

Client **C&C (Auden)**

CALIBRATION CERTIFICATE

Object(s) **ET3DV6 - SN:1762**

Calibration procedure(s) **QA CAL-01.v2
 Calibration procedure for dosimetric E-field probes**

Calibration date: **March 31, 2003**

Condition of the calibrated item **In Tolerance (according to the specific calibration document)**

This calibration statement documents traceability of M&TE used in the calibration procedures and conformity of the procedures with the ISO/IEC 17025 international standard.

All calibrations have been conducted in the closed laboratory facility: environment temperature 22 +/- 2 degrees Celsius and humidity < 75%.

Calibration Equipment used (M&TE critical for calibration)

Model Type	ID #	Cal Date	Scheduled Calibration
RF generator HP 8684C	US3642U01700	4-Aug-99 (in house check Aug-02)	In house check: Aug-05
Power sensor E4412A	MY41495277	Mar-02	Mar-03
Power sensor HP 8481A	MY41092180	18-Sep-02	Sep-03
Power meter EPM E4419B	GB41293874	13-Sep-02	Sep-03
Network Analyzer HP 8753E	US38432426	3-May-00	In house check: May 03
Flyke Process Calibrator Type 702	SN: 6295803	3-Sep-01	Sep-03

Calibrated by: **Name: Nico Veltrop, Function: Technician, Signature: [Handwritten Signature]**

Approved by: **Name: Katja Pokovic, Function: Laboratory Director, Signature: [Handwritten Signature]**

Date issued: April 2, 2003

This calibration certificate is issued as an intermediate solution until the accreditation process (based on ISO/IEC 17025 International Standard) for Calibration Laboratory of Schmid & Partner Engineering AG is completed.

Probe ET3DV6

SN:1762

Manufactured: January 20, 2003
Last calibration: March 31, 2003

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ET3DV6 SN:1762**Sensitivity in Free Space**

NormX	1.90 $\mu\text{V}/(\text{V}/\text{m})^2$
NormY	1.78 $\mu\text{V}/(\text{V}/\text{m})^2$
NormZ	1.82 $\mu\text{V}/(\text{V}/\text{m})^2$

Diode Compression

DCP X	96	mV
DCP Y	96	mV
DCP Z	96	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	6.7 $\pm 9.5\%$ (k=2)		Boundary effect:
ConvF Y	6.7 $\pm 9.5\%$ (k=2)		Alpha 0.67
ConvF Z	6.7 $\pm 9.5\%$ (k=2)		Depth 1.74
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	5.4 $\pm 9.5\%$ (k=2)		Boundary effect:
ConvF Y	5.4 $\pm 9.5\%$ (k=2)		Alpha 0.50
ConvF Z	5.4 $\pm 9.5\%$ (k=2)		Depth 2.63

