

# SAR TEST REPORT

HCT CO., LTD

|                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |
|--------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| EUT Type:                                        | Cellular/ PCS GSM/EDGE Phone with Bluetooth & NFC<br>GPRS Class12 and GPRS mode class B(GPRS and GSM, but not simultaneously)                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |
| FCC ID:                                          | BEJA260                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |
| Model:                                           | LG-A260                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |
| Additional Model:                                | A260                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |
| Date of Issue:                                   | Oct. 11, 2010                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |
| Test report No.:                                 | HCTA1009FS03                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |
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| Testing has been carried out in accordance with: | RSS-102 Issue 4; Health Canada Safety Code 6<br>47CFR §2.1093<br>FCC OET Bulletin 65(Edition 97-01), Supplement C (Edition 01-01)<br>ANSI/ IEEE C95.1 – 2005<br>IEEE 1528-2003                                                                                                                                                                                                                                                                                                                                                                                                          |  |
| Test result:                                     | The tested device complies with the requirements in respect of all parameters subject to the test. The test results and statements relate only to the items tested. The test report shall not be reproduced except in full, without written approval of the laboratory.                                                                                                                                                                                                                                                                                                                 |  |
| Signature                                        | <div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;"> <br/> <hr style="width: 200px; margin: 0 auto;"/> Report prepared by<br/> : Young-Soo Jang<br/> Test Engineer of SAR Part </div> <div style="text-align: center;"> <br/> <hr style="width: 200px; margin: 0 auto;"/> Approved by<br/> : Jae-Sang So<br/> Manager of SAR Part </div> </div> |  |

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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 C95.1-2005 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 (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dV) of a given density ( $\rho$ ). It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body.

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

**Figure 2. 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 <sup>3</sup> ) |
| $E$      | = | Total RMS electric field strength (V/m)                           |

NOTE: The primary factors that control rate of energy absorption were found to be the wavelength of the incident field in 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. 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/EDGE Phone with Bluetooth & NFC<br>GPRS Class12 and GPRS mode class B(GPRS and GSM, but not simultaneously) |                  |    |
| FCC ID:                                | BEJA260                                                                                                                       |                  |    |
| Model:                                 | LG-A260                                                                                                                       |                  |    |
| Additional Model:                      | A260                                                                                                                          |                  |    |
| Trade Name                             | LG                                                                                                                            | Serial Number(s) | #1 |
| Application Type                       | Certification                                                                                                                 |                  |    |
| Mode(s) of Operation                   | GSM850/GSM1900                                                                                                                |                  |    |
| Tx Frequency                           | 824.20 - 848.80 MHz (GSM850)<br>1 850.20 – 1 909.80 MHz (GSM1900)                                                             |                  |    |
| Rx Frequency                           | 869.20 - 893.80 MHz (GSM850)<br>1 930.20 – 1 989.80 MHz (GSM1900)                                                             |                  |    |
| FCC Classification                     | Licensed Portable Transmitter Held to Ear (PCE)                                                                               |                  |    |
| Production Unit or Identical Prototype | Prototype                                                                                                                     |                  |    |
| Max SAR                                | 0.442 W/kg GSM850 Head SAR / 0.428 W/kg GSM850 Body SAR<br>1.14 W/kg GSM1900 Head SAR / 0.681 W/kg GSM1900 Body SAR           |                  |    |
| Date(s) of Tests                       | Oct. 9, 2010 ~ Oct. 10, 2010/ Oct. 22, 2010                                                                                   |                  |    |
| Antenna Type                           | Intenna                                                                                                                       |                  |    |

## **3. DESCRIPTION OF TEST EQUIPMENT**

### **3.1 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.3.1).

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.

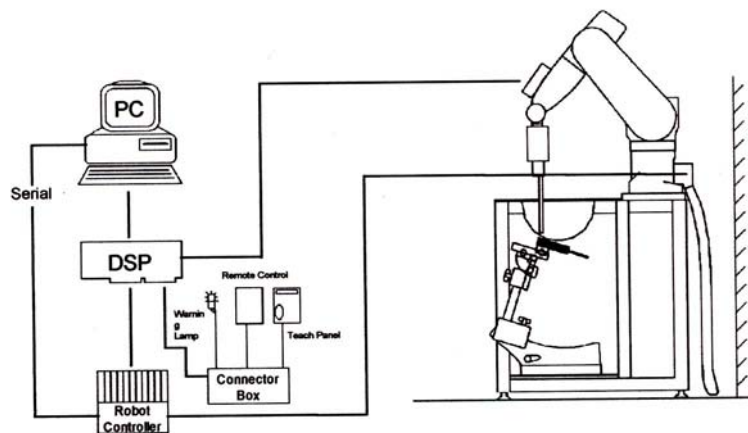


Figure 3.1 HCT SAR Lab. Test Measurement Set-up

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.

## 3.2 DASY4 E-FIELD PROBE SYSTEM

### 3.1 ES3DV3 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: $\pm 0.2$ dB (30 MHz to 4 GHz)                                                                                                                      |
| Directivity   | $\pm 0.2$ dB in HSL (rotation around probe axis)<br>$\pm 0.3$ dB in tissue material (rotation normal to probe axis)                                                             |
| Dynamic Range | 5 $\mu$ W/g to > 100 mW/g; Linearity: $\pm 0.2$ 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                                                                       |

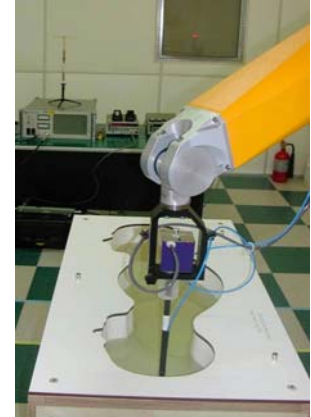


Figure 3.1 Photograph of the probe and the Phantom



Figure 3.2 ES3DV3 E-field Probe

The SAR measurements were conducted with the dosimetric probe ES3DV3, 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<sup>nd</sup> order fitting. The approach is stopped at reaching the maximum.

## 3.3 PROBE CALIBRATION PROCESS

### 3.3.1 E-Probe Calibration

Each probe is calibrated according to a dosimetric assessment procedure with an accuracy better than  $\pm 10 \%$ . The spherical isotropy was evaluated with the proper procedure and found to be better than  $\pm 0.25$  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 below 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<sup>3</sup> for brain tissue)

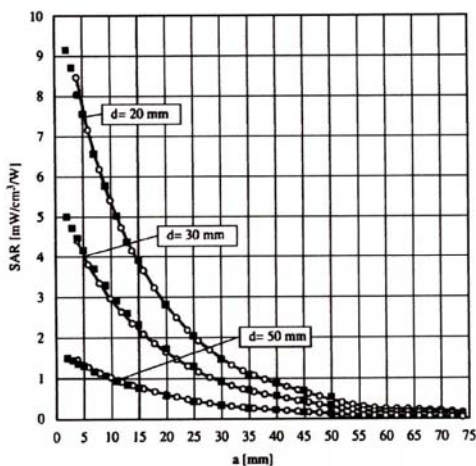


Figure 3.4 E-Field and Temperature measurements at 900 MHz

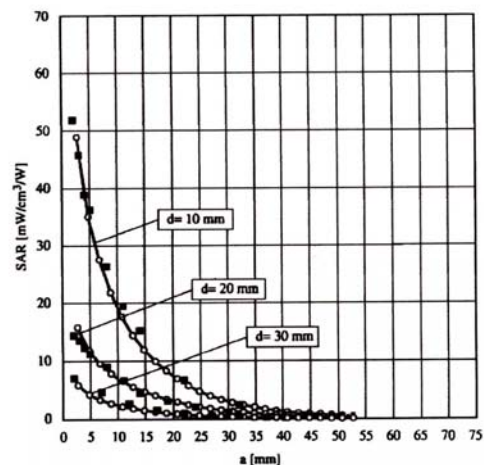


Figure 3.5 E-Field and temperature measurements at 1.8 GHz

### 3.3.2 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;

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

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 point (DASY parameter)

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

E-field probes:

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

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):

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

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

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

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]  
 $\rho$  = equivalent tissue density in g/cm<sup>3</sup>

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

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

with  $P_{pwe}$  = equivalent power density of a plane wave in W/cm<sup>2</sup>  
 $E_{tot}$  = total electric field strength in V/m

### **3.4 SAM Phantom**

The SAM Phantom is constructed of a fiberglass shell integrated in a wooden table. The shape of the shell is based on data from an anatomical study designed to determine the maximum exposure in at least 90 % of all users. 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 the evaporation of the liquid. Reference markings on the Phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot.

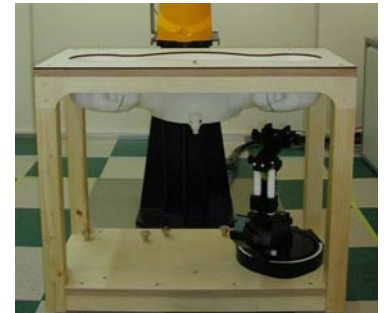


Figure 3.6 SAM Phantom

|                 |                                        |
|-----------------|----------------------------------------|
| Shell Thickness | 2.0 mm                                 |
| Filling Volume  | about 30 L                             |
| Dimensions      | 810 mm x 1 000 mm x 500 mm (H x L x W) |

### **3.5 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 repeatably 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 produce infinite number of configurations. To produce the Worst-case condition (the hand absorbs antenna output power), the hand is omitted during the tests.



Figure 3.7 Device Holder

### 3.6 Brain & Muscle Simulating Mixture Characterization

The brain and muscle mixtures consist of a viscous gel using hydrox-ethyl cellulose (HEC) gelling agent and saline solution (see Table 3.1). Preservation with a bactericide is added and visual inspection is made to make sure air bubbles are not trapped during the mixing process. The mixture is calibrated to obtain proper dielectric constant (permittivity) and conductivity of the desired tissue. The mixture characterizations used for the brain and muscle tissue simulating liquids are according to the data by C. Gabriel and G. Hartsgrove.

| Ingredients<br>(% by weight) | Frequency (MHz) |       |       |      |       |       |       |      |       |      |
|------------------------------|-----------------|-------|-------|------|-------|-------|-------|------|-------|------|
|                              | 450             |       | 835   |      | 915   |       | 1 900 |      | 2 450 |      |
| Tissue Type                  | Head            | Body  | Head  | Body | Head  | Body  | Head  | Body | Head  | Body |
| Water                        | 38.56           | 51.16 | 41.45 | 52.4 | 41.05 | 56.0  | 54.9  | 40.4 | 62.7  | 73.2 |
| Salt (NaCl)                  | 3.95            | 1.49  | 1.45  | 1.4  | 1.35  | 0.76  | 0.18  | 0.5  | 0.5   | 0.04 |
| Sugar                        | 56.32           | 46.78 | 56.0  | 45.0 | 56.5  | 41.76 | 0.0   | 58.0 | 0.0   | 0.0  |
| HEC                          | 0.98            | 0.52  | 1.0   | 1.0  | 1.0   | 1.21  | 0.0   | 1.0  | 0.0   | 0.0  |
| Bactericide                  | 0.19            | 0.05  | 0.1   | 0.1  | 0.1   | 0.27  | 0.0   | 0.1  | 0.0   | 0.0  |
| Triton X-100                 | 0.0             | 0.0   | 0.0   | 0.0  | 0.0   | 0.0   | 0.0   | 0.0  | 36.8  | 0.0  |
| DGBE                         | 0.0             | 0.0   | 0.0   | 0.0  | 0.0   | 0.0   | 44.92 | 0.0  | 0.0   | 26.7 |

|                           |                                                                    |        |                        |
|---------------------------|--------------------------------------------------------------------|--------|------------------------|
| 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 3.1 Composition of the Tissue Equivalent Matter**

### 3.7 SAR TEST EQUIPMENT

| Manufacturer | Type / Model                | S/N             | Calib. Date   | Calib.Interval | Calib.Due     |
|--------------|-----------------------------|-----------------|---------------|----------------|---------------|
| SPEAG        | SAM Phantom                 | -               | N/A           | N/A            | N/A           |
| Staubli      | Robot RX90L                 | F01/5K09A1/A/01 | N/A           | N/A            | N/A           |
| Staubli      | Robot ControllerCS7MB       | F99/5A82A1/C/01 | 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        | DAE3                        | 479             | Aug 19, 2010  | Annual         | Aug 19, 2011  |
| SPEAG        | E-Field Probe ES3DV3        | 3161            | Mar 22, 2010  | Annual         | Mar 22, 2011  |
| SPEAG        | Validation Dipole D450V2    | 1007            | July 15, 2010 | Biennial       | July 15, 2012 |
| SPEAG        | Validation Dipole D835V2    | 441             | May 21, 2010  | Annual         | May 21, 2011  |
| SPEAG        | Validation Dipole D1800V2   | 2d006           | Apr. 20, 2010 | Biennial       | Apr. 20, 2012 |
| SPEAG        | Validation Dipole D1900V2   | 5d032           | July 16, 2010 | Annual         | July 16, 2011 |
| Agilent      | Power Meter(F) E4419B       | MY41291386      | Nov. 05, 2009 | Annual         | Nov. 05, 2010 |
| Agilent      | Power Sensor(G) 8481        | MY41090870      | Nov. 05, 2009 | Annual         | Nov. 05, 2010 |
| HP           | Dielectric Probe Kit 85070C | 00721521        | N/A           | N/A            | N/A           |
| HP           | Dual Directional Coupler    | 16072           | Nov. 05, 2009 | Annual         | Nov. 05, 2010 |
| R&S          | Base Station CMU200         | 110740          | July 26, 2010 | Annual         | July 26, 2011 |
| Agilent      | Base Station E5515C         | GB44400269      | Feb. 10, 2010 | Annual         | Feb. 10, 2011 |
| HP           | Signal Generator E4438C     | MY42082646      | Dec. 24, 2009 | Annual         | Dec. 24, 2010 |
| HP           | Network Analyzer 8753C      | 3310J01394      | Dec. 04, 2009 | Annual         | Dec. 04, 2010 |

**NOTE:**

The E-field probe was calibrated by SPEAG, by the waveguide technique procedure. Dipole Validation measurement is performed by HCT Lab. before each test. The brain 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-equivalent material.

## 4. 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 20 mm x 20 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.

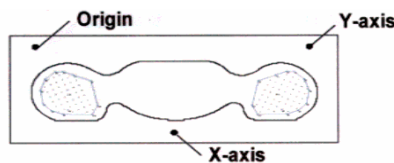


Figure 4.1 SAR Measurement Point in Area Scan

## 5. DESCRIPTION OF TEST POSITION

### 5.1 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 15° or until the device antenna touch the phantom. Please refer to IEEE 1528-2003 illustration below.

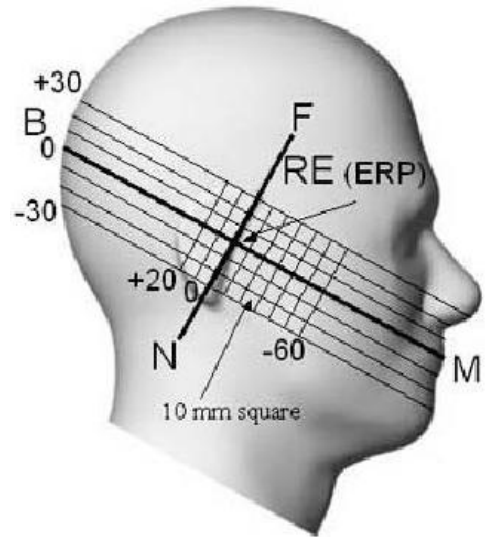


Figure 5.1 Side view of the phantom

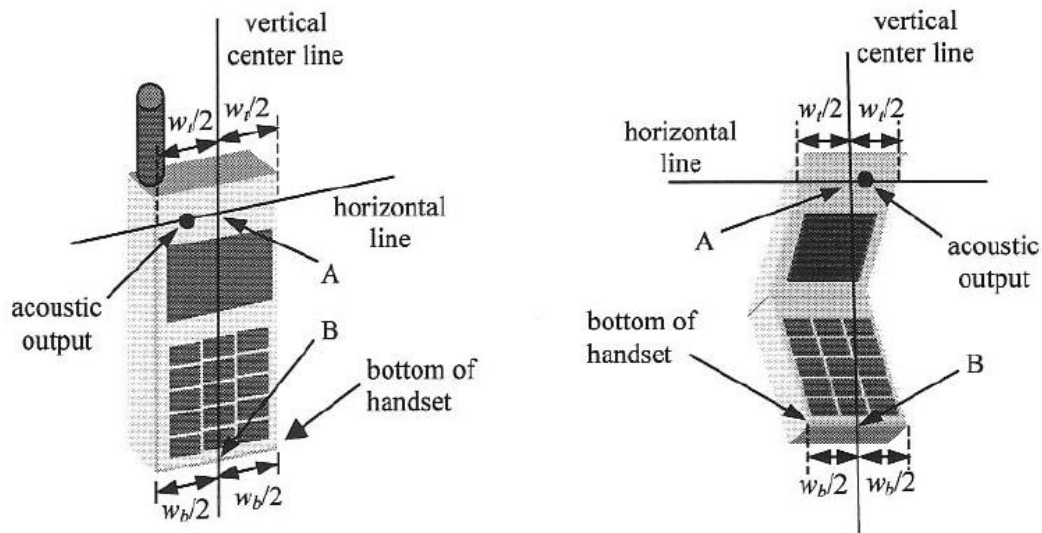


Figure 5.2 Handset vertical and horizontal reference lines

## **5.2 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 2.0 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.

## 6. MEASUREMENT UNCERTAINTY

Measurement uncertainties in SAR measurements are difficult to quantify due to several variables including biological, physiological, and environmental. However, we estimate the measurement uncertainties in SAR to be less than 15 % - 25 %.

According to ANSI/IEEE C95.3, the overall uncertainties are difficult to assess and will vary with the type of meter and usage situation. However, accuracy's of 1 dB to  $\pm 3$  dB can be expected in practice, with greater uncertainties in near-field situations and at higher frequencies (shorter wavelengths), or areas where large reflecting objects are present. Under optimum measurement conditions, SAR measurement uncertainties of at least  $\pm 2$  dB can be expected.

According to CENELEC, typical worst-case uncertainty of field measurements is 5 dB. For well-defined modulation characteristics the uncertainty can be reduced to  $\pm 3$  dB.

| Uncertainty Budegt |                             |            |       |      |              |             |           |             |                 |       |
|--------------------|-----------------------------|------------|-------|------|--------------|-------------|-----------|-------------|-----------------|-------|
| Frequency          | Error                       | Tol        | Prob. | Div. | $\epsilon_i$ | Standard    | $v_{eff}$ | Combined    | Expanded        |       |
| (MHz)              | Description                 | ( $\pm$ %) | dist. |      |              | Uncertainty |           | Uncertainty | STD Uncertainty |       |
|                    |                             |            |       |      |              | ( $\pm$ %)  |           | ( $\pm$ %)  | ( $\pm$ %)      |       |
|                    | 1. Measurement System       |            |       |      |              |             |           |             |                 |       |
|                    | Probe Calibration           | 5.50       | N     | 1    | 1            | 5.50        | $\infty$  |             |                 |       |
|                    | Axial Isotropy              | 4.70       | R     | 1.73 | 0.7          | 1.90        | $\infty$  |             |                 |       |
|                    | Hemispherical Isotropy      | 9.60       | R     | 1.73 | 0.7          | 3.88        | $\infty$  |             |                 |       |
|                    | Boundary Effects            | 1.00       | R     | 1.73 | 1            | 0.58        | $\infty$  |             |                 |       |
|                    | Linearity                   | 4.70       | R     | 1.73 | 1            | 2.71        | $\infty$  |             |                 |       |
|                    | System Detection Limits     | 1.00       | R     | 1.73 | 1            | 0.58        | $\infty$  |             |                 |       |
|                    | Readout Electronics         | 0.30       | N     | 1.00 | 1            | 0.30        | $\infty$  |             |                 |       |
|                    | Response Time               | 0.8        | R     | 1.73 | 1            | 0.46        | $\infty$  |             |                 |       |
|                    | Integration Time            | 2.6        | R     | 1.73 | 1            | 1.50        | $\infty$  |             |                 |       |
|                    | RF Ambient Noise            | 3.00       | R     | 1.73 | 1            | 1.73        | $\infty$  |             |                 |       |
|                    | RF Ambient Reflection       | 3.00       | R     | 1.73 | 1            | 1.73        | $\infty$  |             |                 |       |
|                    | Probe Positioner            | 0.40       | R     | 1.73 | 1            | 0.23        | $\infty$  |             |                 |       |
|                    | Probe Positioning           | 2.90       | R     | 1.73 | 1            | 1.67        | $\infty$  |             |                 |       |
|                    | Max SAR Eval                | 1.00       | R     | 1.73 | 1            | 0.58        | $\infty$  |             |                 |       |
|                    | 2. Test Sample Related      |            |       |      |              |             |           |             |                 |       |
|                    | Device Positioning          | 1.80       | N     | 1.00 | 1            | 1.80        | 9         |             |                 |       |
|                    | Device Holder               | 3.60       | N     | 1.00 | 1            | 3.60        | 5         |             |                 |       |
|                    | Power Drift                 | 5.00       | R     | 1.73 | 1            | 2.89        | $\infty$  |             |                 |       |
|                    | 3. Phantom and Setup        |            |       |      |              |             |           |             |                 |       |
|                    | Phantom Uncertainty         | 4.00       | R     | 1.73 | 1            | 2.31        | $\infty$  |             |                 |       |
|                    | Liquid Conductivity(target) | 5.00       | R     | 1.73 | 0.64         | 1.85        | $\infty$  |             |                 |       |
|                    | Liquid Permittivity(target) | 5.00       | R     | 1.73 | 0.60         | 1.73        | $\infty$  |             |                 |       |
| 835                | Liquid Permittivity(meas.)  | 1.69       | N     | 1    | 0.60         | 1.01        | $\infty$  | 10.53       | 2               | 21.06 |
| (Head)             | Liquid Conductivity(meas.)  | 3.44       | N     | 1    | 0.64         | 2.20        | $\infty$  |             |                 |       |
| 835                | Liquid Permittivity(meas.)  | 1.81       | N     | 1    | 0.60         | 1.09        | $\infty$  | 10.31       | 2               | 20.61 |
| (Body)             | Liquid Conductivity(meas.)  | 0.00       | N     | 1    | 0.64         | 0.00        | $\infty$  |             |                 |       |
| 1900               | Liquid Permittivity(meas.)  | 3.50       | N     | 1    | 0.60         | 2.10        | $\infty$  | 10.46       | 2               | 20.92 |
| (Head)             | Liquid Conductivity(meas.)  | 0.00       | N     | 1    | 0.64         | 0.00        | $\infty$  |             |                 |       |
| 1900               | Liquid Permittivity(meas.)  | 0.62       | N     | 1    | 0.60         | 0.37        | $\infty$  | 10.33       | 2               | 20.67 |
| (Body)             | Liquid Conductivity(meas.)  | 1.97       | N     | 1    | 0.64         | 1.26        | $\infty$  |             |                 |       |

**Table 6.1 Breakdown of Errors**

## 7. ANSI/ IEEE C95.1 - 2005 RF EXPOSURE LIMITS

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

**Table 7.1 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).

## 8. SYSTEM VERIFICATION

### 8.1 Tissue Verification

| Freq.<br>[MHz] | Date          | Liquid | Liquid<br>Temp.[°C] | Parameters   | Target<br>Value | Measured<br>Value | Deviation<br>[%] | Limit<br>[%] |
|----------------|---------------|--------|---------------------|--------------|-----------------|-------------------|------------------|--------------|
| 835            | Oct. 9, 2010  | Head   | 21.2                | $\epsilon_r$ | 41.5            | 42.2              | + 1.69           | $\pm 5$      |
|                |               |        |                     | $\sigma$     | 0.90            | 0.869             | - 3.44           | $\pm 5$      |
| 835            | Oct. 9, 2010  | Body   | 21.2                | $\epsilon_r$ | 55.2            | 54.2              | - 1.81           | $\pm 5$      |
|                |               |        |                     | $\sigma$     | 0.97            | 0.97              | 0.00             | $\pm 5$      |
| 1 900          | Oct. 10, 2010 | Head   | 21.1                | $\epsilon_r$ | 40.0            | 41.4              | + 3.50           | $\pm 5$      |
|                |               |        |                     | $\sigma$     | 1.40            | 1.4               | 0.00             | $\pm 5$      |
| 1 900          | Oct. 10, 2010 | Body   | 21.1                | $\epsilon_r$ | 53.3            | 53.63             | + 0.62           | $\pm 5$      |
|                |               |        |                     | $\sigma$     | 1.52            | 1.49              | - 1.97           | $\pm 5$      |
| 835            | Oct. 22, 2010 | Head   | 21.4                | $\epsilon_r$ | 41.5            | 42.0              | + 1.20           | $\pm 5$      |
|                |               |        |                     | $\sigma$     | 0.90            | 0.892             | - 0.89           | $\pm 5$      |
| 835            | Oct. 22, 2010 | Body   | 21.4                | $\epsilon_r$ | 55.2            | 56.8              | + 2.90           | $\pm 5$      |
|                |               |        |                     | $\sigma$     | 0.97            | 0.981             | + 1.13           | $\pm 5$      |

