February 24, 2003

Federal Communications Commission
Equipment Approval Services
7435 Oakland Mills Road
Columbia, MD 21046
Attn: Diane Poole

SUBJECT: **M/A-COM Private Radio Systems, Inc.**
FCC ID: OWDTR-0013-E
731 Confirmation No.: EA808738
Correspondence No.: 24835

Dear Diane,

On behalf of M/A-COM Private Radio Systems, Inc. is our response to questions 3-5 of your e-mail dated February 21, 2003 requesting additional information for the subject application.

1. The eight battery types are the same voltage (7.5V). The NiMH battery has a nominal capacity of 2400mAh and the NiCd battery has a nominal capacity of 1600mAh. In this case the previous testing was based on the NiMH and NiCd battery types (immersion rated, non-intrinsically safe). The non-immersion rated battery pack is manufactured identically to the immersion rated pack. The only difference involves immersion testing (the immersion rated packs are subjected to statistical sample testing of immersion performance), and warranty (the immersion rated packs are warranted not to leak). The non-immersion battery pack is electrically and mechanically identical to the originally tested immersion type battery packs and does not require additional SAR evaluation. The non-intrinsically safe battery pack previously tested uses a copper wire (0Ω resistance) to connect between the positive terminal of the cell stack and the flex board within the pack. The intrinsically safe battery pack uses a Nichrome wire (0.23Ω resistance) in place of the copper wire. Due to the electrical differences between the intrinsically safe and non-intrinsically safe batteries, we have re-measured the highest SAR levels for face-held and body-worn configurations using the intrinsically safe battery pack (NiMH and NiCd). Please see attached test data and test plots.
2. Before each test the radio was keyed to transmit for a period of 20 seconds in order for the power to stabilize. As a result, the power drift measured after each test was maintained to within 5% of the start power. Attached is power drift versus time evaluation data over a thirty-minute period, and measurement data tested with no turn-on delay at the two highest SAR level configurations to show that the initially reported SAR values were conservative. Included in the measurement data are scaled SAR values by drift.
3. Attached is system performance check data performed on August 29, 2002 for our 1800MHz system manufacturer dipole to show that our system was within 10% of the performance requirements at the time of the evaluation.

If you have any further questions or comments concerning the above, please contact the undersigned.

Sincerely,

Jonathan Hughes
General Manager
Celltech Labs Inc.

SAR MEASUREMENT DATA

SAR MEASUREMENT RESULTS												
With Intrinsically Safe Battery (NiCd - BKB191210/5, NiMH - BKB191210/6)												
Test Type	Freq. (MHz)	Channel	Test Mode	Conducted Power (dBm)		Antenna P/N	Battery Type	Accessory Type	Separation Distance (cm)	SAR 1g (W/kg)			
										100% Duty Cycle		50% Duty Cycle	
				Before	After					Without Scaling	Scaled by Drift	Without Scaling	Scaled by Drift
Face	155.00	Mid	CW	37.68	37.54	KRE1011219/2	NiCd	Speaker-Mic Antenna	2.5	2.20	2.27	1.10	1.14
Face	155.00	Mid	CW	37.68	37.36	KRE1011219/2	NiMH	Speaker-Mic Antenna	2.5	1.51	1.63	0.755	0.815
Body	155.00	Mid	CW	37.68	37.59	KRE1011219/2	NiCd	Metal Belt-Clip	1.1	4.23	4.32	2.12	2.16
Body	155.00	Mid	CW	37.68	37.23	KRE1011219/2	NiMH	Metal Belt-Clip	1.1	4.76	5.28	2.38	2.64

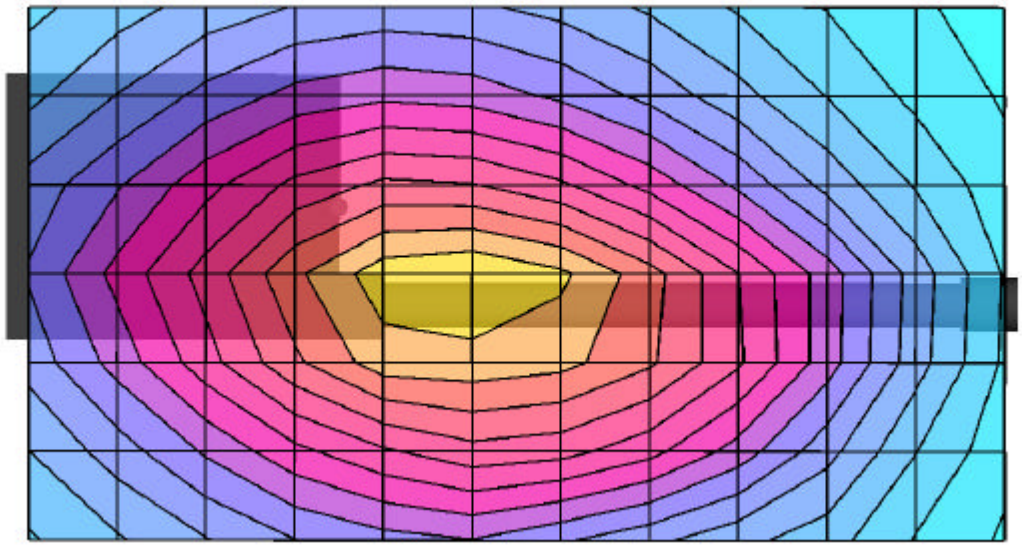
ANSI / IEEE C95.1 1992 - SAFETY LIMIT FACE & BODY: 8.0 W/kg (averaged over 1 gram) Spatial Peak - Controlled Exposure / Occupational						
Measured Mixture Type	150MHz Brain		150MHz Body		Atmospheric Pressure	101.0 kPa
	Target	Measured	Target	Measured	Relative Humidity	46 %
Dielectric Constant	52.3 (+/- 5%)	54.3	61.9 (+/- 5%)	61.5	Ambient Temperature	23.3 °C
Conductivity	0.76 (+/- 5%)	0.78	0.80 (+/- 5%)	0.81	Fluid Temperature	21.1 °C
r (Kg/m^3)		1000			Fluid Depth	≥ 15 cm
Test Date(s)		February 21, 2003			Phantom Section	Planar

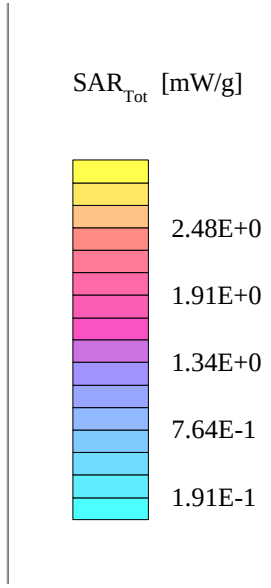
Note(s): 1. The ambient and fluid temperatures were measured prior to, and during, the fluid dielectric parameter check and the SAR evaluation.
2. The temperatures listed in the table above were consistent for all measurement periods.
3. SAR measurements were performed with no turn-on delay.

M/A-COM PRS INC. FCC ID: OWDTR-0013-E

Small Planar Phantom; Planar Section; Position: (90°,0°)
Probe: ET3DV6 - SN1590; ConvF(9.40,9.40,9.40); Crest factor: 1.0
150 MHz Brain : σ = 0.78 mho/m ε_r = 54.3 ρ = 1.00 g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7
SAR (1g): 2.20 mW/g, SAR (10g): 1.65 mW/g

Face-Held SAR with Speaker-Microphone Antenna Antenna Version Plus (KRY1011617/184R1A)
2.5cm Separation Distance from planar phantom
Portable VHF PTT Radio Transceiver Model: P7100(IP)
Helical Coil Antenna (KRE1011219/2)
NiCd Battery - Intrinsically Safe (BKB191210/5)
Continuous Wave Mode
Mid Channel [155.00 MHz]
Conducted Power: 37.68 dBm
Ambient Temp. 23.3°C; Fluid Temp. 21.1°C
Date Tested: February 21, 2003





M/A-COM PRS INC. FCC ID: OWDTR-0013-E

Small Planar Phantom; Planar Section; Position: (90°,0°)
Probe: ET3DV6 - SN1590; ConvF(9.40,9.40,9.40); Crest factor: 1.0
150 MHz Brain : σ = 0.78 mho/m ε_r = 54.3 ρ = 1.00 g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7
SAR (1g): 1.51 mW/g, SAR (10g): 1.13 mW/g

Face-Held SAR with Speaker-Microphone Antenna Version Plus (KRY1011617/184R1A)
2.5cm Separation Distance from planar phantom
Portable VHF PTT Radio Transceiver Model: P7100(IP)
Helical Coil Antenna (KRE1011219/2)
NiMH Battery - Intrinsically Safe (BKB191210/6)
Continuous Wave Mode
Mid Channel [155.00 MHz]
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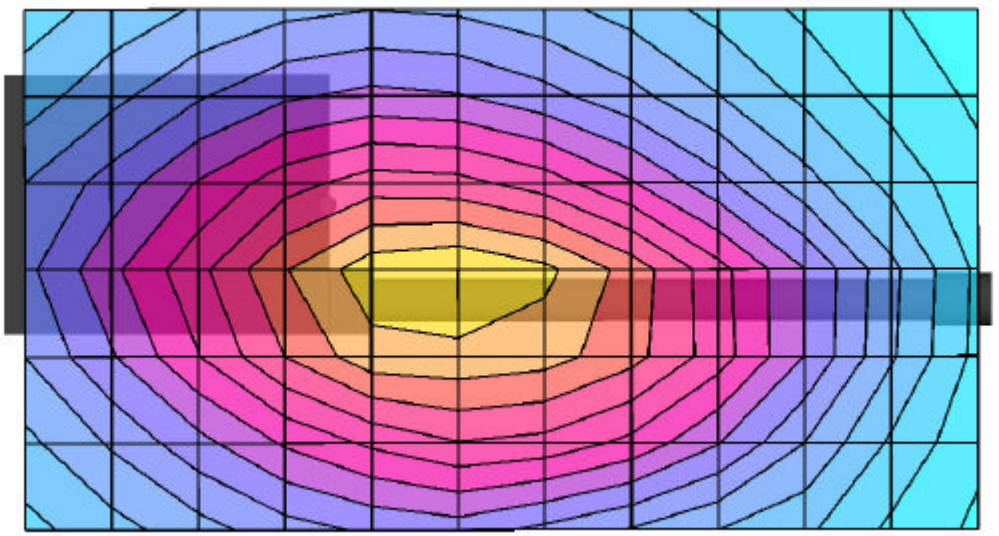
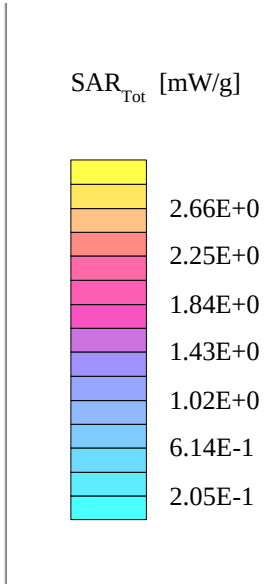
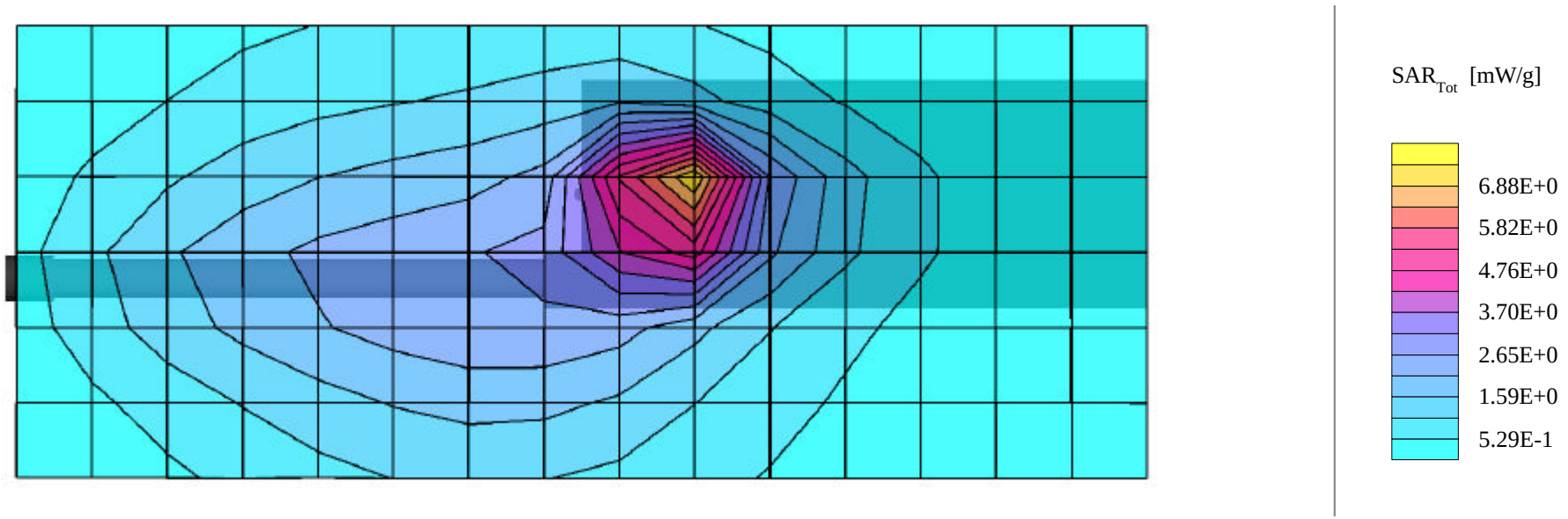




M/A-COM PRS INC. FCC ID: OWDTR-0013-E

Small Planar Phantom; Planar Section; Position: (270°,180°)
Probe: ET3DV6 - SN1590; ConvF(9.10,9.10,9.10); Crest factor: 1.0
150 MHz Muscle: σ = 0.81 mho/m ε_r = 61.5 ρ = 1.00 g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7
SAR (1g): 4.23 mW/g, SAR (10g): 2.25 mW/g

