TCC
Beijing

T207 (EN ISO/IEC 17025)

SAR Compliance Test Report

Test report no.:	TCC 0361	**Date of report:**	2004-08-26
Template version:	2	**Number of pages:**	30
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Responsible test engineer:	Gao Min-Judy	**Product contact person:**	Tero Huhtala
Measurements made by:	Gao Min-Judy		
Tested device:	RM-1		
FCC ID:	PDNRM-1	**IC:**	661R-RM1
Supplement reports:	-		

Testing has been carried out in accordance with:

47CFR §2.1093
Radiofrequency Radiation Exposure Evaluation: Portable Devices

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

RSS-102
Evaluation Procedure for Mobile and Portable Radio Transmitters with Respect to Health Canada's Safety Code 6 for Exposure of Humans to Radio Frequency Fields

IEEE 1528 - 2003
IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques

Documentation: The documentation of the testing performed on the tested devices is archived for 15 years at TCC Beijing

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: 2004-08-27

For the contents: **Gao Min**
Test Engineer

Gao Min

CONTENTS

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1. SUMMARY OF SAR TEST REPORT

1.1 Test Details

Period of test	2004-08-26
SN, HW and SW numbers of tested device	SN: 004400271747394 SW: wk31-cmt1.04333; HW:4100
Batteries used in testing	BL-5C
Headsets used in testing	HS-3
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)	ERP/EIRP	Position	SAR limit (1g avg)	Measured SAR value (1g avg)	Result
GSM1900	512/1850	31.0dBm	Left Tilt	1.6 W/kg	0.55W/kg	PASSED

1.2.2 Body Worn Configuration

Mode	Ch / *f* (MHz)	ERP/EIRP	Separation distance	SAR limit (1g avg)	Measured SAR value (1g avg)	Result
GPRS1900	512/1850	29.9dBm	1.5cm	1.6 W/kg	0.58W/kg	PASSED

1.2.3 Maximum Drift

Maximum drift during measurements	-0.20dB

1.2.4 Measurement Uncertainty

Extended Uncertainty (k=2) 95%	± 29.1 %

2. DESCRIPTION OF THE DEVICE UNDER TEST

Device category	portable			
Exposure environment	general population/uncontrolled			
Modes and Bands of Operation	GSM 1900	GPRS (GSM)	EGPRS (EDGE)	BT
Modulation Mode	GMSK	GMSK	8PSK	GFSK
Duty Cycle	1/8	1/8 or 2/8	1/8 or 2/8	-
Transmitter Frequency Range (MHz)	1850.2 - 1909.8	1850.2 - 1909.8	1850.2 - 1909.8	2400.0 – 2483.5

Outside of USA and Canada, the transmitter of the device is capable of operating also in GSM900, GSM1800 and WCDMA2000 bands, which are not part of this filing.

EGPRS mode was not measured, because maximum averaged output power is 2 dB lower in EGPRS mode than in GPRS mode.

2.1 Picture of the Device

2.2 Description of the Antenna

The device has an internal patch antenna.

3. TEST CONDITIONS

3.1 Temperature and Humidity

Period of measurement:	2004-08-26
Ambient temperature (°C):	21 to 24
Ambient humidity (RH %):	30 to 58

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 power output was measured by a separate test laboratory on the same unit as used for SAR testing.

4. DESCRIPTION OF THE TEST EQUIPMENT

4.1 Measurement System and Components

The measurements were performed using an automated near-field scanning system, DASY4 software version 4.2, manufactured by Schmid & Partner Engineering AG (SPEAG) in Switzerland. The SAR extrapolation algorithm used in all measurements on the device was the 'worst-case extrapolation' algorithm.

The following table lists calibration dates of SPEAG components:

est Equipment	Serial Number	Calibration interval	Calibration expiry
AE3	480	12 months	10/2004
-field Probe ET3DV6	1650	12months	03/2005
ipole validation Kit, D1900V2	547	24 months	03/2006

Additional test equipment used in testing:

Test Equipment	Model	Serial Number	Calibration interval	Calibration expiry
Signal Generator	Agilent 8648C	3847m00258	12months	12/2004
Amplifier	AR 5S1G4M3	302339	12months	12/2004
Power Meter	Agilent E4419B	MY41291520	12months	12/2004
Power Sensor	Agilent 8482A	US37295411	12months	12/2004
Call Tester	CMU200	100359	12months	07/2005
Call Tester	CMU200	835353/008	12months	07/2005
Vector Network Analyzer	Agilent 8753S	MY40002096	12months	07/2005
Dielectric Probe Kit	Agilent 85070C	01033717	-	-

4.1.1 Isotropic E-field Probe: SN1650

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:
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 validation testing and device testing, was the twin-headed "SAM Phantom", manufactured by SPEAG. The phantom conforms to the requirements of IEEE 1528 - 2003.

Validation tests were 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 Simulating Liquids

Recommended values for the dielectric parameters of the simulating liquids are given in IEEE 1528 - 2003 and FCC Supplement C to OET Bulletin 65. All tests were carried out using liquids 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 liquid was 15.0 ± 0.5 cm measured from the ear reference point during validation and device measurements.

