

SAR Compliance Test Report

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Testing has been carried out in accordance with:	47CFR §2.1093 Radiofrequency Radiation Exposure Evaluation: Portable Devices FCC OET Bulletin 65 (Edition 97-01), Supplement C (Edition 01-01) Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields RSS-102 Evaluation Procedure for Mobile and Portable Radio Transmitters with Respect to Health Canada's Safety Code 6 for Exposure of Humans to Radio Frequency Fields IEEE 1528 - 2003 IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Technique		
Documentation:	The documentation of the testing performed on the tested devices is archived for 15 years at TCC Nokia.		
Test results:	The tested device complies with the requirements in respect of all parameters subject to the test. The test results and statements relate only to the items tested. The test report shall not be reproduced except in full, without written approval of the laboratory.		

Date and signatures:

For the contents:

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1. SUMMARY OF SAR TEST REPORT

1.1 Test Details

Period of test	2010-02-24 to 2010-03-01
SN, HW and SW numbers of tested device	SN: 004402/13/019383/6, HW: 1.7, SW: 2.10, DUT: 14508
Batteries used in testing	-
Headsets used in testing	-
Other accessories used in testing	USB Cable, Type: CA-175D, DUT: 14399 Laptop, Type: IBM ThinkPad R52, 1860, SN: GU0956093331, DUT: 13348 Laptop, Type: Amilo Notebook Pa 3553, SN: DWPD011412, DUT: 13612
State of sample	Prototype unit
Notes	-

1.2 Maximum Results

The maximum measured SAR values for Body Worn configuration are given in section 1.2.1. 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 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
1-slot GPRS850	190 / 836.6	29.5 dBm	0.5 cm	0.555 W/kg	0.62 W/kg	1.6 W/kg	PASSED
WCDMA850	4175 / 835.0	21.0 dBm	0.5 cm	0.648 W/kg	0.73 W/kg	1.6 W/kg	PASSED
1-slot GPRS1900	661 / 1880.0	26.0 dBm	0.5 cm	0.270 W/kg	0.30 W/kg	1.6 W/kg	PASSED
WCDMA1900	9400 / 1880.0	21.0 dBm	0.5 cm	0.724 W/kg	0.81 W/kg	1.6 W/kg	PASSED

* 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.

1.2.2 Maximum Drift

Maximum drift covered by 12% scaling up of the SAR values	Maximum drift during measurements
0.5dB	0.42 dB

1.2.3 Measurement Uncertainty

Expanded Uncertainty (k=2) 95%	± 25.8%
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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 1900	GMSK	1/8	824 – 849 1850 – 1910
GPRS	850 1900	GMSK	1/8 to 4/8	824 – 849 1850 – 1910
EGPRS	850 1900	GMSK / 8PSK	1/8 to 4/8	824 – 849 1850 – 1910
WCDMA	850 (Band V) 1900 (Band II)		1	826 – 847 1852 – 1908
HSUPA	850 (Band V) 1900 (Band II)		1	826 – 847 1852 – 1908

Outside of USA and Canada, the transmitter of the device is capable of operating also in GSM/GPRS/EGPRS900, GSM/GPRS/EGPRS1800 and WCDMA/HSUPA2100 bands which are not part of this filing.

8PSK EGPRS mode was not measured, because maximum averaged output power is lower in 8PSK EGPRS mode than in GPRS mode.

This is a WCDMA HSUPA device, but SAR tests for HSUPA mode have not been performed as no HSUPA Sub-test mode has an average power > 0.25dB above the basic WCDMA 12.2kbps RMC mode. Appendix C of this report gives a summary of the measured WCDMA and HSUPA average powers; a detailed report of these WCDMA and HSUPA conducted power tests is submitted separately.

2.1 Description of the Antenna

The device has an internal antenna for cellular use. The cellular antenna is located at the opposite end of the device to the USB connector.

3. TEST CONDITIONS

3.1 Temperature and Humidity

Ambient temperature (°C):	19.7 to 21.9
Ambient humidity (RH %):	39 to 49

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 laptop 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.

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 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	728	12 months	2010-02
DAE 4	793	12 months	2010-05
E-field Probe ES3DV3	3119	12 months	2010-09
E-field Probe ES3DV3	3131	12 months	2010-10
Dipole Validation Kit, D835V2	480	24 months	2011-10
Dipole Validation Kit, D1900V2	5d013	24 months	2011-10
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	2010-09
Amplifier	ZHL-42 (SMA)	N072095-5	12 months	2010-09
Power Meter	NRVS	849305/028	12 months	2010-09
Power Sensor	NRV-Z32	839176/020	12 months	2010-09
Call Tester	CMU 200	101111	-	-
Call Tester	CMU 200	104983	-	-
Vector Network Analyzer	8753E	US38432928	12 months	2010-09
Dielectric Probe Kit	85070B	US33020420	-	-

4.1.1 Isotropic E-field Probe Type ES3DV3

Construction	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., butyl diglycol)
Calibration	Calibration certificate in Appendix D
Frequency	10 MHz to 4 GHz (dosimetry); Linearity: ± 0.2 dB (30 MHz to 4 GHz)
Directivity	± 0.2 dB in HSL (rotation around probe axis) ± 0.3 dB in HSL (rotation normal to probe axis)
Dynamic Range	5 μ W/g to > 100 mW/g; Linearity: ± 0.2 dB
Dimensions	Overall length: 330 mm Tip length: 20 mm Body diameter: 12 mm Tip diameter: 3.9 mm Distance from probe tip to dipole centers: 2.0 mm
Application	General dosimetry up to 4 GHz Compliance tests of mobile phones 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 15.0 ± 0.5 cm measured from the ear reference point during system checking and device measurements.

4.3.1 Tissue Simulant Recipes

The following recipe(s) were used for Body tissue simulant(s):

800MHz band

Ingredient	Body (% by weight)
Deionised Water	69.25
Tween 20	30.00
Salt	0.75

1900MHz band

Ingredient	Body (% by weight)
Deionised Water	70.25
Tween 20	29.41
Salt	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, body tissue simulant

f [MHz]	Description	SAR [W/kg], 1g	Dielectric Parameters		Temp [°C]
			ϵ_r	σ [S/m]	
835	Reference result	2.52	53.2	1.01	
	$\pm 10\%$ window	2.27 – 2.77			
	2010-02-24	2.36	55.0	1.00	21.0
1900	Reference result	10.3	53.5	1.58	
	$\pm 10\%$ window	9.3 – 11.3			
	2010-02-26	9.67	52.3	1.58	21.0
	2010-03-01	10.4	52.4	1.54	21.0

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

4.3.3 Tissue Simulants used in the Measurements

Body tissue simulant measurements

f [MHz]	Description	Dielectric Parameters		Temp [°C]
		ϵ_r	σ [S/m]	
835	Recommended value	55.2	0.97	
	$\pm 5\%$ window	52.4 – 58.0	0.92 – 1.02	
	2010-02-24	55.0	1.00	21.0
836	Recommended value	55.2	0.97	
	$\pm 5\%$ window	52.4 – 58.0	0.92 – 1.02	
	2010-02-24	55.0	1.00	21.0
1880	Recommended value	53.3	1.52	
	$\pm 5\%$ window	50.6 – 56.0	1.44 – 1.60	
	2010-02-26	52.4	1.56	21.0
	2010-03-01	52.4	1.52	21.0

5. DESCRIPTION OF THE TEST PROCEDURE

5.1 Device Holder

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



Device holder supplied by SPEAG

5.2 Test Positions

5.2.1 Body Worn Configuration

The device was placed below the flat section of the phantom. The distance between the device and the phantom was kept at the separation distance of 0.5 cm using a flat spacer that was removed before starting the measurements. The device was oriented with all five sides facing the phantom to find the highest result. Two of the orientations were tested with device directly connected to a horizontal or to a vertical USB port of the laptop computer positioned against the phantom, and the other three orientations were tested with the device connected to the laptop computer using the high quality USB cable assembly CA-175D.

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

7. RESULTS

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

850MHz Body SAR results

Spacer used	Device orientation	Test configuration	SAR, averaged over 1g (W/kg)		
			Ch 128 824.2 MHz	Ch 190 836.6 MHz	Ch 251 848.8 MHz
1-slot GPRS		Conducted Power	29.5 dBm	29.5 dBm	29.5 dBm
0.5cm	Side 1 facing phantom	Dongle in horizontal USB slot of the IBM laptop	0.489	0.555	0.525
	Side 4 facing phantom	Dongle in vertical USB slot of the Amilo laptop	-	0.321	-
	Side 2 facing phantom	Dongle connected	-	0.262	-
	Side 3 facing phantom	with CA-175D cable	-	0.136	-
	Side 5 facing phantom	to the laptop	-	0.019	-
2-slot GPRS		Conducted Power	-	26.5 dBm	-
0.5cm	Side 1 facing phantom	Dongle in horizontal USB slot of the IBM laptop	-	0.496	-
	Side 4 facing phantom	Dongle in vertical USB slot of the Amilo laptop	-	-	-
	Side 2 facing phantom	Dongle connected	-	-	-
	Side 3 facing phantom	with CA-175D cable	-	-	-
	Side 5 facing phantom	to the laptop	-	-	-
3-slot GPRS		Conducted Power	-	24.7 dBm	-
0.5cm	Side 1 facing phantom	Dongle in horizontal USB slot of the IBM laptop	-	0.476	-
	Side 4 facing phantom	Dongle in vertical USB slot of the Amilo laptop	-	-	-
	Side 2 facing phantom	Dongle connected	-	-	-
	Side 3 facing phantom	with CA-175D cable	-	-	-
	Side 5 facing phantom	to the laptop	-	-	-

(850MHz Table continues)

(850MHz Table continues)

Spacer used	Device orientation	Test configuration	SAR, averaged over 1g (W/kg)		
			Ch 128 824.2 MHz	Ch 190 836.6 MHz	Ch 251 848.8 MHz
4-slot GPRS		Conducted Power	-	23.5 dBm	-
0.5cm	Side 1 facing phantom	Dongle in horizontal USB slot of the IBM laptop	-	0.466	-
	Side 4 facing phantom	Dongle in vertical USB slot of the Amilo laptop	-	-	-
	Side 2 facing phantom	Dongle connected with CA-175D cable to the laptop	-	-	-
	Side 3 facing phantom		-	-	-
	Side 5 facing phantom		-	-	-
Spacer used	Device orientation	Test configuration	SAR, averaged over 1g (W/kg)		
			Ch 4132 826.4 MHz	Ch 4175 835.0 MHz	Ch 4233 846.6 MHz
WCDMA		Conducted Power	21.0 dBm	21.0 dBm	21.0 dBm
0.5cm	Side 1 facing phantom	Dongle in horizontal USB slot of the IBM laptop	0.556	0.648	0.607
	Side 4 facing phantom	Dongle in vertical USB slot of the Amilo laptop	-	-	-
	Side 2 facing phantom	Dongle connected with CA-175D cable to the laptop	-	-	-
	Side 3 facing phantom		-	-	-
	Side 5 facing phantom		-	-	-

850MHz Single-point Body SAR results

Spacer used	Device orientation	Test configuration	Maximum value of interpolated SAR from area scan (W/kg)		
			Ch 4132 826.4 MHz	Ch 4175 835.0 MHz	Ch 4233 846.6 MHz
WCDMA		Conducted Power	21.0 dBm	21.0 dBm	21.0 dBm
0.5 cm	Side 1 facing phantom	Dongle	-	0.739	-
1.0 cm		in horizontal	-	0.322	-
1.5 cm		USB slot	-	-	-
2.0 cm		of the IBM laptop	-	-	-
2.5 cm			-	-	-

