



**Specific Absorption Rate (SAR) Test Report**  
for  
**Hewlett-Packard Company**  
on the  
**iPAQ Voice messenger**

Report No. : FA852219-02A  
Trade Name : HP  
Model Name : HSTNH-F20C  
FCC ID : B94HHF20C  
Date of Testing : Jun. 04, 2008 ~ Jul. 12, 2008  
Date of Report : Aug. 21, 2008  
Date of Review : Aug. 21, 2008

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- Report Version: Rev. 02

**SPORTON International Inc.**

**No. 52, Hwa Ya 1<sup>st</sup> Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.**



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**1. Statement of Compliance**

The Specific Absorption Rate (SAR) maximum results found during testing for the Hewlett-Packard Company iPAQ Voice messenger HP HSTNH-F20C are as follows (with expanded uncertainty 21.9%):

| <b>Position \ SAR</b> | <b>GSM850<br/>(W/kg)</b> | <b>GSM1900<br/>(W/Kg)</b> | <b>WCDMA Band II<br/>(W/Kg)</b> |
|-----------------------|--------------------------|---------------------------|---------------------------------|
| <b>Head</b>           | 0.681                    | 0.619                     | 1.01                            |
| <b>Body</b>           | 0.95                     | 0.628                     | 0.64                            |

They are in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1999 and had been tested in accordance with the measurement methods and procedures specified in IEEE C95.3-2002, IEEE P1528-2003, and OET Bulletin 65 Supplement C (Edition 01-01).

Approved by

Roy Wu  
Manager



## **2. Administration Data**

### **2.1 Testing Laboratory**

**Company Name :** Sporton International Inc.  
**Department :** Antenna Design/SAR  
**Address :** No.52, Hwa-Ya 1<sup>st</sup> RD., Hwa Ya Technology Park, Kwei-Shan Hsiang,  
TaoYuan Hsien, Taiwan, R.O.C.  
**Telephone Number :** 886-3-327-3456  
**Fax Number :** 886-3-328-4978

### **2.2 Detail of Applicant**

**Company Name :** Hewlett-Packard Company  
**Address :** 20555 SH 249 Houston, Tx 77070, USA

### **2.3 Detail of Manufacturer**

**Company Name :** FOXCONN Technology Group  
**Address :** 4F G5 No.2, 2nd Donghuan Road, 10th Yousong Industrial District, Longhua,  
Baoan, Shenzhen City, Guangdong Province, China 518109

### **2.4 Application Details**

**Date of reception of application:** May 22, 2008  
**Start of test :** Jun. 04, 2008  
**End of test :** Jul. 12, 2008



### 3. General Information

#### 3.1 Description of Device Under Test (DUT)

| Product Feature & Specification |  |
|---------------------------------|--|
| DUT Type :                      | iPAQ Voice messenger   |
| Trade Name :                    | HP   |
| Model Name :                    | HSTNH-F20C   |
| FCC ID :                        | B94HHF20C  |
| Tx Frequency :                  | GSM850 : 824 MHz ~ 849 MHz<br>GSM1900 : 1850 MHz ~ 1910 MHz<br>WCDMA Band II : 1850 MHz ~ 1910 MHz |
| Rx Frequency :                  | GSM850 : 869 MHz ~ 894 MHz<br>GSM1900 : 1930 MHz ~ 1990 MHz<br>WCDMA Band II : 1930 MHz ~ 1990 MHz |
| Antenna Type :                  | PIFA Antenna   |
| HW Version :                    | DVT  |
| SW Version :                    | 00.15.50.185   |
| Type of Modulation :            | GSM / GPRS : GMSK<br>EDGE : 8PSK<br>WCDMA / HSDPA / HSUPA : QPSK                                   |
| DUT Stage :                     | Identical Prototype  |

**3.2 Basic Description of Accessories**

|                     |                           |  |
|---------------------|---------------------------|--|
| <b>AC Adapter 1</b> | <b>Brand Name</b>         | HP   |
|                     | <b>Model Name</b>         | PSAA05-050   |
|                     | <b>Power Rating</b>       | I/P:100-240Vac, 50-60Hz, 200mA;<br>O/P: 5Vdc, 1A   |
|                     | <b>AC Power Cord Type</b> | 1.8 meter shielded cable without ferrite core      |
| <b>AC Adapter 2</b> | <b>Brand Name</b>         | HP   |
|                     | <b>Model Name</b>         | PSB05R-050Q  |
|                     | <b>Power Rating</b>       | I/P:100-240Vac, 50-60Hz, 200mA;<br>O/P: 5Vdc, 1A   |
| <b>Battery 1</b>    | <b>Brand Name</b>         | HP   |
|                     | <b>Model Name</b>         | HSTNH-T20B-S                                       |
|                     | <b>Power Rating</b>       | 3.7Vdc, 1200mAh                                    |
|                     | <b>Type</b>               | Li-ion   |
| <b>Battery 2</b>    | <b>Brand Name</b>         | HP   |
|                     | <b>Model Name</b>         | HSTNH-K20B-H                                       |
|                     | <b>Power Rating</b>       | 3.7Vdc, 1940mAh                                    |
|                     | <b>Type</b>               | Li-ion   |
| <b>Earphone</b>     | <b>Brand Name</b>         | FOSTER   |
|                     | <b>Model Name</b>         | 480052   |
|                     | <b>Signal Line Type</b>   | 1.45 meter non-shielded cable without ferrite core |
| <b>USB Cable</b>    | <b>Brand Name</b>         | Foxconn  |
|                     | <b>Model Name</b>         | CUNC005B-T45-EF                                    |
|                     | <b>Signal Line Type</b>   | 1.4 meter shielded cable without ferrite core      |
| <b>LCD Panel</b>    | <b>Brand Name</b>         | SAMSUNG  |
|                     | <b>Model Name</b>         | LMS241GF17   |
| <b>Camera</b>       | <b>Brand Name</b>         | SAMSUNG  |
|                     | <b>Model Name</b>         | MOMBE547G6A  |

Remark: Above EUT's information was declared by manufacturer. Please refer to the specifications of manufacturer or User's Manual for more detailed features description.

**3.3 Product Photos**

Refer to Appendix D.



3.4 Applied Standards

47 CFR Part 2 ( 2.1093),  
IEEE C95.1-1999,  
IEEE C95.3-2002,  
IEEE P1528-2003, and  
OET Bulletin 65 Supplement C (Edition 01-01)  
Preliminary Guidance for Reviewing Applications for Certification of 3G Device. May 2006.  
SAR Measurement Procedures for 3G Devices. June 2006.  
KDB 648474 D01 v01r03

3.5 Device Category and SAR Limits

This device belongs to portable device category because its radiating structure is allowed to be used within 20 centimeters of the body of the user. Limit for General Population/Uncontrolled exposure should be applied for this device, it is 1.6 W/kg as averaged over any 1 gram of tissue.

3.6 Test Conditions

3.6.1 Ambient Condition

| Item                                      | HSL 850       | MSL 850       |
|---|---------------|---------------|
| Test Date                                 | June 04, 2008 | June 07, 2008 |
| Ambient Temperature (°C)                  | 20-24         |               |
| Tissue simulating liquid temperature (°C) | 21.6 °C       | 21.5 °C       |
| Humidity (%)                              | <60 %         |               |

| Item                                      | HSL 1900      | HSL 1900      | MSL 1900      | MSL 1900      |
|---|---------------|---------------|---------------|---------------|
| Test Date                                 | June 05, 2008 | July 12, 2008 | June 05, 2008 | June 07, 2008 |
| Ambient Temperature (°C)                  | 20-24         |               |               |               |
| Tissue simulating liquid temperature (°C) | 21.5 °C       | 21.6 °C       | 21.4 °C       | 21.6 °C       |
| Humidity (%)                              | <60 %         |               |               |               |

### 3.6.2 Test Configuration

The DUT was set from the emulator to radiate maximum output power during all tests.

The device was controlled by using a base station emulator R&S CMU200. Communication between the device and the emulator was established by air link. The distance between the DUT and the antenna of the emulator is larger than 50 cm and the output power radiated from the emulator antenna is at least 30 dB smaller than the output power of DUT.

For SAR testing, EUT is in GSM/GPRS/EDGE or WCDMA/HSDPA/HSUPA link mode. In GSM link mode, its crest factor is 8.3. In GPRS/EDGE link mode, its crest factor is 4, because EUT is GPRS/EDGE class 10 device. In WCDMA/HSDPA/HSUPA link mode, its crest factor is 1.

Measurements were performed on the lowest, middle, and highest channel for each testing position. However, measurements were performed only on the middle channel if the SAR is below 3 dB of limit.

FCC revised KDB 648474 on June 23, 2008. According KDB 648474, the simultaneous transmission SAR (volume scan) was not required, because the summation of SAR is 1.427W/kg less than 1.6W/kg. The FCC rule please refer to figure 3.1.

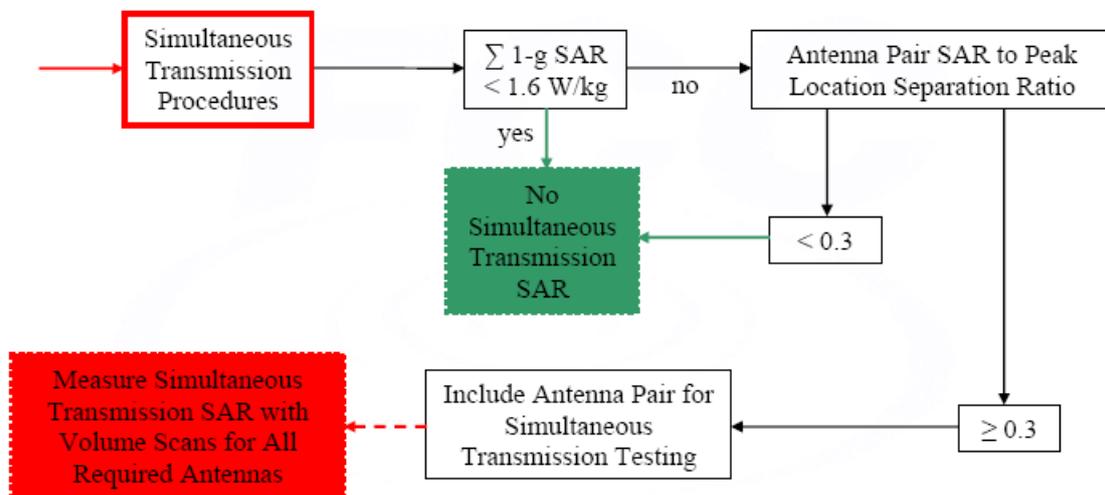


Fig. 3.1 KDB 648474 Simultaneous Transmission SAR Procedures for a Cell Phone

## 4. Specific Absorption Rate (SAR)

### 4.1 Introduction

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

### 4.2 SAR Definition

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (ρ). The equation description is as below:

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

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

SAR measurement can be either related to the temperature elevation in tissue by

$$\text{SAR} = C \frac{\delta T}{\delta t}$$

, where C is the specific heat capacity,  $\delta T$  is the temperature rise and  $\delta t$  the exposure duration,

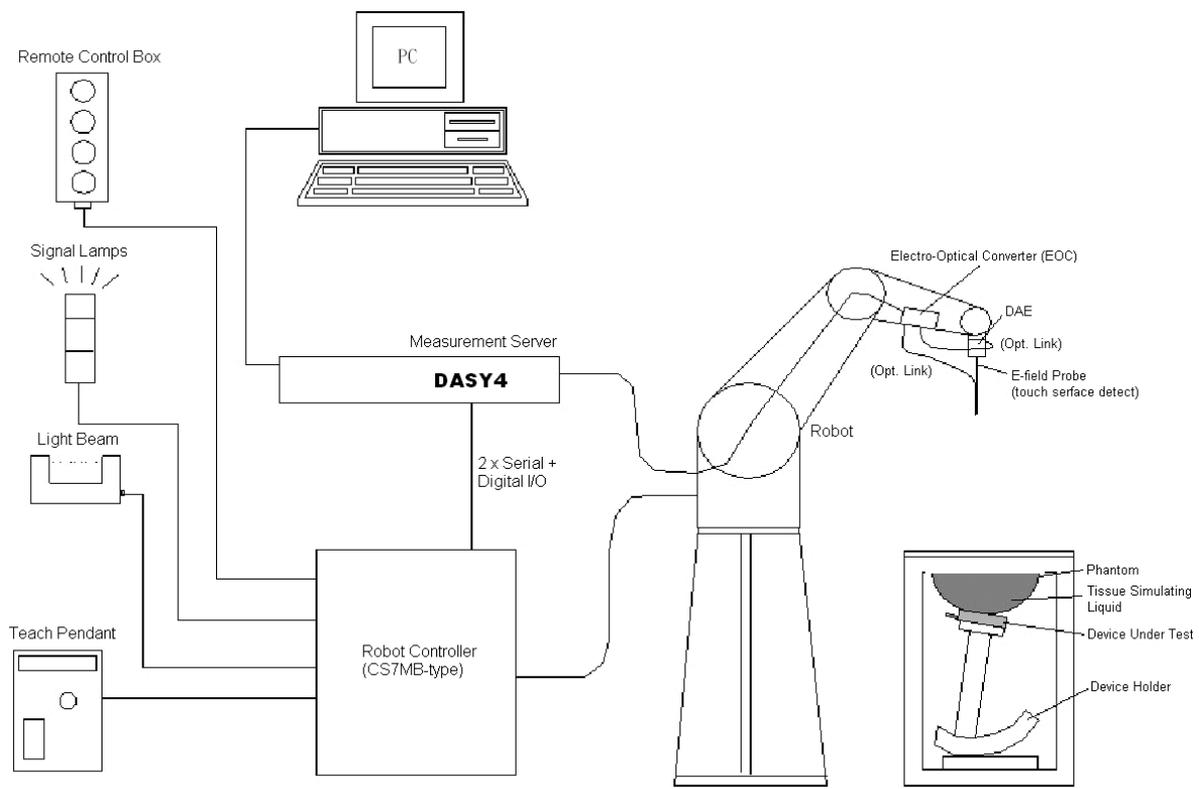
or related to the electrical field in the tissue by

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

, where  $\sigma$  is the conductivity of the tissue,  $\rho$  is the mass density of the tissue and  $E$  is the rms electrical field strength.

However for evaluating SAR of low power transmitter, electrical field measurement is typically applied.

## 5. SAR Measurement Setup



**Fig. 5.1 DASY4 System**

The DASY4 system for performance compliance tests is illustrated above graphically. This system consists of the following items:

- A standard high precision 6-axis robot with controller, a teach pendant and software
- A data acquisition electronic (DAE) attached to the robot arm extension
- A dosimetric probe equipped with an optical surface detector system
- The electro-optical converter (ECO) performs the conversion between optical and electrical signals
- A measurement server performs the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the accuracy of the probe positioning
- A computer operating Windows XP
- DASY4 software
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom
- A device holder
- Tissue simulating liquid
- Dipole for evaluating the proper functioning of the system

Some of the components are described in details in the following sub-sections.

**5.1 DASY4 E-Field Probe System**

The SAR measurement is conducted with the dosimetric probe ET3DV6 (manufactured by SPEAG). The probe is specially designed and calibrated for use in liquid with high permittivity. The dosimetric probe has special calibration in liquid at different frequency. This probe has a built in optical surface detection system to prevent from collision with phantom.

**5.1.1 ET3DV6 E-Field Probe Specification**

<ET3DV6>

|                          |  |   |
|--------------------------|--|---|
| <b>Construction</b>      | Symmetrical design with triangular core<br>Built-in optical fiber for surface detection system<br>Built-in shielding against static charges<br>PEEK enclosure material (resistant to organic solvents) |  |
| <b>Frequency</b>         | 10 MHz to 3 GHz  |   |
| <b>Directivity</b>       | ± 0.2 dB in brain tissue (rotation around probe axis)<br>± 0.4 dB in brain tissue (rotation perpendicular to probe axis)   |   |
| <b>Dynamic Range</b>     | 5 μ W/g to 100mW/g; Linearity: ±0.2dB  |   |
| <b>Surface Detection</b> | ± 0.2 mm repeatability in air and clear liquids on reflecting surface  |   |
| <b>Dimensions</b>        | Overall length: 330mm<br>Tip length: 16mm<br>Body diameter: 12mm<br>Tip diameter: 6.8mm<br>Distance from probe tip to dipole centers: 2.7mm  |   |
| <b>Application</b>       | General dosimetry up to 3GHz<br>Compliance tests for mobile phones and Wireless LAN<br>Fast automatic scanning in arbitrary phantoms   |   |

**Fig. 5.2 Probe Setup on Robot**

**5.1.2 ET3DV6 E-Field Probe Calibration**

Each probe needs to be calibrated according to a dosimetric assessment procedure with accuracy better than ± 10%. The spherical isotropy shall be evaluated and within ± 0.25dB. The sensitivity parameters (NormX, NormY, and NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe are tested. The calibration data are as below:

➤ ET3DV6 sn1787

|  |                        |                  |                  |               |
|--|------------------------|------------------|------------------|---------------|
| <b>Sensitivity</b>                     | X axis : 1.63 μV       | Y axis : 1.66 μV | Z axis : 2.08 μV |               |
| <b>Diode compression point</b>         | X axis : 92 mV         | Y axis : 96 mV   | Z axis : 91 mV   |               |
| <b>Conversion factor (Head / Body)</b> | <b>Frequency (MHz)</b> | <b>X axis</b>    | <b>Y axis</b>    | <b>Z axis</b> |
|  | 800~1000               | 6.58 / 6.10      | 6.58 / 6.10      | 6.58 / 6.10   |
|  | 1710~1910              | 5.16 / 4.68      | 5.16 / 4.68      | 5.16 / 4.68   |
| <b>Boundary effect (Head / Body)</b>   | <b>Frequency (MHz)</b> | <b>Alpha</b>     | <b>Depth</b>     |               |
|  | 800~1000               | 0.32 / 0.36      | 2.42 / 2.52      |               |
|  | 1710~1910              | 0.50 / 0.61      | 2.61 / 2.56      |               |

NOTE: The probe parameters have been calibrated by the SPEAG.

### **5.2 DATA Acquisition Electronics (DAE)**

The data acquisition electronics (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 measurement server is accomplished through an optical downlink for data and status information as well as an optical uplink for commands and the clock.

The mechanical probe mounting device includes two different sensor systems for frontal and sideways probe contacts. They are used for mechanical surface detection and probe collision detection.

The input impedance of the DAE4 is 200M Ohm; the inputs are symmetrical and floating. Common mode rejection is above 80dB.

### **5.3 Robot**

The DASY4 system uses the high precision robots RX90BL type out of the newer series from Stäubli SA (France). For the 6-axis controller DASY4 system, the CS7MB robot controller version from Stäubli is used. The RX robot series have many features that are important for our application:

- High precision (repeatability 0.02 mm)
- High reliability (industrial design)
- Jerk-free straight movements
- Low ELF interference (the closed metallic construction shields against motor control fields)
- 6-axis controller

### **5.4 Measurement Server**

The DASY4 measurement server is based on a PC/104 CPU board with  
166 MHz CPU  
32 MB chipset and  
64 MB RAM.

Communication with  
the DAE4 electronic box  
the 16-bit AD-converter system for optical detection and digital I/O interface.

The measurement server performs all the real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operations.

