DECLARATION OF COMPLIANCE
SAR RF EXPOSURE EVALUATION

Test Lab

CELLTECH LABS INC.
Testing and Engineering Services
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

HOP-ON WIRELESS, INC.
12966 Euclid Street
Garden Grove, CA 92840

FCC Rule Part(s):	**47 CFR §2.1093**
FCC Classification:	**PCS Licensed Transmitter held to ear (PCE)**
Test Procedure(s):	**FCC OET Bulletin 65, Supplement C (01-01)** **IEEE Standard 1528-200X (Draft)**
FCC ID:	**QHOHPN1900**
Model(s):	**HPN1900**
Device Type:	**Dual-Band Tri-Mode PCS/Cellular Phone**
Mode(s) of Operation:	**AMPS / Cellular CDMA / PCS CDMA**
Tx Frequency Range(s):	**824.04 - 848.97 MHz (AMPS)** **824.70 - 848.31 MHz (Cellular CDMA)** **1851.25 - 1908.75 MHz (PCS CDMA)**
Max. RF Conducted Power Tested:	**25.0 dBm (AMPS)** **24.2 dBm (Cellular CDMA)** **22.1 dBm (PCS CDMA)**
Antenna Type:	**Internal**
Battery Type:	**3.7 V Lithium-ion (700 mAh)**
Body-Worn Accessories Tested:	**Belt-Clip, Earpiece/Boom-Microphone**
Max. SAR Measured:	**AMPS: 0.608 W/kg (Head) / 0.148 W/kg (Body)** **Cellular CDMA: 0.634 W/kg (Head) / 0.158 W/kg (Body)** **PCS CDMA: 1.38 W/kg (Head) / 0.126 W/kg (Body)**

Celltech Labs Inc. declares under its sole responsibility that this wireless portable device has demonstrated 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.

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1.0 INTRODUCTION

This measurement report shows that the HOP-ON WIRELESS INC. Model: HPN1900 Dual-Band Tri-Mode PCS/Cellular Phone FCC ID: QHOHPN1900 complies with the SAR (Specific Absorption Rate) RF exposure requirements specified in 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 DEVICE UNDER TEST (DUT)

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 Device Classification	PCS Licensed Transmitter held to ear (PCE)	
DUT Type	Dual-Band Tri-Mode PCS/Cellular Phone	
FCC ID	QHOHPN1900	
Model(s)	HPN1900	
Serial No.	Identical Prototype	
Tx Freq. Range(s)	AMPS	824.04 - 848.97 MHz
	Cellular CDMA	824.70 - 848.31 MHz
	PCS CDMA	1851.25 - 1908.75 MHz
Max. RF Conducted Power Tested	AMPS	25.0 dBm
	Cellular CDMA	24.2 dBm
	PCS CDMA	22.1 dBm
Battery Type(s)	3.7 V Lithium-ion (700 mAh)	
Antenna Type	Internal	
Body-Worn Accessories Tested	Belt-Clip, Earpiece/Boom-Microphone	

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 Measurement System with SAM Phantom

DASY4 Measurement System with SAM Phantom

4.0 MEASUREMENT SUMMARY

HEAD SAR MEASUREMENT RESULTS - AMPS Mode									
Freq. (MHz)	Channel	Test Mode	Battery Type	Conducted Power (dBm)		Antenna Position	Phantom Section	Test Position	Measured SAR 1g (W/kg)
				Before	After				
836.49	383	AMPS	Lithium-ion	25.0	24.8	Internal	Left Ear	Cheek/Touch	0.592
836.49	383	AMPS	Lithium-ion	25.0	24.8	Internal	Left Ear	Ear/Tilt (15°)	0.372
836.49	383	AMPS	Lithium-ion	25.0	24.8	Internal	Right Ear	Cheek/Touch	0.608
836.49	383	AMPS	Lithium-ion	25.0	24.8	Internal	Right Ear	Ear/Tilt (15°)	0.386
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)	12/19/03		Relative Humidity	63%
Measured Fluid Type	835MHz Brain		Atmospheric Pressure	102.0 kPa
Dielectric Constant ε_r	IEEE Target	Measured	Ambient Temperature	23.3 °C
	41.5 ± 5%	41.2	Fluid Temperature	22.0 °C
Conductivity σ (mho/m)	IEEE Target	Measured	Fluid Depth	≥ 15 cm
	0.90 ± 5%	0.92	ρ (Kg/m^3)	1000

Note(s):

1. The measurement results were obtained with the DUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum SAR location of the DUT are reported in Appendix A.
2. If the SAR measurements performed at the mid channel were ≥ 3dB below the SAR limit, SAR evaluation for the low and high channels was optional (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 parameters of the simulated tissue mixture 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. SAR measurements were performed within 24 hours of the system performance check.

MEASUREMENT SUMMARY (Cont.)

HEAD SAR MEASUREMENT RESULTS - Cellular CDMA Mode									
Freq. (MHz)	Channel	Test Mode	Battery Type	Conducted Power (dBm)		Antenna Position	Phantom Section	Test Position	Measured SAR 1g (W/kg)
				Before	After				
835.89	363	Cellular CDMA	Lithium-ion	24.2	24.0	Internal	Left Ear	Cheek/Touch	0.610
835.89	363	Cellular CDMA	Lithium-ion	24.2	24.0	Internal	Left Ear	Ear/Tilt (15°)	0.357
835.89	363	Cellular CDMA	Lithium-ion	24.2	24.0	Internal	Right Ear	Cheek/Touch	0.634
835.89	363	Cellular CDMA	Lithium-ion	24.2	24.0	Internal	Right Ear	Ear/Tilt (15°)	0.369
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)	12/20/03		Relative Humidity	60 %
Measured Fluid Type	835MHz Brain		Atmospheric Pressure	101.5 kPa
Dielectric Constant ε_r	IEEE Target	Measured	Ambient Temperature	23.3 °C
	41.5 ± 5%	40.6	Fluid Temperature	21.9 °C
Conductivity σ (mho/m)	IEEE Target	Measured	Fluid Depth	≥ 15 cm
	0.90 ± 5%	0.90	ρ (Kg/m^3)	1000

Note(s):

1. The measurement results were obtained with the DUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum SAR location of the DUT are reported in Appendix A.
2. If the SAR measurements performed at the mid channel were ≥ 3dB below the SAR limit, SAR evaluation for the low and high channels was optional (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 parameters of the simulated tissue mixture 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. SAR measurements were performed within 24 hours of the system performance check.

MEASUREMENT SUMMARY (Cont.)

HEAD SAR MEASUREMENT RESULTS - PCS CDMA Mode									
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	22.1	21.9	Internal	Left Ear	Cheek/Touch	1.20
1880.00	600	PCS CDMA	Lithium-ion	22.1	21.9	Internal	Left Ear	Cheek/Touch	1.37
1908.75	1175	PCS CDMA	Lithium-ion	22.1	21.9	Internal	Left Ear	Cheek/Touch	0.897
1851.25	25	PCS CDMA	Lithium-ion	22.1	21.9	Internal	Left Ear	Ear/Tilt (15°)	0.842
1880.00	600	PCS CDMA	Lithium-ion	22.1	21.9	Internal	Left Ear	Ear/Tilt (15°)	0.996
1908.75	1175	PCS CDMA	Lithium-ion	22.1	21.9	Internal	Left Ear	Ear/Tilt (15°)	0.817
1851.25	25	PCS CDMA	Lithium-ion	22.1	21.9	Internal	Right Ear	Cheek/Touch	1.24
1880.00	600	PCS CDMA	Lithium-ion	22.1	21.9	Internal	Right Ear	Cheek/Touch	1.38
1908.75	1175	PCS CDMA	Lithium-ion	22.1	21.9	Internal	Right Ear	Cheek/Touch	1.09
1851.25	25	PCS CDMA	Lithium-ion	22.1	21.9	Internal	Right Ear	Ear/Tilt (15°)	0.920
1880.00	600	PCS CDMA	Lithium-ion	22.1	21.9	Internal	Right Ear	Ear/Tilt (15°)	0.890
1908.75	1175	PCS CDMA	Lithium-ion	22.1	21.9	Internal	Right Ear	Ear/Tilt (15°)	0.771
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)	12/21/03		Relative Humidity	58 %
Measured Fluid Type	1880MHz Brain		Atmospheric Pressure	101.7 kPa
Dielectric Constant ε_r	IEEE Target	Measured	Ambient Temperature	24.2 °C
	40.0 ± 5%	38.2	Fluid Temperature	23.8 °C
Conductivity σ (mho/m)	IEEE Target	Measured	Fluid Depth	≥ 15 cm
	1.40 ± 5%	1.42	ρ (Kg/m^3)	1000

Note(s):

1. The measurement results were obtained with the DUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum SAR location of the DUT are reported in Appendix A.
2. If the SAR measurements performed at the mid channel were ≥ 3dB below the SAR limit, SAR evaluation for the low and high channels was optional (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 parameters of the simulated tissue mixture 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. SAR measurements were performed within 24 hours of the system performance check.

MEASUREMENT SUMMARY (Cont.)

BODY SAR MEASUREMENT RESULTS - AMPS Mode										
Freq. (MHz)	Channel	Test Mode	Battery Type	Conducted Power (dBm)		Antenna Position	Body-worn Accessories	DUT Position to Planar Phantom	Separation Distance to Planar Phantom	Measured SAR 1g (W/kg)
				Before	After					
836.49	383	AMPS	Lithium-ion	25.0	24.8	Internal	Belt-Clip Earpiece/Mic	Back Side	2.3 cm	0.148
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)	12/20/03		Relative Humidity	64%
Measured Fluid Type	835MHz Body		Atmospheric Pressure	101.5 kPa
Dielectric Constant ε_r	IEEE Target	Measured	Ambient Temperature	23.9 °C
	55.2 ± 5%	53.5	Fluid Temperature	21.7 °C
Conductivity σ (mho/m)	IEEE Target	Measured	Fluid Depth	≥ 15 cm
	0.97 ± 5%	0.98	ρ (Kg/m^3)	1000

Note(s):

1. The measurement results were obtained with the DUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum SAR location of the DUT are reported in Appendix A.
2. If the SAR measurements performed at the mid channel were ≥ 3dB below the SAR limit, SAR evaluation for the low and high channels was optional (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 parameters of the simulated tissue mixture 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. SAR measurements were performed within 24 hours of the system performance check.

MEASUREMENT SUMMARY (Cont.)

BODY SAR MEASUREMENT RESULTS - CELLULAR CDMA Mode										
Freq. (MHz)	Channel	Test Mode	Battery Type	Conducted Power (dBm)		Antenna Position	Body-worn Accessories	DUT Position to Planar Phantom	Separation Distance to Planar Phantom	Measured SAR 1g (W/kg)
				Before	After					
835.89	363	Cellular CDMA	Lithium-ion	24.2	24.0	Internal	Belt-Clip Earpiece/Mic	Back Side	2.3 cm	0.158

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)	12/20/03		Relative Humidity	64%
Measured Fluid Type	835MHz Body		Atmospheric Pressure	101.5 kPa
Dielectric Constant ε_r	IEEE Target	Measured	Ambient Temperature	23.9 °C
	55.2 ± 5%	53.5	Fluid Temperature	21.7 °C
Conductivity σ (mho/m)	IEEE Target	Measured	Fluid Depth	≥ 15 cm
	0.97 ± 5%	0.98	ρ (Kg/m^3)	1000

Note(s):

1. The measurement results were obtained with the DUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum SAR location of the DUT are reported in Appendix A.
2. If the SAR measurements performed at the mid channel were ≥ 3dB below the SAR limit, SAR evaluation for the low and high channels was optional (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 parameters of the simulated tissue mixture 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. SAR measurements were performed within 24 hours of the system performance check.

MEASUREMENT SUMMARY (Cont.)

