

|                                                           |
|-----------------------------------------------------------|
| <b>Annex C: Calibration Reports</b>                       |
| <b>Tested Model : X6</b>                                  |
| <b>Report Number:<br/>WSCT-ANAB-R&amp;E260800071A-SAR</b> |



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Accreditation No.: **SCS 0108**

Client

**WSCT**  
 Shenzhen

Certificate No.

**D2550V2-1015\_Aug24**

## CALIBRATION CERTIFICATE

Object **D2550V2 - SN: 1015**

Calibration procedure(s) **QA CAL-05.v12**  
**Calibration Procedure for SAR Validation Sources between 0.7 - 3 GHz**

Calibration date **August 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  $(22 \pm 3)^\circ\text{C}$  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 | 28-Mar-24 (No. 217-04038)             | Mar-25        |
| Power Sensor R&S NRP18A                    | SN: 101859 | 21-Mar-24 (No. 4030A315007801)        | Mar-25        |
| Spectrum Analyzer R&S FSV40                | SN: 101832 | 25-Jan-24 (No. 4030-315007551)        | Jan-25        |
| Mismatch; Short [S4188] Attenuator [S4423] | SN: 1152   | 28-Mar-24 (No. 217-04050)             | Mar-25        |
| OCP DAK-12                                 | SN: 1016   | 05-Oct-23 (No. OCP-DAK12-1016_Oct23)  | Oct-24        |
| OCP DAK-3.5                                | SN: 1249   | 05-Oct-23 (No. OCP-DAK3.5-1249_Oct23) | Oct-24        |
| Reference Probe EX3DV4                     | SN: 7349   | 03-Jun-24 (No. EX3-7349_Jun24)        | Jun-25        |
| DAE4ip                                     | SN: 1836   | 10-Jan-24 (No. DAE4ip-1836_Jan24)     | Jan-25        |

| Secondary Standards          | ID         | Check Date (in house)                      | Scheduled Check |
|------------------------------|------------|--------------------------------------------|-----------------|
| ACAD Source Box              | SN: 1000   | 28-May-24 (No. 675-ACAD_Source_Box-240528) | May-25          |
| Signal Generator R&S SMB100A | SN: 182081 | 28-May-24 (No. 0001-300719404)             | May-25          |
| Mismatch; SMA                | SN: 1102   | 22-May-24 (No. 675-Mismatch_SMA-240522)    | May-25          |

|                                                                                                                 | Name               | Function              | Signature |
|-----------------------------------------------------------------------------------------------------------------|--------------------|-----------------------|-----------|
| Calibrated by                                                                                                   | Aidonia Georgiadou | Laboratory Technician |           |
| Approved by                                                                                                     | Sven Kühn          | Technical Manager     |           |
| Issued: August 19, 2024                                                                                         |                    |                       |           |
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## 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  
**S** Swiss Calibration Service

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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**

## 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%.

## Measurement Conditions

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

|                                     |                          |                                     |
|-------------------------------------|--------------------------|-------------------------------------|
| <b>DASY Version</b>                 | DASY8 Module SAR         | 16.4.0                              |
| <b>Extrapolation</b>                | Advanced Extrapolation   |                                     |
| <b>Phantom</b>                      | Modular Flat Phantom     |                                     |
| <b>Distance Dipole Center - TSL</b> | 10 mm                    | with spacer                         |
| <b>Zoom Scan Resolution</b>         | dx, dy = 5mm, dz = 1.5mm | Graded Ratio = 1.5 mm (Z direction) |
| <b>Frequency</b>                    | 2550MHz $\pm$ 1MHz       |                                     |

## Head TSL parameters at 2550 MHz

The following parameters and calculations were applied.

|                                                | Temperature        | Permittivity  | Conductivity        |
|------------------------------------------------|--------------------|---------------|---------------------|
| <b>Nominal Head TSL parameters</b>             | 22.0 °C            | 39.1          | 1.91 mho/m          |
| <b>Measured Head TSL parameters</b>            | (22.0 $\pm$ 0.2)°C | 37.5 $\pm$ 6% | 1.95 mho/m $\pm$ 6% |
| <b>Head TSL temperature change during test</b> | < 0.5 °C           |               |                     |

## SAR result with Head TSL at 2550 MHz

| <b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b> | Condition          |                               |
|-------------------------------------------------------------|--------------------|-------------------------------|
| SAR for nominal Head TSL parameters                         | 24 dBm input power | 13.6 W/kg                     |
| SAR for nominal Head TSL parameters                         | normalized to 1W   | 54.1 W/kg $\pm$ 17.0% (k = 2) |

| <b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b> | Condition          |                               |
|---------------------------------------------------------------|--------------------|-------------------------------|
| SAR for nominal Head TSL parameters                           | 24 dBm input power | 6.21 W/kg                     |
| SAR for nominal Head TSL parameters                           | normalized to 1W   | 24.7 W/kg $\pm$ 16.5% (k = 2) |

**Appendix (Additional assessments outside the scope of SCS 0108)**

**Antenna Parameters with Head TSL at 2550 MHz**

|             |                                |
|-------------|--------------------------------|
| Impedance   | 50.4 $\Omega$ – 1.3 j $\Omega$ |
| Return Loss | -37.4 dB                       |

**General Antenna Parameters and Design**

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.151 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 |
|-----------------|-------|

