



SAR Compliance Test Report

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Measurements made by:	Julian Kim		
Tested device:	RH-66		
FCC ID:	QMNRH-66	IC:	661X-RH66
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 San Diego.		
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: 2005-05-19

For the contents:

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1. SUMMARY OF SAR TEST REPORT

1.1 Test Details

Period of test	2005-05-04 to 2005-05-17
SN, HW and SW numbers of tested device	SN: 044/13934628 HW: 4101 SW: R100V0200.nep
Batteries used in testing	BL-6C
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)	Conducted power	Position	SAR limit (1g avg)	Measured SAR value (1g avg)	Result
AMPS 800	384 / 836.52	25.7 dBm	Right Cheek	1.6 W/kg	1.08 W/kg	PASSED
CDMA 800	384 / 836.52	25.6 dBm	Right Cheek	1.6 W/kg	0.99 W/kg	PASSED
CDMA 1900	25 / 1851.25	23.9 dBm	Left Tilt	1.6 W/kg	1.17 W/kg	PASSED

1.2.2 Body Worn Configuration

Mode	Ch / f (MHz)	Conducted power	Separation distance	SAR limit (1g avg)	Measured SAR value (1g avg)	Result
AMPS 800	991 / 824.04	25.8 dBm	2.2 cm	1.6 W/kg	1.13 W/kg	PASSED
CDMA 800	1013 / 824.70	25.8 dBm	2.2 cm	1.6 W/kg	1.10 W/kg	PASSED
CDMA 1900	25 / 1851.25	23.9 dBm	2.2 cm	1.6 W/kg	0.55 W/kg	PASSED

1.2.3 Maximum Drift

Maximum drift during measurements	-0.18 dB
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1.2.4 Measurement Uncertainty

Extended Uncertainty (k=2) 95%	$\pm 29.8 \%$
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2. DESCRIPTION OF THE DEVICE UNDER TEST

Device category	Portable
Exposure environment	General population / Uncontrolled

Modes and Bands of Operation	AMPS 800	CDMA 800	CDMA 1900
Modulation Mode	FM	QPSK	QPSK
Duty Cycle	1	1	1
Transmitter Frequency Range (MHz)	824 – 849	824 – 849	1850 – 1910

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

Ambient temperature (°C):	21.0 to 22.4
Ambient humidity (RH %):	34 to 59

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.



4. DESCRIPTION OF THE TEST EQUIPMENT

4.1 Measurement System and Components

The measurements were performed using an automated near-field scanning system, DASY 4 software version 4.5, 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:

Test Equipment	Serial Number	Calibration interval	Calibration expiry
DAE V1	604	12 months	2005-10
E-field Probe ET3DV6	1739	12 months	2005-08
Dipole Validation Kit, D835V2	478	24 months	2006-10
Dipole Validation Kit, D1900V2	534	24 months	2006-10

Additional test equipment used in testing:

Test Equipment	Model	Serial Number	Calibration interval	Calibration expiry
Signal Generator	Agilent E4436B	US 39260114	24 months	2006-05
Amplifier	Milmega AS0822-8L	1004832	-	-
Power Meter	Agilent E4417A	GB41290918	12 months	2005-10
Power Sensor	Agilent E9327A	US 40440897	12 months	2006-03
Power Sensor	Agilent E9323A	US 40411295	12 months	2005-11
Call Tester	Agilent 8960/E5515C	US 40440119	12 months	2006-06
Vector Network Analyzer	Agilent 8753ES	MY40002861	12 months	2005-05
Dielectric Probe Kit	Agilent 85070D	US 01440165	-	-



4.1.1 Isotropic E-field Probe SN1739

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 μ W/g to > 100 mW/g; Linearity: ± 0.2 dB
Dimensions	Overall length: 330 mm Tip length: 16 mm Body diameter: 12 mm Tip diameter: 6.8 mm Distance from probe tip to dipole centers: 2.7 mm
Application	General dosimetry up to 3 GHz Compliance tests of mobile phones Fast automatic scanning in arbitrary phantoms

4.2 Phantoms

The phantom used for all tests i.e. for both system checking 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 simulating liquids 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 recipes were used for Head and Body tissue simulants:

800MHz band

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

1900MHz band

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

4.3.2 System Checking

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

System checking, head tissue simulant

f [MHz]	Description	SAR [W/kg], 1g	Dielectric Parameters		Temp [°C]
			ϵ_r	σ [S/m]	
835	Reference result	2.34	41.8	0.89	N/A
	± 10% window	2.11 – 2.57			
	2005-05-04	2.43	42.5	0.91	21.0
	2005-05-05	2.47	42.3	0.91	21.6
	2005-05-06	2.44	41.9	0.91	22.0
1900	Reference result	9.91	39.4	1.44	N/A
	± 10% window	8.92 – 10.90			
	2005-05-12	9.80	38.1	1.45	22.1
	2005-05-13	9.88	38.2	1.46	22.0

System checking, body tissue simulant

f [MHz]	Description	SAR [W/kg], 1g	Dielectric Parameters		Temp [°C]
			ϵ_r	σ [S/m]	
835	Reference result	2.44	54.3	1.00	N/A
	± 10% window	2.20 – 2.68			
	2005-05-09	2.48	54.2	0.96	21.9
	2005-05-10	2.48	54.3	0.97	21.0
1900	Reference result	9.85	51.3	1.59	N/A
	± 10% window	8.87 – 10.84			
	2005-05-17	9.83	50.9	1.58	22.4

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

4.3.3 Tissue Simulants used in the Measurements

Head tissue simulant measurements

f [MHz]	Description	Dielectric Parameters		Temp [°C]
		ϵ_r	σ [S/m]	
836.5	Recommended value	41.5	0.90	N/A
	$\pm 5\%$ window	39.4 – 43.6	0.86 – 0.95	
	2005-05-04	42.5	0.91	21.0
	2005-05-05	42.2	0.91	21.6
	2005-05-06	41.9	0.91	22.0
1880	Recommended value	40.0	1.40	N/A
	$\pm 5\%$ window	38.0 – 42.0	1.33 – 1.47	
	2005-05-12	38.2	1.43	22.1
	2005-05-13	38.3	1.44	22.0

Body tissue simulant measurements

f [MHz]	Description	Dielectric Parameters		Temp [°C]
		ϵ_r	σ [S/m]	
836.5	Recommended value	55.2	0.97	N/A
	$\pm 5\%$ window	52.4 – 58.0	0.92 – 1.02	
	2005-05-09	54.2	0.96	21.9
	2005-05-10	54.2	0.97	21.0
1880	Recommended value	53.3	1.52	N/A
	$\pm 5\%$ window	50.6 – 56.0	1.44 – 1.60	
	2005-05-17	50.8	1.56	22.4

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 gives higher results.



2.2cm Spacer

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

5.3 Scan Procedures

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

5.4 SAR Averaging Methods

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

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

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

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

6. MEASUREMENT UNCERTAINTY

Table 6.1 – Measurement uncertainty evaluation

Uncertainty Component	Section in IEEE 1528	Tol. (%)	Prob Dist	Div	G_i	$G_i \cdot U_i$ (%)	V_i
Measurement System							
Probe Calibration	E2.1	±5.8	N	1	1	±5.8	∞
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	∞
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			±14.9	206
Coverage Factor for 95%			k=2				
Expanded Standard Uncertainty						±29.8	

7. RESULTS

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

800MHz AMPS Head SAR Results

Test configuration		SAR, averaged over 1g (W/kg)		
		Ch 991 824.04 MHz	Ch 384 836.52 MHz	Ch 799 848.97 MHz
Power		25.8 dBm	25.7 dBm	25.3 dBm
Left	Cheek	0.96	1.01	0.94
	Tilt	0.86	0.91	0.87
Right	Cheek	1.04	1.08	0.91
	Tilt	-	0.76	-

800MHz CDMA Head SAR Results

Test configuration		SAR, averaged over 1g (W/kg)		
		Ch 1013 824.70 MHz	Ch 384 836.52 MHz	Ch 777 848.31 MHz
Power		25.8 dBm	25.6 dBm	25.2 dBm
Left	Cheek	-	0.98	-
	Tilt	-	0.87	-
Right	Cheek	-	0.99	-
	Tilt	-	0.74	-

1900MHz CDMA Head SAR Results

Test configuration		SAR, averaged over 1g (W/kg)		
		Ch 25 1851.25 MHz	Ch 600 1880 MHz	Ch 1175 1908.75 MHz
Power		23.9 dBm	23.6 dBm	23.2 dBm
Left	Cheek	1.00	0.98	0.78
	Tilt	1.17	1.15	0.91
Right	Cheek	0.71	0.73	0.58
	Tilt	0.86	0.88	0.73

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

800MHz AMPS Body SAR Results

Test configuration	SAR, averaged over 1g (W/kg)		
	Ch 991 824.04 MHz	Ch 384 836.52 MHz	Ch 799 848.97 MHz
Power	25.8 dBm	25.7 dBm	25.3 dBm
Without headset	1.13	0.90	0.70
Headset HS-3	-	0.68	-

800MHz CDMA Body SAR Results

Test configuration	SAR, averaged over 1g (W/kg)		
	Ch 1013 824.70 MHz	Ch 384 836.52 MHz	Ch 777 848.31 MHz
Power	25.8 dBm	25.6 dBm	25.2 dBm
Without headset	1.10	0.87	0.68
Headset HS-3	-	0.63	-

1900MHz CDMA Body SAR Results

Test configuration	SAR, averaged over 1g (W/kg)		
	Ch 25 1851.25 MHz	Ch 600 1880 MHz	Ch 1175 1908.75 MHz
Power	23.9 dBm	23.6 dBm	23.2 dBm
Without headset	0.55	0.55	0.46
Headset HS-3	-	0.55	-

Plots of the Measurement scans are given in Appendix B.



