SAR Compliance Test Report

Test report no.:	Not numbered	**Date of report:**	2003-06-23
Number of pages:	93	**Contact person:**	Pentti Pärnänen
		Responsible test engineer:	Pentti Pärnänen

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Tested devices: **PPIRH-19**

Supplement reports: -

Testing has been carried out in accordance with:

47CFR §2.1093
Radiofrequency Radiation Exposure Evaluation: Portable Devices

IEEE P1528-200X Draft 6.4
Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques

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

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

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: 2003-06-23

For the contents:

Pentti Pärnänen
Manager, TCC Oulu

Anne Kiviniemi
Test Engineer

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1. SUMMARY FOR SAR TEST REPORT

Date of test	2003-05-13, 2003-05-14, 2003-05-16, 2003-06-12, 2003-06-18
Contact person	Pentti Pärnänen
Test plan referred to	-
FCC ID	PPIRH-19
SN, HW and SW numbers of tested devices	SN: 004400/17/167469/8, HW: 0481, SW: Vp01.71 SN: 004400/17/167921/8, HW: 0483, SW: Vp01.71
Accessories used in testing	Headset HS-5, headset HS-1C, headset HS-R2, battery BL-5C, active cover
Notes	-
Document code	DTX 07333-EN
Responsible test engineer	Pentti Pärnänen
Measurement performed by	Anne Kiviniemi

1.1 Maximum Results Found during SAR Evaluation

The equipment is deemed to fulfil the requirements if the measured values are less than or equal to the limit. Maximum found results are reported per operating band.

1.1.1 Head Configuration

Mode	Ch / f (MHz)	Power EIRP	Position	Limit	Measured	Result
GSM	661/1880.00	29.0 dBm	Cheek	1.6 W/kg	0.72 W/kg	PASSED

1.1.2 Body Worn Configuration

Mode	Ch / f (MHz)	Power EIRP	Accessory	Limit	Measured	Result
GPRS	512/1850.20	29.4 dBm	Headset HS-5	1.6 W/kg	0.58 W/kg	PASSED

1.1.3 Measurement Uncertainty

Combined Standard Uncertainty	**± 13.6%**
Expanded Standard Uncertainty (k=2)	**± 27.1%**

2. DESCRIPTION OF TESTED DEVICE

Device category	Portable device	
Exposure environment	Uncontrolled exposure	
Unit type	Prototype unit	
Case type	Fixed case	
Modes of Operation	GSM1900	GPRS
Modulation Mode	Gaussian Minimum Shift Keying	Gaussian Minimum Shift Keying
Duty Cycle	1/8	2/8
Transmitter Frequency Range (MHz)	1850.2 - 1909.8	1850.2 - 1909.8

Outside of USA, transmitter of tested device may capable of operating also in 900 MHz and 1800 MHz modes, which are not part of this filing.

2.1 Picture of Phone

PPIRH-19

PPIRH-19, Active Cover

2.2 Description of the Antenna

Type	Internal integrated antenna	
Dimensions (mm)	Maximum width	35.7 mm
	Maximum length	28.9 mm
Location	Inside the back cover, near the top of the device	

2.3 Battery Options

There is only one battery option, BL-5C available for tested device.

3. TEST CONDITIONS

3.1 Ambient Conditions

Ambient temperature (°C)	22±2
Tissue simulating liquid temperature (°C)	22±1
Humidity	48

3.2 RF characteristics of the test site

Tests were performed in a fully enclosed RF shielded environment.

3.3 Test Signal, Frequencies, and Output Power

The device was controlled by using a special test mode.

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

The phone was set to maximum power level during the all tests and at the beginning of the each test the battery was fully charged. Power output was measured by accredited test laboratory, Cetecom ICT Services GmbH, on the same unit used in SAR testing.

DASY4 system measures power drift during SAR testing by comparing e-field in the same location at the beginning and at the end of measurement. These records were used to monitor stability of power output.

4. DESCRIPTION OF THE TEST EQUIPMENT

The measurements were performed with an automated near-field scanning system, DASY4, manufactured by Schmid & Partner Engineering AG (SPEAG) in Switzerland.

Test Equipment	Serial Number	Due Date
DAE V1	371	10/03
E-field Probe ET3DV6	1381	10/03
Dipole Validation Kit, D1900V2	511	02/05

Test Equipment 06/18/03	Serial Number	Due Date
DAE 3	555	03/04
E-field Probe ET3DV6	1765	04/04
Dipole Validation Kit, D1900V2	5d030	04/05

E-field probe calibration records are presented in Appendix C.

Additional equipment needed in validation

Test Equipment	Model	Serial Number	Due Date
Signal Generator	Agilent E4433B	GB40050947	09/04
Amplifier	Amplifier Research 5S1G4	27573	-
Power Meter	R&S NRT	101143	03/04
Power Sensor	R&S NRT-Z44	10239	03/04
Thermometer	DO9416	1505985462	-
Vector Network Analyzer	Hewlett Packard 8753E	US38432701	05/04
Dielectric Probe Kit	Agilent 85070C	-	-

Test Equipment 06/18/03	Model	Serial Number	Due Date
Signal Generator	Hewlett Packard 8657B	3630U08114	05/04
Amplifier	Amplifier Research 5S1G4	306024	-
Power Meter	R&S NRT	101143	03/04
Power Sensor	R&S NRT-Z44	10239	03/04
Thermometer	Fluke 52 II	82810048	-
Vector Network Analyzer	Hewlett Packard 8753D	3410A08934	05/04
Dielectric Probe Kit	Agilent 85070D	-	-

4.1 System Accuracy Verification

The probes are calibrated annually by the manufacturer. Dielectric parameters of the simulating liquids are measured by using a dielectric probe kit and a vector network analyzer.

The SAR measurement of the DUT were done within 24 hours of system accuracy verification, which was done using the dipole validation kit.

The dipole antenna, which is manufactured by Schmid & Partner Engineering AG, is matched to be used near flat phantom filled with tissue simulating solution. Dipole length for 1900 MHz is 68 mm with overall height of 300mm. A specific

distance holder is used in the positioning of antenna to ensure correct spacing between the phantom and the dipole. Manufacturer's reference dipole 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 validation results are in the table below and printout of the validation test is presented in Appendix A. All the measured parameters were within the specification.

Tissue	*f* (MHz)	Description	SAR (W/kg), 1g	Dielectric Parameters		Temp (°C)
				ε_r	σ (S/m)	
Head	1900	Measured 05/13/03	9.8	39.9	1.43	22
		Measured 05/14/03	9.7	39.6	1.41	22
		Measured 06/18/03	9.8	40.3	1.40	22
		Reference Result	10.3	38.6	1.46	N/A
Head	1900	Measured 06/18/03	9.8	40.3	1.40	22
		Reference Result	10.5	38.8	1.44	N/A
Muscle	1900	Measured 05/16/03	9.7	52.1	1.54	22
		Measured 06/12/03	10.2	52.4	1.58	22
		Reference Result	10.6	51.2	1.59	N/A

4.2 Tissue Simulants

All dielectric parameters of tissue simulants were measured within 24 hours of SAR measurements. The depth of the tissue simulant in the ear reference point of the phantom was 15cm ± 5mm during all the tests. Volume for each tissue simulant was 26 liters.

4.2.1 Head Tissue Simulant

The composition of the brain tissue simulating liquid for 1900MHz

44.91% 2-(2-butoxyethoxy) Ethanol
54.88% De-Ionized Water
0.21% Salt

f (MHz)	Description	Dielectric Parameters		Temp (°C)
		ε_r	σ (S/m)	
1880	Measured 05/13/03	40.0	1.41	22
	Measured 05/14/03	39.6	1.40	22
	Measured 06/18/03	40.3	1.39	22
	Recommended Values	40.0	1.40	20-26

Recommended values are adopted from OET Bulletin 65 (97-01) Supplement C (01-01).

4.2.2 Muscle Tissue Simulant

The composition of the muscle tissue simulating liquid for 1900MHz

69.02% De-Ionized Water
30.76% Diethylene Glycol Monobutyl Ether
0.22% Salt

f (MHz)	Description	Dielectric Parameters		Temp (°C)
		ε_r	σ (S/m)	
1880	Measured 05/16/03	52.1	1.52	22
	Measured 06/12/03	52.5	1.56	22
	Recommended Values	53.3	1.52	20-26

Recommended values are adopted from OET Bulletin 65 (97-01) Supplement C (01-01).

4.3 Phantoms

"SAM v4.0" phantom", manufactured by SPEAG, was used during the measurement. It has fiberglass shell integrated in a wooden table. The shape of the shell corresponds to the phantom defined by SCC34-SC2. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot.

The thickness of phantom shell is 2 mm except for the ear, where an integrated ear spacer provides a 6 mm spacing from the tissue boundary. Manufacturer reports tolerance in shell thickness to be ±0.1mm.

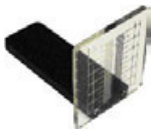
4.4 Isotropic E-Field Probe ET3DV6

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., glycolether)
Calibration	Calibration ceritifcate in Appendix C
Frequency	10 MHz to 3 GHz (dosimetry); Linearity: ± 0.2 dB (30 MHz to 3 GHz)
Optical Surface Detection	± 0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces
Directivity	± 0.2 dB in HSL (rotation around probe axis) ± 0.4 dB in HSL (rotation normal to probe axis)
Dynamic Range	5 µW/g to > 100 mW/g; Linearity: ± 0.2 dB
Dimensions	Overall length: 330 mm Tip length: 16 mm Body diameter: 12 mm Tip diameter: 6.8 mm Distance from probe tip to dipole centers: 2.7 mm
Application	General dosimetry up to 3 GHz Compliance tests of mobile phones Fast automatic scanning in arbitrary phantoms

5. DESCRIPTION OF THE TEST PROCEDURE

5.1 Test Positions

The device was placed in holder using a special positioning tool, which aligns the bottom of the device with holder and ensures that holder contacts only to the sides of the device. After positioning is done, tool is removed. This method provides standard positioning and separation, and also ensures free space for antenna.



Device holder was provided by SPEAG together with DASY4.

5.1.1 Against Phantom Head

Measurements were made on both the "left hand" and "right hand" side of the phantom.

The device was positioned against phantom according to OET Bulletin 65 (97-01) Supplement C (01-01) . Definitions of terms used in aligning the device to a head phantom are available in IEEE Draft Standard P1528-2001 “Recommended Practice for Determining the Spatial-Peak Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques”

5.1.1.1 Initial Ear Position

The device was initially positioned with the earpiece region pressed against the ear spacer of a head phantom parallel to the “Neck-Front” line defined along the base of the ear spacer that contains the “ear reference point”. The “test device reference point” is aligned to the “ear reference point” on the head phantom and the “vertical centerline” is aligned to the “phantom reference plane”.

5.1.1.2 Cheek Position

“Initial ear position” alignments are maintained and the device is brought toward the mouth of the head phantom by pivoting along the “Neck-Front” line until any point on the display, keypad or mouthpiece portions of the handset is in contact with the phantom or when any portion of a foldout, sliding or similar keypad cover opened to its intended self-adjusting normal use position is in contact with the cheek or mouth of the phantom.


PPIRH-19


PPIRH-19, Active Cover

5.1.1.3 Tilt Position

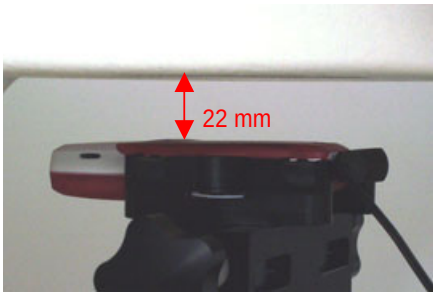
In the “Cheek Position”, if the earpiece of the device is not in full contact with the phantom’s ear spacer and the peak SAR location for the “cheek position” is located at the ear spacer region or corresponds to the earpiece region of the handset, the device is returned to the “initial ear position” by rotating it away from the mouth until the earpiece is in full contact with the ear spacer. Otherwise, the device is moved away from the cheek perpendicular to the line passes through both “ear reference points” for approximate 2-3 cm. While it is in this position, the device is tilted away from the mouth with respect to the “test device reference point” by 15°. After the tilt, it is then moved back toward the head perpendicular to the line passes through both “ear reference points” until the device touches the phantom or the ear spacer. If the antenna touches the head first, the positioning process is repeated with a tilt angle less than 15° so that the device and its antenna would touch the phantom simultaneously.

PPIRH-19

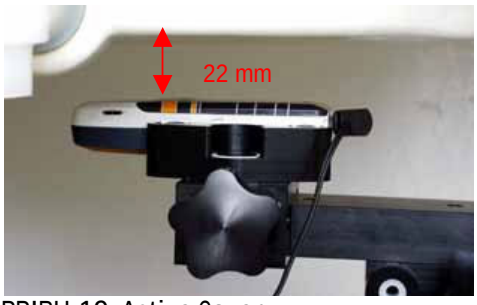
PPIRH-19, Active Cover

5.1.2 Body Worn Configuration

Body worn SAR measurements were performed with antenna facing towards the flat part of the phantom with a separation distance of 22 mm. Headset HS-5 was connected during measurements and the measurement giving the highest SAR as repeated with headsets HS-1C and HS-2R. Body worn measurements were performed in GPRS mode.



PPIRH-19



PPIRH-19, Active Cover

5.2 Scan Procedures

First coarse scans are used for quick determination of the field distribution. Next a 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].

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.

6. MEASUREMENT UNCERTAINTY

6.1 Description of Individual Measurement Uncertainty

6.1.1 Assessment Uncertainty

Uncertainty Component	P1528 Sec	Tol. (%)	Prob Dist	Div	c_i	u_i (%)	v_i
Measurement System							
Probe Calibration	E2.1	±4.8	N	1	1	±4.8	∞
Axial Isotropy	E2.2	±4.7	R	√3	$(1\text{-}c_p)^{1/2}$	±1.9	∞
Hemispherical Isotropy	E2.2	±9.6	R	√3	$(c_p)1^{/2}$	±3.9	∞
Boundary Effect	E2.3	±1.0	R	√3	1	±0.6	∞
Linearity	E2.4	±4.7	R	√3	1	±2.7	∞
System Detection Limits	E2.5	±1.0	R	√3	1	±0.6	∞
Readout Electronics	E2.6	±1.0	N	1	1	±1.0	∞
Response Time	E2.7	±0.8	R	√3	1	±0.5	∞
Integration Time	E2.8	±2.6	R	√3	1	±1.5	∞
RF Ambient Conditions - Noise	E6.1	±3.0	R	√3	1	±1.7	∞
RF Ambient Conditions - Reflections	E6.1	±3.0	R	√3	1	±1.7	∞
Probe Positioner Mechanical Tolerance	E6.2	±0.4	R	√3	1	±0.2	∞
Probe Positioning with respect to Phantom Shell	E6.3	±2.9	R	√3	1	±1.7	∞
Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	E5.2	±1.0	R	√3	1	±0.6	∞
Test sample Related							
Test Sample Positioning	E4.2.1	±6.0	N	1	1	±6.0	11
Device Holder Uncertainty	E4.1.1	±5.0	N	1	1	±5.0	7
Output Power Variation - SAR drift measurement	6.6.3	±10.0	R	√3	1	±5.8	∞
Phantom and Tissue Parameters							
Phantom Uncertainty (shape and thickness tolerances)	E3.1	±4.0	R	√3	1	±2.3	∞
Liquid Conductivity Target - tolerance	E3.2	±5.0	R	√3	0.64	±1.8	∞
Liquid Conductivity - measurement uncertainty	E3.3	±5.5	N	1	0.64	±3.5	5
Liquid Permittivity Target tolerance	E3.2	±5.0	R	√3	0.6	±1.7	∞
Liquid Permittivity - measurement uncertainty	E3.3	±2.9	N	1	0.6	±1.7	5
Combined Standard Uncertainty			RSS			**±13.6**	161
Coverage Factor for 95%			**k=2**				
Expanded Standard Uncertainty						**±27.1**	

7. RESULTS

Corresponding SAR distribution printouts of maximum results in every operating mode and position are shown in Appendix B. It also includes Z-plots of maximum measurement results in head and body worn configurations. The SAR distributions are substantially similar or equivalent to the plots submitted regardless of used channel in each mode and position. The coarse scans used in the head configuration measurements cover the whole head region.

7.1 Head Configuration

PPIRH-19, HWID 0481						
Mode	Channel/ *f* (MHz)	Power EIRP (dBm)	SAR, averaged over 1g (W/kg)			
			Left-hand		Right-hand	
			Cheek	Tilted	Cheek	Tilted
GSM 1900	512/1850.20	29.4	0.40	0.43	0.67	0.63
	661/1880.00	29.0	0.39	0.39	0.63	0.58
	810/1909.80	27.0	0.30	0.29	0.49	0.44

PPIRH-19, HWID 0483						
Mode	Channel/ *f* (MHz)	Power EIRP (dBm)	SAR, averaged over 1g (W/kg)			
			Left-hand		Right-hand	
			Cheek	Tilted	Cheek	Tilted
GSM 1900	512/1850.20	29.3	0.42	0.45	0.67	0.64
	661/1880.00	29.0	0.44	0.46	**0.72**	0.67
	810/1909.80	27.8	0.36	0.35	0.63	0.55

PPIRH-19, HWID 0481, Active Cover						
Mode	Channel/ *f* (MHz)	Power EIRP (dBm)	SAR, averaged over 1g (W/kg)			
			Left-hand		Right-hand	
			Cheek	Tilted	Cheek	Tilted
GSM 1900	512/1850.20	29.4				
	661/1880.00	29.1	0.29	0.27	0.54	0.48
	810/1909.80	26.9				

PPIRH-19, HWID 0483, Active Cover						
Mode	Channel/ *f* (MHz)	Power EIRP (dBm)	SAR, averaged over 1g (W/kg)			
			Left-hand		Right-hand	
			Cheek	Tilted	Cheek	Tilted
GSM 1900	512/1850.20	29.4				
	661/1880.00	29.1	0.32	0.30	0.59	0.54
	810/1909.80	27.8				

7.2 Body Worn Configuration

PPIRH-19, HWID 0481			
Mode	Channel/ *f* (MHz)	Power EIRP (dBm)	SAR, averaged over 1g (W/kg)
			Headset HS-5
GPRS 1900	512/1850.20	29.4	0.55
	661/1880.00	29.0	0.49
	810/1909.80	27.0	0.39

PPIRH-19, HWID 0483			
Mode	Channel/ *f* (MHz)	Power EIRP (dBm)	SAR, averaged over 1g (W/kg)
			Headset HS-5
GPRS 1900	512/1850.20	29.3	0.54
	661/1880.00	29.0	0.51
	810/1909.80	27.8	0.46

PPIRH-19, HWID 0481, Active Cover			
Mode	Channel/ *f* (MHz)	Power EIRP (dBm)	SAR, averaged over 1g (W/kg)
			Headset HS-5
GPRS 1900	512/1850.20	29.4	**0.58**
	661/1880.00	29.1	0.53
	810/1909.80	26.9	0.39

PPIRH-19, HWID 0483, Active Cover			
Mode	Channel/ *f* (MHz)	Power EIRP (dBm)	SAR, averaged over 1g (W/kg)
			Headset HS-5
GPRS 1900	512/1850.20	29.4	0.54
	661/1880.00	29.1	0.55
	810/1909.80	27.8	0.50

There are several headsets and a loopset available for PPIRH-19. HDS-3, HDB-4, HS-5 and LPS-4 have same amount of pins to connect to the phone. Camera headset HS-1C, which uses more pins, was checked for compliance separately. Also radioheadset HS-2R was checked for compliance.

PPIRH-19, HWID 0481			
Mode	Channel/ *f* (MHz)	Power EIRP (dBm)	SAR, averaged over 1g (W/kg)
			Headset HS-1C
GPRS 1900	512/1850.20	29.4	0.50

PPIRH-19, HWID 0483			
Mode	Channel/ *f* (MHz)	Power EIRP (dBm)	SAR, averaged over 1g (W/kg)
			Headset HS-1C
GPRS 1900	512/1850.20	29.3	0.48

PPIRH-19, HWID 0481			
Mode	Channel/ *f* (MHz)	Power EIRP (dBm)	SAR, averaged over 1g (W/kg)
			Headset HS-2R
GPRS 1900	512/1850.20	29.4	0.53

PPIRH-19, HWID 0483			
Mode	Channel/ *f* (MHz)	Power EIRP (dBm)	SAR, averaged over 1g (W/kg)
			Headset HS-2R
GPRS 1900	512/1850.20	29.3	0.51

APPENDIX A.

