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## SAR Test Report, FCC ID: PY7F3022018

|                                                               |                                                                                                       |                        |                                                                                                        |
|---------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|------------------------|--------------------------------------------------------------------------------------------------------|
| <b>Document number:</b>                                       | EAB-08:012564 Uen<br>Rev A                                                                            | <b>Date of report:</b> | 2008-02-22                                                                                             |
| <b>Testing laboratory:</b>                                    | Ericsson EMF Research<br>Laboratory<br><br>Ericsson AB<br>SE-164 80 Stockholm<br>Sweden               | <b>Company/Client:</b> | Lars Melin<br>Sony Ericsson Mobile<br>Communications AB<br><br>Box 64<br>SE-164 94 Stockholm<br>Sweden |
| <b>Test performed by:</b>                                     | Martin Siegbahn<br>Björn Hansson<br>Sonja Hiltunen<br>Daniel Göker                                    | <b>Date of tests:</b>  | January 30 – February 21<br>2008                                                                       |
| <b>Manufacturer and market<br/>name(s) of device:</b>         | Sony Ericsson Mobile Communications AB, G700                                                          |                        |                                                                                                        |
| <b>Testing has been<br/>performed in accordance<br/>with:</b> | IEEE Std 1528, IEC 62209-1, FCC OET Bulletin 65 Supplement C                                          |                        |                                                                                                        |
| <b>Test results:</b>                                          | The tested device complies with the requirements in respect of all parameters<br>subject to the test. |                        |                                                                                                        |
| <b>Additional information:</b>                                |                                                                                                       |                        |                                                                                                        |
| <b>Signature:</b>                                             |                                                                                                       |                        |                                                                                                        |

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## 1 Summary of SAR Test Report<sup>1</sup>

### 1.1 Equipment under test (EUT)

|                             |                                                                |
|-----------------------------|----------------------------------------------------------------|
| Serial Number               | CB5A0M9U94                                                     |
| Type Number                 | FAD-3022018-BV                                                 |
| Device ID                   | FCC ID: PY7F3022018<br>IC: 4170B-F3022018                      |
| Accessories used in testing | Handsfree HPM-62, Bluetooth handsfree HBH-20<br>Battery BST-33 |
| Hardware status             | Pre-production AP1.1b                                          |
| Notes                       | -                                                              |

| Frequency Band [MHz]  | 850                                                       |                          | 900                                 | 1800                                | 1900                                |                          | 2100                                | 2450                     |
|-----------------------|-----------------------------------------------------------|--------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|-------------------------------------|--------------------------|
| Modes                 | GSM GPRS                                                  | WCDMA                    | GSM GPRS                            | GSM GPRS                            | GSM GPRS                            | WCDMA                    | WCDMA                               | WLAN                     |
| Supported             | <input type="checkbox"/>                                  | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Covered by report     | <input type="checkbox"/>                                  | <input type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> |
| Data and connectivity | GPRS class 10, GPRS capability class B, Bluetooth class 1 |                          |                                     |                                     |                                     |                          |                                     |                          |
| Exposure environment  | General public                                            |                          |                                     |                                     |                                     |                          |                                     |                          |

### 1.2 Results

The maximum SAR values are given in the table below. The device conforms to the requirements of the relevant standards when the maximum SAR value is less than or equal to the limit.

Results applicable to the 1g SAR limit of 1.6 W/kg:

|      | Mode      | Channel/<br>Frequency<br>(MHz) | Position     | Max SAR <sub>1g</sub><br>for single<br>mode<br>operation | Max SAR <sub>1g</sub><br>for multi-<br>mode<br>operation <sup>2</sup> | SAR <sub>1g</sub><br>limit <sup>3</sup> | Result |
|------|-----------|--------------------------------|--------------|----------------------------------------------------------|-----------------------------------------------------------------------|-----------------------------------------|--------|
| HEAD | GSM 1900  | 810/1909.8                     | Right, Cheek | 1.22 W/kg                                                | 1.24 W/kg                                                             | 1.6 W/kg                                | PASSED |
| BODY | GSM 1900  | 810/1909.8                     | Back, 15mm   | 0.52 W/kg                                                | 0.80 W/kg                                                             | 1.6 W/kg                                | PASSED |
| BODY | GPRS 1900 | 810/1909.8                     | Back, 15mm   | 1.07 W/kg                                                | 1.41 W/kg                                                             | 1.6 W/kg                                | PASSED |

|                                |          |
|--------------------------------|----------|
| Extended Uncertainty (k=2) 95% | ± 21.9 % |
|--------------------------------|----------|

<sup>1</sup> This page contains a summary of the test results. The full report provides a complete description of all test details and results.

<sup>2</sup> GSM/GPRS and Bluetooth transmitting simultaneously.

<sup>3</sup> SAR limit applicable in USA and Canada

## 2 General information

The tests reported in this document have been performed in accordance with the SAR measurement standards IEC 62209-1 [1], IEEE Standard 1528 [2] and the FCC OET Bulletin 65 Supplement C [3]. The purpose of the tests was to verify that the EUT is in compliance with the appropriate RF exposure standards, recommendations and limits [3-4].

## 3 Equipment under test

The tables below summarize the technical data for the equipment under test. Photographs of the device are presented in Appendix A.

|                                                     |                                                                        |
|-----------------------------------------------------|------------------------------------------------------------------------|
| <b>Device model</b>                                 | Type No: FAD-3022018-BV<br>FCC ID: PY7F3022018<br>IC: 4170B-F3022018   |
| <b>Serial number of tested unit(s)</b>              | CB5A0M9U94                                                             |
| <b>Mode(s) covered by this report</b>               | GSM/GPRS1900<br>Bluetooth                                              |
| <b>Antenna(s)</b>                                   | Internal                                                               |
| <b>Maximum output power level<sup>4</sup> (dBm)</b> | GSM/GPRS(1Tx)1900: 30.5<br>GPRS(2Tx)1900: 30.5<br>Bluetooth: 7.5       |
| <b>GPRS Class, GPRS capability class</b>            | 10, B                                                                  |
| <b>Duty cycle(s)</b>                                | 1:8 (GSM), 1:4 (GPRS)                                                  |
| <b>Transmitter frequency range (MHz)</b>            | GSM1900: 1850.2-1909.8                                                 |
| <b>Hardware status</b>                              | Pre-production AP1.1b                                                  |
| <b>Software(s)</b>                                  | 1203-6566 R9K007, 1200-5567 R1D,<br>1202-7347 R6G803, 1204-3125 R6G803 |
| <b>Tested accessories</b>                           | Stereo handsfree HPM-62<br>Bluetooth handsfree HBH-20                  |
| <b>Tested batteries</b>                             | BST-33                                                                 |

| GSM/GPRS 1900 MHz Output power |                            |                             |                 |        |        |
|--------------------------------|----------------------------|-----------------------------|-----------------|--------|--------|
| Mode                           | Nominal output power (dBm) | Tolerance, upper limit (dB) | EUT power (dBm) |        |        |
|                                |                            |                             | Ch 512          | Ch 661 | Ch 810 |
| GSM/GPRS(1Tx) 1900             | 30.0                       | +0.5                        | 30.6            | 30.6   | 30.6   |
| GPRS(2Tx) 1900                 | 30.0                       | +0.5                        | 30.6            | 30.6   | 30.6   |

<sup>4</sup> Output power level of the phone at the antenna port for the maximum power setting. This equals the nominal output power level plus the tolerance in production.