System Performance Check Report

Summary

| Dipole           | Frequency [MHz] | TSL | Power [dBm] |
|------------------|-----------------|-----|-------------|
| D2550V2 - SN1015 | 2550            | 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--    | 2550, 0                         | 7.35              | 1.95                   | 37.5             |

Hardware Setup

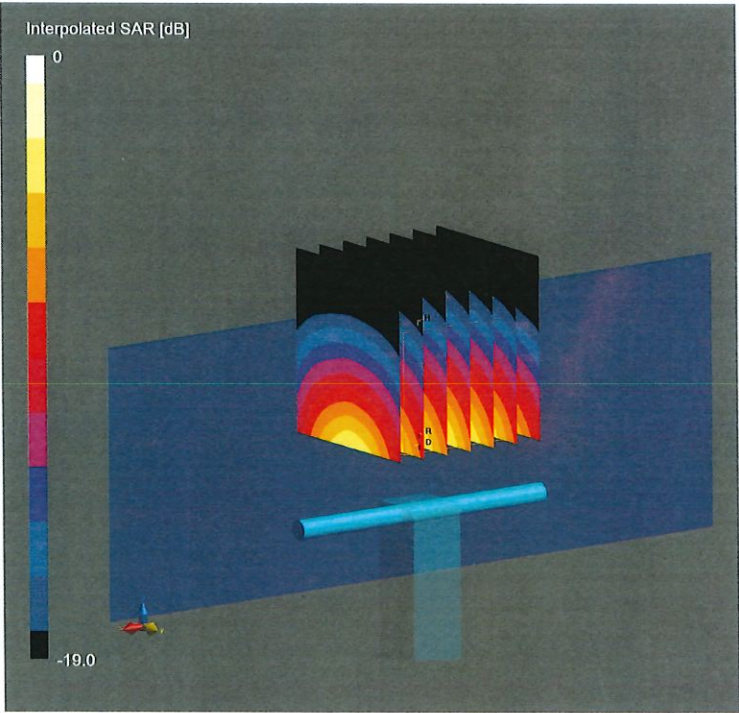
| Phantom         | TSL, Measured Date | Probe, Calibration Date     | DAE, Calibration Date     |
|-----------------|--------------------|-----------------------------|---------------------------|
| MFP V8.0 Center | HSL, 2024-08-16    | EX3DV4 - SN7349, 2024-06-03 | DAE4ip Sn1836, 2024-01-10 |

