Appendix D:DASY System Calibration Certificate

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1、DAE4-SN:387:Due Date(2026-10-12)

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

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S Servizio svizzero di taratura
Swiss Calibration Service

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Accreditation No.: **SCS 0108**

Client **Anbotek**
Shenzhen

Certificate No: **DAE4-387_Oct25**

CALIBRATION CERTIFICATE

Object	DAE4 - SD 000 D04 BM - SN: 387
Calibration procedure(s)	QA CAL-06.v30 Calibration procedure for the data acquisition electronics (DAE)
Calibration date:	October 13, 2025

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	15-Aug-25 (No:43873)	Aug-26
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Auto DAE Calibration Unit	SE UWS 053 AA 1001	23-Jan-25 (in house check)	In house check: Jan-26
Calibrator Box V2.1	SE UMS 006 AA 1002	23-Jan-25 (in house check)	In house check: Jan-26

	Name	Function	Signature
Calibrated by:	Adrian Gehring	Laboratory Technician	
Approved by:	Sven Kühn	Technical Manager	i.V.

Issued: October 13, 2025

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Certificate No: DAE4-387_Oct25 Page 1 of 5

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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.

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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	404.999 ± 0.02% (k=2)	404.667 ± 0.02% (k=2)	404.848 ± 0.02% (k=2)
Low Range	3.98758 ± 1.50% (k=2)	3.98918 ± 1.50% (k=2)	3.94762 ± 1.50% (k=2)

Connector Angle

Connector Angle to be used in DASY system	53.0 ° ± 1 °

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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	15998	15780
Channel Y	16013	15795
Channel Z	15883	15916

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	0.44	-0.73	1.58	0.43
Channel Y	0.59	-1.06	2.22	0.42
Channel Z	-0.93	-1.80	-0.11	0.34

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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2、EX3DV4-SN:3959:Due Date(2026-10-08)

Calibration Laboratory of
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Accreditation No.: SCS 0108

Client: Anbotek, Shenzhen

Certificate No.: EX-3959_Oct25

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN:3959
Calibration procedure(s)	QA CAL-01.v10, QA CAL-12.v10, QA CAL-14.v7, QA CAL-23.v6, QA CAL-25.v8, QA CAL-48.v2 Calibration procedure for dosimetric E-field probes
Calibration date	October 09, 2025

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	Calibration Date (Certificate No.)	Sched. Cal.
Power Sensor R&S NRP-33T	SN: 100967	30-Apr-25 (No. 1020-300791789)	Apr-26
N-type mismatch combination	SN: L1119	26-Mar-25 (No. 217-04292)	Mar-26
OCP DAK-12	SN: 1016	16-Sept-25 (No. OCP-DAK12-1016_Sep25)	Sep-26
OCP DAK-3.5	SN: 1249	16-Sept-25 (No. OCP-DAK3.5-1249_Sep25)	Sep-26
Reference Probe EX3DV4	SN: 7349	10-Jan-25 (No. EX3-7349_Jan25)	Jan-26
DAE4	SN: 1301	07-Nov-24 (No. DAE4-1301_Nov24)	Nov-25

Secondary Standards	ID	Check Date (in house)	Sched. Check
ACAP 2020 Setup 1	SN: L1404	01-Oct-25 (No. IHCK_ACAP2020-1_Oct25)	Oct-26
OCP DAK-12	SN: 1029	27-Feb-25 (No. OCP-DAK12-1029_Feb25)	Feb-26
OCP DAK-3.5	SN: 1336	09-Dec-24 (No. OCP-DAK3.5-1336_Dec24)	Dec-25

	Name	Function	Signature
Calibrated by	Jeton Kastrati	Laboratory Technician	
Approved by	Sven Kühn	Technical Manager	

Issued: October 09, 2025

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Certificate No: EX-3959_Oct25 Page 1 of 9

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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) 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).

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Parameters of Probe: EX3DV4 - SN:3959

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k = 2)
Norm (μV/(V/m)^2) [A]	0.49	0.42	0.58	±10.1%
DCP (mV) [B]	101.0	103.3	101.4	±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	126.0	±1.2%	±4.7%
		Y	0.00	0.00	1.00		148.8		
		Z	0.00	0.00	1.00		138.6		

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 Page 5).
[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.

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Parameters of Probe: EX3DV4 - SN:3959

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle	-35.6°
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	12 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.