BODY SAR MEASUREMENT RESULTS - PCS CDMA Mode										
Freq. (MHz)	Channel	Test Mode	Battery Type	Conducted Power (dBm)		Antenna Position	Body-worn Accessory	DUT Position to Planar Phantom	Separation Distance to Planar Phantom	Measured SAR 1g (W/kg)
				Before	After					
1880.00	600	PCS CDMA	Lithium-ion	22.1	21.9	Internal	Belt-Clip Earpiece-Mic	Back Side	2.3 cm	0.126
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)	12/21/03		Relative Humidity	55 %
Measured Fluid Type	1880MHz Body		Atmospheric Pressure	101.5 kPa
Dielectric Constant ε_r	IEEE Target	Measured	Ambient Temperature	23.6 °C
	53.3 ± 5%	51.5	Fluid Temperature	23.0 °C
Conductivity σ (mho/m)	IEEE Target	Measured	Fluid Depth	≥ 15 cm
	1.52 ± 5%	1.52	ρ (Kg/m^3)	1000

Note(s):

1. The measurement results were obtained with the DUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum SAR location of the DUT are reported in Appendix A.
2. If the SAR measurements performed at the mid channel were ≥ 3dB below the SAR limit, SAR evaluation for the low and high channels was optional (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 parameters of the simulated tissue mixture 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. SAR measurements were performed within 24 hours of the system performance check.

5.0 DETAILS OF SAR EVALUATION

The HOP-ON WIRELESS INC. Model: HPN1900 Dual-Band Tri-Mode PCS/Cellular Phone FCC ID: QHOHPN1900 was 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 DUT 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.

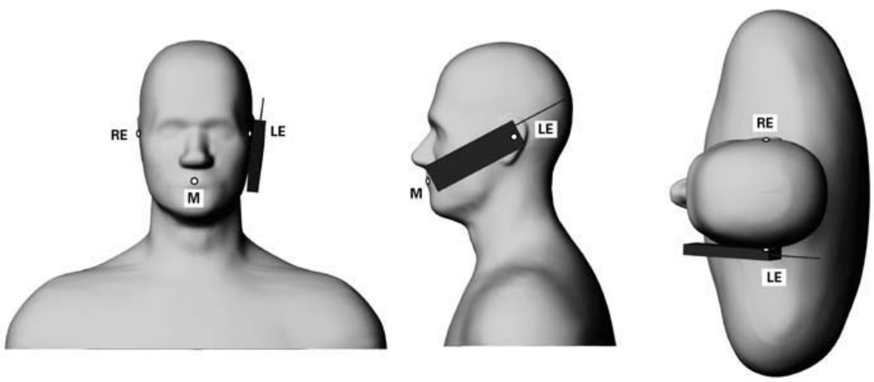


Figure 1. Phone position 1, "cheek" or "touch" position. The reference points for the right ear (RE), left ear (LE) and mouth (M), which define the reference plane for phone positioning, are indicated (Shoulders are shown for illustration only).

- 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.

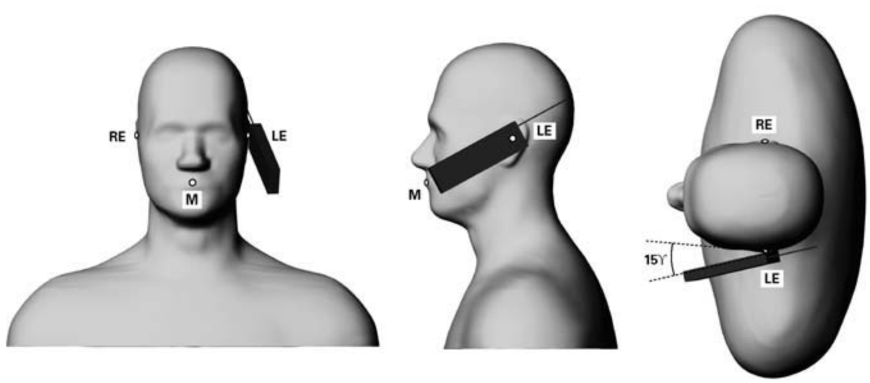


Figure 2. Phone position 2, "tilted position." The reference points for the right ear (RE), left ear (LE) and mouth (M), which define the reference plane for phone positioning, are indicated (Shoulders are shown for illustration only).

DETAILS OF SAR EVALUATION (Cont.)

Body-worn Configuration

2) The DUT was tested in a body-worn configuration with belt-clip and earpiece/boom-microphone accessories. The back of the DUT was placed facing parallel to the outer surface of the SAM phantom (planar section) with the attached belt-clip accessory touching the phantom surface and providing a 2.3 cm separation distance between the back of the DUT and the outer surface of the SAM phantom (planar section).

DUT Test Modes & Power Settings

3) The DUT was tested in AMPS mode at maximum power via internal software controlled from a Laptop PC.
4) The DUT was tested in cellular and PCS modes with a modulated CDMA signal generated via internal software controlled from a Laptop PC at a full data rate in the “always up” power control mode.
5) The conducted power levels were measured before and after each test using a Gigatronics 8652A Universal Power Meter.
6) The DUT was tested with a fully charged lithium-ion battery.

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:

e. 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.
f. 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).

EVALUATION PROCEDURES (Cont.)

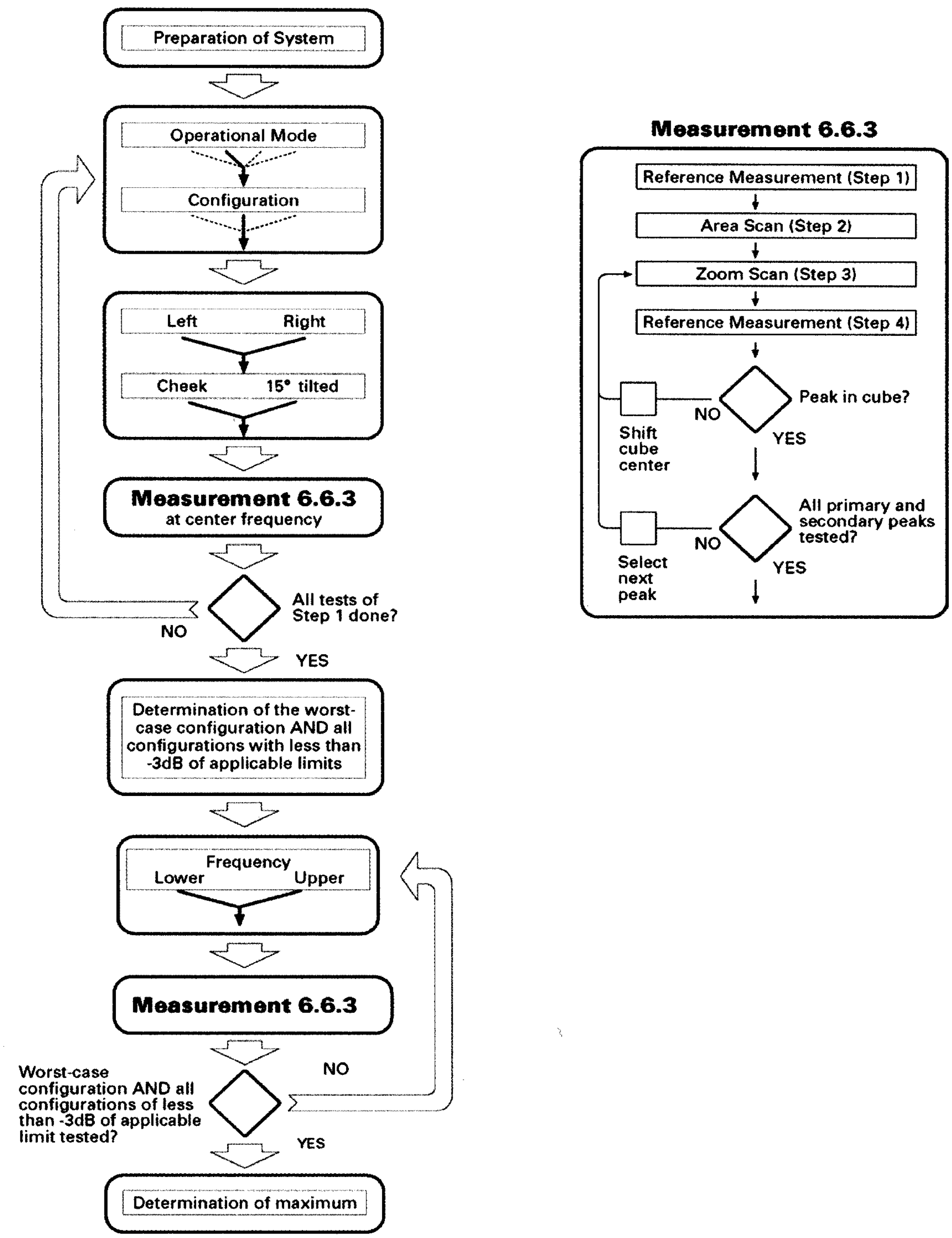


Figure 3. Flow Chart of the recommended practices and procedures per IEEE Standard 1528-200X - Draft (see reference 3])

7.0 SYSTEM PERFORMANCE CHECK

Prior to the SAR evaluation a system check was performed at the planar section of the SAM phantom with a 900MHz dipole and an 1800MHz dipole (see Appendix C for system validation procedures). The fluid dielectric parameters were measured prior to the system performance 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	Freq. (Brain)	SAR 1g (W/kg)		Dielectric Constant ε_r		Conductivity σ (mho/m)		ρ (Kg/m^3)	Amb. Temp. (°C)	Fluid Temp. (°C)	Fluid Depth (cm)	Humid. (%)	Barom. Press. (kPa)
		IEEE Target	Measured	IEEE Target	Measured	IEEE Target	Measured						
12/19/03	900MHz	2.70 ±10%	2.77(+2.6%)	41.5 ±5%	39.9	0.97 ±5%	0.96	1000	23.3	22.0	≥ 15	63	102.0
12/21/03	1800MHz	9.53 ±10%	10.4 (+9.1%)	40.0 ±5%	38.6	1.40 ±5%	1.44	1000	24.2	22.5	≥ 15	58	101.7

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.
2. The SAR evaluations were performed within 24 hours of the system performance check.

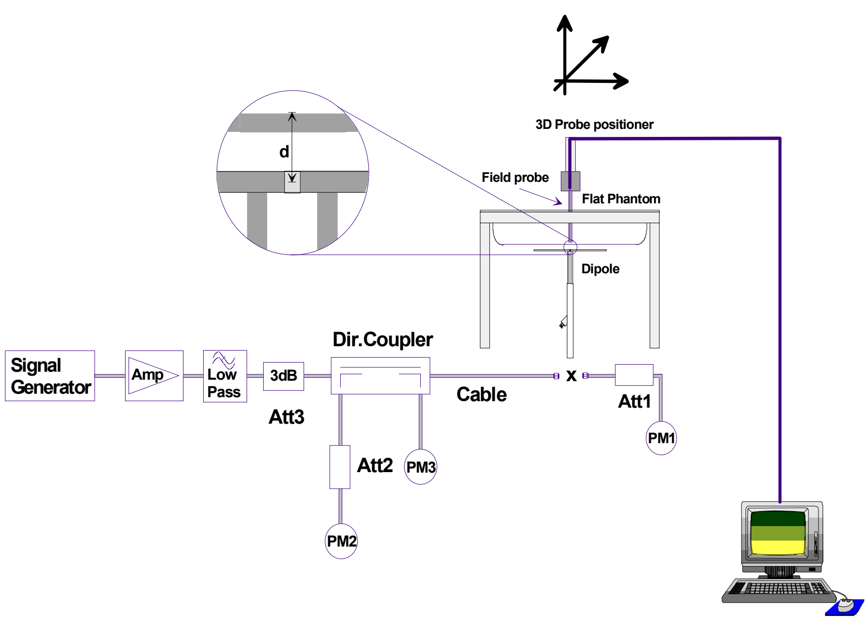


Figure 4. System Performance Check Setup Diagram

1800MHz Dipole Setup

900MHz Dipole Setup

8.0 SIMULATED TISSUE MIXTURES

The 1800MHz and 1900MHz simulated tissue mixtures consist of Glycol-monobutyl, water, and salt. The 835MHz and 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)	1880MHz Brain (DUT Evaluation)	1880MHz Body (DUT 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 (DUT Evaluation)	835MHz Body (DUT 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:	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(s)

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 Detection:	±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 (+/-0.2 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 (see Appendix F for specifications of the SAM phantom V4.0C).


