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SAR Compliance Test Report

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Measurements made by:	Liang Dong		
Tested device:	RH-95		
FCC ID:	QTLRH-95	**IC:**	661AB-RH95
Supplement reports:	-		
Testing has been carried out in accordance with:	**47CFR §2.1093** Radiofrequency Radiation Exposure Evaluation: Portable Devices **FCC OET Bulletin 65 (Edition 97-01), Supplement C (Edition 01-01)** Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields **RSS-102** Evaluation Procedure for Mobile and Portable Radio Transmitters with Respect to Health Canada's Safety Code 6 for Exposure of Humans to Radio Frequency Fields **IEEE 1528 - 2003** IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement 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:

Liang Dong

Digitally signed by Liang Dong
DN: CN = Liang Dong, C = CN, O = nokia, OU = CertT
Date: 2006.12.01 13:13:33 +08'00'

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1. SUMMARY OF SAR TEST REPORT

1.1 Test Details

Period of test	2006-11-27 to 2006-11-28
SN, HW and SW numbers of tested device	SN: 004004/00/222081/3, HW: 0402, SW: 1.9C, DUT: 50429
Batteries used in testing	BL-5CA, DUT: 50408, 50409
Headsets used in testing	HS-7, DUT: 50358
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	251 / 848.8	29.4 dBm ERP	Left, Cheek	0.919 W/kg	**1.03 W/kg**	1.6 W/kg	PASSED
GSM1900	810 / 1909.8	32.2 dBm EIRP	Left, Tilt	0.809 W/kg	**0.91 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	190 / 836.6	29.7 dBm ERP	2.2 cm	0.557 W/kg	**0.62 W/kg**	1.6 W/kg	PASSED
GSM1900	661 / 1880.0	31.6 dBm EIRP	2.2 cm	0.256 W/kg	**0.29 W/kg**	1.6 W/kg	PASSED

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

1.2.3 Maximum Drift

Maximum drift covered by 12% scaling up of the SAR values	Maximum drift during measurements
0.5dB	0.27 dB

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1.2.4 Measurement Uncertainty

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

2. DESCRIPTION OF THE DEVICE UNDER TEST

Device category	Portable
Exposure environment	General population / uncontrolled

Modes and Bands of Operation	GSM 850 / 1900
Modulation Mode	GMSK
Duty Cycle	1/8
Transmitter Frequency Range (MHz)	824 - 849 1850 - 1910

2.1 Picture of the Device

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2.2 Description of the Antenna

The device has an internal antenna.

3. TEST CONDITIONS

3.1 Temperature and Humidity

Ambient temperature (°C):	21.3 to 22.7
Ambient humidity (RH %):	20 to 30

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.

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4. DESCRIPTION OF THE TEST EQUIPMENT

4.1 Measurement System and Components

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

The following table lists calibration dates of SPEAG components:

Test Equipment	Serial Number	Calibration interval	Calibration expiry
DAE 3	480	12 months	2007-09
E-field Probe ET3DV6	1650	12 months	2007-03
Dipole Validation Kit, D850V2	4d005	24 months	2008-03
Dipole Validation Kit, D1900V2	547	24 months	2007-09
DASY4 software	Version 4.6	-	-

Additional test equipment used in testing:

Test Equipment	Model	Serial Number	Calibration interval	Calibration expiry
Signal Generator	8648C	3847M00258	12 months	2007-06
Call Tester	CMU200	835352/008	-	-
Amplifier	AR 5SIG4M3	302339	12 months	2007-06
RF Network Analyzer	8753ES	My40002096	12 months	2007-06
Call Tester	CMU200	100359	-	-
Dielectric Probe Kit	85070C	01033717	-	-
Power Meter	Aligent E4419B	My41291520	12 months	2007-06
Power Sensor	Agilent 8482A	US37295411	12 months	2007-06

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4.1.1 Isotropic E-field Probe Type ET3DV6

Construction	Symmetrical design with triangular core Built-in optical fiber for surface detection system 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 3 GHz (dosimetry); Linearity: ± 0.2 dB (30 MHz to 3 GHz)
Optical Surface Detection	± 0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces
Directivity	± 0.2 dB in HSL (rotation around probe axis) ± 0.4 dB in HSL (rotation normal to probe axis)
Dynamic Range	5 µW/g to > 100 mW/g; Linearity: ± 0.2 dB
Dimensions	Overall length: 330 mm Tip length: 16 mm Body diameter: 12 mm Tip diameter: 6.8 mm Distance from probe tip to dipole centers: 2.7 mm
Application	General dosimetry up to 3 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.

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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 ± 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 stimulant(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

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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	2.36	42.1	0.94	
	± 10% window	2.12 – 2.60			
	2006-11-28	2.26	41.5	0.90	22.0
1900	Reference result	10.1	38.7	1.47	
	± 10% window	9.1 – 11.1			
	2006-11-27	9.33	39.7	1.40	22.0

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

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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	
	± 5% window	39.4 – 43.6	0.86 – 0.95	
	2006-11-28	41.4	0.90	22.0
1880	Recommended value	40.0	1.40	
	± 5% window	38.0 – 42.0	1.33 – 1.47	
	2006-11-27	39.7	1.38	22.0

Body tissue simulant measurements

f [MHz]	Description	Dielectric Parameters		Temp [°C]
		ε_r	σ [S/m]	
836	Recommended value	55.2	0.97	
	± 5% window	52.4 – 58.0	0.92 – 1.02	
	2006-11-28	54.1	0.98	22.1
1880	Recommended value	53.3	1.52	
	± 5% window	50.6 – 56.0	1.44 – 1.60	
	2006-11-27	53.0	1.50	22.2

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5. DESCRIPTION OF THE TEST PROCEDURE

5.1 Device Holder

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

Device holder supplied by SPEAG

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

Nokia spacer

5.2 Test Positions

5.2.1 Against Phantom Head

Measurements were made in “cheek” 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".

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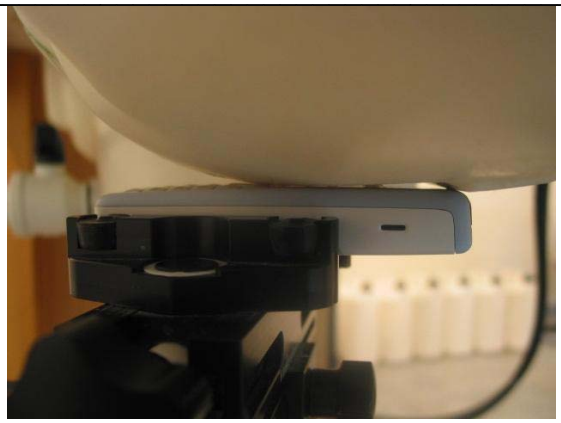

Photo of the device in “cheek” position

Photo of the device in “tilt” position

5.2.2 Body Worn Configuration

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

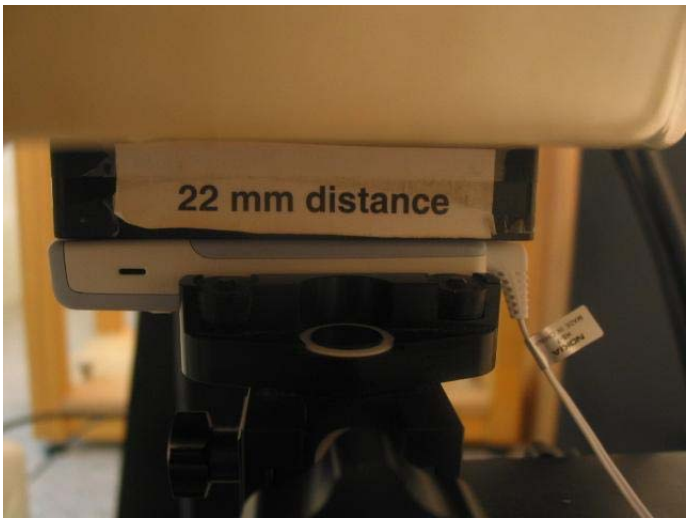

Photo of the device positioned for Body SAR measurement.
The spacer was removed for the tests.

