DECLARATION OF COMPLIANCE
SAR EVALUATION

Test Lab

CELLTECH LABS INC.
Testing and Engineering Lab
1955 Moss Court
Kelowna, B.C.
Canada V1Y 9L3
Phone: 250-448-7047
Fax: 250-448-7046
e-mail: info@celltechlabs.com
web site: www.celltechlabs.com

Applicant Information

HANDSPRING INC.
189 Bernardo Avenue
Mountain View, CA 94043-5203

FCC Rule Part(s):	**47 CFR §2.1093**
Test Procedure(s):	**FCC OET Bulletin 65, Supplement C (01-01)** **IEEE Standard 1528-200X (Draft)**
FCC ID:	**O8FBW**
Model(s):	**Treo 600**
Device Type:	**Dual-Band PCS/Cellular CDMA Phone**
FCC Classification:	**PCS Licensed Transmitter held to ear (PCE)**
Mode(s) of Operation:	**PCS CDMA / Cellular CDMA**
Tx Frequency Range(s):	**1851.25 - 1908.75 MHz (PCS CDMA)** **824.70 - 848.31 MHz (Cellular CDMA)**
Max. RF Conducted Power Tested:	**24.1 dBm (PCS CDMA)** **24.1 dBm (Cellular CDMA)**
Antenna Type:	**Fixed Stubby**
Battery Type:	**3.6V Lithium-ion (1800mAh)**
Body-Worn Accessories Tested:	**Leather Side Case with Belt-Clip (P/N: SKU3155WW)** **Leather Case with Removable Belt-Clip (P/N: SKU3154WW)** **Ear-Microphone**
Max. SAR Measured:	**PCS Band: 1.53 W/kg (Head) / 0.861 W/kg (Body)** **Cellular Band: 1.53 W/kg (Head) / 0.822 W/kg (Body)**

Celltech Labs Inc. declares under its sole responsibility that this device was found to be in compliance 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), and IEEE Standard 1528-200X (Draft) 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.

TABLE OF CONTENTS

1.0 INTRODUCTION

This measurement report shows that the HANDSPRING INC. Model: Treo 600 Dual-Band PCS/Cellular CDMA Phone FCC ID: O8FBW complies with FCC 47 CFR §2.1093 (see reference [1]) for the General Population / Uncontrolled Exposure environment. The test procedures described in FCC OET Bulletin 65, Supplement C, Edition 01-01 (see reference [2]), and IEEE Standard 1528-200X (Draft - see reference [3]) were employed. A description of the product and 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 Equipment Under Test (EUT)

EUT Type	Dual-Band PCS/Cellular CDMA Phone
Equipment Class	PCS Licensed Transmitter held to ear (PCE)
FCC Rule Part(s)	47 CFR §2.1093
Test Procedure(s)	FCC OET Bulletin 65, Supplement C (01-01) IEEE Standard 1528-200X (Draft)
FCC ID	O8FBW
Model(s)	Treo 600
Serial No.	Pre-production unit
Mode(s) of Operation	PCS CDMA / Cellular CDMA
Tx Frequency Range(s)	1851.25 - 1908.75 MHz (PCS CDMA) 824.70 - 848.31 MHz (Cellular CDMA)
Max. RF Conducted Power Tested	24.1 dBm (PCS CDMA) 24.1 dBm (Cellular CDMA)
Battery Type(s)	3.6V Lithium-ion (1800mAh)
Antenna Type	Fixed Stubby (Length: 30 mm)
Body-Worn Accessories Tested	1. Leather Case with Removable Belt-Clip (P/N: SKU3154WW) 2. Leather Side Case with Belt-Clip (P/N: SKU3155WW) 3. Ear-Microphone

3.0 SAR MEASUREMENT SYSTEM

Celltech Labs SAR measurement facility utilizes the Dosimetric Assessment System (DASY™) manufactured by Schmid & Partner Engineering AG (SPEAG™) of Zurich, Switzerland. The DASY system is comprised of the robot controller, computer, near-field probe, probe alignment sensor, specific anthropomorphic mannequin (SAM) phantom, and various planar phantoms for face-held and/or body-worn 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 PC plug-in card. The DAE3 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 PC-card 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. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer.

DASY3 SAR Measurement System with SAM Phantom

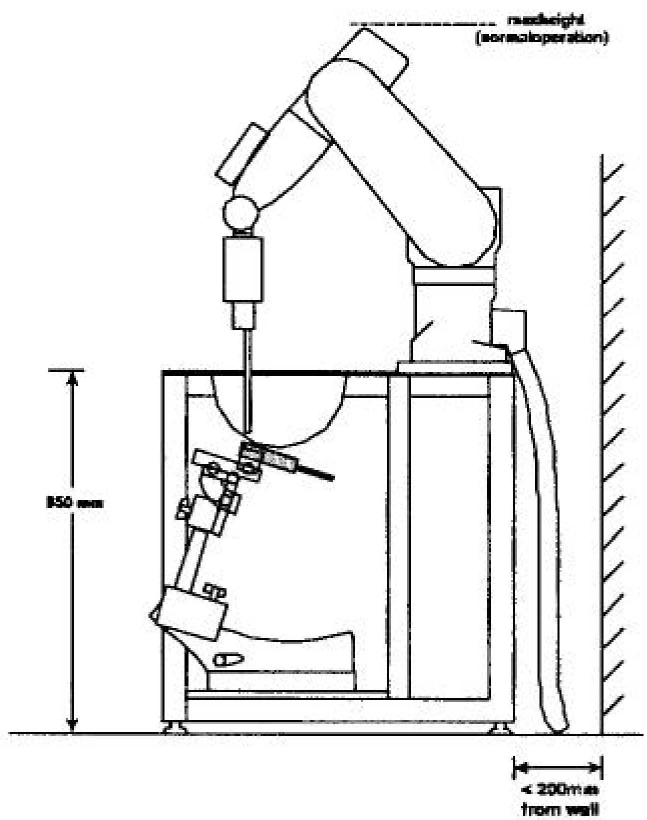


Figure 1. DASY3 Compact Version - Side View

4.0 MEASUREMENT SUMMARY

HEAD SAR MEASUREMENT RESULTS - PCS CDMA										
Freq. (MHz)	Channel	Test Mode	Battery Type	Conducted Power (dBm)		Antenna Position	Phantom Section	Test Position	Measured SAR 1g (W/kg)	
				Before	After					
1851.25	25	PCS CDMA	Lithium-ion	24.00	24.00	Fixed	Left Ear	Cheek/Touch	1.43	
1880.00	600	PCS CDMA	Lithium-ion	24.01	24.03	Fixed	Left Ear	Cheek/Touch	1.51	
1908.75	1175	PCS CDMA	Lithium-ion	24.02	24.03	Fixed	Left Ear	Cheek/Touch	1.53	
1851.25	25	PCS CDMA	Lithium-ion	24.04	24.08	Fixed	Left Ear	Ear/Tilt (15°)	1.37	
1880.00	600	PCS CDMA	Lithium-ion	23.99	24.01	Fixed	Left Ear	Ear/Tilt (15°)	1.43	
1908.75	1175	PCS CDMA	Lithium-ion	24.03	24.03	Fixed	Left Ear	Ear/Tilt (15°)	1.28	
1851.25	25	PCS CDMA	Lithium-ion	24.05	24.07	Fixed	Right Ear	Cheek/Touch	P	1.44
									S	1.05
1880.00	600	PCS CDMA	Lithium-ion	24.00	24.00	Fixed	Right Ear	Cheek/Touch	P	1.44
									S	1.08
1908.75	1175	PCS CDMA	Lithium-ion	24.00	24.02	Fixed	Right Ear	Cheek/Touch	P	1.46
									S	1.04
1851.25	25	PCS CDMA	Lithium-ion	24.07	24.07	Fixed	Right Ear	Ear/Tilt (15°)	1.40	
1880.00	600	PCS CDMA	Lithium-ion	24.00	23.98	Fixed	Right Ear	Ear/Tilt (15°)	1.46	
1908.75	1175	PCS CDMA	Lithium-ion	24.04	24.02	Fixed	Right Ear	Ear/Tilt (15°)	1.27	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT BRAIN: 1.6 W/kg (averaged over 1 gram) Spatial Peak - Uncontrolled Exposure / General Population										

Test Date(s)	06/23/03		Relative Humidity	51 %
Measured Fluid Type	1900MHz Brain		Atmospheric Pressure	101.4 kPa
Dielectric Constant ε_r	IEEE Target	Measured	Ambient Temperature	21.9 °C
	40.0 ± 5%	38.0	Fluid Temperature	21.6 °C
Conductivity σ (mho/m)	IEEE Target	Measured	Fluid Depth	≥ 15 cm
	1.40 ± 5%	1.43	ρ (Kg/m^3)	1000

Note(s):

1. The measurement results were obtained with the EUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum SAR location of the EUT are reported in Appendix A.
2. SAR measurements for the right ear, cheek touch position showed a secondary peak SAR location within 3dB of the primary peak SAR location as shown in the above table (P = Primary, S = Secondary) and Appendix A (SAR Test Plots).
3. 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.
4. The dielectric properties of the simulated tissue fluids 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).

MEASUREMENT SUMMARY (Cont.)

HEAD SAR MEASUREMENT RESULTS - Cellular CDMA									
Freq. (MHz)	Channel	Test Mode	Battery Type	Conducted Power (dBm)		Antenna Position	Phantom Section	Test Position	Measured SAR 1g (W/kg)
				Before	After				
824.70	1013	Cellular CDMA	Lithium-ion	24.10	24.05	Fixed	Left Ear	Cheek/Touch	1.17
835.89	363	Cellular CDMA	Lithium-ion	24.10	23.97	Fixed	Left Ear	Cheek/Touch	1.53
848.31	777	Cellular CDMA	Lithium-ion	24.00	24.08	Fixed	Left Ear	Cheek/Touch	1.31
824.70	1013	Cellular CDMA	Lithium-ion	24.07	24.00	Fixed	Left Ear	Ear/Tilt (15°)	0.631
835.89	363	Cellular CDMA	Lithium-ion	24.00	24.10	Fixed	Left Ear	Ear/Tilt (15°)	0.810
848.31	777	Cellular CDMA	Lithium-ion	24.09	23.90	Fixed	Left Ear	Ear/Tilt (15°)	0.747
824.70	1013	Cellular CDMA	Lithium-ion	24.04	24.08	Fixed	Right Ear	Cheek/Touch	1.24
835.89	363	Cellular CDMA	Lithium-ion	24.10	24.09	Fixed	Right Ear	Cheek/Touch	1.47
848.31	777	Cellular CDMA	Lithium-ion	24.06	23.90	Fixed	Right Ear	Cheek/Touch	1.43
824.70	1013	Cellular CDMA	Lithium-ion	24.10	24.09	Fixed	Right Ear	Ear/Tilt (15°)	0.833
835.89	363	Cellular CDMA	Lithium-ion	24.09	24.10	Fixed	Right Ear	Ear/Tilt (15°)	0.942
848.31	777	Cellular CDMA	Lithium-ion	24.00	23.90	Fixed	Right Ear	Ear/Tilt (15°)	1.01
ANSI / IEEE C95.1 1992 - SAFETY LIMIT BRAIN: 1.6 W/kg (averaged over 1 gram) Spatial Peak - Uncontrolled Exposure / General Population									

Test Date(s)	06/24/03		Relative Humidity	37 %
Measured Fluid Type	835MHz Brain		Atmospheric Pressure	102.1 kPa
Dielectric Constant ε_r	IEEE Target	Measured	Ambient Temperature	24.4 °C
	41.5 ± 5%	41.6	Fluid Temperature	22.2 °C
Conductivity σ (mho/m)	IEEE Target	Measured	Fluid Depth	≥ 15 cm
	0.90 ± 5%	0.91	ρ (Kg/m^3)	1000

Note(s):

1. The measurement results were obtained with the EUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum SAR location of the EUT are reported in Appendix A.
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 tissue fluids 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).

MEASUREMENT SUMMARY (Cont.)

BODY SAR MEASUREMENT RESULTS - PCS CDMA											
Freq. (MHz)	Channel	Test Mode	Battery Type	Conducted Power (dBm)		Antenna Position	Body-worn Accessory	EUT Position to Planar Phantom	Separation Distance to Planar Phantom	Measured SAR 1g (W/kg)	
				Before	After						
1880.00	600	PCS CDMA	Lithium-ion	24.06	24.10	Fixed	Side Case with Belt-Clip	Front Side	1.4 cm	0.576	
1880.00	600	PCS CDMA	Lithium-ion	23.96	24.08	Fixed	Fitted Case & Belt-Clip	Back Side	2.5 cm	P	0.164
										S	0.138
1880.00	600	PCS CDMA	Lithium-ion	23.96	23.98	Fixed	Air Spacing	Front Side	1.0 cm	P	0.565
										S	0.292
1851.25	25	PCS CDMA	Lithium-ion	24.04	24.06	Fixed	Air Spacing	Back Side	1.0 cm	0.861	
1880.00	600	PCS CDMA	Lithium-ion	24.06	23.99	Fixed	Air Spacing	Back Side	1.0 cm	0.861	
1908.75	1175	PCS CDMA	Lithium-ion	24.05	24.00	Fixed	Air Spacing	Back Side	1.0 cm	0.567	

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

Test Date(s)	06/25/03		Relative Humidity	47%
Measured Fluid Type	1900MHz Body		Atmospheric Pressure	102.2 kPa
Dielectric Constant e_r	IEEE Target	Measured	Ambient Temperature	22.5 °C
	53.3 ± 5%	51.7	Fluid Temperature	21.7 °C
Conductivity s (mho/m)	IEEE Target	Measured	Fluid Depth	≥ 15 cm
	1.52 ± 5%	1.58	r (Kg/m^3)	1000

Note(s):

1. The measurement results were obtained with the EUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum SAR location of the EUT are reported in Appendix A.
2. If the SAR measurements performed at the middle channel were ≥ 3dB below the SAR limit, SAR evaluation for the low and high channels was optional for each test configuration (per FCC OET Bulletin 65, Supplement C, Edition 01-01 - see reference [3]).
3. SAR measurements with the fitted case accessory and air spacing configurations (front side) showed secondary peak SAR locations within 3dB of the primary peak SAR location as shown in the above table (P = Primary, S = Secondary) and Appendix A (SAR Test Plots).
4. 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.
5. The dielectric properties of the simulated tissue fluids 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).
6. An ear-microphone accessory was connected to the EUT for the duration of the tests, except for leather side case with belt-clip accessory, which does not have provision for use with ear-microphone accessory. This accessory was tested for the purpose of data upload and download operations that can be performed with the EUT placed inside the case.

MEASUREMENT SUMMARY (Cont.)