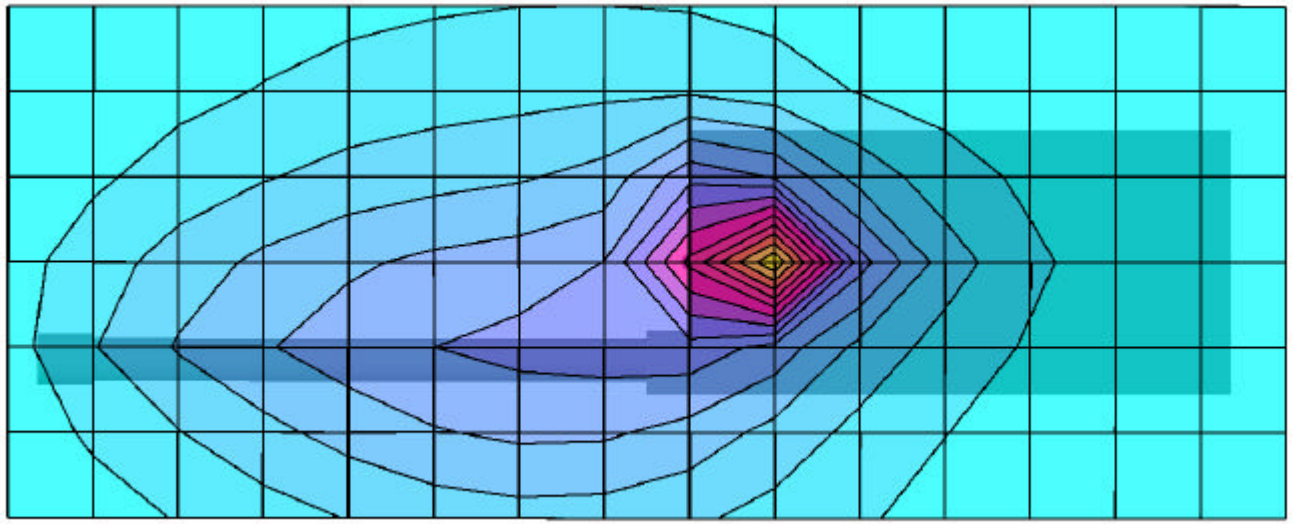
Body-Worn SAR with Metal Belt-Clip (KRY1011647/1)
(1.1cm Belt-Clip Separation Distance)
Portable VHF PTT Radio Transceiver Model: P7100(IP)
Helical Coil Antenna (KRE1011219/2)
NiCd Battery - Intrinsically Safe (BKB191210/5)
Continuous Wave Mode
Mid Channel [155.00 MHz]
Conducted Power: 37.68 dBm
Ambient Temp. 23.3°C; Fluid Temp. 21.1°C
Date Tested: February 21, 2003



M/A-COM PRS INC. FCC ID: OWDTR-0013-E

Small Planar Phantom; Planar Section; Position: (270°,180°)
Probe: ET3DV6 - SN1590; ConvF(9.10,9.10,9.10); Crest factor: 1.0
150 MHz Muscle: σ = 0.81 mho/m ε_r = 61.5 ρ = 1.00 g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7
SAR (1g): 4.76 mW/g, SAR (10g): 2.48 mW/g

Body-Worn SAR with Metal Belt-Clip (KRY1011647/1)
(1.1cm Belt-Clip Separation Distance)
Portable VHF PTT Radio Transceiver Model: P7100(IP)
Helical Coil Antenna (KRE1011219/2)
NiMH Battery - Intrinsically Safe (BKB191210/6)
Continuous Wave Mode
Mid Channel [155.00 MHz]
Conducted Power: 37.68 dBm
Ambient Temp. 23.3°C; Fluid Temp. 21.1°C
Date Tested: February 21, 2003



SAR MEASUREMENT DATA

SAR COMPARISON BETWEEN 20 SECOND STABILIZING PERIOD & NO TURN-ON DELAY (TWO WORST-CASE BODY CONFIGS.)

Turn-on Delay Period	Freq. (MHz)	Chan.	Test Mode	Measured Conducted Power (dBm)			Antenna P/N	Battery Type	Body-worn Accessory	Access. Separ. Dist. (cm)	SAR 1g (W/kg)			
											100% Duty Cycle		50% Duty Cycle	
				Before	After	Drift					Without Scaling	Scaled by Drift	Without Scaling	Scaled by Drift
20 sec.	155.00	Mid	CW	37.68	37.68	0.0	KRE1011219/2	NiMH	Metal Belt-Clip	1.1	4.97	4.97	2.49	2.49
No delay*	155.00	Mid	CW	37.68	37.35	-0.33	KRE1011219/2	NiMH	Metal Belt-Clip	1.1	5.31	5.73	2.66	2.87
20 sec.	155.00	Mid	CW	37.68	37.63	-0.05	KRE1011219/2	NiCd	Spkr-Mic Ant.	1.3	3.76	3.80	1.88	1.90
No delay*	155.00	Mid	CW	37.68	37.22	-0.46	KRE1011219/2	NiCd	Spkr-Mic Ant.	1.3	4.06	4.52	2.03	2.26

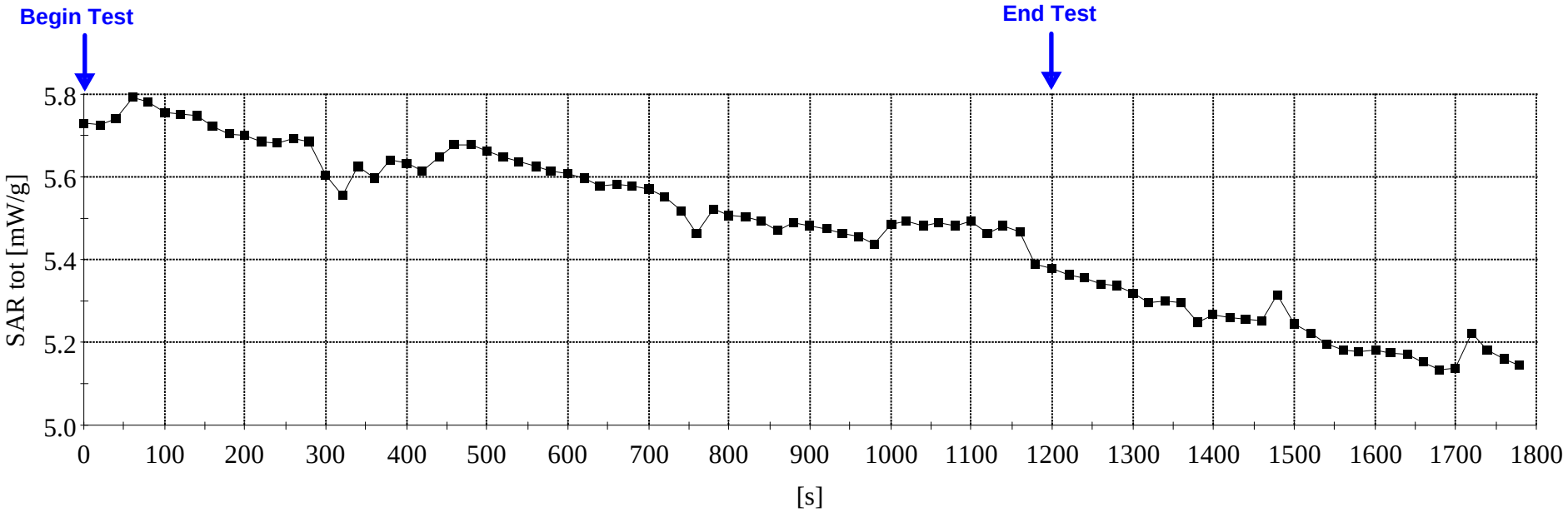
*** Test Date:** 02/21/03
*** Conductivity:** 0.81
*** Dielectric Constant:** 61.5
*** Ambient Temp.:** 23.3°C
*** Fluid Temp.:** 21.1°C
*** Fluid Depth:** [3] 15 cm
*** Atmospheric Pressure:** 101.0 kPa
*** Relative Humidity:** 46%

M/A-COM PRS INC. FCC ID: OWDTR-0013-E

Small Planar Phantom
Probe: ET3DV6 - SN1590; ConvF(9.10,9.10,9.10); Crest factor: 1.0
150 MHz Muscle: σ = 0.81 mho/m ε_r = 61.5 ρ = 1.00 g/cm^3

SAR DRIFT VERSUS TIME (30 mins)

Body-Worn SAR with Metal Belt-Clip (KRY1011647/1)
(1.1cm Belt-Clip Separation Distance)
Portable VHF PTT Radio Transceiver Model: P7100(IP)
Helical Coil Antenna (KRE1011219/2)
NiMH Battery - Non-Intrinsically Safe (BKB191210/4)
Continuous Wave Mode
Mid Channel [155.00 MHz]
Conducted Power: 37.68 dBm
Ambient Temp. 23.3°C; Fluid Temp. 21.1°C
Date Tested: February 21, 2003

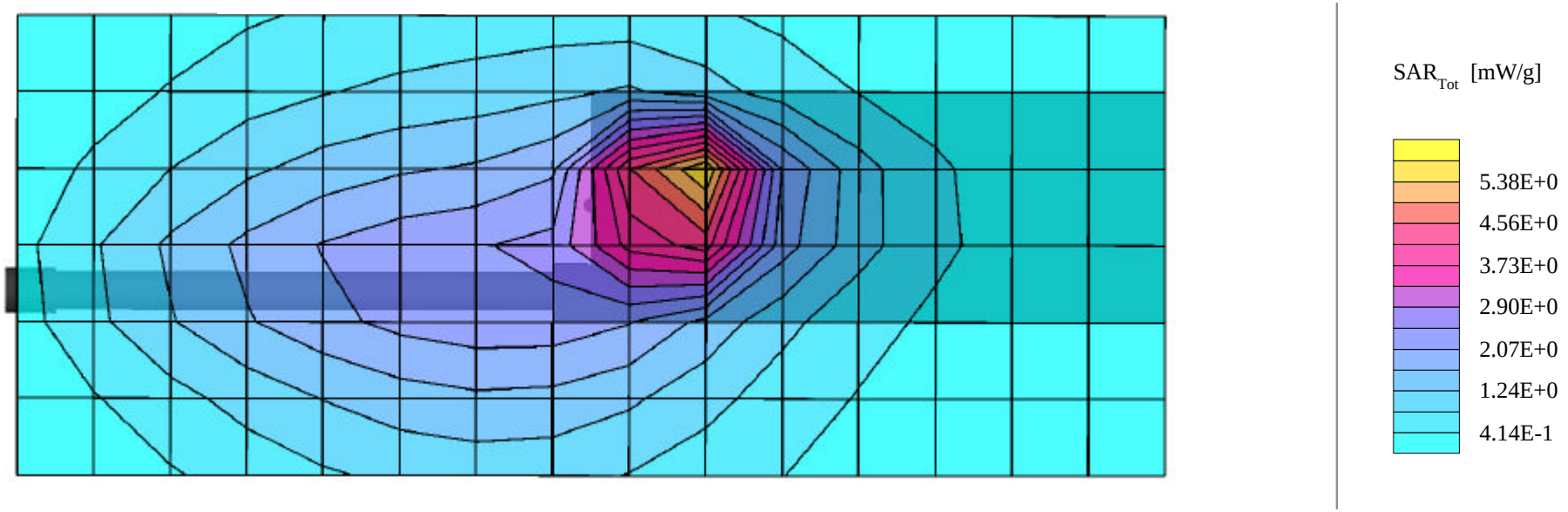


M/A-COM PRS INC. FCC ID: OWDTR-0013-E

Small Planar Phantom; Planar Section; Position: (270°,180°)
Probe: ET3DV6 - SN1590; ConvF(9.10,9.10,9.10); Crest factor: 1.0
150 MHz Muscle: σ = 0.81 mho/m ε_r = 61.5 ρ = 1.00 g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7
SAR (1g): 5.31 mW/g, SAR (10g): 2.86 mW/g

Body-Worn SAR with Metal Belt-Clip (KRY1011647/1)
(1.1cm Belt-Clip Separation Distance)
Portable VHF PTT Radio Transceiver Model: P7100(IP)
Helical Coil Antenna (KRE1011219/2)
NiMH Battery - Non-Intrinsically Safe (BKB191210/4)
Continuous Wave Mode
Mid Channel [155.00 MHz]
Conducted Power: 37.68 dBm
Ambient Temp. 23.3°C; Fluid Temp. 21.1°C
Date Tested: February 21, 2003

