

## Calibration Certificate

### Dosimetric E-Field Probe

Type:

**ET3DV6**

Serial Number:

**1522**

Place of Calibration:

**Zurich**

Date of Calibration:

**May 11, 2001**

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:

*Dezsi Kojan*

Approved by:

*[Signature]*

# Probe ET3DV6

## SN:1522

Manufactured:	March 21, 2000
Last calibration:	April 7, 2000
Recalibrated:	May 11, 2001

Calibrated for System DASY3

**DASY3 - Parameters of Probe: ET3DV6 SN:1522****Sensitivity in Free Space**

NormX	<b>1.68</b> $\mu\text{V}/(\text{V}/\text{m})^2$
NormY	<b>1.64</b> $\mu\text{V}/(\text{V}/\text{m})^2$
NormZ	<b>1.71</b> $\mu\text{V}/(\text{V}/\text{m})^2$

**Diode Compression**

DCP X	<b>99</b> mV
DCP Y	<b>99</b> mV
DCP Z	<b>99</b> mV

**Sensitivity in Tissue Simulating Liquid**

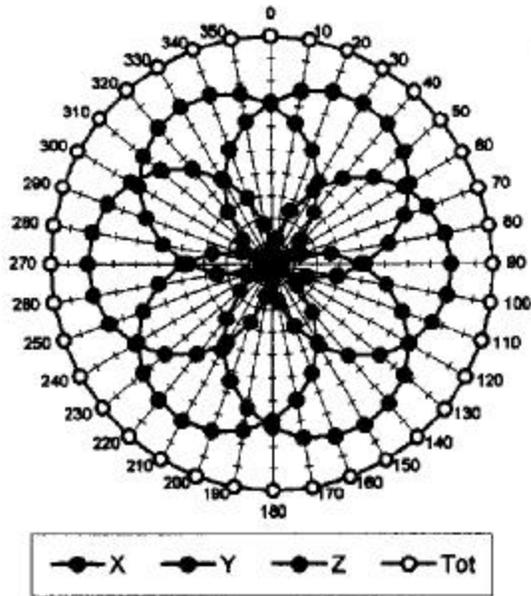
<b>Head</b>	<b>450 MHz</b>	$\epsilon_r = 43.5 \pm 5\%$	$\sigma = 0.87 \pm 10\%$ mho/m
ConvF X	<b>6.81</b> extrapolated		Boundary effect:
ConvF Y	<b>6.81</b> extrapolated		Alpha <b>0.64</b>
ConvF Z	<b>6.81</b> extrapolated		Depth <b>1.92</b>
<b>Head</b>	<b>900 MHz</b>	$\epsilon_r = 42 \pm 5\%$	$\sigma = 0.97 \pm 10\%$ mho/m
ConvF X	<b>6.31</b> $\pm 7\%$ (k=2)		Boundary effect:
ConvF Y	<b>6.31</b> $\pm 7\%$ (k=2)		Alpha <b>0.64</b>
ConvF Z	<b>6.31</b> $\pm 7\%$ (k=2)		Depth <b>1.95</b>
<b>Head</b>	<b>1500 MHz</b>	$\epsilon_r = 40.4 \pm 5\%$	$\sigma = 1.23 \pm 10\%$ mho/m
ConvF X	<b>5.65</b> interpolated		Boundary effect:
ConvF Y	<b>5.65</b> interpolated		Alpha <b>0.64</b>
ConvF Z	<b>5.65</b> interpolated		Depth <b>1.98</b>
<b>Head</b>	<b>1800 MHz</b>	$\epsilon_r = 40 \pm 5\%$	$\sigma = 1.40 \pm 10\%$ mho/m
ConvF X	<b>5.32</b> $\pm 7\%$ (k=2)		Boundary effect:
ConvF Y	<b>5.32</b> $\pm 7\%$ (k=2)		Alpha <b>0.64</b>
ConvF Z	<b>5.32</b> $\pm 7\%$ (k=2)		Depth <b>1.99</b>

