

Schmid & Partner Engineering AG

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Calibration Certificate

Dosimetric E-Field Probe

Type:

ET3DV6

Serial Number:

1503

Place of Calibration:

Zurich

Date of Calibration:

November 20, 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:

D. Vella

Approved by:

John Kelly

Probe ET3DV6

SN:1503

Manufactured:	October 24, 1999
Last calibration:	November 16, 2001
Recalibrated:	November 20, 2002

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ET3DV6 SN:1503**Sensitivity in Free Space****Diode Compression**

NormX	2.21 $\mu\text{V}/(\text{V}/\text{m})^2$	DCP X	92	mV
NormY	2.09 $\mu\text{V}/(\text{V}/\text{m})^2$	DCP Y	92	mV
NormZ	1.91 $\mu\text{V}/(\text{V}/\text{m})^2$	DCP Z	92	mV

Sensitivity in Tissue Simulating Liquid

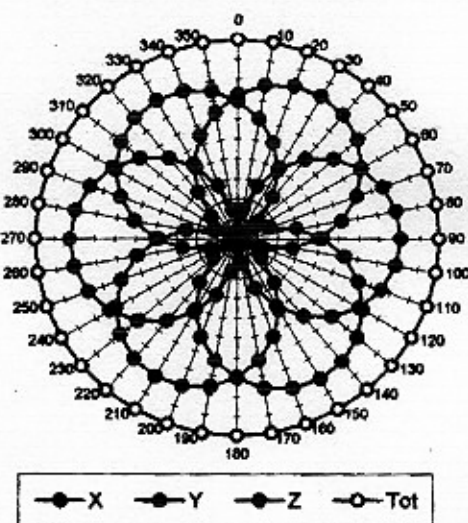
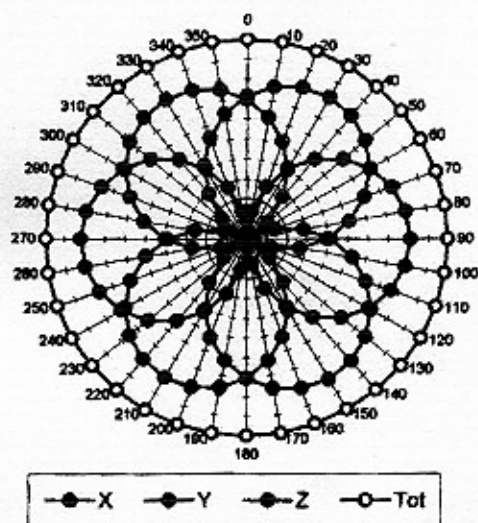
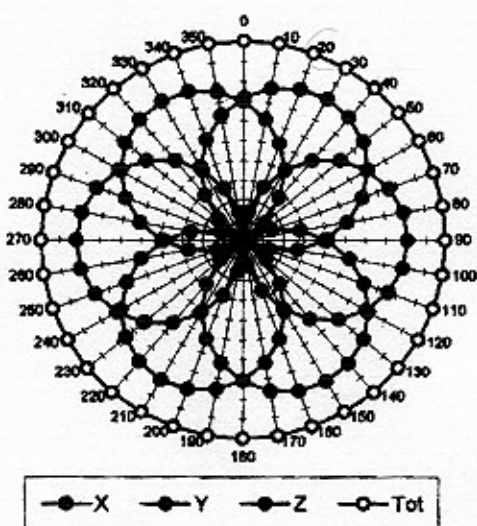
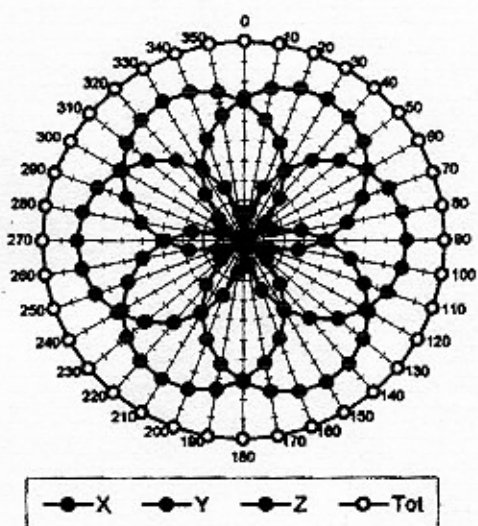
Head	900 MHz	$\epsilon_r = 41.5 \pm 5\%$	$\sigma = 0.97 \pm 5\%$ mho/m
Head	835 MHz	$\epsilon_r = 41.5 \pm 5\%$	$\sigma = 0.90 \pm 5\%$ mho/m
ConvF X	6.5 $\pm 9.5\%$ (k=2)	Boundary effect:	
ConvF Y	6.5 $\pm 9.5\%$ (k=2)	Alpha	0.49
ConvF Z	6.5 $\pm 9.5\%$ (k=2)	Depth	2.11
Head	1800 MHz	$\epsilon_r = 40.0 \pm 5\%$	$\sigma = 1.40 \pm 5\%$ mho/m
Head	1900 MHz	$\epsilon_r = 40.0 \pm 5\%$	$\sigma = 1.40 \pm 5\%$ mho/m
ConvF X	5.3 $\pm 9.5\%$ (k=2)	Boundary effect:	
ConvF Y	5.3 $\pm 9.5\%$ (k=2)	Alpha	0.54
ConvF Z	5.3 $\pm 9.5\%$ (k=2)	Depth	2.47

