DECLARATION OF COMPLIANCE
SAR RF EXPOSURE EVALUATION

Test Lab

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Applicant Information

PLANTRONICS INC.
345 Encinal Street
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Rule Part(s):	**FCC 47 CFR §2.1093**
Test Procedure(s):	**FCC OET Bulletin 65, Supplement C (01-01) to OET Bulletin 65 (97-01)**
Device Classification:	**Digital Transmission System (DTS)**
Device Type:	**Wireless Headset System (Base Unit)**
FCC ID:	**AL8CS50XXXX**
Model(s):	**CS50**
Mode of Operation:	**TDMA**
Tx Frequency Range(s):	**902 - 928 MHz (ISM Band)**
RF Conducted Output Power:	**15.95 dBm Peak (915 MHz)**
Maximum Duty Cycle:	**3.8 %**
Antenna Type:	**Internal**
Power Supply:	**Plantronics AC Power Adapter (P/N: 45561-02)** **Input: 120V AC 60Hz 9W / Output: 9V DC 500mA**
Max. SAR Measured:	**0.0131 W/kg**

Celltech Labs Inc. declares under its sole responsibility that this wireless transceiver is compliant with the Specific Absorption Rate (SAR) RF exposure requirements specified in FCC 47 CFR §2.1093. The device was tested in accordance with the measurement standards and procedures specified in FCC OET Bulletin 65, Supplement C (Edition 01-01) for the General Population / Uncontrolled Exposure environment. All measurements were performed in accordance with the SAR system manufacturer recommendations.

I attest to the accuracy of data. All measurements were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Russell W. Pipe
Senior Compliance Technologist
Celltech Labs Inc.

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1.0 INTRODUCTION

This measurement report shows that the PLANTRONICS CS50 Wireless Headset System (Base Unit) FCC ID: AL8CS50XXXX complies with the SAR (Specific Absorption Rate) RF exposure requirements specified in FCC 47 CFR §2.1093 (see reference [1]) for the General Population environment. The test procedures described in FCC OET Bulletin 65, Supplement C (Edition 01-01) (see reference [2]) were employed. A description of the product, operating configuration, detailed summary of the test results, methodology and procedures used in the evaluation, equipment used, and the various provisions of the rules are included within this test report.

2.0 DESCRIPTION of Device Under Test (DUT)

DUT Type	Wireless Headset System (Base Unit)
FCC Device Classification	Digital Transmission System (DTS)
Test Procedure(s)	FCC OET Bulletin 65, Supplement C (01-01) to OET Bulletin 65 (97-01)
FCC ID	AL8CS50XXXX
Model(s)	CS50
Serial No.	#1429
Mode(s) of Operation	TDMA
Maximum Duty Cycle	3.8 %
Tx Frequency Range(s)	902 - 928 MHz (ISM Band)
RF Conducted Power Tested	15.95 dBm Peak (915 MHz)
Power Supply	Plantronics AC Power Adapter (P/N: 45561-02) Input: 120V AC 60Hz 9W / Output: 9V DC 500mA
Antenna Type	Internal

3.0 SAR MEASUREMENT SYSTEM

Celltech Labs Inc. SAR measurement facility utilizes the Dosimetric Assessment System (DASY™) manufactured by Schmid & Partner Engineering AG (SPEAG™) of Zurich, Switzerland. The DASY4 measurement system is comprised of the measurement server, robot controller, computer, near-field probe, probe alignment sensor, specific anthropomorphic mannequin (SAM) phantom, and various planar phantoms for brain and/or body SAR evaluations. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF). A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and remote control, is used to drive the robot motors. The Staubli robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the DASY4 measurement server. The DAE4 utilizes a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16-bit AD-converter and a command decoder and control logic unit. Transmission to the DASY4 measurement server is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe-mounting device includes two different sensor systems for frontal and sidewise probe contacts. The sensor systems are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer.

DASY4 SAR Measurement System with SAM Phantom

DASY4 SAR Measurement System with Planar Phantom

4.0 MEASUREMENT SUMMARY

BODY SAR MEASUREMENT RESULTS

Freq. (MHz)	Channel	Test Mode	Power Supply	Conducted Power (dBm)	Power Drift (dB)	Antenna Position	DUT Position to Planar Phantom	Separation Distance to Planar Phantom	SAR 1g (W/kg)
915	Mid	Modulated	AC Plug	15.95	0.20	Fixed	Front Left Side (Antenna Side)	0.0 cm	0.00243
915	Mid	Modulated	AC Plug	15.95	-0.03	Fixed	Back Side (2-Point Touch)	0.0 cm	0.00264
									0.000622
915	Mid	Modulated	AC Plug	15.95	0.00	Fixed	Back Side (Flat Touch)	0.0 cm	0.00631
915	Mid	Modulated	AC Plug	15.95	0.02	Fixed	Left Side (Antenna Side)	0.0 cm	0.0131
									0.00752

ANSI / IEEE C95.1 1992 - SAFETY LIMIT
BODY SAR: 1.6 W/kg (averaged over 1 gram)
Spatial Peak - Uncontrolled Exposure / General Population

Test Date(s)	09/26/03		**Relative Humidity**	64 %
Measured Fluid Type	915 MHz Body		**Atmospheric Pressure**	102.5 kPa
Dielectric Constant ε_r	**IEEE Target**	**Measured**	**Ambient Temperature**	23.1 °C
	55.0 ± 5%	54.2	**Fluid Temperature**	22.6 °C
Conductivity σ **(mho/m)**	**IEEE Target**	**Measured**	**Fluid Depth**	≥ 15 cm
	1.06 ± 5%	1.07	ρ **(Kg/m^3)**	1000

Note(s):

1. SAR test results for mid channel were ≥ 3dB below the SAR limit; therefore mid channel data only is reported.
2. The ambient and fluid temperatures were measured prior to, and during, the fluid dielectric parameter check and the SAR evaluation. The temperatures listed in the table above were consistent for all measurement periods.
3. The dielectric properties of the simulated body tissue fluid were measured prior to the SAR evaluation using an 85070C Dielectric Probe Kit and an 8753E Network Analyzer (see Appendix E for printout of measured fluid dielectric parameters).

5.0 DETAILS OF SAR EVALUATION

The PLANTRONICS CS50 Wireless Headset System (Base Unit) FCC ID: AL8CS50XXXX was found to be compliant for localized Specific Absorption Rate (SAR) based on the test provisions and conditions described below. The detailed test setup photographs are shown in Appendix G.

1) The base unit was tested for body SAR with the front left side (antenna side) facing parallel to, and touching, the outer surface of the SAM phantom (planar section).
2) The base unit was tested for body SAR with the back side facing parallel and two-points touching the outer surface of the SAM phantom (planar section).
3) The base unit was tested for body SAR with the back side facing parallel and the flat surface area touching the outer surface of the SAM phantom (planar section).
4) The base unit was tested for body SAR with the left side (antenna side) facing parallel to, and touching, the outer surface of the SAM phantom (planar section).
5) The base unit and headset unit were separated by 1-meter distance. After 10 seconds the link contact switch in the middle external surface of the base unit was depressed. The green LED on the front face of the base unit clicked as the relays close and the green LED on the external surface of the base unit flashed to indicate the device was in test mode.
6) SAR measurements were performed with the DUT transmitting at maximum power on a fixed frequency with random modulation and a source-based time-averaged duty cycle of 3.8% (crest factor = 25.6).
7) The conducted power level of the EUT was measured prior to the SAR evaluation according to the procedures described in FCC 47 CFR §2.1046. The power drift was measured by the DASY4 SAR measurement system.
8) The DUT was tested with an AC power supply.

6.0 EVALUATION PROCEDURES

a. (i) The evaluation was performed in the applicable area of the phantom depending on the type of device being tested. For devices held to the ear during normal operation, both the left and right ear positions were evaluated using the SAM phantom.
(ii) For body-worn and face-held devices a planar phantom was used.
b. The SAR was determined by a pre-defined procedure within the DASY4 software. Upon completion of a reference and optical surface check, the exposed region of the phantom was scanned near the inner surface with a grid spacing of 15mm x 15mm.

An area scan was determined as follows:

c. Based on the defined area scan grid, a more detailed grid is created to increase the points by a factor of 10. The interpolation function then evaluates all field values between corresponding measurement points.
d. A linear search is applied to find all the candidate maxima. Subsequently, all maxima are removed that are >2 dB from the global maximum. The remaining maxima are then used to position the cube scans.

A 1g and 10g spatial peak SAR was determined as follows:

1. Extrapolation is used to find the points between the dipole center of the probe and the surface of the phantom. This data cannot be measured, since the center of the dipoles is 2.7 mm away form the tip of the probe and the distance between the surface and the lowest measuring point is 1.4 mm (see probe calibration document in Appendix D). The extrapolation was based on trivariate quadratics computed from the previously calculated 3D interpolated points nearest the phantom surface.
2. Interpolated data is used to calculate the average SAR over 1g and 10g cubes by spatially discretizing the entire measured cube. The volume used to determine the averaged SAR is a 1mm grid (42875 interpolated points).

7.0 SIMULATED TISSUE MIXTURES

The 900MHz simulated tissue fluids consist of a viscous gel using hydroxethylcellulose (HEC) gelling agent and saline solution. Preservation with a bactericide was added and visual inspection was made to ensure air bubbles were not trapped during the mixing process. The fluids were prepared according to standardized procedures and measured for dielectric parameters (permittivity and conductivity).

900/915MHz SIMULATED TISSUE MIXTURES		
INGREDIENT	**900MHz Brain (System Check)**	**915MHz Body (DUT Evaluation)**
Water	40.71 %	53.70 %
Sugar	56.63 %	45.10 %
Salt	1.48 %	0.97 %
HEC	1.00 %	0.13 %
Bactericide	0.18 %	0.10 %

8.0 SAR SAFETY LIMITS

EXPOSURE LIMITS	SAR (W/kg)	
	(General Population / Uncontrolled Exposure Environment)	(Occupational / Controlled Exposure Environment)
Spatial Average (averaged over the whole body)	0.08	0.4
Spatial Peak (averaged over any 1 g of tissue)	1.60	8.0
Spatial Peak (hands/wrists/feet/ankles averaged over 10 g)	4.0	20.0

Notes:
1. Uncontrolled environments are defined as locations where there is potential exposure of individuals who have no knowledge or control of their potential exposure.
2. Controlled environments are defined as locations where there is potential exposure of individuals who have knowledge of their potential exposure and can exercise control over their exposure.

9.0 SYSTEM PERFORMANCE CHECK

Prior to the SAR evaluation a system check was performed at the planar section of the SAM phantom with a 900MHz dipole (see Appendix C for system validation procedures). The fluid dielectric parameters were measured prior to the system check using an 85070C Dielectric Probe Kit and an 8753E Network Analyzer (see Appendix E for printout of measured fluid dielectric parameters). A forward power of 250mW was applied to the dipole and the system was verified to a tolerance of ±10%.

SYSTEM PERFORMANCE CHECK

Test Date	900MHz Equivalent Tissue	SAR 1g (W/kg)		Dielectric Constant ε_r		Conductivity σ (mho/m)		ρ (Kg/m^3)	Ambient Temp.	Fluid Temp.	Fluid Depth
		IEEE Target	Measured	IEEE Target	Measured	IEEE Target	Measured				
09/26/03	Brain	2.70 ±10%	2.60	41.5 ±5%	39.6	0.97 ±5%	0.96	1000	23.1 °C	22.3 °C	≥ 15 cm

Note(s):
1. The ambient and fluid temperatures were measured prior to, and during, the fluid dielectric parameter check and the system performance check. The temperatures listed in the table above were consistent for all measurement periods.

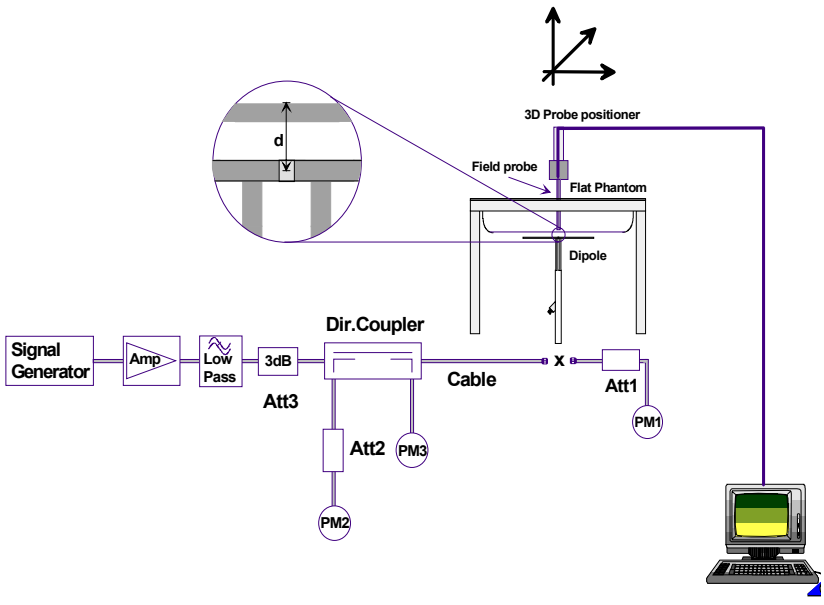


Figure 4. System Performance Check Setup

900MHz Dipole Setup

10.0 ROBOT SYSTEM SPECIFICATIONS

Specifications

POSITIONER: Stäubli Unimation Corp. Robot Model: RX60L
Repeatability: 0.02 mm
No. of axis: 6

Data Acquisition Electronic (DAE) System

Cell Controller

Processor: AMD Athlon XP 2400+
Clock Speed: 2.0 GHz
Operating System: Windows XP Professional

Data Converter

Features: Signal Amplifier, multiplexer, A/D converter, and control logic
Software: DASY4 software
Connecting Lines: Optical downlink for data and status info.
Optical uplink for commands and clock

DASY4 Measurement Server

Function: Real-time data evaluation for field measurements and surface detection
Hardware: PC/104 166MHz Pentium CPU; 32 MB chipdisk; 64 MB RAM
Connections: COM1, COM2, DAE, Robot, Ethernet, Service Interface

E-Field Probe

Model: ET3DV6
Serial No.: 1387
Construction: Triangular core fiber optic detection system
Frequency: 10 MHz to 6 GHz
Linearity: ±0.2 dB (30 MHz to 3 GHz)

Phantom

Type: SAM V4.0C
Shell Material: Fiberglass
Thickness: 2.0 ±0.1 mm
Volume: Approx. 20 liters

11.0 PROBE SPECIFICATION (ET3DV6)

Construction:	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g. glycol)
Calibration:	In air from 10 MHz to 2.5 GHz In brain simulating tissue at frequencies of 900 MHz and 1.8 GHz (accuracy ± 8%)
Frequency:	10 MHz to >6 GHz; Linearity: ±0.2 dB (30 MHz to 3 GHz)
Directivity:	±0.2 dB in brain tissue (rotation around probe axis) ±0.4 dB in brain tissue (rotation normal to probe axis)
Dynamic Range:	5 μW/g to >100 mW/g; Linearity: ±0.2 dB
Surface Detect.	±0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces
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 phone

ET3DV6 E-Field Probe

12.0 SAM PHANTOM V4.0C

The SAM phantom V4.0C is a fiberglass shell phantom with a 2.0 mm shell thickness for left and right head and flat planar area integrated in a wooden table. The shape of the fiberglass shell corresponds to the phantom defined by SCC34-SC2. The device holder positions are adjusted to the standard measurement positions in the three sections.