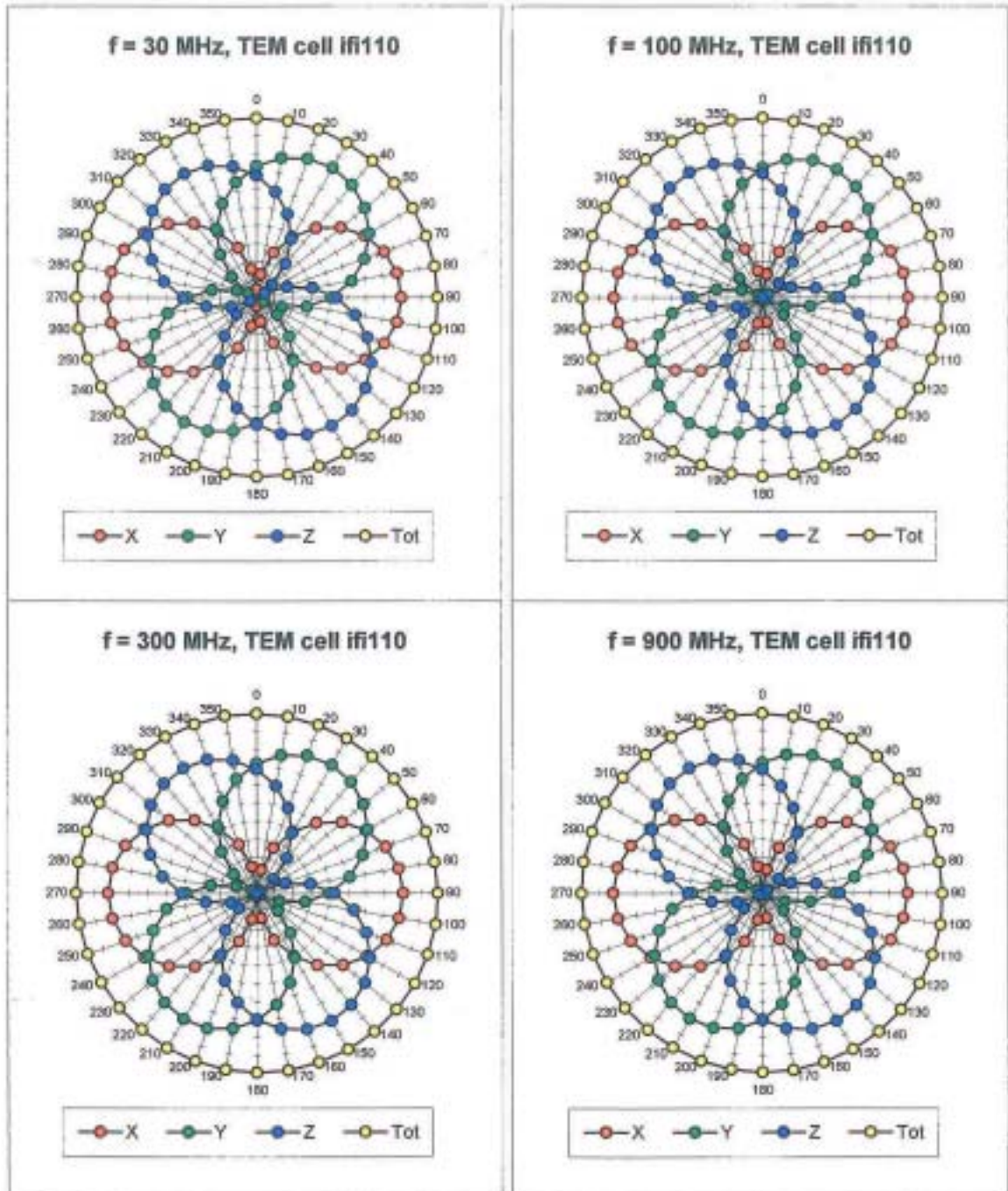
Boundary Effect

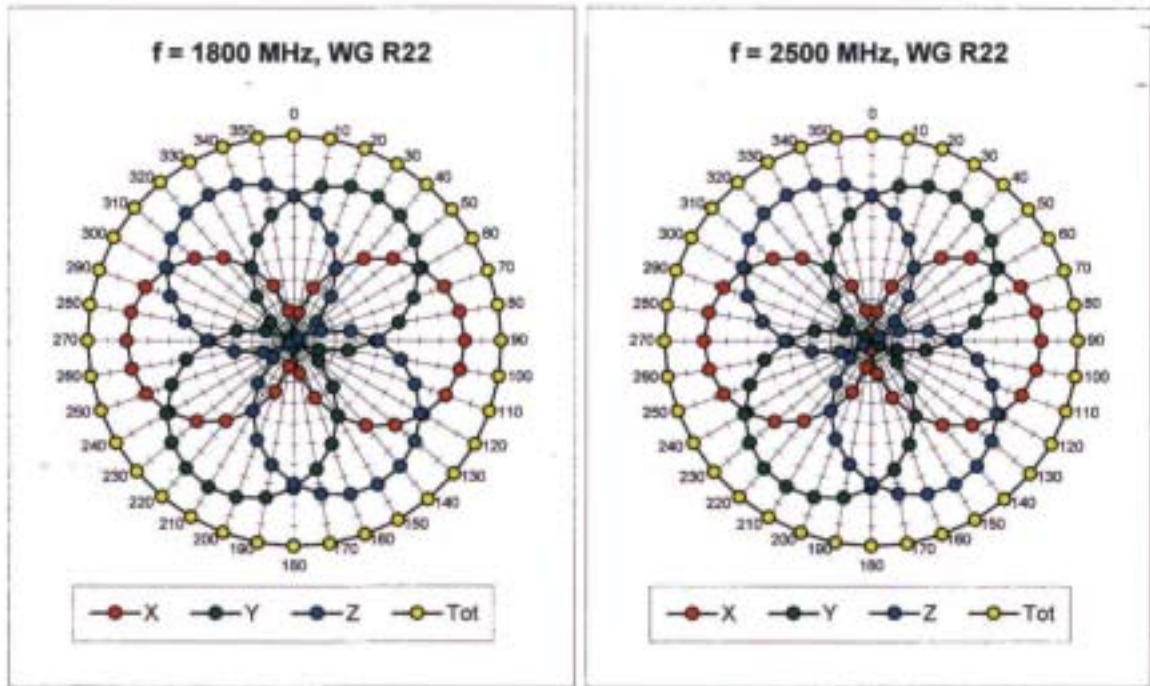
Head	900 MHz	Typical SAR gradient: 5 % per mm	
	Probe Tip to Boundary	1 mm	2 mm
	SAR _{be} [%] Without Correction Algorithm	8.8	4.5
	SAR _{be} [%] With Correction Algorithm	0.1	0.2
Head	1800 MHz	Typical SAR gradient: 10 % per mm	
	Probe Tip to Boundary	1 mm	2 mm
	SAR _{be} [%] Without Correction Algorithm	13.8	9.3
	SAR _{be} [%] With Correction Algorithm	0.2	0.1