### 5.5 SAM Twin Phantom

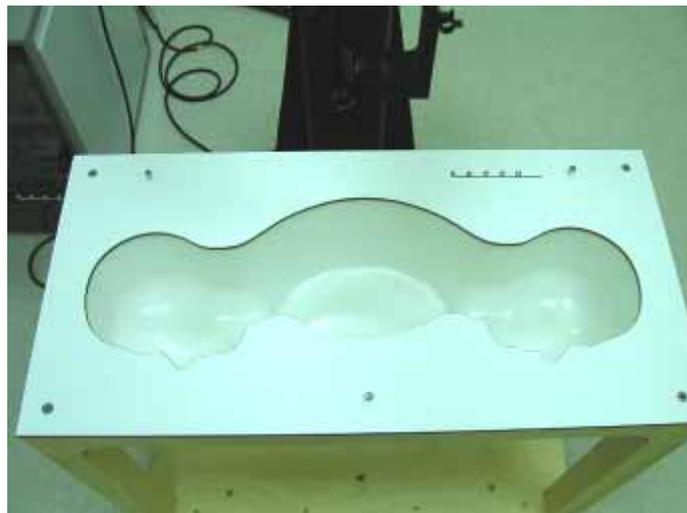
The SAM twin phantom is a fiberglass shell phantom with 2mm shell thickness (except the ear region where shell thickness increases to 6mm). It has three measurement areas:

- Left head
- Right head
- Flat phantom

The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. A white cover is provided to tap the phantom during off-periods to prevent water evaporation and changes in the liquid parameters. On the phantom top, three reference markers are provided to identify the phantom position with respect to the robot.

The phantom can be used with the following tissue simulating liquids:

- \*Water-sugar based liquid
- \*Glycol based liquids



**Fig. 5.3 Top View of Twin Phantom**



**Fig. 5.4 Bottom View of Twin Phantom**

### **5.6 Device Holder for SAM Twin Phantom**

The SAR in the Phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source in 5 mm distance, a positioning uncertainty of  $\pm 0.5\text{mm}$  would produce a SAR uncertainty of  $\pm 20\%$ . An accurate device position is therefore crucial for accurate and repeatable measurement. The position in which the devices must be measured, are defined by the standards.

The DASY4 device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation centers for both scales is the ear reference point (EPR).

Thus the device needs no repositioning when changing the angles.

The DASY4 device holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity  $\epsilon_r = 3$  and loss tangent  $\delta = 0.02$ . The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.



**Fig. 5.5 Device Holder**

## **5.7 Data Storage and Evaluation**

### **5.7.1 Data Storage**

The DASY4 software stores the assessed data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all the necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension .DA4. The post-processing software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of erroneous parameter settings. For example, if a measurement has been performed with an incorrect crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be reevaluated.

The measured data can be visualized or exported in different units or formats, depending on the selected probe type (e.g., [V/m], [A/m], [mW/g]). Some of these units are not available in certain situations or give meaningless results, e.g., a SAR-output in a non-loss media, will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

### **5.7.2 Data Evaluation**

The DASY4 post-processing software (SEMCAD) automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software :

|                            |                           |                                     |
|----------------------------|---------------------------|-------------------------------------|
| <b>Probe parameters :</b>  | - Sensitivity             | $Norm_i, a_{i,0}, a_{i,1}, a_{i,2}$ |
|                            | - Conversion factor       | $ConvF_i$                           |
|                            | - Diode compression point | $dcp_i$                             |
| <b>Device parameters :</b> | - Frequency               | $f$                                 |
|                            | - Crest factor            | $cf$                                |
| <b>Media parameters :</b>  | - Conductivity            |                                     |
|                            | - Density                 |                                     |

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY4 components. In the direct measuring mode of the multi-meter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

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 as :

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

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

H-field probes :  $H_i = \sqrt{V_i} \frac{a_{i0} + a_{i1}f + a_{i2}f^2}{f}$

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 enhancement in solution  
 $a_{ij}$  = sensor sensitivity factors for H-field probes  
 $f$  = carrier frequency [GHz]  
 $E_i$  = electric field strength of channel  $i$  in V/m  
 $H_i$  = magnetic field strength of channel  $i$  in A/m

The RSS value of the field components gives the total field strength (Hermitian 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 mW/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>

\* Note that the density is set to 1, to account for actual head tissue density rather than the density of the tissue simulating liquid.

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

$$P_{pwe} = \frac{E_{tot}^2}{3770} \quad \text{or} \quad P_{pwe} = H_{tot}^2 \cdot 37.7$$

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



5.8 Test Equipment List

| Manufacturer | Name of Equipment                    | Type/Model               | Serial Number   | Calibration   |               |
|--------------|--------------------------------------|--------------------------|-----------------|---------------|---------------|
|              |                                      |                          |                 | Last Cal.     | Due Date      |
| SPEAG        | Dosimetric E-Filed Probe             | ET3DV6                   | 1787            | Aug. 28, 2007 | Aug. 27, 2008 |
| SPEAG        | 835MHz System Validation Kit         | D835V2                   | 499             | Mar. 17, 2008 | Mar. 16, 2010 |
| SPEAG        | 1900MHz System Validation Kit        | D1900V2                  | 5d041           | Mar. 28, 2008 | Mar. 27, 2010 |
| SPEAG        | Data Acquisition Electronics         | DAE4                     | 778             | Sep. 17, 2007 | Sep. 16, 2008 |
| SPEAG        | Device Holder                        | N/A                      | N/A             | NCR           | NCR           |
| SPEAG        | SAM Phantom                          | QD 000 P40 C             | TP-1303         | NCR           | NCR           |
| SPEAG        | SAM Phantom                          | QD 000 P40 C             | TP-1446         | NCR           | NCR           |
| SPEAG        | SAM Phantom                          | QD 000 P40 C             | TP-1383         | NCR           | NCR           |
| SPEAG        | ELI4 Phantom                         | QD 0VA 001 BB            | 1029            | NCR           | NCR           |
| SPEAG        | Robot                                | Staubli RX90BL           | F03/5W15A1/A/01 | NCR           | NCR           |
| SPEAG        | Software                             | DASY4<br>V4.7 Build 55   | N/A             | NCR           | NCR           |
| SPEAG        | Software                             | SEMCAD<br>V1.8 Build 176 | N/A             | NCR           | NCR           |
| SPEAG        | Measurement Server                   | SE UMS 001 BA            | 1021            | NCR           | NCR           |
| Agilent      | PNA Series Network Analyzer          | E8358A                   | US40260131      | Apr. 02, 2008 | Apr. 01, 2009 |
| Agilent      | Wireless Communication Test Set      | E5515C                   | GB46311322      | Dec. 22, 2006 | Dec. 21, 2008 |
| R&S          | Universal Radio Communication Tester | CMU200                   | 103937          | Oct. 19, 2007 | Oct. 18, 2008 |
| Agilent      | Dielectric Probe Kit                 | 85070D                   | US01440205      | NCR           | NCR           |
| Agilent      | Dual Directional Coupler             | 778D                     | 50422           | NCR           | NCR           |
| AR           | Power Amplifier                      | 5S1G4M2                  | 0328767         | NCR           | NCR           |
| R&S          | Power Meter                          | NRVD                     | 101394          | Oct. 31, 2007 | Oct. 30, 2008 |
| R&S          | Power Sensor                         | NRV-Z1                   | 100130          | Oct. 31, 2007 | Oct. 30, 2008 |

Table 5.1 Test Equipment List

**6. Tissue Simulating Liquids**

For the measurement of the field distribution inside the SAM phantom with DASY4, the phantom must be filled with around 25 liters of homogeneous tissue simulating liquid. The liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is (head SAR) or from the flat phantom to the liquid top surface (body SAR) is 15.2cm.

The following ingredients for tissue simulating liquid are used:

- **Water:** deionized water (pure H<sub>2</sub>O), resistivity  $\geq 16\text{M}\Omega$ - as basis for the liquid
- **Sugar:** refined sugar in crystals, as available in food shops – to reduce relative permittivity
- **Salt:** pure NaCl – to increase conductivity
- **Cellulose:** Hydroxyethyl-cellulose, medium viscosity (75-125 mPa.s, 2% in water, 20°C), CAS#54290-to increase viscosity and to keep sugar in solution.
- **Preservative:** Preventol D-7 Bayer AG, D-51368 Leverkusen, CAS#55965-84-9- to prevent the spread of bacteria and molds.
- **DGMBE:** Deithlenglycol-monobuthyl ether (DGMBE), Fluka Chemie GmbH, CAS#112-34-5 – to reduce relative permittivity.

Table 6.1 gives the recipes for one liter of head and body tissue simulating liquid for frequency band 850MHZ and 1900 MHz.

| Ingredient                          | HSL-850   | MSL-850   | HSL-1900  | MSL-1900   |
|-------------------------------------|---|---|---|--|
| Water                               | 532.98 g  | 631.68 g  | 552.42 g  | 716.56 g   |
| Cellulose                           | 0 g   | 0 g   | 0 g   | 0 g  |
| Salt                                | 18.3 g  | 11.72 g   | 3.06 g  | 4.0 g  |
| Preventol D-7                       | 2.4 g   | 1.2 g   | 0 g   | 0 g  |
| Sugar                               | 766.0 g   | 600.0 g   | 0 g   | 0 g  |
| DGMBE                               | 0 g   | 0 g   | 444.52 g  | 300.67 g   |
| <b>Total amount</b>                 | 1 liter (1.3 kg)  | 1 liter (1.3 kg)  | 1 liter (1.0 kg)  | 1 liter (1.0 kg)   |
| <b>Dielectric Parameters at 22°</b> | f = 835 MHz<br>$\epsilon_r = 41.5 \pm 5\%$ ,<br>$\sigma = 0.90 \pm 5\%$ S/m | f = 835 MHz<br>$\epsilon_r = 55.2 \pm 5\%$ ,<br>$\sigma = 0.97 \pm 5\%$ S/m | f = 1900 MHz<br>$\epsilon_r = 40.0 \pm 5\%$ ,<br>$\sigma = 1.4 \pm 5\%$ S/m | f = 1900 MHz<br>$\epsilon_r = 53.3 \pm 5\%$ ,<br>$\sigma = 1.52 \pm 5\%$ S/m |

**Table 6.1 Recipes for Tissue Simulating Liquid**

The dielectric parameters of the liquids were verified prior to the SAR evaluation using an Agilent 85070D Dielectric Probe Kit and an Agilent Network Analyzer.

Table 6.2 shows the measuring results for head and muscle simulating liquid.

| Band          | Position | Frequency (MHz) | Permittivity ( $\epsilon_r$ ) | Conductivity ( $\sigma$ ) | Measurement Date |
|---------------|----------|-----------------|-------------------------------|---------------------------|------------------|
| GSM850        | Head     | 824.2           | 40.7                          | 0.899                     | Jun. 04, 2008    |
|               |          | 836.4           | 40.6                          | 0.909                     |                  |
|               |          | 848.8           | 40.4                          | 0.919                     |                  |
|               | Body     | 824.2           | 56.3                          | 0.955                     | Jun. 07, 2008    |
|               |          | 836.4           | 56.3                          | 0.967                     |                  |
|               |          | 848.8           | 56.1                          | 0.976                     |                  |
| GSM1900       | Head     | 1850.2          | 38.8                          | 1.37                      | Jun. 05, 2008    |
|               |          | 1880.0          | 38.7                          | 1.40                      |                  |
|               |          | 1909.8          | 38.6                          | 1.43                      |                  |
|               | Body     | 1850.2          | 51.0                          | 1.47                      | Jun. 05, 2008    |
|               |          | 1880.0          | 50.9                          | 1.50                      |                  |
|               |          | 1909.8          | 50.8                          | 1.53                      |                  |
| WCDMA Band II | Head     | 1852.4          | 38.8                          | 1.38                      | Jun. 05, 2008    |
|               |          | 1880.0          | 38.7                          | 1.40                      |                  |
|               |          | 1907.6          | 38.6                          | 1.43                      |                  |
|               | Head     | 1852.4          | 41.8                          | 1.35                      | Jul. 12, 2008    |
|               |          | 1880.0          | 41.8                          | 1.39                      |                  |
|               |          | 1907.6          | 41.9                          | 1.43                      |                  |
|               | Body     | 1852.4          | 51.8                          | 1.52                      | Jun. 07, 2008    |
|               |          | 1880.0          | 51.7                          | 1.55                      |                  |
|               |          | 1907.6          | 51.7                          | 1.58                      |                  |

**Table 6.2 Measuring Results for Simulating Liquid**

The measuring data are consistent with  $\epsilon_r = 41.5 \pm 5\%$  and  $\sigma = 0.9 \pm 5\%$  for head GSM850,  $\epsilon_r = 55.2 \pm 5\%$  and  $\sigma = 0.97 \pm 5\%$  for body GSM850,  $\epsilon_r = 40.0 \pm 5\%$  and  $\sigma = 1.4 \pm 5\%$  for head GSM1900 and WCDMA Band II, and  $\epsilon_r = 53.3 \pm 5\%$  and  $\sigma = 1.52 \pm 5\%$  for body GSM1900 and WCDMA Band II.

**7. Uncertainty Assessment**

The component of uncertainty may generally be categorized according to the methods used to evaluate them. The evaluation of uncertainty by the statistical analysis of a series of observations is termed a Type A evaluation of uncertainty. The evaluation of uncertainty by means other than the statistical analysis of a series of observation is termed a Type B evaluation of uncertainty. Each component of uncertainty, however evaluated, is represented by an estimated standard deviation, termed standard uncertainty, which is determined by the positive square root of the estimated variance.

A Type A evaluation of standard uncertainty may be based on any valid statistical method for treating data. This includes calculating the standard deviation of the mean of a series of independent observations; using the method of least squares to fit a curve to the data in order to estimate the parameter of the curve and their standard deviations; or carrying out an analysis of variance in order to identify and quantify random effects in certain kinds of measurement.

A type B evaluation of standard uncertainty is typically based on scientific judgment using all of the relevant information available. These may include previous measurement data, experience and knowledge of the behavior and properties of relevant materials and instruments, manufacture’s specification, data provided in calibration reports and uncertainties assigned to reference data taken from handbooks. Broadly speaking, the uncertainty is either obtained from an outdoor source or obtained from an assumed distribution, such as the normal distribution, rectangular or triangular distributions indicated in Table 7.1

| Uncertainty Distributions               | Normal             | Rectangular | Triangular | U-shape |
|---|--------------------|-------------|------------|---------|
| <b>Multiplying factor<sup>(a)</sup></b> | 1/k <sup>(b)</sup> | 1/ 3        | 1/ 6       | 1/ 2    |

(a) standard uncertainty is determined as the product of the multiplying factor and the estimated range of variations in the measured quantity

(b) is the coverage factor

**Table 7.1 Multiplying Factions for Various Distributions**

The combined standard uncertainty of the measurement result represents the estimated standard deviation of the result. It is obtained by combining the individual standard uncertainties of both Type A and Type B evaluation using the usual “root-sum-squares” (RSS) methods of combining standard deviations by taking the positive square root of the estimated variances.

Expanded uncertainty is a measure of uncertainty that defines an interval about the measurement result within which the measured value is confidently believed to lie. It is obtained by multiplying the combined standard uncertainty by a coverage factor. Typically, the coverage factor ranges from 2 to 3. Using a coverage factor allows the true value of a measured quantity to be specified with a defined probability within the specified uncertainty range. For purpose of this document, a coverage factor two is used, which corresponds to confidence interval of about 95 %. The DASy4 uncertainty Budget is showed in Table 7.2.



| Error Description                                 | Uncertainty Value ± % | Probability Distribution | Divisor | Ci (1g) | Standard Unc. (1g) | vi or Veff |
|---|-----------------------|--------------------------|---------|---------|--------------------|------------|
| <b>Measurement Equipment</b>                      |                       |                          |         |         |                    |            |
| Probe Calibration                                 | ±5.9 %                | Normal                   | 1       | 1       | ±5.9 %             | ∞          |
| Axial Isotropy                                    | ±4.7 %                | Rectangular              | √3      | 0.7     | ±1.9 %             | ∞          |
| Hemispherical Isotropy                            | ±9.6 %                | Rectangular              | √3      | 0.7     | ±3.9 %             | ∞          |
| Boundary Effects                                  | ±1.0 %                | Rectangular              | √3      | 1       | ±0.6 %             | ∞          |
| Linearity   | ±4.7 %                | Rectangular              | √3      | 1       | ±2.7 %             | ∞          |
| System Detection Limits                           | ±1.0 %                | Rectangular              | √3      | 1       | ±0.6 %             | ∞          |
| Readout Electronics                               | ±0.3 %                | Normal                   | 1       | 1       | ±0.3 %             | ∞          |
| Response Time                                     | ±0.8 %                | Rectangular              | √3      | 1       | ±0.5 %             | ∞          |
| Integration Time                                  | ±2.6 %                | Rectangular              | √3      | 1       | ±1.5 %             | ∞          |
| RF Ambient Noise                                  | ±3.0 %                | Rectangular              | √3      | 1       | ±1.7 %             | ∞          |
| RF Ambient Reflections                            | ±3.0 %                | Rectangular              | √3      | 1       | ±1.7 %             | ∞          |
| Probe Positioner                                  | ±0.4 %                | Rectangular              | √3      | 1       | ±0.2 %             | ∞          |
| Probe Positioning                                 | ±2.9 %                | Rectangular              | √3      | 1       | ±1.7 %             | ∞          |
| Max. SAR Eval.                                    | ±1.0 %                | Rectangular              | √3      | 1       | ±0.6 %             | ∞          |
| <b>Test Sample Related</b>                        |                       |                          |         |         |                    |            |
| Device Positioning                                | ±2.9 %                | Normal                   | 1       | 1       | ±2.9               | 145        |
| Device Holder                                     | ±3.6 %                | Normal                   | 1       | 1       | ±3.6               | 5          |
| Power Drift                                       | ±5.0 %                | Rectangular              | √3      | 1       | ±2.9               | ∞          |
| <b>Phantom and Setup</b>                          |                       |                          |         |         |                    |            |
| Phantom Uncertainty                               | ±4.0 %                | Rectangular              | √3      | 1       | ±2.3               | ∞          |
| Liquid Conductivity (target)                      | ±5.0 %                | Rectangular              | √3      | 0.64    | ±1.8               | ∞          |
| Liquid Conductivity (meas.)                       | ±2.5 %                | Normal                   | 1       | 0.64    | ±1.6               | ∞          |
| Liquid Permittivity (target)                      | ±5.0 %                | Rectangular              | √3      | 0.6     | ±1.7               | ∞          |
| Liquid Permittivity (meas.)                       | ±2.5 %                | Normal                   | 1       | 0.6     | ±1.5               | ∞          |
| <b>Combined Standard Uncertainty</b>              |                       |                          |         |         | <b>±10.9</b>       | <b>387</b> |
| <b>Coverage Factor for 95 %</b>                   |                       | <b>K=2</b>               |         |         |                    |            |
| <b>Expanded uncertainty (Coverage factor = 2)</b> |                       |                          |         |         | <b>±21.9</b>       |            |

Table 7.2 Uncertainty Budget of DASY4

## 8. SAR Measurement Evaluation

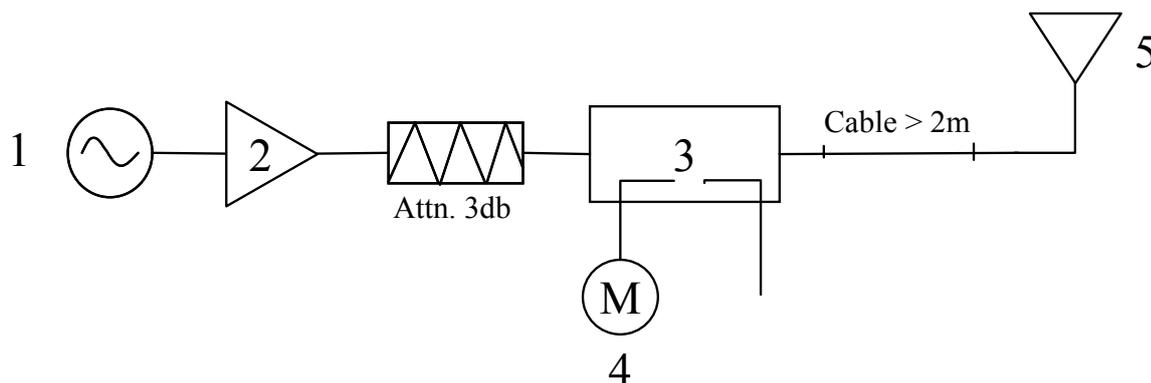
Each DASY4 system is equipped with one or more system validation kits. These units, together with the predefined measurement procedures within the DASY4 software, enable the user to conduct the system performance check and system validation. System validation kit includes a dipole, tripod holder to fix it underneath the flat phantom and a corresponding distance holder.

