

APPENDIX C SAR TESTING EQUIPMENT CALIBRATION CERTIFICATE ATTACHMENTS

Calibration Certificate Attachments

- | | |
|-------------------------------------|---------|
| 1. 450 MHz Dipole Calibration Sheet | 2 pages |
| 2. E-Field Probe Calibration Sheet | 7 Pages |



**Calibration Laboratory of
Schmid & Partner
Engineering AG**
Zeughausstrasse 43, 8004 Zurich, Switzerland



S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
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S Swiss Calibration Service

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The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **EMC Technologies**

Certificate No: **D450V2-1009_Dec06**

CALIBRATION CERTIFICATE																																															
Object	D450V2 - SN: 1009																																														
Calibration procedure(s)	QA CAL-15.v4 Calibration Procedure for dipole validation kits below 800 MHz																																														
Calibration date:	December 14, 2006																																														
Condition of the calibrated item	In Tolerance																																														
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Calibrated by:	Name Claudio Leubler	Function Laboratory Technician	Signature 																																												
Approved by:	Name Katja Pokovic	Technical Manager																																													
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Certificate No: D450V2-1009_Dec06

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Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY4	V4.7
Extrapolation	Advanced Extrapolation	
Phantom	Flat Phantom V4.4	Shell thickness: 6 ± 0.2 mm
Distance Dipole Center - TSL	15 mm	with Spacer
Area Scan resolution	dx, dy = 15 mm	
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	450 MHz \pm 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	43.5	0.87 mho/m
Measured Head TSL parameters	(22.0 \pm 0.2) °C	43.6 \pm 6 %	0.86 mho/m \pm 6 %
Head TSL temperature during test	(22.0 \pm 0.2) °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	condition	
SAR measured	398 mW input power	2.06 mW / g
SAR normalized	normalized to 1W	5.18 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	5.21 mW / g \pm 18.1 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	398 mW input power	1.39 mW / g
SAR normalized	normalized to 1W	3.49 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	3.50 mW / g \pm 17.6 % (k=2)

¹ Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

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Accreditation No.: **SCS 108**

Client **EMC Technologies**

Certificate No: **ET3-1380_Dec06**

CALIBRATION CERTIFICATE																																																															
Object	ET3DV6 - SN:1380																																																														
Calibration procedure(s)	QA CAL-01.v5 and QA CAL-12.v4 Calibration procedure for dosimetric E-field probes																																																														
Calibration date:	December 12, 2006																																																														
Condition of the calibrated item	In Tolerance																																																														
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ET3DV6 SN:1380

December 12, 2006

DASY - Parameters of Probe: ET3DV6 SN:1380

Sensitivity in Free Space ^A			Diode Compression ^B	
NormX	1.79 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP X	91 mV
NormY	1.62 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP Y	90 mV
NormZ	1.75 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP Z	89 mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

TSL	900 MHz	Typical SAR gradient: 5 % per mm		
	Sensor Center to Phantom Surface Distance	3.7 mm	4.7 mm	
	SAR _{be} [%] Without Correction Algorithm	5.5	2.2	
	SAR _{be} [%] With Correction Algorithm	0.0	0.0	
TSL	1810 MHz	Typical SAR gradient: 10 % per mm		
	Sensor Center to Phantom Surface Distance	3.7 mm	4.7 mm	
	SAR _{be} [%] Without Correction Algorithm	13.3	8.5	
	SAR _{be} [%] With Correction Algorithm	0.4	0.3	

Sensor Offset

Probe Tip to Sensor Center **2.7 mm**

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 The uncertainties of NormX,Y,Z do not affect the E²-field uncertainty inside TSL (see Page 8).

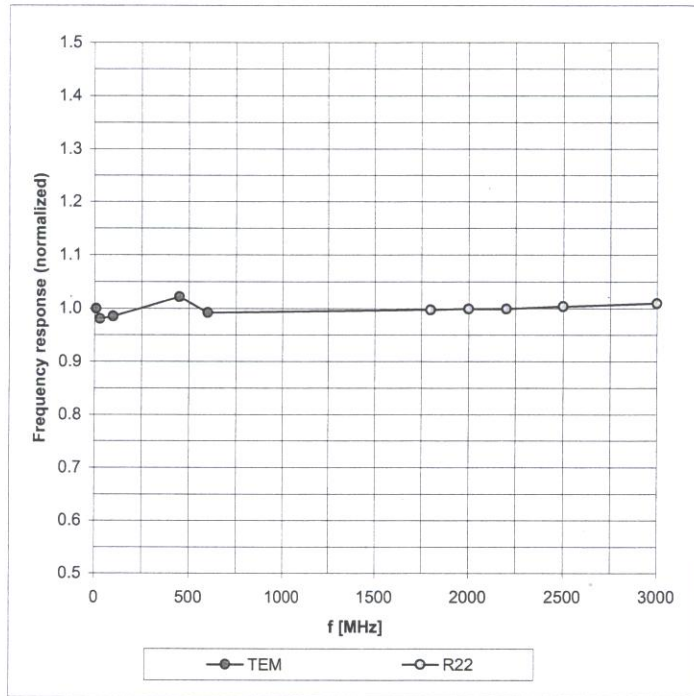
^B Numerical linearization parameter: uncertainty not required.