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Parameters of Probe: EX3DV4 - SN:3959

Calibration Parameter Determined in HSL

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	9.82	10.29	9.84	0.35	1.27	±11.0%
835	41.5	0.90	9.61	10.08	9.63	0.35	1.27	±11.0%
900	41.5	0.97	9.45	9.90	9.47	0.34	1.27	±11.0%
1750	40.1	1.37	8.02	8.41	8.04	0.33	1.27	±11.0%
1900	40.0	1.40	7.78	8.16	7.80	0.33	1.27	±11.0%
2450	39.2	1.80	7.26	7.62	7.28	0.33	1.27	±11.0%
2600	39.0	1.96	7.14	7.48	7.15	0.32	1.27	±11.0%
5250	35.9	4.71	5.70	5.98	5.71	0.29	1.27	±13.1%
5600	35.5	5.07	5.29	5.54	5.30	0.27	1.27	±13.1%
5750	35.4	5.22	5.35	5.61	5.36	0.25	1.27	±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. This is equivalent to the uncertainty component with the symbol CF in Table 9 of IEC/IEEE 62209-1528:2020.

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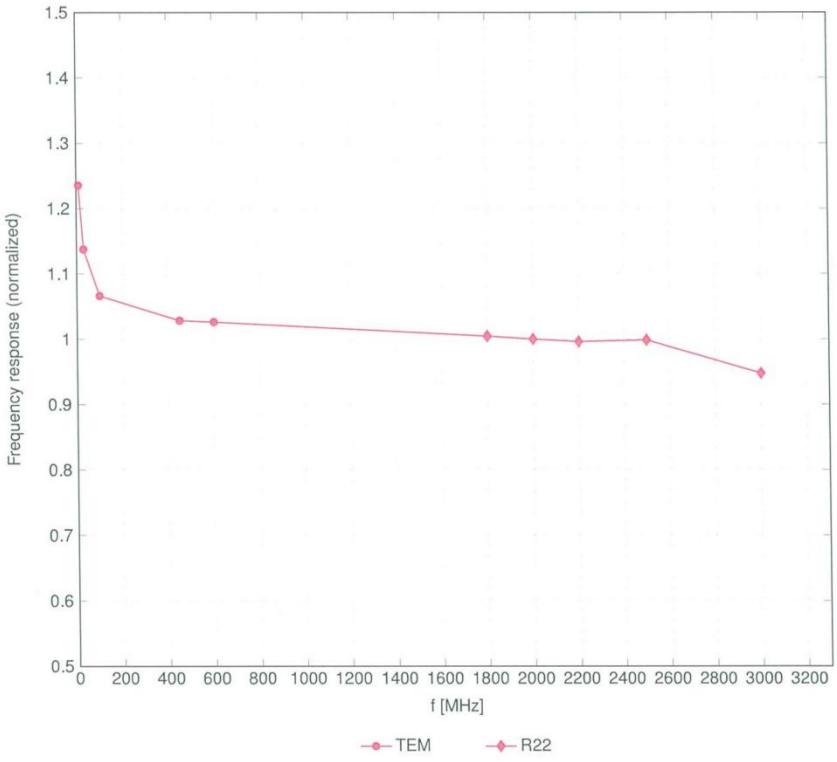
Frequency Response of E-Field

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



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

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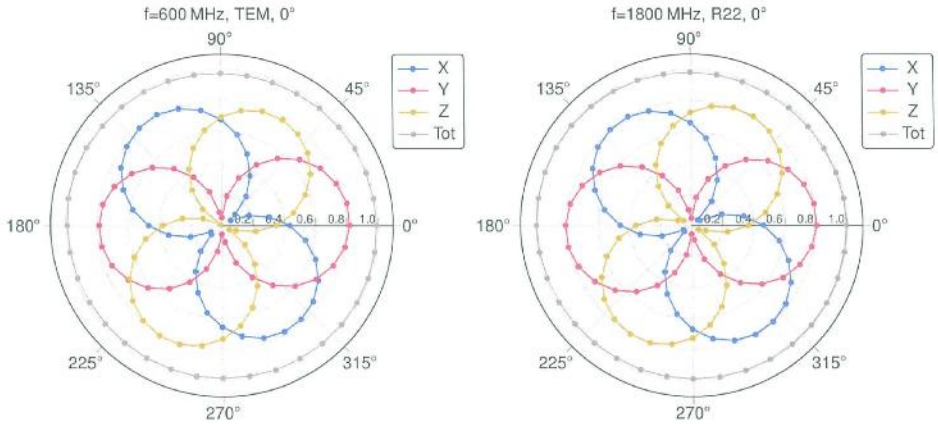
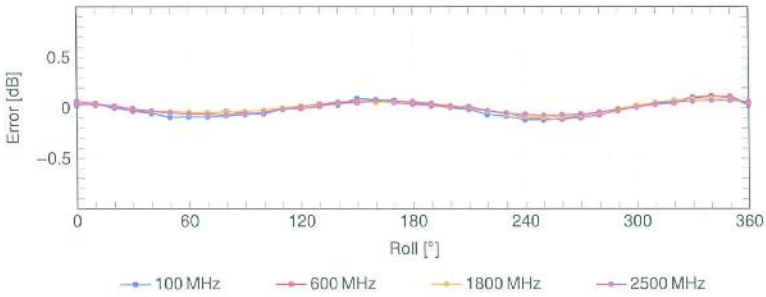
Receiving Pattern (ϕ), $\vartheta = 0°$