Sensor Offset

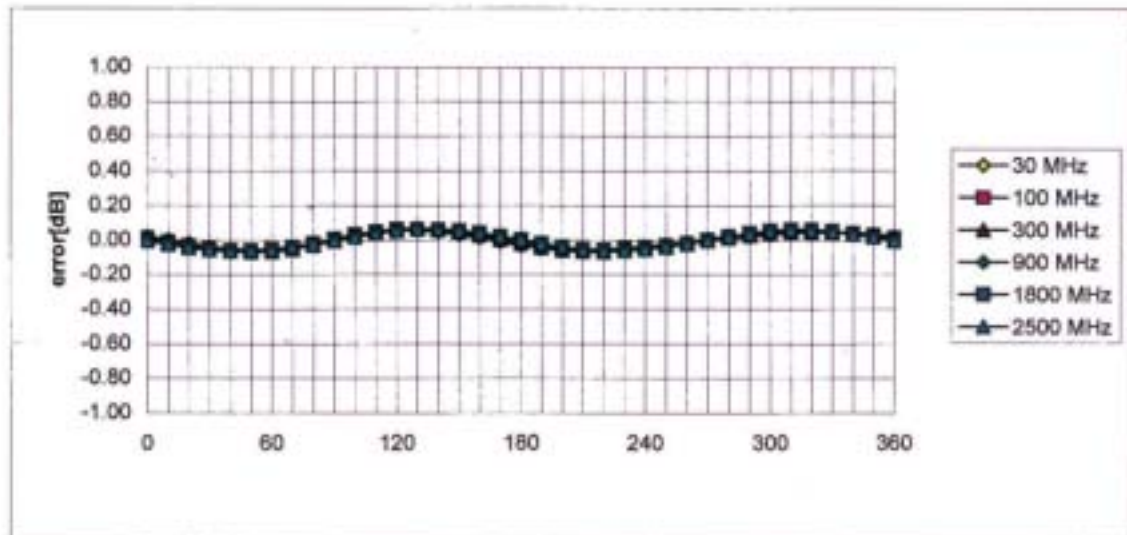
Probe Tip to Sensor Center	2.7	mm
Optical Surface Detection	1.4 \pm 0.2	mm

