

**Client**

**TMC Auden**

## CALIBRATION CERTIFICATE

Object(s)

ET3DV6 - SN:1600

Calibration procedure(s)

QA CAL-01.v2  
Calibration procedure for dosimetric E-field probes

Calibration date:

January 16, 2004

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	2-Apr-03 (METAS, No 252-0250)	Apr-04
Power sensor E4412A	MY41495277	2-Apr-03 (METAS, No 252-0250)	Apr-04
Reference 20 dB Attenuator	SN: 5086 (20b)	3-Apr-03 (METAS, No. 251-0340)	Apr-04
Fluke Process Calibrator Type 702	SN: 6295803	8-Sep-03 (Sintrel SCS No. E-030020)	Sep-04
Power sensor HP 8481A	MY41092180	18-Sep-02 (SPEAG, in house check Oct-03)	In house check: Oct 05
RF generator HP 8684C	US3642U01700	4-Aug-99 (SPEAG, in house check Aug-02)	In house check: Aug-05
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Oct-03)	In house check: Oct 05

Calibrated by:	Name Nico Vetterli	Function Technician	Signature 
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Approved by:	Katja Pokovic	Laboratory Director	
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Date issued: January 21, 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.

# Probe ET3DV6

SN:1600

Manufactured:	July 30, 2001
Last calibrated:	September 4, 2001
Recalibrated:	January 16, 2004

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

## DASY - Parameters of Probe: ET3DV6 SN:1600

### Sensitivity in Free Space

NormX	$1.77 \mu\text{V}/(\text{V}/\text{m})^2$
NormY	$1.42 \mu\text{V}/(\text{V}/\text{m})^2$
NormZ	$1.73 \mu\text{V}/(\text{V}/\text{m})^2$

### Diode Compression <sup>A</sup>

DCP X	94	mV
DCP Y	94	mV
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 Cener to Phantom Surface Distance		<b>3.7 mm</b>	<b>4.7 mm</b>
SAR <sub>be</sub> [%]	Without Correction Algorithm	9.4	5.3
SAR <sub>be</sub> [%]	With Correction Algorithm	0.2	0.3

**Head                      1800 MHz              Typical SAR gradient: 10 % per mm**

Sensor to Surface Distance		<b>3.7 mm</b>	<b>4.7 mm</b>
SAR <sub>be</sub> [%]	Without Correction Algorithm	14.9	10.3
SAR <sub>be</sub> [%]	With Correction Algorithm	0.2	0.1

### Sensor Offset

Probe Tip to Sensor Center	<b>2.7</b> mm
Optical Surface Detection	<b>in tolerance</b>

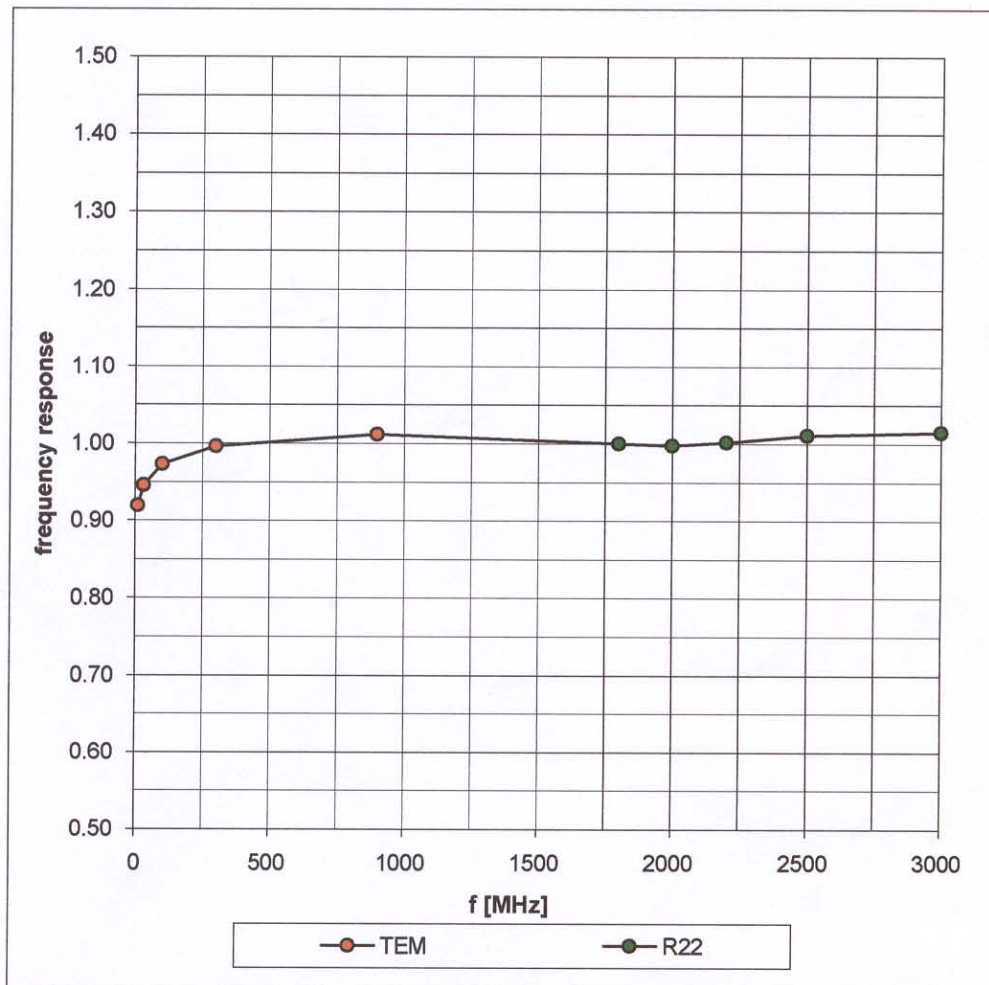
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k=2$ , which for a normal distribution corresponds to a coverage probability of approximately 95%.