SAR EVALUATION WITH NO TURN-ON DELAY

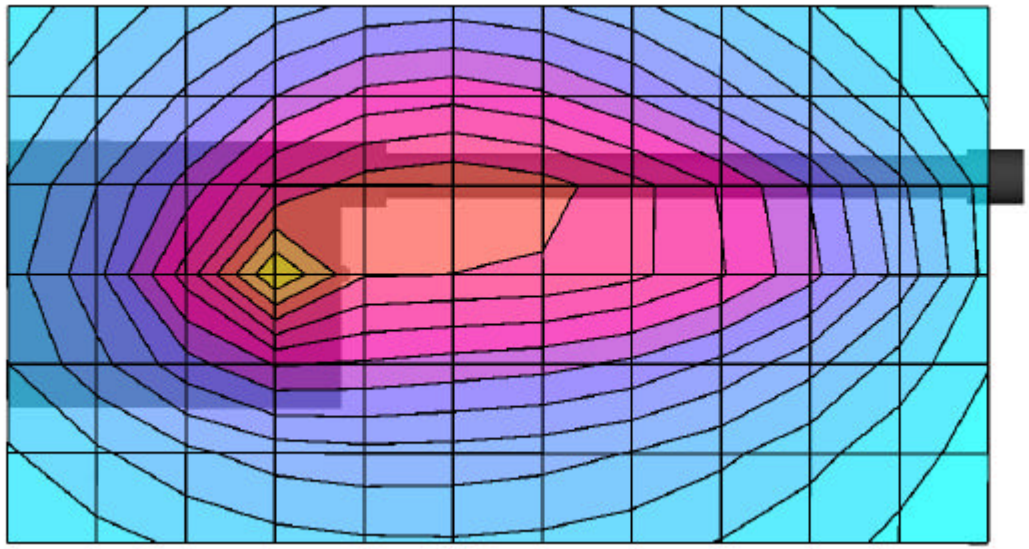


M/A-COM PRS INC. FCC ID: OWDTR-0013-E

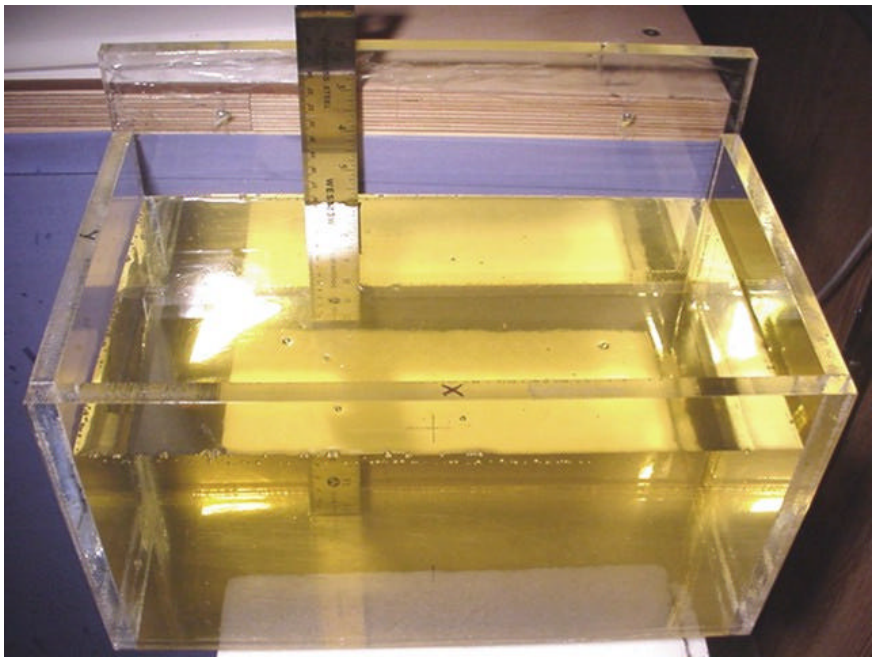
Small Planar Phantom; Planar Section; Position: (270°,180°)
Probe: ET3DV6 - SN1590; ConvF(9.10,9.10,9.10); Crest factor: 1.0
150 MHz Muscle: σ = 0.81 mho/m ε_r = 61.5 ρ = 1.00 g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7
SAR (1g): 4.06 mW/g, SAR (10g): 2.62 mW/g

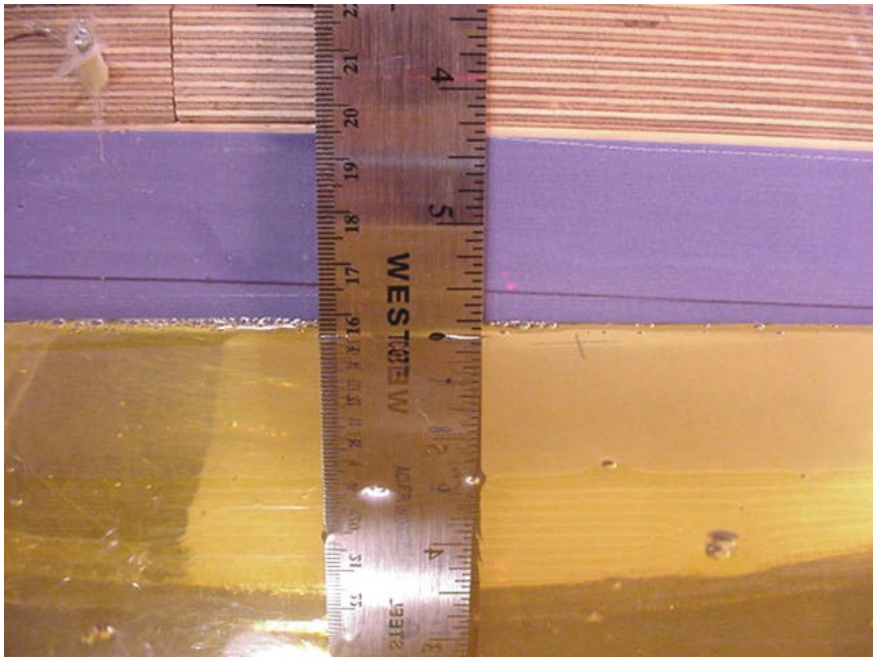
Body-Worn SAR with Speaker-Microphone Antenna Version Plus (KRY1011617/184R1A)
(1.3cm Lapel-Clip Separation Distance)
Portable VHF PTT Radio Transceiver Model: P7100(IP)
Helical Coil Antenna (KRE1011219/2)
NiCd Battery - Non-Intrinsically Safe (BKB191210/3)
Continuous Wave Mode
Mid Channel [155.00 MHz]
Conducted Power: 37.68 dBm
Ambient Temp. 23.3°C; Fluid Temp. 21.1°C
Date Tested: February 21, 2003

SAR EVALUATION WITH NO TURN-ON DELAY



Fluid Depth Photographs





150MHz EUT Evaluation (Face)

Measured Fluid Dielectric Parameters (Brain)

February 21, 2003

Frequency	e'	e''
50.000000 MHz	63.8356	253.6875
60.000000 MHz	62.7398	213.5815
70.000000 MHz	60.5267	185.0615
80.000000 MHz	59.3906	163.6835
90.000000 MHz	58.7425	146.9347
100.000000 MHz	57.3827	133.6352
110.000000 MHz	56.8379	122.7500
120.000000 MHz	56.1588	113.7439
130.000000 MHz	55.4456	105.7398
140.000000 MHz	54.7405	99.1667
150.000000 MHz	54.2816	93.5879
160.000000 MHz	53.7903	88.7802
170.000000 MHz	53.1502	84.5934
180.000000 MHz	52.6359	80.5859
190.000000 MHz	52.0790	77.0881
200.000000 MHz	51.7559	74.0233
210.000000 MHz	51.2660	71.1819
220.000000 MHz	50.8554	68.7230
230.000000 MHz	50.3810	66.3195
240.000000 MHz	49.9645	64.2668
250.000000 MHz	49.5165	62.1802

150MHz EUT Evaluation (Body)

Measured Fluid Dielectric Parameters (Muscle)

February 21, 2003

Frequency	e'	e''
50.000000 MHz	66.1026	272.0522
60.000000 MHz	66.1942	228.6425
70.000000 MHz	65.4713	196.3246
80.000000 MHz	65.2044	173.6783
90.000000 MHz	64.8269	154.9451
100.000000 MHz	63.7724	140.3779
110.000000 MHz	63.5011	128.8555
120.000000 MHz	62.9339	119.0799
130.000000 MHz	62.3819	110.0331
140.000000 MHz	62.4108	103.1111
150.000000 MHz	61.4832	97.1354
160.000000 MHz	61.3709	91.8166
170.000000 MHz	61.0525	87.3216
180.000000 MHz	60.8392	82.9619
190.000000 MHz	60.5267	79.3440
200.000000 MHz	60.3020	75.9471
210.000000 MHz	59.9936	72.9530
220.000000 MHz	59.6888	70.3005
230.000000 MHz	59.3788	67.6918
240.000000 MHz	58.9989	65.4951
250.000000 MHz	58.7908	63.4849

System Performance Check - 300MHz Dipole

Large Planar Phantom; Planar Section

Probe: ET3DV6 - SN1590; ConvF(8.20,8.20,8.20); Crest factor: 1.0; 300 MHz Brain: σ = 0.88 mho/m ε_r = 45.5 ρ = 1.00 g/cm^3

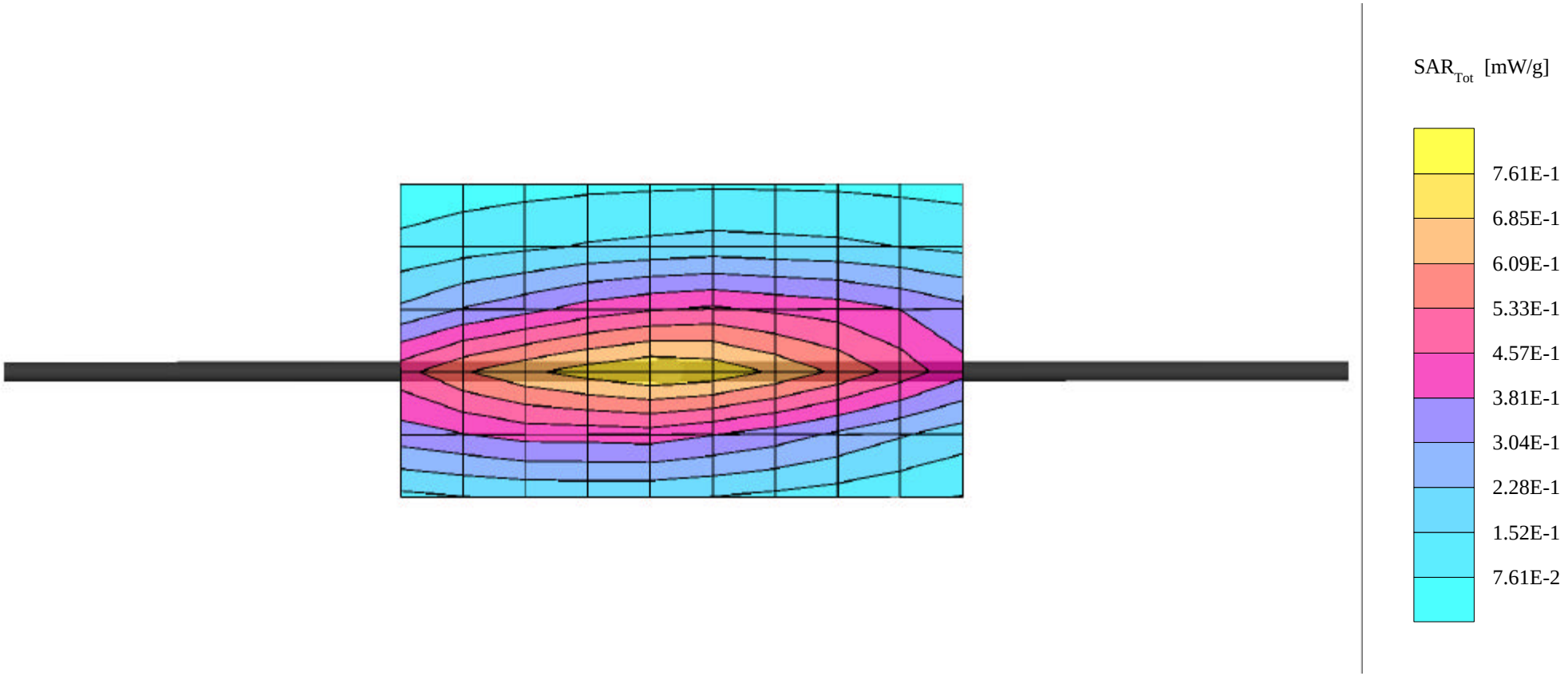
Cube 5x5x7: Peak: 1.22 mW/g, SAR (1g): 0.759 mW/g, SAR (10g): 0.498 mW/g, (Worst-case extrapolation)

Penetration depth: 12.1 (10.3, 14.6) [mm]; Powerdrift: -0.01 dB

Ambient Temp. 23.3°C; Fluid Temp. 21.1°C

Forward Conducted Power: 250 mW

Date Tested: February 21, 2003



300MHz System Performance Check

Measured Fluid Dielectric Parameters (Brain)

February 21, 2003

Frequency	e'	e''
200.000000 MHz	49.4525	71.9689
210.000000 MHz	48.9899	69.3121
220.000000 MHz	48.6794	66.7891
230.000000 MHz	48.1426	64.4306
240.000000 MHz	47.6666	62.4028
250.000000 MHz	47.3379	60.4332
260.000000 MHz	46.8780	58.7377
270.000000 MHz	46.4853	57.1707
280.000000 MHz	46.1777	55.6477
290.000000 MHz	45.8745	54.1726
300.000000 MHz	45.5160	52.7133
310.000000 MHz	45.0814	51.4128
320.000000 MHz	44.8168	50.2683
330.000000 MHz	44.5371	49.1176
340.000000 MHz	44.2654	48.0460
350.000000 MHz	43.9355	47.0063
360.000000 MHz	43.6375	46.1154
370.000000 MHz	43.4456	45.1449
380.000000 MHz	43.2798	44.3334
390.000000 MHz	43.0127	43.4557
400.000000 MHz	42.7641	42.7266

300MHz SYSTEM VALIDATION DIPOLE

Type:	**300MHz Validation Dipole**
Serial Number:	**135**
Place of Calibration:	**Celltech Research Inc.**
Date of Calibration:	**October 15, 2002**

Celltech Research Inc. hereby certifies that this device has been calibrated on the date indicated above.

