

SAR Compliance Test Report

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Tested device:	RM-349		
FCC ID:	QFXRM-349	IC:	661Z-RM349
Supplement reports:	Cph_SAR_0842_03 for RM-348 / FCC ID: QFXRM-348 / IC ID: 661Z-RM348.		
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:

Jose Gomez
Certification Test Engineer

2009-02-12

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1. SUMMARY OF SAR TEST REPORT

1.1 Test Details

Period of test	2008-10-02 to 2008-10-10
SN, HW and SW numbers of tested device	SN: 004401/10/096580/1, HW: 4003, SW: 10.045, DUT: 26940
Batteries used in testing	BL-6F, DUT: 25467, 25468
Headsets used in testing	HS-45, DUT: 29352
Other accessories used in testing	-
State of sample	Prototype unit
Notes	-

1.2 Maximum Results**

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

1.2.1 Head Configuration

Mode	Ch / f (MHz)	Radiated power	Position	Measured SAR value (1g avg)	Scaled* SAR value (1g avg)	SAR limit (1g avg)	Result
GSM850	128 / 824.2	29.1 dBm ERP	Right, Cheek	0.968 W/kg	1.08 W/kg	1.6 W/kg	PASSED
3-slot GPRS1900	661 / 1880.0	24.5 dBm EIRP	Left, Cheek	0.827 W/kg	0.93 W/kg	1.6 W/kg	PASSED

1.2.2 Body Worn Configuration

Mode	Ch / f (MHz)	Radiated power	Separation distance	Measured SAR value (1g avg)	Scaled* SAR value (1g avg)	SAR limit (1g avg)	Result
GSM850	128 / 824.2	29.1 dBm ERP	1.5 cm	0.640 W/kg	0.72 W/kg	1.6 W/kg	PASSED
3-slot GPRS1900	661 / 1880.0	24.5 dBm EIRP	1.5 cm	0.353 W/kg	0.40 W/kg	1.6 W/kg	PASSED

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

**SAR values taken from Cph_SAR_0842_03 for RM-348 / FCC ID: QFXRM-348 / IC ID: 661Z-RM348.

1.2.3 Maximum Drift

Maximum drift covered by 12% scaling up of the SAR values	Maximum drift during measurements
0.5dB	0.32 dB

1.2.4 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 3/8	824 – 849 1850 – 1910
EGPRS	850 1900	GMSK / 8PSK	1/8 to 3/8	824 – 849 1850 – 1910
BT	2450	GFSK	1	2402 – 2480

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

2.1 Picture of the Device



2.2 Description of the Antenna

The device has an internal antenna.

3. TEST CONDITIONS

3.1 Temperature and Humidity

Ambient temperature (°C):	20.5 to 22.5
Ambient humidity (RH %):	35 to 55

3.2 Test Signal, Frequencies and Output Power

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

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

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

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

All of the SAR results, SAR plots and test details given in this report are duplicated from the earlier report Cph_SAR_0842_03 for RM-348 / FCC ID: QFXRM-348 / IC ID: 661Z-RM348. The difference between RM-348 and RM-349 is that RM-349 has had WCDMA900, WCDMA2100 and WLAN components removed.

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
DAE3	501	12 months	2009-03
DAE3	339	12 months	2009-06
E-field Probe ES3DV3	3116	12 months	2009-07
E-field Probe ES3DV3	3117	12 months	2009-07
Dipole Validation Kit, D835V2	476	24 months	2009-02
Dipole Validation Kit, D1900V2	5d026	24 months	2010-03
DASY4 software	Version 4.7	-	-

Additional test equipment used in testing:

Test Equipment	Model	Serial Number	Calibration interval	Calibration expiry
Signal Generator	SME06	829445/008	36 months	2009-03
Amplifier	2100-BBS3Q8CCJ	1003	-	-
Power Meter	NRP	100293	24 months	2009-07
Power Sensor	NRP-Z51	100830	24 months	2009-07
Call Tester	CMU200	105900	-	-
Call Tester	CMU200	110735	-	-
BT Tester	CBT	100263	-	-
Vector Network Analyzer	AT8753ES	MY40001091	12 months	2009-08
Dielectric Probe Kit	HP85070B	US33020403	-	-

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 C
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 Head and Body tissue simulant(s):

800MHz band

Ingredient	Head (% by weight)	Body (% by weight)
Deionised Water	39.74	55.97
HEC	0.25	1.21
Sugar	58.31	41.76
Preservative	0.15	0.27
Salt	1.55	0.79

1900MHz band

Ingredient	Head (% by weight)	Body (% by weight)
Deionised Water	54.88	69.02
Butyl Diglycol	44.91	30.76
Salt	0.21	0.22

4.3.2 System Checking

The manufacturer calibrates the probes annually. Dielectric parameters of the tissue simulants were measured every day using the dielectric probe kit and the network analyser. A system check measurement was made following the determination of the dielectric parameters of the simulant, using the dipole validation kit. A power level of 250 mW was supplied to the dipole antenna, which was placed under the flat section of the twin SAM phantom. The system checking results (dielectric parameters and SAR values) are given in the table below.

System checking, head tissue simulant

f [MHz]	Description	SAR [W/kg], 1g	Dielectric Parameters		Temp [°C]
			ϵ_r	σ [S/m]	
835	Reference result	2.29	40.2	0.88	
	± 10% window	2.06 - 2.52			
	2008-10-02	2.41	40.2	0.88	20.5
1900	Reference result	10.3	40.2	1.47	
	± 10% window	9.3 - 11.3			
	2008-10-09	10.4	38.2	1.41	20.7

System checking, body tissue simulant

f [MHz]	Description	SAR [W/kg], 1g	Dielectric Parameters		Temp [°C]
			ϵ_r	σ [S/m]	
1900	Reference result	10.5	51.7	1.57	
	± 10% window	9.4 - 11.6			
	2008-10-10	10.6	53.0	1.52	20.3

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

4.3.3 Tissue Simulants used in the Measurements

Head tissue simulant measurements

f [MHz]	Description	Dielectric Parameters		Temp [°C]
		ϵ_r	σ [S/m]	
836	Recommended value	41.5	0.90	20.5
	$\pm 5\%$ window	39.4 – 43.6	0.86 – 0.95	
	2008-10-02	40.2	0.88	
1880	Recommended value	40.0	1.40	20.8
	$\pm 5\%$ window	38.0 – 42.0	1.33 – 1.47	
	2008-10-09	38.3	1.39	

Body tissue simulant measurements

f [MHz]	Description	Dielectric Parameters		Temp [°C]
		ϵ_r	σ [S/m]	
836	Recommended value	55.2	0.97	20.7
	$\pm 5\%$ window	52.4 – 58.0	0.92 – 1.02	
	2008-10-02	53.5	0.96	
1880	Recommended value	53.3	1.52	20.3
	$\pm 5\%$ window	50.6 – 56.0	1.44 – 1.60	
	2008-10-10	53.1	1.50	

5. DESCRIPTION OF THE TEST PROCEDURE

5.1 Device Holder

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



Device holder supplied by SPEAG

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



Nokia spacer

5.2 Test Positions

5.2.1 Against Phantom Head

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

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

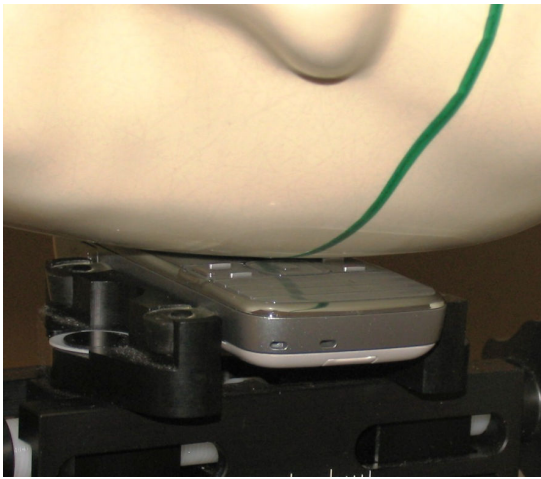


Photo of the device in “cheek” position

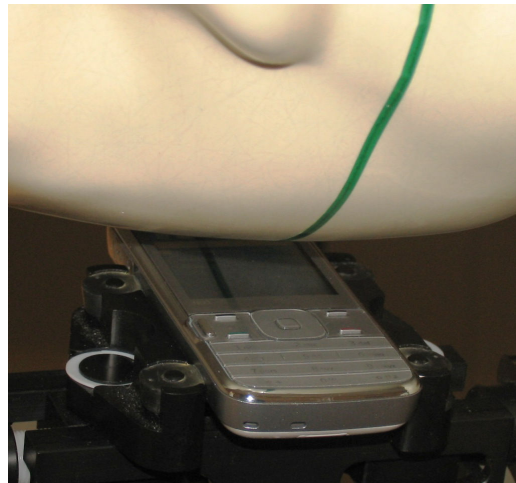


Photo of the device in “tilt” position

5.2.2 Body Worn Configuration

The device was placed in the SPEAG holder using the Nokia spacer and placed below the flat section of the phantom. The distance between the device and the phantom was kept at the separation distance indicated in the photo below using a separate flat spacer that was removed before the start of the measurements.