SAM Phantom V4.0C

13.0 DEVICE HOLDER

The DASY3 device holder has two scales for device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear openings). The plane between the ear openings and the mouth tip has a rotation angle of 65°. The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections.

Device Holder

14.0 TEST EQUIPMENT LIST

TEST EQUIPMENT	SERIAL NO.	CALIBRATION DATE
Schmid & Partner DASY4 System	-	-
DASY4 Measurement Server	1078	N/A
-Robot	599396-01	N/A
-ET3DV6 E-Field Probe	1387	Feb 2003
-300MHz Validation Dipole	135	Oct 2002
-450MHz Validation Dipole	136	Oct 2002
-900MHz Validation Dipole	054	June 2003
-1800MHz Validation Dipole	247	June 2003
-2450MHz Validation Dipole	150	Sept 2003
-SAM Phantom V4.0C	N/A	N/A
HP 85070C Dielectric Probe Kit	N/A	N/A
Gigatronics 8651A Power Meter	8650137	April 2003
Gigatronics 8652A Power Meter	1835267	April 2003
Power Sensor 80701A	1833542	Feb 2003
Power Sensor 80701A	1833699	April 2003
HP E4408B Spectrum Analyzer	US39240170	Dec 2002
HP 8594E Spectrum Analyzer	3543A02721	April 2003
HP 8753E Network Analyzer	US38433013	May 2003
HP 8648D Signal Generator	3847A00611	May 2003
Amplifier Research 5S1G4 Power Amplifier	26235	N/A

15.0 MEASUREMENT UNCERTAINTIES

UNCERTAINTY BUDGET FOR DEVICE EVALUATION						
Error Description	**Uncertainty Value ±%**	**Probability Distribution**	**Divisor**	**c_i 1g**	**Standard Uncertainty ±% (1g)**	**v_i or v_{eff}**
Measurement System						
Probe calibration	± 4.8	Normal	1	1	± 4.8	∞
Axial isotropy of the probe	± 4.7	Rectangular	√3	$(1-c_p)$	± 1.9	∞
Spherical isotropy of the probe	± 9.6	Rectangular	√3	(c_p)	± 3.9	∞
Spatial resolution	± 0.0	Rectangular	√3	1	± 0.0	∞
Boundary effects	± 5.5	Rectangular	√3	1	± 3.2	∞
Probe linearity	± 4.7	Rectangular	√3	1	± 2.7	∞
Detection limit	± 1.0	Rectangular	√3	1	± 0.6	∞
Readout electronics	± 1.0	Normal	1	1	± 1.0	∞
Response time	± 0.8	Rectangular	√3	1	± 0.5	∞
Integration time	± 1.4	Rectangular	√3	1	± 0.8	∞
RF ambient conditions	± 3.0	Rectangular	√3	1	± 1.7	∞
Mech. constraints of robot	± 0.4	Rectangular	√3	1	± 0.2	∞
Probe positioning	± 2.9	Rectangular	√3	1	± 1.7	∞
Extrapolation & integration	± 3.9	Rectangular	√3	1	± 2.3	∞
Test Sample Related						
Device positioning	± 6.0	Normal	√3	1	± 6.7	12
Device holder uncertainty	± 5.0	Normal	√3	1	± 5.9	8
Power drift	± 5.0	Rectangular	√3		± 2.9	∞
Phantom and Setup						
Phantom uncertainty	± 4.0	Rectangular	√3	1	± 2.3	∞
Liquid conductivity (target)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Liquid conductivity (measured)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Liquid permittivity (target)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Liquid permittivity (measured)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Combined Standard Uncertainty					**± 13.3**	
Expanded Uncertainty (k=2)					**± 26.6**	

Measurement Uncertainty Table in accordance with IEEE SCC-34 Std 1528-200X Draft (see reference [3]).

MEASUREMENT UNCERTAINTIES (Cont.)

UNCERTAINTY BUDGET FOR SYSTEM VALIDATION

Error Description	Uncertainty Value ±%	Probability Distribution	Divisor	c_i 1g	Standard Uncertainty ±% (1g)	v_i or v_{eff}
Measurement System						
Probe calibration	± 4.8	Normal	1	1	± 4.8	∞
Axial isotropy of the probe	± 4.7	Rectangular	√3	$(1-c_p)$	± 1.9	∞
Spherical isotropy of the probe	± 9.6	Rectangular	√3	(c_p)	± 3.9	∞
Spatial resolution	± 0.0	Rectangular	√3	1	± 0.0	∞
Boundary effects	± 5.5	Rectangular	√3	1	± 3.2	∞
Probe linearity	± 4.7	Rectangular	√3	1	± 2.7	∞
Detection limit	± 1.0	Rectangular	√3	1	± 0.6	∞
Readout electronics	± 1.0	Normal	1	1	± 1.0	∞
Response time	± 0.8	Rectangular	√3	1	± 0.5	∞
Integration time	± 1.4	Rectangular	√3	1	± 0.8	∞
RF ambient conditions	± 3.0	Rectangular	√3	1	± 1.7	∞
Mech. constraints of robot	± 0.4	Rectangular	√3	1	± 0.2	∞
Probe positioning	± 2.9	Rectangular	√3	1	± 1.7	∞
Extrapolation & integration	± 3.9	Rectangular	√3	1	± 2.3	∞
Dipole						
Dipole Axis to Liquid Distance	± 2.0	Rectangular	√3	1	± 1.2	∞
Input Power	± 4.7	Rectangular	√3	1	± 2.7	∞
Phantom and Setup						
Phantom uncertainty	± 4.0	Rectangular	√3	1	± 2.3	∞
Liquid conductivity (target)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Liquid conductivity (measured)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Liquid permittivity (target)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Liquid permittivity (measured)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Combined Standard Uncertainty					**± 9.9**	
Expanded Uncertainty (k=2)					**± 19.8**	

Measurement Uncertainty Table in accordance with IEEE SCC-34 Std 1528-200X Draft (see reference [3]).

16.0 REFERENCES

[1] Federal Communications Commission, “Radiofrequency radiation exposure evaluation: portable devices”, Rule Part 47 CFR §2.1093: 1999.

[2] Federal Communications Commission, “Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields”, OET Bulletin 65, Supplement C (Edition 01-01), FCC, Washington, D.C.: June 2001.

[3] IEEE Standards Coordinating Committee 34, Std 1528-200X, “DRAFT Recommended Practice for Determining the Spatial-Peak Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques”.

[4] W. Gander, *Computermathematick*, Birkhaeuser, Basel: 1992.

APPENDIX A - SAR MEASUREMENT DATA

Test Date: 09/26/03

DUT: Plantronics Inc. - CS50 Wireless Headset System; Type: Base Unit; Serial: #1429

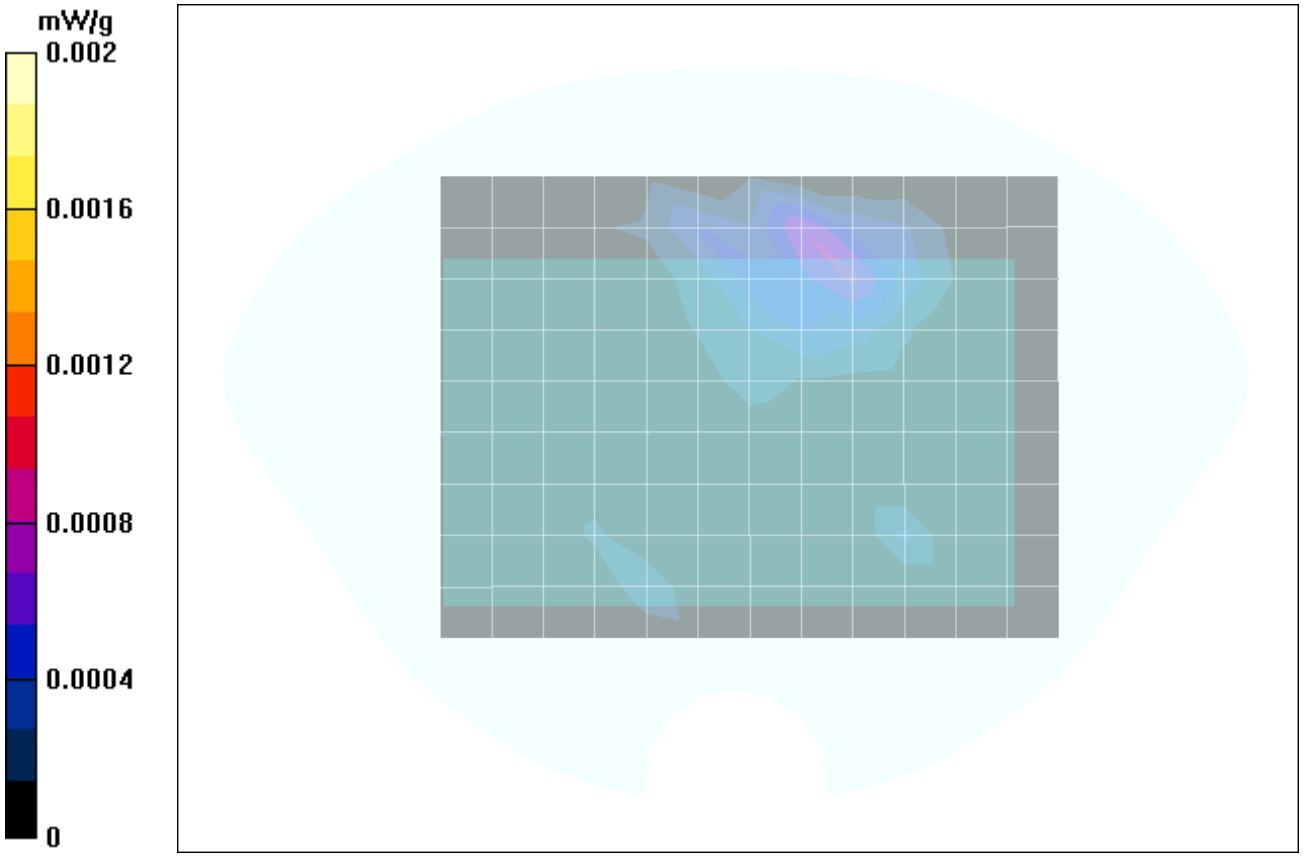
Ambient Temp: 23.1°C; Fluid Temp: 22.6°C Barometric Pressure: 102.5 kPa; Humidity: 64%

Communication System: ISM Band
Frequency: 915 MHz; Duty Cycle: 1:25.64
Medium: M900 (σ = 1.07 mho/m, ε_r = 54.2, ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1387; ConvF(6.4, 6.4, 6.4); Calibrated: 26/02/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn370; Calibrated: 19/05/2003
- Phantom: SAM front; Type: SAM 4.0; Serial: 1033
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 116

Front (Left Tilted)/Area Scan (10x13x1): Measurement grid: dx=15mm, dy=15mm

Front (Left Tilted)/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 0.017 W/kg
SAR(1 g) = 0.00243 mW/g; SAR(10 g) = 0.000997 mW/g
Reference Value = 0.676 V/m
Power Drift = 0.2 dB



