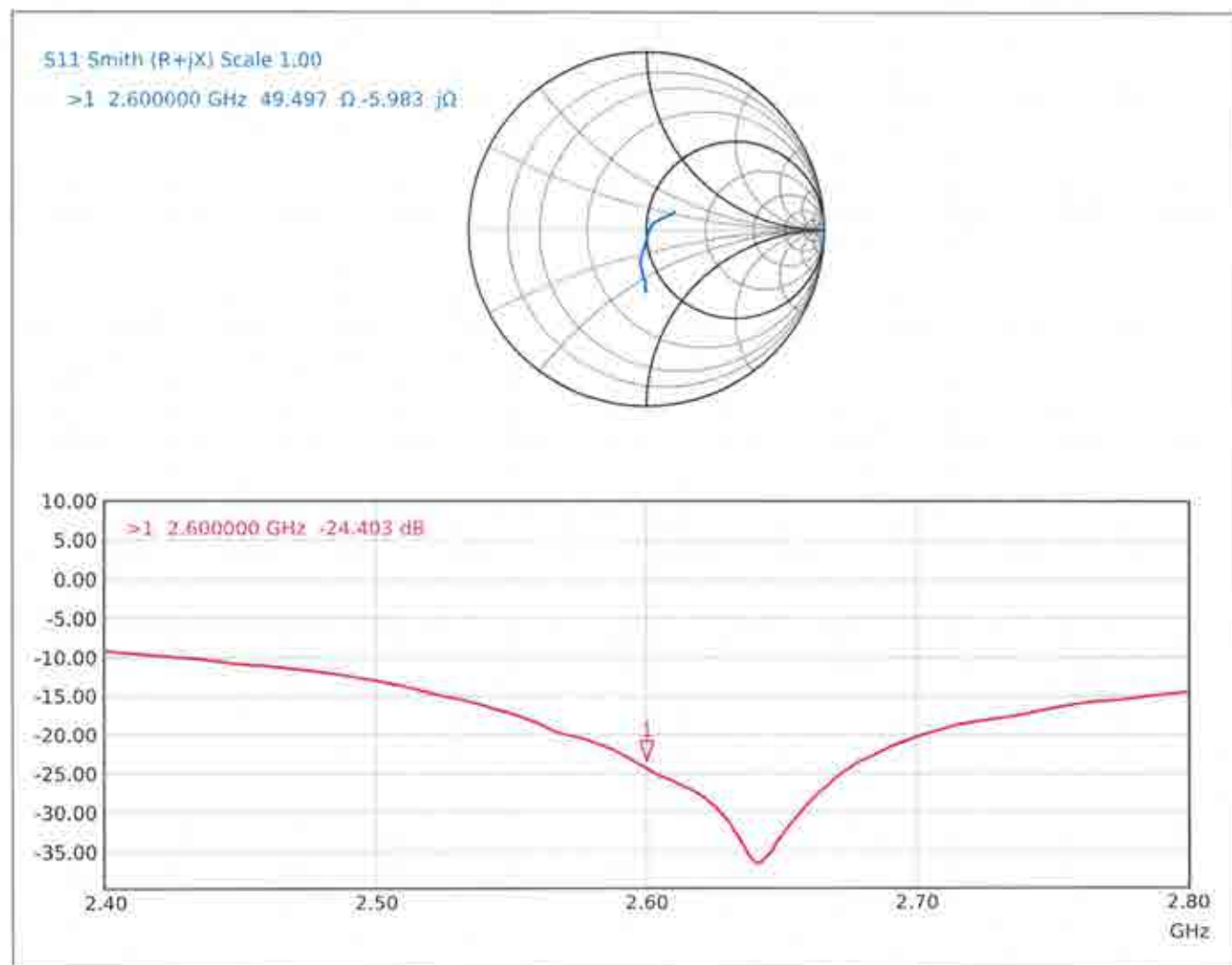


D2600V2 - SN: 1089

March 13, 2025

**Impedance Measurement Plot for HSL**

**Calibration Laboratory of**Schmid & Partner  
Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland



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Accreditation No.: SCS 0108

Client

**Sporton**

Taoyuan City

Certificate No.

