



April 5, 2002

Supplement to SAR Test Report for Motorola portable cellular phone (FCC ID IHDT56CA1)

Prepared by:

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Harvard, Illinois

## Summary of FCC request for additional information

There was a request for additional information regarding Motorola's SAR Test Report for Motorola portable cellular phone (FCC ID IHDT56CA1). The requested information is addressed below in the same numbering sequence received.

1) Please provide a statement justifying why only one side of the device was tested for body worn SAR. Alternatively, provide SAR data with the opposite side of the device towards the flat phantom.

The functional accessories for this unit can only be worn in the body configuration indicated in the original SAR report (Appendix 5, page 23). There is no other usable body worn configuration for the provided accessories.

3) Please supply the calibration certificate information for Probe S/N: 1523.

Please see at Appendix 1

4) Statement confirming the probe conversion factors used are the same as contained in the calibration report.

We affirm that the probe conversion factors used for all the SAR measurements were the same ones contained within the individual probe's calibration sheets. Please see Appendix 1 for Probe SN1523.

5) Please provide a measurement uncertainty budget that meets the IEEE draft 1528 or the FCC/OET Bulletin 65 Supp. C (2001).

Per item #13 of the *OET 65 Supplement C EAB Part 22/24 SAR Review Reminder Sheet 01/2002* handed out during the February, 2002 TCB council meeting, the tabulated total measurement uncertainty is nominal until the IEEE Std 1528 is completed. Much of the required information has to be supplied by the equipment manufacturer, which has not yet been officially supplied. Other items are based on results of studies currently underway. The total measurement uncertainty of +/-12% (K=1) was stated in section 3.1 on page 3 of the original filing.

# Schmid & Partner Engineering AG

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## Calibration Certificate

### Dosimetric E-Field Probe

Type:	<b>ETJ DV6</b>
Serial Number:	<b>1523</b>
Place of Calibration:	<b>Zurich</b>
Date of Calibration:	<b>January 25, 2002</b>
Calibration Interval:	<b>12 months</b>

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 EME and Microwave Electronics at the Swiss Federal Institute of Technology (ETH) in Zurich, Switzerland have been applied.

Calibrated by:	<i>N. Kuster, Geneva</i>
Approved by:	<i>Blaise Käfer</i>

# Probe ET3DV6

**SN:1523**

Manufactured:	March 21, 2000
Last calibration:	May 11, 2001
Recalibrated	January 25, 2002

Calibrated for System DASY3

## DASY3 - Parameters of Probe: ET3DV6 SN:1523

### Sensitivity in Free Space

NormX	<b>1.62</b> $\mu\text{V}/(\text{V}/\text{m})^2$
NormY	<b>1.56</b> $\mu\text{V}/(\text{V}/\text{m})^2$
NormZ	<b>1.56</b> $\mu\text{V}/(\text{V}/\text{m})^2$

### Diode Compression

DCP X	<b>96</b>	mV
DCP Y	<b>96</b>	mV
DCP Z	<b>96</b>	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	<b>6.4</b> $\pm 9.5\%$ (k=2)	Boundary effect:
ConvF Y	<b>6.4</b> $\pm 9.5\%$ (k=2)	Alpha <b>0.57</b>
ConvF Z	<b>6.4</b> $\pm 9.5\%$ (k=2)	Depth <b>1.90</b>

Head    **1700 - 1810 MHz**                       $\epsilon_r = 39.5 - 41.0$                        $\sigma = 1.20 - 1.55 \text{ mho/m}$

ConvF X	<b>5.2</b> $\pm 9.5\%$ (k=2)	Boundary effect:
ConvF Y	<b>5.2</b> $\pm 9.5\%$ (k=2)	Alpha <b>0.76</b>
ConvF Z	<b>5.2</b> $\pm 9.5\%$ (k=2)	Depth <b>1.99</b>

### Boundary Effect

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

Probe Tip to Boundary		<b>1 mm</b>	<b>2 mm</b>
SAR <sub>loc</sub> [%] Without Correction Algorithm		<b>9.0</b>	<b>4.6</b>
SAR <sub>loc</sub> [%] With Correction Algorithm		<b>0.2</b>	<b>0.4</b>

Head    **1700 - 1810 MHz**                      Typical SAR gradient: **10 % per mm**

