

Client **Sony Ericsson Lund**

CALIBRATION CERTIFICATE

Object(s) **ET3DV6 - SN:1569**

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

Calibration date: **March 18, 2004**

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

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
 The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

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 (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM E4419B	GB41293874	2-Apr-03 (METAS, No 252-0250)	Apr-04
Power sensor E4412A	MY41495277	2-Apr-03 (METAS, No 252-0250)	Apr-04
Reference 20 dB Attenuator	SN: 5086 (20b)	3-Apr-03 (METAS, No. 251-0340)	Apr-04
Fuke Process Calibrator Type 702	SN: 6295803	8-Sep-03 (Sintrel SCS No. E-030020)	Sep-04
Power sensor HP 8481A	MY41092180	18-Sep-02 (SPEAG, in house check Oct-03)	In house check: Oct 05
RF generator HP 8684C	US3642U01700	4-Aug-99 (SPEAG, in house check Aug-02)	In house check: Aug-05
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Oct-03)	In house check: Oct 05

	Name	Function	Signature
Calibrated by:	Nico Vetterli	Technician	
Approved by:	Katja Pokovic	Laboratory Director	

Date issued: March 19, 2004

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:1569

Manufactured:	March 19, 2001
Last calibrated:	May 15, 2003
Recalibrated:	March 18, 2004

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ET3DV6 SN:1569**Sensitivity in Free Space****Diode Compression^A**

NormX	1.82 $\mu\text{V}/(\text{V}/\text{m})^2$
NormY	2.05 $\mu\text{V}/(\text{V}/\text{m})^2$
NormZ	1.95 $\mu\text{V}/(\text{V}/\text{m})^2$

DCP X	95	mV
DCP Y	95	mV
DCP Z	95	mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 7.

Boundary Effect**Head 900 MHz Typical SAR gradient: 5 % per mm**

Sensor Cener to Phantom Surface Distance		3.7 mm	4.7 mm
SAR _{pe} [%]	Without Correction Algorithm	8.3	4.5
SAR _{pe} [%]	With Correction Algorithm	0.1	0.3

Head 1800 MHz Typical SAR gradient: 10 % per mm

Sensor to Surface Distance		3.7 mm	4.7 mm
SAR _{pe} [%]	Without Correction Algorithm	11.6	8.0
SAR _{pe} [%]	With Correction Algorithm	0.2	0.1

Sensor Offset

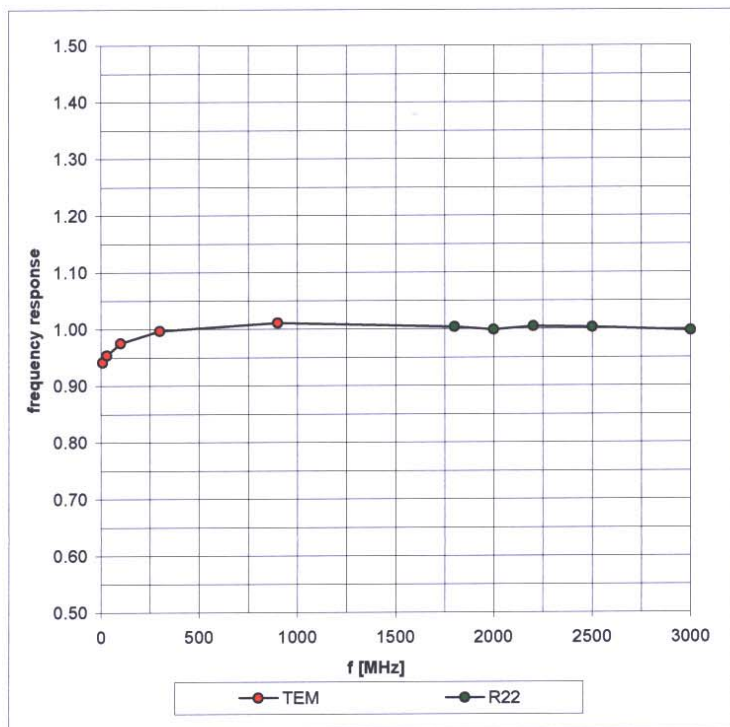
Probe Tip to Sensor Center	2.7 mm
Optical Surface Detection	in tolerance