**D2600V2-1078\_Jun25****CALIBRATION CERTIFICATE**

Object

D2600V2 - SN: 1078

Calibration procedure(s)

QA CAL-05.v12

Calibration Procedure for SAR Validation Sources between 0.7 - 3 GHz

Calibration date

June 11, 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 Cal |
|-----------------------------|------------|----------------------------------------|---------------|
| Power Sensor R&S NRP-33T    | SN: 100967 | 26-Mar-25 (No. 217-04290)              | Mar-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   | 17-Apr-25 (No. DAE4ip-1836_Apr25)      | Apr-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     |           |
| Issued: June 17, 2025                                                                                           |            |                       |           |
| This calibration certificate shall not be reproduced except in full without written approval of the laboratory. |            |                       |           |

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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%.

D2600V2 - SN: 1078

June 11, 2025

## Measurement Conditions

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

|                              |                          |                                     |
|------------------------------|--------------------------|-------------------------------------|
| DASY Version                 | DASY8 Module SAR         | 16.4.0                              |
| 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                    | 2600MHz $\pm$ 1MHz       |                                     |

## HSL parameters at 2600 MHz

The following parameters and calculations were applied.

|                                    | Temperature         | Permittivity  | Conductivity        |
|------------------------------------|---------------------|---------------|---------------------|
| Nominal HSL parameters             | 22.0 °C             | 39.0          | 1.96 mho/m          |
| Measured HSL parameters            | (22.0 $\pm$ 0.2) °C | 37.4 $\pm$ 6% | 2.00 mho/m $\pm$ 6% |
| HSL temperature change during test | < 0.5 °C            |               |                     |

## SAR result with HSL at 2600 MHz

| SAR averaged over 1 cm <sup>3</sup> (1 g) of HSL | Condition          |                               |
|--------------------------------------------------|--------------------|-------------------------------|
| SAR for nominal HSL parameters                   | 24 dBm input power | 13.9 W/kg                     |
| SAR for nominal HSL parameters                   | normalized to 1W   | 55.3 W/kg $\pm$ 17.0% (k = 2) |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of HSL | Condition          |                               |
|----------------------------------------------------|--------------------|-------------------------------|
| SAR for nominal HSL parameters                     | 24 dBm input power | 6.26 W/kg                     |
| SAR for nominal HSL parameters                     | normalized to 1W   | 24.9 W/kg $\pm$ 16.5% (k = 2) |

D2600V2 - SN: 1078

June 11, 2025

**Appendix (Additional assessments outside the scope of SCS 0108)****Antenna Parameters with HSL at 2600 MHz**

|             |                                |
|-------------|--------------------------------|
| Impedance   | 49.6 $\Omega$ – 7.2 j $\Omega$ |
| Return Loss | -22.8 dB                       |

**General Antenna Parameters and Design**

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.153 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 |
|-----------------|-------|

D2600V2 - SN: 1078

June 11, 2025

## System Performance Check Report

## Summary

| Dipole           | Frequency [MHz] | TSL  | Power [dBm] |
|------------------|-----------------|------|-------------|
| D2600V2 - SN1078 | 2600            | JeSL | -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---   | 2600, 0                         | 7.26              | 2.00                   | 37.4             |

## Hardware Setup

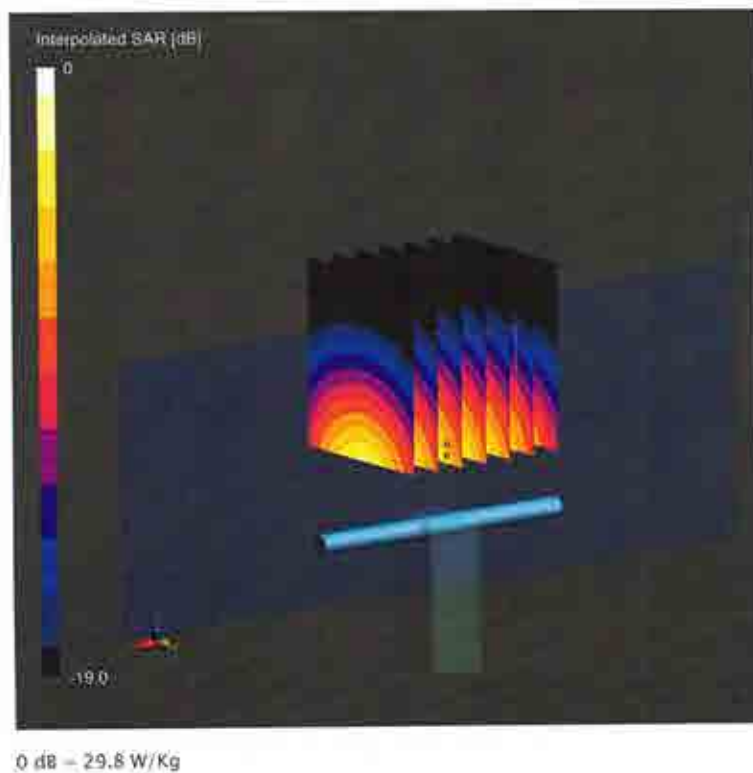
| Phantom         | TSL, Measured Date | Probe, Calibration Date     | DAE, Calibration Date     |
|-----------------|--------------------|-----------------------------|---------------------------|
| MFP V8.0 Center | HSL, 2025-06-11    | EX3DV4 - SN7349, 2025-01-10 | DAE4ip SntB36, 2025-04-17 |