Test Date: 09/26/03

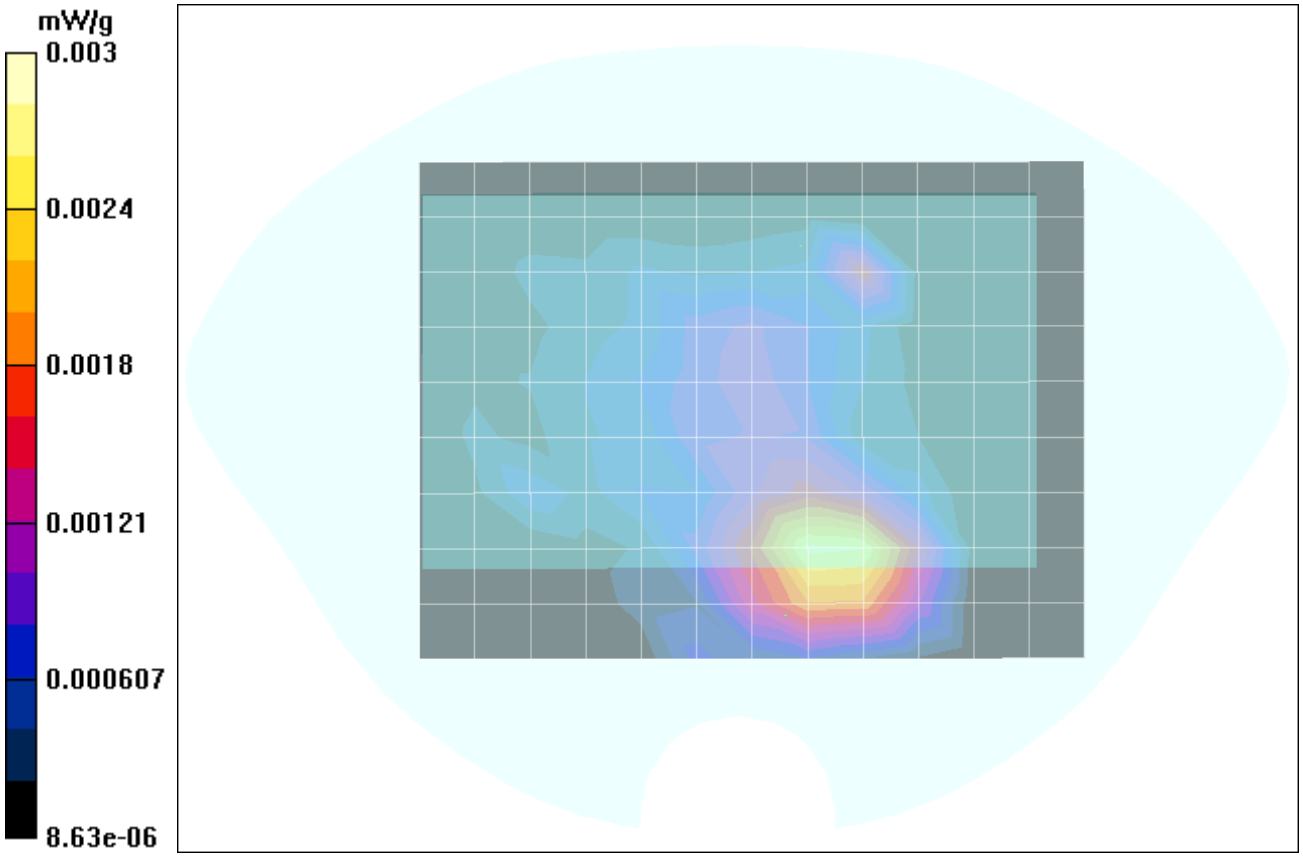
DUT: Plantronics Inc. - CS50 Wireless Headset System; Type: Base Unit; Serial: #1429

Ambient Temp: 23.1°C; Fluid Temp: 22.6°C Barometric Pressure: 102.5 kPa; Humidity: 64%

Communication System: ISM Band
Frequency: 915 MHz; Duty Cycle: 1:25.64
Medium: M900 (σ = 1.07 mho/m, ε_r = 54.2, ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1387; ConvF(6.4, 6.4, 6.4); Calibrated: 26/02/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn370; Calibrated: 19/05/2003
- Phantom: SAM front; Type: SAM 4.0; Serial: 1033
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 116

Back - Two points touching/Area Scan (10x13x1): Measurement grid: dx=15mm, dy=15mm
Back - Two points touching/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 0.00681 W/kg
SAR(1 g) = 0.00264 mW/g; SAR(10 g) = 0.00174 mW/g
Back - Two points touching/Zoom Scan (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 0.00811 W/kg
SAR(1 g) = 0.000622 mW/g; SAR(10 g) = 0.000412 mW/g
Reference Value = 1.06 V/m
Power Drift = -0.03 dB



Test Date: 09/26/03

DUT: Plantronics Inc. - CS50 Wireless Headset System; Type: Base Unit; Serial: #1429

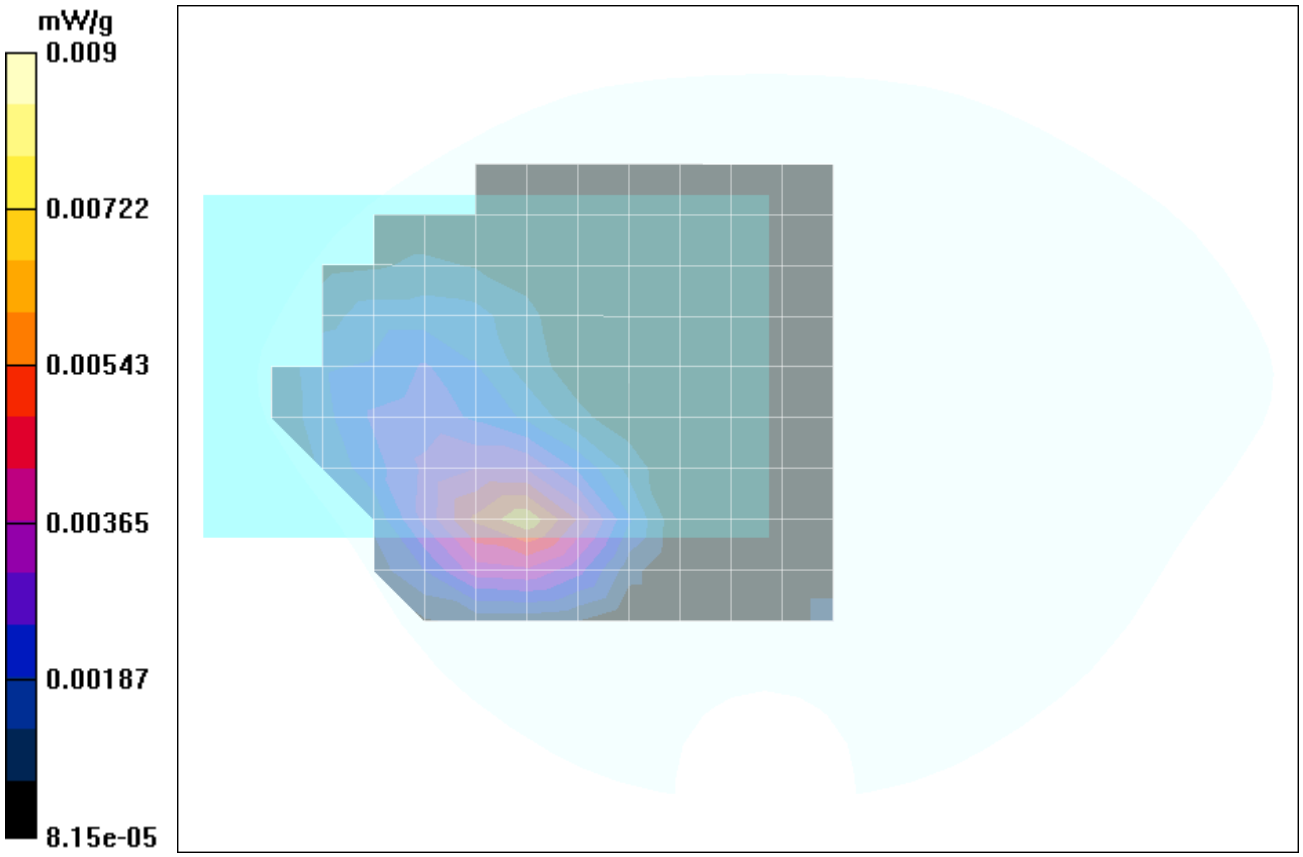
Ambient Temp: 23.1°C; Fluid Temp: 22.6°C Barometric Pressure: 102.5 kPa; Humidity: 64%

Communication System: ISM Band
Frequency: 915 MHz; Duty Cycle: 1:25.64
Medium: M900 (σ = 1.07 mho/m, ε_r = 54.2, ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1387; ConvF(6.4, 6.4, 6.4); Calibrated: 26/02/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn370; Calibrated: 19/05/2003
- Phantom: SAM front; Type: SAM 4.0; Serial: 1033
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 116

Back - Flat against phantom/Area Scan (10x12x1): Measurement grid: dx=15mm, dy=15mm

Back - Flat against phantom/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 0.0193 W/kg
SAR(1 g) = 0.00631 mW/g; SAR(10 g) = 0.00363 mW/g
Reference Value = 0 V/m
Power Drift = 0 dB



Test Date: 09/26/03

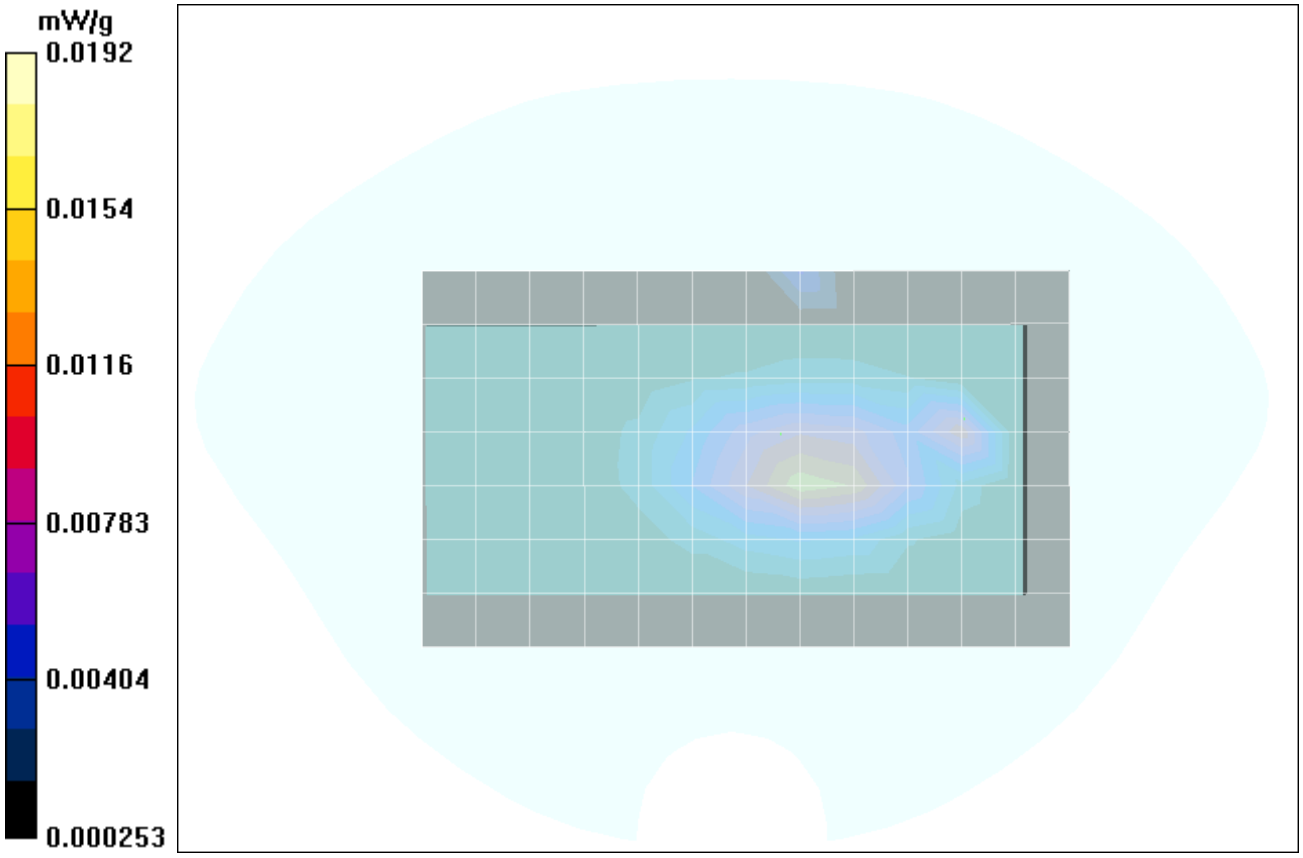
DUT: Plantronics Inc. - CS50 Wireless Headset System; Type: Base Unit; Serial: #1429

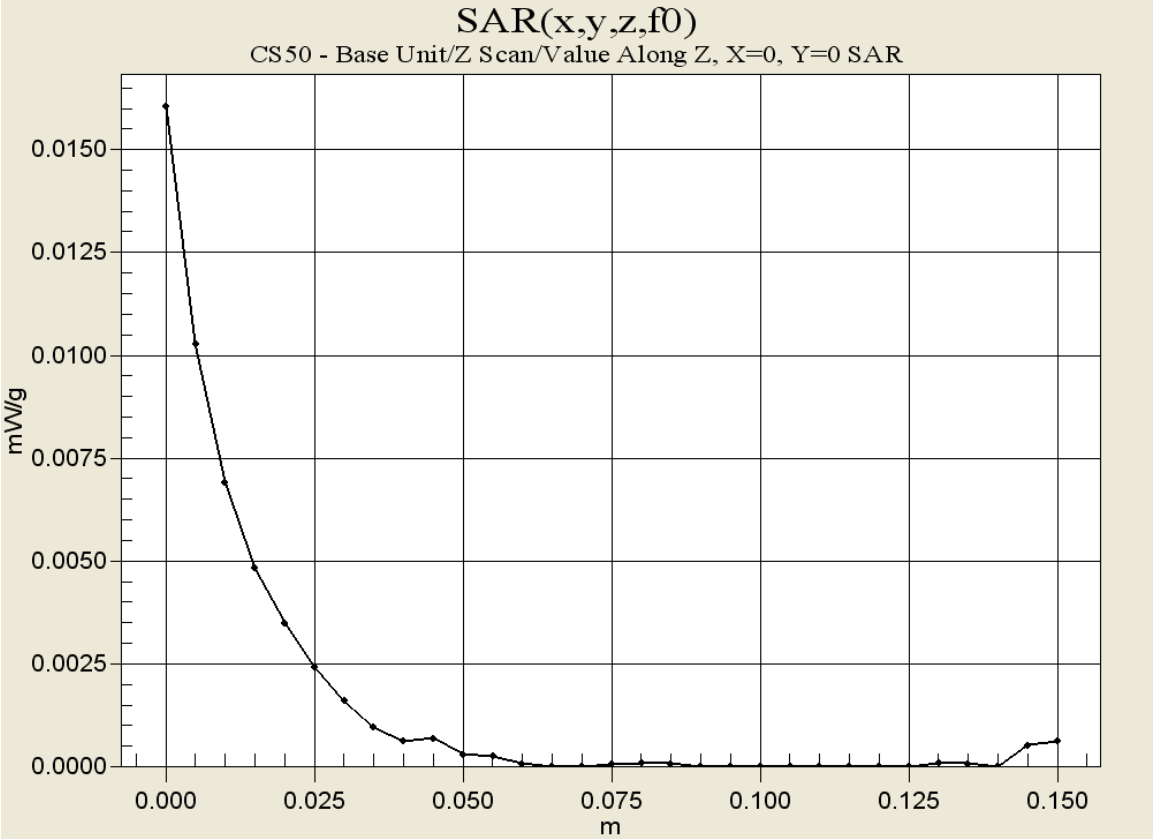
Ambient Temp: 23.1°C; Fluid Temp: 22.6°C Barometric Pressure: 102.5 kPa; Humidity: 64%

