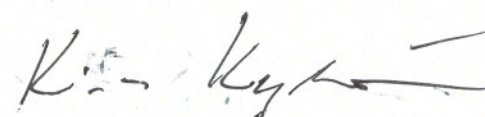


## SAR Compliance Test Report

|                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                         |                                                                                                           |
|--------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----------------------------------------------------------------------------------------------------------|
| Test report no.:                                 | Oulu_SAR_0507_02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Date of report:         | 2005-03-02                                                                                                |
| Template version:                                | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Number of pages:        | 36                                                                                                        |
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| Responsible test engineer:                       | Virpi Tuominen                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Product contact person: | Vivian Kill                                                                                               |
| Measurements made by:                            | Janne Hirsimäki, Virpi Tuominen                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                         |                                                                                                           |
| Tested device:                                   | RM-94                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                         |                                                                                                           |
| FCC ID:                                          | PPIRM-94                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | IC:                     | 661U-RM94                                                                                                 |
| Supplement reports:                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                         |                                                                                                           |
| Testing has been carried out in accordance with: | <p><b>47CFR §2.1093</b><br/>Radiofrequency Radiation Exposure Evaluation: Portable Devices</p> <p><b>FCC OET Bulletin 65 (Edition 97-01), Supplement C (Edition 01-01)</b><br/>Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields</p> <p><b>RSS-102</b><br/>Evaluation Procedure for Mobile and Portable Radio Transmitters with Respect to Health Canada's Safety Code 6 for Exposure of Humans to Radio Frequency Fields</p> <p><b>IEEE 1528 - 2003</b><br/>IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques</p> |                         |                                                                                                           |
| Documentation:                                   | The documentation of the testing performed on the tested devices is archived for 15 years at TCC Nokia.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                         |                                                                                                           |
| Test results:                                    | The tested device complies with the requirements in respect of all parameters subject to the test. The test results and statements relate only to the items tested. The test report shall not be reproduced except in full, without written approval of the laboratory.                                                                                                                                                                                                                                                                                                                                                                                                                               |                         |                                                                                                           |

Date and signatures:  
For the contents:

2005-03-02



Kirsi Kyllönen  
Laboratory Engineer

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## 1. SUMMARY OF SAR TEST REPORT

### 1.1 Test Details

|                                        |                                                        |
|----------------------------------------|--------------------------------------------------------|
| Period of test                         | 2005-01-31 to 2005-02-02                               |
| SN, HW and SW numbers of tested device | SN: 004400/59/170109/7, HW: 3055, SW: 3.71, DUT: 10368 |
| Batteries used in testing              | BL-5B, DUT: 10370, 10371                               |
| Headsets used in testing               | HS-2R DUT: 10372                                       |
| Other accessories used in testing      |                                                        |
| State of sample                        | Prototype Unit                                         |
| Notes                                  |                                                        |

### 1.2 Maximum Results

The maximum measured SAR values for Head configuration and Body Worn configuration are given in section 1.2.1 and 1.2.2 respectively. The device conforms to the requirements of the standard(s) when the maximum measured SAR value is less than or equal to the limit.

#### 1.2.1 Head Configuration

| Mode             | Ch / f (MHz) | Radiated power | Position   | SAR limit (1g avg) | Measured SAR value (1g avg) | Result        |
|------------------|--------------|----------------|------------|--------------------|-----------------------------|---------------|
| 2-SLOT GPRS 1900 | 810/1909.8   | 28.2 dBm EIRP  | Left Cheek | 1.6 W/kg           | 0.69 W/kg                   | <b>PASSED</b> |

#### 1.2.2 Body Worn Configuration

| Mode             | Ch / f (MHz) | Radiated power | Separation distance | SAR limit (1g avg) | Measured SAR value (1g avg) | Result        |
|------------------|--------------|----------------|---------------------|--------------------|-----------------------------|---------------|
| 2-SLOT GPRS 1900 | 810/1909.8   | 28.2 dBm EIRP  | 2.2 cm              | 1.6 W/kg           | 1.04 W/kg                   | <b>PASSED</b> |

#### 1.2.3 Maximum Drift

|                                   |         |
|-----------------------------------|---------|
| Maximum drift during measurements | -0.2 dB |
|-----------------------------------|---------|

#### 1.2.4 Measurement Uncertainty

|                                |          |
|--------------------------------|----------|
| Extended Uncertainty (k=2) 95% | ± 29.8 % |
|--------------------------------|----------|

## 2. DESCRIPTION OF THE DEVICE UNDER TEST

|                      |                                 |
|----------------------|---------------------------------|
| Device category      | portable                        |
| Exposure environment | general population/uncontrolled |

|                                   |             |            |            |             |
|-----------------------------------|-------------|------------|------------|-------------|
| Modes and Bands of Operation      | GSM 1900    | GPRS 1900  | EGPRS 1900 | BT          |
| Modulation Mode                   | GMSK        | GMSK       | 8PSK       | GFSK        |
| Duty Cycle                        | 1/8         | 1/8 or 2/8 | 1/8 or 2/8 |             |
| Transmitter Frequency Range (MHz) | 1850 - 1909 | 1850-1909  | 1850-1909  | 2402 – 2480 |

Outside of USA and Canada, the transmitter is capable of operating also in GSM900 and GSM1800, which are not part of this filing.

This device has Push-to-Talk/Voice-over-IP capability for use at the ear. Therefore, SAR for 2-slot GPRS mode was also evaluated against the head profile of the phantom.

### 2.1 Picture of the Device



### 2.2 Description of the Antenna

The device has an internal patch antenna.

### 3. TEST CONDITIONS

#### 3.1 Temperature and Humidity

|                           |              |
|---------------------------|--------------|
| Ambient temperature (°C): | 22.1 to 22.3 |
| Ambient humidity (RH %):  | 35.4 to 35.9 |

#### 3.2 Test Signal, Frequencies and Output Power

The device was put into operation by using a call tester. Communication between the device and the call tester was established by air link.

The device output power was set to maximum power level for all tests; a fully charged battery was used for every test sequence.

In all operating bands the measurements were performed on lowest, middle and highest channels.

The radiated output power of the device was measured by a separate test laboratory on the same unit as used for SAR testing.

### 4. DESCRIPTION OF THE TEST EQUIPMENT

#### 4.1 Measurement System and Components

The measurements were performed using an automated near-field scanning system, DASY4 software version 4.4, manufactured by Schmid & Partner Engineering AG (SPEAG) in Switzerland. The SAR extrapolation algorithm used in all measurements on the device was the 'worst-case extrapolation' algorithm.

The following table lists calibration dates of SPEAG components:

| Test Equipment                 | Serial Number | Calibration interval | Calibration expiry |
|--------------------------------|---------------|----------------------|--------------------|
| DAE V1                         | 372           | 12 months            | 2005-08            |
| E-field Probe ET3DV6           | 1395          | 12 months            | 2005-08            |
| Dipole Validation Kit, D1900V2 | 5d013         | 24 months            | 2006-07            |

Additional test equipment used in testing:

| Test Equipment          | Model        | Serial Number | Calibration interval | Calibration expiry |
|-------------------------|--------------|---------------|----------------------|--------------------|
| Signal Generator        | SML03        | 101265        | 12 months            | 2005-09            |
| Amplifier               | ZHL-42 (SMA) | N072095-5     | 12 months            | 2005-07            |
| Power Meter             | NRVS         | 849305/028    | 12 months            | 2005-07            |
| Power Sensor            | NRV-Z32      | 839176/020    | 12 months            | 2005-07            |
| Call Tester             | CMU 200      | 101111        | 12 months            | 2005-09            |
| Call Tester             | CMU 200      | 104983        | 12 months            | 2005-04            |
| Vector Network Analyzer | 8753E        | US38432928    | 12 months            | 2005-10            |
| Dielectric Probe Kit    | 85070B       | US33020420    | -                    | -                  |

#### 4.1.1 Isotropic E-field Probe SN: 1395

|                                  |                                                                                                                                                                                                                              |
|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <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, e.g., butyl diglycol) |
| <b>Calibration</b>               | Calibration certificate in Appendix C                                                                                                                                                                                        |
| <b>Frequency</b>                 | 10 MHz to 3 GHz (dosimetry); Linearity: $\pm 0.2$ dB (30 MHz to 3 GHz)                                                                                                                                                       |
| <b>Optical Surface Detection</b> | $\pm 0.2$ mm repeatability in air and clear liquids over diffuse reflecting surfaces                                                                                                                                         |
| <b>Directivity</b>               | $\pm 0.2$ dB in HSL (rotation around probe axis)<br>$\pm 0.4$ dB in HSL (rotation normal to probe axis)                                                                                                                      |
| <b>Dynamic Range</b>             | 5 $\mu$ W/g to > 100 mW/g; Linearity: $\pm 0.2$ dB                                                                                                                                                                           |
| <b>Dimensions</b>                | Overall length: 330 mm<br>Tip length: 16 mm<br>Body diameter: 12 mm<br>Tip diameter: 6.8 mm                                                                                                                                  |
| <b>Application</b>               | Distance from probe tip to dipole centers: 2.7 mm<br>General dosimetry up to 3 GHz<br>Compliance tests of mobile phones<br>Fast automatic scanning in arbitrary phantoms                                                     |

## 4.2 Phantoms

The phantom used for all tests i.e. for both system checking and device testing, was the twin-headed "SAM Phantom", manufactured by SPEAG. The phantom conforms to the requirements of IEEE 1528 - 2003.

