

SAR Compliance Test Report

Test report no.:	Salo_SAR_0917_02	Date of report:	2009-04-23
Template version:	11.0	Number of pages:	26
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Tested device:	HD-1		
FCC ID:	PYAH-D-1	IC:	661V-HD1
Supplement reports:	Salo_SAR_0917_03		
Testing has been carried out in accordance with:	47CFR §2.1093 Radiofrequency Radiation Exposure Evaluation: Portable Devices FCC OET Bulletin 65 (Edition 97-01), Supplement C (Edition 01-01) Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields RSS-102 Evaluation Procedure for Mobile and Portable Radio Transmitters with Respect to Health Canada's Safety Code 6 for Exposure of Humans to Radio Frequency Fields IEEE 1528 - 2003 IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Technique		
Documentation:	The documentation of the testing performed on the tested devices is archived for 15 years at TCC Nokia.		
Test results:	The tested device complies with the requirements in respect of all parameters subject to the test. The test results and statements relate only to the items tested. The test report shall not be reproduced except in full, without written approval of the laboratory.		
Date and signatures:			
For the contents:			

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1. SUMMARY OF SAR TEST REPORT

1.1 Test Details

Period of test	2009-04-17 to 2009-04-23
SN, HW and SW numbers of tested device	SN: 0634028913113T00109, HW: B4, SW: 2.21, DUT: 25220
Batteries used in testing	HD-1 power supply
Headsets used in testing	HS-83, DUT: 25523
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 Body Worn Configuration

Mode	Ch / f (MHz)	Conducted power	Separation distance	Measured SAR value (1g avg)	Scaled* SAR value (1g avg)	SAR limit (1g avg)	Result
WLAN2450	11 / 2462.0	14.0 dBm	0 cm	1.17 W/kg	1.31 W/kg	1.6 W/kg	PASSED

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

1.2.2 Maximum Drift

Maximum drift covered by 12% scaling up of the SAR values	Maximum drift during measurements
0.5dB	0.61 dB

1.2.3 Measurement Uncertainty

Expanded Uncertainty (k=2) 95%	± 25.8%
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2. DESCRIPTION OF THE DEVICE UNDER TEST

Device category	Portable
Exposure environment	General population / uncontrolled

Modes of Operation	Bands	Modulation Mode	Duty Cycle	Transmitter Frequency Range (MHz)
WLAN	2450	11Mbps QPSK	1	2412 – 2462

2.1 Description of the Antenna

The device has two internal antennas. Antenna 1 is located in the top-left back corner of the device, Antenna 2 is located in the top-right back corner.

3. TEST CONDITIONS

3.1 Temperature and Humidity

Ambient temperature (°C):	20.0 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 control software.

The device possesses no battery, so power was supplied by wire from the main electrical supply.

For WLAN, the device was configured to test mode DSSS QPSK 1Mbps as this mode had the highest time-averaged output power of all the possible WLAN modulation modes in the device.

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

The radiated output power of the device was measured by a separate test laboratory on the same unit(s) as used for SAR testing. The results are given in the EMC report supporting this application.

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
DAE4	710	12 months	2009-09
E-field Probe ES3DV3	3118	12 months	2009-09
Dipole Validation Kit, D2450V2	750	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	2012-02
Amplifier	2100-BBS3Q8CCJ	1003	-	-
Power Meter	NRP	100293	24 months	2009-07
Power Sensor	NRP-Z51	100830	24 months	2009-07
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):

2450MHz band		
Ingredient	Head (% by weight)	Body (% by weight)
Deionised Water	56.0	70.20
Tween 20	44.0	29.62
Salt	-	0.18

4.3.2 System Checking

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

System checking, body tissue simulant

f [MHz]	Description	SAR [W/kg], 1g	Dielectric Parameters		Temp [°C]
			ϵ_r	σ [S/m]	
2450	Reference result	13.2	50.8	1.98	
	$\pm 10\%$ window	11.9 – 14.5			
	2009-04-17	14.5	51.3	1.98	21.4
	2009-04-19	14.5	50.9	1.98	21.0
	2009-04-20	14.4	51.2	1.99	21.4
	2009-04-23	14.1	51.0	1.99	21.3

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

4.3.3 Tissue Simulants used in the Measurements

Body tissue simulant measurements

f [MHz]	Description	Dielectric Parameters		Temp [°C]
		ϵ_r	σ [S/m]	
2442	Recommended value	52.7	1.94	
	$\pm 5\%$ window	50.1 – 55.3	1.85 – 2.04	
	2009-04-17	51.3	1.97	21.4
	2009-04-19	50.9	1.97	21.0
	2009-04-20	51.2	1.98	21.4
	2009-04-23	51.1	1.98	21.3

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 Body Worn Configuration

The device was placed below and touching the flat section of the phantom. The device was oriented with a total of four sides facing the phantom to find the highest results.

