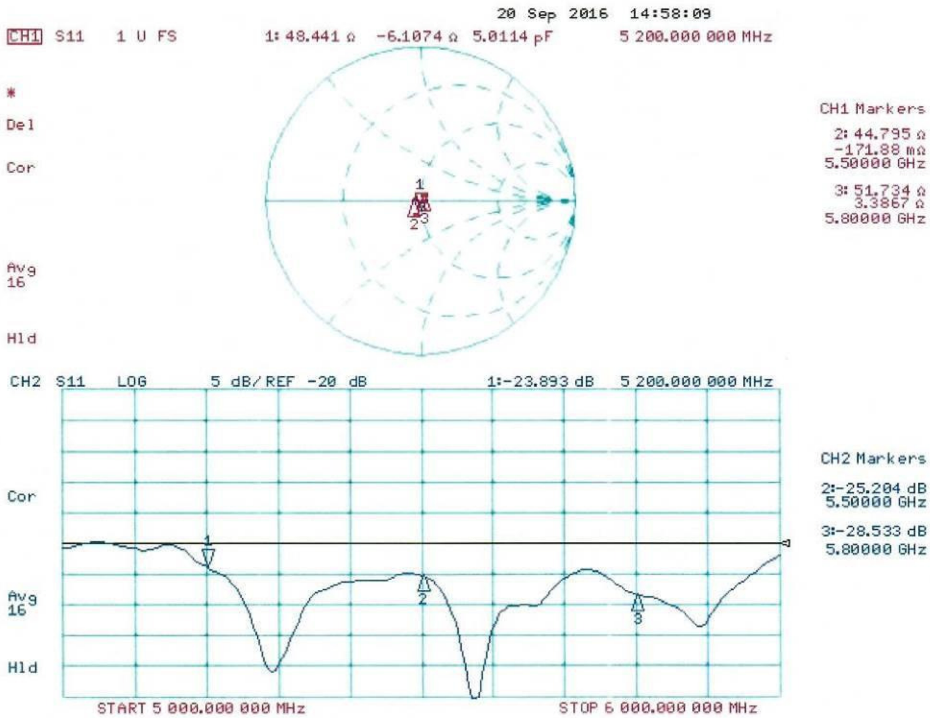
Impedance Measurement Plot for Body TSL



Certificate No: D5GHzV2-1226_Sep16 Page 13 of 13

ANNEX H PROBE CALIBRATION CERTIFICATE

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

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

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

Accreditation No.: **SCS 0108**

Client **MET Laboratories** Certificate No: **EX3-3722_Sep16**

CALIBRATION CERTIFICATE

Object: EX3DV4 - SN:3722

Calibration procedure(s): QA CAL-01.v9, QA CAL-14.v4, QA CAL-23.v5, QA CAL-25.v6
Calibration procedure for dosimetric E-field probes

Calibration date: September 23, 2016

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&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	06-Apr-16 (No. 217-02288/02289)	Apr-17
Power sensor NRP-Z91	SN: 103244	06-Apr-16 (No. 217-02288)	Apr-17
Power sensor NRP-Z91	SN: 103245	06-Apr-16 (No. 217-02289)	Apr-17
Reference 20 dB Attenuator	SN: S5277 (20x)	05-Apr-16 (No. 217-02293)	Apr-17
Reference Probe ES3DV2	SN: 3013	31-Dec-15 (No. ES3-3013_Dec15)	Dec-16
DAE4	SN: 660	23-Dec-15 (No. DAE4-660_Dec15)	Dec-16
Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-16)	In house check: Jun-18
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-16)	In house check: Jun-18
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-16)	In house check: Jun-18
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-16)	In house check: Jun-18
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-15)	In house check: Oct-16

	Name	Function	Signature
Calibrated by:	Claudio Leubler	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: September 28, 2016

Calibration Laboratory of
Schmid & Partner
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Accreditation No.: **SCS 0108**

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 ϑ	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
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
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
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 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 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).