APPENDIX A: SYSTEM CHECKING SCANS

Date: 2005-05-04; Test Laboratory: TCC San Diego

Dipole 835 MHz; Serial No. 478; Head Validation

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

Medium parameters used: $f = 835$ MHz; $\sigma = 0.912$ mho/m; $\epsilon_r = 42.5$; $\rho = 1000$ kg/m³; Temperature (liq.) = 21.0 °C

Phantom section: Flat Section; Advanced Extrapolation

DASY4 Configuration:

- Probe: ET3DV6 - SN1739; ConvF(6.79, 6.79, 6.79); Calibrated: 08/26/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn604; Calibrated: 10/28/2004
- Phantom: SAM1; Type: SAM; Serial: TP-1035
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

835MHz validation/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 2.59 mW/g

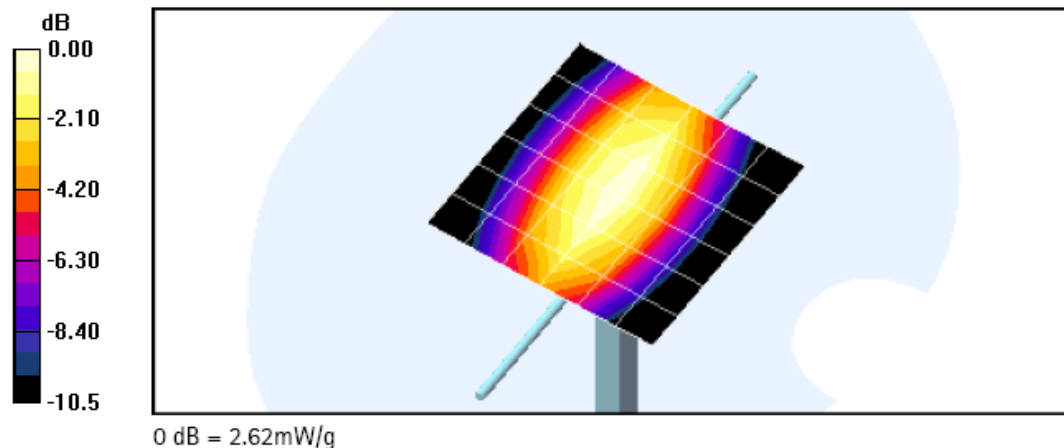
835MHz validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 55.1 V/m; Power Drift = -0.045 dB

Peak SAR (extrapolated) = 3.68 W/kg

SAR(1 g) = 2.43 mW/g; SAR(10 g) = 1.58 mW/g

Maximum value of SAR (measured) = 2.62 mW/g



Date: 2005-05-05; Test Laboratory: TCC San Diego

Dipole 835 MHz; Serial No. 478; Head Validation

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

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.912 \text{ mho/m}$; $\epsilon_r = 42.3$; $\rho = 1000 \text{ kg/m}^3$; Temperature (liq.) = 21.6°C

Phantom section: Flat Section; **Advanced Extrapolation**

DASY4 Configuration:

- Probe: ET3DV6 - SN1739; ConvF(6.79, 6.79, 6.79); Calibrated: 08/26/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn604; Calibrated: 10/28/2004
- Phantom: SAM1; Type: SAM; Serial: TP-1035
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

835MHz validation/Area Scan (7x7x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

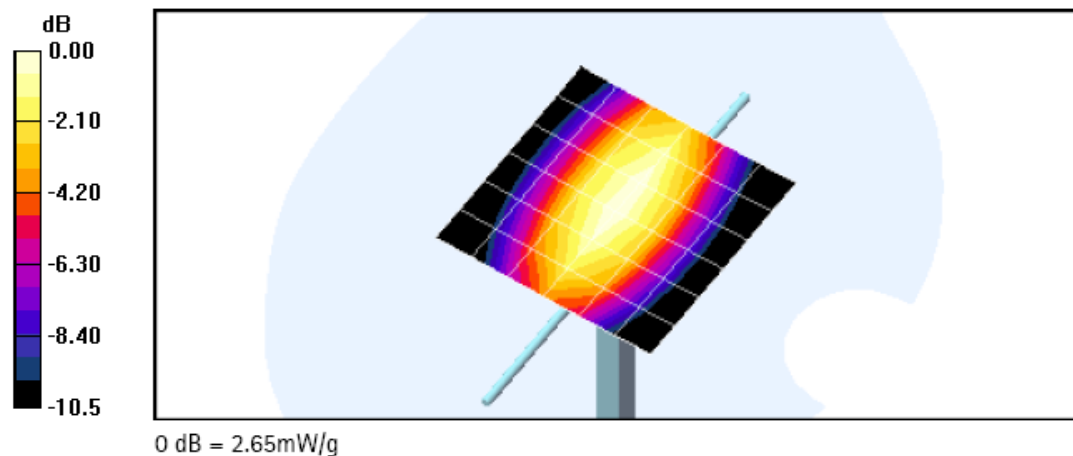
Maximum value of SAR (measured) = 2.65 mW/g

835MHz validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 55.1 V/m ; Power Drift = 0.015 dB

Peak SAR (extrapolated) = 3.73 W/kg

SAR(1 g) = 2.47 mW/g ; SAR(10 g) = 1.61 mW/g



Date: 2005-05-06; Test Laboratory: TCC San Diego

Dipole 835 MHz; Serial No. 478; Head Validation

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

Medium parameters used: $f = 835$ MHz; $\sigma = 0.907$ mho/m; $\epsilon_r = 41.9$; $\rho = 1000$ kg/m³; Temperature (liq.) = 22.0 °C

Phantom section: Flat Section; **Advanced Extrapolation**

DASY4 Configuration:

- Probe: ET3DV6 - SN1739; ConvF(6.79, 6.79, 6.79); Calibrated: 08/26/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn604; Calibrated: 10/28/2004
- Phantom: SAM1; Type: SAM; Serial: TP-1035
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

835MHz validation/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm

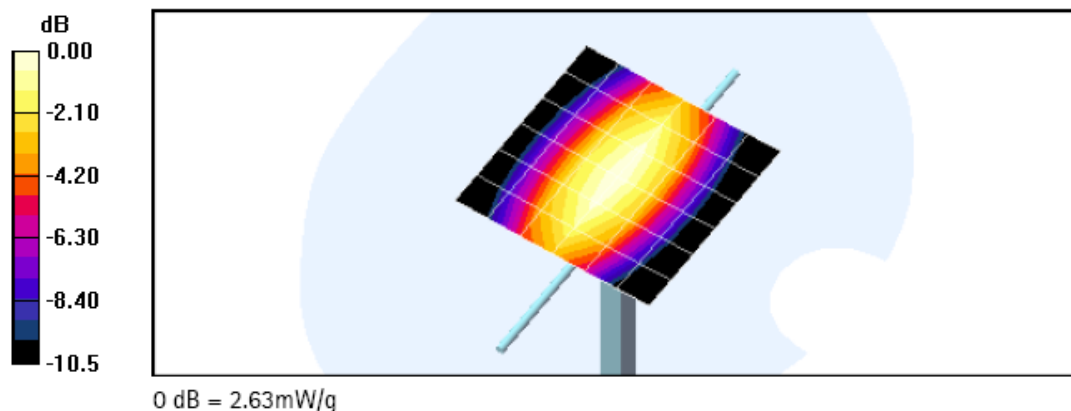
Maximum value of SAR (measured) = 2.63 mW/g

835MHz validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 55.5 V/m; Power Drift = 0.011 dB

Peak SAR (extrapolated) = 3.68 W/kg

SAR(1 g) = 2.44 mW/g; SAR(10 g) = 1.59 mW/g



Date: 2005-05-09; Test Laboratory: TCC San Diego

Dipole 835 MHz; Serial No. 478; Body Validation

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

Medium parameters used: $f = 835$ MHz; $\sigma = 0.961$ mho/m; $\epsilon_r = 54.2$; $\rho = 1000$ kg/m³; Temperature (liq.) = 21.9 °C

Phantom section: Flat Section; **Advanced Extrapolation**

DASY4 Configuration:

- Probe: ET3DV6 - SN1739; ConvF(6.47, 6.47, 6.47); Calibrated: 08/26/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn604; Calibrated: 10/28/2004
- Phantom: SAM2; Type: SAM; Serial: TP-1279
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

835MHz validation/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 2.67 mW/g