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        |

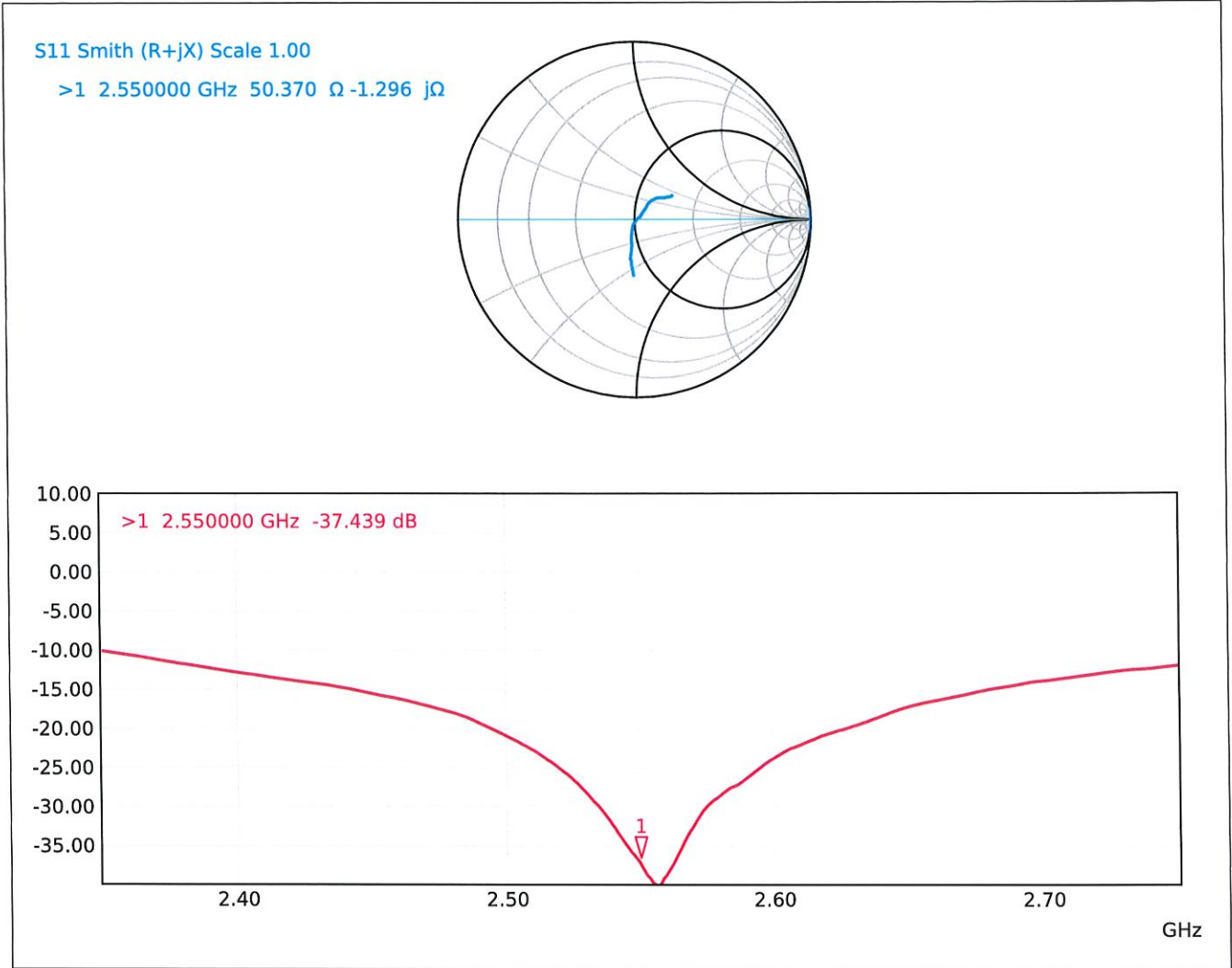
Measurement Results

|                     | Zoom Scan           |
|---------------------|---------------------|
| Date                | 2024-08-16          |
| psSAR1g [W/Kg]      | 13.6                |
| psSAR10g [W/Kg]     | 6.21                |
| Power Drift [dB]    | 0.01                |
| Power Scaling       | Disabled            |
| Scaling Factor [dB] |                     |
| TSL Correction      | Positive / Negative |



0 dB = 29.0 W/Kg

Impedance Measurement Plot for Head TSL





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Client

**WSCT**  
**Shenzhen**

Certificate No.

**D5GHzV2-1412\_Oct24**

## CALIBRATION CERTIFICATE

Object **D5GHzV2 - SN: 1412**

Calibration procedure(s) **QA CAL-22.v7**  
**Calibration Procedure for SAR Validation Sources between 3 - 10 GHz**

Calibration date **October 17, 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  $(22 \pm 3)^{\circ}\text{C}$  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 | 28-Mar-24 (No. 217-04038)             | Mar-25        |
| Power Sensor R&S NRP18A                    | SN: 101859 | 22-Jul-24 (No. 4030A315008547)        | Jul-25        |
| Spectrum Analyzer R&S FSV40                | SN: 101832 | 25-Jan-24 (No. 4030-315007551)        | Jan-25        |
| Mismatch; Short [S4188] Attenuator [S4423] | SN: 1152   | 28-Mar-24 (No. 217-04050)             | Mar-25        |
| OCP DAK-12                                 | SN: 1016   | 24-Sep-24 (No. OCP-DAK12-1016_Sep24)  | Sep-25        |
| OCP DAK-3.5                                | SN: 1249   | 23-Sep-24 (No. OCP-DAK3.5-1249_Sep24) | Sep-25        |
| Reference Probe EX3DV4                     | SN: 7349   | 03-Jun-24 (No. EX3-7349_Jun24)        | Jun-25        |
| DAE4ip                                     | SN: 1836   | 10-Jan-24 (No. DAE4ip-1836_Jan24)     | Jan-25        |

| Secondary Standards          | ID         | Check Date (in house)                      | Scheduled Check |
|------------------------------|------------|--------------------------------------------|-----------------|
| ACAD Source Box              | SN: 1000   | 28-May-24 (No. 675-ACAD_Source_Box-240528) | May-25          |
| Signal Generator R&S SMB100A | SN: 182081 | 28-May-24 (No. 675-CAL16-S4588-240528)     | May-25          |
| Mismatch; SMA                | SN: 1102   | 22-May-24 (No. 675-Mismatch_SMA-240522)    | May-25          |

|               | Name       | Function              | Signature |
|---------------|------------|-----------------------|-----------|
| Calibrated by | Paulo Pina | Laboratory Technician |           |
| Approved by   | Sven Kühn  | Technical Manager     |           |

Issued: October 17, 2024

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## Calibration Laboratory of

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

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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%.

## Measurement Conditions

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

|                                     |                                                                                                            |                                     |
|-------------------------------------|------------------------------------------------------------------------------------------------------------|-------------------------------------|
| <b>DASY Version</b>                 | DASY8 Module SAR                                                                                           | 16.4.0                              |
| <b>Extrapolation</b>                | Advanced Extrapolation                                                                                     |                                     |
| <b>Phantom</b>                      | Modular Flat Phantom                                                                                       |                                     |
| <b>Distance Dipole Center - TSL</b> | 10 mm                                                                                                      | with spacer                         |
| <b>Zoom Scan Resolution</b>         | dx, dy = 4mm, dz = 1.4mm                                                                                   | Graded Ratio = 1.4 mm (Z direction) |
| <b>Frequency</b>                    | 5200MHz $\pm$ 1MHz<br>5300MHz $\pm$ 1MHz<br>5500MHz $\pm$ 1MHz<br>5600MHz $\pm$ 1MHz<br>5800MHz $\pm$ 1MHz |                                     |

## Head TSL parameters at 5200 MHz

The following parameters and calculations were applied.

|                                                | Temperature        | Permittivity  | Conductivity        |
|------------------------------------------------|--------------------|---------------|---------------------|
| <b>Nominal Head TSL parameters</b>             | 22.0 °C            | 36.0          | 4.66 mho/m          |
| <b>Measured Head TSL parameters</b>            | (22.0 $\pm$ 0.2)°C | 35.9 $\pm$ 6% | 4.51 mho/m $\pm$ 6% |
| <b>Head TSL temperature change during test</b> | < 0.5 °C           |               |                     |

