

## SAR Compliance Test Report

|                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                |                                                                                                                                        |
|---------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| <b>Test report no.:</b>                                 | FCC_RM-596_17                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>Date of report:</b>         | 2011-04-15                                                                                                                             |
| <b>Template version:</b>                                | 17.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>Number of pages:</b>        | 51                                                                                                                                     |
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| <b>Tested device:</b>                                   | RM-596                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                |                                                                                                                                        |
| <b>FCC ID:</b>                                          | PDNRM-596X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>IC:</b>                     | 661R-RM596                                                                                                                             |
| <b>Supplement reports:</b>                              | FCC_RM-596_01, FCC_RM-596_06, FCC_RM-596_13 all for RM-596 / FCC ID: PDNRM-596 / IC: 661R-RM596, SAR_Photo_RM-596_19                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                |                                                                                                                                        |
| <b>Testing has been carried out in accordance with:</b> | <b>47CFR §2.1093</b><br>Radiofrequency Radiation Exposure Evaluation: Portable Devices<br><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<br><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<br><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 Technique |                                |                                                                                                                                        |
| <b>Documentation:</b>                                   | The documentation of the testing performed on the tested devices is archived for 15 years at TCC Nokia.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                |                                                                                                                                        |
| <b>Test results:</b>                                    | <b>The tested device complies with the requirements in respect of all parameters subject to the test.</b> 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.                                                                                                                                                                                                                                                                                                                                                                                                |                                |                                                                                                                                        |
| <b>Date and signatures:</b>                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                |                                                                                                                                        |
| <b>For the contents:</b>                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                |                                                                                                                                        |

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## 1. SUMMARY OF SAR TEST REPORT

### 1.1 Test Details

|                                        |                                                           |
|----------------------------------------|-----------------------------------------------------------|
| Period of test                         | 2011-03-08 to 2011-03-15                                  |
| SN, HW and SW numbers of tested device | SN: 356237/04/872514/5, HW: 7473, SW: 013.016, DUT: 15494 |
| Batteries used in testing              | -                                                         |
| Headsets used in testing               | WH-701, DUT: 15495                                        |
| 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)  | Conducted power | Position     | Measured SAR value (1g avg) | Scaled* SAR value (1g avg) | SAR limit (1g avg) | Result        |
|---------------------------|---------------|-----------------|--------------|-----------------------------|----------------------------|--------------------|---------------|
| 2-slot GPRS850            | 251 / 848.8   | 30.8 dBm        | Right, Cheek | 0.879 W/kg                  | <b>0.98 W/kg</b>           | 1.6 W/kg           | <b>PASSED</b> |
| WCDMA850                  | 4233 / 846.6  | 23.5 dBm        | Right, Cheek | 0.635 W/kg                  | <b>0.71 W/kg</b>           | 1.6 W/kg           | <b>PASSED</b> |
| WCDMA1700/2100            | 1412 / 1732.4 | 22.5 dBm        | Left, Cheek  | 0.978 W/kg                  | <b>1.10 W/kg</b>           | 1.6 W/kg           | <b>PASSED</b> |
| GSM1900                   | 810 / 1909.8  | 30.5 dBm        | Left, Cheek  | 0.769 W/kg                  | <b>0.86 W/kg</b>           | 1.6 W/kg           | <b>PASSED</b> |
| WCDMA1900                 | 9262 / 1852.4 | 21.0 dBm        | Left, Cheek  | 0.732 W/kg                  | <b>0.82 W/kg</b>           | 1.6 W/kg           | <b>PASSED</b> |
| WLAN2450***               | 7 / 2442.0    | 18.0 dBm        | Left, Cheek  | 0.888 W/kg                  | <b>0.99 W/kg</b>           | 1.6 W/kg           | <b>PASSED</b> |
| 2-slot GPRS850 + WLAN2450 | -             | -               | Right, Cheek | 0.978 W/kg                  | <b>1.10 W/kg</b>           | 1.6 W/kg           | <b>PASSED</b> |
| WCDMA850 + WLAN2450       | -             | -               | Right, Cheek | 0.733 W/kg                  | <b>0.82 W/kg</b>           | 1.6 W/kg           | <b>PASSED</b> |
| WCDMA1700/2100 + WLAN2450 | -             | -               | Left, Cheek  | 1.03 W/kg                   | <b>1.15 W/kg</b>           | 1.6 W/kg           | <b>PASSED</b> |
| GSM1900 + WLAN2450        | -             | -               | Left, Cheek  | 0.933 W/kg                  | <b>1.04 W/kg</b>           | 1.6 W/kg           | <b>PASSED</b> |
| WCDMA1900 + WLAN2450      | -             | -               | Left, Cheek  | 0.914 W/kg                  | <b>1.02 W/kg</b>           | 1.6 W/kg           | <b>PASSED</b> |

### 1.2.2 Body Worn Configuration

| Mode                      | Ch / f (MHz)  | Conducted power | Separation distance | Measured SAR value (1g avg) | Scaled* SAR value (1g avg) | SAR limit (1g avg) | Result        |
|---------------------------|---------------|-----------------|---------------------|-----------------------------|----------------------------|--------------------|---------------|
| 2-slot GPRS850            | 251 / 848.8   | 30.8 dBm        | 1.5 cm              | 0.826 W/kg                  | <b>0.93 W/kg</b>           | 1.6 W/kg           | <b>PASSED</b> |
| WCDMA850                  | 4233 / 846.6  | 23.5 dBm        | 1.5 cm              | 0.589 W/kg                  | <b>0.66 W/kg</b>           | 1.6 W/kg           | <b>PASSED</b> |
| WCDMA1700/2100            | 1412 / 1732.4 | 22.5 dBm        | 1.5 cm              | 0.738 W/kg                  | <b>0.83 W/kg</b>           | 1.6 W/kg           | <b>PASSED</b> |
| GSM1900                   | 512 / 1850.2  | 30.5 dBm        | 1.5 cm              | 0.550 W/kg                  | <b>0.62 W/kg</b>           | 1.6 W/kg           | <b>PASSED</b> |
| WCDMA1900                 | 9262 / 1852.4 | 21.0 dBm        | 1.5 cm              | 0.561 W/kg                  | <b>0.63 W/kg</b>           | 1.6 W/kg           | <b>PASSED</b> |
| WLAN2450***               | 7 / 2442.0    | 18.0 dBm        | 1.5 cm              | 0.138 W/kg                  | <b>0.15 W/kg</b>           | 1.6 W/kg           | <b>PASSED</b> |
| 2-slot GPRS850 + WLAN2450 | -             | -               | 1.5 cm              | 0.829 W/kg                  | <b>0.93 W/kg</b>           | 1.6 W/kg           | <b>PASSED</b> |
| WCDMA850 + WLAN2450       | -             | -               | 1.5 cm              | 0.592 W/kg                  | <b>0.66 W/kg</b>           | 1.6 W/kg           | <b>PASSED</b> |
| WCDMA1700/2100 + WLAN2450 | -             | -               | 1.5 cm              | 0.773 W/kg                  | <b>0.87 W/kg</b>           | 1.6 W/kg           | <b>PASSED</b> |
| GSM1900 + WLAN2450        | -             | -               | 1.5 cm              | 0.583 W/kg                  | <b>0.65 W/kg</b>           | 1.6 W/kg           | <b>PASSED</b> |
| WCDMA1900 + WLAN2450      | -             | -               | 1.5 cm              | 0.583 W/kg                  | <b>0.65 W/kg</b>           | 1.6 W/kg           | <b>PASSED</b> |

\* SAR values are scaled up by 12% to cover measurement drift. As a consequence of this upwards correction of the SAR values, the contribution of measurement drift to the overall measurement uncertainty (Section 6) is reduced to zero.

\*\*\* SAR data taken from FCC\_RM-596\_06 for RM-596 / FCC ID: PDNRM-596 / IC: 661R-RM596.

### 1.2.3 Maximum Drift

| Maximum drift covered by 12% scaling up of the SAR values | Maximum drift during measurements |
|-----------------------------------------------------------|-----------------------------------|
| 0.5dB                                                     | 0.22dB                            |

### 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 of Operation | Bands                                                 | Modulation Mode         | Duty Cycle | Transmitter Frequency Range (MHz)       |
|--------------------|-------------------------------------------------------|-------------------------|------------|-----------------------------------------|
| GSM                | 850<br>1900                                           | GMSK                    | 1/8        | 824 – 849<br>1850 – 1910                |
| GPRS               | 850<br>1900                                           | GMSK                    | 1/8 to 4/8 | 824 – 849<br>1850 – 1910                |
| EGPRS              | 850<br>1900                                           | GMSK / 8PSK             | 1/8 to 4/8 | 824 – 849<br>1850 – 1910                |
| WCDMA              | 850 (Band V)<br>1700/2100 (Band IV)<br>1900 (Band II) |                         | 1          | 826 – 847<br>1712 – 1753<br>1852 – 1908 |
| HSUPA              | 850 (Band V)<br>1700/2100 (Band IV)<br>1900 (Band II) |                         | 1          | 826 – 847<br>1712 – 1753<br>1852 – 1908 |
| BT                 | 2450                                                  | GFSK                    | 1          | 2402 – 2480                             |
| WLAN b-mode        | 2450                                                  | Up to<br>11Mbps QPSK    | 1          | 2412 – 2462                             |
| WLAN g-mode        | 2450                                                  | Up to<br>54Mbps 64QAM   | 1          | 2412 – 2462                             |
| WLAN n-mode 20MHz  | 2450                                                  | Up to<br>72.2Mbps 64QAM | 1          | 2412 – 2462                             |

Outside of USA and Canada, the transmitter of the device is capable of operating also in GSM/GPRS/EGPRS900, GSM/GPRS/EGPRS1800, WCDMA900 and WCDMA2100 bands which are not part of this filing.

### 2.1 Description of the Antenna

The device has internal antennas for both cellular and WLAN use. The cellular antenna is located at the bottom underneath the back cover. The WLAN antenna is located at the top underneath the back cover.

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### 3. TEST CONDITIONS

#### 3.1 Temperature and Humidity

|                           |             |
|---------------------------|-------------|
| Ambient temperature (°C): | 21.8 – 22.6 |
| Ambient humidity (RH %):  | 29 - 31     |

#### 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.

The transmission mode of the device in all WCDMA tests was configured to 12.2kbps RMC with all TPC bits set as “1”.

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(s) as used for SAR testing. The results are given in the EMC report supporting this application.

The WLAN SAR values reported in this document have been taken from FCC\_RM-596\_06 and FCC\_RM-596\_13 both for RM-596 / FCC ID: PDNRM-596 / IC: 661R-RM596. The number of test cases reported in this document has been minimised based on the earlier testing in FCC\_RM-596\_01 for RM-596 / FCC ID: PDNRM-596 / IC: 661R-RM596.

#### 3.3 Test Cases and Test Minimisation

The tested device examined in this report may not incorporate all of the features described in the text that follows, but its SAR evaluation will have been subjected to the same considerations and test logic described below.

Whilst it's possible to identify the maximum SAR test cases from inspection of the conducted power levels given in the Results tables (Section 7), different modes in the same band and multi-slot transmit GSM/GPRS modes can create some difficulties. Therefore the sequence of the SAR tests made in evaluating this device has used test logic that is based on measured SAR values. Comparison of measured SAR values in this way, can also allow some test minimization (i.e. test elimination) to be made.

For example, when SAR testing multi-slot GSM/GPRS/EGPRS modes, it is an inefficient use of test resources to fully SAR test every test configuration in each of the different modes as these modes have a fixed power relationship between them that is the same, irrespective of the test configuration. In the case of multi-slot GSM/GPRS modes, a single comparative SAR test - using the same test channel and test configuration - is made in each of the n-slot modes; the mode with the highest measured SAR value is then subjected to full SAR testing in all test configurations. These comparative SAR tests (same frequency, same test configuration) are regarded as extremely accurate as they are relative tests in which the tested device changes neither its frequency nor its position between tests. For different modes that operate in the same band and use the same antenna e.g. GSM/GPRS850 and WCDMA850, full SAR testing is carried out in the GSM/GPRS850 mode but WCDMA850 testing is limited to 3 channel testing in the maximum SAR test configuration for GSM/GPRS850.

Multi-slot SAR testing against the Head is always performed whenever such a device offers Push to Talk over cellular with the internal earpiece active, Dual Transfer Mode (i.e. the ability to transmit voice and data simultaneously using the same transmitter) or has WLAN (which enables a Voice over IP call to take place whilst the device can simultaneously transmit data on a cellular band). Whenever a device has an intended multi-slot use against the head, it is also Head SAR tested in EGPRS mode. It should be noted that EGPRS transmit modes can have either GMSK or 8PSK modulation but, when tested, only 8PSK EGPRS will appear explicitly in the results tables, as GMSK EGPRS mode has identical time-averaged power to the reported GPRS mode.

Devices that have flips or slides are fully SAR tested in all device configurations consistent with their intended usage. For example, flip phones that can receive a call in closed mode are SAR tested against the head in both open and closed configurations. Similarly, slide phones are fully SAR tested in all slide configurations in which calls are intended to be made or received.

In the results tables in Section 7, the maximum SAR value for the 'basic' tests (i.e. left cheek, left tilt, right cheek and right tilt in Head SAR testing; with and without headset with the back &/or display side facing the flat phantom in Body SAR testing) is bolded for each band. In some cases, after full testing of the basic SAR test configurations has been completed, additional checking SAR tests are made. These checking tests are always based on the bolded result from the 'basic' testing. When the SAR value of a checking test exceeds the maximum value from the basic tests, it is also bolded and used as the basis for any further checking tests that might be needed.

Checking tests are largely voluntary and can cover optional batteries, different camera slide positions, optional covers, etc. In the case of optional batteries, if the construction of the optional battery is significantly different to the battery used in the full testing e.g. if the outer can is floating electrically rather than grounded, then the maximum SAR test configuration in each band is tested with the optional battery in 3 channels. For camera slides, if the slide

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material is metal, then checking tests in 3 channels are again run for the maximum SAR test configuration in each band. For plastic camera slides, SAR checking is only carried out in the channel that provided the maximum SAR value for the original. Optional front and back covers are tested if their shape differs significantly from the original or if their metallic content varies by more than 15% from the original; in the former case, the testing depends on the extent of the physical differences, whereas in the latter case, 3 channel SAR testing is performed in every band in the max SAR test configuration.

#### 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 4                          | 538           | 12 months            | 2011-09            |
| DAE 4                          | 555           | 12 months            | 2012-02            |
| E-field Probe ES3DV3           | 3194          | 12 months            | 2011-09            |
| E-field Probe ES3DV3           | 3165          | 12 months            | 2012-02            |
| Dipole Validation Kit, D835V2  | 480           | 24 months            | 2011-10            |
| Dipole Validation Kit, D1800V2 | 256           | 24 months            | 2011-10            |
| Dipole Validation Kit, D1900V2 | 5d013         | 24 months            | 2012-03            |
| DASY4 software                 | Version 4.7   | -                    | -                  |

Additional test equipment used in testing:

| Test Equipment          | Model        | Serial Number | Calibration interval | Calibration expiry |
|-------------------------|--------------|---------------|----------------------|--------------------|
| Signal Generator        | SML03        | 101265        | 12 months            | 2011-08            |
| Amplifier               | ZHL-42 (SMA) | N072095-5     | 12 months            | 2011-08            |
| Power Meter             | NRVS         | 838624/032    | 12 months            | 2011-08            |
| Power Sensor            | NRV-Z32      | 839176/020    | 12 months            | 2011-08            |
| Call Tester             | CMU 200      | 101111        | -                    | -                  |
| Call Tester             | CMU 200      | 103293        | -                    | -                  |
| Vector Network Analyzer | 8753E        | US38432928    | 12 months            | 2011-08            |
| Dielectric Probe Kit    | 85070B       | US33020420    | -                    | -                  |

#### 4.1.1 Isotropic E-field Probe Type ES3DV3

|                      |                                                                                                                                                                                              |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Construction</b>  | Symmetrical design with triangular core<br>Interleaved sensors<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 4 GHz (dosimetry); Linearity: $\pm 0.2$ dB (30 MHz to 4 GHz)                                                                                                                       |
| <b>Directivity</b>   | $\pm 0.2$ dB in HSL (rotation around probe axis)<br>$\pm 0.3$ 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: 20 mm<br>Body diameter: 12 mm<br>Tip diameter: 3.9 mm                                                                                                  |
| <b>Application</b>   | Distance from probe tip to dipole centers: 2.0 mm<br>General dosimetry up to 4 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 checks 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 at least 15.0 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 tissue simulants:

##### 800MHz band

| Ingredient      | Head<br>(% by weight) | Body<br>(% by weight) |
|-----------------|-----------------------|-----------------------|
| Deionised Water | 51.50                 | 69.25                 |
| Tween 20        | 47.35                 | 30.00                 |
| Salt            | 1.15                  | 0.75                  |

##### 1800MHz band

| Ingredient      | Head<br>(% by weight) | Body<br>(% by weight) |
|-----------------|-----------------------|-----------------------|
| Deionised Water | 54.0                  | 70.20                 |
| Tween 20        | 45.6                  | 29.37                 |
| Salt            | 0.4                   | 0.43                  |

##### 1900MHz band

| Ingredient      | Head<br>(% by weight) | Body<br>(% by weight) |
|-----------------|-----------------------|-----------------------|
| Deionised Water | 54.50                 | 70.25                 |
| Tween 20        | 45.23                 | 29.41                 |
| Salt            | 0.27                  | 0.34                  |