System checking was performed using the flat section, whilst Head SAR tests used the left and right head profile sections. Body SAR testing also used the flat section between the head profiles.

The SPEAG device holder (see Section 5.1) was used to position the device in all tests whilst a tripod was used to position the validation dipoles against the flat section of phantom.

## 4.3 Tissue Simulants

Recommended values for the dielectric parameters of the tissue simulants are given in IEEE 1528 - 2003 and FCC Supplement C to OET Bulletin 65. All tests were carried out using simulants whose dielectric parameters were within  $\pm 5\%$  of the recommended values. All tests were carried out within 24 hours of measuring the dielectric parameters.

The depth of the tissue simulant was  $15.0 \pm 0.5$  cm measured from the ear reference point during system checking and device measurements.

### 4.3.1 Tissue Simulant Recipes

The following recipes were used for Head and Body tissue simulants:

| 1900MHz band    |                       |                       |
|-----------------|-----------------------|-----------------------|
| Ingredient      | Head<br>(% by weight) | Body<br>(% by weight) |
| Deionised Water | 54.88                 | 69.02                 |
| Butyl Diglycol  | 44.91                 | 30.76                 |
| Salt            | 0.21                  | 0.22                  |

### 4.3.2 System Checking

The manufacturer calibrates the probes annually. Dielectric parameters of the tissue simulants were measured every day using the dielectric probe kit and the network analyser. A system check measurement was made following the determination of the dielectric parameters of the simulant, using the dipole validation kit. A power level of 250 mW was supplied to the dipole

antenna, which was placed under the flat section of the twin SAM phantom. The system checking results (dielectric parameters and SAR values) are given in the table below.

#### System checking, head tissue simulant

| $f$ [MHz] | Description       | SAR [W/kg],<br>1g | Dielectric Parameters |                | Temp<br>[°C] |
|-----------|-------------------|-------------------|-----------------------|----------------|--------------|
|           |                   |                   | $\epsilon_r$          | $\sigma$ [S/m] |              |
| 1900      | Reference result  | 10.0              | 39.4                  | 1.44           |              |
|           | $\pm 10\%$ window | 9.0 - 11.0        |                       |                |              |
|           | 2005-02-02        | 10.3              | 38.3                  | 1.37           | 21.8         |

#### System checking, body tissue simulant

| $f$ [MHz] | Description       | SAR [W/kg],<br>1g | Dielectric Parameters |                | Temp<br>[°C] |
|-----------|-------------------|-------------------|-----------------------|----------------|--------------|
|           |                   |                   | $\epsilon_r$          | $\sigma$ [S/m] |              |
| 1900      | Reference result  | 10.4              | 52.2                  | 1.58           |              |
|           | $\pm 10\%$ window | 9.36 - 11.4       |                       |                |              |
|           | 2005-01-31        | 10.3              | 52.3                  | 1.53           | 22.0         |

Plots of the system checking scans are given in Appendix A.

#### 4.3.3 Tissue Simulants used in the Measurements

##### Head tissue simulant measurements

| $f$ [MHz] | Description       | Dielectric Parameters |                | Temp<br>[°C] |
|-----------|-------------------|-----------------------|----------------|--------------|
|           |                   | $\epsilon_r$          | $\sigma$ [S/m] |              |
| 1880      | Recommended value | 40.0                  | 1.40           |              |
|           | $\pm 5\%$ window  | 38.0 – 42.0           | 1.33 – 1.47    |              |
|           | 2005-02-02        | 38.4                  | 1.35           | 21           |

##### Body tissue simulant measurements

| $f$ [MHz] | Description       | Dielectric Parameters |                | Temp<br>[°C] |
|-----------|-------------------|-----------------------|----------------|--------------|
|           |                   | $\epsilon_r$          | $\sigma$ [S/m] |              |
| 1880      | Recommended value | 53.3                  | 1.52           |              |
|           | $\pm 5\%$ window  | 50.6 – 56.0           | 1.44 – 1.60    |              |
|           | 2005-01-31        | 52.4                  | 1.51           | 21           |

---

## 5. DESCRIPTION OF THE TEST PROCEDURE

### 5.1 Device Holder

The device was placed in the device holder (illustrated below) that is supplied by SPEAG as an integral part of the Dasy system.



Device holder supplied by SPEAG

A Nokia designed spacer (illustrated below) was used to position the device within the SPEAG holder. The spacer positions the device so that the holder has minimal effect on the test results but still holds the device securely. The spacer was removed before the tests.



Nokia spacer

### 5.2 Test Positions

#### 5.2.1 Against Phantom Head

Measurements were made in “cheek” and “tilt” positions on both the left hand and right hand sides of the phantom.

The positions used in the measurements were according to IEEE 1528 - 2003 "IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques".



Photo of the device in "cheek" position



Photo of the device in "tilt" position

### 5.2.2 Body Worn Configuration

The device was placed in the SPEAG holder using the Nokia spacer and placed below the flat section of the phantom. The distance between the device and the phantom was kept at the separation distance indicated in the photo below using a separate flat spacer that was removed before the start of the measurements. The device was oriented with its antenna facing the phantom since this orientation gives higher results.



Photo of the device positioned for Body SAR measurement.  
The spacer was removed for the tests.

### 5.3 Scan Procedures

First, area scans were used for determination of the field distribution. Next, a zoom scan, a minimum of 5x5x7 points covering a volume of at least 30x30x30mm, was performed around the highest E-field value to determine the averaged SAR value. Drift was determined by measuring the same point at the start of the area scan and again at the end of the zoom scan.

### 5.4 SAR Averaging Methods

The maximum SAR value was averaged over a cube of tissue using interpolation and extrapolation.

The interpolation, extrapolation and maximum search routines within Dasy4 are all based on the modified Quadratic Shepard's method (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).

The interpolation scheme combines a least-square fitted function method with a weighted average method. A trivariate 3-D / bivariate 2-D quadratic function is computed for each measurement point and fitted to neighbouring points by a least-square method. For the zoom scan, inverse distance weighting is incorporated to fit distant points more accurately. The interpolating function is finally calculated as a weighted average of the quadratics.

In the zoom scan, the interpolation function is used to extrapolate the Peak SAR from the deepest measurement points to the inner surface of the phantom.

