Schmid & Partner Engineering AG
s p e a g
Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 44 245 9700, Fax +41 44 245 9779
www.speag.swiss, info@speag.swiss

IMPORTANT NOTICE

USAGE OF THE DAE4

The DAE unit is a delicate, high precision instrument and requires careful treatment by the user. There are no serviceable parts inside the DAE. Special attention shall be given to the following points:

Battery Exchange: The battery cover of the DAE4 unit is closed using a screw, over tightening the screw may cause the threads inside the DAE to wear out.

Shipping of the DAE: Before shipping the DAE to SPEAG for calibration, remove the batteries and pack the DAE in an antistatic bag. This antistatic bag shall then be packed into a larger box or container which protects the DAE from impacts during transportation. The package shall be marked to indicate that a fragile instrument is inside.

E-Stop Failures: Touch detection may be malfunctioning due to broken magnets in the E-stop. Rough handling of the E-stop may lead to damage of these magnets. Touch and collision errors are often caused by dust and dirt accumulated in the E-stop. To prevent E-stop failure, the customer shall always mount the probe to the DAE carefully and keep the DAE unit in a non-dusty environment if not used for measurements.

Repair: Minor repairs are performed at no extra cost during the calibration. However, SPEAG reserves the right to charge for any repair especially if rough unprofessional handling caused the defect.

DASY Configuration Files: Since the exact values of the DAE input resistances, as measured during the calibration procedure of a DAE unit, are not used by the DASY software, a nominal value of 200 MOhm is given in the corresponding configuration file.

Important Note:
Warranty and calibration is void if the DAE unit is disassembled partly or fully by the Customer.

Important Note:
Never attempt to grease or oil the E-stop assembly. Cleaning and readjusting of the E-stop assembly is allowed by certified SPEAG personnel only and is part of the calibration procedure.

Important Note:
To prevent damage of the DAE probe connector pins, use great care when installing the probe to the DAE. Carefully connect the probe with the connector notch oriented in the mating position. Avoid any rotational movement of the probe body versus the DAE while turning the locking nut of the connector. The same care shall be used when disconnecting the probe from the DAE.

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

Accreditation No.: SCS 0108

Client **BTL**
New Taipei City

Certificate No: DAE4-1486_May24

CALIBRATION CERTIFICATE

Object	DAE4 - SD 000 D04 BM - SN: 1486
Calibration procedure(s)	QA CAL-06.v30 Calibration procedure for the data acquisition electronics (DAE)
Calibration date:	May 16, 2024

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	29-Aug-23 (No:37421)	Aug-24
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Auto DAE Calibration Unit	SE UWS 053 AA 1001	23-Jan-24 (in house check)	In house check: Jan-25
Calibrator Box V2.1	SE UMS 006 AA 1002	23-Jan-24 (in house check)	In house check: Jan-25

	Name	Function	Signature
Calibrated by:	Dominique Steffen	Laboratory Technician	
Approved by:	Sven Kühn	Technical Manager	

Issued: May 16, 2024

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	404.653 ± 0.02% (k=2)	404.602 ± 0.02% (k=2)	405.192 ± 0.02% (k=2)
Low Range	3.98413 ± 1.50% (k=2)	3.99170 ± 1.50% (k=2)	3.98103 ± 1.50% (k=2)

Connector Angle

Connector Angle to be used in DASY system	33.0 ° ± 1 °

Appendix (Additional assessments outside the scope of SCS0108)

1. DC Voltage Linearity

High Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	200027.02	2.03	0.00
Channel X	+ Input	19994.65	-1.44	-0.01
Channel X	- Input	-20015.25	1.24	-0.01
Channel Y	+ Input	200029.63	4.39	0.00
Channel Y	+ Input	19994.97	-1.33	-0.01
Channel Y	- Input	-20016.70	-0.37	0.00
Channel Z	+ Input	200026.55	1.21	0.00
Channel Z	+ Input	19995.68	-0.68	-0.00
Channel Z	- Input	-20016.24	0.06	-0.00

Low Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	1990.90	-0.27	-0.01
Channel X	+ Input	190.51	-0.55	-0.29
Channel X	- Input	-209.91	-1.11	0.53
Channel Y	+ Input	1991.88	0.71	0.04
Channel Y	+ Input	189.93	-1.13	-0.59
Channel Y	- Input	-209.83	-1.01	0.48
Channel Z	+ Input	1991.34	0.07	0.00
Channel Z	+ Input	190.08	-1.05	-0.55
Channel Z	- Input	-210.02	-1.30	0.62

