

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:

1660

Place of Calibration:

Zurich

Date of Calibration:

January 10, 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:

Nikolaus Meriana

Approved by:

Oliver Katz

Probe ET3DV6

SN:1660

Manufactured:	December 14, 2001
Last calibration:	January 10, 2002

Calibrated for System DASY3

DASY3 - Parameters of Probe: ET3DV6 SN:1660

Sensitivity in Free Space

NormX	1.94 $\mu\text{V}/(\text{V}/\text{m})^2$
NormY	1.73 $\mu\text{V}/(\text{V}/\text{m})^2$
NormZ	1.62 $\mu\text{V}/(\text{V}/\text{m})^2$

Diode Compression

DCP X	98	mV
DCP Y	98	mV
DCP Z	98	mV

Sensitivity in Tissue Simulating Liquid

Head **800 - 1000 MHz** $\epsilon_r = 39.0 - 43.5$ $\sigma = 0.80 - 1.10 \text{ mho/m}$

ConvF X	6.8 $\pm 9.5\%$ (k=2)	Boundary effect:
ConvF Y	6.8 $\pm 9.5\%$ (k=2)	Alpha 0.54
ConvF Z	6.8 $\pm 9.5\%$ (k=2)	Depth 1.86

Head **1700 - 1910 MHz** $\epsilon_r = 39.5 - 41.0$ $\sigma = 1.20 - 1.55 \text{ mho/m}$

ConvF X	5.4 $\pm 9.5\%$ (k=2)	Boundary effect:
ConvF Y	5.4 $\pm 9.5\%$ (k=2)	Alpha 0.51
ConvF Z	5.4 $\pm 9.5\%$ (k=2)	Depth 2.31

Boundary Effect

Head **800 - 1000 MHz** Typical SAR gradient: 5 % per mm

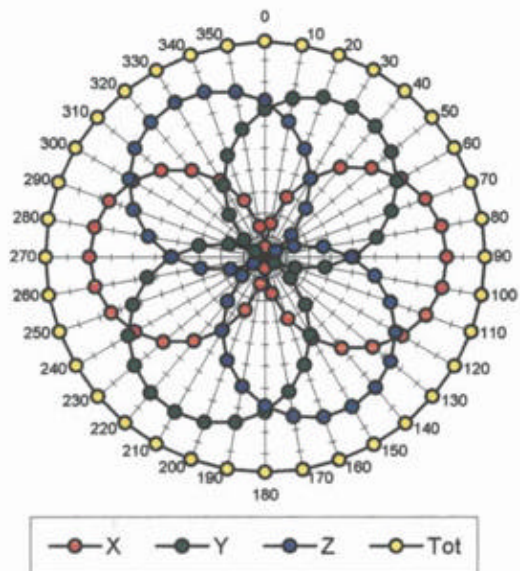
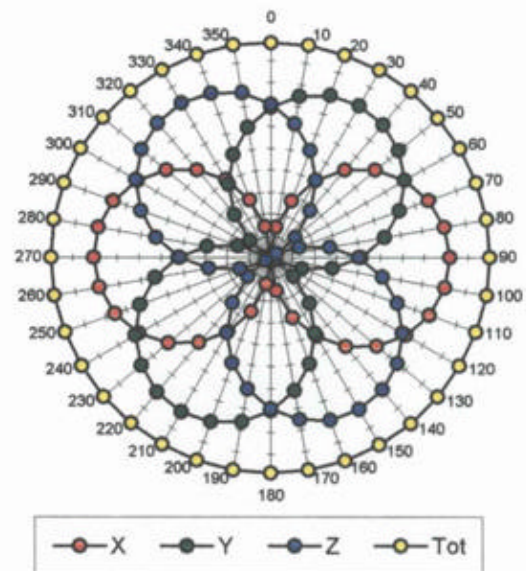
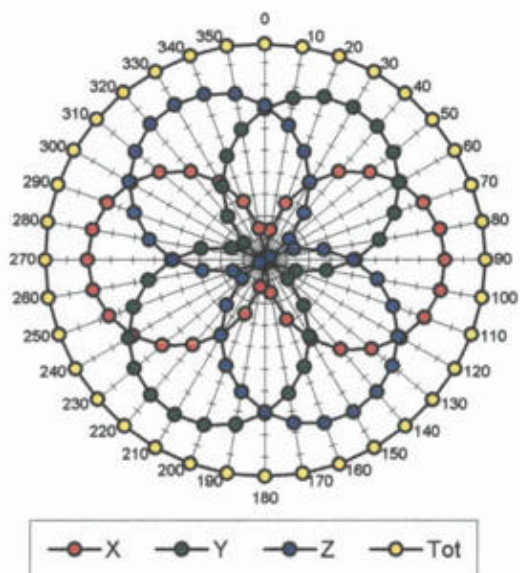
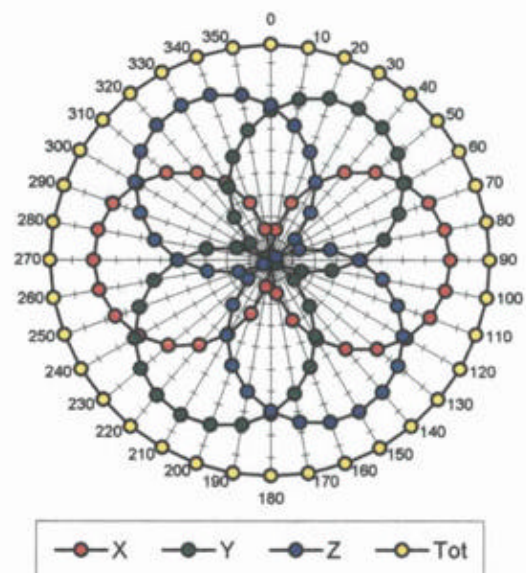
Probe Tip to Boundary	1 mm	2 mm
SAR _{be} [%] Without Correction Algorithm	8.1	4.2
SAR _{be} [%] With Correction Algorithm	0.1	0.3