## 6. MEASUREMENT UNCERTAINTY

Table 6.1 – Measurement uncertainty evaluation

| Uncertainty Component                                                           | Section in IEEE 1528 | Tol. (%)   | Prob Dist | Div        | $G_i$           | $G_i \cdot U_i$ (%) | $V_i$    |
|---------------------------------------------------------------------------------|----------------------|------------|-----------|------------|-----------------|---------------------|----------|
| <b>Measurement System</b>                                                       |                      |            |           |            |                 |                     |          |
| Probe Calibration                                                               | E2.1                 | $\pm 5.8$  | N         | 1          | 1               | $\pm 5.8$           | $\infty$ |
| Axial Isotropy                                                                  | E2.2                 | $\pm 4.7$  | R         | $\sqrt{3}$ | $(1-c_p)^{1/2}$ | $\pm 1.9$           | $\infty$ |
| Hemispherical Isotropy                                                          | E2.2                 | $\pm 9.6$  | R         | $\sqrt{3}$ | $(c_p)^{1/2}$   | $\pm 3.9$           | $\infty$ |
| Boundary Effect                                                                 | E2.3                 | $\pm 8.3$  | R         | $\sqrt{3}$ | 1               | $\pm 4.8$           | $\infty$ |
| Linearity                                                                       | E2.4                 | $\pm 4.7$  | R         | $\sqrt{3}$ | 1               | $\pm 2.7$           | $\infty$ |
| System Detection Limits                                                         | E2.5                 | $\pm 1.0$  | R         | $\sqrt{3}$ | 1               | $\pm 0.6$           | $\infty$ |
| Readout Electronics                                                             | E2.6                 | $\pm 1.0$  | N         | 1          | 1               | $\pm 1.0$           | $\infty$ |
| Response Time                                                                   | E2.7                 | $\pm 0.8$  | R         | $\sqrt{3}$ | 1               | $\pm 0.5$           | $\infty$ |
| Integration Time                                                                | E2.8                 | $\pm 2.6$  | R         | $\sqrt{3}$ | 1               | $\pm 1.5$           | $\infty$ |
| RF Ambient Conditions - Noise                                                   | E6.1                 | $\pm 3.0$  | R         | $\sqrt{3}$ | 1               | $\pm 1.7$           | $\infty$ |
| RF Ambient Conditions - Reflections                                             | E6.1                 | $\pm 3.0$  | R         | $\sqrt{3}$ | 1               | $\pm 1.7$           | $\infty$ |
| Probe Positioner Mechanical Tolerance                                           | E6.2                 | $\pm 0.4$  | R         | $\sqrt{3}$ | 1               | $\pm 0.2$           | $\infty$ |
| Probe Positioning with respect to Phantom Shell                                 | E6.3                 | $\pm 2.9$  | R         | $\sqrt{3}$ | 1               | $\pm 1.7$           | $\infty$ |
| Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation | E5.2                 | $\pm 3.9$  | R         | $\sqrt{3}$ | 1               | $\pm 2.3$           | $\infty$ |
| <b>Test sample Related</b>                                                      |                      |            |           |            |                 |                     |          |
| Test Sample Positioning                                                         | E4.2.1               | $\pm 6.0$  | N         | 1          | 1               | $\pm 6.0$           | 11       |
| Device Holder Uncertainty                                                       | E4.1.1               | $\pm 5.0$  | N         | 1          | 1               | $\pm 5.0$           | 7        |
| Output Power Variation - SAR drift measurement                                  | 6.6.3                | $\pm 10.0$ | R         | $\sqrt{3}$ | 1               | $\pm 5.8$           | $\infty$ |
| <b>Phantom and Tissue Parameters</b>                                            |                      |            |           |            |                 |                     |          |
| Phantom Uncertainty (shape and thickness tolerances)                            | E3.1                 | $\pm 4.0$  | R         | $\sqrt{3}$ | 1               | $\pm 2.3$           | $\infty$ |
| Conductivity Target - tolerance                                                 | E3.2                 | $\pm 5.0$  | R         | $\sqrt{3}$ | 0.64            | $\pm 1.8$           | $\infty$ |
| Conductivity - measurement uncertainty                                          | E3.3                 | $\pm 5.5$  | N         | 1          | 0.64            | $\pm 3.5$           | 5        |
| Permittivity Target - tolerance                                                 | E3.2                 | $\pm 5.0$  | R         | $\sqrt{3}$ | 0.6             | $\pm 1.7$           | $\infty$ |
| Permittivity - measurement uncertainty                                          | E3.3                 | $\pm 2.9$  | N         | 1          | 0.6             | $\pm 1.7$           | 5        |
| <b>Combined Standard Uncertainty</b>                                            |                      |            | RSS       |            |                 | $\pm 14.9$          | 206      |
| <b>Coverage Factor for 95%</b>                                                  |                      |            | k=2       |            |                 |                     |          |
| <b>Expanded Standard Uncertainty</b>                                            |                      |            |           |            |                 | $\pm 29.8$          |          |

## 7. RESULTS

The measured Head SAR values for the test device are tabulated below:

**1900 Head SAR results**

| Position               |       | SAR, averaged over 1g (W/kg) |                      |                      |
|------------------------|-------|------------------------------|----------------------|----------------------|
|                        |       | Ch 512<br>1850.2 MHz         | Ch 661<br>1880.0 MHz | Ch 810<br>1909.8 MHz |
| 2-slot GPRS 1900 EIRP  |       | 29.0 dBm                     | 26.8 dBm             | 28.2 dBm             |
| Left                   | Cheek | 0.55                         | 0.57                 | 0.69                 |
|                        | Tilt  |                              | 0.37                 |                      |
| Right                  | Cheek |                              | 0.45                 |                      |
|                        | Tilt  |                              | 0.33                 |                      |
| Left cheek, BT active  |       |                              |                      | 0.65                 |
| GSM 1900 EIRP          |       | 31.2 dBm                     | 28.9 dBm             | 30.1 dBm             |
| Left cheek             |       | 0.51                         | 0.49                 | 0.55                 |
| 2-slot EGPRS 1900 EIRP |       | 27.4 dBm                     | 26.6 dBm             | 27.8 dBm             |
| Left cheek             |       | 0.27                         | 0.28                 | 0.32                 |

The measured Body SAR values for the test device are tabulated below:

**1900 Body SAR results**

| Body-worn location setup            | SAR, averaged over 1g (W/kg) |                      |                      |
|-------------------------------------|------------------------------|----------------------|----------------------|
|                                     | Ch 512<br>1850.2 MHz         | Ch 661<br>1880.0 MHz | Ch 810<br>1909.8 MHz |
| 2-slot GPRS 1900 EIRP               | 29.0 dBm                     | 26.8 dBm             | 28.2 dBm             |
| Without headset                     | 0.64                         | 0.72                 | 0.92                 |
| Headset HS-2R                       | 0.74                         | 0.79                 | 0.92                 |
| With headset HS-2R Bluetooth active |                              |                      | 1.04                 |
| GSM 1900 EIRP                       | 31.2 dBm                     | 28.9 dBm             | 30.1 dBm             |
| Without headset                     | 0.56                         | 0.69                 | 0.76                 |

Plots of the Measurement scans are given in Appendix B.

---

## APPENDIX A: SYSTEM CHECKING SCANS

Date/Time: 02/02/05 09:29:04

Test Laboratory: TCC Nokia

**DUT: Dipole 1900 MHz; Serial: D1900V2 - SN:5d013**

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1;  $t=21.8$  C

Medium: HSL1900 Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.37$  mho/m;  $\epsilon_r = 38.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1395; ConvF(4.93, 4.93, 4.93); Calibrated: 26.08.2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn372; Calibrated: 19.08.2004
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130

**d=15mm, Pin=250mW, t=21.8 C/Area Scan (61x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 12 mW/g

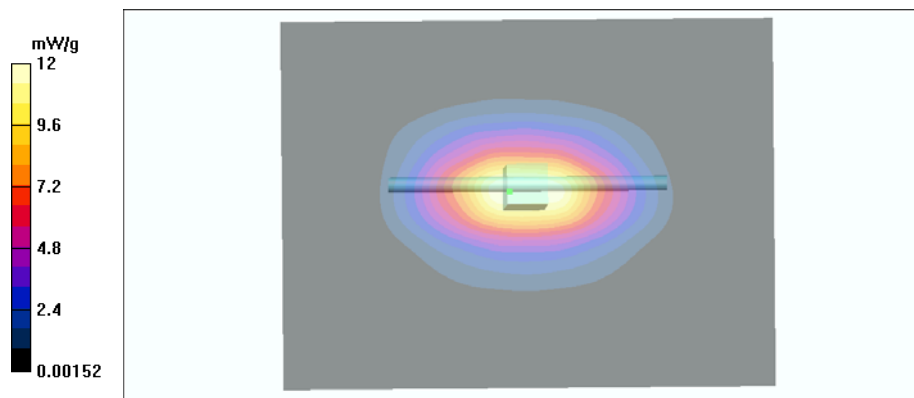
**d=15mm, Pin=250mW, t=21.8 C/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 97.6 V/m; Power Drift = -0.0 dB

Peak SAR (extrapolated) = 17.2 W/kg

**SAR(1 g) = 10.3 mW/g; SAR(10 g) = 5.47 mW/g**

Maximum value of SAR (measured) = 11.7 mW/g



Date/Time: 01/31/05 15:21:47

Test Laboratory: TCC Nokia

**DUT: Dipole 1900 MHz; Serial: D1900V2 - SN:5d013**

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1; t = 22.0

Medium: BSL1900 Medium parameters used: f = 1900 MHz;  $\sigma = 1.53$  mho/m;  $\epsilon_r = 52.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1395; ConvF(4.38, 4.38, 4.38); Calibrated: 26.08.2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn372; Calibrated: 19.08.2004
- Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1179
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130