#### 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] |              |
| 835       | Reference result | 2.36              | 40.5                  | 0.88           |              |
|           | ± 10% window     | 2.12 – 2.60       |                       |                |              |
|           | 2011-03-09       | 2.34              | 40.7                  | 0.89           | 21.0         |
| 1800      | Reference result | 9.90              | 40.0                  | 1.40           |              |
|           | ± 10% window     | 8.91 – 10.89      |                       |                |              |
|           | 2011-03-09       | 10.5              | 38.8                  | 1.36           | 21.0         |
| 1900      | Reference result | 10.2              | 41.2                  | 1.45           |              |
|           | ± 10% window     | 9.2 – 11.2        |                       |                |              |
|           | 2011-03-08       | 11.1              | 39.5                  | 1.39           | 21.0         |

**System checking, body tissue simulant**

| $f$ [MHz] | Description      | SAR [W/kg],<br>1g | Dielectric Parameters |                | Temp<br>[°C] |
|-----------|------------------|-------------------|-----------------------|----------------|--------------|
|           |                  |                   | $\epsilon_r$          | $\sigma$ [S/m] |              |
| 835       | Reference result | 2.52              | 53.2                  | 1.01           |              |
|           | ± 10% window     | 2.27 – 2.77       |                       |                |              |
|           | 2011-03-14       | 2.57              | 53.3                  | 1.01           | 21.0         |
| 1800      | Reference result | 9.61              | 53.5                  | 1.50           |              |
|           | ± 10% window     | 8.65 – 10.57      |                       |                |              |
|           | 2011-03-14       | 10.0              | 51.2                  | 1.49           | 21.0         |
| 1900      | Reference result | 10.4              | 55.0                  | 1.58           |              |
|           | ± 10% window     | 9.4 – 11.4        |                       |                |              |
|           | 2011-03-14       | 11.2              | 52.3                  | 1.54           | 21.0         |

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<br>[MHz] | Description       | Dielectric Parameters |                | Temp<br>[°C] |
|------------|-------------------|-----------------------|----------------|--------------|
|            |                   | $\epsilon_r$          | $\sigma$ [S/m] |              |
| 835        | Recommended value | 41.5                  | 0.90           | 21.0         |
|            | $\pm 5\%$ window  | 39.4 – 43.6           | 0.86 – 0.95    |              |
|            | 2011-03-09        | 40.7                  | 0.89           |              |
| 836        | Recommended value | 41.5                  | 0.90           | 21.0         |
|            | $\pm 5\%$ window  | 39.4 – 43.6           | 0.86 – 0.95    |              |
|            | 2011-03-09        | 40.7                  | 0.89           |              |
| 1732       | Recommended value | 40.1                  | 1.36           | 21.0         |
|            | $\pm 5\%$ window  | 38.1 – 42.1           | 1.29 – 1.43    |              |
|            | 2011-03-09        | 39.1                  | 1.31           |              |
| 1880       | Recommended value | 40.0                  | 1.40           | 21.0         |
|            | $\pm 5\%$ window  | 38.0 – 42.0           | 1.33 – 1.47    |              |
|            | 2011-03-08        | 39.5                  | 1.37           |              |

##### Body tissue simulant measurements

| f<br>[MHz] | Description       | Dielectric Parameters |                | Temp<br>[°C] |
|------------|-------------------|-----------------------|----------------|--------------|
|            |                   | $\epsilon_r$          | $\sigma$ [S/m] |              |
| 835        | Recommended value | 55.2                  | 0.97           | 21.0         |
|            | $\pm 5\%$ window  | 52.4 – 58.0           | 0.92 – 1.02    |              |
|            | 2011-03-14        | 53.3                  | 1.01           |              |
| 836        | Recommended value | 55.2                  | 0.97           | 21.0         |
|            | $\pm 5\%$ window  | 52.4 – 58.0           | 0.92 – 1.02    |              |
|            | 2011-03-14        | 53.2                  | 1.01           |              |
| 1732       | Recommended value | 53.5                  | 1.48           | 21.0         |
|            | $\pm 5\%$ window  | 50.8 – 56.2           | 1.40 – 1.55    |              |
|            | 2011-03-14        | 51.4                  | 1.41           |              |
| 1880       | Recommended value | 53.3                  | 1.52           | 21.0         |
|            | $\pm 5\%$ window  | 50.6 – 56.0           | 1.44 – 1.60    |              |
|            | 2011-03-14        | 52.4                  | 1.52           |              |

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## 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” position 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".

#### 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

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separation distance indicated in Section 1.2.2 using a separate flat spacer that was removed before the start of the measurements.

### 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 | $C_i$           | $C_i \cdot U_i$ (%) | $V_i$ |
|---------------------------------------------------------------------------------|----------------------|----------|-----------|-----|-----------------|---------------------|-------|
| <b>Measurement System</b>                                                       |                      |          |           |     |                 |                     |       |
| 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                | ∞     |
| <b>Test sample Related</b>                                                      |                      |          |           |     |                 |                     |       |
| 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                | ∞     |
| <b>Phantom and Tissue Parameters</b>                                            |                      |          |           |     |                 |                     |       |
| 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     |
| <b>Combined Standard Uncertainty</b>                                            |                      |          | RSS       |     |                 | ±12.9               | 116   |
| <b>Coverage Factor for 95%</b>                                                  |                      |          | k=2       |     |                 |                     |       |
| <b>Expanded Uncertainty</b>                                                     |                      |          |           |     |                 | ±25.8               |       |

## 7. RESULTS

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

### 850MHz Head SAR results

| Mode        | Test configuration |       | SAR, averaged over 1g (W/kg) |                      |                      |
|-------------|--------------------|-------|------------------------------|----------------------|----------------------|
|             |                    |       | Ch 128<br>824.2 MHz          | Ch 190<br>836.6 MHz  | Ch 251<br>848.8 MHz  |
| 2-slot GPRS | Conducted Power    |       | 30.8 dBm                     | 30.8 dBm             | 30.8 dBm             |
|             | Left               | Cheek | -                            | -                    | -                    |
|             |                    | Tilt  | -                            | -                    | -                    |
|             | Right              | Cheek | 0.354                        | 0.599                | <b>0.879</b>         |
|             |                    | Tilt  | -                            | -                    | -                    |
| Mode        | Test configuration |       | SAR, averaged over 1g (W/kg) |                      |                      |
|             |                    |       | Ch 4132<br>826.4 MHz         | Ch 4175<br>835.0 MHz | Ch 4233<br>846.6 MHz |
| WCDMA       | Conducted Power    |       | 23.5 dBm                     | 23.5 dBm             | 23.5 dBm             |
|             | Left               | Cheek | -                            | -                    | -                    |
|             |                    | Tilt  | -                            | -                    | -                    |
|             | Right              | Cheek | 0.303                        | 0.493                | <b>0.635</b>         |
|             |                    | Tilt  | -                            | -                    | -                    |

### 1700/2100 MHz Head SAR results

| Mode  | Test configuration |       | SAR, averaged over 1g (W/kg) |                       |                       |
|-------|--------------------|-------|------------------------------|-----------------------|-----------------------|
|       |                    |       | Ch 1312<br>1712.4 MHz        | Ch 1412<br>1732.4 MHz | Ch 1513<br>1752.6 MHz |
| WCDMA | Conducted Power    |       | 22.5 dBm                     | 22.5 dBm              | 22.5 dBm              |
|       | Left               | Cheek | 0.736                        | <b>0.978</b>          | 0.758                 |
|       |                    | Tilt  | -                            | -                     | -                     |
|       | Right              | Cheek | -                            | -                     | -                     |
|       |                    | Tilt  | -                            | -                     | -                     |

### 1900MHz Head SAR results

| Mode         | Test configuration     |       | SAR, averaged over 1g (W/kg) |                       |                       |
|--------------|------------------------|-------|------------------------------|-----------------------|-----------------------|
|              |                        |       | Ch 512<br>1850.2 MHz         | Ch 661<br>1880.0 MHz  | Ch 810<br>1909.8 MHz  |
| <b>GSM</b>   | <b>Conducted Power</b> |       | <b>30.5 dBm</b>              | <b>30.5 dBm</b>       | <b>30.5 dBm</b>       |
|              | Left                   | Cheek | 0.733                        | 0.744                 | <b>0.769</b>          |
|              |                        | Tilt  | -                            | -                     | -                     |
|              | Right                  | Cheek | -                            | -                     | -                     |
|              |                        | Tilt  | -                            | -                     | -                     |
| Mode         | Test configuration     |       | SAR, averaged over 1g (W/kg) |                       |                       |
|              |                        |       | Ch 9262<br>1852.4 MHz        | Ch 9400<br>1880.0 MHz | Ch 9538<br>1907.6 MHz |
| <b>WCDMA</b> | <b>Conducted Power</b> |       | <b>21.0 dBm</b>              | <b>21.0 dBm</b>       | <b>21.0 dBm</b>       |
|              | Left                   | Cheek | <b>0.732</b>                 | 0.665                 | 0.634                 |
|              |                        | Tilt  | -                            | -                     | -                     |
|              | Right                  | Cheek | -                            | -                     | -                     |
|              |                        | Tilt  | -                            | -                     | -                     |

### 2450MHz Head SAR results\*\*

| Mode                         | Test configuration     |       | SAR, averaged over 1g (W/kg) |                    |                     |
|------------------------------|------------------------|-------|------------------------------|--------------------|---------------------|
|                              |                        |       | Ch 1<br>2412.0 MHz           | Ch 7<br>2442.0 MHz | Ch 11<br>2462.0 MHz |
| <b>WLAN b-mode</b>           | <b>Conducted Power</b> |       | <b>18.0 dBm</b>              | <b>18.0 dBm</b>    | <b>18.0 dBm</b>     |
|                              | Left                   | Cheek | 0.250                        | <b>0.563</b>       | 0.212               |
|                              |                        | Tilt  | -                            | 0.561              | -                   |
|                              | Right                  | Cheek | -                            | 0.379              | -                   |
|                              |                        | Tilt  | -                            | 0.534              | -                   |
| <b>WLAN<br/>n-mode 20MHz</b> | <b>Conducted Power</b> |       | <b>17.5 dBm</b>              | <b>17.5 dBm</b>    | <b>17.5 dBm</b>     |
|                              | Left                   | Cheek | 0.221                        | 0.533              | 0.182               |
|                              |                        | Tilt  | -                            | -                  | -                   |
|                              | Right                  | Cheek | -                            | -                  | -                   |
|                              |                        | Tilt  | -                            | -                  | -                   |

**2450MHz Head SAR results\*\*\***

| Mode               | Test configuration     |       | SAR, averaged over 1g (W/kg) |                    |                     |
|--------------------|------------------------|-------|------------------------------|--------------------|---------------------|
|                    |                        |       | Ch 1<br>2412.0 MHz           | Ch 7<br>2442.0 MHz | Ch 11<br>2462.0 MHz |
| <b>WLAN b-mode</b> | <b>Conducted Power</b> |       | <b>18.0 dBm</b>              | <b>18.0 dBm</b>    | <b>18.0 dBm</b>     |
|                    | Left                   | Cheek | 0.310                        | <b>0.888</b>       | 0.360               |
|                    |                        | Tilt  | -                            | -                  | -                   |
|                    | Right                  | Cheek | 0.181                        | 0.529              | 0.231               |
|                    |                        | Tilt  | -                            | -                  | -                   |

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

**850MHz Body SAR results**

| Mode        | Device orientation     | Test configuration | SAR, averaged over 1g (W/kg) |                      |                      |
|-------------|------------------------|--------------------|------------------------------|----------------------|----------------------|
|             |                        |                    | Ch 128<br>824.2 MHz          | Ch 190<br>836.6 MHz  | Ch 251<br>848.8 MHz  |
| 2-slot GPRS |                        | Conducted Power    | 30.8 dBm                     | 30.8 dBm             | 30.8 dBm             |
|             | Display facing phantom | Without headset    | -                            | -                    | -                    |
|             |                        | Headset WH-701     | -                            | -                    | -                    |
|             | Back facing phantom    | Without headset    | 0.404                        | 0.692                | 0.826                |
|             |                        | Headset WH-701     | -                            | -                    | -                    |
| Mode        | Device orientation     | Test configuration | SAR, averaged over 1g (W/kg) |                      |                      |
|             |                        |                    | Ch 4132<br>826.4 MHz         | Ch 4175<br>835.0 MHz | Ch 4233<br>846.6 MHz |
| WCDMA       |                        | Conducted Power    | 23.5 dBm                     | 23.5 dBm             | 23.5 dBm             |
|             | Display facing phantom | Without headset    | -                            | -                    | -                    |
|             |                        | Headset WH-701     | -                            | -                    | -                    |
|             | Back facing phantom    | Without headset    | 0.312                        | 0.486                | 0.589                |
|             |                        | Headset WH-701     | -                            | -                    | -                    |

### 1700/2100MHz Body SAR results

| Mode  | Device orientation     | Test configuration | SAR, averaged over 1g (W/kg) |                       |                       |
|-------|------------------------|--------------------|------------------------------|-----------------------|-----------------------|
|       |                        |                    | Ch 1312<br>1712.4 MHz        | Ch 1412<br>1732.4 MHz | Ch 1513<br>1752.6 MHz |
| WCDMA |                        | Conducted Power    | 22.5 dBm                     | 22.5 dBm              | 22.5 dBm              |
|       | Display facing phantom | Without headset    | -                            | -                     | -                     |
|       |                        | Headset WH-701     | -                            | -                     | -                     |
|       | Back facing phantom    | Without headset    | -                            | -                     | -                     |
|       |                        | Headset WH-701     | 0.501                        | 0.738                 | 0.594                 |

### 1900MHz Body SAR results

| Mode  | Device orientation     | Test configuration | SAR, averaged over 1g (W/kg) |                       |                       |
|-------|------------------------|--------------------|------------------------------|-----------------------|-----------------------|
|       |                        |                    | Ch 512<br>1850.2 MHz         | Ch 661<br>1880.0 MHz  | Ch 810<br>1909.8 MHz  |
| GSM   |                        | Conducted Power    | 30.5 dBm                     | 30.5 dBm              | 30.5 dBm              |
|       | Display facing phantom | Without headset    | -                            | -                     | -                     |
|       |                        | Headset WH-701     | -                            | -                     | -                     |
|       | Back facing phantom    | Without headset    | -                            | -                     | -                     |
|       |                        | Headset WH-701     | 0.550                        | 0.547                 | 0.520                 |
| Mode  | Device orientation     | Test configuration | SAR, averaged over 1g (W/kg) |                       |                       |
|       |                        |                    | Ch 9262<br>1852.4 MHz        | Ch 9400<br>1880.0 MHz | Ch 9538<br>1907.6 MHz |
| WCDMA |                        | Conducted Power    | 21.0 dBm                     | 21.0 dBm              | 21.0 dBm              |
|       | Display facing phantom | Without headset    | -                            | -                     | -                     |
|       |                        | Headset WH-701     | -                            | -                     | -                     |
|       | Back facing phantom    | Without headset    | 0.561                        | 0.522                 | 0.438                 |
|       |                        | Headset WH-701     | -                            | -                     | -                     |

**2450MHz Body SAR results\*\***

| Mode                 | Device orientation        | Test configuration | SAR, averaged over 1g (W/kg) |                    |                     |
|----------------------|---------------------------|--------------------|------------------------------|--------------------|---------------------|
|                      |                           |                    | Ch 1<br>2412.0 MHz           | Ch 7<br>2442.0 MHz | Ch 11<br>2462.0 MHz |
| WLAN<br>b-mode       |                           | Conducted Power    | 18.0 dBm                     | 18.0 dBm           | 18.0 dBm            |
|                      | Display facing<br>phantom | Without headset    | -                            | 0.072              | -                   |
|                      |                           | Headset WH-701     | -                            | 0.076              | -                   |
|                      | Back facing<br>phantom    | Without headset    | -                            | 0.087              | -                   |
|                      |                           | Headset WH-701     | 0.043                        | 0.096              | 0.045               |
| WLAN<br>n-mode 20MHz |                           | Conducted Power    | 17.5 dBm                     | 17.5 dBm           | 17.5 dBm            |
|                      | Display facing<br>phantom | Without headset    | -                            | -                  | -                   |
|                      |                           | Headset WH-701     | -                            | -                  | -                   |
|                      | Back facing<br>phantom    | Without headset    | -                            | -                  | -                   |
|                      |                           | Headset WH-701     | 0.037                        | 0.090              | 0.042               |

**2450MHz Body SAR results\*\*\***

| Mode        | Device orientation     | Test configuration | SAR, averaged over 1g (W/kg) |                    |                     |
|-------------|------------------------|--------------------|------------------------------|--------------------|---------------------|
|             |                        |                    | Ch 1<br>2412.0 MHz           | Ch 7<br>2442.0 MHz | Ch 11<br>2462.0 MHz |
| WLAN b-mode |                        | Conducted Power    | 18.0 dBm                     | 18.0 dBm           | 18.0 dBm            |
|             | Display facing phantom | Without headset    | -                            | -                  | -                   |
|             |                        | Headset WH-701     | -                            | -                  | -                   |
|             | Back facing phantom    | Without headset    | 0.039                        | 0.124              | 0.053               |
|             |                        | Headset WH-701     | 0.040                        | 0.138              | 0.059               |

**Simultaneous transmissions: Combined SAR results – Individual band Max results**

| Test configuration    | Max. 1g SAR results |                   |              |                    |         |               |
|-----------------------|---------------------|-------------------|--------------|--------------------|---------|---------------|
|                       | WLAN                | 2-slot<br>GPRS850 | WCDMA<br>850 | WCDMA<br>1700/2100 | GSM1900 | WCDMA<br>1900 |
| Head: Left, Cheek     | 0.888***            | -                 | -            | 0.978              | 0.769   | 0.732         |
| Head: Left, Tilt      | 0.561**             | -                 | -            | -                  | -       | -             |
| Head: Right, Cheek    | 0.529***            | 0.879             | 0.635        | -                  | -       | -             |
| Head: Right, Tilt     | 0.534**             | -                 | -            | -                  | -       | -             |
| Body: Without Headset | 0.124***            | 0.826             | 0.589        | -                  | -       | 0.561         |
| Body: Headset WH-701  | 0.138***            | -                 | -            | 0.738              | 0.550   | -             |

**Simultaneous transmissions: Combined SAR results – Max + Max combined results**

| Test configuration    | Combined 1g SAR values      |                    |                              |                   |                     |
|-----------------------|-----------------------------|--------------------|------------------------------|-------------------|---------------------|
|                       | 2-slot<br>GPRS850<br>+ WLAN | WCDMA850<br>+ WLAN | WCDMA<br>1700/2100<br>+ WLAN | GSM1900<br>+ WLAN | WCDMA1900<br>+ WLAN |
| Head: Left, Cheek     | -                           | -                  | 1.866                        | 1.657             | 1.620               |
| Head: Left, Tilt      | -                           | -                  | -                            | -                 | -                   |
| Head: Right, Cheek    | 1.408                       | 1.164              | -                            | -                 | -                   |
| Head: Right, Tilt     | -                           | -                  | -                            | -                 | -                   |
| Body: Without Headset | 0.950                       | 0.713              | -                            | -                 | 0.685               |
| Body: Headset WH-701  | -                           | -                  | 0.876                        | 0.688             | -                   |

\*\* SAR data taken from FCC\_RM-596\_13 for RM-596 / FCC ID: PDNRM-596 / IC: 661R-RM596.