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	13.01	11.40
	- 200	-11.80	-12.95
Channel Y	200	-9.95	-10.59
	- 200	8.64	8.08
Channel Z	200	-16.42	-16.87
	- 200	15.81	15.53

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	-	-1.65	-3.84
Channel Y	200	6.78	-	1.04
Channel Z	200	10.39	4.34	-

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	15818	15480
Channel Y	15987	16082
Channel Z	16204	14939

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	0.38	-0.37	1.14	0.35
Channel Y	-0.04	-1.11	0.89	0.38
Channel Z	-0.17	-0.87	1.09	0.36

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

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Accreditation No.: SCS 0108

Client **BTL**
New Taipei City

Certificate No: DAE4-1764_Jan24

CALIBRATION CERTIFICATE

Object DAE4 - SD 000 D04 BP - SN: 1764

Calibration procedure(s) QA CAL-06.v30
Calibration procedure for the data acquisition electronics (DAE)

Calibration date: January 19, 2024

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	29-Aug-23 (No:37421)	Aug-24
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Auto DAE Calibration Unit	SE UWS 053 AA 1001	27-Jan-23 (in house check)	In house check: Jan-24
Calibrator Box V2.1	SE UMS 006 AA 1002	27-Jan-23 (in house check)	In house check: Jan-24

	Name	Function	Signature
Calibrated by:	Dominique Steffen	Laboratory Technician	
Approved by:	Sven Kühn	Technical Manager	

Issued: January 19, 2024

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

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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	405.161 ± 0.02% (k=2)	405.184 ± 0.02% (k=2)	405.066 ± 0.02% (k=2)
Low Range	3.99849 ± 1.50% (k=2)	4.00270 ± 1.50% (k=2)	3.97310 ± 1.50% (k=2)

Connector Angle

Connector Angle to be used in DASY system	136.5 ° ± 1 °

Appendix (Additional assessments outside the scope of SCS0108)

1. DC Voltage Linearity

High Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	200019.90	4.46	0.00
Channel X	+ Input	19985.90	0.15	0.00
Channel X	- Input	-20027.36	-0.70	0.00
Channel Y	+ Input	200018.28	2.18	0.00
Channel Y	+ Input	19983.18	-2.95	-0.01
Channel Y	- Input	-20028.18	-1.82	0.01
Channel Z	+ Input	200017.39	1.55	0.00
Channel Z	+ Input	19984.67	-1.50	-0.01
Channel Z	- Input	-20028.46	-2.15	0.01

Low Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	1980.43	-0.42	-0.02
Channel X	+ Input	179.47	-1.43	-0.79
Channel X	- Input	-221.04	-1.81	0.82
Channel Y	+ Input	1981.50	0.37	0.02
Channel Y	+ Input	179.48	-1.68	-0.92
Channel Y	- Input	-220.87	-2.03	0.93
Channel Z	+ Input	1981.07	-0.17	-0.01
Channel Z	+ Input	180.45	-0.73	-0.40
Channel Z	- Input	-219.62	-0.78	0.35

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	-1.70	-3.47
	- 200	4.26	1.95
Channel Y	200	6.88	6.77
	- 200	-9.46	-9.66
Channel Z	200	-4.54	-4.53
	- 200	2.37	2.31

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	-	3.02	-3.76
Channel Y	200	6.08	-	4.03
Channel Z	200	7.95	4.91	-

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	15847	13281
Channel Y	15913	13127
Channel Z	16086	15373

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	-0.19	-1.10	0.84	0.34
Channel Y	-0.39	-1.29	0.72	0.36
Channel Z	-0.16	-1.18	1.06	0.38

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

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Accreditation No.: SCS 0108

Client BTL
New Taipei City

Certificate No. EX-7369_Jun24

CALIBRATION CERTIFICATE

Object EX3DV4 - SN:7369

Calibration procedure(s) QA CAL-01.v10, QA CAL-12.v10, QA CAL-14.v7, QA CAL-23.v6, QA CAL-25.v8
Calibration procedure for dosimetric E-field probes