4.3.1 Liquid Recipes

The following recipes were used for Head and Body liquids:

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 Verification of the System

The manufacturer calibrates the probes annually. Dielectric parameters of the simulating liquids were measured every day using the dielectric probe kit and the network analyser. A SAR measurement was made following the determination of the dielectric parameters of the liquids, 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 validation results (dielectric parameters and SAR values) are given in the table below.

System verification, head tissue simulant

f [MHz]	Description	SAR [W/kg], 1g	Dielectric Parameters		Temp [°C]
			ε_r	σ [S/m]	
1900	Reference result	10.2	38.8	1.47	N/A
	± 10% window	9.2 -11.2			
	2004-08-26	9.9	38.6	1.48	20.3

Plots of the Verification 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]	
1880	Recommended value	40.0	1.40	N/A
	± 5% window	38.0 – 42.0	1.33 – 1.47	
	2004-08-26	38.7	1.46	20.3

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Body tissue simulant measurements

f [MHz]	Description	Dielectric Parameters		Temp
		ε_r	σ [S/m]	[°C]
1880	Recommended value	53.3	1.52	N/A
	± 5% window	50.6 – 56.0	1.44 – 1.60	
	2004-08-26	52.7	1.52	21

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. The device was oriented with its antenna facing the phantom since this orientation gave higher results.

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

5.3 Scan Procedures

First coarse scans were used for determination of the field distribution. Next a cube scan, 5x5x7 points covering a volume of 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 coarse scan and again at the end of the cube 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 cube 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 cube 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	$c_i . u_i$ (%)	v_i
Measurement System							
Probe Calibration	E2.1	±4.8	N	1	1	±4.8	∞
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	±8.3	R	√3	1	±4.8	∞
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	E5.2	±3.9	R	√3	1	±2.3	∞
Test sample Related							
Test Sample Positioning	E4.2.1	±6.0	N	1	1	±6.0	11
Device Holder Uncertainty	E4.1.1	±5.0	N	1	1	±5.0	7
Output Power Variation - SAR drift measurement	6.6.3	±10.0	R	√3	1	±5.8	∞
Phantom and Tissue Parameters							
Phantom Uncertainty (shape and thickness tolerances)	E3.1	±4.0	R	√3	1	±2.3	∞
Liquid Conductivity Target - tolerance	E3.2	±5.0	R	√3	0.64	±1.8	∞
Liquid Conductivity - measurement uncertainty	E3.3	±5.5	N	1	0.64	±3.5	5
Liquid Permittivity Target tolerance	E3.2	±5.0	R	√3	0.6	±1.7	∞
Liquid Permittivity - measurement uncertainty	E3.3	±2.9	N	1	0.6	±1.7	5
Combined Standard Uncertainty			RSS			**±14.5**	187
Coverage Factor for 95%			**k=2**				
Expanded Standard Uncertainty						**±29.1**	

7. RESULTS

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

GSM1900MHz Head SAR results

Position		SAR, averaged over 1g (W/kg)		
		Ch 512 1850 MHz	Ch 661 1880 MHz	Ch 810 1910 MHz
Power level		31.0 dBm	30.9 dBm	29.2 dBm
Left Without MMC	Cheek		0.35	
	Tilt	**0.47**	0.40	0.31
Right Without MMC	Cheek		0.25	
	Tilt		0.27	
Left Tilt, With MMC card		**0.55**	0.37	0.29
Left Tilt, with MMC, with BT active		0.52		

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

GPRS1900MHz (2 slots) Body SAR results

Body-worn location setup	SAR, averaged over 1g (W/kg)		
	Ch 512 1850 MHz	Ch 661 1880 MHz	Ch 810 1910 MHz
Power level	**29.9 dBm**	**28.3dBm**	**26.8 dBm**
Without headset, without MMC	**0.58**	0.54	0.50
Headset HS-3, without MMC	0.51	0.50	0.43
Without headset, with MMC	0.53	0.49	0.45
Without headset,without MMC, with BT active	**0.54**		

GSM1900MHz Body SAR results

Body-worn location setup	SAR, averaged over 1g (W/kg)		
	Ch 512 1850 MHz	Ch 661 1880 MHz	Ch 810 1910 MHz
Power level	**31.0 dBm**	**30.9 dBm**	**29.2 dBm**
Without headset, without MMC	**0.48**	0.45	0.42

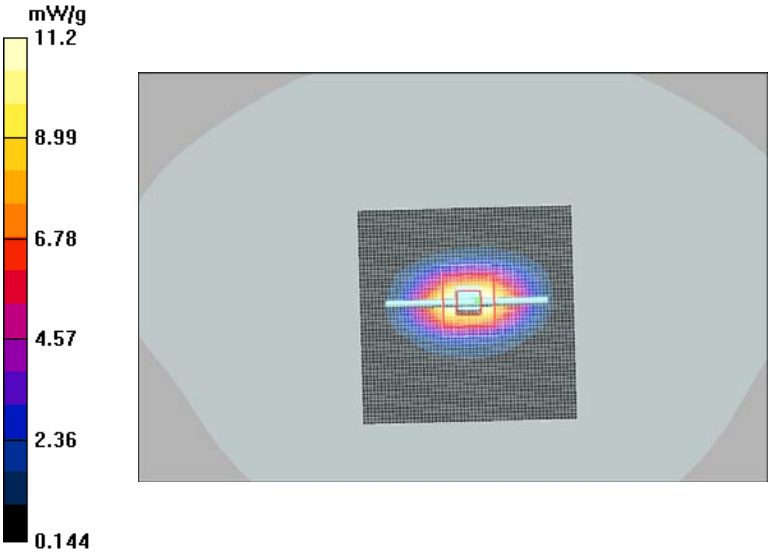
Plots of the Measurement scans are given in Appendix B.