## 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

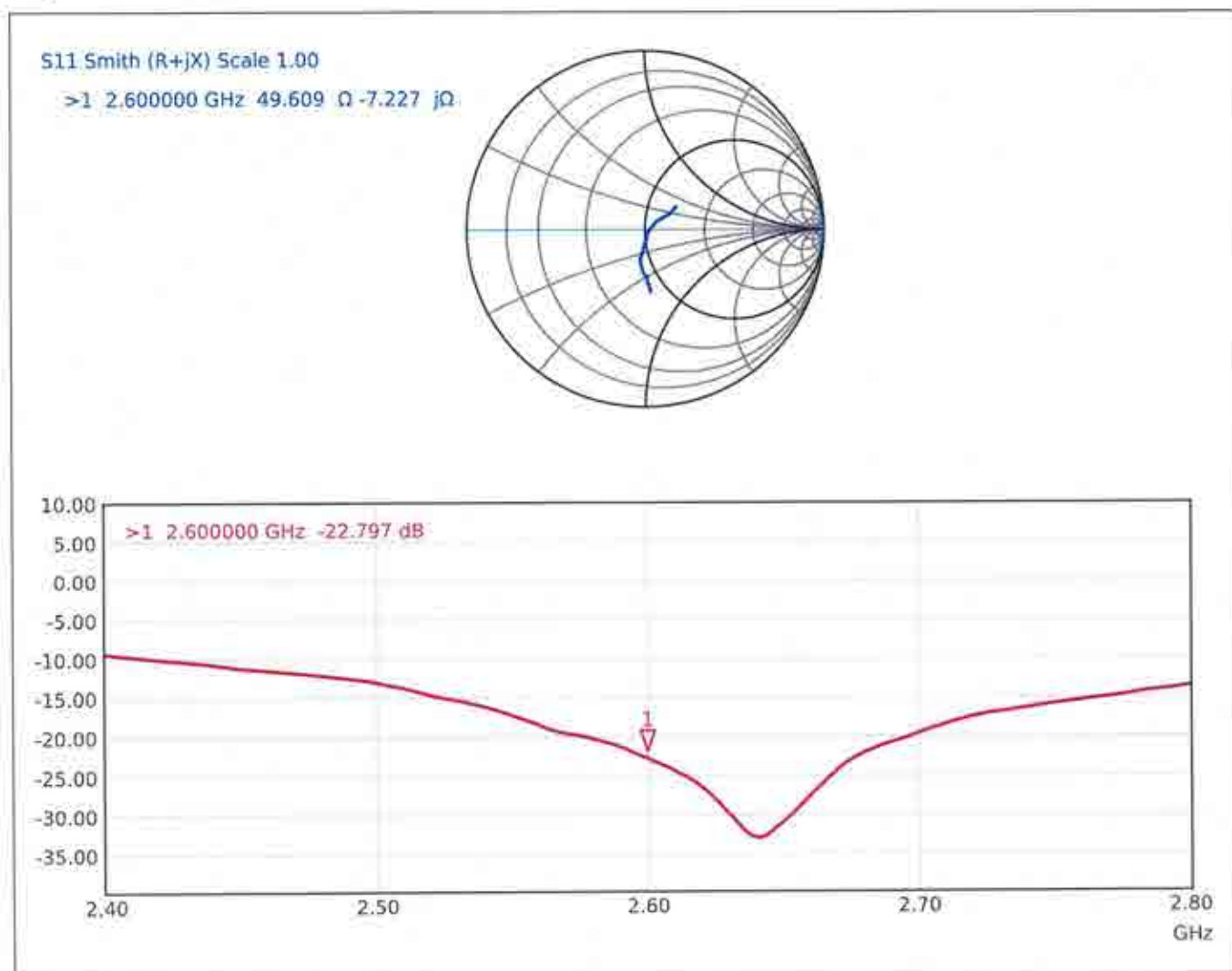
|                     | Zoom Scan           |
|---------------------|---------------------|
| Date                | 2025-06-11          |
| psSAR1g [W/Kg]      | 13.9                |
| psSAR10g [W/Kg]     | 6.26                |
| Power Drift [dB]    | 0.02                |
| Power Scaling       | Disabled            |
| Scaling Factor [dB] |                     |
| TSL Correction      | Positive / Negative |



