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Finnish Accreditation Service
T117 (EN ISO/IEC 17025)

# SAR Compliance Test Report

| | | | |
|---|---|---|---|
| **Test report no.:** | Salo_SAR_0605_03 | **Date of report:** | 2006-03-01 |
| **Template version:** | 5 | **Number of pages:** | 46 |
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| **Tested device:** | RM-55 | | |
| **FCC ID:** | QVVRM-55 | **IC:** | 661AE-RM55 |
| **Supplement reports:** | - | | |

**Testing has been carried out in accordance with:**

**47CFR §2.1093**
Radiofrequency Radiation Exposure Evaluation: Portable Devices

**FCC OET Bulletin 65 (Edition 97-01), Supplement C (Edition 01-01)**
Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields

**RSS-102**
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

**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

**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.

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# 1. SUMMARY OF SAR TEST REPORT

## 1.1 Test Details

| | |
|---|---|
| Period of test | 2006-01-31 to 2006-02-22 |
| SN, HW and SW numbers of tested device | SN: 004400/80/172229/7, HW: 4002, SW: 2.0551.0, DUT: 11017<br>SN: 004400/80/172229/7, HW: 4002, SW: 02.0.026, DUT: 11017 |
| Batteries used in testing | BP-6M, DUT: 11020, 11021 |
| Headsets used in testing | HS-6, DUT: 11019 |
| Other accessories used in testing | MU-card, DUT: 11022 |
| 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 | Measured SAR value (1g avg) | Scaled* SAR value (1g avg) | SAR limit (1g avg) | Result |
|---|---|---|---|---|---|---|---|
| 3-slot GPRS1900 | 810 / 1909.8 | 28.5dBm EIRP | Right, Cheek | 0.61 W/kg | **0.68 W/kg** | 1.6 W/kg | PASSED |
| 3-slot GPRS1900 + WLAN2450 | - | - | Right, Cheek | 0.62 W/kg | **0.69 W/kg** | 1.6 W/kg | PASSED |

### 1.2.2 Body Worn Configuration

| Mode | Ch / *f* (MHz) | Radiated power | Separation distance | Measured SAR value (1g avg) | Scaled* SAR value (1g avg) | SAR limit (1g avg) | Result |
|---|---|---|---|---|---|---|---|
| 3-slot GPRS1900 | 661 / 1880.0 | 28.7 dBm EIRP | 1.5cm | 1.02 W/kg | **1.14 W/kg** | 1.6 W/kg | PASSED |
| 3-slot GPRS1900 + WLAN2450 | - | - | 1.5cm | 1.10 W/kg | **1.23 W/kg** | 1.6 W/kg | PASSED |

*SAR values are scaled up by 12% to cover measurement drift.


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### 1.2.3 Maximum Drift

| Maximum drift covered by 12% scaling up of the SAR values | Maximum drift during measurements |
|---|---|
| 0.5dB | -0.50dB |

### 1.2.4 Measurement Uncertainty

| | |
|---|---|
| Expanded Uncertainty (k=2) 95% | ± 25.8% |

## 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 | WLAN |
|---|---|---|---|---|---|
| Modulation Mode | GMSK | GMSK | GMSK / 8PSK | GFSK | |
| Duty Cycle | 1/8 | 1/8 to 3/8 | 1/8 to 3/8 | | 1 |
| Transmitter Frequency Range (MHz) | 1850 - 1910 | 1850 - 1910 | 1850 - 1910 | 2402-2480 | 2412-2462 |

Outside of USA and Canada, the transmitter of the device is capable of operating also in 900/1800/2100 MHz bands, which are not part of this filing.

This device has Push to Talk and Voice over IP capability for use at the ear. Therefore, SAR for 2-slot and 3-slot GPRS modes were evaluated against the head profile of the phantom.


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## 2.1 Picture of the Device

## 2.2 Description of the Antenna

The device has internal patch antennas.

# 3. TEST CONDITIONS

## 3.1 Temperature and Humidity

| | |
|---|---|
| Ambient temperature (°C): | 21.7 – 22.8 |
| Ambient humidity (RH %): | 30 - 38 |

## 3.2 Test Signal, Frequencies and Output Power

The device was put into operation by using a call tester except for testing WLAN2450 where control software was used. 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.


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# 4. DESCRIPTION OF THE TEST EQUIPMENT

## 4.1 Measurement System and Components

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

The following table lists calibration dates of SPEAG components:

| Test Equipment | Serial Number | Calibration interval | Calibration expiry |
|---|---|---|---|
| DAE V1 | 372 | 12 months | 2006-08 |
| E-field Probe ET3DV6 | 1395 | 12 months | 2006-09 |
| E-field Probe ET3DV6 | 1766 | 12 months | 2006-04 |
| Dipole Validation Kit, D1900V2 | 5d013 | 24 months | 2006-07 |
| Dipole Validation Kit, D2450V2 | 749 | 24 months | 2006-06 |
| DASY4 software | Version 4.6 | - | - |

Additional test equipment used in testing:

| Test Equipment | Model | Serial Number | Calibration interval | Calibration expiry |
|---|---|---|---|---|
| Signal Generator | SML03 | 101265 | 12 months | 2006-07 |
| Amplifier | ZHL-42 (SMA) | N072095-5 | - | - |
| Power Meter | NRVS | 849305/028 | 12 months | 2006-07 |
| Power Sensor | NRV-Z32 | 839176/020 | 12 months | 2006-07 |
| Call Tester | CMU 200 | 101111 | - | - |
| Call Tester | CMU 200 | 104983 | - | - |
| Vector Network Analyzer | 8753E | US38432928 | 12 months | 2006-10 |
| Dielectric Probe Kit | 85070B | US33020420 | - | - |


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### 4.1.1 Isotropic E-field Probe Type ET3DV6

| | |
|---|---|
| **Construction** | 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) |
| **Calibration** | Calibration certificate in Appendix C |
| **Frequency** | 10 MHz to 3 GHz (dosimetry); Linearity: ± 0.2 dB (30 MHz to 3 GHz) |
| **Optical Surface Detection** | ± 0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces |
| **Directivity** | ± 0.2 dB in HSL (rotation around probe axis)<br>± 0.4 dB in HSL (rotation normal to probe axis) |
| **Dynamic Range** | 5 µW/g to > 100 mW/g; Linearity: ± 0.2 dB |
| **Dimensions** | Overall length: 330 mm<br>Tip length: 16 mm<br>Body diameter: 12 mm<br>Tip diameter: 6.8 mm<br>Distance from probe tip to dipole centers: 2.7 mm |
| **Application** | General 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


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whose dielectric parameters were within ± 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 ± 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 (% by weight) | Body (% by weight) |
|---|---|---|
| Deionised Water | 54.50 | 70.25 |
| Tween 20 | 45.23 | 29.41 |
| Salt | 0.27 | 0.34 |

**2450MHz band**

| Ingredient | Head (% by weight) | Body (% by weight) |
|---|---|---|
| Deionised Water | 56.0 | 70.2 |
| Tween 20 | 44.0 | 29.62 |
| Salt | - | 0.18 |

### 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.


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System checking, head tissue simulant

| f [MHz] | Description | SAR [W/kg], 1g | Dielectric Parameters | | Temp [°C] |
|---|---|---|---|---|---|
| | | | εr | σ [S/m] | |
| 1900 | Reference result | 10.0 | 39.4 | 1.44 | |
| | ± 10% window | 9.0 – 11.0 | | | |
| | 2006-01-31 | 10.8 | 38.3 | 1.42 | 21.9 |
| 2450 | Reference result | 13.5 | 38.5 | 1.86 | |
| | ± 10% window | 12.2 – 14.8 | | | |
| | 2006-02-21 | 14.0 | 37.9 | 1.87 | 20.7 |
| | 2006-02-22 | 14.0 | 37.6 | 1.85 | 21.4 |

System checking, body tissue simulant

| f [MHz] | Description | SAR [W/kg], 1g | Dielectric Parameters | | Temp [°C] |
|---|---|---|---|---|---|
| | | | εr | σ [S/m] | |
| 1900 | Reference result | 10.4 | 52.2 | 1.58 | |
| | ± 10% window | 9.4 – 11.4 | | | |
| | 2006-02-01 | 11.1 | 53.0 | 1.55 | 21.9 |

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 [°C] |
|---|---|---|---|---|
| | | εr | σ [S/m] | |
| 1880 | Recommended value | 40.0 | 1.40 | |
| | ± 5% window | 38.0 – 42.0 | 1.33 – 1.47 | |
| | 2006-01-31 | 38.0 | 1.39 | 21.0 |
| 2442 | Recommended value | 39.2 | 1.79 | |
| | ± 5% window | 37.3 – 41.2 | 1.70 – 1.88 | |
| | 2006-02-21 | 38.0 | 1.85 | 21.0 |
| | 2006-02-22 | 37.6 | 1.84 | 21.0 |


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**Body tissue simulant measurements**

| *f* [MHz] | Description | Dielectric Parameters | | Temp [°C] |
|---|---|---|---|---|
| | | $\varepsilon_r$ | $\sigma$ [S/m] | |
| 1880 | Recommended value | 53.3 | 1.52 | |
| | ± 5% window | 50.6 – 56.0 | 1.44 – 1.60 | |
| | 2006-02-01 | 52.6 | 1.52 | 21.0 |
| 2442 | Recommended value | 52.7 | 1.94 | |
| | ± 5% window | 50.1 – 55.3 | 1.85 – 2.04 | |
| | 2006-02-22 | 52.6 | 1.91 | 21.0 |

## 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


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## 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.


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## 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.


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## 6. MEASUREMENT UNCERTAINTY

Table 6.1 – Measurement uncertainty evaluation

| Uncertainty Component | Section in IEEE 1528 | Tol. (%) | Prob Dist | Div | $c_i$ | $c_i.u_i$ (%) | $v_i$ |
|---|---|---|---|---|---|---|---|
| **Measurement System** | | | | | | | |
| Probe Calibration | E2.1 | ±5.9 | N | 1 | 1 | ±5.9 | ∞ |
| Axial Isotropy | E2.2 | ±4.7 | R | √3 | $(1-c_p)^{1/2}$ | ±1.9 | ∞ |
| Hemispherical Isotropy | E2.2 | ±9.6 | R | √3 | $(c_p)^{1/2}$ | ±3.9 | ∞ |
| Boundary Effect | E2.3 | ±1.0 | R | √3 | 1 | ±0.6 | ∞ |
| Linearity | E2.4 | ±4.7 | R | √3 | 1 | ±2.7 | ∞ |
| System Detection Limits | E2.5 | ±1.0 | R | √3 | 1 | ±0.6 | ∞ |
| Readout Electronics | E2.6 | ±1.0 | N | 1 | 1 | ±1.0 | ∞ |
| Response Time | E2.7 | ±0.8 | R | √3 | 1 | ±0.5 | ∞ |
| Integration Time | E2.8 | ±2.6 | R | √3 | 1 | ±1.5 | ∞ |
| RF Ambient Conditions - Noise | E6.1 | ±3.0 | R | √3 | 1 | ±1.7 | ∞ |
| RF Ambient Conditions - Reflections | E6.1 | ±3.0 | R | √3 | 1 | ±1.7 | ∞ |
| Probe Positioner Mechanical Tolerance | E6.2 | ±0.4 | R | √3 | 1 | ±0.2 | ∞ |
| Probe Positioning with respect to Phantom Shell | E6.3 | ±2.9 | R | √3 | 1 | ±1.7 | ∞ |
| Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation | E5 | ±3.9 | R | √3 | 1 | ±2.3 | ∞ |
| **Test sample Related** | | | | | | | |
| Test Sample Positioning | E4.2 | ±6.0 | N | 1 | 1 | ±6.0 | 11 |
| Device Holder Uncertainty | E4.1 | ±5.0 | N | 1 | 1 | ±5.0 | 7 |
| Output Power Variation - SAR drift measurement | 6.6.3 | ±0.0 | R | √3 | 1 | ±0.0 | ∞ |
| **Phantom and Tissue Parameters** | | | | | | | |
| Phantom Uncertainty (shape and thickness tolerances) | E3.1 | ±4.0 | R | √3 | 1 | ±2.3 | ∞ |
| Conductivity Target - tolerance | E3.2 | ±5.0 | R | √3 | 0.64 | ±1.8 | ∞ |
| Conductivity - measurement uncertainty | E3.3 | ±5.5 | N | 1 | 0.64 | ±3.5 | 5 |
| Permittivity Target - tolerance | E3.2 | ±5.0 | R | √3 | 0.6 | ±1.7 | ∞ |
| Permittivity - measurement uncertainty | E3.3 | ±2.9 | N | 1 | 0.6 | ±1.7 | 5 |
| **Combined Standard Uncertainty** | | | RSS | | | **±12.9** | 116 |
| **Coverage Factor for 95%** | | | **k=2** | | | | |
| **Expanded Uncertainty** | | | | | | **±25.8** | |