### 8.1 Purpose of System Performance check

The system performance check verifies that the system operates within its specifications. System and operator errors can be detected and corrected. It is recommended that the system performance check be performed prior to any usage of the system in order to guarantee reproducible results. The system performance check uses normal SAR measurements in a simplified setup with a well characterized source. This setup was selected to give a high sensitivity to all parameters that might fail or vary over time. The system check does not intend to replace the calibration of the components, but indicates situations where the system uncertainty is exceeded due to drift or failure.

### 8.2 System Setup

In the simplified setup for system evaluation, the DUT is replaced by a calibrated dipole and the power source is replaced by a continuous wave which comes from a signal generator at frequency 835 MHz and 1900 MHz. The calibrated dipole must be placed beneath the flat phantom section of the SAM twin phantom with the correct distance holder. The distance holder should touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom. The equipment setup is shown below:



**Fig. 8.1 System Setup for System Evaluation**

1. Signal Generator
2. Amplifier
3. Directional Coupler
4. Power Meter
5. 835 MHz or 1900 MHz Dipole

The output power on dipole port must be calibrated to 20dBm (100mW) before dipole is connected.



**Fig 8.2 Dipole Setup**

**8.3 Validation Results**

Comparing to the original SAR value provided by SPEAG, the validation data should be within its specification of 10 %. Table 8.1 shows the target SAR and measured SAR after normalized to 1W input power.

| Frequency | Position | SAR       | Target (W/kg) | Measurement data (W/kg) | Variation | Measurement Date |
|-----------|----------|-----------|---------------|-------------------------|-----------|------------------|
| 835MHz    | Head     | SAR (1g)  | 9.16          | 9.09                    | -0.8 %    | Jun. 04, 2008    |
|           |          | SAR (10g) | 6.0           | 5.94                    | -1.0 %    |                  |
|           | Body     | SAR (1g)  | 9.91          | 9.96                    | 0.5 %     | Jun. 06, 2008    |
|           |          | SAR (10g) | 6.55          | 6.57                    | 0.3 %     |                  |
| 1900MHz   | Head     | SAR (1g)  | 39.5          | 38.1                    | -3.5 %    | Jun. 05, 2008    |
|           |          | SAR (10g) | 20.6          | 20.0                    | -2.9 %    |                  |
|           | Head     | SAR (1g)  | 39.5          | 39.5                    | 0.0 %     | Jul. 12, 2008    |
|           |          | SAR (10g) | 20.6          | 20.8                    | 1.0 %     |                  |
|           | Body     | SAR (1g)  | 40.1          | 39.1                    | -2.5 %    | Jun. 05, 2008    |
|           |          | SAR (10g) | 21.3          | 21.1                    | -0.9 %    |                  |
|           | Body     | SAR (1g)  | 40.1          | 43.1                    | 7.5 %     | Jun. 06, 2008    |
|           |          | SAR (10g) | 21.3          | 23.2                    | 8.9 %     |                  |

**Table 8.1 Target and Measurement Data Comparison**

The table above indicates the system performance check can meet the variation criterion.

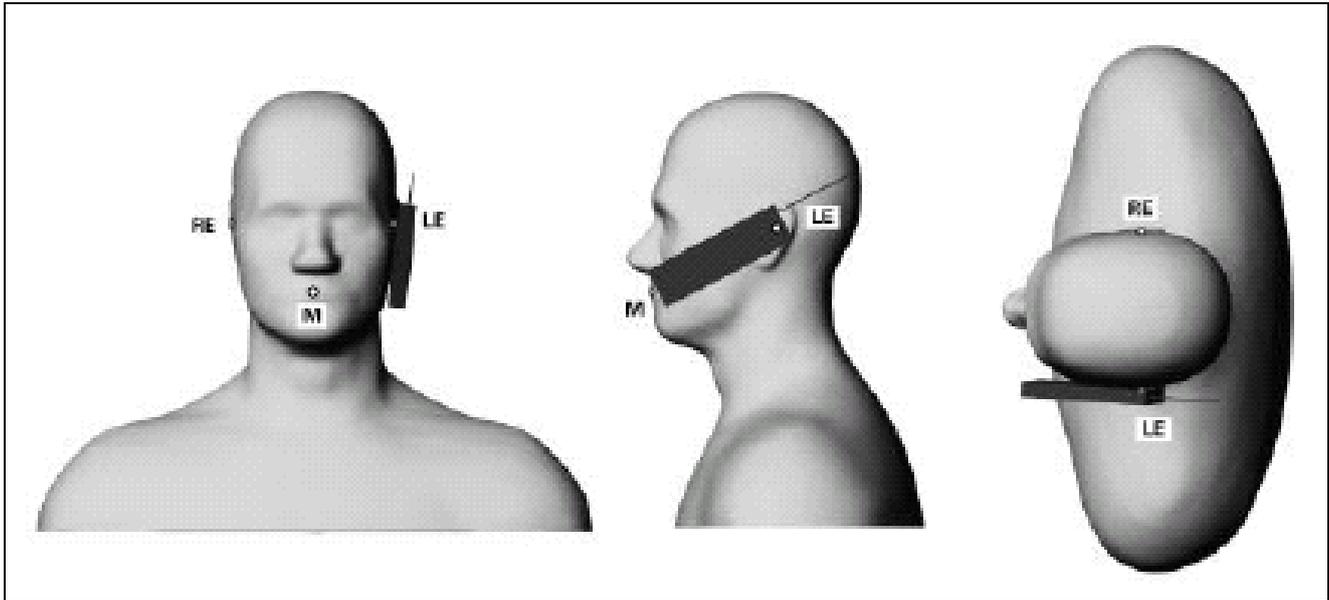


## **9. Description for DUT Testing Position**

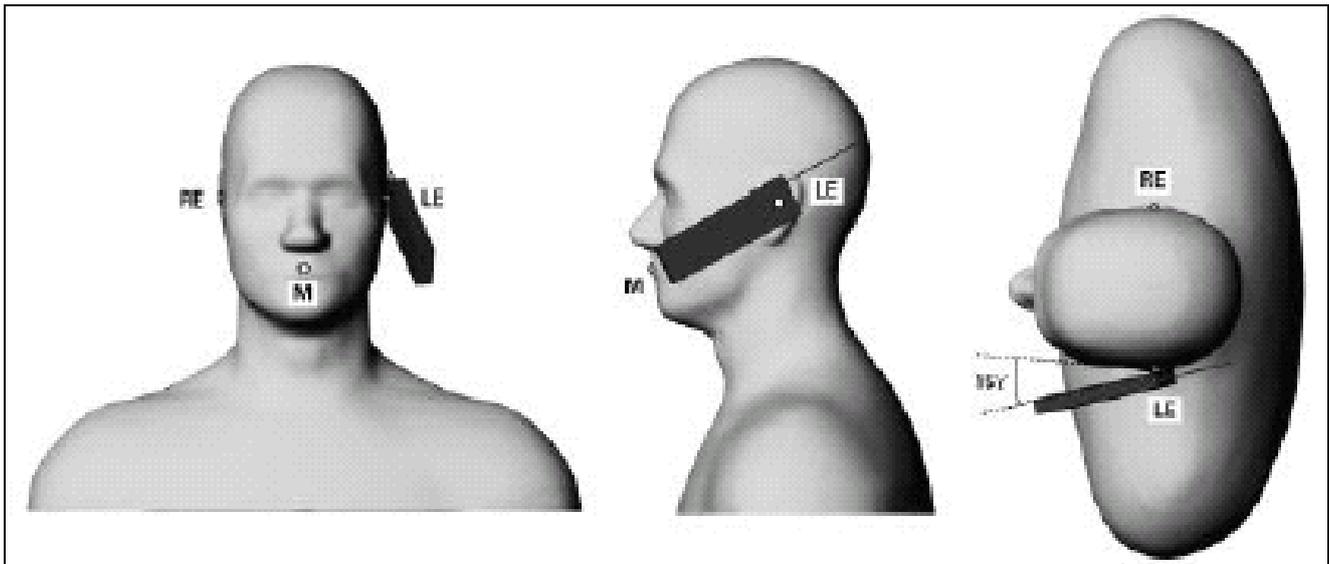
This DUT was tested in six different positions. They are right cheek, right tilted, left cheek, left tilted, face with 1.5cm Gap and bottom with 1.5cm Gap as illustrated below:

- 1) “ Cheek Position”
  - i) To position the device with the vertical center line of the body of the device and the horizontal line crossing the center piece in a plane parallel to the sagittal plane of the phantom. While maintaining the device in this plane, align the vertical center line with the reference plane containing the three ear and mouth reference point (M, RE and LE) and align the center of the ear piece with the line RE-LE.
  - ii) To move the device towards the phantom with the ear piece aligned with the line LE-RE until the phone touched the ear. While maintaining the device in the reference plane and maintaining the phone contact with the ear, move the bottom of the phone until any point on the front side is in contact with the cheek of the phantom or until contact with the ear is lost (see Fig. 9.1).
  
- 2) “ Tilted Position”
  - i) To position the device in the “cheek” position described above.
  - ii) While maintaining the device the reference plane described above and pivoting against the ear, move it outward away from the mouth by an angle of 15 degrees or until contact with the ear is lost (see Fig. 9.2).
  
- 3) “ Body Worn”
  - i) To position the device parallel to the phantom surface.
  - ii) To adjust the phone parallel to the flat phantom.
  - iii) To adjust the distance between the EUT surface and the flat phantom to 1.5 cm.

Remark: Please refer to Appendix E for the test setup photos.



**Fig. 9.1 Phone Position 1, “Cheek” or “Touch” Position.** The reference points for the right ear (RE), left ear (LE) and mouth (M), which define the plane for phone positioning, are indicated.



**Fig. 9.2 Phone Position 2, “Tilted Position”.** The reference point for the right ear (RE), left ear (LE) and mouth (M), which define the plane for phone positioning, are indicated.



## **10. Measurement Procedures**

The measurement procedures are as follows:

- Linking DUT with base station emulator CMU200 in middle channel
- Setting CMU200 to allow DUT to radiate maximum output power
- Measuring output power through RF cable and power meter
- Placing the DUT in the positions described in the last section
- Setting scan area, grid size and other setting on the DASY4 software
- Taking data for the middle channel on each testing position
- Finding out the largest SAR result on these testing positions of each band
- Measuring output power and SAR results for the low and high channels in this worst case testing position

According to the IEEE P1528 draft standard, the recommended procedure for assessing the peak spatial-average SAR value consists of the following steps:

- Power reference measurement
- Area scan
- Zoom scan
- Power reference measurement

### **10.1 Spatial Peak SAR Evaluation**

The procedure for spatial peak SAR evaluation has been implemented according to the IEEE1528-2003 standard. It can be conducted for 1g and 10g, as well as for user-specific masses. The DASY4 software includes all numerical procedures necessary to evaluate the spatial peak SAR value.

Base on the Draft: SCC-34, SC-2, WG-2-Computational Dosimetry, IEEE P1528/D1.2 (Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques), a new algorithm has been implemented. The spatial-peak SAR can be computed over any required mass.

The base for the evaluation is a "cube" measurement. The measured volume must include the 1g and 10g cubes with the highest averaged SAR values. For that purpose , the center of the measured volume is aligned to the interpolated peak SAR value of a previously performed area scan.

The entire evaluation of the spatial peak values is performed within the post-processing engine (SEMCAD). The system always gives the maximum values for the 1g and 10g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

- extraction of the measured data (grid and values) from the Zoom Scan
- calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters)
- generation of a high-resolution mesh within the measured volume
- interpolation of all measured values from the measurement grid to the high-resolution grid
- extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
- calculation of the averaged SAR within masses of 1g and 10g

### **10.2 Scan Procedures**

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan measures 5x5x7 points with step size 8, 8 and 5 mm. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution over 1 g.

### **10.3 SAR Averaged Methods**

In DASY4, the interpolation and extrapolation are both based on the modified Quadratic Shepard's method. The interpolation scheme combines a least-square fitted function method and a weighted average method which are the two basic types of computational interpolation and approximation.

Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. The uncertainty increases with the extrapolation distance. To keep the uncertainty within 1% for the 1 g and 10 g cubes, the extrapolation distance should not be larger than 5 mm.



**11. SAR Test Results**

**11.1 Conducted Power**

| Mode \ Band Channel | GSM 850 (dBm) |       |       | GSM 1900 (dBm) |       |       |
|---------------------|---------------|-------|-------|----------------|-------|-------|
|                     | 128           | 189   | 251   | 512            | 661   | 810   |
| GSM                 | 32.04         | 32.04 | 32.08 | 29.24          | 29.00 | 28.90 |
| GPRS 8              | 32.04         | 32.04 | 32.08 | 29.26          | 29.02 | 28.90 |
| GPRS 10             | 32.00         | 31.99 | 32.03 | 29.19          | 29.00 | 28.85 |
| EGPRS 8             | 26.89         | 26.88 | 26.90 | 26.01          | 25.81 | 25.71 |
| EGPRS 10            | 26.84         | 26.84 | 26.88 | 25.96          | 25.76 | 25.63 |

| WCDMA SAR Test mode - Conducted Power |                         |                   |                 |            |            |   |   |   |
|---------------------------------------|-------------------------|-------------------|-----------------|------------|------------|---|---|---|
| SAR                                   | Mode                    | Setup             | PCS band (1900) |            |            | - |   |   |
|                                       |                         |                   | CH9262          | CH9400     | CH9583     | - | - | - |
|                                       |                         |                   | Pavg (dBm)      | Pavg (dBm) | Pavg (dBm) | - | - | - |
| Head SAR                              | R99 - WCDMA             | RMC 12.2Kbps      | 22.52           | 22.61      | 21.63      | - | - | - |
|                                       |                         | RMC 64Kbps        | 22.53           | 22.66      | 21.67      | - | - | - |
|                                       |                         | RMC 144Kbps       | 22.45           | 22.63      | 21.64      | - | - | - |
|                                       |                         | RMC 384Kbps       | 22.56           | 22.65      | 21.67      | - | - | - |
|                                       |                         | AMR 12.2kbps      | 22.50           | 22.62      | 21.65      | - | - | - |
| Body SAR                              | R6 - HSDPA Only         | HSDPA - subtest 1 | 22.04           | 22.24      | 21.32      | - | - | - |
|                                       | R6 - HSPA (HSUPA&HSDPA) | HSUPA - subtest 1 | 22.97           | 22.87      | 22.24      | - | - | - |
|                                       |                         | HSUPA - subtest 2 | 20.60           | 20.30      | 20.15      | - | - | - |
|                                       |                         | HSUPA - subtest 3 | 22.06           | 21.89      | 21.74      | - | - | - |
|                                       |                         | HSUPA - subtest 4 | 20.93           | 20.63      | 20.37      | - | - | - |
|                                       |                         | HSUPA - subtest 5 | 22.57           | 22.60      | 22.35      | - | - | - |



11.2 Test Records for Head SAR Test

| Position | Band    | Chan. | Freq. (MHz) | Modulation Type | Battery | Measured 1g SAR (W/kg) | Power Drift | Limit (W/kg) | Result |
|----------|---------|-------|-------------|-----------------|---------|------------------------|-------------|--------------|--------|
| RC       | GSM850  | 189   | 836.4       | GMSK            | 1       | 0.681                  | -0.125      | 1.6          | Pass   |
| RT       | GSM850  | 189   | 836.4       | GMSK            | 1       | 0.386                  | -0.132      | 1.6          | Pass   |
| LC       | GSM850  | 189   | 836.4       | GMSK            | 1       | 0.578                  | -0.112      | 1.6          | Pass   |
| LT       | GSM850  | 189   | 836.4       | GMSK            | 1       | 0.33                   | -0.037      | 1.6          | Pass   |
| RC       | GSM850  | 128   | 824.2       | GMSK            | 1       | 0.595                  | -0.003      | 1.6          | Pass   |
| RC       | GSM850  | 251   | 848.8       | GMSK            | 1       | 0.64                   | -0.022      | 1.6          | Pass   |
| RC       | GSM1900 | 661   | 1880.0      | GMSK            | 1       | 0.619                  | -0.156      | 1.6          | Pass   |
| RT       | GSM1900 | 661   | 1880.0      | GMSK            | 1       | 0.236                  | -0.138      | 1.6          | Pass   |
| LC       | GSM1900 | 661   | 1880.0      | GMSK            | 1       | 0.41                   | -0.138      | 1.6          | Pass   |
| LT       | GSM1900 | 661   | 1880.0      | GMSK            | 1       | 0.285                  | -0.009      | 1.6          | Pass   |
| RC       | GSM1900 | 512   | 1850.2      | GMSK            | 1       | 0.614                  | -0.164      | 1.6          | Pass   |
| RC       | GSM1900 | 810   | 1909.8      | GMSK            | 1       | 0.503                  | -0.003      | 1.6          | Pass   |

| Position | Band          | Chan. | Freq. (MHz) | Modulation Type | Battery | Measured 1g SAR (W/kg) | Power Drift | Limit (W/kg) | Result |
|----------|---------------|-------|-------------|-----------------|---------|------------------------|-------------|--------------|--------|
| RC       | WCDMA Band II | 9400  | 1880.0      | QPSK            | 1       | 1.01                   | -0.165      | 1.6          | Pass   |
| RC       | WCDMA Band II | 9400  | 1880.0      | QPSK            | 2       | 0.939                  | -0.166      | 1.6          | Pass   |
| RT       | WCDMA Band II | 9400  | 1880.0      | QPSK            | 1       | 0.403                  | -0.083      | 1.6          | Pass   |
| LC       | WCDMA Band II | 9400  | 1880.0      | QPSK            | 1       | 0.691                  | 0.453       | 1.6          | Pass   |
| LT       | WCDMA Band II | 9400  | 1880.0      | QPSK            | 1       | 0.528                  | -0.066      | 1.6          | Pass   |
| RC       | WCDMA Band II | 9262  | 1852.4      | QPSK            | 1       | 0.779                  | -0.132      | 1.6          | Pass   |
| RC       | WCDMA Band II | 9538  | 1907.6      | QPSK            | 1       | 0.784                  | -0.046      | 1.6          | Pass   |
| RC       | WCDMA Band II | 9262  | 1852.4      | QPSK            | 2       | 0.736                  | -0.163      | 1.6          | Pass   |
| RC       | WCDMA Band II | 9538  | 1907.6      | QPSK            | 2       | 0.717                  | -0.099      | 1.6          | Pass   |