APPENDIX A: VALIDATION SCANS

Date: 2004-08-26
Test Laboratory: Nokia China
Liquid Termperature: 20.3C
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:547
Program Name: System Performance Check at 1900 MHz, Advanced extrapolation
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.48 mho/m; ε_r = 38.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1650; ConvF(5.36, 5.36, 5.36); Calibrated: 3/23/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn480; Calibrated: 10/10/2003
- Phantom: SAM1
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112

d=10mm, Pin=250mW/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 92.2 V/m; Power Drift = 0.0 dB
Maximum value of SAR (interpolated) = 12.2 mW/g

d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 92.2 V/m; Power Drift = 0.0 dB
Maximum value of SAR (measured) = 11.2 mW/g
Peak SAR (extrapolated) = 18.2 W/kg
SAR(1 g) = 9.88 mW/g; SAR(10 g) = 5.06 mW/g



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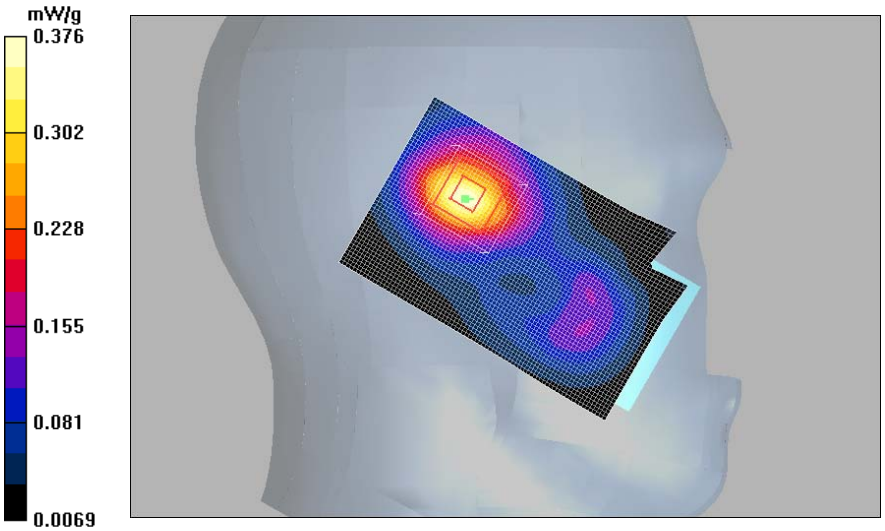
APPENDIX B: MEASUREMENT SCAN

Date: 2004-08-26
Test Laboratory: Nokia China
Liquid Temperature:20.2C
DUTType: RM-1
Program Name: FCC DCS1900, Left side, without MMC, worst case extrapolation
Communication System: DCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.46 mho/m; ε_r = 38.7; ρ = 1000 kg/m^3
Phantom section: Left Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1650; ConvF(5.36, 5.36, 5.36); Calibrated: 3/23/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn480; Calibrated: 10/10/2003
- Phantom: SAM1;
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112

Touch position - Middle/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 11.8 V/m; Power Drift = -0.2 dB
Maximum value of SAR (interpolated) = 0.372 mW/g

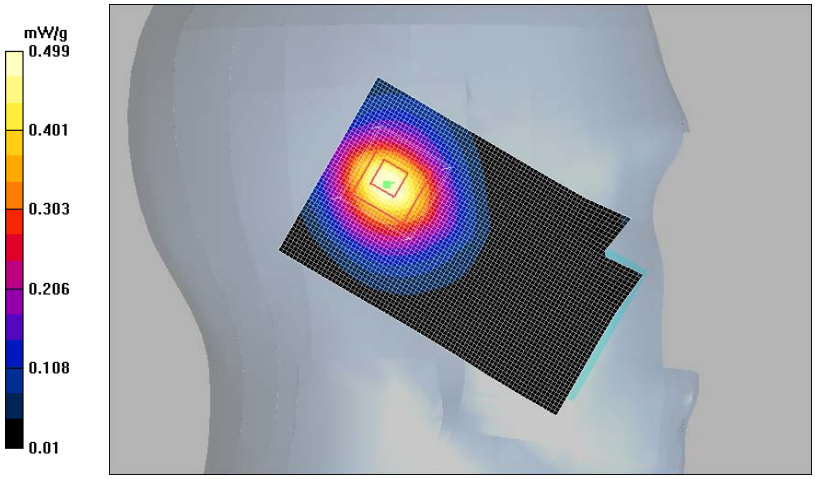
Touch position - Middle/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 11.8 V/m; Power Drift = -0.2 dB
Maximum value of SAR (measured) = 0.376 mW/g
Peak SAR (extrapolated) = 0.708 W/kg
SAR(1 g) = 0.351 mW/g; SAR(10 g) = 0.189 mW/g