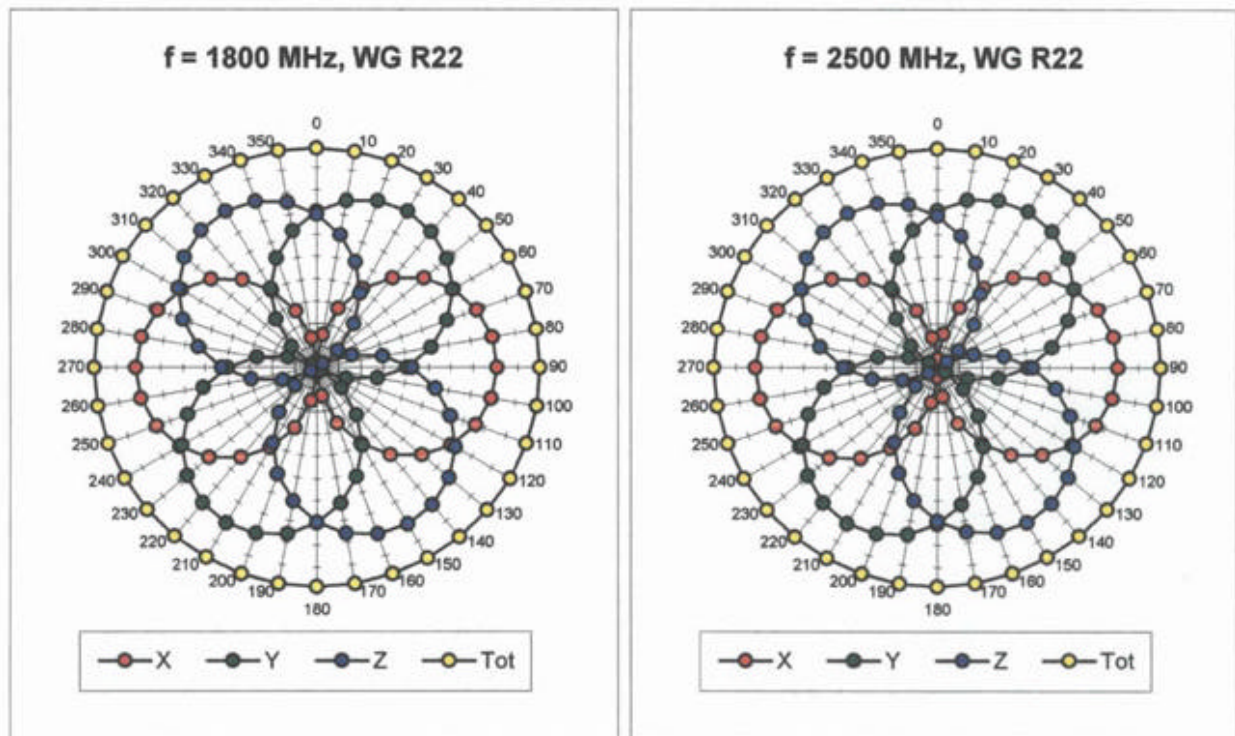
Head **1700 - 1910 MHz** Typical SAR gradient: 10 % per mm