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

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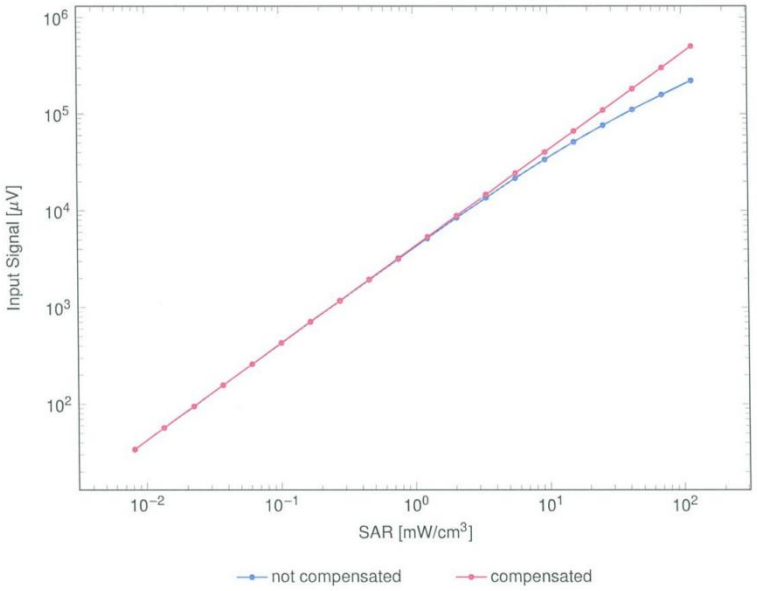
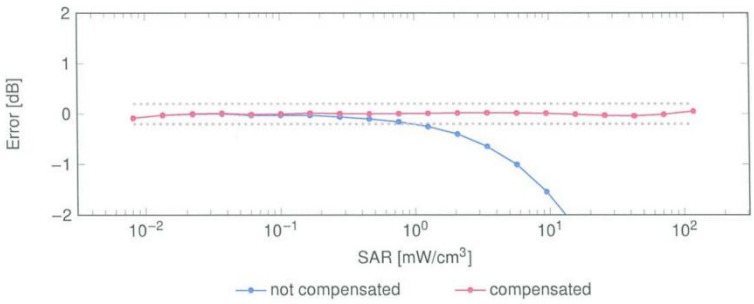
Dynamic Range f(SAR$_{HSL}$)

(TEM cell, f_{eval} = 1900 MHz)





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

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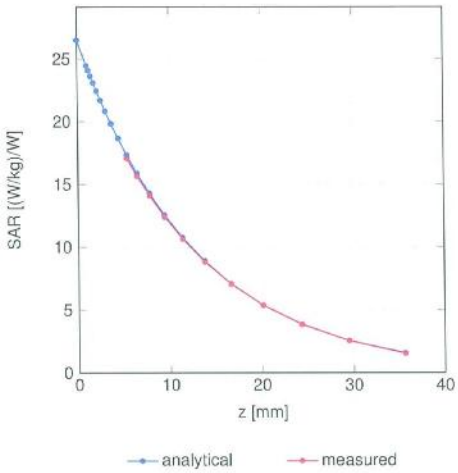
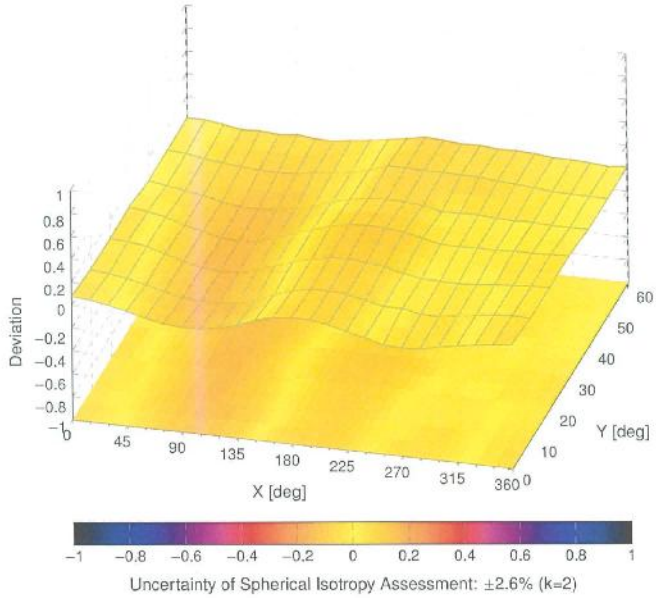
Conversion Factor Assessment

f=1900 MHz, WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, θ), f = 900 MHz



