APPENDIX B - SYSTEM PERFORMANCE CHECK DATA

System Performance Check - 300MHz Dipole

Large Planar Phantom; Planar Section

Probe: ET3DV6 - SN1387; ConvF(7.90,7.90,7.90); Crest factor: 1.0; 300 MHz Brain: σ = 0.89 mho/m ε_r = 45.5 ρ = 1.00 g/cm^3

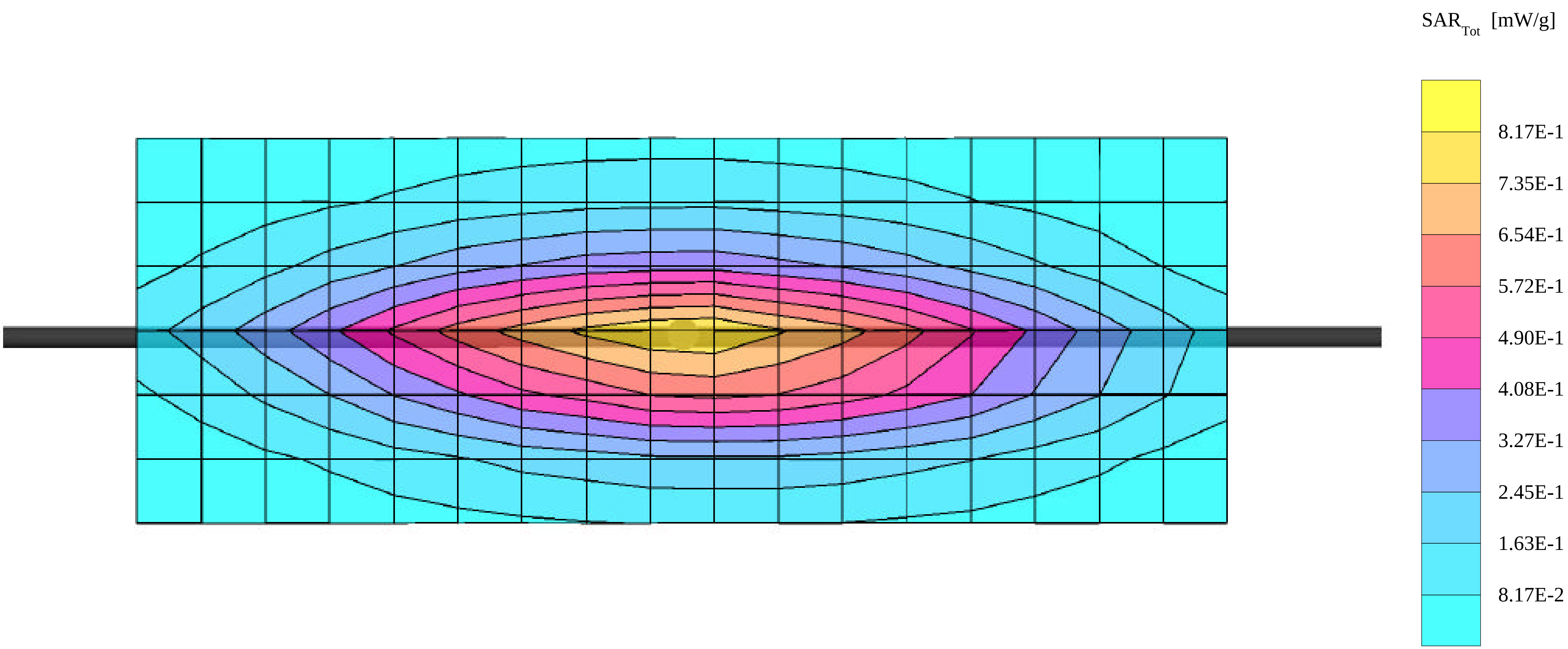
Cube 5x5x7: Peak: 1.29 mW/g, SAR (1g): 0.794 mW/g, SAR (10g): 0.520 mW/g, (Worst-case extrapolation)

Penetration depth: 12.2 (10.2, 14.8) [mm]; Powerdrift: 0.02 dB

Ambient Temp 23.3 °C; Fluid Temp 22.8 °C

Forward Conducted Power: 250 mW

Date Tested: May 05, 2003



APPENDIX C - SYSTEM VALIDATION

Celltech
Testing and Engineering Services Lab

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: Russell W. Pipe

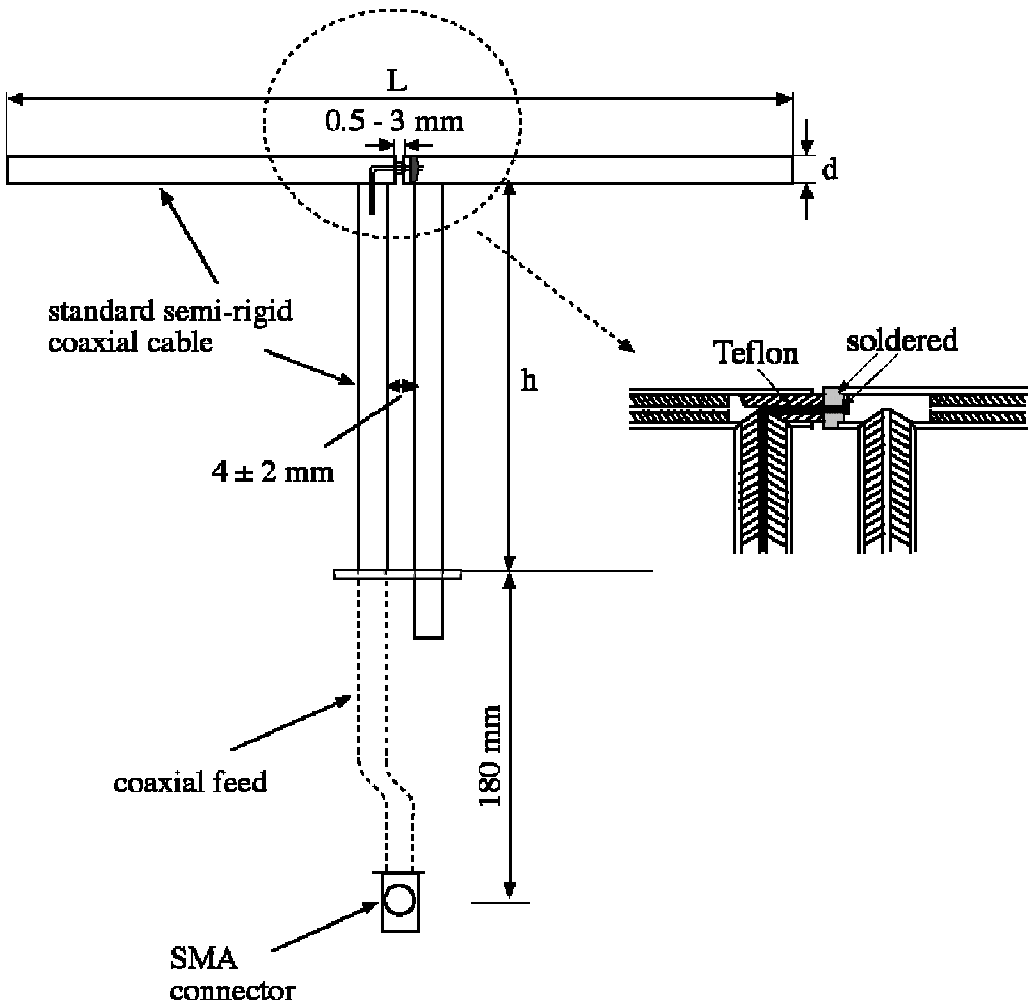
Approved by:

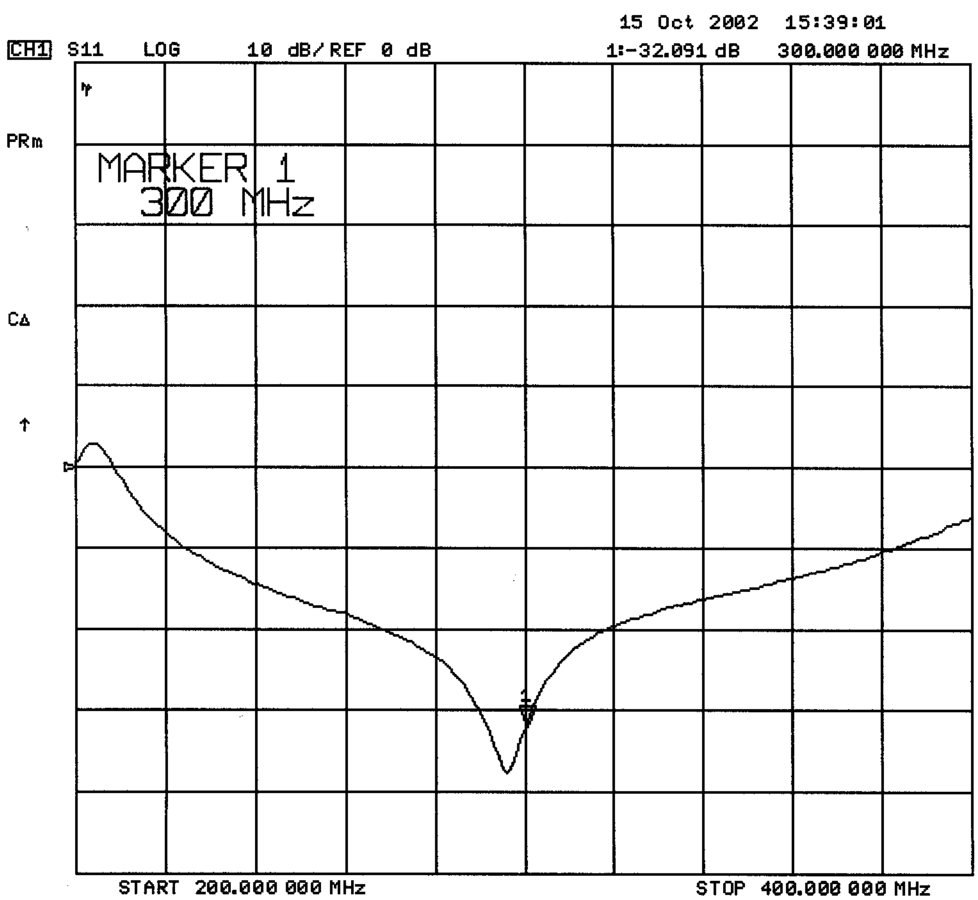
Celltech Research Inc. 1955 Moss Court, Kelowna, B.C. Canada V1Y 9L3
Tel. 250-448-7047 • Fax. 250-448-7046 • e-mail: info@celltechlabs.com
www.celltechlabs.com