## SAR result with Head TSL at 5200 MHz

| <b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b> | Condition          |                               |
|-------------------------------------------------------------|--------------------|-------------------------------|
| SAR for nominal Head TSL parameters                         | 20 dBm input power | 7.60 W/kg                     |
| SAR for nominal Head TSL parameters                         | normalized to 1W   | 76.0 W/kg $\pm$ 19.9% (k = 2) |

| <b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b> | Condition          |                               |
|---------------------------------------------------------------|--------------------|-------------------------------|
| SAR for nominal Head TSL parameters                           | 20 dBm input power | 2.20 W/kg                     |
| SAR for nominal Head TSL parameters                           | normalized to 1W   | 22.0 W/kg $\pm$ 19.5% (k = 2) |

### Head TSL parameters at 5300 MHz

The following parameters and calculations were applied.

|                                         | Temperature   | Permittivity | Conductivity   |
|-----------------------------------------|---------------|--------------|----------------|
| Nominal Head TSL parameters             | 22.0 °C       | 35.9         | 4.76 mho/m     |
| Measured Head TSL parameters            | (22.0 ±0.2)°C | 35.7 ±6%     | 4.60 mho/m ±6% |
| Head TSL temperature change during test | < 0.5 °C      |              |                |

### SAR result with Head TSL at 5300 MHz

| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL | Condition          |                          |
|-------------------------------------------------------|--------------------|--------------------------|
| SAR for nominal Head TSL parameters                   | 20 dBm input power | 8.06 W/kg                |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | 80.6 W/kg ±19.9% (k = 2) |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | Condition          |                          |
|---------------------------------------------------------|--------------------|--------------------------|
| SAR for nominal Head TSL parameters                     | 20 dBm input power | 2.33 W/kg                |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 23.3 W/kg ±19.5% (k = 2) |

### Head TSL parameters at 5500 MHz

The following parameters and calculations were applied.

|                                         | Temperature   | Permittivity | Conductivity   |
|-----------------------------------------|---------------|--------------|----------------|
| Nominal Head TSL parameters             | 22.0 °C       | 35.6         | 4.96 mho/m     |
| Measured Head TSL parameters            | (22.0 ±0.2)°C | 35.3 ±6%     | 4.82 mho/m ±6% |
| Head TSL temperature change during test | < 0.5 °C      |              |                |

### SAR result with Head TSL at 5500 MHz

| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL | Condition          |                          |
|-------------------------------------------------------|--------------------|--------------------------|
| SAR for nominal Head TSL parameters                   | 20 dBm input power | 8.56 W/kg                |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | 85.6 W/kg ±19.9% (k = 2) |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | Condition          |                          |
|---------------------------------------------------------|--------------------|--------------------------|
| SAR for nominal Head TSL parameters                     | 20 dBm input power | 2.45 W/kg                |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 24.5 W/kg ±19.5% (k = 2) |

**Head TSL parameters at 5600 MHz**

The following parameters and calculations were applied.

|                                         | Temperature   | Permittivity | Conductivity   |
|-----------------------------------------|---------------|--------------|----------------|
| Nominal Head TSL parameters             | 22.0 °C       | 35.5         | 5.07 mho/m     |
| Measured Head TSL parameters            | (22.0 ±0.2)°C | 35.1 ±6%     | 4.94 mho/m ±6% |
| Head TSL temperature change during test | < 0.5 °C      |              |                |

**SAR result with Head TSL at 5600 MHz**

| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL | Condition          |                          |
|-------------------------------------------------------|--------------------|--------------------------|
| SAR for nominal Head TSL parameters                   | 20 dBm input power | 8.33 W/kg                |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | 83.3 W/kg ±19.9% (k = 2) |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | Condition          |                          |
|---------------------------------------------------------|--------------------|--------------------------|
| SAR for nominal Head TSL parameters                     | 20 dBm input power | 2.41 W/kg                |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 24.1 W/kg ±19.5% (k = 2) |

**Head TSL parameters at 5800 MHz**

The following parameters and calculations were applied.

|                                         | Temperature   | Permittivity | Conductivity   |
|-----------------------------------------|---------------|--------------|----------------|
| Nominal Head TSL parameters             | 22.0 °C       | 35.3         | 5.27 mho/m     |
| Measured Head TSL parameters            | (22.0 ±0.2)°C | 34.9 ±6%     | 5.15 mho/m ±6% |
| Head TSL temperature change during test | < 0.5 °C      |              |                |

**SAR result with Head TSL at 5800 MHz**

| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL | Condition          |                          |
|-------------------------------------------------------|--------------------|--------------------------|
| SAR for nominal Head TSL parameters                   | 20 dBm input power | 7.90 W/kg                |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | 79.0 W/kg ±19.9% (k = 2) |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | Condition          |                          |
|---------------------------------------------------------|--------------------|--------------------------|
| SAR for nominal Head TSL parameters                     | 20 dBm input power | 2.27 W/kg                |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 22.7 W/kg ±19.5% (k = 2) |

**Appendix (Additional assessments outside the scope of SCS 0108)****Antenna Parameters with Head TSL at 5200 MHz**

|             |                                |
|-------------|--------------------------------|
| Impedance   | 53.3 $\Omega$ – 4.8 j $\Omega$ |
| Return Loss | -25.0 dB                       |

**Antenna Parameters with Head TSL at 5300 MHz**

|             |                                |
|-------------|--------------------------------|
| Impedance   | 48.4 $\Omega$ + 2.0 j $\Omega$ |
| Return Loss | -31.6 dB                       |