### 8.2 System Validation

Prior to assessment, the system is verified to the  $\pm 10\%$  of the specifications at 835 MHz / 1 900 MHz by using the system validation kit. (Graphic Plots Attached)

\* Input Power: 100 m W

| Freq.<br>[MHz] | Date          | Liquid | Liquid<br>Temp.<br>[°C] | SAR<br>Average | Target Value<br>(SPEAG)<br>(mW/g) | *Measured<br>Value<br>(mW/g) | Deviation<br>[%] | Limit<br>[%] |
|----------------|---------------|--------|-------------------------|----------------|-----------------------------------|------------------------------|------------------|--------------|
| 835            | Oct. 9, 2010  | Head   | 21.2                    | 1 g            | 9.66                              | 0.964                        | - 0.20           | $\pm 10$     |
| 1 900          | Oct. 10, 2010 | Head   | 21.1                    | 1 g            | 39.9                              | 4.07                         | + 2.0            | $\pm 10$     |
| 835            | Oct. 22 2010  | Head   | 21.4                    | 1 g            | 9.66                              | 0.958                        | - 0.83           | $\pm 10$     |

## 9. RF CONDUCTED POWER

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

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

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[4] 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 than 5 % occurred, the tests were repeated.

| Band        | Channel | Voice        | GPRS Data                  |                            |                            |                            | EDGE Data                  |                            |                            |                            |
|-------------|---------|--------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
|             |         | GSM<br>(dBm) | GPRS<br>1 TX Slot<br>(dBm) | GPRS<br>2 TX Slot<br>(dBm) | GPRS<br>3 TX Slot<br>(dBm) | GPRS<br>4 TX Slot<br>(dBm) | EDGE<br>1 TX Slot<br>(dBm) | EDGE<br>2 TX Slot<br>(dBm) | EDGE<br>3 TX Slot<br>(dBm) | EDGE<br>4 TX Slot<br>(dBm) |
| GSM<br>850  | 128     | 33.03        | 33.02                      | 30.97                      | 29.09                      | 27.92                      | 27.10                      | 27.07                      | 27.07                      | 27.07                      |
|             | 190     | 33.00        | 32.99                      | 30.93                      | 29.06                      | 27.89                      | 27.07                      | 27.05                      | 27.04                      | 27.04                      |
|             | 251     | 33.02        | 33.01                      | 30.96                      | 29.08                      | 27.91                      | 27.07                      | 27.06                      | 27.04                      | 27.04                      |
| GSM<br>1900 | 512     | 30.02        | 30.03                      | 29.95                      | 29.89                      | 29.78                      | 26.03                      | 26.01                      | 25.98                      | 25.96                      |
|             | 661     | 30.20        | 30.19                      | 30.13                      | 30.02                      | 29.93                      | 26.09                      | 26.05                      | 26.03                      | 26.01                      |
|             | 810     | 30.10        | 30.10                      | 30.05                      | 29.91                      | 29.83                      | 26.04                      | 26.02                      | 25.98                      | 25.96                      |

Table 10.1 GSM Conducted output powers

## 10. SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas

### 10.1 SAR Evaluation Considerations

These procedures were followed according to FCC "SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas", May 2008. The procedures are applicable to phones with built-in unlicensed transmitters, such as 802.11 a/b/g and Bluetooth devices.

|           | 2.45 | 5.15 - 5.35 | 5.47 - 5.85 | GHz |
|-----------|------|-------------|-------------|-----|
| $P_{Ref}$ | 12   | 6           | 5           | mW  |

Device output power should be rounded to the nearest mW to compare with values specified in this

Table. 11.1 Output Power Thresholds for Unlicensed Transmitters

|                         | Individual Transmitter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Simultaneous Transmission                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Licensed Transmitters   | <u>Routine evaluation required</u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>SAR not required:</b><br><u>Unlicensed only</u><br><ul style="list-style-type: none"> <li>when stand-alone 1-g SAR is not required and antenna is <math>\geq 5</math> cm from other antennas</li> </ul> <u>Licensed &amp; Unlicensed</u><br><ul style="list-style-type: none"> <li>when the sum of the 1-g SAR is <math>&lt; 1.6</math> W/kg for all simultaneous transmitting antennas</li> <li>when SAR to peak location separation ratio of simultaneous transmitting antenna pair is <math>&lt; 0.3</math></li> </ul> <b>SAR required:</b><br><u>Licensed &amp; Unlicensed</u><br>antenna pairs with SAR to peak location separation ratio $\geq 0.3$ ; test is only required for the configuration that results in the highest SAR in stand-alone configuration for each wireless mode and exposure condition<br><b>Note: simultaneous transmission exposure conditions for head and body can be different for different style phones; therefore, different test requirements may apply</b> |
| Unlicensed Transmitters | <u>When there is no simultaneous transmission –</u> <ul style="list-style-type: none"> <li>output <math>\leq 60</math> f: SAR not required</li> <li>output <math>&gt; 60</math> f: stand-alone SAR required</li> </ul> <u>When there is simultaneous transmission –</u><br><u>Stand-alone SAR not required when</u> <ul style="list-style-type: none"> <li>output <math>\leq 2 \cdot P_{Ref}</math> and antenna is <math>\geq 5.0</math> cm from other antennas</li> <li>output <math>\leq P_{Ref}</math> and antenna is <math>\geq 2.5</math> cm from other antennas</li> <li>output <math>\leq P_{Ref}</math> and antenna is <math>&lt; 2.5</math> cm from other antennas, each with either output power <math>\leq P_{Ref}</math> or 1-g SAR <math>&lt; 1.2</math> W/kg</li> </ul> <u>Otherwise stand-alone SAR is required</u><br><u>When stand-alone SAR is required</u> <ul style="list-style-type: none"> <li>test SAR on highest output channel for each wireless mode and exposure condition</li> <li>if SAR for highest output channel is <math>&gt; 50\%</math> of SAR limit, evaluate all channels according to normal procedures</li> </ul> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Jaw, Mouth and Nose     | <u>Flat phantom SAR required</u> <ul style="list-style-type: none"> <li>when measurement is required in tight regions of SAM and it is not feasible or the results can be questionable due to probe tilt, calibration, positioning and orientation issues</li> <li>position rectangular and clam-shell phones according to flat phantom procedures and conduct SAR measurements for these specific locations</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | When simultaneous transmission SAR testing is required, contact the FCC Laboratory for interim guidance.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

Table. 11.2 SAR Evaluation Requirements for Cellphones with Multiple Transmitters

FCC ID: BEJA260

BT Max. RF output power: 5.52 dBm (3.56 mW)

Antenna separation distance between Main and BT: 3.1 cm

Antenna separation distance between Main and NFC: 1.13 cm

The conducted output power level of the BT transmitter is less than  $P_{ref}$ , the BT antenna is more than 2.5 cm from the Main antenna, and licensed Transmitter SAR is 0.681 W/kg for body, which are less than 1.2 W/kg, therefore, a stand-alone BT SAR evaluation is not required.

The NFC transmitter can operate simultaneously. However, the NFC transmitter is a low power device (radiated power  $< 1$  mW). Therefore, we did not conduct the SAR testing.

## 11. SAR TEST DATA SUMMARY

### 11.1 Measurement Results (GSM850 Head SAR Touch)

| Frequency                                                                                                              |           | Modulation | Conducted Power (dBm) |       | Battery  | Phantom Position                                                             | Antenna Type | SAR(mW/g) |
|------------------------------------------------------------------------------------------------------------------------|-----------|------------|-----------------------|-------|----------|------------------------------------------------------------------------------|--------------|-----------|
| MHz                                                                                                                    | Channel   |            | Begin                 | End   |          |                                                                              |              |           |
| 836.6                                                                                                                  | 190 (Mid) | GSM850     | 33.00                 | 32.95 | Standard | Left Ear                                                                     | Intenna      | 0.431     |
| 836.6                                                                                                                  | 190 (Mid) | GSM850     | 33.00                 | 32.96 | Standard | Right Ear                                                                    | Intenna      | 0.442     |
| <b>ANSI/ IEEE C95.1 2005 – Safety Limit</b><br><b>Spatial Peak</b><br><b>Uncontrolled Exposure/ General Population</b> |           |            |                       |       |          | <b>Head</b><br><b>1.6 W/kg (mW/g)</b><br><small>Averaged over 1 gram</small> |              |           |

**NOTES:**

- The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
- All modes of operation were investigated and the worst-case are reported.
- Measured Depth of Simulating Tissue is 15.0 cm  $\pm$  0.2 cm.
- Tissue parameters and temperatures are listed on the SAR plot.
- Battery Type ☒ Standard ☐ Extended ☐ Slim  
Batteries are fully charged for all readings.
- Test Signal Call Mode ☐ Manual Test cord ☒ Base Station Simulator
- Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

## 11.2 Measurement Results (GSM850 Head SAR Tilt)

| Frequency                                                                                                              |           | Modulation | Conducted Power (dBm) |       | Battery  | Phantom Position                                              | Antenna Type | SAR(mW/g) |
|------------------------------------------------------------------------------------------------------------------------|-----------|------------|-----------------------|-------|----------|---------------------------------------------------------------|--------------|-----------|
| MHz                                                                                                                    | Channel   |            | Begin                 | End   |          |                                                               |              |           |
| 836.6                                                                                                                  | 190 (Mid) | GSM850     | 33.00                 | 32.96 | Standard | Left Tilt 15°                                                 | Intenna      | 0.236     |
| 836.6                                                                                                                  | 190 (Mid) | GSM850     | 33.00                 | 33.05 | Standard | Right Tilt 15°                                                | Intenna      | 0.239     |
| <b>ANSI/ IEEE C95.1 2005 – Safety Limit</b><br><b>Spatial Peak</b><br><b>Uncontrolled Exposure/ General Population</b> |           |            |                       |       |          | <b>Head</b><br><b>1.6 W/kg (mW/g)</b><br>Averaged over 1 gram |              |           |

**NOTES:**

- The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
- All modes of operation were investigated and the worst-case are reported.
- Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
- Tissue parameters and temperatures are listed on the SAR plot.
- Battery Type ☒ Standard ☐ Extended ☐ Slim  
Batteries are fully charged for all readings.
- Test Signal Call Mode ☐ Manual Test cord ☒ Base Station Simulator
- Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

## 11.3 Measurement Results (GSM1900 Head SAR Touch)

| Frequency                                                                                                              |            | Modulation | Conducted Power (dBm) |       | Battery  | Phantom Position                                                             | Antenna Type | SAR(mW/g) |
|------------------------------------------------------------------------------------------------------------------------|------------|------------|-----------------------|-------|----------|------------------------------------------------------------------------------|--------------|-----------|
| MHz                                                                                                                    | Channel    |            | Begin                 | End   |          |                                                                              |              |           |
| 1 850.2                                                                                                                | 512 (Low)  | GSM1900    | 30.02                 | 30.01 | Standard | Left Ear                                                                     | Intenna      | 1.13      |
| 1 880.0                                                                                                                | 661 (Mid)  | GSM1900    | 30.20                 | 30.11 | Standard | Left Ear                                                                     | Intenna      | 1.14      |
| 1 909.8                                                                                                                | 810 (High) | GSM1900    | 30.10                 | 30.09 | Standard | Left Ear                                                                     | Intenna      | 1.11      |
| 1 850.2                                                                                                                | 512 (Low)  | GSM1900    | 30.02                 | 30.03 | Standard | Right Ear                                                                    | Intenna      | 0.938     |
| 1 880.0                                                                                                                | 661 (Mid)  | GSM1900    | 30.20                 | 30.35 | Standard | Right Ear                                                                    | Intenna      | 0.944     |
| 1 909.8                                                                                                                | 810 (High) | GSM1900    | 30.10                 | 30.02 | Standard | Right Ear                                                                    | Intenna      | 0.823     |
| <b>ANSI/ IEEE C95.1 2005 – Safety Limit</b><br><b>Spatial Peak</b><br><b>Uncontrolled Exposure/ General Population</b> |            |            |                       |       |          | <b>Head</b><br><b>1.6 W/kg (mW/g)</b><br><small>Averaged over 1 gram</small> |              |           |

**NOTES:**

- The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
- All modes of operation were investigated and the worst-case are reported.
- Measured Depth of Simulating Tissue is 15.0 cm  $\pm$  0.2 cm.
- Tissue parameters and temperatures are listed on the SAR plot.
- Battery Type ☒ Standard ☐ Extended ☐ Slim  
Batteries are fully charged for all readings.
- Test Signal Call Mode ☐ Manual Test cord ☒ Base Station Simulator
- Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

## 11.4 Measurement Results (GSM1900 Head SAR Tilt)

| Frequency                                                                                                              |           | Modulation | Conducted Power (dBm) |       | Battery  | Phantom Position                                              | Antenna Type | SAR(mW/g) |
|------------------------------------------------------------------------------------------------------------------------|-----------|------------|-----------------------|-------|----------|---------------------------------------------------------------|--------------|-----------|
| MHz                                                                                                                    | Channel   |            | Begin                 | End   |          |                                                               |              |           |
| 1 880.0                                                                                                                | 661 (Mid) | GSM1900    | 30.20                 | 30.14 | Standard | Left Tilt 15°                                                 | Intenna      | 0.2       |
| 1 880.0                                                                                                                | 661 (Mid) | GSM1900    | 30.20                 | 30.23 | Standard | Right Tilt 15°                                                | Intenna      | 0.231     |
| <b>ANSI/ IEEE C95.1 2005 – Safety Limit</b><br><b>Spatial Peak</b><br><b>Uncontrolled Exposure/ General Population</b> |           |            |                       |       |          | <b>Head</b><br><b>1.6 W/kg (mW/g)</b><br>Averaged over 1 gram |              |           |

**NOTES:**

- The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
- All modes of operation were investigated and the worst-case are reported.
- Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
- Tissue parameters and temperatures are listed on the SAR plot.
- Battery Type ☒ Standard ☐ Extended ☐ Slim  
Batteries are fully charged for all readings.
- Test Signal Call Mode ☐ Manual Test cord ☒ Base Station Simulator
- Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

## 11.5 Measurement Results (GSM850 Body SAR)

| Frequency                                                                                                              |           | Modulation | Conducted Power (dBm) |       | Configuration | Phantom Position                                              | Antenna Type | SAR(mW/g) |
|------------------------------------------------------------------------------------------------------------------------|-----------|------------|-----------------------|-------|---------------|---------------------------------------------------------------|--------------|-----------|
| MHz                                                                                                                    | Channel   |            | Begin                 | End   |               |                                                               |              |           |
| 836.6                                                                                                                  | 190 (Mid) | GPRS 1Tx   | 32.99                 | 32.95 | Rear          | 2.0 cm without Holster                                        | Intenna      | 0.329     |
| 836.6                                                                                                                  | 190 (Mid) | GPRS 2Tx   | 30.93                 | 30.93 | Rear          | 2.0 cm without Holster                                        | Intenna      | 0.428     |
| 836.6                                                                                                                  | 190 (Mid) | GPRS 3Tx   | 29.06                 | 29.09 | Rear          | 2.0 cm without Holster                                        | Intenna      | 0.408     |
| 836.6                                                                                                                  | 190 (Mid) | GPRS 4Tx   | 27.89                 | 27.80 | Rear          | 2.0 cm without Holster                                        | Intenna      | 0.419     |
| 836.6                                                                                                                  | 190 (Mid) | GSM        | 33.00                 | 32.93 | Rear          | 2.0 cm without Holster                                        | Intenna      | 0.327     |
| 836.6                                                                                                                  | 190 (Mid) | EDGE 3 Tx  | 27.04                 | 26.99 | Rear          | 2.0 cm without Holster                                        | Intenna      | 0.249     |
| 836.6                                                                                                                  | 190 (Mid) | EDGE 4 Tx  | 27.04                 | 26.99 | Rear          | 2.0 cm without Holster                                        | Intenna      | 0.373     |
| <b>ANSI/ IEEE C95.1 2005 – Safety Limit</b><br><b>Spatial Peak</b><br><b>Uncontrolled Exposure/ General Population</b> |           |            |                       |       |               | <b>Body</b><br><b>1.6 W/kg (mW/g)</b><br>Averaged over 1 gram |              |           |

**NOTES:**

- The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
- All modes of operation were investigated and the worst-case are reported.
- Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
- Tissue parameters and temperatures are listed on the SAR plot.
- Battery Type ☒ Standard ☐ Extended ☐ Slim  
Batteries are fully charged for all readings.
- Test Signal Call Mode ☐ Manual Test cord ☒ Base Station Simulator
- Both side of the phone were tested and the worst-case side is reported.
- Test Configuration ☐ With Holster ☒ Without Holster
- HEADSET was connected.
- Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

## 11.6 Measurement Results (GSM1900 Body SAR)

| Frequency                                                                                                              |           | Modulation | Conducted Power (dBm) |       | Configuration | Phantom Position                                              | Antenna Type | SAR(mW/g) |
|------------------------------------------------------------------------------------------------------------------------|-----------|------------|-----------------------|-------|---------------|---------------------------------------------------------------|--------------|-----------|
| MHz                                                                                                                    | Channel   |            | Begin                 | End   |               |                                                               |              |           |
| 1 880.0                                                                                                                | 661 (Mid) | GPRS 1Tx   | 30.19                 | 30.23 | Rear          | 2.0 cm without Holster                                        | Intenna      | 0.187     |
| 1 880.0                                                                                                                | 661 (Mid) | GPRS 2Tx   | 30.13                 | 30.18 | Rear          | 2.0 cm without Holster                                        | Intenna      | 0.365     |
| 1 880.0                                                                                                                | 661 (Mid) | GPRS 3Tx   | 30.02                 | 29.95 | Rear          | 2.0 cm without Holster                                        | Intenna      | 0.535     |
| 1 880.0                                                                                                                | 661 (Mid) | GPRS 4Tx   | 29.93                 | 29.92 | Rear          | 2.0 cm without Holster                                        | Intenna      | 0.681     |
| 1 880.0                                                                                                                | 661 (Mid) | GSM        | 30.20                 | 30.18 | Rear          | 2.0 cm without Holster                                        | Intenna      | 0.178     |
| <b>ANSI/ IEEE C95.1 2005 – Safety Limit</b><br><b>Spatial Peak</b><br><b>Uncontrolled Exposure/ General Population</b> |           |            |                       |       |               | <b>Body</b><br><b>1.6 W/kg (mW/g)</b><br>Averaged over 1 gram |              |           |

### NOTES:

- The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
- All modes of operation were investigated and the worst-case are reported.
- Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
- Tissue parameters and temperatures are listed on the SAR plot.
- Battery Type ☒ Standard ☐ Extended ☐ Slim  
Batteries are fully charged for all readings.
- Test Signal Call Mode ☐ Manual Test cord ☒ Base Station Simulator
- Both side of the phone were tested and the worst-case side is reported.
- Test Configuration ☐ With Holster ☒ Without Holster
- HEADSET was connected.
- Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

## 12. CONCLUSION

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The SAR measurement indicates that the EUT complies with the RF radiation exposure limits of the ANSI/IEEE C95.1 2005.

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.

## 13. REFERENCES

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- [1] Federal Communications Commission, OET Bulletin 65 (Edition 97-01), Supplement C (Edition 01-01), Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields, July 2001.
- [2] IEEE Standards Coordinating Committee 34 – IEEE Std. 1528-2003, IEE Recommended Practice or Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body from Wireless Communications Devices.
- [3] Federal Communications Commission, ET Docket 93-62, Guidelines for Evaluating the Environmental Effects of Radio frequency Radiation, Aug. 1996.
- [4] ANSI/IEEE C95.1 - 1991, American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 300 kHz to 100 GHz, New York: IEEE, Aug. 1992
- [5] ANSI/IEEE C95.3 - 1991, IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave, New York: IEEE, 1992.
- [6] NCRP, National Council on Radiation Protection and Measurements, Biological Effects and Exposure Criteria for Radio Frequency Electromagnetic Fields, NCRP Report No. 86, 1986. Reprinted Feb. 1995.
- [7] T. Schmid, O. Egger, N. Kuster, Automated E-field scanning system for dosimetric assessments, IEEE Transaction on Microwave Theory and Techniques, vol. 44, Jan. 1996, pp. 105-113.
- [8] K. Pokovic, T. Schmid, N. Kuster, Robust setup for precise calibration of E-field probes in tissue simulating liquids at mobile communications frequencies, ICECOM97, Oct. 1997, pp. 120-124.
- [9] K. Poković, T. Schmid, and N. Kuster, E-field Probe with improved isotropy in brain simulating liquids, Proceedings of the ELMAR, Zadar, Croatia, June 23-25, 1996, pp. 172-175.
- [10] Schmid & Partner Engineering AG, Application Note: Data Storage and Evaluation, June 1998, p2.
- [11] V. Hombach, K. Meier, M. Burkhardt, E. Kuhn, N. Kuster, The Dependence of EM Energy Absorption upon Human Head Modeling at 900 MHz, IEEE Transaction on Microwave Theory and Techniques, vol. 44 no. 10, Oct. 1996, pp. 1865-1873.
- [12] N. Kuster and Q. Balzano, Energy absorption mechanism by biological bodies in the near field of dipole antennas above 300 MHz, IEEE Transaction on Vehicular Technology, vol. 41, no. 1, Feb. 1992, pp. 17-23.
- [13] G. Hartsgrrove, A. Kraszewski, A. Surowiec, Simulated Biological Materials for Electromagnetic Radiation Absorption Studies, University of Ottawa, Bioelectro magnetics, Canada: 1987, pp. 29-36.
- [14] Q. Balzano, O. Garay, T. Manning Jr., Electromagnetic Energy Exposure of Simulated Users of Portable Cellular Telephones, IEEE Transactions on Vehicular Technology, vol. 44, no.3, Aug. 1995.
- [15] W. Gander, Computer mathematick, Birkhaeuser, Basel, 1992.
- [16] W.H. Press, S.A. Teukolsky, W.T. Vetterling, and B.P. Flannery, Numerical Recepies in C, The Art of Scientific Computing, Second edition, Cambridge University Press, 1992.
- [17] Federal Communications Commission, OET Bulletin 65, Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields. Supplement C, Dec. 1997.
- [18] N. Kuster, R. Kastle, T. Schmid, Dosimetric evaluation of mobile communications equipment with known precision, IEEE Transaction on Communications, vol. E80-B, no. 5, May 1997, pp. 645-652.
- [19] CENELEC CLC/SC111B, European Prestandard (prENV 50166-2), Human Exposure to Electromagnetic Fields High-frequency: 10 kHz-300 GHz, Jan. 1995.
- [20] Prof. Dr. Niels Kuster, ETH, EidgenØssische Technische Hoschschule ZØrich, Dosimetric Evaluation of the Cellular Phone.
- [21] SAR Evaluation of Handsets with Multiple Transmitters and Antennas #648474.
- [22] SAR Measurement Procedure for 802.11 a/b/g Transmitters #KDB 248227.