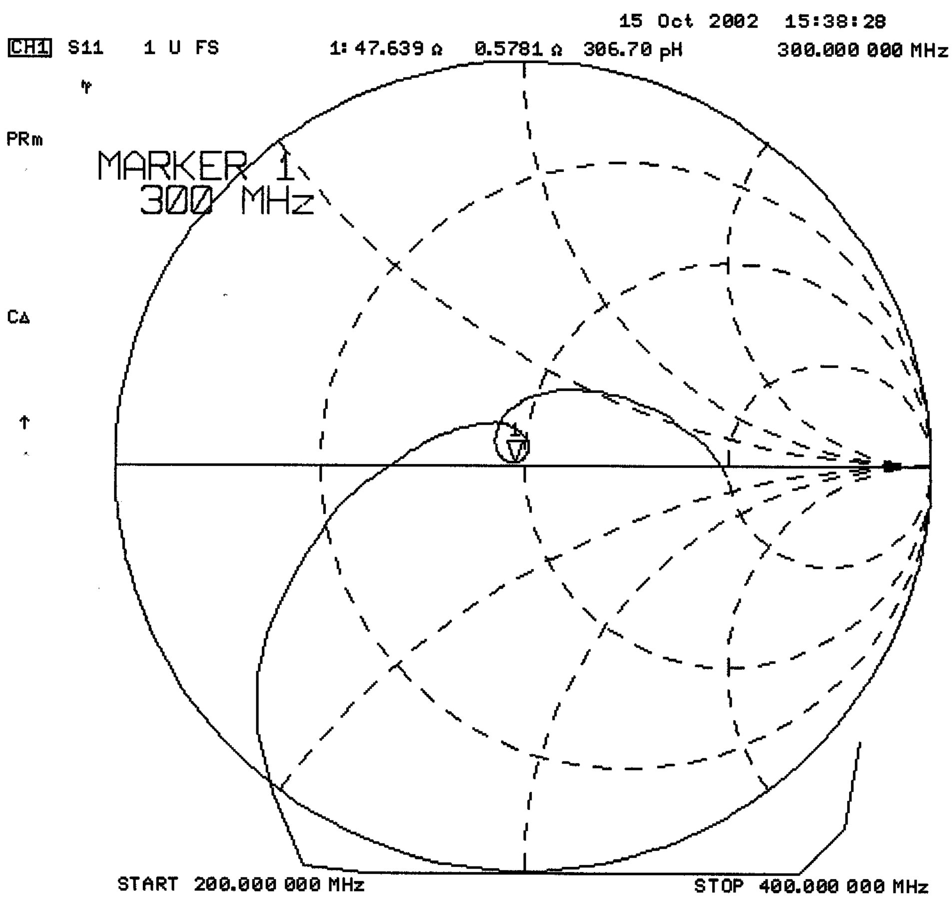
1. Dipole Construction & Electrical Characteristics

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
CΔ
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
CΔ
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

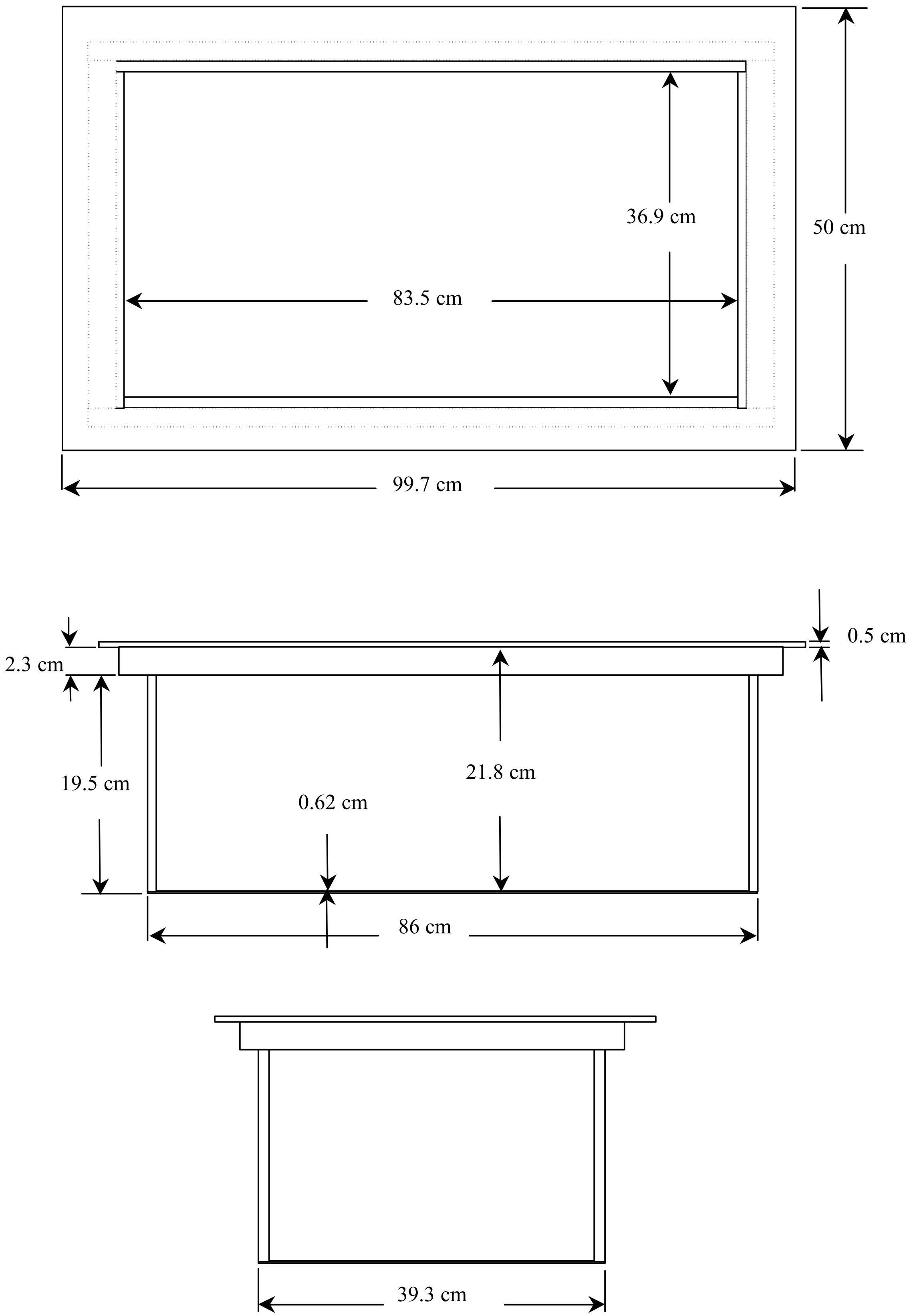
2. Validation Phantom

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

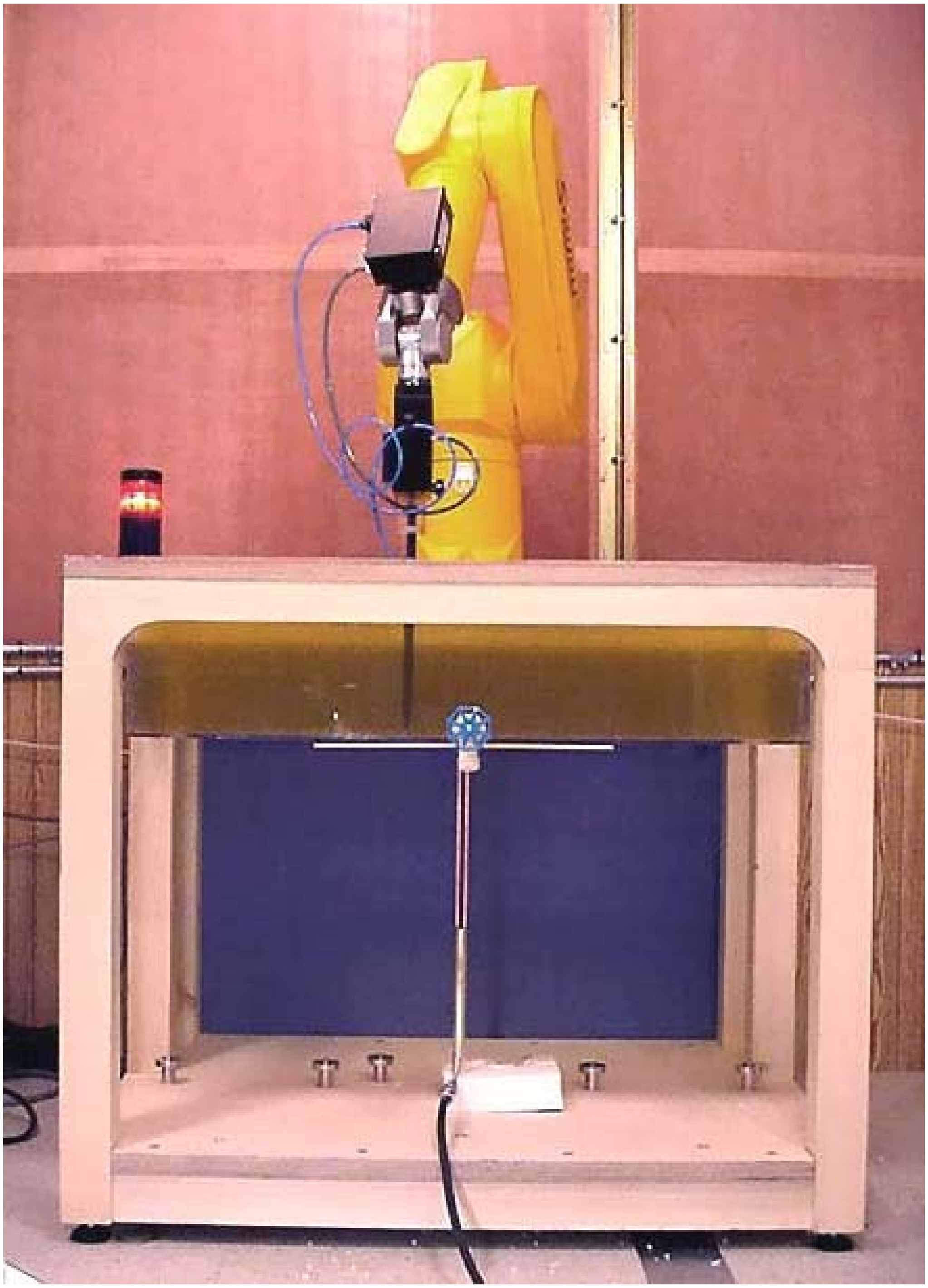
Length: 83.5 cm
Width: 36.9 cm
Height: 21.8 cm