Certificate No: EX3-3722_Sep16 Page 2 of 11

Probe EX3DV4

SN:3722

Manufactured: August 14, 2009
Calibrated: September 23, 2016

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3722

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	0.52	0.49	0.56	± 10.1 %
DCP (mV)[B]	102.3	99.1	101.2	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB$\sqrt{\mu V}$	C	D dB	VR mV	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	194.4	±2.7 %
		Y	0.0	0.0	1.0		189.0	
		Z	0.0	0.0	1.0		195.0	

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 Norm X,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3722

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unc (k=2)
750	41.9	0.89	9.67	9.67	9.67	0.54	0.80	± 12.0 %
900	41.5	0.97	9.08	9.08	9.08	0.36	0.99	± 12.0 %
1810	40.0	1.40	7.71	7.71	7.71	0.37	0.80	± 12.0 %
2000	40.0	1.40	7.65	7.65	7.65	0.35	0.80	± 12.0 %
2450	39.2	1.80	6.90	6.90	6.90	0.37	0.80	± 12.0 %
5200	36.0	4.66	5.08	5.08	5.08	0.35	1.80	± 13.1 %
5300	35.9	4.76	4.78	4.78	4.78	0.40	1.80	± 13.1 %
5500	35.6	4.96	4.62	4.62	4.62	0.45	1.80	± 13.1 %
5800	35.3	5.27	4.34	4.34	4.34	0.50	1.80	± 13.1 %

[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. Above 5 GHz frequency validity can be extended to ± 110 MHz.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 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 ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.
[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

EX3DV4– SN:3722 September 23, 2016

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3722

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unc (k=2)
750	55.5	0.96	8.95	8.95	8.95	0.45	0.80	± 12.0 %
900	55.0	1.05	8.99	8.99	8.99	0.49	0.80	± 12.0 %
1810	53.3	1.52	7.45	7.45	7.45	0.36	0.85	± 12.0 %
2000	53.3	1.52	7.51	7.51	7.51	0.41	0.80	± 12.0 %
2450	52.7	1.95	6.97	6.97	6.97	0.38	0.90	± 12.0 %
5200	49.0	5.30	4.34	4.34	4.34	0.45	1.90	± 13.1 %
5300	48.9	5.42	4.09	4.09	4.09	0.50	1.90	± 13.1 %
5500	48.6	5.65	3.75	3.75	3.75	0.55	1.90	± 13.1 %
5800	48.2	6.00	3.70	3.70	3.70	0.60	1.90	± 13.1 %

[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. Above 5 GHz frequency validity can be extended to ± 110 MHz.

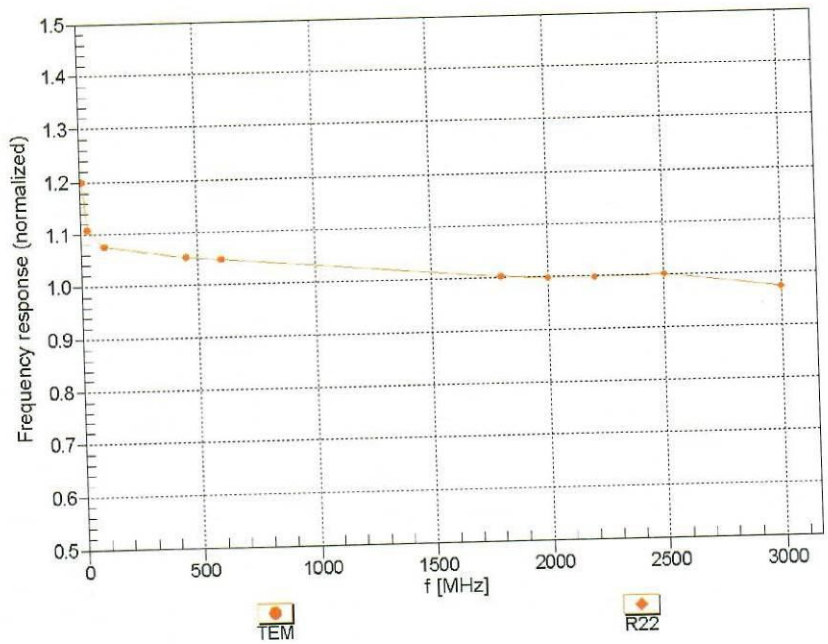
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