D2600V2 - SN: 1078

June 11, 2025

## Impedance Measurement Plot for HSL



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Accreditation No.: **SCS 0108**

Client

**Sporton**  
Taoyuan City

Certificate No.

**D3300V2-1005\_Apr25**

## CALIBRATION CERTIFICATE

Object **D3300V2 - SN: 1005**

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

Calibration date **April 22, 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 Cal |
|-----------------------------|------------|----------------------------------------|---------------|
| Power Sensor R&S NRP-33T    | SN: 100967 | 26-Mar-25 (No. 217-04290)              | Mar-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   | 17-Apr-25 (No. DAE4ip-1836_Apr25)      | Apr-26        |

| 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                                                                                                   | Leif Klysner | Laboratory Technician |           |
| Approved by                                                                                                     | Sven Kühn    | Technical Manager     |           |
| Issued: April 23, 2025                                                                                          |              |                       |           |
| This calibration certificate shall not be reproduced except in full without written approval of the laboratory. |              |                       |           |

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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%.

D3300V2 - SN: 1005

April 22, 2025

## Measurement Conditions

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

|                              |                          |                                     |
|------------------------------|--------------------------|-------------------------------------|
| DASY Version                 | DASY8 Module SAR         | 16.4.0                              |
| Extrapolation                | Advanced Extrapolation   |                                     |
| Phantom                      | Modular Flat Phantom     |                                     |
| Distance Dipole Center - TSL | 10 mm                    | with spacer                         |
| Zoom Scan Resolution         | dx, dy = 5mm, dz = 1.4mm | Graded Ratio = 1.5 mm (Z direction) |
| Frequency                    | 3300MHz $\pm$ 1MHz       |                                     |

## HSL parameters at 3300 MHz

The following parameters and calculations were applied.

|                                    | Temperature         | Permittivity  | Conductivity        |
|------------------------------------|---------------------|---------------|---------------------|
| Nominal HSL parameters             | 22.0 °C             | 38.2          | 2.71 mho/m          |
| Measured HSL parameters            | (22.0 $\pm$ 0.2) °C | 39.7 $\pm$ 6% | 2.80 mho/m $\pm$ 6% |
| HSL temperature change during test | < 0.5 °C            |               |                     |

## SAR result with HSL at 3300 MHz

| SAR averaged over 1 cm <sup>3</sup> (1 g) of HSL | Condition          |                               |
|--------------------------------------------------|--------------------|-------------------------------|
| SAR for nominal HSL parameters                   | 20 dBm Input power | 6.78 W/kg                     |
| SAR for nominal HSL parameters                   | normalized to 1W   | 67.8 W/kg $\pm$ 19.9% (k = 2) |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of HSL | Condition          |                               |
|----------------------------------------------------|--------------------|-------------------------------|
| SAR for nominal HSL parameters                     | 20 dBm Input power | 2.62 W/kg                     |
| SAR for nominal HSL parameters                     | normalized to 1W   | 26.2 W/kg $\pm$ 19.5% (k = 2) |

D3300V2 - SN: 1005

April 22, 2025

**Appendix (Additional assessments outside the scope of SCS 0108)****Antenna Parameters with HSL at 3300 MHz**

|             |                                |
|-------------|--------------------------------|
| Impedance   | 51.1 $\Omega$ – 9.7 j $\Omega$ |
| Return Loss | -20.3 dB                       |

**General Antenna Parameters and Design**

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.116 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 |
|-----------------|-------|

