

SAR Compliance Test Report

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Tested device:	RM-431		
FCC ID:	LJPRM-431X	IC:	661E-RM431
Supplement reports:	SAR_Photo_RM-431_02, Salo_SAR_0849_02 for RM-431 / FCC ID: LJPRM-431 / IC ID: 661E-RM431		
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.		
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1. SUMMARY OF SAR TEST REPORT

1.1 Test Details

Period of test	2009-08-18 to 2009-09-01
SN, HW and SW numbers of tested device	SN: 004401/10/568893/7, HW: 0504, SW: 012.008, DUT: 14143
Batteries used in testing	BL-4CT Sanyo, DUT: 14146, 14147, BL-4CT Sony, DUT: 14166, 14167
Headsets used in testing	HS-45+AD-54, DUT: 14145, 14144
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)	Conducted power	Position	Measured SAR value (1g avg)	Scaled* SAR value (1g avg)	SAR limit (1g avg)	Result
3-slot GPRS850**	251 / 848.8	27.7 dBm	Right, Cheek	0.605 W/kg	0.68 W/kg	1.6 W/kg	PASSED
GSM1900**	661 / 1880.0	29.5 dBm	Right, Cheek	0.908 W/kg	1.02 W/kg	1.6 W/kg	PASSED
WLAN2450	1 / 2412.0	15.0 dBm	Left, Cheek	0.208 W/kg	0.23 W/kg	1.6 W/kg	PASSED
3-slot GPRS850 + WLAN2450	-	-	Right, Cheek	0.745 W/kg	0.83 W/kg	1.6 W/kg	PASSED
GSM1900 + WLAN2450	-	-	Right, Cheek	1.048 W/kg	1.17 W/kg	1.6 W/kg	PASSED

1.2.2 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
3-slot GPRS850**	251 / 848.8	27.7 dBm	2.2cm	0.430 W/kg	0.48 W/kg	1.6 W/kg	PASSED
GSM1900**	661 / 1880.0	29.5 dBm	2.2cm	0.173 W/kg	0.19 W/kg	1.6 W/kg	PASSED
WLAN2450	1 / 2412.0	15.0 dBm	2.2cm	0.067 W/kg	0.08 W/kg	1.6 W/kg	PASSED
3-slot GPRS850 + WLAN2450	-	-	2.2cm	0.497 W/kg	0.56 W/kg	1.6 W/kg	PASSED
GSM1900 + WLAN2450	-	-	2.2cm	0.240 W/kg	0.27 W/kg	1.6 W/kg	PASSED

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

**SAR data taken from Salo_SAR_0849_02 for RM-431 / FCC ID: LJPRM-431 / 661E-RM431.

1.2.3 Maximum Drift

Maximum drift covered by 12% scaling up of the SAR values	Maximum drift during measurements
0.5dB	0.36 dB

1.2.4 Measurement Uncertainty

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

Device category	Portable
Exposure environment	General population / uncontrolled

Modes of Operation	Bands	Modulation Mode	Duty Cycle	Transmitter Frequency Range (MHz)
GSM	850 1900	GMSK	1/8	824 – 849 1850 – 1910
GPRS	850 1900	GMSK	1/8 to 3/8	824 – 849 1850 – 1910
EGPRS	850 1900	GMSK / 8PSK	1/8 to 3/8	824 – 849 1850 – 1910
BT	2450	GFSK	1	2402 – 2480
WLAN	2450	11Mbps QPSK	1	2412 – 2462

Outside of USA and Canada, the transmitter of the device is capable of operating also in GSM/GPRS/EGPRS900, GSM/GPRS/EGPRS1800, WCDMA900 and WCDMA2100 bands which are not part of this filing.

2.1 Description of the Antenna

The device has internal antennas.

3. TEST CONDITIONS

3.1 Temperature and Humidity

Ambient temperature (°C):	20.7 to 22.2
Ambient humidity (RH %):	48 to 60

3.2 Test Signal, Frequencies and Output Power

The device was put into operation for testing WLAN2450 using control software. The transmission mode of the device in all WLAN tests was DSSS QPSK 11Mbps. This mode has the highest (or equal highest) time-averaged output power of all the WLAN modulation modes in Nokia devices.

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.

Some the SAR results given in this report has been copied from Salo_SAR_0849_02 for RM-431 / FCC ID LJPRM-431 / IC ID: 661E-RM431. The testing reported here has been minimised based on the same earlier report.

4. DESCRIPTION OF THE TEST EQUIPMENT

4.1 Measurement System and Components

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

The following table lists calibration dates of SPEAG components:

Test Equipment	Serial Number	Calibration interval	Calibration expiry
DAE 4	555	12 months	2009-11
E-field Probe ES3DV3	3165	12 months	2010-05
Dipole Validation Kit, D2450V2	729	24 months	2010-01
DASY4 software	Version 4.7	-	-

Additional test equipment used in testing:

Test Equipment	Model	Serial Number	Calibration interval	Calibration expiry
Signal Generator	SML03	101265	12 months	2009-08
Amplifier	ZHL-42 (SMA)	N072095-5	12 months	2009-08
Power Meter	NRVS	849305/028	12 months	2009-08
Power Sensor	NRV-Z32	839176/020	12 months	2009-08
Call Tester	CMU 200	103293	-	-
Call Tester	CMU 200	101111	-	-
Vector Network Analyzer	8753E	US38432928	12 months	2009-08
Dielectric Probe Kit	85070B	US33020420	-	-

4.1.1 Isotropic E-field Probe Type ES3DV3

Construction	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., butyl diglycol)
Calibration	Calibration certificate in Appendix 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, head tissue simulant

f [MHz]	Description	SAR [W/kg], 1g	Dielectric Parameters		Temp [°C]
			ϵ_r	σ [S/m]	
2450	Reference result	14.3	37.8	1.82	
	$\pm 10\%$ window	12.9 – 15.7			
	2009-08-18	14.1	37.5	1.88	21.0
	2009-08-19	13.6	37.7	1.83	21.0
	2009-09-01	14.5	37.9	1.87	21.0

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

4.3.3 Tissue Simulants used in the Measurements

Head tissue simulant measurements

f [MHz]	Description	Dielectric Parameters		Temp [°C]
		ϵ_r	σ [S/m]	
2442	Recommended value	39.2	1.79	
	$\pm 5\%$ window	37.3 – 41.2	1.70 – 1.88	
	2009-09-01	37.9	1.86	21.0

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	
	2009-08-18	50.8	2.00	21.0
	2009-08-19	50.8	2.00	21.0

5. DESCRIPTION OF THE TEST PROCEDURE

5.1 Device Holder

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



Device holder supplied by SPEAG

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".