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5.3 Scan Procedures

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

5.4 SAR Averaging Methods

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

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

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

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

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6. MEASUREMENT UNCERTAINTY

Table 6.1 – Measurement uncertainty evaluation

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

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7. RESULTS

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

850MHz Head SAR results

Mode	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		28.3 dBm	29.7 dBm	29.4 dBm
	Left	Cheek	0.626	0.843	**0.919**
		Tilt	-	0.527	-
	Right	Cheek	0.630	0.836	0.897
		Tilt	-	0.507	-

1900MHz Head SAR results

Mode	Test configuration		SAR, averaged over 1g (W/kg)		
			Ch 512 1850.2 MHz	Ch 661 1880.0 MHz	Ch 810 1909.8 MHz
GSM	Power		31.9 dBm	31.6 dBm	32.2 dBm
	Left	Cheek	-	0.778	-
		Tilt	0.695	0.787	**0.809**
	Right	Cheek	-	0.592	-
		Tilt	-	0.656	-

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

850MHz Body SAR results

Mode	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	28.3 dBm	29.7 dBm	29.4 dBm
	Without headset	0.461	**0.557**	0.552
	Headset HS-7	0.486	0.554	0.424

1900MHz Body SAR results

Mode	Test configuration	SAR, averaged over 1g (W/kg)		
		Ch 512 1850.2 MHz	Ch 661 1880.0 MHz	Ch 810 1909.8 MHz
GSM	Power	31.9 dBm	31.6 dBm	32.2 dBm
	Without headset	0.207	**0.256**	0.243
	Headset HS-7	0.191	0.248	0.231

Plots of the Measurement scans are given in Appendix B.

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APPENDIX A: SYSTEM CHECKING SCANS

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Date/Time: 2006-11-28 9:47:42 AM

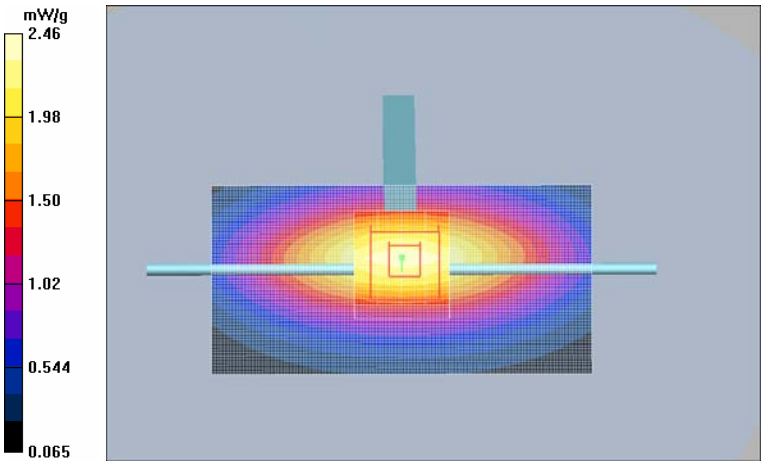
Test Laboratory: Nokia China
Type: D835V2; Serial: 4d005

Communication System: Continuous Wave
Frequency: 835 MHz; Duty Cycle: 1:1
Medium: Head 850; Medium Notes: Medium Temperature: t=22.0 C
Medium parameters used: f = 835 MHz; σ = 0.898 mho/m; ε_r = 41.4; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1650; Probe Notes:
- ConvF(6.91, 6.91, 6.91); Calibrated: 2006-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn480; Calibrated: 2006-09-19
- Phantom: SAM2; Type: SAM; Serial: TP-1099
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

d=15mm, Pin=250mW/Area Scan (61x121x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 2.46 mW/g

d=15mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 51.0 V/m
Peak SAR (extrapolated) = 3.38 W/kg
SAR(1 g) = 2.26 mW/g
SAR(10 g) = 1.47 mW/g
Power Drift = -0.044 dB
Maximum value of SAR (measured) = 2.45 mW/g



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Date/Time: 2006-11-27 9:41:56 AM

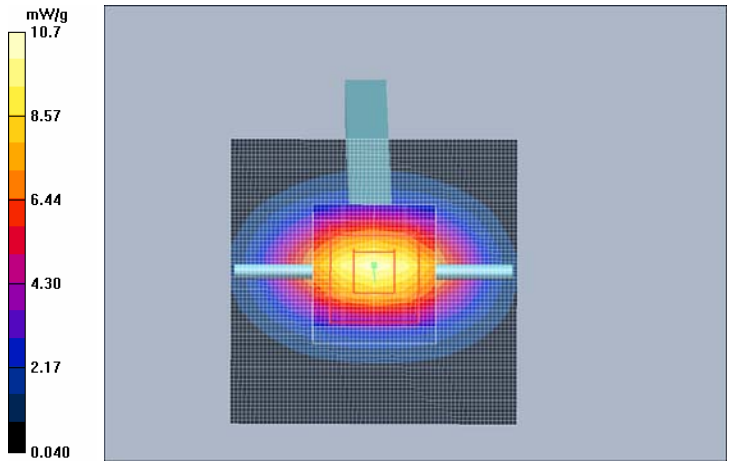
Test Laboratory: Nokia China
Type: D1900V2; Serial: D1900V2 - SN:547

Communication System: Continuous Wave
Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: Head 1900; Medium Notes: Medium Temperature: t=22.0 C
Medium parameters used: f = 1900 MHz; σ = 1.4 mho/m; ε_r = 39.7; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1650; Probe Notes:
- ConvF(5.17, 5.17, 5.17); Calibrated: 2006-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn480; Calibrated: 2006-09-19
- Phantom: SAM1; Type: SAM; Serial: TP-1097
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

d=10mm, Pin=250mW/Area Scan (71x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 10.7 mW/g

d=10mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 88.8 V/m
Peak SAR (extrapolated) = 16.1 W/kg
SAR(1 g) = 9.33 mW/g
SAR(10 g) = 4.92 mW/g
Power Drift = -0.042 dB
Maximum value of SAR (measured) = 10.6 mW/g



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APPENDIX B: MEASUREMENT SCANS

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Date/Time: 2006-11-28 10:37:16 AM

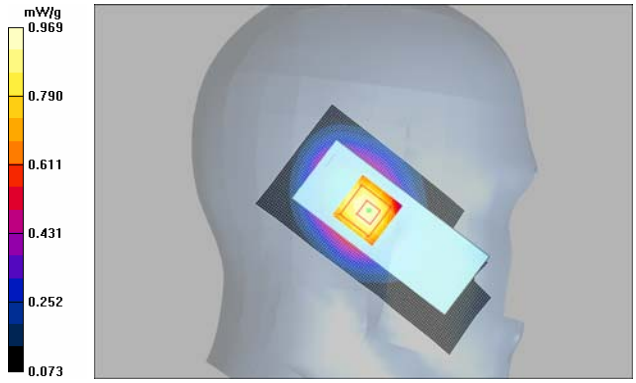
Test Laboratory: Nokia China
Type: RH-95; Serial: 001004/00/222081/3

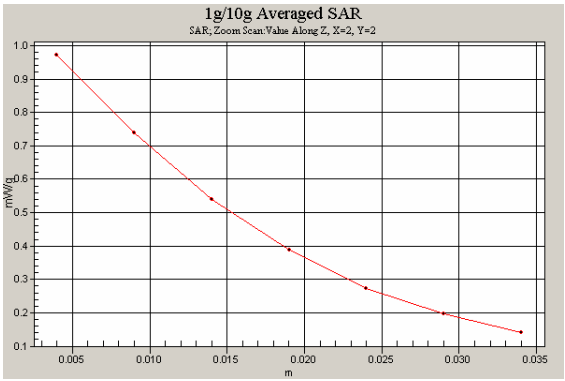
Communication System: GSM850
Frequency: 848.8 MHz; Duty Cycle: 1:8.3
Medium: Head 850; Medium Notes: Medium Temperature: t=22.0 C
Medium parameters used: f = 849 MHz; σ = 0.908 mho/m; ε_r = 41.2; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1650; Probe Notes:
- ConvF(6.91, 6.91, 6.91); Calibrated: 2006-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn480; Calibrated: 2006-09-19
- Phantom: SAM2; Type: SAM; Serial: TP-1099
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Cheek position - High/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.994 mW/g

