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# SAR EVALUATION REPORT

**Applicant Name:**
Apple, Inc.
1 Infinite Loop
Cupertino, CA 95014

**Date of Testing:**
06/19/17 – 08/21/17
**Test Site/Location:**
PCTEST Lab, San Jose, CA, USA
**Document Serial No.:**
1C1706160002-61-01-R3.BCG

**FCC ID:** **BCG-A1861**

**APPLICANT:** **APPLE, INC.**

**DUT Type:** Watch
**Application Type:** Certification
**FCC Rule Part(s):** CFR §2.1093
**Model:** A1861
**Additional Model:** A1958

| Equipment Class | Band & Mode | Tx Frequency | SAR | |
|---|---|---|---|---|
| | | | 1 gm Head (W/kg) | 10 gm Extremity (W/kg) |
| PCT | UMTS 850 | 826.40 - 846.60 MHz | 0.14 | < 0.1 |
| PCT | UMTS 1750 | 1712.4 - 1752.6 MHz | 0.52 | 0.34 |
| PCT | UMTS 1900 | 1852.4 - 1907.6 MHz | 0.42 | 0.28 |
| PCT | LTE Band 12 | 699.7 - 715.3 MHz | 0.11 | < 0.1 |
| PCT | LTE Band 17 | 706.5 - 713.5 MHz | N/A | |
| PCT | LTE Band 13 | 779.5 - 784.5 MHz | 0.11 | < 0.1 |
| PCT | LTE Band 5 (Cell) | 824.7 - 848.3 MHz | 0.10 | < 0.1 |
| PCT | LTE Band 26 (Cell) | 814.7 - 848.3 MHz | 0.11 | < 0.1 |
| PCT | LTE Band 4 (AWS) | 1710.7 - 1754.3 MHz | 0.41 | 0.34 |
| PCT | LTE Band 25 (PCS) | 1850.7 - 1914.3 MHz | 0.41 | 0.20 |
| PCT | LTE Band 2 (PCS) | 1850.7 - 1909.3 MHz | N/A | |
| PCT | LTE Band 41 | 2498.5 - 2687.5 MHz | 0.34 | 0.17 |
| DTS | 2.4 GHz WLAN | 2412 - 2472 MHz | 0.17 | < 0.1 |
| DSS/DTS | Bluetooth | 2402 - 2480 MHz | 0.13 | < 0.1 |
| **Simultaneous SAR per KDB 690783 D01v01r03:** | | | 0.69 | 0.43 |

Note: This revised Test Report (S/N: 1C1706160002-61-01-R3.BCG) 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 watch 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 1.8 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

The SAR Tick is an initiative of the Mobile Manufacturers Forum (MMF). While a product may be considered eligible, use of the SAR Tick logo requires an agreement with the MMF. Further details can be obtained by emailing: sartick@mmfai.info.



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# 1 DEVICE UNDER TEST

## 1.1 Device Overview

**Table 1-1**
**Summary EUT Bands/Modes**

| Band & Mode | Operating Modes | Tx Frequency |
|---|---|---|
| UMTS 850 | Voice/Data | 826.40 - 846.60 MHz |
| UMTS 1750 | Voice/Data | 1712.4 - 1752.6 MHz |
| UMTS 1900 | Voice/Data | 1852.4 - 1907.6 MHz |
| LTE Band 12 | Voice/Data | 699.7 - 715.3 MHz |
| LTE Band 17 | Voice/Data | 706.5 - 713.5 MHz |
| LTE Band 13 | Voice/Data | 779.5 - 784.5 MHz |
| LTE Band 5 (Cell) | Voice/Data | 824.7 - 848.3 MHz |
| LTE Band 26 (Cell) | Voice/Data | 814.7 - 848.3 MHz |
| LTE Band 4 (AWS) | Voice/Data | 1710.7 - 1754.3 MHz |
| LTE Band 25 (PCS) | Voice/Data | 1850.7 - 1914.3 MHz |
| LTE Band 2 (PCS) | Voice/Data | 1850.7 - 1909.3 MHz |
| LTE Band 41 | Voice/Data | 2498.5 - 2687.5 MHz |
| 2.4 GHz WLAN | Voice/Data | 2412 - 2472 MHz |
| Bluetooth | Data | 2402 - 2480 MHz |
| NFC | Data | 13.56 MHz |

## 1.2 Power Reduction for SAR

There is no power reduction used for any band/mode implemented in this device for SAR purposes.

## 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 D01v06.

**Table 1-2**
**Summary Max Conducted Powers - UMTS Mode**

| Mode / Band | | Modulated Average (dBm) | | |
|---|---|---|---|---|
| | | *3GPP WCDMA* | *3GPP HSDPA* | *3GPP HSUPA* |
| UMTS Band 5 (850 MHz) | Maximum | **24.5** | **23.5** | **23.5** |
| | Nominal | **23.5** | **22.5** | **22.5** |
| UMTS Band 4 (1750 MHz) | Maximum | **24.5** | **23.5** | **23.5** |
| | Nominal | **23.5** | **22.5** | **22.5** |
| UMTS Band 2 (1900 MHz) | Maximum | **24.5** | **23.5** | **23.5** |
| | Nominal | **23.5** | **22.5** | **22.5** |




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**Table 1-3**
**Summary Max Conducted Powers - LTE Mode**

| Mode / Band | | Modulated Average (dBm) |
|---|---|---|
| LTE Band 12 | Maximum | **24.0** |
| | Nominal | **23.0** |
| LTE Band 17 | Maximum | **24.0** |
| | Nominal | **23.0** |
| LTE Band 13 | Maximum | **24.0** |
| | Nominal | **23.0** |
| LTE Band 26 (Cell) | Maximum | **24.0** |
| | Nominal | **23.0** |
| LTE Band 5 (Cell) | Maximum | **24.0** |
| | Nominal | **23.0** |
| LTE Band 4 (AWS) | Maximum | **24.0** |
| | Nominal | **23.0** |
| LTE Band 25 (PCS) | Maximum | **24.0** |
| | Nominal | **23.0** |
| LTE Band 2 (PCS) | Maximum | **24.0** |
| | Nominal | **23.0** |
| LTE Band 41 | Maximum | **24.0** |
| | Nominal | **23.0** |

**Table 1-4**
**Summary Max Conducted Powers - WIFI Mode**

| Mode / Band | | Modulated Average (dBm) | | | |
|---|---|---|---|---|---|
| | | Ch. 1-10 | Ch. 11 | Ch. 12 | Ch. 13 |
| IEEE 802.11b (2.4 GHz) | Maximum | **19.5** | **19.5** | **19.5** | **18.0** |
| IEEE 802.11g (2.4 GHz) | Maximum | **19.5** | **17.5** | **15.5** | **8.0** |
| IEEE 802.11n (2.4 GHz) | Maximum | **19.5** | **17.5** | **15.5** | **8.0** |

**Table 1-5**
**Summary Max Conducted Powers - Bluetooth Mode**

| Mode / Band | | Modulated Average (dBm) |
|---|---|---|
| Bluetooth BDR/LE (ePA) | Maximum | **19.0** |
| Bluetooth BDR/LE (iPA) | Maximum | **13.0** |
| Bluetooth EDR (ePA) | Maximum | **13.5** |
| Bluetooth EDR (iPA) | Maximum | **9.0** |




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## 1.4 DUT Antenna Locations

A diagram showing the location of the device antennas can be found in Appendix F.

## 1.5 Near Field Communications (NFC) Antenna

This DUT has NFC operations. The NFC antenna is integrated into the device for this model. Therefore, all SAR tests were performed with the device which already incorporates the NFC antenna. A diagram showing the location of the NFC antenna can be found in Appendix F.

## 1.6 Simultaneous Transmission Capabilities

According to FCC KDB Publication 447498 D01v06, transmitters are considered to be transmitting simultaneously when there is overlapping transmission, with the exception of transmissions during network hand-offs with maximum hand-off duration less than 30 seconds. Possible transmission paths for the DUT are shown in Figure 1-1 and are color-coded to indicate communication modes which share the same path. Modes which share the same transmission path cannot transmit simultaneously with one another.

**Figure 1-1**
**Simultaneous Transmission Paths**

This device contains multiple transmitters that may operate simultaneously, and therefore requires a simultaneous transmission analysis according to FCC KDB Publication 447498 D01v06 4.3.2 procedures.

**Table 1-6**
**Simultaneous Transmission Scenarios**

| No. | Capable Transmit Configuration | Head | Extremity |
|---|---|---|---|
| 1 | UMTS + 2.4 GHz WI-FI | Yes | Yes |
| 2 | UMTS + 2.4 GHz Bluetooth | Yes | Yes |
| 3 | LTE + 2.4 GHz WI-FI | Yes | Yes |
| 4 | LTE + 2.4 GHz Bluetooth | Yes | Yes |

1. 2.4 GHz WLAN, and 2.4 GHz Bluetooth share the same antenna path and cannot transmit simultaneously.
2. All licensed modes share the same antenna path and cannot transmit simultaneously.
3. When the user utilizes multiple services in UMTS 3G mode it uses multi-Radio Access Bearer or multi-RAB. The power control is based on a physical control channel (Dedicated Physical Control Channel [DPCCH]) and power control will be adjusted to meet the needs of both services. Therefore, the UMTS+WLAN scenario also represents the UMTS Voice/DATA + WLAN scenario.
4. This device supports VoLTE and VoWIFI.




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## 1.7 Miscellaneous SAR Test Considerations

### (A) Licensed Transmitter(s)

This device is only capable of QPSK HSUPA in the uplink. Therefore, no additional SAR tests are required beyond that described for devices with HSUPA in KDB 941225 D01v03r01.

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 D05v02r04.

This device supports both LTE Band 12 and LTE Band 17. Since the supported frequency span for LTE Band 17 falls completely within the supported frequency span for LTE Band 12, both LTE bands have the same target power, and both LTE bands share the same transmission path, SAR was only assessed for LTE Band 12.

This device supports both LTE Band 2 and LTE Band 25. Since the supported frequency span for LTE Band 2 falls completely within the supported frequency span for LTE Band 25, both LTE bands have the same target power, and both LTE bands share the same transmission path, SAR was only assessed for LTE Band 25.

## 1.8 Guidance Applied

- FCC KDB Publication 941225 D01v03r01, D05v02r05 (3G/4G)
- FCC KDB Publication 248227 D01v02r02 (SAR Considerations for 802.11 Devices)
- FCC KDB Publication 447498 D01v06 (General SAR Guidance, Wrist-worn Device Guidance)
- FCC KDB Publication 865664 D01v01r04, D02v01r02 (SAR Measurements up to 6 GHz)

## 1.9 Device Serial Numbers

Several samples with identical hardware were used to support SAR testing. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units. The serial numbers used for each test are indicated alongside the results in Section 10.

## 1.10 Device Housing Types and Wristband Types

This device has three housing types that were all evaluated for SAR. The device can also be used with different wrist band accessories. All metallic wrist bands were tested, and the sport band non-metallic wrist band was tested fully for all required exposure conditions. Other non-metallic wrist-bands were checked to be similar or lower in SAR.




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# 2 LTE INFORMATION

| LTE Information | | | | | |
|---|---|---|---|---|---|
| **FCC ID** | **BCG-A1861** | | | | |
| Form Factor | Watch | | | | |
| Frequency Range of each LTE transmission band | LTE Band 12 (699.7 - 715.3 MHz) | | | | |
| | LTE Band 17 (706.5 - 713.5 MHz) | | | | |
| | LTE Band 13 (779.5 - 784.5 MHz) | | | | |
| | LTE Band 5 (Cell) (824.7 - 848.3 MHz) | | | | |
| | LTE Band 26 (Cell) (814.7 - 848.3 MHz) | | | | |
| | LTE Band 4 (AWS) (1710.7 - 1754.3 MHz) | | | | |
| | LTE Band 25 (PCS) (1850.7 - 1914.3 MHz) | | | | |
| | LTE Band 2 (PCS) (1850.7 - 1909.3 MHz) | | | | |
| | LTE Band 41 (2498.5 - 2687.5 MHz) | | | | |
| Channel Bandwidths | LTE Band 12: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz | | | | |
| | LTE Band 17: 5 MHz, 10 MHz | | | | |
| | LTE Band 13: 5 MHz, 10 MHz | | | | |
| | LTE Band 5 (Cell): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz | | | | |
| | LTE Band 26 (Cell): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz | | | | |
| | LTE Band 4 (AWS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz | | | | |
| | LTE Band 25 (PCS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz | | | | |
| | LTE Band 2 (PCS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz | | | | |
| | LTE Band 41: 5 MHz, 10 MHz, 15 MHz, 20 MHz | | | | |
| Channel Numbers and Frequencies (MHz) | Low | Low-Mid | Mid | Mid-High | High |
| LTE Band 12: 1.4 MHz | 699.7 (23017) | | 707.5 (23095) | 715.3 (23173) | |
| LTE Band 12: 3 MHz | 700.5 (23025) | | 707.5 (23095) | 714.5 (23165) | |
| LTE Band 12: 5 MHz | 701.5 (23035) | | 707.5 (23095) | 713.5 (23155) | |
| LTE Band 12: 10 MHz | 704 (23060) | | 707.5 (23095) | 711 (23130) | |
| LTE Band 17: 5 MHz | 706.5 (23755) | | 710 (23790) | 713.5 (23825) | |
| LTE Band 17: 10 MHz | 709 (23780) | | 710 (23790) | 711 (23800) | |
| LTE Band 13: 5 MHz | 779.5 (23205) | | 782 (23230) | 784.5 (23255) | |
| LTE Band 13: 10 MHz | N/A | | 782 (23230) | N/A | |
| LTE Band 5 (Cell): 1.4 MHz | 824.7 (20407) | | 836.5 (20525) | 848.3 (20643) | |
| LTE Band 5 (Cell): 3 MHz | 825.5 (20415) | | 836.5 (20525) | 847.5 (20635) | |
| LTE Band 5 (Cell): 5 MHz | 826.5 (20425) | | 836.5 (20525) | 846.5 (20625) | |
| LTE Band 5 (Cell): 10 MHz | 829 (20450) | | 836.5 (20525) | 844 (20600) | |
| LTE Band 26 (Cell): 1.4 MHz | 814.7 (26697) | | 831.5 (26865) | 848.3 (27033) | |
| LTE Band 26 (Cell): 3 MHz | 815.5 (26705) | | 831.5 (26865) | 847.5 (27025) | |
| LTE Band 26 (Cell): 5 MHz | 816.5 (26715) | | 831.5 (26865) | 846.5 (27015) | |
| LTE Band 26 (Cell): 10 MHz | 819 (26740) | | 831.5 (26865) | 844 (26990) | |
| LTE Band 4 (AWS): 1.4 MHz | 1710.7 (19957) | | 1732.5 (20175) | 1754.3 (20393) | |
| LTE Band 4 (AWS): 3 MHz | 1711.5 (19965) | | 1732.5 (20175) | 1753.5 (20385) | |
| LTE Band 4 (AWS): 5 MHz | 1712.5 (19975) | | 1732.5 (20175) | 1752.5 (20375) | |
| LTE Band 4 (AWS): 10 MHz | 1715 (20000) | | 1732.5 (20175) | 1750 (20350) | |
| LTE Band 4 (AWS): 15 MHz | 1717.5 (20025) | | 1732.5 (20175) | 1747.5 (20325) | |
| LTE Band 4 (AWS): 20 MHz | 1720 (20050) | | 1732.5 (20175) | 1745 (20300) | |
| LTE Band 25 (PCS): 1.4 MHz | 1850.7 (26047) | | 1882.5 (26365) | 1914.3 (26683) | |
| LTE Band 25 (PCS): 3 MHz | 1851.5 (26055) | | 1882.5 (26365) | 1913.5 (26675) | |
| LTE Band 25 (PCS): 5 MHz | 1852.5 (26065) | | 1882.5 (26365) | 1912.5 (26665) | |
| LTE Band 25 (PCS): 10 MHz | 1855 (26090) | | 1882.5 (26365) | 1910 (26640) | |
| LTE Band 25 (PCS): 15 MHz | 1857.5 (26115) | | 1882.5 (26365) | 1907.5 (26615) | |
| LTE Band 25 (PCS): 20 MHz | 1860 (26140) | | 1882.5 (26365) | 1905 (26590) | |
| LTE Band 2 (PCS): 1.4 MHz | 1850.7 (18607) | | 1880 (18900) | 1909.3 (19193) | |
| LTE Band 2 (PCS): 3 MHz | 1851.5 (18615) | | 1880 (18900) | 1908.5 (19185) | |
| LTE Band 2 (PCS): 5 MHz | 1852.5 (18625) | | 1880 (18900) | 1907.5 (19175) | |
| LTE Band 2 (PCS): 10 MHz | 1855 (18650) | | 1880 (18900) | 1905 (19150) | |
| LTE Band 2 (PCS): 15 MHz | 1857.5 (18675) | | 1880 (18900) | 1902.5 (19125) | |
| LTE Band 2 (PCS): 20 MHz | 1860 (18700) | | 1880 (18900) | 1900 (19100) | |
| LTE Band 41: 5 MHz | 2506 (39750) | 2549.5 (40185) | 2593 (40620) | 2636.5 (41055) | 2680 (41490) |
| LTE Band 41: 10 MHz | 2506 (39750) | 2549.5 (40185) | 2593 (40620) | 2636.5 (41055) | 2680 (41490) |
| LTE Band 41: 15 MHz | 2506 (39750) | 2549.5 (40185) | 2593 (40620) | 2636.5 (41055) | 2680 (41490) |
| LTE Band 41: 20 MHz | 2506 (39750) | 2549.5 (40185) | 2593 (40620) | 2636.5 (41055) | 2680 (41490) |
| UE Category | 1 | | | | |
| Modulations Supported in UL | QPSK, 16QAM | | | | |
| LTE MPR Permanently implemented per 3GPP TS 36.101 section 6.2.3~6.2.5? (manufacturer attestation to be provided) | YES | | | | |
| A-MPR (Additional MPR) disabled for SAR Testing? | YES | | | | |
| LTE Release 10 Additional Information | This device does not support full CA features on 3GPP Release 10. All uplink communications are identical to the Release 8 Specifications. The following LTE Release 10 Features are not supported: Carrier Aggregation, Relay, HetNet, Enhanced MIMO, eICIC, WIFI Offloading, eMBMS, Cross-Carrier Scheduling, Enhanced SC-FDMA. | | | | |




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# 3 INTRODUCTION

The FCC and Innovation, Science, and Economic Development 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 (ρ). 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:

σ = conductivity of the tissue-simulating material (S/m)
ρ = mass density of the tissue-simulating material (kg/m$^3$)
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 D01v01r04:

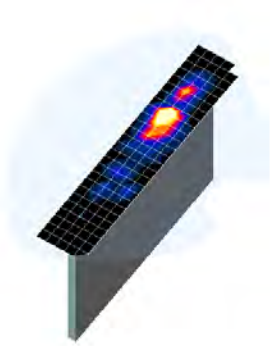

**Figure 4-1**
**Sample SAR Area Scan**

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 D01v01r04 (See Table 4-1).
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 D01v01r04 (See Table 4-1). 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.

**Table 4-1**
**Area and Zoom Scan Resolutions per FCC KDB Publication 865664 D01v01r04***

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




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# 5 TEST CONFIGURATION POSITIONS

## 5.1 Device Holder

The device holder is made out of low-loss POM material having the following dielectric parameters: relative permittivity ε = 3 and loss tangent δ = 0.02. Additionally, a manufacturer provided low-loss foam was used to position the device for head SAR evaluations.

## 5.2 Positioning for Head

Devices that are designed to be worn on the wrist may operate in speaker mode for voice communication, with the device worn on the wrist and positioned next to the mouth. When next-to-mouth SAR evaluation is required, the device is positioned at 10 mm from a flat phantom filled with head tissue-equivalent medium. The device is evaluated with wrist bands strapped together to represent normal use conditions.

## 5.3 Extremity Exposure Configurations

Devices that are designed or intended for use on extremities or mainly operated in extremity only exposure conditions; i.e., hands, wrists, feet and ankles, may require extremity SAR evaluation. When the device also operates in close proximity to the user's body, SAR compliance for the body is also required. When extremity SAR evaluation is required, the device is evaluated with the back of the device touching the flat phantom, which is filled with body tissue-equivalent medium. The device was evaluated with Sport wristband unstrapped and touching the phantom. For Metal Loop and Metal Links wristbands, the device was evaluated with wristbands strapped and the distance between wristbands and the phantom was minimized to represent the spacing created by actual use conditions.




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# 6 RF EXPOSURE LIMITS

## 6.1 Uncontrolled Environment

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

## 6.2 Controlled Environment

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

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

| HUMAN EXPOSURE LIMITS | | |
|---|---|---|
| | UNCONTROLLED ENVIRONMENT *General Population* (W/kg) or (mW/g) | CONTROLLED ENVIRONMENT *Occupational* (W/kg) or (mW/g) |
| **Peak Spatial Average SAR** Head | 1.6 | 8.0 |
| **Whole Body SAR** | 0.08 | 0.4 |
| **Peak Spatial Average SAR** Hands, Feet, Ankle, Wrists, etc. | 4.0 | 20 |

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




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# 7 FCC MEASUREMENT PROCEDURES

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

## 7.1 Measured and Reported SAR

Per FCC KDB Publication 447498 D01v06, 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 D01v01r03.

## 7.2 3G SAR Test Reduction Procedure

In FCC KDB Publication 941225 D01v03r01, certain transmission modes within a frequency band and wireless mode evaluated for SAR are defined as primary modes. The equivalent modes considered for SAR test reduction are denoted as secondary modes. When the maximum output power including tune-up tolerance specified for production units in a secondary mode is ≤ 0.25 dB higher than the primary mode or when the highest reported SAR of the primary mode, scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode, is ≤ 1.2 W/kg, SAR measurements are not required for the secondary mode. These criteria are referred to as the 3G SAR test reduction procedure. When the 3G SAR test reduction procedure is not satisfied, SAR measurements are additionally required for the secondary mode.

## 7.3 Procedures Used to Establish RF Signal for SAR

The following procedures are according to FCC KDB Publication 941225 D01v03r01 “3G SAR Measurement Procedures.”

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

## 7.4 SAR Measurement Conditions for UMTS

### 7.4.1 Output Power Verification

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




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### 7.4.2 Head SAR Measurements

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

### 7.4.3 Body SAR Measurements

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

### 7.4.4 SAR Measurements with Rel 5 HSDPA

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

### 7.4.5 SAR Measurements with Rel 6 HSUPA

The 3G SAR test reduction procedure is applied to HSPA (HSUPA/HSDPA with RMC) body configurations with 12.2 kbps RMC as the primary mode. Otherwise, Body SAR for HSPA is measured with E-DCH Sub-test 5, using H-Set 1 and QPSK for FRC and a 12.2 kbps RMC configured in Test Loop Mode 1 and power control algorithm 2, according to the highest reported body SAR configuration in 12.2 kbps RMC without HSPA.

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

## 7.5 SAR Measurement Conditions for LTE

LTE modes are tested according to FCC KDB 941225 D05v02r04 publication. Establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluating SAR [4]. The R&S CMW500 or Anritsu MT8820C simulators are used for LTE output power measurements and SAR testing. Closed loop power control was used so the UE transmits with maximum output power during SAR testing. SAR tests were performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI).

### 7.5.1 Spectrum Plots for RB Configurations

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




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### 7.5.2 MPR

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

### 7.5.3 A-MPR

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

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

According to FCC KDB 941225 D05v02r04:

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 ≤ 0.8 W/kg for 1g SAR and ≤ 2.0 W/kg for 10g SAR, 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 for 1g SAR and >3.625 W/kg for 10g SAR, 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 for 1g SAR and < 2.0 W/kg for 10g SAR.
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 ½ dB higher than the equivalent configuration using QPSK modulation and when the QPSK SAR for those configurations is <1.45 W/kg for 1g SAR and <3.625 W/kg for 10g SAR.

### 7.5.5 TDD

LTE TDD testing is performed using the SAR test guidance provided in FCC KDB 941225 D05v02r04. TDD is tested at the highest duty factor using UL-DL configuration 0 with special subframe configuration 6 and applying the FDD LTE procedures in KDB 941225 D05v02r04. SAR testing is performed using the extended cyclic prefix listed in 3GPP TS 36.211 Section 4.

## 7.6 SAR Testing with 802.11 Transmitters

The normal network operating configurations of 802.11 transmitters are not suitable for SAR measurements. Unpredictable fluctuations in network traffic and antenna diversity conditions can introduce undesirable variations in SAR results. The SAR for these devices should be measured using chipset based test mode software to ensure the results are consistent and reliable. See KDB Publication 248227 D01v02r02 for more details.




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### 7.6.1 General Device Setup

Chipset based test mode software is hardware dependent and generally varies among manufacturers. The device operating parameters established in test mode for SAR measurements must be identical to those programmed in production units, including output power levels, amplifier gain settings and other RF performance tuning parameters.

A periodic duty factor is required for current generation SAR systems to measure SAR. When 802.11 frame gaps are accounted for in the transmission, a maximum transmission duty factor of 92 - 96% is typically achievable in most test mode configurations. A minimum transmission duty factor of 85% is required to avoid certain hardware and device implementation issues related to wide range SAR scaling. The reported SAR is scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit.

### 7.6.2 2.4 GHz SAR Test Requirements

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

1) When the reported SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.

2) When the reported SAR is > 0.8 W/kg, SAR is required for that position using the next highest measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel; i.e., all channels require testing.

2.4 GHz 802.11 g/n OFDM are additionally evaluated for SAR if the highest reported SAR for 802.11b, adjusted by the ratio of the OFDM to DSSS specified maximum output power, is › 1.2 W/kg. When SAR is required for OFDM modes in 2.4 GHz band, the Initial Test Configuration Procedures should be followed. When 10-g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.



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# 8 RF CONDUCTED POWERS

## 8.1 UMTS Conducted Powers

| 3GPP Release Version | Mode | 3GPP 34.121 Subtest | Cellular Band [dBm] | | | AWS Band [dBm] | | | PCS Band [dBm] | | | 3GPP MPR [dB] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 4132 | 4183 | 4233 | 1312 | 1412 | 1513 | 9262 | 9400 | 9538 | |
| 99 | WCDMA | 12.2 kbps RMC | 23.26 | 23.00 | 23.05 | 23.44 | 23.50 | 23.60 | 23.28 | 23.21 | 23.33 | - |
| 99 | | 12.2 kbps AMR | 23.02 | 23.00 | 23.05 | 23.00 | 23.19 | 23.11 | 23.15 | 23.00 | 23.00 | - |
| 6 | HSDPA | Subtest 1 | 22.33 | 22.37 | 22.36 | 22.25 | 22.43 | 22.33 | 22.39 | 22.30 | 22.23 | 0 |
| 6 | | Subtest 2 | 22.34 | 22.40 | 22.35 | 22.24 | 22.39 | 22.30 | 22.37 | 22.31 | 22.20 | 0 |
| 6 | | Subtest 3 | 21.79 | 21.90 | 21.85 | 21.73 | 21.91 | 21.77 | 21.84 | 21.80 | 21.67 | 0.5 |
| 6 | | Subtest 4 | 21.80 | 21.88 | 21.84 | 21.76 | 21.91 | 21.78 | 21.83 | 21.78 | 21.66 | 0.5 |
| 6 | HSUPA | Subtest 1 | 21.74 | 21.50 | 21.80 | 21.71 | 21.50 | 21.75 | 21.77 | 21.72 | 21.60 | 0 |
| 6 | | Subtest 2 | 21.22 | 21.24 | 21.23 | 21.10 | 21.25 | 21.11 | 21.14 | 21.11 | 21.10 | 2 |
| 6 | | Subtest 3 | 21.42 | 21.45 | 21.43 | 21.30 | 21.43 | 21.33 | 21.33 | 21.26 | 21.20 | 1 |
| 6 | | Subtest 4 | 21.33 | 21.39 | 21.40 | 21.27 | 21.44 | 21.27 | 21.31 | 21.28 | 21.16 | 2 |
| 6 | | Subtest 5 | 22.38 | 22.45 | 22.42 | 22.32 | 22.45 | 22.34 | 22.38 | 22.28 | 22.21 | 0 |

This device does not support DC-HSDPA.

The manufacturer has confirmed the HSPA Powers are operating within expected tolerances for the implementation in this model.

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




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## 8.2 LTE Conducted Powers

### 8.2.1 LTE Band 12

**Table 8-1**
**LTE Band 12 Conducted Powers - 10 MHz Bandwidth**

| LTE Band 12 10 MHz Bandwidth | | | | | |
|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Mid Channel 23095 (707.5 MHz) Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
| QPSK | 1 | 0 | 22.29 | 0 | 0 |
| | 1 | 25 | **22.38** | | 0 |
| | 1 | 49 | 22.31 | | 0 |
| | 25 | 0 | 21.28 | 0-1 | 1 |
| | 25 | 12 | **21.33** | | 1 |
| | 25 | 25 | 21.32 | | 1 |
| | 50 | 0 | 21.30 | | 1 |
| 16QAM | 1 | 0 | 21.44 | 0-1 | 1 |
| | 1 | 25 | 21.53 | | 1 |
| | 1 | 49 | 21.54 | | 1 |
| | 25 | 0 | 20.28 | 0-2 | 2 |
| | 25 | 12 | 20.31 | | 2 |
| | 25 | 25 | 20.31 | | 2 |
| | 50 | 0 | 20.28 | | 2 |

Note: LTE Band 12 at 10 MHz bandwidth does not support three non-overlapping channels. Per KDB Publication 941225 D05v02, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

**Table 8-2**
**LTE Band 12 Conducted Powers - 5 MHz Bandwidth**

| LTE Band 12 5 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 23035 (701.5 MHz) | Mid Channel 23095 (707.5 MHz) | High Channel 23155 (713.5 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 22.10 | 22.28 | 22.34 | 0 | 0 |
| | 1 | 12 | 22.21 | 22.41 | 22.40 | | 0 |
| | 1 | 24 | 22.17 | 22.44 | 22.47 | | 0 |
| | 12 | 0 | 21.23 | 21.24 | 21.22 | 0-1 | 1 |
| | 12 | 6 | 21.25 | 21.34 | 21.29 | | 1 |
| | 12 | 13 | 21.39 | 21.40 | 21.28 | | 1 |
| | 25 | 0 | 21.30 | 21.26 | 21.22 | | 1 |
| 16QAM | 1 | 0 | 21.33 | 21.13 | 21.26 | 0-1 | 1 |
| | 1 | 12 | 21.36 | 21.28 | 21.33 | | 1 |
| | 1 | 24 | 21.41 | 21.22 | 21.36 | | 1 |
| | 12 | 0 | 20.36 | 20.33 | 20.27 | 0-2 | 2 |
| | 12 | 6 | 20.43 | 20.46 | 20.36 | | 2 |
| | 12 | 13 | 20.39 | 20.48 | 20.34 | | 2 |
| | 25 | 0 | 20.37 | 20.32 | 20.29 | | 2 |




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## Table 8-3
## LTE Band 12 Conducted Powers - 3 MHz Bandwidth

| LTE Band 12 3 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 23025 (700.5 MHz) | Mid Channel 23095 (707.5 MHz) | High Channel 23165 (714.5 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 22.22 | 22.09 | 22.13 | 0 | 0 |
| | 1 | 7 | 22.36 | 22.24 | 22.24 | | 0 |
| | 1 | 14 | 22.24 | 22.33 | 22.21 | | 0 |
| | 8 | 0 | 21.28 | 21.13 | 21.15 | 0-1 | 1 |
| | 8 | 4 | 21.33 | 21.22 | 21.20 | | 1 |
| | 8 | 7 | 21.32 | 21.24 | 21.26 | | 1 |
| | 15 | 0 | 21.27 | 21.18 | 21.23 | | 1 |
| 16QAM | 1 | 0 | 21.52 | 21.49 | 21.59 | 0-1 | 1 |
| | 1 | 7 | 21.73 | 21.66 | 21.68 | | 1 |
| | 1 | 14 | 21.46 | 21.61 | 21.63 | | 1 |
| | 8 | 0 | 20.37 | 20.19 | 20.30 | 0-2 | 2 |
| | 8 | 4 | 20.43 | 20.27 | 20.33 | | 2 |
| | 8 | 7 | 20.39 | 20.26 | 20.34 | | 2 |
| | 15 | 0 | 20.41 | 20.23 | 20.24 | | 2 |

## Table 8-4
## LTE Band 12 Conducted Powers -1.4 MHz Bandwidth

| LTE Band 12 1.4 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 23017 (699.7 MHz) | Mid Channel 23095 (707.5 MHz) | High Channel 23173 (715.3 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 22.29 | 22.32 | 22.26 | 0 | 0 |
| | 1 | 2 | 22.36 | 22.44 | 22.34 | | 0 |
| | 1 | 5 | 22.20 | 22.38 | 22.32 | | 0 |
| | 3 | 0 | 22.25 | 22.32 | 22.24 | | 0 |
| | 3 | 2 | 22.31 | 22.41 | 22.36 | | 0 |
| | 3 | 3 | 22.28 | 22.34 | 22.26 | | 0 |
| | 6 | 0 | 21.22 | 21.29 | 21.24 | 0-1 | 1 |
| 16QAM | 1 | 0 | 21.57 | 21.44 | 21.51 | 0-1 | 1 |
| | 1 | 2 | 21.63 | 21.53 | 21.56 | | 1 |
| | 1 | 5 | 21.61 | 21.48 | 21.52 | | 1 |
| | 3 | 0 | 21.16 | 21.23 | 21.33 | | 1 |
| | 3 | 2 | 21.21 | 21.26 | 21.38 | | 1 |
| | 3 | 3 | 21.14 | 21.25 | 21.35 | | 1 |
| | 6 | 0 | 20.17 | 20.22 | 20.20 | 0-2 | 2 |




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## 8.2.2 LTE Band 13

**Table 8-5**
**LTE Band 13 Conducted Powers - 10 MHz Bandwidth**

| LTE Band 13 10 MHzBandwidth | | | | | |
|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Mid Channel 23230 (782.0 MHz) Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
| QPSK | 1 | 0 | 22.23 | 0 | 0 |
| | 1 | 25 | **22.39** | | 0 |
| | 1 | 49 | 22.30 | | 0 |
| | 25 | 0 | 21.27 | 0-1 | 1 |
| | 25 | 12 | 21.36 | | 1 |
| | 25 | 25 | **21.42** | | 1 |
| | 50 | 0 | 21.41 | | 1 |
| 16QAM | 1 | 0 | 21.33 | 0-1 | 1 |
| | 1 | 25 | 21.56 | | 1 |
| | 1 | 49 | 21.53 | | 1 |
| | 25 | 0 | 20.28 | 0-2 | 2 |
| | 25 | 12 | 20.33 | | 2 |
| | 25 | 25 | 20.40 | | 2 |
| | 50 | 0 | 20.43 | | 2 |

**Table 8-6**
**LTE Band 13 Conducted Powers - 5 MHz Bandwidth**

| LTE Band 13 5 MHzBandwidth | | | | | |
|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Mid Channel 23230 (782.0 MHz) Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
| QPSK | 1 | 0 | 22.56 | 0 | 0 |
| | 1 | 12 | 22.49 | | 0 |
| | 1 | 24 | 22.41 | | 0 |
| | 12 | 0 | 21.53 | 0-1 | 1 |
| | 12 | 6 | 21.48 | | 1 |
| | 12 | 13 | 21.51 | | 1 |
| | 25 | 0 | 21.52 | | 1 |
| 16QAM | 1 | 0 | 21.66 | 0-1 | 1 |
| | 1 | 12 | 21.67 | | 1 |
| | 1 | 24 | 21.61 | | 1 |
| | 12 | 0 | 20.58 | 0-2 | 2 |
| | 12 | 6 | 20.53 | | 2 |
| | 12 | 13 | 20.52 | | 2 |
| | 25 | 0 | 20.55 | | 2 |

Note: LTE Band 13 at 5 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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### 8.2.3 LTE Band 5 (Cell)

**Table 8-7**
**LTE Band 5 (Cell) Conducted Powers - 10 MHz Bandwidth**

| LTE Band 5 (Cell) 10 MHz Bandwidth | | | | | |
|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Mid Channel 20525 (836.5 MHz) Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
| QPSK | 1 | 0 | 22.48 | 0 | 0 |
| | 1 | 25 | **22.61** | | 0 |
| | 1 | 49 | 22.51 | | 0 |
| | 25 | 0 | 21.50 | 0-1 | 1 |
| | 25 | 12 | **21.59** | | 1 |
| | 25 | 25 | 21.57 | | 1 |
| | 50 | 0 | 21.54 | | 1 |
| 16QAM | 1 | 0 | 22.18 | 0-1 | 1 |
| | 1 | 25 | 22.15 | | 1 |
| | 1 | 49 | 22.09 | | 1 |
| | 25 | 0 | 20.56 | 0-2 | 2 |
| | 25 | 12 | 20.58 | | 2 |
| | 25 | 25 | 20.52 | | 2 |
| | 50 | 0 | 20.53 | | 2 |

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

**Table 8-8**
**LTE Band 5 (Cell) Conducted Powers - 5 MHz Bandwidth**

| LTE Band 5 (Cell) 5 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 20425 (826.5 MHz) | Mid Channel 20525 (836.5 MHz) | High Channel 20625 (846.5 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 22.74 | 22.88 | 22.74 | 0 | 0 |
| | 1 | 12 | 22.80 | 22.71 | 22.91 | | 0 |
| | 1 | 24 | 22.78 | 22.84 | 22.97 | | 0 |
| | 12 | 0 | 21.75 | 21.74 | 21.73 | 0-1 | 1 |
| | 12 | 6 | 21.77 | 21.73 | 21.79 | | 1 |
| | 12 | 13 | 21.80 | 21.72 | 21.82 | | 1 |
| | 25 | 0 | 21.76 | 21.74 | 21.75 | | 1 |
| 16QAM | 1 | 0 | 22.10 | 21.92 | 21.92 | 0-1 | 1 |
| | 1 | 12 | 22.07 | 21.88 | 21.99 | | 1 |
| | 1 | 24 | 22.12 | 21.99 | 22.00 | | 1 |
| | 12 | 0 | 20.77 | 20.66 | 20.71 | 0-2 | 2 |
| | 12 | 6 | 20.76 | 20.68 | 20.74 | | 2 |
| | 12 | 13 | 20.75 | 20.69 | 20.77 | | 2 |
| | 25 | 0 | 20.71 | 20.72 | 20.77 | | 2 |




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## Table 8-9
## LTE Band 5 (Cell) Conducted Powers - 3 MHz Bandwidth

| LTE Band 5 (Cell) 3 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 20415 (825.5 MHz) | Mid Channel 20525 (836.5 MHz) | High Channel 20635 (847.5 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 22.89 | 22.76 | 22.71 | 0 | 0 |
| | 1 | 7 | 22.87 | 22.81 | 22.81 | | 0 |
| | 1 | 14 | 22.79 | 22.74 | 22.78 | | 0 |
| | 8 | 0 | 21.76 | 21.68 | 21.70 | 0-1 | 1 |
| | 8 | 4 | 21.79 | 21.79 | 21.81 | | 1 |
| | 8 | 7 | 21.81 | 21.78 | 21.79 | | 1 |
| | 15 | 0 | 21.78 | 21.74 | 21.77 | | 1 |
| 16QAM | 1 | 0 | 21.85 | 22.30 | 22.08 | 0-1 | 1 |
| | 1 | 7 | 21.98 | 22.38 | 22.06 | | 1 |
| | 1 | 14 | 21.89 | 22.30 | 22.09 | | 1 |
| | 8 | 0 | 20.72 | 20.91 | 20.74 | 0-2 | 2 |
| | 8 | 4 | 20.73 | 20.87 | 20.79 | | 2 |
| | 8 | 7 | 20.74 | 20.85 | 20.81 | | 2 |
| | 15 | 0 | 20.77 | 20.76 | 20.76 | | 2 |

## Table 8-10
## LTE Band 5 (Cell) Conducted Powers – 1.4 MHz Bandwidth

| LTE Band 5 (Cell) 1.4 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 20407 (824.7 MHz) | Mid Channel 20525 (836.5 MHz) | High Channel 20643 (848.3 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 22.76 | 22.88 | 22.71 | 0 | 0 |
| | 1 | 2 | 22.81 | 22.80 | 22.82 | | 0 |
| | 1 | 5 | 22.79 | 22.79 | 22.65 | | 0 |
| | 3 | 0 | 22.73 | 22.56 | 22.67 | | 0 |
| | 3 | 2 | 22.77 | 22.73 | 22.71 | | 0 |
| | 3 | 3 | 22.75 | 22.71 | 22.69 | | 0 |
| | 6 | 0 | 21.77 | 21.70 | 21.75 | 0-1 | 1 |
| 16QAM | 1 | 0 | 21.88 | 21.68 | 21.94 | 0-1 | 1 |
| | 1 | 2 | 21.91 | 21.69 | 22.10 | | 1 |
| | 1 | 5 | 21.92 | 21.64 | 22.00 | | 1 |
| | 3 | 0 | 21.79 | 21.70 | 21.61 | | 1 |
| | 3 | 2 | 21.81 | 21.82 | 21.73 | | 1 |
| | 3 | 3 | 21.74 | 21.80 | 21.63 | | 1 |
| | 6 | 0 | 20.82 | 20.87 | 20.81 | 0-2 | 2 |




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## 8.2.4 LTE Band 26 (Cell)

**Table 8-11**
**LTE Band 26 (Cell) Conducted Powers - 10 MHz Bandwidth**

| LTE Band 26 (Cell) 10 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 26740 (819.0 MHz) | Mid Channel 26865 (831.5 MHz) | High Channel 26990 (844.0 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 22.76 | 22.60 | 22.70 | 0 | 0 |
| | 1 | 25 | 22.83 | 22.76 | 22.74 | | 0 |
| | 1 | 49 | **22.88** | 22.60 | 22.80 | | 0 |
| | 25 | 0 | 21.80 | 21.77 | 21.51 | 0-1 | 1 |
| | 25 | 12 | **21.84** | 21.78 | 21.61 | | 1 |
| | 25 | 25 | 21.82 | 21.69 | 21.63 | | 1 |
| | 50 | 0 | 21.83 | 21.76 | 21.60 | | 1 |
| 16QAM | 1 | 0 | 22.31 | 21.91 | 21.79 | 0-1 | 1 |
| | 1 | 25 | 22.39 | 21.95 | 21.89 | | 1 |
| | 1 | 49 | 22.40 | 21.91 | 21.74 | | 1 |
| | 25 | 0 | 20.80 | 20.73 | 20.58 | 0-2 | 2 |
| | 25 | 12 | 20.87 | 20.81 | 20.65 | | 2 |
| | 25 | 25 | 20.83 | 20.72 | 20.71 | | 2 |
| | 50 | 0 | 20.82 | 20.76 | 20.65 | | 2 |

**Table 8-12**
**LTE Band 26 (Cell) Conducted Powers - 5 MHz Bandwidth**

| LTE Band 26 (Cell) 5 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 26715 (816.5 MHz) | Mid Channel 26865 (831.5 MHz) | High Channel 27015 (846.5 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 22.88 | 22.73 | 22.63 | 0 | 0 |
| | 1 | 12 | 22.90 | 22.84 | 22.87 | | 0 |
| | 1 | 24 | 22.90 | 22.83 | 22.91 | | 0 |
| | 12 | 0 | 21.85 | 21.75 | 21.61 | 0-1 | 1 |
| | 12 | 6 | 21.88 | 21.77 | 21.65 | | 1 |
| | 12 | 13 | 21.86 | 21.72 | 21.68 | | 1 |
| | 25 | 0 | 21.87 | 21.74 | 21.63 | | 1 |
| 16QAM | 1 | 0 | 22.13 | 21.92 | 21.79 | 0-1 | 1 |
| | 1 | 12 | 22.23 | 21.94 | 21.89 | | 1 |
| | 1 | 24 | 22.25 | 21.93 | 21.94 | | 1 |
| | 12 | 0 | 20.75 | 20.71 | 20.61 | 0-2 | 2 |
| | 12 | 6 | 20.83 | 20.76 | 20.65 | | 2 |
| | 12 | 13 | 20.82 | 20.70 | 20.67 | | 2 |
| | 25 | 0 | 20.81 | 20.77 | 20.69 | | 2 |




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## Table 8-13
## LTE Band 26 (Cell) Conducted Powers - 3 MHz Bandwidth

| LTE Band 26 (Cell) 3 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 26705 (815.5 MHz) | Mid Channel 26865 (831.5 MHz) | High Channel 27025 (847.5 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 22.85 | 22.86 | 22.69 | 0 | 0 |
| | 1 | 7 | 22.96 | 22.83 | 22.81 | | 0 |
| | 1 | 14 | 22.85 | 22.74 | 22.83 | | 0 |
| | 8 | 0 | 21.81 | 21.73 | 21.57 | 0-1 | 1 |
| | 8 | 4 | 21.83 | 21.79 | 21.66 | | 1 |
| | 8 | 7 | 21.87 | 21.75 | 21.64 | | 1 |
| | 15 | 0 | 21.83 | 21.75 | 21.63 | | 1 |
| 16QAM | 1 | 0 | 22.35 | 22.08 | 21.69 | 0-1 | 1 |
| | 1 | 7 | 22.40 | 22.11 | 21.83 | | 1 |
| | 1 | 14 | 22.41 | 22.00 | 21.71 | | 1 |
| | 8 | 0 | 20.90 | 20.78 | 20.57 | 0-2 | 2 |
| | 8 | 4 | 20.95 | 20.83 | 20.65 | | 2 |
| | 8 | 7 | 20.97 | 20.77 | 20.66 | | 2 |
| | 15 | 0 | 20.93 | 20.78 | 20.67 | | 2 |

## Table 8-14
## LTE Band 26 (Cell) Conducted Powers -1.4 MHz Bandwidth

| LTE Band 26 (Cell) 1.4 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 26697 (814.7 MHz) | Mid Channel 26865 (831.5 MHz) | High Channel 27033 (848.3 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 22.85 | 22.85 | 22.64 | 0 | 0 |
| | 1 | 2 | 23.00 | 22.92 | 22.78 | | 0 |
| | 1 | 5 | 22.95 | 22.89 | 22.65 | | 0 |
| | 3 | 0 | 22.77 | 22.66 | 22.62 | | 0 |
| | 3 | 2 | 22.86 | 22.80 | 22.67 | | 0 |
| | 3 | 3 | 22.79 | 22.66 | 22.63 | | 0 |
| | 6 | 0 | 21.80 | 21.75 | 21.62 | 0-1 | 1 |
| 16QAM | 1 | 0 | 21.89 | 21.66 | 21.91 | 0-1 | 1 |
| | 1 | 2 | 22.00 | 21.76 | 21.93 | | 1 |
| | 1 | 5 | 21.98 | 21.71 | 21.92 | | 1 |
| | 3 | 0 | 21.86 | 21.81 | 21.50 | | 1 |
| | 3 | 2 | 21.87 | 21.89 | 21.62 | | 1 |
| | 3 | 3 | 21.78 | 21.85 | 21.54 | | 1 |
| | 6 | 0 | 20.88 | 20.93 | 20.73 | 0-2 | 2 |




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## 8.2.5 LTE Band 4 (AWS)

**Table 8-15**
**LTE Band 4 (AWS) Conducted Powers - 20 MHz Bandwidth**

| LTE Band 4 (AWS) 20 MHzBandwidth | | | | | |
|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Mid Channel 20175 (1732.5 MHz) Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
| QPSK | 1 | 0 | 23.05 | 0 | 0 |
| | 1 | 50 | 22.92 | | 0 |
| | 1 | 99 | **23.31** | | 0 |
| | 50 | 0 | 21.96 | 0-1 | 1 |
| | 50 | 25 | 21.95 | | 1 |
| | 50 | 50 | **22.00** | | 1 |
| | 100 | 0 | 21.99 | | 1 |
| 16QAM | 1 | 0 | 22.31 | 0-1 | 1 |
| | 1 | 50 | 22.30 | | 1 |
| | 1 | 99 | 22.50 | | 1 |
| | 50 | 0 | 21.00 | 0-2 | 2 |
| | 50 | 25 | 20.99 | | 2 |
| | 50 | 50 | 21.01 | | 2 |
| | 100 | 0 | 21.03 | | 2 |

Note: LTE Band 4 (AWS) at 20 MHz bandwidth does not support three non-overlapping channels. Per KDB Publication 941225 D05v02, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

**Table 8-16**
**LTE Band 4 (AWS) Conducted Powers - 15 MHz Bandwidth**

| LTE Band 4 (AWS) 15 MHzBandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 20025 (1717.5 MHz) | Mid Channel 20175 (1732.5 MHz) | High Channel 20325 (1747.5 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 22.98 | 23.00 | 23.05 | 0 | 0 |
| | 1 | 36 | 22.92 | 22.89 | 23.03 | | 0 |
| | 1 | 74 | 23.03 | 22.96 | 23.14 | | 0 |
| | 36 | 0 | 21.90 | 21.88 | 21.92 | 0-1 | 1 |
| | 36 | 18 | 21.87 | 21.89 | 21.80 | | 1 |
| | 36 | 37 | 21.84 | 21.87 | 21.84 | | 1 |
| | 75 | 0 | 21.88 | 21.86 | 21.86 | | 1 |
| 16QAM | 1 | 0 | 22.16 | 22.55 | 22.44 | 0-1 | 1 |
| | 1 | 36 | 22.11 | 22.46 | 22.37 | | 1 |
| | 1 | 74 | 22.23 | 22.43 | 22.49 | | 1 |
| | 36 | 0 | 20.90 | 21.00 | 21.00 | 0-2 | 2 |
| | 36 | 18 | 20.88 | 20.90 | 20.88 | | 2 |
| | 36 | 37 | 20.89 | 20.92 | 20.87 | | 2 |
| | 75 | 0 | 20.92 | 20.94 | 20.88 | | 2 |




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## Table 8-17
## LTE Band 4 (AWS) Conducted Powers - 10 MHz Bandwidth

| LTE Band 4 (AWS) 10 MHzBandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 20000 (1715.0 MHz) | Mid Channel 20175 (1732.5 MHz) | High Channel 20350 (1750.0 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 23.18 | 22.87 | 22.96 | 0 | 0 |
| | 1 | 25 | 22.80 | 22.66 | 22.74 | | 0 |
| | 1 | 49 | 22.79 | 22.83 | 22.86 | | 0 |
| | 25 | 0 | 21.84 | 21.67 | 21.83 | 0-1 | 1 |
| | 25 | 12 | 21.83 | 21.70 | 21.80 | | 1 |
| | 25 | 25 | 21.82 | 21.71 | 21.82 | | 1 |
| | 50 | 0 | 21.81 | 21.71 | 21.83 | | 1 |
| 16QAM | 1 | 0 | 22.18 | 22.43 | 22.18 | 0-1 | 1 |
| | 1 | 25 | 22.10 | 22.37 | 21.98 | | 1 |
| | 1 | 49 | 21.99 | 22.39 | 22.10 | | 1 |
| | 25 | 0 | 20.85 | 20.72 | 20.87 | 0-2 | 2 |
| | 25 | 12 | 20.82 | 20.73 | 20.85 | | 2 |
| | 25 | 25 | 20.87 | 20.74 | 20.84 | | 2 |
| | 50 | 0 | 20.84 | 20.75 | 20.86 | | 2 |

## Table 8-18
## LTE Band 4 (AWS) Conducted Powers - 5 MHz Bandwidth

| LTE Band 4 (AWS) 5 MHzBandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 19975 (1712.5 MHz) | Mid Channel 20175 (1732.5 MHz) | High Channel 20375 (1752.5 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 22.94 | 22.60 | 22.81 | 0 | 0 |
| | 1 | 12 | 22.88 | 22.61 | 22.85 | | 0 |
| | 1 | 24 | 22.89 | 22.66 | 22.88 | | 0 |
| | 12 | 0 | 21.77 | 21.66 | 21.80 | 0-1 | 1 |
| | 12 | 6 | 21.78 | 21.67 | 21.82 | | 1 |
| | 12 | 13 | 21.81 | 21.71 | 21.84 | | 1 |
| | 25 | 0 | 21.77 | 21.67 | 21.79 | | 1 |
| 16QAM | 1 | 0 | 22.18 | 22.00 | 22.03 | 0-1 | 1 |
| | 1 | 12 | 22.17 | 21.96 | 22.16 | | 1 |
| | 1 | 24 | 22.14 | 22.01 | 22.11 | | 1 |
| | 12 | 0 | 20.75 | 20.67 | 20.81 | 0-2 | 2 |
| | 12 | 6 | 20.81 | 20.70 | 20.83 | | 2 |
| | 12 | 13 | 20.79 | 20.72 | 20.85 | | 2 |
| | 25 | 0 | 20.77 | 20.72 | 20.84 | | 2 |




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## Table 8-19
## LTE Band 4 (AWS) Conducted Powers - 3 MHz Bandwidth

| LTE Band 4 (AWS) 3 MHzBandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 19965 (1711.5 MHz) | Mid Channel 20175 (1732.5 MHz) | High Channel 20385 (1753.5 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 22.82 | 22.68 | 22.80 | 0 | 0 |
| | 1 | 7 | 22.87 | 22.78 | 22.92 | | 0 |
| | 1 | 14 | 22.79 | 22.76 | 22.91 | | 0 |
| | 8 | 0 | 21.78 | 21.66 | 21.75 | 0-1 | 1 |
| | 8 | 4 | 21.80 | 21.70 | 21.81 | | 1 |
| | 8 | 7 | 21.78 | 21.71 | 21.82 | | 1 |
| | 15 | 0 | 21.77 | 21.67 | 21.80 | | 1 |
| 16QAM | 1 | 0 | 22.32 | 22.00 | 21.92 | 0-1 | 1 |
| | 1 | 7 | 22.37 | 22.03 | 21.99 | | 1 |
| | 1 | 14 | 22.36 | 22.01 | 21.93 | | 1 |
| | 8 | 0 | 20.89 | 20.69 | 20.81 | 0-2 | 2 |
| | 8 | 4 | 20.88 | 20.72 | 20.82 | | 2 |
| | 8 | 7 | 20.89 | 20.74 | 20.83 | | 2 |
| | 15 | 0 | 20.86 | 20.71 | 20.85 | | 2 |

## Table 8-20
## LTE Band 4 (AWS) Conducted Powers -1.4 MHz Bandwidth

| LTE Band 4 (AWS) 1.4 MHzBandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 19957 (1710.7 MHz) | Mid Channel 20175 (1732.5 MHz) | High Channel 20393 (1754.3 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 22.86 | 22.76 | 22.82 | 0 | 0 |
| | 1 | 2 | 22.92 | 22.76 | 22.90 | | 0 |
| | 1 | 5 | 22.86 | 22.77 | 22.73 | | 0 |
| | 3 | 0 | 22.77 | 22.67 | 22.78 | | 0 |
| | 3 | 2 | 22.82 | 22.70 | 22.81 | | 0 |
| | 3 | 3 | 22.79 | 22.65 | 22.75 | | 0 |
| | 6 | 0 | 21.80 | 21.61 | 21.77 | 0-1 | 1 |
| 16QAM | 1 | 0 | 21.85 | 21.59 | 22.00 | 0-1 | 1 |
| | 1 | 2 | 21.94 | 21.61 | 22.22 | | 1 |
| | 1 | 5 | 21.85 | 21.60 | 22.05 | | 1 |
| | 3 | 0 | 21.81 | 21.70 | 21.66 | | 1 |
| | 3 | 2 | 21.83 | 21.76 | 21.75 | | 1 |
| | 3 | 3 | 21.73 | 21.73 | 21.68 | | 1 |
| | 6 | 0 | 20.86 | 20.82 | 20.87 | 0-2 | 2 |