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Frequency Response of E-Field

(TEM-Cell:ifi110 EXX, Waveguide: R22)



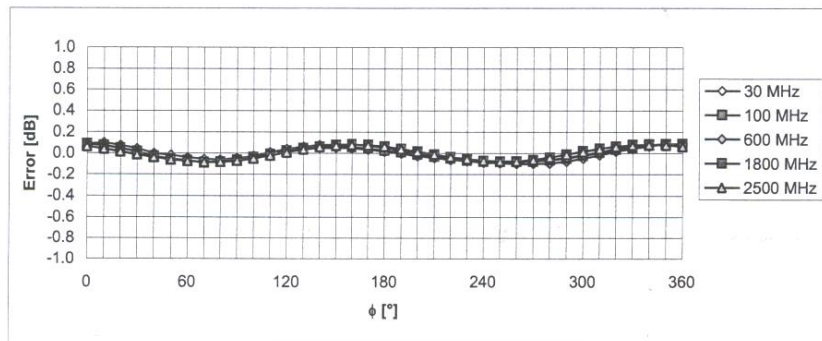
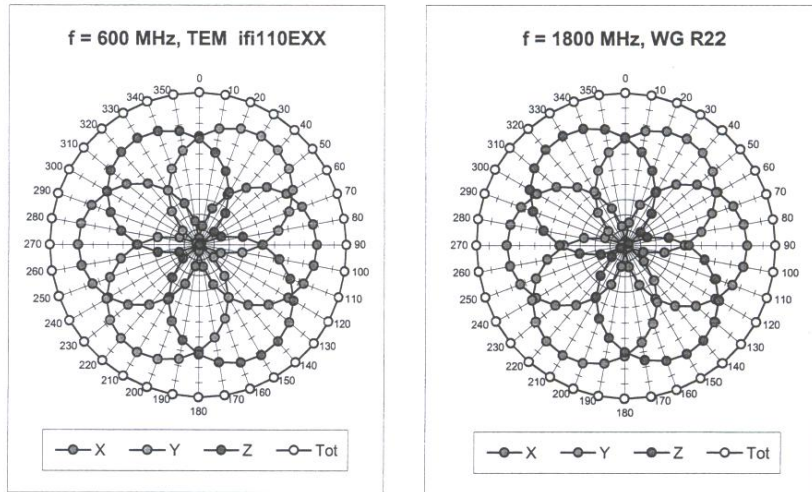
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ (k=2)