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## 7. RESULTS

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

**1900MHz, SAR results**

| Option Flip | Option MU-card | Test configuration | | SAR, averaged over 1g (W/kg) | | |
|---|---|---|---|---|---|---|
| | | | | Ch 512 1850.2 MHz | Ch 661 1880.0 MHz | Ch 810 1909.8 MHz |
| | **GSM** | **Power** | | **29.2 dBm** | **31.9 dBm** | **29.2 dBm** |
| Open | Without MU-card | Left | Cheek | - | 0.165 | - |
| | **2-slot GPRS** | **Power** | | **29.8 dBm** | **32.4 dBm** | **30.4 dBm** |
| Open | Without MU-card | Left | Cheek | - | 0.311 | - |
| | | | Tilt | - | - | - |
| | | Right | Cheek | 0.408 | 0.456 | **0.603** |
| | | | Tilt | - | - | - |
| | **3-slot GPRS** | **Power** | | **28.0 dBm** | **30.5 dBm** | **28.5 dBm** |
| Open | Without MU-card | Left | Cheek | - | 0.327 | - |
| | | | Tilt | - | 0.152 | - |
| | | Right | Cheek | 0.428 | 0.486 | **0.611** |
| | | | Tilt | - | 0.138 | - |
| | **3-slot EGPRS** | **Power** | | **27.6 dBm** | **26.3 dBm** | **25.2 dBm** |
| Open | Without MU-card | Right Cheek | | - | - | 0.223 |
| Open | 3-slot GPRS withMU-card | Right Cheek | | - | - | 0.603 |
| | 3-slot GPRS without MU-card | Right Cheek with BT active | | - | - | 0.598 |


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**2450MHz, SAR results**

| Option Flip | Option MU-card | Test configuration | | SAR, averaged over 1g (W/kg) | | |
|---|---|---|---|---|---|---|
| | | | | Ch 1 2412.0 MHz | Ch 7 2442.0 MHz | Ch 11 2462.0 MHz |
| WLAN | | Power | | 19.2 dBm | 23.3 dBm | 23.6 dBm |
| Open | Without MU-card | Left | Cheek | 0.0098 | 0.0095 | **0.0103** |
| | | | Tilt | - | 0.0058 | - |
| | | Right | Cheek | - | 0.0076 | - |
| | | | Tilt | - | 0.0043 | - |
| Open | WLAN withMU-card | Left Cheek | | - | - | **0.0104** |

**1900MHz, Body SAR results**

| Option Flip | Option MU-card | Test configuration | SAR, averaged over 1g (W/kg) | | |
|---|---|---|---|---|---|
| | | | Ch 512 1850.2 MHz | Ch 661 1880.0 MHz | Ch 810 1909.8 MHz |
| 2-slot GPRS | | Power | 29.0 dBm | 30.9 dBm | 29.2 dBm |
| Closed | Without MU-card | Without headset | 0.873 | 0.832 | - |
| 3-slot GPRS | | Power | 28.2 dBm | 28.7 dBm | 27.7 dBm |
| Closed | Without MU-card | Without headset | 1.01 | **1.02** | 0.858 |
| | | Headset HS-6 | 0.833 | 0.919 | 0.756 |
| Closed | 3-slot GPRS with MU-card | Without headset | - | 0.996 | - |
| Closed | 3-slot GPRS without MU-card | Without headset and with BT active | - | 0.932 | - |


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**2450MHz, Body SAR results**

| Option Flip | Option MU-card | Test configuration | SAR, averaged over 1g (W/kg) | | |
|---|---|---|---|---|---|
| | | | Ch 1 2412.0 MHz | Ch 7 2442.0 MHz | Ch 11 2462.0 MHz |
| WLAN | | Power | 20.9 dBm | 21.1 dBm | 21.4 dBm |
| Closed | Without MU-card | Without headset | 0.046 | 0.061 | **0.081** |
| | | Headset HS-6 | 0.030 | 0.055 | 0.054 |
| Closed | WLAN with MU-card | Without headset | - | - | 0.064 |

**Simultaneous transmissions: Combined SAR results**

| Flip | Test configuration | Max. 1g SAR results | | Combined 1g SAR values |
|---|---|---|---|---|
| | | WLAN | Cellular 1900MHz | WLAN + Cellular 1900MHz |
| Open | Head: Left, Cheek | 0.0104 | 0.327 | 0.337 |
| | Head: Left, Tilt | 0.0058 | 0.152 | 0.158 |
| | Head: Right, Cheek | 0.0076 | 0.611 | **0.619** |
| | Head: Right, Tilt | 0.0043 | 0.138 | 0.142 |
| Closed | Body: With Headset | 0.055 | 0.919 | 0.974 |
| | Body: Without Headset | 0.081 | 1.02 | **1.10** |

Combining the maximum SAR values of WLAN2450 and the cellular bands tends to overestimate the SAR value since their maxima do not necessarily occur in the same location.

Plots of the Measurement scans are given in Appendix B.


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## APPENDIX A: SYSTEM CHECKING SCANS


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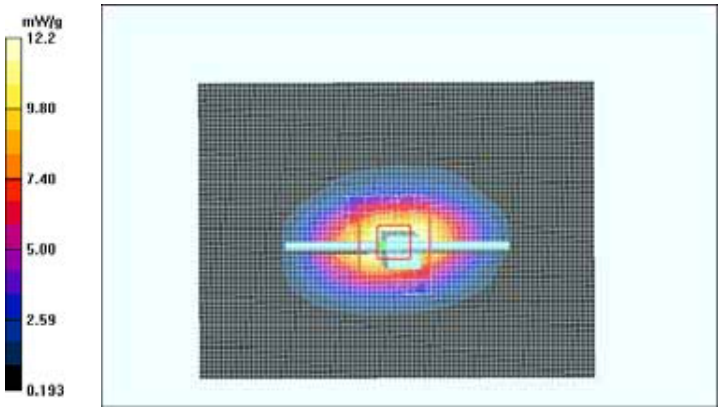
Date/Time: 2006-01-31 09:36:50
Test Laboratory: TCC Nokia
**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d013, Program Name: System Check**

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; $\sigma$ = 1.42 mho/m; $\varepsilon_r$ = 38.3; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1395; ConvF(4.73, 4.73, 4.73); Calibrated: 03.09.2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn372; Calibrated: 18.08.2005
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

**d=15mm, Pin=250mW, t=21.9 C/Area Scan (61x81x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 12.8 mW/g

**d=15mm, Pin=250mW, t=21.9 C/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 99.4 V/m; Power Drift = -0.026 dB
Peak SAR (extrapolated) = 18.7 W/kg
**SAR(1 g) = 10.8 mW/g; SAR(10 g) = 5.69 mW/g**
Maximum value of SAR (measured) = 12.2 mW/g





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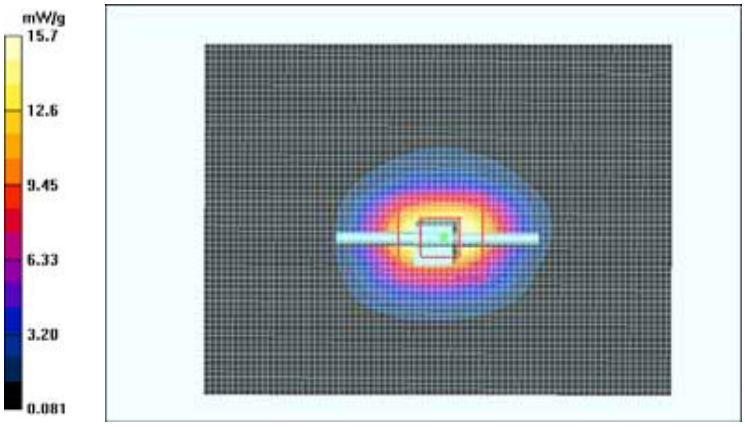
Date/Time: 2006-02-21 11:03:57
Test Laboratory: TCC Nokia
**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:749, Program Name: System Check**

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; $\sigma$ = 1.87 mho/m; $\varepsilon_r$ = 37.9; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1766; ConvF(4.35, 4.35, 4.35); Calibrated: 22.04.2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn372; Calibrated: 18.08.2005
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

**d=15mm, Pin=250mW, t=20.7 C/Area Scan (61x81x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 16.5 mW/g

**d=15mm, Pin=250mW, t=20.7 C/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 97.4 V/m; Power Drift = -0.055 dB
Peak SAR (extrapolated) = 29.9 W/kg
**SAR(1 g) = 14 mW/g; SAR(10 g) = 6.44 mW/g**
Maximum value of SAR (measured) = 15.7 mW/g





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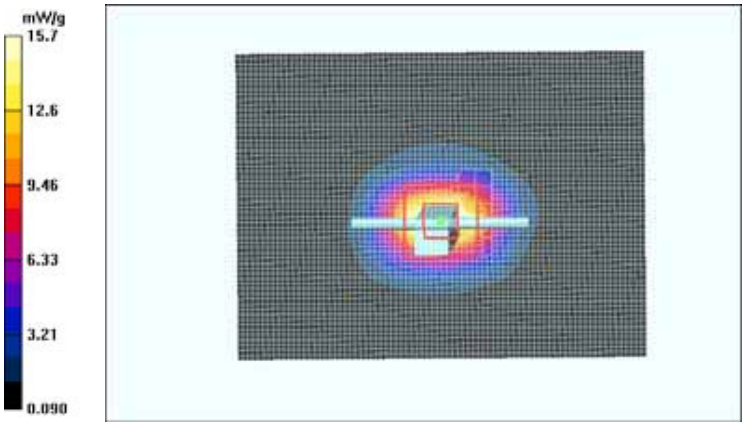
Date/Time: 2006-02-22 07:46:30
Test Laboratory: TCC Nokia
**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:749, Program Name: System Check**

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; $\sigma$ = 1.85 mho/m; $\varepsilon_r$ = 37.6; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1766; ConvF(4.35, 4.35, 4.35); Calibrated: 22.04.2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn372; Calibrated: 18.08.2005
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

**d=15mm, Pin=250mW, t=21.4 C/Area Scan (61x81x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 16.4 mW/g

**d=15mm, Pin=250mW, t=21.4 C/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 97.7 V/m; Power Drift = -0.009 dB
Peak SAR (extrapolated) = 29.8 W/kg
**SAR(1 g) = 14 mW/g; SAR(10 g) = 6.44 mW/g**
Maximum value of SAR (measured) = 15.7 mW/g