## 4 Test equipment

### 4.1 Dosimetric system

The SAR measurements were made using the DASY4 professional near-field scanner by Schmid & Partner Engineering AG that was installed in December 2002. An uncertainty budget including total uncertainty ( $k=1$ ) and expanded uncertainty ( $k=2$ ) for 1g and 10g SAR assessments is found in section 7. The equipment list is given below. In Appendix E calibration parameters for the SAR test probe(s) are listed.

| Description                    | Serial number | Calibration due date | Calibration interval |
|--------------------------------|---------------|----------------------|----------------------|
| Probe electronics, DAE3        | S/N 304       | 2008-10-15           | 12 months            |
| E-field probe, ES3DV3          | S/N 3113      | 2008-06-14           | 12 months            |
| Dipole validation kit, D1900V2 | S/N 510       | NA                   | NA                   |
| SAM Phantom (SAM1)             | S/N TP-1390   | NA                   | NA                   |
| SAM Phantom (SAM2)             | S/N TP-1004   | NA                   | NA                   |

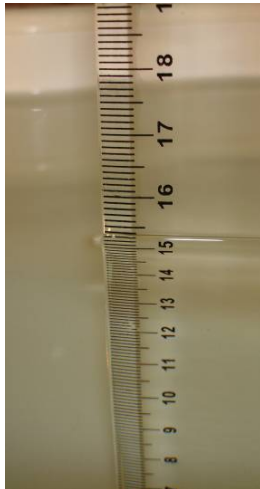
### 4.2 Additional equipment

| Description                                       | Serial number  | Calibration due date | Calibration interval |
|---------------------------------------------------|----------------|----------------------|----------------------|
| Dielectric probe kit, HP 85070C                   | S/N US99360060 | NA                   | NA                   |
| Network analyzer, HP 8752C                        | S/N 3410A03732 | 2008-10-18           | 12 months            |
| Power meter, R&S NRVS                             | S/N 848888/052 | 2008-06-06           | 24 months            |
| Power sensor, R&S NRV-Z5                          | S/N 849895/030 | 2008-06-06           | 24 months            |
| Universal radio communication tester, R&S CMU 200 | S/N 107639     | 2008-05-04           | 12 months            |
| Thermometer, EBRO TFX-392SKWT                     | S/N 10130918   | 2008-10-22           | 12 months            |

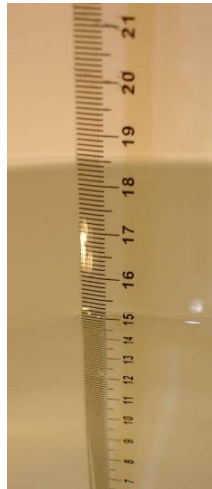
## 5 Electrical parameters of the tissue simulating liquids

The parameters of the tissue simulating liquids were measured using the network analyzer and the dielectric probe kit prior to the SAR measurements. The results are shown in the table below. Specified standard values for the permittivity and the conductivity are given in [1-3]. The measured values are within 5% of the standard values. The mass density of the liquid entered into the DASY4 program was  $1000 \text{ kg/m}^3$ . The depth of the tissue simulating liquid was  $15 \pm 0.5 \text{ cm}$  as shown in the figures below.

| f (MHz) | Liquid type   | Measured/Specification | $\epsilon_r$              | $\sigma$ (S/m)            |
|---------|---------------|------------------------|---------------------------|---------------------------|
| 1900    | Head          | Measured               | 38.2 to 38.4 <sup>5</sup> | 1.37 to 1.43 <sup>5</sup> |
|         |               | Specified value        | 40.0                      | 1.40                      |
|         |               | Difference (%)         | -3.9 to -4.5              | -2.2 to +2.1              |
|         | Body (muscle) | Measured               | 51.5 to 51.8 <sup>5</sup> | 1.59                      |
|         |               | Specified value        | 53.3                      | 1.52                      |
|         |               | Difference (%)         | -2.8 to -3.4              | +4.6                      |



Measured level (153 mm, head section) of 1900 MHz head tissue simulating liquid in phantom.



Measured level (152 mm, flat section) of 1900 MHz muscle tissue simulating liquid in phantom

<sup>5</sup> Measurements were conducted over more than one day and the parameters were in the stated range.

## 6 SAR system performance check

System performance checks for the DASY4 were conducted before the SAR measurements with the D1900V2 dipole kit and the obtained results are displayed in the table below. The results are within 10% of the reference values [2][5]. Evaluations prior to the SAR testing showed that the maximum SAR system noise was below 2 mW/kg, which is below the standard requirements. The temperature of the test facility during the system performance checks was in the range 20°C to 25°C.

| f (MHz) | Liquid type      | Measured/<br>Reference | SAR 1g<br>(W/kg) | SAR 10g<br>(W/kg) | $\epsilon_r$ | $\sigma$ (S/m) | Liquid<br>temp (°C) | Date       |
|---------|------------------|------------------------|------------------|-------------------|--------------|----------------|---------------------|------------|
| 1900    | Head             | Measured               | 43.0             | 22.4              | 38.2         | 1.43           | 20.9                | 2008-02-05 |
|         |                  | Reference [2]          | 39.7             | 20.5              | 40.0         | 1.40           | -                   | -          |
|         |                  | Difference (%)         | +8               | +9                | -4           | +2             | -                   | -          |
|         |                  | Measured               | 39.5             | 20.6              | 38.0         | 1.36           | 21.6                | 2008-02-19 |
|         |                  | Reference [2]          | 39.7             | 20.5              | 40.0         | 1.40           | -                   | -          |
|         |                  | Difference (%)         | -0.6             | +0.3              | -4.9         | -2.8           | -                   | -          |
|         | Body<br>(muscle) | Measured               | 42.4             | 21.9              | 51.4         | 1.56           | 21.7                | 2008-02-02 |
|         |                  | Reference [5]          | 40.4             | 21.1              | 53.3         | 1.52           | -                   | -          |
|         |                  | Difference (%)         | +5               | +4                | -3           | +3             | -                   | -          |

