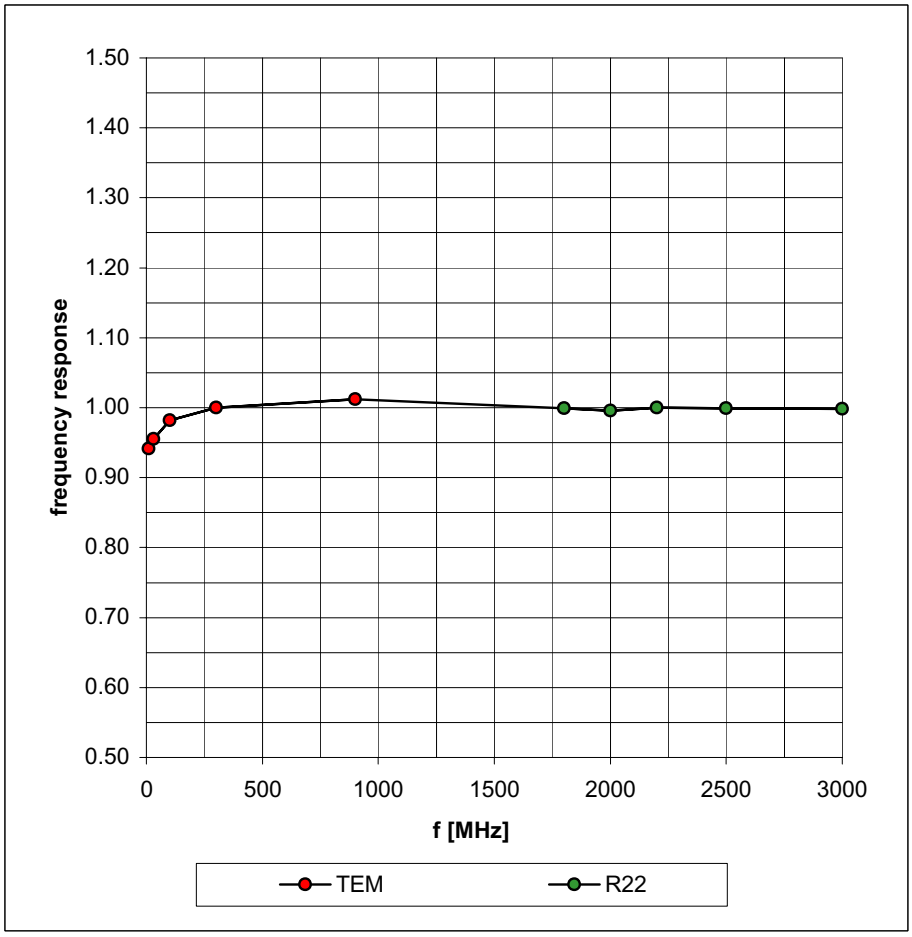
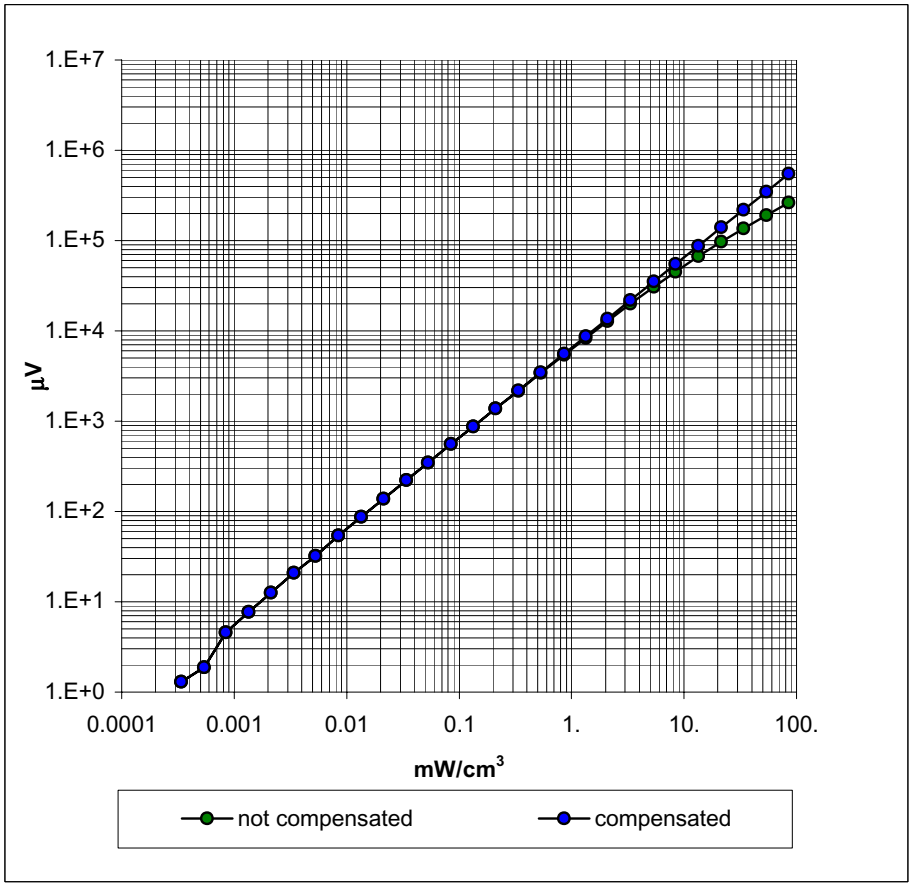
Frequency Response of E-Field

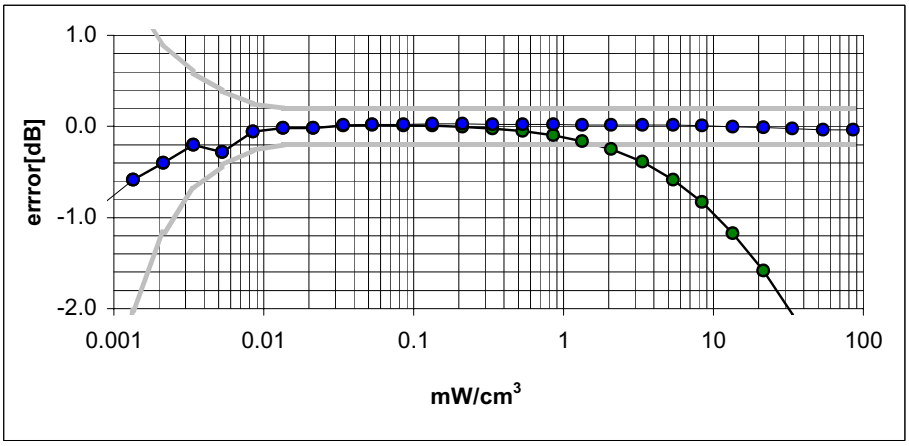
(TEM-Cell:ifi110, Waveguide R22)