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 Section 1.2.2 using a separate flat spacer that was removed before the start of the measurements. The device was oriented with both 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 Head SAR values for the test device are tabulated below:

850MHz Head SAR results**

Option used	Test configuration		SAR, averaged over 1g (W/kg)		
			Ch 128 824.2 MHz	Ch 190 836.6 MHz	Ch 251 848.8 MHz
GSM	Conducted Power		32.5 dBm	32.5 dBm	32.5 dBm
Battery: BL-4CT Sony	Left	Cheek	-	0.458	-
		Tilt	-	-	-
	Right	Cheek	-	-	-
		Tilt	-	-	-
2-slot GPRS	Conducted Power		29.5 dBm	29.5 dBm	29.5 dBm
Battery: BL-4CT Sony	Left	Cheek	-	0.500	-
		Tilt	-	-	-
	Right	Cheek	-	-	-
		Tilt	-	-	-
3-slot GPRS	Conducted Power		27.7 dBm	27.7 dBm	27.7 dBm
Battery: BL-4CT Sony	Left	Cheek	-	0.509	-
		Tilt	-	0.315	-
	Right	Cheek	0.524	0.557	0.605
		Tilt	-	0.372	-
3-slot 8PSK EGPRS	Conducted Power		24.7 dBm	24.7 dBm	24.7 dBm
Battery: BL-4CT Sony	Left	Cheek	-	-	-
		Tilt	-	-	-
	Right	Cheek	-	-	0.139
		Tilt	-	-	-
3-slot GPRS Battery: BL-4CT Sanyo	Right Cheek		0.523	0.563	0.604

1900MHz Head SAR results**

Option used	Test configuration		SAR, averaged over 1g (W/kg)		
			Ch 512 1850.2 MHz	Ch 661 1880.0 MHz	Ch 810 1909.8 MHz
GSM	Conducted Power		29.5 dBm	29.5 dBm	29.5 dBm
Battery: BL-4CT Sony	Left	Cheek	-	0.649	-
		Tilt	-	0.250	-
	Right	Cheek	0.894	0.908	0.888
		Tilt	-	0.182	-
2-slot GPRS	Conducted Power		26.5 dBm	26.5 dBm	26.5 dBm
Battery: BL-4CT Sony	Left	Cheek	-	0.624	-
		Tilt	-	-	-
	Right	Cheek	-	-	-
		Tilt	-	-	-
3-slot GPRS	Conducted Power		24.7 dBm	24.7 dBm	24.7 dBm
Battery: BL-4CT Sony	Left	Cheek	-	0.609	-
		Tilt	-	-	-
	Right	Cheek	-	-	-
		Tilt	-	-	-
1-slot 8PSK EGPRS	Conducted Power		25.5 dBm	25.5 dBm	25.5 dBm
Battery: BL-4CT Sony	Left	Cheek	-	-	-
		Tilt	-	-	-
	Right	Cheek	-	0.218	-
		Tilt	-	-	-
GSM Battery: BL-4CT Sanyo	Right Cheek		0.838	0.787	0.787

2450MHz Head SAR results

Option used	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		15.0 dBm	15.0 dBm	15.0 dBm
HW 0412**, Battery: BL-4CT Sony	Left	Cheek	0.173	0.180	0.174
		Tilt	-	0.160	-
	Right	Cheek	-	0.140	-
		Tilt	-	0.142	-
HW 0412**, Battery:BL-4CT Sanyo	Left Cheek		0.173	0.164	0.153
HW 0504, Battery: BL-4CT Sony	Left	Cheek	0.208	0.151	0.147
		Tilt	-	0.149	-
	Right	Cheek	-	0.129	-
		Tilt	-	0.137	-

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

850MHz Body SAR results**

Option used	Device orientation	Test configuration	SAR, averaged over 1g (W/kg)		
			Ch 128 824.2 MHz	Ch 190 836.6 MHz	Ch 251 848.8 MHz
3-slot GPRS		Conducted Power	27.7 dBm	27.7 dBm	27.7 dBm
Battery: BL-4CT Sony	Display facing phantom	Without headset	-	0.264	-
		Headset HS-45+AD-54	-	0.142	-
	Back facing phantom	Without headset	0.285	0.325	0.427
		Headset HS-45+AD-54	-	0.175	-
Battery: BL-4CT Sanyo	Back facing phantom	Without headset	0.279	0.328	0.430

1900MHz Body SAR results**

Option used	Device orientation	Test configuration	SAR, averaged over 1g (W/kg)		
			Ch 512 1850.2 MHz	Ch 661 1880.0 MHz	Ch 810 1909.8 MHz
GSM		Conducted Power	29.5 dBm	29.5 dBm	29.5 dBm
Battery: BL-4CT Sony	Display facing phantom	Without headset	-	0.109	-
		Headset HS-45+AD-54	-	0.099	-
	Back facing phantom	Without headset	0.167	0.160	0.161
		Headset HS-45+AD-54	-	0.134	-
Battery: BL-4CT Sanyo	Back facing phantom	Without headset	0.165	0.173	0.165

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	15.0 dBm	15.0 dBm	15.0 dBm
HW 0412**, Battery: BL-4CT Sony	Display facing phantom	Without headset	-	-	-
		Headset HS-45+AD-54	-	-	-
	Back facing phantom	Without headset	0.039	0.042	0.041
		Headset HS-45+AD-54	-	0.040	-
HW 0412**, Battery: BL-4CT Sanyo	Back facing phantom	Without headset	0.043	0.043	0.041
HW 0504, Battery: BL-4CT Sanyo	Display facing phantom	Without headset	-	0.018	-
		Headset HS-45+AD-54	-	0.018	-
	Back facing phantom	Without headset	0.067	0.045	0.050
		Headset HS-45+AD-54	-	0.044	-

Simultaneous transmissions: Combined SAR results

Test configuration	Max. 1g SAR results			Combined 1g SAR values	
	WLAN	GSM850	GSM1900	WLAN + GSM850	WLAN + GSM1900
Head: Left, Cheek	0.208	0.509	0.649	0.717	0.857
Head: Left, Tilt	0.160	0.315	0.250	0.475	0.410
Head: Right, Cheek	0.140	0.605	0.908	0.745	1.048
Head: Right, Tilt	0.142	0.372	0.182	0.514	0.324
Body: Without Headset	0.067	0.430	0.173	0.497	0.240
Body: Headset HS-45+AD-54	0.044	0.175	0.134	0.219	0.178

Simultaneous Transmission Procedures as described in KDB648474 are not required for this product. The Combined SAR data given in the tables above has been voluntarily calculated.

