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# SAR COMPLIANCE EVALUATION REPORT

**Applicant Name:**
Samsung Electronics, Co. Ltd.
18600 Broadwick St.
Rancho Dominguez, CA 90220
United States

**Date of Testing:**
01/25/12 - 02/01/12
**Test Site/Location:**
PCTEST Lab, Columbia, MD, USA
**Test Report Serial No.:**
0Y1201230103-R1.A3L

**FCC ID:** **A3LSCHLC11R**

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

**EUT Type:** Portable Wireless Router
**Application Type:** Certification
**FCC Rule Part(s):** CFR §2.1093
**Model(s):** SCH-LC11R

| Band & Mode | Tx Frequency | Conducted Power [dBm] | SAR 1 gm Hotspot (W/kg) |
|---|---|---|---|
| Cell. CDMA/EVDO | 824.70 - 848.31 MHz | 24.53 | 0.58 |
| PCS CDMA/EVDO | 1851.25 - 1908.75 MHz | 24.44 | 0.68 |
| LTE Band 12 | 701.5 - 713.5 MHz | 22.68 | 1.01 |
| LTE Band 5 (Cell) | 824.7 - 848.3 MHz | 22.90 | 0.54 |
| LTE Band 4 (AWS) | 1712.5 - 1752.5 MHz | 23.00 | 0.65 |
| LTE Band 2 (PCS) | 1850.7 - 1909.3 MHz | 22.70 | 0.41 |
| 2.4 GHz WLAN | 2412 - 2462 MHz | 15.30 | 0.23 |
| **Simultaneous SAR per KDB 690783 D01:** | | | 1.22 |

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

**This revised Test Report (S/N: 0Y1201230103-R1.A3L) supersedes and replaces the previously issued test report on the same subject EUT for the same type of testing as indicated. Please discard or destroy the previously issued test report and dispose of it accordingly.**

This wireless portable device has been shown to be capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in ANSI/IEEE C95.1-1992 and has been tested in accordance with the measurement procedures specified in FCC/OET Bulletin 65 Supplement C (2001), IEEE 1528-2003 and in applicable Industry Canada Radio Standards Specifications (RSS); for North American frequency bands only.

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

*PCTEST certifies that no party to this application has been subject to a denial of Federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862.*

Randy Ortanez
President

ACCREDITED
TESTING LABORATORY
CERTIFICATE #2041.01

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# 1 DEVICE UNDER TEST

## 1.1 Device Overview

**Table 1-1**
**Device Capabilities**

| Band & Mode | Tx Frequency |
|---|---|
| Cell. CDMA/EVDO | 824.70 - 848.31 MHz |
| PCS CDMA/EVDO | 1851.25 - 1908.75 MHz |
| LTE Band 12 | 701.5 - 713.5 MHz |
| LTE Band 5 (Cell) | 824.7 - 848.3 MHz |
| LTE Band 4 (AWS) | 1712.5 - 1752.5 MHz |
| LTE Band 2 (PCS) | 1850.7 - 1909.3 MHz |
| 2.4 GHz WLAN | 2412 - 2462 MHz |

## 1.2 EUT Antenna Locations

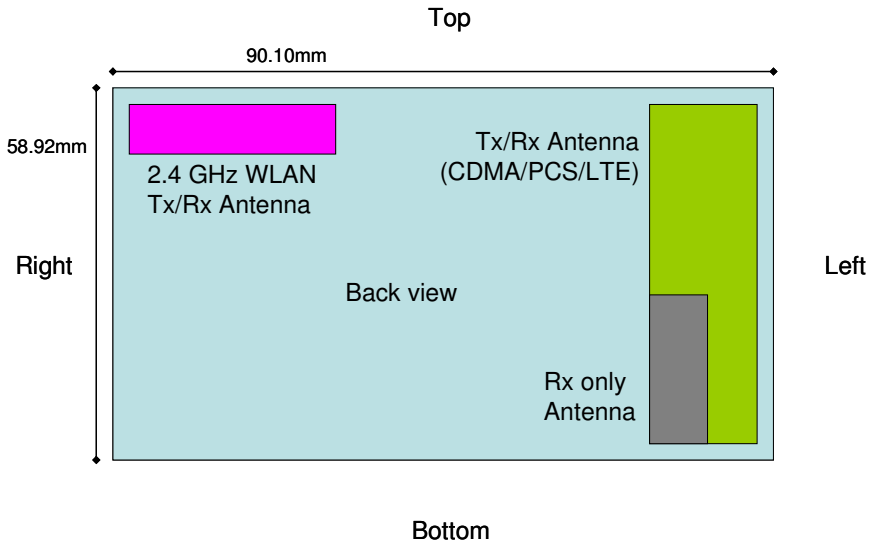



**Figure 1-1**
**EUT Antenna Locations**

Note: Particular DUT edges were not required to be evaluated for Wireless Router SAR if the edges were greater than 2.5 cm from the transmitting antenna according to FCC KDB Publication 941225 D06 guidance, page 2. The antenna document shows the distances between the transmit antennas and the edges of the device.

**Table 1-2**
**Mobile Hotspot Sides for SAR Testing**

| Mobile Hotspot Sides for SAR Testing | | | | | | |
|---|---|---|---|---|---|---|
| Mode | Back | Front | Top | Bottom | Right | Left |
| Cell. CDMA | Yes | Yes | Yes | Yes | No | Yes |
| PCS CDMA | Yes | Yes | Yes | Yes | No | Yes |
| LTE Band 12 | Yes | Yes | Yes | Yes | No | Yes |
| LTE Band 5 (Cell) | Yes | Yes | Yes | Yes | No | Yes |
| LTE Band 4 (AWS) | Yes | Yes | Yes | Yes | No | Yes |
| LTE Band 2 (PCS) | Yes | Yes | Yes | Yes | No | Yes |
| 2.4 GHz WLAN | Yes | Yes | Yes | No | Yes | No |

## 1.3 Simultaneous Transmission Capabilities

Simultaneous transmissions according to KDB 648474, except for transmissions during network hand-offs, with maximum hand-off duration less than 30 seconds, transmitters are considered to be transmitting simultaneously when there is overlapping transmission. Possible Transmission scenarios for the DUT are shown in Figure 1-2 and are color-coded to indicate communication modes which share the same antenna. Modes which share the same antenna cannot transmit simultaneously with one another. Cell./PCS CDMA and LTE share the same antenna and cannot transmit simultaneously. 2.4 WLAN has its own antenna and thus can transmit simultaneously with either Cell./PCS CDMA or LTE.

**Figure 1-2**
**Simultaneous Transmission Scenarios**


This device contains multiple transmitters that may operate simultaneously, and therefore requires a simultaneous transmission analysis according to KDB 447498 4) b) iii) procedures.

**Table 1-3**
**Possible Simultaneous Transmission Scenarios Supported by DUT**

| No. | Capable Transmit Configurations | Hot Spot<br>FCC KDB 941225 | Note |
|---|---|---|---|
| 1 | Cell./PCS CDMA/EVDO Data + WIFI 2.4GHz | Yes | Hotspot |
| 2 | LTE Band 2/4/5/12 Data + WIFI 2.4 GHz | Yes | 4G Hotspot |
| 3 | Cell./PCS CDMA/EVDO Data + LTE Band 2/4/5/12 Data | No | N/S by Hardware |
| 4 | Cell./PCS CDMA 1x/EVDO Data + LTE Band 2/4/5/12 Data + 2.4 GHz WIFI | No | N/S by Hardware |

## 1.4 Device Restrictions Applicable for SAR Testing

### (A) CDMA/PCS/LTE Testing

This model does not support Simultaneous Data (CDMA+LTE, 1x CDMA+EVDO) for the licensed transmitter in any modes.

LTE SAR for the lower bandwidths was not tested since the maximum average output power over all channels and configurations was not more than 0.5 dB higher than the highest bandwidth; and LTE SAR for the highest BW was less than 1.45 W/kg for all configurations according to FCC KDB 941225 D05.

### (B) WIFI Testing

Per KDB publication 447498 3) b) ii), since the maximum average output power of the WLAN (IEEE 802.11B) antenna is 34.277 mW and the WLAN and licensed transmitter antenna separation distance is 38 mm, SAR testing for stand-alone WLAN is required.

## 1.5 Power Reduction for SAR

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

## 1.6 Samples Used for SAR Testing

Several samples with identical hardware were used to facilitate SAR testing only.

**Table 1-4**
**SAR Test Sample Serial Numbers**

| Cell/PCS CDMA | LTE Band 12 | LTE Band 5 (Cell) | LTE Band 4 (AWS) | LTE Band 2 (PCS) | 2.4 GHz WLAN |
|---|---|---|---|---|---|
| FCC #2 | FCC #6 | B-U #1 | FCC #4 | B-U #2 | FCC #10 |

## 1.7 FCC Guidance Applied

- FCC OET Bulletin 65 Supplement C [June 2001]
- IEEE 1528-2003
- FCC KDB 941225 (2G/3G/4G) and hotspot
- FCC KDB 248227 (802.11)
- FCC KDB 648474

# 2 LTE CHECKLIST PER FCC KDB 941225 D05

**Table 2-1**
**LTE Checklist per KDB 941225 D05**

| KDB 941225 Section | FCC ID | A3LSCHLC11R | | |
|---|---|---|---|---|
| | Form Factor | Portable Wireless Router | | |
| 1) | Frequency Range of each LTE transmission band | Band: 2 : Tx (1850.7 - 1909.3 MHz) | | |
| | | Band 4: Tx (1712.5 - 1752.5 MHz) | | |
| | | Band 5: Tx (824.7 - 848.3 MHz) | | |
| | | Band 12: Tx (701.5 - 713.5 MHz) | | |
| 2) | Channel Bandwidths | Band 2: (1.4 MHz, 3 MHz, 5 MHz) | | |
| | | Band 4: (5 MHz, 10 MHz) | | |
| | | Band 5: (1.4 MHz, 3 MHz, 5 MHz) | | |
| | | Band 12: (5 MHz, 10 MHz) | | |
| 3) | Channel Numbers and Frequencies (MHz) | Low | Mid | High |
| | LTE Band 2 and BW 1.4 MHz | 1850.7 MHz (18607) | 1880 MHz (18900) | 1909.3 MHz (19193) |
| | LTE Band 2 and BW 3 MHz | 1851.5 MHz (18615) | 1880 MHz (18900) | 1908.5 MHz (19185) |
| | LTE Band 2 and BW 5 MHz | 1852.5 MHz (18625) | 1880 MHz (18900) | 1907.5 MHz (19175) |
| | LTE Band 4 and BW 5 MHz | 1712.5 MHz (19975) | 1732.5 MHz (20175) | 1752.5 MHz (20375) |
| | LTE Band 4 and BW 10 MHz | 1715 MHz (20000) | 1732.5 MHz (20175) | 1750 MHz (20350) |
| | LTE Band 5 and BW 1.4 MHz | 824.7 MHz (20407) | 836.5 MHz (20525) | 848.3 MHz (20643) |
| | LTE Band 5 and BW 3 MHz | 825.5 MHz (20415) | 836.5 MHz (20525) | 847.5 MHz (20635) |
| | LTE Band 5 and BW 5 MHz | 826.5 MHz (20425) | 836.5 MHz (20525) | 846.5 MHz (20625) |
| | LTE Band 12 and BW 5 MHz | 701.5 MHz (23035) | 707.5 MHz (23095) | 713.5 MHz (23155) |
| | LTE Band 12 and BW 10 MHz | 704 MHz (23060) | 707.5 MHz (23095) | 711 MHz (23130) |
| 4)(a) | UE Category | 3 | | |
| (b) | Modulations Supported in UL | QPSK, 16QAM | | |
| | LTE Transmitter and Antenna Implementation | CDMA and LTE share the same antenna | | |
| 5) | Description of LTE Tx and Ant. Implementation | 1 TX/RX Ant; 1 Rx Ant | | |
| 6) | Hotspot with LTE+WIFI | Yes | | |
| 7) | LTE MPR Permanently implemented per 3GPP TS 36.101 section 6.2.3~6.2.5? (manufacturer attestation to be provided) | Yes | | |
| | A-MPR (Additional MPR) disabled for SAR Testing? | Yes | | |
| 8) | Conducted power Table provided for 1RB (low and high offset), 50% RB (centered), 100% RB | Yes | | |
| 9-10) | Non-LTE US Wireless Operating Modes/Band | RF Output Power | RF Exposure Configurations | |
| | 835 MHz CDMA | see page 1 | Hotspot | |
| | 1900 MHz CDMA | | Hotspot | |
| | 2.4 GHz WI-FI | | Hotspot | |
| 11) | Simultaneous Tx Conditions | See Section 1.3 | | |
| 12) | Power Reduction used for SAR Compliance? | No | | |
| 13) | Describe Power Reduction (LTE Modes) | N/A | | |
| 14) | SAR Test Plan | N/A | | |
| 15) | SAR test data, preliminary | N/A | | |

# 3 INTRODUCTION

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

The safety limits used for the environmental evaluation measurements are based on the criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate (SAR) in IEEE/ANSI C95.1-1992 Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz [3] and Health Canada RF Exposure Guidelines Safety Code 6 [24]. The measurement procedure described in IEEE/ANSI C95.3-2002 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave [4] is used for guidance in measuring the Specific Absorption Rate (SAR) due to the RF radiation exposure from the Equipment Under Test (EUT). These criteria for SAR evaluation are similar to those recommended by the International Committee for Non-Ionizing Radiation Protection (ICNIRP) in Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields," Report No. Vol 74. SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards.

## 3.1 SAR Definition

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

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

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

**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]

# 4 TEST SITE LOCATION

## 4.1 INTRODUCTION

The map at the right shows the location of the PCTEST LABORATORY in Columbia, Maryland. It is in proximity to the FCC Laboratory, the Baltimore-Washington International (BWI) airport, the city of Baltimore and Washington, DC.

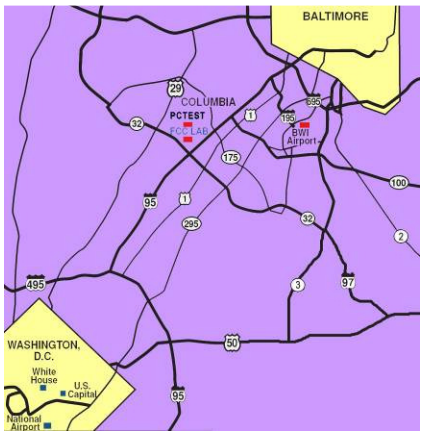



**Figure 4-1**
Map of the Greater Baltimore and Metropolitan Washington, D.C. area

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility in New Concept Business Park, Guilford Industrial Park, Columbia, Maryland. The site address is 6660-B Dobbin Road, Columbia, MD 21045. The test site is one of the highest points in the Columbia area with an elevation of 390 feet above mean sea level. The site coordinates are 39° 11'15" N latitude and 76° 49' 38" W longitude. The facility is 1.5 miles north of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. There are no FM or TV transmitters within 15 miles of the site. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4 on January 27, 2006 and Industry Canada.

## 4.2 Test Facility / Accreditations:

Measurements were performed at an independent accredited PCTEST Engineering Lab located in Columbia, MD 21045, U.S.A.


- PCTEST Lab is accredited to ISO 17025-2005 by the American Association for Laboratory Accreditation (A2LA) in Specific Absorption Rate (SAR) testing, Hearing-Aid Compatibility (HAC), Battery Safety, CTIA Test Plans, and wireless testing for FCC and Industry Canada Rules.
- PCTEST Lab is accredited to ISO 17025 by U.S. National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP Lab code: 100431-0) in EMC, FCC and Telecommunications.
- PCTEST facility is an FCC registered (PCTEST Reg. No. 90864) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules and Industry Canada (IC-2451).
- PCTEST Lab is a recognized U.S. Conformity Assessment Body (CAB) in EMC and R&TTE (n.b. 0982) under the U.S.-EU Mutual Recognition Agreement (MRA).
- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC Guide 65 by the American National Standards Institute (ANSI) in all scopes of FCC Rules and all Industry Canada Standards (RSS).


- PCTEST facility is an IC registered (IC-2451) test laboratory with the site description on file at Industry Canada.
- PCTEST is a CTIA Authorized Test Laboratory (CATL) for AMPS and CDMA, and EvDO mobile phones.
- PCTEST is a CTIA Authorized Test Laboratory (CATL) for Over-the-Air (OTA) Antenna Performance testing for AMPS, CDMA, GSM, GPRS, EGPRS, UMTS (W-CDMA), CDMA 1xEVDO Data, CDMA 1xRTT Data

# 5 SAR MEASUREMENT SETUP

## 5.1 Robotic System

Measurements are performed using the DASY4 and DASY5 automated dosimetric assessment system. The DASY4 and DASY5 are made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland and consists of a high precision robotics system (Staubli), robot controller, desktop computer, near-field probe, probe alignment sensor, and the SAM phantom containing the head or body equivalent material. The robot is a six-axis industrial robot, performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF) (see Figure 5-1).

## 5.2 System Hardware

A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and a remote control used to drive the robot motors. The PC consists of the SAR Measurement Software DASY4 and DASY5, A/D interface card, monitor, mouse, and keyboard. The Staubli Robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit that performs the signal amplification, signal multiplexing, A/D conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal from the DAE and transfers data to the PC card.

## 5.3 System Electronics

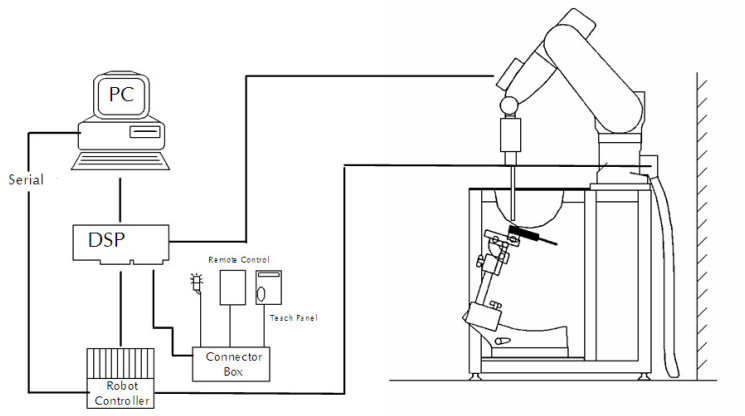



**Figure 5-1**
**SAR Measurement System Setup**

The DAE consists of a highly sensitive electrometer-grade auto-zeroing preamplifier, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer.

## 5.4 Automated Test System Specifications

| | |
|---|---|
| Test Software: | SPEAG DASY4 version 4.7 Measurement Software |
| | SPEAG DASY5 version 52.6 Measurement Software |
| Robot: | Stäubli Unimation Corp. Robot RX60L |
| | Stäubli Unimation Corp. Robot TX90XL |
| Repeatability: | 0.02 mm |
| No. of Axes: | 6 |

Data Acquisition Electronic System (DAE)

Data Converter

| | |
|---|---|
| Features: | Signal Amplifier, multiplexer, A/D converter & control logic |
| Software: | SEMCAD software |
| Connecting Lines: | Optical Downlink for data and status info |
| | Optical upload for commands and clock |

PC Interface Card

| | |
|---|---|
| Function: | Link to DAE |
| | 16-bit A/D converter for surface detection system |
| | Two Serial & Ethernet link to robotics |
| | Direct emergency stop output for robot |

Phantom

| | |
|---|---|
| Type: | SAM Twin Phantom (V4.0 and V5.0) |
| Shell Material: | Composite |
| Thickness: | 2.0 ± 0.2 mm |

**Figure 5-2**
**SAR Measurement System**

# 6 DASY E-FIELD PROBE SYSTEM

## 6.1 Probe Measurement System

**Figure 6-1**
**SAR System**

The SAR measurements were conducted with the dosimetric probe designed in the classical triangular configuration (see Figure 6-3) and optimized for dosimetric evaluation [9]. The probe is constructed using the thick film technique; with printed resistive lines on ceramic substrates. The probe is equipped with an optical multi-fiber line ending at the front of the probe tip. It is connected to the EOC box on the robot arm and provides an automatic detection of the phantom surface. Half of the fibers are connected to a pulsed infrared transmitter, the other half to a synchronized receiver. As the probe approaches the surface, the reflection from the surface produces a coupling from the transmitting to the receiving fibers. This reflection increases first during the approach, reaches maximum and then decreases. If the probe is flatly touching the surface, the coupling is zero. The distance of the coupling maximum to the surface is independent of the surface reflectivity and largely independent of the surface to probe angle. The DASY4 software reads the reflection during a software approach and looks for the maximum using a 2nd order curve fitting (see Figure 7-1). The approach is stopped at reaching the maximum.

## 6.2 Probe Specifications

| | |
|---|---|
| **Model(s):** | ES3DV2, ES3DV3, EX3DV4 |
| **Frequency Range:** | 10 MHz – 6.0 GHz (EX3DV4)<br>10 MHz – 4 GHz (ES3DV3, ES3DV2) |
| **Calibration:** | In head and body simulating tissue at Frequencies from 300 up to 6000MHz |
| **Linearity:** | ± 0.2 dB (30 MHz to 6 GHz) for EX3DV4<br>± 0.2 dB (30 MHz to 4 GHz) for ES3DV3, ES3DV2 |
| **Dynamic Range:** | 10 µW/kg – 100 W/kg |
| **Probe Length:** | 330 mm |
| **Probe Tip Length:** | 20 mm |
| **Body Diameter:** | 12 mm |
| **Tip Diameter:** | 2.5 mm (3.9mm for ES3DV3) |
| **Tip-Center:** | 1 mm (2.0 mm for ES3DV3) |
| **Application:** | SAR Dosimetry Testing<br>Compliance tests of mobile phones<br>Dosimetry in strong gradient fields |

**Figure 6-2**
**Near-Field Probe**

**Figure 6-3**
**Triangular Probe Configuration**

# 7 PROBE CALIBRATION PROCESS

## 7.1 Dosimetric Assessment Procedure

Each E-Probe/Probe Amplifier combination has unique calibration parameters. A TEM cell calibration procedure is conducted to determine the proper amplifier settings to enter in the probe parameters. The amplifier settings are determined for a given frequency by subjecting the probe to a known E-field density (1 mW/cm$^2$) using an RF Signal generator, TEM cell, and RF Power Meter.

## 7.2 Free Space Assessment

The free space E-field from amplified probe outputs is determined in a test chamber. This calibration can be performed in a TEM cell if the frequency is below 1 GHz and in a waveguide or other methodologies above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is rotated 360 degrees until the three channels show the maximum reading. The power density readings equates to 1 mW/cm$^2$.

## 7.3 Temperature Assessment

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated head tissue. The E-field in the medium correlates with the temperature rise in the dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

$$SAR = C\frac{\Delta T}{\Delta t}$$

where:

$\Delta t$ = exposure time (30 seconds),
C = heat capacity of tissue (brain or muscle),
$\Delta T$ = temperature increase due to RF exposure.

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

where:

$\sigma$ = simulated tissue conductivity,
$\rho$ = Tissue density (1.25 g/cm$^3$ for brain tissue)

SAR is proportional to $\Delta T/\Delta t$, the initial rate of tissue heating, before thermal diffusion takes place. The electric field in the simulated tissue can be used to estimate SAR by equating the thermally derived SAR to that with the E- field component.

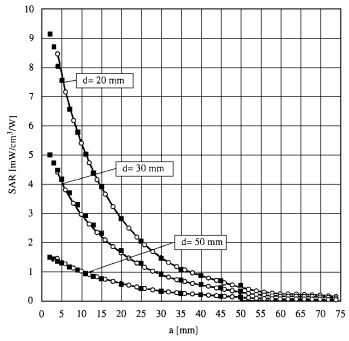



**Figure 7-1 E-Field and Temperature measurements at 900MHz [9]**

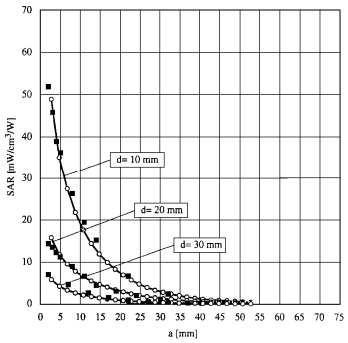



**Figure 7-2 E-Field and temperature measurements at 1.9GHz [9]**

# 8 PHANTOM AND EQUIVALENT TISSUES

## 8.1 SAM Phantoms

**Figure 8-1**
**SAM Phantoms**

The SAM Twin Phantom V4.0 and V5.0 is constructed of a fiberglass shell integrated in a table. The shape of the shell is based on data from an anatomical study designed to represent the 90$^{th}$ percentile of the population [12][13]. The phantom enables the dosimetric evaluation of SAR for both left and right handed handset usage, as well as body-worn usage using the flat phantom region. Reference markings on the Phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot. The shell phantom has a 2mm shell thickness (except the ear region where shell thickness increases to 6 mm).

## 8.2 Tissue Simulating Mixture Characterization

**Figure 8-2**
**SAM Phantom with Simulating Tissue**

The mixture is characterized to obtain proper dielectric constant (permittivity) and conductivity of the tissue of interest. The tissue dielectric parameters recommended in IEEE 1528 and IEC 62209 have been used as targets for the compositions, and are to match within 5%, per the FCC recommendations.

**Table 8-1**
**Composition of the Tissue Equivalent Matter**

| Frequency (MHz) | 835 | 1750 | 1900 | 2450 |
|---|---|---|---|---|
| Tissue | Body | Body | Body | Body |
| Ingredients (% by weight) | | | | |
| Bactericide | 0.1 | | | |
| DGBE | | 31 | 29.44 | 26.7 |
| HEC | 1 | | | |
| NaCl | 0.94 | 0.2 | 0.39 | 0.1 |
| Sucrose | 44.9 | | | |
| Triton X-100 | | | | |
| Water | 53.06 | 68.8 | 70.17 | 73.2 |

See next page for 750 MHz Tissue Composition

**Table 8-2**
Composition of 750 MHz Body Tissue Equivalent Matter

| 2 Composition / Information on ingredients | |
|---|---|
| The Item is composed of the following ingredients: | |
| $H_2O$ | Water, 35 – 58% |
| Sucrose | Sugar, white, refined, 40 – 60% |
| NaCl | Sodium Chloride, 0 – 6% |
| Hydroxyethyl-cellulose | Medium Viscosity (CAS# 9004-62-0), <0.3% |
| Preventol-D7 | Preservative: aqueous preparation, (CAS# 55965-84-9), containing 5-chloro-2-methyl-3(2H)-isothiazolone and 2-methyyl-3(2H)-isothiazolone, 0.1 – 0.7%<br>Relevant for safety; Refer to the respective Safety Data Sheet*. |

**Note:** 750MHz liquid recipes are proprietary SPEAG. The composition is approximate to the actual liquids utilized. Thus the manufacturer production sheets are provided below.

**Measurement Certificate / Material Test**

| | |
|---|---|
| Item Name | **Body Tissue Simulating Liquid (MSL 750)** |
| Product No. | SL AAM 075 AA (Charge: 110606-1) |
| Manufacturer | SPEAG |

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

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

**Test Condition**

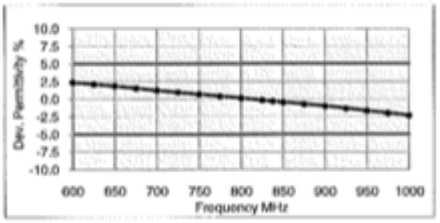
| | |
|---|---|
| Ambient Condition | 22°C ; 30% humidity |
| TSL Temperature | 22°C |
| Test Date | 8-Jun-11 |

**Additional Information**

| | |
|---|---|
| TSL Density | 1.212 g/cm³ |
| TSL Heat-capacity | 3.006 kJ/(kg*K) |

**Results**

| | Measured | | | Target | | Diff.to Target [%] | |
|---|---|---|---|---|---|---|---|
| f [MHz] | HP-e' | HP-e" | sigma | eps | sigma | Δ-eps | Δ-sigma |
| 600 | 57.4 | 24.88 | 0.83 | 56.1 | 0.95 | 2.4 | -12.7 |
| 625 | 57.2 | 24.53 | 0.85 | 56.0 | 0.95 | 2.1 | -10.6 |
| 650 | 57.0 | 24.18 | 0.87 | 55.9 | 0.96 | 1.8 | -8.5 |
| 675 | 56.7 | 23.90 | 0.90 | 55.8 | 0.96 | 1.5 | -6.3 |
| 700 | 56.4 | 23.61 | 0.92 | 55.7 | 0.96 | 1.2 | -4.2 |
| 725 | 56.2 | 23.37 | 0.94 | 55.6 | 0.96 | 0.9 | -2.0 |
| 750 | 55.9 | 23.12 | 0.96 | 55.5 | 0.96 | 0.7 | 0.1 |
| 775 | 55.7 | 22.95 | 0.99 | 55.4 | 0.97 | 0.4 | 2.5 |
| 800 | 55.4 | 22.78 | 1.01 | 55.3 | 0.97 | 0.1 | 4.8 |
| 825 | 55.2 | 22.61 | 1.04 | 55.2 | 0.98 | -0.2 | 6.1 |
| 838 | 55.0 | 22.52 | 1.05 | 55.2 | 0.98 | -0.3 | 6.7 |
| 850 | 54.9 | 22.44 | 1.06 | 55.2 | 0.99 | -0.4 | 7.3 |
| 875 | 54.7 | 22.30 | 1.09 | 55.1 | 1.02 | -0.7 | 6.5 |
| 900 | 54.5 | 22.17 | 1.11 | 55.0 | 1.05 | -1.0 | 5.7 |
| 925 | 54.2 | 22.05 | 1.13 | 55.0 | 1.06 | -1.3 | 6.8 |
| 950 | 54.0 | 21.94 | 1.16 | 54.9 | 1.08 | -1.7 | 7.8 |
| 975 | 53.8 | 21.85 | 1.18 | 54.9 | 1.09 | -2.0 | 9.0 |
| 1000 | 53.6 | 21.75 | 1.21 | 54.8 | 1.10 | -2.3 | 10.2 |



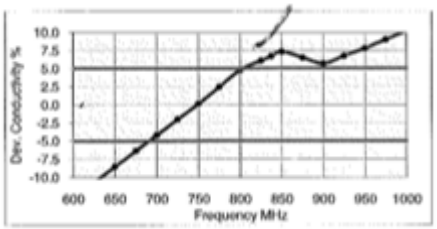




**Figure 8-3**
**750MHz Body Tissue Equivalent Matter**

# 9 DOSIMETRIC ASSESSMENT & PHANTOM SPECS

## 9.1 Measurement Procedure

The evaluation was performed using the following procedure:

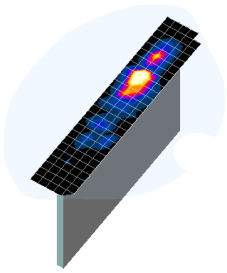


**Figure 9-1**
**Sample SAR Area Scan**

1. The SAR distribution area was ensured to cover the entire dimension of the body phantom area with the DUT positioned under the phantom. The horizontal grid resolution was 15mm x 15mm.
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 testing the 1 gram cube. This fixed point was measured and used as a reference value.
3. Based on the area scan data, the area of the maximum absorption was determined by spline interpolation. Around this point, a volume of 32mm x 32mm x 30mm (fine resolution volume scan, zoom scan) was assessed by measuring 5 x 5 x 7 points. On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure (see references or the DASY manual for more details):
   a. The data was extrapolated to the surface of the outer-shell of the phantom. The combined distance extrapolated was the combined distance from the center of the dipoles 2.7mm away from the tip of the probe housing plus the 1.2 mm distance between the surface and the lowest measuring point. The extrapolation was based on a least-squares algorithm. A polynomial of the fourth order was calculated through the points in the z-axis (normal to the phantom shell).
   b. After the maximum interpolated values were calculated between the points in the cube, the SAR was averaged over the spatial volume (1g or 10g) using a 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the "Not a knot" condition (in x, y, and z directions). The volume was then integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were obtained through interpolation, in order to calculate the averaged SAR.
   c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.
4. The SAR reference value, at the same location as step 2, was re-measured after the zoom scan was complete to calculate the SAR drift. If the drift deviated by more than 5%, the SAR test and drift measurements were repeated.

## 9.2 Specific Anthropomorphic Mannequin (SAM) Specifications

The phantom for wireless data device SAR assessment testing is a low-loss dielectric shell, with shape and dimensions derived from the anthropometric data of the 90th percentile adult male head dimensions as tabulated by the US Army. The SAM Twin Phantom shell is bisected along the mid-sagittal plane into right and left halves (see Figure 9-2). The perimeter sidewalls of each phantom halves are extended to allow filling with liquid to a depth that is sufficient to minimize reflections from the upper surface. The liquid depth is maintained at a minimum depth of 15 cm.

## 9.3 Device Holder

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

**Figure 9-2**
**SAM Twin Phantom Shell**

# 10 FCC RF EXPOSURE LIMITS

## 10.1 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.

## 10.2 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 10-1**
**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) |
| SPATIAL PEAK SAR Brain | 1.6 | 8.0 |
| SPATIAL AVERAGE SAR Whole Body | 0.08 | 0.4 |
| SPATIAL PEAK SAR Hands, Feet, Ankles, Wrists | 4.0 | 20 |

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

# 11 FCC MEASUREMENT PROCEDURES

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

## 11.1 Procedures Used to Establish RF Signal for SAR

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

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

## 11.2 SAR Measurement Conditions for CDMA2000

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

### 11.2.1 Output Power Verification

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

1. If the mobile station (MS) supports Reverse TCH RC 1 and Forward TCH RC 1, set up a call using Fundamental Channel Test Mode 1 (RC=1/1) with 9600 bps data rate only.
2. Under RC1, C.S0011 Table 4.4.5.2-1, Table 11-1 parameters were applied.
3. If the MS supports the RC 3 Reverse FCH, RC3 Reverse $SCH_0$ and demodulation of RC 3,4, or 5, set up a call using Supplemental Channel Test Mode 3 (RC 3/3) with 9600 bps Fundamental Channel and 9600 bps SCH0 data rate.
4. Under RC3, C.S0011 Table 4.4.5.2-2, Table 11-2 was applied.
5. FCHs were configured at full rate for maximum SAR with "All Up" power control bits.

**Table 11-1**
**Parameters for Max. Power for RC1**

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

**Table 11-2**
**Parameters for Max. Power for RC3**

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

### 11.2.2 Body SAR Measurements for EVDO Hotspot

Hotspot Body SAR is measured using Subtype 0/1 Physical Layer configurations for Rev. 0 per KDB Publication 941225 D01 procedures for "1x Ev-Do data Devices". SAR for Subtype 2 Physical layer configurations is not required for Rev. A when the maximum average output of each RF channels is less than that measured in Subtype 0/1 Physical layer configurations. Otherwise, SAR is measured on the maximum output channel for Rev. A using the exposure

configuration that results in the highest SAR for the RF channels in Rev. 0. The AT is tested with a Reverse Data Channel rate of 153.6 kbps in Subtype 0/1 Physical Layer configurations; and a Reverse Data Channel payload size of 4096 bits and Termination Target of 16 slots in Subtype 2 Physical Layer configurations. Both FTAP and FETAP are configured with a Forward Traffic Channel data rate corresponding to the 2-slot version of 307.2 kbps with the ACK Channel transmitting in all slots. AT power control should be in "All Bits Up" conditions for TAP/ETAP

SAR is not required for 1x RTT for Ev-Do devices that also support 1x RTT voice and/or data operations, when the maximum average output of each channel is less than ¼ dB higher than that measured in Subtype 0/1 Physical Layer configurations for Rev. 0. Otherwise, CDMA "Body-SAR Measurement" procedures for "CDMA 2000 1x Handsets" were applied.

### 11.2.3 Body SAR Measurements for CDMA2000 1x Devices

SAR for body exposure configurations is measured in RC3 with the DUT configured to transmit at full rate on FCH with all other code channels disabled using TDSO / SO32. SAR for multiple code channels (FCH + $SCH_n$) is not required when the maximum average output of each RF channel is less than ¼ dB higher than that measured with FCH only. Otherwise, SAR is measured on the maximum output channel (FCH + $SCH_n$) with FCH at full rate and $SCH_0$ enabled at 9600 bps using the exposure configuration that results in the highest SAR for that channel with FCH only. When multiple code channels are enabled, the DUT output may shift by more than 0.5 dB and lead to higher SAR drifts and SCH dropouts. Body SAR was measured using TDSO / SO32 with power control bits in the "All Up"

## 11.3 SAR Measurement Conditions for LTE

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

### 11.3.1 MPR

MPR is 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. The differences noted are not cases of implemented MPR but rather associated with measurement uncertainty and allowable tolerances per 3GPP standard and the manufacturer.

### 11.3.2 A-MPR

A-MPR (Additional MPR) has been disabled for all SAR tests

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

According to FCC KDB 941225 D05:

a. Per Page 4, 3) A), QPSK with 50% RB is required for the highest bandwidth.
b. Per Page 4, footnote 2, when the maximum output power across high, mid., and low channels is < 0.5 dB, mid channel is tested. Low and high channel SAR tests are not required for QPSK, 50% RB allocation when the SAR is < 0.8 W/kg. When less than 3 channels are required based on the size of the maximum bandwidth per KDB Pub 447498 6)c), the channel with maximum output power was evaluated.
c. Per Page 4, 3) B), QPSK with 1 RB for both channel edges are required for the highest bandwidth.
d. Per Page 4, footnote 6, QPSK 1 RB allocation SAR tests were performed on the highest output power channel for the RB allocation when the average output power of the 1 RB allocation was > 0.5 dB higher than the 50% RB allocation for QPSK. Otherwise, SAR tests are performed on the channel that produced the highest SAR for QPSK with 50% RB.
e. Per Page 4, 3) B), I), when the SAR for QPSK 1 RB allocation tests is <1.45 W/kg, testing on the other channels is not required.
f. Per Page 4, 4) A), 16QAM with 50% RB is required for the highest bandwidth on the channel with the highest measured SAR for QPSK with 50% RB allocation.
g. Per Page 4, 4) A), I), when the SAR for 16 QAM, 50 % allocation tests is <1.45 W/kg, testing on the other channels is not required.
h. Per Page 4, 4) B) and Page 5 footnote 9, 16QAM with 1RB for both channel edges are required for the highest bandwidth on the highest output power channel for the 1 RB allocation when the average output power of the 1 RB allocation is >0.5 dB higher than the 50% allocation for 16 QAM. Otherwise, SAR tests are performed on the channel that produced the highest SAR for 16 QAM with 50% RB.
i. Per Page 5, 4) B), I), when the SAR for 16 QAM 1 RB allocation tests is <1.45 W/kg, testing on the other channels is not required.
j. Per Page 4, 4), A) I) and Page 5, 4), A)I, 100% RB Allocation is not required to be tested when the SAR is not > 1.45 W/kg for the highest bandwidth.
k. Per Page 5, 5) B) I), LTE SAR for the lower bandwidths was not tested since the maximum average output power over all channels and configurations was not more than 0.5 dB higher than the highest bandwidth.

## 11.4 SAR Testing with 802.11 Transmitters

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

### 11.4.1 General Device Setup

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

### 11.4.2 Frequency Channel Configurations [27]

802.11 b/g/n operating modes are tested independently according to the service requirements in each frequency band. 802.11 b/g/n modes are tested on channels 1, 6 and 11. These are referred to as the "default test channels". For 2.4 GHz, 802.11g/n modes were evaluated only if the output power was 0.25 dB higher than the 802.11b mode. When the maximum extrapolated peak SAR of the zoom scan for the maximum output channel is <1.6 W/kg and the 1g averaged SAR is <0.8 W/kg, SAR testing on other channels is not required. Otherwise, the other default (or corresponding required) test channels were additionally tested using the lowest data rate.

