

# **Appendix B - DAE & Probe Calibration Certificate**

	Writion Service (SAS) for its one of the signatories i recognition of calibration o	to the EA	motation No.: SCS 0108
Ben SGS (Auden)			EX3-7509_Mar19
ALIBRATION	CERTIFICATE		
object	EX3DV4 - SN:750	9	
Califration (Hospitaliane(H)		A CAL-14.v5, QA CAL-23.v5, QA iure for dosimetric E-field probes	CAL-25.V/
luibrahim date:	March 25, 2019		
The solution contribute docu	menta the lossestory to mitter certantiles with confidence pro	mi standards, which realize the physical unus cability are given on the following pages and	of reasonments (St) are part of the catilicate
I calibrations trave open cond	lucted in the closed laboratory	facility: unveronment temperature (22 ± 3)*C a	and frummaty = 70%
albetton Equipment used (M	6TE critical for calibration)		
	6TE central for calibration	Cat Date (Centificate (%).)	Schedoled Calibration
mmary Standards ower creter NRP	(D SN: 104778	Gal Date (Centificatio (%), ) 04-Apr-16 (%), 217-62672(02673)	Scheduled Calibration Apr-19
Inmary Standards Went matter NRP Inwer sensor NRP-291	10 SNL 104778 SNL 102244	04-Apr-18 (No. 217-02672/02673) 04-Apr-18 (No. 217-02672)	
Inmary Standards Wen onder NRP Inwer sensor NRP-291 Inwer sensor NRP-291	10 SNL 104778 SNL 103244 SNL 103245	04-Apr-18 (No. 217-02872/02873) 04-Apr-18 (No. 217-02872) 04-Apr-18 (No. 217-02872)	Apr-19 Apr-19 Apr-19
Primary Standards Nower Index NRP Nower sensor NRP-201 Nower sensor NRP-201 Nationance 20 it8 Attenuator	ID SN: 194778 SN: 193244 SN: 103245 SN: 55277 (20x)	04-Apr-16 (No. 217-02672/02673) 04-Apr-18 (No. 217-02673) 04-Apr-18 (No. 217-02673) 04-Apr-18 (No. 217-02673)	Apr.19 Apr.19 Apr.18 Apr.18
mmary Standards Wein Ideater NRP Wein Station NRP-201 Ideator NRP-201 Ialianonce 20 th Attenuator ME4	10 SN: 104778 SN: 103244 SN: 103245 SN: 85277 (20s) SN: 85277 (20s)	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) 05-Apr-18 (No. 217-02672) 19-Dec-18 (No. DAE4-66), Dec18)	Apr-19 Apr-19 Apr-19 Apr-19 Apr-10 Dec-19
mmary Standards Wein Ideater NRP Wein Station NRP-201 Ideator NRP-201 Ialianonce 20 th Attenuator ME4	ID SN: 194778 SN: 193244 SN: 103245 SN: 55277 (20x)	04-Apr-16 (No. 217-02672/02673) 04-Apr-18 (No. 217-02673) 04-Apr-18 (No. 217-02673) 04-Apr-18 (No. 217-02673)	Apr.19 Apr.19 Apr.18 Apr.18
Inmary Standards Novel Inteler NRP Inver sensor NRP-291 Inver sensor NRP-291 Intelemence 20 mB Attenuator INE4 Intelemence Probe EB3DV2	10 SN: 194778 SN: 103244 SN: 103245 SN: 85277 (20s) SN: 85277 (20s) SN: 8527 SN: 85277 (20s)	04-Apr-18 (No. 217-02672) 04-Apr-18 (No. 217-02672) 04-Apr-18 (No. 217-02673) 04-Apr-18 (No. 217-02673) 18-Dec-18 (No. 653-3613_Dec18) 31-Dec-18 (No. 653-3613_Dec18)	Apr-19 Apr-19 Apr-19 Apr-10 Dec-19 Dec-19
Primary Standards "Swein meter NRP Power sensor NRP-201 Parker sensor NRP-201 Reference 20 mB Attenuator DAE4 Reference Probe E830V2 Secondary Bandards	1D SPA 104778 SPA 103244 SPA 103245 SPA 85277 (20+) SPA 800 SPA 3013 ED	04-Apr-18 (No. 217-02672/02673) 04-Apr-18 (No. 217-02673) 04-Apr-18 (No. 217-02673) 04-Apr-18 (No. 217-02673) 18-Daro-18 (No. 217-02682) 18-Daro-18 (No. 653-3613_Darc18) 01-Daro-18 (No. 653-3613_Darc18) Check Date (in bound)	Apr-19 Apr-19 Apr-19 Apr-10 Dec-19 Dec-19 Schentuled Check