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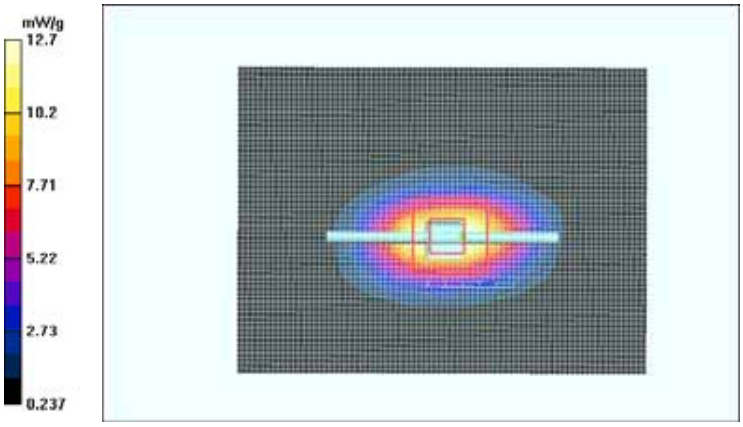
Date/Time: 2006-02-01 10:10:16
Test Laboratory: TCC Nokia
**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d013, Program Name: System Check**

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; $\sigma$ = 1.55 mho/m; $\varepsilon_r$ = 53; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1395; ConvF(4.19, 4.19, 4.19); Calibrated: 03.09.2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn372; Calibrated: 18.08.2005
- Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1179
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

**d=15mm, Pin=250mW, t=21.9 C/Area Scan (61x81x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 13.3 mW/g

**d=15mm, Pin=250mW, t=21.9 C/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.3 V/m; Power Drift = -0.011 dB
Peak SAR (extrapolated) = 19.5 W/kg
**SAR(1 g) = 11.1 mW/g; SAR(10 g) = 5.9 mW/g**
Maximum value of SAR (measured) = 12.7 mW/g





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## APPENDIX B: MEASUREMENT SCANS


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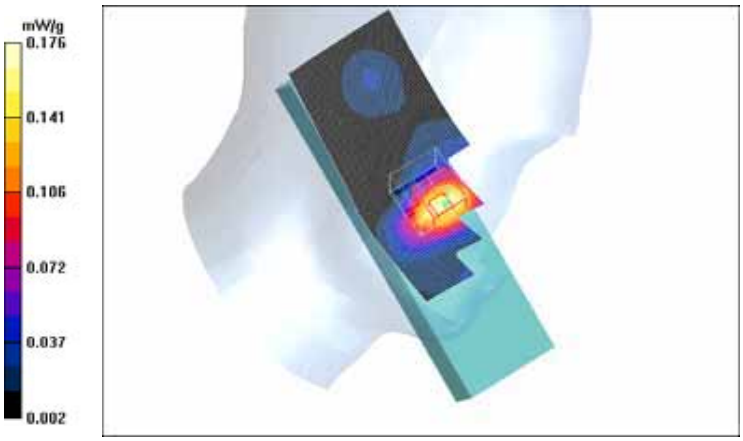
Date/Time: 2006-01-31 10:55:51
Test Laboratory: TCC Nokia
**Type: RM-55;**
**Program Name: Head Measurement - Left, Advanced Extrapolation, t=21.5 C, Flip open,no MU, no BT**

Communication System: GSM1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; $\sigma$ = 1.39 mho/m; $\varepsilon_r$ = 38; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1395; ConvF(4.73, 4.73, 4.73); Calibrated: 03.09.2005
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn372; Calibrated: 18.08.2005
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 159

**Cheek position /Area Scan (51x141x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.180 mW/g

**Cheek position /Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 4.10 V/m; Power Drift = -0.039 dB
Peak SAR (extrapolated) = 0.239 W/kg
**SAR(1 g) = 0.165 mW/g; SAR(10 g) = 0.096 mW/g**
Warning: Maximum averaged SAR over 10 g is located on the boundary of the measurement cube.
Maximum value of SAR (measured) = 0.176 mW/g





Copyright © 2006 TCC Nokia

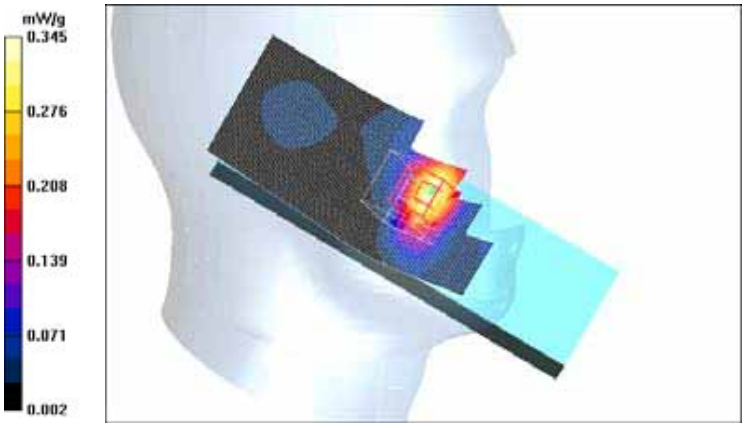
Date/Time: 2006-01-31 12:18:20
Test Laboratory: TCC Nokia
**Type: RM-55;**
**Program Name: Head Measurement - Left, Advanced Extrapolation, t=21.0 C, Flip open, no MU, no BT**

Communication System: 2-slot GPRS1900; Frequency: 1880 MHz;Duty Cycle: 1:4.2
Medium parameters used: f = 1880 MHz; $\sigma$ = 1.39 mho/m; $\varepsilon_r$ = 38; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1395; ConvF(4.73, 4.73, 4.73); Calibrated: 03.09.2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn372; Calibrated: 18.08.2005
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

**Cheek position /Area Scan (51x141x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.344 mW/g

**Cheek position /Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 5.45 V/m; Power Drift = -0.244 dB
Peak SAR (extrapolated) = 0.459 W/kg
**SAR(1 g) = 0.311 mW/g; SAR(10 g) = 0.180 mW/g**
Maximum value of SAR (measured) = 0.345 mW/g





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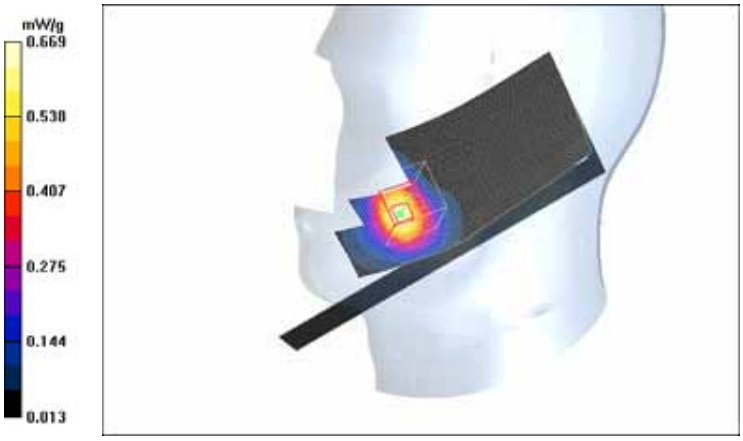
Date/Time: 2006-01-31 16:25:50
Test Laboratory: TCC Nokia
**Type: RM-55;**
**Program Name: Head Measurement - Right, Advanced Extrapolation, t=20.6 C, Flip open, no MU, no BT**

Communication System: 2-slot GPRS1900; Frequency: 1909.8 MHz;Duty Cycle: 1:4.2
Medium parameters used: f = 1910 MHz; $\sigma$ = 1.43 mho/m; $\varepsilon_r$ = 38.4; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1395; ConvF(4.73, 4.73, 4.73); Calibrated: 03.09.2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn372; Calibrated: 18.08.2005
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 159

**Cheek position/Area Scan (51x141x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.664 mW/g

**Cheek position/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 5.06 V/m; Power Drift = -0.220 dB
Peak SAR (extrapolated) = 0.909 W/kg
**SAR(1 g) = 0.603 mW/g; SAR(10 g) = 0.351 mW/g**
Maximum value of SAR (measured) = 0.669 mW/g





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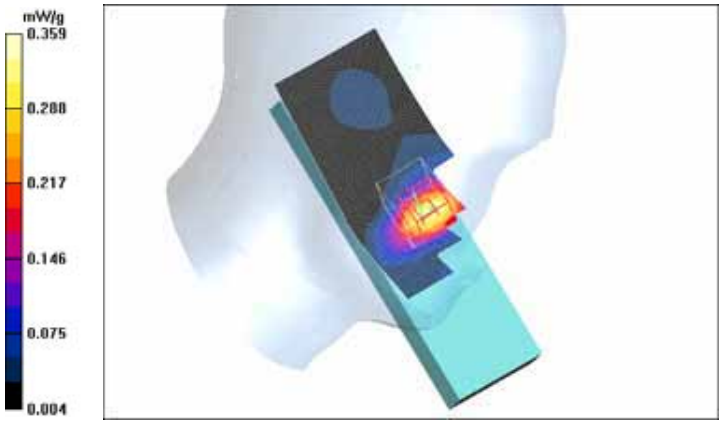
Date/Time: 2006-01-31 12:51:53
Test Laboratory: TCC Nokia
**Type: RM-55;**
**Program Name: Head Measurement - Left, Advanced Extrapolation, t=20.8 C, Flip open, no MU, no BT**

Communication System: 3-slot GPRS1900; Frequency: 1880 MHz;Duty Cycle: 1:2.8
Medium parameters used: f = 1880 MHz; $\sigma$ = 1.39 mho/m; $\varepsilon_r$ = 38; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1395; ConvF(4.73, 4.73, 4.73); Calibrated: 03.09.2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn372; Calibrated: 18.08.2005
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 159

**Cheek position/Area Scan (51x141x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.357 mW/g

**Cheek position/Zoom Scan 2 (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 5.69 V/m; Power Drift = -0.198 dB
Peak SAR (extrapolated) = 0.478 W/kg
**SAR(1 g) = 0.327 mW/g; SAR(10 g) = 0.195 mW/g**
Maximum value of SAR (measured) = 0.359 mW/g





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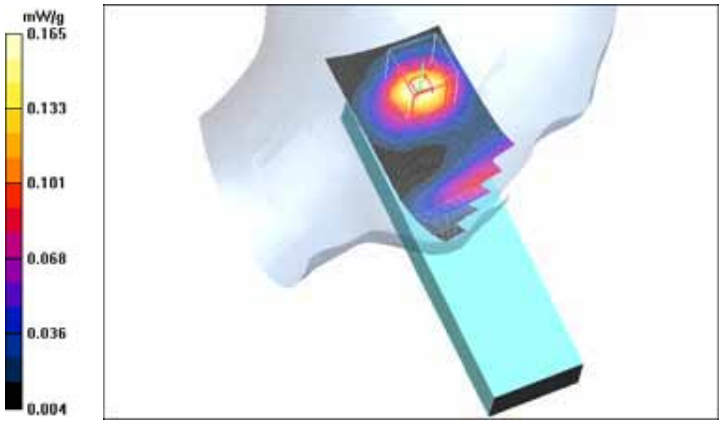
Date/Time: 2006-01-31 13:45:16
Test Laboratory: TCC Nokia
**Type: RM-55;**
**Program Name: Head Measurement - Left, Advanced Extrapolation, t=20.8 C, Flip open, no MU, no BT**

Communication System: 3-slot GPRS1900; Frequency: 1880 MHz;Duty Cycle: 1:2.8
Medium parameters used: f = 1880 MHz; $\sigma$ = 1.39 mho/m; $\varepsilon_r$ = 38; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1395; ConvF(4.73, 4.73, 4.73); Calibrated: 03.09.2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn372; Calibrated: 18.08.2005
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 159

**Tilt position/Area Scan (51x141x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.184 mW/g

**Tilt position/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 10.4 V/m; Power Drift = -0.187 dB
Peak SAR (extrapolated) = 0.221 W/kg
**SAR(1 g) = 0.152 mW/g; SAR(10 g) = 0.092 mW/g**
Maximum value of SAR (measured) = 0.165 mW/g