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## 8.2.6 LTE Band 25 (PCS)

**Table 8-21**
**LTE Band 25 (PCS) Conducted Powers - 20 MHz Bandwidth**

| LTE Band 25 (PCS) 20 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 26140 (1860.0 MHz) | Mid Channel 26365 (1882.5 MHz) | High Channel 26590 (1905.0 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 22.99 | 22.84 | 22.94 | 0 | 0 |
| | 1 | 50 | 22.72 | 22.71 | 22.73 | | 0 |
| | 1 | 99 | **23.13** | 22.90 | 22.97 | | 0 |
| | 50 | 0 | 21.89 | 21.79 | 21.77 | 0-1 | 1 |
| | 50 | 25 | 21.86 | 21.72 | 21.70 | | 1 |
| | 50 | 50 | **21.93** | 21.77 | 21.76 | | 1 |
| | 100 | 0 | 21.88 | 21.78 | 21.80 | | 1 |
| 16QAM | 1 | 0 | 22.54 | 22.15 | 22.03 | 0-1 | 1 |
| | 1 | 50 | 22.31 | 21.94 | 22.01 | | 1 |
| | 1 | 99 | 22.50 | 22.00 | 22.09 | | 1 |
| | 50 | 0 | 20.87 | 20.79 | 20.70 | 0-2 | 2 |
| | 50 | 25 | 20.74 | 20.75 | 20.66 | | 2 |
| | 50 | 50 | 20.88 | 20.76 | 20.61 | | 2 |
| | 100 | 0 | 20.81 | 20.73 | 20.73 | | 2 |

**Table 8-22**
**LTE Band 25 (PCS) Conducted Powers - 15 MHz Bandwidth**

| LTE Band 25 (PCS) 15 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 26115 (1857.5 MHz) | Mid Channel 26365 (1882.5 MHz) | High Channel 26615 (1907.5 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 22.69 | 22.51 | 22.66 | 0 | 0 |
| | 1 | 36 | 22.96 | 22.49 | 22.55 | | 0 |
| | 1 | 74 | 23.00 | 22.77 | 22.74 | | 0 |
| | 36 | 0 | 21.62 | 21.54 | 21.59 | 0-1 | 1 |
| | 36 | 18 | 21.64 | 21.61 | 21.61 | | 1 |
| | 36 | 37 | 21.74 | 21.58 | 21.69 | | 1 |
| | 75 | 0 | 21.70 | 21.59 | 21.55 | | 1 |
| 16QAM | 1 | 0 | 21.84 | 21.86 | 21.78 | 0-1 | 1 |
| | 1 | 36 | 21.81 | 21.82 | 21.77 | | 1 |
| | 1 | 74 | 22.23 | 22.00 | 22.23 | | 1 |
| | 36 | 0 | 20.63 | 20.60 | 20.63 | 0-2 | 2 |
| | 36 | 18 | 20.67 | 20.56 | 20.62 | | 2 |
| | 36 | 37 | 20.74 | 20.62 | 20.72 | | 2 |
| | 75 | 0 | 20.73 | 20.56 | 20.65 | | 2 |




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## Table 8-23
## LTE Band 25 (PCS) Conducted Powers - 10 MHz Bandwidth

| LTE Band 25 (PCS) 10 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 26090 (1855.0 MHz) | Mid Channel 26365 (1882.5 MHz) | High Channel 26640 (1910.0 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 22.89 | 22.64 | 22.63 | 0 | 0 |
| | 1 | 25 | 22.65 | 22.44 | 22.55 | | 0 |
| | 1 | 49 | 22.84 | 22.69 | 22.91 | | 0 |
| | 25 | 0 | 21.78 | 21.58 | 21.62 | 0-1 | 1 |
| | 25 | 12 | 21.76 | 21.59 | 21.64 | | 1 |
| | 25 | 25 | 21.80 | 21.66 | 21.67 | | 1 |
| | 50 | 0 | 21.82 | 21.63 | 21.71 | | 1 |
| 16QAM | 1 | 0 | 21.82 | 21.77 | 22.02 | 0-1 | 1 |
| | 1 | 25 | 21.58 | 21.66 | 22.09 | | 1 |
| | 1 | 49 | 21.88 | 21.83 | 22.22 | | 1 |
| | 25 | 0 | 20.88 | 20.71 | 20.71 | 0-2 | 2 |
| | 25 | 12 | 20.86 | 20.66 | 20.72 | | 2 |
| | 25 | 25 | 20.90 | 20.75 | 20.77 | | 2 |
| | 50 | 0 | 20.91 | 20.65 | 20.70 | | 2 |

## Table 8-24
## LTE Band 25 (PCS) Conducted Powers - 5 MHz Bandwidth

| LTE Band 25 (PCS) 5 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 26065 (1852.5 MHz) | Mid Channel 26365 (1882.5 MHz) | High Channel 26665 (1912.5 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 22.62 | 22.54 | 22.71 | 0 | 0 |
| | 1 | 12 | 22.68 | 22.44 | 22.63 | | 0 |
| | 1 | 24 | 22.73 | 22.61 | 22.73 | | 0 |
| | 12 | 0 | 21.71 | 21.61 | 21.62 | 0-1 | 1 |
| | 12 | 6 | 21.70 | 21.56 | 21.61 | | 1 |
| | 12 | 13 | 21.71 | 21.53 | 21.64 | | 1 |
| | 25 | 0 | 21.69 | 21.55 | 21.62 | | 1 |
| 16QAM | 1 | 0 | 21.73 | 21.65 | 22.15 | 0-1 | 1 |
| | 1 | 12 | 21.74 | 21.55 | 22.21 | | 1 |
| | 1 | 24 | 21.77 | 21.68 | 22.34 | | 1 |
| | 12 | 0 | 20.76 | 20.66 | 20.71 | 0-2 | 2 |
| | 12 | 6 | 20.81 | 20.65 | 20.76 | | 2 |
| | 12 | 13 | 20.77 | 20.61 | 20.73 | | 2 |
| | 25 | 0 | 20.76 | 20.60 | 20.74 | | 2 |




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## Table 8-25
## LTE Band 25 (PCS) Conducted Powers - 3 MHz Bandwidth

| LTE Band 25 (PCS) 3 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 26055 (1851.5 MHz) | Mid Channel 26365 (1882.5 MHz) | High Channel 26675 (1913.5 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 22.84 | 22.63 | 22.63 | 0 | 0 |
| | 1 | 7 | 22.93 | 22.77 | 22.62 | | 0 |
| | 1 | 14 | 22.91 | 22.69 | 22.59 | | 0 |
| | 8 | 0 | 21.65 | 21.70 | 21.54 | 0-1 | 1 |
| | 8 | 4 | 21.69 | 21.73 | 21.61 | | 1 |
| | 8 | 7 | 21.65 | 21.63 | 21.58 | | 1 |
| | 15 | 0 | 21.70 | 21.69 | 21.55 | | 1 |
| 16QAM | 1 | 0 | 21.99 | 21.57 | 21.53 | 0-1 | 1 |
| | 1 | 7 | 22.16 | 21.67 | 21.78 | | 1 |
| | 1 | 14 | 22.07 | 21.59 | 21.59 | | 1 |
| | 8 | 0 | 20.79 | 20.70 | 20.52 | 0-2 | 2 |
| | 8 | 4 | 20.86 | 20.71 | 20.64 | | 2 |
| | 8 | 7 | 20.82 | 20.68 | 20.57 | | 2 |
| | 15 | 0 | 20.72 | 20.70 | 20.62 | | 2 |

## Table 8-26
## LTE Band 25 (PCS) Conducted Powers -1.4 MHz Bandwidth

| LTE Band 25 (PCS) 1.4 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 26047 (1850.7 MHz) | Mid Channel 26365 (1882.5 MHz) | High Channel 26683 (1914.3 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 22.52 | 22.77 | 22.47 | 0 | 0 |
| | 1 | 2 | 22.62 | 22.84 | 22.58 | | 0 |
| | 1 | 5 | 22.69 | 22.89 | 22.68 | | 0 |
| | 3 | 0 | 22.51 | 22.63 | 22.51 | | 0 |
| | 3 | 2 | 22.59 | 22.69 | 22.59 | | 0 |
| | 3 | 3 | 22.52 | 22.63 | 22.52 | | 0 |
| | 6 | 0 | 21.58 | 21.59 | 21.55 | 0-1 | 1 |
| 16QAM | 1 | 0 | 21.99 | 21.68 | 21.94 | 0-1 | 1 |
| | 1 | 2 | 22.00 | 21.75 | 22.03 | | 1 |
| | 1 | 5 | 21.97 | 21.65 | 21.95 | | 1 |
| | 3 | 0 | 21.83 | 21.84 | 21.83 | | 1 |
| | 3 | 2 | 21.90 | 21.88 | 21.92 | | 1 |
| | 3 | 3 | 21.87 | 21.85 | 21.81 | | 1 |
| | 6 | 0 | 20.43 | 20.82 | 20.45 | 0-2 | 2 |




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## 8.2.7 LTE Band 41

### Table 8-27
### LTE Band 41 Conducted Powers - 20 MHz Bandwidth

| LTE Band 41 20 MHzBandwidth | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 39750 (2506.0 MHz) | Low-Mid Channel 40185 (2549.5 MHz) | Mid Channel 40620 (2593.0 MHz) | Mid-High Channel 41055 (2636.5 MHz) | High Channel 41490 (2680.0 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | | | |
| QPSK | 1 | 0 | 22.91 | 22.71 | 22.90 | 23.15 | 23.25 | 0 | 0 |
| | 1 | 50 | 22.81 | 22.77 | 22.77 | 22.93 | 22.95 | | 0 |
| | 1 | 99 | 23.38 | 23.03 | 23.15 | 23.35 | **23.39** | | 0 |
| | 50 | 0 | 21.75 | 21.63 | 21.61 | 21.87 | 21.97 | 0-1 | 1 |
| | 50 | 25 | 21.71 | 21.65 | 21.58 | 21.84 | 21.94 | | 1 |
| | 50 | 50 | 21.91 | 21.72 | 21.76 | 21.82 | **22.04** | | 1 |
| | 100 | 0 | 21.86 | 21.74 | 21.65 | 21.83 | 21.99 | | 1 |
| 16QAM | 1 | 0 | 21.71 | 21.91 | 21.93 | 22.11 | 22.06 | 0-1 | 1 |
| | 1 | 50 | 21.54 | 21.98 | 21.80 | 21.88 | 21.83 | | 1 |
| | 1 | 99 | 22.06 | 22.25 | 22.20 | 22.27 | 22.09 | | 1 |
| | 50 | 0 | 20.68 | 20.58 | 20.56 | 20.82 | 20.95 | 0-2 | 2 |
| | 50 | 25 | 20.62 | 20.65 | 20.53 | 20.84 | 20.93 | | 2 |
| | 50 | 50 | 20.81 | 20.75 | 20.68 | 20.82 | 21.01 | | 2 |
| | 100 | 0 | 20.84 | 20.73 | 20.67 | 20.80 | 20.99 | | 2 |

### Table 8-28
### LTE Band 41 Conducted Powers - 15 MHz Bandwidth

| LTE Band 41 15 MHzBandwidth | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 39750 (2506.0 MHz) | Low-Mid Channel 40185 (2549.5 MHz) | Mid Channel 40620 (2593.0 MHz) | Mid-High Channel 41055 (2636.5 MHz) | High Channel 41490 (2680.0 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | | | |
| QPSK | 1 | 0 | 22.59 | 22.52 | 22.91 | 22.74 | 22.77 | 0 | 0 |
| | 1 | 36 | 22.66 | 22.61 | 22.89 | 22.71 | 22.82 | | 0 |
| | 1 | 74 | 22.98 | 22.78 | 22.96 | 22.76 | 23.00 | | 0 |
| | 36 | 0 | 21.76 | 21.63 | 21.66 | 21.79 | 21.98 | 0-1 | 1 |
| | 36 | 18 | 21.71 | 21.65 | 21.68 | 21.78 | 21.88 | | 1 |
| | 36 | 37 | 21.81 | 21.72 | 21.71 | 21.77 | 21.92 | | 1 |
| | 75 | 0 | 21.76 | 21.71 | 21.67 | 21.79 | 21.93 | | 1 |
| 16QAM | 1 | 0 | 21.66 | 21.24 | 21.84 | 22.00 | 22.00 | 0-1 | 1 |
| | 1 | 36 | 21.63 | 21.28 | 21.88 | 21.95 | 21.88 | | 1 |
| | 1 | 74 | 21.90 | 21.47 | 21.96 | 21.99 | 22.03 | | 1 |
| | 36 | 0 | 20.63 | 20.68 | 20.63 | 20.83 | 20.83 | 0-2 | 2 |
| | 36 | 18 | 20.60 | 20.67 | 20.68 | 20.85 | 20.83 | | 2 |
| | 36 | 37 | 20.71 | 20.81 | 20.72 | 20.86 | 20.87 | | 2 |
| | 75 | 0 | 20.72 | 20.77 | 20.66 | 20.78 | 20.89 | | 2 |




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## Table 8-29
## LTE Band 41 Conducted Powers - 10 MHz Bandwidth

| LTE Band 41 10 MHzBandwidth | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 39750 (2506.0 MHz) | Low-Mid Channel 40185 (2549.5 MHz) | Mid Channel 40620 (2593.0 MHz) | Mid-High Channel 41055 (2636.5 MHz) | High Channel 41490 (2680.0 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | | | |
| QPSK | 1 | 0 | 22.56 | 22.44 | 22.57 | 22.64 | 22.65 | 0 | 0 |
| | 1 | 25 | 22.64 | 22.68 | 22.62 | 22.70 | 22.85 | | 0 |
| | 1 | 49 | 22.81 | 22.74 | 22.76 | 22.85 | 22.86 | | 0 |
| | 25 | 0 | 21.76 | 21.56 | 21.56 | 21.73 | 21.78 | 0-1 | 1 |
| | 25 | 12 | 21.78 | 21.70 | 21.55 | 21.77 | 21.84 | | 1 |
| | 25 | 25 | 21.83 | 21.73 | 21.66 | 21.75 | 21.88 | | 1 |
| | 50 | 0 | 21.78 | 21.70 | 21.59 | 21.78 | 21.89 | | 1 |
| 16QAM | 1 | 0 | 21.73 | 21.44 | 21.48 | 21.47 | 21.74 | 0-1 | 1 |
| | 1 | 25 | 21.99 | 21.59 | 21.54 | 21.59 | 21.94 | | 1 |
| | 1 | 49 | 21.97 | 21.71 | 21.56 | 21.67 | 21.96 | | 1 |
| | 25 | 0 | 20.68 | 20.51 | 20.55 | 20.75 | 20.71 | 0-2 | 2 |
| | 25 | 12 | 20.68 | 20.65 | 20.58 | 20.78 | 20.82 | | 2 |
| | 25 | 25 | 20.75 | 20.68 | 20.63 | 20.75 | 20.88 | | 2 |
| | 50 | 0 | 20.70 | 20.65 | 20.56 | 20.77 | 20.81 | | 2 |

## Table 8-30
## LTE Band 41 Conducted Powers - 5 MHz Bandwidth

| LTE Band 41 5 MHzBandwidth | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 39750 (2506.0 MHz) | Low-Mid Channel 40185 (2549.5 MHz) | Mid Channel 40620 (2593.0 MHz) | Mid-High Channel 41055 (2636.5 MHz) | High Channel 41490 (2680.0 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | | | |
| QPSK | 1 | 0 | 22.81 | 22.56 | 22.55 | 22.76 | 22.81 | 0 | 0 |
| | 1 | 12 | 22.77 | 22.64 | 22.52 | 22.73 | 22.87 | | 0 |
| | 1 | 24 | 22.88 | 22.72 | 22.59 | 22.76 | 22.91 | | 0 |
| | 12 | 0 | 21.71 | 21.65 | 21.53 | 21.66 | 21.83 | 0-1 | 1 |
| | 12 | 6 | 21.74 | 21.64 | 21.55 | 21.68 | 21.85 | | 1 |
| | 12 | 13 | 21.77 | 21.68 | 21.54 | 21.71 | 21.87 | | 1 |
| | 25 | 0 | 21.73 | 21.64 | 21.53 | 21.73 | 21.85 | | 1 |
| 16QAM | 1 | 0 | 21.89 | 21.69 | 21.56 | 21.72 | 21.77 | 0-1 | 1 |
| | 1 | 12 | 21.84 | 21.82 | 21.62 | 21.75 | 21.91 | | 1 |
| | 1 | 24 | 21.83 | 21.86 | 21.65 | 21.69 | 21.88 | | 1 |
| | 12 | 0 | 20.67 | 20.56 | 20.58 | 20.68 | 20.83 | 0-2 | 2 |
| | 12 | 6 | 20.75 | 20.59 | 20.53 | 20.69 | 20.88 | | 2 |
| | 12 | 13 | 20.77 | 20.60 | 20.54 | 20.72 | 20.91 | | 2 |
| | 25 | 0 | 20.66 | 20.55 | 20.56 | 20.81 | 20.85 | | 2 |




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## 8.3 WLAN Conducted Powers

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

| 2.4GHz Conducted Power [dBm] | | | | |
|---|---|---|---|---|
| Freq [MHz] | Channel | IEEE Transmission Mode | | |
| | | 802.11b | 802.11g | 802.11n |
| 2412 | 1 | 19.42 | 19.01 | 19.35 |
| 2437 | **6** | **19.47** | 19.30 | 19.47 |
| 2457 | 10 | 19.21 | 19.25 | 19.45 |
| 2462 | 11 | 19.03 | 17.46 | 17.45 |

Justification for test configurations for WLAN per KDB Publication 248227 D01v02r02:

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

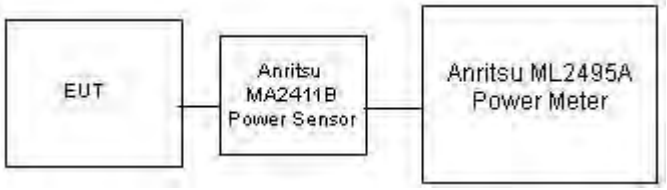


**Figure 8-2**
**Power Measurement Setup**




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## 8.4 Bluetooth Conducted Powers

**Table 8-32**
**Bluetooth Average RF Power**

| Frequency [MHz] | Modulation | Power Scheme | Channel No. | Avg Conducted Power | |
|---|---|---|---|---|---|
| | | | | [dBm] | [mW] |
| 2402 | GFSK | ePA | 0 | 16.78 | 47.643 |
| 2441 | GFSK | ePA | **39** | **18.95** | 78.524 |
| 2480 | GFSK | ePA | 78 | 16.95 | 49.545 |
| 2402 | GFSK | iPA | 0 | 12.81 | 19.099 |
| 2441 | GFSK | iPA | **39** | **12.98** | 19.861 |
| 2480 | GFSK | iPA | 78 | 12.30 | 16.982 |
| 2402 | 8PSK | ePA | 0 | 13.36 | 21.677 |
| 2441 | 8PSK | ePA | 39 | 13.46 | 22.182 |
| 2480 | 8PSK | ePA | 78 | 13.45 | 22.131 |
| 2402 | 8PSK | iPA | 0 | 8.60 | 7.244 |
| 2441 | 8PSK | iPA | 39 | 8.81 | 7.603 |
| 2480 | 8PSK | iPA | 78 | 8.78 | 7.551 |

Note: The bolded data rate and channel above were tested for SAR. Bluetooth was evaluated with a test mode with 100% transmission duty factor.

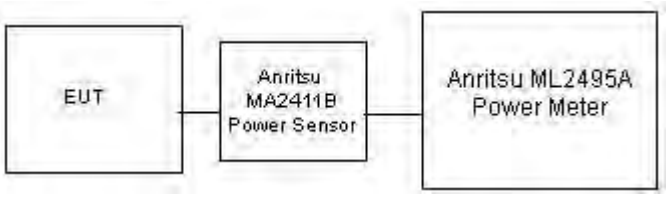


**Figure 8-3**
**Power Measurement Setup**



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# 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, σ (S/m) | Measured Dielectric Constant, ε | TARGET Conductivity, σ (S/m) | TARGET Dielectric Constant, ε | % dev σ | % dev ε |
|---|---|---|---|---|---|---|---|---|---|
| 6/26/2017 | 750H | 19.6 | 700 | 0.849 | 41.648 | 0.889 | 42.201 | -4.50% | -1.31% |
| | | | 710 | 0.855 | 41.471 | 0.890 | 42.149 | -3.93% | -1.61% |
| | | | 740 | 0.882 | 40.996 | 0.893 | 41.994 | -1.23% | -2.38% |
| | | | 755 | 0.897 | 40.806 | 0.894 | 41.916 | 0.34% | -2.65% |
| | | | 770 | 0.909 | 40.535 | 0.895 | 41.838 | 1.56% | -3.11% |
| | | | 785 | 0.926 | 40.388 | 0.896 | 41.760 | 3.35% | -3.29% |
| 6/26/2017 | 850H | 19.3 | 820 | 0.899 | 41.269 | 0.899 | 41.578 | 0.00% | -0.74% |
| | | | 835 | 0.911 | 41.056 | 0.900 | 41.500 | 1.22% | -1.07% |
| | | | 850 | 0.925 | 40.766 | 0.916 | 41.500 | 0.98% | -1.77% |
| 7/10/2017 | 850H | 20.4 | 820 | 0.911 | 42.448 | 0.899 | 41.578 | 1.33% | 2.09% |
| | | | 835 | 0.926 | 42.254 | 0.900 | 41.500 | 2.89% | 1.82% |
| | | | 850 | 0.941 | 42.055 | 0.916 | 41.500 | 2.73% | 1.34% |
| 8/18/2017 | 850H | 18.8 | 800 | 0.901 | 43.343 | 0.897 | 41.682 | 0.45% | 3.98% |
| | | | 820 | 0.925 | 43.097 | 0.899 | 41.578 | 2.89% | 3.65% |
| | | | 835 | 0.933 | 42.866 | 0.900 | 41.500 | 3.67% | 3.29% |
| | | | 850 | 0.949 | 42.739 | 0.916 | 41.500 | 3.60% | 2.99% |
| 6/26/2017 | 1750H | 21.8 | 1710 | 1.322 | 40.147 | 1.348 | 40.142 | -1.93% | 0.01% |
| | | | 1750 | 1.357 | 39.986 | 1.371 | 40.079 | -1.02% | -0.23% |
| | | | 1790 | 1.394 | 39.726 | 1.394 | 40.016 | 0.00% | -0.72% |
| 7/13/2017 | 1750H | 21.6 | 1710 | 1.322 | 38.984 | 1.348 | 40.142 | -1.93% | -2.88% |
| | | | 1750 | 1.364 | 38.813 | 1.371 | 40.079 | -0.51% | -3.16% |
| | | | 1790 | 1.404 | 38.644 | 1.394 | 40.016 | 0.72% | -3.43% |
| 6/22/2017 | 1900H | 20.9 | 1850 | 1.389 | 39.160 | 1.400 | 40.000 | -0.79% | -2.10% |
| | | | 1880 | 1.398 | 38.822 | 1.400 | 40.000 | -0.14% | -2.94% |
| | | | 1910 | 1.459 | 38.610 | 1.400 | 40.000 | 4.21% | -3.48% |
| 8/3/2017 | 1900H | 22.6 | 1850 | 1.365 | 40.099 | 1.400 | 40.000 | -2.50% | 0.25% |
| | | | 1880 | 1.398 | 40.008 | 1.400 | 40.000 | -0.14% | 0.02% |
| | | | 1910 | 1.423 | 39.972 | 1.400 | 40.000 | 1.64% | -0.07% |
| 6/28/2017 | 2450H | 23.4 | 2400 | 1.783 | 39.617 | 1.756 | 39.289 | 1.54% | 0.83% |
| | | | 2450 | 1.838 | 39.444 | 1.800 | 39.200 | 2.11% | 0.62% |
| | | | 2500 | 1.900 | 39.292 | 1.855 | 39.136 | 2.43% | 0.40% |
| 7/3/2017 | 2450H | 23.5 | 2400 | 1.821 | 39.751 | 1.756 | 39.289 | 3.70% | 1.18% |
| | | | 2450 | 1.877 | 39.507 | 1.800 | 39.200 | 4.28% | 0.78% |
| | | | 2500 | 1.938 | 39.329 | 1.855 | 39.136 | 4.47% | 0.49% |
| 7/12/2017 | 2450H | 22.6 | 2400 | 1.825 | 39.770 | 1.756 | 39.289 | 3.93% | 1.22% |
| | | | 2450 | 1.875 | 39.584 | 1.800 | 39.200 | 4.17% | 0.98% |
| | | | 2500 | 1.935 | 39.377 | 1.855 | 39.136 | 4.31% | 0.62% |
| 6/28/2017 | 2600H | 22.8 | 2600 | 2.017 | 38.071 | 1.964 | 39.009 | 2.70% | -2.40% |
| | | | 2650 | 2.085 | 37.826 | 2.018 | 38.945 | 3.32% | -2.87% |
| | | | 2700 | 2.129 | 37.640 | 2.073 | 38.882 | 2.70% | -3.19% |
| 6/20/2017 | 750B | 22.0 | 700 | 0.926 | 54.644 | 0.959 | 55.726 | -3.44% | -1.94% |
| | | | 710 | 0.933 | 54.642 | 0.960 | 55.687 | -2.81% | -1.88% |
| | | | 725 | 0.946 | 54.395 | 0.961 | 55.629 | -1.56% | -2.22% |
| | | | 740 | 0.962 | 54.230 | 0.963 | 55.570 | -0.10% | -2.41% |
| | | | 755 | 0.977 | 54.022 | 0.964 | 55.512 | 1.35% | -2.68% |
| 6/22/2017 | 750B | 22.2 | 725 | 0.964 | 54.782 | 0.961 | 55.629 | 0.31% | -1.52% |
| | | | 740 | 0.966 | 54.467 | 0.963 | 55.570 | 0.31% | -1.98% |
| | | | 755 | 0.983 | 54.500 | 0.964 | 55.512 | 1.97% | -1.82% |
| | | | 770 | 1.007 | 54.233 | 0.965 | 55.453 | 4.35% | -2.20% |
| | | | 785 | 1.014 | 53.923 | 0.966 | 55.395 | 4.97% | -2.66% |
| 6/21/2017 | 850B | 21.5 | 820 | 0.992 | 55.096 | 0.969 | 55.258 | 2.37% | -0.29% |
| | | | 835 | 1.008 | 54.941 | 0.970 | 55.200 | 3.92% | -0.47% |
| | | | 850 | 1.023 | 54.779 | 0.988 | 55.154 | 3.54% | -0.68% |
| 7/4/2017 | 850B | 21.1 | 820 | 0.990 | 54.633 | 0.969 | 55.258 | 2.17% | -1.13% |
| | | | 835 | 1.005 | 54.476 | 0.970 | 55.200 | 3.61% | -1.31% |
| | | | 850 | 1.020 | 54.315 | 0.988 | 55.154 | 3.24% | -1.52% |
| 8/21/2017 | 850B | 21.1 | 800 | 0.957 | 55.750 | 0.967 | 55.336 | -1.03% | 0.75% |
| | | | 820 | 0.975 | 55.568 | 0.969 | 55.258 | 0.62% | 0.56% |
| | | | 835 | 0.998 | 55.281 | 0.970 | 55.200 | 2.89% | 0.15% |
| | | | 850 | 1.014 | 55.089 | 0.988 | 55.154 | 2.63% | -0.12% |
| 7/3/2017 | 1750B | 19.8 | 1710 | 1.483 | 52.768 | 1.463 | 53.537 | 1.37% | -1.44% |
| | | | 1750 | 1.532 | 52.612 | 1.488 | 53.432 | 2.96% | -1.53% |
| | | | 1790 | 1.578 | 52.438 | 1.514 | 53.326 | 4.23% | -1.67% |
| 6/19/2017 | 1900B | 21.5 | 1850 | 1.502 | 51.519 | 1.520 | 53.300 | -1.18% | -3.34% |
| | | | 1880 | 1.532 | 51.399 | 1.520 | 53.300 | 0.79% | -3.57% |
| | | | 1910 | 1.564 | 51.306 | 1.520 | 53.300 | 2.89% | -3.74% |
| 6/29/2017 | 2450B | 21.9 | 2400 | 1.955 | 52.397 | 1.902 | 52.767 | 2.79% | -0.70% |
| | | | 2450 | 2.023 | 52.166 | 1.950 | 52.700 | 3.74% | -1.01% |
| | | | 2500 | 2.094 | 51.957 | 2.021 | 52.636 | 3.61% | -1.29% |
| 7/6/2017 | 2450B | 20.8 | 2400 | 1.971 | 50.978 | 1.902 | 52.767 | 3.63% | -3.39% |
| | | | 2450 | 2.039 | 50.749 | 1.950 | 52.700 | 4.56% | -3.70% |
| | | | 2500 | 2.101 | 50.611 | 2.021 | 52.636 | 3.96% | -3.85% |
| 7/13/2017 | 2450B | 22.7 | 2400 | 1.905 | 51.596 | 1.902 | 52.767 | 0.16% | -2.22% |
| | | | 2450 | 1.967 | 51.397 | 1.950 | 52.700 | 0.87% | -2.47% |
| | | | 2500 | 2.034 | 51.210 | 2.021 | 52.636 | 0.64% | -2.71% |
| 6/21/2017 | 2600B | 22.8 | 2600 | 2.164 | 51.094 | 2.163 | 52.509 | 0.05% | -2.69% |
| | | | 2650 | 2.229 | 50.910 | 2.234 | 52.445 | -0.22% | -2.93% |
| | | | 2700 | 2.305 | 50.749 | 2.305 | 52.382 | 0.00% | -3.12% |

The above measured tissue parameters were used in the DASY software. The DASY software was used to perform interpolation to determine the dielectric parameters at the SAR test device frequencies (per KDB Publication 865664 D01v01r04). The tissue parameters listed in the SAR test plots may slightly differ from the table above due to significant digit rounding in the software.




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## 9.2 Test System Verification

Prior to SAR assessment, the system is verified to ±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 - 1g**

| SAR System # | Tissue Frequency (MHz) | Tissue Type | Date: | Amb. Temp (°C) | Liquid Temp (°C) | Input Power (W) | Source SN | Probe SN | Measured $SAR_{1g}$ (W/kg) | 1 W Target $SAR_{1g}$ (W/kg) | 1 W Normalized $SAR_{1g}$ (W/kg) | $Deviation_{1g}$ (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CAL2 | 750 | HEAD | 06/26/2017 | 19.1 | 19.6 | 0.200 | 1097 | 3347 | 1.690 | 8.220 | 8.450 | 2.80% |
| CAL1 | 850 | HEAD | 06/26/2017 | 19.5 | 19.3 | 0.200 | 1009 | 7420 | 2.120 | 10.100 | 10.600 | 4.95% |
| CAL3 | 850 | HEAD | 07/10/2017 | 22.0 | 20.4 | 0.200 | 1010 | 3118 | 2.090 | 9.680 | 10.450 | 7.95% |
| CAL3 | 850 | HEAD | 08/18/2017 | 20.7 | 19.5 | 0.200 | 1010 | 3118 | 2.040 | 9.680 | 10.200 | 5.37% |
| CAL3 | 1750 | HEAD | 06/26/2017 | 20.9 | 21.8 | 0.100 | 1104 | 3118 | 3.570 | 36.000 | 35.700 | -0.83% |
| CAL2 | 1750 | HEAD | 07/13/2017 | 21.5 | 21.6 | 0.100 | 1104 | 3347 | 3.430 | 36.000 | 34.300 | -4.72% |
| CAL3 | 1900 | HEAD | 06/22/2017 | 20.7 | 20.9 | 0.100 | 5d181 | 3118 | 4.170 | 39.700 | 41.700 | 5.04% |
| CAL1 | 1900 | HEAD | 08/03/2017 | 20.3 | 21.9 | 0.100 | 5d181 | 7420 | 4.210 | 39.700 | 42.100 | 6.05% |
| CAL3 | 2450 | HEAD | 06/28/2017 | 21.5 | 22.5 | 0.100 | 921 | 3118 | 5.180 | 52.100 | 51.800 | -0.58% |
| CAL3 | 2450 | HEAD | 07/03/2017 | 21.7 | 23.5 | 0.100 | 921 | 3118 | 5.270 | 52.100 | 52.700 | 1.15% |
| CAL4 | 2450 | HEAD | 07/12/2017 | 21.5 | 22.0 | 0.100 | 921 | 3329 | 5.220 | 52.100 | 52.200 | 0.19% |
| CAL4 | 2600 | HEAD | 06/28/2017 | 22.0 | 21.5 | 0.100 | 1069 | 3329 | 6.070 | 56.300 | 60.700 | 7.82% |

**Table 9-3**
**System Verification Results - 10g**

| SAR System # | Tissue Frequency (MHz) | Tissue Type | Date: | Amb. Temp (°C) | Liquid Temp (°C) | Input Power (W) | Source SN | Probe SN | Measured $SAR_{10g}$ (W/kg) | 1 W Target $SAR_{10g}$ (W/kg) | 1 W Normalized $SAR_{10g}$ (W/kg) | $Deviation_{10g}$ (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CAL2 | 750 | BODY | 06/20/2017 | 19.0 | 22.0 | 0.200 | 1097 | 3347 | 1.150 | 5.690 | 5.750 | 1.05% |
| CAL2 | 750 | BODY | 06/22/2017 | 19.3 | 20.2 | 0.200 | 1097 | 3347 | 1.140 | 5.690 | 5.700 | 0.18% |
| CAL1 | 850 | BODY | 06/21/2017 | 20.0 | 21.5 | 0.200 | 1009 | 7420 | 1.370 | 6.430 | 6.850 | 6.53% |
| CAL1 | 850 | BODY | 07/04/2017 | 21.8 | 21.5 | 0.200 | 1009 | 7420 | 1.370 | 6.430 | 6.850 | 6.53% |
| CAL4 | 850 | BODY | 08/21/2017 | 19.9 | 19.4 | 0.200 | 1010 | 3329 | 1.380 | 6.570 | 6.900 | 5.02% |
| CAL1 | 1750 | BODY | 07/03/2017 | 20.2 | 20.0 | 0.100 | 1104 | 7420 | 1.950 | 19.300 | 19.500 | 1.04% |
| CAL1 | 1900 | BODY | 06/19/2017 | 19.1 | 21.5 | 0.100 | 5d181 | 7420 | 2.040 | 20.900 | 20.400 | -2.39% |
| CAL2 | 2450 | BODY | 06/29/2017 | 19.7 | 20.4 | 0.100 | 921 | 3347 | 2.260 | 24.000 | 22.600 | -5.83% |
| CAL2 | 2450 | BODY | 07/06/2017 | 20.8 | 20.8 | 0.100 | 921 | 3347 | 2.390 | 24.000 | 23.900 | -0.42% |
| CAL3 | 2450 | BODY | 07/13/2017 | 21.7 | 22.7 | 0.100 | 921 | 3118 | 2.450 | 24.000 | 24.500 | 2.08% |
| CAL4 | 2600 | BODY | 06/21/2017 | 20.0 | 20.9 | 0.100 | 1069 | 3329 | 2.440 | 25.000 | 24.400 | -2.40% |

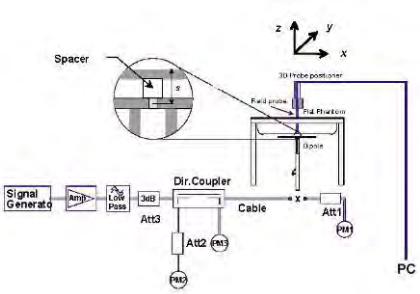


**Figure 9-1**
**System Verification Setup Diagram**

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




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# 10 SAR DATA SUMMARY

## 10.1 Standalone Head SAR Data

**Table 10-1**
**UMTS Head SAR**

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Mode | Service | Housing Type | Wristband Type | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Spacing | Device Serial Number | Duty Cycle | Side | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 836.60 | 4183 | UMTS 850 | RMC | Aluminum | Metal Loop | 24.5 | 23.00 | 0.00 | 10 mm | FH7TT00GJ78M | 1:1 | front | 0.091 | 1.413 | 0.129 | |
| 836.60 | 4183 | UMTS 850 | RMC | Aluminum | Metal Links | 24.5 | 23.00 | 0.05 | 10 mm | FH7TT00GJ78M | 1:1 | front | 0.102 | 1.413 | 0.144 | A1 |
| 836.60 | 4183 | UMTS 850 | RMC | Aluminum | Sport | 24.5 | 23.00 | 0.07 | 10 mm | FH7TT009J78C | 1:1 | front | 0.076 | 1.413 | 0.107 | |
| 836.60 | 4183 | UMTS 850 | RMC | Stainless Steel | Metal Loop | 24.5 | 23.00 | -0.05 | 10 mm | FH7TT003J79H | 1:1 | front | 0.084 | 1.413 | 0.119 | |
| 836.60 | 4183 | UMTS 850 | RMC | Stainless Steel | Metal Links | 24.5 | 23.00 | 0.00 | 10 mm | FH7TT003J79H | 1:1 | front | 0.094 | 1.413 | 0.133 | |
| 836.60 | 4183 | UMTS 850 | RMC | Stainless Steel | Sport | 24.5 | 23.00 | 0.02 | 10 mm | FH7TT003J79H | 1:1 | front | 0.078 | 1.413 | 0.110 | |
| 836.60 | 4183 | UMTS 850 | RMC | Ceramic | Metal Loop | 24.5 | 23.00 | -0.12 | 10 mm | FH7TT001J79R | 1:1 | front | 0.070 | 1.413 | 0.099 | |
| 836.60 | 4183 | UMTS 850 | RMC | Ceramic | Metal Links | 24.5 | 23.00 | -0.13 | 10 mm | FH7TT001J79R | 1:1 | front | 0.094 | 1.413 | 0.133 | |
| 836.60 | 4183 | UMTS 850 | RMC | Ceramic | Sport | 24.5 | 23.00 | -0.03 | 10 mm | FH7TT003J79R | 1:1 | front | 0.065 | 1.413 | 0.092 | |
| 1732.40 | 1412 | UMTS 1750 | RMC | Aluminum | Metal Loop | 24.5 | 23.50 | 0.04 | 10 mm | FH7TT002J78X | 1:1 | front | 0.389 | 1.259 | 0.490 | |
| 1732.40 | 1412 | UMTS 1750 | RMC | Aluminum | Metal Links | 24.5 | 23.50 | -0.02 | 10 mm | FH7TT002J78X | 1:1 | front | 0.323 | 1.259 | 0.407 | |
| 1732.40 | 1412 | UMTS 1750 | RMC | Aluminum | Sport | 24.5 | 23.50 | -0.02 | 10 mm | FH7TT002J78X | 1:1 | front | 0.191 | 1.259 | 0.240 | |
| 1732.40 | 1412 | UMTS 1750 | RMC | Stainless Steel | Metal Loop | 24.5 | 23.50 | 0.07 | 10 mm | FH7TT004J79H | 1:1 | front | 0.361 | 1.259 | 0.454 | |
| 1732.40 | 1412 | UMTS 1750 | RMC | Stainless Steel | Metal Links | 24.5 | 23.50 | -0.03 | 10 mm | FH7TT004J79H | 1:1 | front | 0.305 | 1.259 | 0.384 | |
| 1732.40 | 1412 | UMTS 1750 | RMC | Stainless Steel | Sport | 24.5 | 23.50 | -0.06 | 10 mm | FH7TT004J79H | 1:1 | front | 0.168 | 1.259 | 0.212 | |
| 1712.40 | 1312 | UMTS 1750 | RMC | Ceramic | Metal Loop | 24.5 | 23.44 | -0.03 | 10 mm | FH7TT001J79R | 1:1 | front | 0.387 | 1.276 | 0.494 | |
| 1732.40 | 1412 | UMTS 1750 | RMC | Ceramic | Metal Loop | 24.5 | 23.50 | 0.00 | 10 mm | FH7TT001J79R | 1:1 | front | 0.412 | 1.259 | **0.519** | A2 |
| 1752.60 | 1513 | UMTS 1750 | RMC | Ceramic | Metal Loop | 24.5 | 23.60 | -0.12 | 10 mm | FH7TT001J79R | 1:1 | front | 0.404 | 1.230 | 0.497 | |
| 1732.40 | 1412 | UMTS 1750 | RMC | Ceramic | Metal Links | 24.5 | 23.50 | -0.02 | 10 mm | FH7TT001J79R | 1:1 | front | 0.368 | 1.259 | 0.463 | |
| 1732.40 | 1412 | UMTS 1750 | RMC | Ceramic | Sport | 24.5 | 23.50 | -0.02 | 10 mm | FH7TT001J79R | 1:1 | front | 0.206 | 1.259 | 0.259 | |
| 1880.00 | 9400 | UMTS 1900 | RMC | Aluminum | Metal Loop | 24.5 | 23.21 | -0.12 | 10 mm | FH7TT004J78X | 1:1 | front | 0.315 | 1.346 | 0.424 | A3 |
| 1880.00 | 9400 | UMTS 1900 | RMC | Aluminum | Metal Links | 24.5 | 23.21 | -0.09 | 10 mm | FH7TT004J78X | 1:1 | front | 0.234 | 1.346 | 0.315 | |
| 1880.00 | 9400 | UMTS 1900 | RMC | Aluminum | Sport | 24.5 | 23.21 | -0.12 | 10 mm | FH7TT004J78X | 1:1 | front | 0.182 | 1.346 | 0.245 | |
| 1880.00 | 9400 | UMTS 1900 | RMC | Stainless Steel | Metal Loop | 24.5 | 23.21 | -0.12 | 10 mm | FH7TT003J79H | 1:1 | front | 0.274 | 1.346 | 0.369 | |
| 1880.00 | 9400 | UMTS 1900 | RMC | Stainless Steel | Metal Links | 24.5 | 23.21 | -0.12 | 10 mm | FH7TT003J79H | 1:1 | front | 0.202 | 1.346 | 0.272 | |
| 1880.00 | 9400 | UMTS 1900 | RMC | Stainless Steel | Sport | 24.5 | 23.21 | -0.05 | 10 mm | FH7TT003J79H | 1:1 | front | 0.196 | 1.346 | 0.264 | |
| 1880.00 | 9400 | UMTS 1900 | RMC | Ceramic | Metal Loop | 24.5 | 23.21 | -0.02 | 10 mm | FH7TT002J79R | 1:1 | front | 0.306 | 1.346 | 0.412 | |
| 1880.00 | 9400 | UMTS 1900 | RMC | Ceramic | Metal Links | 24.5 | 23.21 | -0.11 | 10 mm | FH7TT002J79R | 1:1 | front | 0.235 | 1.346 | 0.316 | |
| 1880.00 | 9400 | UMTS 1900 | RMC | Ceramic | Sport | 24.5 | 23.21 | -0.06 | 10 mm | FH7TT002J79R | 1:1 | front | 0.247 | 1.346 | 0.332 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | Head<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | |




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## Table 10-2
## LTE Band 12 Head SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | | Mode | Bandwidth [MHz] | Housing Type | Wristband Type | 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 | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | Aluminum | Metal Loop | 24.0 | 22.38 | 0.02 | 0 | FH7TT002J78X | QPSK | 1 | 25 | 10 mm | front | 1:1 | 0.050 | 1.452 | 0.073 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | Aluminum | Metal Loop | 23.0 | 21.33 | 0.04 | 1 | FH7TT002J78X | QPSK | 25 | 12 | 10 mm | front | 1:1 | 0.040 | 1.469 | 0.059 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | Aluminum | Metal Links | 24.0 | 22.38 | -0.01 | 0 | FH7TT00GJ78M | QPSK | 1 | 25 | 10 mm | front | 1:1 | 0.074 | 1.452 | 0.107 | A4 |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | Aluminum | Metal Links | 23.0 | 21.33 | 0.05 | 1 | FH7TT00GJ78M | QPSK | 25 | 12 | 10 mm | front | 1:1 | 0.060 | 1.469 | 0.088 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | Aluminum | Sport | 24.0 | 22.38 | 0.02 | 0 | FH7TT004J78X | QPSK | 1 | 25 | 10 mm | front | 1:1 | 0.056 | 1.452 | 0.081 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | Aluminum | Sport | 23.0 | 21.33 | 0.05 | 1 | FH7TT004J78X | QPSK | 25 | 12 | 10 mm | front | 1:1 | 0.046 | 1.469 | 0.068 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | Stainless Steel | Metal Loop | 24.0 | 22.38 | 0.01 | 0 | FH7TR06RJ796 | QPSK | 1 | 25 | 10 mm | front | 1:1 | 0.060 | 1.452 | 0.087 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | Stainless Steel | Metal Loop | 23.0 | 21.33 | 0.08 | 1 | FH7TR06RJ796 | QPSK | 25 | 12 | 10 mm | front | 1:1 | 0.048 | 1.469 | 0.071 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | Stainless Steel | Metal Links | 24.0 | 22.38 | 0.03 | 0 | FH7TR06CJ796 | QPSK | 1 | 25 | 10 mm | front | 1:1 | 0.072 | 1.452 | 0.105 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | Stainless Steel | Metal Links | 23.0 | 21.33 | 0.01 | 1 | FH7TR06CJ796 | QPSK | 25 | 12 | 10 mm | front | 1:1 | 0.059 | 1.469 | 0.087 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | Stainless Steel | Sport | 24.0 | 22.38 | 0.00 | 0 | FH7TT003J79H | QPSK | 1 | 25 | 10 mm | front | 1:1 | 0.060 | 1.452 | 0.087 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | Stainless Steel | Sport | 23.0 | 21.33 | 0.03 | 1 | FH7TT003J79H | QPSK | 25 | 12 | 10 mm | front | 1:1 | 0.050 | 1.469 | 0.073 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | Ceramic | Metal Loop | 24.0 | 22.38 | 0.06 | 0 | FH7TT002J79R | QPSK | 1 | 25 | 10 mm | front | 1:1 | 0.055 | 1.452 | 0.080 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | Ceramic | Metal Loop | 23.0 | 21.33 | 0.11 | 1 | FH7TT002J79R | QPSK | 25 | 12 | 10 mm | front | 1:1 | 0.045 | 1.469 | 0.066 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | Ceramic | Metal Links | 24.0 | 22.38 | 0.01 | 0 | FH7TT001J79R | QPSK | 1 | 25 | 10 mm | front | 1:1 | 0.060 | 1.452 | 0.087 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | Ceramic | Metal Links | 23.0 | 21.33 | 0.07 | 1 | FH7TT001J79R | QPSK | 25 | 12 | 10 mm | front | 1:1 | 0.049 | 1.469 | 0.072 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | Ceramic | Sport | 24.0 | 22.38 | 0.00 | 0 | FH7TT003J79R | QPSK | 1 | 25 | 10 mm | front | 1:1 | 0.051 | 1.452 | 0.074 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | Ceramic | Sport | 23.0 | 21.33 | 0.09 | 1 | FH7TT003J79R | QPSK | 25 | 12 | 10 mm | front | 1:1 | 0.042 | 1.469 | 0.062 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | Head<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | | | | | | |

## Table 10-3
## LTE Band 13 Head SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | | Mode | Bandwidth [MHz] | Housing Type | Wristband Type | 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 | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | Aluminum | Metal Loop | 24.0 | 22.39 | -0.03 | 0 | FH7TT009J78C | QPSK | 1 | 25 | 10 mm | front | 1:1 | 0.063 | 1.449 | 0.091 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | Aluminum | Metal Loop | 23.0 | 21.42 | -0.03 | 1 | FH7TT009J78C | QPSK | 25 | 25 | 10 mm | front | 1:1 | 0.050 | 1.439 | 0.072 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | Aluminum | Metal Links | 24.0 | 22.39 | -0.07 | 0 | FH7TT00GJ78M | QPSK | 1 | 25 | 10 mm | front | 1:1 | 0.079 | 1.449 | 0.114 | A5 |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | Aluminum | Metal Links | 23.0 | 21.42 | -0.02 | 1 | FH7TT00GJ78M | QPSK | 25 | 25 | 10 mm | front | 1:1 | 0.063 | 1.439 | 0.091 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | Aluminum | Sport | 24.0 | 22.39 | 0.04 | 0 | FH7TT00GJ78M | QPSK | 1 | 25 | 10 mm | front | 1:1 | 0.066 | 1.449 | 0.096 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | Aluminum | Sport | 23.0 | 21.42 | 0.00 | 1 | FH7TT00GJ78M | QPSK | 25 | 25 | 10 mm | front | 1:1 | 0.055 | 1.439 | 0.079 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | Stainless Steel | Metal Loop | 24.0 | 22.39 | 0.00 | 0 | FH7TT004J79H | QPSK | 1 | 25 | 10 mm | front | 1:1 | 0.069 | 1.449 | 0.100 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | Stainless Steel | Metal Loop | 23.0 | 21.42 | 0.10 | 1 | FH7TT004J79H | QPSK | 25 | 25 | 10 mm | front | 1:1 | 0.050 | 1.439 | 0.072 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | Stainless Steel | Metal Links | 24.0 | 22.39 | 0.00 | 0 | FH7TR06CJ796 | QPSK | 1 | 25 | 10 mm | front | 1:1 | 0.074 | 1.449 | 0.107 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | Stainless Steel | Metal Links | 23.0 | 21.42 | 0.01 | 1 | FH7TR06CJ796 | QPSK | 25 | 25 | 10 mm | front | 1:1 | 0.061 | 1.439 | 0.088 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | Stainless Steel | Sport | 24.0 | 22.39 | 0.05 | 0 | FH7TR06DJ796 | QPSK | 1 | 25 | 10 mm | front | 1:1 | 0.079 | 1.449 | 0.114 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | Stainless Steel | Sport | 23.0 | 21.42 | 0.09 | 1 | FH7TR06DJ796 | QPSK | 25 | 25 | 10 mm | front | 1:1 | 0.063 | 1.439 | 0.091 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | Ceramic | Metal Loop | 24.0 | 22.39 | -0.01 | 0 | FH7TT001J79R | QPSK | 1 | 25 | 10 mm | front | 1:1 | 0.064 | 1.449 | 0.093 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | Ceramic | Metal Loop | 23.0 | 21.42 | 0.05 | 1 | FH7TT001J79R | QPSK | 25 | 25 | 10 mm | front | 1:1 | 0.051 | 1.439 | 0.073 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | Ceramic | Metal Links | 24.0 | 22.39 | -0.03 | 0 | FH7TT001J79R | QPSK | 1 | 25 | 10 mm | front | 1:1 | 0.074 | 1.449 | 0.107 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | Ceramic | Metal Links | 23.0 | 21.42 | -0.01 | 1 | FH7TT001J79R | QPSK | 25 | 25 | 10 mm | front | 1:1 | 0.059 | 1.439 | 0.085 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | Ceramic | Sport | 24.0 | 22.39 | -0.12 | 0 | FH7TT002J79R | QPSK | 1 | 25 | 10 mm | front | 1:1 | 0.065 | 1.449 | 0.094 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | Ceramic | Sport | 23.0 | 21.42 | 0.03 | 1 | FH7TT002J79R | QPSK | 25 | 25 | 10 mm | front | 1:1 | 0.053 | 1.439 | 0.076 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | Head<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | | | | | | |




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## Table 10-4
## LTE Band 5 (Cell) Head SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | | Mode | Bandwidth [MHz] | Housing Type | Wristband Type | 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 | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 836.50 | 20525 | Mid | LTE Band 5 (Cell) | 10 | Aluminum | Metal Loop | 24.0 | 22.61 | -0.09 | 0 | FH7TT004J78X | QPSK | 1 | 25 | 10 mm | front | 1:1 | 0.069 | 1.377 | 0.095 | |
| 836.50 | 20525 | Mid | LTE Band 5 (Cell) | 10 | Aluminum | Metal Loop | 23.0 | 21.59 | -0.06 | 1 | FH7TT004J78X | QPSK | 25 | 12 | 10 mm | front | 1:1 | 0.054 | 1.384 | 0.075 | |
| 836.50 | 20525 | Mid | LTE Band 5 (Cell) | 10 | Aluminum | Metal Links | 24.0 | 22.61 | -0.07 | 0 | FH7TT002J78X | QPSK | 1 | 25 | 10 mm | front | 1:1 | 0.073 | 1.377 | 0.101 | |
| 836.50 | 20525 | Mid | LTE Band 5 (Cell) | 10 | Aluminum | Metal Links | 23.0 | 21.59 | -0.01 | 1 | FH7TT002J78X | QPSK | 25 | 12 | 10 mm | front | 1:1 | 0.058 | 1.384 | 0.080 | |
| 836.50 | 20525 | Mid | LTE Band 5 (Cell) | 10 | Aluminum | Sport | 24.0 | 22.61 | -0.07 | 0 | FH7TT00GJ78M | QPSK | 1 | 25 | 10 mm | front | 1:1 | 0.074 | 1.377 | 0.102 | |
| 836.50 | 20525 | Mid | LTE Band 5 (Cell) | 10 | Aluminum | Sport | 23.0 | 21.59 | -0.04 | 1 | FH7TT00GJ78M | QPSK | 25 | 12 | 10 mm | front | 1:1 | 0.056 | 1.384 | 0.078 | |
| 836.50 | 20525 | Mid | LTE Band 5 (Cell) | 10 | Stainless Steel | Metal Loop | 24.0 | 22.61 | -0.06 | 0 | FH7TR06RJ796 | QPSK | 1 | 25 | 10 mm | front | 1:1 | 0.069 | 1.377 | 0.095 | |
| 836.50 | 20525 | Mid | LTE Band 5 (Cell) | 10 | Stainless Steel | Metal Loop | 23.0 | 21.59 | -0.08 | 1 | FH7TR06RJ796 | QPSK | 25 | 12 | 10 mm | front | 1:1 | 0.055 | 1.384 | 0.076 | |
| 836.50 | 20525 | Mid | LTE Band 5 (Cell) | 10 | Stainless Steel | Metal Links | 24.0 | 22.61 | -0.11 | 0 | FH7TT003J79H | QPSK | 1 | 25 | 10 mm | front | 1:1 | 0.074 | 1.377 | 0.102 | A6 |
| 836.50 | 20525 | Mid | LTE Band 5 (Cell) | 10 | Stainless Steel | Metal Links | 23.0 | 21.59 | -0.03 | 1 | FH7TT003J79H | QPSK | 25 | 12 | 10 mm | front | 1:1 | 0.059 | 1.384 | 0.082 | |
| 836.50 | 20525 | Mid | LTE Band 5 (Cell) | 10 | Stainless Steel | Sport | 24.0 | 22.61 | -0.04 | 0 | FH7TT004J79H | QPSK | 1 | 25 | 10 mm | front | 1:1 | 0.065 | 1.377 | 0.090 | |
| 836.50 | 20525 | Mid | LTE Band 5 (Cell) | 10 | Stainless Steel | Sport | 23.0 | 21.59 | 0.00 | 1 | FH7TT004J79H | QPSK | 25 | 12 | 10 mm | front | 1:1 | 0.052 | 1.384 | 0.072 | |
| 836.50 | 20525 | Mid | LTE Band 5 (Cell) | 10 | Ceramic | Metal Loop | 24.0 | 22.61 | -0.03 | 0 | FH7TT004J79R | QPSK | 1 | 25 | 10 mm | front | 1:1 | 0.056 | 1.377 | 0.077 | |
| 836.50 | 20525 | Mid | LTE Band 5 (Cell) | 10 | Ceramic | Metal Loop | 23.0 | 21.59 | -0.04 | 1 | FH7TT004J79R | QPSK | 25 | 12 | 10 mm | front | 1:1 | 0.043 | 1.384 | 0.060 | |
| 836.50 | 20525 | Mid | LTE Band 5 (Cell) | 10 | Ceramic | Metal Links | 24.0 | 22.61 | -0.10 | 0 | FH7TT002J79R | QPSK | 1 | 25 | 10 mm | front | 1:1 | 0.067 | 1.377 | 0.092 | |
| 836.50 | 20525 | Mid | LTE Band 5 (Cell) | 10 | Ceramic | Metal Links | 23.0 | 21.59 | 0.04 | 1 | FH7TT002J79R | QPSK | 25 | 12 | 10 mm | front | 1:1 | 0.053 | 1.384 | 0.073 | |
| 836.50 | 20525 | Mid | LTE Band 5 (Cell) | 10 | Ceramic | Sport | 24.0 | 22.61 | -0.02 | 0 | FH7TT003J79R | QPSK | 1 | 25 | 10 mm | front | 1:1 | 0.058 | 1.377 | 0.080 | |
| 836.50 | 20525 | Mid | LTE Band 5 (Cell) | 10 | Ceramic | Sport | 23.0 | 21.59 | 0.00 | 1 | FH7TT003J79R | QPSK | 25 | 12 | 10 mm | front | 1:1 | 0.046 | 1.384 | 0.064 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | | Head<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | | | | |

## Table 10-5
## LTE Band 26 (Cell) Head SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | | Mode | Bandwidth [MHz] | Housing Type | Wristband Type | 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 | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 819.00 | 26740 | Low | LTE Band 26 (Cell) | 10 | Aluminum | Metal Loop | 24.0 | 22.88 | -0.11 | 0 | FH7TT009J78C | QPSK | 1 | 49 | 10 mm | front | 1:1 | 0.067 | 1.294 | 0.087 | |
| 819.00 | 26740 | Low | LTE Band 26 (Cell) | 10 | Aluminum | Metal Loop | 23.0 | 21.84 | -0.10 | 1 | FH7TT009J78C | QPSK | 25 | 12 | 10 mm | front | 1:1 | 0.053 | 1.306 | 0.069 | |
| 819.00 | 26740 | Low | LTE Band 26 (Cell) | 10 | Aluminum | Metal Links | 24.0 | 22.88 | -0.05 | 0 | FH7TT004J78X | QPSK | 1 | 49 | 10 mm | front | 1:1 | 0.071 | 1.294 | 0.092 | |
| 819.00 | 26740 | Low | LTE Band 26 (Cell) | 10 | Aluminum | Metal Links | 23.0 | 21.84 | -0.01 | 1 | FH7TT004J78X | QPSK | 25 | 12 | 10 mm | front | 1:1 | 0.057 | 1.306 | 0.074 | |
| 819.00 | 26740 | Low | LTE Band 26 (Cell) | 10 | Aluminum | Sport | 24.0 | 22.88 | -0.07 | 0 | FH7TT00GJ78M | QPSK | 1 | 49 | 10 mm | front | 1:1 | 0.072 | 1.294 | 0.093 | |
| 819.00 | 26740 | Low | LTE Band 26 (Cell) | 10 | Aluminum | Sport | 23.0 | 21.84 | -0.05 | 1 | FH7TT00GJ78M | QPSK | 25 | 12 | 10 mm | front | 1:1 | 0.055 | 1.306 | 0.072 | |
| 819.00 | 26740 | Low | LTE Band 26 (Cell) | 10 | Stainless Steel | Metal Loop | 24.0 | 22.88 | -0.08 | 0 | FH7TR06RJ796 | QPSK | 1 | 49 | 10 mm | front | 1:1 | 0.067 | 1.294 | 0.087 | |
| 819.00 | 26740 | Low | LTE Band 26 (Cell) | 10 | Stainless Steel | Metal Loop | 23.0 | 21.84 | -0.07 | 1 | FH7TR06RJ796 | QPSK | 25 | 12 | 10 mm | front | 1:1 | 0.054 | 1.306 | 0.071 | |
| 819.00 | 26740 | Low | LTE Band 26 (Cell) | 10 | Stainless Steel | Metal Links | 24.0 | 22.88 | -0.05 | 0 | FH7TR06RJ796 | QPSK | 1 | 49 | 10 mm | front | 1:1 | 0.084 | 1.294 | 0.109 | A7 |
| 819.00 | 26740 | Low | LTE Band 26 (Cell) | 10 | Stainless Steel | Metal Links | 23.0 | 21.84 | -0.05 | 1 | FH7TR06RJ796 | QPSK | 25 | 12 | 10 mm | front | 1:1 | 0.068 | 1.306 | 0.089 | |
| 819.00 | 26740 | Low | LTE Band 26 (Cell) | 10 | Stainless Steel | Sport | 24.0 | 22.88 | -0.03 | 0 | FH7TT003J79H | QPSK | 1 | 49 | 10 mm | front | 1:1 | 0.064 | 1.294 | 0.083 | |
| 819.00 | 26740 | Low | LTE Band 26 (Cell) | 10 | Stainless Steel | Sport | 23.0 | 21.84 | 0.00 | 1 | FH7TT003J79H | QPSK | 25 | 12 | 10 mm | front | 1:1 | 0.051 | 1.306 | 0.067 | |
| 819.00 | 26740 | Low | LTE Band 26 (Cell) | 10 | Ceramic | Metal Loop | 24.0 | 22.88 | -0.07 | 0 | FH7TT002J79R | QPSK | 1 | 49 | 10 mm | front | 1:1 | 0.055 | 1.294 | 0.071 | |
| 819.00 | 26740 | Low | LTE Band 26 (Cell) | 10 | Ceramic | Metal Loop | 23.0 | 21.84 | -0.06 | 1 | FH7TT002J79R | QPSK | 25 | 12 | 10 mm | front | 1:1 | 0.042 | 1.306 | 0.055 | |
| 819.00 | 26740 | Low | LTE Band 26 (Cell) | 10 | Ceramic | Metal Links | 24.0 | 22.88 | -0.11 | 0 | FH7TT004J79R | QPSK | 1 | 49 | 10 mm | front | 1:1 | 0.065 | 1.294 | 0.084 | |
| 819.00 | 26740 | Low | LTE Band 26 (Cell) | 10 | Ceramic | Metal Links | 23.0 | 21.84 | 0.05 | 1 | FH7TT004J79R | QPSK | 25 | 12 | 10 mm | front | 1:1 | 0.052 | 1.306 | 0.068 | |
| 819.00 | 26740 | Low | LTE Band 26 (Cell) | 10 | Ceramic | Sport | 24.0 | 22.88 | -0.04 | 0 | FH7TT003J79R | QPSK | 1 | 49 | 10 mm | front | 1:1 | 0.056 | 1.294 | 0.072 | |
| 819.00 | 26740 | Low | LTE Band 26 (Cell) | 10 | Ceramic | Sport | 23.0 | 21.84 | 0.01 | 1 | FH7TT003J79R | QPSK | 25 | 12 | 10 mm | front | 1:1 | 0.044 | 1.306 | 0.057 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | | Head<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | | | | |




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## Table 10-6
## LTE Band 4 (AWS) Head SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | | Mode | Bandwidth [MHz] | Housing Type | Wristband Type | 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 | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | Aluminum | Metal Loop | 24.0 | 23.31 | -0.03 | 0 | FH7TT009J78C | QPSK | 1 | 99 | 10 mm | front | 1:1 | 0.337 | 1.172 | 0.395 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | Aluminum | Metal Loop | 23.0 | 22.00 | -0.05 | 1 | FH7TT009J78C | QPSK | 50 | 50 | 10 mm | front | 1:1 | 0.247 | 1.259 | 0.311 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | Aluminum | Metal Links | 24.0 | 23.31 | 0.04 | 0 | FH7TT002J78X | QPSK | 1 | 99 | 10 mm | front | 1:1 | 0.282 | 1.172 | 0.331 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | Aluminum | Metal Links | 23.0 | 22.00 | 0.00 | 1 | FH7TT002J78X | QPSK | 50 | 50 | 10 mm | front | 1:1 | 0.216 | 1.259 | 0.272 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | Aluminum | Sport | 24.0 | 23.31 | -0.18 | 0 | FH7TT004J78X | QPSK | 1 | 99 | 10 mm | front | 1:1 | 0.144 | 1.172 | 0.169 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | Aluminum | Sport | 23.0 | 22.00 | -0.06 | 1 | FH7TT004J78X | QPSK | 50 | 50 | 10 mm | front | 1:1 | 0.107 | 1.259 | 0.135 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | Stainless Steel | Metal Loop | 24.0 | 23.31 | -0.06 | 0 | FH7TT004J79H | QPSK | 1 | 99 | 10 mm | front | 1:1 | 0.348 | 1.172 | 0.408 | A8 |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | Stainless Steel | Metal Loop | 23.0 | 22.00 | 0.04 | 1 | FH7TT004J79H | QPSK | 50 | 50 | 10 mm | front | 1:1 | 0.261 | 1.259 | 0.329 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | Stainless Steel | Metal Links | 24.0 | 23.31 | -0.05 | 0 | FH7TR06CJ796 | QPSK | 1 | 99 | 10 mm | front | 1:1 | 0.230 | 1.172 | 0.270 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | Stainless Steel | Metal Links | 23.0 | 22.00 | 0.07 | 1 | FH7TR06CJ796 | QPSK | 50 | 50 | 10 mm | front | 1:1 | 0.173 | 1.259 | 0.218 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | Stainless Steel | Sport | 24.0 | 23.31 | -0.10 | 0 | FH7TT004J79H | QPSK | 1 | 99 | 10 mm | front | 1:1 | 0.130 | 1.172 | 0.152 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | Stainless Steel | Sport | 23.0 | 22.00 | -0.04 | 1 | FH7TT004J79H | QPSK | 50 | 50 | 10 mm | front | 1:1 | 0.094 | 1.259 | 0.118 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | Ceramic | Metal Loop | 24.0 | 23.31 | -0.02 | 0 | FH7TT001J79R | QPSK | 1 | 99 | 10 mm | front | 1:1 | 0.343 | 1.172 | 0.402 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | Ceramic | Metal Loop | 23.0 | 22.00 | 0.04 | 1 | FH7TT001J79R | QPSK | 50 | 50 | 10 mm | front | 1:1 | 0.257 | 1.259 | 0.324 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | Ceramic | Metal Links | 24.0 | 23.31 | -0.02 | 0 | FH7TT004J79R | QPSK | 1 | 99 | 10 mm | front | 1:1 | 0.258 | 1.172 | 0.302 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | Ceramic | Metal Links | 23.0 | 22.00 | -0.02 | 1 | FH7TT004J79R | QPSK | 50 | 50 | 10 mm | front | 1:1 | 0.197 | 1.259 | 0.248 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | Ceramic | Sport | 24.0 | 23.31 | -0.10 | 0 | FH7TT003J79R | QPSK | 1 | 99 | 10 mm | front | 1:1 | 0.145 | 1.172 | 0.170 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | Ceramic | Sport | 23.0 | 22.00 | -0.02 | 1 | FH7TT003J79R | QPSK | 50 | 50 | 10 mm | front | 1:1 | 0.110 | 1.259 | 0.138 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | | Head<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | | | | |

## Table 10-7
## LTE Band 25 (PCS) Head SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | | Mode | Bandwidth [MHz] | Housing Type | Wristband Type | 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 | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | Aluminum | Metal Loop | 24.0 | 23.13 | 0.01 | 0 | FH7TT004J78X | QPSK | 1 | 99 | 10 mm | front | 1:1 | 0.330 | 1.222 | 0.403 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | Aluminum | Metal Loop | 23.0 | 21.93 | 0.02 | 1 | FH7TT004J78X | QPSK | 50 | 50 | 10 mm | front | 1:1 | 0.249 | 1.279 | 0.318 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | Aluminum | Metal Links | 24.0 | 23.13 | -0.03 | 0 | FH7TT009J78C | QPSK | 1 | 99 | 10 mm | front | 1:1 | 0.220 | 1.222 | 0.269 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | Aluminum | Metal Links | 23.0 | 21.93 | 0.03 | 1 | FH7TT009J78C | QPSK | 50 | 50 | 10 mm | front | 1:1 | 0.172 | 1.279 | 0.220 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | Aluminum | Sport | 24.0 | 23.13 | -0.03 | 0 | FH7TT00GJ78M | QPSK | 1 | 99 | 10 mm | front | 1:1 | 0.176 | 1.222 | 0.215 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | Aluminum | Sport | 23.0 | 21.93 | -0.05 | 1 | FH7TT00GJ78M | QPSK | 50 | 50 | 10 mm | front | 1:1 | 0.124 | 1.279 | 0.159 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | Stainless Steel | Metal Loop | 24.0 | 23.13 | -0.03 | 0 | FH7TR06DJ796 | QPSK | 1 | 99 | 10 mm | front | 1:1 | 0.259 | 1.222 | 0.316 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | Stainless Steel | Metal Loop | 23.0 | 21.93 | 0.01 | 1 | FH7TR06DJ796 | QPSK | 50 | 50 | 10 mm | front | 1:1 | 0.206 | 1.279 | 0.263 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | Stainless Steel | Metal Links | 24.0 | 23.13 | 0.06 | 0 | FH7TR06RJ796 | QPSK | 1 | 99 | 10 mm | front | 1:1 | 0.213 | 1.222 | 0.260 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | Stainless Steel | Metal Links | 23.0 | 21.93 | 0.02 | 1 | FH7TR06RJ796 | QPSK | 50 | 50 | 10 mm | front | 1:1 | 0.162 | 1.279 | 0.207 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | Stainless Steel | Sport | 24.0 | 23.13 | 0.11 | 0 | FH7TR06RJ796 | QPSK | 1 | 99 | 10 mm | front | 1:1 | 0.166 | 1.222 | 0.203 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | Stainless Steel | Sport | 23.0 | 21.93 | -0.01 | 1 | FH7TR06RJ796 | QPSK | 50 | 50 | 10 mm | front | 1:1 | 0.116 | 1.279 | 0.148 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | Ceramic | Metal Loop | 24.0 | 23.13 | -0.09 | 0 | FH7TT004J79R | QPSK | 1 | 99 | 10 mm | front | 1:1 | 0.337 | 1.222 | 0.412 | A9 |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | Ceramic | Metal Loop | 23.0 | 21.93 | -0.03 | 1 | FH7TT004J79R | QPSK | 50 | 50 | 10 mm | front | 1:1 | 0.254 | 1.279 | 0.325 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | Ceramic | Metal Links | 24.0 | 23.13 | -0.04 | 0 | FH7TT002J79R | QPSK | 1 | 99 | 10 mm | front | 1:1 | 0.200 | 1.222 | 0.244 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | Ceramic | Metal Links | 23.0 | 21.93 | 0.01 | 1 | FH7TT002J79R | QPSK | 50 | 50 | 10 mm | front | 1:1 | 0.157 | 1.279 | 0.201 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | Ceramic | Sport | 24.0 | 23.13 | -0.07 | 0 | FH7TT003J79R | QPSK | 1 | 99 | 10 mm | front | 1:1 | 0.209 | 1.222 | 0.255 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | Ceramic | Sport | 23.0 | 21.93 | -0.01 | 1 | FH7TT003J79R | QPSK | 50 | 50 | 10 mm | front | 1:1 | 0.152 | 1.279 | 0.194 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | | Head<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | | | | |




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## Table 10-8
## LTE Band 41 Head SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | | Mode | Bandwidth [MHz] | Housing Type | Wristband Type | 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 | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 2680.00 | 41490 | High | LTE Band 41 | 20 | Aluminum | Metal Loop | 24.0 | 23.39 | -0.03 | 0 | FH7TT004J78X | QPSK | 1 | 99 | 10 mm | front | 1:1.58 | 0.206 | 1.151 | 0.237 | |
| 2680.00 | 41490 | High | LTE Band 41 | 20 | Aluminum | Metal Loop | 23.0 | 22.04 | 0.03 | 1 | FH7TT004J78X | QPSK | 50 | 50 | 10 mm | front | 1:1.58 | 0.152 | 1.247 | 0.190 | |
| 2680.00 | 41490 | High | LTE Band 41 | 20 | Aluminum | Metal Links | 24.0 | 23.39 | -0.04 | 0 | FH7TT009J78C | QPSK | 1 | 99 | 10 mm | front | 1:1.58 | 0.184 | 1.151 | 0.212 | |
| 2680.00 | 41490 | High | LTE Band 41 | 20 | Aluminum | Metal Links | 23.0 | 22.04 | 0.01 | 1 | FH7TT009J78C | QPSK | 50 | 50 | 10 mm | front | 1:1.58 | 0.136 | 1.247 | 0.170 | |
| 2680.00 | 41490 | High | LTE Band 41 | 20 | Aluminum | Sport | 24.0 | 23.39 | 0.08 | 0 | FH7TT002J78X | QPSK | 1 | 99 | 10 mm | front | 1:1.58 | 0.238 | 1.151 | 0.274 | |
| 2680.00 | 41490 | High | LTE Band 41 | 20 | Aluminum | Sport | 23.0 | 22.04 | 0.09 | 1 | FH7TT002J78X | QPSK | 50 | 50 | 10 mm | front | 1:1.58 | 0.173 | 1.247 | 0.216 | |
| 2680.00 | 41490 | High | LTE Band 41 | 20 | Stainless Steel | Metal Loop | 24.0 | 23.39 | -0.02 | 0 | FH7TR06CJ796 | QPSK | 1 | 99 | 10 mm | front | 1:1.58 | 0.273 | 1.151 | 0.314 | |
| 2680.00 | 41490 | High | LTE Band 41 | 20 | Stainless Steel | Metal Loop | 23.0 | 22.04 | 0.01 | 1 | FH7TR06CJ796 | QPSK | 50 | 50 | 10 mm | front | 1:1.58 | 0.198 | 1.247 | 0.247 | |
| 2680.00 | 41490 | High | LTE Band 41 | 20 | Stainless Steel | Metal Links | 24.0 | 23.39 | -0.04 | 0 | FH7TR06DJ796 | QPSK | 1 | 99 | 10 mm | front | 1:1.58 | 0.264 | 1.151 | 0.304 | |
| 2680.00 | 41490 | High | LTE Band 41 | 20 | Stainless Steel | Metal Links | 23.0 | 22.04 | 0.01 | 1 | FH7TR06DJ796 | QPSK | 50 | 50 | 10 mm | front | 1:1.58 | 0.203 | 1.247 | 0.253 | |
| 2680.00 | 41490 | High | LTE Band 41 | 20 | Stainless Steel | Sport | 24.0 | 23.39 | -0.01 | 0 | FH7TT004J79H | QPSK | 1 | 99 | 10 mm | front | 1:1.58 | 0.296 | 1.151 | 0.341 | A10 |
| 2680.00 | 41490 | High | LTE Band 41 | 20 | Stainless Steel | Sport | 23.0 | 22.04 | 0.09 | 1 | FH7TT004J79H | QPSK | 50 | 50 | 10 mm | front | 1:1.58 | 0.216 | 1.247 | 0.269 | |
| 2680.00 | 41490 | High | LTE Band 41 | 20 | Ceramic | Metal Loop | 24.0 | 23.39 | 0.03 | 0 | FH7TT004J79R | QPSK | 1 | 99 | 10 mm | front | 1:1.58 | 0.247 | 1.151 | 0.284 | |
| 2680.00 | 41490 | High | LTE Band 41 | 20 | Ceramic | Metal Loop | 23.0 | 22.04 | -0.02 | 1 | FH7TT004J79R | QPSK | 50 | 50 | 10 mm | front | 1:1.58 | 0.183 | 1.247 | 0.228 | |
| 2680.00 | 41490 | High | LTE Band 41 | 20 | Ceramic | Metal Links | 24.0 | 23.39 | -0.01 | 0 | FH7TT002J79R | QPSK | 1 | 99 | 10 mm | front | 1:1.58 | 0.245 | 1.151 | 0.282 | |
| 2680.00 | 41490 | High | LTE Band 41 | 20 | Ceramic | Metal Links | 23.0 | 22.04 | 0.03 | 1 | FH7TT002J79R | QPSK | 50 | 50 | 10 mm | front | 1:1.58 | 0.188 | 1.247 | 0.234 | |
| 2680.00 | 41490 | High | LTE Band 41 | 20 | Ceramic | Sport | 24.0 | 23.39 | -0.02 | 0 | FH7TT003J79R | QPSK | 1 | 99 | 10 mm | front | 1:1.58 | 0.249 | 1.151 | 0.287 | |
| 2680.00 | 41490 | High | LTE Band 41 | 20 | Ceramic | Sport | 23.0 | 22.04 | 0.04 | 1 | FH7TT003J79R | QPSK | 50 | 50 | 10 mm | front | 1:1.58 | 0.180 | 1.247 | 0.224 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | | Head<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | | | | |

## Table 10-9
## 2.4 GHz WLAN Head SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Mode | Service | Bandwidth [MHz] | Housing Type | Wristband Type | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Spacing | Device Serial Number | Data Rate (Mbps) | Side | Duty Cycle (%) | SAR (1g) | Scaling Factor (Power) | Scaling Factor (Duty Cycle) | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | (W/kg) | | | (W/kg) | |
| 2437 | 6 | 802.11b | DSSS | 22 | Aluminum | Metal Loop | 19.5 | 19.47 | 0.02 | 10 mm | FH7TT004J78X | 1 | front | 98.2 | 0.119 | 1.007 | 1.018 | 0.122 | |
| 2437 | 6 | 802.11b | DSSS | 22 | Aluminum | Metal Links | 19.5 | 19.47 | -0.13 | 10 mm | FH7TT004J78X | 1 | front | 98.2 | 0.115 | 1.007 | 1.018 | 0.118 | |
| 2437 | 6 | 802.11b | DSSS | 22 | Aluminum | Sport | 19.5 | 19.47 | 0.00 | 10 mm | FH7TT004J78X | 1 | front | 98.2 | 0.162 | 1.007 | 1.018 | **0.166** | A11 |
| 2437 | 6 | 802.11b | DSSS | 22 | Stainless Steel | Metal Loop | 19.5 | 19.47 | 0.02 | 10 mm | FH7TT004J79H | 1 | front | 98.2 | 0.078 | 1.007 | 1.018 | 0.080 | |
| 2437 | 6 | 802.11b | DSSS | 22 | Stainless Steel | Metal Links | 19.5 | 19.47 | -0.03 | 10 mm | FH7TT004J79H | 1 | front | 98.2 | 0.086 | 1.007 | 1.018 | 0.088 | |
| 2437 | 6 | 802.11b | DSSS | 22 | Stainless Steel | Sport | 19.5 | 19.47 | -0.05 | 10 mm | FH7TT004J79H | 1 | front | 98.2 | 0.109 | 1.007 | 1.018 | 0.112 | |
| 2437 | 6 | 802.11b | DSSS | 22 | Ceramic | Metal Loop | 19.5 | 19.47 | -0.02 | 10 mm | FH7TT003J79R | 1 | front | 98.2 | 0.078 | 1.007 | 1.018 | 0.080 | |
| 2437 | 6 | 802.11b | DSSS | 22 | Ceramic | Metal Links | 19.5 | 19.47 | 0.08 | 10 mm | FH7TT003J79R | 1 | front | 98.2 | 0.084 | 1.007 | 1.018 | 0.086 | |
| 2437 | 6 | 802.11b | DSSS | 22 | Ceramic | Sport | 19.5 | 19.47 | 0.04 | 10 mm | FH7TT003J79R | 1 | front | 98.2 | 0.120 | 1.007 | 1.018 | 0.123 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | Head<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | | | |




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## Table 10-10
## Bluetooth (ePA) Head SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Mode | Service | Housing Type | Wristband Type | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Spacing | Device Serial Number | Data Rate (Mbps) | Duty Cycle | Side | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 2441.00 | 39 | Bluetooth | FHSS | Aluminum | Metal Loop | 19.0 | 18.95 | -0.01 | 10 mm | FH7TT00GJ78M | 1 | 1:1 | front | 0.097 | 1.012 | 0.098 | |
| 2441.00 | 39 | Bluetooth | FHSS | Aluminum | Metal Links | 19.0 | 18.95 | 0.01 | 10 mm | FH7TT00GJ78M | 1 | 1:1 | front | 0.095 | 1.012 | 0.096 | |
| 2441.00 | 39 | Bluetooth | FHSS | Aluminum | Sport | 19.0 | 18.95 | 0.09 | 10 mm | FH7TT00GJ78M | 1 | 1:1 | front | 0.128 | 1.012 | **0.130** | A12 |
| 2441.00 | 39 | Bluetooth | FHSS | Stainless Steel | Metal Loop | 19.0 | 18.95 | -0.21 | 10 mm | FH7TT004J79H | 1 | 1:1 | front | 0.085 | 1.012 | 0.086 | |
| 2441.00 | 39 | Bluetooth | FHSS | Stainless Steel | Metal Links | 19.0 | 18.95 | -0.16 | 10 mm | FH7TT004J79H | 1 | 1:1 | front | 0.082 | 1.012 | 0.083 | |
| 2441.00 | 39 | Bluetooth | FHSS | Stainless Steel | Sport | 19.0 | 18.95 | -0.13 | 10 mm | FH7TT004J79H | 1 | 1:1 | front | 0.105 | 1.012 | 0.106 | |
| 2441.00 | 39 | Bluetooth | FHSS | Ceramic | Metal Loop | 19.0 | 18.95 | -0.14 | 10 mm | FH7TT001J79R | 1 | 1:1 | front | 0.083 | 1.012 | 0.084 | |
| 2441.00 | 39 | Bluetooth | FHSS | Ceramic | Metal Links | 19.0 | 18.95 | 0.00 | 10 mm | FH7TT001J79R | 1 | 1:1 | front | 0.082 | 1.012 | 0.083 | |
| 2441.00 | 39 | Bluetooth | FHSS | Ceramic | Sport | 19.0 | 18.95 | -0.03 | 10 mm | FH7TT001J79R | 1 | 1:1 | front | 0.115 | 1.012 | 0.116 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | Head<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | | |

## Table 10-11
## Bluetooth (iPA) Head SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Mode | Service | Housing Type | Wristband Type | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Spacing | Device Serial Number | Data Rate (Mbps) | Duty Cycle | Side | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 2441.00 | 39 | Bluetooth | FHSS | Aluminum | Metal Loop | 13.0 | 12.98 | -0.10 | 10 mm | FH7TT00GJ78M | 1 | 1:1 | front | 0.023 | 1.005 | 0.023 | |
| 2441.00 | 39 | Bluetooth | FHSS | Aluminum | Metal Links | 13.0 | 12.98 | 0.14 | 10 mm | FH7TT00GJ78M | 1 | 1:1 | front | 0.022 | 1.005 | 0.022 | |
| 2441.00 | 39 | Bluetooth | FHSS | Aluminum | Sport | 13.0 | 12.98 | 0.04 | 10 mm | FH7TT00GJ78M | 1 | 1:1 | front | 0.033 | 1.005 | 0.033 | A13 |
| 2441.00 | 39 | Bluetooth | FHSS | Stainless Steel | Metal Loop | 13.0 | 12.98 | 0.15 | 10 mm | FH7TT004J79H | 1 | 1:1 | front | 0.016 | 1.005 | 0.016 | |
| 2441.00 | 39 | Bluetooth | FHSS | Stainless Steel | Metal Links | 13.0 | 12.98 | 0.18 | 10 mm | FH7TT004J79H | 1 | 1:1 | front | 0.016 | 1.005 | 0.016 | |
| 2441.00 | 39 | Bluetooth | FHSS | Stainless Steel | Sport | 13.0 | 12.98 | 0.11 | 10 mm | FH7TT004J79H | 1 | 1:1 | front | 0.022 | 1.005 | 0.022 | |
| 2441.00 | 39 | Bluetooth | FHSS | Ceramic | Metal Loop | 13.0 | 12.98 | 0.13 | 10 mm | FH7TT001J79R | 1 | 1:1 | front | 0.018 | 1.005 | 0.018 | |
| 2441.00 | 39 | Bluetooth | FHSS | Ceramic | Metal Links | 13.0 | 12.98 | 0.10 | 10 mm | FH7TT001J79R | 1 | 1:1 | front | 0.017 | 1.005 | 0.017 | |
| 2441.00 | 39 | Bluetooth | FHSS | Ceramic | Sport | 13.0 | 12.98 | -0.11 | 10 mm | FH7TT001J79R | 1 | 1:1 | front | 0.025 | 1.005 | 0.025 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | Head<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | | |




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## 10.2 Standalone Extremity SAR Data

### Table 10-12
### UMTS Extremity SAR Data

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Mode | Service | Housing Type | Wristband Type | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Spacing | Device Serial Number | Duty Cycle | Side | SAR (10g) | Scaling Factor | Reported SAR (10g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 836.60 | 4183 | UMTS 850 | RMC | Aluminum | Metal Loop | 24.5 | 23.00 | 0.15 | 0 mm | FH7TT009J78C | 1:1 | back | 0.012 | 1.413 | 0.017 | |
| 836.60 | 4183 | UMTS 850 | RMC | Aluminum | Metal Links | 24.5 | 23.00 | 0.15 | 0 mm | FH7TT002J78X | 1:1 | back | 0.005 | 1.413 | 0.007 | |
| 836.60 | 4183 | UMTS 850 | RMC | Aluminum | Sport | 24.5 | 23.00 | 0.11 | 0 mm | FH7TT009J78C | 1:1 | back | 0.015 | 1.413 | 0.021 | |
| 836.60 | 4183 | UMTS 850 | RMC | Stainless Steel | Metal Loop | 24.5 | 23.00 | 0.19 | 0 mm | FH7TT004J79H | 1:1 | back | 0.015 | 1.413 | 0.021 | |
| 836.60 | 4183 | UMTS 850 | RMC | Stainless Steel | Metal Links | 24.5 | 23.00 | 0.16 | 0 mm | FH7TR06CJ796 | 1:1 | back | 0.005 | 1.413 | 0.007 | |
| 836.60 | 4183 | UMTS 850 | RMC | Stainless Steel | Sport | 24.5 | 23.00 | 0.18 | 0 mm | FH7TR06CJ796 | 1:1 | back | 0.016 | 1.413 | 0.023 | |
| 836.60 | 4183 | UMTS 850 | RMC | Ceramic | Metal Loop | 24.5 | 23.00 | 0.14 | 0 mm | FH7TT002J79R | 1:1 | back | 0.017 | 1.413 | 0.024 | |
| 836.60 | 4183 | UMTS 850 | RMC | Ceramic | Metal Links | 24.5 | 23.00 | 0.15 | 0 mm | FH7TT002J79R | 1:1 | back | 0.007 | 1.413 | 0.010 | |
| 836.60 | 4183 | UMTS 850 | RMC | Ceramic | Sport | 24.5 | 23.00 | 0.17 | 0 mm | FH7TT004J79R | 1:1 | back | 0.021 | 1.413 | 0.030 | A14 |
| 1732.40 | 1412 | UMTS 1750 | RMC | Aluminum | Metal Loop | 24.5 | 23.50 | 0.09 | 0 mm | FH7TT004J78X | 1:1 | back | 0.168 | 1.259 | 0.212 | |
| 1732.40 | 1412 | UMTS 1750 | RMC | Aluminum | Metal Links | 24.5 | 23.50 | 0.02 | 0 mm | FH7TT009J78C | 1:1 | back | 0.101 | 1.259 | 0.127 | |
| 1732.40 | 1412 | UMTS 1750 | RMC | Aluminum | Sport | 24.5 | 23.50 | 0.11 | 0 mm | FH7TT004J78X | 1:1 | back | 0.105 | 1.259 | 0.132 | |
| 1732.40 | 1412 | UMTS 1750 | RMC | Stainless Steel | Metal Loop | 24.5 | 23.50 | -0.18 | 0 mm | FH7TT003J79H | 1:1 | back | 0.177 | 1.259 | 0.223 | |
| 1732.40 | 1412 | UMTS 1750 | RMC | Stainless Steel | Metal Links | 24.5 | 23.50 | 0.02 | 0 mm | FH7TT003J79H | 1:1 | back | 0.105 | 1.259 | 0.132 | |
| 1732.40 | 1412 | UMTS 1750 | RMC | Stainless Steel | Sport | 24.5 | 23.50 | 0.07 | 0 mm | FH7TR06CJ796 | 1:1 | back | 0.113 | 1.259 | 0.142 | |
| 1712.40 | 1312 | UMTS 1750 | RMC | Ceramic | Metal Loop | 24.5 | 23.44 | -0.13 | 0 mm | FH7TT001J79R | 1:1 | back | 0.269 | 1.276 | 0.343 | |
| 1732.40 | 1412 | UMTS 1750 | RMC | Ceramic | Metal Loop | 24.5 | 23.50 | -0.11 | 0 mm | FH7TT001J79R | 1:1 | back | 0.273 | 1.259 | **0.344** | A15 |
| 1752.60 | 1513 | UMTS 1750 | RMC | Ceramic | Metal Loop | 24.5 | 23.60 | -0.02 | 0 mm | FH7TT001J79R | 1:1 | back | 0.218 | 1.230 | 0.268 | |
| 1732.40 | 1412 | UMTS 1750 | RMC | Ceramic | Metal Links | 24.5 | 23.50 | 0.01 | 0 mm | FH7TT001J79R | 1:1 | back | 0.158 | 1.259 | 0.199 | |
| 1732.40 | 1412 | UMTS 1750 | RMC | Ceramic | Sport | 24.5 | 23.50 | 0.04 | 0 mm | FH7TT004J79R | 1:1 | back | 0.226 | 1.259 | 0.285 | |
| 1880.00 | 9400 | UMTS 1900 | RMC | Aluminum | Metal Loop | 24.5 | 23.21 | -0.04 | 0 mm | FH7TT002J78X | 1:1 | back | 0.164 | 1.346 | 0.221 | |
| 1880.00 | 9400 | UMTS 1900 | RMC | Aluminum | Metal Links | 24.5 | 23.21 | -0.09 | 0 mm | FH7TT009J78C | 1:1 | back | 0.081 | 1.346 | 0.109 | |
| 1880.00 | 9400 | UMTS 1900 | RMC | Aluminum | Sport | 24.5 | 23.21 | -0.01 | 0 mm | FH7TT009J78C | 1:1 | back | 0.106 | 1.346 | 0.143 | |
| 1880.00 | 9400 | UMTS 1900 | RMC | Stainless Steel | Metal Loop | 24.5 | 23.21 | -0.02 | 0 mm | FH7TR06RJ796 | 1:1 | back | 0.071 | 1.346 | 0.096 | |
| 1880.00 | 9400 | UMTS 1900 | RMC | Stainless Steel | Metal Links | 24.5 | 23.21 | -0.02 | 0 mm | FH7TR06RJ796 | 1:1 | back | 0.057 | 1.346 | 0.077 | |
| 1880.00 | 9400 | UMTS 1900 | RMC | Stainless Steel | Sport | 24.5 | 23.21 | 0.12 | 0 mm | FH7TR06RJ796 | 1:1 | back | 0.071 | 1.346 | 0.096 | |
| 1880.00 | 9400 | UMTS 1900 | RMC | Ceramic | Metal Loop | 24.5 | 23.21 | -0.09 | 0 mm | FH7TT002J79R | 1:1 | back | 0.211 | 1.346 | 0.284 | A16 |
| 1880.00 | 9400 | UMTS 1900 | RMC | Ceramic | Metal Links | 24.5 | 23.21 | 0.02 | 0 mm | FH7TT003J79R | 1:1 | back | 0.150 | 1.346 | 0.202 | |
| 1880.00 | 9400 | UMTS 1900 | RMC | Ceramic | Sport | 24.5 | 23.21 | 0.07 | 0 mm | FH7TT003J79R | 1:1 | back | 0.204 | 1.346 | 0.275 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | Extremity<br>4.0 W/kg (mW/g)<br>averaged over 10 grams | | | | | | |




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## Table 10-13
## LTE Band 12 Extremity SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | | Mode | Bandwidth [MHz] | Housing Type | Wristband Type | 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 (10g) | Scaling Factor | Reported SAR (10g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | Aluminum | Metal Loop | 24.0 | 22.38 | 0.19 | 0 | FH7TT00GJ78M | QPSK | 1 | 25 | 0 mm | back | 1:1 | 0.010 | 1.452 | 0.015 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | Aluminum | Metal Loop | 23.0 | 21.33 | 0.12 | 1 | FH7TT00GJ78M | QPSK | 25 | 12 | 0 mm | back | 1:1 | 0.007 | 1.469 | 0.010 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | Aluminum | Metal Links | 24.0 | 22.38 | 0.11 | 0 | FH7TT004J78X | QPSK | 1 | 25 | 0 mm | back | 1:1 | 0.002 | 1.452 | 0.003 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | Aluminum | Metal Links | 23.0 | 21.33 | 0.19 | 1 | FH7TT009J78C | QPSK | 25 | 12 | 0 mm | back | 1:1 | 0.002 | 1.469 | 0.003 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | Aluminum | Sport | 24.0 | 22.38 | 0.00 | 0 | FH7TT009J78C | QPSK | 1 | 25 | 0 mm | back | 1:1 | 0.008 | 1.452 | 0.012 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | Aluminum | Sport | 23.0 | 21.33 | 0.14 | 1 | FH7TT009J78C | QPSK | 25 | 12 | 0 mm | back | 1:1 | 0.006 | 1.469 | 0.009 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | Stainless Steel | Metal Loop | 24.0 | 22.38 | 0.11 | 0 | FH7TT003J79H | QPSK | 1 | 25 | 0 mm | back | 1:1 | 0.010 | 1.452 | 0.015 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | Stainless Steel | Metal Loop | 23.0 | 21.33 | 0.17 | 1 | FH7TT003J79H | QPSK | 25 | 12 | 0 mm | back | 1:1 | 0.009 | 1.469 | 0.013 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | Stainless Steel | Metal Links | 24.0 | 22.38 | 0.15 | 0 | FH7TT003J79H | QPSK | 1 | 25 | 0 mm | back | 1:1 | 0.002 | 1.452 | 0.003 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | Stainless Steel | Metal Links | 23.0 | 21.33 | 0.16 | 1 | FH7TT003J79H | QPSK | 25 | 12 | 0 mm | back | 1:1 | 0.002 | 1.469 | 0.003 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | Stainless Steel | Sport | 24.0 | 22.38 | 0.13 | 0 | FH7TR06CJ796 | QPSK | 1 | 25 | 0 mm | back | 1:1 | 0.008 | 1.452 | 0.012 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | Stainless Steel | Sport | 23.0 | 21.33 | 0.10 | 1 | FH7TR06CJ796 | QPSK | 25 | 12 | 0 mm | back | 1:1 | 0.007 | 1.469 | 0.010 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | Ceramic | Metal Loop | 24.0 | 22.38 | 0.12 | 0 | FH7TT004J79R | QPSK | 1 | 25 | 0 mm | back | 1:1 | 0.014 | 1.452 | 0.020 | A17 |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | Ceramic | Metal Loop | 23.0 | 21.33 | 0.11 | 1 | FH7TT004J79R | QPSK | 25 | 12 | 0 mm | back | 1:1 | 0.011 | 1.469 | 0.016 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | Ceramic | Metal Links | 24.0 | 22.38 | 0.15 | 0 | FH7TT003J79R | QPSK | 1 | 25 | 0 mm | back | 1:1 | 0.010 | 1.452 | 0.015 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | Ceramic | Metal Links | 23.0 | 21.33 | 0.14 | 1 | FH7TT003J79R | QPSK | 25 | 12 | 0 mm | back | 1:1 | 0.007 | 1.469 | 0.010 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | Ceramic | Sport | 24.0 | 22.38 | 0.16 | 0 | FH7TT002J79R | QPSK | 1 | 25 | 0 mm | back | 1:1 | 0.010 | 1.452 | 0.015 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | Ceramic | Sport | 23.0 | 21.33 | 0.16 | 1 | FH7TT002J79R | QPSK | 25 | 12 | 0 mm | back | 1:1 | 0.007 | 1.469 | 0.010 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | | Extremity<br>4.0 W/kg (mW/g)<br>averaged over 10 grams | | | | | | | | | | |

## Table 10-14
## LTE Band 13 Extremity SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | | Mode | Bandwidth [MHz] | Housing Type | Wristband Type | 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 (10g) | Scaling Factor | Reported SAR (10g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | Aluminum | Metal Loop | 24.0 | 22.39 | 0.14 | 0 | FH7TT00GJ78M | QPSK | 1 | 25 | 0 mm | back | 1:1 | 0.013 | 1.449 | 0.019 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | Aluminum | Metal Loop | 23.0 | 21.42 | 0.13 | 1 | FH7TT00GJ78M | QPSK | 25 | 25 | 0 mm | back | 1:1 | 0.009 | 1.439 | 0.013 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | Aluminum | Metal Links | 24.0 | 22.39 | 0.18 | 0 | FH7TT002J78X | QPSK | 1 | 25 | 0 mm | back | 1:1 | 0.003 | 1.449 | 0.004 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | Aluminum | Metal Links | 23.0 | 21.42 | 0.12 | 1 | FH7TT002J78X | QPSK | 25 | 25 | 0 mm | back | 1:1 | 0.002 | 1.439 | 0.003 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | Aluminum | Sport | 24.0 | 22.39 | -0.16 | 0 | FH7TT002J78X | QPSK | 1 | 25 | 0 mm | back | 1:1 | 0.010 | 1.449 | 0.014 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | Aluminum | Sport | 23.0 | 21.42 | 0.12 | 1 | FH7TT002J78X | QPSK | 25 | 25 | 0 mm | back | 1:1 | 0.008 | 1.439 | 0.012 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | Stainless Steel | Metal Loop | 24.0 | 22.39 | 0.11 | 0 | FH7TT003J79H | QPSK | 1 | 25 | 0 mm | back | 1:1 | 0.013 | 1.449 | 0.019 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | Stainless Steel | Metal Loop | 23.0 | 21.42 | 0.15 | 1 | FH7TT003J79H | QPSK | 25 | 25 | 0 mm | back | 1:1 | 0.011 | 1.439 | 0.016 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | Stainless Steel | Metal Links | 24.0 | 22.39 | 0.18 | 0 | FH7TT004J79H | QPSK | 1 | 25 | 0 mm | back | 1:1 | 0.003 | 1.449 | 0.004 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | Stainless Steel | Metal Links | 23.0 | 21.42 | 0.00 | 1 | FH7TT004J79H | QPSK | 25 | 25 | 0 mm | back | 1:1 | 0.002 | 1.439 | 0.003 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | Stainless Steel | Sport | 24.0 | 22.39 | 0.15 | 0 | FH7TR06DJ796 | QPSK | 1 | 25 | 0 mm | back | 1:1 | 0.012 | 1.449 | 0.017 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | Stainless Steel | Sport | 23.0 | 21.42 | 0.14 | 1 | FH7TR06DJ796 | QPSK | 25 | 25 | 0 mm | back | 1:1 | 0.009 | 1.439 | 0.013 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | Ceramic | Metal Loop | 24.0 | 22.39 | 0.17 | 0 | FH7TT003J79R | QPSK | 1 | 25 | 0 mm | back | 1:1 | 0.017 | 1.449 | 0.025 | A18 |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | Ceramic | Metal Loop | 23.0 | 21.42 | 0.20 | 1 | FH7TT003J79R | QPSK | 25 | 25 | 0 mm | back | 1:1 | 0.013 | 1.439 | 0.019 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | Ceramic | Metal Links | 24.0 | 22.39 | 0.04 | 0 | FH7TT001J79R | QPSK | 1 | 25 | 0 mm | back | 1:1 | 0.009 | 1.449 | 0.013 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | Ceramic | Metal Links | 23.0 | 21.42 | 0.17 | 1 | FH7TT001J79R | QPSK | 25 | 25 | 0 mm | back | 1:1 | 0.007 | 1.439 | 0.010 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | Ceramic | Sport | 24.0 | 22.39 | 0.18 | 0 | FH7TT002J79R | QPSK | 1 | 25 | 0 mm | back | 1:1 | 0.014 | 1.449 | 0.020 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | Ceramic | Sport | 23.0 | 21.42 | 0.17 | 1 | FH7TT002J79R | QPSK | 25 | 25 | 0 mm | back | 1:1 | 0.011 | 1.439 | 0.016 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | | Extremity<br>4.0 W/kg (mW/g)<br>averaged over 10 grams | | | | | | | | | | |




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## Table 10-15
## LTE Band 5 (Cell) Extremity SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | | Mode | Bandwidth [MHz] | Housing Type | Wristband Type | 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 (10g) | Scaling Factor | Reported SAR (10g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 836.50 | 20525 | Mid | LTE Band 5 (Cell) | 10 | Aluminum | Metal Loop | 24.0 | 22.61 | 0.15 | 0 | FH7TT00GJ78M | QPSK | 1 | 25 | 0 mm | back | 1:1 | 0.012 | 1.377 | 0.017 | |
| 836.50 | 20525 | Mid | LTE Band 5 (Cell) | 10 | Aluminum | Metal Loop | 23.0 | 21.59 | 0.11 | 1 | FH7TT00GJ78M | QPSK | 25 | 12 | 0 mm | back | 1:1 | 0.009 | 1.384 | 0.012 | |
| 836.50 | 20525 | Mid | LTE Band 5 (Cell) | 10 | Aluminum | Metal Links | 24.0 | 22.61 | 0.11 | 0 | FH7TT009J78C | QPSK | 1 | 25 | 0 mm | back | 1:1 | 0.005 | 1.377 | 0.007 | |
| 836.50 | 20525 | Mid | LTE Band 5 (Cell) | 10 | Aluminum | Metal Links | 23.0 | 21.59 | 0.17 | 1 | FH7TT009J78C | QPSK | 25 | 12 | 0 mm | back | 1:1 | 0.004 | 1.384 | 0.006 | |
| 836.50 | 20525 | Mid | LTE Band 5 (Cell) | 10 | Aluminum | Sport | 24.0 | 22.61 | 0.14 | 0 | FH7TT004J78X | QPSK | 1 | 25 | 0 mm | back | 1:1 | 0.012 | 1.377 | 0.017 | |
| 836.50 | 20525 | Mid | LTE Band 5 (Cell) | 10 | Aluminum | Sport | 23.0 | 21.59 | 0.12 | 1 | FH7TT004J78X | QPSK | 25 | 12 | 0 mm | back | 1:1 | 0.010 | 1.384 | 0.014 | |
| 836.50 | 20525 | Mid | LTE Band 5 (Cell) | 10 | Stainless Steel | Metal Loop | 24.0 | 22.61 | 0.16 | 0 | FH7TR06RJ796 | QPSK | 1 | 25 | 0 mm | back | 1:1 | 0.012 | 1.377 | 0.017 | |
| 836.50 | 20525 | Mid | LTE Band 5 (Cell) | 10 | Stainless Steel | Metal Loop | 23.0 | 21.59 | 0.18 | 1 | FH7TR06RJ796 | QPSK | 25 | 12 | 0 mm | back | 1:1 | 0.009 | 1.384 | 0.012 | |
| 836.50 | 20525 | Mid | LTE Band 5 (Cell) | 10 | Stainless Steel | Metal Links | 24.0 | 22.61 | 0.12 | 0 | FH7TT003J79H | QPSK | 1 | 25 | 0 mm | back | 1:1 | 0.005 | 1.377 | 0.007 | |
| 836.50 | 20525 | Mid | LTE Band 5 (Cell) | 10 | Stainless Steel | Metal Links | 23.0 | 21.59 | 0.19 | 1 | FH7TT003J79H | QPSK | 25 | 12 | 0 mm | back | 1:1 | 0.004 | 1.384 | 0.006 | |
| 836.50 | 20525 | Mid | LTE Band 5 (Cell) | 10 | Stainless Steel | Sport | 24.0 | 22.61 | 0.10 | 0 | FH7TR06DJ796 | QPSK | 1 | 25 | 0 mm | back | 1:1 | 0.014 | 1.377 | 0.019 | |
| 836.50 | 20525 | Mid | LTE Band 5 (Cell) | 10 | Stainless Steel | Sport | 23.0 | 21.59 | 0.13 | 1 | FH7TR06DJ796 | QPSK | 25 | 12 | 0 mm | back | 1:1 | 0.011 | 1.384 | 0.015 | |
| 836.50 | 20525 | Mid | LTE Band 5 (Cell) | 10 | Ceramic | Metal Loop | 24.0 | 22.61 | 0.16 | 0 | FH7TT001J79R | QPSK | 1 | 25 | 0 mm | back | 1:1 | 0.015 | 1.377 | 0.021 | A19 |
| 836.50 | 20525 | Mid | LTE Band 5 (Cell) | 10 | Ceramic | Metal Loop | 23.0 | 21.59 | 0.14 | 1 | FH7TT001J79R | QPSK | 25 | 12 | 0 mm | back | 1:1 | 0.011 | 1.384 | 0.015 | |
| 836.50 | 20525 | Mid | LTE Band 5 (Cell) | 10 | Ceramic | Metal Links | 24.0 | 22.61 | 0.15 | 0 | FH7TT003J79R | QPSK | 1 | 25 | 0 mm | back | 1:1 | 0.009 | 1.377 | 0.012 | |
| 836.50 | 20525 | Mid | LTE Band 5 (Cell) | 10 | Ceramic | Metal Links | 23.0 | 21.59 | 0.13 | 1 | FH7TT003J79R | QPSK | 25 | 12 | 0 mm | back | 1:1 | 0.006 | 1.384 | 0.008 | |
| 836.50 | 20525 | Mid | LTE Band 5 (Cell) | 10 | Ceramic | Sport | 24.0 | 22.61 | 0.11 | 0 | FH7TT002J79R | QPSK | 1 | 25 | 0 mm | back | 1:1 | 0.014 | 1.377 | 0.019 | |
| 836.50 | 20525 | Mid | LTE Band 5 (Cell) | 10 | Ceramic | Sport | 23.0 | 21.59 | 0.16 | 1 | FH7TT002J79R | QPSK | 25 | 12 | 0 mm | back | 1:1 | 0.011 | 1.384 | 0.015 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | Extremity<br>4.0 W/kg (mW/g)<br>averaged over 10 grams | | | | | | | | | | | | |

## Table 10-16
## LTE Band 26 (Cell) Extremity SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | | Mode | Bandwidth [MHz] | Housing Type | Wristband Type | 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 (10g) | Scaling Factor | Reported SAR (10g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 819.00 | 26740 | Low | LTE Band 26 (Cell) | 10 | Aluminum | Metal Loop | 24.0 | 22.88 | 0.10 | 0 | FH7TT009J78C | QPSK | 1 | 49 | 0 mm | back | 1:1 | 0.011 | 1.294 | 0.014 | |
| 819.00 | 26740 | Low | LTE Band 26 (Cell) | 10 | Aluminum | Metal Loop | 23.0 | 21.84 | 0.11 | 1 | FH7TT009J78C | QPSK | 25 | 12 | 0 mm | back | 1:1 | 0.008 | 1.306 | 0.010 | |
| 819.00 | 26740 | Low | LTE Band 26 (Cell) | 10 | Aluminum | Metal Links | 24.0 | 22.88 | 0.18 | 0 | FH7TT002J78X | QPSK | 1 | 49 | 0 mm | back | 1:1 | 0.005 | 1.294 | 0.006 | |
| 819.00 | 26740 | Low | LTE Band 26 (Cell) | 10 | Aluminum | Metal Links | 23.0 | 21.84 | -0.10 | 1 | FH7TT002J78X | QPSK | 25 | 12 | 0 mm | back | 1:1 | 0.004 | 1.306 | 0.005 | |
| 819.00 | 26740 | Low | LTE Band 26 (Cell) | 10 | Aluminum | Sport | 24.0 | 22.88 | 0.14 | 0 | FH7TT00GJ78M | QPSK | 1 | 49 | 0 mm | back | 1:1 | 0.012 | 1.294 | 0.016 | |
| 819.00 | 26740 | Low | LTE Band 26 (Cell) | 10 | Aluminum | Sport | 23.0 | 21.84 | 0.18 | 1 | FH7TT00GJ78M | QPSK | 25 | 12 | 0 mm | back | 1:1 | 0.009 | 1.306 | 0.012 | |
| 819.00 | 26740 | Low | LTE Band 26 (Cell) | 10 | Stainless Steel | Metal Loop | 24.0 | 22.88 | 0.15 | 0 | FH7TT003J79H | QPSK | 1 | 49 | 0 mm | back | 1:1 | 0.012 | 1.294 | 0.016 | |
| 819.00 | 26740 | Low | LTE Band 26 (Cell) | 10 | Stainless Steel | Metal Loop | 23.0 | 21.84 | 0.10 | 1 | FH7TT003J79H | QPSK | 25 | 12 | 0 mm | back | 1:1 | 0.009 | 1.306 | 0.012 | |
| 819.00 | 26740 | Low | LTE Band 26 (Cell) | 10 | Stainless Steel | Metal Links | 24.0 | 22.88 | 0.10 | 0 | FH7TR06CJ796 | QPSK | 1 | 49 | 0 mm | back | 1:1 | 0.005 | 1.294 | 0.006 | |
| 819.00 | 26740 | Low | LTE Band 26 (Cell) | 10 | Stainless Steel | Metal Links | 23.0 | 21.84 | 0.12 | 1 | FH7TR06CJ796 | QPSK | 25 | 12 | 0 mm | back | 1:1 | 0.004 | 1.306 | 0.005 | |
| 819.00 | 26740 | Low | LTE Band 26 (Cell) | 10 | Stainless Steel | Sport | 24.0 | 22.88 | 0.15 | 0 | FH7TT004J79H | QPSK | 1 | 49 | 0 mm | back | 1:1 | 0.013 | 1.294 | 0.017 | |
| 819.00 | 26740 | Low | LTE Band 26 (Cell) | 10 | Stainless Steel | Sport | 23.0 | 21.84 | 0.13 | 1 | FH7TT004J79H | QPSK | 25 | 12 | 0 mm | back | 1:1 | 0.010 | 1.306 | 0.013 | |
| 819.00 | 26740 | Low | LTE Band 26 (Cell) | 10 | Ceramic | Metal Loop | 24.0 | 22.88 | 0.14 | 0 | FH7TT001J79R | QPSK | 1 | 49 | 0 mm | back | 1:1 | 0.014 | 1.294 | 0.018 | A20 |
| 819.00 | 26740 | Low | LTE Band 26 (Cell) | 10 | Ceramic | Metal Loop | 23.0 | 21.84 | 0.14 | 1 | FH7TT001J79R | QPSK | 25 | 12 | 0 mm | back | 1:1 | 0.011 | 1.306 | 0.014 | |
| 819.00 | 26740 | Low | LTE Band 26 (Cell) | 10 | Ceramic | Metal Links | 24.0 | 22.88 | 0.12 | 0 | FH7TT002J79R | QPSK | 1 | 49 | 0 mm | back | 1:1 | 0.009 | 1.294 | 0.012 | |
| 819.00 | 26740 | Low | LTE Band 26 (Cell) | 10 | Ceramic | Metal Links | 23.0 | 21.84 | 0.12 | 1 | FH7TT002J79R | QPSK | 25 | 12 | 0 mm | back | 1:1 | 0.006 | 1.306 | 0.008 | |
| 819.00 | 26740 | Low | LTE Band 26 (Cell) | 10 | Ceramic | Sport | 24.0 | 22.88 | 0.15 | 0 | FH7TT004J79R | QPSK | 1 | 49 | 0 mm | back | 1:1 | 0.014 | 1.294 | 0.018 | |
| 819.00 | 26740 | Low | LTE Band 26 (Cell) | 10 | Ceramic | Sport | 23.0 | 21.84 | 0.19 | 1 | FH7TT004J79R | QPSK | 25 | 12 | 0 mm | back | 1:1 | 0.011 | 1.306 | 0.014 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | Extremity<br>4.0 W/kg (mW/g)<br>averaged over 10 grams | | | | | | | | | | | | |