Cheek position - High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 30.5 V/m
Peak SAR (extrapolated) = 1.29 W/kg
SAR(1 g) = 0.919 mW/g
SAR(10 g) = 0.643 mW/g
Power Drift = 0.061 dB
Maximum value of SAR (measured) = 0.969 mW/g





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Date/Time: 2006-11-28 10:50:36 AM

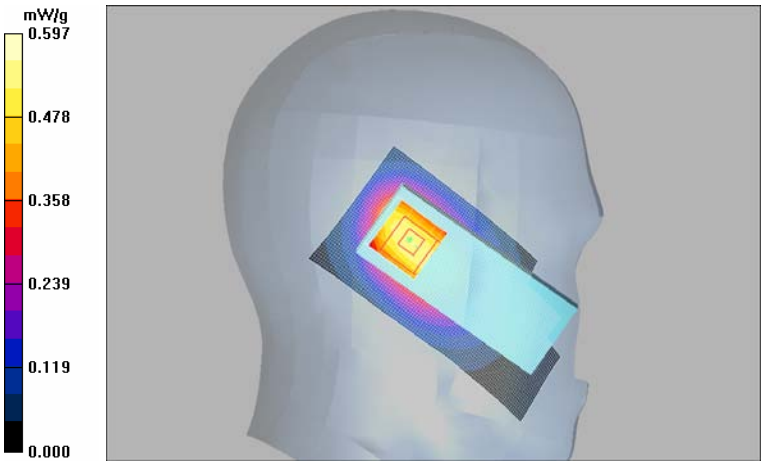
Test Laboratory: Nokia China
Type: RH-95; Serial: 001004/00/222081/3

Communication System: GSM850
Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium: Head 850; Medium Notes: Medium Temperature: t=22.0 C
Medium parameters used: f = 837 MHz; σ = 0.898 mho/m; ε_r = 41.4; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1650; Probe Notes:
- ConvF(6.91, 6.91, 6.91); Calibrated: 2006-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn480; Calibrated: 2006-09-19
- Phantom: SAM2; Type: SAM; Serial: TP-1099
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Tilt position - Middle/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.597 mW/g

Tilt position - Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 25.7 V/m
Peak SAR (extrapolated) = 0.797 W/kg
SAR(1 g) = 0.527 mW/g
SAR(10 g) = 0.365 mW/g
Power Drift = -0.015 dB
Maximum value of SAR (measured) = 0.560 mW/g



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Date/Time: 2006-11-28 12:01:14 PM

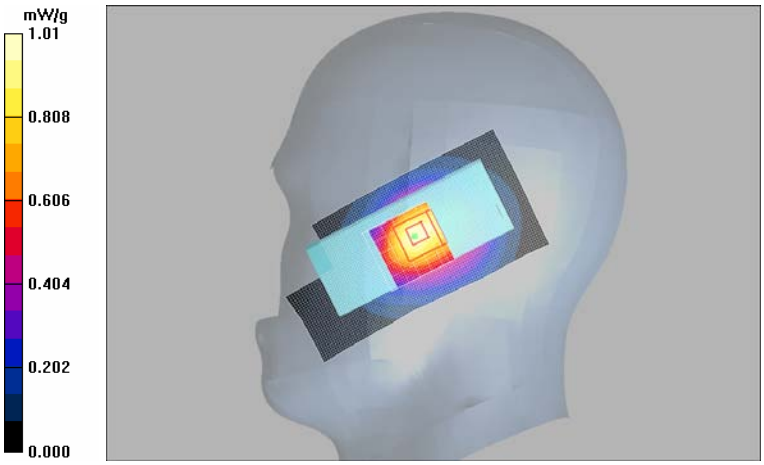
Test Laboratory: Nokia China
Type: RH-95; Serial: 001004/00/222081/3

Communication System: GSM850
Frequency: 848.8 MHz; Duty Cycle: 1:8.3
Medium: Head 850; Medium Notes: Medium Temperature: t=22.0 C
Medium parameters used: f = 849 MHz; σ = 0.908 mho/m; ε_r = 41.2; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1650; Probe Notes:
- ConvF(6.91, 6.91, 6.91); Calibrated: 2006-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn480; Calibrated: 2006-09-19
- Phantom: SAM2; Type: SAM; Serial: TP-1099
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Cheek position - High/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.01 mW/g

Cheek position - High/Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 26.3 V/m
Peak SAR (extrapolated) = 1.23 W/kg
SAR(1 g) = 0.897 mW/g
SAR(10 g) = 0.630 mW/g
Power Drift = -0.028 dB
Maximum value of SAR (measured) = 0.949 mW/g



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Date/Time: 2006-11-28 11:27:06 AM

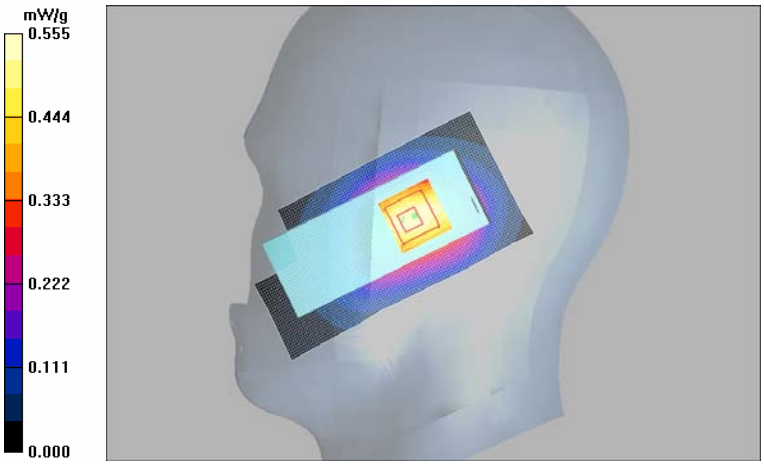
Test Laboratory: Nokia China
Type: RH-95; Serial: 001004/00/222081/3

Communication System: GSM850
Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium: Head 850; Medium Notes: Medium Temperature: t=22.0 C
Medium parameters used: f = 837 MHz; σ = 0.898 mho/m; ε_r = 41.4; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1650; Probe Notes:
- ConvF(6.91, 6.91, 6.91); Calibrated: 2006-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn480; Calibrated: 2006-09-19
- Phantom: SAM2; Type: SAM; Serial: TP-1099
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Tilt position - Middle/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.555 mW/g

Tilt position - Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 24.0 V/m
Peak SAR (extrapolated) = 0.675 W/kg
SAR(1 g) = 0.507 mW/g
SAR(10 g) = 0.361 mW/g
Power Drift = -0.063 dB
Maximum value of SAR (measured) = 0.535 mW/g



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Date/Time: 2006-11-27 11:05:54 AM

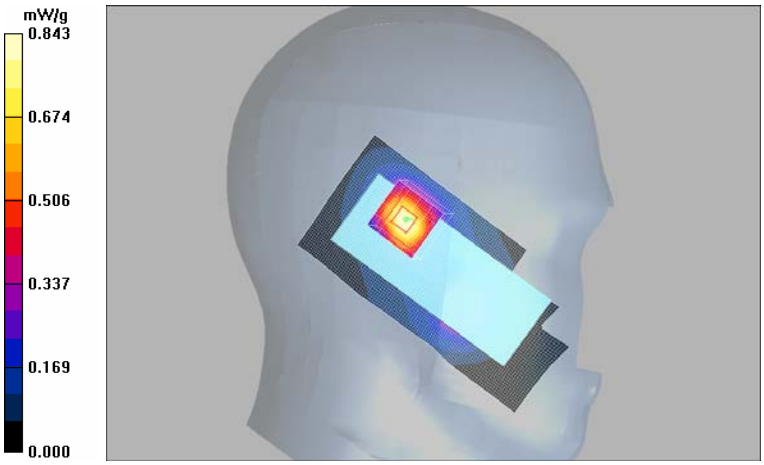
Test Laboratory: Nokia China
Type: RH-95; Serial: 001004/00/222081/3