Remark:

1. RC stands for right cheek.
2. RT stands for right tilted.
3. LC stands for left cheek.
4. LT stands for left tilted.



11.3 Test Records for Body SAR Test

| Position                     | Band                        | Chan.      | Freq. (MHz)  | Modulation Type | Ear-<br>phone | Battery  | Measured<br>1g SAR<br>(W/kg) | Power<br>Drift | Limit<br>(W/kg) | Result      |
|------------------------------|-----------------------------|------------|--------------|-----------------|---------------|----------|------------------------------|----------------|-----------------|-------------|
| Face with 1.5cm Gap          | GSM850<br>(GPRS10)          | 189        | 836.4        | GMSK            | v             | 1        | 0.619                        | -0.132         | 1.6             | Pass        |
| <b>Bottom with 1.5cm Gap</b> | <b>GSM850<br/>(GPRS10)</b>  | <b>189</b> | <b>836.4</b> | <b>GMSK</b>     | <b>v</b>      | <b>1</b> | <b>0.95</b>                  | <b>0.125</b>   | <b>1.6</b>      | <b>Pass</b> |
| Bottom with 1.5cm Gap        | GSM850<br>(EGPRS 10)        | 189        | 836.4        | 8PSK            | v             | 1        | 0.274                        | 0.089          | 1.6             | Pass        |
| Bottom with 1.5cm Gap        | GSM850<br>(GPRS10)          | 128        | 824.2        | GMSK            | v             | 1        | 0.782                        | -0.152         | 1.6             | Pass        |
| Bottom with 1.5cm Gap        | GSM850<br>(GPRS10)          | 251        | 848.8        | GMSK            | v             | 1        | 0.934                        | 0.003          | 1.6             | Pass        |
| Face with 1.5cm Gap          | GSM1900<br>(GPRS10)         | 661        | 1880         | GMSK            | v             | 1        | 0.43                         | -0.164         | 1.6             | Pass        |
| Bottom with 1.5cm Gap        | GSM1900<br>(GPRS10)         | 661        | 1880         | GMSK            | v             | 1        | 0.554                        | 0.023          | 1.6             | Pass        |
| Bottom with 1.5cm Gap        | GSM1900<br>(EGPRS 10)       | 661        | 1880         | 8PSK            | v             | 1        | 0.221                        | 0.065          | 1.6             | Pass        |
| <b>Bottom with 1.5cm Gap</b> | <b>GSM1900<br/>(GPRS10)</b> | <b>512</b> | <b>1850</b>  | <b>GMSK</b>     | <b>v</b>      | <b>1</b> | <b>0.628</b>                 | <b>-0.141</b>  | <b>1.6</b>      | <b>Pass</b> |
| Bottom with 1.5cm Gap        | GSM1900<br>(GPRS10)         | 810        | 1910         | GMSK            | v             | 1        | 0.494                        | 0.009          | 1.6             | Pass        |

| Position                     | Band                                     | Chan .      | Freq. (MHz) | Modulation Type | Ear-<br>phone | Battery  | Measured<br>1g SAR<br>(W/kg) | Power<br>Drift | Limit<br>(W/kg) | Result      |
|------------------------------|--|-------------|-------------|-----------------|---------------|----------|------------------------------|----------------|-----------------|-------------|
| Face with 1.5cm Gap          | WCDMA<br>Band II (RMK<br>12.2K)          | 9400        | 1880        | QPSK            | v             | 1        | 0.453                        | -0.179         | 1.6             | Pass        |
| <b>Bottom with 1.5cm Gap</b> | <b>WCDMA<br/>Band II<br/>(RMK 12.2K)</b> | <b>9400</b> | <b>1880</b> | <b>QPSK</b>     | <b>v</b>      | <b>1</b> | <b>0.64</b>                  | <b>-0.122</b>  | <b>1.6</b>      | <b>Pass</b> |
| Bottom with 1.5cm Gap        | WCDMA<br>Band II<br>(RMK<br>12.2K+HSDPA) | 9400        | 1880        | QPSK            | v             | 1        | 0.478                        | -0.054         | 1.6             | Pass        |
| Bottom with 1.5cm Gap        | WCDMA<br>Band II<br>(RMK<br>12.2K+HSUPA) | 9400        | 1880        | QPSK            | v             | 1        | 0.545                        | -0.141         | 1.6             | Pass        |
| Bottom with 1.5cm Gap        | WCDMA<br>Band II<br>(RMK 12.2K)          | 9262        | 1852        | QPSK            | v             | 1        | 0.364                        | -0.17          | 1.6             | Pass        |
| Bottom with 1.5cm Gap        | WCDMA<br>Band II<br>(RMK 12.2K)          | 9538        | 1908        | QPSK            | v             | 1        | 0.476                        | 0.135          | 1.6             | Pass        |

Remark: Test Engineer : Gordon Lin, Jason Wang, Robert Liu, Eric Huang, and A-Rod Chen



## **12. References**

- [1] FCC 47 CFR Part 2 “Frequency Allocations and Radio Treaty Matters; General Rules and Regulations”
- [2] IEEE Std. P1528-2003, “Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques”, April 21, 2003
- [3] Supplement C (Edition 01-01) to OET Bulletin 65 (Edition 97-01), “Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to RF Emissions”, June 2001
- [4] IEEE Std. C95.3-2002, “IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields-RF and Microwave”, 2002
- [5] IEEE Std. C95.1-1999, “IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz”, 1999
- [6] Robert J. Renka, “Multivariate Interpolation Of Large Sets Of Scattered Data”, University of North Texas ACM Transactions on Mathematical Software, vol. 14, no. 2, June 1988, pp. 139-148
- [7] DASY4 System Handbook

## Appendix A - System Performance Check Data

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab

Date: 2008/6/4

### System Check\_Head\_835MHz

#### DUT: Dipole 835 MHz

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

Medium: HSL\_850 Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.908 \text{ mho/m}$ ;  $\epsilon_r = 40.6$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature : 22.6 °C; Liquid Temperature : 21.6 °C

#### DASY4 Configuration:

- Probe: ET3DV6 - SN1787; ConvF(6.58, 6.58, 6.58); Calibrated: 2007/8/28

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

- Electronics: DAE4 Sn778; Calibrated: 2007/9/17

- Phantom: SAM-B; Type: QD 000 P40 C; Serial: TP-1383

- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

**Pin=100mW/Area Scan (61x61x1):** Measurement grid: dx=15mm, dy=15mm

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

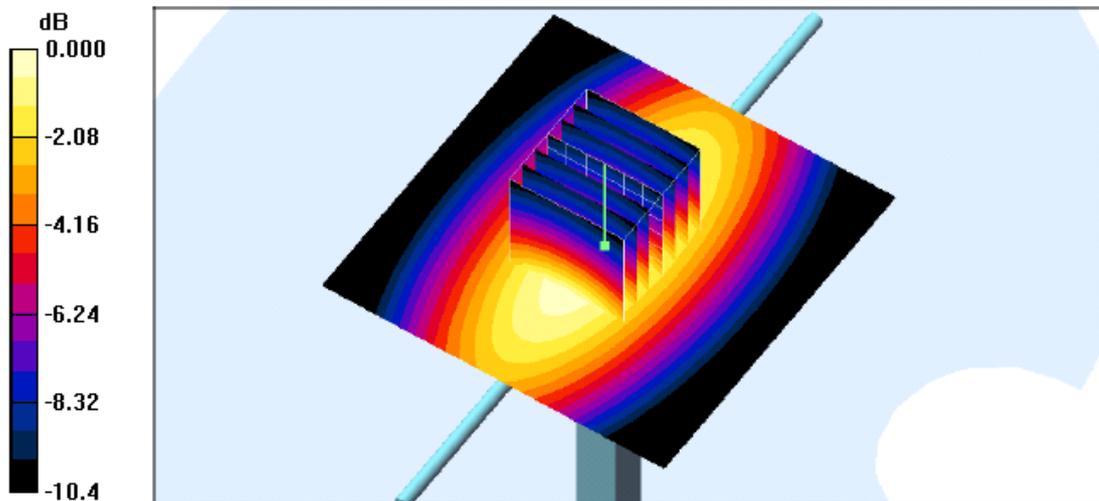
**Pin=100mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 34.1 V/m; Power Drift = -0.030 dB

Peak SAR (extrapolated) = 1.35 W/kg

SAR(1 g) = 0.909 mW/g; SAR(10 g) = 0.594 mW/g

Maximum value of SAR (measured) = 0.983 mW/g



0 dB = 0.983mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab

Date: 2008/6/6

**System Check\_Body\_835MHz**

**DUT: Dipole 835 MHz**

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

Medium: MSL\_850 Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.965 \text{ mho/m}$ ;  $\epsilon_r = 56.3$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature : 22.5 °C; Liquid Temperature : 21.5 °C

**DASY4 Configuration:**

- Probe: ET3DV6 - SN1787; ConvF(6.1, 6.1, 6.1); Calibrated: 2007/8/28
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn778; Calibrated: 2007/9/17
- Phantom: SAM-B; Type: QD 000 P40 C; Serial: TP-1383
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

**Pin=100mW/Area Scan (61x61x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.08 mW/g

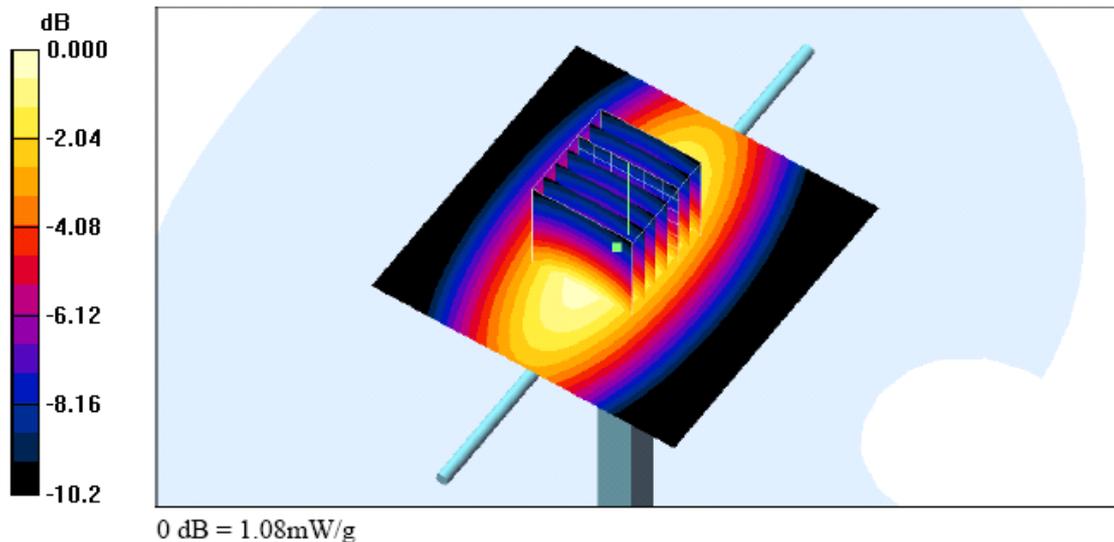
**Pin=100mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 34.5 V/m; Power Drift = -0.008 dB

Peak SAR (extrapolated) = 1.43 W/kg

SAR(1 g) = 0.996 mW/g; SAR(10 g) = 0.657 mW/g

Maximum value of SAR (measured) = 1.08 mW/g





Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab

Date: 2008/6/5

### System Check\_Head\_1900MHz

DUT: Dipole 1900 MHz

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

Medium: HSL\_1900 Medium parameters used:  $f = 1900 \text{ MHz}$ ;  $\sigma = 1.42 \text{ mho/m}$ ;  $\epsilon_r = 38.6$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature : 22.7 °C ; Liquid Temperature : 21.5 °C

DASY4 Configuration:

- Probe: ET3DV6 - SN1787; ConvF(5.16, 5.16, 5.16); Calibrated: 2007/8/28

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

- Electronics: DAE4 Sn778; Calibrated: 2007/9/17

- Phantom: SAM-B; Type: QD 000 P40 C; Serial: TP-1383

- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

**Pin=100mW/Area Scan (61x61x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 4.50 mW/g

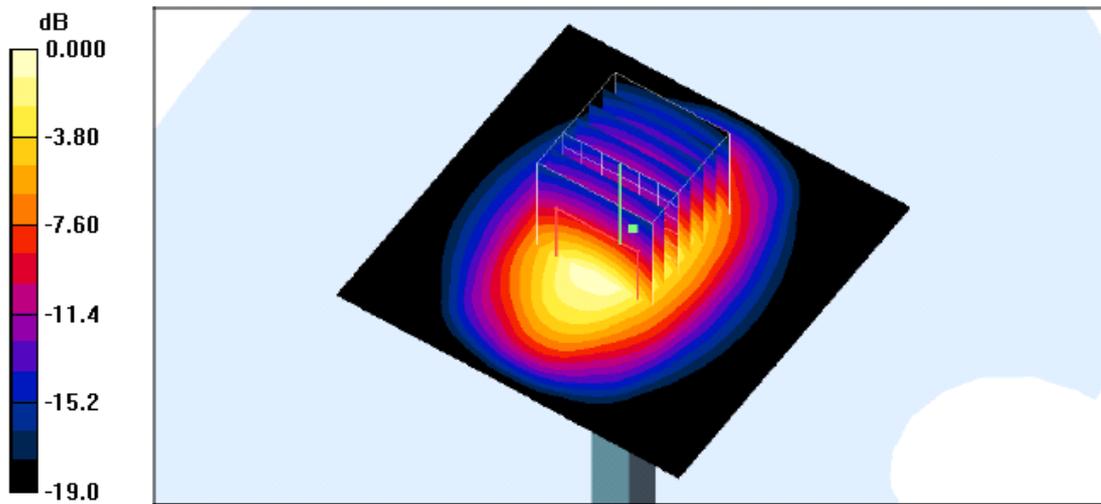
**Pin=100mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 58.3 V/m; Power Drift = -0.016 dB

Peak SAR (extrapolated) = 6.66 W/kg

SAR(1 g) = 3.81 mW/g; SAR(10 g) = 2 mW/g

Maximum value of SAR (measured) = 4.29 mW/g



0 dB = 4.29mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab

Date: 2008/7/12

**System Check\_Head\_1900MH****DUT: Dipole 1900 MHz**

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

Medium: HSL\_1900 Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.42$  mho/m;  $\epsilon_r = 41.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 22.4 °C; Liquid Temperature : 21.2 °C

**DASY4 Configuration:**

- Probe: ET3DV6 - SN1787; ConvF(5.16, 5.16, 5.16); Calibrated: 2007/8/28
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn778; Calibrated: 2007/9/17
- Phantom: SAM-B; Type: QD 000 P40 C; Serial: TP-1383
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

**Pin=100mW/Area Scan (61x61x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 4.80 mW/g

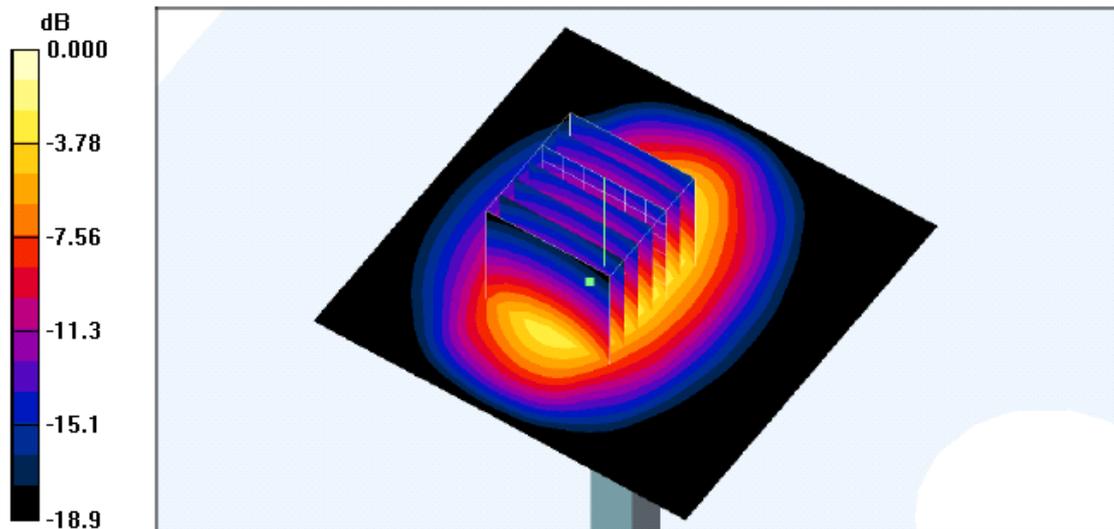
**Pin=100mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 57.2 V/m; Power Drift = -0.007 dB

Peak SAR (extrapolated) = 6.88 W/kg

**SAR(1 g) = 3.95 mW/g; SAR(10 g) = 2.08 mW/g**

Maximum value of SAR (measured) = 4.47 mW/g



0 dB = 4.47mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab

Date: 2008/6/5

**System Check\_Body\_1900MHz****DUT: Dipole 1900 MHz**

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

Medium: MSL\_1900 Medium parameters used:  $f = 1900 \text{ MHz}$ ;  $\sigma = 1.52 \text{ mho/m}$ ;  $\epsilon_r = 50.9$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Ambient Temperature : 23.0 °C; Liquid Temperature : 21.4 °C

**DASY4 Configuration:**

- Probe: ET3DV6 - SN1787; ConvF(4.68, 4.68, 4.68); Calibrated: 2007/8/28
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn778; Calibrated: 2007/9/17
- Phantom: SAM-B; Type: QD 000 P40 C; Serial: TP-1383
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

**Pin=100mW/Area Scan (91x91x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 4.52 mW/g

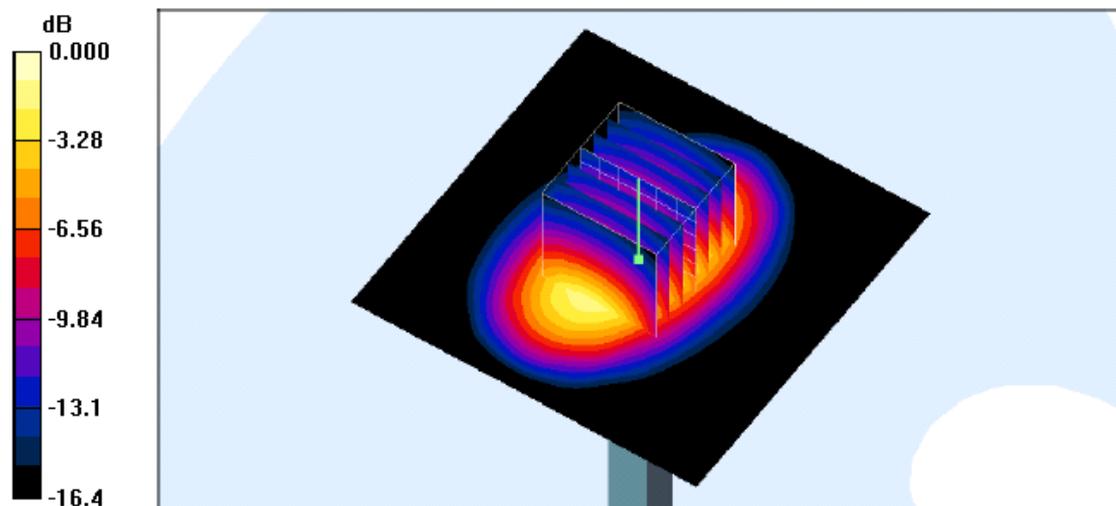
**Pin=100mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 57.9 V/m; Power Drift = 0.016 dB