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



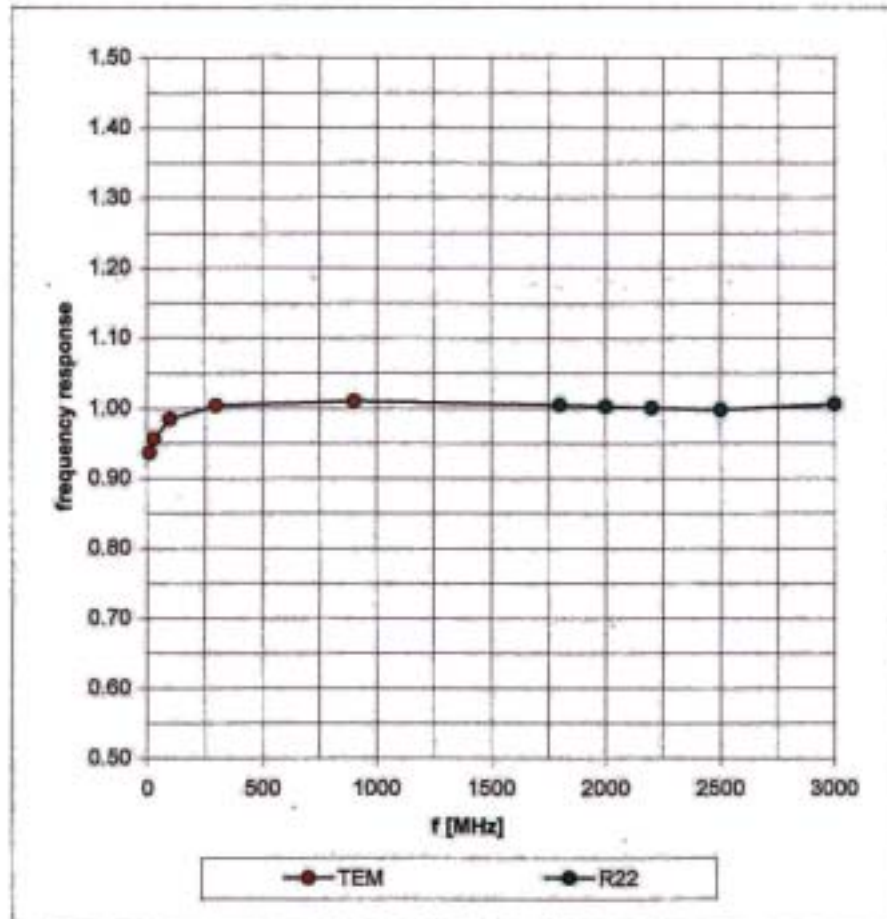


Isotropy Error (ϕ), $\theta = 0^\circ$

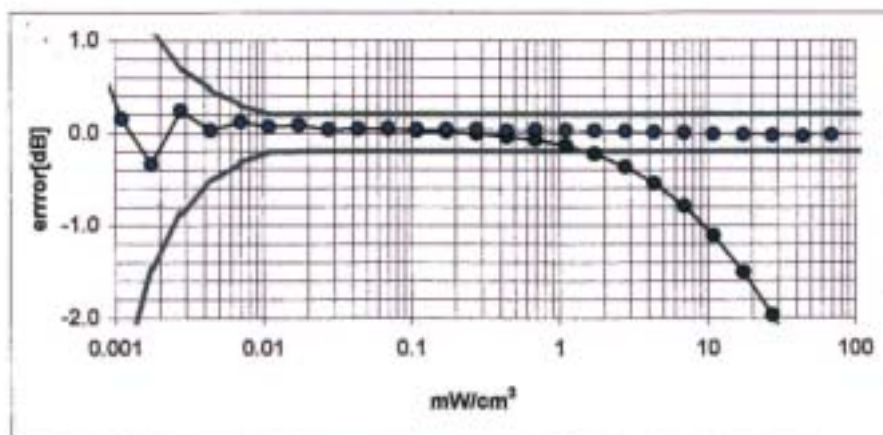
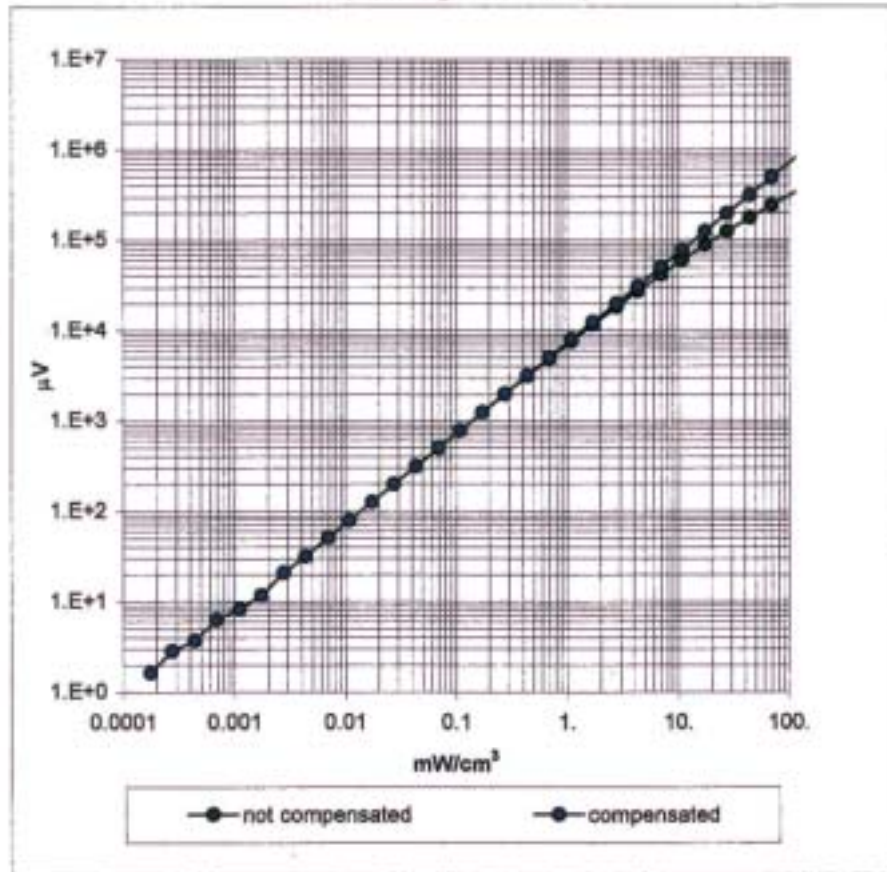


