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T117 (EN ISO/IEC 17025)

SAR Compliance Test Report

Test report no.:	SAR0309_01.doc	**Date of report:**	2003-03-05
Number of pages:	89	**Contact person:**	Mary Washington
		Responsible test engineer:	Virpi Tuominen

Testing laboratory:	TCC Salo P.O. Box 86 Joensuunkatu 7E / Kiila 1B FIN-24101 SALO, FINLAND Tel. +358 (0) 7180 08000 Fax. +358 (0) 7180 45220	**Client:**	Nokia, INC 12278 Scripps Summit Dr. San Diego CA 92131, USA Tel. +1 858 831 5000 Fax. +1 858 831 6500

Tested devices: **QMNRH-3**
Battery: BL-5C, Headsets: HDB-4 and HDK-1K

Supplement reports: -

Testing has been carried out in accordance with: FCC CFR. 47, Part 2.1093 and IEEE 1528-200X Draft CBD 1.0 Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques and FCC OET Bulletin 65, Supplement C, Edition 01-01.

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

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.

Date and signatures: 2003-03-05

For the contents:

Arto Hihnala **Engineering Manager, EMC**	**Virpi Tuominen** **Senior Design Engineer**

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1. SUMMARY FOR SAR TEST REPORT

Date of receipt	2002-12-09
Date of test	2002-12- 09 to 2002-12-13, 2003-02-13 to 2003-02-17
Contact person	Mary Washington
Test plan referred to	-
FCC ID	QMNRH-3
SN, HW, SW and DUT numbers	Phone: QMNRH-3 DUT: 06179, SN: 072/01936265, HW: 3005, SW: V G100b02.ner DUT: 06297, SN: 072/06700503, HW: 4000, SW: V G100b04.nep
Accessories	Battery: BL-5C DUT #'s: 06123, 06124, 06128, 06180, 06181, 06182, 06183, 06184, 06185, 06194. 06195, 06285, 06286
	Headsets: HDB-4, DUT: 06131 HDK-1K, DUT: 06293
Notes	-
Document code	SAR0309_01.doc
Responsible test engineer	Virpi Tuominen
Measurement performed by	Virpi Tuominen, Tomi Lipponen

1.1 Maximum Results Found during SAR Evaluation

The equipment is deemed to fulfilll the requirements if the measured values are less than or equal to the limit.

1.1.1 Head Configuration / CDMA 800

Ch / *f* (MHz)	Conducted Power	Position / Antenna Option	Limit 1 g avg	Measured 1 g avg	Result
384 / 836	25.3	Right hand cheek position / Antenna extended	1.6 mW/g	1.07 mW/g	**PASSED**

1.1.2 Head Configuration / CDMA 1900

Ch / *f* (MHz)	Conducted Power	Position / Antenna Option	Limit 1 g avg	Measured 1 g avg	Result
25 / 1851	23.3 dBm	Left hand tilt position / Antenna extended	1.6 mW/g	1.15 mW/g	**PASSED**
600 / 1880	23.3 dBm	Left hand tilt position / Antenna extended	1.6 mW/g	1.15 mW/g	**PASSED**

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1.1.3 Body Worn Configuration / CDMA 800

Ch / *f* (MHz)	Conducted Power	Accessory / Antenna Option	Separation distance	Limit 1 g avg	Measured 1 g avg	Result
384 / 836	25.3 dBm	HDK-1K / Antenna retracted	22 mm	1.6 mW/g	0.99 mW/g	**PASSED**

1.1.4 Body Worn Configuration / CDMA 1900

Ch / *f* (MHz)	Conducted Power	Accessory / Antenna Option	Separation distance	Limit 1 g avg	Measured 1 g avg	Result
1175 / 1909	23.5 dBm	HDK-1K / Antenna extended	22 mm	1.6 mW/g	0.43 mW/g	**PASSED**

1.1.5 Measurement Uncertainty

Combined Standard Uncertainty	± 14.0%
Expanded Standard Uncertainty (k=2)	± 28.0%

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2. DESCRIPTION OF THE TESTED DEVICE(S)

2.1 Device description

FCC ID Number	QMNRH-3	
Device category	Portable Device	
RF Exposure Limits	General population / Uncontrolled	
Unit type	Prototype unit	
Case type	Fixed case	
Modes of Operation	CDMA 800	CDMA 1900
Modulation Mode	QPSK	QPSK
Duty Cycle	1	1
Maximum Device Rating	Power Class III	Power Class II
Transmitter Frequency Range (MHz)	824.70 - 848.31	1851.25 - 1908.75

Acronyms: QPSK = Quadrature Phase Shift Keying

2.2 Picture of Phone

Fig. 2.2.1.
QMNRH-3 antenna retracted.

Fig. 2.2.2.
QMNRH-3 antenna extended.

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2.3 Description of the Antenna

Type	Retractable whip antenna with PIFA
Location	PIFA: inside the back cover at the top of the device. Retractable whip: back of phone, right hand side.

2.4 Battery Options

There is only one battery available for the tested device, a rechargeable Li-ion battery, type BL-5C.

2.5 Accessories

Headsets HDB-4 and HDK-1K were used for the measurements.

2.6 Body Worn Accessories

The body worn measurements were made with 22 mm separation distance.

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3. DESCRIPTION OF THE TEST EQUIPMENT

3.1 Automated near-field scanning system

The measurements were performed with an automated near-field scanning system, DASY3 manufactured by Schmidt & Partner Engineering AG (SPEAG) in Switzerland.

Schmidt & Partner Engineering AG (SPEAG)
Zeughausstrasse 43
8004 Zurich, Switzerland

Tel. +41 1 245 97 00
Fax. +41 1 245 97 79
www.speag.com

3.2 Robot

Fig. 3.2.1. Robot RX90L.

The robot is a RX90L manufactured by Stäubli France, www.staubli.com.

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3.3 Isotropic E-field probe ET3DV6R

Serial number	1395 *)	1396 **)
Frequency	10 MHz to 3 GHz	10 MHz to 3 GHz
Linearity	± 0.2 dB	± 0.2 dB
Directivity	± 0.2 dB in HSL (rotation around probe axis) ± 0.4 dB in HSL (rotation normal to probe axis)	± 0.2 dB in HSL (rotation around probe axis) ± 0.4 dB in HSL (rotation normal to probe axis)
Dynamic range	5 µW/g to >100 mW/g	5 µW/g to >100 mW/g
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 Tip distance to phantom inner surface: 1.4 mm	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 Tip distance to phantom inner surface: 1.5 mm
Calibration	Aug-02 (see Appendix C)	Jan-03 (see Appendix C)
Due date	Aug-03	Jan-04

*) Used before Feb-03. **) Used since Feb-03

The E-field probe is connected to the robot arm as can be seen in Figure 3.2.1.

3.4 Device holder

The holder was provided by SPEAG as a part of the DASY3 system.

Fig. 3.4.1. Device holder

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3.5 Dipole antennas for validation

The 900 MHz and 1800 MHz dipole antennas are matched for use near flat phantoms filled with head/body simulation solutions. The dipoles are equipped with 15 mm or 10 mm distance holders, respectively.

Antenna	Type	Serial number	Calibration	Due date
900 MHz dipole	D900V2	056	Jan-02	Jan-04
1800 MHz dipole	D1800V2	256	Jan-02	Jan-04

3.6 Phantom

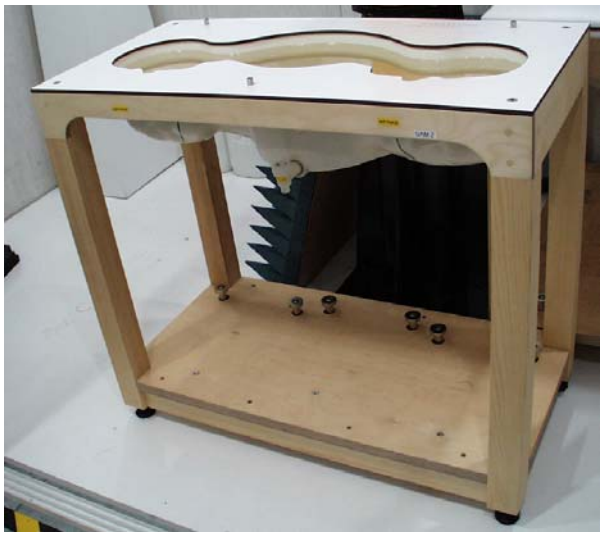

Fig. 3.6.1. SAM-phantom.

The phantoms enables dosimetric evaluation of left and right hand phone usage, as well as body mounted usage at the flat phantom region.

Shell thickness	2 ± 0.2 mm, except at Ear Reference Point, where an integrated spacer provides a 6 mm spacing from tissue simulating liquid
Liquid depth	15 ± 0.5 cm

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3.7 Base Station Simulator

The QMNRH-3 cellular phone was put into operation using a Rhode & Schwarz digital radio tester, CMU 200. Communication between the phone and the tester was established by air link.

Test Equipment	Digital radiocommunication Tester
Model	CMU 200
Serial number	101111
Calibration	Mar-02
Due date	Mar-03

3.8 Additional equipment needed in system check

Test Equipment	Model	Serial Number	Calibration	Due Date
Signal Generator	HP 8642B	2513A00178 [1)] 2531A00362 [2)]	Jan-02 Jan-02	Jan-03 Jan-03
Amplifier	Minicircuit ZHL-42	N072095-5	-	N/A
Power Meter	R&S NRVS	838624/032	Jul-02	Jul-04
Power Meter	R&S NRVS	849305/028	Jul-02	Jul-04
Power Sensor	R&S NRV-Z32	825600/004	Jul-02	Jul-04
Power Sensor	R&S NRV-Z32	839176/020	Jul-02	Jul-04
Thermometer	Lambrecht [3)] 175-H2 [4)]	671297.0003 20004475/211	Nov-02 Nov-02	Nov-03 Nov-03
Vector Network Analyzer	HP8753E	US38432928	Oct-02	Oct-03
Dielectric Probe Kit	HP85070B	US33020420	-	-

[1)] Used before Feb-03. [2)] Used since Feb-03. [3)] Used before Jan-03. [4)] Used since Jan-03.

