

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:

1380

Place of Calibration:

Zurich

Date of Calibration:

November 9, 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. Vetter

Approved by:

Alon Katz

Probe ET3DV6

SN:1380

Manufactured:	August 16, 1999
Last calibration:	August 17, 1999
Recalibrated:	November 9, 2002

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ET3DV6 SN:1380

Sensitivity in Free Space

NormX	1.67 $\mu\text{V}/(\text{V}/\text{m})^2$
NormY	1.57 $\mu\text{V}/(\text{V}/\text{m})^2$
NormZ	1.73 $\mu\text{V}/(\text{V}/\text{m})^2$

Diode Compression

DCP X	90	mV
DCP Y	90	mV
DCP Z	90	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 0.58
ConvF Z	6.5 $\pm 9.5\%$ (k=2)		Depth 1.97
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 0.56
ConvF Z	5.3 $\pm 9.5\%$ (k=2)		Depth 2.36

Boundary Effect

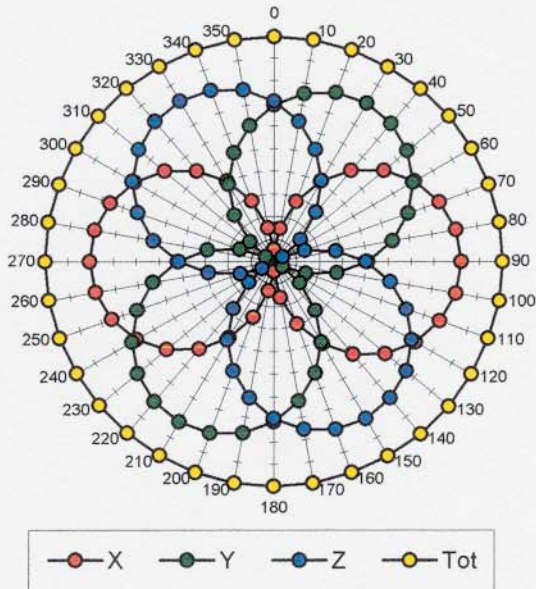
Head	900 MHz	Typical SAR gradient: 5 % per mm	
	Probe Tip to Boundary	1 mm	2 mm
	SAR _{be} [%] Without Correction Algorithm	9.9	5.2
	SAR _{be} [%] With Correction Algorithm	0.2	0.4
Head	1800 MHz	Typical SAR gradient: 10 % per mm	
	Probe Tip to Boundary	1 mm	2 mm
	SAR _{be} [%] Without Correction Algorithm	12.9	8.4
	SAR _{be} [%] With Correction Algorithm	0.2	0.2

Sensor Offset

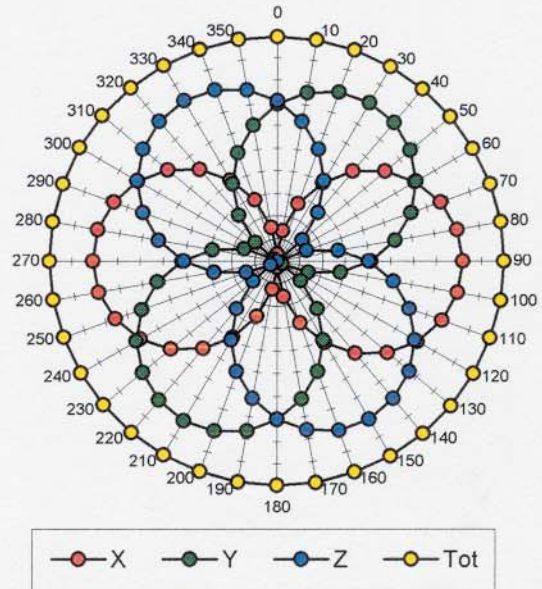
Probe Tip to Sensor Center	2.7	mm
Optical Surface Detection	1.6 \pm 0.2	mm