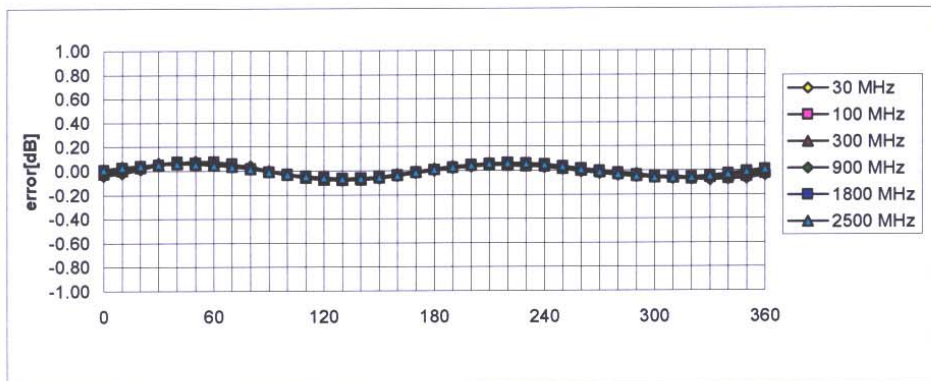
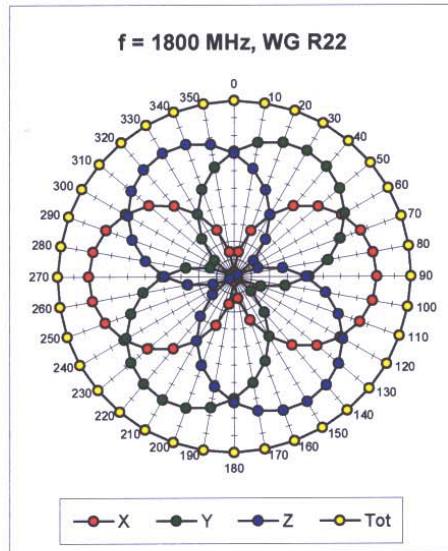
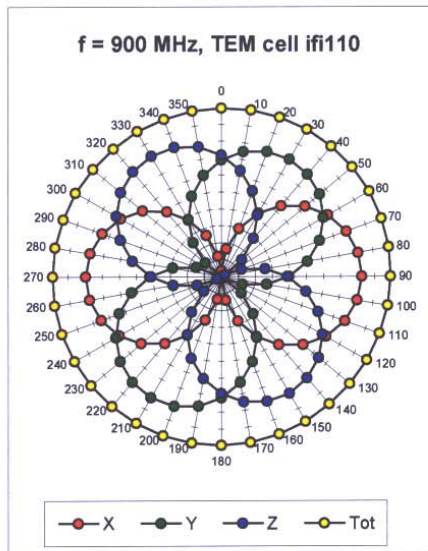
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