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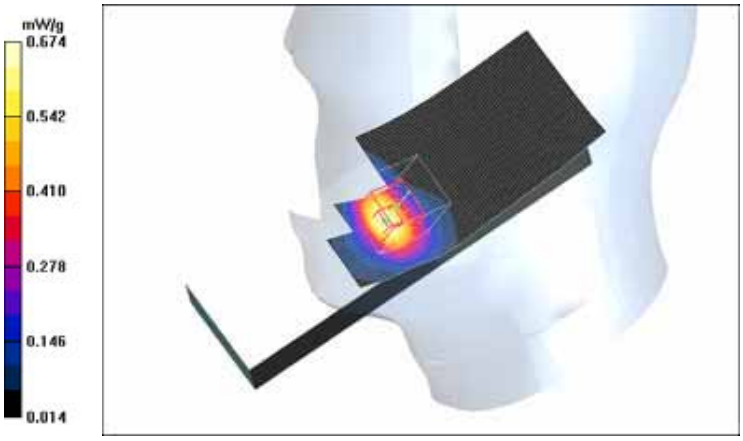
Date/Time: 2006-01-31 15:43:30
Test Laboratory: TCC Nokia
**Type: RM-55;**
**Program Name: Head Measurement - Right, Advanced Extrapolation, t=20.4 C, Flip open, no MU, no BT**

Communication System: 3-slot GPRS1900; Frequency: 1909.8 MHz;Duty Cycle: 1:2.8
Medium parameters used: f = 1910 MHz; $\sigma$ = 1.43 mho/m; $\varepsilon_r$ = 38.4; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1395; ConvF(4.73, 4.73, 4.73); Calibrated: 03.09.2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn372; Calibrated: 18.08.2005
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 159

**Cheek position/Area Scan (51x141x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.674 mW/g

**Cheek position/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 5.21 V/m; Power Drift = -0.504 dB
Peak SAR (extrapolated) = 0.918 W/kg
**SAR(1 g) = 0.611 mW/g; SAR(10 g) = 0.357 mW/g**
Maximum value of SAR (measured) = 0.674 mW/g





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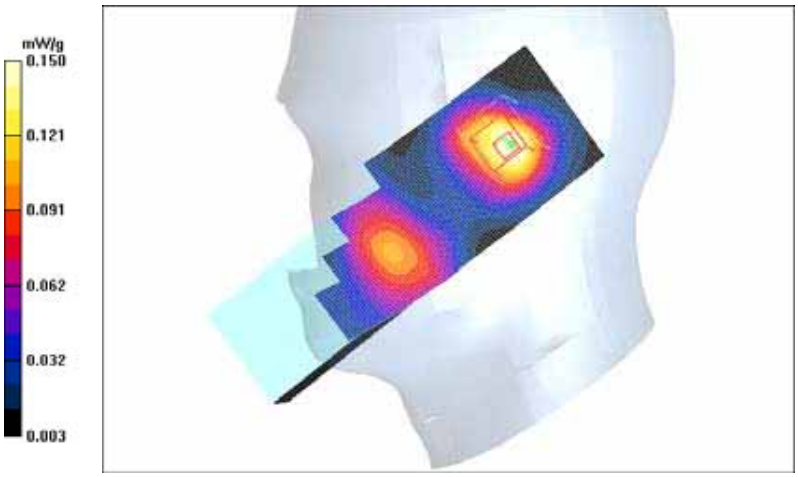
Date/Time: 2006-01-31 14:37:31
Test Laboratory: TCC Nokia
**Type: RM-55;**
**Program Name: Head Measurement - Right, Advanced Extrapolation, t=20.6 C, Flip open, no MU, no BT**

Communication System: 3-slot GPRS1900; Frequency: 1880 MHz;Duty Cycle: 1:2.8
Medium parameters used: f = 1880 MHz; $\sigma$ = 1.39 mho/m; $\varepsilon_r$ = 38; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1395; ConvF(4.73, 4.73, 4.73); Calibrated: 03.09.2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn372; Calibrated: 18.08.2005
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 159

**Tilt position/Area Scan (51x141x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.163 mW/g

**Tilt position/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 10.4 V/m; Power Drift = -0.139 dB
Peak SAR (extrapolated) = 0.196 W/kg
**SAR(1 g) = 0.138 mW/g; SAR(10 g) = 0.087 mW/g**
Maximum value of SAR (measured) = 0.150 mW/g





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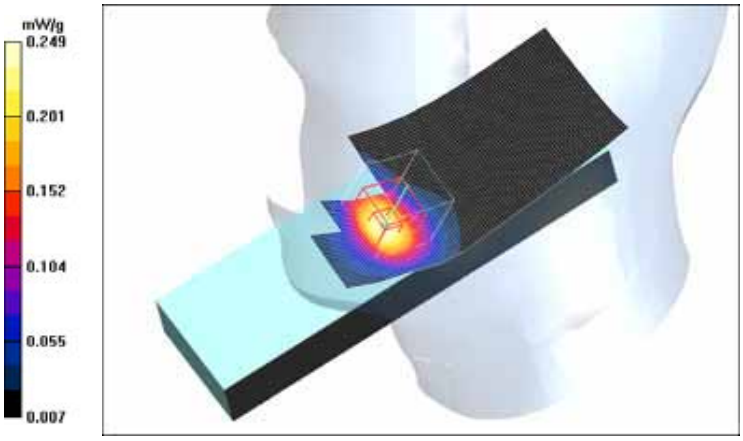
Date/Time: 2006-01-31 19:36:18
Test Laboratory: TCC Nokia
**Type: RM-55;**
**Program Name: Head Measurement - Right, Advanced Extrapolation, t=20.3 C, Flip open, no MU, no BT**

Communication System: 3-slot EGPRS1900; Frequency: 1909.8 MHz;Duty Cycle: 1:2.8
Medium parameters used: f = 1910 MHz; $\sigma$ = 1.43 mho/m; $\varepsilon_r$ = 38.4; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1395; ConvF(4.73, 4.73, 4.73); Calibrated: 03.09.2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn372; Calibrated: 18.08.2005
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 159

**Cheek position/Area Scan (51x141x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.243 mW/g

**Cheek position/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 3.15 V/m; Power Drift = -0.013 dB
Peak SAR (extrapolated) = 0.334 W/kg
**SAR(1 g) = 0.223 mW/g; SAR(10 g) = 0.132 mW/g**
Maximum value of SAR (measured) = 0.249 mW/g





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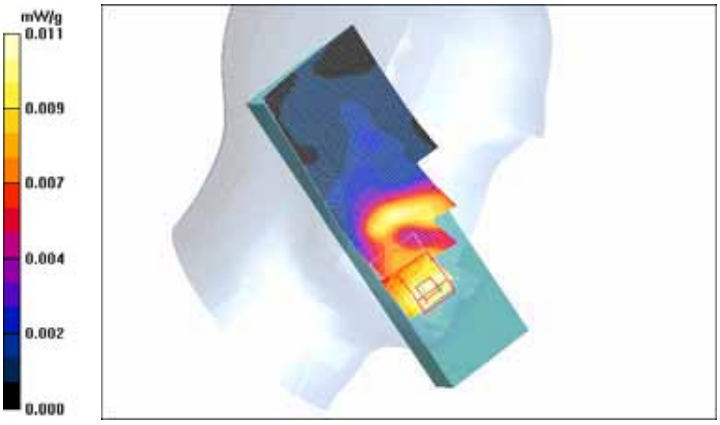
Date/Time: 2006-02-21 16:35:26
Test Laboratory: TCC Nokia
**Type: RM-55;**
**Program Name: Head Measurement - Left, Advanced Extrapolation, t=19.8 C, Flip open, no MU,**

Communication System: WLAN 2450; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2462 MHz; $\sigma$ = 1.88 mho/m; $\varepsilon_r$ = 37.9; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1766; ConvF(4.35, 4.35, 4.35); Calibrated: 22.04.2005
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn372; Calibrated: 18.08.2005
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 159

**Cheek position/Area Scan (51x141x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.011 mW/g

**Cheek position/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 0.778 V/m; Power Drift = -0.242 dB
Peak SAR (extrapolated) = 0.019 W/kg
**SAR(1 g) = 0.010 mW/g; SAR(10 g) = 0.00591 mW/g**
Warning: Maximum averaged SAR over 10 g is located on the boundary of the measurement cube.
Maximum value of SAR (measured) = 0.011 mW/g





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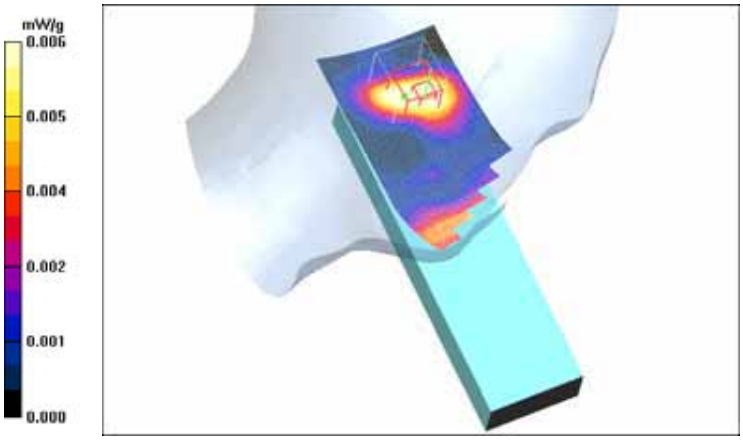
Date/Time: 2006-02-21 12:18:33
Test Laboratory: TCC Nokia
**Type: RM-55;**
**Program Name: Head Measurement - Left, Advanced Extrapolation, t=20.5 C, Flip open,no MU**

Communication System: WLAN 2450; Frequency: 2442 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2442 MHz; $\sigma$ = 1.85 mho/m; $\varepsilon_r$ = 38; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1766; ConvF(4.35, 4.35, 4.35); Calibrated: 22.04.2005
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn372; Calibrated: 18.08.2005
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 159

**Tilt position/Area Scan (51x141x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.008 mW/g

**Tilt position/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.96 V/m; Power Drift = -0.359 dB
Peak SAR (extrapolated) = 0.013 W/kg
**SAR(1 g) = 0.00582 mW/g; SAR(10 g) = 0.00318 mW/g**
Maximum value of SAR (measured) = 0.006 mW/g





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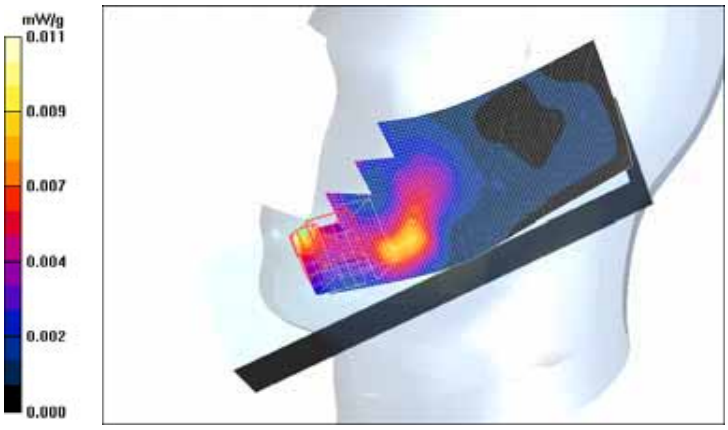
Date/Time: 2006-02-21 12:58:40
Test Laboratory: TCC Nokia
**Type: RM-55;**
**Program Name: Head Measurement - Right, Advanced Extrapolation, t=20.5 C, Flip open, no MU**

Communication System: WLAN 2450; Frequency: 2442 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2442 MHz; $\sigma$ = 1.85 mho/m; $\varepsilon_r$ = 38; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1766; ConvF(4.35, 4.35, 4.35); Calibrated: 22.04.2005
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn372; Calibrated: 18.08.2005
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 159