**Sensor Offset**

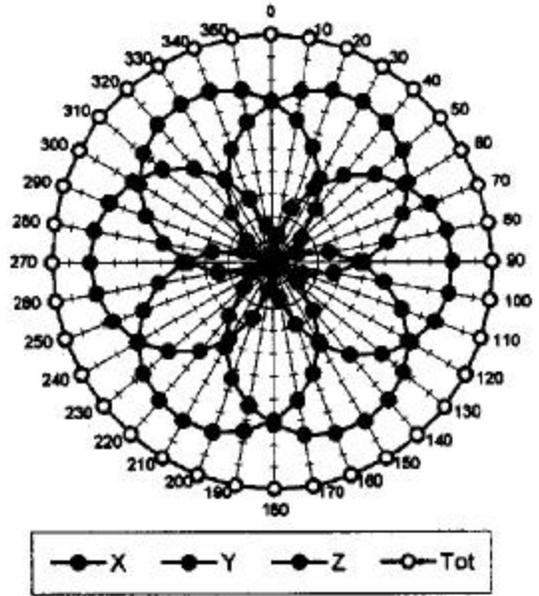
Probe Tip to Sensor Center	<b>2.7</b>	mm
Optical Surface Detection	<b>1.3 <math>\pm</math> 0.2</b>	mm

