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|--|--------------------------|---------------------------|
| Company Kyocera Wireless Corp. | Document No. | |
| KWC-7135 SAR RECONFIRMATION TEST | Issue No: | Date March 2003 |
| FCC ID OVFKWC-7135 | Page Number 25 | |

APPENDIX C: PROBE CALIBRATION CERTIFICATE

039877

Schmid & Partner Engineering AG

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Calibration Certificate

Dosimetric E-Field Probe

Type:

ET3DV6

Serial Number:

1712

Place of Calibration:

Zurich

Date of Calibration:

September 6, 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:

N. Vetter

Approved by:

Oliver Käfer

**Schmid & Partner
Engineering AG**

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

Probe ET3DV6

SN:1712

Manufactured: August 7, 2002
Last calibration: September 6, 2002

Calibrated for DASYS Systems

(Note: non-compatible with DASYS2 system!)

DASY - Parameters of Probe: ET3DV6 SN:1712

Sensitivity in Free Space

| | |
|-------|---|
| NormX | 1.59 $\mu\text{V}/(\text{V}/\text{m})^2$ |
| NormY | 1.53 $\mu\text{V}/(\text{V}/\text{m})^2$ |
| NormZ | 1.61 $\mu\text{V}/(\text{V}/\text{m})^2$ |

Diode Compression

| | | |
|-------|-----------|----|
| DCP X | 95 | mV |
| DCP Y | 95 | mV |
| DCP Z | 95 | 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 | 0.33 |
| ConvF Z | 6.5 $\pm 9.5\%$ (k=2) | Depth | 2.72 |
| 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 | 0.48 |
| ConvF Z | 5.4 $\pm 9.5\%$ (k=2) | Depth | 2.52 |

Boundary Effect

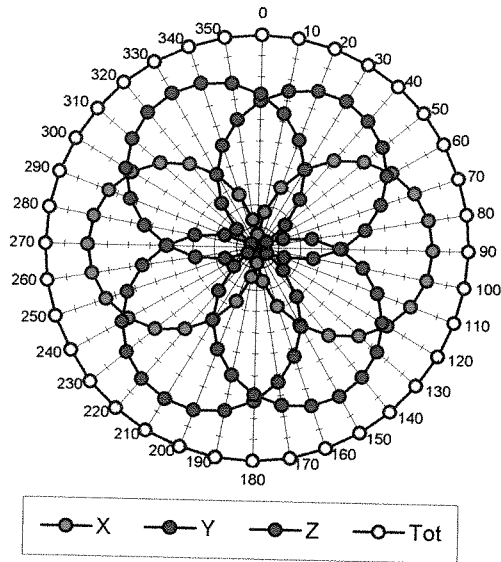
| | | | |
|-----------------------|------------------------------|-----------------------------------|-------------|
| Head | 900 MHz | Typical SAR gradient: 5 % per mm | |
| Probe Tip to Boundary | | 1 mm | 2 mm |
| SAR _{be} [%] | Without Correction Algorithm | 9.8 | 5.7 |
| SAR _{be} [%] | With Correction Algorithm | 0.4 | 0.6 |
| Head | 1800 MHz | Typical SAR gradient: 10 % per mm | |
| Probe Tip to Boundary | | 1 mm | 2 mm |
| SAR _{be} [%] | Without Correction Algorithm | 12.3 | 8.2 |
| SAR _{be} [%] | With Correction Algorithm | 0.1 | 0.2 |