Communication System: ISM Band
Frequency: 915 MHz; Duty Cycle: 1:25.64
Medium: M900 (σ = 1.07 mho/m, ε_r = 54.2, ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1387; ConvF(6.4, 6.4, 6.4); Calibrated: 26/02/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn370; Calibrated: 19/05/2003
- Phantom: SAM front; Type: SAM 4.0; Serial: 1033
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 116

Front Left Side/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Front Left Side/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 0.0167 W/kg
SAR(1 g) = 0.00752 mW/g; SAR(10 g) = 0.00326 mW/g
Front Left Side/Zoom Scan (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 0.0216 W/kg
SAR(1 g) = 0.0131 mW/g; SAR(10 g) = 0.00813 mW/g
Reference Value = 3.01 V/m
Power Drift = 0.02 Db




SAR(x,y,z,f0)
CS50 - Base Unit/Z Scan/Value Along Z, X=0, Y=0 SAR
mW/g
0.0150
0.0125
0.0100
0.0075
0.0050
0.0025
0.0000
0.000
0.025
0.050
0.075
0.100
0.125
0.150
m

APPENDIX B - SYSTEM PERFORMANCE CHECK DATA

Test Date: 09/26/03

DUT: Dipole 900 MHz; Type: System Performance Check; Model: D900V2; Serial: 054

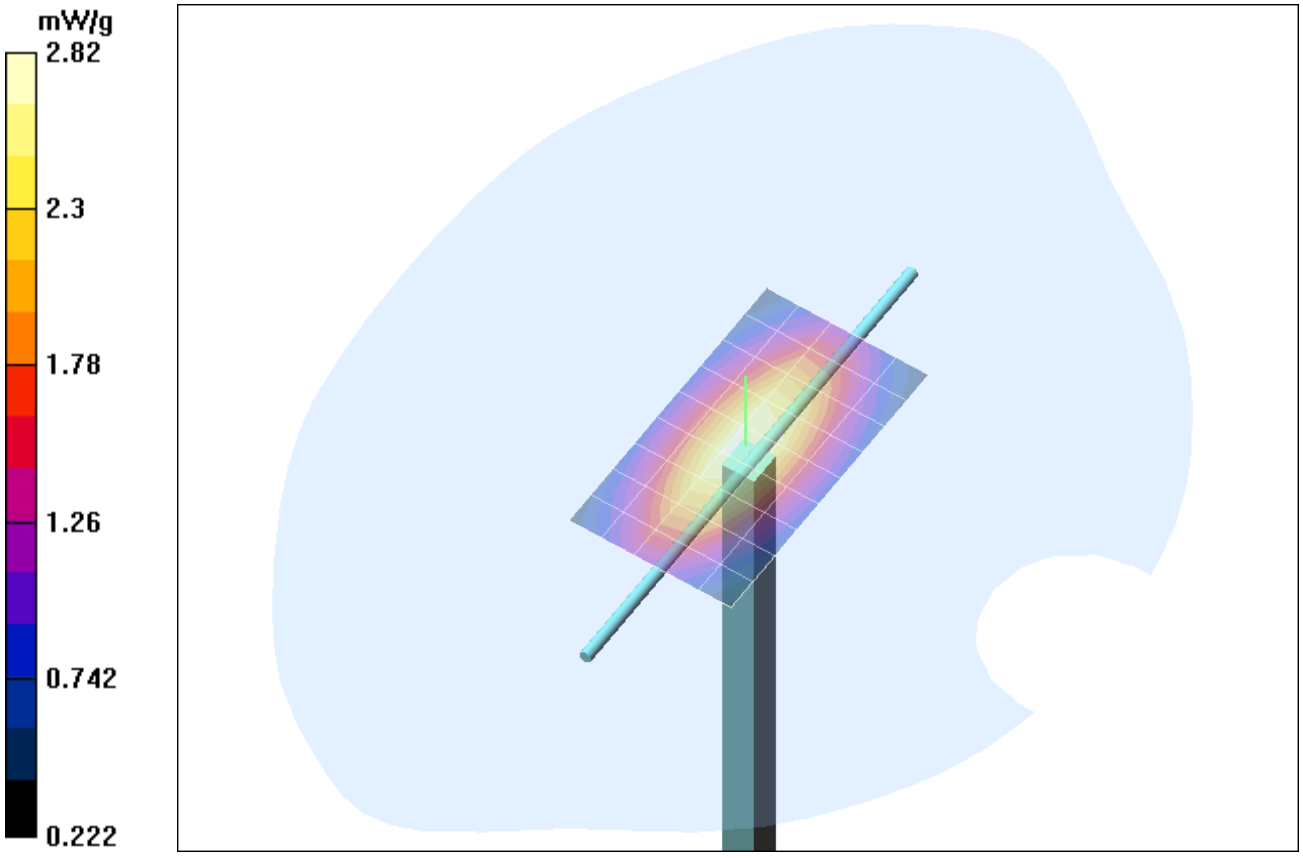
Ambient Temp: 23.1°C; Fluid Temp: 22.3°C; Barometric Pressure: 102.5 kPa; Humidity: 64%

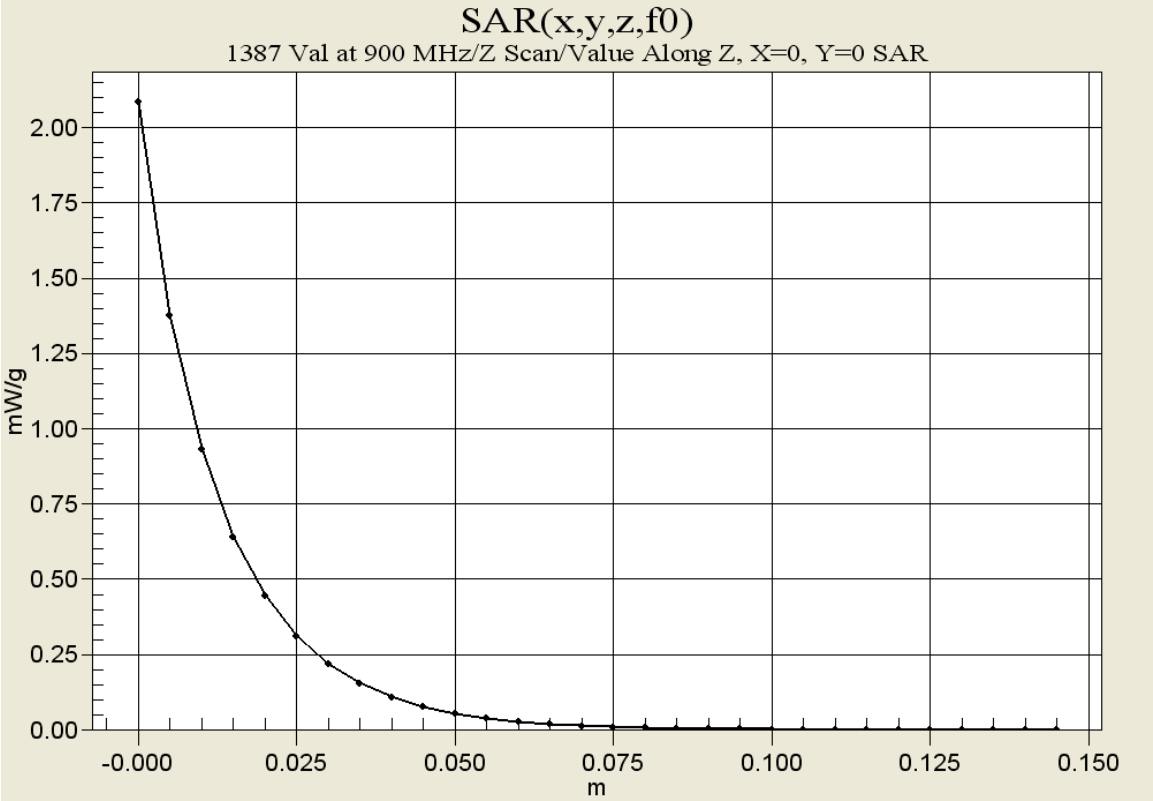
Communication System: CW
Frequency: 900 MHz; Duty Cycle: 1:1
Medium: HSL900 (σ = 0.96 mho/m, ε_r = 39.6, ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1387; ConvF(6.6, 6.6, 6.6); Calibrated: 26/02/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn370; Calibrated: 19/05/2003
- Phantom: SAM front; Type: SAM 4.0; Serial: 1033
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 116

1387 Validation at 900 MHz/Area Scan (6x10x1): Measurement grid: dx=10mm, dy=10mm

1387 Validation at 900 MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 3.66 W/kg
SAR(1 g) = 2.6 mW/g; SAR(10 g) = 1.69 mW/g
Forward Conducted Power: 250 mW
Reference Value = 56.6 V/m
Power Drift = 0.04 dB




SAR(x,y,z,f0)
1387 Val at 900 MHz/Z Scan/Value Along Z, X=0, Y=0 SAR
mW/g
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
-0.000
0.025
0.050
0.075
0.100
0.125
0.150
m

APPENDIX C - SYSTEM VALIDATION

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

Client Celltech Labs

CALIBRATION CERTIFICATE

Object(s) D900V2 - SN 054

Calibration procedure(s) QA CAL-05.v2
Calibration procedure for dipole validation kits

Calibration date: June 3, 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 (Calibrated by, Certificate No.)	Scheduled Calibration
RF generator R&S SML-03	100698	27-Mar-2002 (R&S, No. 20-92389)	In house check: Mar-05
Power sensor HP 8481A	MY41092317	18-Oct-02 (Agilent, No. 20021018)	Oct-04
Power sensor HP 8481A	US37292783	30-Oct-02 (METAS, No. 252-0236)	Oct-03
Power meter EPM E442	GB37480704	30-Oct-02 (METAS, No. 252-0236)	Oct-03
Network Analyzer HP 8753E	US37390585	18-Oct-01 (Agilent, No. 24BR1033101)	In house check: Oct 03

	Name	Function	Signature
Calibrated by:	Judith Mueller	Technician	
Approved by:	Katja Pokovic	Laboratory Director	

Date issued: June 3, 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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Zeughausstrasse 43, 8004 Zurich, Switzerland
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info@speag.com, http://www.speag.com

DASY

Dipole Validation Kit

Type: D900V2

Serial: 054

Manufactured: August 25, 1999
Calibrated: June 3, 2003

1. Measurement Conditions

The measurements were performed in the flat section of the SAM twin phantom filled with head simulating solution of the following electrical parameters at 900 MHz:

Relative Dielectricity	**42.1**	± 5%
Conductivity	**0.95 mho/m**	± 5%

The DASY4 System with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 6.6 at 900 MHz) was used for the measurements.

The dipole was mounted on the small tripod so that the dipole feedpoint was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 15mm from dipole center to the solution surface. The included distance holder was used during measurements for accurate distance positioning.

The coarse grid with a grid spacing of 15mm was aligned with the dipole. The 7x7x7 fine cube was chosen for cube integration.
The dipole input power (forward power) was 250 mW ± 3 %. The results are normalized to 1W input power.

2. SAR Measurement with DASY4 System

Standard SAR-measurements were performed according to the measurement conditions described in section 1. The results (see figure supplied) have been normalized to a dipole input power of 1W (forward power). The resulting averaged SAR-values measured with the dosimetric probe ET3DV6 SN:1507 and applying the advanced extrapolation are:

averaged over 1 cm^3 (1 g) of tissue:	**10.6 mW/g** ± 16.8 % (k=2)[1]
averaged over 10 cm^3 (10 g) of tissue:	**6.84 mW/g** ± 16.2 % (k=2)[1]

[1] validation uncertainty

3. Dipole Impedance and Return Loss

The impedance was measured at the SMA-connector with a network analyzer and numerically transformed to the dipole feedpoint. The transformation parameters from the SMA-connector to the dipole feedpoint are:

Electrical delay:	**1.397 ns**	(one direction)
Transmission factor:	**0.991**	(voltage transmission, one direction)

The dipole was positioned at the flat phantom sections according to section 1 and the distance holder was in place during impedance measurements.

Feedpoint impedance at 900 MHz:	Re{Z} = **49.9 Ω**
	Im {Z} = **-2.0 Ω**
Return Loss at 900 MHz	**-33.9 dB**

4. Handling

Do not apply excessive force to the dipole arms, because they might bend. Bending of the dipole arms stresses the soldered connections near the feedpoint leading to a damage of the dipole.