Communication System: GSM 1900
Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium: Head 1900; Medium Notes: Medium Temperature: t=22.0 C
Medium parameters used: f = 1880 MHz; σ = 1.38 mho/m; ε_r = 39.7; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1650; Probe Notes:
- ConvF(5.17, 5.17, 5.17); Calibrated: 2006-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn480; Calibrated: 2006-09-19
- Phantom: SAM1; Type: SAM; Serial: TP-1097
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Cheek position - Middle/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.843 mW/g

Cheek position - Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 22.0 V/m
Peak SAR (extrapolated) = 1.42 W/kg
SAR(1 g) = 0.778 mW/g
SAR(10 g) = 0.403 mW/g
Power Drift = -0.259 dB
Maximum value of SAR (measured) = 0.879 mW/g



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Date/Time: 2006-11-27 1:16:27 PM

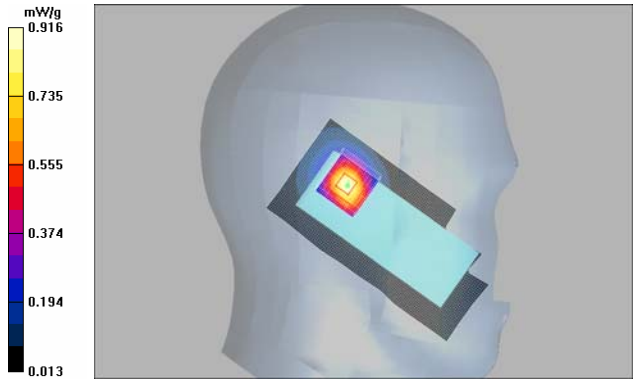
Test Laboratory: Nokia China
Type: RH-95; Serial: 001004/00/222081/3

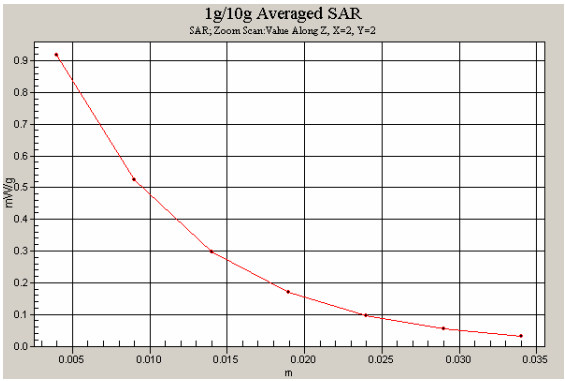
Communication System: GSM 1900
Frequency: 1909.8 MHz; Duty Cycle: 1:8.3
Medium: Head 1900; Medium Notes: Medium Temperature: t=22.0 C
Medium parameters used: f = 1910 MHz; σ = 1.41 mho/m; ε_r = 39.6; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1650; Probe Notes:
- ConvF(5.17, 5.17, 5.17); Calibrated: 2006-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn480; Calibrated: 2006-09-19
- Phantom: SAM1; Type: SAM; Serial: TP-1097
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Tilt position - High/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.917 mW/g

Tilt position - High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 24.5 V/m
Peak SAR (extrapolated) = 1.50 W/kg
SAR(1 g) = 0.809 mW/g
SAR(10 g) = 0.414 mW/g
Power Drift = -0.074 dB
Maximum value of SAR (measured) = 0.916 mW/g





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Date/Time: 2006-11-27 11:36:32 AM

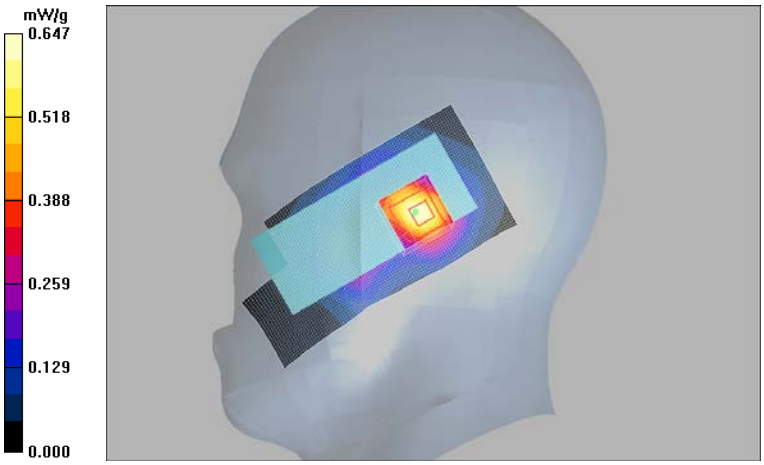
Test Laboratory: Nokia China
Type: RH-95; Serial: 001004/00/222081/3

Communication System: GSM 1900
Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium: Head 1900; Medium Notes: Medium Temperature: t=22.0 C
Medium parameters used: f = 1880 MHz; σ = 1.38 mho/m; ε_r = 39.7; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1650; Probe Notes:
- ConvF(5.17, 5.17, 5.17); Calibrated: 2006-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn480; Calibrated: 2006-09-19
- Phantom: SAM1; Type: SAM; Serial: TP-1097
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Cheek position - Middle/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.647 mW/g

Cheek position - Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 19.5 V/m
Peak SAR (extrapolated) = 0.982 W/kg
SAR(1 g) = 0.592 mW/g
SAR(10 g) = 0.335 mW/g
Power Drift = -0.115 dB
Maximum value of SAR (measured) = 0.640 mW/g



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Date/Time: 2006-11-27 11:52:19 AM

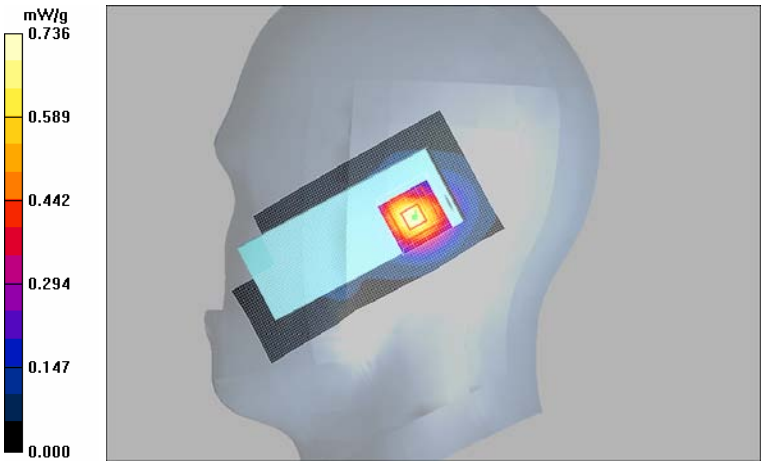
Test Laboratory: Nokia China
Type: RH-95; Serial: 001004/00/222081/3

Communication System: GSM 1900
Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium: Head 1900; Medium Notes: Medium Temperature: t=22.0 C
Medium parameters used: f = 1880 MHz; σ = 1.38 mho/m; ε_r = 39.7; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1650; Probe Notes:
- ConvF(5.17, 5.17, 5.17); Calibrated: 2006-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn480; Calibrated: 2006-09-19
- Phantom: SAM1; Type: SAM; Serial: TP-1097
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Tilt position - Middle/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.736 mW/g

Tilt position - Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 20.7 V/m
Peak SAR (extrapolated) = 1.12 W/kg
SAR(1 g) = 0.656 mW/g
SAR(10 g) = 0.354 mW/g
Power Drift = -0.139 dB
Maximum value of SAR (measured) = 0.734 mW/g



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Date/Time: 2006-11-28 1:22:37 PM