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:

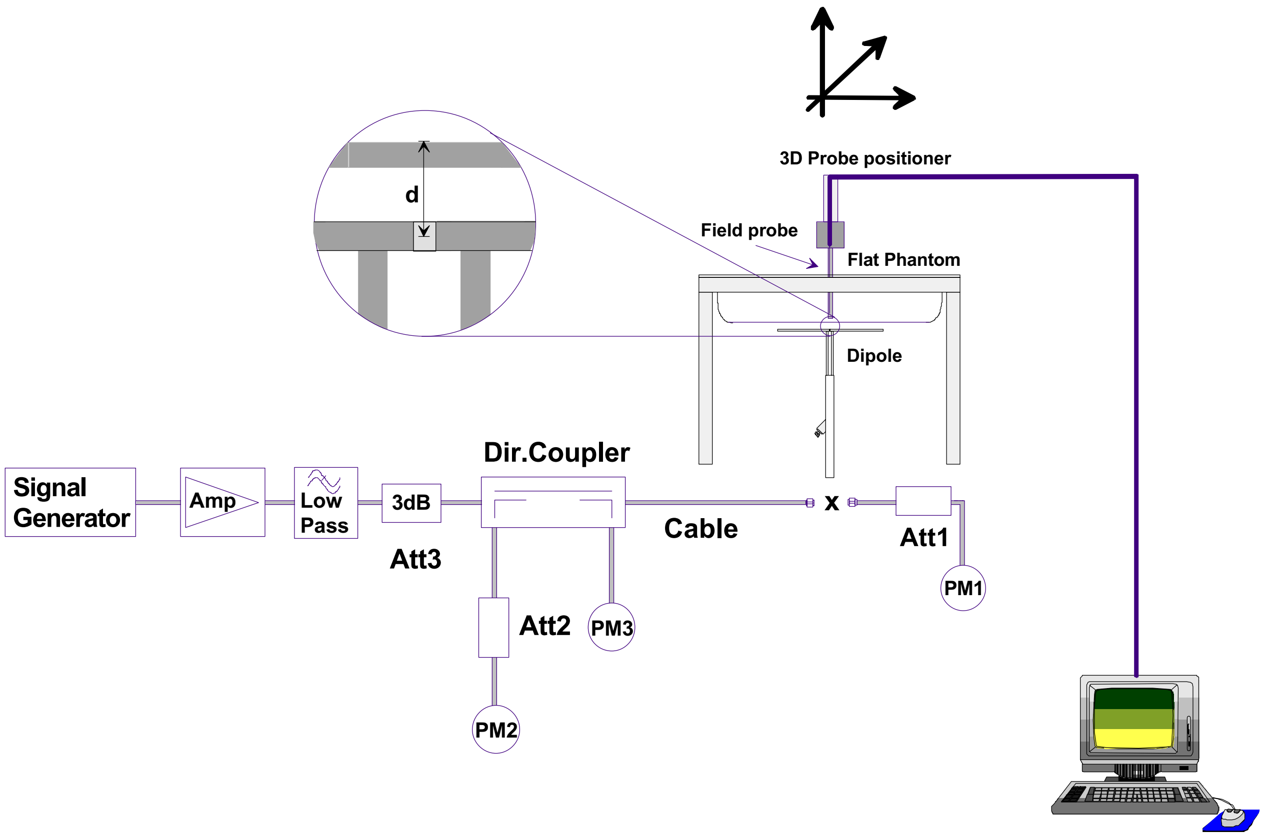
Relative Permittivity:	45.3
Conductivity:	0.90 mho/m
Ambient Temperature:	23.3°C
Fluid Temperature:	23.0°C
Fluid Depth:	≥ 15cm

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.

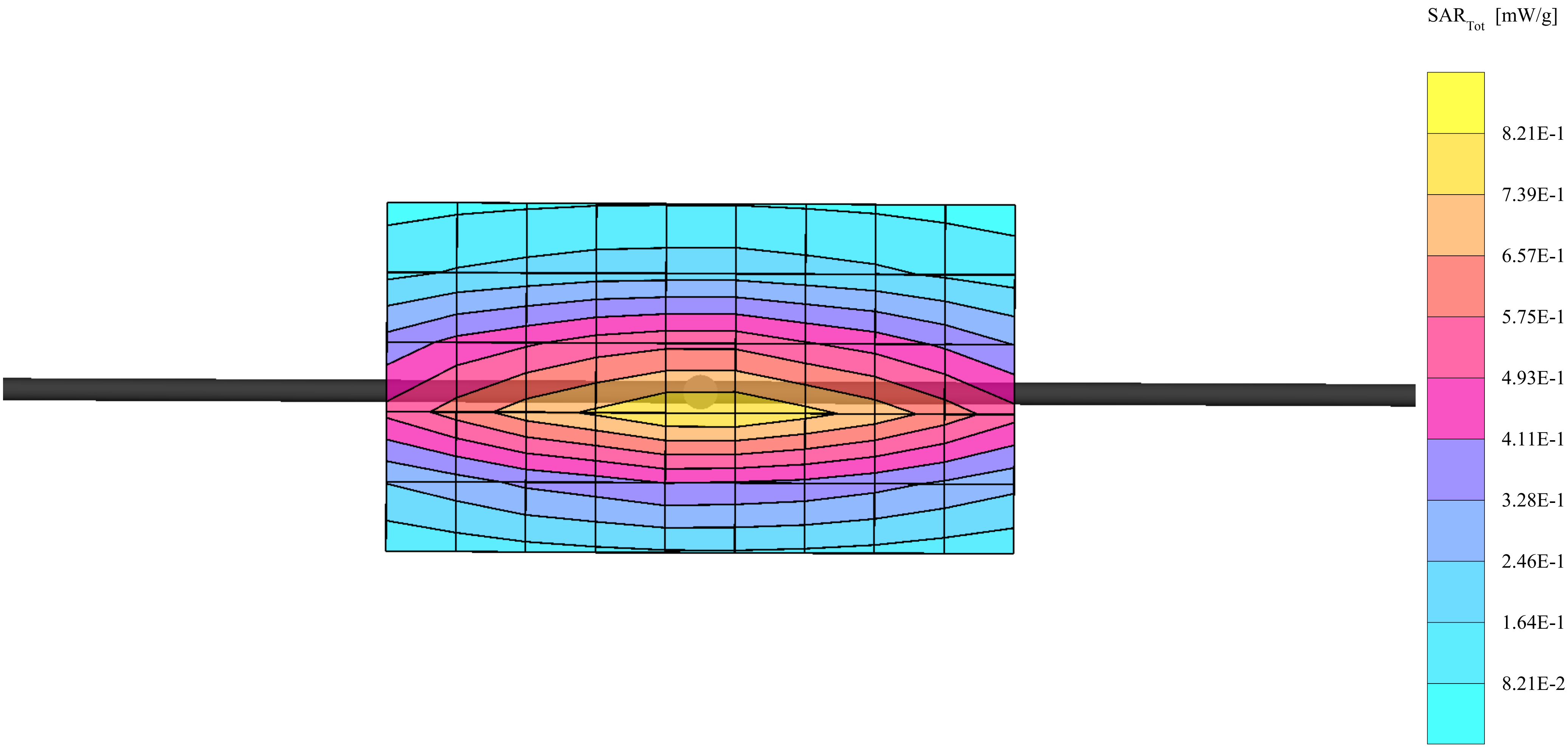
Averaged over 1cm (1g) of tissue: 2.98 mW/g

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

10/15/02

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: σ = 0.90 mho/m ε_r = 45.3 ρ = 1.00 g/cm³
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

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

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

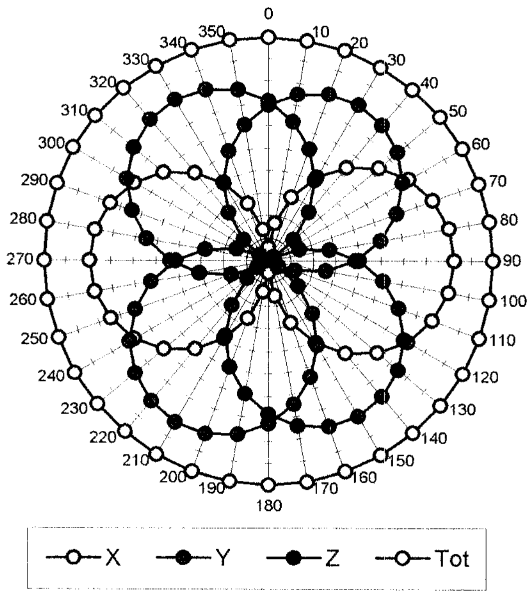
Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	14.6	9.8
SAR_{be} [%]	With Correction Algorithm	0.2	0.0