5. Design

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

6. Power Test

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

Date/Time: 06/03/03 12:00:32

Test Laboratory: SPEAG, Zurich, Switzerland
File Name: SN054_SN1507_HSL900_030603.da4

DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN054
Program: Dipole Calibration

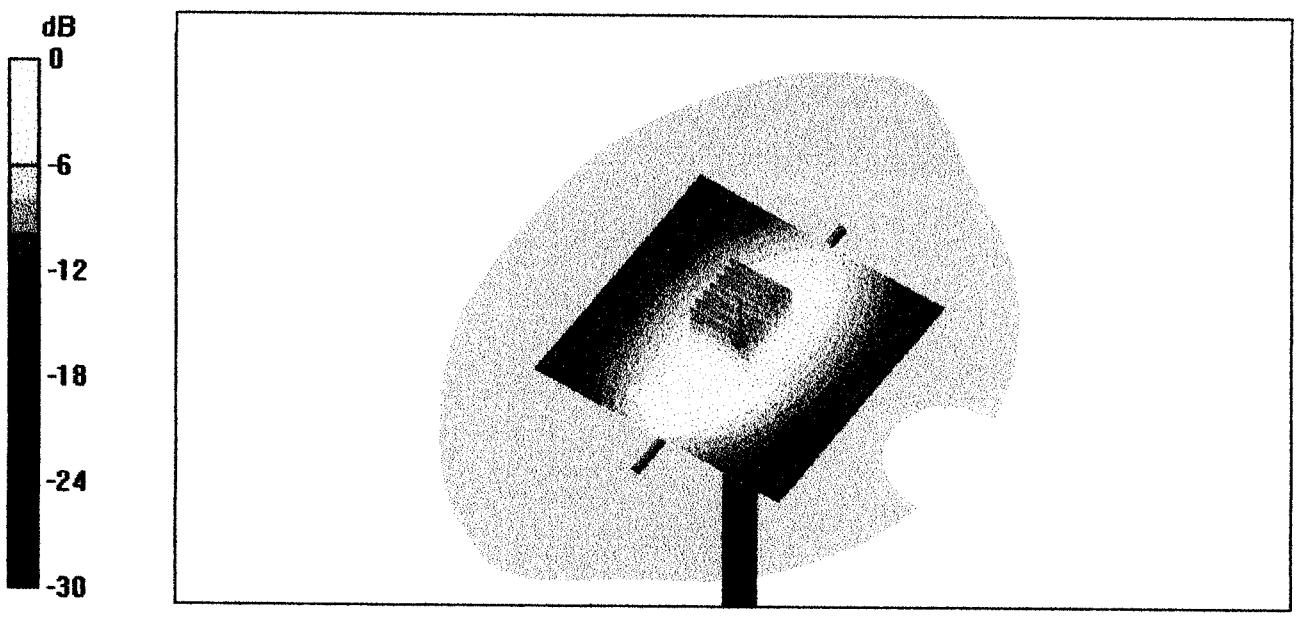
Communication System: CW-900; Frequency: 900 MHz;Duty Cycle: 1:1
Medium: HSL 900 MHz (σ = 0.95 mho/m, ε_r = 42.07, ρ = 1000 kg/m^3)
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

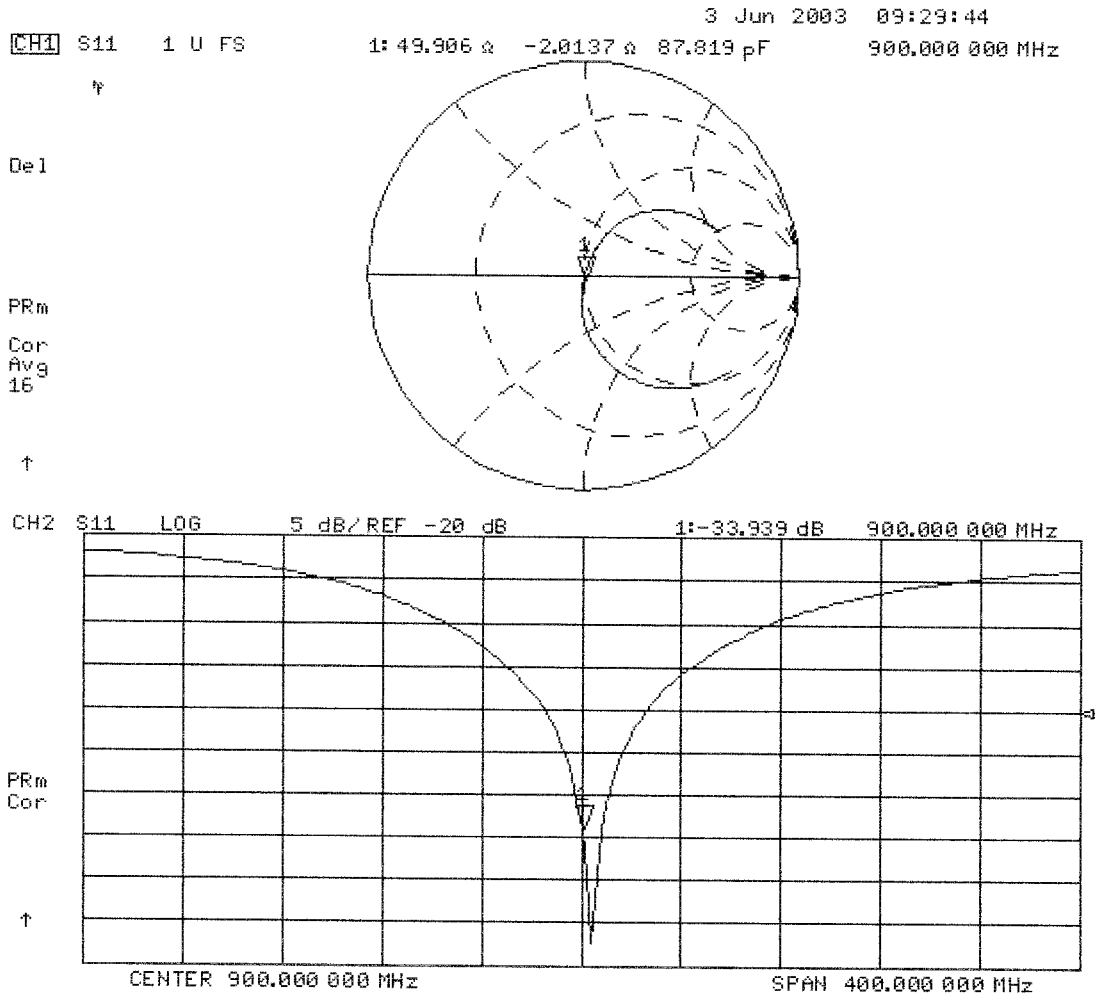
- Probe: ET3DV6 - SN1507; ConvF(6.6, 6.6, 6.6); Calibrated: 1/18/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 - SN411; Calibrated: 1/16/2003
- Phantom: SAM with CRP - TP1006; Type: SAM 4.0; Serial: TP:1006
- *Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115*

Pin = 250 mW; d = 15 mm/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 56.9 V/m
Power Drift = 0.0004 dB
Maximum value of SAR = 2.84 mW/g

Pin = 250 mW; d = 15 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 3.92 W/kg
SAR(1 g) = 2.66 mW/g; SAR(10 g) = 1.71 mW/g
Reference Value = 56.9 V/m
Power Drift = 0.0004 dB
Maximum value of SAR = 2.85 mW/g



0 dB = 2.85mW/g


3 Jun 2003 09:29:44
CH1 S11 1 U FS
1: 49.906 Ω -2.0137 Ω 87.819 pF
900.000 000 MHz
Del
PRm
Cor
Avg
16
CH2 S11 LOG 5 dB/ REF -20 dB
1:-33.939 dB 900.000 000 MHz
PRm
Cor
CENTER 900.000 000 MHz
SPAN 400.000 000 MHz

APPENDIX D - PROBE CALIBRATION

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

Client **Celltech Labs**

CALIBRATION CERTIFICATE

Object(s)	ET3DV6 - SN:1387
Calibration procedure(s)	QA CAL-01.v2 Calibration procedure for dosimetric E-field probes
Calibration date:	February 26, 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	8-Mar-02	Mar-03
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: February 26, 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

s p e a g

Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 1 245 9700, Fax +41 1 245 9779
info@speag.com, http://www.speag.com

Probe ET3DV6

SN:1387

Manufactured:	September 21, 1999
Last calibration:	February 22, 2002
Recalibrated:	February 26, 2003

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ET3DV6 SN:1387

Sensitivity in Free Space

Diode Compression

NormX	**1.55**	$\mu V/(V/m)^2$	DCP X	**92**	mV
NormY	**1.65**	$\mu V/(V/m)^2$	DCP Y	**92**	mV
NormZ	**1.64**	$\mu V/(V/m)^2$	DCP Z	**92**	mV

Sensitivity in Tissue Simulating Liquid

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

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

ConvF X	**6.6**	± 9.5% (k=2)	Boundary effect:	
ConvF Y	**6.6**	± 9.5% (k=2)	Alpha	**0.37**
ConvF Z	**6.6**	± 9.5% (k=2)	Depth	**2.61**

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

Head **1900 MHz** ε_r **= 40.0 ± 5%** σ **= 1.40 ± 5% mho/m**

ConvF X	**5.2**	± 9.5% (k=2)	Boundary effect:	
ConvF Y	**5.2**	± 9.5% (k=2)	Alpha	**0.50**
ConvF Z	**5.2**	± 9.5% (k=2)	Depth	**2.73**

Boundary Effect

Head **900 MHz** **Typical SAR gradient: 5 % per mm**

Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	10.2	5.9
SAR_{be} [%]	With Correction Algorithm	0.4	0.6

Head **1800 MHz** **Typical SAR gradient: 10 % per mm**

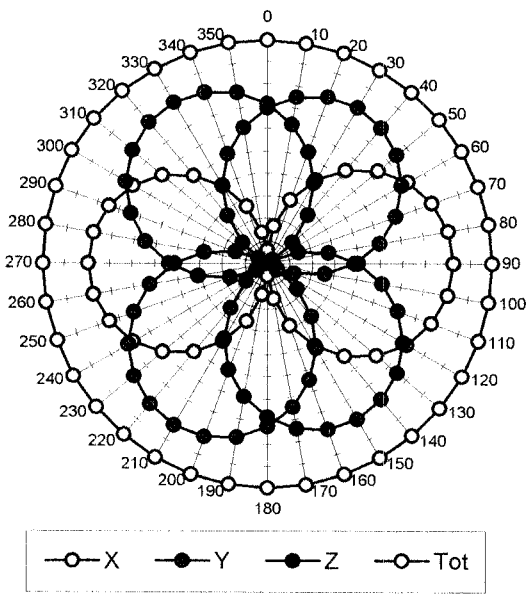
Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	14.6	9.8
SAR_{be} [%]	With Correction Algorithm	0.2	0.0

Sensor Offset

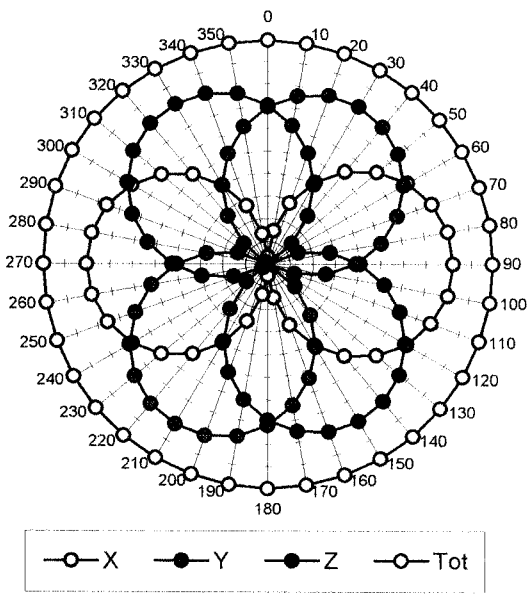
Probe Tip to Sensor Center	**2.7**	mm
Optical Surface Detection	**1.4 ± 0.2**	mm