Sensor Offset

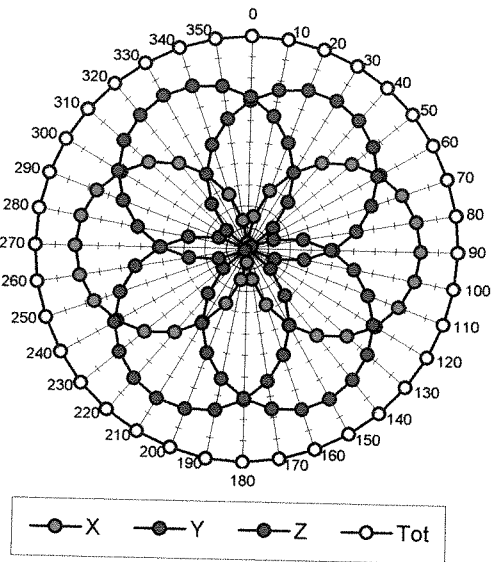
| | | |
|----------------------------|---------------------------------|----|
| Probe Tip to Sensor Center | 2.7 | mm |
| Optical Surface Detection | 1.3 \pm 0.2 | mm |

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

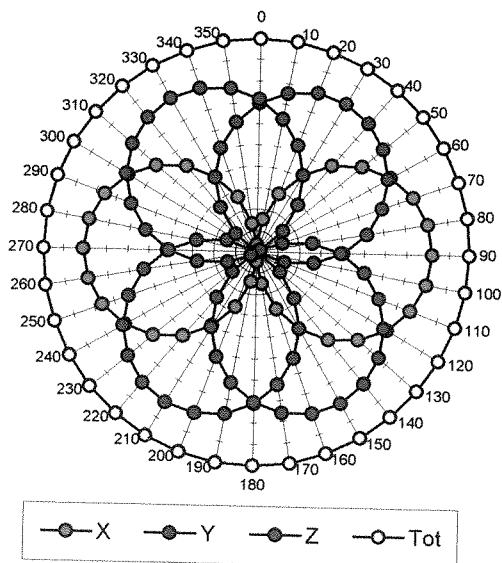
f = 30 MHz, TEM cell ifi110