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

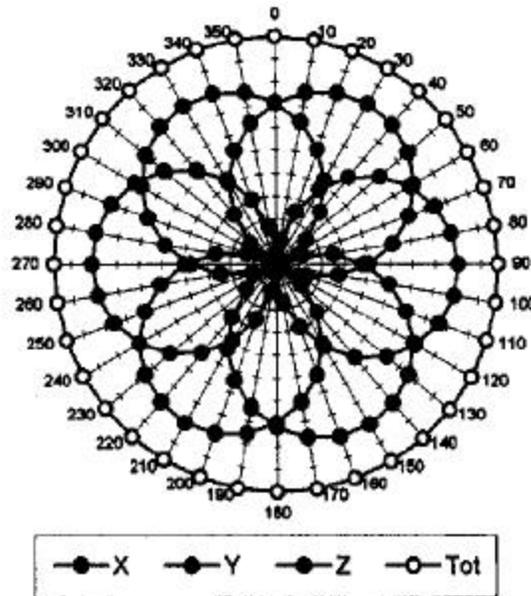
**f = 30 MHz, TEM cell if110**



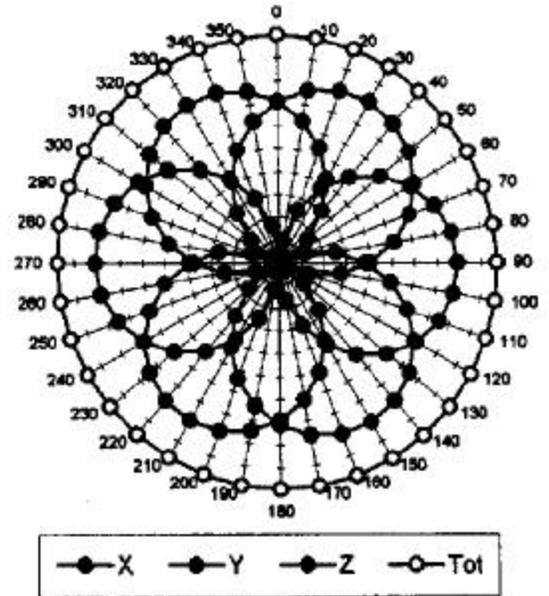
**f = 100 MHz, TEM cell if110**

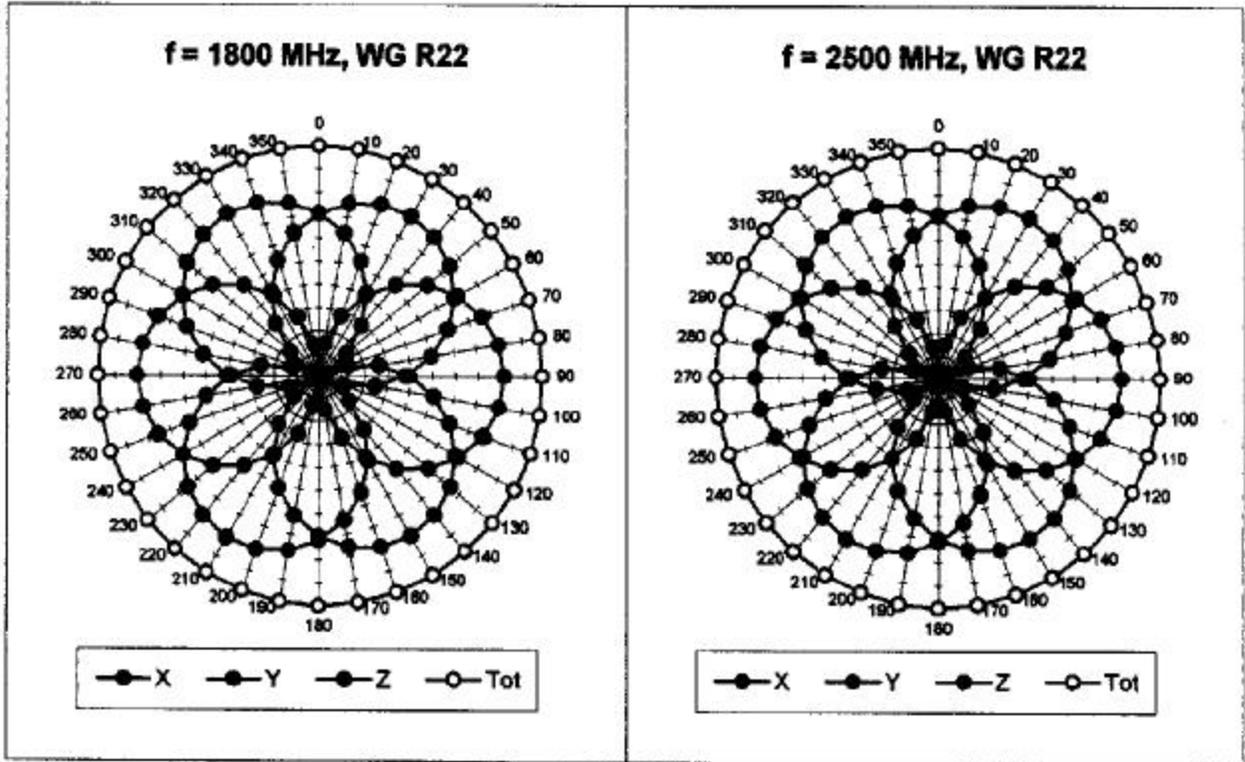


**f = 300 MHz, TEM cell if110**