Calibration date June 03, 2024

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 NRP2	SN: 104778	26-Mar-24 (No. 217-04036/04037)	Mar-25
Power sensor NRP-Z91	SN: 103244	26-Mar-24 (No. 217-04036)	Mar-25
OCP DAK-3.5 (weighted)	SN: 1249	05-Oct-23 (OCP-DAK3.5-1249_Oct23)	Oct-24
OCP DAK-12	SN: 1016	05-Oct-23 (OCP-DAK12-1016_Oct23)	Oct-24
Reference 20 dB Attenuator	SN: CC2552 (20x)	26-Mar-24 (No. 217-04046)	Mar-25
DAE4	SN: 660	23-Feb-24 (No. DAE4-660_Feb24)	Feb-25
Reference Probe EX3DV4	SN: 7349	03-Nov-23 (No. EX3-7349_Nov23)	Nov-24

Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-22)	In house check: Jun-24
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-22)	In house check: Jun-24
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-22)	In house check: Jun-24
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-22)	In house check: Jun-24
Network Analyzer E8358A	SN: US41080477	31-Mar-14 (in house check Oct-22)	In house check: Oct-24

	Name	Function	Signature
Calibrated by	Joanna Lleshaj	Laboratory Technician	
Approved by	Sven Kühn	Technical Manager	

Issued: June 03, 2024

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) IEC/IEEE 62209-1528, "Measurement Procedure For The Assessment Of Specific Absorption Rate Of Human Exposure To Radio Frequency Fields From Hand-Held And Body-Worn Wireless Communication Devices – Part 1528: Human Models, Instrumentation And Procedures (Frequency Range of 4 MHz to 10 GHz)", October 2020.
b) 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 $\vartheta = 0$ ($f \leq 900$ 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. 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 $f \leq 800$ 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).

Parameters of Probe: EX3DV4 - SN:7369

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc ($k = 2$)
Norm (μV/(V/m)^2) [A]	0.40	0.49	0.41	±10.1%
DCP (mV) [B]	102.8	97.4	107.3	±4.7%

Calibration Results for Modulation Response

UID	Communication System Name		A dB	B dB$\sqrt{\mu V}$	C	D dB	VR mV	Max dev.	Max Unc[E] $k = 2$
0	CW	X	0.00	0.00	1.00	0.00	149.7	±1.6%	±4.7%
		Y	0.00	0.00	1.00		117.8		
		Z	0.00	0.00	1.00		121.2		
10352	Pulse Waveform (200Hz, 10%)	X	5.92	74.79	14.10	10.00	60.0	±3.2%	±9.6%
		Y	20.00	90.74	20.10		60.0		
		Z	1.70	61.71	7.41		60.0		
10353	Pulse Waveform (200Hz, 20%)	X	20.00	87.46	16.92	6.99	80.0	±2.5%	±9.6%
		Y	20.00	94.56	20.72		80.0		
		Z	0.87	60.22	5.69		80.0		
10354	Pulse Waveform (200Hz, 40%)	X	20.00	91.80	17.78	3.98	95.0	±1.6%	±9.6%
		Y	20.00	103.19	23.30		95.0		
		Z	56.00	82.00	11.00		95.0		
10355	Pulse Waveform (200Hz, 60%)	X	20.00	102.41	21.60	2.22	120.0	±1.2%	±9.6%
		Y	20.00	113.71	26.62		120.0		
		Z	0.24	60.00	4.53		120.0		
10387	QPSK Waveform, 1 MHz	X	1.74	67.29	15.65	1.00	150.0	±2.3%	±9.6%
		Y	1.64	65.05	14.60		150.0		
		Z	1.76	71.29	16.80		150.0		
10388	QPSK Waveform, 10 MHz	X	2.28	68.66	16.23	0.00	150.0	±1.0%	±9.6%
		Y	2.33	68.14	15.77		150.0		
		Z	2.07	68.96	16.40		150.0		
10396	64-QAM Waveform, 100 kHz	X	2.69	70.47	18.75	3.01	150.0	±1.1%	±9.6%
		Y	2.36	66.31	16.78		150.0		
		Z	2.07	67.22	17.12		150.0		
10399	64-QAM Waveform, 40 MHz	X	3.55	67.48	16.02	0.00	150.0	±0.8%	±9.6%
		Y	3.48	66.64	15.56		150.0		
		Z	3.37	67.58	16.02		150.0		
10414	WLAN CCDF, 64-QAM, 40 MHz	X	4.86	65.89	15.67	0.00	150.0	±1.7%	±9.6%
		Y	4.87	65.32	15.40		150.0		
		Z	4.56	66.17	15.72		150.0		