3.9 RF characteristics of the test site

Tests were performed in RF shielded environment.

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4. TEST CONDITIONS

4.1 Ambient Conditions

Date	02-12-09	02-12-10	02-12-11	02-12-12	02-12-13	03-02-13	03-02-17
Ambient temperature (°C)	21.3	21.5	21.2	21.3	21.2	22.9	22.2
Humidity (% RH)	37	37	37	40	37	37	38

4.2 System Performance Check

Manufacturer calibrates the probes annually. Dielectric parameters of the simulating liquids are measured using a dielectric probe kit HP85070B and a vector network analyzer HP8753E.

The SAR measurements of the DUT were done within 24 hours of liquid parameter measurements and system performance check.

The dipole antenna is matched to be used near flat section of the phantom filled with tissue simulating solution. Length of 900 MHz dipole is 149 mm with overall height of 330 mm. The dimensions of 1800 MHz dipole are 72 mm and 300 mm, respectively. A specific distance holder is used in the positioning of relevant antenna to ensure correct spacing between the phantom and the dipole. Manufacturer's reference dipole data (=calibration data) is presented in Appendix C.

Power level of 250 mW was supplied to a dipole antenna placed under the flat section of SAM phantom. The results are in the table below and printouts of the tests are presented in Appendix A. The references are the calibration results of the dipole antennas. The reference results of the liquid parameters are those used by Speag during dipole calibrations. The ±10%-limits for SAR values and the ±5%-limits for liquid parameters are calculated from the reference values.

Tissue	Measuring date	SAR (W/kg), 1g	Dielectric Parameters	
			ε_r	σ (S/m)
Head 900 MHz	Reference Result	2.78	41.1	0.95
	Requirement	2.50 – 3.06	39.1 – 43.2	0.90 – 1.00
	2002-12-09	2.94	40.2	0.96
Muscle 900 MHz	Reference Result	2.92	54.8	1.03
	Requirement	2.63 – 3.21	52.1 – 57.5	0.98 – 1.08
	2003-12-17	2.99	55.9	1.01

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Tissue	Measuring date	SAR (W/kg), 1g	Dielectric Parameters	
			ε_r	σ (S/m)
Head 1800 MHz	Reference Result	9.99	39.6	1.37
	Requirement	8.99 – 10.99	37.6 – 41.6	1.30 – 1.44
	2002-12-11	9.81	38.8	1.35
	2002-12-12	9.82	38.6	1.36
Muscle 1800 MHz	Reference Result	9.87	53.5	1.45
	Requirement	8.88 – 10.86	50.8 – 56.2	1.38 – 1.52
	2003-02-13	10.7	53.1	1.41

4.3 Tissue Simulants

4.3.1 Measured values of liquid parameters

The tissue simulating liquids are measured by using a HP 85070B dielectric probe kit. The measured dielectric parameters are compared to the recommended values for 835 MHz and for 1800-1900 MHz given in OET Bulletin 65, Supplement C, Edition 01-01.

Tissue	Measuring date	835 MHz	
		ε_r	σ
Head 835 MHz	Recommended	41.5	0.90
	Limits (± 5%)	39.4-43.6	0.86-0.95
	2002-12-09	41.0	0.90
	2002-12-10	40.7	0.89
Muscle 835 MHz	Recommended	55.2	0.97
	Limits (± 5%)	49.7-58.0	0.92-1.02
	2003-02-17	56.1	0.94

Tissue	Measuring date	1880 MHz	
		ε_r	σ
Head 1880 MHz	Recommended	40.0	1.40
	Limits (± 5%)	38.0-42.0	1.33-1.47
	2002-12-11	38.3	1.44
	2002-12-12	38.1	1.44
	2002-12-13	38.2	1.44
Muscle 1880 MHz	Recommended	53.3	1.52
	Limits (± 5%)	50.6-56.0	1.44-1.60
	2003-02-13	52.8	1.50

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4.3.2 Recipes of tissue simulating liquids

Tissue simulating liquids on 835-900 MHz

Ingredient	Head (% by weight)	Muscle (% by weight)
Sugar	58.31	41.76
De-Ionized Water	39.74	55.97
Salt	1.55	0.79
HEC	0.25	1.21
Bactericide	0.15	0.27

Tissue simulating liquids on 1800-1900 MHz

Ingredient	Head (% by weight)	Muscle (% by weight)
De-ionized water	54.88	69.02
Di(ethylene glycol) butyl ether	44.91	30.76
Salt	0.21	0.22

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5. DEVICE POSITIONING

5.1 Positioning procedures

The cellular phone was measured in 2 positions on both “left hand” and “right hand” side of the phantom with the antenna in both extended and retracted positions. Furthermore, the cellular phone was measured under the flat section of the phantom antenna side towards the phantom and antenna extended and retracted. A headset was connected to the phone during the body SAR measurements.

5.1.1 Cheek/Touch Position

1) The phone was positioned with the vertical centerline of the body of the phone and the horizontal line crossing the center of the earpiece in a plane parallel to the sagittal plane of the phantom (“initial position”). While maintaining the phone in this plane, the vertical centerline was aligned with the reference plane containing the three ear and mouth reference points (RE, LE and M) and the center of the earpiece was aligned with the line RE-LE.

2) The mobile phone was moved towards the phantom with the earpiece aligned with the line LE-RE until the phone touched the ear. While maintaining the phone contact with the ear, the bottom of the phone was moved until any point of the phone was in contact with a phantom point below the ear.

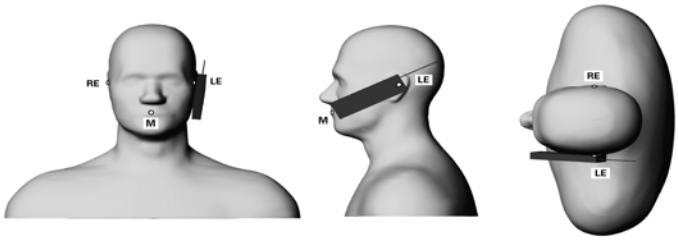

Fig. 5.1.1. Cheek/Touch position

5.1.2 Ear/Tilted Position

1) The phone was positioned in the “cheek/touch” position as described above.

2) While the phone was maintained in the reference plane described above and pivoting against the ear, the phone was moved outward away from the mouth by an angle of 15 degrees or until contact with the ear was lost.

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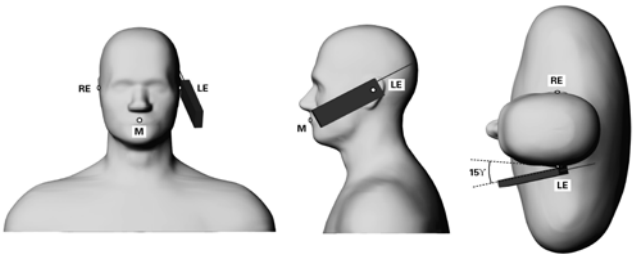

Fig. 5.1.2. Ear/Tilt Position.

5.1.3 Photos of setup

Fig. 5.1.3.1. QMNRH-3 in cheek position.

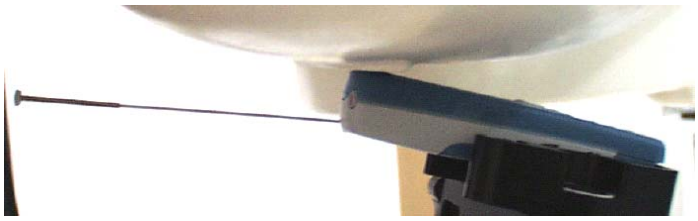

Fig. 5.1.3.2. QMNRH-3 in tilted position.

5.1.4 Body Worn Configuration

The phone was positioned into the holder and placed below the flat section of the phantom. The measurements were made to show compliance with 22 mm separation distance. Measurements were performed with the antenna side towards the phantom.

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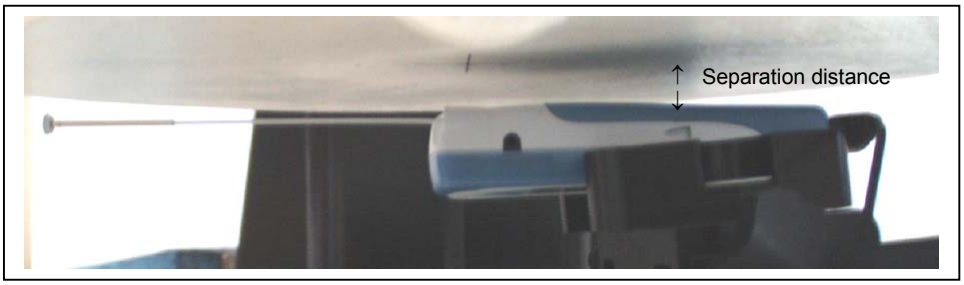

Fig. 5.1.4.1. QMNRH-3 in body position with antenna extended and headset HDB-4 connected.

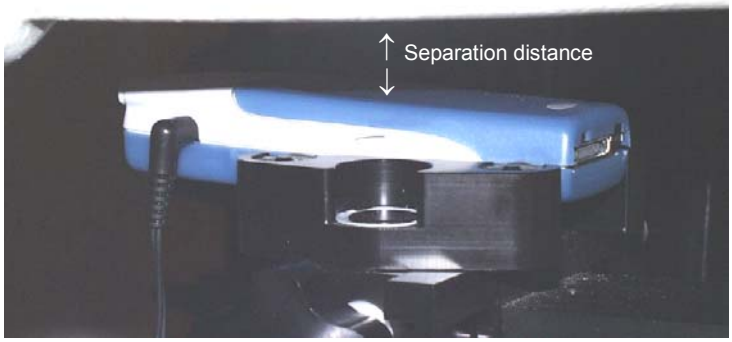

Fig. 5.1.4.2. QMNRH-3 in body position with antenna retracted and headset HDK-1K connected.