1900MHz Body SAR results

Spacer used	Device orientation	Test configuration	SAR, averaged over 1g (W/kg)		
			Ch 512 1850.2 MHz	Ch 661 1880.0 MHz	Ch 810 1909.8 MHz
1-slot GPRS		Conducted Power	-	26.0 dBm	-
0.5cm	Side 1 facing phantom	Dongle in horizontal USB slot of the IBM laptop	-	0.254	-
	Side 4 facing phantom	Dongle in vertical USB slot of the Amilo laptop	-	0.199	-
	Side 2 facing phantom	Dongle connected	0.232	0.270	0.256
	Side 3 facing phantom	with CA-175D cable	-	0.086	-
	Side 5 facing phantom	to the laptop	-	0.027	-
2-slot GPRS		Conducted Power	-	23.5 dBm	-
0.5cm	Side 1 facing phantom	Dongle in horizontal USB slot of the IBM laptop	-	0.242	-
	Side 4 facing phantom	Dongle in vertical USB slot of the Amilo laptop	-	-	-
	Side 2 facing phantom	Dongle connected	-	-	-
	Side 3 facing phantom	with CA-175D cable	-	-	-
	Side 5 facing phantom	to the laptop	-	-	-
3-slot GPRS		Conducted Power	-	21.5 dBm	-
0.5cm	Side 1 facing phantom	Dongle in horizontal USB slot of the IBM laptop	-	0.247	-
	Side 4 facing phantom	Dongle in vertical USB slot of the Amilo laptop	-	-	-
	Side 2 facing phantom	Dongle connected	-	-	-
	Side 3 facing phantom	with CA-175D cable	-	-	-
	Side 5 facing phantom	to the laptop	-	-	-

(1900MHz Table continues)

(1900MHz Table continues)

Spacer used	Device orientation	Test configuration	SAR, averaged over 1g (W/kg)		
			Ch 512 1850.2 MHz	Ch 661 1880.0 MHz	Ch 810 1909.8 MHz
4-slot GPRS		Conducted Power	20.5 dBm	20.5 dBm	20.5 dBm
0.5cm	Side 1 facing phantom	Dongle in horizontal USB slot of the IBM laptop	-	0.252	-
	Side 4 facing phantom	Dongle in vertical USB slot of the Amilo laptop	-	-	-
	Side 2 facing phantom	Dongle connected with CA-175D cable to the laptop	-	-	-
	Side 3 facing phantom		-	-	-
	Side 5 facing phantom		-	-	-
Spacer used	Device orientation	Test configuration	SAR, averaged over 1g (W/kg)		
			Ch 9262 1852.4 MHz	Ch 9400 1880.0 MHz	Ch 9538 1907.6 MHz
WCDMA		Conducted Power	21.0 dBm	21.0 dBm	21.0 dBm
0.5cm	Side 1 facing phantom	Dongle in horizontal USB slot of the IBM laptop	-	-	-
	Side 4 facing phantom	Dongle in vertical USB slot of the Amilo laptop	-	-	-
	Side 2 facing phantom	Dongle connected with CA-175D cable to the laptop	0.607	0.724	0.520
	Side 3 facing phantom		-	-	-
	Side 5 facing phantom		-	-	-

1900MHz Single-point Body SAR results

Spacer used	Device orientation	Test configuration	Maximum value of interpolated SAR from area scan (W/kg)		
			Ch 9262 1852.4 MHz	Ch 9400 1880.0 MHz	Ch 9538 1907.6 MHz
WCDMA		Conducted Power	21.0 dBm	21.0 dBm	21.0 dBm
0.5 cm	Side 2 facing phantom	Dongle connected with CA-175D cable to the laptop	-	0.821	-
1.0 cm			-	0.541	-
1.5 cm			-	0.242	-
2.0 cm			-	-	-
2.5 cm			-	-	-

Plots of the Measurement scans are given in Appendix B.

APPENDIX A: SYSTEM CHECKING SCANS

Date/Time: 2010-02-24 09:37:49

Test Laboratory: TCC Nokia

Type: D835V2; Serial: D835V2 - SN:480

Communication System: CW835

Frequency: 835 MHz; Duty Cycle: 1:1

Medium: BSL850; Medium Notes: $t = 20.8\text{ }^{\circ}\text{C}$

Medium parameters used: $f = 835\text{ MHz}$; $\sigma = 1\text{ mho/m}$; $\epsilon_r = 55$; $\rho = 1000\text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3131
- ConvF(5.69, 5.69, 5.69); Calibrated: 2009-10-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn728; Calibrated: 2009-02-09
- Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1179
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

d=15mm, Pin=250mW/Area Scan (61x81x1): Measurement grid: $dx=15\text{ mm}$, $dy=15\text{ mm}$

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

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

Reference Value = 51.5 V/m

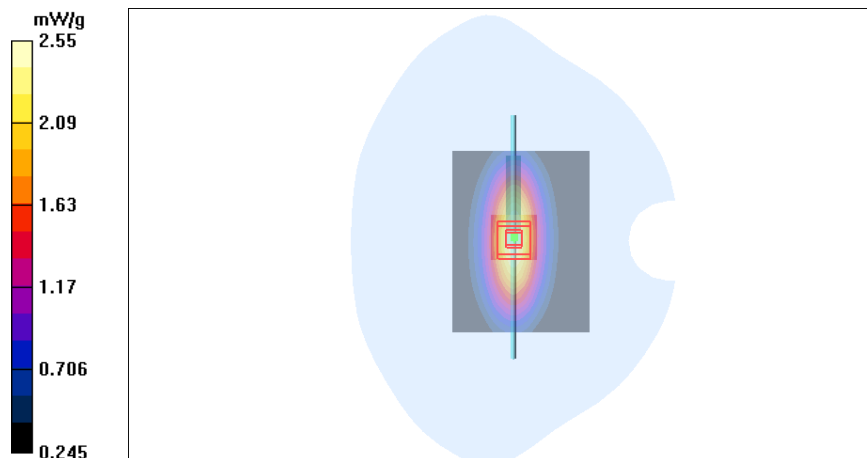
Peak SAR (extrapolated) = 3.40 W/kg

SAR(1 g) = 2.36 mW/g

SAR(10 g) = 1.56 mW/g

Power Drift = 0.001 dB

Maximum value of SAR (measured) = 2.55 mW/g



Date/Time: 2010-02-26 09:13:05

Test Laboratory: TCC Nokia
Type: D1900V2; Serial: D1900V2 - SN:5d013

Communication System: CW1900

Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: BSL1900; Medium Notes: 20.9C

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.58$ mho/m; $\epsilon_r = 52.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3119
- ConvF(4.43, 4.43, 4.43); Calibrated: 2009-09-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn793; Calibrated: 2009-05-15
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- 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) = 11.0 mW/g

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

Reference Value = 83.6 V/m

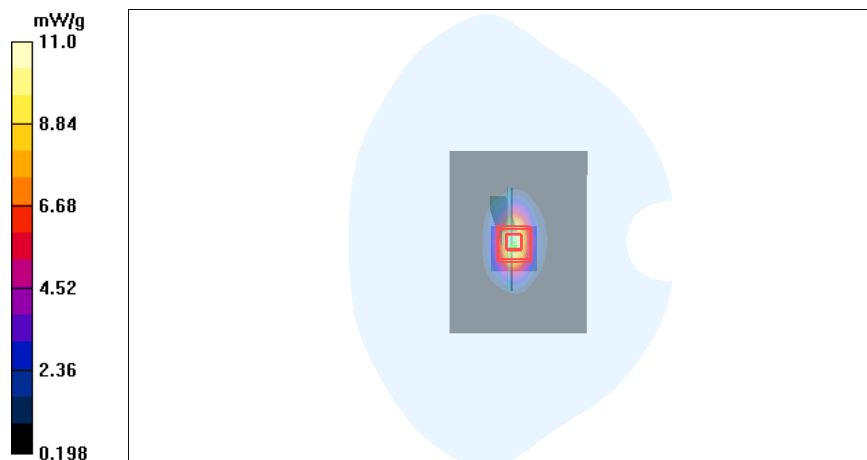
Peak SAR (extrapolated) = 16.6 W/kg

SAR(1 g) = 9.67 mW/g

SAR(10 g) = 5.11 mW/g

Power Drift = 0.148 dB

Maximum value of SAR (measured) = 11.0 mW/g



Date/Time: 2010-03-01 09:08:32

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=20.8 C

Medium parameters used: f = 1900 MHz; σ = 1.54 mho/m; ϵ_r = 52.4; ρ = 1000 kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3119
- ConvF(4.43, 4.43, 4.43); Calibrated: 2009-09-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn793; Calibrated: 2009-05-15
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- 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) = 11.9 mW/g

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

Reference Value = 87.9 V/m

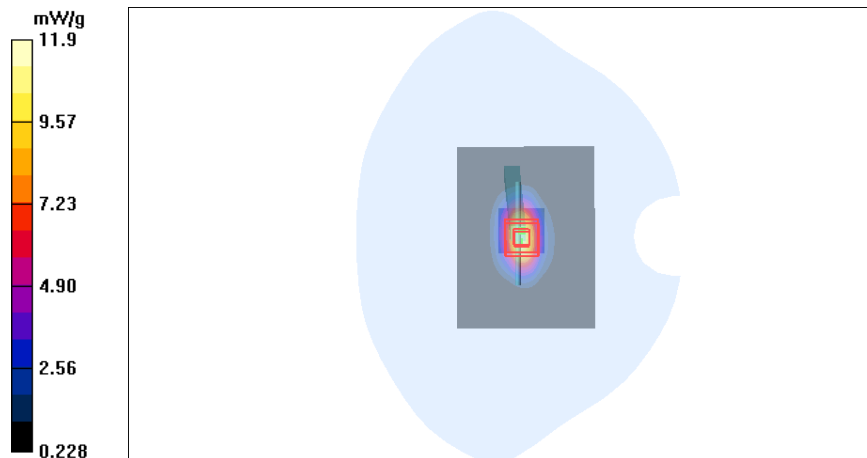
Peak SAR (extrapolated) = 18.0 W/kg

SAR(1 g) = 10.4 mW/g

SAR(10 g) = 5.5 mW/g

Power Drift = 0.105 dB

Maximum value of SAR (measured) = 11.9 mW/g



APPENDIX B: MEASUREMENT SCANS

Date/Time: 2010-02-24 10:15:18

Test Laboratory: TCC Nokia

Type: RD-15; Serial: 004402/13/019383/6

Communication System: 1-slot GPRS850

Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium: BSL850; Medium Notes: t= 20.8 C

Medium parameters used: f = 837 MHz; σ = 1 mho/m; ϵ_r = 55; ρ = 1000 kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3131
- ConvF(5.69, 5.69, 5.69); Calibrated: 2009-10-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn728; Calibrated: 2009-02-09
- Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1179
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Body - Middle - Spacer 0.5cm – IBM laptop – Side 1 facing phantom /Area Scan (41x91x1): Measurement grid:
dx=15mm, dy=15mm

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

Body - Middle - Spacer 0.5cm – IBM laptop – Side 1 facing phantom /Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 24.4 V/m

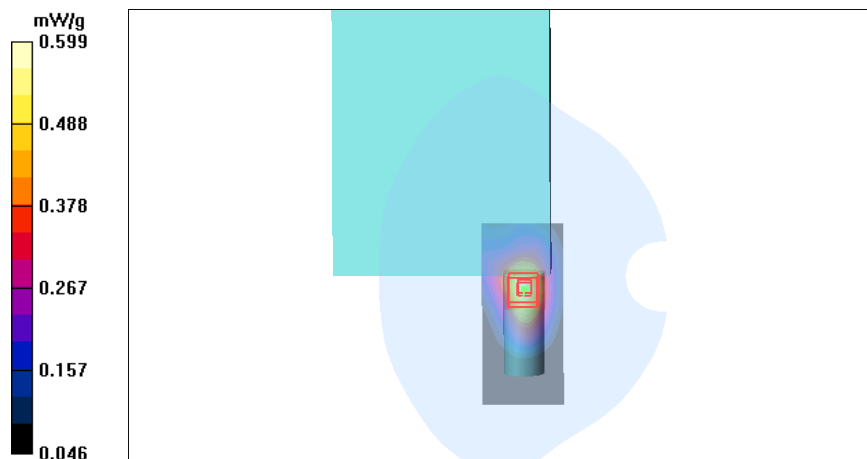
Peak SAR (extrapolated) = 0.805 W/kg

SAR(1 g) = 0.555 mW/g

SAR(10 g) = 0.359 mW/g

Power Drift = -0.072 dB

Maximum value of SAR (measured) = 0.599 mW/g



Date/Time: 2010-02-24 12:15:11

Test Laboratory: TCC Nokia

Type: RD-15; Serial: 004402/13/019383/6

Communication System: 1-slot GPRS850

Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium: BSL850; Medium Notes: t= 20.8 C