5.3 Scan Procedures

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

5.4 SAR Averaging Methods

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

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

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

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

6. MEASUREMENT UNCERTAINTY

Table 6.1 – Measurement uncertainty evaluation

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

7. RESULTS

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

2450MHz Body SAR results

Option used	Device orientation	Test configuration	SAR, averaged over 1g (W/kg)		
			Ch 1 2412.0 MHz	Ch 7 2442.0 MHz	Ch 11 2462.0 MHz
WLAN		Conducted power	14.0 dBm	14.0 dBm	14.0 dBm
Antenna 1 active	Top facing phantom	Without headset	1.12	1.14	1.16
	Back facing phantom	Without headset	-	0.775	-
	Left side facing phantom	Without headset	-	0.073	-
	Right side facing phantom	Without headset	-	-	-
Antenna 2 active	Top facing phantom	Without headset	-	0.191	-
	Back facing phantom	Without headset	-	0.033	-
	Left side facing phantom	Without headset	-	-	-
	Right side facing phantom	Without headset	-	0.032	-
WLAN Antenna 1 active	Top facing phantom	With headset HS-83	-	-	1.17

Plots of the Measurement scans are given in Appendix B.

APPENDIX A: SYSTEM CHECKING SCANS

See the following pages.

Date/Time: 2009-04-17 10:29:38

Test Laboratory: TCC Nokia

Type: D2450V2; Serial: 750

Communication System: CW2450

Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: Body 2450; Medium Notes: Medium Temperature: 21.4 C

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.98$ mho/m; $\epsilon_r = 51.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3118
- ConvF(3.89, 3.89, 3.89); Calibrated: 2008-09-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn710; Calibrated: 2008-09-23
- Phantom: SAM 8; Type: SAM Twin Phantom; Serial: TP-1408
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 176

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

Maximum value of SAR (interpolated) = 17.3 mW/g

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

Reference Value = 88.5 V/m

Peak SAR (extrapolated) = 29.9 W/kg

SAR(1 g) = 14.5 mW/g

SAR(10 g) = 6.75 mW/g

Power Drift = -0.021 dB

Maximum value of SAR (measured) = 16.7 mW/g



Date/Time: 2009-04-19 11:13:48

Test Laboratory: TCC Nokia
Type: D2450V2; Serial: 750

Communication System: CW2450

Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: Body 2450; Medium Notes: Medium Temperature: 21.0 C

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.98$ mho/m; $\epsilon_r = 50.9$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3118
- ConvF(3.89, 3.89, 3.89); Calibrated: 2008-09-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn710; Calibrated: 2008-09-23
- Phantom: SAM 8; Type: SAM Twin Phantom; Serial: TP-1408
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 176

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

Maximum value of SAR (interpolated) = 17.1 mW/g

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

Reference Value = 88.8 V/m

Peak SAR (extrapolated) = 30.2 W/kg

SAR(1 g) = 14.5 mW/g

SAR(10 g) = 6.68 mW/g

Power Drift = -0.084 dB

Maximum value of SAR (measured) = 16.8 mW/g



Date/Time: 2009-04-20 09:32:48

Test Laboratory: TCC Nokia

Type: D2450V2; Serial: 750

Communication System: CW2450

Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: Body 2450; Medium Notes: Medium Temperature: 21.4 C

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.99$ mho/m; $\epsilon_r = 51.2$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3118
- ConvF(3.89, 3.89, 3.89); Calibrated: 2008-09-23
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn710; Calibrated: 2008-09-23
- Phantom: SAM 8; Type: SAM Twin Phantom; Serial: TP-1408
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 176

d=10mm, Pin=250mW 2/Area Scan (71x71x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 17.3 mW/g

d=10mm, Pin=250mW 2/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 87.7 V/m