EX3DV4– SN:3722 September 23, 2016

Frequency Response of E-Field

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

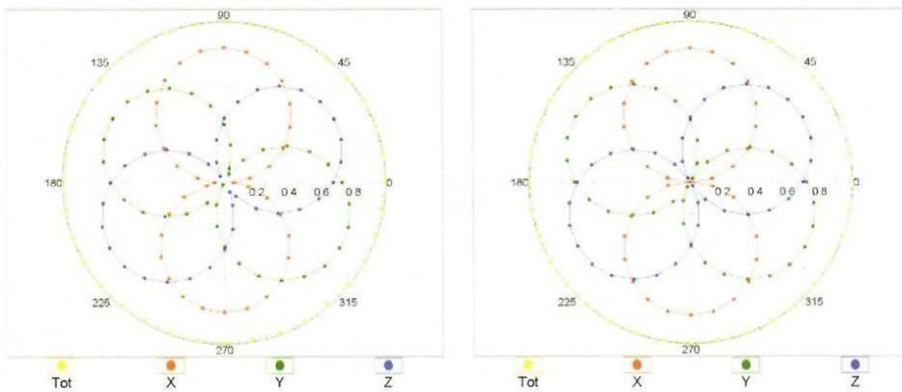


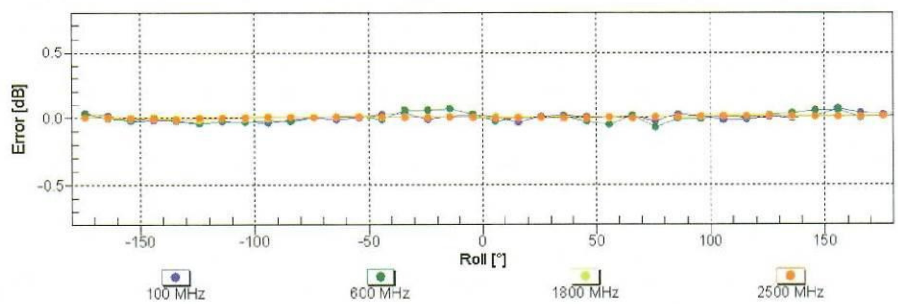
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

EX3DV4– SN:3722 September 23, 2016

Receiving Pattern (ϕ), $\vartheta = 0°$

f=600 MHz,TEM f=1800 MHz,R22



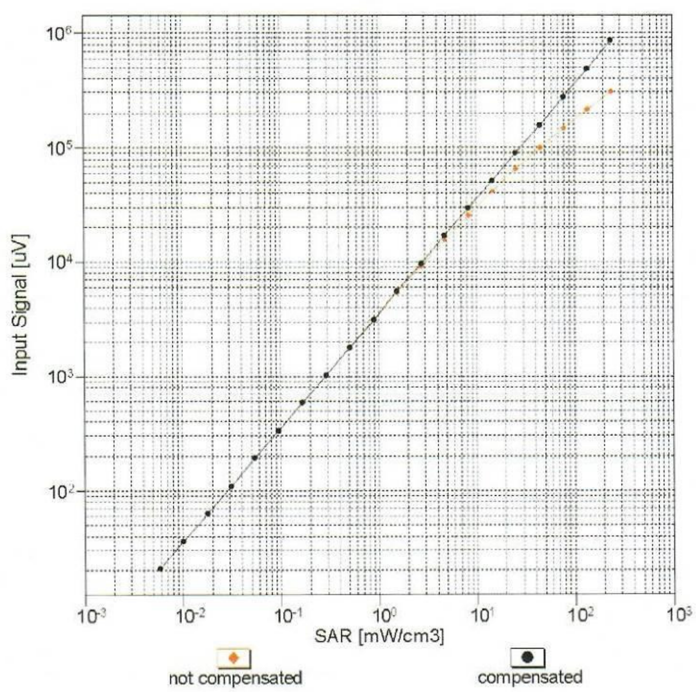


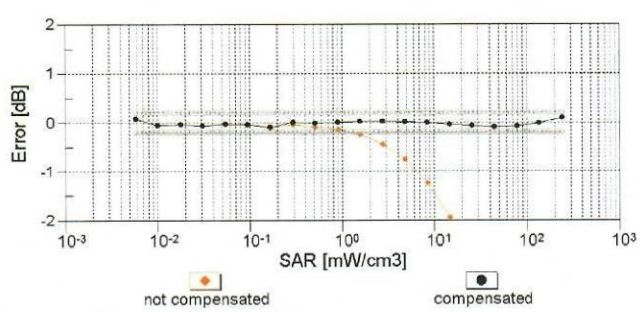
Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Certificate No: EX3-3722_Sep16 Page 8 of 11