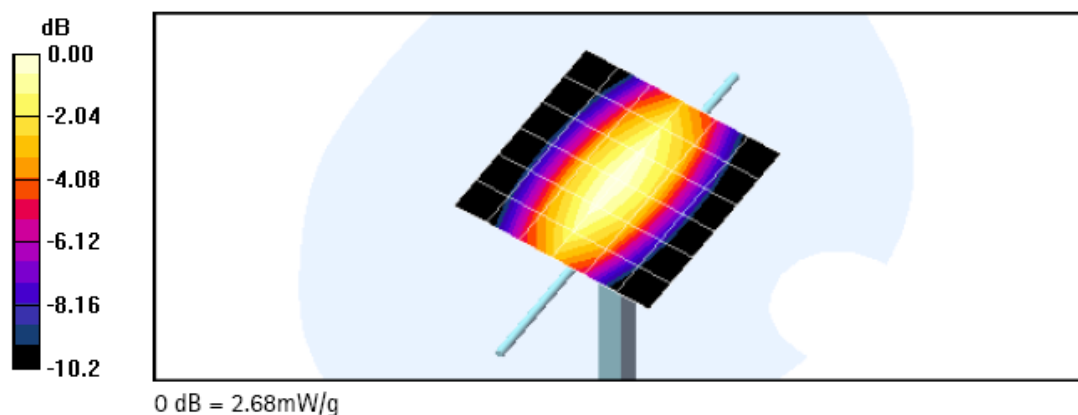
835MHz validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 54.6 V/m; Power Drift = -0.00 dB

Peak SAR (extrapolated) = 3.62 W/kg

SAR(1 g) = 2.48 mW/g; SAR(10 g) = 1.64 mW/g

Maximum value of SAR (measured) = 2.68 mW/g



Date: 2005-05-10; Test Laboratory: TCC San Diego

Dipole 835 MHz; Serial No. 478; Body Validation

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

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.965 \text{ mho/m}$; $\epsilon_r = 54.3$; $\rho = 1000 \text{ kg/m}^3$; Temperature (liq.) = $21.0 \text{ }^\circ\text{C}$

Phantom section: Flat Section; **Advanced Extrapolation**

DASY4 Configuration:

- Probe: ET3DV6 - SN1739; ConvF(6.47, 6.47, 6.47); Calibrated: 08/26/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn604; Calibrated: 10/28/2004
- Phantom: SAM2; Type: SAM; Serial: TP-1279
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

835MHz validation/Area Scan (7x7x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

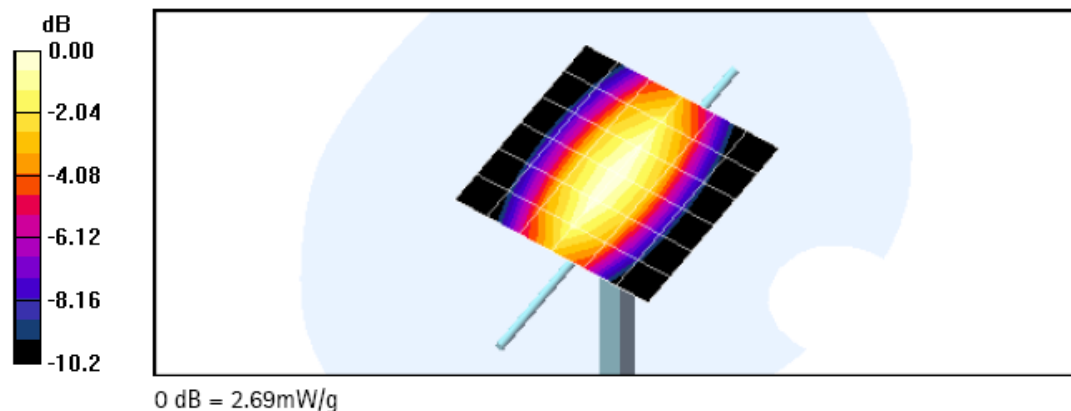
Maximum value of SAR (measured) = 2.69 mW/g

835MHz validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 54.6 V/m ; Power Drift = -0.012 dB

Peak SAR (extrapolated) = 3.62 W/kg

SAR(1 g) = 2.48 mW/g ; SAR(10 g) = 1.64 mW/g



Date: 2005-05-12; Test Laboratory: TCC San Diego

Dipole 1900 MHz; Serial No. 534; Head Validation

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

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.45$ mho/m; $\epsilon_r = 38.1$; $\rho = 1000$ kg/m³; Temperature (liq.) = 22.1 °C

Phantom section: Flat Section; **Advanced Extrapolation**

DASY4 Configuration:

- Probe: ET3DV6 - SN1739; ConvF(5.1, 5.1, 5.1); Calibrated: 08/26/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn604; Calibrated: 10/28/2004
- Phantom: SAM2; Type: SAM; Serial: TP-1279
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

1900MHz validation/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 11.0 mW/g

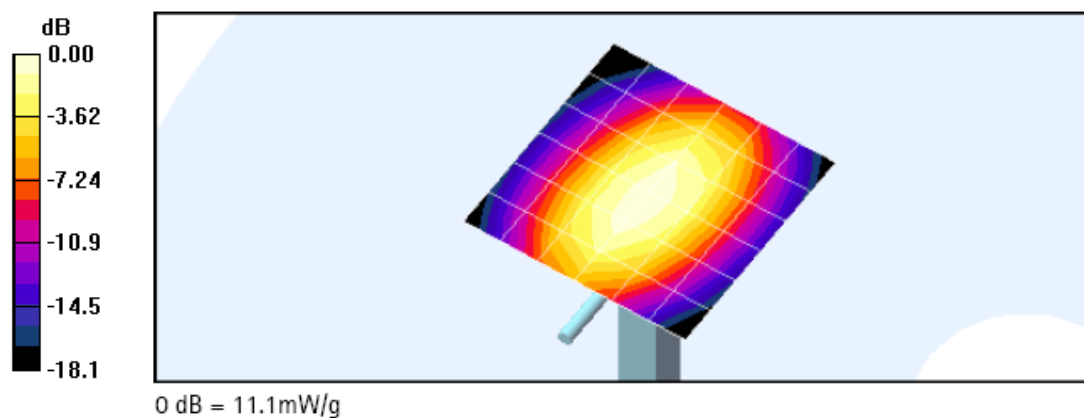
1900MHz validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 92.0 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 17.5 W/kg

SAR(1 g) = 9.8 mW/g; SAR(10 g) = 5.08 mW/g

Maximum value of SAR (measured) = 11.1 mW/g



Date: 2005-05-13; Test Laboratory: TCC San Diego

Dipole 1900 MHz; Serial No. 534; Head Validation

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

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.46$ mho/m; $\epsilon_r = 38.2$; $\rho = 1000$ kg/m³; Temperature (liq.) = 22.0 °C

Phantom section: Flat Section; **Advanced Extrapolation**

DASY4 Configuration:

- Probe: ET3DV6 - SN1739; ConvF(5.1, 5.1, 5.1); Calibrated: 08/26/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn604; Calibrated: 10/28/2004
- Phantom: SAM2; Type: SAM; Serial: TP-1279
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

1900MHz validation/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm

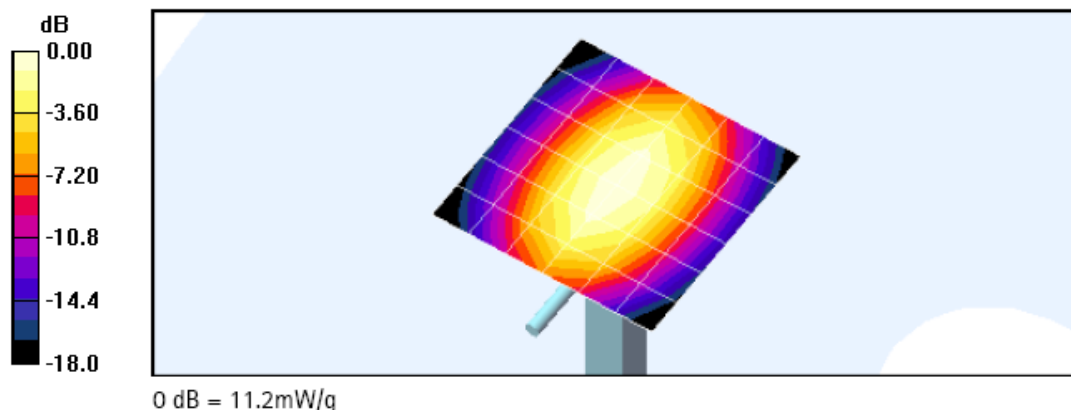
Maximum value of SAR (measured) = 11.2 mW/g

1900MHz validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 92.5 V/m; Power Drift = -0.00 dB

Peak SAR (extrapolated) = 17.7 W/kg

SAR(1 g) = 9.88 mW/g; SAR(10 g) = 5.12 mW/g



Date: 2005-05-17; Test Laboratory: TCC San Diego

Dipole 1900 MHz; Serial No. 534; Body Validation

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

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.58$ mho/m; $\epsilon_r = 50.9$; $\rho = 1000$ kg/m³; Temperature (liq.) = 22.4 °C