**Antenna Parameters with Head TSL at 5500 MHz**

|             |                                |
|-------------|--------------------------------|
| Impedance   | 47.6 $\Omega$ – 2.2 j $\Omega$ |
| Return Loss | -29.5 dB                       |

**Antenna Parameters with Head TSL at 5600 MHz**

|             |                                |
|-------------|--------------------------------|
| Impedance   | 55.9 $\Omega$ + 0.5 j $\Omega$ |
| Return Loss | -25.1 dB                       |

**Antenna Parameters with Head TSL at 5800 MHz**

|             |                                |
|-------------|--------------------------------|
| Impedance   | 50.5 $\Omega$ + 4.2 j $\Omega$ |
| 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 |
|-----------------|-------|

System Performance Check Report

Summary

| Dipole           | Frequency [MHz] | TSL | Power [dBm] |
|------------------|-----------------|-----|-------------|
| D5GHzV2 - SN1412 | 5200            | 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--    | 5200, 0                         | 5.68              | 4.51                   | 35.9             |

Hardware Setup

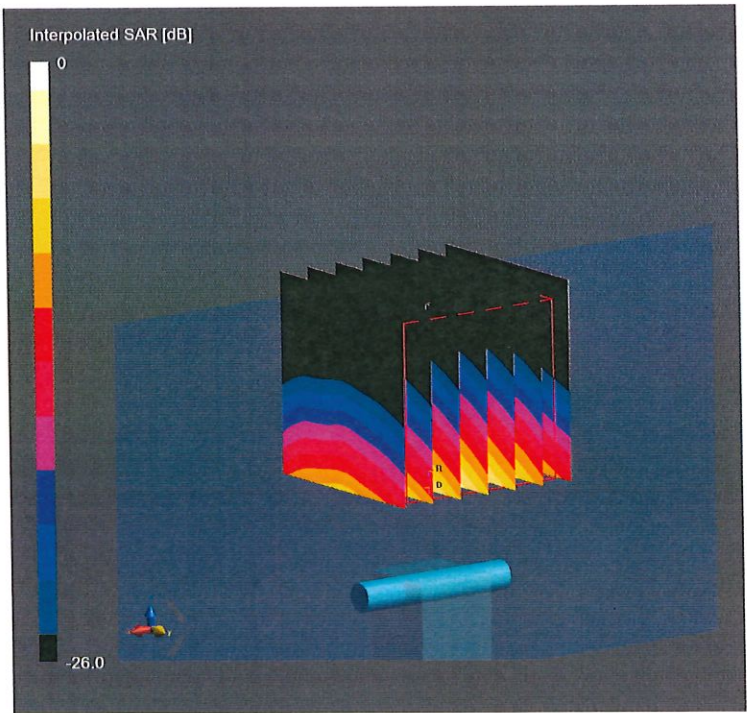
| Phantom         | TSL, Measured Date | Probe, Calibration Date     | DAE, Calibration Date     |
|-----------------|--------------------|-----------------------------|---------------------------|
| MFP V8.0 Center | HSL, 2024-10-17    | EX3DV4 - SN7349, 2024-06-03 | DAE4ip Sn1836, 2024-01-10 |

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                | 2024-10-17          |
| psSAR1g [W/Kg]      | 7.60                |
| psSAR10g [W/Kg]     | 2.20                |
| Power Drift [dB]    | 0.00                |
| Power Scaling       | Disabled            |
| Scaling Factor [dB] |                     |
| TSL Correction      | Positive / Negative |



0 dB = 30.4 W/Kg

System Performance Check Report

Summary

| Dipole           | Frequency [MHz] | TSL | Power [dBm] |
|------------------|-----------------|-----|-------------|
| D5GHzV2 - SN1412 | 5300            | 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--    | 5300, 0                         | 5.45              | 4.60                   | 35.7             |

Hardware Setup

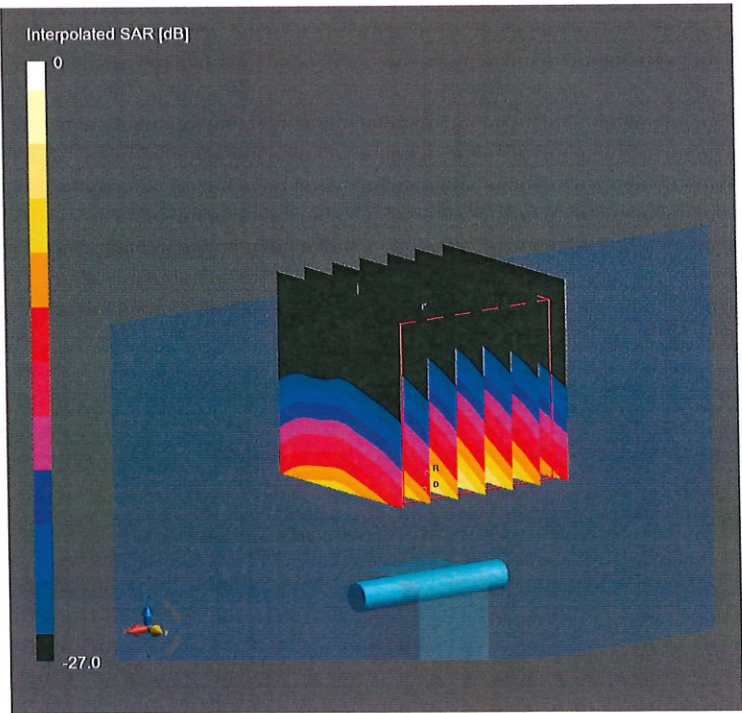
| Phantom         | TSL, Measured Date | Probe, Calibration Date     | DAE, Calibration Date     |
|-----------------|--------------------|-----------------------------|---------------------------|
| MFP V8.0 Center | HSL, 2024-10-17    | EX3DV4 - SN7349, 2024-06-03 | DAE4ip Sn1836, 2024-01-10 |