**d=15mm, Pin=250mW, t=22.0 C/Area Scan (61x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 12 mW/g

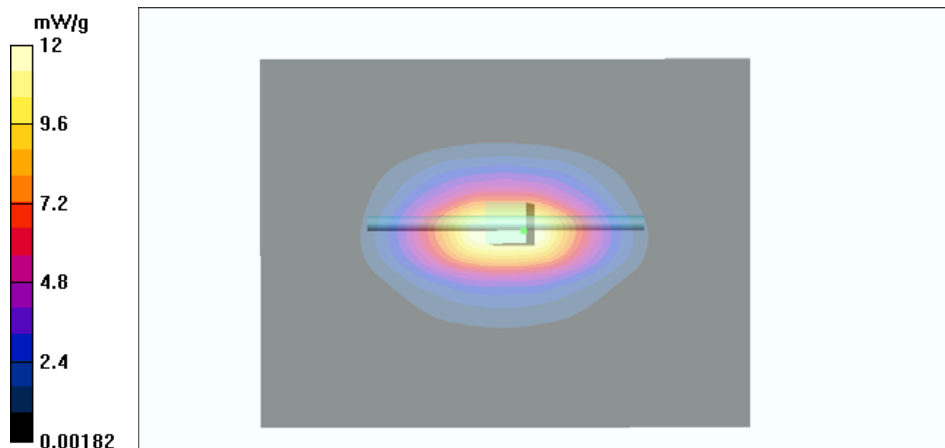
**d=15mm, Pin=250mW, t=22.0 C/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 92.7 V/m; Power Drift = -0.0 dB

Peak SAR (extrapolated) = 17.2 W/kg

**SAR(1 g) = 10.3 mW/g; SAR(10 g) = 5.5 mW/g**

Maximum value of SAR (measured) = 11.8 mW/g



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## APPENDIX B: MEASUREMENT SCANS

Date/Time: 02/02/05 17:45:59

Test Laboratory: TCC Nokia

**Type: RM-94; Serial: 004400/59/170109/7**

Communication System: GPRS1900; Frequency: 1909.8 MHz; Duty Cycle: 1:4.2,  $t = 20.0$  C

Medium: HSL1900 Medium parameters used (interpolated):  $f = 1909.8$  MHz;  $\sigma = 1.38$  mho/m;  $\epsilon_r = 38.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1395; ConvF(4.93, 4.93, 4.93); Calibrated: 26.08.2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn372; Calibrated: 19.08.2004
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130

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

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

Maximum value of SAR (interpolated) = 0.749 mW/g

**Cheek position/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=7.5$ mm,  $dy=7.5$ mm,  $dz=5$ mm

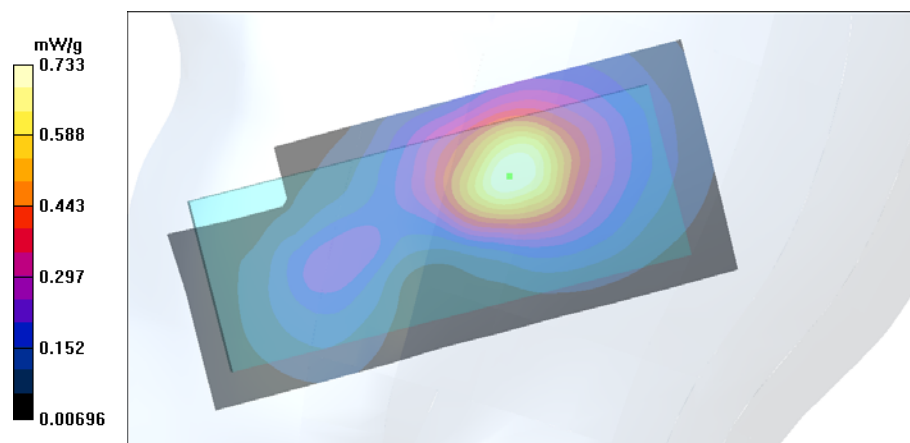
Reference Value = 15 V/m; Power Drift = -0.1 dB

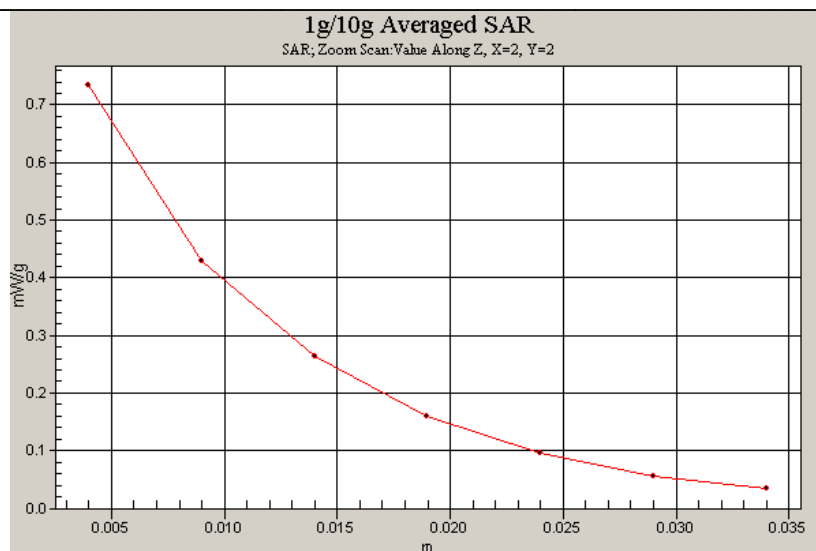
Peak SAR (extrapolated) = 1.39 W/kg

**SAR(1 g) = 0.691 mW/g; SAR(10 g) = 0.364 mW/g**

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

Maximum value of SAR (measured) = 0.733 mW/g





Date/Time: 02/02/05 10:56:44

Test Laboratory: TCC Nokia

**Type: RM-94; Serial: 004400/59/170109/7**

Communication System: GPRS1900; Frequency: 1880 MHz; Duty Cycle: 1:4.2;  $t = 20.8$

Medium: HSL1900 Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.35$  mho/m;  $\epsilon_r = 38.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1395; ConvF(4.93, 4.93, 4.93); Calibrated: 26.08.2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn372; Calibrated: 19.08.2004
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130

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

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

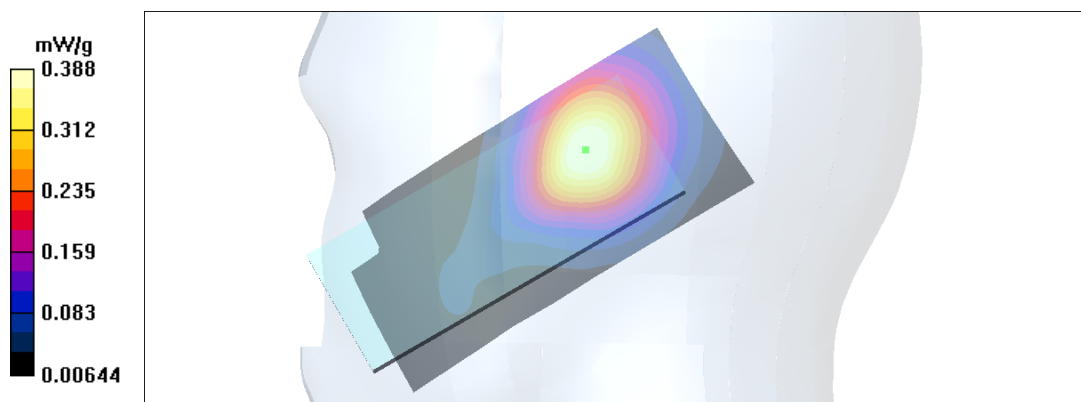
**Tilt position/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=7.5$ mm,  $dy=7.5$ mm,  $dz=5$ mm

Reference Value = 15.8 V/m; Power Drift = -0.2 dB

Peak SAR (extrapolated) = 0.703 W/kg

**SAR(1 g) = 0.369 mW/g; SAR(10 g) = 0.215 mW/g**

Maximum value of SAR (measured) = 0.388 mW/g



Date/Time: 02/02/05 11:28:28

Test Laboratory: TCC Nokia

**Type: RM-94; Serial: 004400/59/170109/7**

Communication System: GPRS1900; Frequency: 1880 MHz; Duty Cycle: 1:4.2;  $t = 20.7$  C

Medium: HSL1900 Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.35$  mho/m;  $\epsilon_r = 38.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1395; ConvF(4.93, 4.93, 4.93); Calibrated: 26.08.2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn372; Calibrated: 19.08.2004
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130

