APPENDIX E – PROBE CALIBRATION DATA

Schmid & Partner
Engineering AG

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Calibration Certificate

Dosimetric E-Field Probe

Type:	ET3DV6
Serial Number:	1609
Place of Calibration:	Zurich
Date of Calibration:	June 20, 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:	D. Vetter
Approved by:	[illegible]

Schmid & Partner
Engineering AG

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Probe ET3DV6

SN:1609

Manufactured:	July 27, 2001
Last calibration:	August 10, 2001
Recalibrated:	June 20, 2002

Calibrated for System DASY3

ET3DV6 SN:1609 June 20, 2002

DASY3 - Parameters of Probe: ET3DV6 SN:1609

Sensitivity in Free Space

NormX	1.74 $\mu V/(V/m)^2$	DCP X	95 mV
NormY	1.76 $\mu V/(V/m)^2$	DCP Y	95 mV
NormZ	1.76 $\mu V/(V/m)^2$	DCP Z	95 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	6.5 ± 9.5% (k=2)		Boundary effect:	
ConvF Y	6.5 ± 9.5% (k=2)		Alpha	0.38
ConvF Z	6.5 ± 9.5% (k=2)		Depth	2.58
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	0.60
ConvF Z	5.4 ± 9.5% (k=2)		Depth	2.14

Boundary Effect

Head 900 MHz Typical SAR gradient: 5 % per mm

Probe Tip to Boundary		1 mm	2 mm
SAR_{be} [%]	Without Correction Algorithm	10.1	5.9
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	11.5	7.3
SAR_{be} [%]	With Correction Algorithm	0.3	0.2

Sensor Offset

Probe Tip to Sensor Center	2.7	mm
Optical Surface Detection	1.3 ± 0.2	mm

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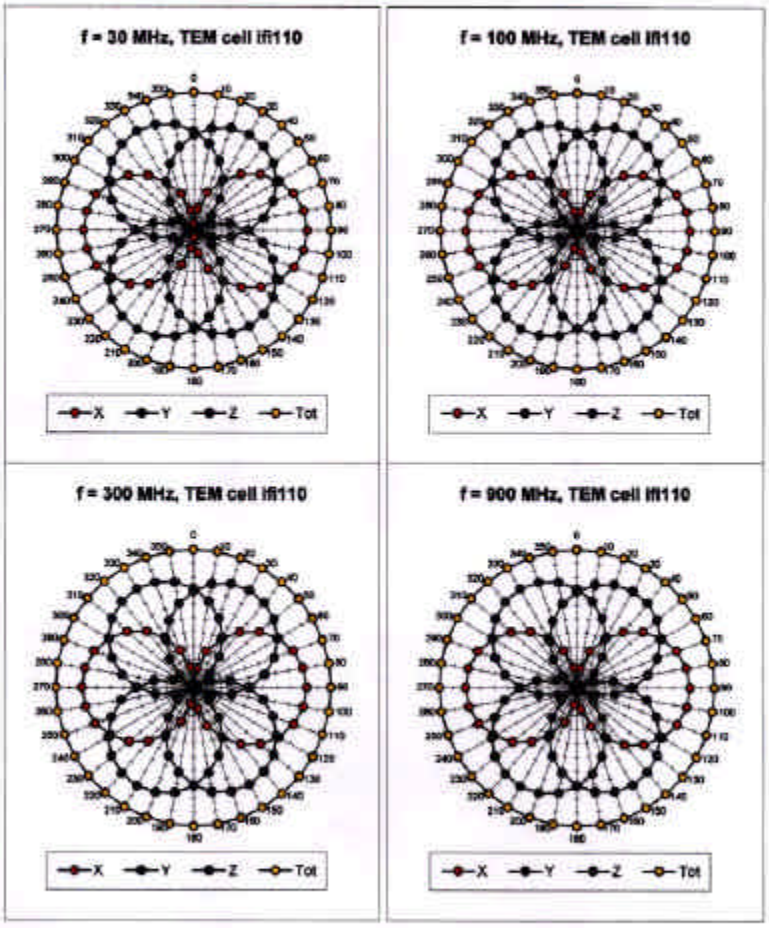
Receiving Pattern (ϕ), θ = 0°