EX3DV4– SN:3722 September 23, 2016

Dynamic Range f(SAR$_{head}$)
(TEM cell , f_{eval}= 1900 MHz)



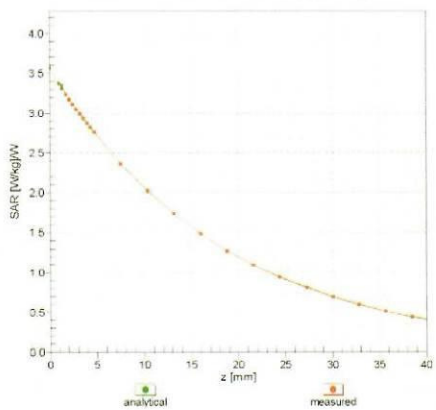


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

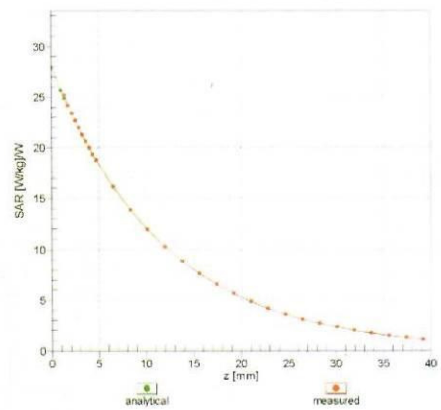
Certificate No: EX3-3722_Sep16 Page 9 of 11

Conversion Factor Assessment

f = 900 MHz,WGLS R9 (H_convF)

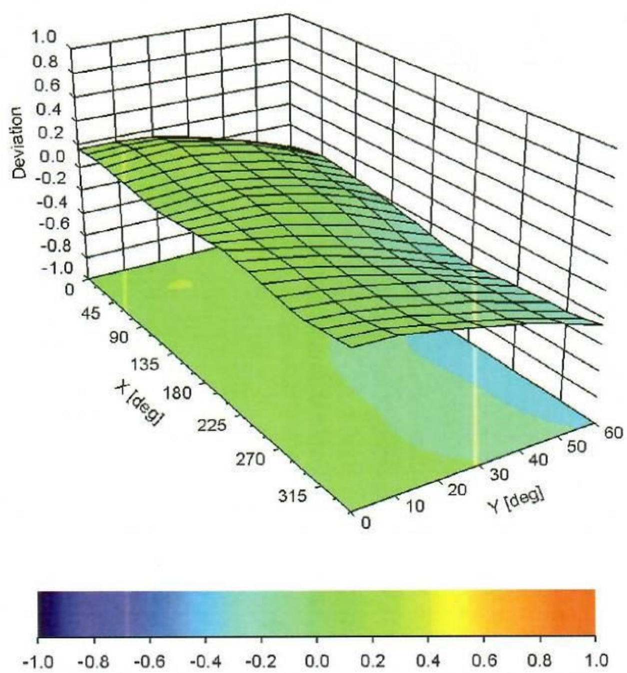


f = 1810 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz



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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3722

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	125.9
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

ANNEX I DAE CALIBRATION CERTIFICATE

Calibration Laboratory of
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Zeughausstrasse 43, 8004 Zurich, Switzerland

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Accreditation No.: SCS 0108

Client **MET Laboratories**

Certificate No: DAE3-584_Sep16

CALIBRATION CERTIFICATE

Object	DAE3 - SD 000 D03 AA - SN: 584
Calibration procedure(s)	QA CAL-06.v29 Calibration procedure for the data acquisition electronics (DAE)
Calibration date:	September 21, 2016