^A numerical linearization parameter; uncertainty not required

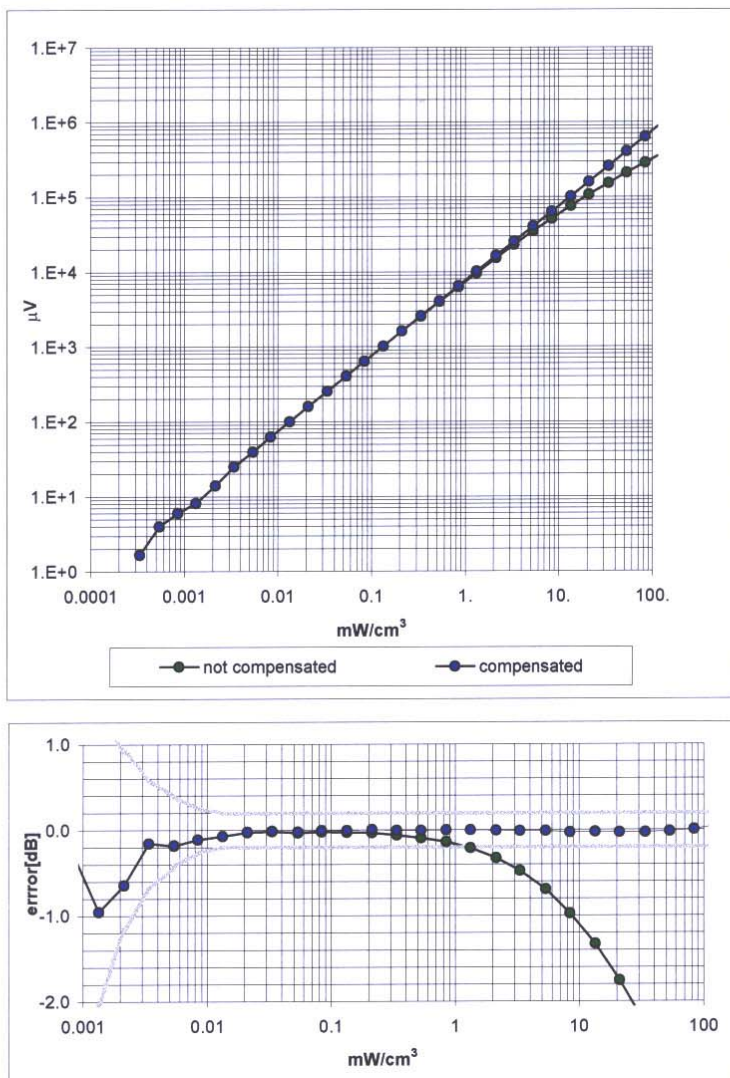
Frequency Response of E-Field

(TEM-Cell:ifi110, Waveguide R22)



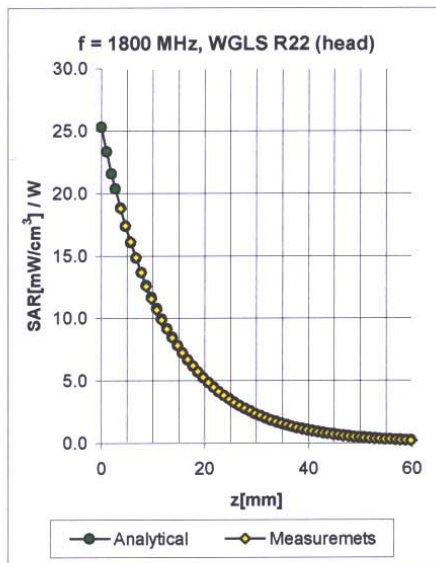
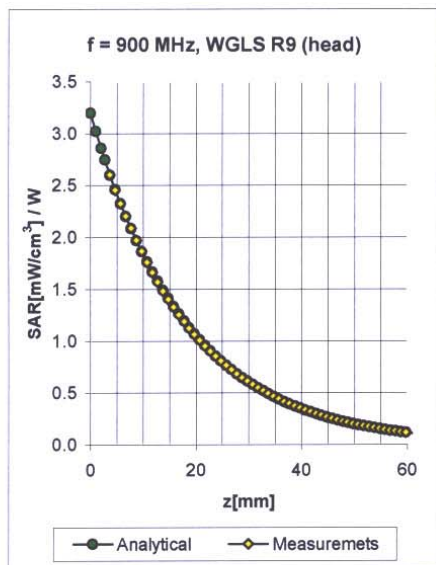
Receiving Pattern (ϕ) , $\theta = 0^\circ$ **Axial Isotropy Error < ± 0.2 dB**