Validation Test Printouts

Date/Time: 05/13/03 09:03:47

Test Laboratory: NOKIA Oulu; DTX07333-EN

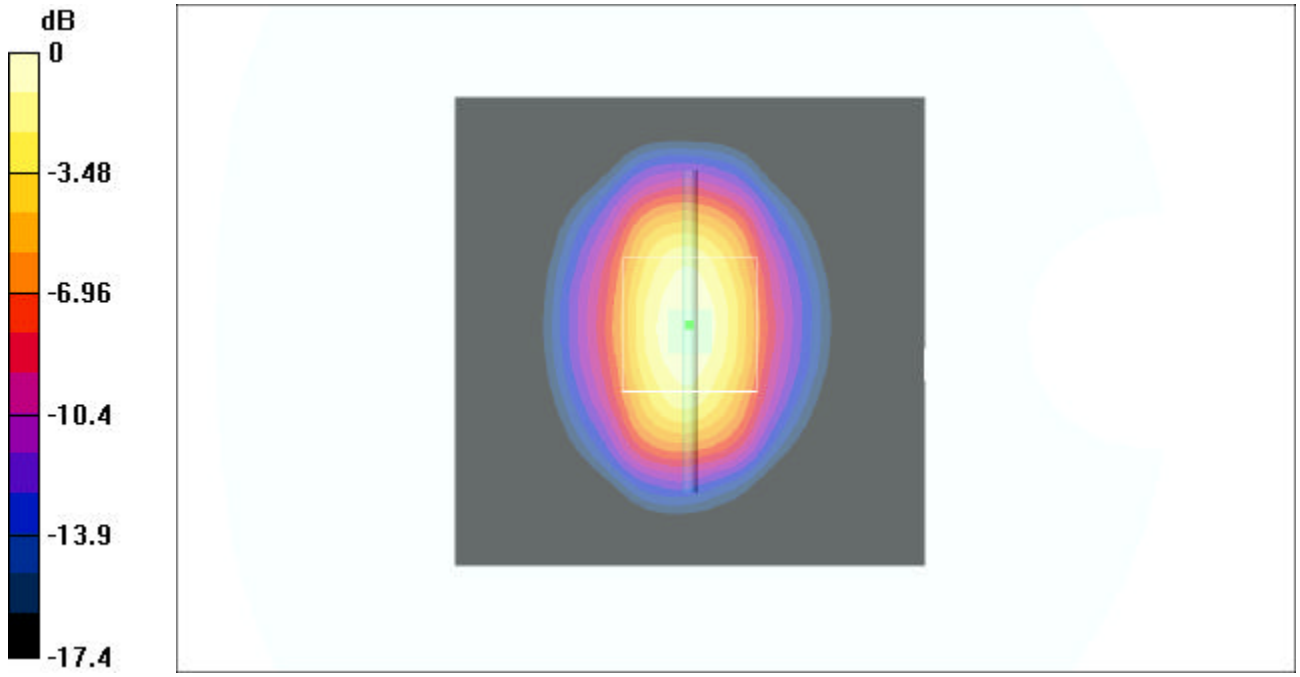
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 511

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: Head 1900 MHz (s = 1.42767 mho/m, e_r = 39.9135, ? = 1000 kg/m^3)
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1381; ConvF(5.1, 5.1, 5.1); Calibrated: 21.10.2002
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn371; Calibrated: 18.10.2002
- Phantom: SAM_2; Type: SAM; Serial: TP-1003
- Measurement SW: DASY4, V4.1 Build 33; Postprocessing SW: SEMCAD, V1.6 Build 115

HSL 1900; t = 21.2 C/Area Scan (71x71x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 92.9 V/m
Power Drift = 0.03 dB
Maximum value of SAR = 11.1 mW/g

HSL 1900; t = 21.2 C/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 17.5 W/kg
SAR(1 g) = 9.82 mW/g; SAR(10 g) = 5.06 mW/g
Reference Value = 92.9 V/m
Power Drift = 0.03 dB
Maximum value of SAR = 11 mW/g



0 dB = 11mW/g

Date/Time: 05/14/03 08:53:44

Test Laboratory: NOKIA Oulu; DTX07333-EN

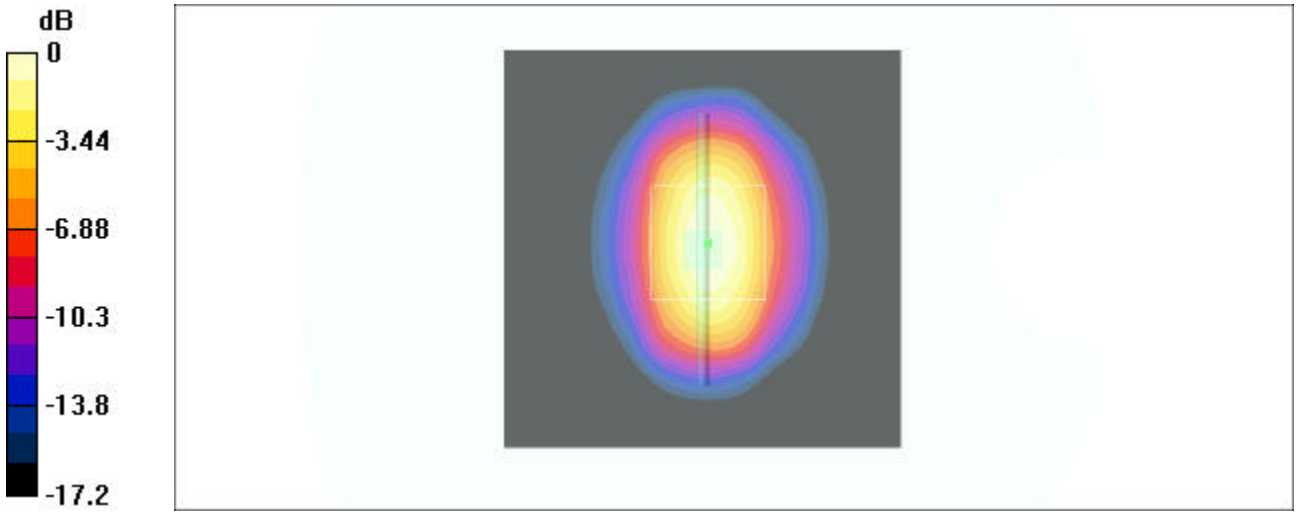
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 511

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: Head 1900 MHz (s = 1.41108 mho/m, e_r = 39.6097, ? = 1000 kg/m^3)
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1381; ConvF(5.1, 5.1, 5.1); Calibrated: 21.10.2002
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn371; Calibrated: 18.10.2002
- Phantom: SAM_2; Type: SAM; Serial: TP-1003
- Measurement SW: DASY4, V4.1 Build 33; Postprocessing SW: SEMCAD, V1.6 Build 115

HSL 1900; t = 21.9 C/Area Scan (71x71x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 90.7 V/m
Power Drift = 0.03 dB
Maximum value of SAR = 11.2 mW/g

HSL 1900; t = 21.9 C/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 17 W/kg
SAR(1 g) = 9.67 mW/g; SAR(10 g) = 5.01 mW/g
Reference Value = 90.7 V/m
Power Drift = 0.03 dB
Maximum value of SAR = 10.9 mW/g



0 dB = 10.9mW/g

Date/Time: 06/18/03 10:29:56

Test Laboratory: Nokia Oulu; DTX07333-EN

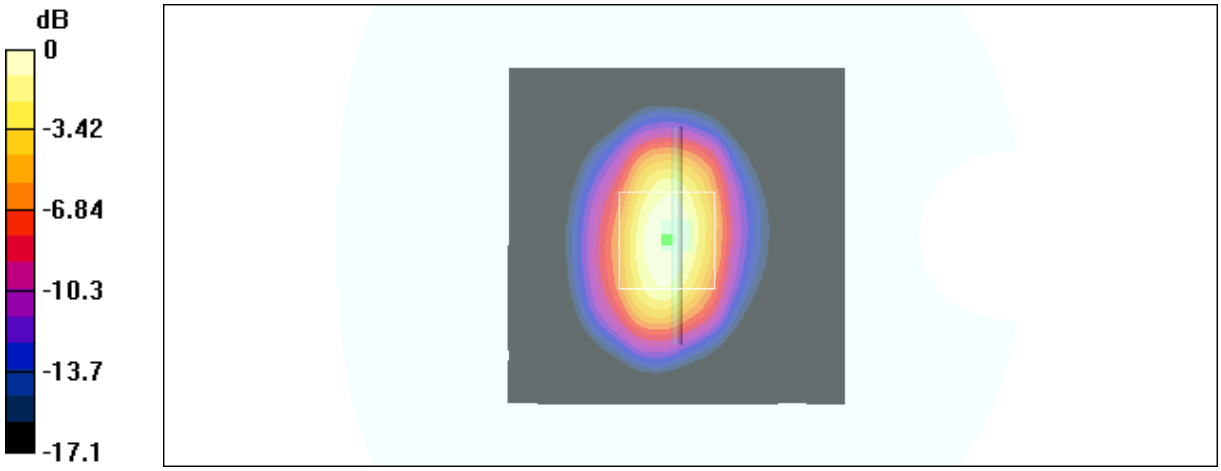
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d030

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: HSL1900 (σ = 1.40281 mho/m, ε_r = 40.2578, ρ = 1000 kg/m^3)
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1765; ConvF(5.2, 5.2, 5.2); Calibrated: 16.04.2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn555; Calibrated: 06.03.2003
- Phantom: SAM 3; Type: SAM 4.0; Serial: 1215
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

head 1900; t = 21.6 C/Area Scan (71x71x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 92.7 V/m
Power Drift = -0.09 dB
Maximum value of SAR = 11.5 mW/g

head 1900; t = 21.6 C/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 17.2 W/kg
SAR(1 g) = 9.79 mW/g; SAR(10 g) = 5.07 mW/g
Reference Value = 92.7 V/m
Power Drift = -0.09 dB
Maximum value of SAR = 10.9 mW/g



0 dB = 10.9mW/g

Date/Time: 05/16/03 10:15:12

Test Laboratory: NOKIA Oulu; DTX07333-EN

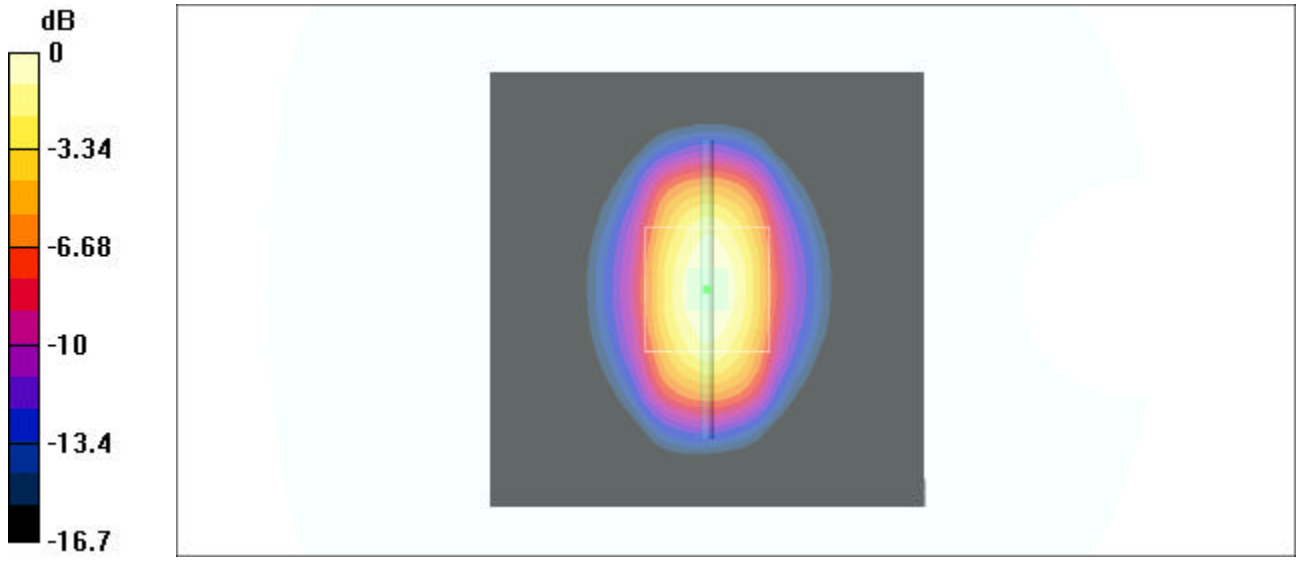
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 511

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: muscle 1900 MHz (s = 1.53809 mho/m, e_r = 52.1093, ? = 1000 kg/m^3)
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1381; ConvF(4.9, 4.9, 4.9); Calibrated: 21.10.2002
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn371; Calibrated: 18.10.2002
- Phantom: SAM_1; Type: SAM; Serial: TP-1128
- Measurement SW: DASY4, V4.1 Build 33; Postprocessing SW: SEMCAD, V1.6 Build 115

muscle 1900; t = 21.6 C/Area Scan (71x71x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 89.4 V/m
Power Drift = -0.003 dB
Maximum value of SAR = 11.4 mW/g

muscle 1900; t = 21.6 C/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 16.8 W/kg
SAR(1 g) = 9.65 mW/g; SAR(10 g) = 5.04 mW/g
Reference Value = 89.4 V/m
Power Drift = -0.003 dB
Maximum value of SAR = 10.8 mW/g



0 dB = 10.8mW/g

Date/Time: 06/12/03 16:12:11

Test Laboratory: NOKIA Oulu; DTX07333-EN

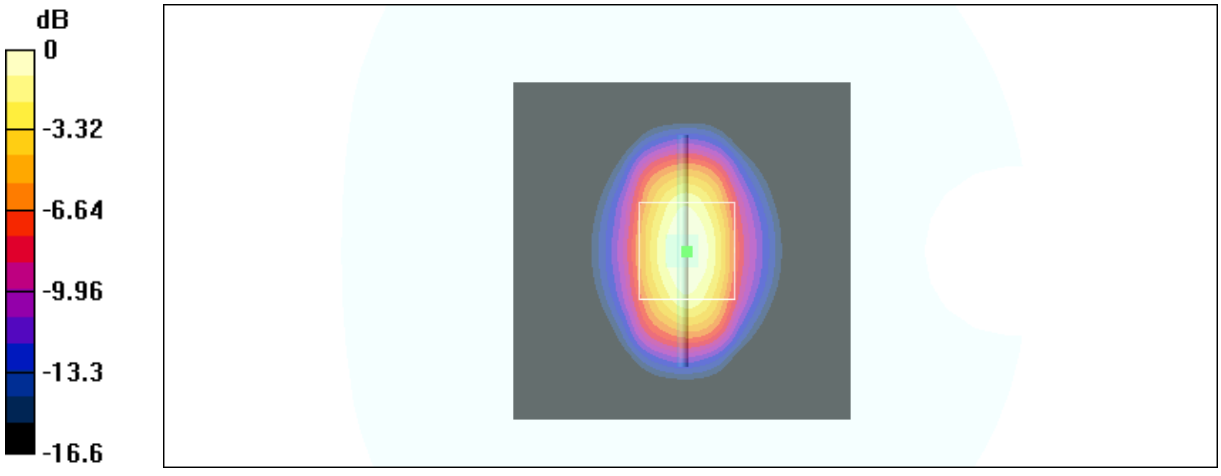
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 511

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: muscle 1900 MHz (σ = 1.58111 mho/m, ε_r = 52.4028, ρ = 1000 kg/m^3)
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1381; ConvF(4.9, 4.9, 4.9); Calibrated: 21.10.2002
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn371; Calibrated: 18.10.2002
- Phantom: SAM_1; Type: SAM; Serial: TP-1128
- Measurement SW: DASY4, V4.1 Build 33; Postprocessing SW: SEMCAD, V1.6 Build 115

muscle 1900; T = 21.9 C/Area Scan (71x71x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 91.1 V/m
Power Drift = -0.1 dB
Maximum value of SAR = 12.3 mW/g

muscle 1900; T = 21.9 C/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 17.5 W/kg
SAR(1 g) = 10.2 mW/g; SAR(10 g) = 5.35 mW/g
Reference Value = 91.1 V/m
Power Drift = -0.1 dB
Maximum value of SAR = 11.3 mW/g



0 dB = 11.3mW/g

APPENDIX B.

SAR Distribution Printouts

Date/Time: 05/14/03 13:06:27

Test Laboratory: NOKIA Oulu; DTX07333-EN

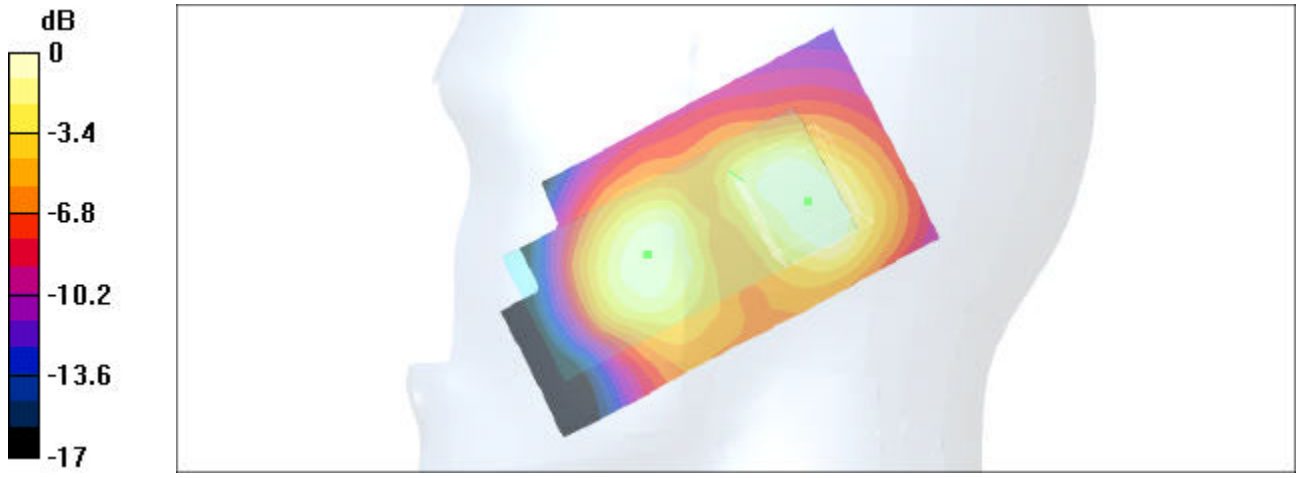
DUT: PPIRH-19; Type: RH-19; Serial: 004400/17/167469/8; HWID0481

Communication System: GSM 1900; Frequency: 1850.2 MHz;Duty Cycle: 1:8.3
Medium: Head 1900 MHz (s = 1.36478 mho/m, e_r = 39.7311, ? = 1000 kg/m^3)
Phantom section: Left Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1381; ConvF(5.1, 5.1, 5.1); Calibrated: 21.10.2002
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn371; Calibrated: 18.10.2002
- Phantom: SAM_2; Type: SAM; Serial: TP-1003
- Measurement SW: DASY4, V4.1 Build 33; Postprocessing SW: SEMCAD, V1.6 Build 115

Cheek, t = 22.5 C, worst case extrapolation/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 16.2 V/m
Power Drift = 0.06 dB
Maximum value of SAR = 0.416 mW/g

Cheek, t = 22.5 C, worst case extrapolation/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 0.847 W/kg
SAR(1 g) = 0.402 mW/g; SAR(10 g) = 0.214 mW/g; 2nd peak SAR(1 g)=0.347 mW/g ; SAR(10 g) = 0.197 mW/g
Reference Value = 16.2 V/m
Power Drift = 0.06 dB
Maximum value of SAR = 0.413 mW/g



0 dB = 0.36mW/g

Date/Time: 05/14/03 13:20:16

Test Laboratory: NOKIA Oulu; DTX07333-EN

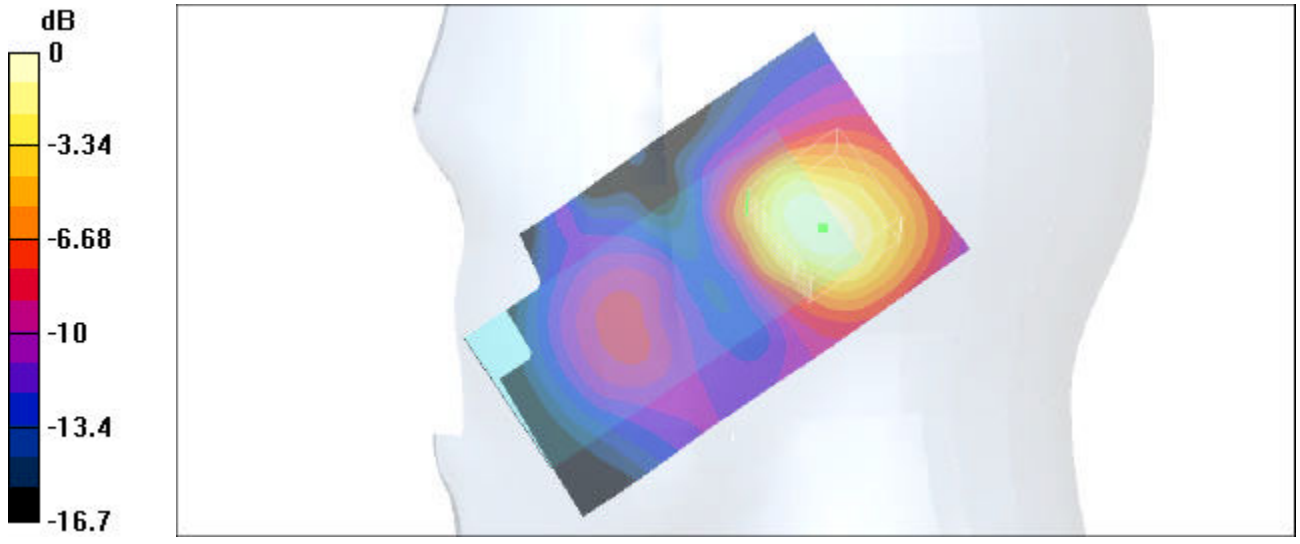
DUT: PPIRH-19; Type: RH-19; Serial: 004400/17/167469/8; HWID0481

Communication System: GSM 1900; Frequency: 1850.2 MHz;Duty Cycle: 1:8.3
Medium: Head 1900 MHz (s = 1.36478 mho/m, e_r = 39.7311, ? = 1000 kg/m^3)
Phantom section: Left Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1381; ConvF(5.1, 5.1, 5.1); Calibrated: 21.10.2002
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn371; Calibrated: 18.10.2002
- Phantom: SAM_2; Type: SAM; Serial: TP-1003
- Measurement SW: DASY4, V4.1 Build 33; Postprocessing SW: SEMCAD, V1.6 Build 115

Tilted, t = 22.7 C, worst case extrapolation/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 16.5 V/m
Power Drift = -0.02 dB
Maximum value of SAR = 0.456 mW/g

Tilted, t = 22.7 C, worst case extrapolation/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 0.891 W/kg
SAR(1 g) = 0.427 mW/g; SAR(10 g) = 0.22 mW/g
Reference Value = 16.5 V/m
Power Drift = -0.02 dB
Maximum value of SAR = 0.45 mW/g



0 dB = 0.45mW/g

Date/Time: 05/14/03 09:27:01

Test Laboratory: NOKIA Oulu; DTX07333-EN

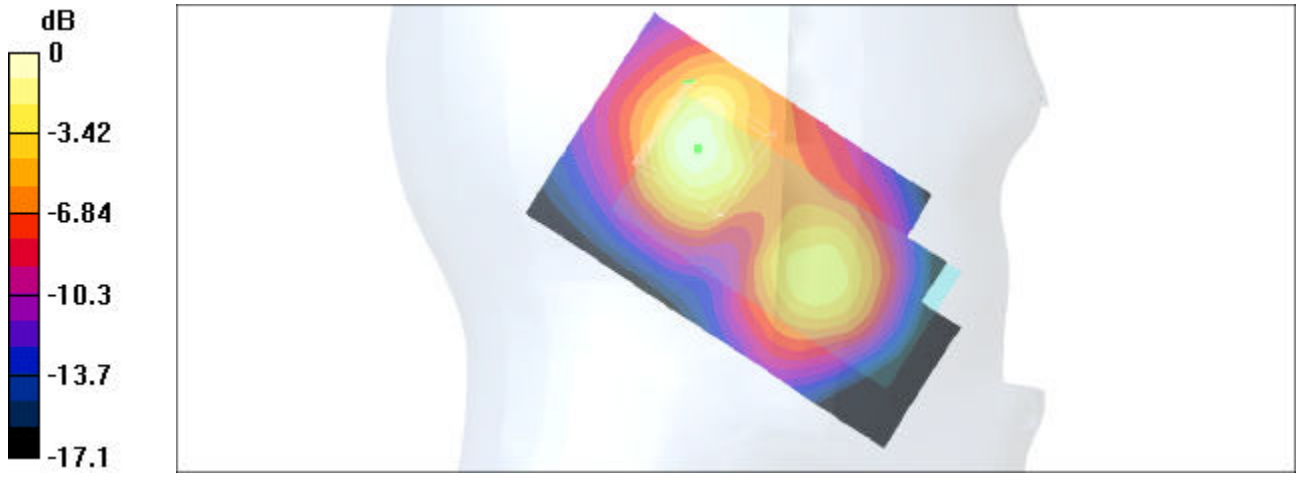
DUT: PPIRH-19; Type: RH-19; Serial: 004400/17/167469/8; HWID0481

Communication System: GSM 1900; Frequency: 1850.2 MHz;Duty Cycle: 1:8.3
Medium: Head 1900 MHz (s = 1.36478 mho/m, e_r = 39.7311, ? = 1000 kg/m^3)
Phantom section: Right Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1381; ConvF(5.1, 5.1, 5.1); Calibrated: 21.10.2002
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn371; Calibrated: 18.10.2002
- Phantom: SAM_2; Type: SAM; Serial: TP-1003
- Measurement SW: DASY4, V4.1 Build 33; Postprocessing SW: SEMCAD, V1.6 Build 115

Cheek, t = 21.9 C, worst case extrapolation/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 17.7 V/m
Power Drift = 0.04 dB
Maximum value of SAR = 0.676 mW/g

Cheek, t = 21.9 C, worst case extrapolation/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 1.6 W/kg
SAR(1 g) = 0.668 mW/g; SAR(10 g) = 0.328 mW/g
Reference Value = 17.7 V/m
Power Drift = 0.04 dB
Maximum value of SAR = 0.705 mW/g