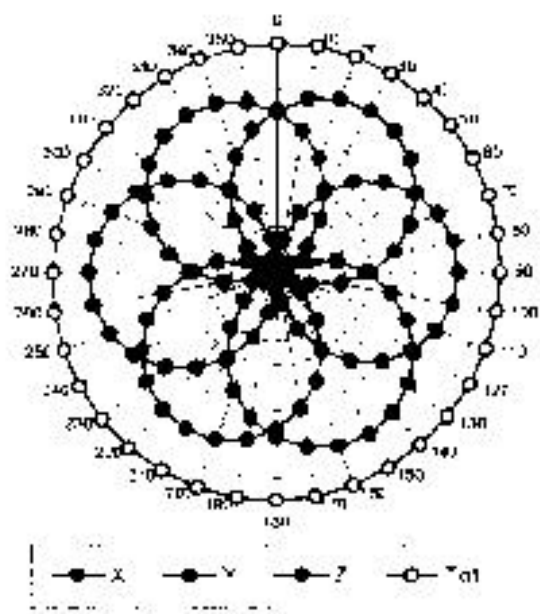
Probe Tip to Boundary		<b>1 mm</b>	<b>2 mm</b>
SAR <sub>loc</sub> [%] Without Correction Algorithm		<b>11.7</b>	<b>7.5</b>
SAR <sub>loc</sub> [%] With Correction Algorithm		<b>1.6</b>	<b>0.2</b>

### Sensor Offset

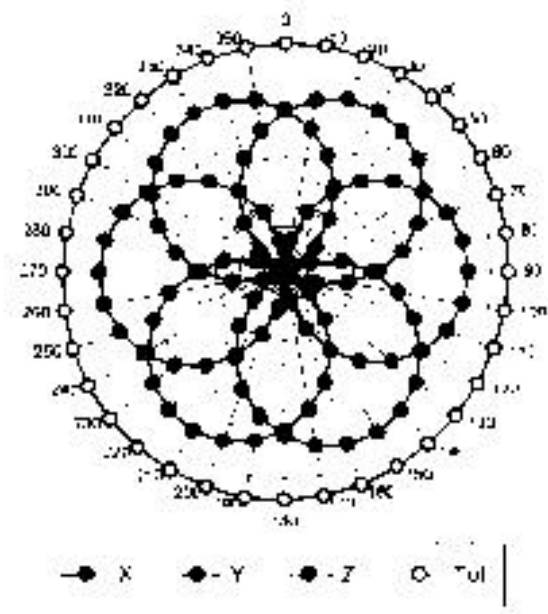
Probe Tip to Sensor Center	<b>2.7</b>	mm
Optical Surface Detection	<b>1.5 <math>\pm</math> 0.2</b>	mm