BODY SAR MEASUREMENT RESULTS - Cellular CDMA

Freq. (MHz)	Channel	Test Mode	Battery Type	Conducted Power (dBm)		Antenna Position	Body-worn Accessory	EUT Position to Planar Phantom	Separation Distance to Planar Phantom	Measured SAR 1g (W/kg)
				Before	After					
824.70	1013	Cellular CDMA	Lithium-ion	24.03	24.02	Fixed	Side Case with Belt-Clip	Front Side	1.4 cm	0.590
835.89	363	Cellular CDMA	Lithium-ion	24.10	23.96	Fixed	Side Case with Belt-Clip	Front Side	1.4 cm	0.822
848.31	777	Cellular CDMA	Lithium-ion	24.01	23.90	Fixed	Side Case with Belt-Clip	Front Side	1.4 cm	0.604
835.89	363	Cellular CDMA	Lithium-ion	24.01	23.96	Fixed	Fitted Case & Belt-Clip	Back Side	2.5 cm	0.391
835.89	363	Cellular CDMA	Lithium-ion	23.96	24.08	Fixed	Air Spacing	Front Side	1.0 cm	0.573
835.89	363	Cellular CDMA	Lithium-ion	24.04	24.03	Fixed	Air Spacing	Back Side	1.0 cm	0.744

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

Test Date(s)	06/25/03		**Relative Humidity**	47%
Measured Fluid Type	835MHz Body		**Atmospheric Pressure**	102.2 kPa
Dielectric Constant e_r	**IEEE Target**	**Measured**	**Ambient Temperature**	22.8 °C
	55.2 ± 5%	54.8	**Fluid Temperature**	22.0 °C
Conductivity s **(mho/m)**	**IEEE Target**	**Measured**	**Fluid Depth**	≥ 15 cm
	0.97 ± 5%	0.99	r **(Kg/m^3)**	1000

Note(s):

1. The measurement results were obtained with the EUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum SAR location of the EUT are reported in Appendix A.
2. If the SAR measurements performed at the middle channel were ≥ 3dB below the SAR limit, SAR evaluation for the low and high channels was optional for each test configuration (per FCC OET Bulletin 65, Supplement C, Edition 01-01 - see reference [3]).
3. 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.
4. The dielectric properties of the simulated tissue fluids 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. An ear-microphone accessory was connected to the EUT for the duration of the tests, except for leather side case with belt-clip accessory, which does not have provision for use with ear-microphone accessory. This accessory was tested for the purpose of data upload and download operations that can be performed with the EUT placed inside the case.

5.0 DETAILS OF SAR EVALUATION

The HANDSPRING INC. Model: Treo 600 Dual-Band PCS/Cellular CDMA Phone FCC ID: O8FBW 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.

Ear-held Configuration

1) The EUT was tested in an ear-held configuration on both the left and right sections of the SAM phantom at the middle channel of the operating band. If the SAR value of the middle channel for each test configuration (left ear, right ear, cheek/touch, ear/tilt) was ≥ 3dB below the SAR limit, measurements at the low and high channels were optional (per FCC OET Bulletin 65, Supplement C, Edition 01-01 - see reference [3]).

a) The handset was placed in the device holder in a normal operating position with the test device reference point located along the vertical centerline on the front of the device aligned to the ear reference point, with the center of the earpiece touching the center of the ear spacer of the SAM phantom.

b) With the handset positioned parallel to the cheek, the test device reference point was aligned to the ear reference point on the head phantom, and the vertical centerline was aligned to the phantom reference plane (initial ear position).

c) While maintaining the three alignments, the body of the handset was gradually adjusted to each of the following test positions:

- Cheek/Touch Position: the handset was brought toward the mouth of the head phantom by pivoting against the ear reference point until any point of the mouthpiece or keypad touched the phantom.

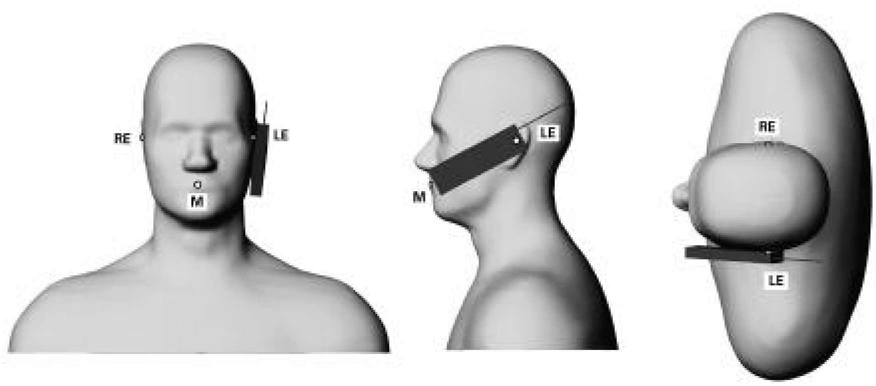


Figure 2. Phone position 1, "cheek" or "touch" position. The reference points for the right ear (RE), left ear (LE) and mouth (M), which define the reference plane for phone positioning, are indicated (Shoulders are shown for illustration only).

- Ear/Tilt Position: With the phone aligned in the Cheek/Touch position, the handset was tilted away from the mouth with respect to the test device reference point by 15 degrees.

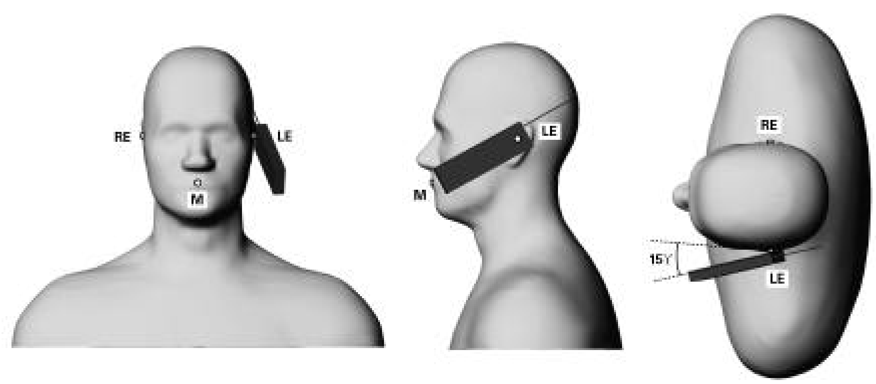


Figure 3. Phone position 2, "tilted position." The reference points for the right ear (RE), left ear (LE) and mouth (M), which define the reference plane for phone positioning, are indicated (Shoulders are shown for illustration only).

DETAILS OF SAR EVALUATION (Cont.)

Body-worn Configuration

2) The EUT was tested in a body-worn configuration placed inside the leather side case with belt-clip accessory. The front side of the EUT (keypad side) was placed facing parallel to the outer surface of the SAM phantom (planar section) with the attached belt-clip accessory touching the phantom surface (the leather side case accessory is designed so that the EUT is positioned with the keypad side facing the user's body). The leather side case with belt-clip accessory provided a 1.4 cm separation distance between the front side of the EUT (keypad side) and the outer surface of the SAM phantom (planar section). This accessory does not have provision for use with an ear-microphone accessory and was tested for the purpose of data upload and download operations that can be performed with the EUT placed inside the case.
3) The EUT was tested in a body-worn configuration placed inside the fitted leather case with removable belt-clip accessory. The rear side of the EUT was placed facing parallel to the outer surface of the SAM phantom (planar section) with the attached belt-clip accessory touching the phantom surface (the fitted leather case accessory is designed so that the EUT is positioned with the rear side facing the user's body). The fitted leather case with removable belt-clip accessory provided a 2.5 cm separation distance between the rear side of the EUT and the outer surface of the SAM phantom (planar section). An ear-microphone accessory was connected to the EUT for the duration of the test.
4) The EUT was tested in a body-worn configuration with an "air" spacing of 1.0 cm between the front side (keypad side) and the outer surface of the SAM phantom (planar section). The EUT was also tested with an "air" spacing of 1.0 cm between the rear side and the outer surface of the SAM phantom (planar section). No body-worn accessories were used with the EUT in the "air" spacing test configurations (except ear-microphone accessory), in order that the EUT has the option of a generic body-worn holster/case that does not contain any metallic components and provides a minimum separation distance of 1.0 cm between the phone and the user's body.
5) The EUT was tested with a modulated CDMA signal generated via internal software at a full data rate in the "always up" power control mode.
6) The conducted power levels were measured before and after each test according to the procedures described in FCC 47 CFR §2.1046 using a Gigatronics 8652A Universal Power Meter. If the conducted power levels measured after each evaluation varied more than 5% from the initial power level, then the EUT was retested. Any unusual anomalies over the course of the test also warranted a re-evaluation.
7) The EUT was tested with a fully charged battery.

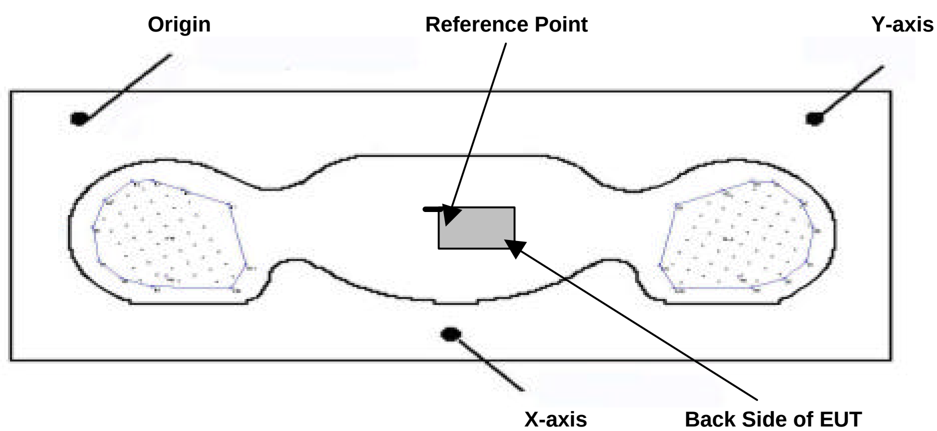


Figure 4. Device Positioning & Reference Point (Body-worn SAR)

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 in accordance with FCC OET Bulletin 65, Supplement C (Edition 01-01) 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 DASY3 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 20mm x 20mm.
c. Based on the area scan data, the area of maximum absorption was determined by spline interpolation. Around this point, a volume of 40 x 40 x 35 mm (fine resolution volume scan, zoom scan) was assessed by measuring 5 x 5 x 7 points.
d. The 1g and 10g spatial peak SAR was determined as follows:
1. The first step was an extrapolation 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 a least square algorithm [W. Gander, Computermathematik, p.168-180] (see reference [4]). Through the points in the first 3 cm in each z-axis, polynomials of the fourth order were calculated. These polynomials were then used to evaluate the points between the surface and the probe tip.
2. The next step used 3D-spline interpolation to get all points within the measured volume in a 1mm grid (35000 points). 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 -direction) [Numerical Recipes in C, Second Edition, p.123ff] (see reference [4]).
3. The maximal interpolated value was searched with a straightforward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1g or 10g) were computed using the 3D-spline interpolation algorithm. 8000 points (20x20x20) were interpolated to calculate the average.

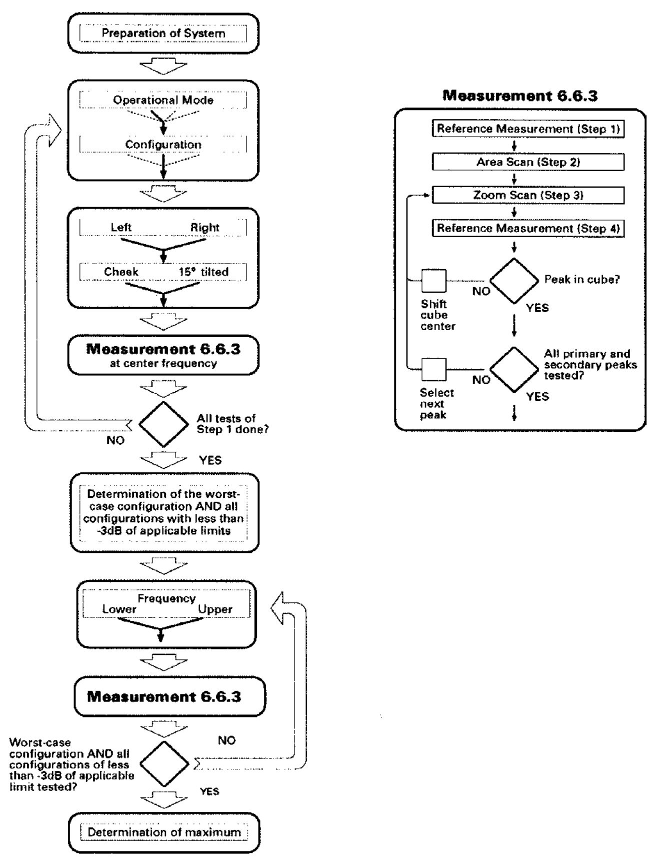


Figure 5. Flow Chart of the recommended practices and procedures per IEEE Standard 1528-200X - Draft (see reference 3])

7.0 SYSTEM PERFORMANCE CHECK

Prior to the SAR evaluation a system check was performed at the planar section of the SAM phantom with an 1800MHz dipole and 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	Equiv. 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				
06/23/03	1800MHz Brain	9.53 ±10%	9.59	40.0 ±5%	39.8	1.40 ±5%	1.39	1000	21.4 °C	21.6 °C	≥ 15 cm
06/24/03	900MHz Brain	2.70 ±10%	2.74	41.5 ±5%	39.8	0.97 ±5%	0.95	1000	24.2 °C	22.4 °C	≥ 15 cm
06/25/03	1800MHz Brain	9.53 ±10%	9.50	40.0 ±5%	39.7	1.40 ±5%	1.37	1000	22.1 °C	22.0 °C	≥ 15 cm
06/25/03	900MHz Brain	2.70 ±10%	2.69	41.5 ±5%	40.0	0.97 ±5%	0.95	1000	22.4 °C	21.8 °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.

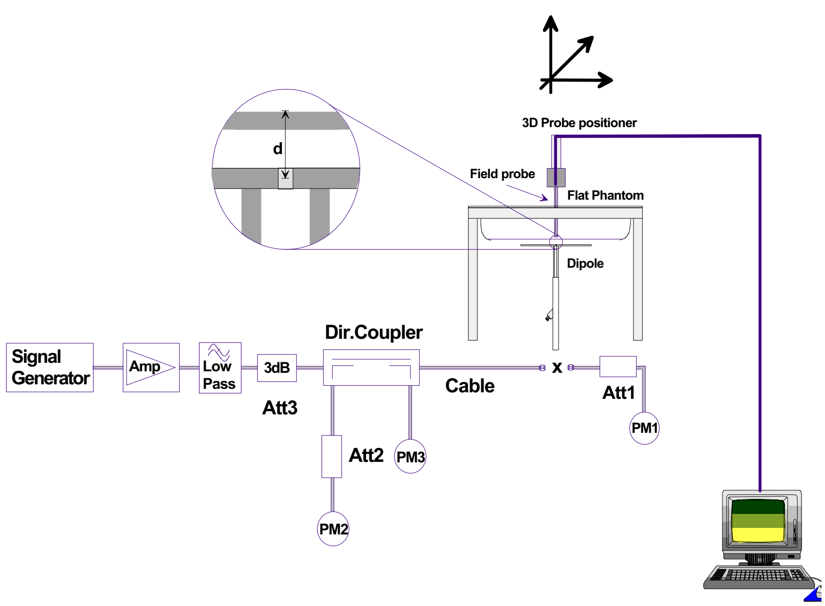


Figure 6. System Performance Check Setup Diagram

1800MHz System Check Setup

900MHz System Check Setup

8.0 SIMULATED TISSUE MIXTURES

The 1800-1900MHz simulated tissue mixtures consist of Glycol-monobutyl, water, and salt. The 835-900MHz simulated tissue mixtures 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).