5.2 Scan Procedures

First coarse scan is used for quick determination of the field distribution. Next cube scan, 5x5x7 points; spacing between each point 8x8x5 mm, is performed around the highest E-field value to determine the averaged SAR-distribution over 1g.

5.3 SAR Averaging Methods

The maximum SAR value is averaged over its volume using interpolation and extrapolation.

The interpolation of the points is done with a 3d-Spline. The 3d-Spline is composed of three one-dimensional splines with the "Not a knot" -condition [W. Gander, Computermathematik, p. 141-150] (x, y and z -directions) [Numerical Recipes in C, Second Edition, p 123].

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The extrapolation is based on least square algorithm [W. Gander, Computermathematik, p.168-180]. Through the points in the first 30 mm in all z-axis, polynomials of order four are calculated. This polynomial is then used to evaluate the points between the surface and the probe tip. The points, calculated from the surface, have a distance of 1mm from one another.

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6. MEASUREMENT UNCERTAINTY

Uncertainty description	Error	Probability distribution	Weight	Standard Deviation
Axial isotropy	± 0.2 dB	U-shape	0.5	± 2.4%
Spherical Isotropy	± 0.4 dB	U-shape	0.5	± 4.8%
Spatial resolution	± 0.5 %	normal	1	± 0.5%
Linearity error	± 0.2 dB	rectangular	1	± 2.7%
Calibration error	± 3.3 %	normal	1	± 3.3%
Total Probe Uncertainty				**± 6.87%**
Data acquisition error	± 1%	rectangular	1	± 0.6%
ELF and RF disturbances	± 0.25%	normal	1	± 0.25%
Conductivity assessment	± 10%	rectangular	1	± 5.8%
Total SAR Evaluation Uncertainty				**± 5.84%**
Extrapolation + boundary effect	± 3%	normal	1	± 3%
Probe positioning error	± 0.1mm	normal	1	± 1%
Integration and cube orientation	± 3%	normal	1	± 3%
Cube shape inaccuracies	± 2%	rectangular	1	± 1.2%
Total Spatial Peak SAR Evaluation Uncertainty				**± 4.52%**
Total Measurement Uncertainty				**± 10.09%**
Device positioning	± 6%	normal	1	± 6%
Phantom dimensions	± 7%	normal	1	± 7%
Laboratory set up	± 3%	normal	1	± 3%
Total Source Uncertainty				**± 9.70%**
Combined Uncertainty				**± 14.0%**
Expanded Uncertainty (k=2) 95.5%				**± 28.0%**

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7. RESULTS

The SAR results shown in the tables are maximum SAR values averaged over 1g of tissue. The maximum result of every different test configuration is included in the appendix B as SAR distribution plots. The other SAR distribution plots are substantially similar or equivalent to the plots submitted regardless of used channel in each mode and position.

7.1 Head Configuration

Position	CDMA 800			
	Channel	Low	Mid	High
	Channel #	1013	384	777
	Conducted power (dBm)	25.4	25.3	25.3
Cheek, left hand	Antenna retracted	0.539	0.826	0.824
	Antenna extended	0.930	1.05	0.859
Tilt, left hand	Antenna retracted	0.392	0.648	0.662
	Antenna extended	0.554	0.741	0.761
Cheek, right hand	Antenna retracted	0.591	0.814	0.852
	Antenna extended	0.941	**1.07**	0.817
Tilt, right hand	Antenna retracted	0.385	0.603	0.593
	Antenna extended	0.547	0.681	0.626

Position	CDMA 1900			
	Channel	Low	Mid	High
	Channel #	25	600	1175
	Conducted power (dBm)	23.3	23.3	23.5
Cheek, left hand	Antenna retracted	0.670	0.950	0.928
	Antenna extended	1.03	1.08	0.956
Tilt, left hand	Antenna retracted	0.674	1.02	1.05
	Antenna extended	**1.15**	**1.15**	0.913
Cheek, right hand	Antenna retracted	0.471	0.579	0.633
	Antenna extended	0.749	0.780	0.635
Tilt, right hand	Antenna retracted	0.566	0.783	0.845
	Antenna extended	0.856	0.924	0.753

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7.2 Body configuration

Body SAR measurements were performed with the headset HDB-4 or HDK-1K connected. Antenna side of the phone was towards the phantom in order to achieve the highest SAR values. The results with 22 mm separation distance are listed in the tables below.

Accessory	CDMA 800			
	Channel	Low	Mid	High
	Channel #	1013	384	777
	Conducted power (dBm)	25.4	25.3	25.3
HDB-4	Antenna retracted	0.486	0.709	0.721
	Antenna extended	0.471	0.643	0.575
HDK-1K	Antenna retracted	0.969	**0.992**	0.721
	Antenna extended	0617	0.775	0.575

Accessory	CDMA 1900			
	Channel	Low	Mid	High
	Channel #	25	600	1175
	Conducted power (dBm)	23.3	23.3	23.5
HDB-4	Antenna retracted	0.254	0.345	0.400
	Antenna extended	0.318	0.358	0.412
HDK-1K	Antenna retracted	0.318	0.369	0.416
	Antenna extended	0.389	0.411	**0.427**

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APPENDIX A.

Validation Test Printouts

Dipole 900 MHz

2002-12-09

SAM 2; Flat

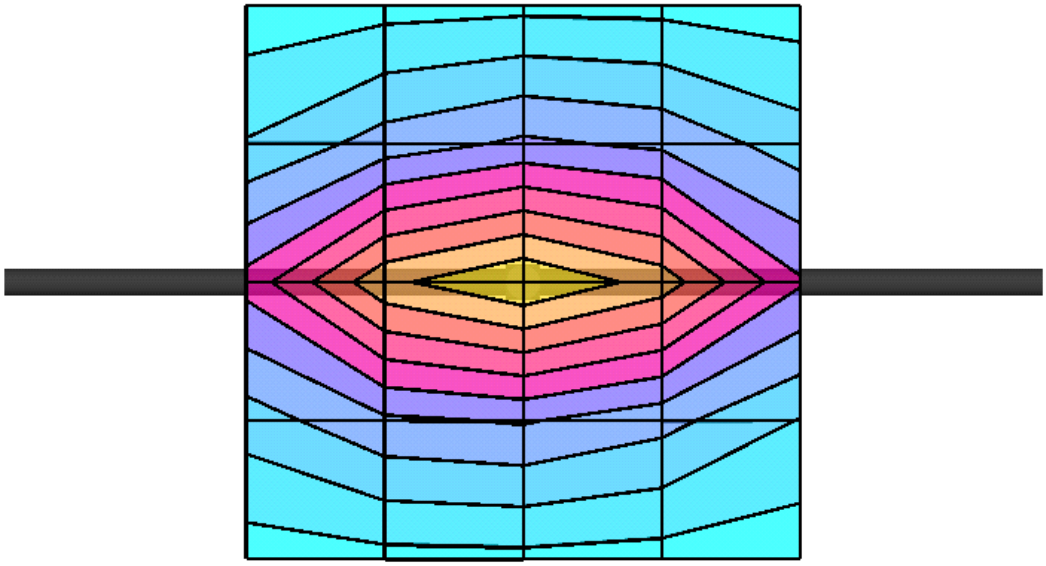
Probe: ET3DV6 - SN1395; ConvF(6.30,6.30,6.30); Crest factor: 1.0;

Brain 900 MHz: σ = 0.96 mho/m ε_r = 40.2 ρ = 1.00 g/cm^3; t=20.2°C

Cubes (2): Peak: 4.81 mW/g ± 0.16 dB, SAR (1g): 2.94 mW/g ± 0.10 dB, SAR (10g): 1.83 mW/g ± 0.06 dB, (Worst-case extrapolation)

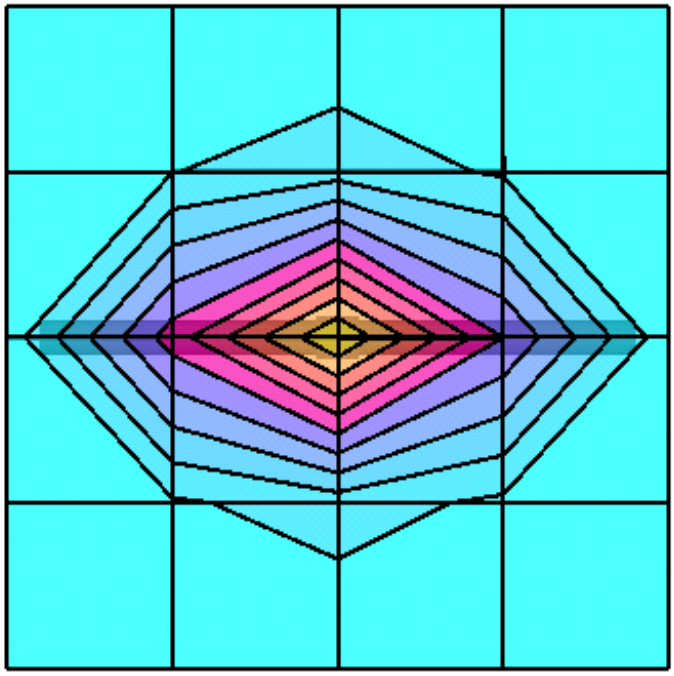
Penetration depth: 11.2 (9.9, 13.0) [mm]