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

Maximum value of SAR (interpolated) = 0.505 mW/g

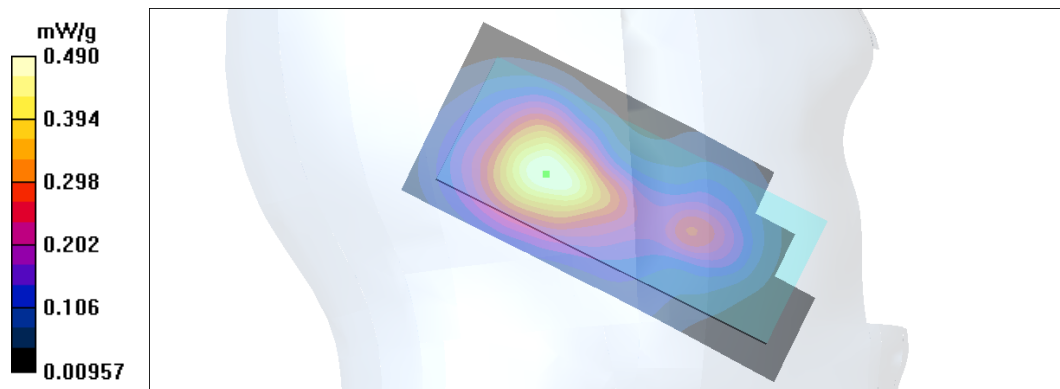
**Cheek position/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=7.5$ mm,  $dy=7.5$ mm,  $dz=5$ mm

Reference Value = 16.1 V/m; Power Drift = -0.1 dB

Peak SAR (extrapolated) = 0.822 W/kg

**SAR(1 g) = 0.454 mW/g; SAR(10 g) = 0.260 mW/g**

Maximum value of SAR (measured) = 0.490 mW/g



Date/Time: 02/02/05 11:50:18

Test Laboratory: TCC Nokia

**Type: RM-94 ; Serial: 004400/59/170109/7**

Communication System: GPRS1900; Frequency: 1880 MHz; Duty Cycle: 1:4.2;  $t_r = 20.5$  C

Medium: HSL1900 Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.35$  mho/m;  $\epsilon_r = 38.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1395; ConvF(4.93, 4.93, 4.93); Calibrated: 26.08.2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn372; Calibrated: 19.08.2004
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130

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

Maximum value of SAR (interpolated) = 0.364 mW/g

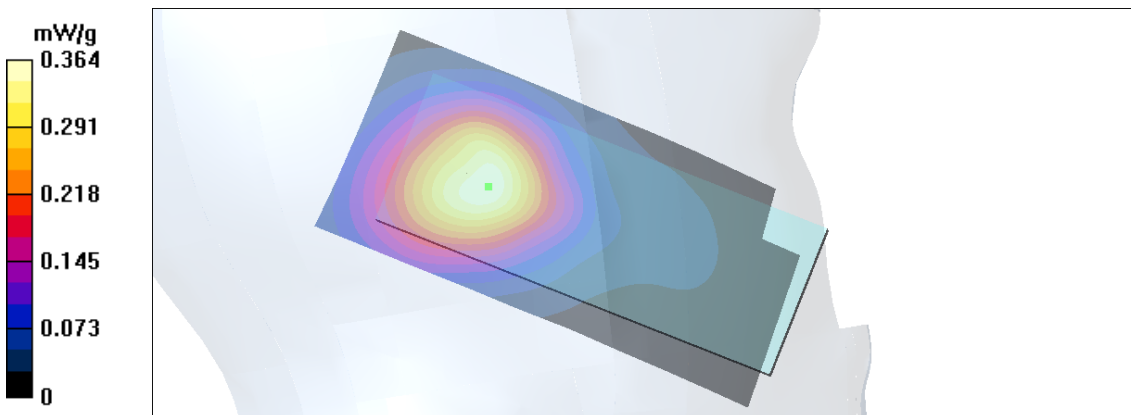
**Tilt position/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=7.5$ mm,  $dy=7.5$ mm,  $dz=5$ mm

Reference Value = 15.5 V/m; Power Drift = -0.2 dB

Peak SAR (extrapolated) = 0.574 W/kg

**SAR(1 g) = 0.325 mW/g; SAR(10 g) = 0.195 mW/g**

Maximum value of SAR (measured) = 0.344 mW/g



Date/Time: 02/02/05 13:48:27

Test Laboratory: TCC Nokia

**Type: RM-94 ; Serial: 004400/59/170109/7**

Communication System: GSM1900; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3;  $t = 19.8$  C

Medium: HSL1900 Medium parameters used (interpolated):  $f = 1909.8$  MHz;  $\sigma = 1.38$  mho/m;  $\epsilon_r = 38.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1395; ConvF(4.93, 4.93, 4.93); Calibrated: 26.08.2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn372; Calibrated: 19.08.2004
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130

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

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

Maximum value of SAR (interpolated) = 0.574 mW/g

**Cheek position/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=7.5$ mm,  $dy=7.5$ mm,  $dz=5$ mm

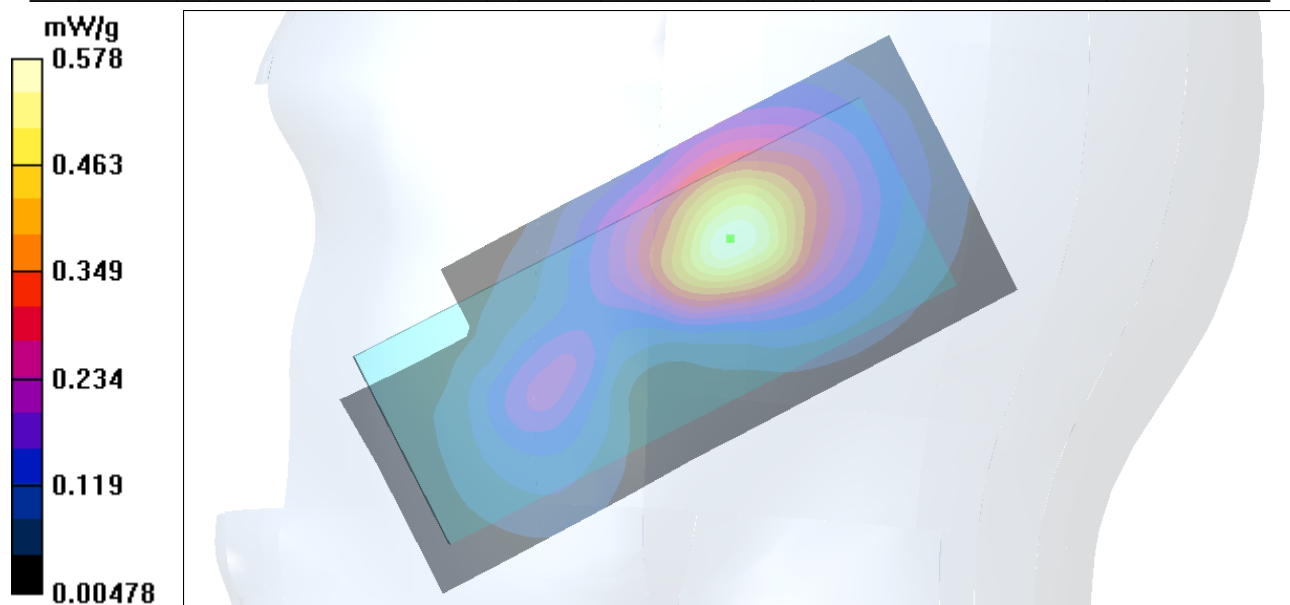
Reference Value = 14.4 V/m; Power Drift = -0.1 dB

Peak SAR (extrapolated) = 1.13 W/kg

**SAR(1 g) = 0.550 mW/g; SAR(10 g) = 0.291 mW/g**

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

Maximum value of SAR (measured) = 0.578 mW/g



Date/Time: 01/31/05 20:18:23

Test Laboratory: TCC Nokia

**Type:RM-94 ; Serial: 004400/59/170109/7; with headset HS-2R, bluetooth active**

Communication System: GPRS1900; Frequency: 1909.8 MHz;Duty Cycle: 1:4.2; t = 20.4 C

Medium: M1900 Medium parameters used (interpolated): f = 1909.8 MHz;  $\sigma = 1.55$  mho/m;  $\epsilon_r = 52.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1395; ConvF(4.38, 4.38, 4.38); Calibrated: 26.08.2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn372; Calibrated: 19.08.2004
- Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1179
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130