Peak SAR (extrapolated) = 6.50 W/kg

**SAR(1 g) = 3.91 mW/g; SAR(10 g) = 2.11 mW/g**

Maximum value of SAR (measured) = 4.44 mW/g



0 dB = 4.44mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab

Date: 2008/6/6

**System Check\_Body\_1900MHz**

**DUT: Dipole 1900 MHz**

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

Medium: MSL\_1900 Medium parameters used:  $f = 1900 \text{ MHz}$ ;  $\sigma = 1.57 \text{ mho/m}$ ;  $\epsilon_r = 51.7$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature : 22.6 °C; Liquid Temperature : 21.6 °C

**DASY4 Configuration:**

- Probe: ET3DV6 - SN1787; ConvF(4.68, 4.68, 4.68); Calibrated: 2007/8/28
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn778; Calibrated: 2007/9/17
- Phantom: SAM-B; Type: QD 000 P40 C; Serial: TP-1383
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

**Pin=100mW/Area Scan (91x91x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 4.98 mW/g

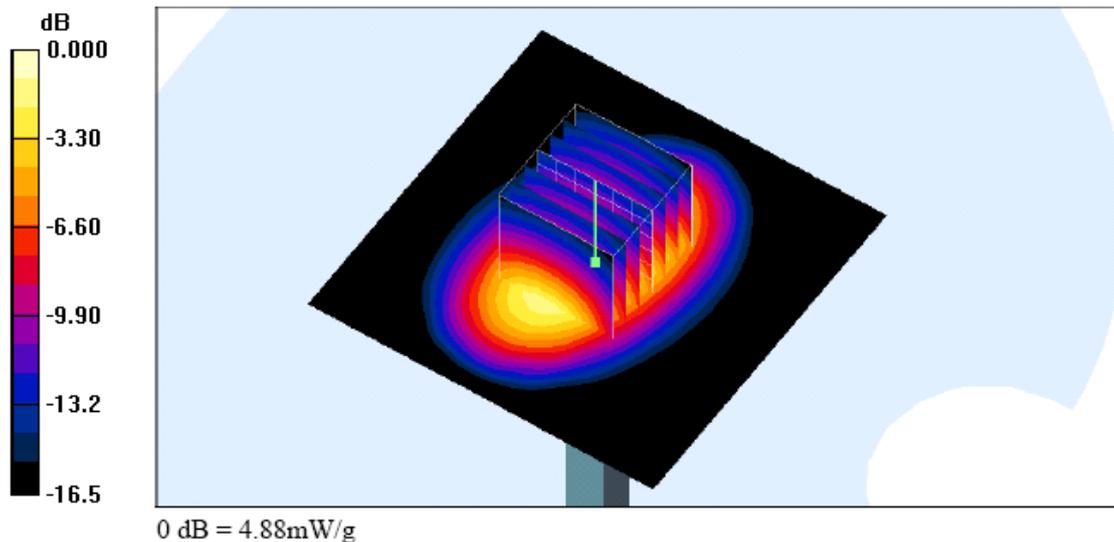
**Pin=100mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 59.6 V/m; Power Drift = 0.011 dB

Peak SAR (extrapolated) = 7.17 W/kg

**SAR(1 g) = 4.31 mW/g; SAR(10 g) = 2.32 mW/g**

Maximum value of SAR (measured) = 4.88 mW/g



### Appendix B - SAR Measurement Data

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab

Date: 2008/6/4

#### Right Cheek\_GSM850 Ch189

DUT: 852219

Communication System: GSM850; Frequency: 836.4 MHz; Duty Cycle: 1:8.3

Medium: HSL\_850 Medium parameters used:  $f = 836.4$  MHz;  $\sigma = 0.909$  mho/m;  $\epsilon_r = 40.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 22.7 °C; Liquid Temperature : 21.6 °C

#### DASY4 Configuration:

- Probe: ET3DV6 - SN1787; ConvF(6.58, 6.58, 6.58); Calibrated: 2007/8/28

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

- Electronics: DAE4 Sn778; Calibrated: 2007/9/17

- Phantom: SAM-B; Type: QD 000 P40 C; Serial: TP-1383

- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

**Ch189/Area Scan (41x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.718 mW/g

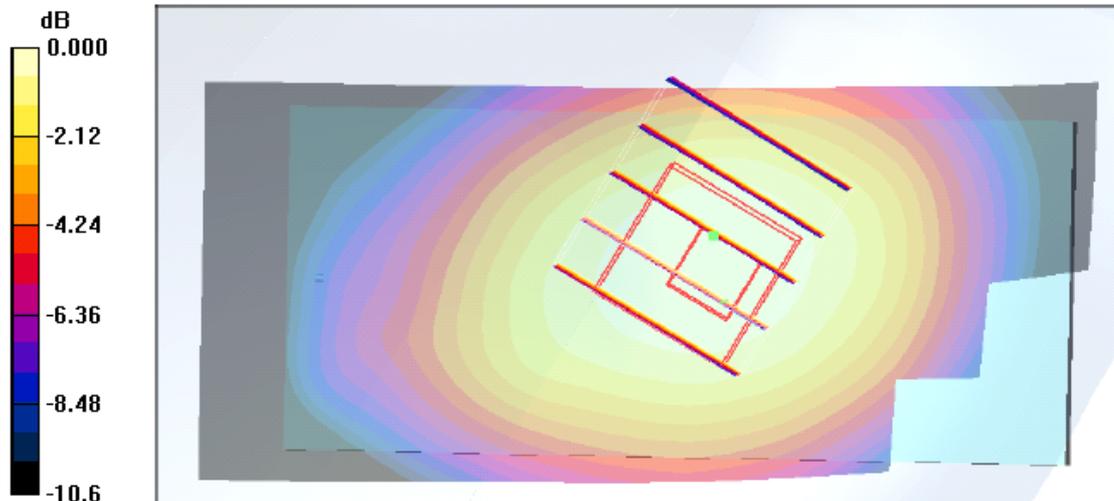
**Ch189/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 11.3 V/m; Power Drift = -0.125 dB

Peak SAR (extrapolated) = 0.865 W/kg

SAR(1 g) = 0.681 mW/g; SAR(10 g) = 0.495 mW/g

Maximum value of SAR (measured) = 0.710 mW/g



0 dB = 0.710mW/g



Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab

Date: 2008/6/4

**Right Tilted\_GSM850 Ch189**

**DUT: 852219**

Communication System: GSM850; Frequency: 836.4 MHz; Duty Cycle: 1:8.3

Medium: HSL\_850 Medium parameters used:  $f = 836.4$  MHz;  $\sigma = 0.909$  mho/m;  $\epsilon_r = 40.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 22.7 °C; Liquid Temperature : 21.6 °C

DASY4 Configuration:

- Probe: ET3DV6 - SN1787; ConvF(6.58, 6.58, 6.58); Calibrated: 2007/8/28
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn778; Calibrated: 2007/9/17
- Phantom: SAM-B; Type: QD 000 P40 C; Serial: TP-1383
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

**Ch189/Area Scan (41x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.407 mW/g

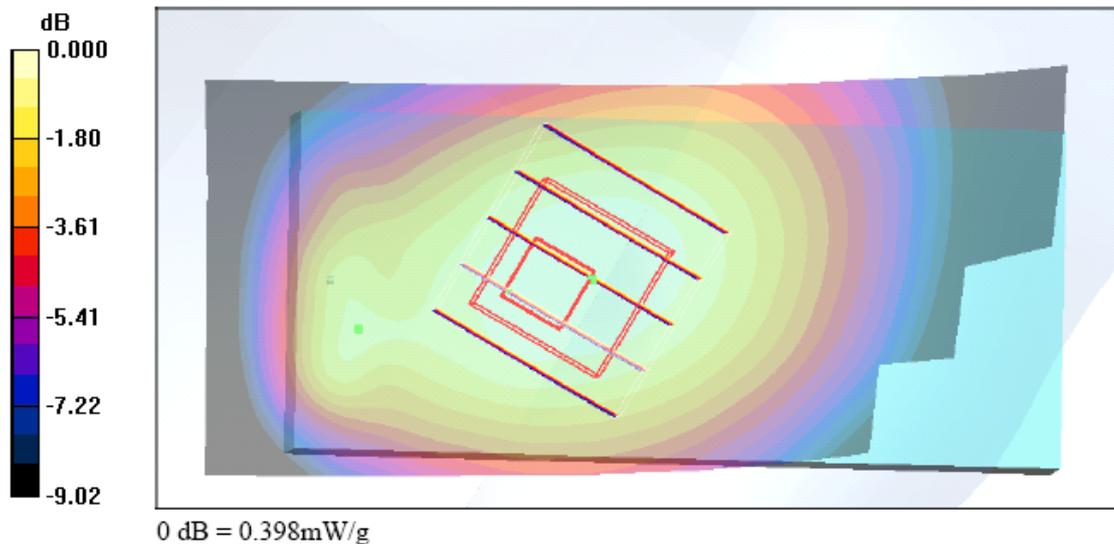
**Ch189/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 15.8 V/m; Power Drift = -0.132 dB

Peak SAR (extrapolated) = 0.494 W/kg

SAR(1 g) = 0.386 mW/g; SAR(10 g) = 0.283 mW/g

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



Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab

Date: 2008/6/4

**Left Cheek\_GSM850 Ch189**

**DUT: 852219**

Communication System: GSM850; Frequency: 836.4 MHz; Duty Cycle: 1:8.3

Medium: HSL\_850 Medium parameters used:  $f = 836.4$  MHz;  $\sigma = 0.909$  mho/m;  $\epsilon_r = 40.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 22.7 °C; Liquid Temperature : 21.6 °C

DASY4 Configuration:

- Probe: ET3DV6 - SN1787; ConvF(6.58, 6.58, 6.58); Calibrated: 2007/8/28
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn778; Calibrated: 2007/9/17
- Phantom: SAM-B; Type: QD 000 P40 C; Serial: TP-1383
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

**Ch189/Area Scan (41x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.591 mW/g

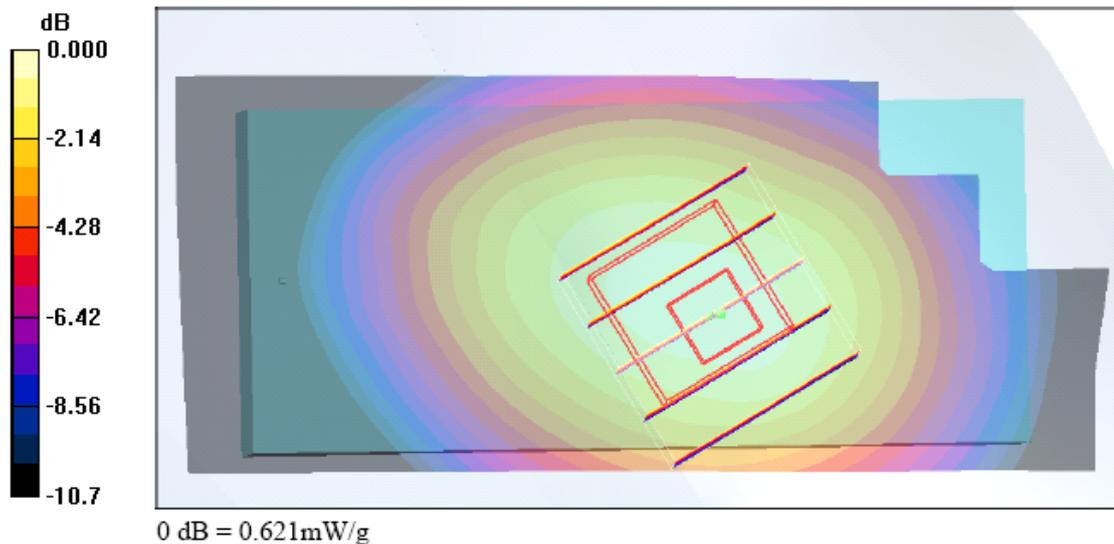
**Ch189/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.98 V/m; Power Drift = -0.112 dB

Peak SAR (extrapolated) = 0.796 W/kg

**SAR(1 g) = 0.578 mW/g; SAR(10 g) = 0.410 mW/g**

Maximum value of SAR (measured) = 0.621 mW/g



Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab

Date: 2008/6/4

**Left Tilted\_GSM850 Ch189**

**DUT: 852219**

Communication System: GSM850; Frequency: 836.4 MHz; Duty Cycle: 1:8.3

Medium: HSL\_850 Medium parameters used:  $f = 836.4$  MHz;  $\sigma = 0.909$  mho/m;  $\epsilon_r = 40.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 22.7 °C; Liquid Temperature : 21.6 °C

DASY4 Configuration:

- Probe: ET3DV6 - SN1787; ConvF(6.58, 6.58, 6.58); Calibrated: 2007/8/28
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn778; Calibrated: 2007/9/17
- Phantom: SAM-B; Type: QD 000 P40 C; Serial: TP-1383
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

**Ch189/Area Scan (41x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.336 mW/g

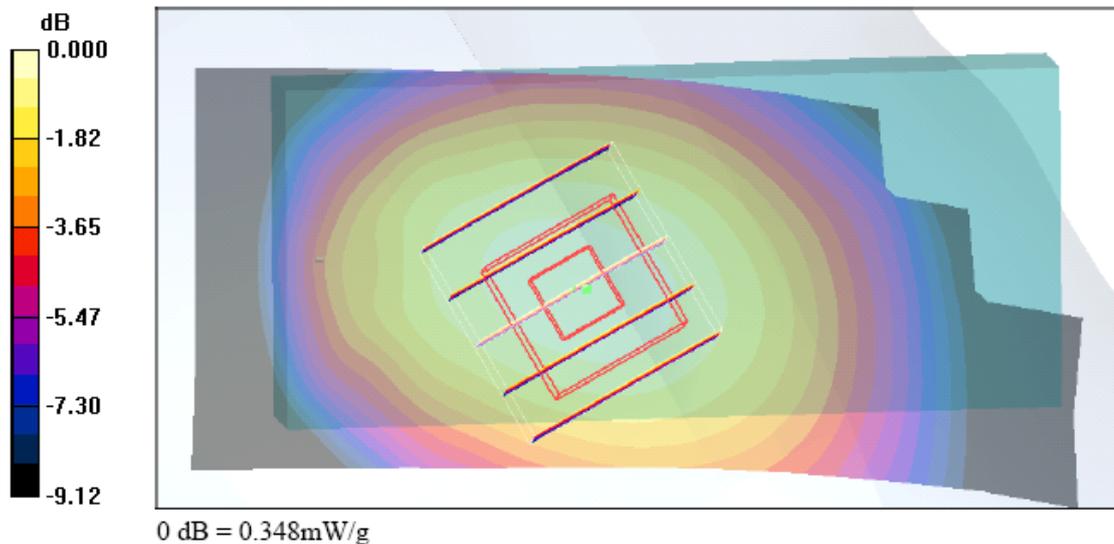
**Ch189/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 13.4 V/m; Power Drift = -0.037 dB

Peak SAR (extrapolated) = 0.422 W/kg

**SAR(1 g) = 0.330 mW/g; SAR(10 g) = 0.243 mW/g**

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



Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab

Date: 2008/6/5

**Right Cheek\_GSM1900 Ch661**

**DUT: 852219**

Communication System: PCS; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium: HSL\_1900 Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.4$  mho/m;  $\epsilon_r = 38.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 22.6 °C; Liquid Temperature : 21.5 °C

DASY4 Configuration:

- Probe: ET3DV6 - SN1787; ConvF(5.16, 5.16, 5.16); Calibrated: 2007/8/28
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn778; Calibrated: 2007/9/17
- Phantom: SAM-B; Type: QD 000 P40 C; Serial: TP-1383
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

**Ch661/Area Scan (41x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.782 mW/g

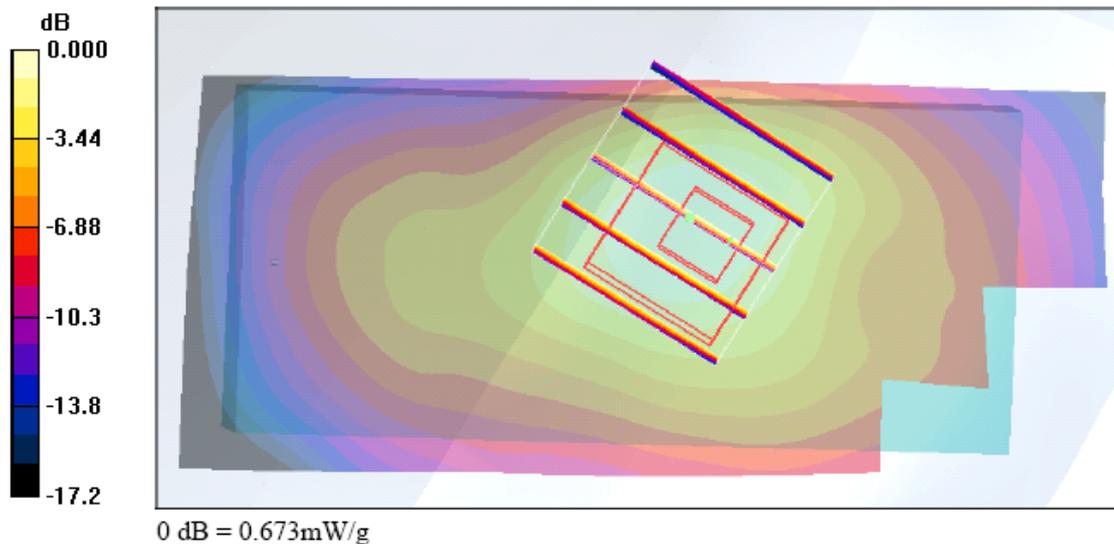
**Ch661/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.15 V/m; Power Drift = -0.156 dB

Peak SAR (extrapolated) = 0.859 W/kg

SAR(1 g) = 0.619 mW/g; SAR(10 g) = 0.377 mW/g

Maximum value of SAR (measured) = 0.673 mW/g



Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab

Date: 2008/6/5

**Right Tilted\_GSM1900 Ch661**

**DUT: 852219**

Communication System: PCS; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium: HSL\_1900 Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.4$  mho/m;  $\epsilon_r = 38.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 22.7 °C; Liquid Temperature : 21.5 °C

DASY4 Configuration:

- Probe: ET3DV6 - SN1787; ConvF(5.16, 5.16, 5.16); Calibrated: 2007/8/28
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn778; Calibrated: 2007/9/17
- Phantom: SAM-B; Type: QD 000 P40 C; Serial: TP-1383
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