Probe Tip to Boundary	1 mm	2 mm
SAR _{be} [%] Without Correction Algorithm	11.2	7.5
SAR _{be} [%] With Correction Algorithm	0.2	0.3

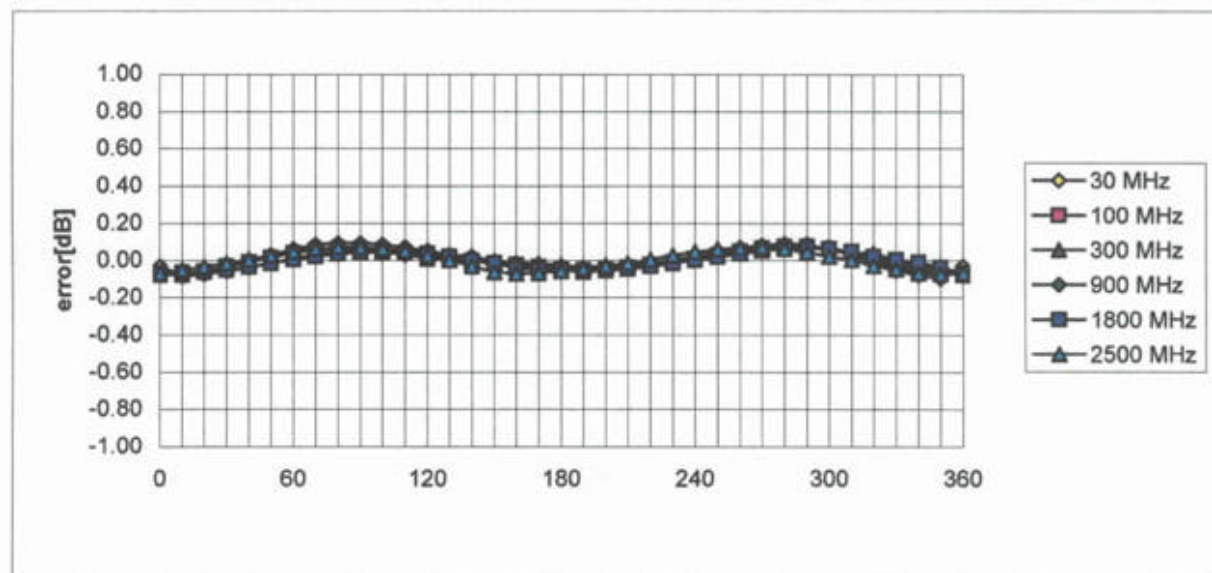
Sensor Offset

Probe Tip to Sensor Center	2.7	mm
Optical Surface Detection	1.6 $\pm$ 0.2	mm

Receiving Pattern (ϕ), $\theta = 0^\circ$ **f = 30 MHz, TEM cell ifi110****f = 100 MHz, TEM cell ifi110****f = 300 MHz, TEM cell ifi110****f = 900 MHz, TEM cell ifi110**