\*\*\* SAR data taken from FCC\_RM-596\_06 for RM-596 / FCC ID: PDNRM-596 / IC: 661R-RM596.

For WCDMA1700/2100 + WLAN, the combined Max + Max SAR value > 1.6. The separation distance between the SAR peaks on the plots is 7.8cm, hence the value of (Max + Max SAR i.e. 1.866)/(separation distance in cm) = 0.24. As this ratio < 0.3, expanded zoom SAR scanning is not required to evaluate the combined SAR value.

For GSM1900 + WLAN, the combined Max + Max SAR value > 1.6. The separation distance between the SAR peaks on the plots is 7.3cm, hence the value of (Max + Max SAR i.e. 1.657)/(separation distance in cm) = 0.23. As this ratio < 0.3, expanded zoom SAR scanning is not required to evaluate the combined SAR value.

For WCDMA1900 + WLAN, the combined Max + Max SAR value > 1.6. The separation distance between the SAR peaks on the plots is 7.2cm, hence the value of (Max + Max SAR i.e. 1.620)/(separation distance in cm) = 0.23. As this ratio < 0.3, expanded zoom SAR scanning is not required to evaluate the combined SAR value.”

The following table gives a more accurate assessment of the SAR values for simultaneous transmission. These values have been calculated using the SPEAG Combined Multiband algorithm, which is based on area scans. It a) converts the 2D area scans into 3D volume scans by assuming frequency-dependent decay characteristics for the E-field, b) sums the SAR values for WLAN2450 and the cellular bands point-by-point and c) calculates the combined average SAR values. It is these values that appear in the Summary table in Section 1.2.

**Simultaneous transmissions: Combined SAR results –  
SPEAG Combined Multiband algorithm results**

| Test configuration    | Combined 1g SAR values      |                    |                              |                   |                     |
|-----------------------|-----------------------------|--------------------|------------------------------|-------------------|---------------------|
|                       | 2-slot<br>GPRS850<br>+ WLAN | WCDMA850<br>+ WLAN | WCDMA<br>1700/2100<br>+ WLAN | GSM1900<br>+ WLAN | WCDMA1900<br>+ WLAN |
| Head: Left, Cheek     | -                           | -                  | 1.03                         | 0.933             | 0.914               |
| Head: Left, Tilt      | -                           | -                  | -                            | -                 | -                   |
| Head: Right, Cheek    | 0.978                       | 0.733              | -                            | -                 | -                   |
| Head: Right, Tilt     | -                           | -                  | -                            | -                 | -                   |
| Body: Without Headset | 0.829                       | 0.592              | -                            | -                 | 0.583               |
| Body: Headset WH-701  | -                           | -                  | 0.773                        | 0.583             | -                   |

Note: Simultaneous Transmission Procedures as described in KDB648474 are not required for this product. The Combined SAR data given in the tables above has been voluntarily calculated.

Plots of the Measurement scans are given in Appendix B.

## APPENDIX A: SYSTEM CHECKING SCANS

Date/Time: 2011-03-09 09:38:22

Test Laboratory: TCC Nokia

Type: D835V2; Serial: D835V2 - SN:480

### Communication System: CW835

Frequency: 835 MHz; Duty Cycle: 1:1

Medium: HSL850; Medium Notes:  $t = 21.3$  C

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.887$  mho/m;  $\epsilon_r = 40.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3194; Probe Notes:
- ConvF(6.09, 6.09, 6.09); Calibrated: 2010-09-09
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn538; Calibrated: 2010-09-09
- Phantom: SAM 3; Type: Twin SAM 040 CA; Serial: TP-1179
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

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

Maximum value of SAR (interpolated) = 2.49 mW/g

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

Reference Value = 53.9 V/m

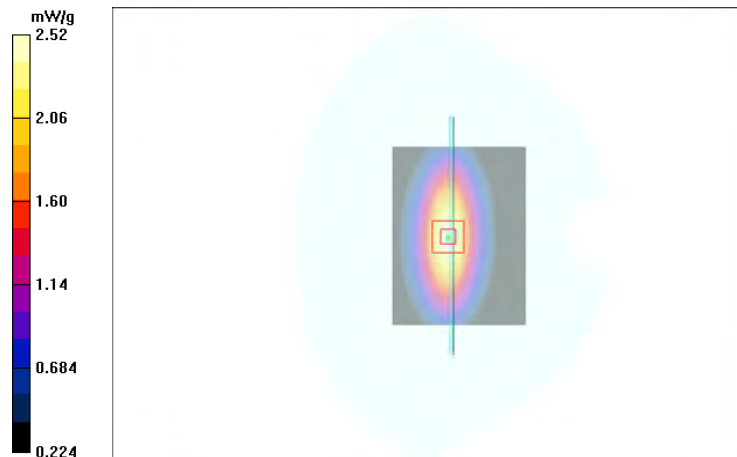
Peak SAR (extrapolated) = 3.56 W/kg

**SAR(1 g) = 2.34 mW/g**

**SAR(10 g) = 1.52 mW/g**

**Power Drift = -0.026 dB**

Maximum value of SAR (measured) = 2.52 mW/g



Date/Time: 2011-03-09 08:29:02

Test Laboratory: TCC Nokia

Type: D1800V2; Serial: D1800V2 - SN:256

**Communication System: CW1800**

Frequency: 1800 MHz; Duty Cycle: 1:1

Medium: HSL1800; Medium Notes:  $t = 21.4$  C

Medium parameters used:  $f = 1800$  MHz;  $\sigma = 1.36$  mho/m;  $\epsilon_r = 38.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

**DASY4 Configuration:**

- Probe: ES3DV3 - SN3165; Probe Notes:
- ConvF(5.19, 5.19, 5.19); Calibrated: 2011-02-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn555; Calibrated: 2011-02-22
- Phantom: SAM 4; Type: Twin SAM 040 CA; Serial: TP-1018
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

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

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

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

Reference Value = 94.4 V/m

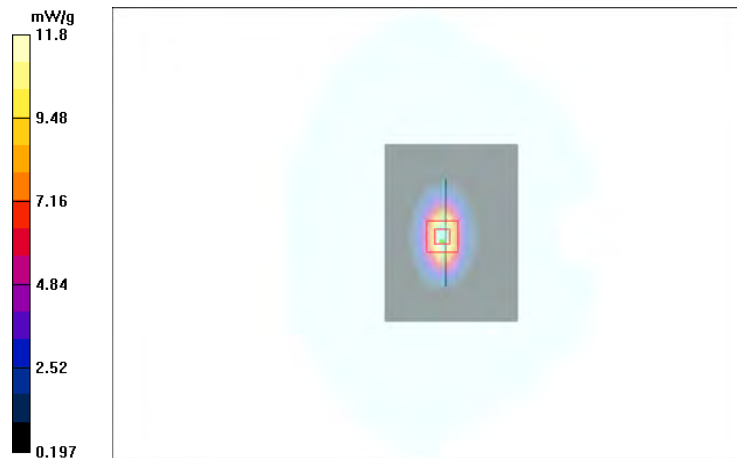
Peak SAR (extrapolated) = 19.5 W/kg

**SAR(1 g) = 10.5 mW/g**

**SAR(10 g) = 5.48 mW/g**

**Power Drift = -0.092 dB**

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



Date/Time: 2011-03-08 10:10:16

Test Laboratory: TCC Nokia

Type: D1900V2; Serial: D1900V2 - SN:5d013

**Communication System: CW1900**

Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: HSL1900; Medium Notes: t= 21.9 C

Medium parameters used: f = 1900 MHz;  $\sigma$  = 1.39 mho/m;  $\epsilon_r$  = 39.5;  $\rho$  = 1000 kg/m<sup>3</sup>

Phantom section: Flat Section

**DASY4 Configuration:**

- Probe: ES3DV3 - SN3165; Probe Notes:
- ConvF(5.03, 5.03, 5.03); Calibrated: 2011-02-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn555; Calibrated: 2011-02-22
- Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1449
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

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

Maximum value of SAR (interpolated) = 13.1 mW/g

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

Reference Value = 94.9 V/m

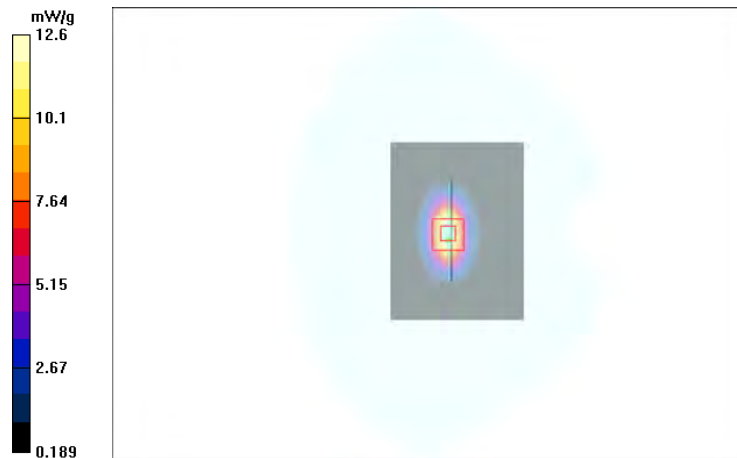
Peak SAR (extrapolated) = 21.1 W/kg

**SAR(1 g) = 11.1 mW/g**

**SAR(10 g) = 5.71 mW/g**

**Power Drift = 0.076 dB**

Maximum value of SAR (measured) = 12.6 mW/g



Date/Time: 2011-03-14 13:49:29

Test Laboratory: TCC Nokia

Type: D835V2; Serial: D835V2 - SN:480

**Communication System: CW835**

Frequency: 835 MHz; Duty Cycle: 1:1

Medium: BSL850; Medium Notes: t= 21.0 C

Medium parameters used: f = 835 MHz;  $\sigma = 1.01$  mho/m;  $\epsilon_r = 53.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3194
- ConvF(5.95, 5.95, 5.95); Calibrated: 2010-09-09
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn538; Calibrated: 2010-09-09
- Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1179
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 184

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

Maximum value of SAR (interpolated) = 2.75 mW/g

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

Reference Value = 52.5 V/m

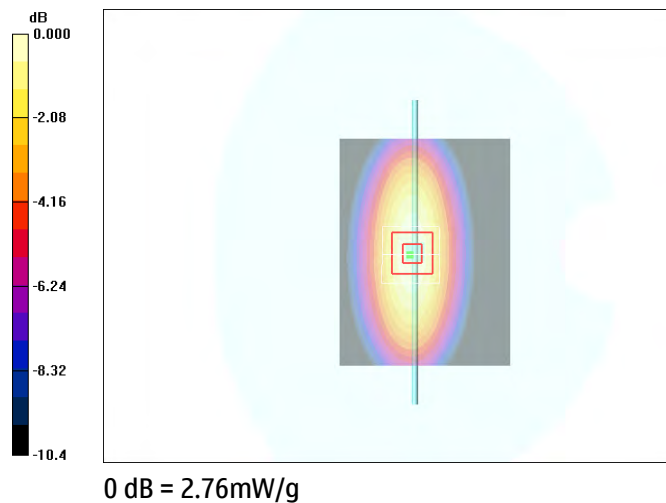
Peak SAR (extrapolated) = 3.84 W/kg

**SAR(1 g) = 2.57 mW/g**

**SAR(10 g) = 1.67 mW/g**

**Power Drift = 0.003 dB**

Maximum value of SAR (measured) = 2.76 mW/g



Date/Time: 2011-03-14 12:19:00

Test Laboratory: TCC Nokia

Type: D1800V2; Serial: D1800V2 - SN:256

**Communication System: CW1800**

Frequency: 1800 MHz; Duty Cycle: 1:1

Medium: BSL1800; Medium Notes: t= 21.9 C

Medium parameters used: f = 1800 MHz;  $\sigma$  = 1.49 mho/m;  $\epsilon_r$  = 51.2;  $\rho$  = 1000 kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3165
- ConvF(4.91, 4.91, 4.91); Calibrated: 2011-02-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn555; Calibrated: 2011-02-22
- Phantom: SAM 3; Type: Twin SAM 040 CA; Serial: TP-1179
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 184

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

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

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

Reference Value = 90.3 V/m

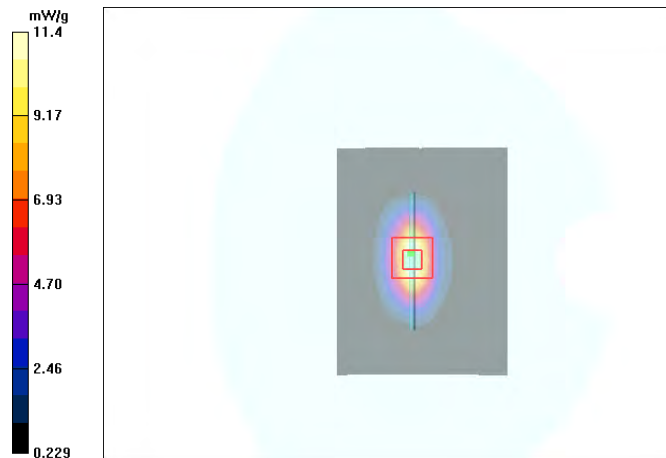
Peak SAR (extrapolated) = 17.4 W/kg

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

**SAR(10 g) = 5.29 mW/g**

**Power Drift = 0.076 dB**

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



Date/Time: 2011-03-14 08:53:33

Test Laboratory: TCC Nokia

Type: D1900V2; Serial: D1900V2 - SN:5d013

**Communication System: CW1900**

Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: BSL1900; Medium Notes: t= 22.2 C

Medium parameters used: f = 1900 MHz;  $\sigma$  = 1.54 mho/m;  $\epsilon_r$  = 52.3;  $\rho$  = 1000 kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3165
- ConvF(4.61, 4.61, 4.61); Calibrated: 2011-02-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn555; Calibrated: 2011-02-22
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 184

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

Maximum value of SAR (interpolated) = 13.0 mW/g

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

Reference Value = 92.6 V/m

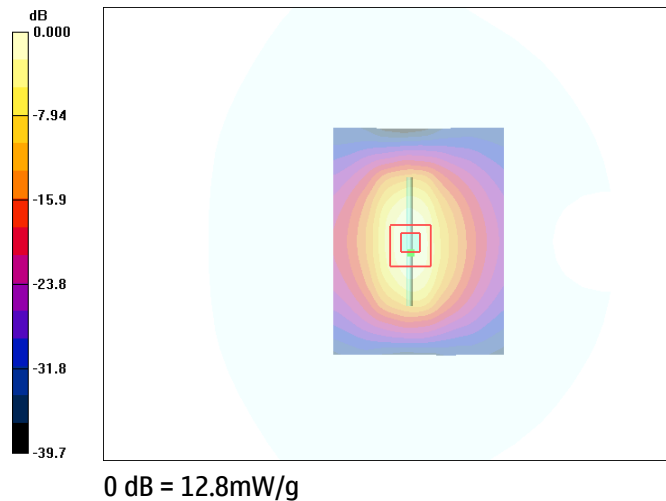
Peak SAR (extrapolated) = 19.8 W/kg

**SAR(1 g) = 11.2 mW/g**

**SAR(10 g) = 5.86 mW/g**

**Power Drift = 0.124 dB**

Maximum value of SAR (measured) = 12.8 mW/g



## APPENDIX B: MEASUREMENT SCANS

Date/Time: 2011-03-09 14:30:55

Test Laboratory: TCC Nokia

Type: RM-596; Serial: 356237/04/872514/5

Communication System: 2-slot GPRS850

Frequency: 848.8 MHz; Duty Cycle: 1:4.2

Medium: HSL850; Medium Notes: t= 21.3 C

Medium parameters used: f = 849 MHz;  $\sigma = 0.897$  mho/m;  $\epsilon_r = 40.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3194; Probe Notes:
- ConvF(6.09, 6.09, 6.09); Calibrated: 2010-09-09
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn538; Calibrated: 2010-09-09
- Phantom: SAM 3; Type: Twin SAM 040 CA; Serial: TP-1179
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Cheek - High/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.958 mW/g