Primary Standards Turven steder NRP Inwer sensor NRP-291 Varier sensor NRP-291 Naference 20 mB Attenuator IAE4 Leterance Probe E83QV2 Secondary Standards fower meter E44198	10 SNL 104778 SNL 10244 SNL 10245 SNL 03245 SNL 03245 SNL 03245 SNL 041293674	04-Apr-18 (No. 217-02872/02873) 04-Apr-18 (No. 217-02672) 04-Apr-18 (No. 217-02673) 04-Apr-19 (No. 217-02673) 18-Dec-18 (No. 0464-66) Dec-18) 31-Dec-18 (No. 653-3013 Dec18) Check Date (in bouse) 08-Apr-16 (in bouse)	Apr-19 Apr-19 Apr-19 Apr-10 Dec-19 Dec-19 Dec-19 Schentilied Check Im haute check: Jun-20
Calification Equipment used (M Primary Standards Power strater NRP Power sensor NRP-201 Power sensor NRP-201 Reference 20 dB Attenuator DAE4 Reference Probe E830V2 Secondary Brandwitte Power sensor E4412A Power sensor E4412A	10 SN: 104778 SN: 103244 SN: 103245 SN: 55277 (20+) SN: 55277 (20+) SN: 600 SN: 3013 ED SN: 6841293874 SN: 6841293874	04-Apr-18 (No. 217-02672/02673) 04-Apr-18 (No. 217-02672) 04-Apr-18 (No. 217-02672) 04-Apr-18 (No. 217-02672) 19-Dec-18 (No. 217-02682) 19-Dec-18 (No. 6454-66), Dec-18) 31-Dec-18 (No. 653-3013, Dec-18) 06-Apr-16 (No. 653-3013, Dec-18) 06-Apr-16 (in house check Jun-16)	Apr-19 Apr-19 Apr-19 Apr-19 Dec-19 Dec-19 Dec-19 Schertlifted Check In hauto check. Jun-20 In house check. Jun-20
Primary Standards Powen sinder NRP Priver sensor NRP-201 Priver sensor NRP-201 Reference 20 mB Attenuator DNE4 Reference Probe E830V2 Secondary Standards Power meter E44198 Power sensor E4412A Power sensor E4412A	1D SN: 194778 SN: 103244 SN: 103244 SN: 103245 SN: 85277 (20b) SN: 860 SN: 000 SN: 6641293874 SN: 6641293874 SN: 600110210	04-Apr-18 (No. 217-02672/02673) 04-Apr-18 (No. 217-02672) 04-Apr-18 (No. 217-02672) 04-Apr-18 (No. 217-02682) 19-Dec-18 (No. 0217-02682) 19-Dec-18 (No. 0217-02682) 01-Dec-18 (No. 053-3013_Dec18) 01-Apr-18 (In house check Jun-16) 08-Apr-16 (In house check Jun-16) 08-Apr-16 (In house check Jun-16)	Apr-19 Apr-19 Apr-19 Apr-19 Dec-19 Dec-19 Dec-19 Schentlied Check In haute check Jun-20 In haute check Jun-20 In haute check Jun-20
Primary Standards Power sensor NRP-201 Power sensor NRP-201 Power sensor NRP-201 Reference 20 mB Attenuator DAE4 Tetremice Probe EB30V2 Secondary Standards Power sensor E4412A Power sensor E4412A Power sensor E4412A Power sensor E4412A Power sensor E4412A	10 SN: 104778 SN: 103244 SN: 103245 SN: 55277 (20+) SN: 55277 (20+) SN: 600 SN: 3013 ED SN: 6841293874 SN: 6841293874	04-Apr-18 (No. 217-02672/02673) 04-Apr-18 (No. 217-02672) 04-Apr-18 (No. 217-02672) 04-Apr-18 (No. 217-02672) 19-Dec-18 (No. 217-02682) 19-Dec-18 (No. 6454-66), Dec-18) 31-Dec-18 (No. 653-3013, Dec-18) 06-Apr-16 (No. 653-3013, Dec-18) 06-Apr-16 (in house check Jun-16)	Apr-19 Apr-19 Apr-19 Apr-19 Dec-19 Dec-19 Dec-19 Dec-19 Dec-10 http://doc.org/