SAM Phantom V4.0C

13.0 DEVICE HOLDER

The DASY4 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 2003
-450MHz Validation Dipole	136	Nov 2003
-900MHz Validation Dipole	054	June 2003
-1800MHz Validation Dipole	247	June 2003
-2450MHz Validation Dipole	150	Sept 2003
-SAM Phantom V4.0C	1033	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 2003
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 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”.

APPENDIX B - SYSTEM PERFORMANCE CHECK DATA

Date Tested: 12/19/03

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

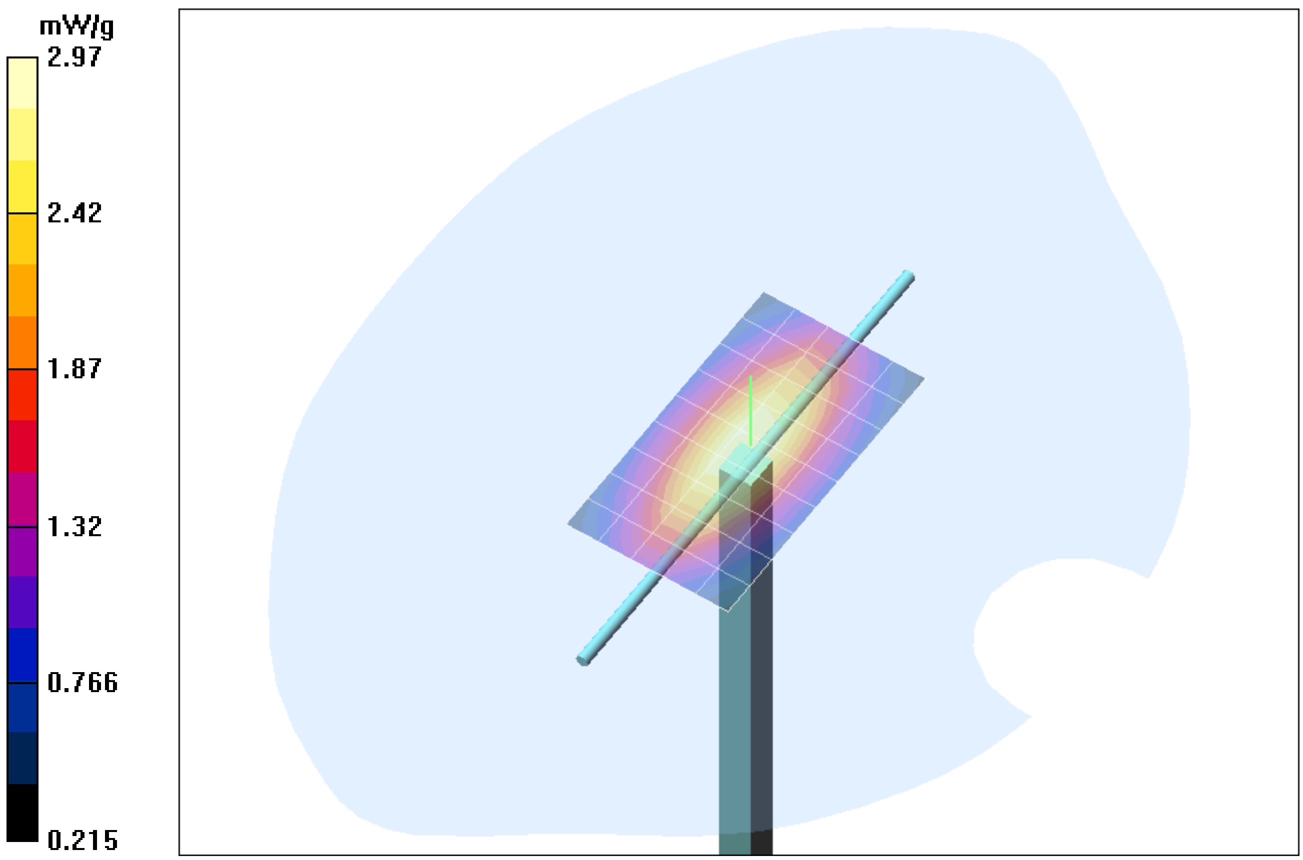
Ambient Temp: 23.3 °C; Fluid Temp: 22.0 °C; Barometric Pressure: 102.0 kPa; Humidity: 63%

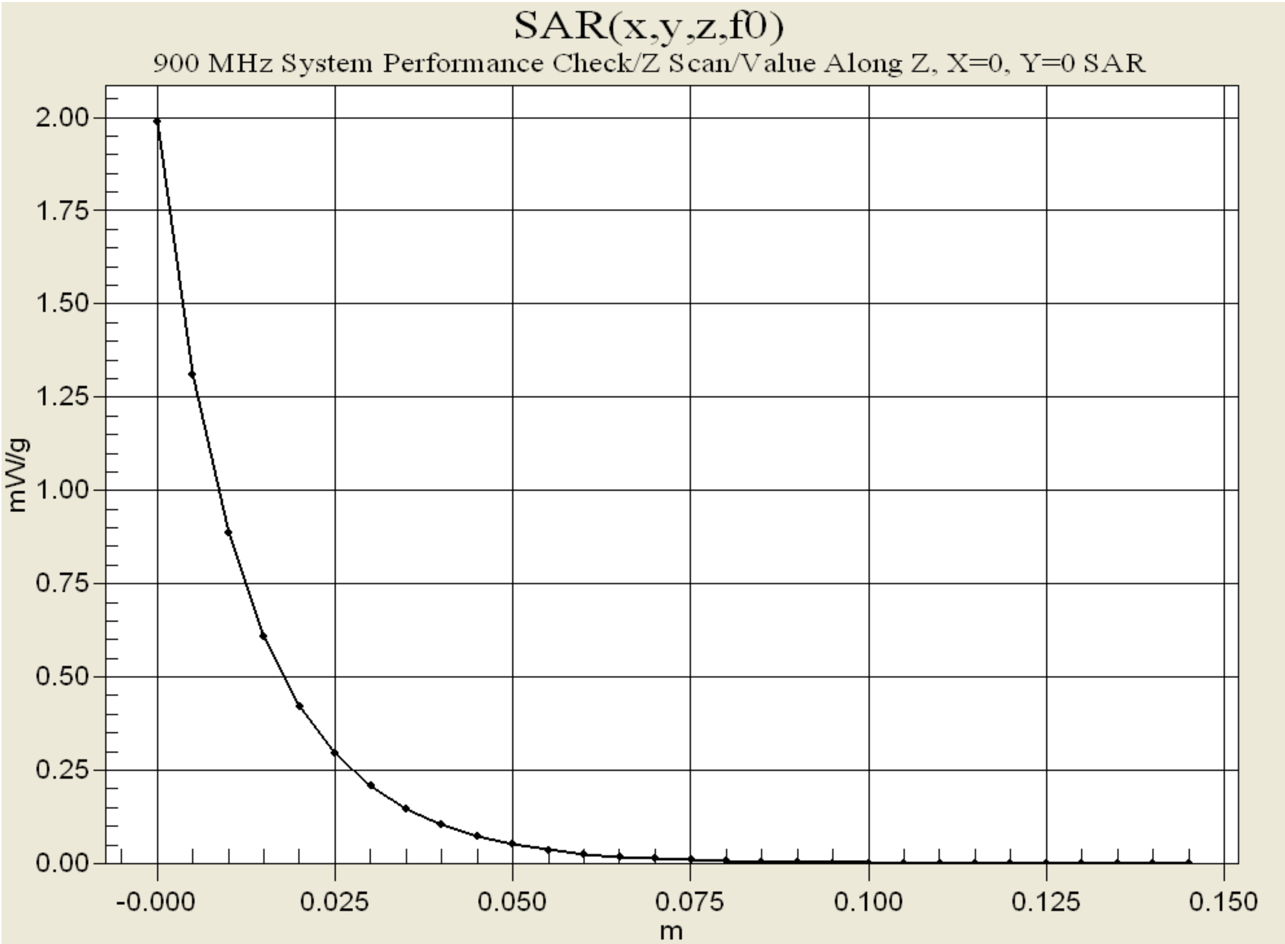
Communication System: CW
Forward Conducted Power: 250mW
Frequency: 900 MHz; Duty Cycle: 1:1
Medium: HSL900 (σ = 0.96 mho/m, ε_r = 39.9, ρ = 1000 kg/m^3)

- 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

900 MHz System Performance Check/Area Scan (6x10x1): Measurement grid: dx=10mm, dy=10mm

900 MHz System Performance Check/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 4.17 W/kg
SAR(1 g) = 2.77 mW/g; SAR(10 g) = 1.75 mW/g
Reference Value = 57.5 V/m
Power Drift = -0.04 dB





SAR(x,y,z,f0)
900 MHz System Performance Check/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

Date Tested: 12/21/03

DUT: Dipole 1800 MHz; Model: D1800V2; Type: System Performance Check; Serial: 247

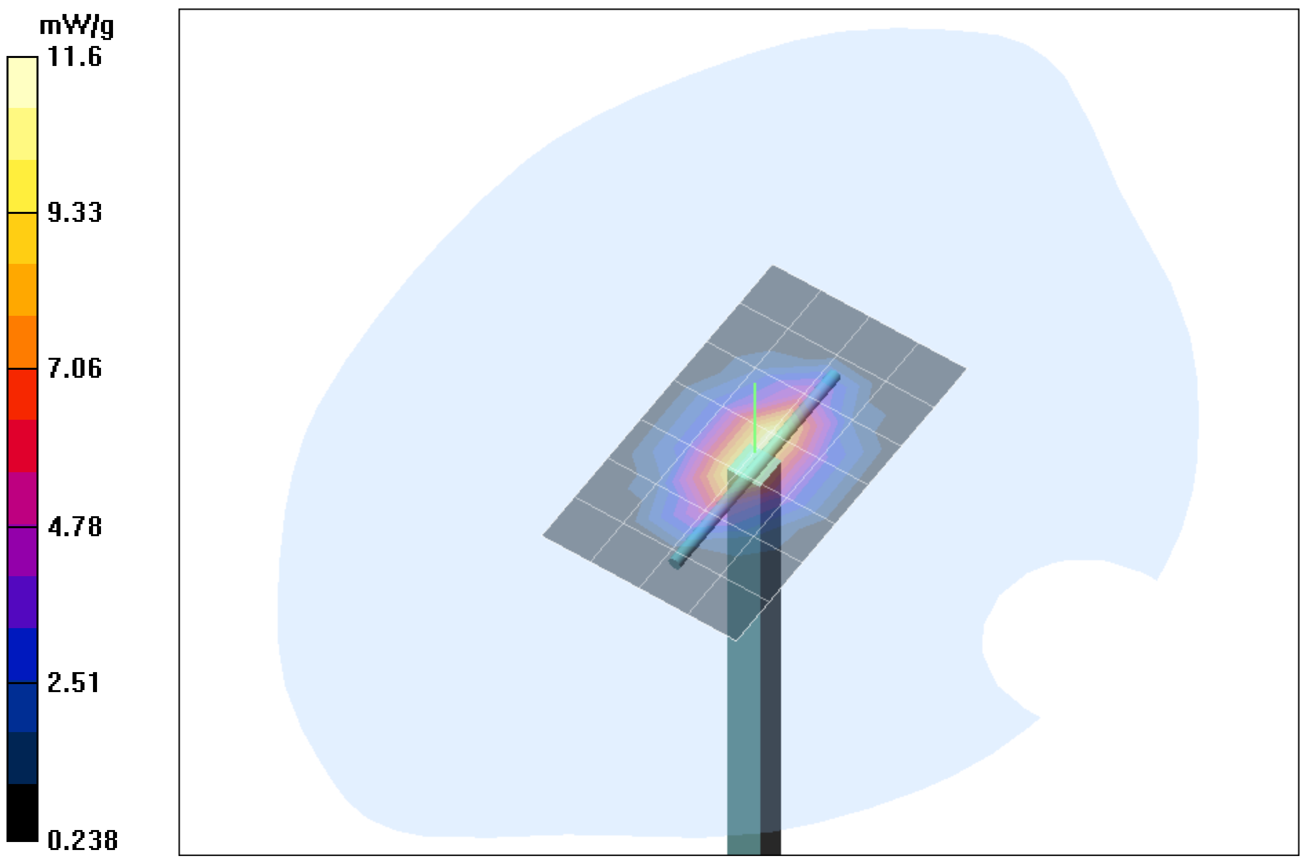
Ambient Temp: 24.2 °C; Fluid Temp: 22.5 °C; Barometric Pressure: 101.7 kPa; Humidity: 58%