Frequency Response of E-Field

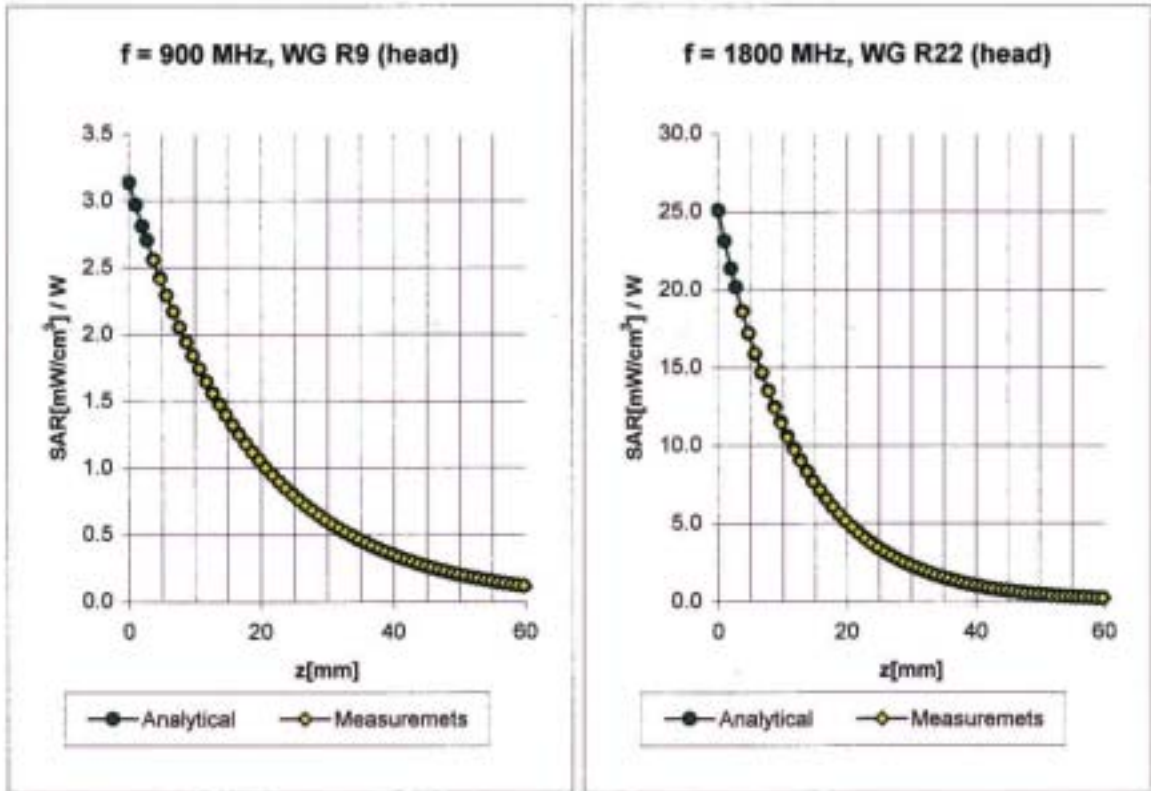
(TEM-Cell:ifi110, Waveguide R22)



