APPENDIX D : Calibration Certificates

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:	1729
Place of Calibration:	Zurich
Date of Calibration:	November 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. Velle
Approved by:	

Schmid & Partner
Engineering AG
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Probe ET3DV6

SN:1729

Manufactured: October 1, 2002
Last calibration: November 20, 2002

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

ET3DV6 SN:1729 November 20, 2002

DASY - Parameters of Probe: ET3DV6 SN:1729

Sensitivity in Free Space

NormX	1.59 $\mu V/(V/m)^2$
NormY	1.53 $\mu V/(V/m)^2$
NormZ	1.75 $\mu V/(V/m)^2$

Diode Compression

DCP X	95	mV
DCP Y	95	mV
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	6.4 ± 9.5% (k=2)	Boundary effect:	
ConvF Y	6.4 ± 9.5% (k=2)	Alpha	0.47
ConvF Z	6.4 ± 9.5% (k=2)	Depth	2.12

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	5.3 ± 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	2.44

Boundary Effect

Head 900 MHz Typical SAR gradient: 5 % per mm

Probe Tip to Boundary		1 mm	2 mm
SAR_{be} [%]	Without Correction Algorithm	9.2	5.0
SAR_{be} [%]	With Correction Algorithm	0.2	0.4

Head 1800 MHz Typical SAR gradient: 10 % per mm

Probe Tip to Boundary		1 mm	2 mm
SAR_{be} [%]	Without Correction Algorithm	12.6	8.4
SAR_{be} [%]	With Correction Algorithm	0.2	0.2

Sensor Offset

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

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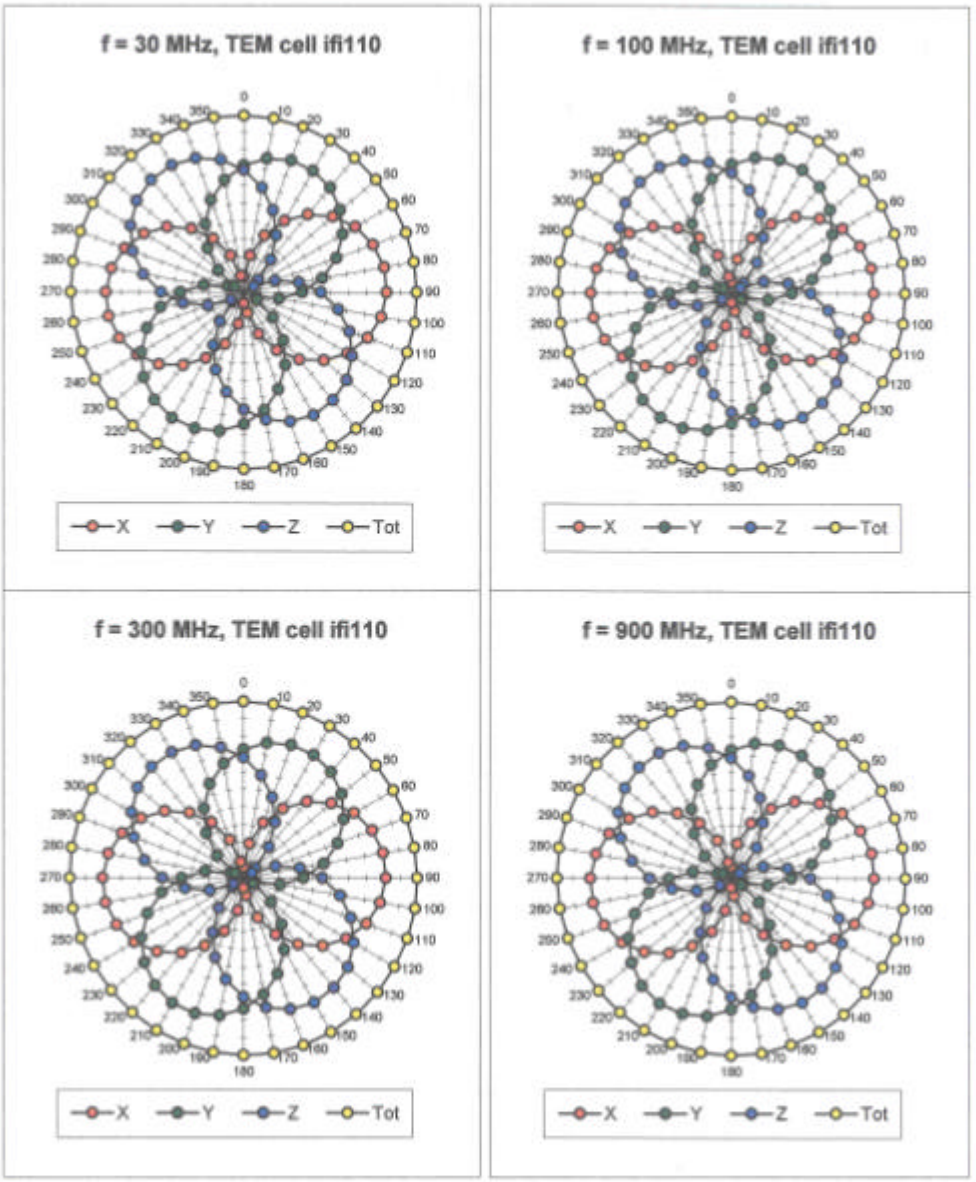
ET3DV6 SN:1729 November 20, 2002