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3、D2450V2-SN:1018:Due Date(2028-09-15)

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Accreditation No.: SCS 0108

Client **Anbotek** Shenzhen

Certificate No. **D2450V2-1018_Sep25**

CALIBRATION CERTIFICATE

Object	D2450V2 - SN: 1018
Calibration procedure(s)	QA CAL-05.v12 Calibration Procedure for SAR Validation Sources between 0.7 - 3 GHz
Calibration date	September 16, 2025

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 Cal
Power Sensor R&S NRP-33T	SN: 100967	30-Apr-25 (No. 1020-300791789)	Apr-26
Power Sensor R&S NRP18A	SN: 101859	06-Feb-25 (No. 4030A315009541)	Feb-26
Spectrum Analyzer R&S FSV40	SN: 101832	29-Jan-25 (No. 4030A315009658)	Jan-26
3.5mm mismatch combination	SN: 1152	24-Mar-25 (No. 217-04293)	Mar-26
OCP DAK-12	SN: 1016	24-Sept-24 (No. OCP-DAK12-1016_Sep24)	Sep-25
OCP DAK-3.5	SN: 1249	23-Sept-24 (No. OCP-DAK3.5-1249_Sep24)	Sep-25
Reference Probe EX3DV4	SN: 7349	10-Jan-25 (No. EX3-7349_Jan25)	Jan-26
DAE4ip	SN: 1836	04-Sep-25 (No. DAE4ip-1836_Sep25)	Sep-26

Secondary Standards	ID	Check Date (in house)	Scheduled Check
ACAD Setup 1	SN: 1000	27-May-25 (No. 675-ACAD_Source_Box-250527)	May-26
Signal Generator R&S SMB100A	SN: 182081	27-May-25 (No. 675-CAL16-S4588-250527)	May-26
Mismatch; SMA	SN: 1102	24-Apr-25 (No. 675-Mismatch_SMA-250424)	Apr-26
OCP DAK-12	SN: 1029	27-Feb-25 (No. OCP-DAK12-1029_Feb25)	Feb-26
OCP DAK-3.5	SN: 1336	09-Dec-24 (No. OCP-DAK3.5-1336_Dec24)	Dec-25

	Name	Function	Signature
Calibrated by	Paulo Pina	Laboratory Technician	
Approved by	Sven Kühn	Technical Manager	i.A.

Issued: September 17, 2025

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Certificate No: D2450V2-1018_Sep25 Page 1 of 6

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Accreditation No.: SCS 0108

Glossary

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards

- 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.
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation

- DASY System Handbook

Methods Applied and Interpretation of Parameters

- *Measurement Conditions*: Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL*: The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss*: These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay*: One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured*: SAR measured at the stated antenna input power.
- *SAR normalized*: SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters*: The measured TSL parameters are used to calculate the nominal SAR result.

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%.

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Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY8 Module SAR	17.0.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with spacer
Zoom Scan Resolution	dx, dy = 5mm, dz = 1.5mm	Graded Ratio = 1.5 mm (Z direction)
Frequency	2450MHz ±1MHz	

HSL parameters at 2450 MHz

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal HSL parameters	22.0 °C	39.2	1.80 mho/m
Measured HSL parameters	(22.0 ±0.2)°C	38.0 ±6%	1.84 mho/m ±6%
HSL temperature change during test	< 0.5 °C		

SAR result with HSL at 2450 MHz

SAR averaged over 1 cm^3 (1 g) of HSL	Condition	
SAR for nominal HSL parameters	24 dBm input power	13.2 W/kg
SAR for nominal HSL parameters	normalized to 1W	52.6 W/kg ±17.0% (k = 2)

SAR averaged over 10 cm^3 (10 g) of HSL	Condition	
SAR for nominal HSL parameters	24 dBm input power	6.19 W/kg
SAR for nominal HSL parameters	normalized to 1W	24.6 W/kg ±16.5% (k = 2)

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Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with HSL at 2450 MHz

Impedance	54.2 Ω + 1.4 jΩ
Return Loss	-27.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.149 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.
The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard. No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG

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System Performance Check Report

Summary

Dipole	Frequency [MHz]	TSL	Power [dBm]
D2450V2 – SN1018	2450	HSL	24

Exposure Conditions

Phantom Section, TSL	Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat	10		CW, 0--	2450, 0	7.06	1.84	38.0