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

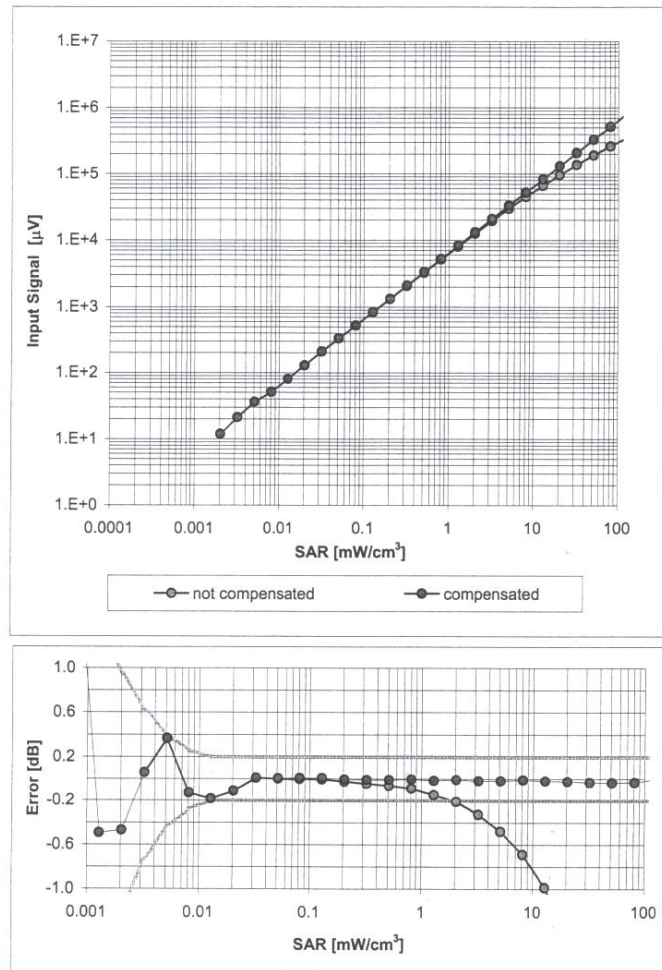


Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

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December 12, 2006

Dynamic Range $f(SAR_{head})$ (Waveguide R22, $f = 1800$ MHz)



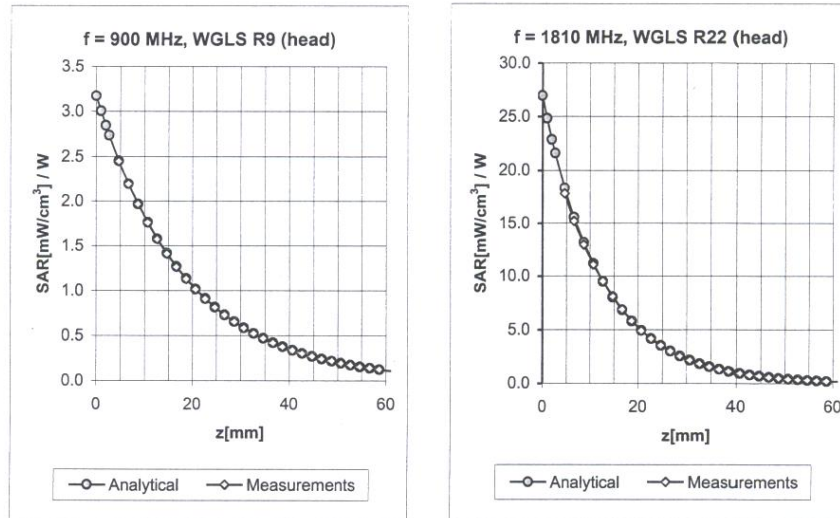
Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)



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Conversion Factor Assessment



f [MHz]	Validity [MHz] ^c	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
450	± 50 / ± 100	Head	43.5 ± 5%	0.87 ± 5%	0.39	1.95	7.04 ± 13.3% (k=2)
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.41	2.29	6.21 ± 11.0% (k=2)
1640	± 50 / ± 100	Head	40.3 ± 5%	1.29 ± 5%	0.54	2.57	5.39 ± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.61	2.42	5.19 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.85	1.68	4.32 ± 11.8% (k=2)
450	± 50 / ± 100	Body	56.7 ± 5%	0.94 ± 5%	0.32	2.01	7.57 ± 13.3% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.34	2.76	6.07 ± 11.0% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.65	2.60	4.52 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.80	1.72	4.21 ± 11.8% (k=2)

^c The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

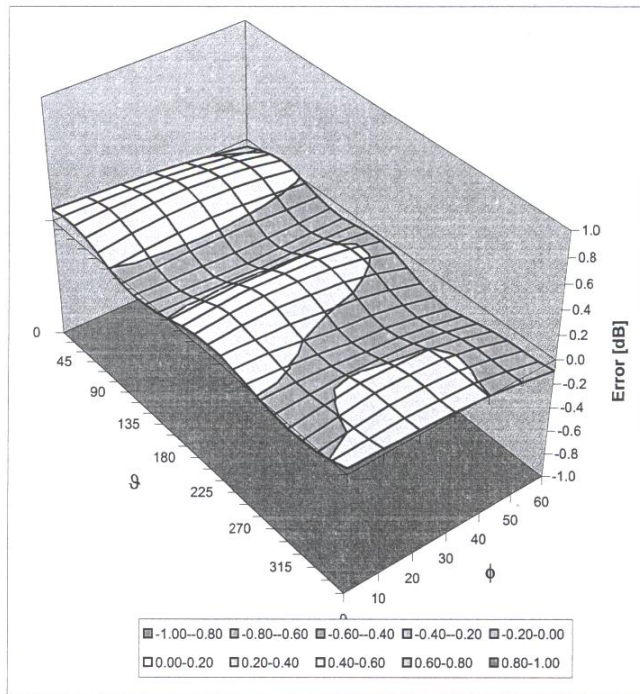


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Deviation from Isotropy in HSL

Error (ϕ , θ), $f = 900$ MHz



Uncertainty of Spherical Isotropy Assessment: $\pm 2.6\%$ ($k=2$)