Receiving Pattern (ϕ), θ = 0°

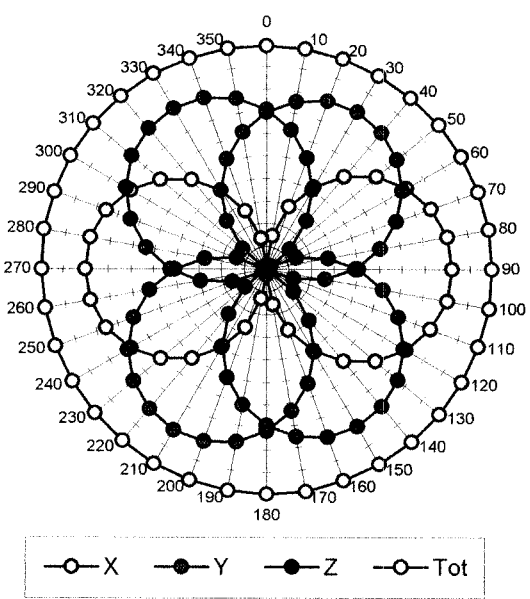
f = 30 MHz, TEM cell ifi110



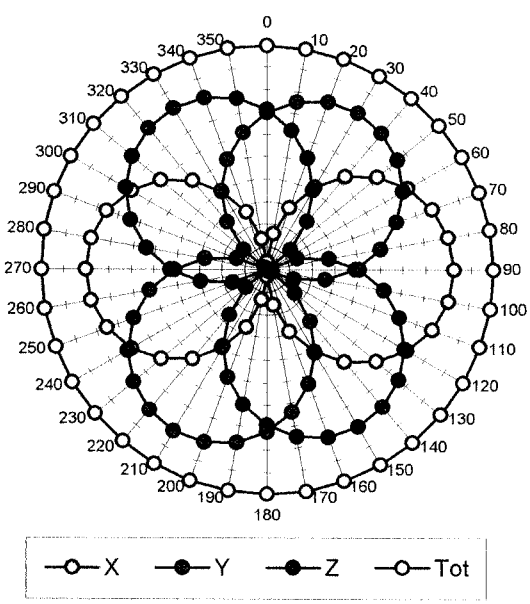
f = 100 MHz, TEM cell ifi110

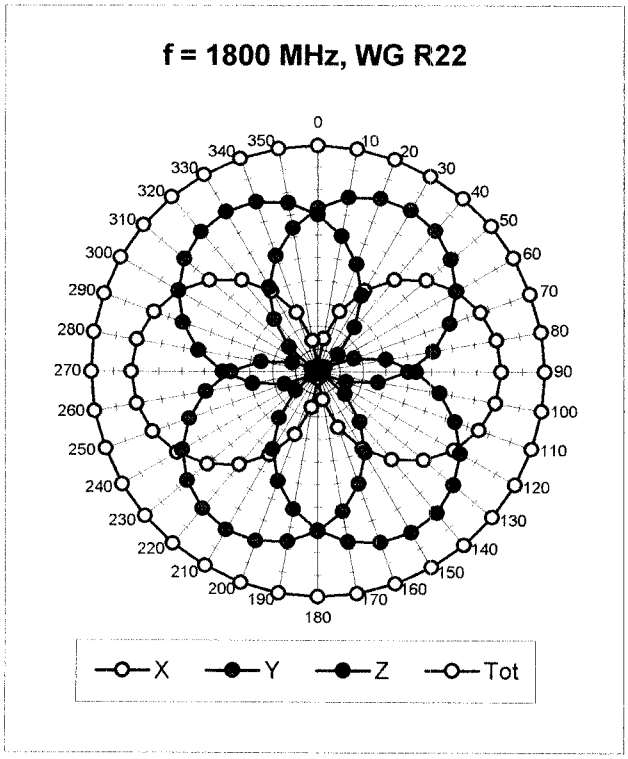


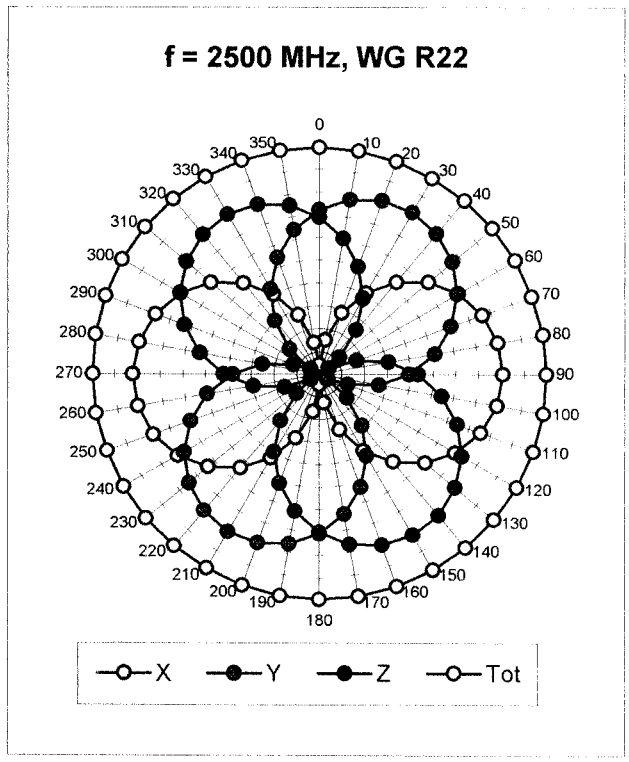
f = 300 MHz, TEM cell ifi110



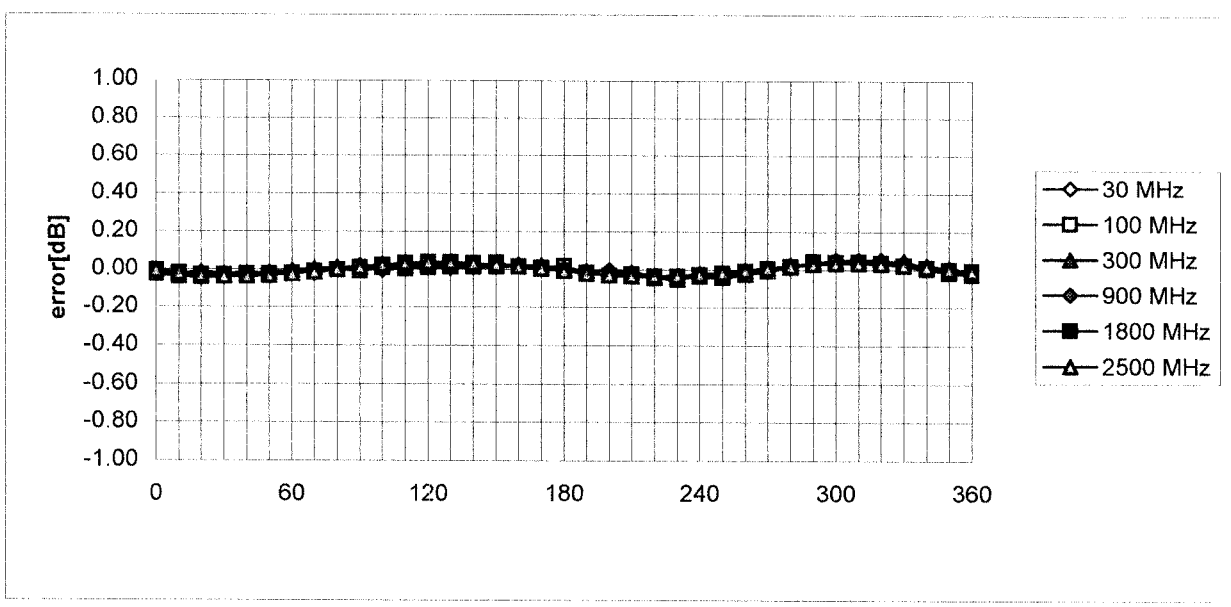
f = 900 MHz, TEM cell ifi110





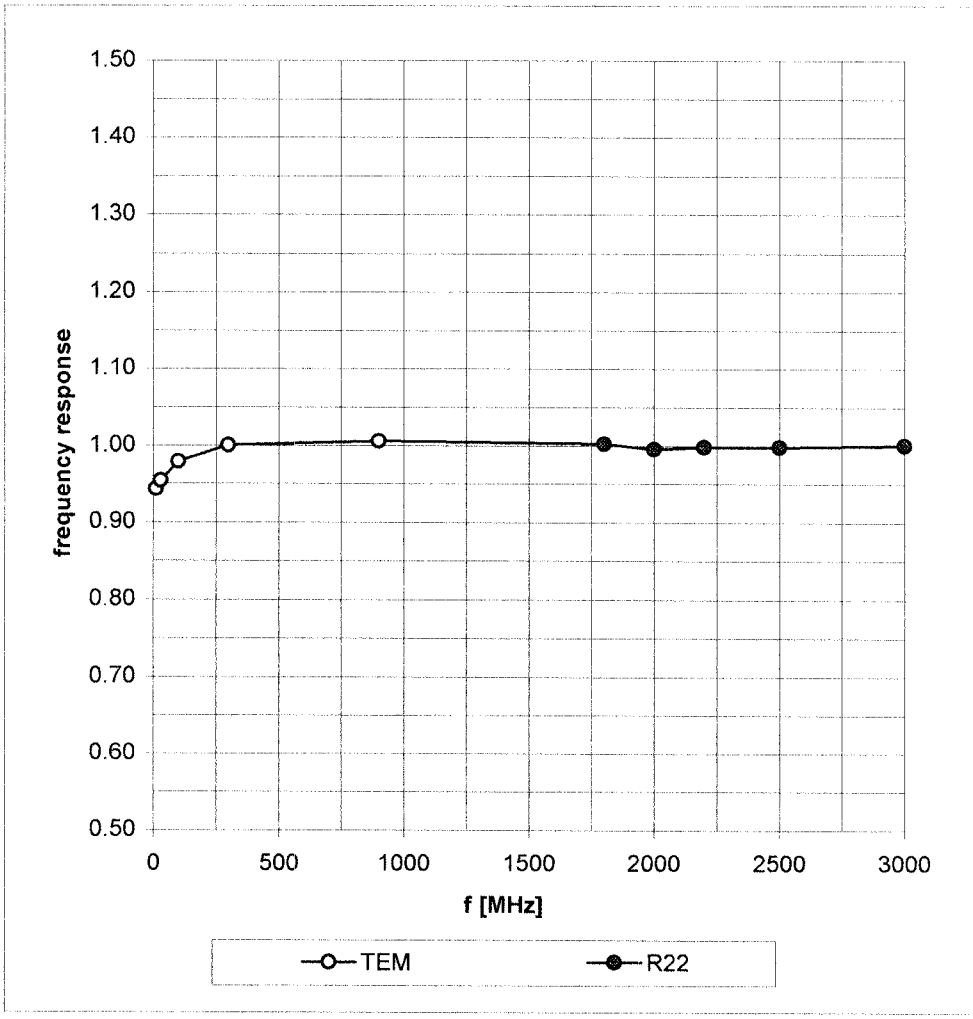


Isotropy Error (ϕ), θ = 0°



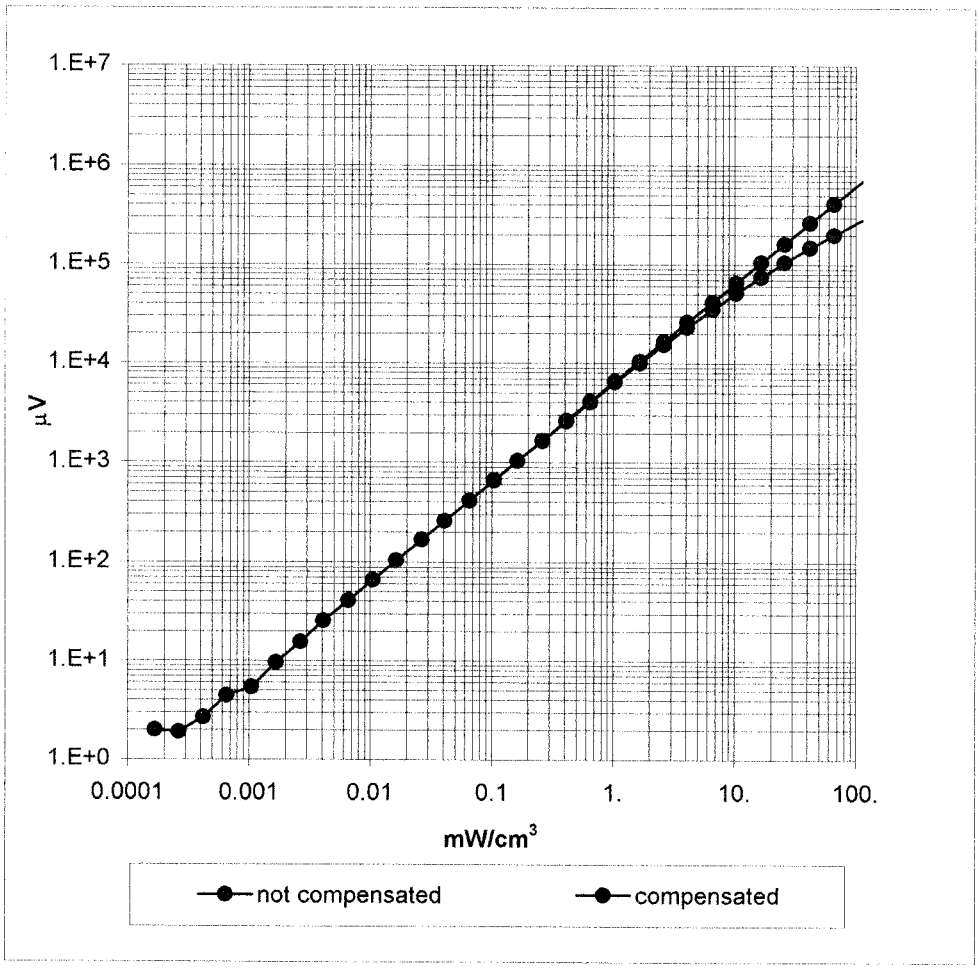
Frequency Response of E-Field

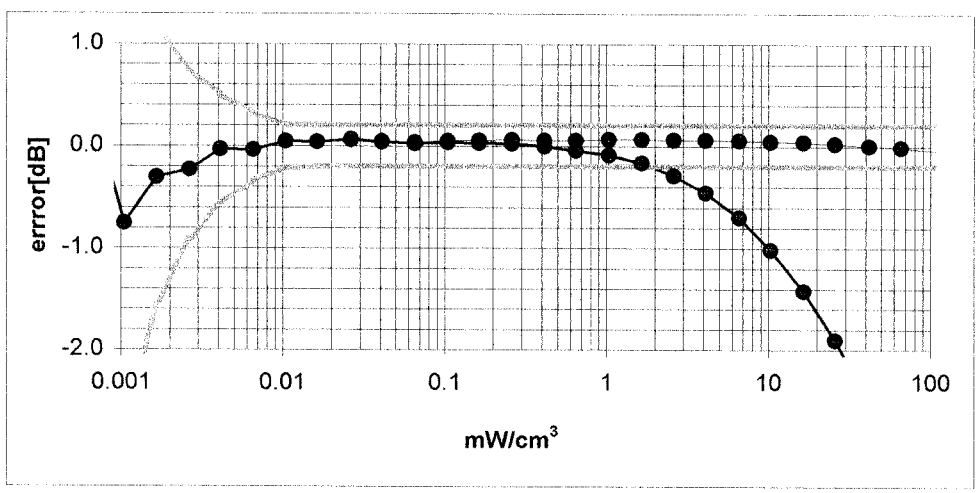
(TEM-Cell:ifi110, Waveguide R22)