Hardware Setup

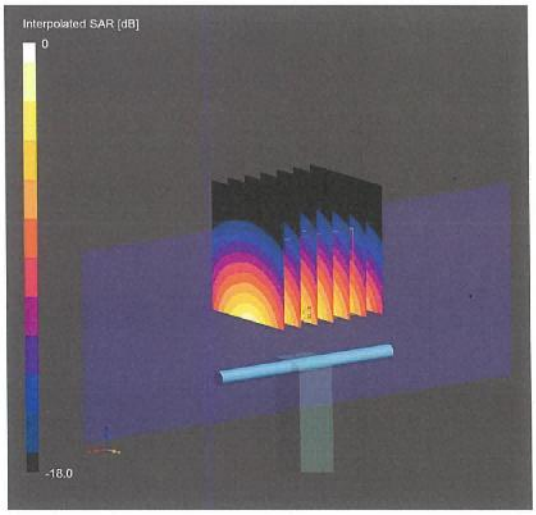
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
MFP V8.0 Center	HSL, 2025-09-16	EX3DV4 – SN7349, 2025-01-10	DAE4ip Sn1836, 2025-09-04

Scans Setup

	Zoom Scan
Grid Extents [mm]	30 x 30 x 30
Grid Steps [mm]	5.0 x 5.0 x 1.5
Sensor Surface [mm]	1.4
Graded Grid	Yes
Grading Ratio	1.5
MAIA	N/A
Surface Detection	VMS + 6p
Scan Method	Measured

Measurement Results

	Zoom Scan
Date	2025-09-16
psSAR1g [W/Kg]	13.2
psSAR10g [W/Kg]	6.19
Power Drift [dB]	0.02
Power Scaling	Disabled
Scaling Factor [dB]	
TSL Correction	Positive / Negative



0 dB = 26.6 W/Kg

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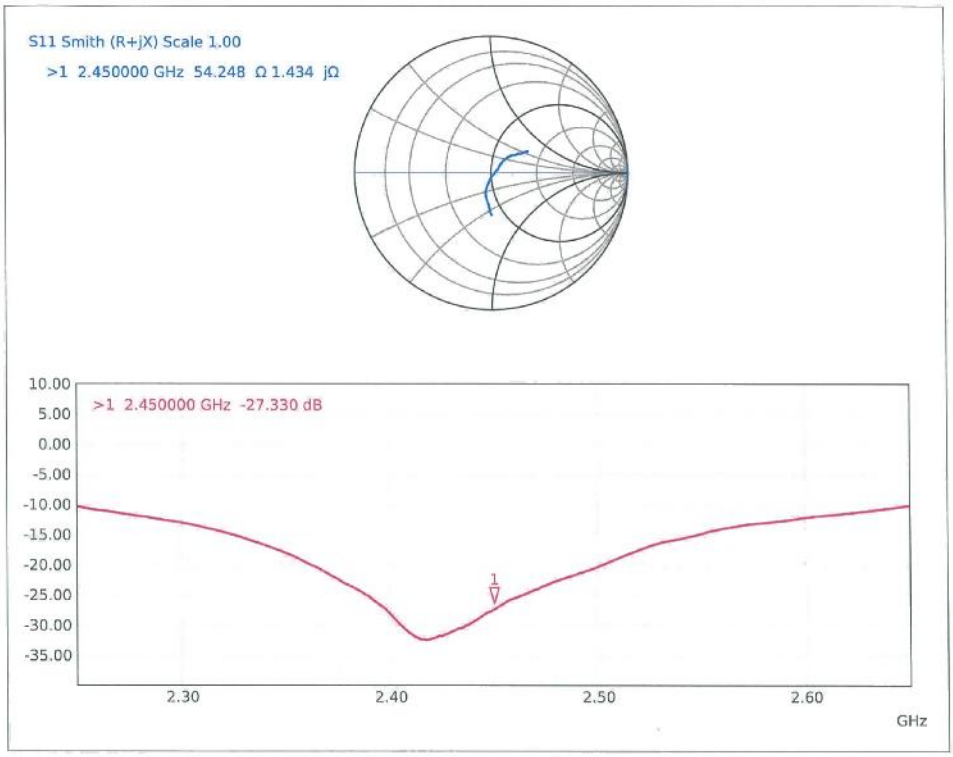
D2450V2 - SN: 1018 September 16, 2025

Impedance Measurement Plot for HSL



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4、D5GHzV2-SN:1093:Due Date(2028-09-16)

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Accreditation No.: SCS 0108

Client **Anbotek** Shenzhen

Certificate No. **D5GHzV2-1093_Sep25**

CALIBRATION CERTIFICATE

Object	D5GHzV2 - SN: 1093
Calibration procedure(s)	QA CAL-22.v7 Calibration Procedure for SAR Validation Sources between 3 - 10 GHz
Calibration date	September 17, 2025