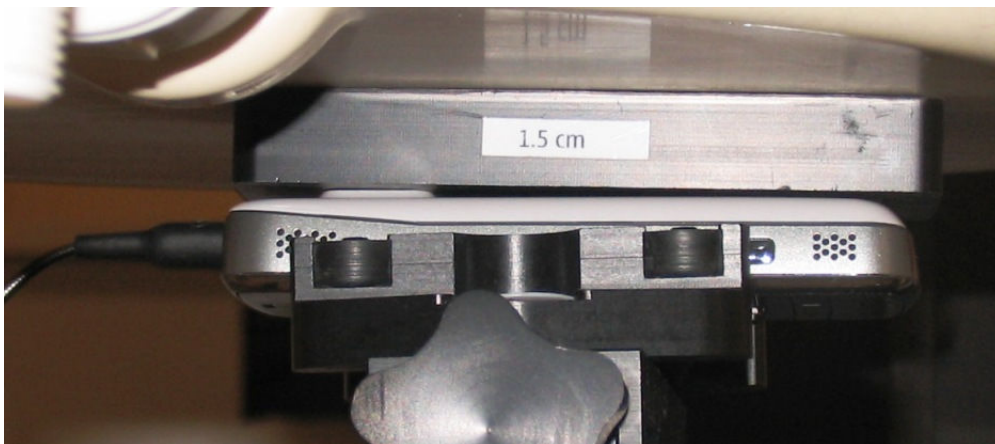


Photo of the device positioned for Body SAR measurement.
The spacer was removed for the tests.

5.3 Scan Procedures

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

5.4 SAR Averaging Methods

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

The interpolation, extrapolation and maximum search routines within Dasy4 are all based on the modified Quadratic Shepard's method (Robert J. Renka, "Multivariate Interpolation Of Large Sets Of Scattered Data", University of North Texas ACM Transactions on Mathematical Software, vol. 14, no. 2, June 1988, pp. 139-148).

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

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

6. MEASUREMENT UNCERTAINTY

Table 6.1 – Measurement uncertainty evaluation

Uncertainty Component	Section in IEEE 1528	Tol. (%)	Prob Dist	Div	C_i	$C_i \cdot U_i$ (%)	ν_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 Head SAR values for the test device are tabulated below:

850 MHz Head SAR results

Option used	Test configuration		SAR, averaged over 1g (W/kg)		
			Ch 128 824.2 MHz	Ch 190 836.6 MHz	Ch 251 848.8 MHz
GSM	Power		29.1 dBm	30.1 dBm	29.4 dBm
Camera slide closed	Left	Cheek	-	-	-
		Tilt	-	-	-
	Right	Cheek	0.959	0.959	0.818
		Tilt	-	-	-
GSM Camera slide open	Right cheek		0.965	0.940	0.818
GSM Camera slide open	Right cheek BT active		0.968	-	-

1900 MHz Head SAR results

Option used	Test configuration		SAR, averaged over 1g (W/kg)		
			Ch 512 1850.2 MHz	Ch 661 1880.0 MHz	Ch 810 1909.8 MHz
3-slot GPRS	Power		23.2 dBm	24.5 dBm	23.4 dBm
Camera slide closed	Left	Cheek	0.773	0.827	0.728
		Tilt	-	-	-
	Right	Cheek	-	-	-
		Tilt	-	-	-
3-slot GPRS Camera slide open	Left cheek		0.771	0.819	0.725
3-slot GPRS Camera slide closed	Left cheek BT active		-	0.728	-

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

850 MHz Body SAR results

Option 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
GSM		Power	29.1 dBm	30.1 dBm	29.4 dBm
Camera slide closed	Display facing phantom	Without headset	-	-	-
		Headset HS-45	-	-	-
	Back facing phantom	Without headset	0.640	0.633	0.564
		Headset HS-45	0.378	0.396	0.342
GSM Camera slide closed	Back facing phantom	Without headset BT active	0.635	-	-

1900 MHz Body SAR results

Option 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
3-slot GPRS		Power	23.2 dBm	24.5 dBm	23.4 dBm
Camera slide closed	Display facing phantom	Without headset	-	-	-
		Headset HS-45	-	-	-
	Back facing phantom	Without headset	0.347	0.352	0.282
		Headset HS-45	0.280	0.306	0.252
3-slot GPRS Camera slide closed	Back facing phantom	Without headset BT active	-	0.353	-

Plots of the Measurement scans are given in Appendix B.

APPENDIX A: SYSTEM CHECKING SCANS

See the following pages

Date/Time: 2008-10-02 09:29:24

Test Laboratory: TCC Nokia

Type: D835V2; Serial: 476

Communication System: CW835

Frequency: 835 MHz; Duty Cycle: 1:1

Medium: Head 850; Medium Notes: Medium Temperature: 20.5 C

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.879 \text{ mho/m}$; $\epsilon_r = 40.2$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3116; Probe Notes:
- ConvF(5.85, 5.85, 5.85); Calibrated: 2008-07-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn501; Calibrated: 2008-03-17
- Phantom: SAM 4; Type: Twin Phantom; Serial: TP-1410
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 184

d=15mm, Pin=250mW/Area Scan (61x121x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 2.60 mW/g

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

Reference Value = 53.1 V/m

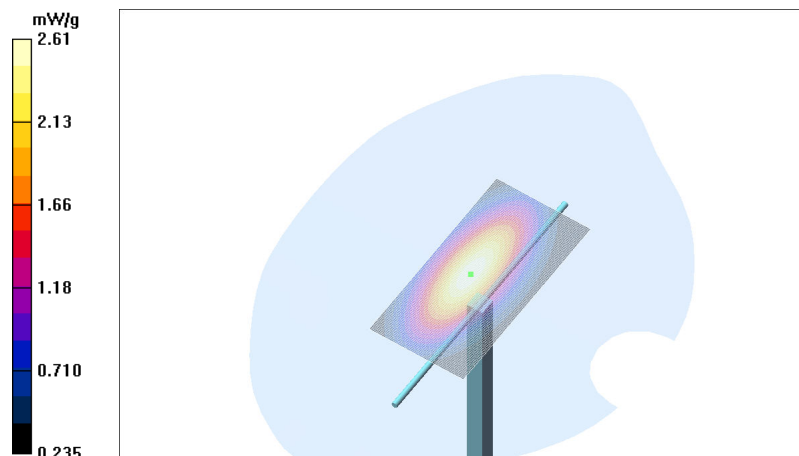
Peak SAR (extrapolated) = 3.57 W/kg

SAR(1 g) = 2.41 mW/g

SAR(10 g) = 1.57 mW/g

Power Drift = -0.104 dB

Maximum value of SAR (measured) = 2.61 mW/g



Date/Time: 2008-10-09 14:22:30

Test Laboratory: TCC Nokia
Type: D1900V2; Serial: 5d026

Communication System: CW1900

Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: Head 1900; Medium Notes: Medium Temperature: 20.7 C

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.41$ mho/m; $\epsilon_r = 38.2$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3117; Probe Notes:
- ConvF(4.96, 4.96, 4.96); Calibrated: 2008-07-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn339; Calibrated: 2008-06-02
- Phantom: SAM 6; Type: SAM Twin Phantom; Serial: TP-1301
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

d=10mm, Pin=250mW/Area Scan (71x71x1): Measurement grid: dx=10mm, dy=10mm

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

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

Reference Value = 92.0 V/m

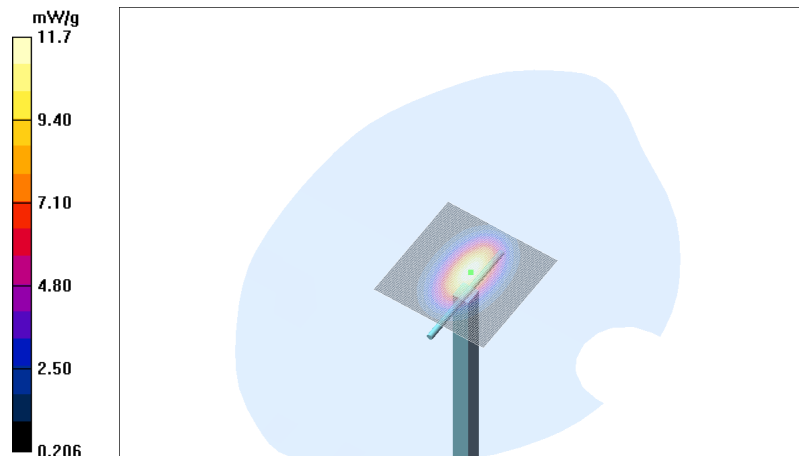
Peak SAR (extrapolated) = 19.5 W/kg

SAR(1 g) = 10.4 mW/g

SAR(10 g) = 5.33 mW/g

Power Drift = -0.015 dB

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



Date/Time: 2008-10-10 01:55:04

Test Laboratory: TCC Nokia
Type: D1900V2; Serial: 5d026

Communication System: CW1900

Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: Body 1900; Medium Notes: Medium Temperature: 20.3 C