1800MHz & 1900MHz TISSUE MIXTURES			
INGREDIENT	**1800MHz Brain (System Check)**	**1900MHz Brain (EUT Evaluation)**	**1900MHz Body (EUT Evaluation)**
Water	548.0 g	552.40 g	716.60 g
Glycol Monobutyl	448.5 g	444.52 g	300.70 g
Salt	3.20 g	3.06 g	3.10 g

835MHz & 900MHz TISSUE MIXTURES			
INGREDIENT	**900MHz Brain (System Check)**	**835MHz Brain (EUT Evaluation)**	**835MHz Body (EUT Evaluation)**
Water	40.71 %	40.71 %	53.70 %
Sugar	56.63 %	56.63 %	45.10 %
Salt	1.48 %	1.48 %	0.97 %
HEC	1.00 %	1.00 %	0.13%
Bactericide	0.18 %	0.18 %	0.10 %

9.0 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.

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:	Pentium III
Clock Speed:	450 MHz
Operating System:	Windows NT
Data Card:	DASY3 PC-Board

Data Converter

Features:	Signal Amplifier, multiplexer, A/D converter, and control logic
Software:	DASY3 software
Connecting Lines:	Optical downlink for data and status info. Optical uplink for commands and clock

PC Interface Card

Function:	24 bit (64 MHz) DSP for real time processing Link to DAE3 16-bit A/D converter for surface detection system serial link to robot direct emergency stop output for robot

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)
Dynam. Rnge:	5 µW/g to >100 mW/g; Linearity: ±0.2 dB
Srfce. 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 portable 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 DASY3 System	-	-
-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	Oct 2002
-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	Feb 2003
HP 8753E Network Analyzer	US38433013	Feb 2003
HP 8648D Signal Generator	3847A00611	Feb 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 Standard 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 Standard 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

APPENDIX B - SYSTEM PERFORMANCE CHECK DATA

System Performance Check - 1800MHz Dipole

SAM Phantom; Flat Section

Probe: ET3DV6 - SN1387; ConvF(5.20,5.20,5.20); Crest factor: 1.0; 1800 MHz Brain: $\sigma = 1.39$ mho/m $\varepsilon_r = 39.8$ $\rho = 1.00$ g/cm^3

Cube 5x5x7: Peak: 16.8 mW/g, SAR (1g): 9.59 mW/g, SAR (10g): 5.11 mW/g, (Worst-case extrapolation)

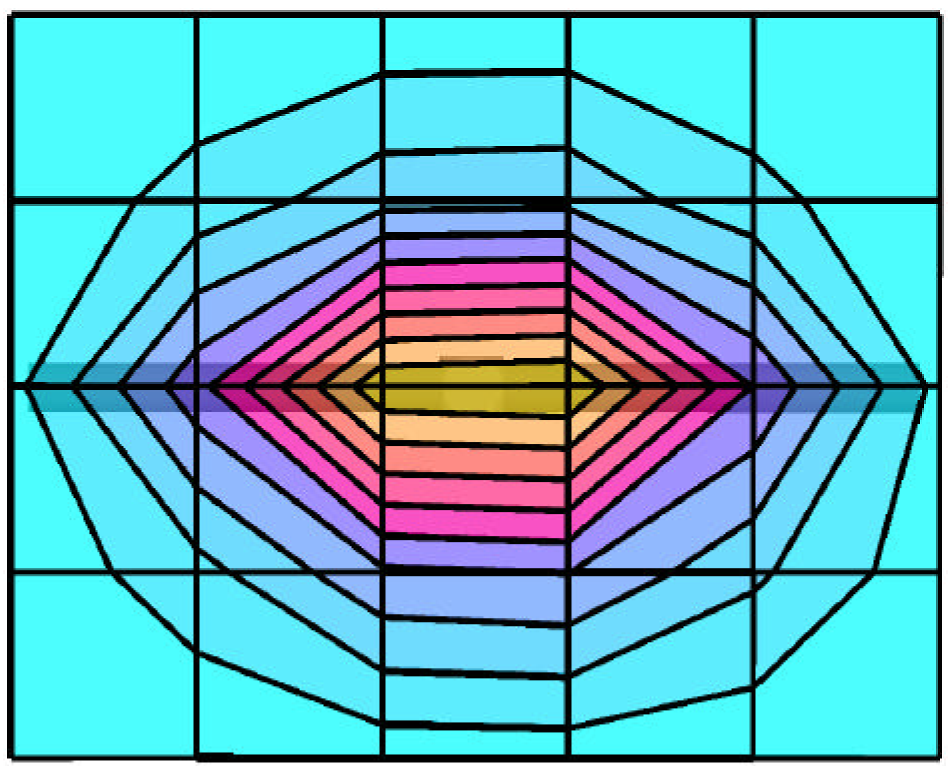
Penetration depth: 8.9 (8.8, 9.2) [mm]

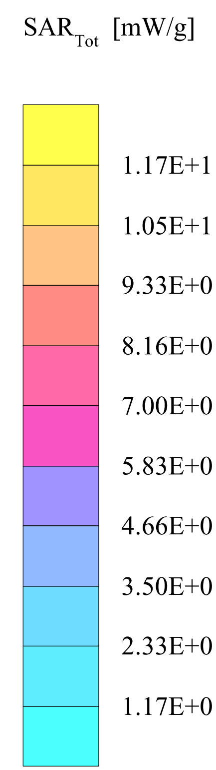
Powerdrift: -0.03 dB

Forward Conducted Power: 250 mW

Ambient Temp. 21.4°C; Fluid Temp. 21.6°C

Date Tested: June 23, 2003

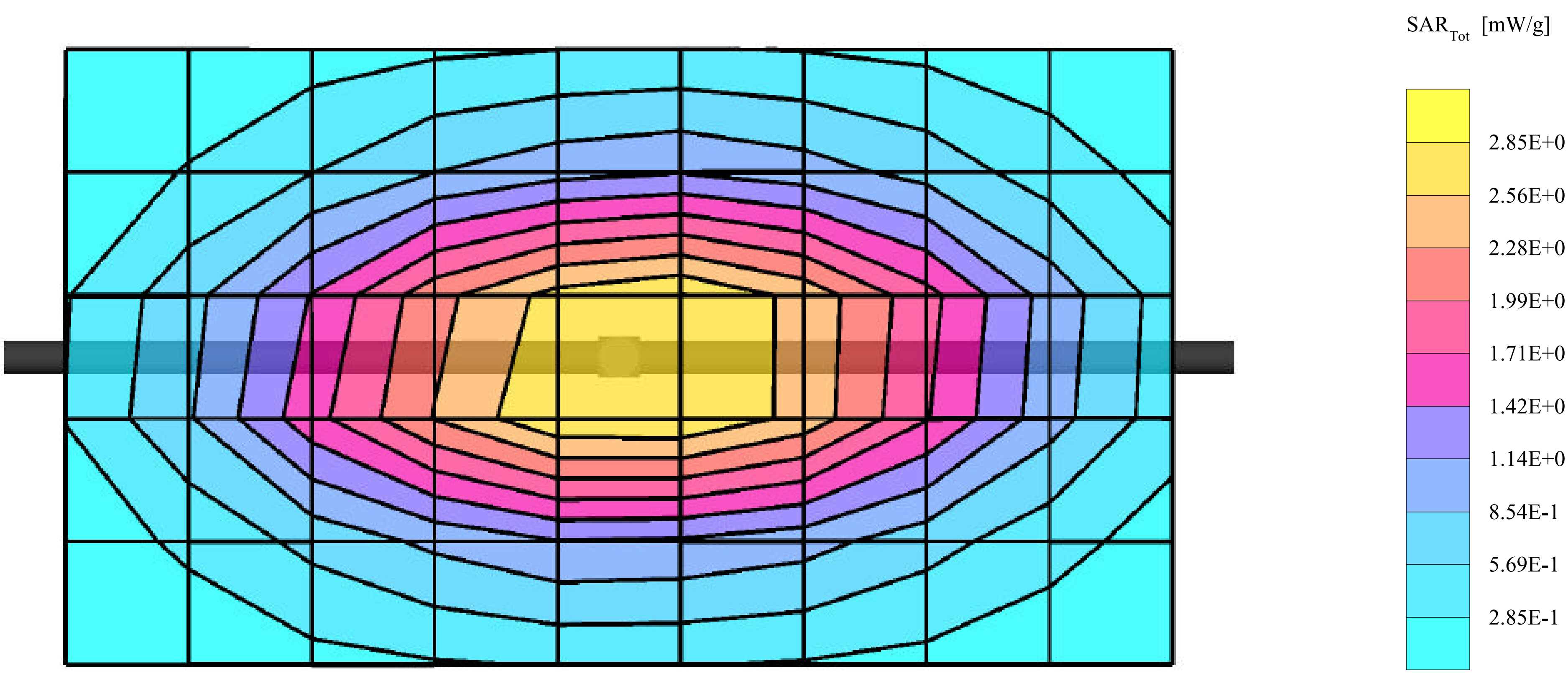




System Performance Check - 900MHz Dipole

SAM Phantom; Flat Section
Probe: ET3DV6 - SN1387; ConvF(6.60,6.60,6.60); Crest factor: 1.0; Brain 900 MHz: $\sigma = 0.95$ mho/m $\epsilon_r = 39.8$ $\rho = 1.00$ g/cm^3
Cube 5x5x7: Peak: 4.14 mW/g, SAR (1g): 2.74 mW/g, SAR (10g): 1.76 mW/g, (Worst-case extrapolation)
Penetration depth: 12.2 (11.9, 12.7) [mm]
Powerdrift: -0.06 dB

Forward Conducted Power: 250mW
Ambient Temp. 24.2°C; Fluid Temp. 22.4°C
Date Tested: June 24, 2003



System Performance Check - 1800MHz Dipole

SAM Phantom; Flat Section

Probe: ET3DV6 - SN1387; ConvF(5.20,5.20,5.20); Crest factor: 1.0; 1800 MHz Brain: $\sigma = 1.37$ mho/m $\varepsilon_r = 39.7$ $\rho = 1.00$ g/cm^3

Cube 5x5x7: Peak: 16.5 mW/g, SAR (1g): 9.50 mW/g, SAR (10g): 5.09 mW/g, (Worst-case extrapolation)

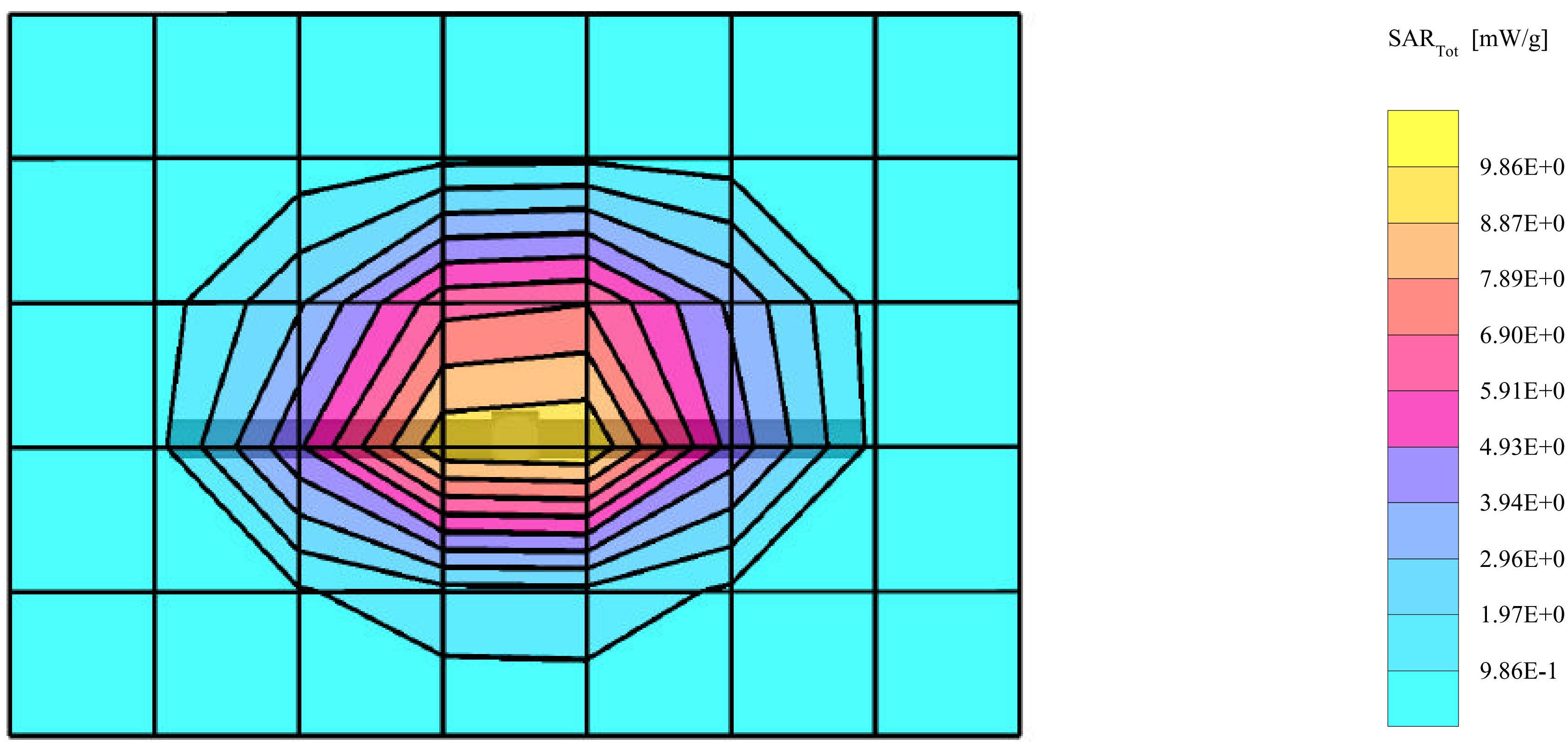
Penetration depth: 9.1 (9.0, 9.4) [mm]