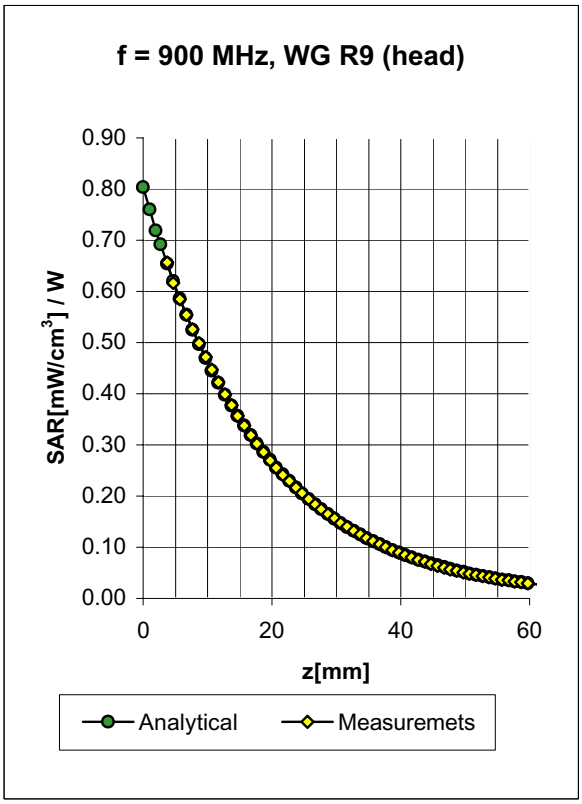
Dynamic Range f(SAR_{brain})

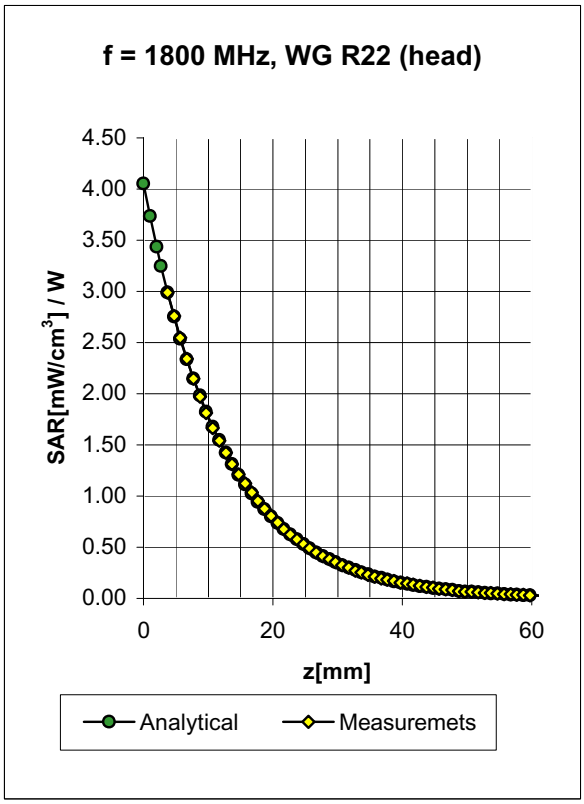
(Waveguide R22)





Conversion Factor Assessment



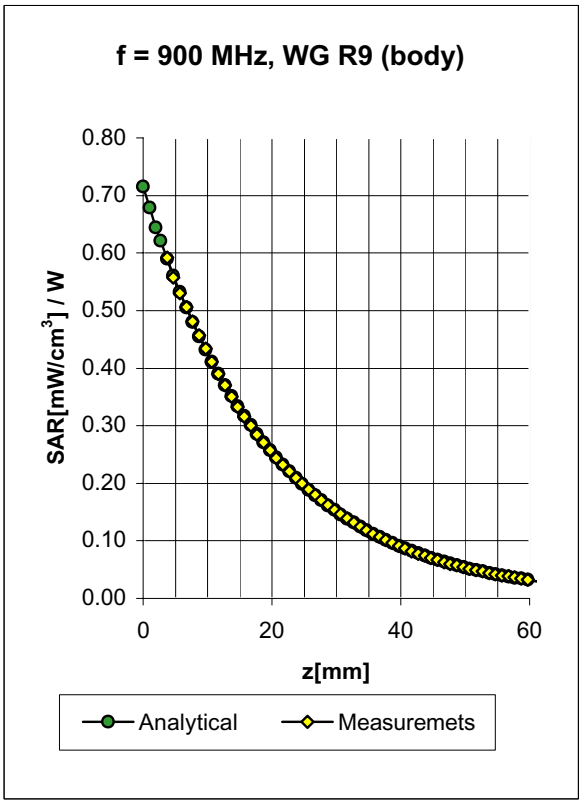


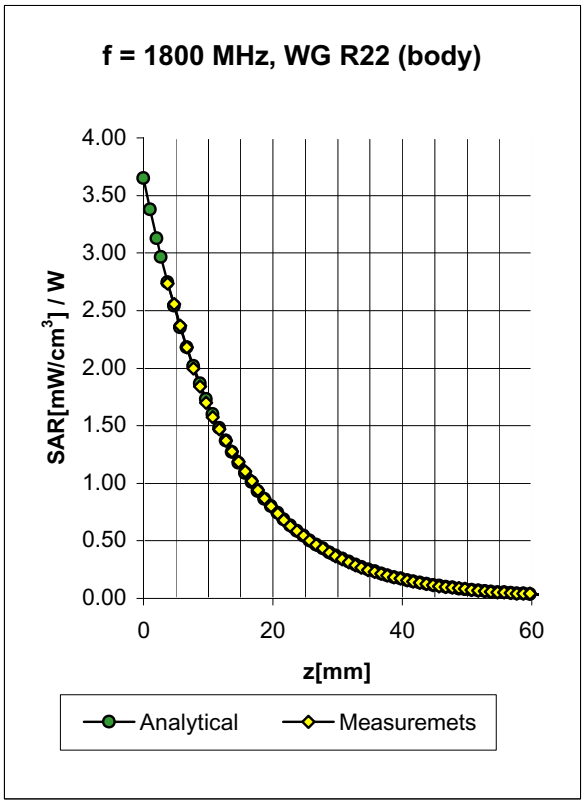
Head	**900 MHz**		**ε_r = 41.5 ± 5%**	**σ = 0.97 ± 5% mho/m**
Head	**835 MHz**		**ε_r = 41.5 ± 5%**	**σ = 0.90 ± 5% mho/m**
	ConvF X	**6.6** ± 9.5% (k=2)		Boundary effect:
	ConvF Y	**6.6** ± 9.5% (k=2)		Alpha **0.40**
	ConvF Z	**6.6** ± 9.5% (k=2)		Depth **2.38**

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	**5.4** ± 9.5% (k=2)		Boundary effect:
	ConvF Y	**5.4** ± 9.5% (k=2)		Alpha **0.57**
	ConvF Z	**5.4** ± 9.5% (k=2)		Depth **2.18**