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## Table 10-17
## LTE Band 4 (AWS) Extremity SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | | Mode | Bandwidth [MHz] | Housing Type | Wristband Type | 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 (10g) | Scaling Factor | Reported SAR (10g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | Aluminum | Metal Loop | 24.0 | 23.31 | 0.13 | 0 | FH7TT002J78X | QPSK | 1 | 99 | 0 mm | back | 1:1 | 0.132 | 1.172 | 0.155 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | Aluminum | Metal Loop | 23.0 | 22.00 | -0.17 | 1 | FH7TT002J78X | QPSK | 50 | 50 | 0 mm | back | 1:1 | 0.094 | 1.259 | 0.118 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | Aluminum | Metal Links | 24.0 | 23.31 | 0.10 | 0 | FH7TT009J78C | QPSK | 1 | 99 | 0 mm | back | 1:1 | 0.080 | 1.172 | 0.094 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | Aluminum | Metal Links | 23.0 | 22.00 | 0.15 | 1 | FH7TT009J78C | QPSK | 50 | 50 | 0 mm | back | 1:1 | 0.060 | 1.259 | 0.076 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | Aluminum | Sport | 24.0 | 23.31 | 0.09 | 0 | FH7TT00GJ78M | QPSK | 1 | 99 | 0 mm | back | 1:1 | 0.076 | 1.172 | 0.089 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | Aluminum | Sport | 23.0 | 22.00 | 0.12 | 1 | FH7TT00GJ78M | QPSK | 50 | 50 | 0 mm | back | 1:1 | 0.055 | 1.259 | 0.069 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | Stainless Steel | Metal Loop | 24.0 | 23.31 | -0.08 | 0 | FH7TR06RJ796 | QPSK | 1 | 99 | 0 mm | back | 1:1 | 0.128 | 1.172 | 0.150 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | Stainless Steel | Metal Loop | 23.0 | 22.00 | -0.06 | 1 | FH7TR06RJ796 | QPSK | 50 | 50 | 0 mm | back | 1:1 | 0.091 | 1.259 | 0.115 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | Stainless Steel | Metal Links | 24.0 | 23.31 | -0.16 | 0 | FH7TT004J79H | QPSK | 1 | 99 | 0 mm | back | 1:1 | 0.073 | 1.172 | 0.086 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | Stainless Steel | Metal Links | 23.0 | 22.00 | 0.09 | 1 | FH7TT004J79H | QPSK | 50 | 50 | 0 mm | back | 1:1 | 0.054 | 1.259 | 0.068 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | Stainless Steel | Sport | 24.0 | 23.31 | 0.05 | 0 | FH7TR06DJ796 | QPSK | 1 | 99 | 0 mm | back | 1:1 | 0.082 | 1.172 | 0.096 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | Stainless Steel | Sport | 23.0 | 22.00 | 0.14 | 1 | FH7TR06DJ796 | QPSK | 50 | 50 | 0 mm | back | 1:1 | 0.063 | 1.259 | 0.079 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | Ceramic | Metal Loop | 24.0 | 23.31 | -0.05 | 0 | FH7TT003J79R | QPSK | 1 | 99 | 0 mm | back | 1:1 | 0.292 | 1.172 | 0.342 | A21 |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | Ceramic | Metal Loop | 23.0 | 22.00 | 0.00 | 1 | FH7TT003J79R | QPSK | 50 | 50 | 0 mm | back | 1:1 | 0.223 | 1.259 | 0.281 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | Ceramic | Metal Links | 24.0 | 23.31 | 0.01 | 0 | FH7TT002J79R | QPSK | 1 | 99 | 0 mm | back | 1:1 | 0.156 | 1.172 | 0.183 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | Ceramic | Metal Links | 23.0 | 22.00 | 0.10 | 1 | FH7TT002J79R | QPSK | 50 | 50 | 0 mm | back | 1:1 | 0.119 | 1.259 | 0.150 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | Ceramic | Sport | 24.0 | 23.31 | 0.07 | 0 | FH7TT004J79R | QPSK | 1 | 99 | 0 mm | back | 1:1 | 0.165 | 1.172 | 0.193 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | Ceramic | Sport | 23.0 | 22.00 | 0.13 | 1 | FH7TT004J79R | QPSK | 50 | 50 | 0 mm | back | 1:1 | 0.127 | 1.259 | 0.160 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | Extremity<br>4.0 W/kg (mW/g)<br>averaged over 10 grams | | | | | | | | | | | |

## Table 10-18
## LTE Band 25 (PCS) Extremity SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | | Mode | Bandwidth [MHz] | Housing Type | Wristband Type | 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 (10g) | Scaling Factor | Reported SAR (10g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | Aluminum | Metal Loop | 24.0 | 23.13 | -0.09 | 0 | FH7TT004J78X | QPSK | 1 | 99 | 0 mm | back | 1:1 | 0.137 | 1.222 | 0.167 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | Aluminum | Metal Loop | 23.0 | 21.93 | 0.02 | 1 | FH7TT004J78X | QPSK | 50 | 50 | 0 mm | back | 1:1 | 0.102 | 1.279 | 0.130 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | Aluminum | Metal Links | 24.0 | 23.13 | -0.06 | 0 | FH7TT00GJ78M | QPSK | 1 | 99 | 0 mm | back | 1:1 | 0.070 | 1.222 | 0.086 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | Aluminum | Metal Links | 23.0 | 21.93 | 0.03 | 1 | FH7TT00GJ78M | QPSK | 50 | 50 | 0 mm | back | 1:1 | 0.052 | 1.279 | 0.067 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | Aluminum | Sport | 24.0 | 23.13 | 0.10 | 0 | FH7TT009J78C | QPSK | 1 | 99 | 0 mm | back | 1:1 | 0.080 | 1.222 | 0.098 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | Aluminum | Sport | 23.0 | 21.93 | 0.06 | 1 | FH7TT009J78C | QPSK | 50 | 50 | 0 mm | back | 1:1 | 0.060 | 1.279 | 0.077 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | Stainless Steel | Metal Loop | 24.0 | 23.13 | 0.04 | 0 | FH7TT003J79H | QPSK | 1 | 99 | 0 mm | back | 1:1 | 0.068 | 1.222 | 0.083 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | Stainless Steel | Metal Loop | 23.0 | 21.93 | 0.07 | 1 | FH7TT003J79H | QPSK | 50 | 50 | 0 mm | back | 1:1 | 0.054 | 1.279 | 0.069 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | Stainless Steel | Metal Links | 24.0 | 23.13 | 0.03 | 0 | FH7TT004J79H | QPSK | 1 | 99 | 0 mm | back | 1:1 | 0.048 | 1.222 | 0.059 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | Stainless Steel | Metal Links | 23.0 | 21.93 | 0.02 | 1 | FH7TT004J79H | QPSK | 50 | 50 | 0 mm | back | 1:1 | 0.034 | 1.279 | 0.043 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | Stainless Steel | Sport | 24.0 | 23.13 | 0.06 | 0 | FH7TR06RJ796 | QPSK | 1 | 99 | 0 mm | back | 1:1 | 0.063 | 1.222 | 0.077 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | Stainless Steel | Sport | 23.0 | 21.93 | 0.09 | 1 | FH7TR06RJ796 | QPSK | 50 | 50 | 0 mm | back | 1:1 | 0.047 | 1.279 | 0.060 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | Ceramic | Metal Loop | 24.0 | 23.13 | -0.03 | 0 | FH7TT001J79R | QPSK | 1 | 99 | 0 mm | back | 1:1 | 0.135 | 1.222 | 0.165 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | Ceramic | Metal Loop | 23.0 | 21.93 | -0.02 | 1 | FH7TT001J79R | QPSK | 50 | 50 | 0 mm | back | 1:1 | 0.100 | 1.279 | 0.128 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | Ceramic | Metal Links | 24.0 | 23.13 | -0.03 | 0 | FH7TT002J79R | QPSK | 1 | 99 | 0 mm | back | 1:1 | 0.101 | 1.222 | 0.123 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | Ceramic | Metal Links | 23.0 | 21.93 | -0.02 | 1 | FH7TT002J79R | QPSK | 50 | 50 | 0 mm | back | 1:1 | 0.076 | 1.279 | 0.097 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | Ceramic | Sport | 24.0 | 23.13 | -0.01 | 0 | FH7TT004J79R | QPSK | 1 | 99 | 0 mm | back | 1:1 | 0.165 | 1.222 | 0.202 | A22 |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | Ceramic | Sport | 23.0 | 21.93 | 0.03 | 1 | FH7TT004J79R | QPSK | 50 | 50 | 0 mm | back | 1:1 | 0.122 | 1.279 | 0.156 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | Extremity<br>4.0 W/kg (mW/g)<br>averaged over 10 grams | | | | | | | | | | | |




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## Table 10-19
## LTE Band 41 Extremity SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | | Mode | Bandwidth [MHz] | Housing Type | Wristband Type | 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 (10g) | Scaling Factor | Reported SAR (10g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 2680.00 | 41490 | High | LTE Band 41 | 20 | Aluminum | Metal Loop | 24.0 | 23.39 | -0.04 | 0 | FH7TT004J78X | QPSK | 1 | 99 | 0 mm | back | 1:1.58 | 0.128 | 1.151 | 0.147 | |
| 2680.00 | 41490 | High | LTE Band 41 | 20 | Aluminum | Metal Loop | 23.0 | 22.04 | -0.02 | 1 | FH7TT004J78X | QPSK | 50 | 50 | 0 mm | back | 1:1.58 | 0.056 | 1.247 | 0.070 | |
| 2680.00 | 41490 | High | LTE Band 41 | 20 | Aluminum | Metal Links | 24.0 | 23.39 | -0.06 | 0 | FH7TT009J78C | QPSK | 1 | 99 | 0 mm | back | 1:1.58 | 0.118 | 1.151 | 0.136 | |
| 2680.00 | 41490 | High | LTE Band 41 | 20 | Aluminum | Metal Links | 23.0 | 22.04 | -0.01 | 1 | FH7TT009J78C | QPSK | 50 | 50 | 0 mm | back | 1:1.58 | 0.088 | 1.247 | 0.110 | |
| 2680.00 | 41490 | High | LTE Band 41 | 20 | Aluminum | Sport | 24.0 | 23.39 | 0.12 | 0 | FH7TT00GJ78M | QPSK | 1 | 99 | 0 mm | back | 1:1.58 | 0.147 | 1.151 | 0.169 | A23 |
| 2680.00 | 41490 | High | LTE Band 41 | 20 | Aluminum | Sport | 23.0 | 22.04 | 0.07 | 1 | FH7TT00GJ78M | QPSK | 50 | 50 | 0 mm | back | 1:1.58 | 0.111 | 1.247 | 0.138 | |
| 2680.00 | 41490 | High | LTE Band 41 | 20 | Stainless Steel | Metal Loop | 24.0 | 23.39 | -0.13 | 0 | FH7TR06DJ796 | QPSK | 1 | 99 | 0 mm | back | 1:1.58 | 0.047 | 1.151 | 0.054 | |
| 2680.00 | 41490 | High | LTE Band 41 | 20 | Stainless Steel | Metal Loop | 23.0 | 22.04 | 0.15 | 1 | FH7TR06DJ796 | QPSK | 50 | 50 | 0 mm | back | 1:1.58 | 0.036 | 1.247 | 0.045 | |
| 2680.00 | 41490 | High | LTE Band 41 | 20 | Stainless Steel | Metal Links | 24.0 | 23.39 | 0.11 | 0 | FH7TR06RJ796 | QPSK | 1 | 99 | 0 mm | back | 1:1.58 | 0.040 | 1.151 | 0.046 | |
| 2680.00 | 41490 | High | LTE Band 41 | 20 | Stainless Steel | Metal Links | 23.0 | 22.04 | 0.10 | 1 | FH7TR06RJ796 | QPSK | 50 | 50 | 0 mm | back | 1:1.58 | 0.031 | 1.247 | 0.039 | |
| 2680.00 | 41490 | High | LTE Band 41 | 20 | Stainless Steel | Sport | 24.0 | 23.39 | 0.19 | 0 | FH7TT004J79H | QPSK | 1 | 99 | 0 mm | back | 1:1.58 | 0.060 | 1.151 | 0.069 | |
| 2680.00 | 41490 | High | LTE Band 41 | 20 | Stainless Steel | Sport | 23.0 | 22.04 | -0.03 | 1 | FH7TT004J79H | QPSK | 50 | 50 | 0 mm | back | 1:1.58 | 0.046 | 1.247 | 0.057 | |
| 2680.00 | 41490 | High | LTE Band 41 | 20 | Ceramic | Metal Loop | 24.0 | 23.39 | 0.02 | 0 | FH7TT002J79R | QPSK | 1 | 99 | 0 mm | back | 1:1.58 | 0.023 | 1.151 | 0.026 | |
| 2680.00 | 41490 | High | LTE Band 41 | 20 | Ceramic | Metal Loop | 23.0 | 22.04 | 0.11 | 1 | FH7TT002J79R | QPSK | 50 | 50 | 0 mm | back | 1:1.58 | 0.018 | 1.247 | 0.022 | |
| 2680.00 | 41490 | High | LTE Band 41 | 20 | Ceramic | Metal Links | 24.0 | 23.39 | 0.21 | 0 | FH7TT002J79R | QPSK | 1 | 99 | 0 mm | back | 1:1.58 | 0.022 | 1.151 | 0.025 | |
| 2680.00 | 41490 | High | LTE Band 41 | 20 | Ceramic | Metal Links | 23.0 | 22.04 | 0.11 | 1 | FH7TT002J79R | QPSK | 50 | 50 | 0 mm | back | 1:1.58 | 0.014 | 1.247 | 0.017 | |
| 2680.00 | 41490 | High | LTE Band 41 | 20 | Ceramic | Sport | 24.0 | 23.39 | 0.18 | 0 | FH7TT002J79R | QPSK | 1 | 99 | 0 mm | back | 1:1.58 | 0.036 | 1.151 | 0.041 | |
| 2680.00 | 41490 | High | LTE Band 41 | 20 | Ceramic | Sport | 23.0 | 22.04 | 0.18 | 1 | FH7TT002J79R | QPSK | 50 | 50 | 0 mm | back | 1:1.58 | 0.026 | 1.247 | 0.032 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | | Extremity<br>4.0 W/kg (mW/g)<br>averaged over 10 grams | | | | | | | | | | |

## Table 10-20
## 2.4 GHz WLAN Extremity SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Mode | Service | Bandwidth [MHz] | Housing Type | Wristband Type | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Spacing | Device Serial Number | Data Rate (Mbps) | Side | Duty Cycle (%) | SAR (10g) | Scaling Factor (Power) | Scaling Factor (Duty Cycle) | Reported SAR (10g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | (W/kg) | | | (W/kg) | |
| 2437 | 6 | 802.11b | DSSS | 22 | Aluminum | Metal Loop | 19.5 | 19.47 | 0.13 | 0 mm | FH7TT009J78C | 1 | back | 98.2 | 0.066 | 1.007 | 1.018 | 0.068 | |
| 2437 | 6 | 802.11b | DSSS | 22 | Aluminum | Metal Links | 19.5 | 19.47 | 0.00 | 0 mm | FH7TT009J78C | 1 | back | 98.2 | 0.051 | 1.007 | 1.018 | 0.052 | |
| 2437 | 6 | 802.11b | DSSS | 22 | Aluminum | Sport | 19.5 | 19.47 | 0.04 | 0 mm | FH7TT009J78C | 1 | back | 98.2 | 0.081 | 1.007 | 1.018 | **0.083** | A24 |
| 2437 | 6 | 802.11b | DSSS | 22 | Stainless Steel | Metal Loop | 19.5 | 19.47 | -0.06 | 0 mm | FH7TT004J79H | 1 | back | 98.2 | 0.023 | 1.007 | 1.018 | 0.024 | |
| 2437 | 6 | 802.11b | DSSS | 22 | Stainless Steel | Metal Links | 19.5 | 19.47 | 0.12 | 0 mm | FH7TT004J79H | 1 | back | 98.2 | 0.019 | 1.007 | 1.018 | 0.019 | |
| 2437 | 6 | 802.11b | DSSS | 22 | Stainless Steel | Sport | 19.5 | 19.47 | 0.10 | 0 mm | FH7TT004J79H | 1 | back | 98.2 | 0.033 | 1.007 | 1.018 | 0.034 | |
| 2437 | 6 | 802.11b | DSSS | 22 | Ceramic | Metal Loop | 19.5 | 19.47 | -0.21 | 0 mm | FH7TT004J79R | 1 | back | 98.2 | 0.029 | 1.007 | 1.018 | 0.030 | |
| 2437 | 6 | 802.11b | DSSS | 22 | Ceramic | Metal Links | 19.5 | 19.47 | 0.15 | 0 mm | FH7TT004J79R | 1 | back | 98.2 | 0.028 | 1.007 | 1.018 | 0.029 | |
| 2437 | 6 | 802.11b | DSSS | 22 | Ceramic | Sport | 19.5 | 19.47 | 0.15 | 0 mm | FH7TT004J79R | 1 | back | 98.2 | 0.044 | 1.007 | 1.018 | 0.045 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | | Extremity<br>4.0 W/kg (mW/g)<br>averaged over 10 grams | | | | | | | | |




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## Table 10-21
## Bluetooth (ePA) Extremity SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Mode | Service | Housing Type | Wristband Type | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Spacing | Device Serial Number | Data Rate (Mbps) | Duty Cycle | Side | SAR (10g) | Scaling Factor | Reported SAR (10g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 2441.00 | 39 | Bluetooth | FHSS | Aluminum | Metal Loop | 19.0 | 18.95 | 0.01 | 0 mm | FH7TT00GJ78M | 1 | 1:1 | back | 0.051 | 1.012 | 0.052 | |
| 2441.00 | 39 | Bluetooth | FHSS | Aluminum | Metal Links | 19.0 | 18.95 | 0.04 | 0 mm | FH7TT00GJ78M | 1 | 1:1 | back | 0.040 | 1.012 | 0.040 | |
| 2441.00 | 39 | Bluetooth | FHSS | Aluminum | Sport | 19.0 | 18.95 | 0.01 | 0 mm | FH7TT00GJ78M | 1 | 1:1 | back | 0.069 | 1.012 | **0.070** | A25 |
| 2441.00 | 39 | Bluetooth | FHSS | Stainless Steel | Metal Loop | 19.0 | 18.95 | 0.07 | 0 mm | FH7TR06DJ796 | 1 | 1:1 | back | 0.037 | 1.012 | 0.037 | |
| 2441.00 | 39 | Bluetooth | FHSS | Stainless Steel | Metal Links | 19.0 | 18.95 | 0.06 | 0 mm | FH7TR06DJ796 | 1 | 1:1 | back | 0.025 | 1.012 | 0.025 | |
| 2441.00 | 39 | Bluetooth | FHSS | Stainless Steel | Sport | 19.0 | 18.95 | 0.06 | 0 mm | FH7TR06DJ796 | 1 | 1:1 | back | 0.043 | 1.012 | 0.044 | |
| 2441.00 | 39 | Bluetooth | FHSS | Ceramic | Metal Loop | 19.0 | 18.95 | 0.09 | 0 mm | FH7TT001J79R | 1 | 1:1 | back | 0.046 | 1.012 | 0.047 | |
| 2441.00 | 39 | Bluetooth | FHSS | Ceramic | Metal Links | 19.0 | 18.95 | 0.00 | 0 mm | FH7TT001J79R | 1 | 1:1 | back | 0.026 | 1.012 | 0.026 | |
| 2441.00 | 39 | Bluetooth | FHSS | Ceramic | Sport | 19.0 | 18.95 | -0.01 | 0 mm | FH7TT001J79R | 1 | 1:1 | back | 0.057 | 1.012 | 0.058 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | Extremity<br>4.0 W/kg (mW/g)<br>averaged over 10 grams | | | | | | | | |

## Table 10-22
## Bluetooth (iPA) Extremity SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Mode | Service | Housing Type | Wristband Type | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Spacing | Device Serial Number | Data Rate (Mbps) | Duty Cycle | Side | SAR (10g) | Scaling Factor | Reported SAR (10g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 2441.00 | 39 | Bluetooth | FHSS | Aluminum | Metal Loop | 13.0 | 12.98 | -0.04 | 0 mm | FH7TT004J78X | 1 | 1:1 | back | 0.015 | 1.005 | 0.015 | |
| 2441.00 | 39 | Bluetooth | FHSS | Aluminum | Metal Links | 13.0 | 12.98 | -0.19 | 0 mm | FH7TT004J78X | 1 | 1:1 | back | 0.011 | 1.005 | 0.011 | |
| 2441.00 | 39 | Bluetooth | FHSS | Aluminum | Sport | 13.0 | 12.98 | -0.07 | 0 mm | FH7TT004J78X | 1 | 1:1 | back | 0.019 | 1.005 | 0.019 | A26 |
| 2441.00 | 39 | Bluetooth | FHSS | Stainless Steel | Metal Loop | 13.0 | 12.98 | -0.14 | 0 mm | FH7TR06RJ796 | 1 | 1:1 | back | 0.007 | 1.005 | 0.007 | |
| 2441.00 | 39 | Bluetooth | FHSS | Stainless Steel | Metal Links | 13.0 | 12.98 | -0.10 | 0 mm | FH7TR06RJ796 | 1 | 1:1 | back | 0.005 | 1.005 | 0.005 | |
| 2441.00 | 39 | Bluetooth | FHSS | Stainless Steel | Sport | 13.0 | 12.98 | 0.05 | 0 mm | FH7TR06RJ796 | 1 | 1:1 | back | 0.009 | 1.005 | 0.009 | |
| 2441.00 | 39 | Bluetooth | FHSS | Ceramic | Metal Loop | 13.0 | 12.98 | -0.07 | 0 mm | FH7TT001J79R | 1 | 1:1 | back | 0.009 | 1.005 | 0.009 | |
| 2441.00 | 39 | Bluetooth | FHSS | Ceramic | Metal Links | 13.0 | 12.98 | -0.14 | 0 mm | FH7TT001J79R | 1 | 1:1 | back | 0.006 | 1.005 | 0.006 | |
| 2441.00 | 39 | Bluetooth | FHSS | Ceramic | Sport | 13.0 | 12.98 | -0.15 | 0 mm | FH7TT001J79R | 1 | 1:1 | back | 0.012 | 1.005 | 0.012 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | Extremity<br>4.0 W/kg (mW/g)<br>averaged over 10 grams | | | | | | | | |

## 10.3 SAR Test Notes

General Notes:

1. The test data reported are the worst-case SAR values according to test procedures specified in FCC KDB Publication 447498 D01v06.
2. Batteries are fully charged at the beginning of the SAR measurements.
3. Liquid tissue depth was at least 15.0 cm for all frequencies.
4. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
5. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB Publication 447498 D01v06.
6. Per FCC KDB Publication 865664 D01v01r04, variability SAR tests were not required since measured SAR results for all frequency bands were less than 0.8 W/kg for 1g SAR and 2.0 W/kg for 10g SAR.
7. This device has three housing types: Aluminum, Stainless Steel and Ceramic. The non-metallic wrist accessory, sport band, was evaluated for all exposure conditions. The available metallic wrist accessories, metal links band and metal loop band, were additionally evaluated.
8. This device is a portable wrist-worn device and does not support any other use conditions. Therefore the procedures in FCC KDB Publication 447498 D01v06 Section 6.2 have been applied for extremity and next to mouth (head) conditions.




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UMTS Notes:

1. UMTS mode in was tested under RMC 12.2 kbps with HSPA Inactive per KDB Publication 941225 D01v03r01. AMR and HSPA SAR was not required per the 3G Test Reduction Procedure in KDB Publication 941225 D01v03r01.
2. Per FCC KDB Publication 447498 D01v06, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg for 1g SAR and ≤ 2.0 W/kg for 10g SAR then testing at the other channels is not required for such test configuration(s). When the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel was used.

LTE Notes:

1. LTE Considerations: LTE test configurations are determined according to SAR Evaluation Considerations for LTE Devices in FCC KDB Publication 941225 D05v02r04. The general test procedures used for testing can be found in Section 7.5.4.
2. MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1.
3. A-MPR was disabled for all SAR tests by setting NS=01 on the base station simulator. SAR tests were performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI).
4. Per FCC KDB Publication 447498 D01v06, when the reported (scaled) for LTE Band 41 SAR measured at the highest output power channel in a given a test configuration was > 0.6 W/kg for 1g SAR and > 1.5 W/kg for 10g SAR, testing at the other channels was required for such test configurations.
5. TDD LTE was tested per the guidance provided in FCC KDB Publication 941225 D05v02r04. Testing was performed using UL-DL configuration 0 with 6 UL subframes and 2 S subframes using extended cyclic prefix only and special subframe configuration 6. SAR tests were performed at maximum output power and worst-case transmission duty factor in extended cyclic prefix. Per 3GPP 36.211 Section 4, the duty factor for special subframe configuration 6 using extended cyclic prefix is 0.633.

WLAN/Bluetooth Notes:

1. Justification for test configurations for WLAN per KDB Publication 248227 D01v02r02 for 2.4 GHz WIFI operations, the highest measured maximum output power channel for DSSS was selected for SAR measurement. SAR for OFDM modes (2.4 GHz 802.11g/n) was not required due to the maximum allowed powers and the highest reported DSSS SAR. See Section 7.6.2 for more information. When the maximum reported 1g averaged SAR is ≤0.8 W/kg, SAR testing on additional channels was not required. Otherwise, SAR for the next highest output power channel was required until the reported SAR result was ≤ 1.20 W/kg or all test channels were measured.
2. When 10-g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.
3. The device was configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools. The reported SAR was scaled to the 100% transmission duty factor to determine compliance. Procedures used to measure the duty factor are identical to that in the associated EMC test reports.
4. To determine compliance, Bluetooth SAR was measured with internal power amplifier and external power amplifier. Bluetooth was evaluated with a test mode with 100% transmission duty factor.




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# 11 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

## 11.1 Introduction

The following procedures adopted from FCC KDB Publication 447498 D01v06 are applicable to devices with built-in unlicensed transmitters such as 802.11 and Bluetooth devices which may simultaneously transmit with the licensed transmitter.

## 11.2 Simultaneous Transmission Procedures

This device contains transmitters that may operate simultaneously. Therefore, simultaneous transmission analysis is required. Per FCC KDB Publication 447498 D01v06 4.3.2, simultaneous transmission SAR test exclusion may be applied when the sum of the 1-g SAR or 10-g SAR for all the simultaneous transmitting antennas in a specific a physical test configuration is ≤1.6 W/kg or ≤4.0 W/kg. The different test positions in an exposure condition may be considered collectively to determine SAR test exclusion according to the sum of 1-g or 10-g SAR.

## 11.3 Head SAR Simultaneous Transmission Analysis

For SAR summation, the highest reported SAR across all housing and wristband types was used as a conservative evaluation for the simultaneous transmission analysis.

**Table 11-1**
**Simultaneous Transmission Scenario with 2.4 GHz WLAN (Head at 1.0 cm)**

| Exposure Condition | Mode | 3G/4G SAR (W/kg) | 2.4 GHz WLAN SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|
| Head SAR | UMTS 850 | 0.144 | 0.166 | 0.310 |
| | UMTS 1750 | 0.519 | 0.166 | **0.685** |
| | UMTS 1900 | 0.424 | 0.166 | 0.590 |
| | LTE Band 12 | 0.107 | 0.166 | 0.273 |
| | LTE Band 13 | 0.114 | 0.166 | 0.280 |
| | LTE Band 5 (Cell) | 0.102 | 0.166 | 0.268 |
| | LTE Band 26 (Cell) | 0.109 | 0.166 | 0.275 |
| | LTE Band 4 (AWS) | 0.408 | 0.166 | 0.574 |
| | LTE Band 25 (PCS) | 0.412 | 0.166 | 0.578 |
| | LTE Band 41 | 0.341 | 0.166 | 0.507 |




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**Table 11-2**
**Simultaneous Transmission Scenario with Bluetooth (ePA) (Head at 1.0 cm)**

| Exposure Condition | Mode | 3G/4G SAR (W/kg) | Bluetooth (ePA) SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|
| Head SAR | UMTS 850 | 0.144 | 0.130 | 0.274 |
| | UMTS 1750 | 0.519 | 0.130 | **0.649** |
| | UMTS 1900 | 0.424 | 0.130 | 0.554 |
| | LTE Band 12 | 0.107 | 0.130 | 0.237 |
| | LTE Band 13 | 0.114 | 0.130 | 0.244 |
| | LTE Band 5 (Cell) | 0.102 | 0.130 | 0.232 |
| | LTE Band 26 (Cell) | 0.109 | 0.130 | 0.239 |
| | LTE Band 4 (AWS) | 0.408 | 0.130 | 0.538 |
| | LTE Band 25 (PCS) | 0.412 | 0.130 | 0.542 |
| | LTE Band 41 | 0.341 | 0.130 | 0.471 |

**Table 11-3**
**Simultaneous Transmission Scenario with Bluetooth (iPA) (Head at 1.0 cm)**

| Exposure Condition | Mode | 3G/4G SAR (W/kg) | Bluetooth (iPA) SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|
| Head SAR | UMTS 850 | 0.144 | 0.033 | 0.177 |
| | UMTS 1750 | 0.519 | 0.033 | **0.552** |
| | UMTS 1900 | 0.424 | 0.033 | 0.457 |
| | LTE Band 12 | 0.107 | 0.033 | 0.140 |
| | LTE Band 13 | 0.114 | 0.033 | 0.147 |
| | LTE Band 5 (Cell) | 0.102 | 0.033 | 0.135 |
| | LTE Band 26 (Cell) | 0.109 | 0.033 | 0.142 |
| | LTE Band 4 (AWS) | 0.408 | 0.033 | 0.441 |
| | LTE Band 25 (PCS) | 0.412 | 0.033 | 0.445 |
| | LTE Band 41 | 0.341 | 0.033 | 0.374 |



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## 11.4 Extremity SAR Simultaneous Transmission Analysis

**Table 11-4**
**Simultaneous Transmission Scenario with 2.4 GHz WLAN (Extremity at 0.0 cm)**

| Exposure Condition | Mode | 3G/4G SAR (W/kg) | 2.4 GHz WLAN SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|
| Extremity SAR | UMTS 850 | 0.030 | 0.083 | 0.113 |
| | UMTS 1750 | 0.344 | 0.083 | **0.427** |
| | UMTS 1900 | 0.284 | 0.083 | 0.367 |
| | LTE Band 12 | 0.020 | 0.083 | 0.103 |
| | LTE Band 13 | 0.025 | 0.083 | 0.108 |
| | LTE Band 5 (Cell) | 0.021 | 0.083 | 0.104 |
| | LTE Band 26 (Cell) | 0.018 | 0.083 | 0.101 |
| | LTE Band 4 (AWS) | 0.342 | 0.083 | 0.425 |
| | LTE Band 25 (PCS) | 0.202 | 0.083 | 0.285 |
| | LTE Band 41 | 0.169 | 0.083 | 0.252 |

**Table 11-5**
**Simultaneous Transmission Scenario with Bluetooth (ePA) (Extremity at 0.0 cm)**

| Exposure Condition | Mode | 3G/4G SAR (W/kg) | Bluetooth (ePA) SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|
| Extremity SAR | UMTS 850 | 0.030 | 0.070 | 0.100 |
| | UMTS 1750 | 0.344 | 0.070 | **0.414** |
| | UMTS 1900 | 0.284 | 0.070 | 0.354 |
| | LTE Band 12 | 0.020 | 0.070 | 0.090 |
| | LTE Band 13 | 0.025 | 0.070 | 0.095 |
| | LTE Band 5 (Cell) | 0.021 | 0.070 | 0.091 |
| | LTE Band 26 (Cell) | 0.018 | 0.070 | 0.088 |
| | LTE Band 4 (AWS) | 0.342 | 0.070 | 0.412 |
| | LTE Band 25 (PCS) | 0.202 | 0.070 | 0.272 |
| | LTE Band 41 | 0.169 | 0.070 | 0.239 |




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**Table 11-6**
**Simultaneous Transmission Scenario with Bluetooth (iPA) (Extremity at 0.0 cm)**

| Exposure Condition | Mode | 3G/4G SAR (W/kg) | Bluetooth (iPA) SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|
| Extremity SAR | UMTS 850 | 0.030 | 0.019 | 0.049 |
| | UMTS 1750 | 0.344 | 0.019 | **0.363** |
| | UMTS 1900 | 0.284 | 0.019 | 0.303 |
| | LTE Band 12 | 0.020 | 0.019 | 0.039 |
| | LTE Band 13 | 0.025 | 0.019 | 0.044 |
| | LTE Band 5 (Cell) | 0.021 | 0.019 | 0.040 |
| | LTE Band 26 (Cell) | 0.018 | 0.019 | 0.037 |
| | LTE Band 4 (AWS) | 0.342 | 0.019 | 0.361 |
| | LTE Band 25 (PCS) | 0.202 | 0.019 | 0.221 |
| | LTE Band 41 | 0.169 | 0.019 | 0.188 |

## 11.5 Simultaneous Transmission Conclusion

The above numerical summed SAR results for all the worst-case simultaneous transmission conditions were below the SAR limit. Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit and therefore no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D01v06.




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# 12 SAR MEASUREMENT VARIABILITY

## 12.1 Measurement Variability

Per FCC KDB Publication 865664 D01v01, SAR measurement variability was not assessed for each frequency band since all measured SAR values are < 0.80 W/kg for 1g SAR and < 2.0 W/kg for 10g SAR.

## 12.2 Measurement Uncertainty

The measured SAR was <1.5 W/kg for 1g SAR and <3.75 W/kg for 10g SAR for all frequency bands. Therefore, per KDB Publication 865664 D01v01r04, the extended measurement uncertainty analysis was not required.




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# 13 EQUIPMENT LIST

| Manufacturer | Model | Description | Cal Date | Cal Interval | Cal Due | Serial Number |
|---|---|---|---|---|---|---|
| Agilent | E8257D | (250kHz-20GHz) Signal Generator | 3/22/2017 | Annual | 3/22/2018 | MY45470194 |
| Agilent | 8594A | (9kHz-2.9GHz) Spectrum Analyzer | N/A | N/A | N/A | 3051A00187 |
| Agilent | E4438C | ESG Vector Signal Generator | 3/24/2017 | Biennial | 3/24/2019 | MY42082385 |
| Agilent | E4438C | ESG Vector Signal Generator | 3/23/2017 | Annual | 3/23/2018 | MY47270002 |
| Agilent | N5182A | MXG Vector Signal Generator | 2/28/2017 | Annual | 2/28/2018 | MY47420800 |
| Agilent | N5182A | MXG Vector Signal Generator | 10/27/2016 | Annual | 10/27/2017 | MY47420603 |
| Agilent | 8753ES | S-Parameter Vector Network Analyzer | 8/19/2016 | Annual | 8/19/2017 | MY40003841 |
| Agilent | 8753ES | S-Parameter Vector Network Analyzer | 10/26/2016 | Annual | 10/26/2017 | US39170118 |
| Agilent | E5515C | Wireless Communications Test Set | 1/29/2016 | Biennial | 1/29/2018 | GB46310798 |
| Amplifier Research | 15S1G6 | Amplifier | CBT | N/A | CBT | 433971 |
| Amplifier Research | 15S1G6 | Amplifier | CBT | N/A | CBT | 433972 |
| Anritsu | ML2495A | Power Meter | 10/16/2015 | Biennial | 10/16/2017 | 941001 |
| Anritsu | ML2495A | Power Meter | 10/16/2015 | Biennial | 10/16/2017 | 1039008 |
| Anritsu | MA2411B | Pulse Power Sensor | 2/10/2017 | Annual | 2/10/2018 | 1207364 |
| Anritsu | MA2411B | Pulse Power Sensor | 8/18/2016 | Annual | 8/18/2017 | 1126066 |
| Anritsu | MA24106A | USB Power Sensor | 6/7/2017 | Annual | 6/7/2018 | 1231538 |
| Anritsu | MA24106A | USB Power Sensor | 6/7/2017 | Annual | 6/7/2018 | 1231535 |
| COMTECH | AR85729-5/5759B | Solid State Amplifier | CBT | N/A | CBT | M3W1A00-1002 |
| COMTech | AR85729-5 | Solid State Amplifier | CBT | N/A | CBT | M1S5A00-009 |
| Control Company | 4352 | Ultra Long Stem Thermometer | 5/2/2017 | Biennial | 5/2/2019 | 170330156 |
| Control Company | 4352 | Ultra Long Stem Thermometer | 3/3/2017 | Biennial | 3/3/2019 | 170155534 |
| Keysight | 772D | Dual Directional Coupler | CBT | N/A | CBT | MY52180215 |
| MCL | BW-N6W5+ | 6dB Attenuator | CBT | N/A | CBT | 1139 |
| MiniCircuits | SLP-2400+ | Low Pass Filter | CBT | N/A | CBT | R8979500903 |
| Mini-Circuits | BW-N20W5+ | DC to 18 GHz Precision Fixed 20 dB Attenuator | CBT | N/A | CBT | N/A |
| Mini-Circuits | NLP-1200+ | Low Pass Filter DC to 1000 MHz | CBT | N/A | CBT | N/A |
| Mini-Circuits | NLP-2950+ | Low Pass Filter DC to 2700 MHz | CBT | N/A | CBT | N/A |
| Mitutoyo | CD-6"CSX | Digital Caliper | 3/2/2016 | Biennial | 3/2/2018 | 13264162 |
| Narda | 4772-3 | Attenuator (3dB) | CBT | N/A | CBT | 9406 |
| Narda | BW-S3W2 | Attenuator (3dB) | CBT | N/A | CBT | 120 |
| Pasternack | PE2208-6 | Bidirectional Coupler | CBT | N/A | CBT | N/A |
| Pasternack | PE2209-10 | Bidirectional Coupler | CBT | N/A | CBT | N/A |
| Rohde & Schwarz | CMU200 | Base Station Simulator | 4/11/2017 | Annual | 4/11/2018 | 836371/0079 |
| Rohde & Schwarz | CMW500 | Radio Communication Tester | 10/20/2016 | Annual | 10/20/2017 | 100976 |
| Rohde & Schwarz | CMW500 | Radio Communication Tester | 5/4/2017 | Annual | 5/4/2018 | 112347 |
| Rohde & Schwarz | CMW500 | Radio Communication Tester | 5/4/2017 | Annual | 5/4/2018 | 101699 |
| Rohde & Schwarz | CMW500 | Radio Communication Tester | 10/13/2016 | Annual | 10/13/2017 | 102060 |
| Rohde & Schwarz | CMW500 | Wideband Radio Communication Tester | 2/10/2017 | Annual | 2/10/2018 | 162125 |
| Seekonk | NC-100 | Torque Wrench (8" lb) | 9/1/2016 | Biennial | 9/1/2018 | 21053 |
| Seekonk | NC-100 | Torque Wrench (8" lb) | 8/30/2016 | Biennial | 8/30/2018 | N/A |
| SPEAG | DAKS-3.5 | Portable Dielectric Assessment Kit | 8/25/2016 | Annual | 8/25/2017 | 1041 |
| SPEAG | D750V3 | 750 MHz SAR Dipole | 9/19/2016 | Annual | 9/19/2017 | 1097 |
| SPEAG | D850V2 | 850 MHz SAR Dipole | 8/16/2016 | Annual | 8/16/2017 | 1009 |
| SPEAG | D850V2 | 835 MHz SAR Dipole | 9/19/2016 | Annual | 9/19/2017 | 1010 |
| SPEAG | D1750V2 | 1750 MHz SAR Dipole | 9/14/2016 | Annual | 9/14/2017 | 1104 |
| SPEAG | D1900V2 | 1900 MHz SAR Dipole | 9/19/2016 | Annual | 9/19/2017 | 5d181 |
| SPEAG | D2450V2 | 2450 MHz SAR Dipole | 9/13/2016 | Annual | 9/13/2017 | 921 |
| SPEAG | D2600V2 | 2600 MHz SAR Dipole | 9/13/2016 | Annual | 9/13/2017 | 1069 |
| SPEAG | ES3DV3 | SAR Probe | 11/11/2016 | Annual | 11/11/2017 | 3347 |
| SPEAG | EX3DV4 | SAR Probe | 11/15/2016 | Annual | 11/15/2017 | 7420 |
| SPEAG | ES3DV3 | SAR Probe | 3/16/2017 | Annual | 3/16/2018 | 3118 |
| SPEAG | ES3DV3 | SAR Probe | 3/14/2017 | Annual | 3/14/2018 | 3329 |
| SPEAG | DAE4 | Dasy Data Acquisition Electronics | 11/15/2016 | Annual | 11/15/2017 | 1450 |
| SPEAG | DAE4 | Dasy Data Acquisition Electronics | 9/21/2016 | Annual | 9/21/2017 | 1449 |
| SPEAG | DAE4 | Dasy Data Acquisition Electronics | 3/8/2017 | Annual | 3/8/2018 | 1213 |
| SPEAG | DAE4 | Dasy Data Acquisition Electronics | 3/10/2017 | Annual | 3/10/2018 | 1403 |

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




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# 14 MEASUREMENT UNCERTAINTIES

| a | c | d | e= f(d,k) | f | g | h = c x f/e | i = c x g/e | k |
|---|---|---|---|---|---|---|---|---|
| Uncertainty Component | Tol. (± %) | Prob. Dist. | Div. | $c_i$ 1gm | $c_i$ 10 gms | 1gm $u_i$ (± %) | 10gms $u_i$ (± %) | $v_i$ |
| **Measurement System** | | | | | | | | |
| Probe Calibration | 6.55 | N | 1 | 1.0 | 1.0 | 6.6 | 6.6 | ∞ |
| Axial Isotropy | 0.25 | N | 1 | 0.7 | 0.7 | 0.2 | 0.2 | ∞ |
| Hemishperical Isotropy | 1.3 | N | 1 | 0.7 | 0.7 | 0.9 | 0.9 | ∞ |
| Boundary Effect | 2.0 | R | 1.73 | 1.0 | 1.0 | 1.2 | 1.2 | ∞ |
| Linearity | 0.3 | N | 1 | 1.0 | 1.0 | 0.3 | 0.3 | ∞ |
| System Detection Limits | 0.25 | R | 1.73 | 1.0 | 1.0 | 0.1 | 0.1 | ∞ |
| Readout Electronics | 0.3 | N | 1 | 1.0 | 1.0 | 0.3 | 0.3 | ∞ |
| Response Time | 0.8 | R | 1.73 | 1.0 | 1.0 | 0.5 | 0.5 | ∞ |
| Integration Time | 2.6 | R | 1.73 | 1.0 | 1.0 | 1.5 | 1.5 | ∞ |
| RF Ambient Conditions - Noise | 3.0 | R | 1.73 | 1.0 | 1.0 | 1.7 | 1.7 | ∞ |
| RF Ambient Conditions - Reflections | 3.0 | R | 1.73 | 1.0 | 1.0 | 1.7 | 1.7 | ∞ |
| Probe Positioner Mechanical Tolerance | 0.4 | R | 1.73 | 1.0 | 1.0 | 0.2 | 0.2 | ∞ |
| Probe Positioning w/ respect to Phantom | 6.7 | R | 1.73 | 1.0 | 1.0 | 3.9 | 3.9 | ∞ |
| Extrapolation, Interpolation & Integration algorithms for Max. SAR Evaluation | 4.0 | R | 1.73 | 1.0 | 1.0 | 2.3 | 2.3 | ∞ |
| **Test Sample Related** | | | | | | | | |
| Test Sample Positioning | 2.7 | N | 1 | 1.0 | 1.0 | 2.7 | 2.7 | 35 |
| Device Holder Uncertainty | 1.67 | N | 1 | 1.0 | 1.0 | 1.7 | 1.7 | 5 |
| Output Power Variation - SAR drift measurement | 5.0 | R | 1.73 | 1.0 | 1.0 | 2.9 | 2.9 | ∞ |
| SAR Scaling | 0.0 | R | 1.73 | 1.0 | 1.0 | 0.0 | 0.0 | ∞ |
| **Phantom & Tissue Parameters** | | | | | | | | |
| Phantom Uncertainty (Shape & Thickness tolerances) | 7.6 | R | 1.73 | 1.0 | 1.0 | 4.4 | 4.4 | ∞ |
| Liquid Conductivity - measurement uncertainty | 4.2 | N | 1 | 0.78 | 0.71 | 3.3 | 3.0 | 10 |
| Liquid Permittivity - measurement uncertainty | 4.1 | N | 1 | 0.23 | 0.26 | 1.0 | 1.1 | 10 |
| Liquid Conductivity - Temperature Uncertainty | 3.4 | R | 1.73 | 0.78 | 0.71 | 1.5 | 1.4 | ∞ |
| Liquid Permittivity - Temperature Unceritainty | 0.6 | R | 1.73 | 0.23 | 0.26 | 0.1 | 0.1 | ∞ |
| Liquid Conductivity - deviation from target values | 5.0 | R | 1.73 | 0.64 | 0.43 | 1.8 | 1.2 | ∞ |
| Liquid Permittivity - deviation from target values | 5.0 | R | 1.73 | 0.60 | 0.49 | 1.7 | 1.4 | ∞ |
| **Combined Standard Uncertainty (k=1)** | | RSS | | | | 11.5 | 11.3 | 60 |
| **Expanded Uncertainty** (95% CONFIDENCE LEVEL) | | k=2 | | | | 23.0 | 22.6 | |




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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 Innovation, Science, and Economic Development 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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# APPENDIX A: SAR TEST DATA

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# PCTEST ENGINEERING LABORATORY, INC.