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

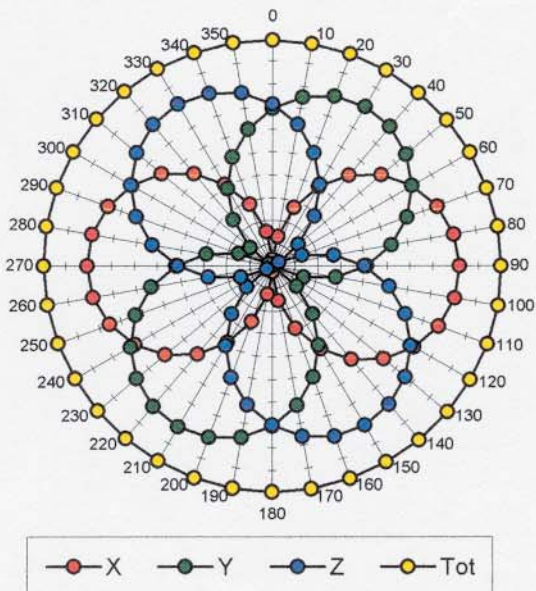
f = 30 MHz, TEM cell ifi110



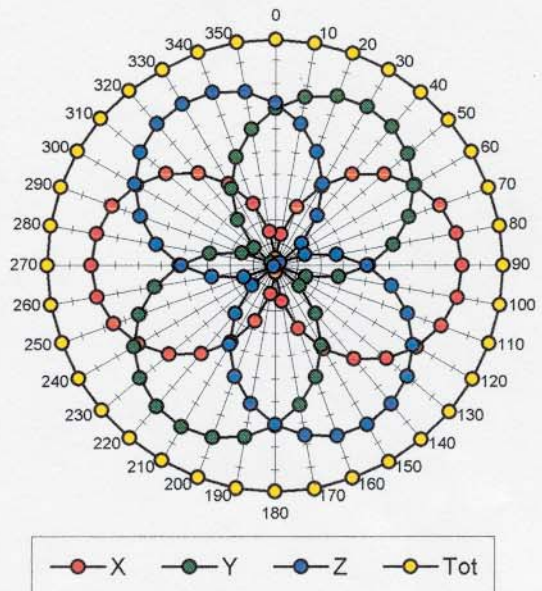
f = 100 MHz, TEM cell ifi110

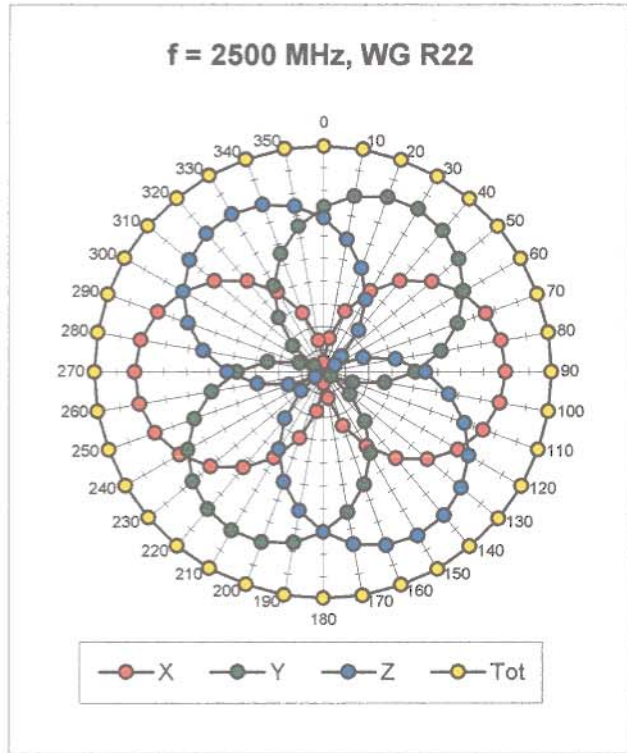
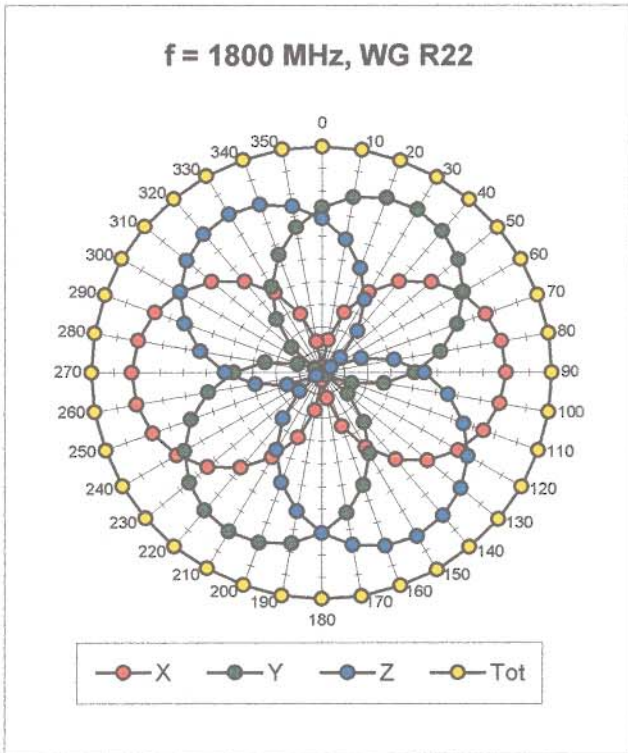