Primary Standards Power seater NRP Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Attenuator DAE4 Reference Probe E830V2 Secondary Standards Power meter E44198	10 SN: 104778 SN: 103244 SN: 103245 SN: 83277 (20x) SN: 000 SN: 0041209874 SN: 0041209874 SN: 0041209874 SN: 0041200 SN: 00541080477	04-Apr-16 (No. 217-02672/02673) 04-Apr-16 (No. 217-02672) 04-Apr-16 (No. 217-02672) 04-Apr-16 (No. 217-02672) 19-Dec-18 (No. 217-02682) 19-Dec-18 (No. 653-3013 Dec18) 019-Apr-16 (No. 653-3013 Dec18) 06-Apr-16 (in house check Jun-16) 06-Apr-16 (in house check Jun-16) 08-Apr-16 (in house check Jun-16) 08-Apr-16 (in house check Jun-16) 08-Apr-16 (in house check Jun-16) 04-Aug-99 (in house check Jun-16) 04-Aug-99 (in house check Jun-16)	Apr-19 Apr-19 Apr-19 Dec-19 Dec-19 Dec-19 Schentliked Check In house check, Jun-20 In house check, Jun-20
Primary Standards Power sensor NRP-201 Power sensor NRP-201 Power sensor NRP-201 Reference 20 dB Attenuator DAE4 Reference Probe EB30V2 Secondary Standards Power sensor E44138 Power sensor E44132A Power sensor E44132A RF generator 197-86482	1D SN: 194778 SN: 193244 SN: 193245 SN: 93277 (20s) SN: 900 SN: 9213 SN: 0641238874 SN: 0641238874 SN: 0641238874 SN: 05564201730	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) 19-Dec-18 (No. 217-02082) 19-Dec-18 (No. 653-3613, Dec18) Check Date (in house) 06-Apr-18 (in house (hock Jun-18) 06-Apr-16 (in house (hock 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)	Apr-19 Apr-19 Apr-19 Apr-19 Dec-19 Dec-19 Dec-19 Dec-19 Dec-10 http://doc.org/
Primary Standards Power sensor NRP-201 Power sensor NRP-201 Power sensor NRP-201 Reference 20 dB Attenuator DAE4 Reference Probe EB30V2 Secondary Standards Power sensor E44198 Power sensor E4419A Power sensor E4419A Regresentor 149 16448C Network Analyzer E8358A	10 SN: 194778 SN: 103244 SN: 103245 SN: 85277 (20x) SN: 3013 ED SN: 6841293874 SN: 6841293874 SN: 6841293874 SN: 600110210 SN: 000110210 SN: 000110210 SN: 0054080477 Name	04-Apr-16 (No. 217-02672/02673) 04-Apr-16 (No. 217-02672) 04-Apr-16 (No. 217-02672) 04-Apr-18 (No. 217-02672) 19-Dec-18 (No. 217-02682) 19-Dec-18 (No. 253-3013 Dec18) 06-Apr-16 (No. 553-3013 Dec18) 06-Apr-16 (In house check Jun-16) 06-Apr-16 (In house check Jun-16) 04-Apr-16 (In house check Jun-16) 11-Mar-14 (In house check Oct-16) Fundion	Apr-19 Apr-19 Apr-19 Dec-19 Dec-19 Dec-19 Schentliked Check In house check, Jun-20 In house check, Jun-20
Primary Standards Powen mater NRP Powen sensor NRP-201 Powen sensor NRP-201 Reference 20 mB Attenuator DAE4 Reference Probe E830V2 Becondary Blandards Rower meter E44198 Power meter E44198 Power sensor E4412A Power sensor E4412A Power sensor E4412A Reference 149 8648C Network Analyse E83584 Settended by:	10 SN: 104778 SN: 103244 SN: 103245 SN: 03245 SN: 3013 E SN: 0841293874 SN: 0841293874 SN: 0841293874 SN: 0841293874 SN: 09411220 SN: 0941090477 Name Claudio Lauber Kana Pokowc	04-Apr-16 (Rec. 217-42672402873) 04-Apr-16 (Rec. 217-426729) 04-Apr-16 (Rec. 217-42672) 04-Apr-18 (Rec. 217-42672) 04-Apr-18 (No. 217-42672) 19-Dec-18 (No. DE4-460). Dec-18) 31-Dec-18 (No. E53-3013-Dec-18) 06-Apr-18 (In Docum) 06-Apr-18 (In Docum) 06-Apr-16 (In Docum)	Apr-19 Apr-19 Apr-19 Apr-19 Dec-19 Dec-19 Dec-19 Schentliked Check In house check, Jun-20 In house check, Jun-20

