

Applicant:KyoceraFCC ID:V65SCP-6760Report #:CT-V65-Probe-0709-R0

EXHIBIT 9 APPENDIX C: SAR PROBE CALIBRATION CERTIFICATE

Total pages including cover page = 37

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

Client



Schweizerischer Kalibrierdienst Service suisse d'étalonnage Servizio svizzero di taratura

S Swiss Calibration Service

Certificate No: ES3=3035 Aug08

Accredited by the Swiss Accreditation Service (SAS) The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Kyocera USA

Accreditation No.: SCS 108

S

С

Object	ES3DV3-SN-3(035	
Calibration procedure(s)		and QA CAL-23.v3 edure for dosimetric E-field probe	S
Calibration date:	August 25, 2008		
Condition of the calibrated item	In Tolerance		
The measurements and the unce	entainties with confidence	tional standards, which realize the physical uni probability are given on the following pages an	d are part of the certificate.
All calibrations have been conduc	cted in the closed laborate	ory facility: environment temperature (22 ± 3)°C	C and humidity < 70%.
Calibration Equipment used (M&	TE critical for calibration)		
Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	ID # GB41293874	1-Apr-08 (No. 217-00788)	Apr-09
ower meter E4419B ower sensor E4412A	GB41293874 MY41495277	1-Apr-08 (No. 217-00788) 1-Apr-08 (No. 217-00788)	Apr-09 Apr-09
Power meter E4419B Power sensor E4412A Power sensor E4412A	GB41293874 MY41495277 MY41498087	1-Apr-08 (No. 217-00788) 1-Apr-08 (No. 217-00788) 1-Apr-08 (No. 217-00788)	Apr-09 Apr-09 Apr-09
Power meter E4419B Power sensor E4412A Power sensor E4412A Reference 3 dB Attenuator	GB41293874 MY41495277 MY41498087 SN: S5054 (3c)	1-Apr-08 (No. 217-00788) 1-Apr-08 (No. 217-00788) 1-Apr-08 (No. 217-00788) 1-Jul-08 (No. 217-00865)	Арг-09 Арг-09 Арг-09 Jul-09
Power meter E4419B Power sensor E4412A Power sensor E4412A Reference 3 dB Attenuator Reference 20 dB Attenuator	GB41293874 MY41495277 MY41498087 SN: S5054 (3c) SN: S5086 (20b)	1-Apr-08 (No. 217-00788) 1-Apr-08 (No. 217-00788) 1-Apr-08 (No. 217-00788) 1-Jul-08 (No. 217-00865) 31-Mar-08 (No. 217-00787)	Apr-09 Apr-09 Apr-09 Jul-09 Apr-09
Primary Standards Power meter E4419B Power sensor E4412A Power sensor E4412A Reference 3 dB Attenuator Reference 20 dB Attenuator Reference 30 dB Attenuator	GB41293874 MY41495277 MY41498087 SN: S5054 (3c) SN: S5086 (20b) SN: S5129 (30b)	1-Apr-08 (No. 217-00788) 1-Apr-08 (No. 217-00788) 1-Apr-08 (No. 217-00788) 1-Jul-08 (No. 217-00865) 31-Mar-08 (No. 217-00787) 1-Jul-08 (No. 217-00866)	Apr-09 Apr-09 Apr-09 Jul-09 Apr-09 Jul-09
Power meter E4419B Power sensor E4412A Power sensor E4412A Reference 3 dB Attenuator Reference 20 dB Attenuator	GB41293874 MY41495277 MY41498087 SN: S5054 (3c) SN: S5086 (20b)	1-Apr-08 (No. 217-00788) 1-Apr-08 (No. 217-00788) 1-Apr-08 (No. 217-00788) 1-Jul-08 (No. 217-00865) 31-Mar-08 (No. 217-00787)	Apr-09 Apr-09 Apr-09 Jul-09 Apr-09
Power meter E4419B Power sensor E4412A Power sensor E4412A Reference 3 dB Attenuator Reference 20 dB Attenuator Reference 30 dB Attenuator Reference Probe ES3DV2 DAE4	GB41293874 MY41495277 MY41498087 SN: S5054 (3c) SN: S5086 (20b) SN: S5129 (30b) SN: 3013	1-Apr-08 (No. 217-00788) 1-Apr-08 (No. 217-00788) 1-Apr-08 (No. 217-00788) 1-Jul-08 (No. 217-00865) 31-Mar-08 (No. 217-00787) 1-Jul-08 (No. 217-00866) 2-Jan-08 (No. ES3-3013_Jan08)	Apr-09 Apr-09 Apr-09 Jul-09 Apr-09 Jul-09 Jan-09
Power meter E4419B Power sensor E4412A Power sensor E4412A Reference 3 dB Attenuator Reference 20 dB Attenuator Reference 30 dB Attenuator Reference Probe ES3DV2 DAE4 Recondary Standards	GB41293874 MY41495277 MY41498087 SN: S5054 (3c) SN: S5086 (20b) SN: S5129 (30b) SN: 3013 SN: 660	1-Apr-08 (No. 217-00788) 1-Apr-08 (No. 217-00788) 1-Apr-08 (No. 217-00788) 1-Jul-08 (No. 217-00865) 31-Mar-08 (No. 217-00866) 2-Jan-08 (No. ES3-3013_Jan08) 3-Sep-07 (No. DAE4-660_Sep07)	Apr-09 Apr-09 Apr-09 Jul-09 Apr-09 Jul-09 Jan-09 Sep-08
Power meter E4419B Power sensor E4412A Power sensor E4412A Reference 3 dB Attenuator Reference 20 dB Attenuator Reference 30 dB Attenuator Reference Probe ES3DV2 DAE4 Recondary Standards RF generator HP 8648C	GB41293874 MY41495277 MY41498087 SN: S5054 (3c) SN: S5086 (20b) SN: S5129 (30b) SN: 3013 SN: 660	1-Apr-08 (No. 217-00788) 1-Apr-08 (No. 217-00788) 1-Apr-08 (No. 217-00788) 1-Jul-08 (No. 217-00865) 31-Mar-08 (No. 217-00787) 1-Jul-08 (No. 217-00866) 2-Jan-08 (No. ES3-3013_Jan08) 3-Sep-07 (No. DAE4-660_Sep07) Check Date (in house)	Apr-09 Apr-09 Apr-09 Jul-09 Apr-09 Jul-09 Jan-09 Sep-08 Scheduled Check
Power meter E4419B Power sensor E4412A Power sensor E4412A Reference 3 dB Attenuator Reference 20 dB Attenuator Reference 30 dB Attenuator Reference Probe ES3DV2 DAE4 Secondary Standards RF generator HP 8648C Retwork Analyzer HP 8753E	GB41293874 MY41495277 MY41498087 SN: S5054 (3c) SN: S5086 (20b) SN: S5129 (30b) SN: 3013 SN: 660 ID # US3642U01700 US37390585 Name	1-Apr-08 (No. 217-00788) 1-Apr-08 (No. 217-00788) 1-Apr-08 (No. 217-00788) 1-Jul-08 (No. 217-00865) 31-Mar-08 (No. 217-00866) 2-Jan-08 (No. 217-00866) 2-Jan-08 (No. ES3-3013_Jan08) 3-Sep-07 (No. DAE4-660_Sep07) Check Date (in house) 4-Aug-99 (in house check Oct-07) 18-Oct-01 (in house check Oct-07) Function	Apr-09 Apr-09 Apr-09 Jul-09 Apr-09 Jul-09 Jan-09 Sep-08 Scheduled Check In house check: Oct-09
Power meter E4419B Power sensor E4412A Power sensor E4412A Reference 3 dB Attenuator Reference 20 dB Attenuator Reference 30 dB Attenuator Reference Probe ES3DV2 DAE4 Recondary Standards Regenerator HP 8648C Retwork Analyzer HP 8753E	GB41293874 MY41495277 MY41498087 SN: S5054 (3c) SN: S5086 (20b) SN: S5129 (30b) SN: 3013 SN: 660 ID # US3642U01700 US37390585	1-Apr-08 (No. 217-00788) 1-Apr-08 (No. 217-00788) 1-Apr-08 (No. 217-00788) 1-Jul-08 (No. 217-00865) 31-Mar-08 (No. 217-00866) 2-Jan-08 (No. 217-00866) 2-Jan-08 (No. ES3-3013_Jan08) 3-Sep-07 (No. DAE4-660_Sep07) Check Date (in house) 4-Aug-99 (in house check Oct-07) 18-Oct-01 (in house check Oct-07)	Apr-09 Apr-09 Jul-09 Apr-09 Jul-09 Jan-09 Sep-08 Scheduled Check In house check: Oct-09 In house check: Oct-08
Power meter E4419B Power sensor E4412A Power sensor E4412A Reference 3 dB Attenuator Reference 20 dB Attenuator Reference 30 dB Attenuator Reference Probe ES3DV2 DAE4 Recondary Standards RF generator HP 8648C	GB41293874 MY41495277 MY41498087 SN: S5054 (3c) SN: S5086 (20b) SN: S5129 (30b) SN: 3013 SN: 660 ID # US3642U01700 US37390585 Name	1-Apr-08 (No. 217-00788) 1-Apr-08 (No. 217-00788) 1-Apr-08 (No. 217-00788) 1-Jul-08 (No. 217-00865) 31-Mar-08 (No. 217-00866) 2-Jan-08 (No. 217-00866) 2-Jan-08 (No. ES3-3013_Jan08) 3-Sep-07 (No. DAE4-660_Sep07) Check Date (in house) 4-Aug-99 (in house check Oct-07) 18-Oct-01 (in house check Oct-07) Function	Apr-09 Apr-09 Jul-09 Apr-09 Jul-09 Jan-09 Sep-08 Scheduled Check In house check: Oct-09 In house check: Oct-08