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.52$ mho/m; $\epsilon_r = 53$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3116; Probe Notes:
- ConvF(4.63, 4.63, 4.63); Calibrated: 2008-07-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn501; Calibrated: 2008-03-17
- Phantom: SAM 3; Type: Twin Phantom; Serial: TP-1302
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

d=10mm, Pin=250mW/Area Scan (71x71x1): Measurement grid: dx=10mm, dy=10mm

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

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

Reference Value = 89.9 V/m

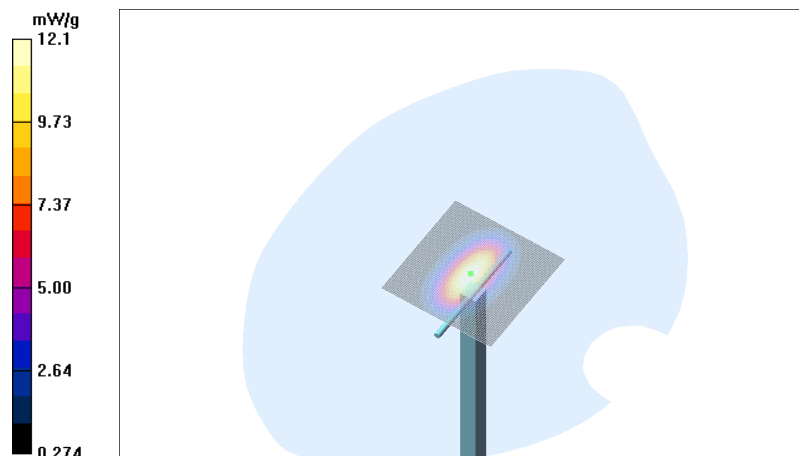
Peak SAR (extrapolated) = 19.4 W/kg

SAR(1 g) = 10.6 mW/g

SAR(10 g) = 5.55 mW/g

Power Drift = 0.098 dB

Maximum value of SAR (measured) = 12.1 mW/g



APPENDIX B: MEASUREMENT SCANS

See the following pages

Date/Time: 2008-10-02 10:54:32

Test Laboratory: TCC Nokia

Type: RM-348; Serial: 004401/10/096580/1

Communication System: GSM850

Frequency: 824.2 MHz; Duty Cycle: 1:8.3

Medium: Head 850; Medium Notes: Medium Temperature: 20.5 C

Medium parameters used (interpolated): $f = 824.2$ MHz; $\sigma = 0.87$ mho/m; $\epsilon_r = 40.3$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3116; Probe Notes:
- ConvF(5.85, 5.85, 5.85); Calibrated: 2008-07-21
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn501; Calibrated: 2008-03-17
- Phantom: SAM 4; Type: Twin Phantom; Serial: TP-1410
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 184

Cheek position – Low – Camera slide closed/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.03 mW/g

Cheek position – Low – Camera slide closed/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 12.9 V/m

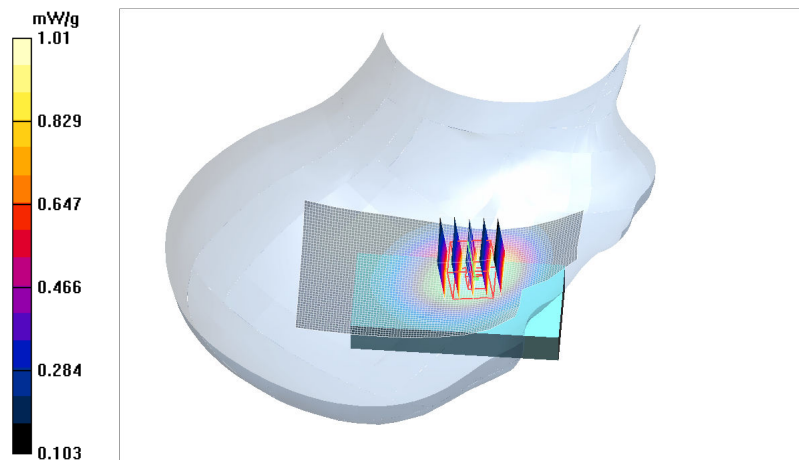
Peak SAR (extrapolated) = 1.22 W/kg

SAR(1 g) = 0.959 mW/g

SAR(10 g) = 0.702 mW/g

Power Drift = 0.048 dB

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



Date/Time: 2008-10-02 10:42:53

Test Laboratory: TCC Nokia

Type: RM-348; Serial: 004401/10/096580/1

Communication System: GSM850

Frequency: 824.2 MHz; Duty Cycle: 1:8.3

Medium: Head 850; Medium Notes: Medium Temperature: 20.5 C

Medium parameters used (interpolated): $f = 824.2$ MHz; $\sigma = 0.87$ mho/m; $\epsilon_r = 40.3$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3116; Probe Notes:
- ConvF(5.85, 5.85, 5.85); Calibrated: 2008-07-21
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn501; Calibrated: 2008-03-17
- Phantom: SAM 4; Type: Twin Phantom; Serial: TP-1410
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 184

Cheek position - Low - Camera slide open/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.03 mW/g

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

Reference Value = 13.0 V/m

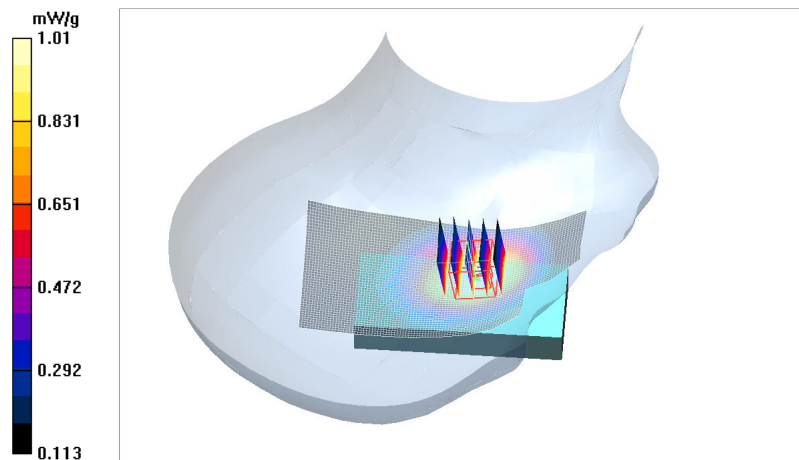
Peak SAR (extrapolated) = 1.22 W/kg

SAR(1 g) = 0.965 mW/g

SAR(10 g) = 0.710 mW/g

Power Drift = 0.037 dB

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



Date/Time: 2008-10-02 12:06:08

Test Laboratory: TCC Nokia

Type: RM-348; Serial: 004401/10/096580/1

Communication System: GSM850

Frequency: 824.2 MHz; Duty Cycle: 1:8.3

Medium: Head 850; Medium Notes: Medium Temperature: 20.5 C

Medium parameters used (interpolated): $f = 824.2$ MHz; $\sigma = 0.87$ mho/m; $\epsilon_r = 40.3$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3116; Probe Notes:
- ConvF(5.85, 5.85, 5.85); Calibrated: 2008-07-21
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn501; Calibrated: 2008-03-17
- Phantom: SAM 4; Type: Twin Phantom; Serial: TP-1410
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 184

Cheek position - Low - Camera slide open - BT Active/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.05 mW/g

Cheek position - Low - Camera slide open - BT Active/Zoom Scan (5x5x7)/Cube 0: Measurement grid:

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

Reference Value = 13.2 V/m

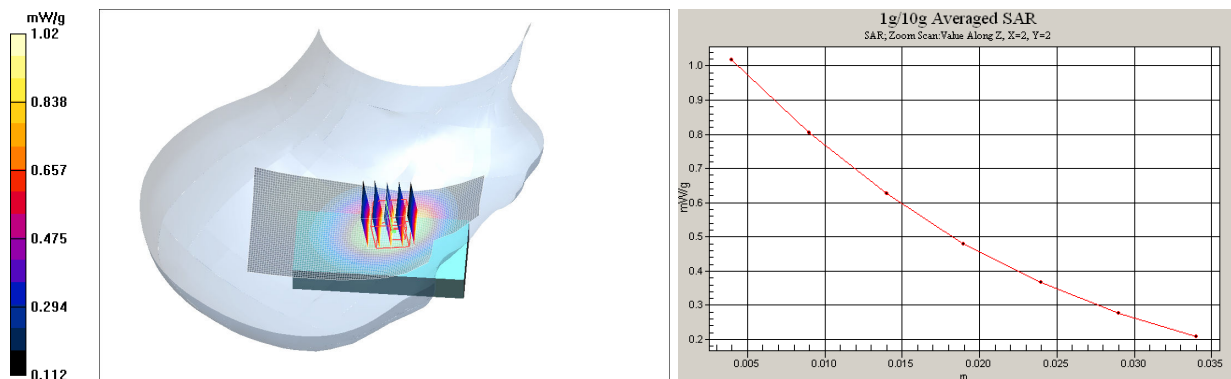
Peak SAR (extrapolated) = 1.22 W/kg

SAR(1 g) = 0.968 mW/g

SAR(10 g) = 0.712 mW/g

Power Drift = -0.063 dB

Maximum value of SAR (measured) = 1.02 mW/g



SAR Report

SD_SAR_0912_01

Applicant: Nokia Corporation

Type: RM-348

Copyright © 2009 TCC Nokia

Date/Time: 2008-10-09 22:24:15

Test Laboratory: TCC Nokia

Type: RM-348; Serial: 004401/10/096580/1

Communication System: 3-slot GPRS1900

Frequency: 1880 MHz; Duty Cycle: 1:2.8

Medium: Head 1900; Medium Notes: Medium Temperature: 20.8 C

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.39$ mho/m; $\epsilon_r = 38.3$; $\rho = 1000$ kg/m³

