

ATTACHMENT R – PROBE CALIBRATION DATA

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:

1608

Place of Calibration:

Zurich

Date of Calibration:

August 10, 2001

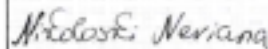
Calibration Interval:

12 months

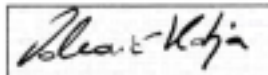
Schmid & Partner Engineering AG hereby certifies, that this device has been calibrated on the date indicated above. The calibration was performed in accordance with specifications and procedures of Schmid & Partner Engineering AG.

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:



Approved by:



Schmid & Partner Engineering AG

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

Probe ET3DV6

SN:1608

Manufactured:	July 27, 2001
Calibrated:	August 10, 2001

Calibrated for System DASY3

ET3DV6 SN:1608

DASY3 - Parameters of Probe: ET3DV6 SN:1608

Sensitivity in Free Space

Diode Compression

NormX	1.70 $\mu\text{V}/(\text{V}/\text{m})^2$	DCP X	97 mV
NormY	1.51 $\mu\text{V}/(\text{V}/\text{m})^2$	DCP Y	97 mV
NormZ	1.79 $\mu\text{V}/(\text{V}/\text{m})^2$	DCP Z	97 mV

Sensitivity in Tissue Simulating Liquid

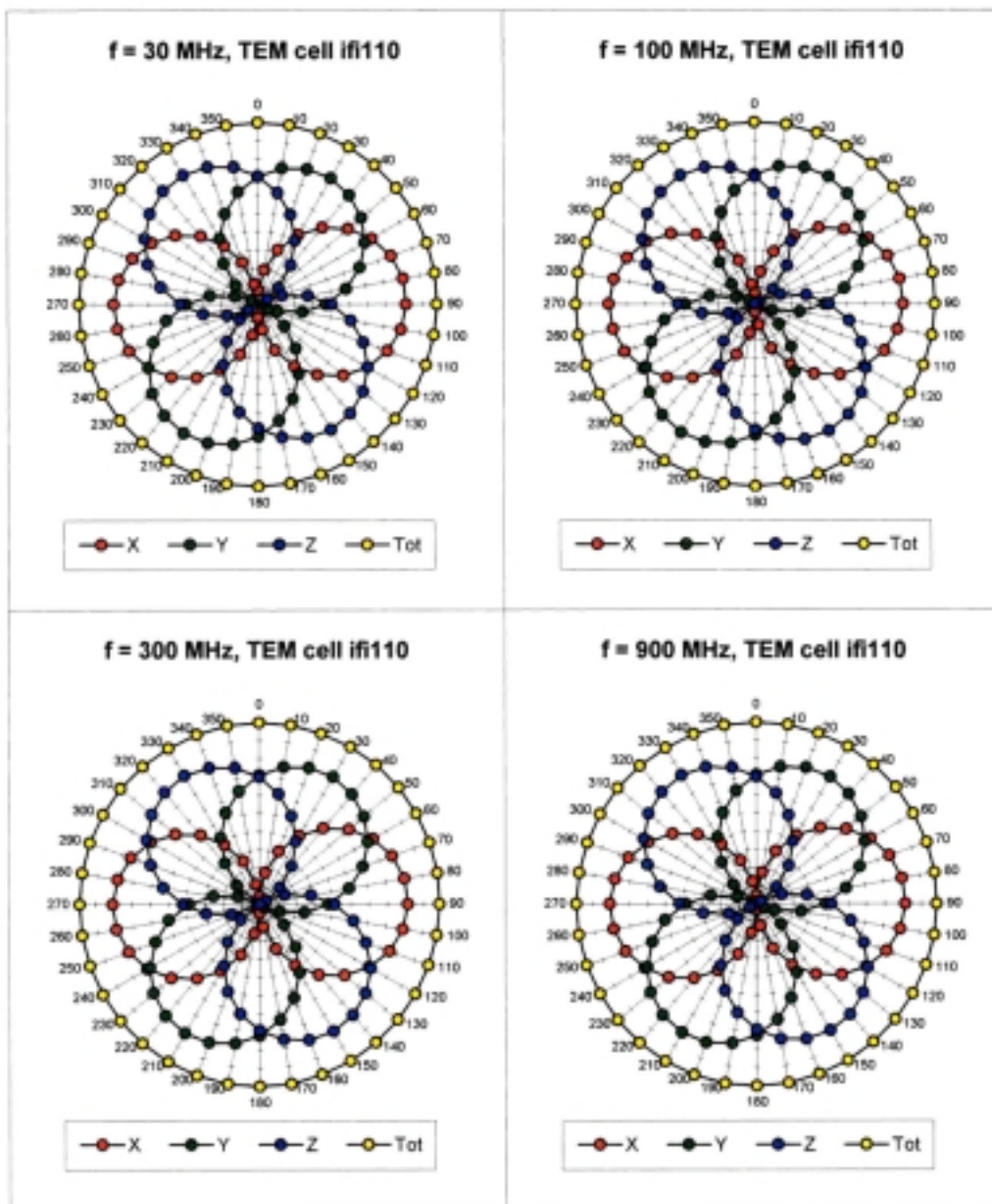
Head	450 MHz	$\epsilon_r = 43.5 \pm 5\%$	$\sigma = 0.87 \pm 10\% \text{ mho}/\text{m}$
ConvF X	7.13 extrapolated	Boundary effect:	
ConvF Y	7.13 extrapolated	Alpha	0.21
ConvF Z	7.13 extrapolated	Depth	3.07
Head	900 MHz	$\epsilon_r = 42 \pm 5\%$	$\sigma = 0.97 \pm 10\% \text{ mho}/\text{m}$
ConvF X	6.62 $\pm 7\%$ (k=2)	Boundary effect:	
ConvF Y	6.62 $\pm 7\%$ (k=2)	Alpha	0.29
ConvF Z	6.62 $\pm 7\%$ (k=2)	Depth	2.81
Head	1500 MHz	$\epsilon_r = 40.4 \pm 5\%$	$\sigma = 1.23 \pm 10\% \text{ mho}/\text{m}$
ConvF X	5.94 interpolated	Boundary effect:	
ConvF Y	5.94 interpolated	Alpha	0.41
ConvF Z	5.94 interpolated	Depth	2.46
Head	1800 MHz	$\epsilon_r = 40 \pm 5\%$	$\sigma = 1.40 \pm 10\% \text{ mho}/\text{m}$
ConvF X	5.60 $\pm 7\%$ (k=2)	Boundary effect:	
ConvF Y	5.60 $\pm 7\%$ (k=2)	Alpha	0.46
ConvF Z	5.60 $\pm 7\%$ (k=2)	Depth	2.29

