



Accredited testing laboratory

DAR registration number: TTI-P-G 166/98

**Federal Motor Transport Authority (KBA)
DAR registration number: KBA-P 00070-97**

**Appendix to test report 2-3816-02-03/04
Calibration data, Phantom certificate
and detail information of the DASY4 System**

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1 Calibration report "Probe ET3DV6"

**Calibration Laboratory of
Schmid & Partner
Engineering AG**
Zeughausstrasse 43, 8004 Zurich, Switzerland

Client **Cetecom**

CALIBRATION CERTIFICATE																															
Object(s)	ET3DV6 - SN:1558																														
Calibration procedure(s)	QA CAL-01.v2 Calibration procedure for dosimetric E-field probes																														
Calibration date:	September 6, 2004																														
Condition of the calibrated item	In Tolerance (according to the specific calibration document)																														
<p>This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.</p> <p>All calibrations have been conducted in the closed laboratory facility: environment temperature 22 +/- 2 degrees Celsius and humidity < 75%.</p> <p>Calibration Equipment used (M&TE critical for calibration)</p> <table border="1"> <thead> <tr> <th>Model Type</th> <th>ID #</th> <th>Cal Date (Calibrated by, Certificate No.)</th> <th>Scheduled Calibration</th> </tr> </thead> <tbody> <tr> <td>Power meter EPM E4419B</td> <td>GB41293874</td> <td>5-May-04 (METAS, No 251-00388)</td> <td>May-05</td> </tr> <tr> <td>Power sensor E4412A</td> <td>MY41495277</td> <td>5-May-04 (METAS, No 251-00388)</td> <td>May-05</td> </tr> <tr> <td>Reference 20 dB Attenuator</td> <td>SN: 5086 (20b)</td> <td>3-May-04 (METAS, No 251-00389)</td> <td>May-05</td> </tr> <tr> <td>Power sensor HP 8481A</td> <td>MY41092180</td> <td>18-Sep-02 (SPEAG, in house check Oct03)</td> <td>In house check: Oct 05</td> </tr> <tr> <td>RF generator HP 8684C</td> <td>US3642U01700</td> <td>4-Aug-99 (SPEAG, in house check Aug02)</td> <td>In house check: Aug05</td> </tr> <tr> <td>Network Analyzer HP 8753E</td> <td>US37390585</td> <td>18-Oct-01 (SPEAG, in house check Oct03)</td> <td>In house check: Oct 05</td> </tr> </tbody> </table>				Model Type	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration	Power meter EPM E4419B	GB41293874	5-May-04 (METAS, No 251-00388)	May-05	Power sensor E4412A	MY41495277	5-May-04 (METAS, No 251-00388)	May-05	Reference 20 dB Attenuator	SN: 5086 (20b)	3-May-04 (METAS, No 251-00389)	May-05	Power sensor HP 8481A	MY41092180	18-Sep-02 (SPEAG, in house check Oct03)	In house check: Oct 05	RF generator HP 8684C	US3642U01700	4-Aug-99 (SPEAG, in house check Aug02)	In house check: Aug05	Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Oct03)	In house check: Oct 05
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Approved by:	Katja Pokovic	Laboratory Director																													
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<p>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.</p>																															

Probe ET3DV6

SN:1558

Manufactured: September 16, 2003
Last calibrated: September 6, 2004

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

ET3DV6 SN:1558

September 6, 2004

DASY - Parameters of Probe: ET3DV6 SN:1558

Sensitivity in Free Space		Diode Compression ^A		
NormX	2.03 $\mu\text{V}/(\text{V}/\text{m})^2$	DCP X	94	mV
NormY	1.92 $\mu\text{V}/(\text{V}/\text{m})^2$	DCP Y	94	mV
NormZ	1.63 $\mu\text{V}/(\text{V}/\text{m})^2$	DCP Z	94	mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 7.