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



Probe Linearity < ± 0.2 dB

Conversion Factor Assessment

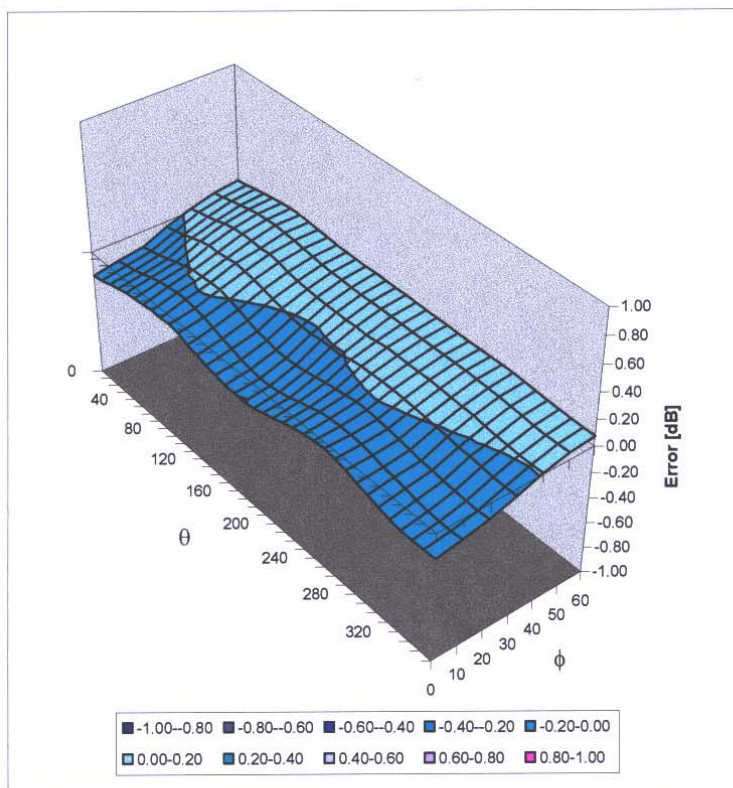


f [MHz]	Validity [MHz] ^B	Tissue	Permittivity	Conductivity	Alpha	Depth	ConvF	Uncertainty
835	785-885	Head	41.5 ± 5%	0.90 ± 5%	0.57	1.76	7.12	± 9.7% (k=2)
900	850-950	Head	41.5 ± 5%	0.97 ± 5%	0.49	1.98	6.95	± 9.7% (k=2)
1750	1700-1800	Head	40.0 ± 5%	1.40 ± 5%	0.43	2.75	5.56	± 9.7% (k=2)
1900	1850-1950	Head	40.0 ± 5%	1.40 ± 5%	0.44	2.97	5.28	± 9.7% (k=2)
2000	1950-2050	Head	40.0 ± 5%	1.40 ± 5%	0.47	2.73	5.05	± 9.7% (k=2)
2450	2400-2500	Head	39.2 ± 5%	1.80 ± 5%	0.79	2.03	4.72	± 9.7% (k=2)
835	785-885	Body	55.2 ± 5%	0.97 ± 5%	0.39	2.28	6.72	± 9.7% (k=2)
900	850-950	Body	55.0 ± 5%	1.05 ± 5%	0.51	1.92	6.60	± 9.7% (k=2)
1750	1700-1800	Body	53.3 ± 5%	1.52 ± 5%	0.51	2.83	4.79	± 9.7% (k=2)
1900	1850-1950	Body	53.3 ± 5%	1.52 ± 5%	0.55	2.90	4.60	± 9.7% (k=2)
2000	1950-2050	Body	53.3 ± 5%	1.52 ± 5%	0.63	2.51	4.44	± 9.7% (k=2)
2450	2400-2500	Body	52.7 ± 5%	1.95 ± 5%	1.01	1.64	4.34	± 9.7% (k=2)

^B The total standard uncertainty is calculated as root-sum-square of standard uncertainty of the Conversion Factor at calibration frequency and the standard uncertainty for the indicated frequency band.

Deviation from Isotropy in HSL

Error (θ, ϕ), $f = 900$ MHz



Spherical Isotropy Error $< \pm 0.4$ dB

Client **Sony Ericsson Lund**

CALIBRATION CERTIFICATE

Object(s) **ET3DV6 - SN:1585**

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

Calibration date: **March 18, 2004**

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

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Date issued: March 19, 2004

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Probe ET3DV6

SN:1585

Manufactured:	May 7, 2001
Last calibrated:	April 16, 2003
Recalibrated:	March 18, 2004

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ET3DV6 SN:1585

Sensitivity in Free Space

Diode Compression^A

NormX	$1.84 \mu\text{V}/(\text{V}/\text{m})^2$
NormY	$1.71 \mu\text{V}/(\text{V}/\text{m})^2$
NormZ	$1.90 \mu\text{V}/(\text{V}/\text{m})^2$

DCP X	95	mV
DCP Y	95	mV
DCP Z	95	mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 7.