Calibration Laboratory of

Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland





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- S Swiss Calibration Service

Accreditation No.: SCS 108

Accredited by the Swiss Accreditation Service (SAS) The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Glossary:	
TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
Polarization φ	φ rotation around probe axis
Polarization 9	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- *NORMx*, *y*, *z*: Assessed for E-field polarization $\vartheta = 0$ (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx, y, z does not effect the E^2 -field uncertainty inside TSL (see below ConvF).
- NORM(f)x, y, z = NORMx, y, z * frequency_response (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- DCPx, y, z: DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- ConvF and Boundary Effect Parameters: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \le 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORMx, y, z * ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from \pm 50 MHz to \pm 100 MHz.
- Spherical isotropy (3D deviation from isotropy): in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe ES3DV3

SN:3035

Manufactured: Last calibrated: Recalibrated: August 21, 2003 September 19, 2007 August 25, 2008

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ES3DV3 SN:3035

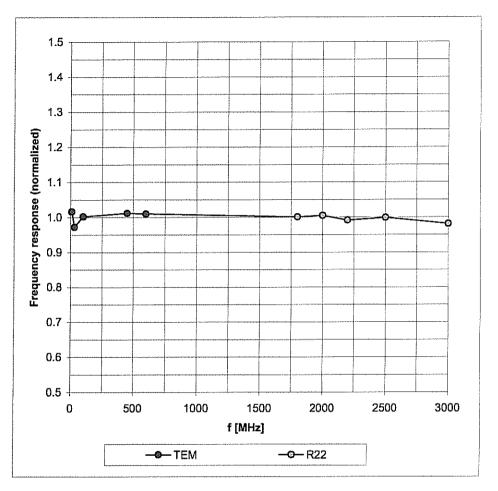
Sens	sitivity in Fre	ee Spac	e ^A		Diode	Compression ^B			
	NormX	1.1	1 ± 10.1%	μV/(V/m) ²	DCP X	97 mV			
	NormY		3 ± 10.1%	μV/(V/m) ²	DCP Y				
	NormZ		5 ± 10.1%	μV/(V/m) ²	DCP Z	96 mV			
Sens	Sensitivity in Tissue Simulating Liquid (Conversion Factors)								
Please	see Page 8.								
Bour	dary Effect								
TSL	8	35 MHz	Typical SA	R gradient: 5 % j	per mm				
				-					
	Sensor Cente	r to Phanto	m Surface Di	stance	3.0 mm	4.0 mm			
	SAR _{be} [%]	Without	Correction A	lgorithm	9.1	5.0			
	SAR _{be} [%]	With Co	prrection Algo	rithm	0.8	0.3			
TSL	19	00 MHz	Typical SA	R gradient: 10 %	per mm				
	Sensor Center	r to Phanto	m Surface Di	stance	3.0 mm	4.0 mm			
	SAR _{be} [%]	Without	Correction A	lgorithm	8.5	4.8			
	SAR _{be} [%]	With Co	rrection Algo	rithm	0.4	0.2			
Sens	or Offset								
	Probe Tip to Sensor Center				2.0 mm				
The re	ported uncer	tainty of I	neasureme	nt is stated as t	be standard u	Incertainty of			