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

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

Maximum value of SAR (interpolated) = 1.17 mW/g

**Body Measurement/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

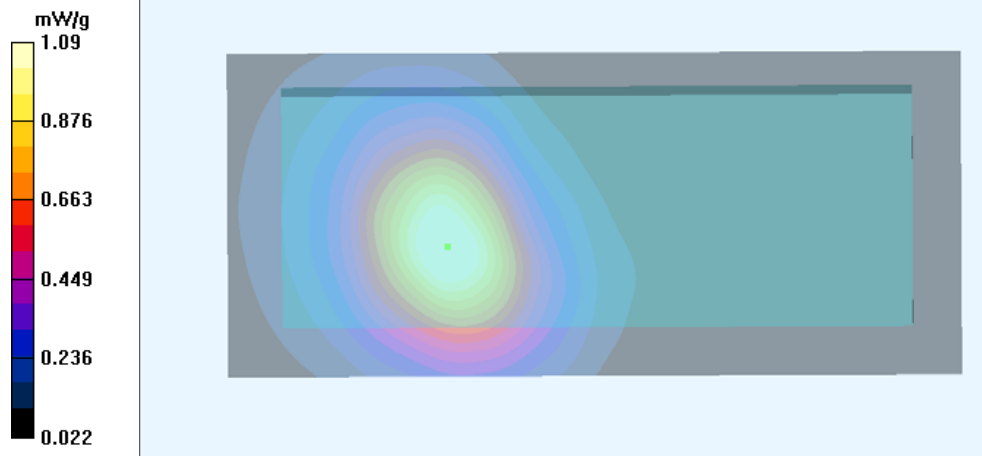
Reference Value = 21.1 V/m; Power Drift = -0.1 dB

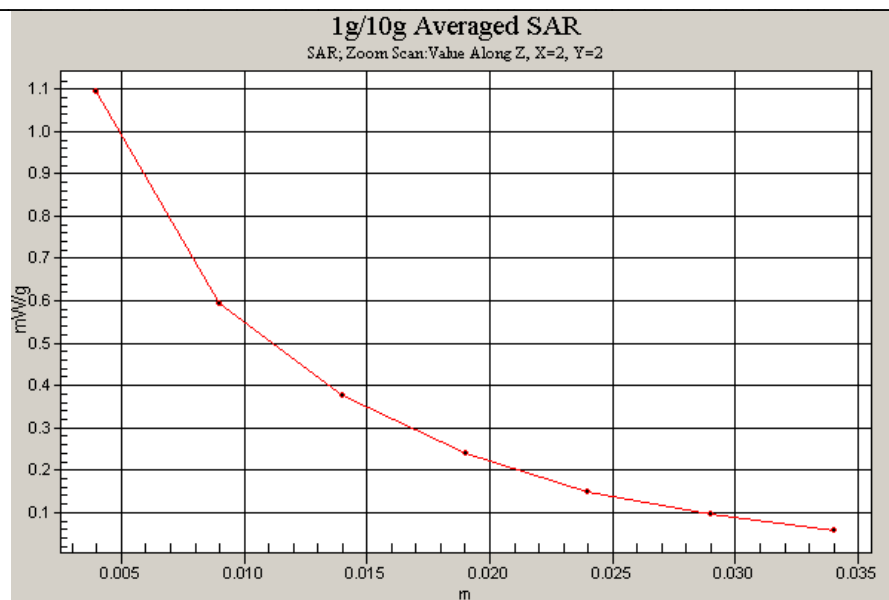
Peak SAR (extrapolated) = 2.29 W/kg

**SAR(1 g) = 1.04 mW/g; SAR(10 g) = 0.560 mW/g**

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

Maximum value of SAR (measured) = 1.09 mW/g





Date/Time: 01/31/05 18:37:21

Test Laboratory: TCC Nokia

**Type: RM-94 ; Serial: 004400/59/170109/7; without headset**

Communication System: GPRS1900; Frequency: 1909.8 MHz; Duty Cycle: 1:4.2;  $t = 20.7$  C

Medium: M1900 Medium parameters used (interpolated):  $f = 1909.8$  MHz;  $\sigma = 1.55$  mho/m;  $\epsilon_r = 52.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1395; ConvF(4.38, 4.38, 4.38); Calibrated: 26.08.2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn372; Calibrated: 19.08.2004
- Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1179
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130

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

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

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

**Body Measurement/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=7.5$ mm,  $dy=7.5$ mm,  $dz=5$ mm

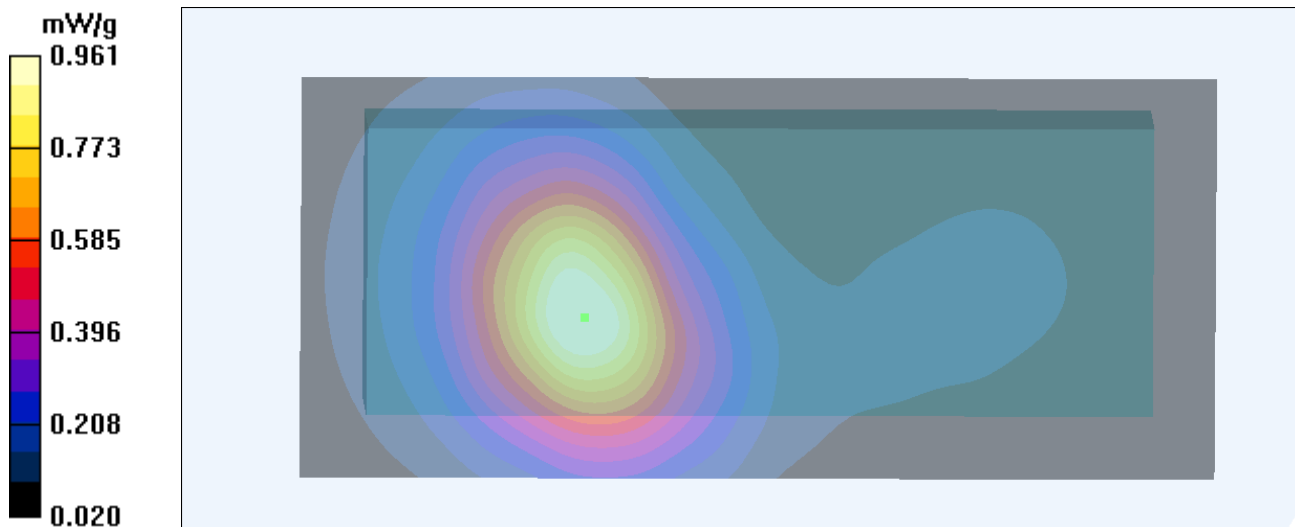
Reference Value = 19.1 V/m; Power Drift = -0.2 dB

Peak SAR (extrapolated) = 2.04 W/kg

**SAR(1 g) = 0.916 mW/g; SAR(10 g) = 0.496 mW/g**

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

Maximum value of SAR (measured) = 0.961 mW/g



Date/Time: 01/31/05 17:04:41

Test Laboratory: TCC Nokia

**Type: RM-94 ; Serial: 004400/59/170109/7; without headset**

Communication System: GSM1900; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3;  $t = 21.1$  C

Medium: M1900 Medium parameters used (interpolated):  $f = 1909.8$  MHz;  $\sigma = 1.55$  mho/m;  $\epsilon_r = 52.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1395; ConvF(4.38, 4.38, 4.38); Calibrated: 26.08.2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn372; Calibrated: 19.08.2004
- Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1179
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130

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

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

Maximum value of SAR (interpolated) = 0.823 mW/g

**Body Measurement/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=7.5$ mm,  $dy=7.5$ mm,  $dz=5$ mm

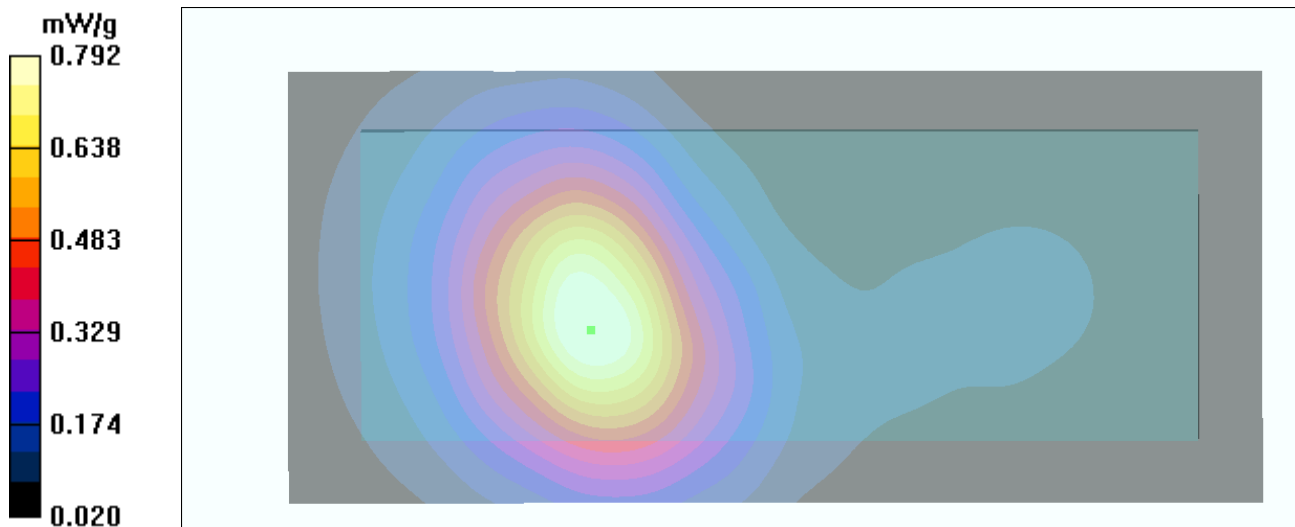
Reference Value = 17 V/m; Power Drift = -0.1 dB