Boundary Effect

Head	900 MHz	Typical SAR gradient: 5 % per mm		
	Sensor Center to Phantom Surface Distance	3.7 mm	4.7 mm	
	SAR _{be} [%] Without Correction Algorithm	9.6	5.2	
	SAR _{be} [%] With Correction Algorithm	0.1	0.2	

Head	1750 MHz	Typical SAR gradient: 10 % per mm		
	Sensor Center to Phantom Surface Distance	3.7 mm	4.7 mm	
	SAR _{be} [%] Without Correction Algorithm	13.8	9.0	
	SAR _{be} [%] With Correction Algorithm	0.2	0.1	

Sensor Offset

Probe Tip to Sensor Center	2.7 mm
Optical Surface Detection	in tolerance

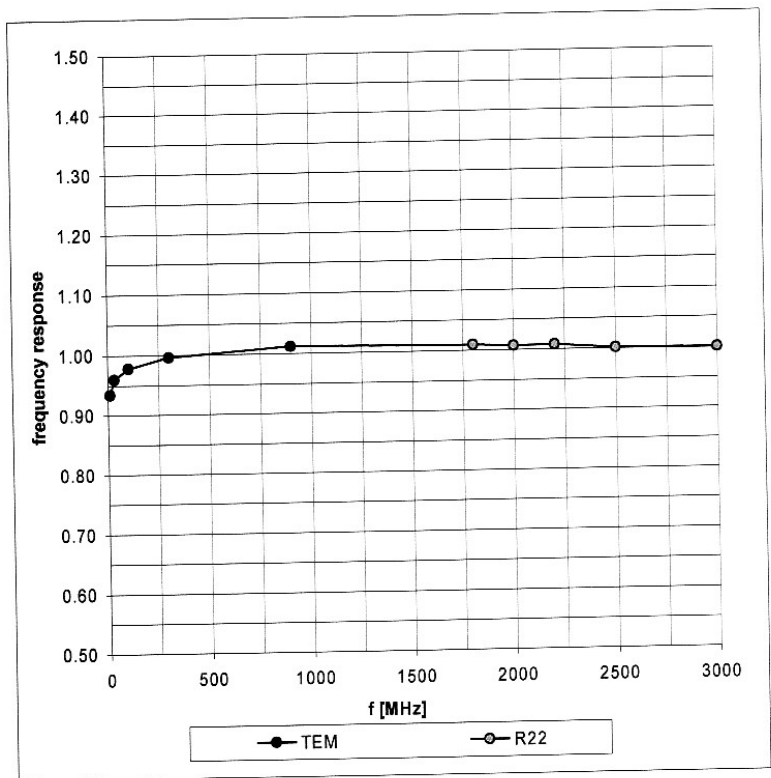
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

^A numerical linearization parameter: uncertainty not required

ET3DV6 SN:1558

September 6, 2004

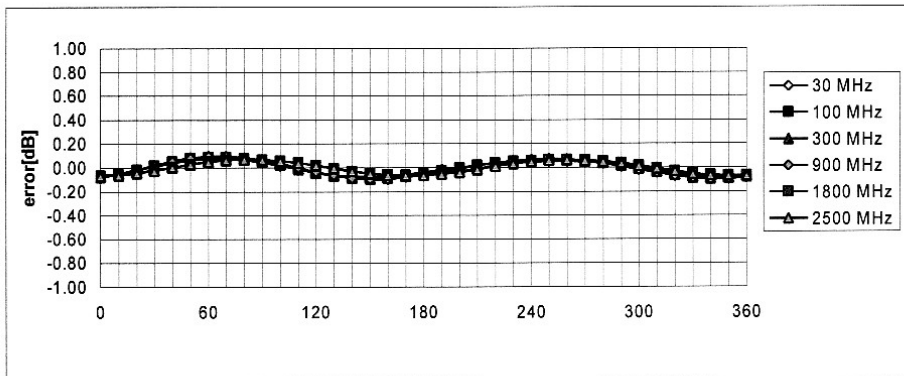
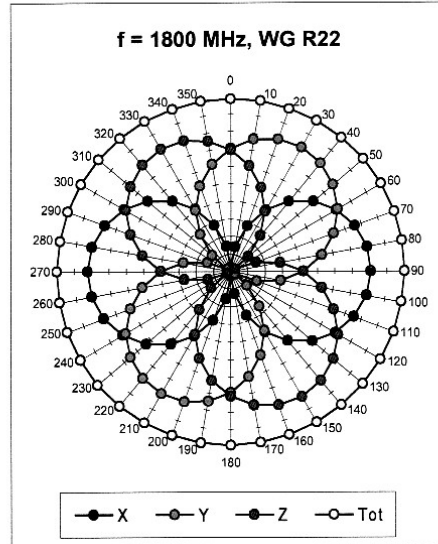
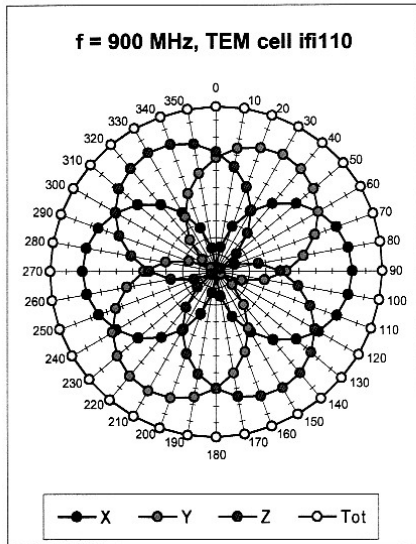
Frequency Response of E-Field (TEM-Cell:ifi110, Waveguide R22)