0 dB = 0.705mW/g

Date/Time: 05/14/03 11:11:36

Test Laboratory: NOKIA Oulu; DTX07333-EN

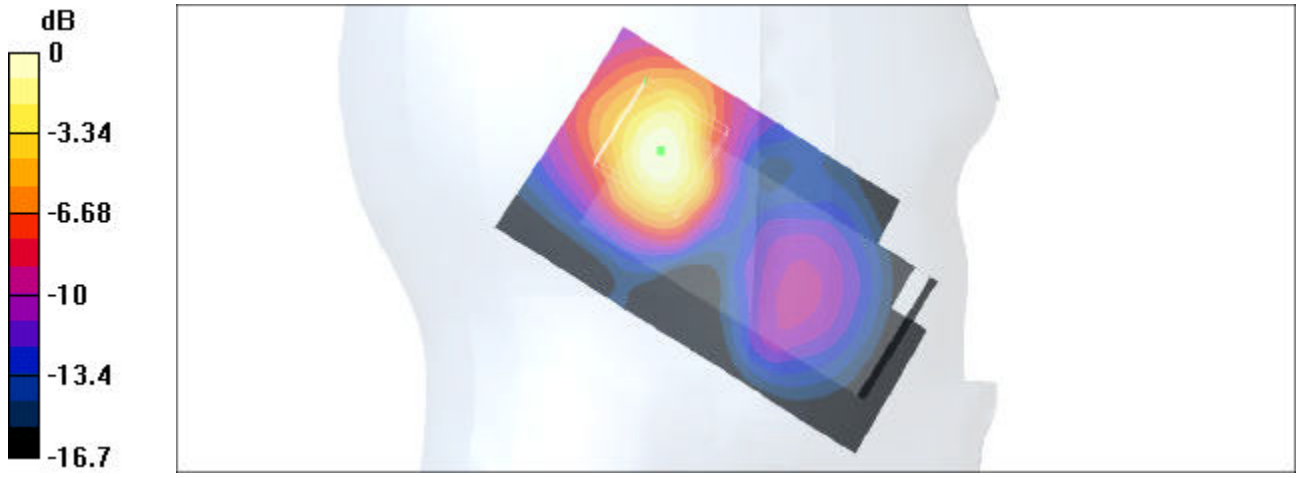
DUT: PPIRH-19; Type: RH-19; Serial: 004400/17/167469/8; HWID0481

Communication System: GSM 1900; Frequency: 1850.2 MHz;Duty Cycle: 1:8.3
Medium: Head 1900 MHz (s = 1.36478 mho/m, e_r = 39.7311, ? = 1000 kg/m^3)
Phantom section: Right Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1381; ConvF(5.1, 5.1, 5.1); Calibrated: 21.10.2002
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn371; Calibrated: 18.10.2002
- Phantom: SAM_2; Type: SAM; Serial: TP-1003
- Measurement SW: DASY4, V4.1 Build 33; Postprocessing SW: SEMCAD, V1.6 Build 115

Tilted, t = 21.9 C, worst case extrapolation/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 17.7 V/m
Power Drift = 0.0004 dB
Maximum value of SAR = 0.654 mW/g

Tilted, t = 21.9 C, worst case extrapolation/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 1.47 W/kg
SAR(1 g) = 0.625 mW/g; SAR(10 g) = 0.301 mW/g
Reference Value = 17.7 V/m
Power Drift = 0.0004 dB
Maximum value of SAR = 0.661 mW/g



0 dB = 0.661mW/g

Date/Time: 05/13/03 14:57:01

Test Laboratory: NOKIA Oulu; DTX07333-EN

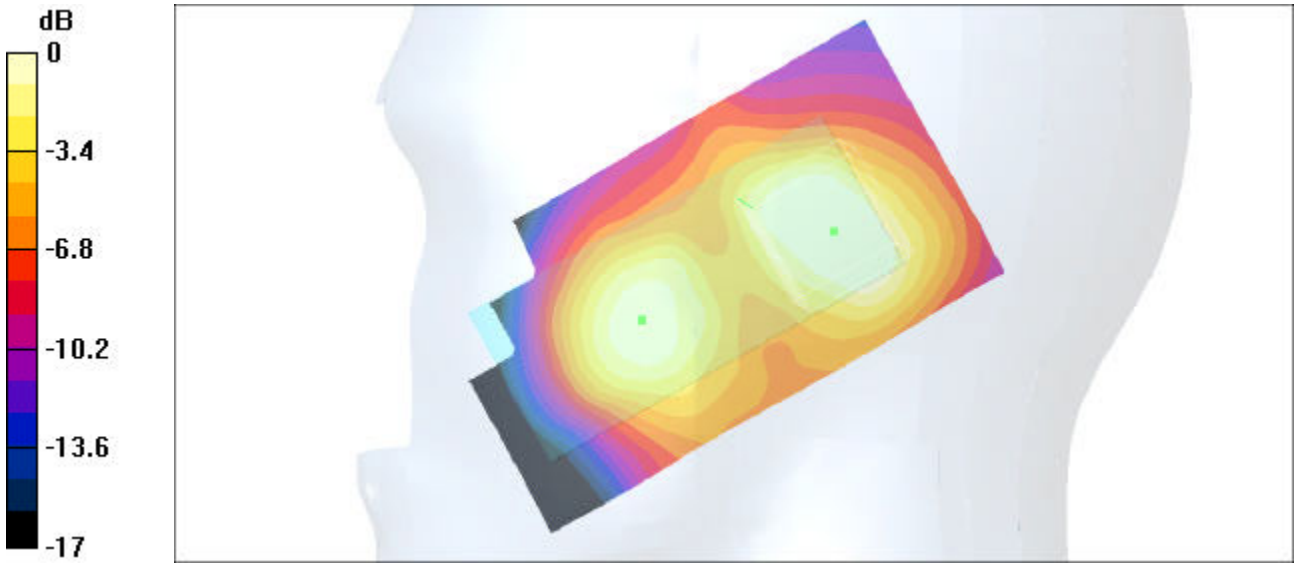
DUT: PPIRH-19; Type: RH-19; Serial: 004400/17/167921/8; HWID0483

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: Head 1900 MHz (s = 1.413 mho/m, e_r = 40.0405, ? = 1000 kg/m^3)
Phantom section: Left Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1381; ConvF(5.1, 5.1, 5.1); Calibrated: 21.10.2002
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn371; Calibrated: 18.10.2002
- Phantom: SAM_2; Type: SAM; Serial: TP-1003
- Measurement SW: DASY4, V4.1 Build 33; Postprocessing SW: SEMCAD, V1.6 Build 115

Cheek, t = 22.1 C, worst case extrapolation/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 16.5 V/m
Power Drift = 0.04 dB
Maximum value of SAR = 0.455 mW/g

Cheek, t = 22.1 C, worst case extrapolation/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 0.928 W/kg
SAR(1 g) = 0.437 mW/g; SAR(10 g) = 0.233 mW/g; 2nd peak SAR(1 g)=0.335 mW/g ; SAR(10 g) = 0.192 mW/g
Reference Value = 16.5 V/m
Power Drift = 0.04 dB
Maximum value of SAR = 0.453 mW/g



0 dB = 0.348mW/g

Date/Time: 05/13/03 14:57:20

Test Laboratory: NOKIA Oulu; DTX07333-EN

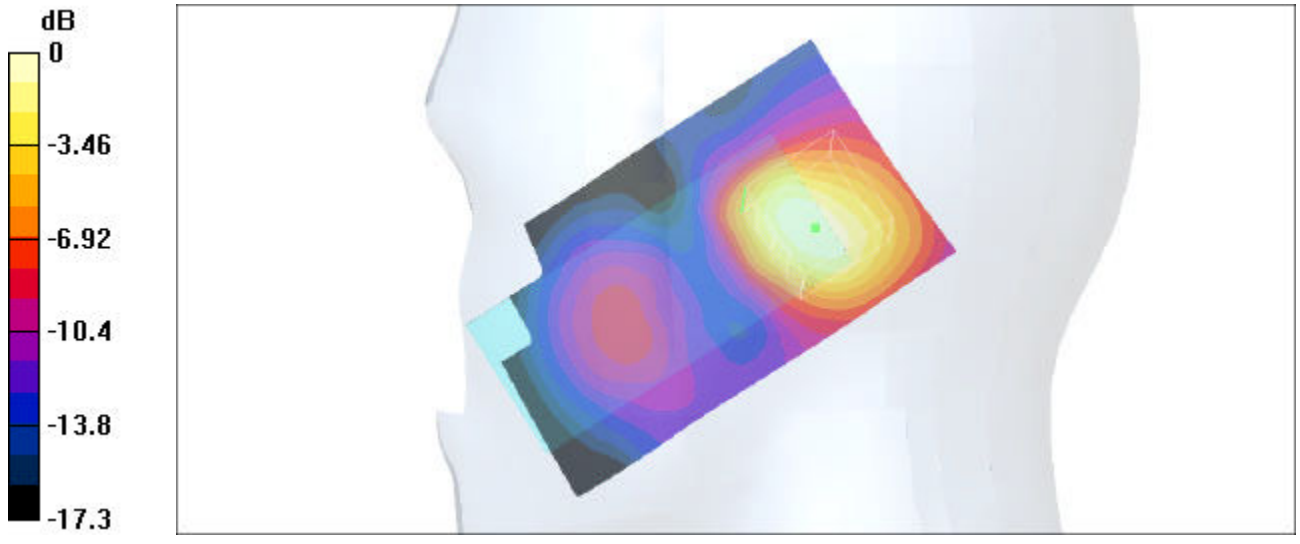
DUT: PPIRH-19; Type: RH-19; Serial: 004400/17/167921/8; HWID0483

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: Head 1900 MHz (s = 1.413 mho/m, e_r = 40.0405, ? = 1000 kg/m^3)
Phantom section: Left Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1381; ConvF(5.1, 5.1, 5.1); Calibrated: 21.10.2002
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn371; Calibrated: 18.10.2002
- Phantom: SAM_2; Type: SAM; Serial: TP-1003
- Measurement SW: DASY4, V4.1 Build 33; Postprocessing SW: SEMCAD, V1.6 Build 115

Tilted, t = 22.3 C, worst case extrapolation/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 16.6 V/m
Power Drift = 0.02 dB
Maximum value of SAR = 0.484 mW/g

Tilted, t = 22.3 C, worst case extrapolation/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 0.975 W/kg
SAR(1 g) = 0.461 mW/g; SAR(10 g) = 0.237 mW/g
Reference Value = 16.6 V/m
Power Drift = 0.02 dB
Maximum value of SAR = 0.487 mW/g



0 dB = 0.487mW/g

Date/Time: 05/13/03 10:30:20

Test Laboratory: NOKIA Oulu; DTX07333-EN

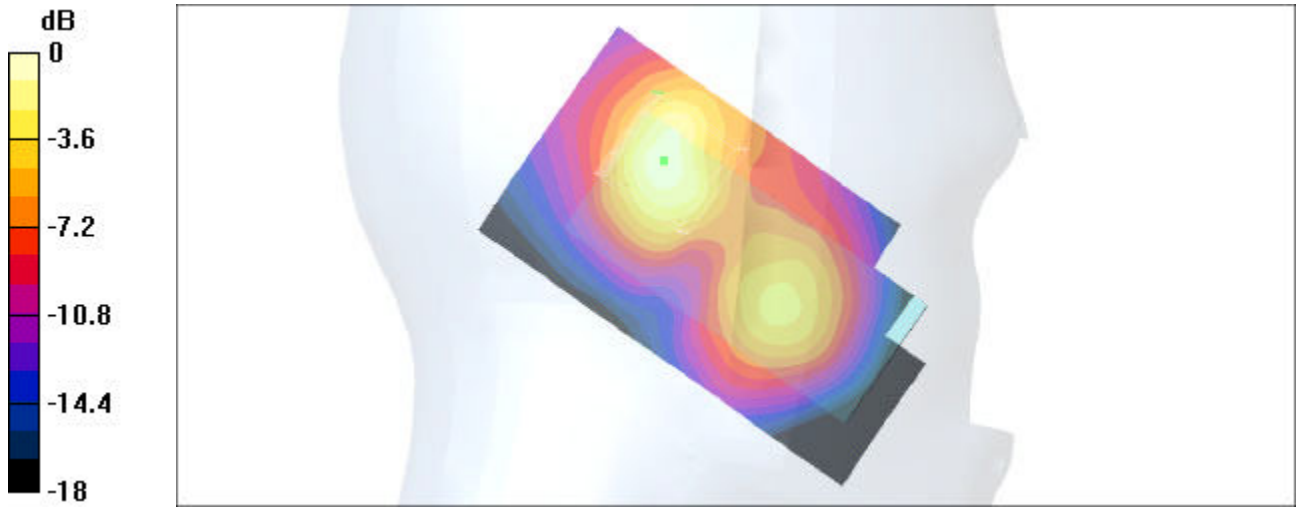
DUT: PPIRH-19; Type: RH-19; Serial: 004400/17/167921/8; HWID0483

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: Head 1900 MHz (s = 1.413 mho/m, e_r = 40.0405, ? = 1000 kg/m^3)
Phantom section: Right Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1381; ConvF(5.1, 5.1, 5.1); Calibrated: 21.10.2002
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn371; Calibrated: 18.10.2002
- Phantom: SAM_2; Type: SAM; Serial: TP-1003
- Measurement SW: DASY4, V4.1 Build 33; Postprocessing SW: SEMCAD, V1.6 Build 115

Cheek, t = 21.4 C, worst case extrapolation/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 16.1 V/m
Power Drift = 0.04 dB
Maximum value of SAR = 0.7 mW/g

Cheek, t = 21.4 C, worst case extrapolation/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 1.71 W/kg
SAR(1 g) = 0.722 mW/g; SAR(10 g) = 0.344 mW/g
Reference Value = 16.1 V/m
Power Drift = 0.04 dB
Maximum value of SAR = 0.778 mW/g



0 dB = 0.778mW/g

Date/Time: 05/13/03 10:54:38

Test Laboratory: NOKIA Oulu; DTX07333-EN

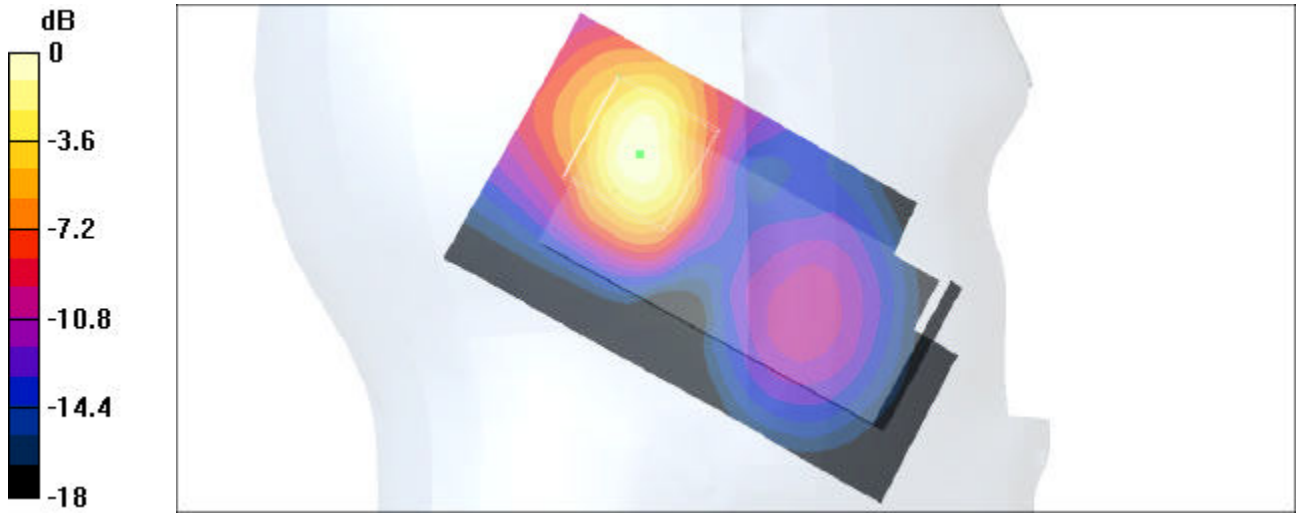
DUT: PPIRH-19; Type: RH-19; Serial: 004400/17/167921/8; HWID0483

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: Head 1900 MHz (s = 1.413 mho/m, e_r = 40.0405, ? = 1000 kg/m^3)
Phantom section: Right Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1381; ConvF(5.1, 5.1, 5.1); Calibrated: 21.10.2002
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn371; Calibrated: 18.10.2002
- Phantom: SAM_2; Type: SAM; Serial: TP-1003
- Measurement SW: DASY4, V4.1 Build 33; Postprocessing SW: SEMCAD, V1.6 Build 115

Tilted, t = 21.5 C, worst case extrapolation/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 16.3 V/m
Power Drift = 0.01 dB
Maximum value of SAR = 0.669 mW/g

Tilted, t = 21.5 C, worst case extrapolation/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 1.61 W/kg
SAR(1 g) = 0.672 mW/g; SAR(10 g) = 0.318 mW/g
Reference Value = 16.3 V/m
Power Drift = 0.01 dB
Maximum value of SAR = 0.725 mW/g



0 dB = 0.725mW/g

Date/Time: 06/18/03 14:08:34

Test Laboratory: NOKIA Oulu; DTX07333-EN

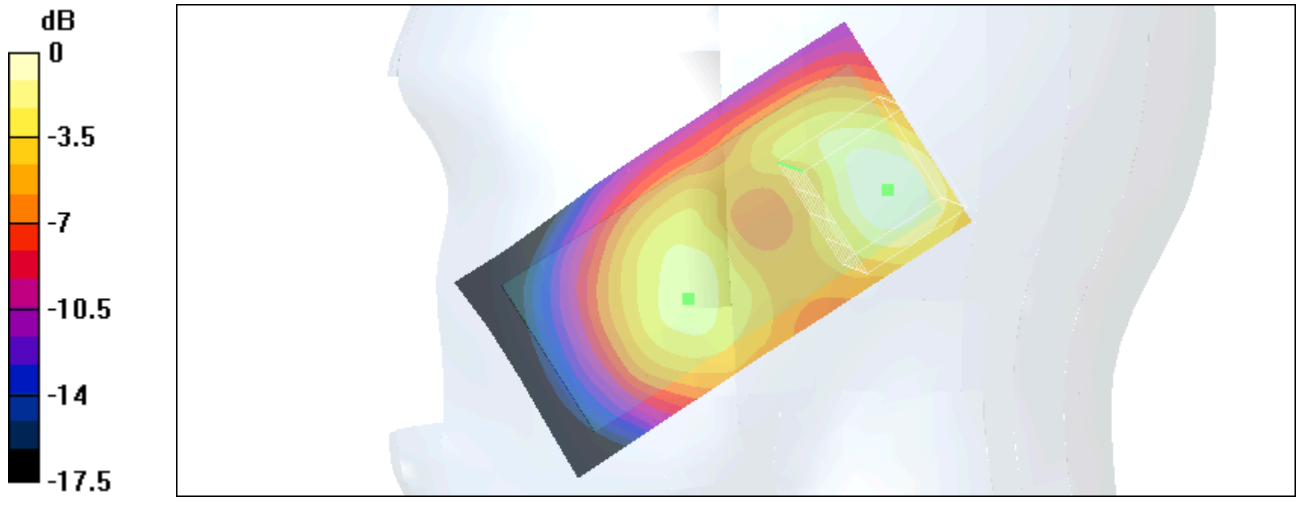
DUT: PPIRH-19; Type: RH-19; Serial: 004400/17/167469/8; HWID0481; Active Cover

Communication System: DCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 (σ = 1.39098 mho/m, ε_r = 40.3021, ρ = 1000 kg/m^3)
Phantom section: Left Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1765; ConvF(5.2, 5.2, 5.2); Calibrated: 16.04.2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn555; Calibrated: 06.03.2003
- Phantom: SAM 3; Type: SAM 4.0; Serial: 1215
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

Cheek; worst case extrapolation; t= 21.5 C/Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 13.3 V/m
Power Drift = -0.05 dB
Maximum value of SAR = 0.31 mW/g

Cheek; worst case extrapolation; t= 21.5 C/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 0.621 W/kg
SAR(1 g) = 0.291 mW/g; SAR(10 g) = 0.152 mW/g
Reference Value = 13.3 V/m
Power Drift = -0.05 dB
Maximum value of SAR = 0.307 mW/g



0 dB = 0.307mW/g

Date/Time: 06/18/03 14:29:02

Test Laboratory: NOKIA Oulu; DTX07333-EN

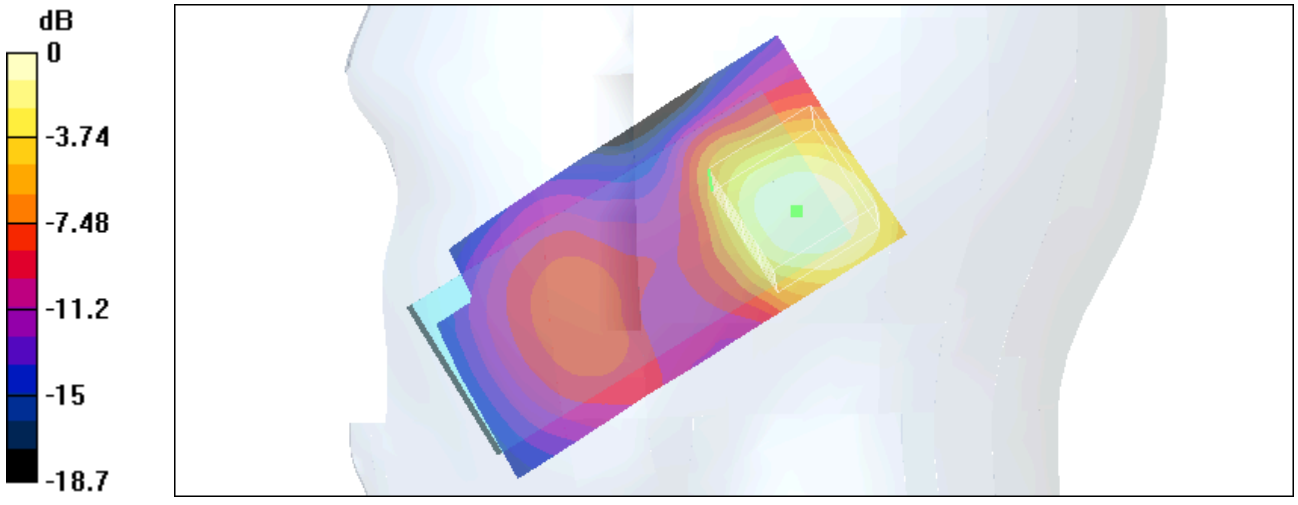
DUT: PPIRH-19; Type: RH-19; Serial: 004400/17/167469/8; HWID0481; Active Cover

Communication System: DCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 (σ = 1.39098 mho/m, ε_r = 40.3021, ρ = 1000 kg/m^3)
Phantom section: Left Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1765; ConvF(5.2, 5.2, 5.2); Calibrated: 16.04.2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn555; Calibrated: 06.03.2003
- Phantom: SAM 3; Type: SAM 4.0; Serial: 1215
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

Tilted; worst case extrapolation; t = 21.5 C/Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 12.3 V/m
Power Drift = 0.006 dB
Maximum value of SAR = 0.284 mW/g

Tilted; worst case extrapolation; t = 21.5 C/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 0.543 W/kg
SAR(1 g) = 0.269 mW/g; SAR(10 g) = 0.144 mW/g
Reference Value = 12.3 V/m
Power Drift = 0.006 dB
Maximum value of SAR = 0.276 mW/g