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

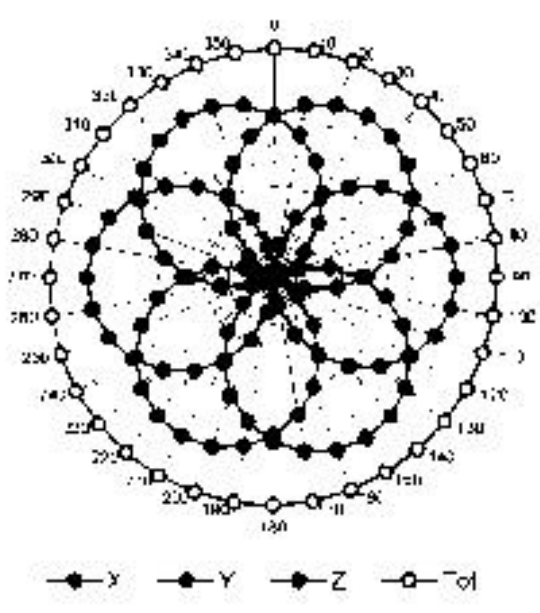
$f = 30$  MHz, TEM cell if110



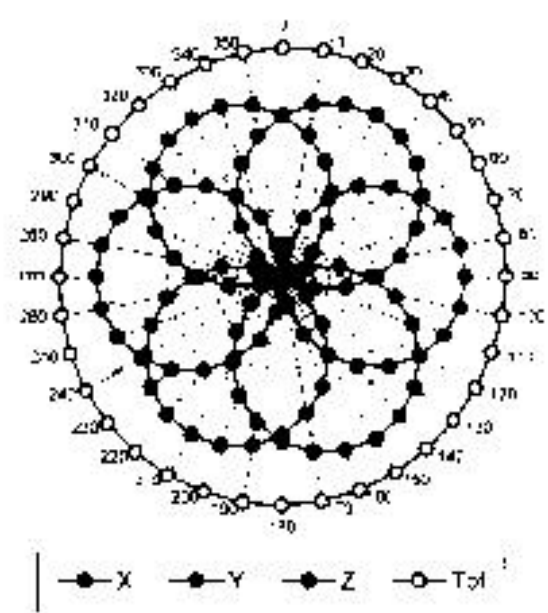
$f = 100$  MHz, TEM cell if110