**Table 11-3**
**802.11 Test Channels per FCC KDB Publication 248227**

| Mode | GHz | Channel | Turbo Channel | "Default Test Channels" | | | |
|---|---|---|---|---|---|---|---|
| | | | | §15.247 | | UNII | |
| | | | | 802.11b | 802.11g | | |
| 802.11 b/g | 2.412 | 1 | | √ | ∇ | | |
| | 2.437 | 6 | 6 | √ | ∇ | | |
| | 2.462 | 11 | | √ | ∇ | | |

## 11.5 Personal Wireless Router Considerations

Some battery-operated devices have the capability to transmit and receive internet connectivity through simultaneous transmission of WIFI in conjunction with a separate licensed transmitter. The FCC has provided guidance in KDB Publication 941225 D06 where SAR test considerations for devices (L x W ≥ 9 cm x 5 cm) are based on a composite test separation distance of 10 mm from the front, back and edges of the device with antennas 2.5 cm or closer to the edge of the device, determined from general mixed use conditions for this type of devices. Since the device meets the given size constraints, the aforementioned procedure was followed for SAR testing.

## 11.6 SAR Test Setup for Personal Wireless Router Features

When the user enables the personal wireless router functions for the device, actual operations include simultaneous transmission of both the WIFI transmitter and another licensed transmitter. Both transmitters often do not transmit at the same transmitting frequency and thus cannot be evaluated for SAR under actual use conditions. Therefore, SAR must be evaluated for each frequency transmission and mode separately and summed with the WIFI transmitter according to KDB 648474 publication procedures. The "Portable Hotspot" feature on the device was NOT activated, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal.

### 12.1.1 CDMA Conducted Powers

**Table 12-1**
**CDMA Average RF Power**

| Band | Channel | Frequency | TDSO SO32 [dBm] | TDSO SO32 [dBm] | 1x EvDO Rev. 0 [dBm] | 1x EvDO Rev. A [dBm] |
|---|---|---|---|---|---|---|
| | F-RC | MHz | FCH+SCH | FCH | (RTAP) | (RETAP) |
| Cellular | 1013 | 824.7 | 24.56 | 24.58 | 24.08 | 24.07 |
| | 384 | 836.52 | 24.52 | 24.53 | 24.11 | 24.10 |
| | 777 | 848.31 | 24.44 | 24.45 | 23.92 | 23.91 |
| PCS | 25 | 1851.25 | 24.58 | 24.67 | 24.30 | 24.27 |
| | 600 | 1880 | 24.41 | 24.44 | 24.31 | 24.28 |
| | 1175 | 1908.75 | 24.20 | 24.22 | 23.91 | 23.90 |

Per KDB Publication 941225 D01:

1. SAR was tested with 1x RTT with TDSO / SO32 FCH Only. Ev-Do and TDSO / SO32 FCH+SCH SAR tests were not required since the maximum average output power was not more than 0.25 dB higher than the maximum average TDSO / SO32 FCH only powers.


**Figure 12-1**
**Power Measurement Setup**

## 12.2 LTE Conducted Powers

### 12.2.1 LTE Band 12

**Table 12-2**
**LTE Band 12 Average RF Power**

**5 MHz Bandwidth**

| | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | Target MPR [dB] | Allowed per 3GPP [dB] |
|---|---|---|---|---|---|---|---|---|---|
| Low | 701.5 | 23025 | 5 | QPSK | 1 | 0 | 22.63 | 0 | 0 |
| | 701.5 | 23025 | 5 | QPSK | 1 | 24 | 22.45 | 0 | 0 |
| | 701.5 | 23025 | 5 | QPSK | 12 | 6 | 21.64 | 1 | 0-1 |
| | 701.5 | 23025 | 5 | QPSK | 25 | 0 | 21.66 | 1 | 0-1 |
| | 701.5 | 23025 | 5 | 16-QAM | 1 | 0 | 21.40 | 1 | 0-1 |
| | 701.5 | 23025 | 5 | 16-QAM | 1 | 24 | 21.34 | 1 | 0-1 |
| | 701.5 | 23025 | 5 | 16-QAM | 12 | 6 | 20.44 | 2 | 0-2 |
| | 701.5 | 23025 | 5 | 16-QAM | 25 | 0 | 20.78 | 2 | 0-2 |
| Mid | 707.5 | 23085 | 5 | QPSK | 1 | 0 | 22.17 | 0 | 0 |
| | 707.5 | 23085 | 5 | QPSK | 1 | 24 | 22.31 | 0 | 0 |
| | 707.5 | 23085 | 5 | QPSK | 12 | 6 | 21.58 | 1 | 0-1 |
| | 707.5 | 23085 | 5 | QPSK | 25 | 0 | 21.46 | 1 | 0-1 |
| | 707.5 | 23085 | 5 | 16-QAM | 1 | 0 | 21.29 | 1 | 0-1 |
| | 707.5 | 23085 | 5 | 16-QAM | 1 | 24 | 21.09 | 1 | 0-1 |
| | 707.5 | 23085 | 5 | 16-QAM | 12 | 6 | 20.37 | 2 | 0-2 |
| | 707.5 | 23085 | 5 | 16-QAM | 25 | 0 | 20.60 | 2 | 0-2 |
| High | 713.5 | 23145 | 5 | QPSK | 1 | 0 | 22.29 | 0 | 0 |
| | 713.5 | 23145 | 5 | QPSK | 1 | 24 | 22.56 | 0 | 0 |
| | 713.5 | 23145 | 5 | QPSK | 12 | 6 | 21.51 | 1 | 0-1 |
| | 713.5 | 23145 | 5 | QPSK | 25 | 0 | 21.56 | 1 | 0-1 |
| | 713.5 | 23145 | 5 | 16-QAM | 1 | 0 | 21.19 | 1 | 0-1 |
| | 713.5 | 23145 | 5 | 16-QAM | 1 | 24 | 21.43 | 1 | 0-1 |
| | 713.5 | 23145 | 5 | 16-QAM | 12 | 6 | 20.20 | 2 | 0-2 |
| | 713.5 | 23145 | 5 | 16-QAM | 25 | 0 | 20.52 | 2 | 0-2 |

**Table 12-3**
**LTE Band 12 Average RF Power**

**10 MHz Bandwidth**

| | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | Target MPR [dB] | Allowed per 3GPP [dB] |
|---|---|---|---|---|---|---|---|---|---|
| Low | 704 | 23050 | 10 | QPSK | 1 | 0 | 22.65 | 0 | 0 |
| | 704 | 23050 | 10 | QPSK | 1 | 49 | 22.66 | 0 | 0 |
| | 704 | 23050 | 10 | QPSK | 25 | 12 | 21.54 | 1 | 0-1 |
| | 704 | 23050 | 10 | QPSK | 50 | 0 | 21.44 | 1 | 0-1 |
| | 704 | 23050 | 10 | 16QAM | 1 | 0 | 21.32 | 1 | 0-1 |
| | 704 | 23050 | 10 | 16QAM | 1 | 49 | 21.19 | 1 | 0-1 |
| | 704 | 23050 | 10 | 16QAM | 25 | 12 | 20.99 | 2 | 0-2 |
| | 704 | 23050 | 10 | 16QAM | 50 | 0 | 20.54 | 2 | 0-2 |
| Mid | 707.5 | 23085 | 10 | QPSK | 1 | 0 | **22.68** | 0 | 0 |
| | 707.5 | 23085 | 10 | QPSK | 1 | 49 | **22.45** | 0 | 0 |
| | 707.5 | 23085 | 10 | QPSK | 25 | 12 | **21.70** | 1 | 0-1 |
| | 707.5 | 23085 | 10 | QPSK | 50 | 0 | 21.60 | 1 | 0-1 |
| | 707.5 | 23085 | 10 | 16QAM | 1 | 0 | **21.58** | 1 | 0-1 |
| | 707.5 | 23085 | 10 | 16QAM | 1 | 49 | **21.35** | 1 | 0-1 |
| | 707.5 | 23085 | 10 | 16QAM | 25 | 12 | **20.80** | 2 | 0-2 |
| | 707.5 | 23085 | 10 | 16QAM | 50 | 0 | 20.83 | 2 | 0-2 |
| High | 711 | 23120 | 10 | QPSK | 1 | 0 | 22.67 | 0 | 0 |
| | 711 | 23120 | 10 | QPSK | 1 | 49 | 22.55 | 0 | 0 |
| | 711 | 23120 | 10 | QPSK | 25 | 12 | 21.38 | 1 | 0-1 |
| | 711 | 23120 | 10 | QPSK | 50 | 0 | 21.34 | 1 | 0-1 |
| | 711 | 23120 | 10 | 16QAM | 1 | 0 | 21.57 | 1 | 0-1 |
| | 711 | 23120 | 10 | 16QAM | 1 | 49 | 21.34 | 1 | 0-1 |
| | 711 | 23120 | 10 | 16QAM | 25 | 12 | 20.98 | 2 | 0-2 |
| | 711 | 23120 | 10 | 16QAM | 50 | 0 | 20.55 | 2 | 0-2 |

## 12.2.2 LTE Band 5 (Cell)

**Table 12-4**
**LTE Band 5 (Cell) Average RF Power**

**1.4 MHz Bandwidth**

| | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | Target MPR [dB] | Allowed per 3GPP [dB] |
|---|---|---|---|---|---|---|---|---|---|
| Low | 824.7 | 20407 | 1.4 | QPSK | 1 | 0 | 22.67 | 0 | 0 |
| | 824.7 | 20407 | 1.4 | QPSK | 1 | 5 | 22.78 | 0 | 0 |
| | 824.7 | 20407 | 1.4 | QPSK | 3 | 2 | 22.76 | 0 | 0 |
| | 824.7 | 20407 | 1.4 | QPSK | 6 | 0 | 21.70 | 1 | 0-1 |
| | 824.7 | 20407 | 1.4 | 16-QAM | 1 | 0 | 21.70 | 1 | 0-1 |
| | 824.7 | 20407 | 1.4 | 16-QAM | 1 | 5 | 21.75 | 1 | 0-1 |
| | 824.7 | 20407 | 1.4 | 16-QAM | 3 | 2 | 21.98 | 1 | 0-1 |
| | 824.7 | 20407 | 1.4 | 16-QAM | 6 | 0 | 20.99 | 2 | 0-2 |
| Mid | 836.5 | 20525 | 1.4 | QPSK | 1 | 0 | 22.77 | 0 | 0 |
| | 836.5 | 20525 | 1.4 | QPSK | 1 | 5 | 22.72 | 0 | 0 |
| | 836.5 | 20525 | 1.4 | QPSK | 3 | 2 | 21.78 | 0 | 0 |
| | 836.5 | 20525 | 1.4 | QPSK | 6 | 0 | 21.75 | 1 | 0-1 |
| | 836.5 | 20525 | 1.4 | 16-QAM | 1 | 0 | 21.71 | 1 | 0-1 |
| | 836.5 | 20525 | 1.4 | 16-QAM | 1 | 5 | 21.91 | 1 | 0-1 |
| | 836.5 | 20525 | 1.4 | 16-QAM | 3 | 2 | 21.01 | 1 | 0-1 |
| | 836.5 | 20525 | 1.4 | 16-QAM | 6 | 0 | 20.93 | 2 | 0-2 |
| High | 848.3 | 20643 | 1.4 | QPSK | 1 | 0 | 22.65 | 0 | 0 |
| | 848.3 | 20643 | 1.4 | QPSK | 1 | 5 | 22.68 | 0 | 0 |
| | 848.3 | 20643 | 1.4 | QPSK | 3 | 2 | 22.71 | 0 | 0 |
| | 848.3 | 20643 | 1.4 | QPSK | 6 | 0 | 21.75 | 1 | 0-1 |
| | 848.3 | 20643 | 1.4 | 16-QAM | 1 | 0 | 21.60 | 1 | 0-1 |
| | 848.3 | 20643 | 1.4 | 16-QAM | 1 | 5 | 21.63 | 1 | 0-1 |
| | 848.3 | 20643 | 1.4 | 16-QAM | 3 | 2 | 21.94 | 1 | 0-1 |
| | 848.3 | 20643 | 1.4 | 16-QAM | 6 | 0 | 20.99 | 2 | 0-2 |

**Table 12-5**
**LTE Band 5 (Cell) Average RF Power**

**3 MHz Bandwidth**

| | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | Target MPR [dB] | Allowed per 3GPP [dB] |
|---|---|---|---|---|---|---|---|---|---|
| Low | 825.5 | 20415 | 3 | QPSK | 1 | 0 | 22.62 | 0 | 0 |
| | 825.5 | 20415 | 3 | QPSK | 1 | 14 | 22.74 | 0 | 0 |
| | 825.5 | 20415 | 3 | QPSK | 8 | 4 | 21.66 | 1 | 0-1 |
| | 825.5 | 20415 | 3 | QPSK | 15 | 0 | 21.76 | 1 | 0-1 |
| | 825.5 | 20415 | 3 | 16-QAM | 1 | 0 | 21.54 | 1 | 0-1 |
| | 825.5 | 20415 | 3 | 16-QAM | 1 | 14 | 21.68 | 1 | 0-1 |
| | 825.5 | 20415 | 3 | 16-QAM | 8 | 4 | 20.98 | 2 | 0-2 |
| | 825.5 | 20415 | 3 | 16-QAM | 15 | 0 | 20.61 | 2 | 0-2 |
| Mid | 836.5 | 20525 | 3 | QPSK | 1 | 0 | 22.74 | 0 | 0 |
| | 836.5 | 20525 | 3 | QPSK | 1 | 14 | 22.73 | 0 | 0 |
| | 836.5 | 20525 | 3 | QPSK | 8 | 4 | 21.75 | 1 | 0-1 |
| | 836.5 | 20525 | 3 | QPSK | 15 | 0 | 21.71 | 1 | 0-1 |
| | 836.5 | 20525 | 3 | 16-QAM | 1 | 0 | 21.51 | 1 | 0-1 |
| | 836.5 | 20525 | 3 | 16-QAM | 1 | 14 | 21.59 | 1 | 0-1 |
| | 836.5 | 20525 | 3 | 16-QAM | 8 | 4 | 20.98 | 2 | 0-2 |
| | 836.5 | 20525 | 3 | 16-QAM | 15 | 0 | 20.61 | 2 | 0-2 |
| High | 847.5 | 20635 | 3 | QPSK | 1 | 0 | 22.59 | 0 | 0 |
| | 847.5 | 20635 | 3 | QPSK | 1 | 14 | 22.72 | 0 | 0 |
| | 847.5 | 20635 | 3 | QPSK | 8 | 4 | 21.65 | 1 | 0-1 |
| | 847.5 | 20635 | 3 | QPSK | 15 | 0 | 21.62 | 1 | 0-1 |
| | 847.5 | 20635 | 3 | 16-QAM | 1 | 0 | 21.53 | 1 | 0-1 |
| | 847.5 | 20635 | 3 | 16-QAM | 1 | 14 | 21.34 | 1 | 0-1 |
| | 847.5 | 20635 | 3 | 16-QAM | 8 | 4 | 20.85 | 2 | 0-2 |
| | 847.5 | 20635 | 3 | 16-QAM | 15 | 0 | 20.52 | 2 | 0-2 |

## Table 12-6
## LTE Band 5 (Cell) Average RF Power

**5 MHz Bandwidth**

| | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | Target MPR [dB] | Allowed per 3GPP [dB] |
|---|---|---|---|---|---|---|---|---|---|
| Low | 826.5 | 20425 | 5 | QPSK | 1 | 0 | **22.90** | 0 | 0 |
| | 826.5 | 20425 | 5 | QPSK | 1 | 24 | **22.75** | 0 | 0 |
| | 826.5 | 20425 | 5 | QPSK | 12 | 6 | **21.90** | 1 | 0-1 |
| | 826.5 | 20425 | 5 | QPSK | 25 | 0 | 21.95 | 1 | 0-1 |
| | 826.5 | 20425 | 5 | 16-QAM | 1 | 0 | **21.88** | 1 | 0-1 |
| | 826.5 | 20425 | 5 | 16-QAM | 1 | 24 | **21.82** | 1 | 0-1 |
| | 826.5 | 20425 | 5 | 16-QAM | 12 | 6 | **20.73** | 2 | 0-2 |
| | 826.5 | 20425 | 5 | 16-QAM | 25 | 0 | 20.97 | 2 | 0-2 |
| Mid | 836.5 | 20525 | 5 | QPSK | 1 | 0 | 22.35 | 0 | 0 |
| | 836.5 | 20525 | 5 | QPSK | 1 | 24 | 22.39 | 0 | 0 |
| | 836.5 | 20525 | 5 | QPSK | 12 | 6 | 21.85 | 1 | 0-1 |
| | 836.5 | 20525 | 5 | QPSK | 25 | 0 | 21.77 | 1 | 0-1 |
| | 836.5 | 20525 | 5 | 16-QAM | 1 | 0 | 21.47 | 1 | 0-1 |
| | 836.5 | 20525 | 5 | 16-QAM | 1 | 24 | 21.68 | 1 | 0-1 |
| | 836.5 | 20525 | 5 | 16-QAM | 12 | 6 | 20.77 | 2 | 0-2 |
| | 836.5 | 20525 | 5 | 16-QAM | 25 | 0 | 20.94 | 2 | 0-2 |
| High | 846.5 | 20625 | 5 | QPSK | 1 | 0 | 22.77 | 0 | 0 |
| | 846.5 | 20625 | 5 | QPSK | 1 | 24 | 22.75 | 0 | 0 |
| | 846.5 | 20625 | 5 | QPSK | 12 | 6 | 21.84 | 1 | 0-1 |
| | 846.5 | 20625 | 5 | QPSK | 25 | 0 | 21.90 | 1 | 0-1 |
| | 846.5 | 20625 | 5 | 16-QAM | 1 | 0 | 21.70 | 1 | 0-1 |
| | 846.5 | 20625 | 5 | 16-QAM | 1 | 24 | 21.70 | 1 | 0-1 |
| | 846.5 | 20625 | 5 | 16-QAM | 12 | 6 | 20.65 | 2 | 0-2 |
| | 846.5 | 20625 | 5 | 16-QAM | 25 | 0 | 20.95 | 2 | 0-2 |

### 12.2.3 LTE Band 4 (AWS)

## Table 12-7
## LTE Band 4 (AWS) Average RF Power

**5 MHz Bandwidth**

| | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | Target MPR [dB] | Maximum MPR Allowed per 3GPP [dB] |
|---|---|---|---|---|---|---|---|---|---|
| Low | 1712.5 | 19975 | 5 | QPSK | 1 | 0 | 22.86 | 0 | 0 |
| | 1712.5 | 19975 | 5 | QPSK | 1 | 24 | 22.77 | 0 | 0 |
| | 1712.5 | 19975 | 5 | QPSK | 12 | 6 | 21.99 | 1 | 0-1 |
| | 1712.5 | 19975 | 5 | QPSK | 25 | 0 | 21.98 | 1 | 0-1 |
| | 1712.5 | 19975 | 5 | 16-QAM | 1 | 0 | 21.89 | 1 | 0-1 |
| | 1712.5 | 19975 | 5 | 16-QAM | 1 | 24 | 21.82 | 1 | 0-1 |
| | 1712.5 | 19975 | 5 | 16-QAM | 12 | 6 | 20.83 | 2 | 0-2 |
| | 1712.5 | 19975 | 5 | 16-QAM | 25 | 0 | 20.97 | 2 | 0-2 |
| Mid | 1732.5 | 20175 | 5 | QPSK | 1 | 0 | 22.93 | 0 | 0 |
| | 1732.5 | 20175 | 5 | QPSK | 1 | 24 | 22.72 | 0 | 0 |
| | 1732.5 | 20175 | 5 | QPSK | 12 | 6 | 21.94 | 1 | 0-1 |
| | 1732.5 | 20175 | 5 | QPSK | 25 | 0 | 21.95 | 1 | 0-1 |
| | 1732.5 | 20175 | 5 | 16-QAM | 1 | 0 | 21.95 | 1 | 0-1 |
| | 1732.5 | 20175 | 5 | 16-QAM | 1 | 24 | 21.79 | 1 | 0-1 |
| | 1732.5 | 20175 | 5 | 16-QAM | 12 | 6 | 20.85 | 2 | 0-2 |
| | 1732.5 | 20175 | 5 | 16-QAM | 25 | 0 | 20.96 | 2 | 0-2 |
| High | 1752.5 | 20375 | 5 | QPSK | 1 | 0 | 22.75 | 0 | 0 |
| | 1752.5 | 20375 | 5 | QPSK | 1 | 24 | 22.92 | 0 | 0 |
| | 1752.5 | 20375 | 5 | QPSK | 12 | 6 | 21.94 | 1 | 0-1 |
| | 1752.5 | 20375 | 5 | QPSK | 25 | 0 | 21.92 | 1 | 0-1 |
| | 1752.5 | 20375 | 5 | 16-QAM | 1 | 0 | 21.86 | 1 | 0-1 |
| | 1752.5 | 20375 | 5 | 16-QAM | 1 | 24 | 21.98 | 1 | 0-1 |
| | 1752.5 | 20375 | 5 | 16-QAM | 12 | 6 | 20.87 | 2 | 0-2 |
| | 1752.5 | 20375 | 5 | 16-QAM | 25 | 0 | 20.96 | 2 | 0-2 |

## Table 12-8
## LTE Band 4 (AWS) Average RF Power

**10 MHz Bandwidth**

| | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | Target MPR [dB] | Maximum MPR Allowed per 3GPP [dB] |
|---|---|---|---|---|---|---|---|---|---|
| Low | 1715 | 20000 | 10 | QPSK | 1 | 0 | **23.00** | 0 | 0 |
| | 1715 | 20000 | 10 | QPSK | 1 | 49 | **22.78** | 0 | 0 |
| | 1715 | 20000 | 10 | QPSK | 25 | 12 | 21.90 | 1 | 0-1 |
| | 1715 | 20000 | 10 | QPSK | 50 | 0 | 21.87 | 1 | 0-1 |
| | 1715 | 20000 | 10 | 16QAM | 1 | 0 | **21.90** | 1 | 0-1 |
| | 1715 | 20000 | 10 | 16QAM | 1 | 49 | **21.54** | 1 | 0-1 |
| | 1715 | 20000 | 10 | 16QAM | 25 | 12 | 20.87 | 2 | 0-2 |
| | 1715 | 20000 | 10 | 16QAM | 50 | 0 | 20.98 | 2 | 0-2 |
| Mid | 1732.5 | 20175 | 10 | QPSK | 1 | 0 | 23.00 | 0 | 0 |
| | 1732.5 | 20175 | 10 | QPSK | 1 | 49 | 22.60 | 0 | 0 |
| | 1732.5 | 20175 | 10 | QPSK | 25 | 12 | **21.70** | 1 | 0-1 |
| | 1732.5 | 20175 | 10 | QPSK | 50 | 0 | 21.80 | 1 | 0-1 |
| | 1732.5 | 20175 | 10 | 16QAM | 1 | 0 | 21.83 | 1 | 0-1 |
| | 1732.5 | 20175 | 10 | 16QAM | 1 | 49 | 21.45 | 1 | 0-1 |
| | 1732.5 | 20175 | 10 | 16QAM | 25 | 12 | **20.70** | 2 | 0-2 |
| | 1732.5 | 20175 | 10 | 16QAM | 50 | 0 | 20.80 | 2 | 0-2 |
| High | 1750 | 20350 | 10 | QPSK | 1 | 0 | 22.60 | 0 | 0 |
| | 1750 | 20350 | 10 | QPSK | 1 | 49 | 22.53 | 0 | 0 |
| | 1750 | 20350 | 10 | QPSK | 25 | 12 | 21.56 | 1 | 0-1 |
| | 1750 | 20350 | 10 | QPSK | 50 | 0 | 21.50 | 1 | 0-1 |
| | 1750 | 20350 | 10 | 16QAM | 1 | 0 | 21.40 | 1 | 0-1 |
| | 1750 | 20350 | 10 | 16QAM | 1 | 49 | 21.33 | 1 | 0-1 |
| | 1750 | 20350 | 10 | 16QAM | 25 | 12 | 20.65 | 2 | 0-2 |
| | 1750 | 20350 | 10 | 16QAM | 50 | 0 | 20.60 | 2 | 0-2 |

### 12.2.4 LTE Band 2 (PCS)

## Table 12-9
## LTE Band 2 (PCS) Average RF Power

**1.4 MHz Bandwidth**

| | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | Target MPR [dB] | Maximum MPR Allowed per 3GPP [dB] |
|---|---|---|---|---|---|---|---|---|---|
| Low | 1850.7 | 18607 | 1.4 | QPSK | 1 | 0 | 22.61 | 0 | 0 |
| | 1850.7 | 18607 | 1.4 | QPSK | 1 | 5 | 22.73 | 0 | 0 |
| | 1850.7 | 18607 | 1.4 | QPSK | 3 | 2 | 22.74 | 0 | 0 |
| | 1850.7 | 18607 | 1.4 | QPSK | 6 | 0 | 21.69 | 1 | 0-1 |
| | 1850.7 | 18607 | 1.4 | 16-QAM | 1 | 0 | 21.76 | 1 | 0-1 |
| | 1850.7 | 18607 | 1.4 | 16-QAM | 1 | 5 | 21.83 | 1 | 0-1 |
| | 1850.7 | 18607 | 1.4 | 16-QAM | 3 | 2 | 21.87 | 1 | 0-1 |
| | 1850.7 | 18607 | 1.4 | 16-QAM | 6 | 0 | 20.57 | 2 | 0-2 |
| Mid | 1880.0 | 18900 | 1.4 | QPSK | 1 | 0 | 22.50 | 0 | 0 |
| | 1880.0 | 18900 | 1.4 | QPSK | 1 | 5 | 22.49 | 0 | 0 |
| | 1880.0 | 18900 | 1.4 | QPSK | 3 | 2 | 22.74 | 0 | 0 |
| | 1880.0 | 18900 | 1.4 | QPSK | 6 | 0 | 21.64 | 1 | 0-1 |
| | 1880.0 | 18900 | 1.4 | 16-QAM | 1 | 0 | 21.89 | 1 | 0-1 |
| | 1880.0 | 18900 | 1.4 | 16-QAM | 1 | 5 | 21.76 | 1 | 0-1 |
| | 1880.0 | 18900 | 1.4 | 16-QAM | 3 | 2 | 21.70 | 1 | 0-1 |
| | 1880.0 | 18900 | 1.4 | 16-QAM | 6 | 0 | 20.76 | 2 | 0-2 |
| High | 1909.3 | 19193 | 1.4 | QPSK | 1 | 0 | 22.37 | 0 | 0 |
| | 1909.3 | 19193 | 1.4 | QPSK | 1 | 5 | 22.02 | 0 | 0 |
| | 1909.3 | 19193 | 1.4 | QPSK | 3 | 2 | 22.20 | 0 | 0 |
| | 1909.3 | 19193 | 1.4 | QPSK | 6 | 0 | 21.69 | 1 | 0-1 |
| | 1909.3 | 19193 | 1.4 | 16-QAM | 1 | 0 | 21.51 | 1 | 0-1 |
| | 1909.3 | 19193 | 1.4 | 16-QAM | 1 | 5 | 21.14 | 1 | 0-1 |
| | 1909.3 | 19193 | 1.4 | 16-QAM | 3 | 2 | 21.67 | 1 | 0-1 |
| | 1909.3 | 19193 | 1.4 | 16-QAM | 6 | 0 | 20.56 | 2 | 0-2 |

## Table 12-10
## LTE Band 2 (PCS) Average RF Power

### 3 MHz Bandwidth

| | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | Target MPR [dB] | Maximum MPR Allowed per 3GPP [dB] |
|---|---|---|---|---|---|---|---|---|---|
| Low | 1851.5 | 18615 | 3 | QPSK | 1 | 0 | 22.50 | 0 | 0 |
| | 1851.5 | 18615 | 3 | QPSK | 1 | 14 | 22.60 | 0 | 0 |
| | 1851.5 | 18615 | 3 | QPSK | 8 | 4 | 21.74 | 1 | 0-1 |
| | 1851.5 | 18615 | 3 | QPSK | 15 | 0 | 21.69 | 1 | 0-1 |
| | 1851.5 | 18615 | 3 | 16-QAM | 1 | 0 | 21.31 | 1 | 0-1 |
| | 1851.5 | 18615 | 3 | 16-QAM | 1 | 14 | 21.37 | 1 | 0-1 |
| | 1851.5 | 18615 | 3 | 16-QAM | 8 | 4 | 20.90 | 2 | 0-2 |
| | 1851.5 | 18615 | 3 | 16-QAM | 15 | 0 | 20.54 | 2 | 0-2 |
| Mid | 1880.0 | 18900 | 3 | QPSK | 1 | 0 | 22.51 | 0 | 0 |
| | 1880.0 | 18900 | 3 | QPSK | 1 | 14 | 22.50 | 0 | 0 |
| | 1880.0 | 18900 | 3 | QPSK | 8 | 4 | 21.53 | 1 | 0-1 |
| | 1880.0 | 18900 | 3 | QPSK | 15 | 0 | 21.52 | 1 | 0-1 |
| | 1880.0 | 18900 | 3 | 16-QAM | 1 | 0 | 21.32 | 1 | 0-1 |
| | 1880.0 | 18900 | 3 | 16-QAM | 1 | 14 | 21.30 | 1 | 0-1 |
| | 1880.0 | 18900 | 3 | 16-QAM | 8 | 4 | 20.67 | 2 | 0-2 |
| | 1880.0 | 18900 | 3 | 16-QAM | 15 | 0 | 20.53 | 2 | 0-2 |
| High | 1908.5 | 19185 | 3 | QPSK | 1 | 0 | 22.61 | 0 | 0 |
| | 1908.5 | 19185 | 3 | QPSK | 1 | 14 | 22.04 | 0 | 0 |
| | 1908.5 | 19185 | 3 | QPSK | 8 | 4 | 21.51 | 1 | 0-1 |
| | 1908.5 | 19185 | 3 | QPSK | 15 | 0 | 21.45 | 1 | 0-1 |
| | 1908.5 | 19185 | 3 | 16-QAM | 1 | 0 | 21.44 | 1 | 0-1 |
| | 1908.5 | 19185 | 3 | 16-QAM | 1 | 14 | 21.01 | 1 | 0-1 |
| | 1908.5 | 19185 | 3 | 16-QAM | 8 | 4 | 20.68 | 2 | 0-2 |
| | 1908.5 | 19185 | 3 | 16-QAM | 15 | 0 | 20.29 | 2 | 0-2 |

## Table 12-11
## LTE Band 2 (PCS) Average RF Power

### 5 MHz Bandwidth

| | Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | Target MPR [dB] | Maximum MPR Allowed per 3GPP [dB] |
|---|---|---|---|---|---|---|---|---|---|
| Low | 1852.5 | 18625 | 5 | QPSK | 1 | 0 | **22.70** | 0 | 0 |
| | 1852.5 | 18625 | 5 | QPSK | 1 | 24 | **22.70** | 0 | 0 |
| | 1852.5 | 18625 | 5 | QPSK | 12 | 6 | 21.71 | 1 | 0-1 |
| | 1852.5 | 18625 | 5 | QPSK | 25 | 0 | 21.78 | 1 | 0-1 |
| | 1852.5 | 18625 | 5 | 16-QAM | 1 | 0 | **21.80** | 1 | 0-1 |
| | 1852.5 | 18625 | 5 | 16-QAM | 1 | 24 | **21.84** | 1 | 0-1 |
| | 1852.5 | 18625 | 5 | 16-QAM | 12 | 6 | 20.68 | 2 | 0-2 |
| | 1852.5 | 18625 | 5 | 16-QAM | 25 | 0 | 20.85 | 2 | 0-2 |
| Mid | 1880.0 | 18900 | 5 | QPSK | 1 | 0 | 22.57 | 0 | 0 |
| | 1880.0 | 18900 | 5 | QPSK | 1 | 24 | 22.65 | 0 | 0 |
| | 1880.0 | 18900 | 5 | QPSK | 12 | 6 | **21.55** | 1 | 0-1 |
| | 1880.0 | 18900 | 5 | QPSK | 25 | 0 | 21.60 | 1 | 0-1 |
| | 1880.0 | 18900 | 5 | 16-QAM | 1 | 0 | 21.75 | 1 | 0-1 |
| | 1880.0 | 18900 | 5 | 16-QAM | 1 | 24 | 21.80 | 1 | 0-1 |
| | 1880.0 | 18900 | 5 | 16-QAM | 12 | 6 | **20.50** | 2 | 0-2 |
| | 1880.0 | 18900 | 5 | 16-QAM | 25 | 0 | 20.77 | 2 | 0-2 |
| High | 1907.5 | 19175 | 5 | QPSK | 1 | 0 | 22.63 | 0 | 0 |
| | 1907.5 | 19175 | 5 | QPSK | 1 | 24 | 22.18 | 0 | 0 |
| | 1907.5 | 19175 | 5 | QPSK | 12 | 6 | 21.60 | 1 | 0-1 |
| | 1907.5 | 19175 | 5 | QPSK | 25 | 0 | 21.50 | 1 | 0-1 |
| | 1907.5 | 19175 | 5 | 16-QAM | 1 | 0 | 21.73 | 1 | 0-1 |
| | 1907.5 | 19175 | 5 | 16-QAM | 1 | 24 | 21.25 | 1 | 0-1 |
| | 1907.5 | 19175 | 5 | 16-QAM | 12 | 6 | 20.60 | 2 | 0-2 |
| | 1907.5 | 19175 | 5 | 16-QAM | 25 | 0 | 20.70 | 2 | 0-2 |

LTE Notes:

1. Considerations: LTE test configurations are determined according to SAR Test Considerations for LTE handsets and Data Modems KDB 941225 D05 Publication :
    a. Per Page 4, 3) A), QPSK with 50% RB is required for the highest bandwidth.
    b. Per Page 4, footnote 2, when the maximum output power across high, mid., and low channels is < 0.5 dB, mid channel is tested. Low and high channel SAR tests are not required for QPSK, 50% RB allocation when the SAR is < 0.8 W/kg. When less than 3 channels are required based on the size of the maximum bandwidth per KDB Pub 447498 6)c), the channel with maximum output power was evaluated.
    c. Per Page 4, 3) B), QPSK with 1 RB for both channel edges are required for the highest bandwidth.
    d. Per Page 4, footnote 6, QPSK 1 RB allocation SAR tests were performed on the highest output power channel for the RB allocation when the average output power of the 1 RB allocation was > 0.5 dB higher than the 50% RB allocation for QPSK. Otherwise, SAR tests are performed on the channel that produced the highest SAR for QPSK with 50% RB.
    e. Per Page 4, 3) B), I), when the SAR for QPSK 1 RB allocation tests is <1.45 W/kg, testing on the other channels is not required.
    f. Per Page 4, 4) A), 16QAM with 50% RB is required for the highest bandwidth on the channel with the highest measured SAR for QPSK with 50% RB allocation.
    g. Per Page 4, 4) A), I), when the SAR for 16 QAM, 50 % allocation tests is <1.45 W/kg, testing on the other channels is not required.
    h. Per Page 4, 4) B) and Page 5 footnote 9, 16QAM with 1RB for both channel edges are required for the highest bandwidth on the highest output power channel for the 1 RB allocation when the average output power of the 1 RB allocation is >0.5 dB higher than the 50% allocation for 16 QAM. Otherwise, SAR tests are performed on the channel that produced the highest SAR for 16 QAM with 50% RB.
    i. Per Page 5, 4) B), I), when the SAR for 16 QAM 1 RB allocation tests is <1.45 W/kg, testing on the other channels is not required.
    j. Per Page 4, 4), A) I) and Page 5, 4), A)I, 100% RB Allocation is not required to be tested when the SAR is not > 1.45 W/kg for the highest bandwidth.
    k. Per Page 5, 5) B) I), LTE SAR for the lower bandwidths was not tested since the maximum average output power over all channels and configurations was not more than 0.5 dB higher than the highest bandwidth.
    l. The bolded powers in the tables above were tested for SAR.


Figure 12-2
Power Measurement Setup

## 12.3 WLAN Conducted Powers

**Table 12-12**
**IEEE 802.11b Average RF Power**

| Freq [MHz] | Channel | Data Rate [Mbps] | Measured Average Power [dBm] |
|---|---|---|---|
| 2412 | 1 | 1 | 15.22 |
| | | 2 | 15.34 |
| | | 5.5 | 15 |
| | | 11 | 14.89 |
| 2437 | 6 | 1 | 15.3 |
| | | 2 | 15.2 |
| | | 5.5 | 14.96 |
| | | 11 | 14.9 |
| 2462 | 11 | 1 | 15.22 |
| | | 2 | 15.35 |
| | | 5.5 | 14.98 |
| | | 11 | 14.9 |

**Table 12-13**
**IEEE 802.11g Average RF Power**

| Freq [MHz] | Channel | Data Rate [Mbps] | Measured Average Power [dBm] |
|---|---|---|---|
| 2412 | 1 | 6 | 12.08 |
| | | 9 | 11.76 |
| | | 12 | 11.69 |
| | | 18 | 11.38 |
| | | 24 | 11.38 |
| | | 36 | 10.87 |
| | | 48 | 10.52 |
| | | 54 | 10.16 |
| 2437 | 6 | 6 | 11.99 |
| | | 9 | 11.66 |
| | | 12 | 11.6 |
| | | 18 | 11.23 |
| | | 24 | 11.1 |
| | | 36 | 10.72 |
| | | 48 | 10.27 |
| | | 54 | 10.1 |
| 2462 | 11 | 6 | 11.74 |
| | | 9 | 11.42 |
| | | 12 | 11.31 |
| | | 18 | 11.06 |
| | | 24 | 10.9 |
| | | 36 | 10.59 |
| | | 48 | 10.01 |
| | | 54 | 9.93 |

**Table 12-14**
**IEEE 802.11n Average RF Power**

| Freq [MHz] | Channel | Data Rate [Mbps] | Measured Average Power [dBm] |
|---|---|---|---|
| 2412 | 1 | 6.5/7.2 | 11.99 |
| | | 13/14.4 | 11.55 |
| | | 19.5/21.7 | 11.46 |
| | | 26/28.9 | 11.19 |
| | | 39/43.3 | 10.99 |
| | | 52/57.8 | 10.27 |
| | | 58.5/65 | 10.24 |
| | | 65/72.2 | 10.08 |
| 2437 | 6 | 6.5/7.2 | 11.84 |
| | | 13/14.4 | 11.5 |
| | | 19.5/21.7 | 11.26 |
| | | 26/28.9 | 11.02 |
| | | 39/43.3 | 10.75 |
| | | 52/57.8 | 10.25 |
| | | 58.5/65 | 10.14 |
| | | 65/72.2 | 10.14 |
| 2462 | 11 | 6.5/7.2 | 11.52 |
| | | 13/14.4 | 11.24 |
| | | 19.5/21.7 | 11.08 |
| | | 26/28.9 | 10.65 |
| | | 39/43.3 | 10.52 |
| | | 52/57.8 | 10.01 |
| | | 58.5/65 | 10.03 |
| | | 65/72.2 | 9.88 |

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

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


**Figure 12-3**
**Power Measurement Setup**

# 13 SYSTEM VERIFICATION

## 13.1 Tissue Verification

**Table 13-1**
**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 |
|---|---|---|---|---|---|---|---|---|---|
| 02/01/2012 | 740B | 21.6 | 680 | 0.911 | 57.38 | 0.956 | 56.069 | -4.71% | 2.34% |
| | | | 695 | 0.920 | 57.07 | 0.957 | 55.985 | -3.87% | 1.94% |
| | | | 710 | 0.924 | 56.87 | 0.958 | 55.901 | -3.55% | 1.73% |
| | | | 725 | 0.948 | 56.54 | 0.960 | 55.817 | -1.25% | 1.30% |
| | | | 740 | 0.960 | 56.39 | 0.961 | 55.733 | -0.10% | 1.18% |
| | | | 755 | 0.978 | 56.32 | 0.963 | 55.649 | 1.56% | 1.21% |
| 01/26/2012 | 835B | 20.2 | 820 | 0.945 | 53.08 | 0.969 | 55.284 | -2.48% | -3.99% |
| | | | 835 | 0.958 | 52.90 | 0.970 | 55.200 | -1.24% | -4.17% |
| | | | 850 | 0.977 | 52.65 | 0.988 | 55.154 | -1.11% | -4.54% |
| 01/25/2012 | 1750B | 23.5 | 1710 | 1.452 | 51.04 | 1.460 | 53.540 | -0.55% | -4.67% |
| | | | 1750 | 1.492 | 50.92 | 1.490 | 53.430 | 0.13% | -4.70% |
| | | | 1790 | 1.538 | 50.77 | 1.510 | 53.330 | 1.85% | -4.80% |
| 01/25/2012 | 1900B | 23.4 | 1850 | 1.448 | 51.34 | 1.520 | 53.300 | -4.74% | -3.68% |
| | | | 1880 | 1.485 | 51.32 | 1.520 | 53.300 | -2.30% | -3.71% |
| | | | 1910 | 1.502 | 51.32 | 1.520 | 53.300 | -1.18% | -3.71% |
| 01/30/2012 | 2450B | 22.1 | 2401 | 1.962 | 50.52 | 1.903 | 52.765 | 3.10% | -4.25% |
| | | | 2450 | 2.019 | 50.29 | 1.950 | 52.700 | 3.54% | -4.57% |
| | | | 2499 | 2.087 | 50.19 | 2.019 | 52.638 | 3.37% | -4.65% |

Note: KDB Publication 450824 was ensured to be applied for probe calibration frequencies greater than or equal to 50 MHz of the DUT frequencies.