## Attachment 1. – SAR Test Plots

Test Laboratory: HCT CO., LTD

EUT Type: Cellular/ PCS GSM/EDGE Phone with Bluetooth &amp; NFC

GPRS Class12 and GPRS mode class B(GPRS and GSM, but not simultaneously)

Liquid Temperature: 21.2 °C

Ambient Temperature: 21.4 °C

Test Date: Oct. 9, 2010

**DUT: LG-A260; Type: Bar; Serial: #1**

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium parameters used (interpolated):  $f = 836.6$  MHz;  $\sigma = 0.871$  mho/m;  $\epsilon_r = 42.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ES3DV3 - SN3161; ConvF(5.96, 5.96, 5.96); Calibrated: 2010-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn479; Calibrated: 2010-08-19
- Phantom: 835/900 Phantom ; Type: SAM

**Left touch 190/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.457 mW/g

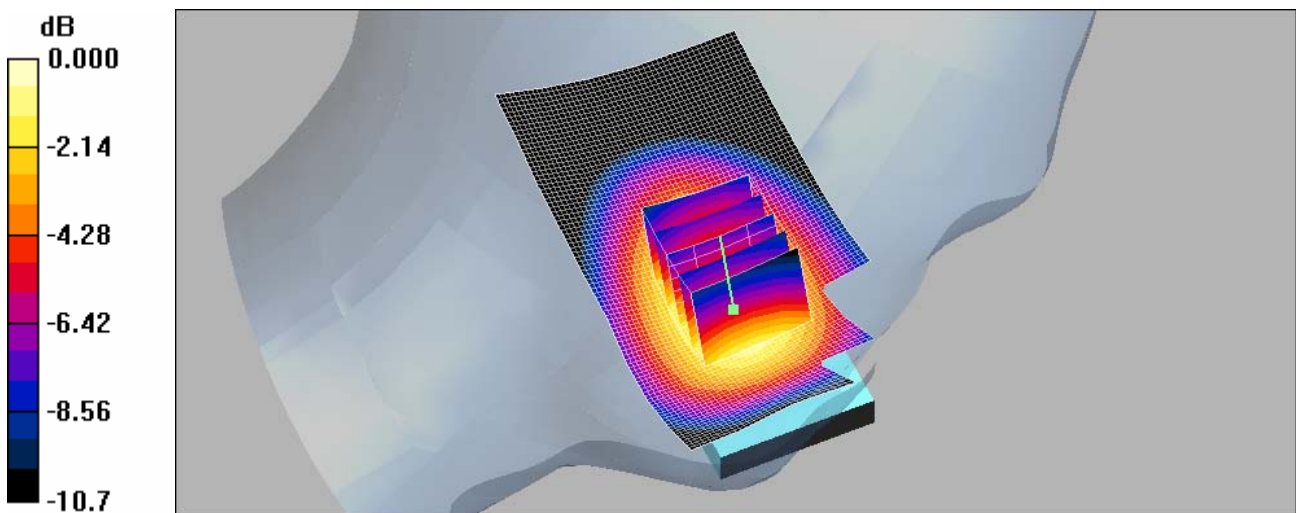
**Left touch 190/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 7.22 V/m; Power Drift = -0.052 dB

Peak SAR (extrapolated) = 0.575 W/kg

**SAR(1 g) = 0.431 mW/g; SAR(10 g) = 0.305 mW/g**[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.464 mW/g



0 dB = 0.464mW/g

Test Laboratory: HCT CO., LTD

EUT Type: Cellular/ PCS GSM/EDGE Phone with Bluetooth &amp; NFC

GPRS Class12 and GPRS mode class B(GPRS and GSM, but not simultaneously)

Liquid Temperature: 21.2 °C

Ambient Temperature: 21.4 °C

Test Date: Oct. 9, 2010

**DUT: LG-A260; Type: Bar; Serial: #1**

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium parameters used (interpolated):  $f = 836.6 \text{ MHz}$ ;  $\sigma = 0.871 \text{ mho/m}$ ;  $\epsilon_r = 42.2$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ES3DV3 - SN3161; ConvF(5.96, 5.96, 5.96); Calibrated: 2010-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn479; Calibrated: 2010-08-19
- Phantom: 835/900 Phantom ; Type: SAM

**Right touch 190/Area Scan (51x91x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$ [Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.475 mW/g

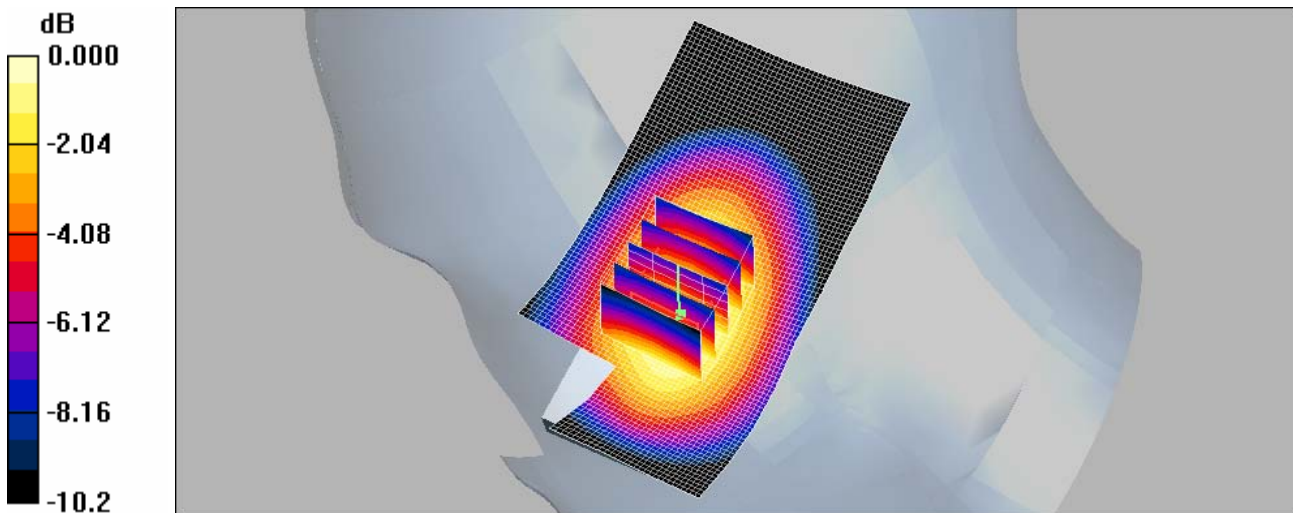
**Right touch 190/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$ 

Reference Value = 8.17 V/m; Power Drift = -0.045 dB

Peak SAR (extrapolated) = 0.587 W/kg

**SAR(1 g) = 0.442 mW/g; SAR(10 g) = 0.313 mW/g**[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.474 mW/g



0 dB = 0.474mW/g

Test Laboratory: HCT CO., LTD

EUT Type: Cellular/ PCS GSM/EDGE Phone with Bluetooth & NFC

GPRS Class12 and GPRS mode class B(GPRS and GSM, but not simultaneously)

Liquid Temperature: 21.2 °C

Ambient Temperature: 21.4 °C

Test Date: Oct. 9, 2010

**DUT: LG-A260; Type: Bar; Serial: #1**

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium parameters used (interpolated):  $f = 836.6$  MHz;  $\sigma = 0.871$  mho/m;  $\epsilon_r = 42.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ES3DV3 - SN3161; ConvF(5.96, 5.96, 5.96); Calibrated: 2010-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn479; Calibrated: 2010-08-19
- Phantom: 835/900 Phantom ; Type: SAM

**Left tilt 190/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.252 mW/g

**Left tilt 190/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

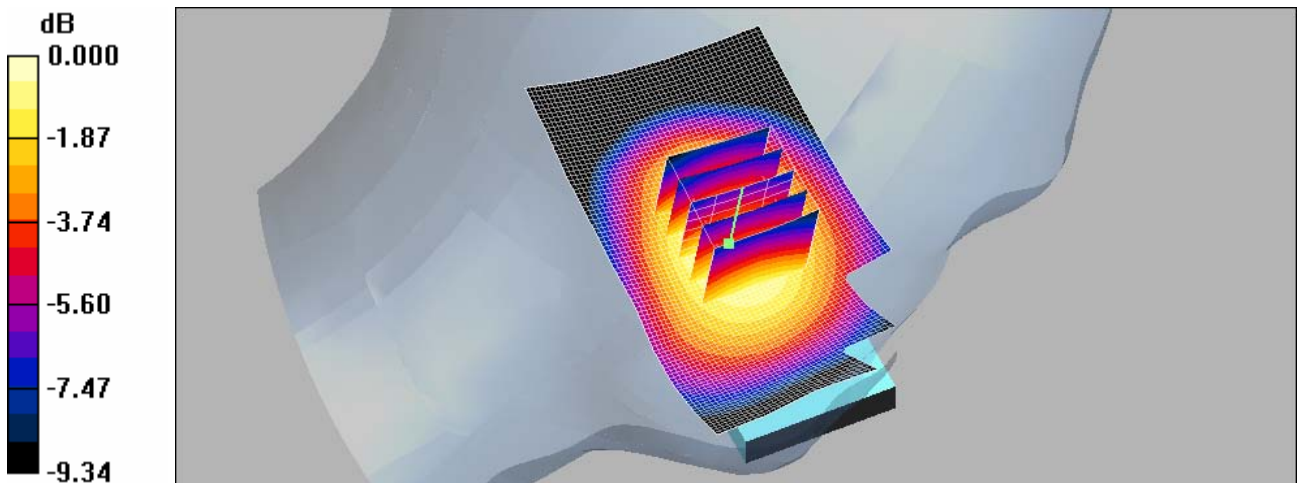
Reference Value = 9.70 V/m; Power Drift = -0.042 dB

Peak SAR (extrapolated) = 0.309 W/kg

**SAR(1 g) = 0.236 mW/g; SAR(10 g) = 0.172 mW/g**

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.250 mW/g



0 dB = 0.250mW/g

Test Laboratory: HCT CO., LTD

EUT Type: Cellular/ PCS GSM/EDGE Phone with Bluetooth & NFC

GPRS Class12 and GPRS mode class B(GPRS and GSM, but not simultaneously)

Liquid Temperature: 21.2 °C

Ambient Temperature: 21.4 °C

Test Date: Oct. 9, 2010

**DUT: LG-A260; Type: Bar; Serial: #1**

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium parameters used (interpolated):  $f = 836.6 \text{ MHz}$ ;  $\sigma = 0.871 \text{ mho/m}$ ;  $\epsilon_r = 42.2$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ES3DV3 - SN3161; ConvF(5.96, 5.96, 5.96); Calibrated: 2010-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn479; Calibrated: 2010-08-19
- Phantom: 835/900 Phantom ; Type: SAM

**Right tilt 190/Area Scan (51x91x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.256 mW/g

**Right tilt 190/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

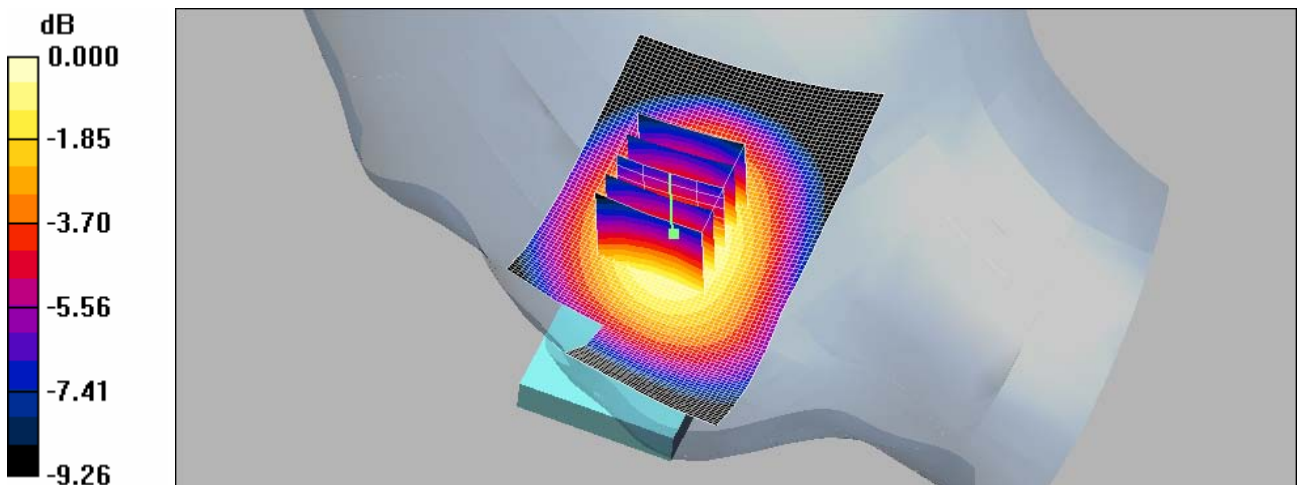
Reference Value = 11.0 V/m; Power Drift = 0.047 dB

Peak SAR (extrapolated) = 0.311 W/kg

**SAR(1 g) = 0.239 mW/g; SAR(10 g) = 0.174 mW/g**

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.250 mW/g



0 dB = 0.250mW/g

Test Laboratory: HCT CO., LTD

EUT Type: Cellular/ PCS GSM/EDGE Phone with Bluetooth & NFC

GPRS Class12 and GPRS mode class B(GPRS and GSM, but not simultaneously)

Liquid Temperature: 21.1 °C

Ambient Temperature: 21.3 °C

Test Date: Oct. 10, 2010

**DUT: LG-A260; Type: Bar; Serial: #1**

Communication System: GSM 1900; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3

Medium parameters used (interpolated):  $f = 1850.2$  MHz;  $\sigma = 1.35$  mho/m;  $\epsilon_r = 41.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ES3DV3 - SN3161; ConvF(4.79, 4.79, 4.79); Calibrated: 2010-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn479; Calibrated: 2010-08-19
- Phantom: 1800/1900 Phantom; Type: SAM

**Left touch 512/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 1.15 mW/g

**Left touch 512/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

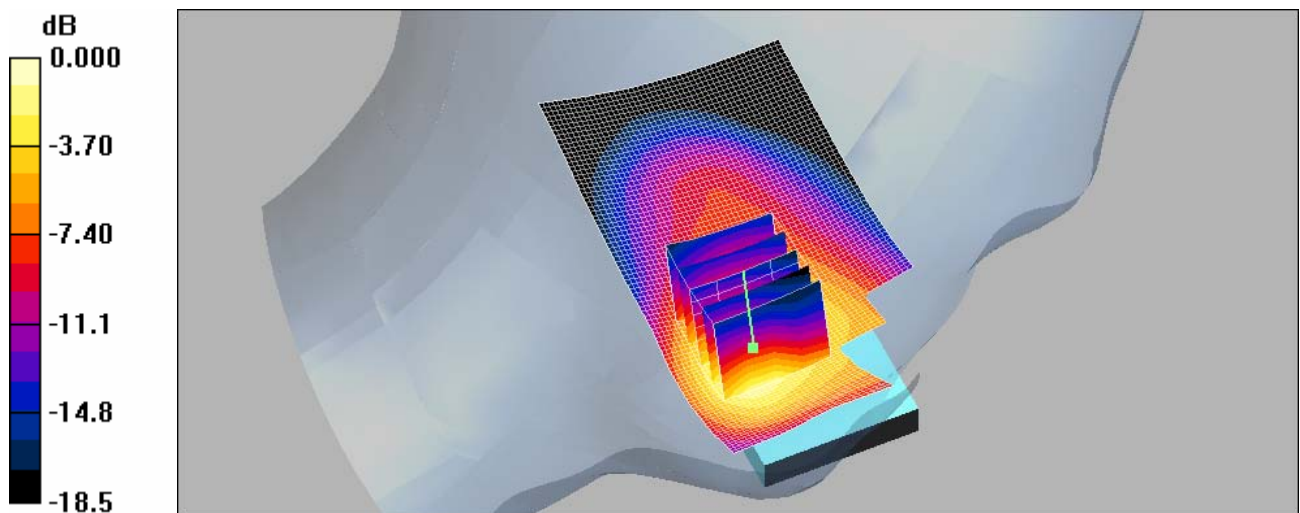
Reference Value = 7.69 V/m; Power Drift = -0.010 dB

Peak SAR (extrapolated) = 1.98 W/kg

**SAR(1 g) = 1.13 mW/g; SAR(10 g) = 0.605 mW/g**

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 1.24 mW/g



0 dB = 1.24mW/g

Test Laboratory: HCT CO., LTD

EUT Type: Cellular/ PCS GSM/EDGE Phone with Bluetooth &amp; NFC

GPRS Class12 and GPRS mode class B(GPRS and GSM, but not simultaneously)

Liquid Temperature: 21.1 °C

Ambient Temperature: 21.3 °C

Test Date: Oct. 10, 2010

**DUT: LG-A260; Type: Bar; Serial: #1**

Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used:  $f = 1880 \text{ MHz}$ ;  $\sigma = 1.38 \text{ mho/m}$ ;  $\epsilon_r = 41.6$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ES3DV3 - SN3161; ConvF(4.79, 4.79, 4.79); Calibrated: 2010-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn479; Calibrated: 2010-08-19
- Phantom: 1800/1900 Phantom; Type: SAM

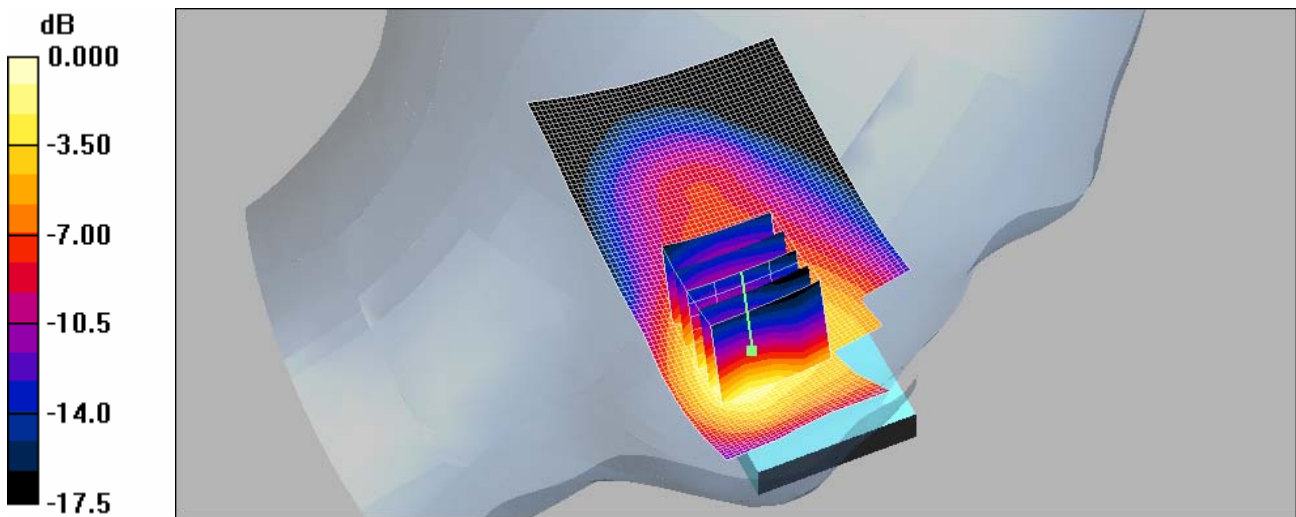
**Left touch 661/Area Scan (51x91x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$   
Maximum value of SAR (interpolated) = 1.15 mW/g**Left touch 661/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$ 

Reference Value = 8.51 V/m; Power Drift = -0.090 dB

Peak SAR (extrapolated) = 1.97 W/kg

**SAR(1 g) = 1.14 mW/g; SAR(10 g) = 0.608 mW/g**

Maximum value of SAR (measured) = 1.22 mW/g



Test Laboratory: HCT CO., LTD

EUT Type: Cellular/ PCS GSM/EDGE Phone with Bluetooth &amp; NFC

GPRS Class12 and GPRS mode class B(GPRS and GSM, but not simultaneously)

Liquid Temperature: 21.1 °C

Ambient Temperature: 21.3 °C

Test Date: Oct. 10, 2010

**DUT: LG-A260; Type: Bar; Serial: #1**

Communication System: GSM 1900; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3

Medium parameters used:  $f = 1910$  MHz;  $\sigma = 1.4$  mho/m;  $\epsilon_r = 41.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ES3DV3 - SN3161; ConvF(4.79, 4.79, 4.79); Calibrated: 2010-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn479; Calibrated: 2010-08-19
- Phantom: 1800/1900 Phantom; Type: SAM

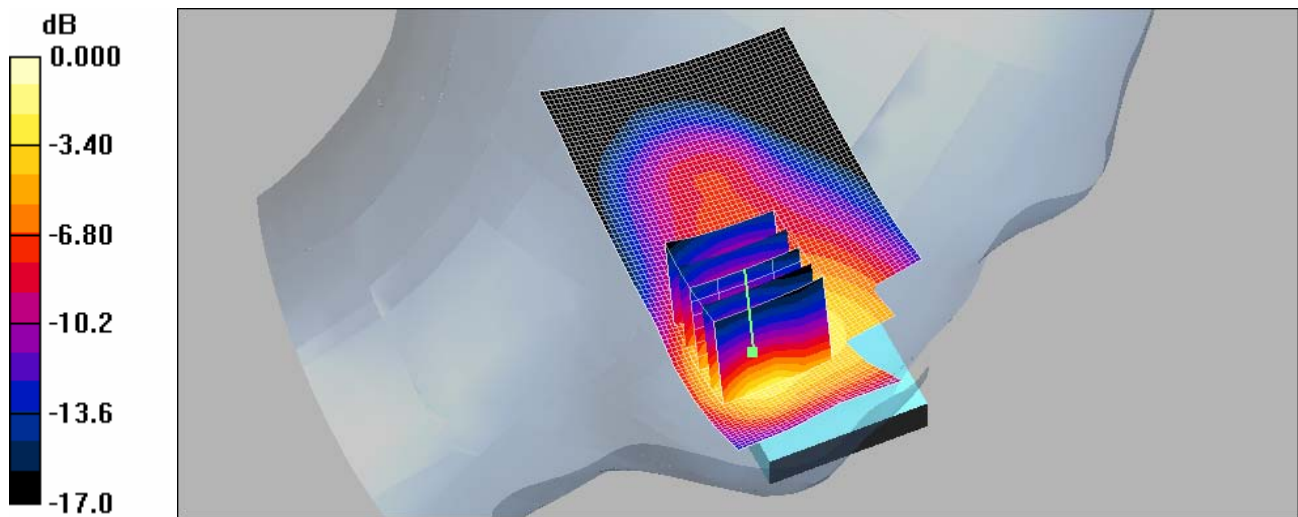
**Left touch 810/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 1.10 mW/g**Left touch 810/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.66 V/m; Power Drift = -0.011 dB

Peak SAR (extrapolated) = 1.92 W/kg

**SAR(1 g) = 1.11 mW/g; SAR(10 g) = 0.600 mW/g**

Maximum value of SAR (measured) = 1.26 mW/g



Test Laboratory: HCT CO., LTD

EUT Type: Cellular/ PCS GSM/EDGE Phone with Bluetooth & NFC

GPRS Class12 and GPRS mode class B(GPRS and GSM, but not simultaneously)

Liquid Temperature: 21.1 °C

Ambient Temperature: 21.3 °C

Test Date: Oct. 10, 2010

**DUT: LG-A260; Type: Bar; Serial: #1**

Communication System: GSM 1900; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3

Medium parameters used (interpolated):  $f = 1850.2 \text{ MHz}$ ;  $\sigma = 1.35 \text{ mho/m}$ ;  $\epsilon_r = 41.8$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ES3DV3 - SN3161; ConvF(4.79, 4.79, 4.79); Calibrated: 2010-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn479; Calibrated: 2010-08-19
- Phantom: 1800/1900 Phantom; Type: SAM

**Right touch 512/Area Scan (51x91x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.991 mW/g

**Right touch 512/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

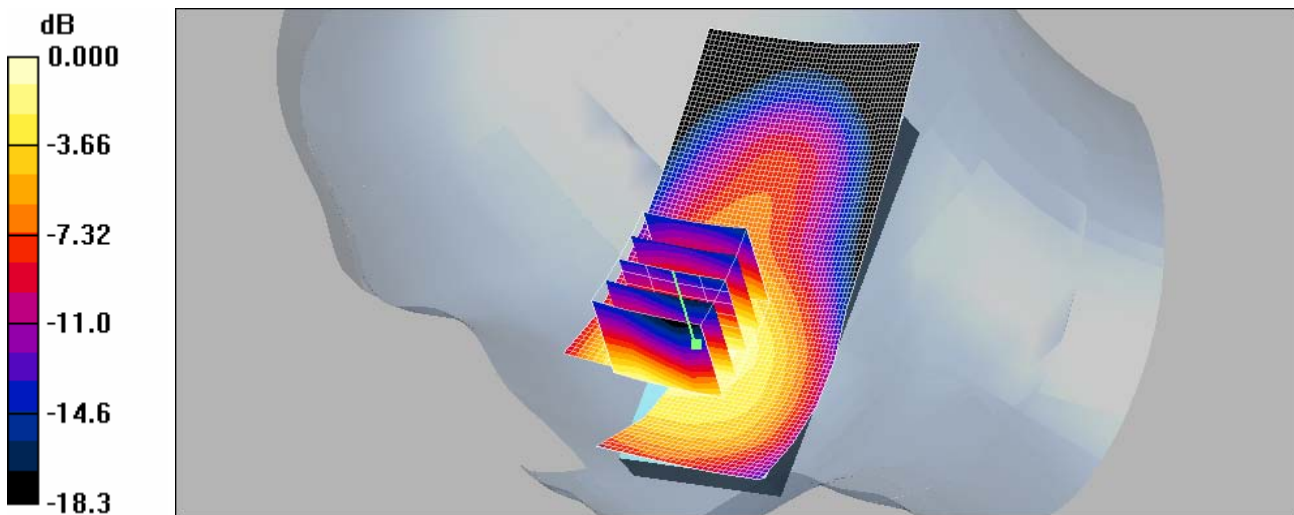
Reference Value = 7.69 V/m; Power Drift = 0.007 dB

Peak SAR (extrapolated) = 1.59 W/kg

**SAR(1 g) = 0.938 mW/g; SAR(10 g) = 0.523 mW/g**

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.986 mW/g



0 dB = 0.986mW/g

Test Laboratory: HCT CO., LTD

EUT Type: Cellular/ PCS GSM/EDGE Phone with Bluetooth &amp; NFC

GPRS Class12 and GPRS mode class B(GPRS and GSM, but not simultaneously)

Liquid Temperature: 21.1 °C

Ambient Temperature: 21.3 °C

Test Date: Oct. 10, 2010

**DUT: LG-A260; Type: Bar; Serial: #1**

Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.38$  mho/m;  $\epsilon_r = 41.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ES3DV3 - SN3161; ConvF(4.79, 4.79, 4.79); Calibrated: 2010-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn479; Calibrated: 2010-08-19
- Phantom: 1800/1900 Phantom; Type: SAM

