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# SAR TEST REPORT

| | |
|---|---|
| **LG Electronics, MobileComm U.S.A., Inc.**<br>1000 Sylvan Avenue, Englewood Cliffs NJ 07632 | **Date of Issue: February 06, 2015**<br>**Test Report No.: HCT-A-1502-F003-1**<br>**Test Site: HCT CO., LTD.** |

**FCC ID:** **ZNFH340F**

| | |
|---|---|
| **Equipment Type:** | **Cellular/PCS GSM/WCDMA/LTE Phone with WLAN and Bluetooth** |
| **Model Name:** | **LG-H340f** |
| **Additional Model Name:** | **LGH340f, H340f, LG-H340F, LGH340F, H340F, LG-H342f, LGH342f, H342f, LG-H342F, LGH342F, H342F, LG-H340AR, LGH340AR, H340AR** |
| **Testing has been carried out in accordance with:** | **47CFR §2.1093**<br>**ANSI/ IEEE C95.1 – 1992**<br>**IEEE 1528-2003** |
| **Date of Test:** | **January 14, 2015 ~ January 23, 2015** |

**This device has been shown to be capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in FCC KDB procedures and had been tested in accordance with the measurement procedures specified in FCC KDB procedures.**

**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.**

**Tested By;**

**Yun-Jeang Heo**
**Test Engineer / SAR Team**
**Certification Division**

**Reviewer**

**Dong-Seob Kim**
**Technical Manager / SAR Team**
**Certification Division**

This report only responds to the tested sample and may not be reproduced, except in full, without written approval of the HCT Co., Ltd.

# Revision History

| Rev. | Issue DATE | DESCRIPTION |
|---|---|---|
| HCT-A-1502-F003 | Feb. 03, 2015 | Initial Issue |
| HCT-A-1502-F003-1 | Feb. 06, 2015 | Add additional model names belows:.<br>(LG-H342f, LGH342f, H342f, LG-H342F, LGH342F, H342F, LG-H340AR, LGH340AR,H340AR)<br>- Revised cover page. (Revised additional model names)<br>- Revised Sec. 3 (Revised additional model names) |

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# 1. INTRODUCTION

The FCC has adopted the guidelines for evaluating the environmental effects of radio frequency 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.

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. 1992 by the Institute of Electrical and Electronics Engineers, Inc., New York, New York 10017. The measurement procedure described in IEEE/ANSI C95.3-1992 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave is used for guidance in measuring 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 National Council on Radiation Protection and Measurements (NCRP) in Biological Effects and Exposure Criteria for Radio frequency Electromagnetic Fields," NCRP Report No. 86 NCRP, 1986, Bethesda, MD 20814. 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.

## SAR Definition

Specific Absorption Rate (SAR) is defined as the time derivative of the incremental electromagnetic energy (d*W*) absorbed by (dissipated in) an incremental mass (d*m*) contained in a volume element (d*V*) of a given density (*r* ). It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body.

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

Figure 1. SAR Mathematical Equation

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

$$SAR = \sigma E^2 / \rho$$

Where:
$\sigma$ = conductivity of the tissue-simulant material (S/m)
$\rho$ = mass density of the tissue-simulant 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 relations 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.

# 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC KDB Procedure, IEEE Standard 1528-2003 & IEEE 1528a-2005 and the following published KDB procedures.

- FCC KDB Publication 941225 D01 3G SAR Procedures v03
- FCC KDB Publication 941225 D06 Hot Spot SAR v02
- FCC KDB Publication 941225 D05 SAR for LTE Devices v02r03
- FCC KDB Publication 248227 D01 SAR Consideration for 802.11 Devices v01r02
- FCC KDB Publication 447498 D01 General SAR Guidance v05r02
- FCC KDB Publication 648474 D04 Handset SAR v01r02
- FCC KDB Publication 865664 D01 SAR measurement 100 MHz to 6 GHz v01r03
- FCC KDB Publication 865664 D02 SAR Reporting v01r01
- October 2013 TCB Workshop Notes (GPRS testing criteria)

# 3. DESCRIPTION OF DEVICE

Environmental evaluation measurements of specific absorption rate (SAR) distributions in emulated human head and body tissues exposed to radio frequency (RF) radiation from wireless portable devices for compliance with the rules and regulations of the U.S. Federal Communications Commission (FCC).

| | | | | | | |
|---|---|---|---|---|---|---|
| EUT Type | Cellular/PCS GSM/WCDMA/LTE Phone with WLAN and Bluetooth | | | | | |
| FCC ID: | ZNFH340F | | | | | |
| Model: | LG-H340f | | | | | |
| Additional Model Name: | LGH340f, H340f, LG-H340F, LGH340F, H340F, LG-H342f, LGH342f, H342f, LG-H342F, LGH342F, H342F, LG-H340AR, LGH340AR, H340AR | | | | | |
| Trade Name: | LG Electronics, MobileComm U.S.A., Inc. | | | | | |
| Application Type: | Certification | | | | | |
| Production Unit or Identical Prototype: | Prototype | | | | | |
| Max. SAR: | Band | Tx Frequency (MHz) | Equipment Class | Reported 1g SAR (W/Kg) | | |
| | | | | Head | Body-Worn | Hotspot |
| | GSM/GPRS /EDGE 850 | 824.2 - 848.8 | PCE | 0.96 | 1.18 | 1.18 |
| | GSM/GPRS/ EDGE 1900 | 1 850.2 -1 909.8 | PCE | 0.70 | 0.55 | 0.77 |
| | WCDMA 850 | 826.4 - 846.6 | PCE | 0.49 | 0.69 | 0.69 |
| | WCDMA 1900 | 1 852.4 – 1 907.6 | PCE | 1.12 | 1.11 | 1.18 |
| | LTE 2 | 1 850.7 ~ 1 909.3 | PCE | 0.90 | 1.10 | 1.17 |
| | LTE 4 | 1 710.7 – 1 754.3 | PCE | 0.94 | 1.05 | 1.28 |
| | LTE 7 | 2 502.5 – 2 567.5 | PCE | 1.12 | 0.67 | 0.67 |
| | 802.11b | 2 412.0 - 2 462.0 | DTS | 0.21 | 0.02 | 0.02 |
| | Bluetooth | 2 402 – 2 480 | DSS/DTS | - | 0.17* | - |
| | Simultaneous SAR per KDB 690783 D01v01r03 | | | 1.32 | 1.35 | 1.30 |
| Date(s) of Tests: | January 14, 2015 ~ January 23, 2015 | | | | | |
| Antenna Type: | Integral Antenna | | | | | |
| GPRS/EDGE: | Multi-slot Class 33, | | | | | |
| Key Feature(s) | This device supports Mobile Hotspot. | | | | | |

* Note : BT Body-worn SAR value is estimate SAR value that should not be reported standalone SAR on grants of

equipment approval.

## 3.1 KDB 941225 LTE information

<table>
<tr><th>Item.</th><th>Description</th></tr>
<tr><td rowspan="2">Frequency Range:</td><td>Band 2: 1 850.7 MHz ~ 1 909.3 MHz , Band 4: 1 710.7 MHz – 1 754.3 MHz</td></tr>
<tr><td>Band 7: 2 502.5 MHz ~ 2 567.5 MHz</td></tr>
<tr><td rowspan="3">Channel Bandwidth:</td><td>Band 2: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz</td></tr>
<tr><td>Band 4: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz</td></tr>
<tr><td>Band 7: 5 MHz, 10 MHz, 15MHz, 20MHz</td></tr>
<tr><td>Channel Number & Frequency:</td><td>
<table>
<tr><th colspan="12">Band 2</th></tr>
<tr><th colspan="2">1.4 MHz</th><th colspan="2">3 MHz</th><th colspan="2">5 MHz</th><th colspan="2">10 MHz</th><th colspan="2">15 MHz</th><th colspan="2">20 MHz</th></tr>
<tr><th>Ch.</th><th>Freq. (MHz)</th><th>Ch.</th><th>Freq. (MHz)</th><th>Ch.</th><th>Freq. (MHz)</th><th>Ch.</th><th>Freq. (MHz)</th><th>Ch.</th><th>Freq. (MHz)</th><th>Ch.</th><th>Freq. (MHz)</th></tr>
<tr><td>18607</td><td>1850.7</td><td>18615</td><td>1851.5</td><td>18625</td><td>1852.5</td><td>18650</td><td>1855</td><td>18675</td><td>1857.5</td><td>18700</td><td>1860</td></tr>
<tr><td>18900</td><td>1880</td><td>18900</td><td>1880</td><td>18900</td><td>1880</td><td>18900</td><td>1880</td><td>18900</td><td>1880</td><td>18900</td><td>1880</td></tr>
<tr><td>19193</td><td>1909.3</td><td>19185</td><td>1908.5</td><td>19175</td><td>1907.5</td><td>19150</td><td>1905</td><td>19125</td><td>1902.5</td><td>19100</td><td>1900</td></tr>
</table>
<table>
<tr><th colspan="12">Band 4</th></tr>
<tr><th colspan="2">1.4 MHz</th><th colspan="2">3 MHz</th><th colspan="2">5 MHz</th><th colspan="2">10 MHz</th><th colspan="2">15 MHz</th><th colspan="2">20 MHz</th></tr>
<tr><th>Ch.</th><th>Freq. (MHz)</th><th>Ch.</th><th>Freq. (MHz)</th><th>Ch.</th><th>Freq. (MHz)</th><th>Ch.</th><th>Freq. (MHz)</th><th>Ch.</th><th>Freq. (MHz)</th><th>Ch.</th><th>Freq. (MHz)</th></tr>
<tr><td>19957</td><td>1 710.7</td><td>19965</td><td>1 711.5</td><td>19975</td><td>1 712.5</td><td>20000</td><td>1 715</td><td>20025</td><td>1 717.5</td><td>20050</td><td>1 720</td></tr>
<tr><td>20175</td><td>1 732.5</td><td>20175</td><td>1 732.5</td><td>20175</td><td>1 732.5</td><td>20175</td><td>1 732.5</td><td>20175</td><td>1 732.5</td><td>20175</td><td>1 732.5</td></tr>
<tr><td>20393</td><td>1 754.3</td><td>20385</td><td>1 753.5</td><td>20375</td><td>1 752.5</td><td>20350</td><td>1 750</td><td>20325</td><td>1 747.5</td><td>20300</td><td>1 745</td></tr>
</table>
<table>
<tr><th colspan="8">Band 7</th></tr>
<tr><th colspan="2">5 MHz</th><th colspan="2">10 MHz</th><th colspan="2">15 MHz</th><th colspan="2">20 MHz</th></tr>
<tr><th>Ch.</th><th>Freq. (MHz)</th><th>Ch.</th><th>Freq. (MHz)</th><th>Ch.</th><th>Freq. (MHz)</th><th>Ch.</th><th>Freq. (MHz)</th></tr>
<tr><td>20775</td><td>2 502.5</td><td>20800</td><td>2 505</td><td>20825</td><td>2 507.5</td><td>20850</td><td>2 510</td></tr>
<tr><td>21100</td><td>2 535</td><td>21100</td><td>2 535</td><td>21100</td><td>2 535</td><td>21100</td><td>2 535</td></tr>
<tr><td>21425</td><td>2 567.5</td><td>21400</td><td>2 565</td><td>21375</td><td>2 562.5</td><td>21350</td><td>2 560</td></tr>
</table>
</td></tr>
</table>

| Item. | Description |
|---|---|
| UE Category & Uplink Modulation | UE Category 3 QPSK, 16QAM |
| Description of the LTE Transmitter & antenna | This model has two Tx paths.<br>-, One is for GSM and WCDMA and LTE. It can not transmit simultaneously.<br>- The other is for BT & WLAN. It can not transmit simultaneously.<br>Please find the section 12 |
| LTE voice/data requirements | Data Only,<br>LTE voice is available via VoIP. Considering the users may install 3rd party software<br>to enable VoIP, LTE Head SAR is also evaluated. |
| Identify if MPR is optional or mendatory<br>optional or mendatory | The EUT incorporates MPR as per 3GPP TS 36.101 sec. 6.2.3 ~ 6.2.5<br>The MPR is permanently built-in by design as a mandatory.<br>A-MPR is not implemented in the EUT.<br>See section 11.4 RF output power measurements in the SAR report. |
| Maximum average conducted output power(dBm) Identify all other U.S. wireless operating modes, device exposure configurations and frequency bands | GSM850/ GSM1900, WCDMA850/1900, LTE Band 2, LTE Band 4, and LTE Band 7<br><br>: Head & Body SAR are required. |
| Maximum average conducted output power for other wireless mode and frequency | See section 11 RF output power measurements in the SAR report. |
| Simultaneous Transmission condition | This device supports simultaneous transmission. Please find the section 15. |
| Power reduction explanation | This device doesn't implements power reduction. |
| Description of the test equipment, software, etc. | LTE SAR Testing was performed using a CMW500.<br>UE transmits with maximum output power during SAR testing. |

# 4. DESCRIPTION OF TEST EQUIPMENT

## 4.1 SAR MEASUREMENT SETUP

These measurements are performed using the DASY4 automated dosimetric assessment system. It is made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland. It consists of high precision robotics system (Staubli), robot controller, Pentium III computer, near-field probe, probe alignment sensor, and the generic twin phantom containing the brain 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.2).

A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and remote control, is used to drive the robot motors. The PC consists of the HP Pentium IV 3.0 GHz computer with Windows XP system and SAR Measurement Software DASY4, 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 performs the signal amplification, signal multiplexing, AD-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 of the DAE and transfers data to the PC plug-in card.

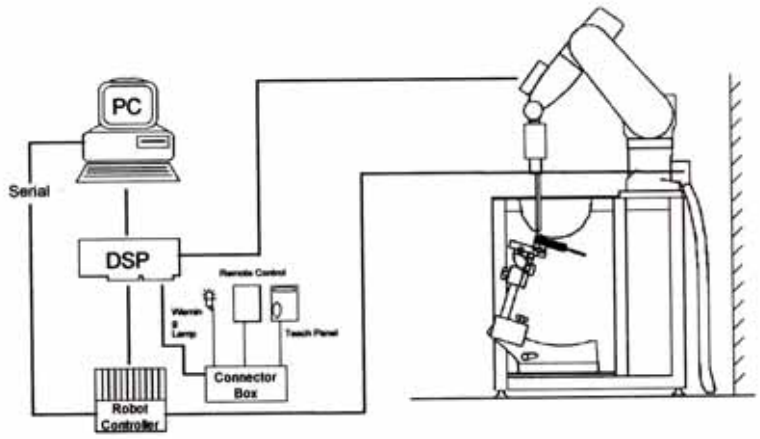



Figure 2. HCT SAR Lab. Test Measurement Set-up

The DAE4 consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, 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. The system is described in detail in.

# 4.2 DASY E-FIELD PROBE SYSTEM

## 4.1 ET3DV6 Probe Specification

| | |
|---|---|
| Construction | Symmetrical design with triangular core<br>Built-in optical fiber for surface detection System<br>Built-in shielding against static charges |
| Calibration | In air from 10 MHz to 2.5 GHz<br>In brain and muscle simulating tissue at<br>Frequencies of 450 MHz, 900 MHz and<br>1.8 GHz (accuracy: 8 %) |
| Frequency | 10 MHz to > 3 GHz; Linearity: ± 0.2 dB<br>(30 MHz to 3 GHz) |
| Directivity | ± 0.2 dB in brain tissue (rotation around probe axis)<br>± 0.4 dB in brain tissue (rotation normal probe axis) |
| Dynamic | 5 μW/g to > 100 mW/g; |
| Range Linearity: | ± 0.2 dB |
| Surface Detection | ± 0.2 mm repeatability in air and clear liquids<br>over diffuse reflecting surfaces. |
| Dimensions | Overall length: 330 mm<br>Tip length: 16 mm<br>Body diameter: 12 mm<br>Tip diameter: 6.8 mm<br>Distance from probe tip to dipole centers: 2.7 mm |
| Application | General dissymmetry up to 3 GHz<br>Compliance tests of WCDMA/LTE Phones<br>Fast automatic scanning in arbitrary phantoms |

Figure 3. Photograph of the probe and the Phantom

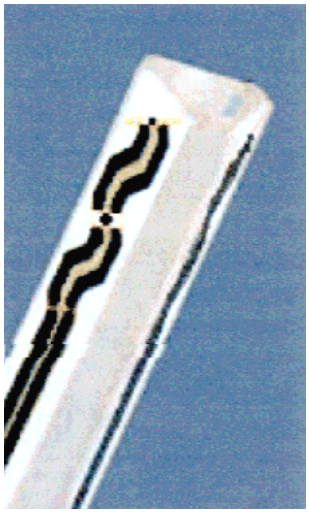


Figure 4. ET3DV6 E-field Probe

The SAR measurements were conducted with the dosimetric probe ET3DV6, designed in the classical triangular configuration and optimized for dosimetric evaluation. The probe is constructed using the thick film technique; with printed resistive lines on ceramic substrates. The probe is equipped with an optical multifiber 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 a 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 fitting. The approach is stopped at reaching the maximum.

## 4.2.1 EX3DV4 Probe Specification

| | |
|---|---|
| Construction | Symmetrical design with triangular core Interleaved sensors<br>Built-in shielding against static charges<br>PEEK enclosure material (resistant to organic solvents, e.g., DGBE) |
| Calibration | Basic Broad Band Calibration in air<br>Conversion Factors (CF) for HSL 900 and HSL 1810<br>Additional CF for other liquids and frequencies upon request |
| Frequency | 10 MHz to 4 GHz; Linearity: ± 0.2 dB (30 MHz to 4 GHz) |
| Directivity | ± 0.2 dB in HSL (rotation around probe axis)<br>± 0.3 dB in tissue material (rotation normal to probe axis) |
| Dynamic Range | 5 μW/g to > 100 mW/g; Linearity: ± 0.2 dB |
| Dimensions | Overall length: 330 mm (Tip: 20 mm)<br>Tip diameter: 3.9 mm (Body: 12 mm)<br>Distance from probe tip to dipole centers: 2.0 mm |
| Application | General dosimetry up to 4 GHz<br>Dosimetry in strong gradient fields<br>Compliance tests of mobile phones |

Figure 5. Photograph of the probe and the Phantom

Figure 6. EX3DV4 E-field Probe

The SAR measurements were conducted with the dosimetric probe EX3DV4, designed in the classical triangular configuration and optimized for dosimetric evaluation. The probe is constructed using the thick film technique; with printed resistive lines on ceramic substrates. The probe is equipped with an optical multifiber 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 a 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 2$^{nd}$ order fitting. The approach is stopped at reaching the maximum.

# 4.3 PROBE CALIBRATION PROCESS

## 4.3.1 E-Probe Calibration

Each probe is calibrated according to a dosimetric assessment procedure with an accuracy better than ± 10 %. The spherical isotropy was evaluated with the proper procedure and found to be better than ± 0.25 dB. The sensitivity parameters (NormX, NormY, NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe is tested.
The free space E-field from amplified probe outputs is determined in a test chamber. This is performed in a TEM cell for frequencies bellow 1 GHz, and in a waveguide 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 then rotated 360 degrees.
E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated brain tissue. The measured free space E-field in the medium correlates to temperature rise in a 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 is proportional to $\Delta T/\Delta t$, the initial rate of tissue heating, before thermal diffusion takes place.
Now it's possible to quantify the electric field in the simulated tissue by equating the thermally derived SAR to the E-field;

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

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

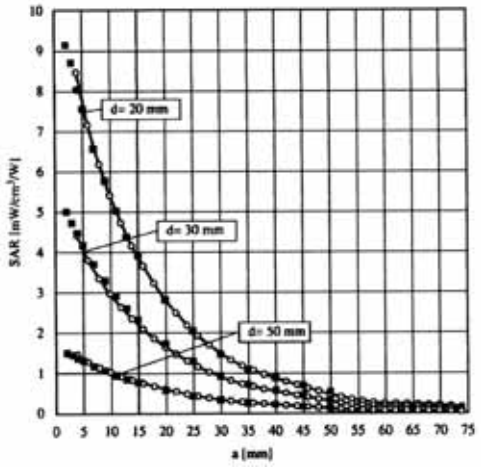



Figure 7. E-Field and Temperature measurements at 900 MHz

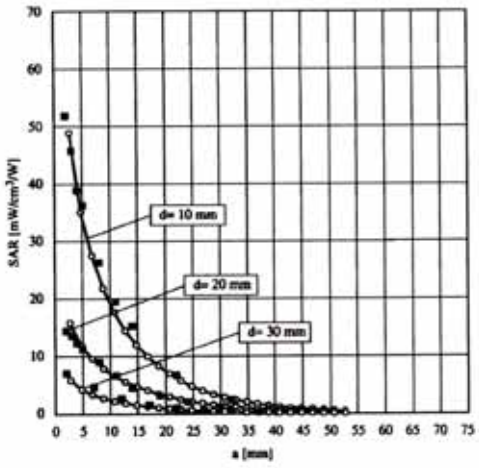



Figure 8. E-Field and temperature measurements at 1.8 GHz

## 4.3.2 Data Extrapolation

The DASY4 software automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics. If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given like below;

$$\boldsymbol{V_i = U_i + U_i^2 \cdot \frac{cf}{dcp_i}}$$

with

$V_i$ = compensated signal of channel i (i=x,y,z)
$U_i$ = input signal of channel i (i=x,y,z)
cf = crest factor of exciting field (DASY parameter)
$dcp_i$ = diode compression poing (DASY parameter)

From the compensated input signals the primary field data for each channel can be evaluated:

E-field probes:

$$\boldsymbol{E_i = \sqrt{\frac{V_i}{Norm_i \cdot ConvF}}}$$

with

$V_i$ = compensated signal of channel i (i=x,y,z)
$Norm_i$ = sensor sensitivity of channel i (i=x,y,z) $\mu V/(V/m)^2$ for E-field probes
$ConvF$ = sensitivity of enhancement in solution
$E_i$ = electric field strength of channel i in V/m

The RSS value of the field components gives the total field strength (Hermetian magnitude):

$$\boldsymbol{E_{tot} = E_x^2 + E_y^2 + E_z^2}$$

The primary field data are used to calculate the derived field units.

$$\boldsymbol{SAR = E_{tot}^2 \cdot \frac{\sigma}{\rho \cdot 1000}}$$

with

$SAR$ = local specific absorption rate in W/g
$E_{tot}$ = total field strength in V/m
$\sigma$ = conductivity in [mho/m] or [Siemens/m]
ρ = equivalent tissue density in g/$cm^3$

The power flow density is calculated assuming the excitation field to be a free space field.

$$\boldsymbol{P_{pwe} = \frac{E_{tot}^2}{3770}}$$

with

$P_{pwe}$ = equivalent power density of a plane wave in w/$cm^2$
$E_{tot}$ = total electric field strength in V/m

## 4.4 SAM Phantom

The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528 and IEC 62209-1. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by teaching three points with the robot.

Figure 9. SAM Phantom

| | |
|---|---|
| Shell Thickness | 2.0 mm ± 0.2 mm (6 ± 0.2 mm at ear point) |
| Filling Volume | about 25 L |
| Dimensions | 810 mm x 1 000 mm x 500 mm (H x L x W) |

Triple Modular Phantom consists of tree identical modules which can be installed and removed separately without emptying the liquid. It includes three reference points for phantom installation. Covers prevent evaporation of the liquid. Phantom material is resistant to DGBE based tissue simulating liquids. The MFP V5.1 will be delivered including wooden support only (non-standard SPEAG support).
Applicable for system performance check from 700 MHz to 6 GHz (MFP V5.1C) or 800 MHz - 6 GHz (MFP V5.1A) as well as dosimetric evaluations for body-worn operation.

Figure 10. MFP V5.1 Triple Modular Phantom

| | |
|---|---|
| Shell Thickness | 2.0 mm ± 0.2 mm |
| Filling Volume | approx. 9.2 L |
| Dimensions | 830 mm x 500 mm (L x W) |

## 4.5 Device Holder for Transmitters

In combination with the SAM Phantom V 4.0, the Mounting Device (POM) enables the rotation of the mounted transmitter in spherical coordinates whereby the rotation points is the ear opening. The devices can be easily, accurately, and repeatable positioned according to the FCC and CENELEC specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).

Note: A simulating human hand is not used due to the complex anatomical and geometrical structure of the hand that may produced infinite number of configurations. To produce the Worst-case condition (the hand absorbs antenna output power), the hand is omitted during the tests.

Figure 11. Device Holder

# 4.6 Tissue Simulating Mixture Characterization

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 mach within 5%, per the FCC recommendations.