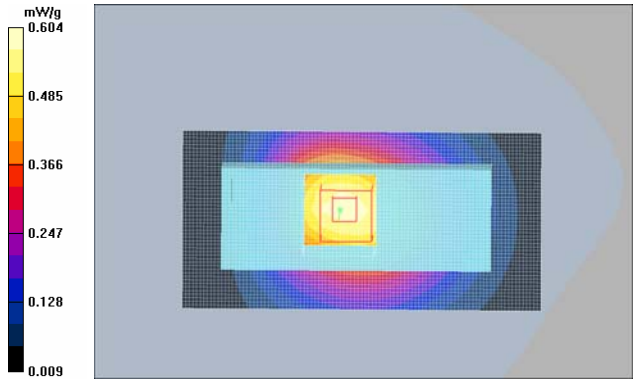
Test Laboratory: Nokia China
Type: RH-95; Serial: 001004/00/222081/3

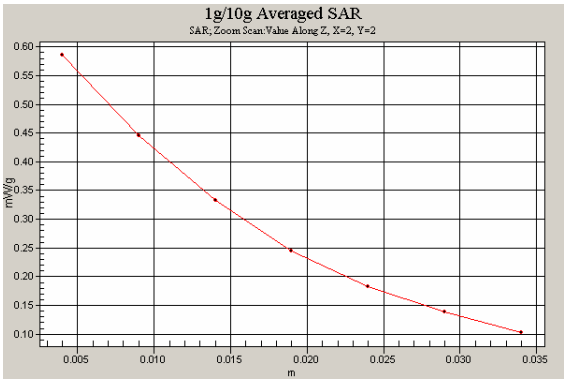
Communication System: GSM850
Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium: Body 850; Medium Notes: Medium Temperature: t= 22.1 C
Medium parameters used: f = 837 MHz; σ = 0.979 mho/m; ε_r = 54.2; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1650; Probe Notes:
- ConvF(6.52, 6.52, 6.52); Calibrated: 2006-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn480; Calibrated: 2006-09-19
- Phantom: SAM1; Type: SAM; Serial: TP-1097
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Body - Middle - No Accessory/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.604 mW/g

Body - Middle - No Accessory/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 16.0 V/m
Peak SAR (extrapolated) = 0.719 W/kg
SAR(1 g) = 0.557 mW/g
SAR(10 g) = 0.404 mW/g
Power Drift = -0.267 dB
Maximum value of SAR (measured) = 0.585 mW/g





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Date/Time: 2006-11-28 1:35:40 PM

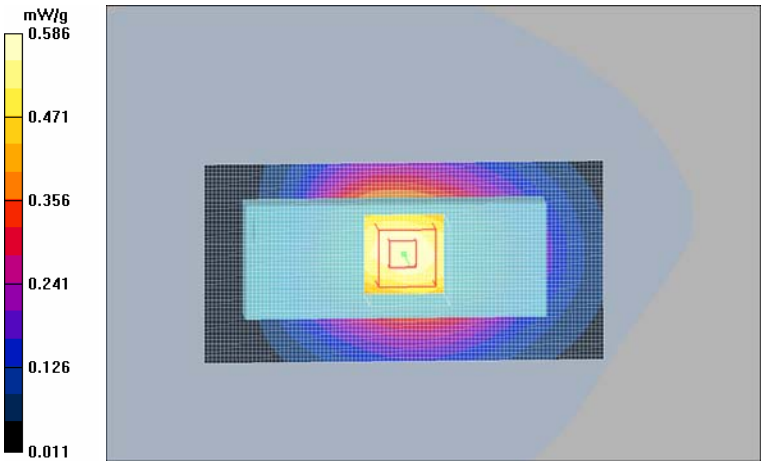
Test Laboratory: Nokia China
Type: RH-95; Serial: 001004/00/222081/3

Communication System: GSM850
Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium: Body 850; Medium Notes: Medium Temperature: t= 22.1 C
Medium parameters used: f = 837 MHz; σ = 0.979 mho/m; ε_r = 54.2; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1650; Probe Notes:
- ConvF(6.52, 6.52, 6.52); Calibrated: 2006-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn480; Calibrated: 2006-09-19
- Phantom: SAM1; Type: SAM; Serial: TP-1097
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Body - Middle - HS-7/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.586 mW/g

Body - Middle - HS-7/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 15.2 V/m
Peak SAR (extrapolated) = 0.722 W/kg
SAR(1 g) = 0.554 mW/g
SAR(10 g) = 0.401 mW/g
Power Drift = -0.012 dB
Maximum value of SAR (measured) = 0.588 mW/g



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Date/Time: 2006-11-27 2:57:53 PM

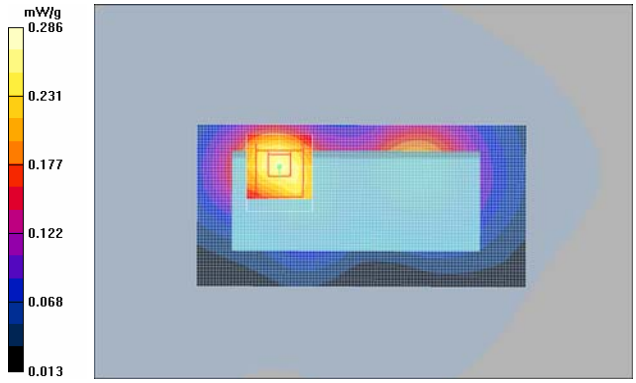
Test Laboratory: Nokia China
Type: RH-95; Serial: 001004/00/222081/3

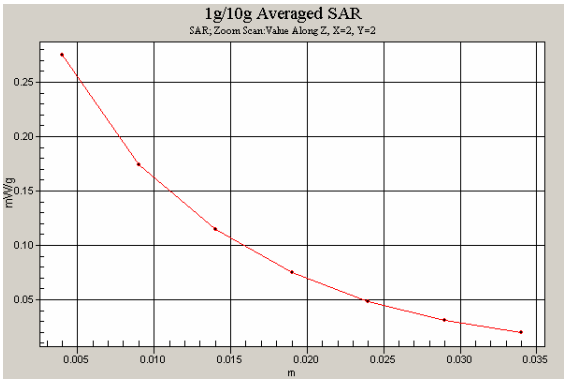
Communication System: GSM 1900
Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium: Body 1900; Medium Notes: Medium Temperature: t=22.2 C
Medium parameters used: f = 1880 MHz; σ = 1.5 mho/m; ε_r = 53; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1650; Probe Notes:
- ConvF(4.64, 4.64, 4.64); Calibrated: 2006-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn480; Calibrated: 2006-09-19
- Phantom: SAM2; Type: SAM; Serial: TP-1099
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Body - Middle - No Accessory/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.286 mW/g

Body - Middle - No Accessory/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 11.1 V/m
Peak SAR (extrapolated) = 0.417 W/kg
SAR(1 g) = 0.256 mW/g
SAR(10 g) = 0.160 mW/g
Power Drift = -0.182 dB
Maximum value of SAR (measured) = 0.275 mW/g





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Date/Time: 2006-11-27 3:11:52 PM

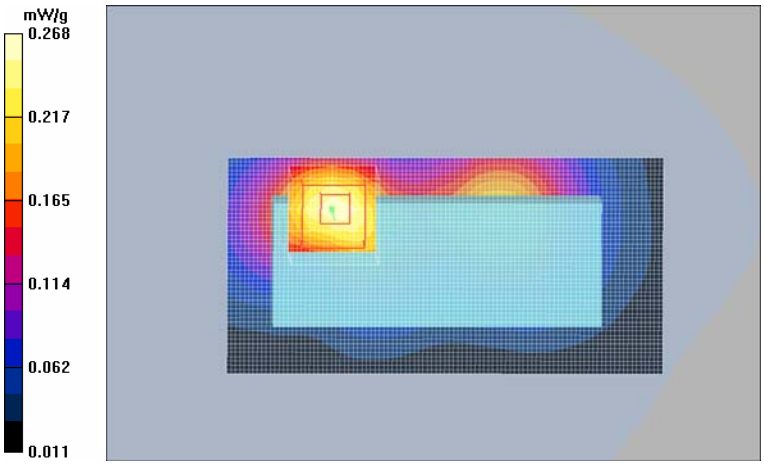
Test Laboratory: Nokia China
Type: RH-95; Serial: 001004/00/222081/3

