Fax: -8475





Phone: +49 (0) 681 598-8454

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

Calibration Data and Phantom Information to test report no.: 2-3816-02-03/04



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1 Calibration report "Probe ET3DV6"

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

Client Cetecom

CALIBRATION	CERTIFICAT	E							
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	Condition of the calibrated item In Tolerance (according to the specific calibration document)								
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. 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 (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	Network Analyzer HP 8753E US37390585 18-Oct-01 (SPEAG, in house check Oct03) In house check: Oct 05								
	Name	Function	Signature						
Calibrated by:	Nico Vetterli	Technician	D. CHED						
Calibrated by: Nico Vetterli Technician D. Child Approved by: Katja Pokovic Laboratory Director Calibrated by:									
			Date issued:September6, 2004						
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.									

880-KP0301061-A

Page 1 of 8



Probe ET3DV6

SN:1558

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

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

Page 2 of 8

Calibration Data and Phantom Information to test report no.: 2-3816-02-03/04



September 6, 2004 ET3DV6 SN:1558 DASY - Parameters of Probe: ET3DV6 SN:1558 Diode Compression^A Sensitivity in Free Space 2.03 µV/(V/m)² DCP X mV NormX 94 **1.92** μV/(V/m)² DCP Y NormY 94 mV 1.63 μV/(V/m)² m٧ NormZ DCP Z 94 Sensitivity in Tissue Simulating Liquid (Conversion Factors) Please see Page 7. **Boundary Effect** Head 900 MHz Typical SAR gradient: 5 % per mm 3.7 mm 4.7 mm Sensor Center to Phantom Surface Distance 9.6 5.2 SAR_{be} [%] Without Correction Algorithm 0.1 02 SAR_{be} [%] With Correction Algorithm 1750 MHz Typical SAR gradient: 10 % per mm Head Sensor Center to Phantom Surface Distance 3.7 mm 4.7 mm 13.8 9.0 SAR_{be} [%] Without Correction Algorithm SAR_{be} [%] With Correction Algorithm 0.2 0.1 Sensor Offset 2.7 Probe Tip to Sensor Center mm in tolerance **Optical Surface Detection** 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

A numerical linearization parameter: uncertainty not required

corresponds to a coverage probability of approximately 95%.

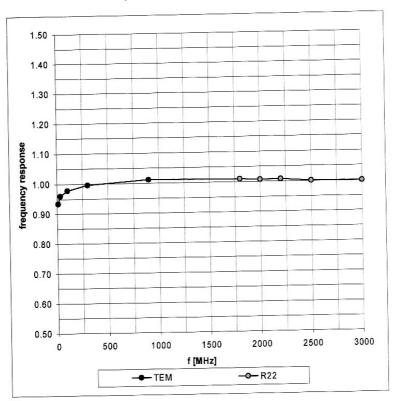
Page 3 of 8



ET3DV6 SN:1558

September 6, 2004

Frequency Response of E-Field



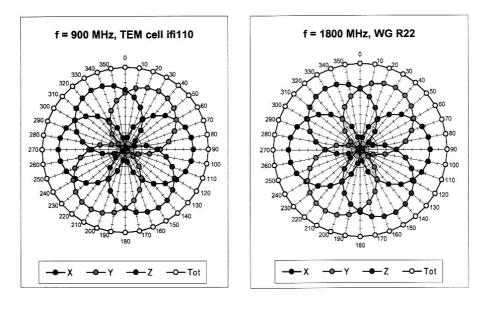
(TEM-Cell:ifi110, Waveguide R22)

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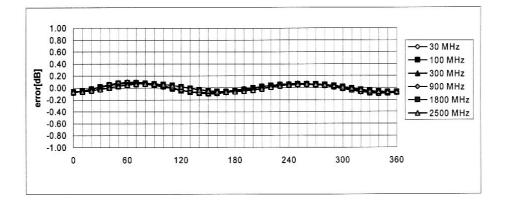