ET3DV6 SN:1387 **February 22, 2002**

Conversion Factor Assessment





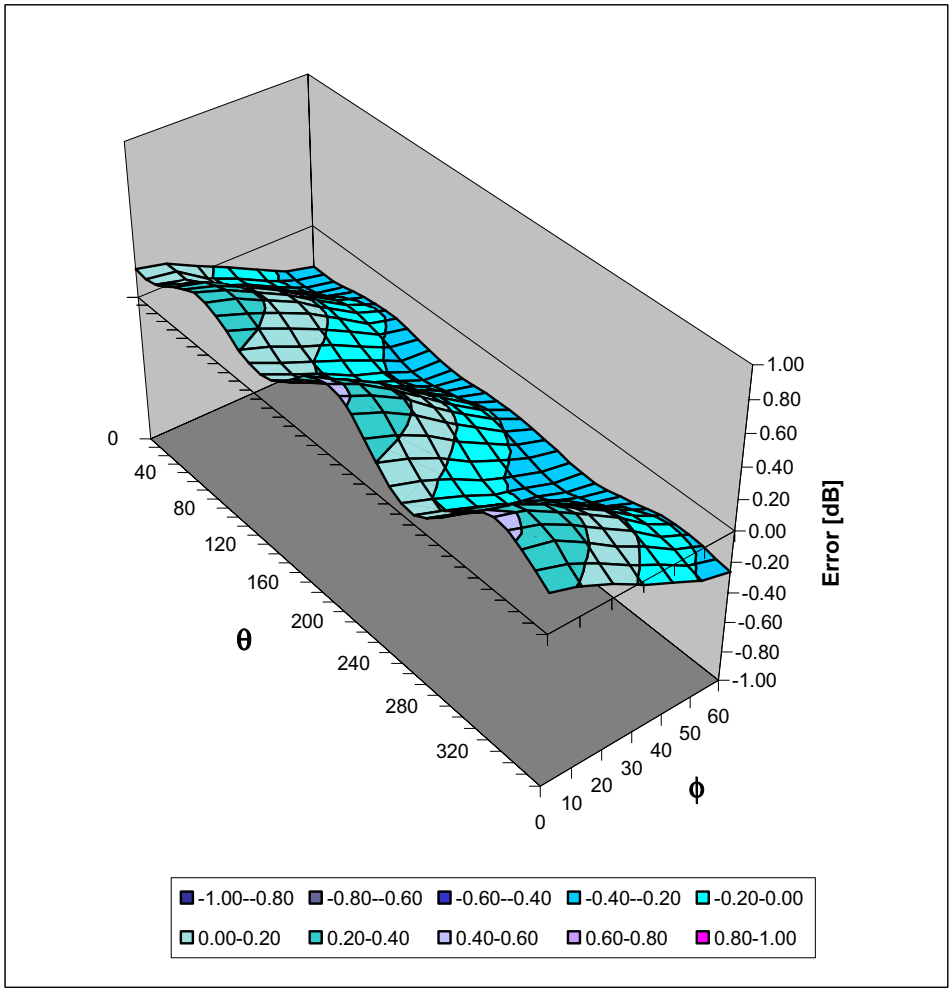
Body	**900 MHz**	ε_r **= 55.0 ± 5%**	**σ = 1.05 ± 5% mho/m**	
Body	**835 MHz**	ε_r **= 55.2 ± 5%**	**σ = 0.97 ± 5% mho/m**	
	ConvF X	**6.3** ± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**6.3** ± 9.5% (k=2)	Alpha	**0.42**
	ConvF Z	**6.3** ± 9.5% (k=2)	Depth	**2.44**

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	**5.0** ± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**5.0** ± 9.5% (k=2)	Alpha	**0.76**
	ConvF Z	**5.0** ± 9.5% (k=2)	Depth	**2.01**

ET3DV6 SN:1387 **February 22, 2002**

Deviation from Isotropy in HSL

Error ($\theta\phi$), 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 25, 2002**
Probe Calibration Date:	**February 22, 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:1387

Conversion Factor (± standard deviation)

150 MHz	ConvF	**9.2 ± 8%**	**ε_r = 52.3** **σ = 0.76 mho/m** (head tissue)
300 MHz	ConvF	**8.0 ± 8%**	**ε_r = 45.3** **σ = 0.87 mho/m** (head tissue)
450 MHz	ConvF	**7.3 ± 8%**	**ε_r = 43.5** **σ = 0.87 mho/m** (head tissue)
2450 MHz	ConvF	**4.7 ± 8%**	**ε_r = 39.2** **σ = 1.80 mho/m** (head tissue)
150 MHz	ConvF	**8.8 ± 8%**	**ε_r = 61.9** **σ = 0.80 mho/m** (body tissue)
450 MHz	ConvF	**7.7 ± 8%**	**ε_r = 56.7** **σ = 0.94 mho/m** (body tissue)
2450 MHz	ConvF	**4.3 ± 8%**	**ε_r = 52.7** **σ = 1.95 mho/m** (body tissue)

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**

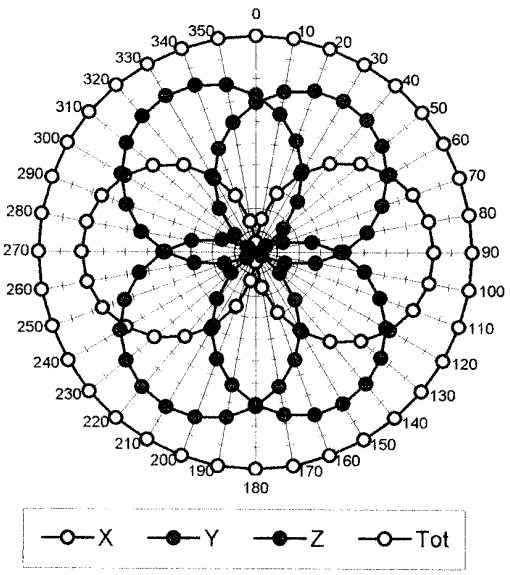
Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	10.7	7.4
SAR_{be} [%]	With Correction Algorithm	0.1	0.3

Sensor Offset

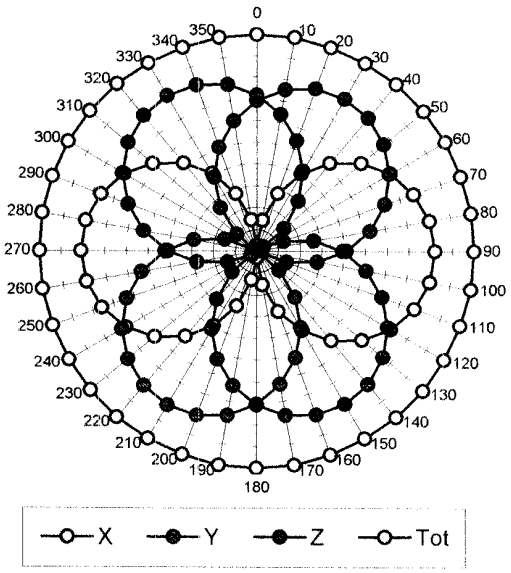
Probe Tip to Sensor Center	**2.7**	mm
Optical Surface Detection	**1.2 ± 0.2**	mm