Medium parameters used: f = 837 MHz; $\sigma = 1$ mho/m; $\epsilon_r = 55$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3131
- ConvF(5.69, 5.69, 5.69); Calibrated: 2009-10-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn728; Calibrated: 2009-02-09
- Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1179
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Body - Middle - Spacer 0.5cm – Amilo laptop – Side 4 facing phantom /Area Scan (41x91x1): Measurement grid:
dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.350 mW/g

Body - Middle - Spacer 0.5cm – Amilo laptop – Side 4 facing phantom /Zoom Scan (5x5x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 19.0 V/m

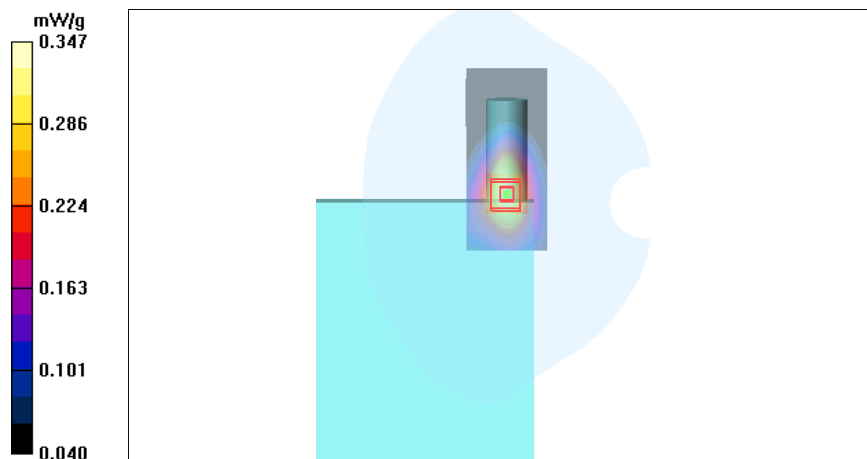
Peak SAR (extrapolated) = 0.452 W/kg

SAR(1 g) = 0.321 mW/g

SAR(10 g) = 0.217 mW/g

Power Drift = -0.196 dB

Maximum value of SAR (measured) = 0.347 mW/g



Date/Time: 2010-02-24 13:00:02

Test Laboratory: TCC Nokia

Type: RD-15; Serial: 004402/13/019383/6

Communication System: 1-slot GPRS850

Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium: BSL850; Medium Notes: t= 20.8 C

Medium parameters used: f = 837 MHz; $\sigma = 1$ mho/m; $\epsilon_r = 55$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3131
- ConvF(5.69, 5.69, 5.69); Calibrated: 2009-10-27
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn728; Calibrated: 2009-02-09
- Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1179
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Body - Middle - Spacer 0.5cm – With cable CA-175D – Side 2 facing phantom /Area Scan (41x81x1):

Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.298 mW/g

Body - Middle - Spacer 0.5cm – With cable CA-175D – Side 2 facing phantom /Zoom Scan (5x5x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 8.41 V/m

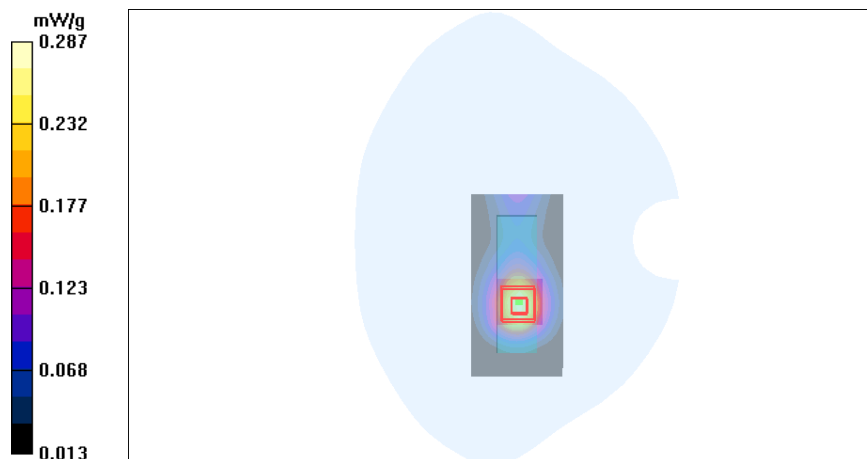
Peak SAR (extrapolated) = 0.424 W/kg

SAR(1 g) = 0.262 mW/g

SAR(10 g) = 0.156 mW/g

Power Drift = -0.035 dB

Maximum value of SAR (measured) = 0.287 mW/g



Date/Time: 2010-02-24 12:44:45

Test Laboratory: TCC Nokia

Type: RD-15; Serial: 004402/13/019383/6

Communication System: 1-slot GPRS850

Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium: BSL850; Medium Notes: t= 20.8 C

Medium parameters used: f = 837 MHz; σ = 1 mho/m; ϵ_r = 55; ρ = 1000 kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3131
- ConvF(5.69, 5.69, 5.69); Calibrated: 2009-10-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn728; Calibrated: 2009-02-09
- Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1179
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Body - Middle - Spacer 0.5cm - With cable CA-175D – Side 3 facing phantom /Area Scan (41x81x1):

Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.160 mW/g

Body - Middle - Spacer 0.5cm - With cable CA-175D – Side 3 facing phantom /Zoom Scan (5x5x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 6.75 V/m

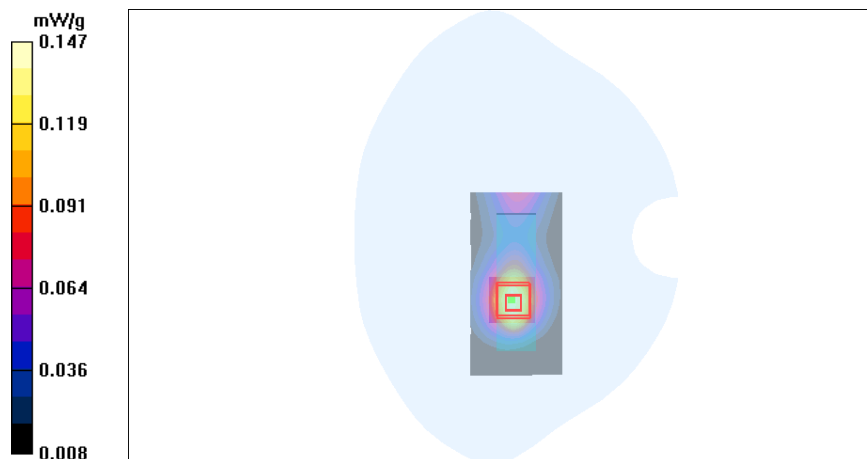
Peak SAR (extrapolated) = 0.212 W/kg

SAR(1 g) = 0.136 mW/g

SAR(10 g) = 0.084 mW/g

Power Drift = -0.130 dB

Maximum value of SAR (measured) = 0.147 mW/g



Date/Time: 2010-02-24 12:32:06

Test Laboratory: TCC Nokia

Type: RD-15; Serial: 004402/13/019383/6

Communication System: 1-slot GPRS850

Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium: BSL850; Medium Notes: t= 20.8 C

Medium parameters used: f = 837 MHz; $\sigma = 1$ mho/m; $\epsilon_r = 55$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3131
- ConvF(5.69, 5.69, 5.69); Calibrated: 2009-10-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn728; Calibrated: 2009-02-09
- Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1179
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Body - Middle - Spacer 0.5cm – With cable CA-175D – Side 5 facing phantom /Area Scan (41x41x1):

Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.020 mW/g

Body - Middle - Spacer 0.5cm – With cable CA-175D – Side 5 facing phantom /Zoom Scan (5x5x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 4.36 V/m

Peak SAR (extrapolated) = 0.042 W/kg

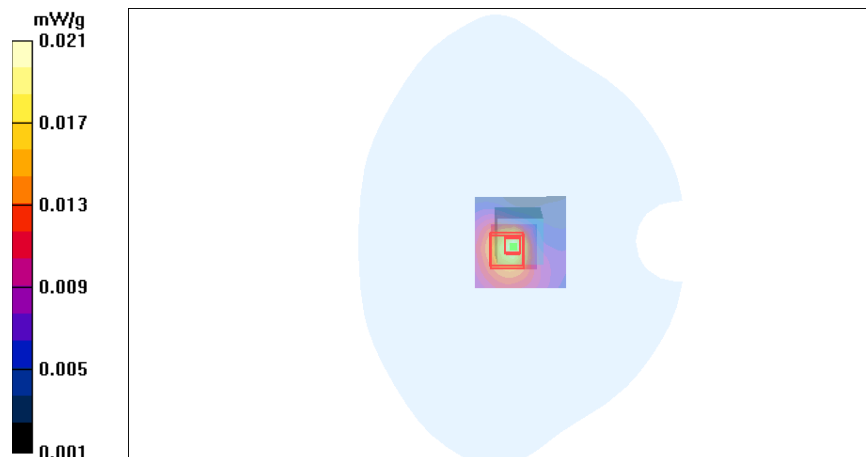
SAR(1 g) = 0.019 mW/g

SAR(10 g) = 0.011 mW/g

Power Drift = -0.010 dB

Warning: Maximum averaged SAR over 10 g is located on the boundary of the measurement cube. This cube might not incorporate the absolute averaged SAR. Please consider a refinement of the Area Scan measurement.

Maximum value of SAR (measured) = 0.021 mW/g



Date/Time: 2010-02-24 11:31:39

Test Laboratory: TCC Nokia

Type: RD-15; Serial: 004402/13/019383/6

Communication System: 2-slot GPRS850

Frequency: 836.6 MHz; Duty Cycle: 1:4.2

Medium: BSL850; Medium Notes: t= 20.8 C

Medium parameters used: f = 837 MHz; $\sigma = 1$ mho/m; $\epsilon_r = 55$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3131
- ConvF(5.69, 5.69, 5.69); Calibrated: 2009-10-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn728; Calibrated: 2009-02-09
- Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1179
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Body - Middle - Spacer 0.5cm – IBM laptop – Side 1 facing phantom /Area Scan (41x91x1): Measurement grid:
dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.540 mW/g

Body - Middle - Spacer 0.5cm – IBM laptop – Side 1 facing phantom /Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 23.1 V/m

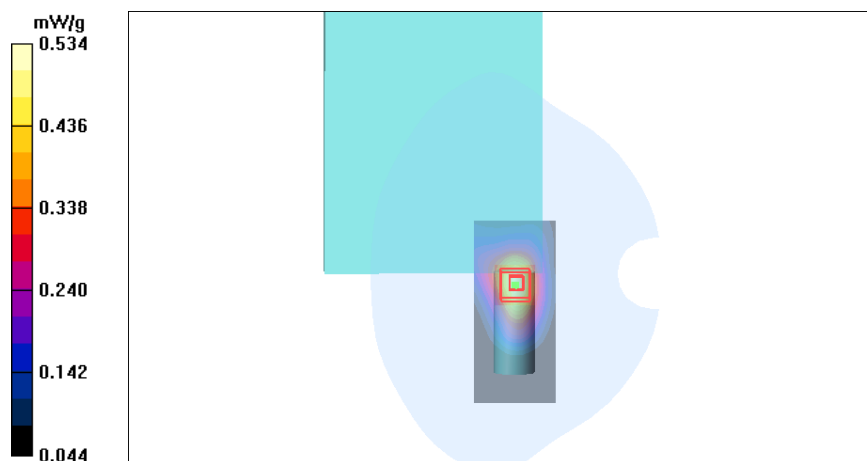
Peak SAR (extrapolated) = 0.706 W/kg

SAR(1 g) = 0.496 mW/g

SAR(10 g) = 0.325 mW/g

Power Drift = 0.029 dB

Maximum value of SAR (measured) = 0.534 mW/g



Date/Time: 2010-02-24 11:44:39

Test Laboratory: TCC Nokia

Type: RD-15; Serial: 004402/13/019383/6

Communication System: 3-slot GPRS850

Frequency: 836.6 MHz; Duty Cycle: 1:2.8

Medium: BSL850; Medium Notes: t= 20.8 C

Medium parameters used: f = 837 MHz; $\sigma = 1$ mho/m; $\epsilon_r = 55$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3131
- ConvF(5.69, 5.69, 5.69); Calibrated: 2009-10-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn728; Calibrated: 2009-02-09
- Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1179
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Body - Middle - Spacer 0.5cm – IBM laptop – Side 1 facing phantom /Area Scan (41x91x1): Measurement grid:
dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.516 mW/g