.

| Ingredients (% by weight) | Frequency (MHz) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 835 | | 1 900 | | 2 450 ~ 2 700 | | 5 200 - 5 800 | |
| Tissue Type | Head | Body | Head | Body | Head | Body | Head | Body |
| Water | 40.45 | 53.06 | 54.9 | 70.17 | 71.88 | 73.2 | 65.52 | 78.66 |
| Salt (NaCl) | 1.45 | 0.94 | 0.18 | 0.39 | 0.16 | 0.1 | 0.0 | 0.0 |
| Sugar | 57.0 | 44.9 | 0.0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| HEC | 1.0 | 1.0 | 0.0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Bactericide | 0.1 | 0.1 | 0.0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Triton X-100 | 0.0 | 0.0 | 0.0 | 0.0 | 19.97 | 0.0 | 17.24 | 10.67 |
| DGBE | 0.0 | 0.0 | 44.92 | 29.44 | 7.99 | 26.7 | 0.0 | 0.0 |
| Diethylene glycol hexyl ether | - | - | - | - | - | - | 17.24 | 10.67 |

| | | | |
|---|---|---|---|
| Salt: | 99 % Pure Sodium Chloride | Sugar: | 98 % Pure Sucrose |
| Water: | De-ionized, 16M resistivity | HEC: | Hydroxyethyl Cellulose |
| DGBE: | 99 % Di(ethylene glycol) butyl ether,[2-(2-butoxyethoxy) ethanol] | | |
| Triton X-100(ultra pure): | Polyethylene glycol mono[4-(1,1,3,3-tetramethylbutyl)phenyl] ether | | |

**Table 4.1 Composition of the Tissue Equivalent Matter**

# 4.7 SAR TEST EQUIPMENT

| Manufacturer | Type / Model | S/N | Calib. Date | Calib.Interval | Calib.Due |
|---|---|---|---|---|---|
| SPEAG | SAM Phantom | - | N/A | N/A | N/A |
| SPEAG | Triple Modular Phantom | - | N/A | N/A | N/A |
| Staubli | Robot RX90B L | F01/5K09A1/A/01 | N/A | N/A | N/A |
| Staubli | Robot ControllerCS7MB | 3403-91935 | N/A | N/A | N/A |
| HP | Pavilion t000_puffer | KRJ51201TV | N/A | N/A | N/A |
| SPEAG | Light Alignment Sensor | 265 | N/A | N/A | N/A |
| Staubli | Teach Pendant (Joystick) | D221340.01 | N/A | N/A | N/A |
| SPEAG | DAE4 | 1225 | Mar. 24, 2014 | Annual | Mar. 24, 2015 |
| SPEAG | DAE4 | 911 | Feb. 25, 2014 | Annual | Feb. 25, 2015 |
| SPEAG | DAE4 | 652 | Mar. 26, 2014 | Annual | Mar. 26, 2015 |
| SPEAG | E-Field Probe ET3DV6 | 1630 | Apr. 21, 2014 | Annual | Apr. 21, 2015 |
| SPEAG | E-Field Probe EX3DV4 | 3903 | Aug. 28, 2014 | Annual | Aug. 28, 2014 |
| SPEAG | E-Field Probe EX3DV4 | 3863 | Jul. 24, 2014 | Annual | Jul. 24, 2015 |
| SPEAG | Dipole D835V2 | 490 | May 16,2014 | Annual | May 16,2015 |
| SPEAG | Dipole D1800V2 | 2d006 | Mar.24, 2014 | Annual | Mar.24, 2015 |
| SPEAG | Dipole D1900V2 | 5d061 | Jul. 23, 2014 | Annual | Jul. 23, 2015 |
| SPEAG | Dipole D2450V2 | 743 | Jul. 24, 2014 | Annual | Jul. 24, 2015 |
| SPEAG | Dipole D2600V2 | 1015 | Apr.23, 2014 | Annual | Apr.23, 2015 |
| Agilent | Power Meter(F) E4419B | MY41291386 | Oct. 27, 2014 | Annual | Oct. 27, 2015 |
| Agilent | Power Sensor(G) 8481 | MY41090680 | Oct. 27, 2014 | Annual | Oct. 27, 2015 |
| HP | Dielectric Probe Kit 85070C | 00721521 | CBT | | |
| HP | Dual Directional Coupler | 16072 | Oct. 27, 2014 | Annual | Oct. 27, 2015 |
| Agilent | Base Station E5515C | GB44400269 | Feb. 10, 2014 | Annual | Feb. 10, 2015 |
| HP | Signal Generator 8664A | 3744A02069 | Oct. 27, 2014 | Annual | Oct. 27, 2015 |
| Hewlett Packard | 11636B/Power Divider | 58698 | Mar. 03. 2014 | Annual | Mar. 03. 2015 |
| Agilent | N9020A/ SIGNAL | MY50510407 | Mar. 25, 2014 | Annual | Mar. 25, 2015 |
| TESCOM | TC-3000C / BLUETOOTH | 3000C000276 | Apr. 11, 2014 | Annual | Apr. 11. 2015 |
| HP | Network Analyzer 8753ES | JP39240221 | Mar. 21, 2014 | Annual | Mar. 21, 2015 |
| R&S | Base Station CMW500 | 100990 | Dec. 05, 2014 | Annual | Dec. 05, 2015 |

NOTE:
1. The E-field probe was calibrated by SPEAG, by the waveguide technique procedure. Dipole Verification measurement is performed by HCT Lab. before each test. The brain/body simulating material is calibrated by HCT using the dielectric probe system and network analyzer to determine the conductivity and permittivity
(dielectric constant) of the brain/body-equivalent material.
2. CBT(Calibrating Before Testing). Prior to testing, the dielectric probe kit was calibrated via the network analyzer, with the specified procedure(calibrated in pure water) and calibration kit(standard) short circuit, before the dielectric measurement. The specific procedure and calibration kit are provided by Agilent

# 5. SAR MEASUREMENT PROCEDURE

The evaluation was performed with the following procedure:

1. The SAR value at a fixed location above the ear point was measured and was used as a reference value for assessing the power drop.

2. The SAR distribution at the exposed side of the head was measured at a distance of 3.9 mm from the inner surface of the shell. The area covered the entire dimension of the head and the horizontal grid spacing was 15 mm x 15 mm. Based on this data, the area of the maximum absorption was determined by spline interpolation.

3. Around this point, a volume of 32 mm x 32 mm x 30 mm 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:
   **a.** The data at the surface were extrapolated, since the center of the dipoles is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2 mm. The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.
   **b.** The maximum interpolated value was searched with a straight-forward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1 g or 10 g) were computed using the 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 integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were interpolated to calculate the average.
   **c.** All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

4. The SAR value, at the same location as procedure #1, was re-measured. If the value changed by more than 5 %, the evaluation is repeated.

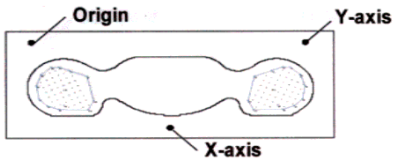



Figure 12. SAR Measurement Point in Area Scan

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s).
The measurement grid within an Area Scan is defined by the grid extend, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan is performed around the hightest E-field value to determine the averaged SASR-distribution over 10g.
Area scan and zoom scan resolution setting follow KDB 865664 D01v01r03 quoted below

| | | | ≤ 3 GHz | > 3 GHz |
|---|---|---|---|---|
| Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface | | | 5 ± 1 mm | ½·δ·ln(2) ± 0.5 mm |
| Maximum probe angle from probe axis to phantom surface normal at the measurement location | | | 30° ± 1° | 20° ± 1° |
| Maximum area scan spatial resolution: $\Delta x_{Area}$, $\Delta y_{Area}$ | | | ≤ 2 GHz: ≤ 15 mm<br>2 – 3 GHz: ≤ 12 mm | 3 – 4 GHz: ≤ 12 mm<br>4 – 6 GHz: ≤ 10 mm |
| | | | When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device. | |
| Maximum zoom scan spatial resolution: $\Delta x_{Zoom}$, $\Delta y_{Zoom}$ | | | ≤ 2 GHz: ≤ 8 mm<br>2 – 3 GHz: ≤ 5 mm* | 3 – 4 GHz: ≤ 5 mm*<br>4 – 6 GHz: ≤ 4 mm* |
| Maximum zoom scan spatial resolution, normal to phantom surface | uniform grid: $\Delta z_{Zoom}(n)$ | | ≤ 5 mm | 3 – 4 GHz: ≤ 4 mm<br>4 – 5 GHz: ≤ 3 mm<br>5 – 6 GHz: ≤ 2 mm |
| | graded grid | $\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface | ≤ 4 mm | 3 – 4 GHz: ≤ 3 mm<br>4 – 5 GHz: ≤ 2.5 mm<br>5 – 6 GHz: ≤ 2 mm |
| | | $\Delta z_{Zoom}(n>1)$: between subsequent points | ≤ 1.5·$\Delta z_{Zoom}(n-1)$ | |
| Minimum zoom scan volume | x, y, z | | ≥ 30 mm | 3 – 4 GHz: ≥ 28 mm<br>4 – 5 GHz: ≥ 25 mm<br>5 – 6 GHz: ≥ 22 mm |

Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.

* When zoom scan is required and the *reported* SAR from the area scan based *1-g SAR estimation* procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.

# 6. DESCRIPTION OF TEST POSITION

## 6.1 HEAD POSITION

The device was placed in a normal operating position with the Point A on the device, as illustrated in following drawing, aligned with the location of the RE(ERP) on the phantom. With the ear-piece pressed against the head, the vertical center line of the body of the handset was aligned with an imaginary plane consisting of the RE, LE and M. While maintaining these alignments, the body of the handset was gradually moved towards the cheek until any point on the mouth-piece or keypad contacted the cheek. This is a cheek/touch position. For ear/tilt position, while maintain the device aligned with the BM and FN lines, the device was pivot against ERP back for 15º or until the device antenna touch the phantom. Please refer to IEEE 1528-2003 illustration below.

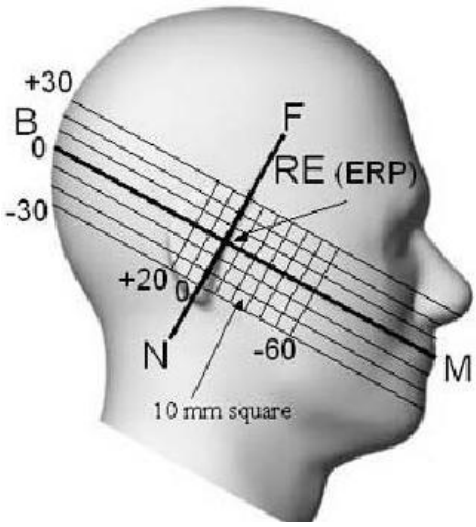



Figure 13. Side view of the phantom

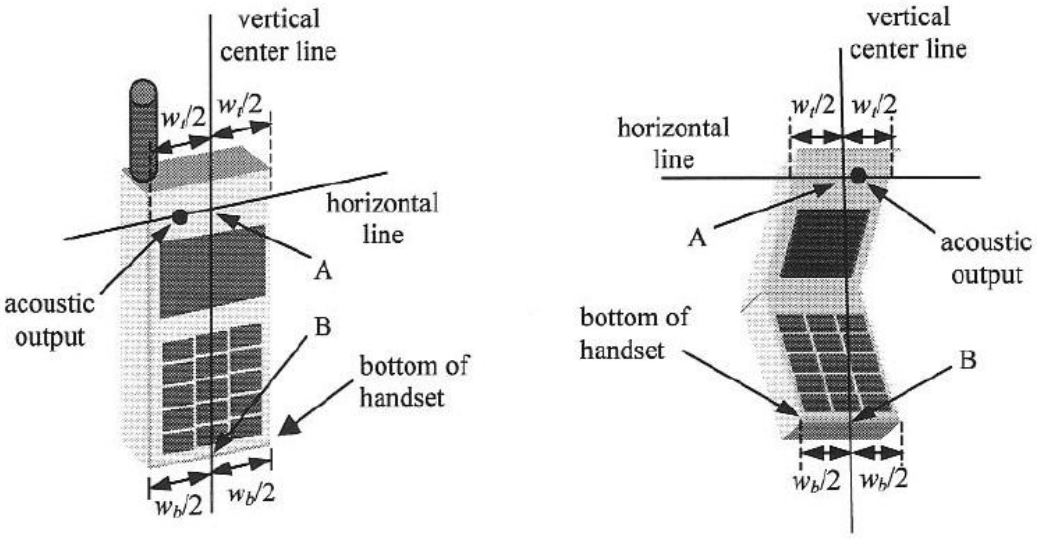



Figure 14. Handset vertical and horizontal reference lines

## 6.2 Body Holster/Belt Clip Configurations

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration. A device with a headset output is tested with a headset connected to the device. Body dielectric parameters are used.

Accessories for Body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that contain metallic components. When multiple accessories that do not contain metallic components are supplied with the device, the device is tested with only the accessory that dictates the closest spacing to the body. Then multiple accessories that contain metallic components are tested with each accessory. If multiple accessory share an identical metallic component (i.e. the same metallic belt-clip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.

Body-worn accessories may not always be supplied or available as options for some Devices intended to be authorized for body-worn use. In this case, a test configuration with a separation distance between the back of the device and the flat phantom is used.

Since this EUT does not supply any body worn accessory to the end user a distance of 1.0 cm from the EUT back surface to the liquid interface is configured for the generic test.

"See the Test SET-UP Photo"

Transmitters that are designed to operate in front of a person’s face, as in push-to-talk configurations, are tested for SAR compliance with the front of the device positioned to face the flat phantom. For devices that are carried next to the body such as a shoulder, waist or chest-worn transmitters, SAR compliance is tested with the accessory(ies), Including headsets and microphones, attached to the device and positioned against a flat phantom in a normal use configuration.

In all cases SAR measurements are performed to investigate the worst-case positioning. Worstcase positioning is then documented and used to perform Body SAR testing.

# 7. MEASUREMENT UNCERTAINTY

| Error Description | Tol (± %) | Prob. dist. | Div. | $c_i$ | Standard Uncertainty (± %) | $v_{eff}$ |
|---|---|---|---|---|---|---|
| **1. Measurement System** | | | | | | |
| Probe Calibration | 6.00 | N | 1 | 1 | 6.00 | ∞ |
| Axial Isotropy | 4.70 | R | 1.73 | 0.7 | 1.90 | ∞ |
| Hemispherical Isotropy | 9.60 | R | 1.73 | 0.7 | 3.88 | ∞ |
| Boundary Effects | 1.00 | R | 1.73 | 1 | 0.58 | ∞ |
| Linearity | 4.70 | R | 1.73 | 1 | 2.71 | ∞ |
| System Detection Limits | 1.00 | R | 1.73 | 1 | 0.58 | ∞ |
| Readout Electronics | 0.30 | N | 1.00 | 1 | 0.30 | ∞ |
| Response Time | 0.8 | R | 1.73 | 1 | 0.46 | ∞ |
| Integration Time | 2.6 | R | 1.73 | 1 | 1.50 | ∞ |
| RF Ambient Conditions | 3.00 | R | 1.73 | 1 | 1.73 | ∞ |
| Probe Positioner | 0.40 | R | 1.73 | 1 | 0.23 | ∞ |
| Probe Positioning | 2.90 | R | 1.73 | 1 | 1.67 | ∞ |
| Max SAR Eval | 1.00 | R | 1.73 | 1 | 0.58 | ∞ |
| **2.Test Sample Related** | | | | | | |
| Device Positioning | 2.90 | N | 1.00 | 1 | 2.90 | 145 |
| Device Holder | 3.60 | N | 1.00 | 1 | 3.60 | 5 |
| Power Drift | 5.00 | R | 1.73 | 1 | 2.89 | ∞ |
| **3.Phantom and Setup** | | | | | | |
| Phantom Uncertainty | 4.00 | R | 1.73 | 1 | 2.31 | ∞ |
| Liquid Conductivity(target) | 5.00 | R | 1.73 | 0.64 | 1.85 | ∞ |
| Liquid Conductivity(meas.) | 2.07 | N | 1 | 0.64 | 1.60 | 9 |
| Liquid Permitivity(target) | 5.00 | R | 1.73 | 0.6 | 1.73 | ∞ |
| Liquid Permitivity(meas.) | 5.02 | N | 1 | 0.6 | 1.50 | 9 |
| **Combind Standard Uncertainty** | | | | | 10.85 | |
| **Coverage Factor for 95 %** | | | | | $k=2$ | |
| **Expanded STD Uncertainty** | | | | | 21.70 | |

**Table 7.1 Uncertainty (800 MHz- 2 600 MHz)**

# 8. ANSI/ IEEE C95.1 - 1992 RF EXPOSURE LIMITS

| HUMAN EXPOSURE | UNCONTROLLED ENVIRONMENT General Population (W/kg) or (mW/g) | CONTROLLED ENVIRONMENT Occupational (W/kg) or (mW/g) |
|---|---|---|
| SPATIAL PEAK SAR * (Brain) | 1.60 | 8.00 |
| SPATIAL AVERAGE SAR ** (Whole Body) | 0.08 | 0.40 |
| SPATIAL PEAK SAR *** (Hands / Feet / Ankle / Wrist) | 4.00 | 20.00 |

**Table 8.1 Safety Limits for Partial Body Exposure**

**NOTES:**

* The Spatial Peak value of the SAR averaged over any 1 g of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

** The Spatial Average value of the SAR averaged over the whole-body.

*** The Spatial Peak value of the SAR averaged over any 10 g of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

**Uncontrolled Environments** are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

**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).

# 9. SAR SYSTEM VALIDATION

Per FCC KCB 865664 D02v01r01, SAR system validation status should be document to confirm measurement accuracy. The SAR systems (including SAR probes, system components and software versions) used for this device were validated against its performance specifications prior to the SAR measurements. Reference dipoles were used with the required tissue- equivalent media for system validation, according to the procedures outlined in IEEE 1528-2003 and FCC KDB 865664 D01v01r03. Since SAR probe calibrations are frequency dependent, each probe calibration point was validated at a frequency within the valid frequency range of the probe calibration point, using the system that normally operates with the probe for routine SAR measurements and according to the required tissue-equivalent media.

A tabulated summary of the system validation status including the validation date(s), measurement frequencies, SAR probes and tissue dielectric parameters has been included.

| SAR System # | Probe | Probe Type | Probe Calibration Point | | Dipole | Date | Dielectric Parameters | | CW Validation | | | Modulation Validation | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Measured Permittivity | Measured Conductivity | Sensitivity | Probe Linearity | Probe Isotropy | MOD. Type | Duty Factor | PAR |
| 7 | 1630 | ET3DV6 | Head | 835 | 490 | Jan. 7,2015 | 41.6 | 0.91 | PASS | PASS | PASS | GMSK | PASS | N/A |
| 1 | 3863 | EX3DV4 | Body | 835 | 490 | Jan. 5,2015 | 55.3 | 1.01 | PASS | PASS | PASS | GMSK | PASS | N/A |
| 1 | 3863 | EX3DV4 | Head | 1800 | 2d006 | Aug.04,2014 | 40.1 | 1.39 | PASS | PASS | PASS | N/A | N/A | N/A |
| 5 | 3903 | EX3DV4 | Body | 1800 | 2d006 | Apr.11,2014 | 53.1 | 1.54 | PASS | PASS | PASS | N/A | N/A | N/A |
| 1 | 3863 | EX3DV4 | Head | 1900 | 5d061 | Aug.05,2014 | 39.8 | 1.4 | PASS | PASS | PASS | GMSK | PASS | N/A |
| 1 | 3863 | EX3DV4 | Body | 1900 | 5d061 | Aug.06,2014 | 52.1 | 1.52 | PASS | PASS | PASS | GMSK | PASS | N/A |
| 5 | 3903 | EX3DV4 | Head | 1900 | 5d061 | Aug.05,2014 | 39.8 | 1.4 | PASS | PASS | PASS | NA | N/A | NA |
| 5 | 3903 | EX3DV4 | Body | 1900 | 5d061 | Aug.06,2014 | 52.1 | 1.52 | PASS | PASS | PASS | NA | N/A | NA |
| 1 | 3863 | EX3DV4 | Head | 2450 | 743 | Aug.05,2014 | 38.2 | 1.79 | PASS | PASS | PASS | OFDM | N/A | PASS |
| 1 | 3863 | EX3DV4 | Body | 2450 | 743 | Aug.06,2014 | 53.2 | 1.95 | PASS | PASS | PASS | OFDM | N/A | PASS |
| 1 | 3863 | EX3DV4 | Head | 2600 | 1015 | Aug.05,2014 | 38.5 | 1.98 | PASS | PASS | PASS | N/A | N/A | N/A |
| 1 | 3863 | EX3DV4 | Body | 2600 | 1015 | Aug.06,2014 | 52.7 | 2.09 | PASS | PASS | PASS | N/A | N/A | N/A |

**SAR System Validation Summary**

**Note;**

All measurement were performed using probes calibrated for CW signal only. Modulations in the table bove represent test configurations for which the measurement system has been validated per FCC KDB Publication 865664 D01v01r03. SAR system were validated for modulated signals with a periodic duty cycle, such as GMSK, or with a high peak to average ratio (>5 dB), such as OFDM according to KDB 865664 D01v01r03.

# 10. SYSTEM VERIFICATION

## 10.1 Tissue Verification

| Freq. [MHz] | Date | Probe | Dipole | Liquid | Liquid Temp. [°C] | Parameters | Target Value | Measured Value | Deviation [%] | Limit [%] |
|---|---|---|---|---|---|---|---|---|---|---|
| 835 | Jan. 14, 2015 | 1630 | 490 | Head | 22.1 | ε r | 41.5 | 41.9 | + 0.96 | ± 5 |
| | | | | | | σ | 0.90 | 0.915 | + 1.67 | ± 5 |
| 835 | Jan. 15, 2015 | 3863 | | Body | 23.0 | ε r | 55.2 | 56.8 | + 2.90 | ± 5 |
| | | | | | | σ | 0.97 | 0.985 | + 1.55 | ± 5 |
| 1 800 | Jan. 19, 2015 | 3863 | 2d006 | Head | 22.9 | ε r | 40.0 | 40.1 | + 0.25 | ± 5 |
| | | | | | | σ | 1.40 | 1.4 | + 0.00 | ± 5 |
| 1 800 | Jan. 19, 2015 | 3903 | | Body | 22.9 | ε r | 53.3 | 55.1 | + 3.38 | ± 5 |
| | | | | | | σ | 1.52 | 1.51 | - 0.66 | ± 5 |
| 1 900 | Jan. 16, 2015 | 3863 | 5d061 | Head | 22.9 | ε r | 40.0 | 38.9 | - 2.75 | ± 5 |
| | | | | | | σ | 1.40 | 1.43 | + 2.14 | ± 5 |
| 1 900 | Jan. 16, 2015 | 3863 | | Body | 22.9 | ε r | 53.3 | 54 | + 1.31 | ± 5 |
| | | | | | | σ | 1.52 | 1.55 | + 1.97 | ± 5 |
| 1 900 | Jan. 23, 2015 | 3903 | 5d061 | Head | 21.8 | ε r | 40.0 | 38.9 | - 2.75 | ± 5 |
| | | | | | | σ | 1.40 | 1.43 | + 2.14 | ± 5 |
| 1 900 | Jan. 23, 2015 | 3903 | | Body | 21.8 | ε r | 53.3 | 54 | + 1.31 | ± 5 |
| | | | | | | σ | 1.52 | 1.55 | + 1.97 | ± 5 |
| 2 450 | Jan. 20, 2015 | 3863 | 743 | Head | 21.2 | ε r | 39.2 | 37.7 | - 3.83 | ± 5 |
| | | | | | | σ | 1.80 | 1.83 | + 1.67 | ± 5 |
| 2 450 | Jan. 20, 2015 | 3863 | | Body | 21.2 | ε r | 52.7 | 52.9 | + 0.38 | ± 5 |
| | | | | | | σ | 1.95 | 1.98 | + 1.54 | ± 5 |
| 2 600 | Jan. 22, 2015 | 3863 | 1015 | Head | 21.1 | ε r | 39.0 | 38.6 | - 1.03 | ± 5 |
| | | | | | | σ | 1.96 | 2.03 | + 3.57 | ± 5 |
| 2 600 | Jan. 22, 2015 | 3863 | | Body | 21.1 | ε r | 52.5 | 54.3 | + 3.43 | ± 5 |
| | | | | | | σ | 2.16 | 2.19 | + 1.39 | ± 5 |

The Tissue dielectronic parameters were measured prior to the SAR evaluation using an Agilent 85070C Dielectronic Probe Kit and Agilent Network Analyzer.

## 10.2 System Verification

Prior to assessment, the system is verified to the ± 10 % of the specifications at 835 MHz / 1 800 MHz / 1 900 MHz / 2 450 MHz/ 2 600 MHz by using the system Verification kit. (Graphic Plots Attached)

**System Verification Results**

| Freq. | Date | Probe (S/N) | Dipole (S/N) | Liquid | Amb. Temp. | Liquid Temp. | 1 W Target $SAR_{1g}$ (SPEAG) | Measured $SAR_{1g}$ | 1 W Normalized $SAR_{1g}$ | Deviation | Limit [%] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| [MHz] | | | | | [°C] | [°C] | [mW/g] | [mW/g] | [mW/g] | [%] | [%] |
| 835 | Jan. 14, 2015 | 1630 | 490 | Head | 22.3 | 22.1 | 9.07 | 0.935 | 9.35 | + 3.09 | ± 10 |
| 835 | Jan. 15, 2015 | 3863 | | Body | 23.2 | 23.0 | 9.49 | 0.967 | 9.67 | + 1.90 | ± 10 |
| 1 800 | Jan. 19, 2015 | 3863 | 2d006 | Head | 23.1 | 22.9 | 38.1 | 3.68 | 36.8 | - 3.41 | ± 10 |
| 1 800 | Jan. 19, 2015 | 3903 | | Body | 23.1 | 22.9 | 38.1 | 4 | 40 | + 4.99 | ± 10 |
| 1 900 | Jan. 16, 2015 | 3863 | 5d061 | Head | 23.1 | 22.9 | 40.6 | 3.85 | 38.5 | - 5.17 | ± 10 |
| 1 900 | Jan. 16, 2015 | 3863 | | Body | 23.1 | 22.9 | 40.8 | 4.13 | 41.3 | + 1.23 | ± 10 |
| 1 900 | Jan. 23, 2015 | 3903 | 5d061 | Head | 22.0 | 21.8 | 40.6 | 4.03 | 40.3 | - 0.74 | ± 10 |
| 1 900 | Jan. 23, 2015 | 3903 | | Body | 22.0 | 21.8 | 40.8 | 3.84 | 38.4 | - 5.88 | ± 10 |
| 2 450 | Jan. 20, 2015 | 3863 | 743 | Head | 21.4 | 21.2 | 53.2 | 5.2 | 52 | - 2.26 | ± 10 |
| 2 450 | Jan. 20, 2015 | 3863 | | Body | 21.4 | 21.2 | 51.3 | 5.26 | 52.6 | + 2.53 | ± 10 |
| 2 600 | Jan. 22, 2015 | 3863 | 1015 | Head | 21.3 | 21.1 | 57.7 | 5.75 | 57.5 | - 0.35 | ± 10 |
| 2 600 | Jan. 22, 2015 | 3863 | | Body | 21.3 | 21.1 | 55.5 | 5.65 | 56.5 | + 1.80 | ± 10 |

## 10.3 System Verification Procedure

SAR measurement was prior to assessment, the system is verified to the ± 10 % of the specifications at each frequency band by using the system Verification kit. (Graphic Plots Attached)
- Cabling the system, using the Verification kit equipment.
- Generate about 100 mW Input Level from the Signal generator to the Dipole Antenna.
- Dipole Antenna was placed below the Flat phantom.
- The measured one-gram SAR at the surface of the phantom above the dipole feed-point should be within 10 % of the target reference value.
- The results are normalized to 1 W input power.

Note;
SAR Verification was performed according to the FCC KDB 865664 D01v01r03.

# 11. RF CONDUCTED POWER MEASUREMENT

Power measurements were performed using a base station simulator under digital average power.
The handset was placed into a simulated call using a base station simulator in a shielded chamber.
Such test signals offer a consistent means for testing SAR and are recommended for evaluation SAR
SAR measurements were taken with a fully charged battery. In order to verify that the device was tested
and maintained at full power, this was configured with the base station simulator. The SAR measurement
Software calculates a reference point at the start and end of the test to check for power drifts. If conducted
Power deviations of more then 5 % occurred, the tests were repeated.

# 11.1 Output Power Specifications.

This device operates using the following maximum output power specifications. SAR values were scaled to the maximum allowed power to determine compliance per KDB publication 447498 D01v05r02.