<sup>A</sup> numerical linearization parameter: uncertainty not required

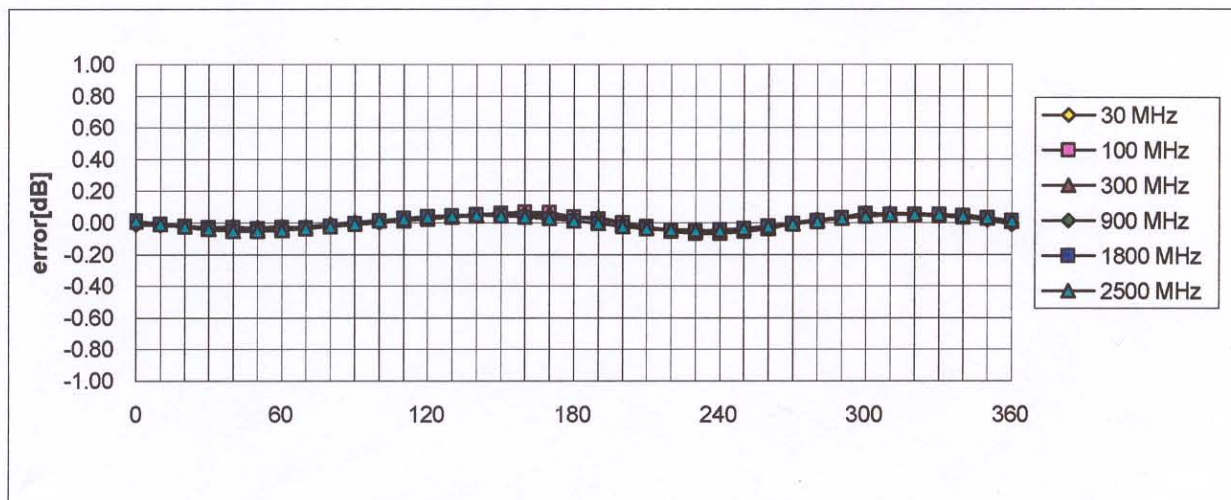
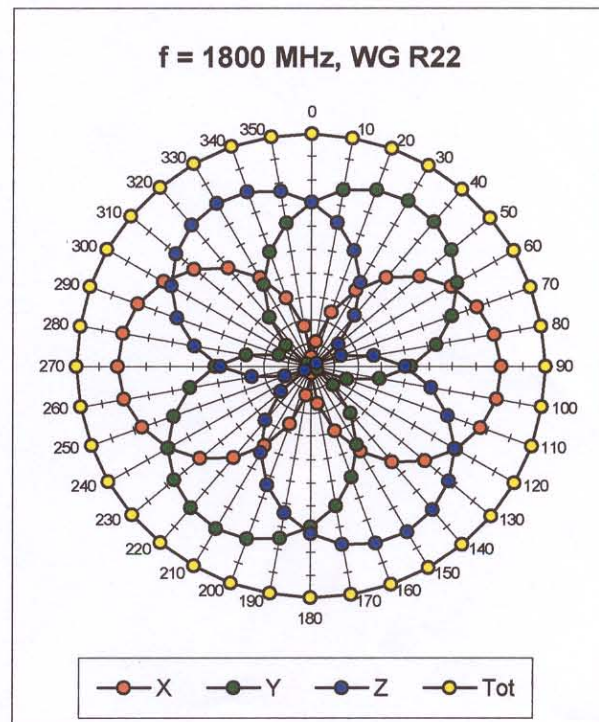
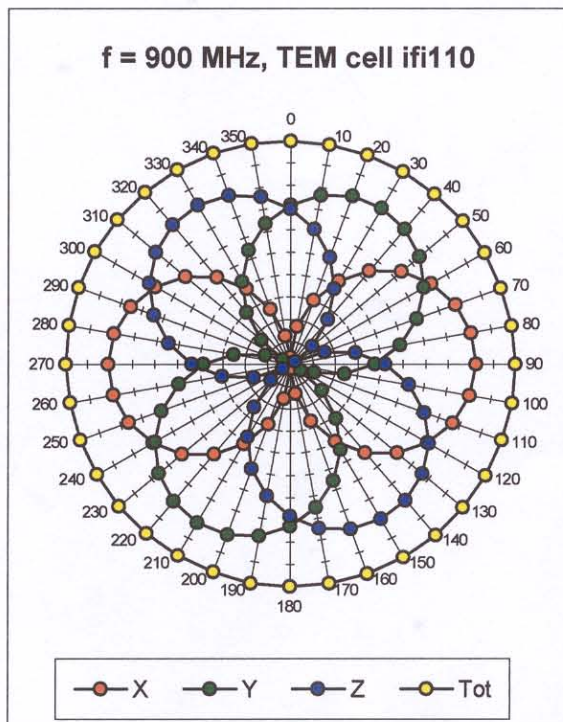