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

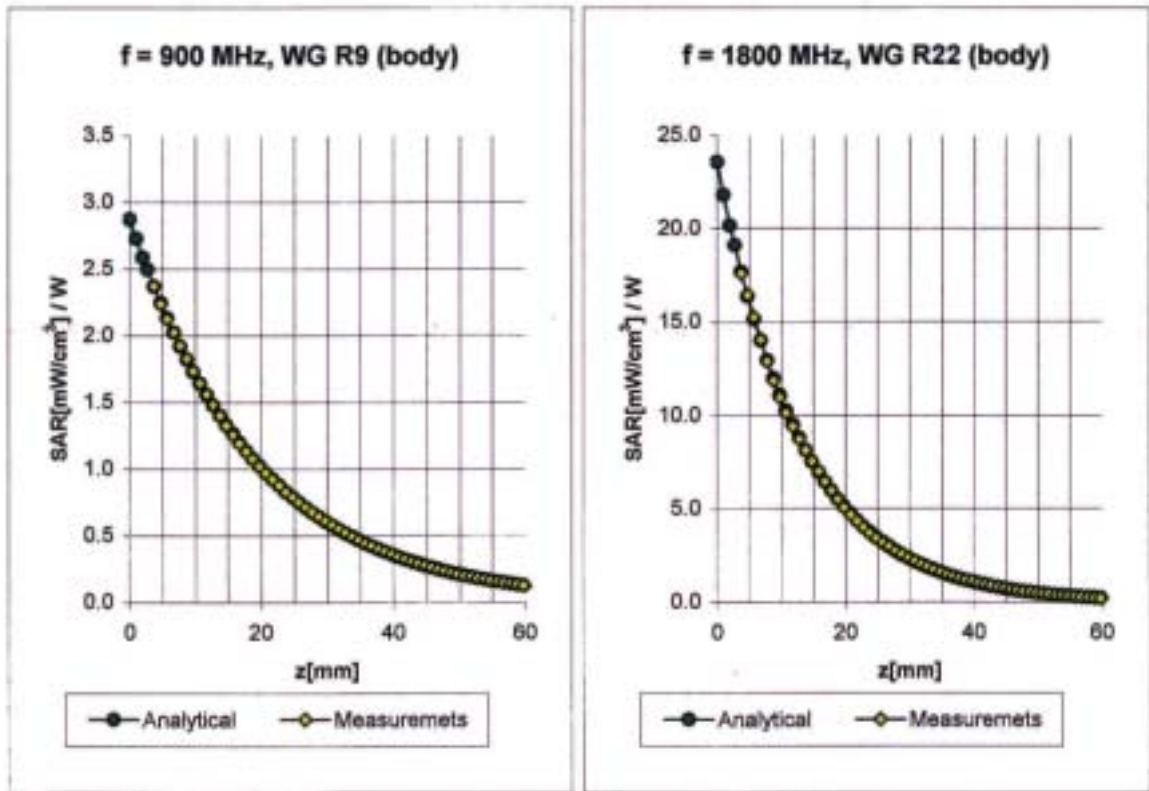


Conversion Factor Assessment



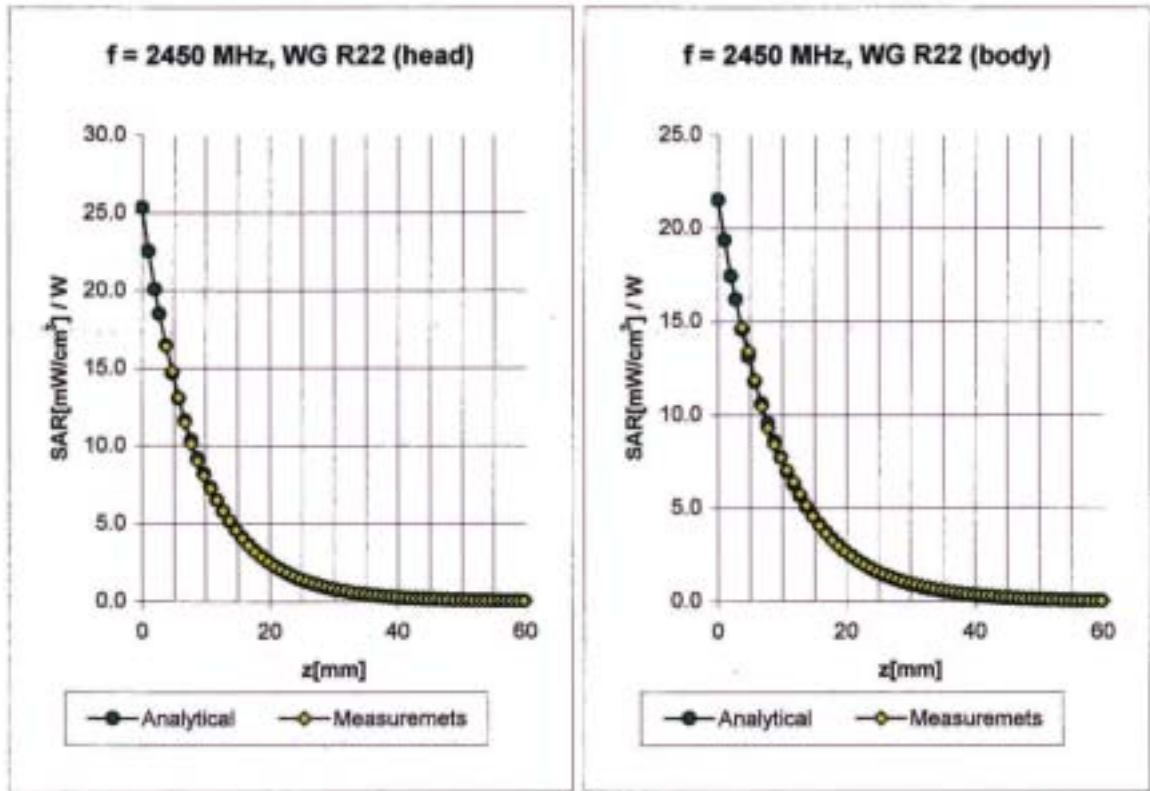
Head	900 MHz	$\epsilon_r = 41.5 \pm 5\%$	$\sigma = 0.97 \pm 5\%$ mho/m
Head	835 MHz	$\epsilon_r = 41.5 \pm 5\%$	$\sigma = 0.90 \pm 5\%$ mho/m
	ConvF X	6.7 $\pm 9.5\%$ (k=2)	Boundary effect:
	ConvF Y	6.7 $\pm 9.5\%$ (k=2)	Alpha 0.67
	ConvF Z	6.7 $\pm 9.5\%$ (k=2)	Depth 1.74
Head	1800 MHz	$\epsilon_r = 40.0 \pm 5\%$	$\sigma = 1.40 \pm 5\%$ mho/m
Head	1900 MHz	$\epsilon_r = 40.0 \pm 5\%$	$\sigma = 1.40 \pm 5\%$ mho/m
	ConvF X	5.4 $\pm 9.5\%$ (k=2)	Boundary effect:
	ConvF Y	5.4 $\pm 9.5\%$ (k=2)	Alpha 0.50
	ConvF Z	5.4 $\pm 9.5\%$ (k=2)	Depth 2.63