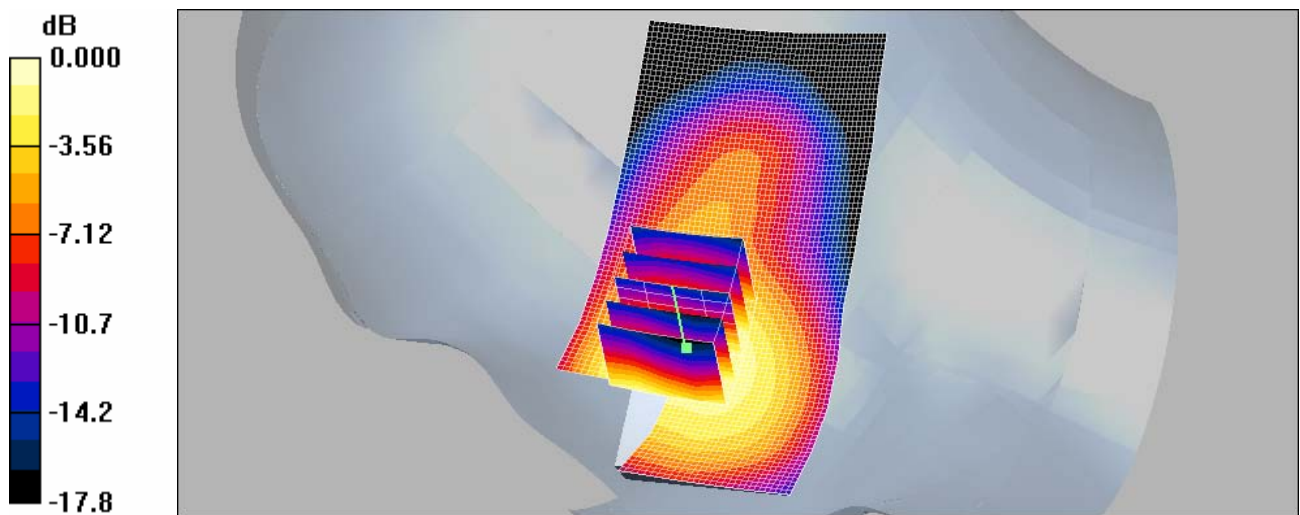
**Right touch 661/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.975 mW/g**Right touch 661/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.32 V/m; Power Drift = 0.152 dB

Peak SAR (extrapolated) = 1.63 W/kg

**SAR(1 g) = 0.944 mW/g; SAR(10 g) = 0.524 mW/g**

Maximum value of SAR (measured) = 0.991 mW/g



Test Laboratory: HCT CO., LTD

EUT Type: Cellular/ PCS GSM/EDGE Phone with Bluetooth &amp; NFC

GPRS Class12 and GPRS mode class B(GPRS and GSM, but not simultaneously)

Liquid Temperature: 21.1 °C

Ambient Temperature: 21.3 °C

Test Date: Oct. 10, 2010

**DUT: LG-A260; Type: Bar; Serial: #1**

Communication System: GSM 1900; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3

Medium parameters used:  $f = 1910$  MHz;  $\sigma = 1.4$  mho/m;  $\epsilon_r = 41.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ES3DV3 - SN3161; ConvF(4.79, 4.79, 4.79); Calibrated: 2010-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn479; Calibrated: 2010-08-19
- Phantom: 1800/1900 Phantom; Type: SAM

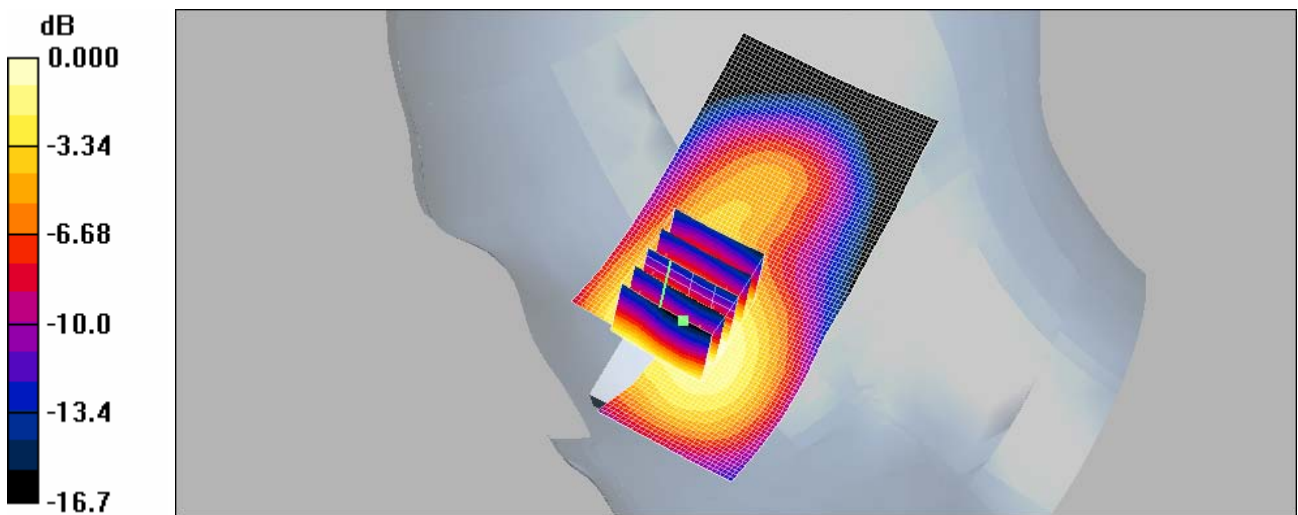
**Right touch 810/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.865 mW/g**Right touch 810/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.49 V/m; Power Drift = -0.277 dB

Peak SAR (extrapolated) = 1.39 W/kg

**SAR(1 g) = 0.823 mW/g; SAR(10 g) = 0.471 mW/g**

Maximum value of SAR (measured) = 0.873 mW/g



0 dB = 0.873mW/g

Test Laboratory: HCT CO., LTD

EUT Type: Cellular/ PCS GSM/EDGE Phone with Bluetooth &amp; NFC

GPRS Class12 and GPRS mode class B(GPRS and GSM, but not simultaneously)

Liquid Temperature: 21.1 °C

Ambient Temperature: 21.3 °C

Test Date: Oct. 10, 2010

**DUT: LG-A260; Type: Bar; Serial: #1**

Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.38$  mho/m;  $\epsilon_r = 41.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ES3DV3 - SN3161; ConvF(4.79, 4.79, 4.79); Calibrated: 2010-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn479; Calibrated: 2010-08-19
- Phantom: 1800/1900 Phantom; Type: SAM

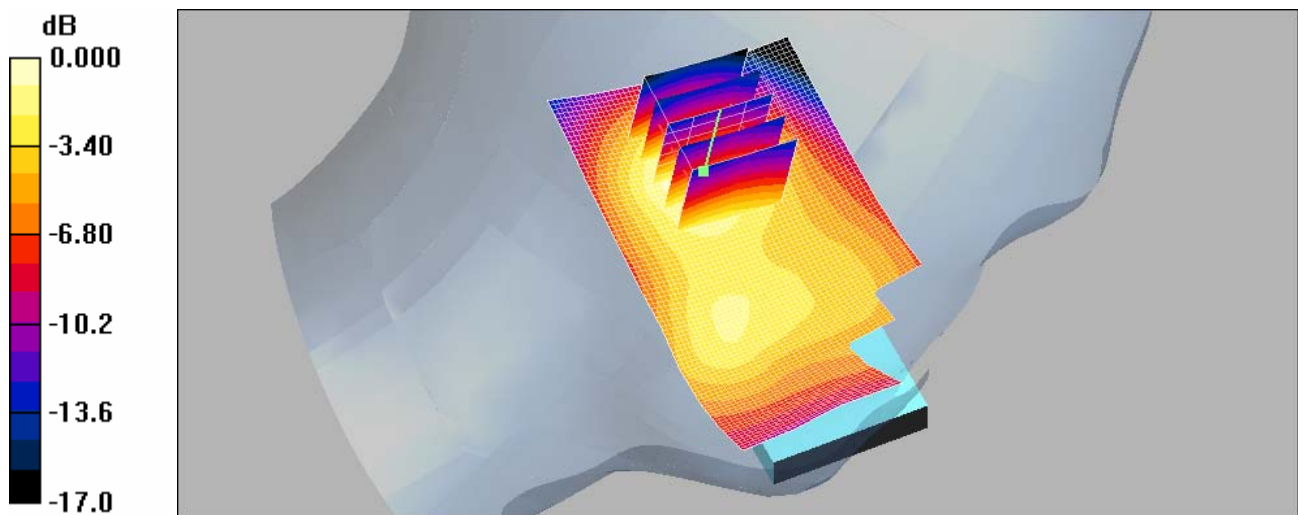
**Left tilt 661/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.223 mW/g**Left tilt 661/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 11.8 V/m; Power Drift = -0.062 dB

Peak SAR (extrapolated) = 0.321 W/kg

**SAR(1 g) = 0.200 mW/g; SAR(10 g) = 0.117 mW/g**

Maximum value of SAR (measured) = 0.218 mW/g



0 dB = 0.218mW/g

Test Laboratory: HCT CO., LTD

EUT Type: Cellular/ PCS GSM/EDGE Phone with Bluetooth & NFC

GPRS Class12 and GPRS mode class B(GPRS and GSM, but not simultaneously)

Liquid Temperature: 21.1 °C

Ambient Temperature: 21.3 °C

Test Date: Oct. 10, 2010

**DUT: LG-A260; Type: Bar; Serial: #1**

Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.38$  mho/m;  $\epsilon_r = 41.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

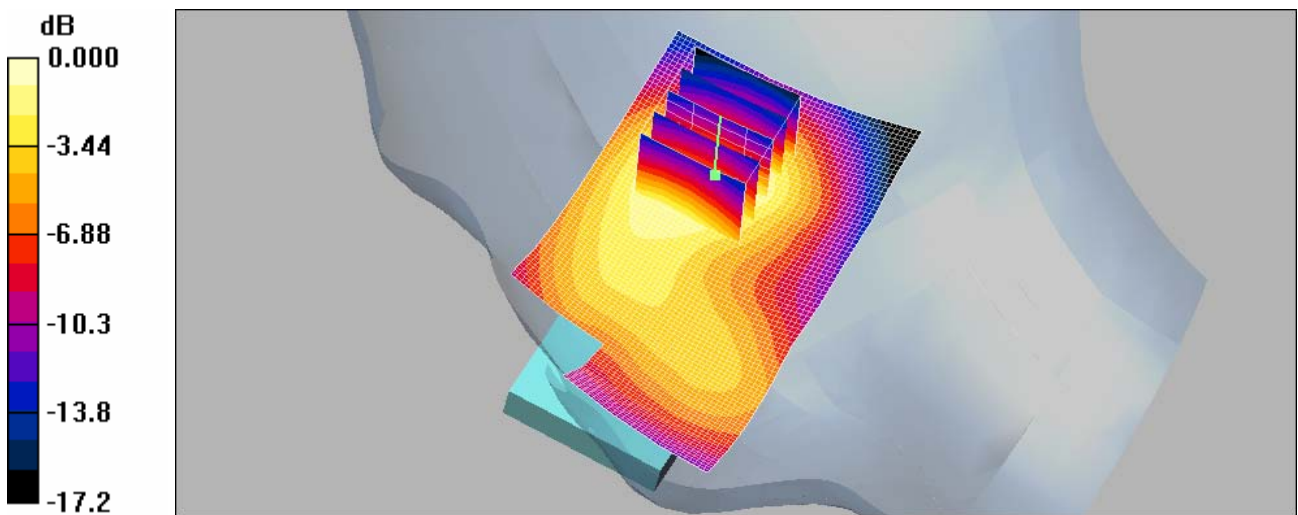
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ES3DV3 - SN3161; ConvF(4.79, 4.79, 4.79); Calibrated: 2010-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn479; Calibrated: 2010-08-19
- Phantom: 1800/1900 Phantom; Type: SAM

**Right tilt 661/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.268 mW/g

**Right tilt 661/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 10.7 V/m; Power Drift = 0.027 dB  
Peak SAR (extrapolated) = 0.376 W/kg  
**SAR(1 g) = 0.231 mW/g; SAR(10 g) = 0.136 mW/g**  
Maximum value of SAR (measured) = 0.251 mW/g



0 dB = 0.251mW/g

Test Laboratory: HCT CO., LTD

EUT Type: Cellular/ PCS GSM/EDGE Phone with Bluetooth & NFC

GPRS Class12 and GPRS mode class B(GPRS and GSM, but not simultaneously)

Liquid Temperature: 21.2 °C

Ambient Temperature: 21.4 °C

Test Date: Oct. 9, 2010

**DUT: LG-A260; Type: Bar; Serial: #1**

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium parameters used (interpolated):  $f = 836.6$  MHz;  $\sigma = 0.974$  mho/m;  $\epsilon_r = 54.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ES3DV3 - SN3161; ConvF(5.84, 5.84, 5.84); Calibrated: 2010-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn479; Calibrated: 2010-08-19
- Phantom: 835/900 Phantom ; Type: SAM

**Body 190/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.351 mW/g

**Body 190/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

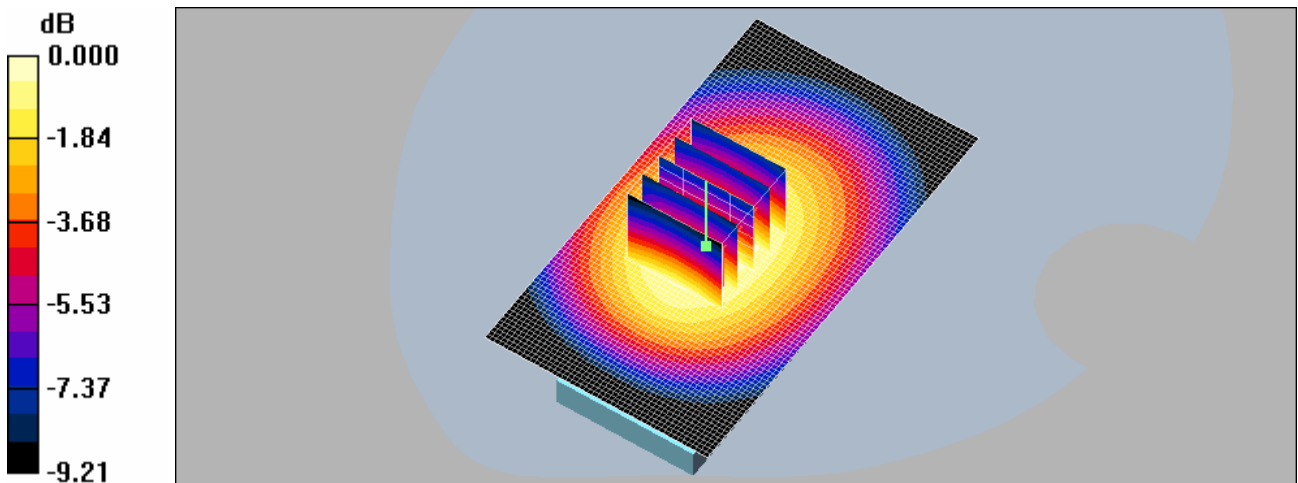
Reference Value = 10.4 V/m; Power Drift = -0.040 dB

Peak SAR (extrapolated) = 0.438 W/kg

**SAR(1 g) = 0.329 mW/g; SAR(10 g) = 0.238 mW/g**

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.350 mW/g



0 dB = 0.350mW/g

Test Laboratory: HCT CO., LTD

EUT Type: Cellular/ PCS GSM/EDGE Phone with Bluetooth &amp; NFC

GPRS Class12 and GPRS mode class B(GPRS and GSM, but not simultaneously)

Liquid Temperature: 21.2 °C

Ambient Temperature: 21.4 °C

Test Date: Oct. 9, 2010

**DUT: LG-A260; Type: Bar; Serial: #1**

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:4.15

Medium parameters used (interpolated):  $f = 836.6$  MHz;  $\sigma = 0.974$  mho/m;  $\epsilon_r = 54.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ES3DV3 - SN3161; ConvF(5.84, 5.84, 5.84); Calibrated: 2010-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn479; Calibrated: 2010-08-19
- Phantom: 835/900 Phantom ; Type: SAM

**Body 190/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.438 mW/g

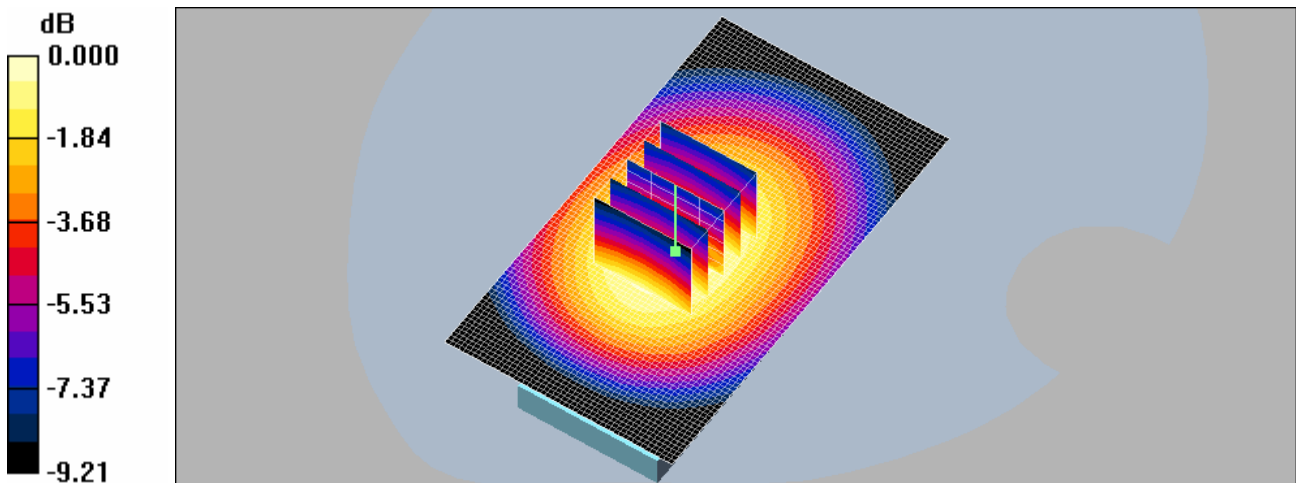
**Body 190/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 11.6 V/m; Power Drift = 0.002 dB

Peak SAR (extrapolated) = 1.05 W/kg

**SAR(1 g) = 0.428 mW/g; SAR(10 g) = 0.302 mW/g**[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.440 mW/g



0 dB = 0.440mW/g

Test Laboratory: HCT CO., LTD

EUT Type: Cellular/ PCS GSM/EDGE Phone with Bluetooth &amp; NFC

GPRS Class12 and GPRS mode class B(GPRS and GSM, but not simultaneously)

Liquid Temperature: 21.2 °C

Ambient Temperature: 21.4 °C

Test Date: Oct. 9, 2010

**DUT: LG-A260; Type: Bar; Serial: #1**

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:2.77

Medium parameters used (interpolated):  $f = 836.6$  MHz;  $\sigma = 0.974$  mho/m;  $\epsilon_r = 54.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ES3DV3 - SN3161; ConvF(5.84, 5.84, 5.84); Calibrated: 2010-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn479; Calibrated: 2010-08-19
- Phantom: 835/900 Phantom ; Type: SAM

**Body 190/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.431 mW/g

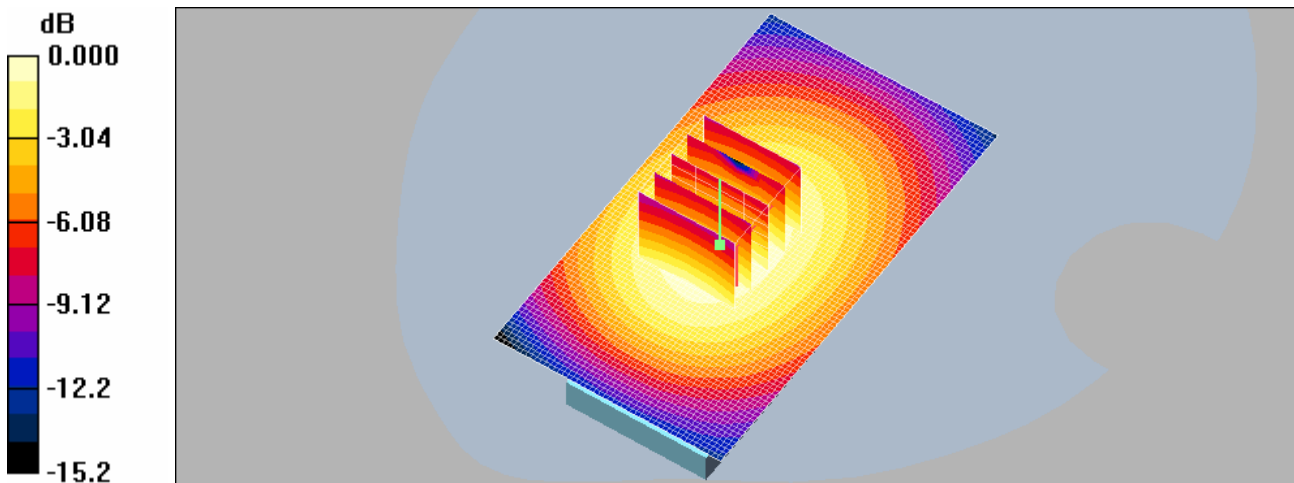
**Body 190/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 11.5 V/m; Power Drift = 0.031 dB

Peak SAR (extrapolated) = 0.548 W/kg

**SAR(1 g) = 0.408 mW/g; SAR(10 g) = 0.295 mW/g**[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.433 mW/g



0 dB = 0.433mW/g

Test Laboratory: HCT CO., LTD

EUT Type: Cellular/ PCS GSM/EDGE Phone with Bluetooth &amp; NFC

GPRS Class12 and GPRS mode class B(GPRS and GSM, but not simultaneously)

Liquid Temperature: 21.2 °C

Ambient Temperature: 21.4 °C

Test Date: Oct. 9, 2010

**DUT: LG-A260; Type: Bar; Serial: #1**

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:2.075

Medium parameters used (interpolated):  $f = 836.6$  MHz;  $\sigma = 0.974$  mho/m;  $\epsilon_r = 54.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ES3DV3 - SN3161; ConvF(5.84, 5.84, 5.84); Calibrated: 2010-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn479; Calibrated: 2010-08-19
- Phantom: 835/900 Phantom ; Type: SAM

**Body 190/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.441 mW/g

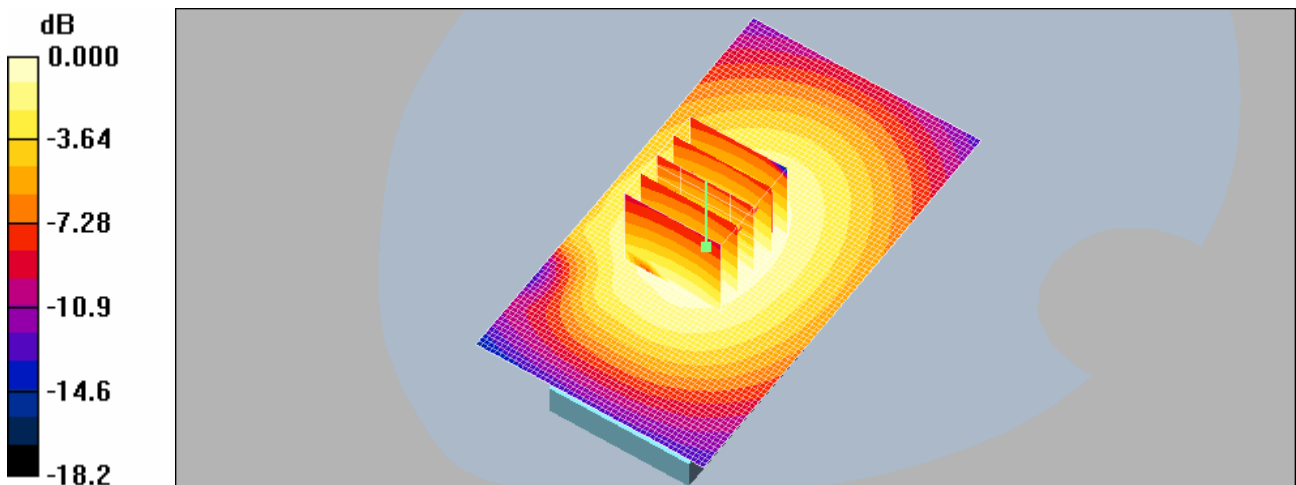
**Body 190/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.6 V/m; Power Drift = -0.094 dB

Peak SAR (extrapolated) = 0.564 W/kg

**SAR(1 g) = 0.419 mW/g; SAR(10 g) = 0.301 mW/g**[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.437 mW/g



0 dB = 0.437mW/g

Test Laboratory: HCT CO., LTD

EUT Type: Cellular/ PCS GSM/EDGE Phone with Bluetooth &amp; NFC

GPRS Class12 and GPRS mode class B(GPRS and GSM, but not simultaneously)