f = 300 MHz, TEM cell ifi110

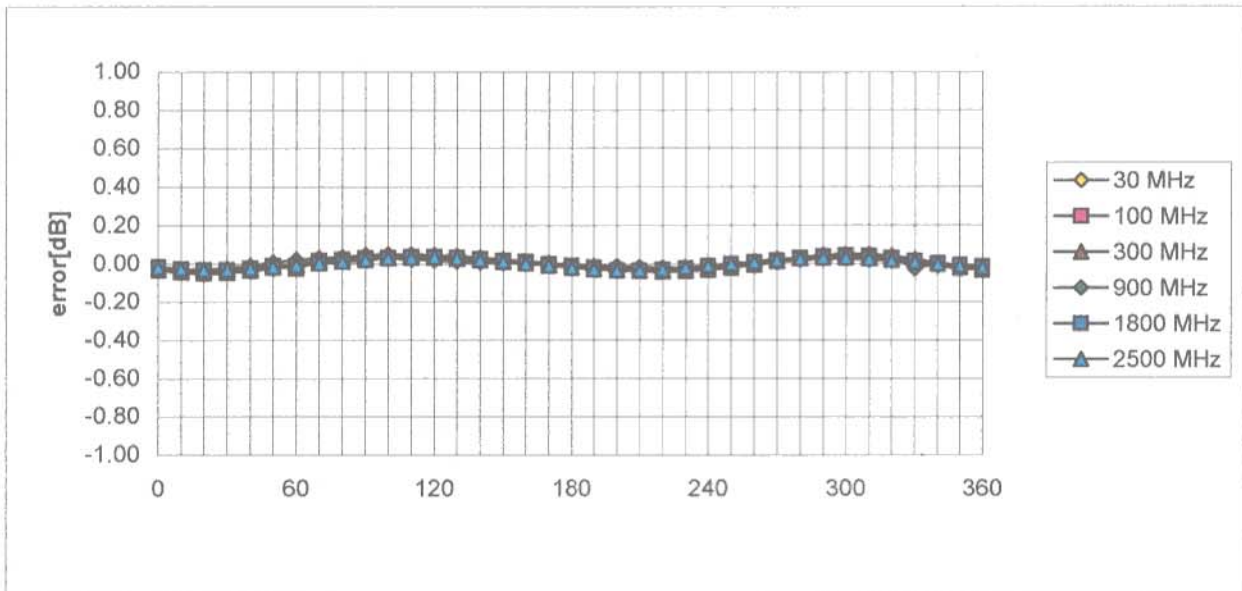


f = 900 MHz, TEM cell ifi110



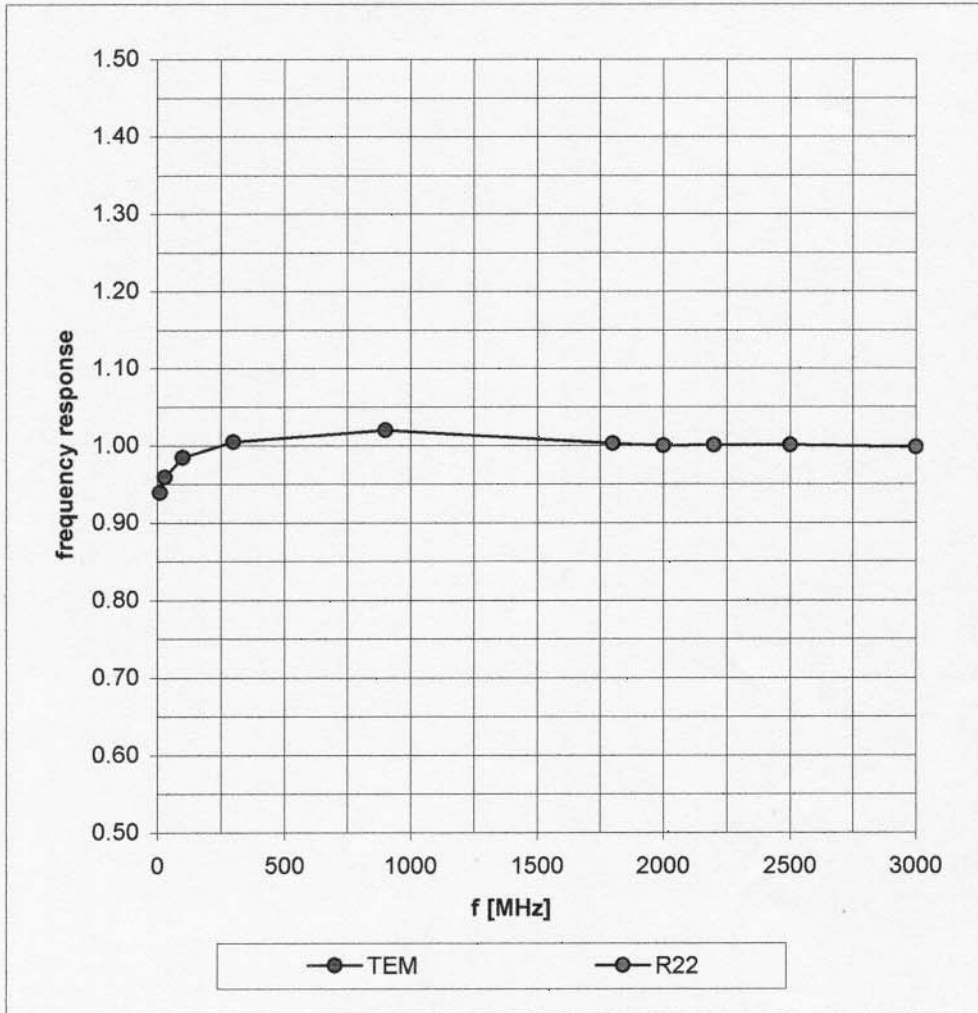