D3300V2 - SN: 1005

April 22, 2025

## System Performance Check Report

## Summary

| Dipole           | Frequency [MHz] | TSL | Power [dBm] |
|------------------|-----------------|-----|-------------|
| D3300V2 - SN1005 | 3300            | 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      | 3300, 0                         | 0.0               | 2.80                   | 39.7             |

## Hardware Setup

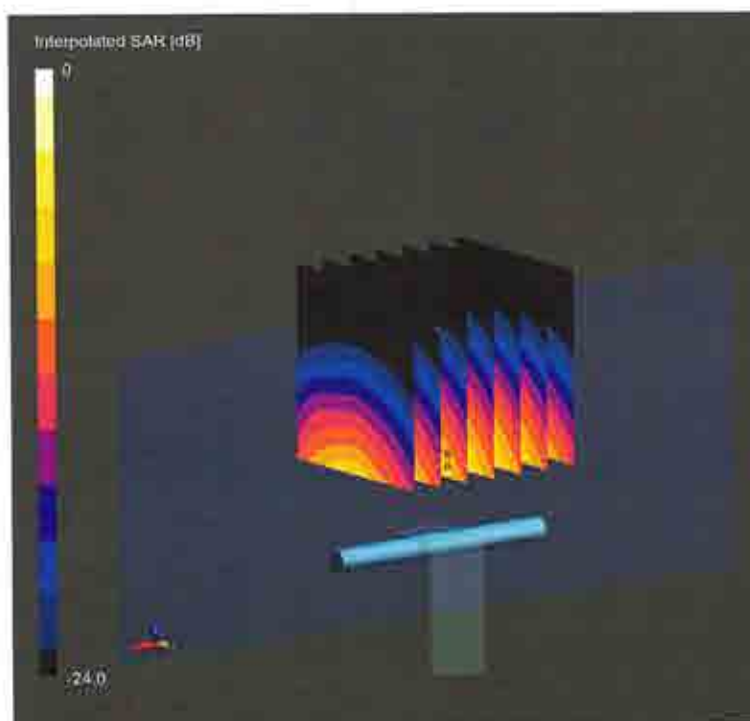
| Phantom         | TSL, Measured Date | Probe, Calibration Date     | DAE, Calibration Date     |
|-----------------|--------------------|-----------------------------|---------------------------|
| MFP V8.0 Center | HSL, 2025-04-22    | EX3DV4 - SN7349, 2025-01-10 | DAE4ip Sn1836, 2025-04-17 |

## Scans Setup

|                     | Zoom Scan       |
|---------------------|-----------------|
| Grid Extents [mm]   | 28 x 28 x 28    |
| Grid Steps [mm]     | 5.0 x 5.0 x 1.4 |
| Sensor Surface [mm] | 1.4             |
| Graded Grid         | Yes             |
| Grading Ratio       | 1.5             |
| MAIA                | N/A             |
| Surface Detection   | VM5 - 6p        |
| Scan Method         | Measured        |

## Measurement Results

|                     | Zoom Scan           |
|---------------------|---------------------|
| Date                | 2025-04-22          |
| psSAR1g [W/Kg]      | 6.78                |
| psSAR10g [W/Kg]     | 2.62                |
| Power Drift [dB]    | -0.01               |
| Power Scaling       | Disabled            |
| Scaling Factor [dB] |                     |
| TSL Correction      | Positive / Negative |