Sensor Offset

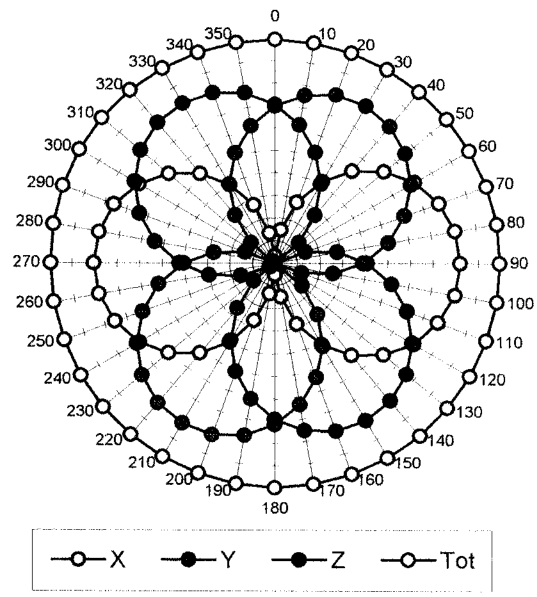
Probe Tip to Sensor Center	**2.7**	mm
Optical Surface Detection	**1.4 ± 0.2**	mm

Receiving Pattern (ϕ), θ = 0°

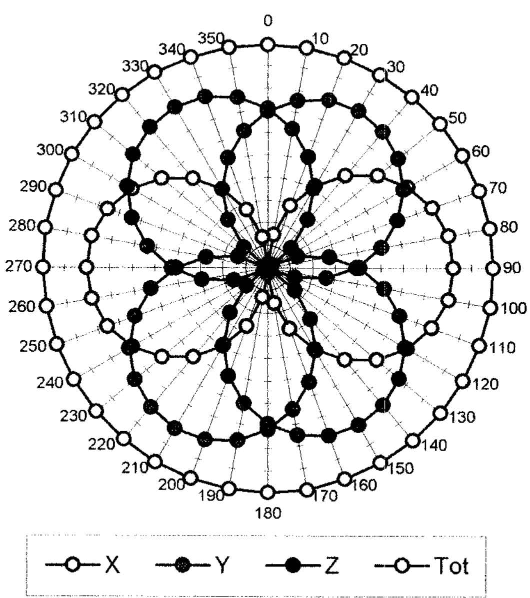
f = 30 MHz, TEM cell ifi110



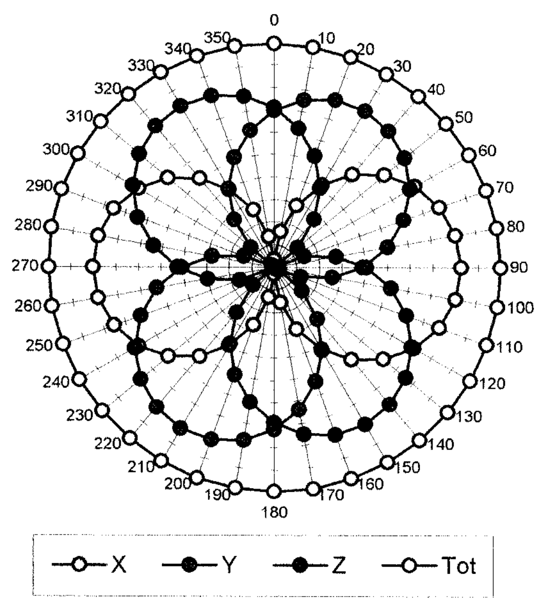
f = 100 MHz, TEM cell ifi110

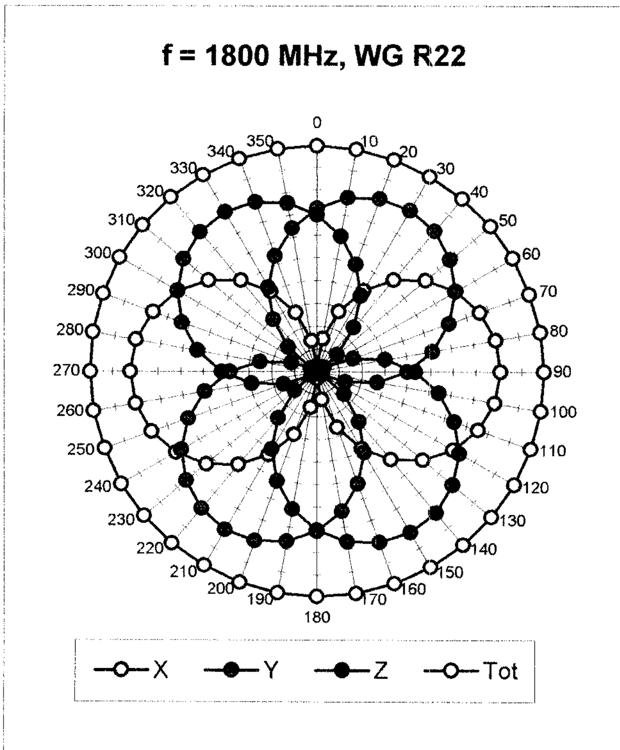


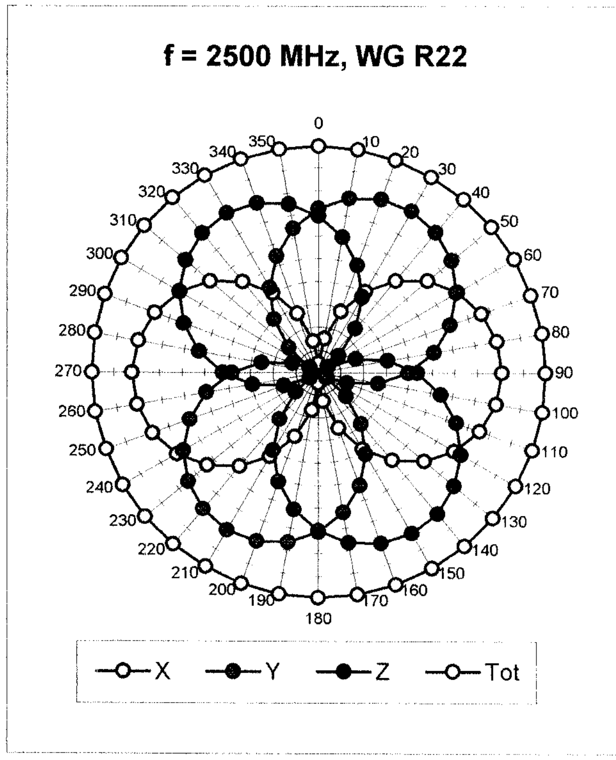
f = 300 MHz, TEM cell ifi110