Receiving Pattern (ϕ), θ = 0°

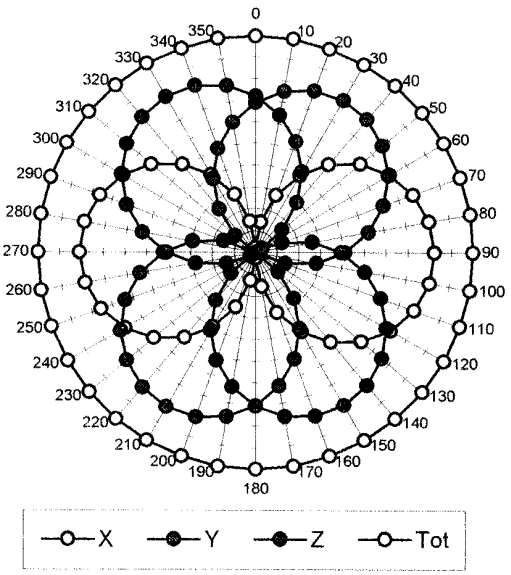
f = 30 MHz, TEM cell ifi110



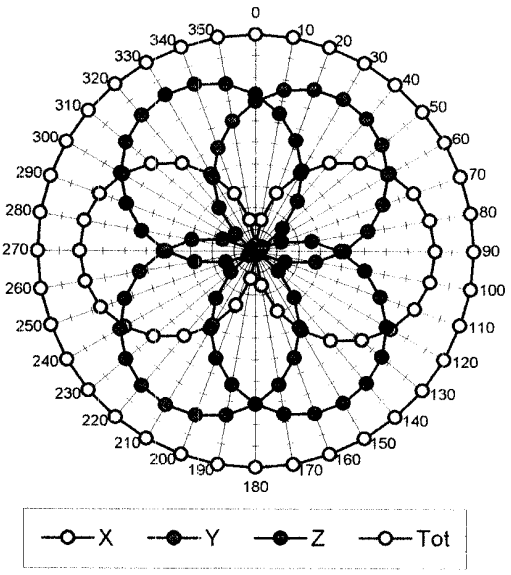
f = 100 MHz, TEM cell ifi110

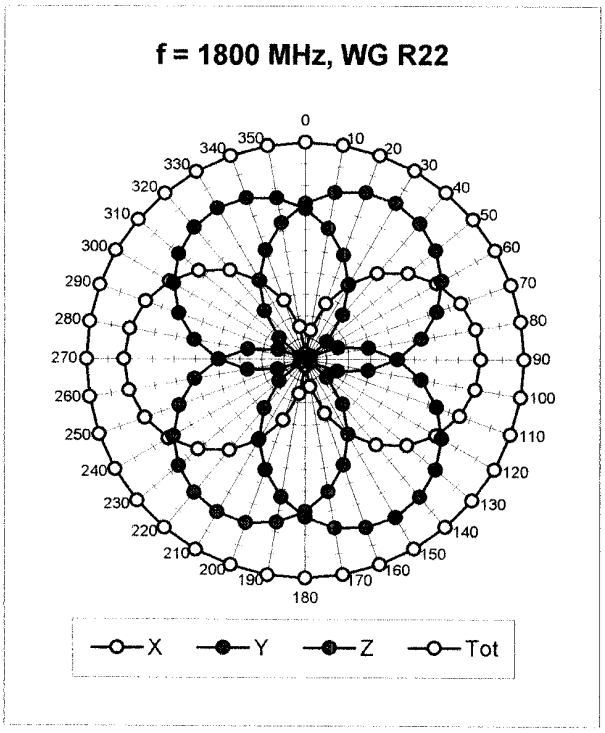


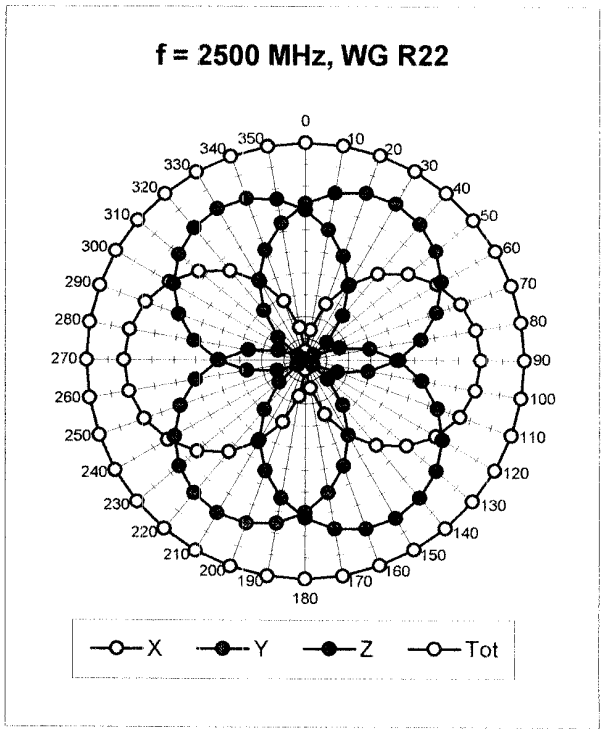
f = 300 MHz, TEM cell ifi110