ET3DV6 SN:1558

September 6, 2004

Receiving Pattern (ϕ), $\theta = 0^\circ$

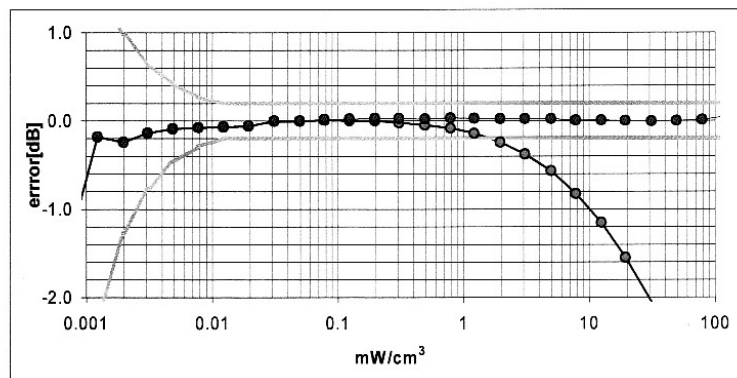
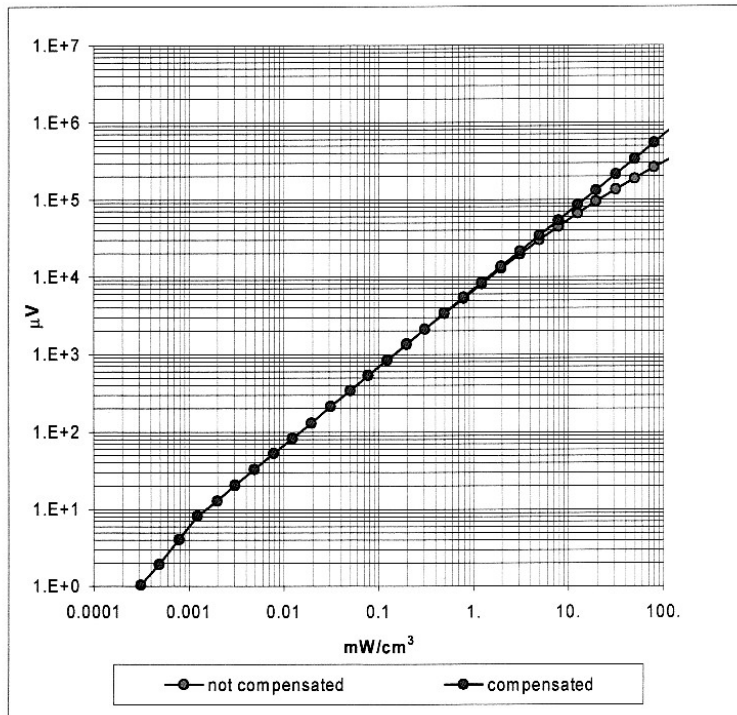


Axial Isotropy Error $< \pm 0.2$ dB

ET3DV6 SN:1558

September 6, 2004

Dynamic Range $f(SAR_{head})$
(Waveguide R22)