Powerdrift: -0.03 dB

Forward Conducted Power: 250 mW

Ambient Temp. 22.1°C; Fluid Temp. 22.0°C

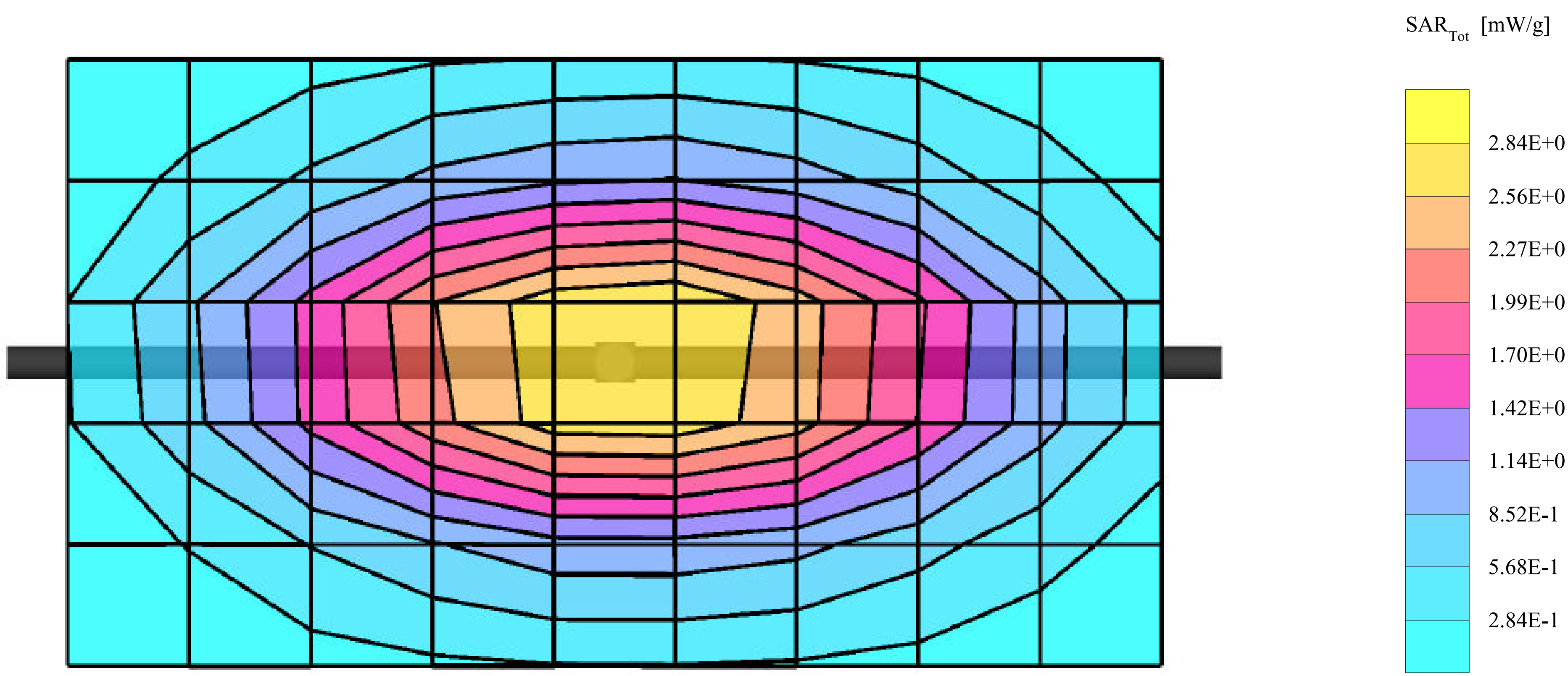
Date Tested: June 25, 2003



System Performance Check - 900MHz Dipole

SAM Phantom; Flat Section
Probe: ET3DV6 - SN1387; ConvF(6.60,6.60,6.60); Crest factor: 1.0; Brain 900 MHz: $\sigma = 0.95$ mho/m $\epsilon_r = 40.0$ $\rho = 1.00$ g/cm³
Cube 5x5x7: Peak: 4.11 mW/g, SAR (1g): 2.69 mW/g, SAR (10g): 1.73 mW/g, (Worst-case extrapolation)
Penetration depth: 12.1 (11.7, 12.7) [mm]
Powerdrift: -0.00 dB

Forward Conducted Power: 250mW
Ambient Temp. 22.4°C; Fluid Temp. 21.8°C
Date Tested: June 25, 2003



APPENDIX C - SYSTEM VALIDATION

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

Client Celltech Labs

CALIBRATION CERTIFICATE

Object(s)	D1800V2 - SN:247
Calibration procedure(s)	QA CAL-05.v2 Calibration procedure for dipole validation kits
Calibration date:	June 4, 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	i.V. F. Bomholt
Approved by:	Katja Pokovic	Laboratory Director	Pokovic Katja

Date issued: June 4, 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

DASY

Dipole Validation Kit

Type: D1800V2

Serial: 247

Manufactured: August 25, 1999
Calibrated: June 4, 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 1800 MHz:

Relative Dielectricity	**39.2**	± 5%
Conductivity	**1.36 mho/m**	± 5%

The DASY4 System with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 5.3 at 1800 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 10mm from dipole center to the solution surface. The included distance spacer 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 250mW ± 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:	**39.6 mW/g** ± 16.8 % (k=2)[1]
averaged over 10 cm^3 (10 g) of tissue:	**20.9 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:	**1.190 ns**	(one direction)
Transmission factor:	**0.998**	(voltage transmission, one direction)

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

Feedpoint impedance at 1800 MHz:	Re{Z} = **48.5 Ω**
	Im {Z} = **-6.5 Ω**
Return Loss at 1800 MHz	**-23.3 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 40W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

Date/Time: 06/04/03 14:55:26

Test Laboratory: SPEAG, Zurich, Switzerland
File Name: SN247_SN1507_HSL1800_040603.da4

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN247
Program: Dipole Calibration

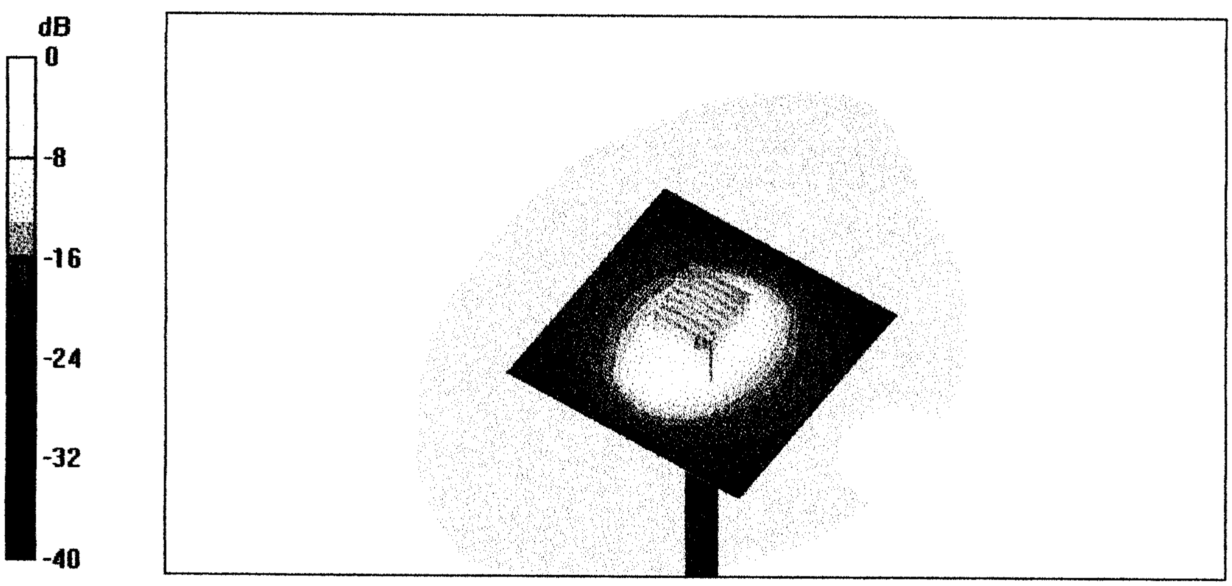
Communication System: CW-1800; Frequency: 1800 MHz;Duty Cycle: 1:1
Medium: HSL 1800 MHz (σ = 1.36 mho/m, ε_r = 39.22, ρ = 1000 kg/m^3)
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

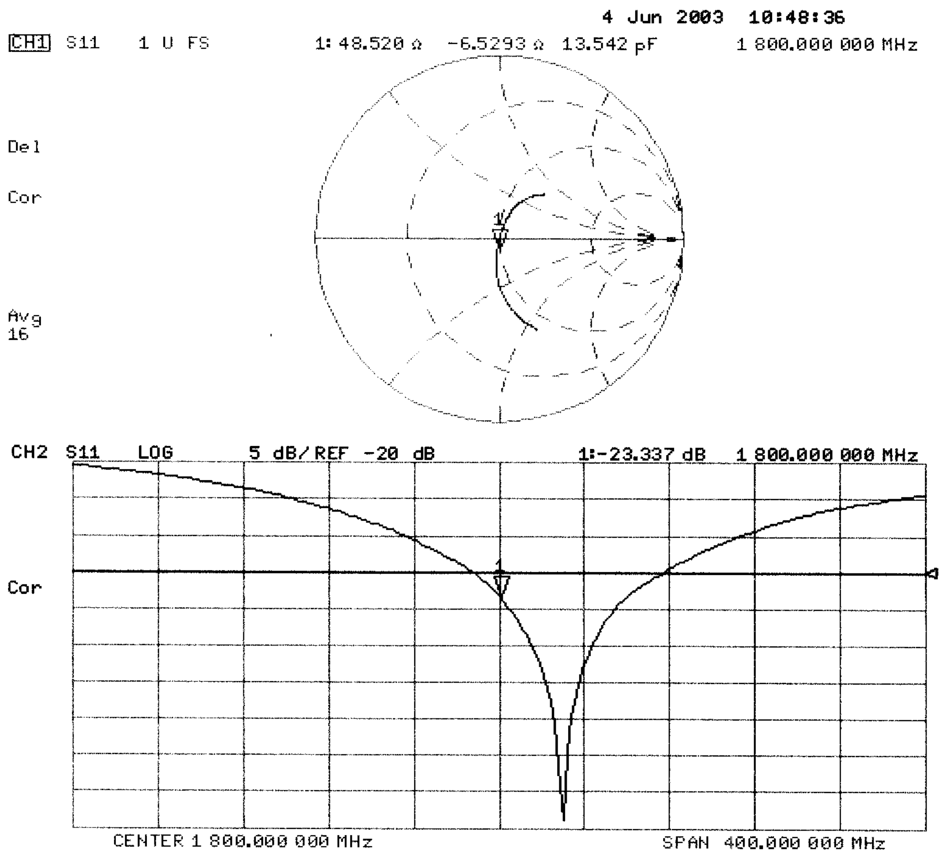
- Probe: ET3DV6 - SN1507; ConvF(5.3, 5.3, 5.3); Calibrated: 1/18/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 - SN411; Calibrated: 1/16/2003
- Phantom: SAM with CRP - TP1006; Type: SAM 4.0; Serial: TP:1006
- *Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115*

Pin = 250 mW; d = 10 mm/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 96 V/m
Power Drift = -0.004 dB
Maximum value of SAR = 11 mW/g

Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 16.9 W/kg
SAR(1 g) = 9.9 mW/g; SAR(10 g) = 5.22 mW/g
Reference Value = 96 V/m
Power Drift = -0.004 dB
Maximum value of SAR = 11.1 mW/g



0 dB = 11.1mW/g


4 Jun 2003 10:48:36
CH1 S11 1 U FS
1: 48.520 Ω -6.5293 Ω 13.542 pF
1 800.000 000 MHz
Del
Cor
Avg
16
CH2 S11 LOG 5 dB/ REF -20 dB
1:-23.337 dB 1 800.000 000 MHz
Cor
CENTER 1 800.000 000 MHz
SPAN 400.000 000 MHz

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

Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 1 245 9700, Fax +41 1 245 9779
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

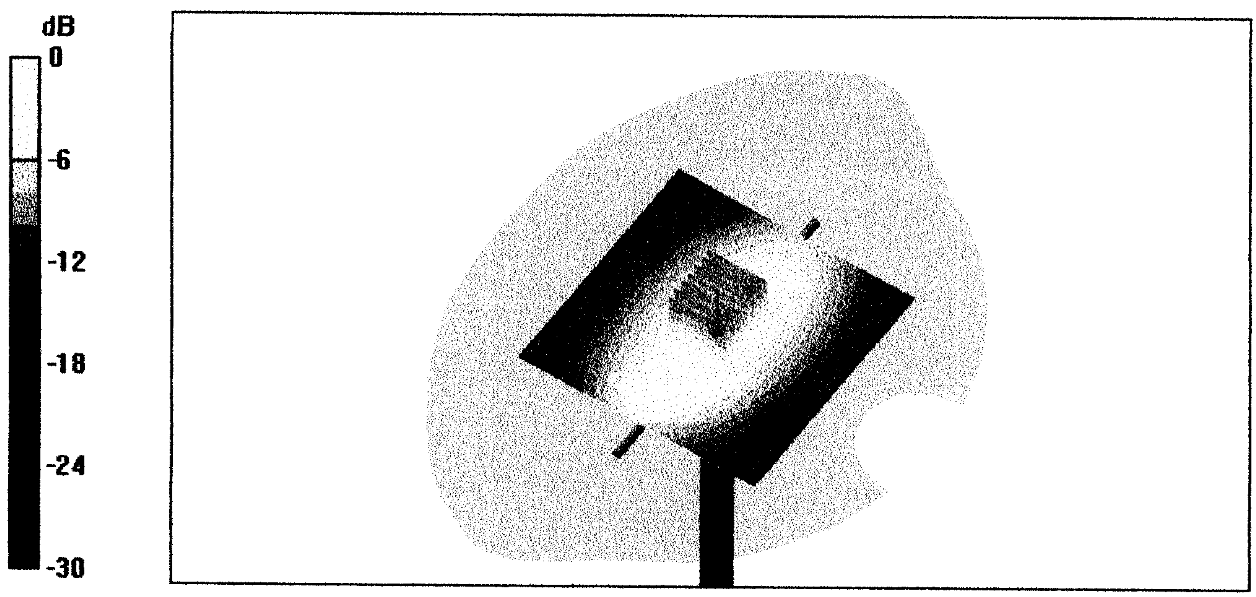
Communication System: CW-900; Frequency: 900 MHz;Duty Cycle: 1:1
Medium: HSL 900 MHz (σ = 0.95 mho/m, ε_r = 42.07, ρ = 1000 kg/m^3)
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