The above measured tissue parameters were used in the DASY software to perform interpolation via the DASY software to determine actual dielectric parameters at the test frequencies (per IEEE 1528 6.6.1.2). The SAR test plots may slightly differ from the table above since the DASY software rounds to three significant digits.

## 13.2 Measurement Procedure for Tissue verification

1) The network analyzer and probe system was configured and calibrated.
2) The probe was immersed in the sample which was placed in a nonmetallic container. Trapped air bubbles beneath the flange were minimized by placing the probe at a slight angle.
3) The complex admittance with respect to the probe aperture was measured
4) The complex relative permittivity , for example from the below equation (Pournaropoulos and Misra):

$$Y = \frac{j2\omega\varepsilon_r\varepsilon_0}{\left[\ln(b/a)\right]^2}\int_a^b\int_a^b\int_0^\pi \cos\phi' \frac{\exp\left[-j\omega r(\mu_0\varepsilon_r'\varepsilon_0)^{1/2}\right]}{r} d\phi' d\rho' d\rho$$

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

## 13.3 Test System Verification

Prior to assessment, the system is verified to ±10% of the manufacturer SAR measurement on the reference dipole at the time of calibration.

**Table 13-2**
**System Verification Results**

| System Verification TARGET & MEASURED | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Tissue Frequency (MHz) | Tissue Type | Date: | Amb. Temp (°C) | Liquid Temp (°C) | Input Power (W) | Dipole SN | Probe SN | Measured $SAR_{1g}$ (W/kg) | 1 W Target $SAR_{1g}$ (W/kg) | 1 W Normalized $SAR_{1g}$ (W/kg) | Deviation (%) |
| 750 | Body | 02/01/2012 | 22.8 | 20.9 | 0.250 | 1046 | 3022 | 2.14 | 8.800 | 8.560 | -2.73% |
| 835 | Body | 01/26/2012 | 24.0 | 21.5 | 0.100 | 4d119 | 3258 | 0.997 | 9.540 | 9.970 | 4.51% |
| 1750 | Body | 01/25/2012 | 23.9 | 22.0 | 0.040 | 1051 | 3209 | 1.51 | 37.000 | 37.750 | 2.03% |
| 1900 | Body | 01/25/2012 | 22.1 | 21.6 | 0.100 | 5d141 | 3213 | 4 | 41.400 | 40.000 | -3.38% |
| 2450 | Body | 01/30/2012 | 23.3 | 20.6 | 0.040 | 719 | 3258 | 2.11 | 51.300 | 52.750 | 2.83% |

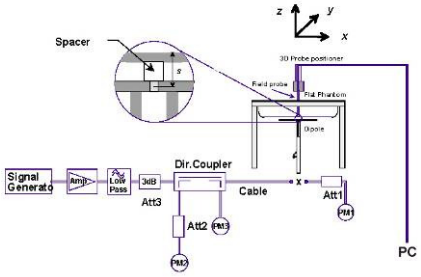



**Figure 13-1**
**System Verification Setup Diagram**

**Figure 13-2**
**System Verification Setup Photo**

# 14 SAR DATA SUMMARY

## 14.1 Hotspot SAR Data

**Table 14-1**
**CDMA Hotspot SAR Data**

| MEASUREMENT RESULTS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Mode | Service | Conducted Power [dBm] | Power Drift [dB] | Spacing | Device Serial Number | Side | SAR (1g) |
| MHz | Ch. | | | | | | | | (W/kg) |
| 836.52 | 384 | Cell. CDMA | TDSO32 | 24.53 | 0.05 | 1.0 cm | FCC#2 | back | **0.576** |
| 836.52 | 384 | Cell. CDMA | TDSO32 | 24.53 | -0.02 | 1.0 cm | FCC#2 | front | 0.543 |
| 836.52 | 384 | Cell. CDMA | TDSO32 | 24.53 | 0.11 | 1.0 cm | FCC#2 | top | 0.354 |
| 836.52 | 384 | Cell. CDMA | TDSO32 | 24.53 | 0.13 | 1.0 cm | FCC#2 | bottom | 0.107 |
| 836.52 | 384 | Cell. CDMA | TDSO32 | 24.53 | 0.10 | 1.0 cm | FCC#2 | left | 0.072 |
| 1880.00 | 600 | PCS CDMA | TDSO32 | 24.44 | -0.02 | 1.0 cm | FCC#2 | back | **0.675** |
| 1880.00 | 600 | PCS CDMA | TDSO32 | 24.44 | 0.06 | 1.0 cm | FCC#2 | front | 0.635 |
| 1880.00 | 600 | PCS CDMA | TDSO32 | 24.44 | 0.02 | 1.0 cm | FCC#2 | top | 0.242 |
| 1880.00 | 600 | PCS CDMA | TDSO32 | 24.44 | 0.12 | 1.0 cm | FCC#2 | bottom | 0.270 |
| 1880.00 | 600 | PCS CDMA | TDSO32 | 24.44 | 0.10 | 1.0 cm | FCC#2 | left | 0.107 |
| **ANSI / IEEE C95.1 1992 - SAFETY LIMIT**<br>**Spatial Peak**<br>**Uncontrolled Exposure/General Population** | | | | | | **Body**<br>**1.6 W/kg (mW/g)**<br>averaged over 1 gram | | | |

**Note:** SAR was tested with 1x RTT with TDSO / SO32 FCH Only. Ev-Do SAR tests were not required since the maximum average output power of 1x RTT was more than 0.25 dB higher than the maximum average Ev-Do output power.

# Table 14-2
# LTE Band 12 Hotspot SAR Data

| MEASUREMENT RESULTS | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Mode | Modulation | Conducted Power [dBm] | Power Drift [dB] | Target MPR [dB] | BW [MHz] | RB Size | RB Offset | Spacing | Device Serial Number | Side | SAR (1g) |
| MHz | Ch. | | | | | | | | | | | | (W/kg) |
| 704.00 | 23050 | LTE Band 12 | QPSK | 21.54 | 0.02 | 1 | 10 | 25 | 12 | 1.0 cm | FCC#6 | back | 0.854 |
| 707.50 | 23095 | LTE Band 12 | QPSK | 21.70 | -0.01 | 1 | 10 | 25 | 12 | 1.0 cm | FCC#6 | back | 0.905 |
| 711.00 | 23120 | LTE Band 12 | QPSK | 21.38 | 0.01 | 1 | 10 | 25 | 12 | 1.0 cm | FCC#6 | back | **1.010** |
| 707.50 | 23095 | LTE Band 12 | QPSK | 22.68 | 0.04 | 0 | 10 | 1 | 0 | 1.0 cm | FCC#6 | back | 0.962 |
| 707.50 | 23095 | LTE Band 12 | QPSK | 22.45 | -0.06 | 0 | 10 | 1 | 49 | 1.0 cm | FCC#6 | back | 1.000 |
| 711.00 | 23120 | LTE Band 12 | 16QAM | 20.98 | 0.00 | 2 | 10 | 25 | 12 | 1.0 cm | FCC#6 | back | 0.802 |
| 707.50 | 23095 | LTE Band 12 | 16QAM | 21.58 | 0.01 | 1 | 10 | 1 | 0 | 1.0 cm | FCC#6 | back | 0.755 |
| 707.50 | 23095 | LTE Band 12 | 16QAM | 21.35 | 0.01 | 1 | 10 | 1 | 49 | 1.0 cm | FCC#6 | back | 0.791 |
| 704.00 | 23050 | LTE Band 12 | QPSK | 21.54 | -0.09 | 1 | 10 | 25 | 12 | 1.0 cm | FCC#6 | front | 0.832 |
| 707.50 | 23095 | LTE Band 12 | QPSK | 21.70 | 0.03 | 1 | 10 | 25 | 12 | 1.0 cm | FCC#6 | front | 0.873 |
| 711.00 | 23120 | LTE Band 12 | QPSK | 21.38 | -0.11 | 1 | 10 | 25 | 12 | 1.0 cm | FCC#6 | front | 0.962 |
| 707.50 | 23095 | LTE Band 12 | QPSK | 22.68 | 0.04 | 0 | 10 | 1 | 0 | 1.0 cm | FCC#6 | front | 0.933 |
| 707.50 | 23095 | LTE Band 12 | QPSK | 22.45 | 0.00 | 0 | 10 | 1 | 49 | 1.0 cm | FCC#6 | front | 0.967 |
| 711.00 | 23120 | LTE Band 12 | 16QAM | 20.98 | -0.12 | 2 | 10 | 25 | 12 | 1.0 cm | FCC#6 | front | 0.811 |
| 707.50 | 23095 | LTE Band 12 | 16QAM | 21.58 | -0.08 | 1 | 10 | 1 | 0 | 1.0 cm | FCC#6 | front | 0.757 |
| 707.50 | 23095 | LTE Band 12 | 16QAM | 21.35 | -0.09 | 1 | 10 | 1 | 49 | 1.0 cm | FCC#6 | front | 0.779 |
| 707.50 | 23095 | LTE Band 12 | QPSK | 21.70 | -0.03 | 1 | 10 | 25 | 12 | 1.0 cm | FCC#6 | top | 0.425 |
| 707.50 | 23095 | LTE Band 12 | QPSK | 22.68 | 0.05 | 0 | 10 | 1 | 0 | 1.0 cm | FCC#6 | top | 0.484 |
| 707.50 | 23095 | LTE Band 12 | QPSK | 22.45 | -0.08 | 0 | 10 | 1 | 49 | 1.0 cm | FCC#6 | top | 0.588 |
| 707.50 | 23095 | LTE Band 12 | 16QAM | 20.80 | -0.05 | 2 | 10 | 25 | 12 | 1.0 cm | FCC#6 | top | 0.359 |
| 707.50 | 23095 | LTE Band 12 | 16QAM | 21.58 | 0.08 | 1 | 10 | 1 | 0 | 1.0 cm | FCC#6 | top | 0.358 |
| 707.50 | 23095 | LTE Band 12 | 16QAM | 21.35 | -0.02 | 1 | 10 | 1 | 49 | 1.0 cm | FCC#6 | top | 0.445 |
| 707.50 | 23095 | LTE Band 12 | QPSK | 21.70 | -0.08 | 1 | 10 | 25 | 12 | 1.0 cm | FCC#6 | bottom | 0.249 |
| 707.50 | 23095 | LTE Band 12 | QPSK | 22.68 | 0.01 | 0 | 10 | 1 | 0 | 1.0 cm | FCC#6 | bottom | 0.313 |
| 707.50 | 23095 | LTE Band 12 | QPSK | 22.45 | -0.05 | 0 | 10 | 1 | 49 | 1.0 cm | FCC#6 | bottom | 0.338 |
| 707.50 | 23095 | LTE Band 12 | 16QAM | 20.80 | 0.05 | 2 | 10 | 25 | 12 | 1.0 cm | FCC#6 | bottom | 0.221 |
| 707.50 | 23095 | LTE Band 12 | 16QAM | 21.58 | -0.07 | 1 | 10 | 1 | 0 | 1.0 cm | FCC#6 | bottom | 0.250 |
| 707.50 | 23095 | LTE Band 12 | 16QAM | 21.35 | -0.02 | 1 | 10 | 1 | 49 | 1.0 cm | FCC#6 | bottom | 0.255 |
| 707.50 | 23095 | LTE Band 12 | QPSK | 21.70 | 0.01 | 1 | 10 | 25 | 12 | 1.0 cm | FCC#6 | left | 0.132 |
| 707.50 | 23095 | LTE Band 12 | QPSK | 22.68 | 0.17 | 0 | 10 | 1 | 0 | 1.0 cm | FCC#6 | left | 0.141 |
| 707.50 | 23095 | LTE Band 12 | QPSK | 22.45 | 0.02 | 0 | 10 | 1 | 49 | 1.0 cm | FCC#6 | left | 0.117 |
| 707.50 | 23095 | LTE Band 12 | 16QAM | 20.80 | -0.12 | 2 | 10 | 25 | 12 | 1.0 cm | FCC#6 | left | 0.116 |
| 707.50 | 23095 | LTE Band 12 | 16QAM | 21.58 | -0.13 | 1 | 10 | 1 | 0 | 1.0 cm | FCC#6 | left | 0.118 |
| 707.50 | 23095 | LTE Band 12 | 16QAM | 21.35 | -0.11 | 1 | 10 | 1 | 49 | 1.0 cm | FCC#6 | left | 0.102 |
| **ANSI / IEEE C95.1 1992 - SAFETY LIMIT**<br>**Spatial Peak**<br>**Uncontrolled Exposure/General Population** | | | | | | | | | | | | **Body**<br>**1.6 W/kg (mW/g)**<br>averaged over 1 gram | |

## Table 14-3
## LTE Band 5 (Cell) Hotspot SAR Data

| MEASUREMENT RESULTS | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Mode | Modulation | Conducted Power [dBm] | Power Drift [dB] | Target MPR [dB] | BW [MHz] | RB Size | RB Offset | Spacing | Device Serial Number | Side | SAR (1g) |
| MHz | Ch. | | | | | | | | | | | | (W/kg) |
| 826.50 | 20425 | LTE Band 5 (Cell) | QPSK | 21.90 | -0.04 | 1 | 5 | 12 | 6 | 1.0 cm | B-U #1 | back | 0.417 |
| 826.50 | 20425 | LTE Band 5 (Cell) | QPSK | 22.90 | -0.01 | 0 | 5 | 1 | 0 | 1.0 cm | B-U #1 | back | 0.533 |
| 826.50 | 20425 | LTE Band 5 (Cell) | QPSK | 22.75 | 0.05 | 0 | 5 | 1 | 24 | 1.0 cm | B-U #1 | back | 0.494 |
| 826.50 | 20425 | LTE Band 5 (Cell) | 16QAM | 20.73 | 0.02 | 2 | 5 | 12 | 6 | 1.0 cm | B-U #1 | back | 0.321 |
| 826.50 | 20425 | LTE Band 5 (Cell) | 16QAM | 21.88 | 0.05 | 1 | 5 | 1 | 0 | 1.0 cm | B-U #1 | back | 0.426 |
| 826.50 | 20425 | LTE Band 5 (Cell) | 16QAM | 21.82 | 0.04 | 1 | 5 | 1 | 24 | 1.0 cm | B-U #1 | back | 0.397 |
| 826.50 | 20425 | LTE Band 5 (Cell) | QPSK | 21.90 | 0.13 | 1 | 5 | 12 | 6 | 1.0 cm | B-U #1 | front | 0.444 |
| 826.50 | 20425 | LTE Band 5 (Cell) | QPSK | 22.90 | 0.10 | 0 | 5 | 1 | 0 | 1.0 cm | B-U #1 | front | **0.536** |
| 826.50 | 20425 | LTE Band 5 (Cell) | QPSK | 22.75 | 0.13 | 0 | 5 | 1 | 24 | 1.0 cm | B-U #1 | front | 0.494 |
| 826.50 | 20425 | LTE Band 5 (Cell) | 16QAM | 20.73 | 0.15 | 2 | 5 | 12 | 6 | 1.0 cm | B-U #1 | front | 0.335 |
| 826.50 | 20425 | LTE Band 5 (Cell) | 16QAM | 21.88 | -0.18 | 1 | 5 | 1 | 0 | 1.0 cm | B-U #1 | front | 0.448 |
| 826.50 | 20425 | LTE Band 5 (Cell) | 16QAM | 21.82 | 0.10 | 1 | 5 | 1 | 24 | 1.0 cm | B-U #1 | front | 0.417 |
| 826.50 | 20425 | LTE Band 5 (Cell) | QPSK | 21.90 | 0.01 | 1 | 5 | 12 | 6 | 1.0 cm | B-U #1 | top | 0.268 |
| 826.50 | 20425 | LTE Band 5 (Cell) | QPSK | 22.90 | -0.03 | 0 | 5 | 1 | 0 | 1.0 cm | B-U #1 | top | 0.341 |
| 826.50 | 20425 | LTE Band 5 (Cell) | QPSK | 22.75 | 0.00 | 0 | 5 | 1 | 24 | 1.0 cm | B-U #1 | top | 0.311 |
| 826.50 | 20425 | LTE Band 5 (Cell) | 16QAM | 20.73 | -0.02 | 2 | 5 | 12 | 6 | 1.0 cm | B-U #1 | top | 0.203 |
| 826.50 | 20425 | LTE Band 5 (Cell) | 16QAM | 21.88 | -0.03 | 1 | 5 | 1 | 0 | 1.0 cm | B-U #1 | top | 0.273 |
| 826.50 | 20425 | LTE Band 5 (Cell) | 16QAM | 21.82 | 0.10 | 1 | 5 | 1 | 24 | 1.0 cm | B-U #1 | top | 0.252 |
| 826.50 | 20425 | LTE Band 5 (Cell) | QPSK | 21.90 | -0.06 | 1 | 5 | 12 | 6 | 1.0 cm | B-U #1 | bottom | 0.085 |
| 826.50 | 20425 | LTE Band 5 (Cell) | QPSK | 22.90 | 0.05 | 0 | 5 | 1 | 0 | 1.0 cm | B-U #1 | bottom | 0.108 |
| 826.50 | 20425 | LTE Band 5 (Cell) | QPSK | 22.75 | 0.01 | 0 | 5 | 1 | 24 | 1.0 cm | B-U #1 | bottom | 0.099 |
| 826.50 | 20425 | LTE Band 5 (Cell) | 16QAM | 20.73 | 0.02 | 2 | 5 | 12 | 6 | 1.0 cm | B-U #1 | bottom | 0.062 |
| 826.50 | 20425 | LTE Band 5 (Cell) | 16QAM | 21.88 | 0.03 | 1 | 5 | 1 | 0 | 1.0 cm | B-U #1 | bottom | 0.087 |
| 826.50 | 20425 | LTE Band 5 (Cell) | 16QAM | 21.82 | 0.13 | 1 | 5 | 1 | 24 | 1.0 cm | B-U #1 | bottom | 0.080 |
| 826.50 | 20425 | LTE Band 5 (Cell) | QPSK | 21.90 | 0.20 | 1 | 5 | 12 | 6 | 1.0 cm | B-U #1 | left | 0.048 |
| 826.50 | 20425 | LTE Band 5 (Cell) | QPSK | 22.90 | 0.14 | 0 | 5 | 1 | 0 | 1.0 cm | B-U #1 | left | 0.062 |
| 826.50 | 20425 | LTE Band 5 (Cell) | QPSK | 22.75 | 0.02 | 0 | 5 | 1 | 24 | 1.0 cm | B-U #1 | left | 0.059 |
| 826.50 | 20425 | LTE Band 5 (Cell) | 16QAM | 20.73 | 0.02 | 2 | 5 | 12 | 6 | 1.0 cm | B-U #1 | left | 0.037 |
| 826.50 | 20425 | LTE Band 5 (Cell) | 16QAM | 21.88 | 0.03 | 1 | 5 | 1 | 0 | 1.0 cm | B-U #1 | left | 0.049 |
| 826.50 | 20425 | LTE Band 5 (Cell) | 16QAM | 21.82 | 0.15 | 1 | 5 | 1 | 24 | 1.0 cm | B-U #1 | left | 0.048 |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | | | Body<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | |

**Note:** The average output power across low, mid and high channels was >0.5 dB, therefore the highest output power (low channel) was tested.

## Table 14-4
## LTE Band 4 (AWS) Hotspot SAR Data

| MEASUREMENT RESULTS | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Mode | Modulation | Conducted Power [dBm] | Power Drift [dB] | Target MPR[dB] | BW [MHz] | RB Size | RB Offset | Spacing | Device Serial Number | Side | SAR (1g) |
| MHz | Ch. | | | | | | | | | | | | (W/kg) |
| 1732.50 | 20175 | LTE Band 4 (AWS) | QPSK | 21.70 | 0.07 | 1 | 10 | 25 | 12 | 1.0 cm | FCC#4 | back | 0.563 |
| 1715.00 | 20000 | LTE Band 4 (AWS) | QPSK | 23.00 | -0.02 | 0 | 10 | 1 | 0 | 1.0 cm | FCC#4 | back | 0.577 |
| 1715.00 | 20000 | LTE Band 4 (AWS) | QPSK | 22.78 | -0.07 | 0 | 10 | 1 | 49 | 1.0 cm | FCC#4 | back | **0.654** |
| 1732.50 | 20175 | LTE Band 4 (AWS) | 16QAM | 20.70 | -0.03 | 2 | 10 | 25 | 12 | 1.0 cm | FCC#4 | back | 0.432 |
| 1715.00 | 20000 | LTE Band 4 (AWS) | 16QAM | 21.90 | -0.05 | 1 | 10 | 1 | 0 | 1.0 cm | FCC#4 | back | 0.436 |
| 1715.00 | 20000 | LTE Band 4 (AWS) | 16QAM | 21.54 | -0.03 | 1 | 10 | 1 | 49 | 1.0 cm | FCC#4 | back | 0.504 |
| 1732.50 | 20175 | LTE Band 4 (AWS) | QPSK | 21.70 | 0.02 | 1 | 10 | 25 | 12 | 1.0 cm | FCC#4 | front | 0.475 |
| 1715.00 | 20000 | LTE Band 4 (AWS) | QPSK | 23.00 | 0.01 | 0 | 10 | 1 | 0 | 1.0 cm | FCC#4 | front | 0.481 |
| 1715.00 | 20000 | LTE Band 4 (AWS) | QPSK | 22.78 | 0.06 | 0 | 10 | 1 | 49 | 1.0 cm | FCC#4 | front | 0.546 |
| 1732.50 | 20175 | LTE Band 4 (AWS) | 16QAM | 20.70 | 0.05 | 2 | 10 | 25 | 12 | 1.0 cm | FCC#4 | front | 0.361 |
| 1715.00 | 20000 | LTE Band 4 (AWS) | 16QAM | 21.90 | 0.06 | 1 | 10 | 1 | 0 | 1.0 cm | FCC#4 | front | 0.366 |
| 1715.00 | 20000 | LTE Band 4 (AWS) | 16QAM | 21.54 | 0.09 | 1 | 10 | 1 | 49 | 1.0 cm | FCC#4 | front | 0.424 |
| 1732.50 | 20175 | LTE Band 4 (AWS) | QPSK | 21.70 | 0.02 | 1 | 10 | 25 | 12 | 1.0 cm | FCC#4 | top | 0.194 |
| 1715.00 | 20000 | LTE Band 4 (AWS) | QPSK | 23.00 | 0.16 | 0 | 10 | 1 | 0 | 1.0 cm | FCC#4 | top | 0.223 |
| 1715.00 | 20000 | LTE Band 4 (AWS) | QPSK | 22.78 | 0.09 | 0 | 10 | 1 | 49 | 1.0 cm | FCC#4 | top | 0.254 |
| 1732.50 | 20175 | LTE Band 4 (AWS) | 16QAM | 20.70 | 0.12 | 2 | 10 | 25 | 12 | 1.0 cm | FCC#4 | top | 0.171 |
| 1715.00 | 20000 | LTE Band 4 (AWS) | 16QAM | 21.90 | 0.02 | 1 | 10 | 1 | 0 | 1.0 cm | FCC#4 | top | 0.172 |
| 1715.00 | 20000 | LTE Band 4 (AWS) | 16QAM | 21.54 | -0.03 | 1 | 10 | 1 | 49 | 1.0 cm | FCC#4 | top | 0.197 |
| 1732.50 | 20175 | LTE Band 4 (AWS) | QPSK | 21.70 | -0.07 | 1 | 10 | 25 | 12 | 1.0 cm | FCC#4 | bottom | 0.128 |
| 1715.00 | 20000 | LTE Band 4 (AWS) | QPSK | 23.00 | 0.09 | 0 | 10 | 1 | 0 | 1.0 cm | FCC#4 | bottom | 0.163 |
| 1715.00 | 20000 | LTE Band 4 (AWS) | QPSK | 22.78 | 0.06 | 0 | 10 | 1 | 49 | 1.0 cm | FCC#4 | bottom | 0.149 |
| 1732.50 | 20175 | LTE Band 4 (AWS) | 16QAM | 20.70 | 0.12 | 2 | 10 | 25 | 12 | 1.0 cm | FCC#4 | bottom | 0.124 |
| 1715.00 | 20000 | LTE Band 4 (AWS) | 16QAM | 21.90 | 0.16 | 1 | 10 | 1 | 0 | 1.0 cm | FCC#4 | bottom | 0.125 |
| 1715.00 | 20000 | LTE Band 4 (AWS) | 16QAM | 21.54 | 0.18 | 1 | 10 | 1 | 49 | 1.0 cm | FCC#4 | bottom | 0.118 |
| 1732.50 | 20175 | LTE Band 4 (AWS) | QPSK | 21.70 | -0.10 | 1 | 10 | 25 | 12 | 1.0 cm | FCC#4 | left | 0.163 |
| 1715.00 | 20000 | LTE Band 4 (AWS) | QPSK | 23.00 | -0.01 | 0 | 10 | 1 | 0 | 1.0 cm | FCC#4 | left | 0.169 |
| 1715.00 | 20000 | LTE Band 4 (AWS) | QPSK | 22.78 | 0.02 | 0 | 10 | 1 | 49 | 1.0 cm | FCC#4 | left | 0.181 |
| 1732.50 | 20175 | LTE Band 4 (AWS) | 16QAM | 20.70 | 0.00 | 2 | 10 | 25 | 12 | 1.0 cm | FCC#4 | left | 0.145 |
| 1715.00 | 20000 | LTE Band 4 (AWS) | 16QAM | 21.90 | 0.00 | 1 | 10 | 1 | 0 | 1.0 cm | FCC#4 | left | 0.133 |
| 1715.00 | 20000 | LTE Band 4 (AWS) | 16QAM | 21.54 | -0.09 | 1 | 10 | 1 | 49 | 1.0 cm | FCC#4 | left | 0.140 |

| ANSI / IEEE C95.1 1992 - SAFETY LIMIT | Body |
|---|---|
| Spatial Peak | 1.6 W/kg (mW/g) |
| Uncontrolled Exposure/General Population | averaged over 1 gram |

**Note:** QPSK and 16 QAM 1 RB allocation SAR tests were performed on the highest output power channel for the RB allocation when the average output power of the 1 RB allocation was > 0.5 dB higher than the 50% RB allocation for QPSK and 16 QAM, respectively. Otherwise, SAR tests are performed on the channel that produced the highest SAR for QPSK and 16 QAM with 50% RB.

## Table 14-5
## LTE Band 2 (PCS) Hotspot SAR Data

| MEASUREMENT RESULTS | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Mode | Modulation | Conducted Power [dBm] | Power Drift [dB] | Target MPR [dB] | BW [MHz] | RB Size | RB Offset | Spacing | Device Serial Number | Side | SAR (1g) |
| MHz | Ch. | | | | | | | | | | | | (W/kg) |
| 1880.00 | 18900 | LTE Band 2 (PCS) | QPSK | 21.55 | 0.04 | 1 | 5 | 12 | 6 | 1.0 cm | B-U #2 | back | 0.275 |
| 1852.50 | 18625 | LTE Band 2 (PCS) | QPSK | 22.70 | -0.03 | 0 | 5 | 1 | 0 | 1.0 cm | B-U #2 | back | 0.369 |
| 1852.50 | 18625 | LTE Band 2 (PCS) | QPSK | 22.70 | 0.07 | 0 | 5 | 1 | 24 | 1.0 cm | B-U #2 | back | 0.309 |
| 1880.00 | 18900 | LTE Band 2 (PCS) | 16QAM | 20.50 | 0.02 | 2 | 5 | 12 | 6 | 1.0 cm | B-U #2 | back | 0.222 |
| 1852.50 | 18625 | LTE Band 2 (PCS) | 16QAM | 21.80 | 0.11 | 1 | 5 | 1 | 0 | 1.0 cm | B-U #2 | back | 0.262 |
| 1852.50 | 18625 | LTE Band 2 (PCS) | 16QAM | 21.84 | -0.01 | 1 | 5 | 1 | 24 | 1.0 cm | B-U #2 | back | 0.267 |
| 1880.00 | 18900 | LTE Band 2 (PCS) | QPSK | 21.55 | -0.11 | 1 | 5 | 12 | 6 | 1.0 cm | B-U #2 | front | 0.353 |
| 1852.50 | 18625 | LTE Band 2 (PCS) | QPSK | 22.70 | 0.03 | 0 | 5 | 1 | 0 | 1.0 cm | B-U #2 | front | 0.397 |
| 1852.50 | 18625 | LTE Band 2 (PCS) | QPSK | 22.70 | 0.04 | 0 | 5 | 1 | 24 | 1.0 cm | B-U #2 | front | 0.396 |
| 1880.00 | 18900 | LTE Band 2 (PCS) | 16QAM | 20.50 | 0.05 | 2 | 5 | 12 | 6 | 1.0 cm | B-U #2 | front | 0.281 |
| 1852.50 | 18625 | LTE Band 2 (PCS) | 16QAM | 21.80 | 0.04 | 1 | 5 | 1 | 0 | 1.0 cm | B-U #2 | front | **0.407** |
| 1852.50 | 18625 | LTE Band 2 (PCS) | 16QAM | 21.84 | 0.20 | 1 | 5 | 1 | 24 | 1.0 cm | B-U #2 | front | 0.387 |
| 1880.00 | 18900 | LTE Band 2 (PCS) | QPSK | 21.55 | 0.21 | 1 | 5 | 12 | 6 | 1.0 cm | B-U #2 | top | 0.127 |
| 1852.50 | 18625 | LTE Band 2 (PCS) | QPSK | 22.70 | 0.03 | 0 | 5 | 1 | 0 | 1.0 cm | B-U #2 | top | 0.141 |
| 1852.50 | 18625 | LTE Band 2 (PCS) | QPSK | 22.70 | 0.07 | 0 | 5 | 1 | 24 | 1.0 cm | B-U #2 | top | 0.151 |
| 1880.00 | 18900 | LTE Band 2 (PCS) | 16QAM | 20.50 | 0.03 | 2 | 5 | 12 | 6 | 1.0 cm | B-U #2 | top | 0.107 |
| 1852.50 | 18625 | LTE Band 2 (PCS) | 16QAM | 21.80 | 0.01 | 1 | 5 | 1 | 0 | 1.0 cm | B-U #2 | top | 0.119 |
| 1852.50 | 18625 | LTE Band 2 (PCS) | 16QAM | 21.84 | 0.11 | 1 | 5 | 1 | 24 | 1.0 cm | B-U #2 | top | 0.123 |
| 1880.00 | 18900 | LTE Band 2 (PCS) | QPSK | 21.55 | 0.13 | 1 | 5 | 12 | 6 | 1.0 cm | B-U #2 | bottom | 0.150 |
| 1852.50 | 18625 | LTE Band 2 (PCS) | QPSK | 22.70 | 0.05 | 0 | 5 | 1 | 0 | 1.0 cm | B-U #2 | bottom | 0.125 |
| 1852.50 | 18625 | LTE Band 2 (PCS) | QPSK | 22.70 | -0.02 | 0 | 5 | 1 | 24 | 1.0 cm | B-U #2 | bottom | 0.122 |
| 1880.00 | 18900 | LTE Band 2 (PCS) | 16QAM | 20.50 | 0.18 | 2 | 5 | 12 | 6 | 1.0 cm | B-U #2 | bottom | 0.122 |
| 1852.50 | 18625 | LTE Band 2 (PCS) | 16QAM | 21.80 | -0.04 | 1 | 5 | 1 | 0 | 1.0 cm | B-U #2 | bottom | 0.103 |
| 1852.50 | 18625 | LTE Band 2 (PCS) | 16QAM | 21.84 | -0.05 | 1 | 5 | 1 | 24 | 1.0 cm | B-U #2 | bottom | 0.097 |
| 1880.00 | 18900 | LTE Band 2 (PCS) | QPSK | 21.55 | -0.04 | 1 | 5 | 12 | 6 | 1.0 cm | B-U #2 | left | 0.063 |
| 1852.50 | 18625 | LTE Band 2 (PCS) | QPSK | 22.70 | 0.04 | 0 | 5 | 1 | 0 | 1.0 cm | B-U #2 | left | 0.074 |
| 1852.50 | 18625 | LTE Band 2 (PCS) | QPSK | 22.70 | 0.02 | 0 | 5 | 1 | 24 | 1.0 cm | B-U #2 | left | 0.068 |
| 1880.00 | 18900 | LTE Band 2 (PCS) | 16QAM | 20.50 | 0.12 | 2 | 5 | 12 | 6 | 1.0 cm | B-U #2 | left | 0.050 |
| 1852.50 | 18625 | LTE Band 2 (PCS) | 16QAM | 21.80 | 0.21 | 1 | 5 | 1 | 0 | 1.0 cm | B-U #2 | left | 0.053 |
| 1852.50 | 18625 | LTE Band 2 (PCS) | 16QAM | 21.84 | 0.03 | 1 | 5 | 1 | 24 | 1.0 cm | B-U #2 | left | 0.052 |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | | Body<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | |

**Note:** QPSK and 16 QAM 1 RB allocation SAR tests were performed on the highest output power channel for the RB allocation when the average output power of the 1 RB allocation was > 0.5 dB higher than the 50% RB allocation for QPSK and 16 QAM, respectively. Otherwise, SAR tests are performed on the channel that produced the highest SAR for QPSK and 16 QAM with 50% RB.

**Table 14-6**
**WLAN Hotspot SAR Data**

| MEASUREMENT RESULTS | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Mode | Service | Conducted Power [dBm] | Power Drift [dB] | Spacing | Device Serial Number | Data Rate (Mbps) | Side | SAR (1g) |
| MHz | Ch. | | | | | | | | | (W/kg) |
| 2437 | 6 | IEEE 802.11b | DSSS | 15.30 | 0.13 | 1.0 cm | FCC #10 | 1 | back | 0.209 |
| 2437 | 6 | IEEE 802.11b | DSSS | 15.30 | -0.01 | 1.0 cm | FCC #10 | 1 | front | **0.225** |
| 2437 | 6 | IEEE 802.11b | DSSS | 15.30 | 0.03 | 1.0 cm | FCC #10 | 1 | top | 0.188 |
| 2437 | 6 | IEEE 802.11b | DSSS | 15.30 | 0.07 | 1.0 cm | FCC #10 | 1 | right | 0.173 |
| **ANSI / IEEE C95.1 1992 - SAFETY LIMIT**<br>**Spatial Peak**<br>**Uncontrolled Exposure/General Population** | | | | | | **Body**<br>**1.6 W/kg (mW/g)**<br>averaged over 1 gram | | | | |

## 14.2 SAR Test Notes

General Notes:

1. The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used were according to FCC/OET Bulletin 65, Supplement C [June 2001].
2. Batteries are fully charged for all readings. Standard battery was used.
3. Tissue parameters and temperatures are listed on the SAR plots.
4. Liquid tissue depth was at least 15.0 cm.
5. All samples tested were electrically identical per the applicant.
6. Device was tested using a fixed spacing for SAR testing. Per KDB 941225 D06, a separation distance of 10 mm was tested for hotspot mode related exposure conditions.
7. To confirm the proper SAR liquid depth, the z-axis plots from the system verifications were included since the system verifications were performed using the same liquid, probe and DAE as the SAR tests in the same time period.

CDMA Notes:

1. Justification for reduced test configurations: Per FCC/OET Bulletin 65 Supplement C (June 2001) and Public Notice DA-02-1438, if the SAR measured at the middle channel for each test configuration is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).
2. SAR was tested with 1x RTT with TDSO / SO32 FCH Only. Ev-Do SAR tests were not required since the maximum average output power of 1x RTT was more than 0.25 dB higher than the maximum Ev-Do power.
3. Only the primary Tx/Rx CDMA antenna was transmitting during testing. The secondary CDMA antenna was for receive-only and cannot transmit.

LTE Notes:

1. LTE test configurations are determined according to SAR Test Considerations for LTE handsets and Data Modems KDB 941225 D05 Publication and were evaluated independently for each test position. General test procedures can be found in Section 11.3.3.
2. MPR is 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. The differences noted are not cases of implemented MPR but rather associated with measurement uncertainty and allowable tolerances per 3GPP standard and the manufacturer.
3. A-MPR was disabled for all SAR tests.
4. Only the primary Tx/Rx LTE antenna was transmitting during testing. The secondary LTE antenna was for receive-only and cannot transmit.
5. LTE Band 4 (AWS) SAR was measured with a probe calibrated at 1750 MHz and is valid for measuring SAR from ± 50 MHz. The 1750MHz specific liquid was verified with specific probe calibration factors as required per FCC KDB Publication 450824 D01.

WLAN Notes:

1. Justification for reduced test configurations for WIFI channels per KDB Publication 248227 and April 2010 FCC/TCB Meeting Notes for 2.4 GHz WIFI: Highest average RF output power channel for the lowest data rate was selected for SAR evaluation in 802.11b. Other IEEE 802.11 modes (including 802.11g/n) were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11b mode.
2. WLAN transmission was verified using a spectrum analyzer that was not calibrated. No measurements were made with this analyzer.
3. When the maximum extrapolated peak SAR of the zoom scan for the maximum output channel is <1.6 W/kg and the 1g averaged SAR is <0.8 W/kg, SAR testing on other channels is not required. Otherwise, the other default (or corresponding required) test channels were additionally tested using the lowest data rate.