## 7 Uncertainty evaluation of SAR measurement system DASY4 according to IEC 62209-1 [1] and IEEE 1528 [2]

| Uncertainty Component                            | Section in IEEE 1528 | Uncer. (%) | Prob Dist. | Div. | C <sub>i,1g</sub> | C <sub>i,10g</sub> | Std. Uncer. (1g) (%) | Std. Uncer. (10g) (%) |
|--------------------------------------------------|----------------------|------------|------------|------|-------------------|--------------------|----------------------|-----------------------|
| <b>Measurement System</b>                        |                      |            |            |      |                   |                    |                      |                       |
| Probe Calibration                                | E2.1                 | ±5.9       | N          | 1    | 1                 | 1                  | ±5.9                 | ±5.9                  |
| Axial Isotropy                                   | E2.2                 | ±4.7       | R          | √3   | 0.7               | 0.7                | ±1.9                 | ±1.9                  |
| Spherical Isotropy                               | E2.2                 | ±9.6       | R          | √3   | 0.7               | 0.7                | ±3.9                 | ±3.9                  |
| Boundary Effect                                  | E2.3                 | ±1.0       | R          | √3   | 1                 | 1                  | ±0.6                 | ±0.6                  |
| Linearity                                        | E2.4                 | ±4.7       | R          | √3   | 1                 | 1                  | ±2.7                 | ±2.7                  |
| System Detection Limits                          | E2.5                 | ±1.0       | R          | √3   | 1                 | 1                  | ±0.6                 | ±0.6                  |
| Readout electronics                              | E2.6                 | ±0.3       | N          | 1    | 1                 | 1                  | ±0.3                 | ±0.3                  |
| Response time                                    | E2.7                 | ±0.8       | R          | √3   | 1                 | 1                  | ±0.5                 | ±0.5                  |
| Integration time                                 | E2.8                 | ±2.6       | R          | √3   | 1                 | 1                  | ±1.5                 | ±1.5                  |
| RF Ambient Noise                                 | E6.1                 | ±3.0       | R          | √3   | 1                 | 1                  | ±1.7                 | ±1.7                  |
| RF Ambient Reflections                           | E6.1                 | ±3.0       | R          | √3   | 1                 | 1                  | ±1.7                 | ±1.7                  |
| Probe Positioner                                 | E6.2                 | ±0.4       | R          | √3   | 1                 | 1                  | ±0.2                 | ±0.2                  |
| Probe Positioning                                | E6.3                 | ±2.9       | R          | √3   | 1                 | 1                  | ±1.7                 | ±1.7                  |
| Max. SAR Evaluation                              | E5                   | ±1.0       | R          | √3   | 1                 | 1                  | ±0.6                 | ±0.6                  |
| <i>Measurement System Uncertainty</i>            |                      |            |            |      |                   |                    | ±8.6                 | ±8.6                  |
| <b>Test Sample Related</b>                       |                      |            |            |      |                   |                    |                      |                       |
| Device positioning                               | E4.2                 | ±2.9       | N          | 1    | 1                 | 1                  | ±2.9                 | ±2.9                  |
| Device holder uncertainty                        | E4.1                 | ±3.6       | N          | 1    | 1                 | 1                  | ±3.6                 | ±3.6                  |
| Power drift                                      | 6.6.3                | ±5.0       | R          | √3   | 1                 | 1                  | ±2.9                 | ±2.9                  |
| <i>Test Sample Related Uncertainty</i>           |                      |            |            |      |                   |                    | ±5.5                 | ±5.5                  |
| <b>Phantom and Tissue Parameters</b>             |                      |            |            |      |                   |                    |                      |                       |
| Phantom uncertainty                              | E3.1                 | ±4.0       | R          | √3   | 1                 | 1                  | ±2.3                 | ±2.3                  |
| Liquid conductivity (meas uncertainty)           | E3.3                 | ±2.5       | N          | 1    | 0.64              | 0.43               | ±1.6                 | ±1.1                  |
| Liquid conductivity (target)                     | E3.2                 | ±5.0       | R          | √3   | 0.64              | 0.43               | ±1.8                 | ±1.2                  |
| Liquid Permittivity (meas uncertainty)           | E3.3                 | ±2.5       | N          | 1    | 0.6               | 0.49               | ±1.5                 | ±1.2                  |
| Liquid Permittivity (target)                     | E3.2                 | ±5.0       | R          | √3   | 0.6               | 0.49               | ±1.7                 | ±1.4                  |
| <i>Phantom and Tissue Parameters Uncertainty</i> |                      |            |            |      |                   |                    | ±4.9                 | ±3.4                  |
| <b>Combined standard uncertainty</b>             |                      |            |            |      |                   |                    | <b>±10.9</b>         | <b>±10.7</b>          |
| <b>Extended standard uncertainty (k=2)</b>       |                      |            |            |      |                   |                    | <b>±21.9</b>         | <b>±21.4</b>          |

Uncertainty budget is applicable for both head and body measurements

## 8 Test results

The tables in this section show the measured 1g and 10g averaged SAR for the device and the corresponding values normalized to the maximum output power level. A universal radio communication tester was used to control the device during the SAR measurements on the mobile telephony band(s). The phone was supplied with a fully charged battery for the tests. The temperature of the test facility during the tests was in the range 20 to 25°C. During the tests, the temperature of the tissue simulating liquid was within  $\pm 2^{\circ}\text{C}$  from the liquid temperature at system performance check.

The device was tested on the right-hand phantom, corresponding to the right side of the head, and the left-hand phantom for the cheek and tilt phone positions in the middle of the transmit band(s), corresponding to the channel 661 for GSM1900. In Appendix B, pictures of the device positioned on the head phantom are shown. For the phone position giving the highest SAR result, the device was also tested at the lowest and the highest frequencies of the transmit band(s) corresponding to the channels 512 and 810 for GSM1900. For the position and frequency giving the highest SAR result for the GSM1900 band, tests were performed with the Bluetooth transmitter turned on.

The device was also tested in body worn positions with the front and back side of the device facing the phantom on the middle channel. For the phone position giving the highest SAR result, the device was then tested at the lowest and the highest frequencies of the transmit band. For the position and frequency giving the highest SAR result, tests were performed with the Bluetooth transmitter turned on. All tests in body worn positions were performed at 15 mm separation between the device and the flat phantom, with the stereo handsfree attached for speech and data modes (replaced by Bluetooth handsfree when Bluetooth enabled). In Appendix B, pictures of the device when positioned under the flat section of the phantom are shown.

The device can transmit simultaneously in Bluetooth mode, with the mobile telephony modes. Multi-mode SAR results are presented in each GSM1900 result table.

### 8.1 Results for the GSM1900 mode (head)

| Configuration | Phone position |       | f (MHz) | Measured output power (dBm) | Measured (W/kg)   |                    | Normalized to max power, 30.5 dBm (W/kg) |                    |
|---------------|----------------|-------|---------|-----------------------------|-------------------|--------------------|------------------------------------------|--------------------|
|               |                |       |         |                             | SAR <sub>1g</sub> | SAR <sub>10g</sub> | SAR <sub>1g</sub>                        | SAR <sub>10g</sub> |
|               | Left           | Cheek | 1850.2  | 30.6                        | 0.89              | 0.58               | 0.87                                     | 0.56               |
|               |                |       | 1880.0  | 30.6                        | 0.97              | 0.62               | 0.94                                     | 0.61               |
|               |                |       | 1909.8  | 30.6                        | 1.20              | 0.77               | 1.17                                     | 0.75               |
|               |                | Tilt  | 1880.0  | 30.6                        | 0.34              | 0.20               | 0.33                                     | 0.20               |
|               | Right          | Cheek | 1850.2  | 30.6                        | 0.97              | 0.57               | 0.95                                     | 0.56               |
|               |                |       | 1880.0  | 30.6                        | 0.99              | 0.57               | 0.97                                     | 0.56               |
|               |                |       | 1909.8  | 30.6                        | 1.25              | 0.71               | 1.22                                     | 0.69               |
|               |                | Tilt  | 1880.0  | 30.6                        | 0.43              | 0.25               | 0.42                                     | 0.24               |
| Bluetooth on  | Left           | Cheek | 1909.8  | 30.6                        | 1.22              | 0.78               | 1.19                                     | 0.76               |
|               | Right          | Cheek | 1909.8  | 30.6                        | 1.27              | 0.72               | 1.24                                     | 0.71               |

Appendix D, Figures a-d, show SAR distributions for Right Cheek, Right Tilt, Left Cheek and Left Tilt positions, including the configuration giving the maximum 1g SAR for GSM1900 Head measurements.

### 8.2 Results for the GSM1900 mode (body)

| Separation                           | Configuration              | Phone position | f (MHz) | Measured output power (dBm) | Measured (W/kg)   |                    | Normalized to max power, 30.5 dBm (W/kg) |                    |
|--------------------------------------|----------------------------|----------------|---------|-----------------------------|-------------------|--------------------|------------------------------------------|--------------------|
|                                      |                            |                |         |                             | SAR <sub>1g</sub> | SAR <sub>10g</sub> | SAR <sub>1g</sub>                        | SAR <sub>10g</sub> |
| 15mm between device and flat phantom | Stereo handsfree           | Front          | 1880.0  | 30.6                        | 0.40              | 0.25               | 0.39                                     | 0.24               |
|                                      |                            | Back           | 1850.2  | 30.6                        | 0.48              | 0.30               | 0.47                                     | 0.29               |
|                                      |                            |                | 1880.0  | 30.6                        | 0.52              | 0.32               | 0.51                                     | 0.31               |
|                                      |                            |                | 1909.8  | 30.6                        | 0.53              | 0.32               | 0.52                                     | 0.32               |
|                                      | Bluetooth on, no handsfree | Back           | 1909.8  | 30.6                        | 0.82              | 0.49               | 0.80                                     | 0.48               |

Appendix D, Figure e, shows the SAR distribution for the configuration giving the maximum 1g SAR for GSM1900 Body measurements.