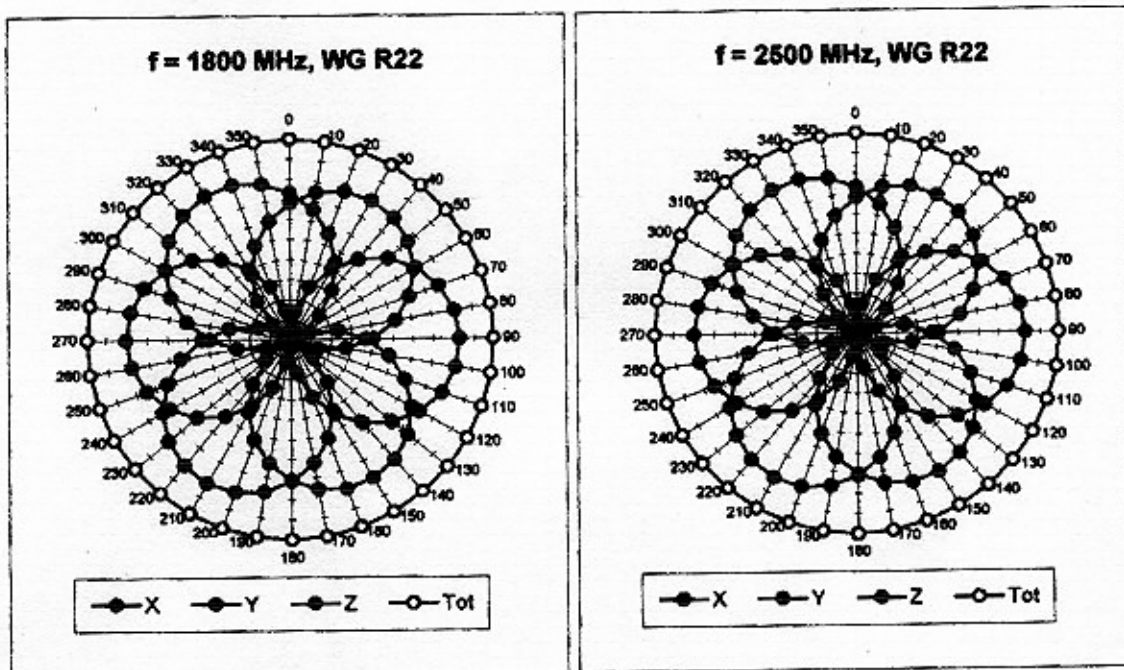
Boundary Effect

Head	900 MHz	Typical SAR gradient: 5 % per mm	
Probe Tip to Boundary		1 mm	2 mm
SAR ₉₀ [%] Without Correction Algorithm		9.5	5.2
SAR ₉₀ [%] With Correction Algorithm		0.2	0.4
Head	1800 MHz	Typical SAR gradient: 10 % per mm	
Probe Tip to Boundary		1 mm	2 mm
SAR ₉₀ [%] Without Correction Algorithm		13.4	8.9
SAR ₉₀ [%] With Correction Algorithm		0.2	0.2