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 Cal
Power Sensor R&S NRP-33T	SN: 100967	30-Apr-25 (No. 1020-300791789)	Apr-26
Power Sensor R&S NRP18A	SN: 101859	06-Feb-25 (No. 4030A315009541)	Feb-26
Spectrum Analyzer R&S FSV40	SN: 101832	29-Jan-25 (No. 4030A315009658)	Jan-26
3.5mm mismatch combination	SN: 1152	24-Mar-25 (No. 217-04293)	Mar-26
OCP DAK-12	SN: 1016	16-Sept-25 (No. OCP-DAK12-1016_Sep25)	Sep-26
OCP DAK-3.5	SN: 1249	16-Sept-25 (No. OCP-DAK3.5-1249_Sep25)	Sep-26
Reference Probe EX3DV4	SN: 7349	10-Jan-25 (No. EX3-7349_Jan25)	Jan-26
DAE4ip	SN: 1836	04-Sep-25 (No. DAE4ip-1836_Sep25)	Sep-26

Secondary Standards	ID	Check Date (in house)	Scheduled Check
ACAD Setup 1	SN: 1000	27-May-25 (No. 675-ACAD_Source_Box-250527)	May-26
Signal Generator R&S SMB100A	SN: 182081	27-May-25 (No. 675-CAL16-S4588-250527)	May-26
Mismatch; SMA	SN: 1102	24-Apr-25 (No. 675-Mismatch_SMA-250424)	Apr-26
OCP DAK-12	SN: 1029	27-Feb-25 (No. OCP-DAK12-1029_Feb25)	Feb-26
OCP DAK-3.5	SN: 1336	09-Dec-24 (No. OCP-DAK3.5-1336_Dec24)	Dec-25

	Name	Function	Signature
Calibrated by	Claudio Leubler	Laboratory Technician	
Approved by	Sven Kühn	Technical Manager	i.A.

Issued: September 18, 2025

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

Certificate No: D5GHzV2-1093_Sep25 Page 1 of 9

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Accreditation No.: SCS 0108

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Calibration is Performed According to the Following Standards

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Additional Documentation

- DASY System Handbook

Methods Applied and Interpretation of Parameters

- *Measurement Conditions*: Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL*: The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
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- *Electrical Delay*: One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured*: SAR measured at the stated antenna input power.
- *SAR normalized*: SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters*: The measured TSL parameters are used to calculate the nominal SAR result.

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%.

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Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY8 Module SAR	17.0.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with spacer
Zoom Scan Resolution	dx, dy = 4mm, dz = 1.4mm	Graded Ratio = 1.4 mm (Z direction)
Frequency	5250MHz ±1MHz 5600MHz ±1MHz 5750MHz ±1MHz	

HSL parameters at 5250 MHz

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal HSL parameters	22.0 °C	35.9	4.71 mho/m
Measured HSL parameters	(22.0 ±0.2)°C	37.3 ±6%	4.62 mho/m ±6%
HSL temperature change during test	< 0.5 °C		

SAR result with HSL at 5250 MHz

SAR averaged over 1 cm^3 (1 g) of HSL	Condition	
SAR for nominal HSL parameters	20 dBm input power	8.29 W/kg
SAR for nominal HSL parameters	normalized to 1W	82.9 W/kg ±19.9% (k = 2)

SAR averaged over 10 cm^3 (10 g) of HSL	Condition	
SAR for nominal HSL parameters	20 dBm input power	2.36 W/kg
SAR for nominal HSL parameters	normalized to 1W	23.6 W/kg ±19.5% (k = 2)

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HSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal HSL parameters	22.0 °C	35.5	5.07 mho/m
Measured HSL parameters	(22.0 ±0.2)°C	36.6 ±6%	4.99 mho/m ±6%
HSL temperature change during test	< 0.5 °C		

SAR result with HSL at 5600 MHz

SAR averaged over 1 cm^3 (1 g) of HSL	Condition	
SAR for nominal HSL parameters	20 dBm input power	8.14 W/kg
SAR for nominal HSL parameters	normalized to 1W	81.4 W/kg ±19.9% (k = 2)

SAR averaged over 10 cm^3 (10 g) of HSL	Condition	
SAR for nominal HSL parameters	20 dBm input power	2.33 W/kg
SAR for nominal HSL parameters	normalized to 1W	23.3 W/kg ±19.5% (k = 2)

HSL parameters at 5750 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal HSL parameters	22.0 °C	35.4	5.22 mho/m
Measured HSL parameters	(22.0 ±0.2)°C	36.4 ±6%	5.16 mho/m ±6%
HSL temperature change during test	< 0.5 °C		

SAR result with HSL at 5750 MHz

SAR averaged over 1 cm^3 (1 g) of HSL	Condition	
SAR for nominal HSL parameters	20 dBm input power	7.79 W/kg
SAR for nominal HSL parameters	normalized to 1W	77.9 W/kg ±19.9% (k = 2)