Phantom section: Flat Section; **Advanced Extrapolation**

DASY4 Configuration:

- Probe: ET3DV6 - SN1739; ConvF(4.57, 4.57, 4.57); Calibrated: 08/26/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn604; Calibrated: 10/28/2004
- Phantom: SAM2; Type: SAM; Serial: TP-1279
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

1900MHz validation/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 11.0 mW/g

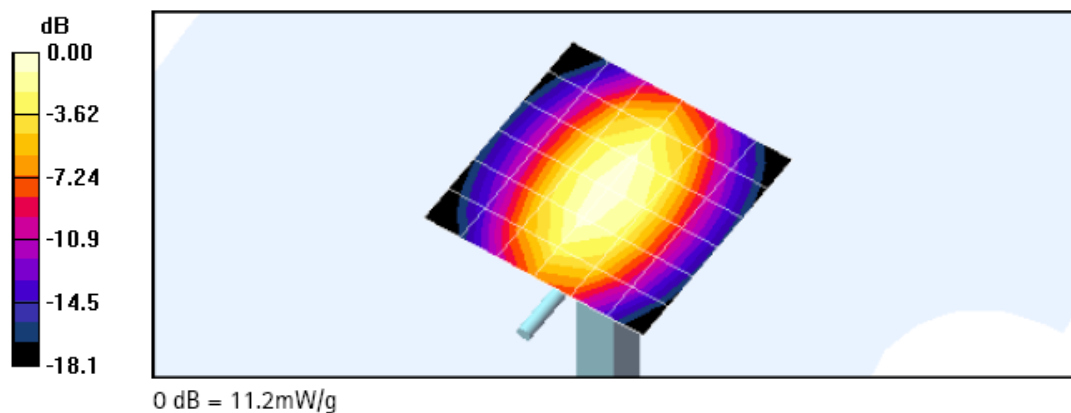
1900MHz validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 90.3 V/m; Power Drift = 0.010 dB

Peak SAR (extrapolated) = 17.1 W/kg

SAR(1 g) = 9.83 mW/g; SAR(10 g) = 5.13 mW/g

Maximum value of SAR (measured) = 11.2 mW/g





APPENDIX B: MEASUREMENT SCANS

Date: 2005-05-05; Test Laboratory: TCC San Diego

Type: RH-66; HWID: 4101; Serial No. 044/13934628

Communication System: AMPS800; Channel 384; Frequency: 836.52 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 836.52$ MHz; $\sigma = 0.914$ mho/m; $\epsilon_r = 42.2$; $\rho = 1000$ kg/m³;

Temperature (liq.) = 21.6 °C

Phantom section: Right Section; **Worst Case Extrapolation**

DASY4 Configuration:

- Probe: ET3DV6 - SN1739; ConvF(6.79, 6.79, 6.79); Calibrated: 08/26/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn604; Calibrated: 10/28/2004
- Phantom: SAM1; Type: SAM; Serial: TP-1035
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Right cheek/Area Scan (71x101x1): Measurement grid: dx=15mm, dy=15mm

Reference Value = 33.7 V/m; Power Drift = 0.013 dB

Maximum value of SAR (interpolated) = 1.33 mW/g

Right cheek/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

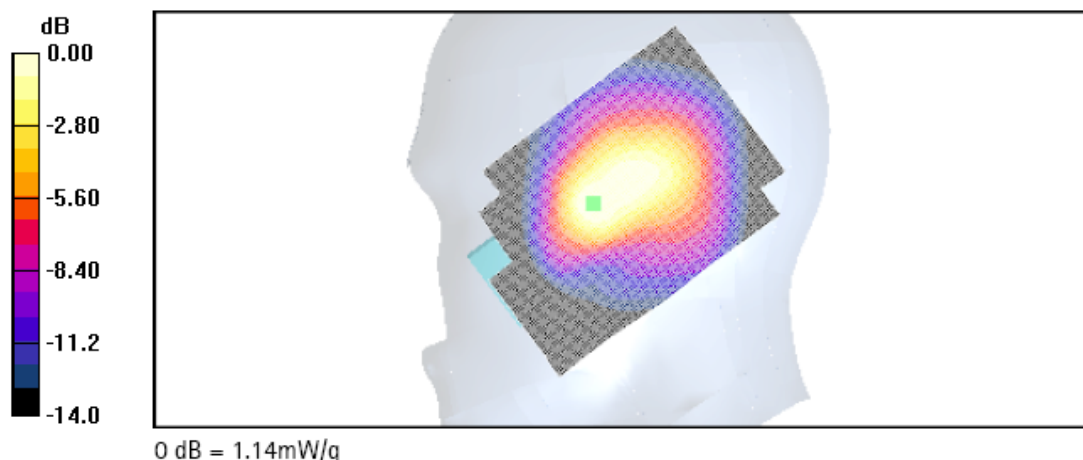
Reference Value = 33.7 V/m; Power Drift = 0.013 dB

Maximum value of SAR (measured) = 1.14 mW/g

Peak SAR (extrapolated) = 2.13 W/kg

SAR(1 g) = 1.08 mW/g; SAR(10 g) = 0.688 mW/g

Info: Interpolated medium parameters used for SAR evaluation!



Date: 2005-05-05; Test Laboratory: TCC San Diego

Type: RH-66; HWID: 4101; Serial No: 044/13934628

Communication System: AMPS800; Channel: 384; Frequency: 836.52 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 836.52$ MHz; $\sigma = 0.914$ mho/m; $\epsilon_r = 42.2$; $\rho = 1000$ kg/m³;

Temperature (liq.) = 21.6 °C

Phantom section: Right Section; **Worst Case Extrapolation**

DASY4 Configuration:

- Probe: ET3DV6 - SN1739; ConvF(6.79, 6.79, 6.79); Calibrated: 08/26/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn604; Calibrated: 10/28/2004
- Phantom: SAM1; Type: SAM; Serial No: TP-1035
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Right cheek/Area Scan (71x101x1): Measurement grid: dx=15mm, dy=15mm

Reference Value = 33.7 V/m; Power Drift = 0.013 dB

Maximum value of SAR (interpolated) = 1.33 mW/g

Right cheek/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 33.7 V/m; Power Drift = 0.013 dB

Maximum value of SAR (measured) = 1.14 mW/g

Peak SAR (extrapolated) = 2.13 W/kg

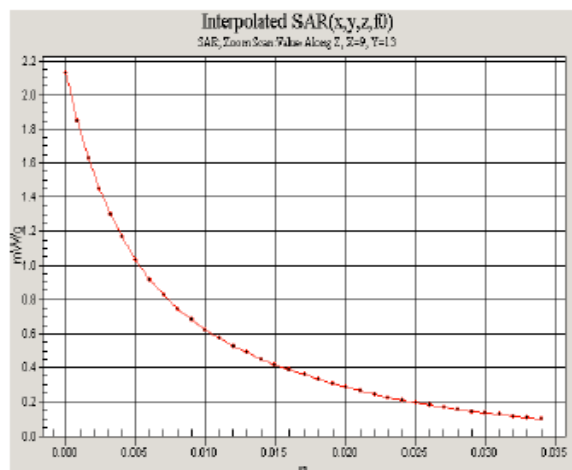
SAR(1 g) = 1.08 mW/g; SAR(10 g) = 0.688 mW/g

Right cheek/Zoom Scan (21x21x36)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 33.7 V/m; Power Drift = 0.013 dB

Maximum value of SAR (interpolated) = 2.13 mW/g

Info: Interpolated medium parameters used for SAR evaluation!



Date: 2005-05-06; Test Laboratory: TCC San Diego

Type: RH-66; HWID: 4101; Serial No. 044/13934628

Communication System: CDMA800; Channel: 384; Frequency: 836.52 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 836.52$ MHz; $\sigma = 0.908$ mho/m; $\epsilon_r = 41.9$; $\rho = 1000$ kg/m³;

Temperature (liq.) = 22.0 °C

Phantom section: Right Section; **Worst Case Extrapolation**

DASY4 Configuration:

- Probe: ET3DV6 - SN1739; ConvF(6.79, 6.79, 6.79); Calibrated: 08/26/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn604; Calibrated: 10/28/2004
- Phantom: SAM1; Type: SAM; Serial: TP-1035
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Right cheek/Area Scan (71x101x1): Measurement grid: dx=15mm, dy=15mm