**GSM**

| GSM850 | GSM1900 |
|---|---|
| Target Power : 33.7 dBm | Target Power : 29.0 dBm |
| GPRS850 | PCS1900 |
| GPRS 1tx : 33.7 dBm / EGPRS 1tx : 27.7 dBm | GPRS 1tx : 29.0 dBm / EGPRS 1tx : 25.7 dBm |
| GPRS 2tx : 31.2 dBm / EGPRS 2tx : 27.7 dBm | GPRS 2tx : 26.5 dBm / EGPRS 2tx : 25.7 dBm |
| GPRS 3tx : 30.2 dBm / EGPRS 3tx : 26.7 dBm | GPRS 3tx : 25.5 dBm / EGPRS 3tx : 24.7 dBm |
| GPRS 4tx : 28.7 dBm / EGPRS 4tx : 25.7 dBm | GPRS 4tx : 24.5 dBm / EGPRS 4tx : 23.7 dBm |
| Tune-up Tolerance : -1.5 dB/ +0.5 dB | |

**WCDMA**

| WCDMA850 | | | |
|---|---|---|---|
| Target Power : 23.7 dBm | | | |
| HSDPA Sub-test1 | Target Power : 23.7 dBm | DC-HSDPA Sub-test1 | Target Power : 23.7 dBm |
| HSDPA Sub-test2 | Target Power : 23.7 dBm | DC-HSDPA Sub-test2 | Target Power : 23.7 dBm |
| HSDPA Sub-test3 | Target Power : 23.2 dBm | DC-HSDPA Sub-test3 | Target Power : 23.2 dBm |
| HSDPA Sub-test4 | Target Power : 23.2 dBm | DC-HSDPA Sub-test4 | Target Power : 23.2 dBm |
| HSUPA Sub-test1 | Target Power : 23.7 dBm | - | - |
| HSUPA Sub-test2 | Target Power : 21.7 dBm | - | - |
| HSUPA Sub-test3 | Target Power : 22.7 dBm | - | - |
| HSUPA Sub-test4 | Target Power : 21.7 dBm | - | - |
| HSUPA Sub-test5 | Target Power : 23.7 dBm | - | - |
| WCDMA1900 | | | |
| Target Power : 23.2 dBm | | | |
| HSDPA Sub-test1 | Target Power : 23.2 dBm | DC-HSDPA Sub-test1 | Target Power : 23.2 dBm |
| HSDPA Sub-test2 | Target Power : 23.2 dBm | DC-HSDPA Sub-test2 | Target Power : 23.2 dBm |
| HSDPA Sub-test3 | Target Power : 22.7 dBm | DC-HSDPA Sub-test3 | Target Power : 22.7 dBm |
| HSDPA Sub-test4 | Target Power : 22.7 dBm | DC-HSDPA Sub-test4 | Target Power : 22.7 dBm |
| HSUPA Sub-test1 | Target Power : 23.2 dBm | - | - |
| HSUPA Sub-test2 | Target Power : 21.2 dBm | - | - |
| HSUPA Sub-test3 | Target Power : 22.2 dBm | - | - |
| HSUPA Sub-test4 | Target Power : 21.2 dBm | - | - |
| HSUPA Sub-test5 | Target Power : 22.2 dBm | - | - |
| Tune-up Tolerance : -1.5 dB/ +0.5 dB | | | |
| MPR Tolerance : -1.5 dB/ +0.5 dB | | | |

* The HSUPA transmitter power will not exceed the R99 maximum transmit power in devices based on Qualcomm's HSPA chipset solutions

**LTE**

| Mode/Band | LTE Band 2 | LTE Band 4 | LTE Band 7 |
|---|---|---|---|
| Target Power | 22.5 dBm | 22.5 dBm | 22.5 dBm |
| Tune-up Tolerance : -1.5 dB/ +0.5 dB | | | |

**Wifi**

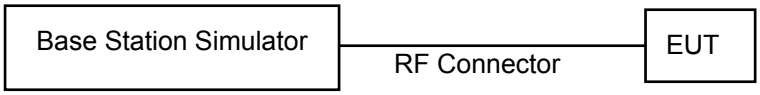
| IEEE 802.11 (in dBm) | | | | | | |
|---|---|---|---|---|---|---|
| 2.4 GHz WIFI | Mode / Band | a | b | g | N (20MHz) | N (40MHz) |
| | Maximum | N/A | 11.5 | 10.2 | 9.3 | N/A |
| | Nominal | N/A | 10.5 | 9.2 | 8.3 | N/A |

**BT.**

| Bluetooth (Average Power) | (in dBm) | DH5 | 2-DH5 | 3-DH5 | LE |
|---|---|---|---|---|---|
| | Maximum | 9 | 6.5 | 6.5 | 0 |
| | Nominal | 8 | 5.5 | 5.5 | -1 |

## 11.2 GSM

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




SAR Test for WWAN were performed with a base station simulator Agilent E5515C. Communication between the device and the emulator was established by air link. Set base station emulator to allow DUT to radiate maximum output power during all tests. Please refer to the below worst case SAR operation setup.

- GSM voice: Head SAR, Body SAR
- GPRS Multi-slots : Body SAR with GPRS/EDGE Multi-slot Class 33 with CS 1 (GMSK)

**Note;**
This EUT'S GSM, GPRS and EDGE device class is B, DTM Multislot class :N/A
Per KDB 941225 D01v03, GMSK GPRS and EDGE mode is the primary mode.
CS1/MCS7 coding scheme was used in GPRS/EDGE output power measurements and SAR Testing, as a condition where GMSK modulation was ensured. Investigation has shown that CS1 - CS4/ MCS5 – MCS9 settings do not have any impact on the output levels in the GPRS/EDGE modes.

GSM Conducted output powers (Burst-Average)

| Band | Channel | Voice | GPRS(GMSK) Data – CS1 | | | | EDGE Data | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | GSM (dBm) | GPRS 1 TX Slot (dBm) | GPRS 2 TX Slot (dBm) | GPRS 3 TX Slot (dBm) | GPRS 4 TX Slot (dBm) | EDGE 1 TX Slot (dBm) | EDGE 2 TX Slot (dBm) | EDGE 3 TX Slot (dBm) | EDGE 4 TX Slot (dBm) |
| GSM 850 | 128 | 33.36 | 33.36 | 31.08 | 30.07 | 28.73 | 26.44 | 26.32 | 25.24 | 24.37 |
| | 190 | 33.47 | 33.41 | 31.20 | 30.14 | 28.54 | 26.52 | 26.40 | 25.31 | 24.48 |
| | 251 | 33.14 | 33.11 | 30.92 | 30.22 | 28.56 | 26.42 | 26.34 | 25.23 | 24.38 |
| GSM 1900 | 512 | 28.11 | 28.10 | 26.30 | 25.79 | 24.54 | 25.07 | 25.02 | 24.70 | 23.69 |
| | 661 | 28.11 | 28.11 | 26.28 | 25.97 | 24.43 | 25.03 | 24.96 | 24.65 | 23.63 |
| | 810 | 28.15 | 28.15 | 26.32 | 25.97 | 24.54 | 25.11 | 25.05 | 24.75 | 23.72 |

GSM Conducted output powers (Frame-Average)

| Band | Channel | Voice | GPRS(GMSK) Data – CS1 | | | | EDGE Data | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | GSM (dBm) | GPRS 1 TX Slot (dBm) | GPRS 2 TX Slot (dBm) | GPRS 3 TX Slot (dBm) | GPRS 4 TX Slot (dBm) | EDGE 1 TX Slot (dBm) | EDGE 2 TX Slot (dBm) | EDGE 3 TX Slot (dBm) | EDGE 4 TX Slot (dBm) |
| GSM 850 | 128 | 24.33 | 24.33 | 25.06 | 25.81 | 25.72 | 17.41 | 20.30 | 20.98 | 21.36 |
| | 190 | 24.44 | 24.38 | 25.18 | 25.88 | 25.53 | 17.49 | 20.38 | 21.05 | 21.47 |
| | 251 | 24.11 | 24.08 | 24.90 | 25.96 | 25.55 | 17.39 | 20.32 | 20.97 | 21.37 |
| GSM 1900 | 512 | 19.08 | 19.07 | 20.28 | 21.53 | 21.53 | 16.04 | 19.00 | 20.44 | 20.68 |
| | 661 | 19.08 | 19.08 | 20.26 | 21.71 | 21.42 | 16.00 | 18.94 | 20.39 | 20.62 |
| | 810 | 19.12 | 19.12 | 20.30 | 21.71 | 21.53 | 16.08 | 19.03 | 20.49 | 20.71 |

**Note:**

Time slot average factor is as follows:
1 Tx slot = 9.03 dB, Frame-Average output power = Burst-Average output power – 9.03 dB
2 Tx slot = 6.02 dB, Frame-Average output power = Burst-Average output power – 6.02 dB
3 Tx slot = 4.26 dB, Frame-Average output power = Burst-Average output power – 4.26 dB
4 Tx slot = 3.01 dB, Frame-Average output power = Burst-Average output power – 3.01 dB

# 11.3 WCDMA

Body SAR is not required for handsets with HSDPA/HSUPA capabilities when the maximum average output of each RF channel with HSDPA active is less than ¼ dB higher than that measured without HSDPA using 12.2 kbps RMC and the maximum SAR for 12.2 kbps RMC is ≤ 75 % of the SAR limit. Otherwise, SAR is Measured for HSDPA, using an FRC with H-Set 1 in Sub-test 1 and a 12.2 kbps RMC configured in Test Loop Mode 1, using the highest body SAR configuration in 12.2 kbps RMC without HSDPA, on the maximum output channel with the body exposure configuration that results in the highest SAR in 12.2 kbps RMC for that RF channel.

## 11.3.1 Output Power Verification

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

## 11.3.2 Head SAR Measurements

SAR for head exposure configurations is measured using the 12.2 kbps RMC with TPC bits configured to all "1s". SAR in AMR configurations is not required when the maximum average output of each RF channel for 12.2 kbps AMR is less than ¼ dB higher than that measured in 12.2 kbps RMC. Otherwise, SAR is measured on the maximum output channel in 12.2 AMR with a 3.4 kbps SRB (signaling radio bearer using the exposure configuration that results in the highest SAR for that RF channel in 12.2 RMC.

## 11.3.3 Body SAR Measurement

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

## 11.3.4 Handsets with Release 5 HSDPA

Body SAR is not required for handsets with HSDPA capabilities when the maximum average output of each RF channel with HSDPA active is less than ¼ dB higher than that measured without HSDPA using 12.2 kbps RMC and the maximum SAR for 12.2 kbps RMC is ≤ 75 % of the SAR limit. Otherwise, SAR is Measured for HSDPA, using an FRC with H-Set 1 in Sub-test 1 and a 12.2 kbps RMC configured in Test Loop Mode 1, using the highest body SAR configuration in 12.2 kbps RMC without HSDPA, on the maximum output channel with the body exposure configuration that results in the highest SAR in 12.2 kbps RMC for that RF channel.

**Sub-Test 1 Setup for Release 5 HSDPA**

| Sub-test | $\beta_c$ | $\beta_d$ | $\beta_d$ (SF) | $\beta_c/\beta_d$ | $\beta_{hs}$ (1) | CM (dB) (2) |
|---|---|---|---|---|---|---|
| 1 | 2/15 | 15/15 | 64 | 2/15 | 4/15 | 0.0 |
| 2 | 12/15 (3) | 15/15 (3) | 64 | 12/15 (3) | 24/15 | 1.0 |
| 3 | 15/15 | 8/15 | 64 | 15/8 | 30/15 | 1.5 |
| 4 | 15/15 | 4/15 | 64 | 15/4 | 30/15 | 1.5 |

Note 1: $\Delta_{ACK}$, $\Delta_{NACK}$ and $\Delta_{CQI} = 8 \Leftrightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$
Note 2: CM = 1 for $\beta_c/\beta_d$ =12/15, $\beta_{hs}/\beta_c$=24/15.
Note 3: For subtest 2 the $\beta_c/\beta_d$ ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to $\beta_c$ = 11/15 and $\beta_d$ = 15/15.

## 11.3.5 Handsets with Release 6 HSPA (HSDPA/HSUPA)

Body SAR is not required for handsets with HSPA capabilities when the maximum average output of each RF channel with HSUPA/HSDPA active is less than ¼ dB higher than that measured without HSUPA/HSDPA using 12.2 kbps RMC and the maximum SAR for 12.2 kbps RMC is ≤ 75 % of the SAR limit. Body SAR for HSPA is measured with E-DCH Sub-test 5, using H-Set 1 and QPSK for FRC and a 12.2 kbps RMC configured in Test Loop Mode 1 with power control algorithm 2, according to the highest body SAR configuration in 12.1 kbps RMC without HSPA. When VOIP is applicable for head exposure, SAR is not required when the maximum output of each RF channel with HSPA is less than ¼ dB higher than that measured using 12.2 kbps RMC; otherwise, the same HSPA configuration used for body measurement should be used to test for head exposure.

| Sub-test | $\beta_c$ | $\beta_d$ | $\beta_d$ (SF) | $\beta_c/\beta_d$ | $\beta_{hs}$(1) | $\beta_{ec}$ | $\beta_{ed}$ | $\beta_{ed}$ (SF) | $\beta_{ed}$ (codes) | CM(2) (dB) | MPR (dB) | AG(4) Index | E-TFCI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 11/15(3) | 15/15(3) | 64 | 11/15(3) | 22/15 | 209/225 | 1039/225 | 4 | 1 | 1.0 | 0.0 | 20 | 75 |
| 2 | 6/15 | 15/15 | 64 | 6/15 | 12/15 | 12/15 | 94/75 | 4 | 1 | 3.0 | 2.0 | 12 | 67 |
| 3 | 15/15 | 9/15 | 64 | 15/9 | 30/15 | 30/15 | $\beta_{ed1}$: 47/15 $\beta_{ed2}$: 47/15 | 4 | 2 | 2.0 | 1.0 | 15 | 92 |
| 4 | 2/15 | 15/15 | 64 | 2/15 | 4/15 | 2/15 | 56/75 | 4 | 1 | 3.0 | 2.0 | 17 | 71 |
| 5 | 15/15(4) | 15/15(4) | 64 | 15/15(4) | 30/15 | 24/15 | 134/15 | 4 | 1 | 1.0 | 0.0 | 21 | 81 |

Note 1: $\Delta_{ACK}$, $\Delta_{NACK}$ and $\Delta_{CQI}$ = 8 ⇔ $A_{hs}$ = $\beta_{hs}/\beta_c$ = 30/15 ⇔ $\beta_{hs}$= 30/15 *$\beta_c$.
Note 2: CM = 1 for $\beta_c/\beta_d$ =12/15, $\beta_{hs}/\beta_c$=24/15. For all other combinations of DPDCH, DPCCH, HS- DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.
Note 3: For subtest 1 the $\beta_c/\beta_d$ ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to $\beta_c$ = 10/15 and $\beta_d$ = 15/15.
Note 4: For subtest 5 the $\beta_c/\beta_d$ ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to $\beta_c$ = 14/15 and $\beta_d$ = 15/15.
Note 5: Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Table 5.1g.
Note 6: $\beta_{ed}$ can not be set directly; it is set by Absolute Grant Value.

Note : Per KDB 941225 D01v03, the 12.2kbps RMC is the primary mode.

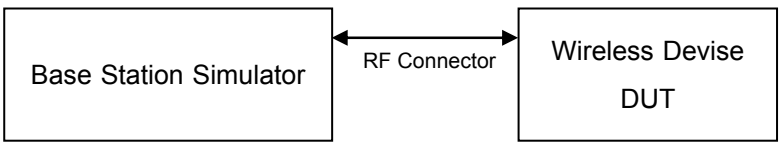
## 11.3.6 DC-HSDPA

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

DC-HSDPA Considerations:

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

It is expected by the manufacturer that MPR for some HSUPA subtests may be up to 1 dB more than specified by 3GPP, but also as low as 0 dB according to the chipset implementation in this model.



**WCDMA850**

| 3GPP Release Version | Mode | 3GPP 34.121 Subtest | Cellular Band [dBm] | | |
|---|---|---|---|---|---|
| | | | UL 4132 DL 4357 | UL 4183 DL 4408 | UL 4233 DL 4458 |
| 99 | WCDMA | 12.2 kbps RMC | 23.68 | 23.68 | 23.65 |
| 99 | WCDMA | 12.2 kbps AMR | 23.67 | 23.65 | 23.64 |
| 5 | HSDPA | Subtest 1 | 22.77 | 22.76 | 22.99 |
| 5 | | Subtest 2 | 22.79 | 22.79 | 22.96 |
| 5 | | Subtest 3 | 22.26 | 22.22 | 22.29 |
| 5 | | Subtest 4 | 22.25 | 22.17 | 22.23 |
| 6 | HSUPA | Subtest 1 | 22.24 | 22.37 | 22.48 |
| 6 | | Subtest 2 | 21.59 | 21.47 | 21.55 |
| 6 | | Subtest 3 | 21.54 | 21.58 | 21.43 |
| 6 | | Subtest 4 | 21.48 | 22.08 | 21.45 |
| 6 | | Subtest 5 | 22.21 | 22.23 | 22.35 |
| 8 | DC-HSDPA | Subtest 1 | 22.69 | 22.74 | 22.70 |
| 8 | | Subtest 2 | 22.75 | 22.82 | 22.69 |
| 8 | | Subtest 3 | 22.31 | 22.30 | 22.20 |
| 8 | | Subtest 4 | 22.31 | 22.31 | 22.22 |

WCDMA Average Conducted output powers

**WCDMA1900**

| 3GPP Release Version | Mode | 3GPP 34.121 Subtest | PCS Band [dBm] | | |
|---|---|---|---|---|---|
| | | | UL 9262 DL 9662 | UL 9400 DL 9800 | UL 9538 DL 9938 |
| 99 | WCDMA | 12.2 kbps RMC | 23.60 | 23.57 | 23.64 |
| 99 | WCDMA | 12.2 kbps AMR | 23.63 | 23.56 | 23.64 |
| 5 | HSDPA | Subtest 1 | 22.54 | 22.61 | 22.59 |
| 5 | | Subtest 2 | 22.50 | 22.69 | 22.56 |
| 5 | | Subtest 3 | 22.13 | 22.11 | 22.16 |
| 5 | | Subtest 4 | 22.09 | 22.19 | 22.05 |
| 6 | HSUPA | Subtest 1 | 22.51 | 22.40 | 22.57 |
| 6 | | Subtest 2 | 21.13 | 21.56 | 21.20 |
| 6 | | Subtest 3 | 21.36 | 21.65 | 21.64 |
| 6 | | Subtest 4 | 21.54 | 21.58 | 21.35 |
| 6 | | Subtest 5 | 22.77 | 22.12 | 22.05 |
| 8 | DC-HSDPA | Subtest 1 | 23.60 | 22.69 | 22.82 |
| 8 | | Subtest 2 | 22.61 | 22.74 | 22.86 |
| 8 | | Subtest 3 | 22.07 | 22.22 | 22.35 |
| 8 | | Subtest 4 | 22.06 | 22.21 | 22.35 |

WCDMA Average Conducted output powers

# 11.4 LTE

SAR testing was performed according to the FCC KDB 941225 D05v02r03 publication.
This DUT is developed base on MPR. The MPR is mandatory.
The device will not operate with any other MPR setting than that stated in the table as indicated.
SAR Testing was performed using a CMW500. UE transmits with Maximum output power during SAR testing.
A-MPR has been disabled for all SAR tests by setting NS=01 on the R&S CMW500.

## - LTE Band 2

| Bandwidth | Modulation | RB Size | RB Offset | Max.Average Power (dBm) | | |
|---|---|---|---|---|---|---|
| | | | | 18607 | 18900 | 19193 |
| 1.4 MHz | QPSK | 1 | 0 | 22.27 | 22.78 | 22.64 |
| | | 1 | 3 | 22.26 | 22.38 | 22.40 |
| | | 1 | 5 | 22.33 | 22.54 | 22.37 |
| | | 3 | 0 | 22.47 | 22.46 | 22.32 |
| | | 3 | 1 | 22.59 | 22.49 | 22.28 |
| | | 3 | 3 | 22.45 | 22.58 | 22.33 |
| | | 6 | 0 | 21.55 | 21.44 | 21.40 |
| | 16QAM | 1 | 0 | 21.98 | 21.80 | 21.49 |
| | | 1 | 3 | 21.75 | 21.85 | 21.58 |
| | | 1 | 5 | 21.94 | 21.94 | 21.42 |
| | | 3 | 0 | 21.07 | 21.29 | 21.88 |
| | | 3 | 1 | 21.71 | 21.68 | 21.11 |
| | | 3 | 3 | 21.35 | 20.68 | 21.07 |
| | | 6 | 0 | 20.15 | 20.40 | 20.58 |

| Bandwidth | Modulation | RB Size | RB Offset | Max.Average Power (dBm) | | |
|---|---|---|---|---|---|---|
| | | | | 18615 | 18900 | 19185 |
| 3 MHz | QPSK | 1 | 0 | 22.51 | 22.61 | 22.32 |
| | | 1 | 7 | 22.75 | 22.48 | 22.82 |
| | | 1 | 14 | 22.62 | 22.43 | 22.47 |
| | | 8 | 0 | 21.71 | 21.41 | 21.30 |
| | | 8 | 3 | 21.54 | 21.46 | 21.47 |
| | | 8 | 7 | 21.50 | 21.50 | 21.41 |
| | | 15 | 0 | 21.57 | 21.44 | 21.54 |
| | 16QAM | 1 | 0 | 21.97 | 21.60 | 21.68 |
| | | 1 | 7 | 21.98 | 21.94 | 21.53 |
| | | 1 | 14 | 21.26 | 21.84 | 21.10 |
| | | 8 | 0 | 20.85 | 20.54 | 20.37 |
| | | 8 | 3 | 20.36 | 20.46 | 20.35 |
| | | 8 | 7 | 20.34 | 20.12 | 20.35 |
| | | 15 | 0 | 20.48 | 20.34 | 20.51 |

| Bandwidth | Modulation | RB Size | RB Offset | Max.Average Power (dBm) | | |
|---|---|---|---|---|---|---|
| | | | | 18625 | 18900 | 19175 |
| 5 MHz | QPSK | 1 | 0 | 22.68 | 22.65 | 22.17 |
| | | 1 | 12 | 22.89 | 22.85 | 22.66 |
| | | 1 | 24 | 22.80 | 22.42 | 22.33 |
| | | 12 | 0 | 21.47 | 21.46 | 21.35 |
| | | 12 | 6 | 21.49 | 21.45 | 21.28 |
| | | 12 | 11 | 21.54 | 21.44 | 21.29 |
| | | 25 | 0 | 21.57 | 21.41 | 21.36 |
| | 16QAM | 1 | 0 | 21.21 | 21.59 | 21.69 |
| | | 1 | 12 | 21.71 | 21.86 | 21.95 |
| | | 1 | 24 | 21.69 | 21.63 | 21.49 |
| | | 12 | 0 | 20.32 | 20.59 | 20.20 |
| | | 12 | 6 | 20.67 | 20.59 | 20.25 |
| | | 12 | 11 | 20.68 | 20.49 | 20.27 |
| | | 25 | 0 | 20.62 | 20.47 | 20.53 |

| Bandwidth | Modulation | RB Size | RB Offset | Max.Average Power (dBm) | | |
|---|---|---|---|---|---|---|
| | | | | 18650 | 18900 | 19150 |
| 10 MHz | QPSK | 1 | 0 | 22.74 | 22.70 | 22.83 |
| | | 1 | 24 | 22.27 | 22.35 | 22.97 |
| | | 1 | 49 | 22.46 | 22.23 | 22.80 |
| | | 25 | 0 | 21.34 | 21.44 | 21.32 |
| | | 25 | 12 | 21.39 | 21.27 | 21.37 |
| | | 25 | 24 | 21.38 | 21.41 | 21.41 |
| | | 50 | 0 | 21.32 | 21.44 | 21.34 |
| | 16QAM | 1 | 0 | 21.98 | 21.88 | 21.94 |
| | | 1 | 24 | 21.46 | 20.54 | 21.94 |
| | | 1 | 49 | 21.93 | 21.38 | 21.99 |
| | | 25 | 0 | 20.63 | 20.70 | 20.24 |
| | | 25 | 12 | 20.33 | 20.55 | 20.37 |
| | | 25 | 24 | 20.41 | 20.55 | 20.33 |
| | | 50 | 0 | 20.36 | 20.35 | 20.24 |

| Bandwidth | Modulation | RB Size | RB Offset | Max.Average Power (dBm) | | |
|---|---|---|---|---|---|---|
| | | | | 18675 | 18900 | 19125 |
| 15 MHz | QPSK | 1 | 0 | 22.48 | 22.54 | 22.33 |
| | | 1 | 36 | 22.54 | 22.39 | 22.10 |
| | | 1 | 74 | 22.47 | 22.45 | 22.14 |
| | | 36 | 0 | 21.51 | 21.45 | 21.51 |
| | | 36 | 18 | 21.44 | 21.38 | 21.45 |
| | | 36 | 38 | 21.48 | 21.38 | 21.46 |
| | | 75 | 0 | 21.44 | 21.50 | 21.47 |
| | 16QAM | 1 | 0 | 21.57 | 21.96 | 21.95 |
| | | 1 | 36 | 21.46 | 21.93 | 21.63 |
| | | 1 | 74 | 21.58 | 21.98 | 21.66 |
| | | 36 | 0 | 20.50 | 20.43 | 20.24 |
| | | 36 | 18 | 20.43 | 20.36 | 20.25 |
| | | 36 | 38 | 20.37 | 20.38 | 20.28 |
| | | 75 | 0 | 20.44 | 20.49 | 20.30 |

| Bandwidth | Modulation | RB Size | RB Offset | Max.Average Power (dBm) | | |
|---|---|---|---|---|---|---|
| | | | | 18700 | 18900 | 19100 |
| 20 MHz | QPSK | 1 | 0 | 22.76 | 22.79 | 22.63 |
| | | 1 | 49 | 22.63 | 22.51 | 22.49 |
| | | 1 | 99 | 22.54 | 22.43 | 22.53 |
| | | 50 | 0 | 21.60 | 21.62 | 21.55 |
| | | 50 | 25 | 21.51 | 21.53 | 21.41 |
| | | 50 | 49 | 21.49 | 21.43 | 21.41 |
| | | 100 | 0 | 21.57 | 21.55 | 21.55 |
| | 16QAM | 1 | 0 | 21.54 | 21.28 | 21.10 |
| | | 1 | 49 | 21.39 | 20.99 | 20.78 |
| | | 1 | 99 | 21.42 | 21.00 | 20.86 |
| | | 50 | 0 | 20.44 | 20.62 | 20.54 |
| | | 50 | 25 | 20.42 | 20.67 | 20.43 |
| | | 50 | 49 | 20.33 | 20.50 | 20.44 |
| | | 100 | 0 | 20.44 | 20.49 | 20.41 |