Body - Middle - Spacer 0.5cm – IBM laptop – Side 1 facing phantom /Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 22.8 V/m

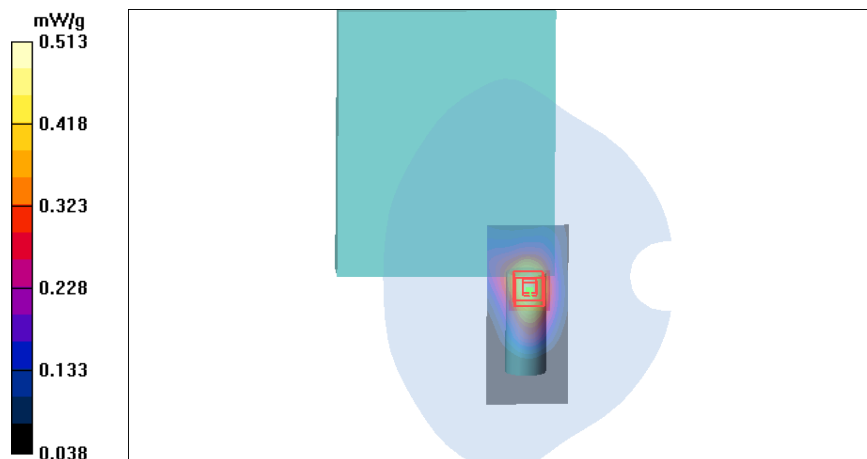
Peak SAR (extrapolated) = 0.697 W/kg

SAR(1 g) = 0.476 mW/g

SAR(10 g) = 0.311 mW/g

Power Drift = -0.044 dB

Maximum value of SAR (measured) = 0.513 mW/g



Date/Time: 2010-02-24 11:57:26

Test Laboratory: TCC Nokia

Type: RD-15; Serial: 004402/13/019383/6

Communication System: 4-slot GPRS850

Frequency: 836.6 MHz; Duty Cycle: 1:2.1

Medium: BSL850; Medium Notes: t= 20.8 C

Medium parameters used: f = 837 MHz; $\sigma = 1$ mho/m; $\epsilon_r = 55$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3131
- ConvF(5.69, 5.69, 5.69); Calibrated: 2009-10-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn728; Calibrated: 2009-02-09
- Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1179
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Body - Middle - Spacer 0.5cm – IBM laptop – Side 1 facing phantom /Area Scan (41x91x1): Measurement grid:
dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.506 mW/g

Body - Middle - Spacer 0.5cm – IBM laptop – Side 1 facing phantom /Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 22.5 V/m

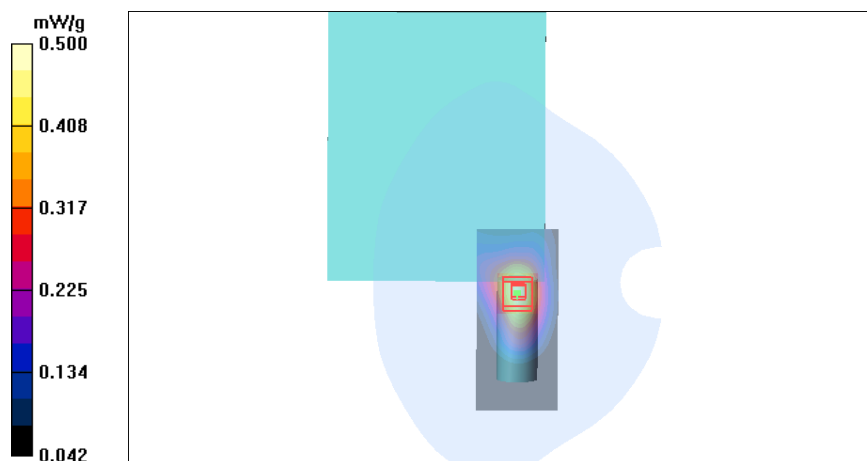
Peak SAR (extrapolated) = 0.661 W/kg

SAR(1 g) = 0.466 mW/g

SAR(10 g) = 0.307 mW/g

Power Drift = -0.012 dB

Maximum value of SAR (measured) = 0.500 mW/g



Date/Time: 2010-02-24 14:38:50

Test Laboratory: TCC Nokia

Type: RD-15; Serial: 004402/13/019383/6

Communication System: WCDMA850

Frequency: 835 MHz; Duty Cycle: 1:1

Medium: BSL850; Medium Notes: t= 20.8 C

Medium parameters used: f = 835 MHz; $\sigma = 1$ mho/m; $\epsilon_r = 55$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3131
- ConvF(5.69, 5.69, 5.69); Calibrated: 2009-10-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn728; Calibrated: 2009-02-09
- Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1179
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Body - Middle - Spacer 0.5cm – IBM laptop – Side 1 facing phantom /Area Scan (41x91x1): Measurement grid:
dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.739 mW/g

Body - Middle - Spacer 0.5cm – IBM laptop – Side 1 facing phantom /Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 26.4 V/m

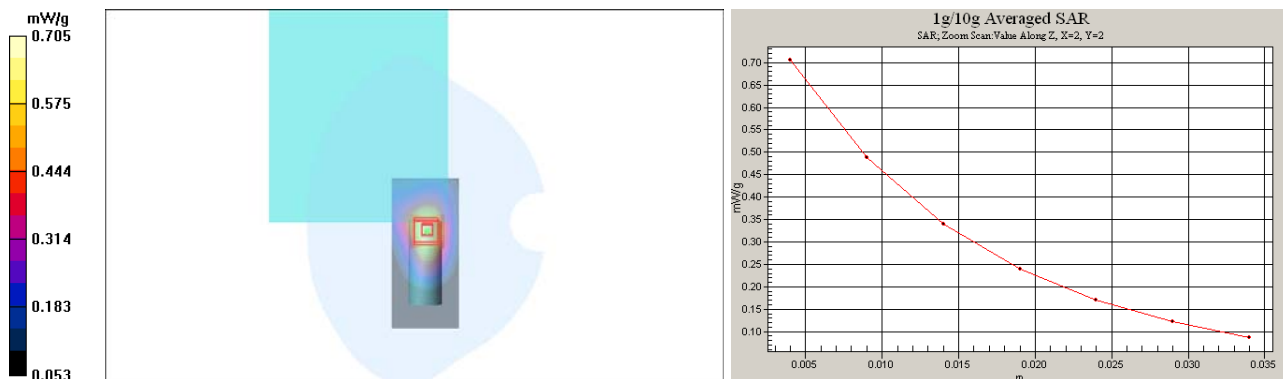
Peak SAR (extrapolated) = 0.927 W/kg

SAR(1 g) = 0.648 mW/g

SAR(10 g) = 0.424 mW/g

Power Drift = -0.145 dB

Maximum value of SAR (measured) = 0.705 mW/g



SAR Report

FCC_RD-15_02

Applicant: Nokia Corporation

Type: RD-15

Copyright © 2010 TCC Nokia

Date/Time: 2010-02-24 14:38:50

Test Laboratory: TCC Nokia

Type: RD-15; Serial: 004402/13/019383/6

Communication System: WCDMA850

Frequency: 835 MHz; Duty Cycle: 1:1

Medium: BSL850; Medium Notes: t= 20.8 C

Medium parameters used: f = 835 MHz; $\sigma = 1$ mho/m; $\epsilon_r = 55$; $\rho = 1000$ kg/m³

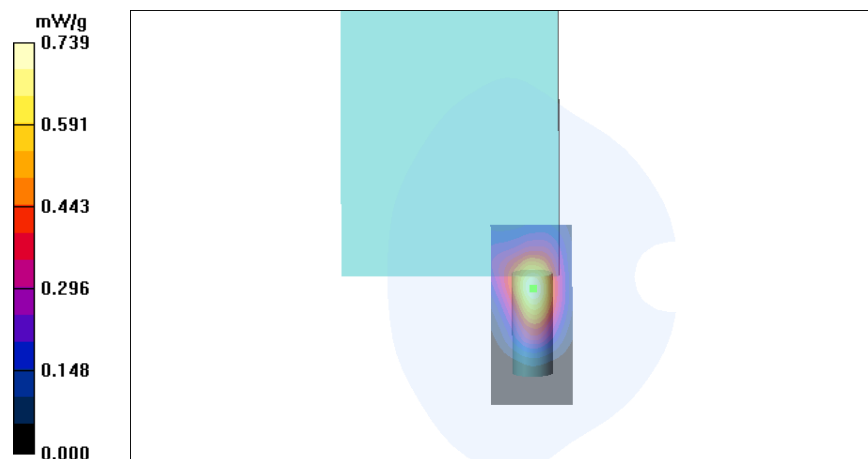
Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3131
- ConvF(5.69, 5.69, 5.69); Calibrated: 2009-10-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn728; Calibrated: 2009-02-09
- Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1179
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Body - Middle - Spacer 0.5cm – IBM laptop – Side 1 facing phantom /Area Scan (41x91x1): Measurement grid:
dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.739 mW/g



Date/Time: 2010-02-24 15:24:57

Test Laboratory: TCC Nokia

Type: RD-15; Serial: 004402/13/019383/6

Communication System: WCDMA850

Frequency: 835 MHz; Duty Cycle: 1:1

Medium: BSL850; Medium Notes: t= 20.8 C

Medium parameters used: f = 835 MHz; $\sigma = 1$ mho/m; $\epsilon_r = 55$; $\rho = 1000$ kg/m³

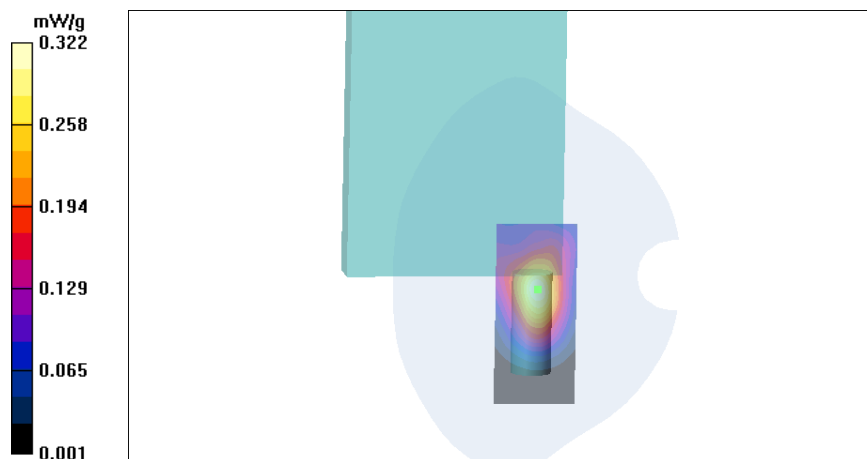
Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3131
- ConvF(5.69, 5.69, 5.69); Calibrated: 2009-10-27
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))
- Electronics: DAE4 Sn728; Calibrated: 2009-02-09
- Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1179
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Body - Middle - Spacer 1.0cm - IBM laptop - Side 1 facing phantom /Area Scan (41x91x1): Measurement grid:
dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.322 mW/g