### 8.3 Results for the GPRS(2Tx)1900 mode (body)

| Separation                           | Configuration              | Phone position | f (MHz) | Measured output power (dBm) | Measured (W/kg)   |                    | Normalized to max power, 30.5 dBm (W/kg) |                    |
|--------------------------------------|----------------------------|----------------|---------|-----------------------------|-------------------|--------------------|------------------------------------------|--------------------|
|                                      |                            |                |         |                             | SAR <sub>1g</sub> | SAR <sub>10g</sub> | SAR <sub>1g</sub>                        | SAR <sub>10g</sub> |
| 15mm between device and flat phantom | Stereo handsfree           | Front          | 1880.0  | 30.6                        | -                 | -                  | -                                        | -                  |
|                                      |                            | Back           | 1850.2  | 30.6                        | 0.93              | 0.57               | 0.91                                     | 0.56               |
|                                      |                            |                | 1880.0  | 30.6                        | 0.86              | 0.52               | 0.84                                     | 0.51               |
|                                      |                            |                | 1909.8  | 30.6                        | 1.09              | 0.65               | 1.07                                     | 0.64               |
|                                      | Bluetooth on, no handsfree | Back           | 1909.8  | 30.6                        | 1.44              | 0.86               | 1.41                                     | 0.84               |

Appendix D, Figure f, shows the SAR distribution for the configuration giving the maximum 1g SAR for GPRS(2Tx)1900 Body measurements.

## 9 Conclusion

The results above show that the maximum SAR for the EUT is below the applicable SAR limits. Consequently, the EUT is in compliance with the appropriate RF exposure standards and recommendations.

## 10 References

- [1] IEC 62209-1, International Standard, "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Humans models, instrumentation, and procedures – Part 1: Procedure to determine the Specific Absorption Rate (SAR) for hand-held mobile devices used in close proximity of the ear (frequency range of 300 MHz to 3 GHz)", IEC, February 2005.
- [2] IEEE, Standard 1528, "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques.", The Institute for Electrical and Electronics Engineers (IEEE) Inc., June 2003.
- [3] FCC, "Evaluating Compliance with FCC Guidelines from Human Exposure To Radiofrequency Electromagnetic Fields", Supplement C Edition 01-01 to OET Bulletin 65 Edition 97-01, June 2001.
- [4] ANSI/IEEE Std C95.1-2005 (Revision of IEEE Std C95.1-1991), "Safety levels with respect to human exposure to radio frequency electromagnetic fields, 3 kHz to 300 GHz", The Institute of Electrical and Electronics Engineers Inc., New York, 2006.
- [5] EAB/TF-03:090, "Calculation of reference SAR values for system performance checks with muscle tissue simulating liquid", Ericsson technical report, December 2006.
- [6] IEC 62209-2 Ed.1: "Human exposure to radio frequency fields from handheld and body-mounted wireless communication devices – Human models, instrumentation, and procedures – Part 2: Procedure to determine the specific absorption rate (SAR) for mobile wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz), Committee Draft, July 2007.

## 11 Revision History

| Rev. | Date       | Description    |
|------|------------|----------------|
| A    | 2008-02-21 | First revision |
|      |            |                |

**APPENDIX A: Photographs of the EUT**



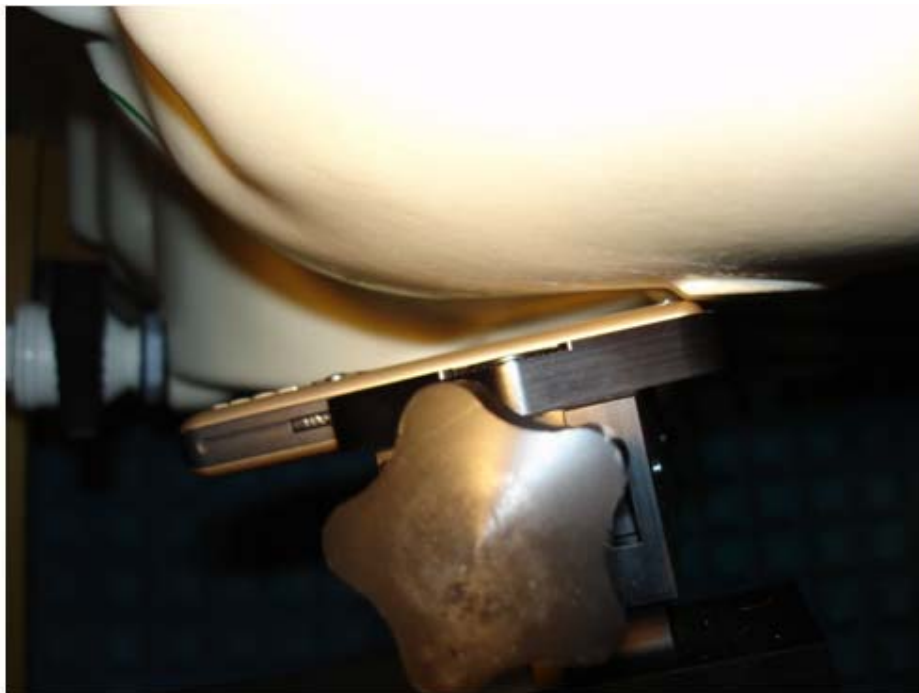
**(a) Right, Front, Left and Back view of the EUT.**



**(b) Battery BST-33**

**APPENDIX B: Photographs of the EUT when positioned for SAR measurements**

**(a) Device on head phantom in the cheek position.**



**(b) Device on head phantom in the tilt position.**



(c) Device on flat section of the phantom. The separation was 15 mm between the device and the flat phantom.

**APPENDIX C: SAR distribution plots for the system performance checks****System performance check at 1900 MHz (Body) conducted February 2<sup>nd</sup>**

Date/Time: 2008-02-02 13:45:54

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

-Medium: Muscle 1900 MHz;  $\sigma = 1.56$  mho/m;  $\epsilon_r = 51.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

-Probe: ES3DV3 - SN3113; ConvF(4.71, 4.71, 4.71)

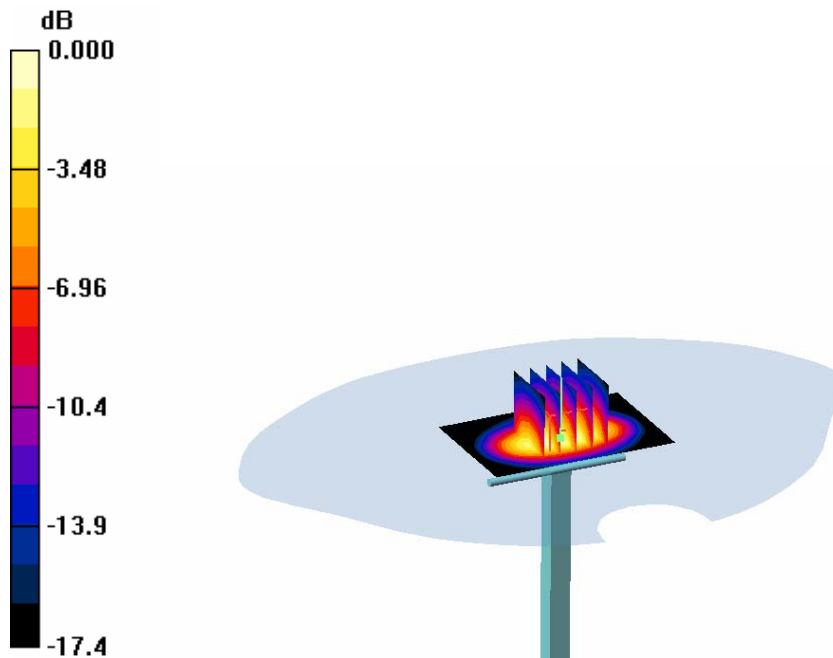
-Electronics: DAE3 Sn304

-Phantom: SAM 2; Serial: TP1004

-Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**d=10mm, Pin= 254.7 mW/Area Scan (61x91x1):** Measurement grid: dx=10mm, dy=10mm  
Maximum value of SAR (interpolated) = 12.5 mW/g