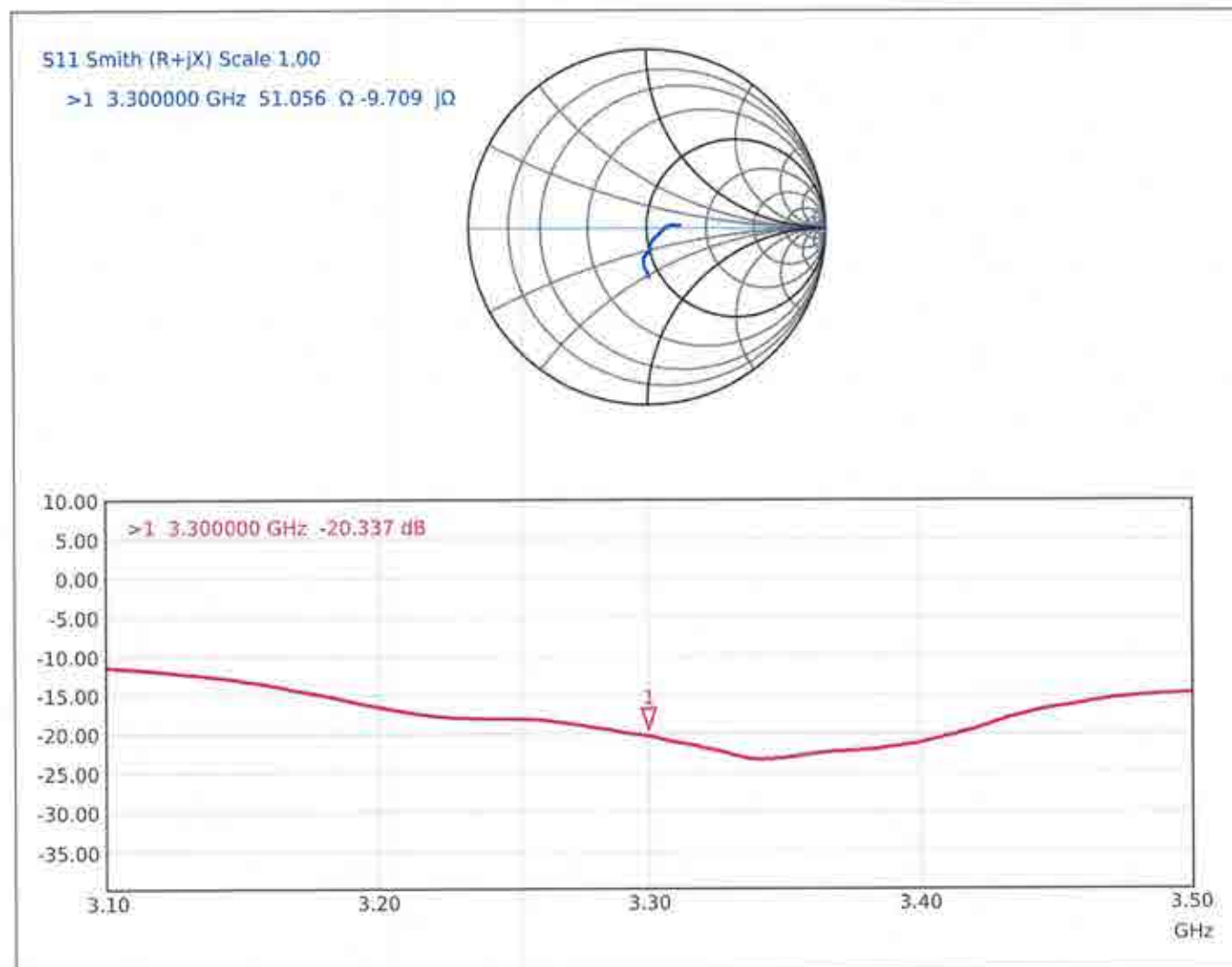


0 dB = 17.2 W/Kg

D3300V2 - SN: 1005

April 22, 2025

## Impedance Measurement Plot for HSL



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Accreditation No.: **SCS 0108**

Client

**Sporton**  
Taoyuan City

Certificate No.

**D3500V2-1036\_Mar25**

## CALIBRATION CERTIFICATE

Object **D3500V2 - SN: 1036**

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

Calibration date **March 11, 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 Cal |
|--------------------------------------------|------------|---------------------------------------|---------------|
| Power Sensor R&S NRP-33T                   | SN: 100967 | 28-Mar-24 (No. 217-04038)             | Mar-25        |
| 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        |
| 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   | 10-Jan-25 (No. EX3-7349_Jan25)        | Jan-26        |
| DAE4ip                                     | SN: 1836   | 28-Oct-24 (No. DAE4ip-1836_Oct24)     | Oct-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 | Krešimir Franjić | Laboratory Technician |           |
| Approved by   | Sven Kühn        | Technical Manager     |           |

Issued: March 12, 2025

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Accredited by the Swiss Accreditation Service (SAS)

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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%.