**DUT: BCG-A1861; Type: Watch; Serial: FH7TT00GJ78M**

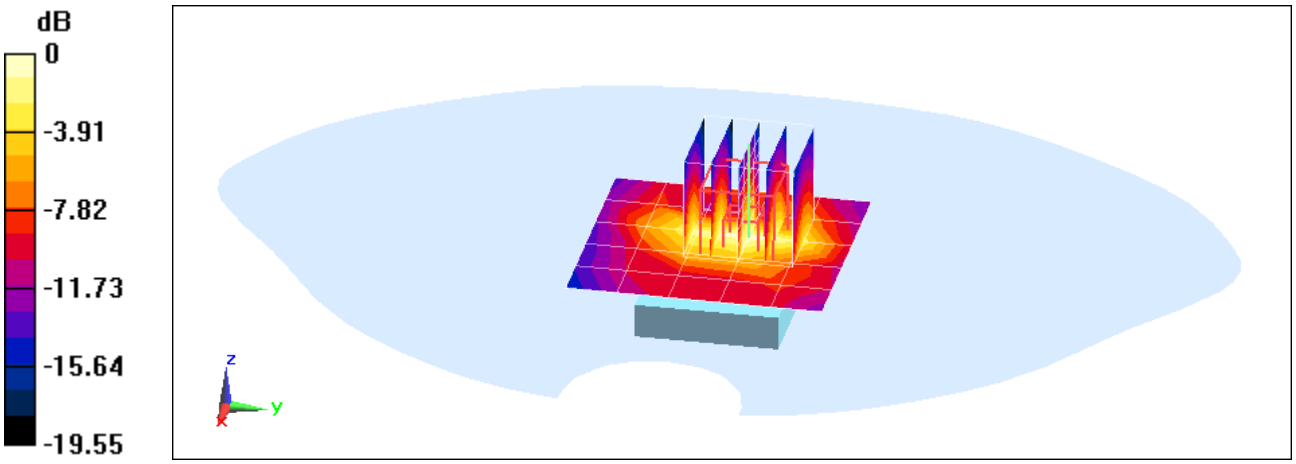
Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 836.6 MHz; $\sigma$ = 0.912 S/m; $\varepsilon_r$ = 41.025; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-26-2017; Ambient Temp: 19.5°C; Tissue Temp: 19.3°C

Probe: EX3DV4 - SN7420; ConvF(10.1, 10.1, 10.1); Calibrated: 11/15/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1449; Calibrated: 9/21/2016
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1793
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## Mode: UMTS 850, Head SAR, Front side, Mid.ch, Aluminum, Metal Links Wristband

**Area Scan (6x6x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.87 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.198 W/kg
**SAR(1 g) = 0.102 W/kg**




0 dB = 0.155 W/kg = -8.10 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: BCG-A1861; Type: Watch; Serial: FH7TT001J79R**

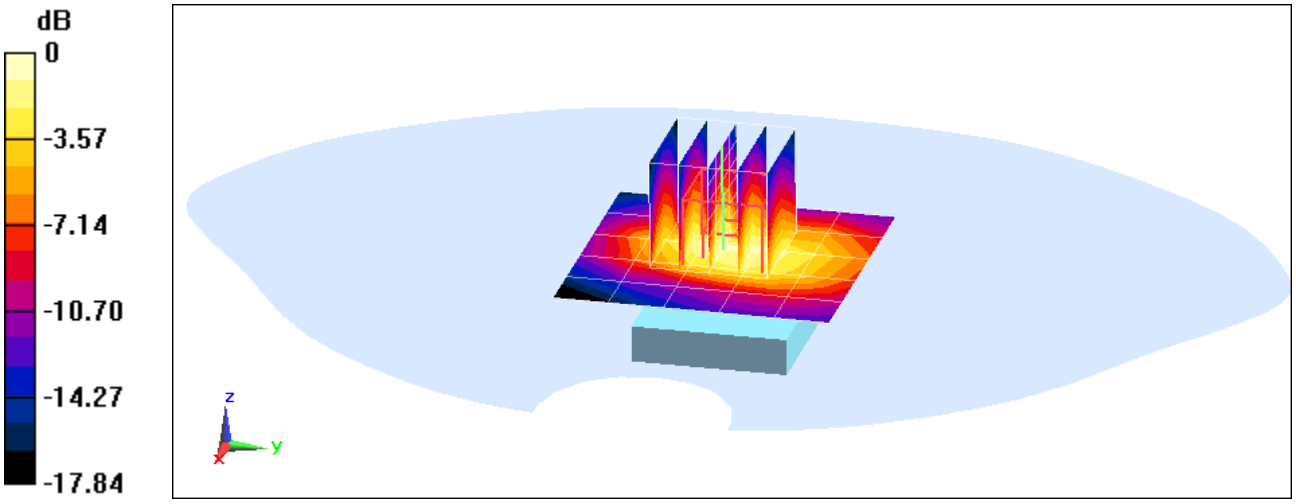
Communication System: UID 0, UMTS; Frequency: 1732.4 MHz; Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used (interpolated):
f = 1732.4 MHz; $\sigma$ = 1.346 S/m; $\varepsilon_r$ = 38.888; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-13-2017; Ambient Temp: 21.5°C; Tissue Temp: 21.6°C

Probe: ES3DV3 - SN3347; ConvF(5.43, 5.43, 5.43); Calibrated: 11/11/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 11/15/2016
Phantom: SAM with CRP; Type: SAM; Serial: TP:1792
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## Mode: UMTS 1750, Head SAR, Front side, Mid.ch, Ceramic, Metal Loop Wristband

**Area Scan (6x6x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.62 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.647 W/kg
**SAR(1 g) = 0.412 W/kg**




0 dB = 0.492 W/kg = -3.08 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: BCG-A1861; Type: Watch; Serial: FH7TT004J78X**

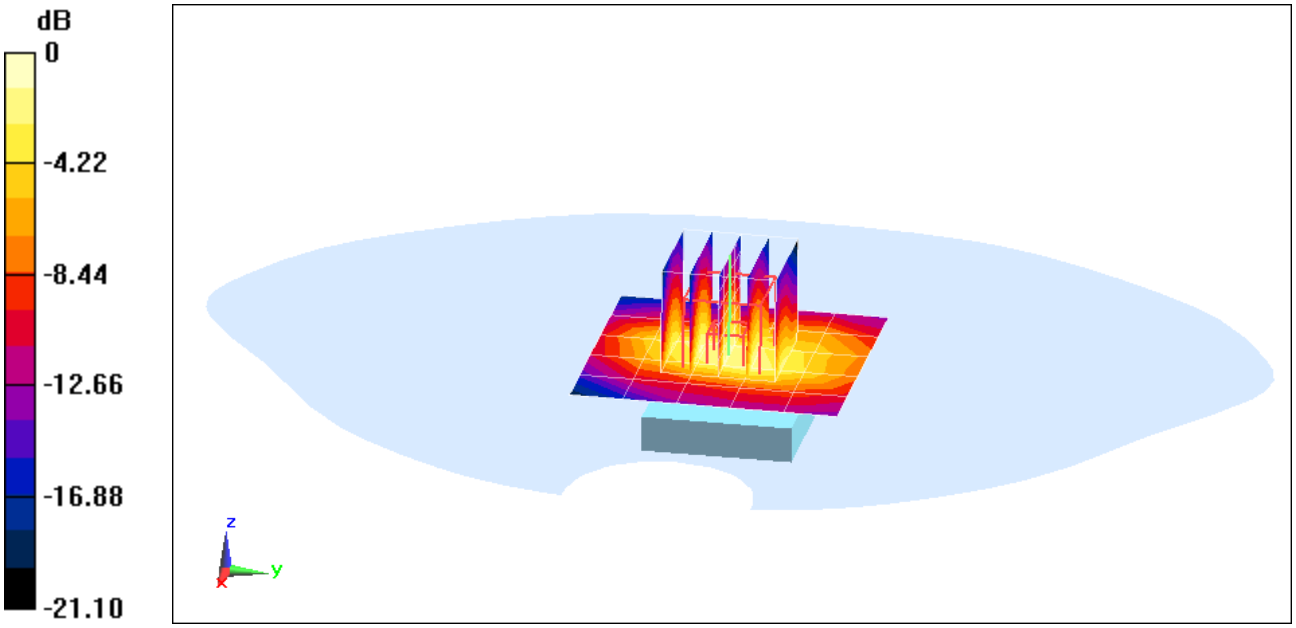
Communication System: UID 0, UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; $\sigma$ = 1.398 S/m; $\varepsilon_r$ = 40.008; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-03-2017; Ambient Temp: 20.3°C; Tissue Temp: 21.9°C

Probe: EX3DV4 - SN7420; ConvF(8.17, 8.17, 8.17); Calibrated: 11/15/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1449; Calibrated: 9/21/2016
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1793
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## Mode: UMTS 1900, Head SAR, Front side, Mid.ch, Aluminum, Metal Loop Wristband

**Area Scan (6x6x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.62 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 0.547 W/kg
**SAR(1 g) = 0.315 W/kg**




0 dB = 0.454 W/kg = -3.43 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: BCG-A1861; Type: Watch; Serial: FH7TT00GJ78M**

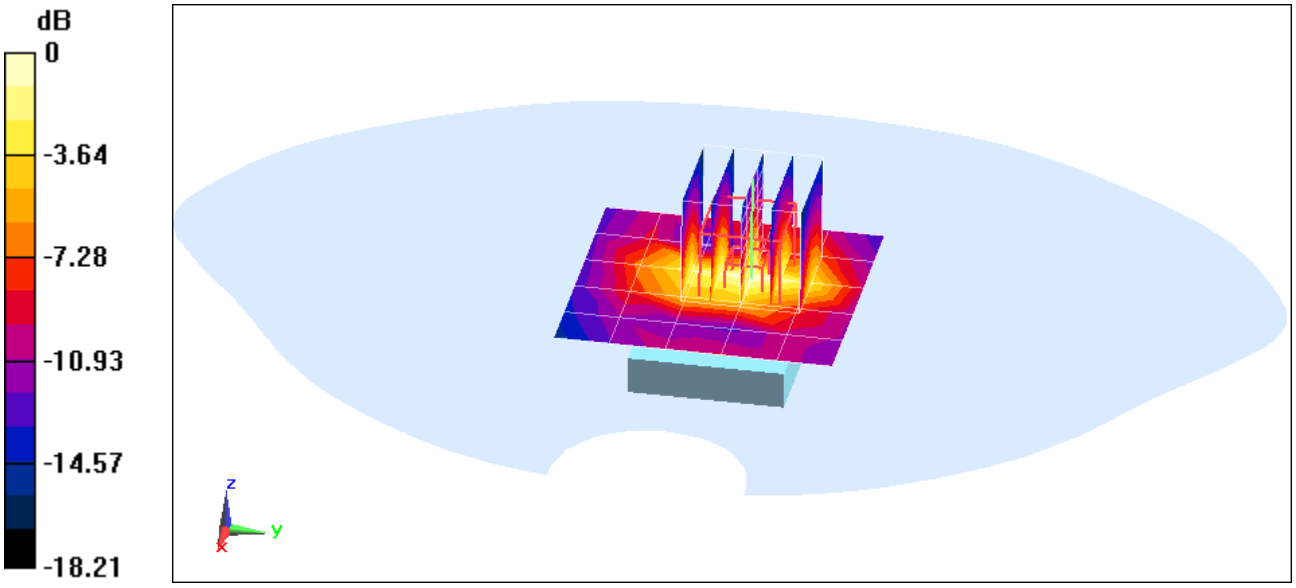
Communication System: UID 0, LTE Band 12; Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: 750 Head Medium parameters used (interpolated):
f = 707.5 MHz; $\sigma$ = 0.854 S/m; $\varepsilon_r$ = 41.515; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-26-2017; Ambient Temp: 19.1°C; Tissue Temp: 19.6°C

Probe: ES3DV3 - SN3347; ConvF(6.75, 6.75, 6.75); Calibrated: 11/11/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 11/15/2016
Phantom: SAM with CRP; Type: SAM; Serial: TP:1792
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: LTE Band 12, Head SAR, Front side, Mid.ch, 10 MHz Bandwidth, QPSK, 1 RB, 25 RB Offset, Aluminum, Metal Links Wristband**

**Area Scan (6x6x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.853 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.144 W/kg
**SAR(1 g) = 0.074 W/kg**




0 dB = 0.0913 W/kg = -10.40 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: BCG-A1861; Type: Watch; Serial: FH7TT00GJ78M**

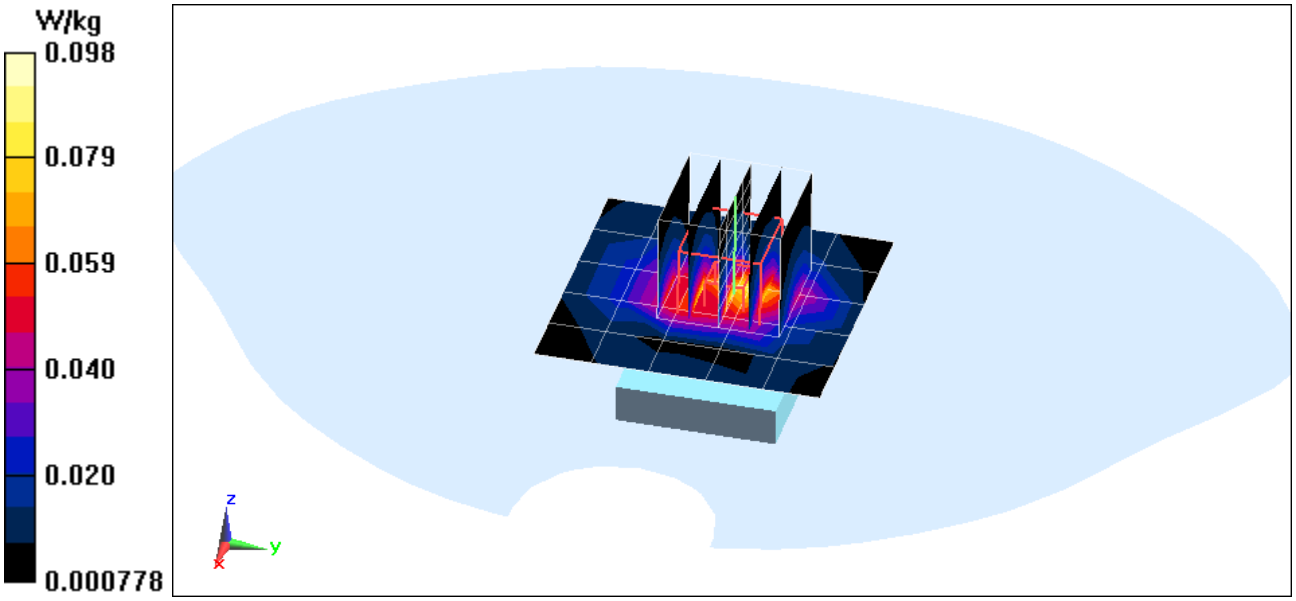
Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 Head Medium parameters used (interpolated):
f = 782 MHz; $\sigma$ = 0.923 S/m; $\varepsilon_r$ = 40.417; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-26-2017; Ambient Temp: 19.1°C; Tissue Temp: 19.6°C

Probe: ES3DV3 - SN3347; ConvF(6.75, 6.75, 6.75); Calibrated: 11/11/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 11/15/2016
Phantom: SAM with CRP; Type: SAM; Serial: TP:1792
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: LTE Band 13, Head SAR, Front side, Mid.ch, 10 MHz Bandwidth, QPSK, 1 RB, 25 RB Offset, Aluminum, Metal Links Wristband**

**Area Scan (6x6x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.867 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 0.155 W/kg
**SAR(1 g) = 0.079 W/kg**



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: BCG-A1861; Type: Watch; Serial: FH7TT003J79H**

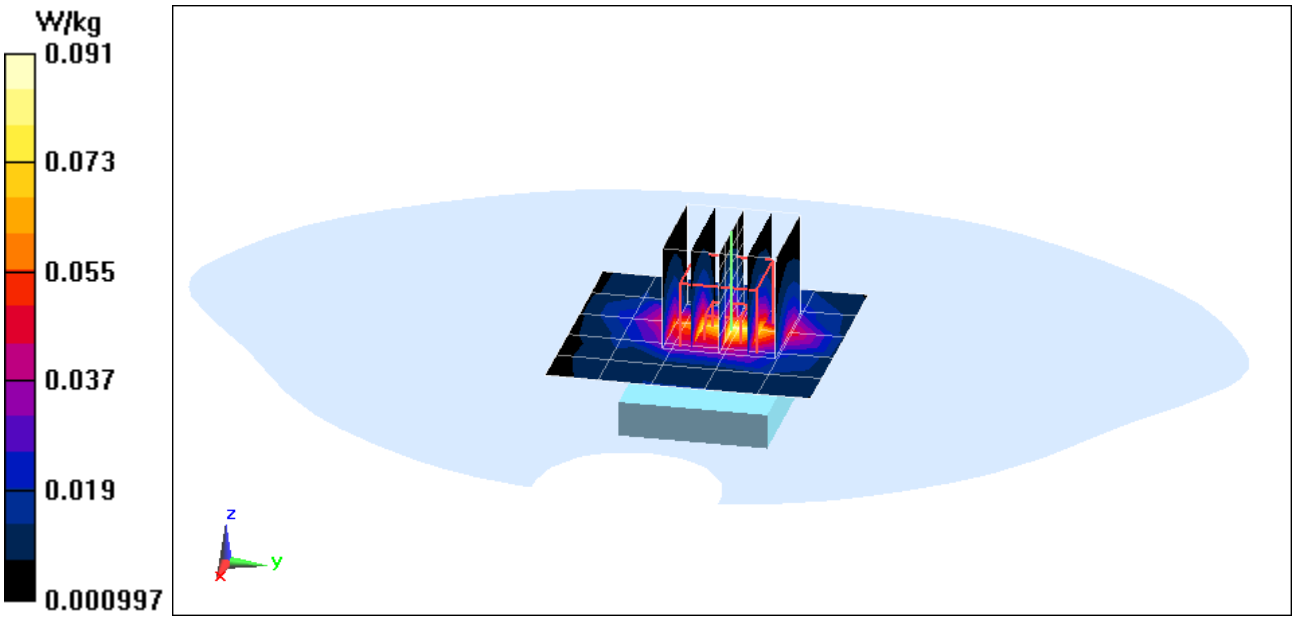
Communication System: UID 0, LTE Band 5 (Cell.); Frequency: 836.5 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 836.5 MHz; $\sigma$ = 0.928 S/m; $\varepsilon_r$ = 42.234; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-10-2017; Ambient Temp: 22.0°C; Tissue Temp: 20.4°C

Probe: ES3DV3 - SN3118; ConvF(6.32, 6.32, 6.32); Calibrated: 3/16/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1213; Calibrated: 3/8/2017
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1868
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: LTE Band 5 (Cell.), Head SAR, Front side, Mid.ch, 10 MHz Bandwidth, QPSK, 1 RB, 25 RB Offset, Stainless Steel, Metal Links Wristband**

**Area Scan (6x6x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.453 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 0.140 W/kg
**SAR(1 g) = 0.074 W/kg**



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: BCG-A1861; Type: Watch; Serial: FH7TR06RJ796**

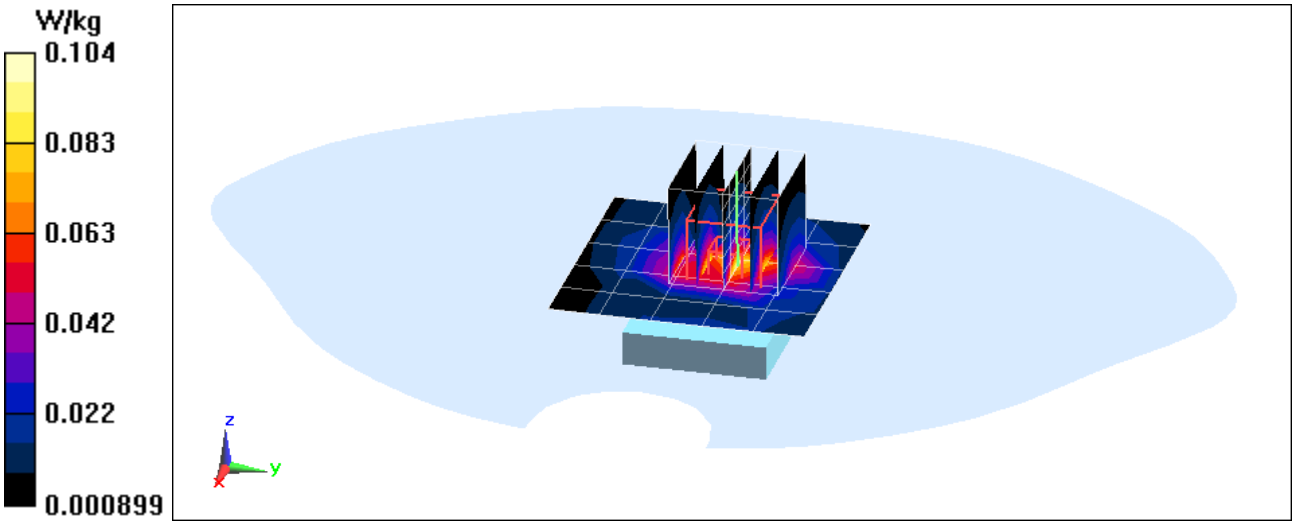
Communication System: UID 0, LTE Band 26; Frequency: 819 MHz; Duty Cycle: 1:1
Medium: 850 Head Medium parameters used (interpolated):
f = 819 MHz; $\sigma$ = 0.924 S/m; $\varepsilon_r$ = 43.109; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-18-2017; Ambient Temp: 20.7°C; Tissue Temp: 19.5°C

Probe: ES3DV3 - SN3118; ConvF(6.32, 6.32, 6.32); Calibrated: 3/16/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1213; Calibrated: 3/8/2017
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1868
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## Mode: LTE Band 26 (Cell.), Head SAR, Front side, Low.ch, 10 MHz Bandwidth, QPSK, 1 RB, 49 RB Offset, Stainless Steel, Metal Links Wristband

**Area Scan (6x6x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.13 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.157 W/kg
**SAR(1 g) = 0.084 W/kg**



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: BCG-A1861; Type: Watch; Serial: FH7TT004J79H**

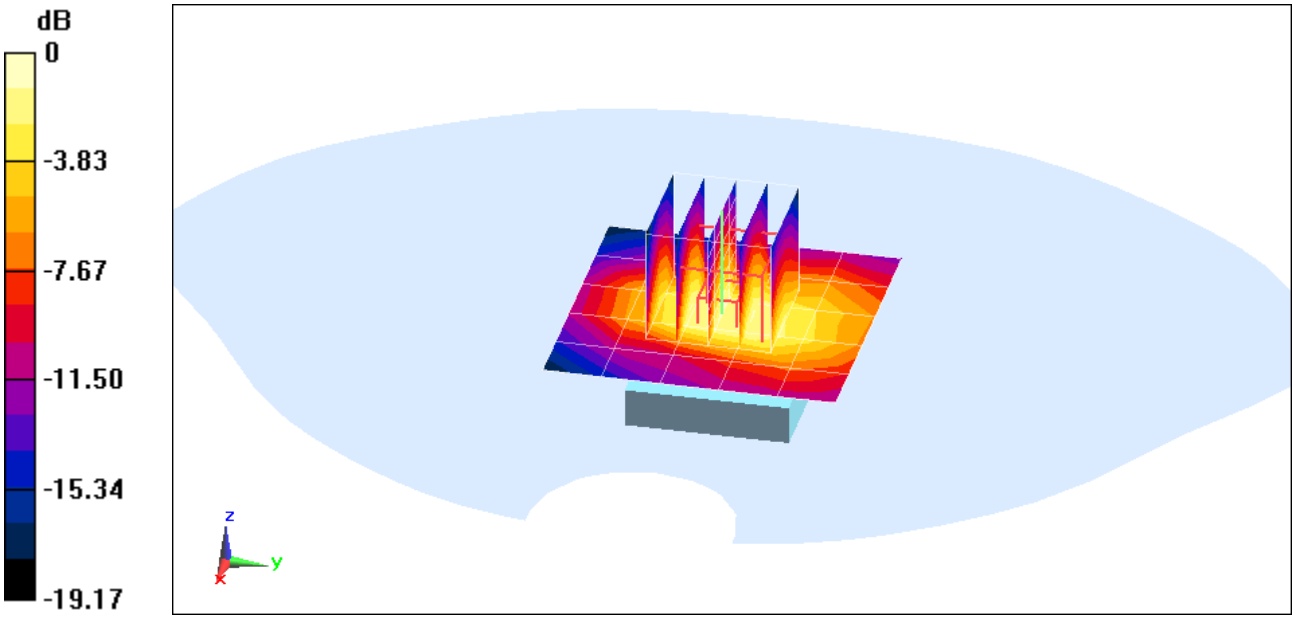
Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used (interpolated):
f = 1732.5 MHz; $\sigma$ = 1.342 S/m; $\varepsilon_r$ = 40.056; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-26-2017; Ambient Temp: 20.9°C; Tissue Temp: 21.8°C

Probe: ES3DV3 - SN3118; ConvF(5.21, 5.21, 5.21); Calibrated: 3/16/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1213; Calibrated: 3/8/2017
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1868
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## Mode: LTE Band 4 (AWS), Head SAR, Front side, Mid.ch, 20 MHz Bandwidth, QPSK, 1 RB, 99 RB Offset, Stainless Steel, Metal Loop Wristband

**Area Scan (6x6x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.30 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.559 W/kg
**SAR(1 g) = 0.348 W/kg**




0 dB = 0.422 W/kg = -3.75 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: BCG-A1861; Type: Watch; Serial: FH7TT004J79R**

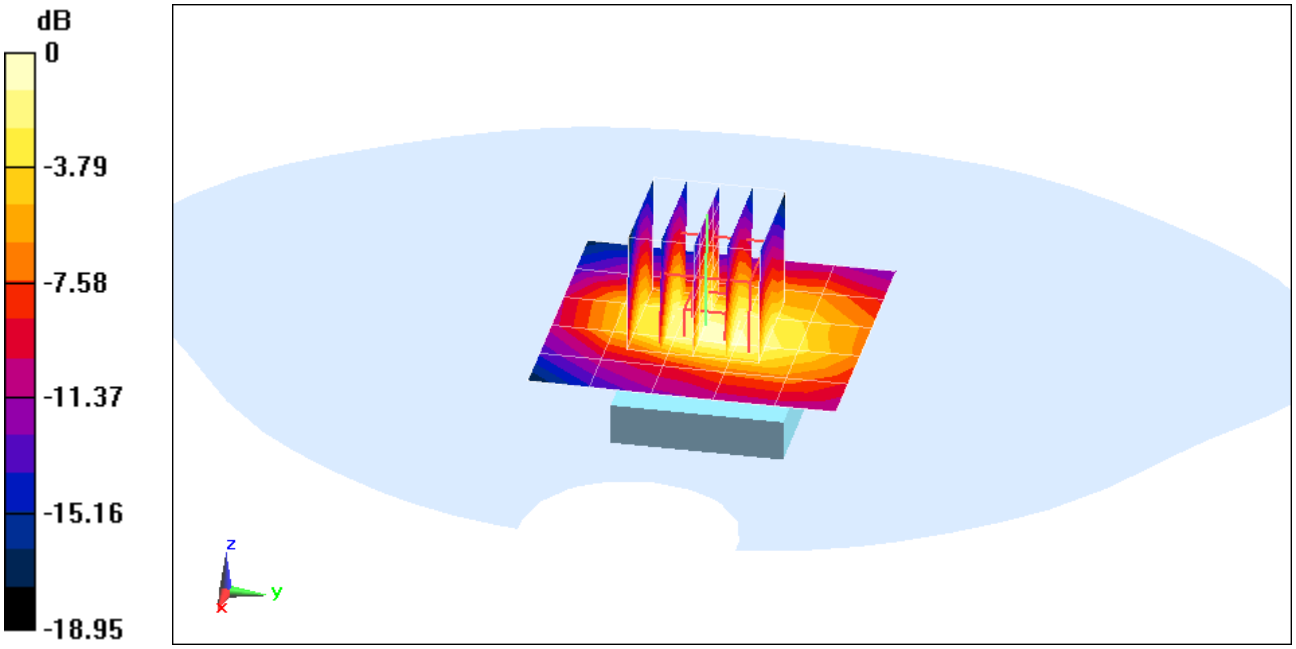
Communication System: UID 0, LTE Band 25 (PCS); Frequency: 1860 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1860 MHz; $\sigma$ = 1.392 S/m; $\varepsilon_r$ = 39.047; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-22-2017; Ambient Temp: 20.7°C; Tissue Temp: 20.9°C

Probe: ES3DV3 - SN3118; ConvF(5.05, 5.05, 5.05); Calibrated: 3/16/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1213; Calibrated: 3/8/2017
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1868
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## Mode: LTE Band 25 (PCS), Head SAR, Front side, Low.ch, 20 MHz Bandwidth, QPSK, 1 RB, 99 RB Offset, Ceramic, Metal Loop Wristband

**Area Scan (6x6x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.67 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 0.535 W/kg
**SAR(1 g) = 0.337 W/kg**




0 dB = 0.405 W/kg = -3.93 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: BCG-A1861; Type: Watch; Serial: FH7TT004J79H**

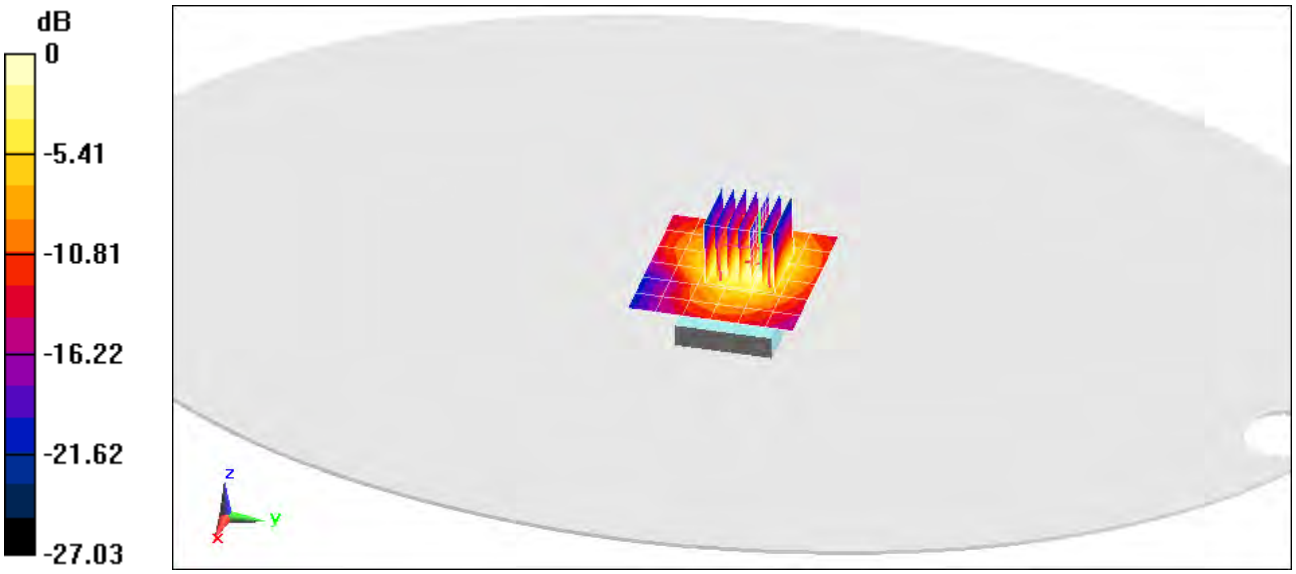
Communication System: UID 0, LTE Band 41; Frequency: 2680 MHz; Duty Cycle: 1:1.58
Medium: 2600 Head Medium parameters used (interpolated):
f = 2680 MHz; $\sigma$ = 2.111 S/m; $\varepsilon_r$ = 37.714; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-28-2017; Ambient Temp: 22.0°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3329; ConvF(4.54, 4.54, 4.54); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1403; Calibrated: 3/10/2017
Phantom: ELI v6.0; Type: QDOVA003AA; Serial: TP:2003
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## Mode: LTE Band 41, Head SAR, Front side, High.ch, 20 MHz Bandwidth, QPSK, 1 RB, 99 RB Offset, Stainless Steel, Sport Wristband

**Area Scan (7x7x1):** Measurement grid: dx=12mm, dy=12mm
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.40 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.639 W/kg
**SAR(1 g) = 0.296 W/kg**




0 dB = 0.382 W/kg = -4.18 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: BCG-A1861; Type: Watch; Serial: FH7TT004J78X**

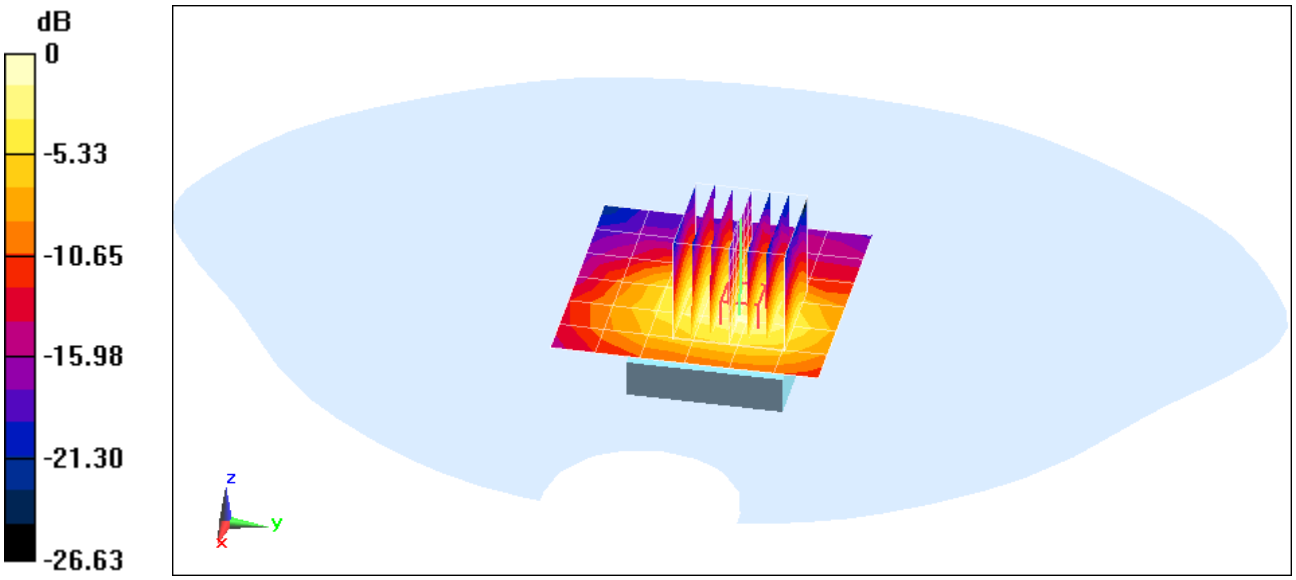
Communication System: UID 0, IEEE 802.11b; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
f = 2437 MHz; $\sigma$ = 1.824 S/m; $\varepsilon_r$ = 39.489; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-28-2017; Ambient Temp: 21.5°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3118; ConvF(4.37, 4.37, 4.37); Calibrated: 3/16/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1213; Calibrated: 3/8/2017
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1868
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## Mode: IEEE 802.11b, 22 MHz Bandwidth, Head SAR, Ch 6, 1 Mbps, Front Side, Aluminum, Sport Wristband

**Area Scan (7x7x1):** Measurement grid: dx=12mm, dy=12mm
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.12 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.325 W/kg
**SAR(1 g) = 0.162 W/kg**




0 dB = 0.207 W/kg = -6.84 dBW/kg

**DUT: BCG-A1861; Type: Watch; Serial: FH7TT00GJ78M**

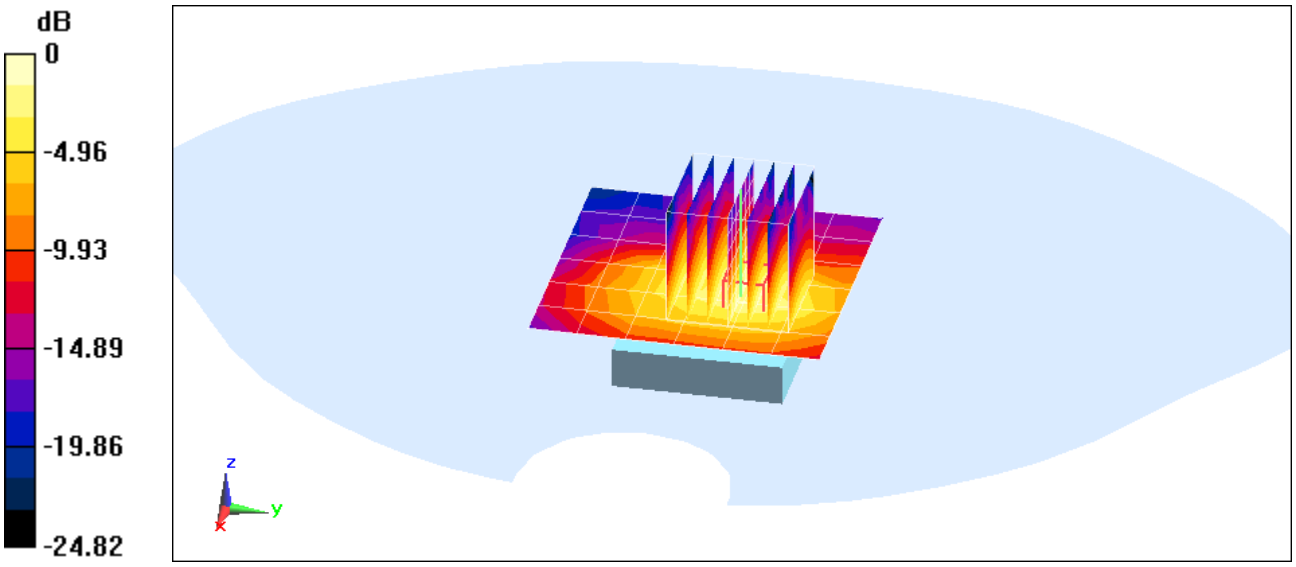
Communication System: UID 0, Bluetooth; Frequency: 2441 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
f = 2441 MHz; $\sigma$ = 1.867 S/m; $\varepsilon_r$ = 39.551; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-03-2017; Ambient Temp: 21.7°C; Tissue Temp: 23.5°C

Probe: ES3DV3 - SN3118; ConvF(4.37, 4.37, 4.37); Calibrated: 3/16/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1213; Calibrated: 3/8/2017
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1868
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## Mode: Bluetooth (ePA), Head SAR, Ch 39, 1 Mbps, Front Side, Aluminum, Sport Wristband

**Area Scan (7x7x1):** Measurement grid: dx=12mm, dy=12mm
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.906 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 0.262 W/kg
**SAR(1 g) = 0.128 W/kg**




0 dB = 0.165 W/kg = -7.83 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: BCG-A1861; Type: Watch; Serial: FH7TT00GJ78M**

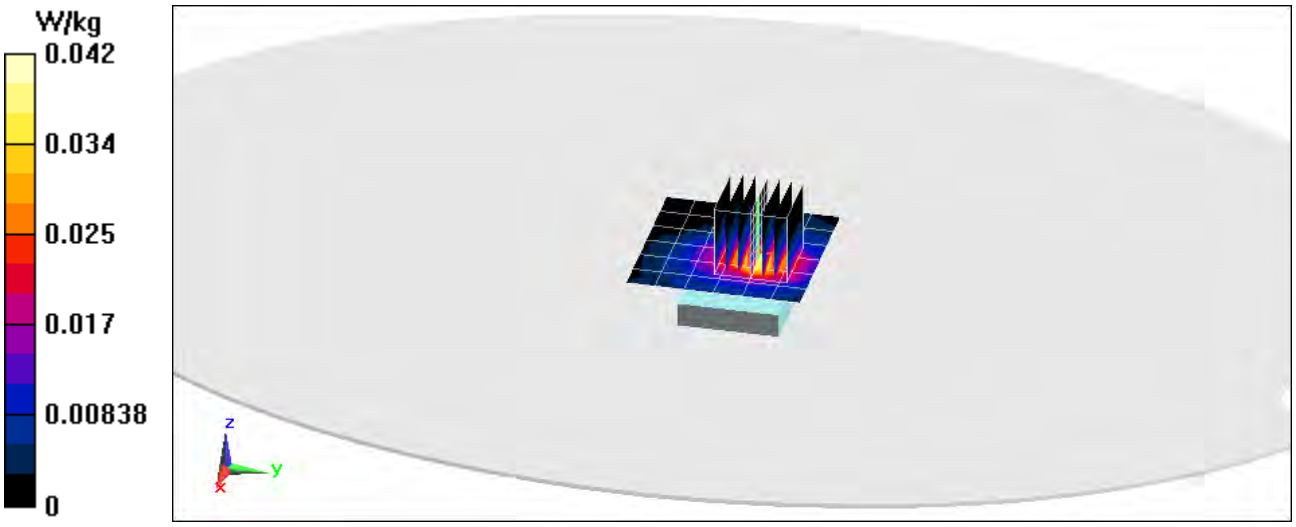
Communication System: UID 0, Bluetooth; Frequency: 2441 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
f = 2441 MHz; $\sigma$ = 1.866 S/m; $\varepsilon_r$ = 39.617; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-12-2017; Ambient Temp: 21.5°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3329; ConvF(4.71, 4.71, 4.71); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1403; Calibrated: 3/10/2017
Phantom: ELI v6.0; Type: QDOVA003AA; Serial: TP:2003
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## Mode: Bluetooth (iPA), Head SAR, Ch 39, 1 Mbps, Front Side, Aluminum, Sport Wristband

**Area Scan (7x7x1):** Measurement grid: dx=12mm, dy=12mm
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.467 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.0670 W/kg
**SAR(1 g) = 0.033 W/kg**



**DUT: BCG-A1861; Type: Watch; Serial: FH7TT004J79R**

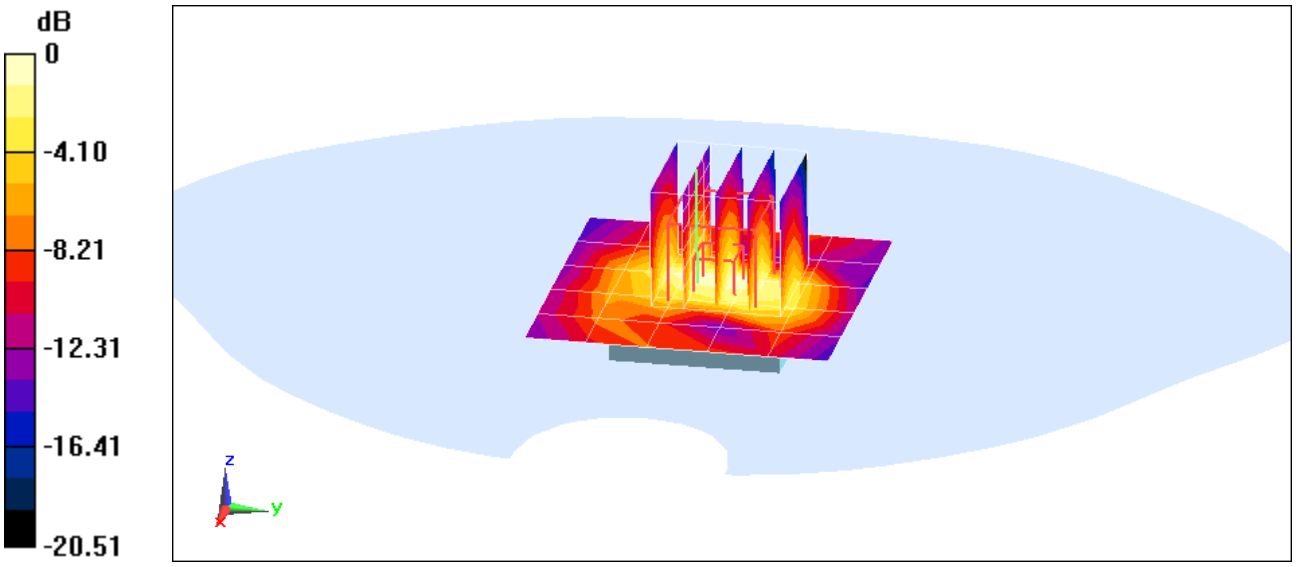
Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; $\sigma$ = 1.01 S/m; $\varepsilon_r$ = 54.924; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 06-21-2017; Ambient Temp: 20.0°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN7420; ConvF(9.73, 9.73, 9.73); Calibrated: 11/15/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1449; Calibrated: 9/21/2016
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1793
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: UMTS 850, Extremity SAR, Back side, Mid.ch, Ceramic, Sport Wristband**

**Area Scan (6x6x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.525 V/m; Power Drift = 0.17 dB
Peak SAR (extrapolated) = 0.0700 W/kg
**SAR(10 g) = 0.021 W/kg**




0 dB = 0.0555 W/kg = -12.56 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: BCG-A1861; Type: Watch; Serial: FH7TT001J79R**

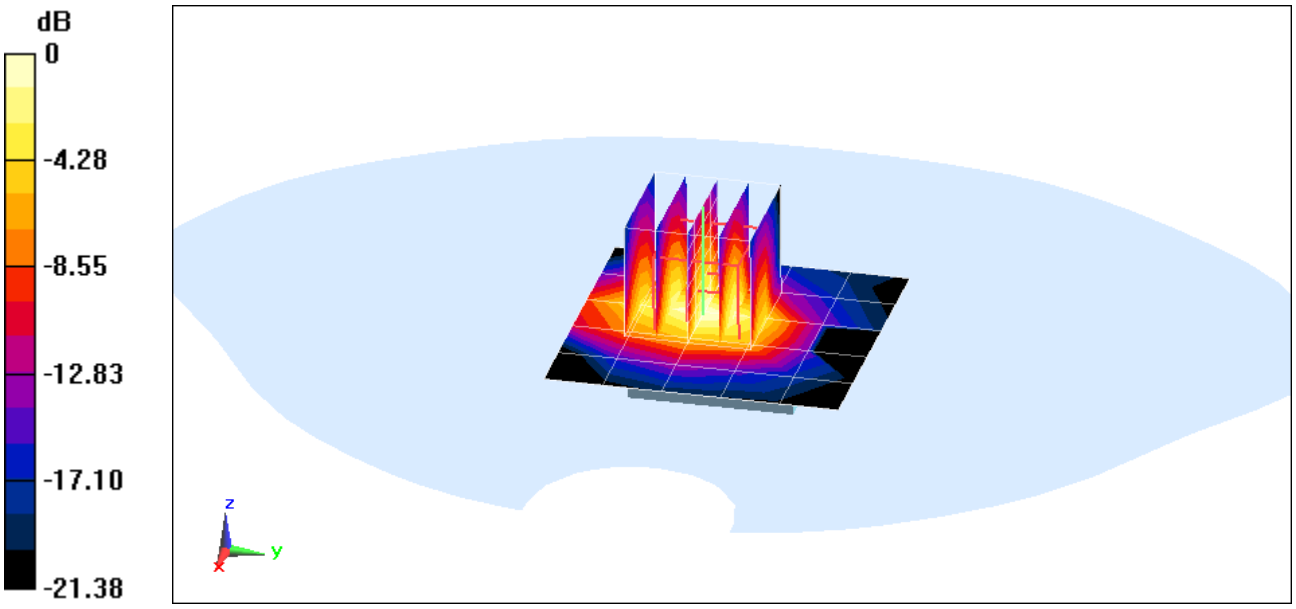
Communication System: UID 0, UMTS; Frequency: 1732.4 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1732.4 MHz; $\sigma$ = 1.51 S/m; $\varepsilon_r$ = 52.681; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 07-03-2017; Ambient Temp: 20.2°C; Tissue Temp: 20.0°C

Probe: EX3DV4 - SN7420; ConvF(8.05, 8.05, 8.05); Calibrated: 11/15/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1449; Calibrated: 9/21/2016
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1793
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## Mode: UMTS 1750, Extremity SAR, Back side, Mid.ch, Ceramic, Metal Loop Wristband

**Area Scan (6x6x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.23 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 0.950 W/kg
**SAR(10 g) = 0.273 W/kg**




0 dB = 0.766 W/kg = -1.16 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: BCG-A1861; Type: Watch; Serial: FH7TT002J79R**

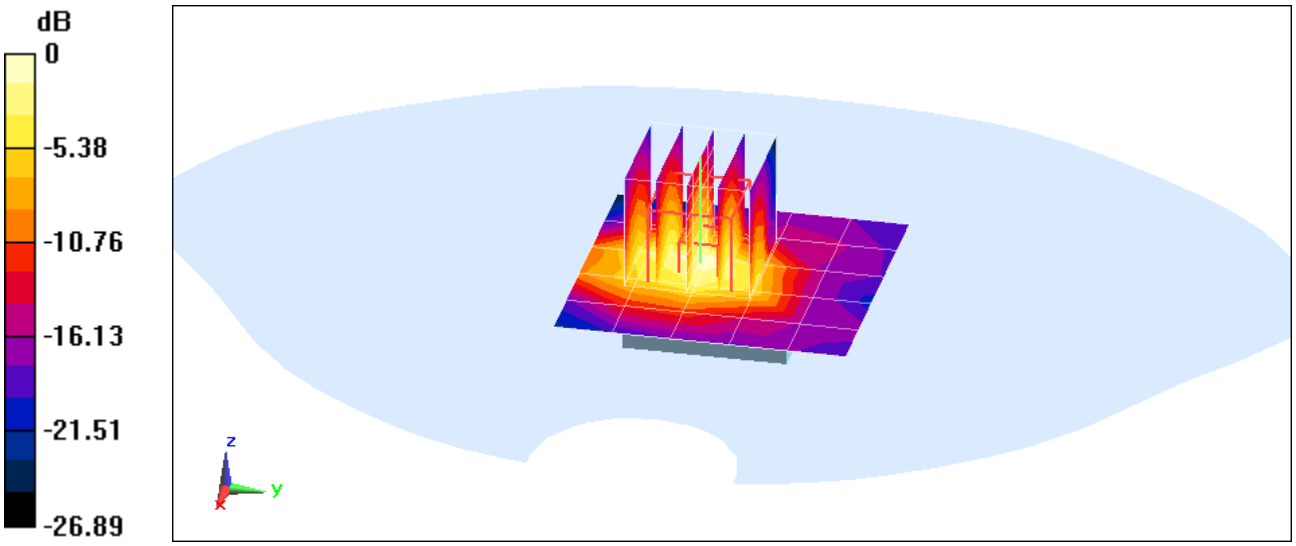
Communication System: UID 0, UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; $\sigma$ = 1.532 S/m; $\varepsilon_r$ = 51.399; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 06-19-2017; Ambient Temp: 19.1°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN7420; ConvF(7.79, 7.79, 7.79); Calibrated: 11/15/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1449; Calibrated: 9/21/2016
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1793
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## Mode: UMTS 1900, Extremity SAR, Back side, Mid.ch, Ceramic, Metal Loop Wristband

**Area Scan (6x6x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.34 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 0.828 W/kg
**SAR(10 g) = 0.211 W/kg**




0 dB = 0.696 W/kg = -1.57 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: BCG-A1861; Type: Watch; Serial: FH7TT004J79R**

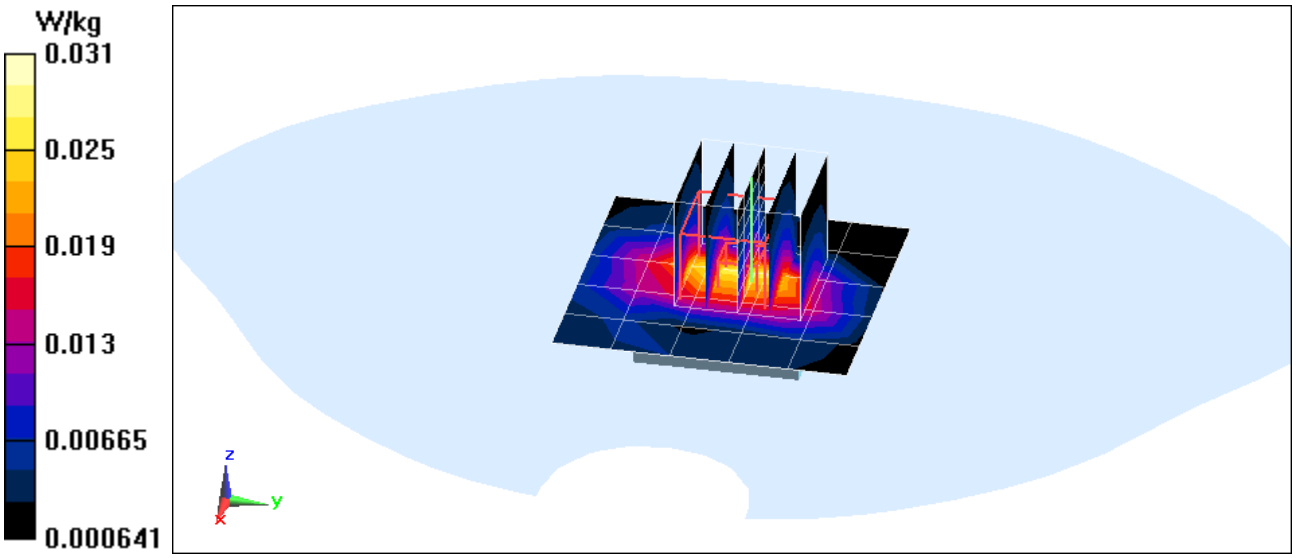
Communication System: UID 0, LTE Band 12; Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 707.5 MHz; $\sigma$ = 0.931 S/m; $\varepsilon_r$ = 54.642; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 06-20-2017; Ambient Temp: 19.0°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3347; ConvF(6.47, 6.47, 6.47); Calibrated: 11/11/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 11/15/2016
Phantom: SAM with CRP; Type: SAM; Serial: TP:1792
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: LTE Band 12, Extremity SAR, Back side, Mid.ch, 10 MHz Bandwidth, QPSK, 1 RB, 25 RB Offset, Ceramic, Metal Loop Wristband**

**Area Scan (6x6x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.431 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 0.0420 W/kg
**SAR(10 g) = 0.014 W/kg**



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: BCG-A1861; Type: Watch; Serial: FH7TT003J79R**

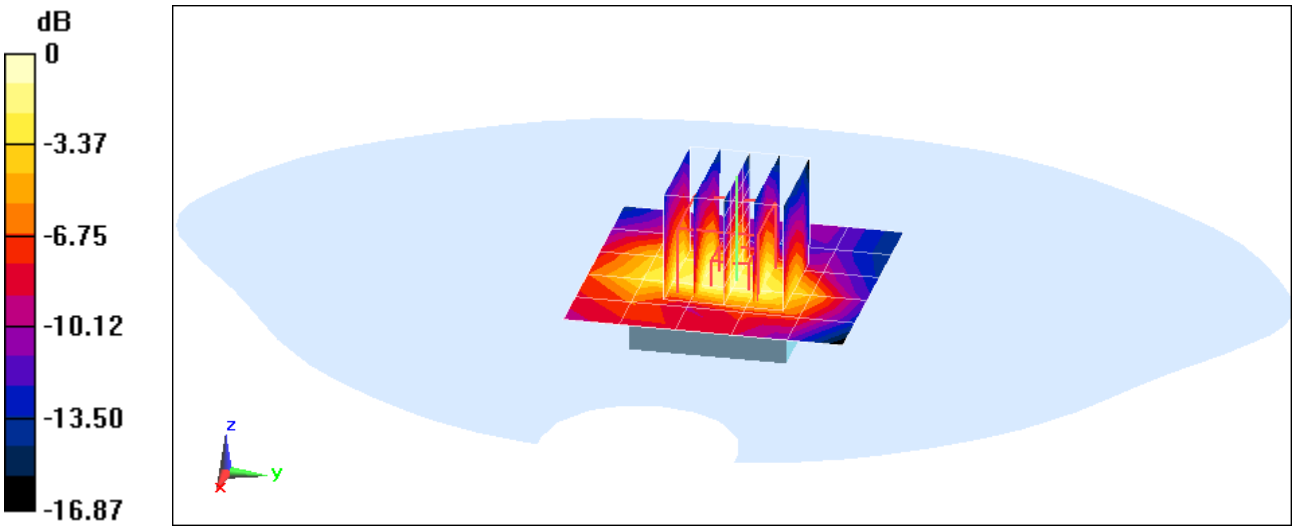
Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 782 MHz; $\sigma$ = 1.013 S/m; $\varepsilon_r$ = 53.985; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 06-22-2017; Ambient Temp: 19.3°C; Tissue Temp: 20.2°C

Probe: ES3DV3 - SN3347; ConvF(6.47, 6.47, 6.47); Calibrated: 11/11/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 11/15/2016
Phantom: SAM with CRP; Type: SAM; Serial: TP:1792
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## Mode: LTE Band 13, Extremity SAR, Back side, Mid.ch, 10 MHz Bandwidth, QPSK, 1 RB, 25 RB Offset, Ceramic, Metal Loop Wristband

**Area Scan (6x6x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.808 V/m; Power Drift = 0.17 dB
Peak SAR (extrapolated) = 0.0540 W/kg
**SAR(10 g) = 0.017 W/kg**




0 dB = 0.0375 W/kg = -14.26 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: BCG-A1861; Type: Watch; Serial: FH7TT001J79R**

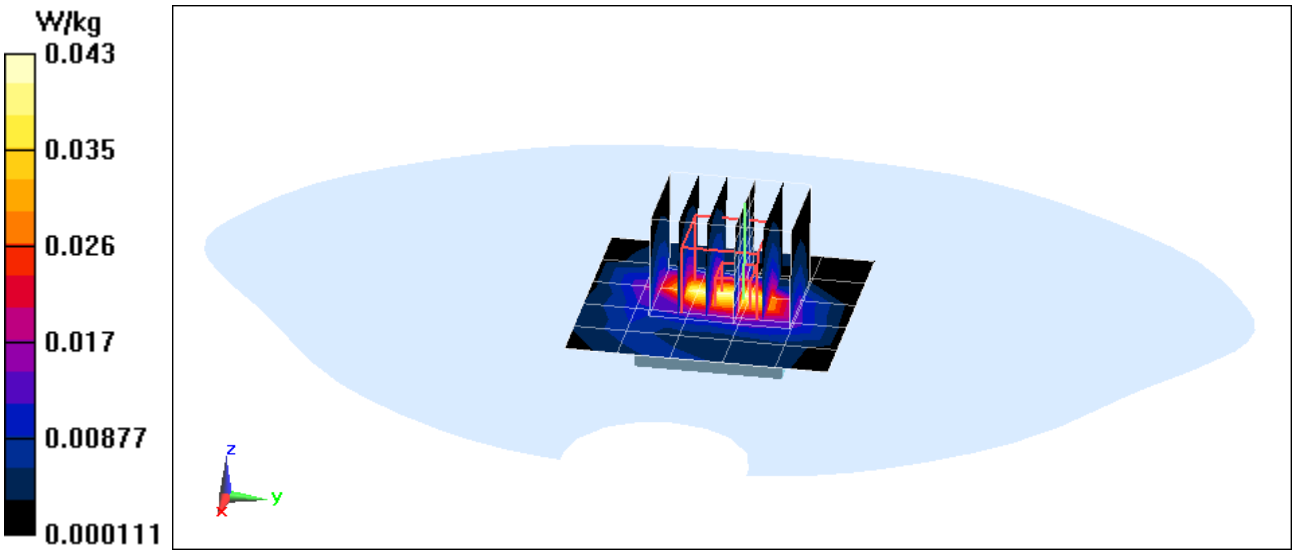
Communication System: UID 0, LTE Band 5; Frequency: 836.5 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.5 MHz; $\sigma$ = 1.007 S/m; $\varepsilon_r$ = 54.46; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 07-04-2017; Ambient Temp: 21.8°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN7420; ConvF(9.73, 9.73, 9.73); Calibrated: 11/15/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1449; Calibrated: 9/21/2016
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1793
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: LTE Band 5 (Cell.), Extremity SAR, Back side, Mid.ch, 10 MHz Bandwidth, QPSK, 1 RB, 25 RB Offset, Ceramic, Metal Loop Wristband**

**Area Scan (6x6x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x6x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.737 V/m; Power Drift = 0.16 dB
Peak SAR (extrapolated) = 0.0520 W/kg
**SAR(10 g) = 0.015 W/kg**



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: BCG-A1861; Type: Watch; Serial: FH7TT001J79R**

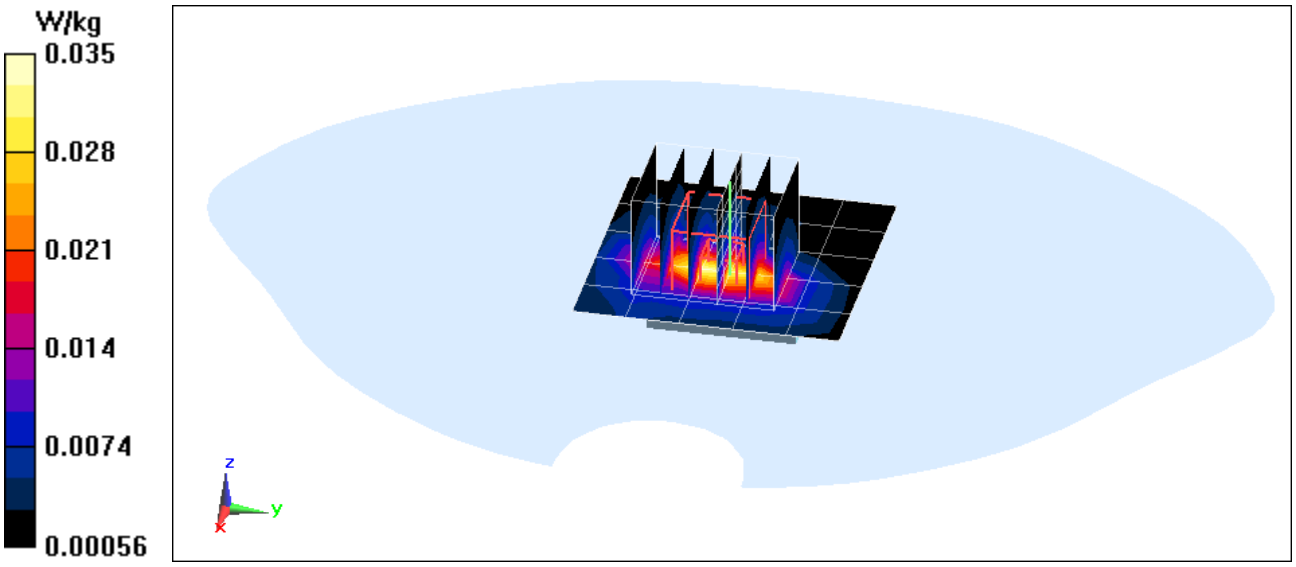
Communication System: UID 0, LTE Band 26; Frequency: 819 MHz; Duty Cycle: 1:1
Medium: 850 Body Medium parameters used (interpolated):
f = 819 MHz; $\sigma$ = 0.974 S/m; $\varepsilon_r$ = 55.577; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 08-21-2017; Ambient Temp: 19.9°C; Tissue Temp: 19.4°C