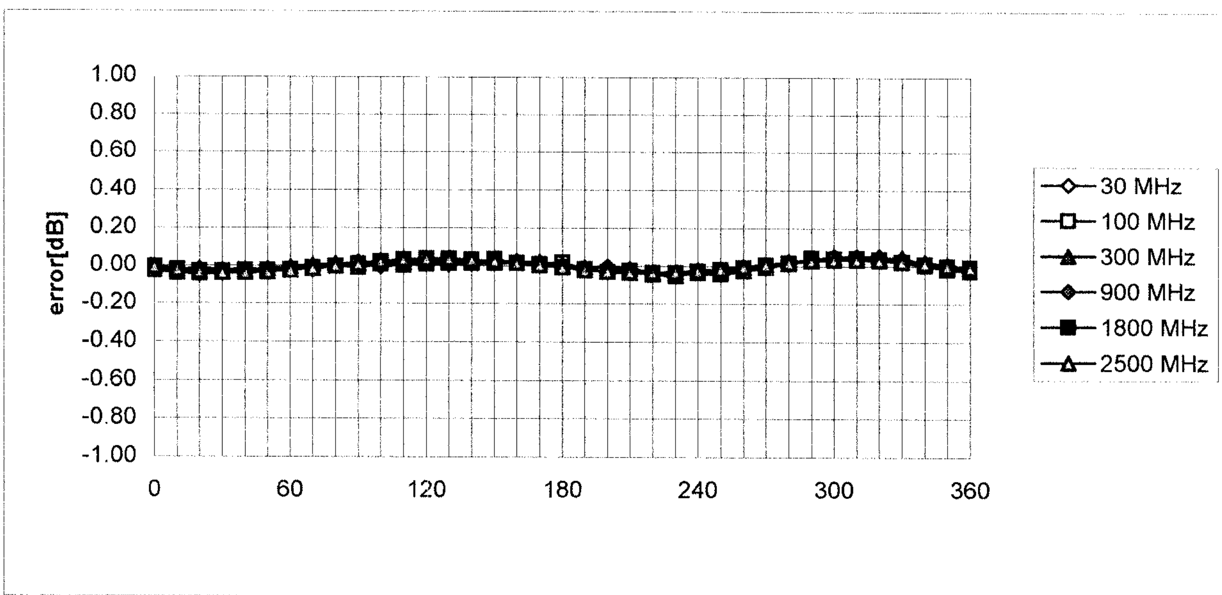
f = 900 MHz, TEM cell ifi110





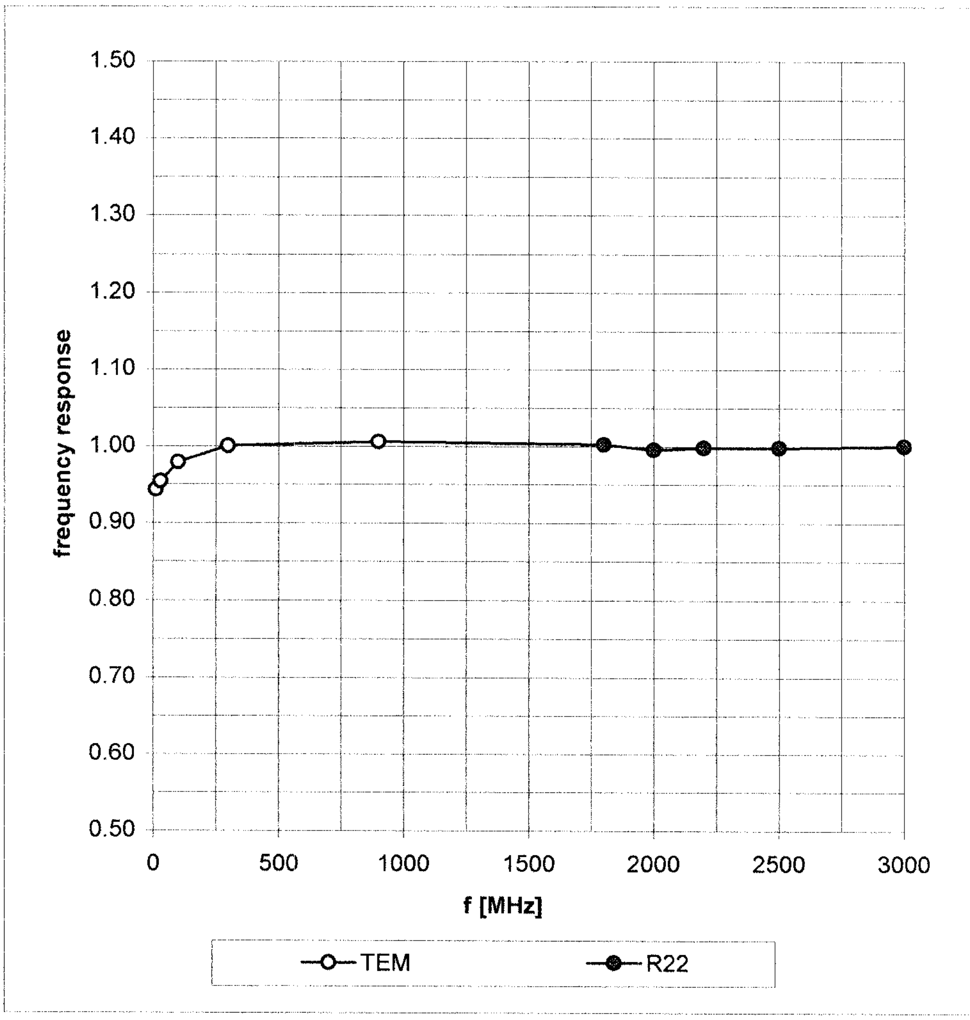


Isotropy Error (ϕ), θ = 0°



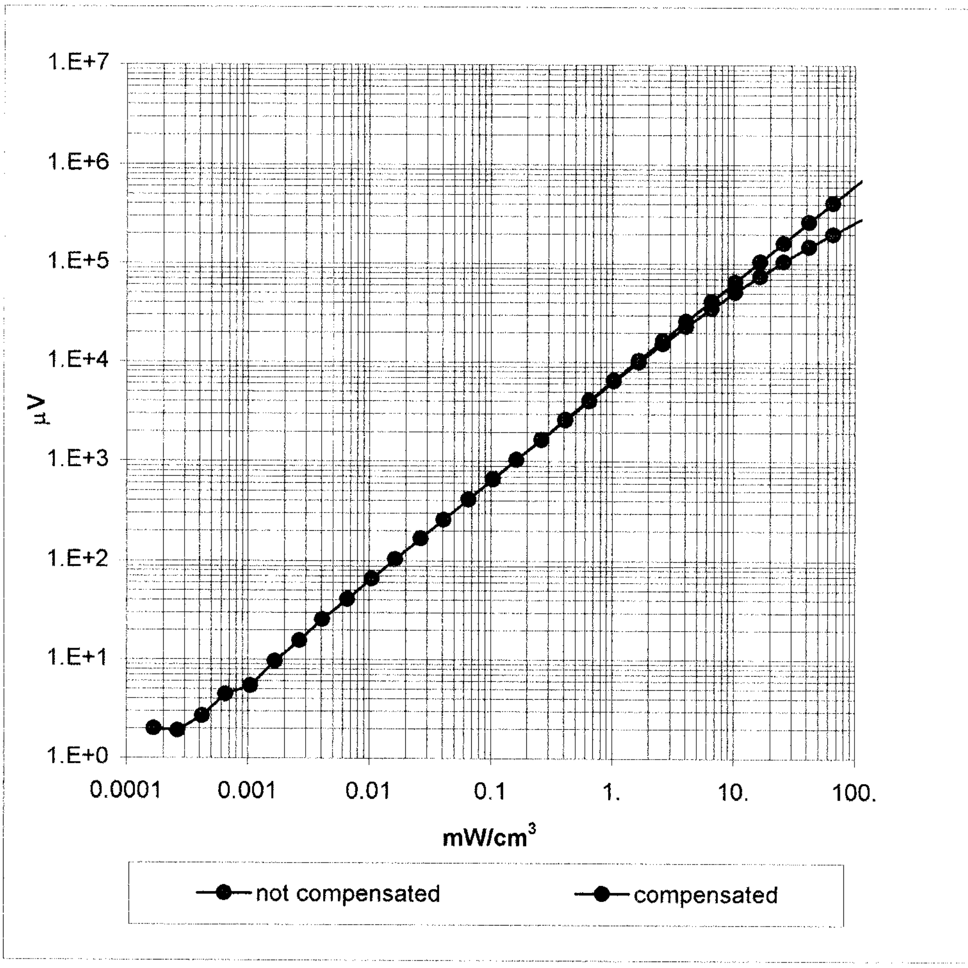
Frequency Response of E-Field

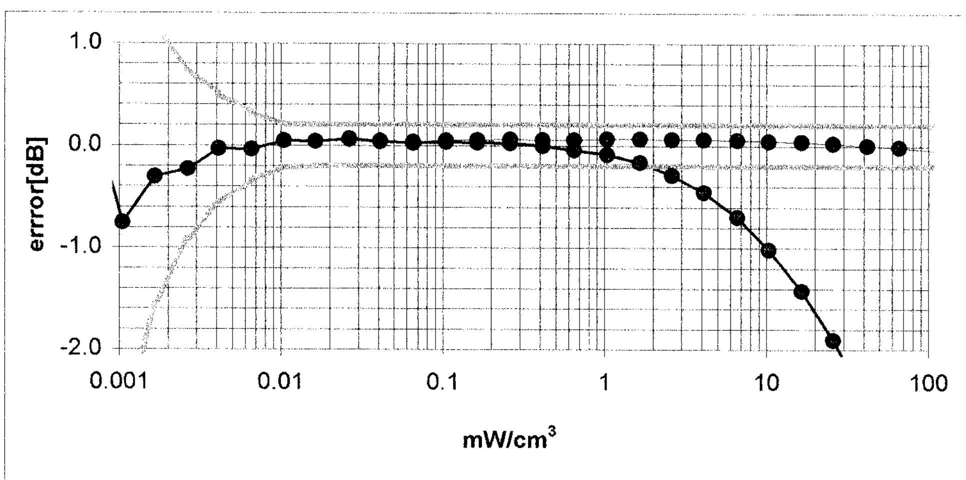
(TEM-Cell:ifi110, Waveguide R22)



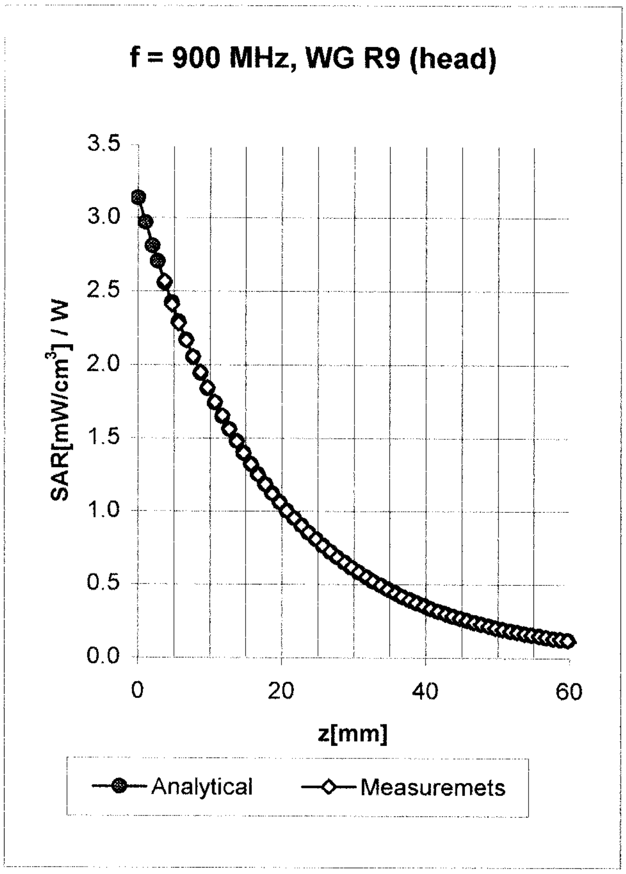
Dynamic Range f(SAR_{brain})

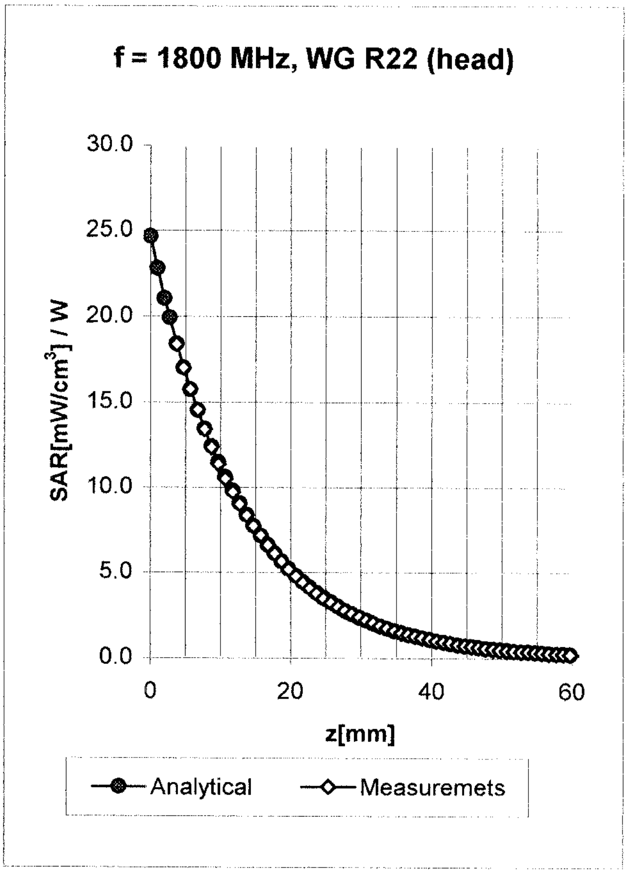
(Waveguide R22)