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).

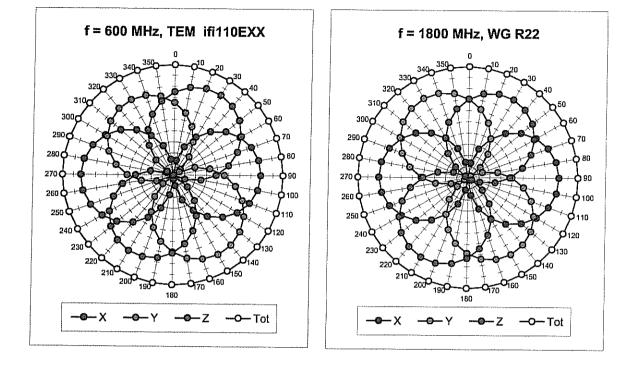
^a Numerical linearization parameter: uncertainty not required.

Frequency Response of E-Field

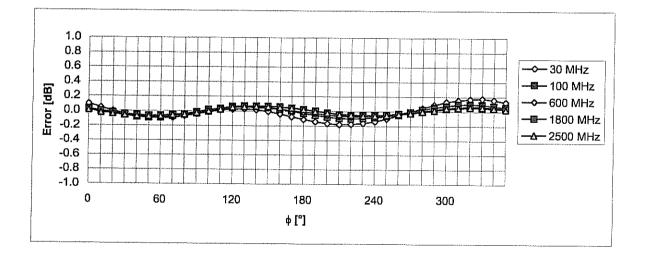


(TEM-Cell:ifi110 EXX, Waveguide: R22)

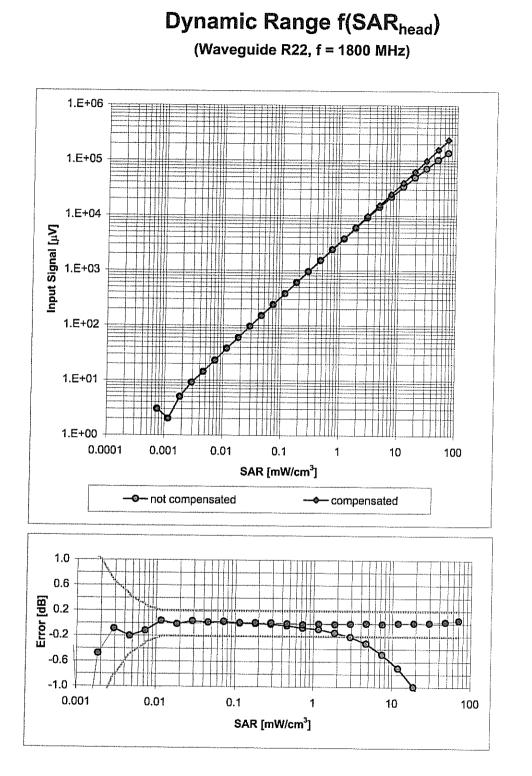
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)



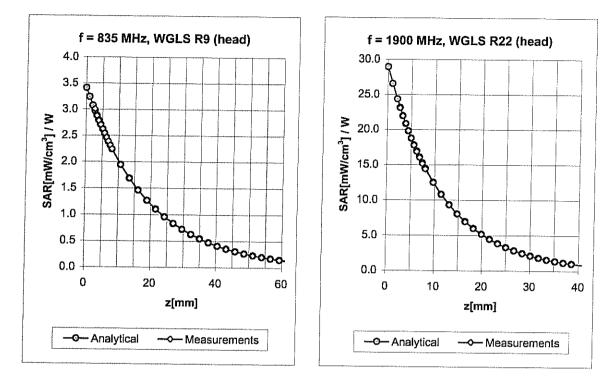
Receiving Pattern (ϕ), $\vartheta = 0^{\circ}$



Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)



Uncertainty of Linearity Assessment: ± 0.6% (k=2)



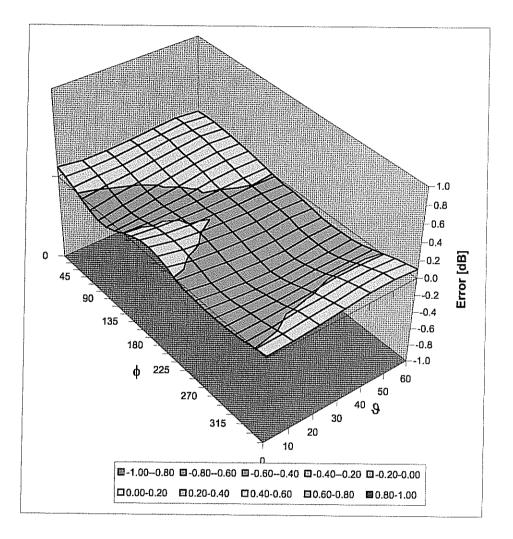
Conversion Factor Assessment

f [MHz]	Validity [MHz] ^c	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty	
835	± 50 / ± 100	Head	41.5 ± 5%	0.90 ± 5%	0.43	1.49	6.20 ± 11.0% (k=	=2)
1900	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.66	1.27	5.01 ± 11.0% (k=	=2)
835	± 50 / ± 100	Body	55.2 ± 5%	0.97 ± 5%	0.60	1.28	6.06 ± 11.0% (k=	:2)
1900	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.45	1.77	4.65 ± 11.0% (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.