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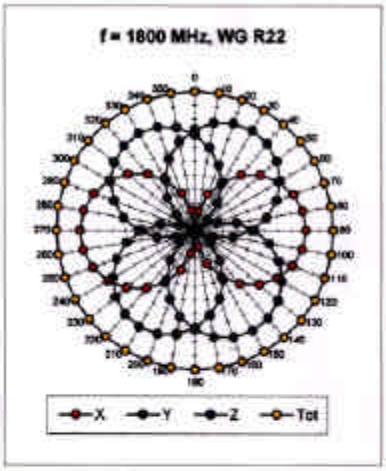
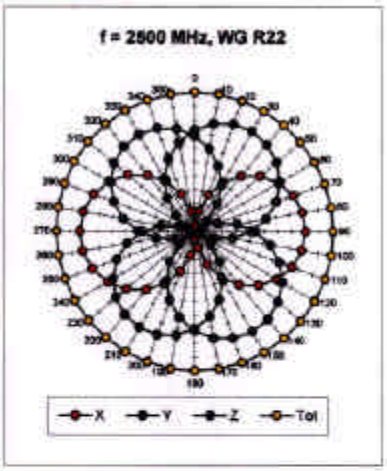
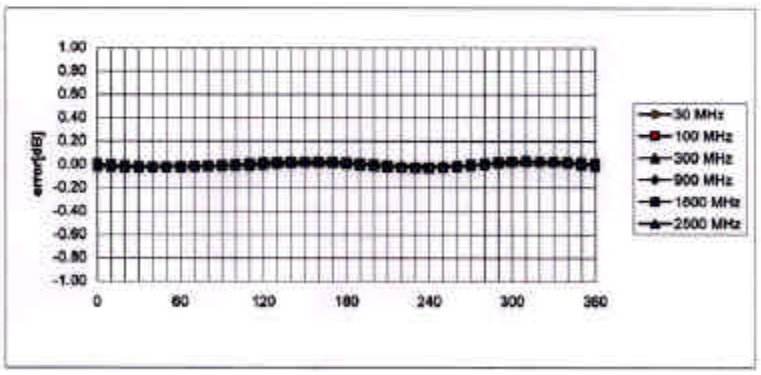




Isotropy Error (ϕ), θ = 0°



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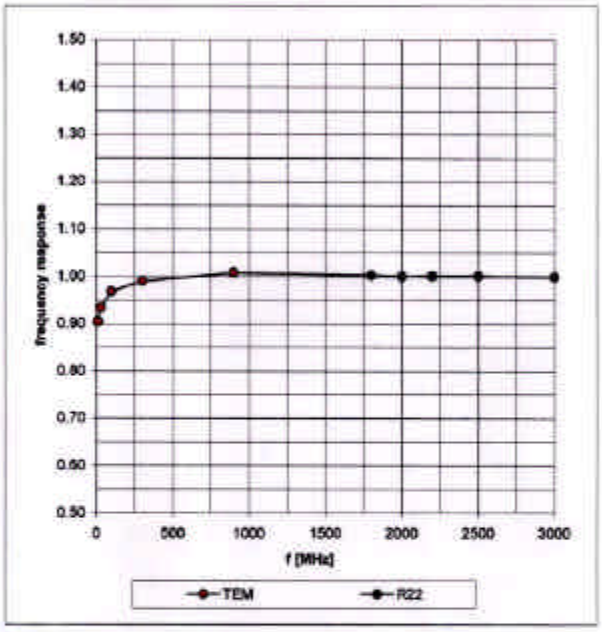
Frequency Response of E-Field

(TEM-Cell:ifi110, Waveguide R22)