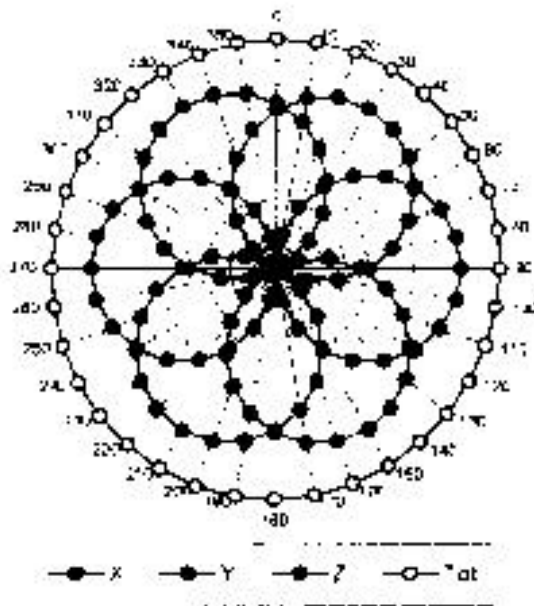
$f = 300$  MHz, TEM cell if110



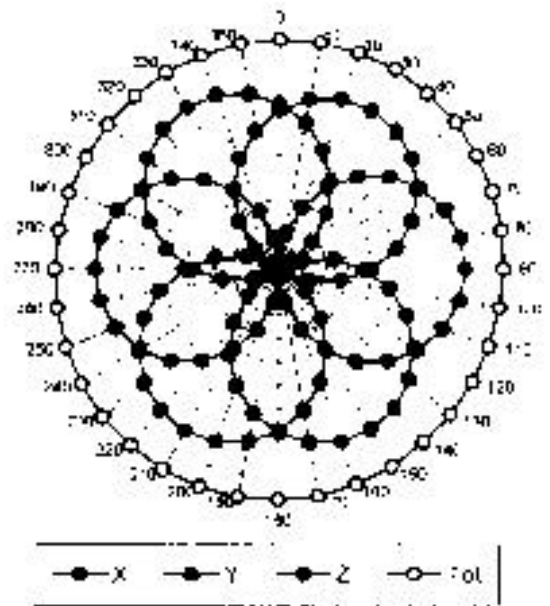
$f = 900$  MHz, TEM cell if110



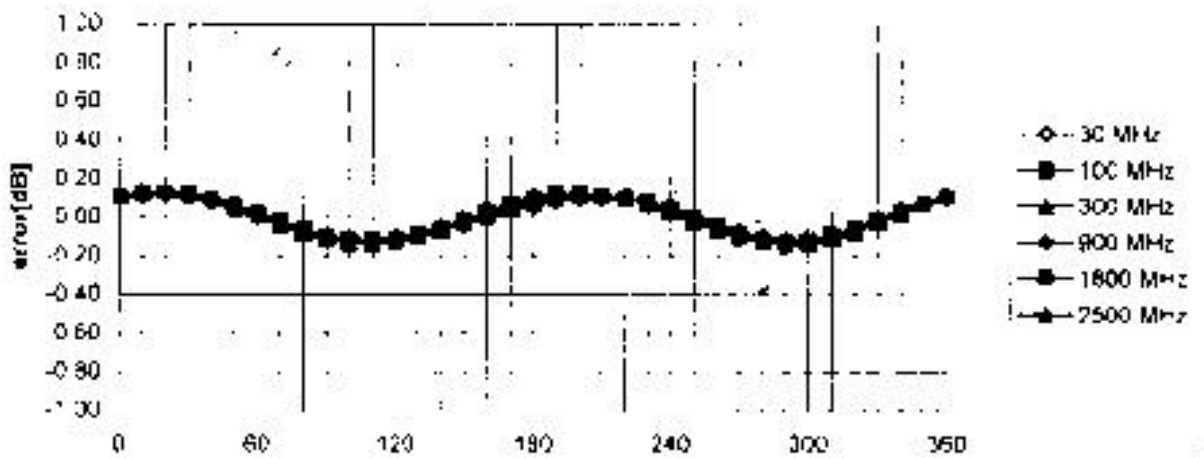
f = 1800 MHz, WG R22