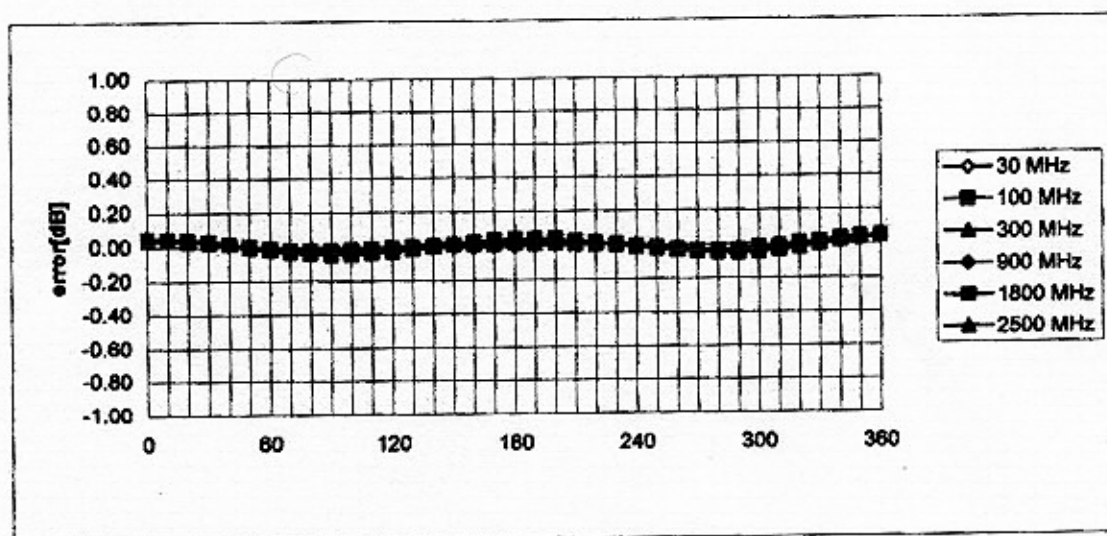
Sensor Offset

Probe Tip to Sensor Center	2.7	mm
Optical Surface Detection	1.3 $\pm$ 0.2	mm

Receiving Pattern (ϕ), $\theta = 0^\circ$ $f = 30$ MHz, TEM cell if110 $f = 100$ MHz, TEM cell if110 $f = 300$ MHz, TEM cell if110 $f = 900$ MHz, TEM cell if110