Hotspot Notes:

1. Right Edge for the CDMA/LTE transmitter was not tested since the antenna distance from the edge was greater than 2.5 cm per FCC KDB Publication 941225 D06 (see Section 1.2).
2. Bottom and Left Edges for the WLAN transmitter were not tested since the antenna distance from the edge was greater than 2.5 cm per FCC KDB Publication 941225 D06 (see Section 1.2).
3. During SAR Testing for the Wireless Router conditions per KDB 941225 D06, the actual Portable Hotspot operation (with actual simultaneous transmission of a transmitter with WIFI) was not activated (See Section 11.6).
4. For Hotspot SAR testing, transmission modes were evaluated separately for SAR. SAR evaluation requires a single frequency of measurement for valid measurements using the SAR probe and tissue which are calibrated for specific limited frequency ranges. Therefore, during SAR evaluation it was ensured that the WLAN transmission was disabled by the manufacturer to assess the standalone SAR. WLAN SAR was separately evaluated to account for the WLAN SAR for portable hotspot exposure conditions (see section 11).

# 15 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

## 15.1 Introduction

The following procedures adopted from "FCC SAR Considerations for Cell Phones with Multiple Transmitters" FCC KDB Publication 648474 are applicable to wireless data devices with built-in unlicensed transmitters such as 802.11b/g/n which may simultaneously transmit with the licensed transmitter.

## 15.2 FCC Power Tables & Conditions

| | 2.45 | 5.15 - 5.35 | 5.47 - 5.85 | GHz |
|---|---|---|---|---|
| $P_{Ref}$ | 12 | 6 | 5 | mW |
| Device output power should be rounded to the nearest mW to compare with values specified in this table. | | | | |

**Figure 15-1**
**Output Power Thresholds for Unlicensed Transmitters**

| | Individual Transmitter | Simultaneous Transmission |
|---|---|---|
| **Licensed Transmitters** | Routine evaluation required | SAR not required:<br>Unlicensed only<br>○ when stand-alone 1-g SAR is not required and antenna is ≥ 5 cm from other antennas<br>Licensed & Unlicensed<br>○ when the sum of the 1-g SAR is < 1.6 W/kg for all simultaneous transmitting antennas<br>○ when SAR to peak location separation ratio of simultaneous transmitting antenna pair is < 0.3<br>SAR required:<br>Licensed & Unlicensed<br>antenna pairs with SAR to peak location separation ratio ≥ 0.3; test is only required for the configuration that results in the highest SAR in stand-alone configuration for each wireless mode and exposure condition<br>Note: simultaneous transmission exposure conditions for head and body can be different for different style phones; therefore, different test requirements may apply |
| **Unlicensed Transmitters** | When there is no simultaneous transmission –<br>○ output ≤ 60/f: SAR not required<br>○ output > 60/f: stand-alone SAR required<br>When there is simultaneous transmission –<br>Stand-alone SAR not required when<br>○ output ≤ 2·$P_{Ref}$ and antenna is ≥ 5.0 cm from other antennas<br>○ output ≤ $P_{Ref}$ and antenna is ≥ 2.5 cm from other antennas<br>○ output ≤ $P_{Ref}$ and antenna is < 2.5 cm from other antennas, each with either output power ≤ $P_{Ref}$ or 1-g SAR < 1.2 W/kg<br>Otherwise stand-alone SAR is required<br>When stand-alone SAR is required<br>○ test SAR on highest output channel for each wireless mode and exposure condition<br>○ if SAR for highest output channel is > 50% of SAR limit, evaluate all channels according to normal procedures | |

**Figure 15-2**
**SAR Evaluation Requirements for Multiple Transmitter Handsets**

Per KDB publication 447498 3) b) ii), since the maximum average output power of the WLAN (IEEE 802.11B) antenna is 34.277 mW and the WLAN and licensed transmitter antenna separation distance is 38 mm, SAR testing for stand-alone WLAN is required.

## 15.3 Hotspot SAR Simultaneous Transmission Analysis

**Table 15-1**
**Simultaneous Transmission Scenario (Hotspot)**

| Simult Tx | Configuration | Cell. CDMA SAR (W/kg) | 2.4 GHz WIFI SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|
| Body SAR | Back | 0.576 | 0.209 | **0.785** |
| | Front | 0.543 | 0.225 | 0.768 |
| | Top | 0.354 | 0.188 | 0.542 |
| | Bottom | 0.107 | - | 0.107 |
| | Right | - | 0.173 | 0.173 |
| | Left | 0.072 | - | 0.072 |

| Simult Tx | Configuration | PCS CDMA SAR (W/kg) | 2.4 GHz WIFI SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|
| Body SAR | Back | 0.675 | 0.209 | **0.884** |
| | Front | 0.635 | 0.225 | 0.860 |
| | Top | 0.242 | 0.188 | 0.430 |
| | Bottom | 0.270 | - | 0.270 |
| | Right | - | 0.173 | 0.173 |
| | Left | 0.107 | - | 0.107 |

| Simult Tx | Configuration | LTE Band 5 (Cell) SAR (W/kg) | 2.4 GHz WIFI SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|
| Body SAR | Back | 0.533 | 0.209 | 0.742 |
| | Front | 0.536 | 0.225 | **0.761** |
| | Top | 0.341 | 0.188 | 0.529 |
| | Bottom | 0.108 | - | 0.108 |
| | Right | - | 0.173 | 0.173 |
| | Left | 0.062 | - | 0.062 |

| Simult Tx | Configuration | LTE Band 12 SAR (W/kg) | 2.4 GHz WIFI SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|
| Body SAR | Back | 1.010 | 0.209 | **1.219** |
| | Front | 0.967 | 0.225 | 1.192 |
| | Top | 0.588 | 0.188 | 0.776 |
| | Bottom | 0.338 | - | 0.338 |
| | Right | - | 0.173 | 0.173 |
| | Left | 0.141 | - | 0.141 |

| Simult Tx | Configuration | LTE Band 2 (PCS) SAR (W/kg) | 2.4 GHz WIFI SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|
| Body SAR | Back | 0.369 | 0.209 | 0.578 |
| | Front | 0.407 | 0.225 | **0.632** |
| | Top | 0.151 | 0.188 | 0.339 |
| | Bottom | 0.150 | - | 0.150 |
| | Right | - | 0.173 | 0.173 |
| | Left | 0.074 | - | 0.074 |

| Simult Tx | Configuration | LTE Band 4 (AWS) SAR (W/kg) | 2.4 GHz WIFI SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|
| Body SAR | Back | 0.654 | 0.209 | **0.863** |
| | Front | 0.546 | 0.225 | 0.771 |
| | Top | 0.254 | 0.188 | 0.442 |
| | Bottom | 0.163 | - | 0.163 |
| | Right | - | 0.173 | 0.173 |
| | Left | 0.181 | - | 0.181 |

Note: Per FCC KDB Publication 941225 D06, the edges with antennas more than 2.5 cm are not required to be evaluated for SAR ("-"). The above tables represent a portable hotspot condition.

## 15.4 Simultaneous Transmission Conclusion

The above numerical summed SAR was below the SAR limit. Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit. No volumetric SAR summation per FCC KDB Publication 648474.

# 16 EQUIPMENT LIST

| Manufacturer | Model | Description | Cal Date | Cal Interval | Cal Due | Serial Number |
|---|---|---|---|---|---|---|
| Agilent | 8648D | (9kHz-4GHz) Signal Generator | 10/10/2011 | Annual | 10/10/2012 | 3613A00315 |
| Agilent | 8753E | (30kHz-6GHz) Network Analyzer | 4/21/2011 | Annual | 4/21/2012 | JP38020182 |
| Agilent | E5515C | Wireless Communications Test Set | 10/10/2011 | Annual | 10/10/2012 | GB46110872 |
| Agilent | E5515C | Wireless Communications Test Set | 7/6/2011 | Annual | 7/6/2012 | GB41450275 |
| Agilent | E8257D | (250kHz-20GHz) Signal Generator | 4/8/2011 | Annual | 4/8/2012 | MY45470194 |
| Gigatronics | 80701A | (0.05-18GHz) Power Sensor | 10/12/2011 | Annual | 10/12/2012 | 1833460 |
| Gigatronics | 8651A | Universal Power Meter | 10/12/2011 | Annual | 10/12/2012 | 8650319 |
| Index SAR | IXTL-010 | Dielectric Measurement Kit | N/A | | N/A | N/A |
| Index SAR | IXTL-030 | 30MM TEM line for 6 GHz | N/A | | N/A | N/A |
| Pasternack | PE2208-6 | Bidirectional Coupler | CBT | | N/A | N/A |
| Pasternack | PE2209-10 | Bidirectional Coupler | CBT | | N/A | N/A |
| Rohde & Schwarz | CMU200 | Base Station Simulator | 6/1/2011 | Annual | 6/1/2012 | 833855/0010 |
| Rohde & Schwarz | CMU200 | Base Station Simulator | 4/19/2011 | Annual | 4/19/2012 | 107826 |
| Rohde & Schwarz | NRVD | Dual Channel Power Meter | 4/8/2011 | Biennial | 4/8/2013 | 101695 |
| SPEAG | D2450V2 | 2450 MHz SAR Dipole | 8/19/2011 | Annual | 8/19/2012 | 719 |
| SPEAG | DAE3 | Dasy Data Acquisition Electronics | 11/9/2011 | Annual | 11/9/2012 | 455 |
| SPEAG | DAE4 | Dasy Data Acquisition Electronics | 9/16/2011 | Annual | 9/16/2012 | 704 |
| SPEAG | DAE4 | Dasy Data Acquisition Electronics | 2/21/2011 | Annual | 2/21/2012 | 649 |
| SPEAG | ES3DV2 | SAR Probe | 8/25/2011 | Annual | 8/25/2012 | 3022 |
| SPEAG | DAE4 | Dasy Data Acquisition Electronics | 5/19/2011 | Annual | 5/19/2012 | 859 |
| SPEAG | ES3DV3 | SAR Probe | 3/24/2011 | Annual | 3/24/2012 | 3213 |
| SPEAG | ES3DV3 | SAR Probe | 4/18/2011 | Annual | 4/18/2012 | 3209 |
| Rohde & Schwarz | SMIQ03B | Signal Generator | 4/6/2011 | Annual | 4/6/2012 | DE27259 |
| Rohde & Schwarz | CMW500 | LTE Radio Communication Tester | 8/25/2011 | Annual | 8/25/2012 | 100976 |
| Anritsu | MA2481A | Power Sensor | 2/7/2011 | Annual | 2/7/2012 | 5318 |
| Anritsu | MA2481A | Power Sensor | 2/7/2011 | Annual | 2/7/2012 | 5442 |
| Anritsu | ML2438A | Power Meter | 2/7/2011 | Annual | 2/7/2012 | 1190013 |
| Anritsu | ML2438A | Power Meter | 2/7/2011 | Annual | 2/7/2012 | 98150041 |
| Agilent | 8648D | Signal Generator | 4/5/2011 | Annual | 4/5/2012 | 3629U00687 |
| Anritsu | ML2438A | Power Meter | 2/7/2011 | Annual | 2/7/2012 | 1070030 |
| Anritsu | MA2481A | Power Sensor | 2/7/2011 | Annual | 2/7/2012 | 5821 |
| Anritsu | MA2481A | Power Sensor | 2/7/2011 | Annual | 2/7/2012 | 8013 |
| Anritsu | MA2481A | Power Sensor | 2/7/2011 | Annual | 2/7/2012 | 5605 |
| Anritsu | MA2481A | Power Sensor | 2/7/2011 | Annual | 2/7/2012 | 2400 |
| Anritsu | ML2495A | Power Meter | 10/13/2011 | Annual | 10/13/2012 | 1039008 |
| Anritsu | MA2411B | Pulse Sensor | 10/13/2011 | Annual | 10/13/2012 | 1027293 |
| Agilent | E5515C | Wireless Communications Test Set | 7/6/2011 | Annual | 7/6/2012 | GB43304447 |
| Agilent | E5515C | Wireless Communications Tester | 4/21/2011 | Annual | 4/21/2012 | US41140256 |
| Mini-Circuits | BW-N20W5+ | DC to 18 GHz Precision Fixed 20 dB Attenuator | CBT | | N/A | N/A |
| Agilent | E5515C | Wireless Communications Test Set | 2/8/2011 | Annual | 2/8/2012 | GB45360985 |
| Rohde & Schwarz | CMW500 | LTE Radio Communication Tester | 10/7/2011 | Annual | 10/7/2012 | 103962 |
| Control Company | 61220-416 | Long-Stem Thermometer | 2/15/2011 | Biennial | 2/15/2013 | 111331322 |
| Control Company | 61220-416 | Long-Stem Thermometer | 2/15/2011 | Biennial | 2/15/2013 | 111331323 |
| Control Company | 61220-416 | Long-Stem Thermometer | 2/15/2011 | Biennial | 2/15/2013 | 111331330 |
| Control Company | 61220-416 | Long-Stem Thermometer | 2/15/2011 | Biennial | 2/15/2013 | 111331332 |
| Control Company | 61220-416 | Long-Stem Thermometer | 3/16/2011 | Biennial | 3/16/2013 | 111391601 |
| VWR | 36934-158 | Wall-Mounted Thermometer | 1/21/2011 | Biennial | 1/21/2013 | 111286445 |
| VWR | 36934-158 | Wall-Mounted Thermometer | 1/21/2011 | Biennial | 1/21/2013 | 111286460 |
| VWR | 36934-158 | Wall-Mounted Thermometer | 5/26/2010 | Biennial | 5/26/2012 | 101718589 |
| VWR | 36934-158 | Wall-Mounted Thermometer | 1/21/2011 | Biennial | 1/21/2013 | 111286454 |
| VWR | 36934-158 | Wall-Mounted Thermometer | 2/26/2010 | Biennial | 2/26/2012 | 101536273 |
| SPEAG | ES3DV3 | SAR Probe | 4/8/2011 | Annual | 4/8/2012 | 3258 |
| SPEAG | D1750V2 | 1750 MHz SAR Dipole | 5/24/2011 | Annual | 5/24/2012 | 1051 |
| MiniCircuits | SLP-2400+ | Low Pass Filter | CBT | | N/A | R8979500903 |
| Narda | 4772-3 | Attenuator (3dB) | CBT | | N/A | 9406 |
| Narda | BW-S3W2 | Attenuator (3dB) | CBT | | N/A | 120 |
| Rohde & Schwarz | CMW500 | LTE Radio Communication Tester | 8/5/2011 | Annual | 8/5/2012 | 112347 |
| Mini-Circuits | NLP-2950+ | Low Pass Filter DC to 2700 MHz | CBT | | N/A | N/A |
| Mini-Circuits | NLP-1200+ | Low Pass Filter DC to 1000 MHz | CBT | | N/A | N/A |
| SPEAG | D1900V2 | 1900 MHz SAR Dipole | 7/11/2011 | Annual | 7/11/2012 | 5d141 |
| SPEAG | D835V2 | 835 MHz SAR Dipole | 12/21/2011 | Annual | 12/21/2012 | 4d119 |
| SPEAG | D750V3 | 750 MHz Dipole | 10/27/2011 | Annual | 10/27/2012 | 1046 |
| Agilent | N9340A | Spectrum Analyzer | N/A | | N/A | N/A |

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

Note: WLAN transmission was verified using a spectrum analyzer that was not calibrated. No measurements were made with this analyzer.

# 17 MEASUREMENT UNCERTAINTIES

Applicable for frequencies less than 3000 MHz.

| a | b | c | d | e= f(d,k) | f | g | h = c x f/e | i = c x g/e | k |
|---|---|---|---|---|---|---|---|---|---|
| **Uncertainty Component** | **IEEE 1528 Sec.** | **Tol. (± %)** | **Prob. Dist.** | **Div.** | **$c_i$ 1gm** | **$c_i$ 10 gms** | **1gm $u_i$ (± %)** | **10gms $u_i$ (± %)** | **$v_i$** |
| **Measurement System** | | | | | | | | | |
| Probe Calibration | E.2.1 | 6.0 | N | 1 | 1.0 | 1.0 | 6.0 | 6.0 | ∞ |
| Axial Isotropy | E.2.2 | 0.25 | N | 1 | 0.7 | 0.7 | 0.2 | 0.2 | ∞ |
| Hemishperical Isotropy | E.2.2 | 1.3 | N | 1 | 1.0 | 1.0 | 1.3 | 1.3 | ∞ |
| Boundary Effect | E.2.3 | 0.4 | N | 1 | 1.0 | 1.0 | 0.4 | 0.4 | ∞ |
| Linearity | E.2.4 | 0.3 | N | 1 | 1.0 | 1.0 | 0.3 | 0.3 | ∞ |
| System Detection Limits | E.2.5 | 5.1 | N | 1 | 1.0 | 1.0 | 5.1 | 5.1 | ∞ |
| Readout Electronics | E.2.6 | 1.0 | N | 1 | 1.0 | 1.0 | 1.0 | 1.0 | ∞ |
| Response Time | E.2.7 | 0.8 | R | 1.73 | 1.0 | 1.0 | 0.5 | 0.5 | ∞ |
| Integration Time | E.2.8 | 2.6 | R | 1.73 | 1.0 | 1.0 | 1.5 | 1.5 | ∞ |
| RF Ambient Conditions | E.6.1 | 3.0 | R | 1.73 | 1.0 | 1.0 | 1.7 | 1.7 | ∞ |
| Probe Positioner Mechanical Tolerance | E.6.2 | 0.4 | R | 1.73 | 1.0 | 1.0 | 0.2 | 0.2 | ∞ |
| Probe Positioning w/ respect to Phantom | E.6.3 | 2.9 | R | 1.73 | 1.0 | 1.0 | 1.7 | 1.7 | ∞ |
| Extrapolation, Interpolation & Integration algorithms for Max. SAR Evaluation | E.5 | 1.0 | R | 1.73 | 1.0 | 1.0 | 0.6 | 0.6 | ∞ |
| **Test Sample Related** | | | | | | | | | |
| Test Sample Positioning | E.4.2 | 6.0 | N | 1 | 1.0 | 1.0 | 6.0 | 6.0 | 287 |
| Device Holder Uncertainty | E.4.1 | 3.32 | R | 1.73 | 1.0 | 1.0 | 1.9 | 1.9 | ∞ |
| Output Power Variation - SAR drift measurement | 6.6.2 | 5.0 | R | 1.73 | 1.0 | 1.0 | 2.9 | 2.9 | ∞ |
| **Phantom & Tissue Parameters** | | | | | | | | | |
| Phantom Uncertainty (Shape & Thickness tolerances) | E.3.1 | 4.0 | R | 1.73 | 1.0 | 1.0 | 2.3 | 2.3 | ∞ |
| Liquid Conductivity - deviation from target values | E.3.2 | 5.0 | R | 1.73 | 0.64 | 0.43 | 1.8 | 1.2 | ∞ |
| Liquid Conductivity - measurement uncertainty | E.3.3 | 3.8 | N | 1 | 0.64 | 0.43 | 2.4 | 1.6 | 6 |
| Liquid Permittivity - deviation from target values | E.3.2 | 5.0 | R | 1.73 | 0.60 | 0.49 | 1.7 | 1.4 | ∞ |
| Liquid Permittivity - measurement uncertainty | E.3.3 | 4.5 | N | 1 | 0.60 | 0.49 | 2.7 | 2.2 | 6 |
| **Combined Standard Uncertainty (k=1)** | | | RSS | | | | 12.1 | 11.7 | 299 |
| **Expanded Uncertainty** (95% CONFIDENCE LEVEL) | | | k=2 | | | | 24.2 | 23.5 | |

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

# 18 CONCLUSION

## 18.1 Measurement Conclusion

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

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

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# APPENDIX A: SAR TEST DATA

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSCHLC11R; Type: Portable Wireless Router; Serial: FCC #6**

Communication System: LTE Band 12; Frequency: 711.0 MHz; Duty Cycle: 1:1
Medium: 695 Body Medium parameters used (interpolated):
f = 711.0 MHz; $\sigma$ = 0.926 mho/m; $\varepsilon_r$ = 56.848; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

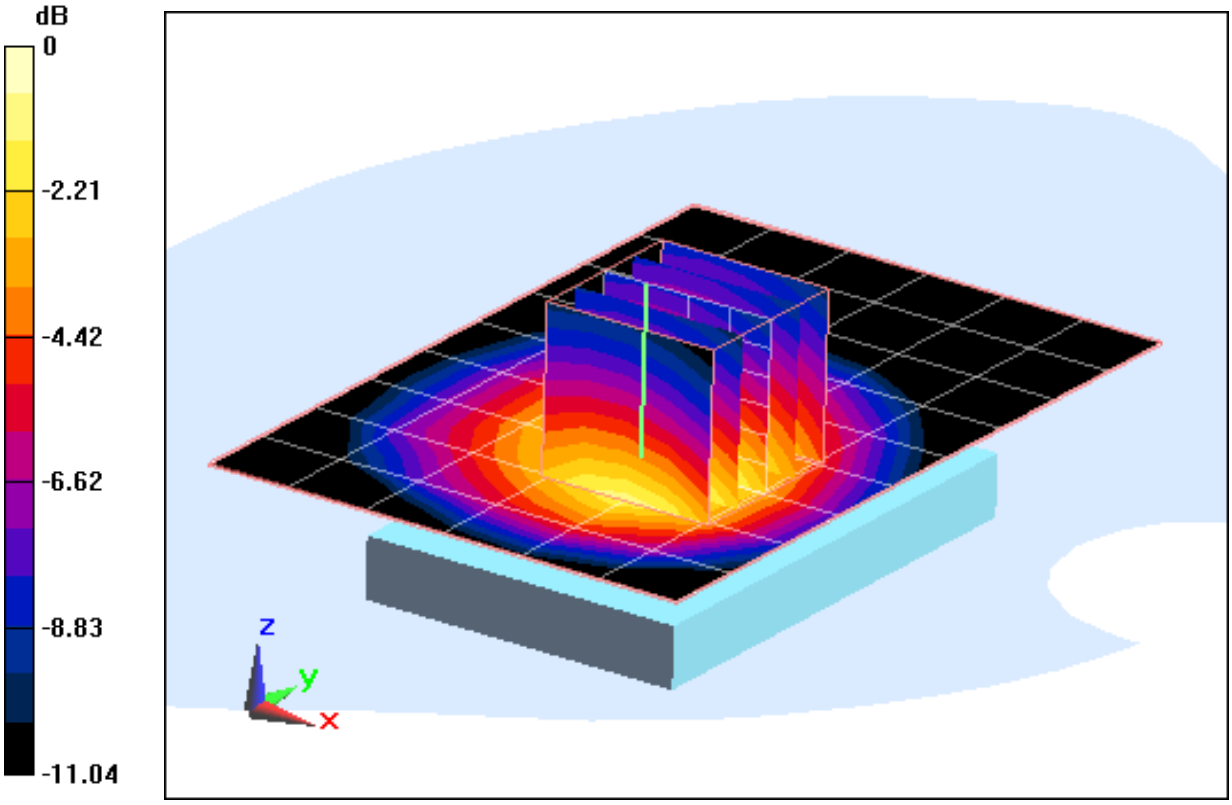
Test Date: 02-01-2012; Ambient Temp: 22.8°C; Tissue Temp: 20.9°C

Probe: ES3DV2 - SN3022; ConvF(6.11, 6.11, 6.11); Calibrated: 8/25/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn704; Calibrated: 9/16/2011
Phantom: SAM v5.0 front; Type: SAM v5.0; Serial: TP-1646
Measurement SW: DASY52, Version 52.6 (2);SEMCAD X Version 14.4.5 (3634)

**Mode: LTE Band 12, Body SAR, Back side, High.ch**

**QPSK, 10 MHz BW, 25 RB, RB Offset 12**

**Area Scan (7x10x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 34.253 V/m; Power Drift = 0.005 dB
Peak SAR (extrapolated) = 1.399 W/kg
**SAR(1 g) = 1.01 mW/g; SAR(10 g) = 0.678 mW/g**




0 dB = 1.050mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSCHLC11R; Type: Portable Wireless Router; Serial: FCC #6**

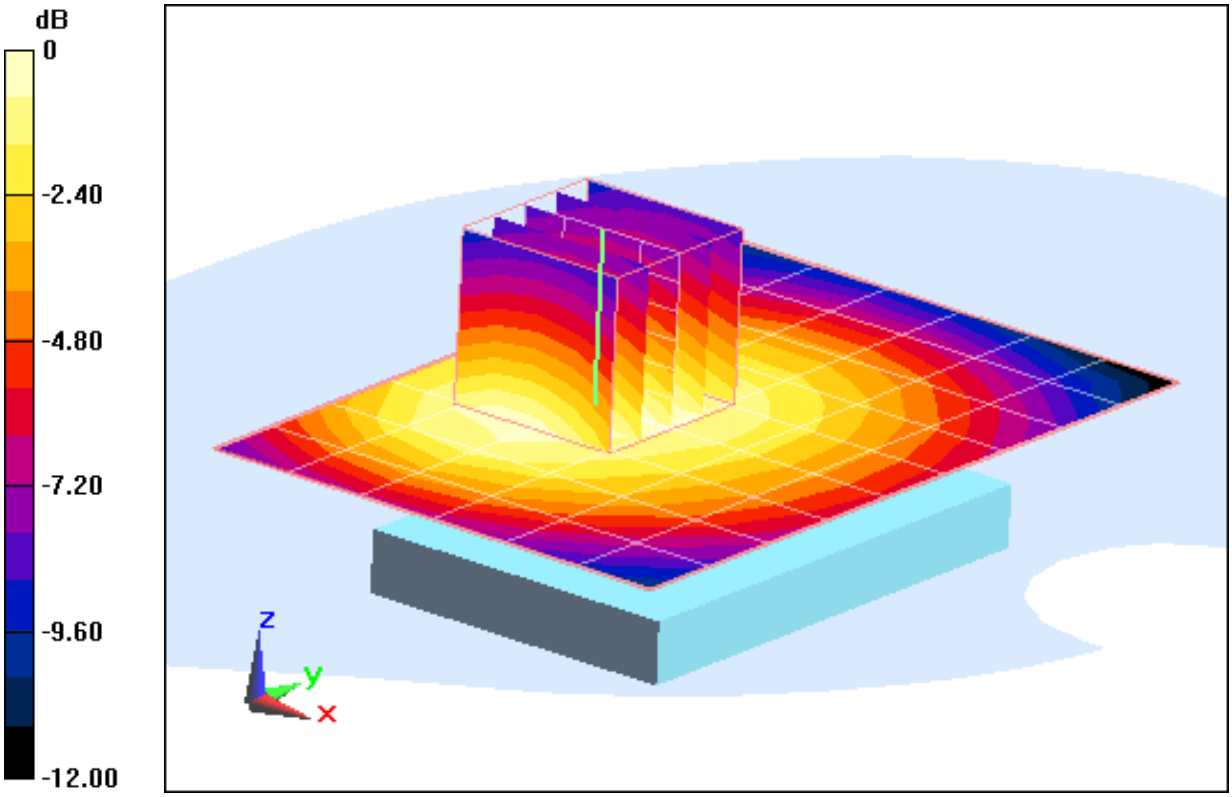
Communication System: LTE Band 12; Frequency: 707.5 MHz;Duty Cycle: 1:1
Medium: 695 Body Medium parameters used (interpolated):
f = 707.5 MHz; $\sigma$ = 0.923 mho/m; $\varepsilon_r$ = 56.903; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-01-2012; Ambient Temp: 22.8°C; Tissue Temp: 20.9°C

Probe: ES3DV2 - SN3022; ConvF(6.11, 6.11, 6.11); Calibrated: 8/25/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn704; Calibrated: 9/16/2011
Phantom: SAM v5.0 front; Type: SAM v5.0; Serial: TP-1646
Measurement SW: DASY52, Version 52.6 (2);SEMCAD X Version 14.4.5 (3634)

**Mode: LTE Band 12, Body SAR, Front side, Mid.ch**
**QPSK, 10 MHz BW, 1 RB, RB Offset 49**

**Area Scan (7x10x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 33.528 V/m; Power Drift = -0.0057 dB
Peak SAR (extrapolated) = 1.357 W/kg
**SAR(1 g) = 0.967 mW/g; SAR(10 g) = 0.660 mW/g**




0 dB = 0.920mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSCHLC11R; Type: Portable Wireless Router; Serial: FCC #6**

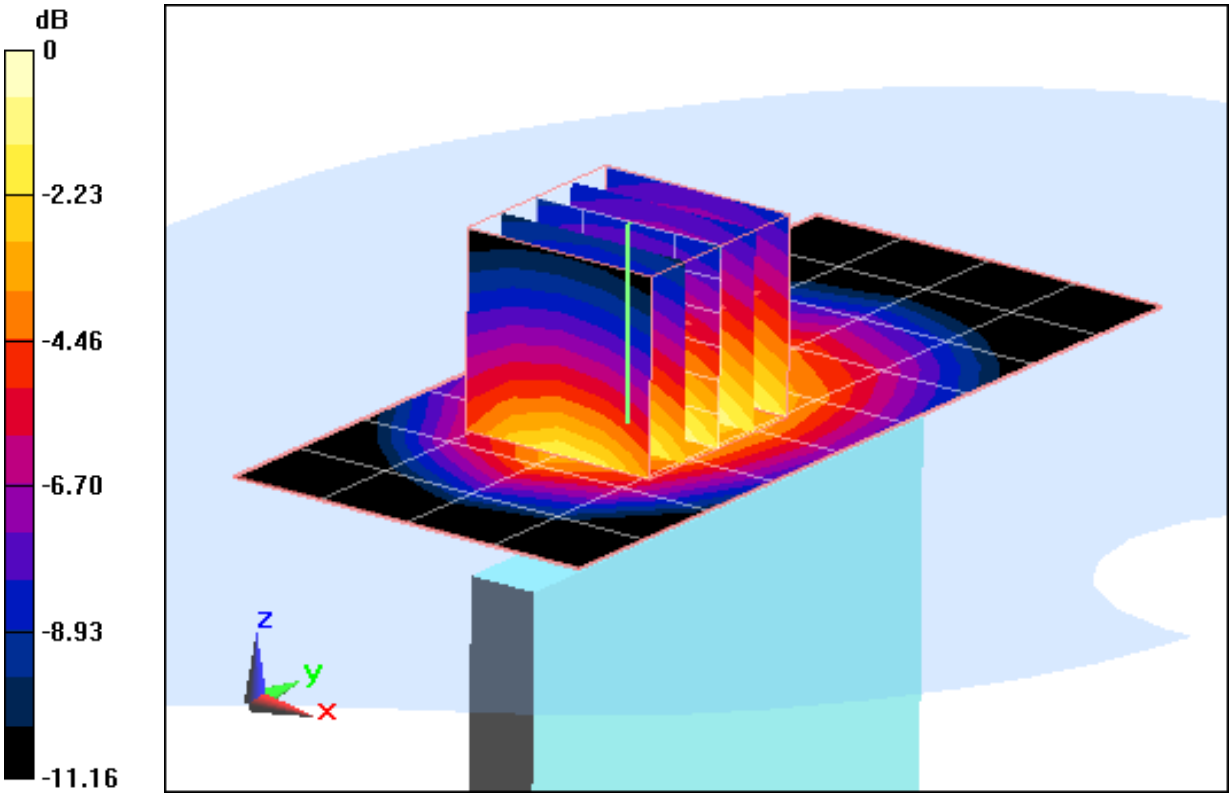
Communication System: LTE Band 12; Frequency: 707.5 MHz;Duty Cycle: 1:1
Medium: 695 Body Medium parameters used (interpolated):
f = 707.5 MHz; $\sigma$ = 0.923 mho/m; $\varepsilon_r$ = 56.903; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-01-2012; Ambient Temp: 22.8°C; Tissue Temp: 20.9°C

Probe: ES3DV2 - SN3022; ConvF(6.11, 6.11, 6.11); Calibrated: 8/25/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn704; Calibrated: 9/16/2011
Phantom: SAM v5.0 front; Type:SAM v5.0; Serial: TP-1646
Measurement SW: DASY52, Version 52.6 (2);SEMCAD X Version 14.4.5 (3634)

**Mode: LTE Band 12, Body SAR, Top Edge, Mid.ch**
**QPSK, 10 MHz BW, 1 RB, RB Offset 49**

**Area Scan (5x10x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 26.540 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 0.818 W/kg
**SAR(1 g) = 0.588 mW/g; SAR(10 g) = 0.404 mW/g**




0 dB = 0.630mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSCHLC11R; Type: Portable Wireless Router; Serial: FCC #6**

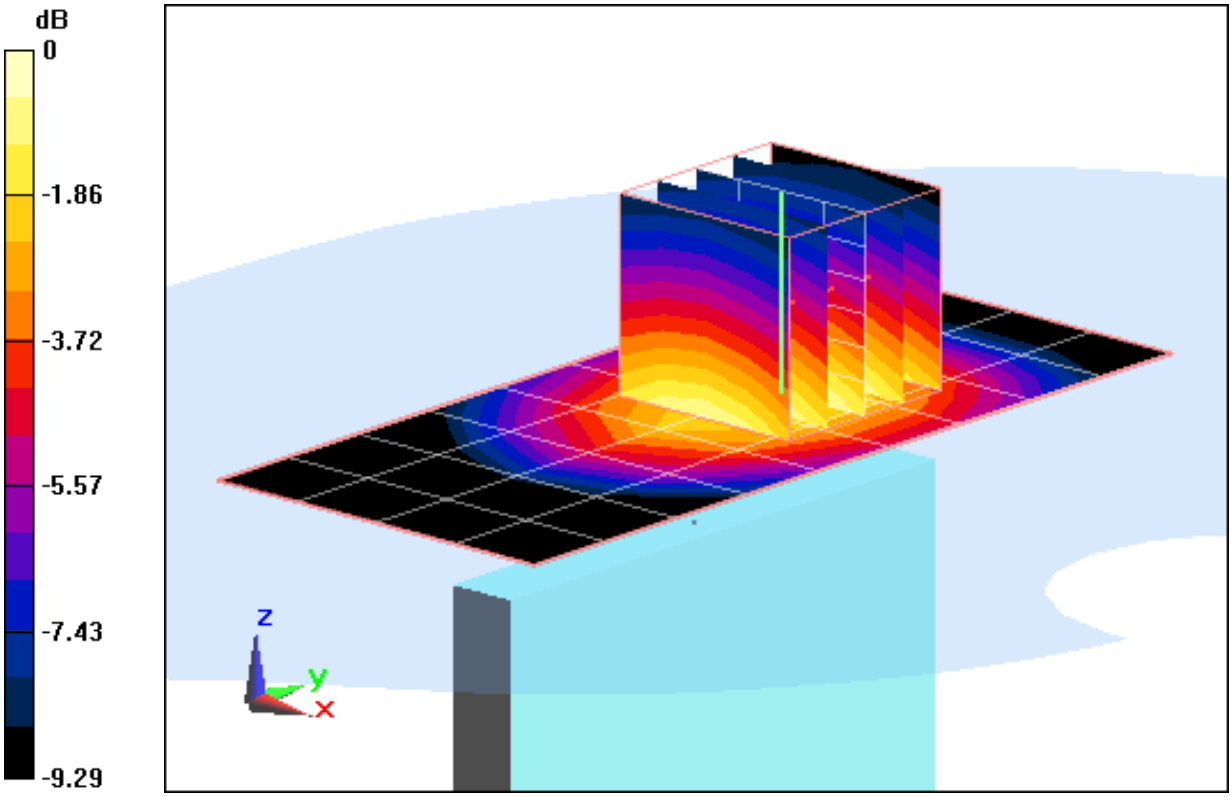
Communication System: LTE Band 12; Frequency: 707.5 MHz;Duty Cycle: 1:1
Medium: 695 Body Medium parameters used (interpolated):
f = 707.5 MHz; $\sigma$ = 0.923 mho/m; $\varepsilon_r$ = 56.903; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-01-2012; Ambient Temp: 22.8°C; Tissue Temp: 20.9°C

Probe: ES3DV2 - SN3022; ConvF(6.11, 6.11, 6.11); Calibrated: 8/25/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn704; Calibrated: 9/16/2011
Phantom: SAM v5.0 front; Type: SAM v5.0; Serial: TP-1646
Measurement SW: DASY52, Version 52.6 (2);SEMCAD X Version 14.4.5 (3634)

**Mode: LTE Band 12, Body SAR, Bottom Edge, Mid.ch**
**QPSK, 10 MHz BW, 1 RB, RB Offset 49**

**Area Scan (5x10x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.970 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.455 W/kg
**SAR(1 g) = 0.338 mW/g; SAR(10 g) = 0.239 mW/g**




0 dB = 0.360mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSCHLC11R; Type: Portable Wireless Router; Serial: FCC #6**

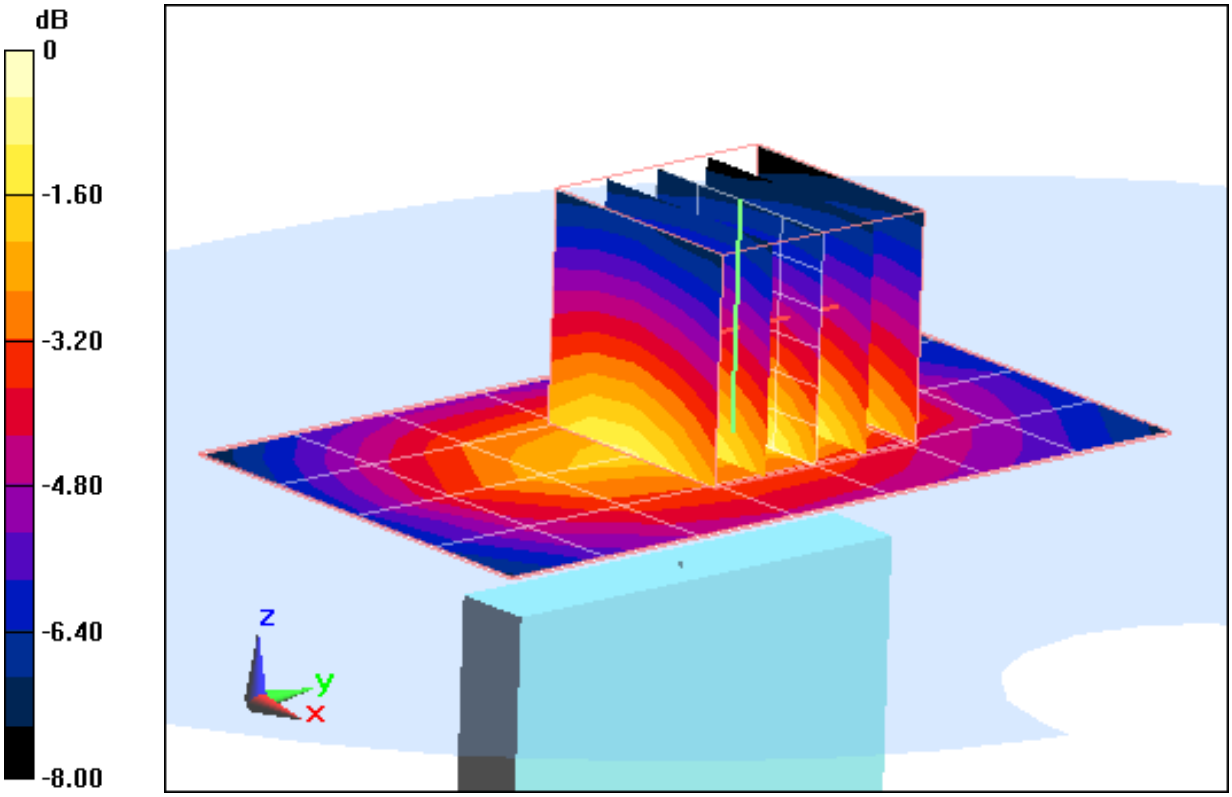
Communication System: LTE Band 12; Frequency: 707.5 MHz;Duty Cycle: 1:1
Medium: 695 Body Medium parameters used (interpolated):
f = 707.5 MHz; $\sigma$ = 0.923 mho/m; $\varepsilon_r$ = 56.903; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-01-2012; Ambient Temp: 22.8°C; Tissue Temp: 20.9°C