Date: 2004-08-26
Test Laboratory: Nokia China
Liquid Temperature: 20.2C
DUT Type: RM-1
Program Name: FCC DCS1900, Left side, without MMC, worst case extrapolation
Communication System: DCS 1900; Frequency: 1850 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1850 MHz; σ = 1.44 mho/m; ε_r = 38.8; ρ = 1000 kg/m^3
Phantom section: Left Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1650; ConvF(5.36, 5.36, 5.36); Calibrated: 3/23/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn480; Calibrated: 10/10/2003
- Phantom: SAM1;
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112

Tilt position - Low/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 17.3 V/m; Power Drift = -0.2 dB
Maximum value of SAR (interpolated) = 0.512 mW/g

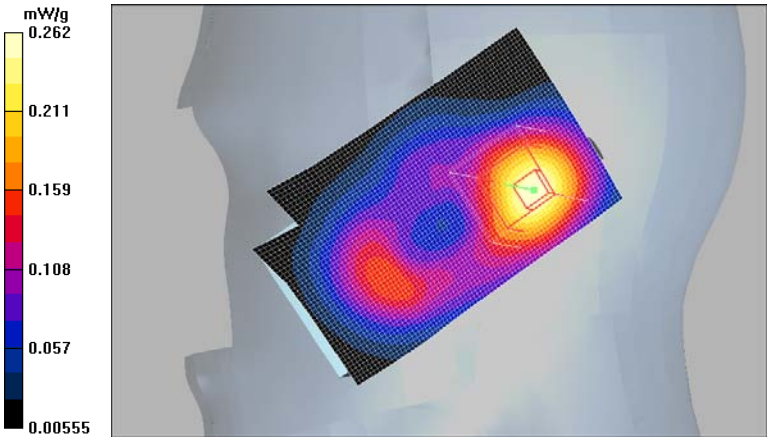
Tilt position - Low/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 17.3 V/m; Power Drift = -0.2 dB
Maximum value of SAR (measured) = 0.499 mW/g
Peak SAR (extrapolated) = 0.938 W/kg
SAR(1 g) = 0.468 mW/g; SAR(10 g) = 0.257 mW/g



Date: 2004-08-26
Test Laboratory: Nokia China
Liquid Temperature: 20.2C
DUT Type: RM-1
Program Name: FCC, DCS1900, Right side, without MMC, worst case extrapolation
Communication System: DCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.46 mho/m; ε_r = 38.7; ρ = 1000 kg/m^3
Phantom section: Right Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1650; ConvF(5.36, 5.36, 5.36); Calibrated: 3/23/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn480; Calibrated: 10/10/2003
- Phantom: SAM1;
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112

Touch position - Middle/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 11.1 V/m; Power Drift = -0.2 dB
Maximum value of SAR (interpolated) = 0.262 mW/g

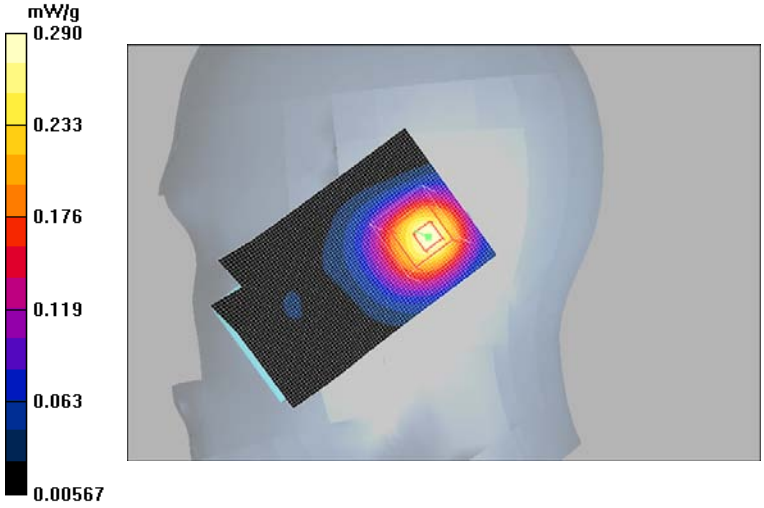
Touch position - Middle/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 11.1 V/m; Power Drift = -0.2 dB
Maximum value of SAR (measured) = 0.262 mW/g
Peak SAR (extrapolated) = 0.464 W/kg
SAR(1 g) = 0.247 mW/g; SAR(10 g) = 0.142 mW/g



Date: 2004-08-26
Test Laboratory: Nokia China
Liquid Temperature: 20.2C
DUT Type: RM-1
Program Name: FCC, DCS1900, Right side, without MMC, worst case extrapolation
Communication System: DCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.46 mho/m; ε_r = 38.7; ρ = 1000 kg/m^3
Phantom section: Right Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1650; ConvF(5.36, 5.36, 5.36); Calibrated: 3/23/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn480; Calibrated: 10/10/2003
- Phantom: SAM1;
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112