Liquid Temperature: 21.2 °C

Ambient Temperature: 21.4 °C

Test Date: Oct. 9, 2010

**DUT: LG-A260; Type: Bar; Serial: #1**

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium parameters used (interpolated):  $f = 836.6$  MHz;  $\sigma = 0.974$  mho/m;  $\epsilon_r = 54.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ES3DV3 - SN3161; ConvF(5.84, 5.84, 5.84); Calibrated: 2010-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn479; Calibrated: 2010-08-19
- Phantom: 835/900 Phantom ; Type: SAM

**Body 190/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.348 mW/g

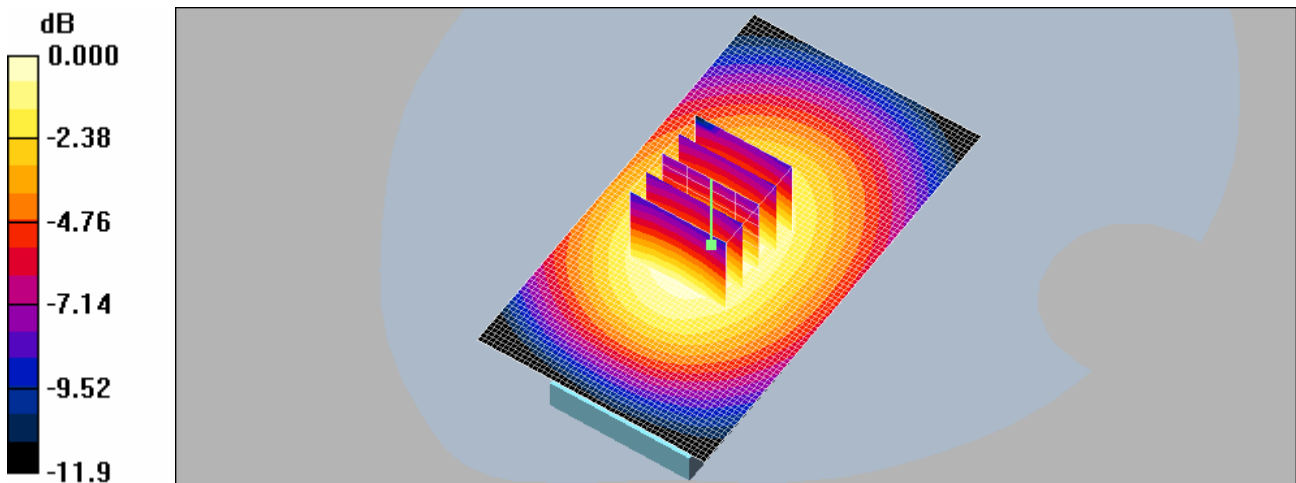
**Body 190/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.4 V/m; Power Drift = -0.071 dB

Peak SAR (extrapolated) = 0.420 W/kg

**SAR(1 g) = 0.327 mW/g; SAR(10 g) = 0.232 mW/g**[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.349 mW/g



0 dB = 0.349mW/g

Test Laboratory: HCT CO., LTD

EUT Type: Cellular/ PCS GSM/EDGE Phone with Bluetooth &amp; NFC

GPRS Class12 and GPRS mode class B(GPRS and GSM, but not simultaneously)

Liquid Temperature: 21.4 °C

Ambient Temperature: 21.6 °C

Test Date: Oct. 22, 2010

**DUT: LG-A260; Type: Bar; Serial: #1**

Communication System: GSM 850; Frequency: 824.2 MHz; Duty Cycle: 1:2.77

Medium parameters used:  $f = 825$  MHz;  $\sigma = 0.973$  mho/m;  $\epsilon_r = 56.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ES3DV3 - SN3161; ConvF(5.84, 5.84, 5.84); Calibrated: 2010-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: 835/900 Phantom ; Type: SAM

**Body 128/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.260 mW/g

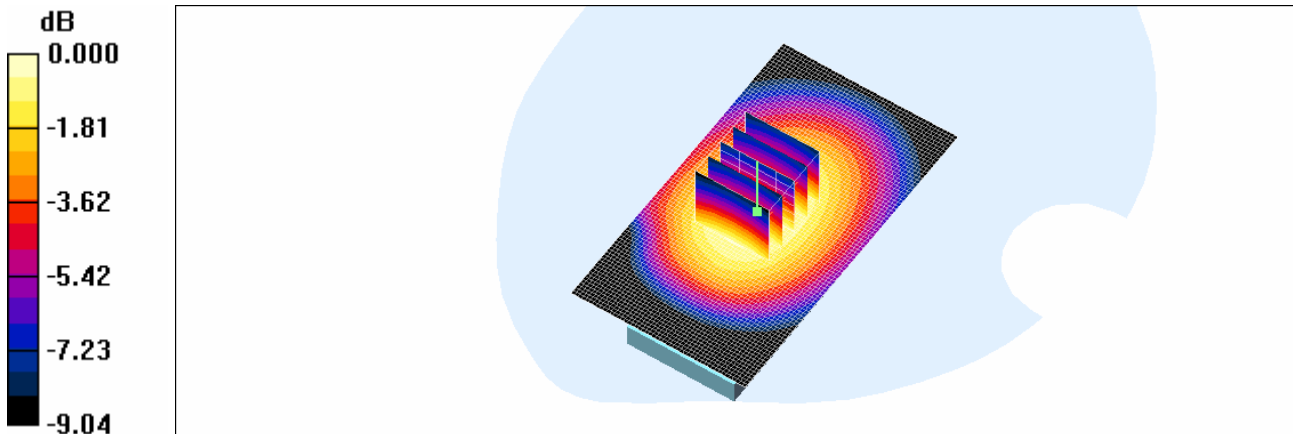
**Body 128/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.00 V/m; Power Drift = -0.041 dB

Peak SAR (extrapolated) = 0.329 W/kg

**SAR(1 g) = 0.249 mW/g; SAR(10 g) = 0.179 mW/g**

Maximum value of SAR (measured) = 0.263 mW/g



0 dB = 0.263mW/g

Test Laboratory: HCT CO., LTD

EUT Type: Cellular/ PCS GSM/EDGE Phone with Bluetooth &amp; NFC

GPRS Class12 and GPRS mode class B(GPRS and GSM, but not simultaneously)

Liquid Temperature: 21.4 °C

Ambient Temperature: 21.6 °C

Test Date: Oct. 22, 2010

**DUT: LG-A260; Type: Bar; Serial: #1**

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:2.075

Medium parameters used (interpolated):  $f = 836.6$  MHz;  $\sigma = 0.983$  mho/m;  $\epsilon_r = 56.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ES3DV3 - SN3161; ConvF(5.84, 5.84, 5.84); Calibrated: 2010-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: 835/900 Phantom ; Type: SAM

**Body 190/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.397 mW/g

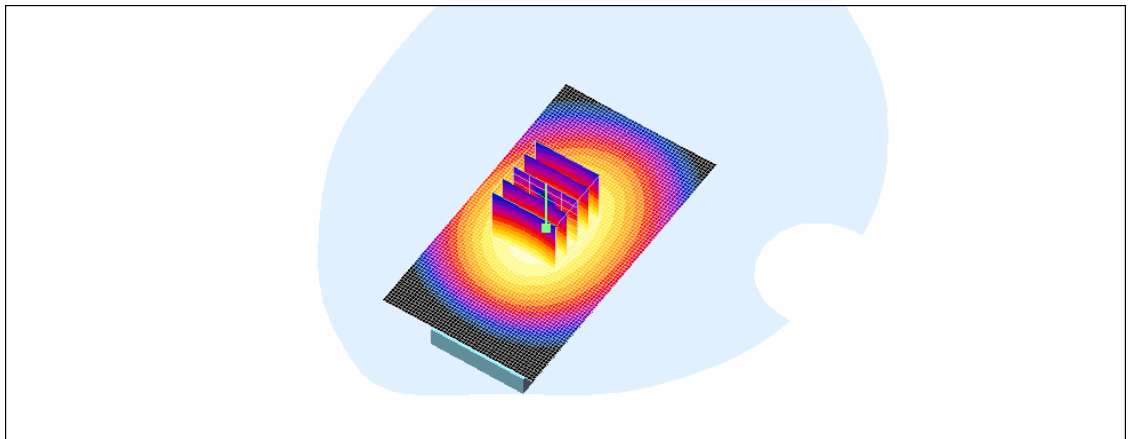
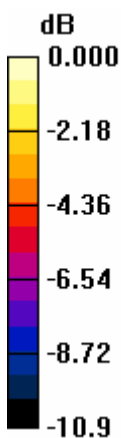
**Body 190/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.3 V/m; Power Drift = -0.035 dB

Peak SAR (extrapolated) = 0.496 W/kg

**SAR(1 g) = 0.373 mW/g; SAR(10 g) = 0.268 mW/g**[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.394 mW/g



0 dB = 0.394mW/g

Test Laboratory: HCT CO., LTD

EUT Type: Cellular/ PCS GSM/EDGE Phone with Bluetooth &amp; NFC

GPRS Class12 and GPRS mode class B(GPRS and GSM, but not simultaneously)

Liquid Temperature: 21.1 °C

Ambient Temperature: 21.3 °C

Test Date: Oct. 10, 2010

**DUT: LG-A260; Type: Bar; Serial: #1**

Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.47$  mho/m;  $\epsilon_r = 53.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ES3DV3 - SN3161; ConvF(4.52, 4.52, 4.52); Calibrated: 2010-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn479; Calibrated: 2010-08-19
- Phantom: 1800/1900 Phantom; Type: SAM

**Body 661/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.202 mW/g

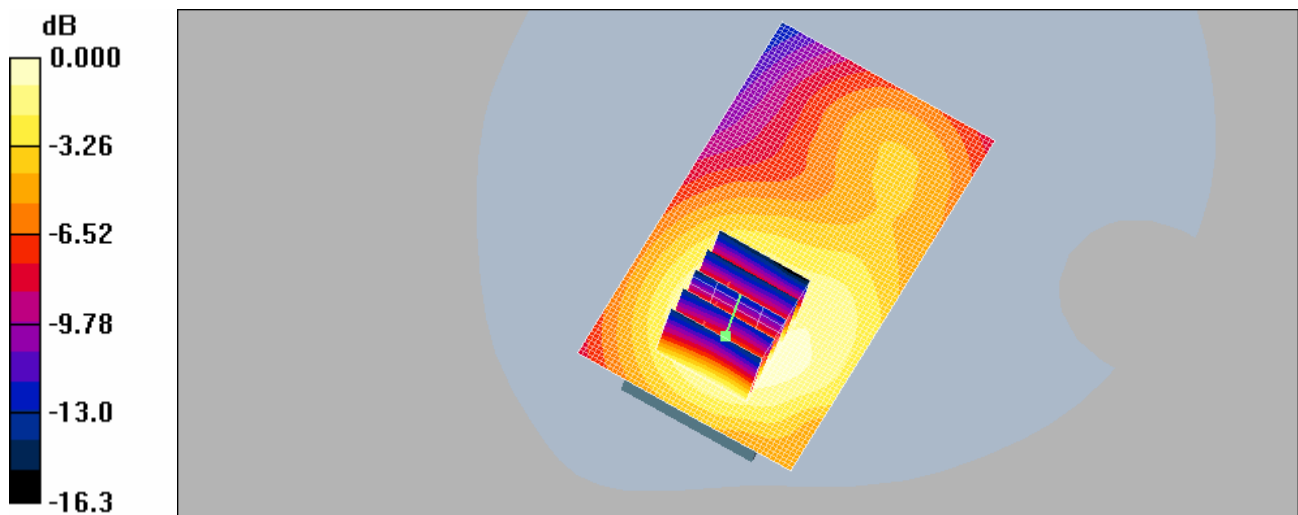
**Body 661/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.74 V/m; Power Drift = 0.036 dB

Peak SAR (extrapolated) = 0.292 W/kg

**SAR(1 g) = 0.187 mW/g; SAR(10 g) = 0.114 mW/g**

Maximum value of SAR (measured) = 0.203 mW/g



0 dB = 0.203mW/g

Test Laboratory: HCT CO., LTD

EUT Type: Cellular/ PCS GSM/EDGE Phone with Bluetooth &amp; NFC

GPRS Class12 and GPRS mode class B(GPRS and GSM, but not simultaneously)

Liquid Temperature: 21.1 °C

Ambient Temperature: 21.3 °C

Test Date: Oct. 10, 2010

**DUT: LG-A260; Type: Bar; Serial: #1**

Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:4.15

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.47$  mho/m;  $\epsilon_r = 53.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ES3DV3 - SN3161; ConvF(4.52, 4.52, 4.52); Calibrated: 2010-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn479; Calibrated: 2010-08-19
- Phantom: 1800/1900 Phantom; Type: SAM

**Body 661/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.398 mW/g

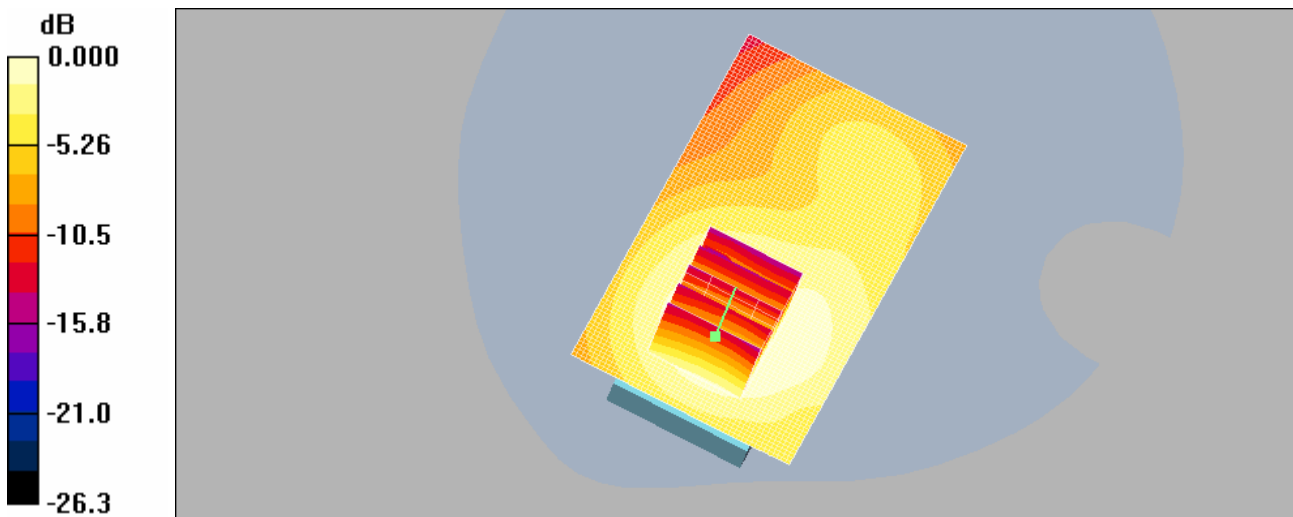
**Body 661/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.46 V/m; Power Drift = 0.047 dB

Peak SAR (extrapolated) = 0.578 W/kg

**SAR(1 g) = 0.365 mW/g; SAR(10 g) = 0.224 mW/g**

Maximum value of SAR (measured) = 0.395 mW/g



Test Laboratory: HCT CO., LTD

EUT Type: Cellular/ PCS GSM/EDGE Phone with Bluetooth &amp; NFC

GPRS Class12 and GPRS mode class B(GPRS and GSM, but not simultaneously)

Liquid Temperature: 21.1 °C

Ambient Temperature: 21.3 °C

Test Date: Oct. 10, 2010

**DUT: LG-A260; Type: Bar; Serial: #1**

Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:2.77

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.47$  mho/m;  $\epsilon_r = 53.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ES3DV3 - SN3161; ConvF(4.52, 4.52, 4.52); Calibrated: 2010-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn479; Calibrated: 2010-08-19
- Phantom: 1800/1900 Phantom; Type: SAM

**Body 661/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.583 mW/g

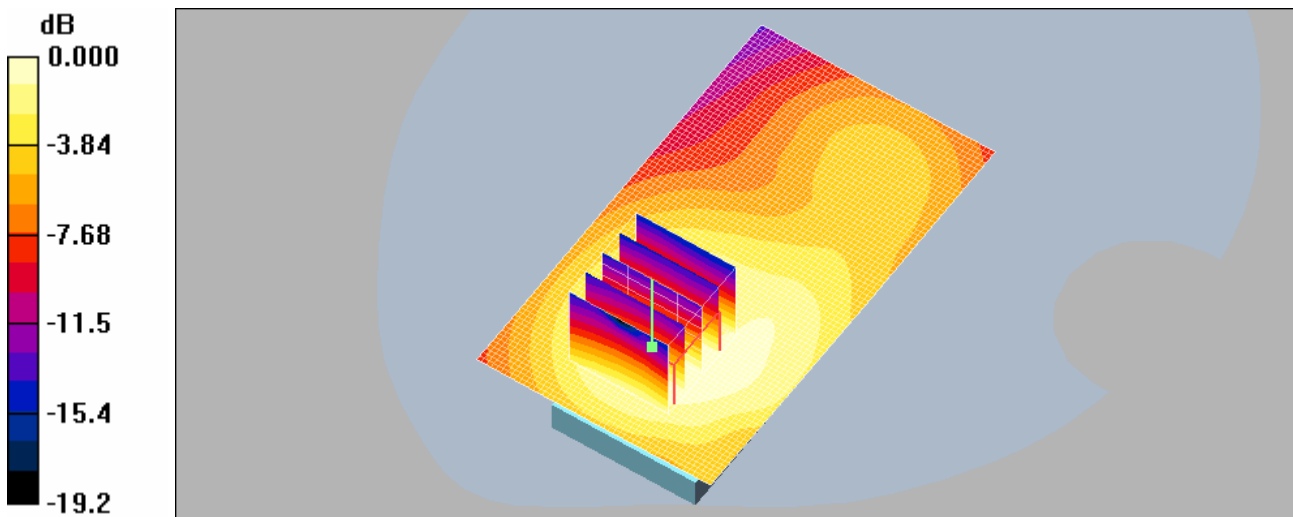
**Body 661/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 11.5 V/m; Power Drift = -0.072 dB

Peak SAR (extrapolated) = 0.842 W/kg

**SAR(1 g) = 0.535 mW/g; SAR(10 g) = 0.327 mW/g**

Maximum value of SAR (measured) = 0.580 mW/g



Test Laboratory: HCT CO., LTD

EUT Type: Cellular/ PCS GSM/EDGE Phone with Bluetooth &amp; NFC

GPRS Class12 and GPRS mode class B(GPRS and GSM, but not simultaneously)

Liquid Temperature: 21.1 °C

Ambient Temperature: 21.3 °C

Test Date: Oct. 10, 2010

**DUT: LG-A260; Type: Bar; Serial: #1**

Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:2.075

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.47$  mho/m;  $\epsilon_r = 53.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ES3DV3 - SN3161; ConvF(4.52, 4.52, 4.52); Calibrated: 2010-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn479; Calibrated: 2010-08-19
- Phantom: 1800/1900 Phantom; Type: SAM

**Body 661/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.748 mW/g

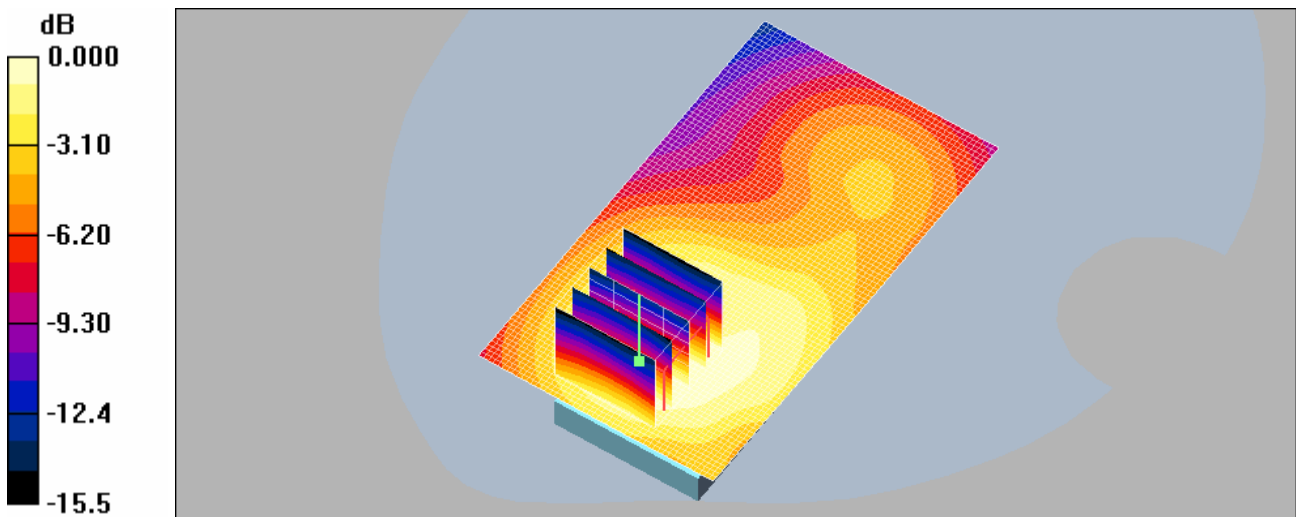
**Body 661/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 13.2 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 1.05 W/kg

**SAR(1 g) = 0.681 mW/g; SAR(10 g) = 0.420 mW/g**

Maximum value of SAR (measured) = 0.746 mW/g



0 dB = 0.746mW/g

Test Laboratory: HCT CO., LTD

EUT Type: Cellular/ PCS GSM/EDGE Phone with Bluetooth &amp; NFC

GPRS Class12 and GPRS mode class B(GPRS and GSM, but not simultaneously)

Liquid Temperature: 21.1 °C

Ambient Temperature: 21.3 °C

Test Date: Oct. 10, 2010

**DUT: LG-A260; Type: Bar; Serial: #1**

Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.47$  mho/m;  $\epsilon_r = 53.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ES3DV3 - SN3161; ConvF(4.52, 4.52, 4.52); Calibrated: 2010-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn479; Calibrated: 2010-08-19
- Phantom: 1800/1900 Phantom; Type: SAM

**Body 661/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.192 mW/g

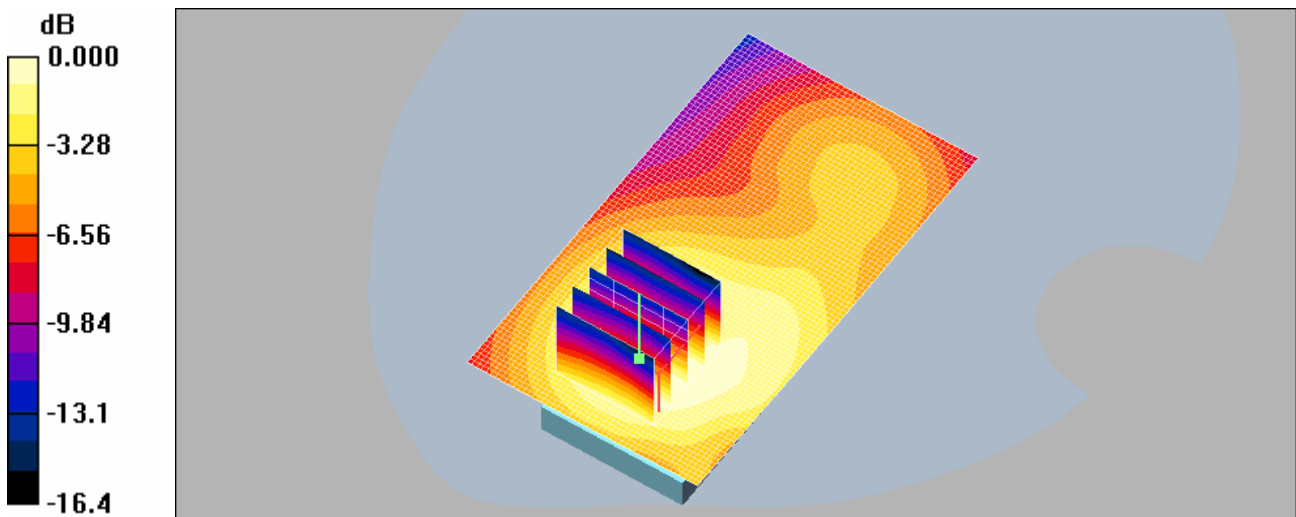
**Body 661/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 7.01 V/m; Power Drift = -0.018 dB

Peak SAR (extrapolated) = 0.278 W/kg

**SAR(1 g) = 0.178 mW/g; SAR(10 g) = 0.110 mW/g**

Maximum value of SAR (measured) = 0.193 mW/g



Test Laboratory: HCT CO., LTD

EUT Type: Cellular/ PCS GSM/EDGE Phone with Bluetooth & NFC

GPRS Class12 and GPRS mode class B(GPRS and GSM, but not simultaneously)