Probe: ES3DV3 - SN3329; ConvF(6.32, 6.32, 6.32); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1403; Calibrated: 3/10/2017
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1873
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## Mode: LTE Band 26 (Cell.), Extremity SAR, Back side, Low.ch, 10 MHz Bandwidth, QPSK, 1 RB,49 RB Offset, Ceramic, Metal Loop Wristband

**Area Scan (6x6x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x6x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.666 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 0.0500 W/kg
**SAR(10 g) = 0.014 W/kg**



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: BCG-A1861; Type: Watch; Serial: FH7TT003J79R**

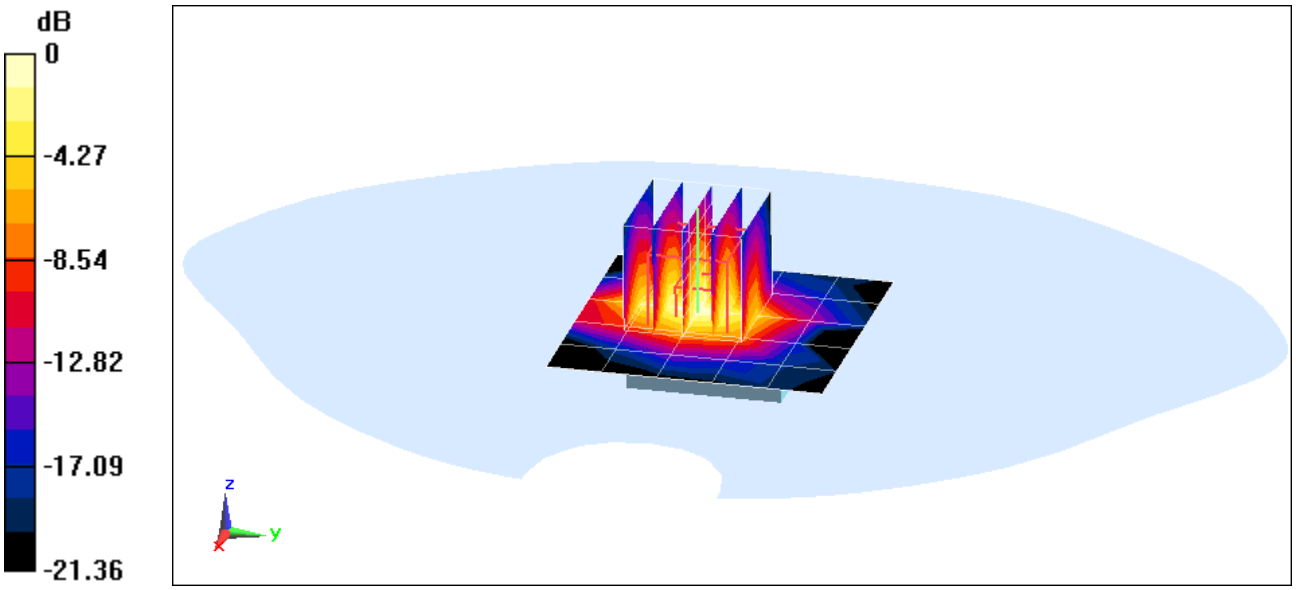
Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1732.5 MHz; $\sigma$ = 1.511 S/m; $\varepsilon_r$ = 52.68; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 07-03-2017; Ambient Temp: 20.2°C; Tissue Temp: 20.0°C

Probe: EX3DV4 - SN7420; ConvF(8.05, 8.05, 8.05); Calibrated: 11/15/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1449; Calibrated: 9/21/2016
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1793
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## Mode: LTE Band 4 (AWS), Extremity SAR, Back side, Mid.ch, 20 MHz Bandwidth, QPSK, 1 RB, 99 RB Offset, Ceramic, Metal Loop Wristband

**Area Scan (6x6x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.59 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 1.04 W/kg
**SAR(10 g) = 0.292 W/kg**




0 dB = 0.885 W/kg = -0.53 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: BCG-A1861; Type: Watch; Serial: FH7TT004J79R**

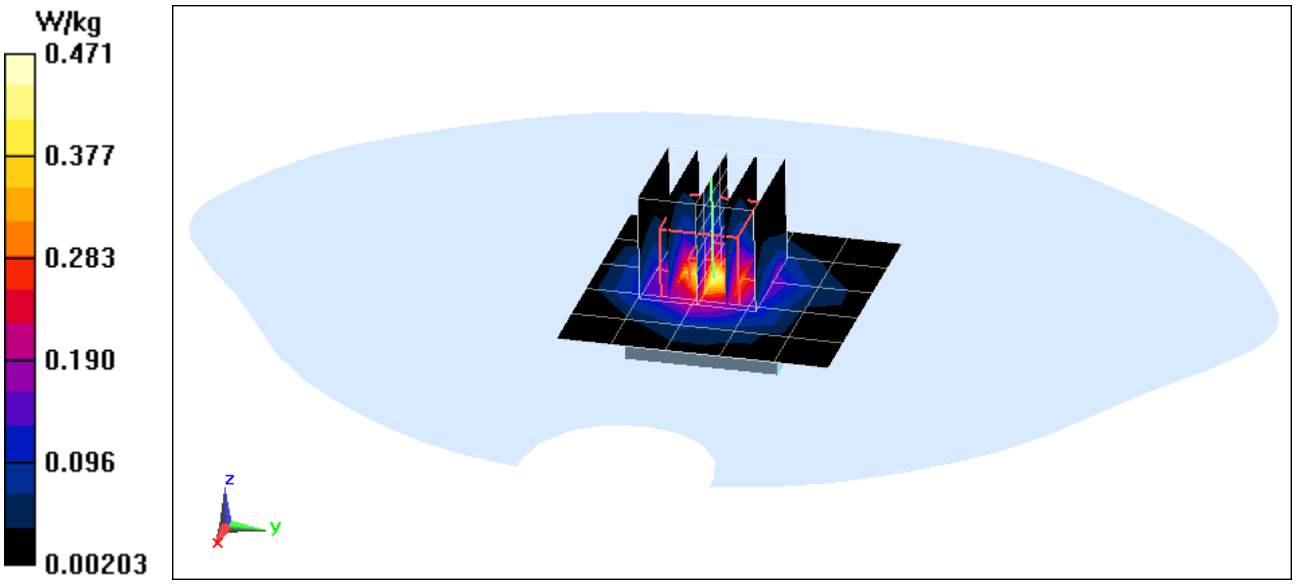
Communication System: UID 0, LTE Band 25 (PCS); Frequency: 1860 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1860 MHz; $\sigma$ = 1.512 S/m; $\varepsilon_r$ = 51.479; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 06-19-2017; Ambient Temp: 19.1°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN7420; ConvF(7.79, 7.79, 7.79); Calibrated: 11/15/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1449; Calibrated: 9/21/2016
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1793
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## Mode: LTE Band 25 (PCS), Extremity SAR, Back side, Low.ch, 20 MHz Bandwidth, QPSK, 1 RB, 99 RB Offset, Ceramic, Sport Wristband

**Area Scan (6x6x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.72 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.550 W/kg
**SAR(10 g) = 0.165 W/kg**



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: BCG-A1861; Type: Watch; Serial: FH7TT00GJ78M**

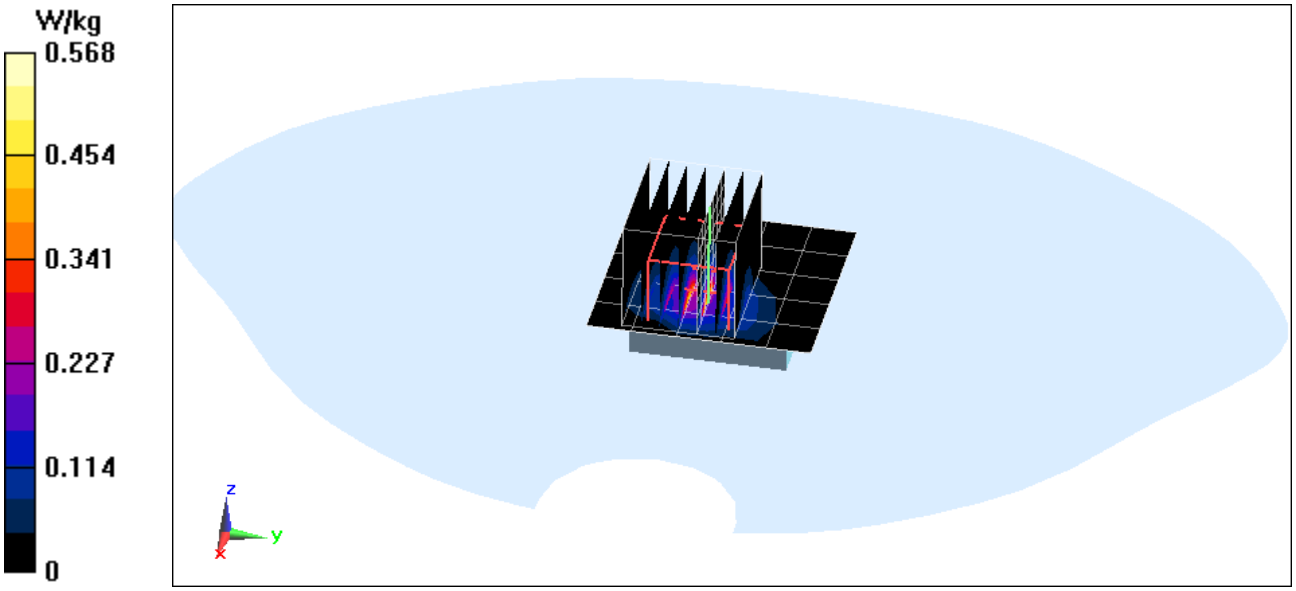
Communication System: UID 0, LTE Band 41; Frequency: 2680 MHz; Duty Cycle: 1:1.58
Medium: 2600 Body Medium parameters used (interpolated):
f = 2680 MHz; $\sigma$ = 2.275 S/m; $\varepsilon_r$ = 50.813; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 06-21-2017; Ambient Temp: 20.0°C; Tissue Temp: 20.9°C

Probe: ES3DV3 - SN3329; ConvF(4.34, 4.34, 4.34); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1403; Calibrated: 3/10/2017
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1873
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: LTE Band 41, Extremity SAR, Back side, High.ch, 20 MHz Bandwidth, QPSK, 1 RB, 99 RB Offset, Aluminum, Sport Wristband**

**Area Scan (6x6x1):** Measurement grid: dx=12mm, dy=12mm
**Zoom Scan (8x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.66 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 0.934 W/kg
**SAR(10 g) = 0.147 W/kg**



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: BCG-A1861; Type: Watch; Serial: FH7TT009J78C**

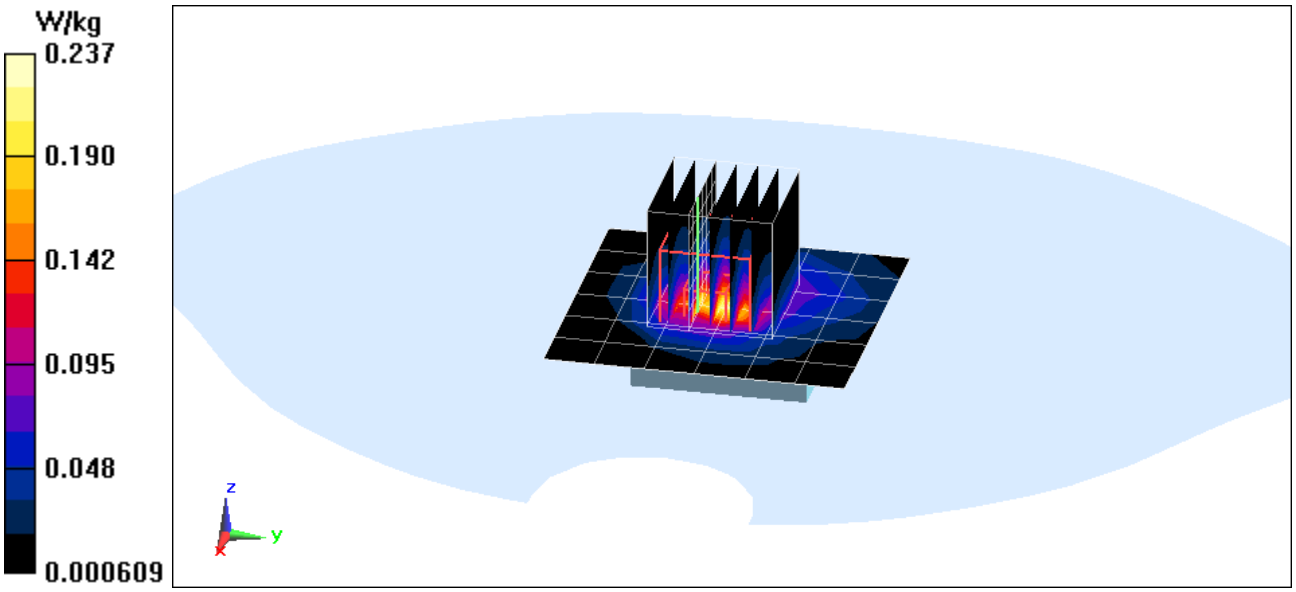
Communication System: UID 0, IEEE 802.11b; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2437 MHz; $\sigma$ = 2.005 S/m; $\varepsilon_r$ = 52.226; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 06-29-2017; Ambient Temp: 19.7°C; Tissue Temp: 20.4°C

Probe: ES3DV3 - SN3347; ConvF(4.53, 4.53, 4.53); Calibrated: 11/11/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 11/15/2016
Phantom: SAM with CRP; Type: SAM; Serial: TP:1792
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## Mode: IEEE 802.11b, 22 MHz Bandwidth, Extremity SAR, Ch 6, 1 Mbps, Back Side, Aluminum, Sport Wristband

**Area Scan (7x7x1):** Measurement grid: dx=12mm, dy=12mm
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.31 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.376 W/kg
**SAR(10 g) = 0.081 W/kg**



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: BCG-A1861; Type: Watch; Serial: FH7TT00GJ78M**

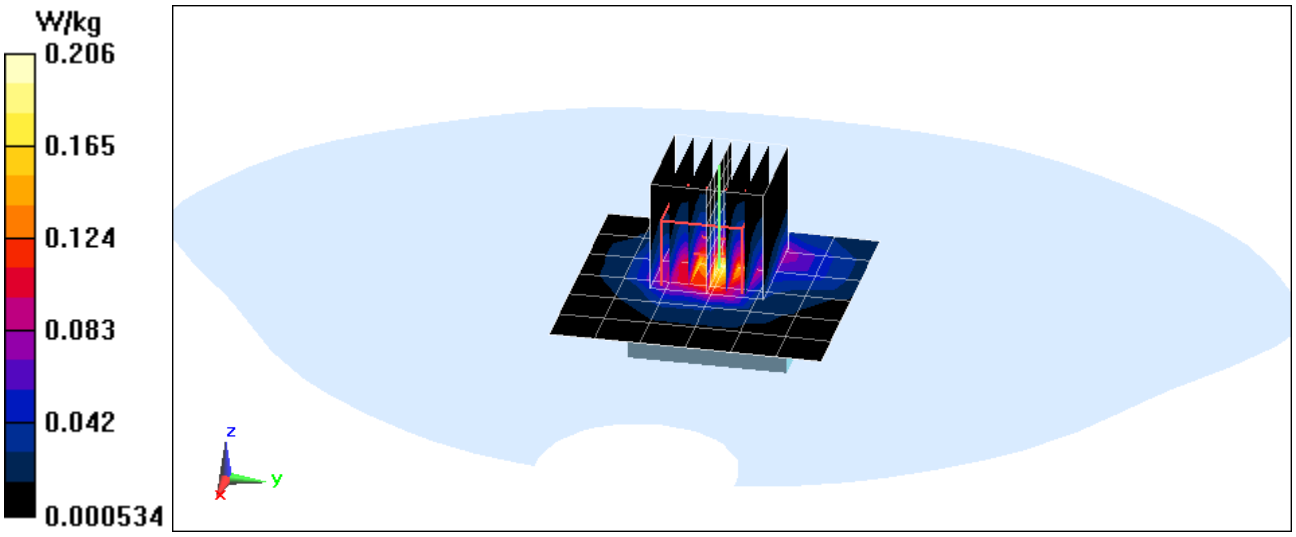
Communication System: UID 0, Bluetooth; Frequency: 2441 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2441 MHz; $\sigma$ = 2.027 S/m; $\varepsilon_r$ = 50.79; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 07-06-2017; Ambient Temp: 20.8°C; Tissue Temp: 20.8°C

Probe: ES3DV3 - SN3347; ConvF(4.53, 4.53, 4.53); Calibrated: 11/11/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 11/15/2016
Phantom: SAM with CRP; Type: SAM; Serial: TP:1792
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## Mode: Bluetooth (ePA), Extremity SAR, Ch 39, 1 Mbps, Back Side, Aluminum, Sport Wristband

**Area Scan (7x7x1):** Measurement grid: dx=12mm, dy=12mm
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.705 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.304 W/kg
**SAR(10 g) = 0.069 W/kg**



**DUT: BCG-A1861; Type: Watch; Serial: FH7TT004J78X**

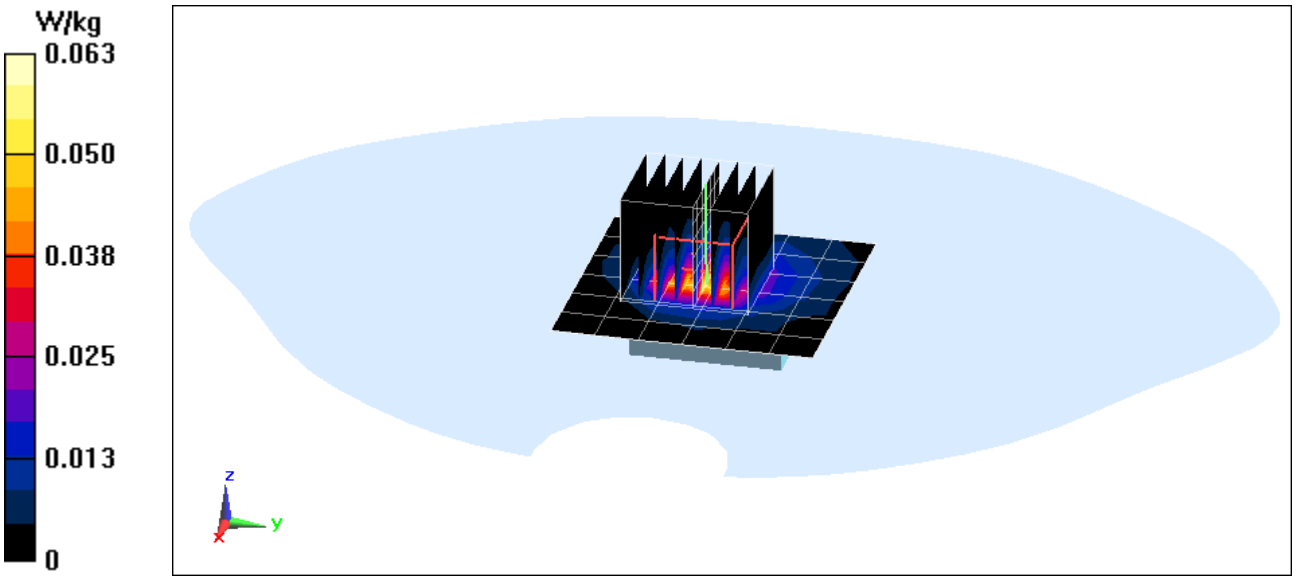
Communication System: UID 0, Bluetooth; Frequency: 2441 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2441 MHz; $\sigma$ = 1.956 S/m; $\varepsilon_r$ = 51.433; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 07-13-2017; Ambient Temp: 21.7°C; Tissue Temp: 22.7°C

Probe: ES3DV3 - SN3118; ConvF(4.29, 4.29, 4.29); Calibrated: 3/16/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1213; Calibrated: 3/8/2017
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1868
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## Mode: Bluetooth (iPA), Extremity SAR, Ch 39, 1 Mbps, Back Side, Aluminum, Sport Wristband

**Area Scan (7x7x1):** Measurement grid: dx=12mm, dy=12mm
**Zoom Scan (7x8x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.338 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 0.0950 W/kg
**SAR(10 g) = 0.019 W/kg**



# APPENDIX B: SYSTEM VERIFICATION

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# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 750 MHz; Type: D750V3; Serial: 1097**

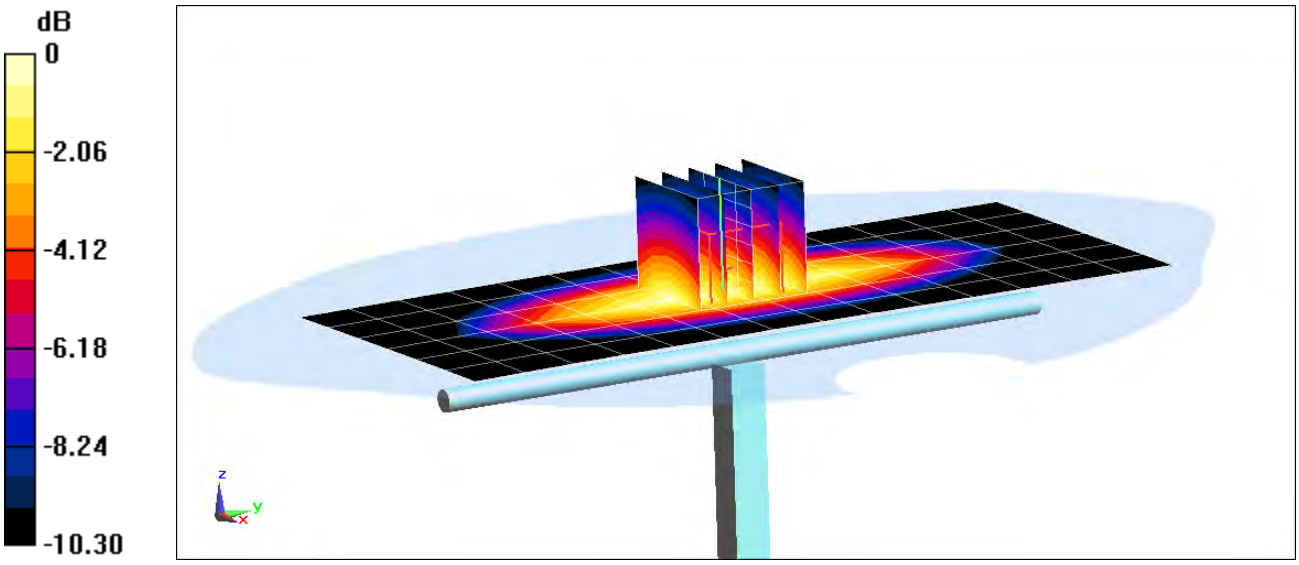
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 Head Medium parameters used (interpolated):
f = 750 MHz; $\sigma$ = 0.892 S/m; $\varepsilon_r$ = 40.869; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 06-26-2017; Ambient Temp: 19.1°C; Tissue Temp: 19.6°C

Probe: ES3DV3 - SN3347; ConvF(6.75, 6.75, 6.75); Calibrated: 11/11/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 11/15/2016
Phantom: SAM with CRP; Type: SAM; Serial: TP:1792
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## 750 MHz System Verification at 23.0 dBm (200 mW)

**Area Scan (7x15x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 2.48 W/kg
**SAR(1 g) = 1.69 W/kg**
Deviation(1 g) = 2.80%




0 dB = 1.98 W/kg = 2.97 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 850 MHz; Type: D850V2; Serial: 1009**

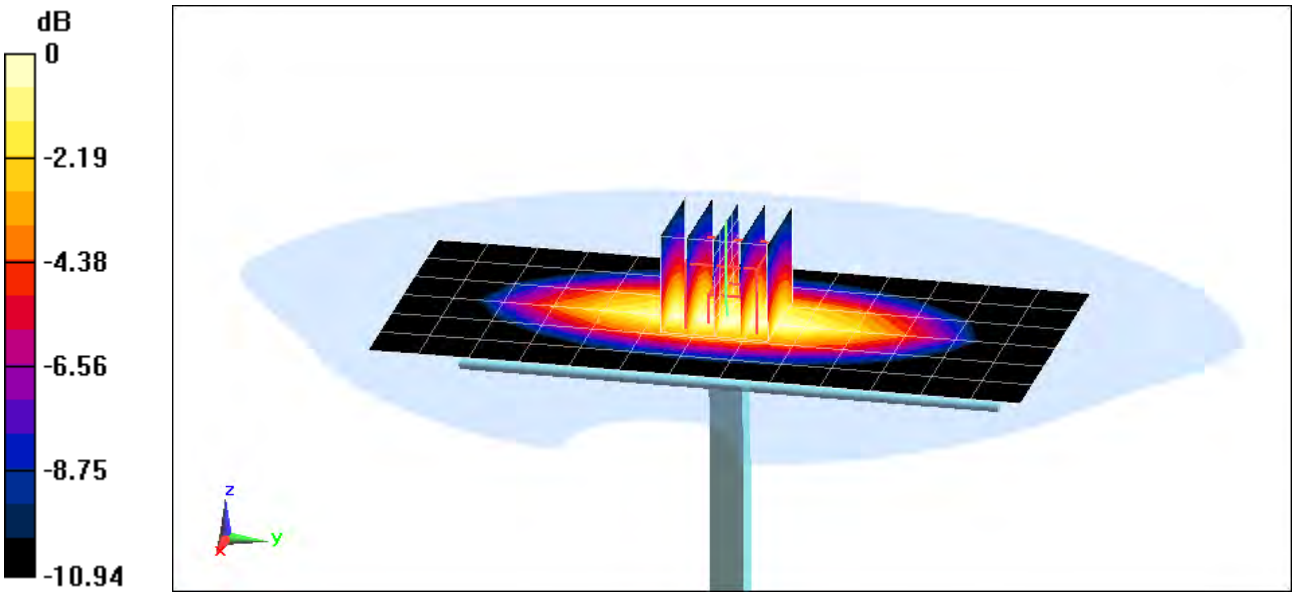
Communication System: UID 0, CW; Frequency: 850 MHz; Duty Cycle: 1:1
Medium: 850 Head Medium parameters used:
f = 850 MHz; $\sigma$ = 0.925 S/m; $\varepsilon_r$ = 40.766; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 06-26-2017; Ambient Temp: 19.5°C; Tissue Temp: 19.3°C

Probe: EX3DV4 - SN7420; ConvF(10.1, 10.1, 10.1); Calibrated: 11/15/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1449; Calibrated: 9/21/2016
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1793
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## 850 MHz System Verification at 23.0 dBm (200 mW)

**Area Scan (7x14x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 3.22 W/kg
**SAR(1 g) = 2.12 W/kg**
Deviation(1 g) = 4.95%




0 dB = 2.85 W/kg = 4.55 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 850 MHz; Type: D850V2; Serial: 1010**

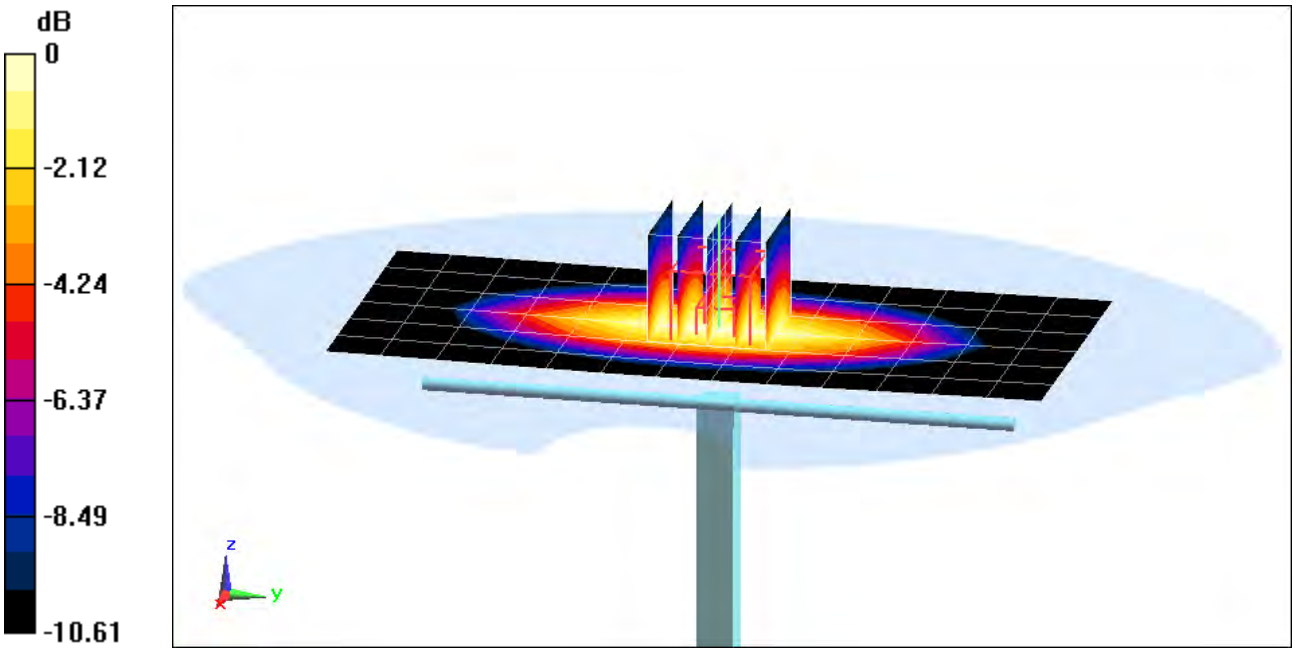
Communication System: UID 0, CW; Frequency: 850 MHz; Duty Cycle: 1:1
Medium: 850 Head Medium parameters used:
f = 850 MHz; $\sigma$ = 0.941 S/m; $\varepsilon_r$ = 42.055; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 07-10-2017; Ambient Temp: 22.0°C; Tissue Temp: 20.4°C

Probe: ES3DV3 - SN3118; ConvF(6.32, 6.32, 6.32); Calibrated: 3/16/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1213; Calibrated: 3/8/2017
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1868
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## 850 MHz System Verification at 23.0 dBm (200 mW)

**Area Scan (7x14x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 3.15 W/kg
**SAR(1 g) = 2.09 W/kg**
Deviation(1 g) = 7.95%




0 dB = 2.46 W/kg = 3.91 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1104**

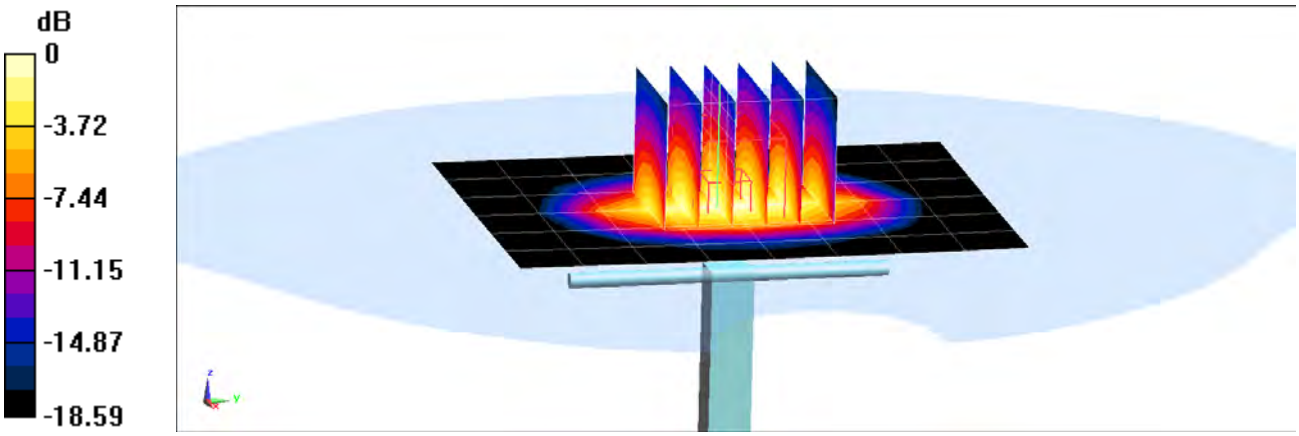
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used:
f = 1750 MHz; $\sigma$ = 1.357 S/m; $\varepsilon_r$ = 39.986; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-26-2017; Ambient Temp: 20.9°C; Tissue Temp: 21.8°C

Probe: ES3DV3 - SN3118; ConvF(5.21, 5.21, 5.21); Calibrated: 03/16/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1213; Calibrated: 03/08/2017
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1868
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## 1750 MHz System Verification at 20.0 dBm (100 mW)

**Area Scan (7x9x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x6x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 6.52 W/kg
**SAR(1 g) = 3.57 W/kg**
Deviation(1 g) = -0.83%




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

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1104**

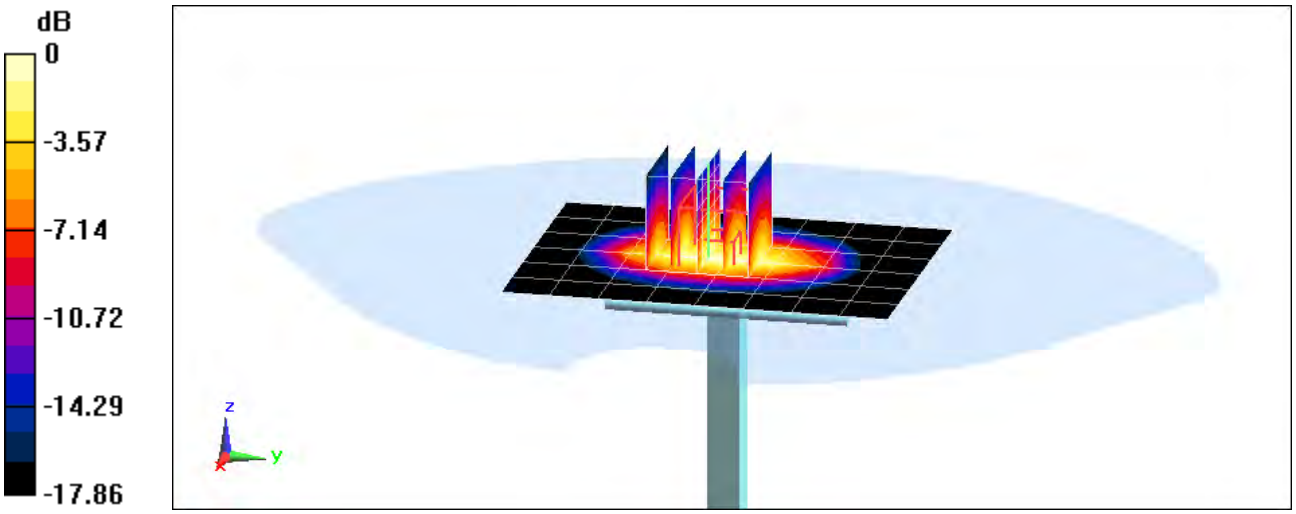
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used:
f = 1750 MHz; $\sigma$ = 1.364 S/m; $\varepsilon_r$ = 38.813; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-13-2017; Ambient Temp: 21.5°C; Tissue Temp: 21.6°C

Probe: ES3DV3 - SN3347; ConvF(5.43, 5.43, 5.43); Calibrated: 11/11/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 11/15/2016
Phantom: SAM with CRP; Type: SAM; Serial: TP:1792
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## 1750 MHz System Verification at 20.0 dBm (100 mW)

**Area Scan (7x9x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 6.21 W/kg
**SAR(1 g) = 3.43 W/kg**
Deviation(1 g) = -4.72%




0 dB = 4.27 W/kg = 6.30 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d181**

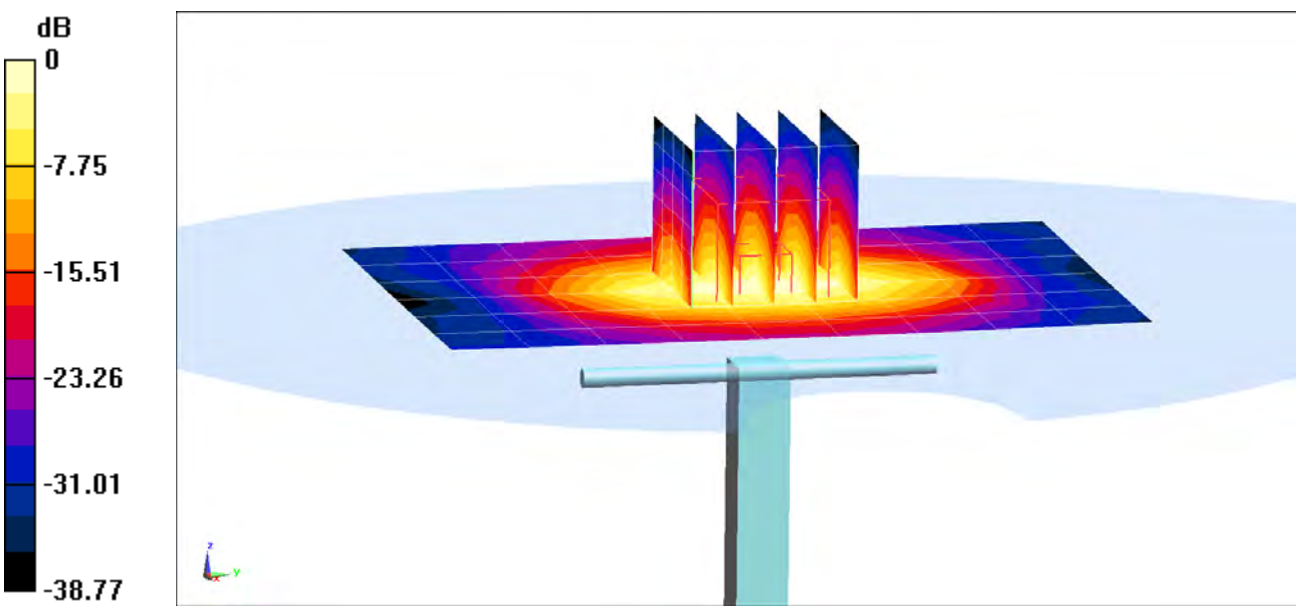
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1900 MHz; $\sigma$ = 1.439 S/m; $\varepsilon_r$ = 38.681; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-22-2017; Ambient Temp: 20.7°C; Tissue Temp: 20.9°C

Probe: ES3DV3 - SN3118; ConvF(5.05, 5.05, 5.05); Calibrated: 03/16/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1213; Calibrated: 03/08/2017
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1868
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## 1900 MHz System Verification at 20.0 dBm (100 mW)

**Area Scan (7x10x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 7.93 W/kg
**SAR(1 g) = 4.17 W/kg**
Deviation(1 g) = 5.04%




0 dB = 5.57 W/kg = 7.46 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d181**

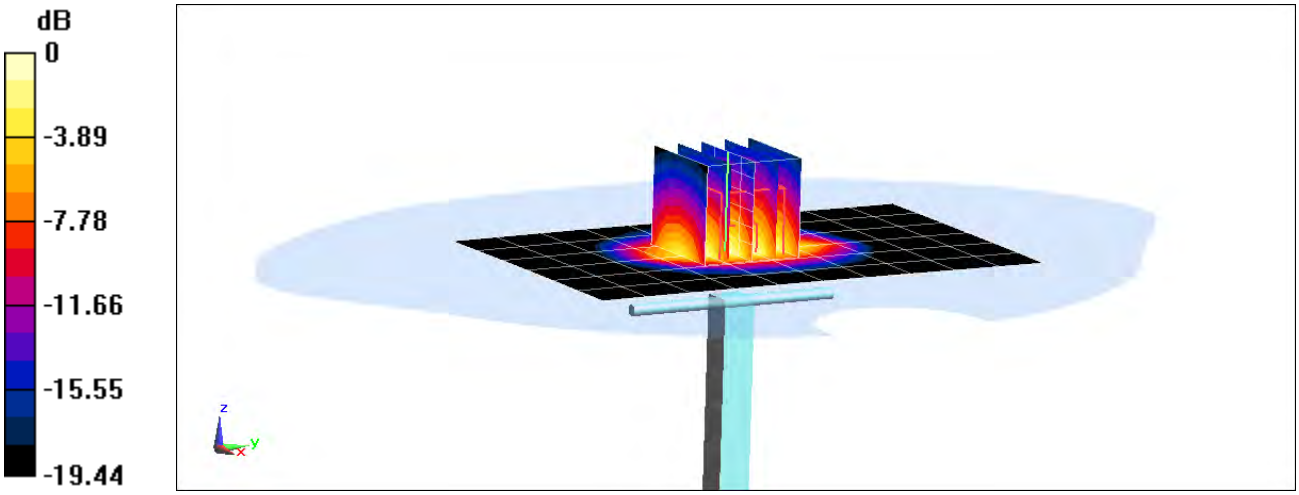
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1900 MHz; $\sigma$ = 1.415 S/m; $\varepsilon_r$ = 39.984; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-03-2017; Ambient Temp: 20.3°C; Tissue Temp: 21.9°C

Probe: EX3DV4 - SN7420; ConvF(8.17, 8.17, 8.17); Calibrated: 11/15/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1449; Calibrated: 09/21/2016
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1793
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## 1900 MHz System Verification at 20.0 dBm (100 mW)

**Area Scan (7x11x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 8.20 W/kg
**SAR(1 g) = 4.21 W/kg**
Deviation(1 g) = 6.05%




0 dB = 6.64 W/kg = 8.22 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 921**

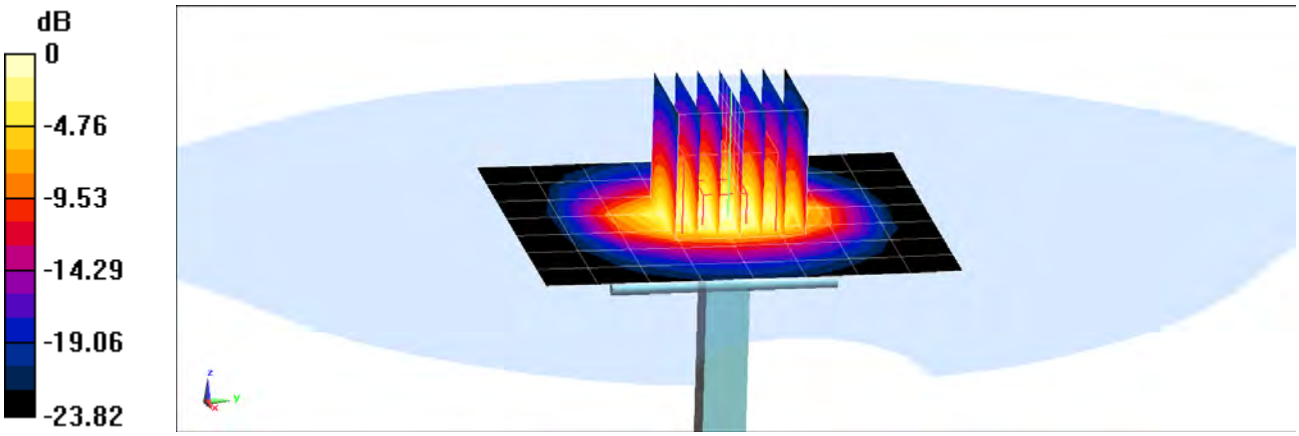
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used:
f = 2450 MHz; $\sigma$ = 1.877 S/m; $\varepsilon_r$ = 39.507; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-03-2017; Ambient Temp: 21.7°C; Tissue Temp: 23.5°C

Probe: ES3DV3 - SN3118; ConvF(4.37, 4.37, 4.37); Calibrated: 03/16/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1213; Calibrated: 03/08/2017
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1868
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## 2450 MHz System Verification at 20.0 dBm (100 mW)

**Area Scan (8x9x1):** Measurement grid: dx=12mm, dy=12mm
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 11.4 W/kg
**SAR(1 g) = 5.27 W/kg**
Deviation(1 g) = 1.15%




0 dB = 6.99 W/kg = 8.44 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 921**

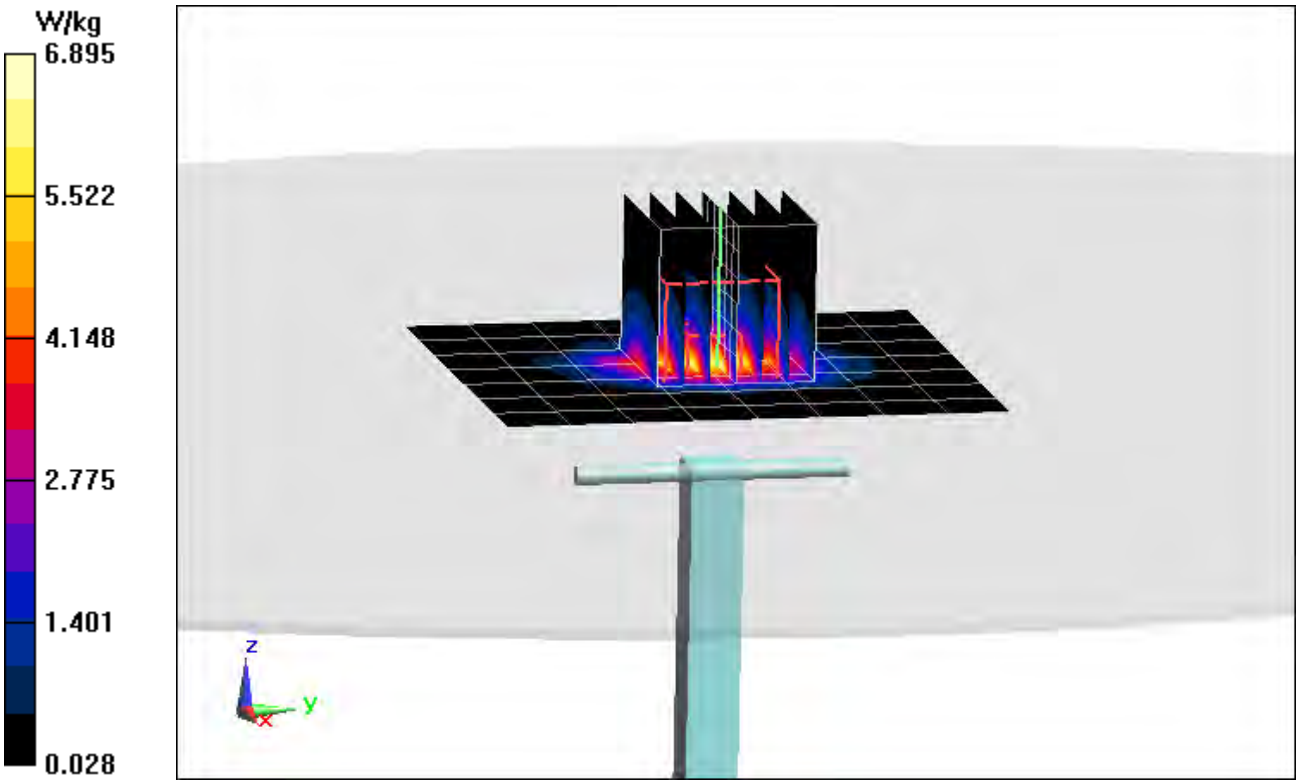
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used:
f = 2450 MHz; $\sigma$ = 1.875 S/m; $\varepsilon_r$ = 39.584; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-12-2017; Ambient Temp: 21.5°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3329; ConvF(4.71, 4.71, 4.71); Calibrated: 03/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1403; Calibrated: 03/10/2017
Phantom: ELI v6.0; Type: QDOVA003AA; Serial: TP:2003
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## 2450 MHz System Verification at 20.0 dBm (100 mW)

**Area Scan (8x9x1):** Measurement grid: dx=12mm, dy=12mm
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 11.5 W/kg
**SAR(1 g) = 5.22 W/kg**
Deviation(1 g) = 0.19%



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 2600 MHz; Type: D2600V2; Serial: 1069**

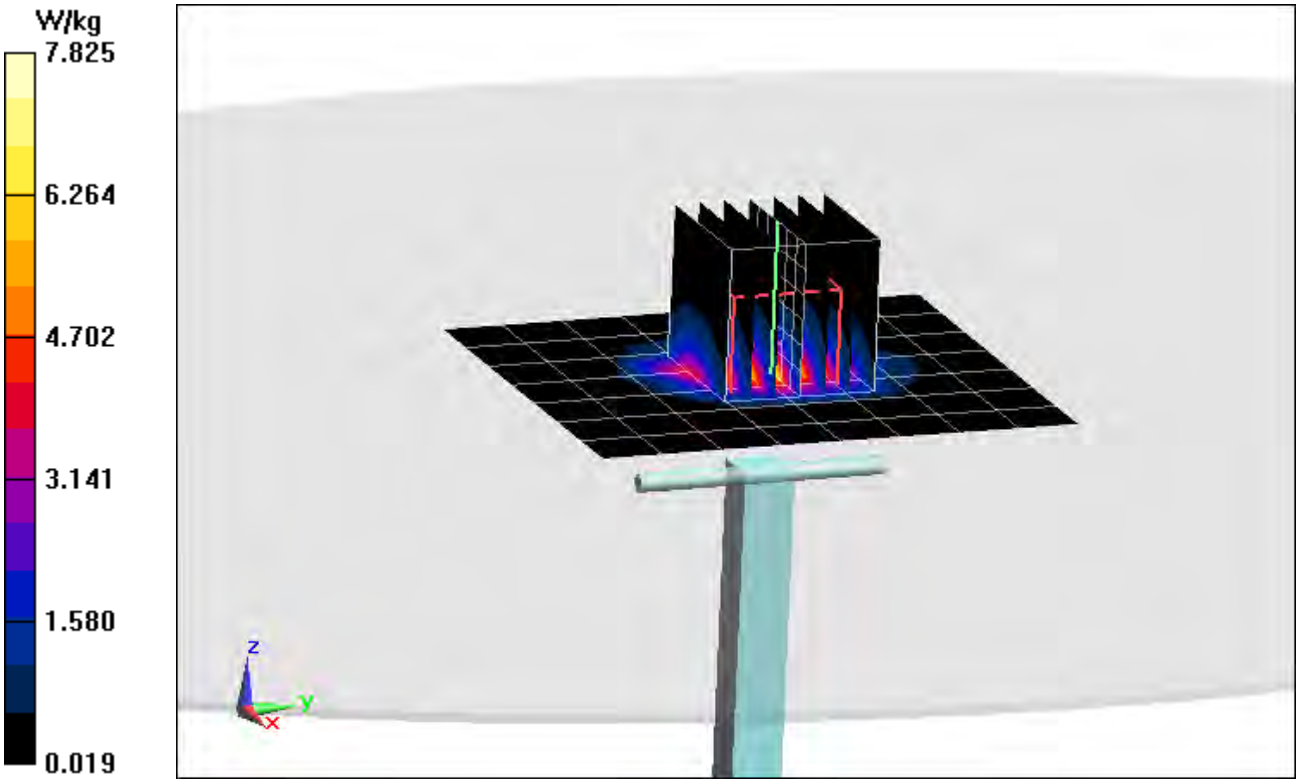
Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1
Medium: 2600 Head Medium parameters used:
f = 2600 MHz; $\sigma$ = 2.017 S/m; $\varepsilon_r$ = 38.071; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-28-2017; Ambient Temp: 22.0°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3329; ConvF(4.54, 4.54, 4.54); Calibrated: 03/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1403; Calibrated: 03/10/2017
Phantom: ELI v6.0; Type: QDOVA003AA; Serial: TP:2003
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## 2600 MHz System Verification at 20.0 dBm (100 mW)

**Area Scan (8x9x1):** Measurement grid: dx=12mm, dy=12mm
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 13.3 W/kg
**SAR(1 g) = 6.07 W/kg**
Deviation(1 g) = 7.82%



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 750 MHz; Type: D750V3; Serial: 1097**

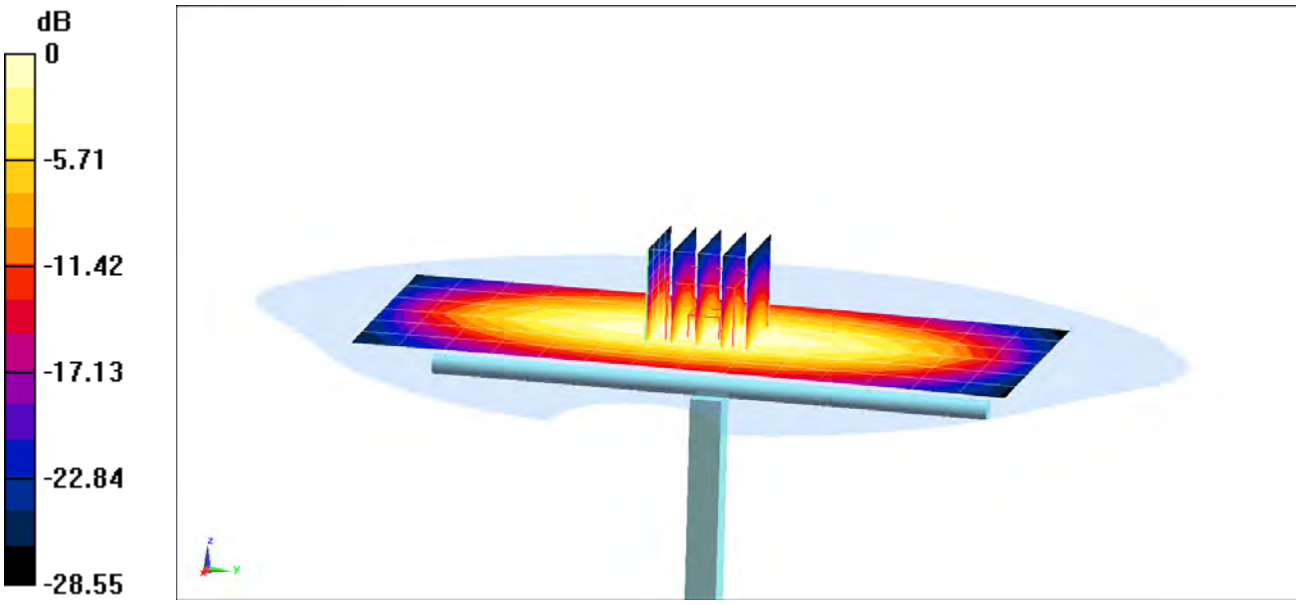
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 750 MHz; $\sigma$ = 0.972 S/m; $\varepsilon_r$ = 54.091; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 06-20-2017; Ambient Temp: 19.0°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3347; ConvF(6.47, 6.47, 6.47); Calibrated: 11/11/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 11/15/2016
Phantom: SAM with CRP; Type: SAM; Serial: TP:1792
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## 750 MHz System Verification at 23.0 dBm (200 mW)

**Area Scan (7x15x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 2.51 W/kg
**SAR(10 g) = 1.15 W/kg**
Deviation(10 g) = 1.05%




0 dB = 2.01 W/kg = 3.04 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 850 MHz; Type: D850V2; Serial: 1009**