Calibrated by: 

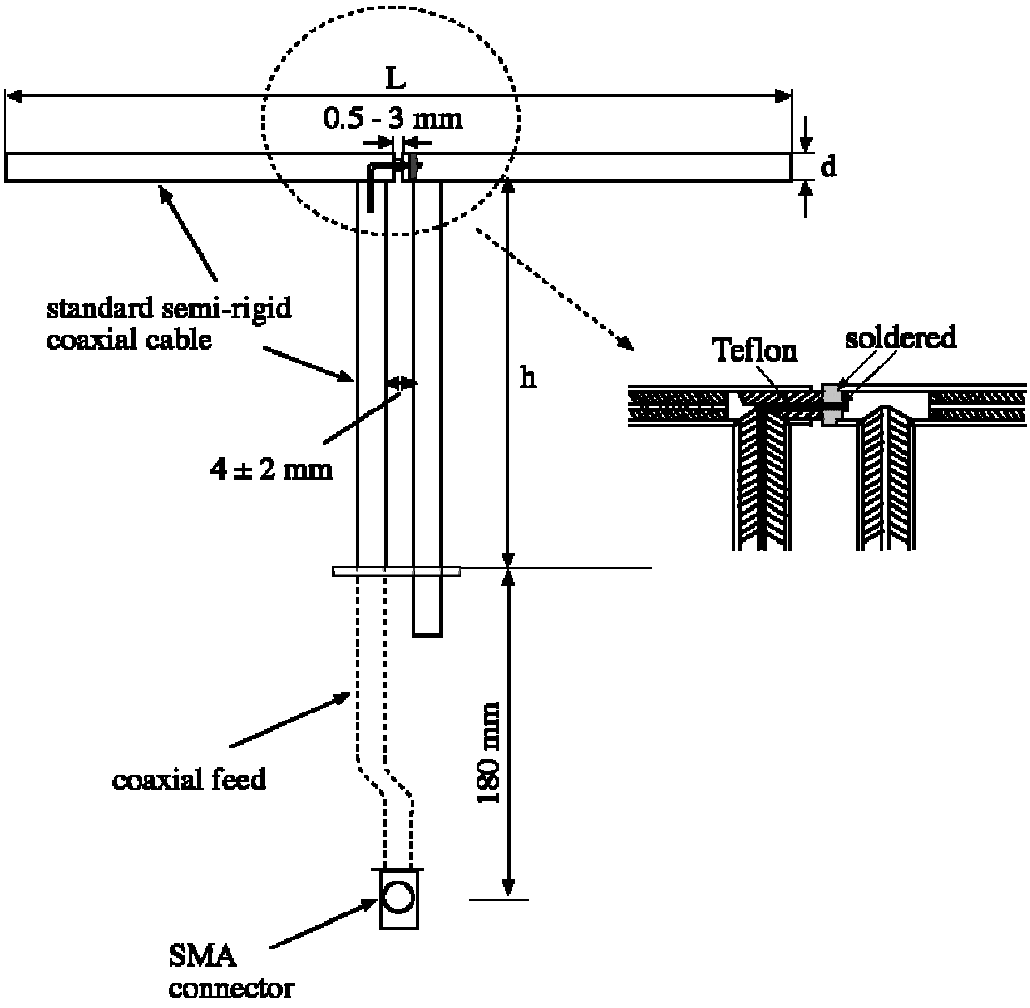
Approved by: 

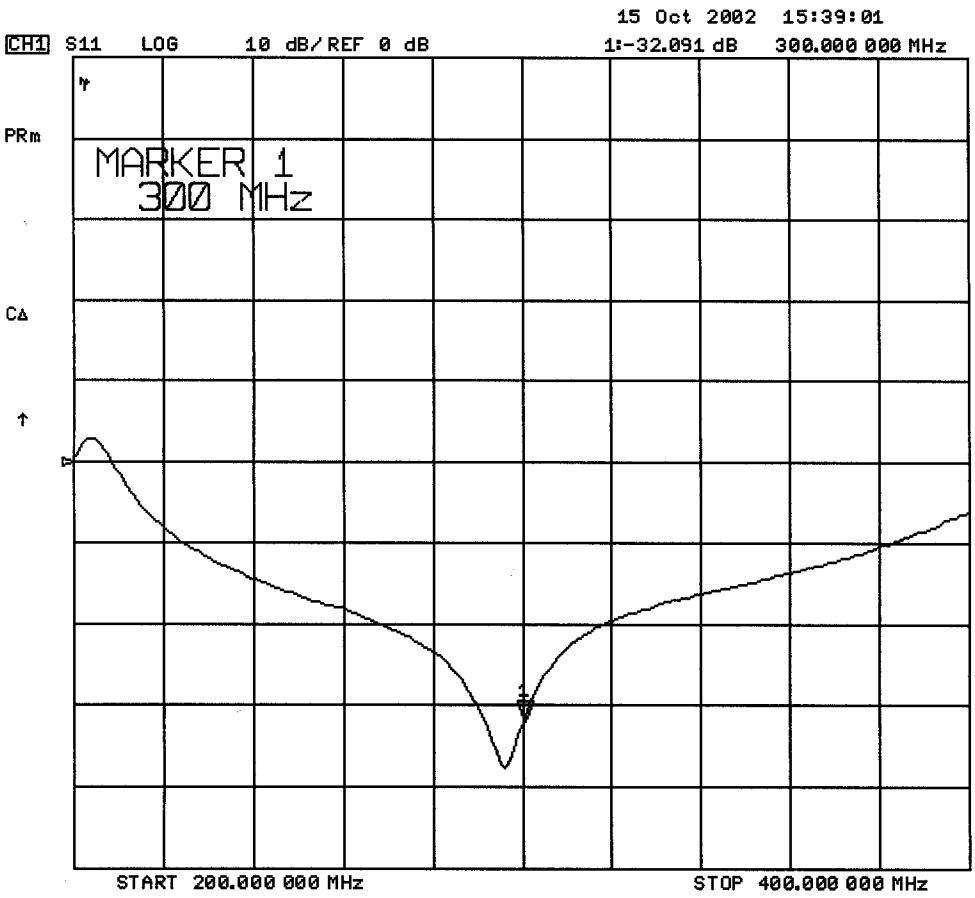
Celltech Research Inc. 1955 Moss Court, Kelowna, B.C. Canada V1Y 9L3
Tel. 250-448-7047 • Fax. 250-448-7046 • e-mail: info@celltechlabs.com
www.celltechlabs.com

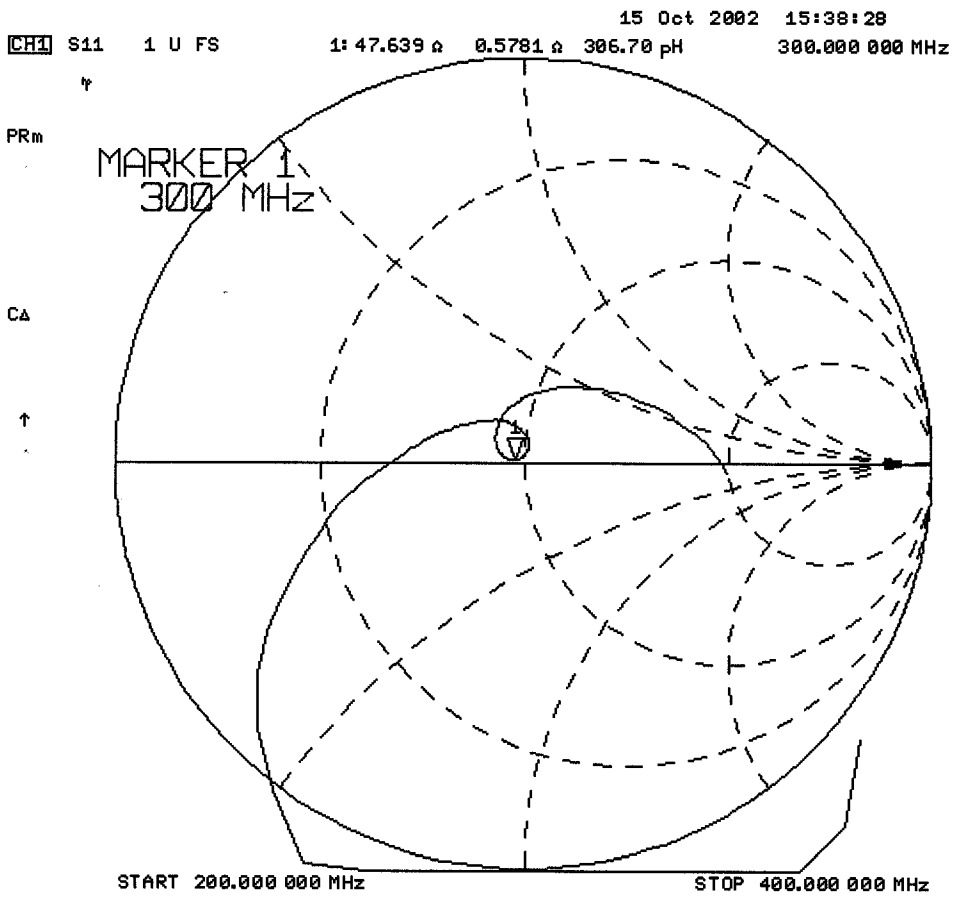
1. Dipole Construction & Electrical Characteristics

The validation dipole was constructed in accordance with the IEEE Std "Recommended Practice for Determining the Spatial-Peak Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques". The electrical properties were measured using an HP 8753E Network Analyzer. The network analyzer was calibrated to the validation dipole N-type connector feed point using an HP85032E Type N calibration kit. The dipole was placed parallel to a planar phantom at a separation distance of 15.0mm from the simulating fluid using a loss-less dielectric spacer. The measured input impedance is:

Feed point impedance at 300MHz	Re{Z} = 47.639Ω
	Im{Z} = 0.5781Ω
Return Loss at 300MHz	-32.091dB




15 Oct 2002 15:39:01
CH1 S11 LOG 10 dB/ REF 0 dB
1:-32.091 dB 300.000 000 MHz
PRm
MARKER 1
300 MHz
CA
START 200.000 000 MHz
STOP 400.000 000 MHz


15 Oct 2002 15:38:28
CH1 S11 1 U FS
1: 47.639 Ω 0.5781 Ω 306.70 pH
300.000 000 MHz
PRm
MARKER 1
300 MHz
CA
START 200.000 000 MHz
STOP 400.000 000 MHz

Validation Dipole Dimensions

Frequency (MHz)	L (mm)	h (mm)	d (mm)
300	420.0	250.0	6.2
450	288.0	167.0	6.2
835	161.0	89.8	3.6
900	149.0	83.3	3.6
1450	89.1	51.7	3.6
1800	72.0	41.7	3.6
1900	68.0	39.5	3.6
2000	64.5	37.5	3.6
2450	51.8	30.6	3.6
3000	41.5	25.0	3.6

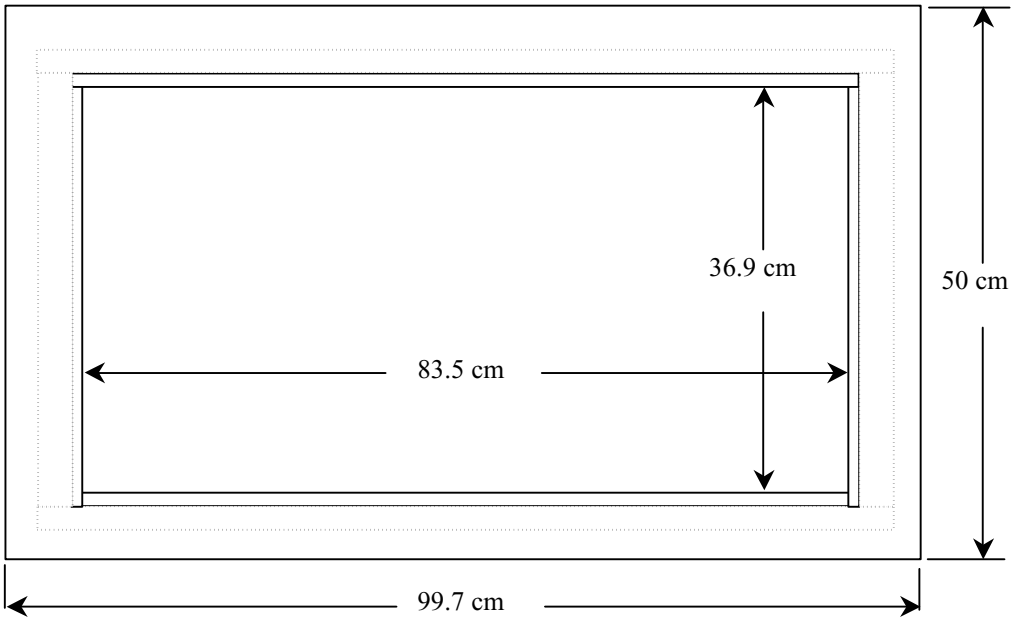
2. Validation Phantom

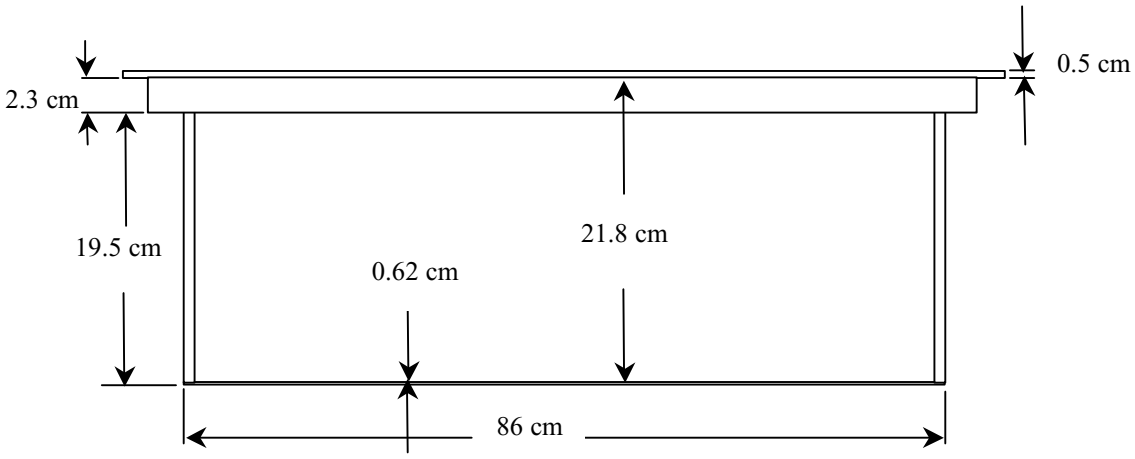
The validation phantom was constructed using relatively low-loss tangent Plexiglas material. The dimensions of the phantom are as follows:

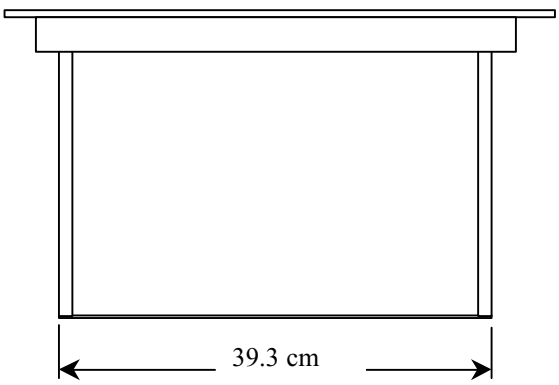
Length: 83.5 cm
Width: 36.9 cm
Height: 21.8 cm

The bottom of the phantom is constructed of 6.2 ± 0.1mm Plexiglas.