Powerdrift: -0.07 dB



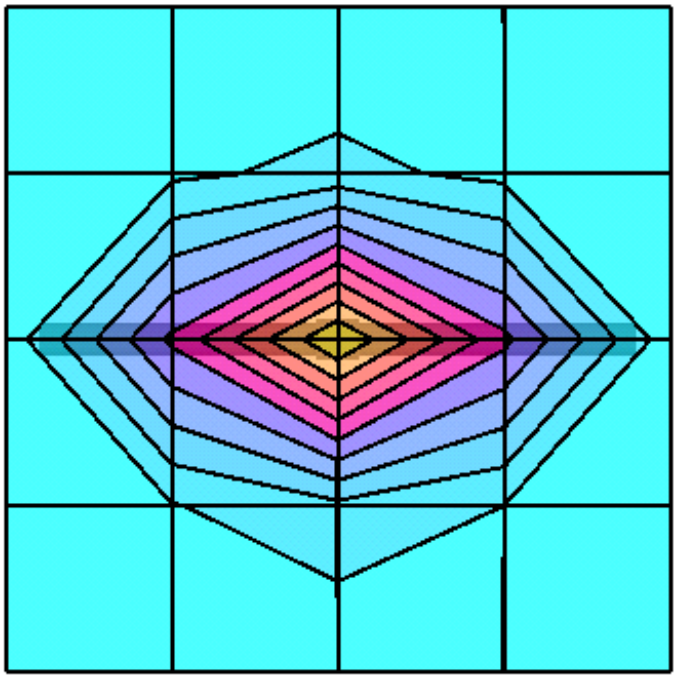
Dipole 1800 MHz

2002-12-11
SAM 2; Flat
Probe: ET3DV6 - SN1395; ConvF(5.40,5.40,5.40); Crest factor: 1.0;
Brain 1800 MHz: σ = 1.35 mho/m ε_r = 38.8 ρ = 1.00 g/cm^3; t=22.0°C
Cubes (2): Peak: 18.3 mW/g ± 0.08 dB, SAR (1g): 9.81 mW/g ± 0.06 dB, SAR (10g): 5.12 mW/g ± 0.04 dB, (Worst-case extrapolation)
Penetration depth: 8.2 (7.7, 9.3) [mm]
Powerdrift: -0.01 dB



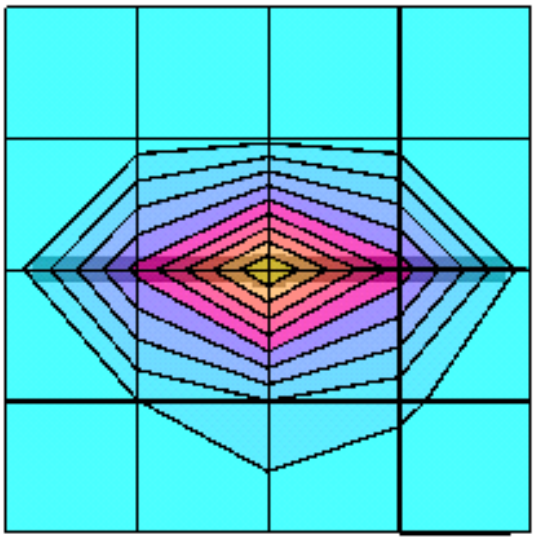
Dipole 1800 MHz

2002-12-12
SAM 2; Flat
Probe: ET3DV6 - SN1395; ConvF(5.40,5.40,5.40); Crest factor: 1.0;
Brain 1800 MHz: σ = 1.36 mho/m ε_r = 38.6 ρ = 1.00 g/cm^3; t=21.8°C
Cubes (2): Peak: 18.2 mW/g ± 0.07 dB, SAR (1g): 9.82 mW/g ± 0.05 dB, SAR (10g): 5.15 mW/g ± 0.03 dB, (Worst-case extrapolation)
Penetration depth: 8.3 (7.7, 9.4) [mm]
Powerdrift: 0.01 dB



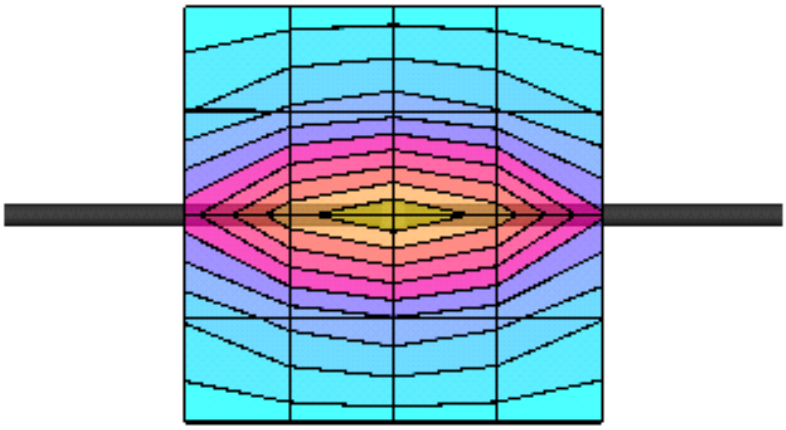
Dipole 1800 MHz

2003-02-13
t(liq.)=21.4°C
SAM 2; Flat
Probe: ET3DV6 - SN1396; ConvF(5.10,5.10,5.10); Crest factor: 1.0; BODY 1800 MHz: σ = 1.41 mho/m ε_r = 53.1 ρ = 1.00 g/cm^3
Cubes (2): Peak: 19.2 mW/g ± 0.14 dB, SAR (1g): 10.7 mW/g ± 0.12 dB, SAR (10g): 5.74 mW/g ± 0.11 dB, (Worst-case extrapolation)
Penetration depth: 9.3 (8.5, 10.6) [mm]
Powerdrift: -0.03 dB



Dipole 900 MHz

2003-02-17
t(liq.)=20.6°C
SAM 2; Flat
Probe: ET3DV6 - SN1396; ConvF(6.60,6.60,6.60); Crest factor: 1.0; Body900 MHz: σ = 1.01 mho/m ε_r = 55.5 ρ = 1.00 g/cm^3
Cubes (2): Peak: 4.77 mW/g ± 0.12 dB, SAR (1g): 2.99 mW/g ± 0.13 dB, SAR (10g): 1.92 mW/g ± 0.12 dB, (Worst-case extrapolation)
Penetration depth: 12.4 (11.0, 14.1) [mm]
Powerdrift: -0.04 dB



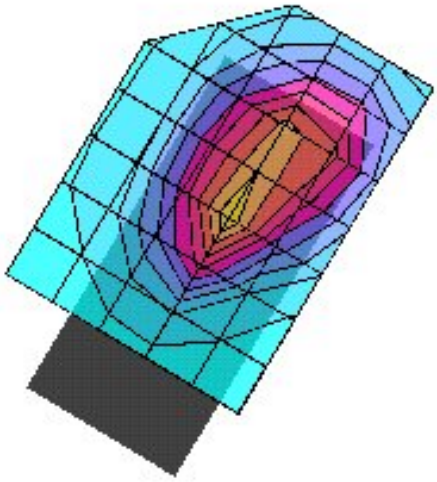
APPENDIX B.

SAR Distribution Printouts

QMNRH-3, ANTENNA RETRACTED, LEFT CHEEK, CDMA 800

2002-12-09
t(liq.)=20.7°C

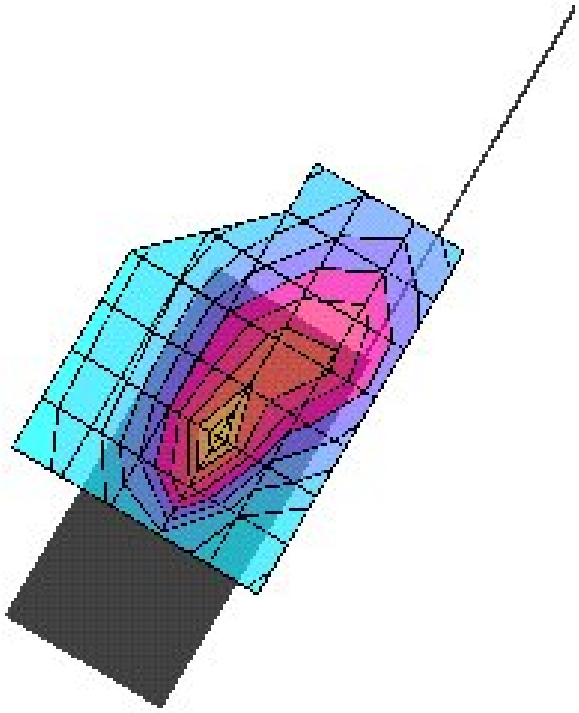
SAM 2 Phantom; Left Hand Section; Cheek Position: (90°,59°); Frequency: 836 MHz
Probe: ET3DV6 - SN1395; ConvF(6.30,6.30,6.30); Crest factor: 1.0; Brain 835 MHz: σ = 0.90 mho/m ε_r = 41.0 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 0.826 mW/g, SAR (10g): 0.525 mW/g * Max outside, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: -0.21 dB



QMNRH-3, ANTENNA EXTENDED, LEFT CHEEK, CDMA 800

2002-12-09
t(liq.)=20.7°C

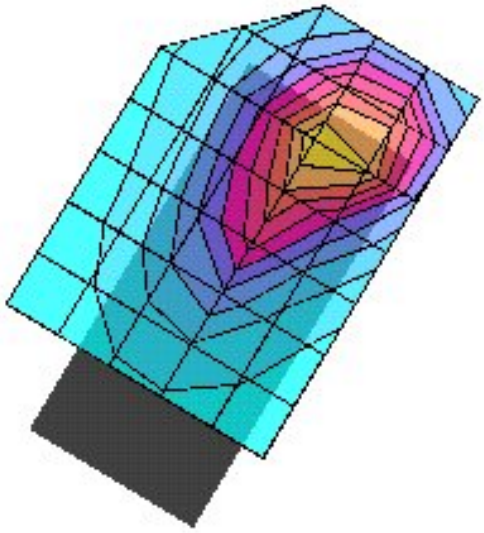
SAM 2 Phantom; Left Hand Section; Cheek Position: (90°,59°); Frequency: 837 MHz
Probe: ET3DV6 - SN1395; ConvF(6.30,6.30,6.30); Crest factor: 1.0; Brain 835 MHz: σ = 0.90 mho/m ε_r = 41.0 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 1.05 mW/g, SAR (10g): 0.614 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: -0.05 dB