## - LTE Band 4

| Bandwidth | Modulation | RB Size | RB Offset | Max.Average Power (dBm) | | |
|---|---|---|---|---|---|---|
| | | | | 19957 | 20175 | 20393 |
| 1.4 MHz | QPSK | 1 | 0 | 21.22 | 21.61 | 21.48 |
| | | 1 | 3 | 21.32 | 21.77 | 21.86 |
| | | 1 | 5 | 21.33 | 21.55 | 21.38 |
| | | 3 | 0 | 21.31 | 21.23 | 21.22 |
| | | 3 | 1 | 21.53 | 21.38 | 21.37 |
| | | 3 | 3 | 21.35 | 21.23 | 21.27 |
| | | 6 | 0 | 20.41 | 20.21 | 20.18 |
| | 16QAM | 1 | 0 | 20.65 | 20.86 | 20.30 |
| | | 1 | 3 | 20.60 | 21.01 | 20.41 |
| | | 1 | 5 | 20.88 | 20.92 | 20.81 |
| | | 3 | 0 | 20.04 | 20.14 | 20.10 |
| | | 3 | 1 | 20.08 | 20.17 | 20.03 |
| | | 3 | 3 | 20.38 | 20.04 | 20.07 |
| | | 6 | 0 | 19.65 | 19.03 | 19.12 |

| Bandwidth | Modulation | RB Size | RB Offset | Max.Average Power (dBm) | | |
|---|---|---|---|---|---|---|
| | | | | 19965 | 20175 | 20385 |
| 3 MHz | QPSK | 1 | 0 | 21.36 | 21.18 | 21.57 |
| | | 1 | 7 | 21.46 | 21.50 | 21.31 |
| | | 1 | 14 | 21.02 | 21.15 | 21.57 |
| | | 8 | 0 | 20.21 | 20.23 | 20.21 |
| | | 8 | 3 | 20.21 | 20.24 | 20.13 |
| | | 8 | 7 | 20.13 | 20.07 | 20.14 |
| | | 15 | 0 | 20.06 | 20.17 | 20.21 |
| | 16QAM | 1 | 0 | 20.30 | 20.58 | 20.12 |
| | | 1 | 7 | 20.34 | 20.13 | 21.24 |
| | | 1 | 14 | 20.83 | 20.67 | 20.82 |
| | | 8 | 0 | 19.28 | 19.02 | 19.04 |
| | | 8 | 3 | 19.53 | 19.04 | 19.18 |
| | | 8 | 7 | 19.19 | 19.20 | 19.14 |
| | | 15 | 0 | 19.18 | 19.18 | 19.24 |

| Bandwidth | Modulation | RB Size | RB Offset | Max.Average Power (dBm) | | |
|---|---|---|---|---|---|---|
| | | | | 19975 | 20175 | 20375 |
| 5 MHz | QPSK | 1 | 0 | 21.24 | 21.33 | 21.17 |
| | | 1 | 12 | 21.53 | 21.21 | 21.57 |
| | | 1 | 24 | 21.45 | 21.13 | 21.37 |
| | | 12 | 0 | 20.24 | 20.18 | 20.23 |
| | | 12 | 6 | 20.25 | 20.29 | 20.27 |
| | | 12 | 11 | 20.23 | 20.08 | 20.23 |
| | | 25 | 0 | 20.15 | 20.16 | 20.22 |
| | 16QAM | 1 | 0 | 20.82 | 20.65 | 20.69 |
| | | 1 | 12 | 20.61 | 20.18 | 20.84 |
| | | 1 | 24 | 20.83 | 20.23 | 20.85 |
| | | 12 | 0 | 19.47 | 19.27 | 19.27 |
| | | 12 | 6 | 19.24 | 19.16 | 19.22 |
| | | 12 | 11 | 19.03 | 19.57 | 19.29 |
| | | 25 | 0 | 19.27 | 19.23 | 19.27 |

| Bandwidth | Modulation | RB Size | RB Offset | Max.Average Power (dBm) | | |
|---|---|---|---|---|---|---|
| | | | | 20000 | 20175 | 20350 |
| 10 MHz | QPSK | 1 | 0 | 21.35 | 21.82 | 21.32 |
| | | 1 | 24 | 21.62 | 21.75 | 21.28 |
| | | 1 | 49 | 21.64 | 21.78 | 21.30 |
| | | 25 | 0 | 20.27 | 20.26 | 20.18 |
| | | 25 | 12 | 20.25 | 20.31 | 20.22 |
| | | 25 | 24 | 20.31 | 20.25 | 20.26 |
| | | 50 | 0 | 20.28 | 20.22 | 20.26 |
| | 16QAM | 1 | 0 | 21.19 | 21.41 | 20.50 |
| | | 1 | 24 | 21.16 | 20.43 | 20.05 |
| | | 1 | 49 | 21.02 | 20.42 | 20.33 |
| | | 25 | 0 | 20.35 | 20.12 | 20.40 |
| | | 25 | 12 | 20.22 | 20.29 | 20.31 |
| | | 25 | 24 | 20.18 | 20.10 | 20.39 |
| | | 50 | 0 | 19.29 | 19.21 | 19.14 |

| Bandwidth | Modulation | RB Size | RB Offset | Max.Average Power (dBm) | | |
|---|---|---|---|---|---|---|
| | | | | 20025 | 20175 | 20325 |
| 15 MHz | QPSK | 1 | 0 | 21.51 | 21.44 | 21.07 |
| | | 1 | 36 | 21.11 | 21.40 | 21.09 |
| | | 1 | 74 | 21.35 | 21.41 | 21.03 |
| | | 36 | 0 | 20.28 | 20.28 | 20.26 |
| | | 36 | 18 | 20.29 | 20.23 | 20.21 |
| | | 36 | 38 | 20.34 | 20.26 | 20.22 |
| | | 75 | 0 | 20.29 | 20.23 | 20.23 |
| | 16QAM | 1 | 0 | 20.20 | 20.49 | 21.99 |
| | | 1 | 36 | 20.03 | 20.35 | 21.81 |
| | | 1 | 74 | 20.53 | 20.46 | 21.64 |
| | | 36 | 0 | 19.16 | 19.42 | 19.30 |
| | | 36 | 18 | 19.20 | 19.40 | 19.29 |
| | | 36 | 38 | 19.13 | 19.32 | 19.19 |
| | | 75 | 0 | 19.41 | 19.36 | 19.32 |

| Bandwidth | Modulation | RB Size | RB Offset | Max.Average Power (dBm) |
|---|---|---|---|---|
| | | | | 20175 |
| 20 MHz | QPSK | 1 | 0 | 21.61 |
| | | 1 | 49 | 21.27 |
| | | 1 | 99 | 21.27 |
| | | 50 | 0 | 20.40 |
| | | 50 | 25 | 20.40 |
| | | 50 | 49 | 20.29 |
| | | 100 | 0 | 20.29 |
| | 16QAM | 1 | 0 | 20.58 |
| | | 1 | 49 | 20.53 |
| | | 1 | 99 | 20.49 |
| | | 50 | 0 | 19.30 |
| | | 50 | 25 | 19.32 |
| | | 50 | 49 | 19.31 |
| | | 100 | 0 | 19.34 |

## - LTE Band 7

| Bandwidth | Modulation | RB Size | RB Offset | Max.Average Power (dBm) | | |
|---|---|---|---|---|---|---|
| | | | | 20775 | 21100 | 21425 |
| 5 MHz | QPSK | 1 | 0 | 22.43 | 22.18 | 22.24 |
| | | 1 | 12 | 22.47 | 22.37 | 22.26 |
| | | 1 | 24 | 22.18 | 22.22 | 22.14 |
| | | 12 | 0 | 21.24 | 21.22 | 21.32 |
| | | 12 | 6 | 21.18 | 21.27 | 21.36 |
| | | 12 | 11 | 21.15 | 21.30 | 21.33 |
| | | 25 | 0 | 21.19 | 21.34 | 21.27 |
| | 16QAM | 1 | 0 | 20.83 | 21.36 | 21.71 |
| | | 1 | 12 | 20.81 | 21.28 | 21.92 |
| | | 1 | 24 | 20.45 | 21.23 | 21.65 |
| | | 12 | 0 | 20.48 | 20.50 | 20.31 |
| | | 12 | 6 | 20.17 | 20.14 | 20.34 |
| | | 12 | 11 | 20.21 | 20.48 | 20.29 |
| | | 25 | 0 | 20.24 | 20.28 | 20.34 |

| Bandwidth | Modulation | RB Size | RB Offset | Max.Average Power (dBm) | | |
|---|---|---|---|---|---|---|
| | | | | 20800 | 21100 | 21400 |
| 10 MHz | QPSK | 1 | 0 | 22.60 | 22.23 | 22.30 |
| | | 1 | 24 | 22.29 | 22.66 | 22.20 |
| | | 1 | 49 | 22.17 | 22.10 | 22.23 |
| | | 25 | 0 | 21.21 | 21.29 | 21.41 |
| | | 25 | 12 | 21.02 | 21.36 | 21.43 |
| | | 25 | 24 | 21.09 | 21.19 | 21.45 |
| | | 50 | 0 | 21.19 | 21.33 | 21.41 |
| | 16QAM | 1 | 0 | 21.00 | 21.98 | 21.63 |
| | | 1 | 24 | 21.03 | 21.98 | 21.58 |
| | | 1 | 49 | 20.87 | 21.99 | 21.32 |
| | | 25 | 0 | 20.19 | 20.35 | 20.37 |
| | | 25 | 12 | 20.04 | 20.34 | 20.59 |
| | | 25 | 24 | 20.20 | 20.29 | 20.47 |
| | | 50 | 0 | 20.25 | 20.54 | 20.32 |

| Bandwidth | Modulation | RB Size | RB Offset | Max.Average Power (dBm) | | |
|---|---|---|---|---|---|---|
| | | | | 20825 | 21100 | 21375 |
| 15 MHz | QPSK | 1 | 0 | 22.84 | 22.51 | 22.24 |
| | | 1 | 36 | 22.44 | 22.27 | 21.98 |
| | | 1 | 74 | 22.46 | 22.23 | 22.11 |
| | | 36 | 0 | 21.23 | 21.28 | 21.35 |
| | | 36 | 18 | 21.19 | 21.37 | 21.34 |
| | | 36 | 38 | 21.11 | 21.29 | 21.43 |
| | | 75 | 0 | 21.20 | 21.18 | 21.38 |
| | 16QAM | 1 | 0 | 21.38 | 21.69 | 21.88 |
| | | 1 | 36 | 20.99 | 21.43 | 21.94 |
| | | 1 | 74 | 21.01 | 21.43 | 21.85 |
| | | 36 | 0 | 20.17 | 20.31 | 20.20 |
| | | 36 | 18 | 20.21 | 20.42 | 20.24 |
| | | 36 | 38 | 20.15 | 20.44 | 20.21 |
| | | 75 | 0 | 20.24 | 20.40 | 20.27 |

| Bandwidth | Modulation | RB Size | RB Offset | Max.Average Power (dBm) | | |
|---|---|---|---|---|---|---|
| | | | | 20850 | 21100 | 21350 |
| 20 MHz | QPSK | 1 | 0 | 22.73 | 22.40 | 22.40 |
| | | 1 | 49 | 22.67 | 22.19 | 22.22 |
| | | 1 | 99 | 22.27 | 22.21 | 22.24 |
| | | 50 | 0 | 21.30 | 21.51 | 21.40 |
| | | 50 | 25 | 21.21 | 21.36 | 21.50 |
| | | 50 | 49 | 21.21 | 21.25 | 21.44 |
| | | 100 | 0 | 21.24 | 21.55 | 21.50 |
| | 16QAM | 1 | 0 | 21.32 | 21.97 | 21.71 |
| | | 1 | 49 | 20.94 | 21.58 | 21.61 |
| | | 1 | 99 | 20.99 | 21.36 | 21.54 |
| | | 50 | 0 | 20.46 | 20.37 | 20.33 |
| | | 50 | 25 | 20.34 | 20.34 | 20.28 |
| | | 50 | 49 | 20.36 | 20.17 | 20.28 |
| | | 100 | 0 | 20.15 | 20.35 | 20.39 |

# 11.5 WiFi

## 11.5.1 SAR Testing for 802.11b/g/n modes

## General Device Setup

Normal Network operating configurations are not suitable for measuring the SAR of 802.11 a/b/g 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.

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

## Frequency Channel Configurations

802.11 a/b/g and 4.9 GHz operating modes are tested independently according to the service requirements in each frequency band. 802.11 b/g modes are tested on channels 1, 6 and 11.802.11a is tested for UNII operations on channels 36 and 48 in the 5.15-5.25 GHz band; channels 52 and 64 in the 5.25-5.35 GHz band; Channels 104, 116, 124 and 136 in the 5.470-5.725 GHz band; and channels 149 and 161 in the 5.8 GHz band. When 5.8 GHz § 15.247 is also available, channels 149, 157 and 165 should be tested instead of the UNII channels. 4.9 GHz is tested on channels 1, 10 and 5 or 6, whichever has the higher output power, for 5 MHz channels; channels 11,15 and 19 for 10 MHz channels; and channels 21 and 25 for 20 MHz channels. These are referred to as the “default test channels”. 802.11g mode was evaluated only if the output power was 0.25 dB higher than the 802.11b mode.

| Mode | | GHz | Channel | Turbo Channel | “Default Test Channels” | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | §15.247 | | UNII | |
| | | | | | 802.11b | 802.11g | | |
| 802.11b/g | | 2.412 | 1# | | √ | ▽ | | |
| | | 2.437 | 6 | 6 | √ | ▽ | | |
| | | 2.462 | 11# | | √ | ▽ | | |
| 802.11a | UNII | 5.18 | 36 | | | | √ | |
| | | 5.20 | 40 | 42 (5.21 GHz) | | | | * |
| | | 5.22 | 44 | | | | | * |
| | | 5.24 | 48 | 50 (5.25 GHz) | | | √ | |
| | | 5.26 | 52 | | | | √ | |
| | | 5.28 | 56 | 58 (5.29 GHz) | | | | * |
| | | 5.30 | 60 | | | | | * |
| | | 5.32 | 64 | | | | √ | |
| | | 5.500 | 100 | Unknown | | | | * |
| | | 5.520 | 104 | | | | √ | |
| | | 5.540 | 108 | | | | | * |
| | | 5.560 | 112 | | | | | * |
| | | 5.580 | 116 | | | | √ | |
| | | 5.600 | 120 | | | | | * |
| | | 5.620 | 124 | | | | √ | |
| | | 5.640 | 128 | | | | | * |
| | | 5.660 | 132 | | | | | * |
| | | 5.680 | 136 | | | | √ | |
| | | 5.700 | 140 | | | | | * |
| | UNII or §15.247 | 5.745 | 149 | | √ | | √ | |
| | | 5.765 | 153 | 152 (5.76 GHz) | | * | | * |
| | | 5.785 | 157 | | √ | | | * |
| | | 5.805 | 161 | 160 (5.80 GHz) | | * | √ | |
| | §15.247 | 5.825 | 165 | | √ | | | |

802.11 Test Channels per FCC Requirements

**IEEE 802.11b Average RF Power**

| Mode | Freq. [MHz] | Channel | 802.11b (2.4 GHz) Conducted Power [dBm] | | | |
|---|---|---|---|---|---|---|
| | | | Data Rate (Mbps) | | | |
| | | | 1 | 2 | 5.5 | 11 |
| 802.11b | 2412 | 1 | 11.07 | 10.98 | 11.16 | 11.18 |
| | 2437 | 6 | 10.21 | 10.24 | 10.23 | 10.23 |
| | 2462 | 11 | 9.24 | 9.48 | 9.27 | 9.29 |

**IEEE 802.11g Average RF Power**

| Mode | Freq. [MHz] | Channel | 802.11g (2.4 GHz) Conducted Power [dBm] | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Data Rate (Mbps) | | | | | | | |
| | | | 6 | 9 | 12 | 18 | 24 | 36 | 48 | 54 |
| 802.11g | 2412 | 1 | 9.58 | 9.65 | 9.64 | 9.67 | 9.65 | 9.64 | 9.73 | 9.66 |
| | 2437 | 6 | 9.12 | 8.96 | 8.98 | 9.03 | 9.00 | 9.00 | 9.04 | 9.00 |
| | 2462 | 11 | 7.84 | 8.02 | 8.04 | 8.05 | 8.08 | 8.10 | 8.07 | 8.06 |

**IEEE 802.11n Average RF Power**

| Mode | Freq. [MHz] | Channel | 802.11n (2.4 GHz) Conducted Power [dBm] | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Data Rate (Mbps) | | | | | | | |
| | | | 6.5 | 13 | 19.5 | 26 | 39 | 52 | 58.5 | 65 |
| 802.11n (20MHz) | 2412 | 1 | 8.65 | 8.58 | 8.70 | 8.69 | 8.68 | 8.69 | 8.73 | 8.79 |
| | 2437 | 6 | 8.02 | 8.24 | 8.06 | 8.02 | 8.03 | 8.08 | 8.08 | 8.06 |
| | 2462 | 11 | 7.09 | 7.17 | 7.12 | 7.09 | 7.13 | 7.23 | 7.11 | 7.16 |

# 11.6 SAR Test Exclusions Applied

## 11.6.1 WCDMA

Per FCC KDB 941225 D01V03, 12.2 kbps RMC is the primary mode and HSPA (HSUPA/HSDPA with RMC) is the secondary mode.

Per KDB 941225 D01v03, The SAR test exclusion is applied to the secondary mode by the following equation.

$$\text{Adjusted SAR} = \text{Highest Reported SAR} * \frac{Secondary\ Max\ tune - up\ (mW)}{Primary\ Max\ tune\ tune - up(mW)} \leq 1.2\ \text{W/kg}.$$

Based on the highest Reported SAR, the secondary mode is not required.

[1.175 * (234/234)] = 1.175 W/kg ≤ 1.2 W/kg

And the the maximum output power and tune-up tolerance in secondary mode is ≤ 0.25 dB higher than the primary mode.

## 11.6.2 BT

Per FCC KDB 447498 D01v05r02, The SAR exclusion threshold for distance < 50 mm is defined by the following equation:

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

| Mode | Frequency | Maximum Allowed Power | Separation Distance | ≤ 3.0 |
|---|---|---|---|---|
| | [MHz] | [mW] | [mm] | |
| Bluetooth | 2 480 | 8 | 10 | 1.26 |

Based on the maximum conducted power of Bluetooth and antenna to use separation distance, Bluetooth SAR was not required [(8/10)*√2.480] = 1.26 < 3.0.

This device contains transmitters that may operate simultaneously. Therefore simultaneous transmission analysis is required. Per FCC KDB 447498 D01v05r02 IV.C.1iii, simultaneous transmission SAR test exclusion may be applied when the sum of the 1-g SAR for all the simultaneous transmitting antennas in a specific a physical test configuration is ≤ 1.6W/kg. When standalone SAR is not required to be measured per FCC KDB 447498 D01v05r02 4.3.22, the following equation must be used to estimate the standalone 1-g SAR for simultaneous transmission assessment involving that transmitter.

$$Estimated\ SAR = \frac{\sqrt{f(GHZ)}}{7.5} * \frac{(Max\ Power\ of\ channel\ mW)}{Min\ Seperation\ Distance}.$$

| Mode | Frequency | Maximum Allowed Power | Separation Distance (Body) | Estimated SAR (Body) |
|---|---|---|---|---|
| | [MHz] | [mW] | [mm] | [W/kg] |
| Bluetooth | 2 480 | 8 | 10 | 0.17 |

**Note** :
1) Held-to ear configurations are not applicable to Bluetooth operations and therefore were not considered for simultaneous transmission. The Estimated SAR results were determined according to FCC KDB447498 D01v05r02.

2) The frequency of Bluetooth using for estimated SAR was selected highest channel of Bluetooth for highest estimated SAR.

# 12. SAR Test configuration

## 12.1 Mobile Hotspot sides for SAR Testing Configurations

| Mode | Rear | Front | Left | Right | Bottom | Top |
|---|---|---|---|---|---|---|
| GSM/GPRS 850 | Yes | Yes | No | Yes | Yes | No |
| GSM/GPRS 1900 | Yes | Yes | Yes | No | Yes | No |
| WCDMA 850 | Yes | Yes | No | Yes | Yes | No |
| WCDMA 1900 | Yes | Yes | Yes | No | Yes | No |
| LTE Band 2 | Yes | Yes | Yes | No | Yes | No |
| LTE Band 4 | Yes | Yes | Yes | No | Yes | No |
| LTE Band 7 | Yes | Yes | No | Yes | Yes | No |
| 2.4 GHz WLAN | Yes | Yes | No | Yes | No | Yes |

*** Note;** All test configurations are based on front view.

# 13. SAR TEST DATA SUMMARY

## 13.1-1 Measurement Results (GSM850 Head SAR)

| Frequency | | Mode | Power (dBm) | | Power Drift (dB) | Battery | Phantom Position | Measured SAR (mW/g) | Scaling Factor | Scaled SAR (mW/g) | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MHz | Ch. | | Tune-Up Limit | Conducted Power | | | | | | | |
| 836.6 | 190 | GSM 850 | 34.2 | 33.47 | 0.01 | Standard | Left Ear | 0.442 | 1.183 | 0.523 | - |
| 836.6 | 190 | | 34.2 | 33.47 | -0.052 | Standard | Left Tilt | 0.245 | 1.183 | 0.290 | - |
| 836.6 | 190 | | 34.2 | 33.47 | 0.165 | Standard | Right Ear | 0.449 | 1.183 | 0.531 | - |
| 836.6 | 190 | | 34.2 | 33.47 | -0.012 | Standard | Right Tilt | 0.289 | 1.183 | 0.342 | - |
| 824.2 | 128 | GPRS 4Tx | 29.2 | 28.73 | 0.180 | Standard | Left Ear | 0.621 | 1.114 | 0.692 | - |
| 836.6 | 190 | | 29.2 | 28.54 | -0.168 | Standard | Left Ear | 0.695 | 1.164 | 0.809 | - |
| 848.8 | 251 | | 29.2 | 28.56 | 0.113 | Standard | Left Ear | 0.626 | 1.159 | 0.725 | - |
| 836.6 | 190 | | 29.2 | 28.54 | -0.152 | Standard | Left Tilt | 0.408 | 1.164 | 0.475 | - |
| 824.2 | 128 | | 29.2 | 28.73 | 0.104 | Standard | Right Ear | 0.711 | 1.114 | 0.792 | - |
| 836.6 | 190 | | 29.2 | 28.54 | 0.174 | Standard | Right Ear | 0.821 | 1.164 | **0.956** | 1 |
| 848.8 | 251 | | 29.2 | 28.56 | -0.043 | Standard | Right Ear | 0.752 | 1.159 | 0.871 | - |
| 836.6 | 190 | | 29.2 | 28.54 | 0.043 | Standard | Right Tilt | 0.487 | 1.164 | 0.567 | - |
| ANSI/ IEEE C95.1 - 1992– Safety Limit<br>Spatial Peak<br>Uncontrolled Exposure/ General Population | | | | | | | Head<br>1.6 W/kg (mW/g)<br>Averaged over 1 gram | | | | |

## 13.1-2 Measurement Results (GSM1900 Head SAR)

| Frequency | | Mode | Power (dBm) | | Power Drift (dB) | Battery | Phantom Position | Measured SAR (mW/g) | Scaling Factor | Scaled SAR (mW/g) | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MHz | Ch. | | Tune-Up Limit | Conducted Power | | | | | | | |
| 1 880.0 | 661 | GSM 1900 | 29.5 | 28.11 | 0.183 | Standard | Left Ear | 0.358 | 1.377 | 0.493 | - |
| 1 880.0 | 661 | | 29.5 | 28.11 | -0.075 | Standard | Left Tilt | 0.262 | 1.377 | 0.361 | - |
| 1 880.0 | 661 | | 29.5 | 28.11 | 0.036 | Standard | Right Ear | 0.305 | 1.377 | 0.420 | - |
| 1 880.0 | 661 | | 29.5 | 28.11 | 0.174 | Standard | Right Tilt | 0.112 | 1.377 | 0.154 | - |
| 1 880.0 | 661 | GPRS 4Tx | 25.0 | 24.43 | -0.138 | Standard | Left Ear | 0.611 | 1.140 | **0.697** | 2 |
| 1 880.0 | 661 | | 25.0 | 24.43 | 0.052 | Standard | Left Tilt | 0.258 | 1.140 | 0.294 | - |
| 1 880.0 | 661 | | 25.0 | 24.43 | 0.023 | Standard | Right Ear | 0.535 | 1.140 | 0.610 | - |
| 1 880.0 | 661 | | 25.0 | 24.43 | 0.141 | Standard | Right Tilt | 0.189 | 1.140 | 0.216 | - |
| ANSI/ IEEE C95.1 - 1992– Safety Limit<br>Spatial Peak<br>Uncontrolled Exposure/ General Population | | | | | | | Head<br>1.6 W/kg (mW/g)<br>Averaged over 1 gram | | | | |

## 13.1-3 Measurement Results (WCDMA850 Head SAR)

| Frequency | | Mode | Power (dBm) | | Power Drift (dB) | Battery | Phantom Position | Measured SAR(mW/g) | Scaling Factor | Scaled SAR (mW/g) | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MHz | Ch. | | Tune-Up Limit | Conducted Power | | | | | | | |
| 836.6 | 4183 | WCDMA 850 | 24.2 | 23.68 | 0.182 | Standard | Left Ear | 0.344 | 1.127 | 0.388 | - |
| 836.6 | 4183 | | 24.2 | 23.68 | 0.095 | Standard | Left Tilt | 0.201 | 1.127 | 0.227 | - |
| 836.6 | 4183 | | 24.2 | 23.68 | 0.122 | Standard | Right Ear | 0.430 | 1.127 | **0.485** | 3 |
| 836.6 | 4183 | | 24.2 | 23.68 | 0.003 | Standard | Right Tilt | 0.268 | 1.127 | 0.302 | - |
| ANSI/ IEEE C95.1 - 1992– Safety Limit<br>Spatial Peak<br>Uncontrolled Exposure/ General Population | | | | | | | Head<br>1.6 W/kg (mW/g)<br>Averaged over 1 gram | | | | |

## 13.1-4 Measurement Results (WCDMA1900 Head SAR)

| Frequency | | Mode | Power (dBm) | | Power Drift (dB) | Battery | Phantom Position | Measured SAR(mW/g) | Scaling Factor | Scaled SAR (mW/g) | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MHz | Ch. | | Tune-Up Limit | Conducted Power | | | | | | | |
| 1 852.4 | 9262 | WCDMA 1900 | 23.7 | 23.60 | -0.151 | Standard | Left Ear | 0.984 | 1.023 | 1.007 | - |
| 1 880 | 9400 | | 23.7 | 23.57 | -0.005 | Standard | Left Ear | 1.04 | 1.030 | 1.072 | - |
| 1 907.6 | 9538 | | 23.7 | 23.64 | -0.190 | Standard | Left Ear | 1.1 | 1.014 | **1.115** | 4 |
| 1 880 | 9400 | | 23.7 | 23.57 | -0.129 | Standard | Left Tilt | 0.436 | 1.030 | 0.449 | - |
| 1 880 | 9400 | | 23.7 | 23.57 | -0.049 | Standard | Right Ear | 0.758 | 1.030 | 0.781 | - |
| 1 880 | 9400 | | 23.7 | 23.57 | 0.194 | Standard | Right Tilt | 0.340 | 1.030 | 0.350 | - |
| ANSI/ IEEE C95.1 - 1992– Safety Limit<br>Spatial Peak<br>Uncontrolled Exposure/ General Population | | | | | | | Head<br>1.6 W/kg (mW/g)<br>Averaged over 1 gram | | | | |