Boundary Effect

Head 900 MHz Typical SAR gradient: 5 % per mm

Sensor Cener to Phantom Surface Distance	3.7 mm	4.7 mm
SAR _{be} [%] Without Correction Algorithm	8.3	4.4
SAR _{be} [%] With Correction Algorithm	0.0	0.2

Head 1800 MHz Typical SAR gradient: 10 % per mm

Sensor to Surface Distance	3.7 mm	4.7 mm
SAR _{be} [%] Without Correction Algorithm	12.1	8.2
SAR _{be} [%] With Correction Algorithm	0.2	0.1

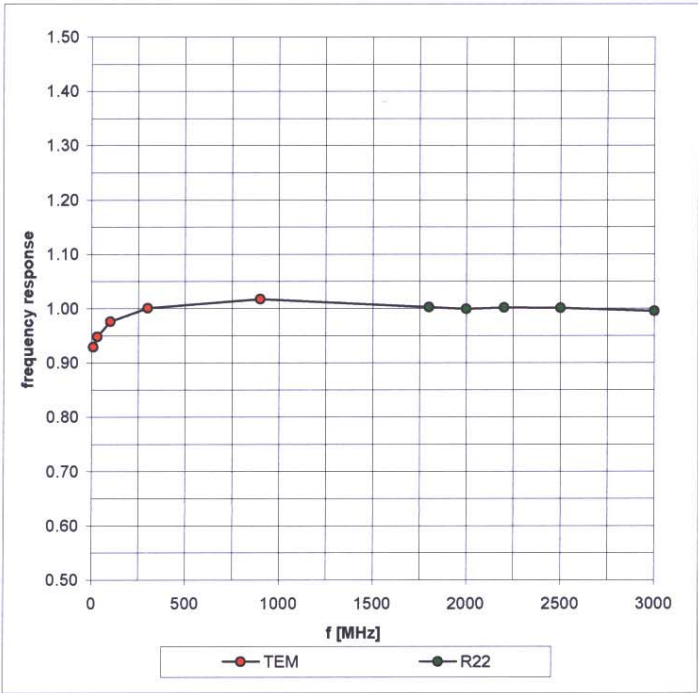
Sensor Offset

Probe Tip to Sensor Center	2.7 mm
Optical Surface Detection	in tolerance

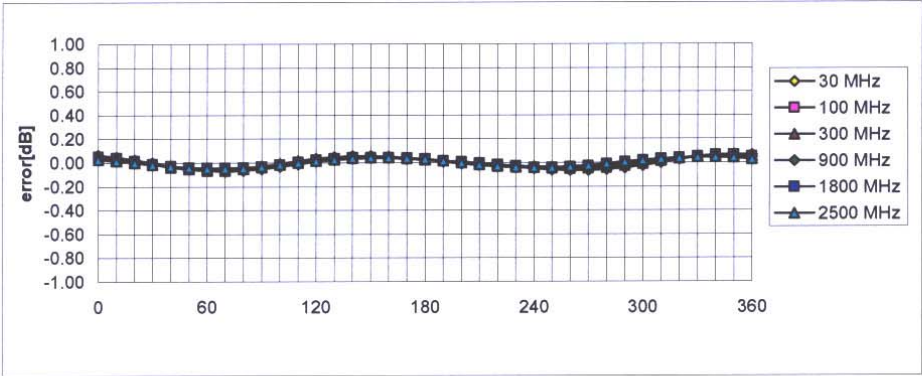
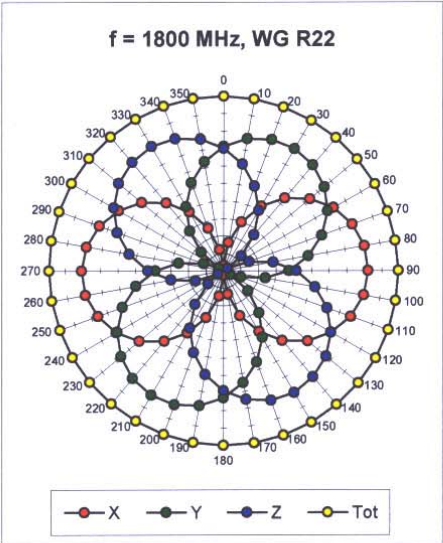
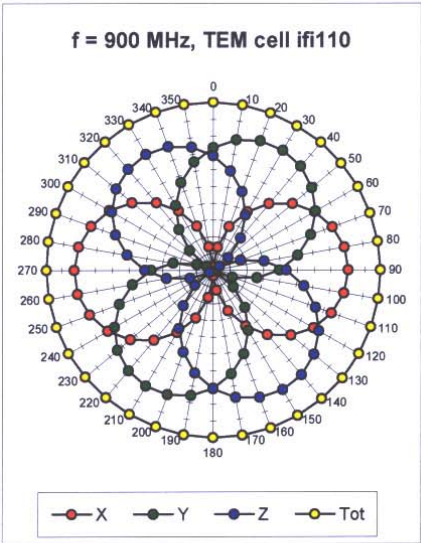
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^A numerical linearization parameter: uncertainty not required