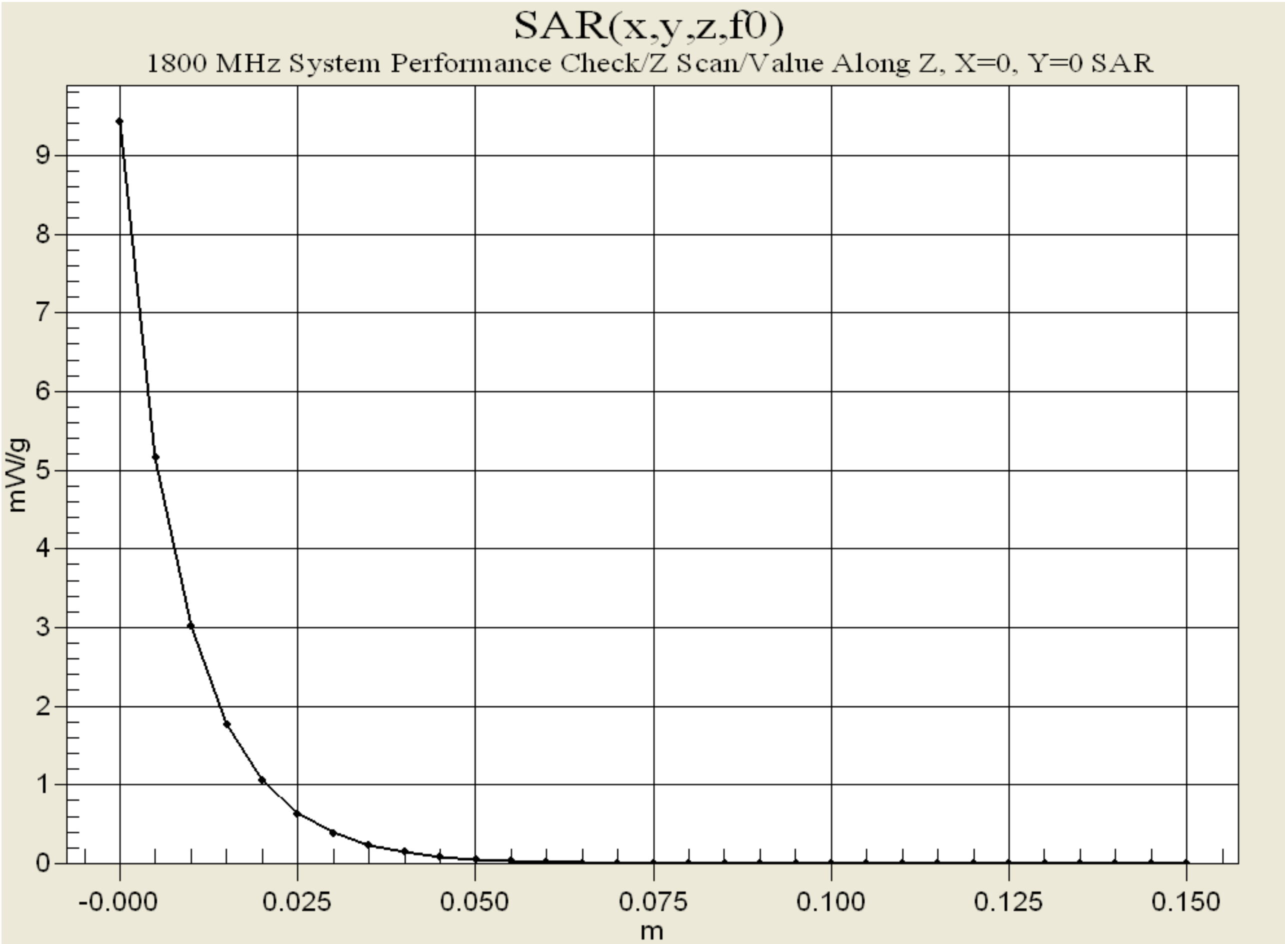
Communication System: CW
Forward Conducted Power: 250mW
Frequency: 1800 MHz; Duty Cycle: 1:1
Medium: HSL1800 (σ = 1.44 mho/m, ε_r = 38.6, ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1387; ConvF(5.2, 5.2, 5.2); 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

1800 MHz System Performance Check/Area Scan (5x8x1): Measurement grid: dx=15mm, dy=15mm

1800 MHz System Performance Check/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 17.5 W/kg
SAR(1 g) = 10.4 mW/g; SAR(10 g) = 5.49 mW/g
Reference Value = 95.8 V/m
Power Drift = -0.01 dB





SAR(x,y,z,f0)
1800 MHz System Performance Check/Z Scan/Value Along Z, X=0, Y=0 SAR
mW/g
9
8
7
6
5
4
3
2
1
0
-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

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

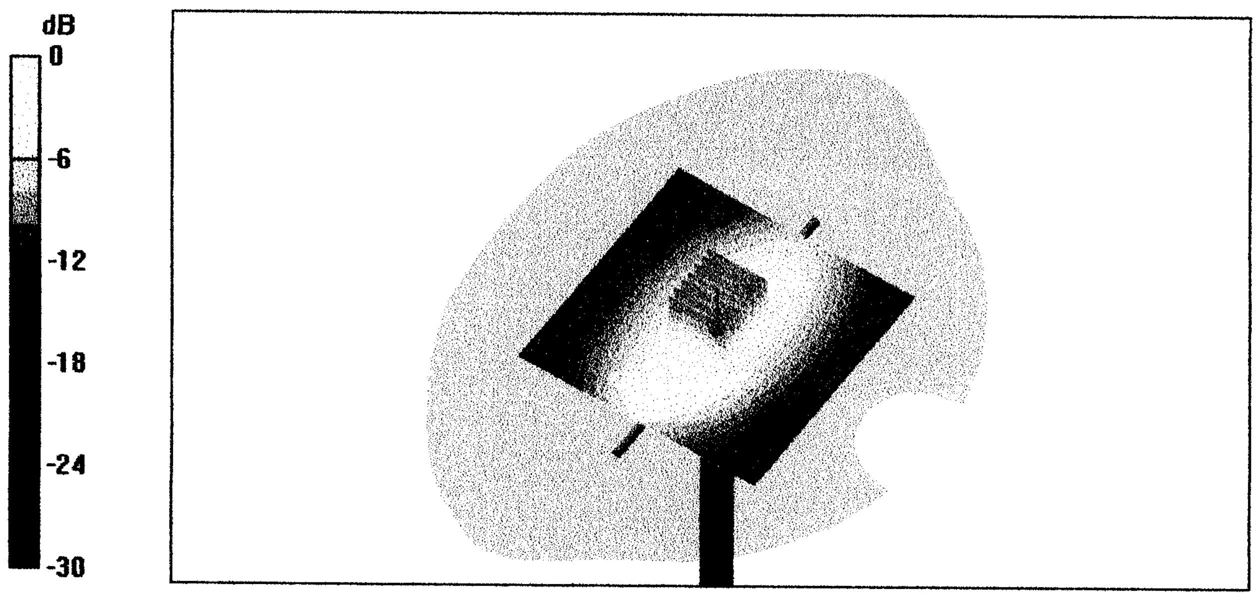
Communication System: CW-900; Frequency: 900 MHz;Duty Cycle: 1:1
Medium: HSL 900 MHz (σ = 0.95 mho/m, ε_r = 42.07, ρ = 1000 kg/m^3)
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

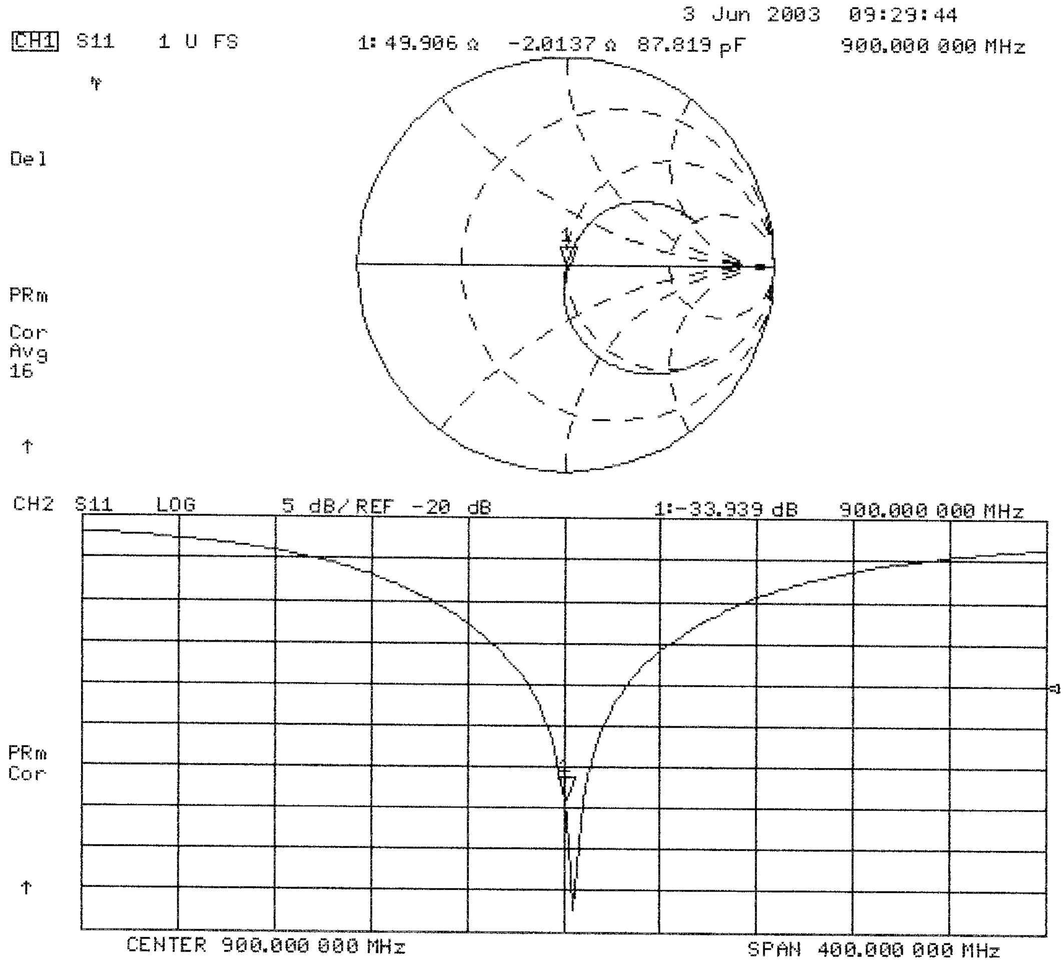
- Probe: ET3DV6 - SN1507; ConvF(6.6, 6.6, 6.6); Calibrated: 1/18/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 - SN411; Calibrated: 1/16/2003
- Phantom: SAM with CRP - TP1006; Type: SAM 4.0; Serial: TP:1006
- Measurement SW: DASY4, V4.1 *Build* 47; *Postprocessing SW:*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