# 13.1-5 Measurement Results (LTE Band 2 20MHz Head SAR)

| Frequency | | Mode | Power (dBm) | | Power Drift (dB) | Battery | Phantom Position | RB Size | RB Offset | Measured SAR (mW/g) | Scaling Factor | Scaled SAR (mW/g) | Plot No |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MHz | Ch. | | Tune-Up Limit | Conducted Power | | | | | | | | | |
| 1 860 | 18700 | QPSK | 23.0 | 22.76 | -0.088 | Standard | Left Ear | 1 | 0 | 0.814 | 1.057 | 0.860 | - |
| 1 880 | 18900 | | 23.0 | 22.79 | 0.172 | Standard | Left Ear | 1 | 0 | 0.860 | 1.050 | **0.903** | 5 |
| 1 900 | 19100 | | 23.0 | 22.63 | -0.193 | Standard | Left Ear | 1 | 0 | 0.751 | 1.089 | 0.818 | - |
| 1 880 | 18900 | | 22.0 | 21.62 | 0.139 | Standard | Left Ear | 50 | 0 | 0.646 | 1.091 | 0.705 | - |
| 1 860 | 18700 | | 22.0 | 21.57 | -0.170 | Standard | Left Ear | 100 | 0 | 0.592 | 1.104 | 0.654 | - |
| 1 880 | 18900 | | 23.0 | 22.79 | -0.044 | Standard | Left Tilt | 1 | 0 | 0.409 | 1.050 | 0.429 | - |
| 1 880 | 18900 | | 22.0 | 21.62 | -0.016 | Standard | Left Tilt | 50 | 0 | 0.297 | 1.091 | 0.324 | - |
| 1 880 | 18900 | | 23.0 | 22.79 | -0.122 | Standard | Right Ear | 1 | 0 | 0.549 | 1.050 | 0.576 | - |
| 1 880 | 18900 | | 22.0 | 21.62 | 0.124 | Standard | Right Ear | 50 | 0 | 0.431 | 1.091 | 0.470 | - |
| 1 880 | 18900 | | 23.0 | 22.79 | -0.185 | Standard | Right Tilt | 1 | 0 | 0.350 | 1.050 | 0.367 | - |
| 1 880 | 18900 | | 22.0 | 21.62 | 0.186 | Standard | Right Tilt | 50 | 0 | 0.254 | 1.091 | 0.277 | - |
| ANSI/ IEEE C95.1 1992 – Safety Limit<br>Spatial Peak<br>Uncontrolled Exposure/ General Population | | | | | | | | Head<br>1.6 W/kg (mW/g)<br>Averaged over 1 gram | | | | | |

# 13.1-6 Measurement Results (LTE Band 4 20MHz Head SAR)

| Frequency | | Mode | Power (dBm) | | Power Drift (dB) | Battery | Phantom Position | RB Size | RB Offset | Measured SAR (mW/g) | Scaling Factor | Scaled SAR (mW/g) | Plot No |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MHz | Ch. | | Tune-Up Limit | Conducted Power | | | | | | | | | |
| 1 732.5 | 20175 | QPSK | 23.0 | 21.61 | 0.162 | Standard | Left Ear | 1 | 0 | 0.553 | 1.377 | 0.762 | - |
| 1 732.5 | 20175 | | 22.0 | 20.40 | 0.06 | Standard | Left Ear | 50 | 0 | 0.403 | 1.445 | 0.583 | - |
| 1 732.5 | 20175 | | 23.0 | 21.61 | -0.151 | Standard | Left Tilt | 1 | 0 | 0.221 | 1.377 | 0.304 | - |
| 1 732.5 | 20175 | | 22.0 | 20.40 | -0.063 | Standard | Left Tilt | 50 | 0 | 0.179 | 1.445 | 0.259 | - |
| 1 732.5 | 20175 | | 23.0 | 21.61 | 0.184 | Standard | Right Ear | 1 | 0 | 0.681 | 1.377 | **0.938** | 6 |
| 1 732.5 | 20175 | | 22.0 | 20.40 | -0.179 | Standard | Right Ear | 50 | 0 | 0.501 | 1.445 | 0.724 | - |
| 1 732.5 | 20175 | | 22.0 | 20.29 | -0.125 | Standard | Right Ear | 100 | 0 | 0.461 | 1.483 | 0.683 | - |
| 1 732.5 | 20175 | | 23.0 | 21.61 | 0.172 | Standard | Right Tilt | 1 | 0 | 0.139 | 1.377 | 0.191 | - |
| 1 732.5 | 20175 | | 22.0 | 20.40 | -0.032 | Standard | Right Tilt | 50 | 0 | 0.089 | 1.445 | 0.129 | - |
| ANSI/ IEEE C95.1 1992 – Safety Limit<br>Spatial Peak<br>Uncontrolled Exposure/ General Population | | | | | | | | Head<br>1.6 W/kg (mW/g)<br>Averaged over 1 gram | | | | | |

# 13.1-7 Measurement Results (LTE Band 7 20MHz Head SAR)

| Frequency | | Mode | Power (dBm) | | Power Drift (dB) | Battery | Phantom Position | RB Size | RB Offset | Measured SAR (mW/g) | Scaling Factor | Scaled SAR (mW/g) | Plot No |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MHz | Ch. | | Tune-Up Limit | Conducted Power | | | | | | | | | |
| 2 510 | 20850 | QPSK | 23.0 | 22.73 | -0.165 | Standard | Left Ear | 1 | 0 | 0.448 | 1.064 | 0.477 | - |
| 2 535 | 21100 | | 22.0 | 21.51 | -0.113 | Standard | Left Ear | 50 | 0 | 0.288 | 1.119 | 0.322 | - |
| 2 510 | 20850 | | 23.0 | 22.73 | 0.164 | Standard | Left Tilt | 1 | 0 | 0.307 | 1.064 | 0.327 | - |
| 2 535 | 21100 | | 22.0 | 21.51 | 0.141 | Standard | Left Tilt | 50 | 0 | 0.202 | 1.119 | 0.226 | - |
| 2 510 | 20850 | | 23.0 | 22.73 | 0.146 | Standard | Right Ear | 1 | 0 | 1.05 | 1.064 | **1.117** | 7 |
| 2 535 | 21100 | | 23.0 | 22.40 | -0.128 | Standard | Right Ear | 1 | 0 | 0.845 | 1.148 | 0.970 | - |
| 2 560 | 21350 | | 23.0 | 22.40 | -0.117 | Standard | Right Ear | 1 | 0 | 0.719 | 1.148 | 0.826 | - |
| 2 535 | 21100 | | 22.0 | 21.51 | 0.154 | Standard | Right Ear | 50 | 0 | 0.710 | 1.119 | 0.795 | - |
| 2 535 | 21100 | | 22.0 | 21.55 | 0.130 | Standard | Right Ear | 100 | 0 | 0.657 | 1.109 | 0.729 | - |
| 2 510 | 20850 | | 23.0 | 22.73 | 0.154 | Standard | Right Tilt | 1 | 0 | 0.299 | 1.064 | 0.318 | - |
| 2 535 | 21100 | | 22.0 | 21.51 | 0.094 | Standard | Right Tilt | 50 | 0 | 0.166 | 1.119 | 0.186 | - |
| ANSI/ IEEE C95.1 1992 – Safety Limit<br>Spatial Peak<br>Uncontrolled Exposure/ General Population | | | | | | | | Head<br>1.6 W/kg (mW/g)<br>Averaged over 1 gram | | | | | |

# 13.1-8 Measurement Results (DTS Head SAR)

| Frequency | | Mode | Power (dBm) | | Power Drift (dB) | Battery | Phantom Position | Data Rate | Measured SAR (mW/g) | Scaling Factor | Scaled SAR (mW/g) | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MHz | Ch. | | Tune-Up Limit | Conducted Power | | | | | | | | |
| 2 412 | 1 | 802.11b | 11.5 | 11.07 | -0.145 | Standard | Left Ear | 1Mbps | 0.187 | 1.104 | **0.206** | 8 |
| | | | 11.5 | 11.07 | 0.127 | Standard | Left Tilt | 1Mbps | 0.136 | 1.104 | 0.150 | - |
| | | | 11.5 | 11.07 | -0.121 | Standard | Right Ear | 1Mbps | 0.098 | 1.104 | 0.108 | - |
| | | | 11.5 | 11.07 | 0.103 | Standard | Right Tilt | 1Mbps | 0.081 | 1.104 | 0.089 | - |
| ANSI/ IEEE C95.1 - 1992– Safety Limit<br>Spatial Peak<br>Uncontrolled Exposure/ General Population | | | | | | | Head<br>1.6 W/kg (mW/g)<br>Averaged over 1 gram | | | | | |

# 13.2-1 Measurement Results (GSM850 Hotspot SAR)

| Frequency | | Mode | Power (dBm) | | Power Drift (dB) | Configuration | Separation Distance | Measured SAR(mW/g) | Scaling Factor | Scaled SAR(mW/g) | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MHz | Ch. | | Tune-Up Limit | Conducted Power | | | | | | | |
| 824.2 | 128 | GPRS 4Tx | 29.2 | 28.73 | 0.036 | Rear | 1.0 cm | 1.06 | 1.114 | **1.181** | 9 |
| 836.6 | 190 | | 29.2 | 28.54 | -0.051 | Rear | 1.0 cm | 0.979 | 1.164 | 1.140 | - |
| 848.8 | 251 | | 29.2 | 28.56 | 0.084 | Rear | 1.0 cm | 0.827 | 1.159 | 0.958 | - |
| 836.6 | 190 | | 29.2 | 28.54 | -0.010 | Front | 1.0 cm | 0.661 | 1.164 | 0.769 | - |
| 836.6 | 190 | | 29.2 | 28.54 | -0.193 | Right | 1.0 cm | 0.673 | 1.164 | 0.783 | - |
| 836.6 | 190 | | 29.2 | 28.54 | 0.050 | Bottom | 1.0 cm | 0.304 | 1.164 | 0.354 | - |
| 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 | | | | |

# 13. 2-2 Measurement Results (GSM1900 Hotspot SAR)

| Frequency | | Mode | Power (dBm) | | Power Drift (dB) | Configuration | Separation Distance | Measured SAR (mW/g) | Scaling Factor | Scaled SAR (mW/g) | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MHz | Ch. | | Tune-Up Limit | Conducted Power | | | | | | | |
| 1 880.0 | 661 | GPRS 4Tx | 25.0 | 24.43 | -0.176 | Rear | 1.0 cm | 0.478 | 1.140 | 0.545 | 10 |
| 1 880.0 | 661 | | 25.0 | 24.43 | 0.166 | Front | 1.0 cm | 0.675 | 1.140 | **0.770** | 11 |
| 1 880.0 | 661 | | 25.0 | 24.43 | 0.144 | Left | 1.0 cm | 0.272 | 1.140 | 0.310 | - |
| 1 880.0 | 661 | | 25.0 | 24.43 | 0.089 | Bottom | 1.0 cm | 0.393 | 1.140 | 0.448 | - |
| 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 | | | | |

# 13.2-3 Measurement Results (WCDMA850 Hotspot SAR)

| Frequency | | Mode | Power (dBm) | | Power Drift (dB) | Configuration | Separation Distance | Measured SAR (mW/g) | Scaling Factor | Scaled SAR (mW/g) | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MHz | Ch. | | Tune-Up Limit | Conducted Power | | | | | | | |
| 836.6 | 4183 | WCDMA 850 | 24.2 | 23.68 | 0.113 | Rear | 1.0 cm | 0.608 | 1.127 | **0.685** | 12 |
| 836.6 | 4183 | | 24.2 | 23.68 | 0.143 | Front | 1.0 cm | 0.498 | 1.127 | 0.561 | - |
| 836.6 | 4183 | | 24.2 | 23.68 | -0.005 | Right | 1.0 cm | 0.508 | 1.127 | 0.573 | - |
| 836.6 | 4183 | | 24.2 | 23.68 | 0.038 | Bottom | 1.0 cm | 0.201 | 1.127 | 0.227 | - |
| 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 | | | | |

# 13. 2-4 Measurement Results (WCDMA1900 Hotspot SAR)

| Frequency | | Mode | Power (dBm) | | Power Drift (dB) | Configuration | Separation Distance | Measured SAR(mW/g) | Scaling Factor | Scaled SAR(mW/g) | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MHz | Ch. | | Tune-Up Limit | Conducted Power | | | | | | | |
| 1 852.4 | 9262 | WCDMA 1900 | 23.7 | 23.60 | 0.110 | Rear | 1.0 cm | 1.01 | 1.023 | 1.034 | - |
| 1 880.0 | 9400 | | 23.7 | 23.57 | -0.018 | Rear | 1.0 cm | 1.05 | 1.030 | 1.082 | - |
| 1 907.6 | 9538 | | 23.7 | 23.64 | 0.081 | Rear | 1.0 cm | 1.09 | 1.014 | 1.105 | 13 |
| 1 852.4 | 9262 | | 23.7 | 23.60 | 0.114 | Front | 1.0 cm | 1.13 | 1.023 | 1.156 | - |
| 1 880.0 | 9400 | | 23.7 | 23.57 | 0.130 | Front | 1.0 cm | 1.14 | 1.030 | **1.175** | 14 |
| 1 907.6 | 9538 | | 23.7 | 23.64 | 0.013 | Front | 1.0 cm | 1.11 | 1.014 | 1.125 | - |
| 1 880.0 | 9400 | | 23.7 | 23.57 | 0.060 | Left | 1.0 cm | 0.464 | 1.030 | 0.478 | - |
| 1 880.0 | 9400 | | 23.7 | 23.57 | -0.146 | Bottom | 1.0 cm | 0.740 | 1.030 | 0.762 | - |
| 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 | | | | |

# 13.2-5 Measurement Results (LTE Band 2 20MHz Hotspot SAR)

| Frequency | | Mode | Power (dBm) | | Power Drift (dB) | Configuration | RB Size | RB Offset | Separation Distance | Measured SAR (mW/g) | Scaling Factor | Scaled SAR (mW/g) | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MHz | Ch. | | Tune-Up Limit | Conducted Power | | | | | | | | | |
| 1 860 | 18700 | QPSK | 23.0 | 22.76 | 0.181 | Rear | 1 | 0 | 1.0 cm | 1.03 | 1.057 | 1.089 | - |
| 1 880 | 18900 | | 23.0 | 22.79 | -0.119 | Rear | 1 | 0 | 1.0 cm | 1.03 | 1.050 | 1.081 | 15 |
| 1 900 | 19100 | | 23.0 | 22.63 | 0.010 | Rear | 1 | 0 | 1.0 cm | 1.01 | 1.089 | 1.100 | - |
| 1 860 | 18700 | | 22.0 | 21.60 | 0.040 | Rear | 50 | 0 | 1.0 cm | 0.726 | 1.096 | 0.796 | - |
| 1 880 | 18900 | | 22.0 | 21.62 | 0.022 | Rear | 50 | 0 | 1.0 cm | 0.747 | 1.091 | 0.815 | - |
| 1 900 | 19100 | | 22.0 | 21.55 | -0.037 | Rear | 50 | 0 | 1.0 cm | 0.747 | 1.109 | 0.829 | - |
| 1 860 | 18700 | | 22.0 | 21.57 | 0.057 | Rear | 100 | 0 | 1.0 cm | 0.722 | 1.104 | 0.797 | - |
| 1 860 | 18700 | | 23.0 | 22.76 | 0.185 | Front | 1 | 0 | 1.0 cm | 1.09 | 1.057 | 1.152 | - |
| 1 880 | 18900 | | 23.0 | 22.79 | 0.109 | Front | 1 | 0 | 1.0 cm | 1.1 | 1.050 | 1.154 | 16 |
| 1 900 | 19100 | | 23.0 | 22.63 | -0.198 | Front | 1 | 0 | 1.0 cm | 1.07 | 1.089 | **1.165** | - |
| 1 860 | 18700 | | 22.0 | 21.60 | 0.110 | Front | 50 | 0 | 1.0 cm | 0.763 | 1.096 | 0.837 | - |
| 1 880 | 18900 | | 22.0 | 21.62 | 0.039 | Front | 50 | 0 | 1.0 cm | 0.802 | 1.091 | 0.875 | - |
| 1 900 | 19100 | | 22.0 | 21.55 | -0.048 | Front | 50 | 0 | 1.0 cm | 0.766 | 1.109 | 0.850 | - |
| 1 860 | 18700 | | 22.0 | 21.57 | 0.018 | Front | 100 | 0 | 1.0 cm | 0.775 | 1.104 | 0.856 | - |
| 1 880 | 18900 | | 23.0 | 22.79 | 0.150 | Left | 1 | 0 | 1.0 cm | 0.402 | 1.050 | 0.422 | - |
| 1 880 | 18900 | | 22.0 | 21.62 | 0.082 | Left | 50 | 0 | 1.0 cm | 0.305 | 1.091 | 0.333 | - |
| 1 880 | 18900 | | 23.0 | 22.79 | -0.135 | Bottom | 1 | 0 | 1.0 cm | 0.544 | 1.050 | 0.571 | - |
| 1 880 | 18900 | | 22.0 | 21.62 | 0.015 | Bottom | 50 | 0 | 1.0 cm | 0.402 | 1.091 | 0.439 | - |
| 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 | | | | | | |

# 13.2-6 Measurement Results (LTE Band 4 20MHz Hotspot SAR)

| Frequency | | Mode | Power (dBm) | | Power Drift (dB) | Configuration | RB Size | RB Offset | Separation Distance | Measured SAR (mW/g) | Scaling Factor | Scaled SAR (mW/g) | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MHz | Ch. | | Tune-Up Limit | Conducted Power | | | | | | | | | |
| 1 732.5 | 20175 | QPSK | 23.0 | 21.61 | -0.138 | Rear | 1 | 0 | 1.0 cm | 0.763 | 1.377 | 1.051 | 17 |
| 1 732.5 | 20175 | | 22.0 | 20.40 | 0.044 | Rear | 50 | 0 | 1.0 cm | 0.583 | 1.445 | 0.843 | - |
| 1 732.5 | 20175 | | 22.0 | 20.29 | -0.001 | Rear | 100 | 0 | 1.0 cm | 0.546 | 1.483 | 0.809 | - |
| 1 732.5 | 20175 | | 23.0 | 21.61 | -0.196 | Front | 1 | 0 | 1.0 cm | 0.932 | 1.377 | **1.284** | 18 |
| 1 732.5 | 20175 | | 22.0 | 20.40 | 0.041 | Front | 50 | 0 | 1.0 cm | 0.696 | 1.445 | 1.006 | - |
| 1 732.5 | 20175 | | 22.0 | 20.29 | 0.034 | Front | 100 | 0 | 1.0 cm | 0.668 | 1.483 | 0.990 | - |
| 1 732.5 | 20175 | | 23.0 | 21.61 | 0.114 | Left | 1 | 0 | 1.0 cm | 0.365 | 1.377 | 0.503 | - |
| 1 732.5 | 20175 | | 22.0 | 20.40 | 0.092 | Left | 50 | 0 | 1.0 cm | 0.282 | 1.445 | 0.408 | - |
| 1 732.5 | 20175 | | 23.0 | 21.61 | -0.129 | Bottom | 1 | 0 | 1.0 cm | 0.592 | 1.377 | 0.815 | - |
| 1 732.5 | 20175 | | 22.0 | 20.40 | -0.059 | Bottom | 50 | 0 | 1.0 cm | 0.464 | 1.445 | 0.671 | - |
| 1 732.5 | 20175 | | 22.0 | 20.29 | -0.012 | Bottom | 100 | 0 | 1.0 cm | 0.376 | 1.483 | 0.557 | |
| 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 | | | | | | |

# 13.2-7 Measurement Results (LTE Band 7 20MHz Hotspot SAR)

| Frequency | | Mode | Power (dBm) | | Power Drift (dB) | Configuration | RB Size | RB Offset | Separation Distance | Measured SAR (mW/g) | Scaling Factor | Scaled SAR (mW/g) | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MHz | Ch. | | Tune-Up Limit | Conducted Power | | | | | | | | | |
| 2 510 | 20850 | QPSK | 23.0 | 22.73 | 0.134 | Rear | 1 | 0 | 1.0 cm | 0.629 | 1.064 | **0.669** | 19 |
| 2 535 | 21100 | | 22.0 | 21.51 | 0.098 | Rear | 50 | 0 | 1.0 cm | 0.411 | 1.119 | 0.460 | - |
| 2 510 | 20850 | | 23.0 | 22.73 | 0.155 | Front | 1 | 0 | 1.0 cm | 0.429 | 1.064 | 0.457 | - |
| 2 535 | 21100 | | 22.0 | 21.51 | -0.102 | Front | 50 | 0 | 1.0 cm | 0.301 | 1.119 | 0.337 | - |
| 2 510 | 20850 | | 23.0 | 22.73 | 0.067 | Right | 1 | 0 | 1.0 cm | 0.548 | 1.064 | 0.583 | - |
| 2 535 | 21100 | | 22.0 | 21.51 | 0.121 | Right | 50 | 0 | 1.0 cm | 0.383 | 1.119 | 0.429 | - |
| 2 510 | 20850 | | 23.0 | 22.73 | 0.048 | Bottom | 1 | 0 | 1.0 cm | 0.311 | 1.064 | 0.331 | - |
| 2 535 | 21100 | | 22.0 | 21.51 | 0.147 | Bottom | 50 | 0 | 1.0 cm | 0.231 | 1.119 | 0.259 | - |
| 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 | | | | | | |

# 13. 2-8 Measurement Results (WLAN Hotspot SAR)

| Frequency | | Mode | Power (dBm) | | Power Drift (dB) | Configuration | Data Rate | Separation Distance | Measured SAR (mW/g) | Scaling Factor | Scaled SAR (mW/g) | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MHz | Ch. | | Tune-Up Limit | Conducted Power | | | | | | | | |
| 2 412 | 1 | 802.11b | 11.5 | 11.07 | 0.174 | Rear | 1Mbps | 1.0 cm | 0.016 | 1.104 | **0.018** | 20 |
| | | | 11.5 | 11.07 | 0.121 | Front | 1Mbps | 1.0 cm | 0.00981 | 1.104 | 0.011 | - |
| | | | 11.5 | 11.07 | 0.134 | Right | 1Mbps | 1.0 cm | 0.012 | 1.104 | 0.013 | - |
| | | | 11.5 | 11.07 | 0.187 | Top | 1Mbps | 1.0 cm | 0.013 | 1.104 | 0.014 | - |
| 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 | | | | | |

# 13.3-1 Measurement Results (DTS Body-worn SAR)

| Frequency | | Mode | Power (dBm) | | Power Drift (dB) | Configuration | Data Rate | Separation Distance | Measured SAR (mW/g) | Scaling Factor | Scaled SAR (mW/g) | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MHz | Ch. | | Tune-Up Limit | Conducted Power | | | | | | | | |
| 2 412 | 1 | 802.11b | 11.5 | 11.07 | 0.174 | Rear | 1Mbps | 1.0 cm | 0.016 | 1.104 | 0.018 | 20 |
| 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 | | | | | |

# 13.3-2 Measurement Results (Body-worn SAR)

| Frequency | | Mode | Power (dBm) | | Power Drift (dB) | Configuration | Separation Distance | Measured SAR (mW/g) | Scaling Factor | Scaled SAR (mW/g) | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MHz | Ch. | | Tune-Up Limit | Conducted Power | | | | | | | |
| 836.6 | 190 | GSM 850 | 34.2 | 33.47 | 0.110 | Rear | 1.0 cm | 0.531 | 1.183 | 0.628 | 21 |
| 824.2 | 128 | GPRS 4Tx | 29.2 | 28.73 | 0.036 | Rear | 1.0 cm | 1.06 | 1.114 | **1.181** | 9 |
| 836.6 | 190 | GPRS 4Tx | 29.2 | 28.54 | -0.051 | Rear | 1.0 cm | 0.979 | 1.164 | 1.140 | - |
| 848.8 | 251 | GPRS 4Tx | 29.2 | 28.56 | 0.084 | Rear | 1.0 cm | 0.827 | 1.159 | 0.958 | - |
| 1 880.0 | 661 | GSM 1900 | 29.5 | 28.11 | 0.151 | Rear | 1.0 cm | 0.261 | 1.377 | 0.359 | 22 |
| 1 880.0 | 661 | GPRS 4Tx | 25.0 | 24.43 | -0.176 | Rear | 1.0 cm | 0.478 | 1.140 | **0.545** | 10 |
| 836.6 | 4183 | WCDMA 850 | 24.2 | 23.68 | 0.113 | Rear | 1.0 cm | 0.608 | 1.127 | **0.685** | 12 |
| 1 852.4 | 9262 | WCDMA1900 | 23.7 | 23.60 | 0.110 | Rear | 1.0 cm | 1.01 | 1.023 | 1.034 | - |
| 1 880.0 | 9400 | WCDMA1900 | 23.7 | 23.57 | -0.018 | Rear | 1.0 cm | 1.05 | 1.030 | 1.082 | - |
| 1 907.6 | 9538 | WCDMA1900 | 23.7 | 23.64 | 0.081 | Rear | 1.0 cm | 1.09 | 1.014 | **1.105** | 13 |
| 1 860 | 18700 | LTE Band 2 | 23.0 | 22.76 | 0.181 | Rear (1RB, 0offset) | 1.0 cm | 1.03 | 1.057 | 1.089 | - |
| 1 880 | 18900 | LTE Band 2 | 23.0 | 22.79 | -0.119 | Rear (1RB, 0offset) | 1.0 cm | 1.03 | 1.050 | 1.081 | 15 |
| 1 900 | 19100 | LTE Band 2 | 23.0 | 22.63 | 0.010 | Rear (1RB, 0offset) | 1.0 cm | 1.01 | 1.089 | **1.100** | - |
| 1 860 | 18700 | LTE Band 2 | 22.0 | 21.60 | 0.040 | Rear (50RB, 0offset) | 1.0 cm | 0.726 | 1.096 | 0.796 | - |
| 1 880 | 18900 | LTE Band 2 | 22.0 | 21.62 | 0.022 | Rear (50RB, 0offset) | 1.0 cm | 0.747 | 1.091 | 0.815 | - |
| 1 900 | 19100 | LTE Band 2 | 22.0 | 21.55 | -0.037 | Rear (50RB, 0offset | 1.0 cm | 0.747 | 1.109 | 0.829 | - |
| 1 860 | 18700 | LTE Band 2 | 22.0 | 21.57 | 0.057 | Rear (100RB, 0offset) | 1.0 cm | 0.722 | 1.104 | 0.797 | - |
| 1 732.5 | 20175 | LTE Band 4 | 23.0 | 21.61 | -0.138 | Rear (1RB, 0offset) | 1.0 cm | 0.763 | 1.377 | **1.051** | 17 |
| 1 732.5 | 20175 | LTE Band 4 | 22.0 | 20.40 | 0.044 | Rear (50RB, 0offset) | 1.0 cm | 0.583 | 1.445 | 0.843 | - |
| 1 732.5 | 20175 | LTE Band 4 | 22.0 | 20.29 | -0.001 | Rear (100RB, 0offset) | 1.0 cm | 0.546 | 1.483 | 0.809 | - |
| 2 510 | 20850 | LTE Band 7 | 23.0 | 22.73 | 0.134 | Rear (1RB, 0offset) | 1.0 cm | 0.629 | 1.064 | **0.669** | 19 |
| 2 535 | 21100 | LTE Band 7 | 22.0 | 21.51 | 0.098 | Rear (50RB, 0offset) | 1.0 cm | 0.411 | 1.119 | 0.460 | - |
| 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 | | | |

# 13.4 SAR Test Notes

**General Notes:**

1. The test data reported are the worst-case SAR values according to test procedures specified in IEEE 1528-2003, FCC KDB Procedure.
2. Batteries are fully charged at the beginning of the SAR measurements. A standard battery was used for all SAR measurements.
3. Liquid tissue depth was at least 15.0 cm for all frequencies.
4. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
5. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB 447498 D01v05r02.
6. Device was tested using a fixed spacing for body-worn accessory testing. A separation distance of 10 mm was considered because the manufacturer has determined that there will be body-worn accessories available in the marketplace for users to support this separation distance.
7. Per FCC KDB 648474 D04v01r02, SAR was evaluated without a headset connected to the device. Since the standalone reported SAR was ≤ 1.2 W/kg, no additional SAR evaluation using a headset cable were required.