Isotropy Error (ϕ), $\theta = 0^\circ$

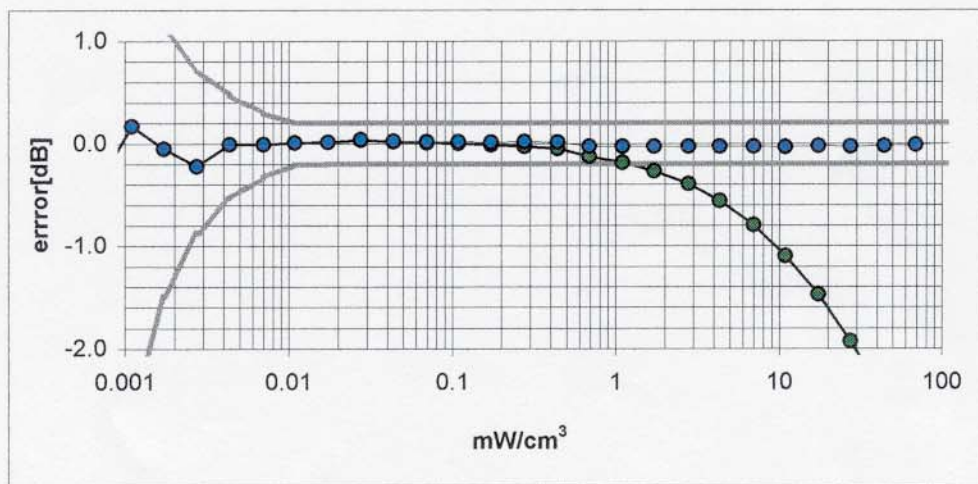
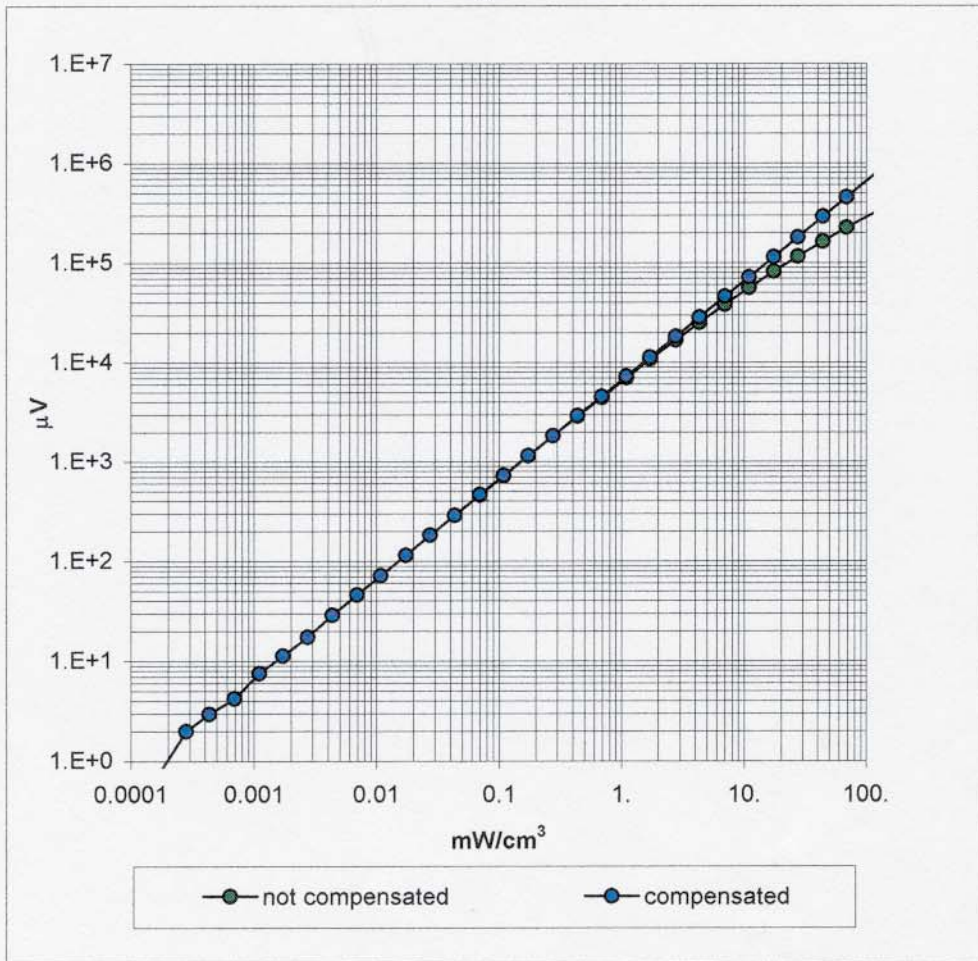