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                | 2024-10-17          |
| psSAR1g [W/Kg]      | 8.06                |
| psSAR10g [W/Kg]     | 2.33                |
| Power Drift [dB]    | 0.00                |
| Power Scaling       | Disabled            |
| Scaling Factor [dB] |                     |
| TSL Correction      | Positive / Negative |



0 dB = 33.1 W/Kg

System Performance Check Report

Summary

| Dipole           | Frequency [MHz] | TSL | Power [dBm] |
|------------------|-----------------|-----|-------------|
| D5GHzV2 - SN1412 | 5500            | 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--    | 5500, 0                         | 5.07              | 4.82                   | 35.3             |

Hardware Setup

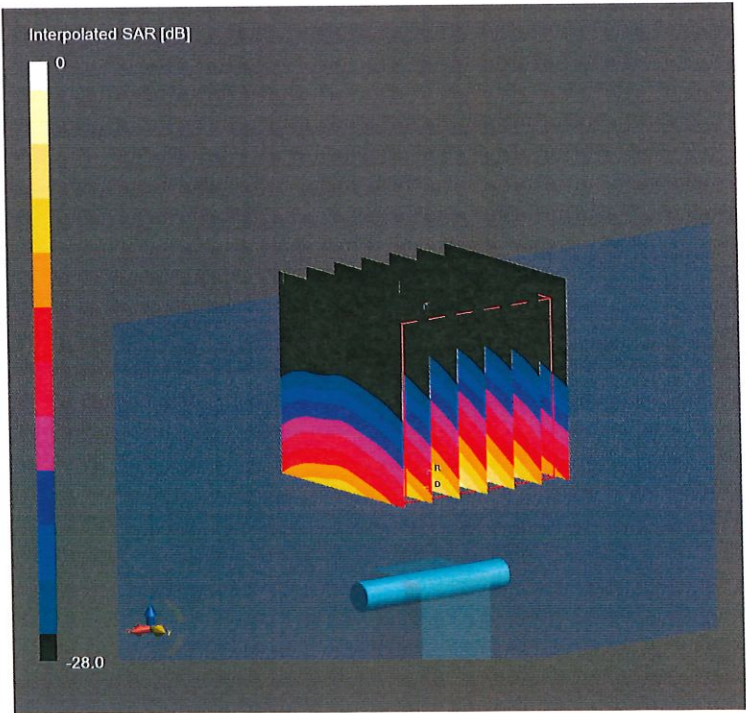
| Phantom         | TSL, Measured Date | Probe, Calibration Date     | DAE, Calibration Date     |
|-----------------|--------------------|-----------------------------|---------------------------|
| MFP V8.0 Center | HSL, 2024-10-17    | EX3DV4 - SN7349, 2024-06-03 | DAE4ip Sn1836, 2024-01-10 |

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                | 2024-10-17          |
| psSAR1g [W/Kg]      | 8.56                |
| psSAR10g [W/Kg]     | 2.45                |
| Power Drift [dB]    | 0.00                |
| Power Scaling       | Disabled            |
| Scaling Factor [dB] |                     |
| TSL Correction      | Positive / Negative |



0 dB = 36.7 W/Kg

## System Performance Check Report

## Summary

| Dipole           | Frequency [MHz] | TSL | Power [dBm] |
|------------------|-----------------|-----|-------------|
| D5GHzV2 - SN1412 | 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                         | 5.03              | 4.94                   | 35.1             |

## Hardware Setup

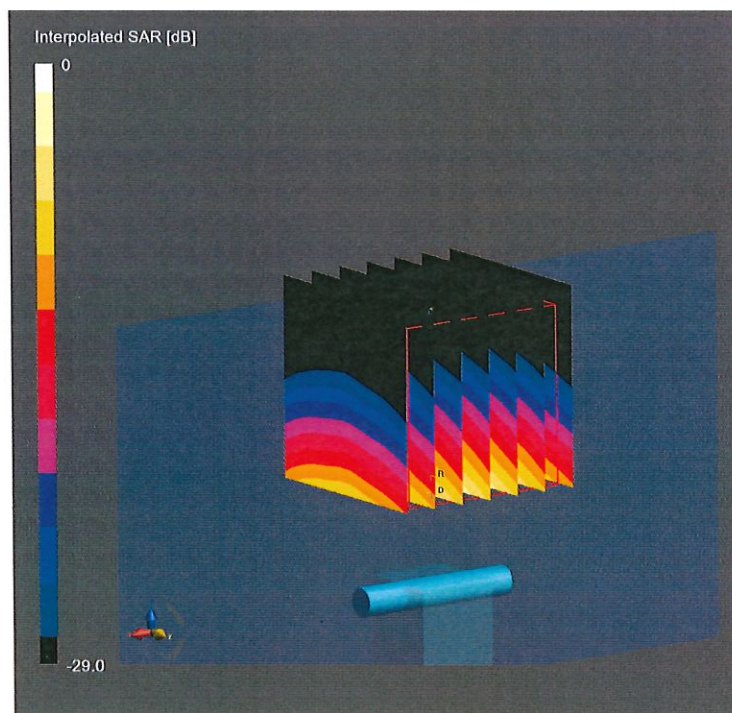
| Phantom         | TSL, Measured Date | Probe, Calibration Date     | DAE, Calibration Date     |
|-----------------|--------------------|-----------------------------|---------------------------|
| MFP V8.0 Center | HSL, 2024-10-17    | EX3DV4 - SN7349, 2024-06-03 | DAE4ip Sn1836, 2024-01-10 |