Conversion Factor Assessment

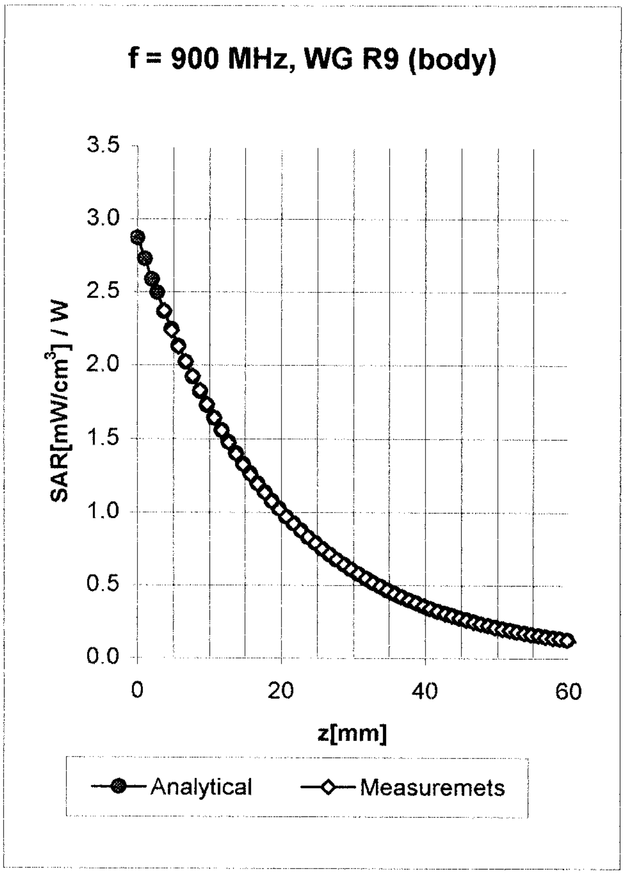


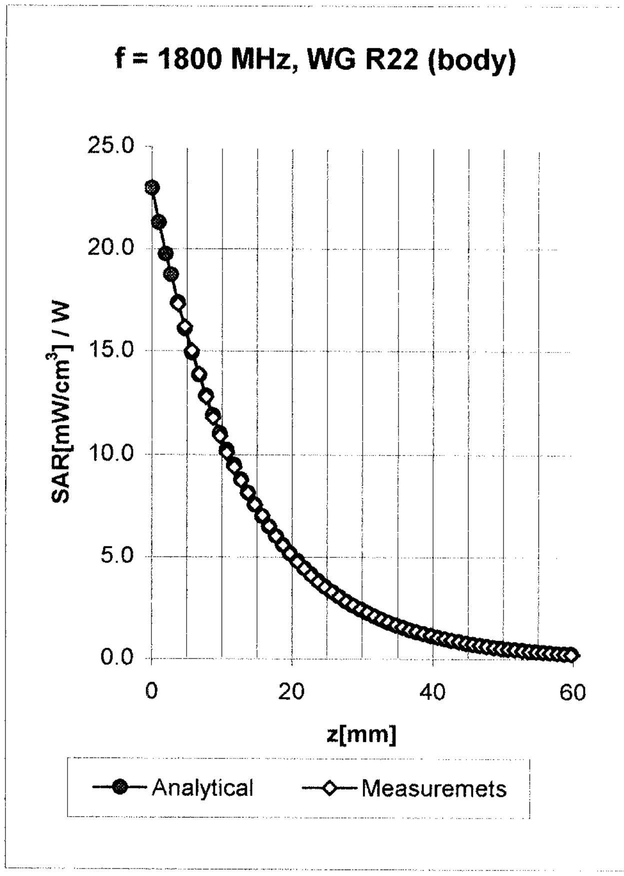


Head	**900 MHz**		ε_r = **41.5 ± 5%**	σ = **0.97 ± 5% mho/m**	
Head	**835 MHz**		ε_r = **41.5 ± 5%**	σ = **0.90 ± 5% mho/m**	
	ConvF X	**6.6**	± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**6.6**	± 9.5% (k=2)	Alpha	**0.37**
	ConvF Z	**6.6**	± 9.5% (k=2)	Depth	**2.61**

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

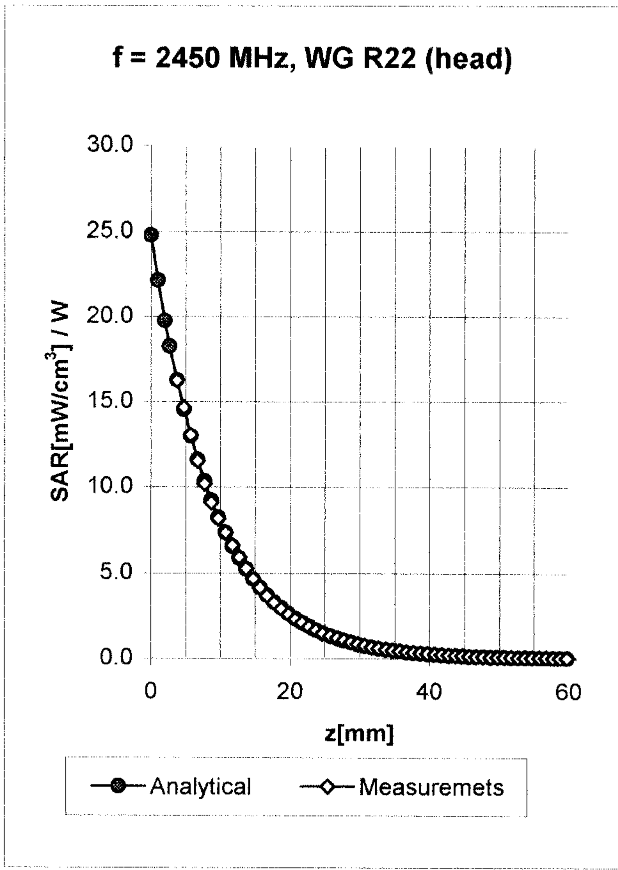


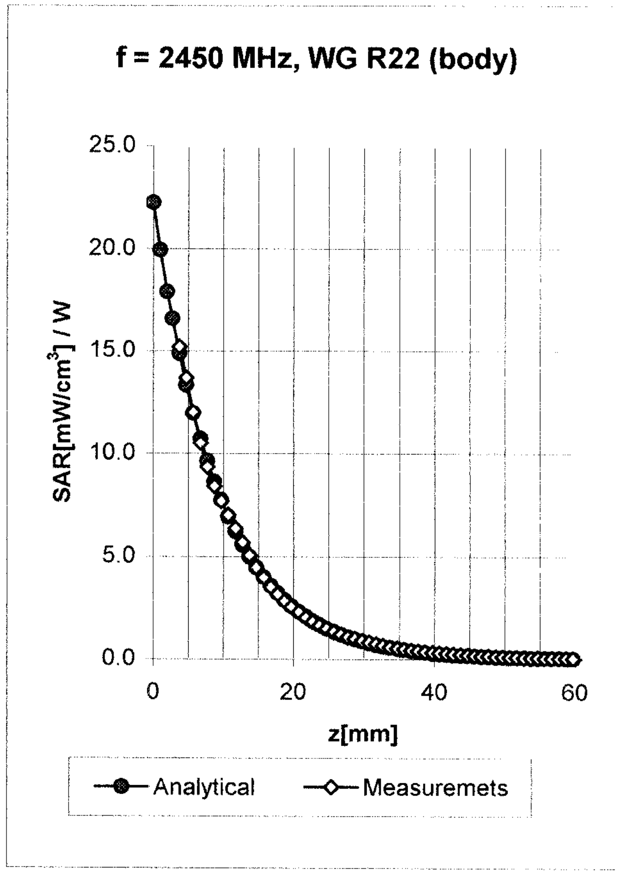


Body	**900 MHz**		ε_r = **55.0 ± 5%**	σ = **1.05 ± 5% mho/m**	
Body	**835 MHz**		ε_r = **55.2 ± 5%**	σ = **0.97 ± 5% mho/m**	
	ConvF X	**6.4**	± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**6.4**	± 9.5% (k=2)	Alpha	**0.45**
	ConvF Z	**6.4**	± 9.5% (k=2)	Depth	**2.35**