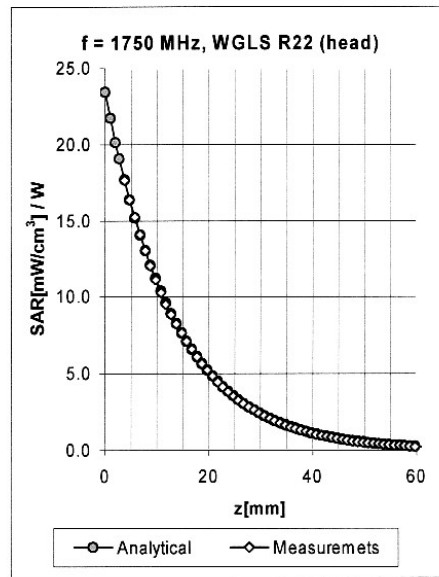
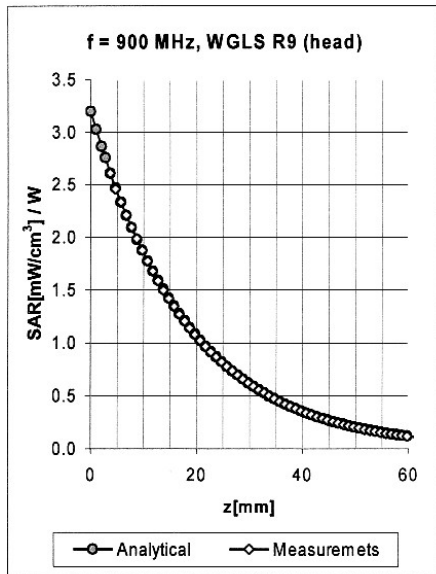


Probe Linearity Error $\leq \pm 0.2 \text{ dB}$

ET3DV6 SN:1558

September 6, 2004

Conversion Factor Assessment



f [MHz]	Validity [MHz] ^B	Tissue	Permittivity	Conductivity	Alpha	Depth	ConvF	Uncertainty
835	785-885	Head	41.5 ± 5%	0.90 ± 5%	0.60	1.89	6.31 ± 9.7%	(k=2)
900	850-950	Head	41.5 ± 5%	0.97 ± 5%	0.62	1.89	6.03 ± 9.7%	(k=2)
1750	1700-1800	Head	40.0 ± 5%	1.40 ± 5%	0.52	2.56	4.96 ± 9.7%	(k=2)
1900	1850-1950	Head	40.0 ± 5%	1.40 ± 5%	0.52	2.64	4.82 ± 9.7%	(k=2)
2450	2400-2500	Head	39.2 ± 5%	1.80 ± 5%	0.95	1.92	4.27 ± 9.7%	(k=2)
835	785-885	Body	55.2 ± 5%	0.97 ± 5%	0.51	2.15	6.01 ± 9.7%	(k=2)
900	850-950	Body	55.0 ± 5%	1.05 ± 5%	0.47	2.24	5.78 ± 9.7%	(k=2)
1750	1700-1800	Body	53.3 ± 5%	1.52 ± 5%	0.52	2.85	4.45 ± 9.7%	(k=2)
1900	1850-1950	Body	53.3 ± 5%	1.52 ± 5%	0.57	2.83	4.32 ± 9.7%	(k=2)
2450	2400-2500	Body	52.7 ± 5%	1.95 ± 5%	1.01	1.69	4.06 ± 9.7%	(k=2)

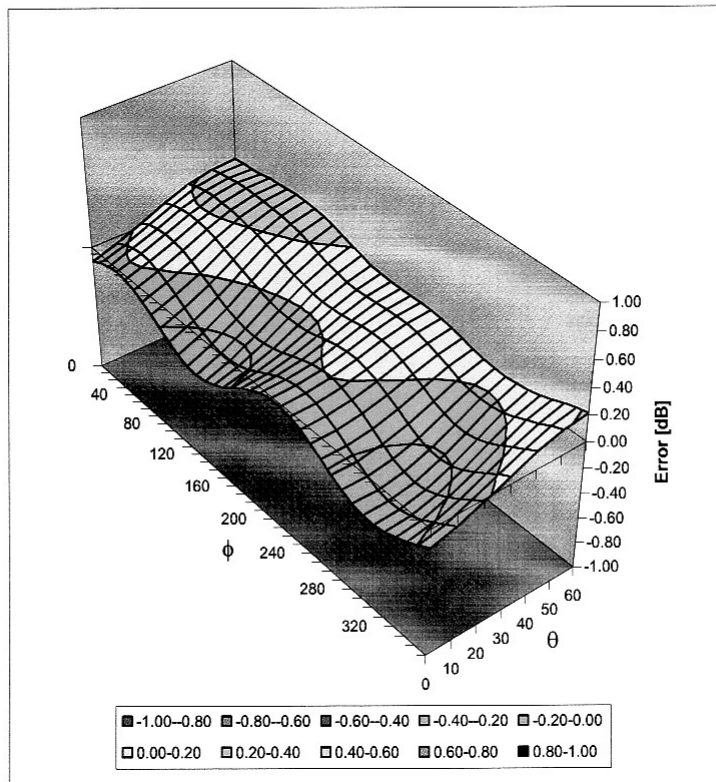
^B The total standard uncertainty is calculated as root-sum-square of standard uncertainty of the Conversion Factor at calibration frequency and the standard uncertainty for the indicated frequency band.