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

Reference Value = 15.0 V/m

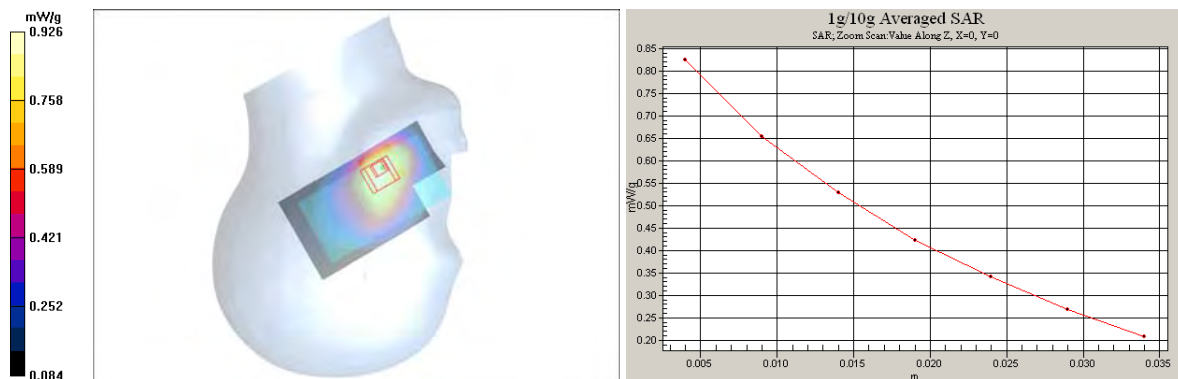
Peak SAR (extrapolated) = 1.22 W/kg

**SAR(1 g) = 0.879 mW/g**

**SAR(10 g) = 0.638 mW/g**

**Power Drift = -0.045 dB**

Maximum value of SAR (measured) = 0.926 mW/g



Date/Time: 2011-03-09 12:48:52

Test Laboratory: TCC Nokia

Type: RM-596; Serial: 356237/04/872514/5

**Communication System: WCDMA850**

Frequency: 846.6 MHz; Duty Cycle: 1:1

Medium: HSL850; Medium Notes: t= 21.3 C

Medium parameters used: f = 847 MHz;  $\sigma$  = 0.896 mho/m;  $\epsilon_r$  = 40.6;  $\rho$  = 1000 kg/m<sup>3</sup>

Phantom section: Right Section

**DASY4 Configuration:**

- Probe: ES3DV3 - SN3194; Probe Notes:
- ConvF(6.09, 6.09, 6.09); Calibrated: 2010-09-09
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn538; Calibrated: 2010-09-09
- Phantom: SAM 3; Type: Twin SAM 040 CA; Serial: TP-1179
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

**Cheek - High/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.685 mW/g

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

Reference Value = 11.6 V/m

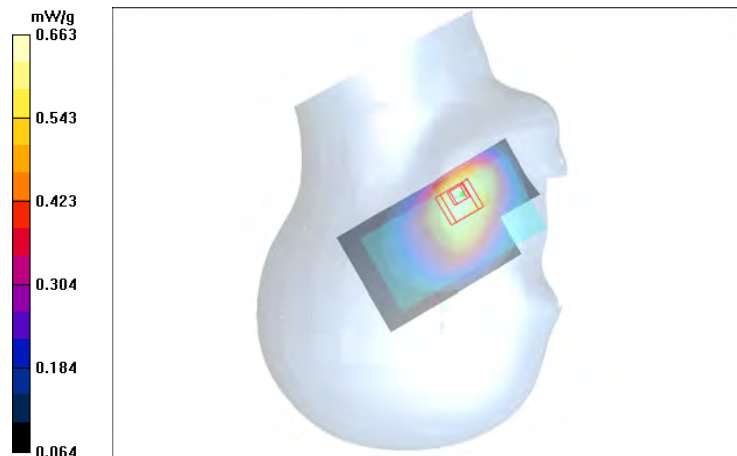
Peak SAR (extrapolated) = 0.884 W/kg

**SAR(1 g) = 0.635 mW/g**

**SAR(10 g) = 0.465 mW/g**

**Power Drift = 0.038 dB**

Maximum value of SAR (measured) = 0.663 mW/g



Date/Time: 2011-03-09 09:05:19

Test Laboratory: TCC Nokia

Type: RM-596; Serial: 356237/04/872514/5

**Communication System: WCDMA1700/2100**

Frequency: 1732.4 MHz; Duty Cycle: 1:1

Medium: HSL1800; Medium Notes: t= 21.4 C

Medium parameters used (interpolated): f = 1732.4 MHz;  $\sigma = 1.31$  mho/m;  $\epsilon_r = 39.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3165; Probe Notes:
- ConvF(5.19, 5.19, 5.19); Calibrated: 2011-02-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn555; Calibrated: 2011-02-22
- Phantom: SAM 4; Type: Twin SAM 040 CA; Serial: TP-1018
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

**Cheek - Middle/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

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

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

Reference Value = 6.85 V/m

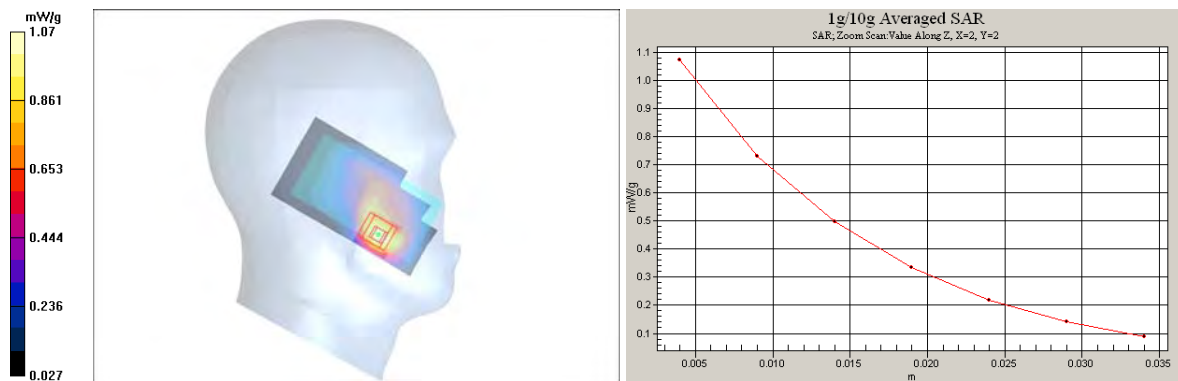
Peak SAR (extrapolated) = 1.48 W/kg

**SAR(1 g) = 0.978 mW/g**

**SAR(10 g) = 0.604 mW/g**

**Power Drift = 0.141 dB**

Maximum value of SAR (measured) = 1.07 mW/g



SAR Report

FCC\_RM-596\_17

Applicant: Nokia Corporation

Type: RM-596

Copyright © 2011 TCC Nokia

Date/Time: 2011-03-08 15:13:52

Test Laboratory: TCC Nokia

Type: RM-596; Serial: 356237/04/872514/5

**Communication System: GSM1900**

Frequency: 1909.8 MHz; Duty Cycle: 1:8.3

Medium: HSL1900; Medium Notes: t= 21.9 C

Medium parameters used: f = 1910 MHz;  $\sigma = 1.4$  mho/m;  $\epsilon_r = 39.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

**DASY4 Configuration:**

- Probe: ES3DV3 - SN3165; Probe Notes:
- ConvF(5.03, 5.03, 5.03); Calibrated: 2011-02-17
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn555; Calibrated: 2011-02-22
- Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1449
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

**Cheek - High/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.856 mW/g

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

Reference Value = 7.94 V/m

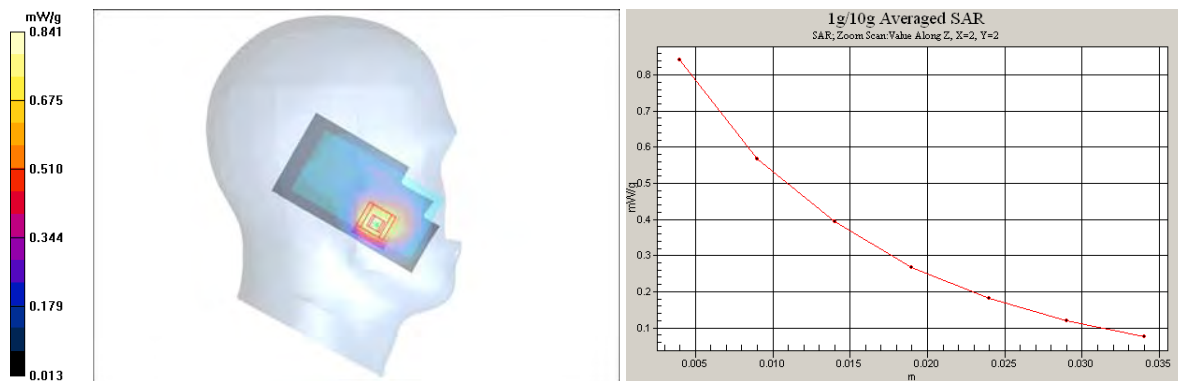
Peak SAR (extrapolated) = 1.23 W/kg

**SAR(1 g) = 0.769 mW/g**

**SAR(10 g) = 0.476 mW/g**

**Power Drift = 0.040 dB**

Maximum value of SAR (measured) = 0.841 mW/g



SAR Report

FCC\_RM-596\_17

Applicant: Nokia Corporation

Type: RM-596

Copyright © 2011 TCC Nokia

Date/Time: 2011-03-08 12:38:10

Test Laboratory: TCC Nokia

Type: RM-596; Serial: 356237/04/872514/5

**Communication System: WCDMA1900**

Frequency: 1852.4 MHz; Duty Cycle: 1:1

Medium: HSL1900; Medium Notes: t= 21.9 C

Medium parameters used (interpolated): f = 1852.4 MHz;  $\sigma = 1.35$  mho/m;  $\epsilon_r = 39.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

**DASY4 Configuration:**

- Probe: ES3DV3 - SN3165; Probe Notes:
- ConvF(5.03, 5.03, 5.03); Calibrated: 2011-02-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn555; Calibrated: 2011-02-22
- Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1449
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

**Cheek - Low/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.817 mW/g

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

Reference Value = 7.12 V/m

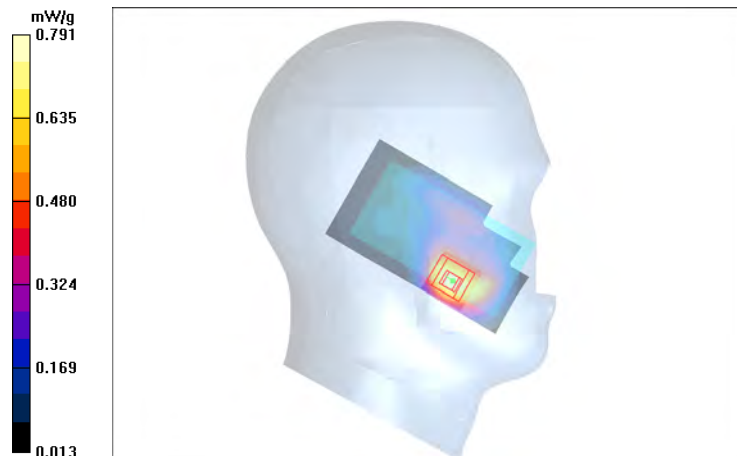
Peak SAR (extrapolated) = 1.15 W/kg

**SAR(1 g) = 0.732 mW/g**

**SAR(10 g) = 0.454 mW/g**

**Power Drift = 0.069 dB**

Maximum value of SAR (measured) = 0.791 mW/g



Date/Time: 2011-03-14 14:51:56

Test Laboratory: TCC Nokia

Type: RM-596; Serial: 356237/04/872514/5

**Communication System: 2-slot GPRS850**

Frequency: 848.8 MHz; Duty Cycle: 1:4.2

Medium: BSL850; Medium Notes: t= 21.0 C

Medium parameters used: f = 849 MHz;  $\sigma = 1.02$  mho/m;  $\epsilon_r = 53.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3194

- ConvF(5.95, 5.95, 5.95); Calibrated: 2010-09-09

- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)

- Electronics: DAE4 Sn538; Calibrated: 2010-09-09

- Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1179

- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 184

**Body - High - No accessory - Back Facing Phantom/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.866 mW/g

**Body - High - No accessory - Back Facing Phantom/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 11.5 V/m

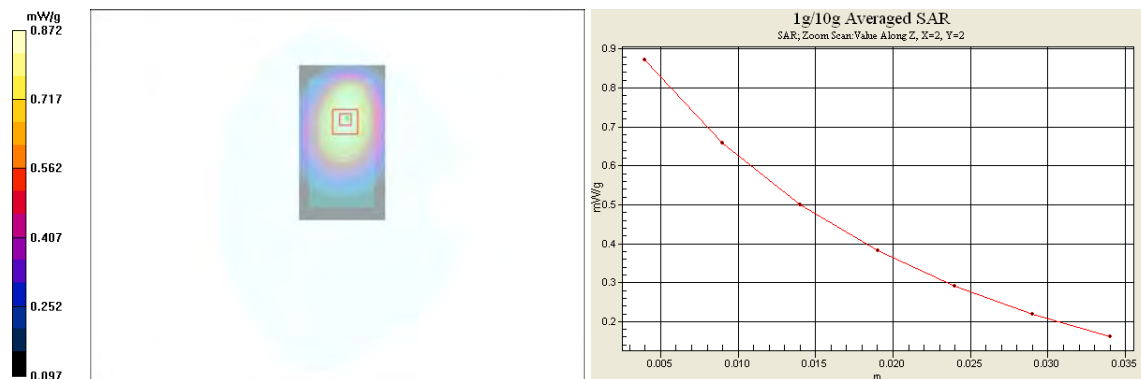
Peak SAR (extrapolated) = 1.08 W/kg

**SAR(1 g) = 0.826 mW/g**

**SAR(10 g) = 0.609 mW/g**

**Power Drift = 0.037 dB**

Maximum value of SAR (measured) = 0.872 mW/g



SAR Report

FCC\_RM-596\_17

Applicant: Nokia Corporation

Type: RM-596

Copyright © 2011 TCC Nokia

Date/Time: 2011-03-15 09:09:28

Test Laboratory: TCC Nokia

Type: RM-596; Serial: 356237/04/872514/5

**Communication System: WCDMA850**

Frequency: 846.6 MHz; Duty Cycle: 1:1

Medium: BSL850; Medium Notes: t= 21.0 C

Medium parameters used: f = 847 MHz;  $\sigma = 1.01$  mho/m;  $\epsilon_r = 53.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

**DASY4 Configuration:**

- Probe: ES3DV3 - SN3194
- ConvF(5.95, 5.95, 5.95); Calibrated: 2010-09-09
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn538; Calibrated: 2010-09-09
- Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1179
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 184

**Body - High - No accessory - Back Facing Phantom/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.608 mW/g

**Body - High - No accessory - Back Facing Phantom/Zoom Scan 3 (5x5x7)/Cube 0:** Measurement grid:

dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 11.0 V/m

Peak SAR (extrapolated) = 0.765 W/kg

**SAR(1 g) = 0.589 mW/g**

**SAR(10 g) = 0.435 mW/g**

**Power Drift = -0.045 dB**

Maximum value of SAR (measured) = 0.620 mW/g



Date/Time: 2011-03-14 13:10:39

Test Laboratory: TCC Nokia

Type: RM-596; Serial: 356237/04/872514/5

**Communication System: WCDMA1700/2100**

Frequency: 1732.4 MHz; Duty Cycle: 1:1

Medium: BSL1800; Medium Notes: t= 21.9 C

Medium parameters used (interpolated): f = 1732.4 MHz;  $\sigma = 1.41$  mho/m;  $\epsilon_r = 51.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3165
- ConvF(4.91, 4.91, 4.91); Calibrated: 2011-02-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn555; Calibrated: 2011-02-22
- Phantom: SAM 3; Type: Twin SAM 040 CA; Serial: TP-1179
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 184

**Body - Middle - WH-701 - Back Facing Phantom/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.835 mW/g

**Body - Middle - WH-701 - Back Facing Phantom/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 9.63 V/m

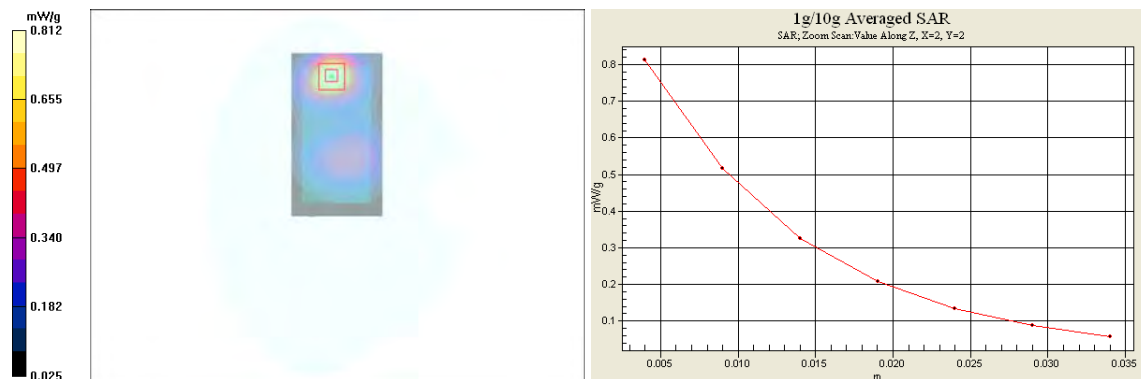
Peak SAR (extrapolated) = 1.15 W/kg

**SAR(1 g) = 0.738 mW/g**

**SAR(10 g) = 0.442 mW/g**

**Power Drift = -0.164 dB**

Maximum value of SAR (measured) = 0.812 mW/g



SAR Report

FCC\_RM-596\_17

Applicant: Nokia Corporation

Type: RM-596

Copyright © 2011 TCC Nokia

Date/Time: 2011-03-14 09:36:08

Test Laboratory: TCC Nokia

Type: RM-596; Serial: 356237/04/872514/5

**Communication System: GSM1900**

Frequency: 1850.2 MHz; Duty Cycle: 1:8.3

Medium: BSL1900; Medium Notes: t= 22.2 C

Medium parameters used (interpolated): f = 1850.2 MHz;  $\sigma$  = 1.49 mho/m;  $\epsilon_r$  = 52.5;  $\rho$  = 1000 kg/m<sup>3</sup>