**SAR data taken from Salo_SAR_0849_02.

Combining the maximum SAR values of WLAN2450 and the cellular bands tends to overestimate the SAR value since their maxima do not necessarily occur in the same location.

Plots of the Measurement scans are given in Appendix B.

APPENDIX A: SYSTEM CHECKING SCANS

Date/Time: 2009-08-18 08:26:10

Test Laboratory: TCC Nokia

Type: D2450V2; Serial: D2450V2 - SN:729

Communication System: CW2450

Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: HSL2450; Medium Notes: 21.4C

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.88$ mho/m; $\epsilon_r = 37.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3165
- ConvF(4.49, 4.49, 4.49); Calibrated: 2009-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn555; Calibrated: 2008-11-07
- Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1449
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

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

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

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

Reference Value = 89.8 V/m

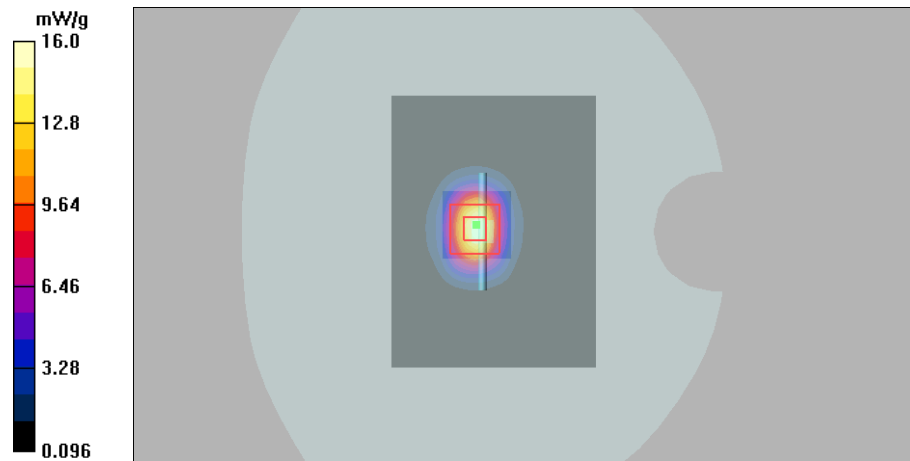
Peak SAR (extrapolated) = 29.7 W/kg

SAR(1 g) = 14.1 mW/g

SAR(10 g) = 6.53 mW/g

Power Drift = 0.058 dB

Maximum value of SAR (measured) = 16.0 mW/g



Date/Time: 2009-08-19 09:04:42

Test Laboratory: TCC Nokia

Type: D2450V2; Serial: D2450V2 - SN:729

Communication System: CW2450

Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: HSL2450; Medium Notes: 21.3C

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.83$ mho/m; $\epsilon_r = 37.7$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3165
- ConvF(4.49, 4.49, 4.49); Calibrated: 2009-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn555; Calibrated: 2008-11-07
- Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1449
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

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

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

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

Reference Value = 89.7 V/m

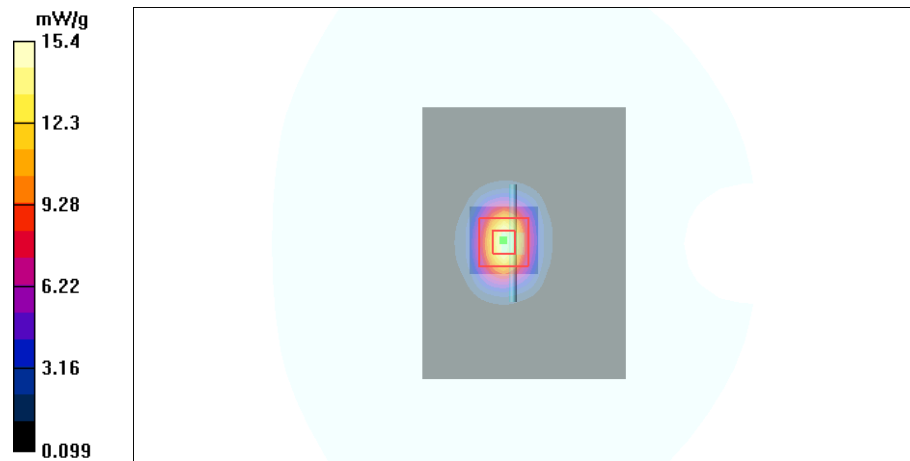
Peak SAR (extrapolated) = 28.3 W/kg

SAR(1 g) = 13.6 mW/g

SAR(10 g) = 6.32 mW/g

Power Drift = 0.006 dB

Maximum value of SAR (measured) = 15.4 mW/g



Date/Time: 2009-09-01 08:46:52

Test Laboratory: TCC Nokia

Type: D2450V2; Serial: D2450V2 - SN:729

Communication System: CW2450

Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: HSL2450; Medium Notes: 21.4 C

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.87$ mho/m; $\epsilon_r = 37.9$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3165
- ConvF(4.49, 4.49, 4.49); Calibrated: 2009-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn555; Calibrated: 2008-11-07
- Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1449
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

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

Maximum value of SAR (interpolated) = 17.6 mW/g

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

Reference Value = 94.7 V/m

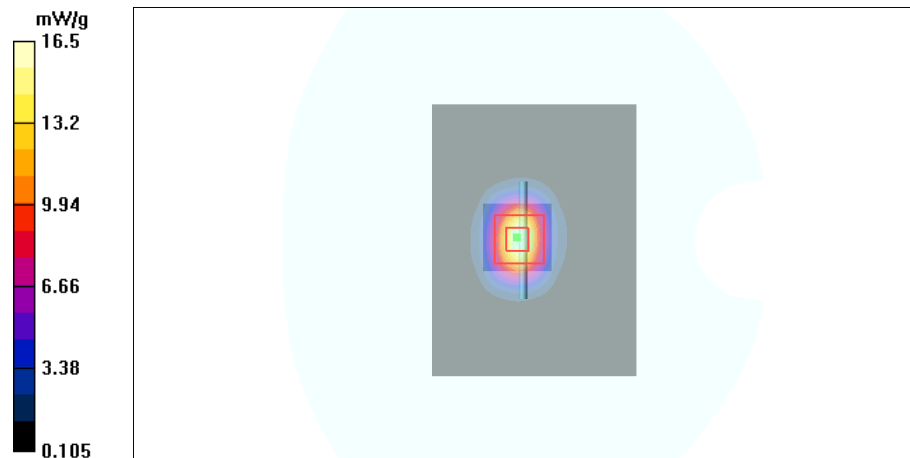
Peak SAR (extrapolated) = 30.3 W/kg

SAR(1 g) = 14.5 mW/g

SAR(10 g) = 6.74 mW/g

Power Drift = 0.029 dB

Maximum value of SAR (measured) = 16.5 mW/g



APPENDIX B: MEASUREMENT SCANS

Date/Time: 2009-09-01 10:31:38

Test Laboratory: TCC Nokia

Type: RM-431; Serial: 004401/10/568893/7

Communication System: WLAN2450

Frequency: 2412 MHz; Duty Cycle: 1:1

Medium: HSL2450; Medium Notes: 21.4 C

Medium parameters used: $f = 2412$ MHz; $\sigma = 1.82$ mho/m; $\epsilon_r = 38$; $\rho = 1000$ kg/m³