Peak SAR (extrapolated) = 29.6 W/kg

SAR(1 g) = 14.4 mW/g

SAR(10 g) = 6.7 mW/g

Power Drift = -0.031 dB

Maximum value of SAR (measured) = 16.6 mW/g



Date/Time: 2009-04-23 09:48:21

Test Laboratory: TCC Nokia

Type: D2450V2; Serial: 750

Communication System: CW2450

Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: Body 2450; Medium Notes: Medium Temperature: 21.3 C

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.99$ mho/m; $\epsilon_r = 51$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3118; Probe Notes:
- ConvF(3.89, 3.89, 3.89); Calibrated: 2008-09-23
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn710; Calibrated: 2008-09-23
- Phantom: SAM 8; Type: SAM Twin Phantom; Serial: TP-1408
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

d=10mm, Pin=250mW 2/Area Scan (71x71x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 16.8 mW/g

d=10mm, Pin=250mW 2/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 87.7 V/m

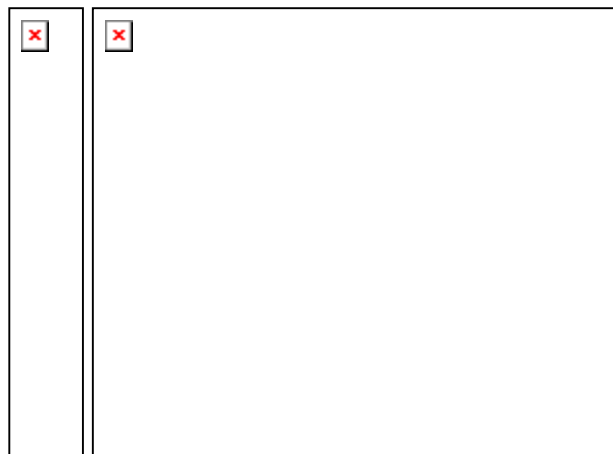
Peak SAR (extrapolated) = 29.1 W/kg

SAR(1 g) = 14.1 mW/g

SAR(10 g) = 6.55 mW/g

Power Drift = 0.024 dB

Maximum value of SAR (measured) = 16.2 mW/g



APPENDIX B: MEASUREMENT SCANS

See the following pages.

Date/Time: 2009-04-20 12:32:23

Test Laboratory: TCC Nokia
Type: HD-1; Serial: 0634028913113T00109

Communication System: WLAN2450

Frequency: 2462 MHz; Duty Cycle: 1:1

Medium: Body 2450; Medium Notes: Medium Temperature: 21.4 C

Medium parameters used: $f = 2462$ MHz; $\sigma = 2.01$ mho/m; $\epsilon_r = 51.2$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3118; Probe Notes:
- ConvF(3.89, 3.89, 3.89); Calibrated: 2008-09-23
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn710; Calibrated: 2008-09-23
- Phantom: SAM 8; Type: SAM Twin Phantom; Serial: TP-1408
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Body - High - No Accessory - Top - Tx_1/Area Scan (111x161x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.34 mW/g

Body - High - No Accessory - Top - Tx_1/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 16.6 V/m

Peak SAR (extrapolated) = 2.35 W/kg

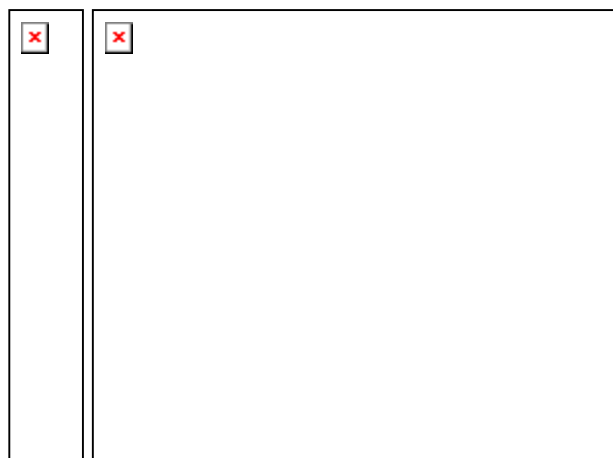
SAR(1 g) = 1.16 mW/g

SAR(10 g) = 0.561 mW/g

Power Drift = -0.155 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) = 1.20 mW/g