Liquid Temperature: 21.2 °C

Ambient Temperature: 21.4 °C

Test Date: Oct. 9, 2010

**DUT: LG-A260; Type: Bar; Serial: #1**

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium parameters used (interpolated):  $f = 836.6 \text{ MHz}$ ;  $\sigma = 0.871 \text{ mho/m}$ ;  $\epsilon_r = 42.2$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ES3DV3 - SN3161; ConvF(5.96, 5.96, 5.96); Calibrated: 2010-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn479; Calibrated: 2010-08-19
- Phantom: 835/900 Phantom ; Type: SAM

**Right touch 190/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.475 mW/g

**Right touch 190/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

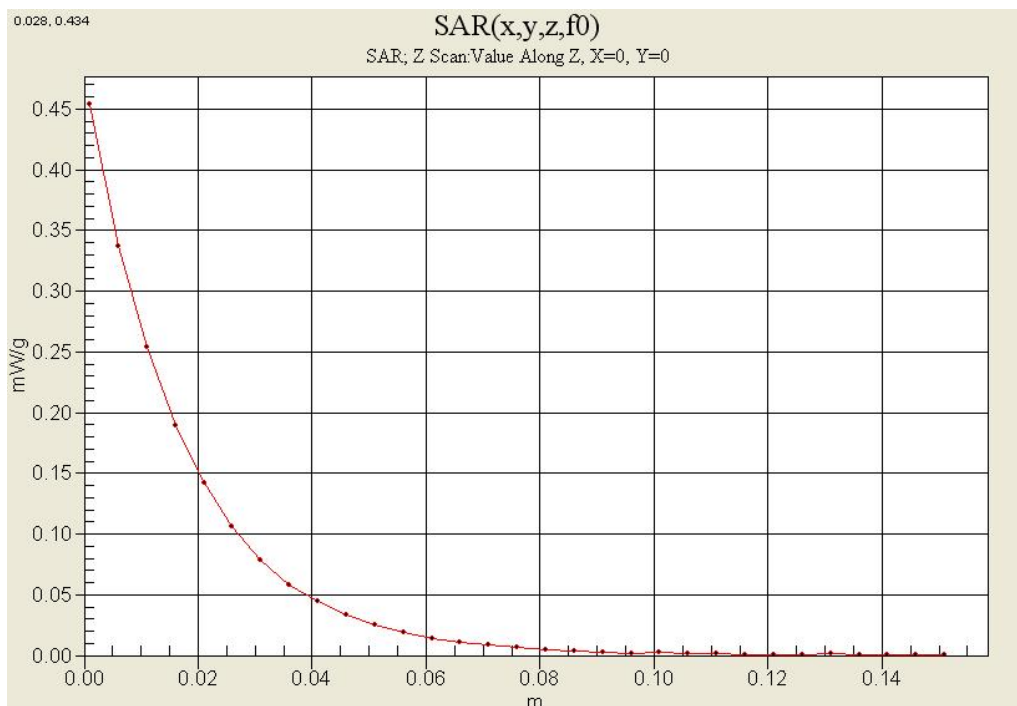
Reference Value = 8.17 V/m; Power Drift = -0.045 dB

Peak SAR (extrapolated) = 0.587 W/kg

**SAR(1 g) = 0.442 mW/g; SAR(10 g) = 0.313 mW/g**

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.474 mW/g



Test Laboratory: HCT CO., LTD

EUT Type: Cellular/ PCS GSM/EDGE Phone with Bluetooth & NFC

GPRS Class12 and GPRS mode class B(GPRS and GSM, but not simultaneously)

Liquid Temperature: 21.2 °C

Ambient Temperature: 21.4 °C

Test Date: Oct. 9, 2010

**DUT: LG-A260; Type: Bar; Serial: #1**

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:4.15

Medium parameters used (interpolated):  $f = 836.6$  MHz;  $\sigma = 0.974$  mho/m;  $\epsilon_r = 54.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ES3DV3 - SN3161; ConvF(5.84, 5.84, 5.84); Calibrated: 2010-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn479; Calibrated: 2010-08-19
- Phantom: 835/900 Phantom ; Type: SAM

**Body 190/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.438 mW/g

**Body 190/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

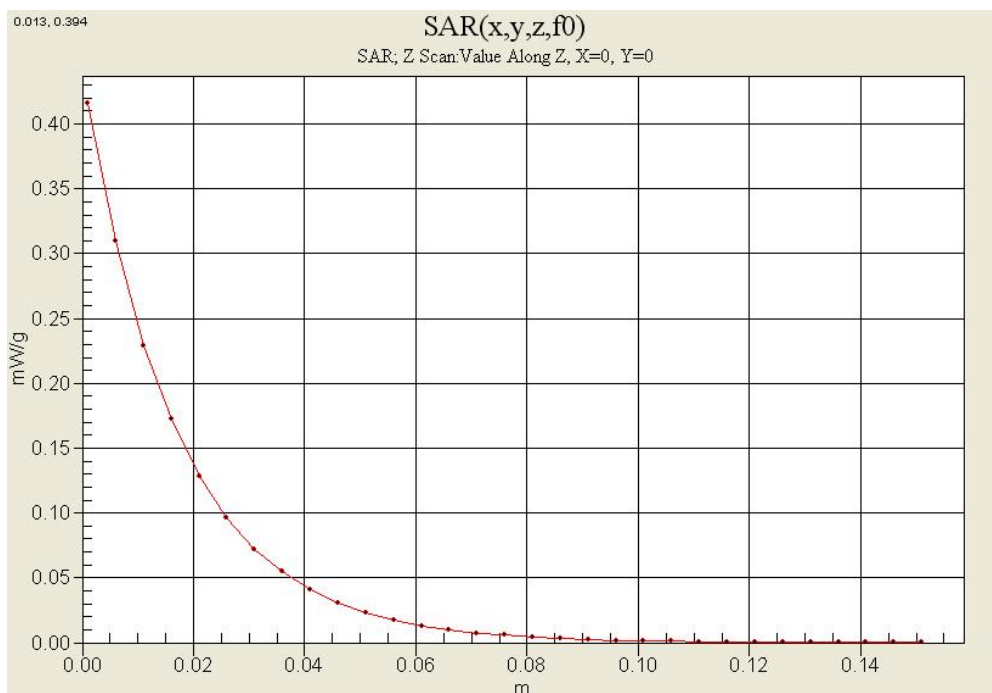
Reference Value = 11.6 V/m; Power Drift = 0.002 dB

Peak SAR (extrapolated) = 1.05 W/kg

**SAR(1 g) = 0.428 mW/g; SAR(10 g) = 0.302 mW/g**

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.440 mW/g



Test Laboratory: HCT CO., LTD

EUT Type: Cellular/ PCS GSM/EDGE Phone with Bluetooth &amp; NFC

GPRS Class12 and GPRS mode class B(GPRS and GSM, but not simultaneously)

Liquid Temperature: 21.1 °C

Ambient Temperature: 21.3 °C

Test Date: Oct. 10, 2010

**DUT: LG-A260; Type: Bar; Serial: #1**

Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.38$  mho/m;  $\epsilon_r = 41.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ES3DV3 - SN3161; ConvF(4.79, 4.79, 4.79); Calibrated: 2010-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn479; Calibrated: 2010-08-19
- Phantom: 1800/1900 Phantom; Type: SAM

**Left touch 661/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.15 mW/g

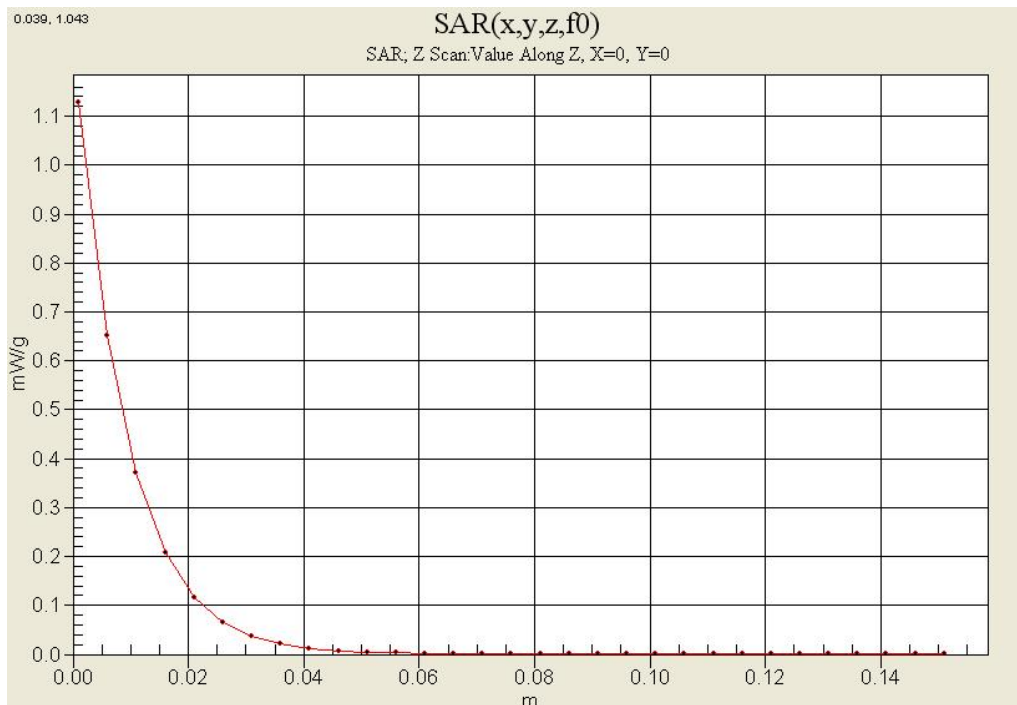
**Left touch 661/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.51 V/m; Power Drift = -0.090 dB

Peak SAR (extrapolated) = 1.97 W/kg

**SAR(1 g) = 1.14 mW/g; SAR(10 g) = 0.608 mW/g**

Maximum value of SAR (measured) = 1.22 mW/g



Test Laboratory: HCT CO., LTD

EUT Type: Cellular/ PCS GSM/EDGE Phone with Bluetooth &amp; NFC

GPRS Class12 and GPRS mode class B(GPRS and GSM, but not simultaneously)

Liquid Temperature: 21.1 °C

Ambient Temperature: 21.3 °C

Test Date: Oct. 10, 2010

**DUT: LG-A260; Type: Bar; Serial: #1**

Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:2.075

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.47$  mho/m;  $\epsilon_r = 53.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ES3DV3 - SN3161; ConvF(4.52, 4.52, 4.52); Calibrated: 2010-03-22

- Sensor-Surface: 4mm (Mechanical Surface Detection)

- Electronics: DAE3 Sn479; Calibrated: 2010-08-19

- Phantom: 1800/1900 Phantom; Type: SAM

**Body 661/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.748 mW/g

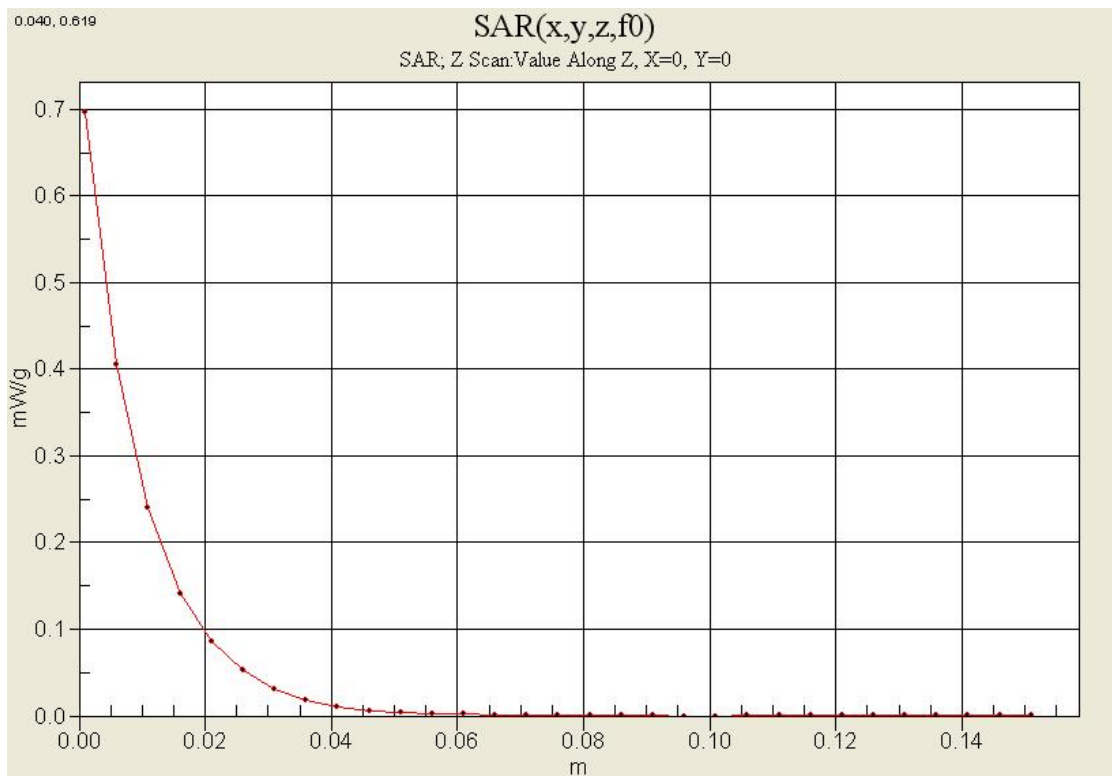
**Body 661/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 13.2 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 1.05 W/kg

**SAR(1 g) = 0.681 mW/g; SAR(10 g) = 0.420 mW/g**

Maximum value of SAR (measured) = 0.746 mW/g



## Attachment 2. – Dipole Validation Plots

## ■ Validation Data (835 MHz Head)

Test Laboratory: HCT CO., LTD  
Input Power 100 mW (20 dBm)  
Liquid Temp: 21.2 °C  
Test Date: Oct. 9, 2010

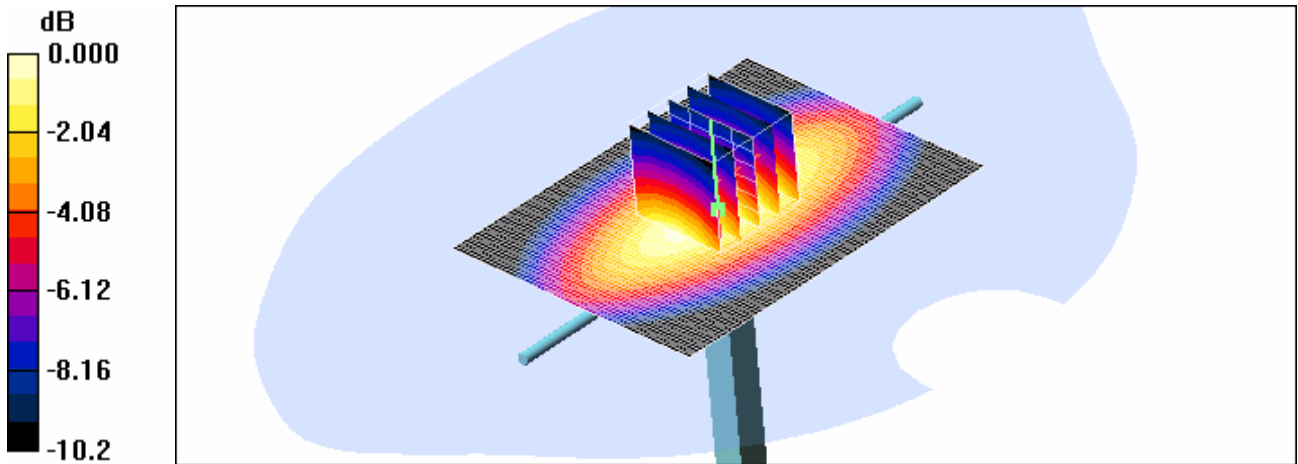
**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 – SN:441**

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.869 \text{ mho/m}$ ;  $\epsilon_r = 42.2$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 176

DASY4 Configuration:  
- Probe: ES3DV3 – SN3161; ConvF(5.96, 5.96, 5.96); Calibrated: 2010-03-22  
- Sensor-Surface: 4mm (Mechanical Surface Detection)  
- Electronics: DAE3 Sn479; Calibrated: 2010-08-19  
- Phantom: SAM 835/900 MHz; Type: SAM

**Validation 835 MHz/Area Scan (61x81x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$   
Maximum value of SAR (interpolated) = 1.05 mW/g

**Validation 835 MHz/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$   
Reference Value = 35.0 V/m; Power Drift = -0.091 dB  
Peak SAR (extrapolated) = 1.42 W/kg  
**SAR(1 g) = 0.964 mW/g; SAR(10 g) = 0.640 mW/g**  
Maximum value of SAR (measured) = 1.04 mW/g



0 dB = 1.04mW/g

## ■ Validation Data (1900 MHz Head)

Test Laboratory: HCT CO., LTD  
Input Power 100 mW (20 dBm)  
Liquid Temp: 21.1 °C  
Test Date: Oct. 10, 2010

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 – SN:5D032**

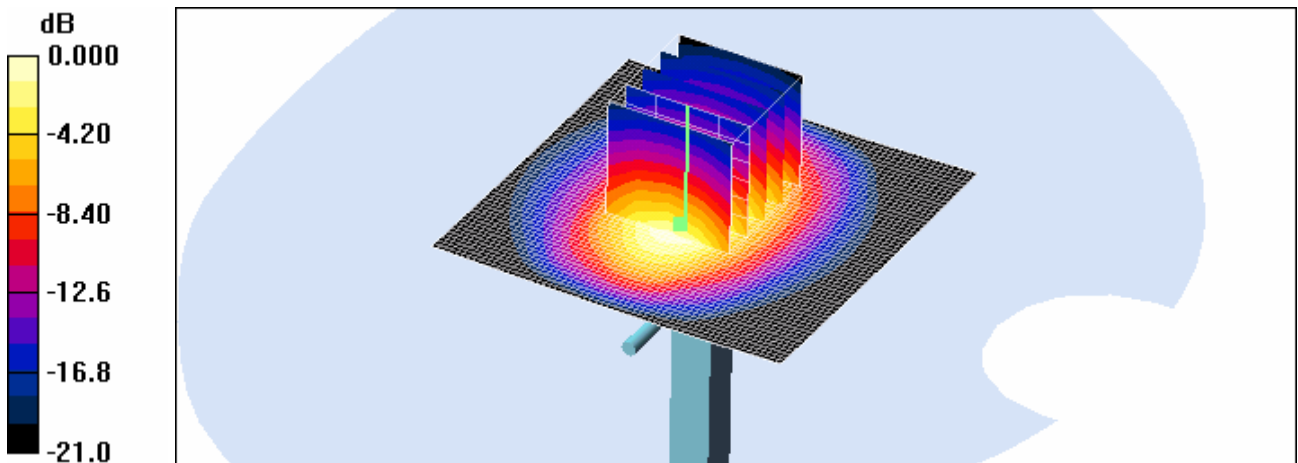
Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.4$  mho/m;  $\epsilon_r = 41.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 176

DASY4 Configuration:

- Probe: ES3DV3 – SN3161; ConvF(4.79, 4.79, 4.79); Calibrated: 2010-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn479; Calibrated: 2010-08-19
- Phantom: SAM 1800/1900 MHz; Type: SAM

**Dipole 1900MHz Validation/Area Scan (61x61x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 4.66 mW/g

**Dipole 1900MHz Validation/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 57.5 V/m; Power Drift = -0.001 dB  
Peak SAR (extrapolated) = 8.02 W/kg  
**SAR(1 g) = 4.07 mW/g; SAR(10 g) = 2.02 mW/g**  
Maximum value of SAR (measured) = 4.50 mW/g



0 dB = 4.50mW/g

## ■ Validation Data (835 MHz Head)

Test Laboratory: HCT CO., LTD  
Input Power 100 mW (20 dBm)  
Liquid Temp: 21.4 °C  
Test Date: Oct. 22, 2010

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 – SN:441**

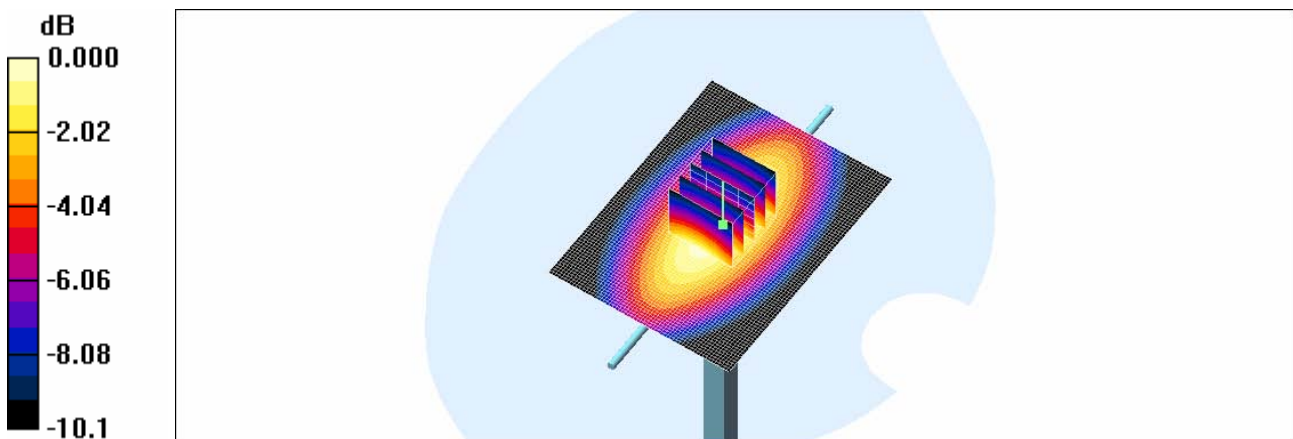
Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.892 \text{ mho/m}$ ;  $\epsilon_r = 42$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ES3DV3 – SN3161; ConvF(5.96, 5.96, 5.96); Calibrated: 2010-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 835/900 MHz; Type: SAM

**Validation 835 MHz/Area Scan (61x81x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$   
Maximum value of SAR (interpolated) = 1.04 mW/g

**Validation 835 MHz/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$   
Reference Value = 34.3 V/m; Power Drift = 0.008 dB  
Peak SAR (extrapolated) = 1.41 W/kg  
**SAR(1 g) = 0.958 mW/g; SAR(10 g) = 0.635 mW/g**  
Maximum value of SAR (measured) = 1.03 mW/g



0 dB = 1.03mW/g

**■ Dielectric Parameter (835 MHz Head)**

Title LG-A260  
SubTitle GSM850(Head)  
Test Date Oct. 9, 2010

| Frequency      | e'      | e''     |
|----------------|---------|---------|
| 800000000.0000 | 42.7916 | 18.6911 |
| 805000000.0000 | 42.7385 | 18.6611 |
| 810000000.0000 | 42.6013 | 18.6927 |
| 815000000.0000 | 42.5172 | 18.6774 |
| 820000000.0000 | 42.4561 | 18.6827 |
| 825000000.0000 | 42.3471 | 18.6646 |
| 830000000.0000 | 42.2423 | 18.6933 |
| 835000000.0000 | 42.1764 | 18.7058 |
| 840000000.0000 | 42.1455 | 18.7084 |
| 845000000.0000 | 42.0699 | 18.6613 |
| 850000000.0000 | 41.9614 | 18.6762 |
| 855000000.0000 | 41.9698 | 18.6987 |
| 860000000.0000 | 41.8986 | 18.6568 |
| 865000000.0000 | 41.8260 | 18.6771 |
| 870000000.0000 | 41.7535 | 18.6416 |
| 875000000.0000 | 41.7091 | 18.6640 |
| 880000000.0000 | 41.6336 | 18.5950 |
| 885000000.0000 | 41.6163 | 18.5846 |
| 890000000.0000 | 41.5236 | 18.5868 |
| 895000000.0000 | 41.4539 | 18.5625 |
| 900000000.0000 | 41.3825 | 18.5293 |

**■ Dielectric Parameter (835 MHz Body)**

Title LG-A260  
SubTitle GSM850(Body)  
Test Date Oct. 9, 2010

| Frequency      | e'      | e''     |
|----------------|---------|---------|
| 800000000.0000 | 54.7082 | 21.1553 |
| 805000000.0000 | 54.6539 | 21.0676 |
| 810000000.0000 | 54.5728 | 21.0671 |
| 815000000.0000 | 54.4746 | 21.0127 |
| 820000000.0000 | 54.3662 | 21.0052 |
| 825000000.0000 | 54.2884 | 21.0184 |
| 830000000.0000 | 54.2341 | 20.9707 |
| 835000000.0000 | 54.1864 | 20.9334 |
| 840000000.0000 | 54.1374 | 20.9417 |
| 845000000.0000 | 54.1189 | 20.9296 |
| 850000000.0000 | 54.0968 | 20.9415 |
| 855000000.0000 | 54.0152 | 20.9546 |
| 860000000.0000 | 54.0586 | 20.9444 |
| 865000000.0000 | 54.0556 | 20.9197 |
| 870000000.0000 | 54.0089 | 20.9407 |
| 875000000.0000 | 54.0482 | 20.9492 |
| 880000000.0000 | 54.0391 | 20.9234 |
| 885000000.0000 | 54.0297 | 20.9497 |
| 890000000.0000 | 54.0359 | 20.8936 |
| 895000000.0000 | 54.0042 | 20.9065 |
| 900000000.0000 | 53.9279 | 20.8761 |