Note: For details on UID parameters see Appendix

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] Linearization parameter uncertainty for maximum specified field strength.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

Parameters of Probe: EX3DV4 - SN:7369

Sensor Model Parameters

	C1 fF	C2 fF	α V^{-1}	T1 $ms\,V^{-2}$	T2 $ms\,V^{-1}$	T3 ms	T4 V^{-2}	T5 V^{-1}	T6
x	41.1	299.68	34.13	9.32	0.00	5.00	1.84	0.00	1.00
y	49.9	377.10	36.25	7.60	0.06	5.05	0.00	0.39	1.00
z	24.7	174.11	32.19	4.97	0.00	4.92	1.07	0.00	1.00

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle	64.6°
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

Note: Measurement distance from surface can be increased to 3–4 mm for an *Area Scan* job.

Parameters of Probe: EX3DV4 - SN:7369

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz)[C]	Relative Permittivity[F]	Conductivity[F] (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha[G]	Depth[G] (mm)	Unc[H] ($k = 2$)
750	41.9	0.89	9.56	9.81	9.16	0.39	1.27	±11.0%
835	41.5	0.90	10.19	9.82	8.66	0.39	1.27	±11.0%
900	41.5	0.97	9.44	9.29	8.66	0.38	1.27	±11.0%
1450	40.5	1.20	8.12	8.07	7.62	0.36	1.27	±11.0%
1750	40.1	1.37	8.96	9.02	8.47	0.25	1.27	±11.0%
1900	40.0	1.40	7.88	7.92	7.43	0.27	1.27	±11.0%
2100	39.8	1.49	8.04	8.07	7.54	0.28	1.27	±11.0%
2300	39.5	1.67	7.91	7.98	7.40	0.30	1.27	±11.0%
2450	39.2	1.80	7.60	7.66	7.12	0.30	1.27	±11.0%
2600	39.0	1.96	7.56	7.63	7.06	0.29	1.27	±11.0%
3300	38.2	2.71	6.90	6.96	6.48	0.35	1.27	±13.1%
3500	37.9	2.91	6.87	6.96	6.44	0.35	1.27	±13.1%
3700	37.7	3.12	6.82	6.90	6.39	0.36	1.27	±13.1%
3900	37.5	3.32	6.68	6.75	6.25	0.36	1.27	±13.1%
4200	37.1	3.63	6.48	6.53	6.05	0.37	1.27	±13.1%
4400	36.9	3.84	6.31	6.35	5.88	0.38	1.27	±13.1%
4600	36.7	4.04	6.35	6.40	5.90	0.37	1.27	±13.1%
4800	36.4	4.25	6.25	6.41	5.87	0.37	1.27	±13.1%
4950	36.3	4.40	5.91	5.93	5.45	0.41	1.36	±13.1%
5200	36.0	4.66	5.36	5.44	4.91	0.38	1.51	±13.1%
5300	35.9	4.76	5.17	5.24	4.78	0.39	1.55	±13.1%
5600	35.5	5.07	4.57	4.65	4.21	0.38	1.74	±13.1%
5800	35.3	5.27	4.67	4.76	4.28	0.37	1.86	±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. Validity of ConvF assessed at 6 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] The probes are calibrated using tissue simulating liquids (TSL) that deviate for ε and σ by less than ±5% from the target values (typically better than ±3%) and are valid for TSL with deviations of up to ±10% if SAR correction is applied.

[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.

[H] The stated uncertainty is the total calibration uncertainty ($k = 2$) of Norm·ConvF. Therefore, The uncertainty stated is equivalent to the uncertainty component with the symbol CF in Table 9 of IEC/IEEE 62209-1528:2020.