Frequency Response of E-Field
(TEM-Cell:ifi110, Waveguide R22)

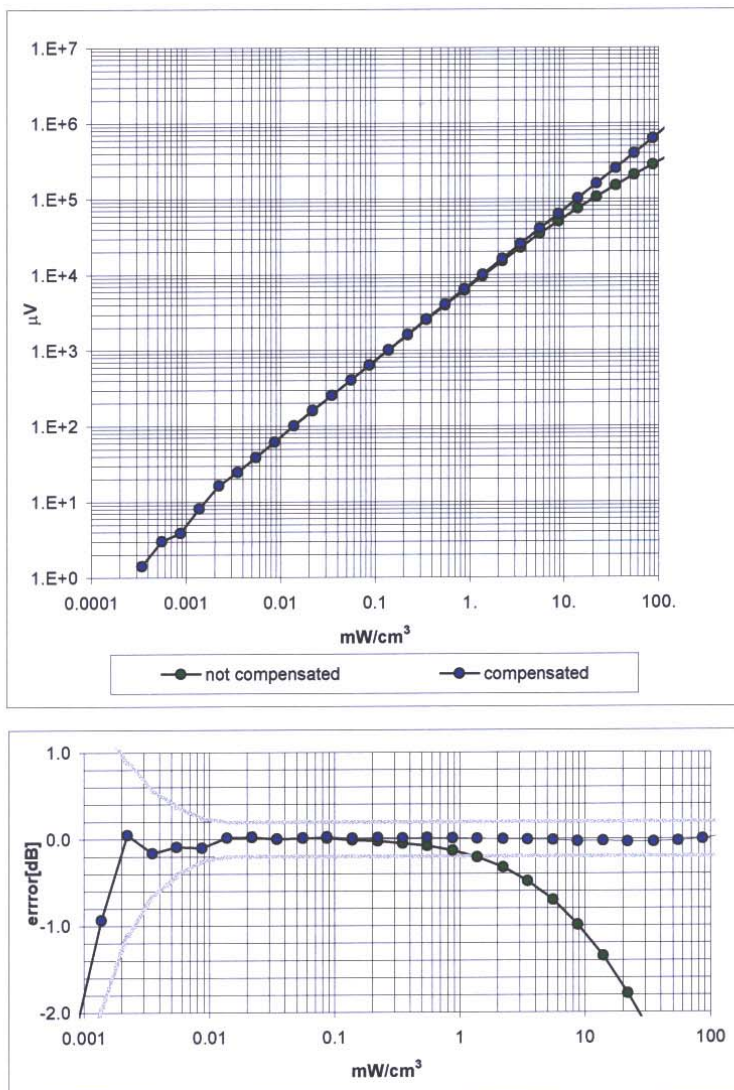


Receiving Pattern (ϕ) , $\theta = 0^\circ$



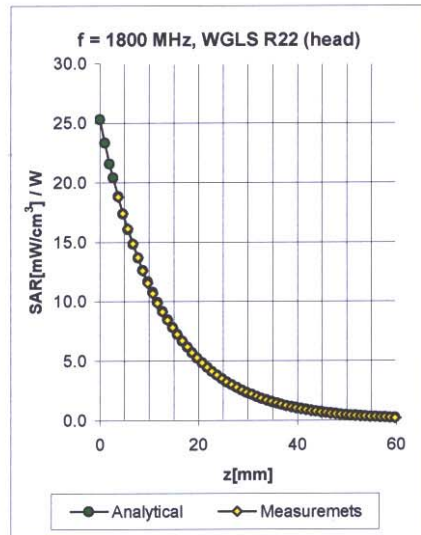
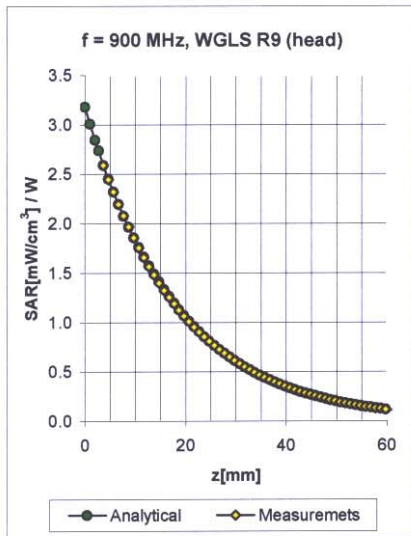
Axial Isotropy Error < ± 0.2 dB