## ■ Dielectric Parameter (1900 MHz Head)

Title LG-A260  
 SubTitle GSM1900(Head)  
 Test Date Oct. 10, 2010

| Frequency       | e'      | e''     |
|-----------------|---------|---------|
| 1800000000.0000 | 42.0001 | 12.9146 |
| 1810000000.0000 | 41.9605 | 12.9499 |
| 1820000000.0000 | 41.9447 | 13.0191 |
| 1830000000.0000 | 41.9393 | 13.0688 |
| 1840000000.0000 | 41.8863 | 13.1004 |
| 1850000000.0000 | 41.8274 | 13.1022 |
| 1860000000.0000 | 41.7603 | 13.1038 |
| 1870000000.0000 | 41.6484 | 13.0961 |
| 1880000000.0000 | 41.6057 | 13.1618 |
| 1890000000.0000 | 41.5401 | 13.2004 |
| 1900000000.0000 | 41.4495 | 13.2044 |
| 1910000000.0000 | 41.3374 | 13.2147 |
| 1920000000.0000 | 41.2783 | 13.2562 |
| 1930000000.0000 | 41.4044 | 13.3277 |
| 1940000000.0000 | 41.4391 | 13.3917 |
| 1950000000.0000 | 41.4005 | 13.3703 |
| 1960000000.0000 | 41.3991 | 13.3833 |
| 1970000000.0000 | 41.4313 | 13.4297 |
| 1980000000.0000 | 41.3820 | 13.4402 |
| 1990000000.0000 | 41.3742 | 13.4693 |
| 2000000000.0000 | 41.3008 | 13.4974 |

## ■ Dielectric Parameter (1900 MHz Body)

Title LG-A260  
 SubTitle GSM 1900(Body)  
 Test Date Oct. 10, 2010

| Frequency       | e'      | e''     |
|-----------------|---------|---------|
| 1850000000.0000 | 53.9452 | 14.0089 |
| 1855000000.0000 | 53.9706 | 14.0266 |
| 1860000000.0000 | 53.9838 | 14.0466 |
| 1865000000.0000 | 53.9573 | 14.0564 |
| 1870000000.0000 | 53.9262 | 14.0735 |
| 1875000000.0000 | 53.8625 | 14.0743 |
| 1880000000.0000 | 53.8423 | 14.0840 |
| 1885000000.0000 | 53.7796 | 14.0928 |
| 1890000000.0000 | 53.7315 | 14.1215 |
| 1895000000.0000 | 53.6783 | 14.1086 |
| 1900000000.0000 | 53.6314 | 14.1533 |
| 1905000000.0000 | 53.5938 | 14.1632 |
| 1910000000.0000 | 53.5504 | 14.1744 |
| 1915000000.0000 | 53.4886 | 14.2190 |
| 1920000000.0000 | 53.4741 | 14.2826 |
| 1925000000.0000 | 53.4850 | 14.2817 |
| 1930000000.0000 | 53.4408 | 14.3174 |
| 1935000000.0000 | 53.4846 | 14.3495 |
| 1940000000.0000 | 53.4846 | 14.3670 |
| 1945000000.0000 | 53.5132 | 14.4070 |
| 1950000000.0000 | 53.5426 | 14.4204 |

## ■ Dielectric Parameter (835 MHz Head)

Title LG-A260  
 SubTitle GSM850(Head)  
 Test Date Oct. 22, 2010

| Frequency      | e'      | e''     |
|----------------|---------|---------|
| 800000000.0000 | 42.3254 | 19.2109 |
| 805000000.0000 | 42.2682 | 19.1915 |
| 810000000.0000 | 42.2084 | 19.1785 |
| 815000000.0000 | 42.1369 | 19.1583 |
| 820000000.0000 | 42.1059 | 19.1646 |
| 825000000.0000 | 42.0538 | 19.1873 |
| 830000000.0000 | 42.0663 | 19.1918 |
| 835000000.0000 | 41.9908 | 19.1998 |
| 840000000.0000 | 41.9670 | 19.2195 |
| 845000000.0000 | 41.9479 | 19.2167 |
| 850000000.0000 | 41.9281 | 19.1727 |
| 855000000.0000 | 41.9108 | 19.1540 |
| 860000000.0000 | 41.8488 | 19.1742 |
| 865000000.0000 | 41.7963 | 19.1353 |
| 870000000.0000 | 41.7503 | 19.1510 |
| 875000000.0000 | 41.7145 | 19.0774 |
| 880000000.0000 | 41.6468 | 19.0998 |
| 885000000.0000 | 41.6358 | 19.0551 |
| 890000000.0000 | 41.5430 | 19.0202 |
| 895000000.0000 | 41.4628 | 18.9572 |
| 900000000.0000 | 41.4200 | 18.9829 |

## ■ Dielectric Parameter (835 MHz Body)

Title LG-A260  
 SubTitle GSM850(Body)  
 Test Date Oct. 22, 2010

| Frequency      | e'      | e''     |
|----------------|---------|---------|
| 800000000.0000 | 57.0424 | 21.3042 |
| 805000000.0000 | 56.9924 | 21.2754 |
| 810000000.0000 | 56.9815 | 21.2996 |
| 815000000.0000 | 56.9354 | 21.2049 |
| 820000000.0000 | 56.9537 | 21.1766 |
| 825000000.0000 | 56.8818 | 21.2069 |
| 830000000.0000 | 56.8736 | 21.1429 |
| 835000000.0000 | 56.8482 | 21.1525 |
| 840000000.0000 | 56.8006 | 21.0794 |
| 845000000.0000 | 56.7279 | 21.0482 |
| 850000000.0000 | 56.6858 | 21.0049 |
| 855000000.0000 | 56.6470 | 21.0049 |
| 860000000.0000 | 56.5277 | 20.9396 |
| 865000000.0000 | 56.4882 | 20.9410 |
| 870000000.0000 | 56.3504 | 20.8309 |
| 875000000.0000 | 56.3308 | 20.8087 |
| 880000000.0000 | 56.2253 | 20.7883 |
| 885000000.0000 | 56.2027 | 20.8169 |
| 890000000.0000 | 56.1204 | 20.7710 |
| 895000000.0000 | 56.0868 | 20.7759 |
| 900000000.0000 | 56.0185 | 20.7493 |

## Attachment 3. – Probe Calibration Data

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



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **HCT (Dymstec)**

Certificate No: **ES3-3161\_Mar10**

## CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3161**

Calibration procedure(s) **QA CAL-01.v6, QA CAL-12.v6, QA CAL-23.v3 and QA CAL-25.v2  
Calibration procedure for dosimetric E-field probes**

Calibration date: **March 22, 2010**

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

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

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards          | ID #            | Cal Date (Certificate No.)        | Scheduled Calibration  |
|----------------------------|-----------------|-----------------------------------|------------------------|
| Power meter E4419B         | GB41293874      | 1-Apr-09 (No. 217-01030)          | Apr-10                 |
| Power sensor E4412A        | MY41495277      | 1-Apr-09 (No. 217-01030)          | Apr-10                 |
| Power sensor E4412A        | MY41498087      | 1-Apr-09 (No. 217-01030)          | Apr-10                 |
| Reference 3 dB Attenuator  | SN: S5054 (3c)  | 31-Mar-09 (No. 217-01026)         | Mar-10                 |
| Reference 20 dB Attenuator | SN: S5086 (20b) | 31-Mar-09 (No. 217-01028)         | Mar-10                 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 31-Mar-09 (No. 217-01027)         | Mar-10                 |
| Reference Probe ES3DV2     | SN: 3013        | 30-Dec-09 (No. ES3-3013_Dec09)    | Dec-10                 |
| DAE4                       | SN: 660         | 29-Sep-09 (No. DAE4-660_Sep09)    | Sep-10                 |
| Secondary Standards        | ID #            | Check Date (in house)             | Scheduled Check        |
| RF generator HP 8648C      | US3642U01700    | 4-Aug-99 (in house check Oct-09)  | In house check: Oct-11 |
| Network Analyzer HP 8753E  | US37390585      | 18-Oct-01 (in house check Oct-09) | In house check: Oct10  |

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

Issued: March 25, 2010

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

Certificate No: ES3-3161\_Mar10

Page 1 of 11

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Accreditation No.: **SCS 108**

**Glossary:**

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

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

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

**Methods Applied and Interpretation of Parameters:**

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

ES3DV3 SN:3161

March 22, 2010

# Probe ES3DV3

## SN:3161

|                  |                 |
|------------------|-----------------|
| Manufactured:    | October 8, 2007 |
| Last calibrated: | July 22, 2009   |
| Recalibrated:    | March 22, 2010  |

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

ES3DV3 SN:3161

March 22, 2010

## DASY - Parameters of Probe: ES3DV3 SN:3161

### Basic Calibration Parameters

|                                                           | Sensor X | Sensor Y | Sensor Z | Unc (k=2) |
|-----------------------------------------------------------|----------|----------|----------|-----------|
| Norm ( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>A</sup> | 1.11     | 1.27     | 1.21     | ± 10.1%   |
| DCP (mV) <sup>B</sup>                                     | 89.6     | 92.5     | 91.0     |           |

### Modulation Calibration Parameters

| UID   | Communication System Name | PAR  |   | A<br>dB | B<br>dBuV | C    | VR<br>mV | Unc <sup>E</sup><br>(k=2) |
|-------|---------------------------|------|---|---------|-----------|------|----------|---------------------------|
| 10000 | CW                        | 0.00 | X | 0.00    | 0.00      | 1.00 | 300.0    | ± 1.5%                    |
|       |                           |      | Y | 0.00    | 0.00      | 1.00 | 300.0    |                           |
|       |                           |      | Z | 0.00    | 0.00      | 1.00 | 300.0    |                           |

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

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

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

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

ES3DV3 SN:3161

March 22, 2010

## DASY - Parameters of Probe: ES3DV3 SN:3161

### Calibration Parameter Determined in Head Tissue Simulating Media

| f [MHz] | Validity [MHz] <sup>©</sup> | Permittivity | Conductivity | ConvF X | ConvF Y | ConvF Z | Alpha | Depth Unc (k=2) |
|---------|-----------------------------|--------------|--------------|---------|---------|---------|-------|-----------------|
| 450     | ± 50 / ± 100                | 43.5 ± 5%    | 0.87 ± 5%    | 6.23    | 6.23    | 6.23    | 0.24  | 1.47 ± 13.3%    |
| 835     | ± 50 / ± 100                | 41.5 ± 5%    | 0.90 ± 5%    | 5.96    | 5.96    | 5.96    | 0.82  | 1.12 ± 11.0%    |
| 900     | ± 50 / ± 100                | 41.5 ± 5%    | 0.97 ± 5%    | 5.82    | 5.82    | 5.82    | 0.74  | 1.17 ± 11.0%    |
| 1750    | ± 50 / ± 100                | 40.1 ± 5%    | 1.37 ± 5%    | 4.97    | 4.97    | 4.97    | 0.40  | 1.69 ± 11.0%    |
| 1900    | ± 50 / ± 100                | 40.0 ± 5%    | 1.40 ± 5%    | 4.79    | 4.79    | 4.79    | 0.42  | 1.63 ± 11.0%    |
| 1950    | ± 50 / ± 100                | 40.0 ± 5%    | 1.40 ± 5%    | 4.67    | 4.67    | 4.67    | 0.37  | 1.79 ± 11.0%    |
| 2300    | ± 50 / ± 100                | 39.5 ± 5%    | 1.67 ± 5%    | 4.54    | 4.54    | 4.54    | 0.34  | 2.02 ± 11.0%    |
| 2450    | ± 50 / ± 100                | 39.2 ± 5%    | 1.80 ± 5%    | 4.26    | 4.26    | 4.26    | 0.39  | 1.91 ± 11.0%    |
| 2600    | ± 50 / ± 100                | 39.0 ± 5%    | 1.96 ± 5%    | 4.22    | 4.22    | 4.22    | 0.53  | 1.57 ± 11.0%    |

<sup>©</sup> The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

ES3DV3 SN:3161

March 22, 2010

## DASY - Parameters of Probe: ES3DV3 SN:3161

### Calibration Parameter Determined in Body Tissue Simulating Media

| f [MHz] | Validity [MHz] <sup>c</sup> | Permittivity | Conductivity | ConvF X | ConvF Y | ConvF Z | Alpha | Depth Unc (k=2) |
|---------|-----------------------------|--------------|--------------|---------|---------|---------|-------|-----------------|
| 450     | ± 50 / ± 100                | 56.7 ± 5%    | 0.94 ± 5%    | 6.69    | 6.69    | 6.69    | 0.15  | 1.27 ± 13.3%    |
| 835     | ± 50 / ± 100                | 55.2 ± 5%    | 0.97 ± 5%    | 5.84    | 5.84    | 5.84    | 0.70  | 1.23 ± 11.0%    |
| 1750    | ± 50 / ± 100                | 53.4 ± 5%    | 1.49 ± 5%    | 4.74    | 4.74    | 4.74    | 0.34  | 2.11 ± 11.0%    |
| 1900    | ± 50 / ± 100                | 53.3 ± 5%    | 1.52 ± 5%    | 4.52    | 4.52    | 4.52    | 0.31  | 2.37 ± 11.0%    |
| 1950    | ± 50 / ± 100                | 53.3 ± 5%    | 1.52 ± 5%    | 4.64    | 4.64    | 4.64    | 0.35  | 2.18 ± 11.0%    |
| 2300    | ± 50 / ± 100                | 52.8 ± 5%    | 1.85 ± 5%    | 4.35    | 4.35    | 4.35    | 0.41  | 1.83 ± 11.0%    |
| 2450    | ± 50 / ± 100                | 52.7 ± 5%    | 1.95 ± 5%    | 4.17    | 4.17    | 4.17    | 0.77  | 1.17 ± 11.0%    |
| 2600    | ± 50 / ± 100                | 52.5 ± 5%    | 2.16 ± 5%    | 4.07    | 4.07    | 4.07    | 0.82  | 1.20 ± 11.0%    |

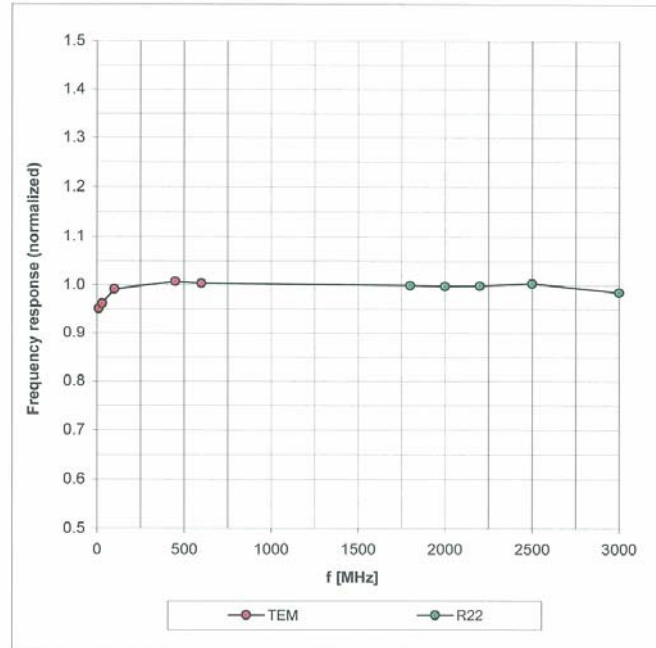
<sup>c</sup> The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

ES3DV3 SN:3161

March 22, 2010

## Frequency Response of E-Field

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

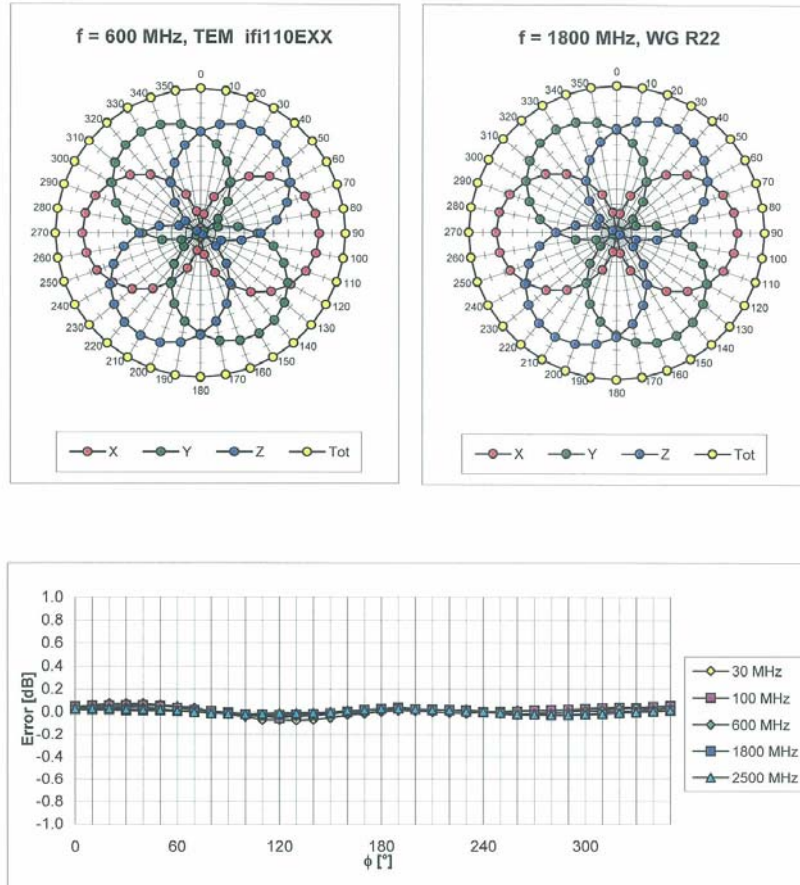


Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  ( $k=2$ )

ES3DV3 SN:3161

March 22, 2010

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

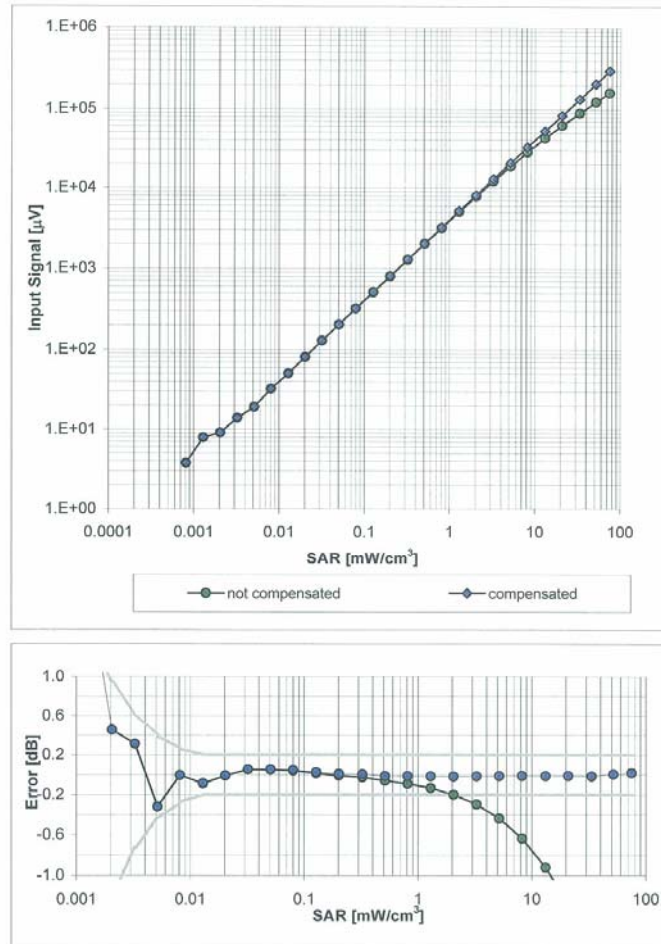


Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

ES3DV3 SN:3161

March 22, 2010

**Dynamic Range  $f(\text{SAR}_{\text{head}})$**   
(Waveguide R22,  $f = 1800 \text{ MHz}$ )

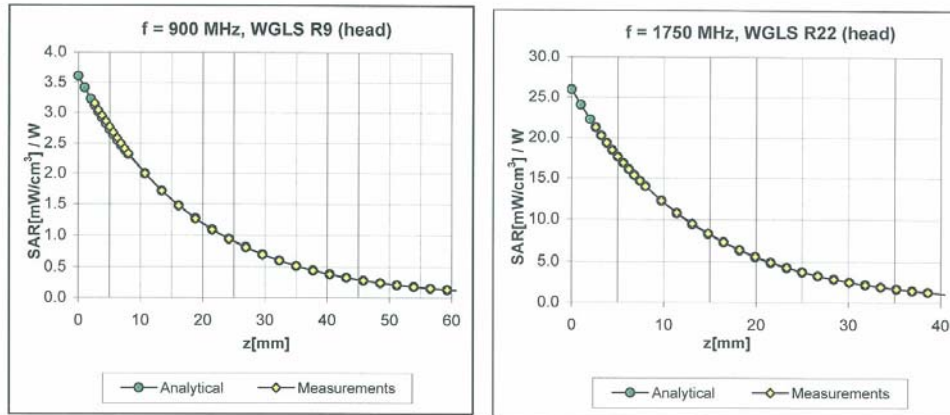


Uncertainty of Linearity Assessment:  $\pm 0.6\%$  ( $k=2$ )

ES3DV3 SN:3161

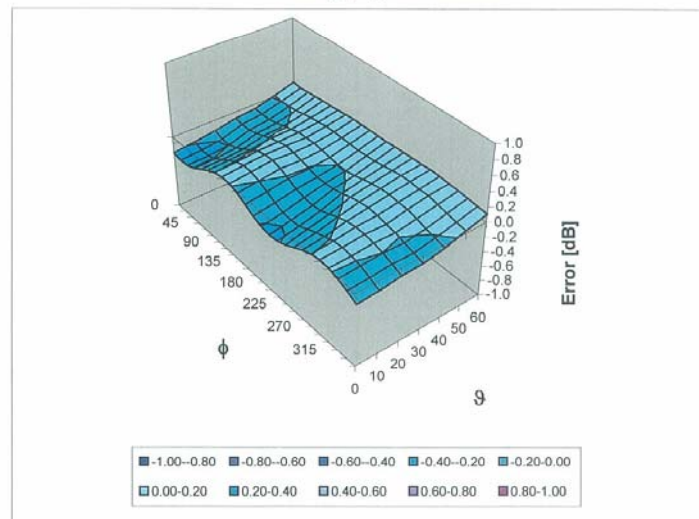
March 22, 2010

## Conversion Factor Assessment



## Deviation from Isotropy in HSL

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



Uncertainty of Spherical Isotropy Assessment:  $\pm 2.6\%$  (k=2)

ES3DV3 SN:3161

March 22, 2010

**Other Probe Parameters**

|                                               |                |
|-----------------------------------------------|----------------|
| Sensor Arrangement                            | Triangular     |
| Connector Angle (°)                           | Not applicable |
| Mechanical Surface Detection Mode             | enabled        |
| Optical Surface Detection Mode                | disabled       |
| Probe Overall Length                          | 337 mm         |
| Probe Body Diameter                           | 10 mm          |
| Tip Length                                    | 10 mm          |
| Tip Diameter                                  | 4.0 mm         |
| Probe Tip to Sensor X Calibration Point       | 2 mm           |
| Probe Tip to Sensor Y Calibration Point       | 2 mm           |
| Probe Tip to Sensor Z Calibration Point       | 2 mm           |
| Recommended Measurement Distance from Surface | 3 mm           |

Schmid &amp; Partner Engineering AG

**s p e a g**Zeughausstrasse 43, 8004 Zurich, Switzerland  
Phone +41 44 245 9700, Fax +41 44 245 9779  
info@speag.com, <http://www.speag.com>**Additional Conversion Factors**  
for Dosimetric E-Field Probe

Type:

ES3DV3

Serial Number:

3161

Place of Assessment:

Zurich

Date of Assessment:

May 3, 2010

Probe Calibration Date:

March 22, 2010

Schmid & Partner Engineering AG hereby certifies that conversion factor(s) of this probe have been evaluated on the date indicated above. The assessment was performed using the FDTD numerical code SEMCAD of Schmid & Partner Engineering AG. Since the evaluation is coupled with measured conversion factors, it has to be recalculated yearly, i.e., following the recalibration schedule of the probe. The uncertainty of the numerical assessment is based on the extrapolation from measured value at 900 MHz or at 1750 MHz.

Assessed by:



ES3DV3-SN:3161

Page 1 of 2

May 3, 2010

Scherid &amp; Partner Engineering AG

**s p e a g**Zeughausstrasse 43, 8004 Zurich, Switzerland  
Phone +41 44 245 8700, Fax +41 44 245 9779  
info@speag.com, <http://www.speag.com>**Dosimetric E-Field Probe ES3DV3 - SN:3161**Conversion factor ( $\pm$  standard deviation)1500  $\pm$  50 MHz      *ConvF*      5.20  $\pm$  7% $\epsilon_r = 40.4 \pm 5\%$  $\sigma = 1.23 \pm 5\%$  mho/m

(head tissue)

**Important Note:**

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

Please see also DASY Manual.

