

Appendix B - DAE & Probe Calibration Certificate

	itation Service (SAS)		reditation No.: SCS 0108
he Swiss Accreditation Serv			
ultilateral Agreement for the	recognition of calibration c		and the second second
lient SGS-TW (Aud	den)	Certificate No:	EX3-7466_Feb19
CALIBRATION	CERTIFICATE		
Object	EX3DV4 - SN:746	6	
	04 041 04 0 0		041 00 5
Calibration procedure(s)		A CAL-12.v9, QA CAL-14.v5, QA	CAL-23.v5,
	QA CAL-25.v7	luro for dosimotrio E field probas	
	Calibration proced	lure for dosimetric E-field probes	
Collination data	Cabruant 4 0040		
Calibration date:	February 4, 2019		
This solition and Easts dool	mante the transferred life to anti-		100
		nal standards, which realize the physical units	and the second
		bability are given on the following pages and facility: environment temperature (22 \pm 3)°C a	and the second
All calibrations have been cond	lucted in the closed laboratory		and the second
All calibrations have been cond Calibration Equipment used (M	lucted in the closed laboratory		and the second
All calibrations have been cond Calibration Equipment used (M Primary Standards	ducted in the closed laboratory	facility: environment temperature (22 ± 3)°C a	and humidity < 70%.
All calibrations have been cond Calibration Equipment used (M Primary Standards Power meter NRP Power sensor NRP-291	ducted in the closed laboratory	facility: environment temperature (22 ± 3)°C a Cal Date (Certificate No.) 04-Apr-18 (No. 217-02672/02673) 04-Apr-18 (No. 217-02672)	and humidity < 70%.
All calibrations have been cond Calibration Equipment used (M Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91	Uucted in the closed laboratory &TE critical for calibration) ID SN: 104778 SN: 103244 SN: 103245	facility: environment temperature (22 ± 3)°C a Cal Date (Certificate No.) 04-Apr-18 (No. 217-02672/02673) 04-Apr-18 (No. 217-02672) 04-Apr-18 (No. 217-02673)	Scheduled Calibration Apr-19 Apr-19 Apr-19
All calibrations have been cond Calibration Equipment used (M Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator	Aucted in the closed laboratory (&TE critical for calibration) ID SN: 104778 SN: 103244 SN: 103245 SN: S5277 (20x)	facility: environment temperature (22 ± 3)°C a Cal Date (Certificate No.) 04-Apr-18 (No. 217-02672/02673) 04-Apr-18 (No. 217-02672) 04-Apr-18 (No. 217-02673) 04-Apr-18 (No. 217-02682)	Scheduled Calibration Apr-19 Apr-19 Apr-19 Apr-19 Apr-19
All calibrations have been cond Calibration Equipment used (M Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator DAE4	ID ID SN: 104778 SN: 103244 SN: 103245 SN: 55277 (20x) SN: 660 SN: 660	Cal Date (Certificate No.) 04-Apr-18 (No. 217-02672/02673) 04-Apr-18 (No. 217-02672) 04-Apr-18 (No. 217-02682) 19-Dec-18 (No. DAE4-660_Dec18)	Scheduled Calibration Apr-19 Apr-19 Apr-19 Apr-19 Apr-19 Dec-19