Date/Time: 2009-04-20 10:42:55

Test Laboratory: TCC Nokia

Type: HD-1; Serial: 0634028913113T00109

Communication System: WLAN2450

Frequency: 2442 MHz; Duty Cycle: 1:1

Medium: Body 2450; Medium Notes: Medium Temperature: 21.4 C

Medium parameters used: $f = 2442$ MHz; $\sigma = 1.98$ mho/m; $\epsilon_r = 51.2$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3118; Probe Notes:
- ConvF(3.89, 3.89, 3.89); Calibrated: 2008-09-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn710; Calibrated: 2008-09-23
- Phantom: SAM 8; Type: SAM Twin Phantom; Serial: TP-1408
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Body - Middle - No Accessory - Back - Tx_1/Area Scan (81x81x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.894 mW/g

Body - Middle - No Accessory - Back - Tx_1/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 1.72 V/m

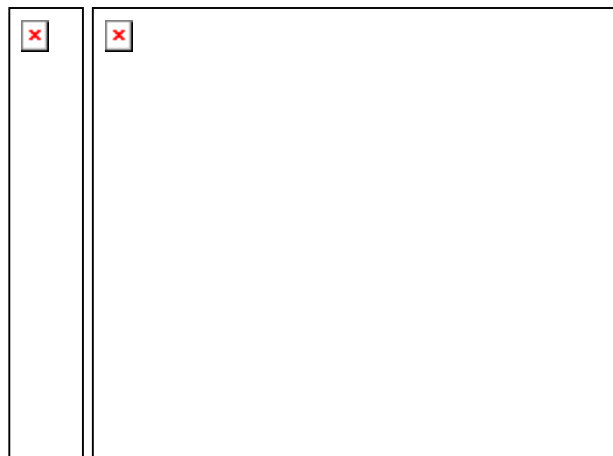
Peak SAR (extrapolated) = 1.59 W/kg

SAR(1 g) = 0.775 mW/g

SAR(10 g) = 0.368 mW/g

Power Drift = 0.609 dB

Maximum value of SAR (measured) = 0.883 mW/g



Date/Time: 2009-04-20 11:04:27

Test Laboratory: TCC Nokia

Type: HD-1; Serial: 0634028913113T00109

Communication System: WLAN2450

Frequency: 2442 MHz; Duty Cycle: 1:1

Medium: Body 2450; Medium Notes: Medium Temperature: 21.4 C

Medium parameters used: $f = 2442$ MHz; $\sigma = 1.98$ mho/m; $\epsilon_r = 51.2$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3118; Probe Notes:
- ConvF(3.89, 3.89, 3.89); Calibrated: 2008-09-23
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn710; Calibrated: 2008-09-23
- Phantom: SAM 8; Type: SAM Twin Phantom; Serial: TP-1408
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Body - Middle - No Accessory - Left Side - Tx_1/Area Scan (111x161x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.082 mW/g

Body - Middle - No Accessory - Left Side - Tx_1/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 3.78 V/m

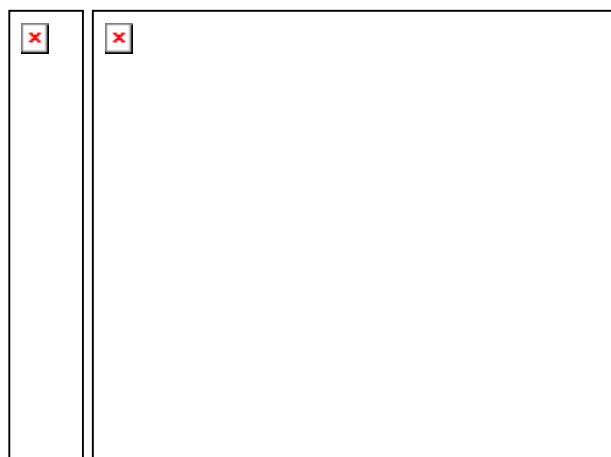
Peak SAR (extrapolated) = 0.124 W/kg

SAR(1 g) = 0.073 mW/g

SAR(10 g) = 0.043 mW/g

Power Drift = 0.017 dB

Maximum value of SAR (measured) = 0.079 mW/g



Date/Time: 2009-04-17 13:23:53

Test Laboratory: TCC Nokia

Type: HD-1; Serial: 0634028913113T00109

Communication System: WLAN2450

Frequency: 2442 MHz; Duty Cycle: 1:1

Medium: Body 2450; Medium Notes: Medium Temperature: 21.4 C

Medium parameters used: $f = 2442$ MHz; $\sigma = 1.97$ mho/m; $\epsilon_r = 51.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3118; Probe Notes:
- ConvF(3.89, 3.89, 3.89); Calibrated: 2008-09-23
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn710; Calibrated: 2008-09-23
- Phantom: SAM 8; Type: SAM Twin Phantom; Serial: TP-1408
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Body - Middle - No Accessory - Top - Tx_2/Area Scan (111x161x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.205 mW/g