## Frequency Response of E-Field

( TEM-Cell:ifi110, Waveguide R22)

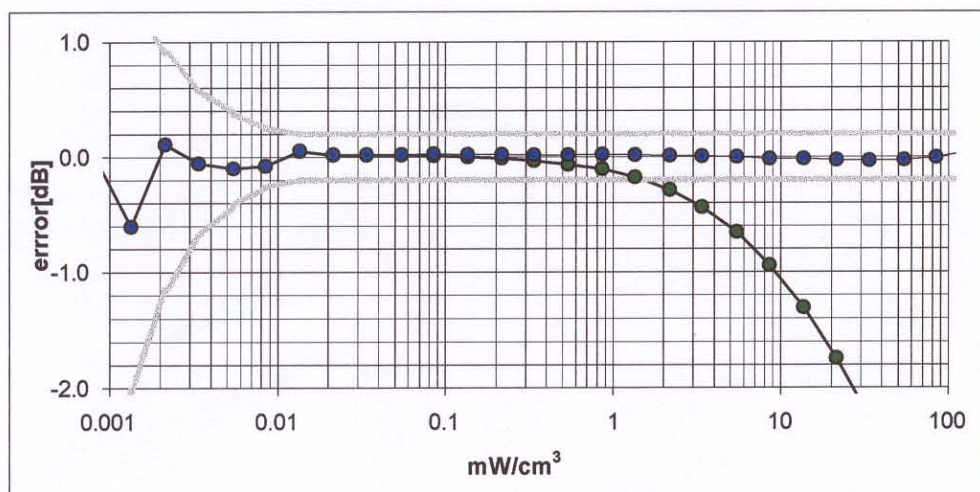
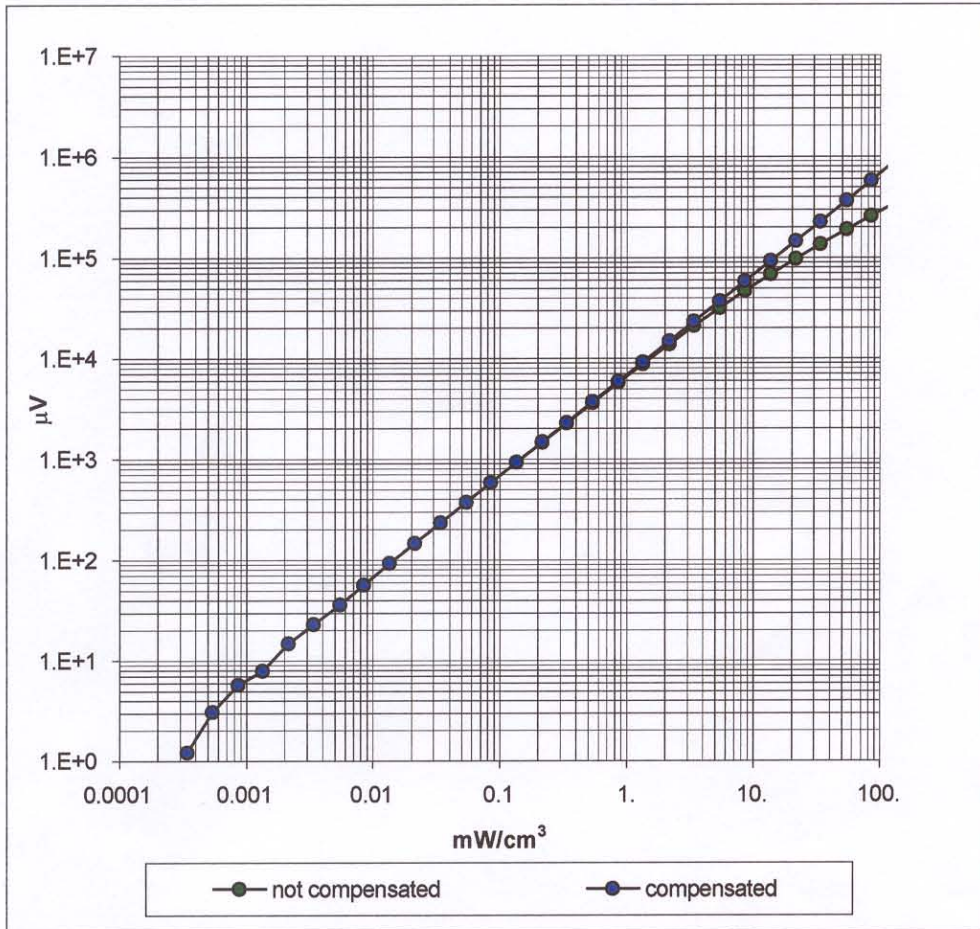