All calibrations have been cond Calibration Equipment used (M Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator	Aucted in the closed laboratory (&TE critical for calibration) ID SN: 104778 SN: 103244 SN: 103245 SN: S5277 (20x)	facility: environment temperature (22 ± 3)°C a Cal Date (Certificate No.) 04-Apr-18 (No. 217-02672/02673) 04-Apr-18 (No. 217-02672) 04-Apr-18 (No. 217-02673) 04-Apr-18 (No. 217-02682)	Scheduled Calibration Apr-19 Apr-19 Apr-19 Apr-19 Apr-19
All calibrations have been cond Calibration Equipment used (M Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator DAE4 Reference Probe ES3DV2	Uncted in the closed laboratory INTE critical for calibration) ID SN: 104778 SN: 103244 SN: 103245 SN: 03245 SN: 55277 (20x) SN: 660 SN: 3013	facility: environment temperature (22 ± 3)°C a Cal Date (Certificate No.) 04-Apr-18 (No. 217-02672/02673) 04-Apr-18 (No. 217-02672) 04-Apr-18 (No. 217-02673) 04-Apr-18 (No. 217-02682) 19-Dec-18 (No. DAE4-660_Dec18) 31-Dec-18 (No. ES3-3013_Dec18)	Scheduled Calibration Apr-19 Apr-19 Apr-19 Apr-19 Dec-19 Dec-19
All calibrations have been cond Calibration Equipment used (M Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator DAE4 Reference Probe ES3DV2 Secondary Standards	ID SN: 104778 SN: 103244 SN: 103245 SN: 103245 SN: 55277 (20x) SN: 660 SN: 3013 ID	Cal Date (Certificate No.) 04-Apr-18 (No. 217-02672/02673) 04-Apr-18 (No. 217-02672) 04-Apr-18 (No. 217-02673) 04-Apr-18 (No. 217-02673) 04-Apr-18 (No. 217-02682) 19-Dec-18 (No. ES3-3013_Dec18) 31-Dec-18 (no. base)	Apr-19 Apr-19 Apr-19 Apr-19 Apr-19 Dec-19 Dec-19 Dec-19 Scheduled Check
All calibrations have been cond Calibration Equipment used (M Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator DAE4 Reference Probe ES3DV2	Uncted in the closed laboratory INTE critical for calibration) ID SN: 104778 SN: 103244 SN: 103245 SN: 03245 SN: 55277 (20x) SN: 660 SN: 3013	Cal Date (Certificate No.) 04-Apr-18 (No. 217-02672/02673) 04-Apr-18 (No. 217-02672) 04-Apr-18 (No. 217-02672) 04-Apr-18 (No. 217-02673) 04-Apr-18 (No. 217-02673) 04-Apr-18 (No. 217-02673) 04-Apr-18 (No. 217-02673) 04-Apr-18 (No. 217-02682) 19-Dec-18 (No. DAE4-660_Dec18) 31-Dec-18 (No. ES3-3013_Dec18) Check Date (in house) 06-Apr-16 (in house check Jun-18)	Apr-19 Apr-19 Apr-19 Apr-19 Apr-19 Dec-19 Dec-19 Dec-19 Scheduled Check In house check: Jun-20
All calibrations have been cond Calibration Equipment used (M Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator DAE4 Reference Probe ES3DV2 Secondary Standards Power meter E4419B	Jucted in the closed laboratory IETE critical for calibration) ID SN: 104778 SN: 103244 SN: 103245 SN: 55277 (20x) SN: 3013 ID SN: 3013 ID SN: GB41293874	Cal Date (Certificate No.) 04-Apr-18 (No. 217-02672/02673) 04-Apr-18 (No. 217-02672) 04-Apr-18 (No. 217-02673) 04-Apr-18 (No. 217-02673) 04-Apr-18 (No. 217-02682) 19-Dec-18 (No. ES3-3013_Dec18) 31-Dec-18 (no. base)	Apr-19 Apr-19 Apr-19 Apr-19 Apr-19 Dec-19 Dec-19 Dec-19 Scheduled Check