Deviation from Isotropy in HSL

Error (φ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

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



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Client Kyocera USA

certificate Nor ES3-3036 Sep08

Accreditation No.: SCS 108

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GATERATION	Her Heren	E					
Object	ES3DV3-SN3	036					
Calibration procedure(s)	QA CAL-01.v6 and QA CAL-23.v3 Calibration procedure for dosimetric E-field probes						
Calibration date:	September 18,	2008					
Condition of the calibrated item	In Tolerance						
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 ± 3)°C and humidity < 70%.							
Calibration Equipment used (M&T	E critical for calibration)						
Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration				
Power meter E4419B	GB41293874	1-Apr-08 (No. 217-00788)	Apr-09				
Power sensor E4412A	MY41495277	1-Apr-08 (No. 217-00788)	Apr-09				
Power sensor E4412A	MY41498087	1-Apr-08 (No. 217-00788)	Apr-09				
Reference 3 dB Attenuator	SN: S5054 (3c)	1-Jul-08 (No. 217-00865)	90-luC				
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-08 (No. 217-00787)	Арг-09				
Reference 30 dB Attenuator	SN: S5129 (30b)	1-Jul-08 (No. 217-00866)	60-luL				
Reference Probe ES3DV2	SN: 3013	2-Jan-08 (No. ES3-3013_Jan08)	Jan-09				
DAE4	SN: 660	9-Sep-08 (No. DAE4-660_Sep08)	Sep-09				
Secondary Standards	ID #	Check Date (in house)	Scheduled Check				
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-07)	In house check: Oct-09				
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-07)	In house check: Oct-08				
	Name	Function	Signature				
Calibrated by:	Katja Pokovic	Technical Manager	_T_ #2				
Approved by:	Niejs Kuster	Quality Manager	1.125				
This calibration certificate shall no	t be reproduced except i	n full without written approval of the laboratory.	Issued: September 19, 2008				

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





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Glossary:	
TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
Polarization φ	φ rotation around probe axis
Polarization 9	$\frac{1}{9}$ rotation around an axis that is in the plane normal to probe axis (at
	measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

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- NORM(f)x,y,z = NORMx,y,z * frequency_response (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- ConvF and Boundary Effect Parameters: Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z* * *ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy): in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe ES3DV3

SN:3036

Manufactured: Last calibrated: Recalibrated: August 21, 2003 October 22, 2007 September 18, 2008

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ES3DV3 SN:3036

Sens	sitivity in F	ree Spac	Diode	Compression ^B					
	NormX	1.2	2 ± 10.1%	μV/(V/m)²	DCP X	91 mV			
	NormY	1.4	0 ± 10.1%	μV/(V/m) ²	DCP Y	94 mV			
	NormZ	1.4	3 ± 10.1%	μV/(V/m) ²	DCP Z	93 mV			
Sens	Sensitivity in Tissue Simulating Liquid (Conversion Factors)								
	see Page 8.		Ū	· · ·		<i>'</i>			
Boun	idary Effec	st							
TSL		835 MHz	Typical SA	AR gradient: 5 %	per mm				
	Sensor Cent	er to Phanto	m Surface Di	istance	3.0 mm	4.0 mm			
	SAR _{be} [%]	Without	Correction A	lgorithm	12.1	8.1			
	SAR _{be} [%]	With Co	rrection Algo	rithm	0.7	0.4			
TSL	1	900 MHz	Typical SA	R gradient: 10 %	per mm				
	Sensor Cent	er to Phantor	n Surface Di	stance	3.0 mm	4.0 mm			
	SAR _{be} [%]	Without	Correction A	Igorithm	11.7	7.9			
	SAR _{be} [%]	With Co	rrection Algo	rithm	0.4	0.2			
Sensor Offset									
	Probe Tip to Sensor Center				2.0 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).

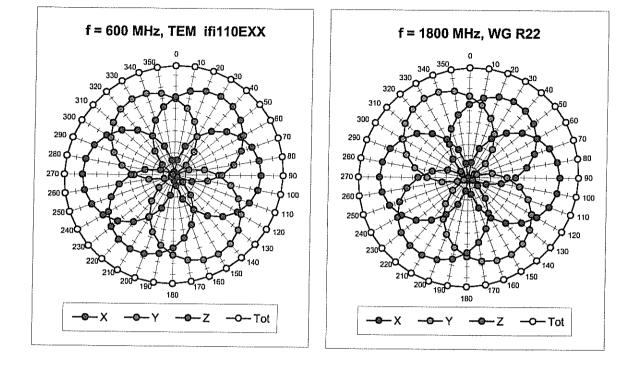
^B Numerical linearization parameter: uncertainty not required.

Frequency Response of E-Field

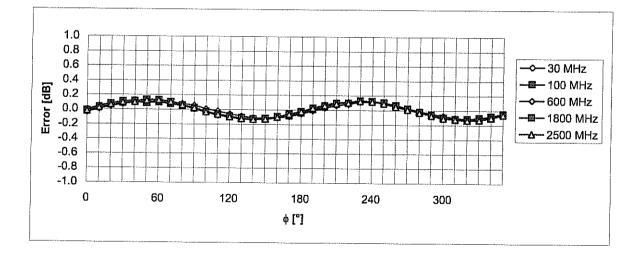
1.5 1.4 1.3 Frequency response (normalized) 1.2 1.1 1.0 0.9 0.8 0.7 0.6 0.5 0 500 1000 1500 2000 2500 3000 f [MHz] -O- TEM -0- R22