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&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0810278	09-Sep-16 (No:19065)	Sep-17
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Auto DAE Calibration Unit	SE UWS 053 AA 1001	05-Jan-16 (in house check)	In house check: Jan-17
Calibrator Box V2.1	SE UMS 006 AA 1002	05-Jan-16 (in house check)	In house check: Jan-17

	Name	Function	Signature
Calibrated by:	Eric Hainfeld	Technician	[signature]
Approved by:	Fin Bomholt	Deputy Technical Manager	i.V. [signature]

Issued: September 21, 2016

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Certificate No: DAE3-584_Sep16 Page 1 of 5

Calibration Laboratory of
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Accreditation No.: SCS 0108

Glossary

DAE	data acquisition electronics
Connector angle	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.

DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1μV , full range = -100...+300 mV

Low Range: 1LSB = 61nV , full range = -1.......+3mV

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

Calibration Factors	X	Y	Z
High Range	404.497 ± 0.02% (k=2)	404.684 ± 0.02% (k=2)	404.109 ± 0.02% (k=2)
Low Range	3.92959 ± 1.50% (k=2)	3.91818 ± 1.50% (k=2)	3.94514 ± 1.50% (k=2)

Connector Angle

Connector Angle to be used in DASY system	142.0 ° ± 1 °

Appendix (Additional assessments outside the scope of SCS0108)

1. DC Voltage Linearity

High Range		Reading (µV)	Difference (µV)	Error (%)
Channel X	+ Input	199989.98	-6.78	-0.00
Channel X	+ Input	20002.67	1.05	0.01
Channel X	- Input	-20001.03	-0.13	0.00
Channel Y	+ Input	199994.65	-2.21	-0.00
Channel Y	+ Input	20003.08	1.53	0.01
Channel Y	- Input	-19995.08	5.84	-0.03
Channel Z	+ Input	199997.75	0.63	0.00
Channel Z	+ Input	19997.79	-3.79	-0.02
Channel Z	- Input	-20002.74	-1.77	0.01

Low Range		Reading (µV)	Difference (µV)	Error (%)
Channel X	+ Input	2001.49	0.15	0.01
Channel X	+ Input	201.90	0.26	0.13
Channel X	- Input	-198.61	-0.53	0.27
Channel Y	+ Input	2000.93	-0.41	-0.02
Channel Y	+ Input	201.53	-0.11	-0.05
Channel Y	- Input	-199.00	-0.90	0.46
Channel Z	+ Input	2000.92	-0.28	-0.01
Channel Z	+ Input	200.91	-0.65	-0.32
Channel Z	- Input	-199.60	-1.43	0.72

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	3.25	1.52
	- 200	-1.08	-2.90
Channel Y	200	2.80	2.69
	- 200	-3.39	-3.72
Channel Z	200	-6.34	-6.43
	- 200	4.51	4.34

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	-	-0.44	-3.66
Channel Y	200	7.35	-	0.04
Channel Z	200	6.60	5.86	-

4. 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	16111	16149
Channel Y	16215	16800
Channel Z	16296	17501

5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec
Input 10MΩ

	Average (μV)	min. Offset (μV)	max. Offset (μV)	Std. Deviation (μV)
Channel X	1.36	-0.11	3.26	0.52
Channel Y	-0.30	-1.72	1.39	0.51
Channel Z	0.24	-1.16	1.64	0.46

6. Input Offset Current

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

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)	+7.9
Supply (- Vcc)	-7.6

9. Power Consumption (Typical values for information)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0.01	+6	+14
Supply (- Vcc)	–0.01	-8	-9