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All calibrations have been cond Calibration Equipment used (M Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator DAE4 Reference Probe ES3DV2 Secondary Standards Power meter E4419B Power sensor E4412A Power sensor E4412A RF generator HP 8648C Network Analyzer E8358A	Aucted in the closed laboratory (#TE critical for calibration) ID SN: 104778 SN: 103244 SN: 103245 SN: 103245 SN: 03245 SN: 660 SN: 3013 ID SN: GB41293874 SN: 00110210 SN: US3642U01700 SN: US41080477 Name	facility: environment temperature (22 ± 3)°C a Cal Date (Certificate No.) 04-Apr-18 (No. 217-02672/02673) 04-Apr-18 (No. 217-02672) 04-Apr-18 (No. 217-02673) 04-Apr-18 (No. 217-02682) 19-Dec-18 (No. DAE4-660_Dec18) 31-Dec-18 (No. ES3-3013_Dec18) Check Date (in house) 06-Apr-16 (in house check Jun-18) 06-Apr-16 (in house check Jun-18) 06-Apr-16 (in house check Jun-18) 06-Apr-16 (in house check Jun-18) 04-Aug-99 (in house check Jun-18) 31-Mar-14 (in house check Jun-18) Tunction	Apr-19 Apr-19 Apr-19 Apr-19 Apr-19 Dec-19 Dec-19 Scheduled Check In house check: Jun-20 In house check: Jun-20 In house check: Jun-20 In house check: Jun-20
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All calibrations have been cond Calibration Equipment used (M Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator DAE4 Reference Probe ES3DV2 Secondary Standards Power meter E44198 Power sensor E4412A RF generator HP 8648C Network Analyzer E8358A Calibrated by:	Aucted in the closed laboratory (%TE critical for calibration) (D) SN: 104778 SN: 103244 SN: 103245 SN: 55277 (20x) SN: 3013 (D) SN: GB41293874 SN: MY41498087 SN: 000110210 SN: US3642U01700 SN: US41080477 Name Jeton Kastrati	facility: environment temperature (22 ± 3)°C a Cal Date (Certificate No.) 04-Apr-18 (No. 217-02672/02673) 04-Apr-18 (No. 217-02673) 04-Apr-18 (No. 217-02673) 04-Apr-18 (No. 217-02623) 19-Dec-18 (No. 217-02623) 19-Dec-18 (No. 217-02673) 04-Apr-18 (No. 217-02673) 04-Apr-18 (No. 217-02673) 06-Apr-18 (No. 217-02673) 04-Apr-18 (No. 217-02673) 04-Apr-18 (No. 217-02673) 04-Apr-18 (No. 217-02673) 04-Apr-18 (No. 217-02673) 06-Apr-18 (No. 217-02673) 07-N04 07-N0	Apr-19 Apr-19 Apr-19 Apr-19 Dec-19 Dec-19 Dec-19 Dec-19 In house check: Jun-20 In house check: Oct-19
All calibrations have been cond Calibration Equipment used (M Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator DAE4 Reference Probe ES3DV2 Secondary Standards Power meter E44198 Power sensor E4412A RF generator HP 8648C Network Analyzer E8358A Calibrated by:	Aucted in the closed laboratory (%TE critical for calibration) (D) SN: 104778 SN: 103244 SN: 103245 SN: 55277 (20x) SN: 3013 (D) SN: GB41293874 SN: MY41498087 SN: 000110210 SN: US3642U01700 SN: US41080477 Name Jeton Kastrati	facility: environment temperature (22 ± 3)°C a Cal Date (Certificate No.) 04-Apr-18 (No. 217-02672/02673) 04-Apr-18 (No. 217-02673) 04-Apr-18 (No. 217-02673) 04-Apr-18 (No. 217-02623) 19-Dec-18 (No. 217-02623) 19-Dec-18 (No. 217-02673) 04-Apr-18 (No. 217-02673) 04-Apr-18 (No. 217-02673) 06-Apr-18 (No. 217-02673) 04-Apr-18 (No. 217-02673) 04-Apr-18 (No. 217-02673) 04-Apr-18 (No. 217-02673) 04-Apr-18 (No. 217-02673) 06-Apr-18 (No. 217-02673) 07-N04 07-N0	Apr-19 Apr-19 Apr-19 Apr-19 Dec-19 Dec-19 Dec-19 Dec-19 In house check: Jun-20 In house check: Jun-20