Phantom section: Flat Section

**DASY4 Configuration:**

- Probe: ES3DV3 - SN3165
- ConvF(4.61, 4.61, 4.61); Calibrated: 2011-02-17
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn555; Calibrated: 2011-02-22
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 184

**Body - Low - WH-701 - Back Facing Phantom/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.608 mW/g

**Body - Low - WH-701 - Back Facing Phantom/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 10.5 V/m

Peak SAR (extrapolated) = 0.870 W/kg

**SAR(1 g) = 0.550 mW/g**

**SAR(10 g) = 0.332 mW/g**

**Power Drift = -0.061 dB**

Maximum value of SAR (measured) = 0.598 mW/g



Date/Time: 2011-03-14 10:21:57

Test Laboratory: TCC Nokia

Type: RM-596; Serial: 356237/04/872514/5

**Communication System: WCDMA1900**

Frequency: 1852.4 MHz; Duty Cycle: 1:1

Medium: BSL1900; Medium Notes: t= 22.2 C

Medium parameters used (interpolated): f = 1852.4 MHz;  $\sigma = 1.49$  mho/m;  $\epsilon_r = 52.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

**DASY4 Configuration:**

- Probe: ES3DV3 - SN3165

- ConvF(4.61, 4.61, 4.61); Calibrated: 2011-02-17

- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)

- Electronics: DAE4 Sn555; Calibrated: 2011-02-22

- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177

- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 184

**Body - Low - No accessory - Back Facing Phantom/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.613 mW/g

**Body - Low - No accessory - Back Facing Phantom/Zoom Scan 3 (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 11.1 V/m

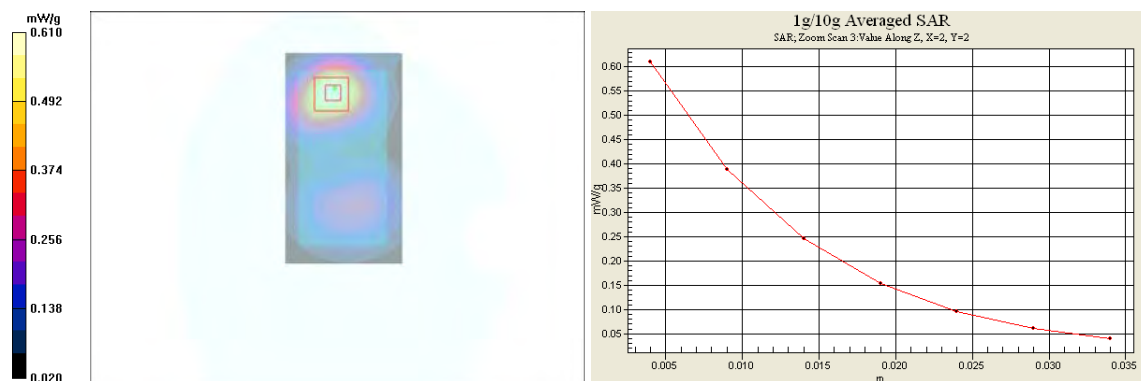
Peak SAR (extrapolated) = 0.885 W/kg

**SAR(1 g) = 0.561 mW/g**

**SAR(10 g) = 0.340 mW/g**

**Power Drift = -0.018 dB**

Maximum value of SAR (measured) = 0.610 mW/g



SAR Report

FCC\_RM-596\_17

Applicant: Nokia Corporation

Type: RM-596

Copyright © 2011 TCC Nokia

ate/Time: 2011-03-09 14:30:55, Date/Time: 2010-06-17 12:31:40

Test Laboratory: TCC Nokia

Type: RM-596; Serial: 356237/04/872514/5, Serial: 004402/13/086642/3

**Communication System: 2-slot GPRS850, Communication System: WLAN2450 b-mode**

Frequency: 848.8 MHz, Frequency: 2442 MHz; Duty Cycle: 1:4.2, Duty Cycle: 1:1

Medium: HSL850, Medium: HSL2450; Medium Notes: t= 21.3 C, Medium Notes: 19.1C

Medium parameters used: f = 849 MHz;  $\sigma$  = 0.897 mho/m;  $\epsilon_r$  = 40.6;  $\rho$  = 1000 kg/m<sup>3</sup>, Medium parameters used:  
f = 2442 MHz;  $\sigma$  = 1.81 mho/m;  $\epsilon_r$  = 37.6;  $\rho$  = 1000 kg/m<sup>3</sup>

Phantom section: Right Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3194, Probe: EX3DV4 - SN3573
- ConvF(6.09, 6.09, 6.09), ConvF(6.56, 6.56, 6.56); Calibrated: 2010-09-09, Calibrated: 2009-11-20
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))
- Electronics: DAE4 Sn538, Electronics: DAE4 Sn555; Calibrated: 2010-09-09, Calibrated: 2009-10-15
- Phantom: SAM 3, Phantom: SAM1; Type: Twin SAM 040 CA, Type: SAM; Serial: TP-1179, Serial: TP-1126
- ; SEMCAD X Version 14.0 Build 61

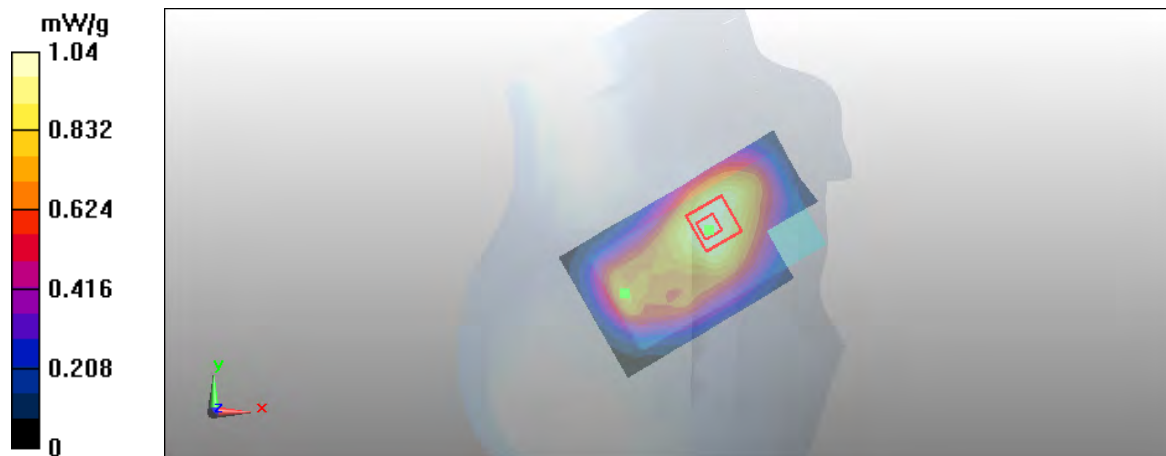
**Configuration/Cheek - High/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm**

**Configuration/Cheek - Middle/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm**

**Motorola Fast SAR of Combined Scans: SAR(1 g) = 0.978 mW/g**

**SAR(10 g) = 0.670 mW/g**

Maximum value of SAR (measured) = 1.04 mW/g



Date/Time: 2011-03-09 12:48:52, Date/Time: 2010-06-17 12:31:40

Test Laboratory: TCC Nokia

Type: RM-596; Serial: 356237/04/872514/5, Serial: 004402/13/086642/3

**Communication System: WCDMA850, Communication System: WLAN2450 b-mode**

Frequency: 846.6 MHz, Frequency: 2442 MHz; Duty Cycle: 1:1

Medium: HSL850, Medium: HSL2450; Medium Notes: t= 21.3 C, Medium Notes: 19.1C

Medium parameters used:  $f = 847$  MHz;  $\sigma = 0.896$  mho/m;  $\epsilon_r = 40.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  
 $f = 2442$  MHz;  $\sigma = 1.81$  mho/m;  $\epsilon_r = 37.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3194, Probe: EX3DV4 - SN3573
- ConvF(6.09, 6.09, 6.09), ConvF(6.56, 6.56, 6.56); Calibrated: 2010-09-09, Calibrated: 2009-11-20
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))
- Electronics: DAE4 Sn538, Electronics: DAE4 Sn555; Calibrated: 2010-09-09, Calibrated: 2009-10-15
- Phantom: SAM 3, Phantom: SAM1; Type: Twin SAM 040 CA, Type: SAM; Serial: TP-1179, Serial: TP-1126
- ; SEMCAD X Version 14.0 Build 61

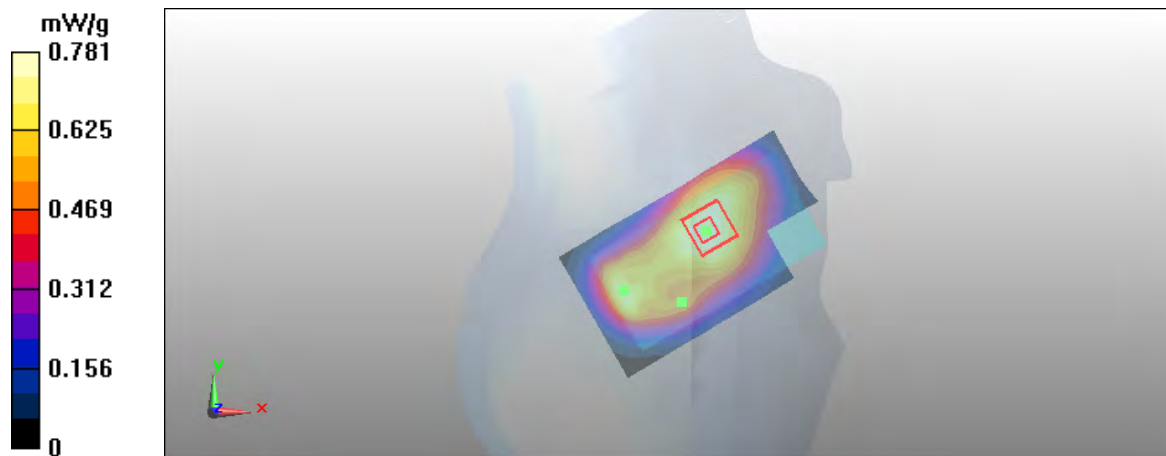
**Configuration/Cheek - High/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm**

**Configuration/Cheek - Middle/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm**

**Motorola Fast SAR of Combined Scans: SAR(1 g) = 0.733 mW/g**

**SAR(10 g) = 0.496 mW/g**

Maximum value of SAR (measured) = 0.781 mW/g



Date/Time: 2011-03-09 09:05:19, Date/Time: 2010-06-16 14:06:20

Test Laboratory: TCC Nokia

Type: RM-596; Serial: 356237/04/872514/5, Serial: 004402/13/086642/3

**Communication System: WCDMA1700/2100, Communication System: WLAN2450 b-mode**

Frequency: 1732.4 MHz, Frequency: 2442 MHz; Duty Cycle: 1:1

Medium: HSL1800, Medium: HSL2450; Medium Notes: t= 21.4 C, Medium Notes: 19.2C

Medium parameters used (interpolated): f = 1732.4 MHz;  $\sigma$  = 1.31 mho/m;  $\epsilon_r$  = 39.1;  $\rho$  = 1000 kg/m<sup>3</sup>, Medium parameters used: f = 2442 MHz;  $\sigma$  = 1.83 mho/m;  $\epsilon_r$  = 37.6;  $\rho$  = 1000 kg/m<sup>3</sup>

Phantom section: Left Section

DASY4 Configuration:

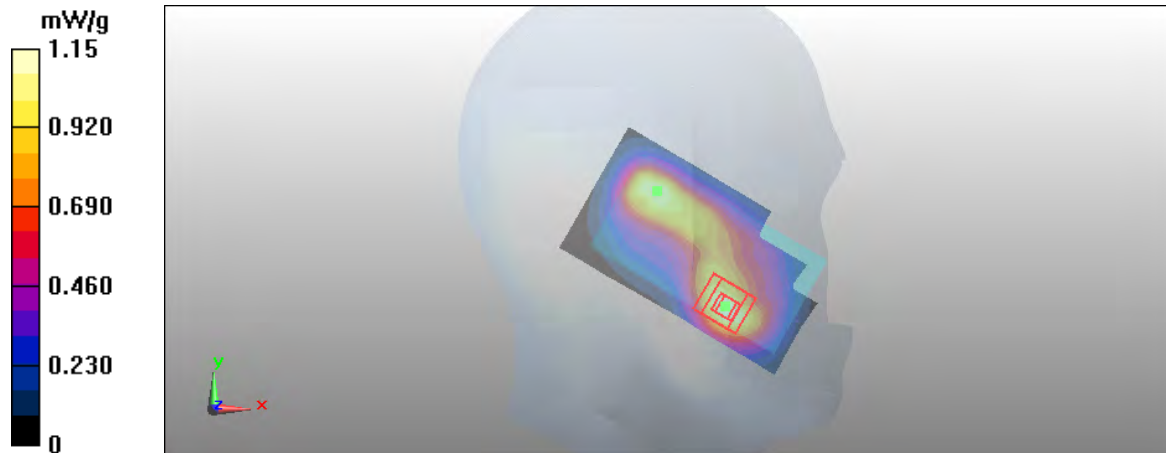
- Probe: ES3DV3 - SN3165, Probe: EX3DV4 - SN3573
- ConvF(5.19, 5.19, 5.19), ConvF(6.56, 6.56, 6.56); Calibrated: 2011-02-17, Calibrated: 2009-11-20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn555; Calibrated: 2011-02-22, Calibrated: 2009-10-15
- Phantom: SAM 4, Phantom: SAM1; Type: Twin SAM 040 CA, Type: SAM; Serial: TP-1018, Serial: TP-1126
- ; SEMCAD X Version 14.0 Build 61

**Configuration/Cheek - Middle/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm**

**Motorola Fast SAR of Combined Scans: SAR(1 g) = 1.03 mW/g**

**SAR(10 g) = 0.596 mW/g**

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



Date/Time: 2011-03-08 15:13:52, Date/Time: 2010-06-16 14:06:20

Test Laboratory: TCC Nokia

Type: RM-596; Serial: 356237/04/872514/5, Serial: 004402/13/086642/3

**Communication System: GSM1900, Communication System: WLAN2450 b-mode**

Frequency: 1909.8 MHz, Frequency: 2442 MHz; Duty Cycle: 1:8.3, Duty Cycle: 1:1

Medium: HSL1900, Medium: HSL2450; Medium Notes: t= 21.9 C, Medium Notes: 19.2C

Medium parameters used:  $f = 1910$  MHz;  $\sigma = 1.4$  mho/m;  $\epsilon_r = 39.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  
 $f = 2442$  MHz;  $\sigma = 1.83$  mho/m;  $\epsilon_r = 37.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3165, Probe: EX3DV4 - SN3573
- ConvF(5.03, 5.03, 5.03), ConvF(6.56, 6.56, 6.56); Calibrated: 2011-02-17, Calibrated: 2009-11-20
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn555; Calibrated: 2011-02-22, Calibrated: 2009-10-15
- Phantom: SAM 1, Phantom: SAM1; Type: Twin SAM 040 CA, Type: SAM; Serial: TP-1449, Serial: TP-1126
- ; SEMCAD X Version 14.0 Build 61

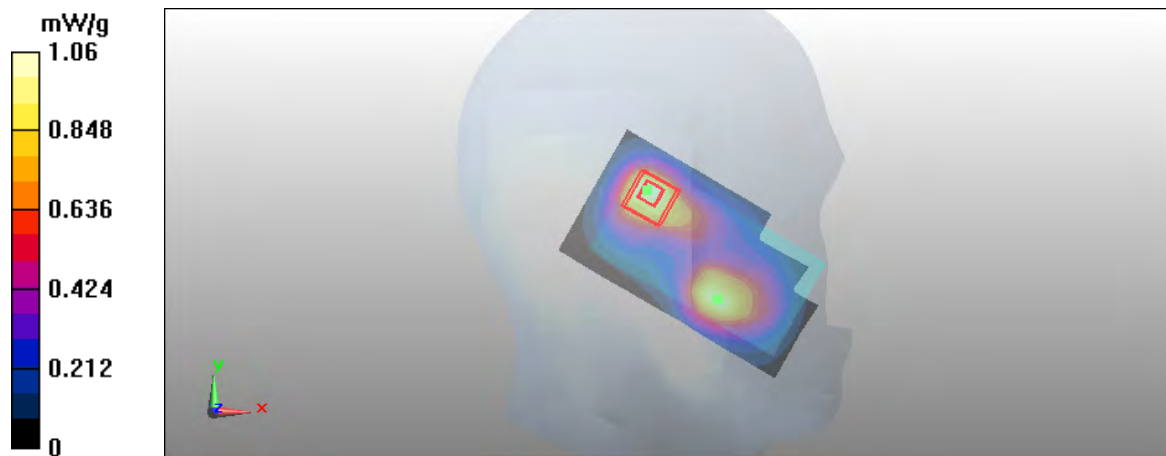
**Configuration/Cheek - High/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm**