ET3DV6 SN:1558

September 6, 2004



Receiving Pattern (ϕ), θ = 0°



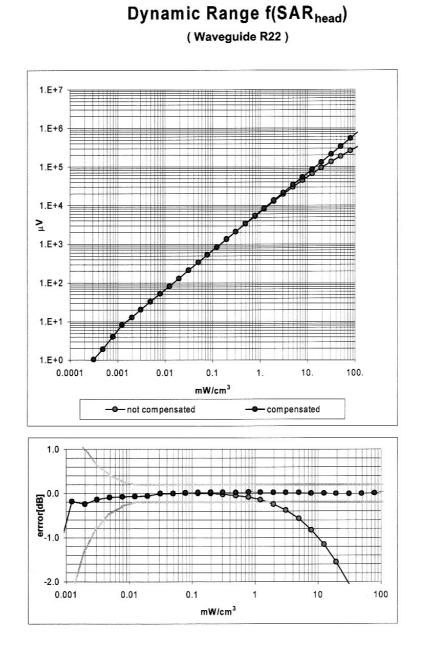
Axial Isotropy Error < ± 0.2 dB

Page 5 of 8

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ET3DV6 SN:1558

September 6, 2004



Probe Linearity Error < ± 0.2 dB

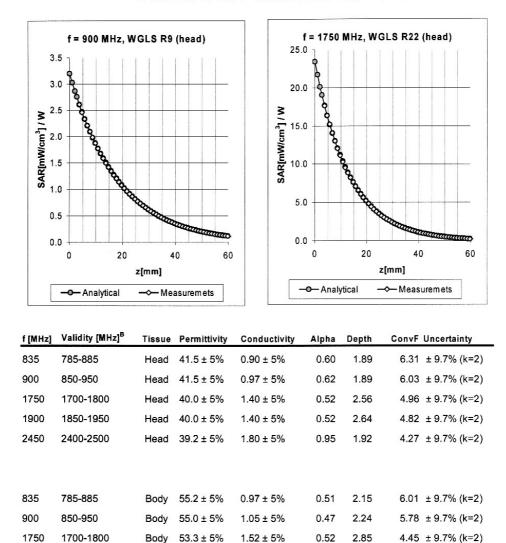
Page 6 of 8

Calibration Data and Phantom Information to test report no.: 2-3816-02-03/04



ET3DV6 SN:1558

September 6, 2004



Conversion Factor Assessment

⁸ 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.

 $1.52 \pm 5\%$

 $1.95 \pm 5\%$

0.57

1.01

2.83

1.69

4.32 ± 9.7% (k=2)

4.06 ± 9.7% (k=2)

Page 7 of 8

1900

2450

1850-1950

2400-2500

Body

Body

 $53.3 \pm 5\%$

52.7 ± 5%

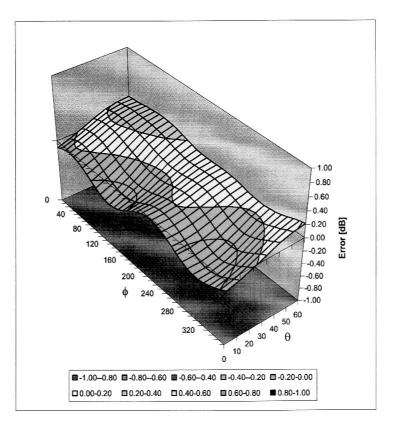


ET3DV6 SN:1558

September 6, 2004

Deviation from Isotropy in HSL

Error (θ , ϕ), f = 900 MHz



Spherical Isotropy Error < ± 0.4 dB

Page 8 of 8



2 Calibration report "Probe ET3DV6"

Engineering AG eughausstrasse 43, 8004 Zurich, 5	Switzerland					
Client Cetecor	m					
CALIBRATION C	ERTIFICAT	E				
Object(s)	ET3DV6 - SN:	1559				
Calibration procedure(s)	QA CAL-01.v2					
	Calibration pro	ocedure for dosimetric Efield prob	Des			
Calibration date:	July 18, 2004					
Condition of the calibrated item In Tolerance (according to the specific calibration document)						
This calibration certificate documen The measurements and the uncerta	ts the traceability to na inties with confidence	tional standards, which realize physical units of me probability are given on the following pages and are ory facility: environent temperature 22 +/ 2 degrees C	easurements (SI). part of the certificate.			
This calibration certificate documen The measurements and the uncerta All calibrations have been conducte	its the traceability to na inities with confidence d in the closed laborato	tional standards, which realize physical units of me probability are given on the following pages and are bry facility: enviroment temperature 22 +# 2 degrees C	easurements (SI). part of the certificate.			
This calibration certificate documen The measurements and the uncerta All calibrations have been conducte Calibration Equipment used (M&TE Model Type	its the traceability to na inities with confidence d in the closed laborato critical for calibration) ID #	tional standards, which realize physical units of me probability are given on the following pages and are by facility: environent temperature 22 +# 2 degrees C Cal Date (Calibrated by, Certificate No.)	easurements (SI). part of the certificate. Cetsius and humidity < 75%. Scheduled Calibration			
This calibration certificate documen The measurements and the uncerta All calibrations have been conducte Calibration Equipment used (M&TE Model Type Power meter EPM E4419B	Its the traceability to na sinties with confidence d in the closed laborato critical for calibration) ID # GB41293874	tional standards, which realize physical units of me probability are given on the following pages and are by facility: enviroment temperature 22 +# 2 degrees C Cal Date (Calibrated by, Certificate No.) 5-May-04 (METAS, No 251-00388)	easurements (SI). part of the certificate. Cetsius and humidity < 75%. Scheduled Calibration May-05			
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Calibration Data and Phantom Information to test report no.: 2-3816-02-03/04



Probe ET3DV6

SN:1559

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

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system):

Page 2 of 8



ET3DV6 SN:1559

July 18, 2004

DASY - Parameters of Probe: ET3DV6 SN:1559

Sensitivity in Free Space

Diode Compression^A

NormX	1.76 μV/(V/m) ²	DCP X	94	۳V
Norm Y	1.56 μV/(V/m) ²	DCP Y	94	m٧
NormZ	1.71 μV/(V/m) ²	DCP Z	94	Vrr

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Plese see Page 7.