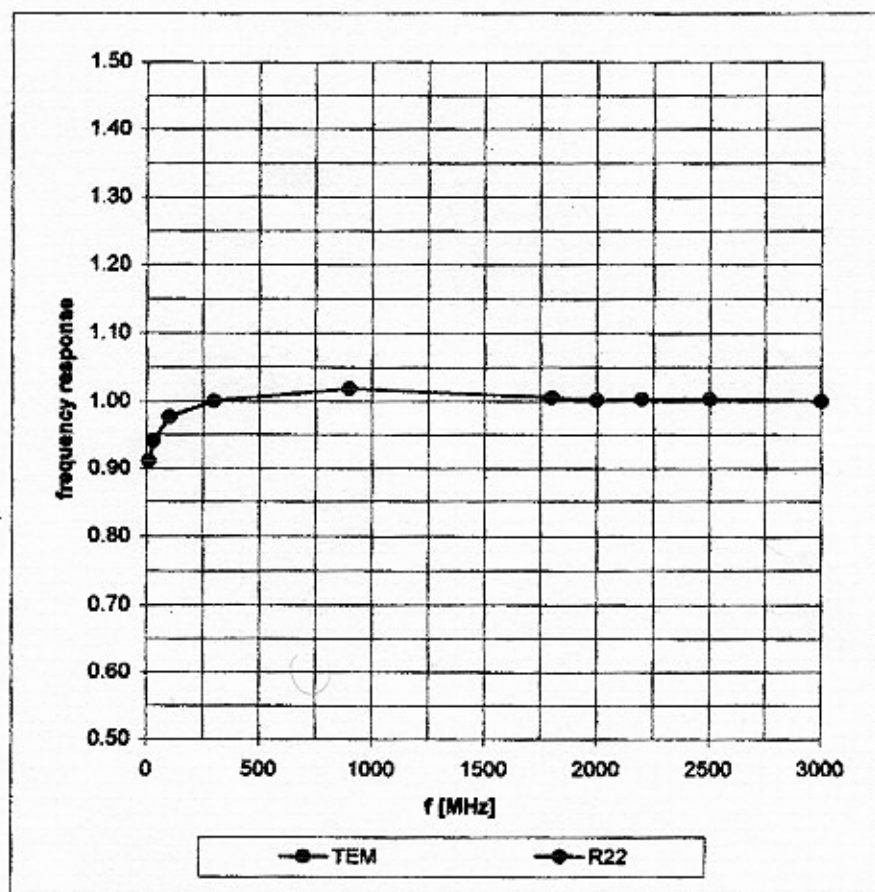


Isotropy Error (ϕ), $\theta = 0^\circ$

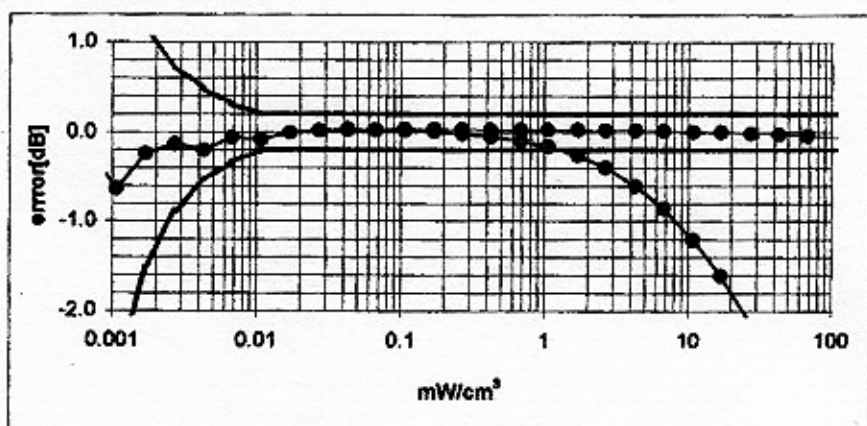
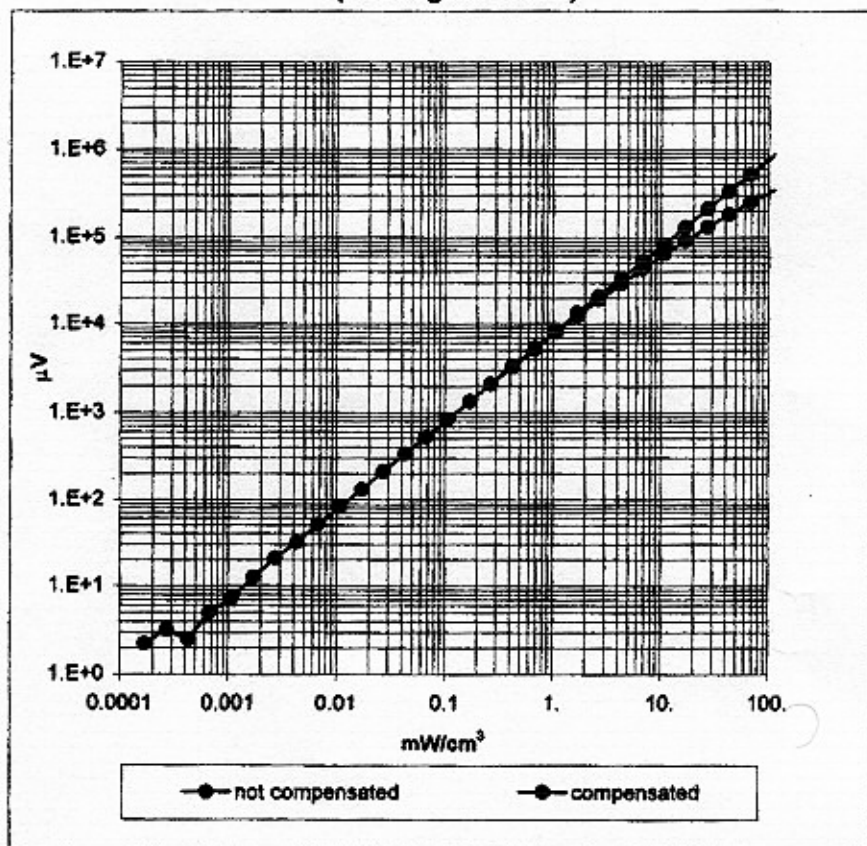