**d=10mm, Pin= 254.7 mW/Zoom Scan (5x5x7) (5x5x7)/Cube 0:** Measurement grid:  
dx=8mm, dy=8mm, dz=5mm  
Reference Value = 86.4 V/m; Power Drift = -0.111 dB  
Peak SAR (extrapolated) = 20.0 W/kg  
**SAR(1 g) = 10.8 mW/g; SAR(10 g) = 5.57 mW/g**  
Maximum value of SAR (measured) = 12.1 mW/g



0 dB = 12.1mW/g

**System performance check at 1900 MHz (Head) conducted February 5<sup>th</sup>**

Date/Time: 2008-02-05 09:49:50

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

-Medium: HSL1900; Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.43$  mho/m;  $\epsilon_r = 38.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

-Probe: ES3DV3 - SN3113; ConvF(4.83, 4.83, 4.83)

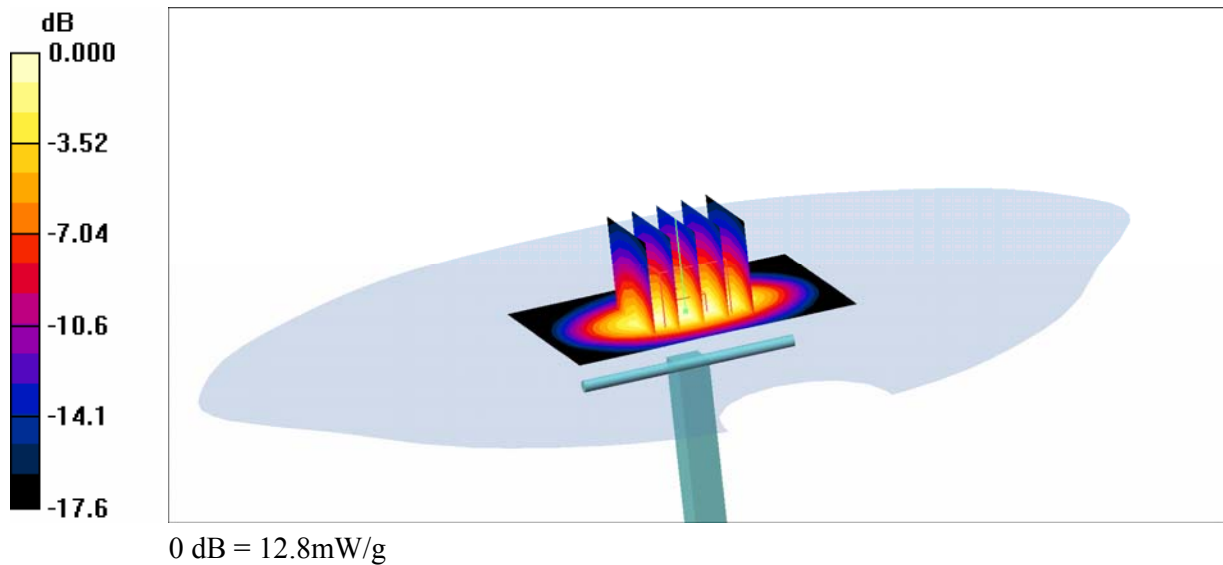
-Electronics: DAE3 Sn304

-Phantom: SAM 2; Serial: TP1004

-Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**d=10mm, Pin= 262.8 mW/Area Scan (61x91x1):** Measurement grid: dx=10mm, dy=10mm  
Maximum value of SAR (interpolated) = 12.9 mW/g

**d=10mm, Pin= 262.8 mW/Zoom Scan (5x5x7) (5x5x7)/Cube 0:** Measurement grid:  
dx=8mm, dy=8mm, dz=5mm  
Reference Value = 92.6 V/m; Power Drift = -0.047 dB  
Peak SAR (extrapolated) = 20.9 W/kg  
**SAR(1 g) = 11.3 mW/g; SAR(10 g) = 5.89 mW/g**  
Maximum value of SAR (measured) = 12.8 mW/g



**System performance check at 1900 MHz (Head) conducted February 19<sup>th</sup>**

Date/Time: 2008-02-19 15:06:00

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

-Medium: HSL1900; Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.36$  mho/m;  $\epsilon_r = 38$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

-Probe: ES3DV3 - SN3113; ConvF(4.83, 4.83, 4.83)

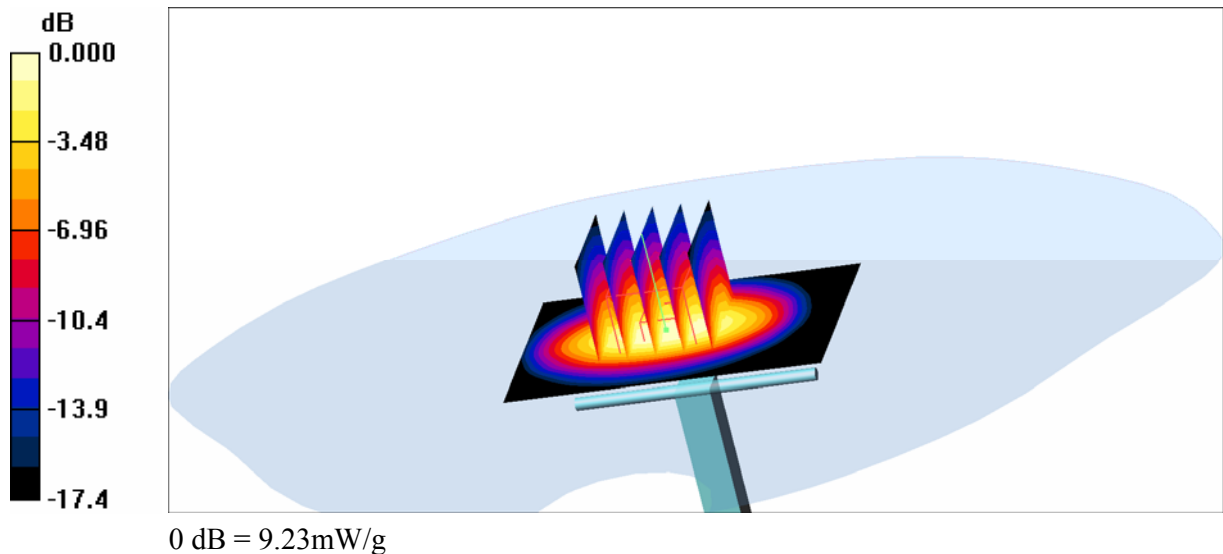
-Electronics: DAE3 Sn304

-Phantom: SAM 1; Serial: TP1390

-Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**d=10mm, Pin= 208.3 mW/Area Scan (61x91x1):** Measurement grid: dx=10mm, dy=10mm  
Maximum value of SAR (interpolated) = 9.33 mW/g