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**

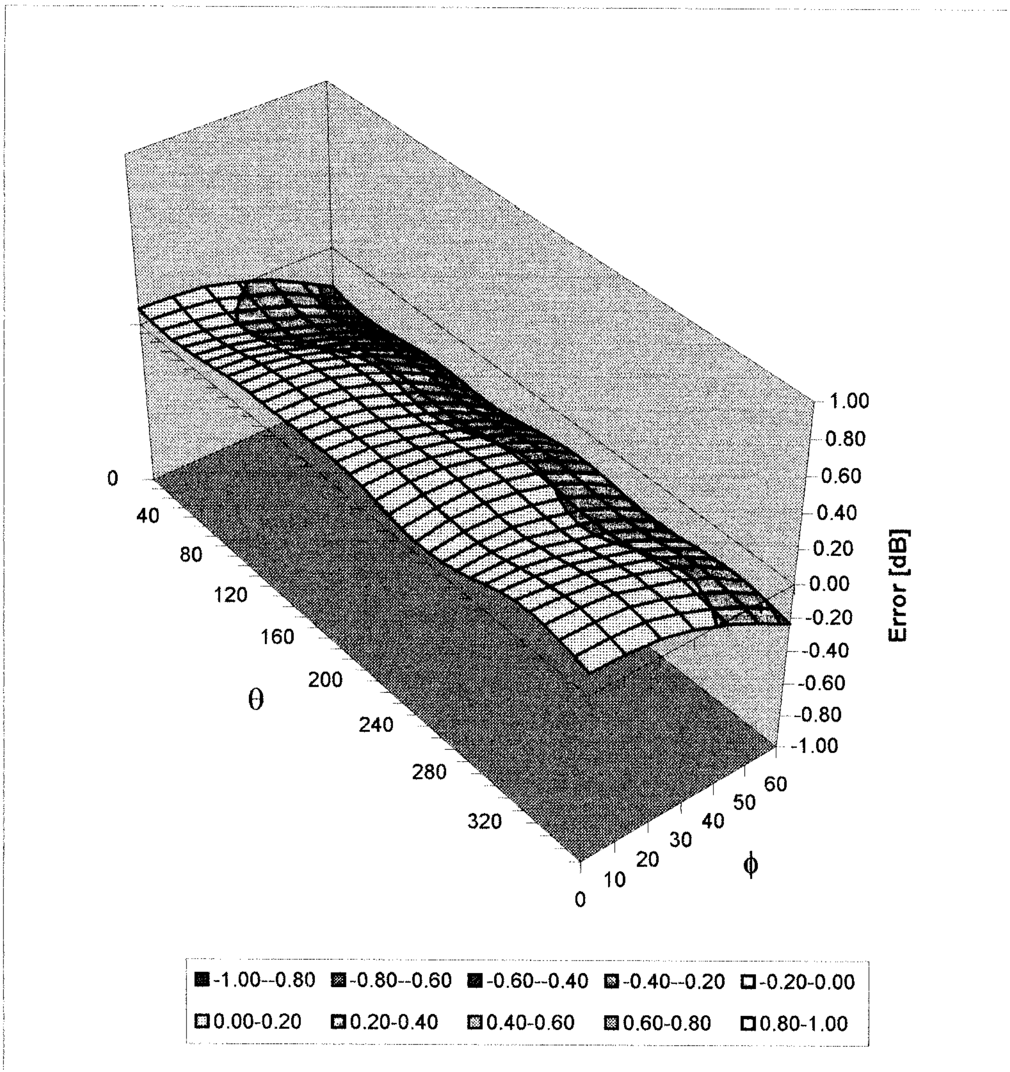
ConvF X	**5.0**	± 8.9% (k=2)	Boundary effect:	
ConvF Y	**5.0**	± 8.9% (k=2)	Alpha	**1.04**
ConvF Z	**5.0**	± 8.9% (k=2)	Depth	**1.85**

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: [signature]

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

300MHz System Performance Check

Measured Fluid Dielectric Parameters (Brain)

May 05, 2003

Frequency	e'	e''
200.000000 MHz	49.6937	72.0571
210.000000 MHz	49.1416	69.3848
220.000000 MHz	48.8159	66.9744
230.000000 MHz	48.2404	64.6310
240.000000 MHz	47.7816	62.4387
250.000000 MHz	47.2850	60.6583
260.000000 MHz	46.8403	58.9470
270.000000 MHz	46.4749	57.4791
280.000000 MHz	46.1336	56.0541
290.000000 MHz	45.8051	54.7262
300.000000 MHz	45.5196	53.2582
310.000000 MHz	45.1429	52.0975
320.000000 MHz	44.8142	50.9655
330.000000 MHz	44.5305	49.8717
340.000000 MHz	44.2161	48.7339
350.000000 MHz	43.9492	47.7885
360.000000 MHz	43.6490	46.8645
370.000000 MHz	43.4629	45.9306
380.000000 MHz	43.2159	45.0864
390.000000 MHz	42.9679	44.1656
400.000000 MHz	42.7381	43.4800

150MHz EUT Evaluation (Face)

Measured Fluid Dielectric Parameters (Brain)

May 05, 2003

Frequency	e'	e''
50.000000 MHz	62.2272	241.2507
60.000000 MHz	60.0964	204.1251
70.000000 MHz	59.8950	176.6113
80.000000 MHz	58.2559	156.4559
90.000000 MHz	57.8933	140.6803
100.000000 MHz	57.0533	128.1853
110.000000 MHz	56.2502	117.6191
120.000000 MHz	55.4784	109.2813
130.000000 MHz	54.8431	101.2401
140.000000 MHz	54.5138	95.4320
150.000000 MHz	53.6399	89.9885
160.000000 MHz	53.1107	85.2025
170.000000 MHz	52.7646	81.2286
180.000000 MHz	52.1973	77.4792
190.000000 MHz	51.9518	74.0760
200.000000 MHz	51.3664	71.2827
210.000000 MHz	50.8504	68.6122
220.000000 MHz	50.5282	66.2987
230.000000 MHz	50.1076	64.1209
240.000000 MHz	49.5892	62.1329
250.000000 MHz	49.1493	60.2972

150MHz EUT Evaluation (Body)

Measured Fluid Dielectric Parameters (Muscle)

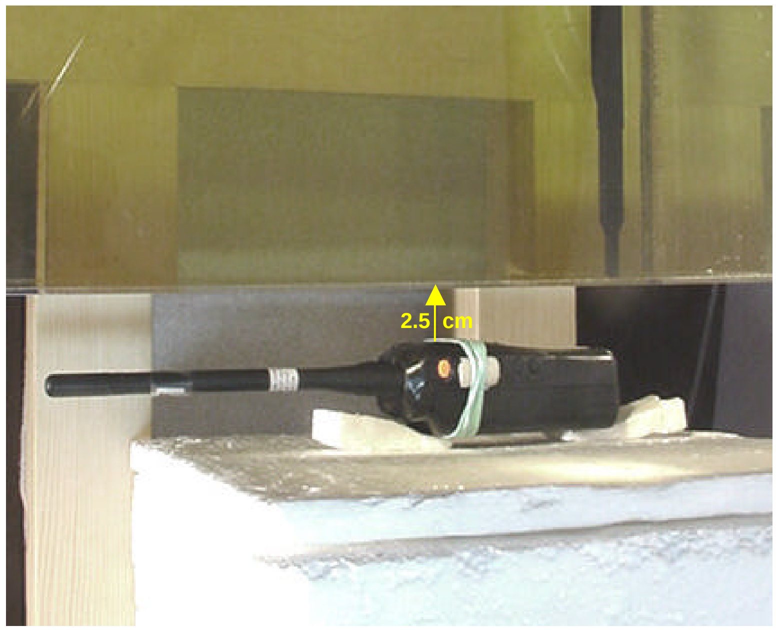
May 05, 2003

Frequency	e'	e''
50.000000 MHz	65.9176	258.7560
60.000000 MHz	65.6298	217.1560
70.000000 MHz	65.1457	187.3447
80.000000 MHz	64.5939	165.0592
90.000000 MHz	63.5798	147.5853
100.000000 MHz	62.8490	134.2329
110.000000 MHz	62.1534	123.3301
120.000000 MHz	61.8349	113.8351
130.000000 MHz	61.1007	105.8104
140.000000 MHz	60.7892	99.1898
150.000000 MHz	60.5412	93.6271
160.000000 MHz	60.1837	88.4729
170.000000 MHz	59.9304	84.0043
180.000000 MHz	59.7189	79.8349
190.000000 MHz	59.4613	76.2507
200.000000 MHz	59.2259	73.1389
210.000000 MHz	58.7332	70.2224
220.000000 MHz	58.3873	67.7800
230.000000 MHz	57.9606	65.4638
240.000000 MHz	57.5399	63.3375
250.000000 MHz	57.2254	61.3838

APPENDIX F - SAR TEST SETUP & EUT PHOTOGRAPHS

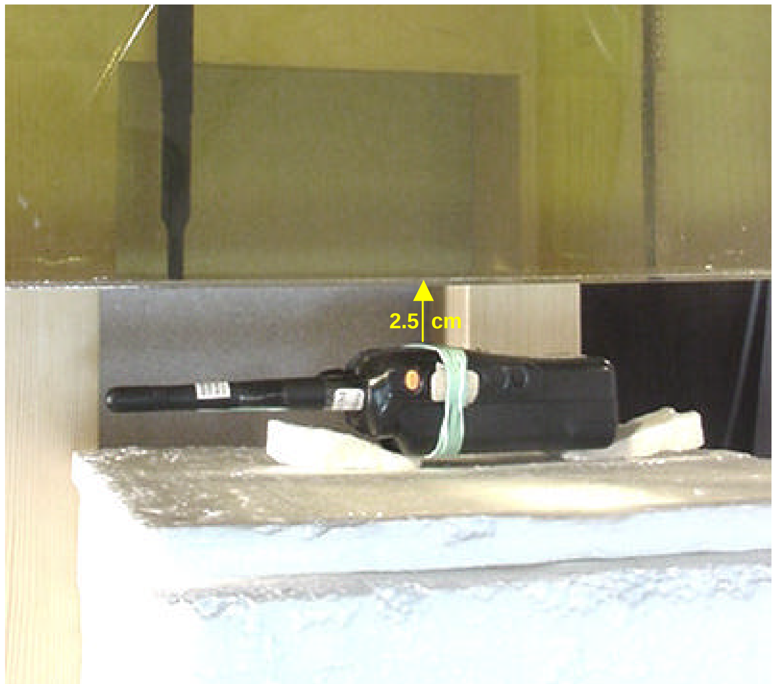
FACE-HELD SAR TEST SETUP PHOTOGRAPHS

2.5 cm Separation Distance from Front of Radio to Planar Phantom
With Antenna P/N: KRA-26



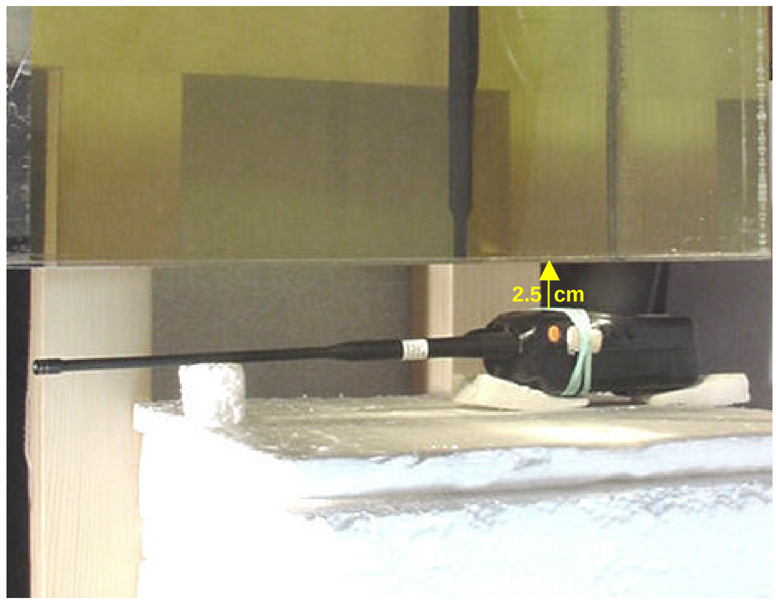
FACE-HELD SAR TEST SETUP PHOTOGRAPHS

2.5 cm Separation Distance from Front of Radio to Planar Phantom
With Antenna P/N: KRA-22