ANNEX J 2.4 GHz MEASURED FLUID DIELECTRIC PARAMETERS

Vuzix M300 Smart Glasses

Head Simulating Liquid Parameters for 2450MHz

November 28, 2016 08:01 AM

Frequency	e’	e”
2.40000 GHz	38.786	13.813
2.40200 GHz	38.676	13.824
2.40400 GHz	38.683	13.838
2.40600 GHz	38.672	13.852
2.40800 GHz	38.673	13.862
2.41000 GHz	38.668	13.891
2.41200 GHz	38.656	13.894
2.41400 GHz	38.647	13.905
2.41600 GHz	38.649	13.906
2.41800 GHz	38.644	13.913
2.42000 GHz	38.635	13.914
2.42200 GHz	38.624	13.916
2.42400 GHz	38.620	13.918
2.42600 GHz	38.605	13.919
2.42800 GHz	38.606	13.920
2.43000 GHz	38.591	13.920
2.43200 GHz	38.592	13.921
2.43400 GHz	38.577	13.921
2.43600 GHz	38.560	13.922
2.43800 GHz	38.554	13.922
2.44000 GHz	38.548	13.923
2.44200 GHz	38.531	13.923
2.44400 GHz	38.531	13.923
2.44600 GHz	38.526	13.924
2.44800 GHz	38.223	13.924
2.45000 GHz	38.516	13.925
2.45200 GHz	38.491	13.928
2.45400 GHz	38.484	13.930
2.45600 GHz	38.479	13.936
2.45800 GHz	38.474	13.939
2.46000 GHz	38.448	13.943
2.46200 GHz	38.445	13.941
2.46400 GHz	38.432	13.941

2.46600 GHz	38.435	13.946
2.46800 GHz	38.423	13.950
2.47000 GHz	38.402	13.951
2.47200 GHz	38.401	13.955
2.47400 GHz	38.381	13.972
2.47600 GHz	38.370	13.969
2.47800 GHz	38.368	13.975
2.48000 GHz	38.349	13.984
2.48200 GHz	38.338	13.980
2.48400 GHz	38.326	13.988
2.48600 GHz	38.322	14.006
2.48800 GHz	38.307	14.020
2.49000 GHz	38.303	14.028
2.49200 GHz	37.288	14.036
2.49400 GHz	37.282	14.045
2.49600 GHz	37.263	14.047
2.49800 GHz	37.261	14.062
2.50000 GHz	37.256	14.074

ANNEX K 5.0 GHz MEASURED FLUID DIELECTRIC PARAMETERS

Vuzix M300 Smart Glasses

Head Simulating Liquid Parameters for 5200MHz

November 29, 2016 10:09 AM

Frequency	e'	e"
5.18000 GHz	34.753	15.733
5.18400 GHz	34.752	15.734
5.18720 GHz	34.751	15.736
5.19000 GHz	34.749	15.738
5.19360 GHz	34.749	15.738
5.19680 GHz	34.750	15.738
5.20000 GHz	34.749	15.734
5.20320 GHz	34.754	15.734
5.20640 GHz	34.748	15.744
5.20960 GHz	34.750	15.740
5.21280 GHz	34.751	15.735
5.21600 GHz	34.747	15.747
5.21920 GHz	34.746	15.745
5.22240 GHz	34.752	15.744
5.22560 GHz	34.745	15.754
5.22880 GHz	34.721	15.749
5.23200 GHz	34.721	15.755
5.23520 GHz	34.717	15.751
5.23840 GHz	34.716	15.751
5.24160 GHz	34.714	15.751
5.24480 GHz	34.700	15.754
5.24800 GHz	34.693	15.763
5.25120 GHz	34.675	15.759
5.25440 GHz	34.656	15.754
5.25760 GHz	34.651	15.756
5.26080 GHz	34.634	15.747
5.26400 GHz	34.634	15.760
5.26720 GHz	34.626	15.782
5.27040 GHz	34.622	15.784
5.27360 GHz	34.629	15.761
5.27680 GHz	34.613	15.783
5.28000 GHz	34.604	15.790
5.28320 GHz	34.602	15.790

5.28640 GHz	34.587	15.796
5.28960 GHz	34.584	15.800
5.29280 GHz	34.595	15.803
5.29600 GHz	34.589	15.806
5.29920 GHz	34.582	15.820
5.30240 GHz	34.585	15.019
5.30560 GHz	34.585	15.017
5.30880 GHz	34.561	15.027
5.31200 GHz	34.573	15.037
5.31520 GHz	34.564	15.039
5.31840 GHz	34.563	15.047
5.32160 GHz	34.565	15.032
5.32480 GHz	34.558	15.030
5.32800 GHz	34.562	15.059
5.33120 GHz	34.545	15.046
5.33440 GHz	34.541	15.053
5.33760 GHz	34.545	15.057
5.34080 GHz	34.540	15.058
5.34400 GHz	34.533	15.059
5.34720 GHz	34.530	15.060
5.35040 GHz	34.527	15.048
5.35360 GHz	34.524	15.058
5.35680 GHz	34.511	15.052
5.36000 GHz	34.506	15.058