**d=10mm, Pin= 208.3 mW/Zoom Scan (5x5x7) (5x5x7)/Cube 0:** Measurement grid:  
dx=8mm, dy=8mm, dz=5mm  
Reference Value = 80.9 V/m; Power Drift = 0.012 dB  
Peak SAR (extrapolated) = 15.0 W/kg  
**SAR(1 g) = 8.22 mW/g; SAR(10 g) = 4.28 mW/g**  
Maximum value of SAR (measured) = 9.23 mW/g



**APPENDIX D: SAR distribution plots**

Date/Time: 2008-02-05 12:56:36

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

-Medium: Head 1900 MHz;  $\sigma = 1.43$  mho/m;  $\epsilon_r = 38.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

-Probe: ES3DV3 - SN3113; ConvF(4.83, 4.83, 4.83)

-Electronics: DAE3 Sn304

-Phantom: SAM 2; ; Serial: TP1004

-Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**Cheek high BT/Area Scan (111x61x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 1.41 mW/g

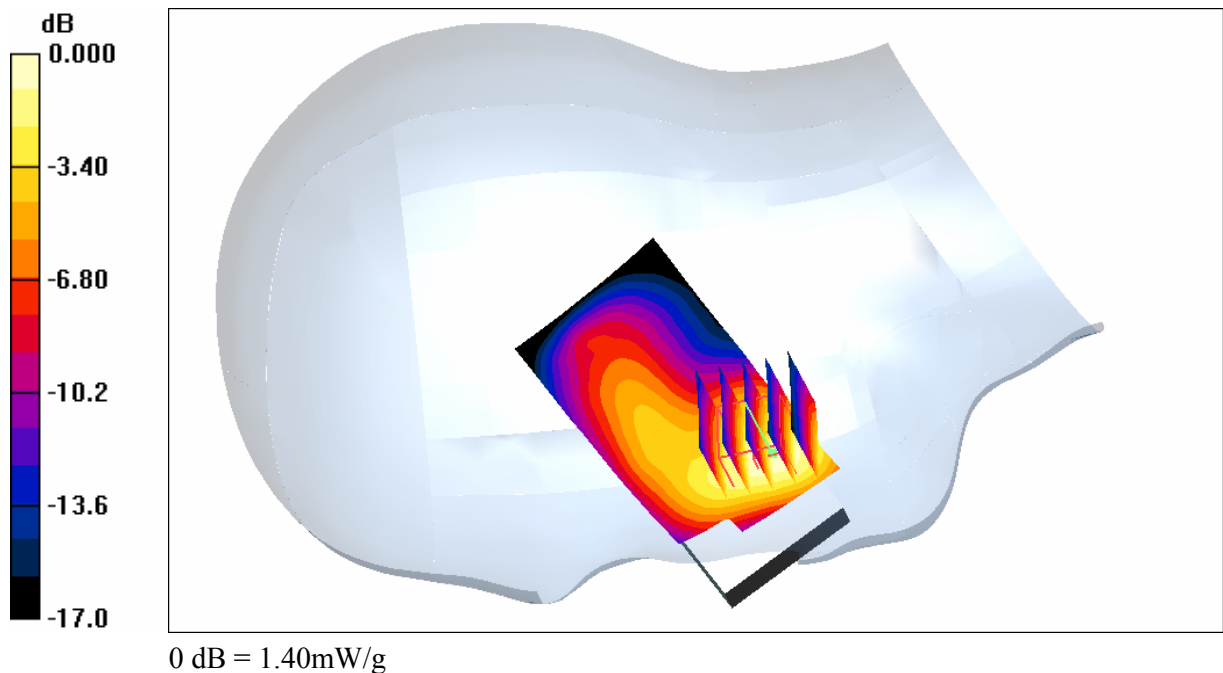
**Cheek high BT/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.5 V/m; Power Drift = 0.061 dB

Peak SAR (extrapolated) = 2.17 W/kg

**SAR(1 g) = 1.27 mW/g; SAR(10 g) = 0.72 mW/g**

Maximum value of SAR (measured) = 1.40 mW/g



**(a) SAR Distribution for EUT in GSM1900 mode measured against the right hand side phantom for the cheek phone position.**

Date/Time: 2008-02-05 12:29:55

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

-Medium: Head 1900 MHz;  $\sigma = 1.43$  mho/m;  $\epsilon_r = 38.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

-Probe: ES3DV3 - SN3113; ConvF(4.83, 4.83, 4.83)

-Electronics: DAE3 Sn304

-Phantom: SAM 2; ; Serial: TP1004

-Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**Tilt mid/Area Scan (111x61x1):** Measurement grid: dx=10mm, dy=10mm

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

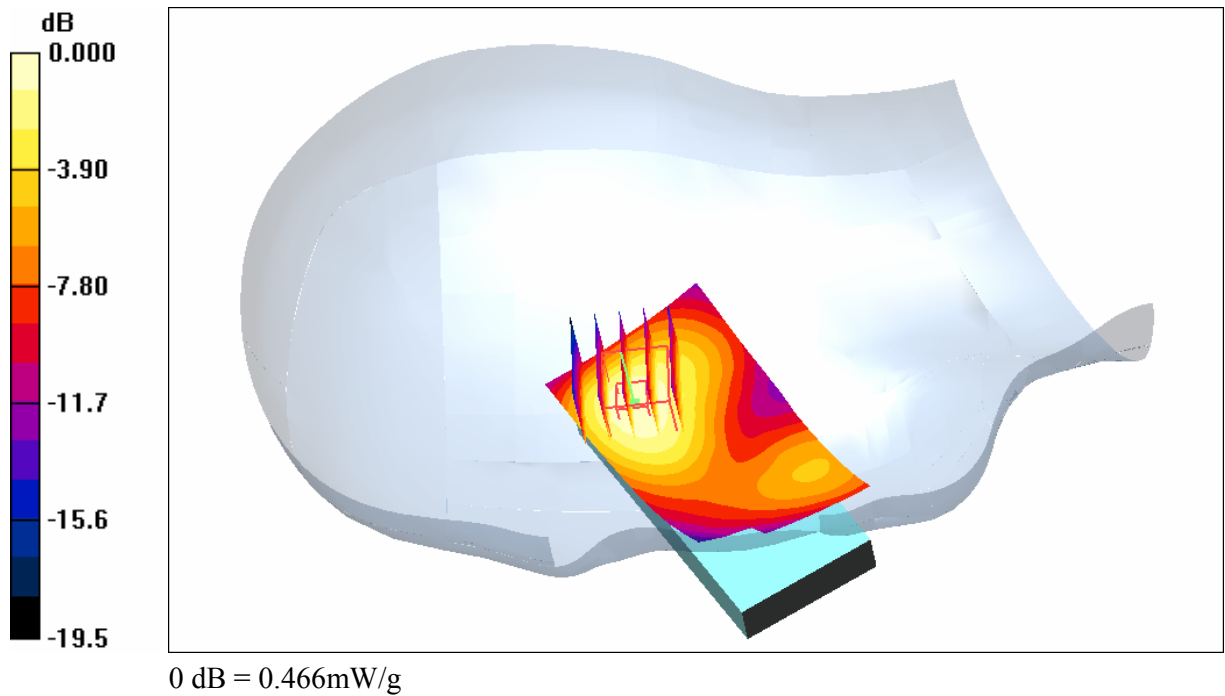
**Tilt mid/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.5 V/m; Power Drift = 0.076 dB

Peak SAR (extrapolated) = 0.669 W/kg

**SAR(1 g) = 0.43 mW/g; SAR(10 g) = 0.25 mW/g**

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



**(b) SAR Distribution for EUT in GSM1900 mode measured against the right hand side phantom for the tilt phone position.**