Sensor Offset

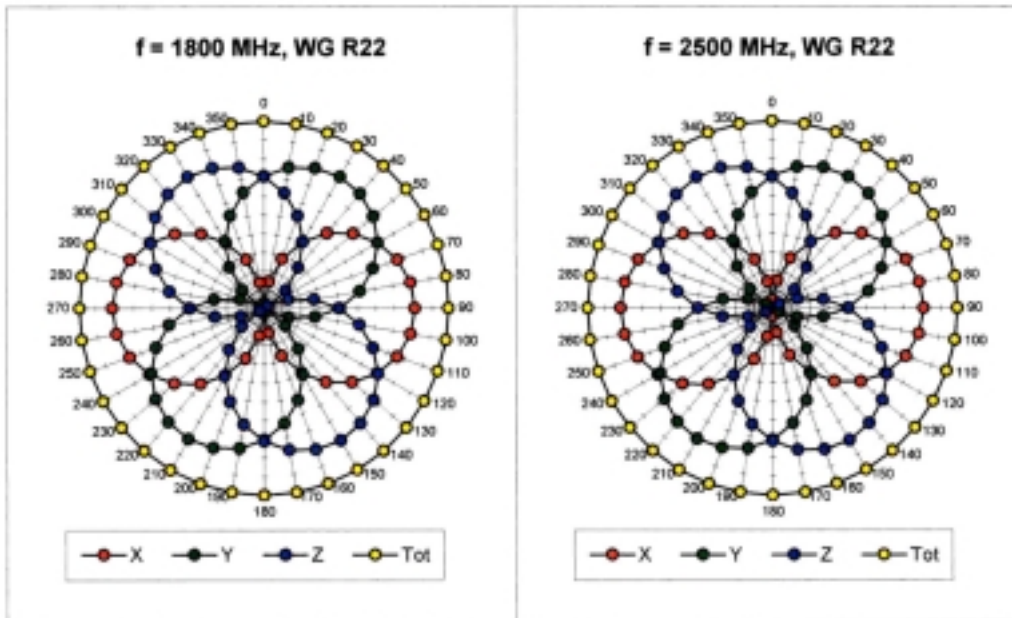
Probe Tip to Sensor Center	2.7	mm
Optical Surface Detection	1.4 $\pm$ 0.2	mm