Communication System: GSM 1900
Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium: Body 1900; Medium Notes: Medium Temperature: t=22.2 C
Medium parameters used: f = 1880 MHz; σ = 1.5 mho/m; ε_r = 53; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1650; Probe Notes:
- ConvF(4.64, 4.64, 4.64); Calibrated: 2006-03-22
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn480; Calibrated: 2006-09-19
- Phantom: SAM2; Type: SAM; Serial: TP-1099
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Body - Middle - HS-7/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.275 mW/g

Body - Middle - HS-7/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 9.96 V/m
Peak SAR (extrapolated) = 0.402 W/kg
SAR(1 g) = 0.248 mW/g
SAR(10 g) = 0.152 mW/g
Power Drift = 0.012 dB
Maximum value of SAR (measured) = 0.268 mW/g



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

E-field probe ET3DV6, SN: 1650
See the next three pages

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

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

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

Accreditation No.: SCS 108

Client **Nokia Beijing TCC**

Certificate No: ET3-1650_Mar06

CALIBRATION CERTIFICATE

Object	ET3DV6 - SN:1650
Calibration procedure(s)	QA CAL-01.v5 and QA CAL-12.v4 Calibration procedure for dosimetric E-field probes
Calibration date:	March 22, 2006
Condition of the calibrated item	In Tolerance

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	3-May-05 (METAS, No. 251-00466)	May-06
Power sensor E4412A	MY41495277	3-May-05 (METAS, No. 251-00466)	May-06
Power sensor E4412A	MY41498087	3-May-05 (METAS, No. 251-00466)	May-06
Reference 3 dB Attenuator	SN: S5054 (3c)	11-Aug-05 (METAS, No. 251-00499)	Aug-06
Reference 20 dB Attenuator	SN: S5086 (20b)	3-May-05 (METAS, No. 251-00467)	May-06
Reference 30 dB Attenuator	SN: S5129 (30b)	11-Aug-05 (METAS, No. 251-00500)	Aug-06
Reference Probe ES3DV2	SN: 3013	2-Jan-06 (SPEAG, No. ES3-3013_Jan06)	Jan-07
DAE4	SN: 654	2-Feb-06 (SPEAG, No. DAE4-654_Feb06)	Feb-07

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Nov-05)	In house check: Nov 06

	Name	Function	Signature
Calibrated by:	Katja Pokovic	Technical Manager	
Approved by:	Fin Bomholt	R&D Director	

Issued: March 22, 2006

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

DASY - Parameters of Probe: ET3DV6 SN:1650

Sensitivity in Free Space[A]

NormX	**1.88** ± 10.1%	$\mu V/(V/m)^2$	DCP X	**95** mV
NormY	**1.86** ± 10.1%	$\mu V/(V/m)^2$	DCP Y	**95** mV
NormZ	**1.84** ± 10.1%	$\mu V/(V/m)^2$	DCP Z	**95** mV

Diode Compression[B]

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

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

Sensor Center to Phantom Surface Distance		**3.7 mm**	**4.7 mm**
SAR_{be} [%]	Without Correction Algorithm	7.8	4.3
SAR_{be} [%]	With Correction Algorithm	0.1	0.2

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

Sensor Center to Phantom Surface Distance		**3.7 mm**	**4.7 mm**
SAR_{be} [%]	Without Correction Algorithm	6.4	3.5
SAR_{be} [%]	With Correction Algorithm	0.1	0.2

Sensor Offset

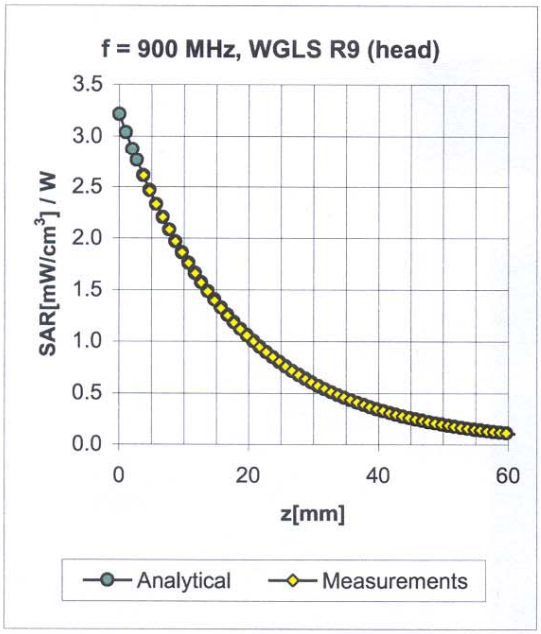
Probe Tip to Sensor Center **2.7** mm

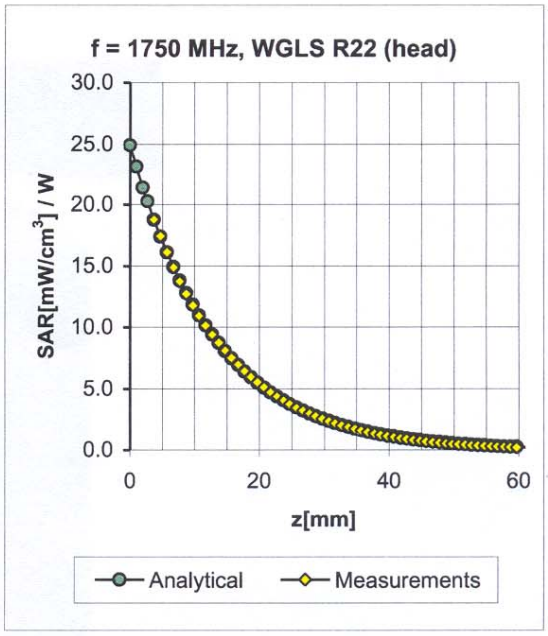
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

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

[B] Numerical linearization parameter: uncertainty not required.

Conversion Factor Assessment





f [MHz]	Validity [MHz][c]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
450	± 50 / ± 100	Head	43.5 ± 5%	0.87 ± 5%	0.27	3.21	7.13 ± 13.3% (k=2)
835	± 50 / ± 100	Head	41.5 ± 5%	0.90 ± 5%	0.52	1.85	6.91 ± 11.0% (k=2)
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.46	1.99	6.66 ± 11.0% (k=2)
1750	± 50 / ± 100	Head	40.1 ± 5%	1.37 ± 5%	0.46	2.66	5.45 ± 11.0% (k=2)
1900	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.55	2.43	5.17 ± 11.0% (k=2)
1950	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.53	2.50	5.13 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.58	2.10	4.57 ± 11.8% (k=2)
450	± 50 / ± 100	Body	56.7 ± 5%	0.94 ± 5%	0.24	4.07	7.64 ± 13.3% (k=2)
835	± 50 / ± 100	Body	55.2 ± 5%	0.97 ± 5%	0.48	2.01	6.52 ± 11.0% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.45	2.11	6.19 ± 11.0% (k=2)
1750	± 50 / ± 100	Body	53.4 ± 5%	1.49 ± 5%	0.63	2.40	4.84 ± 11.0% (k=2)
1900	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.77	2.13	4.64 ± 11.0% (k=2)
1950	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.83	2.00	4.63 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.60	2.12	4.25 ± 11.8% (k=2)

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

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

835MHz dipole, SN: 4d005
1900MHz dipole, SN: 547
See the next six pages

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Zeughausstrasse 43, 8004 Zurich, Switzerland

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Accreditation No.: SCS 108

Client **Nokia Beijing TCC**

Certificate No: D835V2-4d005_Mar06

CALIBRATION CERTIFICATE

Object	D835V2 - SN: 4d005
Calibration procedure(s)	QA CAL-05.v6 Calibration procedure for dipole validation kits
Calibration date:	March 15, 2006
Condition of the calibrated item	In Tolerance