QMNRH-3, ANTENNA RETRACTED, LEFT TILT, CDMA 800

2002-12-09
t(liq.)=20.1°C

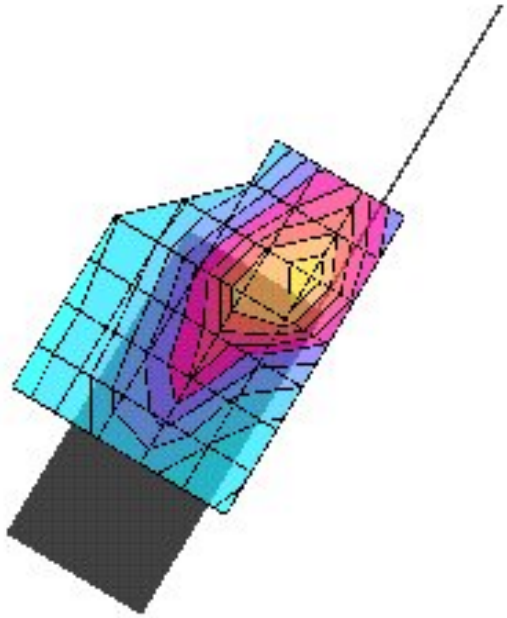
SAM 2 Phantom; Left Hand Section; Tilt Position: (90°,59°); Frequency: 848 MHz
Probe: ET3DV6 - SN1395; ConvF(6.30,6.30,6.30); Crest factor: 1.0; Brain 835 MHz: σ = 0.90 mho/m ε_r = 41.0 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 0.662 mW/g, SAR (10g): 0.389 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: -0.02 dB



QMNRH-3, ANTENNA EXTENDED, LEFT TILT, CDMA 800

2002-12-10
t(liq.)=21.1°C

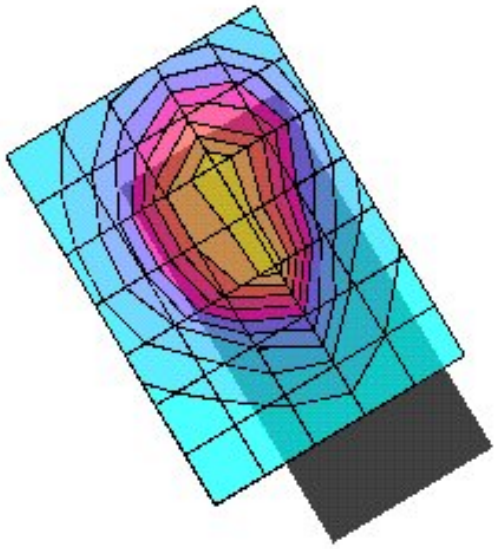
SAM 2 Phantom; Left Hand Section; Tilt Position: (90°,59°); Frequency: 848 MHz
Probe: ET3DV6 - SN1395; ConvF(6.30,6.30,6.30); Crest factor: 1.0; Brain 835 MHz: σ = 0.89 mho/m ε_r = 40.7 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 0.761 mW/g, SAR (10g): 0.467 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: 0.06 dB



QMNRH-3, ANTENNA RETRACTED, RIGHT CHEEK, CDMA 800

2002-12-09
t(liq.)=20.9°C

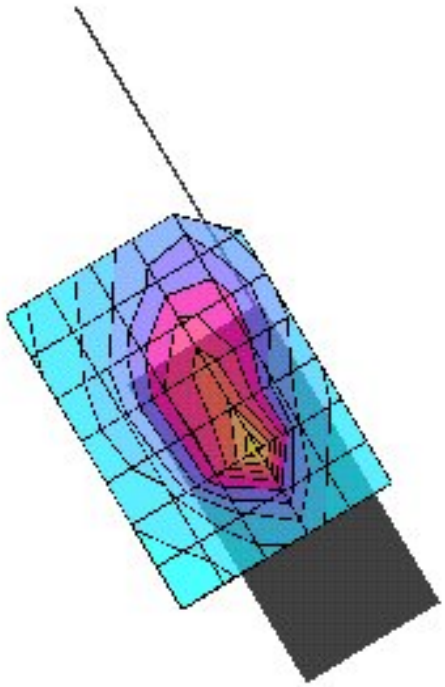
SAM 2 Phantom; Righ Hand Section; Cheek Position: (90°,301°); Frequency: 848 MHz
Probe: ET3DV6 - SN1395; ConvF(6.30,6.30,6.30); Crest factor: 1.0; Brain 835 MHz: σ = 0.90 mho/m ε_r = 41.0 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 0.852 mW/g, SAR (10g): 0.564 mW/g * Max outside, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: -0.00 dB



QMNRH-3, ANTENNA EXTENDED, RIGHT CHEEK, CDMA 800

2002-12-09
t(liq.)=21.0°C

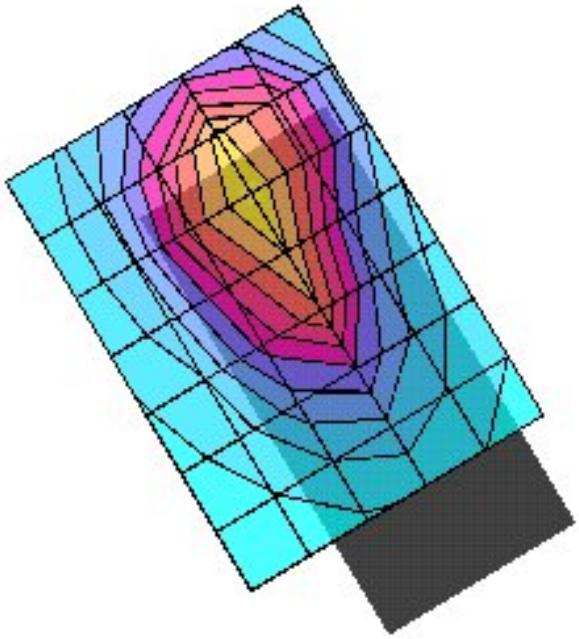
SAM 2 Phantom; Righ Hand Section; Cheek Position: (90°,301°); Frequency: 837 MHz
Probe: ET3DV6 - SN1395; ConvF(6.30,6.30,6.30); Crest factor: 1.0; Brain 835 MHz: σ = 0.90 mho/m ε_r = 41.0 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 1.07 mW/g, SAR (10g): 0.624 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: -0.00 dB



QMNRH-3, ANTENNA RETRACTED, RIGHT TILT, CDMA 800

2002-12-09
t(liq.)=20.5°C

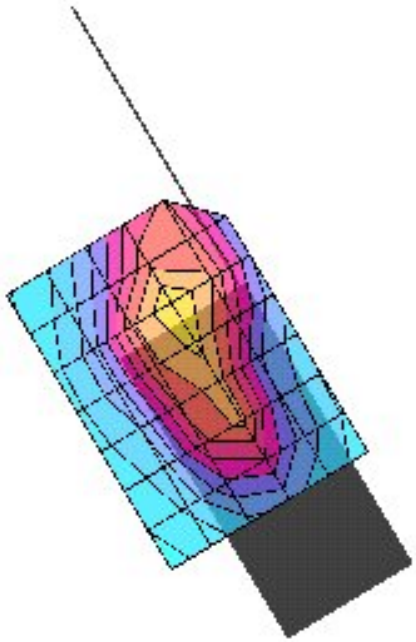
SAM 2 Phantom; Righ Hand Section;Tilt Position: (90°,301°); Frequency: 837 MHz
Probe: ET3DV6 - SN1395; ConvF(6.30,6.30,6.30); Crest factor: 1.0; Brain 835 MHz: σ = 0.90 mho/m ε_r = 41.0 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 0.603 mW/g, SAR (10g): 0.381 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: -0.12 dB



QMNRH-3, ANTENNA EXTENDED, RIGHT TILT, CDMA 800

2002-12-09
t(liq.)=20.6°C

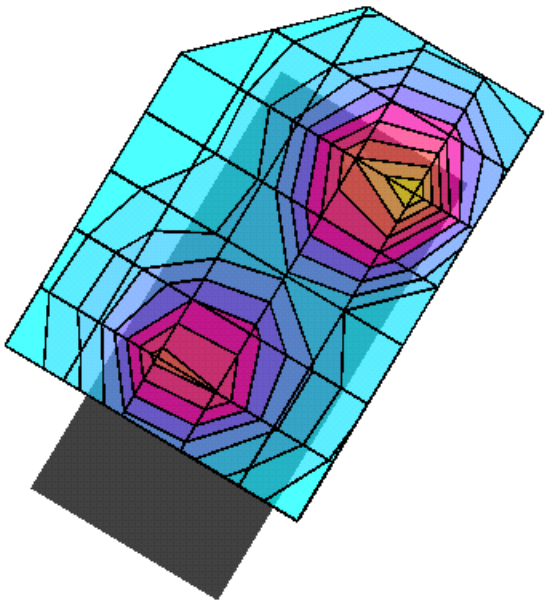
SAM 2 Phantom; Righ Hand Section; Tilt Position: (90°,301°); Frequency: 837 MHz
Probe: ET3DV6 - SN1395; ConvF(6.30,6.30,6.30); Crest factor: 1.0; Brain 835 MHz: σ = 0.90 mho/m ε_r = 41.0 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 0.681 mW/g, SAR (10g): 0.438 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: -0.01 dB