Tilt position - Middle/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 12.9 V/m; Power Drift = -0.1 dB
Maximum value of SAR (interpolated) = 0.292 mW/g

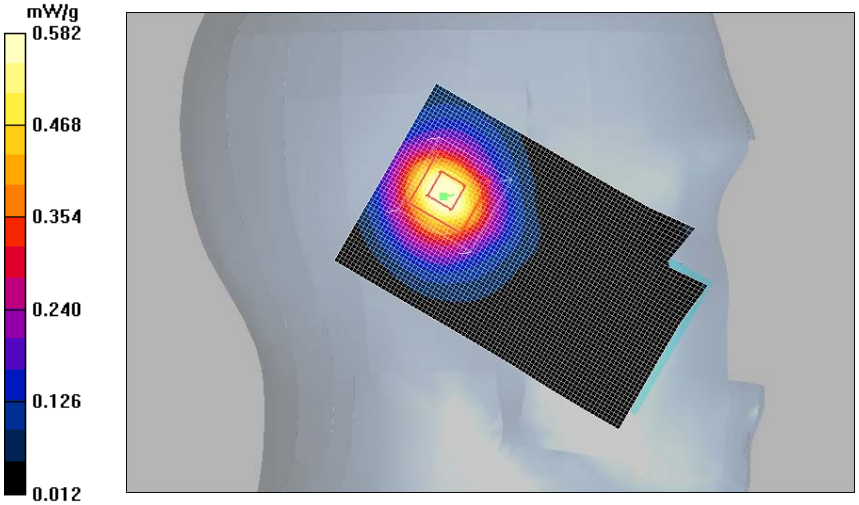
Tilt position - Middle/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 12.9 V/m; Power Drift = -0.1 dB
Maximum value of SAR (measured) = 0.290 mW/g
Peak SAR (extrapolated) = 0.534 W/kg
SAR(1 g) = 0.272 mW/g; SAR(10 g) = 0.152 mW/g

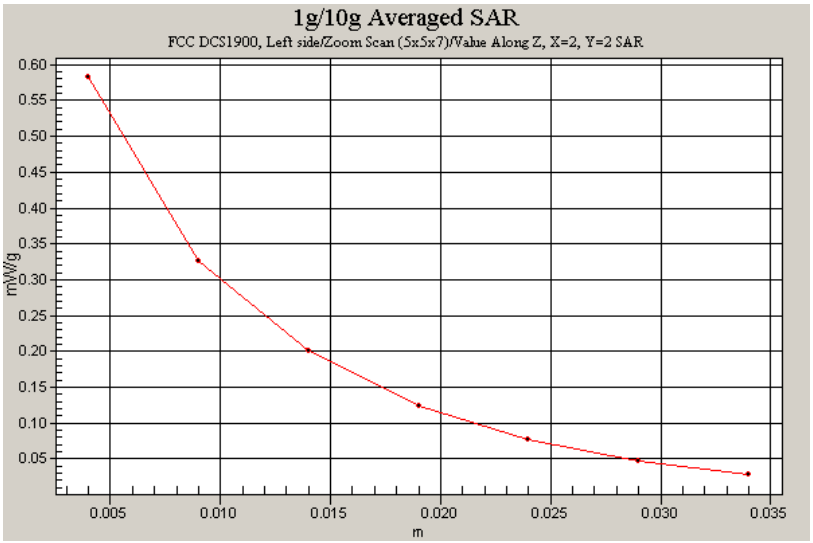


Date:2004-08-26
Test Laboratory: Nokia China
Liquid Temperature: 20.4C
DUT Type: RM-1
Program Name: FCC DCS1900, Left side, with MMC, worst casr extrapolation
Communication System: DCS 1900; Frequency: 1850 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1850 MHz; σ = 1.44 mho/m; ε_r = 38.8; ρ = 1000 kg/m^3
Phantom section: Left Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1650; ConvF(5.36, 5.36, 5.36); Calibrated: 3/23/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn480; Calibrated: 10/10/2003
- Phantom: SAM1;
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112

Tilt position - Low/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 18.8 V/m; Power Drift = -0.002 dB
Maximum value of SAR (interpolated) = 0.619 mW/g

Tilt position - Low/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 18.8 V/m; Power Drift = -0.002 dB
Maximum value of SAR (measured) = 0.582 mW/g
Peak SAR (extrapolated) = 1.1 W/kg
SAR(1 g) = 0.548 mW/g; SAR(10 g) = 0.297 mW/g