**Ch661/Area Scan (41x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.280 mW/g

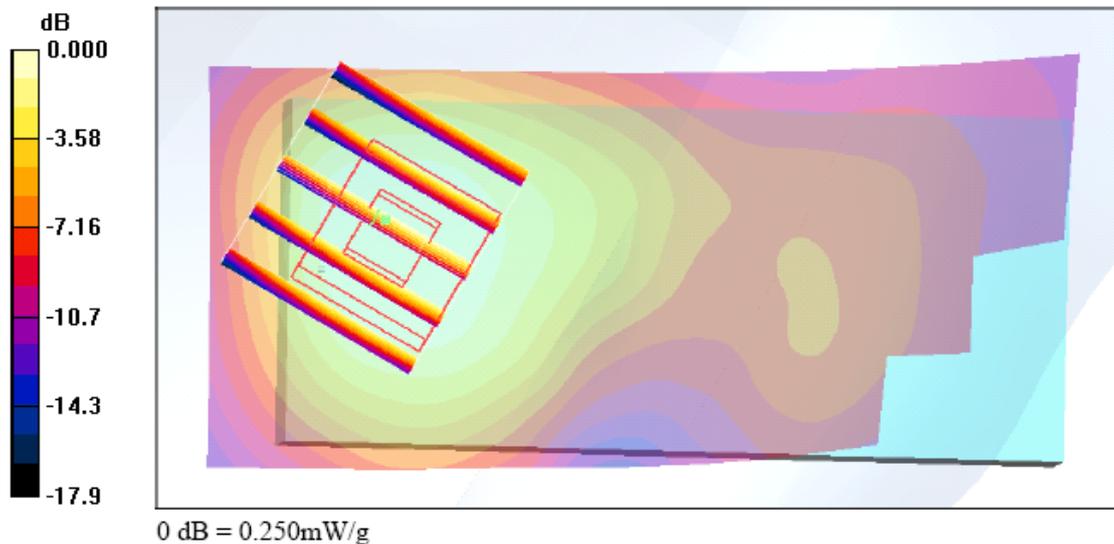
**Ch661/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.2 V/m; Power Drift = -0.138 dB

Peak SAR (extrapolated) = 0.330 W/kg

SAR(1 g) = 0.236 mW/g; SAR(10 g) = 0.150 mW/g

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



Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab

Date: 2008/6/5

**Left Cheek\_GSM1900 Ch661**

**DUT: 852219**

Communication System: PCS; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium: HSL\_1900 Medium parameters used:  $f = 1880 \text{ MHz}$ ;  $\sigma = 1.4 \text{ mho/m}$ ;  $\epsilon_r = 38.7$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature : 22.8 °C; Liquid Temperature : 21.5 °C

DASY4 Configuration:

- Probe: ET3DV6 - SN1787; ConvF(5.16, 5.16, 5.16); Calibrated: 2007/8/28
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn778; Calibrated: 2007/9/17
- Phantom: SAM-B; Type: QD 000 P40 C; Serial: TP-1383
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

**Ch661/Area Scan (41x91x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 0.466 mW/g

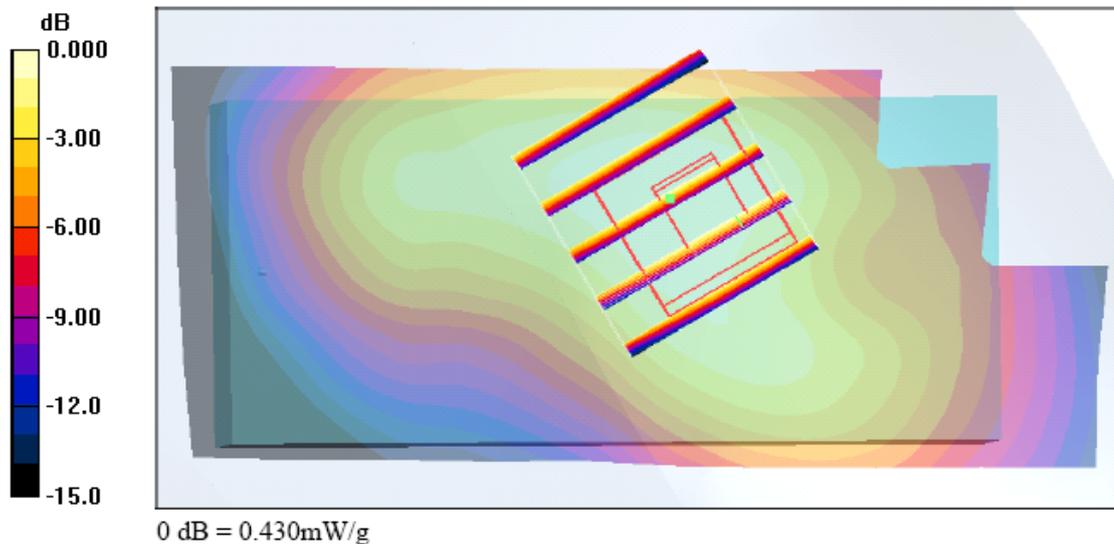
**Ch661/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 6.66 V/m; Power Drift = -0.138 dB

Peak SAR (extrapolated) = 0.564 W/kg

**SAR(1 g) = 0.410 mW/g; SAR(10 g) = 0.258 mW/g**

Maximum value of SAR (measured) = 0.430 mW/g



Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab

Date: 2008/6/5

**Left Tilted\_GSM1900 Ch661****DUT: 852219**

Communication System: PCS; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium: HSL\_1900 Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.4$  mho/m;  $\epsilon_r = 38.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 22.6 °C; Liquid Temperature : 21.5 °C

DASY4 Configuration:

- Probe: ET3DV6 - SN1787; ConvF(5.16, 5.16, 5.16); Calibrated: 2007/8/28

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

- Electronics: DAE4 Sn778; Calibrated: 2007/9/17

- Phantom: SAM-B; Type: QD 000 P40 C; Serial: TP-1383

- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

**Ch661/Area Scan (41x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.328 mW/g

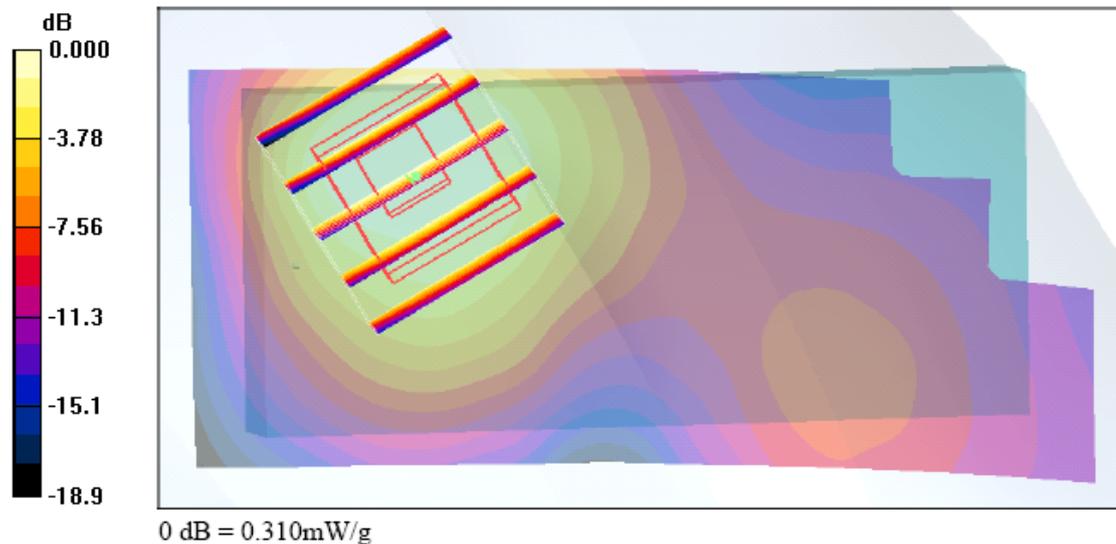
**Ch661/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.48 V/m; Power Drift = -0.009 dB

Peak SAR (extrapolated) = 0.438 W/kg

SAR(1 g) = 0.285 mW/g; SAR(10 g) = 0.170 mW/g

Maximum value of SAR (measured) = 0.310 mW/g





Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab

Date: 2008/6/5

**Right Cheek\_WCDMA1900 Ch9400**

**DUT: 852219**

Communication System: WCDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: HSL\_1900 Medium parameters used:  $f = 1880 \text{ MHz}$ ;  $\sigma = 1.4 \text{ mho/m}$ ;  $\epsilon_r = 38.7$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature : 22.6 °C; Liquid Temperature : 21.5 °C

DASY4 Configuration:

- Probe: ET3DV6 - SN1787; ConvF(5.16, 5.16, 5.16); Calibrated: 2007/8/28
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn778; Calibrated: 2007/9/17
- Phantom: SAM-B; Type: QD 000 P40 C; Serial: TP-1383
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

**Ch9400/Area Scan (41x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.14 mW/g

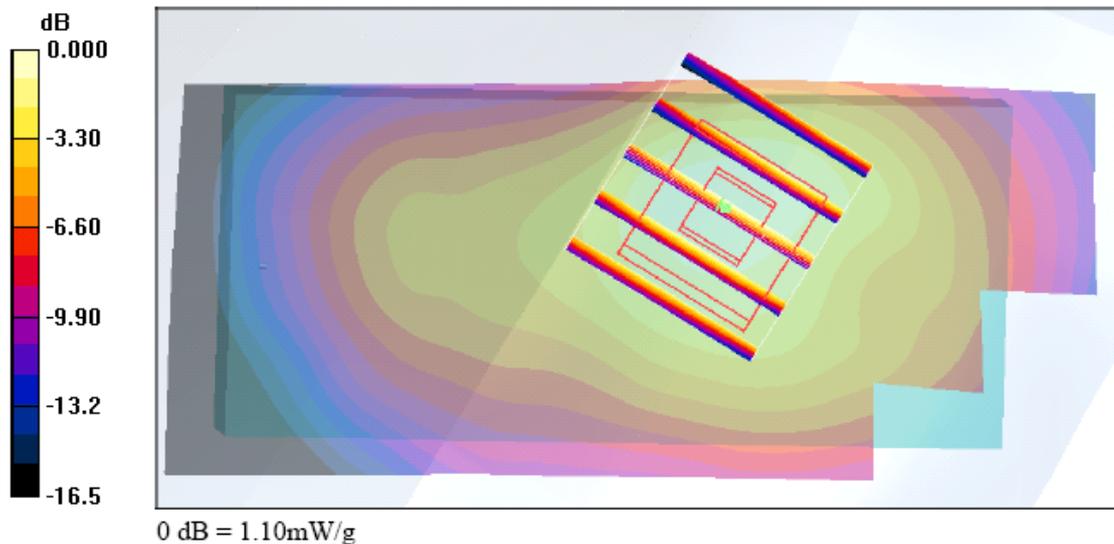
**Ch9400/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.88 V/m; Power Drift = -0.165 dB

Peak SAR (extrapolated) = 1.41 W/kg

**SAR(1 g) = 1.01 mW/g; SAR(10 g) = 0.617 mW/g**

Maximum value of SAR (measured) = 1.10 mW/g





Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab

Date: 2008/6/5

**Right Tilted\_WCDMA1900 Ch9400**

**DUT: 852219**

Communication System: WCDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: HSL\_1900 Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.4$  mho/m;  $\epsilon_r = 38.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 22.6 °C; Liquid Temperature : 21.5 °C

DASY4 Configuration:

- Probe: ET3DV6 - SN1787; ConvF(5.16, 5.16, 5.16); Calibrated: 2007/8/28
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn778; Calibrated: 2007/9/17
- Phantom: SAM-B; Type: QD 000 P40 C; Serial: TP-1383
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

**Ch9400/Area Scan (41x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.485 mW/g

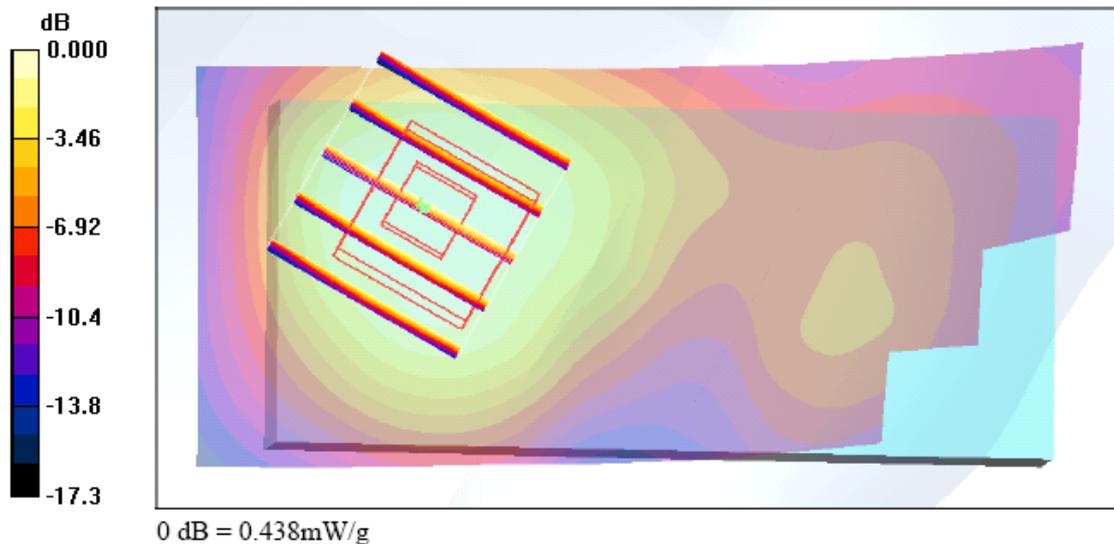
**Ch9400/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.5 V/m; Power Drift = -0.083 dB

Peak SAR (extrapolated) = 0.561 W/kg

SAR(1 g) = 0.403 mW/g; SAR(10 g) = 0.258 mW/g

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



Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab

Date: 2008/6/5

**Left Cheek\_WCDMA1900 Ch9400**

**DUT: 852219**

Communication System: WCDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: HSL\_1900 Medium parameters used:  $f = 1880 \text{ MHz}$ ;  $\sigma = 1.4 \text{ mho/m}$ ;  $\epsilon_r = 38.7$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature : 22.6 °C; Liquid Temperature : 21.5 °C

DASY4 Configuration:

- Probe: ET3DV6 - SN1787; ConvF(5.16, 5.16, 5.16); Calibrated: 2007/8/28

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

- Electronics: DAE4 Sn778; Calibrated: 2007/9/17

- Phantom: SAM-B; Type: QD 000 P40 C; Serial: TP-1383

- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

**Ch9400/Area Scan (41x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.799 mW/g

**Ch9400/Zoom Scan (5x5x7)/Cube 1:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.92 V/m; Power Drift = -0.122 dB

Peak SAR (extrapolated) = 0.895 W/kg

SAR(1 g) = 0.691 mW/g; SAR(10 g) = 0.453 mW/g

Maximum value of SAR (measured) = 0.752 mW/g

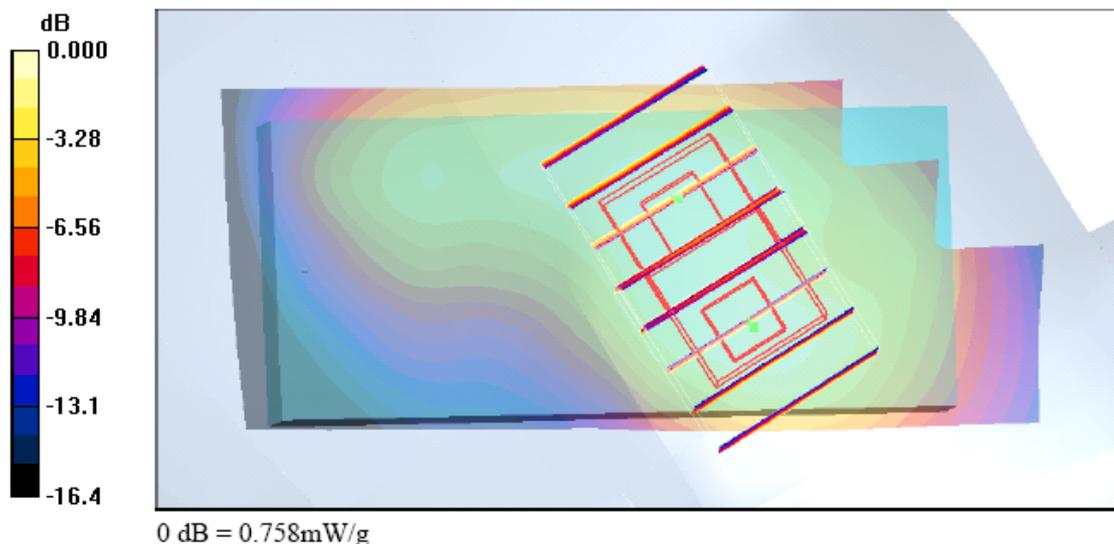
**Ch9400/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.92 V/m; Power Drift = -0.122 dB

Peak SAR (extrapolated) = 1.00 W/kg

SAR(1 g) = 0.661 mW/g; SAR(10 g) = 0.410 mW/g

Maximum value of SAR (measured) = 0.758 mW/g



Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab

Date: 2008/6/5

**Left Tilted\_WCDMA1900 Ch9400****DUT: 852219**

Communication System: WCDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: HSL\_1900 Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.4$  mho/m;  $\epsilon_r = 38.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 22.6 °C; Liquid Temperature : 21.4 °C

DASY4 Configuration:

- Probe: ET3DV6 - SN1787; ConvF(5.16, 5.16, 5.16); Calibrated: 2007/8/28

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

- Electronics: DAE4 Sn778; Calibrated: 2007/9/17

- Phantom: SAM-B; Type: QD 000 P40 C; Serial: TP-1383

- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

**Ch9400/Area Scan (41x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.605 mW/g

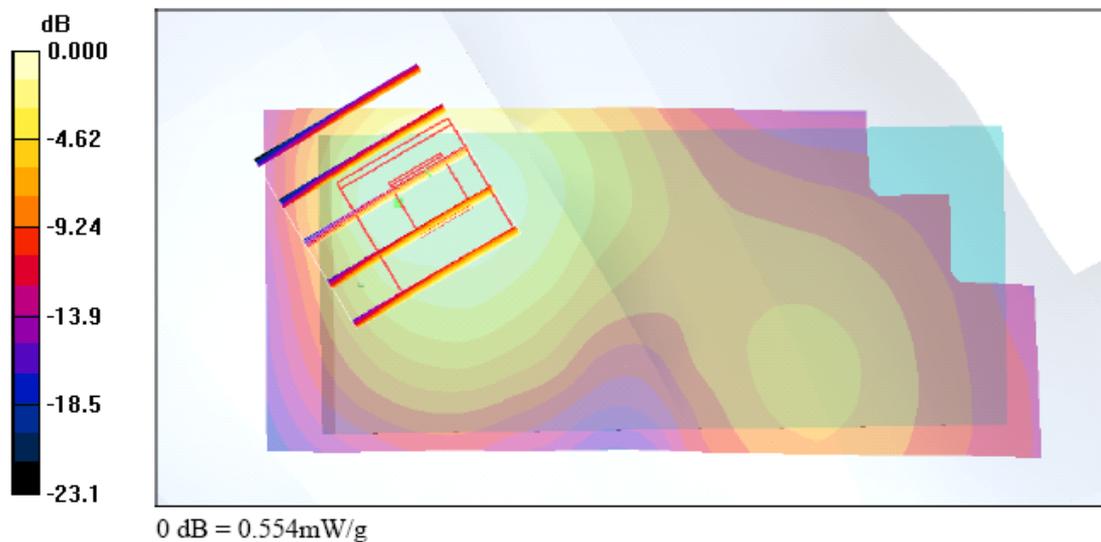
**Ch9400/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.9 V/m; Power Drift = -0.066 dB