QMNRH-3, ANTENNA RETRACTED, LEFT CHEEK, CDMA 1900

2002-12-12
t(liq.)=21.1°C

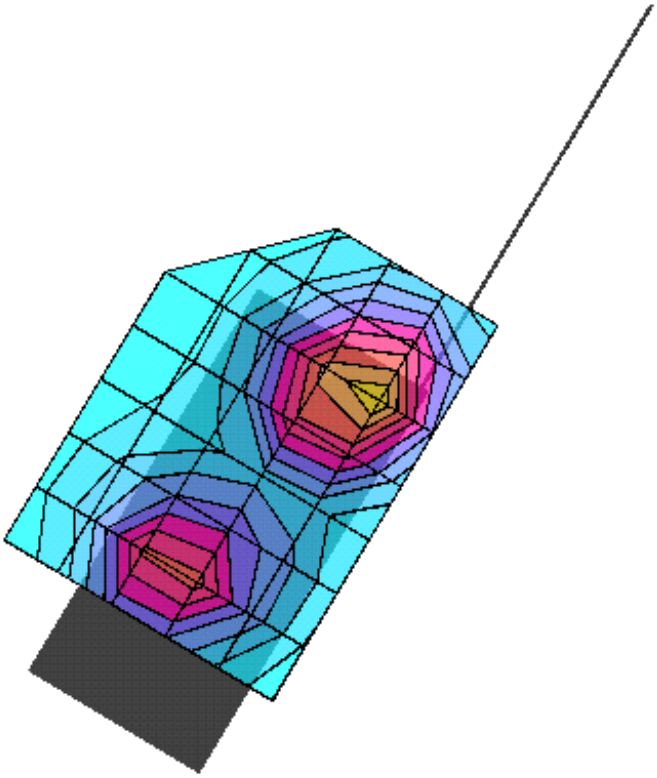
SAM 2 Phantom; Left Hand Section; Cheek Position: (90°,59°); Frequency: 1880 MHz
Probe: ET3DV6 - SN1395; ConvF(5.40,5.40,5.40); Crest factor: 1.0; Brain 1880 MHz: σ = 1.44 mho/m ε_r = 38.1 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 0.950 mW/g, SAR (10g): 0.514 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: -0.04 dB



QMNRH-3, ANTENNA EXTENDED, LEFT CHEEK, CDMA 1900

2002-12-11
t(liq.)=20.0°C

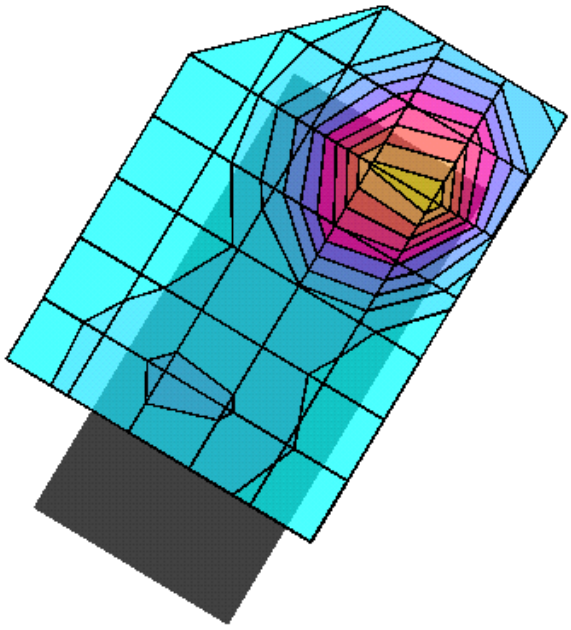
SAM 2 Phantom; Left Hand Section; Cheek Position: (90°,59°); Frequency: 1880 MHz
Probe: ET3DV6 - SN1395; ConvF(5.40,5.40,5.40); Crest factor: 1.0; Brain 1880 MHz: σ = 1.44 mho/m ε_r = 38.3 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 1.08 mW/g, SAR (10g): 0.596 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: 0.03 dB



QMNRH-3, ANTENNA RETRACTED, LEFT TILT, CDMA 1900

2002-12-12
t(liq.)=21.2°C

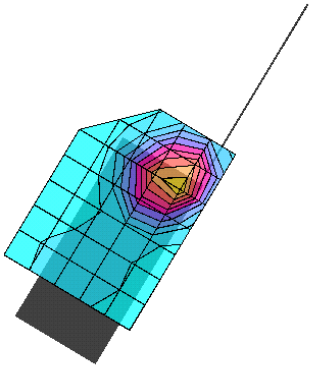
SAM 2 Phantom; Left Hand Section; Tilt Position: (90°,59°); Frequency: 1909 MHz
Probe: ET3DV6 - SN1395; ConvF(5.40,5.40,5.40); Crest factor: 1.0; Brain 1880 MHz: σ = 1.44 mho/m ε_r = 38.1 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 1.05 mW/g, SAR (10g): 0.567 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: -0.01 dB



QMNRH-3, ANTENNA EXTENDED, LEFT TILT, CDMA 1900

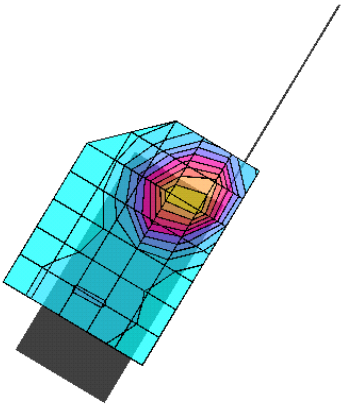
2002-12-11
t(liq.)=20.1°C

SAM 2 Phantom; Left Hand Section; Tilt Position: (90°,59°); Frequency: 1851 MHz
Probe: ET3DV6 - SN1395; ConvF(5.40,5.40,5.40); Crest factor: 1.0; Brain 1880 MHz: σ = 1.44 mho/m ε_r = 38.3 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 1.15 mW/g, SAR (10g): 0.629 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: 0.08 dB



2002-12-11
t(liq.)=20.1°C

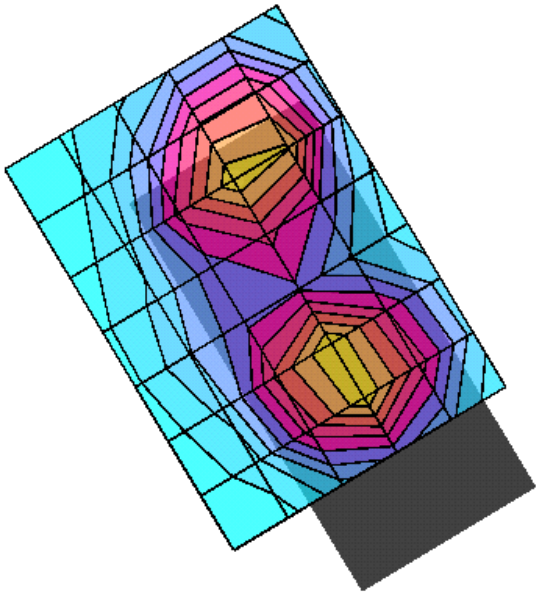
SAM 2 Phantom; Left Hand Section; Tilt Position: (90°,59°); Frequency: 1880 MHz
Probe: ET3DV6 - SN1395; ConvF(5.40,5.40,5.40); Crest factor: 1.0; Brain 1880 MHz: σ = 1.44 mho/m ε_r = 38.3 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 1.15 mW/g, SAR (10g): 0.640 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: -0.09 dB



QMNRH-3, ANTENNA RETRACTED, RIGHT CHEEK, CDMA 1900

2002-12-13
t(liq.)=20.6°C

SAM 2 Phantom; Righ Hand Section; Cheek Position: (90°,301°); Frequency: 1851 MHz
Probe: ET3DV6 - SN1395; ConvF(5.40,5.40,5.40); Crest factor: 1.0; Brain 1880 MHz: σ = 1.44 mho/m ε_r = 38.2 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 0.633 mW/g, SAR (10g): 0.393 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: -0.09 dB

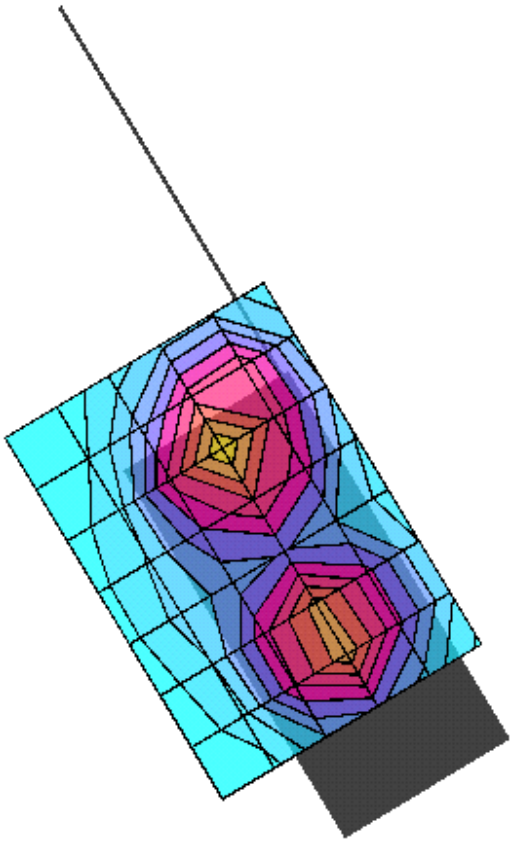


The lower hot spot was evaluated automatically by the DASY-3 and the SAR-value is 0.633 mW/g. The other maximum was scanned manually, but its SAR-value was lower (1g averaged result: 0.627 mW/g).