ET3DV6 SN:1558

September 6, 2004

Deviation from Isotropy in HSL

Error (θ, ϕ), $f = 900$ MHz



Spherical Isotropy Error <math>< \pm 0.4

2 Calibration report "Probe ET3DV6"

Calibration Laboratory of
 Schmid & Partner
 Engineering AG
 Zeughausstrasse 43, 8004 Zurich, Switzerland

Client **Cetecom**

CALIBRATION CERTIFICATE																																			
Object(s)	ET3DV6 - SN:1559																																		
Calibration procedure(s)	QA CAL-01.v2 Calibration procedure for dosimetric field probes																																		
Calibration date:	July 18, 2004																																		
Condition of the calibrated item	In Tolerance (according to the specific calibration document)																																		
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Approved by:	Name Katja Pokovic	Function Laboratory Director	Signature 																																
Date issued: July 19, 2004																																			
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Probe ET3DV6

SN:1559

Manufactured:	December 1, 2000
Last calibrated:	April 16, 2003
Recalibrated:	July 18, 2004

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

ET3DV6 SN:1559

July 18, 2004

DASY - Parameters of Probe: ET3DV6 SN:1559

Sensitivity in Free Space		Diode Compression ^A	
NormX	1.76 $\mu\text{V}/(\text{V}/\text{m})^2$	DCP X	94 mV
NormY	1.56 $\mu\text{V}/(\text{V}/\text{m})^2$	DCP Y	94 mV
NormZ	1.71 $\mu\text{V}/(\text{V}/\text{m})^2$	DCP Z	94 mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 7.

Boundary Effect

Head	900 MHz	Typical SAR gradient: 5 % per mm	
	Sensor Center to Phantom Surface Distance	3.7 mm	4.7 mm
	SAR _{cor} [%] Without Correction Algorithm	8.5	4.7
	SAR _{cor} [%] With Correction Algorithm	0.0	0.1
Head	1750 MHz	Typical SAR gradient: 10 % per mm	
	Sensor Center to Phantom Surface Distance	3.7 mm	4.7 mm
	SAR _{cor} [%] Without Correction Algorithm	12.2	7.7
	SAR _{cor} [%] With Correction Algorithm	0.0	0.3