Boundary Effect

Head

900 MHz Typical SAR gradient: 5 % per mm

Sensor Center to Phantom Surface Distance 3.7 mm						
SAR., [%]	Without Correction Algorithm	85	47			
SAR., [%]	With Correction Algorithm	0.0	0.1			

Head

1750 MHz Typical SAR gradient: 10 % per mm

Sensor Cente	er to Phantom Surface Distance	3.7 mm	4.7 mm
SAR, [%]	Without Correction Argorithm	12.2	77
SAR. [%]	With Correction Algorithm	0.0	03

Sensor Offset

Probe Tip to Sensor Ceriter	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%.

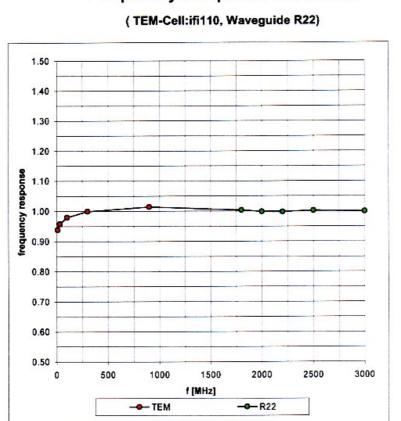
* numerical linearization parameter juncertainly not recurred.

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ET3DV6 SN:1559

July 18, 2004



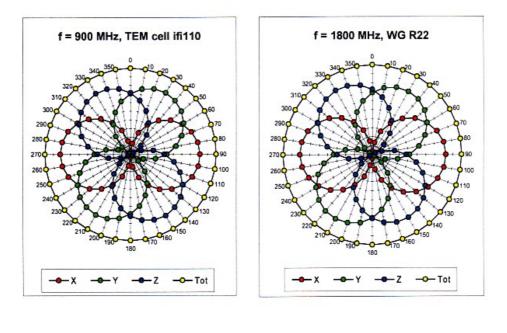
Frequency Response of E-Field

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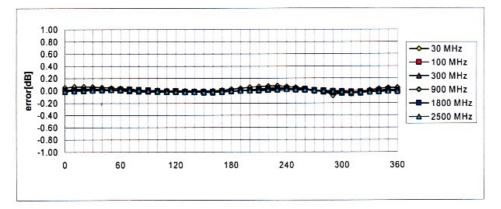


ET3DV6 SN:1559

July 18, 2004



Receiving Pattern (ϕ), θ = 0°



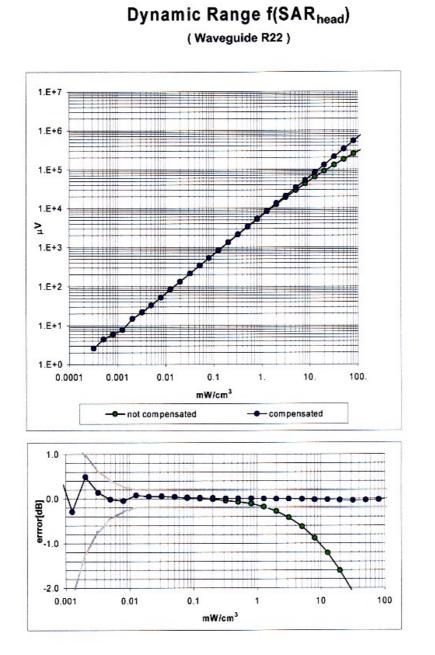
Axial Isotropy Error < ± 0.2 dB

Page 5 of 8

CETECOM

ET3DV6 SN:1559

July 18, 2004



Probe Linearity Error < ± 0.2 dB

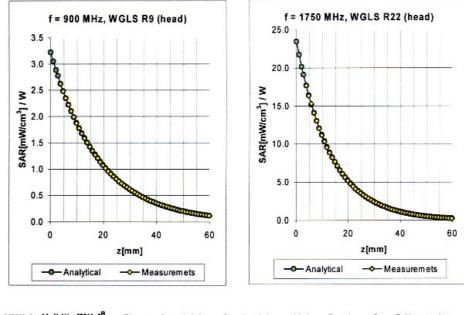
Page 6 of 8

Calibration Data and Phantom Information to test report no.: 2-3816-02-03/04



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.

Page 7 of 8

Calibration Data and Phantom Information to test report no.: 2-3816-02-03/04

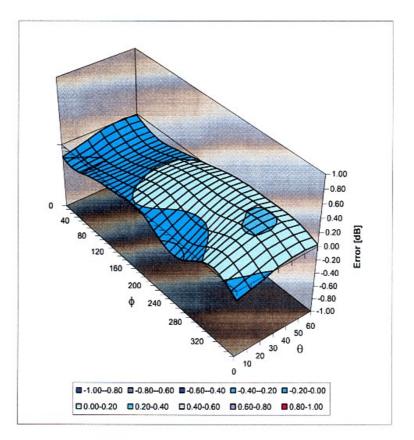


ET3DV6 SN:1559

July 18, 2004

Deviation from Isotropy in HSL

Error (θ, φ), f = 900 MHz



Spherical Isotropy Error < ± 0.4 dB

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