SAR averaged over 10 cm^3 (10 g) of HSL	Condition	
SAR for nominal HSL parameters	20 dBm input power	2.21 W/kg
SAR for nominal HSL parameters	normalized to 1W	22.1 W/kg ±19.5% (k = 2)

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Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with HSL at 5250 MHz

Impedance	48.6 Ω – 4.8 jΩ
Return Loss	-25.9 dB

Antenna Parameters with HSL at 5600 MHz

Impedance	55.9 Ω – 1.0 jΩ
Return Loss	-25.0 dB

Antenna Parameters with HSL at 5750 MHz

Impedance	54.2 Ω – 1.3 jΩ
Return Loss	-27.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.207 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.
The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard. No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG

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System Performance Check Report

Summary

Dipole	Frequency [MHz]	TSL	Power [dBm]
D5GHzV2 – SN1093	5250	HSL	20

Exposure Conditions

Phantom Section, TSL	Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat	10		CW, 0--	5250, 0	5.68	4.62	37.3

Hardware Setup

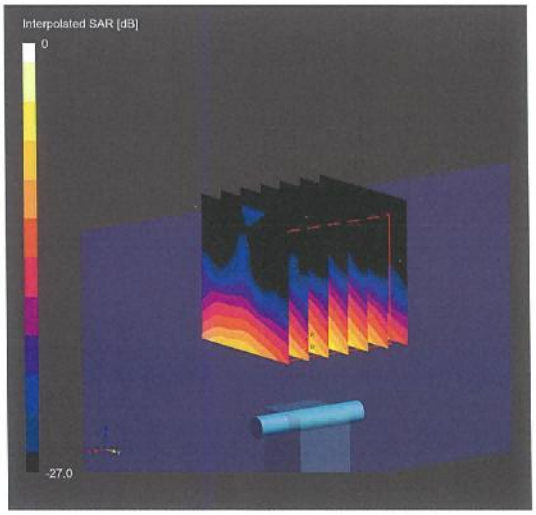
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
MFP V8.0 Center	HSL, 2025-09-17	EX3DV4 – SN7349, 2025-01-10	DAE4ip Sn1836, 2025-09-04

Scans Setup

	Zoom Scan
Grid Extents [mm]	22 x 22 x 22
Grid Steps [mm]	4.0 x 4.0 x 1.4
Sensor Surface [mm]	1.4
Graded Grid	Yes
Grading Ratio	1.4
MAIA	N/A
Surface Detection	VMS + 6p
Scan Method	Measured

Measurement Results

	Zoom Scan
Date	2025-09-17
psSAR1g [W/Kg]	8.29
psSAR10g [W/Kg]	2.36
Power Drift [dB]	-0.06
Power Scaling	Disabled
Scaling Factor [dB]	
TSL Correction	Positive / Negative



0 dB = 33.5 W/Kg

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System Performance Check Report

Summary

Dipole	Frequency [MHz]	TSL	Power [dBm]
D5GHzV2 - SN1093	5600	HSL	20

Exposure Conditions

Phantom Section, TSL	Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat	10		CW, 0--	5600, 0	5.21	4.99	36.6

Hardware Setup

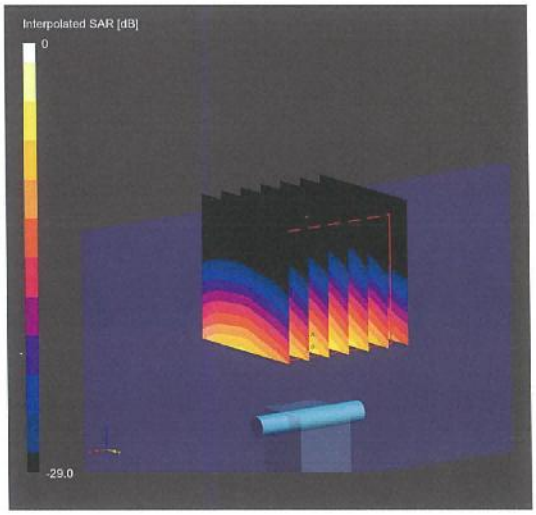
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
MFP V8.0 Center	HSL, 2025-09-17	EX3DV4 - SN7349, 2025-01-10	DAE4ip Sn1836, 2025-09-04

Scans Setup

	Zoom Scan
Grid Extents [mm]	22 x 22 x 22
Grid Steps [mm]	4.0 x 4.0 x 1.4
Sensor Surface [mm]	1.4
Graded Grid	Yes
Grading Ratio	1.4
MAIA	N/A
Surface Detection	VMS - 6p
Scan Method	Measured

Measurement Results

	Zoom Scan
Date	2025-09-17
psSAR1g [W/Kg]	8.14
psSAR10g [W/Kg]	2.33
Power Drift [dB]	0.00
Power Scaling	Disabled
Scaling Factor [dB]	
TSL Correction	Positive / Negative