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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Schweizerischer Kallprindimun Service ellesse d'étalomage Servizio avizzaro di montura Swies Calibration Sarvice

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Addresillation No.: SCS 0108

According by the Sens According to Service (SAS) The Swiss Accreditation Service is one of the signatonies to itse EA Multiliteral Agreement for the recognition of colibration certificates

#### Glossary:

TSI. Lessue simulating lipuid NOFIMIX, y, 2 sensitivity in free space sensitivity in TSL / NORMX, y,z CunvF DCE didde compression point crest factor (1/duly\_crycle) of the RF signal modulation dependent linearization parameters CE A.B.C.D Polarization m in rotation around probe axis Polarization 8 a rotation around an axis that is in the plane normal to probe axis (al measurement contor). i.e., B = D is normal to probe axis information leads in DASY system to align probe sensor X to the robot coordinate system Cannector Angle

Calibration is Performed According to the Following Standards:

- IEEE Sld 1528-2013, 'IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) In the Human Head from Winters Communications Devices. Measurement a) b) 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 wheless communication devicer
- -b)
- 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:

- NORMs, y.z. Assessed for E-field polarization % = 0 (/ < 900 MHz in TEM-cell; / > 1600 MHz; R22 waveguide) NORMx, y, a wo only intermediate values. Le., the Lincertainties of NORMx, y, z does not affect the E<sup>2</sup>-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 linear 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 mindia. 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 / > 600 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 (sotropy): In a field of low gradients realized using a flat phantom exposed by a patch entenna.
- Sensor Offset: The sensor offset corresponds to the offset of virtual massumment 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 (equiled)

Certificate No: EX3-7509 Mar19

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# EX30V4 - SN 7509

March 25, 2019

# DASY/EASY - Parameters of Probe: EX3DV4 - SN:7509

#### **Basic Calibration Parameters**

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm (µV/(V/m) <sup>®</sup> ) <sup>n</sup>	0,47	0.49	0.47	± 10.1 %
DCP (mV) <sup>e</sup>	99.6	96,6	102.3	

# Calibration Results for Modulation Response

UID	Communication System Name	0	A dB	B dBõV	c	0 dB	VR mV	Max dev.	Unc <sup>4</sup> (h=2)
Ū .	CW.	×.	0,0	0.0	1.0	0.00	176.8	±3.3 %	247%
		- ¥	0.0	0.0	10		156,0		
		Y	0.0	0.0	1.0		183,5	-	

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 3, Y Z do not effect the E<sup>2</sup> field undertainty inside TSL (see Pages 5 and 6) Numerical Invanzation proceedings not required. Uncertainty is determined using the max-deviation from linear invanient analyzing tentangular discritization and is expressed for the scuare of the finite prostors.