Vuzix M300 Smart Glasses

Head Simulating Liquid Parameters for 5500MHz

November 29, 2016 10:18 AM

Frequency	e’	e”
5.49000 GHz	34.559	16.402
5.49168 GHz	34.557	16.404
5.49309 GHz	34.557	16.406
5.49449 GHz	34.556	16.406
5.49590 GHz	34.556	16.406
5.49730 GHz	34.554	16.407
5.49871 GHz	34.554	16.408
5.50000 GHz	34.552	16.408
5.50140 GHz	34.535	16.424
5.50281 GHz	34.533	16.416
5.50421 GHz	34.541	16.419
5.50562 GHz	34.522	16.420
5.50702 GHz	34.517	16.422
5.50843 GHz	34.517	16.411
5.50983 GHz	34.513	16.421
5.51124 GHz	34.507	16.431
5.51265 GHz	34.498	16.435
5.51405 GHz	34.495	16.427
5.51546 GHz	34.488	16.435
5.51686 GHz	34.488	16.436
5.51827 GHz	34.478	16.441
5.51967 GHz	34.480	16.435
5.52108 GHz	34.480	16.458
5.52248 GHz	34.486	16.452
5.52389 GHz	34.469	16.447
5.52530 GHz	34.468	16.449
5.52670 GHz	34.478	16.444
5.52811 GHz	34.480	16.455
5.52951 GHz	34.467	16.452
5.53092 GHz	34.475	16.450
5.53232 GHz	34.470	16.462
5.53373 GHz	34.461	16.457
5.53514 GHz	34.469	16.455

5.53654 GHz	34.459	16.453
5.53795 GHz	34.459	16.452
5.53935 GHz	34.450	16.454
5.54076 GHz	34.434	16.439
5.54216 GHz	34.451	16.452
5.54357 GHz	34.456	16.449
5.54497 GHz	34.448	16.451
5.54638 GHz	34.445	16.442
5.54779 GHz	34.447	16.444
5.54919 GHz	34.450	16.455
5.55060 GHz	34.446	16.445
5.55200 GHz	34.440	16.452
5.55341 GHz	34.447	16.461
5.55481 GHz	34.445	16.448
5.55622 GHz	34.435	16.446
5.55763 GHz	34.449	16.439
5.55903 GHz	34.443	16.443
5.56044 GHz	34.438	16.447
5.56184 GHz	34.431	16.446
5.56325 GHz	34.436	16.451
5.56465 GHz	34.418	16.442
5.56606 GHz	34.423	16.457
5.56746 GHz	34.422	16.440
5.56887 GHz	34.420	16.446
5.57028 GHz	34.429	16.451
5.57168 GHz	34.411	16.449
5.57309 GHz	34.418	16.455
5.57449 GHz	34.415	16.457
5.57590 GHz	34.412	16.452
5.57730 GHz	34.399	16.445
5.57871 GHz	34.403	16.455
5.58000 GHz	34.421	16.491
5.58152 GHz	34.388	16.451
5.58293 GHz	34.387	16.448
5.58433 GHz	34.386	16.451
5.58574 GHz	34.407	16.459
5.58714 GHz	34.389	16.468
5.58855 GHz	34.382	16.471