**GSM/GPRS Test Notes:**

1. This EUT'S GSM, GPRS and EDGE device class is B.
2. This device supports GSM VOIP in the head and the body-worn configurations therefore GPRS was additionally evaluated for head and body-worn compliance.
3. Body-Worn accessory testing is typically associated with voice operations. Therefore, GSM voice was evaluated for body-worn SAR.
4. Justification for reduced test configurations per KDB 941225 D01v03: The source-based time-averaged output power was evaluated for all multi-slot operations. The multi-slot configuration with the highest frame averaged output power was evaluated for SAR.
5. Per FCC KDB 447498 D01v05r02, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s). When the maximum output power variation across the required test channels is 1/2 dB, instead of the middle channel, the highest output power channel must be used.
6. Justification for reduced test configurations per KDB Publication 941225 D01v03 and October 2013 TCB Workshop Notes: The source-based frame-averaged output power was evaluated for all GPRS/EDGE slot configurations. The configuration with the highest target frame averaged output power was evaluated for hotspot SAR. When the maximum frame-averaged powers are equivalent across two or more slots (within 0.25 dB), the configuration with the most number of time slots was tested.

**UMTS Notes:**

1. The 12.2 kbps RMC mode is the primary mode.
2. UMTS mode in Body SAR was tested under RMC 12.2 kbps with HSPA inactive per KDB 941225 D01v03. HSPA SAR was not required since the average output power of the HSPA subtests was not more than 0.25 dB higher than the RMC level and Adjusted SAR value was less than 1.2 W/kg.
3. Per FCC KDB 447498 D01v05r02, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s). When the maximum output power variation across the channel highest output power channel was used.
4. UMTS SAR was tested under RMC 12.2 kbps with HSPA inactive per KDB publication 941225 D01v03. HSPA SAR was not required since the average output power of the HSPA subtests was not more than 0.25 dB higher than the RMC level and SAR was less than 1.2 W/kg.

**LTE Notes:**

1. LTE Considerations: LTE test configurations are determined according to SAR Evaluation Consideration for LTE Devices in FCC KDB 941225 D05v02r03.
2. According to FCC KDB 941225 D05v02r01:
   i. When the reported SAR is ≤ 0.8 W/kg, testing of the 100%RB allocation and required test channels is not required. Otherwise, SAR is required for the remaining required test channels using the 1RB, 50%RB and 100%RB allocation with highest output power for that channel.
   ii. Only one channel, and as reported SAR values for 1RB allocation and 50%RB allocation were less than 1.45W/Kg only the highest power RB offset for each allocation was required.
3. MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to target MPR is indicated alongside the SAR results.
4. A-MPR was diabled for all SAR tests by setting NS=01 on the base station simulator.
5. Pre-installed VOIP applications are considered.
6. SAR test reduction is applied using the following criteria:
   - Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB, and 50% RB allocation, using the RB offset and required test channel combination with the highest maximum output power among RB offsets at the upper edge, middle and lower edge of each required test channel.
   - When the reported SAR is >0.8 W/kg, testing for other Channels is performed at the highest output power level for 1RB, and 50% RB configuration for that channel.
   - Testing for 100% RB configuration is performed at the highest output power level for 100% RB configuration across the Low, Mid and High Channel when the highest reported SAR for 1 RB and 50% RB are >0.8 W/kg, Testing for the remaining required channels is not needed because the reported SAR for 100% RB Allocation <1.45 W/kg.
   - Testing for 16-QAM modulation is not required because the reported SAR for QPSK is <1.45 W/kg and its output power is not more than 0.5 dB higher than that a QPSK.
     Testing for the other channel bandwidths is not required because the reported SAR for the highest channel bandwidth is <1.45 W/kg and its

**WLAN Notes:**

1. Justification for reduced test configurations for WIFI channels per KDB 248227 D01v01r02 and Oct. 2012 FCC/TCB Meeting Notes for 2.4 GHz WIFI: Highest average RF output power channel for the lowest data rate was selected for SAR evaluation in 802.11b. Other IEEE 802.11 modes (including 802.11 g/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. Since the maximum extrapolated peak SAR of the zoom scan for the maximum output channel was ≤ 1.6 W/kg and the reported 1g averaged SAR was < 0.8 W/kg, SAR testing on other default channels was not required.

# 14. SAR Measurement Variability and Uncertainty

In accordance with published RF Exposure KDB procedure 865664 D01v01r03 SAR measurement 100 MHz to 6 GHz. These additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.

2) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.

3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~ 10 % from the 1-g SAR limit).

4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

| Frequency | | Modulation | Battery | Configuration | Original SAR (mW/g) | Repeated SAR (mW/g) | Largest to Smallest SAR Ratio | Plot No. |
|---|---|---|---|---|---|---|---|---|
| MHz | Channel | | | | | | | |
| 824.2 | 128 | GSM 850 | Standard | Rear | 1.06 | 0.980 | 1.08 | 23 |
| 1 880 | 9400 | WCDMA 1900 | Standard | Front | 1.14 | 1.11 | 1.03 | 24 |
| 1 732.5 | 20175 | LTE Band 4 | Standard | Front (1RB, 0offset) | 0.932 | 0.919 | 1.01 | 25 |
| 2 510 | 20850 | LTE Band 7 | Standard | Right Ear (1RB, 0offset) | 1.05 | 1.02 | 1.03 | 26 |

# 15. SAR Summation Scenario

| | Position | Applicable Combination | Note |
|---|---|---|---|
| Simultaneous Transmission | Head | GSM 850 Voice + 2.4 GHz WiFi | |
| | | GSM 1900 Voice + 2.4 GHz WiFi | |
| | | GPRS 850 Data + 2.4 GHz WiFi | |
| | | GPRS 1900 Data + 2.4 GHz WiFi | |
| | | WCDMA850 + 2.4 GHz WiFi | |
| | | WCDMA1900 + 2.4 GHz WiFi | |
| | | LTE Band 2 Data + 2.4 GHz WiFi | *Pre-installed VOIP applications are considered. |
| | | LTE Band 4 Data + 2.4 GHz WiFi | |
| | | LTE Band 7 Data + 2.4 GHz WiFi | |
| | Hotspot | GPRS 850 Data + 2.4 GHz WiFi | |
| | | GPRS 1900 Data + 2.4 GHz WiFi | |
| | | WCDMA 850 + 2.4 GHz WiFi | |
| | | WCDMA1900 + 2.4 GHz WiFi | |
| | | LTE Band 2 Data + 2.4 GHz WiFi | *Pre-installed VOIP applications are considered. |
| | | LTE Band 4 Data + 2.4 GHz WiFi | |
| | | LTE Band 7 Data + 2.4 GHz WiFi | |
| | Body-worn | GSM 850 Voice + 2.4 GHz WiFi | |
| | | GPRS 850 Data + 2.4 GHz WiFi | |
| | | GSM 1900 Voice + 2.4 GHz WiFi | |
| | | GPRS 1900 Data + 2.4 GHz WiFi | |
| | | WCDMA 850 + 2.4 GHz WiFi | |
| | | WCDMA1900 + 2.4 GHz WiFi | |
| | | LTE Band 2 Data + 2.4 GHz WiFi | |
| | | LTE Band 4 Data + 2.4 GHz WiFi | |
| | | LTE Band 7 Data + 2.4 GHz WiFi | |
| | | GSM 850 Voice + 2.4 GHz Bluetooth | |
| | | GPRS VoIP 850 + 2.4 GHz Bluetooth | |
| | | GSM 1900 Voice + 2.4 GHz Bluetooth | |
| | | GPRS VoIP 1900 + 2.4 GHz Bluetooth | |
| | | WCDMA 850 + 2.4 GHz Bluetooth | |
| | | WCDMA1900 + 2.4 GHz Bluetooth | |
| | | LTE Band 2 Data + 2.4 GHz Bluetooth | |
| | | LTE Band 4 Data 2.4 GHz Bluetooth | |
| | | LTE Band 7 Data + 2.4 GHz Bluetooth | |
| * BT and WLAN are not simultaneous transmission. | | | |

# 15.1 Simultaneous Transmission Summation for Head

**Simultaneous Transmission Summation with 2.4 GHz WIFI**

| Band | Configuration | Scaled SAR (W/kg) | 2.4 GHz WIFI Scaled SAR (W/kg) | ∑ 1-g SAR (W/kg) |
|---|---|---|---|---|
| GSM 850 | Left Cheek | 0.523 | 0.206 | 0.729 |
| | Left Tilt | 0.290 | 0.150 | 0.440 |
| | Right Cheek | 0.531 | 0.108 | 0.639 |
| | Right Tilt | 0.342 | 0.089 | 0.431 |
| GPRS 850 | Left Cheek | 0.809 | 0.206 | 1.015 |
| | Left Tilt | 0.475 | 0.150 | 0.625 |
| | Right Cheek | 0.956 | 0.108 | 1.064 |
| | Right Tilt | 0.567 | 0.089 | 0.656 |
| GSM 1900 | Left Cheek | 0.493 | 0.206 | 0.699 |
| | Left Tilt | 0.361 | 0.150 | 0.511 |
| | Right Cheek | 0.420 | 0.108 | 0.528 |
| | Right Tilt | 0.154 | 0.089 | 0.243 |
| GPRS 1900 | Left Cheek | 0.697 | 0.206 | 0.903 |
| | Left Tilt | 0.294 | 0.150 | 0.444 |
| | Right Cheek | 0.610 | 0.108 | 0.718 |
| | Right Tilt | 0.216 | 0.089 | 0.305 |
| WCDMA 850 | Left Cheek | 0.388 | 0.206 | 0.594 |
| | Left Tilt | 0.227 | 0.150 | 0.377 |
| | Right Cheek | 0.485 | 0.108 | 0.593 |
| | Right Tilt | 0.302 | 0.089 | 0.391 |
| WCDMA 1900 | Left Cheek | 1.115 | 0.206 | **1.321** |
| | Left Tilt | 0.449 | 0.150 | 0.599 |
| | Right Cheek | 0.781 | 0.108 | 0.889 |
| | Right Tilt | 0.350 | 0.089 | 0.439 |
| LTE Band 2 | Left Cheek | 0.903 | 0.206 | 1.109 |
| | Left Tilt | 0.429 | 0.150 | 0.579 |
| | Right Cheek | 0.576 | 0.108 | 0.684 |
| | Right Tilt | 0.367 | 0.089 | 0.456 |
| LTE Band 4 | Left Cheek | 0.762 | 0.206 | 0.968 |
| | Left Tilt | 0.304 | 0.150 | 0.454 |
| | Right Cheek | 0.938 | 0.108 | 1.046 |
| | Right Tilt | 0.191 | 0.089 | 0.280 |
| LTE Band 7 | Left Cheek | 0.477 | 0.206 | 0.683 |
| | Left Tilt | 0.327 | 0.150 | 0.477 |
| | Right Cheek | 1.117 | 0.108 | 1.225 |
| | Right Tilt | 0.318 | 0.089 | 0.407 |

# 15.2 Simultaneous Transmission Summation for Body-Worn

**Simultaneous Transmission Summation with Wifi (1 cm)**

| Band | configuration | Scaled SAR(W/kg) | 2.4 GHz WIFI Scaled SAR (W/kg) | ∑ 1-g SAR (W/kg) |
|---|---|---|---|---|
| GSM 850 | Rear | 0.628 | 0.018 | 0.646 |
| GPRS 850 | Rear | 1.181 | 0.018 | 1.199 |
| GSM 1900 | Rear | 0.359 | 0.018 | 0.377 |
| GPRS 1900 | Rear | 0.545 | 0.018 | 0.563 |
| WCDMA 850 | Rear | 0.685 | 0.018 | 0.703 |
| WCDMA 1900 | Rear | 1.105 | 0.018 | 1.123 |
| LTE Band 2 | Rear | 1.100 | 0.018 | 1.118 |
| LTE Band 4 | Rear | 1.051 | 0.018 | 1.069 |
| LTE Band 7 | Rear | 0.669 | 0.018 | 0.687 |

Simultaneous Transmission Summation with Bluetooth (1 cm)

| Band | configuration | Scaled SAR(W/kg) | Estimated SAR BT SAR (W/kg) | ∑ 1-g SAR (W/kg) |
|---|---|---|---|---|
| GSM 850 | Rear | 0.628 | 0.17 | 0.798 |
| GPRS 850 | Rear | 1.181 | 0.17 | 1.351 |
| GSM 1900 | Rear | 0.359 | 0.17 | 0.529 |
| GPRS 1900 | Rear | 0.545 | 0.17 | 0.715 |
| WCDMA 850 | Rear | 0.685 | 0.17 | 0.855 |
| WCDMA 1900 | Rear | 1.105 | 0.17 | 1.275 |
| LTE Band 2 | Rear | 1.100 | 0.17 | 1.270 |
| LTE Band 4 | Rear | 1.051 | 0.17 | 1.221 |
| LTE Band 7 | Rear | 0.669 | 0.17 | 0.839 |

# 15.3 Simultaneous Transmission Summation for Hotspot

**Simultaneous Transmission Summation with 2.4 GHz WIFI (1 cm)**

| Band | configuration | Scaled SAR (W/kg) | 2.4 GHz WIFI Scaled SAR (W/kg) | ∑ 1-g SAR (W/kg) |
|---|---|---|---|---|
| GSM 850 | Rear | 1.181 | 0.018 | 1.199 |
| | Front | 0.769 | 0.011 | 0.780 |
| | Left | | | |
| | Right | 0.783 | 0.013 | 0.796 |
| | Bottom | 0.354 | | 0.354 |
| | Top | | 0.014 | 0.014 |
| GSM 1900 | Rear | 0.545 | 0.018 | 0.563 |
| | Front | 0.770 | 0.011 | 0.781 |
| | Left | 0.310 | | 0.310 |
| | Right | | 0.013 | 0.013 |
| | Bottom | 0.448 | | 0.448 |
| | Top | | 0.014 | 0.014 |
| WCDMA 850 | Rear | 0.685 | 0.018 | 0.703 |
| | Front | 0.561 | 0.011 | 0.572 |
| | Left | | | |
| | Right | 0.573 | 0.013 | 0.586 |
| | Bottom | 0.227 | | 0.227 |
| | Top | | 0.014 | 0.014 |
| WCDMA 1900 | Rear | 1.105 | 0.018 | 1.123 |
| | Front | 1.175 | 0.011 | 1.186 |
| | Left | 0.478 | | 0.478 |
| | Right | | 0.013 | 0.013 |
| | Bottom | 0.762 | | 0.762 |
| | Top | | 0.014 | 0.014 |
| LTE Band 2 | Rear | 1.100 | 0.018 | 1.118 |
| | Front | 1.165 | 0.011 | 1.176 |
| | Left | 0.422 | | 0.422 |
| | Right | | 0.013 | 0.013 |
| | Bottom | 0.571 | | 0.571 |
| | Top | | 0.014 | 0.014 |
| LTE Band 4 | Rear | 1.051 | 0.018 | 1.069 |
| | Front | 1.284 | 0.011 | **1.295** |
| | Left | 0.503 | | 0.503 |
| | Right | | 0.013 | 0.013 |
| | Bottom | 0.815 | | 0.815 |
| | Top | | 0.014 | 0.014 |
| LTE Band 7 | Rear | 0.669 | 0.018 | 0.687 |
| | Front | 0.457 | 0.011 | 0.468 |
| | Left | | | |
| | Right | 0.583 | 0.013 | 0.596 |
| | Bottom | 0.331 | | 0.331 |
| | Top | | 0.014 | 0.014 |

## 15.4 Simultaneous Transmission Conclusion

The above numerical summed SAR results for all the worst-case simultaneous transmission conditions were below the SAR limit. Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit. And therefore no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D01v05r02.

# 16. CONCLUSION

The SAR measurement indicates that the EUT complies with the RF radiation exposure limits of the ANSI/ IEEE C95.1 1992.

These measurements are taken to simulate the RF effects exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests.

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# Attachment 1. – SAR Test Plots

| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | Cellular/PCS GSM/WCDMA/LTE Phone with WLAN and Bluetooth |
| Liquid Temperature: | 22.1 ℃ |
| Ambient Temperature: | 22.3 ℃ |
| Test Date: | Jan. 14, 2015 |
| Plot No. | 1 |

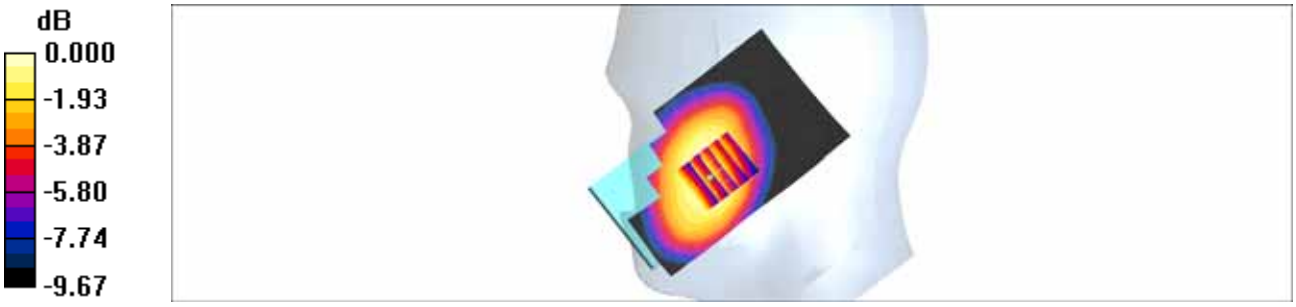
**DUT: LG-H340f; Type: Bar;**

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:2.075
Medium parameters used (interpolated): f = 836.6 MHz; $\sigma$ = 0.916 mho/m; $\varepsilon_r$ = 41.9; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

DASY4 Configuration:
- Probe: ET3DV6 - SN1630; ConvF(6.67, 6.67, 6.67); Calibrated: 2014-04-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn911; Calibrated: 2014-02-25
- Phantom: 1800/1900 Phantom; Type: SAM

**GSM850 Head Right Touch 190ch GPRS 4Tx/Area Scan (61x101x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.855 mW/g

**GSM850 Head Right Touch 190ch GPRS 4Tx/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.71 V/m; Power Drift = 0.174 dB
Peak SAR (extrapolated) = 1.06 W/kg
**SAR(1 g) = 0.821 mW/g; SAR(10 g) = 0.627 mW/g**
Maximum value of SAR (measured) = 0.864 mW/g




0 dB = 0.864mW/g

| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | Cellular/PCS GSM/WCDMA/LTE Phone with WLAN and Bluetooth |
| Liquid Temperature: | 22.9 ℃ |
| Ambient Temperature: | 23.1 ℃ |
| Test Date: | Jan. 16, 2015 |
| Plot No. | 2 |

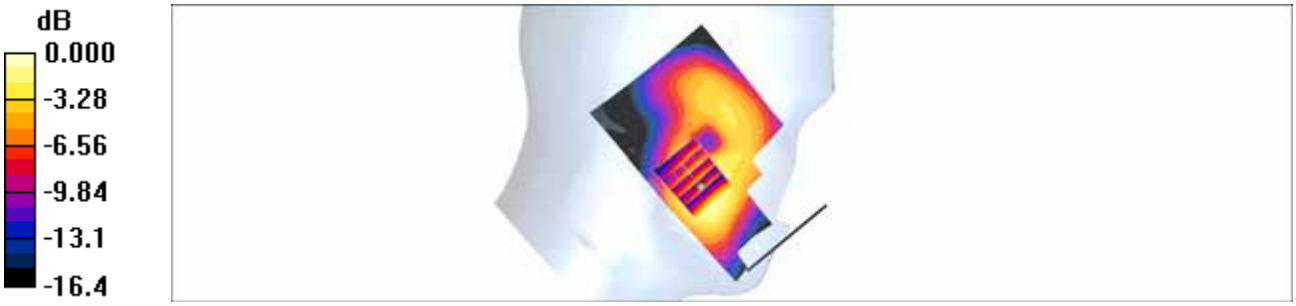
**DUT: LG-H340f; Type: Bar;**

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:2.075
Medium parameters used: f = 1880 MHz; $\sigma$ = 1.42 mho/m; $\varepsilon_r$ = 38.9; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

DASY4 Configuration:
- Probe: EX3DV4 - SN3863; ConvF(8.02, 8.02, 8.02); Calibrated: 2014-07-24
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2014-03-24
- Phantom: 1800/1900 Phantom; Type: SAM

**GSM1900 Left touch 661ch GPRS 4Tx/Area Scan (61x101x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.791 mW/g

**GSM1900 Left touch 661ch GPRS 4Tx/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.98 V/m; Power Drift = -0.138 dB
Peak SAR (extrapolated) = 1.00 W/kg
**SAR(1 g) = 0.611 mW/g; SAR(10 g) = 0.370 mW/g**
Maximum value of SAR (measured) = 0.783 mW/g




0 dB = 0.783mW/g

| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | Cellular/PCS GSM/WCDMA/LTE Phone with WLAN and Bluetooth |
| Liquid Temperature: | 22.1 ℃ |
| Ambient Temperature: | 22.3 ℃ |
| Test Date: | Jan. 14, 2015 |
| Plot No. | 3 |

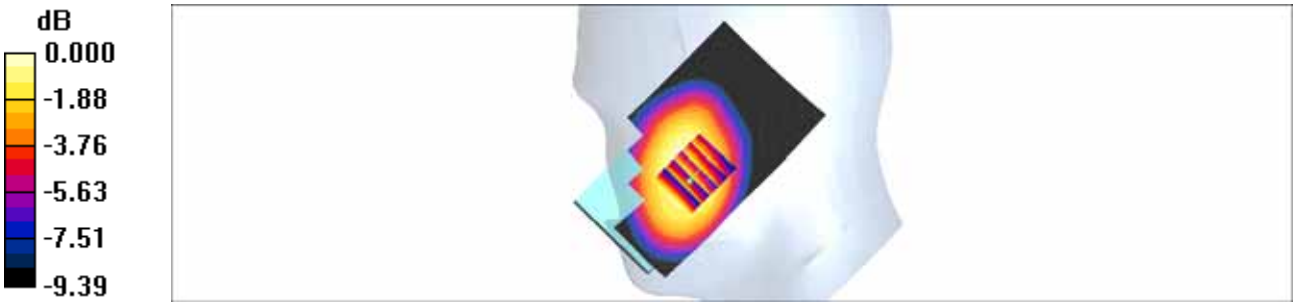
**DUT: LG-H340f; Type: Bar;**

Communication System: WCDMA850; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.6 MHz; $\sigma$ = 0.916 mho/m; $\varepsilon_r$ = 41.9; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

DASY4 Configuration:
- Probe: ET3DV6 - SN1630; ConvF(6.67, 6.67, 6.67); Calibrated: 2014-04-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn911; Calibrated: 2014-02-25
- Phantom: 1800/1900 Phantom; Type: SAM

**WCDMA850 Head Right Touch 4183ch/Area Scan (61x101x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.452 mW/g

**WCDMA850 Head Right Touch 4183ch/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.11 V/m; Power Drift = 0.122 dB
Peak SAR (extrapolated) = 0.582 W/kg
**SAR(1 g) = 0.430 mW/g; SAR(10 g) = 0.328 mW/g**
Maximum value of SAR (measured) = 0.451 mW/g




0 dB = 0.451mW/g

| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | Cellular/PCS GSM/WCDMA/LTE Phone with WLAN and Bluetooth |
| Liquid Temperature: | 22.9 ℃ |
| Ambient Temperature: | 23.1 ℃ |
| Test Date: | Jan. 16, 2015 |
| Plot No. | 4 |

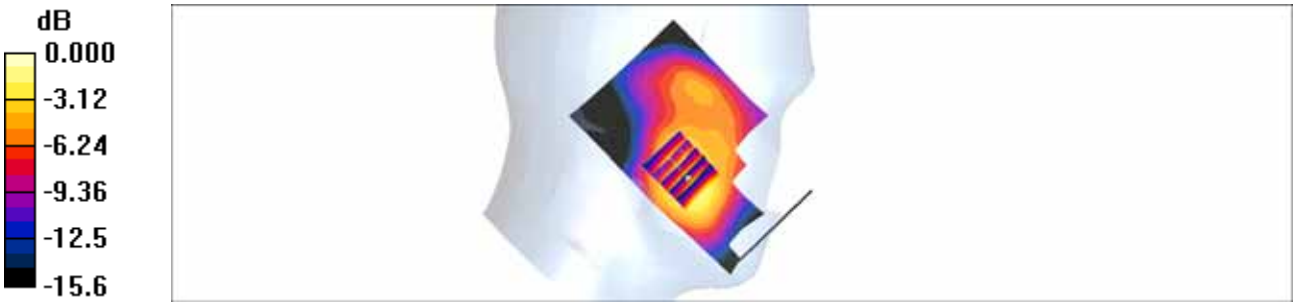
**DUT: LG-H340f; Type: Bar;**

Communication System: WCDMA1900; Frequency: 1907.6 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1907.6 MHz; $\sigma$ = 1.44 mho/m; $\varepsilon_r$ = 38.9; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

DASY4 Configuration:
- Probe: EX3DV4 - SN3863; ConvF(8.02, 8.02, 8.02); Calibrated: 2014-07-24
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2014-03-24
- Phantom: 1800/1900 Phantom; Type: SAM

**WCDMA1900 Left touch 9538ch/Area Scan (61x101x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.27 mW/g

**WCDMA1900 Left touch 9538ch/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.93 V/m; Power Drift = -0.190 dB
Peak SAR (extrapolated) = 1.81 W/kg
**SAR(1 g) = 1.1 mW/g; SAR(10 g) = 0.654 mW/g**
Maximum value of SAR (measured) = 1.48 mW/g




0 dB = 1.48mW/g

| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | Cellular/PCS GSM/WCDMA/LTE Phone with WLAN and Bluetooth |
| Liquid Temperature: | 21.8 ℃ |
| Ambient Temperature: | 22.0 ℃ |
| Test Date: | Jan. 23, 2015 |
| Plot No. | 5 |