Probe: ES3DV2 - SN3022; ConvF(6.11, 6.11, 6.11); Calibrated: 8/25/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn704; Calibrated: 9/16/2011
Phantom: SAM v5.0 front; Type: SAM v5.0; Serial: TP-1646
Measurement SW: DASY52, Version 52.6 (2);SEMCAD X Version 14.4.5 (3634)

**Mode: LTE Band 12, Body SAR, Left Edge, Mid.ch**
**QPSK, 10 MHz BW, 1 RB, RB Offset 0**

**Area Scan (5x8x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.877 V/m; Power Drift = 0.17 dB
Peak SAR (extrapolated) = 0.231 W/kg
**SAR(1 g) = 0.141 mW/g; SAR(10 g) = 0.087 mW/g**




0 dB = 0.150mW/g

**DUT: A3LSCHLC11R; Type: Portable Wireless Router; Serial: FCC #2**

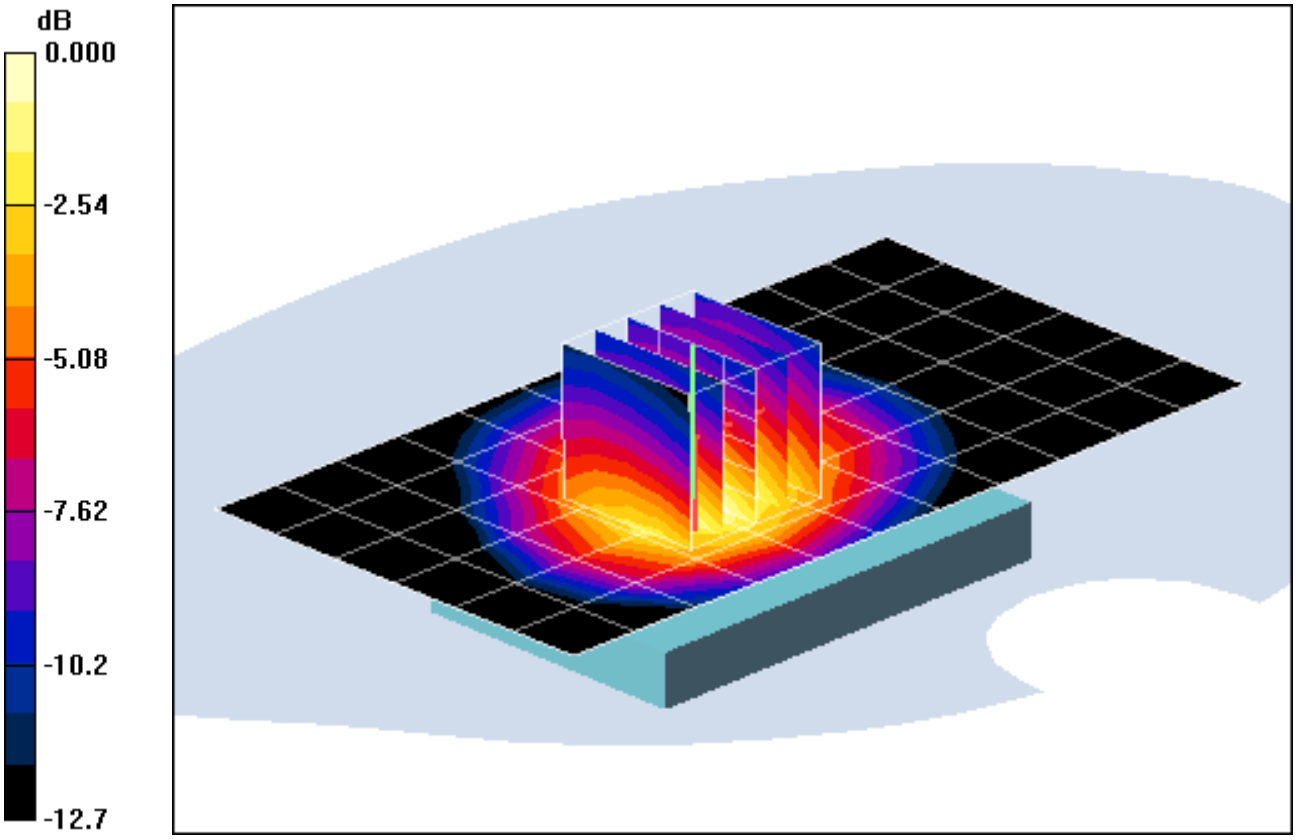
Communication System: Cellular CDMA; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.52 MHz; $\sigma$ = 0.96 mho/m; $\varepsilon_r$ = 52.9; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-26-2012; Ambient Temp: 24.0°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3258; ConvF(6.12, 6.12, 6.12); Calibrated: 4/8/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/21/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

## Mode: Cellular TDSO, Body SAR, Back side, Mid.ch

**Area Scan (7x12x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 27.2 V/m; Power Drift = 0.048 dB
Peak SAR (extrapolated) = 0.882 W/kg
**SAR(1 g) = 0.576 mW/g; SAR(10 g) = 0.371 mW/g**




0 dB = 0.623mW/g

**DUT: A3LSCHLC11R; Type: Portable Wireless Router; Serial: FCC #2**

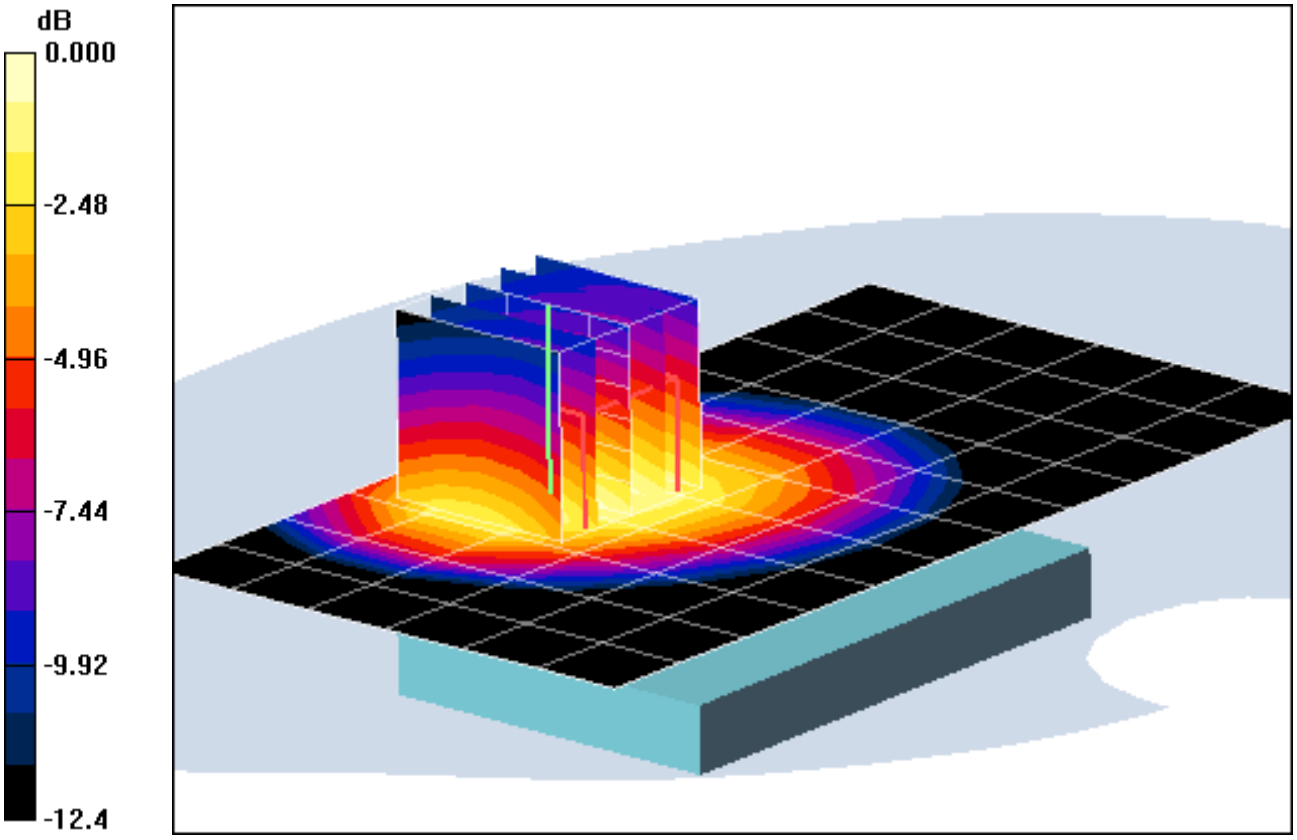
Communication System: Cellular CDMA; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.52 MHz; $\sigma$ = 0.96 mho/m; $\varepsilon_r$ = 52.9; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-26-2012; Ambient Temp: 24.0°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3258; ConvF(6.12, 6.12, 6.12); Calibrated: 4/8/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/21/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

## Mode: Cellular TDSO, Body SAR, Front side, Mid.ch

**Area Scan (7x12x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 25.6 V/m; Power Drift = -0.020 dB
Peak SAR (extrapolated) = 0.816 W/kg
**SAR(1 g) = 0.543 mW/g; SAR(10 g) = 0.355 mW/g**




0 dB = 0.590mW/g

**DUT: A3LSCHLC11R; Type: Portable Wireless Router; Serial: FCC #2**

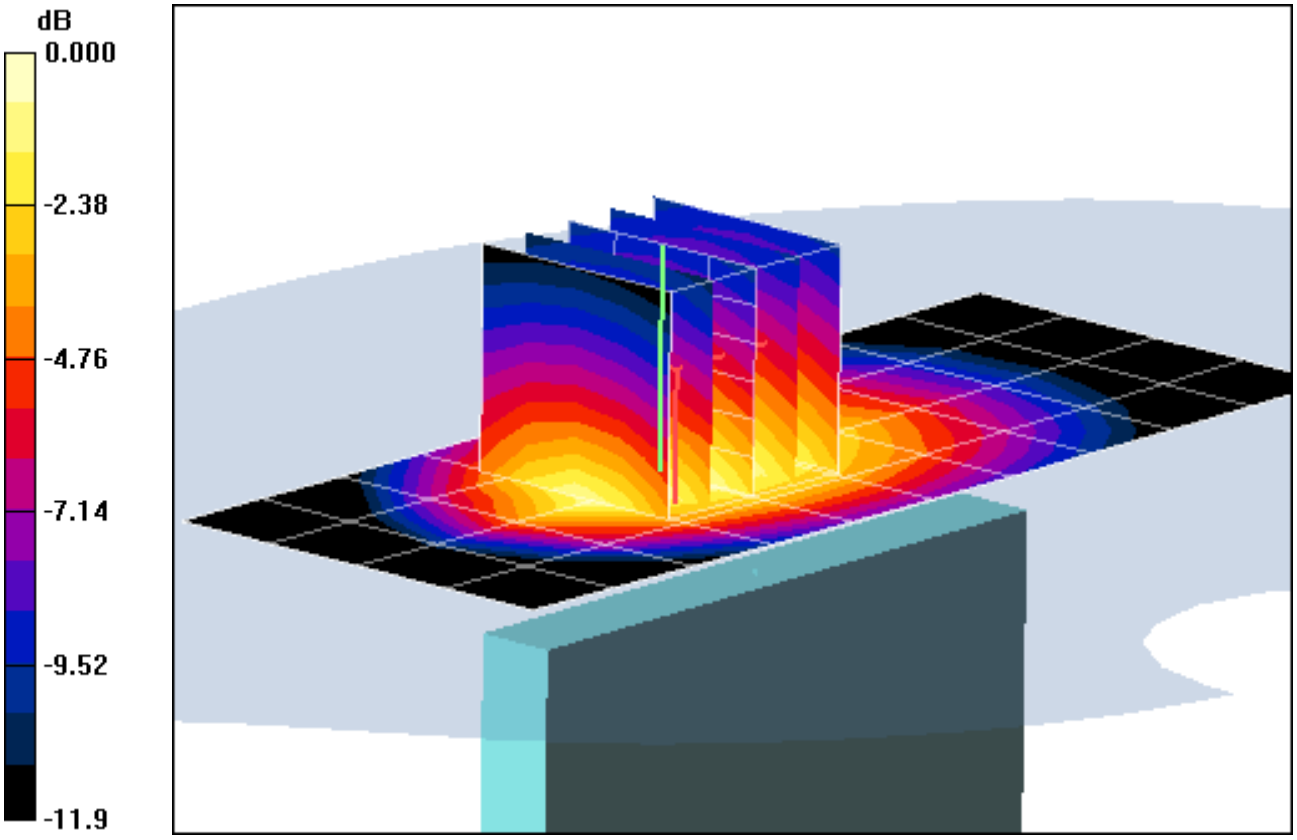
Communication System: Cellular CDMA; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.52 MHz; $\sigma$ = 0.96 mho/m; $\varepsilon_r$ = 52.9; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-26-2012; Ambient Temp: 24.0°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3258; ConvF(6.12, 6.12, 6.12); Calibrated: 4/8/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/21/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

## Mode: Cellular TDSO, Body SAR, Top Edge, Mid.ch

**Area Scan (5x11x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.5 V/m; Power Drift = 0.111 dB
Peak SAR (extrapolated) = 0.533 W/kg
**SAR(1 g) = 0.354 mW/g; SAR(10 g) = 0.230 mW/g**




0 dB = 0.382mW/g

**DUT: A3LSCHLC11R; Type: Portable Wireless Router; Serial: FCC #2**

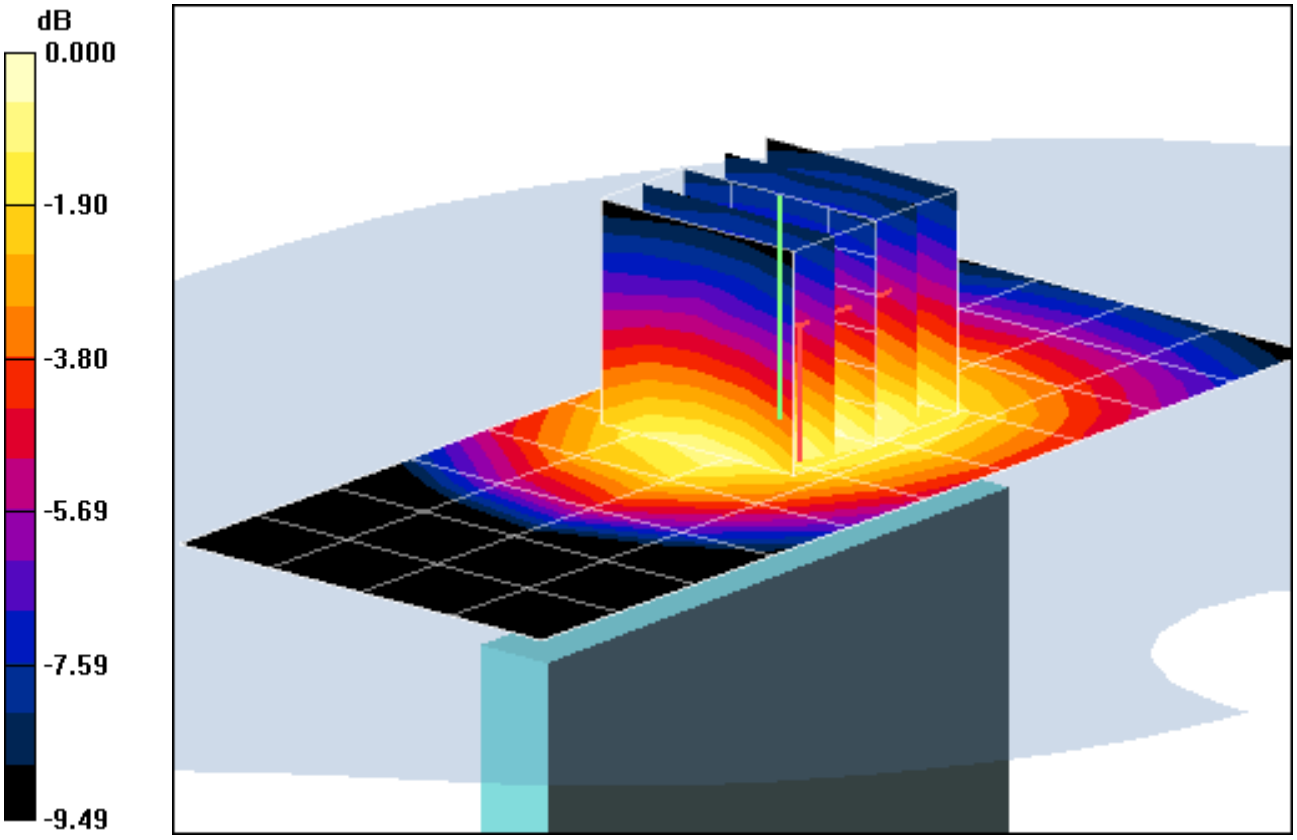
Communication System: Cellular CDMA; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.52 MHz; $\sigma$ = 0.96 mho/m; $\varepsilon_r$ = 52.9; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-26-2012; Ambient Temp: 24.0°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3258; ConvF(6.12, 6.12, 6.12); Calibrated: 4/8/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/21/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

## Mode: Cellular TDSO, Body SAR, Bottom Edge, Mid.ch

**Area Scan (5x11x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.4 V/m; Power Drift = 0.125 dB
Peak SAR (extrapolated) = 0.154 W/kg
**SAR(1 g) = 0.107 mW/g; SAR(10 g) = 0.075 mW/g**




0 dB = 0.113mW/g

**DUT: A3LSCHLC11R; Type: Portable Wireless Router; Serial: FCC #2**

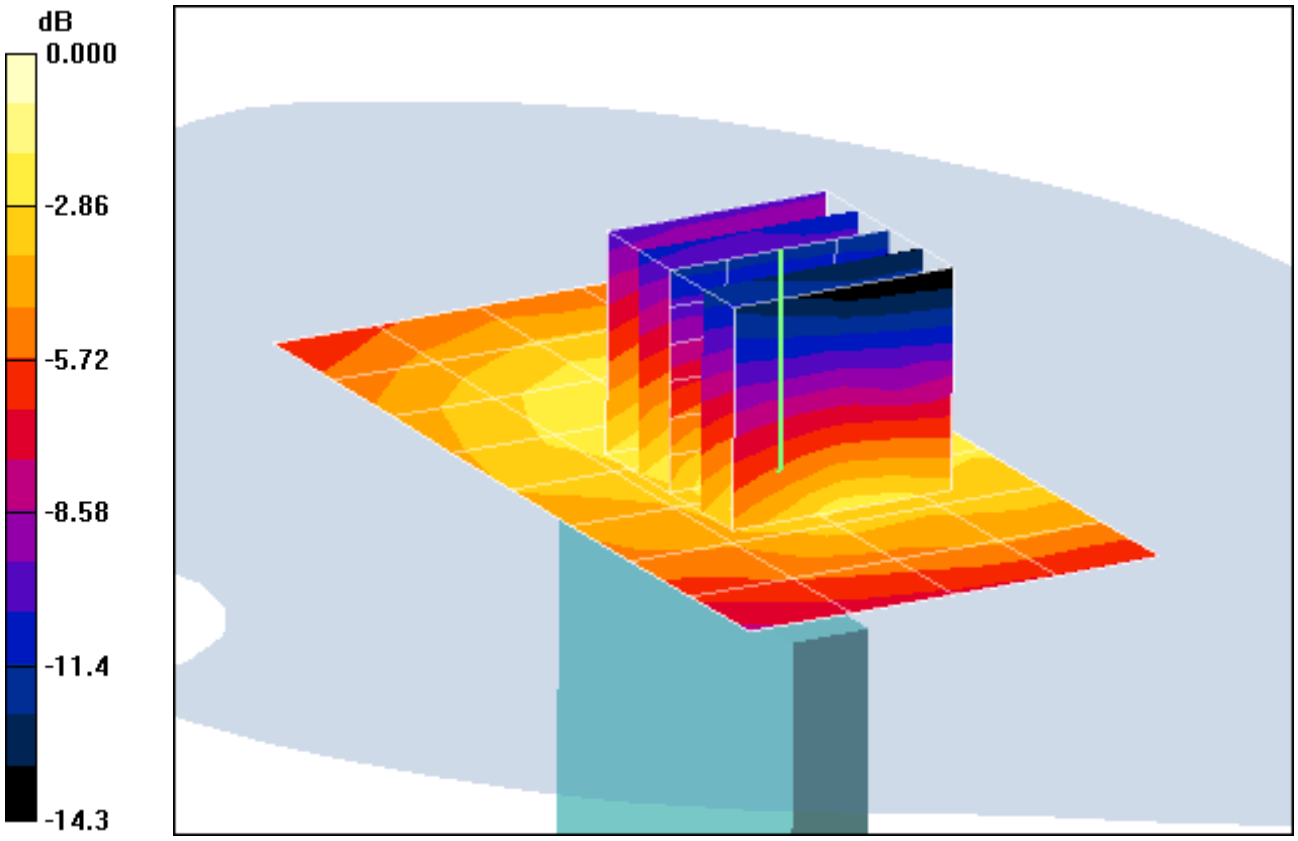
Communication System: Cellular CDMA; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.52 MHz; $\sigma$ = 0.96 mho/m; $\varepsilon_r$ = 52.9; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-26-2012; Ambient Temp: 24.0°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3258; ConvF(6.12, 6.12, 6.12); Calibrated: 4/8/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/21/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

## Mode: Cellular TDSO, Body SAR, Left Edge, Mid.ch

**Area Scan (5x9x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.44 V/m; Power Drift = 0.101 dB
Peak SAR (extrapolated) = 0.132 W/kg
**SAR(1 g) = 0.072 mW/g; SAR(10 g) = 0.043 mW/g**




0 dB = 0.079mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSCHLC11R; Type: Portable Wireless Router; Serial: B-U #1**

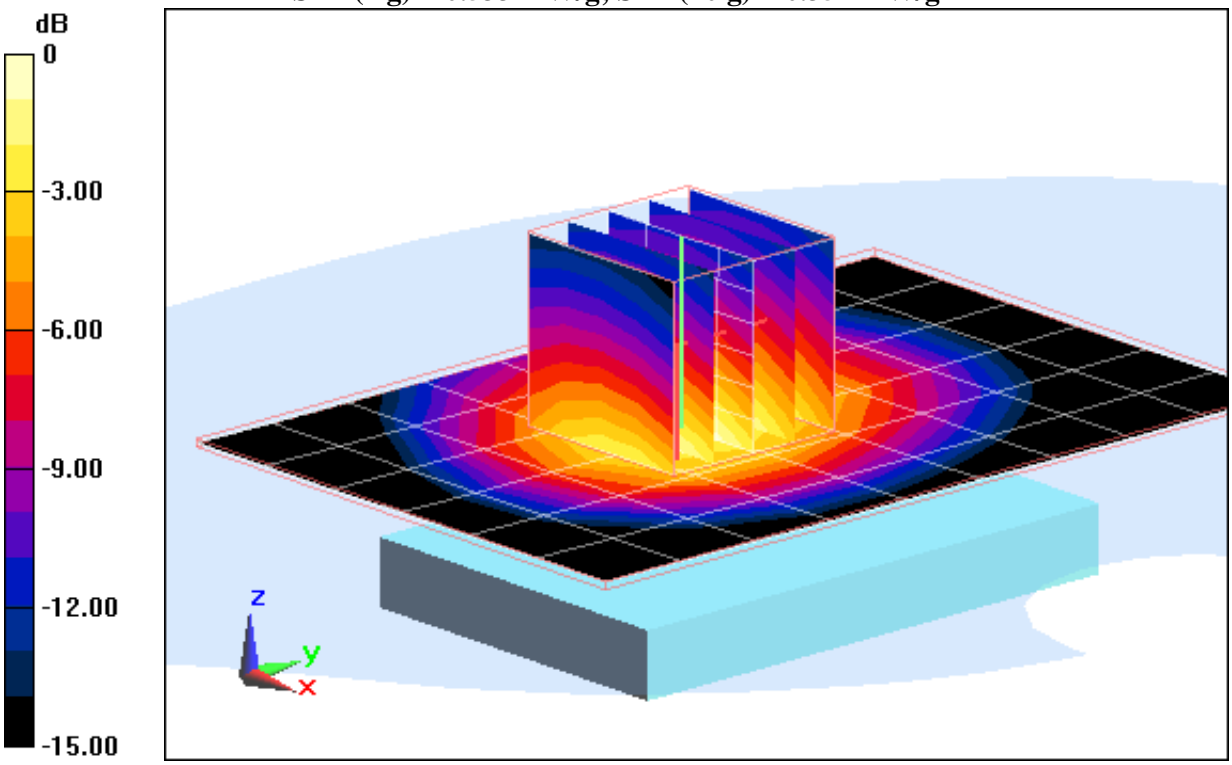
Communication System: LTE BAND 5; Frequency: 826.5 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 826.5 MHz; $\sigma$ = 0.951 mho/m; $\varepsilon_r$ = 53.002; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-26-2012; Ambient Temp: 24.0°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3258; ConvF(6.12, 6.12, 6.12); Calibrated: 4/8/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/21/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.4.5 (3634)

**Mode: LTE Band 5 (Cell), Body SAR, Back side, Low.ch**
**QPSK, 5 MHz BW, 1 RB, RB Offset 0**

**Area Scan (7x10x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.833 V/m; Power Drift = -0.0079 dB
Peak SAR (extrapolated) = 0.792 W/kg
**SAR(1 g) = 0.533 mW/g; SAR(10 g) = 0.352 mW/g**




0 dB = 0.570mW/g

**DUT: A3LSCHLC11R; Type: Portable Wireless Router; Serial: B-U #1**

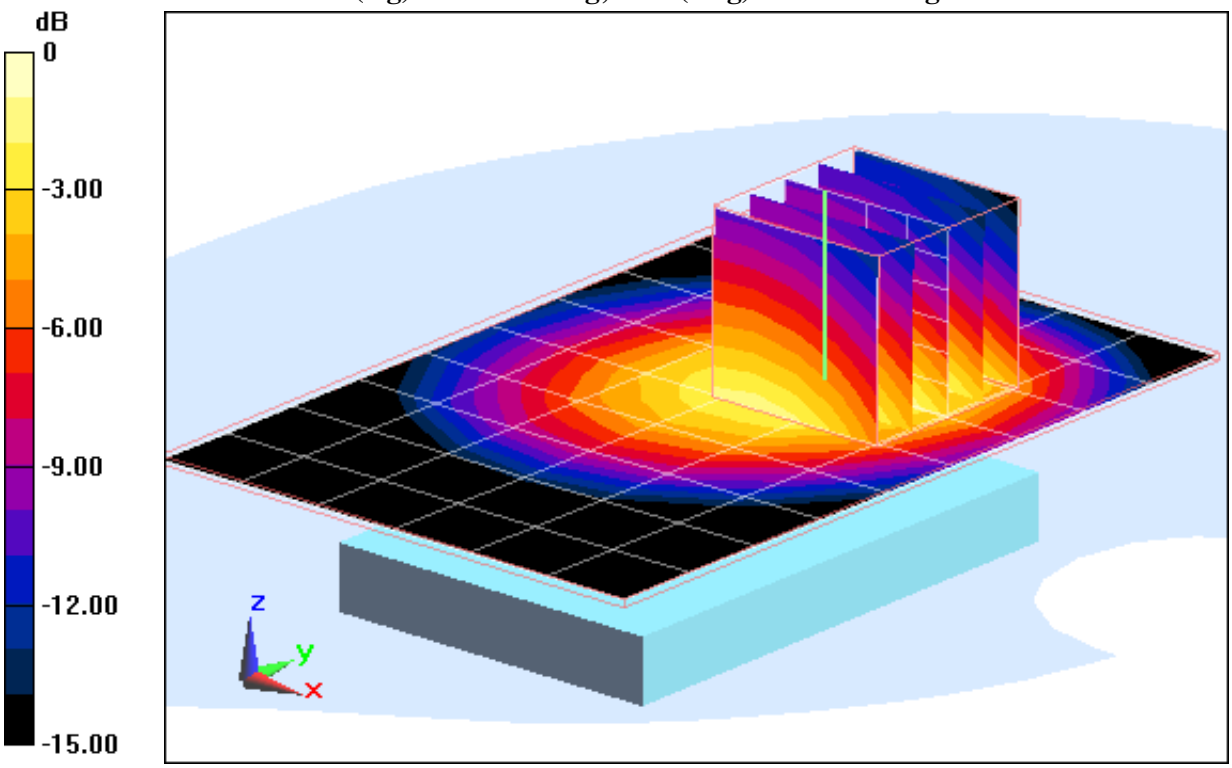
Communication System: LTE BAND 5; Frequency: 826.5 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 826.5 MHz; $\sigma$ = 0.951 mho/m; $\varepsilon_r$ = 53.002; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-26-2012; Ambient Temp: 24.0°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3258; ConvF(6.12, 6.12, 6.12); Calibrated: 4/8/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/21/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.4.5 (3634)

**Mode: LTE Band 5 (Cell), Body SAR, Front side, Low.ch**
**QPSK, 5 MHz BW, 1 RB, RB Offset 0**

**Area Scan (7x10x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.379 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 0.790 W/kg
**SAR(1 g) = 0.536 mW/g; SAR(10 g) = 0.354 mW/g**




0 dB = 0.560mW/g

**DUT: A3LSCHLC11R; Type: Portable Wireless Router; Serial: B-U #1**

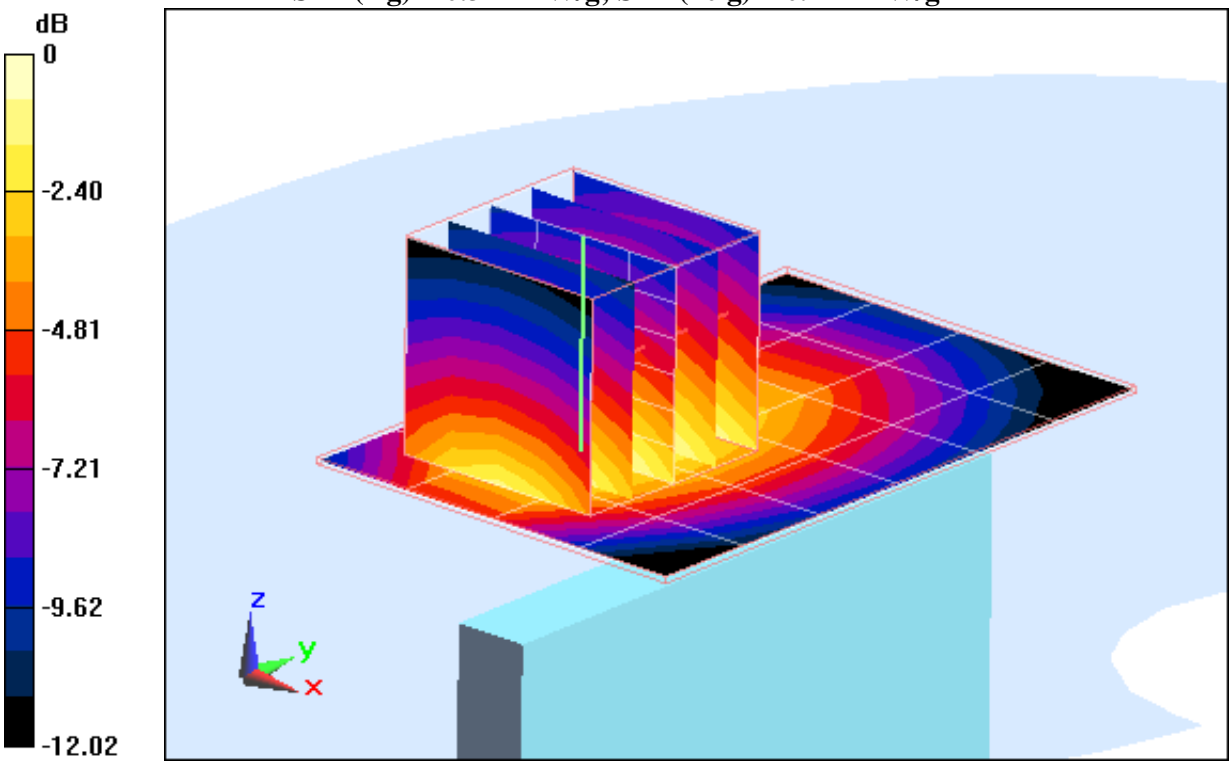
Communication System: LTE BAND 5; Frequency: 826.5 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 826.5 MHz; $\sigma$ = 0.951 mho/m; $\varepsilon_r$ = 53.002; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-26-2012; Ambient Temp: 24.0°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3258; ConvF(6.12, 6.12, 6.12); Calibrated: 4/8/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/21/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.4.5 (3634)

**Mode: LTE Band 5 (Cell), Body SAR, Top Edge, Low.ch**
**QPSK, 5 MHz BW, 1 RB, RB Offset 0**

**Area Scan (5x7x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.831 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.494 W/kg
**SAR(1 g) = 0.341 mW/g; SAR(10 g) = 0.227 mW/g**




0 dB = 0.360mW/g

**DUT: A3LSCHLC11R; Type: Portable Wireless Router; Serial: B-U #1**

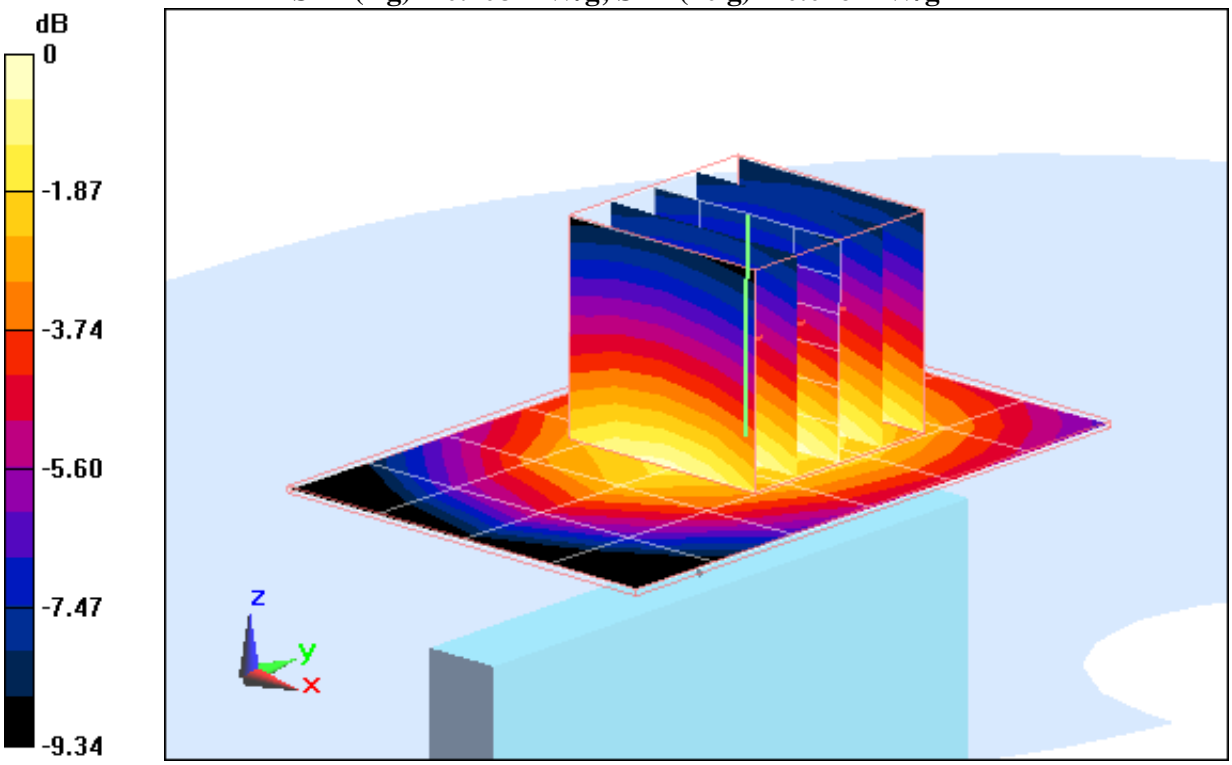
Communication System: LTE BAND 5; Frequency: 826.5 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 826.5 MHz; $\sigma$ = 0.951 mho/m; $\varepsilon_r$ = 53.002; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-26-2012; Ambient Temp: 24.0°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3258; ConvF(6.12, 6.12, 6.12); Calibrated: 4/8/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/21/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.4.5 (3634)

**Mode: LTE Band 5 (Cell), Body SAR, Bottom Edge, Low.ch**
**QPSK, 5 MHz BW, 1 RB, RB Offset 0**

**Area Scan (5x7x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.134 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.151 W/kg
**SAR(1 g) = 0.108 mW/g; SAR(10 g) = 0.076 mW/g**




0 dB = 0.110mW/g

**DUT: A3LSCHLC11R; Type: Portable Wireless Router; Serial: B-U #1**

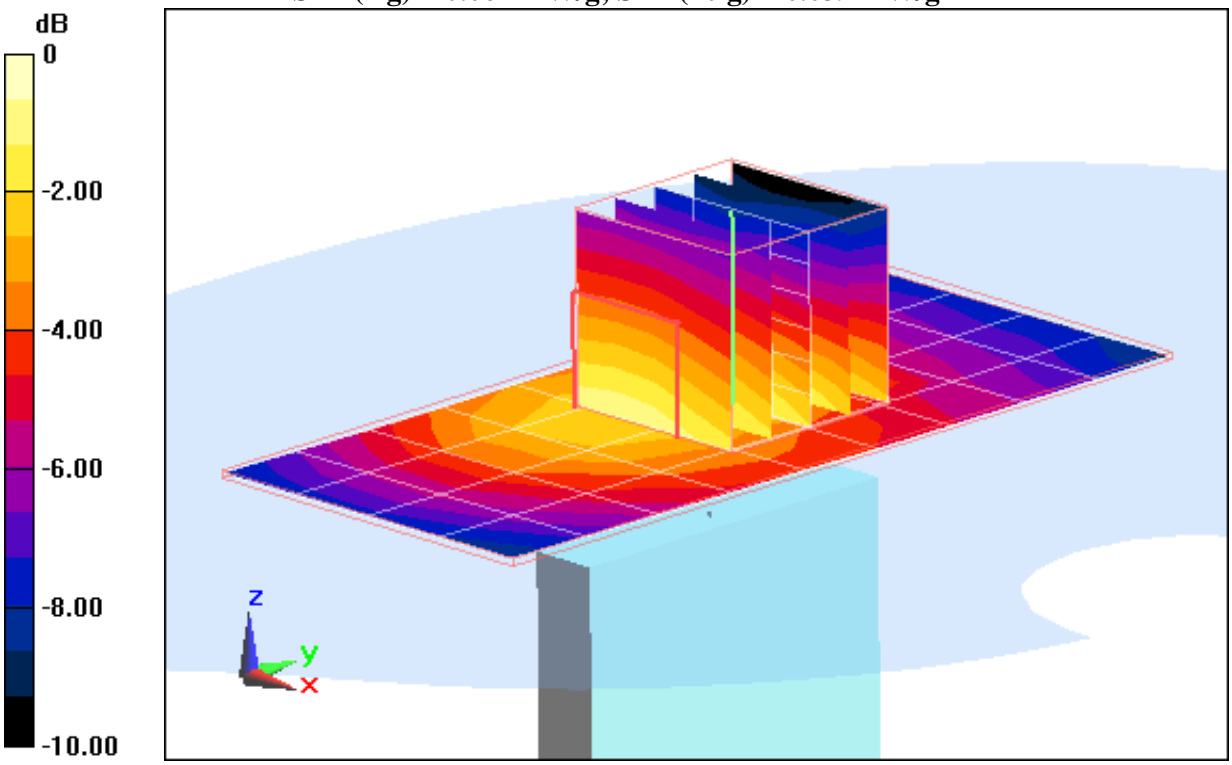
Communication System: LTE BAND 5; Frequency: 826.5 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 826.5 MHz; $\sigma$ = 0.951 mho/m; $\varepsilon_r$ = 53.002; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-26-2012; Ambient Temp: 24.0°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3258; ConvF(6.12, 6.12, 6.12); Calibrated: 4/8/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/21/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.4.5 (3634)