Phantom section: Left Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3165
- ConvF(4.49, 4.49, 4.49); Calibrated: 2009-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn555; Calibrated: 2008-11-07
- Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1449
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Cheek position - Low – BL-4CT Sony, HW0504/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm

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

Cheek position - Low – BL-4CT Sony, HW0504/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 10.9 V/m

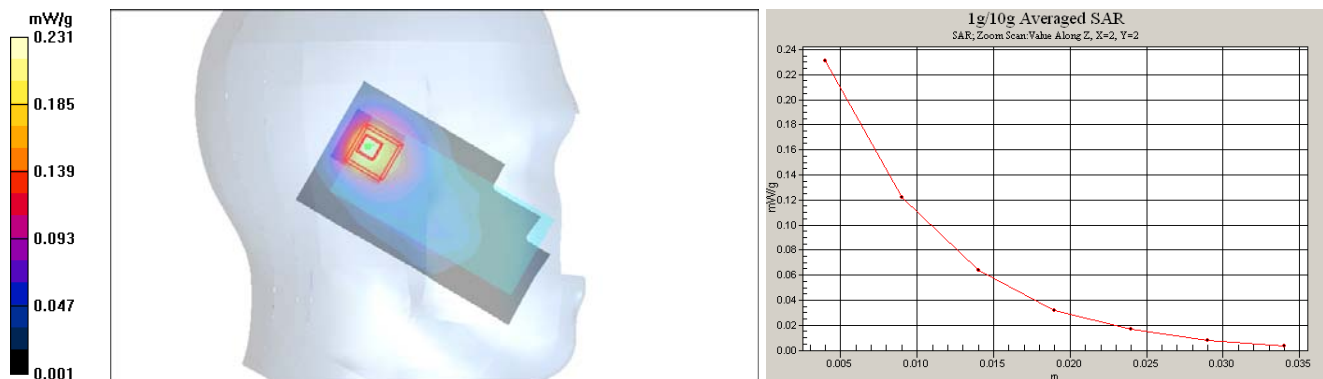
Peak SAR (extrapolated) = 0.402 W/kg

SAR(1 g) = 0.208 mW/g

SAR(10 g) = 0.109 mW/g

Power Drift = 0.071 dB

Maximum value of SAR (measured) = 0.231 mW/g



SAR Report

FCC_RM-431_01

Applicant: Nokia Corporation

Type: RM-431

Copyright © 2009 TCC Nokia

Date/Time: 2009-09-01 09:33:59

Test Laboratory: TCC Nokia

Type: RM-431; Serial: 004401/10/568893/7

Communication System: WLAN2450

Frequency: 2442 MHz; Duty Cycle: 1:1

Medium: HSL2450; Medium Notes: 21.4 C

Medium parameters used: $f = 2442$ MHz; $\sigma = 1.86$ mho/m; $\epsilon_r = 37.9$; $\rho = 1000$ kg/m³

Phantom section: Left Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3165
- ConvF(4.49, 4.49, 4.49); Calibrated: 2009-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn555; Calibrated: 2008-11-07
- Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1449
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Tilt position - Middle – BL-4CT Sony, HW0504/Area Scan (41x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.167 mW/g

Tilt position - Middle – BL-4CT Sony, HW0504/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 9.57 V/m

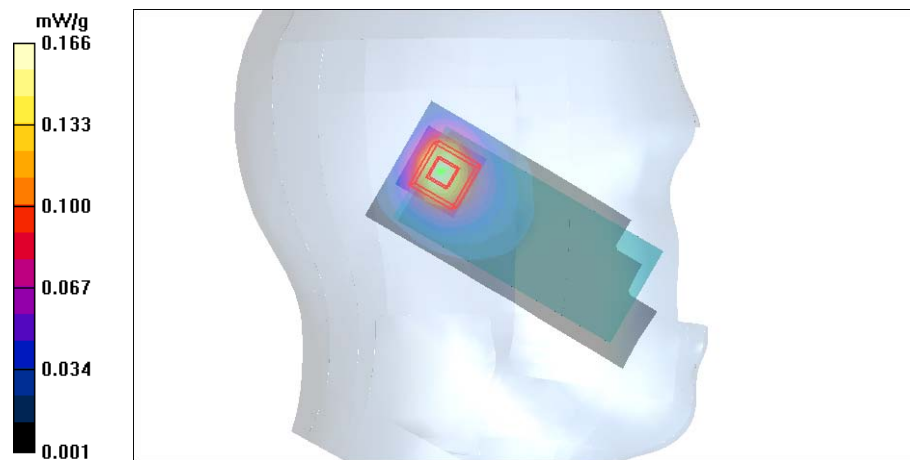
Peak SAR (extrapolated) = 0.296 W/kg

SAR(1 g) = 0.149 mW/g

SAR(10 g) = 0.075 mW/g

Power Drift = 0.038 dB

Maximum value of SAR (measured) = 0.166 mW/g



Date/Time: 2009-09-01 10:03:59

Test Laboratory: TCC Nokia

Type: RM-431; Serial: 004401/10/568893/7

Communication System: WLAN2450

Frequency: 2442 MHz; Duty Cycle: 1:1

Medium: HSL2450; Medium Notes: 21.4 C

Medium parameters used: $f = 2442$ MHz; $\sigma = 1.86$ mho/m; $\epsilon_r = 37.9$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3165
- ConvF(4.49, 4.49, 4.49); Calibrated: 2009-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn555; Calibrated: 2008-11-07
- Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1449
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Cheek position - Middle – BL-4CT Sony, HW0504/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.148 mW/g