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

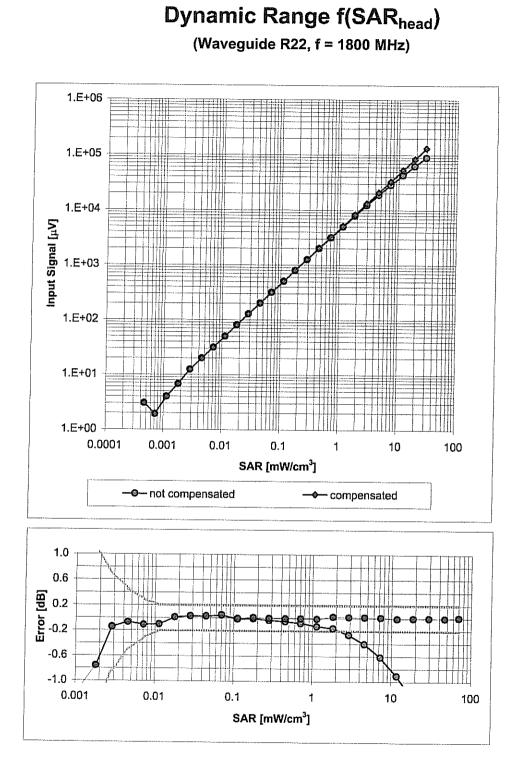
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)



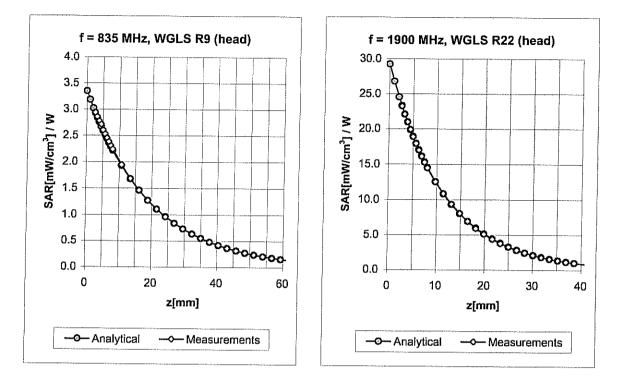
Receiving Pattern (ϕ), ϑ = 0°



Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)



Uncertainty of Linearity Assessment: ± 0.6% (k=2)



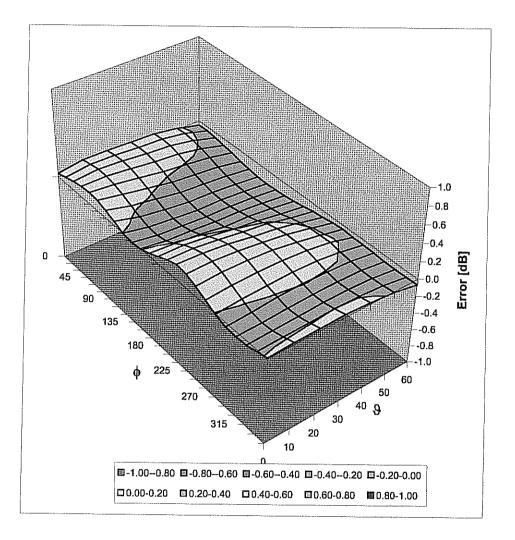
Conversion Factor Assessment

f [MHz]	Validity [MHz] ^C	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
835	± 50 / ± 100	Head	41.5 ± 5%	0.90 ± 5%	0.62	1.46	6.09 ± 11.0% (k=2)
1900	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.40	1.98	5.02 ± 11.0% (k=2)
835	± 50 / ± 100	Body	55.2 ± 5%	0.97 ± 5%	0.99	1.09	5.97 ± 11.0% (k=2)
1900	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.40	2.02	4.56 ± 11.0% (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.

Deviation from Isotropy in HSL

Error (φ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)



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Client Kyocera US	Ą	Ċa	ntificate No: ET3-1618_Aug08
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Object	ET3DV6-SN11	518	
			NATIONAL AND
Calibration procedure(s)		ind QA CAL-23.v3 edure for dosimetric E-fiel	d probes
Calibration date:	August 25, 2008		
Condition of the calibrated ite	m In Tolerance		
			physical units of measurements (SI). g pages and are part of the certificate.
All calibrations have been cor	nducted in the closed laborato	ory facility: environment temperature	e (22 ± 3)°C and humidity < 70%.
Calibration Equipment used (I	M&TE critical for calibration)		
Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-08 (No. 217-00788)	Арт-09
Power sensor E4412A	MY41495277	1-Apr-08 (No. 217-00788)	Apr-09
Power sensor E4412A	MY41498087	1-Apr-08 (No. 217-00788)	Арг-09
Reference 3 dB Attenuator	SN: S5054 (3c)	1-Jul-08 (No. 217-00865)	Jul-09
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-08 (No. 217-00787)	Арг-09
Reference 30 dB Attenuator	SN: S5129 (30b)	1-Jul-08 (No. 217-00866)	Jul-09
Reference Probe ES3DV2	SN: 3013	2-Jan-08 (No. ES3-3013_Jan08	3) Jan-09
DAE4	SN: 660	3-Sep-07 (No. DAE4-660_Sep	07) Sep-08
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-0	
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-	
	Name	Function	Signature
Calibrated by:	Katja Pokovic	Technical Manage	Flight
Approved by:	Niels Kuster	Quality Manager	X / / ké
ւ դրբւնմեն նչ.		Youny manager	/V./
			issued: August 25, 2008
This calibration certificate sha	Il not be reproduced except in	n full without written approval of the	laboratory.