Frequency Response of E-Field

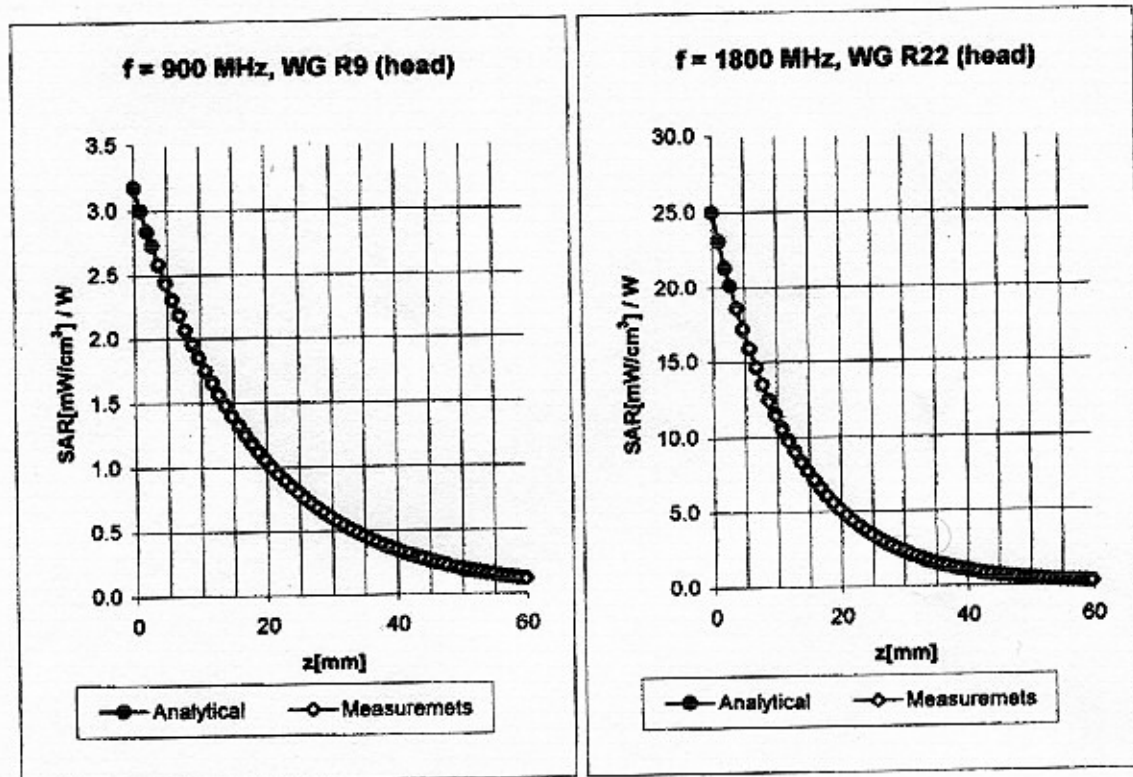
(TEM-Cell:ifi110, Waveguide R22)