Reference Value = 32.8 V/m; Power Drift = -0.176 dB

Maximum value of SAR (interpolated) = 1.28 mW/g

Right cheek/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

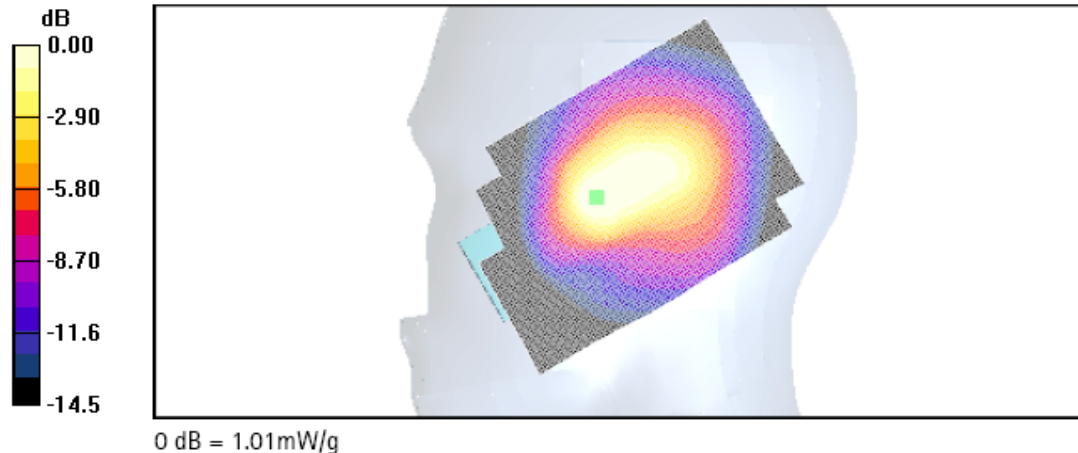
Reference Value = 32.8 V/m; Power Drift = -0.176 dB

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

Peak SAR (extrapolated) = 2.04 W/kg

SAR(1 g) = 0.987 mW/g; SAR(10 g) = 0.622 mW/g

Info: Interpolated medium parameters used for SAR evaluation!



Date: 2005-05-12; Test Laboratory: TCC San Diego

Type: RH-66; HWID: 4101; Serial No. 044/13934628

Communication System: CDMA1900; Channel: 25; Frequency: 1851.25 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 1851.25$ MHz; $\sigma = 1.4$ mho/m; $\epsilon_r = 38.3$; $\rho = 1000$ kg/m³;

Temperature (liq.) = 22.1°C

Phantom section: Left Section; **Worst Case Extrapolation**

DASY4 Configuration:

- Probe: ET3DV6 - SN1739; ConvF(5.1, 5.1, 5.1); Calibrated: 08/26/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn604; Calibrated: 10/28/2004
- Phantom: SAM2; Type: SAM; Serial: TP-1279
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

left tilt/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Reference Value = 22.6 V/m; Power Drift = -0.012 dB

Maximum value of SAR (interpolated) = 1.30 mW/g

left tilt/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

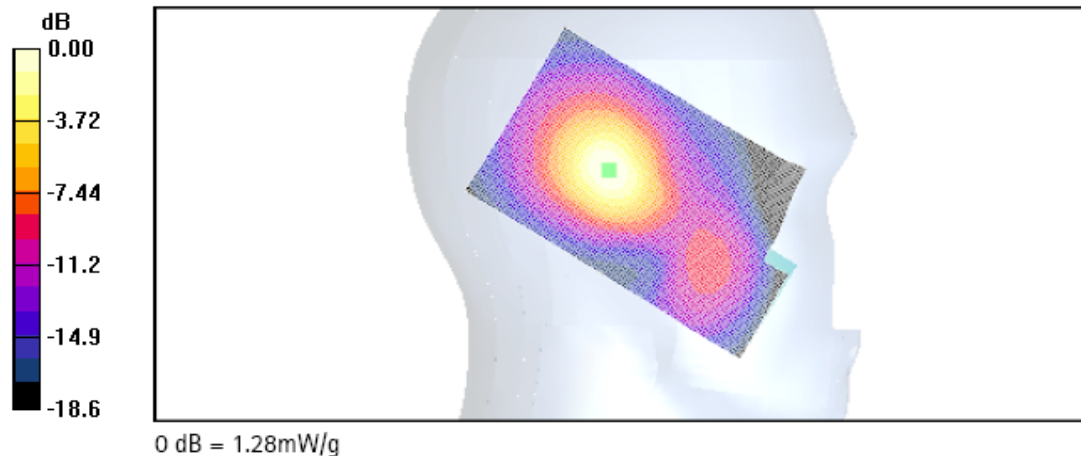
Reference Value = 22.6 V/m; Power Drift = -0.012 dB

Maximum value of SAR (measured) = 1.28 mW/g

Peak SAR (extrapolated) = 2.58 W/kg

SAR(1 g) = 1.17 mW/g; SAR(10 g) = 0.588 mW/g

Info: Interpolated medium parameters used for SAR evaluation!



Date: 2005-05-12; Test Laboratory: TCC San Diego

Type: RH-66; HWID: 4101; Serial No: 044/13934628

Communication System: CDMA1900 ; Channel: 25; Frequency: 1851.25 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 1851.25$ MHz; $\sigma = 1.4$ mho/m; $\epsilon_r = 38.3$; $\rho = 1000$ kg/m³;

Temperature (liq.) = 22.1 °C

Phantom section: Left Section; **Worst Case Extrapolation**

DASY4 Configuration:

- Probe: ET3DV6 - SN1739; ConvF(5.1, 5.1, 5.1); Calibrated: 08/26/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn604; Calibrated: 10/28/2004
- Phantom: SAM2; Type: SAM; Serial: TP-1279
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

left tilt/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Reference Value = 22.6 V/m; Power Drift = -0.012 dB

Maximum value of SAR (interpolated) = 1.30 mW/g

left tilt/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 22.6 V/m; Power Drift = -0.012 dB

Maximum value of SAR (measured) = 1.28 mW/g

Peak SAR (extrapolated) = 2.58 W/kg

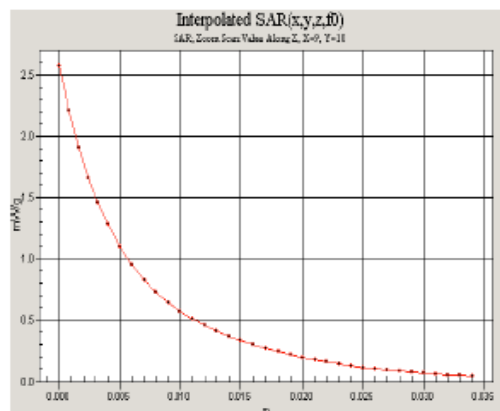
SAR(1 g) = 1.17 mW/g; SAR(10 g) = 0.588 mW/g

left tilt/Zoom Scan (21x21x36)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 22.6 V/m; Power Drift = -0.012 dB

Maximum value of SAR (interpolated) = 2.58 mW/g

Info: Interpolated medium parameters used for SAR evaluation!



Date: 2005-05-10; Test Laboratory: TCC San Diego

Type: RH-66; HWID: 4101; Serial No: 044/13934628; without headset

Communication System: AMPS800; Channel: 991; Frequency: 824.04 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 824.04$ MHz; $\sigma = 0.953$ mho/m; $\epsilon_r = 54.4$; $\rho = 1000$ kg/m³;

Temperature (liq.) = 21.0 °C

Phantom section: Flat Section; **Worst Case Extrapolation**

DASY4 Configuration:

- Probe: ET3DV6 - SN1739; ConvF(6.47, 6.47, 6.47); Calibrated: 08/26/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn604; Calibrated: 10/28/2004
- Phantom: SAM2; Type: SAM; Serial: TP-1279
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Body/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm

Reference Value = 20.3 V/m; Power Drift = 0.014 dB

Maximum value of SAR (interpolated) = 1.20 mW/g

Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

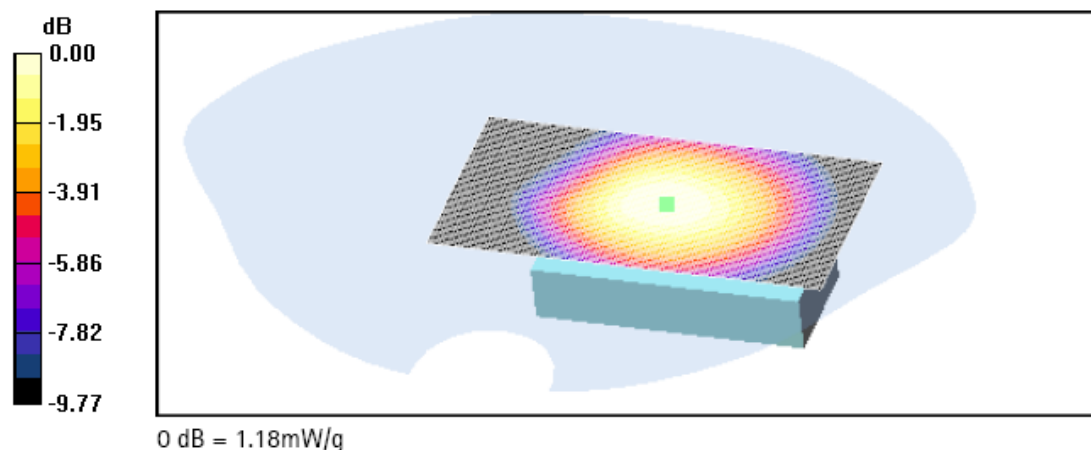
Reference Value = 20.3 V/m; Power Drift = 0.014 dB

Maximum value of SAR (measured) = 1.18 mW/g

Peak SAR (extrapolated) = 1.68 W/kg

SAR(1 g) = 1.13 mW/g; SAR(10 g) = 0.789 mW/g

Info: Interpolated medium parameters used for SAR evaluation!