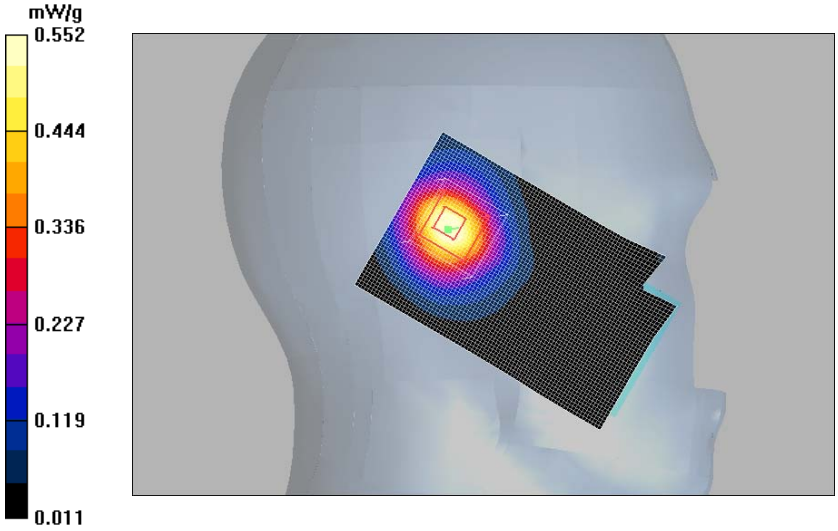




Date:2004-08-26
Test Laboratory: Nokia China
Liquid Temperature: 20.4C
DUT Type: RM-1
Program Name: FCC DCS1900, Left side, with MMC, BT active, worst case extrapolation
Communication System: DCS 1900; Frequency: 1850 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1850 MHz; σ = 1.44 mho/m; ε_r = 38.8; ρ = 1000 kg/m^3
Phantom section: Left Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1650; ConvF(5.36, 5.36, 5.36); Calibrated: 3/23/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn480; Calibrated: 10/10/2003
- Phantom: SAM1;
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112

Tilt position, BT active - Low/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 18.3 V/m; Power Drift = 0.0 dB
Maximum value of SAR (interpolated) = 0.586 mW/g

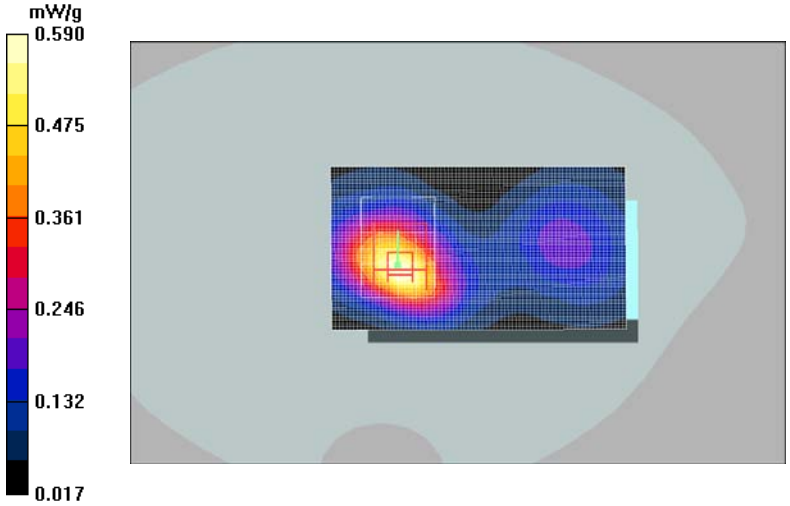
Tilt position, BT active - Low/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 18.3 V/m; Power Drift = 0.0 dB
Maximum value of SAR (measured) = 0.552 mW/g
Peak SAR (extrapolated) = 1.03 W/kg
SAR(1 g) = 0.519 mW/g; SAR(10 g) = 0.283 mW/g

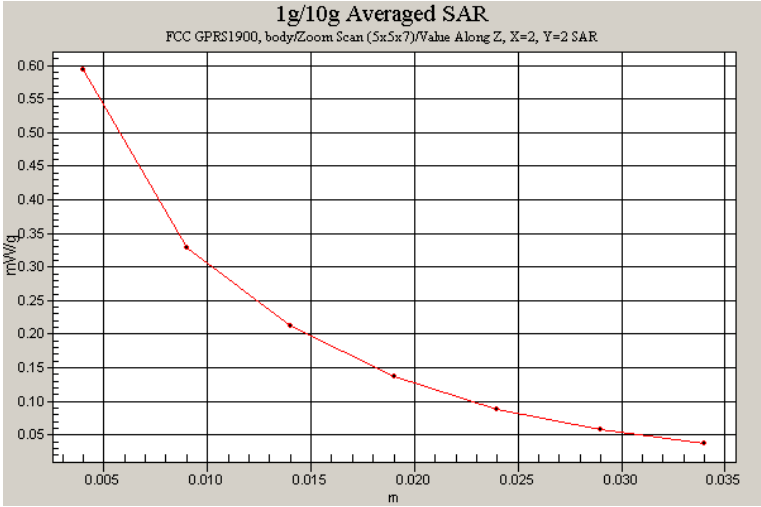


Date: 2004-08-26
Test Laboratory: Nokia China
Liquid Temperature: 21.4C
DUT Type: RM-1
Program Name: FCC GPRS1900, body, without headset, without MMC, worst case extrapolation
Communication System: GPRS 1900; Frequency: 1850 MHz;Duty Cycle: 1:4.1
Medium parameters used: f = 1850 MHz; σ = 1.5 mho/m; ε_r = 52.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1650; ConvF(4.73, 4.73, 4.73); Calibrated: 3/23/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn480; Calibrated: 10/10/2003
- Phantom: SAM2;
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112

without headset, without MMC-low/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 18.7 V/m; Power Drift = -0.1 dB
Maximum value of SAR (interpolated) = 0.606 mW/g

without headset, without MMC-low/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 18.7 V/m; Power Drift = -0.1 dB
Maximum value of SAR (measured) = 0.590 mW/g
Peak SAR (extrapolated) = 1.27 W/kg
SAR(1 g) = 0.575 mW/g; SAR(10 g) = 0.316 mW/g