**Cheek position/Area Scan (51x141x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.009 mW/g

**Cheek position/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 0.971 V/m; Power Drift = -0.503 dB
Peak SAR (extrapolated) = 0.017 W/kg
**SAR(1 g) = 0.00764 mW/g; SAR(10 g) = 0.00328 mW/g**
Warning: Maximum averaged SAR over 1 g is located on the boundary of the measurement cube.
Maximum averaged SAR over 10 g is located on the boundary of the measurement cube.
Maximum value of SAR (measured) = 0.011 mW/g





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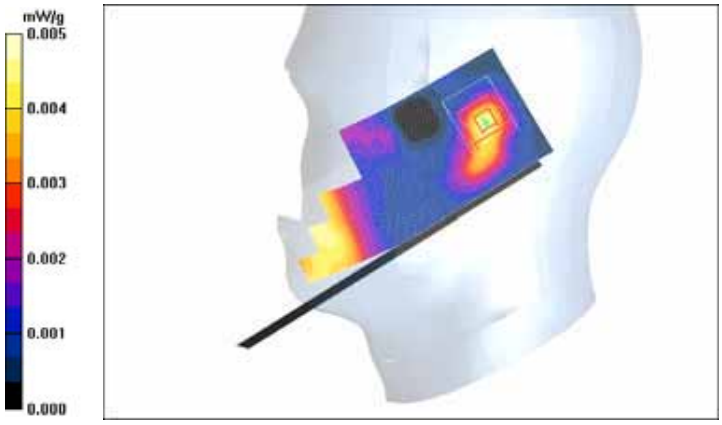
Date/Time: 2006-02-21 14:25:06
Test Laboratory: TCC Nokia
**Type: RM-55;**
**Program Name: Head Measurement - Right, Advanced Extrapolation, t=20.3 C, Flip open,no MU**

Communication System: WLAN 2450; Frequency: 2442 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2442 MHz; $\sigma$ = 1.85 mho/m; $\varepsilon_r$ = 38; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1766; ConvF(4.35, 4.35, 4.35); Calibrated: 22.04.2005
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn372; Calibrated: 18.08.2005
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 159

**Tilt position/Area Scan (51x141x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.005 mW/g

**Tilt position/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.75 V/m; Power Drift = -0.063 dB
Peak SAR (extrapolated) = 0.007 W/kg
**SAR(1 g) = 0.00428 mW/g; SAR(10 g) = 0.0022 mW/g**
Maximum value of SAR (measured) = 0.005 mW/g





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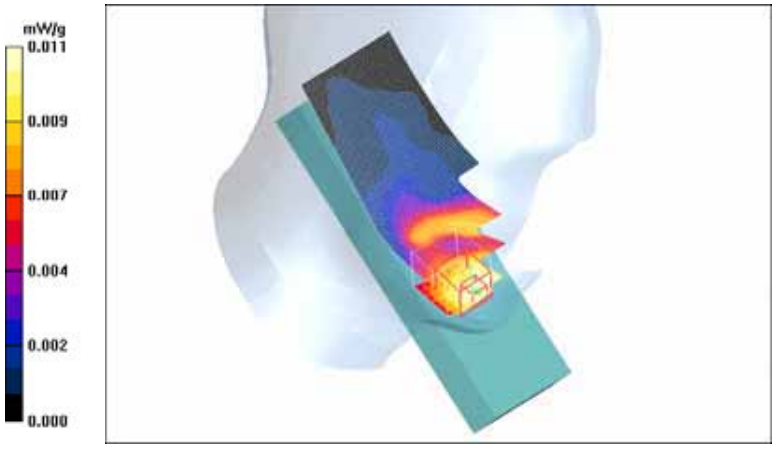
Date/Time: 2006-02-21 17:16:41
Test Laboratory: TCC Nokia
**Type: RM-55;**
**Program Name: Head Measurement - Left, Advanced Extrapolation, t=19.8 C, Flip open, MU**

Communication System: WLAN 2450; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2462 MHz; $\sigma$ = 1.88 mho/m; $\varepsilon_r$ = 37.9; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1766; ConvF(4.35, 4.35, 4.35); Calibrated: 22.04.2005
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn372; Calibrated: 18.08.2005
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 159

**Cheek position/Area Scan (51x141x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.011 mW/g

**Cheek position/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 0.755 V/m; Power Drift = 0.057 dB
Peak SAR (extrapolated) = 0.018 W/kg
**SAR(1 g) = 0.010 mW/g; SAR(10 g) = 0.00583 mW/g**
Warning: Maximum averaged SAR over 10 g is located on the boundary of the measurement cube.
Maximum value of SAR (measured) = 0.011 mW/g





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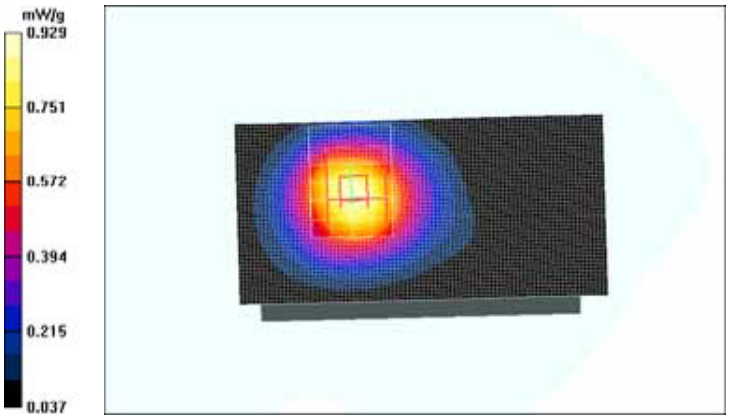
Date/Time: 2006-02-01 14:21:17
Test Laboratory: TCC Nokia
**Type: RM-55;**
**Program Name: Body measurement, Advanced Extrapolation, t=21.8 C, Flip closed, no hs, no MU, no BT**

Communication System: 2-slot GPRS1900; Frequency: 1850.2 MHz;Duty Cycle: 1:4.2
Medium parameters used (interpolated): f = 1850.2 MHz; $\sigma$ = 1.47 mho/m; $\varepsilon_r$ = 52.6; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1395; ConvF(4.19, 4.19, 4.19); Calibrated: 03.09.2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn372; Calibrated: 18.08.2005
- Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1179
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 159

**Body Measurement /Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.967 mW/g

**Body Measurement /Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 19.0 V/m; Power Drift = -0.135 dB
Peak SAR (extrapolated) = 1.40 W/kg
**SAR(1 g) = 0.873 mW/g; SAR(10 g) = 0.537 mW/g**
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.929 mW/g





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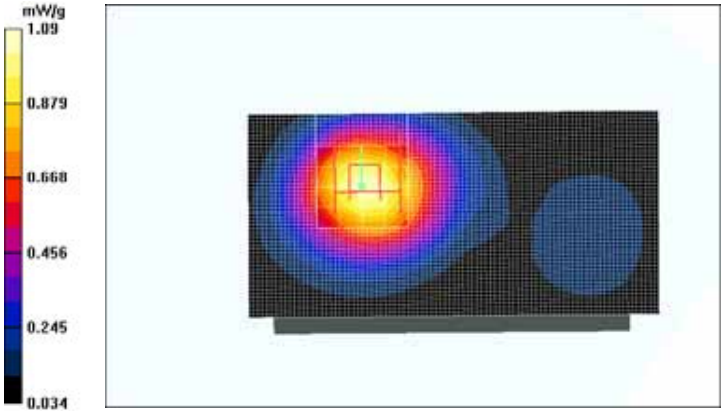
Date/Time: 2006-02-01 11:33:21
Test Laboratory: TCC Nokia
**Type: RM-55;**
**Program Name: Body measurement, Advanced Extrapolation, t=21.8 C, Flip closed, no hs, no MU, no BT**

Communication System: 3-slot GPRS1900; Frequency: 1880 MHz;Duty Cycle: 1:2.8
Medium parameters used: f = 1880 MHz; $\sigma$ = 1.52 mho/m; $\varepsilon_r$ = 52.6; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1395; ConvF(4.19, 4.19, 4.19); Calibrated: 03.09.2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn372; Calibrated: 18.08.2005
- Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1179
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 159

**Body Measurement /Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.14 mW/g

**Body Measurement /Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 22.2 V/m; Power Drift = -0.209 dB
Peak SAR (extrapolated) = 1.64 W/kg
**SAR(1 g) = 1.02 mW/g; SAR(10 g) = 0.624 mW/g**
Maximum value of SAR (measured) = 1.09 mW/g





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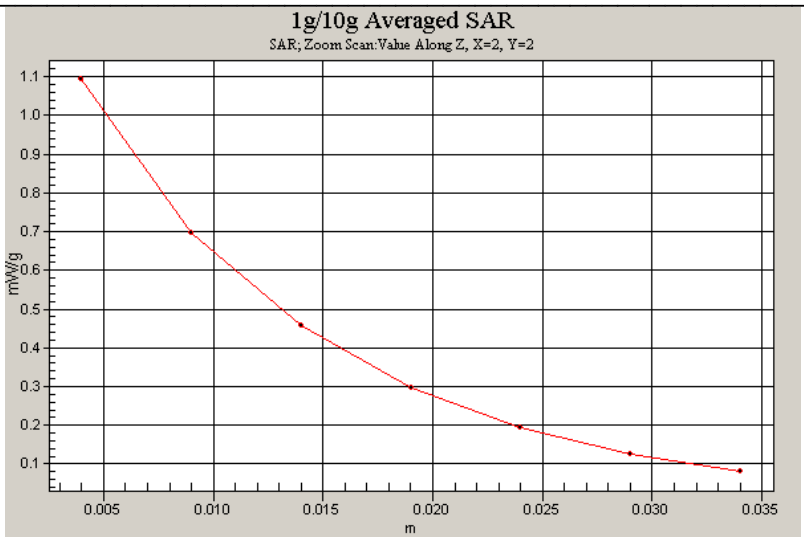



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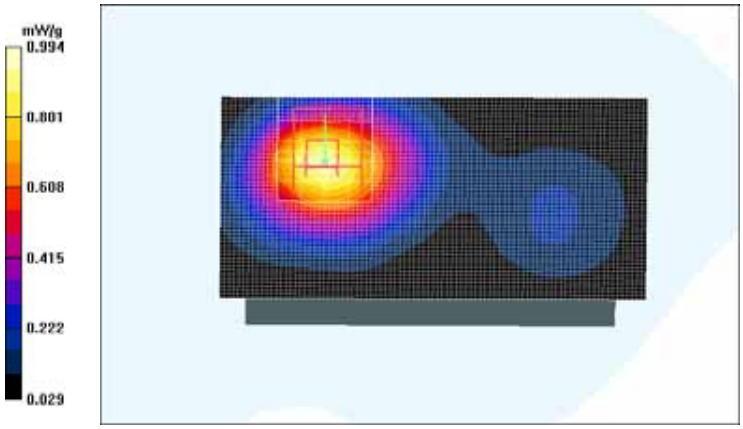
Date/Time: 2006-02-01 13:18:54
Test Laboratory: TCC Nokia
**Type: RM-55;**
**Program Name: Body measurement, Advanced Extrapolation, t=21.8 C, Flip closed, HS-6, no MU, no BT**

Communication System: 3-slot GPRS1900; Frequency: 1880 MHz;Duty Cycle: 1:2.8
Medium parameters used: f = 1880 MHz; $\sigma$ = 1.52 mho/m; $\varepsilon_r$ = 52.6; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1395; ConvF(4.19, 4.19, 4.19); Calibrated: 03.09.2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn372; Calibrated: 18.08.2005
- Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1179
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 159