0 dB = 0.276mW/g

Date/Time: 06/18/03 12:27:50

Test Laboratory: NOKIA Oulu; DTX07333-EN

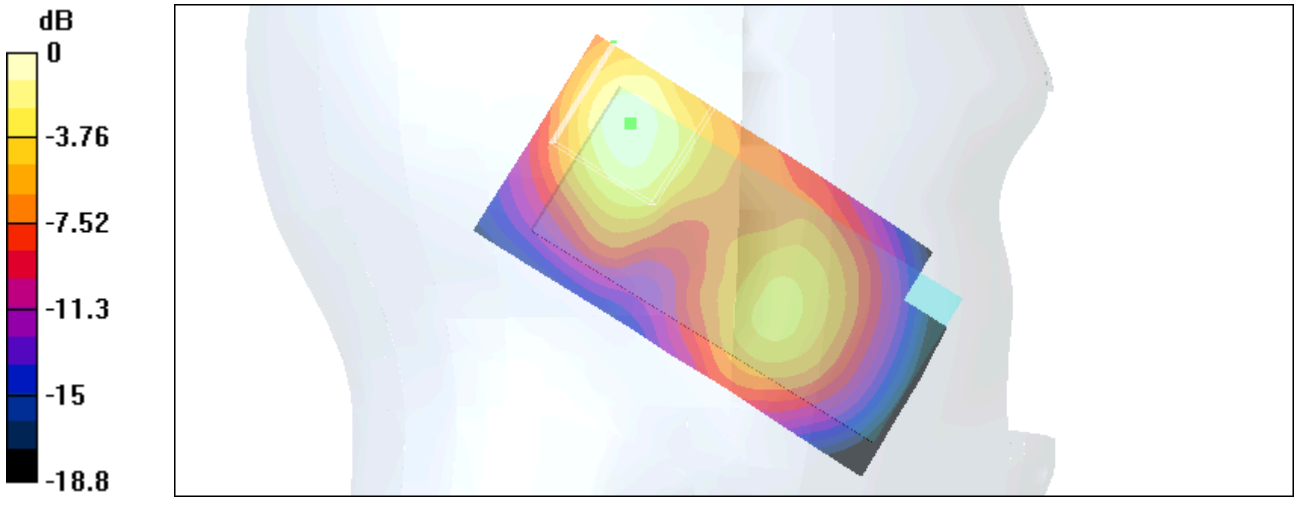
DUT: PPIRH-19; Type: RH-19; Serial: 004400/17/167469/8; HWID0481; Active Cover

Communication System: DCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 (σ = 1.39098 mho/m, ε_r = 40.3021, ρ = 1000 kg/m^3)
Phantom section: Right Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1765; ConvF(5.2, 5.2, 5.2); Calibrated: 16.04.2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn555; Calibrated: 06.03.2003
- Phantom: SAM 3; Type: SAM 4.0; Serial: 1215
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

Cheek; worst case extrapolation; t= 21.5 C/Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 15.4 V/m
Power Drift = -0.03 dB
Maximum value of SAR = 0.585 mW/g

Cheek; worst case extrapolation; t= 21.5 C/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 1.25 W/kg
SAR(1 g) = 0.541 mW/g; SAR(10 g) = 0.26 mW/g
Reference Value = 15.4 V/m
Power Drift = -0.03 dB
Maximum value of SAR = 0.585 mW/g



0 dB = 0.585mW/g

Date/Time: 06/18/03 12:46:21

Test Laboratory: NOKIA Oulu; DTX07333-EN

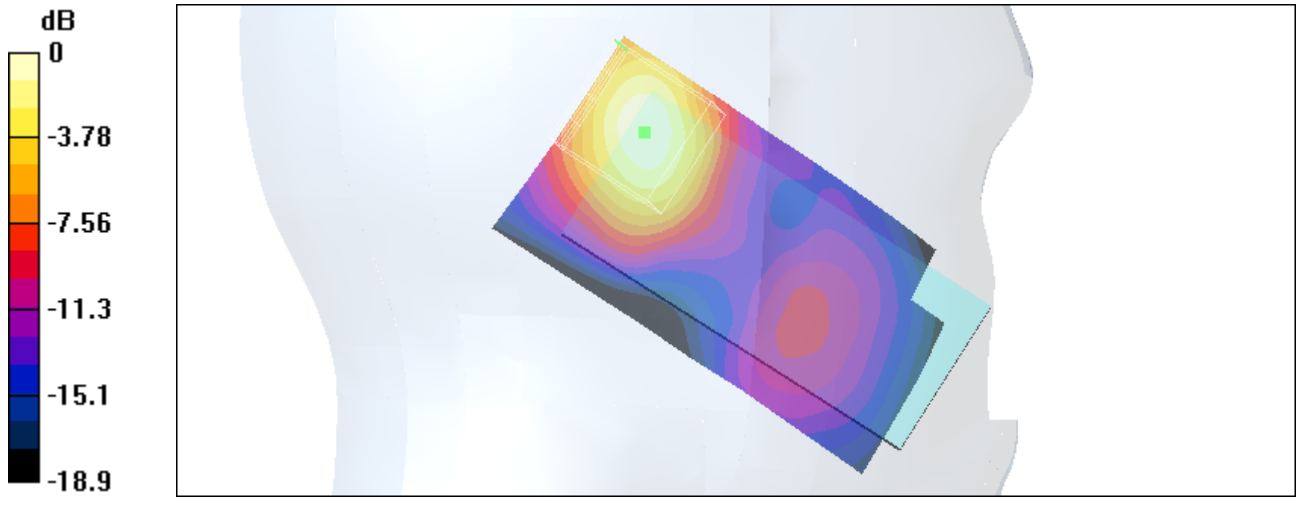
DUT: PPIRH-19; Type: RH-19; Serial: 004400/17/167469/8; HWID0481; Active Cover

Communication System: DCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 (σ = 1.39098 mho/m, ε_r = 40.3021, ρ = 1000 kg/m^3)
Phantom section: Right Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1765; ConvF(5.2, 5.2, 5.2); Calibrated: 16.04.2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn555; Calibrated: 06.03.2003
- Phantom: SAM 3; Type: SAM 4.0; Serial: 1215
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

Tilted; worst case extrapolation; t = 21.6 C/Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 15.2 V/m
Power Drift = 0.002 dB
Maximum value of SAR = 0.506 mW/g

Tilted; worst case extrapolation; t = 21.6 C/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 1.07 W/kg
SAR(1 g) = 0.478 mW/g; SAR(10 g) = 0.23 mW/g
Reference Value = 15.2 V/m
Power Drift = 0.002 dB
Maximum value of SAR = 0.521 mW/g



0 dB = 0.521mW/g

Date/Time: 06/18/03 13:55:34

Test Laboratory: NOKIA Oulu; DTX07333-EN

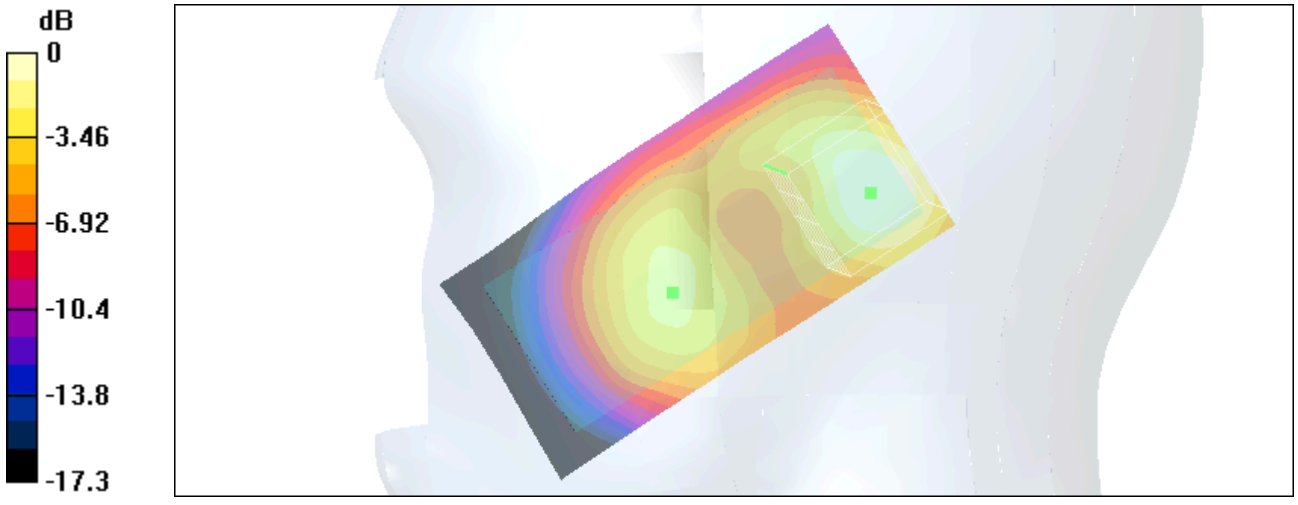
DUT: PPIRH-19; Type: RH-19; Serial: 004400/17/167921/8; HWID0483; Active Cover

Communication System: DCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 (σ = 1.39098 mho/m, ε_r = 40.3021, ρ = 1000 kg/m^3)
Phantom section: Left Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1765; ConvF(5.2, 5.2, 5.2); Calibrated: 16.04.2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn555; Calibrated: 06.03.2003
- Phantom: SAM 3; Type: SAM 4.0; Serial: 1215
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

Cheek; worst case extrapolation; t= 21.4 C/Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 13.8 V/m
Power Drift = -0.005 dB
Maximum value of SAR = 0.343 mW/g

Cheek; worst case extrapolation; t= 21.4 C/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 0.686 W/kg
SAR(1 g) = 0.321 mW/g; SAR(10 g) = 0.166 mW/g
Reference Value = 13.8 V/m
Power Drift = -0.005 dB
Maximum value of SAR = 0.333 mW/g



0 dB = 0.333mW/g

Date/Time: 06/18/03 13:36:37

Test Laboratory: NOKIA Oulu; DTX07333-EN

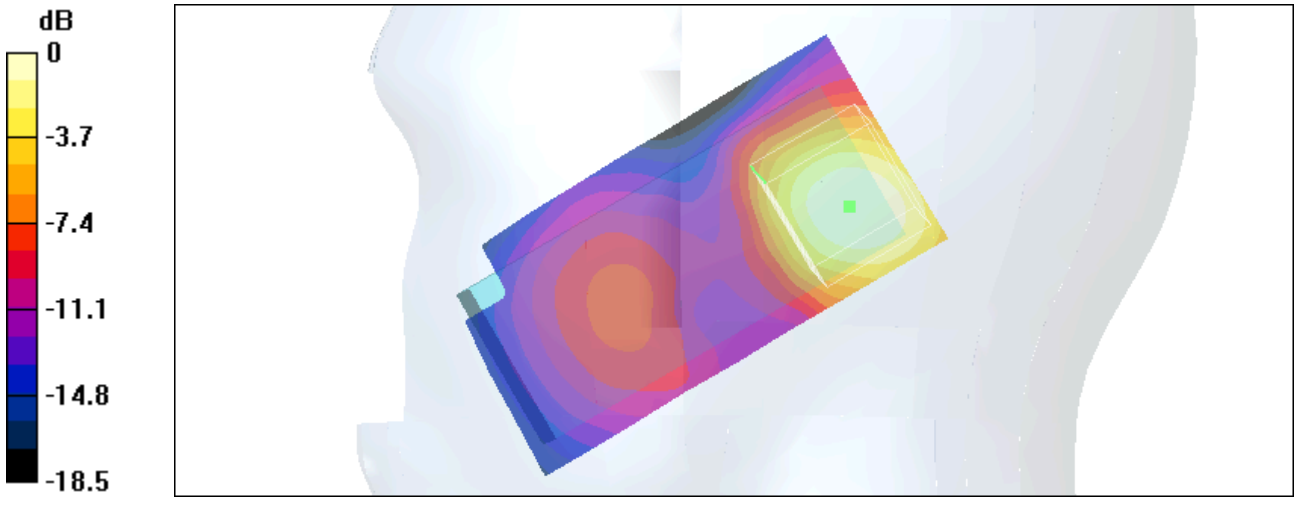
DUT: PPIRH-19; Type: RH-19; Serial: 004400/17/167921/8; HWID0483; Active Cover

Communication System: DCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 (σ = 1.39098 mho/m, ε_r = 40.3021, ρ = 1000 kg/m^3)
Phantom section: Left Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1765; ConvF(5.2, 5.2, 5.2); Calibrated: 16.04.2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn555; Calibrated: 06.03.2003
- Phantom: SAM 3; Type: SAM 4.0; Serial: 1215
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

Tilted; worst case extrapolation; t = 21.4 C/Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 13 V/m
Power Drift = -0.004 dB
Maximum value of SAR = 0.326 mW/g

Tilted; worst case extrapolation; t = 21.4 C/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 0.615 W/kg
SAR(1 g) = 0.302 mW/g; SAR(10 g) = 0.161 mW/g
Reference Value = 13 V/m
Power Drift = -0.004 dB
Maximum value of SAR = 0.312 mW/g



0 dB = 0.312mW/g

Date/Time: 06/18/03 13:55:56

Test Laboratory: NOKIA Oulu; DTX07333-EN

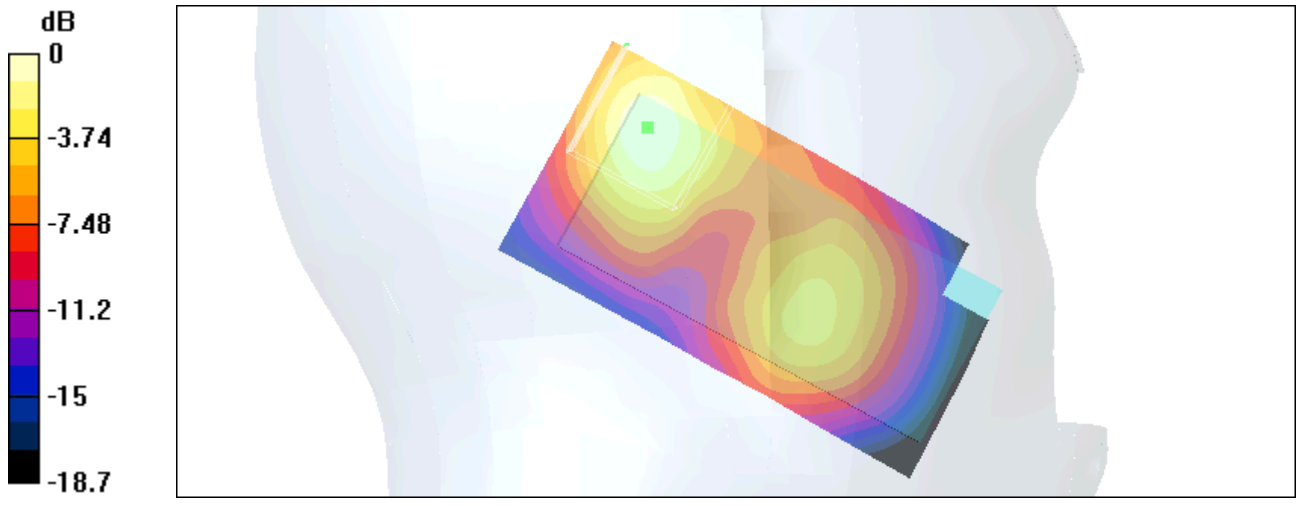
DUT: PPIRH-19; Type: RH-19; Serial: 004400/17/167921/8; HWID0483; Active Cover

Communication System: DCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 (σ = 1.39098 mho/m, ε_r = 40.3021, ρ = 1000 kg/m^3)
Phantom section: Right Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1765; ConvF(5.2, 5.2, 5.2); Calibrated: 16.04.2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn555; Calibrated: 06.03.2003
- Phantom: SAM 3; Type: SAM 4.0; Serial: 1215
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

Cheek; worst case extrapolation; t= 21.5 C/Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 16 V/m
Power Drift = -0.02 dB
Maximum value of SAR = 0.645 mW/g

Cheek; worst case extrapolation; t= 21.5 C/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 1.36 W/kg
SAR(1 g) = 0.591 mW/g; SAR(10 g) = 0.286 mW/g
Reference Value = 16 V/m
Power Drift = -0.02 dB
Maximum value of SAR = 0.631 mW/g



0 dB = 0.631mW/g

Date/Time: 06/18/03 12:48:03

Test Laboratory: NOKIA Oulu; DTX07333-EN

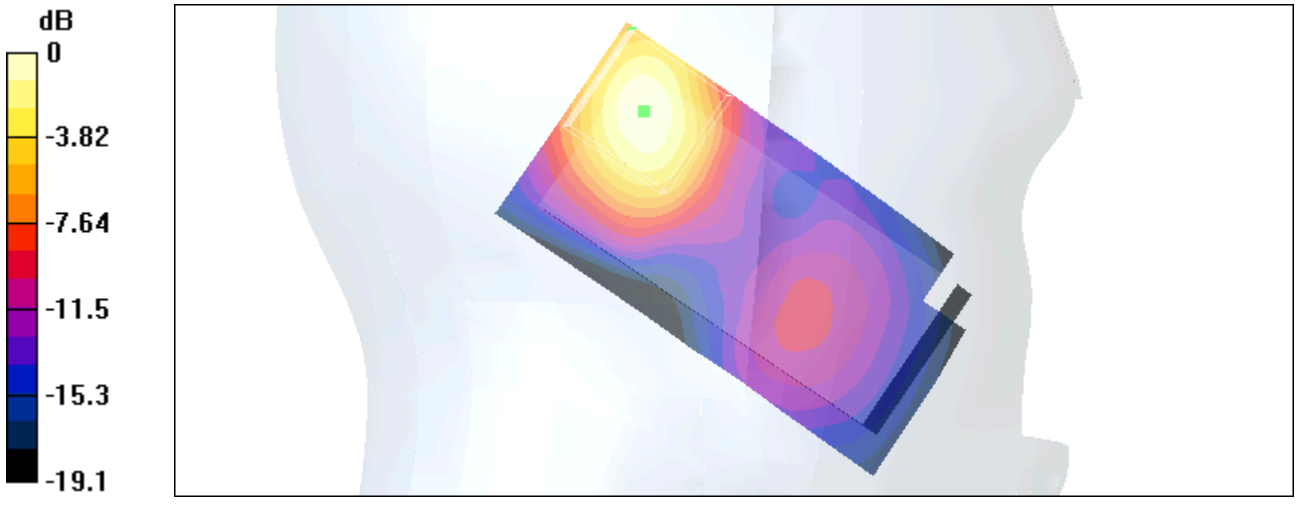
DUT: PPIRH-19; Type: RH-19; Serial: 004400/17/167921/8; HWID0483; Active Cover

Communication System: DCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 (σ = 1.39098 mho/m, ε_r = 40.3021, ρ = 1000 kg/m^3)
Phantom section: Right Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1765; ConvF(5.2, 5.2, 5.2); Calibrated: 16.04.2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn555; Calibrated: 06.03.2003
- Phantom: SAM 3; Type: SAM 4.0; Serial: 1215
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

Tilted; worst case extrapolation; t = 21.5 C/Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 15.8 V/m
Power Drift = -0.03 dB
Maximum value of SAR = 0.574 mW/g

Tilted; worst case extrapolation; t = 21.5 C/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 1.2 W/kg
SAR(1 g) = 0.537 mW/g; SAR(10 g) = 0.258 mW/g
Reference Value = 15.8 V/m
Power Drift = -0.03 dB
Maximum value of SAR = 0.583 mW/g



0 dB = 0.583mW/g

Date/Time: 05/16/03 14:37:41

Test Laboratory: NOKIA Oulu; DTX07333-EN

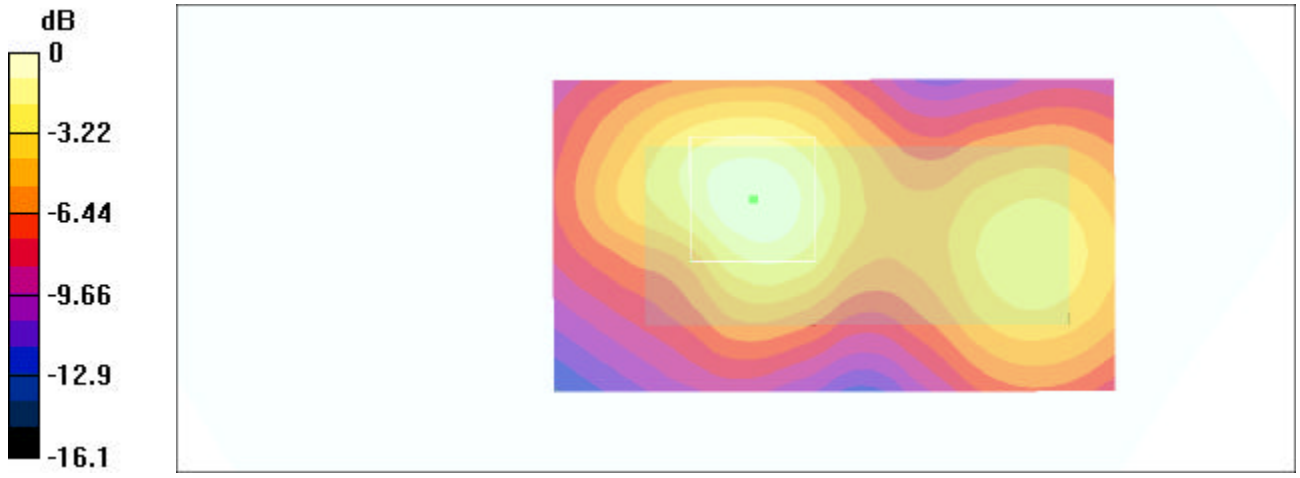
DUT: PPIRH-19; Type: RH-19; Serial: 004400/17/167469/8; HWID0481, headset HS-5

Communication System: GPRS 1900; Frequency: 1850.2 MHz;Duty Cycle: 1:4.2
Medium: muscle 1900 MHz (s = 1.48797 mho/m, e_r = 52.217, ? = 1000 kg/m^3)
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1381; ConvF(4.9, 4.9, 4.9); Calibrated: 21.10.2002
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn371; Calibrated: 18.10.2002
- Phantom: SAM_1; Type: SAM; Serial: TP-1128
- Measurement SW: DASY4, V4.1 Build 33; Postprocessing SW: SEMCAD, V1.6 Build 115

HS-5; t = 22.3 C; Worst case extrapolation/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 12.5 V/m
Power Drift = -0.07 dB
Maximum value of SAR = 0.577 mW/g

HS-5; t = 22.3 C; Worst case extrapolation/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 1.13 W/kg
SAR(1 g) = 0.553 mW/g; SAR(10 g) = 0.314 mW/g
Reference Value = 12.5 V/m
Power Drift = -0.07 dB
Maximum value of SAR = 0.573 mW/g



0 dB = 0.573mW/g

Date/Time: 05/16/03 14:38:03

Test Laboratory: NOKIA Oulu; DTX07333-EN

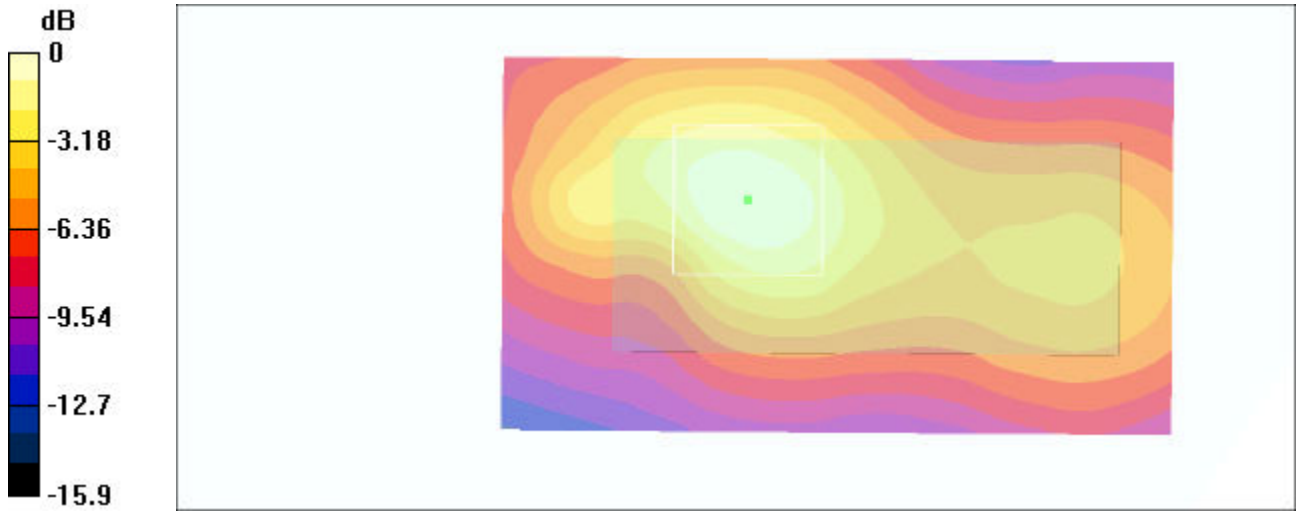
DUT: PPIRH-19; Type: RH-19; Serial: 004400/17/167469/8; HWID0481, headset HS-1C