Phantom section: Left Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3117; Probe Notes:
- ConvF(4.96, 4.96, 4.96); Calibrated: 2008-07-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn339; Calibrated: 2008-06-02
- Phantom: SAM 6; Type: SAM Twin Phantom; Serial: TP-1301
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Cheek position – Middle – Camera slide closed/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.933 mW/g

Cheek position – Middle – Camera slide closed/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 7.92 V/m

Peak SAR (extrapolated) = 1.31 W/kg

SAR(1 g) = 0.827 mW/g

SAR(10 g) = 0.470 mW/g

Power Drift = -0.119 dB

Maximum value of SAR (measured) = 0.870 mW/g

Cheek position – Middle – Camera slide closed/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 7.92 V/m

Peak SAR (extrapolated) = 1.25 W/kg

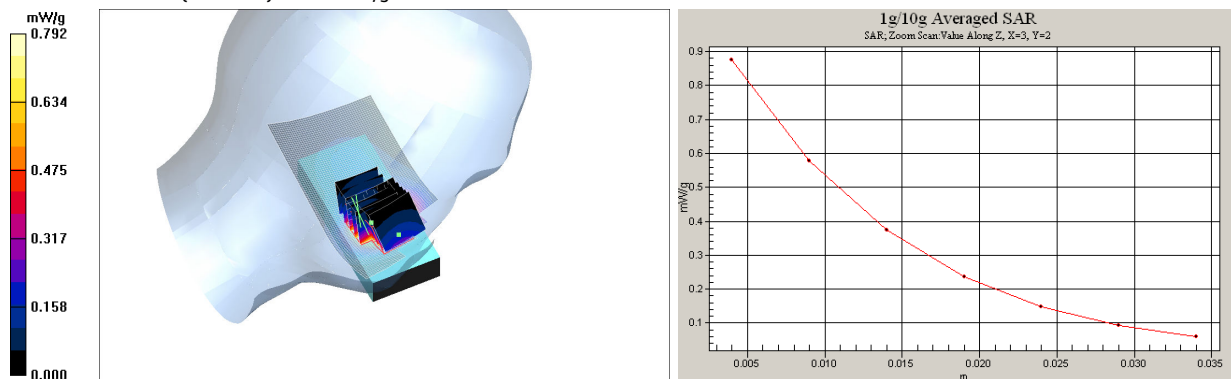
SAR(1 g) = 0.586 mW/g

SAR(10 g) = 0.278 mW/g

Power Drift = -0.119 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) = 0.792 mW/g



SAR Report

SD_SAR_0912_01

Applicant: Nokia Corporation

Type: RM-348

Copyright © 2009 TCC Nokia

Date/Time: 2008-10-09 22:45:15

Test Laboratory: TCC Nokia

Type: RM-348; Serial: 004401/10/096580/1

Communication System: 3-slot GPRS1900

Frequency: 1880 MHz; Duty Cycle: 1:2.8

Medium: Head 1900; Medium Notes: Medium Temperature: 20.8 C

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.39$ mho/m; $\epsilon_r = 38.3$; $\rho = 1000$ kg/m³

Phantom section: Left Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3117; Probe Notes:

- ConvF(4.96, 4.96, 4.96); Calibrated: 2008-07-21

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

- Electronics: DAE3 Sn339; Calibrated: 2008-06-02

- Phantom: SAM 6; Type: SAM Twin Phantom; Serial: TP-1301

- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Cheek position - Middle - Camera slide spen/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.909 mW/g

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

Reference Value = 7.77 V/m

Peak SAR (extrapolated) = 1.30 W/kg

SAR(1 g) = 0.819 mW/g

SAR(10 g) = 0.466 mW/g

Power Drift = 0.104 dB

Maximum value of SAR (measured) = 0.869 mW/g

Cheek position - Middle - Camera Slide Open/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 7.77 V/m

Peak SAR (extrapolated) = 0.977 W/kg

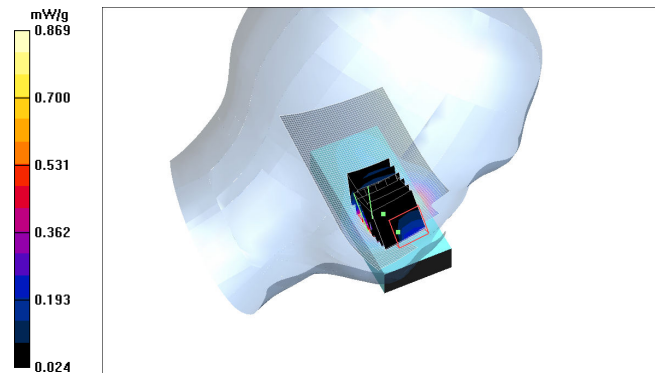
SAR(1 g) = 0.548 mW/g

SAR(10 g) = 0.190 mW/g

Power Drift = 0.104 dB

Warning: Maximum averaged SAR over 1 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 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) = 0.591 mW/g



SAR Report

SD_SAR_0912_01

Applicant: Nokia Corporation

Type: RM-349

Copyright © 2009 TCC Nokia

Date/Time: 2008-10-10 00:13:28

Test Laboratory: TCC Nokia

Type: RM-348; Serial: 004401/10/096580/1

Communication System: 3-slot GPRS1900

Frequency: 1880 MHz; Duty Cycle: 1:2.8

Medium: Head 1900; Medium Notes: Medium Temperature: 20.8 C

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.39$ mho/m; $\epsilon_r = 38.3$; $\rho = 1000$ kg/m³

Phantom section: Left Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3117; Probe Notes:

- ConvF(4.96, 4.96, 4.96); Calibrated: 2008-07-21

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

- Electronics: DAE3 Sn339; Calibrated: 2008-06-02

- Phantom: SAM 6; Type: SAM Twin Phantom; Serial: TP-1301

- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Cheek position - Middle – Camera slide closed - BT Active/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm

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

Cheek position - Middle – Camera slide closed - BT Active/Zoom Scan (5x5x7)/Cube 0: Measurement grid:

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

Reference Value = 7.76 V/m

Peak SAR (extrapolated) = 1.24 W/kg

SAR(1 g) = 0.782 mW/g

SAR(10 g) = 0.444 mW/g

Power Drift = -0.284 dB

Maximum value of SAR (measured) = 0.826 mW/g

Cheek position - Middle – Camera slide closed - BT Active/Zoom Scan (5x5x7)/Cube 1: Measurement grid:

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

Reference Value = 7.76 V/m

Peak SAR (extrapolated) = 0.892 W/kg

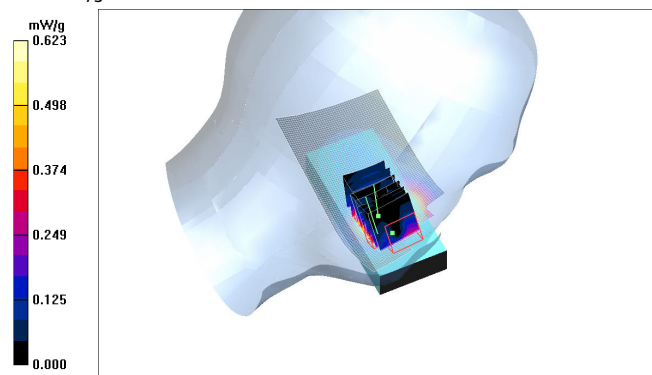
SAR(1 g) = 0.481 mW/g

SAR(10 g) = 0.161 mW/g

Power Drift = -0.284 dB

Warning: Maximum averaged SAR over 1 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 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) = 0.623 mW/g



SAR Report

SD_SAR_0912_01

Applicant: Nokia Corporation

Type: RM-348

Copyright © 2009 TCC Nokia

Date/Time: 2008-10-02 14:18:48

Test Laboratory: TCC Nokia

Type: RM-348; Serial: 004401/10/096580/1

Communication System: GSM850

Frequency: 824.2 MHz; Duty Cycle: 1:8.3

Medium: Body 850; Medium Notes: Medium Temperature: 20.7 C

Medium parameters used (interpolated): $f = 824.2$ MHz; $\sigma = 0.948$ mho/m; $\epsilon_r = 53.7$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3116; Probe Notes:
- ConvF(5.76, 5.76, 5.76); Calibrated: 2008-07-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn501; Calibrated: 2008-03-17
- Phantom: SAM 5; Type: Twin Phantom; Serial: TP-1412
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 184

Body - Low - No Accessory - Back facing phantom – Camera slide closed/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.681 mW/g