**Mode: LTE Band 5 (Cell), Body SAR, Left Edge, Low.ch**
**QPSK, 5 MHz BW, 1 RB, RB Offset 0**

**Area Scan (5x10x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.433 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 0.112 W/kg
**SAR(1 g) = 0.062 mW/g; SAR(10 g) = 0.039 mW/g**




0 dB = 0.070mW/g

**DUT: A3LSCHLC11R; Type: Portable Wireless Router; Serial: FCC #4**

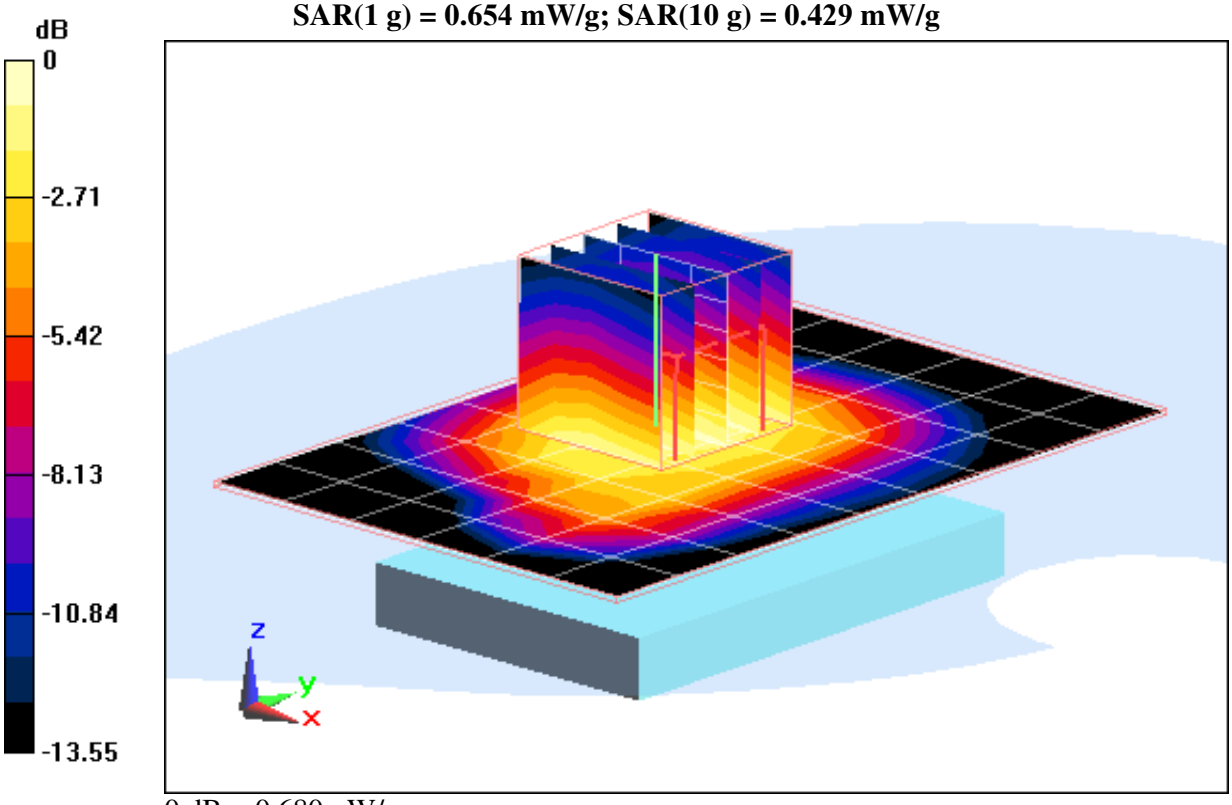
Communication System: LTE RF; Frequency: 1715 MHz;Duty Cycle: 1:1
Medium: 1750 Body, Medium parameters used (interpolated):
f = 1715 MHz; $\sigma$ = 1.457 mho/m; $\varepsilon_r$ = 51.025; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-25-2012; Ambient Temp: 23.9°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3209; ConvF(4.75, 4.75, 4.75); Calibrated: 4/18/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.4.5 (3634)

**Mode: LTE Band 4 (AWS), Body SAR, Back side, Low.ch**
**QPSK, 10 MHz BW, 1 RB, RB Offset 49**

**Area Scan (7x10x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.4 V/m; Power Drift = -0.071 dB
Peak SAR (extrapolated) = 0.959 W/kg
**SAR(1 g) = 0.654 mW/g; SAR(10 g) = 0.429 mW/g**




0 dB = 0.680mW/g

**DUT: A3LSCHLC11R; Type: Portable Wireless Router; Serial: FCC #4**

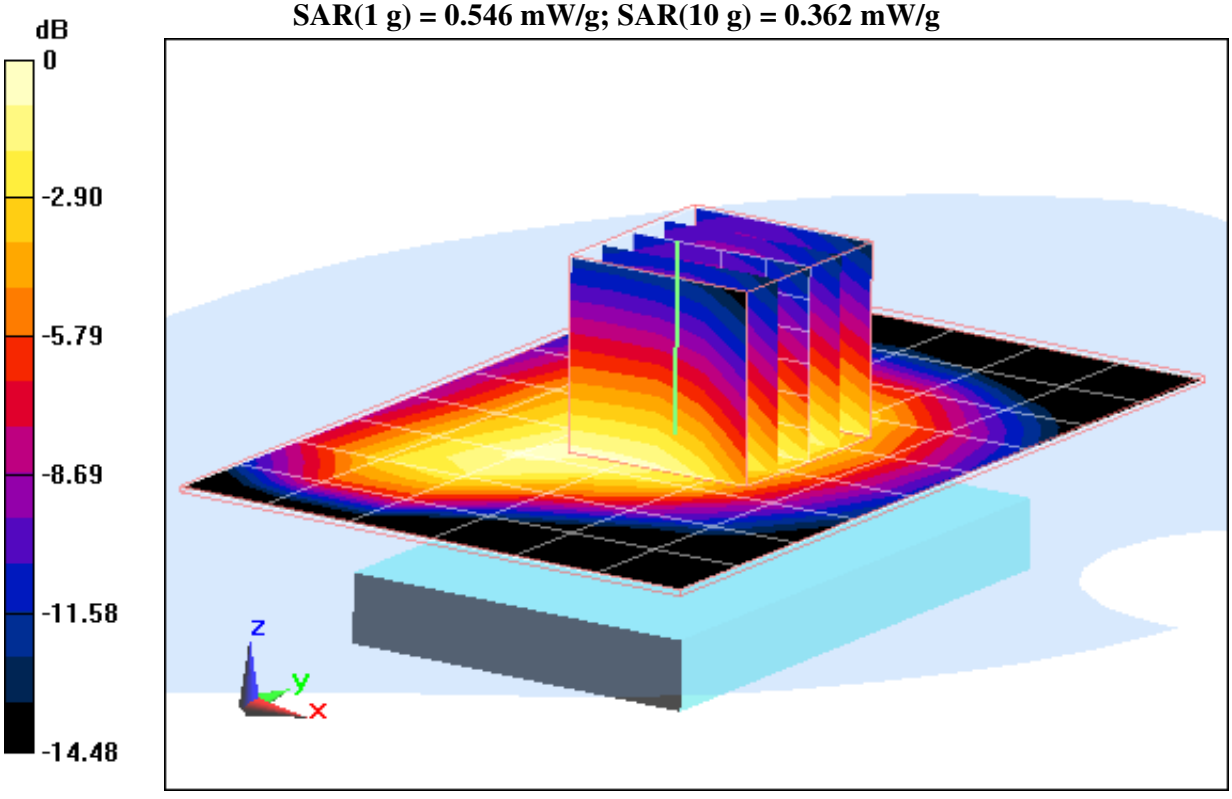
Communication System: LTE RF; Frequency: 1715 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1715 MHz; $\sigma$ = 1.457 mho/m; $\varepsilon_r$ = 51.025; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-25-2012; Ambient Temp: 23.9°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3209; ConvF(4.75, 4.75, 4.75); Calibrated: 4/18/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.4.5 (3634)

**Mode: LTE Band 4 (AWS), Body SAR, Front side, Low.ch**
**QPSK, 10 MHz BW, 1 RB, RB Offset 49**

**Area Scan (7x10x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.1 V/m; Power Drift = 0.056 dB
Peak SAR (extrapolated) = 0.801 W/kg
**SAR(1 g) = 0.546 mW/g; SAR(10 g) = 0.362 mW/g**




0 dB = 0.560mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSCHLC11R; Type: Portable Wireless Router; Serial: FCC #4**

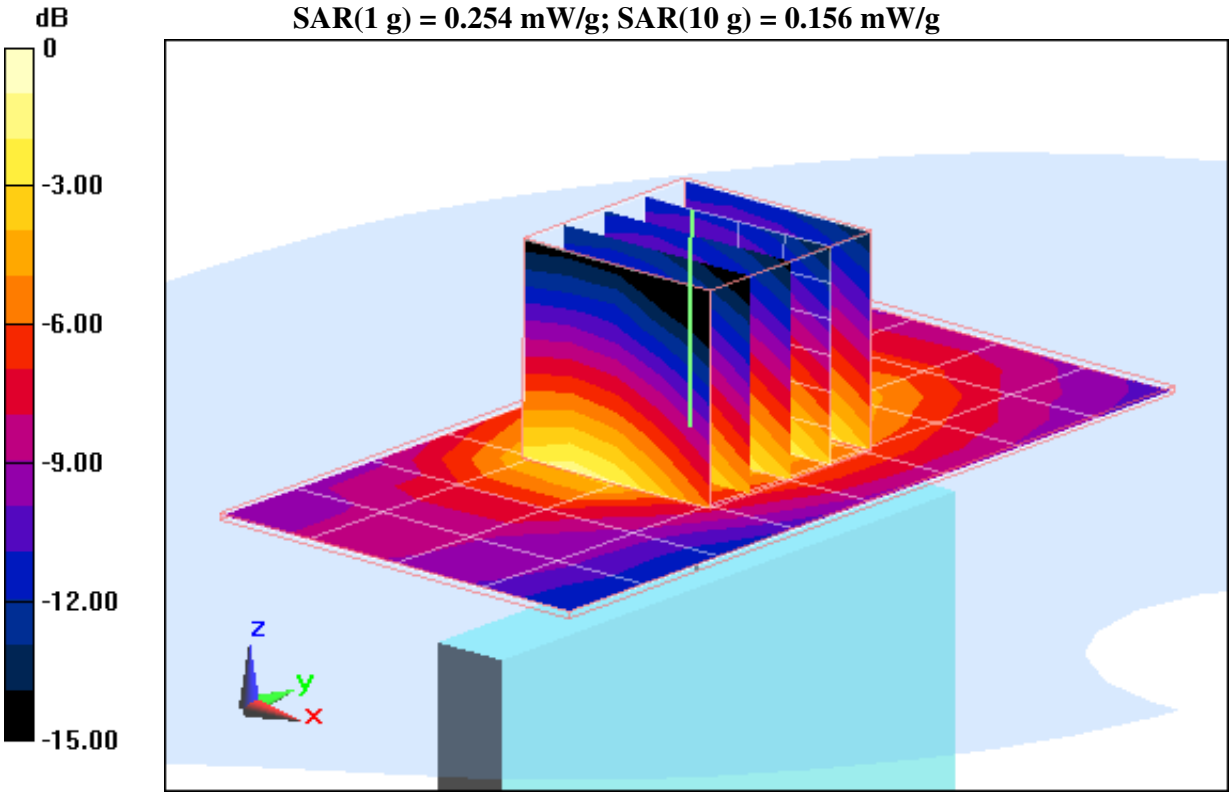
Communication System: LTE RF; Frequency: 1715 MHz;Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1715 MHz; $\sigma$ = 1.457 mho/m; $\varepsilon_r$ = 51.025; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-25-2012; Ambient Temp: 23.9°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3209; ConvF(4.75, 4.75, 4.75); Calibrated: 4/18/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.4.5 (3634)

**Mode: LTE Band 4 (AWS), Body SAR, Top Edge, Low.ch**
**QPSK, 10 MHz BW, 1 RB, RB Offset 49**

**Area Scan (5x9x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.1 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 0.397 W/kg
**SAR(1 g) = 0.254 mW/g; SAR(10 g) = 0.156 mW/g**




0 dB = 0.260mW/g

**DUT: A3LSCHLC11R; Type: Portable Wireless Router; Serial: FCC #4**

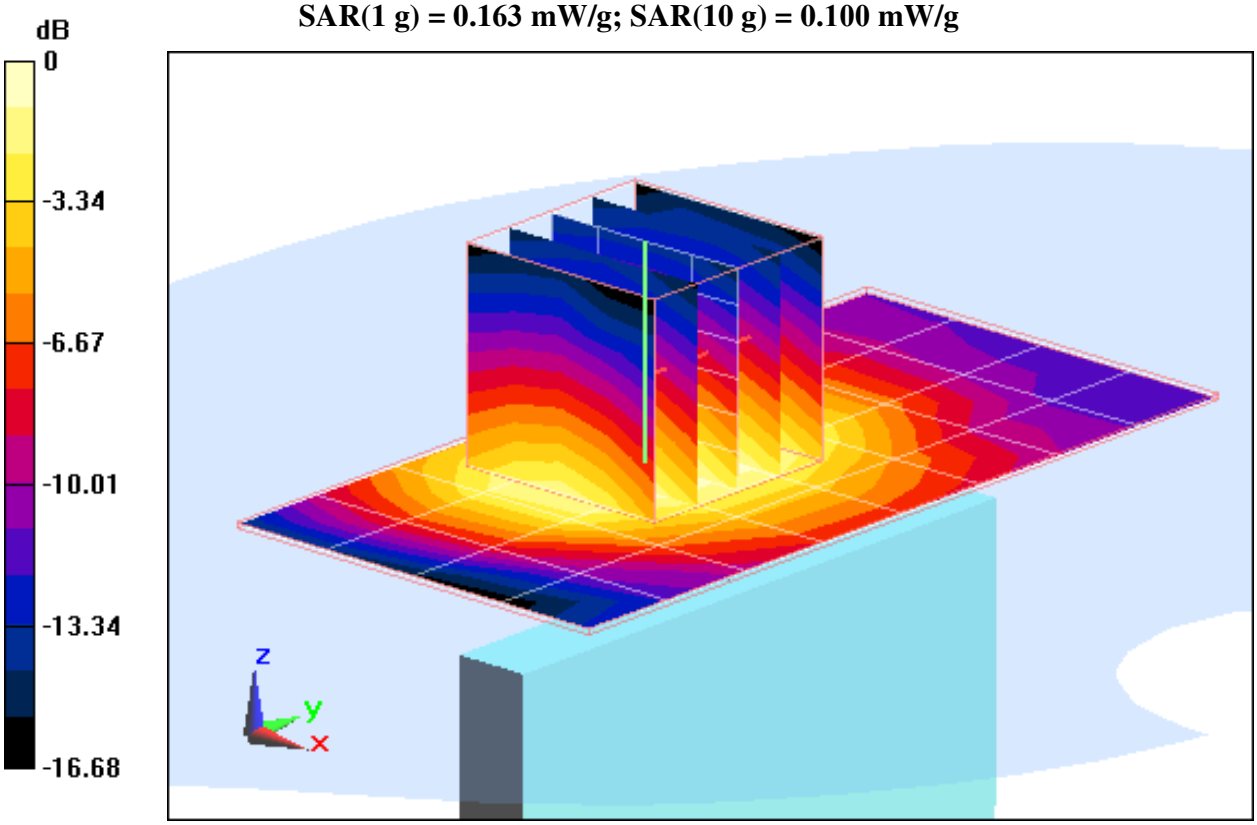
Communication System: LTE RF; Frequency: 1715 MHz;Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1715 MHz; $\sigma$ = 1.457 mho/m; $\varepsilon_r$ = 51.025; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-25-2012; Ambient Temp: 23.9°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3209; ConvF(4.75, 4.75, 4.75); Calibrated: 4/18/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.4.5 (3634)

**Mode: LTE Band 4 (AWS), Body SAR, Bottom Edge, Low.ch**
**QPSK, 10 MHz BW, 1 RB, RB Offset 0**

**Area Scan (5x9x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.2 V/m; Power Drift = 0.087 dB
Peak SAR (extrapolated) = 0.256 W/kg
**SAR(1 g) = 0.163 mW/g; SAR(10 g) = 0.100 mW/g**




0 dB = 0.140mW/g

**DUT: A3LSCHLC11R; Type: Portable Wireless Router; Serial: FCC #4**

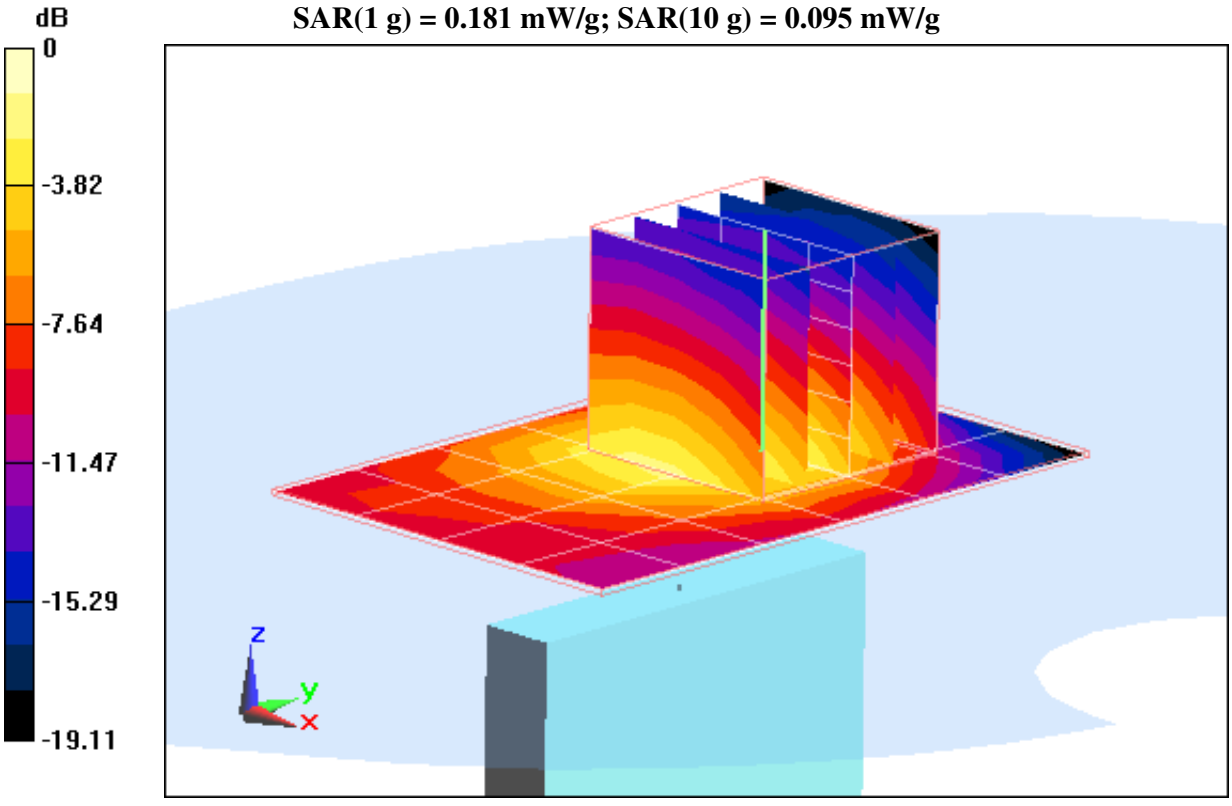
Communication System: LTE RF; Frequency: 1715 MHz;Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1715 MHz; $\sigma$ = 1.457 mho/m; $\varepsilon_r$ = 51.025; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-25-2012; Ambient Temp: 23.9°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3209; ConvF(4.75, 4.75, 4.75); Calibrated: 4/18/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.4.5 (3634)

**Mode: LTE Band 4 (AWS), Body SAR, Left Edge, Low.ch**
**QPSK, 10 MHz BW, 1 RB, RB Offset 49**

**Area Scan (5x7x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.0 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.340 W/kg
**SAR(1 g) = 0.181 mW/g; SAR(10 g) = 0.095 mW/g**




0 dB = 0.180mW/g

**DUT: A3LSCHLC11R; Type: Portable Wireless Router; Serial: FCC #2**

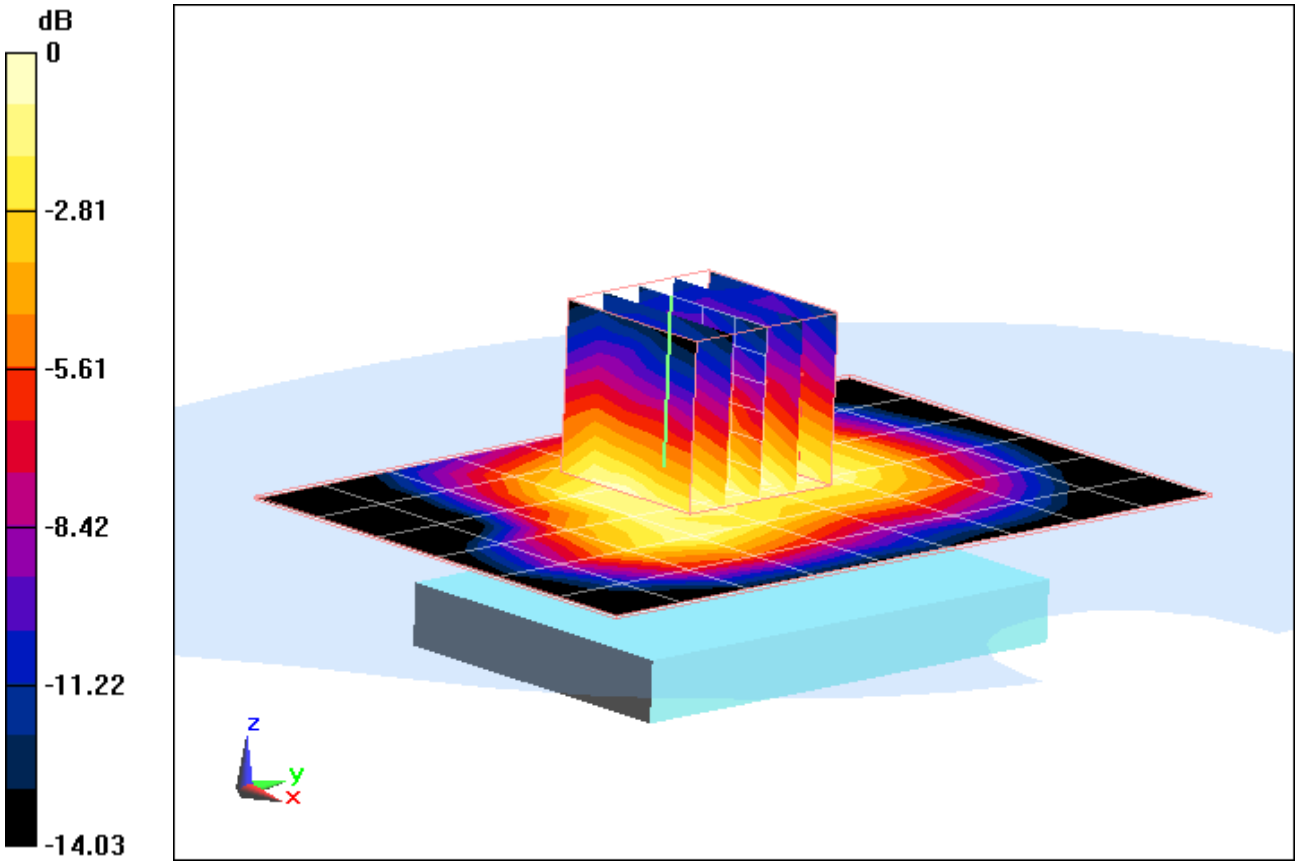
Communication System: CDMA; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; $\sigma$ = 1.485 mho/m; $\varepsilon_r$ = 51.32; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-25-2012; Ambient Temp: 22.1°C; Tissue Temp: 21.6°C

Probe: ES3DV3 - SN3213; ConvF(4.58, 4.58, 4.58); Calibrated: 3/24/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE3 Sn455; Calibrated: 11/9/2011
Phantom: SAM 5.0 front; Type: SAM v5.0; Serial: TP:-1648
Measurement SW: DASY52, Version 52.6 (2);SEMCAD X Version 14.4.5 (3634)

**Mode: PCS CDMA, Body SAR, Back Side, Mid. Channel**

**Area Scan (7x10x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.916 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 1.156 W/kg
**SAR(1 g) = 0.675 mW/g; SAR(10 g) = 0.435 mW/g**




0 dB = 0.750mW/g

**DUT: A3LSCHLC11R; Type: Portable Wireless Router; Serial: FCC #2**

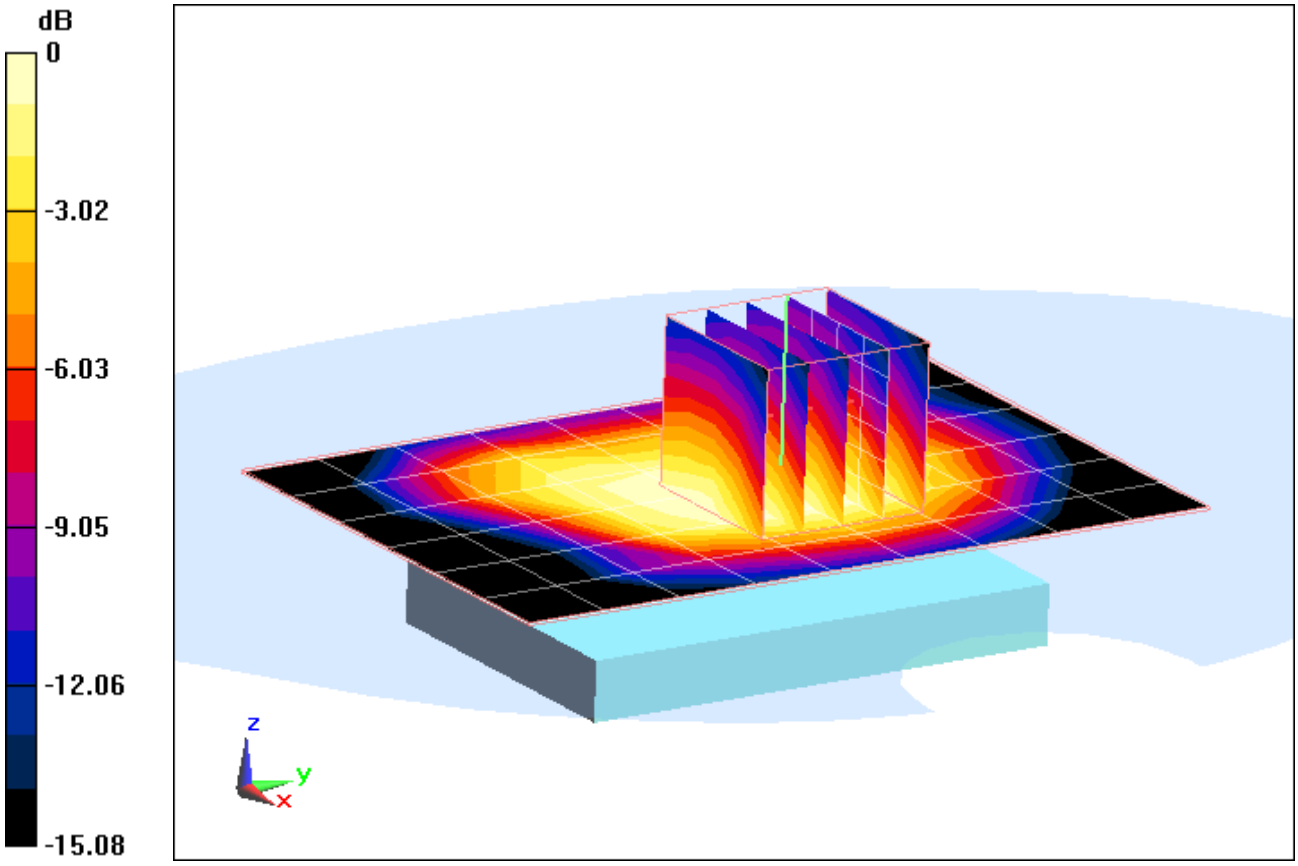
Communication System: CDMA; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; $\sigma$ = 1.485 mho/m; $\varepsilon_r$ = 51.32; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-25-2012; Ambient Temp: 22.1°C; Tissue Temp: 21.6°C

Probe: ES3DV3 - SN3213; ConvF(4.58, 4.58, 4.58); Calibrated: 3/24/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE3 Sn455; Calibrated: 11/9/2011
Phantom: SAM 5.0 front; Type: SAM v5.0; Serial: TP:-1648
Measurement SW: DASY52, Version 52.6 (2);SEMCAD X Version 14.4.5 (3634)

**Mode: PCS CDMA, Body SAR, Front Side, Mid. Channel**

**Area Scan (7x10x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.709 V/m; Power Drift = 0.060 dB
Peak SAR (extrapolated) = 0.962 W/kg
**SAR(1 g) = 0.635 mW/g; SAR(10 g) = 0.428 mW/g**




0 dB = 0.700mW/g

**DUT: A3LSCHLC11R; Type: Portable Wireless Router; Serial: FCC #2**

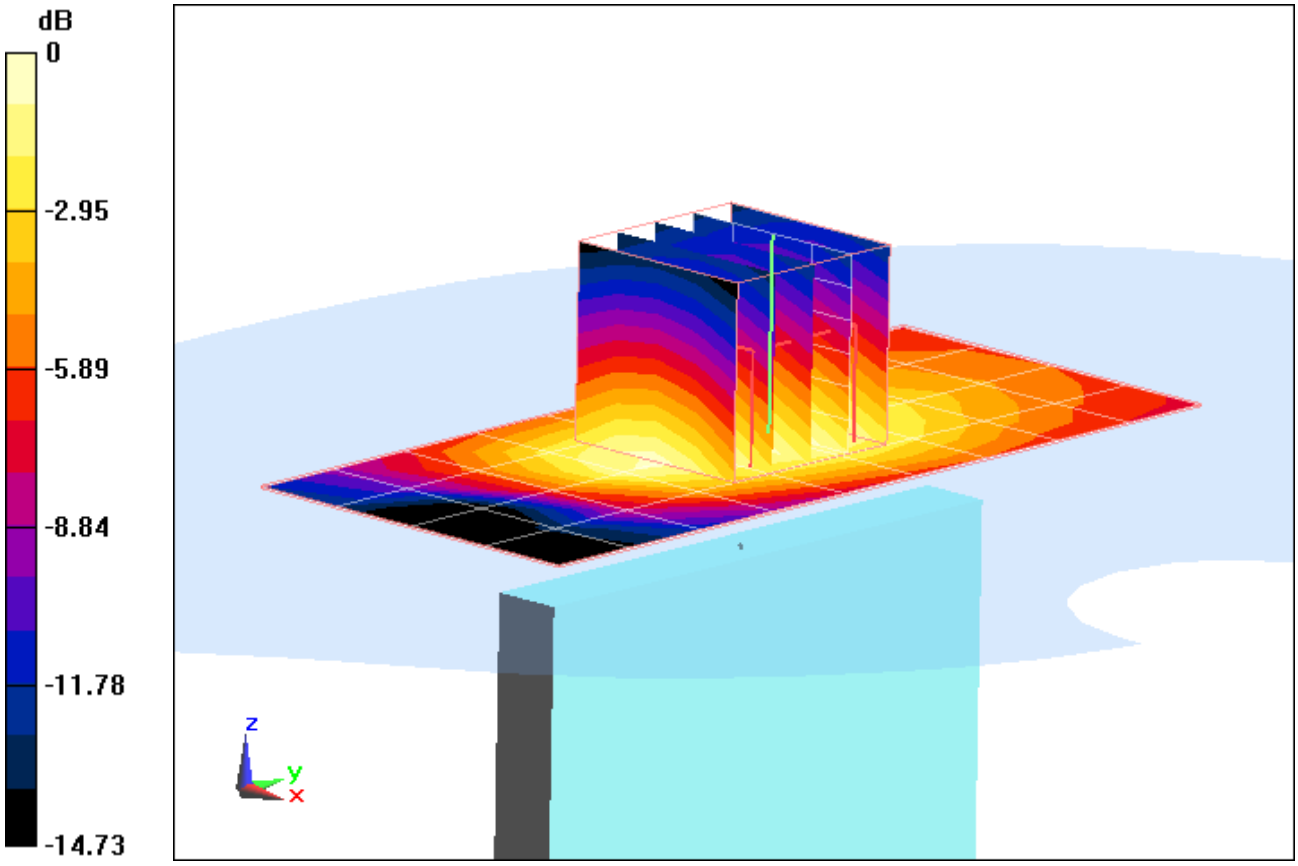
Communication System: CDMA; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; $\sigma$ = 1.485 mho/m; $\varepsilon_r$ = 51.32; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-25-2012; Ambient Temp: 22.1°C; Tissue Temp: 21.6°C

Probe: ES3DV3 - SN3213; ConvF(4.58, 4.58, 4.58); Calibrated: 3/24/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE3 Sn455; Calibrated: 11/9/2011
Phantom: SAM 5.0 front; Type: SAM v5.0; Serial: TP:-1648
Measurement SW: DASY52, Version 52.6 (2);SEMCAD X Version 14.4.5 (3634)

**Mode:PCS CDMA, Body SAR, Top Edge, Mid. Channel**

**Area Scan (5x10x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.498 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.373 W/kg
**SAR(1 g) = 0.242 mW/g; SAR(10 g) = 0.152 mW/g**




0 dB = 0.260mW/g

**DUT: A3LSCHLC11R; Type: Portable Wireless Router; Serial: FCC #2**

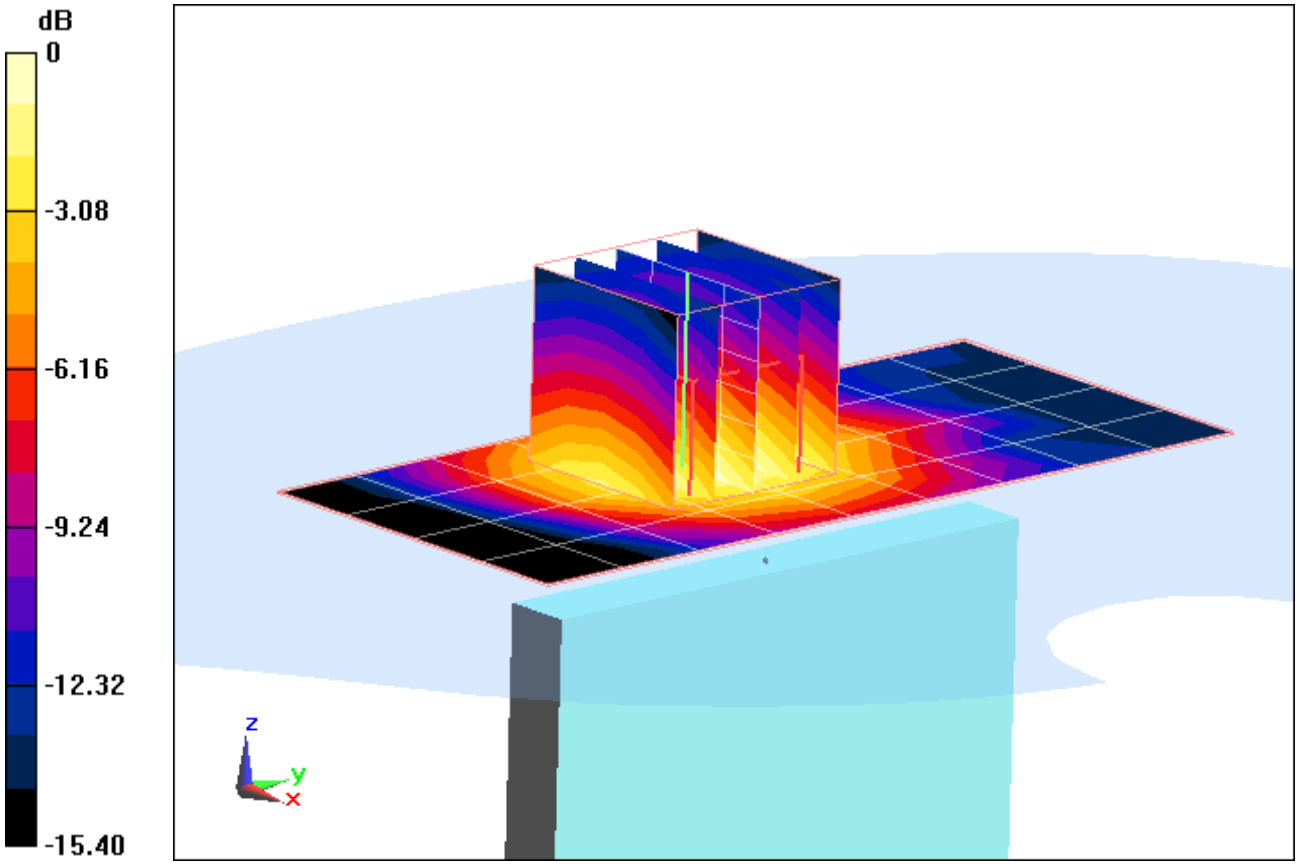
Communication System: CDMA; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; $\sigma$ = 1.485 mho/m; $\varepsilon_r$ = 51.32; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-25-2012; Ambient Temp: 22.1°C; Tissue Temp: 21.6°C

Probe: ES3DV3 - SN3213; ConvF(4.58, 4.58, 4.58); Calibrated: 3/24/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE3 Sn455; Calibrated: 11/9/2011
Phantom: SAM 5.0 front; Type: SAM v5.0; Serial: TP:-1648
Measurement SW: DASY52, Version 52.6 (2);SEMCAD X Version 14.4.5 (3634)

**Mode: PCS CDMA, Body SAR, Bottom Edge, Mid. Channel**

**Area Scan (5x10x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.753 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 0.427 W/kg
**SAR(1 g) = 0.270 mW/g; SAR(10 g) = 0.163 mW/g**