Date/Time: 2010-02-26 11:10:07

Test Laboratory: TCC Nokia

Type: RD-15; Serial: 004402/13/019383/6

Communication System: 1-slot GPRS1900

Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium: BSL1900; Medium Notes: 20.9C

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.56$ mho/m; $\epsilon_r = 52.4$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3119
- ConvF(4.43, 4.43, 4.43); Calibrated: 2009-09-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn793; Calibrated: 2009-05-15
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Body - Middle - Spacer 0.5cm - IBM laptop - Side 1 facing phantom /Area Scan (41x81x1): Measurement grid:
dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.315 mW/g

Body - Middle - Spacer 0.5cm - IBM laptop - Side 1 facing phantom /Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 10.8 V/m

Peak SAR (extrapolated) = 0.448 W/kg

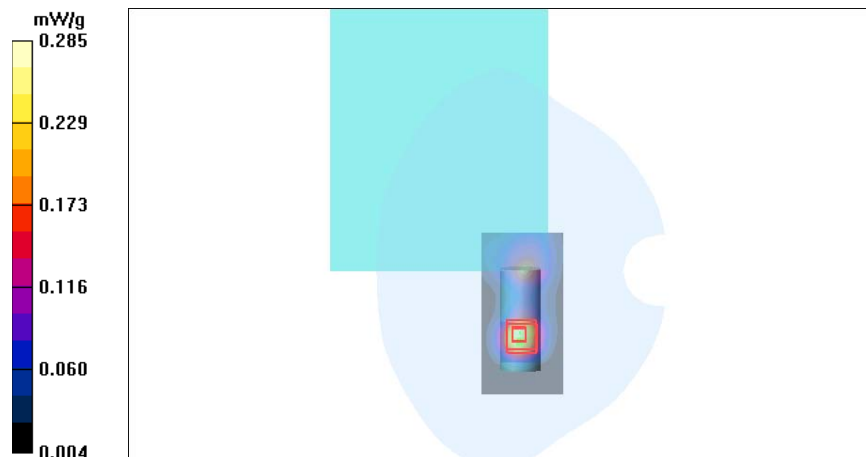
SAR(1 g) = 0.254 mW/g

SAR(10 g) = 0.135 mW/g

Power Drift = 0.322 dB

Warning: Maximum averaged SAR over 10 g is located on the boundary of the measurement cube. This cube might not incorporate the absolute averaged SAR. Please consider a refinement of the Area Scan measurement.

Maximum value of SAR (measured) = 0.285 mW/g



Date/Time: 2010-03-01 09:57:40

Test Laboratory: TCC Nokia

Type: RD-15; Serial: 004402/13/019383/6

Communication System: 1-slot GPRS1900

Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium: BSL1900; Medium Notes: t=20.8 C

Medium parameters used: f = 1880 MHz; σ = 1.52 mho/m; ϵ_r = 52.4; ρ = 1000 kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3119
- ConvF(4.43, 4.43, 4.43); Calibrated: 2009-09-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn793; Calibrated: 2009-05-15
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Body - Middle - Spacer 0.5cm – Amilo laptop - Side 4 facing phantom /Area Scan (51x71x1): Measurement grid:
dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.227 mW/g

Body - Middle - Spacer 0.5cm – Amilo laptop - Side 4 facing phantom /Zoom Scan (5x5x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 12.1 V/m

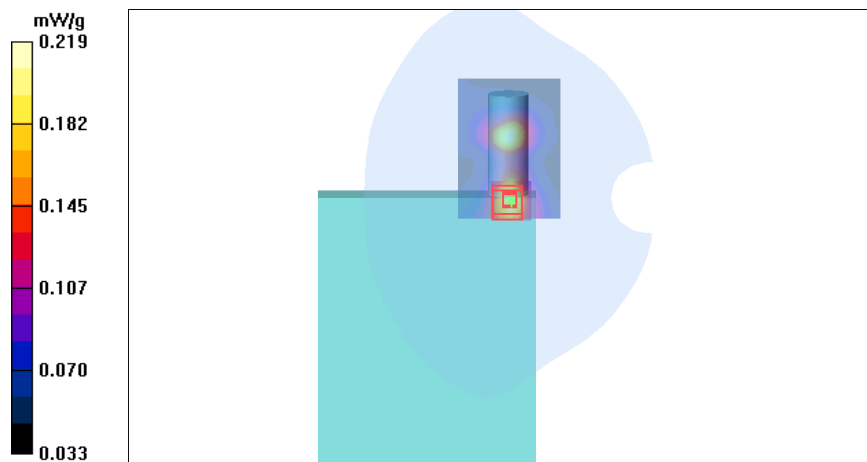
Peak SAR (extrapolated) = 0.293 W/kg

SAR(1 g) = 0.199 mW/g

SAR(10 g) = 0.132 mW/g

Power Drift = -0.417 dB

Maximum value of SAR (measured) = 0.219 mW/g



Date/Time: 2010-03-01 10:27:03

Test Laboratory: TCC Nokia

Type: RD-15; Serial: 004402/13/019383/6

Communication System: 1-slot GPRS1900

Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium: BSL1900; Medium Notes: t=20.8 C

Medium parameters used: f = 1880 MHz; σ = 1.52 mho/m; ϵ_r = 52.4; ρ = 1000 kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3119
- ConvF(4.43, 4.43, 4.43); Calibrated: 2009-09-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn793; Calibrated: 2009-05-15
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Body - Middle - Spacer 0.5cm – With cable CA-175D - Side 2 facing phantom /Area Scan (51x81x1):

Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.314 mW/g

Body - Middle - Spacer 0.5cm – With cable CA-175D - Side 2 facing phantom /Zoom Scan (5x5x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 12.6 V/m

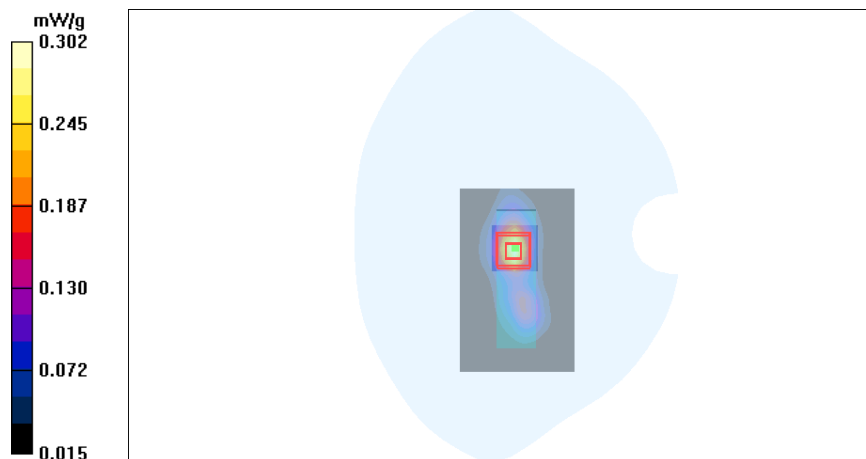
Peak SAR (extrapolated) = 0.452 W/kg

SAR(1 g) = 0.270 mW/g

SAR(10 g) = 0.144 mW/g

Power Drift = 0.080 dB

Maximum value of SAR (measured) = 0.302 mW/g



Date/Time: 2010-03-01 11:17:36

Test Laboratory: TCC Nokia

Type: RD-15; Serial: 004402/13/019383/6

Communication System: 1-slot GPRS1900

Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium: BSL1900; Medium Notes: t=20.8 C

Medium parameters used: f = 1880 MHz; σ = 1.52 mho/m; ϵ_r = 52.4; ρ = 1000 kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3119
- ConvF(4.43, 4.43, 4.43); Calibrated: 2009-09-22
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn793; Calibrated: 2009-05-15
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Body - Middle - Spacer 0.5cm - With cable CA-175D - Side 3 facing phantom /Area Scan (51x81x1):

Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.106 mW/g

Body - Middle - Spacer 0.5cm - With cable CA-175D - Side 3 facing phantom /Zoom Scan (5x5x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 5.87 V/m

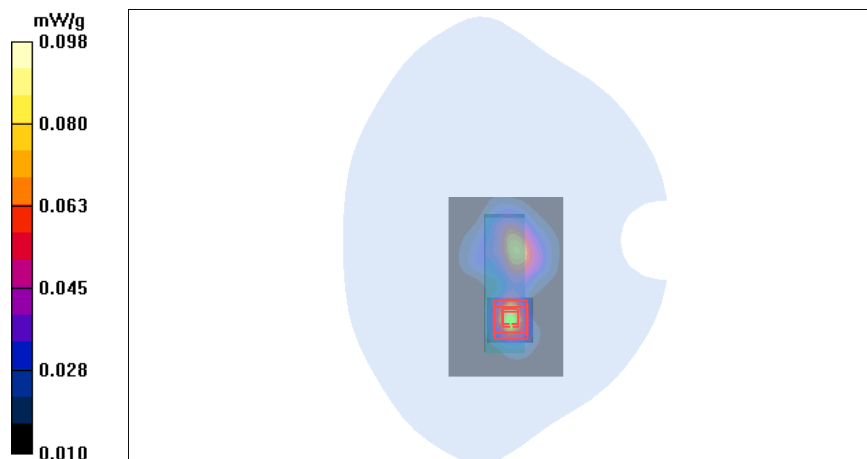
Peak SAR (extrapolated) = 0.168 W/kg

SAR(1 g) = 0.086 mW/g

SAR(10 g) = 0.043 mW/g

Power Drift = 0.064 dB

Maximum value of SAR (measured) = 0.098 mW/g



Date/Time: 2010-03-01 11:34:19

Test Laboratory: TCC Nokia

Type: RD-15; Serial: 004402/13/019383/6

Communication System: 1-slot GPRS1900

Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium: BSL1900; Medium Notes: t=20.8 C

Medium parameters used: f = 1880 MHz; σ = 1.52 mho/m; ϵ_r = 52.4; ρ = 1000 kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3119
- ConvF(4.43, 4.43, 4.43); Calibrated: 2009-09-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn793; Calibrated: 2009-05-15
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Body - Middle - Spacer 0.5cm - With cable CA-175D - Side 5 facing phantom /Area Scan (41x41x1):

Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.031 mW/g

Body - Middle - Spacer 0.5cm - With cable CA-175D - Side 5 facing phantom /Zoom Scan (5x5x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 4.53 V/m

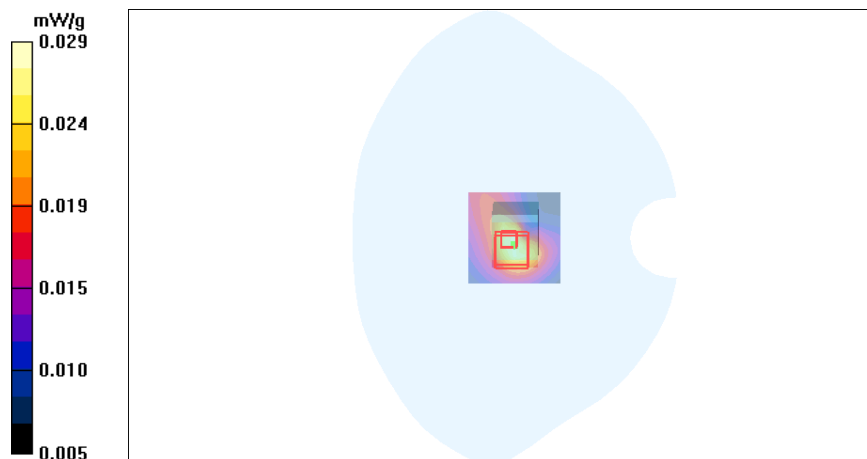
Peak SAR (extrapolated) = 0.052 W/kg

SAR(1 g) = 0.027 mW/g

SAR(10 g) = 0.017 mW/g

Power Drift = -0.011 dB

Maximum value of SAR (measured) = 0.029 mW/g



Date/Time: 2010-02-26 11:30:29

Test Laboratory: TCC Nokia

Type: RD-15; Serial: 004402/13/019383/6

Communication System: 2-slot GPRS1900

Frequency: 1880 MHz; Duty Cycle: 1:4.2

Medium: BSL1900; Medium Notes: 20.9C

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.56$ mho/m; $\epsilon_r = 52.4$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3119
- ConvF(4.43, 4.43, 4.43); Calibrated: 2009-09-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn793; Calibrated: 2009-05-15
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Body - Middle - Spacer 0.5cm – IBM laptop - Side 1 facing phantom /Area Scan (41x81x1): Measurement grid:
dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.306 mW/g