Cheek position - Middle – BL-4CT Sony, HW0504/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 8.75 V/m

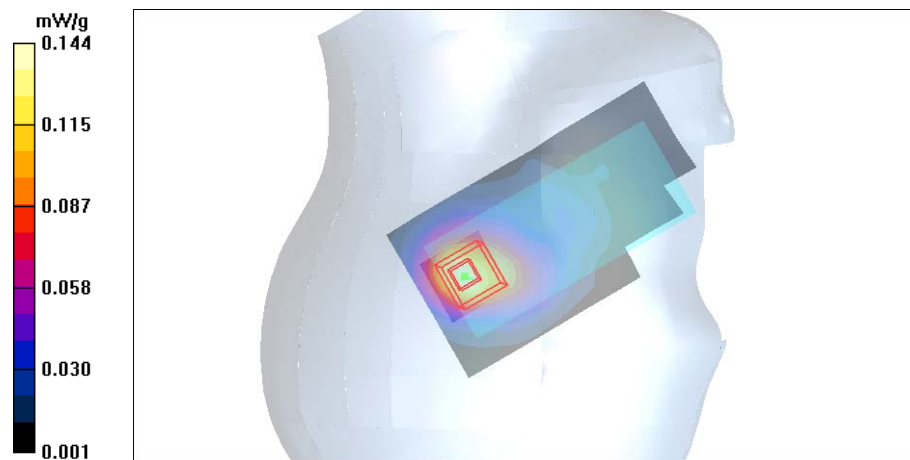
Peak SAR (extrapolated) = 0.242 W/kg

SAR(1 g) = 0.129 mW/g

SAR(10 g) = 0.069 mW/g

Power Drift = 0.060 dB

Maximum value of SAR (measured) = 0.144 mW/g



Date/Time: 2009-09-01 09:49:04

Test Laboratory: TCC Nokia

Type: RM-431; Serial: 004401/10/568893/7

Communication System: WLAN2450

Frequency: 2442 MHz; Duty Cycle: 1:1

Medium: HSL2450; Medium Notes: 21.4 C

Medium parameters used: $f = 2442$ MHz; $\sigma = 1.86$ mho/m; $\epsilon_r = 37.9$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3165
- ConvF(4.49, 4.49, 4.49); Calibrated: 2009-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn555; Calibrated: 2008-11-07
- Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1449
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Tilt position – Middle – BL-4CT Sony, HW0504/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.155 mW/g

Tilt position - Middle – BL-4CT Sony, HW0504/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 9.27 V/m

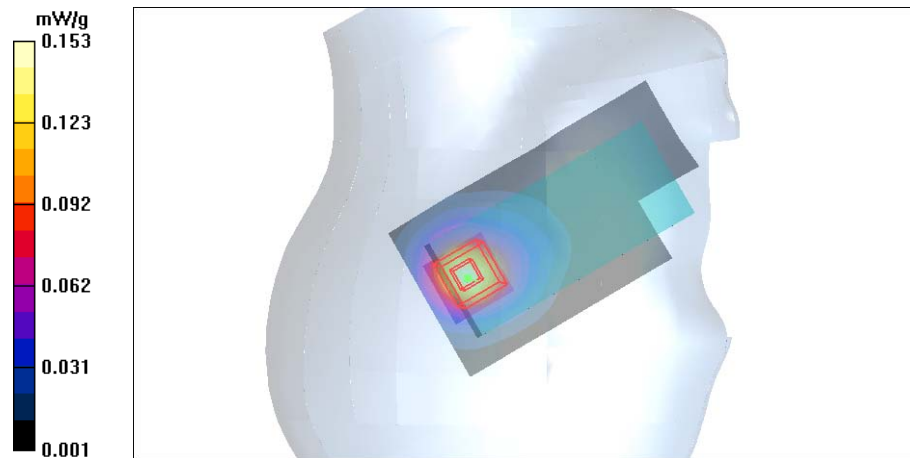
Peak SAR (extrapolated) = 0.263 W/kg

SAR(1 g) = 0.137 mW/g

SAR(10 g) = 0.069 mW/g

Power Drift = -0.020 dB

Maximum value of SAR (measured) = 0.153 mW/g



Date/Time: 2009-08-18 14:00:09

Test Laboratory: TCC Nokia

Type: RM-431; Serial: 004401/10/568893/7

Communication System: WLAN2450

Frequency: 2442 MHz; Duty Cycle: 1:1

Medium: BSL2450; Medium Notes: 21.1 C

Medium parameters used: $f = 2442$ MHz; $\sigma = 2$ mho/m; $\epsilon_r = 50.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3165
- ConvF(4.17, 4.17, 4.17); Calibrated: 2009-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn555; Calibrated: 2008-11-07
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Body - Middle – BL-4CT Sanyo - No Accessory - Display Facing Phantom, HW0504/Area Scan (51x91x1):

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

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

Body - Middle – BL-4CT Sanyo - No Accessory - Display Facing Phantom, HW0504/Zoom Scan (5x5x7)/Cube 0:

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

Reference Value = 2.81 V/m

Peak SAR (extrapolated) = 0.060 W/kg

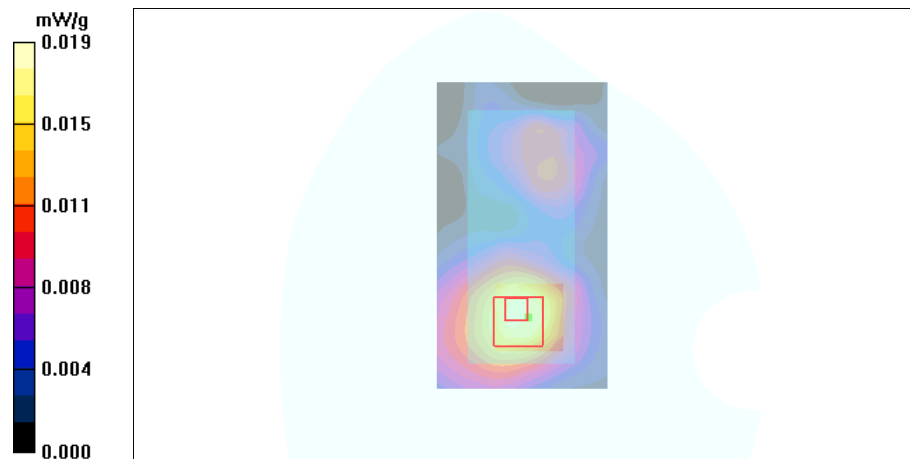
SAR(1 g) = 0.018 mW/g

SAR(10 g) = 0.00804 mW/g

Power Drift = 0.192 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) = 0.019 mW/g