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	6.5 $\pm 9.5\%$ (k=2)	Boundary effect:
	ConvF Y	6.5 $\pm 9.5\%$ (k=2)	Alpha 0.43
	ConvF Z	6.5 $\pm 9.5\%$ (k=2)	Depth 2.34
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 0.57
	ConvF Z	5.0 $\pm 9.5\%$ (k=2)	Depth 2.65

Conversion Factor Assessment



Head	2450	MHz	$\epsilon_r = 39.2 \pm 5\%$	$\sigma = 1.80 \pm 5\%$ mho/m
	ConvF X		5.1 $\pm 8.9\%$ (k=2)	Boundary effect:
	ConvF Y		5.1 $\pm 8.9\%$ (k=2)	Alpha 1.32
	ConvF Z		5.1 $\pm 8.9\%$ (k=2)	Depth 1.61
Body	2450	MHz	$\epsilon_r = 52.7 \pm 5\%$	$\sigma = 1.95 \pm 5\%$ mho/m
	ConvF X		4.6 $\pm 8.9\%$ (k=2)	Boundary effect:
	ConvF Y		4.6 $\pm 8.9\%$ (k=2)	Alpha 1.39
	ConvF Z		4.6 $\pm 8.9\%$ (k=2)	Depth 1.60

Deviation from Isotropy in HSL

Error (θ, ϕ), $f = 900$ MHz