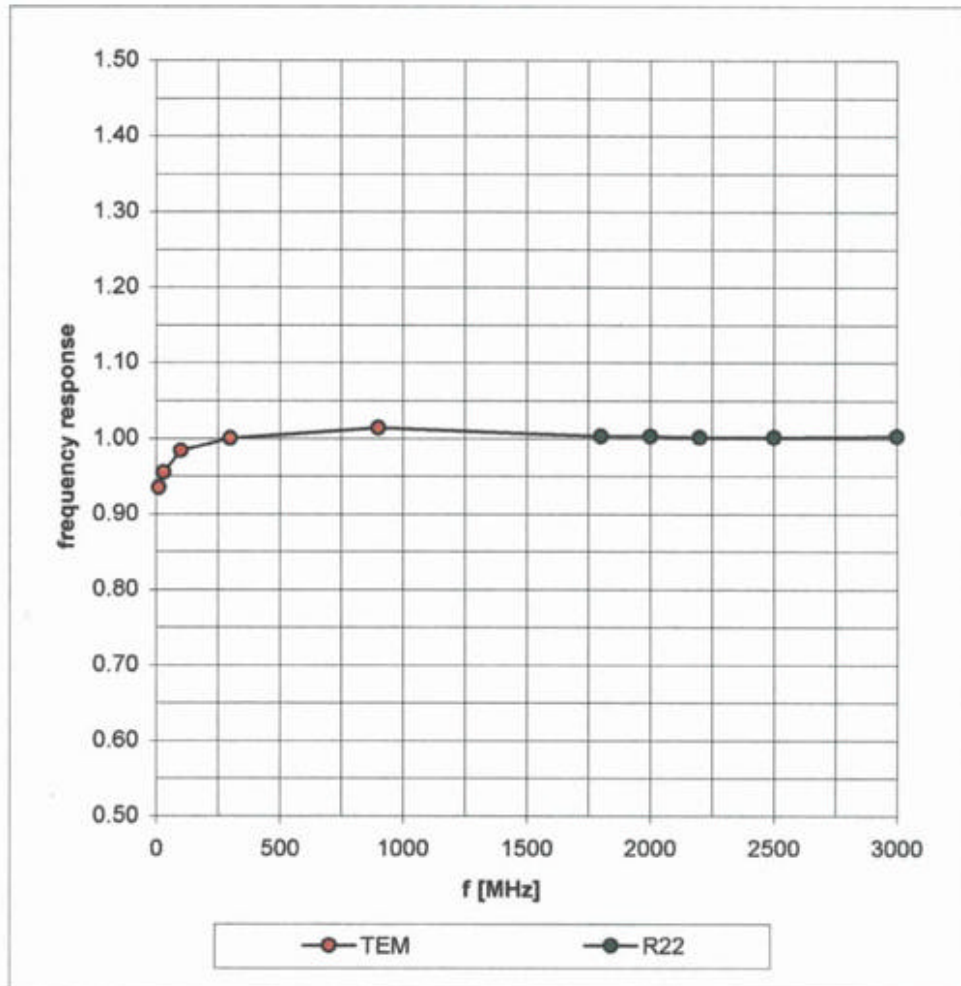


Isotropy Error (ϕ), $\theta = 0^\circ$