0 dB = 0.290mW/g

**DUT: A3LSCHLC11R; Type: Portable Wireless Router; Serial: FCC #2**

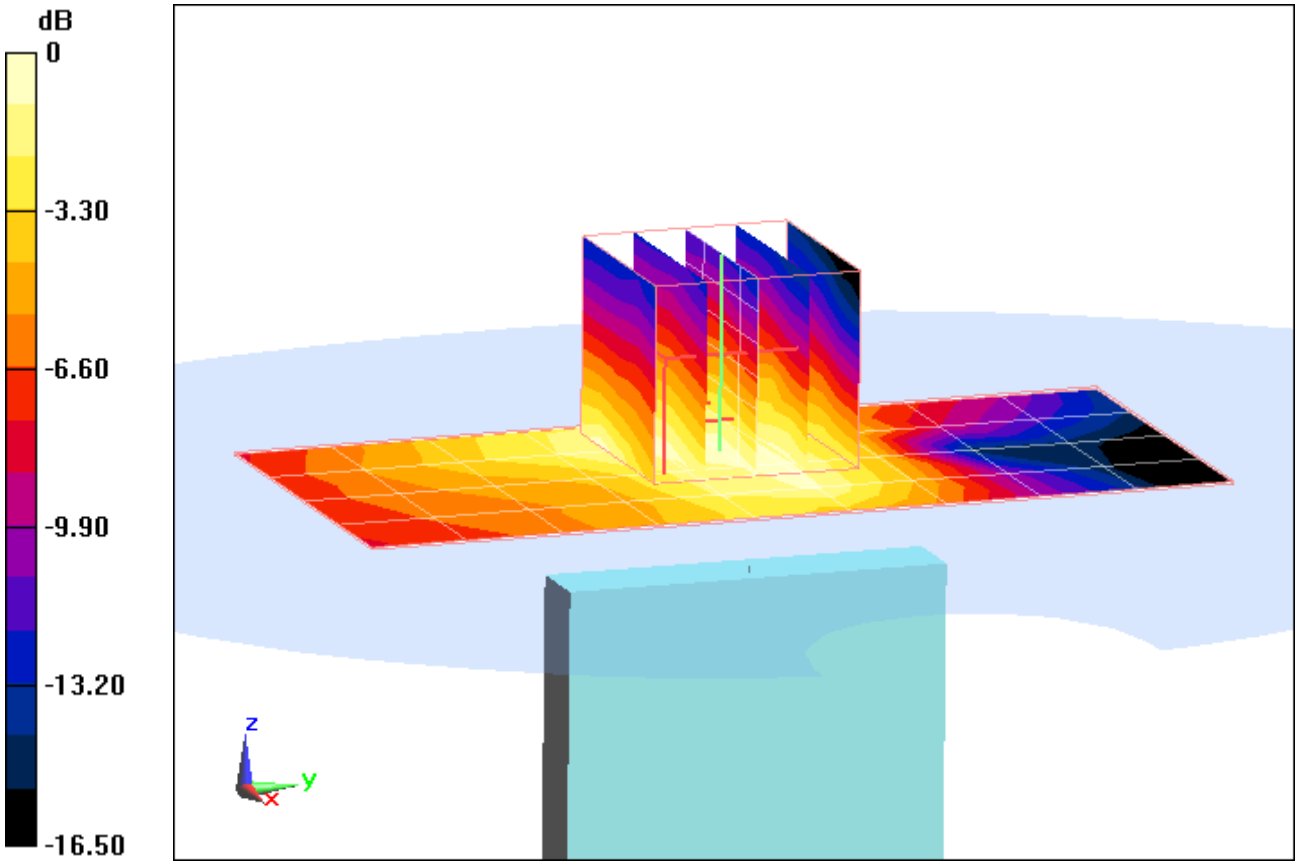
Communication System: CDMA; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; $\sigma$ = 1.485 mho/m; $\varepsilon_r$ = 51.32; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-25-2012; Ambient Temp: 22.1°C; Tissue Temp: 21.6°C

Probe: ES3DV3 - SN3213; ConvF(4.58, 4.58, 4.58); Calibrated: 3/24/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE3 Sn455; Calibrated: 11/9/2011
Phantom: SAM 5.0 front; Type: SAM v5.0; Serial: TP:-1648
Measurement SW: DASY52, Version 52.6 (2);SEMCAD X Version 14.4.5 (3634)

**Mode: PCS CDMA, Body SAR, Left Edge, Mid. Channel**

**Area Scan (5x10x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.703 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 0.188 W/kg
**SAR(1 g) = 0.107 mW/g; SAR(10 g) = 0.067 mW/g**




0 dB = 0.120mW/g

**DUT: A3LSCHLC11R; Type: Portable Wireless Router; Serial: B-U #2**

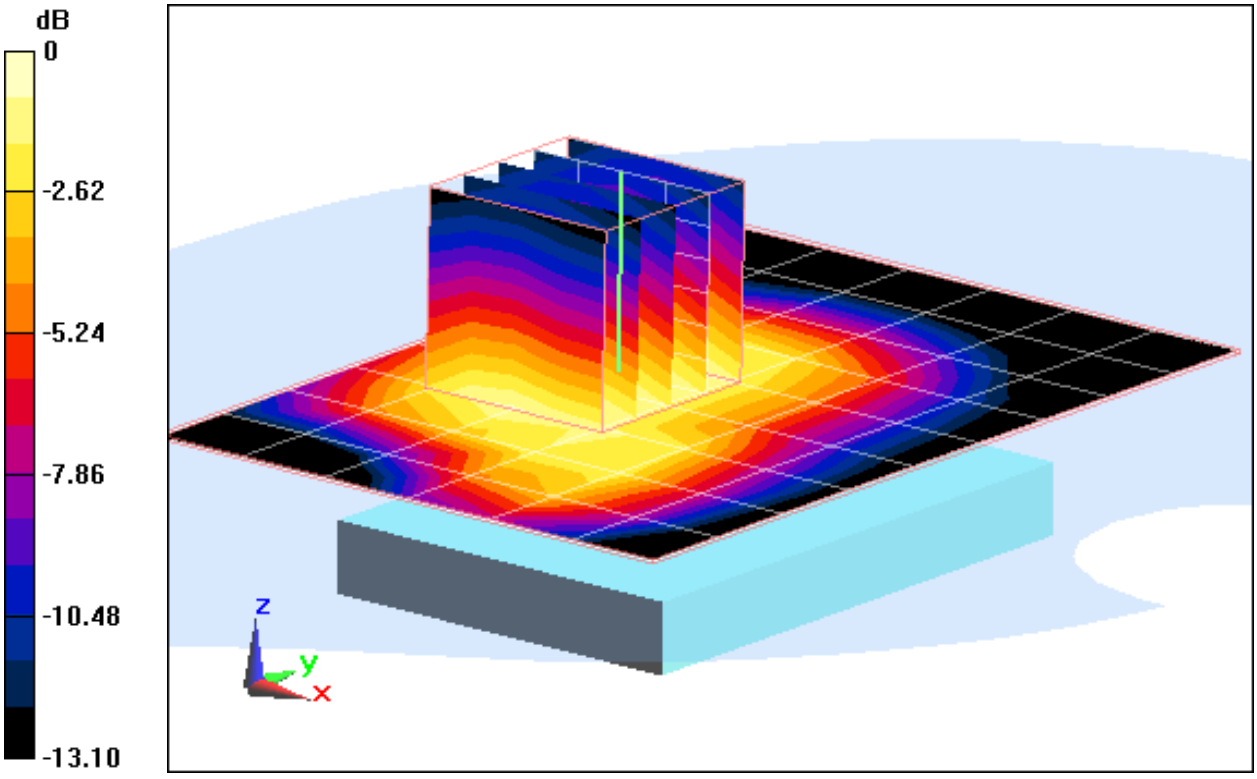
Communication System: LTE Band 2 (PCS); Frequency: 1852.5 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1852.5 MHz; $\sigma$ = 1.451 mho/m; $\varepsilon_r$ = 51.338; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-25-2012; Ambient Temp: 22.1°C; Tissue Temp: 21.6°C

Probe: ES3DV3 - SN3213; ConvF(4.58, 4.58, 4.58); Calibrated: 3/24/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE3 Sn455; Calibrated: 11/9/2011
Phantom: SAM 5.0 front; Type: SAM v5.0; Serial: TP:-1648
Measurement SW: DASY52, Version 52.6 (2);SEMCAD X Version 14.4.5 (3634)

**Mode: LTE Band 2 (PCS), Body SAR, Back Side, Low.ch**
**5 MHz BW, QPSK, 1 RB, RB Offset 0**

**Area Scan (7x10x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.768 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.546 W/kg
**SAR(1 g) = 0.369 mW/g; SAR(10 g) = 0.240 mW/g**




0 dB = 0.390mW/g

**DUT: A3LSCHLC11R; Type: Portable Wireless Router; Serial: B-U #2**

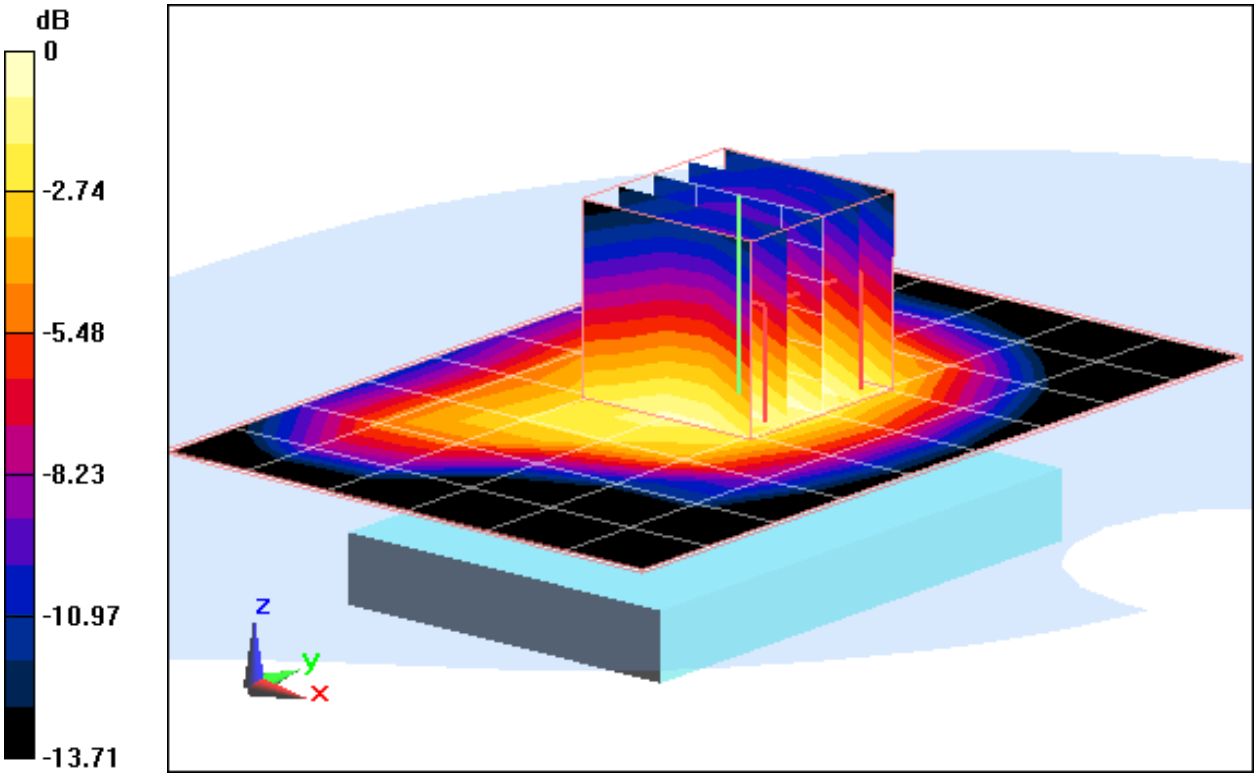
Communication System: LTE Band 2 (PCS); Frequency: 1852.5 MHz;Duty Cycle: 1:1
Medium: 1900 Body, Medium parameters used (interpolated):
f = 1852.5 MHz; $\sigma$ = 1.451 mho/m; $\varepsilon_r$ = 51.338; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-25-2012; Ambient Temp: 22.1°C; Tissue Temp: 21.6°C

Probe: ES3DV3 - SN3213; ConvF(4.58, 4.58, 4.58); Calibrated: 3/24/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE3 Sn455; Calibrated: 11/9/2011
Phantom: SAM 5.0 front; Type: SAM v5.0; Serial: TP:-1648
Measurement SW: DASY52, Version 52.6 (2);SEMCAD X Version 14.4.5 (3634)

**Mode: LTE Band 2 (PCS), Body SAR, Front Side, Low.ch**
**5 MHz BW, 16 QAM, 1 RB, RB Offset 0**

**Area Scan (7x10x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.435 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.602 W/kg
**SAR(1 g) = 0.407 mW/g; SAR(10 g) = 0.268 mW/g**




0 dB = 0.430mW/g

**DUT: A3LSCHLC11R; Type: Portable Wireless Router; Serial: B-U #2**

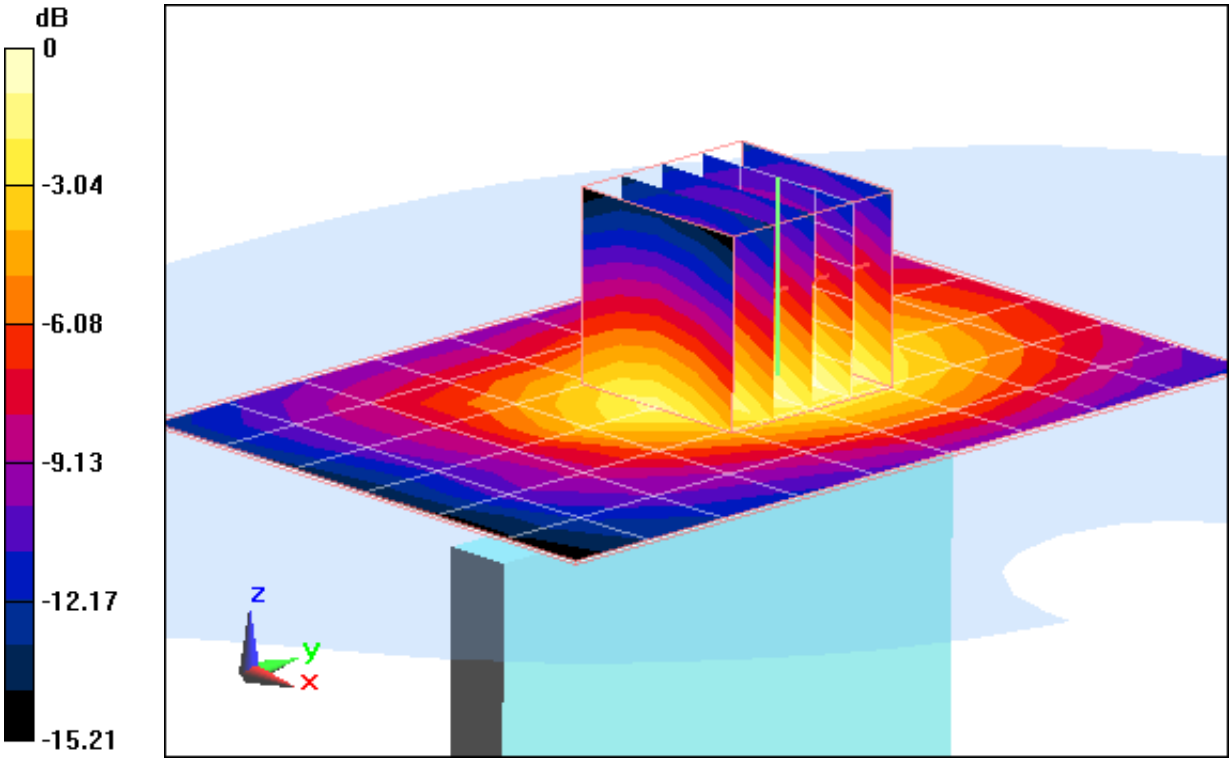
Communication System: LTE Band 2 (PCS); Frequency: 1852.5 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1852.5 MHz; $\sigma$ = 1.451 mho/m; $\varepsilon_r$ = 51.338; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-25-2012; Ambient Temp: 22.1°C; Tissue Temp: 21.6°C

Probe: ES3DV3 - SN3213; ConvF(4.58, 4.58, 4.58); Calibrated: 3/24/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE3 Sn455; Calibrated: 11/9/2011
Phantom: SAM 5.0 front; Type: SAM v5.0; Serial: TP:-1648
Measurement SW: DASY52, Version 52.6 (2);SEMCAD X Version 14.4.5 (3634)

**Mode: LTE Band 2 (PCS), Body SAR, Top Edge, Low.ch**
**5 MHz BW, QPSK, 1 RB, RB Offset 24**

**Area Scan (7x10x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.585 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 0.234 W/kg
**SAR(1 g) = 0.151 mW/g; SAR(10 g) = 0.094 mW/g**




0 dB = 0.160mW/g

**DUT: A3LSCHLC11R; Type: Portable Wireless Router; Serial: B-U #2**

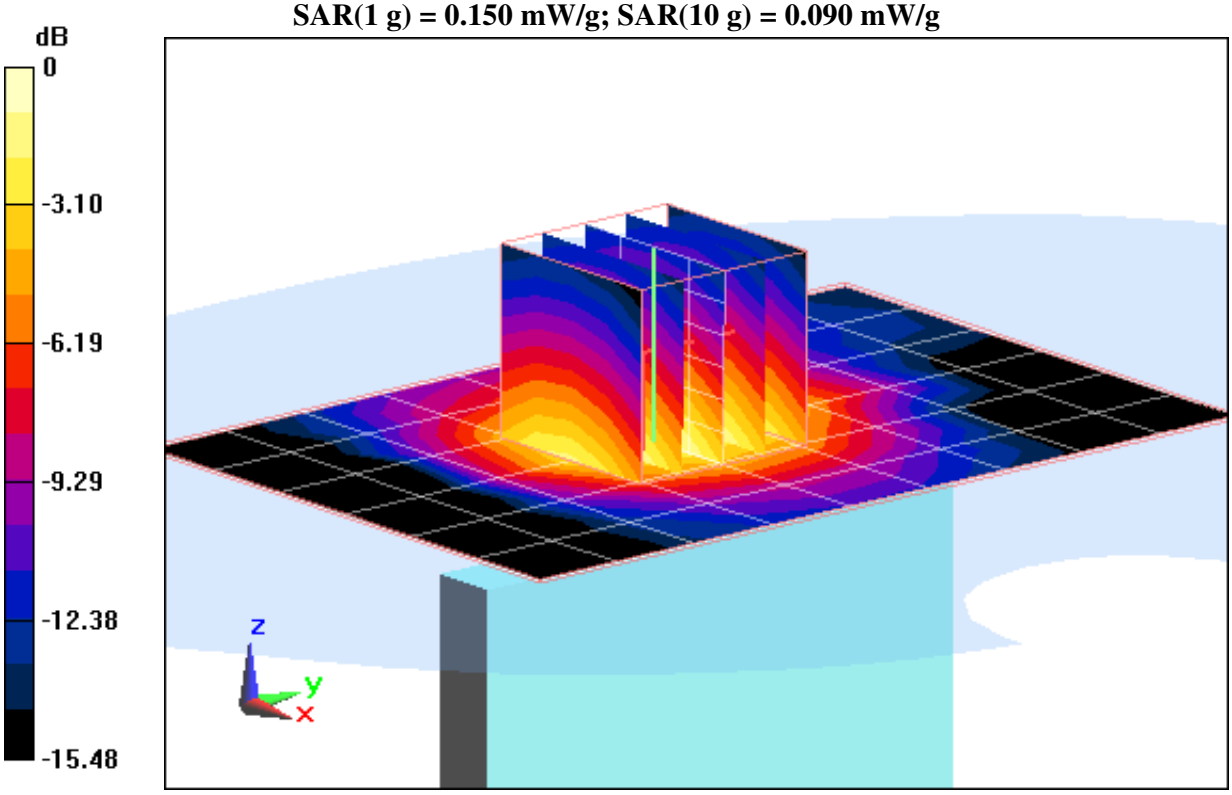
Communication System: LTE Band 2 (PCS); Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: 1900 Body, Medium parameters used:
f = 1880 MHz; $\sigma$ = 1.485 mho/m; $\varepsilon_r$ = 51.32; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-25-2012; Ambient Temp: 22.1°C; Tissue Temp: 21.6°C

Probe: ES3DV3 - SN3213; ConvF(4.58, 4.58, 4.58); Calibrated: 3/24/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE3 Sn455; Calibrated: 11/9/2011
Phantom: SAM 5.0 front; Type: SAM v5.0; Serial: TP:-1648
Measurement SW: DASY52, Version 52.6 (2);SEMCAD X Version 14.4.5 (3634)

**Mode: LTE Band 2 (PCS), Body SAR, Bottom Edge, Mid.ch**
**5 MHz BW, QPSK, 12 RB, RB Offset 6**

**Area Scan (7x10x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.642 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 0.239 W/kg
**SAR(1 g) = 0.150 mW/g; SAR(10 g) = 0.090 mW/g**




0 dB = 0.160mW/g

**DUT: A3LSCHLC11R; Type: Portable Wireless Router; Serial: B-U #2**

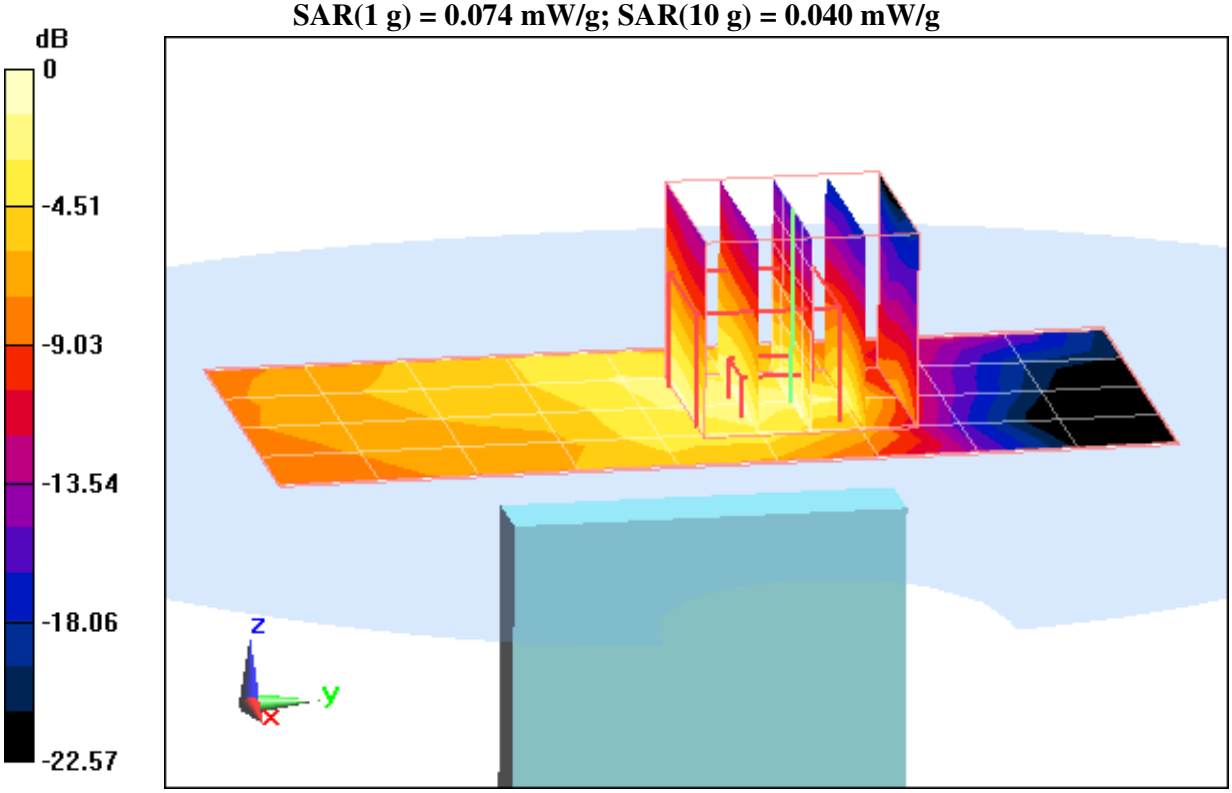
Communication System: LTE Band 2 (PCS); Frequency: 1852.5 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1852.5 MHz; $\sigma$ = 1.451 mho/m; $\varepsilon_r$ = 51.338; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-25-2012; Ambient Temp: 22.1°C; Tissue Temp: 21.6°C

Probe: ES3DV3 - SN3213; ConvF(4.58, 4.58, 4.58); Calibrated: 3/24/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE3 Sn455; Calibrated: 11/9/2011
Phantom: SAM 5.0 front; Type: SAM v5.0; Serial: TP:-1648
Measurement SW: DASY52, Version 52.6 (2);SEMCAD X Version 14.4.5 (3634)

**Mode: LTE Band 2 (PCS), Body SAR, Left Edge, Low.ch**
**5 MHz BW, QPSK, 1 RB, RB Offset 0**

**Area Scan (5x10x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.095 V/m; Power Drift = 0.038 dB
Peak SAR (extrapolated) = 0.145 W/kg
**SAR(1 g) = 0.074 mW/g; SAR(10 g) = 0.040 mW/g**




0 dB = 0.080mW/g

**DUT: A3LSCHLC11R; Type: Portable Wireless Router; Serial: FCC #10**

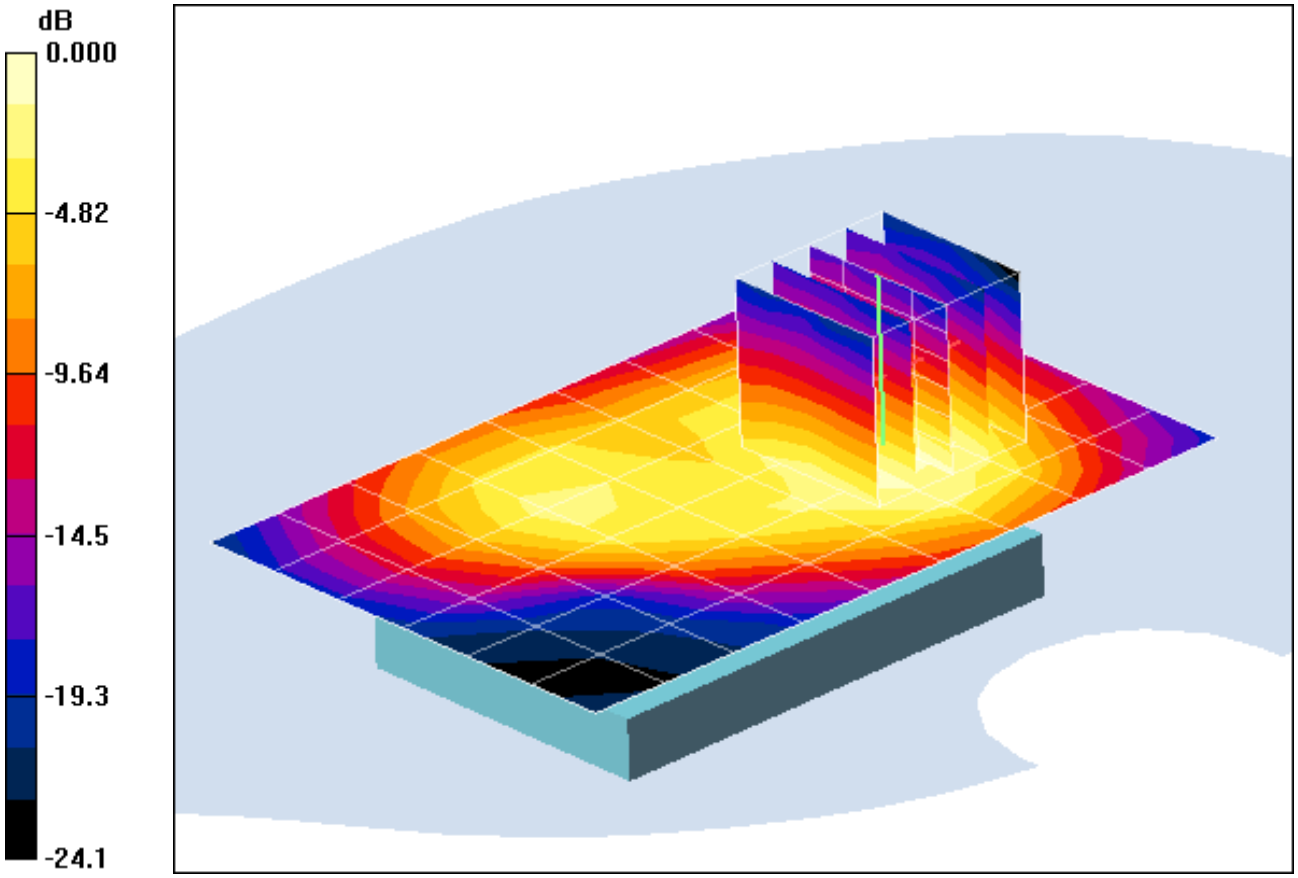
Communication System: IEEE 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2437 MHz; $\sigma$ = 2 mho/m; $\varepsilon_r$ = 50.4; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-30-2012; Ambient Temp: 23.3°C; Tissue Temp: 20.6°C

Probe: ES3DV3 - SN3258; ConvF(4.34, 4.34, 4.34); Calibrated: 4/8/2011
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/21/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

## Mode: IEEE 802.11b, Body SAR, Ch 06, 1 Mbps, Back Side

**Area Scan (7x10x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.89 V/m; Power Drift = 0.126 dB
Peak SAR (extrapolated) = 0.399 W/kg
**SAR(1 g) = 0.209 mW/g; SAR(10 g) = 0.113 mW/g**




0 dB = 0.262mW/g

**DUT: A3LSCHLC11R; Type: Portable Wireless Router; Serial: FCC #10**

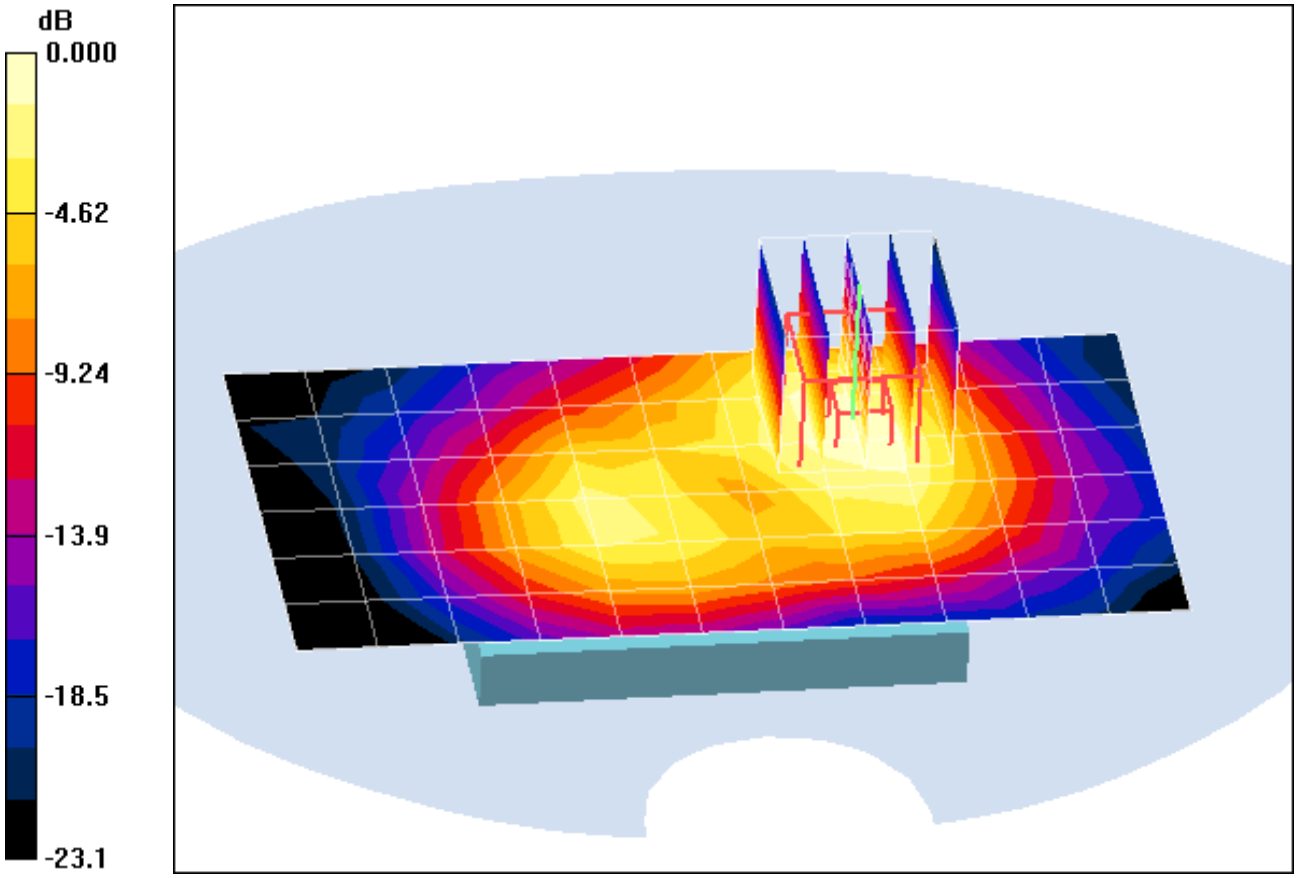
Communication System: IEEE 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2437 MHz; $\sigma$ = 2 mho/m; $\varepsilon_r$ = 50.4; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-30-2012; Ambient Temp: 23.3°C; Tissue Temp: 20.6°C

Probe: ES3DV3 - SN3258; ConvF(4.34, 4.34, 4.34); Calibrated: 4/8/2011
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/21/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

## Mode: IEEE 802.11b, Body SAR, Ch 06, 1 Mbps, Front Side

**Area Scan (7x12x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.4 V/m; Power Drift = -0.014 dB
Peak SAR (extrapolated) = 0.458 W/kg
**SAR(1 g) = 0.225 mW/g; SAR(10 g) = 0.118 mW/g**




0 dB = 0.285mW/g

**DUT: A3LSCHLC11R; Type: Portable Wireless Router; Serial: FCC #10**

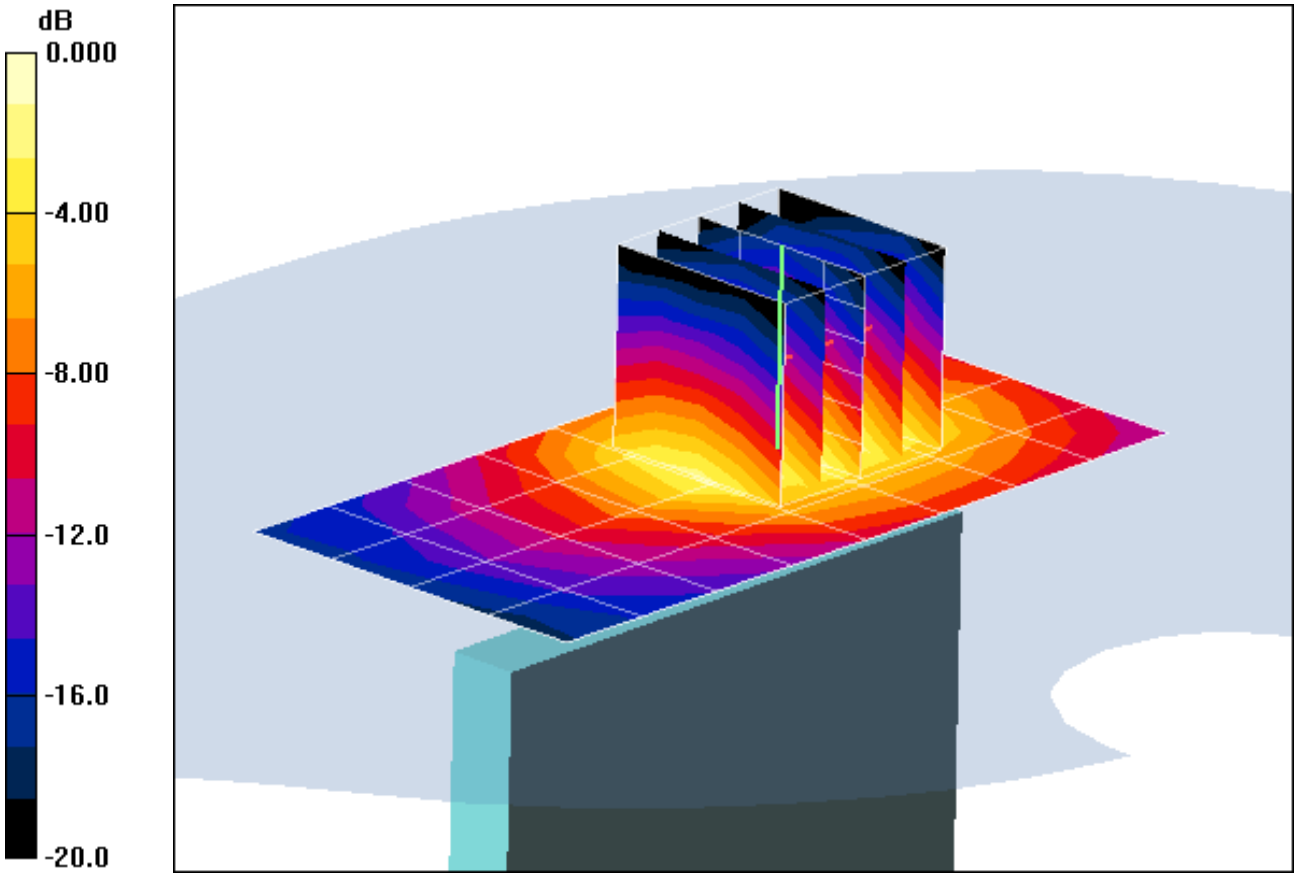
Communication System: IEEE 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2437 MHz; $\sigma$ = 2 mho/m; $\varepsilon_r$ = 50.4; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-30-2012; Ambient Temp: 23.3°C; Tissue Temp: 20.6°C

Probe: ES3DV3 - SN3258; ConvF(4.34, 4.34, 4.34); Calibrated: 4/8/2011
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/21/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

## Mode: IEEE 802.11b, Body SAR, Ch 06, 1 Mbps, Top Edge

**Area Scan (5x9x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.88 V/m; Power Drift = 0.029 dB
Peak SAR (extrapolated) = 0.374 W/kg
**SAR(1 g) = 0.188 mW/g; SAR(10 g) = 0.095 mW/g**