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	
Approved by:	Katja Pokovic	Laboratory Director	

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

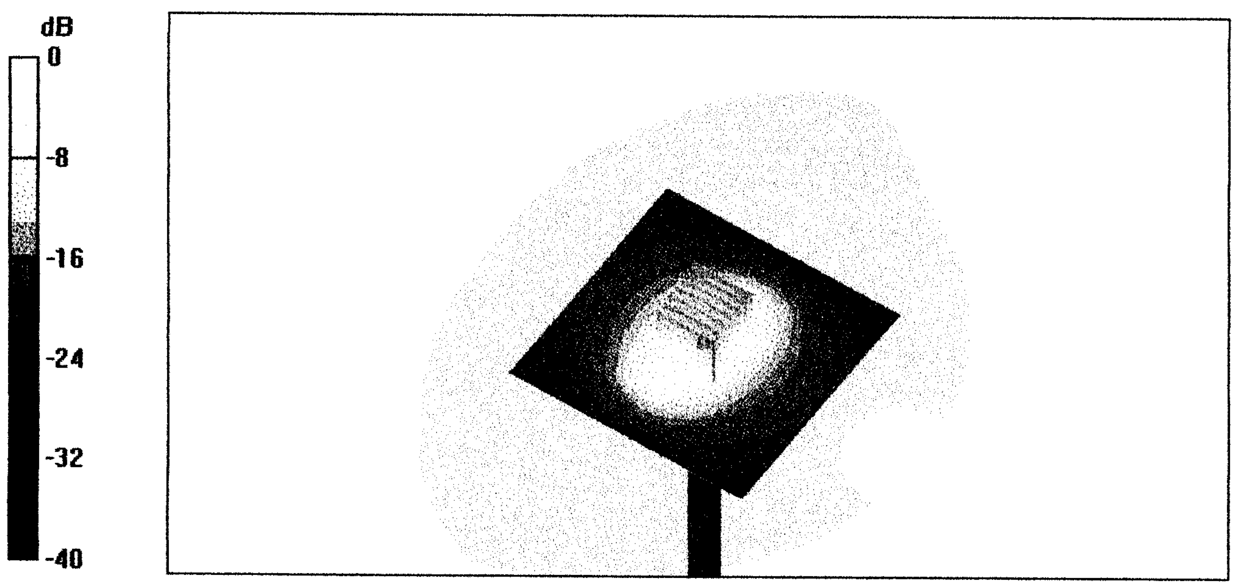
Communication System: CW-1800; Frequency: 1800 MHz;Duty Cycle: 1:1
Medium: HSL 1800 MHz (σ = 1.36 mho/m, ε_r = 39.22, ρ = 1000 kg/m^3)
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

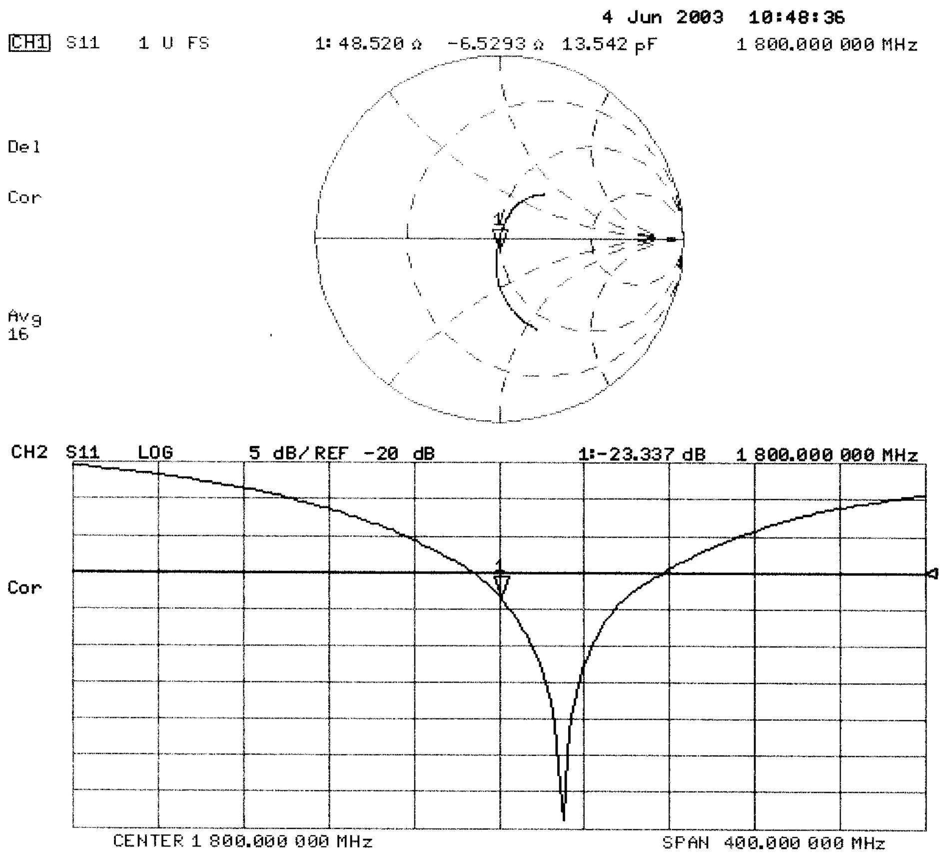
- Probe: ET3DV6 - SN1507; ConvF(5.3, 5.3, 5.3); Calibrated: 1/18/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 - SN411; Calibrated: 1/16/2003
- Phantom: SAM with CRP - TP1006; Type: SAM 4.0; Serial: TP:1006
- *Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD,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

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	

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**

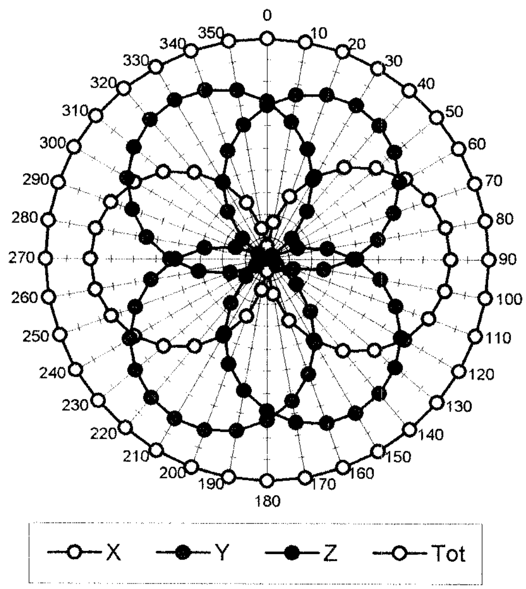
Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	14.6	9.8
SAR_{be} [%]	With Correction Algorithm	0.2	0.0

Sensor Offset

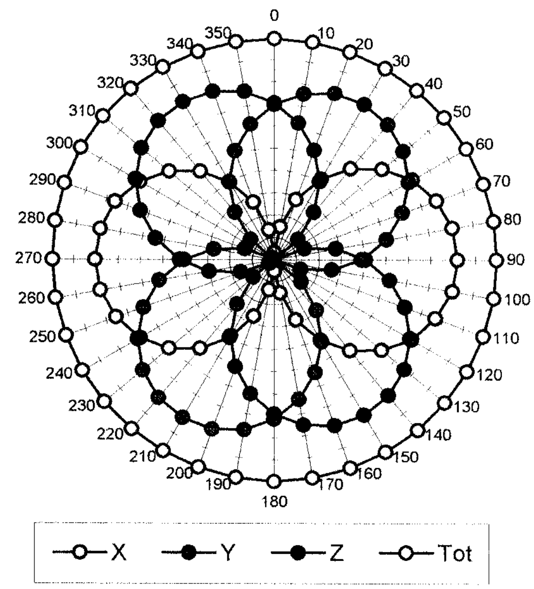
Probe Tip to Sensor Center	**2.7**	mm
Optical Surface Detection	**1.4 ± 0.2**	mm