SAR Report

FCC_RM-431_01

Applicant: Nokia Corporation

Type: RM-431

Copyright © 2009 TCC Nokia

Date/Time: 2009-08-18 14:23:55

Test Laboratory: TCC Nokia

Type: RM-431; Serial: 004401/10/568893/7

Communication System: WLAN2450

Frequency: 2442 MHz; Duty Cycle: 1:1

Medium: BSL2450; Medium Notes: 21.1 C

Medium parameters used: $f = 2442$ MHz; $\sigma = 2$ mho/m; $\epsilon_r = 50.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3165
- ConvF(4.17, 4.17, 4.17); Calibrated: 2009-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)) Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn555; Calibrated: 2008-11-07
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Body - Middle – BL-4CT Sanyo - HS-45 + AD-54 - Display Facing Phantom, HW0504/Area Scan (51x91x1):

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

Maximum value of SAR (interpolated) = 0.052 mW/g

Body - Middle – BL-4CT Sanyo - HS-45 + AD-54 - Display Facing Phantom, HW0504/Zoom Scan (5x5x7)/Cube 0:

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

Reference Value = 2.60 V/m

Peak SAR (extrapolated) = 0.035 W/kg

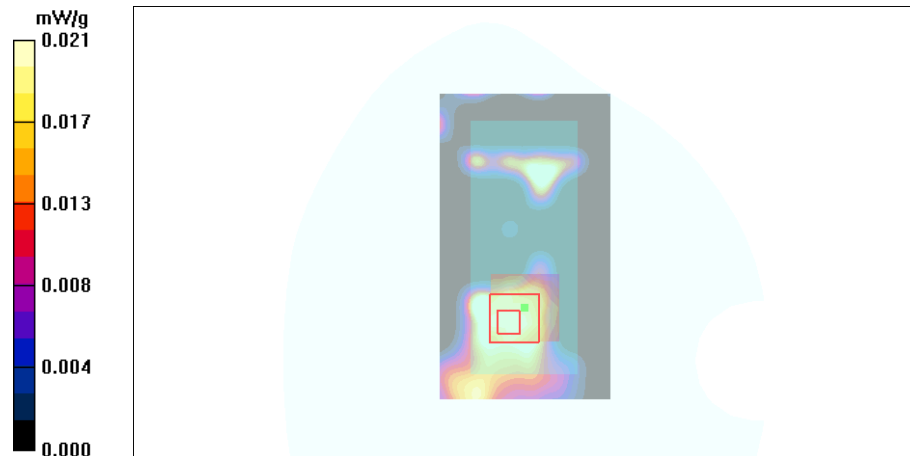
SAR(1 g) = 0.018 mW/g

SAR(10 g) = 0.009 mW/g

Power Drift = 0.360 dB

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

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



Date/Time: 2009-08-19 09:36:27

Test Laboratory: TCC Nokia

Type: RM-431; Serial: 004401/10/568893/7

Communication System: WLAN2450

Frequency: 2412 MHz; Duty Cycle: 1:1

Medium: BSL2450; Medium Notes: 20.7 C

Medium parameters used: $f = 2412$ MHz; $\sigma = 1.97$ mho/m; $\epsilon_r = 50.9$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3165
- ConvF(4.17, 4.17, 4.17); Calibrated: 2009-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn555; Calibrated: 2008-11-07
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Body - Low - BL-4CT Sanyo - No Accessory - Back Facing Phantom, HW0504/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.075 mW/g

Body - Low - BL-4CT Sanyo - No Accessory - Back Facing Phantom, HW0504/Zoom Scan (5x5x7)/Cube 0:

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

Reference Value = 5.92 V/m

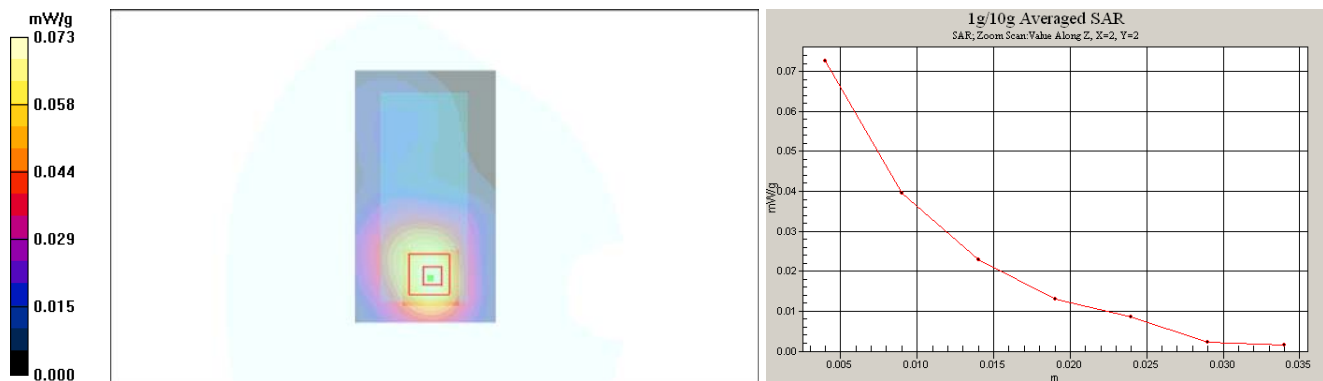
Peak SAR (extrapolated) = 0.119 W/kg

SAR(1 g) = 0.067 mW/g

SAR(10 g) = 0.039 mW/g

Power Drift = -0.025 dB

Maximum value of SAR (measured) = 0.073 mW/g



SAR Report

FCC_RM-431_01

Applicant: Nokia Corporation

Type: RM-431

Copyright © 2009 TCC Nokia

Date/Time: 2009-08-18 15:06:06

Test Laboratory: TCC Nokia

Type: RM-431; Serial: 004401/10/568893/7

Communication System: WLAN2450

Frequency: 2442 MHz; Duty Cycle: 1:1

Medium: BSL2450; Medium Notes: 21.1 C

Medium parameters used: $f = 2442$ MHz; $\sigma = 2$ mho/m; $\epsilon_r = 50.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3165
- ConvF(4.17, 4.17, 4.17); Calibrated: 2009-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn555; Calibrated: 2008-11-07
- Phantom: SAM 2; Type: Twin SAM 040 CA; Serial: TP - 1177
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Body - Middle – BL-4CT Sanyo - HS-45 + AD-54 - Back Facing Phantom, HW0504/Area Scan (51x91x1):