D3500V2 - SN: 1036

March 11, 2025

### 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 = 1.4mm | Graded Ratio = 1.5 mm (Z direction) |
| <b>Frequency</b>                    | 3500MHz $\pm$ 1MHz       |                                     |

### HSL parameters at 3500 MHz

The following parameters and calculations were applied.

|                                           | Temperature         | Permittivity  | Conductivity        |
|-------------------------------------------|---------------------|---------------|---------------------|
| <b>Nominal HSL parameters</b>             | 22.0 °C             | 37.9          | 2.91 mho/m          |
| <b>Measured HSL parameters</b>            | (22.0 $\pm$ 0.2) °C | 38.7 $\pm$ 6% | 2.94 mho/m $\pm$ 6% |
| <b>HSL temperature change during test</b> | < 0.5 °C            |               |                     |

### SAR result with HSL at 3500 MHz

| <b>SAR averaged over 1 cm<sup>3</sup> (1 g) of HSL</b> | Condition          |                               |
|--------------------------------------------------------|--------------------|-------------------------------|
| SAR for nominal HSL parameters                         | 20 dBm input power | 6.56 W/kg                     |
| SAR for nominal HSL parameters                         | normalized to 1W   | 65.6 W/kg $\pm$ 19.9% (k = 2) |

| <b>SAR averaged over 10 cm<sup>3</sup> (10 g) of HSL</b> | Condition          |                               |
|----------------------------------------------------------|--------------------|-------------------------------|
| SAR for nominal HSL parameters                           | 20 dBm input power | 2.49 W/kg                     |
| SAR for nominal HSL parameters                           | normalized to 1W   | 24.9 W/kg $\pm$ 19.5% (k = 2) |

D3500V2 - SN: 1036

March 11, 2025

**Appendix (Additional assessments outside the scope of SCS 0108)****Antenna Parameters with HSL at 3500 MHz**

|             |                                |
|-------------|--------------------------------|
| Impedance   | 52.4 $\Omega$ - 3.7 j $\Omega$ |
| Return Loss | -27.3 dB                       |

**General Antenna Parameters and Design**

|                                  |         |
|----------------------------------|---------|
| Electrical Delay (one direction) | 1.14 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 |
|-----------------|-------|

D3500V2 - SN: 1036

March 11, 2025

## System Performance Check Report

## Summary

| Dipole           | Frequency [MHz] | TSL | Power [dBm] |
|------------------|-----------------|-----|-------------|
| D3500V2 - SN1036 | 3500            | 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—     | 3500, 0                         | 6.63              | 2.94                   | 88.7             |

## Hardware Setup

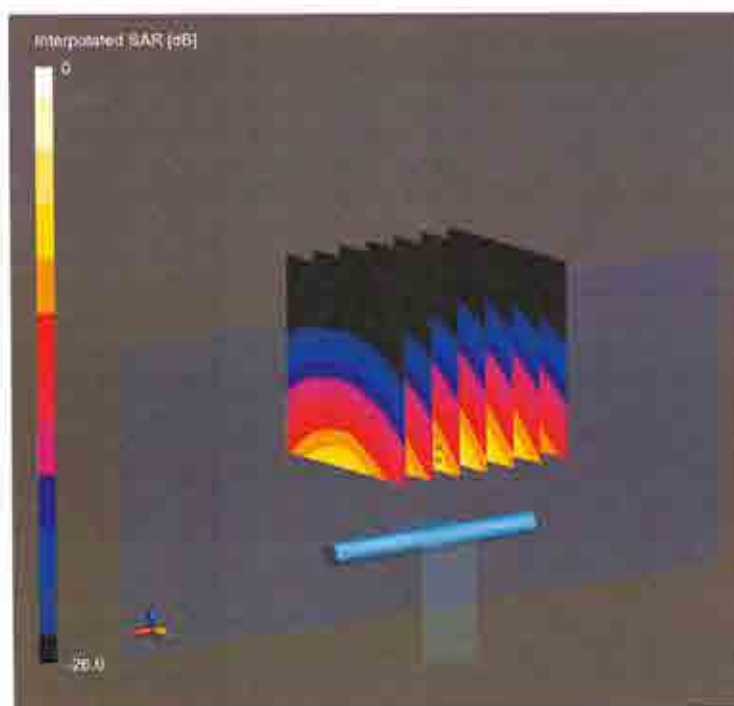
| Phantom         | TSL, Measured Date | Probe, Calibration Date     | DAE, Calibration Date     |
|-----------------|--------------------|-----------------------------|---------------------------|
| MFP V8.0 Center | HSL, 2025-03-11    | EX3DV4 - SN7369, 2025-01-10 | DAE4ip Sn1836, 2024-10-28 |