0 dB = 35.0 W/Kg

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System Performance Check Report

Summary

Dipole	Frequency [MHz]	TSL	Power [dBm]
D5GHzV2 - SN1093	5750	HSL	20

Exposure Conditions

Phantom Section, TSL	Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat	10		CW, 0--	5750, 0	5.38	5.16	36.4

Hardware Setup

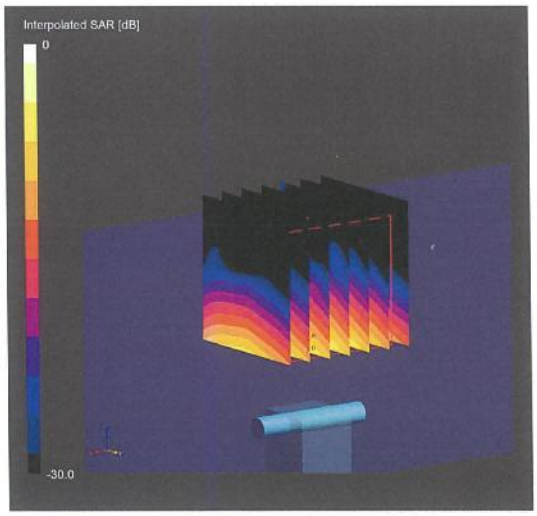
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
MFP V8.0 Center	HSL, 2025-09-17	EX3DV4 - SN7349, 2025-01-10	DAE4ip Sn1836, 2025-09-04

Scans Setup

	Zoom Scan
Grid Extents [mm]	22 x 22 x 22
Grid Steps [mm]	4.0 x 4.0 x 1.4
Sensor Surface [mm]	1.4
Graded Grid	Yes
Grading Ratio	1.4
MAIA	N/A
Surface Detection	VMS + 6p
Scan Method	Measured

Measurement Results

	Zoom Scan
Date	2025-09-17
psSAR1g [W/Kg]	7.79
psSAR10g [W/Kg]	2.21
Power Drift [dB]	0.00
Power Scaling	Disabled
Scaling Factor [dB]	
TSL Correction	Positive / Negative



0 dB = 34.6 W/Kg

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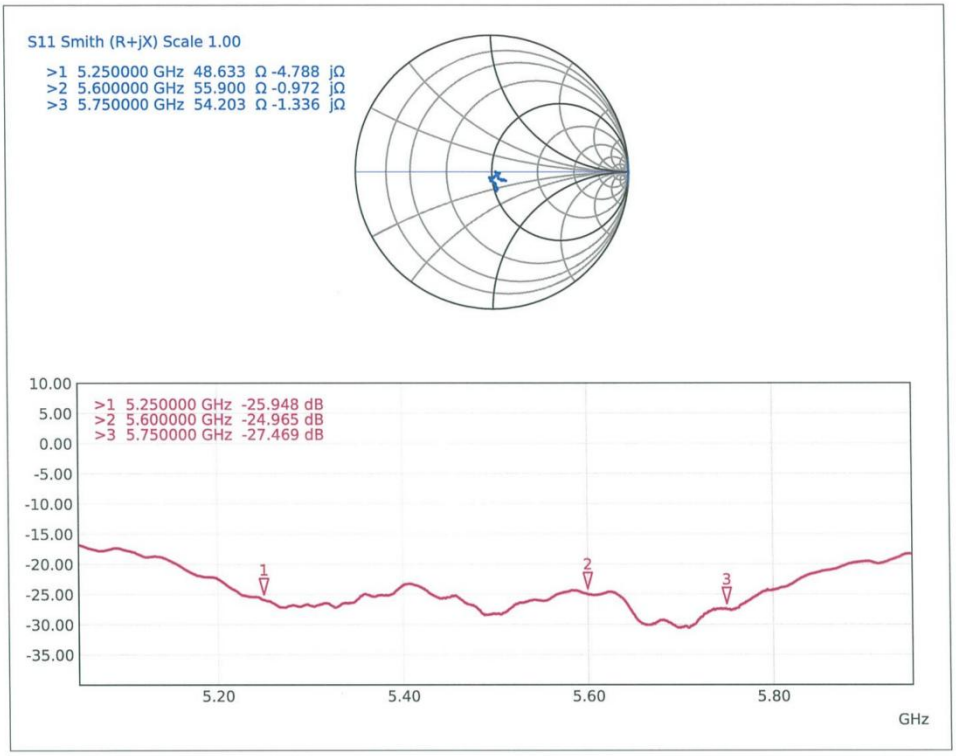
D5GHzV2 - SN: 1093 September 17, 2025

Impedance Measurement Plot for HSL



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