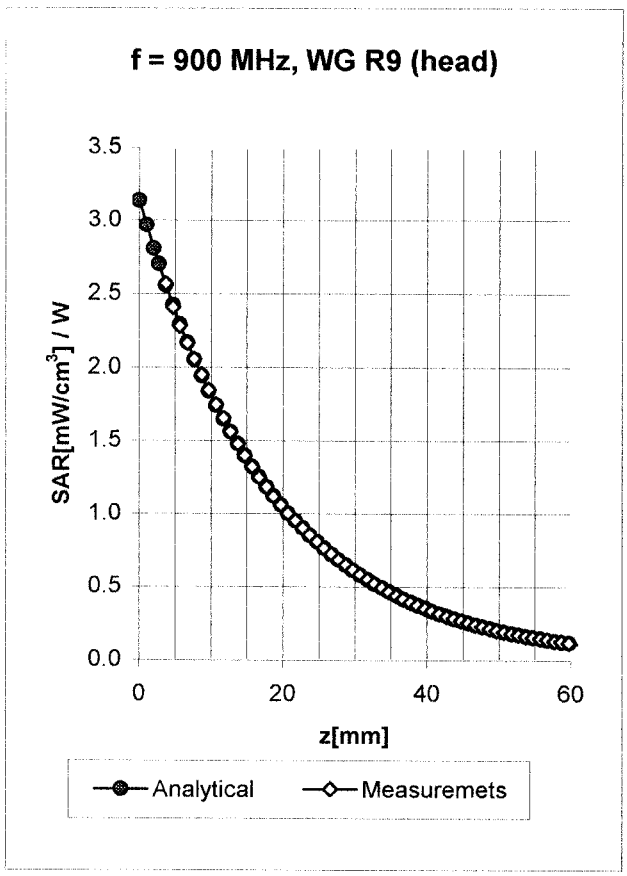
Dynamic Range f(SAR_{brain})

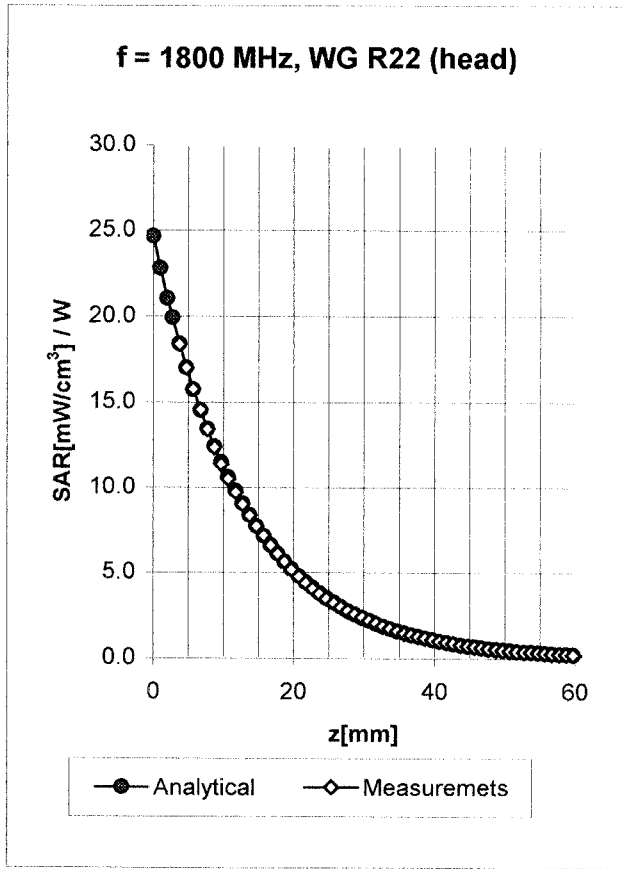
(Waveguide R22)





Conversion Factor Assessment

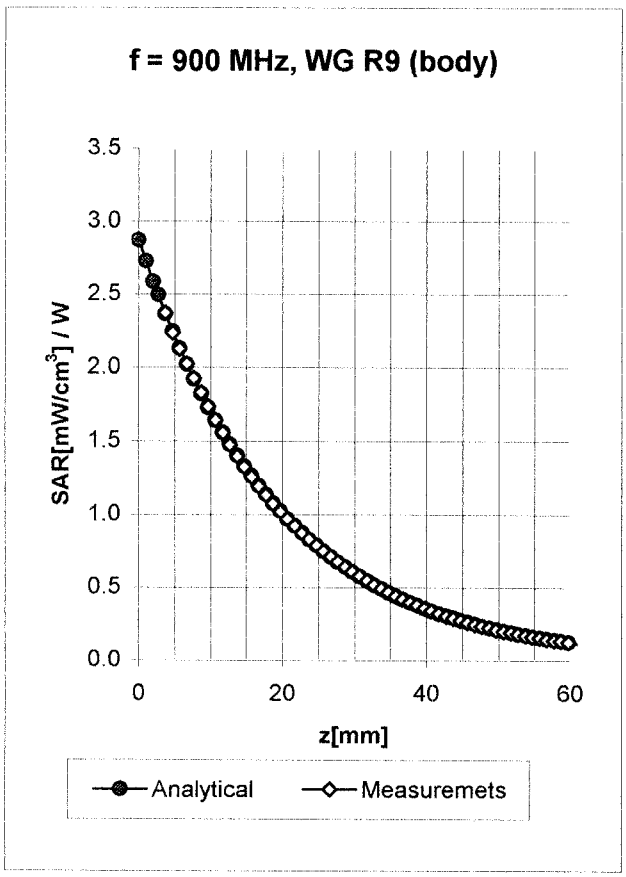


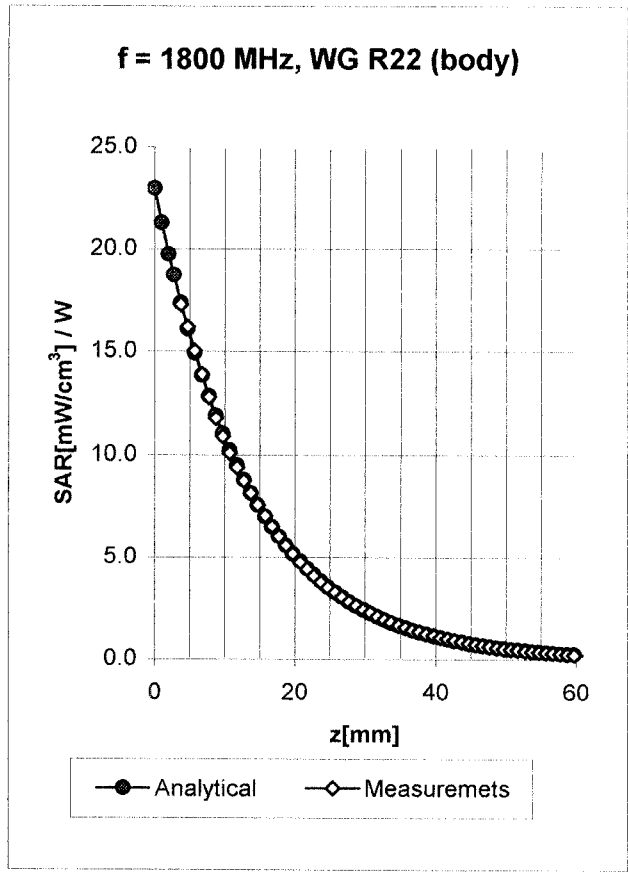


Head	**900 MHz**		ε_r = **41.5 ± 5%**	σ = **0.97 ± 5% mho/m**
Head	**835 MHz**		ε_r = **41.5 ± 5%**	σ = **0.90 ± 5% mho/m**
	ConvF X	**6.6** ± 9.5% (k=2)		Boundary effect:
	ConvF Y	**6.6** ± 9.5% (k=2)		Alpha **0.37**
	ConvF Z	**6.6** ± 9.5% (k=2)		Depth **2.61**

Head	**1800 MHz**		ε_r = **40.0 ± 5%**	σ = **1.40 ± 5% mho/m**
Head	**1900 MHz**		ε_r = **40.0 ± 5%**	σ = **1.40 ± 5% mho/m**
	ConvF X	**5.2** ± 9.5% (k=2)		Boundary effect:
	ConvF Y	**5.2** ± 9.5% (k=2)		Alpha **0.50**
	ConvF Z	**5.2** ± 9.5% (k=2)		Depth **2.73**

Conversion Factor Assessment

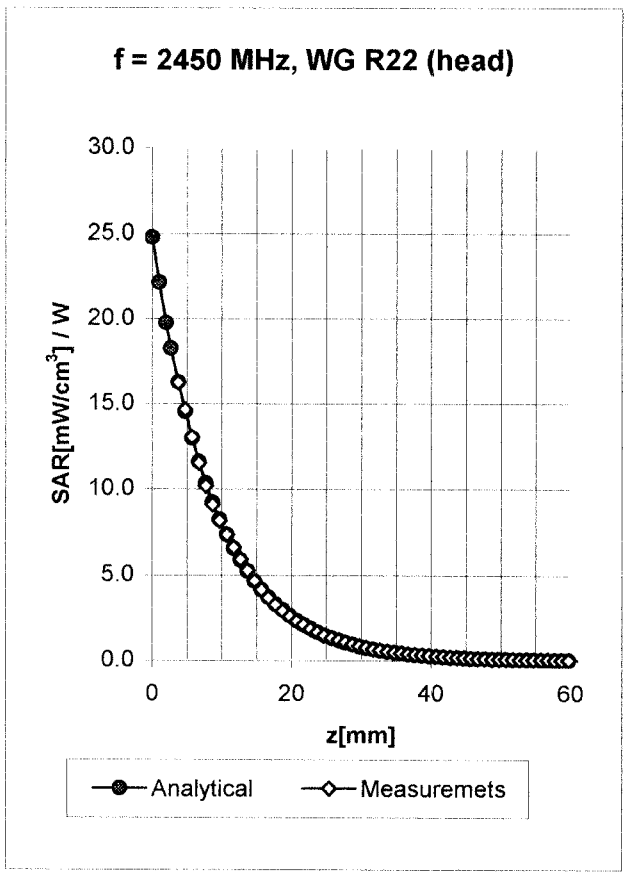


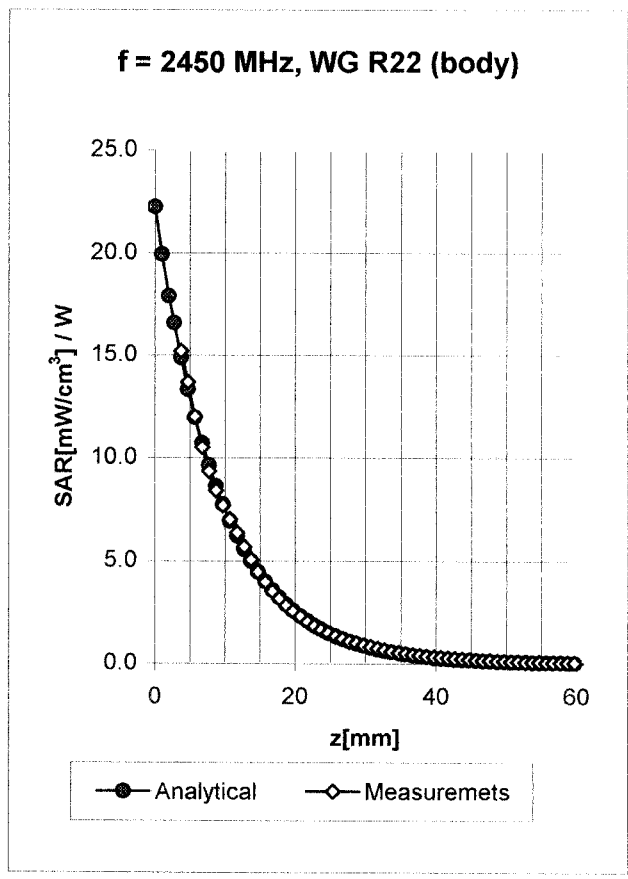


Body	**900 MHz**		ε_r = **55.0 ± 5%**	σ = **1.05 ± 5% mho/m**
Body	**835 MHz**		ε_r = **55.2 ± 5%**	σ = **0.97 ± 5% mho/m**
	ConvF X	**6.4** ± 9.5% (k=2)		Boundary effect:
	ConvF Y	**6.4** ± 9.5% (k=2)		Alpha **0.45**
	ConvF Z	**6.4** ± 9.5% (k=2)		Depth **2.35**

Body	**1800 MHz**		ε_r = **53.3 ± 5%**	σ = **1.52 ± 5% mho/m**
Body	**1900 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 **0.60**
	ConvF Z	**4.9** ± 9.5% (k=2)		Depth **2.59**