Communication System: GPRS 1900; Frequency: 1850.2 MHz;Duty Cycle: 1:4.2
Medium: muscle 1900 MHz (s = 1.48797 mho/m, e_r = 52.217, ? = 1000 kg/m^3)
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1381; ConvF(4.9, 4.9, 4.9); Calibrated: 21.10.2002
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn371; Calibrated: 18.10.2002
- Phantom: SAM_1; Type: SAM; Serial: TP-1128
- Measurement SW: DASY4, V4.1 Build 33; Postprocessing SW: SEMCAD, V1.6 Build 115

HS-1C; t = 22.3 C; Worst case extrapolation/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 11.4 V/m
Power Drift = -0.007 dB
Maximum value of SAR = 0.527 mW/g

HS-1C; t = 22.3 C; Worst case extrapolation/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 1 W/kg
SAR(1 g) = 0.502 mW/g; SAR(10 g) = 0.287 mW/g
Reference Value = 11.4 V/m
Power Drift = -0.007 dB
Maximum value of SAR = 0.521 mW/g



0 dB = 0.521mW/g

Date/Time: 05/16/03 14:37:21

Test Laboratory: NOKIA Oulu; DTX07333-EN

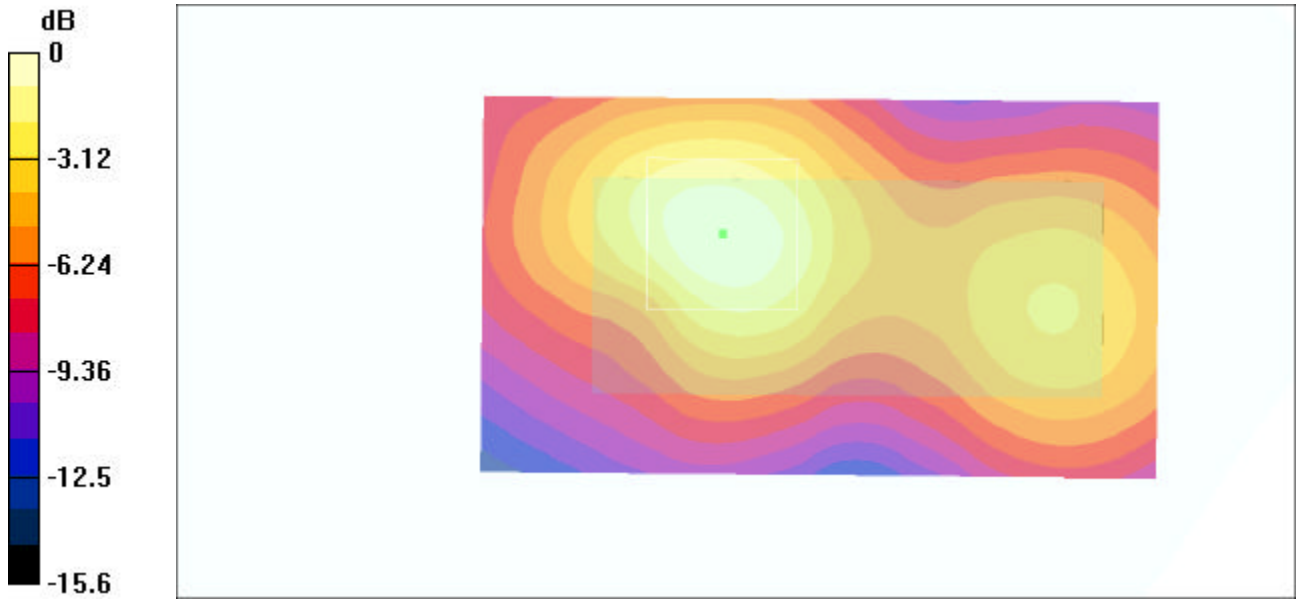
DUT: PPIRH-19; Type: RH-19; Serial: 004400/17/167469/8; HWID0481, headset HS-2R

Communication System: GPRS 1900; Frequency: 1850.2 MHz;Duty Cycle: 1:4.2
Medium: muscle 1900 MHz (s = 1.48797 mho/m, e_r = 52.217, ? = 1000 kg/m^3)
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1381; ConvF(4.9, 4.9, 4.9); Calibrated: 21.10.2002
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn371; Calibrated: 18.10.2002
- Phantom: SAM_1; Type: SAM; Serial: TP-1128
- Measurement SW: DASY4, V4.1 Build 33; Postprocessing SW: SEMCAD, V1.6 Build 115

HS-2R; t = 22.2 C; Worst case extrapolation/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 11.9 V/m
Power Drift = 0.04 dB
Maximum value of SAR = 0.551 mW/g

HS-2R; t = 22.2 C; Worst case extrapolation/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 1.05 W/kg
SAR(1 g) = 0.53 mW/g; SAR(10 g) = 0.305 mW/g
Reference Value = 11.9 V/m
Power Drift = 0.04 dB
Maximum value of SAR = 0.55 mW/g



0 dB = 0.55mW/g

Date/Time: 05/16/03 12:12:45

Test Laboratory: NOKIA Oulu; DTX07333-EN

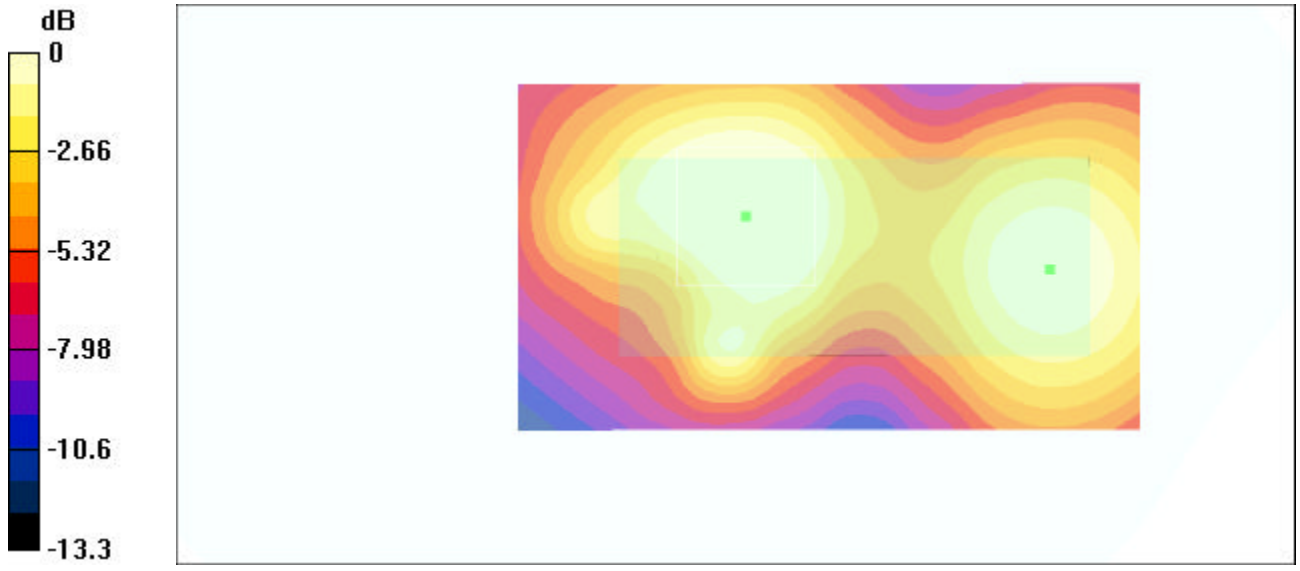
DUT: PPIRH-19; Type: RH-19; Serial: 004400/17/167921/8; HWID0483, headset HS-5

Communication System: GPRS 1900; Frequency: 1850.2 MHz;Duty Cycle: 1:4.2
Medium: muscle 1900 MHz (s = 1.48797 mho/m, e_r = 52.217, ? = 1000 kg/m^3)
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1381; ConvF(4.9, 4.9, 4.9); Calibrated: 21.10.2002
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn371; Calibrated: 18.10.2002
- Phantom: SAM_1; Type: SAM; Serial: TP-1128
- Measurement SW: DASY4, V4.1 Build 33; Postprocessing SW: SEMCAD, V1.6 Build 115

HS-5; t = 21.6 C; Worst case extrapolation/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 11.8 V/m
Power Drift = -0.05 dB
Maximum value of SAR = 0.553 mW/g

HS-5; t = 21.6 C; Worst case extrapolation/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 1.09 W/kg
SAR(1 g) = 0.535 mW/g; SAR(10 g) = 0.303 mW/g; 2nd peak SAR(1 g)=0.358 mW/g ; SAR(10 g) = 0.219 mW/g
Reference Value = 11.8 V/m
Power Drift = -0.05 dB
Maximum value of SAR = 0.554 mW/g



0 dB = 0.365mW/g

Date/Time: 05/16/03 12:13:33

Test Laboratory: NOKIA Oulu; DTX07333-EN

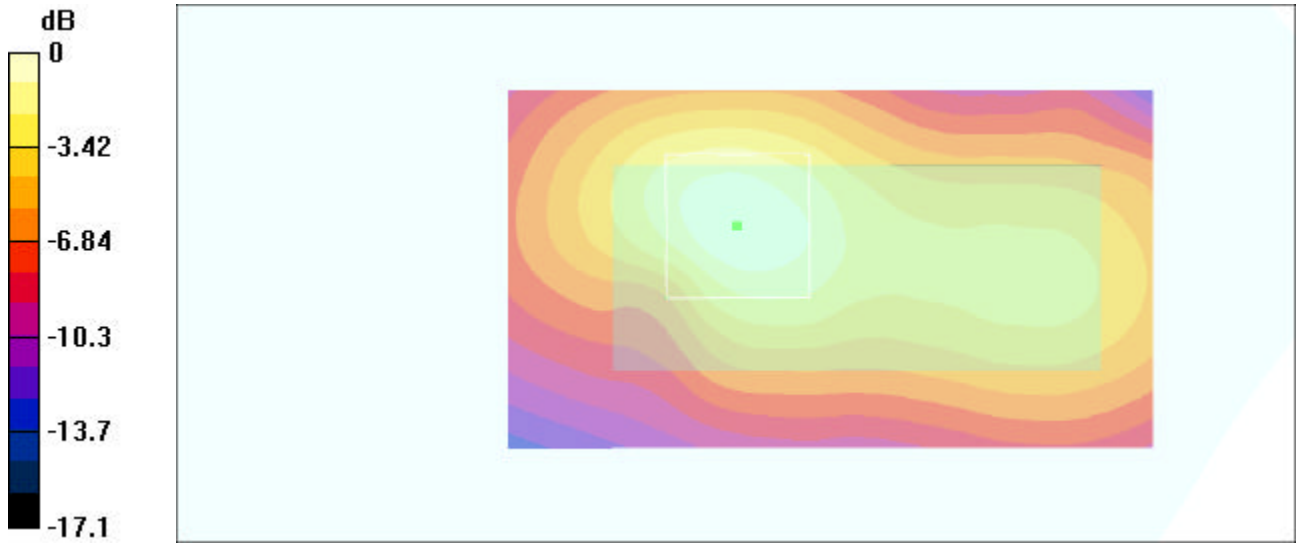
DUT: PPIRH-19; Type: RH-19; Serial: 004400/17/167921/8; HWID0483, headset HS-1C

Communication System: GPRS 1900; Frequency: 1850.2 MHz;Duty Cycle: 1:4.2
Medium: muscle 1900 MHz (s = 1.48797 mho/m, e_r = 52.217, ? = 1000 kg/m^3)
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1381; ConvF(4.9, 4.9, 4.9); Calibrated: 21.10.2002
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn371; Calibrated: 18.10.2002
- Phantom: SAM_1; Type: SAM; Serial: TP-1128
- Measurement SW: DASY4, V4.1 Build 33; Postprocessing SW: SEMCAD, V1.6 Build 115

HS-1C; t = 21.8 C; Worst case extrapolation/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 11 V/m
Power Drift = 0.06 dB
Maximum value of SAR = 0.495 mW/g

HS-1C; t = 21.8 C; Worst case extrapolation/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 0.966 W/kg
SAR(1 g) = 0.478 mW/g; SAR(10 g) = 0.273 mW/g
Reference Value = 11 V/m
Power Drift = 0.06 dB
Maximum value of SAR = 0.495 mW/g



0 dB = 0.495mW/g

Date/Time: 05/16/03 12:14:33

Test Laboratory: NOKIA Oulu; DTX07333-EN

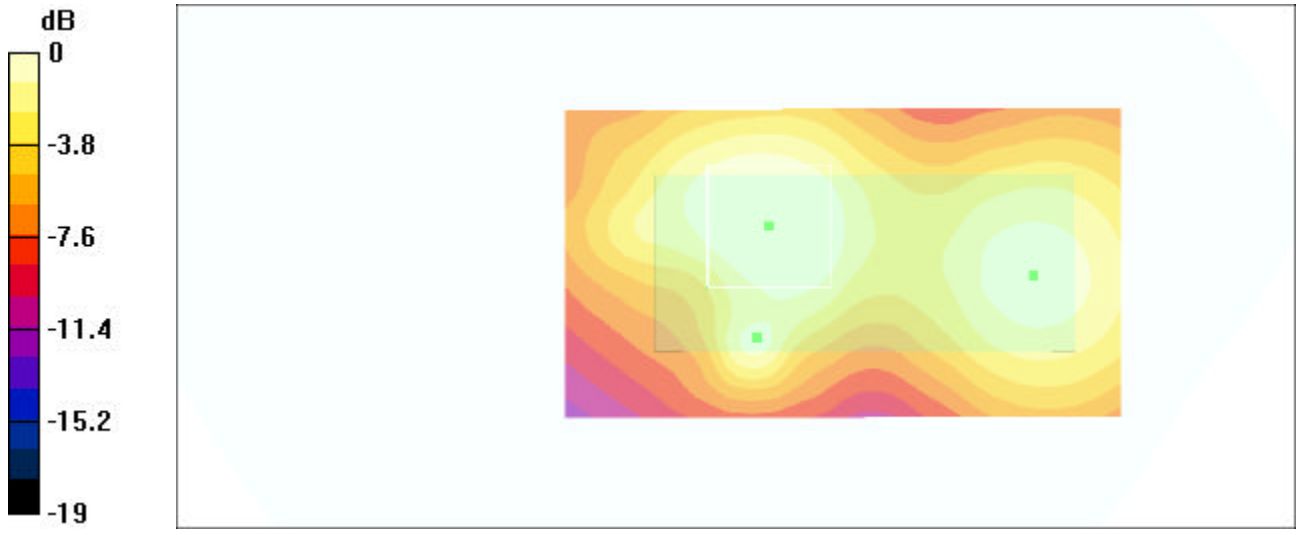
DUT: PPIRH-19; Type: RH-19; Serial: 004400/17/167921/8; HWID0483, headset HS-2R

Communication System: GPRS 1900; Frequency: 1850.2 MHz;Duty Cycle: 1:4.2
Medium: muscle 1900 MHz (s = 1.48797 mho/m, e_r = 52.217, ? = 1000 kg/m^3)
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1381; ConvF(4.9, 4.9, 4.9); Calibrated: 21.10.2002
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn371; Calibrated: 18.10.2002
- Phantom: SAM_1; Type: SAM; Serial: TP-1128
- Measurement SW: DASY4, V4.1 Build 33; Postprocessing SW: SEMCAD, V1.6 Build 115

HS-2R; t = 21.7 C; Worst case extrapolation/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 11.3 V/m
Power Drift = -0.02 dB
Maximum value of SAR = 0.523 mW/g

HS-2R; t = 21.7 C; Worst case extrapolation/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 1.04 W/kg
SAR(1 g) = 0.514 mW/g; SAR(10 g) = 0.291 mW/g, 2nd peak SAR(1 g)=0.342 mW/g ; SAR(10 g) = 0.211 mW/g
Reference Value = 11.3 V/m
Power Drift = -0.02 dB
Maximum value of SAR = 0.532 mW/g



0 dB = 0.39mW/g

Date/Time: 06/12/03 16:09:34

Test Laboratory: NOKIA Oulu; DTX07333-EN

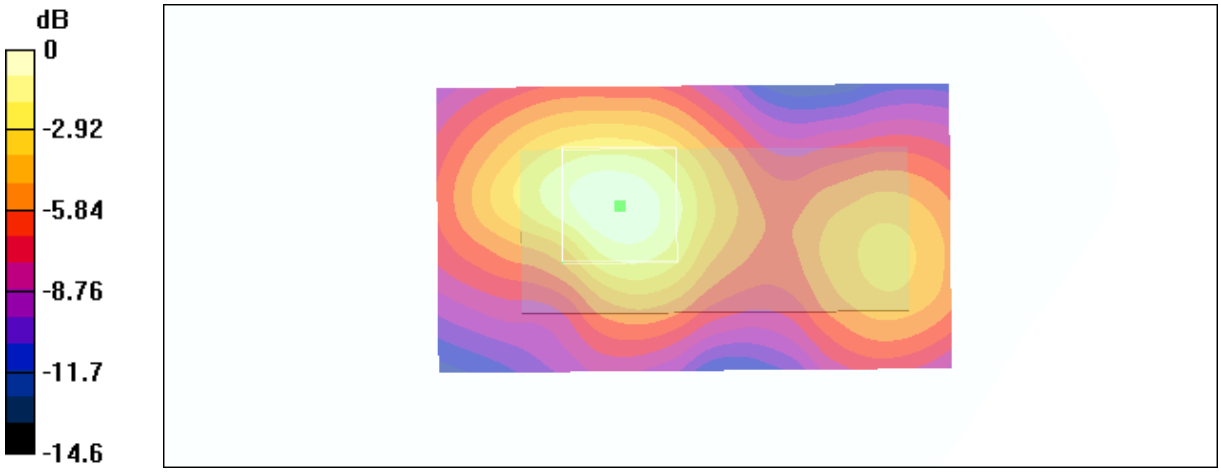
DUT: PPIRH-19; Type: RH-19; Serial: 004400/17/167469/8; HWID: 0481; Headset: HS-5; Active Cover

Communication System: GPRS 1900; Frequency: 1850.2 MHz;Duty Cycle: 1:4.2
Medium: muscle 1900 MHz (σ = 1.52898 mho/m, ε_r = 52.6593, ρ = 1000 kg/m^3)
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1381; ConvF(4.9, 4.9, 4.9); Calibrated: 21.10.2002
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn371; Calibrated: 18.10.2002
- Phantom: SAM_1; Type: SAM; Serial: TP-1128
- Measurement SW: DASY4, V4.1 Build 33; Postprocessing SW: SEMCAD, V1.6 Build 115

HS-5; T = 22.8 C; Worst case extrapolation/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 14.5 V/m
Power Drift = -0.1 dB
Maximum value of SAR = 0.607 mW/g

HS-5; T = 22.8 C; Worst case extrapolation/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 1.19 W/kg
SAR(1 g) = 0.584 mW/g; SAR(10 g) = 0.333 mW/g
Reference Value = 14.5 V/m
Power Drift = -0.1 dB
Maximum value of SAR = 0.606 mW/g



0 dB = 0.606mW/g

Date/Time: 06/12/03 16:10:39

Test Laboratory: NOKIA Oulu; DTX07333-EN

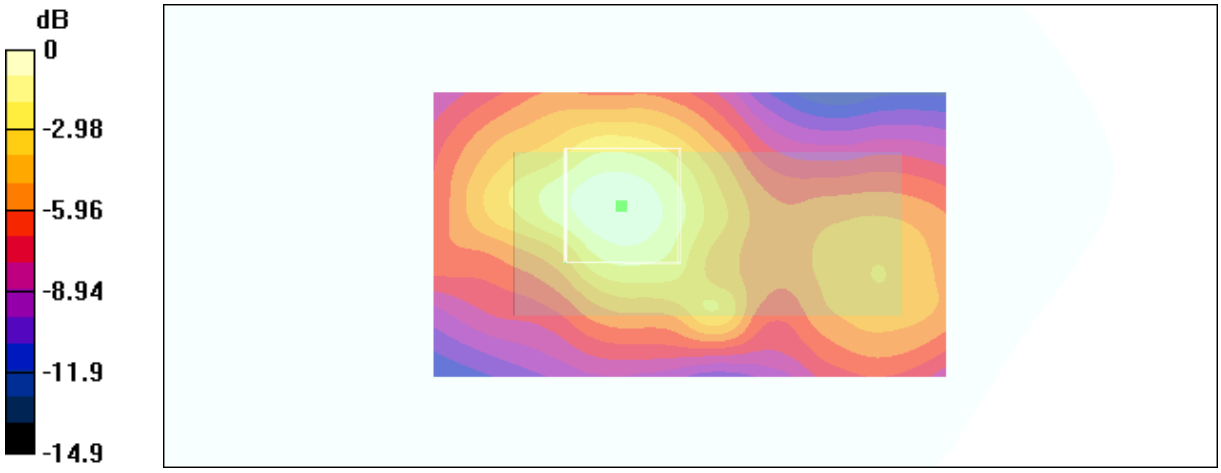
DUT: PPIRH-19; Type: RH-19; Serial: 004400/17/167921/8; HWID0483; Headset: HS-5; Active Cover

Communication System: GPRS 1900; Frequency: 1880 MHz;Duty Cycle: 1:4.2
Medium: muscle 1900 MHz (σ = 1.5615 mho/m, ε_r = 52.4967, ρ = 1000 kg/m^3)
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1381; ConvF(4.9, 4.9, 4.9); Calibrated: 21.10.2002
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn371; Calibrated: 18.10.2002
- Phantom: SAM_1; Type: SAM; Serial: TP-1128
- Measurement SW: DASY4, V4.1 Build 33; Postprocessing SW: SEMCAD, V1.6 Build 115

HS-5; T = 22.9 ┌C; Worst case extrapolation/Area Scan (51x91x1): Measurement grid:
dx=15mm, dy=15mm
Reference Value = 13.2 V/m
Power Drift = -0.02 dB
Maximum value of SAR = 0.558 mW/g

HS-5; T = 22.9 ┌C; Worst case extrapolation/Zoom Scan (5x5x7)/Cube 0: Measurement grid:
dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 1.13 W/kg
SAR(1 g) = 0.554 mW/g; SAR(10 g) = 0.317 mW/g
Reference Value = 13.2 V/m
Power Drift = -0.02 dB
Maximum value of SAR = 0.57 mW/g