**Configuration/Cheek - Middle/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm**

**Motorola Fast SAR of Combined Scans: SAR(1 g) = 0.933 mW/g**

**SAR(10 g) = 0.491 mW/g**

Maximum value of SAR (measured) = 1.06 mW/g



Date/Time: 2011-03-08 12:38:10, Date/Time: 2010-06-16 14:06:20

Test Laboratory: TCC Nokia

Type: RM-596; Serial: 356237/04/872514/5, Serial: 004402/13/086642/3

**Communication System: WCDMA1900, Communication System: WLAN2450 b-mode**

Frequency: 1852.4 MHz, Frequency: 2442 MHz; Duty Cycle: 1:1

Medium: HSL1900, Medium: HSL2450; Medium Notes: t= 21.9 C, Medium Notes: 19.2C

Medium parameters used (interpolated):  $f = 1852.4$  MHz;  $\sigma = 1.35$  mho/m;  $\epsilon_r = 39.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 2442$  MHz;  $\sigma = 1.83$  mho/m;  $\epsilon_r = 37.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3165, Probe: EX3DV4 - SN3573
- ConvF(5.03, 5.03, 5.03), ConvF(6.56, 6.56, 6.56); Calibrated: 2011-02-17, Calibrated: 2009-11-20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn555; Calibrated: 2011-02-22, Calibrated: 2009-10-15
- Phantom: SAM 1, Phantom: SAM1; Type: Twin SAM 040 CA, Type: SAM; Serial: TP-1449, Serial: TP-1126
- ; SEMCAD X Version 14.0 Build 61

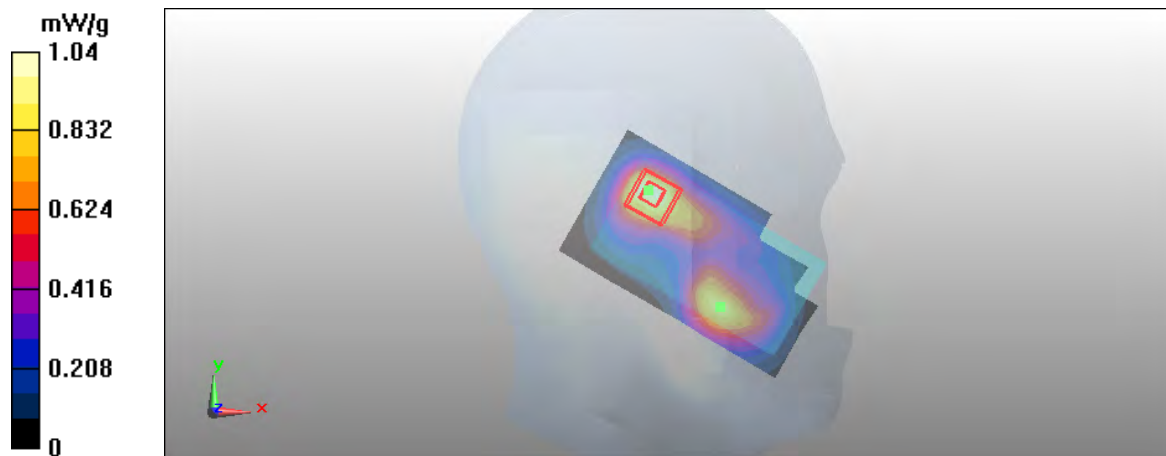
**Configuration/Cheek - Low/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm**

**Configuration/Cheek - Middle/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm**

**Motorola Fast SAR of Combined Scans: SAR(1 g) = 0.914 mW/g**

**SAR(10 g) = 0.478 mW/g**

Maximum value of SAR (measured) = 1.04 mW/g



Date/Time: 2011-03-14 14:51:56, Date/Time: 2010-06-22 14:31:56

Test Laboratory: TCC Nokia

Type: RM-596; Serial: 356237/04/872514/5, Serial: 004402/13/086642/3

**Communication System: 2-slot GPRS850, Communication System: WLAN2450 b-mode**

Frequency: 848.8 MHz, Frequency: 2442 MHz; Duty Cycle: 1:4.2, Duty Cycle: 1:1

Medium: BSL850, Medium: BSL2450; Medium Notes: t= 21.0 C, Medium Notes: 20.7C

Medium parameters used: f = 849 MHz;  $\sigma = 1.02$  mho/m;  $\epsilon_r = 53.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  
f = 2442 MHz;  $\sigma = 1.99$  mho/m;  $\epsilon_r = 51$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3194, Probe: EX3DV4 - SN3573
- ConvF(5.95, 5.95, 5.95), ConvF(6.63, 6.63, 6.63); Calibrated: 2010-09-09, Calibrated: 2009-11-20
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn538, Electronics: DAE4 Sn555; Calibrated: 2010-09-09, Calibrated: 2009-10-15
- Phantom: SAM 1, Phantom: SAM2; Type: Twin SAM 040 CA, Type:; Serial: TP-1179, Serial:
- ; SEMCAD X Version 14.0 Build 61

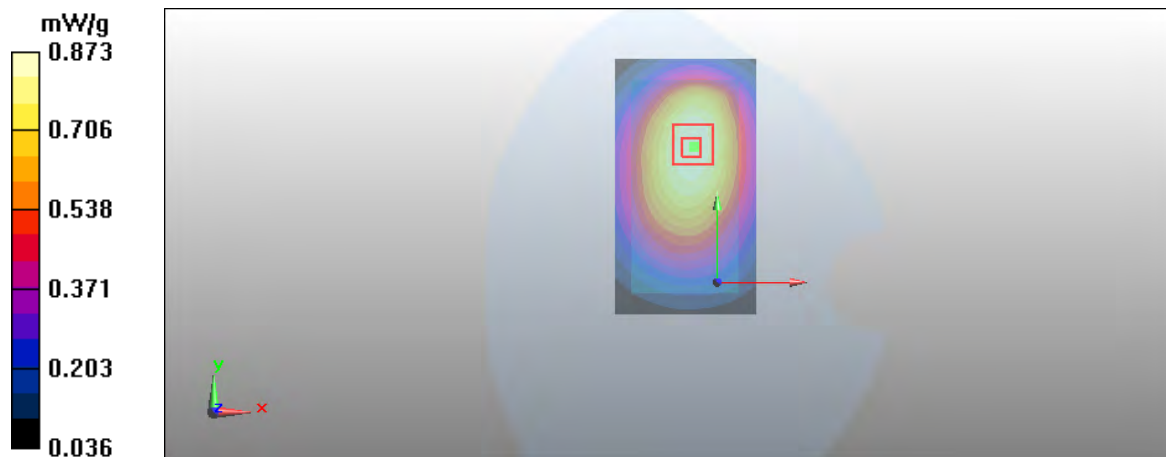
**Configuration/Body - High - No accessory - Back Facing Phantom/Area Scan (6x10x1): Measurement grid:**  
dx=15mm, dy=15mm

**Configuration/Body - Middle - No Accessory - Back Facing Phantom/Area Scan (6x10x1): Measurement grid:**  
dx=15mm, dy=15mm

**Motorola Fast SAR of Combined Scans: SAR(1 g) = 0.829 mW/g**

**SAR(10 g) = 0.591 mW/g**

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



Date/Time: 2011-03-15 09:09:28, Date/Time: 2010-06-22 14:31:56

Test Laboratory: TCC Nokia

Type: RM-596; Serial: 356237/04/872514/5, Serial: 004402/13/086642/3

**Communication System: WCDMA850, Communication System: WLAN2450 b-mode**

Frequency: 846.6 MHz, Frequency: 2442 MHz; Duty Cycle: 1:1

Medium: BSL850, Medium: BSL2450; Medium Notes: t= 21.0 C, Medium Notes: 20.7C

Medium parameters used: f = 847 MHz;  $\sigma = 1.01$  mho/m;  $\epsilon_r = 53.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  
f = 2442 MHz;  $\sigma = 1.99$  mho/m;  $\epsilon_r = 51$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3194, Probe: EX3DV4 - SN3573
- ConvF(5.95, 5.95, 5.95), ConvF(6.63, 6.63, 6.63); Calibrated: 2010-09-09, Calibrated: 2009-11-20
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn538, Electronics: DAE4 Sn555; Calibrated: 2010-09-09, Calibrated: 2009-10-15
- Phantom: SAM 1, Phantom: SAM2; Type: Twin SAM 040 CA, Type:; Serial: TP-1179, Serial:
- ; SEMCAD X Version 14.0 Build 61

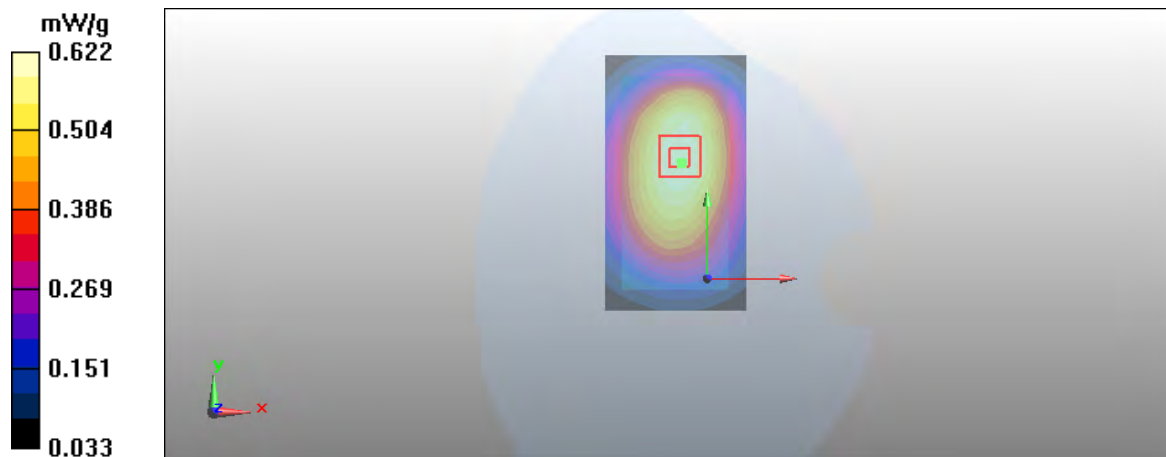
**Configuration/Body - High - No accessory - Back Facing Phantom/Area Scan (6x10x1): Measurement grid:**  
dx=15mm, dy=15mm

**Configuration/Body - Middle - No Accessory - Back Facing Phantom/Area Scan (6x10x1): Measurement grid:**  
dx=15mm, dy=15mm

**Motorola Fast SAR of Combined Scans: SAR(1 g) = 0.592 mW/g**

**SAR(10 g) = 0.421 mW/g**

Maximum value of SAR (measured) = 0.622 mW/g



Date/Time: 2011-03-14 13:10:39, Date/Time: 2010-06-23 09:00:13

Test Laboratory: TCC Nokia

Type: RM-596; Serial: 356237/04/872514/5, Serial: 004402/13/086642/3

**Communication System: WCDMA1700/2100, Communication System: WLAN2450 b-mode**

Frequency: 1732.4 MHz, Frequency: 2442 MHz; Duty Cycle: 1:1

Medium: BSL1800, Medium: BSL2450; Medium Notes: t= 21.9 C, Medium Notes: 20.7C

Medium parameters used (interpolated): f = 1732.4 MHz;  $\sigma = 1.41$  mho/m;  $\epsilon_r = 51.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used: f = 2442 MHz;  $\sigma = 1.99$  mho/m;  $\epsilon_r = 51$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

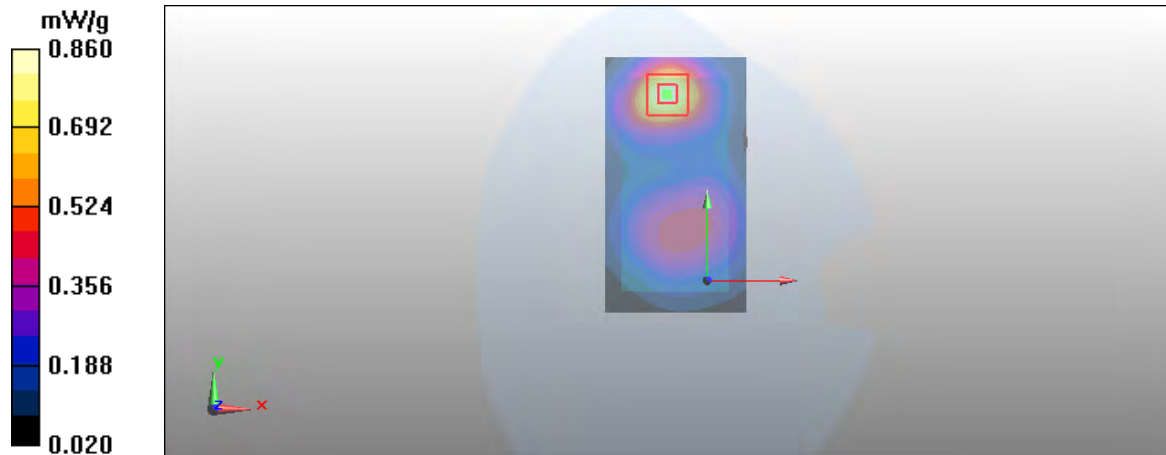
DASY4 Configuration:

- Probe: ES3DV3 - SN3165, Probe: EX3DV4 - SN3573
- ConvF(4.91, 4.91, 4.91), ConvF(6.63, 6.63, 6.63); Calibrated: 2011-02-17, Calibrated: 2009-11-20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn555; Calibrated: 2011-02-22, Calibrated: 2009-10-15
- Phantom: SAM 3, Phantom: SAM2; Type: Twin SAM 040 CA, Type:; Serial: TP-1179, Serial:
- ; SEMCAD X Version 14.0 Build 61

**Configuration/Body - Middle - WH-701 - Back Facing Phantom/Area Scan (6x10x1): Measurement grid:**  
dx=15mm, dy=15mm

**Motorola Fast SAR of Combined Scans: SAR(1 g) = 0.773 mW/g**  
**SAR(10 g) = 0.447 mW/g**

Maximum value of SAR (measured) = 0.860 mW/g



Date/Time: 2011-03-14 09:36:08, Date/Time: 2010-06-23 09:00:13

Test Laboratory: TCC Nokia

Type: RM-596; Serial: 356237/04/872514/5, Serial: 004402/13/086642/3

**Communication System: GSM1900, Communication System: WLAN2450 b-mode**

Frequency: 1850.2 MHz, Frequency: 2442 MHz; Duty Cycle: 1:8.3, Duty Cycle: 1:1

Medium: BSL1900, Medium: BSL2450; Medium Notes: t= 22.2 C, Medium Notes: 20.7C

Medium parameters used (interpolated): f = 1850.2 MHz;  $\sigma$  = 1.49 mho/m;  $\epsilon_r$  = 52.5;  $\rho$  = 1000 kg/m<sup>3</sup>, Medium parameters used: f = 2442 MHz;  $\sigma$  = 1.99 mho/m;  $\epsilon_r$  = 51;  $\rho$  = 1000 kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3165, Probe: EX3DV4 - SN3573
- ConvF(4.61, 4.61, 4.61), ConvF(6.63, 6.63, 6.63); Calibrated: 2011-02-17, Calibrated: 2009-11-20
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn555; Calibrated: 2011-02-22, Calibrated: 2009-10-15
- Phantom: SAM 2, Phantom: SAM2; Type: Twin SAM 040 CA, Type: Serial: TP - 1177, Serial
- ; SEMCAD X Version 14.0 Build 61

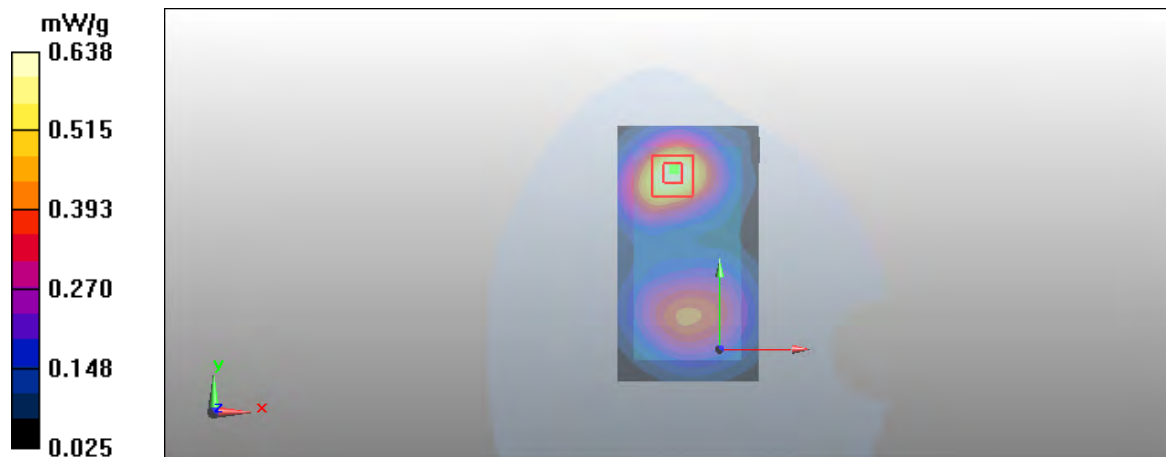
**Configuration/Body - Low - WH-701 - Back Facing Phantom/Area Scan (6x10x1):** Measurement grid: dx=15mm, dy=15mm