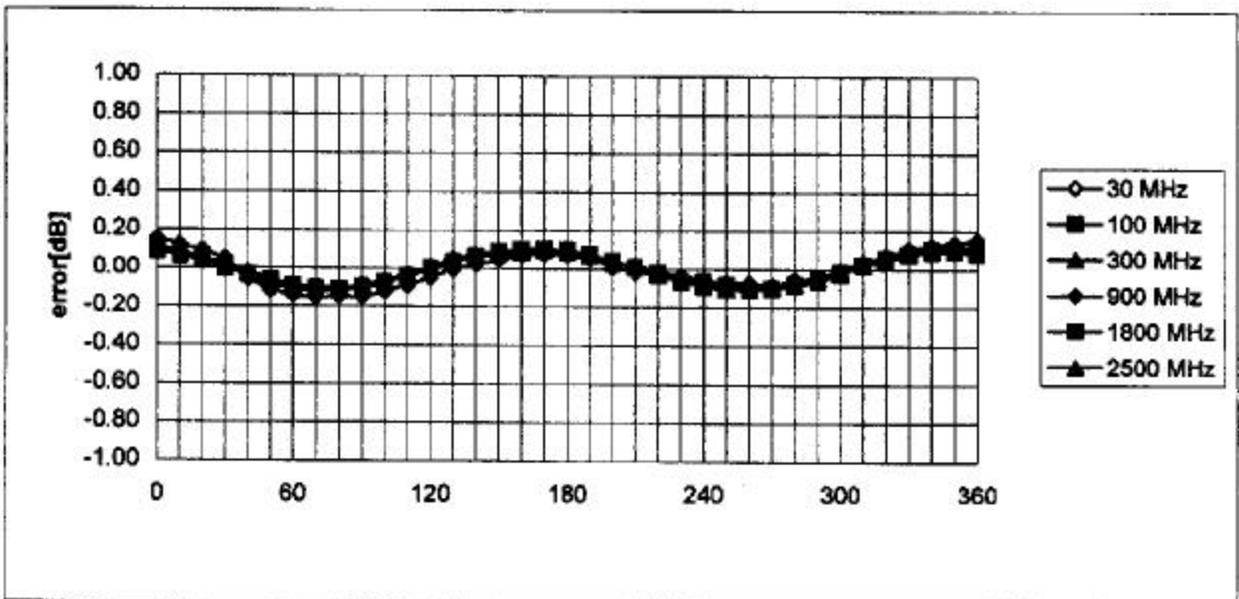


**f = 900 MHz, TEM cell if110**



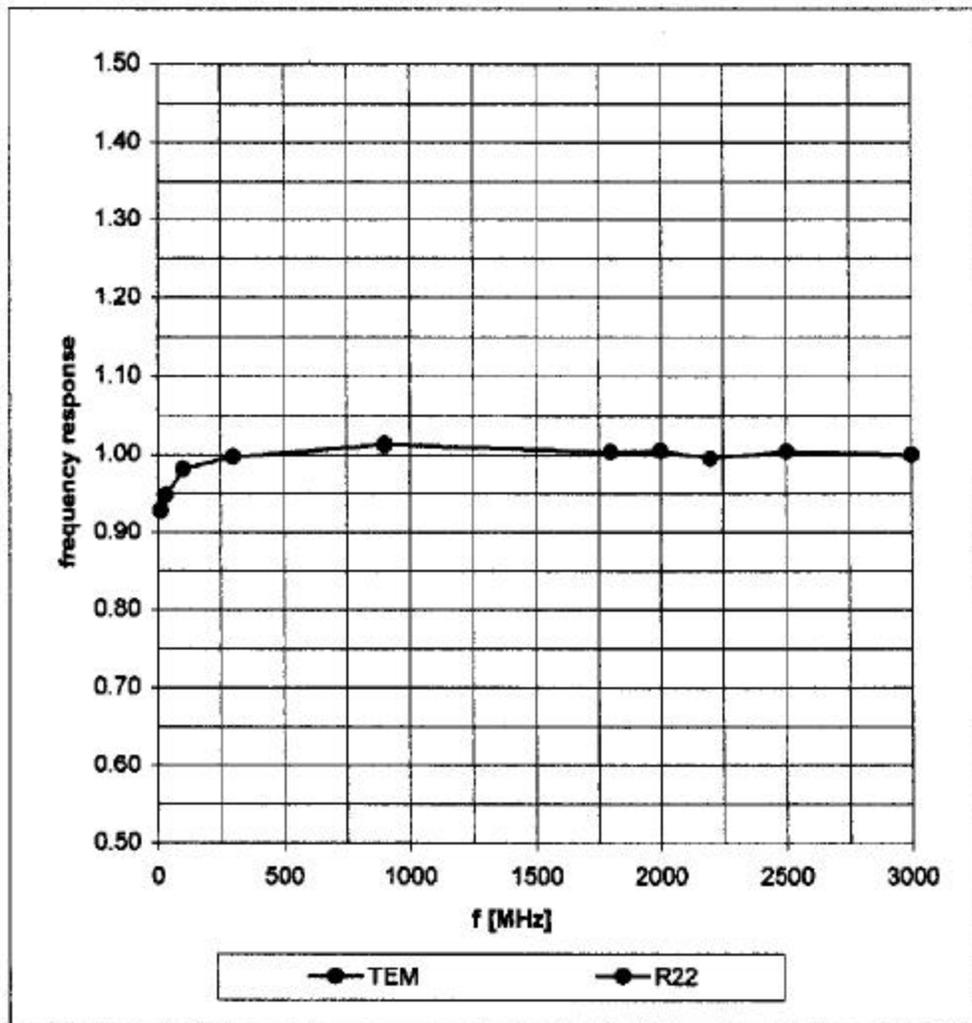


**Isotropy Error ( $\phi$ ),  $\theta = 0^\circ$**



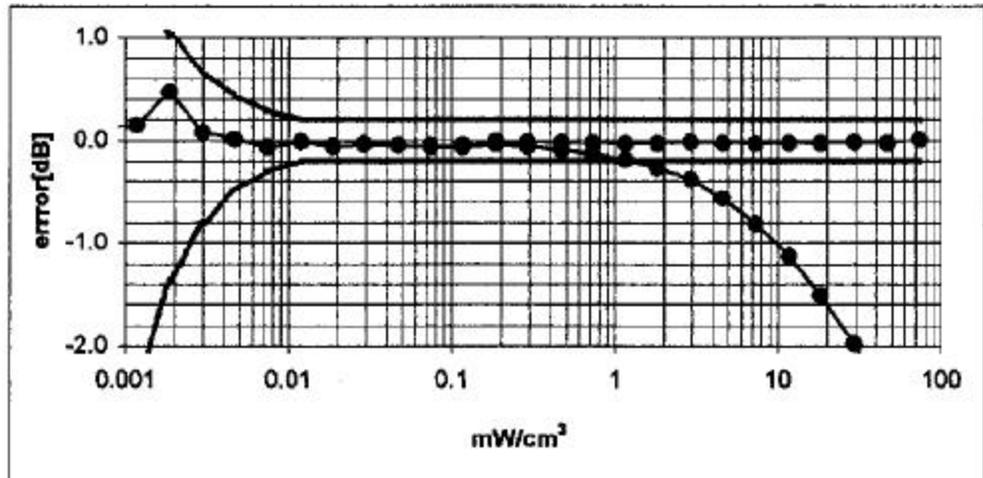
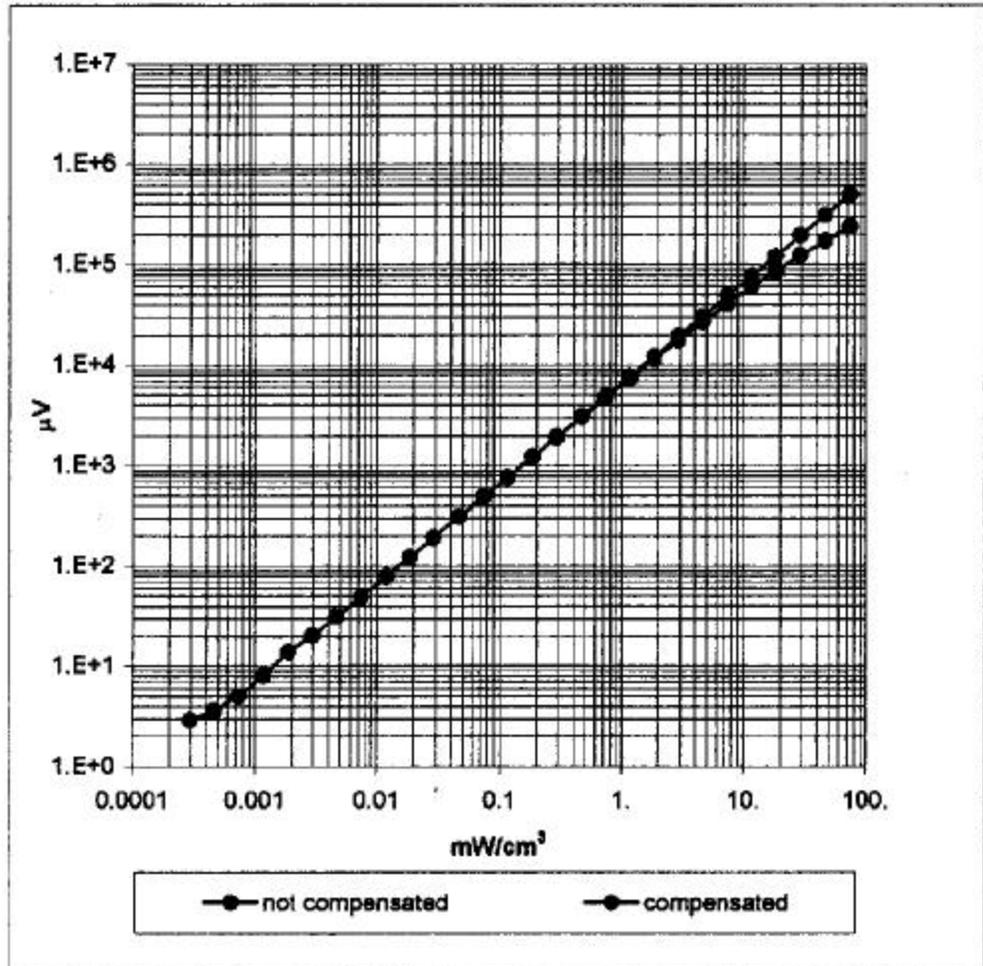
# Frequency Response of E-Field