Receiving Pattern (ϕ), θ = 0°



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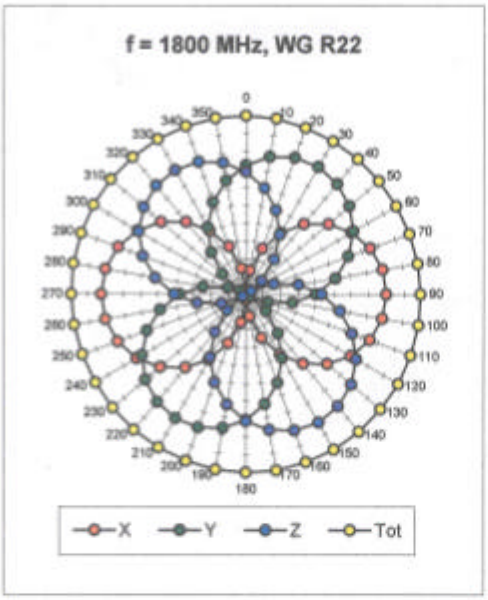
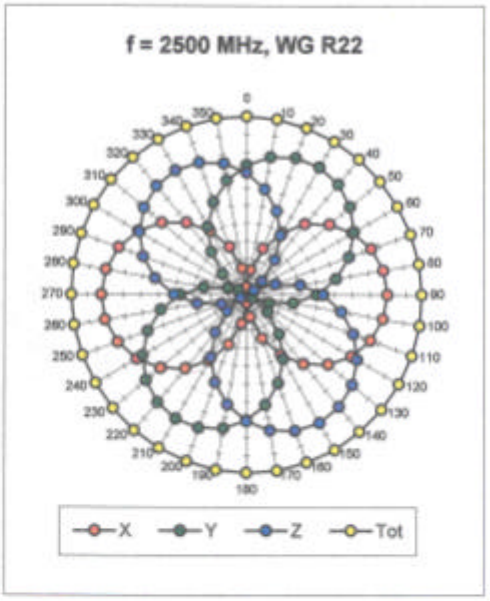
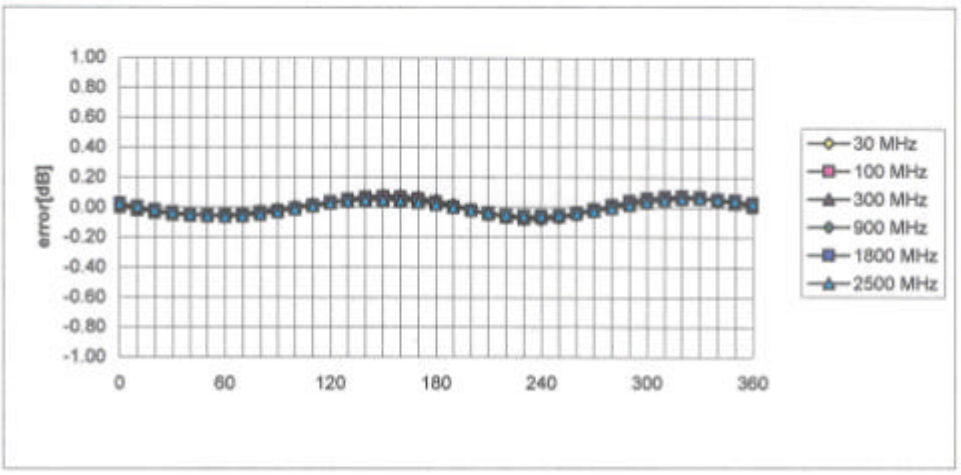
ET3DV6 SN:1729 November 20, 2002