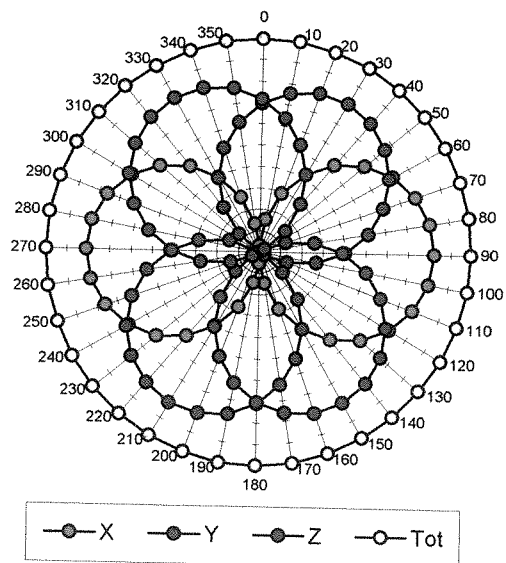
f = 100 MHz, TEM cell ifi110

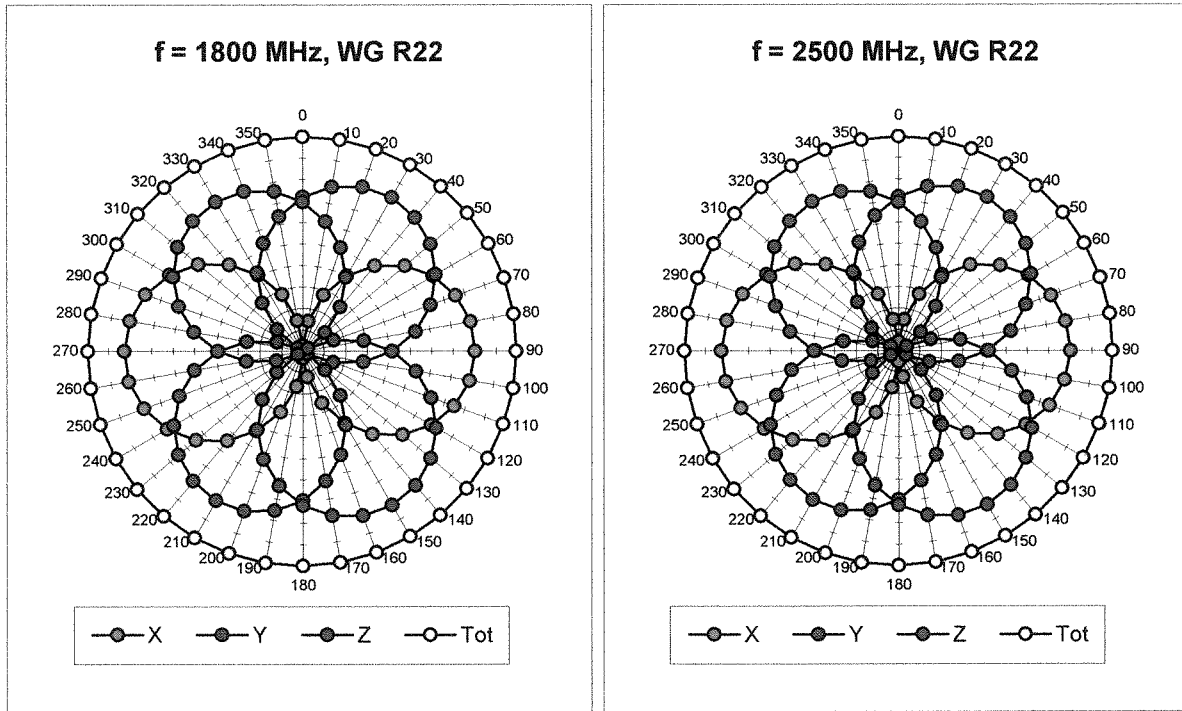


f = 300 MHz, TEM cell ifi110

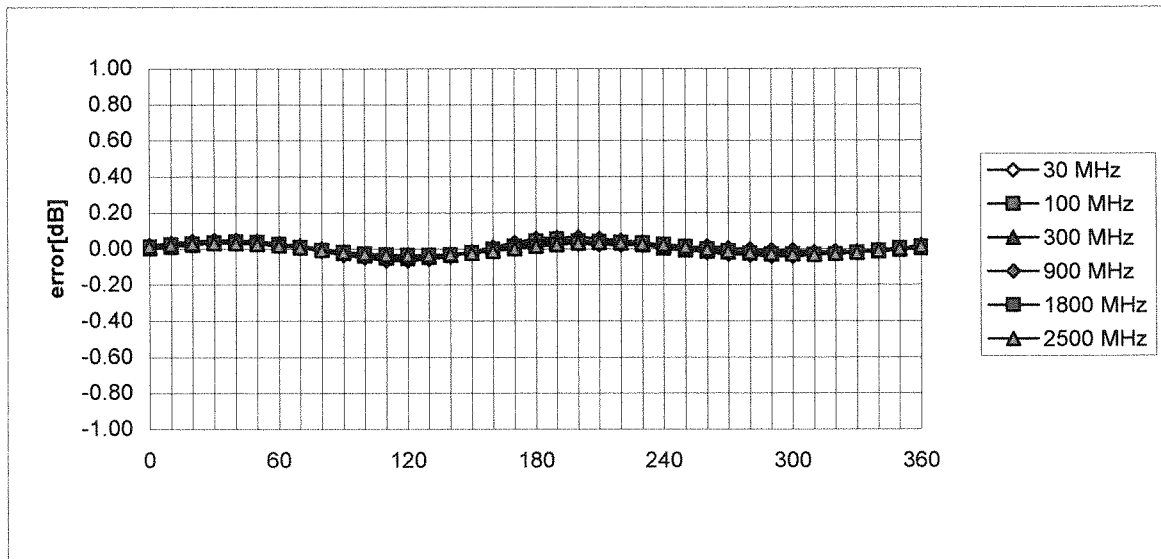