**Configuration/Body - Middle - WH-701 - Back Facing Phantom/Area Scan (6x10x1):** Measurement grid: dx=15mm, dy=15mm

**Motorola Fast SAR of Combined Scans: SAR(1 g) = 0.583 mW/g**

**SAR(10 g) = 0.342 mW/g**

Maximum value of SAR (measured) = 0.638 mW/g



Date/Time: 2011-03-14 10:21:57, Date/Time: 2010-06-22 14:31:56

Test Laboratory: TCC Nokia

Type: RM-596; Serial: 356237/04/872514/5, Serial: 004402/13/086642/3

**Communication System: WCDMA1900, Communication System: WLAN2450 b-mode**

Frequency: 1852.4 MHz, Frequency: 2442 MHz; Duty Cycle: 1:1

Medium: BSL1900, Medium: BSL2450; Medium Notes: t= 22.2 C, Medium Notes: 20.7C

Medium parameters used (interpolated): f = 1852.4 MHz;  $\sigma$  = 1.49 mho/m;  $\epsilon_r$  = 52.5;  $\rho$  = 1000 kg/m<sup>3</sup>, Medium parameters used: f = 2442 MHz;  $\sigma$  = 1.99 mho/m;  $\epsilon_r$  = 51;  $\rho$  = 1000 kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3165, Probe: EX3DV4 - SN3573
- ConvF(4.61, 4.61, 4.61), ConvF(6.63, 6.63, 6.63); Calibrated: 2011-02-17, Calibrated: 2009-11-20
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn555; Calibrated: 2011-02-22, Calibrated: 2009-10-15
- Phantom: SAM 2, Phantom: SAM2; Type: Twin SAM 040 CA, Type:; Serial: TP - 1177, Serial: ; SEMCAD X Version 14.0 Build 61

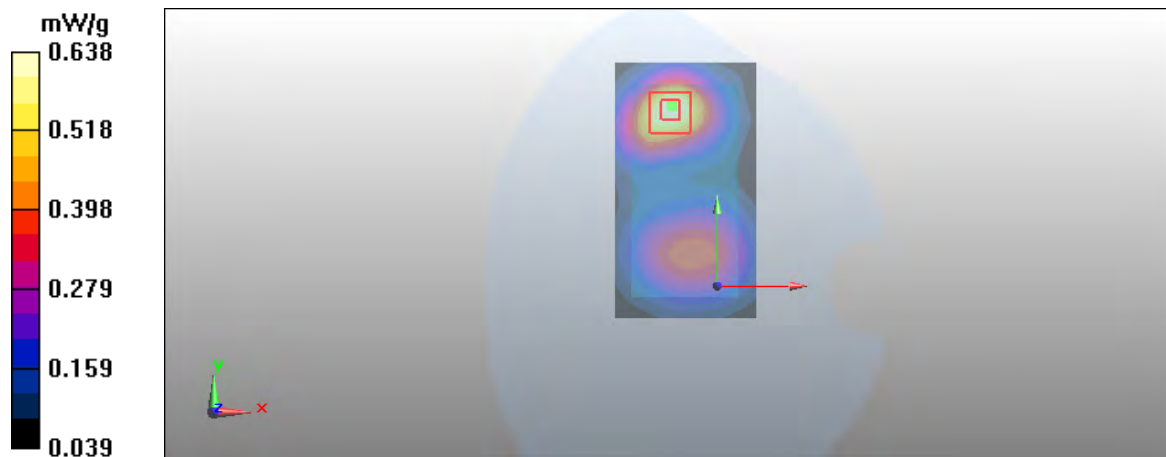
**Configuration/Body - Low - No accessory - Back Facing Phantom/Area Scan (6x10x1):** Measurement grid: dx=15mm, dy=15mm

**Configuration/Body - Middle - No Accessory - Back Facing Phantom/Area Scan (6x10x1):** Measurement grid: dx=15mm, dy=15mm

**Motorola Fast SAR of Combined Scans: SAR(1 g) = 0.583 mW/g**

**SAR(10 g) = 0.344 mW/g**

Maximum value of SAR (measured) = 0.638 mW/g



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## APPENDIX C: RELEVANT PAGES FROM PROBE CALIBRATION REPORTS



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

The Swiss Accreditation Service is one of the signatories to the EA  
 Multilateral Agreement for the recognition of calibration certificates

Client **Nokia Salo TCC**

Certificate No: **ES3-3194\_Sep10**

## CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3194**

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

Calibration date: **September 9, 2010**

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

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

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards          | ID #            | Cal Date (Certificate No.)     | Scheduled Calibration |
|----------------------------|-----------------|--------------------------------|-----------------------|
| Power meter E4419B         | GB41293874      | 1-Apr-10 (No. 217-01136)       | Apr-11                |
| Power sensor E4412A        | MY41495277      | 1-Apr-10 (No. 217-01136)       | Apr-11                |
| Power sensor E4412A        | MY41498087      | 1-Apr-10 (No. 217-01136)       | Apr-11                |
| Reference 3 dB Attenuator  | SN: S5054 (3c)  | 30-Mar-10 (No. 217-01159)      | Mar-11                |
| Reference 20 dB Attenuator | SN: S5086 (20b) | 30-Mar-10 (No. 217-01161)      | Mar-11                |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 30-Mar-10 (No. 217-01160)      | Mar-11                |
| Reference Probe ES3DV2     | SN: 3013        | 30-Dec-09 (No. ES3-3013_Dec09) | Dec-10                |
| DAE4                       | SN: 660         | 20-Apr-10 (No. DAE4-660_Apr10) | Apr-11                |

| Secondary Standards       | ID #         | Check Date (in house)             | Scheduled Check        |
|---------------------------|--------------|-----------------------------------|------------------------|
| RF generator HP 8648C     | US3642U01700 | 4-Aug-99 (in house check Oct-09)  | In house check: Oct-11 |
| Network Analyzer HP 8753E | US37390585   | 18-Oct-01 (in house check Oct-09) | In house check: Oct10  |

Calibrated by: **Jeton Kastrati** **Laboratory Technician**

Approved by: **Katja Pokovic** **Technical Manager**

Issued: September 9, 2010

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

**DASY/EASY - Parameters of Probe: ES3DV3 SN:3194****Basic Calibration Parameters**

|                                                           | Sensor X | Sensor Y | Sensor Z | Unc (k=2)    |
|-----------------------------------------------------------|----------|----------|----------|--------------|
| Norm ( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>A</sup> | 1.39     | 1.28     | 1.37     | $\pm 10.1\%$ |
| DCP (mV) <sup>B</sup>                                     | 95.7     | 93.2     | 88.0     |              |

**Modulation Calibration Parameters**

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

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

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

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

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

## DASY/EASY - Parameters of Probe: ES3DV3 SN:3194

### Calibration Parameter Determined in Head Tissue Simulating Media

| f [MHz] | Validity [MHz] <sup>c</sup> | Permittivity | Conductivity | ConvF X | ConvF Y | ConvF Z | Alpha | Depth Unc (k=2) |
|---------|-----------------------------|--------------|--------------|---------|---------|---------|-------|-----------------|
| 835     | ± 50 / ± 100                | 41.5 ± 5%    | 0.90 ± 5%    | 6.09    | 6.09    | 6.09    | 0.99  | 1.05 ± 11.0%    |
| 1750    | ± 50 / ± 100                | 40.1 ± 5%    | 1.37 ± 5%    | 5.14    | 5.14    | 5.14    | 0.45  | 1.74 ± 11.0%    |
| 1900    | ± 50 / ± 100                | 40.0 ± 5%    | 1.40 ± 5%    | 4.93    | 4.93    | 4.93    | 0.44  | 1.85 ± 11.0%    |
| 2450    | ± 50 / ± 100                | 39.2 ± 5%    | 1.80 ± 5%    | 4.30    | 4.30    | 4.30    | 0.41  | 1.99 ± 11.0%    |

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

## DASY/EASY - Parameters of Probe: ES3DV3 SN:3194

### Calibration Parameter Determined in Body Tissue Simulating Media

| f [MHz] | Validity [MHz] <sup>c</sup> | Permittivity | Conductivity | ConvF X | ConvF Y | ConvF Z | Alpha | Depth Unc (k=2) |
|---------|-----------------------------|--------------|--------------|---------|---------|---------|-------|-----------------|
| 835     | ± 50 / ± 100                | 55.2 ± 5%    | 0.97 ± 5%    | 5.95    | 5.95    | 5.95    | 0.84  | 1.15 ± 11.0%    |
| 1750    | ± 50 / ± 100                | 53.4 ± 5%    | 1.49 ± 5%    | 4.81    | 4.81    | 4.81    | 0.35  | 2.12 ± 11.0%    |
| 1900    | ± 50 / ± 100                | 53.3 ± 5%    | 1.52 ± 5%    | 4.58    | 4.58    | 4.58    | 0.35  | 2.32 ± 11.0%    |
| 2450    | ± 50 / ± 100                | 52.7 ± 5%    | 1.95 ± 5%    | 4.24    | 4.24    | 4.24    | 0.77  | 1.20 ± 11.0%    |

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



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Nokia Salo TCC** Certificate No: **ES3-3165\_Feb11**

CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3165**

Calibration procedure(s) **QA CAL-01.v7, QA CAL-23.v4, QA CAL-25.v3  
Calibration procedure for dosimetric E-field probes**

Calibration date: **February 17, 2011**

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 (Certificate No.)        | Scheduled Calibration  |
|----------------------------|-----------------|-----------------------------------|------------------------|
| Power meter E4419B         | GB41293874      | 01-Apr-10 (No. 217-01136)         | Apr-11                 |
| Power sensor E4412A        | MY41495277      | 01-Apr-10 (No. 217-01136)         | Apr-11                 |
| Power sensor E4412A        | MY41498087      | 01-Apr-10 (No. 217-01136)         | Apr-11                 |
| Reference 3 dB Attenuator  | SN: S5054 (3c)  | 30-Mar-10 (No. 217-01159)         | Mar-11                 |
| Reference 20 dB Attenuator | SN: S5086 (20b) | 30-Mar-10 (No. 217-01161)         | Mar-11                 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 30-Mar-10 (No. 217-01160)         | Mar-11                 |
| Reference Probe ES3DV2     | SN: 3013        | 29-Dec-10 (No. ES3-3013_Dec10)    | Dec-11                 |
| DAE4                       | SN: 654         | 23-Apr-10 (No. DAE4-654_Apr10)    | Apr-11                 |
| Secondary Standards        | ID              | Check Date (in house)             | Scheduled Check        |
| RF generator HP 8648C      | US3642U01700    | 4-Aug-99 (in house check Oct-09)  | In house check: Oct-11 |
| Network Analyzer HP 8753E  | US37390585      | 18-Oct-01 (in house check Oct-10) | In house check: Oct-11 |

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

Issued: February 22, 2011

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DASY/EASY - Parameters of Probe: ES3DV3 - SN:3165

Calibration Parameter Determined in Head Tissue Simulating Media

| f (MHz) <sup>C</sup> | Relative Permittivity <sup>F</sup> | Conductivity (S/m) <sup>F</sup> | ConvF X | ConvF Y | ConvF Z | Alpha | Depth (mm) | Unci. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|-------|------------|-------------|
| 835                  | 41.5                               | 0.90                            | 6.09    | 6.09    | 6.09    | 0.43  | 1.44       | ± 12.0 %    |
| 1750                 | 40.1                               | 1.37                            | 5.19    | 5.19    | 5.19    | 0.35  | 1.84       | ± 12.0 %    |
| 1900                 | 40.0                               | 1.40                            | 5.03    | 5.03    | 5.03    | 0.64  | 1.34       | ± 12.0 %    |
| 2450                 | 39.2                               | 1.80                            | 4.44    | 4.44    | 4.44    | 0.79  | 1.13       | ± 12.0 %    |

<sup>C</sup> Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

<sup>F</sup> At frequencies below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

DASY/EASY - Parameters of Probe: ES3DV3- SN:3165

Calibration Parameter Determined in Body Tissue Simulating Media

| f (MHz) <sup>C</sup> | Relative Permittivity <sup>F</sup> | Conductivity (S/m) <sup>F</sup> | ConvF X | ConvF Y | ConvF Z | Alpha | Depth (mm) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|-------|------------|-------------|
| 835                  | 55.2                               | 0.97                            | 6.04    | 6.04    | 6.04    | 0.50  | 1.43       | ± 12.0 %    |
| 1750                 | 53.4                               | 1.49                            | 4.91    | 4.91    | 4.91    | 0.36  | 2.50       | ± 12.0 %    |
| 1900                 | 53.3                               | 1.52                            | 4.61    | 4.61    | 4.61    | 0.34  | 2.38       | ± 12.0 %    |
| 2450                 | 52.7                               | 1.95                            | 4.18    | 4.18    | 4.18    | 0.79  | 0.83       | ± 12.0 %    |

<sup>C</sup> Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

<sup>F</sup> At frequencies below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

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**APPENDIX D: RELEVANT PAGES FROM DIPOLE VALIDATION KIT REPORTS**



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Accreditation No.: **SCS 108**

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Multilateral Agreement for the recognition of calibration certificates

Client **Nokia Salo TCC**

Certificate No: **D835V2-480\_Oct09**

## CALIBRATION CERTIFICATE

Object **D835V2 - SN: 480**

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

Calibration date: **October 19, 2009**

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

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

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards           | ID #               | Cal Date (Certificate No.)     | Scheduled Calibration |
|-----------------------------|--------------------|--------------------------------|-----------------------|
| Power meter EPM-442A        | GB37480704         | 06-Oct-09 (No. 217-01086)      | Oct-10                |
| Power sensor HP 8481A       | US37292783         | 06-Oct-09 (No. 217-01086)      | Oct-10                |
| Reference 20 dB Attenuator  | SN: 5086 (20g)     | 31-Mar-09 (No. 217-01025)      | Mar-10                |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 31-Mar-09 (No. 217-01029)      | Mar-10                |
| Reference Probe ES3DV3      | SN: 3205           | 26-Jun-09 (No. ES3-3205_Jun09) | Jun-10                |
| DAE4                        | SN: 601            | 07-Mar-09 (No. DAE4-601_Mar09) | Mar-10                |

| Secondary Standards       | ID #             | Check Date (in house)             | Scheduled Check        |
|---------------------------|------------------|-----------------------------------|------------------------|
| Power sensor HP 8481A     | MY41092317       | 18-Oct-02 (in house check Oct-09) | In house check: Oct-11 |
| RF generator R&S SMT-06   | 100005           | 4-Aug-99 (in house check Oct-09)  | In house check: Oct-11 |
| Network Analyzer HP 8753E | US37390585 S4206 | 18-Oct-01 (in house check Oct-09) | In house check: Oct-10 |

|                |                |                       |           |
|----------------|----------------|-----------------------|-----------|
|                | Name           | Function              | Signature |
| Calibrated by: | Jeton Kastrati | Laboratory Technician |           |

|              |               |                   |
|--------------|---------------|-------------------|
| Approved by: | Katja Pokovic | Technical Manager |
|--------------|---------------|-------------------|

Issued: October 19, 2009

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## DASY5 Validation Report for Head TSL

Date/Time: 19.10.2009 10:11:32

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:480**

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

Medium: HSL900

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.88 \text{ mho/m}$ ;  $\epsilon_r = 40.5$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

### DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.04, 6.04, 6.04); Calibrated: 26.06.2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.03.2009
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

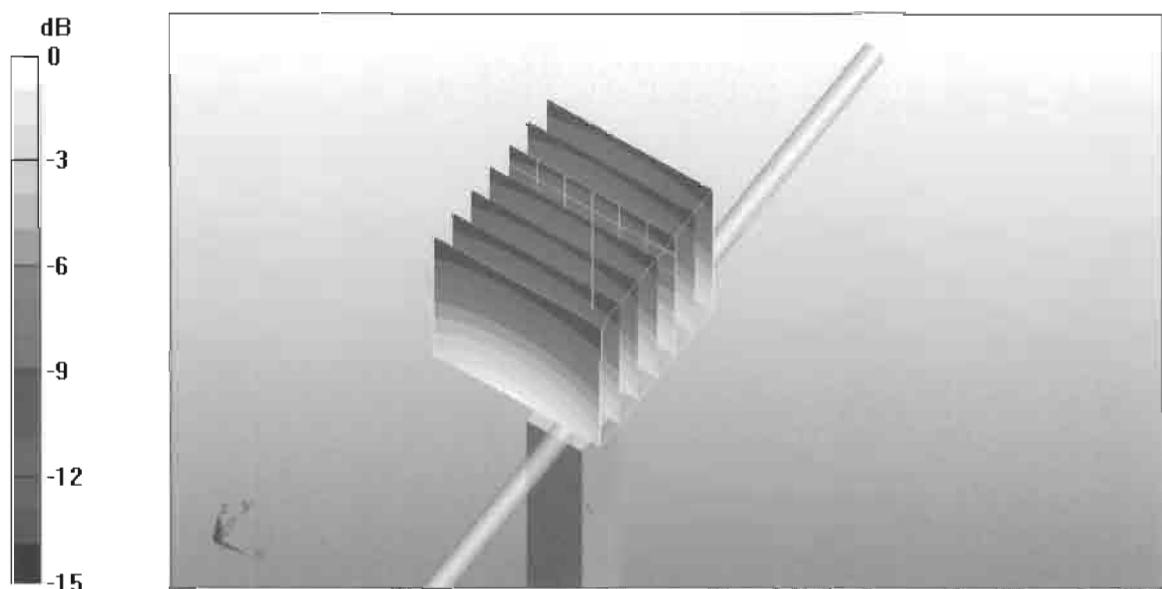
**Pin=250 mW /d=15mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 57.6 V/m; Power Drift = 0.00856 dB

Peak SAR (extrapolated) = 3.53 W/kg

**SAR(1 g) = 2.36 mW/g; SAR(10 g) = 1.55 mW/g**

Maximum value of SAR (measured) = 2.76 mW/g



0 dB = 2.76mW/g

## DASY5 Validation Report for Body

Date/Time: 19.10.2009 13:40:30

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:480**

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

Medium: MSL900

Medium parameters used:  $f = 835$  MHz;  $\sigma = 1.01$  mho/m;  $\epsilon_r = 53.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.97, 5.97, 5.97); Calibrated: 26.06.2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.03.2009
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