Calibration Laboratory of

Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland





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Glossary:	
TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
Polarization φ	φ rotation around probe axis
Polarization 9	9 rotation around an axis that is in the plane normal to probe axis (at
	measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- NORMx, y, z: Assessed for E-field polarization θ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx, y, z are only intermediate values, i.e., the uncertainties of NORMx, y, z does not effect the E²-field uncertainty inside TSL (see below ConvF).
- NORM(f)x,y,z = NORMx,y,z * frequency_response (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- DCPx,y,z: DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- ConvF and Boundary Effect Parameters: Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z* * *ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy): in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe ET3DV6

SN:1618

Manufactured: Last calibrated: Recalibrated:

January 25, 2002 September 19, 2007 August 25, 2008

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ET3DV6 SN:1618

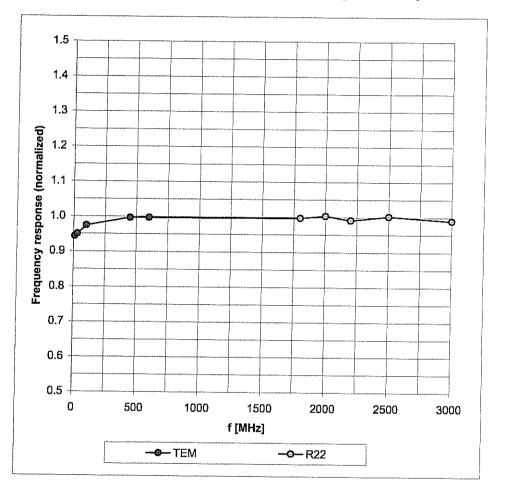
Sens	sitivity in Fr	ee Spac		Diode	Compression ^B			
	NormX	2.0	4 ± 10.1%	μV/(V/m) ²	DCP X	93 mV		
	NormY	2.0	1 ± 10.1%	μV/(V/m) ²	DCP Y	92 m∨		
	NormZ	2.1	7 ± 10.1%	μV/(V/m)²	DCP Z	96 mV		
Sensitivity in Tissue Simulating Liquid (Conversion Factors)								
Please	see Page 8.							
Bour	Boundary Effect							
TSL	٤	335 MHz	Typical SA	R gradient: 5 %	per mm			
	Sensor Cente	er to Phanto	m Surface Di	stance	3.7 mm	4.7 mm		
	SAR _{be} [%]	Without	Correction A	lgorithm	10.0	6.1		
	SAR _{be} [%]	With Co	rrection Algo	rithm	0.8	0.5		
TSL	17	50 MHz	Typical SA	R gradient: 10 %	per mm			
	Sensor Cente	er to Phanto	m Surface Di	stance	3.7 mm	4.7 mm		
	SAR _{be} [%]	Without	Correction A	lgorithm	11.0	6.9		
	SAR _{ba} [%]	With Co	rrection Algo	rithm	0.6	0.3		
Sens	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).

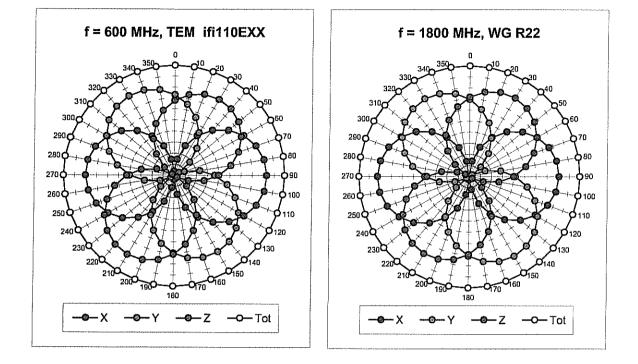
^B Numerical linearization parameter: uncertainty not required.

Frequency Response of E-Field

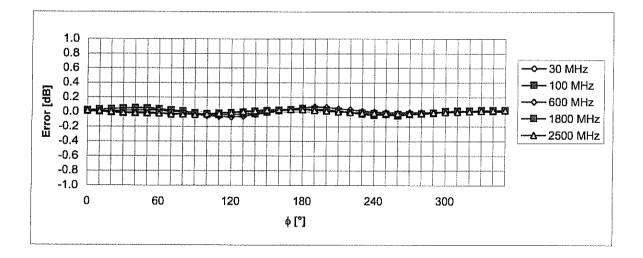


(TEM-Cell:ifi110 EXX, Waveguide: R22)

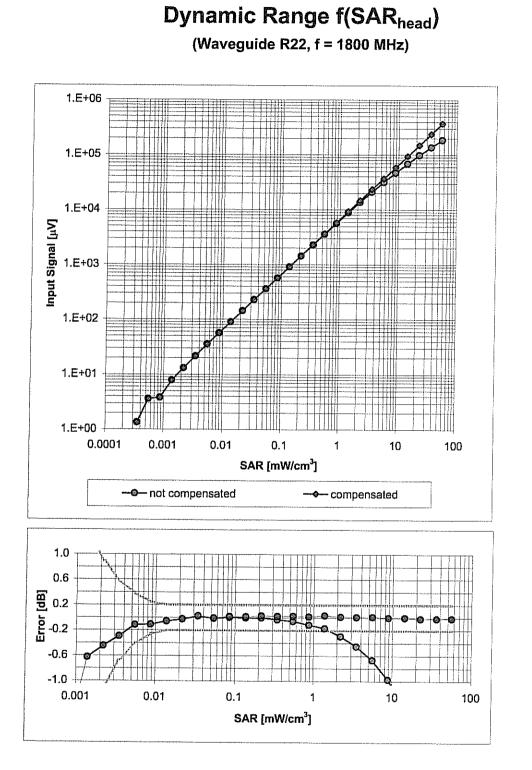
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)



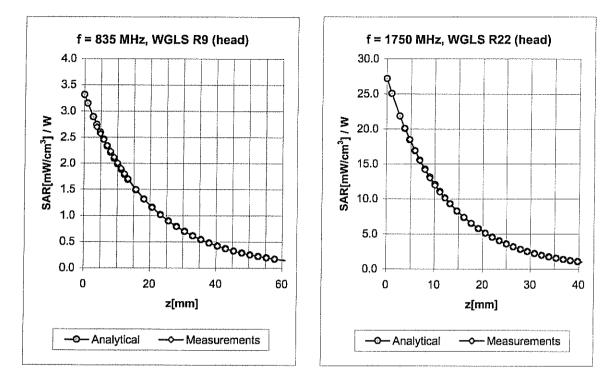
Receiving Pattern (ϕ **),** ϑ = 0°



Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)



Uncertainty of Linearity Assessment: ± 0.6% (k=2)