ET3DV6 SN:1608

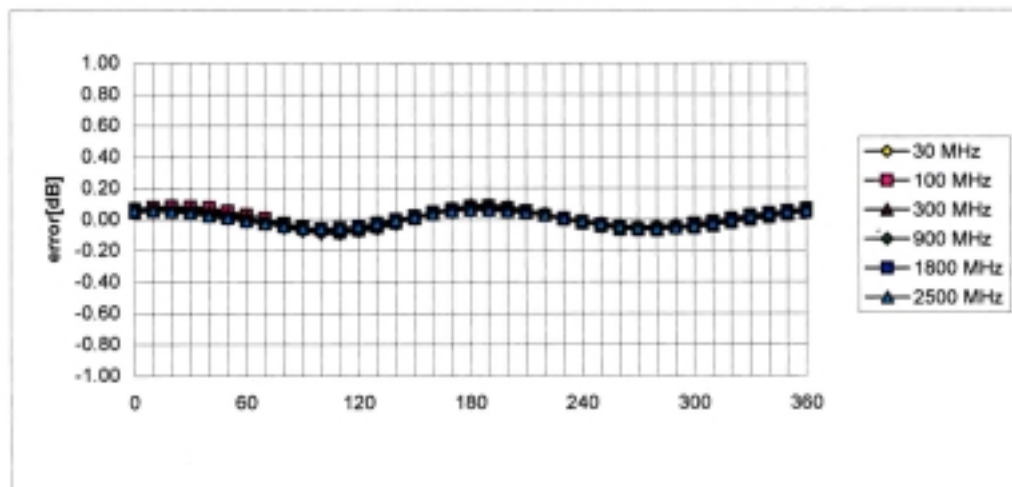
Receiving Pattern (ϕ), $\theta = 0^\circ$