Body - Low - No Accessory - Back facing phantom – Camera slide closed/Zoom Scan (5x5x7)/Cube 0:

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

Reference Value = 10.2 V/m

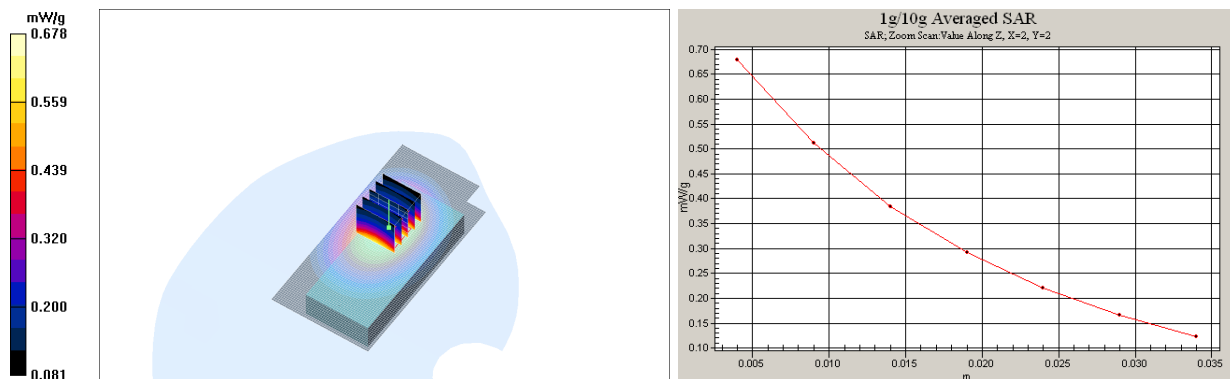
Peak SAR (extrapolated) = 0.829 W/kg

SAR(1 g) = 0.640 mW/g

SAR(10 g) = 0.464 mW/g

Power Drift = -0.179 dB

Maximum value of SAR (measured) = 0.678 mW/g



SAR Report

SD_SAR_0912_01

Applicant: Nokia Corporation

Type: RM-348

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Date/Time: 2008-10-02 15:19:18

Test Laboratory: TCC Nokia

Type: RM-348; Serial: 004401/10/096580/1

Communication System: GSM850

Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium: Body 850; Medium Notes: Medium Temperature: 20.7 C

Medium parameters used: $f = 837$ MHz; $\sigma = 0.96$ mho/m; $\epsilon_r = 53.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3116; Probe Notes:
- ConvF(5.76, 5.76, 5.76); Calibrated: 2008-07-21
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn501; Calibrated: 2008-03-17
- Phantom: SAM 5; Type: Twin Phantom; Serial: TP-1412
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 184

Body - Middle - HS-45 - Back facing phantom – Camera slide closed/Area Scan (51x101x1): Measurement grid:
dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.422 mW/g

Body - Middle - HS-45 - Back facing phantom – Camera slide closed/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 9.16 V/m

Peak SAR (extrapolated) = 0.525 W/kg

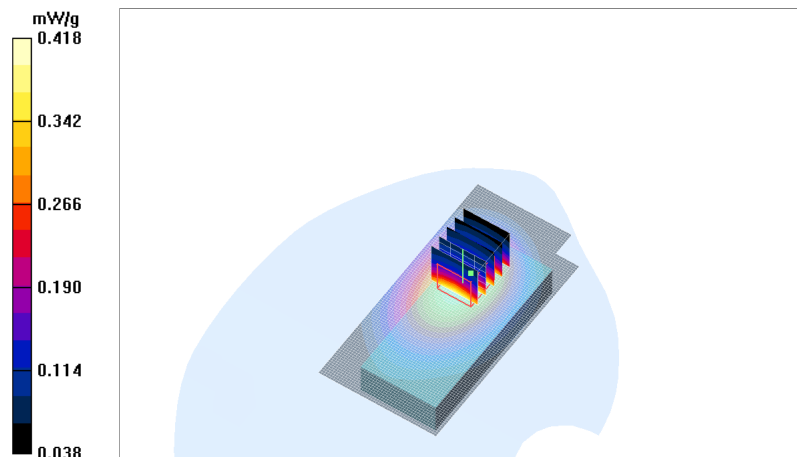
SAR(1 g) = 0.396 mW/g

SAR(10 g) = 0.282 mW/g

Power Drift = 0.014 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) = 0.418 mW/g



Date/Time: 2008-10-02 15:41:33

Test Laboratory: TCC Nokia

Type: RM-348; Serial: 004401/10/096580/1

Communication System: GSM850

Frequency: 824.2 MHz; Duty Cycle: 1:8.3

Medium: Body 850; Medium Notes: Medium Temperature: 20.7 C

Medium parameters used (interpolated): $f = 824.2$ MHz; $\sigma = 0.948$ mho/m; $\epsilon_r = 53.7$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3116; Probe Notes:
- ConvF(5.76, 5.76, 5.76); Calibrated: 2008-07-21
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn501; Calibrated: 2008-03-17
- Phantom: SAM 5; Type: Twin Phantom; Serial: TP-1412
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 184

Body - Low - No Accessory - Back facing phantom – Camera slide closed - BT Active/Area Scan (51x101x1):

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

Maximum value of SAR (interpolated) = 0.670 mW/g

Body - Low - No Accessory - Back facing phantom – Camera slide closed - BT Active/Zoom Scan (5x5x7)/Cube 0:

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

Reference Value = 9.92 V/m

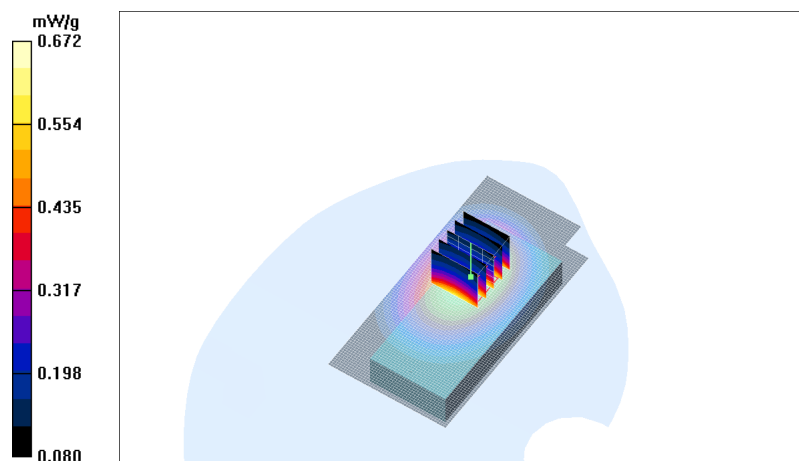
Peak SAR (extrapolated) = 0.830 W/kg

SAR(1 g) = 0.635 mW/g

SAR(10 g) = 0.459 mW/g

Power Drift = 0.027 dB

Maximum value of SAR (measured) = 0.672 mW/g



Date/Time: 2008-10-10 03:37:54

Test Laboratory: TCC Nokia

Type: RM-348; Serial: 004401/10/096580/1

Communication System: 3-slot GPRS1900

Frequency: 1880 MHz; Duty Cycle: 1:2.8

Medium: Body 1900; Medium Notes: Medium Temperature: 20.3 C

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.5$ mho/m; $\epsilon_r = 53.1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3116; Probe Notes:
- ConvF(4.63, 4.63, 4.63); Calibrated: 2008-07-21
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn501; Calibrated: 2008-03-17
- Phantom: SAM 3; Type: Twin Phantom; Serial: TP-1302
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Body - Middle - No Accessory - Back facing phantom – Camera slide closed/Area Scan (51x101x1):

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

Maximum value of SAR (interpolated) = 0.374 mW/g

Body - Middle - No Accessory - Back facing phantom – Camera slide closed/Zoom Scan (5x5x7)/Cube 0:

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

Reference Value = 7.69 V/m

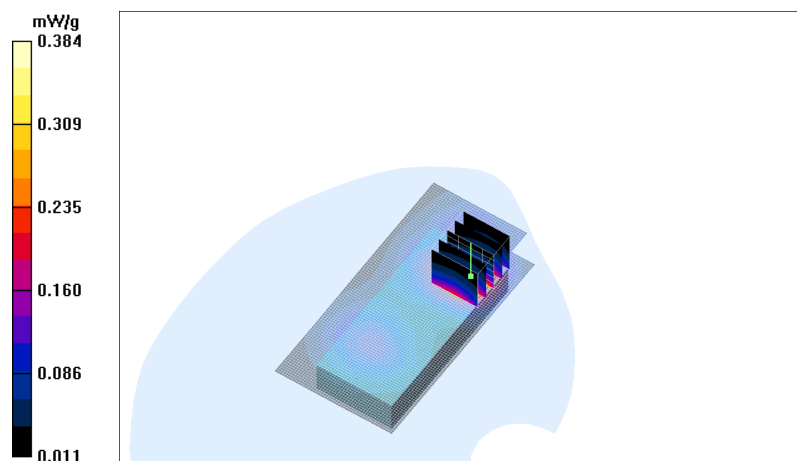
Peak SAR (extrapolated) = 0.591 W/kg

SAR(1 g) = 0.352 mW/g

SAR(10 g) = 0.199 mW/g

Power Drift = -0.025 dB

Maximum value of SAR (measured) = 0.384 mW/g



Date/Time: 2008-10-10 03:27:01

Test Laboratory: TCC Nokia

Type: RM-348; Serial: 004401/10/096580/1

Communication System: 3-slot GPRS1900

Frequency: 1880 MHz; Duty Cycle: 1:2.8

Medium: Body 1900; Medium Notes: Medium Temperature: 20.3 C

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.5$ mho/m; $\epsilon_r = 53.1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3116; Probe Notes:
- ConvF(4.63, 4.63, 4.63); Calibrated: 2008-07-21
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn501; Calibrated: 2008-03-17
- Phantom: SAM 3; Type: Twin Phantom; Serial: TP-1302
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Body - Middle - HS-45 - Back facing phantom – Camera slide closed/Area Scan (51x101x1): Measurement grid:
dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.323 mW/g