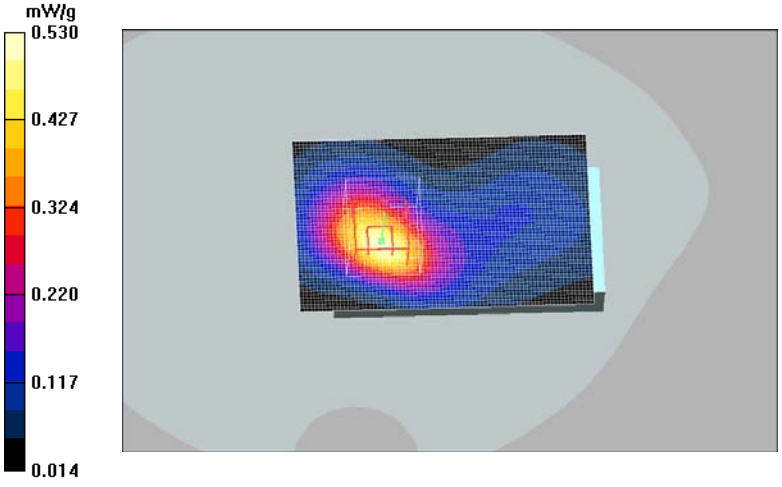




Date: 2004-08-26
Test Laboratory: Nokia China
Liquid Temperature: 21.3C
DUT Type: RM-1
Program Name: FCC GPRS1900, body, with HS-3, without MMC, worst case extrapolation
Communication System: GPRS 1900; Frequency: 1850 MHz;Duty Cycle: 1:4.1
Medium parameters used: f = 1850 MHz; σ = 1.5 mho/m; ε_r = 52.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1650; ConvF(4.73, 4.73, 4.73); Calibrated: 3/23/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn480; Calibrated: 10/10/2003
- Phantom: SAM2;
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112

with HS-3, without MMC-low/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 16 V/m; Power Drift = -0.0 dB
Maximum value of SAR (interpolated) = 0.538 mW/g

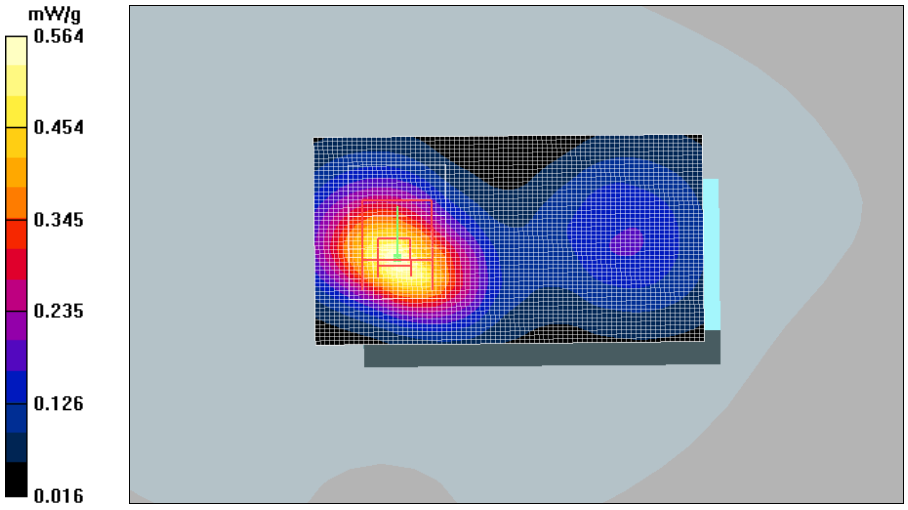
with HS-3, without MMC-low/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 16 V/m; Power Drift = -0.0 dB
Maximum value of SAR (measured) = 0.530 mW/g
Peak SAR (extrapolated) = 1.13 W/kg
SAR(1 g) = 0.509 mW/g; SAR(10 g) = 0.281 mW/g



Date: 2004-08-26
Test Laboratory: Nokia China
Liquid Temperature: 21.3C
DUT Type: RM-1
Program Name: FCC GPRS1900, body, without headset, with MMC, worst case extrapolation
Communication System: GPRS 1900; Frequency: 1850 MHz;Duty Cycle: 1:4.1
Medium parameters used: f = 1850 MHz; σ = 1.5 mho/m; ε_r = 52.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1650; ConvF(4.73, 4.73, 4.73); Calibrated: 3/23/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn480; Calibrated: 10/10/2003
- Phantom: SAM2;
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112

without headset, with MMC-low/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 18.6 V/m; Power Drift = -0.1 dB
Maximum value of SAR (interpolated) = 0.571 mW/g