Sensor Offset

Probe Tip to Sensor Center	2.7 mm
Optical Surface Detection	in tolerance

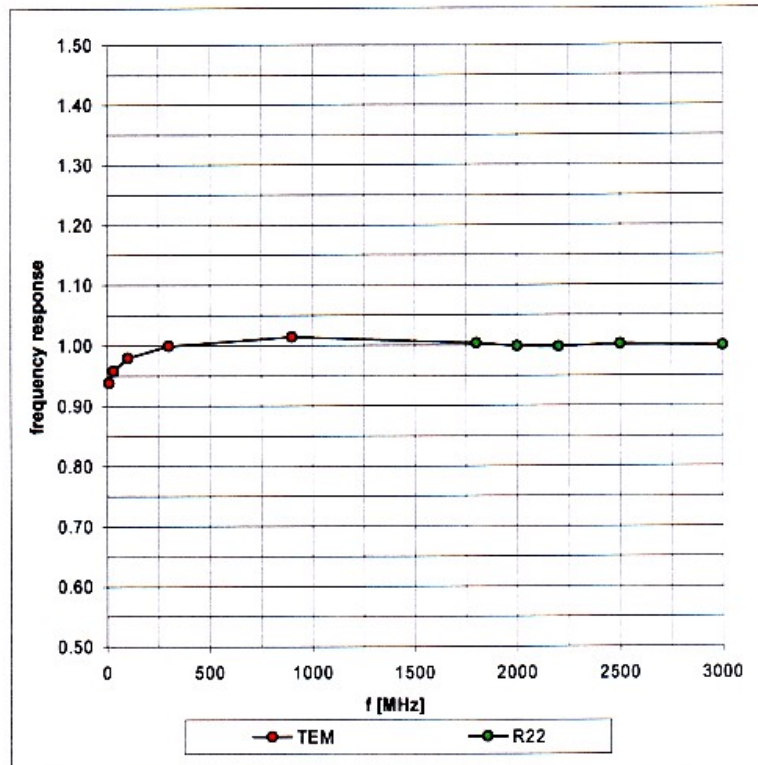
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

^A numerical linearization parameter, uncertainty not recorded

ET3DV6 SN:1559

July 18, 2004

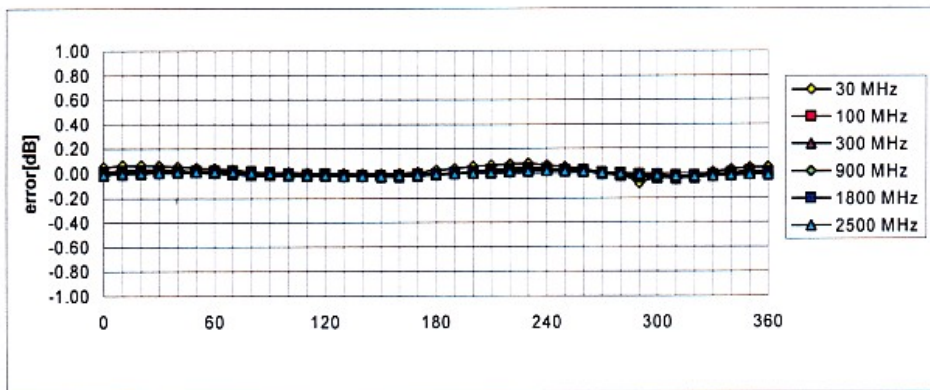
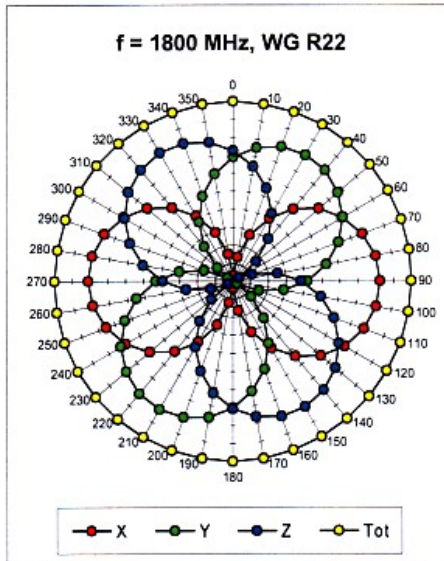
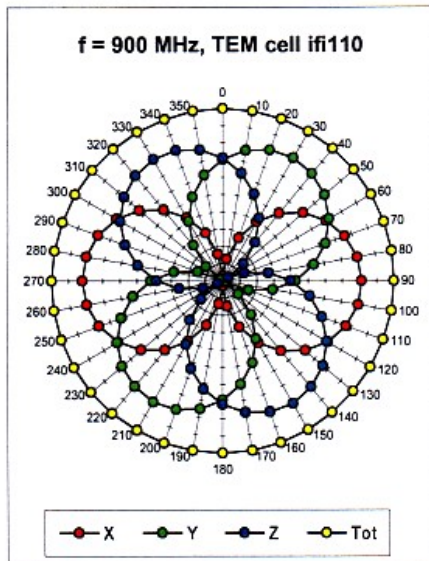
Frequency Response of E-Field (TEM-Cell:ifi110, Waveguide R22)