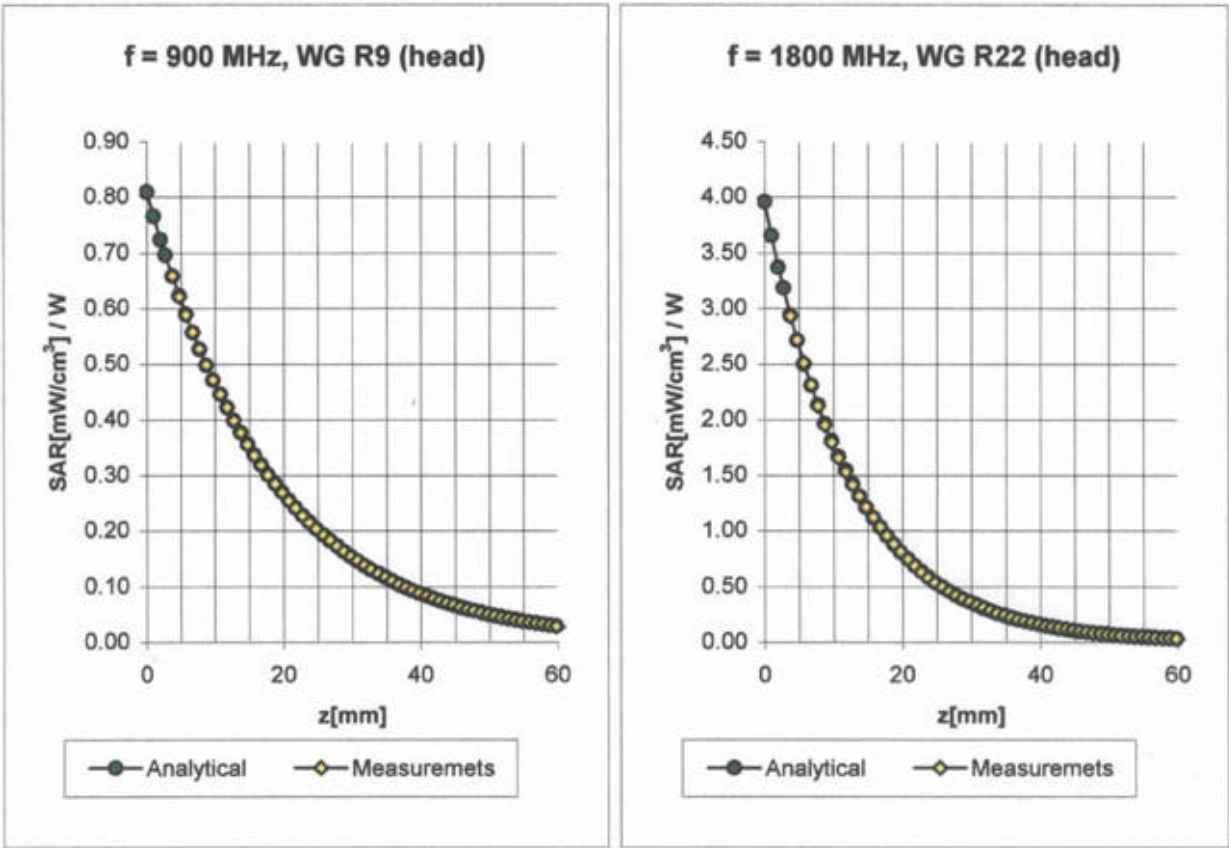


Frequency Response of E-Field

(TEM-Cell:ifi110, Waveguide R22)