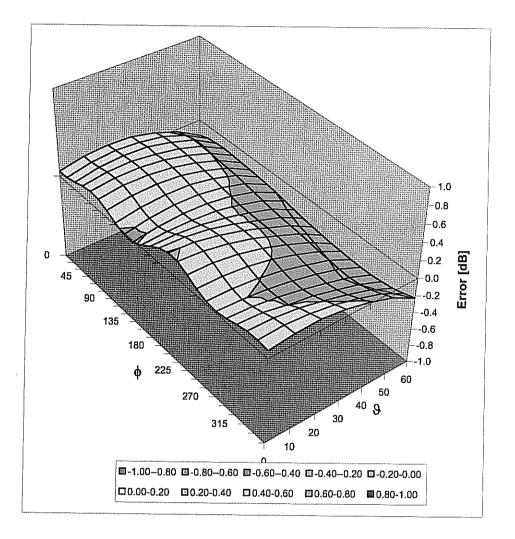
Conversion Factor Assessment

f [MHz]	Validity [MHz] ^c	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
835	± 50 / ± 100	Head	41.5 ± 5%	0.90 ± 5%	0.50	2.40	6.64 ± 11.0% (k=2)
1750	± 50 / ± 100	Head	40.1 ± 5%	1.37 ± 5%	0.58	2.21	5.57 ± 11.0% (k=2)
1900	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.65	1.90	5.29 ± 11.0% (k=2)
835	± 50 / ± 100	Body	55.2 ± 5%	0.97 ± 5%	0.54	2.36	6.41 ± 11.0% (k=2)
1750	± 50 / ± 100	Body	53.4 ± 5%	1.49 ± 5%	0.59	2.19	4.89 ± 11.0% (k=2)
1900	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.63	2.00	4.57 ± 11.0% (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.

Deviation from Isotropy in HSL

Error (φ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

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Accreditation No.: SCS 108

Certificate No: E13-1663 Sep08

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Kyocera USA Client

GALERATION	garala(o .vi	E	
Object	ET3DV6-SNM	663	
Calibration procedure(s)	and the part of the ball of the second start o	and QA CAL-23.v3 edure for dosimetric E-field prob	es
Calibration date:	September 22,	2008	
Condition of the calibrated item	In Tolerance		
		tional standards, which realize the physical u probability are given on the following pages a	
All calibrations have been condu	cted in the closed laborat	ory facility: environment temperature (22 \pm 3)	°C and humidity < 70%.
Calibration Equipment used (M&	TE critical for calibration)		
Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-08 (No. 217-00788)	Apr-09
Power sensor E4412A	MY41495277	1-Apr-08 (No. 217-00788)	Apr-09
Power sensor E4412A	MY41498087	1-Apr-08 (No. 217-00788)	Apr-09
Reference 3 dB Attenuator	SN: S5054 (3c)	1-Jul-08 (No. 217-00865)	Jul-09
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-08 (No. 217-00787)	Apr-09
Reference 30 dB Attenuator	SN: S5129 (30b)	1-Jul-08 (No. 217-00866)	Jul-09
Reference Probe ES3DV2	SN: 3013	2-Jan-08 (No. ES3-3013_Jan08)	Jan-09
DAE4	SN: 660	9-Sep-08 (No. DAE4-660_Sep08)	Sep-09
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-07)	In house check: Oct-08
	Name	Function	Signature
Calibrated by:	Katja Pokovic	Technical Manager	For for
Approved by:	Niels Kuster	Quality Manager	λ/k
This polibration cartificate about	at he reproduced event i	n full without written approval of the laborator	Issued: September 22, 2008

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Accreditation No.: SCS 108

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tissue simulating liquid
sensitivity in free space
sensitivity in TSL / NORMx,y,z
diode compression point
φ rotation around probe axis
ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- *NORMx*, *y*, *z*: Assessed for E-field polarization $\vartheta = 0$ (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx, y, z does not effect the E^2 -field uncertainty inside TSL (see below ConvF).
- NORM(f)x,y,z = NORMx,y,z * frequency_response (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- DCPx, v, z: DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- ConvF and Boundary Effect Parameters: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \le 800 \text{ MHz}$) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORMx, y, z * ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from \pm 50 MHz to \pm 100 MHz.
- Spherical isotropy (3D deviation from isotropy): in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe ET3DV6

SN:1663

Manufactured: Last calibrated: Modified: Recalibrated: February 8, 2002 October 22, 2007 September 18, 2008 September 22, 2008

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ET3DV6 SN:1663

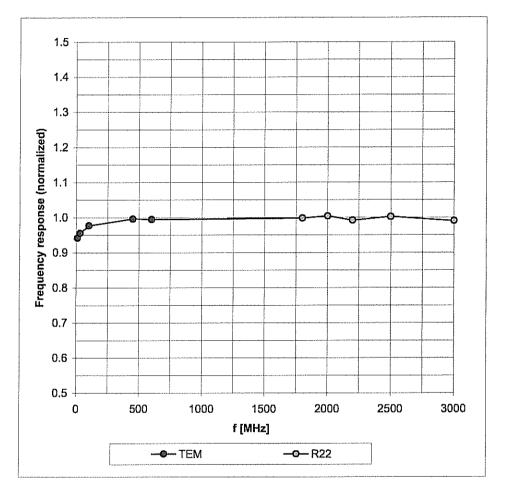
Sensitivity in Free Space ^A Diode Compression ^B								
	NormX	2.0	08 ± 10.1%	μV/(V/m) ²	DCP X	91 mV		
	NormY	1.7	75 ± 10.1%	μV/(V/m) ²	DCP Y	93 mV		
	NormZ		19 ± 10.1%	μV/(V/m) ²	DCP Z	92 mV		
Sens	Sensitivity in Tissue Simulating Liquid (Conversion Factors)							
Please	see Page 8.							
Boun	dary Effect							
TSL	835	MHz	Typical SAP	gradient: 5 % per	mm			
	000	1911 14.	i ypical oAll	gradient. o /s per				
	Sensor Center to Phantom Surface Distance 3.7 mm 4.7 mm							
	SAR _{be} [%]	Without Correction Algorithm			10.5	6.1		
	SAR _{be} [%]	With C	orrection Algorit	hm	0.8	0.5		
TÊL	4000	1011-	Turinal SAD	andiant 10 % no	-			
TSL	1900	MHZ	Typical SAR	gradient: 10 % pe	r mm			
	Sensor Center to	Phanto	om Surface Dista	ance	3.7 mm	4.7 mm		
	SAR _{be} [%]	Withou	t Correction Alg	orithm	12.3	7.5		
	SAR _{be} [%]	With C	orrection Algorit	hm	0.9	0.2		
Sense	or Offset							
	Probe Tip to Sen	sor Cer	nter	2	2.7 mm			
Tho re	ported upocite			t is stated as the	ctandard	incontainty of		

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).