Body - Middle - No Accessory - Top - Tx_2/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 9.36 V/m

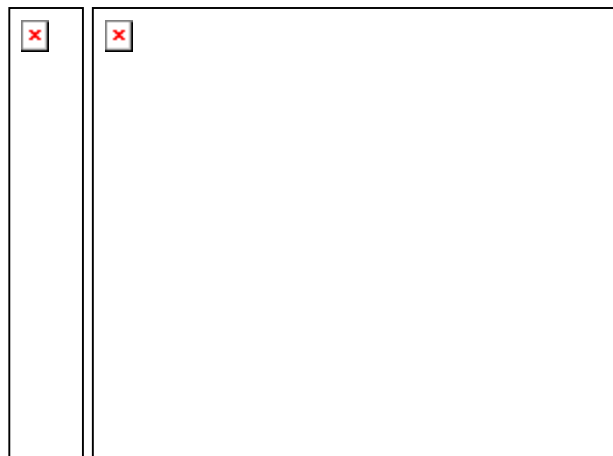
Peak SAR (extrapolated) = 0.365 W/kg

SAR(1 g) = 0.191 mW/g

SAR(10 g) = 0.100 mW/g

Power Drift = -0.128 dB

Maximum value of SAR (measured) = 0.204 mW/g



Date/Time: 2009-04-23 11:20:34

Test Laboratory: TCC Nokia

Type: HD-1; Serial: 0634028913113T00109

Communication System: WLAN2450

Frequency: 2442 MHz; Duty Cycle: 1:1

Medium: Body 2450; Medium Notes: Medium Temperature: 21.3 C

Medium parameters used: $f = 2442$ MHz; $\sigma = 1.98$ mho/m; $\epsilon_r = 51.1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3118; Probe Notes:
- ConvF(3.89, 3.89, 3.89); Calibrated: 2008-09-23
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn710; Calibrated: 2008-09-23
- Phantom: SAM 8; Type: SAM Twin Phantom; Serial: TP-1408
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Body - Middle - No Accessory - Back - Tx_2/Area Scan (61x81x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.042 mW/g

Body - Middle - No Accessory - Back - Tx_2/Area Scan (refined) (61x61x1): Measurement grid: dx=5mm, dy=5mm

Maximum value of SAR (interpolated) = 0.038 mW/g

Body - Middle - No Accessory - Back - Tx_2/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 1.34 V/m

Peak SAR (extrapolated) = 0.068 W/kg

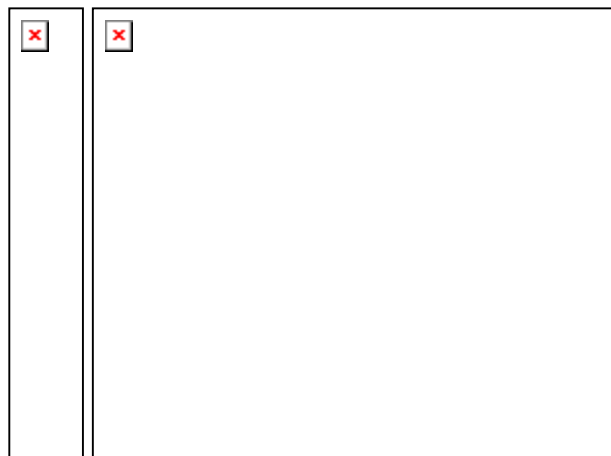
SAR(1 g) = 0.033 mW/g

SAR(10 g) = 0.018 mW/g

Power Drift = 0.151 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) = 0.036 mW/g