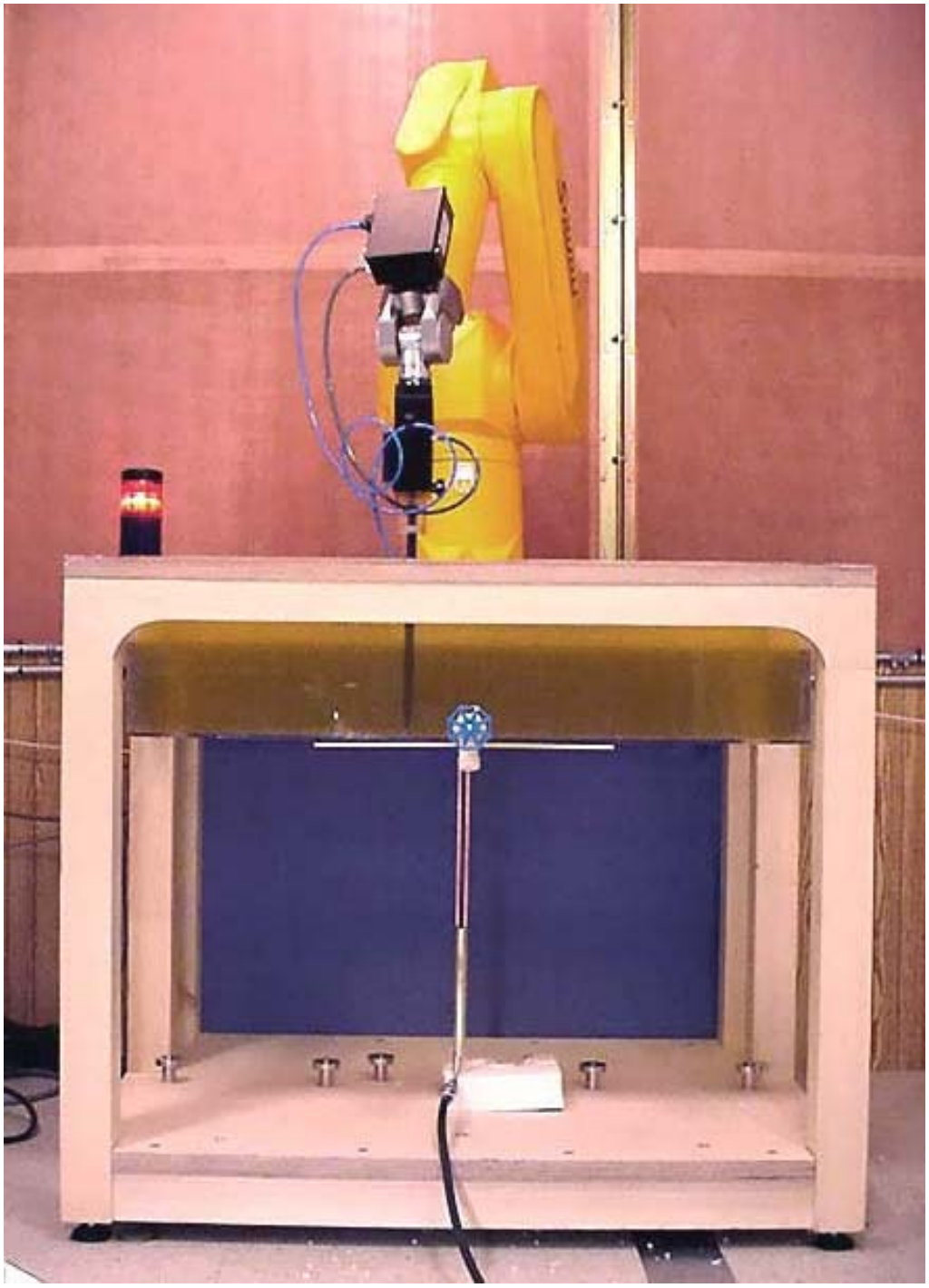
Dimensions of Plexiglas Planar Phantom







300MHz System Validation Setup



300MHz System Validation Setup

3. Measurement Conditions

The planar phantom was filled with brain simulating tissue having the following electrical parameters at 300MHz:

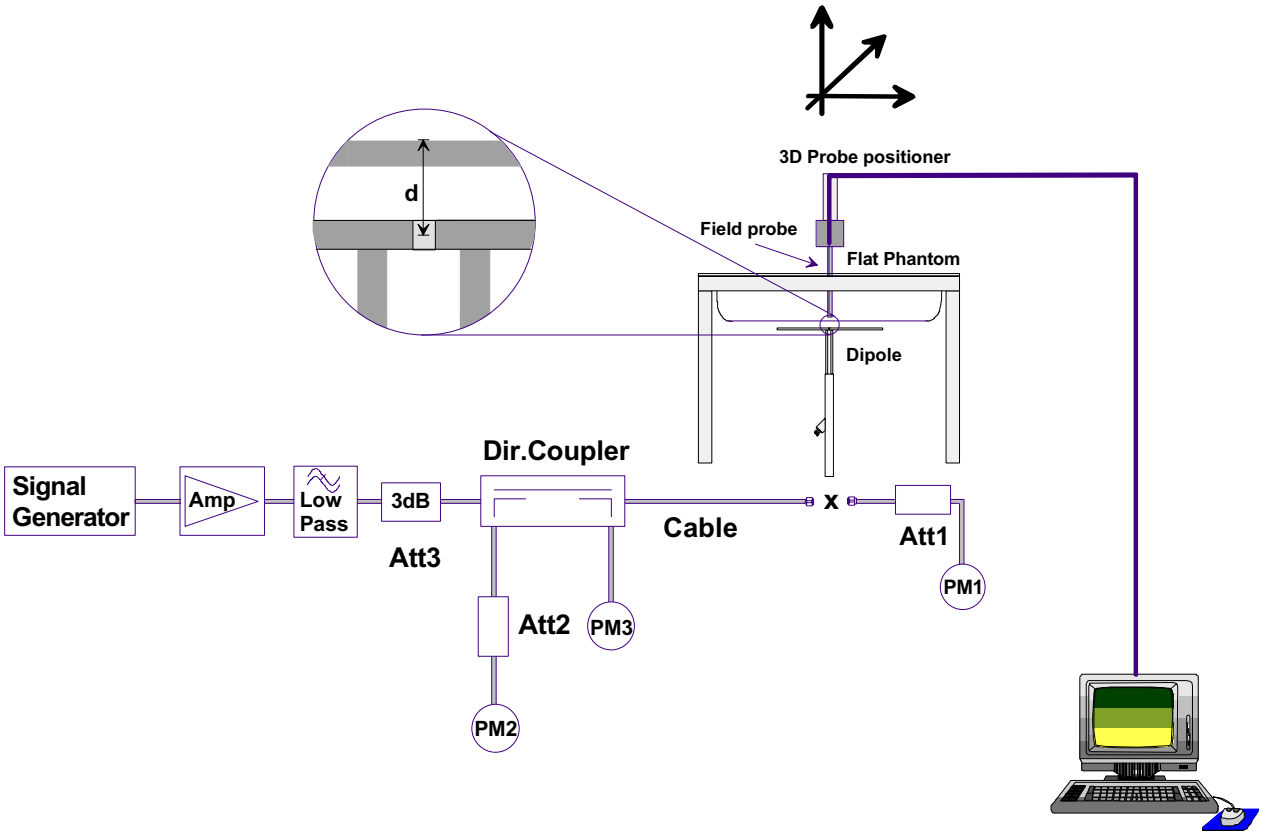
Relative Permittivity:	45.3
Conductivity:	0.90 mho/m
Ambient Temperature:	23.3°C
Fluid Temperature:	23.0°C
Fluid Depth:	≥ 15cm

The 300MHz simulating tissue consists of the following ingredients:

Ingredient	Percentage by weight
Water	37.56%
Sugar	55.32%
Salt	5.95%
HEC	0.98%
Dowicil 75	0.19%
300MHz Target Dielectric Parameters at 22°C	ε_r = 45.3 σ = 0.87 S/m

4. SAR Measurement

The SAR measurement was performed with the E-field probe in mechanical detection mode only. The setup and determination of the forward power into the dipole was performed using the following procedures.



First the power meter PM1 (including attenuator Att1) is connected to the cable to measure the forward power at the location of the dipole connector (X). The signal generator is adjusted for the desired forward power at the dipole connector (taking into account the attenuation of Att1) as read by power meter PM2. After connecting the cable to the dipole, the signal generator is readjusted for the same reading at power meter PM2. If the signal generator does not allow adjustment in 0.01dB steps, the remaining difference at PM2 must be taken into consideration. PM3 records the reflected power from the dipole to ensure that the value is not changed from the previous value. The reflected power should be 20dB below the forward power.

Ten SAR measurements were performed in order to achieve repeatability and to establish an average target value.

Validation Dipole SAR Test Results

Validation Measurement	SAR @ 0.25W Input averaged over 1g	SAR @ 1W Input averaged over 1g	SAR @ 0.25W Input averaged over 10g	SAR @ 1W Input averaged over 10g	Peak SAR @ 0.25W Input
Test 1	0.755	3.02	0.496	1.98	1.21
Test 2	0.757	3.03	0.497	1.99	1.22
Test 3	0.750	3.00	0.493	1.97	1.21
Test 4	0.763	3.05	0.500	2.00	1.23
Test 5	0.769	3.08	0.505	2.02	1.24
Test 6	0.755	3.02	0.496	1.98	1.21
Test 7	0.718	2.87	0.472	1.89	1.16
Test 8	0.730	2.92	0.479	1.92	1.18
Test 9	0.717	2.87	0.471	1.88	1.15
Test10	0.726	2.90	0.477	1.91	1.17
Average Value	0.744	2.98	0.488	1.95	1.20

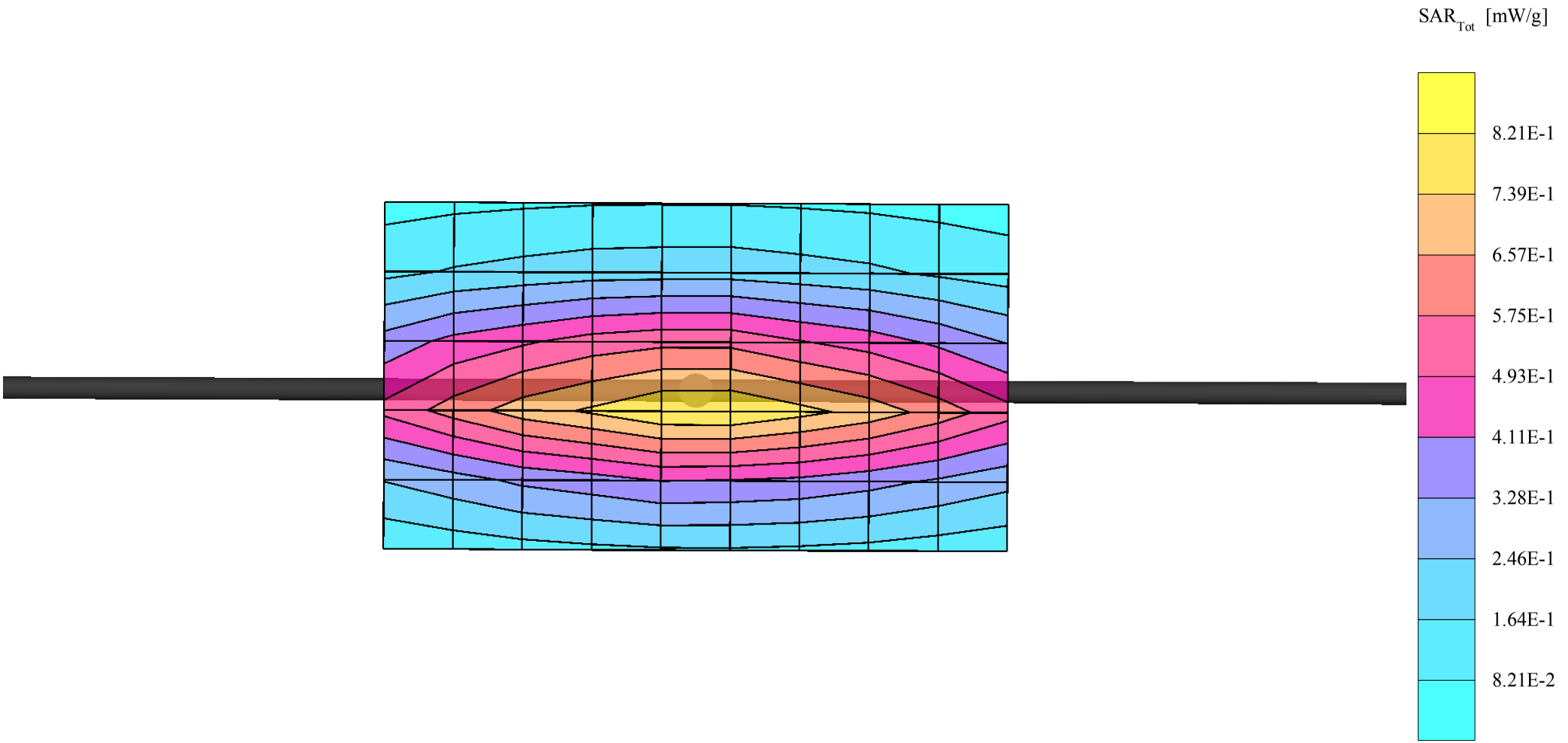
The results have been normalized to 1W (forward power) into the dipole.