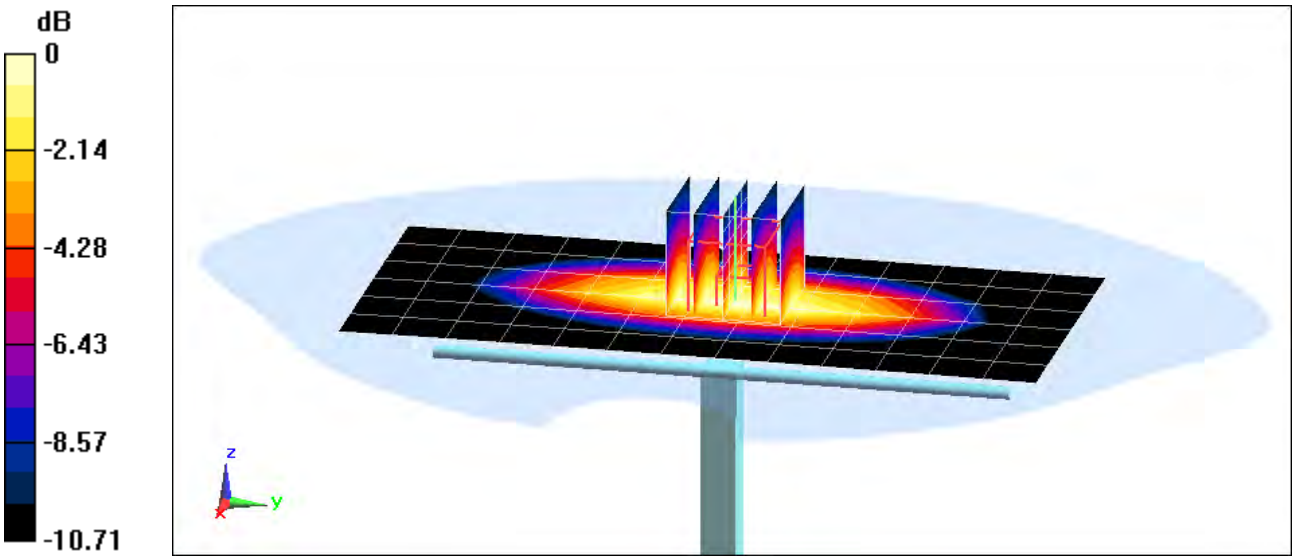
Communication System: UID 0, CW; Frequency: 850 MHz; Duty Cycle: 1:1
Medium: 850 Body Medium parameters used:
f = 850 MHz; $\sigma$ = 1.023 S/m; $\varepsilon_r$ = 54.779; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 06-21-2017; Ambient Temp: 20.0°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN7420; ConvF(9.73, 9.73, 9.73); Calibrated: 11/15/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1449; Calibrated: 9/21/2016
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1793
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## 850 MHz System Verification at 23.0 dBm (200 mW)

**Area Scan (7x14x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 3.20 W/kg
**SAR(10 g) = 1.37 W/kg**
Deviation(10 g) = 6.53%




0 dB = 2.82 W/kg = 4.50 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 850 MHz; Type: D850V2; Serial: 1010**

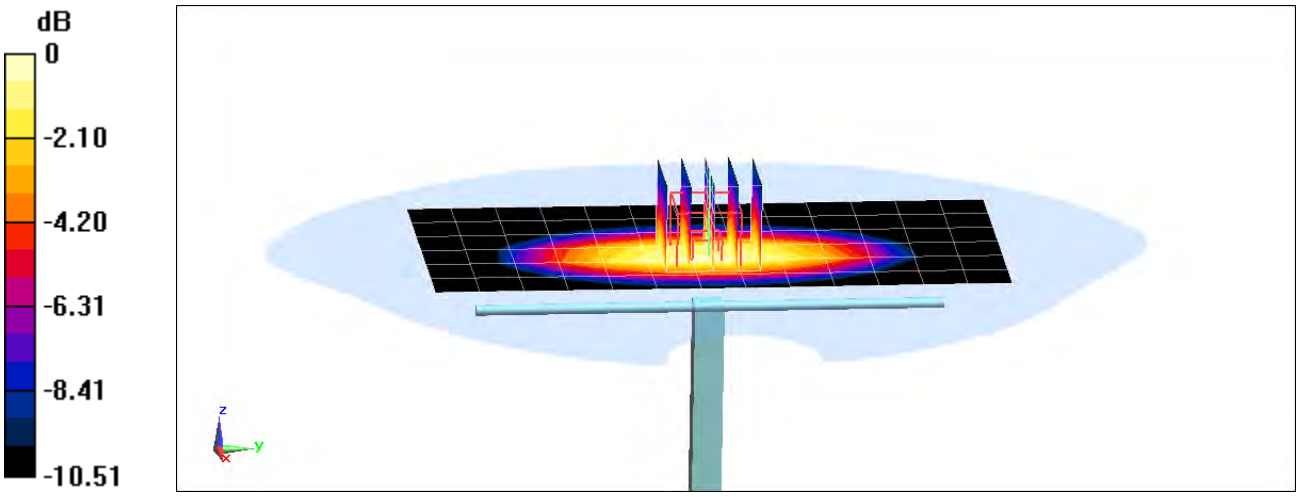
Communication System: UID 0, CW; Frequency: 850 MHz; Duty Cycle: 1:1
Medium: 850 Body Medium parameters used:
f = 850 MHz; $\sigma$ = 1.014 S/m; $\varepsilon_r$ = 55.089; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 08-21-2017; Ambient Temp: 19.9°C; Tissue Temp: 19.4°C

Probe: ES3DV3 - SN3329; ConvF(6.32, 6.32, 6.32); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1403; Calibrated: 3/10/2017
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1873
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## 850 MHz System Verification at 23.0 dBm (200 mW)

**Area Scan (7x14x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 3.08 W/kg
**SAR(10 g) = 1.38 W/kg**
Deviation(10 g) = 5.02%




0 dB = 2.46 W/kg = 3.91 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1104**

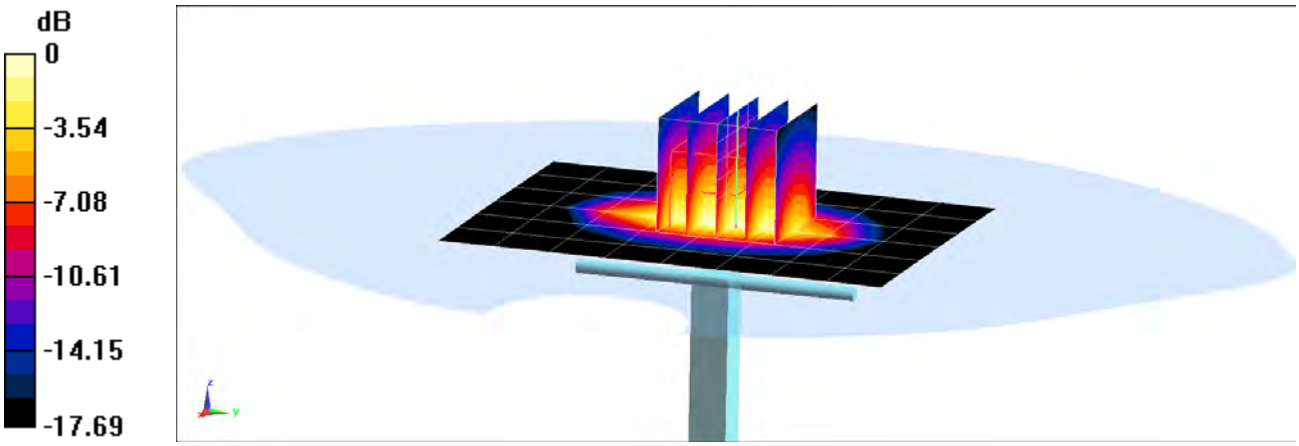
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used:
f = 1750 MHz; $\sigma$ = 1.532 S/m; $\varepsilon_r$ = 52.612; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-03-2017; Ambient Temp: 20.2°C; Tissue Temp: 20.0°C

Probe: EX3DV4 - SN7420; ConvF(8.05, 8.05, 8.05); Calibrated: 11/15/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1449; Calibrated: 9/21/2016
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1793
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## 1750 MHz System Verification at 20.0 dBm (100 mW)

**Area Scan (7x9x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 6.81 W/kg
**SAR(10 g) = 1.95 W/kg**
Deviation(10 g) = 1.04%




0 dB = 5.60 W/kg = 7.48 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d181**

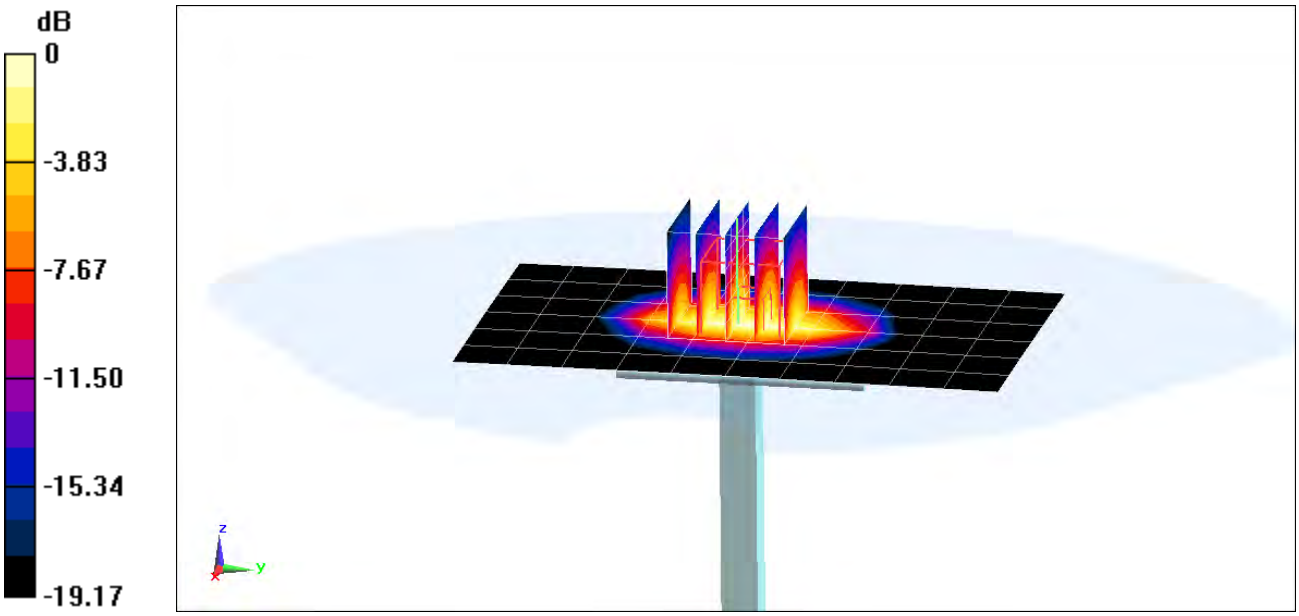
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; $\sigma$ = 1.553 S/m; $\varepsilon_r$ = 51.337; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-19-2017; Ambient Temp: 19.1°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN7420; ConvF(7.79, 7.79, 7.79); Calibrated: 11/15/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1449; Calibrated: 9/21/2016
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1793
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## 1900 MHz System Verification at 20.0 dBm (100 mW)

**Area Scan (7x11x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 7.48 W/kg
**SAR(10 g) = 2.04 W/kg**
Deviation(10 g) = -2.39%




0 dB = 6.14 W/kg = 7.88 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 921**

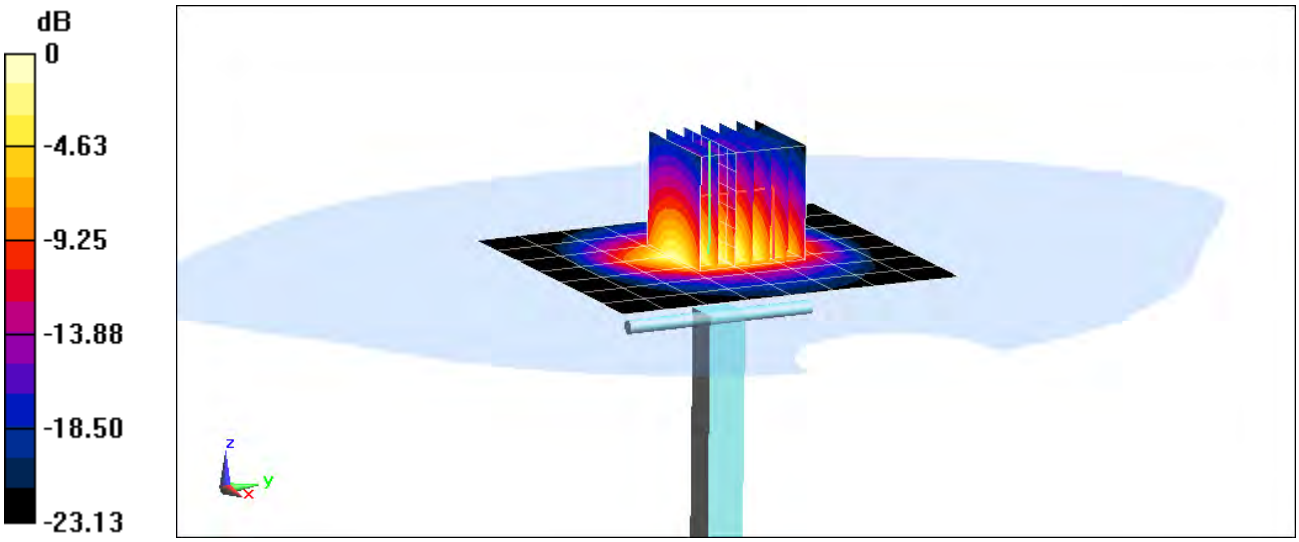
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used:
f = 2450 MHz; $\sigma$ = 2.023 S/m; $\varepsilon_r$ = 52.166; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-29-2017; Ambient Temp: 19.7°C; Tissue Temp: 20.4°C

Probe: ES3DV3 - SN3347; ConvF(4.53, 4.53, 4.53); Calibrated: 11/11/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 11/15/2016
Phantom: SAM with CRP; Type: SAM; Serial: TP:1792
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## 2450 MHz System Verification at 20.0 dBm (100 mW)

**Area Scan (8x9x1):** Measurement grid: dx=12mm, dy=12mm
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 10.8 W/kg
**SAR(10 g) = 2.26 W/kg**
Deviation(10 g) = -5.83%




0 dB = 6.60 W/kg = 8.20 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 921**

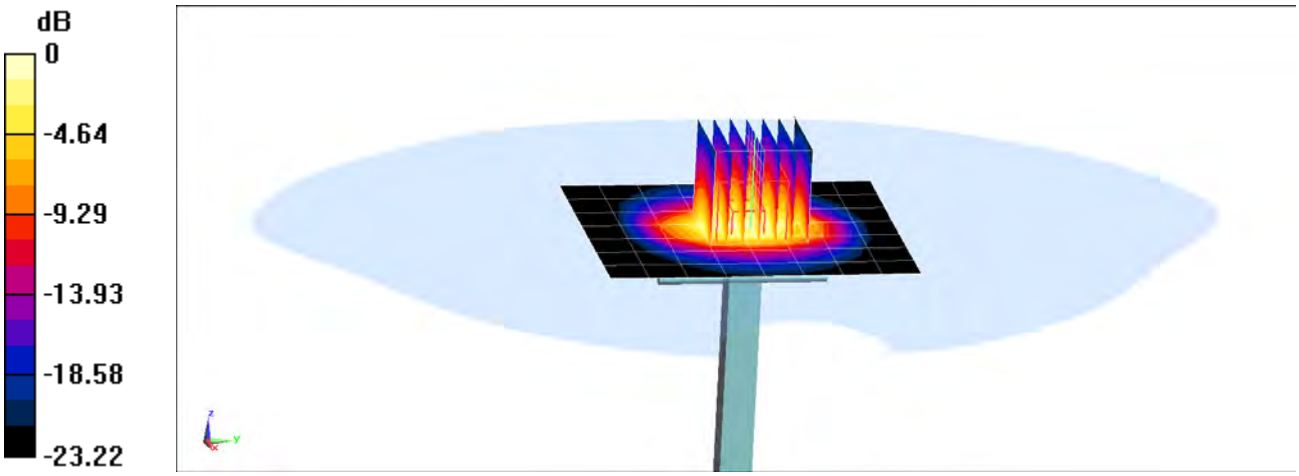
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used:
f = 2450 MHz; $\sigma$ = 1.967 S/m; $\varepsilon_r$ = 51.397; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-13-2017; Ambient Temp: 21.7°C; Tissue Temp: 22.7°C

Probe: ES3DV3 - SN3118; ConvF(4.29, 4.29, 4.29); Calibrated: 03/16/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1213; Calibrated: 03/08/2017
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1868
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## 2450 MHz System Verification at 20.0 dBm (100 mW)

**Area Scan (8x9x1):** Measurement grid: dx=12mm, dy=12mm
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 11.8 W/kg
**SAR(10 g) = 2.45 W/kg**
Deviation(10 g) = 2.08%




0 dB = 7.12 W/kg = 8.52 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 2600 MHz; Type: D2600V2; Serial: 1069**

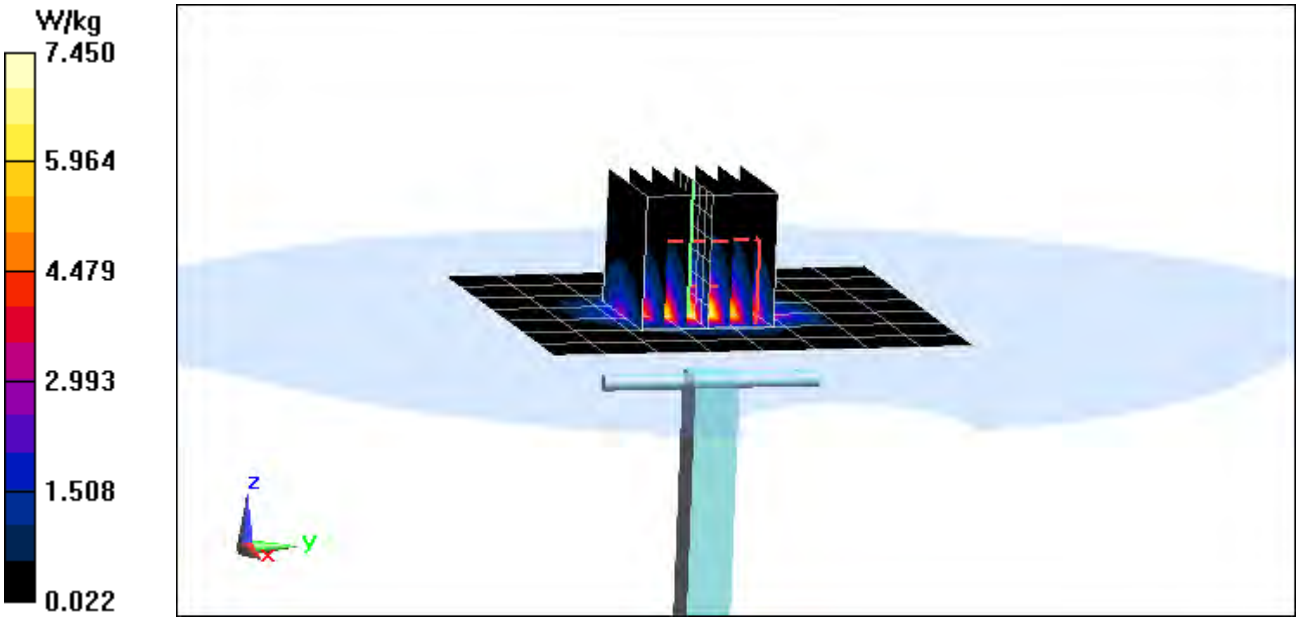
Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1
Medium: 2600 Body Medium parameters used:
f = 2600 MHz; $\sigma$ = 2.164 S/m; $\varepsilon_r$ = 51.094; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-21-2017; Ambient Temp: 20.0°C; Tissue Temp: 20.9°C

Probe: ES3DV3 - SN3329; ConvF(4.34, 4.34, 4.34); Calibrated: 03/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1403; Calibrated: 03/10/2017
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1873
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## 2600 MHz System Verification at 20.0 dBm (100 mW)

**Area Scan (8x9x1):** Measurement grid: dx=12mm, dy=12mm
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 12.7 W/kg
**SAR(10 g) = 2.44 W/kg**
Deviation(10 g) = -2.40%



# APPENDIX C: PROBE CALIBRATION

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

**S** Schweizerischer Kalibrierdienst
**C** Service suisse d'étalonnage
Servizio svizzero di taratura
**S** Swiss Calibration Service

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

**Accreditation No.: SCS 0108**

**Client** **PC Test**

**Certificate No: D750V3-1097_Sep16**

# CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | D750V3 - SN:1097 |
| Calibration procedure(s) | QA CAL-05.v9<br>Calibration procedure for dipole validation kits above 700 MHz |
| Calibration date: | September 19, 2016 |

BNV
09-28-2016

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 NRP | SN: 104778 | 06-Apr-16 (No. 217-02288/02289) | Apr-17 |
| Power sensor NRP-Z91 | SN: 103244 | 06-Apr-16 (No. 217-02288) | Apr-17 |
| Power sensor NRP-Z91 | SN: 103245 | 06-Apr-16 (No. 217-02289) | Apr-17 |
| Reference 20 dB Attenuator | SN: 5058 (20k) | 05-Apr-16 (No. 217-02292) | Apr-17 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 05-Apr-16 (No. 217-02295) | Apr-17 |
| Reference Probe EX3DV4 | SN: 7349 | 15-Jun-16 (No. EX3-7349_Jun16) | Jun-17 |
| DAE4 | SN: 601 | 30-Dec-15 (No. DAE4-601_Dec15) | Dec-16 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---|---|---|---|
| Power meter EPM-442A | SN: GB37480704 | 07-Oct-15 (No. 217-02222) | In house check: Oct-16 |
| Power sensor HP 8481A | SN: US37292783 | 07-Oct-15 (No. 217-02222) | In house check: Oct-16 |
| Power sensor HP 8481A | SN: MY41092317 | 07-Oct-15 (No. 217-02223) | In house check: Oct-16 |
| RF generator R&S SMT-06 | SN: 100972 | 15-Jun-15 (in house check Jun-15) | In house check: Oct-16 |
| Network Analyzer HP 8753E | SN: US37390585 | 18-Oct-01 (in house check Oct-15) | In house check: Oct-16 |

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

Issued: September 19, 2016

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

## Glossary:

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

## Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) IEC 62209-2, "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)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

## Additional Documentation:

e) DASY4/5 System Handbook

## Methods Applied and Interpretation of Parameters:

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

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

## Measurement Conditions

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

| | | |
|---|---|---|
| **DASY Version** | DASY5 | V52.8.8 |
| **Extrapolation** | Advanced Extrapolation | |
| **Phantom** | Modular Flat Phantom | |
| **Distance Dipole Center - TSL** | 15 mm | with Spacer |
| **Zoom Scan Resolution** | dx, dy, dz = 5 mm | |
| **Frequency** | 750 MHz ± 1 MHz | |

## Head TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Head TSL parameters** | 22.0 °C | 41.9 | 0.89 mho/m |
| **Measured Head TSL parameters** | (22.0 ± 0.2) °C | 41.0 ± 6 % | 0.91 mho/m ± 6 % |
| **Head TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Head TSL

| **SAR averaged over 1 cm³ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 2.10 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **8.22 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 cm³ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 1.37 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **5.39 W/kg ± 16.5 % (k=2)** |

## Body TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Body TSL parameters** | 22.0 °C | 55.5 | 0.96 mho/m |
| **Measured Body TSL parameters** | (22.0 ± 0.2) °C | 55.9 ± 6 % | 0.97 mho/m ± 6 % |
| **Body TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Body TSL

| **SAR averaged over 1 cm³ (1 g) of Body TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 2.17 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **8.63 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 cm³ (10 g) of Body TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 1.43 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **5.69 W/kg ± 16.5 % (k=2)** |

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

### Antenna Parameters with Head TSL

| | |
|---|---|
| Impedance, transformed to feed point | 54.5 Ω - 0.9 jΩ |
| Return Loss | - 27.1 dB |

### Antenna Parameters with Body TSL

| | |
|---|---|
| Impedance, transformed to feed point | 49.9 Ω - 2.4 jΩ |
| Return Loss | - 32.5 dB |

### General Antenna Parameters and Design

| | |
|---|---|
| Electrical Delay (one direction) | 1.030 ns |

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

### Additional EUT Data

| | |
|---|---|
| Manufactured by | SPEAG |
| Manufactured on | July 05, 2013 |

## DASY5 Validation Report for Head TSL

Date: 19.09.2016

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1097**

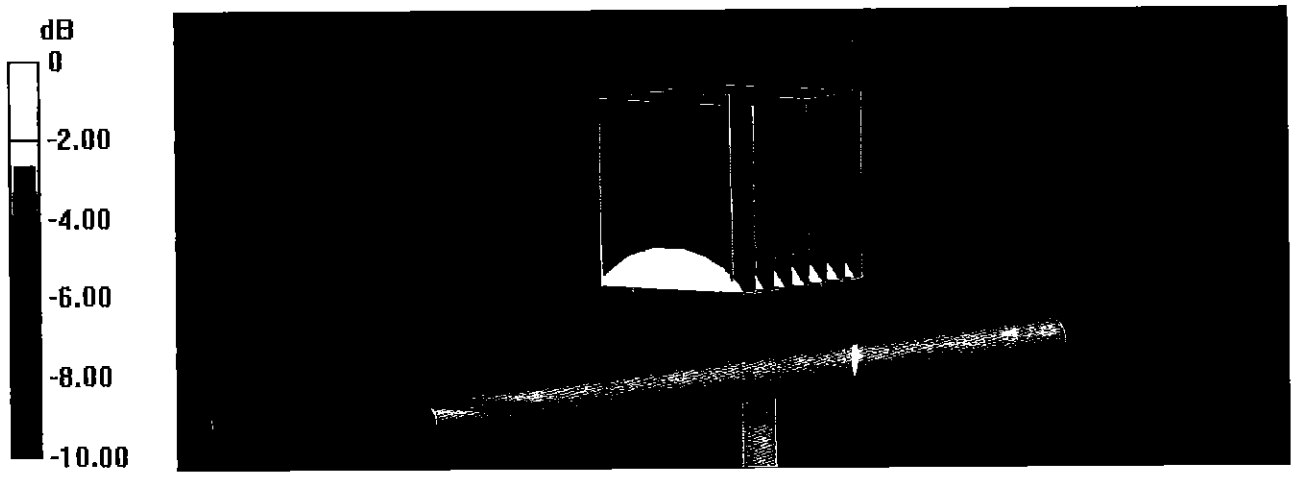
Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; $\sigma$ = 0.91 S/m; $\varepsilon_r$ = 41; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.07, 10.07, 10.07); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

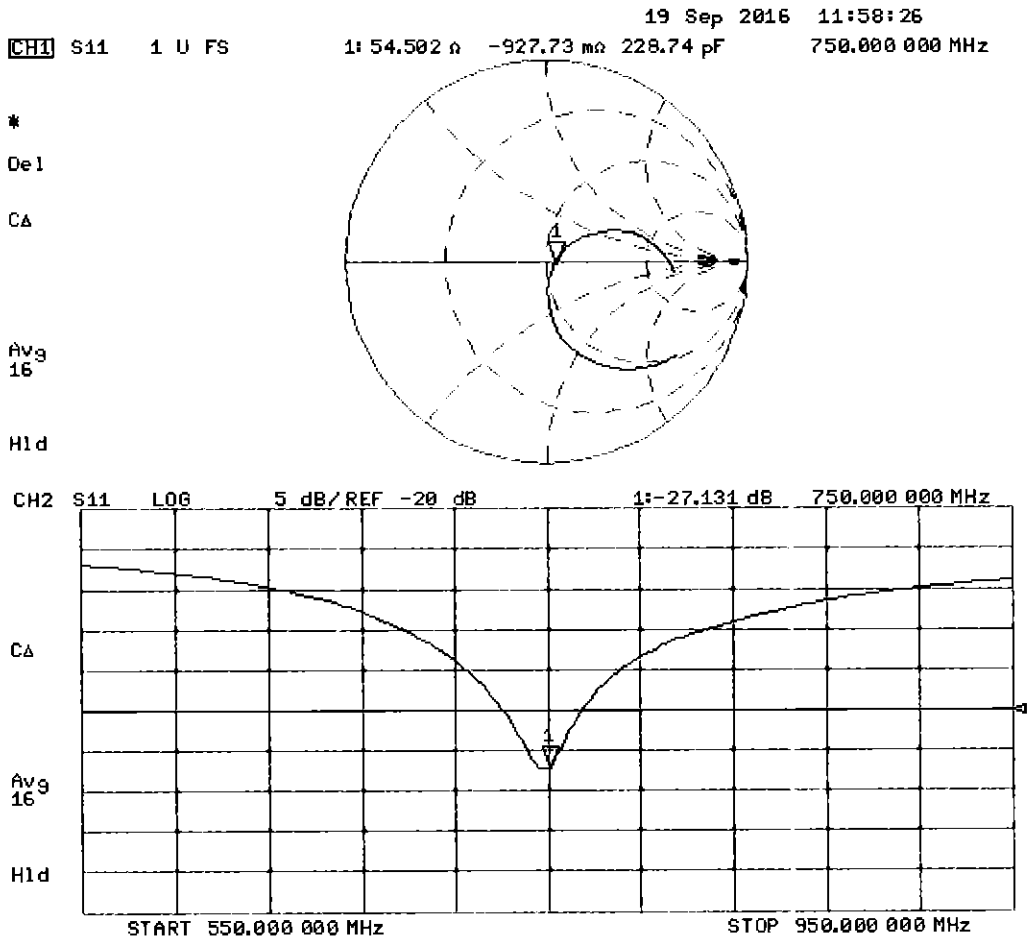
### Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 58.29 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 3.16 W/kg
**SAR(1 g) = 2.1 W/kg; SAR(10 g) = 1.37 W/kg**
Maximum value of SAR (measured) = 2.80 W/kg




0 dB = 2.80 W/kg = 4.47 dBW/kg

## Impedance Measurement Plot for Head TSL



## DASY5 Validation Report for Body TSL

Date: 19.09.2016

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1097**

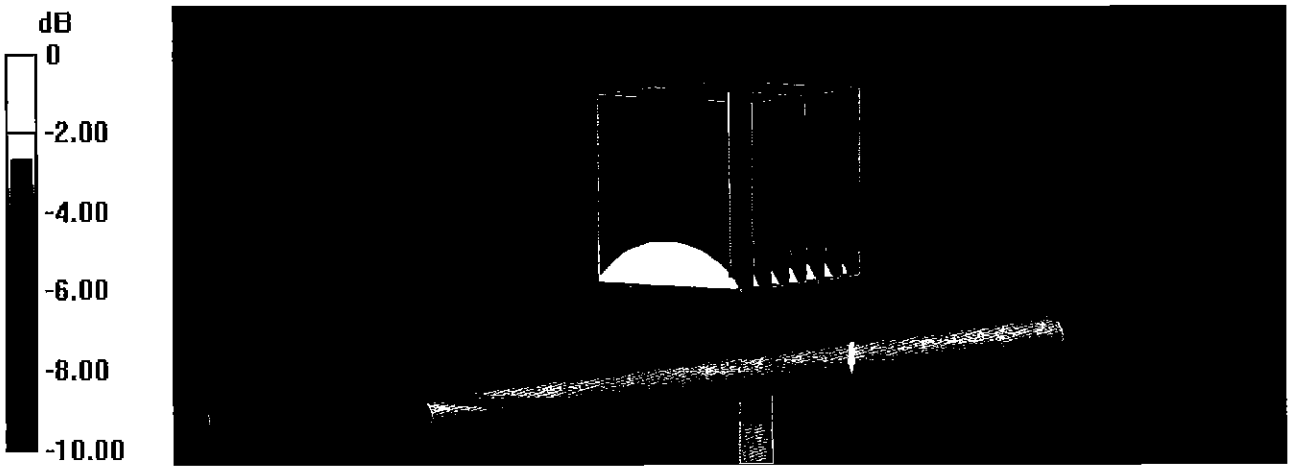
Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; $\sigma$ = 0.97 S/m; $\varepsilon_r$ = 55.9; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.99, 9.99, 9.99); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

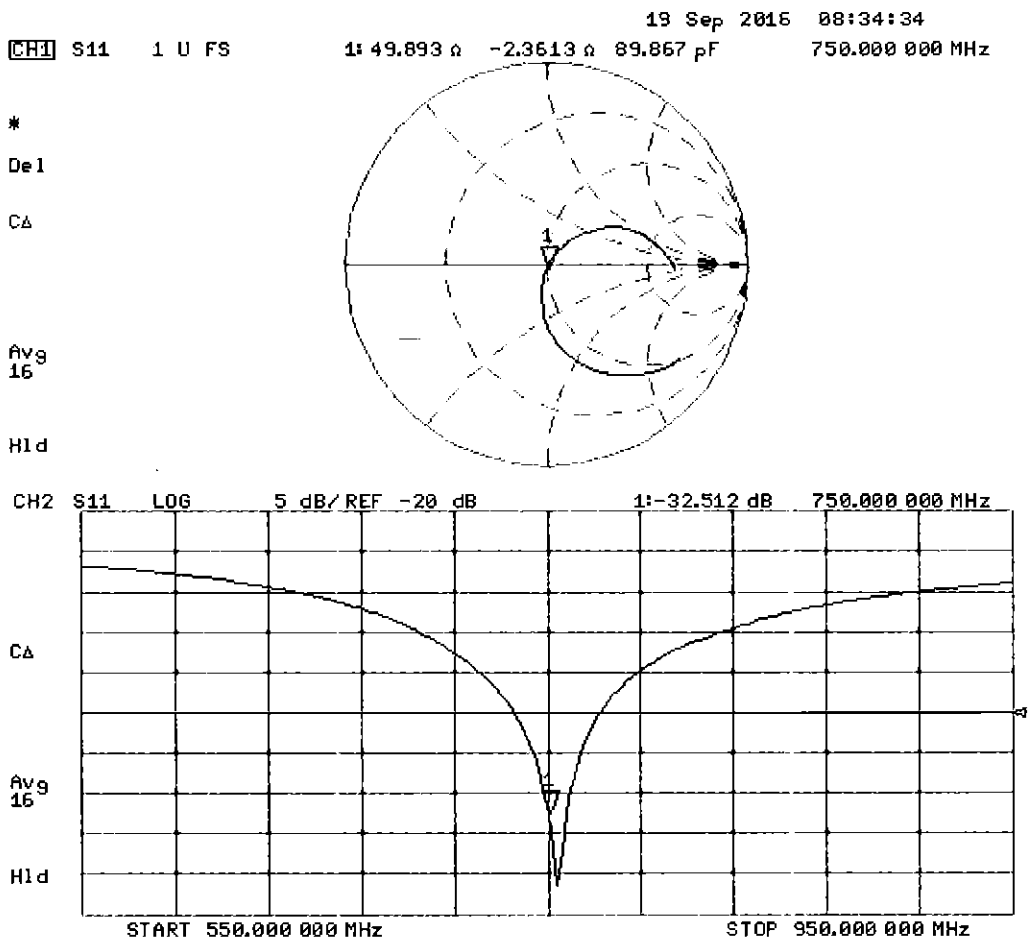
### Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.94 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 3.24 W/kg
**SAR(1 g) = 2.17 W/kg; SAR(10 g) = 1.43 W/kg**
Maximum value of SAR (measured) = 2.86 W/kg




0 dB = 2.86 W/kg = 4.56 dBW/kg

## Impedance Measurement Plot for Body TSL



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

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**C** Service suisse d'étalonnage
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**S** Swiss Calibration Service

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

**Accreditation No.: SCS 0108**

**Client** **PC Test**

**Certificate No: D850V2-1009_Aug16**

# CALIBRATION CERTIFICATE

Object: D850V2 - SN: 1009

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

Calibration date: August 16, 2016

BN ✓
09-01-2016

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 NRP | SN: 104778 | 06-Apr-16 (No. 217-02288/02289) | Apr-17 |
| Power sensor NRP-Z91 | SN: 103244 | 06-Apr-16 (No. 217-02288) | Apr-17 |
| Power sensor NRP-Z91 | SN: 103245 | 06-Apr-16 (No. 217-02289) | Apr-17 |
| Reference 20 dB Attenuator | SN: 5058 (20k) | 05-Apr-16 (No. 217-02292) | Apr-17 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 05-Apr-16 (No. 217-02295) | Apr-17 |
| Reference Probe EX3DV4 | SN: 7349 | 15-Jun-16 (No. EX3-7349_Jun16) | Jun-17 |
| DAE4 | SN: 601 | 30-Dec-15 (No. DAE4-601_Dec15) | Dec-16 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---|---|---|---|
| Power meter EPM-442A | SN: GB37480704 | 07-Oct-15 (No. 217-02222) | In house check: Oct-16 |
| Power sensor HP 8481A | SN: US37292783 | 07-Oct-15 (No. 217-02222) | In house check: Oct-16 |
| Power sensor HP 8481A | SN: MY41092317 | 07-Oct-15 (No. 217-02223) | In house check: Oct-16 |
| RF generator R&S SMT-06 | SN: 100972 | 15-Jun-15 (in house check Jun-15) | In house check: Oct-16 |
| Network Analyzer HP 8753E | SN: US37390585 | 18-Oct-01 (in house check Oct-15) | In house check: Oct-16 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Johannes Kurikka | Laboratory Technician | |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: August 22, 2016

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

## Glossary:

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

## Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) IEC 62209-2, "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)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

## Additional Documentation:

e) DASY4/5 System Handbook

## Methods Applied and Interpretation of Parameters:

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

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

## Measurement Conditions

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

| | | |
|---|---|---|
| **DASY Version** | DASY5 | V52.8.8 |
| **Extrapolation** | Advanced Extrapolation | |
| **Phantom** | Modular Flat Phantom | |
| **Distance Dipole Center - TSL** | 15 mm | with Spacer |
| **Zoom Scan Resolution** | dx, dy, dz = 5 mm | |
| **Frequency** | 850 MHz ± 1 MHz | |

## Head TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Head TSL parameters** | 22.0 °C | 41.5 | 0.92 mho/m |
| **Measured Head TSL parameters** | (22.0 ± 0.2) °C | 42.1 ± 6 % | 0.94 mho/m ± 6 % |
| **Head TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Head TSL

| **SAR averaged over 1 $cm^3$ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 2.56 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **10.1 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 1.65 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **6.53 W/kg ± 16.5 % (k=2)** |

## Body TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Body TSL parameters** | 22.0 °C | 55.2 | 0.99 mho/m |
| **Measured Body TSL parameters** | (22.0 ± 0.2) °C | 54.6 ± 6 % | 1.02 mho/m ± 6 % |
| **Body TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Body TSL

| **SAR averaged over 1 $cm^3$ (1 g) of Body TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 2.53 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **9.87 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Body TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 1.64 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **6.43 W/kg ± 16.5 % (k=2)** |

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

### Antenna Parameters with Head TSL

| | |
|---|---|
| Impedance, transformed to feed point | 51.6 Ω - 4.3 jΩ |
| Return Loss | - 26.8 dB |

### Antenna Parameters with Body TSL

| | |
|---|---|
| Impedance, transformed to feed point | 47.6 Ω - 5.7 jΩ |
| Return Loss | - 23.9 dB |

### General Antenna Parameters and Design

| | |
|---|---|
| Electrical Delay (one direction) | 1.432 ns |

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

### Additional EUT Data

| | |
|---|---|
| Manufactured by | SPEAG |
| Manufactured on | September 04, 2012 |

## DASY5 Validation Report for Head TSL

Date: 16.08.2016

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 850 MHz; Type: D850V2; Serial: D850V2 - SN: 1009**

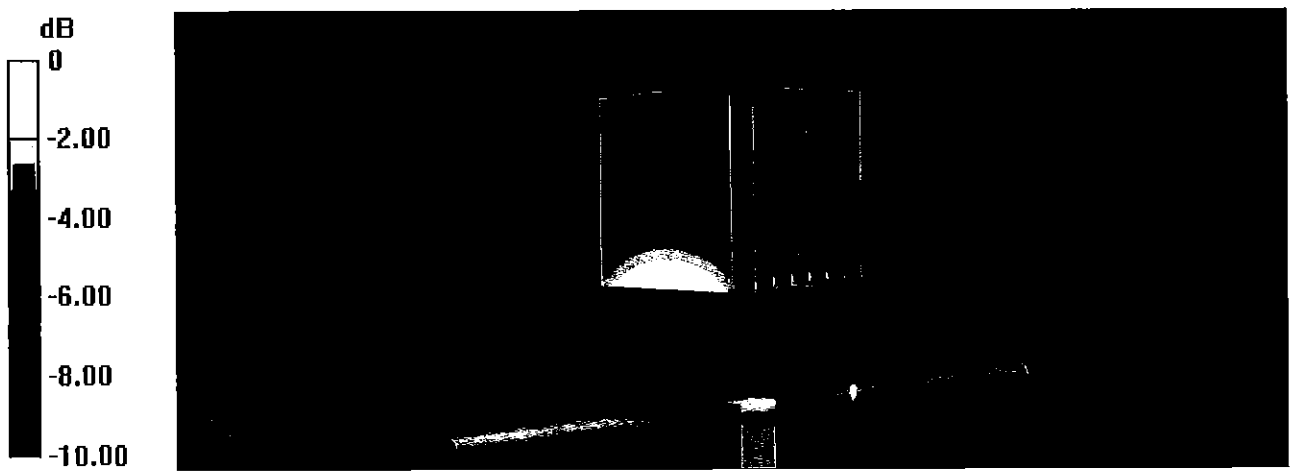
Communication System: UID 0 - CW; Frequency: 850 MHz
Medium parameters used: f = 850 MHz; $\sigma$ = 0.94 S/m; $\varepsilon_r$ = 42.1; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.7, 9.7, 9.7); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

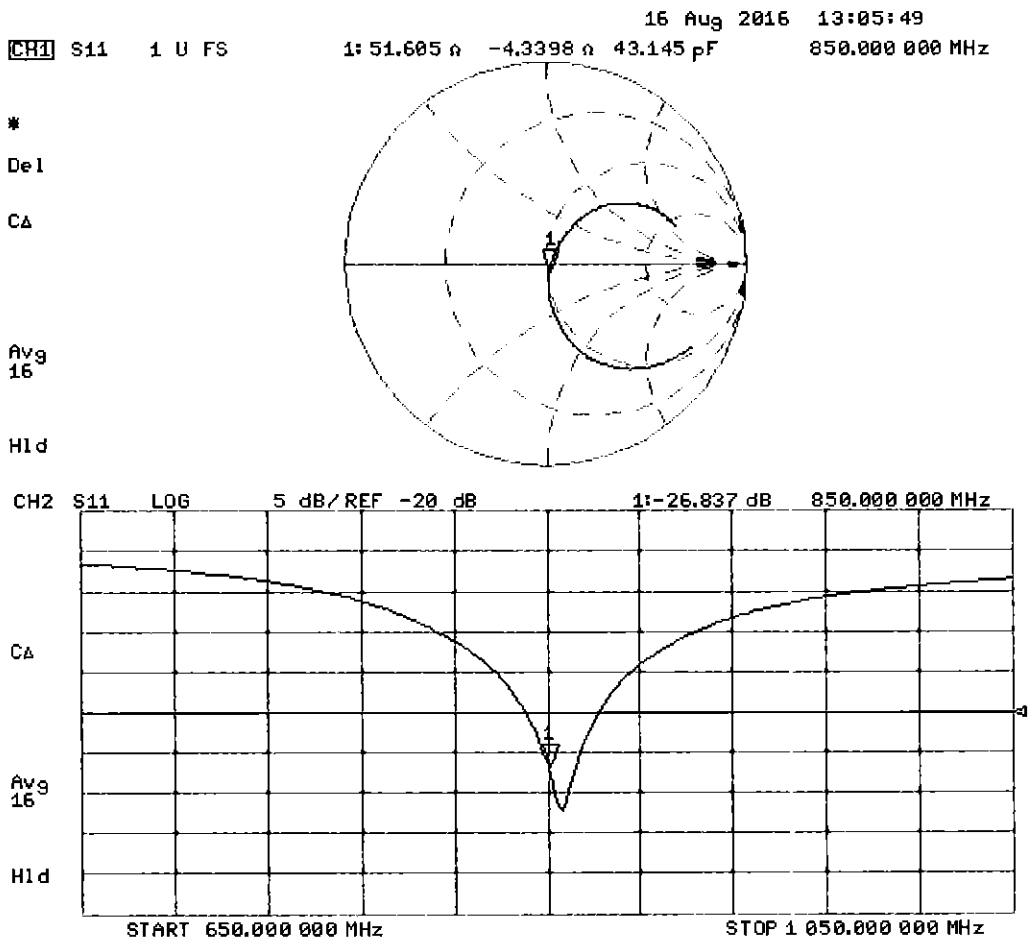
### Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 63.69 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 3.84 W/kg
**SAR(1 g) = 2.56 W/kg; SAR(10 g) = 1.65 W/kg**
Maximum value of SAR (measured) = 3.41 W/kg




0 dB = 3.41 W/kg = 5.33 dBW/kg

## Impedance Measurement Plot for Head TSL



## DASY5 Validation Report for Body TSL

Date: 16.08.2016

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 850 MHz; Type: D850V2; Serial: D850V2 - SN: 1009**

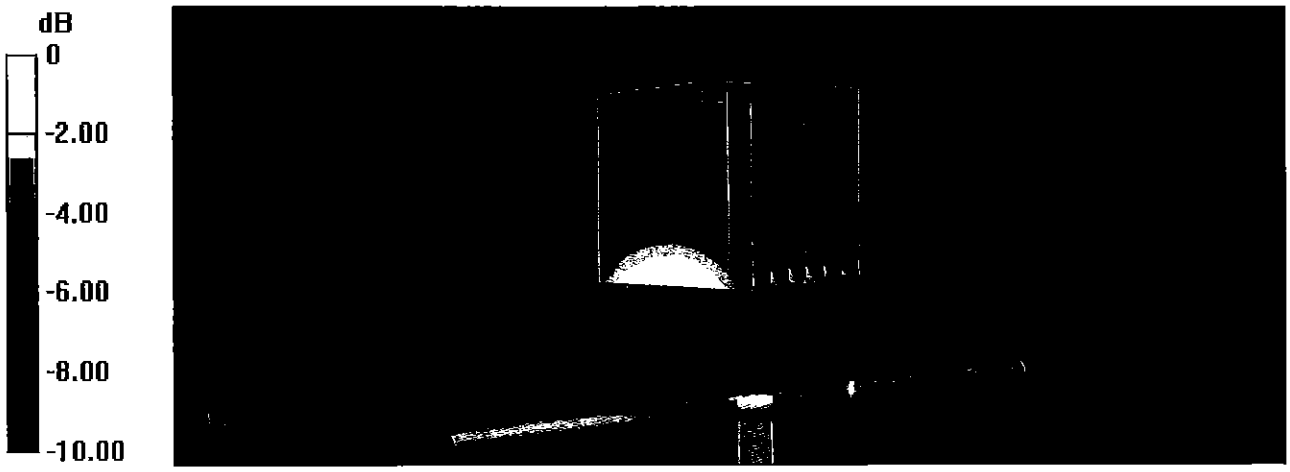
Communication System: UID 0 - CW; Frequency: 850 MHz
Medium parameters used: f = 850 MHz; $\sigma$ = 1.02 S/m; $\varepsilon_r$ = 54.6; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.72, 9.72, 9.72); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

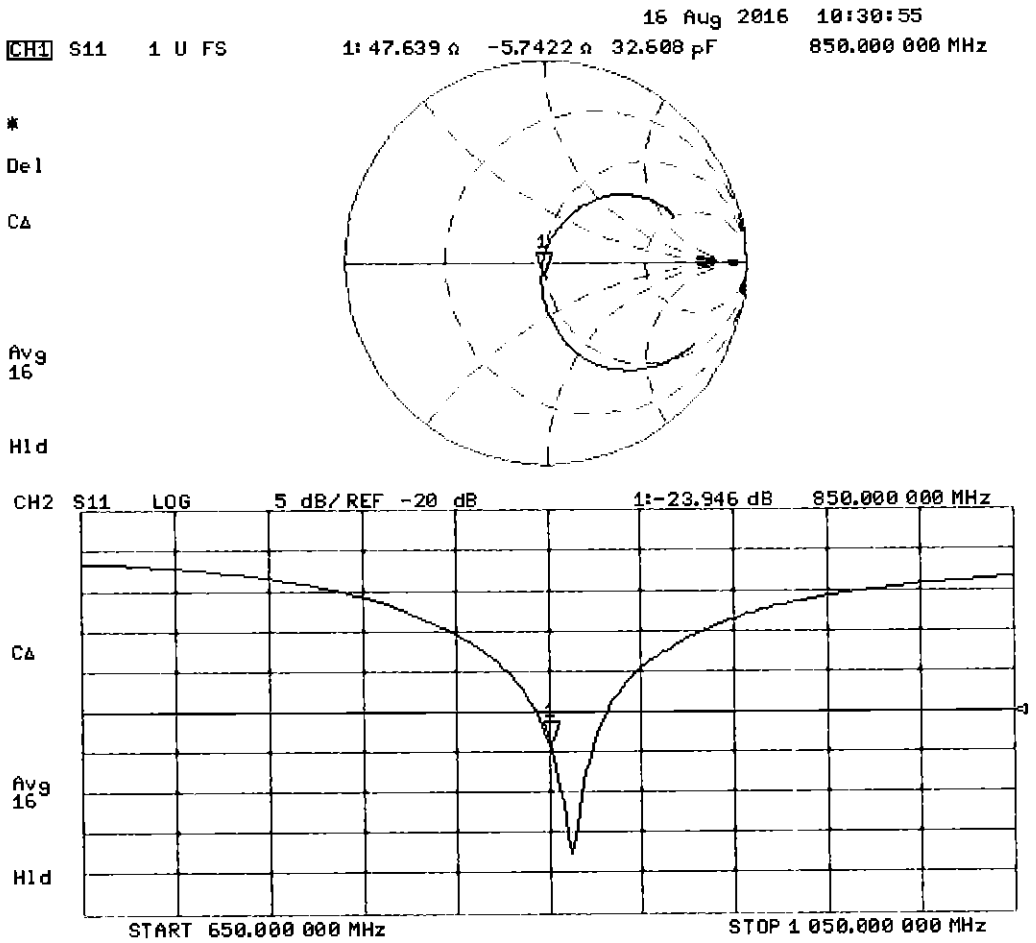
### Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 60.86 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 3.78 W/kg
**SAR(1 g) = 2.53 W/kg; SAR(10 g) = 1.64 W/kg**
Maximum value of SAR (measured) = 3.37 W/kg




0 dB = 3.37 W/kg = 5.28 dBW/kg

## Impedance Measurement Plot for Body TSL



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

**S** Schweizerischer Kalibrierdienst
**C** Service suisse d'étalonnage
Servizio svizzero di taratura
**S** Swiss Calibration Service

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

**Accreditation No.: SCS 0108**

**Client** **PC Test**

**Certificate No: D850V2-1010_Sep16**

# CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | D850V2 - SN: 1010 |
| Calibration procedure(s) | QA CAL-05.v9<br>Calibration procedure for dipole validation kits above 700 MHz |
| Calibration date: | September 19, 2016 |

BN 09-28-2016

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 NRP | SN: 104778 | 06-Apr-16 (No. 217-02288/02289) | Apr-17 |
| Power sensor NRP-Z91 | SN: 103244 | 06-Apr-16 (No. 217-02288) | Apr-17 |
| Power sensor NRP-Z91 | SN: 103245 | 06-Apr-16 (No. 217-02289) | Apr-17 |
| Reference 20 dB Attenuator | SN: 5058 (20k) | 05-Apr-16 (No. 217-02292) | Apr-17 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 05-Apr-16 (No. 217-02295) | Apr-17 |
| Reference Probe EX3DV4 | SN: 7349 | 15-Jun-16 (No. EX3-7349_Jun16) | Jun-17 |
| DAE4 | SN: 601 | 30-Dec-15 (No. DAE4-601_Dec15) | Dec-16 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---|---|---|---|
| Power meter EPM-442A | SN: GB37480704 | 07-Oct-15 (No. 217-02222) | In house check: Oct-16 |
| Power sensor HP 8481A | SN: US37292783 | 07-Oct-15 (No. 217-02222) | In house check: Oct-16 |
| Power sensor HP 8481A | SN: MY41092317 | 07-Oct-15 (No. 217-02223) | In house check: Oct-16 |
| RF generator R&S SMT-06 | SN: 100972 | 15-Jun-15 (in house check Jun-15) | In house check: Oct-16 |
| Network Analyzer HP 8753E | SN: US37390585 | 18-Oct-01 (in house check Oct-15) | In house check: Oct-16 |

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

Issued: September 20, 2016

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

## Glossary:

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

## Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) IEC 62209-2, "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)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

## Additional Documentation:

e) DASY4/5 System Handbook

## Methods Applied and Interpretation of Parameters:

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

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

## Measurement Conditions

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

| | | |
|---|---|---|
| **DASY Version** | DASY5 | V52.8.8 |
| **Extrapolation** | Advanced Extrapolation | |
| **Phantom** | Modular Flat Phantom | |
| **Distance Dipole Center - TSL** | 15 mm | with Spacer |
| **Zoom Scan Resolution** | dx, dy, dz = 5 mm | |
| **Frequency** | 850 MHz ± 1 MHz | |

## Head TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Head TSL parameters** | 22.0 °C | 41.5 | 0.92 mho/m |
| **Measured Head TSL parameters** | (22.0 ± 0.2) °C | 40.7 ± 6 % | 0.95 mho/m ± 6 % |
| **Head TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Head TSL

| **SAR averaged over 1 $cm^3$ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 2.49 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **9.68 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 1.61 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **6.30 W/kg ± 16.5 % (k=2)** |

## Body TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Body TSL parameters** | 22.0 °C | 55.2 | 0.99 mho/m |
| **Measured Body TSL parameters** | (22.0 ± 0.2) °C | 55.6 ± 6 % | 1.00 mho/m ± 6 % |
| **Body TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Body TSL

| **SAR averaged over 1 $cm^3$ (1 g) of Body TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 2.53 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **10.1 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Body TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 1.65 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **6.57 W/kg ± 16.5 % (k=2)** |

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

### Antenna Parameters with Head TSL

| | |
|---|---|
| Impedance, transformed to feed point | 50.6 Ω - 3.0 jΩ |
| Return Loss | - 30.4 dB |

### Antenna Parameters with Body TSL

| | |
|---|---|
| Impedance, transformed to feed point | 46.2 Ω - 4.9 jΩ |
| Return Loss | - 23.8 dB |

### General Antenna Parameters and Design

| | |
|---|---|
| Electrical Delay (one direction) | 1.429 ns |

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

### Additional EUT Data

| | |
|---|---|
| Manufactured by | SPEAG |
| Manufactured on | September 04, 2012 |