ET3DV6 SN:1559

July 18, 2004

Receiving Pattern (ϕ), $\theta = 0^\circ$

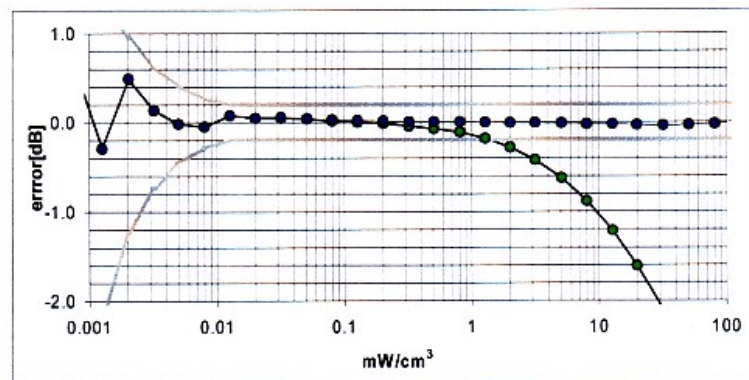
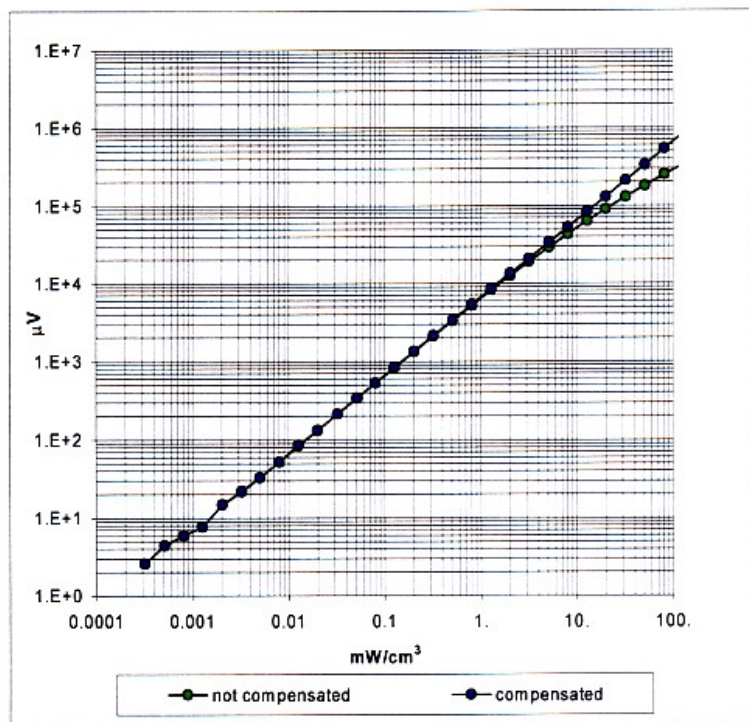


Axial Isotropy Error $< \pm 0.2$ dB

ET3DV6 SN:1559

July 18, 2004

Dynamic Range f(SAR_{head}) (Waveguide R22)

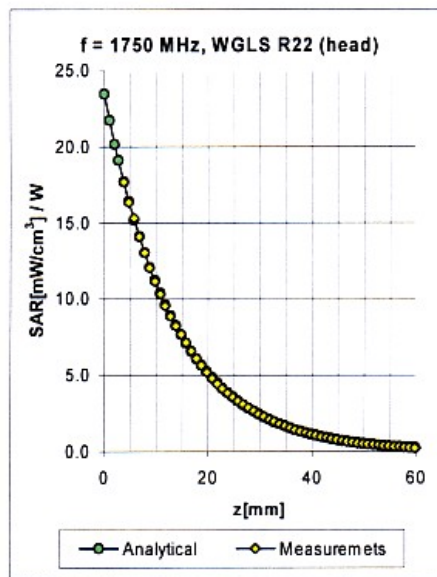
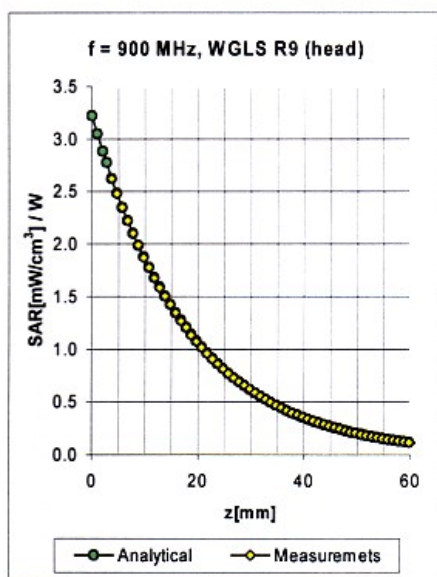