Averaged over 1cm (1g) of tissue: 2.98 mW/g

Averaged over 10cm (10g) of tissue: 1.95 mW/g

Dipole 300 MHz

Frequency: 300 MHz; Conducted Input Power: 250 [mW]
Large Planar Phantom; Planar Section
Probe: ET3DV6 - SN1387; ConvF(8.00,8.00,8.00); Crest factor: 1.0; 300 MHz Brain: $\sigma = 0.90$ mho/m $\varepsilon_r = 45.3$ $\rho = 1.00$ g/cm^3
Cubes (10): Peak: 1.20 mW/g ± 0.16 dB, SAR (1g): 0.744 mW/g ± 0.15 dB, SAR (10g): 0.488 mW/g ± 0.15 dB, (Worst-case extrapolation)
Penetration depth: 12.3 (10.4, 14.7) [mm]; Powerdrift: 0.01 dB; Ambient Temp.: 23.3°C; Fluid Temp.: 23.0°C
Calibration Date: October 15, 2002



300MHz System Validation

Measured Fluid Dielectric Parameters (Brain)

October 15, 2002

Frequency	e'	e''
200.000000 MHz	49.2984	73.0807
210.000000 MHz	48.7479	70.3637
220.000000 MHz	48.4051	67.9145
230.000000 MHz	47.9112	65.6173
240.000000 MHz	47.3854	63.6189
250.000000 MHz	47.0619	61.6629
260.000000 MHz	46.6549	60.0248
270.000000 MHz	46.2913	58.4424
280.000000 MHz	45.9411	56.9567
290.000000 MHz	45.6495	55.4516
300.000000 MHz	45.3231	54.0358
310.000000 MHz	44.9246	52.8278
320.000000 MHz	44.6796	51.6396
330.000000 MHz	44.3563	50.4677
340.000000 MHz	44.0723	49.4102
350.000000 MHz	43.7189	48.3852
360.000000 MHz	43.4393	47.4561
370.000000 MHz	43.2292	46.5343
380.000000 MHz	43.0035	45.6962
390.000000 MHz	42.7120	44.8767
400.000000 MHz	42.5081	44.1512

Schmid & Partner
Engineering AG

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

Calibration Certificate

Dosimetric E-Field Probe

Type:	**ET3DV6**
Serial Number:	**1590**
Place of Calibration:	**Zurich**
Date of Calibration:	**December 1, 2002**
Calibration Interval:	**12 months**

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

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

Calibrated by:	
Approved by:	

Schmid & Partner
Engineering AG

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

Probe ET3DV6

SN:1590

Manufactured:	March 19, 2001
Last calibration:	April 26, 2002
Recalibrated:	December 1, 2002

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ET3DV6 SN:1590

Sensitivity in Free Space

NormX	**1.75**	$\mu V/(V/m)^2$
NormY	**1.89**	$\mu V/(V/m)^2$
NormZ	**1.63**	$\mu V/(V/m)^2$

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	**6.9**	± 9.5% (k=2)	Boundary effect:
ConvF Y	**6.9**	± 9.5% (k=2)	Alpha **0.30**
ConvF Z	**6.9**	± 9.5% (k=2)	Depth **2.71**

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	**5.6**	± 9.5% (k=2)	Boundary effect:
ConvF Y	**5.6**	± 9.5% (k=2)	Alpha **0.42**
ConvF Z	**5.6**	± 9.5% (k=2)	Depth **2.56**

Boundary Effect

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

Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	8.7	5.0
SAR_{be} [%]	With Correction Algorithm	0.3	0.5

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

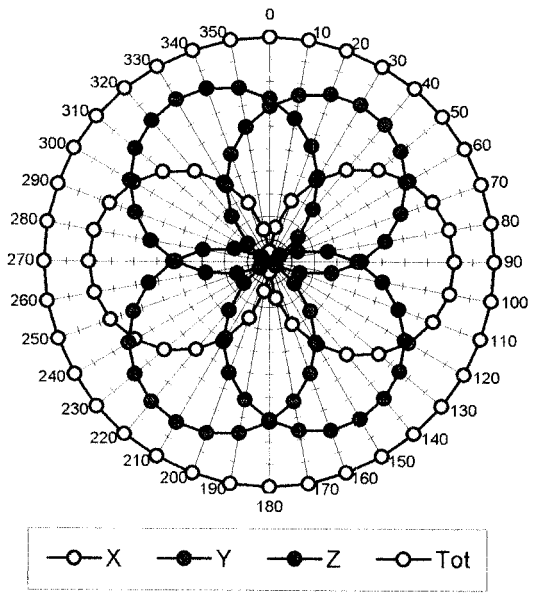
Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	10.7	7.4
SAR_{be} [%]	With Correction Algorithm	0.1	0.3

Sensor Offset

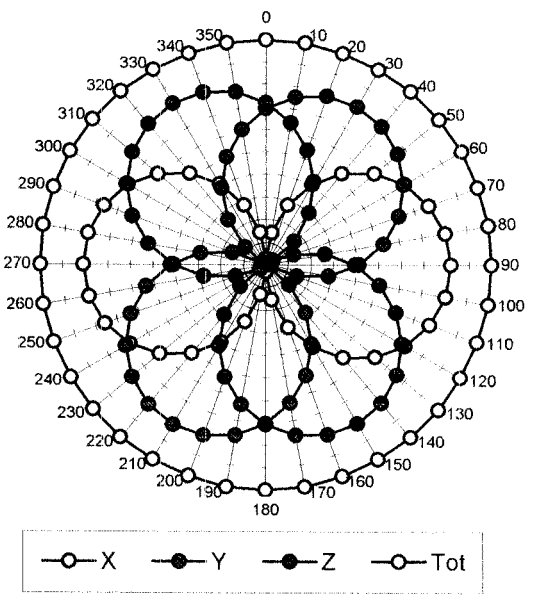
Probe Tip to Sensor Center	**2.7**	mm
Optical Surface Detection	**1.2 ± 0.2**	mm