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

Maximum value of SAR (interpolated) = 0.052 mW/g

Body - Middle – BL-4CT Sanyo - HS-45 + AD-54 - Back Facing Phantom, HW0504/Zoom Scan (5x5x7)/Cube 0:

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

Reference Value = 4.13 V/m

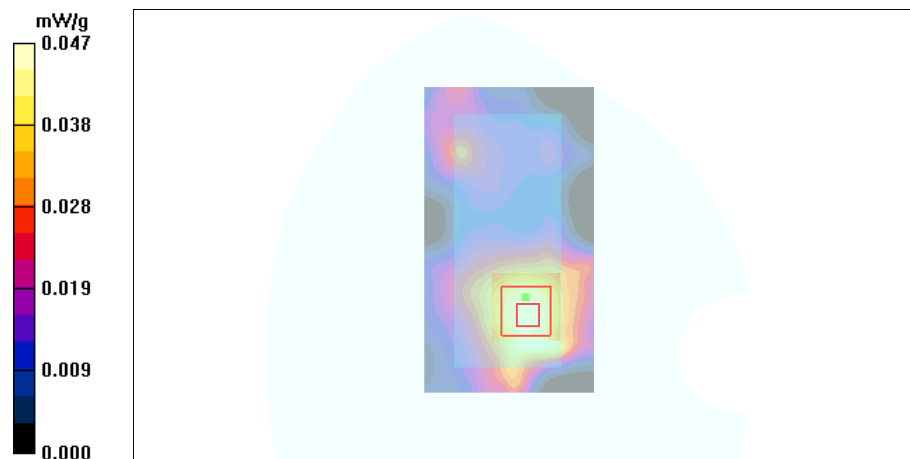
Peak SAR (extrapolated) = 0.080 W/kg

SAR(1 g) = 0.044 mW/g

SAR(10 g) = 0.025 mW/g

Power Drift = -0.168 dB

Maximum value of SAR (measured) = 0.047 mW/g



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



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

Accreditation No.: **SCS 108**

Client **Nokia Salo TCC**

Certificate No: **ES3-3165_May09**

CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3165**

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

Calibration date: **May 25, 2009**

Condition of the calibrated item **In Tolerance**

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

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

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

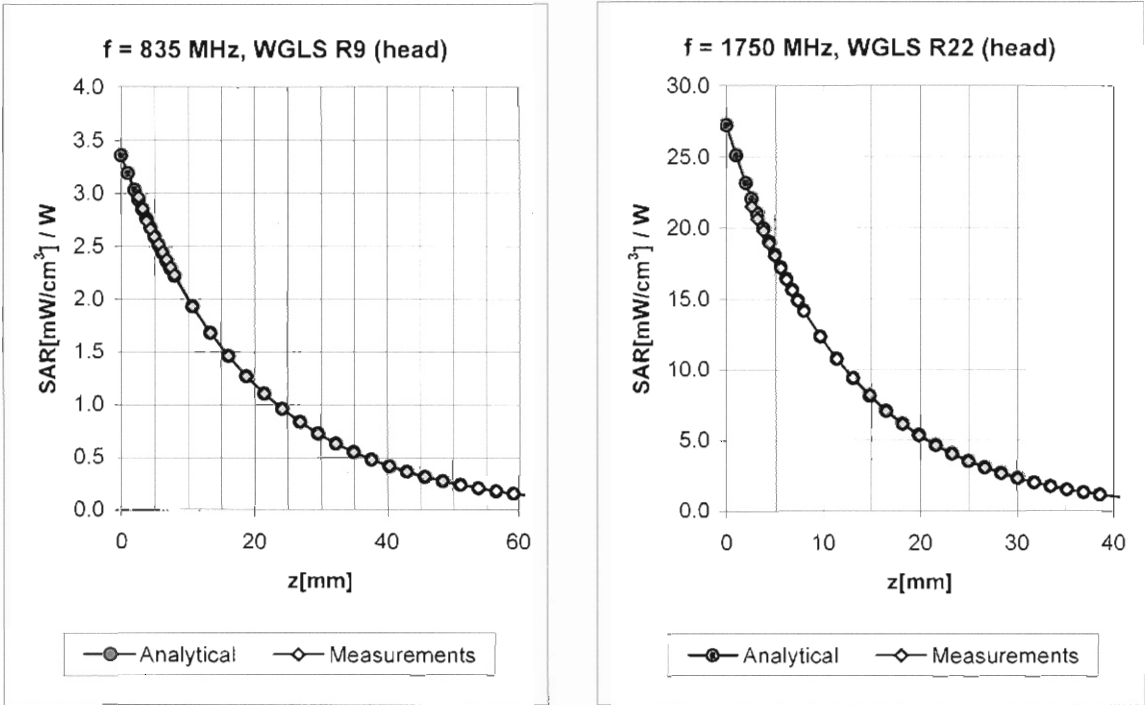
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-08)	In house check: Oct-09

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: May 25, 2009

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

Conversion Factor Assessment



f [MHz]	Validity [MHz] ^c	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF	Uncertainty
835	± 50 / ± 100	Head	41.5 ± 5%	0.90 ± 5%	0.45	1.64	5.98	± 11.0% (k=2)
1750	± 50 / ± 100	Head	40.1 ± 5%	1.37 ± 5%	0.65	1.29	5.17	± 11.0% (k=2)
1900	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.60	1.48	5.00	± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.80	1.34	4.49	± 11.0% (k=2)
835	± 50 / ± 100	Body	55.2 ± 5%	0.97 ± 5%	0.40	1.64	5.95	± 11.0% (k=2)
1750	± 50 / ± 100	Body	53.4 ± 5%	1.49 ± 5%	0.54	1.59	4.89	± 11.0% (k=2)
1900	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.39	2.01	4.60	± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.70	1.30	4.17	± 11.0% (k=2)

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

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



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

Accreditation No.: **SCS 108**

Client **Nokia Salo TCC**

Certificate No: **D2450V2-729_Jan08**

CALIBRATION CERTIFICATE

Object **D2450V2 - SN: 729**

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

Calibration date: **January 30, 2008**

Condition of the calibrated item **In Tolerance**

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

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 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-07 (METAS, No. 217-00736)	Oct-08
Power sensor HP 8481A	US37292783	04-Oct-07 (METAS, No. 217-00736)	Oct-08
Reference 20 dB Attenuator	SN: 5086 (20g)	07-Aug-07 (METAS, No 217-00718)	Aug-08
Reference 10 dB Attenuator	SN: 5047.2 (10r)	07-Aug-07 (METAS, No 217-00718)	Aug-08
Reference Probe ES3DV2	SN: 3025	26-Oct-07 (SPEAG, No. ES3-3025_Oct07)	Oct-08
DAE4	SN 601	03-Jan-08 (SPEAG, No. DAE4-601_Jan08)	Jan-09