Body - Middle - HS-45 - Back facing phantom – Camera slide closed/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 6.01 V/m

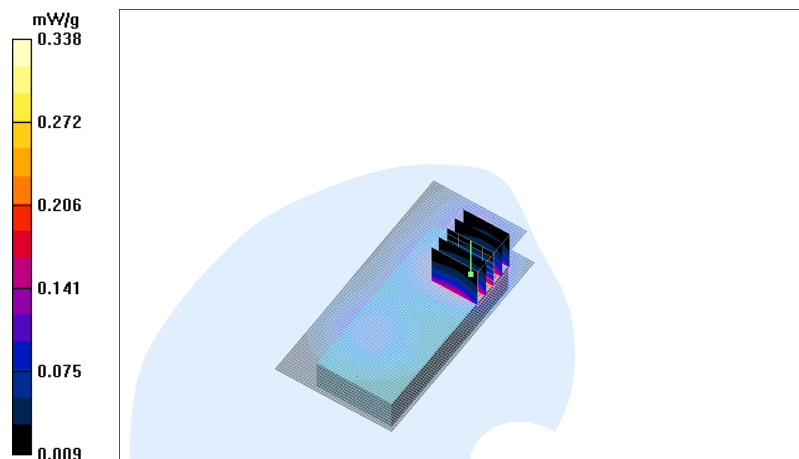
Peak SAR (extrapolated) = 0.523 W/kg

SAR(1 g) = 0.306 mW/g

SAR(10 g) = 0.171 mW/g

Power Drift = -0.105 dB

Maximum value of SAR (measured) = 0.338 mW/g



Date/Time: 2008-10-10 04:24:08

Test Laboratory: TCC Nokia

Type: RM-348; Serial: 004401/10/096580/1

Communication System: 3-slot GPRS1900

Frequency: 1880 MHz; Duty Cycle: 1:2.8

Medium: Body 1900; Medium Notes: Medium Temperature: 20.3 C

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.5$ mho/m; $\epsilon_r = 53.1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3116; Probe Notes:
- ConvF(4.63, 4.63, 4.63); Calibrated: 2008-07-21
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn501; Calibrated: 2008-03-17
- Phantom: SAM 3; Type: Twin Phantom; Serial: TP-1302
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Body - Middle - No Accessory - Back facing phantom – Camera slide closed - BT Active/Area Scan (51x101x1):

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

Maximum value of SAR (interpolated) = 0.383 mW/g

Body - Middle - No Accessory - Back facing phantom – Camera slide closed - BT Active/Zoom Scan (5x5x7)/Cube

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

Reference Value = 7.84 V/m

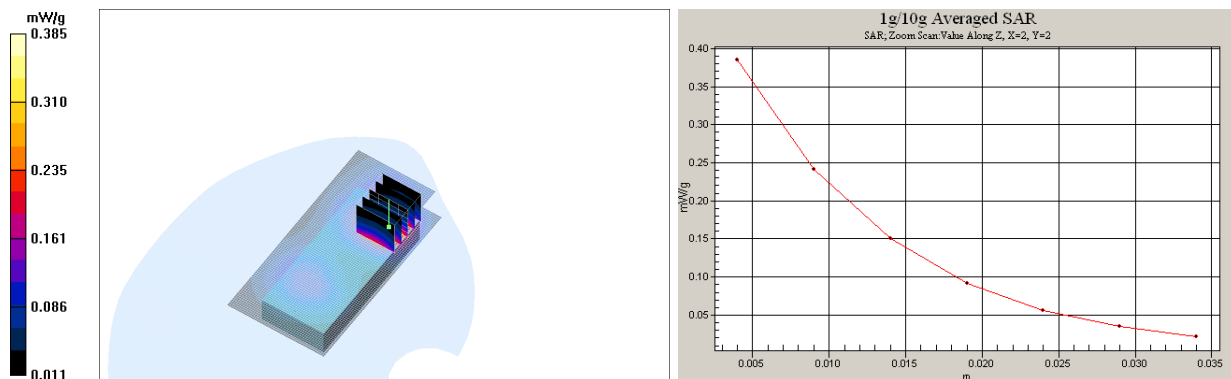
Peak SAR (extrapolated) = 0.586 W/kg

SAR(1 g) = 0.353 mW/g

SAR(10 g) = 0.201 mW/g

Power Drift = -0.185 dB

Maximum value of SAR (measured) = 0.385 mW/g



SAR Report

SD_SAR_0912_01

Applicant: Nokia Corporation

Type: RM-348

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

See the following pages

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



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Nokia Denmark A/S**

Certificate No: **ES3-3116_Jul08**

CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3116**

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

Calibration date: **July 21, 2008**

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 $(22 \pm 3)^{\circ}\text{C}$ 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-08 (No. 217-00788)	Apr-09
Power sensor E4412A	MY41495277	1-Apr-08 (No. 217-00788)	Apr-09
Power sensor E4412A	MY41498087	1-Apr-08 (No. 217-00788)	Apr-09
Reference 3 dB Attenuator	SN: S5054 (3c)	1-Jul-08 (No. 217-00865)	Jul-09
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-08 (No. 217-00787)	Apr-09
Reference 30 dB Attenuator	SN: S5129 (30b)	1-Jul-08 (No. 217-00866)	Jul-09
Reference Probe ES3DV2	SN: 3013	2-Jan-08 (No. ES3-3013_Jan08)	Jan-09
DAE4	SN: 660	3-Sep-07 (No. DAE4-660_Sep07)	Sep-08

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-07)	In house check: Oct-08

Calibrated by: **Katja Pokovic** **Technical Manager**

Approved by: **Niels Kuster** **Quality Manager**

Issued: July 21, 2008

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Certificate No: ES3-3116_Jul08

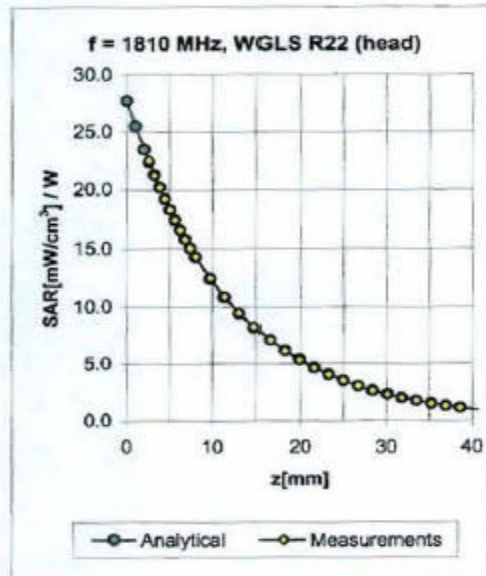
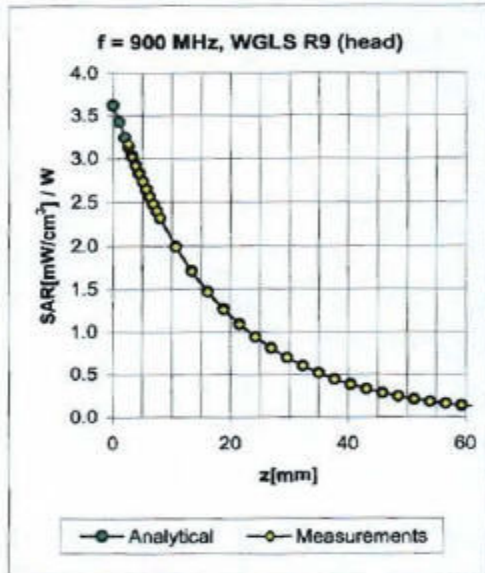
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SAR Report
SD_SAR_0912_01
Applicant: Nokia Corporation

Type: RM-349

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Conversion Factor Assessment



f [MHz]	Validity [MHz] ^c	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.42	1.53	5.85 ± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.66	1.42	4.99 ± 11.0% (k=2)
1950	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.89	1.24	4.80 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.55	1.65	4.43 ± 11.0% (k=2)
2600	± 50 / ± 100	Head	39.0 ± 5%	1.96 ± 5%	0.55	1.55	4.45 ± 11.0% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.52	1.46	5.76 ± 11.0% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.60	1.50	4.63 ± 11.0% (k=2)
1950	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.77	1.30	4.60 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.55	1.65	4.03 ± 11.0% (k=2)
2600	± 50 / ± 100	Body	52.5 ± 5%	2.16 ± 5%	0.60	1.55	3.98 ± 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.