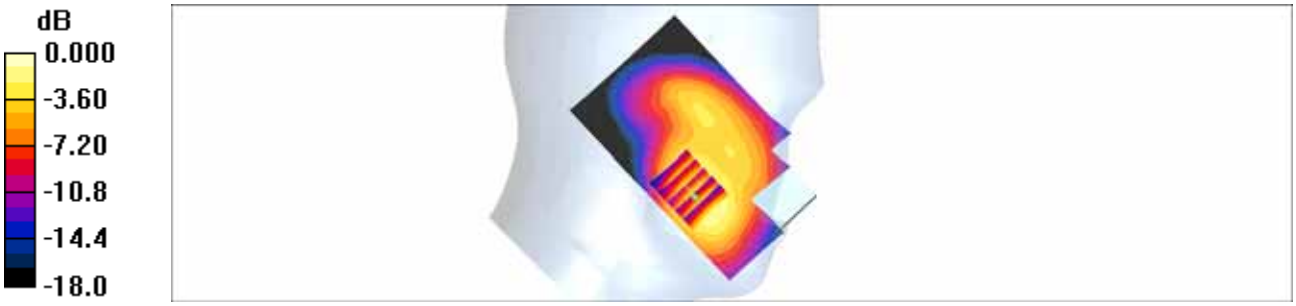
**DUT: LG-H340f; Type: Bar;**

Communication System: LTE band 2; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; $\sigma$ = 1.42 mho/m; $\varepsilon_r$ = 38.9; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

DASY4 Configuration:
- Probe: EX3DV4 - SN3903; ConvF(8.11, 8.11, 8.11); Calibrated: 2014-08-28
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn652; Calibrated: 2014-03-26
- Phantom: SAM 1800/1900 MHz; Type: SAM

**LTE Band 2 Head Left touch QPSK 20MHz 1RB 0offset 18900ch/Area Scan (61x101x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.07 mW/g

**LTE Band 2 Head Left touch QPSK 20MHz 1RB 0offset 18900ch/Zoom Scan (5x5x7)/Cube 0:**
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.55 V/m; Power Drift = 0.172 dB
Peak SAR (extrapolated) = 1.35 W/kg
**SAR(1 g) = 0.860 mW/g; SAR(10 g) = 0.529 mW/g**
Maximum value of SAR (measured) = 1.13 mW/g




0 dB = 1.13mW/g

| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | Cellular/PCS GSM/WCDMA/LTE Phone with WLAN and Bluetooth |
| Liquid Temperature: | 22.9 ℃ |
| Ambient Temperature: | 23.1 ℃ |
| Test Date: | Jan. 19, 2015 |
| Plot No. | 6 |

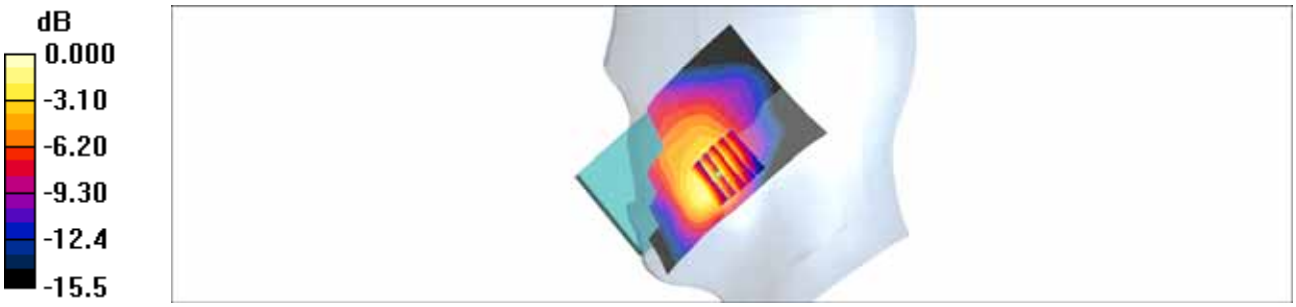
**DUT: LG-H340f; Type: Bar;**

Communication System: LTE Band 4; Frequency: 1732.5 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1732.5 MHz; $\sigma$ = 1.33 mho/m; $\varepsilon_r$ = 40.4; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

DASY4 Configuration:
- Probe: EX3DV4 - SN3863; ConvF(8.38, 8.38, 8.38); Calibrated: 2014-07-24
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2014-03-24
- Phantom: 1800/1900 Phantom; Type: SAM

**LTE4 Right Touch QPSK 20Mhz 1RB 0ffset 20175ch/Area Scan (61x101x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.737 mW/g

**LTE4 Right Touch QPSK 20Mhz 1RB 0ffset 20175ch/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.05 V/m; Power Drift = 0.184 dB
Peak SAR (extrapolated) = 1.05 W/kg
**SAR(1 g) = 0.681 mW/g; SAR(10 g) = 0.442 mW/g**
Maximum value of SAR (measured) = 0.880 mW/g




0 dB = 0.880mW/g

| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | Cellular/PCS GSM/WCDMA/LTE Phone with WLAN and Bluetooth |
| Liquid Temperature: | 21.1 ℃ |
| Ambient Temperature: | 21.3 ℃ |
| Test Date: | Jan. 22, 2015 |
| Plot No. | 7 |

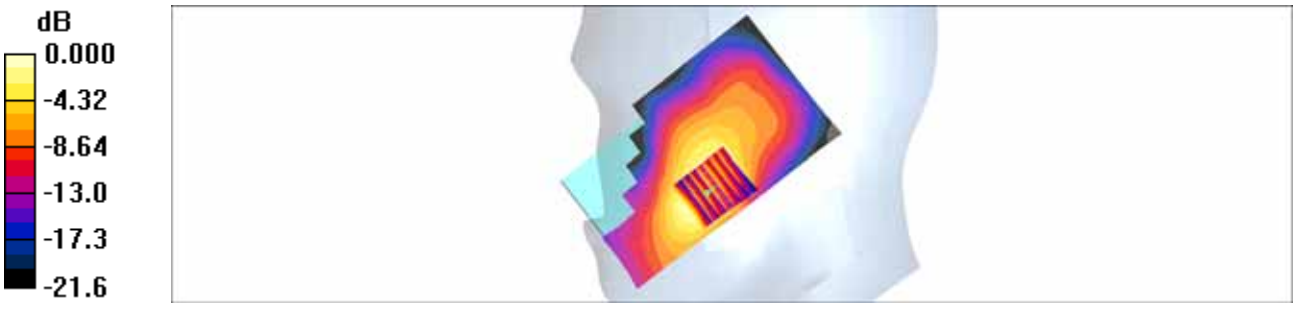
**DUT: LG-H340f; Type: Bar;**

Communication System: LTE Band 7; Frequency: 2510 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2510 MHz; $\sigma$ = 1.93 mho/m; $\varepsilon_r$ = 38.9; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

DASY4 Configuration:
- Probe: EX3DV4 - SN3863; ConvF(7.05, 7.05, 7.05); Calibrated: 2014-07-24
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2014-03-24
- Phantom: 800/900 Phantom; Type: SAM

**LTE7 Left Touch QPSK 20Mhz 1RB 0offset 20850ch/Area Scan (71x121x1):** Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 1.56 mW/g

**LTE7 Left Touch QPSK 20Mhz 1RB 0offset 20850ch/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.13 V/m; Power Drift = 0.146 dB
Peak SAR (extrapolated) = 1.82 W/kg
**SAR(1 g) = 1.05 mW/g; SAR(10 g) = 0.579 mW/g**
Maximum value of SAR (measured) = 1.44 mW/g




0 dB = 1.44mW/g

| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | Cellular/PCS GSM/WCDMA/LTE Phone with WLAN and Bluetooth |
| Liquid Temperature: | 21.2 ℃ |
| Ambient Temperature: | 21.4 ℃ |
| Test Date: | Jan. 20, 2015 |
| Plot No. | 8 |

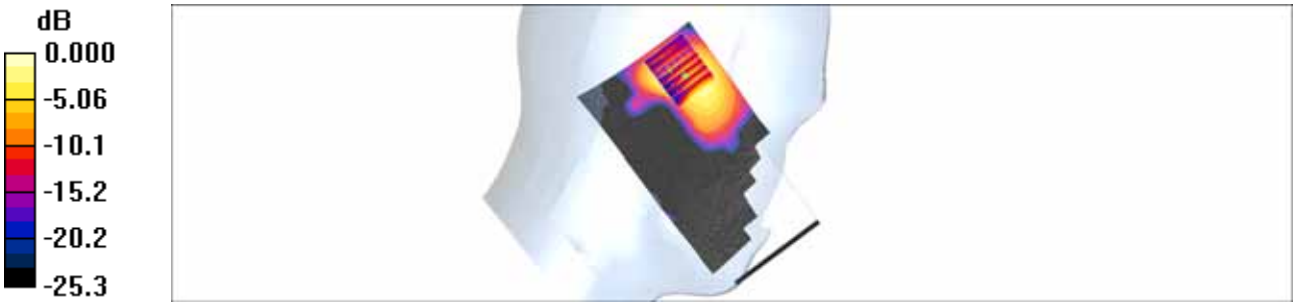
**DUT: LG-H340f; Type: Bar;**

Communication System: 2450MHz FCC; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2412 MHz; $\sigma$ = 1.79 mho/m; $\varepsilon_r$ = 37.8; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

DASY4 Configuration:
- Probe: EX3DV4 - SN3863; ConvF(7.15, 7.15, 7.15); Calibrated: 2014-07-24
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2014-03-24
- Phantom: 800/900 Phantom; Type: SAM

**802.11b Left Touch 1ch 1Mbps/Area Scan (71x131x1):** Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 0.277 mW/g

**802.11b Left Touch 1ch 1Mbps/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.82 V/m; Power Drift = -0.145 dB
Peak SAR (extrapolated) = 0.418 W/kg
**SAR(1 g) = 0.187 mW/g; SAR(10 g) = 0.095 mW/g**
Maximum value of SAR (measured) = 0.294 mW/g




0 dB = 0.294mW/g

| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | Cellular/PCS GSM/WCDMA/LTE Phone with WLAN and Bluetooth |
| Liquid Temperature: | 23.0 ℃ |
| Ambient Temperature: | 23.2 ℃ |
| Test Date: | Jan. 15, 2015 |
| Plot No. | 9 |

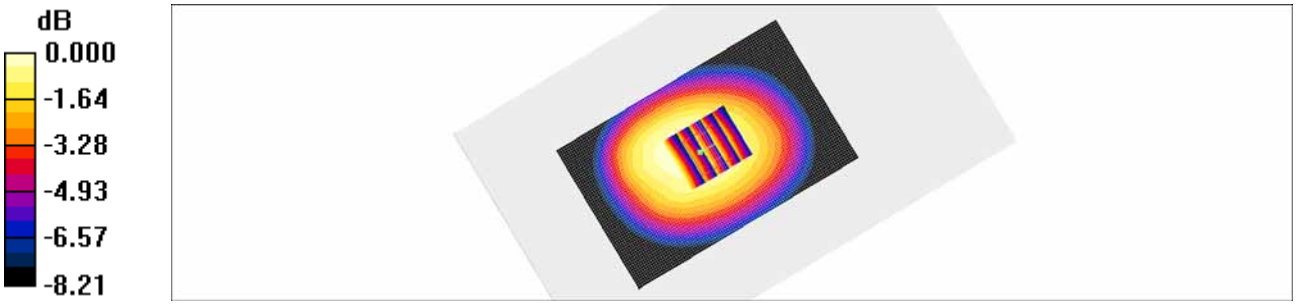
**DUT: LG-H340f; Type: Bar;**

Communication System: GSM 850; Frequency: 824.2 MHz;Duty Cycle: 1:2.075
Medium parameters used: f = 825 MHz; $\sigma$ = 0.979 mho/m; $\varepsilon_r$ = 56.9; $\rho$ = 1000 kg/m$^3$
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

DASY4 Configuration:
- Probe: EX3DV4 - SN3863; ConvF(9.43, 9.43, 9.43); Calibrated: 2014-07-24
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2014-03-24
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA

**GSM850 Body Rear 128ch GPRS 4TX/Area Scan (61x101x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.24 mW/g

**GSM850 Body Rear 128ch GPRS 4TX/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 32.7 V/m; Power Drift = 0.036 dB
Peak SAR (extrapolated) = 1.35 W/kg
**SAR(1 g) = 1.06 mW/g; SAR(10 g) = 0.809 mW/g**
Maximum value of SAR (measured) = 1.22 mW/g




0 dB = 1.22mW/g

| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | Cellular/PCS GSM/WCDMA/LTE Phone with WLAN and Bluetooth |
| Liquid Temperature: | 22.9 ℃ |
| Ambient Temperature: | 23.1 ℃ |
| Test Date: | Jan. 16, 2015 |
| Plot No. | 10 |

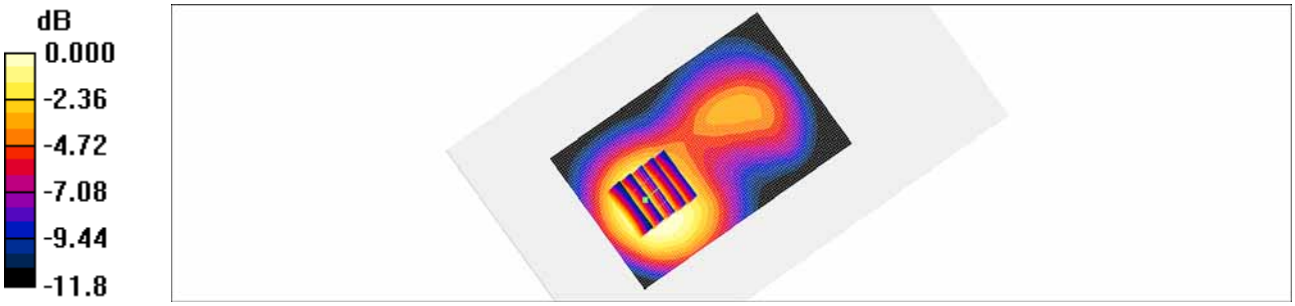
**DUT: LG-H340f; Type: Bar;**

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:2.075
Medium parameters used: f = 1880 MHz; $\sigma$ = 1.53 mho/m; $\varepsilon_r$ = 54.1; $\rho$ = 1000 kg/m$^3$
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

DASY4 Configuration:
- Probe: EX3DV4 - SN3863; ConvF(7.36, 7.36, 7.36); Calibrated: 2014-07-24
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2014-03-24
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA

**GSM1900 Body Rear 661ch GPRS 4TX/Area Scan (61x101x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.595 mW/g

**GSM1900 Body Rear 661ch GPRS 4TX/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.8 V/m; Power Drift = -0.176 dB
Peak SAR (extrapolated) = 0.676 W/kg
**SAR(1 g) = 0.478 mW/g; SAR(10 g) = 0.326 mW/g**
Maximum value of SAR (measured) = 0.580 mW/g




0 dB = 0.580mW/g

| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | Cellular/PCS GSM/WCDMA/LTE Phone with WLAN and Bluetooth |
| Liquid Temperature: | 22.9 ℃ |
| Ambient Temperature: | 23.1 ℃ |
| Test Date: | Jan. 16, 2015 |
| Plot No. | 11 |

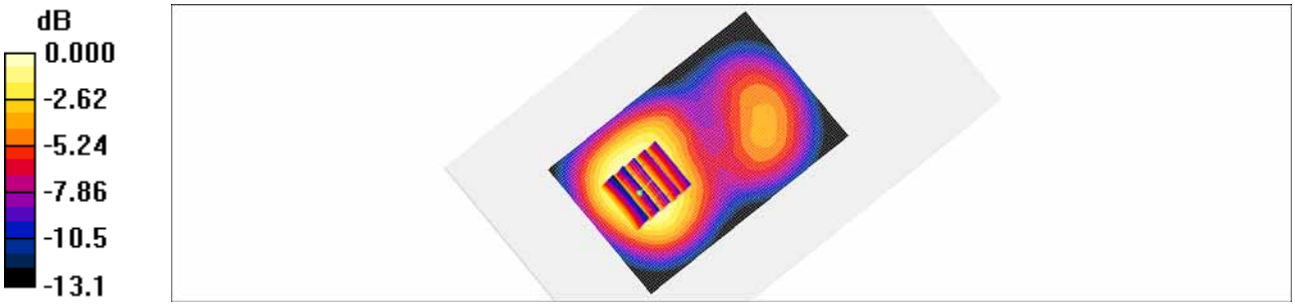
**DUT: LG-H340f; Type: Bar;**

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:2.075
Medium parameters used: f = 1880 MHz; $\sigma$ = 1.53 mho/m; $\varepsilon_r$ = 54.1; $\rho$ = 1000 kg/m$^3$
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

DASY4 Configuration:
- Probe: EX3DV4 - SN3863; ConvF(7.36, 7.36, 7.36); Calibrated: 2014-07-24
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2014-03-24
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA

**GSM1900 Body Front 661ch GPRS 4Tx/Area Scan (61x101x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.838 mW/g

**GSM1900 Body Front 661ch GPRS 4Tx/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.5 V/m; Power Drift = 0.166 dB
Peak SAR (extrapolated) = 0.955 W/kg
**SAR(1 g) = 0.675 mW/g; SAR(10 g) = 0.448 mW/g**
Maximum value of SAR (measured) = 0.805 mW/g




0 dB = 0.805mW/g

| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | Cellular/PCS GSM/WCDMA/LTE Phone with WLAN and Bluetooth |
| Liquid Temperature: | 23.0 ℃ |
| Ambient Temperature: | 23.2 ℃ |
| Test Date: | Jan. 15, 2015 |
| Plot No. | 12 |

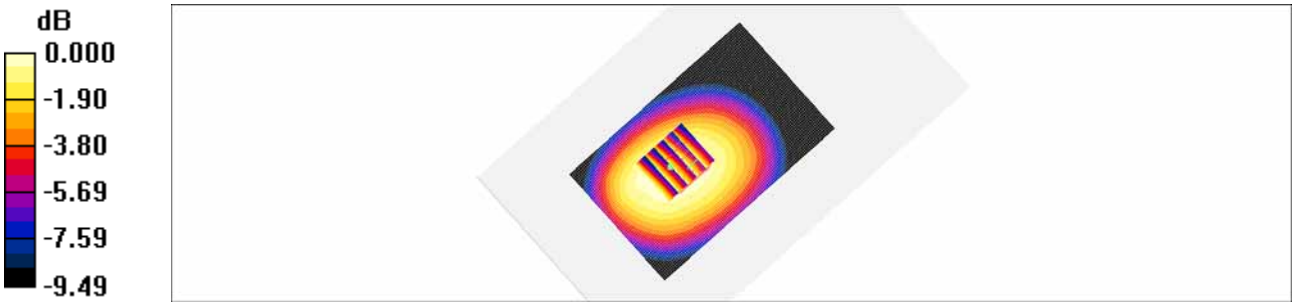
**DUT: LG-H340f; Type: Bar;**

Communication System: WCDMA850; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.6 MHz; $\sigma$ = 0.987 mho/m; $\varepsilon_r$ = 56.8; $\rho$ = 1000 kg/m$^3$
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

DASY4 Configuration:
- Probe: EX3DV4 - SN3863; ConvF(9.43, 9.43, 9.43); Calibrated: 2014-07-24
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2014-03-24
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA

**WCDMA850 Body Rear/Area Scan (61x101x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.700 mW/g

**WCDMA850 Body Rear/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.3 V/m; Power Drift = 0.113 dB
Peak SAR (extrapolated) = 0.768 W/kg
**SAR(1 g) = 0.608 mW/g; SAR(10 g) = 0.463 mW/g**
Maximum value of SAR (measured) = 0.695 mW/g




0 dB = 0.695mW/g

| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | Cellular/PCS GSM/WCDMA/LTE Phone with WLAN and Bluetooth |
| Liquid Temperature: | 22.9 ℃ |
| Ambient Temperature: | 23.1 ℃ |
| Test Date: | Jan. 16, 2015 |
| Plot No. | 13 |

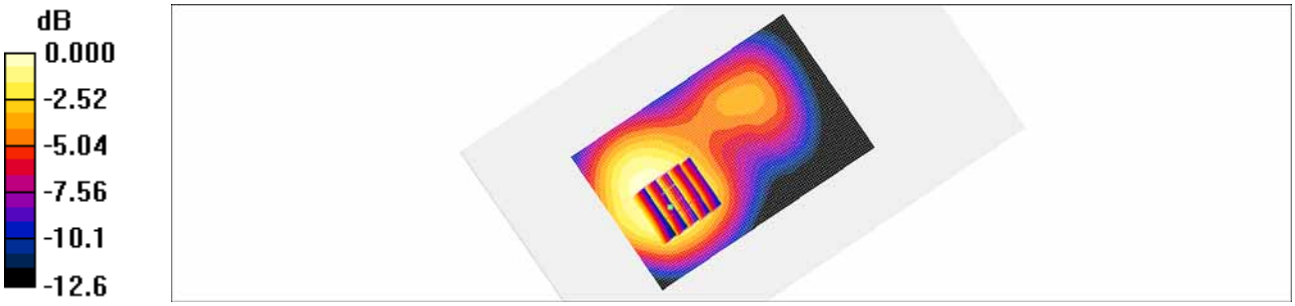
**DUT: LG-H340f; Type: Bar;**

Communication System: WCDMA1900; Frequency: 1907.6 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1907.6 MHz; $\sigma$ = 1.55 mho/m; $\varepsilon_r$ = 53.9; $\rho$ = 1000 kg/m$^3$
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

DASY4 Configuration:
- Probe: EX3DV4 - SN3863; ConvF(7.36, 7.36, 7.36); Calibrated: 2014-07-24
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2014-03-24
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA

**WCDMA1900 Body Rear 9538ch/Area Scan (61x101x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.26 mW/g

**WCDMA1900 Body Rear 9538ch/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.7 V/m; Power Drift = 0.081 dB
Peak SAR (extrapolated) = 1.52 W/kg
**SAR(1 g) = 1.09 mW/g; SAR(10 g) = 0.747 mW/g**
Maximum value of SAR (measured) = 1.32 mW/g




0 dB = 1.32mW/g

| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | Cellular/PCS GSM/WCDMA/LTE Phone with WLAN and Bluetooth |
| Liquid Temperature: | 22.9 ℃ |
| Ambient Temperature: | 23.1 ℃ |
| Test Date: | Jan. 16, 2015 |
| Plot No. | 14 |

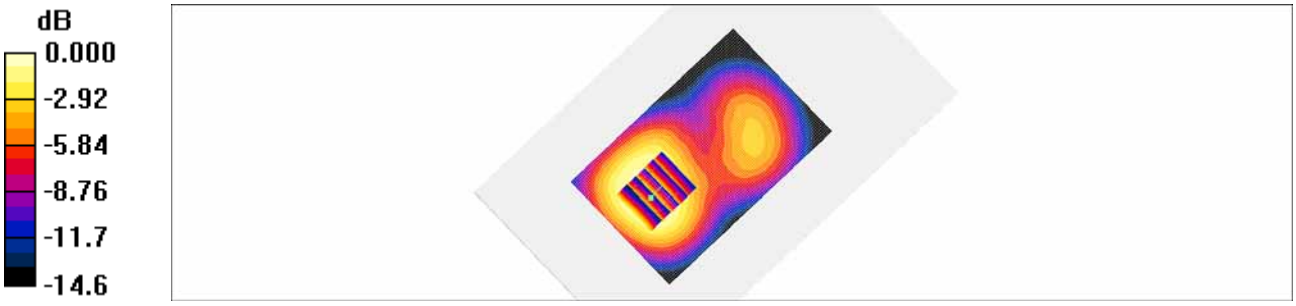
**DUT: LG-H340f; Type: Bar;**

Communication System: WCDMA1900; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; $\sigma$ = 1.53 mho/m; $\varepsilon_r$ = 54.1; $\rho$ = 1000 kg/m$^3$
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

DASY4 Configuration:
- Probe: EX3DV4 - SN3863; ConvF(7.36, 7.36, 7.36); Calibrated: 2014-07-24
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2014-03-24
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA

**WCDMA1900 Body Front 9400ch/Area Scan (61x101x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.44 mW/g

**WCDMA1900 Body Front 9400ch/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.9 V/m; Power Drift = 0.130 dB
Peak SAR (extrapolated) = 1.73 W/kg
**SAR(1 g) = 1.14 mW/g; SAR(10 g) = 0.730 mW/g**
Maximum value of SAR (measured) = 1.46 mW/g




0 dB = 1.46mW/g

| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | Cellular/PCS GSM/WCDMA/LTE Phone with WLAN and Bluetooth |
| Liquid Temperature: | 21.8 ℃ |
| Ambient Temperature: | 22.0 ℃ |
| Test Date: | Jan. 23, 2015 |
| Plot No. | 15 |

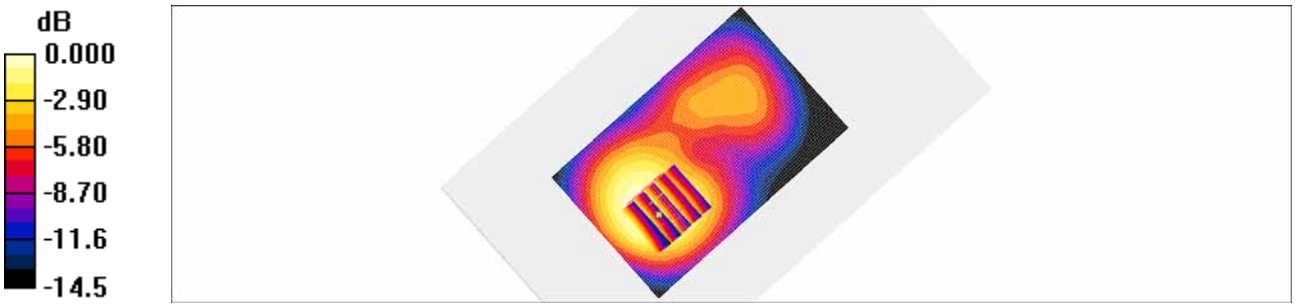
**DUT: LG-H340f; Type: Bar;**

Communication System: LTE band 2; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; $\sigma$ = 1.53 mho/m; $\varepsilon_r$ = 54.1; $\rho$ = 1000 kg/m$^3$
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

DASY4 Configuration:
- Probe: EX3DV4 - SN3903; ConvF(7.72, 7.72, 7.72); Calibrated: 2014-08-28
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn652; Calibrated: 2014-03-26
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA

**LTE Band 2 Body Rear QPSK 20MHz 1RB 0offset 18900ch/Area Scan (61x101x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.26 mW/g

**LTE Band 2 Body Rear QPSK 20MHz 1RB 0offset 18900ch/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.4 V/m; Power Drift = -0.119 dB
Peak SAR (extrapolated) = 1.49 W/kg
**SAR(1 g) = 1.03 mW/g; SAR(10 g) = 0.690 mW/g**
Maximum value of SAR (measured) = 1.27 mW/g