Parameters of Probe: EX3DV4 - SN:7369

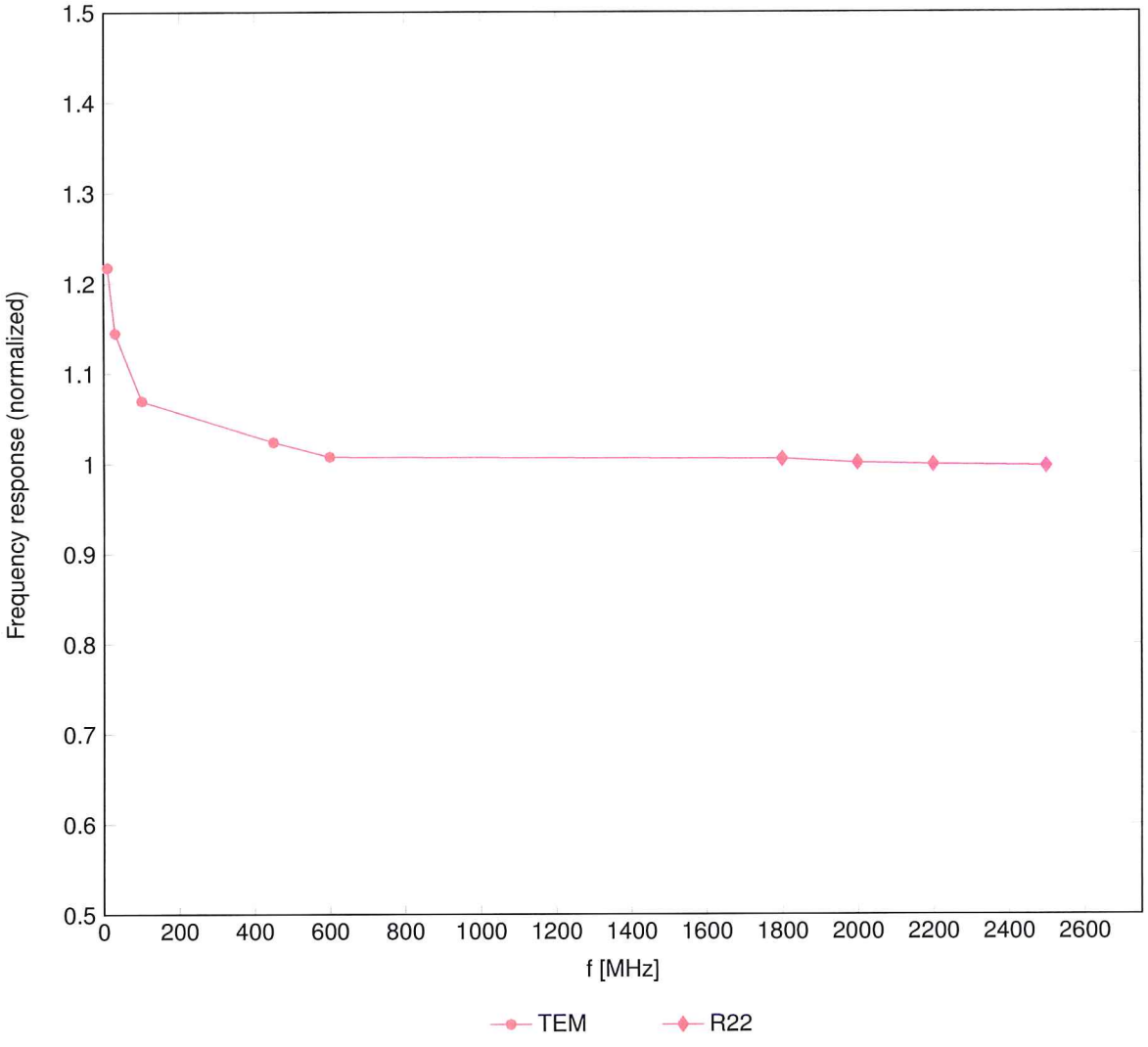
Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz)[C]	Relative Permittivity[F]	Conductivity[F] (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha[G]	Depth[G] (mm)	Unc[H] ($k = 2$)
6500	34.5	6.07	5.71	5.67	5.17	0.20	1.27	±18.6%

[C] Frequency validity at 6.5 GHz is −600/+700 MHz, and ±700 MHz at or above 7 GHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] The probes are calibrated using tissue simulating liquids (TSL) that deviate for ε and σ by less than ±10% from the target values (typically better than ±6%) and are valid for TSL with deviations of up to ±10%.
[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; below ±2% for frequencies between 3–6 GHz; and below ±4% for frequencies between 6–10 GHz at any distance larger than half the probe tip diameter from the boundary.
[H] The stated uncertainty is the total calibration uncertainty ($k = 2$) of Norm·ConvF. Therefore, The uncertainty stated is equivalent to the uncertainty component with the symbol CF in Table 9 of IEC/IEEE 62209-1528:2020.

Frequency Response of E-Field

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



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