Body - Middle - Spacer 0.5cm – IBM laptop - Side 1 facing phantom /Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 11.9 V/m

Peak SAR (extrapolated) = 0.428 W/kg

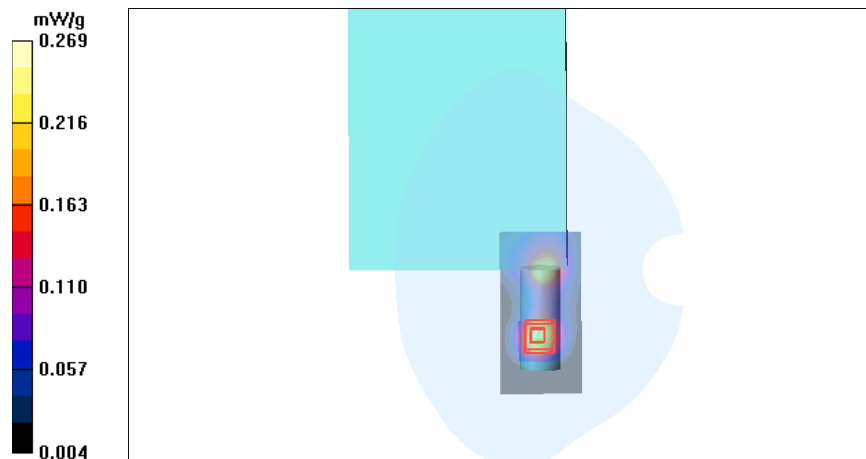
SAR(1 g) = 0.242 mW/g

SAR(10 g) = 0.129 mW/g

Power Drift = -0.004 dB

Warning: Maximum averaged SAR over 10 g is located on the boundary of the measurement cube. This cube might not incorporate the absolute averaged SAR. Please consider a refinement of the Area Scan measurement.

Maximum value of SAR (measured) = 0.269 mW/g



Date/Time: 2010-02-26 11:51:38

Test Laboratory: TCC Nokia

Type: RD-15; Serial: 004402/13/019383/6

Communication System: 3-slot GPRS1900

Frequency: 1880 MHz; Duty Cycle: 1:2.8

Medium: BSL1900; Medium Notes: 20.9C

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.56$ mho/m; $\epsilon_r = 52.4$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3119
- ConvF(4.43, 4.43, 4.43); Calibrated: 2009-09-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn793; Calibrated: 2009-05-15
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Body - Middle - Spacer 0.5cm – IBM laptop - Side 1 facing phantom /Area Scan (41x81x1): Measurement grid:
dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.298 mW/g

Body - Middle - Spacer 0.5cm – IBM laptop - Side 1 facing phantom /Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 11.9 V/m

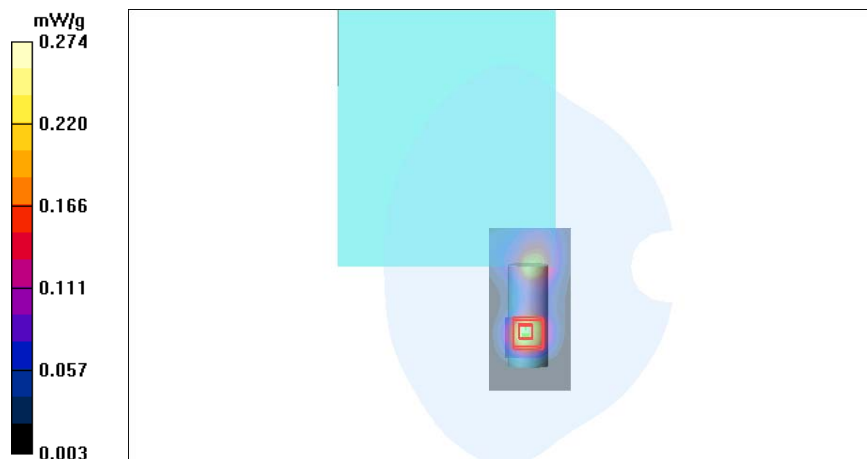
Peak SAR (extrapolated) = 0.439 W/kg

SAR(1 g) = 0.247 mW/g

SAR(10 g) = 0.132 mW/g

Power Drift = -0.030 dB

Maximum value of SAR (measured) = 0.274 mW/g



Date/Time: 2010-02-26 12:05:16

Test Laboratory: TCC Nokia

Type: RD-15; Serial: 004402/13/019383/6

Communication System: 4-slot GPRS1900

Frequency: 1880 MHz; Duty Cycle: 1:2.1

Medium: BSL1900; Medium Notes: 20.9C

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.56$ mho/m; $\epsilon_r = 52.4$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3119
- ConvF(4.43, 4.43, 4.43); Calibrated: 2009-09-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn793; Calibrated: 2009-05-15
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Body - Middle - Spacer 0.5cm – IBM laptop - Side 1 facing phantom /Area Scan (41x81x1): Measurement grid:
dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.304 mW/g

Body - Middle - Spacer 0.5cm – IBM laptop - Side 1 facing phantom /Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 12.1 V/m

Peak SAR (extrapolated) = 0.444 W/kg

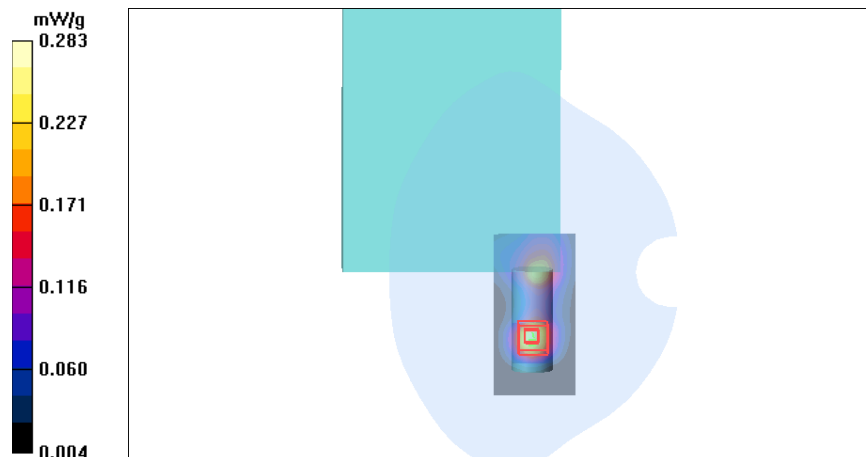
SAR(1 g) = 0.252 mW/g

SAR(10 g) = 0.134 mW/g

Power Drift = -0.028 dB

Warning: Maximum averaged SAR over 10 g is located on the boundary of the measurement cube. This cube might not incorporate the absolute averaged SAR. Please consider a refinement of the Area Scan measurement.

Maximum value of SAR (measured) = 0.283 mW/g



Date/Time: 2010-03-01 13:15:21

Test Laboratory: TCC Nokia

Type: RD-15; Serial: 004402/13/019383/6

Communication System: WCDMA1900

Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: BSL1900; Medium Notes: t=20.8 C

Medium parameters used: f = 1880 MHz; $\sigma = 1.52$ mho/m; $\epsilon_r = 52.4$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3119
- ConvF(4.43, 4.43, 4.43); Calibrated: 2009-09-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn793; Calibrated: 2009-05-15
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Body - Middle - Spacer 0.5cm - With cable CA-175D - Side 2 facing phantom /Area Scan (51x81x1):

Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.821 mW/g

Body - Middle - Spacer 0.5cm - With cable CA-175D - Side 2 facing phantom /Zoom Scan (5x5x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 22.7 V/m

Peak SAR (extrapolated) = 1.20 W/kg

SAR(1 g) = 0.724 mW/g

SAR(10 g) = 0.387 mW/g

Power Drift = 0.050 dB

Maximum value of SAR (measured) = 0.824 mW/g

Body - Middle - Spacer 0.5cm - With cable CA-175D - Side 2 facing phantom /Zoom Scan 2 (5x5x7)/Cube 0:

Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 22.7 V/m

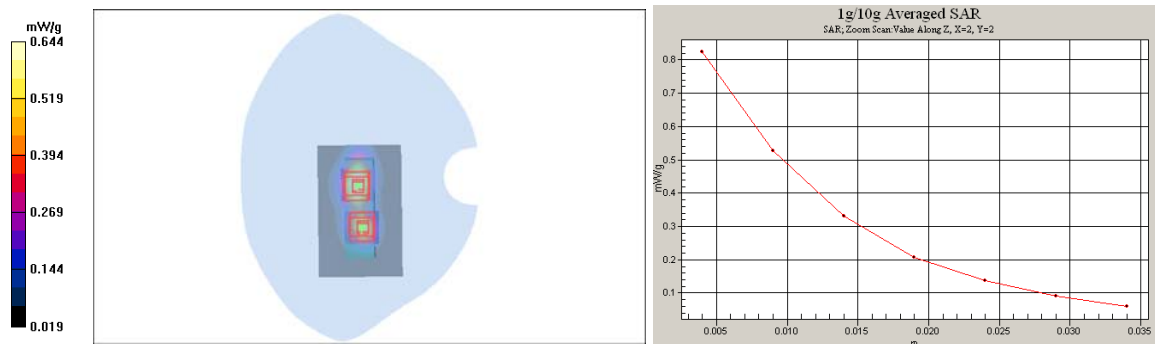
Peak SAR (extrapolated) = 1.09 W/kg

SAR(1 g) = 0.551 mW/g

SAR(10 g) = 0.268 mW/g

Power Drift = 0.050 dB

Maximum value of SAR (measured) = 0.644 mW/g



SAR Report

FCC_RD-15_02

Applicant: Nokia Corporation

Type: RD-15

Copyright © 2010 TCC Nokia

Date/Time: 2010-03-01 13:15:21

Test Laboratory: TCC Nokia

Type: RD-15; Serial: 004402/13/019383/6

Communication System: WCDMA1900

Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: BSL1900; Medium Notes: t=20.8 C

Medium parameters used: f = 1880 MHz; $\sigma = 1.52$ mho/m; $\epsilon_r = 52.4$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

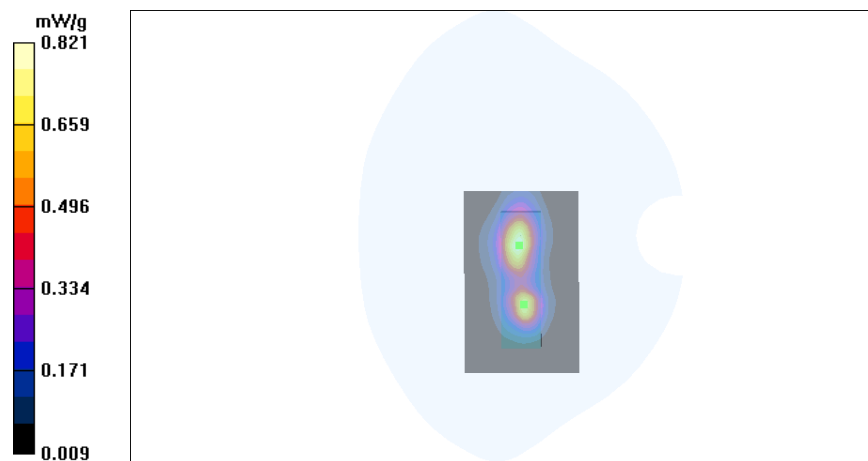
DASY4 Configuration:

- Probe: ES3DV3 - SN3119
- ConvF(4.43, 4.43, 4.43); Calibrated: 2009-09-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn793; Calibrated: 2009-05-15
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Body - Middle - Spacer 0.5cm - With cable CA-175D - Side 2 facing phantom /Area Scan (51x81x1):

Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.821 mW/g



Date/Time: 2010-03-01 14:20:44

Test Laboratory: TCC Nokia

Type: RD-15; Serial: 004402/13/019383/6

Communication System: WCDMA1900

Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: BSL1900; Medium Notes: t=20.8 C

Medium parameters used: f = 1880 MHz; σ = 1.52 mho/m; ϵ_r = 52.4; ρ = 1000 kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3119
- ConvF(4.43, 4.43, 4.43); Calibrated: 2009-09-22
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))
- Electronics: DAE4 Sn793; Calibrated: 2009-05-15
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Body - Middle - Spacer 1.0cm - With cable CA-175D – Side 2 facing phantom /Area Scan (51x81x1):

Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.541 mW/g



Date/Time: 2010-03-01 14:35:38

Test Laboratory: TCC Nokia

Type: RD-15; Serial: 004402/13/019383/6

Communication System: WCDMA1900

Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: BSL1900; Medium Notes: t=20.8 C

Medium parameters used: f = 1880 MHz; σ = 1.52 mho/m; ϵ_r = 52.4; ρ = 1000 kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3119
- ConvF(4.43, 4.43, 4.43); Calibrated: 2009-09-22
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))
- Electronics: DAE4 Sn793; Calibrated: 2009-05-15
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Body - Middle - Spacer 1.5cm - With cable CA-175D – Side 2 facing phantom /Area Scan (51x81x1):

Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.242 mW/g



APPENDIX C: CONDUCTED AVERAGE POWER MEASUREMENTS FOR WCDMA AND HSUPA

Test Laboratory: Sporton International Inc.
Type: RD-15; SN: 004402/13/019396/8, HW: 1.7, SW: 2.11

C.1. WCDMA850 Test results

Average power

Ch / f (MHz)	P [dBm]
4132 / 826.4	21.12
4182 / 836.4	20.96
4233 / 846.6	21.07

C.2. HSUPA850 Test results

Average power

Ch / f (MHz)	P [dBm]				
	Subtest mode 1	Subtest mode 2	Subtest mode 3	Subtest mode 4	Subtest mode 5
4132 / 826.4	18.57	18.87	19.78	18.83	19.33
4182 / 836.4	18.41	18.94	19.81	18.70	19.43
4233 / 846.6	18.54	18.87	19.74	18.87	19.64

Note: In HSUPA operation, the output power is reduced relative to the tuning target power for WCDMA. This device runs two separate HSUPA power control routines: MPR and E-TFC MPR. In each Subtest mode, the routine with the higher power reduction dominates. As a result, the MPR for each of the Subtest modes is as follows:

Maximum Power Reduction (MPR)				
Subtest mode 1	Subtest mode 2	Subtest mode 3	Subtest mode 4	Subtest mode 5
1.5dB	2.0dB	1.0dB	2.0dB	1.5dB

C.3. WCDMA1900 Test results

Average power

Ch / f (MHz)	P [dBm]
9262 / 1852.4	21.05
9400 / 1880.0	21.11
9538 / 1907.6	20.87

C.4. HSUPA1900 Test results

Average power

Ch / f (MHz)	P [dBm]				
	Subtest mode 1	Subtest mode 2	Subtest mode 3	Subtest mode 4	Subtest mode 5
9262 / 1852.4	18.42	18.60	19.27	18.56	19.48
9400 / 1880.0	18.61	18.82	19.49	18.81	19.19
9538 / 1907.6	18.51	18.73	19.58	18.87	19.34

Note: In HSUPA operation, the output power is reduced relative to the tuning target power for WCDMA. This device runs two separate HSUPA power control routines: MPR and E-TFC MPR. In each Subtest mode, the routine with the higher power reduction dominates. As a result, the MPR for each of the Subtest modes is as follows:

Maximum Power Reduction (MPR)				
Subtest mode 1	Subtest mode 2	Subtest mode 3	Subtest mode 4	Subtest mode 5
1.5dB	2.0dB	1.0dB	2.0dB	1.5dB

APPENDIX D: RELEVANT PAGES FROM PROBE CALIBRATION REPORT(S)



Accredited by the Swiss Accreditation Service (SAS)
 The Swiss Accreditation Service is one of the signatories to the EA
 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Nokia Denmark A/S**

Certificate No: **ES3-3119_Sep09**

CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3119**

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 22, 2009**

Condition of the calibrated item **In Tolerance**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-09 (No. 217-01030)	Apr-10
Power sensor E4412A	MY41495277	1-Apr-09 (No. 217-01030)	Apr-10
Power sensor E4412A	MY41498087	1-Apr-09 (No. 217-01030)	Apr-10
Reference 3 dB Attenuator	SN: S5054 (3c)	31-Mar-09 (No. 217-01026)	Mar-10
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-09 (No. 217-01028)	Mar-10
Reference 30 dB Attenuator	SN: S5129 (30b)	31-Mar-09 (No. 217-01027)	Mar-10
Reference Probe ES3DV2	SN: 3013	2-Jan-09 (No. ES3-3013_Jan09)	Jan-10
DAE4	SN: 660	9-Sep-08 (No. DAE4-660_Sep08)	Sep-09

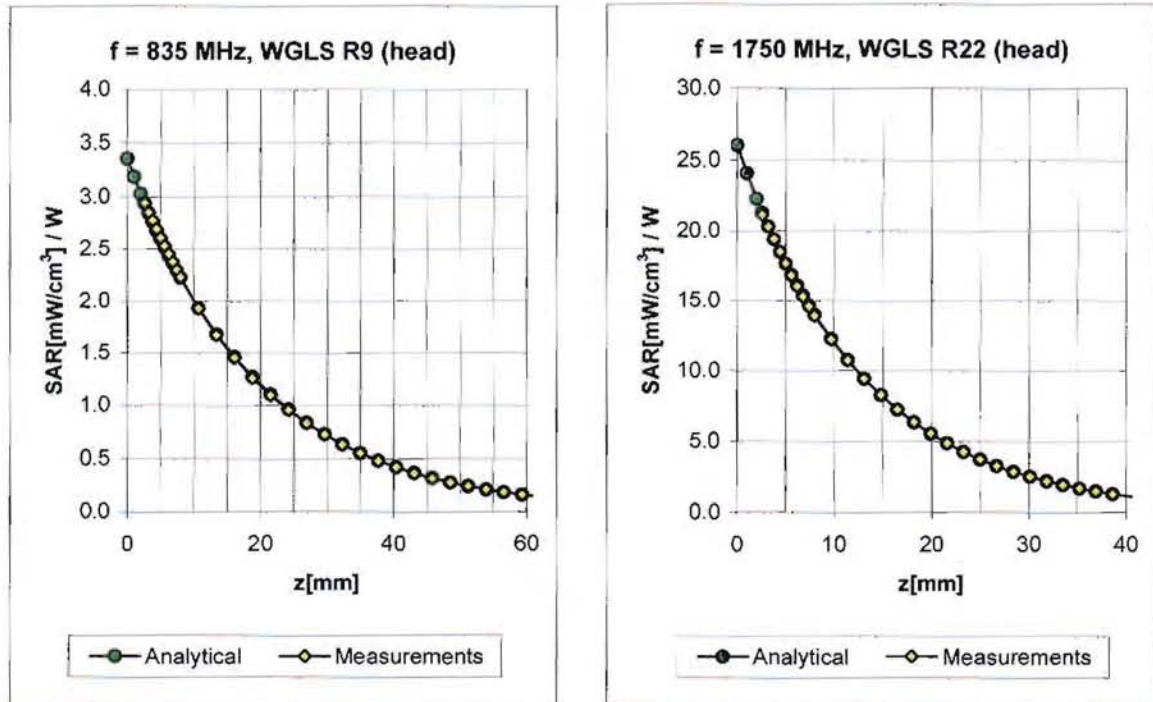
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-08)	In house check: Oct-09

	Name	Function	Signature
Calibrated by:	Marcel Fehr	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: September 22, 2009

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

Conversion Factor Assessment



f [MHz]	Validity [MHz] ^c	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
835	$\pm 50 / \pm 100$	Head	$41.5 \pm 5\%$	$0.90 \pm 5\%$	0.87	1.10	$5.88 \pm 11.0\%$ (k=2)
1750	$\pm 50 / \pm 100$	Head	$40.1 \pm 5\%$	$1.37 \pm 5\%$	0.46	1.61	$5.03 \pm 11.0\%$ (k=2)
1900	$\pm 50 / \pm 100$	Head	$40.0 \pm 5\%$	$1.40 \pm 5\%$	0.45	1.62	$4.81 \pm 11.0\%$ (k=2)
2450	$\pm 50 / \pm 100$	Head	$39.2 \pm 5\%$	$1.80 \pm 5\%$	0.41	1.84	$4.27 \pm 11.0\%$ (k=2)
835	$\pm 50 / \pm 100$	Body	$55.2 \pm 5\%$	$0.97 \pm 5\%$	0.97	1.11	$5.71 \pm 11.0\%$ (k=2)
1750	$\pm 50 / \pm 100$	Body	$53.4 \pm 5\%$	$1.49 \pm 5\%$	0.37	2.06	$4.65 \pm 11.0\%$ (k=2)
1900	$\pm 50 / \pm 100$	Body	$53.3 \pm 5\%$	$1.52 \pm 5\%$	0.37	2.25	$4.43 \pm 11.0\%$ (k=2)
2450	$\pm 50 / \pm 100$	Body	$52.7 \pm 5\%$	$1.95 \pm 5\%$	0.99	1.08	$4.13 \pm 11.0\%$ (k=2)

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



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: **ES3-3131_Oct09**

CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3131**

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: **October 27, 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 $(22 \pm 3)^{\circ}\text{C}$ 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-09 (No. 217-01030)	Apr-10
Power sensor E4412A	MY41495277	1-Apr-09 (No. 217-01030)	Apr-10
Power sensor E4412A	MY41498087	1-Apr-09 (No. 217-01030)	Apr-10
Reference 3 dB Attenuator	SN: S5054 (3c)	31-Mar-09 (No. 217-01026)	Mar-10
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-09 (No. 217-01028)	Mar-10
Reference 30 dB Attenuator	SN: S5129 (30b)	31-Mar-09 (No. 217-01027)	Mar-10
Reference Probe ES3DV2	SN: 3013	2-Jan-09 (No. ES3-3013_Jan09)	Jan-10
DAE4	SN: 660	29-Sep-09 (No. DAE4-660_Sep09)	Sep-10

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

	Name	Function	Signature
Calibrated by:	Marcel Fehr	Laboratory Technician	

Approved by:	Katja Pokovic	Technical Manager	
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Issued: October 27, 2009

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DASY - Parameters of Probe: ES3DV3 SN:3131**Basic Calibration Parameters**

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	1.36	1.30	1.29	$\pm 10.1\%$
DCP (mV) ^B	95.7	92.8	93.9	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dBuV	C	VR mV	Unc (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	300	$\pm 1.5\%$
			Y	0.00	0.00	1.00	300	
			Z	0.00	0.00	1.00	300	

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

^A The uncertainties of NormX,Y,Z do not affect the E²-field uncertainty inside TSL (see Pages 5 and 6).

^B Numerical linearization parameter: uncertainty not required.