**Body Measurement /Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.03 mW/g

**Body Measurement /Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 22.7 V/m; Power Drift = -0.292 dB
Peak SAR (extrapolated) = 1.54 W/kg
**SAR(1 g) = 0.919 mW/g; SAR(10 g) = 0.553 mW/g**
Maximum value of SAR (measured) = 0.994 mW/g





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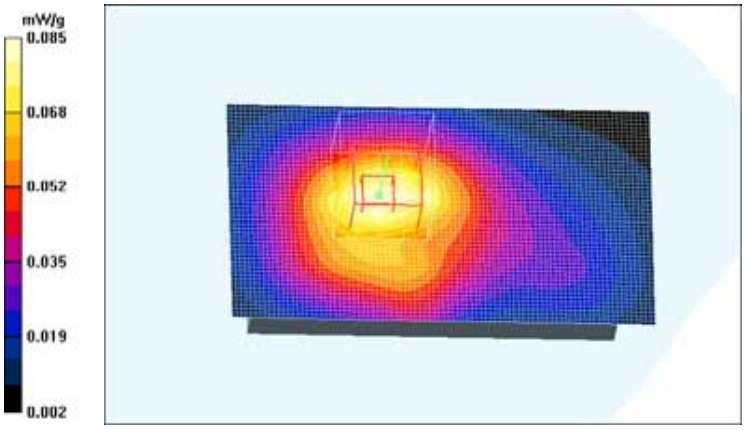
Date/Time: 2006-02-22 10:32:01
Test Laboratory: TCC Nokia
**Type: RM-55;**
**Program Name: Body measurement, Advanced Extrapolation, t=21.8 C, Flip closed, no hs, no MU**

Communication System: WLAN2450; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2462 MHz; $\sigma$ = 1.95 mho/m; $\varepsilon_r$ = 52.5; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1766; ConvF(4.08, 4.08, 4.08); Calibrated: 22.04.2005
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn372; Calibrated: 18.08.2005
- Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1179
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 159

**Body Measurement /Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.089 mW/g

**Body Measurement /Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 5.59 V/m; Power Drift = -0.132 dB
Peak SAR (extrapolated) = 0.152 W/kg
**SAR(1 g) = 0.081 mW/g; SAR(10 g) = 0.048 mW/g**
Maximum value of SAR (measured) = 0.085 mW/g





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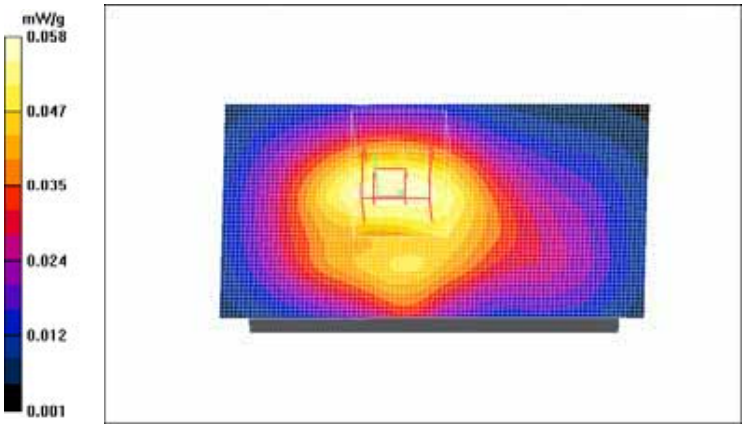
Date/Time: 2006-02-22 11:43:12
Test Laboratory: TCC Nokia
**Type: RM-55;**
**Program Name: Body measurement, Advanced Extrapolation, t=21.5 C, Flip closed, HS-6, no MU**
Communication System: WLAN2450; Frequency: 2442 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2442 MHz; $\sigma$ = 1.91 mho/m; $\varepsilon_r$ = 52.6; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1766; ConvF(4.08, 4.08, 4.08); Calibrated: 22.04.2005
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn372; Calibrated: 18.08.2005
- Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1179
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 159

**Body Measurement /Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.060 mW/g

**Body Measurement /Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 4.66 V/m; Power Drift = -0.086 dB
Peak SAR (extrapolated) = 0.103 W/kg
**SAR(1 g) = 0.055 mW/g; SAR(10 g) = 0.033 mW/g**
Maximum value of SAR (measured) = 0.058 mW/g





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

E-field probe ET3DV, SN: 1395 and 1766
See the next six pages.


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

**S** Schweizerischer Kalibrierdienst
**C** Service suisse d'étalonnage
Servizio svizzero di taratura
**S** Swiss Calibration Service

Accredited by the Swiss Federal Office of Metrology and Accreditation
**The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates**

**Accreditation No.: SCS 108**

**Client** **Nokia Salo TCC**

**Certificate No: ET3-1395_Sep05**

# CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | ET3DV6 - SN:1395 |
| Calibration procedure(s) | QA CAL-01.v5 and QA CAL-12.v4<br>Calibration procedure for dosimetric E-field probes |
| Calibration date: | September 3, 2005 |
| Condition of the calibrated item | In Tolerance |

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 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date (Calibrated by, Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power meter E4419B | GB41293874 | 3-May-05 (METAS, No. 251-00466) | May-06 |
| Power sensor E4412A | MY41495277 | 3-May-05 (METAS, No. 251-00466) | May-06 |
| Power sensor E4412A | MY41498087 | 3-May-05 (METAS, No. 251-00466) | May-06 |
| Reference 3 dB Attenuator | SN: S5054 (3c) | 11-Aug-05 (METAS, No. 251-00499) | Aug-06 |
| Reference 20 dB Attenuator | SN: S5086 (20b) | 3-May-05 (METAS, No. 251-00467) | May-06 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 11-Aug-05 (METAS, No. 251-00500) | Aug-06 |
| Reference Probe ES3DV2 | SN: 3013 | 7-Jan-05 (SPEAG, No. ES3-3013_Jan05) | Jan-06 |
| DAE4 | SN: 654 | 29-Nov-04 (SPEAG, No. DAE4-654_Nov04) | Nov-05 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---|---|---|---|
| RF generator HP 8648C | US3642U01700 | 4-Aug-99 (SPEAG, in house check Dec-03) | In house check: Dec-05 |
| Network Analyzer HP 8753E | US37390585 | 18-Oct-01 (SPEAG, in house check Nov-04) | In house check: Nov 05 |

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

Issued: September 5, 2005

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

# DASY - Parameters of Probe: ET3DV6 SN:1395

## Sensitivity in Free Space[A]

| | | | | |
|---|---|---|---|---|
| NormX | **1.86** ± 10.1% | $\mu V/(V/m)^2$ | DCP X | **91** mV |
| NormY | **1.82** ± 10.1% | $\mu V/(V/m)^2$ | DCP Y | **91** mV |
| NormZ | **1.82** ± 10.1% | $\mu V/(V/m)^2$ | DCP Z | **91** mV |

## Diode Compression[B]

## Sensitivity in Tissue Simulating Liquid (Conversion Factors)

**Please see Page 8.**

## Boundary Effect

**TSL** **900 MHz** **Typical SAR gradient: 5 % per mm**

| Sensor Center to Phantom Surface Distance | | **3.7 mm** | **4.7 mm** |
|---|---|---|---|
| $SAR_{be}$ [%] | Without Correction Algorithm | 9.6 | 5.0 |
| $SAR_{be}$ [%] | With Correction Algorithm | 0.0 | 0.2 |

**TSL** **1750 MHz** **Typical SAR gradient: 10 % per mm**

| Sensor Center to Phantom Surface Distance | | **3.7 mm** | **4.7 mm** |
|---|---|---|---|
| $SAR_{be}$ [%] | Without Correction Algorithm | 13.4 | 8.8 |
| $SAR_{be}$ [%] | With Correction Algorithm | 1.1 | 0.1 |

## Sensor Offset

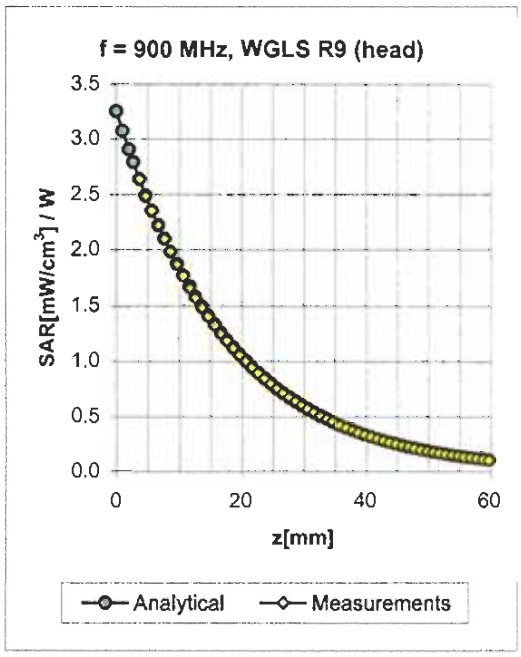
Probe Tip to Sensor Center **2.7** mm

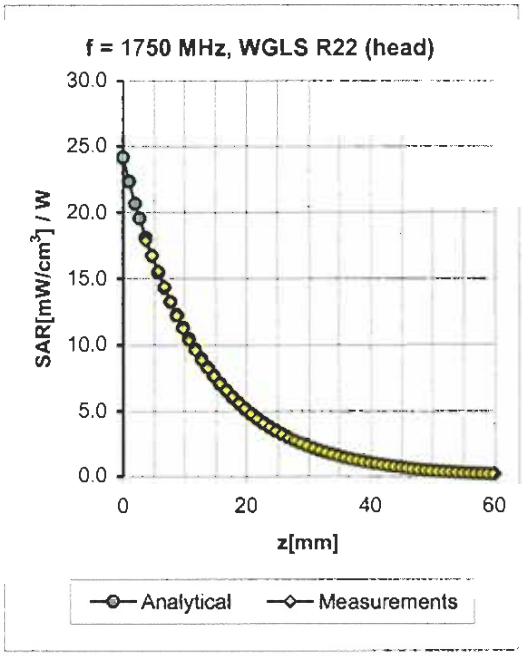
**The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.**

[A] The uncertainties of NormX,Y,Z do not affect the $E^2$-field uncertainty inside TSL (see Page 8).

[B] Numerical linearization parameter: uncertainty not required.