## 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                | 2024-10-17          |
| psSAR1g [W/Kg]      | 8.33                |
| psSAR10g [W/Kg]     | 2.41                |
| Power Drift [dB]    | 0.00                |
| Power Scaling       | Disabled            |
| Scaling Factor [dB] |                     |
| TSL Correction      | Positive / Negative |



System Performance Check Report

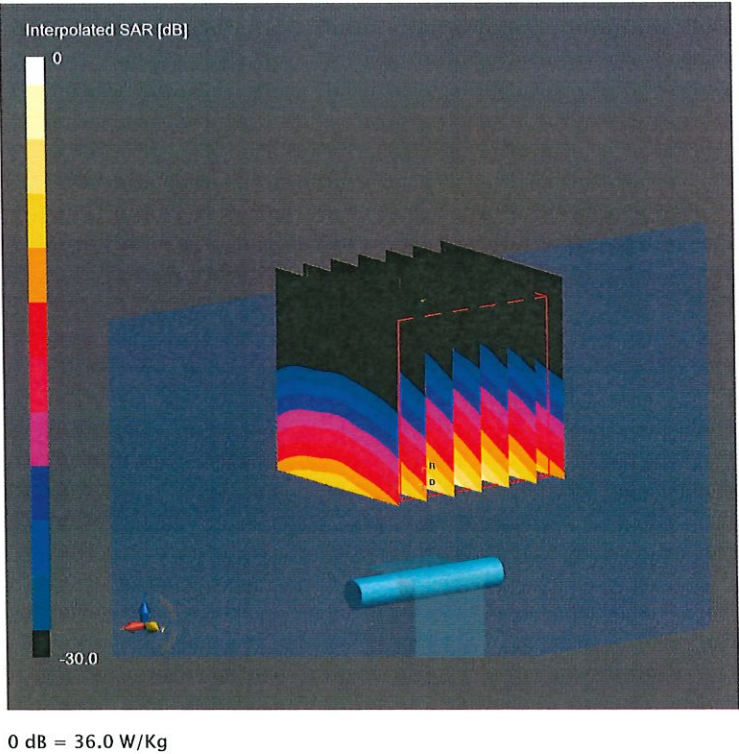
|                  |                 |     |             |
|------------------|-----------------|-----|-------------|
| Summary          |                 |     |             |
| Dipole           | Frequency [MHz] | TSL | Power [dBm] |
| D5GHzV2 – SN1412 | 5800            | HSL | 20          |

|                      |                    |      |            |                                 |                   |                        |                  |
|----------------------|--------------------|------|------------|---------------------------------|-------------------|------------------------|------------------|
| 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--    | 5800, 0                         | 5.08              | 5.15                   | 34.9             |

|                 |                    |                             |                           |
|-----------------|--------------------|-----------------------------|---------------------------|
| Hardware Setup  |                    |                             |                           |
| Phantom         | TSL, Measured Date | Probe, Calibration Date     | DAE, Calibration Date     |
| MFP V8.0 Center | HSL, 2024-10-17    | EX3DV4 – SN7349, 2024-06-03 | DAE4ip Sn1836, 2024-01-10 |

|                     |                 |
|---------------------|-----------------|
| 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        |

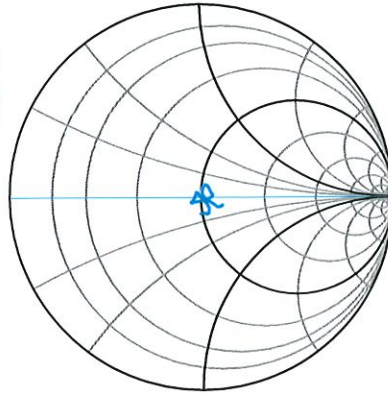
|                     |                     |
|---------------------|---------------------|
| Measurement Results |                     |
|                     | Zoom Scan           |
| Date                | 2024-10-17          |
| psSAR1g [W/Kg]      | 7.90                |
| psSAR10g [W/Kg]     | 2.27                |
| Power Drift [dB]    | -0.01               |
| Power Scaling       | Disabled            |
| Scaling Factor [dB] |                     |
| TSL Correction      | Positive / Negative |



Impedance Measurement Plot for Head TSL

S11 Smith (R+jX) Scale 1.00

|    |              |                 |                   |
|----|--------------|-----------------|-------------------|
| >1 | 5.200000 GHz | 53.331 $\Omega$ | -4.787 j $\Omega$ |
| >2 | 5.300000 GHz | 48.405 $\Omega$ | 2.049 j $\Omega$  |
| >3 | 5.500000 GHz | 47.552 $\Omega$ | -2.187 j $\Omega$ |
| >4 | 5.600000 GHz | 55.889 $\Omega$ | 0.477 j $\Omega$  |
| >5 | 5.800000 GHz | 50.472 $\Omega$ | 4.191 j $\Omega$  |