0 dB = 0.57mW/g

Date/Time: 05/13/03 10:30:20

Test Laboratory: NOKIA Oulu; DTX07333-EN

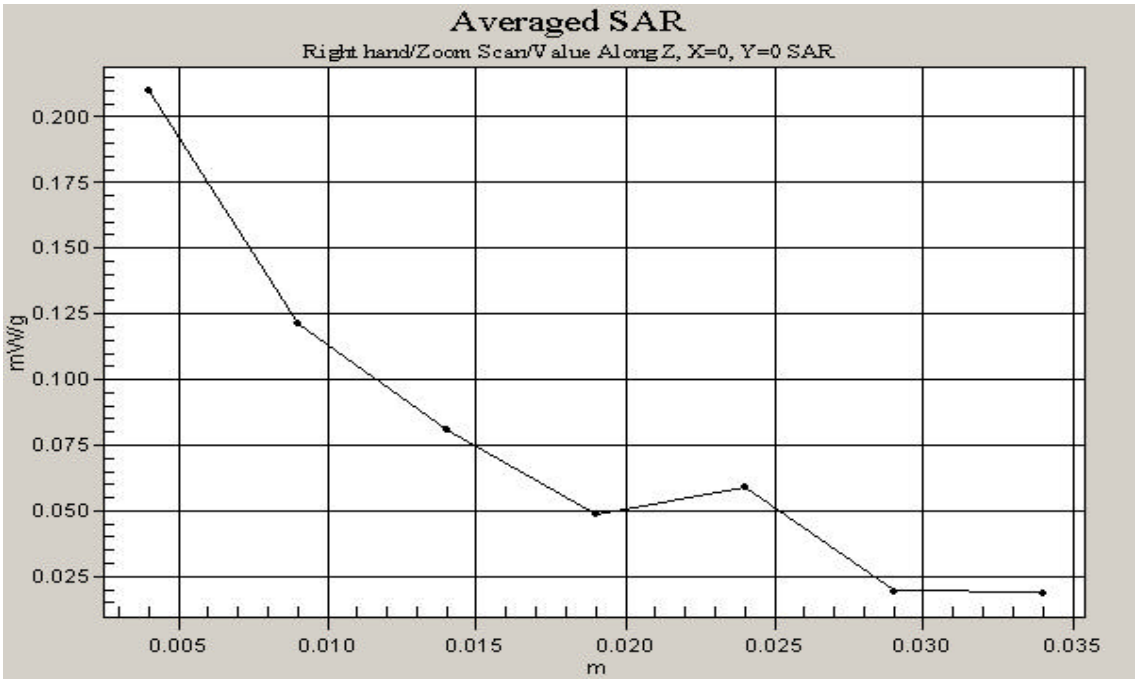
DUT: PPIRH-19; Type: RH-19; Serial: 004400/17/167921/8; HWID0483

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: Head 1900 MHz (s = 1.413 mho/m, e_r = 40.0405, ? = 1000 kg/m^3)
Phantom section: Right Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1381; ConvF(5.1, 5.1, 5.1); Calibrated: 21.10.2002
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn371; Calibrated: 18.10.2002
- Phantom: SAM_2; Type: SAM; Serial: TP-1003
- Measurement SW: DASY4, V4.1 Build 33; Postprocessing SW: SEMCAD, V1.6 Build 115

Cheek, t = 21.4 C, worst case extrapolation/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 16.1 V/m
Power Drift = 0.04 dB
Maximum value of SAR = 0.7 mW/g

Cheek, t = 21.4 C, worst case extrapolation/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 1.71 W/kg
SAR(1 g) = 0.722 mW/g; SAR(10 g) = 0.344 mW/g
Reference Value = 16.1 V/m
Power Drift = 0.04 dB
Maximum value of SAR = 0.778 mW/g



Date/Time: 06/18/03 13:55:56

Test Laboratory: Nokia Oulu; DTX07333-EN

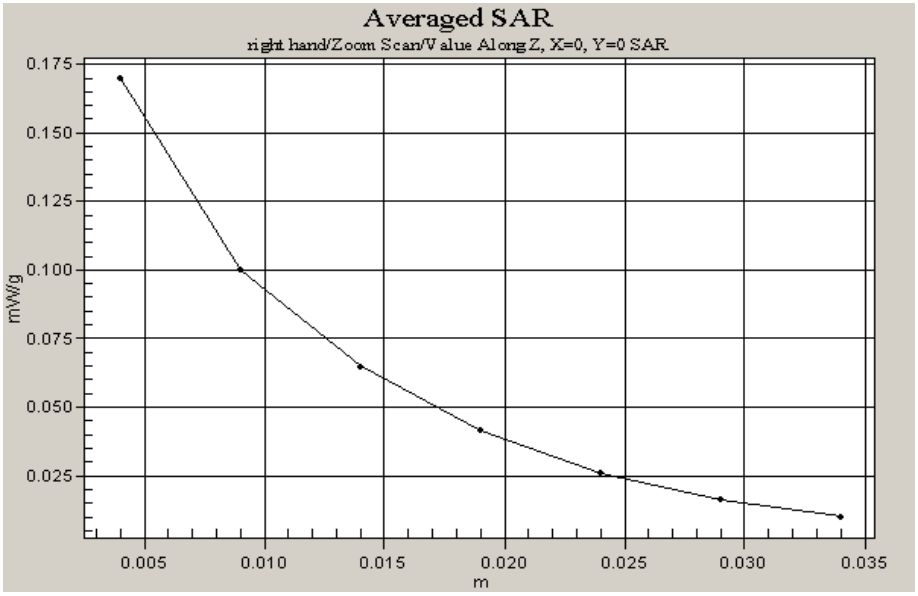
DUT: PPIRH-19; Type: RH-19; Serial: 004400/17/167921/8; HWID0483; Active Cover

Communication System: DCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 (σ = 1.39098 mho/m, ε_r = 40.3021, ρ = 1000 kg/m^3)
Phantom section: Right Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1765; ConvF(5.2, 5.2, 5.2); Calibrated: 16.04.2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn555; Calibrated: 06.03.2003
- Phantom: SAM 3; Type: SAM 4.0; Serial: 1215
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

Cheek; worst case extrapolation; t= 21.5 C/Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 16 V/m
Power Drift = -0.02 dB
Maximum value of SAR = 0.645 mW/g

Cheek; worst case extrapolation; t= 21.5 C/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 1.36 W/kg
SAR(1 g) = 0.591 mW/g; SAR(10 g) = 0.286 mW/g
Reference Value = 16 V/m
Power Drift = -0.02 dB
Maximum value of SAR = 0.631 mW/g



Date/Time: 05/16/03 14:37:41

Test Laboratory: NOKIA Oulu; DTX07333-EN

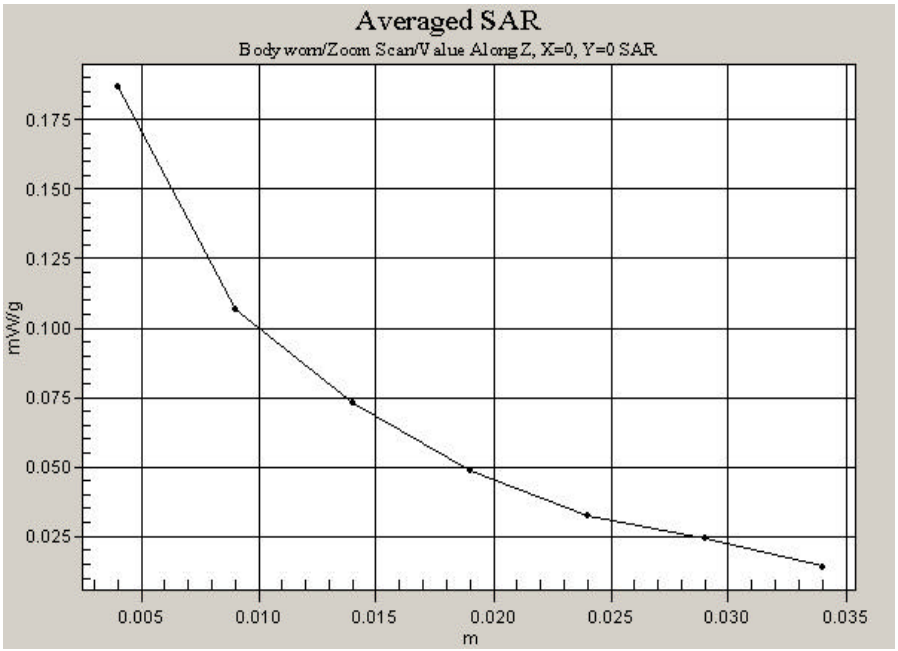
DUT: PPIRH-19; Type: RH-19; Serial: 004400/17/167469/8; HWID0481, headset HS-5

Communication System: GPRS 1900; Frequency: 1850.2 MHz;Duty Cycle: 1:4.2
Medium: muscle 1900 MHz (s = 1.48797 mho/m, e_r = 52.217, ? = 1000 kg/m^3)
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1381; ConvF(4.9, 4.9, 4.9); Calibrated: 21.10.2002
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn371; Calibrated: 18.10.2002
- Phantom: SAM_1; Type: SAM; Serial: TP-1128
- Measurement SW: DASY4, V4.1 Build 33; Postprocessing SW: SEMCAD, V1.6 Build 115

HS-5; t = 22.3 C; Worst case extrapolation/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 12.5 V/m
Power Drift = -0.07 dB
Maximum value of SAR = 0.577 mW/g

HS-5; t = 22.3 C; Worst case extrapolation/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 1.13 W/kg
SAR(1 g) = 0.553 mW/g; SAR(10 g) = 0.314 mW/g
Reference Value = 12.5 V/m
Power Drift = -0.07 dB
Maximum value of SAR = 0.573 mW/g



Date/Time: 06/12/03 16:09:34

Test Laboratory: NOKIA Oulu; DTX07333-EN

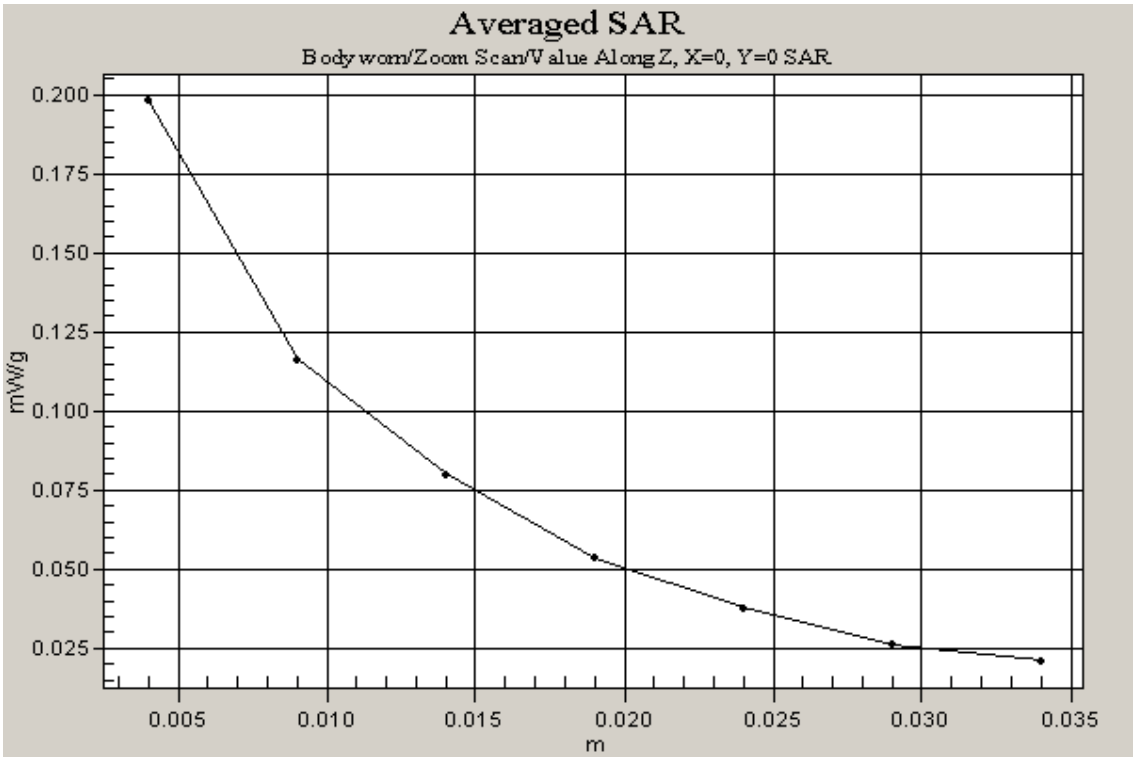
DUT: PPIRH-19; Type: RH-19; Serial: 004400/17/167469/8; HWID0481; Headset: HS-5; Active Cover

Communication System: GPRS 1900; Frequency: 1850.2 MHz;Duty Cycle: 1:4.2
Medium: muscle 1900 MHz (σ = 1.52898 mho/m, ε_r = 52.6593, ρ = 1000 kg/m^3)
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1381; ConvF(4.9, 4.9, 4.9); Calibrated: 21.10.2002
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn371; Calibrated: 18.10.2002
- Phantom: SAM_1; Type: SAM; Serial: TP-1128
- Measurement SW: DASY4, V4.1 Build 33; Postprocessing SW: SEMCAD, V1.6 Build 115

HS-5; T = 22.8 C; Worst case extrapolation/Area Scan (51x91x1): Measurement grid:
dx=15mm, dy=15mm
Reference Value = 14.5 V/m
Power Drift = -0.1 dB
Maximum value of SAR = 0.607 mW/g

HS-5; T = 22.8 C; Worst case extrapolation/Zoom Scan (5x5x7)/Cube 0: Measurement grid:
dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 1.19 W/kg
SAR(1 g) = 0.584 mW/g; SAR(10 g) = 0.333 mW/g
Reference Value = 14.5 V/m
Power Drift = -0.1 dB
Maximum value of SAR = 0.606 mW/g



APPENDIX C.

Calibration Certificate(s)

Schmid & Partner
Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 245 97 00, Fax +41 1 245 97 79

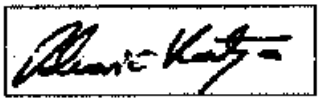
Calibration Certificate

Dosimetric E-Field Probe

Type:	**ET3DV6**
Serial Number:	**1381**
Place of Calibration:	**Zurich**
Date of Calibration:	**October 21, 2002**
Calibration Interval:	**12 months**

Schmid & Partner Engineering AG hereby certifies, that this device has been calibrated on the date indicated above. The calibration was performed in accordance with specifications and procedures of Schmid & Partner Engineering AG.

Wherever applicable, the standards used in the calibration process are traceable to international standards. In all other cases the standards of the Laboratory for EMF and Microwave Electronics at the Swiss Federal Institute of Technology (ETH) in Zurich, Switzerland have been applied.

Calibrated by:	
Approved by:	

Schmid & Partner
Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland, Telephone +41 1 245 97 00, Fax +41 1 245 97 79

Probe ET3DV6

SN:1381

Manufactured:	September 18, 1999
Last calibration:	October 25, 2001
Recalibrated:	October 21, 2002

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ET3DV6 SN:1381

Sensitivity in Free Space

Diode Compression

NormX	1.57 $\mu V/(V/m)^2$	DCP X	95	mV
NormY	1.69 $\mu V/(V/m)^2$	DCP Y	95	mV
NormZ	1.78 $\mu V/(V/m)^2$	DCP Z	95	mV

Sensitivity in Tissue Simulating Liquid

Head	**835 MHz**	ε_r = **41.5 ± 5%**	σ = **0.90 ± 5% mho/m**
Head	**900 MHz**	ε_r = **41.5 ± 5%**	σ = **0.97 ± 5% mho/m**

ConvF X	**6.3** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**6.3** ± 9.5% (k=2)	Alpha	**0.43**
ConvF Z	**6.3** ± 9.5% (k=2)	Depth	**2.44**

Head	**1880 MHz**	ε_r = **40.0 ± 5%**	σ = **1.40 ± 5% mho/m**
Head	**1800 MHz**	ε_r = **40.0 ± 5%**	σ = **1.40 ± 5% mho/m**

ConvF X	**5.1** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**5.1** ± 9.5% (k=2)	Alpha	**0.61**
ConvF Z	**5.1** ± 9.5% (k=2)	Depth	**2.32**

Boundary Effect

Head **835 MHz** **Typical SAR gradient: 5 % per mm**

Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	11.0	6.1
SAR_{be} [%]	With Correction Algorithm	0.4	0.6

Head **1880 MHz** **Typical SAR gradient: 10 % per mm**

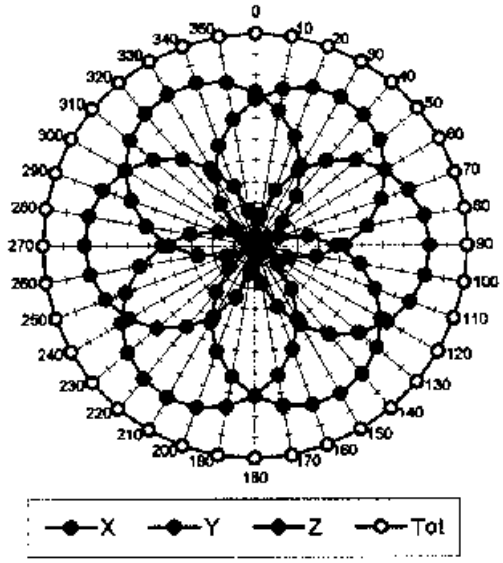
Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	13.9	8.9
SAR_{be} [%]	With Correction Algorithm	0.2	0.2

Sensor Offset

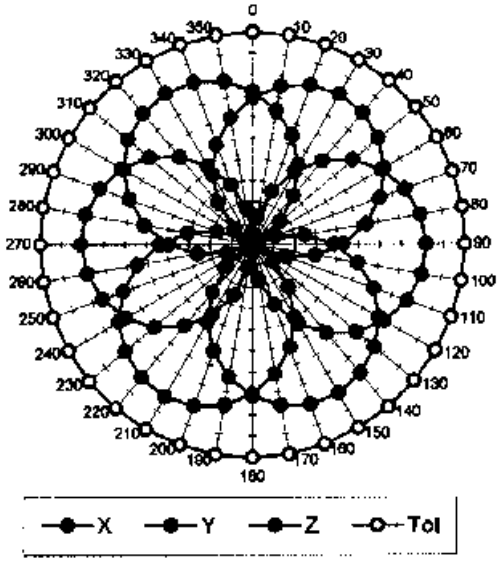
Probe Tip to Sensor Center	**2.7**	mm
Optical Surface Detection	**1.6 ± 0.2**	mm