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Accreditation No.: **SCS 108**

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Multilateral Agreement for the recognition of calibration certificates

Client **Nokia Denmark A/S**

Certificate No: **ES3-3117_Jul08**

CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3117**

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

Calibration date: **July 21, 2008**

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 $(22 \pm 3)^{\circ}\text{C}$ 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-06 (No. 217-00788)	Apr-09
Power sensor E4412A	MY41495277	1-Apr-06 (No. 217-00788)	Apr-09
Power sensor E4412A	MY41498087	1-Apr-06 (No. 217-00788)	Apr-09
Reference 3 dB Attenuator	SN: S5054 (3c)	1-Jul-08 (No. 217-00865)	Jul-09
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-06 (No. 217-00787)	Apr-09
Reference 30 dB Attenuator	SN: S5129 (30b)	1-Jul-08 (No. 217-00866)	Jul-09
Reference Probe ES3DV2	SN: 3013	2-Jan-06 (No. ES3-3013_Jan06)	Jan-09
DAE4	SN: 660	3-Sep-07 (No. DAE4-660_Sep07)	Sep-08
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-07)	In house check: Oct-08

	Name	Function	Signature
Calibrated by:	Katja Pokovic	Technical Manager	
Approved by:	Niels Kuster	Quality Manager	

Issued: July 21, 2008

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Certificate No: ES3-3117_Jul08

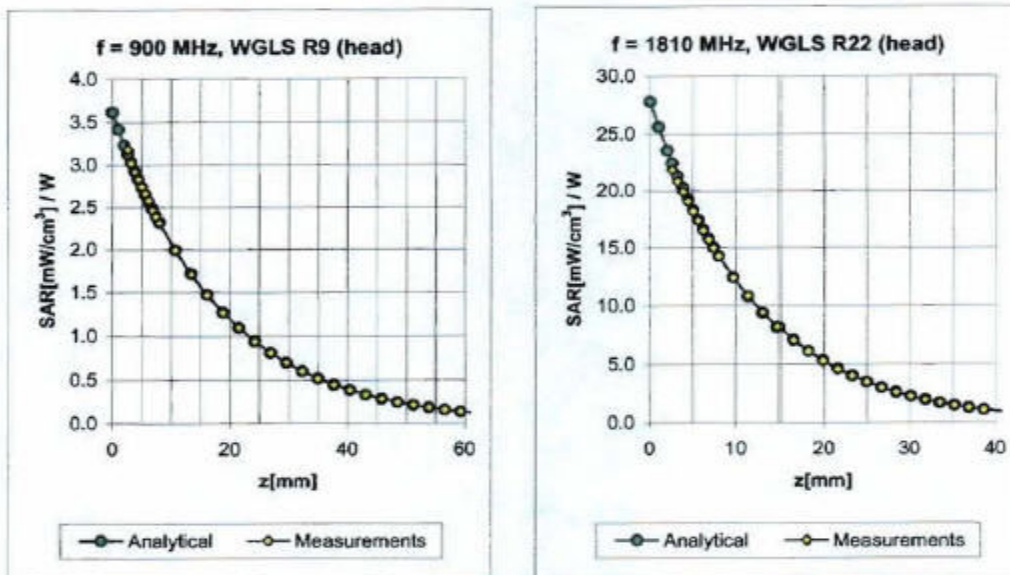
Page 1 of 9

SAR Report
SD_SAR_0912_01
Applicant: Nokia Corporation

Type: RM-349

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Conversion Factor Assessment



F [MHz]	Validity [MHz] ^c	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.26	2.38	5.75 ± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.52	1.41	4.96 ± 11.0% (k=2)
1950	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.76	1.20	4.78 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.50	1.60	4.39 ± 11.0% (k=2)
2600	± 50 / ± 100	Head	39.0 ± 5%	1.96 ± 5%	0.55	1.55	4.34 ± 11.0% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.54	1.41	5.72 ± 11.0% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.48	1.62	4.66 ± 11.0% (k=2)
1950	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.66	1.44	4.58 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.50	1.70	3.98 ± 11.0% (k=2)
2600	± 50 / ± 100	Body	52.5 ± 5%	2.16 ± 5%	0.55	1.70	3.91 ± 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.

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

See the following

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Accreditation No.: **SCS 108**

Client **Nokia DK TCC**

Certificate No: **D835V2-476_Feb07**

CALIBRATION CERTIFICATE

Object **D835V2 - SN: 476**

Calibration procedure(s) **QA CAL-05.v6**
Calibration procedure for dipole validation kits

Calibration date: **February 19, 2007**

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 $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	03-Oct-06 (METAS, No. 217-00608)	Oct-07
Power sensor HP 8481A	US37292783	03-Oct-06 (METAS, No. 217-00608)	Oct-07
Reference 20 dB Attenuator	SN: 5086 (20g)	10-Aug-06 (METAS, No 217-00591)	Aug-07
Reference 10 dB Attenuator	SN: 5047.2 (10r)	10-Aug-06 (METAS, No 217-00591)	Aug-07
Reference Probe ET3DV6 (HF)	SN 1507	19-Oct-06 (SPEAG, No. ET3-1507_Oct06)	Oct-07
DAE4	SN 601	30-Jan-07 (SPEAG, No. DAE4-601_Jan07)	Jan-08
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (SPEAG, in house check Oct-05)	In house check: Oct-07
RF generator Agilent E4421B	MY41000675	11-May-05 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (SPEAG, in house check Oct-06)	In house check: Oct-07

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

Issued: February 20, 2007

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DASY4 Validation Report for Head TSL

Date/Time: 19.02.2007 12:03:21

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 476

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

Medium: HSL 900 MHz;

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.88 \text{ mho/m}$; $\epsilon_r = 40.2$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507 (HF); ConvF(6.09, 6.09, 6.09); Calibrated: 19.10.2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.01.2007
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; ;
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Pin = 250 mW; d = 15 mm/Zoom Scan (7x7x7)/Cube 0:

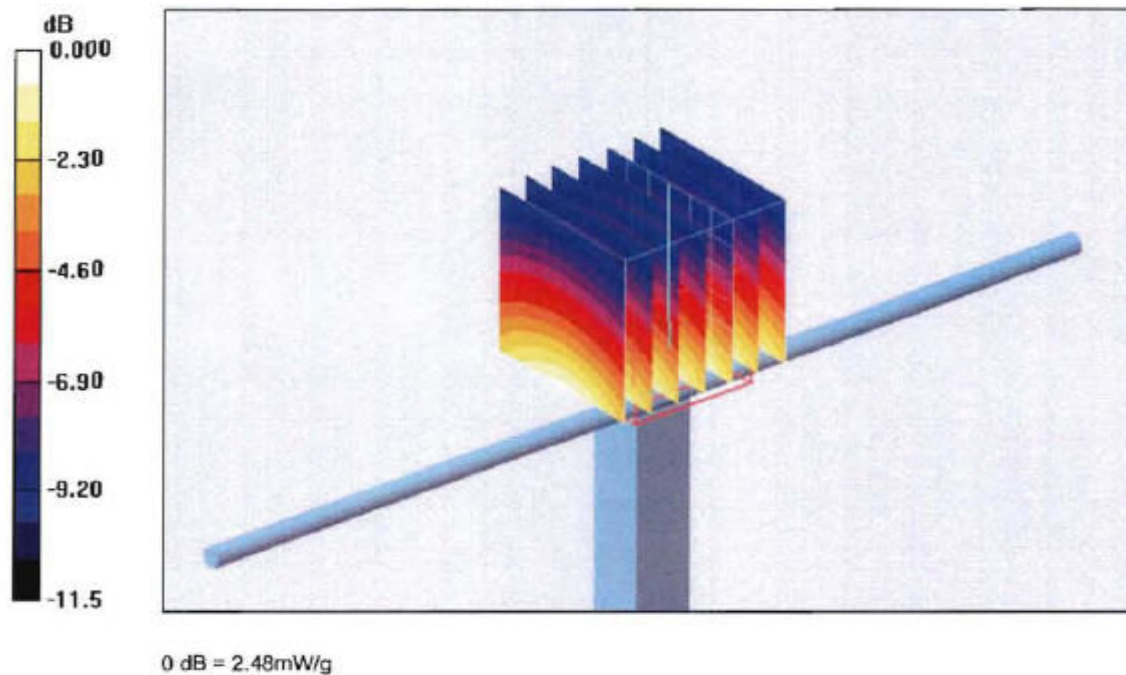
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 55.4 V/m; Power Drift = 0.039 dB

Peak SAR (extrapolated) = 3.31 W/kg

SAR(1 g) = 2.29 mW/g; SAR(10 g) = 1.51 mW/g

Maximum value of SAR (measured) = 2.48 mW/g



DASY4 Validation Report for Body TSL

Date/Time: 12.02.2007 12:15:22

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:476

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

Medium: MSL900;