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No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路 134號 SGS Taiwan Ltd. 1

台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488

www.tw.sas.com



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



Schweizerischer Kalibrierdienst S Service suisse d'étalonnage C Servizio svizzero di taratura S

Swiss Calibration Service

Accreditation No.: SCS 0108

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

b)

Glossary:	
TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
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
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
 - IEC 62209-1, ", "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-
- held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016 c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices
- used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010 d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

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 affect the E2-fiel
- 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 with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal
- characteristics
- Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z: A, B, C, D are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode. *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.
- Connector Angle: The angle is assessed using the information gained by determining the NORMx (no uncertainty required).

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No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路 134號 SGS Taiwan Ltd.

f (886-2) 2298-0488

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EX3DV4 - SN:7466

February 4, 2019

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7466

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm $(\mu V/(V/m)^2)^A$	0.47	0.40	0.62	± 10.1 %
DCP (mV) ⁸	98.2	99.6	98.8	

Calibration Results for Modulation Response

UID	Communication System Name		A dB	B dBõV	С	D dB	VR mV	Max dev.	Unc ^E (k=2)
0	CW	X	0.0	0.0	1.0	0.00	152.6	±3.0 %	± 4.7 %
		Y	0.0	0.0	1.0		138.6		
		Y	0.0	0.0	1.0		155.1	-	

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%.

The uncertainties of Norm X,Y,Z do not affect the E²-field uncertainty inside TSL (see Pages 5 and 6).

Numerical linearization parameter: uncertainty not required. Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

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EX3DV4-SN:7466

February 4, 2019

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7466

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-6.8
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

Certificate No: EX3-7466_Feb19

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EX3DV4- SN:7466

February 4, 2019

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7466

f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha ^G	Depth ^G (mm)	Unc (k=2)
600	42.7	0.88	10.73	10.73	10.73	0.00	1.00	± 13.3 %
750	41.9	0.89	10.45	10.45	10.45	0.46	0.85	± 12.0 %
835	41.5	0.90	10.15	10.15	10.15	0.27	1.18	± 12.0 %
900	41.5	0.97	9.87	9.87	9.87	0.33	1.04	± 12.0 %
1750	40.1	1.37	8.99	8.99	8.99	0.33	0.86	± 12.0 %
1900	40.0	1.40	8.67	8.67	8.67	0.36	0.85	± 12.0 %
2000	40.0	1.40	8.53	8.53	8.53	0.35	0.85	± 12.0 %
2300	39.5	1.67	8.26	8.26	8.26	0.34	0.86	± 12.0 %
2450	39.2	1.80	7.66	7.66	7,66	0.38	0.90	± 12.0 %
2600	39.0	1.96	7.43	7.43	7.43	0.27	1.30	± 12.0 %
3300	38.2	2.71	7.05	7.05	7.05	0.30	1.15	± 13.1 %
3500	37.9	2.91	6.98	6.98	6.98	0.30	1.20	± 13.1 %
3700	37.7	3.12	6.94	6.94	6.94	0.30	1.20	± 13.1 %
3900	37.5	3.32	6.71	6.71	6.71	0.25	1.60	± 13.1 %
5200	36.0	4.66	5.56	5.56	5.56	0.40	1.80	± 13.1 %
5300	35.9	4.76	5.41	5.41	5.41	0.40	1.80	± 13.1 %
5600	35.5	5.07	4.88	4.88	4.88	0.40	1.80	± 13.1 %
5800	35.3	5.27	5.06	5.06	5.06	0.40	1.80	± 13.1 %

Calibration Parameter Determined in Head Tissue Simulating Media

^C Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Validity of ConvF assessed at 8 MHz is 4-9 MHz, and ConvF assessed at 13 MHz is 9-19 MHz. Above 5 GHz frequency validity can be extended to ± 110 MHz.
^R At frequencies below 3 GHz, the validity of tissue parameters (c and o) can be relaxed to ± 10% if liquid compensation formula is applied to the convertient of the uncertainty of the uncertainty is the RSS of the convertient of the RSS of the test of the RSS of the RSS of the RSS of the RSS of the convertient of the RSS of

An inequalities below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to $\pm 10\%$ if iquid compensation formula is applied to measured SAR values. All frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to $\pm 5\%$. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters. (ϵ and σ) is restricted to $\pm 5\%$. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters. (ϵ and σ) is restricted to $\pm 5\%$. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters. (ϵ and σ) is restricted to $\pm 5\%$. The uncertainty is the RSS of the Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than $\pm 1\%$ for frequencies below 3 GHz and below $\pm 2\%$ for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