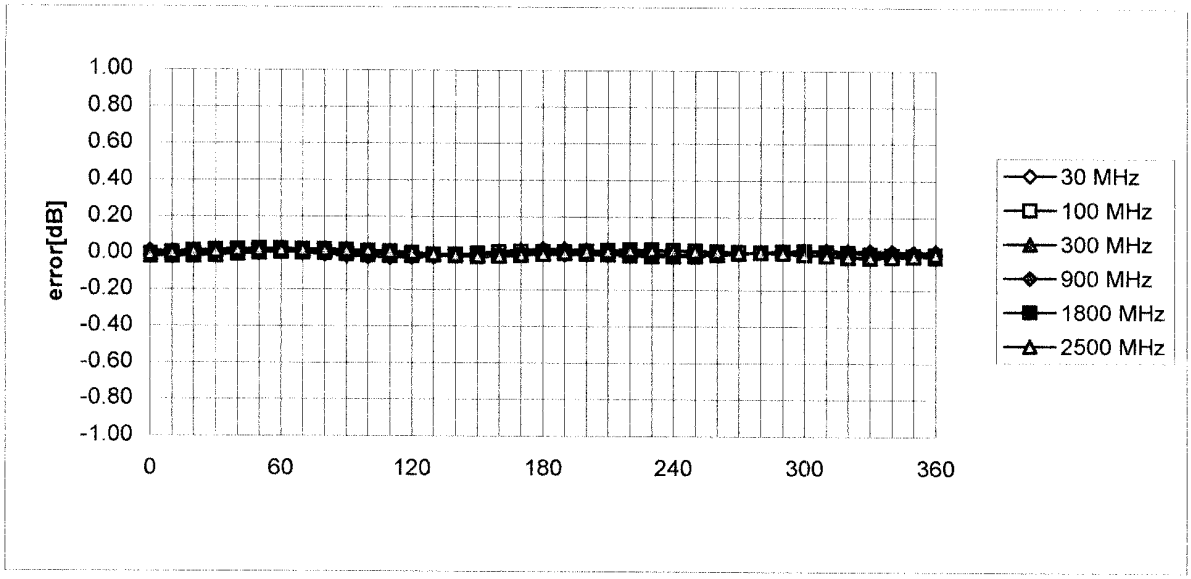
f = 900 MHz, TEM cell ifi110





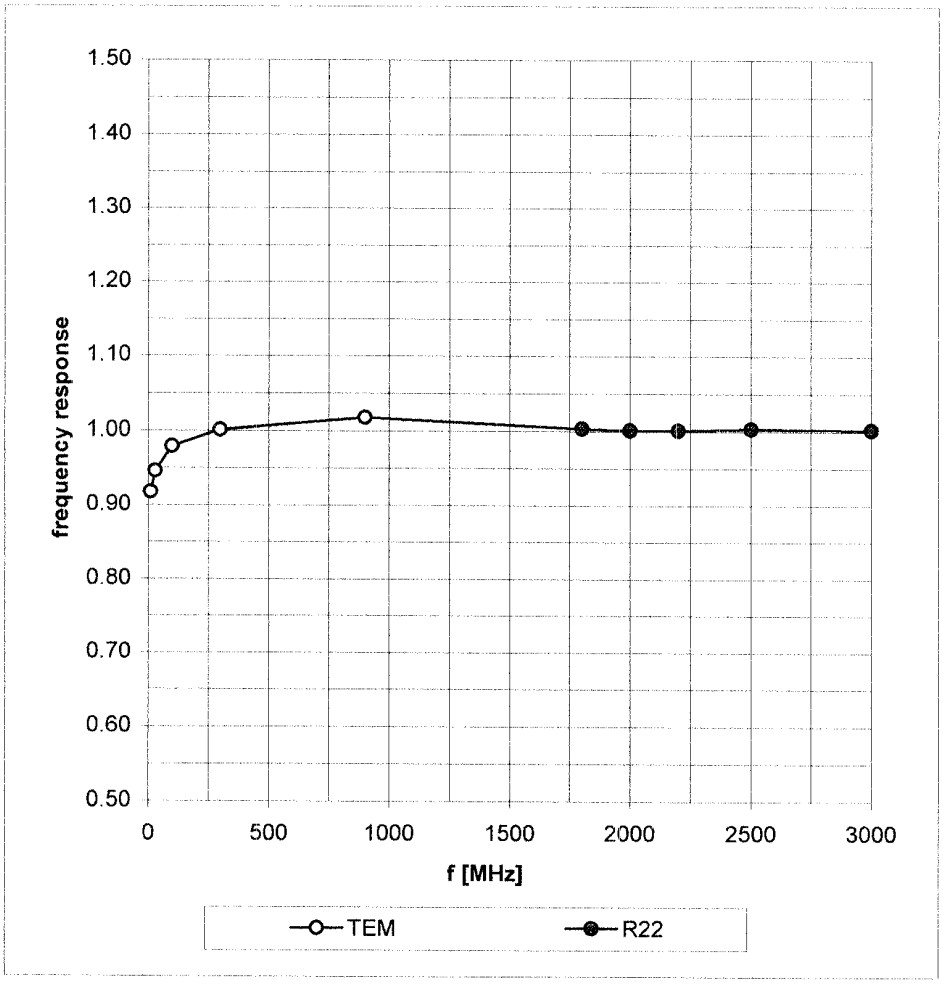


Isotropy Error (ϕ), θ = 0°



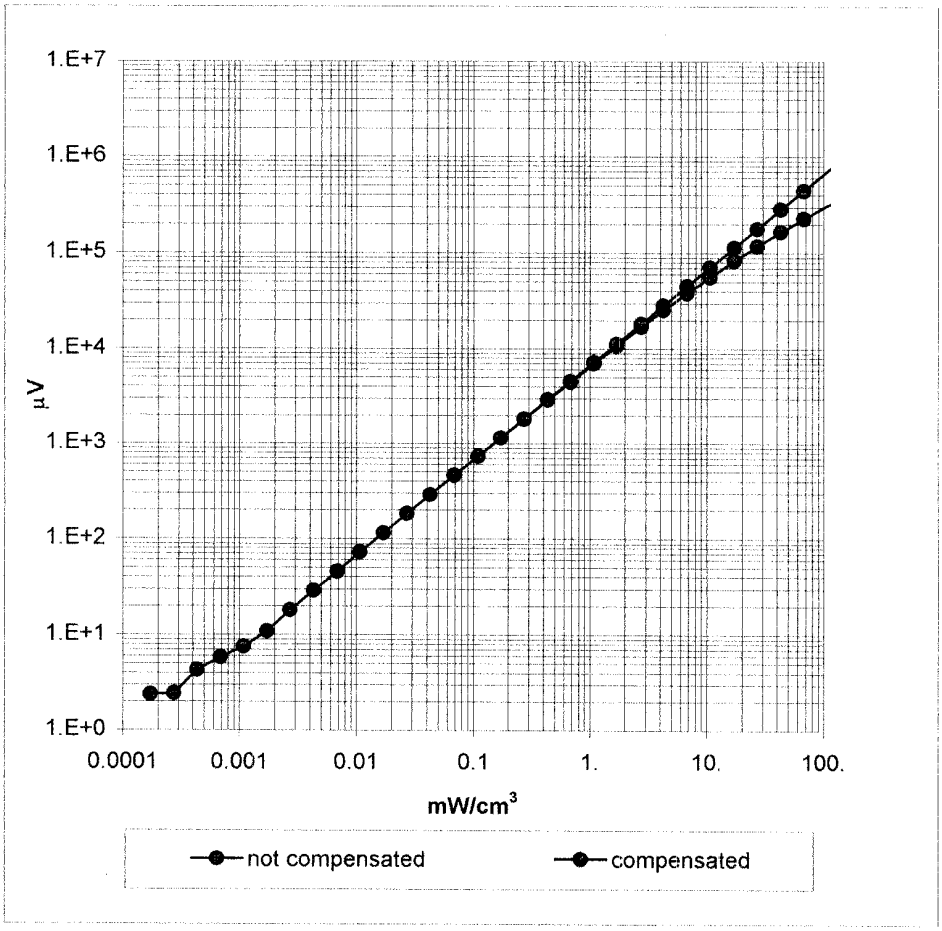
Frequency Response of E-Field

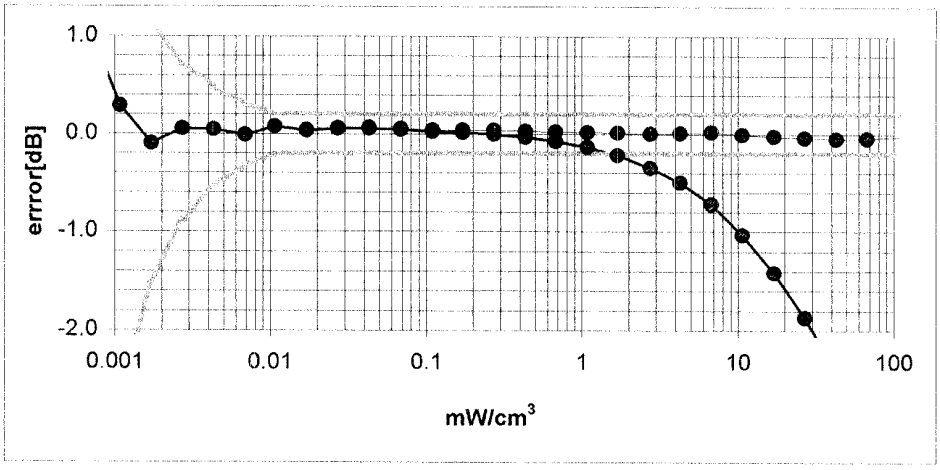
(TEM-Cell:ifi110, Waveguide R22)