Receiving Pattern (ϕ), θ = 0°

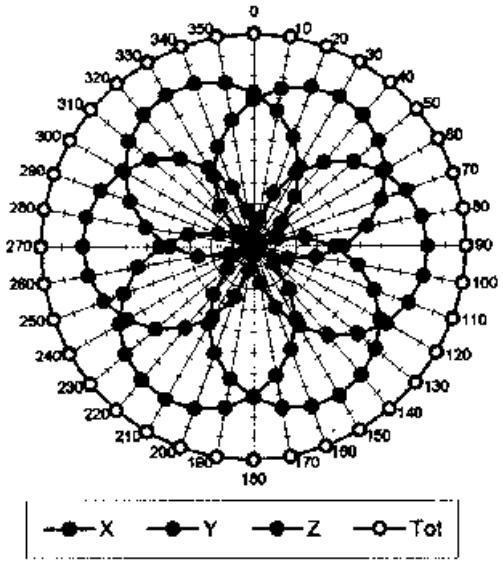
f = 30 MHz, TEM cell ifi110



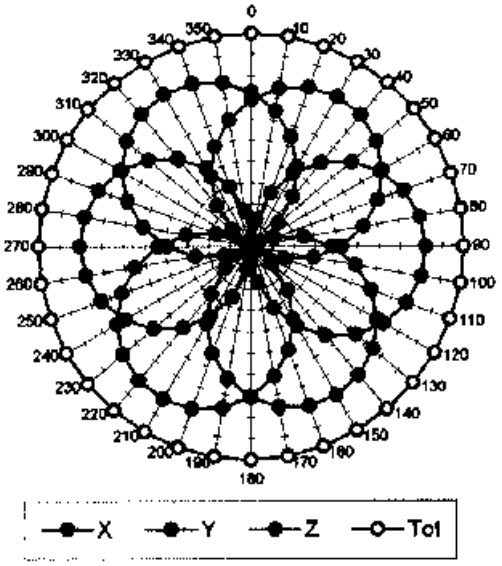
f = 100 MHz, TEM cell ifi110

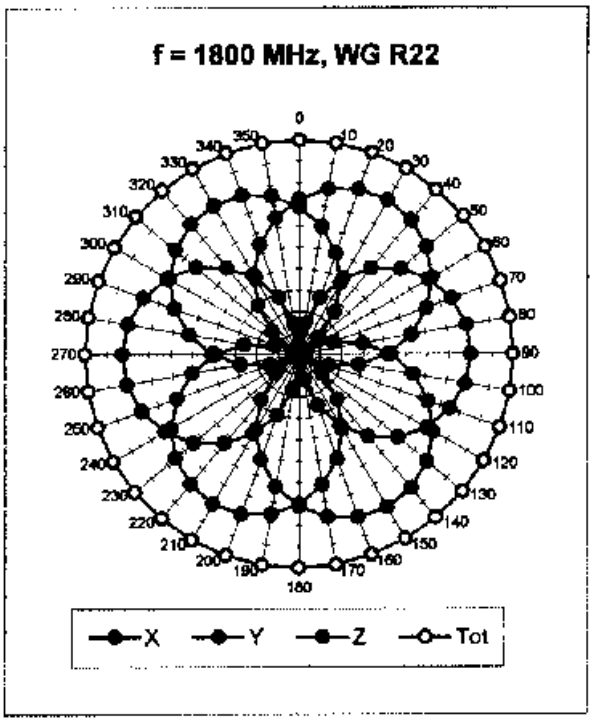


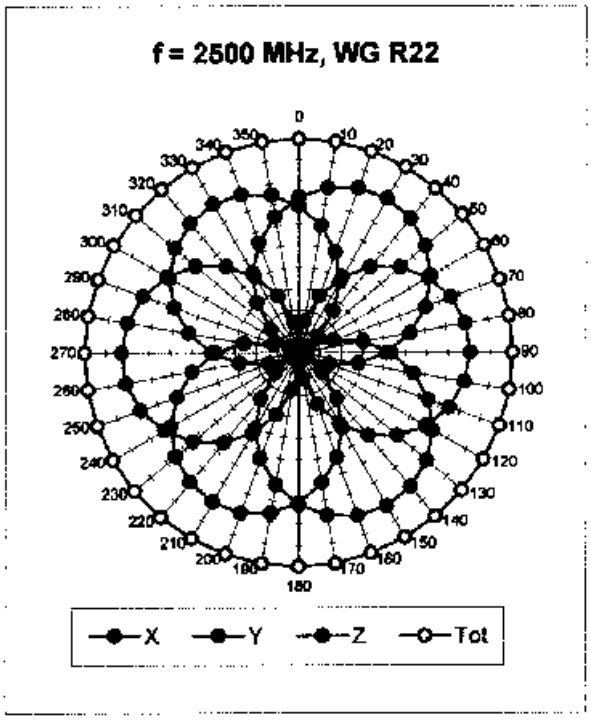
f = 300 MHz, TEM cell ifi110



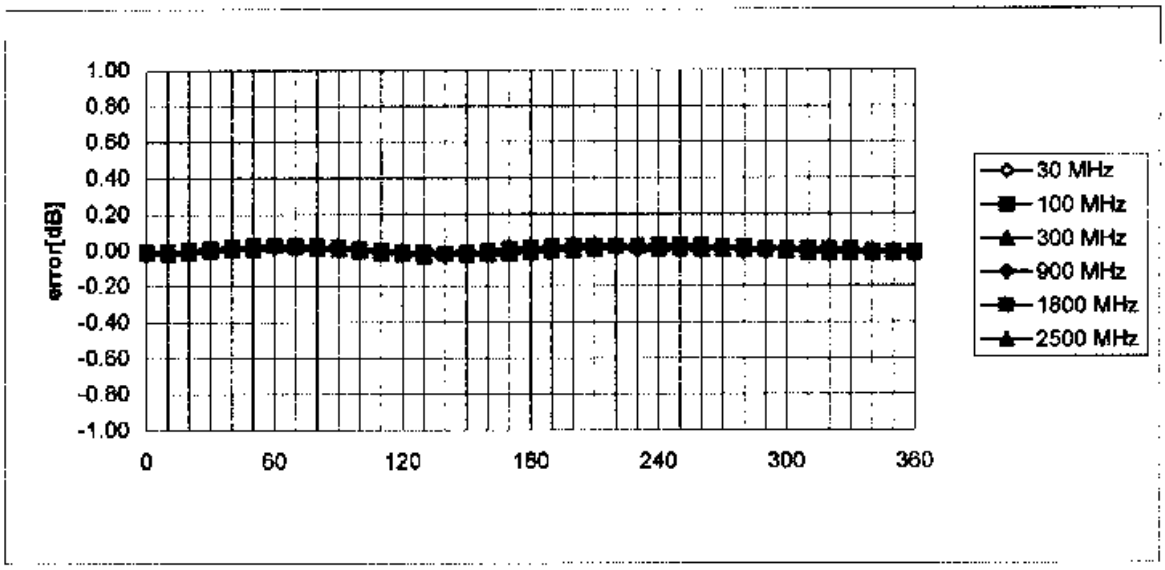
f = 900 MHz, TEM cell ifi110





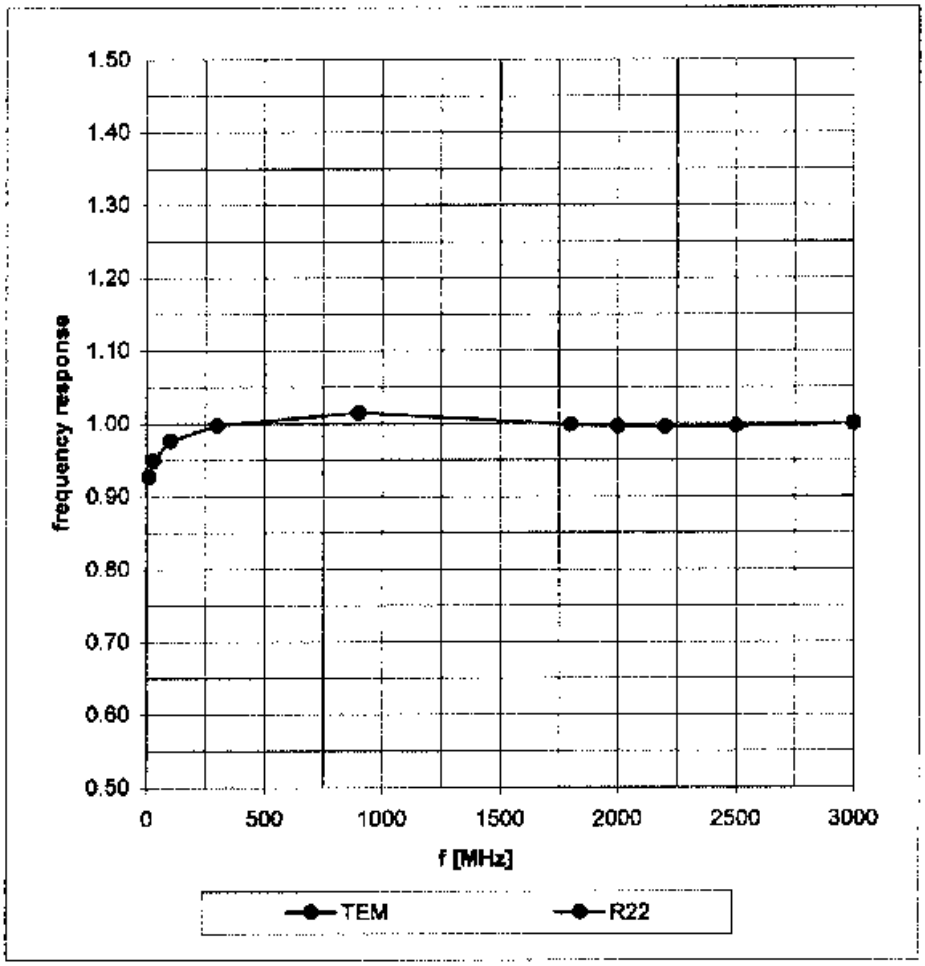


Isotropy Error (ϕ), θ = 0°



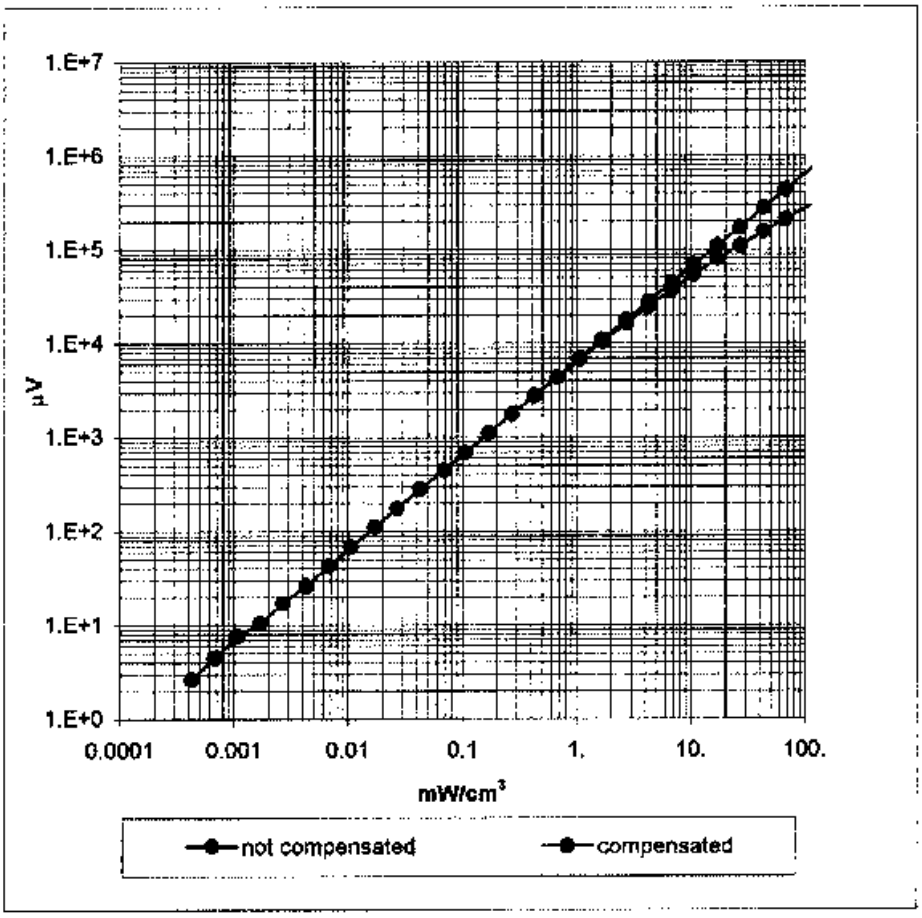
Frequency Response of E-Field

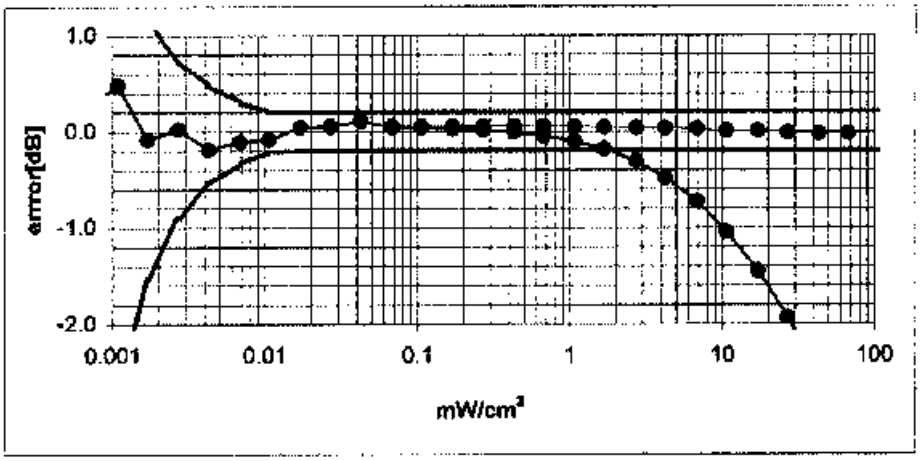
(TEM-Cell:ifi110, Waveguide R22)



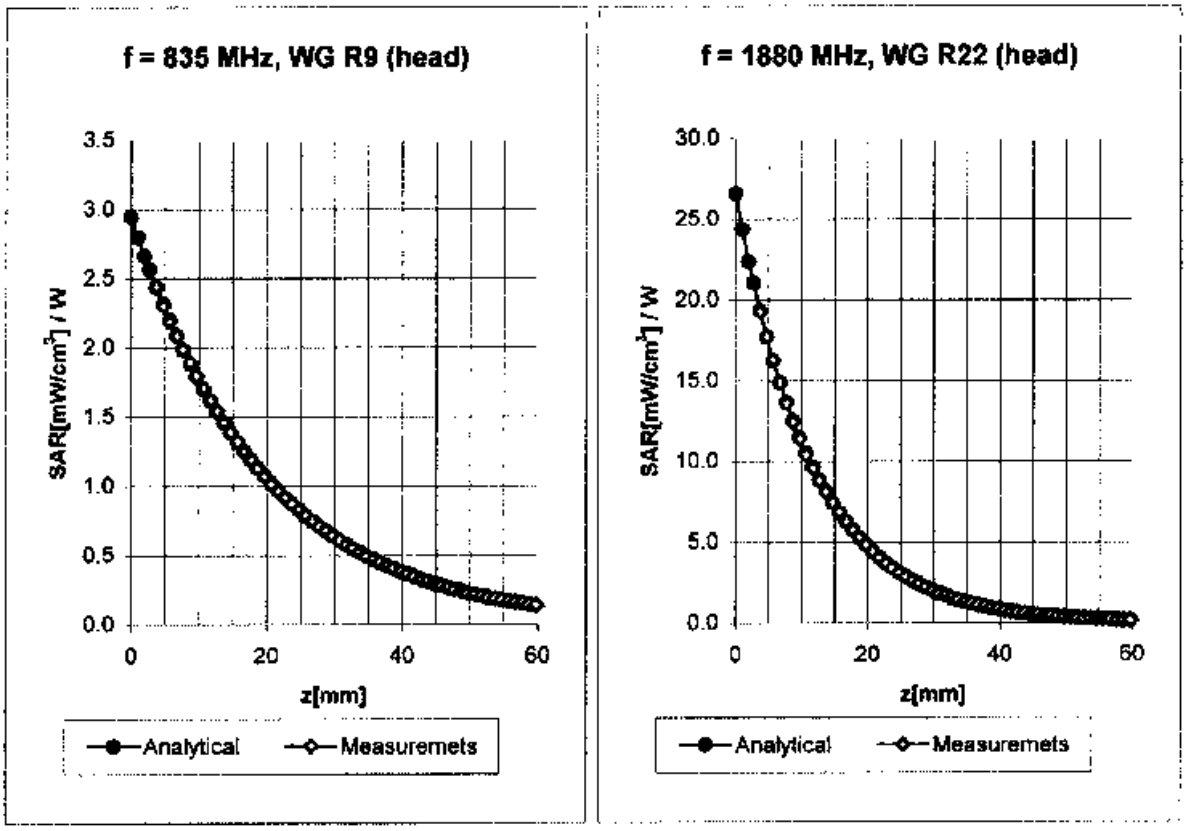
Dynamic Range f(SAR_{brain})

(Waveguide R22)





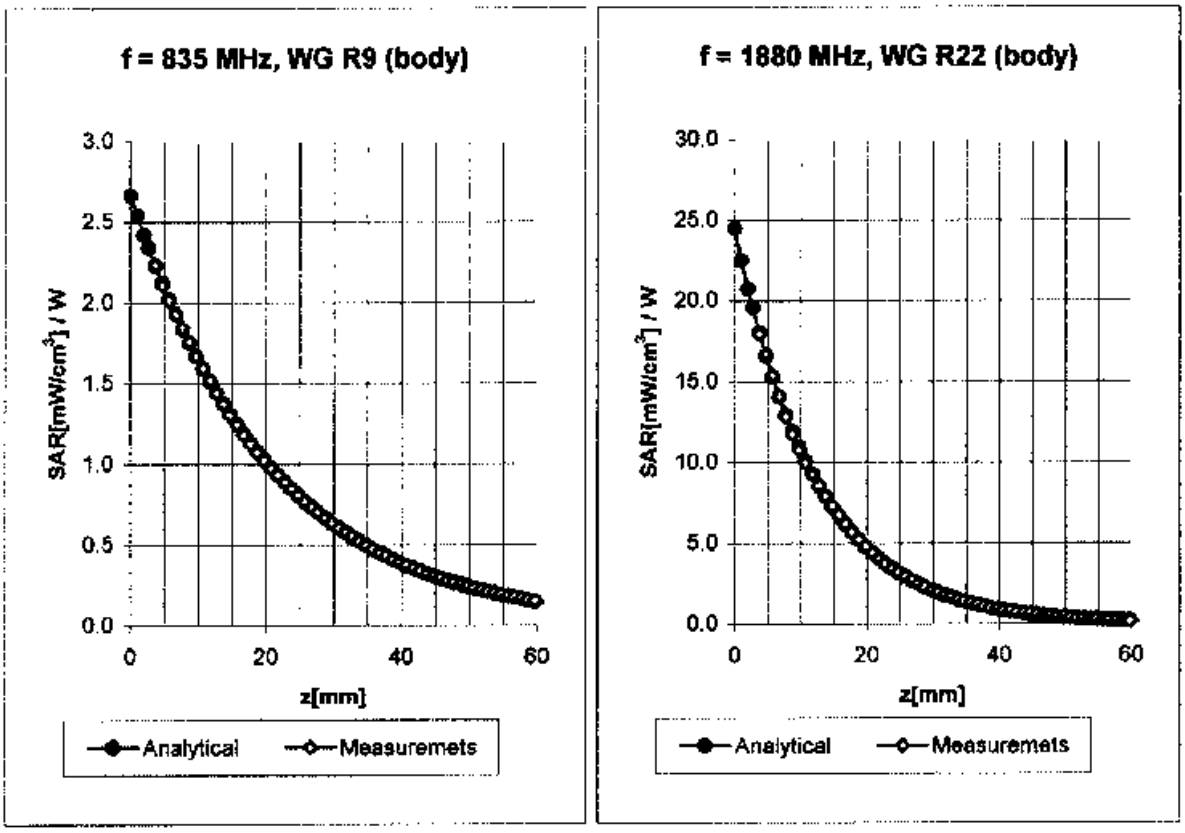
Conversion Factor Assessment



Head	**835 MHz**	ε_r = **41.5 ± 5%**	σ = **0.90 ± 5% mho/m**	
Head	**900 MHz**	ε_r = **41.5 ± 5%**	σ = **0.97 ± 5% mho/m**	
	ConvF X	**6.3** ± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**6.3** ± 9.5% (k=2)	Alpha	**0.43**
	ConvF Z	**6.3** ± 9.5% (k=2)	Depth	**2.44**

Head	**1880 MHz**	ε_r = **40.0 ± 5%**	σ = **1.40 ± 5% mho/m**	
Head	**1800 MHz**	ε_r = **40.0 ± 5%**	σ = **1.40 ± 5% mho/m**	
	ConvF X	**5.1** ± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**5.1** ± 9.5% (k=2)	Alpha	**0.61**
	ConvF Z	**5.1** ± 9.5% (k=2)	Depth	**2.32**

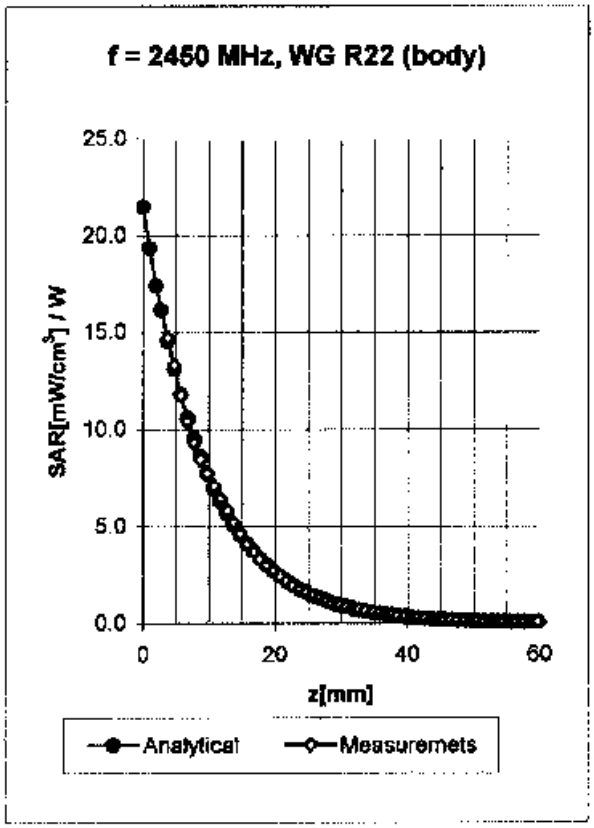
Conversion Factor Assessment



Body	**835 MHz**	ε_r = **55.2 ± 5%**	σ = **0.97 ± 5% mho/m**	
Body	**900 MHz**	ε_r = **55.0 ± 5%**	σ = **1.05 ± 5% mho/m**	
	ConvF X	**6.1** ± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**6.1** ± 9.5% (k=2)	Alpha	**0.49**
	ConvF Z	**6.1** ± 9.5% (k=2)	Depth	**2.35**

Body	**1880 MHz**	ε_r = **53.3 ± 5%**	σ = **1.52 ± 5% mho/m**	
Body	**1800 MHz**	ε_r = **53.3 ± 5%**	σ = **1.52 ± 5% mho/m**	
	ConvF X	**4.9** ± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**4.9** ± 9.5% (k=2)	Alpha	**0.81**
	ConvF Z	**4.9** ± 9.5% (k=2)	Depth	**2.07**

Conversion Factor Assessment

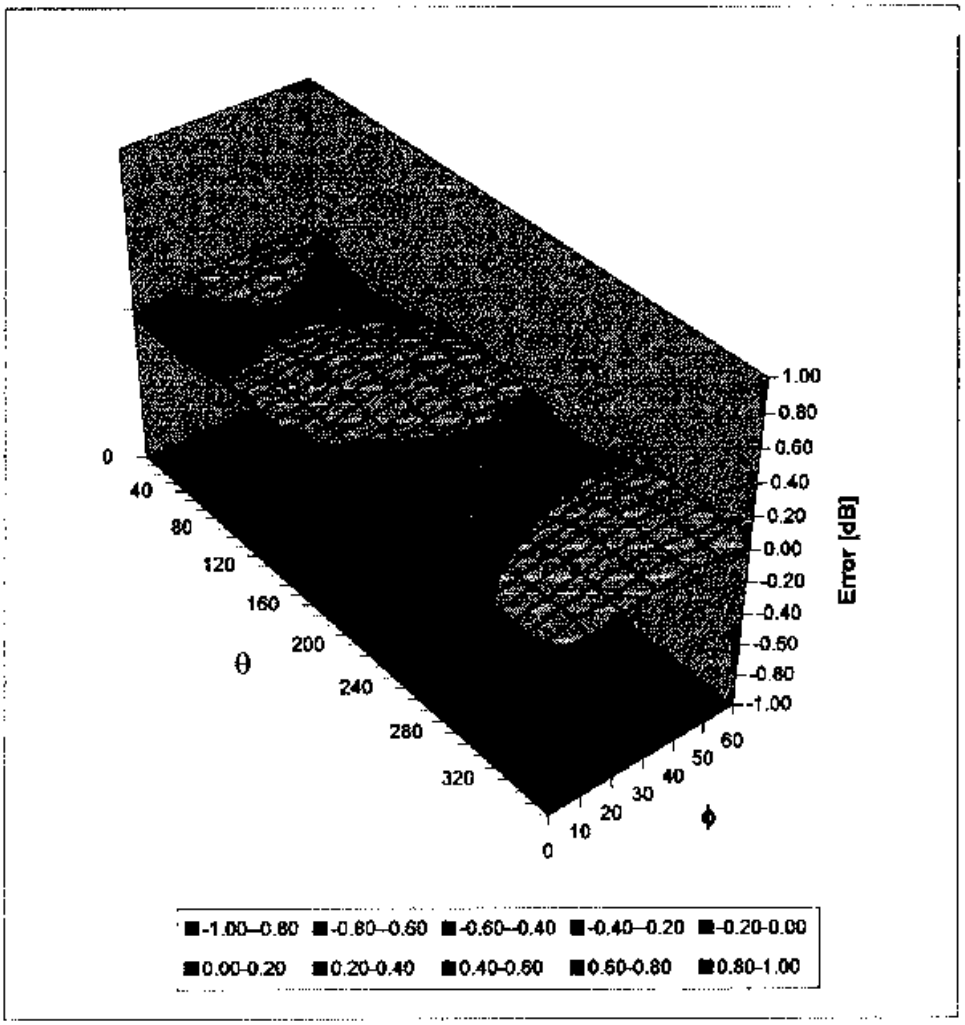


2450	**Body**	**MHz**	ε_r = 52.7 ± 5%	σ = 1.95 ± 5% mho/m

ConvF X	**4.5** ± 8.9% (k=2)	Boundary effect:	
ConvF Y	**4.5** ± 8.9% (k=2)	Alpha	**1.00**
ConvF Z	**4.5** ± 8.9% (k=2)	Depth	**1.99**

Deviation from Isotropy in HSL

Error (θ,φ), f = 900 MHz



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

Client **Nokia Oyj, Oulu**

CALIBRATION CERTIFICATE

Object(s)	ET3DV6 - SN:1765
Calibration procedure(s)	QA CAL-01.v2 Calibration procedure for dosimetric E-field probes
Calibration date:	April 16, 2003
Condition of the calibrated item	In Tolerance (according to the specific calibration document)

This calibration statement documents traceability of M&TE used in the calibration procedures and conformity of the procedures with the ISO/IEC 17025 international standard.

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)

Model Type	ID #	Cal Date	Scheduled Calibration
RF generator HP 8684C	US3642U01700	4-Aug-99 (in house check Aug-02)	In house check: Aug-05
Power sensor E4412A	MY41495277	2-Apr-03	Apr-04
Power sensor HP 8481A	MY41092180	18-Sep-02	Sep-03
Power meter EPM E4419B	GB41293874	13-Sep-02	Sep-03
Network Analyzer HP 8753E	US38432426	3-May-00	In house check: May 03
Fluke Process Calibrator Type 702	SN: 6295803	3-Sep-01	Sep-03

	Name	Function	Signature
Calibrated by:	Nico Vetterli	Technician	
Approved by:	Katja Pokovic	Laboratory Director	

Date issued: April 17, 2003

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.