Receiving Pattern (ϕ), θ = 0°

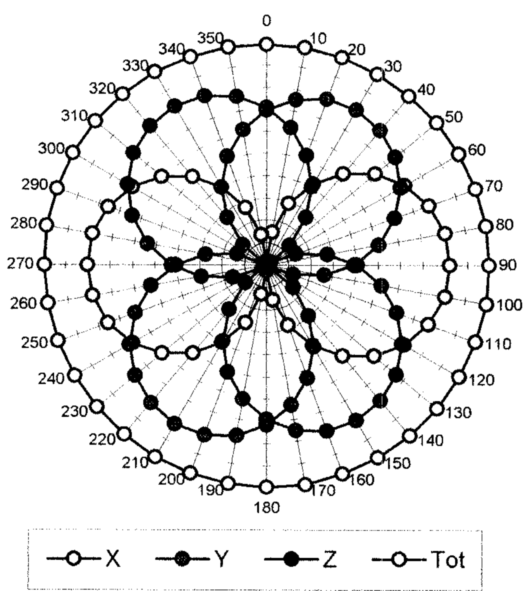
f = 30 MHz, TEM cell ifi110



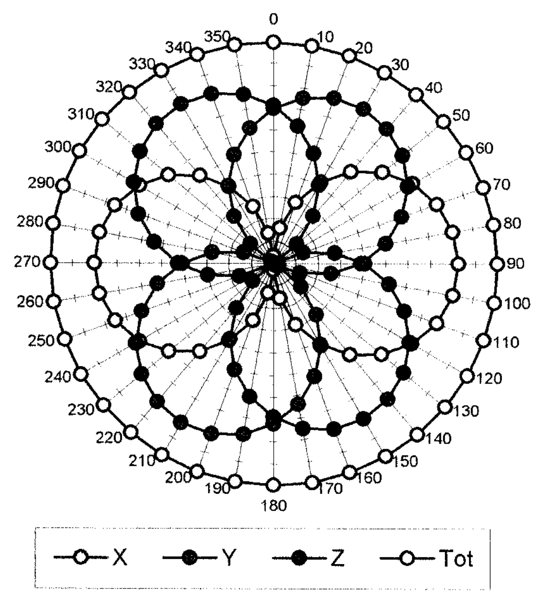
f = 100 MHz, TEM cell ifi110

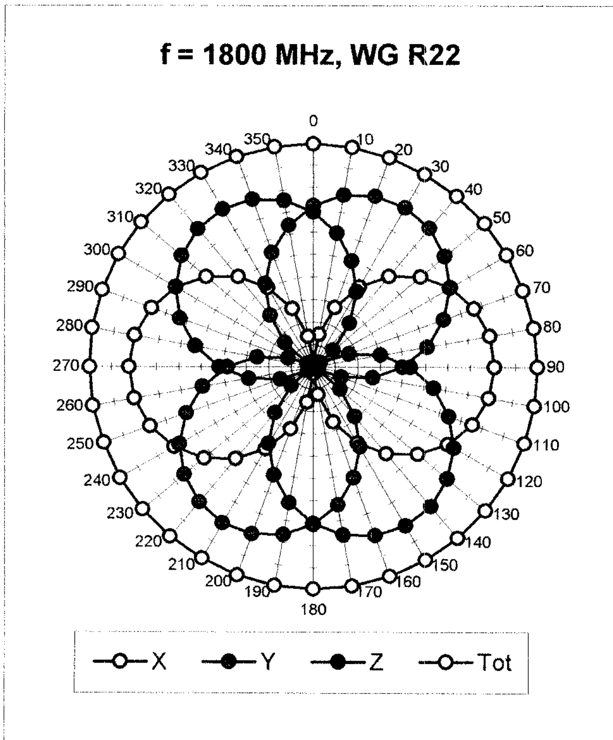


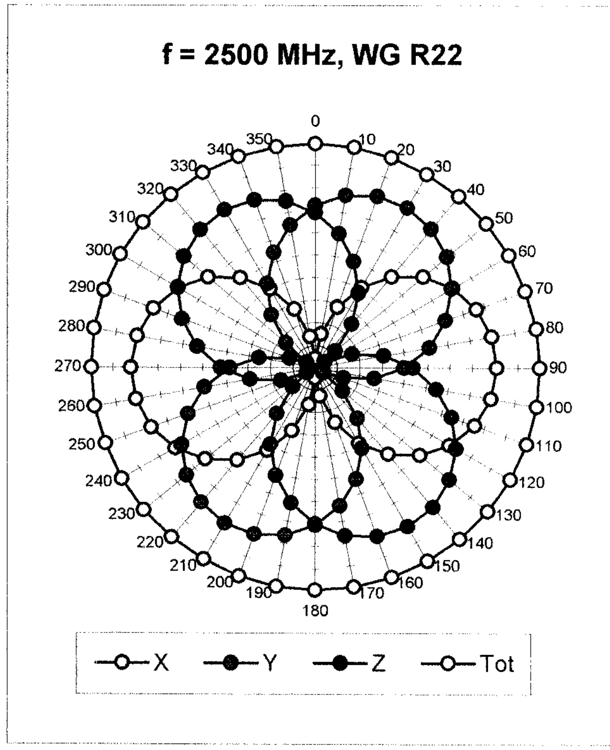
f = 300 MHz, TEM cell ifi110



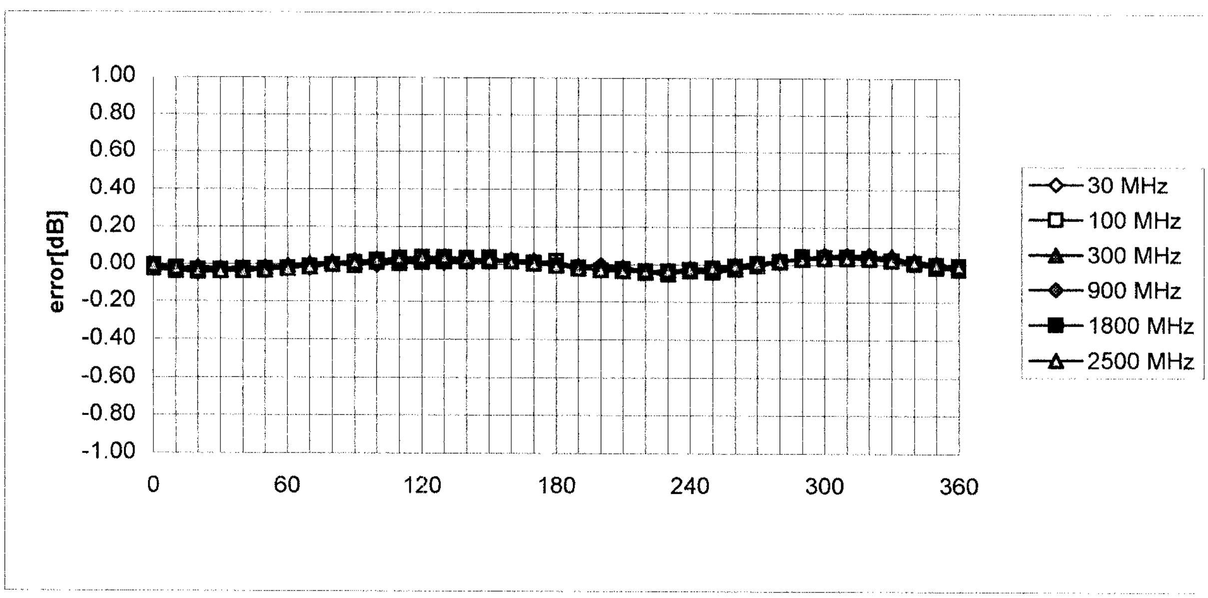
f = 900 MHz, TEM cell ifi110





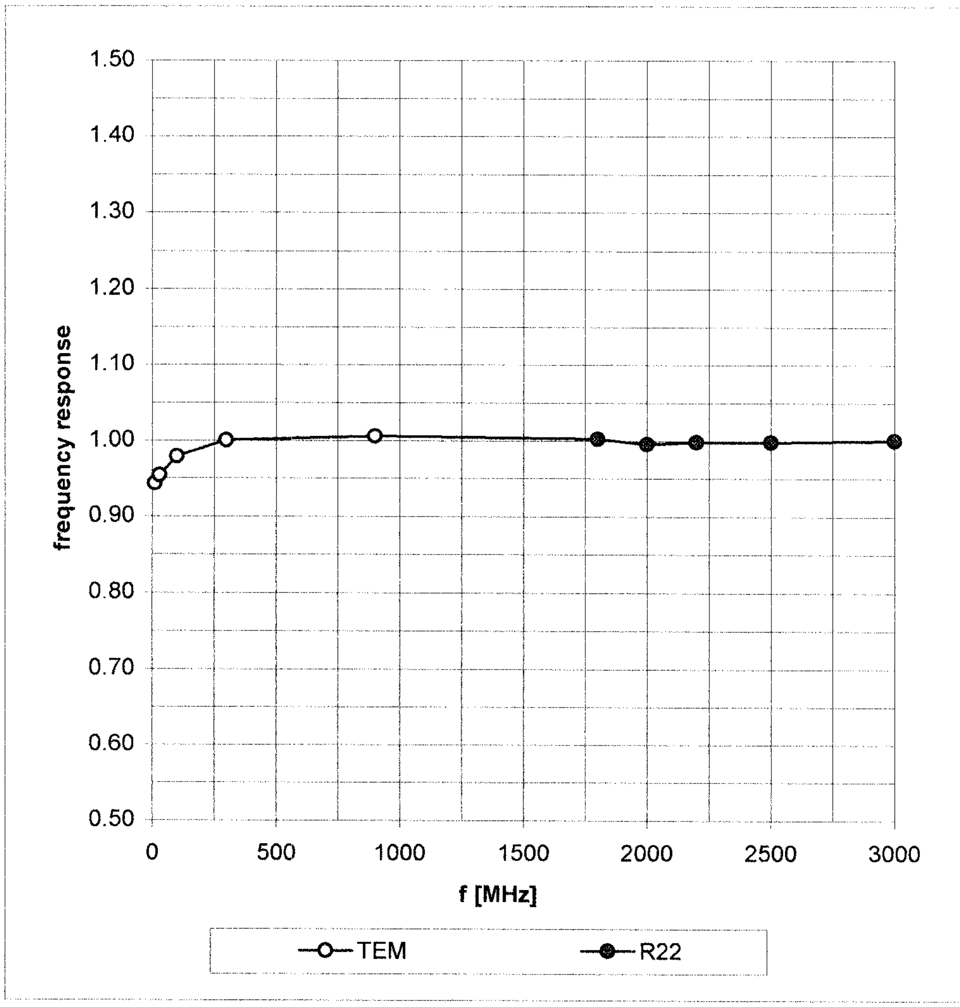


Isotropy Error (ϕ), θ = 0°



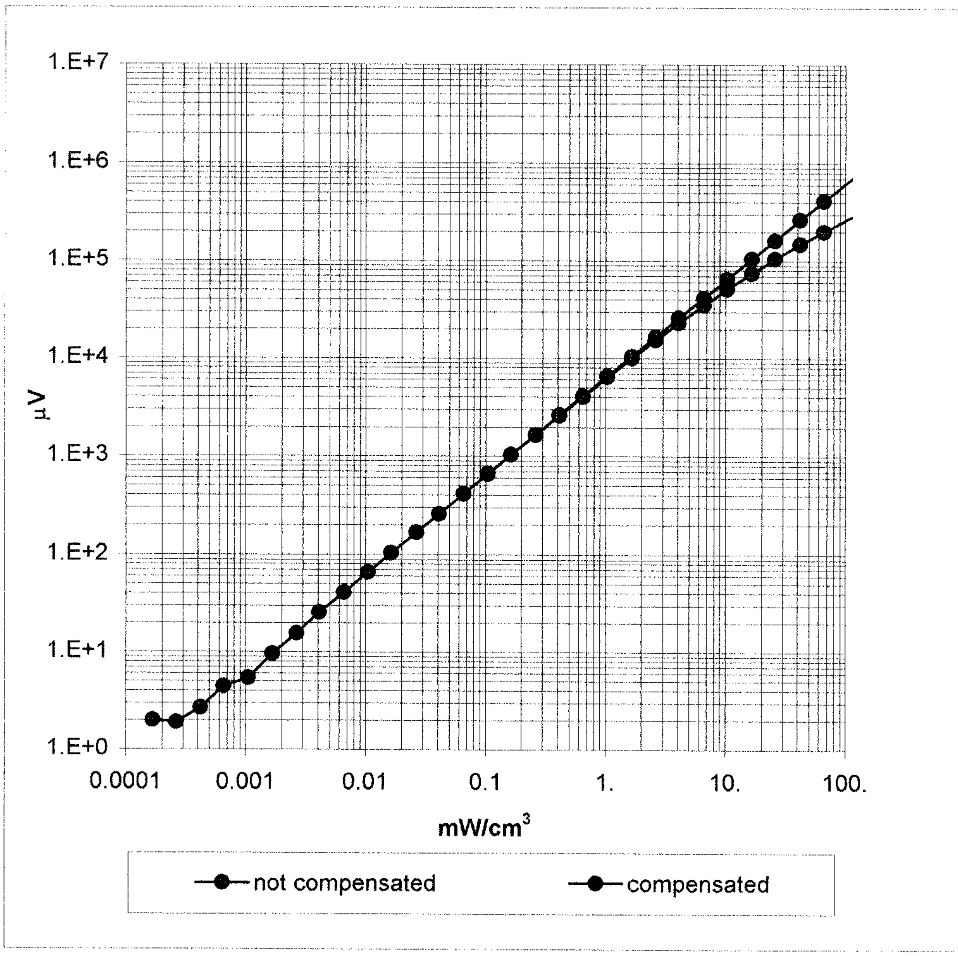
Frequency Response of E-Field

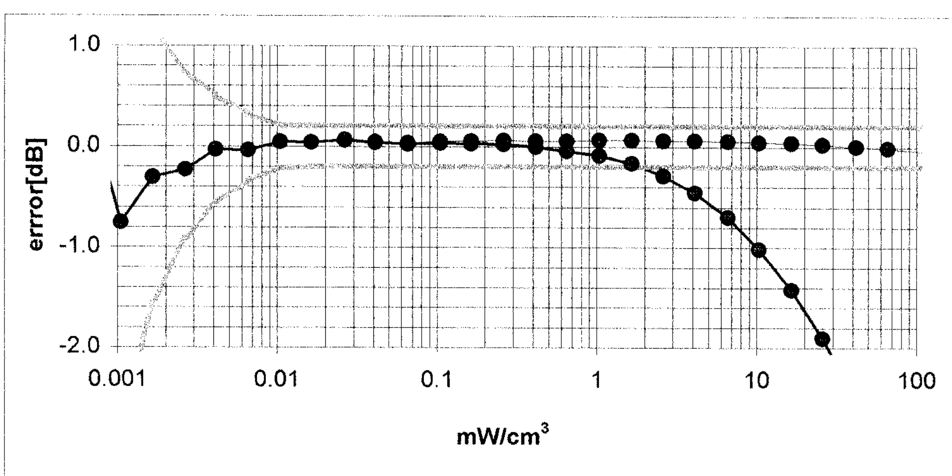
(TEM-Cell:ifi110, Waveguide R22)