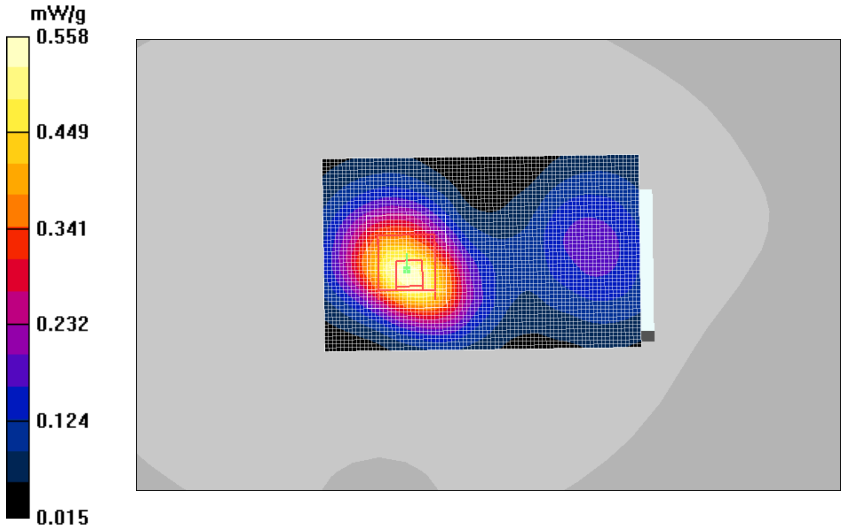
without headset, with MMC-low/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 18.6 V/m; Power Drift = -0.1 dB
Maximum value of SAR (measured) = 0.564 mW/g
Peak SAR (extrapolated) = 1.12 W/kg
SAR(1 g) = 0.528 mW/g; SAR(10 g) = 0.294 mW/g



Date: 2004-08-26
Test Laboratory: Nokia China
Liquid Temperature: 21.3C
DUT Type: RM-1
Program Name: FCC GPRS1900, body, without headset, without MMC, BT active, worst case extrapolation
Communication System: GPRS 1900; Frequency: 1850 MHz;Duty Cycle: 1:4.1
Medium parameters used: f = 1850 MHz; σ = 1.5 mho/m; ε_r = 52.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1650; ConvF(4.73, 4.73, 4.73); Calibrated: 3/23/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn480; Calibrated: 10/10/2003
- Phantom: SAM2; ;
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112

without headset, without MMC, BT active-low/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 17.3 V/m; Power Drift = -0.1 dB
Maximum value of SAR (interpolated) = 0.568 mW/g

without headset, without MMC, BT active-low/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 17.3 V/m; Power Drift = -0.1 dB
Maximum value of SAR (measured) = 0.558 mW/g
Peak SAR (extrapolated) = 1.18 W/kg
SAR(1 g) = 0.543 mW/g; SAR(10 g) = 0.300 mW/g



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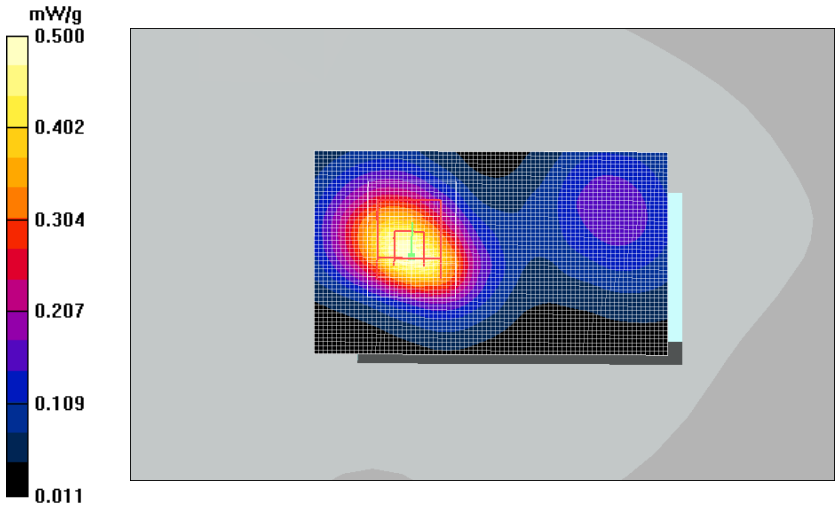
Date: 2004-08-26
Test Laboratory: Nokia China
Liquid temperature: 21.4C
DUT Type: RM-1
Program Name: FCC GSM 1900, body, without headset, without MMC, worst case extrapolation
Communication System: DCS 1900; Frequency: 1850 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1850 MHz; σ = 1.5 mho/m; ε_r = 52.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1650; ConvF(4.73, 4.73, 4.73); Calibrated: 3/23/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn480; Calibrated: 10/10/2003
- Phantom: SAM2;
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112

without headset, without MMC-low/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 15.3 V/m; Power Drift = -0.0 dB
Maximum value of SAR (interpolated) = 0.518 mW/g

without headset, without MMC-low/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 15.3 V/m; Power Drift = -0.0 dB
Maximum value of SAR (measured) = 0.500 mW/g
Peak SAR (extrapolated) = 1.02 W/kg
SAR(1 g) = 0.477 mW/g; SAR(10 g) = 0.266 mW/g



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

Please see file: ET3DV6-SN1650.pdf

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

Please see file: D1900-head&body.pdf