# Conversion Factor Assessment




| f [MHz] | Validity [MHz][c] | TSL | Permittivity | Conductivity | Alpha | Depth | ConvF Uncertainty |
|---|---|---|---|---|---|---|---|
| 450 | ± 50 / ± 100 | Head | 43.5 ± 5% | 0.87 ± 5% | 0.05 | 1.80 | 6.78 ± 13.3% (k=2) |
| 835 | ± 50 / ± 100 | Head | 41.5 ± 5% | 0.90 ± 5% | 0.77 | 1.66 | 5.96 ± 11.0% (k=2) |
| 900 | ± 50 / ± 100 | Head | 41.5 ± 5% | 0.97 ± 5% | 0.71 | 1.77 | 5.88 ± 11.0% (k=2) |
| 1750 | ± 50 / ± 100 | Head | 40.1 ± 5% | 1.37 ± 5% | 0.74 | 2.11 | 4.87 ± 11.0% (k=2) |
| 1900 | ± 50 / ± 100 | Head | 40.0 ± 5% | 1.40 ± 5% | 0.67 | 2.33 | 4.73 ± 11.0% (k=2) |
| 1950 | ± 50 / ± 100 | Head | 40.0 ± 5% | 1.40 ± 5% | 0.67 | 2.32 | 4.54 ± 11.0% (k=2) |
| 2450 | ± 50 / ± 100 | Head | 39.2 ± 5% | 1.80 ± 5% | 0.87 | 1.91 | 4.30 ± 11.8% (k=2) |
| | | | | | | | |
| 450 | ± 50 / ± 100 | Body | 56.7 ± 5% | 0.94 ± 5% | 0.03 | 1.95 | 6.92 ± 13.3% (k=2) |
| 835 | ± 50 / ± 100 | Body | 55.2 ± 5% | 0.97 ± 5% | 0.63 | 1.87 | 5.91 ± 11.0% (k=2) |
| 900 | ± 50 / ± 100 | Body | 55.0 ± 5% | 1.05 ± 5% | 0.62 | 1.93 | 5.71 ± 11.0% (k=2) |
| 1750 | ± 50 / ± 100 | Body | 53.4 ± 5% | 1.49 ± 5% | 0.62 | 2.73 | 4.22 ± 11.0% (k=2) |
| 1900 | ± 50 / ± 100 | Body | 53.3 ± 5% | 1.52 ± 5% | 0.67 | 2.46 | 4.19 ± 11.0% (k=2) |
| 1950 | ± 50 / ± 100 | Body | 53.3 ± 5% | 1.52 ± 5% | 0.68 | 2.37 | 4.09 ± 11.0% (k=2) |
| 2450 | ± 50 / ± 100 | Body | 52.7 ± 5% | 1.95 ± 5% | 0.95 | 1.69 | 4.04 ± 11.8% (k=2) |

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

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

**S** Schweizerischer Kalibrierdienst
**C** Service suisse d'étalonnage
Servizio svizzero di taratura
**S** Swiss Calibration Service

Accredited by the Swiss Federal Office of Metrology and Accreditation
**The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates**

**Accreditation No.: SCS 108**

**Client** **Nokia Oulu**

**Certificate No: ET3-1766_Apr05**

# CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | ET3DV6 - SN:1766 |
| Calibration procedure(s) | QA CAL-01.v5<br>Calibration procedure for dosimetric E-field probes |
| Calibration date: | April 22, 2005 |
| Condition of the calibrated item | In Tolerance |

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 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date (Calibrated by, Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power meter 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 3 dB Attenuator | SN: S5054 (3c) | 10-Aug-04 (METAS, No. 251-00403) | Aug-05 |
| Reference 20 dB Attenuator | SN: S5086 (20b) | 3-May-04 (METAS, No. 251-00389) | May-05 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 10-Aug-04 (METAS, No. 251-00404) | Aug-05 |
| Reference Probe ES3DV2 | SN: 3013 | 7-Jan-05 (SPEAG, No. ES3-3013_Jan05) | Jan-06 |
| DAE4 | SN: 617 | 19-Jan-05 (SPEAG, No. DAE4-617_Jan05) | Jan-06 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---|---|---|---|
| Power sensor HP 8481A | MY41092180 | 18-Sep-02 (SPEAG, in house check Oct-03) | In house check: Oct 05 |
| RF generator HP 8648C | US3642U01700 | 4-Aug-99 (SPEAG, in house check Dec-03) | In house check: Dec-05 |
| Network Analyzer HP 8753E | US37390585 | 18-Oct-01 (SPEAG, in house check Nov-04) | In house check: Nov 05 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Nico Vetterli | Laboratory Technician | N. Vetterli |
| Approved by: | Katja Pokovic | Technical Manager | Pokovic Katja |

Issued: April 25, 2005

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

# DASY - Parameters of Probe: ET3DV6 SN:1766

## Sensitivity in Free Space[A]

| | | | | |
|---|---|---|---|---|
| NormX | **1.99** ± 10.1% | $\mu V/(V/m)^2$ | DCP X | **93** mV |
| NormY | **1.71** ± 10.1% | $\mu V/(V/m)^2$ | DCP Y | **93** mV |
| NormZ | **1.89** ± 10.1% | $\mu V/(V/m)^2$ | DCP Z | **93** mV |

## Diode Compression[B]

## Sensitivity in Tissue Simulating Liquid (Conversion Factors)

**Please see Page 8.**

## Boundary Effect

**TSL** **900 MHz** **Typical SAR gradient: 5 % per mm**

| Sensor Center to Phantom Surface Distance | | **3.7 mm** | **4.7 mm** |
|---|---|---|---|
| $SAR_{be}$ [%] | Without Correction Algorithm | 8.8 | 4.5 |
| $SAR_{be}$ [%] | With Correction Algorithm | 0.1 | 0.3 |

**TSL** **1750 MHz** **Typical SAR gradient: 10 % per mm**

| Sensor Center to Phantom Surface Distance | | **3.7 mm** | **4.7 mm** |
|---|---|---|---|
| $SAR_{be}$ [%] | Without Correction Algorithm | 13.2 | 8.8 |
| $SAR_{be}$ [%] | With Correction Algorithm | 0.9 | 0.1 |

## Sensor Offset

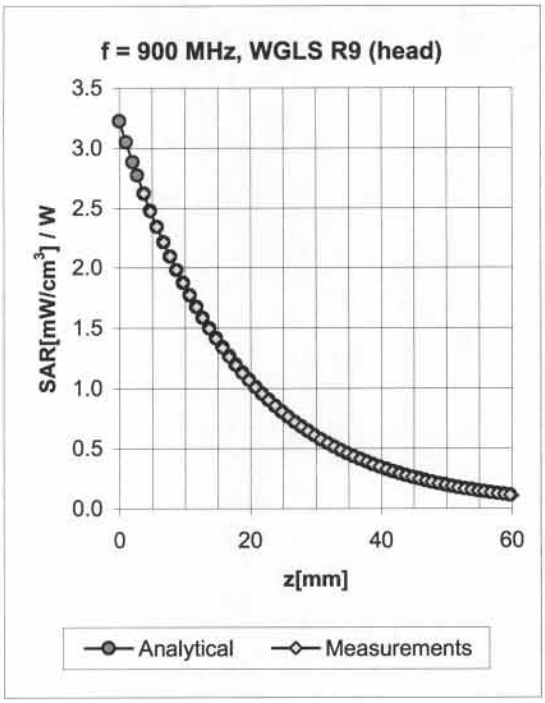
Probe Tip to Sensor Center **2.7** mm

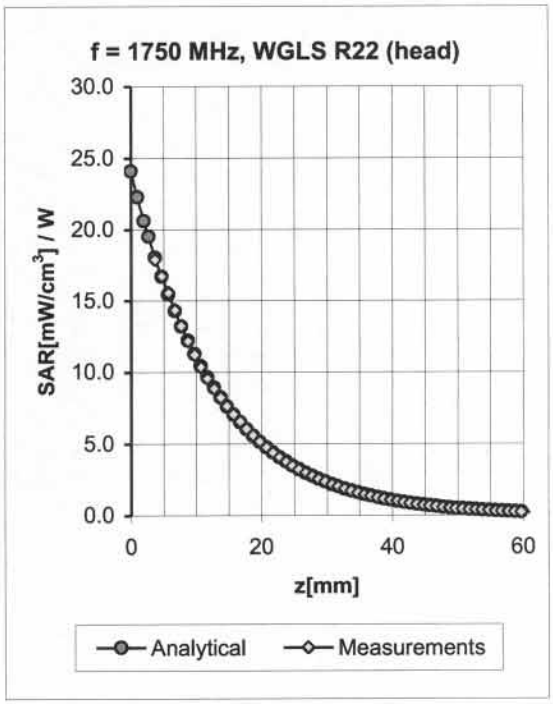
**The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.**

[A] The uncertainties of NormX,Y,Z do not affect the $E^2$-field uncertainty inside TSL (see Page 8).

[B] Numerical linearization parameter: uncertainty not required.

# Conversion Factor Assessment




| f [MHz] | Validity [MHz][C] | TSL | Permittivity | Conductivity | Alpha | Depth | ConvF Uncertainty |
|---|---|---|---|---|---|---|---|
| 835 | ± 50 / ± 100 | Head | 41.5 ± 5% | 0.90 ± 5% | 0.66 | 1.77 | 6.37 ± 11.0% (k=2) |
| 900 | ± 50 / ± 100 | Head | 41.5 ± 5% | 0.97 ± 5% | 0.68 | 1.74 | 6.16 ± 11.0% (k=2) |
| 1750 | ± 50 / ± 100 | Head | 40.1 ± 5% | 1.37 ± 5% | 0.65 | 2.24 | 5.04 ± 11.0% (k=2) |
| 1900 | ± 50 / ± 100 | Head | 40.0 ± 5% | 1.40 ± 5% | 0.64 | 2.36 | 4.90 ± 11.0% (k=2) |
| 1950 | ± 50 / ± 100 | Head | 40.0 ± 5% | 1.40 ± 5% | 0.64 | 2.38 | 4.75 ± 11.0% (k=2) |
| 2450 | ± 50 / ± 100 | Head | 39.2 ± 5% | 1.80 ± 5% | 0.74 | 2.13 | 4.35 ± 11.8% (k=2) |
| | | | | | | | |
| 835 | ± 50 / ± 100 | Body | 55.2 ± 5% | 0.97 ± 5% | 0.53 | 2.03 | 6.32 ± 11.0% (k=2) |
| 900 | ± 50 / ± 100 | Body | 55.0 ± 5% | 1.05 ± 5% | 0.53 | 2.06 | 5.98 ± 11.0% (k=2) |
| 1750 | ± 50 / ± 100 | Body | 53.4 ± 5% | 1.49 ± 5% | 0.63 | 2.59 | 4.59 ± 11.0% (k=2) |
| 1900 | ± 50 / ± 100 | Body | 53.3 ± 5% | 1.52 ± 5% | 0.63 | 2.64 | 4.42 ± 11.0% (k=2) |
| 1950 | ± 50 / ± 100 | Body | 53.3 ± 5% | 1.52 ± 5% | 0.66 | 2.45 | 4.25 ± 11.0% (k=2) |
| 2450 | ± 50 / ± 100 | Body | 52.7 ± 5% | 1.95 ± 5% | 0.82 | 1.95 | 4.08 ± 11.8% (k=2) |

**[C] The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.**

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

1900MHz dipole D1900V2, SN: 5d013
2450MHz dipole D2450V2, SN: 749
See the next six pages.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**Calibration Laboratory of**
Schmid & Partner
Engineering AG
**Zeughausstrasse 43, 8004 Zurich, Switzerland**

**Client** **Nokia Salo TCC**

# CALIBRATION CERTIFICATE

| | |
|---|---|
| Object(s) | D1900V2 - SN:5d013 |
| Calibration procedure(s) | QA CAL-05.v2<br>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.