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EX3DV4- SN-7466

February 4, 2019

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7466

f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) F	ConvF X	ConvF Y	ConvF Z	Alpha ^G	Depth ^G (mm)	Unc (k=2)
600	56.1	0.95	10.86	10.86	10.86	0.00	1.00	± 13.3 %
750	55.5	0.96	10.49	10.49	10.49	0.30	1.08	± 12.0 %
835	55.2	0.97	10.04	10.04	10.04	0.31	1.09	± 12.0 %
900	55.0	1.05	9.94	9.94	9.94	0.31	1.04	± 12.0 %
1750	53.4	1.49	8.48	8.48	8.48	0.36	0.87	± 12.0 %
1900	53.3	1.52	8.04	8.04	8.04	0.44	0.86	± 12.0 %
2000	53.3	1.52	7.94	7.94	7.94	0.30	1.15	± 12.0 %
2300	52.9	1.81	7.84	7.84	7.84	0.40	0.92	± 12.0 %
2450	52.7	1.95	7.71	7.71	7.71	0.44	0.90	± 12.0 %
2600	52.5	2.16	7.47	7.47	7.47	0.41	0.96	± 12.0 %
3300	51.6	3.08	6.86	6.86	6.86	0.26	1.20	± 13.1 %
3500	51.3	3.31	6.69	6.69	6.69	0.25	1.25	± 13.1 %
3700	51.0	3.55	6.58	6.58	6.58	0.30	1.25	± 13.1 %
3900	51.2	3.78	6.12	6.12	6.12	0.25	1.60	± 13.1 %
5200	49.0	5.30	4.95	4.95	4.95	0.50	1.90	± 13.1 %
5300	48.9	5.42	4.80	4.80	4.80	0.50	1.90	± 13.1 %
5600	48.5	5.77	4.22	4.22	4.22	0.50	1.90	± 13.1 %
5800	48.2	6.00	4.38	4.38	4.38	0.50	1.90	± 13.1 %

Calibration Parameter Determined in Body Tissue Simulating Media

^C Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessed at 8 MHz is 4-9 MHz, and ConvF assessed at 13 MHz is 9-19 MHz. Above 5 GHz frequency validity can be extended to ± 110 MHz.
^F Af frequencies below 3 GHz, the validity of tissue parameters (s and o) can be relaxed to ± 10% if liquid compensation formula is applied to the analytic of the validity of the vali

At inequancies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to $\pm 10\%$ if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to $\pm 5\%$. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters. ^(a) Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than $\pm 1\%$ for frequencies below 3 GHz and below $\pm 2\%$ for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

Certificate No: EX3-7466_Feb19

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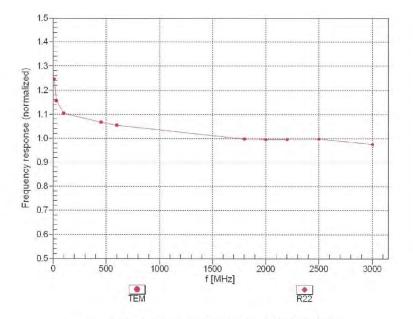


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EX3DV4- SN:7466

February 4, 2019





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

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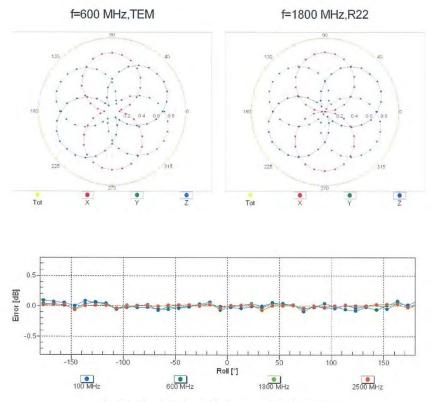
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Receiving Pattern (ϕ), $\vartheta = 0^{\circ}$