f = 900 MHz, TEM cell ifi110



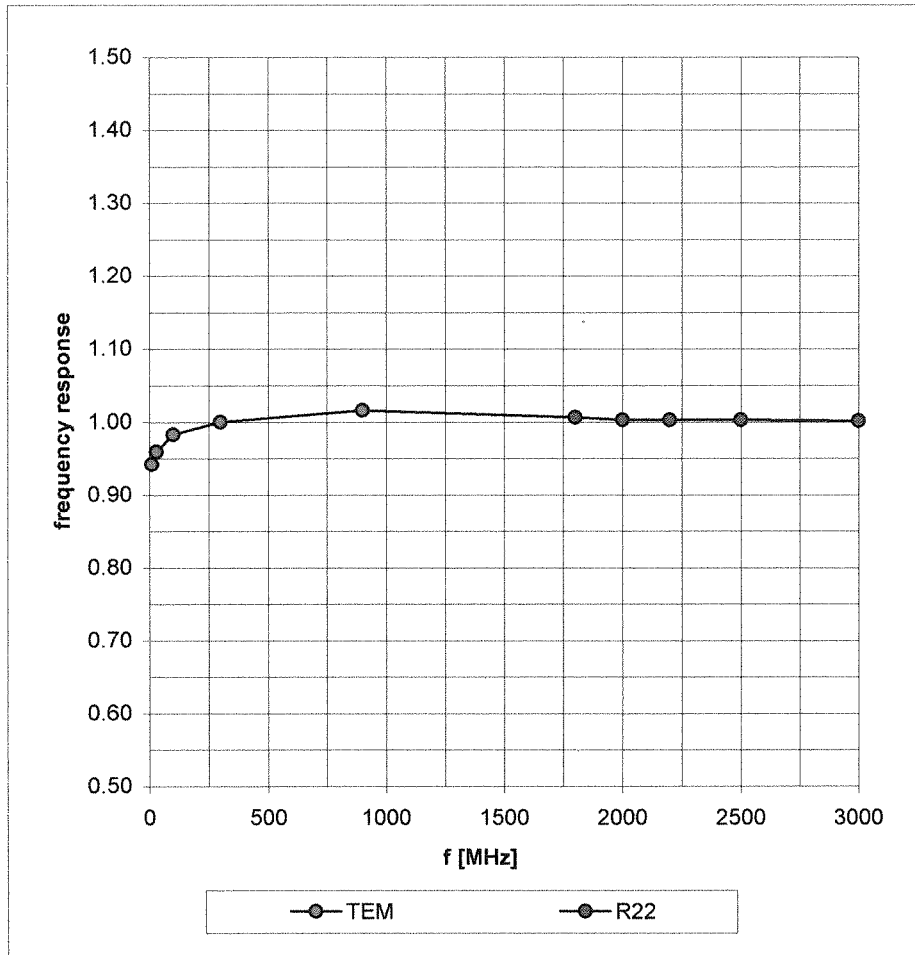


Isotropy Error (ϕ), $\theta = 0^\circ$

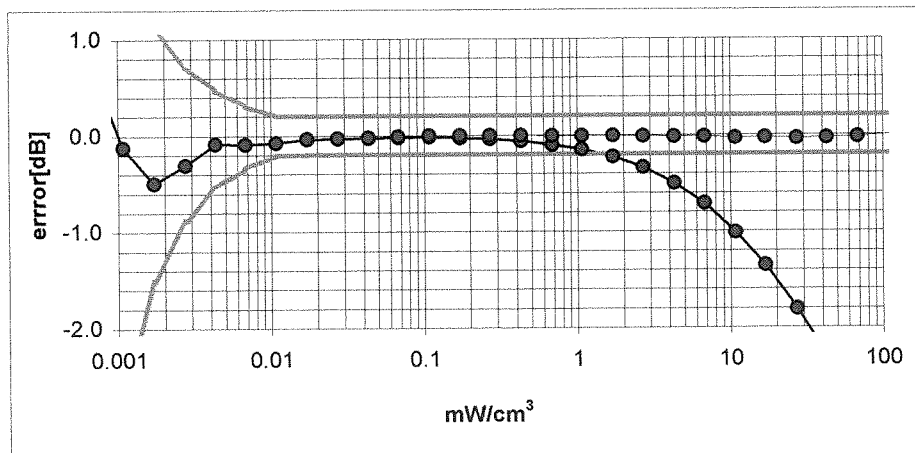
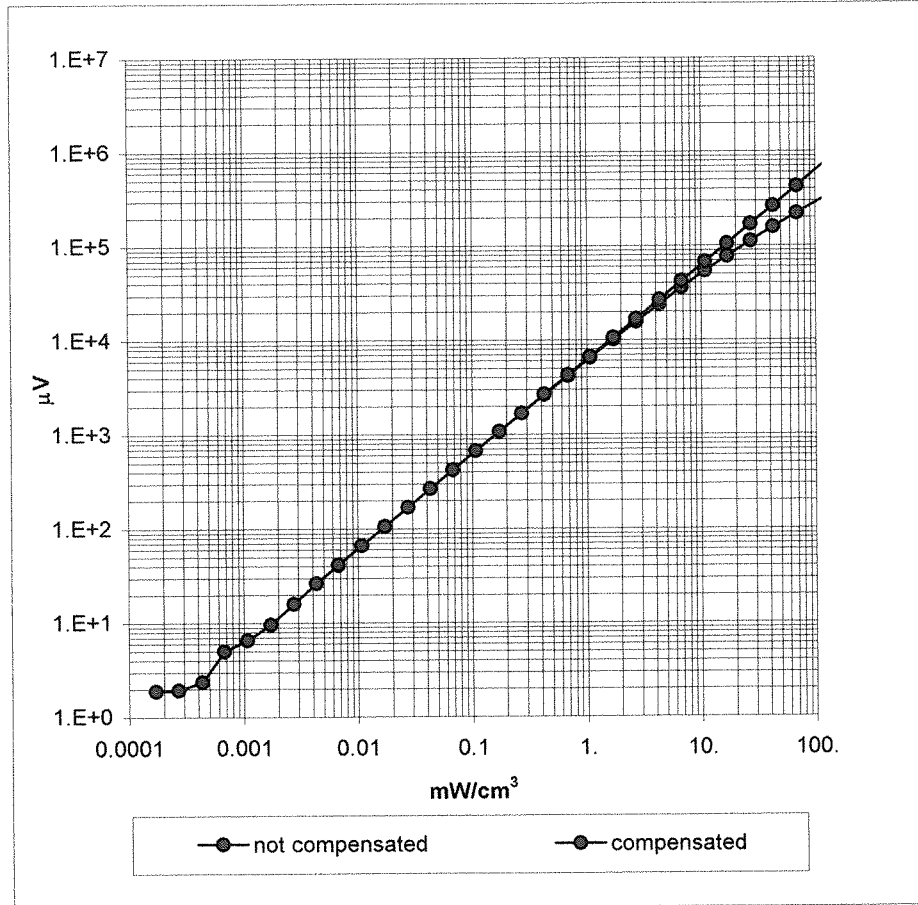