ET3DV6 SN:1608



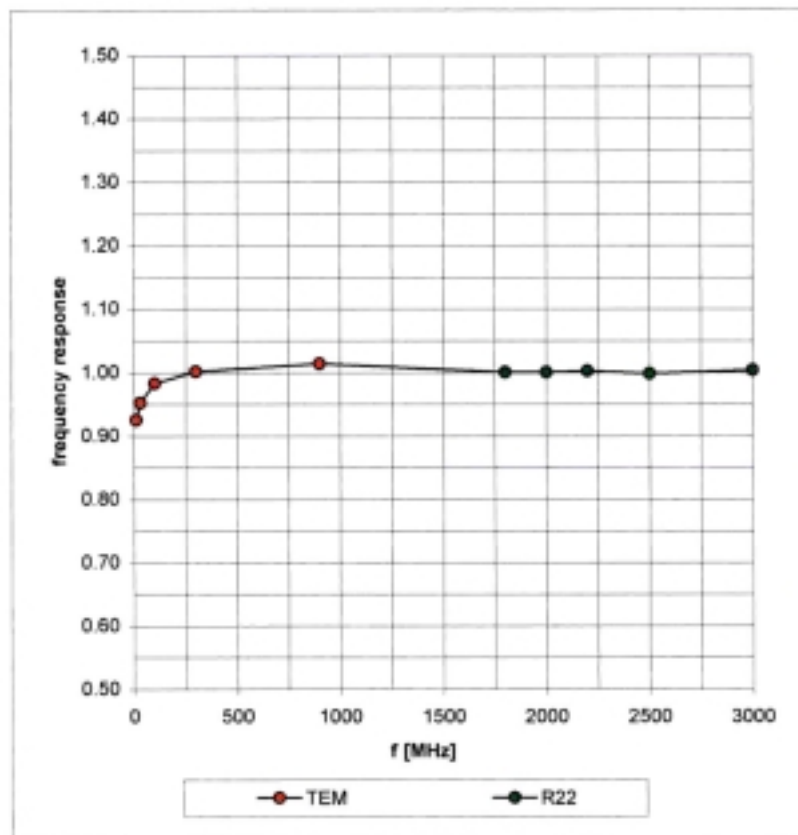
Isotropy Error (ϕ), $\theta = 0^\circ$



ET3DV6 SN:1608

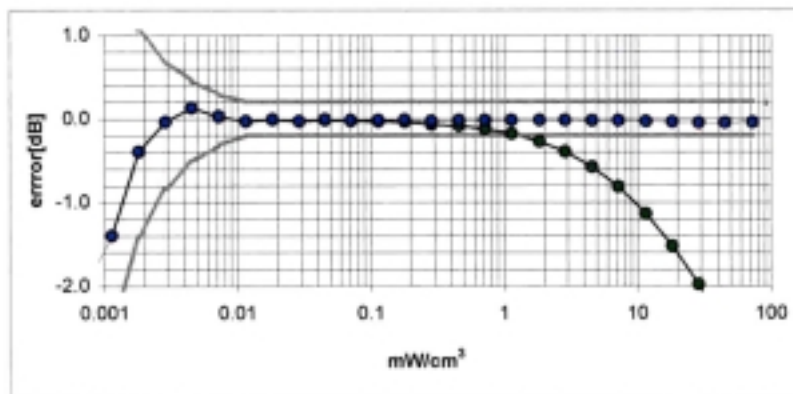
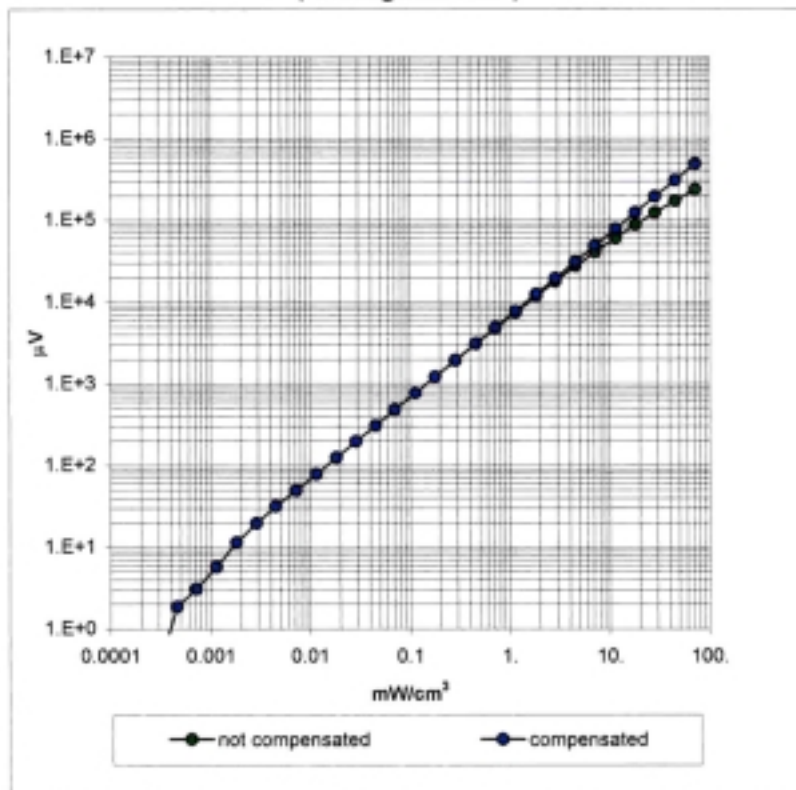
Frequency Response of E-Field

