance [mm]                            | 18    | 17    | 16    | 15    | 14    | 13    | 12    | 11    | 10    | 9     | 8     |
| LTE B13                                  | 24.20 | 24.20 | 24.20 | 24.20 | 24.20 | 20.20 | 20.20 | 20.20 | 20.20 | 20.20 | 20.20 |
| LTE B4                                   | 24.20 | 24.20 | 24.20 | 24.20 | 24.20 | 14.20 | 14.20 | 14.20 | 14.20 | 14.20 | 14.20 |

Moving device away from the phantom:

| KDB 616217 6.2.8<br>Measured Power [dBm] |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Distance [mm]                            | 24    | 21    | 18    | 17    | 16    | 15    | 14    | 13    | 12    | 11    | 10    | 9     | 6     | 0     |
| LTE B13                                  | 24.20 | 24.20 | 24.20 | 24.20 | 24.20 | 24.20 | 24.20 | 20.20 | 20.20 | 20.20 | 20.20 | 20.20 | 20.20 | 20.20 |
| LTE B4                                   | 24.20 | 24.20 | 24.20 | 24.20 | 24.20 | 24.20 | 24.20 | 14.20 | 14.20 | 14.20 | 14.20 | 14.20 | 14.20 | 14.20 |

Based on the most conservative measured triggering distance of 13 mm, additional SAR measurements were required at 12 mm from the top edge.

|                                        |                                                                                     |                       |                                                                                       |                                 |
|----------------------------------------|-------------------------------------------------------------------------------------|-----------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: ZNFVK810                       |  | SAR EVALUATION REPORT |  | Reviewed by:<br>Quality Manager |
| Test Dates:<br>12/10/2013 – 12/16/2013 | DUT Type:<br>Portable Tablet                                                        |                       |                                                                                       | APPENDIX G:<br>Page G3 of G3    |