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

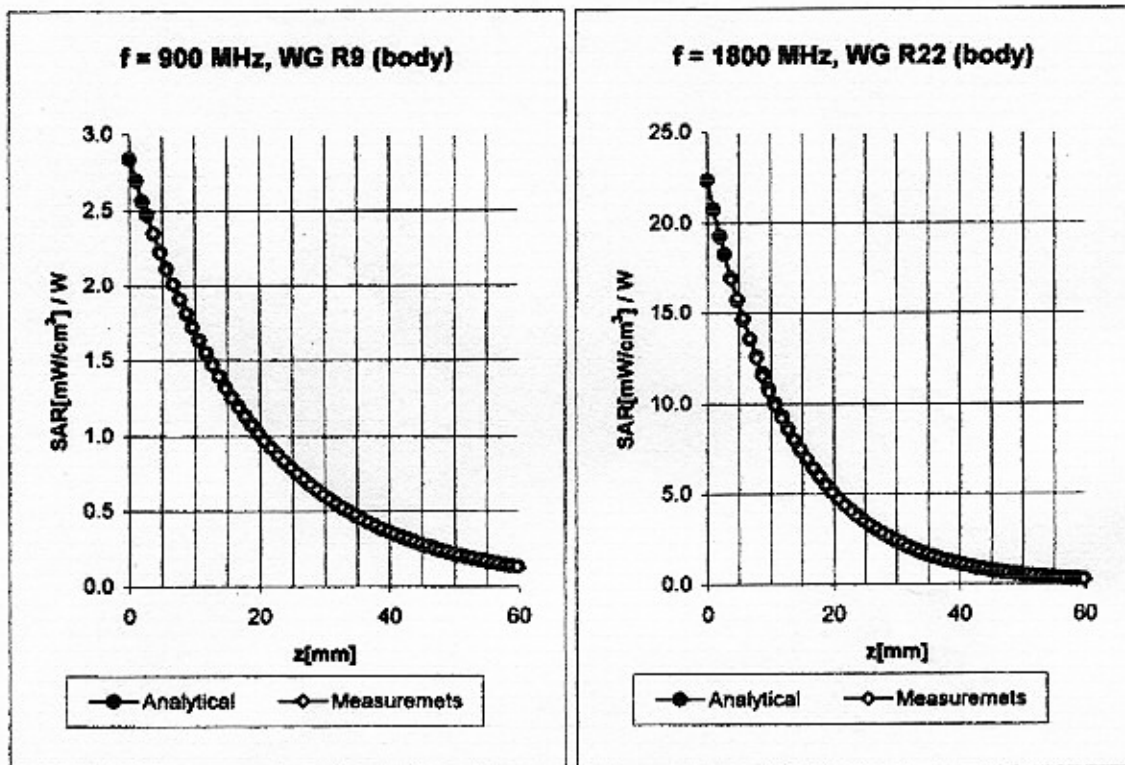


Conversion Factor Assessment



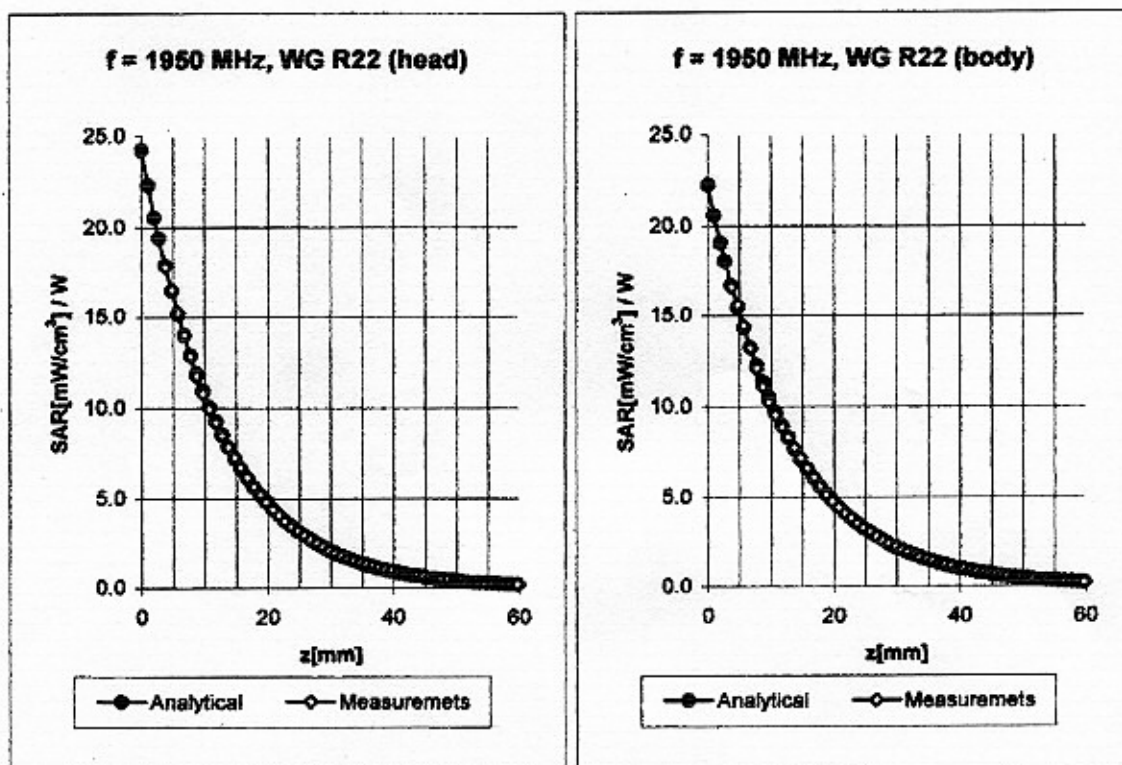
Head	900 MHz	$\epsilon_r = 41.5 \pm 5\%$	$\sigma = 0.97 \pm 5\%$ mho/m
Head	835 MHz	$\epsilon_r = 41.5 \pm 5\%$	$\sigma = 0.90 \pm 5\%$ mho/m
	ConvF X	$6.5 \pm 9.5\%$ (k=2)	Boundary effect:
	ConvF Y	$6.5 \pm 9.5\%$ (k=2)	Alpha 0.49
	ConvF Z	$6.5 \pm 9.5\%$ (k=2)	Depth 2.11
Head	1800 MHz	$\epsilon_r = 40.0 \pm 5\%$	$\sigma = 1.40 \pm 5\%$ mho/m
Head	1900 MHz	$\epsilon_r = 40.0 \pm 5\%$	$\sigma = 1.40 \pm 5\%$ mho/m
	ConvF X	$5.3 \pm 9.5\%$ (k=2)	Boundary effect:
	ConvF Y	$5.3 \pm 9.5\%$ (k=2)	Alpha 0.54
	ConvF Z	$5.3 \pm 9.5\%$ (k=2)	Depth 2.47