Isotropy Error (ϕ), θ = 0°



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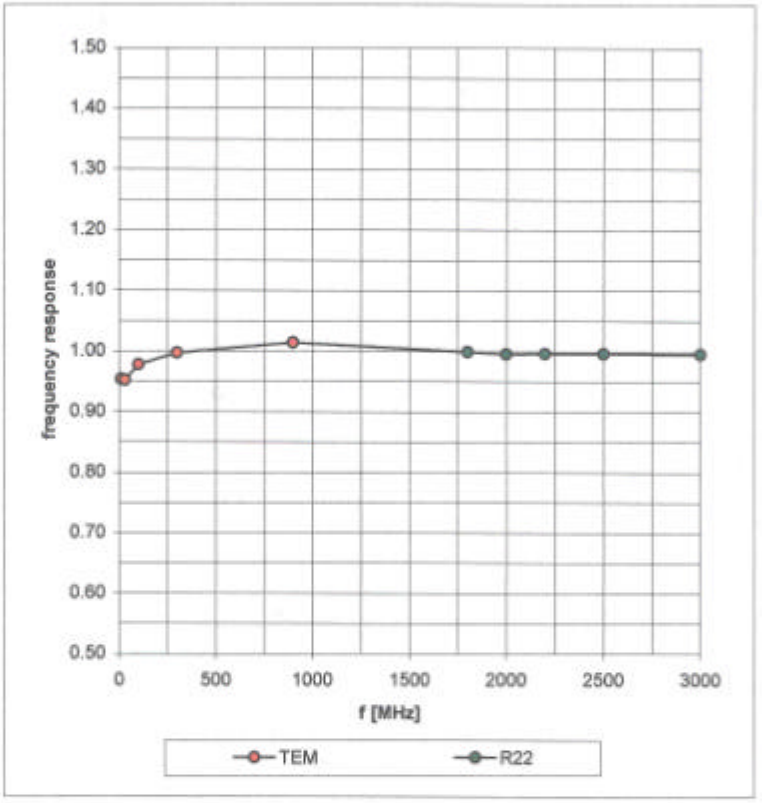
ET3DV6 SN:1729 November 20, 2002

Frequency Response of E-Field

(TEM-Cell:ifi110, Waveguide R22)