## DASY5 Validation Report for Head TSL

Date: 19.09.2016

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 850 MHz; Type: D850V2; Serial: D850V2 - SN: 1010**

Communication System: UID 0 - CW; Frequency: 850 MHz
Medium parameters used: f = 850 MHz; $\sigma$ = 0.95 S/m; $\varepsilon_r$ = 40.7; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

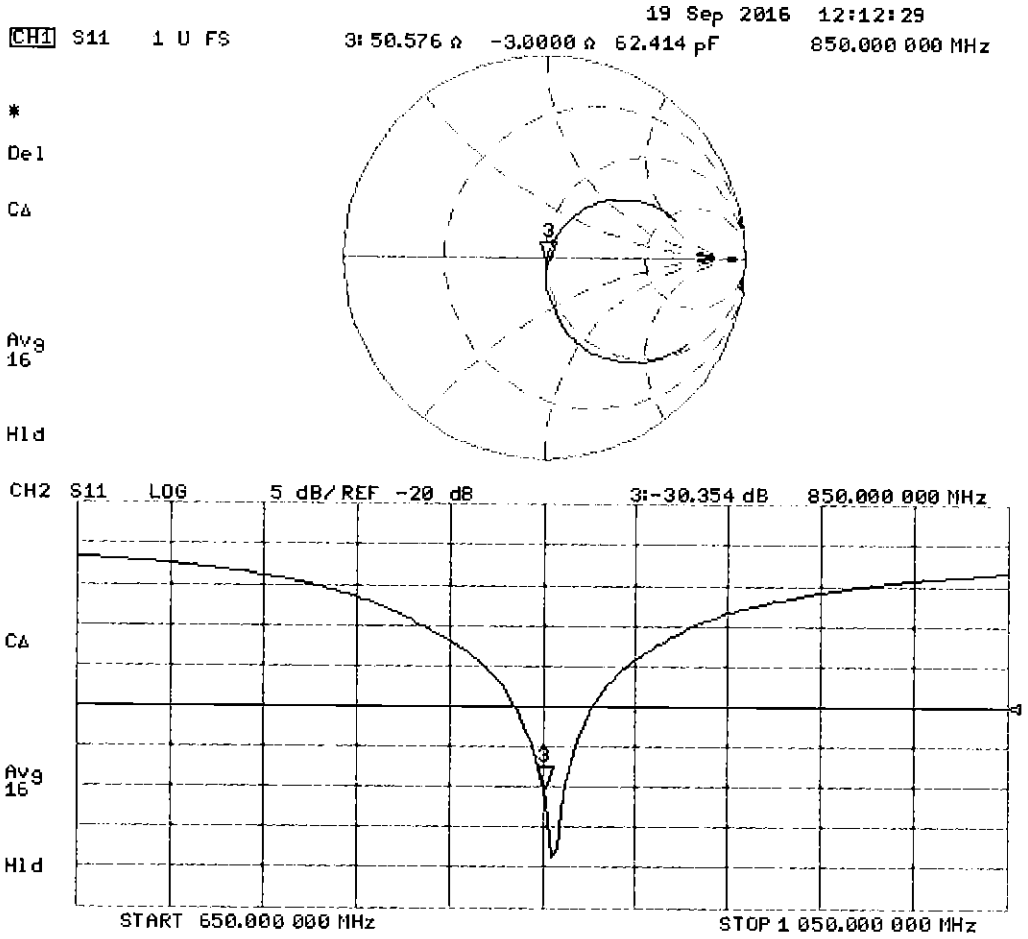
- Probe: EX3DV4 - SN7349; ConvF(9.7, 9.7, 9.7); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

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

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 63.38 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 3.70 W/kg
**SAR(1 g) = 2.49 W/kg; SAR(10 g) = 1.61 W/kg**
Maximum value of SAR (measured) = 3.30 W/kg

0 dB = 3.30 W/kg = 5.19 dBW/kg

## Impedance Measurement Plot for Head TSL



## DASY5 Validation Report for Body TSL

Date: 19.09.2016

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 850 MHz; Type: D850V2; Serial: D850V2 - SN: 1010**

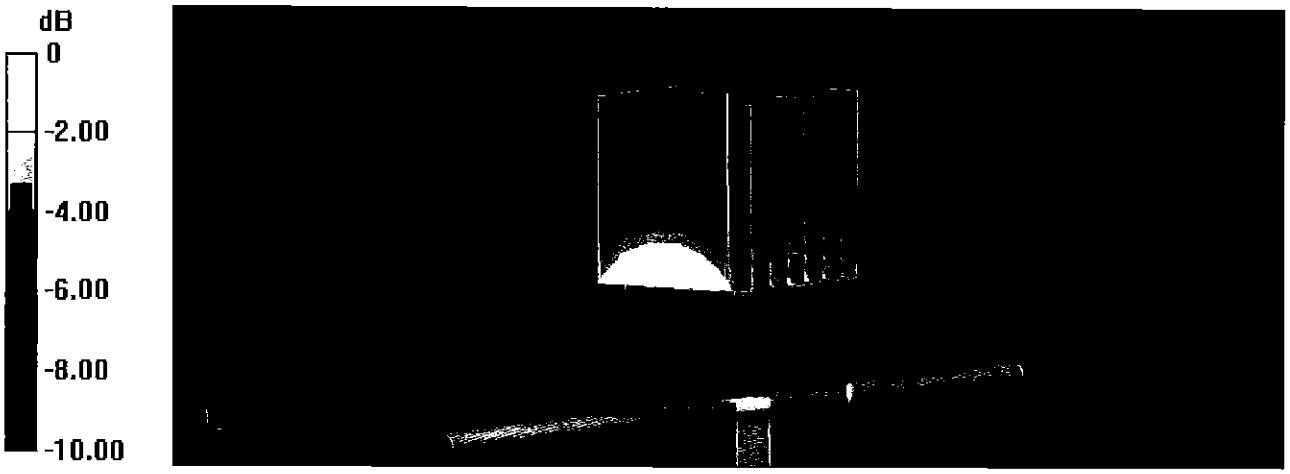
Communication System: UID 0 - CW; Frequency: 850 MHz
Medium parameters used: f = 850 MHz; $\sigma$ = 1 S/m; $\varepsilon_r$ = 55.6; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.72, 9.72, 9.72); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

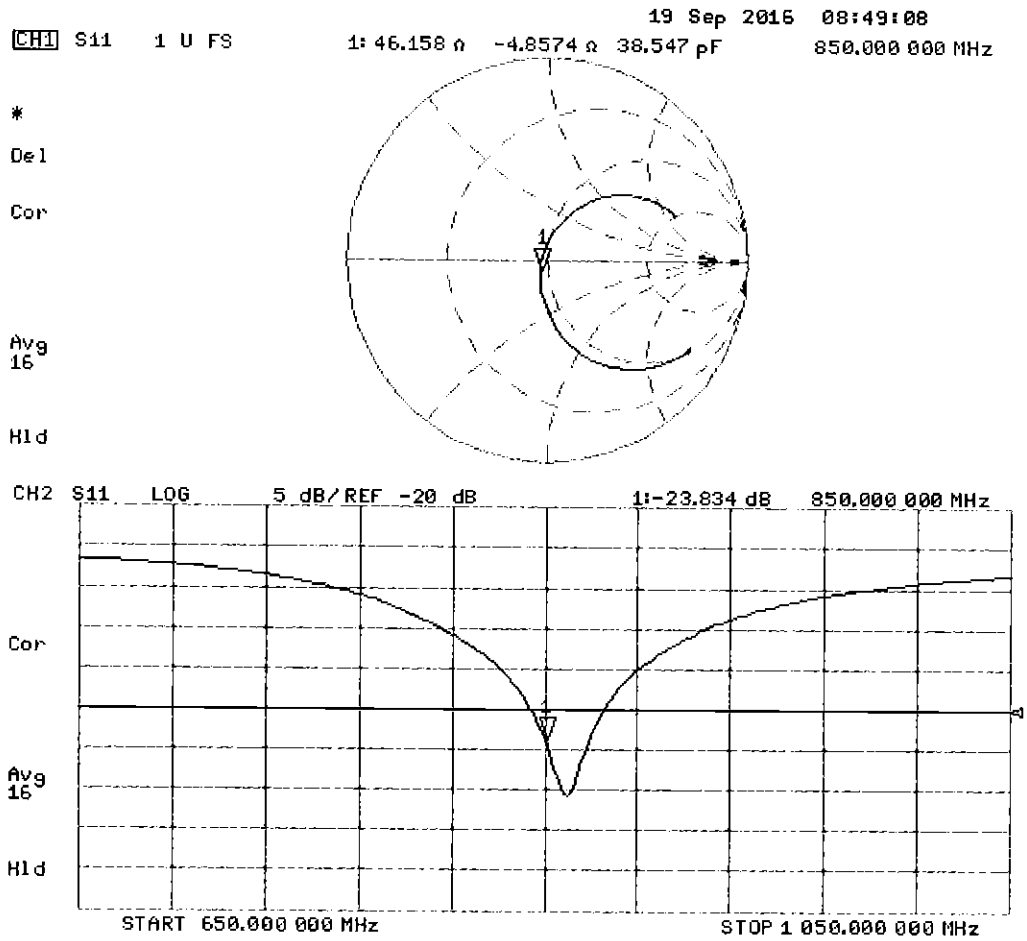
### Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 60.87 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 3.71 W/kg
**SAR(1 g) = 2.53 W/kg; SAR(10 g) = 1.65 W/kg**
Maximum value of SAR (measured) = 3.29 W/kg




0 dB = 3.29 W/kg = 5.17 dBW/kg

## Impedance Measurement Plot for Body TSL



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Engineering AG
**Zeughausstrasse 43, 8004 Zurich, Switzerland**

**S** Schweizerischer Kalibrierdienst
**C** Service suisse d'étalonnage
Servizio svizzero di taratura
**S** Swiss Calibration Service

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

**Accreditation No.: SCS 0108**

**Client** **PC Test**

**Certificate No: D1750V2-1104_Sep16**

# CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | D1750V2 - SN:1104 |
| Calibration procedure(s) | QA CAL-05.v9<br>Calibration procedure for dipole validation kits above 700 MHz |
| Calibration date: | September 14, 2016 |

BN ✓
09-28-2016

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 NRP | SN: 104778 | 06-Apr-16 (No. 217-02288/02289) | Apr-17 |
| Power sensor NRP-Z91 | SN: 103244 | 06-Apr-16 (No. 217-02288) | Apr-17 |
| Power sensor NRP-Z91 | SN: 103245 | 06-Apr-16 (No. 217-02289) | Apr-17 |
| Reference 20 dB Attenuator | SN: 5058 (20k) | 05-Apr-16 (No. 217-02292) | Apr-17 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 05-Apr-16 (No. 217-02295) | Apr-17 |
| Reference Probe EX3DV4 | SN: 7349 | 15-Jun-16 (No. EX3-7349_Jun16) | Jun-17 |
| DAE4 | SN: 601 | 30-Dec-15 (No. DAE4-601_Dec15) | Dec-16 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---|---|---|---|
| Power meter EPM-442A | SN: GB37480704 | 07-Oct-15 (No. 217-02222) | In house check: Oct-16 |
| Power sensor HP 8481A | SN: US37292783 | 07-Oct-15 (No. 217-02222) | In house check: Oct-16 |
| Power sensor HP 8481A | SN: MY41092317 | 07-Oct-15 (No. 217-02223) | In house check: Oct-16 |
| RF generator R&S SMT-06 | SN: 100972 | 15-Jun-15 (in house check Jun-15) | In house check: Oct-16 |
| Network Analyzer HP 8753E | SN: US37390585 | 18-Oct-01 (in house check Oct-15) | In house check: Oct-16 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Claudio Leubler | Laboratory Technician | |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: September 15, 2016

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## Glossary:

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

## Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) IEC 62209-2, "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)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

## Additional Documentation:

e) DASY4/5 System Handbook

## Methods Applied and Interpretation of Parameters:

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

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

## Measurement Conditions

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

| | | |
|---|---|---|
| **DASY Version** | DASY5 | V52.8.8 |
| **Extrapolation** | Advanced Extrapolation | |
| **Phantom** | Modular Flat Phantom | |
| **Distance Dipole Center - TSL** | 10 mm | with Spacer |
| **Zoom Scan Resolution** | dx, dy, dz = 5 mm | |
| **Frequency** | 1750 MHz ± 1 MHz | |

## Head TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Head TSL parameters** | 22.0 °C | 40.1 | 1.37 mho/m |
| **Measured Head TSL parameters** | (22.0 ± 0.2) °C | 38.9 ± 6 % | 1.37 mho/m ± 6 % |
| **Head TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Head TSL

| **SAR averaged over 1 $cm^3$ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 9.06 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **36.0 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 4.80 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **19.1 W/kg ± 16.5 % (k=2)** |

## Body TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Body TSL parameters** | 22.0 °C | 53.4 | 1.49 mho/m |
| **Measured Body TSL parameters** | (22.0 ± 0.2) °C | 54.2 ± 6 % | 1.49 mho/m ± 6 % |
| **Body TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Body TSL

| **SAR averaged over 1 $cm^3$ (1 g) of Body TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 9.01 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **36.2 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Body TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 4.82 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **19.3 W/kg ± 16.5 % (k=2)** |

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

### Antenna Parameters with Head TSL

| | |
|---|---|
| Impedance, transformed to feed point | 51.6 Ω + 0.0 jΩ |
| Return Loss | - 36.2 dB |

### Antenna Parameters with Body TSL

| | |
|---|---|
| Impedance, transformed to feed point | 46.6 Ω - 0.9 jΩ |
| Return Loss | - 28.8 dB |

### General Antenna Parameters and Design

| | |
|---|---|
| Electrical Delay (one direction) | 1.216 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 | May 16, 2013 |

## DASY5 Validation Report for Head TSL

Date: 14.09.2016

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN:1104**

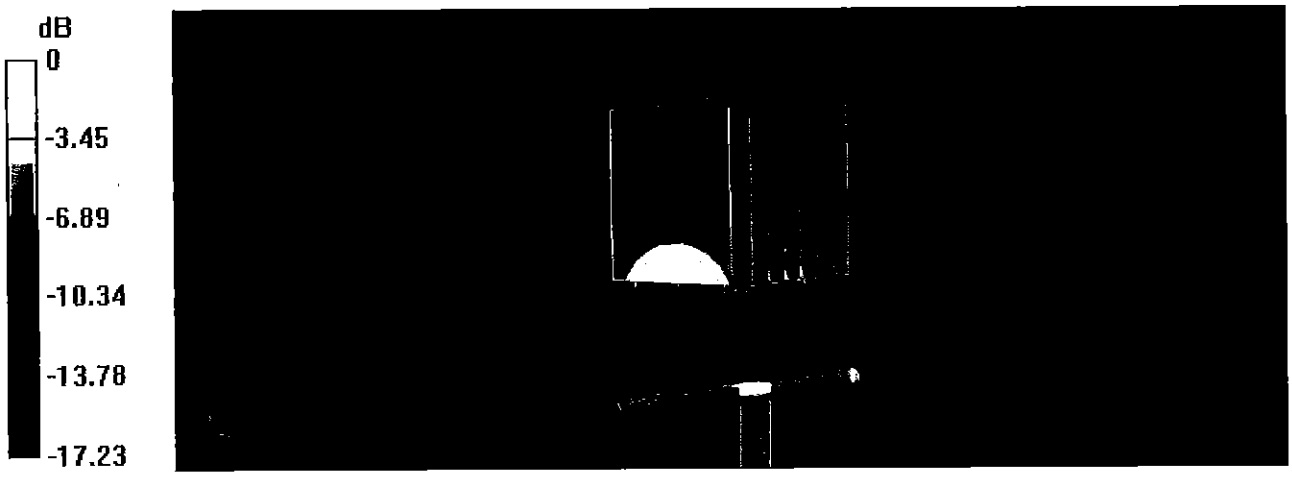
Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; $\sigma$ = 1.37 S/m; $\varepsilon_r$ = 38.9; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.46, 8.46, 8.46); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

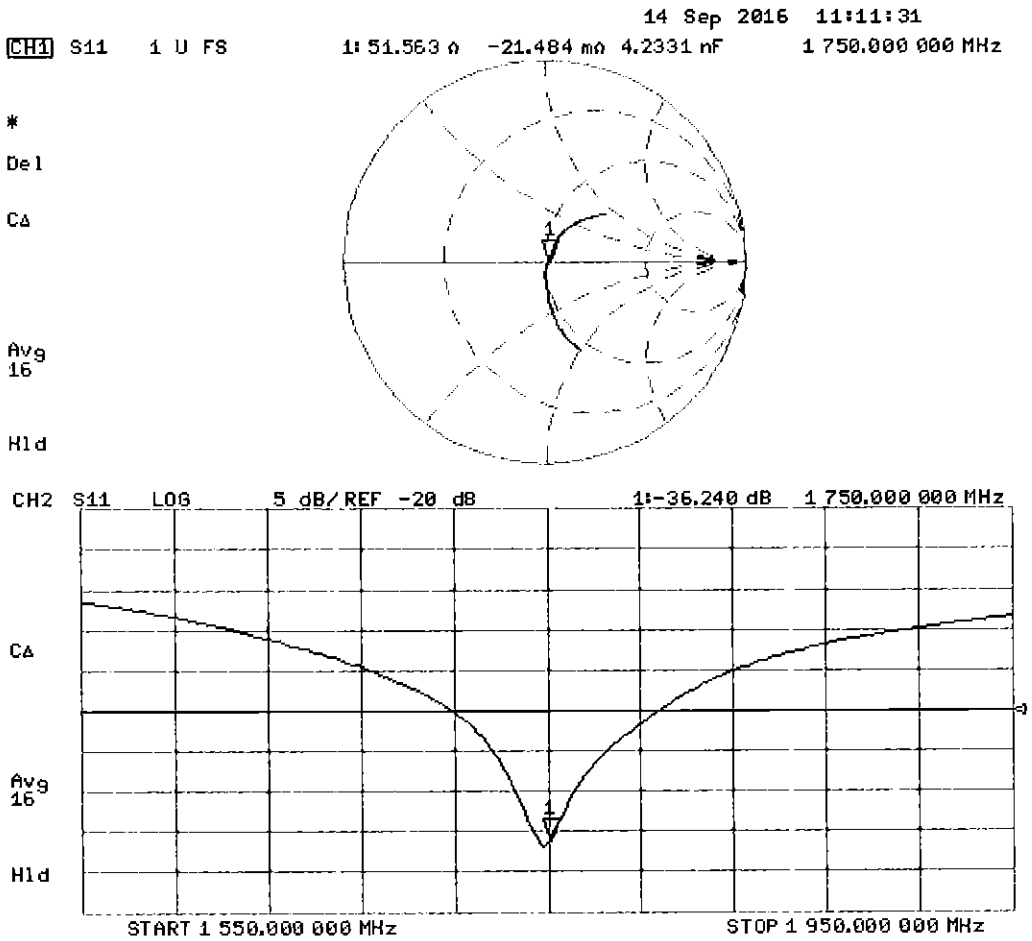
### Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 104.5 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 16.6 W/kg
**SAR(1 g) = 9.06 W/kg; SAR(10 g) = 4.8 W/kg**
Maximum value of SAR (measured) = 13.9 W/kg




0 dB = 13.9 W/kg = 11.43 dBW/kg

## Impedance Measurement Plot for Head TSL



## DASY5 Validation Report for Body TSL

Date: 14.09.2016

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN:1104**

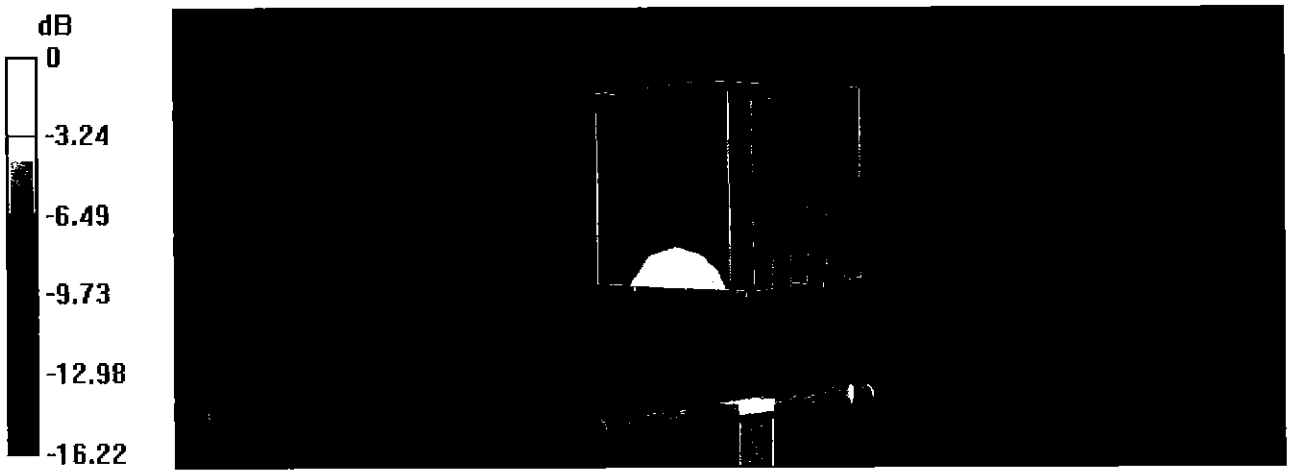
Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; $\sigma$ = 1.49 S/m; $\varepsilon_r$ = 54.2; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.25, 8.25, 8.25); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

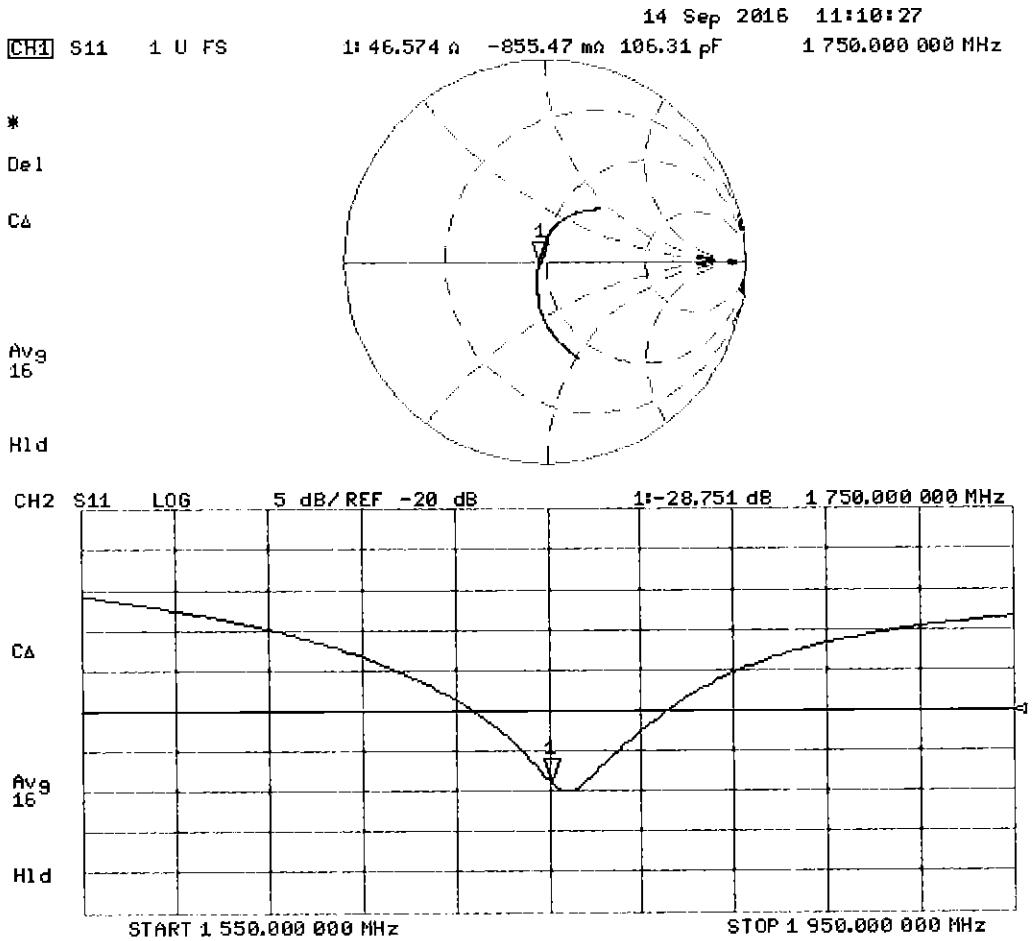
### Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 99.58 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 15.8 W/kg
**SAR(1 g) = 9.01 W/kg; SAR(10 g) = 4.82 W/kg**
Maximum value of SAR (measured) = 13.6 W/kg




0 dB = 13.6 W/kg = 11.34 dBW/kg

## Impedance Measurement Plot for Body TSL



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**Zeughausstrasse 43, 8004 Zurich, Switzerland**

**S** Schweizerischer Kalibrierdienst
**C** Service suisse d'étalonnage
Servizio svizzero di taratura
**S** Swiss Calibration Service

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

**Accreditation No.: SCS 0108**

**Client** **PC Test**

**Certificate No: D1900V2-5d181_Sep16**

# CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | D1900V2 - SN:5d181 |
| Calibration procedure(s) | QA CAL-05.v9<br>Calibration procedure for dipole validation kits above 700 MHz |
| Calibration date: | September 19, 2016 |

BNV
09-28-2016

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 NRP | SN: 104778 | 06-Apr-16 (No. 217-02288/02289) | Apr-17 |
| Power sensor NRP-Z91 | SN: 103244 | 06-Apr-16 (No. 217-02288) | Apr-17 |
| Power sensor NRP-Z91 | SN: 103245 | 06-Apr-16 (No. 217-02289) | Apr-17 |
| Reference 20 dB Attenuator | SN: 5058 (20k) | 05-Apr-16 (No. 217-02292) | Apr-17 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 05-Apr-16 (No. 217-02295) | Apr-17 |
| Reference Probe EX3DV4 | SN: 7349 | 15-Jun-16 (No. EX3-7349_Jun16) | Jun-17 |
| DAE4 | SN: 601 | 30-Dec-15 (No. DAE4-601_Dec15) | Dec-16 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---|---|---|---|
| Power meter EPM-442A | SN: GB37480704 | 07-Oct-15 (No. 217-02222) | In house check: Oct-16 |
| Power sensor HP 8481A | SN: US37292783 | 07-Oct-15 (No. 217-02222) | In house check: Oct-16 |
| Power sensor HP 8481A | SN: MY41092317 | 07-Oct-15 (No. 217-02223) | In house check: Oct-16 |
| RF generator R&S SMT-06 | SN: 100972 | 15-Jun-15 (in house check Jun-15) | In house check: Oct-16 |
| Network Analyzer HP 8753E | SN: US37390585 | 18-Oct-01 (in house check Oct-15) | In house check: Oct-16 |

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

Issued: September 19, 2016

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

## Glossary:

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

## Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) IEC 62209-2, "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)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

## Additional Documentation:

e) DASY4/5 System Handbook

## Methods Applied and Interpretation of Parameters:

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

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

## Measurement Conditions

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

| | | |
|---|---|---|
| **DASY Version** | DASY5 | V52.8.8 |
| **Extrapolation** | Advanced Extrapolation | |
| **Phantom** | Modular Flat Phantom | |
| **Distance Dipole Center - TSL** | 10 mm | with Spacer |
| **Zoom Scan Resolution** | dx, dy, dz = 5 mm | |
| **Frequency** | 1900 MHz ± 1 MHz | |

## Head TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Head TSL parameters** | 22.0 °C | 40.0 | 1.40 mho/m |
| **Measured Head TSL parameters** | (22.0 ± 0.2) °C | 40.5 ± 6 % | 1.40 mho/m ± 6 % |
| **Head TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Head TSL

| **SAR averaged over 1 cm³ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 9.89 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **39.7 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 cm³ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 5.21 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **20.9 W/kg ± 16.5 % (k=2)** |

## Body TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Body TSL parameters** | 22.0 °C | 53.3 | 1.52 mho/m |
| **Measured Body TSL parameters** | (22.0 ± 0.2) °C | 53.6 ± 6 % | 1.49 mho/m ± 6 % |
| **Body TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Body TSL

| **SAR averaged over 1 cm³ (1 g) of Body TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 9.71 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **39.4 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 cm³ (10 g) of Body TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 5.17 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **20.9 W/kg ± 16.5 % (k=2)** |

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

### Antenna Parameters with Head TSL

| | |
|---|---|
| Impedance, transformed to feed point | 54.2 Ω + 4.7 jΩ |
| Return Loss | - 24.4 dB |

### Antenna Parameters with Body TSL

| | |
|---|---|
| Impedance, transformed to feed point | 49.2 Ω + 6.1 jΩ |
| Return Loss | - 24.1 dB |

### General Antenna Parameters and Design

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

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

### Additional EUT Data

| | |
|---|---|
| Manufactured by | SPEAG |
| Manufactured on | August 23, 2013 |

## DASY5 Validation Report for Head TSL

Date: 14.09.2016

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d181**

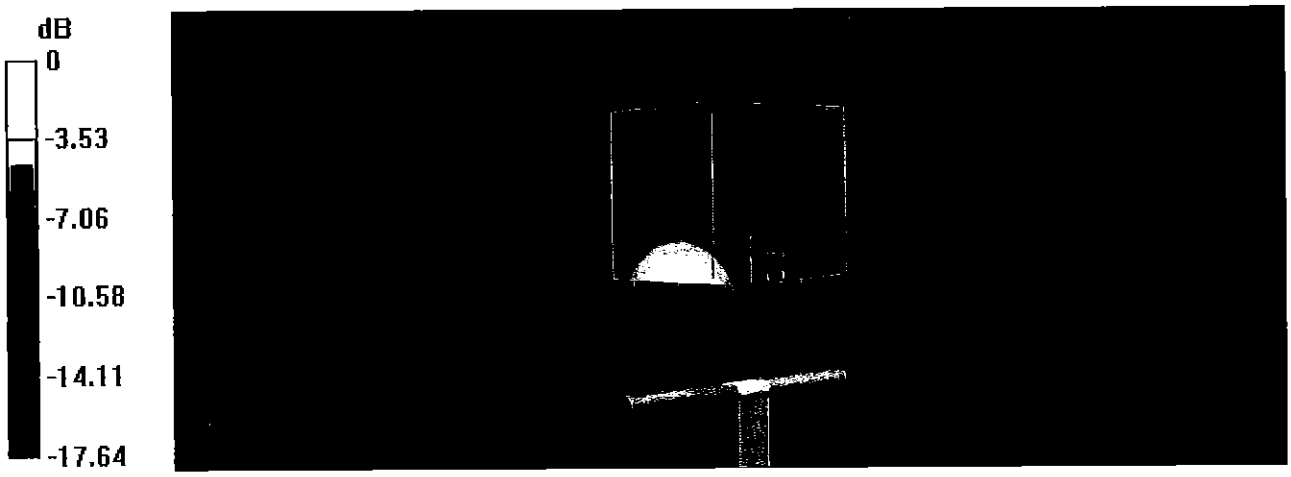
Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; $\sigma$ = 1.4 S/m; $\varepsilon_r$ = 40.5; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.99, 7.99, 7.99); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

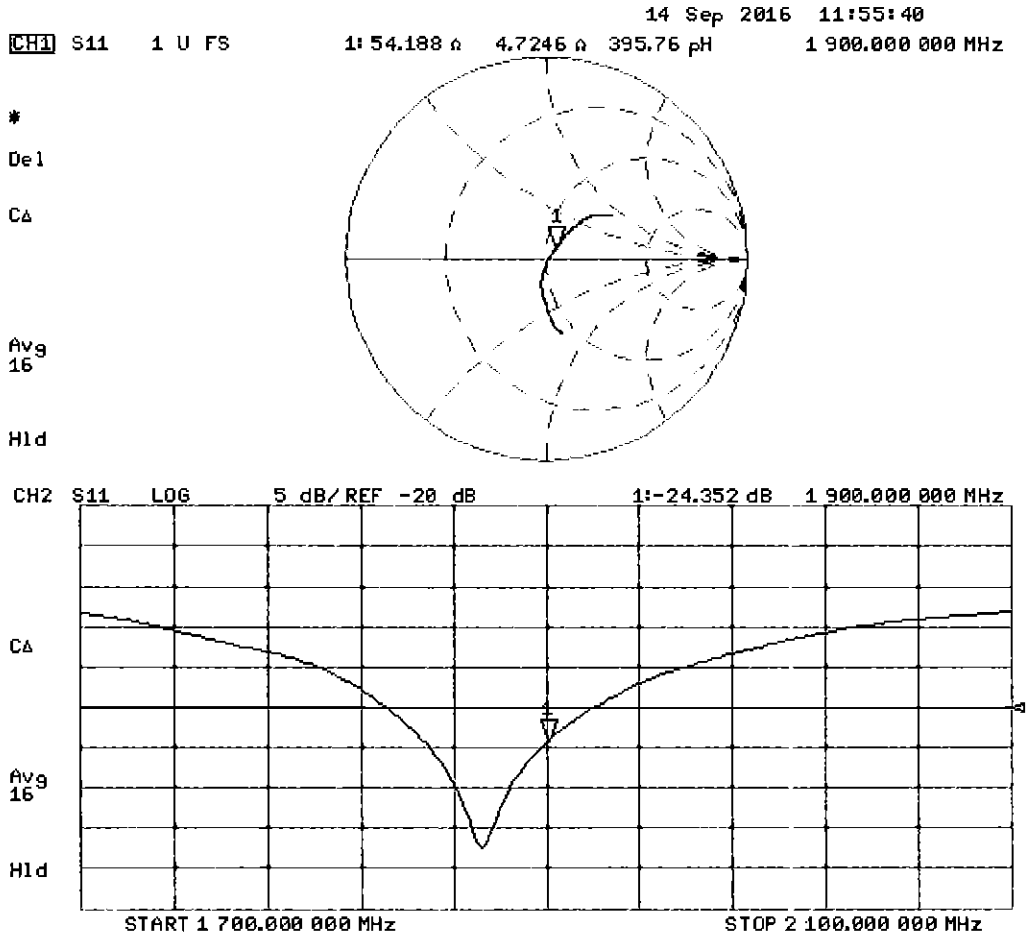
### Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 106.3 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 18.4 W/kg
**SAR(1 g) = 9.89 W/kg; SAR(10 g) = 5.21 W/kg**
Maximum value of SAR (measured) = 15.3 W/kg




0 dB = 15.3 W/kg = 11.85 dBW/kg

## Impedance Measurement Plot for Head TSL



## DASY5 Validation Report for Body TSL

Date: 19.09.2016

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d181**

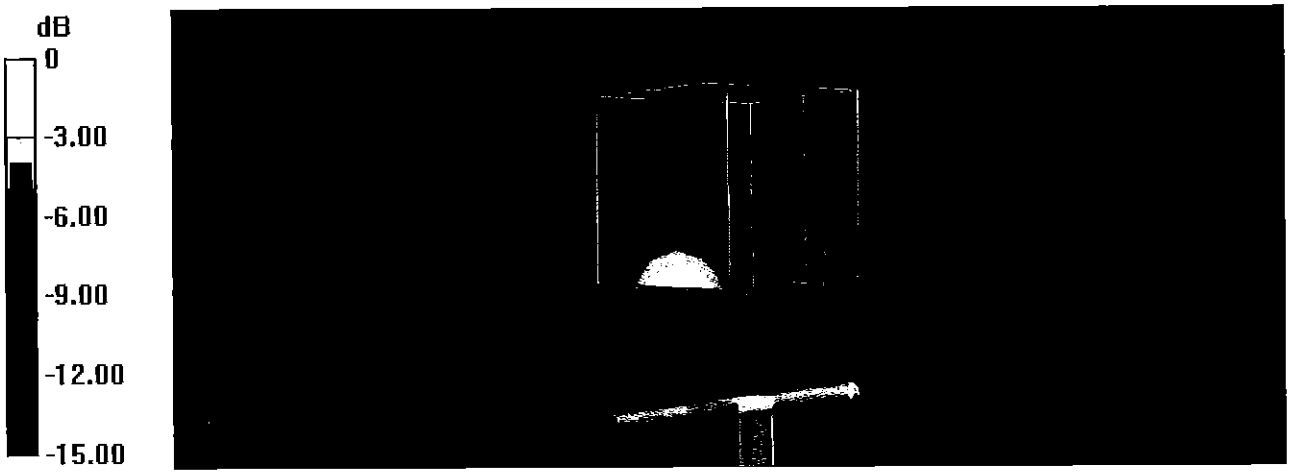
Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; $\sigma$ = 1.49 S/m; $\varepsilon_r$ = 53.6; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.03, 8.03, 8.03); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

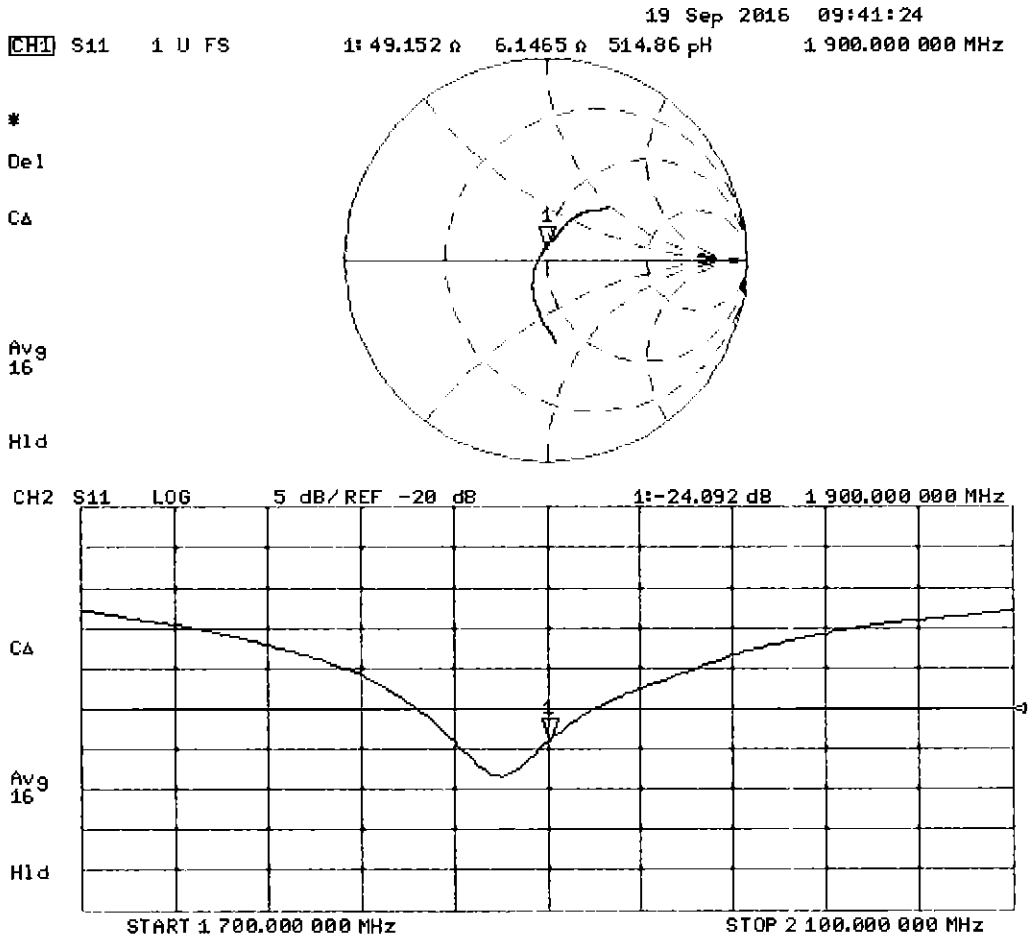
### Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 103.7 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 17.0 W/kg
**SAR(1 g) = 9.71 W/kg; SAR(10 g) = 5.17 W/kg**
Maximum value of SAR (measured) = 14.6 W/kg




0 dB = 14.6 W/kg = 11.64 dBW/kg

## Impedance Measurement Plot for Body TSL



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**Zeughausstrasse 43, 8004 Zurich, Switzerland**

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**C** Service suisse d'étalonnage
Servizio svizzero di taratura
**S** Swiss Calibration Service

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

**Accreditation No.: SCS 0108**

**Client** **PC Test**

**Certificate No: D2450V2-921_Sep16**

# CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | D2450V2 - SN:921 |
| Calibration procedure(s) | QA CAL-05.v9<br>Calibration procedure for dipole validation kits above 700 MHz |
| Calibration date: | September 13, 2016 |

BN ✓
09-28-2016

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 NRP | SN: 104778 | 06-Apr-16 (No. 217-02288/02289) | Apr-17 |
| Power sensor NRP-Z91 | SN: 103244 | 06-Apr-16 (No. 217-02288) | Apr-17 |
| Power sensor NRP-Z91 | SN: 103245 | 06-Apr-16 (No. 217-02289) | Apr-17 |
| Reference 20 dB Attenuator | SN: 5058 (20k) | 05-Apr-16 (No. 217-02292) | Apr-17 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 05-Apr-16 (No. 217-02295) | Apr-17 |
| Reference Probe EX3DV4 | SN: 7349 | 15-Jun-16 (No. EX3-7349_Jun16) | Jun-17 |
| DAE4 | SN: 601 | 30-Dec-15 (No. DAE4-601_Dec15) | Dec-16 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---|---|---|---|
| Power meter EPM-442A | SN: GB37480704 | 07-Oct-15 (No. 217-02222) | In house check: Oct-16 |
| Power sensor HP 8481A | SN: US37292783 | 07-Oct-15 (No. 217-02222) | In house check: Oct-16 |
| Power sensor HP 8481A | SN: MY41092317 | 07-Oct-15 (No. 217-02223) | In house check: Oct-16 |
| RF generator R&S SMT-06 | SN: 100972 | 15-Jun-15 (in house check Jun-15) | In house check: Oct-16 |
| Network Analyzer HP 8753E | SN: US37390585 | 18-Oct-01 (in house check Oct-15) | In house check: Oct-16 |

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

Issued: September 15, 2016

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

## Glossary:

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

## Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) IEC 62209-2, "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)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

## Additional Documentation:

e) DASY4/5 System Handbook

## Methods Applied and Interpretation of Parameters:

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

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

## Measurement Conditions

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

| | | |
|---|---|---|
| **DASY Version** | DASY5 | V52.8.8 |
| **Extrapolation** | Advanced Extrapolation | |
| **Phantom** | Modular Flat Phantom | |
| **Distance Dipole Center - TSL** | 10 mm | with Spacer |
| **Zoom Scan Resolution** | dx, dy, dz = 5 mm | |
| **Frequency** | 2450 MHz ± 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 ± 0.2) °C | 37.9 ± 6 % | 1.88 mho/m ± 6 % |
| **Head TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Head TSL

| **SAR averaged over 1 $cm^3$ (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 | **52.1 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 6.23 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **24.5 W/kg ± 16.5 % (k=2)** |

## Body TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Body TSL parameters** | 22.0 °C | 52.7 | 1.95 mho/m |
| **Measured Body TSL parameters** | (22.0 ± 0.2) °C | 51.6 ± 6 % | 2.04 mho/m ± 6 % |
| **Body TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Body TSL

| **SAR averaged over 1 $cm^3$ (1 g) of Body TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 12.9 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **50.3 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Body TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 6.08 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **24.0 W/kg ± 16.5 % (k=2)** |

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

### Antenna Parameters with Head TSL

| | |
|---|---|
| Impedance, transformed to feed point | 52.8 Ω + 3.0 jΩ |
| Return Loss | - 27.9 dB |

### Antenna Parameters with Body TSL

| | |
|---|---|
| Impedance, transformed to feed point | 49.6 Ω + 5.4 jΩ |
| Return Loss | - 25.3 dB |

### General Antenna Parameters and Design

| | |
|---|---|
| Electrical Delay (one direction) | 1.157 ns |

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

### Additional EUT Data

| | |
|---|---|
| Manufactured by | SPEAG |
| Manufactured on | September 26, 2013 |

## DASY5 Validation Report for Head TSL

Date: 13.09.2016

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:921**

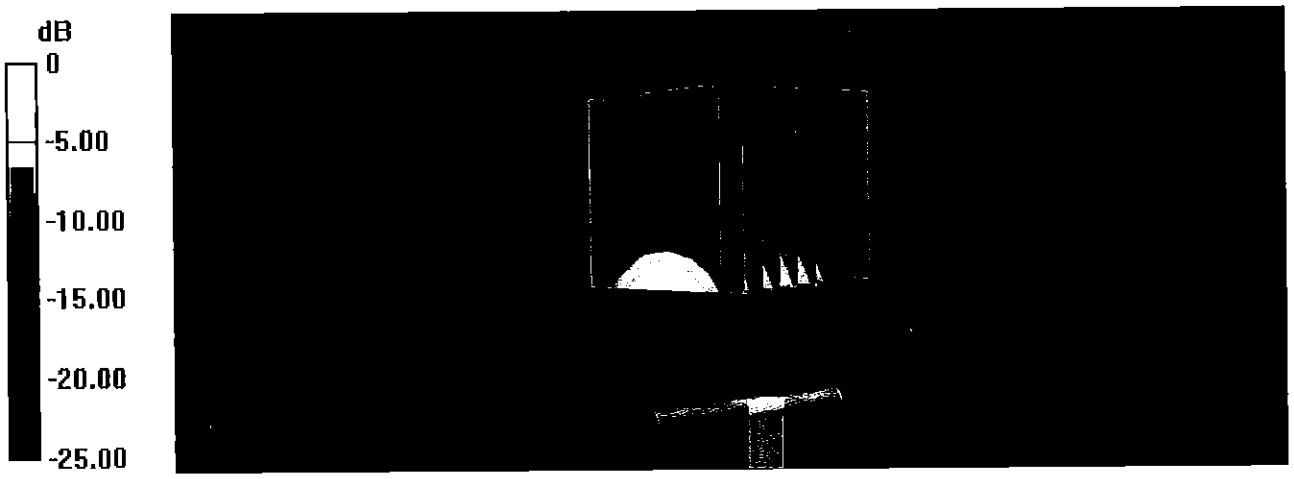
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; $\sigma$ = 1.88 S/m; $\varepsilon_r$ = 37.9; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.72, 7.72, 7.72); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

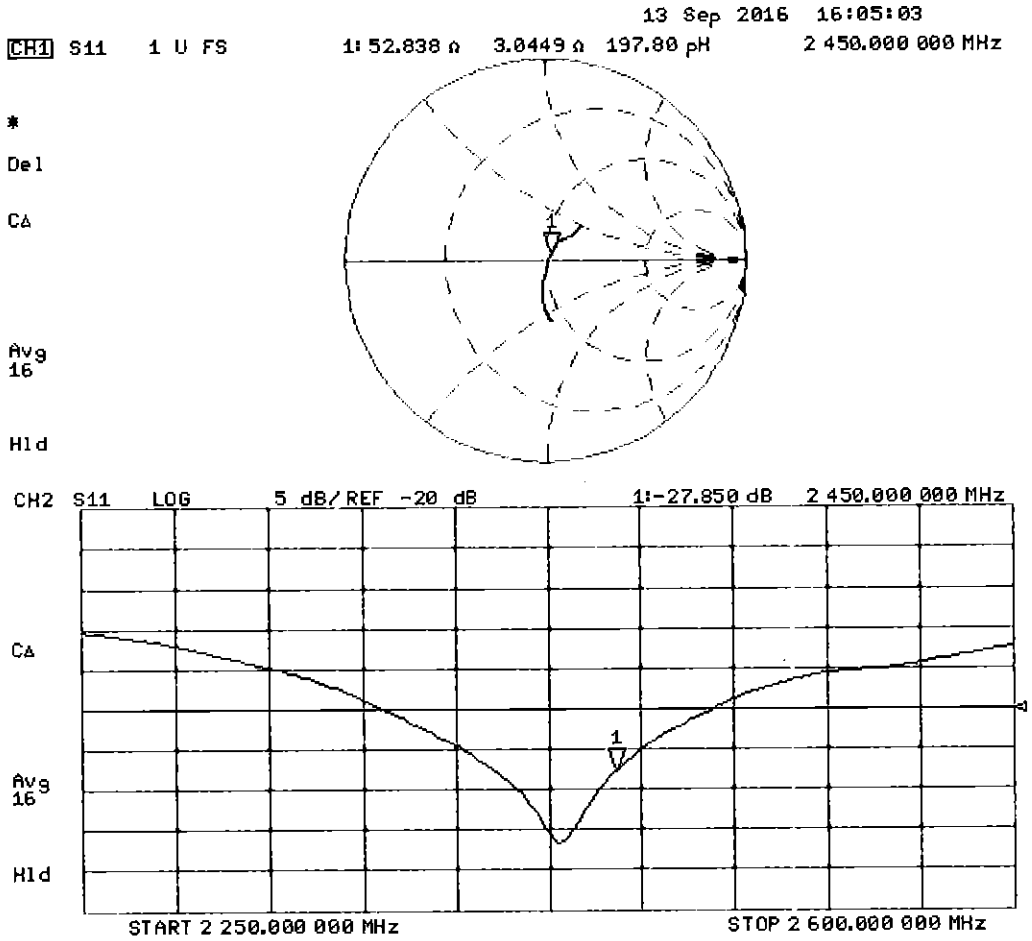
### Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x8x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 110.8 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 26.9 W/kg
**SAR(1 g) = 13.4 W/kg; SAR(10 g) = 6.23 W/kg**
Maximum value of SAR (measured) = 22.2 W/kg




0 dB = 22.2 W/kg = 13.46 dBW/kg

## Impedance Measurement Plot for Head TSL



## DASY5 Validation Report for Body TSL

Date: 13.09.2016

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:921**

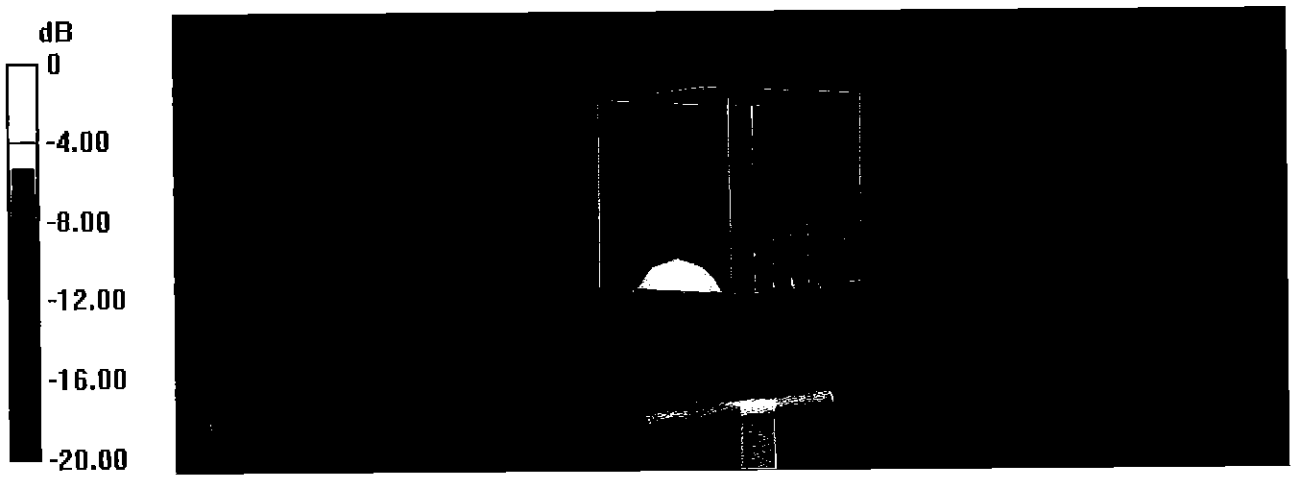
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; $\sigma$ = 2.04 S/m; $\varepsilon_r$ = 51.6; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

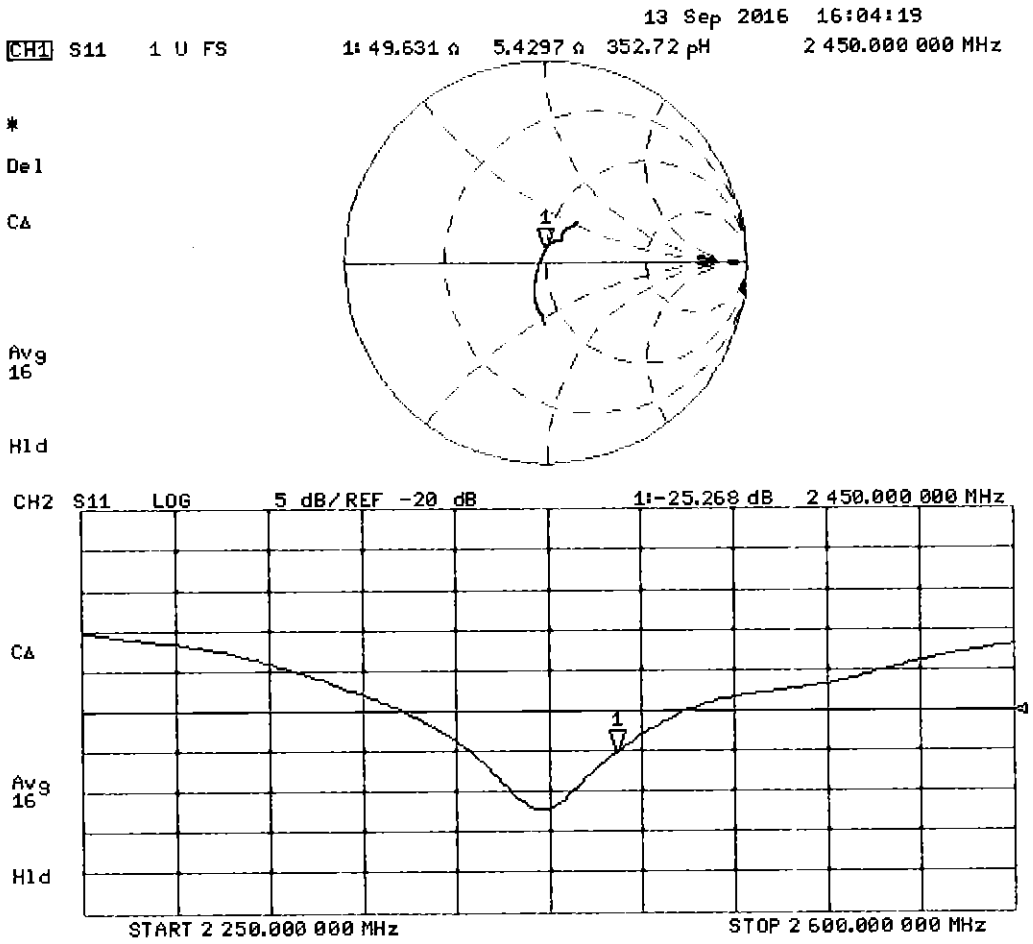
DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.79, 7.79, 7.79); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

### 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 = 106.6 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 25.7 W/kg
**SAR(1 g) = 12.9 W/kg; SAR(10 g) = 6.08 W/kg**
Maximum value of SAR (measured) = 21.2 W/kg




0 dB = 21.2 W/kg = 13.26 dBW/kg

## Impedance Measurement Plot for Body TSL