Date: 2005-05-10; Test Laboratory: TCC San Diego

DUT: RH-66; HWID: 4101; Serial No: 044/13934628; without headset

Communication System: AMPS800; Channel: 991; Frequency: 824.04 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 824.04$ MHz; $\sigma = 0.953$ mho/m; $\epsilon_r = 54.4$; $\rho = 1000$ kg/m³;

Temperature (liq.) = 21.0 °C

Phantom section: Flat Section; **Worst Case Extrapolation**

DASY4 Configuration:

- Probe: ET3DV6 - SN1739; ConvF(6.47, 6.47, 6.47); Calibrated: 08/26/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn604; Calibrated: 10/28/2004
- Phantom: SAM2; Type: SAM; Serial: TP-1279
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Body/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm

Reference Value = 20.3 V/m; Power Drift = 0.014 dB

Maximum value of SAR (interpolated) = 1.20 mW/g

Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 20.3 V/m; Power Drift = 0.014 dB

Maximum value of SAR (measured) = 1.18 mW/g

Peak SAR (extrapolated) = 1.68 W/kg

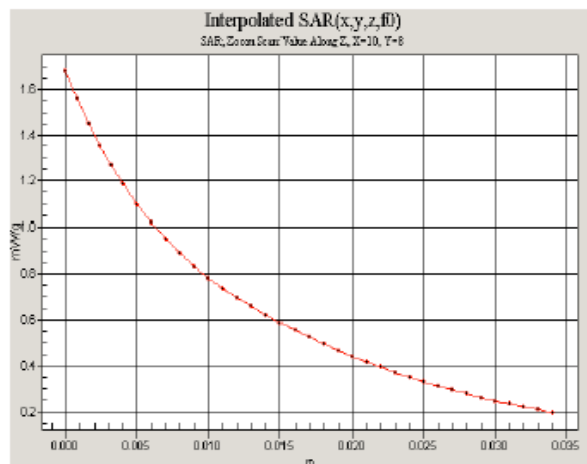
SAR(1 g) = 1.13 mW/g; SAR(10 g) = 0.789 mW/g

Body/Zoom Scan (21x21x36)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 20.3 V/m; Power Drift = 0.014 dB

Maximum value of SAR (interpolated) = 1.68 mW/g

Info: Interpolated medium parameters used for SAR evaluation!



Date: 2005-05-10; Test Laboratory: TCC San Diego

Type: RH-66; HWID: 4101; Serial No: 044/13934628; without headset

Communication System: CDMA800; Channel: 1013; Frequency: 824.7 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 824.7$ MHz; $\sigma = 0.954$ mho/m; $\epsilon_r = 54.4$; $\rho = 1000$ kg/m³; Temperature (liq.) = 21.0 °C

Phantom section: Flat Section; **Worst Case Extrapolation**

DASY4 Configuration:

- Probe: ET3DV6 - SN1739; ConvF(6.47, 6.47, 6.47); Calibrated: 08/26/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn604; Calibrated: 10/28/2004
- Phantom: SAM2; Type: SAM; Serial: TP-1279
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Body/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm

Reference Value = 20.2 V/m; Power Drift = -0.017 dB

Maximum value of SAR (interpolated) = 1.18 mW/g

Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

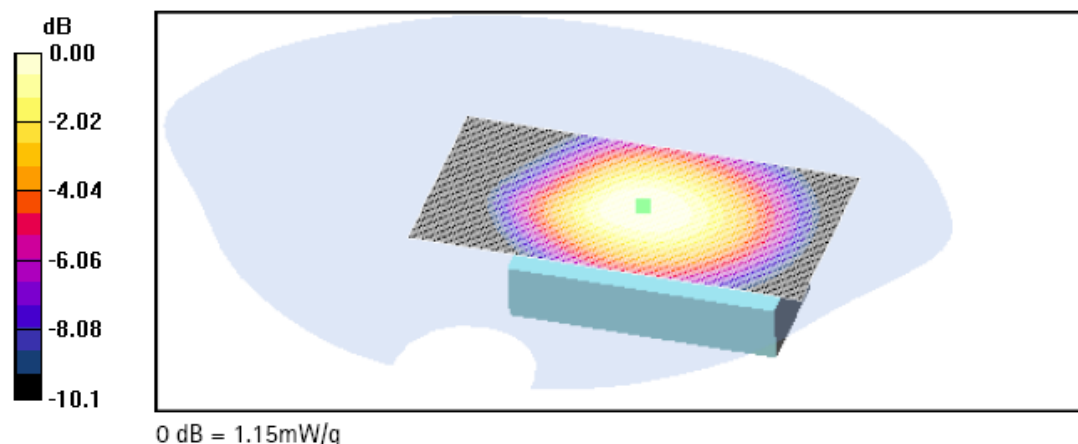
Reference Value = 20.2 V/m; Power Drift = -0.017 dB

Maximum value of SAR (measured) = 1.15 mW/g

Peak SAR (extrapolated) = 1.63 W/kg

SAR(1 g) = 1.1 mW/g; SAR(10 g) = 0.772 mW/g

Info: Interpolated medium parameters used for SAR evaluation!



Date: 2005-05-17; Test Laboratory: TCC San Diego

Type: RH-66; HWID: 4101; Serial No: 044/13934628; without headset

Communication System: CDMA1900; Channel: 25; Frequency: 1851.25 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 1851.25$ MHz; $\sigma = 1.53$ mho/m; $\epsilon_r = 51$; $\rho = 1000$ kg/m³; Temperature (liq.) = 22.4 °C

Phantom section: Flat Section; Worst Case Extrapolation

DASY4 Configuration:

- Probe: ET3DV6 - SN1739; ConvF(4.57, 4.57, 4.57); Calibrated: 08/26/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn604; Calibrated: 10/28/2004
- Phantom: SAM2; Type: SAM; Serial: TP-1279
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Body/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm

Reference Value = 13.6 V/m; Power Drift = -0.011 dB

Maximum value of SAR (interpolated) = 0.589 mW/g

Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

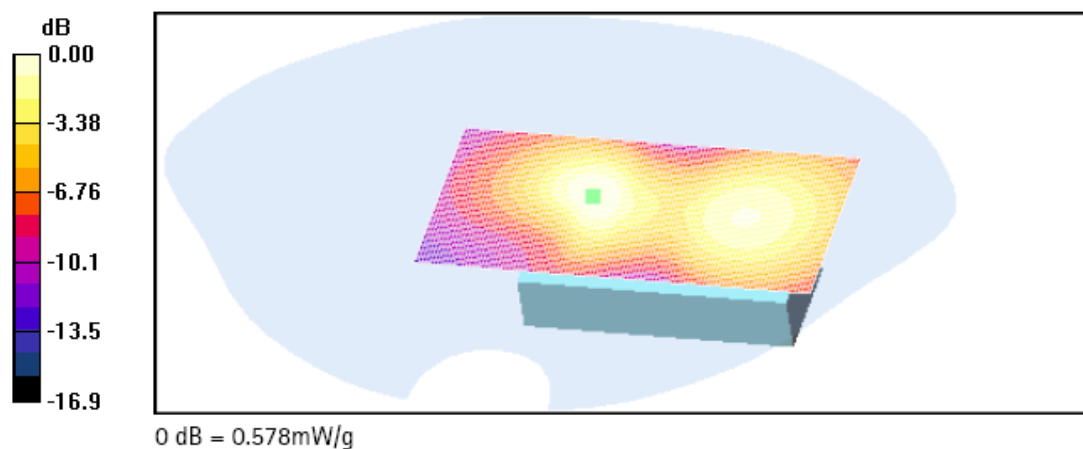
Reference Value = 13.6 V/m; Power Drift = -0.011 dB

Maximum value of SAR (measured) = 0.578 mW/g

Peak SAR (extrapolated) = 1.15 W/kg

SAR(1 g) = 0.547 mW/g; SAR(10 g) = 0.305 mW/g

Info: Interpolated medium parameters used for SAR evaluation!