DASY - Parameters of Probe: ES3DV3 SN:3131

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz]	Validity [MHz] ^c	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
835	± 50 / ± 100	41.5 ± 5%	0.90 ± 5%	5.85	5.85	5.85	0.26	2.01 ± 11.0%
1750	± 50 / ± 100	40.1 ± 5%	1.37 ± 5%	5.08	5.08	5.08	0.45	1.56 ± 11.0%
1900	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	4.88	4.88	4.88	0.38	1.72 ± 11.0%
2450	± 50 / ± 100	39.2 ± 5%	1.80 ± 5%	4.31	4.31	4.31	0.44	1.66 ± 11.0%

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

DASY - Parameters of Probe: ES3DV3 SN:3131

Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz]	Validity [MHz] ^C	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
835	± 50 / ± 100	55.2 ± 5%	0.97 ± 5%	5.69	5.69	5.69	0.32	1.93 ± 11.0%
1750	± 50 / ± 100	53.4 ± 5%	1.49 ± 5%	4.71	4.71	4.71	0.43	1.83 ± 11.0%
1900	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	4.48	4.48	4.48	0.34	2.34 ± 11.0%
2450	± 50 / ± 100	52.7 ± 5%	1.95 ± 5%	4.07	4.07	4.07	0.94	1.10 ± 11.0%

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

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



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: **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 ± 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
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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

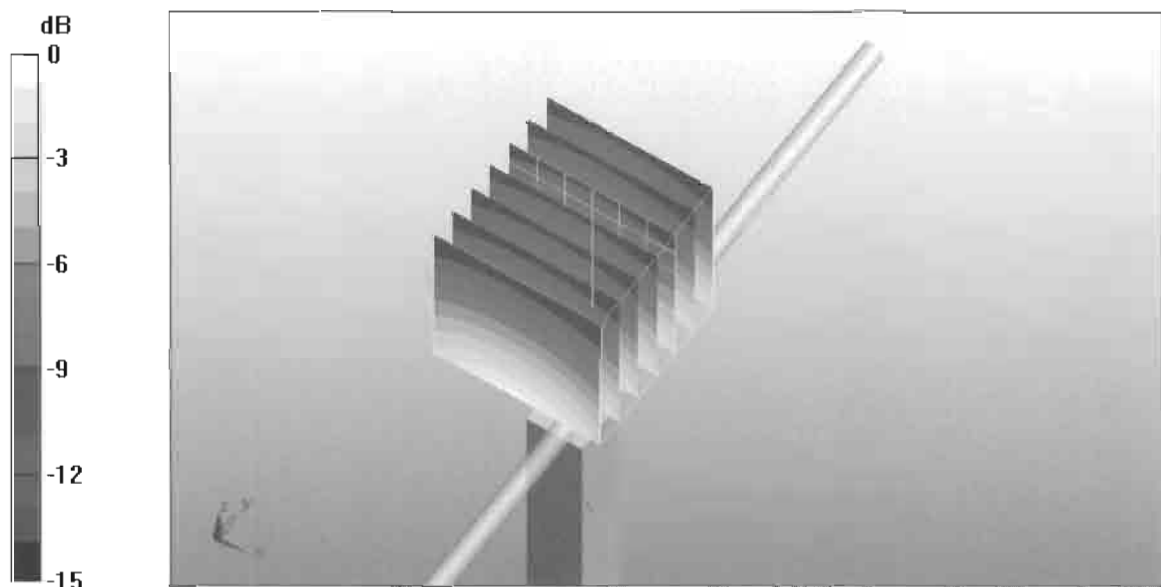
Pin=250 mW /d=15mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

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/m³

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

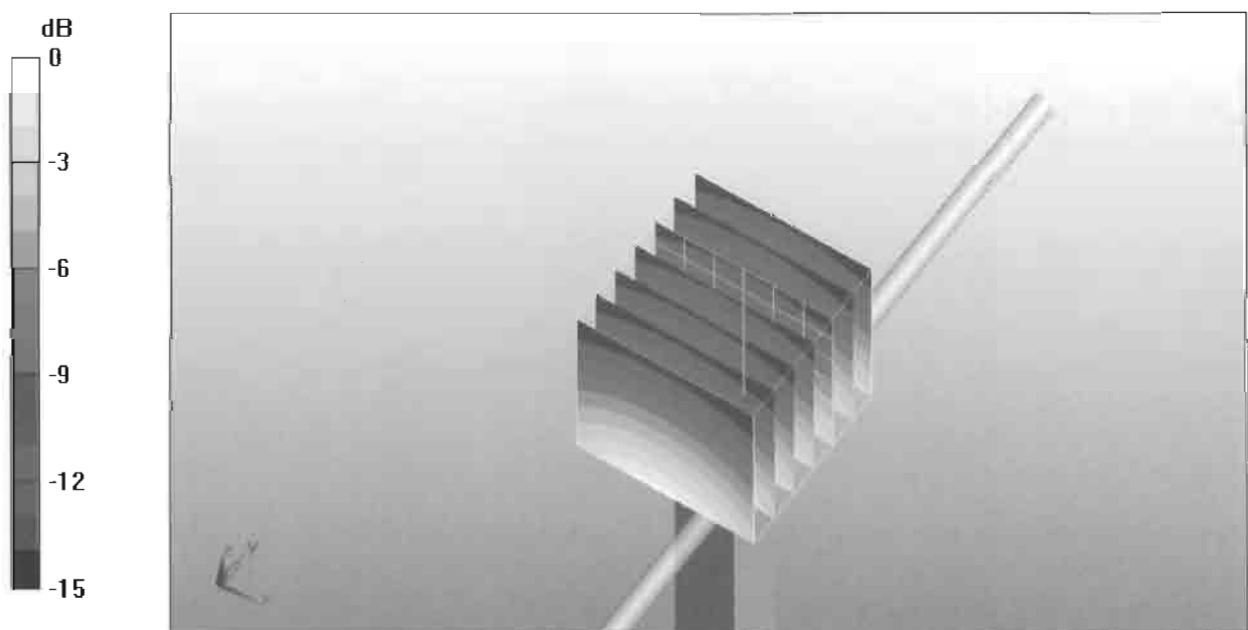
Pin250 mW /d=15mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

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



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: **D1900V2-5d013_Oct09**

CALIBRATION CERTIFICATE

Object **D1900V2 - SN: 5d013**

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 ± 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

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

DASY5 Validation Report for Head TSL

Date/Time: 20.10.2009 11:58:36

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; $\sigma = 1.43$ mho/m; $\epsilon_r = 39.8$; $\rho = 1000$ kg/m³

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

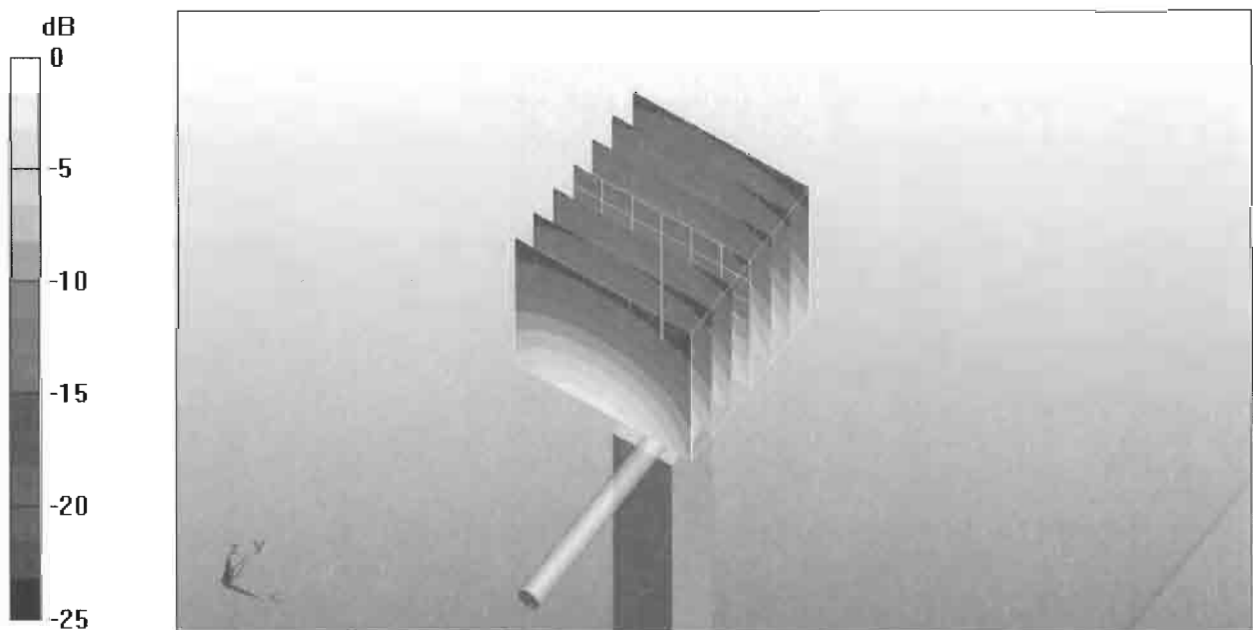
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 97.2 V/m; Power Drift = 0.039 dB

Peak SAR (extrapolated) = 18.5 W/kg

SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.24 mW/g

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



0 dB = 12.6mW/g

DASY5 Validation Report for Body

Date/Time: 20.10.2009 13:55:16

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 U10 BB

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.58$ mho/m; $\epsilon_r = 53.5$; $\rho = 1000$ kg/m³

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

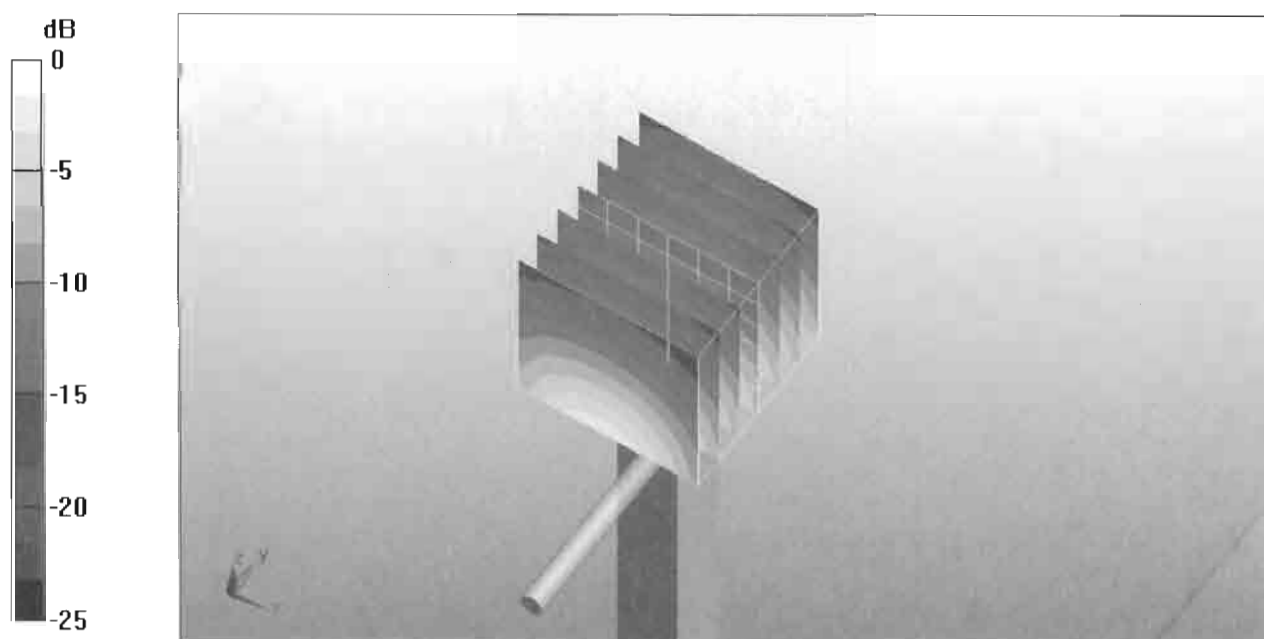
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96 V/m; Power Drift = -0.013 dB

Peak SAR (extrapolated) = 18.5 W/kg

SAR(1 g) = 10.3 mW/g; SAR(10 g) = 5.41 mW/g

Maximum value of SAR (measured) = 13 mW/g



0 dB = 13mW/g