Date/Time: 2008-02-21 10:21:26

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

-Medium: Head 1900 MHz;  $f = 1909.8$  MHz;  $\sigma = 1.37$  mho/m;  $\epsilon_r = 38.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

-Probe: ES3DV3 - SN3113; ConvF(4.83, 4.83, 4.83)

-Electronics: DAE3 Sn304

-Phantom: SAM 1; Serial: TP1390 ;

-Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

### Cheek High BT/Area Scan (111x61x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 1.38 mW/g

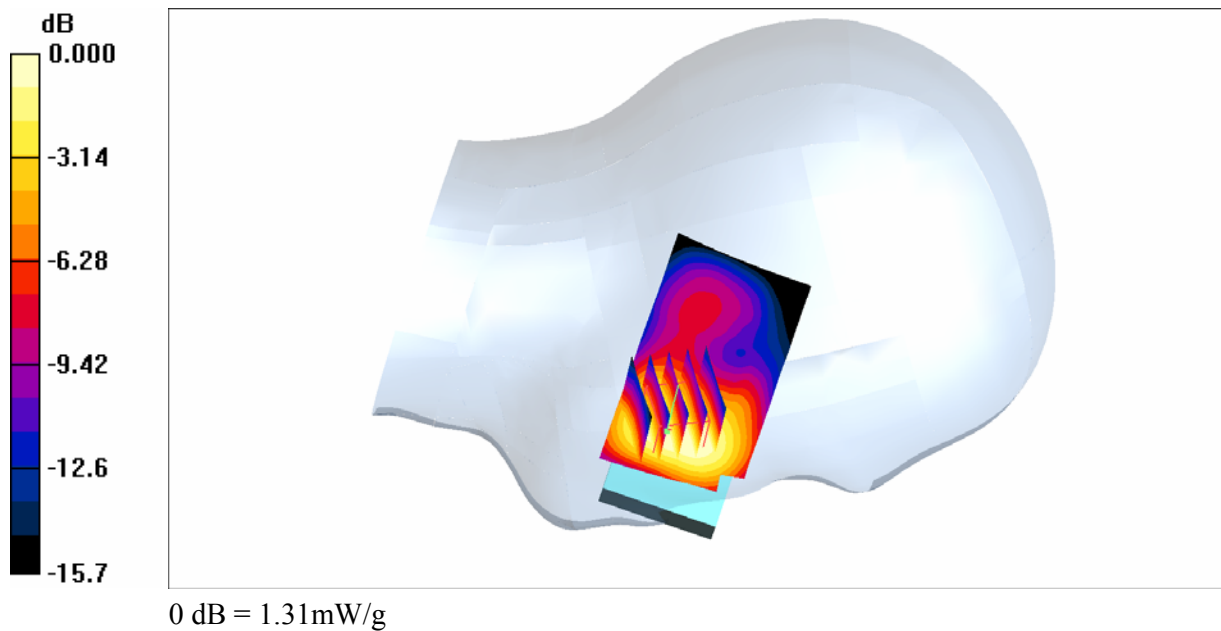
### Cheek High BT/Zoom Scan 2 (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.41 V/m; Power Drift = 0.144 dB

Peak SAR (extrapolated) = 1.81 W/kg

**SAR(1 g) = 1.22 mW/g; SAR(10 g) = 0.78 mW/g**

Maximum value of SAR (measured) = 1.31 mW/g



**(c) SAR Distribution for EUT in GSM1900 mode measured against the left hand side phantom for the cheek phone position.**

Date/Time: 2008-02-05 13:32:09

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

-Medium: Head 1900 MHz;  $\sigma = 1.43$  mho/m;  $\epsilon_r = 38.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

-Probe: ES3DV3 - SN3113; ConvF(4.83, 4.83, 4.83)

-Electronics: DAE3 Sn304

-Phantom: SAM 2; ; Serial: TP1004

-Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**Tilt Mid/Area Scan (111x61x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.379 mW/g

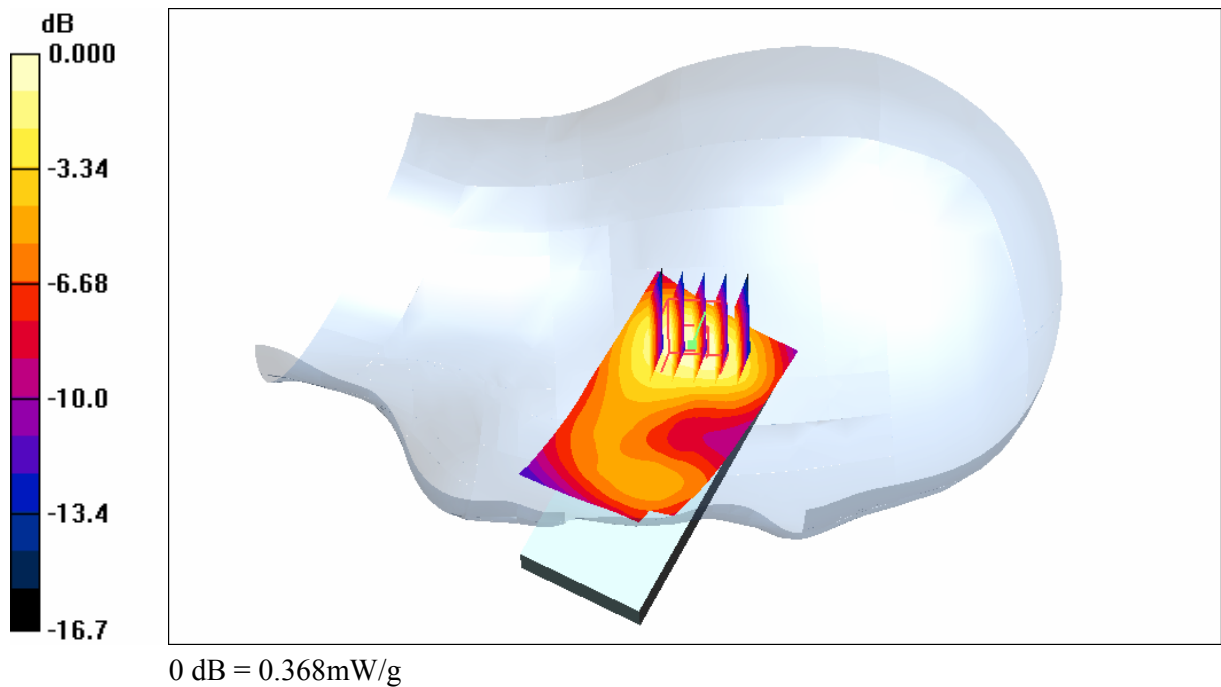
**Tilt Mid/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 14.6 V/m; Power Drift = 0.001 dB

Peak SAR (extrapolated) = 0.517 W/kg

**SAR(1 g) = 0.34 mW/g; SAR(10 g) = 0.20 mW/g**

Maximum value of SAR (measured) = 0.368 mW/g



**(d) SAR Distribution for EUT in GSM1900 mode measured against the left hand side phantom for the tilt phone position.**

Date/Time: 2008-02-03 17:13:55

-Communication System: GSM 1900; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3  
-Medium:  $f = 1900$  MHz;  $\sigma = 1.59$  mho/m;  $\epsilon_r = 51.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

-Probe: ES3DV3 - SN3113; ConvF(4.71, 4.71, 4.71)  
-Electronics: DAE3 Sn304  
-Phantom: SAM 2; ; Serial: TP1004  
-Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**Back 15mm Ch810 BT/Area Scan 2 (121x61x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.890 mW/g