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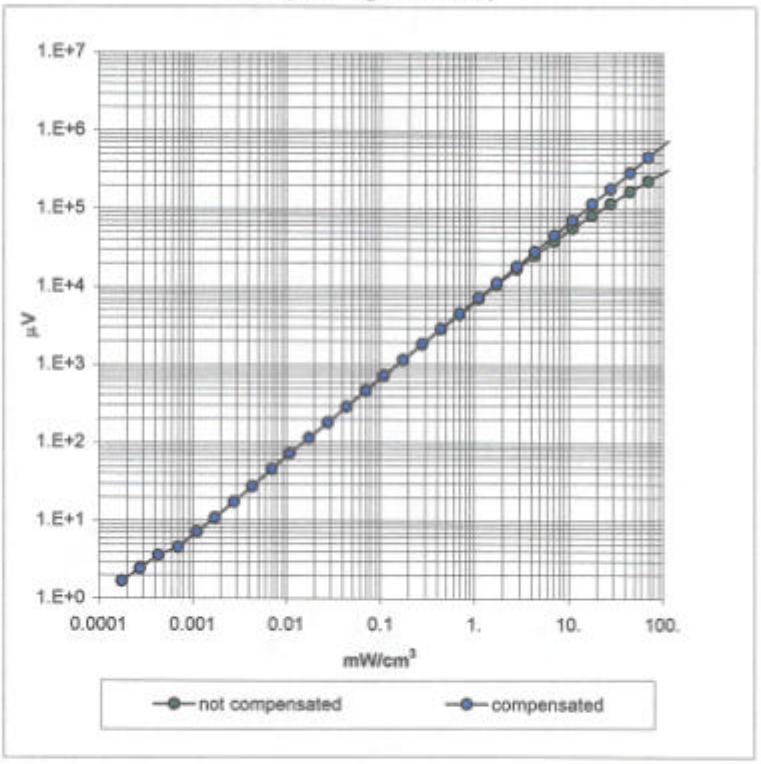
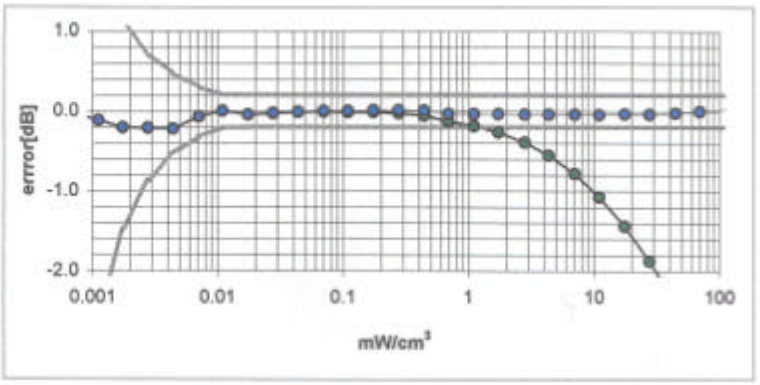
Dynamic Range f(SAR_{brain})

(Waveguide R22)





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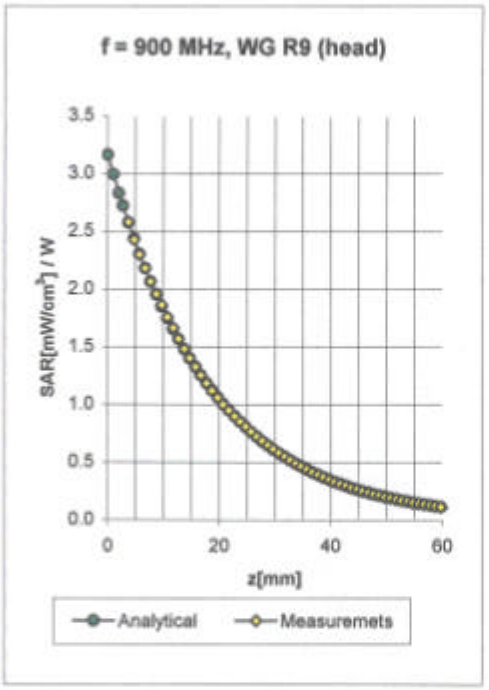
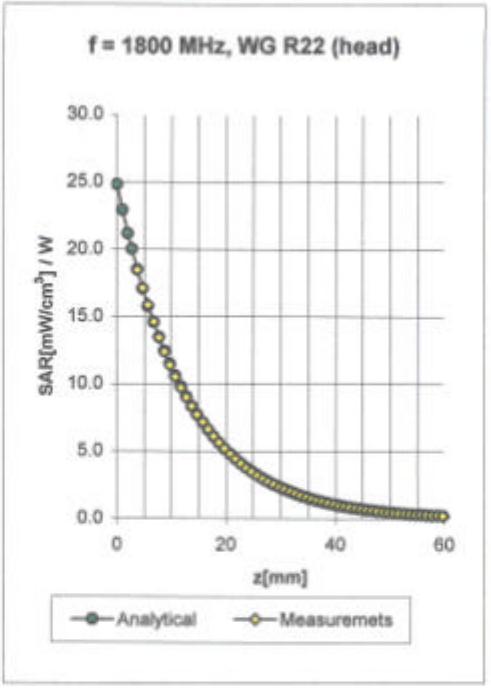
Conversion Factor Assessment