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (SPEAG, in house check Oct-07)	In house check: Oct-08
RF generator R&S SMT-06	100005	4-Aug-99 (SPEAG, in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (SPEAG, in house check Oct-07)	In house check: Oct-08

	Name	Function	Signature
Calibrated by:	Claudio Leubler	Laboratory Technician	

Approved by:	Katja Pokovic	Technical Manager
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Issued: January 31, 2008

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

DASY4 Validation Report for Head TSL

Date/Time: 30.01.2008 12:36:45

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN729

Communication System: CW-2450; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: HSL U10 BB;

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.82$ mho/m; $\epsilon_r = 37.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV2 - SN3025 (HF); ConvF(4.41, 4.41, 4.41); Calibrated: 26.10.2007
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 03.01.2008
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; ;
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 172

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

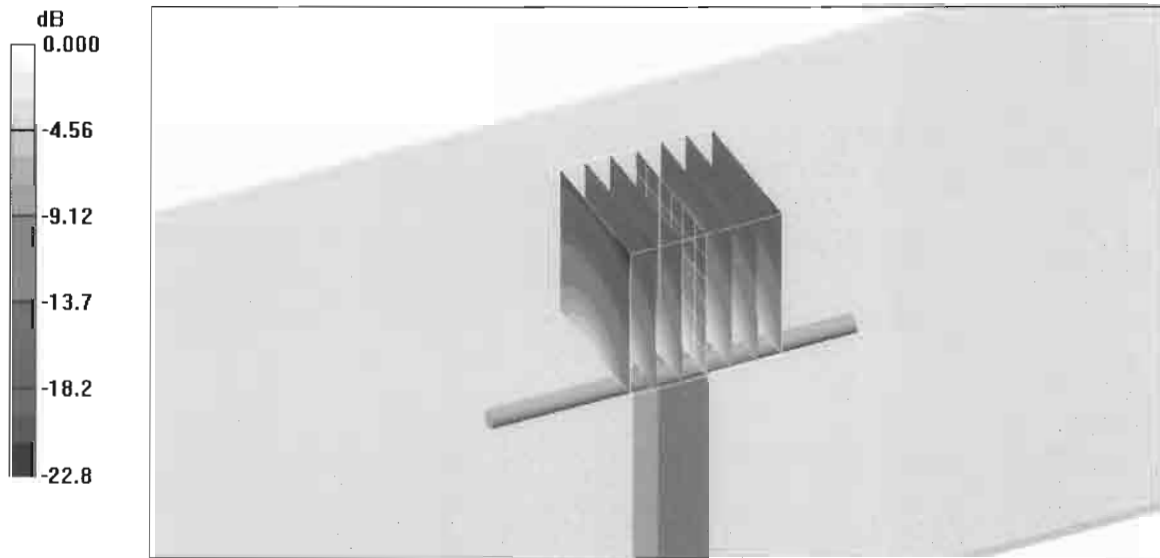
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 92.1 V/m; Power Drift = 0.058 dB

Peak SAR (extrapolated) = 30.7 W/kg

SAR(1 g) = 14.3 mW/g; SAR(10 g) = 6.57 mW/g

Maximum value of SAR (measured) = 15.4 mW/g



DASY4 Validation Report for Body TSL

Date/Time: 23.01.2008 12:53:20

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN729

Communication System: CW-2450; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: MSL U10 BB;

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.99$ mho/m; $\epsilon_r = 52.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV2 - SN3025 (HF); ConvF(4.02, 4.02, 4.02); Calibrated: 26.10.2007
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 03.01.2008
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; ;
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 172

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

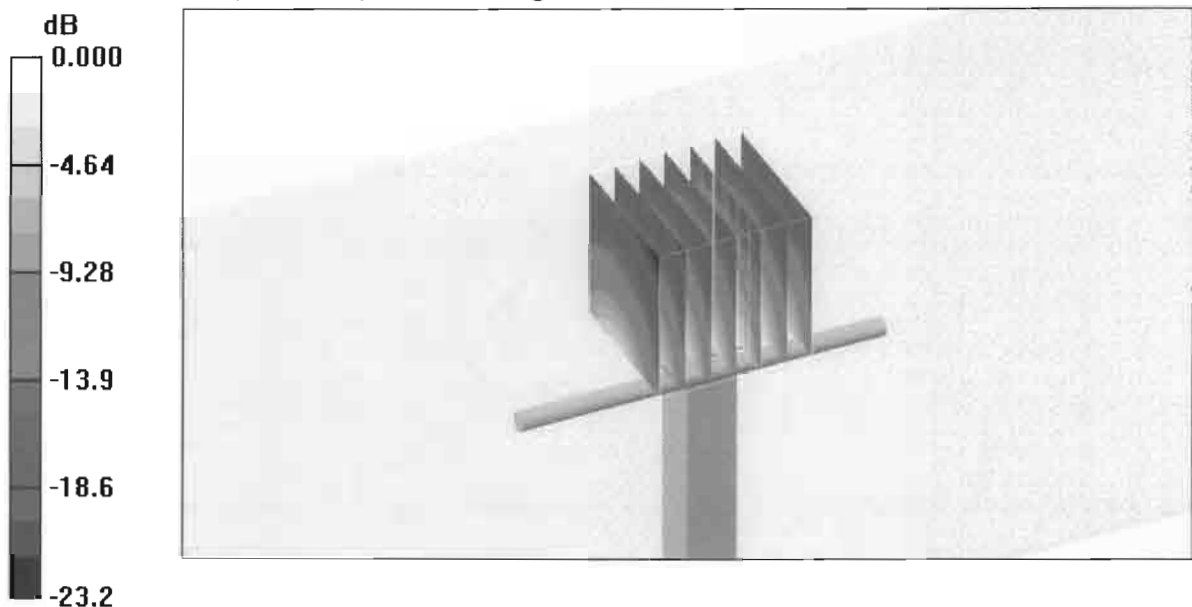
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 82.8 V/m; Power Drift = 0.091 dB

Peak SAR (extrapolated) = 28.8 W/kg

SAR(1 g) = 13.8 mW/g; SAR(10 g) = 6.33 mW/g

Maximum value of SAR (measured) = 15.6 mW/g



0 dB = 15.6mW/g