(TEM-Cell:ifi110, Waveguide R22)



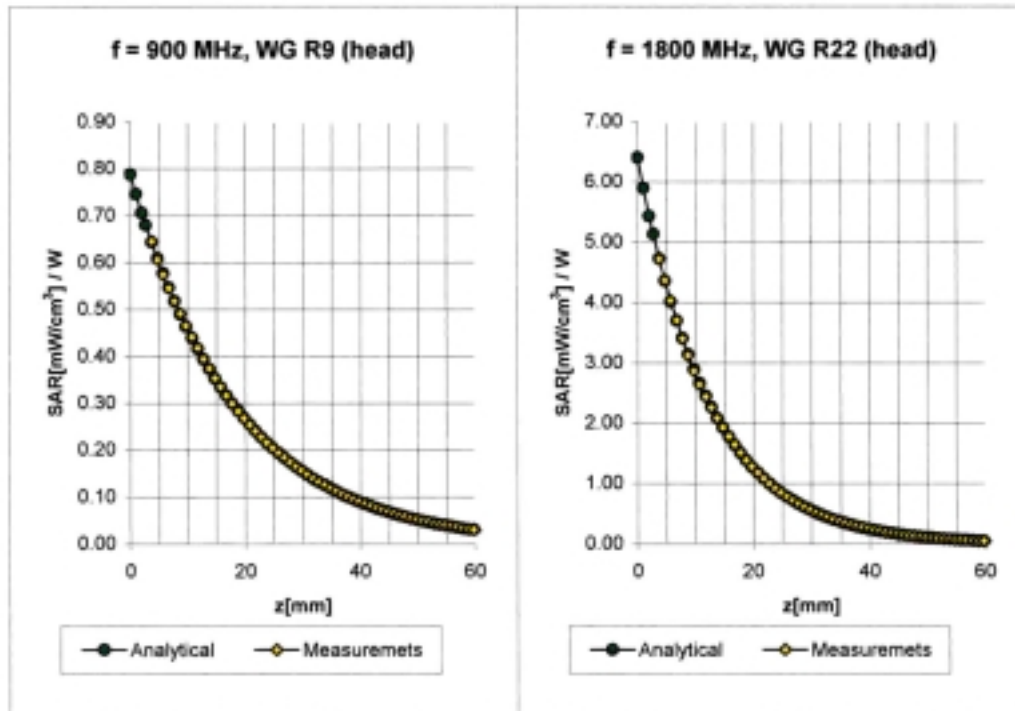
ET3DV6 SN:1608

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



ET3DV6 SN:1608

Conversion Factor Assessment

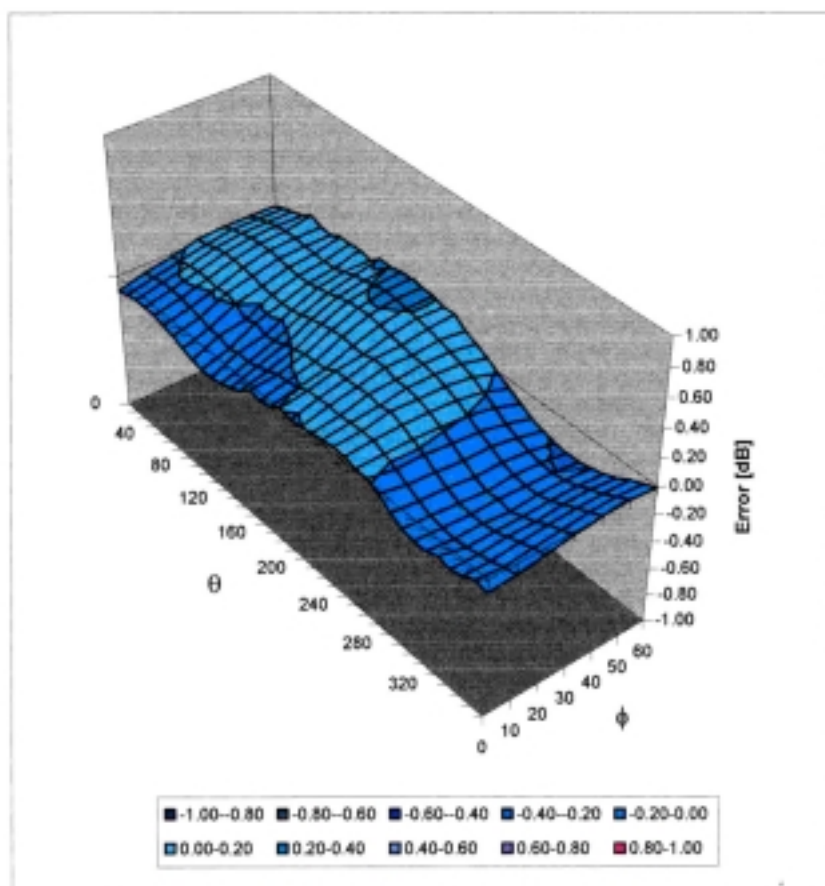


Head	900 MHz	$\epsilon_r = 42 \pm 5\%$	$\sigma = 0.97 \pm 10\% \text{ mho/m}$
ConvF X	6.62 $\pm 7\%$ (k=2)	Boundary effect:	
ConvF Y	6.62 $\pm 7\%$ (k=2)	Alpha	0.29
ConvF Z	6.62 $\pm 7\%$ (k=2)	Depth	2.81
Head	1800 MHz	$\epsilon_r = 40 \pm 5\%$	$\sigma = 1.40 \pm 10\% \text{ mho/m}$
ConvF X	5.60 $\pm 7\%$ (k=2)	Boundary effect:	
ConvF Y	5.60 $\pm 7\%$ (k=2)	Alpha	0.46
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Deviation from Isotropy in HSL

Error (θ, ϕ), $f = 900$ MHz



Schmid & Partner Engineering AG

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Additional Conversion Factors for Dosimetric E-Field Probe

Type:

ET3DV6

Serial Number:

1608

Place of Assessment:

Zurich

Date of Assessment:

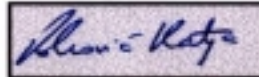
February 25, 2002

Probe Calibration Date:

August 10, 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:1608Conversion factor ($\pm$ standard deviation)**450 MHz** ConvF **$7.7 \pm 8\%$**

$\epsilon_r = 56.7$ $\sigma = 0.94 \text{ mho/m}$ (body tissue)

835 MHz ConvF **$6.5 \pm 8\%$**