## Receiving Pattern ( $\phi$ ) , $\theta = 0^\circ$



**Axial Isotropy Error <  $\pm 0.2$  dB**

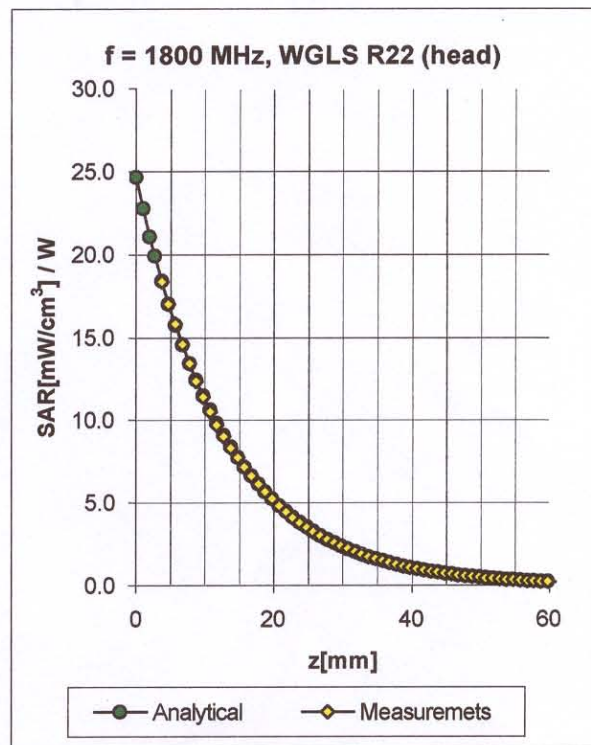
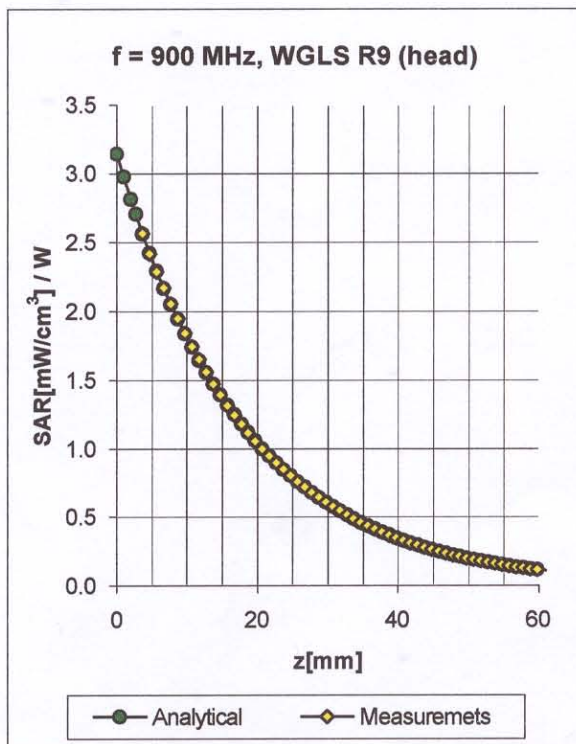
## Dynamic Range $f(\text{SAR}_{\text{head}})$ ( Waveguide R22 )