Peak SAR (extrapolated) = 0.855 W/kg

**SAR(1 g) = 0.528 mW/g; SAR(10 g) = 0.306 mW/g**

Maximum value of SAR (measured) = 0.554 mW/g



Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab

Date: 2008/6/7

**Body\_GSM850 Ch189\_Face with 1.5cm Gap\_GPRS10**

**DUT: 852219**

Communication System: GSM850; Frequency: 836.4 MHz; Duty Cycle: 1:4

Medium: MSL\_850 Medium parameters used:  $f = 836.4$  MHz;  $\sigma = 0.967$  mho/m;  $\epsilon_r = 56.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 22.5 °C; Liquid Temperature : 21.5 °C

DASY4 Configuration:

- Probe: ET3DV6 - SN1787; ConvF(6.1, 6.1, 6.1); Calibrated: 2007/8/28
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn778; Calibrated: 2007/9/17
- Phantom: SAM-B; Type: QD 000 P40 C; Serial: TP-1383
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

**Ch189/Area Scan (41x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.648 mW/g

**Ch189/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 11.1 V/m; Power Drift = -0.132 dB

Peak SAR (extrapolated) = 0.767 W/kg

SAR(1 g) = 0.619 mW/g; SAR(10 g) = 0.459 mW/g

Maximum value of SAR (measured) = 0.661 mW/g

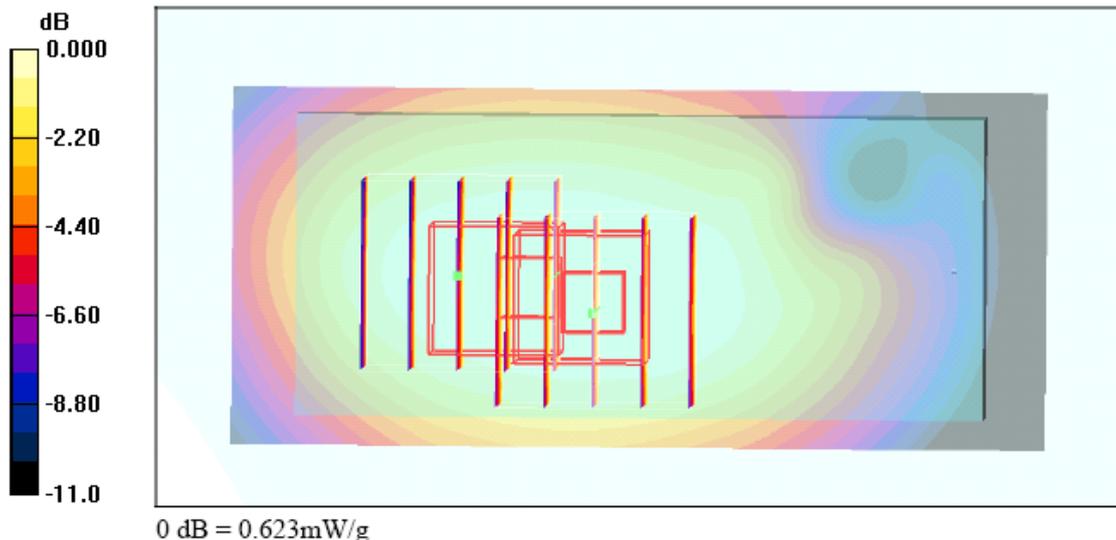
**Ch189/Zoom Scan (5x5x7)/Cube 1:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 11.1 V/m; Power Drift = -0.132 dB

Peak SAR (extrapolated) = 0.739 W/kg

SAR(1 g) = 0.592 mW/g; SAR(10 g) = 0.429 mW/g

Maximum value of SAR (measured) = 0.623 mW/g





Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab

Date: 2008/6/7

**Body\_GSM850 Ch189\_Bottom with 1.5cm Gap\_GPRS10**

**DUT: 852219**

Communication System: GSM850; Frequency: 836.4 MHz; Duty Cycle: 1:4

Medium: MSL\_850 Medium parameters used:  $f = 836.4$  MHz;  $\sigma = 0.967$  mho/m;  $\epsilon_1 = 56.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 22.6 °C; Liquid Temperature : 21.5 °C

DASY4 Configuration:

- Probe: ET3DV6 - SN1787; ConvF(6.1, 6.1, 6.1); Calibrated: 2007/8/28
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn778; Calibrated: 2007/9/17
- Phantom: SAM-B; Type: QD 000 P40 C; Serial: TP-1383
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

**Ch189/Area Scan (41x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.01 mW/g

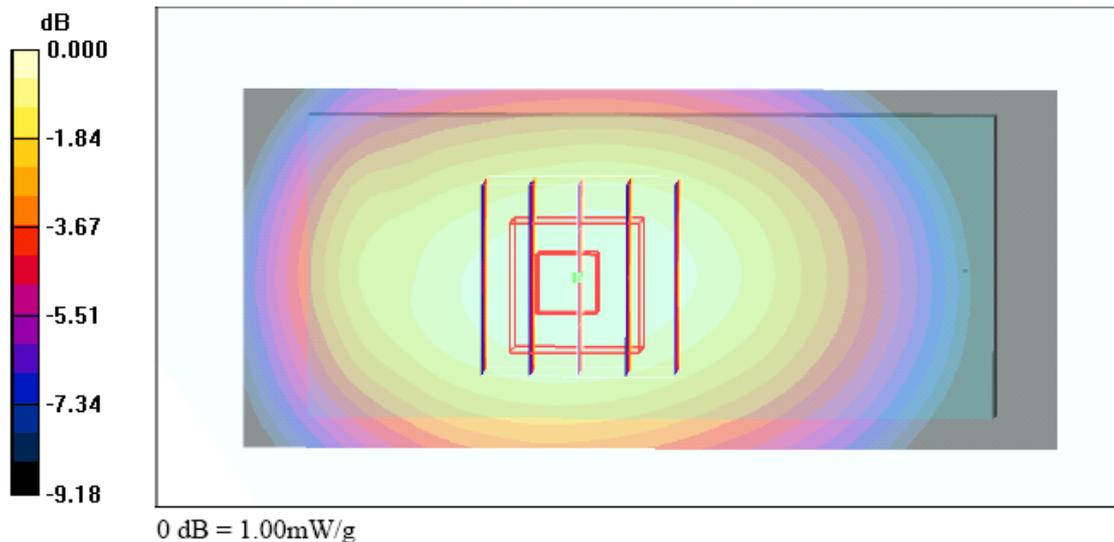
**Ch189/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 13.3 V/m; Power Drift = -0.125 dB

Peak SAR (extrapolated) = 1.20 W/kg

SAR(1 g) = 0.950 mW/g; SAR(10 g) = 0.690 mW/g

Maximum value of SAR (measured) = 1.00 mW/g



Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab

Date: 2008/6/5

**Body\_GSM1900 Ch661\_Face with 1.5cm Gap\_GPRS10**

**DUT: 852219**

Communication System: PCS 1900; Frequency: 1880 MHz; Duty Cycle: 1:4

Medium: MSL\_1900 Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.5$  mho/m;  $\epsilon_r = 50.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.0 °C; Liquid Temperature : 21.4 °C

DASY4 Configuration:

- Probe: ET3DV6 - SN1787; ConvF(4.68, 4.68, 4.68); Calibrated: 2007/8/28

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

- Electronics: DAE4 Sn778; Calibrated: 2007/9/17

- Phantom: SAM-B; Type: QD 000 P40 C; Serial: TP-1383

- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

**Ch661/Area Scan (41x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.483 mW/g

**Ch661/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.0 V/m; Power Drift = -0.164 dB

Peak SAR (extrapolated) = 0.677 W/kg

**SAR(1 g) = 0.430 mW/g; SAR(10 g) = 0.262 mW/g**

Maximum value of SAR (measured) = 0.476 mW/g

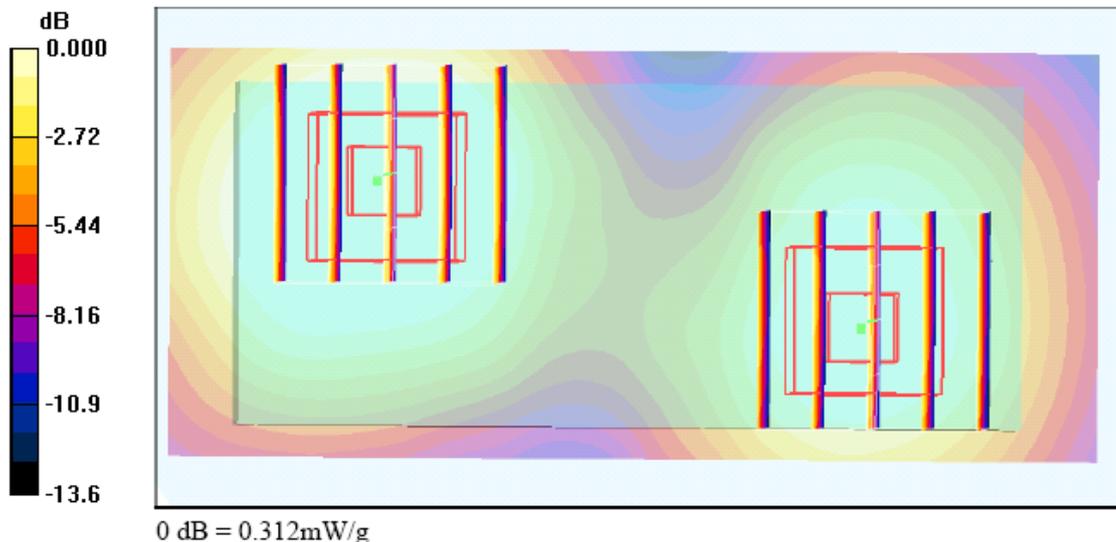
**Ch661/Zoom Scan (5x5x7)/Cube 1:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.0 V/m; Power Drift = -0.164 dB

Peak SAR (extrapolated) = 0.414 W/kg

**SAR(1 g) = 0.290 mW/g; SAR(10 g) = 0.188 mW/g**

Maximum value of SAR (measured) = 0.312 mW/g





Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab

Date: 2008/6/5

**Body\_GSM1900 Ch512\_Bottom with 1.5cm Gap\_GPRS10**

**DUT: 852219**

Communication System: PCS 1900; Frequency: 1850.2 MHz; Duty Cycle: 1:4

Medium: MSL\_1900 Medium parameters used :  $f = 1850.2$  MHz;  $\sigma = 1.47$  mho/m;  $\epsilon_r = 51$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.0 °C; Liquid Temperature : 21.4 °C

DASY4 Configuration:

- Probe: ET3DV6 - SN1787; ConvF(4.68, 4.68, 4.68); Calibrated: 2007/8/28

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

- Electronics: DAE4 Sn778; Calibrated: 2007/9/17

- Phantom: SAM-B; Type: QD 000 P40 C; Serial: TP-1383

- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

**Ch512/Area Scan (41x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.730 mW/g

**Ch512/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 13.9 V/m; Power Drift = -0.141 dB

Peak SAR (extrapolated) = 0.946 W/kg

SAR(1 g) = 0.628 mW/g; SAR(10 g) = 0.387 mW/g

Maximum value of SAR (measured) = 0.680 mW/g

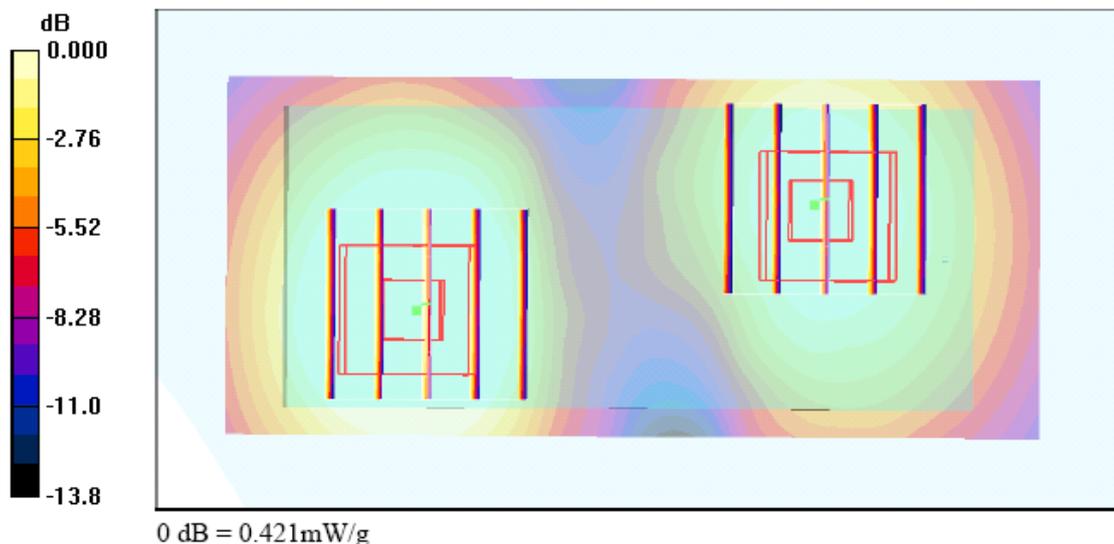
**Ch512/Zoom Scan (5x5x7)/Cube 1:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 13.9 V/m; Power Drift = -0.141 dB

Peak SAR (extrapolated) = 0.559 W/kg

SAR(1 g) = 0.390 mW/g; SAR(10 g) = 0.255 mW/g

Maximum value of SAR (measured) = 0.421 mW/g



Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab

Date: 2008/6/7

**Body\_WCDMA1900 Ch9400\_Face with 1.5cm Gap\_RMC12.2K**

**DUT: 852219**

Communication System: WCDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: MSL\_1900 Medium parameters used:  $f = 1880 \text{ MHz}$ ;  $\sigma = 1.55 \text{ mho/m}$ ;  $\epsilon_r = 51.7$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature : 22.6 °C; Liquid Temperature : 21.6 °C

DASY4 Configuration:

- Probe: ET3DV6 - SN1787; ConvF(4.68, 4.68, 4.68); Calibrated: 2007/8/28
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn778; Calibrated: 2007/9/17
- Phantom: SAM-B; Type: QD 000 P40 C; Serial: TP-1383
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

**Ch9400/Area Scan (41x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.522 mW/g

**Ch9400/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 11.3 V/m; Power Drift = -0.179 dB

Peak SAR (extrapolated) = 0.700 W/kg

SAR(1 g) = 0.453 mW/g; SAR(10 g) = 0.279 mW/g

Maximum value of SAR (measured) = 0.487 mW/g

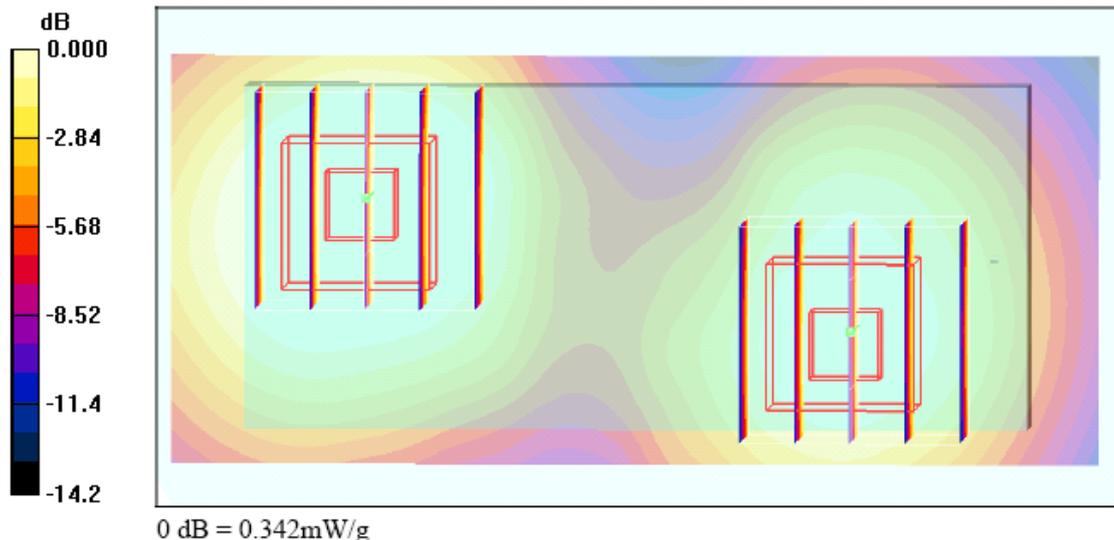
**Ch9400/Zoom Scan (5x5x7)/Cube 1:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 11.3 V/m; Power Drift = -0.179 dB

Peak SAR (extrapolated) = 0.454 W/kg

SAR(1 g) = 0.321 mW/g; SAR(10 g) = 0.208 mW/g

Maximum value of SAR (measured) = 0.342 mW/g



Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab

Date: 2008/6/7

**Body\_WCDMA1900 Ch9400\_Bottom with 1.5cm Gap\_RMC12.2K**

**DUT: 852219**

Communication System: WCDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: MSL\_1900 Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.55$  mho/m;  $\epsilon_r = 51.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 22.7 °C; Liquid Temperature : 21.6 °C

DASY4 Configuration:

- Probe: ET3DV6 - SN1787; ConvF(4.68, 4.68, 4.68); Calibrated: 2007/8/28
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn778; Calibrated: 2007/9/17
- Phantom: SAM-B; Type: QD 000 P40 C; Serial: TP-1383
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

**Ch9400/Area Scan (41x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.720 mW/g

**Ch9400/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 13.5 V/m; Power Drift = -0.122 dB

Peak SAR (extrapolated) = 0.963 W/kg

**SAR(1 g) = 0.640 mW/g; SAR(10 g) = 0.393 mW/g**

Maximum value of SAR (measured) = 0.690 mW/g

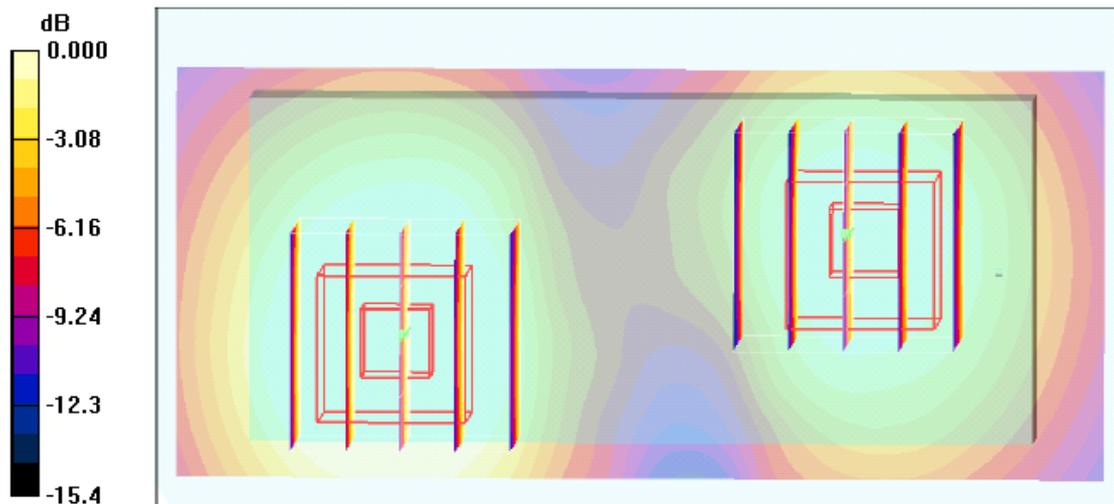
**Ch9400/Zoom Scan (5x5x7)/Cube 1:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 13.5 V/m; Power Drift = -0.122 dB