Probe Linearity Error < ± 0.2 dB

ET3DV6 SN:1559

July 18, 2004

Conversion Factor Assessment



f [MHz]	Validity [MHz] ^B	Tissue	Permittivity	Conductivity	Alpha	Depth	ConvF	Uncertainty
900	850-950	Head	41.5 ± 5%	0.97 ± 5%	0.53	1.93	6.59 ± 9.7%	(k=2)
1750	1700-1800	Head	40.0 ± 5%	1.40 ± 5%	0.46	2.58	5.37 ± 9.7%	(k=2)
1900	1850-1950	Head	40.0 ± 5%	1.40 ± 5%	0.48	2.79	5.13 ± 9.7%	(k=2)
2450	2400-2500	Head	39.2 ± 5%	1.80 ± 5%	0.81	1.92	4.56 ± 9.7%	(k=2)
450	400-500	Body	56.7 ± 5%	0.94 ± 5%	0.29	2.46	7.13 ± 15.5%	(k=2)
900	850-950	Body	55.0 ± 5%	1.05 ± 5%	0.46	2.26	6.21 ± 9.7%	(k=2)
1750	1700-1800	Body	53.3 ± 5%	1.52 ± 5%	0.48	2.94	4.60 ± 9.7%	(k=2)
1900	1850-1950	Body	53.3 ± 5%	1.52 ± 5%	0.53	2.90	4.40 ± 9.7%	(k=2)
2450	2400-2500	Body	52.7 ± 5%	1.95 ± 5%	1.11	1.55	4.21 ± 9.7%	(k=2)

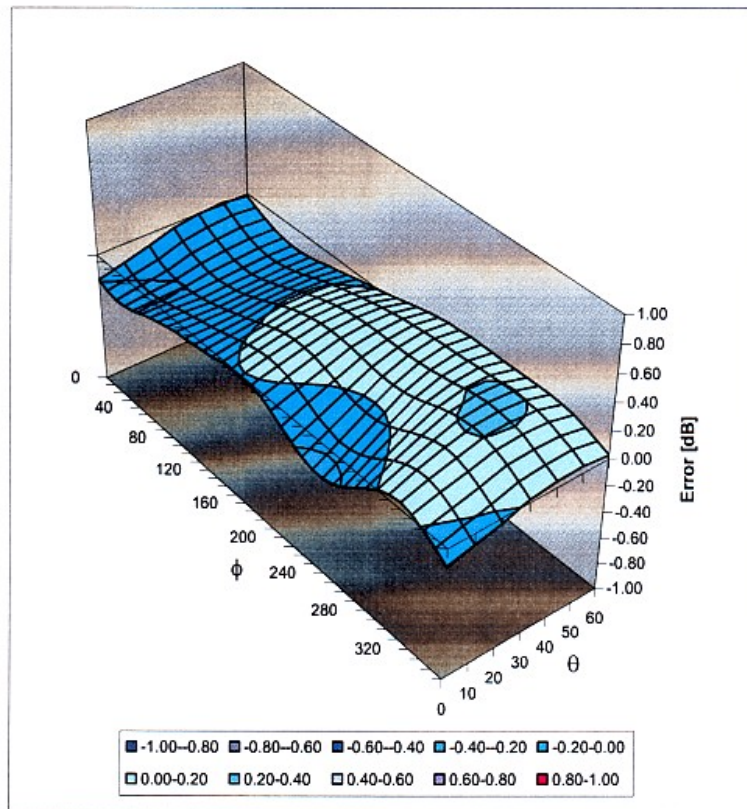
^B The total standard uncertainty is calculated as root-sum-square of standard uncertainty of the Conversion Factor at calibration frequency and the standard uncertainty for the indicated frequency band.

ET3DV6 SN:1559

July 18, 2004

Deviation from Isotropy in HSL

Error (θ, ϕ), $f = 900$ MHz



Spherical Isotropy Error $< \pm 0.4$ dB