QMNRH-3, ANTENNA EXTENDED, RIGHT CHEEK, CDMA 1900

2002-12-12
t(liq.)=20.7°C

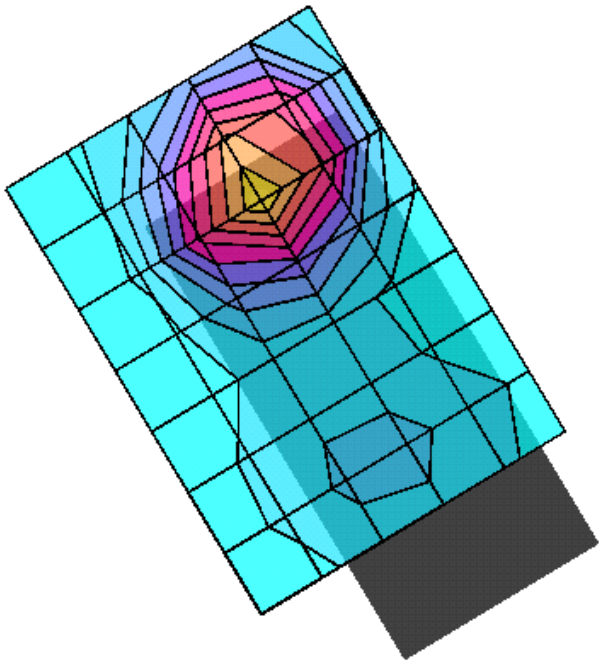
SAM 2 Phantom; Righ Hand Section; Cheek Position: (90°,301°); Frequency: 1880 MHz
Probe: ET3DV6 - SN1395; ConvF(5.40,5.40,5.40); Crest factor: 1.0; Brain 1880 MHz: σ = 1.44 mho/m ε_r = 38.1 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 0.780 mW/g, SAR (10g): 0.465 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: 0.00 dB



QMNRH-3, ANTENNA RETRACTED, RIGHT TILT, CDMA 1900

2002-12-12
t(liq.)=20.6°C

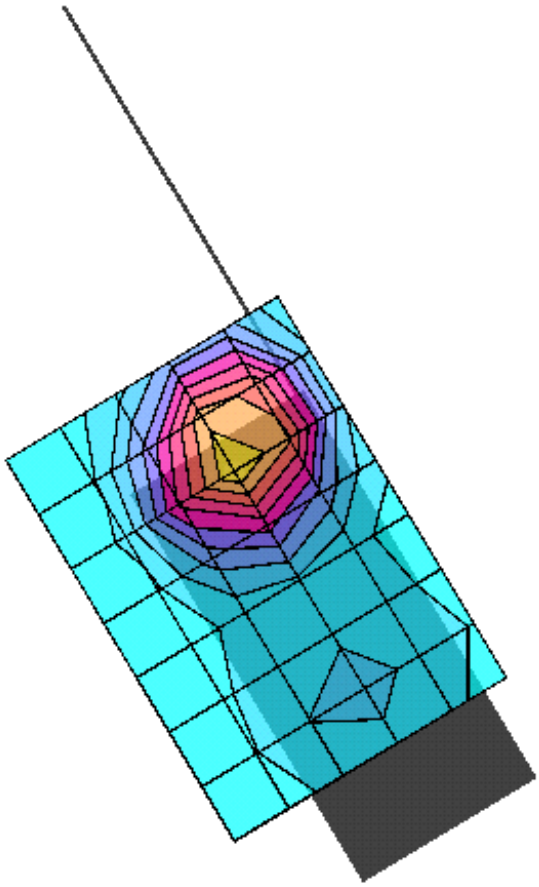
SAM 2 Phantom; Righ Hand Section; Tilt Position: (90°,301°); Frequency: 1909 MHz
Probe: ET3DV6 - SN1395; ConvF(5.40,5.40,5.40); Crest factor: 1.0; Brain 1880 MHz: σ = 1.44 mho/m ε_r = 38.1 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 0.845 mW/g, SAR (10g): 0.472 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: -0.01 dB



QMNRH-3, ANTENNA EXTENDED, RIGHT TILT, CDMA 1900

2002-12-12
t(liq.)=20.7°C

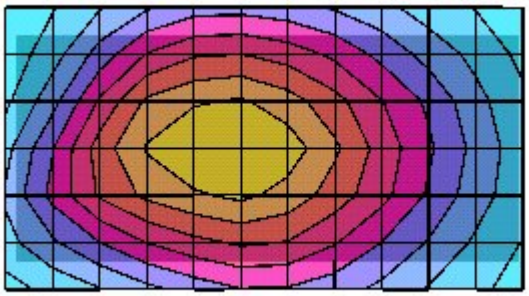
SAM 2 Phantom; Righ Hand Section; Tilt Position: (90°,301°); Frequency: 1880 MHz
Probe: ET3DV6 - SN1395; ConvF(5.40,5.40,5.40); Crest factor: 1.0; Brain 1880 MHz: σ = 1.44 mho/m ε_r = 38.1 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 0.924 mW/g, SAR (10g): 0.530 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: 0.00 dB



QMNRH-3 WITH HDB-4, ANTENNA RETRACTED, BODY, CDMA 800

2003-02-17
t(liq.)=20.3°C

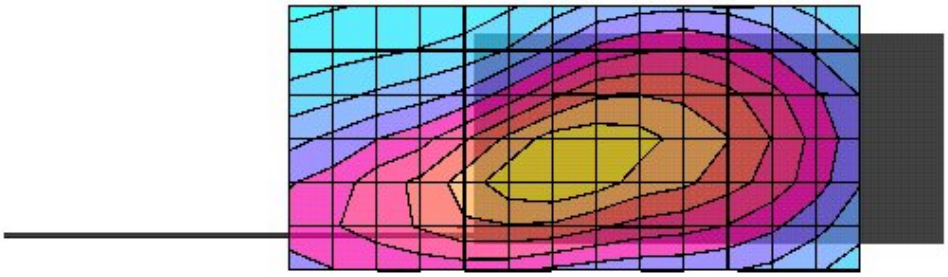
SAM 2 Phantom; Flat Section; Body Position: (270°,90°); Frequency: 848 MHz
Probe: ET3DV6 - SN1396; ConvF(6.60,6.60,6.60); Crest factor: 1.0; Body 836MHz: σ = 0.94 mho/m ε_r = 56.1 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 0.721 mW/g, SAR (10g): 0.517 mW/g * Max outside, (Worst-case extrapolation)
Coarse: Dx = 10.0, Dy = 10.0, Dz = 10.0
Powerdrift: -0.14 dB



QMNRH-3 WITH HDB-4, ANTENNA EXTENDED, BODY, CDMA 800

2003-02-17
t(liq.)=20.4 °C

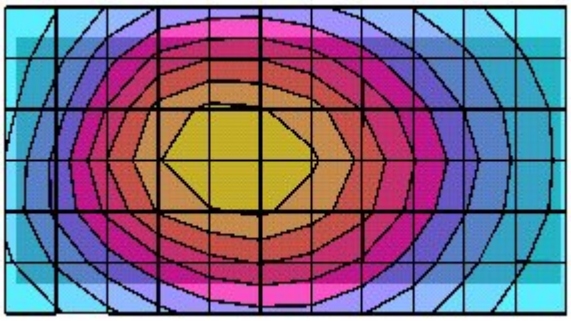
SAM 2 Phantom; Flat Section; Body Position: (270°,90°); Frequency: 836 MHz
Probe: ET3DV6 - SN1396; ConvF(6.60,6.60,6.60); Crest factor: 1.0; Body 836MHz: σ = 0.94 mho/m ε_r = 56.1 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 0.643 mW/g, SAR (10g): 0.449 mW/g, (Worst-case extrapolation)
Coarse: Dx = 10.0, Dy = 10.0, Dz = 10.0
Powerdrift: -0.04 dB



QMNRH-3 WITH HDK-1K, ANTENNA RETRACTED, BODY, CDMA 800

2003-02-17
t(liq.)=20.3 °C

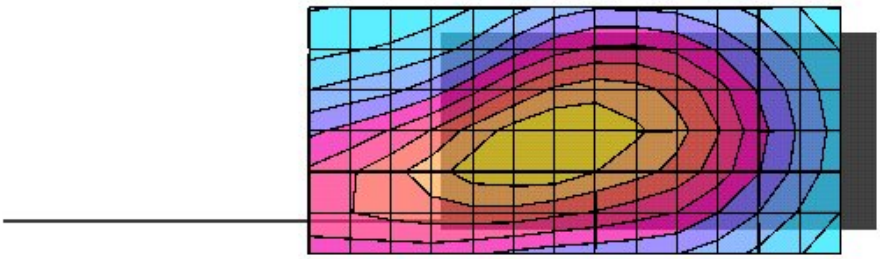
SAM 2 Phantom; Flat Section; Body Position: (270°,90°); Frequency: 836 MHz
Probe: ET3DV6 - SN1396; ConvF(6.60,6.60,6.60); Crest factor: 1.0; Body 836MHz: σ = 0.94 mho/m ε_r = 56.1 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 0.992 mW/g, SAR (10g): 0.707 mW/g, (Worst-case extrapolation)
Coarse: Dx = 10.0, Dy = 10.0, Dz = 10.0
Powerdrift: -0.04 dB