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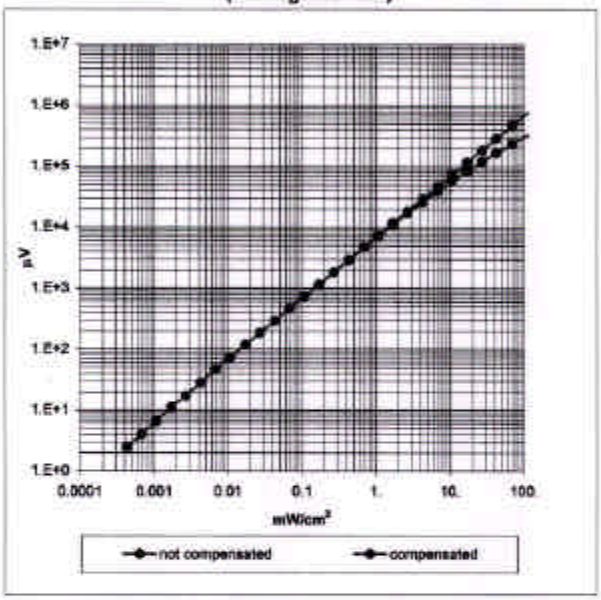
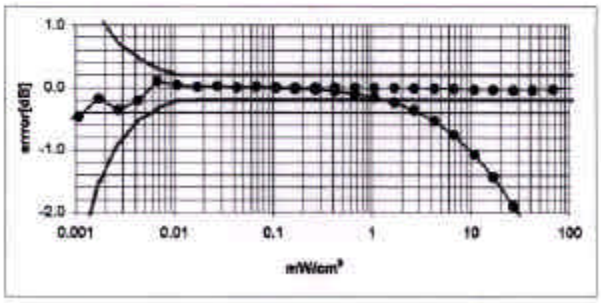
Dynamic Range f(SAR_{brain})

(Waveguide R22)





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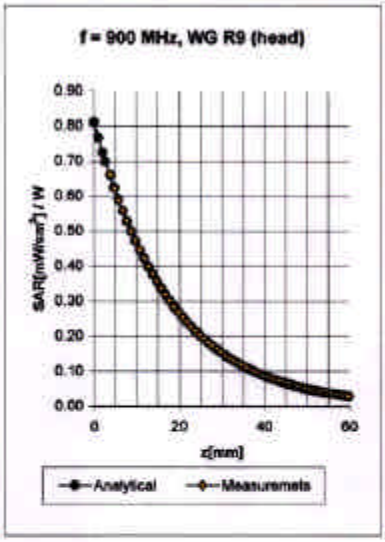
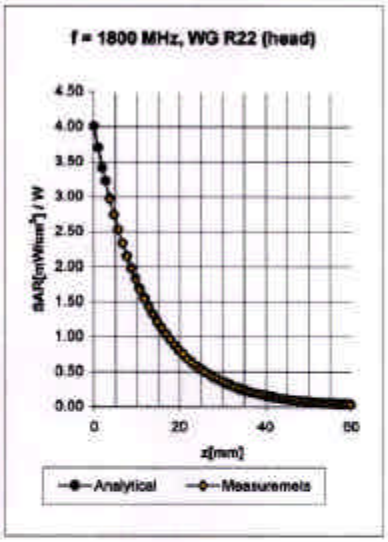
Conversion Factor Assessment





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	6.5 ± 9.5% (k=2)	Boundary effect:	
	ConvF Y	6.5 ± 9.5% (k=2)	Alpha	0.38
	ConvF Z	6.5 ± 9.5% (k=2)	Depth	2.56

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	0.60
	ConvF Z	5.4 ± 9.5% (k=2)	Depth	2.14