FACE-HELD SAR TEST SETUP PHOTOGRAPHS

2.5 cm Separation Distance from Front of Radio to Planar Phantom
With Antenna P/N: KRA-25



BODY-WORN SAR TEST SETUP PHOTOGRAPHS

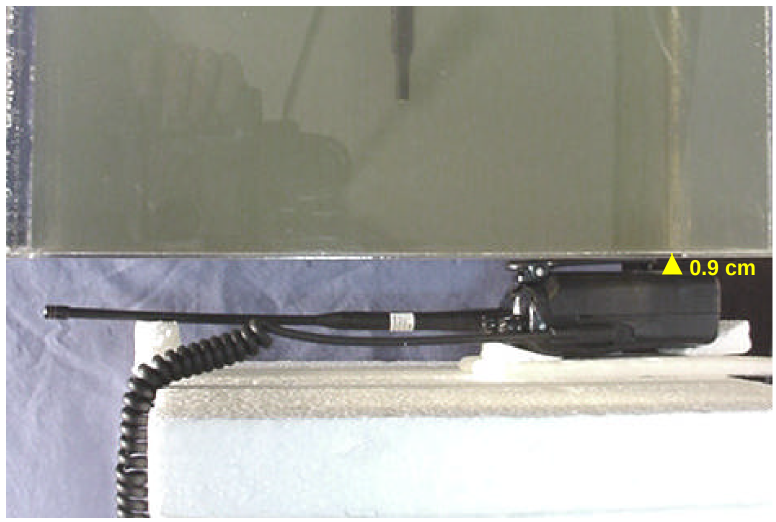
0.9 cm Belt-Clip Separation Distance to Planar Phantom
With Antenna P/N: KRA-26 & Speaker-Microphone Accessory

BODY-WORN SAR TEST SETUP PHOTOGRAPHS

0.9 cm Belt-Clip Separation Distance to Planar Phantom
With Antenna P/N: KRA-22 & Speaker-Microphone Accessory

BODY-WORN SAR TEST SETUP PHOTOGRAPHS

0.9 cm Belt-Clip Separation Distance to Planar Phantom
With Antenna P/N: KRA-25 & Speaker-Microphone Accessory



EUT PHOTOGRAPHS

Front of Radio
Antenna P/N: KRA-26(M)

Front of Radio
Antenna P/N: KRA-26(M2)

Front of Radio
Antenna P/N: KRA-26(M3)

Front of Radio
Antenna P/N: KRA-25

Front of Radio
Antenna P/N: KRA-22(M)

Front of Radio
Antenna P/N: KRA-22(M2)

Front of Radio
Antenna P/N: KRA-22(M3)

EUT PHOTOGRAPHS

Back of Radio with Belt-Clip

Back of Radio - Battery Removed

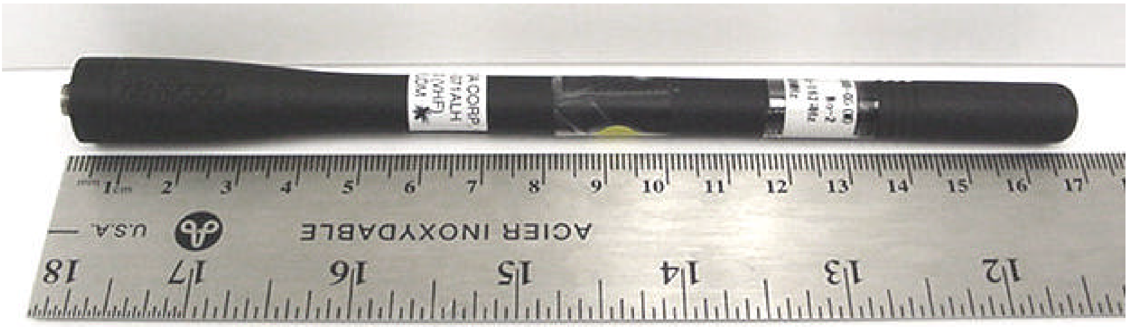
NiMH Battery (KNB-26N)

NiMH Battery (KNB-26N)

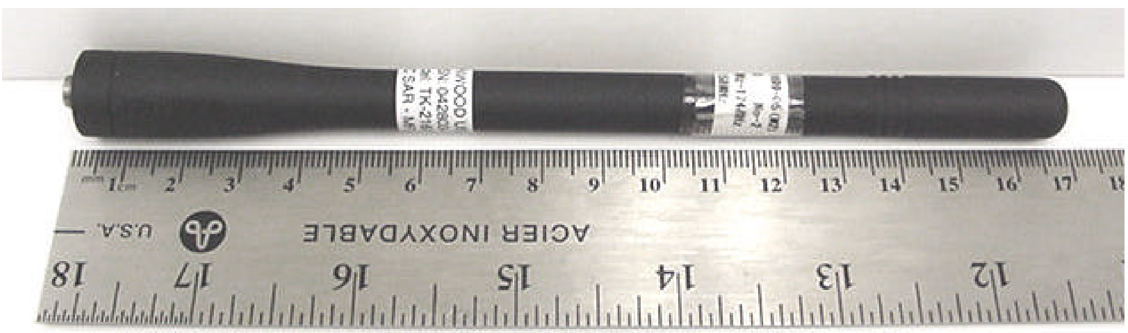
Left Side of Radio with Belt-Clip

Right Side of Radio with Belt-Clip

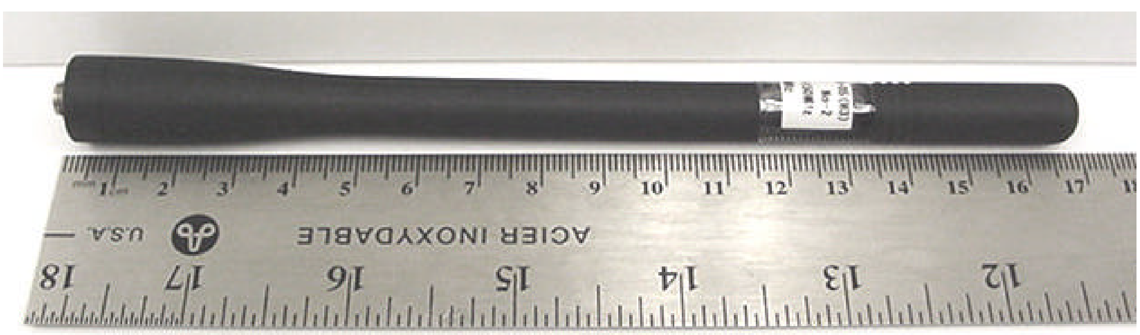
EUT PHOTOGRAPHS



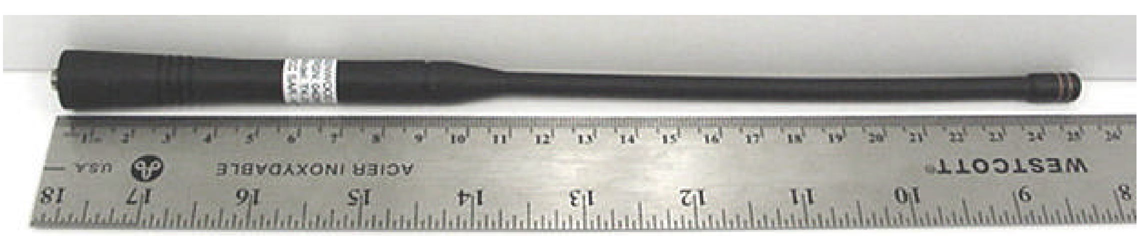
Antenna P/N: KRA-26(M)



Antenna P/N: KRA-26(M2)

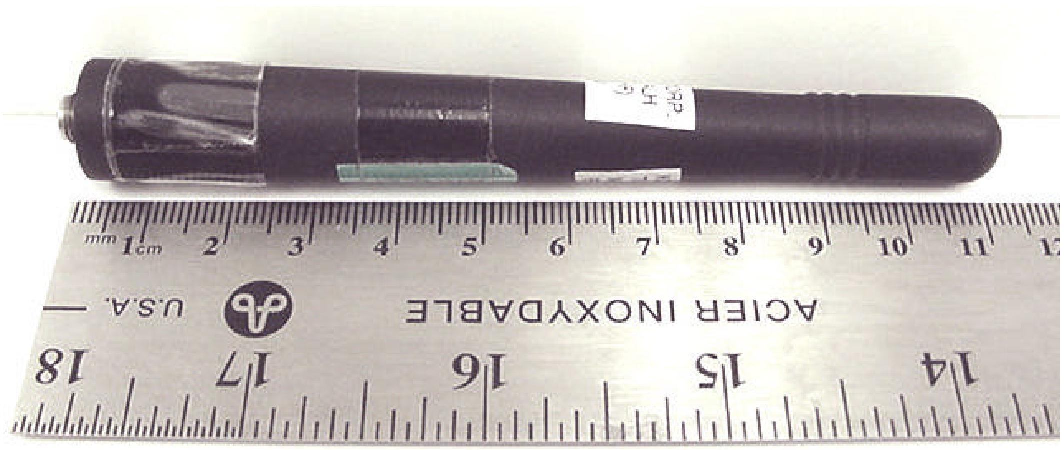


Antenna P/N: KRA-26(M3)



Antenna P/N: KRA-25

EUT PHOTOGRAPHS



Antenna P/N: KRA-22(M)

Antenna P/N: KRA-22(M2)

Antenna P/N: KRA-22(M3)

EUT PHOTOGRAPHS

Front of Speaker-Microphone Accessory


Front of Radio with Speaker-Microphone Accessory

Back of Speaker-Microphone Accessory