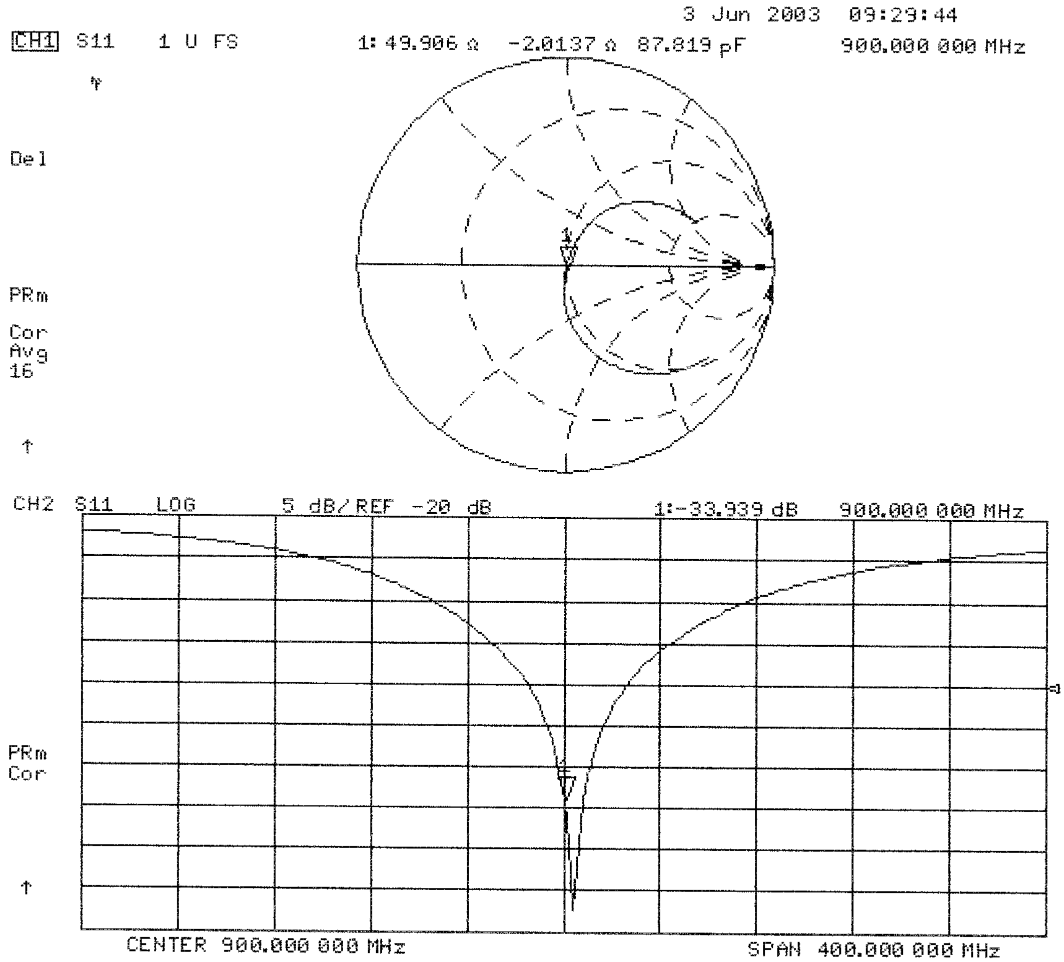
- Probe: ET3DV6 - SN1507; ConvF(6.6, 6.6, 6.6); Calibrated: 1/18/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 - SN411; Calibrated: 1/16/2003
- Phantom: SAM with CRP - TP1006; Type: SAM 4.0; Serial: TP:1006
- Measurement SW: DASY4, V4.1 *Build* 47; *Postprocessing SW:* 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	N. Vetterli
Approved by:	Katja Pokovic	Laboratory Director	[signature]

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

NormX	**1.55**	$\mu V/(V/m)^2$
NormY	**1.65**	$\mu V/(V/m)^2$
NormZ	**1.64**	$\mu V/(V/m)^2$

Diode Compression

DCP X	**92**	mV
DCP Y	**92**	mV
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

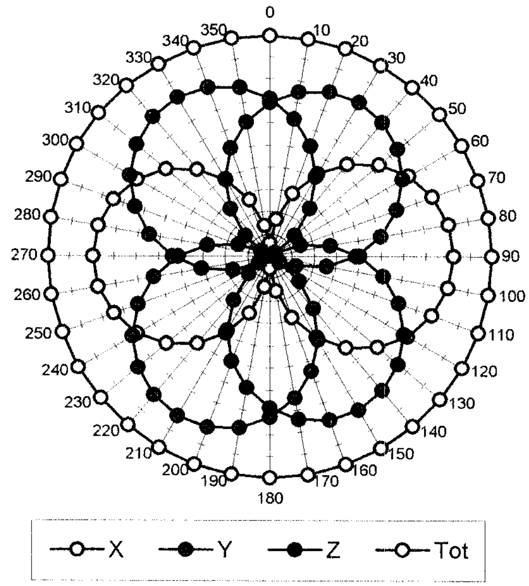
Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	14.6	9.8
SAR_{be} [%]	With Correction Algorithm	0.2	0.0

Sensor Offset

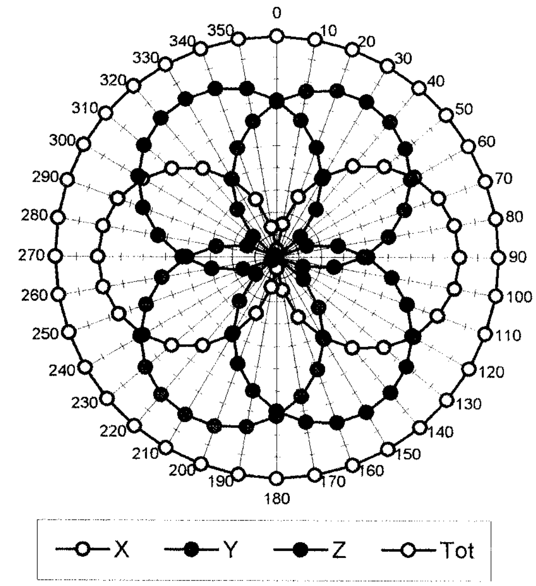
Probe Tip to Sensor Center	**2.7**	mm
Optical Surface Detection	**1.4 ± 0.2**	mm