Date: 2005-05-17; Test Laboratory: TCC San Diego

Type: RH-66; HWID: 4101; Serial No: 044/13934628; without headset

Communication System: CDMA1900; Channel: 25; Frequency: 1851.25 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 1851.25$ MHz; $\sigma = 1.53$ mho/m; $\epsilon_r = 51$; $\rho = 1000$ kg/m³; Temperature (liq.) = 22.4 °C

Phantom section: Flat Section; **Worst Case Extrapolation**

DASY4 Configuration:

- Probe: ET3DV6 - SN1739; ConvF(4.57, 4.57, 4.57); Calibrated: 08/26/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn604; Calibrated: 10/28/2004
- Phantom: SAM2; Type: SAM; Serial: TP-1279
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Body/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm

Reference Value = 13.6 V/m; Power Drift = -0.011 dB

Maximum value of SAR (interpolated) = 0.589 mW/g

Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 13.6 V/m; Power Drift = -0.011 dB

Maximum value of SAR (measured) = 0.578 mW/g

Peak SAR (extrapolated) = 1.15 W/kg

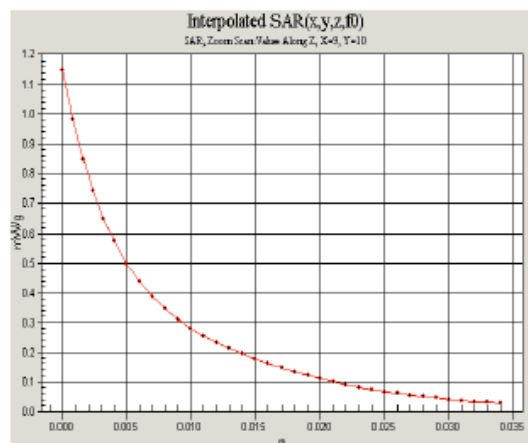
SAR(1 g) = 0.547 mW/g; SAR(10 g) = 0.305 mW/g

Body/Zoom Scan (21x21x36)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 13.6 V/m; Power Drift = -0.011 dB

Maximum value of SAR (interpolated) = 1.15 mW/g

Info: Interpolated medium parameters used for SAR evaluation!





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



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

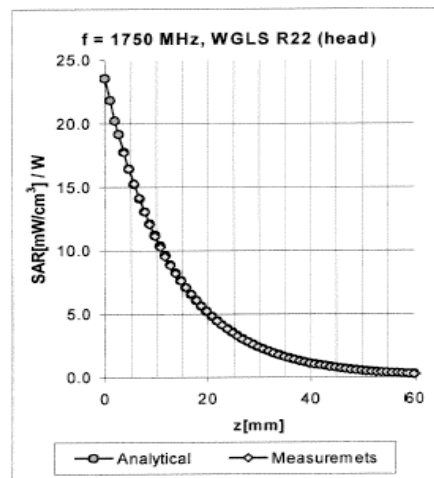
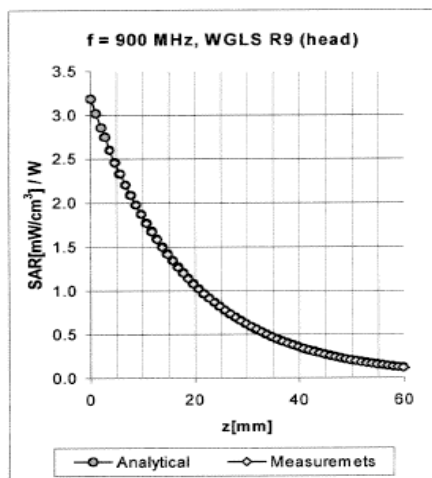
Client **Nokia SD**

CALIBRATION CERTIFICATE																																			
Object(s)	ET3DV6 - SN:1739																																		
Calibration procedure(s)	QA CAL-01.v2 Calibration procedure for dosimetric E-field probes																																		
Calibration date:	August 26, 2004																																		
Condition of the calibrated item	In Tolerance (according to the specific calibration document)																																		
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 +/- 2 degrees Celsius and humidity < 75%. Calibration Equipment used (M&TE critical for calibration) <table border="1" style="width: 100%; border-collapse: collapse; font-size: small;"> <thead> <tr> <th style="width: 25%;">Model Type</th> <th style="width: 15%;">ID #</th> <th style="width: 35%;">Cal Date (Calibrated by, Certificate No.)</th> <th style="width: 25%;">Scheduled Calibration</th> </tr> </thead> <tbody> <tr> <td>Power meter EPM E4419B</td> <td>GB41293874</td> <td>5-May-04 (METAS, No 251-00388)</td> <td>May-05</td> </tr> <tr> <td>Power sensor E4412A</td> <td>MY41495277</td> <td>5-May-04 (METAS, No 251-00388)</td> <td>May-05</td> </tr> <tr> <td>Reference 20 dB Attenuator</td> <td>SN: 5086 (20b)</td> <td>3-May-04 (METAS, No 251-00388)</td> <td>May-05</td> </tr> <tr> <td>Fluke Process Calibrator Type 702</td> <td>SN: 6295803</td> <td>8-Sep-03 (Sintrel SCS No. E-030020)</td> <td>Sep-04</td> </tr> <tr> <td>Power sensor HP 8481A</td> <td>MY41092180</td> <td>18-Sep-02 (SPEAG, in house check Oct03)</td> <td>In house check: Oct 05</td> </tr> <tr> <td>RF generator HP 8684C</td> <td>US3642U01700</td> <td>4-Aug-99 (SPEAG, in house check Aug02)</td> <td>In house check: Aug05</td> </tr> <tr> <td>Network Analyzer HP 8753E</td> <td>US37390585</td> <td>18-Oct-01 (SPEAG, in house check Oct03)</td> <td>In house check: Oct 05</td> </tr> </tbody> </table>				Model Type	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration	Power meter EPM E4419B	GB41293874	5-May-04 (METAS, No 251-00388)	May-05	Power sensor E4412A	MY41495277	5-May-04 (METAS, No 251-00388)	May-05	Reference 20 dB Attenuator	SN: 5086 (20b)	3-May-04 (METAS, No 251-00388)	May-05	Fluke Process Calibrator Type 702	SN: 6295803	8-Sep-03 (Sintrel SCS No. E-030020)	Sep-04	Power sensor HP 8481A	MY41092180	18-Sep-02 (SPEAG, in house check Oct03)	In house check: Oct 05	RF generator HP 8684C	US3642U01700	4-Aug-99 (SPEAG, in house check Aug02)	In house check: Aug05	Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Oct03)	In house check: Oct 05
Model Type	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration																																
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Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Oct03)	In house check: Oct 05																																
Calibrated by:	Name Nico Vetterli	Function Technician	Signature 																																
Approved by:	Katja Pokovic	Laboratory Director																																	
Date issued: August 26, 2004																																			
This calibration certificate is issued as an intermediate solution until the accreditation process (based on ISO/IEC 17025 International Standard) for Calibration Laboratory of Schmid & Partner Engineering AG is completed.																																			

ET3DV6 SN:1739

August 26, 2004

Conversion Factor Assessment



f [MHz]	Validity [MHz] ^B	Tissue	Permittivity	Conductivity	Alpha	Depth	ConvF	Uncertainty
835	785-885	Head	41.5 ± 5%	0.90 ± 5%	0.81	1.52	6.79	± 9.7% (k=2)
900	850-950	Head	41.5 ± 5%	0.97 ± 5%	0.61	1.77	6.50	± 9.7% (k=2)
1750	1700-1800	Head	40.0 ± 5%	1.40 ± 5%	0.44	2.65	5.26	± 9.7% (k=2)
1900	1850-1950	Head	40.0 ± 5%	1.40 ± 5%	0.47	2.69	5.10	± 9.7% (k=2)
2450	2400-2500	Head	39.2 ± 5%	1.80 ± 5%	0.93	1.84	4.53	± 9.7% (k=2)
835	785-885	Body	55.2 ± 5%	0.97 ± 5%	0.58	1.84	6.47	± 9.7% (k=2)
900	850-950	Body	55.0 ± 5%	1.05 ± 5%	0.44	2.23	6.12	± 9.7% (k=2)
1750	1700-1800	Body	53.3 ± 5%	1.52 ± 5%	0.50	2.80	4.66	± 9.7% (k=2)
1900	1850-1950	Body	53.3 ± 5%	1.52 ± 5%	0.57	2.70	4.57	± 9.7% (k=2)
2450	2400-2500	Body	52.7 ± 5%	1.95 ± 5%	1.12	1.60	4.22	± 9.7% (k=2)

^B The total standard uncertainty is calculated as root-sum-square of standard uncertainty of the Conversion Factor at calibration frequency and the standard uncertainty for the indicated frequency band.