Certilicate No. EX3-7509\_Mart9

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#### EX30V4-SN:7500

March 25, 2019

# DASY/EASY - Parameters of Probe: EX3DV4 - SN:7509

#### Other Probe Parameters

Sensor Arrangement	Triangutar
Connector Angle (")	-47.6
Mechanical Surface Dataction Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	3 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 In Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

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EX3DV4- 5N 75/19

March 25, 2019

# DASY/EASY - Parameters of Probe: EX3DV4 - SN:7509

((MHz) <sup>C</sup>	Relative Permittivity	Conductivity (S/m)	ConvF X	Conv# Y	ConvF Z	Alpha <sup>®</sup>	Depth <sup>40</sup> (mm)	Unc (k=2)
750	47.9	0.89	10.41	10.41	10.41	0.51	0.80	± 12.0 %
835	41.5	0.90	10.13	10.13	10.13	0.48	0,85	± 12.0 %
900	41.5	0.97	9.89	9.69	9.89	0,44	0.84	± 12.0 %
1750	40.1	1.37	8.84	8.84	8.84	0.28	0.98	± 12.0 %
1900	40.0	1.40	8.50	8.50	8.50	D.30	0.85	± 12.0 %
2000	40,0	1.40	8.39	8,39	B.39	0.35	0.85	± 12.0 %
2300	39.5	1.67	8.13	8,13	8.13	0.29	0.88	±12.0%
2450	39.2	1.80	7.79	1.79	7.79	0.30	U.88	= 12.0 %
2800	39.0	1.90	7.70	7.70	7.70	0.35	D.86	= 12.0 %
5200	36.0	4.66	5.45	5.46	5.46	0.40	1.80	± 13.1 %
5300	35.9	4.78	5.20	5.20	5.20	0.40	1.80	± 13,1 %
5600	35.5	5.07	4.77	4.77	4.77	0.40	1.80	± 13.1 %
5800	35.3	5.27	4.94	4.94	4.94	0.40	1.80	± 13.1 %

Calibration Parameter Determined in Head Tissue Simulating Media

Trequency validity above 300 MHz of a 100 MHz mily apples for DASY v4.4 and higher (see Page 3), else it is instructed to  $\pm$  50 MHz. The increation validity is the RSB of the ConvE asymptotic cohord asymptotic parts for DASY v4.4 and higher (see Page 3), else it is instructed to  $\pm$  50 MHz. The increation validity is the RSB of the ConvE asymptotic cohord asymptotic parts for the uncertainty is the RSB of the ConvE asymptotic validity palaye 300 MHz is ± 10, 25, 40, 50 em 20 MHz for ConvE assessments at 30, 64, 128, 150 and 20 MHz mapsetholds. Validity of ConvE assessed p1 6 MHz is ± 0 MHz, and ConvE masses at at 13 MHz is 5 to MHz. Above 5 GHz frequency wildity can be assessed to  $\pm$  110 MHz. All magnetices below 3 GHz the weithing of these parameters (is and a) can be reased to  $\pm$  10% if frequencies below 3 GHz the weithing of these parameters (is and a) is readed to  $\pm$  10%. If frequencies below 3 GHz, the validity of these parameters (is and a) is readed by  $\pm$  3%. The uncertainty is the RSB of the ConvE interstance during of BSB of the dupon set of the readed to  $\pm$  10%. If frequencies to the RSB of the ConvE interstance during of BSB of SHz. The validity of these parameters (is and a) is readed if to  $\pm$  3%. The uncertainty is the RSB of the ConvE interstance during of BSB of SHz. The VELON SEC Sectorements that the remaining deviation rise to the based by effect after comparameters is always loss then  $\pm$  1% for frequencies below 3 GHz and balow  $\pm$  2% for hequencies 2% GHz at any chain half the to obse the manuale from the boundary.

Certificate No: EX3-7509\_Mir18

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Report No. : EN/2019/70012 Rev: 01 Page: 6 of 15