Receiving Pattern (ϕ), θ = 0°

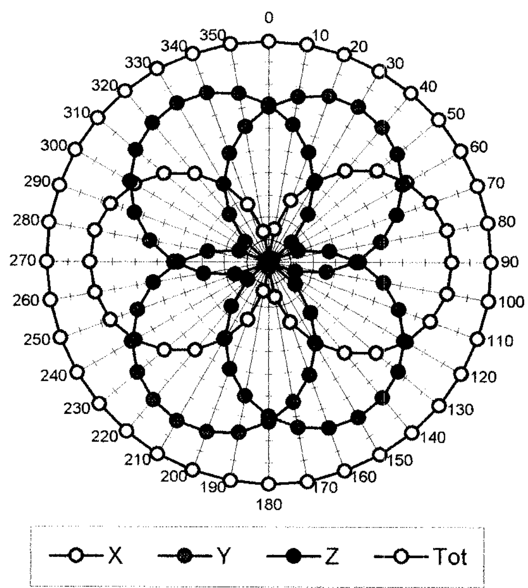
f = 30 MHz, TEM cell ifi110



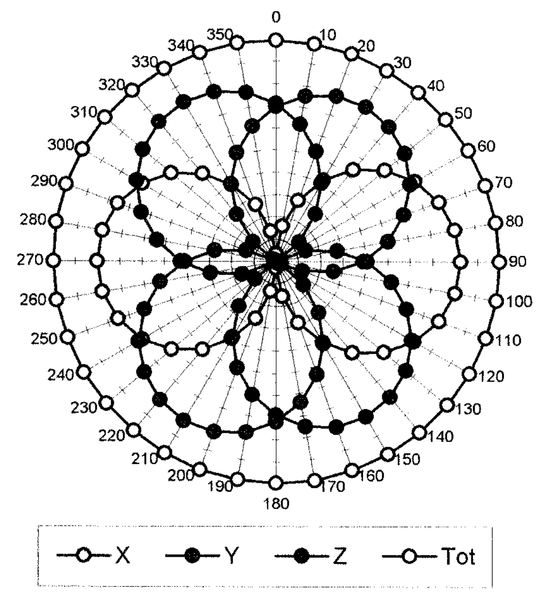
f = 100 MHz, TEM cell ifi110

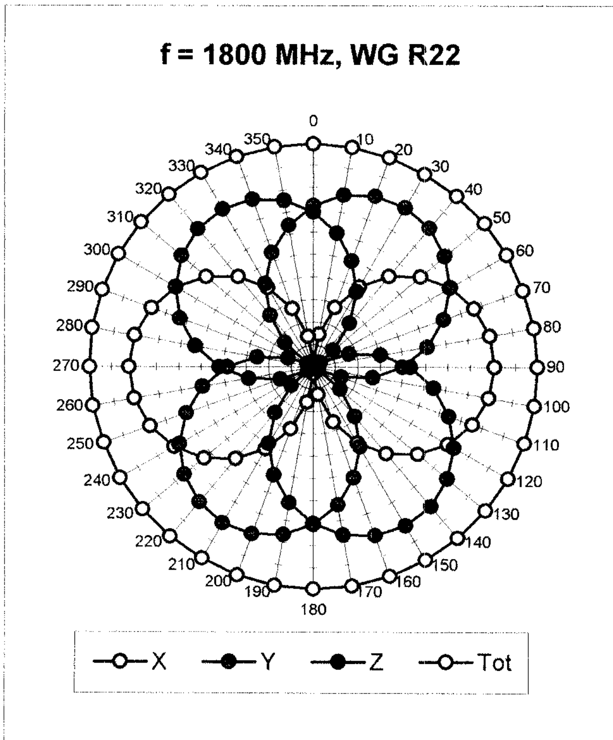


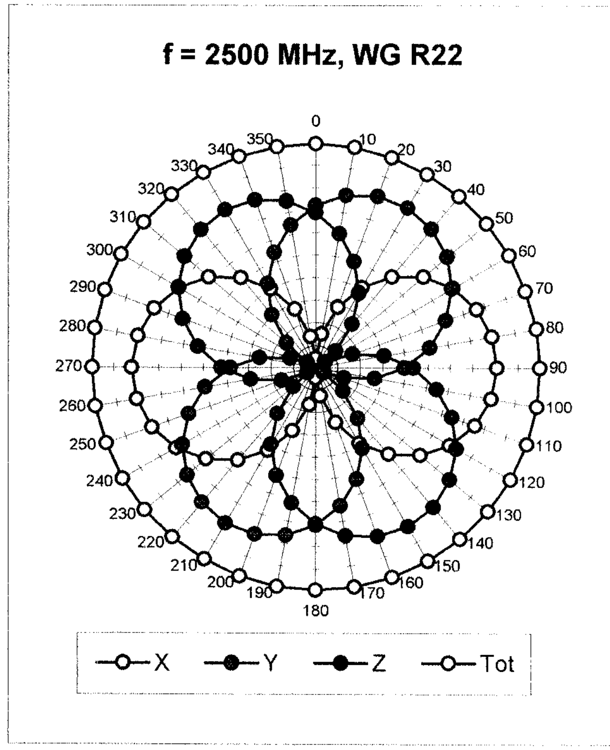
f = 300 MHz, TEM cell ifi110



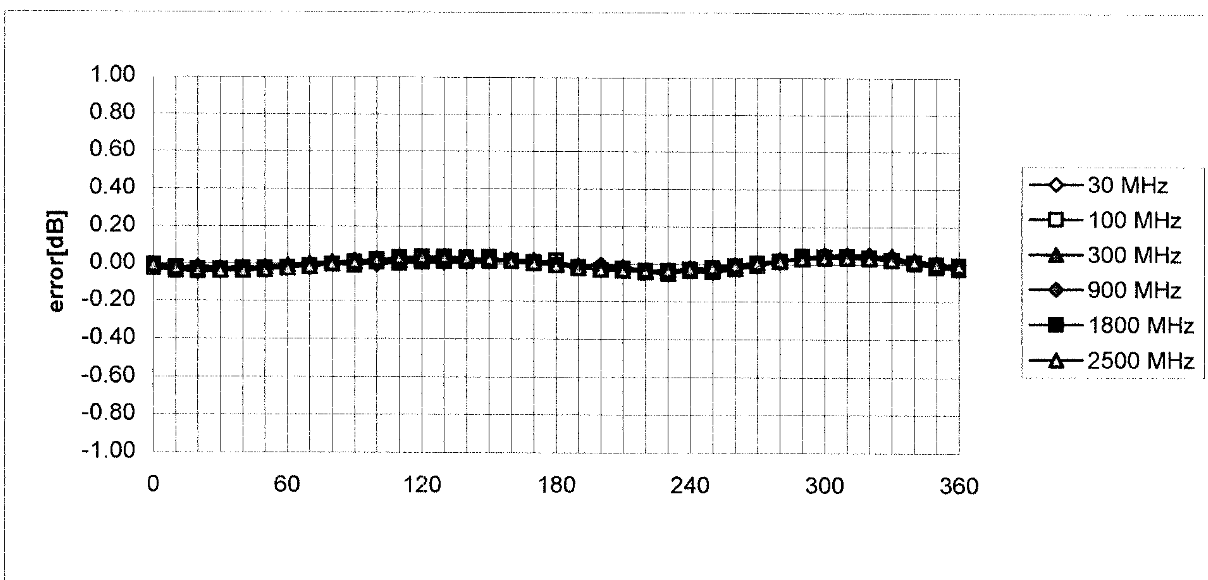
f = 900 MHz, TEM cell ifi110





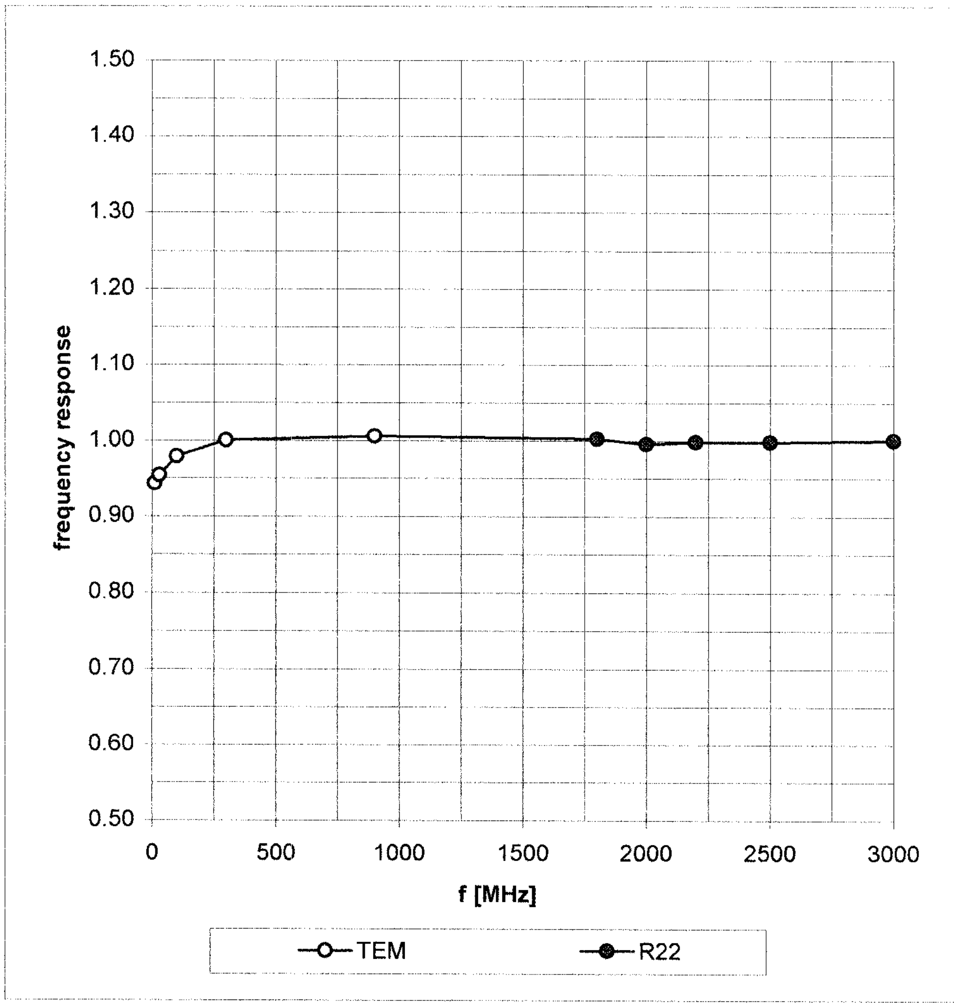


Isotropy Error (ϕ), θ = 0°



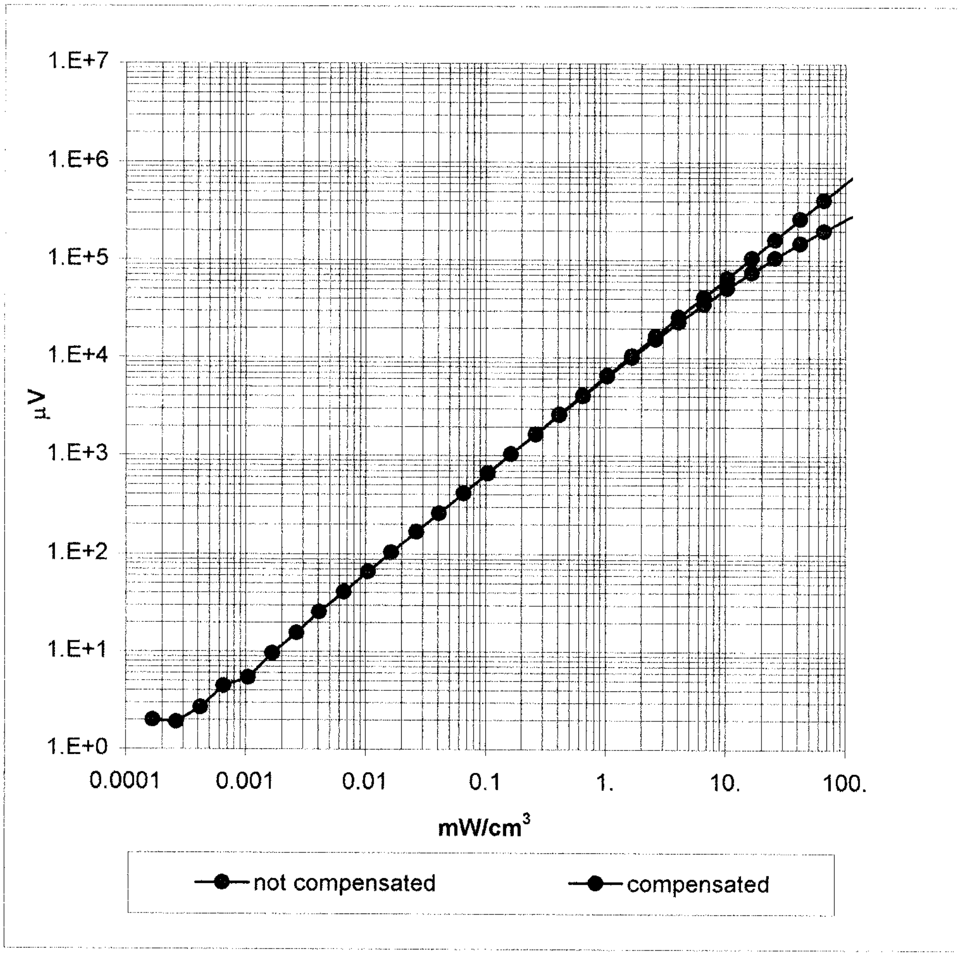
Frequency Response of E-Field

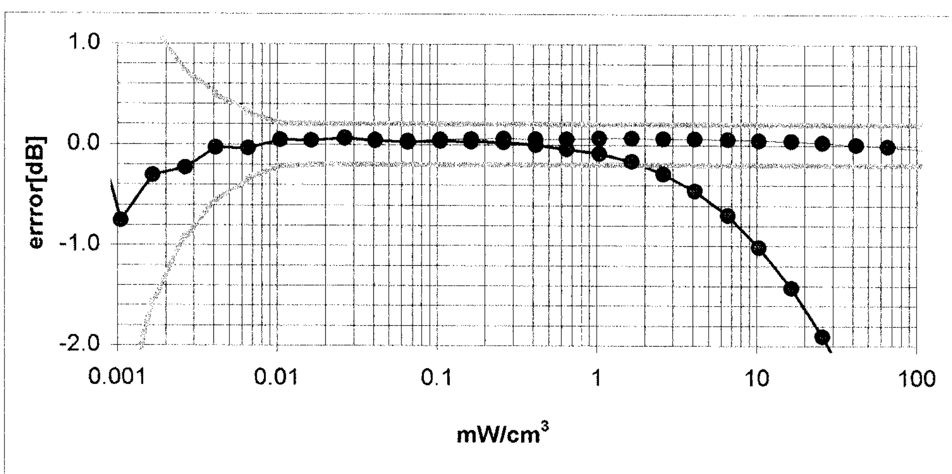
(TEM-Cell:ifi110, Waveguide R22)



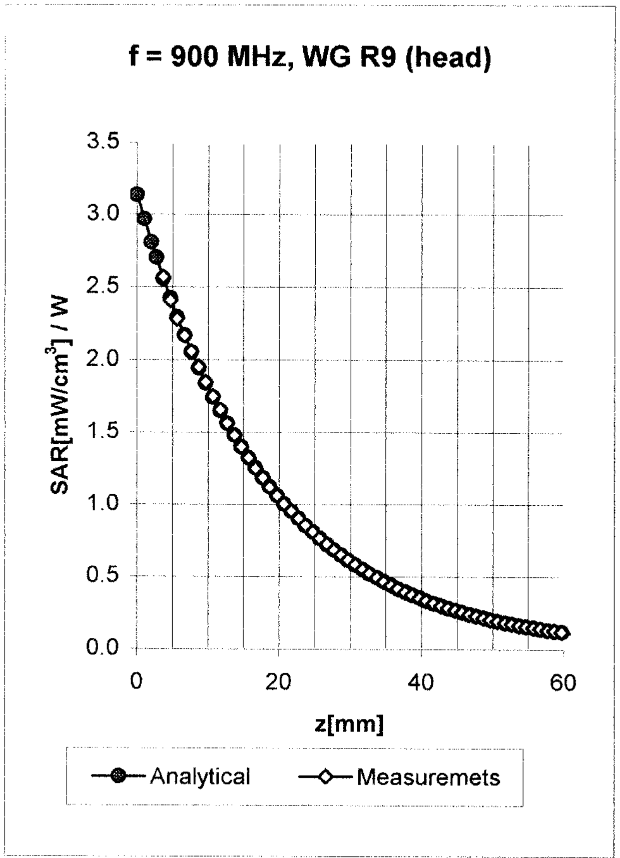
Dynamic Range f(SAR_{brain})

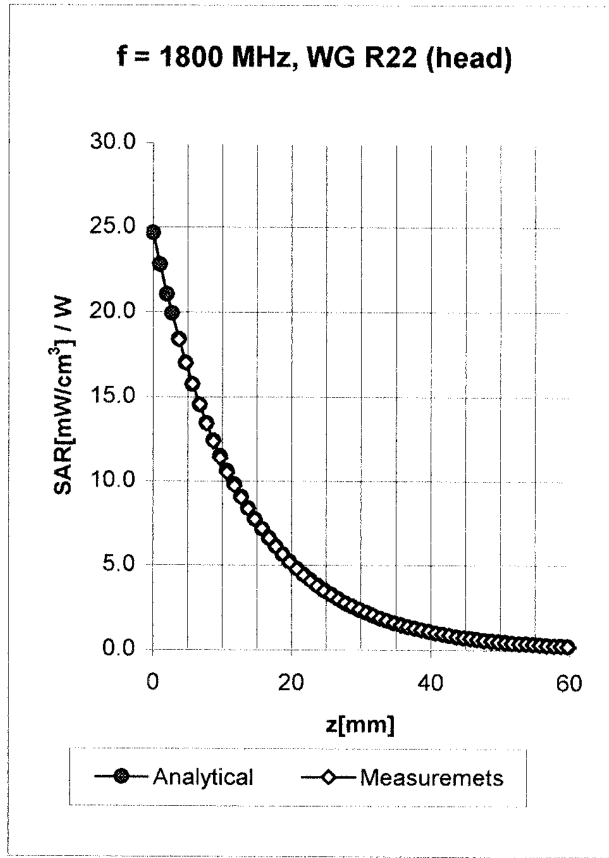
(Waveguide R22)





Conversion Factor Assessment

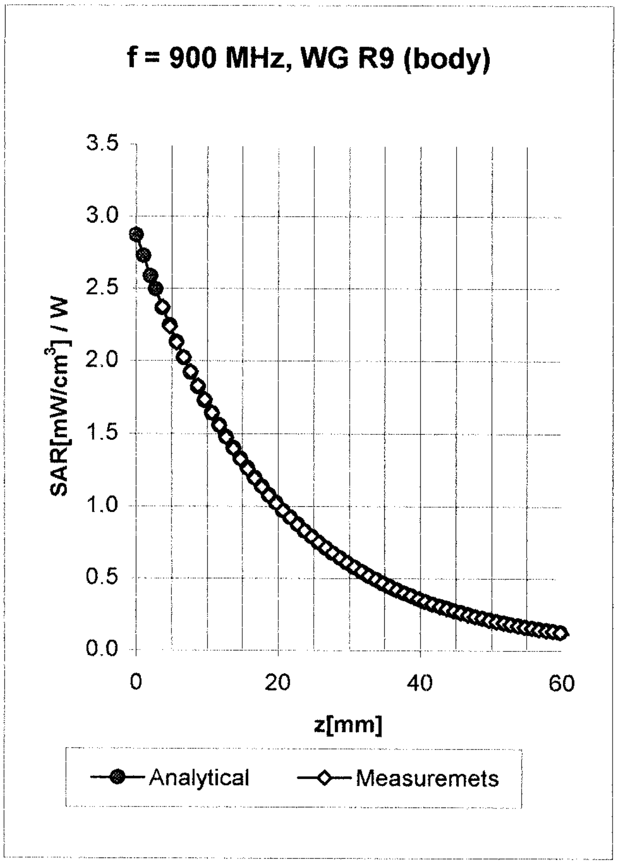


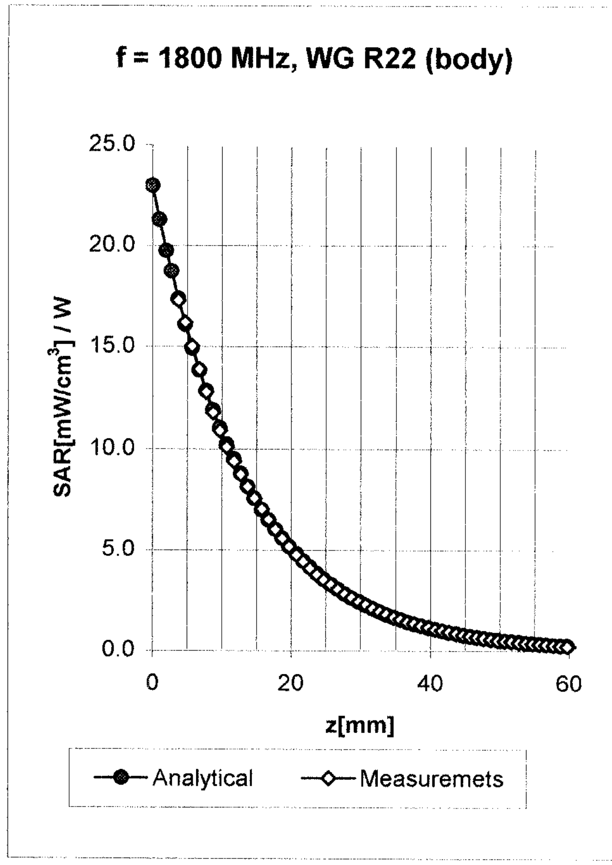


Head	**900 MHz**		ε_r = **41.5 ± 5%**	σ = **0.97 ± 5% mho/m**	
Head	**835 MHz**		ε_r = **41.5 ± 5%**	σ = **0.90 ± 5% mho/m**	
	ConvF X	**6.6**	± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**6.6**	± 9.5% (k=2)	Alpha	**0.37**
	ConvF Z	**6.6**	± 9.5% (k=2)	Depth	**2.61**