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



Probe Linearity $< \pm 0.2$ dB

Conversion Factor Assessment

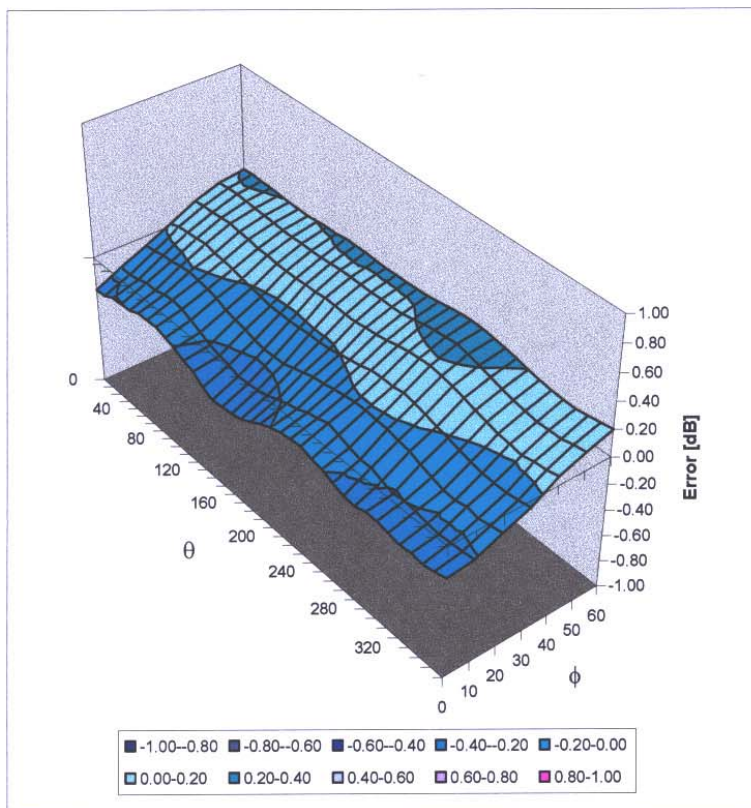


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900	850-950	Head	41.5 ± 5%	0.97 ± 5%	0.58	1.83	6.67 ± 9.7% (k=2)
1750	1700-1800	Head	40.0 ± 5%	1.40 ± 5%	0.45	2.67	5.57 ± 9.7% (k=2)
1900	1850-1950	Head	40.0 ± 5%	1.40 ± 5%	0.45	2.94	5.26 ± 9.7% (k=2)
2000	1950-2050	Head	40.0 ± 5%	1.40 ± 5%	0.45	3.21	4.96 ± 9.7% (k=2)
2450	2400-2500	Head	39.2 ± 5%	1.80 ± 5%	0.80	2.03	4.74 ± 9.7% (k=2)
835	785-885	Body	55.2 ± 5%	0.97 ± 5%	0.46	2.10	6.58 ± 9.7% (k=2)
900	850-950	Body	55.0 ± 5%	1.05 ± 5%	0.81	1.51	6.38 ± 9.7% (k=2)
1750	1700-1800	Body	53.3 ± 5%	1.52 ± 5%	0.52	2.86	4.77 ± 9.7% (k=2)
1900	1850-1950	Body	53.3 ± 5%	1.52 ± 5%	0.56	2.88	4.56 ± 9.7% (k=2)
2000	1950-2050	Body	53.3 ± 5%	1.52 ± 5%	0.65	2.45	4.45 ± 9.7% (k=2)
2450	2400-2500	Body	52.7 ± 5%	1.95 ± 5%	1.01	1.60	4.36 ± 9.7% (k=2)

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Error (θ, ϕ), $f = 900$ MHz



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