Peak SAR (extrapolated) = 1.66 W/kg

**SAR(1 g) = 0.757 mW/g; SAR(10 g) = 0.411 mW/g**

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

Maximum value of SAR (measured) = 0.792 mW/g



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**APPENDIX C: RELEVANT PAGES FROM PROBE CALIBRATION REPORT(S)**

E-field Probe, SN: 1395  
See the next three pages

Client

Nokia Salo TCC

## CALIBRATION CERTIFICATE

Object(s) ET3DV6 - SN:1395

Calibration procedure(s) QA CAL-01.v2  
Calibration procedure for dosimetric E-field probes

Calibration date: August 26, 2004

Condition of the calibrated item In Tolerance (according to the specific calibration document)

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

All calibrations have been conducted in the closed laboratory facility: environment temperature 22 +/- 2 degrees Celsius and humidity < 75%.

Calibration Equipment used (M&TE critical for calibration)

| Model Type                        | ID #           | Cal Date (Calibrated by, Certificate No.) | Scheduled Calibration  |
|-----------------------------------|----------------|-------------------------------------------|------------------------|
| Power meter EPM E4419B            | GB41293874     | 5-May-04 (METAS, No 251-00388)            | May-05                 |
| Power sensor E4412A               | MY41495277     | 5-May-04 (METAS, No 251-00388)            | May-05                 |
| Reference 20 dB Attenuator        | SN: 5086 (20b) | 3-May-04 (METAS, No 251-00389)            | May-05                 |
| Fluke Process Calibrator Type 702 | SN: 6295803    | 8-Sep-03 (Sintrel SCS No. E030020)        | Sep-04                 |
| Power sensor HP 8481A             | MY41092180     | 18-Sep-02 (SPEAG, in house check Oct03)   | In house check: Oct 05 |
| RF generator HP 8684C             | US3642U01700   | 4-Aug-99 (SPEAG, in house check Aug02)    | In house check: Aug05  |
| Network Analyzer HP 8753E         | US37390585     | 18-Oct-01 (SPEAG, in house check Oct03)   | In house check: Oct 05 |

|                |               |                     |                                                                                       |
|----------------|---------------|---------------------|---------------------------------------------------------------------------------------|
|                | Name          | Function            | Signature                                                                             |
| Calibrated by: | Nico Vetterli | Technician          |  |
| Approved by:   | Katja Pokovic | Laboratory Director |  |

Date issued: August 26, 2004

This calibration certificate is issued as an intermediate solution until the accreditation process (based on ISO/IEC 17025 International Standard) for Calibration Laboratory of Schmid & Partner Engineering AG is completed.

DASY - Parameters of Probe: ET3DV6 SN:1395

| Sensitivity in Free Space |                                          | Diode Compression <sup>A</sup> |    |    |
|---------------------------|------------------------------------------|--------------------------------|----|----|
| NormX                     | 1.74 $\mu\text{V}/(\text{V}/\text{m})^2$ | DCP X                          | 92 | mV |
| NormY                     | 1.75 $\mu\text{V}/(\text{V}/\text{m})^2$ | DCP Y                          | 92 | mV |
| NormZ                     | 1.71 $\mu\text{V}/(\text{V}/\text{m})^2$ | DCP Z                          | 92 | mV |

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Plese see Page 7.

Boundary Effect

| Head                                      | 900 MHz                      | Typical SAR gradient: 5 % per mm |        |
|-------------------------------------------|------------------------------|----------------------------------|--------|
| Sensor Center to Phantom Surface Distance |                              | 3.7 mm                           | 4.7 mm |
| SAR <sub>ce</sub> [%]                     | Without Correction Algorithm | 10.2                             | 5.0    |
| SAR <sub>ce</sub> [%]                     | With Correction Algorithm    | 0.0                              | 0.1    |

| Head                                      | 1750 MHz                     | Typical SAR gradient: 10 % per mm |        |
|-------------------------------------------|------------------------------|-----------------------------------|--------|
| Sensor Center to Phantom Surface Distance |                              | 3.7 mm                            | 4.7 mm |
| SAR <sub>ce</sub> [%]                     | Without Correction Algorithm | 15.0                              | 9.7    |
| SAR <sub>ce</sub> [%]                     | With Correction Algorithm    | 0.1                               | 0.0    |

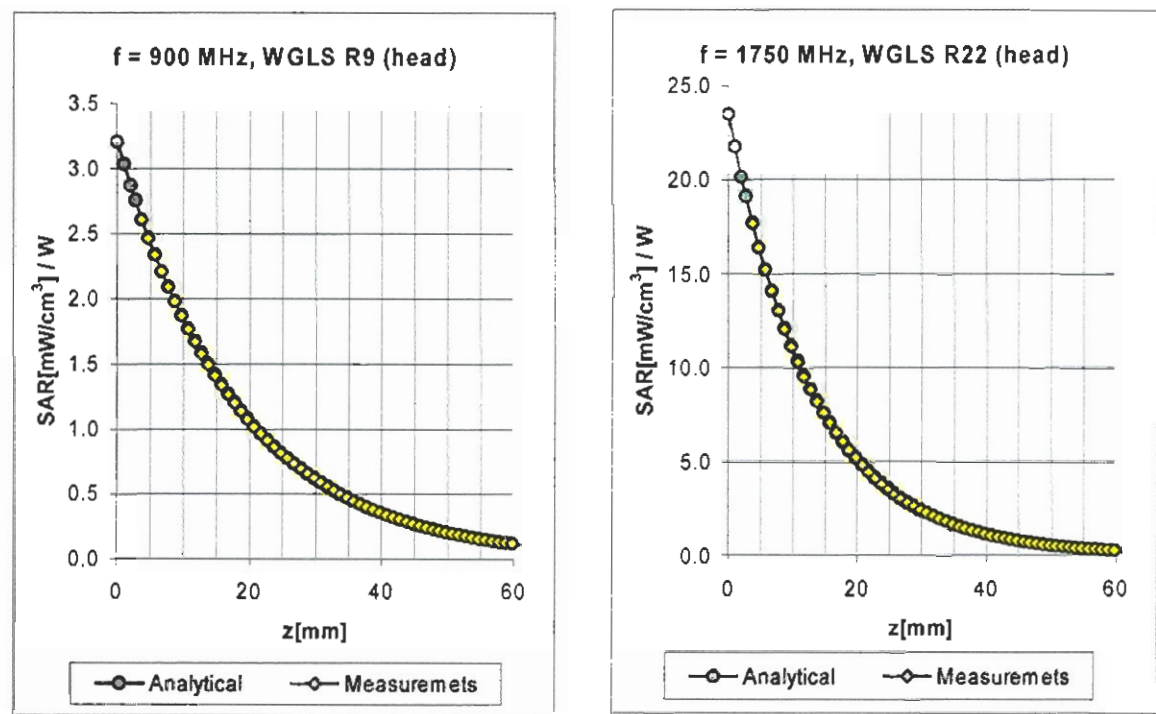
Sensor Offset

|                            |              |
|----------------------------|--------------|
| Probe Tip to Sensor Center | 2.7 mm       |
| Optical Surface Detection  | in tolerance |