Probe Linearity  $< \pm 0.2$  dB



## Conversion Factor Assessment

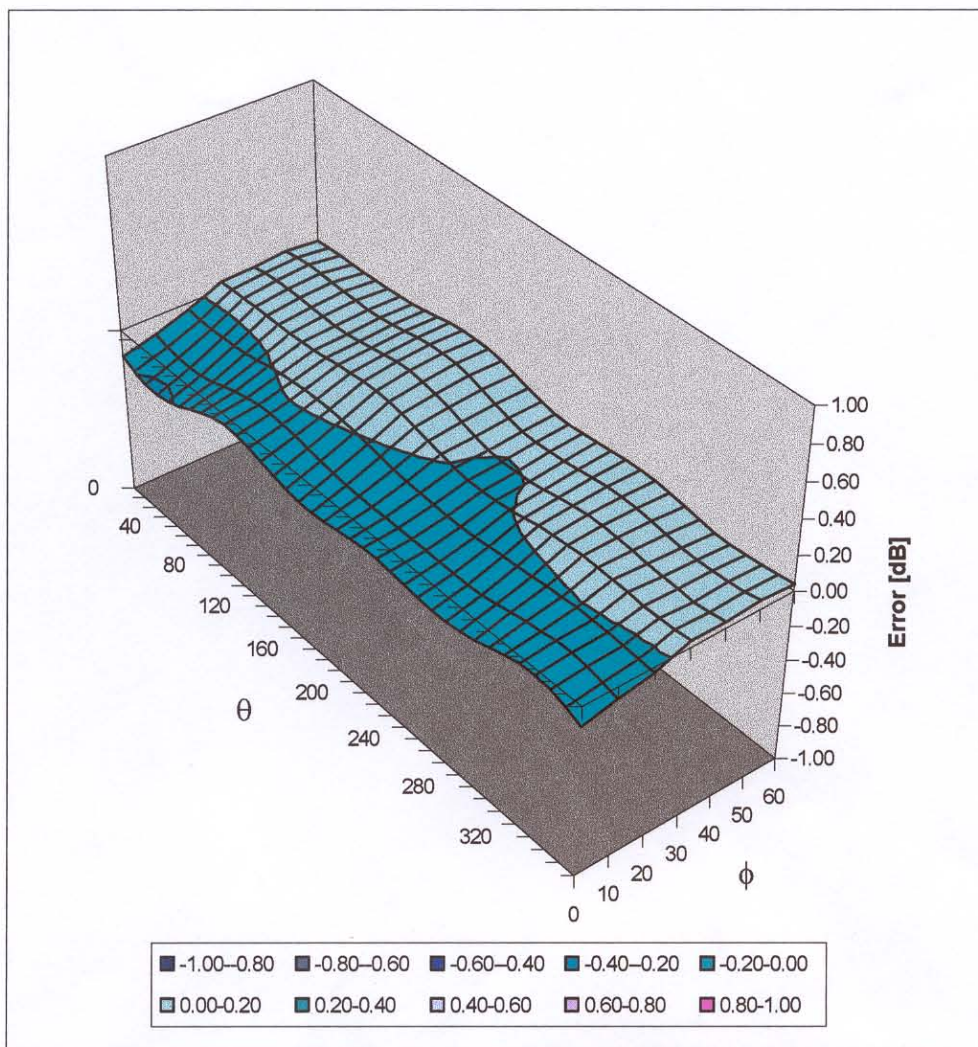


f [MHz]	Validity [MHz] <sup>B</sup>	Tissue	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
900	800-1000	Head	41.5 ± 5%	0.97 ± 5%	0.44	2.22	6.36 ± 11.3% (k=2)
1800	1710-1910	Head	40.0 ± 5%	1.40 ± 5%	0.48	2.87	5.04 ± 11.7% (k=2)

<sup>B</sup> 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.

## Deviation from Isotropy in HSL

Error ( $\theta, \phi$ ),  $f = 900$  MHz



Spherical Isotropy Error <  $\pm 0.4$  dB