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



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



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

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

Accreditation No.: **SCS 108**

Client **Nokia SD**

Certificate No: **D835V2-478_Oct04/2**

CALIBRATION CERTIFICATE (Replacement of No: D835V2-478_Oct04)

Object **D835V2 - SN: 478**

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

Calibration date: **October 22, 2004**

Condition of the calibrated item **In Tolerance**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM E442	GB37480704	12-Oct-04 (METAS, No. 251-00412)	Oct-05
Power sensor HP 8481A	US37292783	12-Oct-04 (METAS, No. 251-00412)	Oct-05
Reference 20 dB Attenuator	SN: 5086 (20g)	10-Aug-04 (METAS, No 251-00402)	Aug-05
Reference 10 dB Attenuator	SN: 5047.2 (10r)	10-Aug-04 (METAS, No 251-00402)	Aug-05
Reference Probe ET3DV6	SN 1680	23-Feb-04 (SPEAG, No. ET3-1680_Feb04)	Feb-05
DAE4	SN 601	22-Jul-04 (SPEAG, No. DAE4-601_Jul04)	Jul-05
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (SPEAG, in house check Oct-03)	in house check: Oct-05
RF generator R&S SML-03	100698	27-Mar-02 (SPEAG, in house check Dec-03)	in house check: Dec-05
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (SPEAG, in house check Nov-03)	in house check: Nov 04

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

Issued: November 15, 2004

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

DASY4 Validation Report for Head TSL

Date/Time: 10/22/04 19:01:22

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN478

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

Medium: HSL 835 MHz;

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.89 \text{ mho/m}$; $\epsilon_r = 41.8$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1680; ConvF(6.4, 6.4, 6.4); Calibrated: 23.02.2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 22.07.2004
- Phantom: Flat Phantom half size; Type: QD000P49AA; Serial: SN:1001;
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130

Pin = 250 mW; d = 15 mm/Area Scan (81x81x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 2.49 mW/g

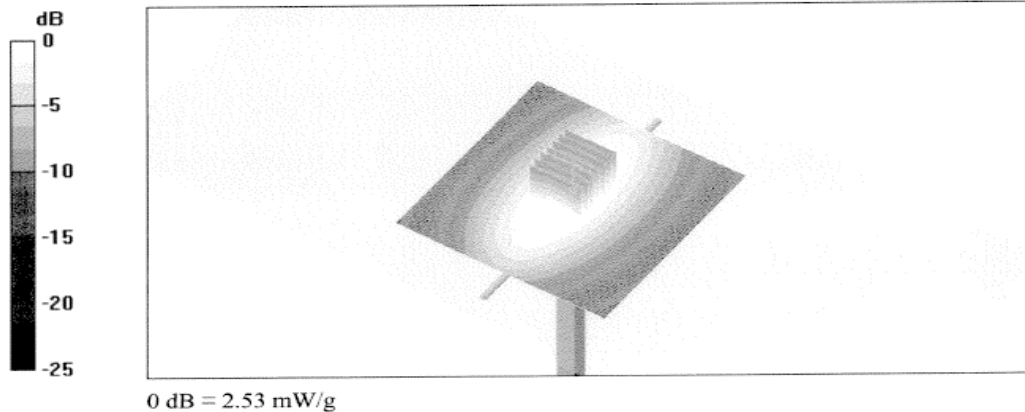
Pin = 250 mW; d = 15 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 54.1 V/m; Power Drift = 0.0 dB

Peak SAR (extrapolated) = 3.41 W/kg

SAR(1 g) = 2.34 mW/g; SAR(10 g) = 1.54 mW/g

Maximum value of SAR (measured) = 2.53 mW/g



DASY4 Validation Report for Body TSL

Date/Time: 10/22/04 18:58:12

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN478

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

Medium: Muscle 835 MHz;

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 1 \text{ mho/m}$; $\epsilon_r = 54.3$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1680; ConvF(6.31, 6.31, 6.31); Calibrated: 23.02.2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 22.07.2004
- Phantom: Flat Phantom half size; Type: QD000P49AA; Serial: SN:1001;
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130

Pin = 250 mW; d = 15 mm/Area Scan (81x81x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
Maximum value of SAR (interpolated) = 2.61 mW/g

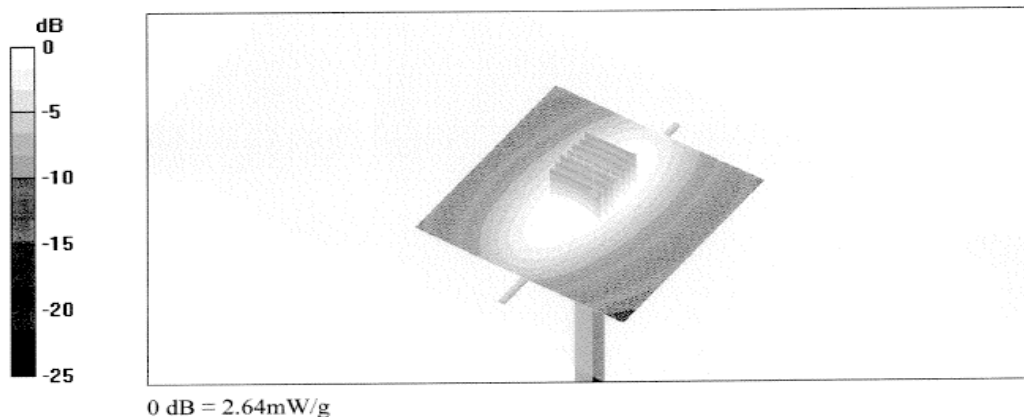
Pin = 250 mW; d = 15 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 51.6 V/m; Power Drift = 0.0 dB

Peak SAR (extrapolated) = 3.54 W/kg

SAR(1 g) = 2.44 mW/g; SAR(10 g) = 1.61 mW/g

Maximum value of SAR (measured) = 2.64 mW/g





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



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

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

Accreditation No.: **SCS 108**

Client **Nokia SD**

Certificate No: **D1900V2-534_Oct04/2**

CALIBRATION CERTIFICATE (Replacement of No: D1900V2-534_Oct04)

Object **D1900V2 - SN: 534**

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

Calibration date: **October 22, 2004**

Condition of the calibrated item **In Tolerance**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM E442	GB37480704	12-Oct-04 (METAS, No. 251-00412)	Oct-05
Power sensor HP 8481A	US37292783	12-Oct-04 (METAS, No. 251-00412)	Oct-05
Reference 20 dB Attenuator	SN: 5086 (20g)	10-Aug-04 (METAS, No 251-00402)	Aug-05
Reference 10 dB Attenuator	SN: 5047.2 (10r)	10-Aug-04 (METAS, No 251-00402)	Aug-05
Reference Probe ET3DV6	SN 1680	23-Feb-04 (SPEAG, No. ET3-1680_Feb04)	Feb-05
DAE4	SN 601	22-Jul-04 (SPEAG, No. DAE4-601_Jul04)	Jul-05
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (SPEAG, in house check Oct-03)	In house check: Oct-05
RF generator R&S SML-03	100698	27-Mar-02 (SPEAG, in house check Dec-03)	In house check: Dec-05
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (SPEAG, in house check Nov-03)	In house check: Nov 04

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

Issued: November 15, 2004

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

Certificate No: D1900V2-534_Oct04/2

Page 1 of 9

DASY4 Validation Report for Head TSL

Date/Time: 11/15/04 16:09:12

Test Laboratory: SPEAG, Zürich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:534

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

Medium: HSL 1800 MHz;

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.44$ mho/m; $\epsilon_r = 39.4$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1680; ConvF(5.02, 5.02, 5.02); Calibrated: 23.02.2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 22.07.2004
- Phantom: Flat Phantom quarter size -SN:1001; Type: QD000P50AA; Serial: SN:1001;
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130

Pin = 250 mW; d = 10 mm/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 11.4 mW/g

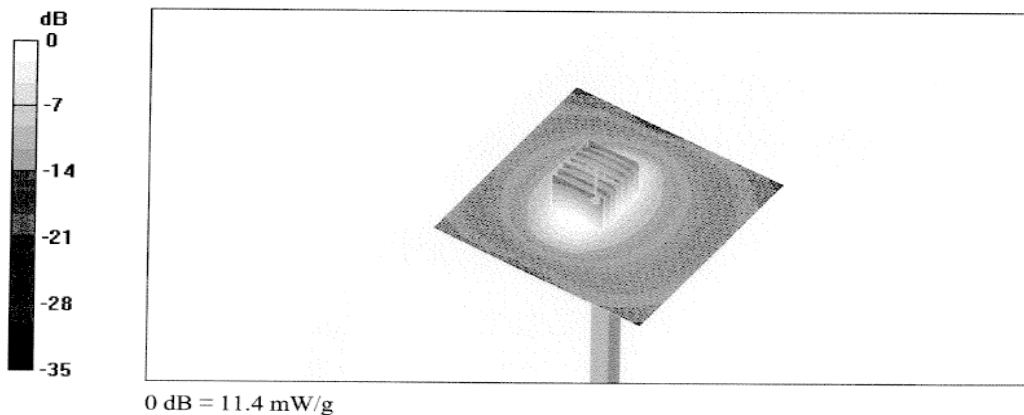
Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 77.7 V/m; Power Drift = 0.1 dB

Peak SAR (extrapolated) = 17.5 W/kg

SAR(1 g) = 9.91 mW/g; SAR(10 g) = 5.18 mW/g

Maximum value of SAR (measured) = 11.4 mW/g



DASY4 Validation Report for Body TSL

Date/Time: 11/15/04 16:09:27

Test Laboratory: SPEAG, Z^{ür}ich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 – SN:534

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

Medium: Muscle 1900 MHz;

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.59$ mho/m; $\epsilon_r = 51.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1680; ConvF(4.52, 4.52, 4.52); Calibrated: 23.02.2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 22.07.2004
- Phantom: Flat Phantom quarter size -SN:1001; Type: QD000P50AA; Serial: SN:1001;
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130

Pin = 250 mW; d = 10 mm/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm

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

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

Reference Value = 74.3 V/m; Power Drift = 0.1 dB

Peak SAR (extrapolated) = 16.4 W/kg

SAR(1 g) = 9.85 mW/g; SAR(10 g) = 5.28 mW/g

Maximum value of SAR (measured) = 11.3 mW/g