f = 2500 MHz, WG R22

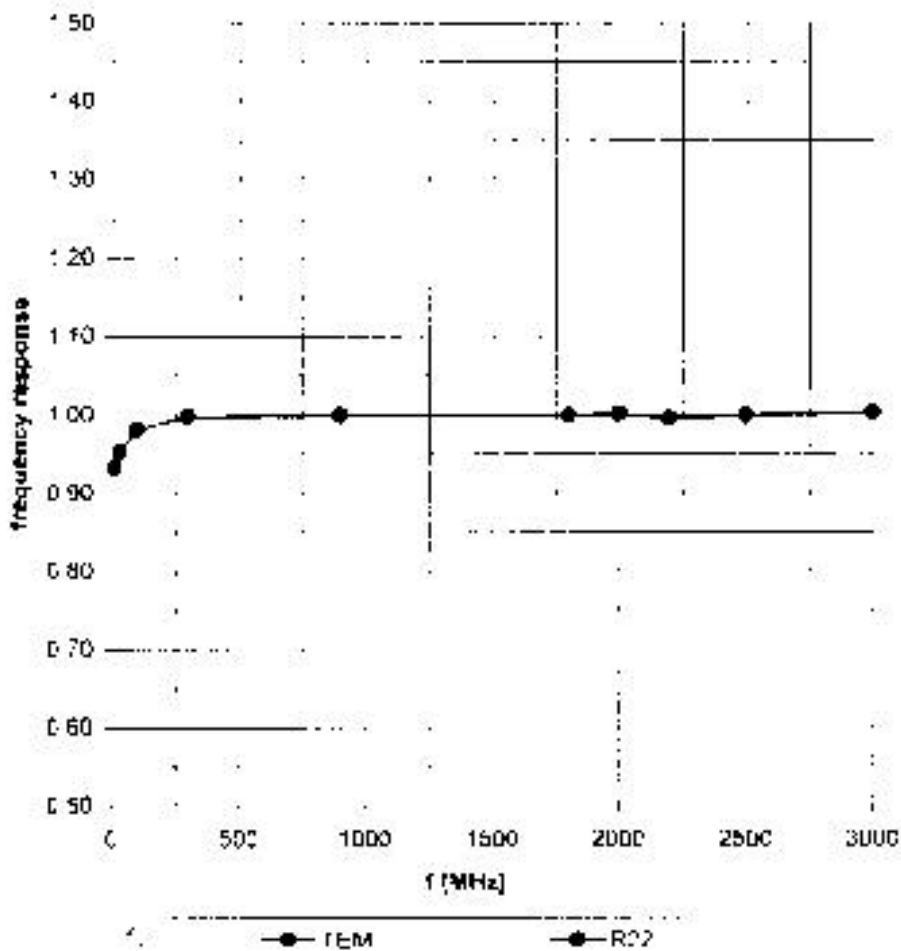


Isotropy Error ( $\phi$ ),  $\theta = 0^\circ$

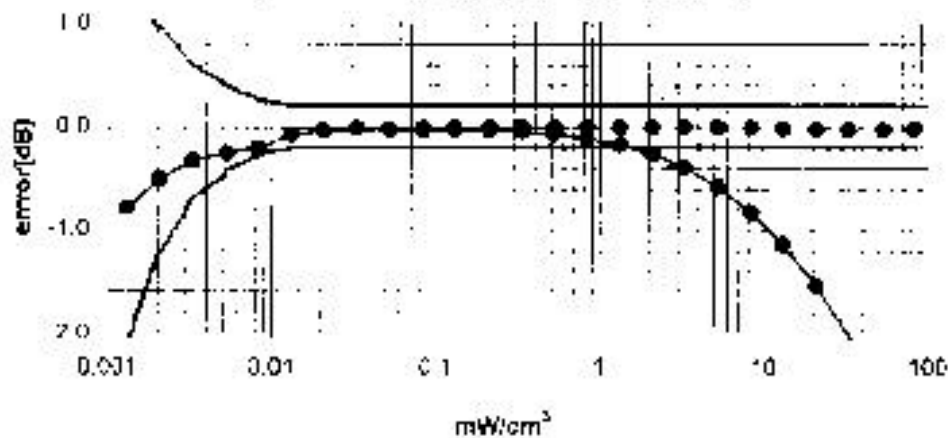
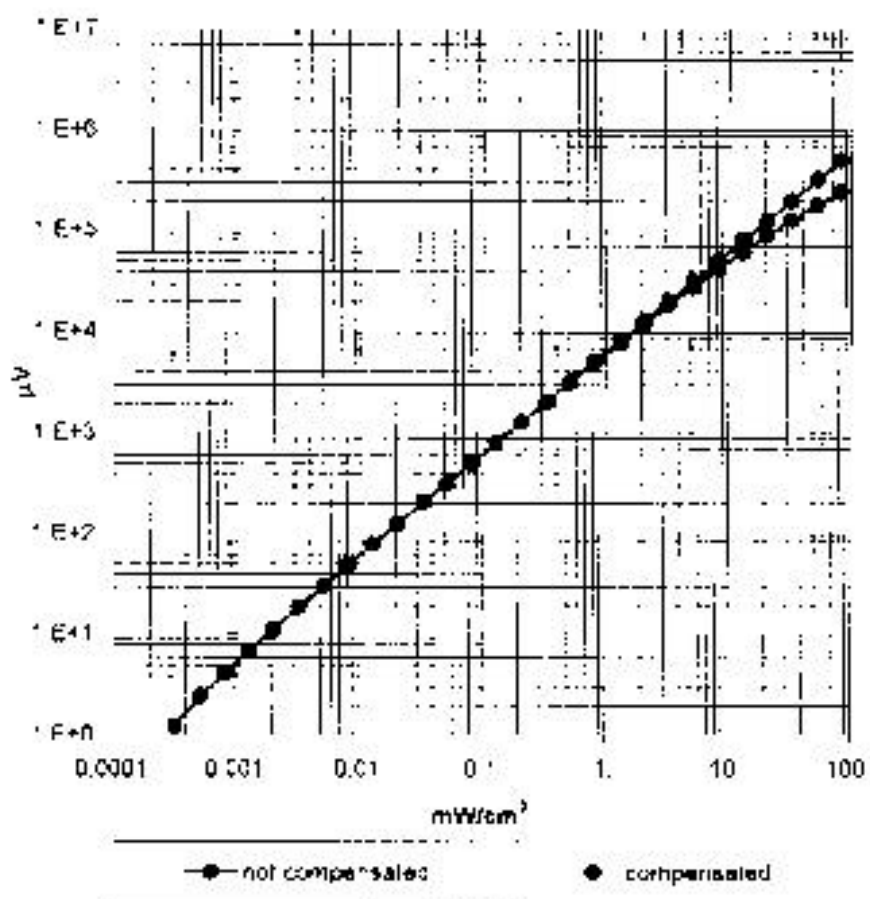