Vuzix M300 Smart Glasses

Head Simulating Liquid Parameters for 5800MHz

November 29, 2016 10:29 AM

Frequency	e'	e"
5.75000 GHz	34.249	16.621
5.75192 GHz	34.249	16.621
5.75333 GHz	34.247	16.621
5.75473 GHz	34.246	16.621
5.75614 GHz	34.243	16.621
5.75755 GHz	34.243	16.621
5.75895 GHz	34.244	16.621
5.76000 GHz	34.243	16.621
5.76024 GHz	34.237	16.628
5.76164 GHz	34.233	16.621
5.76305 GHz	34.235	16.617
5.76445 GHz	34.236	16.623
5.76586 GHz	34.229	16.623
5.76726 GHz	34.232	16.615
5.76867 GHz	34.227	16.619
5.77008 GHz	34.214	16.616
5.77148 GHz	34.228	16.619
5.77289 GHz	34.227	16.614
5.77429 GHz	34.228	16.602
5.77570 GHz	34.223	16.606
5.77108 GHz	34.215	16.597
5.77851 GHz	34.220	16.505
5.77991 GHz	34.230	16.600
5.78132 GHz	34.212	16.599
5.78273 GHz	34.210	16.596
5.78413 GHz	34.214	16.596
5.78554 GHz	34.207	16.599
5.78694 GHz	34.199	16.600
5.78835 GHz	34.194	16.600
5.78975 GHz	34.191	16.594
5.79116 GHz	34.202	16.504
5.79257 GHz	34.187	16.589
5.79397 GHz	34.179	16.594

5.79538 GHz	34.186	16.593
5.79678 GHz	34.179	16.591
5.79819 GHz	34.170	16.591
5.79959 GHz	34.171	16.595
5.80000 GHz	34.182	16.592
5.80240 GHz	34.175	16.592
5.80381 GHz	34.167	16.589
5.80522 GHz	34.174	16.594
5.80662 GHz	34.165	16.596
5.80803 GHz	34.155	16.598
5.80943 GHz	34.151	16.504
5.81084 GHz	34.139	16.592
5.81224 GHz	34.129	16.577
5.81365 GHz	34.141	16.584
5.81506 GHz	34.123	16.599
5.81646 GHz	34.119	16.591
5.81787 GHz	34.106	16.595
5.81927 GHz	34.108	16.592
5.82068 GHz	34.104	16.595
5.82208 GHz	34.102	16.587
5.82349 GHz	34.110	16.596
5.82489 GHz	34.116	16.591
5.82500 GHz	34.165	16.583
5.82771 GHz	34.096	16.599
5.82911 GHz	34.104	16.598
5.83052 GHz	34.070	16.598
5.83192 GHz	34.083	16.583
5.83333 GHz	34.071	16.582
5.83473 GHz	34.079	16.572
5.83614 GHz	34.083	16.570
5.83755 GHz	34.082	16.573
5.83895 GHz	34.096	16.573
5.84000 GHz	34.091	16.574

ANNEX L PHANTOM CERTIFICATE OF CONFORMITY

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info@speag.com, http://www.speag.com

Certificate of conformity / First Article Inspection

Item	SAM Twin Phantom V4.0
Type No	QD 000 P40 C
Series No	TP-1150 and higher
Manufacturer / Origin	Untersee Composites Hauptstr. 69 CH-8559 Fruthwilen Switzerland

Tests

The series production process used allows the limitation to test of first articles.
Complete tests were made on the pre-series Type No. QD 000 P40 AA, Serial No. TP-1001 and on the series first article Type No. QD 000 P40 BA, Serial No. TP-1006. Certain parameters have been retested using further series units (called samples).

Test	Requirement	Details	Units tested
Shape	Compliance with the geometry according to the CAD model.	IT'IS CAD File (*)	First article, Samples
Material thickness	Compliant with the requirements according to the standards	2mm +/- 0.2mm in specific areas; 6mm +/- 0.2mm at ERP	First article, Samples
Material parameters	Dielectric parameters for required frequencies	200 MHz – 3 GHz Relative permittivity < 5 Loss tangent < 0.05.	Material sample TP 104-5
Material resistivity	The material has been tested to be compatible with the liquids defined in the standards if handled and cleaned according to the instructions	DEGMBE based simulating liquids	Pre-series, First article, Samples

Standards

[1] CENELEC EN 50361
[2] IEEE Std 1528-200x Draft CD 1.1 (Dec 02)
[3] IEC 62209/CD (Nov 02)
(*) The IT'IS CAD file is derived from [2] and is also within the tolerance requirements of the shapes of [1] and [3].

Conformity

Based on the sample tests above, we certify that this item is in compliance with the uncertainty requirements of SAR measurements specified in standard [1] and draft standards [2] and [3].

Date 7.8.2003

Signature / Stamp

s p e a g
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