## IMPORTANT NOTICE

### USAGE OF THE DAE4ip SN: 1921

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 must be given to the following points:

**Shipping of the DAE:** Before shipping the DAE to SPEAG for calibration, 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.**



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 **WSCT**  
Shenzhen

Certificate No: **DAE4ip-1921\_Sep25**

## CALIBRATION CERTIFICATE

Object **DAE4ip - SD 000 D14 AG - SN: 1921**

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

Calibration date: **September 04, 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  $(22 \pm 3)^{\circ}\text{C}$  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: | Timo Rott | Laboratory Technician |           |
| Approved by:   | Sven Kühn | Technical Manager     |           |

Issued: September 4, 2025

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



Accredited by the Swiss Accreditation Service (SAS)  
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Multilateral Agreement for the recognition of calibration certificates

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 = 6.1  $\mu$ V, full range = -100...+300 mV

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

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

| Calibration Factors | X                         | Y                         | Z                         |
|---------------------|---------------------------|---------------------------|---------------------------|
| High Range          | 405.339 $\pm$ 0.02% (k=2) | 405.748 $\pm$ 0.02% (k=2) | 405.675 $\pm$ 0.02% (k=2) |
| Low Range           | 3.99724 $\pm$ 1.50% (k=2) | 3.98942 $\pm$ 1.50% (k=2) | 4.00806 $\pm$ 1.50% (k=2) |

## Connector Angle

|                                           |                                    |
|-------------------------------------------|------------------------------------|
| Connector Angle to be used in DASY system | 77.5 $^{\circ}$ $\pm$ 1 $^{\circ}$ |
|-------------------------------------------|------------------------------------|

## Appendix (Additional assessments outside the scope of SCS0108)

### 1. DC Voltage Linearity

| High Range |         | Reading ( $\mu\text{V}$ ) | Difference ( $\mu\text{V}$ ) | Error (%) |
|------------|---------|---------------------------|------------------------------|-----------|
| Channel X  | + Input | 200003.68                 | 1.60                         | 0.00      |
| Channel X  | + Input | 20010.61                  | 2.62                         | 0.01      |
| Channel X  | - Input | -19994.77                 | 2.48                         | -0.01     |
| Channel Y  | + Input | 200004.42                 | 1.84                         | 0.00      |
| Channel Y  | + Input | 20007.69                  | -0.26                        | -0.00     |
| Channel Y  | - Input | -19997.23                 | 0.16                         | -0.00     |
| Channel Z  | + Input | 200002.59                 | 0.37                         | 0.00      |
| Channel Z  | + Input | 20007.41                  | -0.39                        | -0.00     |
| Channel Z  | - Input | -19998.21                 | -0.69                        | 0.00      |

| Low Range |         | Reading ( $\mu\text{V}$ ) | Difference ( $\mu\text{V}$ ) | Error (%) |
|-----------|---------|---------------------------|------------------------------|-----------|
| Channel X | + Input | 2007.75                   | 1.47                         | 0.07      |
| Channel X | + Input | 207.25                    | 0.72                         | 0.35      |
| Channel X | - Input | -193.00                   | 0.26                         | -0.14     |
| Channel Y | + Input | 2007.15                   | 0.90                         | 0.04      |
| Channel Y | + Input | 206.28                    | -0.23                        | -0.11     |
| Channel Y | - Input | -194.22                   | -0.94                        | 0.49      |
| Channel Z | + Input | 2006.80                   | 0.62                         | 0.03      |
| Channel Z | + Input | 205.63                    | -0.68                        | -0.33     |
| Channel Z | - Input | -195.01                   | -1.56                        | 0.81      |

### 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 ( $\mu\text{V}$ ) | Low Range Average Reading ( $\mu\text{V}$ ) |
|-----------|--------------------------------|----------------------------------------------|---------------------------------------------|
| Channel X | 200                            | 0.47                                         | -1.00                                       |
|           | - 200                          | 1.61                                         | 0.55                                        |
| Channel Y | 200                            | 2.60                                         | 1.95                                        |
|           | - 200                          | -3.09                                        | -3.32                                       |
| Channel Z | 200                            | -16.60                                       | -16.30                                      |
|           | - 200                          | 14.45                                        | 14.40                                       |

### 3. Channel separation

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

|           | Input Voltage (mV) | Channel X ( $\mu\text{V}$ ) | Channel Y ( $\mu\text{V}$ ) | Channel Z ( $\mu\text{V}$ ) |
|-----------|--------------------|-----------------------------|-----------------------------|-----------------------------|
| Channel X | 200                | -                           | 0.13                        | -1.91                       |
| Channel Y | 200                | 4.24                        | -                           | 1.29                        |
| Channel Z | 200                | 8.02                        | 1.85                        | -                           |

#### 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 | 15794            | 15541           |
| Channel Y | 15816            | 15550           |
| Channel Z | 15914            | 15220           |

#### 5. Input Offset Measurement

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

Input 10M $\Omega$

|           | Average ( $\mu$ V) | min. Offset ( $\mu$ V) | max. Offset ( $\mu$ V) | Std. Deviation ( $\mu$ V) |
|-----------|--------------------|------------------------|------------------------|---------------------------|
| Channel X | 0.24               | -0.42                  | 0.81                   | 0.27                      |
| Channel Y | 0.15               | -1.17                  | 0.96                   | 0.37                      |
| Channel Z | -0.41              | -1.33                  | 0.68                   | 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                |