Frequency Response of E-Field

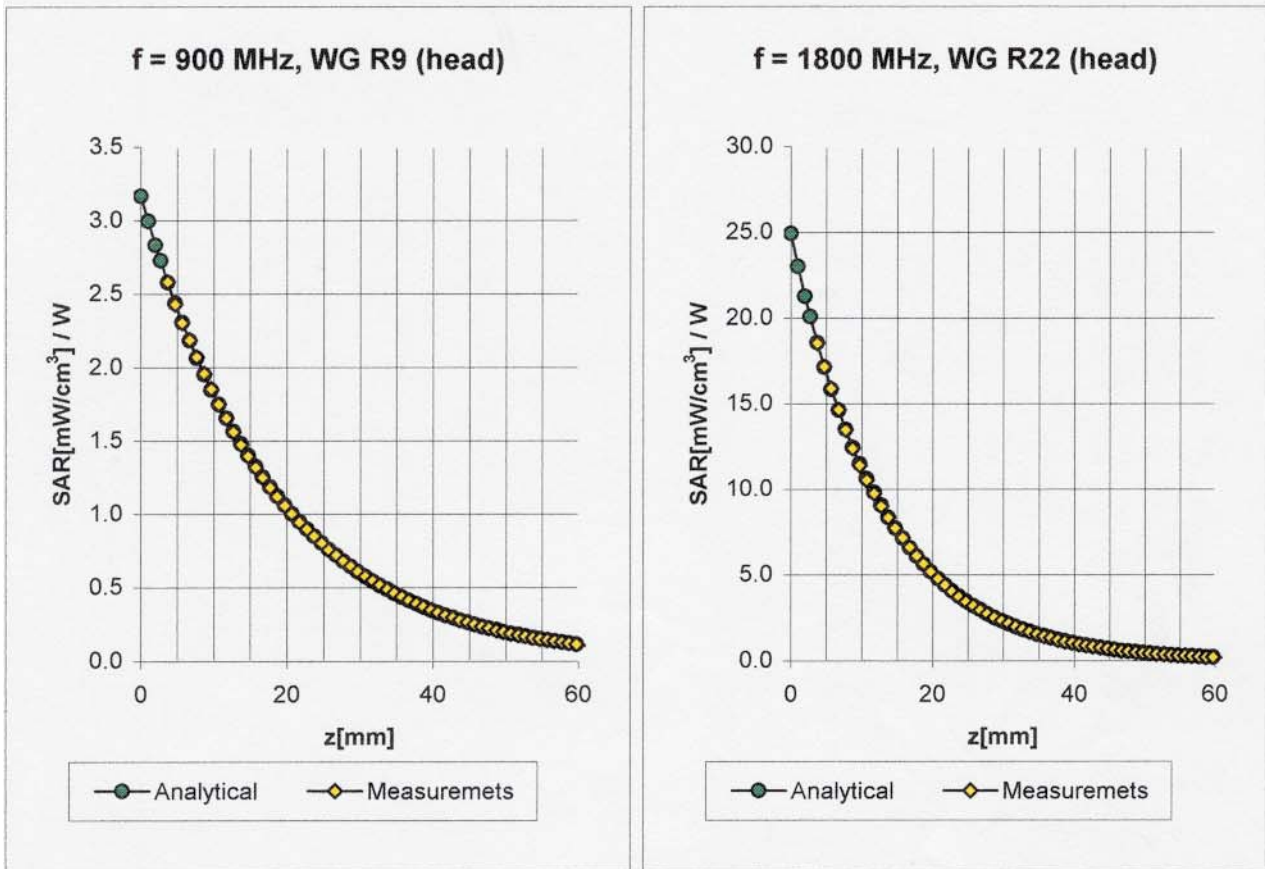
(TEM-Cell:ifi110, Waveguide R22)