0 dB = 1.27mW/g

| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | Cellular/PCS GSM/WCDMA/LTE Phone with WLAN and Bluetooth |
| Liquid Temperature: | 21.8 ℃ |
| Ambient Temperature: | 22.0 ℃ |
| Test Date: | Jan. 23, 2015 |
| Plot No. | 16 |

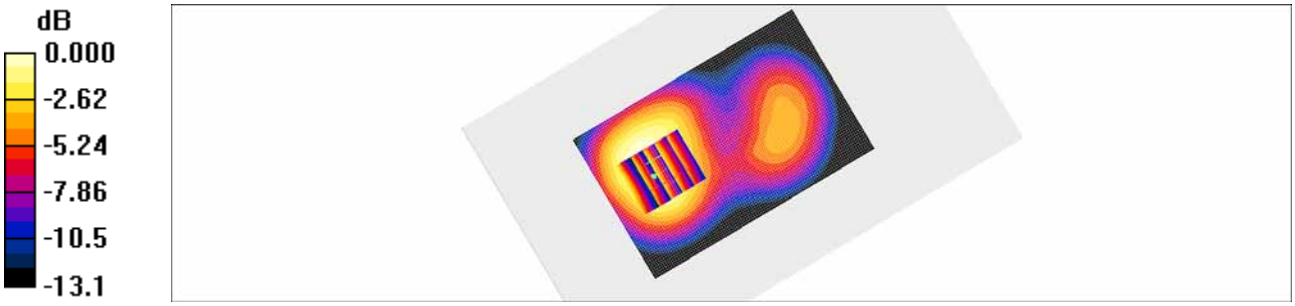
**DUT: LG-H340f; Type: Bar;**

Communication System: LTE band 2; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; $\sigma$ = 1.53 mho/m; $\varepsilon_r$ = 54.1; $\rho$ = 1000 kg/m$^3$
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

DASY4 Configuration:
- Probe: EX3DV4 - SN3903; ConvF(7.72, 7.72, 7.72); Calibrated: 2014-08-28
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn652; Calibrated: 2014-03-26
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA

**LTE Band 2 Body Front QPSK 20MHz 1RB 0offset 18900ch/Area Scan (61x101x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.35 mW/g

**LTE Band 2 Body Front QPSK 20MHz 1RB 0offset 18900ch/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.8 V/m; Power Drift = 0.109 dB
Peak SAR (extrapolated) = 1.59 W/kg
**SAR(1 g) = 1.1 mW/g; SAR(10 g) = 0.732 mW/g**
Maximum value of SAR (measured) = 1.35 mW/g




0 dB = 1.35mW/g

| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | Cellular/PCS GSM/WCDMA/LTE Phone with WLAN and Bluetooth |
| Liquid Temperature: | 22.9 ℃ |
| Ambient Temperature: | 23.1 ℃ |
| Test Date: | Jan. 19, 2015 |
| Plot No. | 17 |

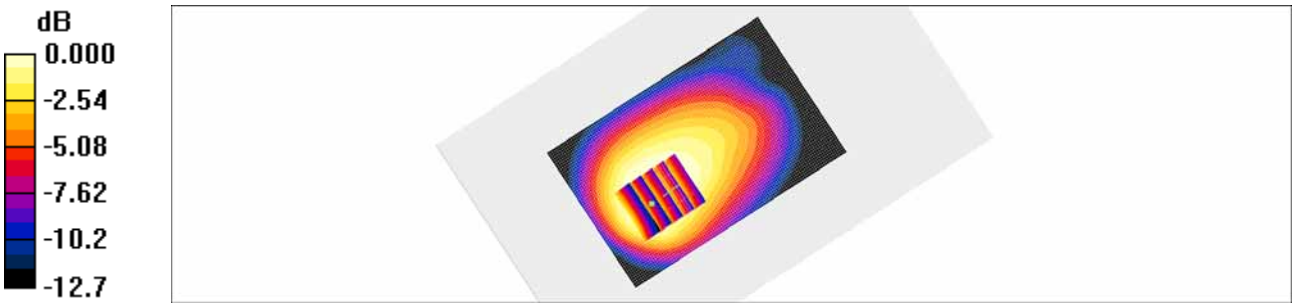
**DUT: LG-H340f; Type: Bar;**

Communication System: LTE Band 4; Frequency: 1732.5 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1732.5 MHz; $\sigma$ = 1.45 mho/m; $\varepsilon_r$ = 55.1; $\rho$ = 1000 kg/m$^3$
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

DASY4 Configuration:
- Probe: EX3DV4 - SN3903; ConvF(8.02, 8.02, 8.02); Calibrated: 2014-08-28
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn652; Calibrated: 2014-03-26
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA

**LTE Band 4 Body Rear QPSK 20MHz 1RB 0offset 20175ch/Area Scan (61x101x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.11 mW/g

**LTE Band 4 Body Rear QPSK 20MHz 1RB 0offset 20175ch/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.4 V/m; Power Drift = -0.138 dB
Peak SAR (extrapolated) = 1.08 W/kg
**SAR(1 g) = 0.763 mW/g; SAR(10 g) = 0.533 mW/g**
Maximum value of SAR (measured) = 0.926 mW/g




0 dB = 0.926mW/g

| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | Cellular/PCS GSM/WCDMA/LTE Phone with WLAN and Bluetooth |
| Liquid Temperature: | 22.9 ℃ |
| Ambient Temperature: | 23.1 ℃ |
| Test Date: | Jan. 19, 2015 |
| Plot No. | 18 |

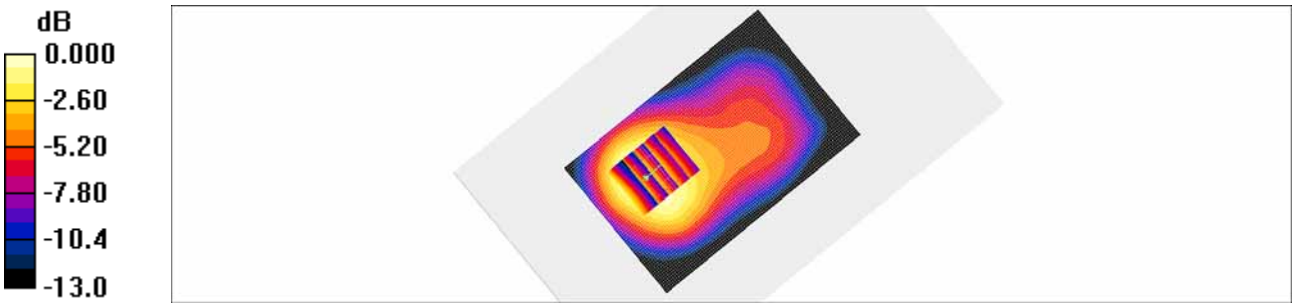
**DUT: LG-H340f; Type: Bar;**

Communication System: LTE Band 4; Frequency: 1732.5 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1732.5 MHz; $\sigma$ = 1.45 mho/m; $\varepsilon_r$ = 55.1; $\rho$ = 1000 kg/m$^3$
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

DASY4 Configuration:
- Probe: EX3DV4 - SN3903; ConvF(8.02, 8.02, 8.02); Calibrated: 2014-08-28
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn652; Calibrated: 2014-03-26
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA

**LTE Band 4 Body Front QPSK 20MHz 1RB 0offset 20175ch/Area Scan (61x101x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.17 mW/g

**LTE Band 4 Body Front QPSK 20MHz 1RB 0offset 20175ch/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.1 V/m; Power Drift = -0.196 dB
Peak SAR (extrapolated) = 1.34 W/kg
**SAR(1 g) = 0.932 mW/g; SAR(10 g) = 0.643 mW/g**
Maximum value of SAR (measured) = 1.13 mW/g




0 dB = 1.13mW/g

| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | Cellular/PCS GSM/WCDMA/LTE Phone with WLAN and Bluetooth |
| Liquid Temperature: | 21.1 ℃ |
| Ambient Temperature: | 21.3 ℃ |
| Test Date: | Jan. 22, 2015 |
| Plot No. | 19 |

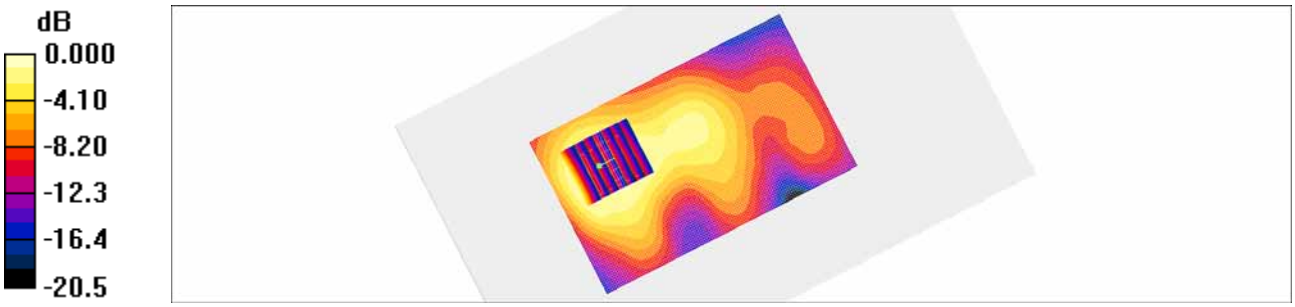
**DUT: LG-H340f; Type: Bar;**

Communication System: LTE Band 7; Frequency: 2510 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2510 MHz; $\sigma$ = 2.07 mho/m; $\varepsilon_r$ = 54.6; $\rho$ = 1000 kg/m$^3$
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

DASY4 Configuration:
- Probe: EX3DV4 - SN3863; ConvF(6.87, 6.87, 6.87); Calibrated: 2014-07-24
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2014-03-24
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA

**LTE7 Body Rear QPSK 20Mhz 1RB 0ffset 20850ch/Area Scan (71x121x1):** Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 0.930 mW/g

**LTE7 Body Rear QPSK 20Mhz 1RB 0ffset 20850ch/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.4 V/m; Power Drift = 0.134 dB
Peak SAR (extrapolated) = 1.25 W/kg
**SAR(1 g) = 0.629 mW/g; SAR(10 g) = 0.346 mW/g**
Maximum value of SAR (measured) = 0.912 mW/g




0 dB = 0.912mW/g

| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | Cellular/PCS GSM/WCDMA/LTE Phone with WLAN and Bluetooth |
| Liquid Temperature: | 21.2 ℃ |
| Ambient Temperature: | 21.4 ℃ |
| Test Date: | Jan. 20, 2015 |
| Plot No. | 20 |

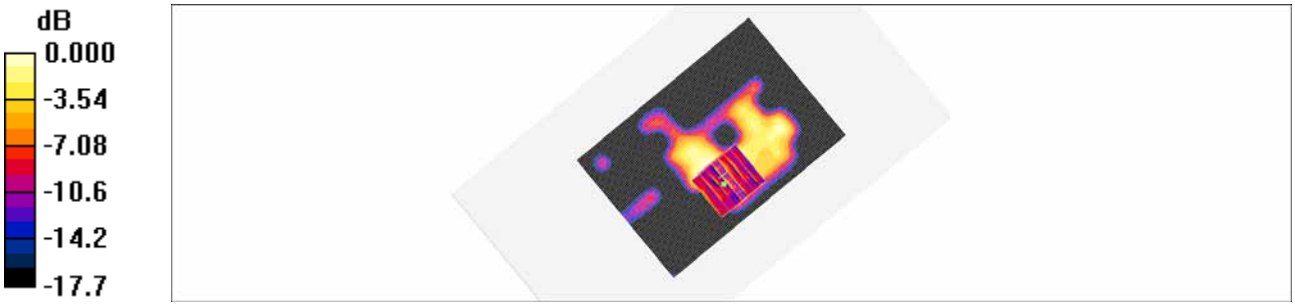
**DUT: LG-H340f; Type: Bar;**

Communication System: 2450MHz FCC; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2412 MHz; $\sigma$ = 1.94 mho/m; $\varepsilon_r$ = 53; $\rho$ = 1000 kg/m$^3$
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

DASY4 Configuration:
- Probe: EX3DV4 - SN3863; ConvF(6.97, 6.97, 6.97); Calibrated: 2014-07-24
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2014-03-24
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA

**802.11b Body Rear 1ch 1Mbps/Area Scan (81x121x1):** Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 0.028 mW/g

**802.11b Body Rear 1ch 1Mbps/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.72 V/m; Power Drift = 0.174 dB
Peak SAR (extrapolated) = 0.030 W/kg
**SAR(1 g) = 0.016 mW/g; SAR(10 g) = 0.00816 mW/g**
Maximum value of SAR (measured) = 0.023 mW/g




0 dB = 0.023mW/g

| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | Cellular/PCS GSM/WCDMA/LTE Phone with WLAN and Bluetooth |
| Liquid Temperature: | 23.0 ℃ |
| Ambient Temperature: | 23.2 ℃ |
| Test Date: | Jan. 15, 2015 |
| Plot No. | 21 |

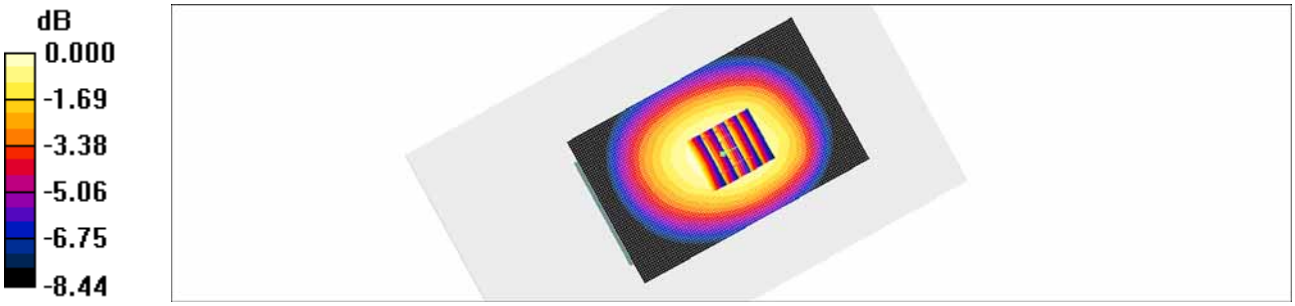
**DUT: LG-H340f; Type: Bar;**

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used (interpolated): f = 836.6 MHz; $\sigma$ = 0.987 mho/m; $\varepsilon_r$ = 56.8; $\rho$ = 1000 kg/m$^3$
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

DASY4 Configuration:
- Probe: EX3DV4 - SN3863; ConvF(9.43, 9.43, 9.43); Calibrated: 2014-07-24
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2014-03-24
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA

**GSM850 Body Rear-worn 190ch/Area Scan (61x101x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.609 mW/g

**GSM850 Body Rear-worn 190ch/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.3 V/m; Power Drift = 0.110 dB
Peak SAR (extrapolated) = 0.672 W/kg
**SAR(1 g) = 0.531 mW/g; SAR(10 g) = 0.403 mW/g**
Maximum value of SAR (measured) = 0.611 mW/g




0 dB = 0.611mW/g

| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | Cellular/PCS GSM/WCDMA/LTE Phone with WLAN and Bluetooth |
| Liquid Temperature: | 22.9 ℃ |
| Ambient Temperature: | 23.1 ℃ |
| Test Date: | Jan. 16, 2015 |
| Plot No. | 22 |

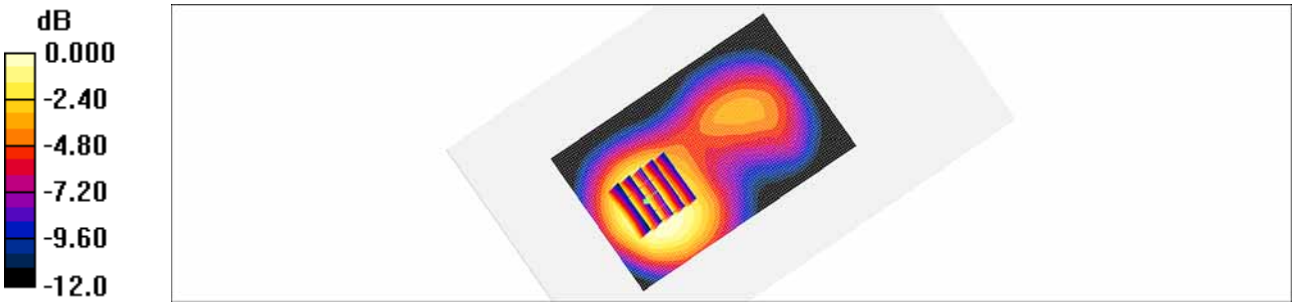
**DUT: LG-H340f; Type: Bar;**

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; $\sigma$ = 1.53 mho/m; $\varepsilon_r$ = 54.1; $\rho$ = 1000 kg/m$^3$
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

DASY4 Configuration:
- Probe: EX3DV4 - SN3863; ConvF(7.36, 7.36, 7.36); Calibrated: 2014-07-24
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2014-03-24
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA

**GSM1900 Body Rear 661ch Body Worn/Area Scan (61x101x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.326 mW/g

**GSM1900 Body Rear 661ch Body Worn/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.80 V/m; Power Drift = 0.151 dB
Peak SAR (extrapolated) = 0.369 W/kg
**SAR(1 g) = 0.261 mW/g; SAR(10 g) = 0.178 mW/g**
Maximum value of SAR (measured) = 0.319 mW/g




0 dB = 0.319mW/g

| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | Cellular/PCS GSM/WCDMA/LTE Phone with WLAN and Bluetooth |
| Liquid Temperature: | 23.0 ℃ |
| Ambient Temperature: | 23.2 ℃ |
| Test Date: | Jan. 15, 2015 |
| Plot No. | 23 |

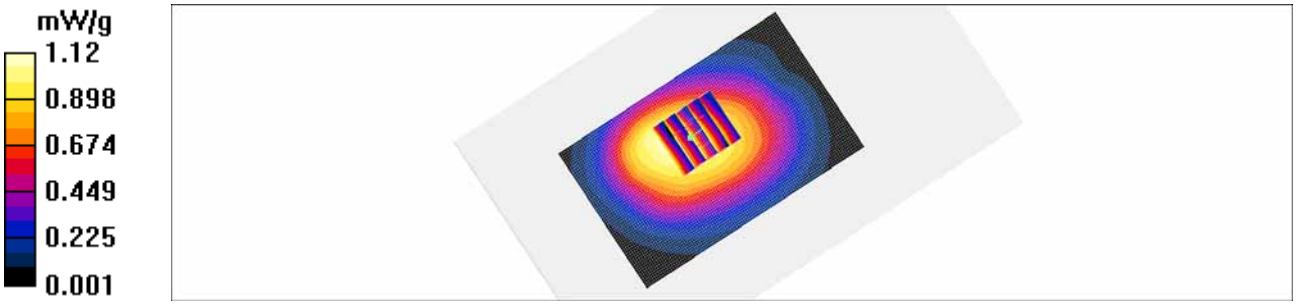
**DUT: LG-H340f; Type: Bar;**

Communication System: GSM 850; Frequency: 824.2 MHz;Duty Cycle: 1:2.075
Medium parameters used: f = 825 MHz; $\sigma$ = 0.979 mho/m; $\varepsilon_r$ = 56.9; $\rho$ = 1000 kg/m$^3$
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

DASY4 Configuration:
- Probe: EX3DV4 - SN3863; ConvF(9.43, 9.43, 9.43); Calibrated: 2014-07-24
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2014-03-24
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA

**GSM850 Body Rear 128ch GPRS 4TX/Area Scan (61x101x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.10 mW/g

**GSM850 Body Rear 128ch GPRS 4TX/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 29.8 V/m; Power Drift = 0.040 dB
Peak SAR (extrapolated) = 1.26 W/kg
**SAR(1 g) = 0.980 mW/g; SAR(10 g) = 0.756 mW/g**
Maximum value of SAR (measured) = 1.12 mW/g



| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | Cellular/PCS GSM/WCDMA/LTE Phone with WLAN and Bluetooth |
| Liquid Temperature: | 22.9 ℃ |
| Ambient Temperature: | 23.1 ℃ |
| Test Date: | Jan. 16, 2015 |
| Plot No. | 24 |

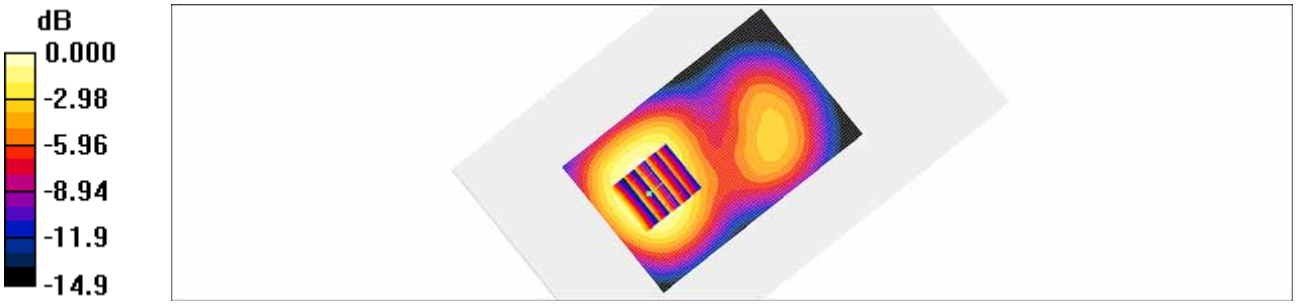
**DUT: LG-H340f; Type: Bar;**

Communication System: WCDMA1900; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; $\sigma$ = 1.53 mho/m; $\varepsilon_r$ = 54.1; $\rho$ = 1000 kg/m$^3$
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

DASY4 Configuration:
- Probe: EX3DV4 - SN3863; ConvF(7.36, 7.36, 7.36); Calibrated: 2014-07-24
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2014-03-24
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA

**WCDMA1900 Body Front 9400ch/Area Scan (61x101x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.45 mW/g

**WCDMA1900 Body Front 9400ch/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.0 V/m; Power Drift = 0.024 dB
Peak SAR (extrapolated) = 1.69 W/kg
**SAR(1 g) = 1.11 mW/g; SAR(10 g) = 0.715 mW/g**
Maximum value of SAR (measured) = 1.42 mW/g




0 dB = 1.42mW/g

| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | Cellular/PCS GSM/WCDMA/LTE Phone with WLAN and Bluetooth |
| Liquid Temperature: | 22.9 ℃ |
| Ambient Temperature: | 23.1 ℃ |
| Test Date: | Jan. 19, 2015 |
| Plot No. | 25 |

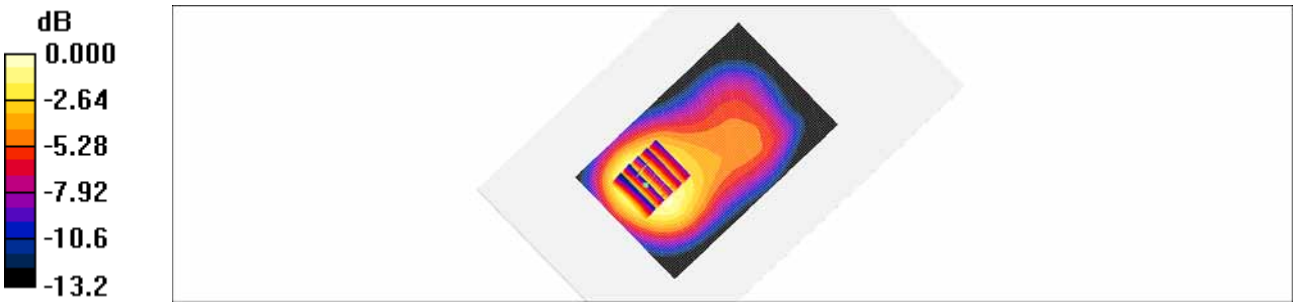
**DUT: LG-H340f; Type: Bar;**

Communication System: LTE Band 4; Frequency: 1732.5 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1732.5 MHz; $\sigma$ = 1.45 mho/m; $\varepsilon_r$ = 55.1; $\rho$ = 1000 kg/m$^3$
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

DASY4 Configuration:
- Probe: EX3DV4 - SN3903; ConvF(8.02, 8.02, 8.02); Calibrated: 2014-08-28
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn652; Calibrated: 2014-03-26
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA

**LTE Band 4 Body Front QPSK 20MHz 1RB 0offset 20175ch/Area Scan (61x101x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.16 mW/g

**LTE Band 4 Body Front QPSK 20MHz 1RB 0offset 20175ch/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.5 V/m; Power Drift = 0.130 dB
Peak SAR (extrapolated) = 1.37 W/kg
**SAR(1 g) = 0.919 mW/g; SAR(10 g) = 0.632 mW/g**
Maximum value of SAR (measured) = 1.14 mW/g




0 dB = 1.14mW/g

| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | Cellular/PCS GSM/WCDMA/LTE Phone with WLAN and Bluetooth |
| Liquid Temperature: | 21.1 ℃ |
| Ambient Temperature: | 21.3 ℃ |
| Test Date: | Jan. 22, 2015 |
| Plot No. | 26 |

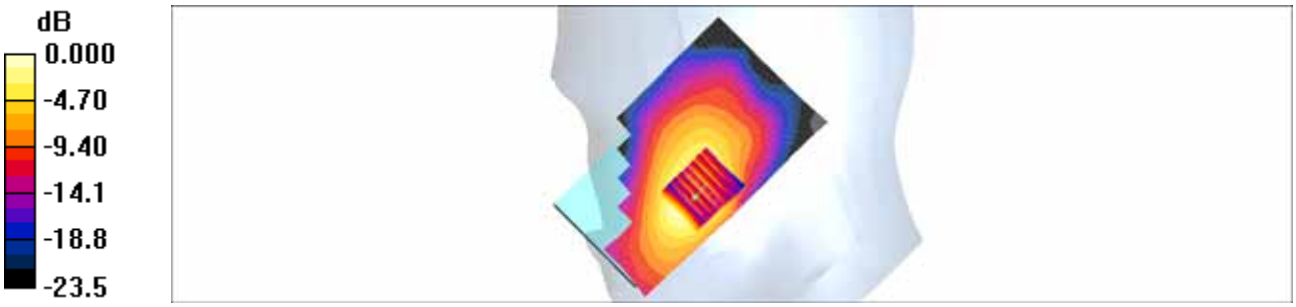
**DUT: LG-H340f; Type: Bar;**

Communication System: LTE Band 7; Frequency: 2510 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2510 MHz; $\sigma$ = 1.93 mho/m; $\varepsilon_r$ = 38.9; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

DASY4 Configuration:
- Probe: EX3DV4 - SN3863; ConvF(7.05, 7.05, 7.05); Calibrated: 2014-07-24
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2014-03-24
- Phantom: 800/900 Phantom; Type: SAM

**LTE7 Left Touch QPSK 20Mhz 1RB 0offset 20850ch/Area Scan (71x121x1):** Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 1.41 mW/g

**LTE7 Left Touch QPSK 20Mhz 1RB 0offset 20850ch/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.15 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 1.78 W/kg
**SAR(1 g) = 1.02 mW/g; SAR(10 g) = 0.559 mW/g**
Maximum value of SAR (measured) = 1.40 mW/g




0 dB = 1.40mW/g