Conversion Factor Assessment



Body	900 MHz	$\epsilon_r = 55.0 \pm 5\%$	$\sigma = 1.05 \pm 5\% \text{ mho/m}$
Body	835 MHz	$\epsilon_r = 55.2 \pm 5\%$	$\sigma = 0.97 \pm 5\% \text{ mho/m}$
	ConvF X	$6.2 \pm 9.5\% (k=2)$	Boundary effect:
	ConvF Y	$6.2 \pm 9.5\% (k=2)$	Alpha 0.47
	ConvF Z	$6.2 \pm 9.5\% (k=2)$	Depth 2.30
Body	1800 MHz	$\epsilon_r = 53.3 \pm 5\%$	$\sigma = 1.52 \pm 5\% \text{ mho/m}$
Body	1900 MHz	$\epsilon_r = 53.3 \pm 5\%$	$\sigma = 1.52 \pm 5\% \text{ mho/m}$
	ConvF X	$5.0 \pm 9.5\% (k=2)$	Boundary effect:
	ConvF Y	$5.0 \pm 9.5\% (k=2)$	Alpha 0.66
	ConvF Z	$5.0 \pm 9.5\% (k=2)$	Depth 2.21

Conversion Factor Assessment



1950	Head	MHz	$\epsilon_r = 40.0 \pm 5\%$	$\sigma = 1.40 \pm 5\% \text{ mho/m}$
	ConvF X		5.1 $\pm 8.9\%$ (k=2)	Boundary effect:
	ConvF Y		5.1 $\pm 8.9\%$ (k=2)	Alpha 0.61
	ConvF Z		5.1 $\pm 8.9\%$ (k=2)	Depth 2.25
1950	Body	MHz	$\epsilon_r = 53.3 \pm 5\%$	$\sigma = 1.52 \pm 5\% \text{ mho/m}$
	ConvF X		4.6 $\pm 8.9\%$ (k=2)	Boundary effect:
	ConvF Y		4.6 $\pm 8.9\%$ (k=2)	Alpha 0.89
	ConvF Z		4.6 $\pm 8.9\%$ (k=2)	Depth 1.88

Deviation from Isotropy in HSL

Error (θ, ϕ), $f = 900$ MHz