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



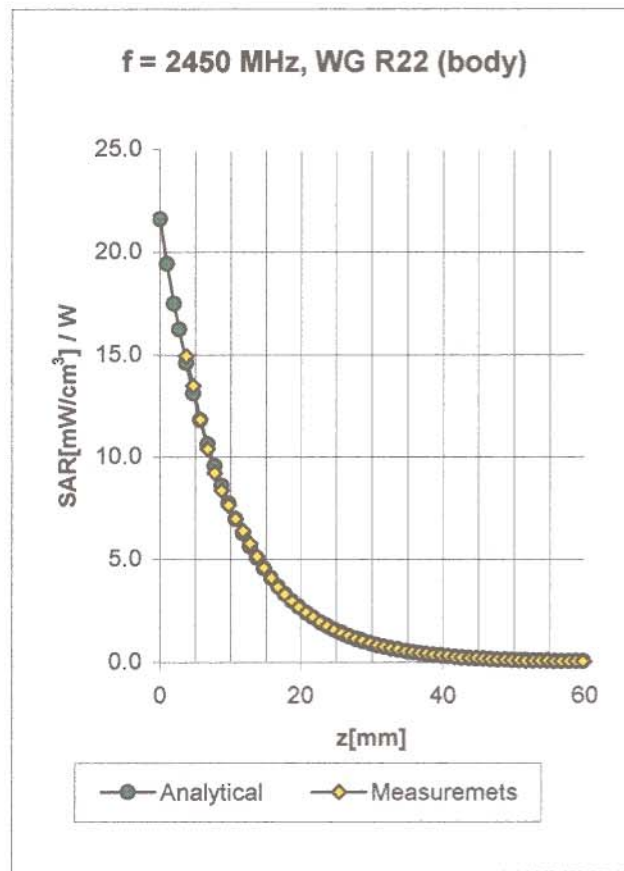
Conversion Factor Assessment



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 0.58
	ConvF Z	6.5 $\pm 9.5\%$ (k=2)	Depth 1.97

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 0.56
	ConvF Z	5.3 $\pm 9.5\%$ (k=2)	Depth 2.36

Conversion Factor Assessment



2450	Body	MHz	$\epsilon_r = 52.7 \pm 5\%$	$\sigma = 1.95 \pm 5\% \text{ mho/m}$
	ConvF X	4.5	$\pm 8.9\% (k=2)$	Boundary effect:
	ConvF Y	4.5	$\pm 8.9\% (k=2)$	Alpha 1.40
	ConvF Z	4.5	$\pm 8.9\% (k=2)$	Depth 1.50

Deviation from Isotropy in HSL

Error (θ, ϕ), $f = 900$ MHz