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

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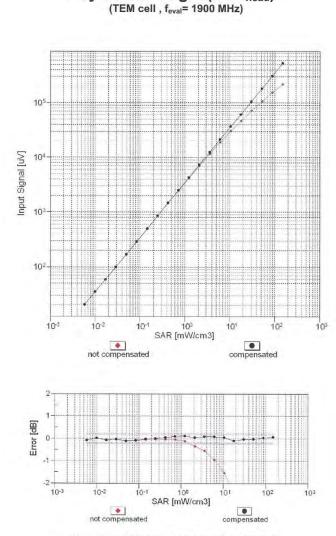
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EX3DV4- SN:7466

February 4, 2019



Dynamic Range f(SAR_{head})

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

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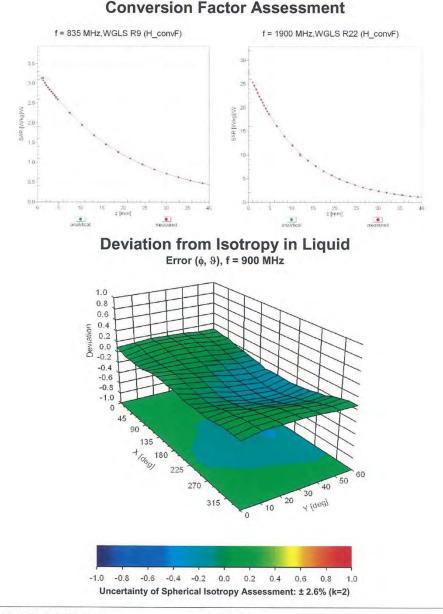
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CALIBRATION O	CERTIFICATE	1.8	
Dbject	DAE4 - SD 000 D0	04 BM - SN: 1260	
Calibration procedure(s)	QA CAL-06,v29 Calibration proced	lure for the data acquisition elec	tronics (DAE)
Calibration date:	September 11, 20	19	
The measurements and the unc	ertainties with confidence pro	nal standards, which realize the physical un obability are given on the following pages ar	nd are part of the certificate.
The measurements and the uno All calibrations have been condu Calibration Equipment used (M8	ertainties with confidence pro- licted in the closed laboratory ITE critical for calibration)	obability are given on the following pages ar tacility: environment temperature $(22\pm3)^{\circ}$	nd are part of the certificate.
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The measurements and the unc All calibrations have been condu Calibration Equipment used (M8 Primary Standards Keithley Multimeter Type 2001	ertainties with confidence pro- incled in the closed laboratory ITE critical for calibration)	cal Date (Certificate No.) 03-Sep-19 (No:25949)	nd are part of the certificate. C and humIdity < 70%. Scheduled Calibration Sep 20
The measurements and the unc All calibrations have been condu Calibration Equipment used (M8 Primary Standards Keithley Multimeter Type 2001 Secondary Standards	ertainties with confidence pro- lacted in the closed laboratory ITE critical for calibration) ID # SN: 0910276 ID #	cal Date (Certificate No.) 03-Sep-19 (No:25949) Check Date (in house)	nd are part of the certificate. C and humidity < 70%. Scheduled Calibration Sep 20. Scheduled Check
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f (886-2) 2298-0488



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



Schweizerischer Kalibrierdienst s Service suïsse d'étalonnage C Servizio svizzero di taratura S Swiss Calibration Service

Accreditation No.: SCS 0108

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Glossary

DAE Connector angle

data acquisition electronics information used in DASY system to align probe sensor X to the robot coordinate system.

Methods Applied and Interpretation of Parameters

- DC Voltage Measurement: Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- Connector angle: The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
 - DC Voltage Measurement Linearity: Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
 - Common mode sensitivity: Influence of a positive or negative common mode voltage on the differential measurement.
 - Channel separation: Influence of a voltage on the neighbor channels not subject to an w input voltage.
 - AD Converter Values with inputs shorted: Values on the internal AD converter . corresponding to zero input voltage
 - Input Offset Measurement. Output voltage and statistical results over a large number of . zero voltage measurements.
 - Input Offset Current: Typical value for information; Maximum channel input offset current, not considering the input resistance.
 - Input resistance: Typical value for information: DAE input resistance at the connector. during internal auto-zeroing and during measurement.
 - Low Battery Alarm Voltage: Typical value for information. Below this voltage, a battery alarm signal is generated.
 - Power consumption: Typical value for information. Supply currents in various operating modes.