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

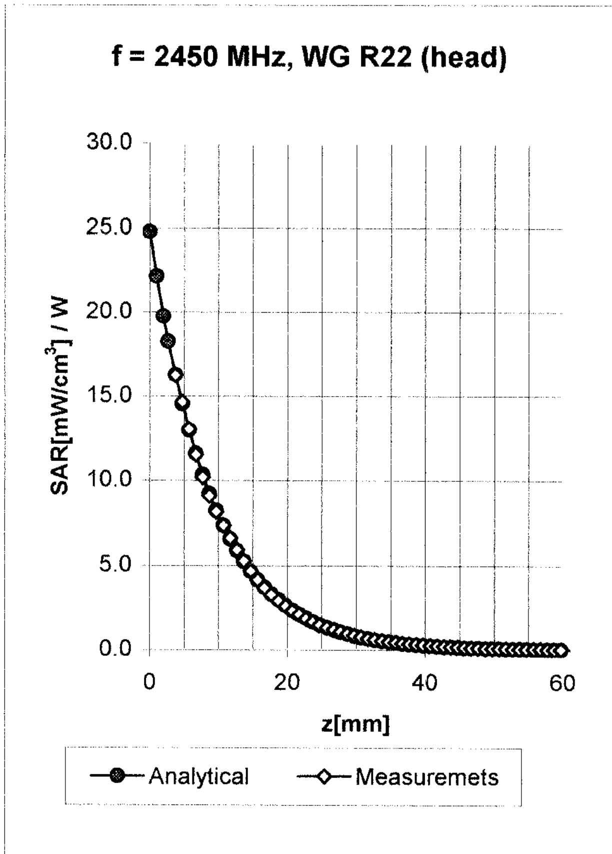


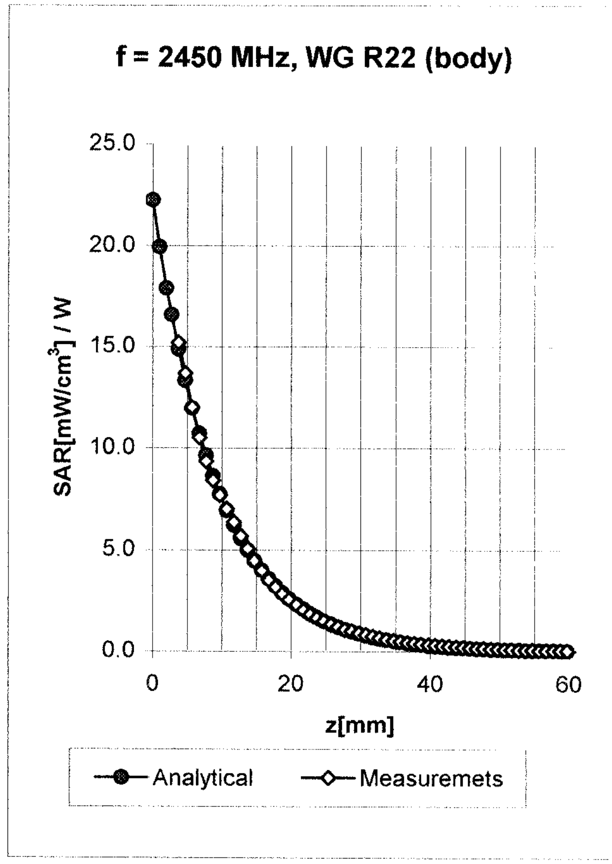


Body	**900 MHz**	ε_r = **55.0 ± 5%**	σ = **1.05 ± 5% mho/m**	
Body	**835 MHz**	ε_r = **55.2 ± 5%**	σ = **0.97 ± 5% mho/m**	
ConvF X	**6.4** ± 9.5% (k=2)		Boundary effect:	
ConvF Y	**6.4** ± 9.5% (k=2)		Alpha	**0.45**
ConvF Z	**6.4** ± 9.5% (k=2)		Depth	**2.35**

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

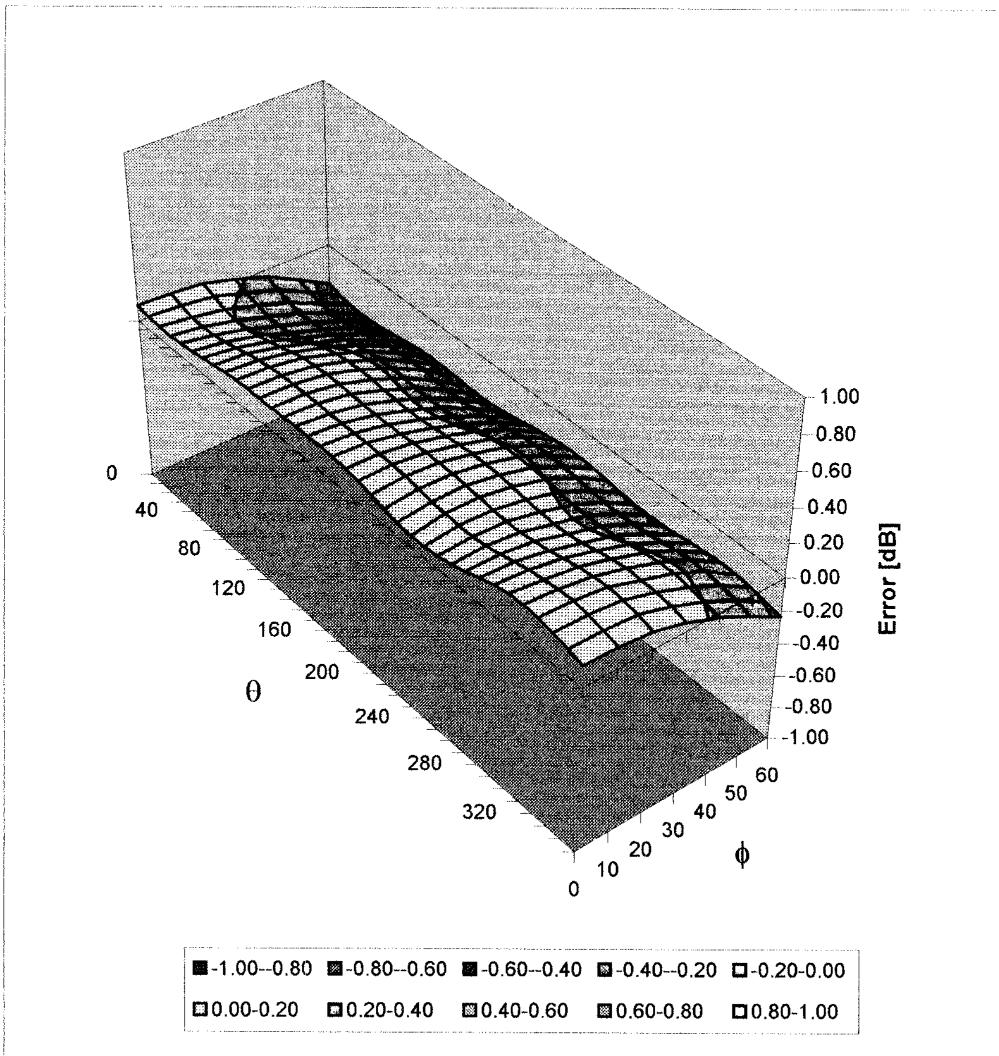




Head	**2450**	**MHz**		ε_r = **39.2 ± 5%**	σ = **1.80 ± 5% mho/m**	
	ConvF X	**5.0**	± 8.9% (k=2)		Boundary effect:	
	ConvF Y	**5.0**	± 8.9% (k=2)		Alpha	**1.04**
	ConvF Z	**5.0**	± 8.9% (k=2)		Depth	**1.85**
Body	**2450**	**MHz**		ε_r = **52.7 ± 5%**	σ = **1.95 ± 5% mho/m**	
	ConvF X	**4.6**	± 8.9% (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



Schmid & Partner
Engineering AG

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

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

1800MHz System Performance Check

Measured Fluid Dielectrc Parameters (Brain)

June 23, 2003

Frequency	e'	e''
1.700000000 GHz	40.1651	13.5151
1.710000000 GHz	40.1516	13.5336
1.720000000 GHz	40.1184	13.5540
1.730000000 GHz	40.0754	13.5927
1.740000000 GHz	40.0274	13.6467
1.750000000 GHz	39.9989	13.6891
1.760000000 GHz	39.9440	13.7471
1.770000000 GHz	39.9249	13.7899
1.780000000 GHz	39.8819	13.8315
1.790000000 GHz	39.8408	13.8689
1.800000000 GHz	39.7909	13.8994
1.810000000 GHz	39.7359	13.9393
1.820000000 GHz	39.6698	13.9587
1.830000000 GHz	39.6209	13.9891
1.840000000 GHz	39.5785	14.0279
1.850000000 GHz	39.5414	14.0483
1.860000000 GHz	39.4969	14.0795
1.870000000 GHz	39.4440	14.0950
1.880000000 GHz	39.4065	14.1282
1.890000000 GHz	39.3521	14.1660
1.900000000 GHz	39.3097	14.1875
1.910000000 GHz	39.2470	14.2221
1.920000000 GHz	39.2002	14.2468
1.930000000 GHz	39.1624	14.2838
1.940000000 GHz	39.1225	14.3015
1.950000000 GHz	39.0807	14.3147
1.960000000 GHz	39.0276	14.3178
1.970000000 GHz	38.9745	14.3329
1.980000000 GHz	38.9230	14.3533
1.990000000 GHz	38.8703	14.3923
2.000000000 GHz	38.8152	14.4126
2.010000000 GHz	38.7759	14.4637
2.020000000 GHz	38.7437	14.4577
2.030000000 GHz	38.7129	14.4743
2.040000000 GHz	38.6755	14.4839
2.050000000 GHz	38.6335	14.4852
2.060000000 GHz	38.5770	14.5023
2.070000000 GHz	38.5267	14.5098
2.080000000 GHz	38.4918	14.5217
2.090000000 GHz	38.4373	14.5328
2.100000000 GHz	38.4063	14.5769

1900MHz EUT Evaluation (Head)

Measured Fluid Dielectric Parameters (Brain)

June 23, 2003

Frequency	e'	e''
1.700000000 GHz	38.8627	12.9327
1.710000000 GHz	38.8384	12.9528
1.720000000 GHz	38.8033	12.9788
1.730000000 GHz	38.7566	13.0144
1.740000000 GHz	38.7149	13.0564
1.750000000 GHz	38.6807	13.1091
1.760000000 GHz	38.6463	13.1377
1.770000000 GHz	38.5973	13.1806
1.780000000 GHz	38.5584	13.2178
1.790000000 GHz	38.5134	13.2524
1.800000000 GHz	38.4690	13.2807
1.810000000 GHz	38.4110	13.3142
1.820000000 GHz	38.3485	13.3325
1.830000000 GHz	38.2970	13.3774
1.840000000 GHz	38.2623	13.4183
1.850000000 GHz	38.2361	13.4363
1.860000000 GHz	38.1920	13.4622
1.870000000 GHz	38.1578	13.4733
1.880000000 GHz	38.1168	13.5005
1.890000000 GHz	38.0694	13.5199
1.900000000 GHz	38.0186	13.5416
1.910000000 GHz	37.9697	13.5740
1.920000000 GHz	37.9189	13.6106
1.930000000 GHz	37.8862	13.6275
1.940000000 GHz	37.8477	13.6568
1.950000000 GHz	37.8109	13.6823
1.960000000 GHz	37.7728	13.6855
1.970000000 GHz	37.7208	13.7064
1.980000000 GHz	37.6750	13.7352
1.990000000 GHz	37.6363	13.7825
2.000000000 GHz	37.5781	13.8108
2.010000000 GHz	37.5446	13.8579
2.020000000 GHz	37.5070	13.8791
2.030000000 GHz	37.4770	13.8927
2.040000000 GHz	37.4357	13.9224
2.050000000 GHz	37.3843	13.9219
2.060000000 GHz	37.3262	13.9402
2.070000000 GHz	37.2756	13.9681
2.080000000 GHz	37.2246	13.9852
2.090000000 GHz	37.1782	14.0165
2.100000000 GHz	37.1438	14.0513

900MHz System Performance Check

Measured Fluid Dielectric Parameters (Brain)

June 24, 2003

Frequency	e'	e''
800.000000 MHz	40.9665	19.3965
810.000000 MHz	40.8457	19.3543
820.000000 MHz	40.7255	19.3400
830.000000 MHz	40.5817	19.3014
840.000000 MHz	40.4753	19.2698
850.000000 MHz	40.3069	19.2254
860.000000 MHz	40.2218	19.1701
870.000000 MHz	40.0535	19.1699
880.000000 MHz	39.9524	19.1418
890.000000 MHz	39.8453	19.1164
900.000000 MHz	39.7902	19.0376
910.000000 MHz	39.6767	18.9870
920.000000 MHz	39.5546	18.9792
930.000000 MHz	39.4520	18.9281
940.000000 MHz	39.3340	18.9116
950.000000 MHz	39.2245	18.9124
960.000000 MHz	39.1039	18.8657
970.000000 MHz	38.9968	18.8536
980.000000 MHz	38.8746	18.8422
990.000000 MHz	38.7877	18.8164
1.000000000 GHz	38.7093	18.7661

835MHz EUT Evaluation (Head)

Measured Fluid Dielectric Parameters (Brain)

June 24, 2003

Frequency	e'	e''
735.000000 MHz	42.7978	20.0434
745.000000 MHz	42.6396	20.0024
755.000000 MHz	42.5107	19.9213
765.000000 MHz	42.3704	19.8682
775.000000 MHz	42.2432	19.8473
785.000000 MHz	42.1355	19.7999
795.000000 MHz	42.0196	19.7892
805.000000 MHz	41.9096	19.7450
815.000000 MHz	41.8053	19.7276
825.000000 MHz	41.6669	19.6885
835.000000 MHz	41.5640	19.6673
845.000000 MHz	41.4027	19.6114
855.000000 MHz	41.2829	19.5768
865.000000 MHz	41.1478	19.5479
875.000000 MHz	41.0289	19.5258
885.000000 MHz	40.9202	19.4918
895.000000 MHz	40.8526	19.4170
905.000000 MHz	40.7683	19.3783
915.000000 MHz	40.6302	19.2980
925.000000 MHz	40.5225	19.3078
935.000000 MHz	40.4241	19.2575

1800MHz System Performance Check

Measured Fluid Dielectric Parameters (Brain)

June 25, 2003

Frequency	e'	e''
1.700000000 GHz	40.1142	13.3938
1.710000000 GHz	40.0700	13.4087
1.720000000 GHz	40.0334	13.4131
1.730000000 GHz	39.9827	13.4446
1.740000000 GHz	39.9326	13.4850
1.750000000 GHz	39.9106	13.5183
1.760000000 GHz	39.8731	13.5544
1.770000000 GHz	39.8408	13.5812
1.780000000 GHz	39.7886	13.6138
1.790000000 GHz	39.7550	13.6292
1.800000000 GHz	39.7000	13.6577
1.810000000 GHz	39.6502	13.6924
1.820000000 GHz	39.5702	13.7151
1.830000000 GHz	39.5372	13.7429
1.840000000 GHz	39.4909	13.7669
1.850000000 GHz	39.4657	13.7839
1.860000000 GHz	39.4195	13.7991
1.870000000 GHz	39.3825	13.8176
1.880000000 GHz	39.3397	13.8489
1.890000000 GHz	39.3158	13.8655
1.900000000 GHz	39.2651	13.8663

1900MHz EUT Evaluation (Body)

Measured Fluid Dielectric Parameters (Muscle)

June 25, 2003

Frequency	e'	e''
1.800000000 GHz	52.1530	14.6024
1.810000000 GHz	52.1252	14.6350
1.820000000 GHz	52.0703	14.6800
1.830000000 GHz	52.0165	14.7279
1.840000000 GHz	51.9884	14.7615
1.850000000 GHz	51.9471	14.7815
1.860000000 GHz	51.8924	14.8171
1.870000000 GHz	51.8780	14.8431
1.880000000 GHz	51.8206	14.8712
1.890000000 GHz	51.7975	14.9197
1.900000000 GHz	51.7460	14.9541
1.910000000 GHz	51.6959	14.9878
1.920000000 GHz	51.6811	15.0189
1.930000000 GHz	51.6363	15.0702
1.940000000 GHz	51.6166	15.0956
1.950000000 GHz	51.5682	15.1151
1.960000000 GHz	51.5227	15.1396
1.970000000 GHz	51.4806	15.1544
1.980000000 GHz	51.4292	15.1997
1.990000000 GHz	51.3822	15.2592
2.000000000 GHz	51.3451	15.2851

900MHz System Performance Check

Measured Fluid Dielectric Parameters (Brain)