( TEM-Cell:ifi110, Waveguide R22)

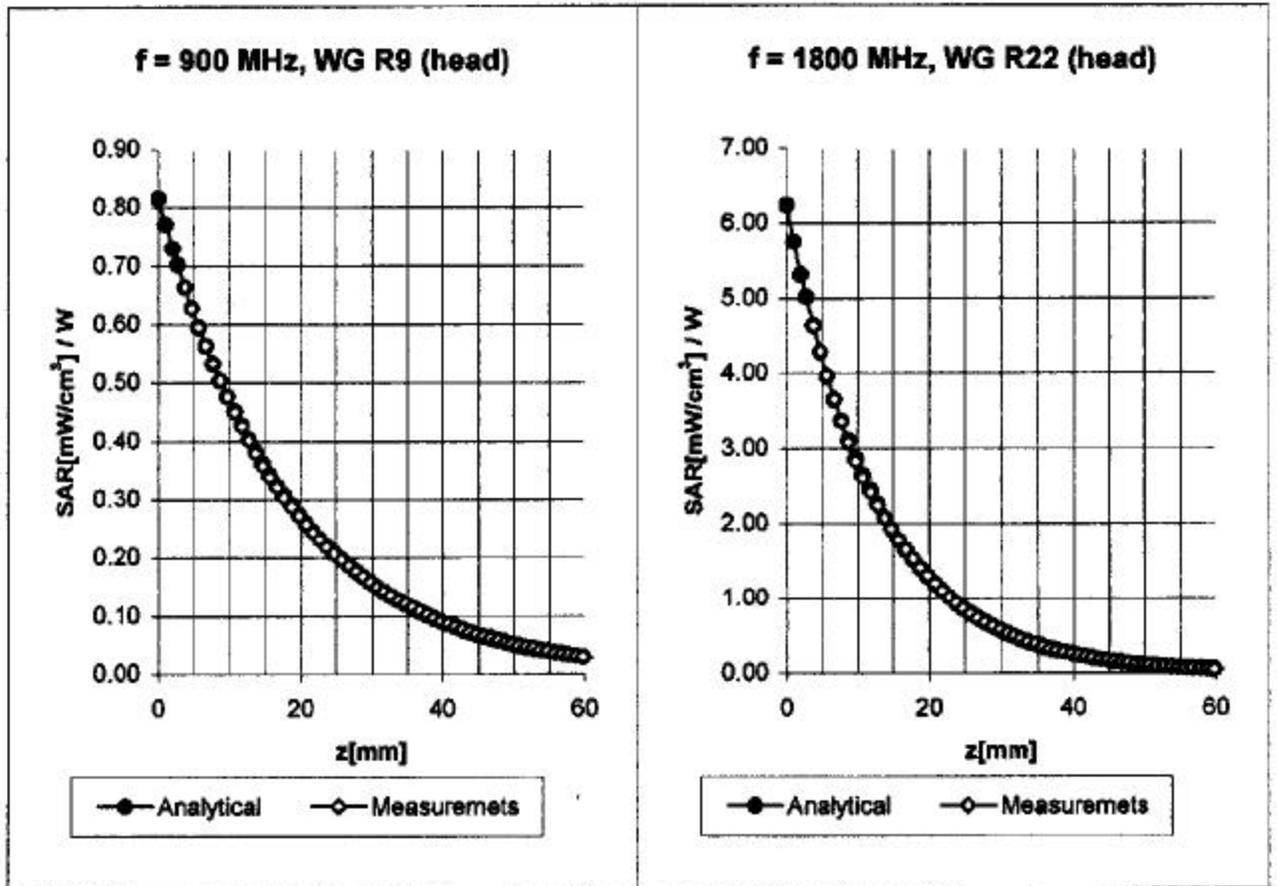


# Dynamic Range f(SAR<sub>brain</sub>)

( TEM-Cell:ifi110 )



## Conversion Factor Assessment



Head                      900 MHz                       $\epsilon_r = 42 \pm 5\%$                        $\sigma = 0.97 \pm 10\%$  mho/m

ConvF X                      **6.31**  $\pm 7\%$  (k=2)

ConvF Y                      **6.31**  $\pm 7\%$  (k=2)

ConvF Z                      **6.31**  $\pm 7\%$  (k=2)

Boundary effect:

Alpha                      **0.64**

Depth                      **1.95**

Head                      1800 MHz                       $\epsilon_r = 40 \pm 5\%$                        $\sigma = 1.40 \pm 10\%$  mho/m

ConvF X                      **5.32**  $\pm 7\%$  (k=2)

ConvF Y                      **5.32**  $\pm 7\%$  (k=2)

ConvF Z                      **5.32**  $\pm 7\%$  (k=2)

Boundary effect:

Alpha                      **0.64**

Depth                      **1.99**

# Schmid & Partner Engineering AG

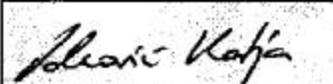
Zeughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 245 97 00, Fax +41 1 245 97 79

## Additional Conversion Factors for Dosimetric E-Field Probe

Type:	ET3DV6
Serial Number:	1522
Place of Assessment:	Zurich
Date of Assessment:	May 16, 2001
Probe Calibration Date:	May 11, 2001

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:1522

Conversion factor ( $\pm$  standard deviation)

835 MHz	ConvF	$6.37 \pm 8\%$	$\epsilon_r = 44.0$ $\sigma = 0.90 \text{ mho/m}$ (brain tissue)
900 MHz	ConvF	$6.25 \pm 8\%$	$\epsilon_r = 42.5$ $\sigma = 0.86 \text{ mho/m}$ (brain tissue)
925 MHz	ConvF	$6.20 \pm 8\%$	$\epsilon_r = 44.0$ $\sigma = 0.93 \text{ mho/m}$ (brain tissue)
835 MHz	ConvF	$6.31 \pm 8\%$	$\epsilon_r = 52.0$ $\sigma = 1.10 \text{ mho/m}$ (muscle tissue)
925 MHz	ConvF	$6.16 \pm 8\%$	$\epsilon_r = 52.0$ $\sigma = 1.20 \text{ mho/m}$ (muscle tissue)

## Dosimetric E-Field Probe ET3DV6 SN:1522

Conversion factor ( $\pm$  standard deviation)

1800 MHz	ConvF	5.40 $\pm$ 8%	$\epsilon_r = 41.5$ $\sigma = 1.69$ mho/m (brain tissue, sugar-water)
1800 MHz	ConvF	5.29 $\pm$ 8%	$\epsilon_r = 40.3$ $\sigma = 1.35$ mho/m (brain tissue, glycol)
1900 MHz	ConvF	5.16 $\pm$ 8%	$\epsilon_r = 39.9$ $\sigma = 1.42$ mho/m (brain tissue, glycol)
1800 MHz	ConvF	5.05 $\pm$ 8%	$\epsilon_r = 50.0$ $\sigma = 1.58$ mho/m (muscle tissue, glycol)
1900 MHz	ConvF	4.91 $\pm$ 8%	$\epsilon_r = 50.0$ $\sigma = 1.64$ mho/m (muscle tissue, glycol)