Receiving Pattern (ϕ), θ = 0°

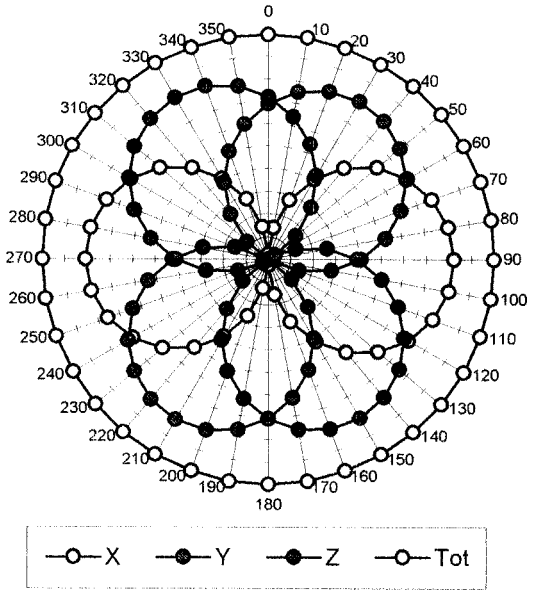
f = 30 MHz, TEM cell ifi110



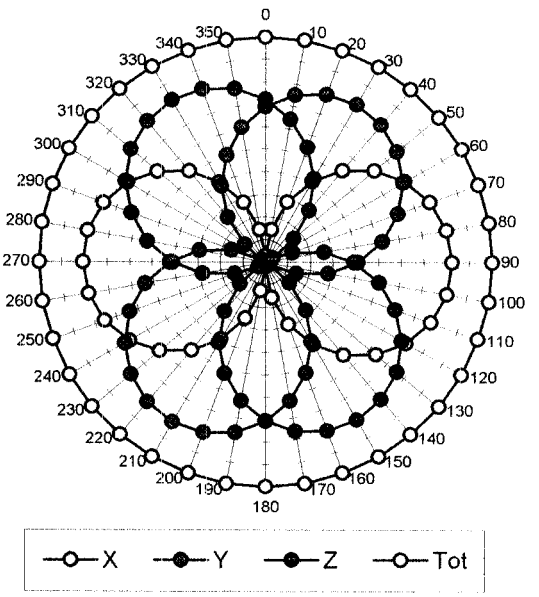
f = 100 MHz, TEM cell ifi110

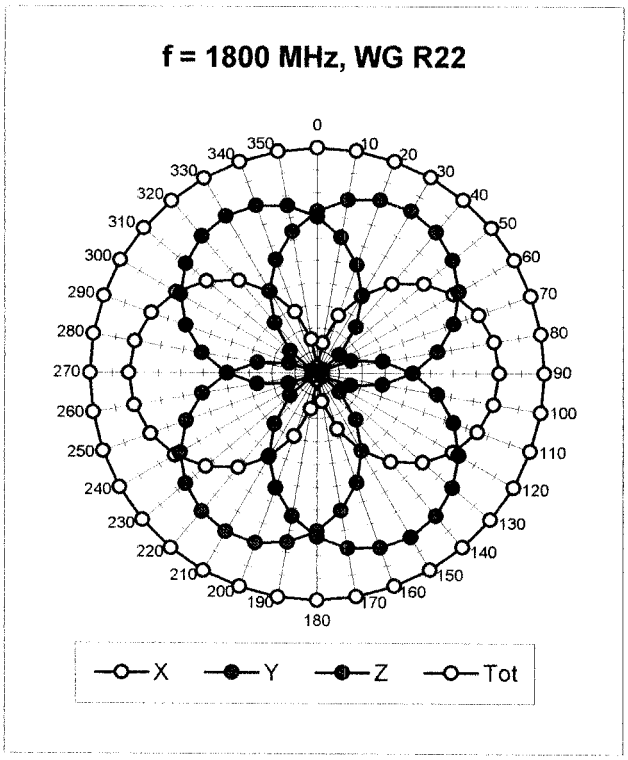


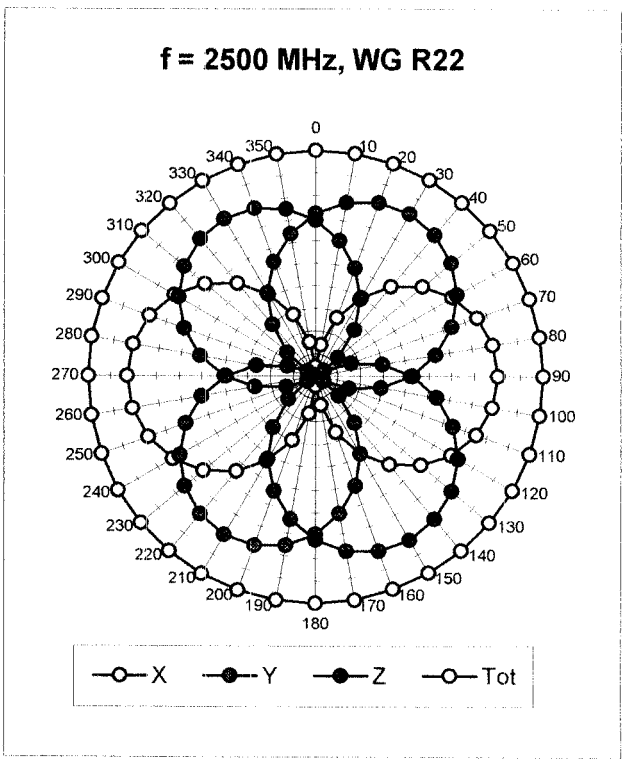
f = 300 MHz, TEM cell ifi110



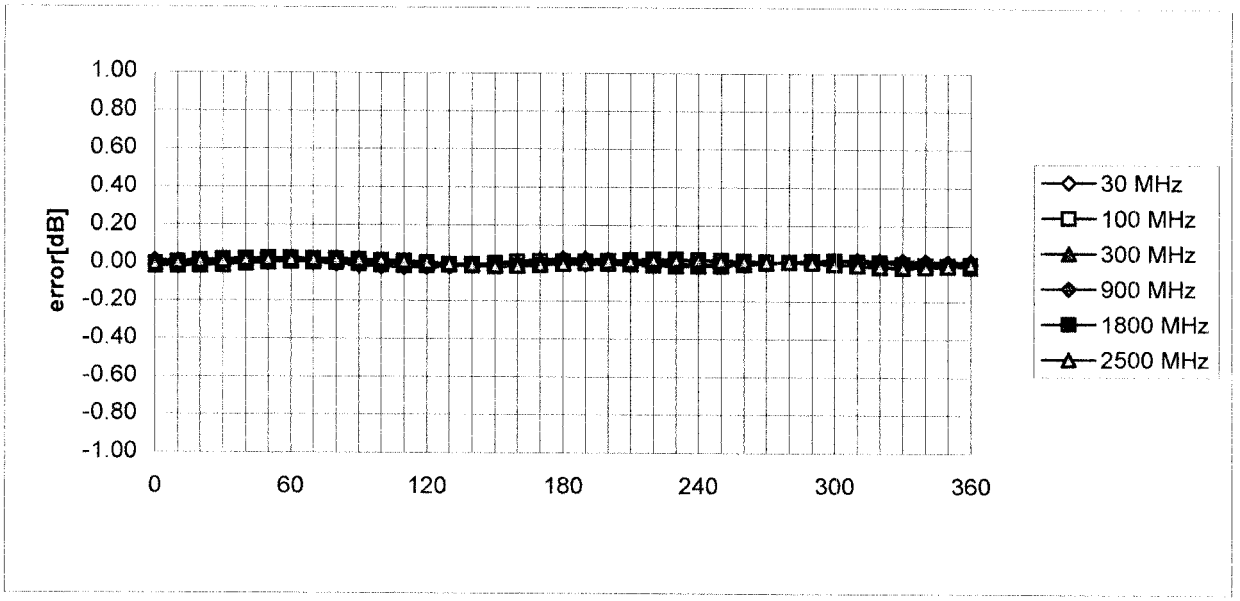
f = 900 MHz, TEM cell ifi110





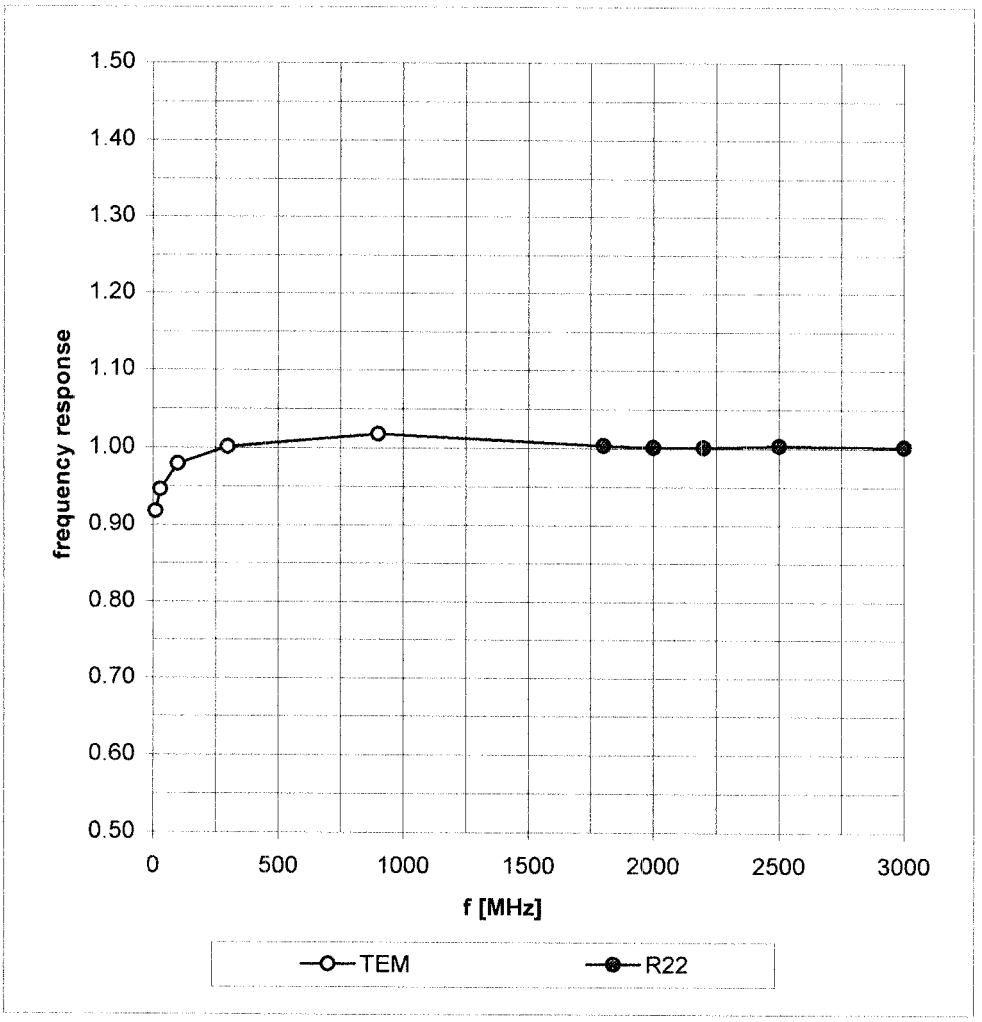


Isotropy Error (ϕ), θ = 0°



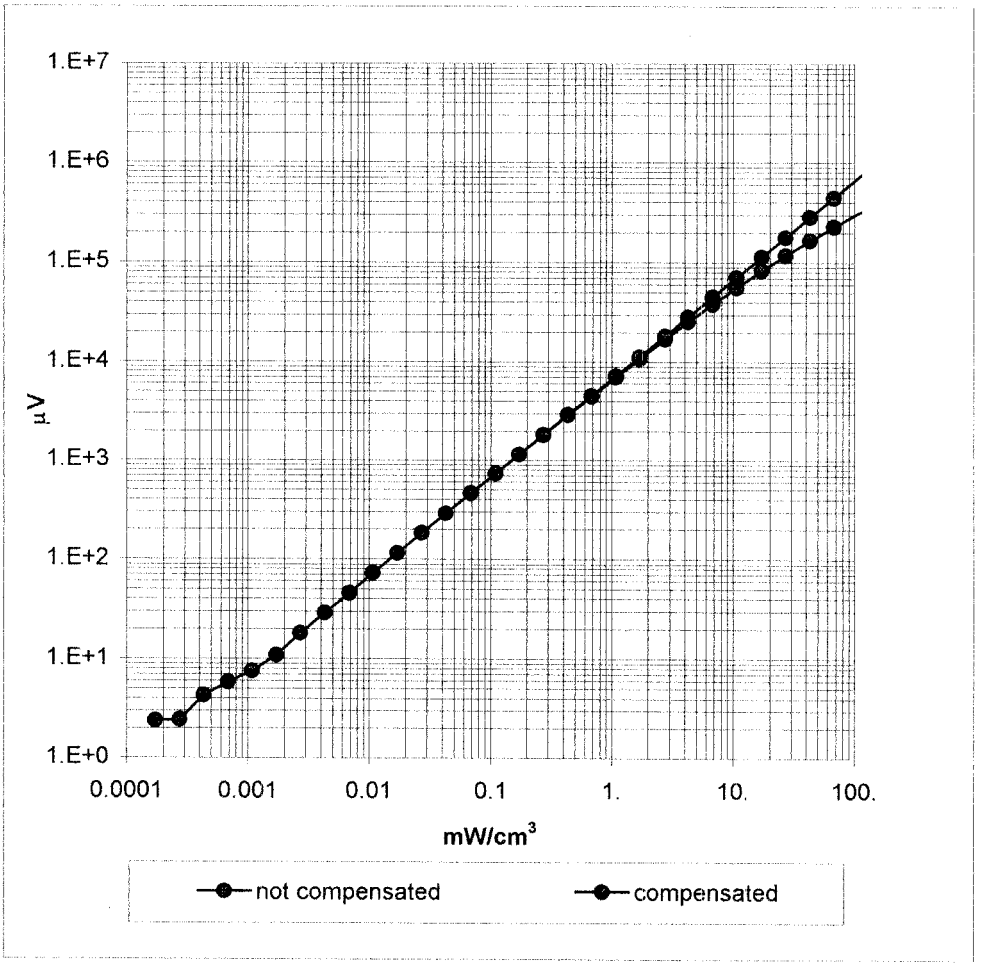
Frequency Response of E-Field

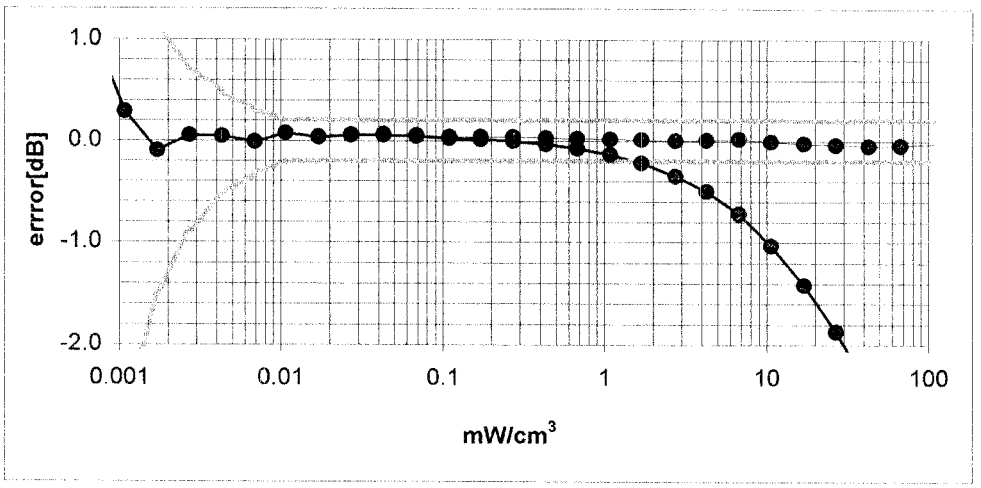
(TEM-Cell:ifi110, Waveguide R22)



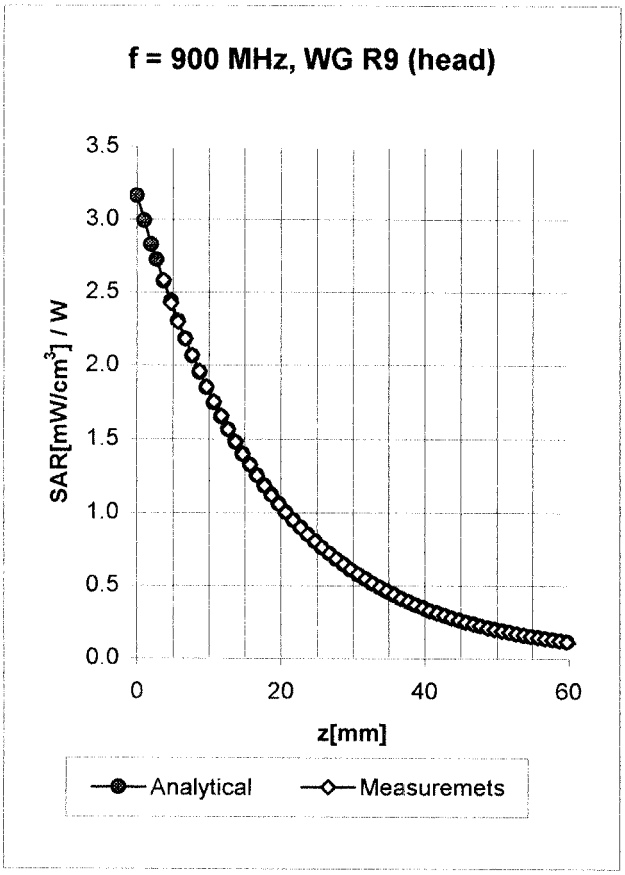
Dynamic Range f(SAR_{brain})

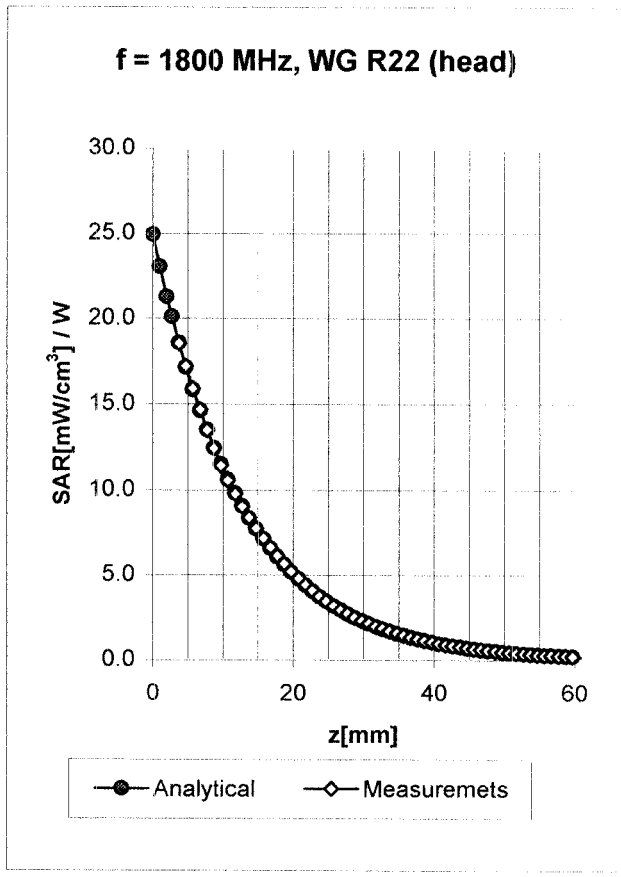
(Waveguide R22)