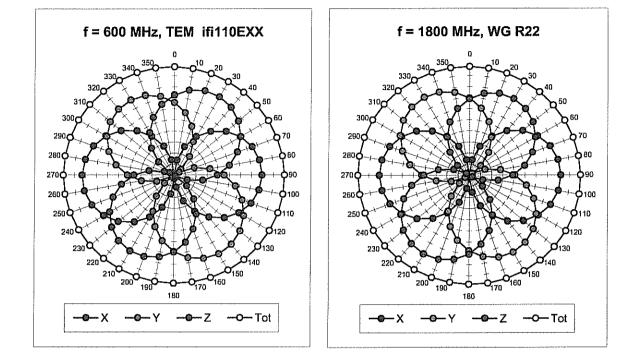
^B Numerical linearization parameter: uncertainty not required.

Frequency Response of E-Field

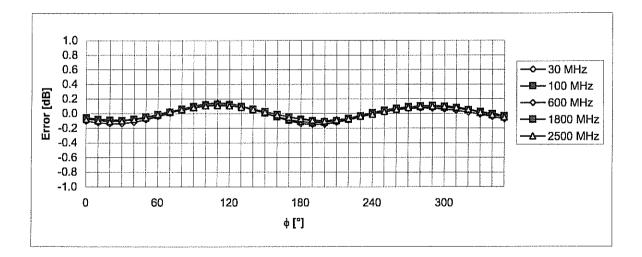


(TEM-Cell:ifi110 EXX, Waveguide: R22)

Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

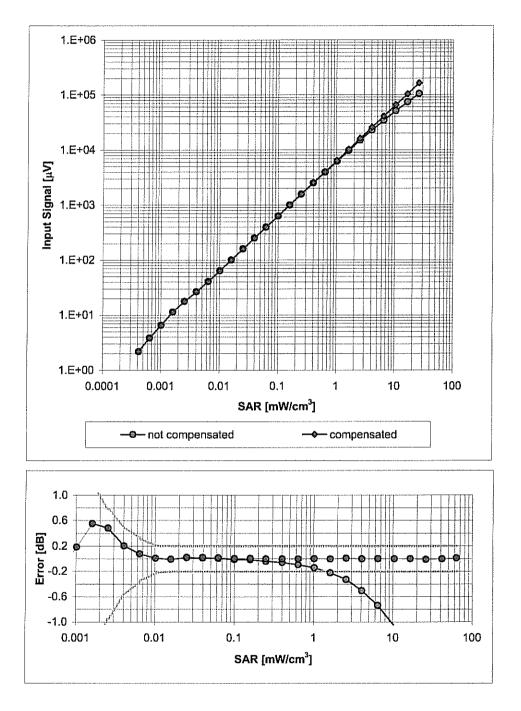


Receiving Pattern (ϕ), $\vartheta = 0^{\circ}$

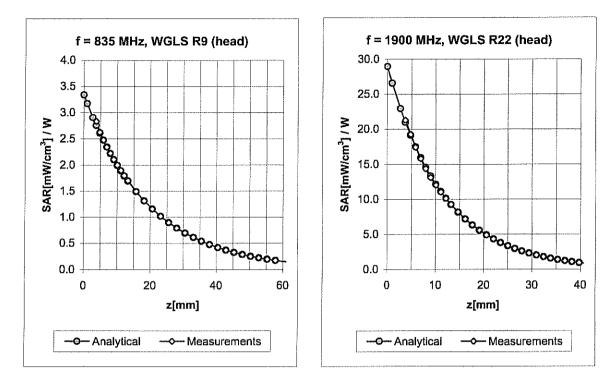


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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



Uncertainty of Linearity Assessment: ± 0.6% (k=2)



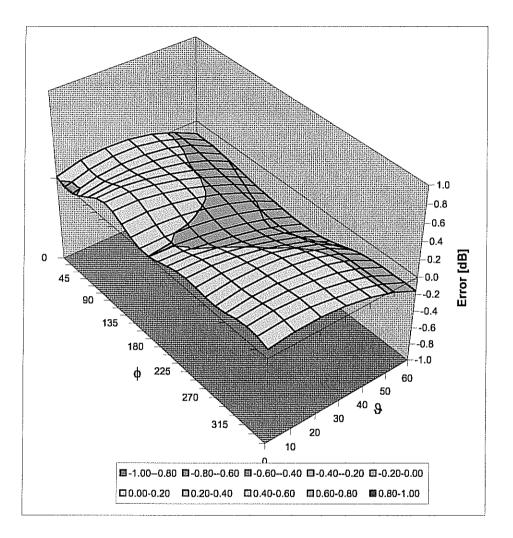
Conversion Factor Assessment

f [MHz]	Validity [MHz] ^c	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty	
835	± 50 / ± 100	Head	41.5 ± 5%	0.90 ± 5%	0.18	3.94	6.58	± 11.0% (k=2)
1900	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.85	2.01	5.20	± 11.0% (k=2)
835	± 50 / ± 100	Body	55.2 ± 5%	0.97 ± 5%	0.23	3.46	6.25	± 11.0% (k=2)
1900	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.85	1.95	4.52	± 11.0% (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.

Deviation from Isotropy in HSL

Error (φ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)