Frequency Response of E-Field

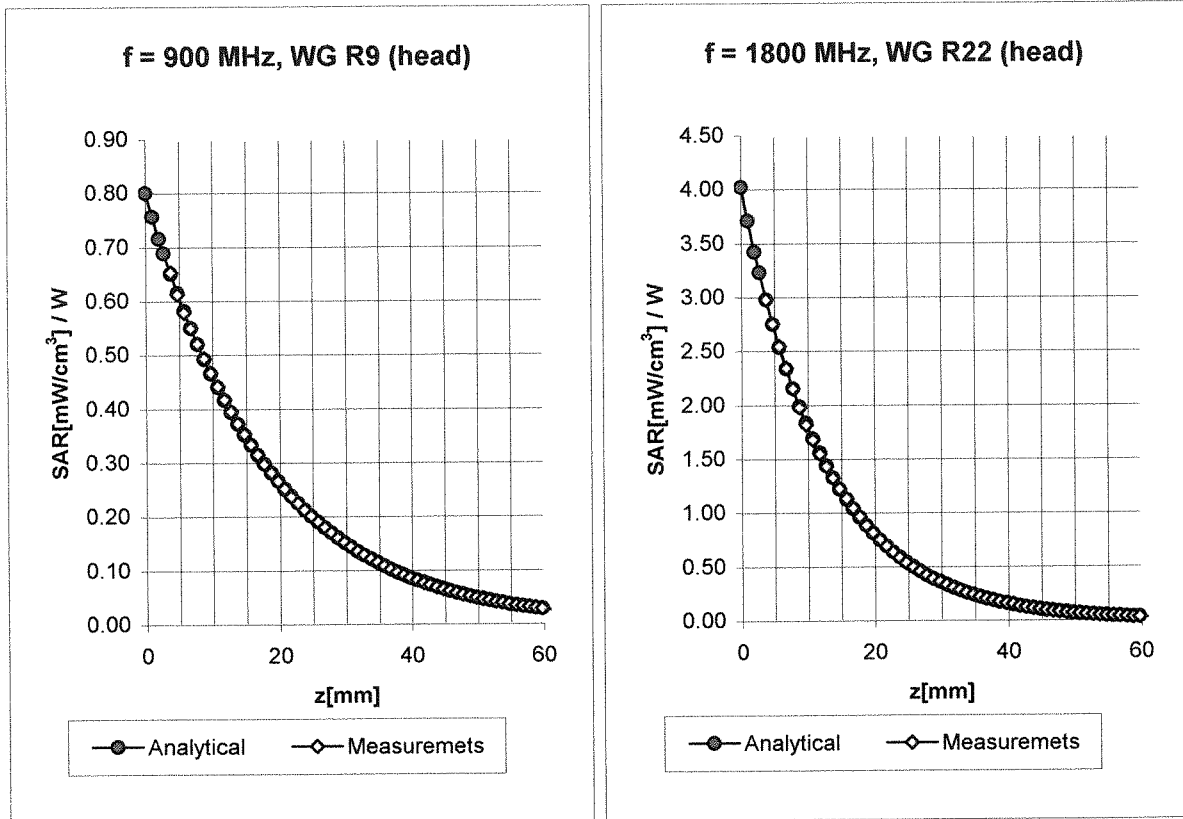
(TEM-Cell:ifi110, Waveguide R22)