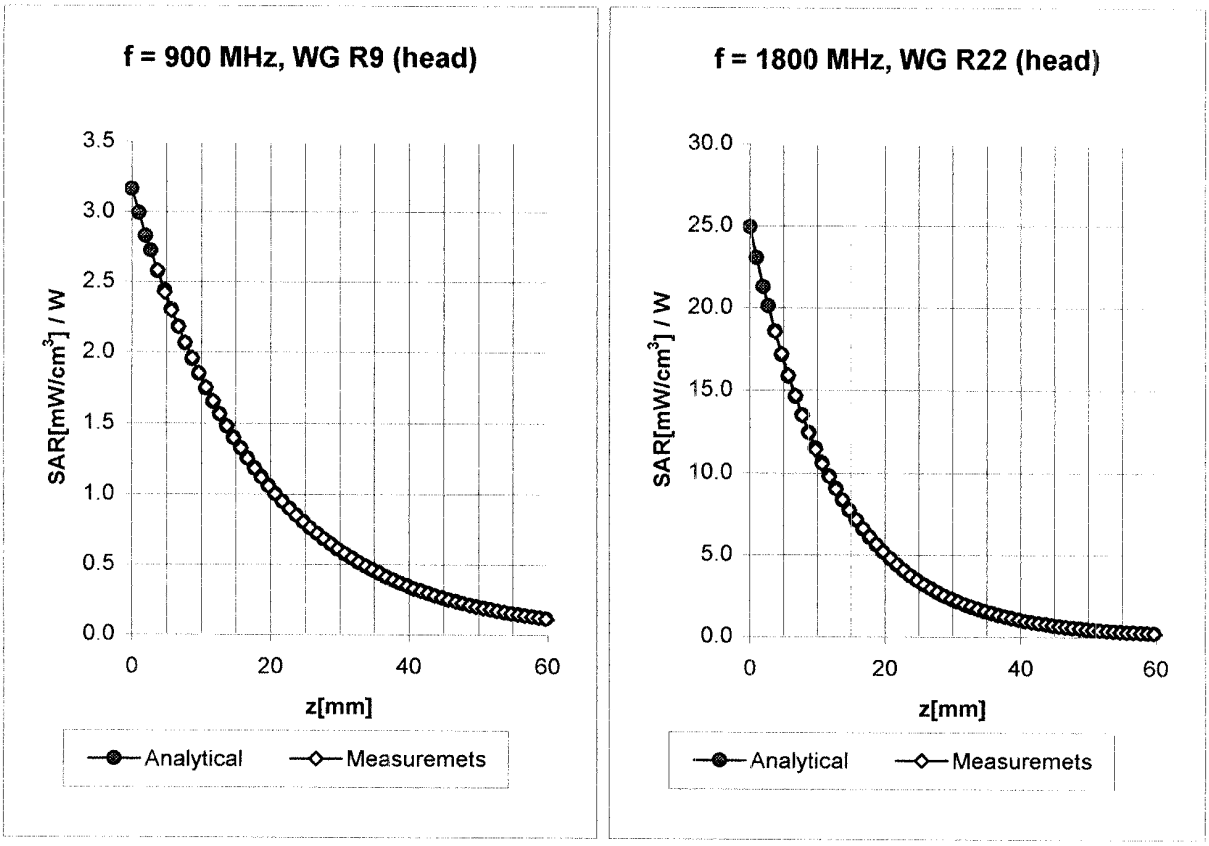
Dynamic Range f(SAR_{brain})

(Waveguide R22)