Conversion Factor Assessment

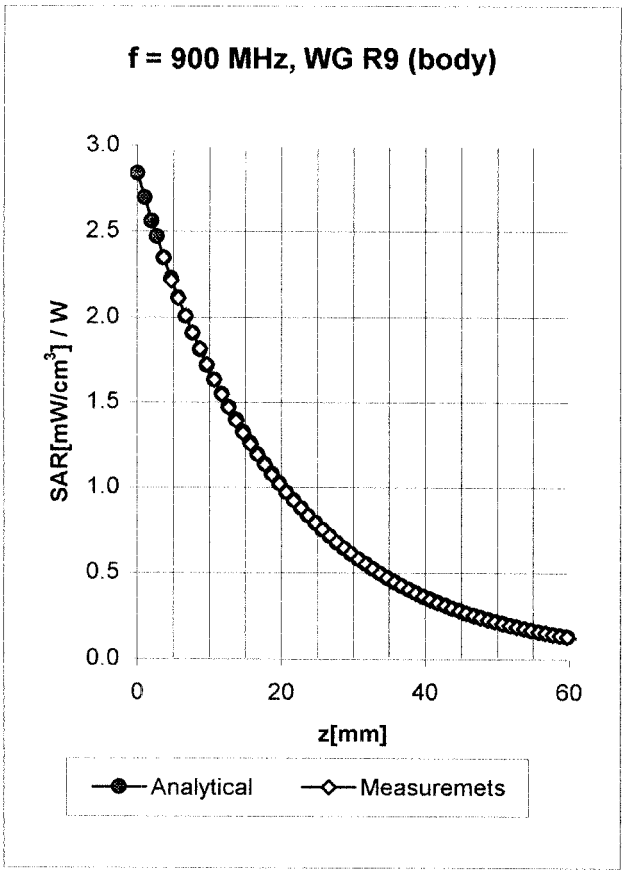


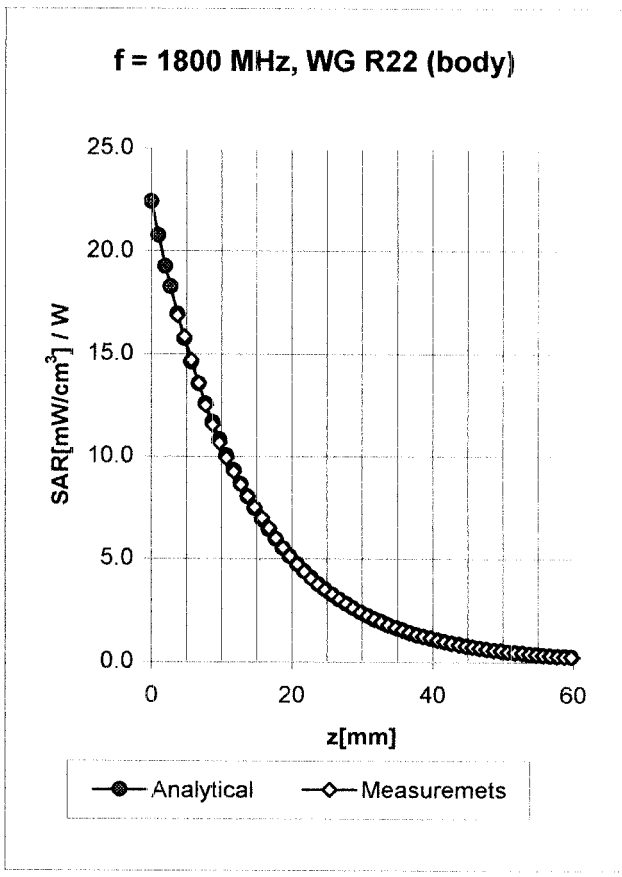


Head	**900 MHz**		ε_r = **41.5 ± 5%**	σ = **0.97 ± 5% mho/m**
Head	**835 MHz**		ε_r = **41.5 ± 5%**	σ = **0.90 ± 5% mho/m**
	ConvF X	**6.9** ± 9.5% (k=2)		Boundary effect:
	ConvF Y	**6.9** ± 9.5% (k=2)		Alpha **0.30**
	ConvF Z	**6.9** ± 9.5% (k=2)		Depth **2.71**

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	**5.6** ± 9.5% (k=2)		Boundary effect:
	ConvF Y	**5.6** ± 9.5% (k=2)		Alpha **0.42**
	ConvF Z	**5.6** ± 9.5% (k=2)		Depth **2.56**

Conversion Factor Assessment



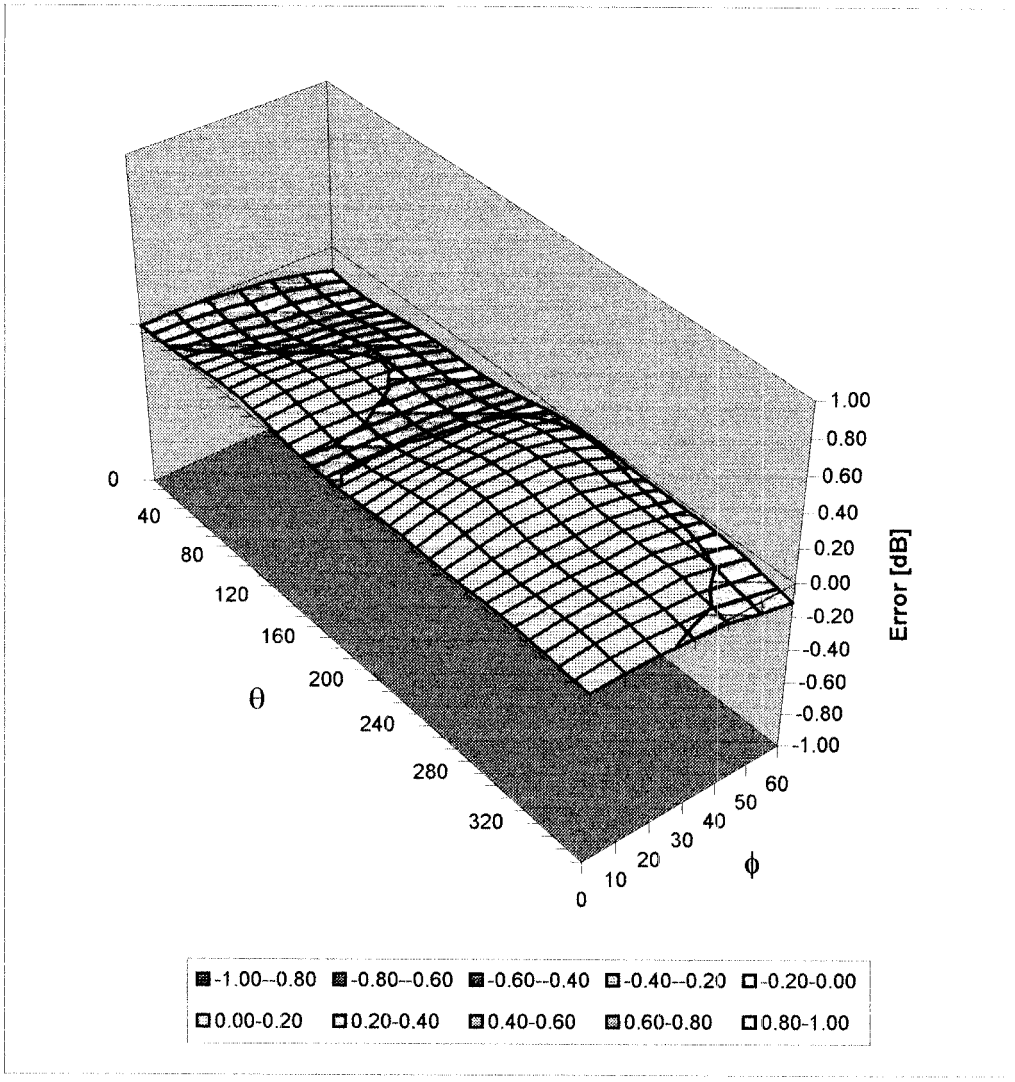


Body	**900 MHz**		ε_r = **55.0 ± 5%**	σ = **1.05 ± 5% mho/m**
Body	**835 MHz**		ε_r = **55.2 ± 5%**	σ = **0.97 ± 5% mho/m**
	ConvF X	**6.7** ± 9.5% (k=2)		Boundary effect:
	ConvF Y	**6.7** ± 9.5% (k=2)		Alpha **0.34**
	ConvF Z	**6.7** ± 9.5% (k=2)		Depth **2.57**

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	**5.3** ± 9.5% (k=2)		Boundary effect:
	ConvF Y	**5.3** ± 9.5% (k=2)		Alpha **0.52**
	ConvF Z	**5.3** ± 9.5% (k=2)		Depth **2.46**

Deviation from Isotropy in HSL

Error (θ,ϕ), f = 900 MHz



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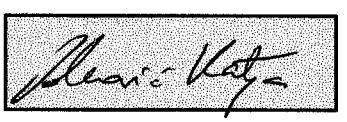
Additional Conversion Factors

for Dosimetric E-Field Probe

Type:	**ET3DV6**
Serial Number:	**1590**
Place of Assessment:	**Zurich**
Date of Assessment:	**May 1, 2002**
Probe Calibration Date:	**April 26, 2002**

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:1590

Conversion factor (± standard deviation)

150 MHz	ConvF	**9.4 ± 8%**	ε_r = **52.3** σ = **0.76 mho/m** (head tissue)
300 MHz	ConvF	**8.2 ± 8%**	ε_r = **45.3** σ = **0.87 mho/m** (head tissue)
450 MHz	ConvF	**7.8 ± 8%**	ε_r = **43.5** σ = **0.87mho/m** (head tissue)
150 MHz	ConvF	**9.1 ± 8%**	ε_r = **61.9** σ = **0.80 mho/m** (body tissue)
450 MHz	ConvF	**7.9 ± 8%**	ε_r = **56.7** σ = **0.94 mho/m** (body tissue)
2450 MHz	ConvF	**4.5 ± 8%**	ε_r = **39.2** σ = **1.80 mho/m** (head tissue)
2450 MHz	ConvF	**4.1 ± 8%**	ε_r = **52.7** σ = **1.95 mho/m** (body tissue)

Dipole 1800MHz

SAM Phantom; Flat Section

Probe: ET3DV6 - SN1387; ConvF(5.40,5.40,5.40); Crest factor: 1.0; 1800MHz Brain: σ = 1.40 mho/m ε_r = 40.3 ρ = 1.00 g/cm^3

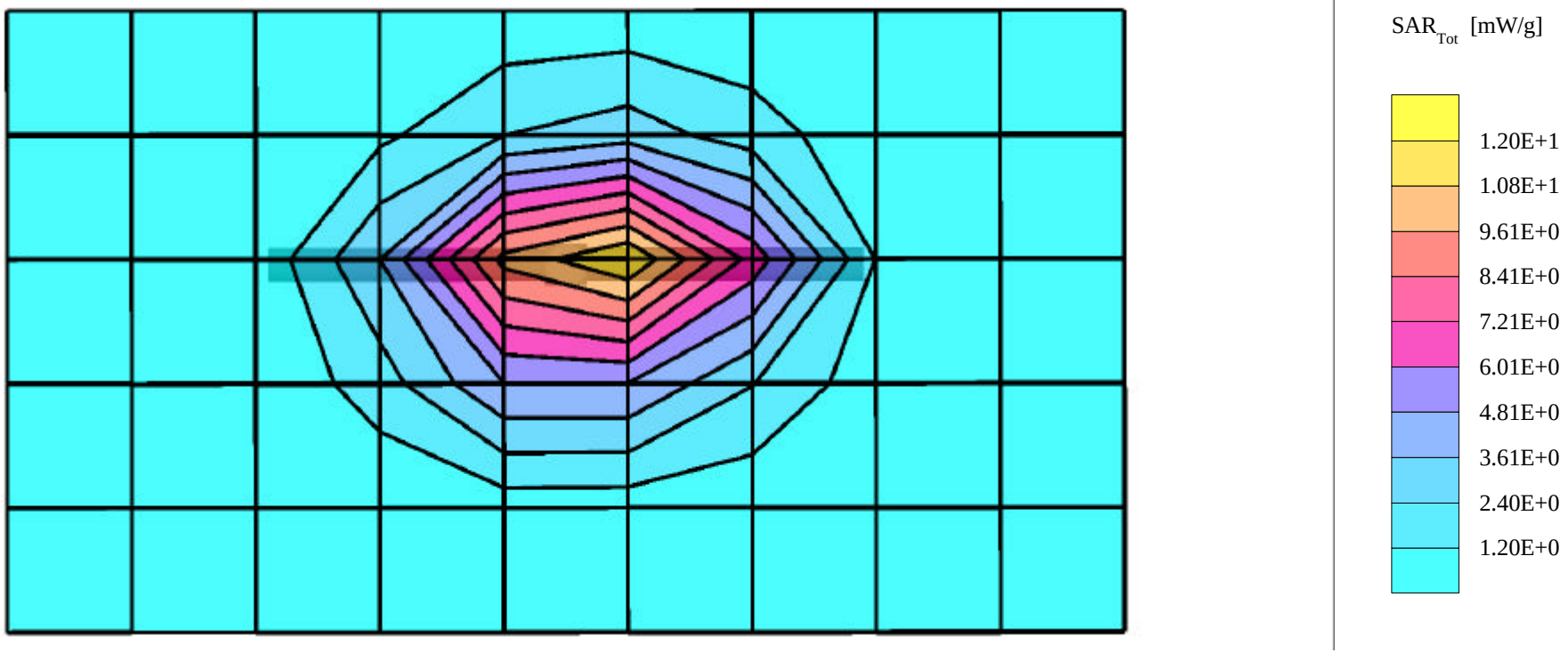
Cube 5x5x7: Peak: 19.3 mW/g, SAR (1g): 10.0 mW/g, SAR (10g): 5.11 mW/g, (Worst-case extrapolation)

Penetration depth: 7.9 (7.4, 9.0) [mm]; Ambient Temp. 24.4°C; Fluid Temp. 22.1°C

Powerdrift: 0.05 dB

1800MHz System Validation

Validation Date: August 29, 2002



1800MHz System Validation

Measured Fluid Dielectric Parameters (Brain)

August 29, 2002

Frequency	e'	e''
1.750000000 GHz	40.3889	14.0165
1.755000000 GHz	40.3589	14.0142
1.760000000 GHz	40.3549	14.0041
1.765000000 GHz	40.3499	13.9976
1.770000000 GHz	40.3436	13.9828
1.775000000 GHz	40.3402	13.9784
1.780000000 GHz	40.3345	13.9752
1.785000000 GHz	40.3092	13.9738
1.790000000 GHz	40.3005	13.9752
1.795000000 GHz	40.2948	13.9928
1.800000000 GHz	40.2703	13.9969
1.805000000 GHz	40.2404	14.0069
1.810000000 GHz	40.2289	14.0394
1.815000000 GHz	40.2080	14.0593
1.820000000 GHz	40.1883	14.0756
1.825000000 GHz	40.1642	14.0885
1.830000000 GHz	40.1534	14.1146
1.835000000 GHz	40.1477	14.1174
1.840000000 GHz	40.1585	14.1285
1.845000000 GHz	40.1690	14.1281
1.850000000 GHz	40.1914	14.1384
1.855000000 GHz	40.2011	14.1411
1.860000000 GHz	40.2157	14.1526
1.865000000 GHz	40.2246	14.1585
1.870000000 GHz	40.2130	14.1846
1.875000000 GHz	40.1957	14.2052
1.880000000 GHz	40.1814	14.2153
1.885000000 GHz	40.1556	14.2146
1.890000000 GHz	40.1464	14.2277
1.895000000 GHz	40.1240	14.2425
1.900000000 GHz	40.1028	14.2739
1.905000000 GHz	40.0809	14.3087
1.910000000 GHz	40.0510	14.3538
1.915000000 GHz	40.0120	14.3926
1.920000000 GHz	39.9612	14.4152