Schmid & Partner Engineering AG

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Probe ET3DV

SN:1765

Manufactured: January 20, 2003
Last calibration: April 16, 2003

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ET3DV SN:1765

Sensitivity in Free Space

Diode Compression

NormX	**1.60** $\mu V/(V/m)^2$	DCP X	**95**	mV
NormY	**1.81** $\mu V/(V/m)^2$	DCP Y	**95**	mV
NormZ	**1.86** $\mu V/(V/m)^2$	DCP Z	**95**	mV

Sensitivity in Tissue Simulating Liquid

Head **835 MHz** ε_r **= 41.5 ± 5%** σ **= 0.90 ± 5% mho/m**

Valid for f=800-1000 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X	**6.6** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**6.6** ± 9.5% (k=2)	Alpha	**0.66**
ConvF Z	**6.6** ± 9.5% (k=2)	Depth	**1.81**

Head **1880 MHz** ε_r **= 40.0 ± 5%** σ **= 1.40 ± 5% mho/m**

Valid for f=1710-1910 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X	**5.2** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**5.2** ± 9.5% (k=2)	Alpha	**0.59**
ConvF Z	**5.2** ± 9.5% (k=2)	Depth	**2.38**

Boundary Effect

Head **835 MHz** **Typical SAR gradient: 5 % per mm**

Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	9.4	4.8
SAR_{be} [%]	With Correction Algorithm	0.1	0.3

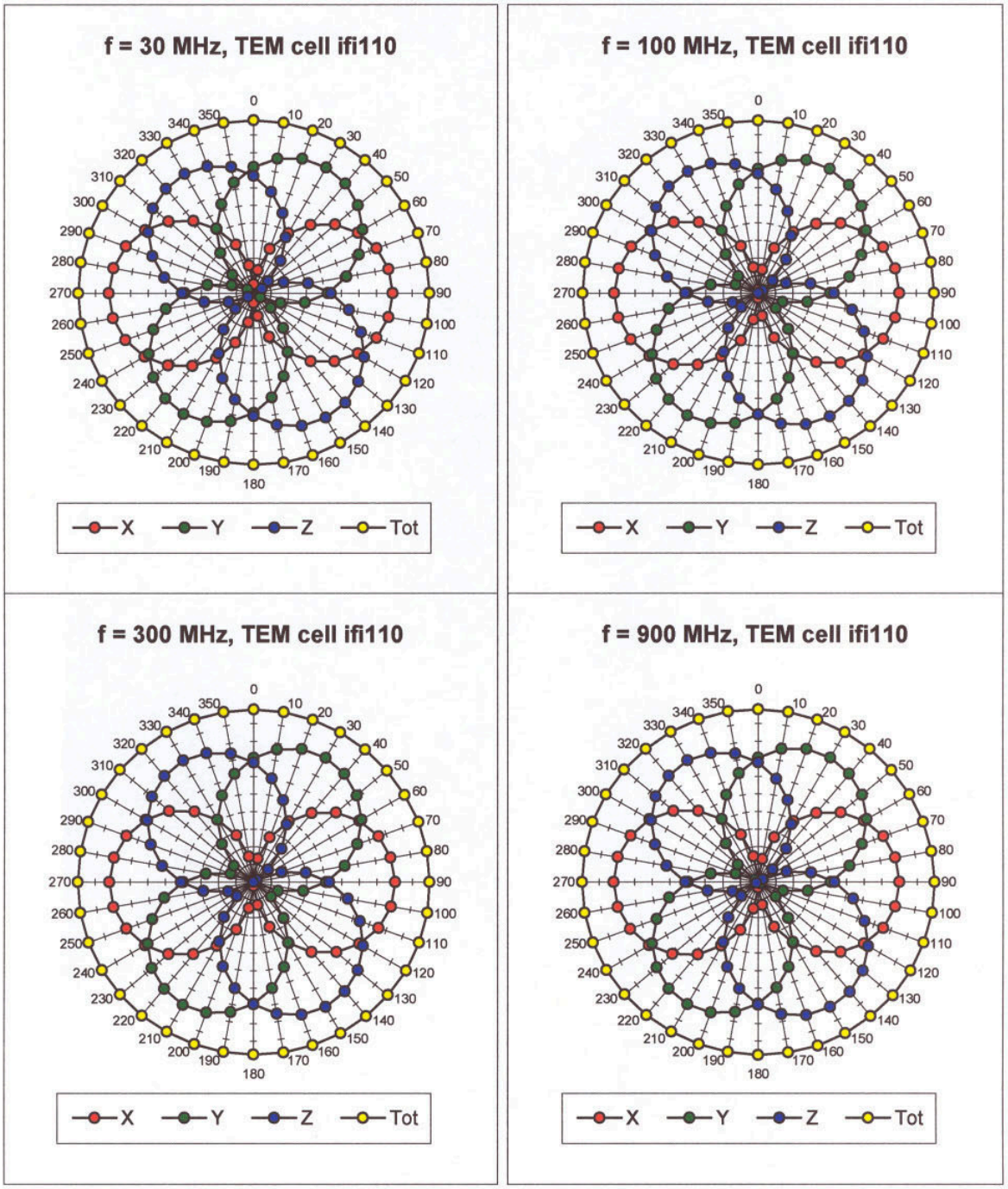
Head **1880 MHz** **Typical SAR gradient: 10 % per mm**

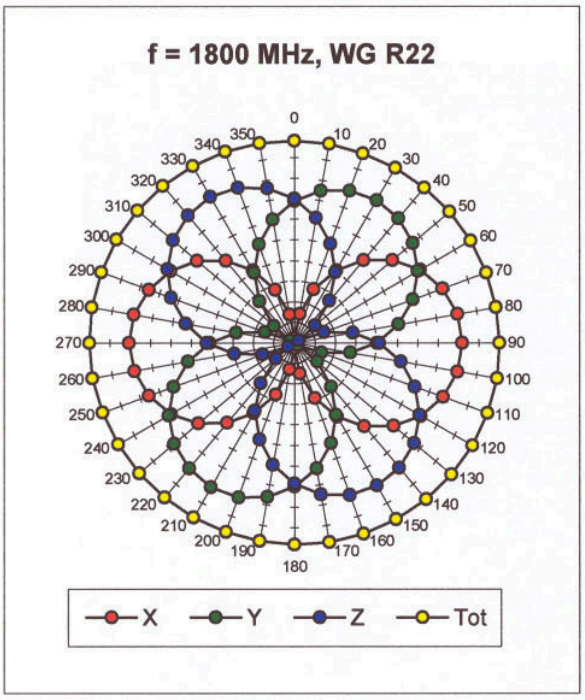
Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	14.0	9.2
SAR_{be} [%]	With Correction Algorithm	0.2	0.3

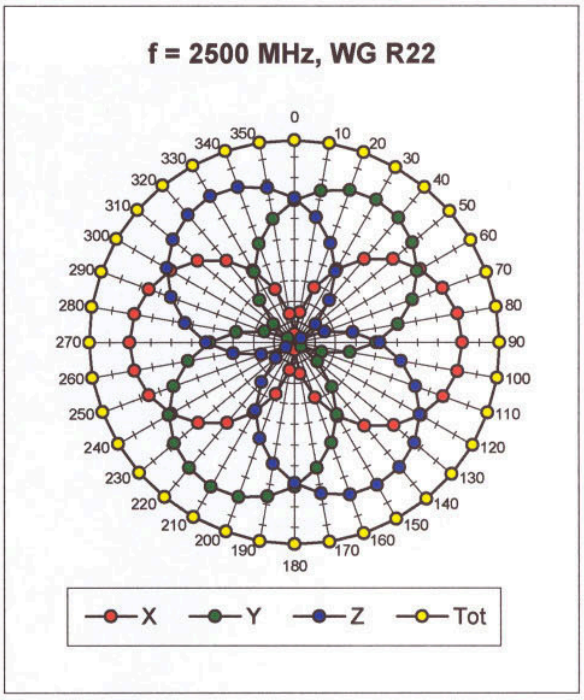
Sensor Offset

Probe Tip to Sensor Center	**2.7**	mm
Optical Surface Detection	**1.2 ± 0.2**	mm

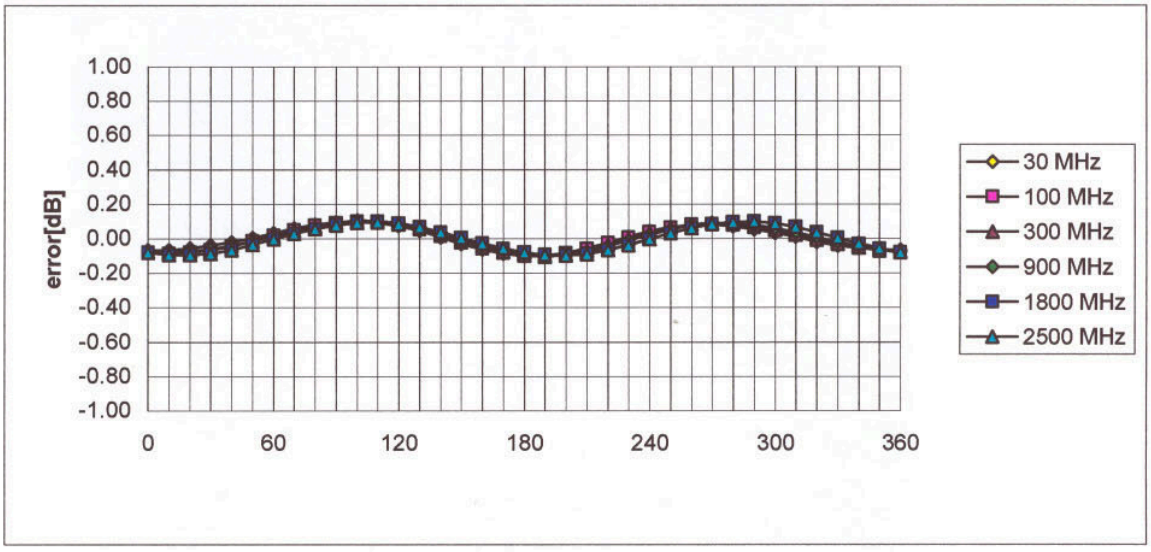
Receiving Pattern (ϕ , θ = 0°





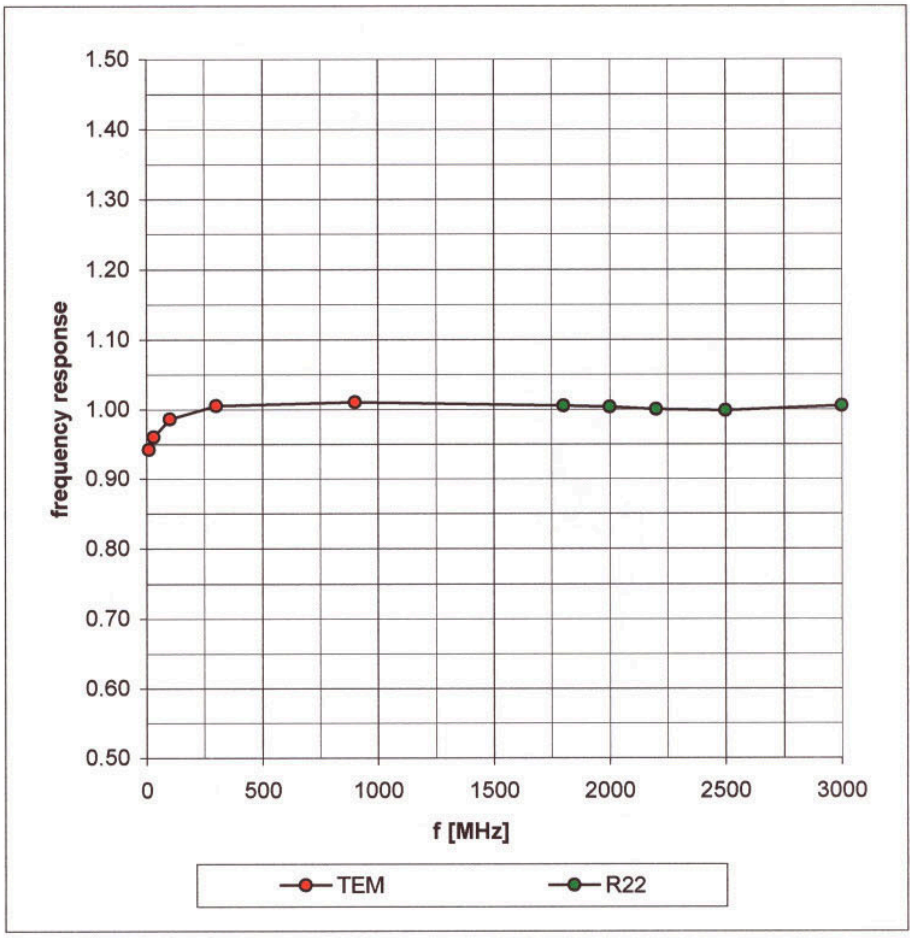


Isotropy Error (ϕ), θ = 0°



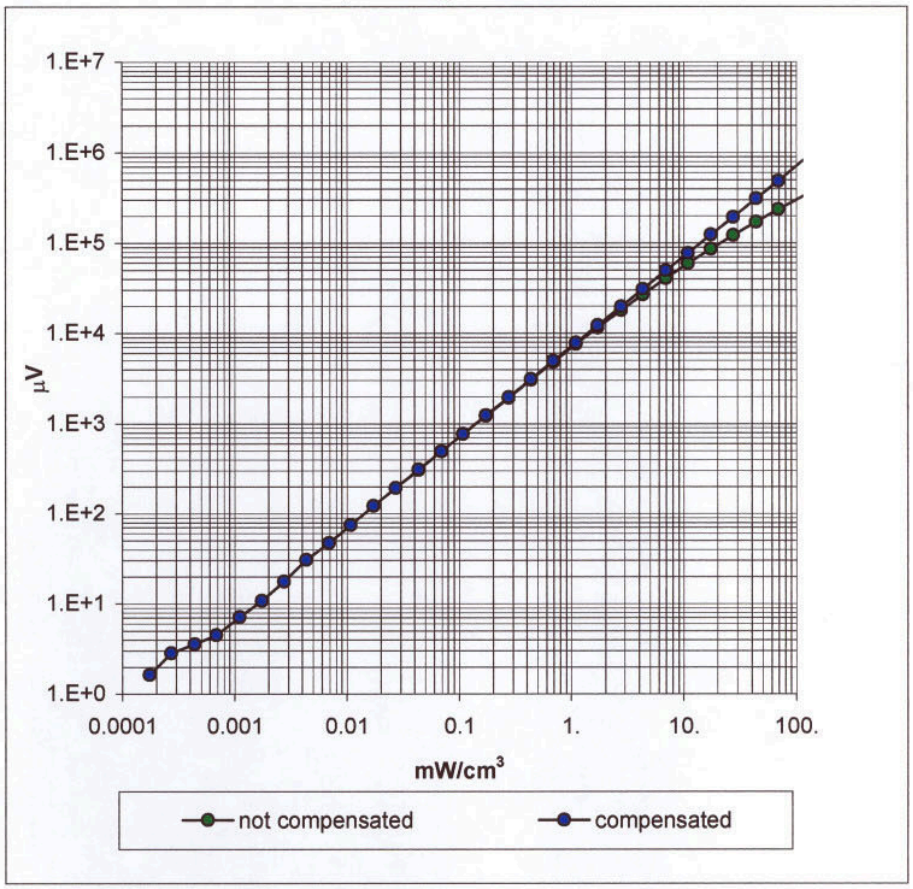
Frequency Response of E-Field

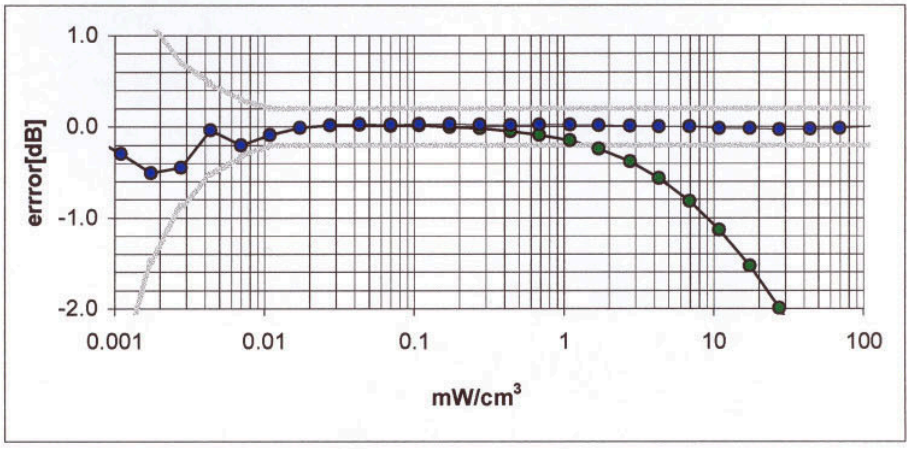
(TEM-Cell:ifi110, Waveguide R22)



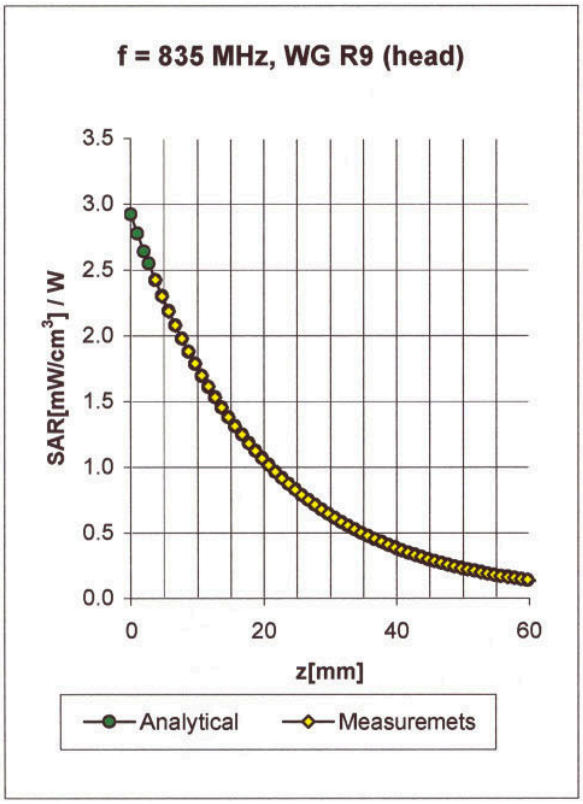
Dynamic Range f(SAR_{brain})

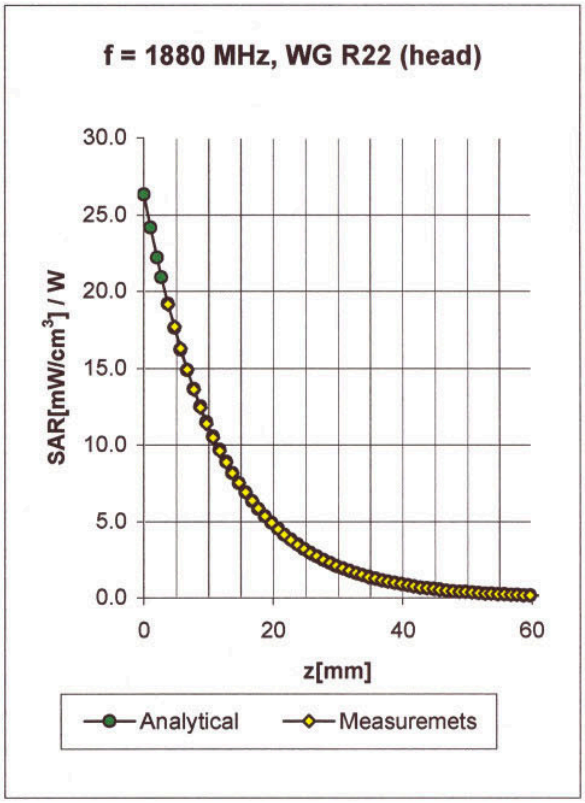
(Waveguide R22)





Conversion Factor Assessment





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Head **1880 MHz** ε_r **= 40.0 ± 5%** σ **= 1.40 ± 5% mho/m**

Valid for f=1710-1910 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

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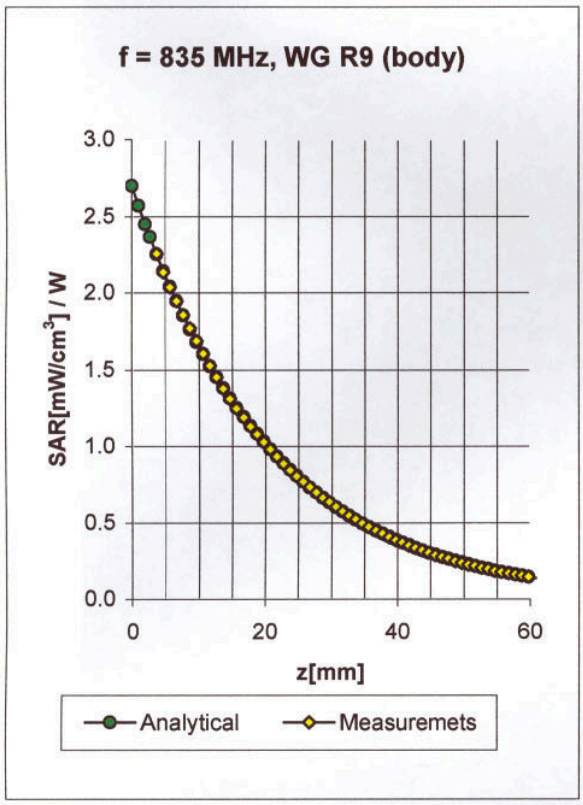
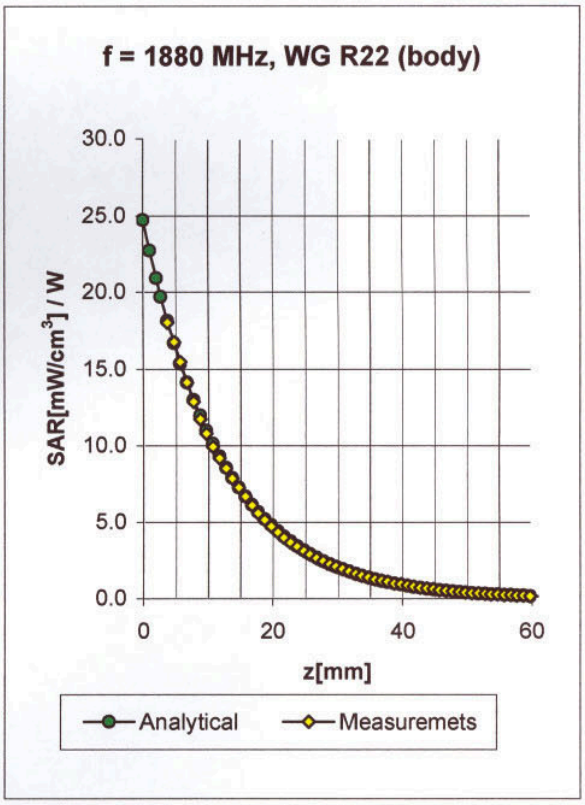
ConvF Y	**5.2** ± 9.5% (k=2)	Alpha	**0.59**
ConvF Z	**5.2** ± 9.5% (k=2)	Depth	**2.38**

Conversion Factor Assessment





Body **835 MHz** ε_r **= 55.2 ± 5%** σ **= 0.97 ± 5% mho/m**

Valid for f=800-1000 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C

ConvF X	**6.4** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**6.4** ± 9.5% (k=2)	Alpha	**0.50**
ConvF Z	**6.4** ± 9.5% (k=2)	Depth	**2.16**

Body **1880 MHz** ε_r **= 53.3 ± 5%** σ **= 1.52 ± 5% mho/m**

Valid for f=1710-1910 MHz with Head Tissue Simulating Liquid according to OET 65 Suppl. C

ConvF X	**4.9** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**4.9** ± 9.5% (k=2)	Alpha	**0.65**
ConvF Z	**4.9** ± 9.5% (k=2)	Depth	**2.41**