Conversion Factor Assessment

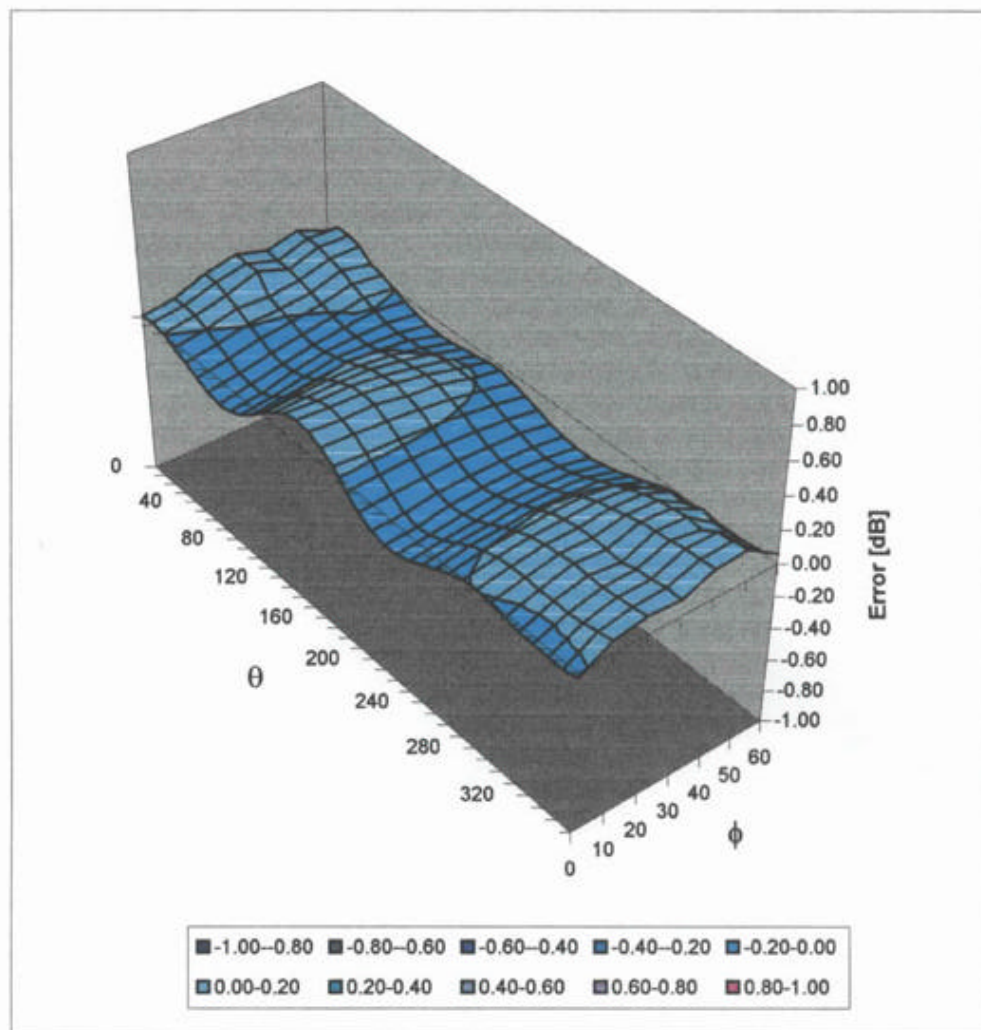


Head	800 - 1000 MHz	$\epsilon_r = 39.0 - 43.5$	$\sigma = 0.80 - 1.10$ mho/m
	ConvF X	6.8 $\pm 9.5\%$ (k=2)	Boundary effect:
	ConvF Y	6.8 $\pm 9.5\%$ (k=2)	Alpha 0.54
	ConvF Z	6.8 $\pm 9.5\%$ (k=2)	Depth 1.86

Head	1700 - 1910 MHz	$\epsilon_r = 39.5 - 41.0$	$\sigma = 1.20 - 1.55$ mho/m
	ConvF X	5.4 $\pm 9.5\%$ (k=2)	Boundary effect:
	ConvF Y	5.4 $\pm 9.5\%$ (k=2)	Alpha 0.51
	ConvF Z	5.4 $\pm 9.5\%$ (k=2)	Depth 2.31

Deviation from Isotropy in HSL

Error (θ, ϕ), $f = 900$ MHz



Additional Conversion Factors for Dosimetric E-Field Probe

Type:

ET3DV6

Serial Number:

1660

Place of Assessment:

Zurich

Date of Assessment:

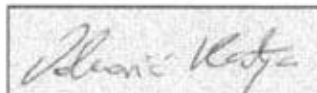
May 6, 2002

Probe Calibration Date:

January 10, 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:



Dosimetric E-Field Probe ET3DV6 SN:1660

Conversion factor ($\pm$ standard deviation)

835 MHz	ConvF	$6.9 \pm 8\%$	$\epsilon_r = 41.5$ $\sigma = 0.90 \text{ mho/m}$ (head tissue)
835 MHz	ConvF	$6.7 \pm 8\%$	$\epsilon_r = 55.2$ $\sigma = 0.97 \text{ mho/m}$ (body tissue)
1900 MHz	ConvF	$5.2 \pm 8\%$	$\epsilon_r = 40.0$ $\sigma = 1.40 \text{ mho/m}$ (head tissue)
1900 MHz	ConvF	$4.8 \pm 8\%$	$\epsilon_r = 53.3$ $\sigma = 1.52 \text{ mho/m}$ (body tissue)