0 dB = 0.241mW/g

**DUT: A3LSCHLC11R; Type: Portable Wireless Router; Serial: FCC #10**

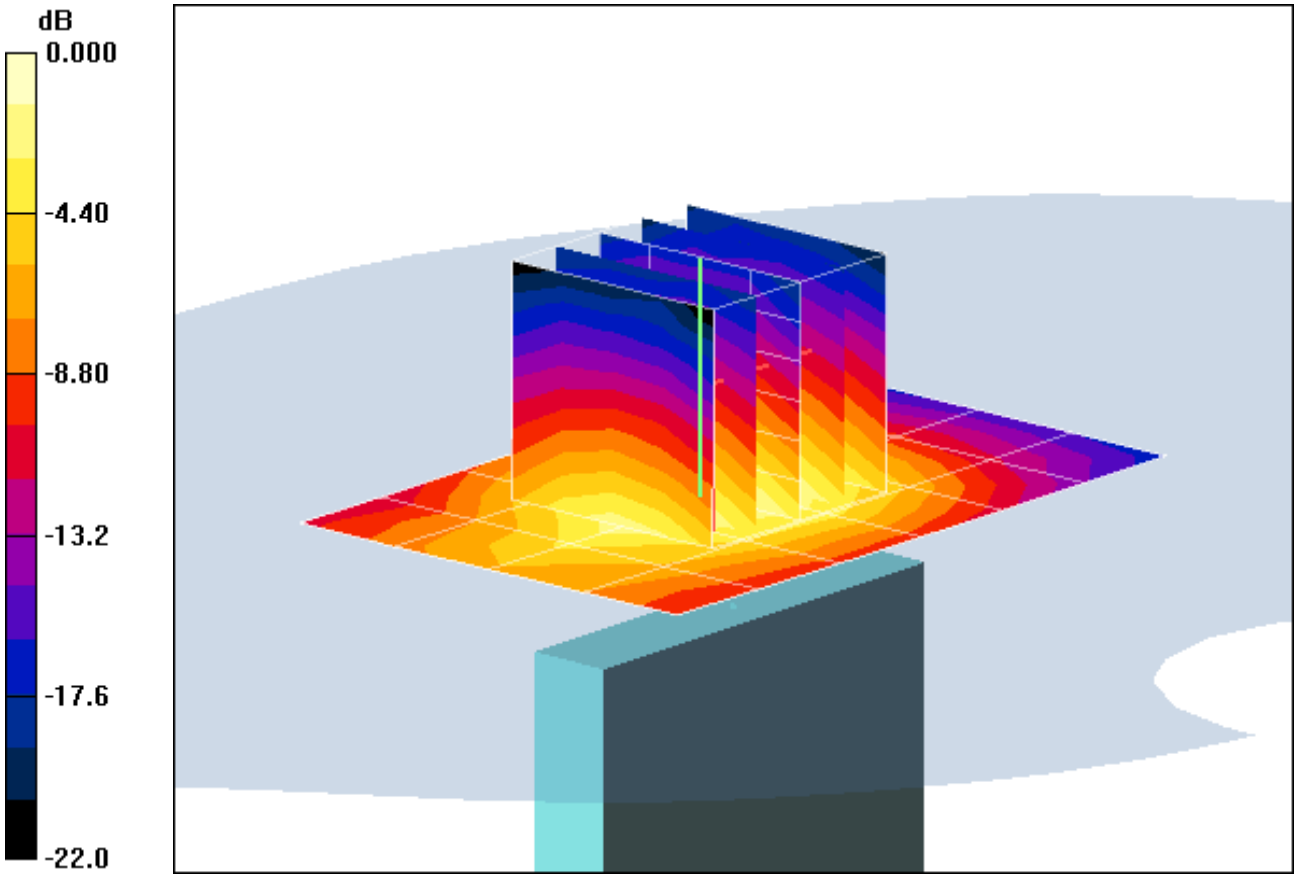
Communication System: IEEE 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2437 MHz; $\sigma$ = 2 mho/m; $\varepsilon_r$ = 50.4; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-30-2012; Ambient Temp: 23.3°C; Tissue Temp: 20.6°C

Probe: ES3DV3 - SN3258; ConvF(4.34, 4.34, 4.34); Calibrated: 4/8/2011
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/21/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

## Mode: IEEE 802.11b, Body SAR, Ch 06, 1 Mbps, Right Edge

**Area Scan (5x7x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.85 V/m; Power Drift = 0.070 dB
Peak SAR (extrapolated) = 0.330 W/kg
**SAR(1 g) = 0.173 mW/g; SAR(10 g) = 0.091 mW/g**




0 dB = 0.215mW/g

# APPENDIX B: SYSTEM VERIFICATION

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 750 MHz; Type: D750V3; Serial: 1046**

Communication System: CW; Frequency: 750 MHz;Duty Cycle: 1:1
Medium: 740 Body Medium parameters used (interpolated):
f = 750 MHz; $\sigma$ = 0.972 mho/m; $\varepsilon_r$ = 56.343; $\rho$ = 1000 kg/m$^3$

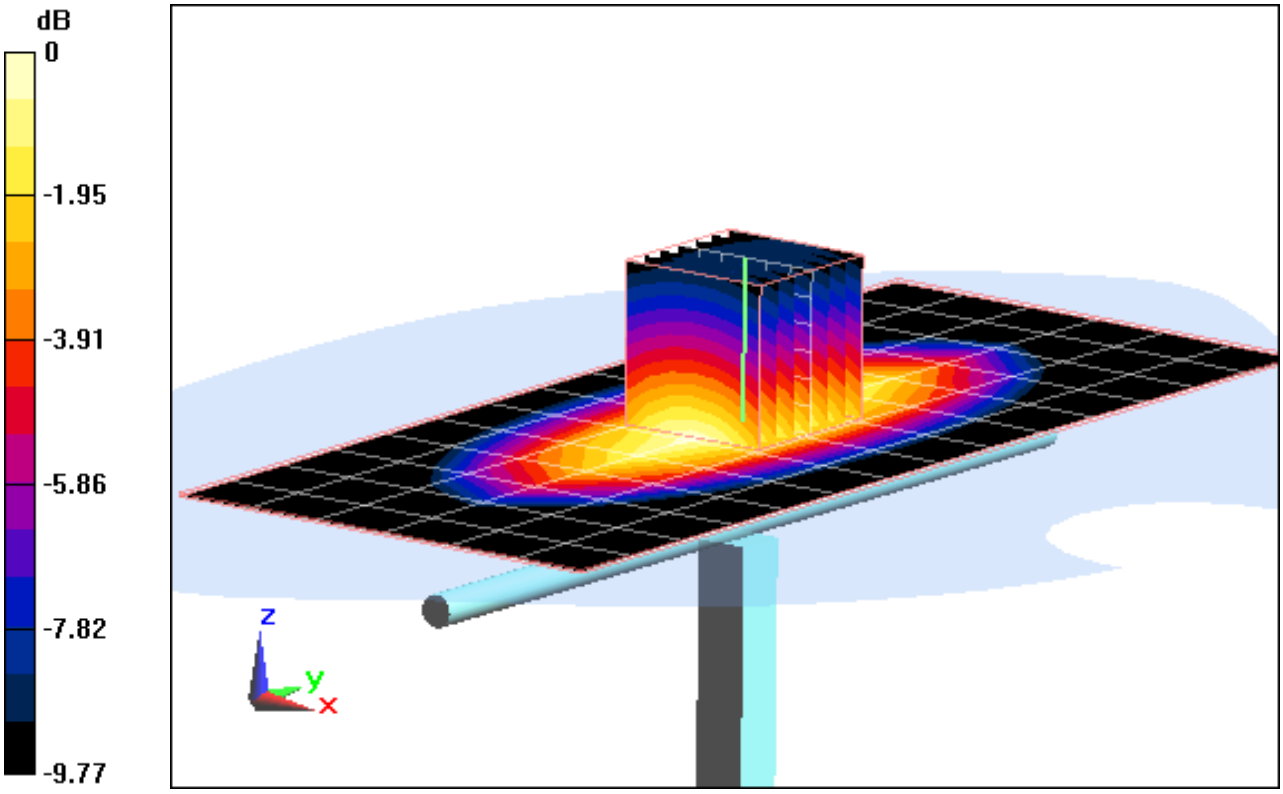
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 02-01-2012; Ambient Temp: 22.8°C; Tissue Temp: 20.9°C

Probe: ES3DV2 - SN3022; ConvF(6.11, 6.11, 6.11); Calibrated: 8/25/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn704; Calibrated: 9/16/2011
Phantom: SAM v5.0 front; Type: SAM v5.0; Serial: TP-1646
Measurement SW: DASY52, Version 52.6 (2);SEMCAD X Version 14.4.5 (3634)

## Mode: 750 MHz System Verification

**Area Scan (7x15x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Input Power = 24.0 dBm (250 mW)
**SAR(1 g) = 2.14 mW/g; SAR(10 g) = 1.42 mW/g**
Deviation = -2.73 %




0 dB = 2.310mW/g

**DUT: Dipole 750 MHz; Type: D750V3; Serial: 1046**

Communication System: CW; Frequency: 750 MHz;Duty Cycle: 1:1
Medium: 740 Body Medium parameters used (interpolated):
f = 750 MHz; $\sigma$ = 0.972 mho/m; $\varepsilon_r$ = 56.343; $\rho$ = 1000 kg/m$^3$

Phantom section: Flat Section; Space: 1.5 cm

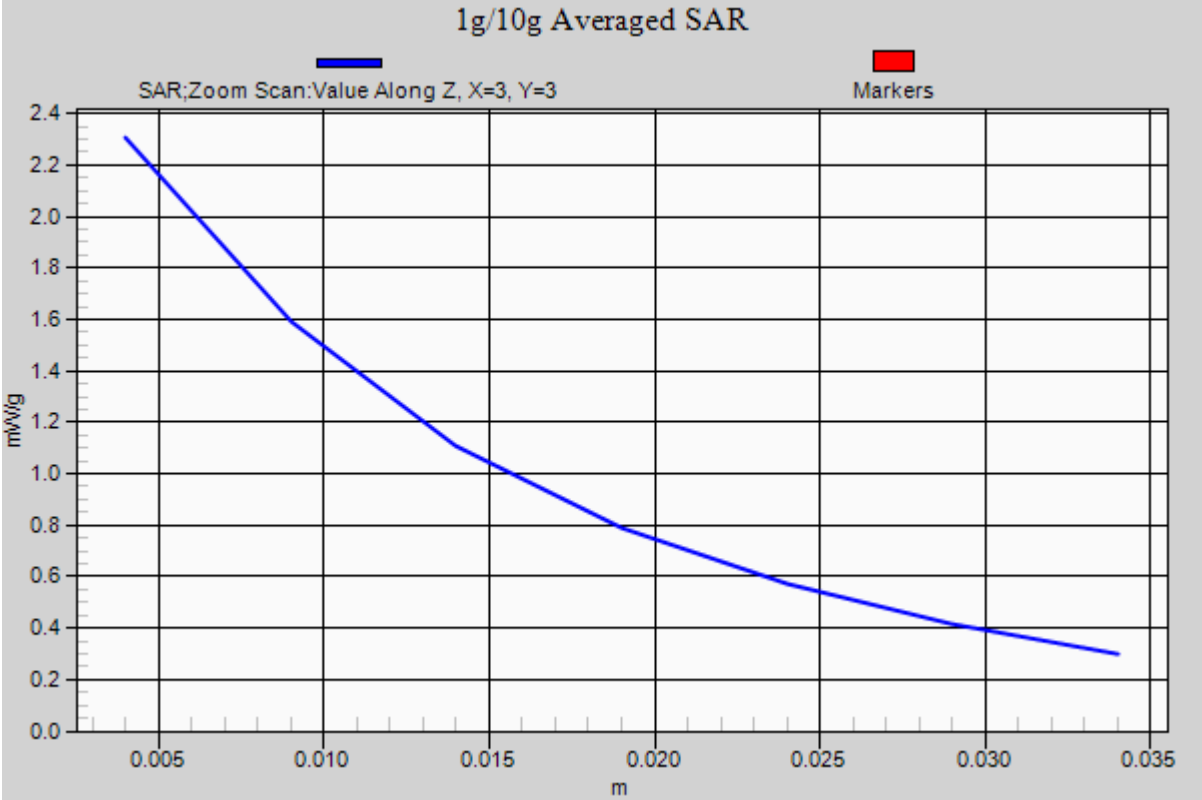
Test Date: 02-01-2012; Ambient Temp: 22.8°C; Tissue Temp: 20.9°C

Probe: ES3DV2 - SN3022; ConvF(6.11, 6.11, 6.11); Calibrated: 8/25/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn704; Calibrated: 9/16/2011

Phantom: SAM v5.0 front; Type: SAM v5.0; Serial: TP-1646
Measurement SW: DASY52, Version 52.6 (2);SEMCAD X Version 14.4.5 (3634)

## Mode: 750 MHz System Verification

**Area Scan (7x15x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Input Power = 24.0 dBm (250 mW)
**SAR(1 g) = 2.14 mW/g; SAR(10 g) = 1.42 mW/g**
Deviation = -2.73 %



# PCTEST ENGINEERING LABORATORY, INC.

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

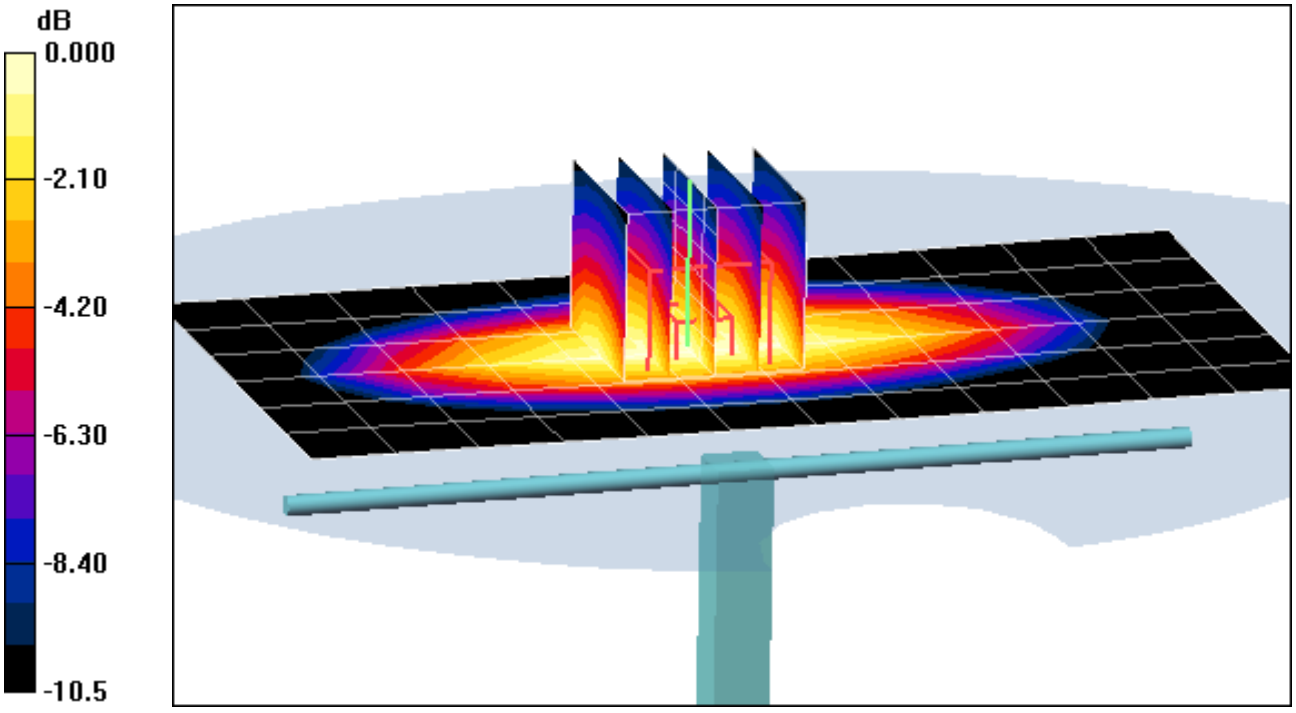
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used:
f = 835 MHz; $\sigma$ = 0.958 mho/m; $\varepsilon_r$ = 52.9; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01-26-2012; Ambient Temp: 24.0°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3258; ConvF(6.12, 6.12, 6.12); Calibrated: 4/8/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/21/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

## 835MHz System Verification

**Area Scan (7x13x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
**SAR(1 g) = 0.997 mW/g; SAR(10 g) = 0.649 mW/g**
Deviation = 4.51%




0 dB = 1.07mW/g

# PCTEST ENGINEERING LABORATORY, INC.

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

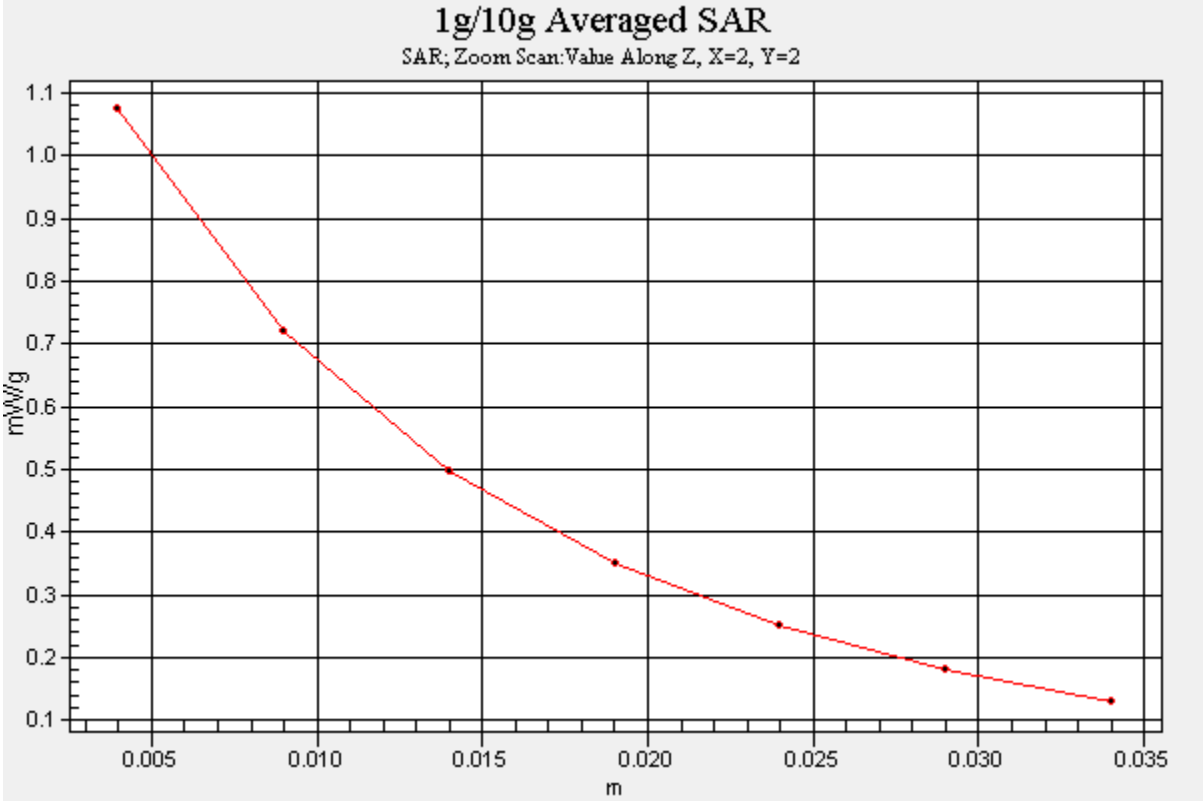
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used:
f = 835 MHz; $\sigma$ = 0.958 mho/m; $\varepsilon_r$ = 52.9; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01-26-2012; Ambient Temp: 24.0°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3258; ConvF(6.12, 6.12, 6.12); Calibrated: 4/8/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/21/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

## 835MHz System Verification

**Area Scan (7x13x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
**SAR(1 g) = 0.997 mW/g; SAR(10 g) = 0.649 mW/g**
Deviation = 4.51%



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

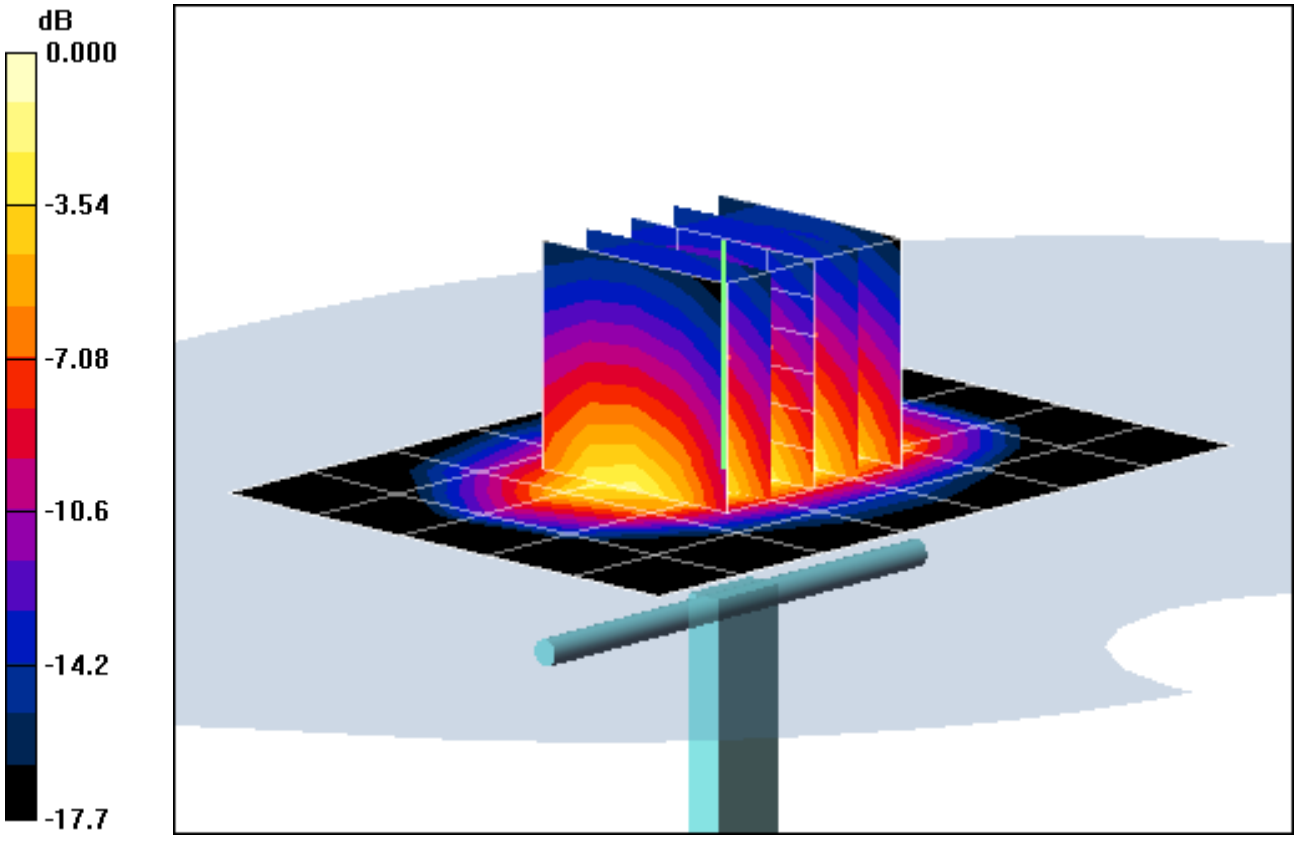
Communication System: CW; Frequency: 1750 MHz;Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used:
f = 1750 MHz; $\sigma$ = 1.49 mho/m; $\varepsilon_r$ = 50.9; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-25-2012; Ambient Temp: 23.9°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3209; ConvF(4.75, 4.75, 4.75); Calibrated: 4/18/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

## 1750 MHz System Verification

**Area Scan (6x8x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 16.0 dBm (40 mW)
**SAR(1 g) = 1.51 mW/g; SAR(10 g) = 0.785 mW/g**
Deviation = 2.03 %




0 dB = 1.68mW/g

# PCTEST ENGINEERING LABORATORY, INC.

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

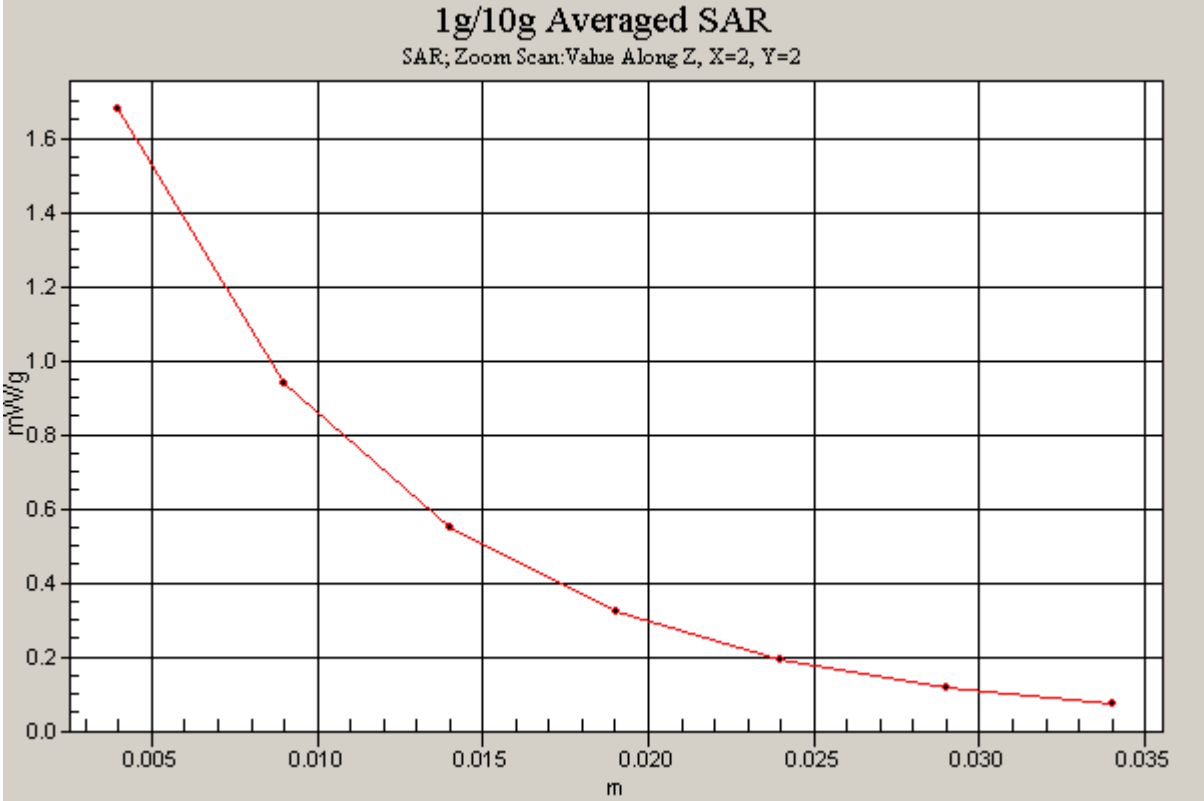
Communication System: CW; Frequency: 1750 MHz;Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used:
f = 1750 MHz; $\sigma$ = 1.49 mho/m; $\varepsilon_r$ = 50.9; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-25-2012; Ambient Temp: 23.9°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3209; ConvF(4.75, 4.75, 4.75); Calibrated: 4/18/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

## 1750 MHz System Verification

**Area Scan (6x8x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 16.0 dBm (40 mW)
**SAR(1 g) = 1.51 mW/g; SAR(10 g) = 0.785 mW/g**
Deviation = 2.03 %



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: SAR Dipole 1900 MHz; Type: D1900V2; Serial: 5d141**

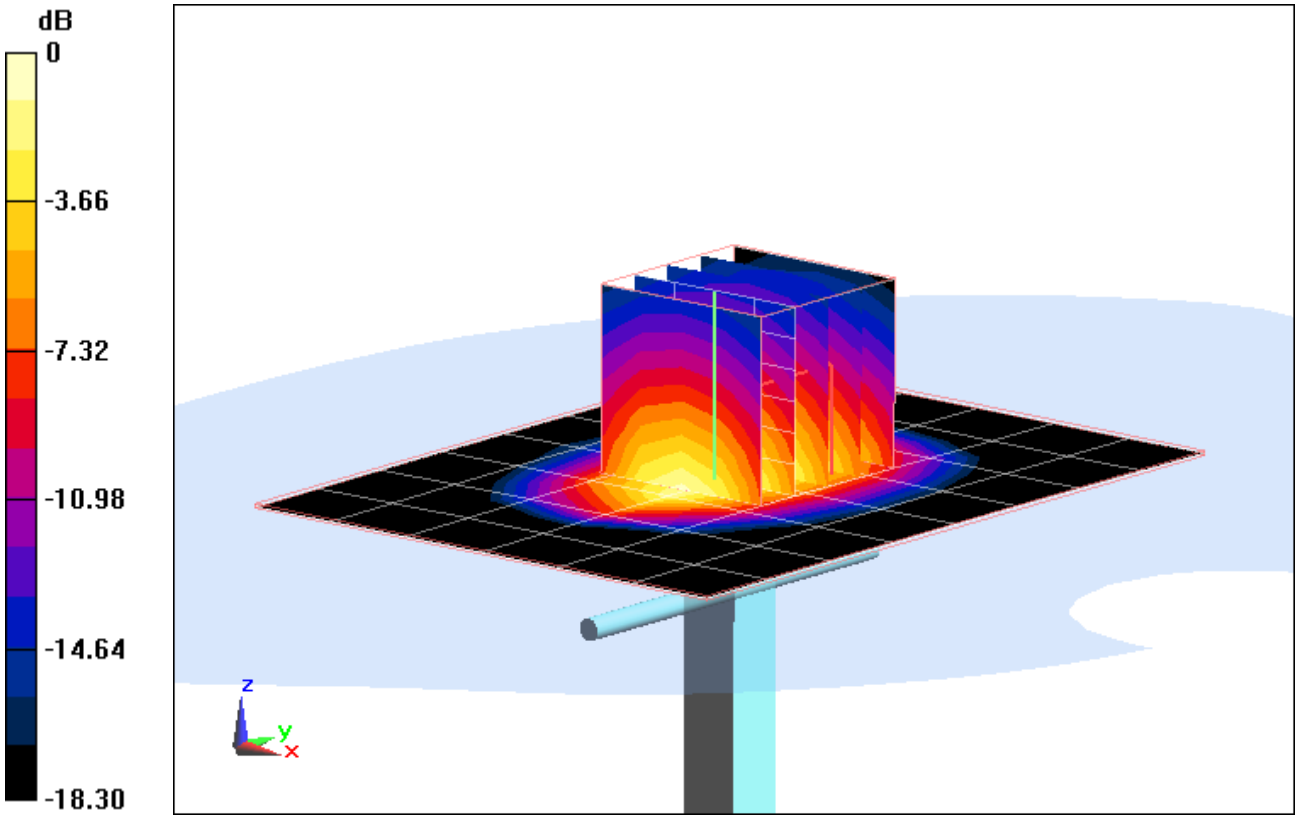
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
$f = 1900$ MHz; $\sigma = 1.496$ mho/m; $\varepsilon_r = 51.32$; $\rho = 1000$ kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-25-2012; Ambient Temp: 22.1°C; Tissue Temp: 21.6°C

Probe: ES3DV3 - SN3213; ConvF(4.58, 4.58, 4.58); Calibrated: 3/24/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE3 Sn455; Calibrated: 11/9/2011
Phantom: SAM 5.0 front; Type: SAM v5.0; Serial: TP:-1648
Measurement SW: DASY52, Version 52.6 (2);SEMCAD X Version 14.4.5 (3634)

## Mode: 1900 MHz System Verification

**Area Scan (7x9x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
**SAR(1 g) = 4 mW/g; SAR(10 g) = 2.09 mW/g**
Deviation = -3.38 %




0 dB = 4.440mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: SAR Dipole 1900 MHz; Type: D1900V2; Serial: 5d141**

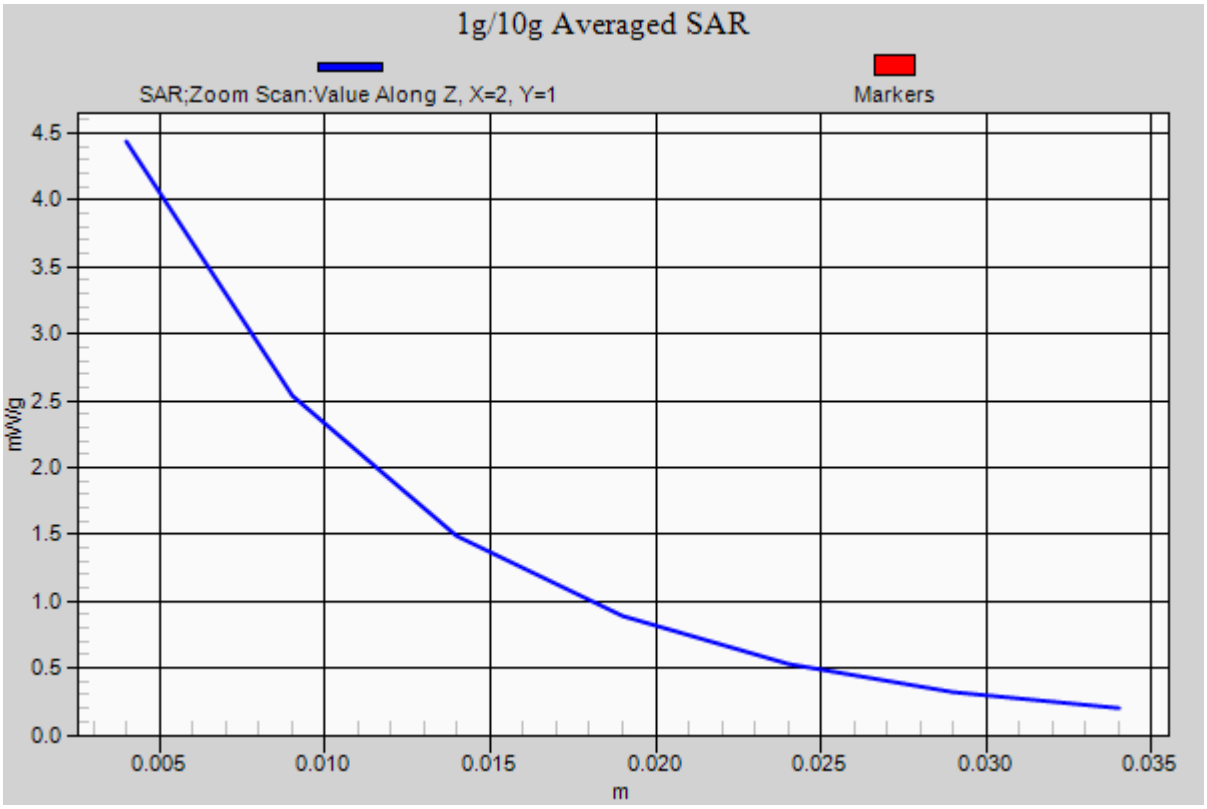
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; $\sigma$ = 1.496 mho/m; $\varepsilon_r$ = 51.32; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-25-2012; Ambient Temp: 22.1°C; Tissue Temp: 21.6°C

Probe: ES3DV3 - SN3213; ConvF(4.58, 4.58, 4.58); Calibrated: 3/24/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE3 Sn455; Calibrated: 11/9/2011
Phantom: SAM 5.0 front; Type: SAM v5.0; Serial: TP:-1648
Measurement SW: DASY52, Version 52.6 (2);SEMCAD X Version 14.4.5 (3634)

## Mode: 1900 MHz System Verification

**Area Scan (7x9x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
**SAR(1 g) = 4 mW/g; SAR(10 g) = 2.09 mW/g**
Deviation = -3.38 %



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

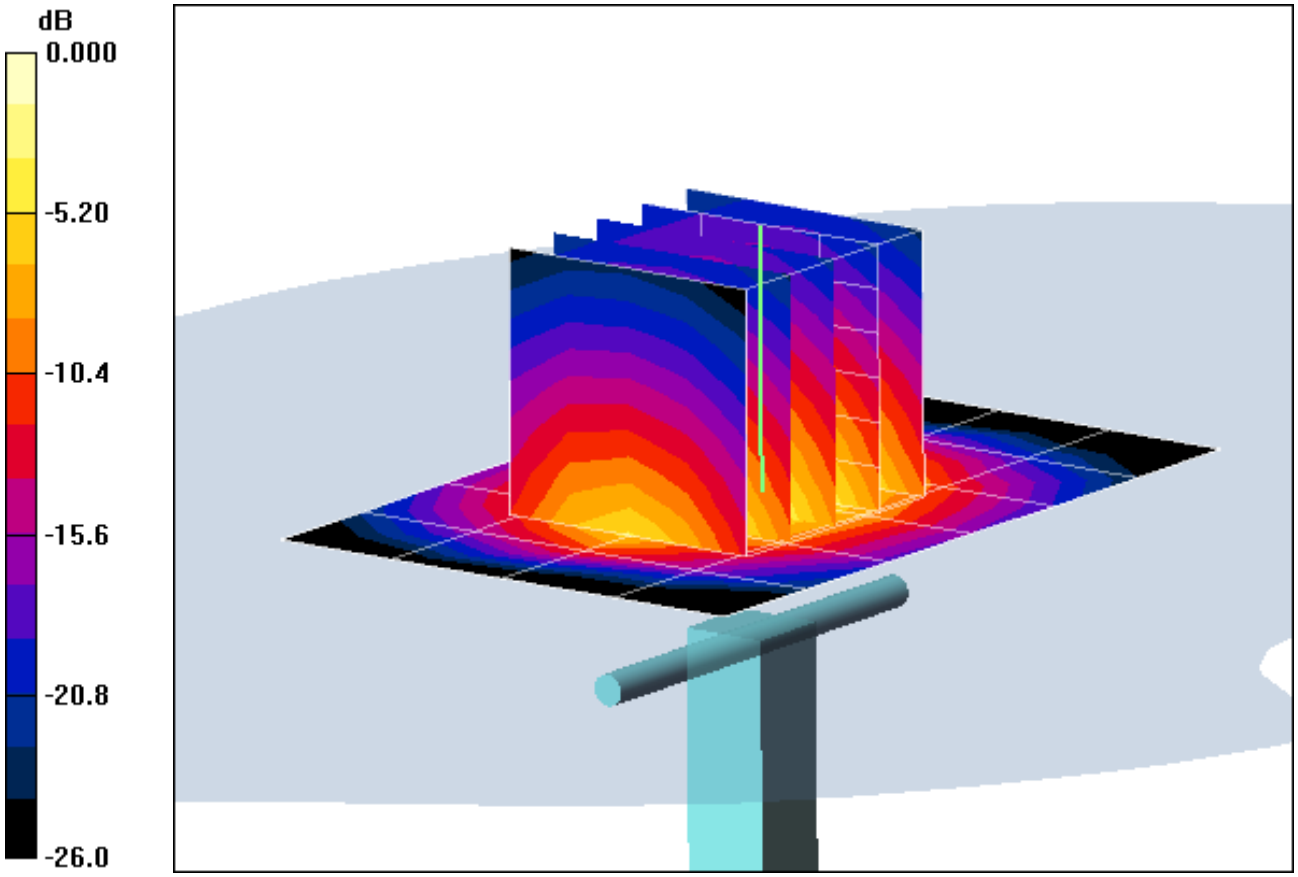
Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used:
f = 2450 MHz; $\sigma$ = 2.02 mho/m; $\varepsilon_r$ = 50.3; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-30-2012; Ambient Temp: 23.3°C; Tissue Temp: 20.6°C

Probe: ES3DV3 - SN3258; ConvF(4.34, 4.34, 4.34); Calibrated: 4/8/2011
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/21/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

## 2450 MHz System Verification

**Area Scan (5x7x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 16.0 dBm (40 mW)
**SAR(1 g) = 2.11 mW/g; SAR(10 g) = 0.934 mW/g**
Deviation = 2.83 %




0 dB = 2.73mW/g

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

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used:
f = 2450 MHz; $\sigma$ = 2.02 mho/m; $\varepsilon_r$ = 50.3; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-30-2012; Ambient Temp: 23.3°C; Tissue Temp: 20.6°C

Probe: ES3DV3 - SN3258; ConvF(4.34, 4.34, 4.34); Calibrated: 4/8/2011
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/21/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

## 2450 MHz System Verification

**Area Scan (5x7x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 16.0 dBm (40 mW)
**SAR(1 g) = 2.11 mW/g; SAR(10 g) = 0.934 mW/g**
Deviation = 2.83 %