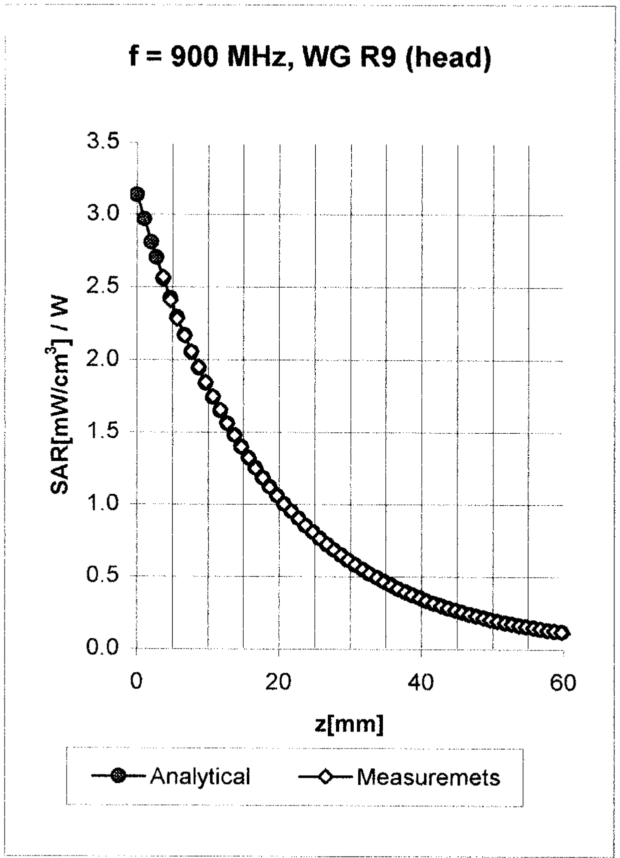
Dynamic Range f(SAR_{brain})

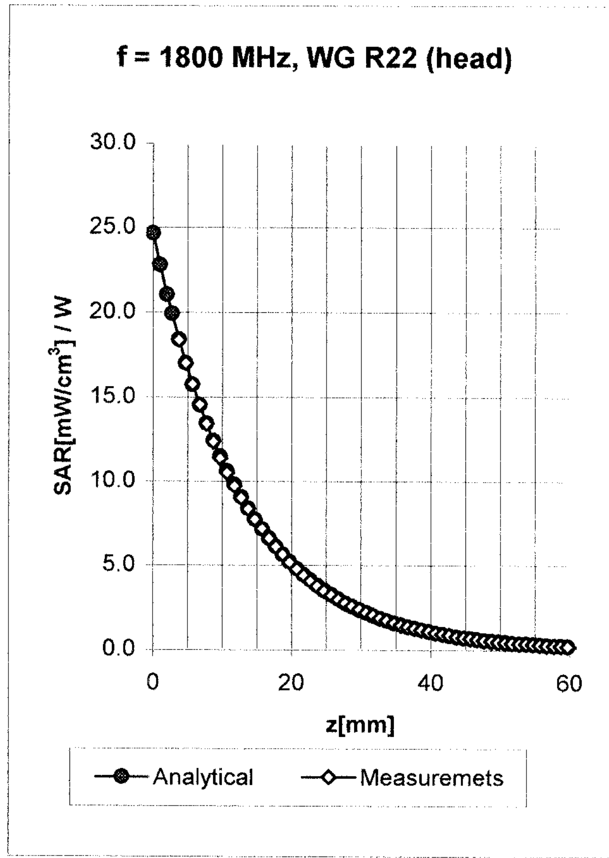
(Waveguide R22)





Conversion Factor Assessment

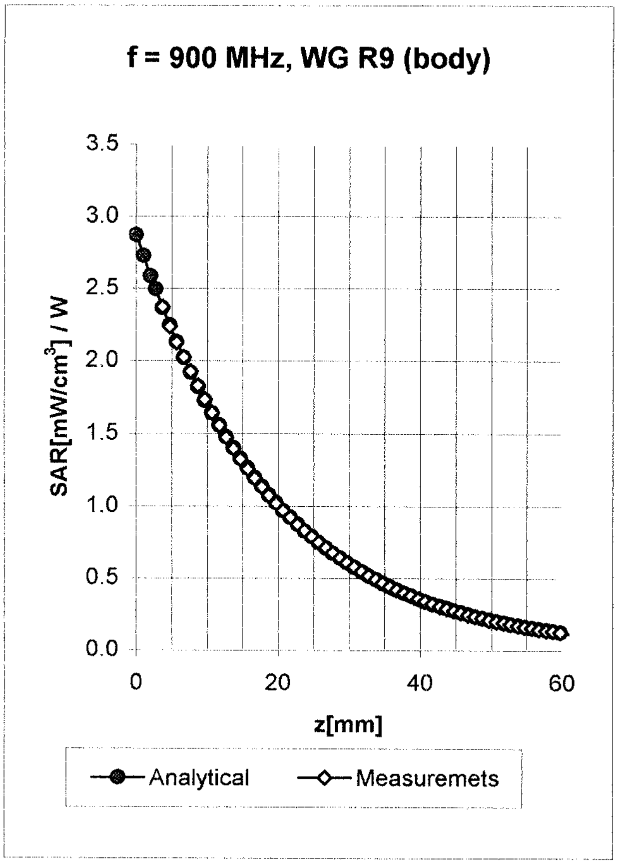


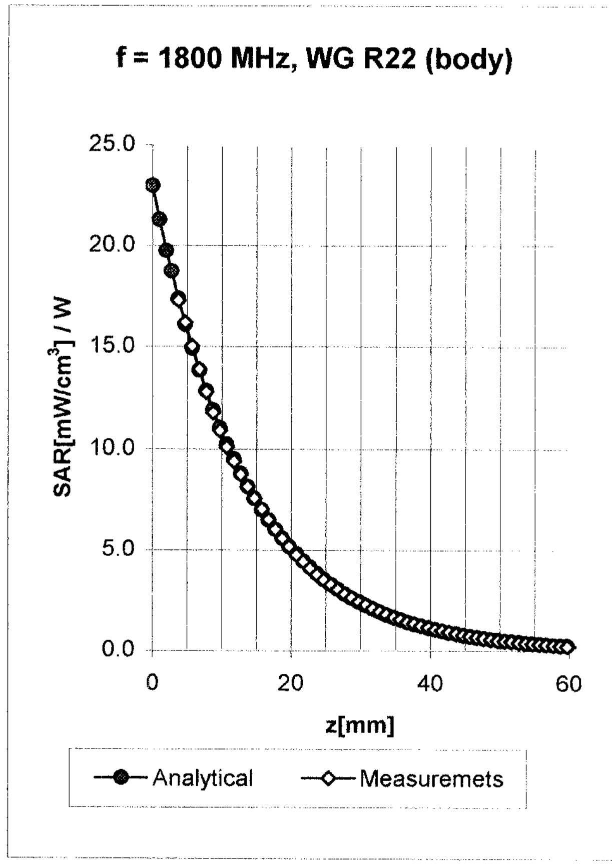


Head	**900 MHz**		ε_r **= 41.5 ± 5%**	σ **= 0.97 ± 5% mho/m**	
Head	**835 MHz**		ε_r **= 41.5 ± 5%**	σ **= 0.90 ± 5% mho/m**	
	ConvF X	**6.6**	± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**6.6**	± 9.5% (k=2)	Alpha	**0.37**
	ConvF Z	**6.6**	± 9.5% (k=2)	Depth	**2.61**

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

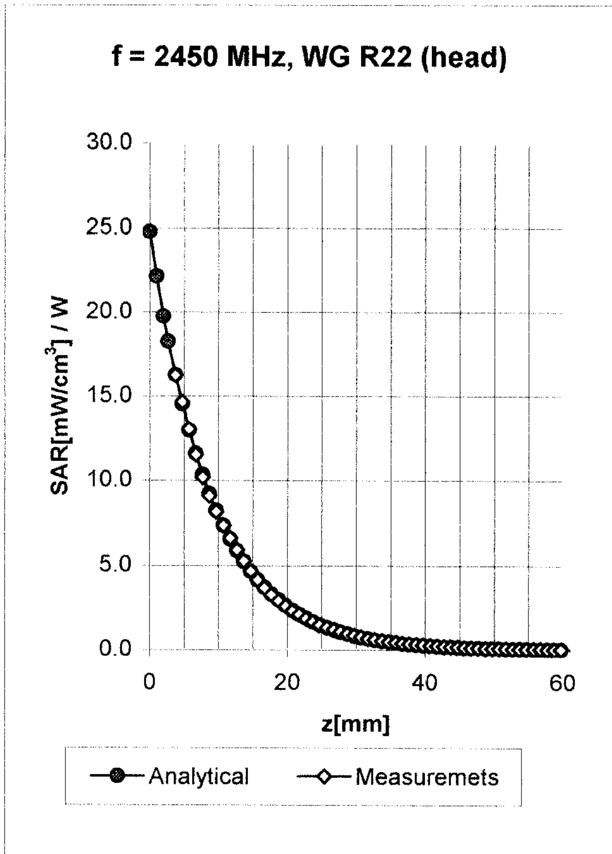


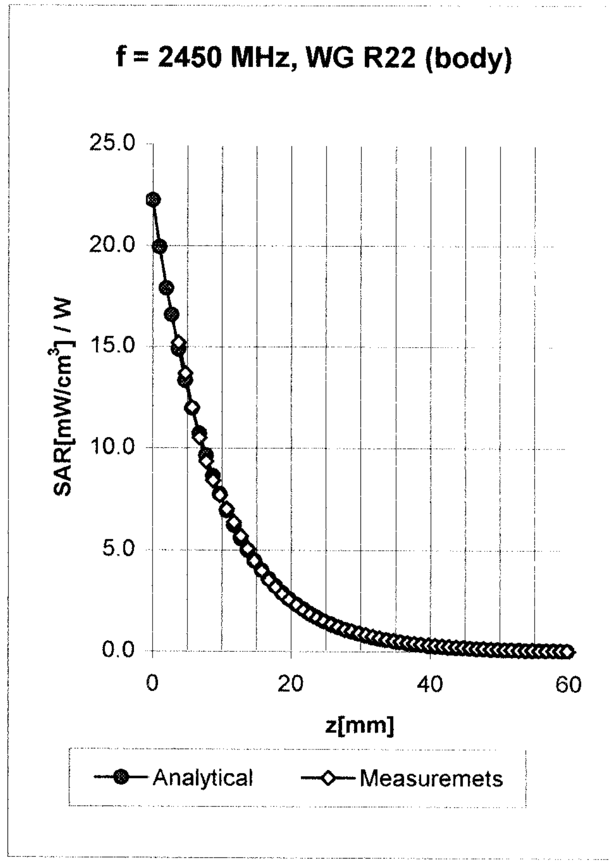


Body	**900 MHz**		ε_r **= 55.0 ± 5%**	σ **= 1.05 ± 5% mho/m**	
Body	**835 MHz**		ε_r **= 55.2 ± 5%**	σ **= 0.97 ± 5% mho/m**	
	ConvF X	**6.4**	± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**6.4**	± 9.5% (k=2)	Alpha	**0.45**
	ConvF Z	**6.4**	± 9.5% (k=2)	Depth	**2.35**