Conversion Factor Assessment





Head **2450** **MHz** ε_r **= 39.2 ± 5%** σ **= 1.80 ± 5% mho/m**

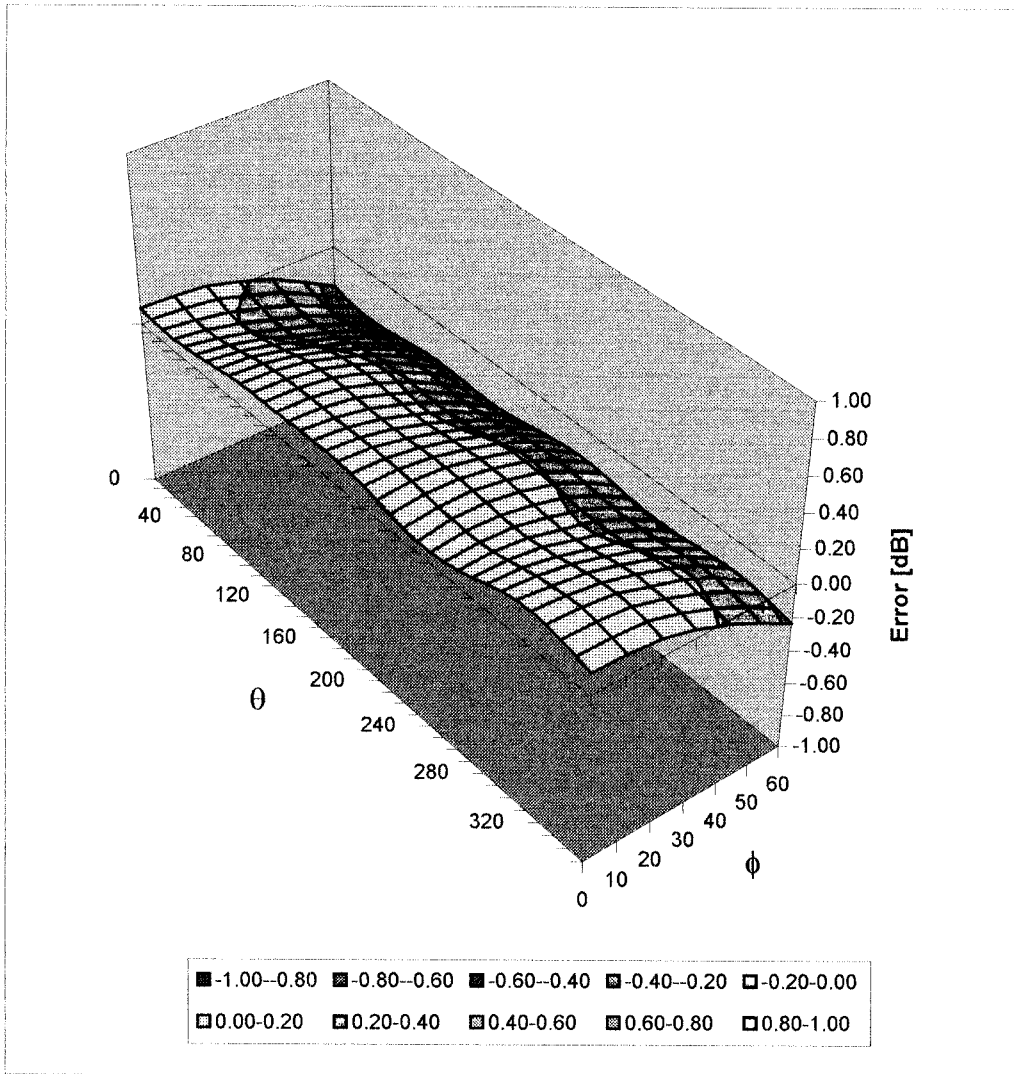
ConvF X	**5.0** ± 8.9% (k=2)	Boundary effect:	
ConvF Y	**5.0** ± 8.9% (k=2)	Alpha	**1.04**
ConvF Z	**5.0** ± 8.9% (k=2)	Depth	**1.85**

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

ConvF X	**4.6** ± 8.9% (k=2)	Boundary effect:	
ConvF Y	**4.6** ± 8.9% (k=2)	Alpha	**1.20**
ConvF Z	**4.6** ± 8.9% (k=2)	Depth	**1.60**

Deviation from Isotropy in HSL

Error (θ,ϕ), f = 900 MHz



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Engineering AG

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Additional Conversion Factors

for Dosimetric E-Field Probe

Type:	**ET3DV6**
Serial Number:	**1387**
Place of Assessment:	**Zurich**
Date of Assessment:	**February 28, 2003**
Probe Calibration Date:	**February 26, 2003**

Schmid & Partner Engineering AG hereby certifies that conversion factor(s) of this probe have been evaluated on the date indicated above. The assessment was performed using the FDTD numerical code SEMCAD of Schmid & Partner Engineering AG. Since the evaluation is coupled with measured conversion factors, it has to be recalculated yearly, i.e., following the re-calibration schedule of the probe. The uncertainty of the numerical assessment is based on the extrapolation from measured value at 900 MHz or at 1800 MHz.

Assessed by: 

Dosimetric E-Field Probe ET3DV6 SN:1387

Conversion factor (± standard deviation)

150 MHz	ConvF	**9.1 ± 8%**	ε_r = **52.3** σ = **0.76 mho/m** (head tissue)
300 MHz	ConvF	**7.9 ± 8%**	ε_r = **45.3** σ = **0.87 mho/m** (head tissue)
450 MHz	ConvF	**7.5 ± 8%**	ε_r = **43.5** σ = **0.87 mho/m** (head tissue)
150 MHz	ConvF	**8.8 ± 8%**	ε_r = **61.9** σ = **0.80 mho/m** (body tissue)
300 MHz	ConvF	**8.0 ± 8%**	ε_r = **58.2** σ = **0.92 mho/m** (body tissue)
450 MHz	ConvF	**7.7 ± 8%**	ε_r = **56.7** σ = **0.94 mho/m** (body tissue)

APPENDIX E - MEASURED FLUID DIELECTRIC PARAMETERS

900MHz System Performance Check

Measured Fluid Dielectric Parameters (Brain)

September 26, 2003

Frequency	e'	e"
800.000000 MHz	40.8082	19.5795
810.000000 MHz	40.7297	19.5250
820.000000 MHz	40.5743	19.4711
830.000000 MHz	40.4315	19.4474
840.000000 MHz	40.2713	19.4403
850.000000 MHz	40.1202	19.4112
860.000000 MHz	39.9820	19.3390
870.000000 MHz	39.8326	19.3229
880.000000 MHz	39.7340	19.2938
890.000000 MHz	39.6320	19.2766
900.000000 MHz	39.5905	19.1838
910.000000 MHz	39.4903	19.1534
920.000000 MHz	39.4047	19.1296
930.000000 MHz	39.2898	19.0623
940.000000 MHz	39.1813	19.0712
950.000000 MHz	39.0804	19.0311
960.000000 MHz	38.9627	18.9879
970.000000 MHz	38.8277	18.9699
980.000000 MHz	38.6962	18.9520
990.000000 MHz	38.5700	18.9108
1.000000000 GHz	38.4823	18.8819

915MHz DUT Evaluation (Body)

Measured Fluid Dielectric Parameters (Muscle)

September 26, 2003

Frequency	e'	e"
850.000000 MHz	55.4327	21.7754
855.000000 MHz	55.3472	21.7071
860.000000 MHz	55.2590	21.6974
865.000000 MHz	55.1249	21.6269
870.000000 MHz	55.0319	21.6093
875.000000 MHz	54.8792	21.5381
880.000000 MHz	54.7874	21.5002
885.000000 MHz	54.6641	21.4538
890.000000 MHz	54.5910	21.4428
895.000000 MHz	54.5162	21.3902
900.000000 MHz	54.4637	21.2928
905.000000 MHz	54.4012	21.2425
910.000000 MHz	54.3177	21.1963
915.000000 MHz	54.2426	21.1373
920.000000 MHz	54.1466	21.1185
925.000000 MHz	54.0641	21.0746
930.000000 MHz	53.9647	21.0539
935.000000 MHz	53.8639	21.0445
940.000000 MHz	53.8044	21.0528
945.000000 MHz	53.7067	20.9989
950.000000 MHz	53.6251	21.0077

APPENDIX F - SAM PHANTOM CERTIFICATE OF CONFORMITY

Schmid & Partner
Engineering AG

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Certificate of conformity / First Article Inspection

Item	SAM Twin Phantom V4.0
Type No	QD 000 P40 BA
Series No	TP-1002 and higher
Manufacturer / Origin	Untersee Composites Hauptstr. 69 CH-8559 Fruthwilen Switzerland

Tests

The series production process used allows the limitation to test of first articles.
Complete tests were made on the pre-series Type No. QD 000 P40 AA, Serial No. TP-1001 and on the series first article Type No. QD 000 P40 BA, Serial No. TP-1006. Certain parameters have been retested using further series units (called samples).

Test	Requirement	Details	Units tested
Shape	Compliance with the geometry according to the CAD model.	IT'IS CAD File (*)	First article, Samples
Material thickness	Compliant with the requirements according to the standards	2mm +/- 0.2mm in specific areas	First article, Samples
Material parameters	Dielectric parameters for required frequencies	200 MHz – 3 GHz Relative permittivity < 5 Loss tangent < 0.05.	Material sample TP 104-5
Material resistivity	The material has been tested to be compatible with the liquids defined in the standards	Liquid type HSL 1800 and others according to the standard.	Pre-series, First article

Standards

[1] CENELEC EN 50361
[2] IEEE P1528-200x draft 6.5
[3] IEC PT 62209 draft 0.9
(*) The IT'IS CAD file is derived from [2] and is also within the tolerance requirements of the shapes of [1] and [3].

Conformity

Based on the sample tests above, we certify that this item is in compliance with the uncertainty requirements of SAR measurements specified in standard [1] and draft standards [2] and [3].

Date 18.11.2001

Signature / Stamp Schmid & Partner Engineering AG
Zeughausstrasse 43, CH-8004 Zurich
Tel. +41 1 245 97 00, Fax +41 1 245 97 79

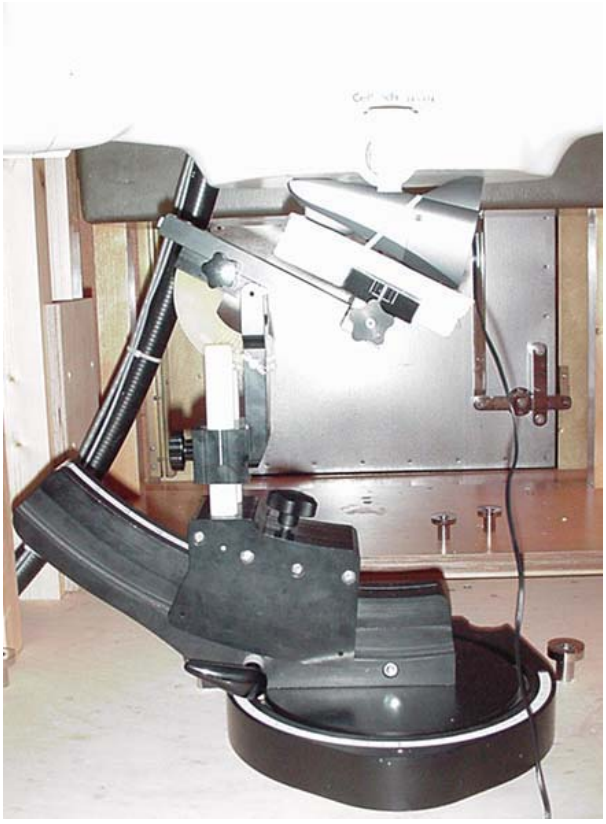
APPENDIX G - SAR TEST SETUP & DUT PHOTOGRAPHS

BODY SAR TEST SETUP PHOTOGRAPHS

Base Unit - Front Left Side (Antenna Side) Touching Planar Phantom

BODY SAR TEST SETUP PHOTOGRAPHS

Base Unit - Back Side Touching Planar Phantom - Two Points Touching Phantom

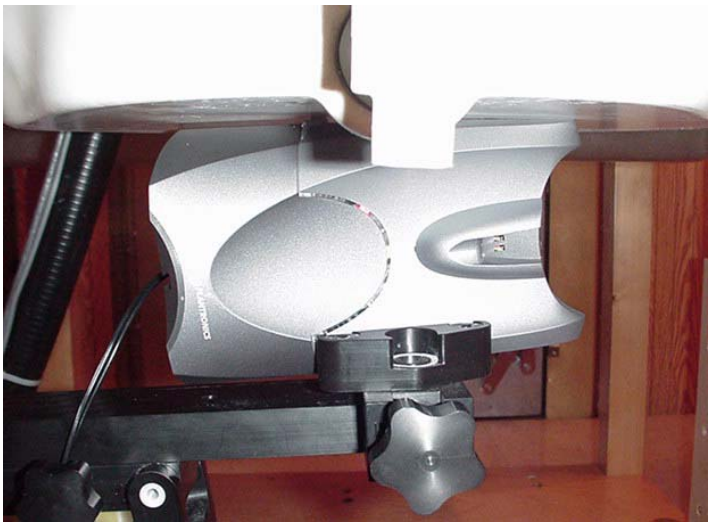


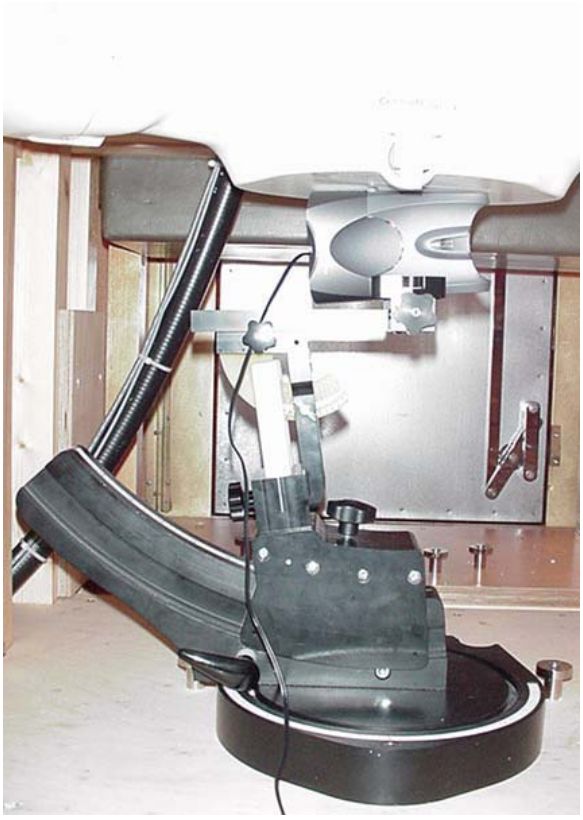
BODY SAR TEST SETUP PHOTOGRAPHS

Base Unit - Back Side Touching Planar Phantom - Flat Section Touching Phantom

BODY SAR TEST SETUP PHOTOGRAPHS

Base Unit - Left Side (Antenna Side) Touching Planar Phantom





DUT PHOTOGRAPHS