## Attachment 4. – Dipole Calibration Data

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Accreditation No.: **SCS 108**

Client **HCT (Dymstec)**

Certificate No: **D835V2-441\_May10**

## CALIBRATION CERTIFICATE

Object **D835V2 - SN: 441**

Calibration procedure(s) **QA CAL-05.v7**  
**Calibration procedure for dipole validation kits**

Calibration date: **May 21, 2010**

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

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

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards           | ID #               | Cal Date (Certificate No.)        | Scheduled Calibration  |
|-----------------------------|--------------------|-----------------------------------|------------------------|
| Power meter EPM-442A        | GB37480704         | 06-Oct-09 (No. 217-01086)         | Oct-10                 |
| Power sensor HP 8481A       | US37292783         | 06-Oct-09 (No. 217-01086)         | Oct-10                 |
| Reference 20 dB Attenuator  | SN: 5086 (20g)     | 30-Mar-10 (No. 217-01158)         | Mar-11                 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 30-Mar-10 (No. 217-01162)         | Mar-11                 |
| Reference Probe ES3DV3      | SN: 3205           | 30-Apr-10 (No. ES3-3205_Apr10)    | Apr-11                 |
| DAE4                        | SN: 601            | 02-Mar-10 (No. DAE4-601_Mar10)    | Mar-11                 |
| Secondary Standards         | ID #               | Check Date (in house)             | Scheduled Check        |
| Power sensor HP 8481A       | MY41092317         | 18-Oct-02 (in house check Oct-09) | In house check: Oct-11 |
| RF generator R&S SMT-06     | 100005             | 4-Aug-99 (in house check Oct-09)  | In house check: Oct-11 |
| Network Analyzer HP 8753E   | US37390585 S4206   | 18-Oct-01 (in house check Oct-09) | In house check: Oct-10 |

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

Issued: May 21, 2010

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Accreditation No.: **SCS 108**

**Glossary:**

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

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

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

**Additional Documentation:**

- DASY4/5 System Handbook

**Methods Applied and Interpretation of Parameters:**

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

### Measurement Conditions

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

|                              |                           |             |
|------------------------------|---------------------------|-------------|
| DASY Version                 | DASY5                     | V5.2        |
| Extrapolation                | Advanced Extrapolation    |             |
| Phantom                      | Modular Flat Phantom V4.9 |             |
| Distance Dipole Center - TSL | 15 mm                     | with Spacer |
| Zoom Scan Resolution         | dx, dy, dz = 5 mm         |             |
| Frequency                    | 835 MHz $\pm$ 1 MHz       |             |

### Head TSL parameters

The following parameters and calculations were applied.

|                                  | Temperature         | Permittivity   | Conductivity         |
|----------------------------------|---------------------|----------------|----------------------|
| Nominal Head TSL parameters      | 22.0 °C             | 41.5           | 0.90 mho/m           |
| Measured Head TSL parameters     | (22.0 $\pm$ 0.2) °C | 41.7 $\pm$ 6 % | 0.91 mho/m $\pm$ 6 % |
| Head TSL temperature during test | (22.5 $\pm$ 0.2) °C | ----           | ----                 |

### SAR result with Head TSL

| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL | Condition          |                                                  |
|-------------------------------------------------------|--------------------|--------------------------------------------------|
| SAR measured                                          | 250 mW input power | 2.43 mW / g                                      |
| SAR normalized                                        | normalized to 1W   | 9.72 mW / g                                      |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | <b>9.66 mW / g <math>\pm</math> 17.0 % (k=2)</b> |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | condition          |                                                  |
|---------------------------------------------------------|--------------------|--------------------------------------------------|
| SAR measured                                            | 250 mW input power | 1.58 mW / g                                      |
| SAR normalized                                          | normalized to 1W   | 6.32 mW / g                                      |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | <b>6.29 mW / g <math>\pm</math> 16.5 % (k=2)</b> |

**Body TSL parameters**

The following parameters and calculations were applied.

|                                  | Temperature     | Permittivity | Conductivity     |
|----------------------------------|-----------------|--------------|------------------|
| Nominal Body TSL parameters      | 22.0 °C         | 55.2         | 0.97 mho/m       |
| Measured Body TSL parameters     | (22.0 ± 0.2) °C | 54.2 ± 6 %   | 0.98 mho/m ± 6 % |
| Body TSL temperature during test | (22.0 ± 0.2) °C | ----         | ----             |

**SAR result with Body TSL**

| SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL | Condition          |                            |
|-------------------------------------------------------|--------------------|----------------------------|
| SAR measured                                          | 250 mW input power | 2.51 mW / g                |
| SAR normalized                                        | normalized to 1W   | 10.0 mW / g                |
| SAR for nominal Body TSL parameters                   | normalized to 1W   | 9.92 mW / g ± 17.0 % (k=2) |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL | condition          |                            |
|---------------------------------------------------------|--------------------|----------------------------|
| SAR measured                                            | 250 mW input power | 1.64 mW / g                |
| SAR normalized                                          | normalized to 1W   | 6.56 mW / g                |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | 6.51 mW / g ± 16.5 % (k=2) |

**Appendix****Antenna Parameters with Head TSL**

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 55.2 $\Omega$ - 8.2 j $\Omega$ |
| Return Loss                          | - 20.8 dB                      |

**Antenna Parameters with Body TSL**

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 45.3 $\Omega$ - 9.4 j $\Omega$ |
| Return Loss                          | - 19.2 dB                      |

**General Antenna Parameters and Design**

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.375 ns |
|----------------------------------|----------|

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

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

**Additional EUT Data**

|                 |                |
|-----------------|----------------|
| Manufactured by | SPEAG          |
| Manufactured on | March 09, 2001 |

**DASY5 Validation Report for Head TSL**

Date/Time: 21.05.2010 09:55:07

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:441**

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: HSL900

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.91 \text{ mho/m}$ ;  $\epsilon_r = 41.9$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

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

**DASY5 Configuration:**

- Probe: ES3DV3 - SN3205; ConvF(6.03, 6.03, 6.03); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.03.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

**Pin=250 mW /d=15mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7)/Cube 0: Measurement**

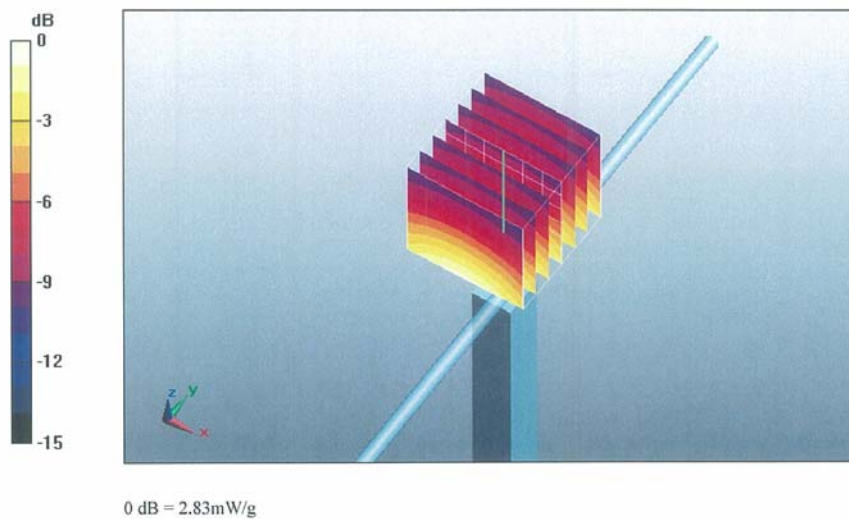
grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 57.3 V/m; Power Drift = -0.023 dB

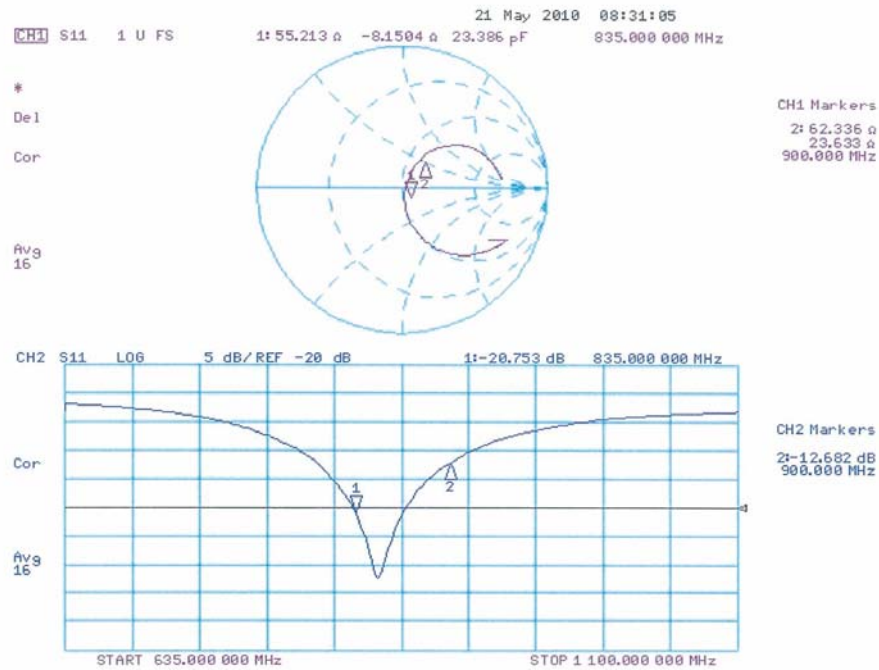
Peak SAR (extrapolated) = 3.63 W/kg

**SAR(1 g) = 2.43 mW/g; SAR(10 g) = 1.58 mW/g**

Maximum value of SAR (measured) = 2.83 mW/g



**Impedance Measurement Plot for Head TSL**



**DASY5 Validation Report for Body**

Date/Time: 20.05.2010 09:50:16

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:441**

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: MSL900

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.98 \text{ mho/m}$ ;  $\epsilon_r = 54.2$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

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

**DASY5 Configuration:**

- Probe: ES3DV3 - SN3205; ConvF(5.86, 5.86, 5.86); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.03.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

**Pin250 mW /d=15mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7)/Cube 0: Measurement**

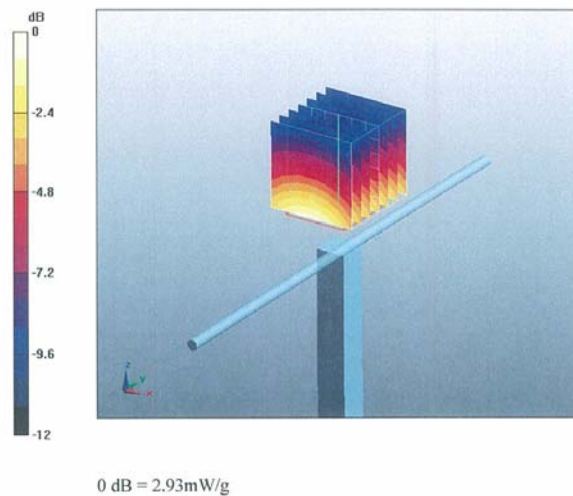
grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 56.4 V/m; Power Drift = 0.000719 dB

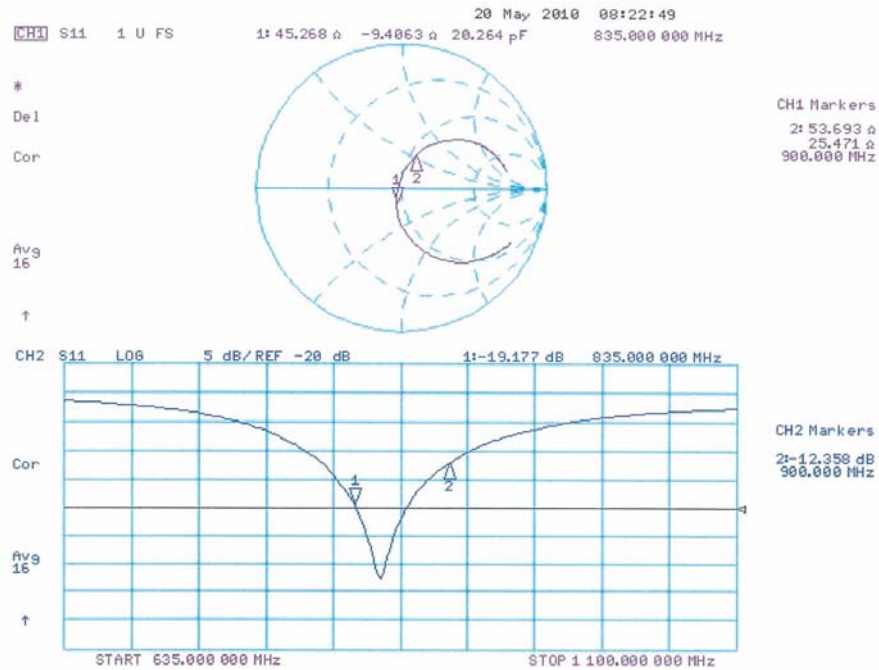
Peak SAR (extrapolated) = 3.69 W/kg

**SAR(1 g) = 2.51 mW/g; SAR(10 g) = 1.64 mW/g**

Maximum value of SAR (measured) = 2.93 mW/g



**Impedance Measurement Plot for Body TSL**



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



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**C** Service suisse d'étalonnage  
**S** Servizio svizzero di taratura  
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The Swiss Accreditation Service is one of the signatories to the EA  
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **HCT (Dymstec)**

Certificate No: **D1900V2-5d032\_Jul10**

## CALIBRATION CERTIFICATE

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                  |                                   |                        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|-----------------------------------|------------------------|
| Object                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | D1900V2 - SN: 5d032                                              |                                   |                        |
| Calibration procedure(s)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | QA CAL-05.v7<br>Calibration procedure for dipole validation kits |                                   |                        |
| Calibration date:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | July 16, 2010                                                    |                                   |                        |
| <p>This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).<br/>The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.</p> <p>All calibrations have been conducted in the closed laboratory facility: environment temperature (<math>22 \pm 3</math>)°C and humidity &lt; 70%.</p> <p>Calibration Equipment used (M&amp;TE critical for calibration)</p> |                                                                  |                                   |                        |
| Primary Standards                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | ID #                                                             | Cal Date (Certificate No.)        | Scheduled Calibration  |
| Power meter EPM-442A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | GB37480704                                                       | 06-Oct-09 (No. 217-01086)         | Oct-10                 |
| Power sensor HP 8481A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | US37292783                                                       | 06-Oct-09 (No. 217-01086)         | Oct-10                 |
| Reference 20 dB Attenuator                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | SN: 5086 (20g)                                                   | 30-Mar-10 (No. 217-01158)         | Mar-11                 |
| Type-N mismatch combination                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | SN: 5047.2 / 06327                                               | 30-Mar-10 (No. 217-01162)         | Mar-11                 |
| Reference Probe ES3DV3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | SN: 3205                                                         | 30-Apr-10 (No. ES3-3205_Apr10)    | Apr-11                 |
| DAE4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | SN: 601                                                          | 10-Jun-10 (No. DAE4-601_Jun10)    | Jun-11                 |
| Secondary Standards                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | ID #                                                             | Check Date (in house)             | Scheduled Check        |
| Power sensor HP 8481A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | MY41092317                                                       | 18-Oct-02 (in house check Oct-09) | In house check: Oct-11 |
| RF generator R&S SMT-06                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 100005                                                           | 4-Aug-99 (in house check Oct-09)  | In house check: Oct-11 |
| Network Analyzer HP 8753E                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | US37390585 S4206                                                 | 18-Oct-01 (in house check Oct-09) | In house check: Oct-10 |
| Calibrated by:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Name<br>Dimce Iliev                                              | Function<br>Laboratory Technician | Signature<br>          |
| Approved by:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Katja Pokovic                                                    | Technical Manager                 |                        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                  |                                   | Issued: July 19, 2010  |
| This calibration certificate shall not be reproduced except in full without written approval of the laboratory.                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                  |                                   |                        |

Certificate No: D1900V2-5d032\_Jul10

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



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

Accreditation No.: **SCS 108**

**Glossary:**

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

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

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

**Additional Documentation:**

- DASY4/5 System Handbook

**Methods Applied and Interpretation of Parameters:**

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

**Measurement Conditions**

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

|                              |                           |             |
|------------------------------|---------------------------|-------------|
| DASY Version                 | DASY5                     | V52.2       |
| Extrapolation                | Advanced Extrapolation    |             |
| Phantom                      | Modular Flat Phantom V5.0 |             |
| Distance Dipole Center - TSL | 10 mm                     | with Spacer |
| Zoom Scan Resolution         | dx, dy, dz = 5 mm         |             |
| Frequency                    | 1900 MHz $\pm$ 1 MHz      |             |

**Head TSL parameters**

The following parameters and calculations were applied.

|                                  | Temperature         | Permittivity   | Conductivity         |
|----------------------------------|---------------------|----------------|----------------------|
| Nominal Head TSL parameters      | 22.0 °C             | 40.0           | 1.40 mho/m           |
| Measured Head TSL parameters     | (22.0 $\pm$ 0.2) °C | 40.3 $\pm$ 6 % | 1.43 mho/m $\pm$ 6 % |
| Head TSL temperature during test | (22.6 $\pm$ 0.2) °C | ----           | ----                 |

**SAR result with Head TSL**

| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL | Condition          |                                                 |
|-------------------------------------------------------|--------------------|-------------------------------------------------|
| SAR measured                                          | 250 mW input power | 10.1 mW / g                                     |
| SAR normalized                                        | normalized to 1W   | 40.4 mW / g                                     |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | <b>39.9 mW /g <math>\pm</math> 17.0 % (k=2)</b> |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | condition          |                                                 |
|---------------------------------------------------------|--------------------|-------------------------------------------------|
| SAR measured                                            | 250 mW input power | 5.26 mW / g                                     |
| SAR normalized                                          | normalized to 1W   | 21.0 mW / g                                     |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | <b>20.9 mW /g <math>\pm</math> 16.5 % (k=2)</b> |

**Body TSL parameters**

The following parameters and calculations were applied.

|                                  | Temperature     | Permittivity | Conductivity     |
|----------------------------------|-----------------|--------------|------------------|
| Nominal Body TSL parameters      | 22.0 °C         | 53.3         | 1.52 mho/m       |
| Measured Body TSL parameters     | (22.0 ± 0.2) °C | 53.3 ± 6 %   | 1.55 mho/m ± 6 % |
| Body TSL temperature during test | (22.5 ± 0.2) °C | ----         | ----             |

**SAR result with Body TSL**

| SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL | Condition          |                                   |
|-------------------------------------------------------|--------------------|-----------------------------------|
| SAR measured                                          | 250 mW input power | 10.5 mW / g                       |
| SAR normalized                                        | normalized to 1W   | 42.0 mW / g                       |
| SAR for nominal Body TSL parameters                   | normalized to 1W   | <b>41.5 mW / g ± 17.0 % (k=2)</b> |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL | condition          |                                   |
|---------------------------------------------------------|--------------------|-----------------------------------|
| SAR measured                                            | 250 mW input power | 5.63 mW / g                       |
| SAR normalized                                          | normalized to 1W   | 22.5 mW / g                       |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | <b>22.4 mW / g ± 16.5 % (k=2)</b> |

**Appendix****Antenna Parameters with Head TSL**

|                                      |                             |
|--------------------------------------|-----------------------------|
| Impedance, transformed to feed point | $51.6 \Omega + 6.2 j\Omega$ |
| Return Loss                          | - 24.0 dB                   |

**Antenna Parameters with Body TSL**

|                                      |                             |
|--------------------------------------|-----------------------------|
| Impedance, transformed to feed point | $50.3 \Omega + 7.0 j\Omega$ |
| Return Loss                          | - 23.1 dB                   |

**General Antenna Parameters and Design**

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.177 ns |
|----------------------------------|----------|

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.  
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

**Additional EUT Data**

|                 |                |
|-----------------|----------------|
| Manufactured by | SPEAG          |
| Manufactured on | March 17, 2003 |

**DASY5 Validation Report for Head TSL**

Date/Time: 16.07.2010 12:15:48

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d032**

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: HSL U12 BB

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.43$  mho/m;  $\epsilon_r = 40.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.09, 5.09, 5.09); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

**Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement**

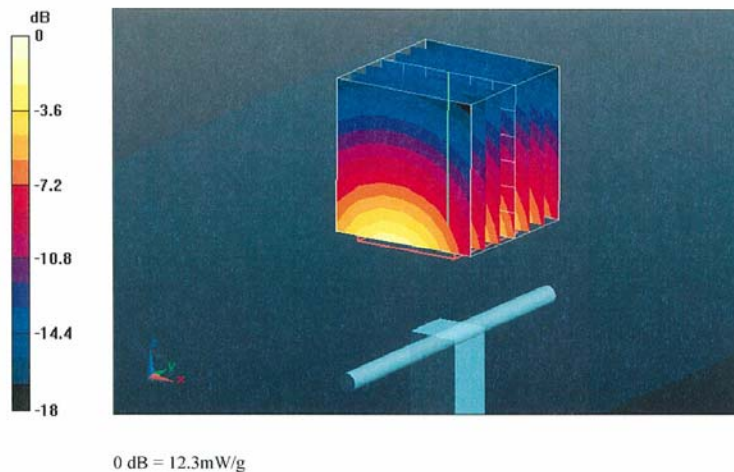
grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.4 V/m; Power Drift = 0.039 dB

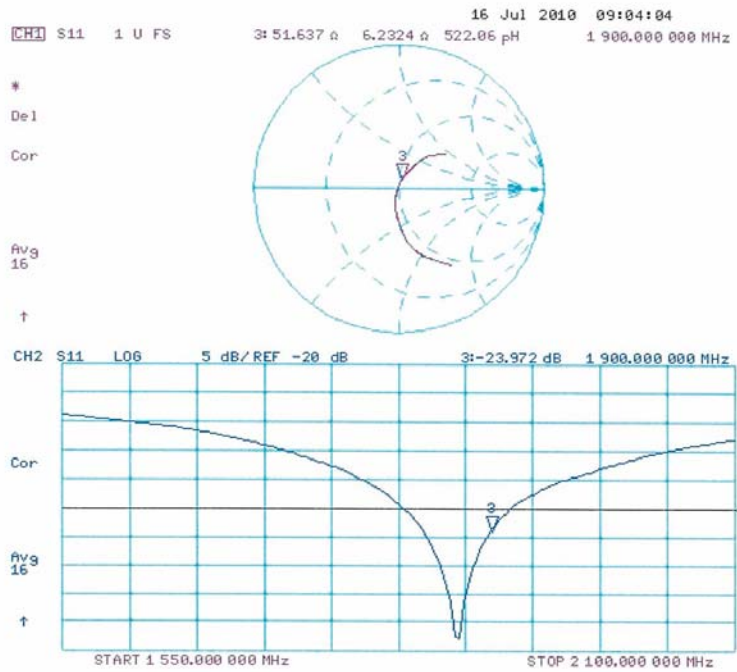
Peak SAR (extrapolated) = 18.3 W/kg

**SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.26 mW/g**

Maximum value of SAR (measured) = 12.3 mW/g



**Impedance Measurement Plot for Head TSL**



**DASY5 Validation Report for Body**

Date/Time: 13.07.2010 12:14:01

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d032**

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: MSL U11 BB

Medium parameters used:  $f = 1900 \text{ MHz}$ ;  $\sigma = 1.55 \text{ mho/m}$ ;  $\epsilon_r = 53.2$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.59, 4.59, 4.59); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

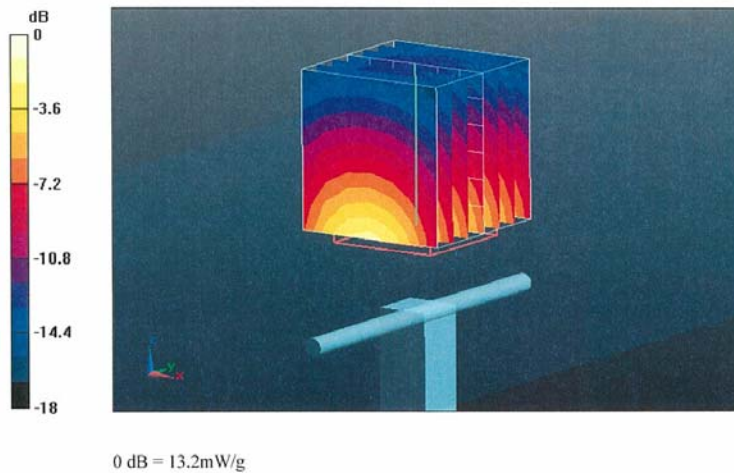
**Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 97.1 V/m; Power Drift = 0.00127 dB

Peak SAR (extrapolated) = 17.6 W/kg

**SAR(1 g) = 10.5 mW/g; SAR(10 g) = 5.63 mW/g**

Maximum value of SAR (measured) = 13.2 mW/g



**Impedance Measurement Plot for Body TSL**