Date/Time: 2009-04-19 11:40:19

Test Laboratory: TCC Nokia
Type: HD-1; Serial: 0634028913113T00109

Communication System: WLAN2450

Frequency: 2442 MHz; Duty Cycle: 1:1

Medium: Body 2450; Medium Notes: Medium Temperature: 21.0 C

Medium parameters used: $f = 2442$ MHz; $\sigma = 1.97$ mho/m; $\epsilon_r = 50.9$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3118; Probe Notes:
- ConvF(3.89, 3.89, 3.89); Calibrated: 2008-09-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn710; Calibrated: 2008-09-23
- Phantom: SAM 8; Type: SAM Twin Phantom; Serial: TP-1408
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Body - Middle - No Accessory - Right Side - Tx_2/Area Scan (111x161x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.036 mW/g

Body - Middle - No Accessory - Right Side - Tx_2/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 4.23 V/m

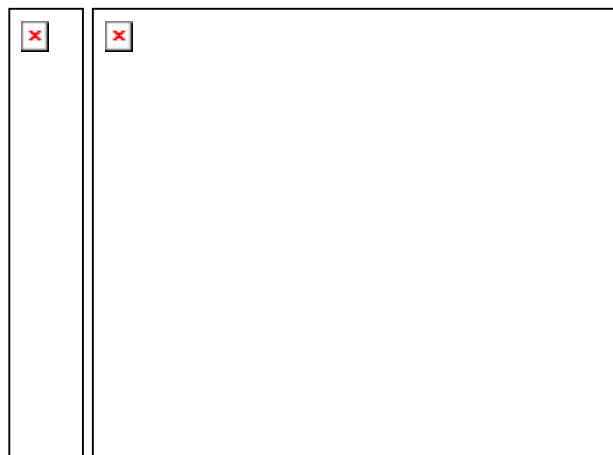
Peak SAR (extrapolated) = 0.056 W/kg

SAR(1 g) = 0.032 mW/g

SAR(10 g) = 0.022 mW/g

Power Drift = -0.406 dB

Maximum value of SAR (measured) = 0.034 mW/g



Date/Time: 2009-04-20 13:16:32

Test Laboratory: TCC Nokia

Type: HD-1; Serial: 0634028913113T00109

Communication System: WLAN2450

Frequency: 2462 MHz; Duty Cycle: 1:1

Medium: Body 2450; Medium Notes: Medium Temperature: 21.4 C

Medium parameters used: $f = 2462$ MHz; $\sigma = 2.01$ mho/m; $\epsilon_r = 51.2$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3118; Probe Notes:
- ConvF(3.89, 3.89, 3.89); Calibrated: 2008-09-23
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn710; Calibrated: 2008-09-23
- Phantom: SAM 8; Type: SAM Twin Phantom; Serial: TP-1408
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Body - High - Headset - Top - Tx_1/Area Scan (111x161x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.43 mW/g

Body - High - Headset - Top - Tx_1/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 17.3 V/m

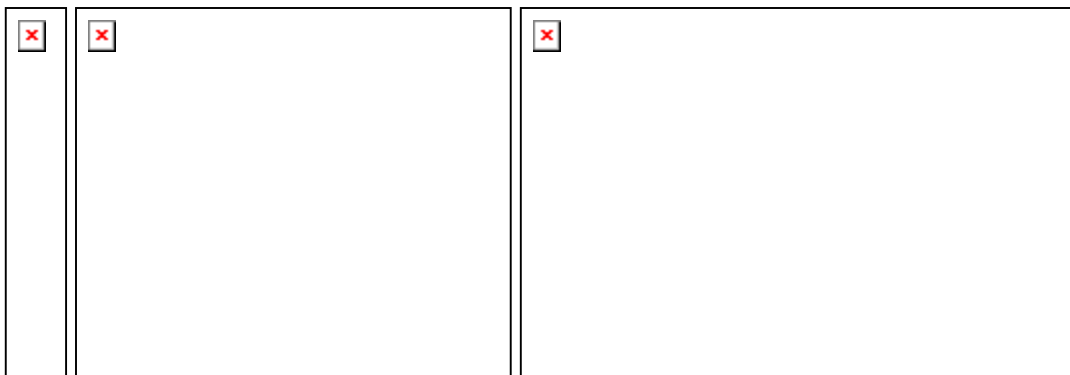
Peak SAR (extrapolated) = 2.34 W/kg

SAR(1 g) = 1.17 mW/g

SAR(10 g) = 0.569 mW/g

Power Drift = -0.054 dB

Maximum value of SAR (measured) = 1.26 mW/g



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

See the following pages.

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

See the following pages.