$\epsilon_r = 55.2$ $\sigma = 0.97 \text{ mho/m}$ (body tissue)

1800 MHz ConvF **$5.2 \pm 8\%$**

$\epsilon_r = 53.3$ $\sigma = 1.52 \text{ mho/m}$ (body tissue)

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Additional Conversion Factors for Dosimetric E-Field Probe

Type:

ET3DV6

Serial Number:

1608

Place of Assessment:

Zurich

Date of Assessment:

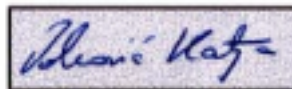
May 6, 2002

Probe Calibration Date:

August 10, 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:1608Conversion factor ($\pm$ standard deviation)**835 MHz**

ConvF

 $6.7 \pm 8\%$ **$\epsilon_r = 41.5 \pm 5\%$** **$\sigma = 0.90 \pm 5\%$ mho/m**

(head tissue)

Schmid & Partner Engineering AG

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Additional Conversion Factors for Dosimetric E-Field Probe

Type:

ET3DV6

Serial Number:

1608

Place of Assessment:

Zurich

Date of Assessment:

May 21, 2002

Probe Calibration Date:

August 10, 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:1608Conversion factor ($\pm$ standard deviation)**1900 MHz** ConvF **$5.4 \pm 8\%$**

$\epsilon_r = 40.0 \pm 5\%$ $\sigma = 1.40 \pm 5\% \text{ mho/m}$ (head tissue)

1900 MHz ConvF **$5.0 \pm 8\%$**

$\epsilon_r = 53.3 \pm 5\%$ $\sigma = 1.52 \pm 5\% \text{ mho/m}$ (body tissue)