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	04-Oct-05 (METAS, No. 251-00516)	Oct-06
Power sensor HP 8481A	US37292783	04-Oct-05 (METAS, No. 251-00516)	Oct-06
Reference 20 dB Attenuator	SN: 5086 (20g)	11-Aug-05 (METAS, No 251-00498)	Aug-06
Reference 10 dB Attenuator	SN: 5047.2 (10r)	11-Aug-05 (METAS, No 251-00498)	Aug-06
Reference Probe ET3DV6	SN 1507	28-Oct-05 (SPEAG, No. ET3-1507_Oct05)	Oct-06
DAE4	SN 601	15-Dec-05 (SPEAG, No. DAE4-601_Dec05)	Dec-06

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 Nov-05)	In house check: Nov-06

	Name	Function	Signature
Calibrated by:	Judith Müller	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: March 16, 2006

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DASY4 Validation Report for Head TSL

Date/Time: 15.03.2006 14:15:36

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d005

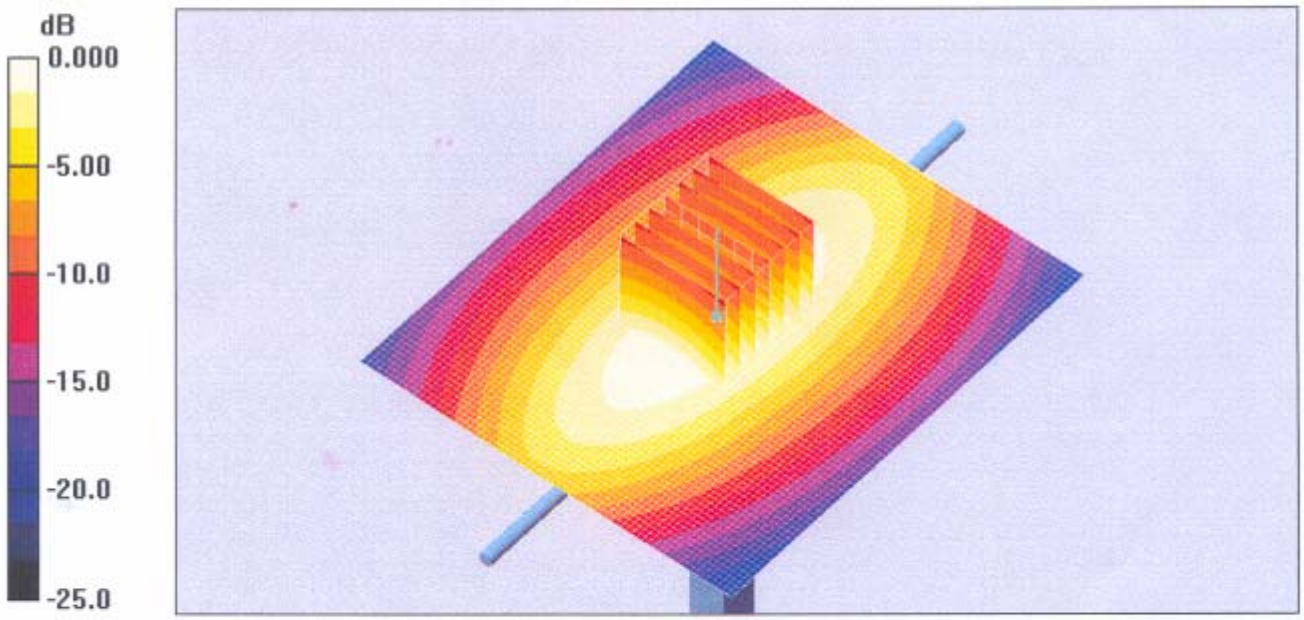
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: HSL U10 BB;
Medium parameters used: f = 835 MHz; σ = 0.942 mho/m; ε_r = 42.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507 (HF); ConvF(6.09, 6.09, 6.09); Calibrated: 28.10.2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 15.12.2005
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; ;
- Measurement SW: DASY4, V4.7 Build 14; Postprocessing SW: SEMCAD, V1.8 Build 165

Pin = 250 mW; d = 10 mm/Area Scan (71x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.53 mW/g

Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 54.1 V/m; Power Drift = -0.024 dB
Peak SAR (extrapolated) = 3.52 W/kg
SAR(1 g) = 2.36 mW/g; SAR(10 g) = 1.53 mW/g
Maximum value of SAR (measured) = 2.55 mW/g



0 dB = 2.55mW/g

DASY4 Validation Report for Body TSL

Date/Time: 01.03.2006 16:19:55

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d005

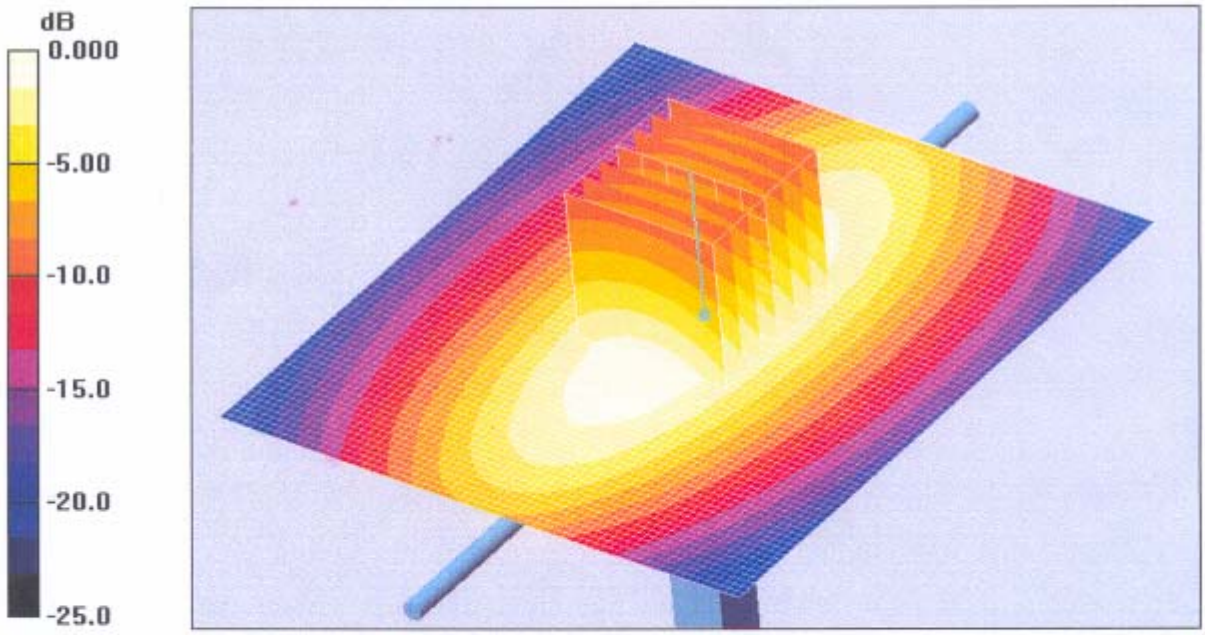
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: MSL U10;
Medium parameters used: f = 835 MHz; σ = 0.99 mho/m; ε_r = 56.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507 (HF); ConvF(5.84, 5.84, 5.84); Calibrated: 28.10.2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 15.12.2005
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; ;
- Measurement SW: DASY4, V4.7 Build 5; Postprocessing SW: SEMCAD, V1.8 Build 160

Pin = 250 mW; d = 10 mm/Area Scan (71x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.61 mW/g

Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 53.3 V/m; Power Drift = 0.003 dB
Peak SAR (extrapolated) = 3.44 W/kg
SAR(1 g) = 2.41 mW/g; SAR(10 g) = 1.6 mW/g
Maximum value of SAR (measured) = 2.60 mW/g



0 dB = 2.60mW/g

Calibration Laboratory of
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Engineering AG
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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 TCC Beijing**

Certificate No: D1900V2-547_Sep05

CALIBRATION CERTIFICATE

Object	D1900V2 - SN: 547
Calibration procedure(s)	QA CAL-05.v6 Calibration procedure for dipole validation kits
Calibration date:	September 27, 2005
Condition of the calibrated item	In Tolerance