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DC Voltage Measurement

A/D Converter Hes	olution nominal				
High Range:	1LSB =	6.1µV,	full range =	-100+300 mV	
Low Bange:	1LSB =	61nV _		-1+3mV	
DASY measurement	parameters: Au	to Zero Time: 3	sec; Measuring	time: 3 sec	

Calibration Factors	X	4	z
High Range	404,437 ± 0.02% (k=2)	404.966 ± 0.02% (k=2)	405,328 ± 0.02% (k=2)
Low Range	3.96161 ± 1.50% (k=2)	3.97935 ± 1.50% (k=2)	4.00819±1.50% (k=2)

Connector Angle

	040 0 8 4 1 9
Connector Angle to be used in DASY system	343.0 * 1.1 *
THE BOOK PREPARENCE AND A STATE OF A STATE O	

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Appendix (Additional assessments outside the scope of SCS0108)

1. DC Voltage Linearity

High Range	Reading (µV)	Difference (jiV)	Error (%)	
Channel X + Input	200000.30	2.07	0.00	
Channel X + Input	20000.00	-2,41	+0.01	
Channel X - Input	-19999.21	2.27	-0,01	
Channel Y + Input	199996.34	-1.90	-0.00	
Channel Y + Input	19998.21	3.98	-0.02	
Channel Y - Input	-20002.63	-0.97	0.00	
Channel Z + Input	100006.40	-1.28	⊇0.00	
Channel Z + Input	19997.44	-4.77	-0.02	
Channel Z - Input	-20003.12	-1.40	0.01	

Low Range	Reading (µV)	Difference (µV)	Error (%)
Channel X + Input	2001.92	0.55	0.03
Channel X + Input	202.46	0.82	0.41
Channel X - Input	-197.55	0,58	-0.29
Channel Y + Input	2001.94	0.61	0.03
Channel Y + Input	200.97	0.61	0.30
Channel Y Input	-199.26	-0.96	0.48
Channel Z + Input	2001.12	-0.17	-0.01
Channel Z + Input	200.91	-0,58	-0.29
Channel Z + Input	-199.18	-0,90	0.45

2. Common mode sensitivity

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Common mode Input Voltage (mV)	High Hangc Average Reading (µV)	Low Range Average Reading (µV)
Channel X	200	-0.96	-2.91
	- 200	4.60	2.59
Channel Y	200	-10.27	-10.96
	- 200	9.87	9.11
Channel Z	200	-23.68	-23,96
	- 200	23.04	23.00

3. Channel separation

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	input Voltage (mV)	Channel X (µV)	Channel Y (µV)	Channel Z (µV)
Channel X	200		-0.09	-4/15
Channel Y	200	8.52	1. I.S. 11	1.38
Channel Z	200	10.67	5.22	- 4

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AD-Converter Values with inputs shorted.

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	High Range (LSB)	Low Range (LSB)
Channel X	16352	15640
Channel Y	16198	15914
Channel Z	16290	15542

5. Input Offset Measurement

DASY measurement parameters: Auto Zoro Time: 3 sec; Measuring time: 3 sec Input 10M Ω

	Average (µV)	min. Offset (µV)	max. Offset (µV)	Std. Deviation (µV)
Channel X	1.17	-0.05	2.04	0.39
Channel Y	-0.13	-1.00	1.18	0,40
Channel Z	0.57	0.39	1.39	0,37

6. Input Offset Current

Nominal Input circuitry offset current on all channels: <25tA

7. Input Resistance (Typical values for information)

	Zeroing (kOhm)	Measuring (MOhm)
Channel X	200	200
Channel Y	-200	200
Channel Z	- 200 -	200

8. Low Battery Alarm Voltage (Typical values for information)

Typical values	Alarm Level (VDC)
Supply (+ Vcc)	+7.0
Supply (- Vec)	+7.0

9. Power Consumption (Typical values for information)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+10.01	+6	+14
Supply (- Vcc)	-0.01	8	- <u>0</u> -

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- End of report -

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