EX3DV4-SN 7509

March 25, 2015

# DASY/EASY - Parameters of Probe: EX3DV4 - SN:7509

t (MHz) <sup>c</sup>	Relative Permittivity	Conductivity (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha	Depth <sup>in</sup> (mm)	Unc (k=2)
750	55.5	0.96	10.91	10.91	10.91	0.45	D,80	± 12.0 V
835	55.2	0.97	10.59	10:59	10.59	0.40	0,88	± 12,0 %
900	55.0	1.05	10.47	10:47	10.47	0.40	0.80	± 12.0 %
1750	53.4	1.49	8.63	B.63	8.63	0.35	0.85	± 12.0 5
1900	53.3	1.52	8.24	6.24	8.24	0.36	0.85	± 12.0 %
2000	53.3	1.52	8.19	8,19	8,19	0.22	1.16	± 12.0 %
2300	52.9	1,81	8.11	-8,11	8.97	0.35	0.88	± 12.0 %
2450	52.7	1.95	8.05	6.05	8.05	0.28	0.93	± 12.0 %
2600	52.5	2.16	7.76	7.76	7.76	0.25	8e.0	±12.0 9
5200	49.0	5.30	4.81	4.81	4.81	0.50	1.90	±13.1 %
5300	48.9	5.42	4 66	4.66	4.66	0.50	1.90	= 13 1 9
5600	48,5	5.77	4,19	4.19	4.19	0.50	1.90	# 13.1 %
5800	48,2	6.00	4.20	4.20	4.20	0.50	1.90	± 13.1 %

Calibration Parameter Determined in Body Tissue Simulating Media

Formulative validity allows 300 MHz or ± 100 MHz only applies for DASY v4.4 and kigher (see Fige 2), else it in restricted to ± 50 MHz. The understative is the PSS of the ComF increation requery and the biotectary for the increation requery to the increation of the control for the c

Centilicate Nex EX3-7509. Mar19

Page 6 of 10

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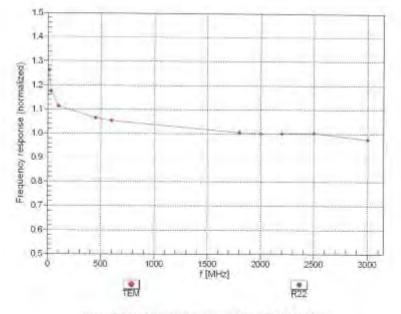


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EX3DV4-SN 7509

March 25: 2019





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

Certificate No. EX3-7509, Mar 19

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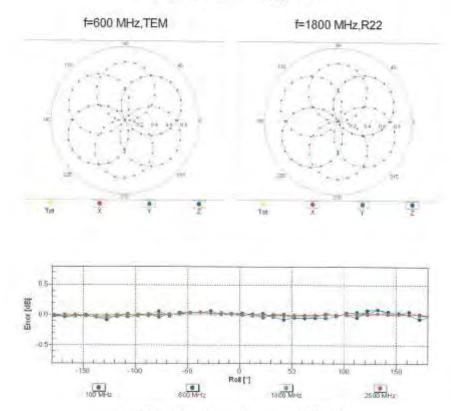
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EX30V4- SN:7509

March 25, 2019



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

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

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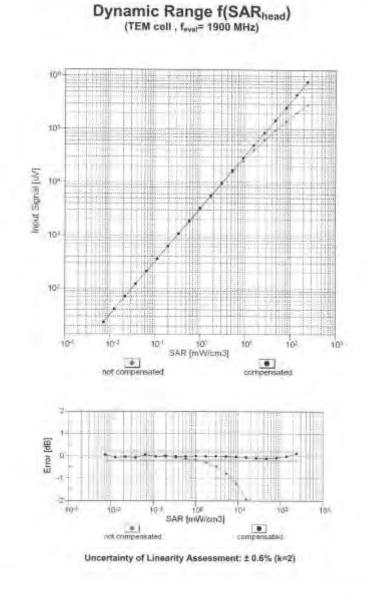
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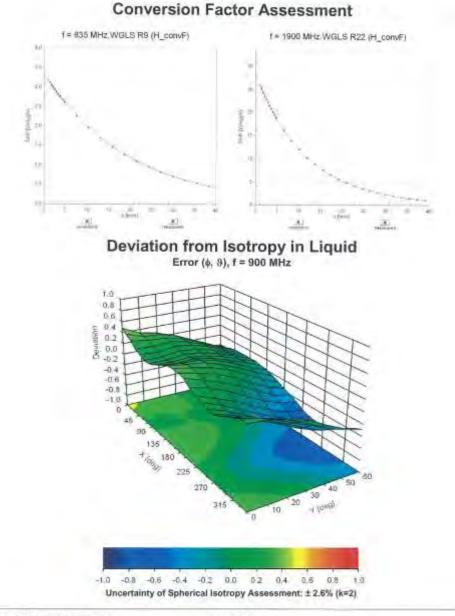
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client SGS-TW (Aude	3		No: DAE4-547_Mar19
CALIBRATION	CERTIFICATE		
3bjeci	DAE4 - SD 000 D	04 BM - SN: 547	
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Calibration date:	March 22, 2019		
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Calibration Laboratory of Schmid & Partner Engineering AG Zeughausstresse 43, 8004 Zurich, Switzerland