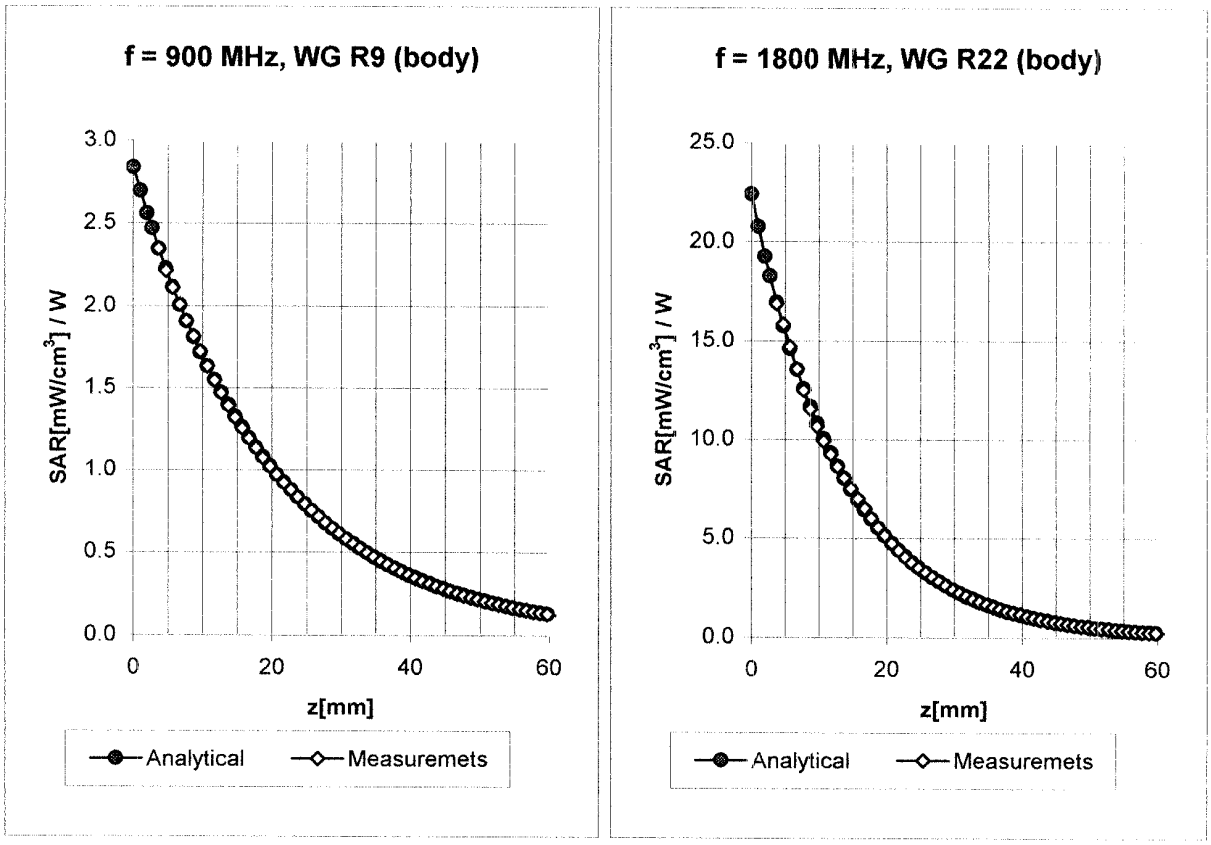
Conversion Factor Assessment



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

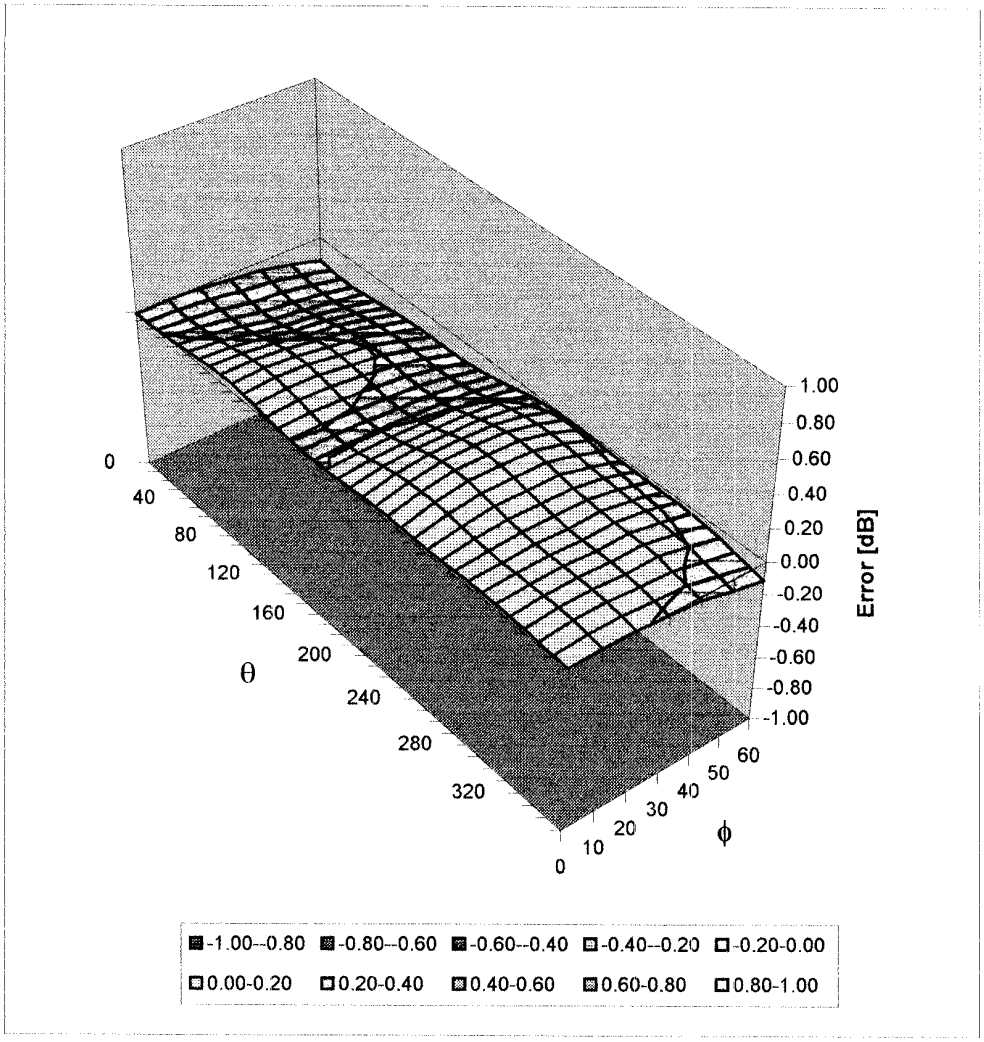


Body	**900 MHz**	ε_r = **55.0 ± 5%**	σ = **1.05 ± 5% mho/m**	
Body	**835 MHz**	ε_r = **55.2 ± 5%**	σ = **0.97 ± 5% mho/m**	
	ConvF X	**6.7** ± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**6.7** ± 9.5% (k=2)	Alpha	**0.34**
	ConvF Z	**6.7** ± 9.5% (k=2)	Depth	**2.57**

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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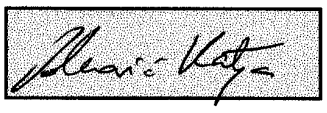
Additional Conversion Factors

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)

APPENDIX E - MEASURED FLUID DIELECTRIC PARAMETERS

1800MHz System Performance Check

Measured Fluid Dielectric Parameters (Brain)

October 31, 2002

Frequency	e'	e''
1.700000000 GHz	41.2798	13.0837
1.710000000 GHz	41.2602	13.0951
1.720000000 GHz	41.2428	13.1239
1.730000000 GHz	41.2332	13.1635
1.740000000 GHz	41.1970	13.2033
1.750000000 GHz	41.1597	13.2594
1.760000000 GHz	41.1399	13.3108
1.770000000 GHz	41.0942	13.3531
1.780000000 GHz	41.0424	13.3931
1.790000000 GHz	41.0023	13.4196
1.800000000 GHz	40.9392	13.4514
1.810000000 GHz	40.8723	13.5044
1.820000000 GHz	40.8305	13.5262
1.830000000 GHz	40.7701	13.5601
1.840000000 GHz	40.7256	13.6024
1.850000000 GHz	40.6963	13.6136
1.860000000 GHz	40.6578	13.6371
1.870000000 GHz	40.6143	13.6698
1.880000000 GHz	40.5860	13.7051
1.890000000 GHz	40.5368	13.7388
1.900000000 GHz	40.4979	13.7539
1.910000000 GHz	40.4361	13.7782
1.920000000 GHz	40.3913	13.8216
1.930000000 GHz	40.3420	13.8382
1.940000000 GHz	40.2957	13.8799
1.950000000 GHz	40.2504	13.8943
1.960000000 GHz	40.2068	13.9137
1.970000000 GHz	40.1537	13.9220
1.980000000 GHz	40.1066	13.9680
1.990000000 GHz	40.0705	13.9890
2.000000000 GHz	40.0110	14.0174
2.010000000 GHz	39.9634	14.0526
2.020000000 GHz	39.9454	14.0734
2.030000000 GHz	39.9005	14.0836
2.040000000 GHz	39.8735	14.0757
2.050000000 GHz	39.8261	14.0793
2.060000000 GHz	39.7697	14.0897
2.070000000 GHz	39.7324	14.1132
2.080000000 GHz	39.6860	14.1142
2.090000000 GHz	39.6347	14.1394
2.100000000 GHz	39.6010	14.1757

1900MHz EUT Evaluation (Body)

Measured Fluid Dielectric Parameters (Muscle)

October 31, 2002

Frequency	e'	e''
1.780000000 GHz	53.7799	14.1634
1.790000000 GHz	53.7451	14.1811
1.800000000 GHz	53.6851	14.2061
1.810000000 GHz	53.6466	14.2278
1.820000000 GHz	53.5981	14.2401
1.830000000 GHz	53.5462	14.2632
1.840000000 GHz	53.5197	14.2792
1.850000000 GHz	53.4766	14.2954
1.860000000 GHz	53.4572	14.2945
1.870000000 GHz	53.4243	14.3098
1.880000000 GHz	53.3928	14.3204
1.890000000 GHz	53.3722	14.3288
1.900000000 GHz	53.3463	14.3497
1.910000000 GHz	53.3347	14.3760
1.920000000 GHz	53.3135	14.3820
1.930000000 GHz	53.3075	14.4182
1.940000000 GHz	53.3146	14.4349
1.950000000 GHz	53.3167	14.4599
1.960000000 GHz	53.2951	14.4929
1.970000000 GHz	53.2730	14.5118
1.980000000 GHz	53.2137	14.5745

1900MHz EUT Evaluation (Body)

Measured Fluid Dielectric Parameters (Muscle)

February 19, 2003

Frequency	e'	e''
1.880000000 GHz	52.1339	14.4407
1.882000000 GHz	52.1315	14.4488
1.884000000 GHz	52.1272	14.4587
1.886000000 GHz	52.1197	14.4569
1.888000000 GHz	52.1095	14.4720
1.890000000 GHz	52.0998	14.4795
1.892000000 GHz	52.0937	14.4910
1.894000000 GHz	52.1018	14.4862
1.896000000 GHz	52.0850	14.4857
1.898000000 GHz	52.0689	14.5097
1.900000000 GHz	52.0733	14.5046
1.902000000 GHz	52.0601	14.5118
1.904000000 GHz	52.0543	14.5230
1.906000000 GHz	52.0460	14.5115
1.908000000 GHz	52.0336	14.5431
1.910000000 GHz	52.0223	14.5521
1.912000000 GHz	52.0266	14.5543
1.914000000 GHz	52.0084	14.5554
1.916000000 GHz	51.9863	14.5600
1.918000000 GHz	51.9824	14.5767
1.920000000 GHz	51.9908	14.5752

900MHz System Performance Check

Measured Fluid Dielectric Parameters (Brain)