# Frequency Response of E-Field

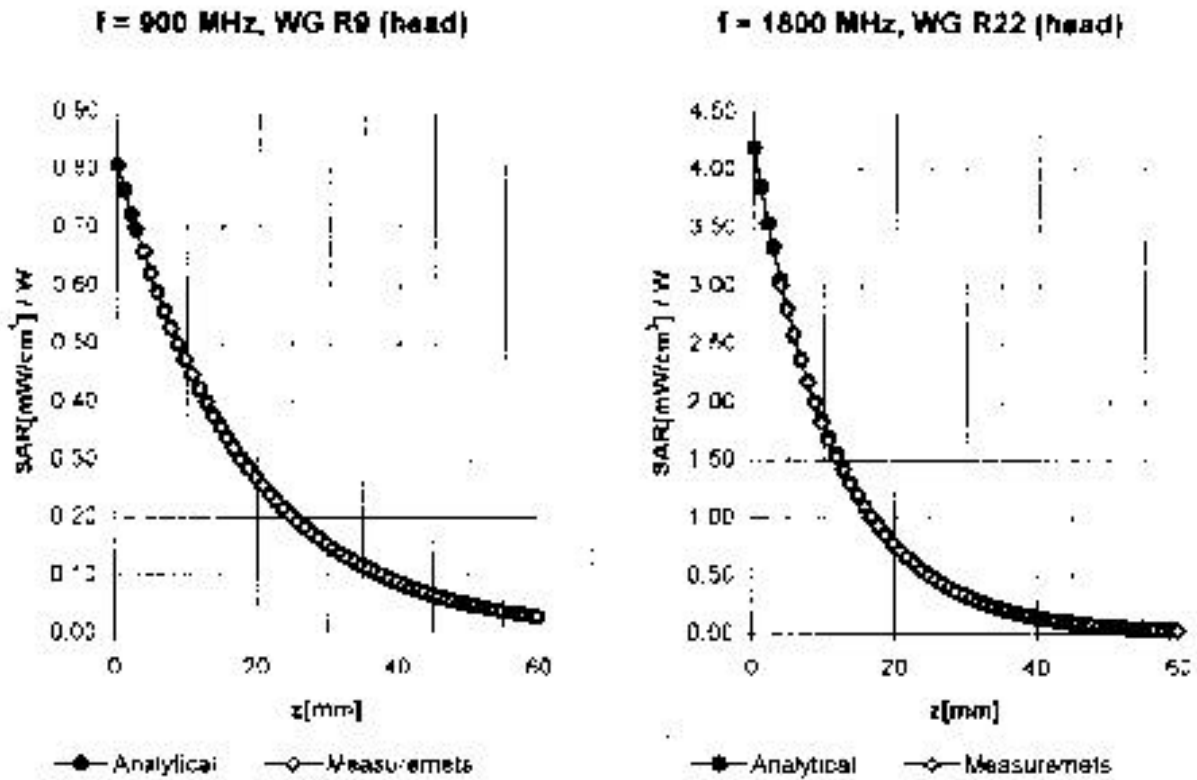
( TEM-Cell:ifi110, Waveguide R22)



### Dynamic Range f(SAR<sub>brain</sub>) ( Waveguide R22 )



## Conversion Factor Assessment



<b>Head</b>	<b>800 - 1000 MHz</b>	$\epsilon_r = 39.0 - 43.5$	$\sigma = 0.80 - 1.10$ mho/m
	ConvF X	<b>6.4</b> $\pm$ 9.5% (k=2)	Boundary effect:
	ConvF Y	<b>6.4</b> $\pm$ 9.5% (k=2)	Alpha <b>0.57</b>
	ConvF Z	<b>6.4</b> $\pm$ 9.5% (k=2)	Depth <b>1.90</b>
<b>Head</b>	<b>1700 - 1910 MHz</b>	$\epsilon_r = 39.5 - 41.0$	$\sigma = 1.20 - 1.55$ mho/m
	ConvF X	<b>5.2</b> $\pm$ 9.5% (k=2)	Boundary effect:
	ConvF Y	<b>5.2</b> $\pm$ 9.5% (k=2)	Alpha <b>0.76</b>
	ConvF Z	<b>5.2</b> $\pm$ 9.5% (k=2)	Depth <b>1.99</b>

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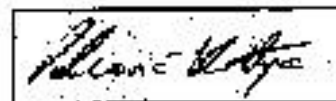
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## Additional Conversion Factors for Dosimetric E-Field Probe

Type:	ET3DV6
Serial Number:	1523
Place of Assessment:	Zurich
Date of Assessment:	January 28, 2002
Probe Calibration Date:	January 25, 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 ET3DA 6 SN:1523

Conversion factor (± standard deviation)

835 MHz	ConvF	6.5 ± 8%	$\epsilon_r = 41.5$ $\sigma = 0.90 \text{ mho/m}$ (head tissue)
1950 MHz	ConvF	4.9 ± 8%	$\epsilon_r = 40.0$ $\sigma = 1.40 \text{ mho/m}$ (head tissue)
835 MHz	ConvF	6.3 ± 8%	$\epsilon_r = 55.2$ $\sigma = 0.97 \text{ mho/m}$ (body tissue)
900 MHz	ConvF	6.2 ± 8%	$\epsilon_r = 55.0$ $\sigma = 1.05 \text{ mho/m}$ (body tissue)
1800 MHz	ConvF	4.8 ± 8%	$\epsilon_r = 53.3$ $\sigma = 1.52 \text{ mho/m}$ (body tissue)
1950 MHz	ConvF	4.6 ± 8%	$\epsilon_r = 53.3$ $\sigma = 1.52 \text{ mho/m}$ (body tissue)