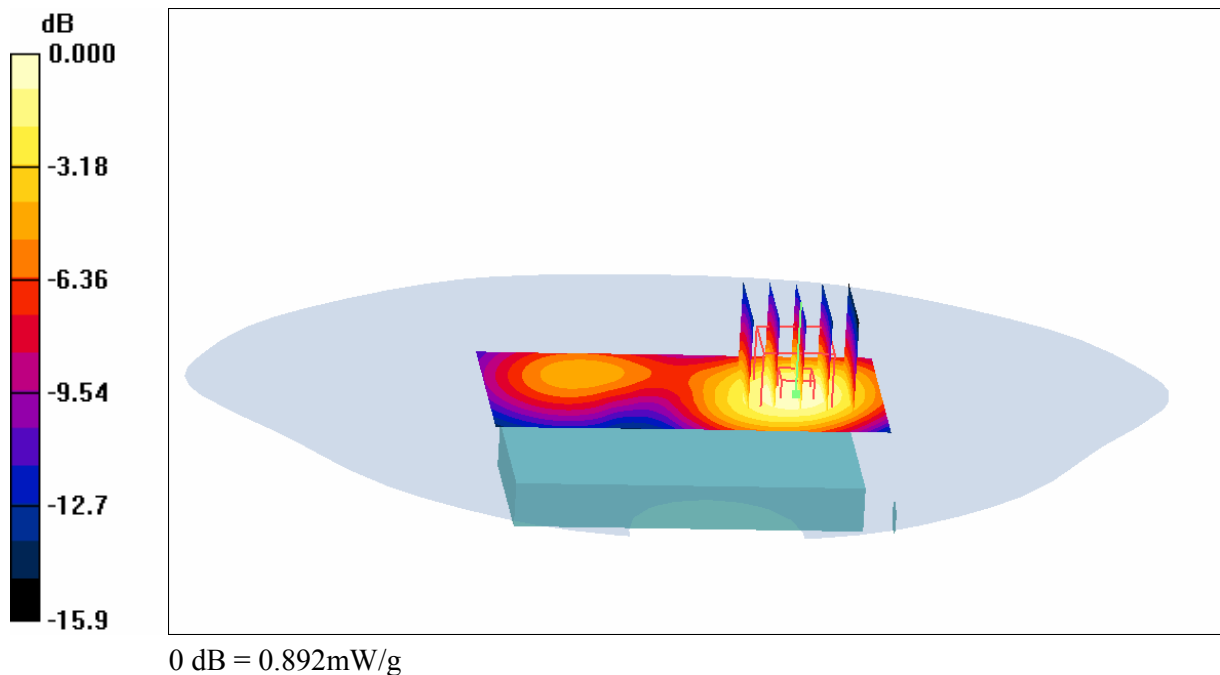
**Back 15mm Ch810 BT/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.9 V/m; Power Drift = 0.008 dB

Peak SAR (extrapolated) = 1.32 W/kg

**SAR(1 g) = 0.82 mW/g; SAR(10 g) = 0.49 mW/g**

Maximum value of SAR (measured) = 0.892 mW/g



**(e) Maximum SAR Distribution for EUT in GSM1900 mode measured with the back of the phone facing the flat section of phantom.**

Date/Time: 2008-02-04 11:19:35

-Communication System: GPRS 1900 (2Tx); Frequency: 1909.8 MHz; Duty Cycle: 1:4.15  
 -Medium:  $f = 1900$  MHz;  $\sigma = 1.59$  mho/m;  $\epsilon_r = 51.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

-Probe: ES3DV3 - SN3113; ConvF(4.71, 4.71, 4.71)  
 -Electronics: DAE3 Sn304  
 -Phantom: SAM 2; ; Serial: TP1004  
 -Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**Back 15mm Ch810 Bluetooth/Area Scan 2 (121x61x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 1.58 mW/g

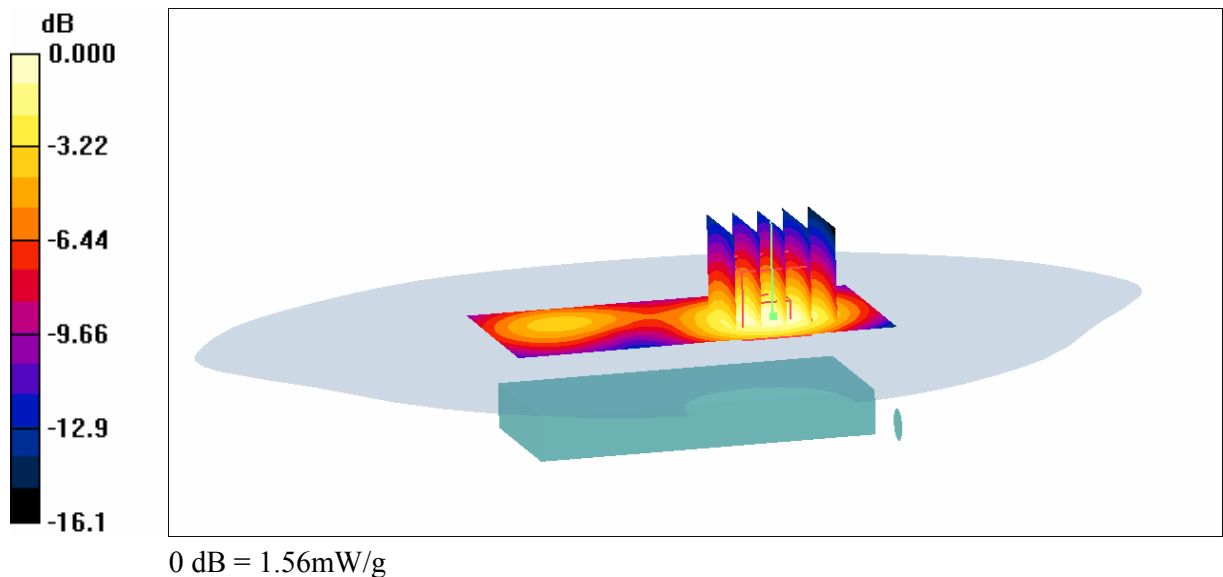
**Back 15mm Ch810 Bluetooth/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 17.2 V/m; Power Drift = -0.028 dB

Peak SAR (extrapolated) = 2.32 W/kg

**SAR(1 g) = 1.44 mW/g; SAR(10 g) = 0.86 mW/g**

Maximum value of SAR (measured) = 1.56 mW/g



(f) Maximum SAR Distribution for EUT in GPRS(2Tx)1900 mode measured with the back of the phone facing the flat section of phantom.

## APPENDIX E: Probe calibration parameters for ES3DV3, S/N: 3113

### Diode compression:

| Parameter | Value in mV |
|-----------|-------------|
| DCP X     | 97          |
| DCP Y     | 97          |
| DCP Z     | 96          |

### Sensitivity in free space:

| Parameter | Value in $\mu\text{V}/(\text{V/m})^2$ |
|-----------|---------------------------------------|
| Norm X    | 1.18                                  |
| Norm Y    | 1.12                                  |
| Norm Z    | 1.27                                  |

### Sensitivity in tissue simulating liquid

Head      1900 MHz;  $\epsilon_r=40 \pm 5\%$ ,  $\sigma=1.40 \pm 5\%$  S/m.

| Parameter | Value |
|-----------|-------|
| ConvF X   | 4.83  |
| ConvF Y   | 4.83  |
| ConvF Z   | 4.83  |

Muscle      1900 MHz;  $\epsilon_r=53.3 \pm 5\%$ ,  $\sigma=1.52 \pm 5\%$  S/m.

| Parameter | Value |
|-----------|-------|
| ConvF X   | 4.71  |
| ConvF Y   | 4.71  |
| ConvF Z   | 4.71  |

**Probe tip to sensor center:**    2.0 mm