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM E442	GB37480704	12-Oct-04 (METAS, No. 251-00412)	Oct-05
Power sensor HP 8481A	US37292783	12-Oct-04 (METAS, No. 251-00412)	Oct-05
Reference 20 dB Attenuator	SN: 5086 (20g)	11-Aug-05 (METAS, No 251-00498)	Aug-06
Reference 10 dB Attenuator	SN: 5047.2 (10r)	11-Aug-05 (METAS, No 251-00498)	Aug-06
Reference Probe ET3DV6	SN 1507	26-Oct-04 (SPEAG, No. ET3-1507_Oct04)	Oct-05
DAE4	SN 601	07-Jan-05 (SPEAG, No. DAE4-601_Jan05)	Jan-06

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (SPEAG, in house check Oct-03)	In house check: Oct-05
RF generator R&S SML-03	100698	27-Mar-02 (SPEAG, in house check Dec-03)	In house check: Dec-05
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (SPEAG, in house check Nov-04)	In house check: Nov 05

	Name	Function	Signature
Calibrated by:	Mike Meili	Laboratory Technician	M. Meili
Approved by:	Katja Pokovic	Technical Manager	

Issued: September 27, 2005

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DASY4 Validation Report for Head TSL

Date/Time: 23.09.2005 12:58:27

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:547

Communication System: CW-1900; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: HSL 1900 MHz;
Medium parameters used: f = 1900 MHz; σ = 1.47 mho/m; ε_r = 38.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

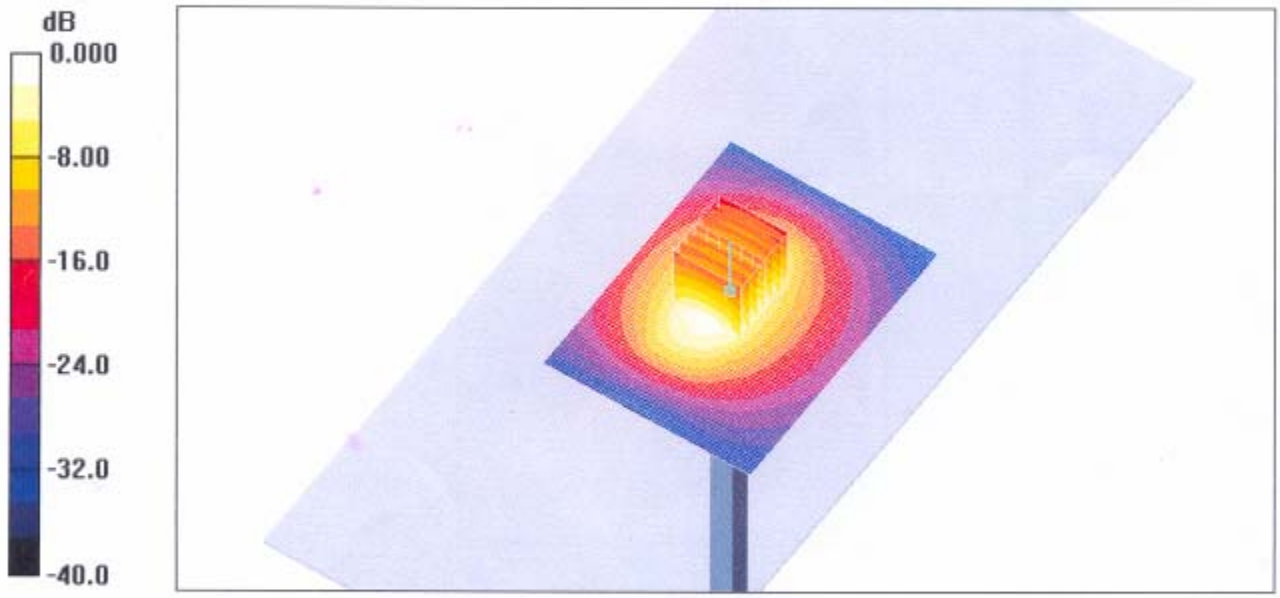
- Probe: ET3DV6 - SN1507; ConvF(4.96, 4.96, 4.96); Calibrated: 26.10.2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.01.2005
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA
- Measurement SW: DASY4, V4.6 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 159

Pin = 250 mW; d = 10 mm/Area Scan (61x81x1):

Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 12.1 mW/g

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

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 92.0 V/m; Power Drift = 0.030 dB
Peak SAR (extrapolated) = 17.3 W/kg
SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.29 mW/g
Maximum value of SAR (measured) = 11.3 mW/g



0 dB = 11.3mW/g

DASY4 Validation Report for Body TSL

Date/Time: 27.09.2005 12:11:20

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:547

Communication System: CW-1900; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: MSL 1900 MHz;
Medium parameters used: f = 1900 MHz; σ = 1.59 mho/m; ε_r = 53.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

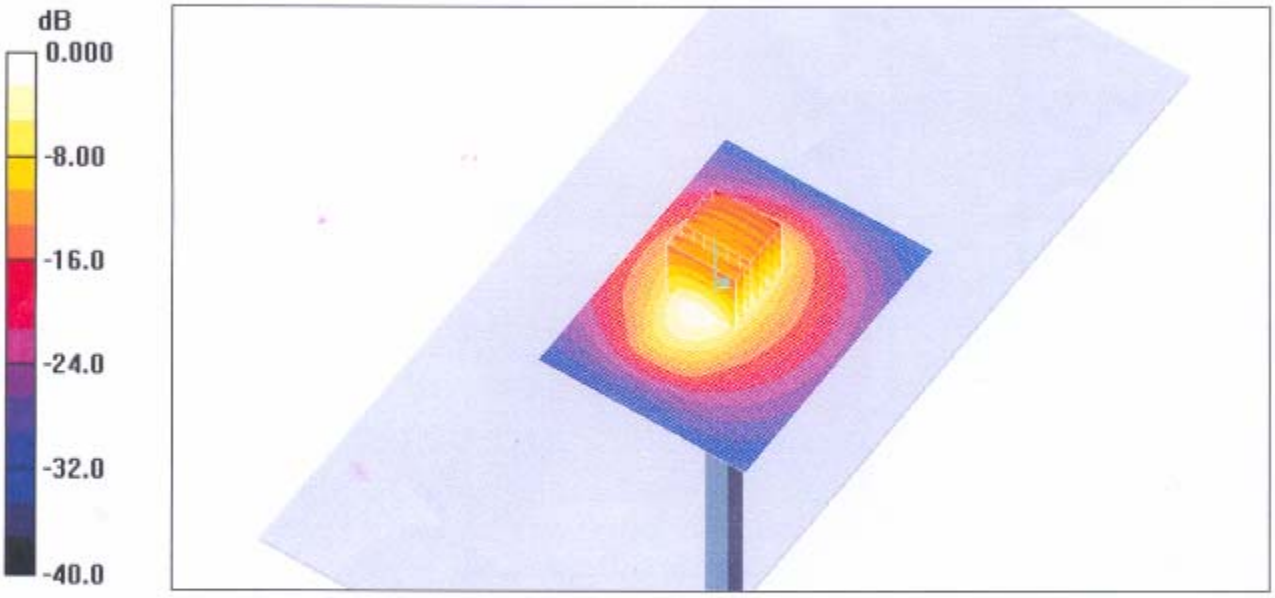
- Probe: ET3DV6 - SN1507; ConvF(4.43, 4.43, 4.43); Calibrated: 26.10.2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.01.2005
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA
- Measurement SW: DASY4, V4.6 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 159

Pin = 250 mW; d = 10 mm/Area Scan (61x81x1):

Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 12.0 mW/g

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

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 85.1 V/m; Power Drift = 0.040 dB
Peak SAR (extrapolated) = 16.3 W/kg
SAR(1 g) = 9.81 mW/g; SAR(10 g) = 5.23 mW/g
Maximum value of SAR (measured) = 11.1 mW/g



0 dB = 11.1mW/g