Date/Time: 07/13/04 11:09:33

Test Laboratory: SPEAG, Zurich, Switzerland

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

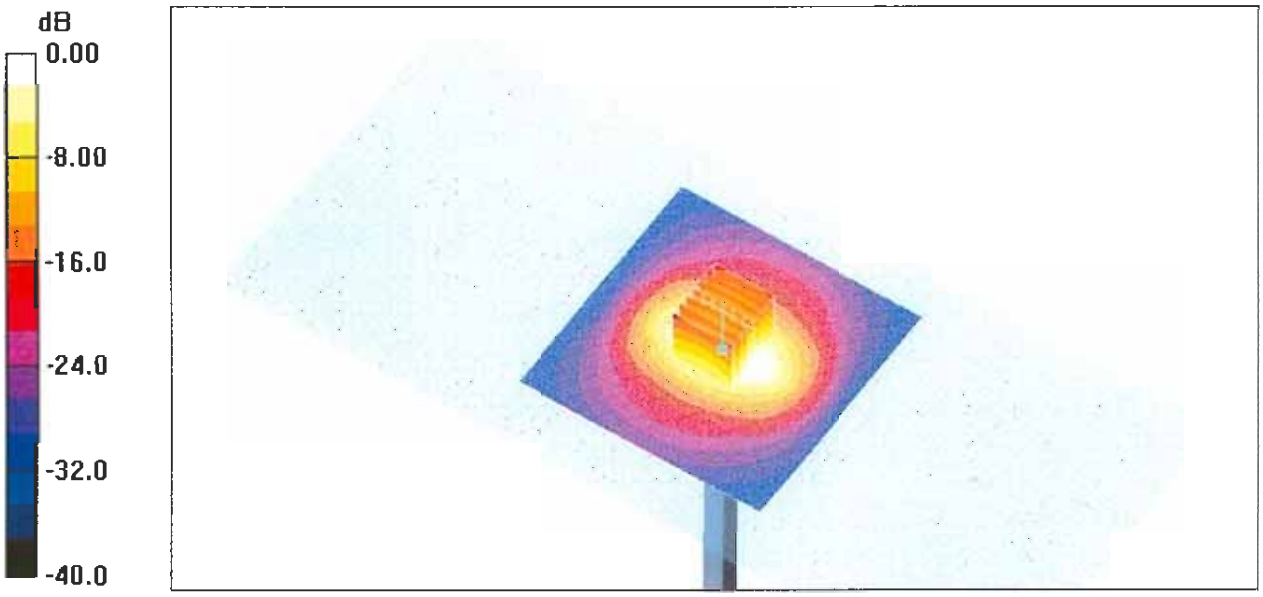
Communication System: CW-1900; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: HSL 1900 MHz;
Medium parameters used: f = 1900 MHz; $\sigma$ = 1.44 mho/m; $\varepsilon_r$ = 39.4; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

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




0 dB = 11.4mW/g

Date/Time: 07/07/04 17:18:35

Test Laboratory: SPEAG, Zurich, Switzerland

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

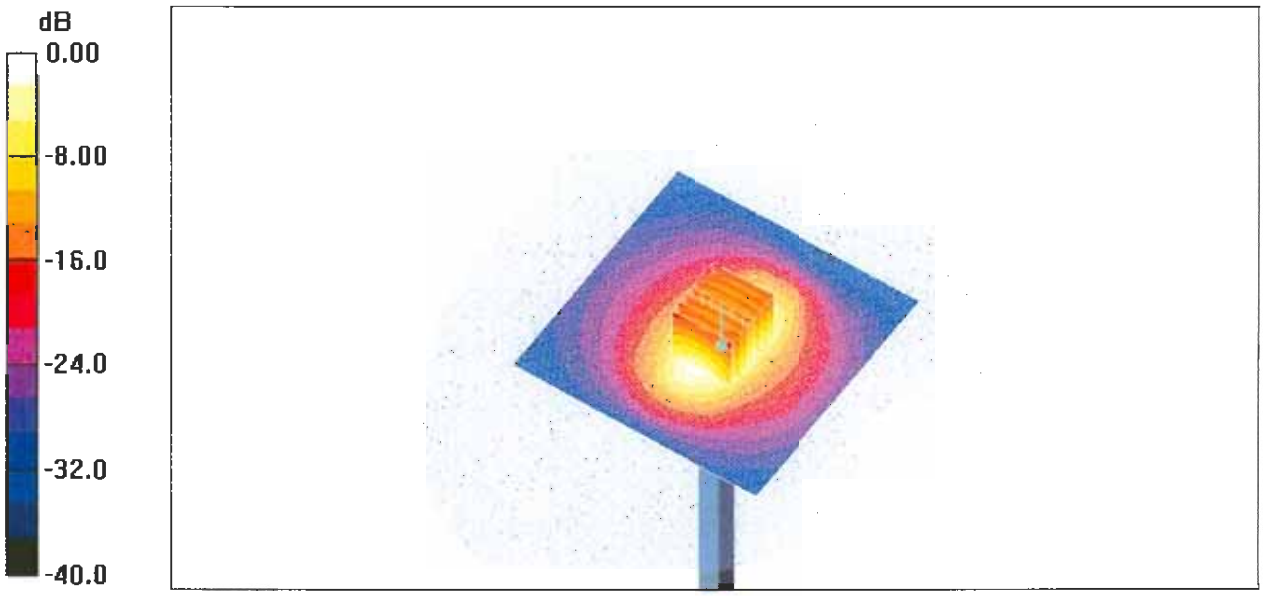
Communication System: CW-1900; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: Muscle 1900 MHz;
Medium parameters used: f = 1900 MHz; $\sigma$ = 1.58 mho/m; $\varepsilon_r$ = 52.2; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

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




0 dB = 11.8mW/g

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

**Client** **Nokia Salo TCC**

# CALIBRATION CERTIFICATE

| | |
|---|---|
| Object(s) | D2450V2 - SN:749 |
| Calibration procedure(s) | QA CAL-05.v2<br>Calibration procedure for dipole validation kits |
| Calibration date: | June 7, 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: June 14, 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.

Date/Time: 06/07/04 11:53:10

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN749**

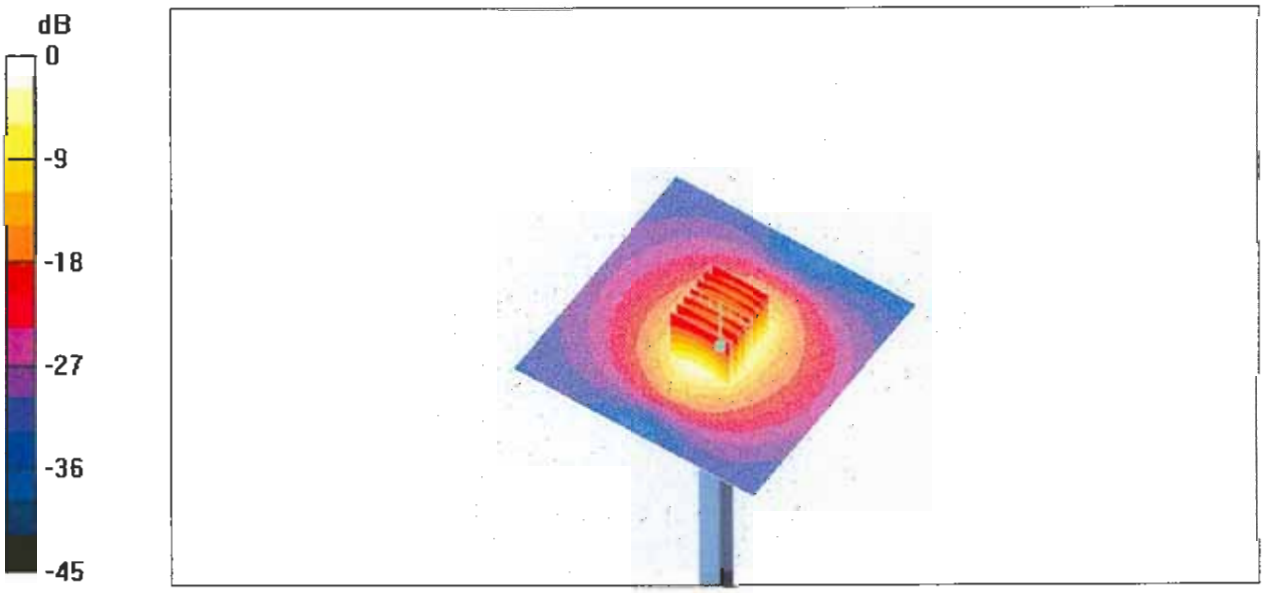
Communication System: CW-2450; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: HSL 2450 MHz;
Medium parameters used: f = 2450 MHz; $\sigma$ = 1.86 mho/m; $\varepsilon_r$ = 38.5; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV2 - SN3025; ConvF(4.55, 4.55, 4.55); Calibrated: 9/29/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn411; Calibrated: 11/6/2003
- Phantom: SAM with CRP - TP1006; Type: SAM 4.0; Serial: TP:1006;
- Measurement SW: DASY4, V4.2 Build 54; Postprocessing SW: SEMCAD, V1.8 Build 112

**Pin = 250 mW; d = 10 mm/Area Scan (81x81x1):** Measurement grid: dx=15mm, dy=15mm
Reference Value = 85.3 V/m; Power Drift = 0.0 dB
Maximum value of SAR (interpolated) = 15.2 mW/g

**Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 85.3 V/m; Power Drift = 0.0 dB
Maximum value of SAR (measured) = 15.2 mW/g
Peak SAR (extrapolated) = 29.2 W/kg
**SAR(1 g) = 13.5 mW/g; SAR(10 g) = 6.11 mW/g**




0 dB = 15.2mW/g

Date/Time: 06/07/04 14:29:30

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN749**

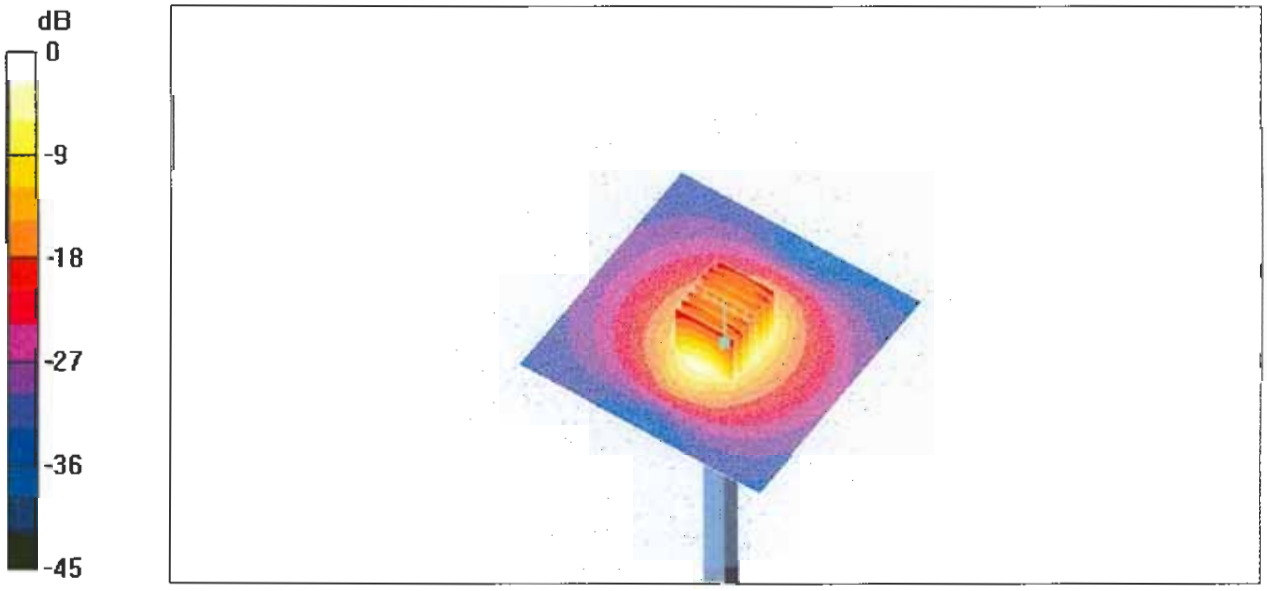
Communication System: CW-2450; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: Muscle 2450 MHz;
Medium parameters used: f = 2450 MHz; $\sigma$ = 2 mho/m; $\varepsilon_r$ = 51.5; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV2 - SN3025; ConvF(4.22, 4.22, 4.22); Calibrated: 9/29/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn411; Calibrated: 11/6/2003
- Phantom: SAM with CRP - TP1006; Type: SAM 4.0; Serial: TP:1006;
- Measurement SW: DASY4, V4.2 Build 54; Postprocessing SW: SEMCAD, V1.8 Build 112

**Pin = 250 mW; d = 10 mm/Area Scan (81x81x1):** Measurement grid: dx=15mm, dy=15mm
Reference Value = 81.2 V/m; Power Drift = 0.0 dB
Maximum value of SAR (interpolated) = 15 mW/g

**Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 81.2 V/m; Power Drift = 0.0 dB
Maximum value of SAR (measured) = 15.1 mW/g
Peak SAR (extrapolated) = 27.5 W/kg
**SAR(1 g) = 13.2 mW/g; SAR(10 g) = 6.1 mW/g**




0 dB = 15.1mW/g