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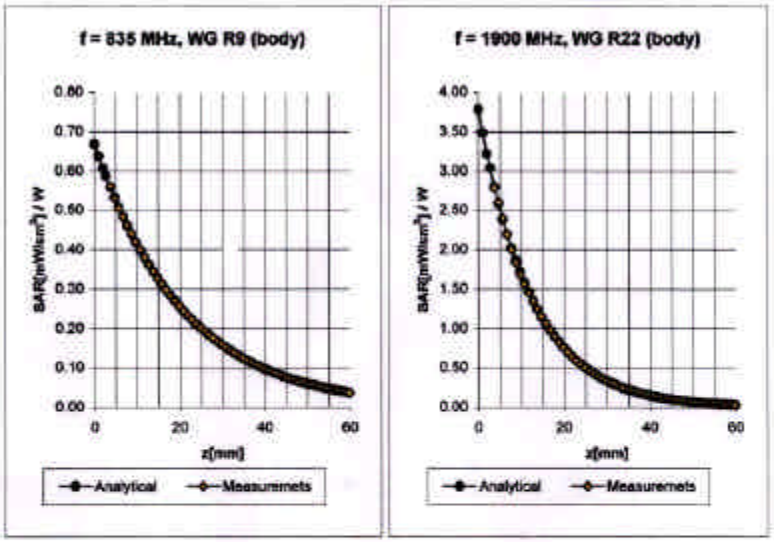
Conversion Factor Assessment



Body	835 MHz	ε_r = 55.2 ± 5%	σ = 0.97 ± 5% mho/m	
Body	900 MHz	ε_r = 55.0 ± 5%	σ = 1.05 ± 5% mho/m	
ConvF X	6.3 ± 9.5% (k=2)		Boundary effect:	
ConvF Y	6.3 ± 9.5% (k=2)		Alpha	0.36
ConvF Z	6.3 ± 9.5% (k=2)		Depth	2.71

Body	1900 MHz	ε_r = 53.3 ± 5%	σ = 1.52 ± 5% mho/m	
Body	1800 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	0.77
ConvF Z	4.9 ± 9.5% (k=2)		Depth	2.05

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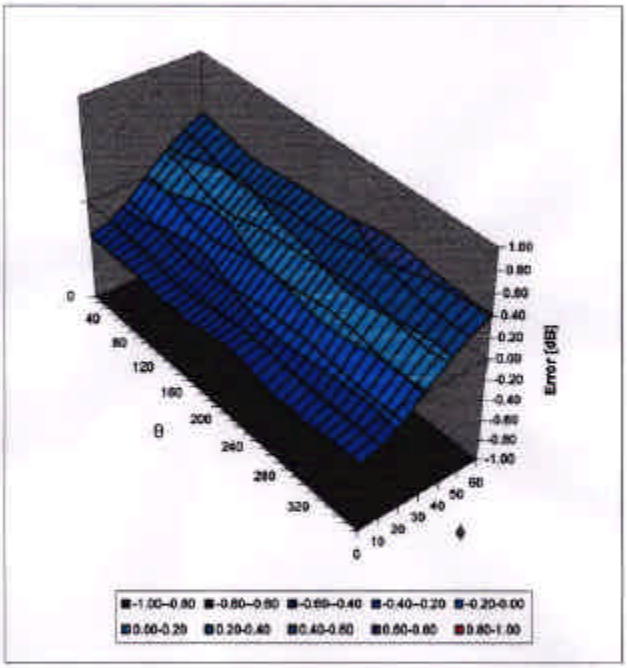
Deviation from Isotropy in HSL

Error (θ,ϕ), f = 900 MHz



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Additional Conversion Factors

for Dosimetric E-Field Probe

Type:	**ET3DV6**
Serial Number:	**1609**
Place of Assessment:	**Zurich**
Date of Assessment:	**June 21, 2002**
Probe Calibration Date:	**June 20, 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. The evaluation is coupled with measured conversion factors. 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:1609

Conversion factor (± standard deviation)

450 MHz	ConvF	7.4 ± 8%	ε_r = 43.5 ± 5% σ = 0.87 ± 5% mho/m (head tissue)
450 MHz	ConvF	7.6 ± 8%	ε_r = 56.7 ± 5% σ = 0.94 ± 5% mho/m (body tissue)

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