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



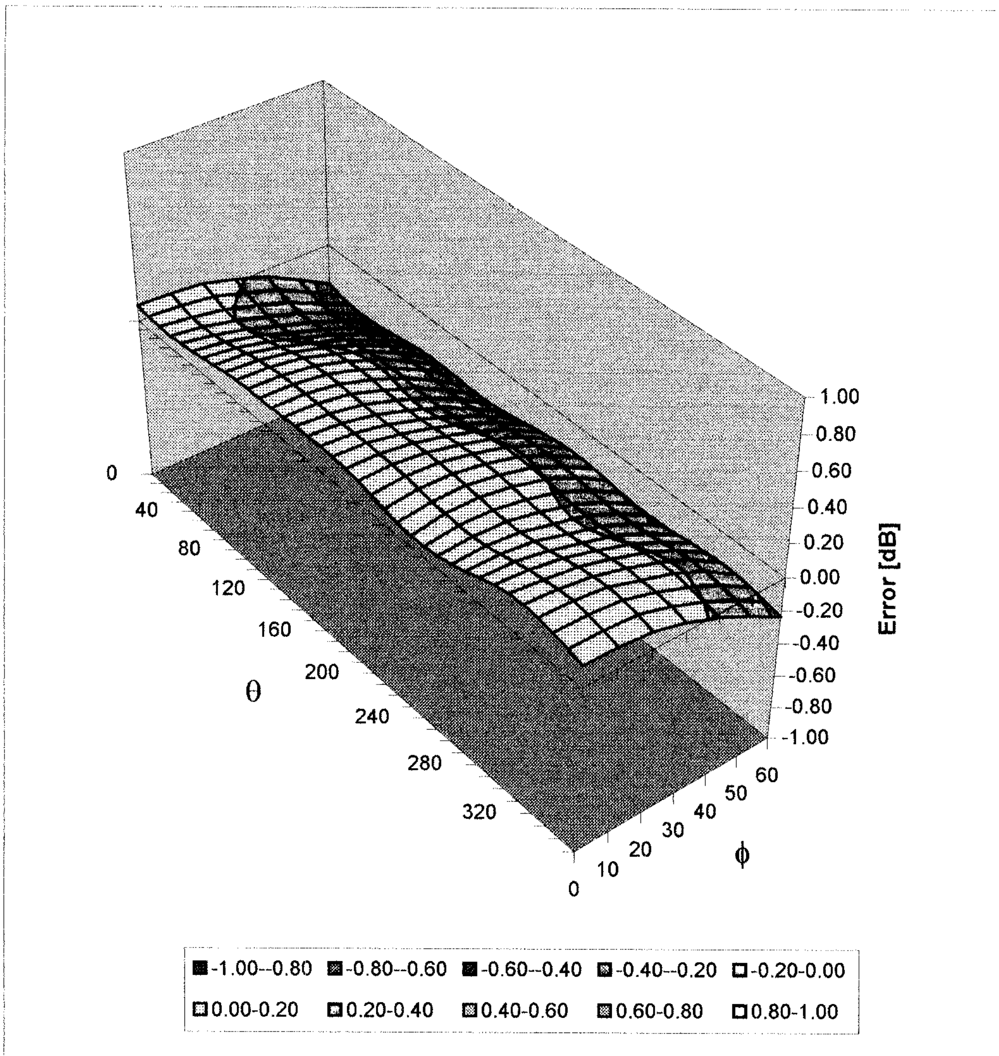


Head	**2450**	**MHz**	**ε_r = 39.2 ± 5%**	**σ = 1.80 ± 5% mho/m**
	ConvF X	**5.0** ± 8.9% (k=2)		Boundary effect:
	ConvF Y	**5.0** ± 8.9% (k=2)	Alpha	**1.04**
	ConvF Z	**5.0** ± 8.9% (k=2)	Depth	**1.85**

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

900 MHz System Performance Check

Measured Fluid Dielectric Parameters (Brain)

December 19, 2003

Frequency	e'	e"
800.000000 MHz	41.0666	19.4461
810.000000 MHz	40.9813	19.3988
820.000000 MHz	40.8246	19.3719
830.000000 MHz	40.7039	19.3630
840.000000 MHz	40.5452	19.3341
850.000000 MHz	40.3745	19.3205
860.000000 MHz	40.2441	19.2868
870.000000 MHz	40.1187	19.2936
880.000000 MHz	40.0105	19.2761
890.000000 MHz	39.9190	19.2348
900.000000 MHz	39.8595	19.1409
910.000000 MHz	39.7527	19.0969
920.000000 MHz	39.6432	19.0502
930.000000 MHz	39.5348	18.9805
940.000000 MHz	39.4073	18.9660
950.000000 MHz	39.3007	18.9462
960.000000 MHz	39.1774	18.9231
970.000000 MHz	39.0652	18.9256
980.000000 MHz	38.9477	18.9304
990.000000 MHz	38.8491	18.9117
1.000000000 GHz	38.7544	18.9109

835 MHz DUT Evaluation (Head)

Measured Fluid Dielectric Parameters (Brain)

December 19, 2003

Frequency	e'	e''
735.000000 MHz	42.3931	20.1573
745.000000 MHz	42.2372	20.1050
755.000000 MHz	42.0891	20.0184
765.000000 MHz	41.9968	19.9994
775.000000 MHz	41.8476	19.9623
785.000000 MHz	41.7502	19.9354
795.000000 MHz	41.6517	19.9316
805.000000 MHz	41.5664	19.8813
815.000000 MHz	41.4306	19.8514
825.000000 MHz	41.2824	19.7997
835.000000 MHz	41.1797	19.7636
845.000000 MHz	40.9991	19.7349
855.000000 MHz	40.8522	19.6985
865.000000 MHz	40.6879	19.6583
875.000000 MHz	40.5885	19.6523
885.000000 MHz	40.4698	19.6021
895.000000 MHz	40.4253	19.5221
905.000000 MHz	40.3264	19.4692
915.000000 MHz	40.2241	19.4286
925.000000 MHz	40.1435	19.4021
935.000000 MHz	40.0171	19.3422

835 MHz DUT Evaluation (Head)

Measured Fluid Dielectric Parameters (Brain)

December 20, 2003

Frequency	e'	e"
735.000000 MHz	41.8676	19.7622
745.000000 MHz	41.7280	19.7361
755.000000 MHz	41.6040	19.6846
765.000000 MHz	41.4498	19.6312
775.000000 MHz	41.3398	19.5574
785.000000 MHz	41.2264	19.5416
795.000000 MHz	41.1014	19.5079
805.000000 MHz	41.0210	19.4637
815.000000 MHz	40.8978	19.4481
825.000000 MHz	40.7585	19.4166
835.000000 MHz	40.5813	19.4232
845.000000 MHz	40.4642	19.3831
855.000000 MHz	40.2944	19.4002
865.000000 MHz	40.1678	19.3347
875.000000 MHz	40.0352	19.3435
885.000000 MHz	39.9385	19.3228
895.000000 MHz	39.8933	19.2286
905.000000 MHz	39.7851	19.1494
915.000000 MHz	39.6788	19.1009
925.000000 MHz	39.5555	19.0829
935.000000 MHz	39.4480	19.0422

835 MHz DUT Evaluation (Body)

Measured Fluid Dielectric Parameters (Muscle)

December 20, 2003

Frequency	e'	e''
735.000000 MHz	54.5745	21.6737
745.000000 MHz	54.4600	21.5868
755.000000 MHz	54.3252	21.5683
765.000000 MHz	54.2415	21.4745
775.000000 MHz	54.1410	21.4232
785.000000 MHz	54.0345	21.3752
795.000000 MHz	53.9532	21.3538
805.000000 MHz	53.8891	21.3041
815.000000 MHz	53.7946	21.2377
825.000000 MHz	53.6773	21.2366
835.000000 MHz	53.5342	21.1957
845.000000 MHz	53.4017	21.1853
855.000000 MHz	53.2886	21.1253
865.000000 MHz	53.1558	21.1172
875.000000 MHz	53.0499	21.1106
885.000000 MHz	52.9595	21.0775
895.000000 MHz	52.9064	20.9681
905.000000 MHz	52.8416	20.9167
915.000000 MHz	52.7388	20.8656
925.000000 MHz	52.6562	20.8180
935.000000 MHz	52.5768	20.7954

1800 MHz System Performance Check

Measured Fluid Dielectric Parameters (Brain)

December 21, 2003

Frequency	e'	e"
1.700000000 GHz	39.1217	14.1141
1.710000000 GHz	39.0784	14.1028
1.720000000 GHz	39.0186	14.0824
1.730000000 GHz	38.9395	14.1137
1.740000000 GHz	38.8675	14.1166
1.750000000 GHz	38.7972	14.1744
1.760000000 GHz	38.7381	14.2382
1.770000000 GHz	38.6961	14.2862
1.780000000 GHz	38.6395	14.3486
1.790000000 GHz	38.6168	14.3824
1.800000000 GHz	38.5669	14.4196
1.810000000 GHz	38.5349	14.4436
1.820000000 GHz	38.4826	14.4310
1.830000000 GHz	38.4340	14.4228
1.840000000 GHz	38.3977	14.4136
1.850000000 GHz	38.3570	14.3953
1.860000000 GHz	38.3178	14.4034
1.870000000 GHz	38.2800	14.4168
1.880000000 GHz	38.2252	14.4645
1.890000000 GHz	38.1850	14.5242
1.900000000 GHz	38.1598	14.5867

1880 MHz DUT Evaluation (Head)

Measured Fluid Dielectric Parameters (Brain)

December 21, 2003

Frequency	e'	e''
1.800000000 GHz	38.6107	13.5286
1.810000000 GHz	38.5721	13.5734
1.820000000 GHz	38.5484	13.5855
1.830000000 GHz	38.4999	13.5793
1.840000000 GHz	38.4634	13.5664
1.850000000 GHz	38.4070	13.5537
1.860000000 GHz	38.3564	13.5440
1.870000000 GHz	38.3006	13.5584
1.880000000 GHz	38.2420	13.5954
1.890000000 GHz	38.1915	13.6483
1.900000000 GHz	38.1478	13.7147
1.910000000 GHz	38.1066	13.7972
1.920000000 GHz	38.0811	13.8552
1.930000000 GHz	38.0540	13.9083
1.940000000 GHz	38.0333	13.9369
1.950000000 GHz	38.0082	13.9334
1.960000000 GHz	37.9561	13.9179
1.970000000 GHz	37.9145	13.8904
1.980000000 GHz	37.8514	13.8915
1.990000000 GHz	37.7905	13.8944
2.000000000 GHz	37.7180	13.9224

1880 MHz DUT Evaluation (Body)

Measured Fluid Dielectric Parameters (Muscle)

December 21, 2003

Frequency	e'	e''
1.800000000 GHz	51.7757	14.3962
1.810000000 GHz	51.7478	14.4168
1.820000000 GHz	51.6978	14.4346
1.830000000 GHz	51.6772	14.4637
1.840000000 GHz	51.6436	14.4755
1.850000000 GHz	51.6106	14.4941
1.860000000 GHz	51.5907	14.5052
1.870000000 GHz	51.5503	14.5237
1.880000000 GHz	51.5223	14.5707
1.890000000 GHz	51.5092	14.6120
1.900000000 GHz	51.4607	14.6634
1.910000000 GHz	51.4372	14.6965
1.920000000 GHz	51.4104	14.7398
1.930000000 GHz	51.3731	14.7929
1.940000000 GHz	51.3648	14.8129
1.950000000 GHz	51.3311	14.8420
1.960000000 GHz	51.2934	14.8572
1.970000000 GHz	51.2656	14.8851
1.980000000 GHz	51.2019	14.9145
1.990000000 GHz	51.1837	14.9910
2.000000000 GHz	51.1190	15.0117

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