June 25, 2003

Frequency	e'	e''
800.000000 MHz	41.1601	19.3887
810.000000 MHz	41.0552	19.3736
820.000000 MHz	40.9560	19.3257
830.000000 MHz	40.8092	19.3238
840.000000 MHz	40.6731	19.2677
850.000000 MHz	40.5282	19.2779
860.000000 MHz	40.4113	19.1888
870.000000 MHz	40.2774	19.2084
880.000000 MHz	40.1662	19.1515
890.000000 MHz	40.0294	19.1334
900.000000 MHz	39.9986	19.0415
910.000000 MHz	39.8876	18.9891
920.000000 MHz	39.7640	18.9662
930.000000 MHz	39.6683	18.9121
940.000000 MHz	39.5307	18.9006
950.000000 MHz	39.4428	18.8846
960.000000 MHz	39.3194	18.8660
970.000000 MHz	39.2019	18.8560
980.000000 MHz	39.1252	18.8482
990.000000 MHz	39.0292	18.8285
1.000000000 GHz	38.9420	18.7706

835MHz EUT Evaluation (Body)

Measured Fluid Dielectric Parameters (Muscle)

June 25, 2003

Frequency	e'	e''
735.000000 MHz	55.6786	21.8837
745.000000 MHz	55.5734	21.7833
755.000000 MHz	55.4802	21.7408
765.000000 MHz	55.3700	21.6694
775.000000 MHz	55.2820	21.6154
785.000000 MHz	55.1740	21.5578
795.000000 MHz	55.0944	21.5029
805.000000 MHz	55.0420	21.4335
815.000000 MHz	54.9615	21.3864
825.000000 MHz	54.8628	21.3244
835.000000 MHz	54.7607	21.2871
845.000000 MHz	54.6260	21.2685
855.000000 MHz	54.5270	21.2158
865.000000 MHz	54.3871	21.1583
875.000000 MHz	54.2991	21.1682
885.000000 MHz	54.2227	21.1418
895.000000 MHz	54.1701	21.0329
905.000000 MHz	54.0704	20.9703
915.000000 MHz	54.0037	20.9424
925.000000 MHz	53.9319	20.8811
935.000000 MHz	53.7958	20.8420

APPENDIX F - SAM PHANTOM CERTIFICATE OF CONFORMITY

Schmid & Partner Engineering AG

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

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

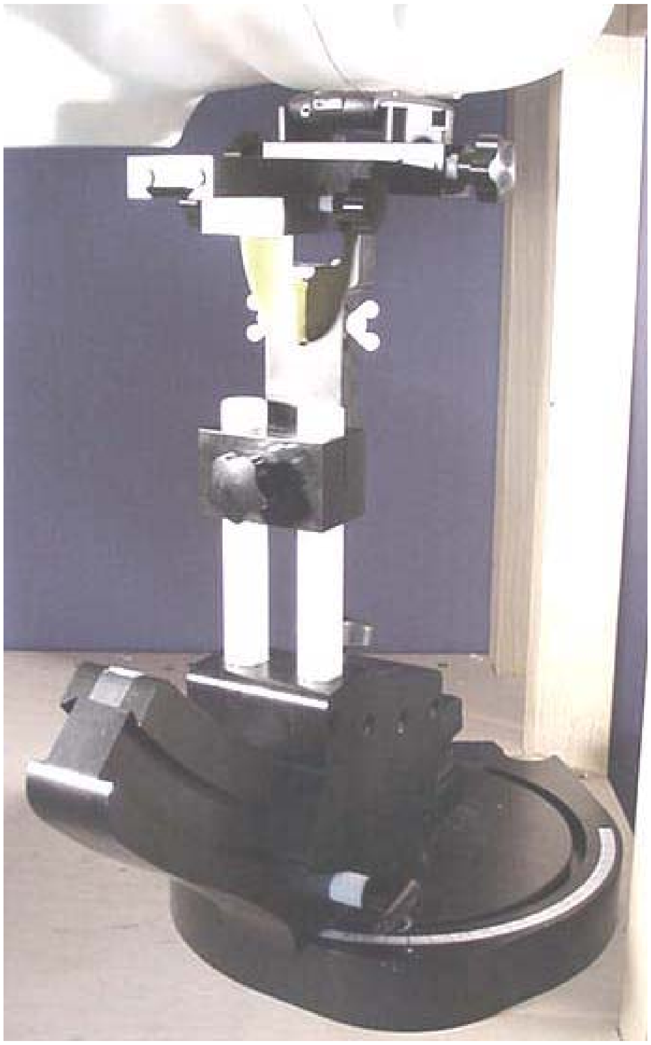
Signature / Stamp

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 PHOTOGRAPHS

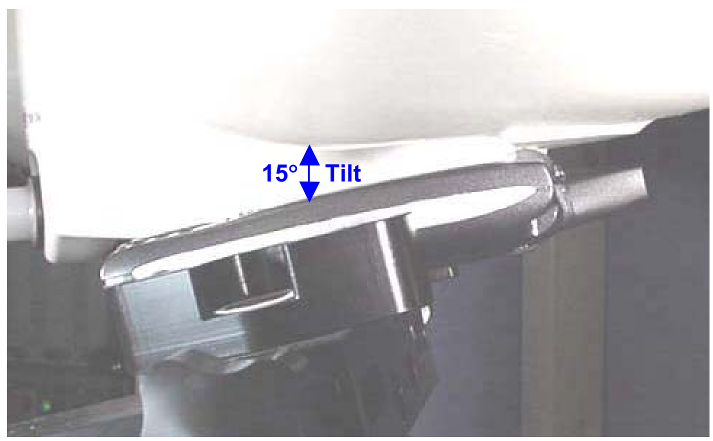
SAR TEST SETUP PHOTOGRAPHS

Left Head Section / Cheek-Touch Position



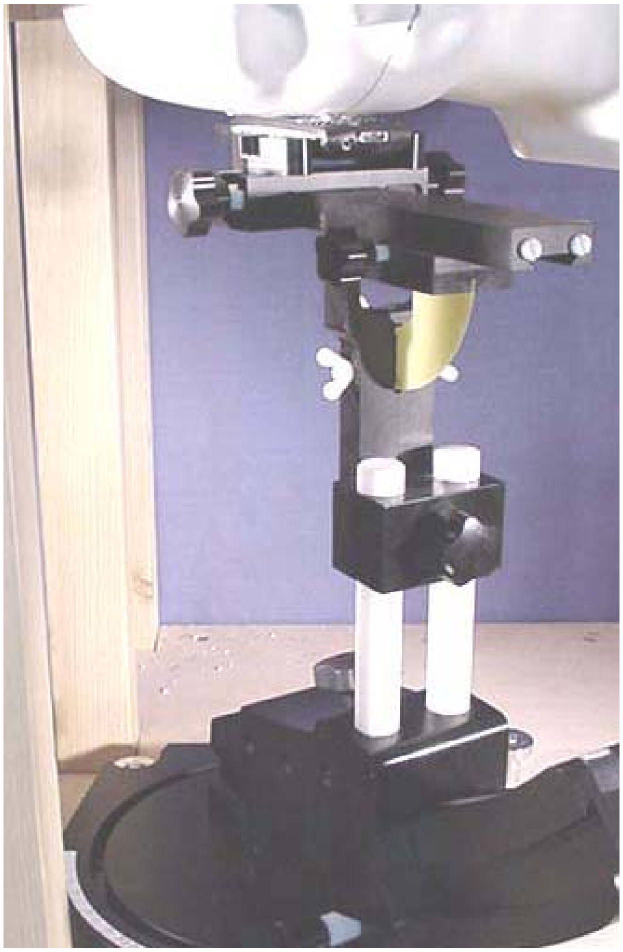
SAR TEST SETUP PHOTOGRAPHS

Left Head Section / Ear-Tilt Position (15°)



SAR TEST SETUP PHOTOGRAPHS

Right Head Section / Cheek-Touch Position



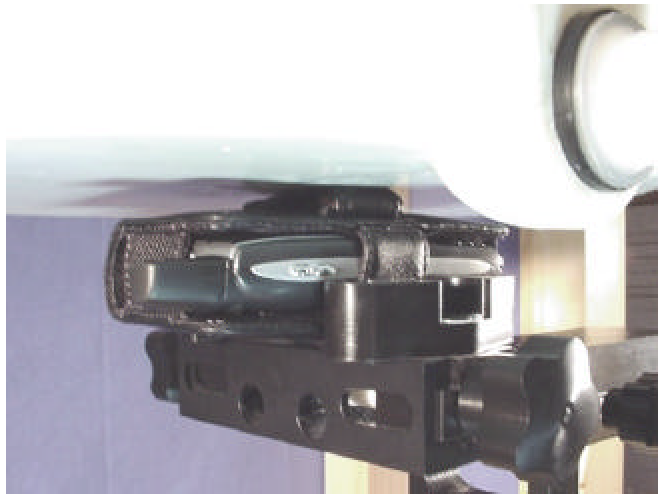
SAR TEST SETUP PHOTOGRAPHS

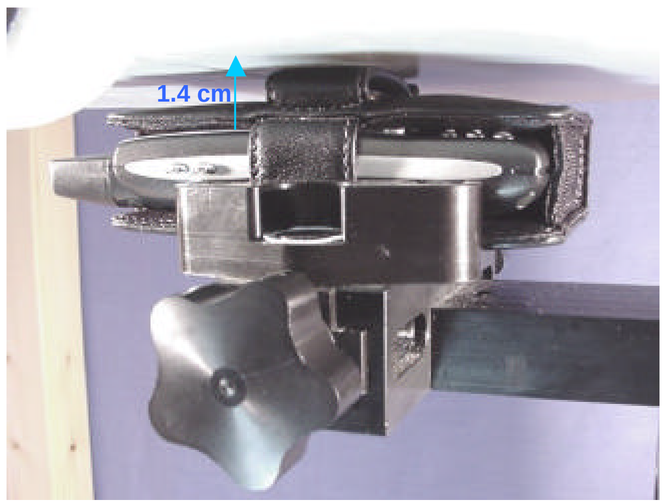
Right Head Section / Ear-Tilt Position (15°)

SAR TEST SETUP PHOTOGRAPHS

Body-Worn with Leather Side Case & Belt-Clip Accessory

(1.4 cm Leather Side Case / Belt-Clip Separation Distance from Front Keypad Side of EUT to Planar Phantom)

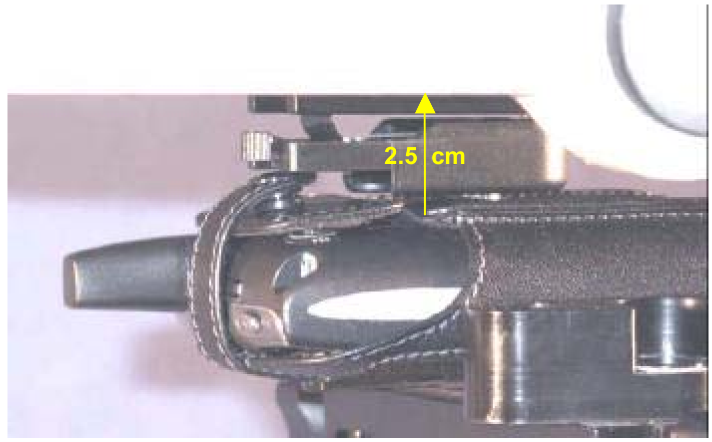


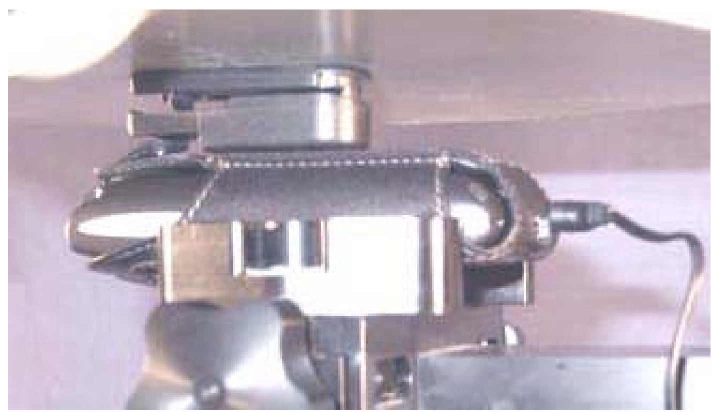


SAR TEST SETUP PHOTOGRAPHS

Body-Worn with Fitted Leather Case, Belt-Clip, & Ear-Microphone Accessories

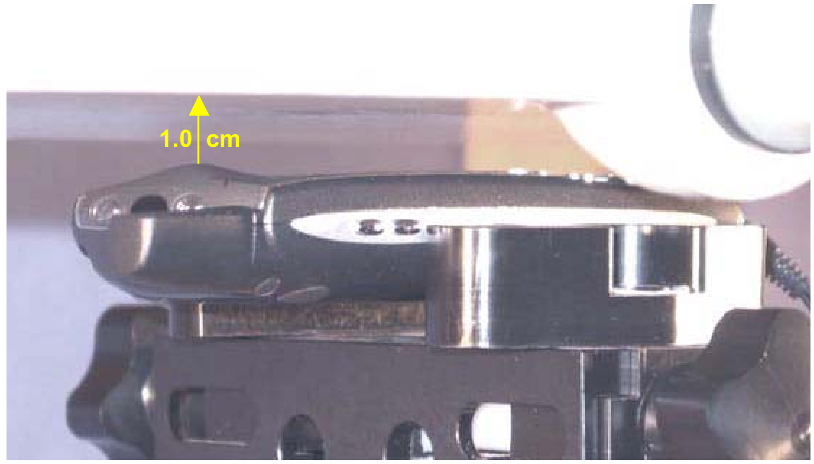
(2.5 cm Leather Case / Belt-Clip Separation Distance from Back of EUT to Planar Phantom)

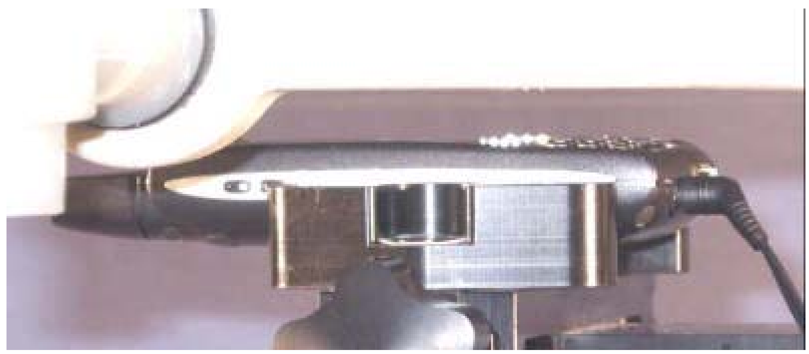




SAR TEST SETUP PHOTOGRAPHS

Body-Worn with 1.0 cm Air Spacing from Front Keypad Side of EUT to Planar Phantom





SAR TEST SETUP PHOTOGRAPHS

Body-Worn with 1.0 cm Air Spacing from Back Side of EUT to Planar Phantom