November 01, 2002

Frequency	e'	e''
800.000000 MHz	41.2662	19.6652
810.000000 MHz	41.2314	19.7088
820.000000 MHz	41.1038	19.7337
830.000000 MHz	40.9247	19.7465
840.000000 MHz	40.7396	19.6991
850.000000 MHz	40.5885	19.6444
860.000000 MHz	40.4447	19.5281
870.000000 MHz	40.2887	19.4286
880.000000 MHz	40.2284	19.3349
890.000000 MHz	40.1639	19.3241
900.000000 MHz	40.0967	19.2946
910.000000 MHz	39.9764	19.3598
920.000000 MHz	39.7993	19.3830
930.000000 MHz	39.6051	19.3158
940.000000 MHz	39.5146	19.2297
950.000000 MHz	39.4518	19.1656
960.000000 MHz	39.3739	19.1074
970.000000 MHz	39.2703	19.0490
980.000000 MHz	39.1973	18.9920
990.000000 MHz	39.1346	18.9467
1.000000000 GHz	39.0321	18.9421

835MHz EUT Evaluation (Body)

Measured Fluid Dielectric Parameters (Muscle)

November 01, 2002

Frequency	e'	e''
735.000000 MHz	54.3563	21.0114
745.000000 MHz	54.2502	20.9616
755.000000 MHz	54.0917	20.9181
765.000000 MHz	54.0164	20.8607
775.000000 MHz	53.9204	20.8343
785.000000 MHz	53.8288	20.8070
795.000000 MHz	53.7482	20.7992
805.000000 MHz	53.6311	20.7704
815.000000 MHz	53.5235	20.7392
825.000000 MHz	53.4250	20.7056
835.000000 MHz	53.3029	20.6705
845.000000 MHz	53.1899	20.6332
855.000000 MHz	53.0621	20.6024
865.000000 MHz	52.9515	20.5772
875.000000 MHz	52.8425	20.5735
885.000000 MHz	52.7526	20.5528
895.000000 MHz	52.6987	20.4932
905.000000 MHz	52.6232	20.4374
915.000000 MHz	52.5281	20.4157
925.000000 MHz	52.4357	20.3785
935.000000 MHz	52.3238	20.3598

835MHz EUT Evaluation (Body)

Measured Fluid Dielectric Parameters (Muscle)

February 19, 2003

Frequency	e'	e''
735.000000 MHz	54.8691	21.3105
745.000000 MHz	54.7535	21.2377
755.000000 MHz	54.6248	21.1829
765.000000 MHz	54.5190	21.1455
775.000000 MHz	54.4038	21.1005
785.000000 MHz	54.2866	21.0690
795.000000 MHz	54.2012	21.0159
805.000000 MHz	54.1353	20.9908
815.000000 MHz	54.0471	20.9234
825.000000 MHz	53.9580	20.8742
835.000000 MHz	53.8782	20.8392
845.000000 MHz	53.7448	20.8409
855.000000 MHz	53.6401	20.7893
865.000000 MHz	53.5089	20.7705
875.000000 MHz	53.3986	20.7660
885.000000 MHz	53.3165	20.7408
895.000000 MHz	53.2577	20.6443
905.000000 MHz	53.1686	20.6233
915.000000 MHz	53.0600	20.5694
925.000000 MHz	52.9903	20.5525
935.000000 MHz	52.8634	20.4981

APPENDIX F - SAM PHANTOM CERTIFICATE OF CONFORMITY

Schmid & Partner Engineering AG

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

Certificate of conformity / First Article Inspection

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

Tests

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

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

Standards

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

Conformity

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

Date 18.11.2001

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

APPENDIX G - SAR TEST SETUP PHOTOGRAPHS

BODY SAR TEST SETUP PHOTOGRAPHS

Back of LCD Display (Closed) - Antenna Parallel to Planar Phantom (Stowed Position)
0.0cm Separation Distance from Back of LCD to Planar Phantom

BODY SAR TEST SETUP PHOTOGRAPHS

Back of LCD Display (Closed) - Antenna Perpendicular to Planar Phantom (180°)
0.0cm Separation Distance from Back of LCD to Planar Phantom

BODY SAR TEST SETUP PHOTOGRAPHS

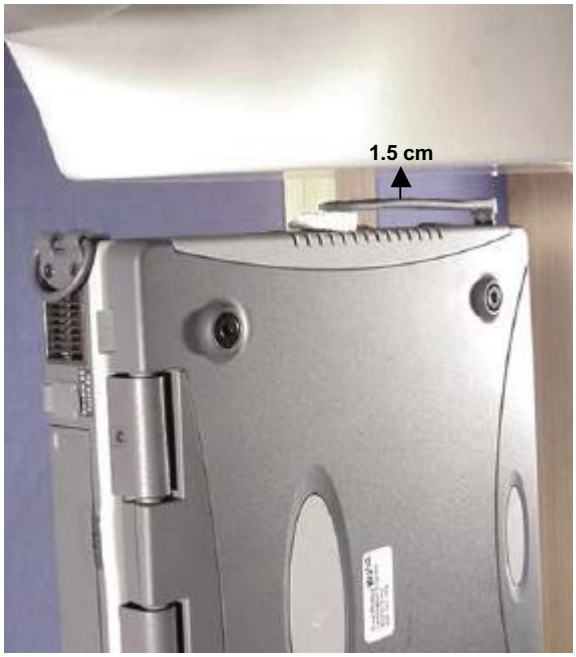
Bottom of Laptop PC (LCD Display Closed) - Antenna Parallel to Planar Phantom (Stowed Position)
0.0cm Separation Distance from Bottom of Laptop PC to Planar Phantom

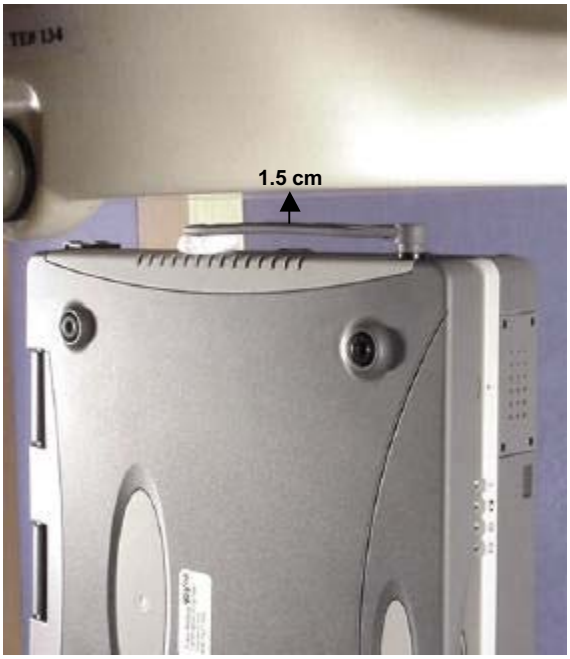
BODY SAR TEST SETUP PHOTOGRAPHS

Bottom of Laptop PC (LCD Display Closed) - Antenna Perpendicular to Planar Phantom (Extended Position)
0.0cm Separation Distance from Bottom of Laptop PC to Planar Phantom

BODY SAR TEST SETUP PHOTOGRAPHS

Right Side of LCD Display (Closed) - Antenna Parallel to Planar Phantom (Stowed Position)
1.5cm Separation Distance from Antenna to Planar Phantom





BODY SAR TEST SETUP PHOTOGRAPHS

Right Side of LCD Display (Closed) - Antenna Parallel to Planar Phantom (Extended Position)
1.5cm Separation Distance from Antenna to Planar Phantom