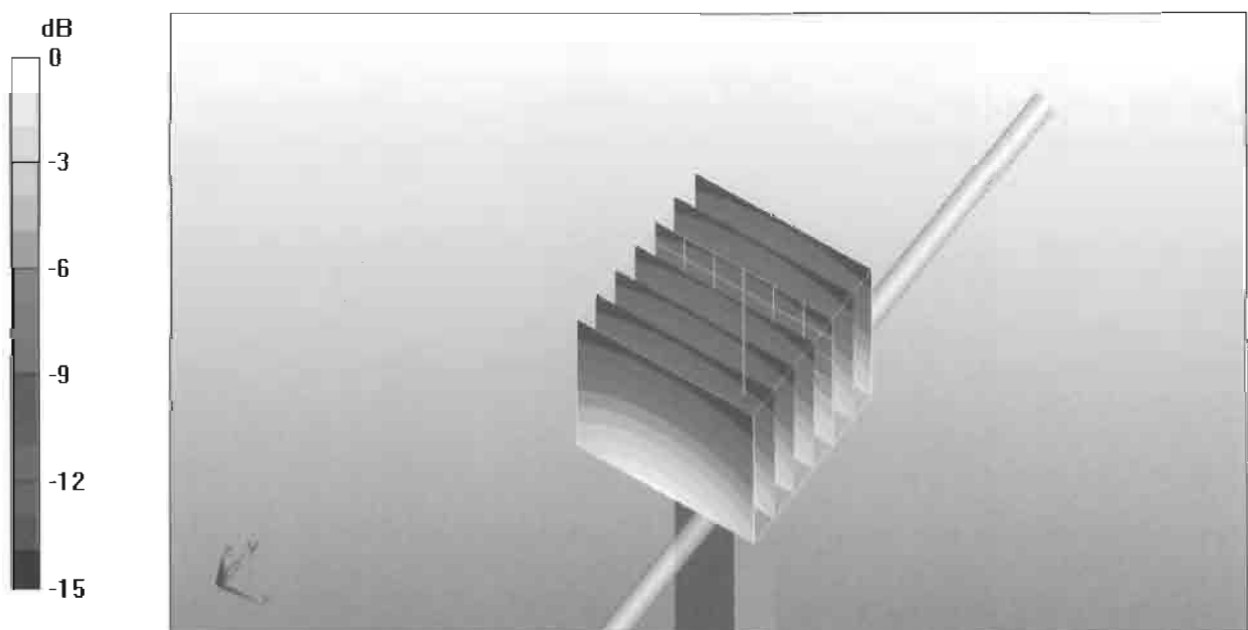
**Pin250 mW /d=15mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 55.5 V/m; Power Drift = 0.014 dB

Peak SAR (extrapolated) = 3.74 W/kg

**SAR(1 g) = 2.52 mW/g; SAR(10 g) = 1.65 mW/g**

Maximum value of SAR (measured) = 2.94 mW/g



0 dB = 2.94mW/g



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Client **Nokia Salo TCC**

Certificate No: **D1800V2-256\_Oct09**

## CALIBRATION CERTIFICATE

Object **D1800V2 - SN: 256**

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

Calibration date: **October 20, 2009**

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

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

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards           | ID #               | Cal Date (Certificate No.)     | Scheduled Calibration |
|-----------------------------|--------------------|--------------------------------|-----------------------|
| Power meter EPM-442A        | GB37480704         | 06-Oct-09 (No. 217-01086)      | Oct-10                |
| Power sensor HP 8481A       | US37292783         | 06-Oct-09 (No. 217-01086)      | Oct-10                |
| Reference 20 dB Attenuator  | SN: 5086 (20g)     | 31-Mar-09 (No. 217-01025)      | Mar-10                |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 31-Mar-09 (No. 217-01029)      | Mar-10                |
| Reference Probe ES3DV3      | SN: 3205           | 26-Jun-09 (No. ES3-3205_Jun09) | Jun-10                |
| DAE4                        | SN: 601            | 07-Mar-09 (No. DAE4-601_Mar09) | Mar-10                |

| Secondary Standards       | ID #             | Check Date (in house)             | Scheduled Check        |
|---------------------------|------------------|-----------------------------------|------------------------|
| Power sensor HP 8481A     | MY41092317       | 18-Oct-02 (in house check Oct-09) | In house check: Oct-11 |
| RF generator R&S SMT-06   | 100005           | 4-Aug-99 (in house check Oct-09)  | In house check: Oct-11 |
| Network Analyzer HP 8753E | US37390585 S4206 | 18-Oct-01 (in house check Oct-09) | In house check: Oct-10 |

|                |                |                       |           |
|----------------|----------------|-----------------------|-----------|
|                | Name           | Function              | Signature |
| Calibrated by: | Jeton Kastrati | Laboratory Technician |           |

|              |               |                   |
|--------------|---------------|-------------------|
| Approved by: | Katja Pokovic | Technical Manager |
|--------------|---------------|-------------------|

Issued: October 21, 2009

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Accreditation No.: **SCS 108**

Client **Nokia Salo TCC**

Certificate No: **D1900V2-5d013\_Mar10**

## CALIBRATION CERTIFICATE

Object **D1900V2 - SN: 5d013**

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

Calibration date: **March 23, 2010**

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

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

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards           | ID #               | Cal Date (Certificate No.)        | Scheduled Calibration  |
|-----------------------------|--------------------|-----------------------------------|------------------------|
| Power meter EPM-442A        | GB37480704         | 06-Oct-09 (No. 217-01086)         | Oct-10                 |
| Power sensor HP 8481A       | US37292783         | 06-Oct-09 (No. 217-01086)         | Oct-10                 |
| Reference 20 dB Attenuator  | SN: 5086 (20g)     | 31-Mar-09 (No. 217-01025)         | Mar-10                 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 31-Mar-09 (No. 217-01029)         | Mar-10                 |
| Reference Probe ES3DV3      | SN: 3205           | 26-Jun-09 (No. ES3-3205_Jun09)    | Jun-10                 |
| DAE4                        | SN: 601            | 02-Mar-10 (No. DAE4-601_Mar10)    | Mar-11                 |
| Secondary Standards         | ID #               | Check Date (in house)             | Scheduled Check        |
| Power sensor HP 8481A       | MY41092317         | 18-Oct-02 (in house check Oct-09) | In house check: Oct-11 |
| RF generator R&S SMT-06     | 100005             | 4-Aug-99 (in house check Oct-09)  | In house check: Oct-11 |
| Network Analyzer HP 8753E   | US37390585 S4206   | 18-Oct-01 (in house check Oct-09) | In house check: Oct-10 |

Calibrated by: **Dinco Iliev** **Laboratory Technician**

Approved by: **Katja Pokovic** **Technical Manager**

Issued: March 23, 2010

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

## DASY5 Validation Report for Head TSL

Date/Time: 23.03.2010 10:16:39

Test Laboratory: SPEAG, Zurich, Switzerland

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

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

Medium: HSL U11 BB

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.45$  mho/m;  $\epsilon_r = 41.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.09, 5.09, 5.09); Calibrated: 26.06.2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.03.2010
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

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

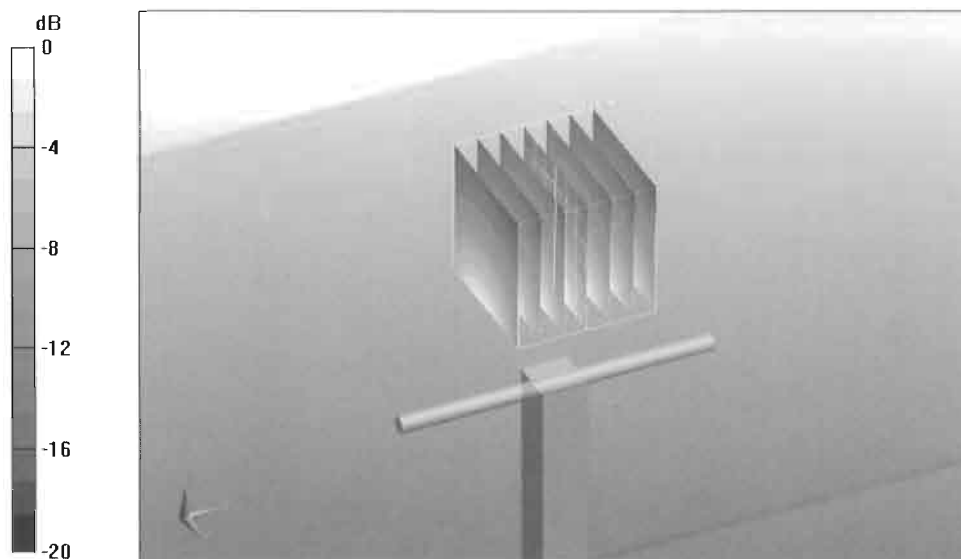
grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.4 V/m; Power Drift = 0.028 dB

Peak SAR (extrapolated) = 18.5 W/kg

**SAR(1 g) = 10.2 mW/g; SAR(10 g) = 5.32 mW/g**

Maximum value of SAR (measured) = 12.6 mW/g



0 dB = 12.6mW/g

## DASY5 Validation Report for Body

Date/Time: 23.03.2010 13:12:18

Test Laboratory: SPEAG, Zurich, Switzerland

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

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

Medium: MSL U11 BB

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.58$  mho/m;  $\epsilon_r = 55$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.59, 4.59, 4.59); Calibrated: 26.06.2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.03.2010
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

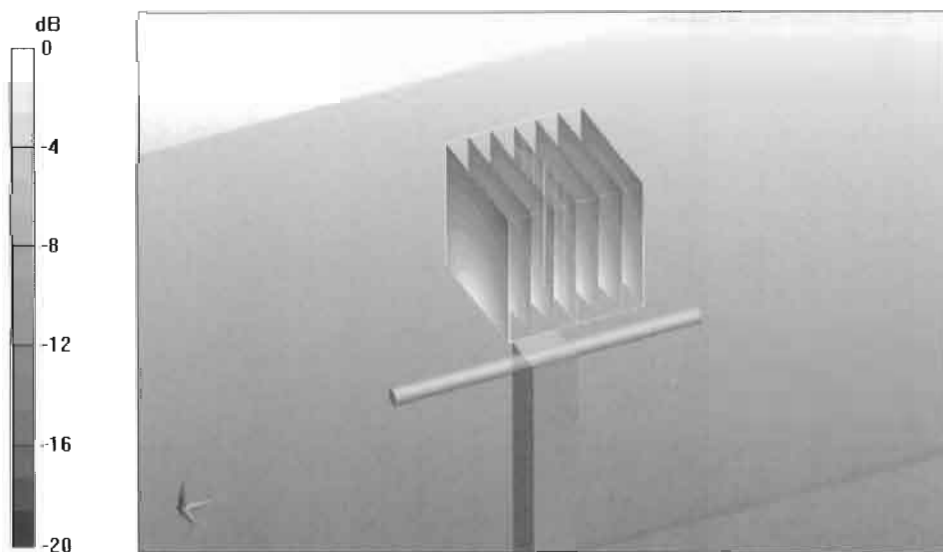
**Pin250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 94.9 V/m; Power Drift = 0.00956 dB

Peak SAR (extrapolated) = 17.5 W/kg

**SAR(1 g) = 10.4 mW/g; SAR(10 g) = 5.58 mW/g**

Maximum value of SAR (measured) = 12.7 mW/g



0 dB = 12.7mW/g

## DASY5 Validation Report for Head TSL

Date/Time: 20.10.2009 10:26:59

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:256**

Communication System: CW; Frequency: 1800 MHz; Duty Cycle: 1:1

Medium: HSL U11 BB

Medium parameters used:  $f = 1800$  MHz;  $\sigma = 1.4$  mho/m;  $\epsilon_r = 40$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.25, 5.25, 5.25); Calibrated: 26.06.2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.03.2009
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

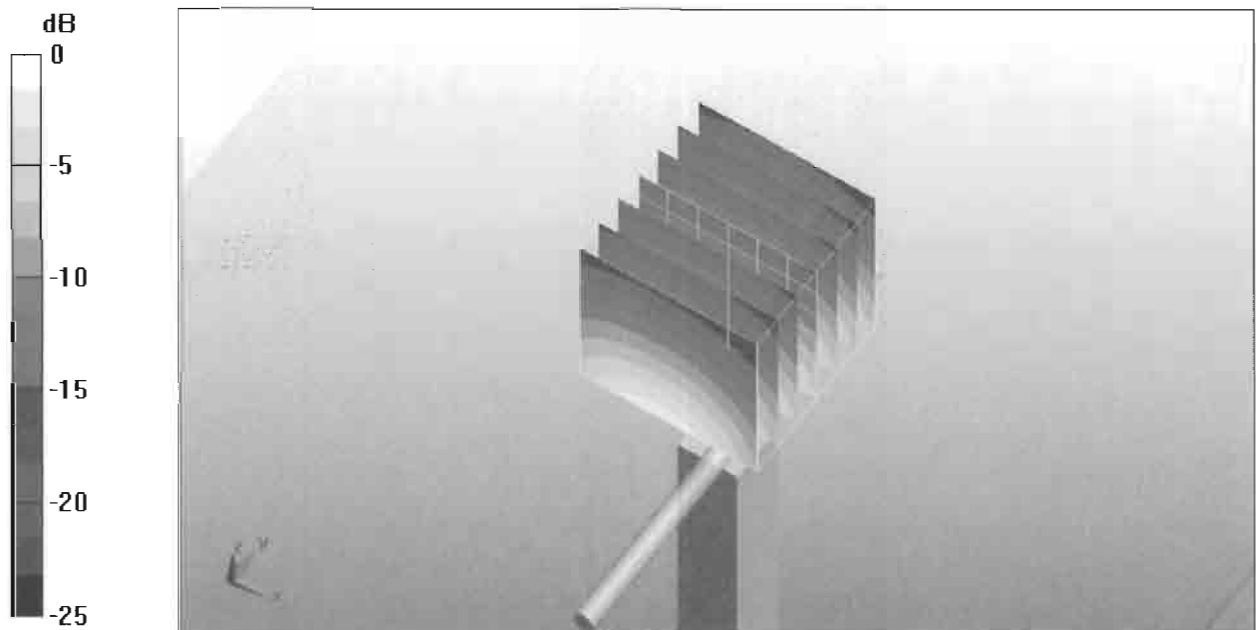
**Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 97.2 V/m; Power Drift = 0.025 dB

Peak SAR (extrapolated) = 17.9 W/kg

**SAR(1 g) = 9.9 mW/g; SAR(10 g) = 5.21 mW/g**

Maximum value of SAR (measured) = 12.4 mW/g



0 dB = 12.4mW/g

## DASY5 Validation Report for Body

Date/Time: 20.10.2009 14:52:33

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:256**

Communication System: CW; Frequency: 1800 MHz; Duty Cycle: 1:1

Medium: MSL U10 BB

Medium parameters used:  $f = 1800$  MHz;  $\sigma = 1.5$  mho/m;  $\epsilon_r = 53.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.8, 4.8, 4.8); Calibrated: 26.06.2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.03.2009
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

**Pin250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7)/Cube 0: Measurement**

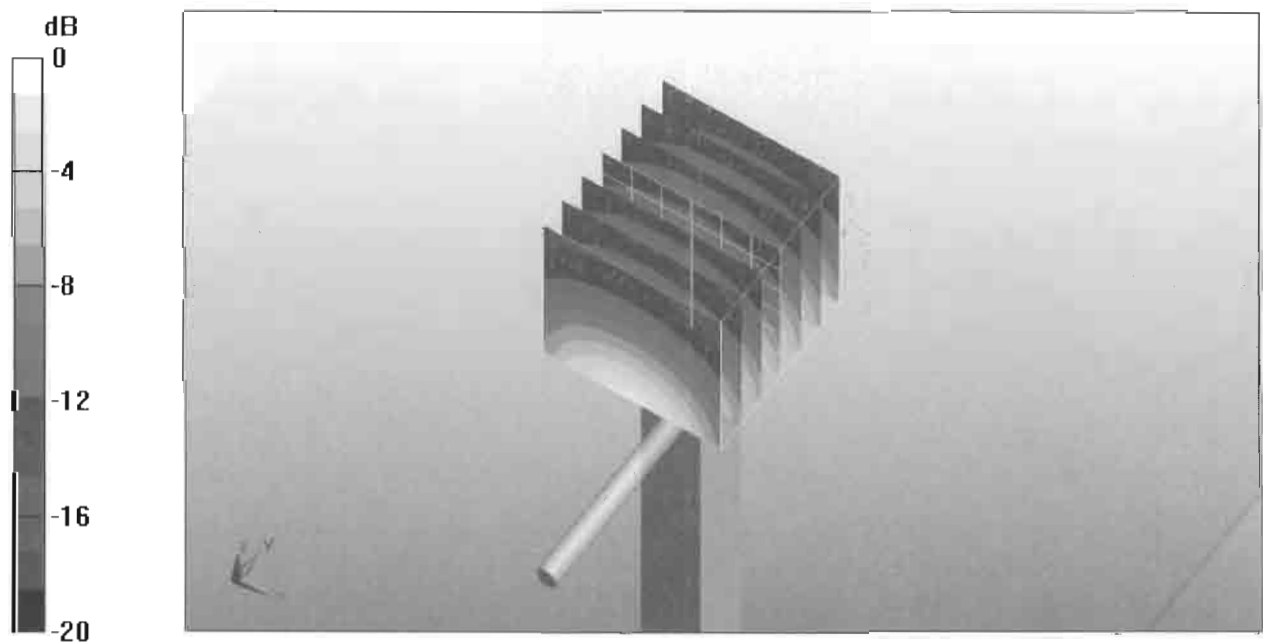
grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 94.2 V/m; Power Drift = 0.020 dB

Peak SAR (extrapolated) = 16.8 W/kg

**SAR(1 g) = 9.61 mW/g; SAR(10 g) = 5.07 mW/g**

Maximum value of SAR (measured) = 12.2 mW/g



0 dB = 12.2mW/g