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

<sup>A</sup> numerical linearization parameter: uncertainty not required

Conversion Factor Assessment



| f [MHz] | Validity [MHz] <sup>B</sup> | Tissue | Permittivity | Conductivity | Alpha | Depth | ConvF Uncertainty |
|---------|-----------------------------|--------|--------------|--------------|-------|-------|-------------------|
| 835     | 785-885                     | Head   | 41.5 ± 5%    | 0.90 ± 5%    | 0.80  | 1.73  | 6.42 ± 9.7% (k=2) |
| 900     | 850-950                     | Head   | 41.5 ± 5%    | 0.97 ± 5%    | 0.96  | 1.58  | 6.25 ± 9.7% (k=2) |
| 1750    | 1700-1800                   | Head   | 40.0 ± 5%    | 1.40 ± 5%    | 0.56  | 2.55  | 5.15 ± 9.7% (k=2) |
| 1900    | 1850-1950                   | Head   | 40.0 ± 5%    | 1.40 ± 5%    | 0.58  | 2.72  | 4.93 ± 9.7% (k=2) |
| 2450    | 2400-2500                   | Head   | 39.2 ± 5%    | 1.80 ± 5%    | 1.19  | 1.73  | 4.55 ± 9.7% (k=2) |
| 835     | 785-885                     | Body   | 55.2 ± 5%    | 0.97 ± 5%    | 0.94  | 1.61  | 6.17 ± 9.7% (k=2) |
| 900     | 850-950                     | Body   | 55.0 ± 5%    | 1.05 ± 5%    | 0.87  | 1.71  | 6.01 ± 9.7% (k=2) |
| 1750    | 1700-1800                   | Body   | 53.3 ± 5%    | 1.52 ± 5%    | 0.58  | 2.80  | 4.56 ± 9.7% (k=2) |
| 1900    | 1850-1950                   | Body   | 53.3 ± 5%    | 1.52 ± 5%    | 0.64  | 2.78  | 4.38 ± 9.7% (k=2) |
| 2450    | 2400-2500                   | Body   | 52.7 ± 5%    | 1.95 ± 5%    | 1.99  | 1.20  | 4.34 ± 9.7% (k=2) |

<sup>B</sup> The total standard uncertainty is calculated as root-sum-square of standard uncertainty of the Conversion Factor at calibration frequency and the standard uncertainty for the indicated frequency band.

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## APPENDIX D: RELEVANT PAGES FROM DIPOLE VALIDATION KIT REPORT(S)

1900 MHz Dipole, SN: 5d013  
See the next three pages.

Client **Nokia Salo TCC**

## CALIBRATION CERTIFICATE

Object(s) **D1900V2 - SN:5d013**

Calibration procedure(s) **QA CAL-05.v2  
Calibration procedure for dipole validation kits**

Calibration date: **July 13, 2004**

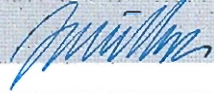
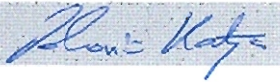
Condition of the calibrated item **In Tolerance (according to the specific calibration document)**

This calibration statement documents traceability of M&TE used in the calibration procedures and conformity of the procedures with the ISO/IEC 17025 international standard.

All calibrations have been conducted in the closed laboratory facility: environment temperature 22 +/- 2 degrees Celsius and humidity < 75%.

Calibration Equipment used (M&TE critical for calibration)

| Model Type                | ID #       | Cal Date (Calibrated by, Certificate No.) | Scheduled Calibration  |
|---------------------------|------------|-------------------------------------------|------------------------|
| Power meter EPM E442      | GB37480704 | 6-Nov-03 (METAS, No. 252-0254)            | Nov-04                 |
| Power sensor HP 8481A     | US37292783 | 6-Nov-03 (METAS, No. 252-0254)            | Nov-04                 |
| Power sensor HP 8481A     | MY41092317 | 18-Oct-02 (Agilent, No. 20021018)         | Oct-04                 |
| RF generator R&S SML-03   | 100698     | 27-Mar-2002 (R&S, No. 20-92389)           | In house check: Mar-05 |
| Network Analyzer HP 8753E | US37390585 | 18-Oct-01 (SPEAG, in house check Nov-03)  | In house check: Oct 05 |

|                |                |                     |                                                                                       |
|----------------|----------------|---------------------|---------------------------------------------------------------------------------------|
|                | Name           | Function            | Signature                                                                             |
| Calibrated by: | Judith Mueller | Technician          |  |
| Approved by:   | Katja Pokovic  | Laboratory Director |  |

Date issued: July 15, 2004

This calibration certificate is issued as an intermediate solution until the accreditation process (based on ISO/IEC 17025 International Standard) for Calibration Laboratory of Schmid & Partner Engineering AG is completed.

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN5d013**

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

Medium: HSL 1900 MHz;

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.44$  mho/m;  $\epsilon_r = 39.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507; ConvF(4.96, 4.96, 4.96); Calibrated: 1/23/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn903; Calibrated: 2/19/2004
- Phantom: Flat Phantom quarter size; Type: QD000P50AA; Serial: SN:1002;
- Measurement SW: DASY4, V4.3 Build 8; Postprocessing SW: SEMCAD, V1.8 Build 117

**Pin = 250 mW; d = 10 mm/Area Scan (81x81x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 11.4 mW/g

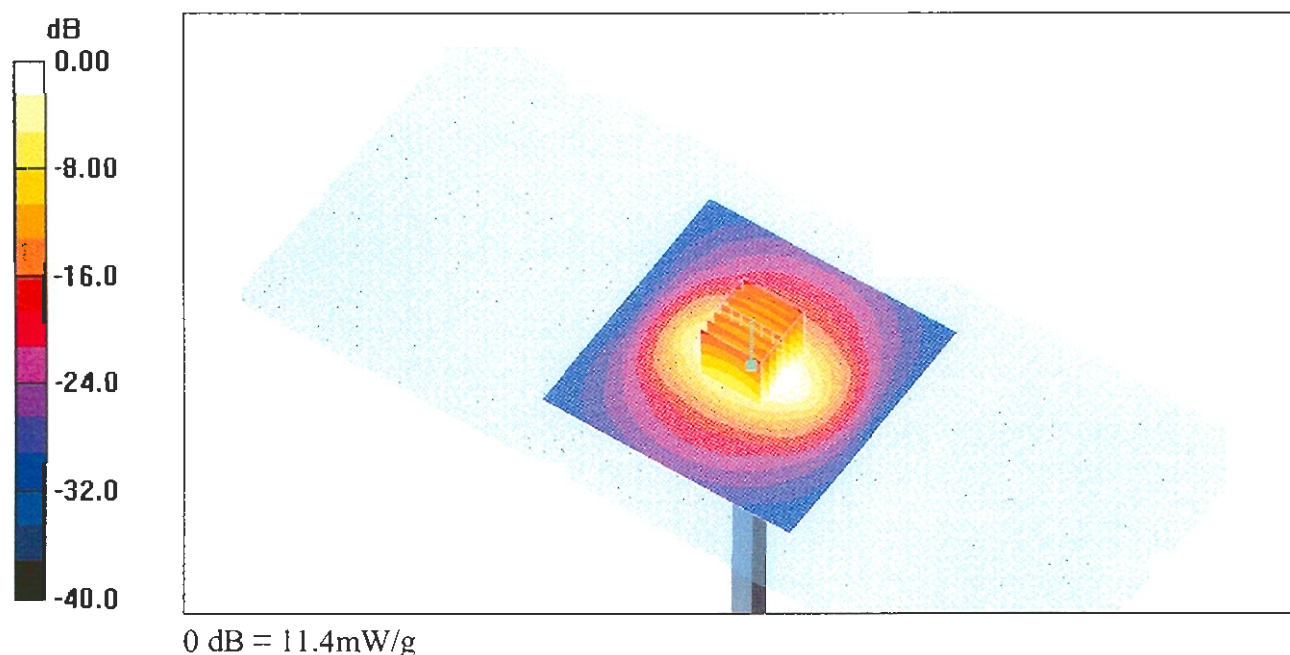
**Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 93.6 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 17.9 W/kg

**SAR(1 g) = 10 mW/g; SAR(10 g) = 5.24 mW/g**

Maximum value of SAR (measured) = 11.4 mW/g



Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN5d013**

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

Medium: Muscle 1900 MHz;

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.58$  mho/m;  $\epsilon_r = 52.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507; ConvF(4.57, 4.57, 4.57); Calibrated: 1/23/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn903; Calibrated: 2/19/2004
- Phantom: SAM with CRP - TP1006; Type: SAM 4.0; Serial: TP:1006;
- Measurement SW: DASY4, V4.3 Build 8; Postprocessing SW: SEMCAD, V1.8 Build 117

**Pin = 250 mW; d = 10 mm/Area Scan (81x81x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 12.0 mW/g

**Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 82.5 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 18.9 W/kg

**SAR(1 g) = 10.4 mW/g; SAR(10 g) = 5.41 mW/g**

Maximum value of SAR (measured) = 11.8 mW/g