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	6.4 ± 9.5% (k=2)	Boundary effect:	
	ConvF Y	6.4 ± 9.5% (k=2)	Alpha	0.47
	ConvF Z	6.4 ± 9.5% (k=2)	Depth	2.12

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	5.3 ± 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	2.44

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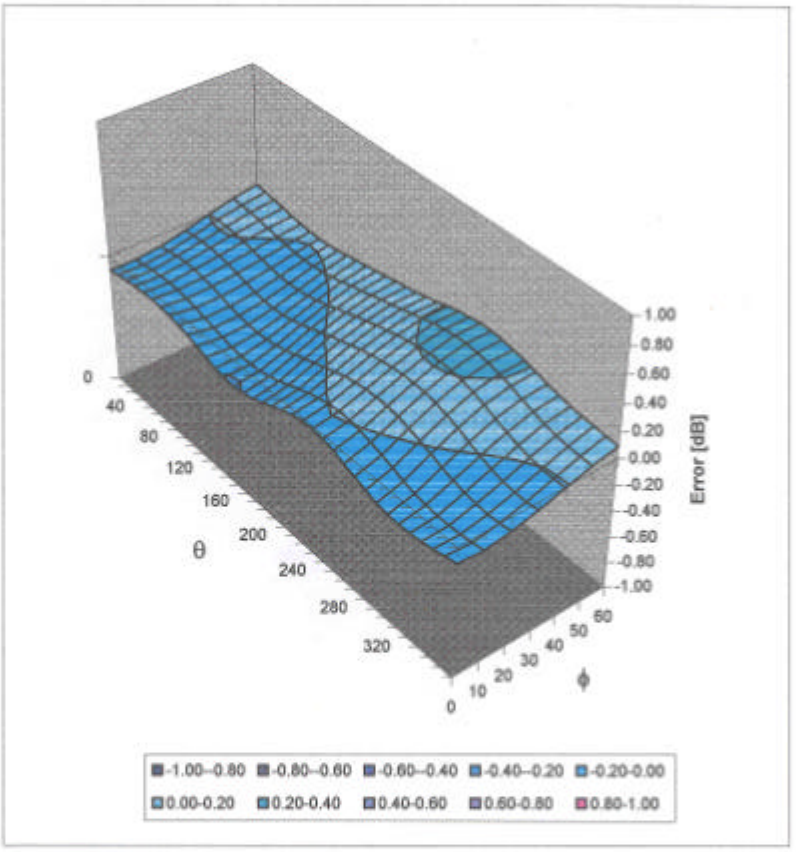
ET3DV6 SN:1729 November 20, 2002

Deviation from Isotropy in HSL

Error (θ,ϕ), f = 900 MHz



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probe (2250x3368x16M jpeg)

Schmid & Partner Engineering AG

s p e a g

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info@speag.com, http://www.speag.com

Additional Conversion Factors

for Dosimetric E-Field Probe

Type:	**ET3DV6**
Serial Number:	**1729**
Place of Assessment:	**Zurich**
Date of Assessment:	**May 22, 2003**
Probe Calibration Date:	**November 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. 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:

Schmid & Partner Engineering AG

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Dosimetric E-Field Probe ET3DV6 SN:1729

Conversion factor (± standard deviation)

835 MHz	ConvF	**6.3 ± 8%**	ε_r = **55.2 ± 5%** σ = **0.97 ± 5% mho/m** (body tissue)
1900 MHz	ConvF	**4.7 ± 8%**	ε_r = **53.3 ± 5%** σ = **1.52 ± 5% mho/m** (body tissue)

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Calibration Certificate

835 MHz System Validation Dipole

Type:	D835V2
Serial Number:	471
Place of Calibration:	Zurich
Date of Calibration:	December 4, 2002
Calibration Interval:	24 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. Velez
Approved by:	[illegible]