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

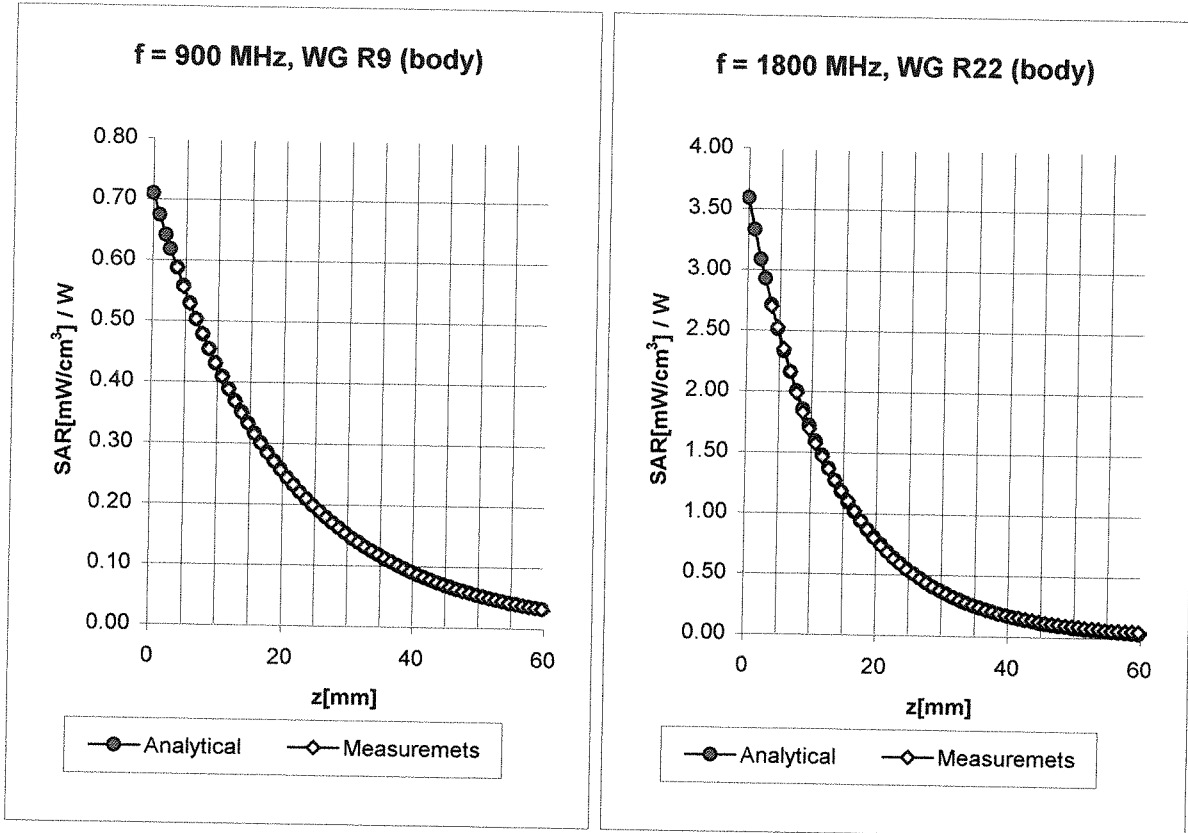


Conversion Factor Assessment



| | | | |
|-------------|-----------------|------------------------------|---------------------------------------|
| Head | 900 MHz | $\epsilon_r = 41.5 \pm 5\%$ | $\sigma = 0.97 \pm 5\% \text{ mho/m}$ |
| Head | 835 MHz | $\epsilon_r = 41.5 \pm 5\%$ | $\sigma = 0.90 \pm 5\% \text{ mho/m}$ |
| | ConvF X | 6.5 $\pm 9.5\%$ (k=2) | Boundary effect: |
| | ConvF Y | 6.5 $\pm 9.5\%$ (k=2) | Alpha 0.33 |
| | ConvF Z | 6.5 $\pm 9.5\%$ (k=2) | Depth 2.72 |
| | | | |
| Head | 1800 MHz | $\epsilon_r = 40.0 \pm 5\%$ | $\sigma = 1.40 \pm 5\% \text{ mho/m}$ |
| Head | 1900 MHz | $\epsilon_r = 40.0 \pm 5\%$ | $\sigma = 1.40 \pm 5\% \text{ mho/m}$ |
| | ConvF X | 5.4 $\pm 9.5\%$ (k=2) | Boundary effect: |
| | ConvF Y | 5.4 $\pm 9.5\%$ (k=2) | Alpha 0.48 |
| | ConvF Z | 5.4 $\pm 9.5\%$ (k=2) | Depth 2.52 |

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 | 6.3 $\pm 9.5\%$ (k=2) | Boundary effect: |
| | ConvF Y | 6.3 $\pm 9.5\%$ (k=2) | Alpha 0.41 |
| | ConvF Z | 6.3 $\pm 9.5\%$ (k=2) | Depth 2.49 |
| 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 0.60 |
| | ConvF Z | 5.0 $\pm 9.5\%$ (k=2) | Depth 2.30 |

Deviation from Isotropy in HSL

Error (θ, ϕ), $f = 900$ MHz