QMNRH-3 WITH HDK-1K, ANTENNA EXTENDED, BODY, CDMA 800

2003-02-17
t(liq.)=20.4 °C

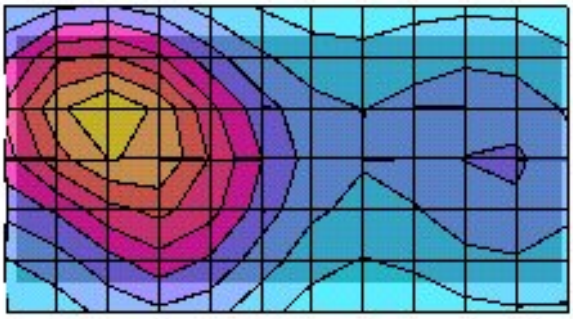
SAM 2 Phantom; Flat Section;Body Position: (270°,90°); Frequency: 836 MHz
Probe: ET3DV6 - SN1396; ConvF(6.60,6.60,6.60); Crest factor: 1.0; Body 836MHz: σ = 0.94 mho/m ε_r = 56.1 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 0.775 mW/g, SAR (10g): 0.550 mW/g, (Worst-case extrapolation)
Coarse: Dx = 10.0, Dy = 10.0, Dz = 10.0
Powerdrift: -0.03 dB



QMNRH-3 WITH HDB-4, ANTENNA RETRACTED, BODY, CDMA 1900

2003-02-13
t(liq.)=20.2°C

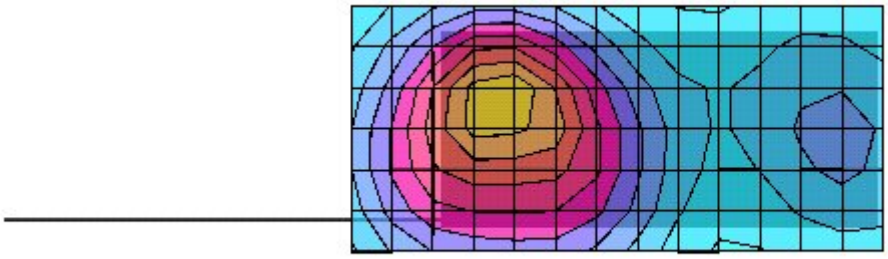
SAM 2 Phantom; Flat Section; Body Position: (270°,90°); Frequency: 1909 MHz
Probe: ET3DV6 - SN1396; ConvF(5.10,5.10,5.10); Crest factor: 1.0; BODY 1880 MHz: σ = 1.50 mho/m ε_r = 52.8 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 0.400 mW/g, SAR (10g): 0.236 mW/g, (Worst-case extrapolation)
Coarse: Dx = 10.0, Dy = 10.0, Dz = 10.0
Powerdrift: -0.11 dB



QMNRH-3 WITH HDB-4, ANTENNA EXTENDED, BODY, CDMA 1900

2003-02-13
t(liq.)=20.3°C

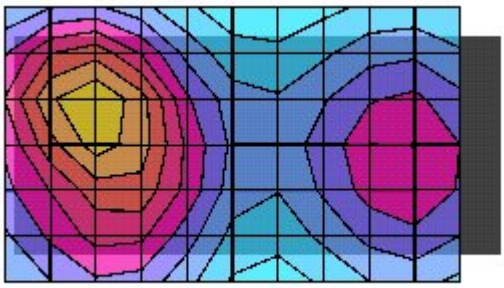
SAM 2 Phantom; Flat Section; Body Position: (270°,90°); Frequency: 1909 MHz
Probe: ET3DV6 - SN1396; ConvF(5.10,5.10,5.10); Crest factor: 1.0; BODY 1880 MHz: σ = 1.50 mho/m ε_r = 52.8 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 0.412 mW/g, SAR (10g): 0.245 mW/g, (Worst-case extrapolation)
Coarse: Dx = 10.0, Dy = 10.0, Dz = 10.0
Powerdrift: -0.01 dB



QMNRH-3 WITH HDK-1K, ANTENNA RETRACTED, BODY, CDMA 1900

2003-02-13
t(liq.)=20.5°C

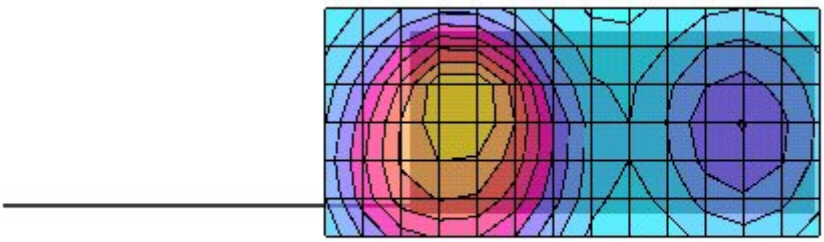
SAM 2 Phantom; Flat Section; Body Position: (270°,90°); Frequency: 1909 MHz
Probe: ET3DV6 - SN1396; ConvF(5.10,5.10,5.10); Crest factor: 1.0; B0DY 1880 MHz: σ = 1.50 mho/m ε_r = 52.8 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 0.416 mW/g, SAR (10g): 0.249 mW/g, (Worst-case extrapolation)
Coarse: Dx = 10.0, Dy = 10.0, Dz = 10.0
Powerdrift: 0.06 dB



QMNRH-3 WITH HDK-1K, ANTENNA EXTENDED, BODY, CDMA 1900

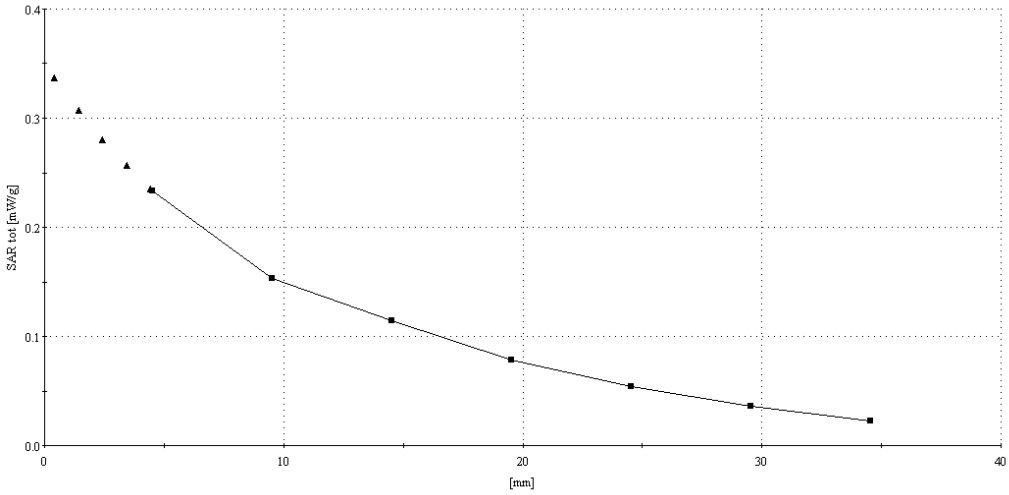
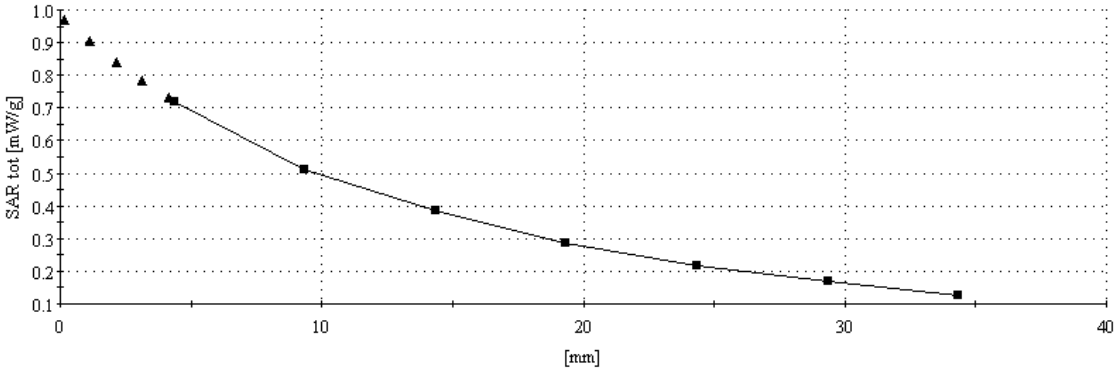
2003-02-13
t(liq.)=20.3°C

SAM 2 Phantom; Flat Section; Body Position: (270°,90°); Frequency: 1909 MHz
Probe: ET3DV6 - SN1396; ConvF(5.10,5.10,5.10); Crest factor: 1.0; BODY 1880 MHz: σ = 1.50 mho/m ε_r = 52.8 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 0.427 mW/g, SAR (10g): 0.259 mW/g, (Worst-case extrapolation)
Coarse: Dx = 10.0, Dy = 10.0, Dz = 10.0
Powerdrift: -0.13 dB



Z-PLOTS OF MAXIMUM RESULTS

QMNRH-3, antenna extended, left tilt, CDMA 1900
2002-12-11
SAM 2 Phantom; Left Hand Section;Tilt Position:; Frequency: 1851 MHz
Probe: ET3DV6 - SN1395; ConvF(5.40,5.40,5.40); Crest factor: 1.0;
Brain 1880 MHz: σ = 1.44 mho/m ε_r = 38.3 ρ = 1.00 g/cm^3; t=20.1°C
Cube 5x5x7: SAR (1g): 1.15 mW/g, SAR (10g): 0.629 mW/g, (Worst-case extrapolation)
Cube 5x5x7: Dx = 8.0, Dy = 8.0, Dz = 5.0



SAM 2 Phantom; Flat Section; Body Position: (270°,90°); Frequency: 836 MHz
Probe: ET3DV6 - SN1396; ConvF(6.60,6.60,6.60); Crest factor: 1.0; Body 836MHz: σ = 0.94 mho/m ε_r = 56.1 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 0.992 mW/g, SAR (10g): 0.707 mW/g, (Worst-case extrapolation)
Cube 5x5x7: Dx = 8.0, Dy = 8.0, Dz = 5.0