Peak SAR (extrapolated) = 0.589 W/kg

**SAR(1 g) = 0.401 mW/g; SAR(10 g) = 0.254 mW/g**

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



0 dB = 0.431mW/g



Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab

Date: 2008/6/4

**Right Cheek\_GSM850 Ch189\_2D**

**DUT: 852219**

Communication System: GSM850; Frequency: 836.4 MHz; Duty Cycle: 1:8.3

Medium: HSL\_850 Medium parameters used:  $f = 836.4$  MHz;  $\sigma = 0.909$  mho/m;  $\epsilon_r = 40.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 22.7 °C; Liquid Temperature : 21.6 °C

DASY4 Configuration:

- Probe: ET3DV6 - SN1787; ConvF(6.58, 6.58, 6.58); Calibrated: 2007/8/28
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn778; Calibrated: 2007/9/17
- Phantom: SAM-B; Type: QD 000 P40 C; Serial: TP-1383
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

**Ch189/Area Scan (41x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.718 mW/g

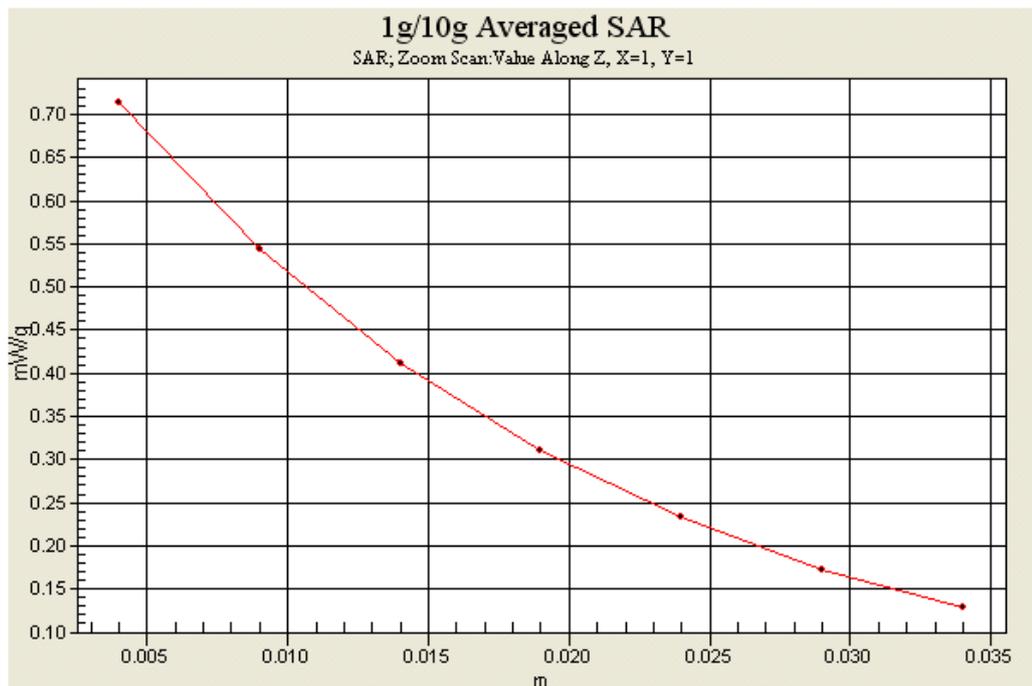
**Ch189/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 11.3 V/m; Power Drift = -0.125 dB

Peak SAR (extrapolated) = 0.865 W/kg

**SAR(1 g) = 0.681 mW/g; SAR(10 g) = 0.495 mW/g**

Maximum value of SAR (measured) = 0.710 mW/g





Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab

Date: 2008/6/5

**Right Cheek\_GSM1900 Ch661\_2D**

**DUT: 852219**

Communication System: PCS; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium: HSL\_1900 Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.4$  mho/m;  $\epsilon_r = 38.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 22.6 °C; Liquid Temperature : 21.5 °C

DASY4 Configuration:

- Probe: ET3DV6 - SN1787; ConvF(5.16, 5.16, 5.16); Calibrated: 2007/8/28
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn778; Calibrated: 2007/9/17
- Phantom: SAM-B; Type: QD 000 P40 C; Serial: TP-1383
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

**Ch661/Area Scan (41x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.782 mW/g

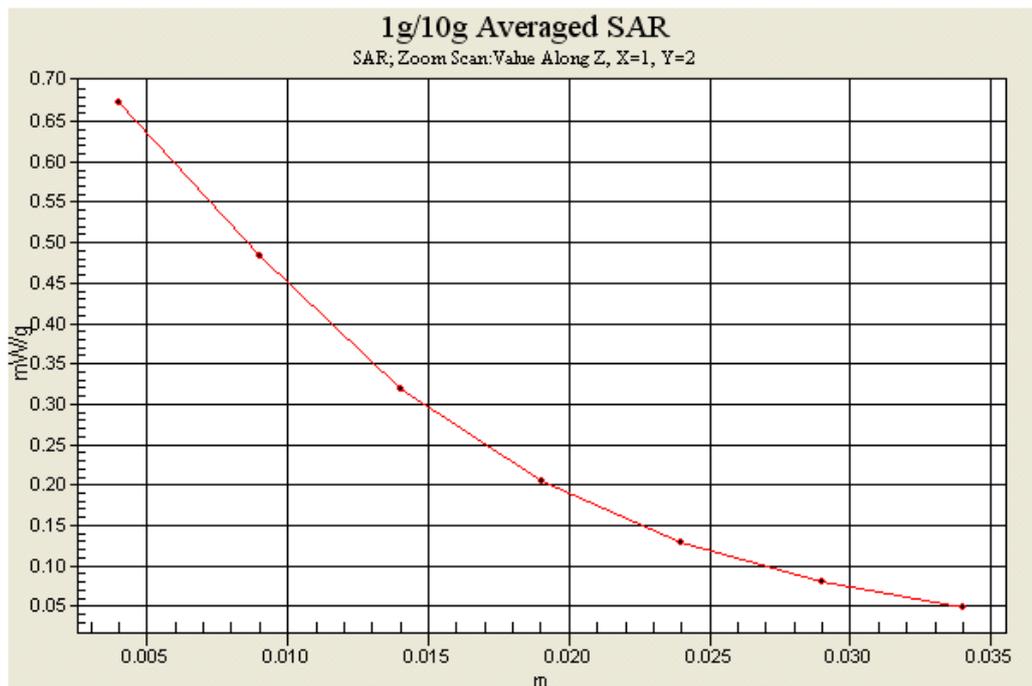
**Ch661/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.15 V/m; Power Drift = -0.156 dB

Peak SAR (extrapolated) = 0.859 W/kg

**SAR(1 g) = 0.619 mW/g; SAR(10 g) = 0.377 mW/g**

Maximum value of SAR (measured) = 0.673 mW/g





Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab

Date: 2008/6/5

**Right Cheek\_WCDMA1900 Ch9400\_2D**

**DUT: 852219**

Communication System: WCDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: HSL\_1900 Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.4$  mho/m;  $\epsilon_r = 38.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 22.6 °C; Liquid Temperature : 21.5 °C

DASY4 Configuration:

- Probe: ET3DV6 - SN1787; ConvF(5.16, 5.16, 5.16); Calibrated: 2007/8/28
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn778; Calibrated: 2007/9/17
- Phantom: SAM-B; Type: QD 000 P40 C; Serial: TP-1383
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

**Ch9400/Area Scan (41x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.14 mW/g

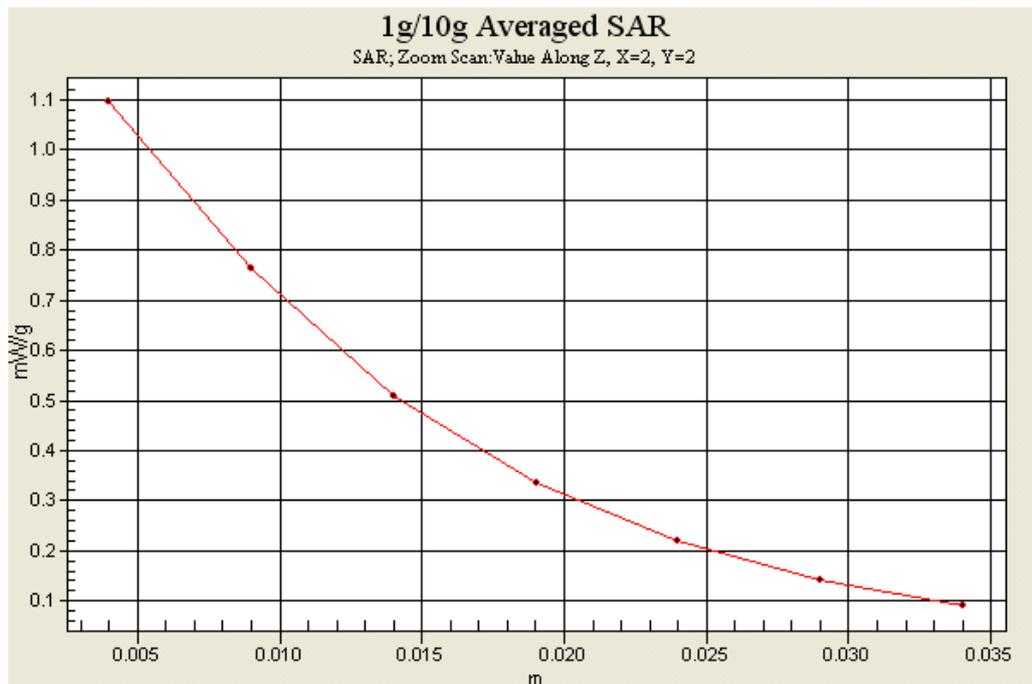
**Ch9400/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.88 V/m; Power Drift = -0.195 dB

Peak SAR (extrapolated) = 1.41 W/kg

**SAR(1 g) = 1.01 mW/g; SAR(10 g) = 0.617 mW/g**

Maximum value of SAR (measured) = 1.10 mW/g





Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab

Date: 2008/6/7

**Body\_GSM850 Ch189\_Bottom with 1.5cm Gap\_GPRS10\_2D**

**DUT: 852219**

Communication System: GSM850; Frequency: 836.4 MHz; Duty Cycle: 1:4

Medium: MSL\_850 Medium parameters used:  $f = 836.4 \text{ MHz}$ ;  $\sigma = 0.967 \text{ mho/m}$ ;  $\epsilon_r = 56.3$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature : 22.6 °C; Liquid Temperature : 21.5 °C

DASY4 Configuration:

- Probe: ET3DV6 - SN1787; ConvF(6.1, 6.1, 6.1); Calibrated: 2007/8/28
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn778; Calibrated: 2007/9/17
- Phantom: SAM-B; Type: QD 000 P40 C; Serial: TP-1383
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

**Ch189/Area Scan (41x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.01 mW/g

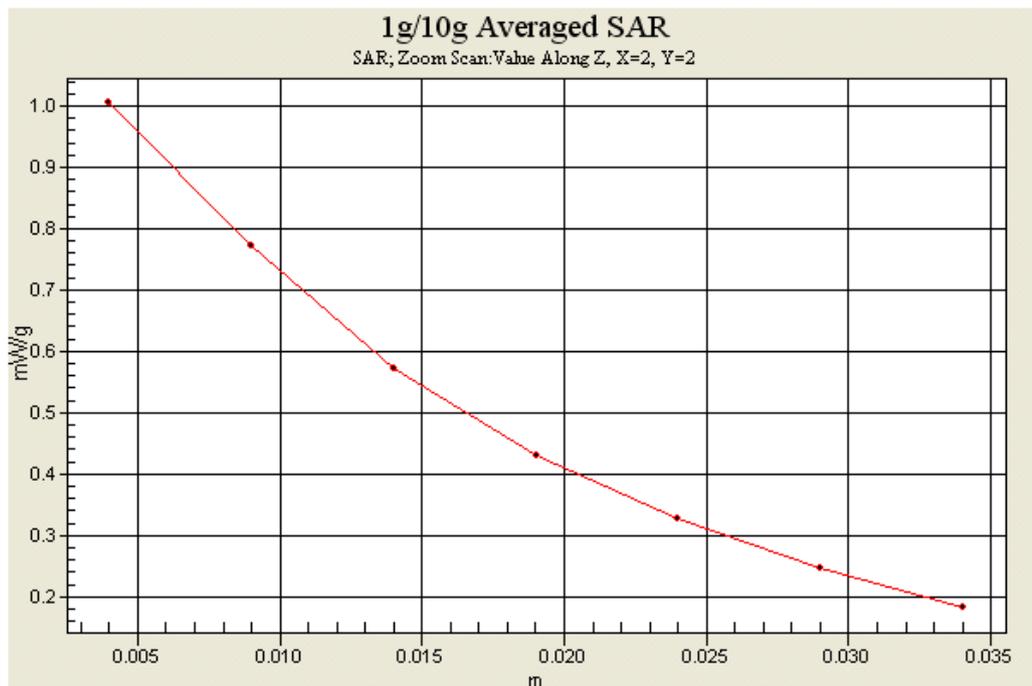
**Ch189/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 13.3 V/m; Power Drift = -0.125 dB

Peak SAR (extrapolated) = 1.20 W/kg

**SAR(1 g) = 0.950 mW/g; SAR(10 g) = 0.690 mW/g**

Maximum value of SAR (measured) = 1.00 mW/g





Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab

Date: 2008/6/5

**Body\_GSM1900 Ch512\_Bottom with 1.5cm Gap\_GPRS10\_2D**

**DUT: 852219**

Communication System: PCS 1900; Frequency: 1850.2 MHz; Duty Cycle: 1:4

Medium: MSL\_1900 Medium parameters used :  $f = 1850.2$  MHz;  $\sigma = 1.47$  mho/m;  $\epsilon_r = 51$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.0 °C; Liquid Temperature : 21.4 °C

**DASY4 Configuration:**

- Probe: ET3DV6 - SN1787; ConvF(4.68, 4.68, 4.68); Calibrated: 2007/8/28
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn778; Calibrated: 2007/9/17
- Phantom: SAM-B; Type: QD 000 P40 C; Serial: TP-1383
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

**Ch512/Area Scan (41x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.730 mW/g

**Ch512/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 13.9 V/m; Power Drift = -0.141 dB

Peak SAR (extrapolated) = 0.946 W/kg

SAR(1 g) = 0.628 mW/g; SAR(10 g) = 0.387 mW/g

Maximum value of SAR (measured) = 0.680 mW/g

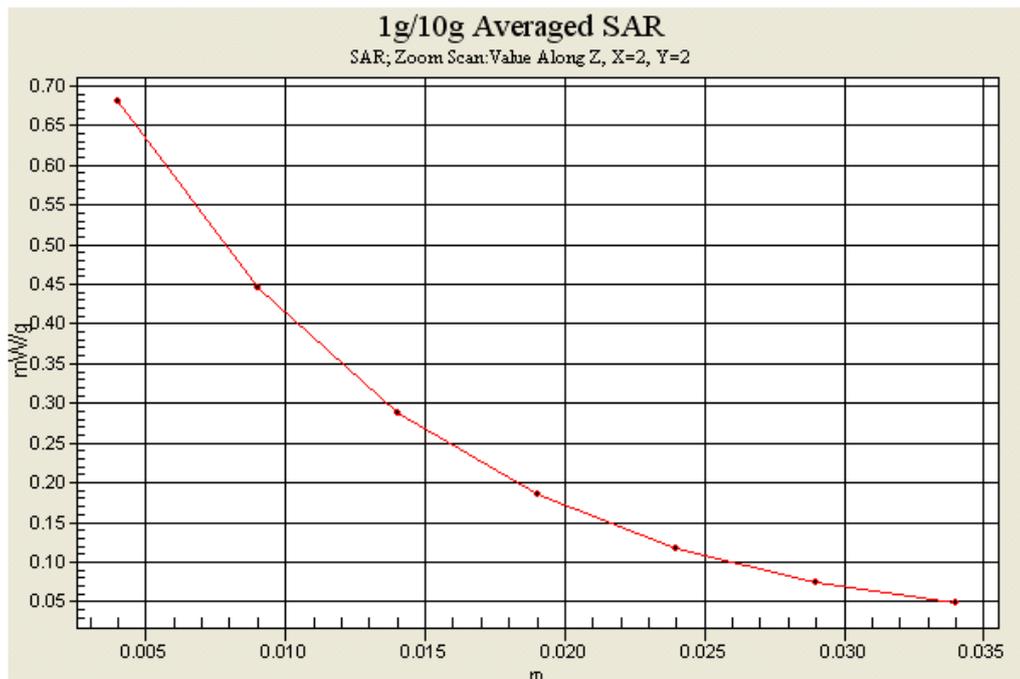
**Ch512/Zoom Scan (5x5x7)/Cube 1:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 13.9 V/m; Power Drift = -0.141 dB

Peak SAR (extrapolated) = 0.559 W/kg

SAR(1 g) = 0.390 mW/g; SAR(10 g) = 0.255 mW/g

Maximum value of SAR (measured) = 0.421 mW/g





Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab

Date: 2008/6/7

**Body\_WCDMA1900 Ch9400\_Bottom with 1.5cm Gap\_RMC12.2K\_2D**

**DUT: 852219**

Communication System: WCDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: MSL\_1900 Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.55$  mho/m;  $\epsilon_r = 51.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 22.7 °C; Liquid Temperature : 21.6 °C

DASY4 Configuration:

- Probe: ET3DV6 - SN1787; ConvF(4.68, 4.68, 4.68); Calibrated: 2007/8/28
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn778; Calibrated: 2007/9/17
- Phantom: SAM-B; Type: QD 000 P40 C; Serial: TP-1383
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

**Ch9400/Area Scan (41x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.720 mW/g

**Ch9400/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 13.5 V/m; Power Drift = -0.122 dB

Peak SAR (extrapolated) = 0.963 W/kg

**SAR(1 g) = 0.640 mW/g; SAR(10 g) = 0.393 mW/g**

Maximum value of SAR (measured) = 0.690 mW/g

**Ch9400/Zoom Scan (5x5x7)/Cube 1:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 13.5 V/m; Power Drift = -0.122 dB

Peak SAR (extrapolated) = 0.589 W/kg

**SAR(1 g) = 0.401 mW/g; SAR(10 g) = 0.254 mW/g**

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