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.98 \text{ mho/m}$; $\epsilon_r = 52.9$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507 (HF); ConvF(5.75, 5.75, 5.75); Calibrated: 19.10.2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.01.2007
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; ;
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Pin = 250mW/Zoom Scan (7x7x7)/Cube 0:

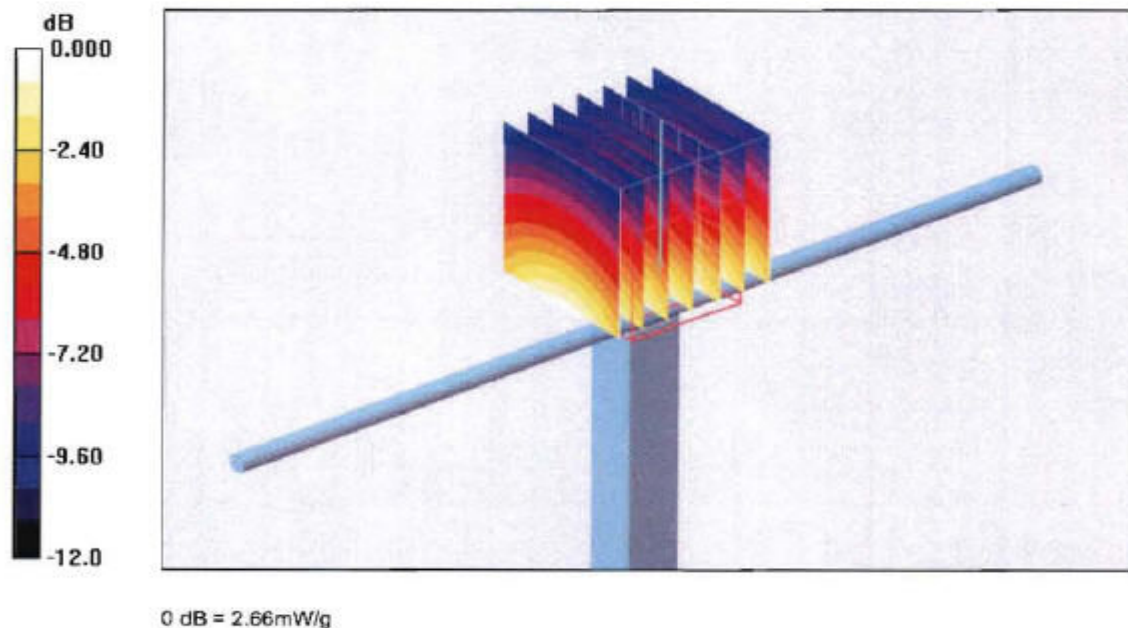
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 54.6 V/m; Power Drift = 0.029 dB

Peak SAR (extrapolated) = 3.44 W/kg

SAR(1 g) = 2.47 mW/g; SAR(10 g) = 1.64 mW/g

Maximum value of SAR (measured) = 2.66 mW/g



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Accreditation No.: **SCS 108**

Client **Nokia Denmark A/S**

Certificate No: **D1900V2-5d026_Mar08**

CALIBRATION CERTIFICATE

Object **D1900V2 - SN: 5d026**

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

Calibration date: **March 18, 2008**

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 $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	04-Oct-07 (METAS, No. 217-00736)	Oct-08
Power sensor HP 8481A	US37292783	04-Oct-07 (METAS, No. 217-00736)	Oct-08
Reference 20 dB Attenuator	SN: 5086 (20g)	07-Aug-07 (METAS, No 217-00718)	Aug-08
Reference 10 dB Attenuator	SN: 5047.2 (10r)	07-Aug-07 (METAS, No 217-00718)	Aug-08
Reference Probe ES3DV2	SN: 3025	01-Mar-08 (SPEAG, No. ES3-3025_Mar08)	Mar-09
DAE4	SN 909	3-Sep-08 (SPEAG, No. DAE4-909_Sep07)	Sep-07
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (SPEAG, in house check Oct-07)	In house check: Oct-08
RF generator R&S SMT-06	100005	4-Aug-99 (SPEAG, in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (SPEAG, in house check Oct-07)	In house check: Oct-08
Power meter EPM-442A	GB37480704	04-Oct-07 (METAS, No. 217-00736)	Oct-08

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

Issued: March 18, 2008

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

DASY4 Validation Report for Head TSL

Date/Time: 18.03.2008 11:48:54

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d026

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

Medium: HSL U10 BB;

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.47$ mho/m; $\epsilon_r = 40.2$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV2 - SN3025; ConvF(4.9, 4.9, 4.9); Calibrated: 01.03.2008
- Sensor-Surface: 3.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn909; Calibrated: 03.09.2007
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; ;
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 172

Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:

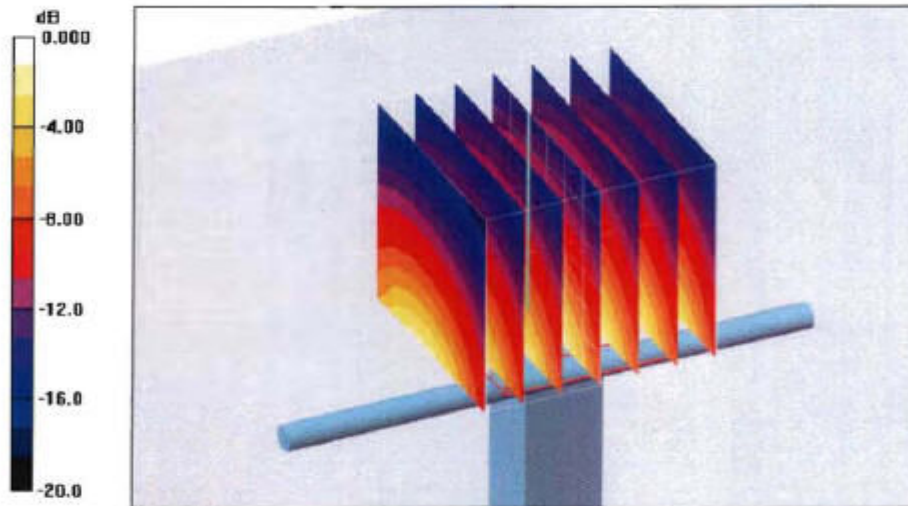
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 90.7 V/m; Power Drift = 0.071 dB

Peak SAR (extrapolated) = 19.3 W/kg

SAR(1 g) = 10.3 mW/g; SAR(10 g) = 5.27 mW/g

Maximum value of SAR (measured) = 12.0 mW/g



0 dB = 12.0mW/g

DASY4 Validation Report for Body TSL

Date/Time: 14.03.2008 12:53:13

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d026

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

Medium: MSL U10 BB;

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.57$ mho/m; $\epsilon_r = 51.7$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV2 - SN3025; ConvF(4.5, 4.5, 4.5); Calibrated: 01.03.2008
- Sensor-Surface: 3.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn909; Calibrated: 03.09.2007
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; ;
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 172

Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:

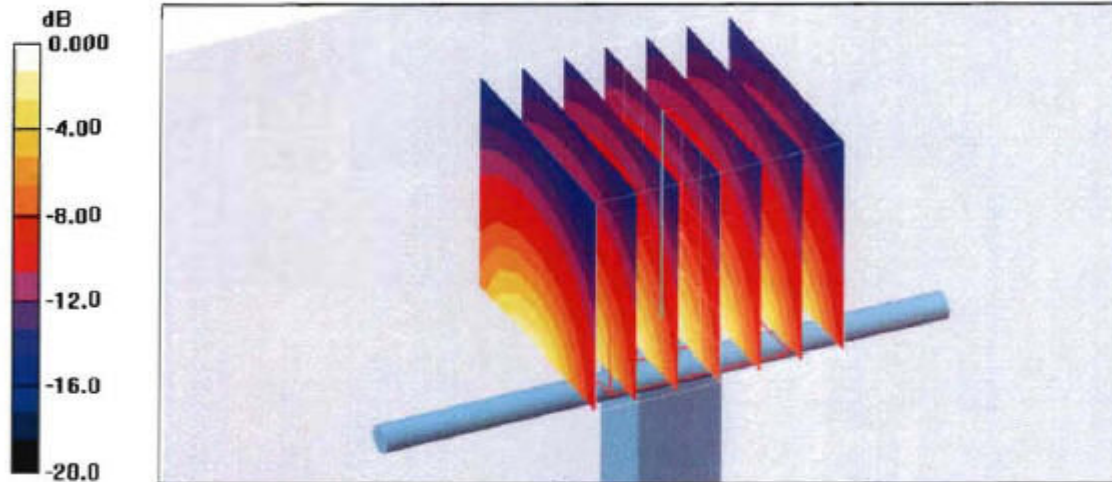
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 89.8 V/m; Power Drift = 0.050 dB

Peak SAR (extrapolated) = 18.7 W/kg

SAR(1 g) = 10.5 mW/g; SAR(10 g) = 5.5 mW/g

Maximum value of SAR (measured) = 12.1 mW/g



0 dB = 12.1mW/g