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Accondition by the Swise Acconditation Service (SAS) The Swiss Accreditation Service is one of the signatories to the EA Mullilimeral Agreement for the recognition of calibration pertificates

### 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 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**

High Range:	1LSB =	0.1LLY .	full range =	-100+300 mV
Low Range	1LS8 =	61nV	tull tange =	-1

Calibration Factors	×	Y.	Z
High Bange	403.235 ± 0.02% (k=2)	-405.136±0.02% (k=2)	402.783 ± 0.02% (k=2)
Low Range	3.95448 ± 1.50% (k=2)	3.90479 ± 1.50% (k=2)	3.86245 ± 1.50% (k=2)

**Connector Angle** 

Connector Angle to be used in DASY system	91.5 " ± 1 "
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# Appendix (Additional assessments outside the scope of SCS0108)

#### 1. DC Voltage Linearity

High Range	Reading (µV)	Difference (µV)	Error (%)	
Channel X + Input	199995.43	1.41	6.00	
Channel X + Input	20002,84	1.52	0.01	
Channel X - Input	-19996.87	4.78	-0.02	
Channel Y + Input	199993.66	0.02	0.00	
Channel Y + Input	19999.34	-2.02	-0.01	
Channel Y - Input	20003.96	-2.33	0.01	
Channel Z + Input	199994.47	1.04	0.00	
Channel Z + Input	20002.60	1.36	0.01	
Channel Z - Input	-20001.47	0.29	-0.00	

Low Range	Reading (uV)	Difference (µV)	Error (%)
Channel X + Input	2000.59	-0.23	-0.01
Channel X + Input	201,16	-0.10	-0.05
Channel X - Input	-199.09	-0.45	0.23
Channel Y + Input	2000.65	-0.10	-0.01
Channel Y + Input	200.83	-0.37	-0.18
Channel Y - Input	-199.37	-0.70	0.35
Channel Z + Input	2000.48	-0.35	-0.02
Channel Z + Input	199.75	-1.60	-0.75
Channel Z Input	-200.47	1.80	0.90

### 2. Common mode sensitivity

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

	Common mode Input Voltage (mV)	High Range Average Reading (µV)	Low Range Average Reading (µV)
Channel X	200	-3,66	-5.24
	- 200	5.24	3,62
Channel Y	200	-0.39	-1.02
	-200	0,24	-0.55
Channel Z	200	5.61	5.22
	200	-7.68	8.11

#### 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		3,67	-2.18
Channel Y	200	9.88	6	4.13
Channel Z	200	4,62	B.17	~

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#### 4. AD-Converter Values with inputs shorted

DASY measurement parameters: Auto Zaro Time: 3 sec; Measuring time: 1 sec

	High Range (LSB)	Low Range (LSB)
Channel X	16357	14727
Channel Y	16459	15185
Channel Z	16084	17210

#### 5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring limit: 3 sec Linput 10MGz

	Average (µV)	min. Offset (µV)	max. Offset (µV)	Std. Deviation (µV)
Channel X	4.59	-2.60	÷0,90	0.32
Channel Y	0,54	-0.42	1,60	0.34
Channel Z	0.95	-0.46	2.89	0,59

## 6. Input Offset Current

Nominal input circuitry offset current on all channels: <25IA

#### 7. Input Resistance (Typical values for information)

The second second second	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)	47.9	
Supply (- Vac)	-0.8	

### 9. Power Consumption (Typical values for information)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0,01	4B	+14
Supply (- Vcc)	-0.01	-18	-9

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# - End of report -

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