## Scans Setup

|                     | Zoom Scan       |
|---------------------|-----------------|
| Grid Extents [mm]   | 28 x 28 x 28    |
| Grid Steps [mm]     | 5.0 x 5.0 x 1.4 |
| 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                | 2025-03-11          |
| psSAR1g [W/Kg]      | 6.56                |
| psSAR10g [W/Kg]     | 2.49                |
| Power Drift [dB]    | -0.01               |
| Power Scaling       | Disabled            |
| Scaling Factor [dB] |                     |
| TSL Correction      | Positive   Negative |

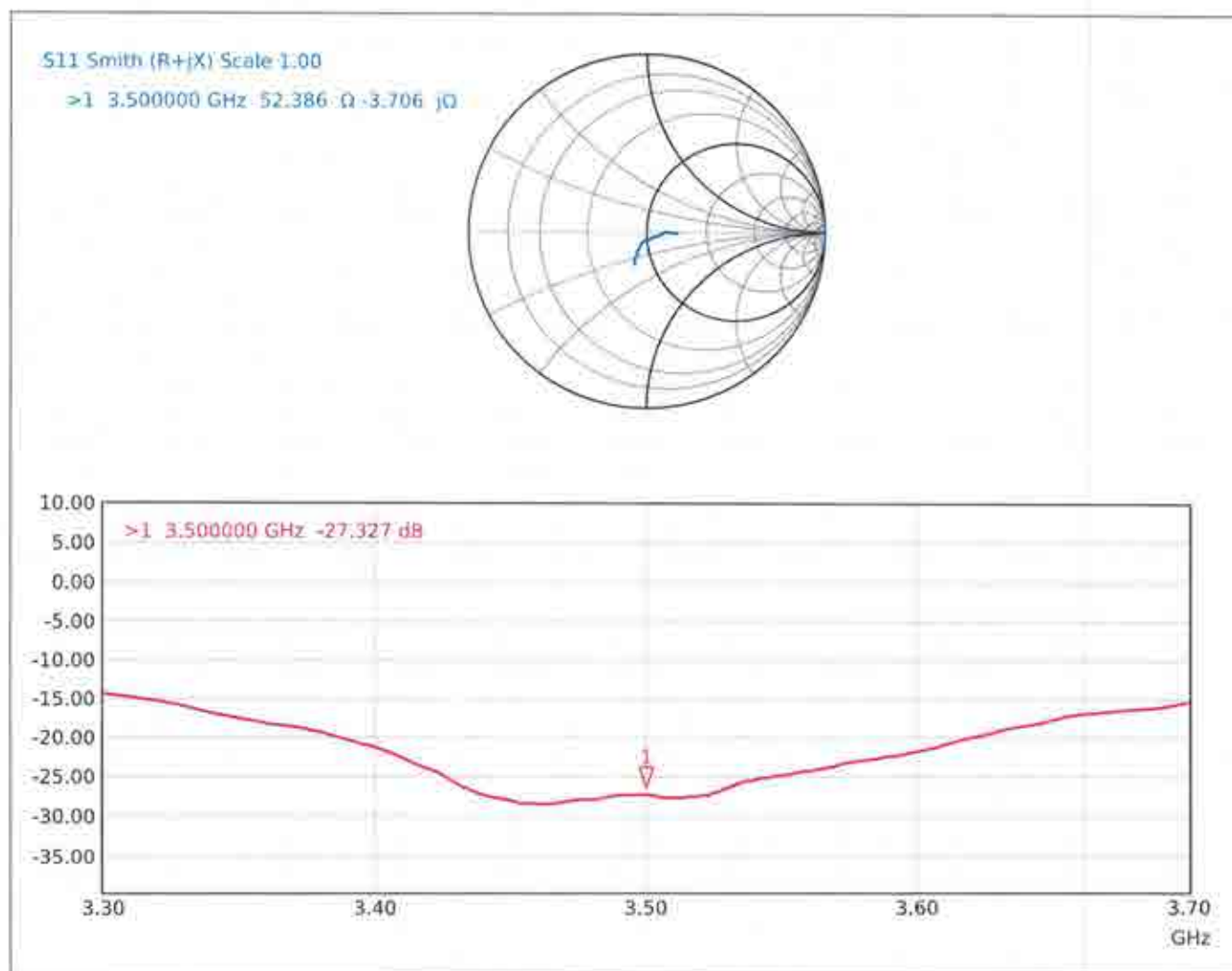


0 dB = 17.0 W/Kg

D3500V2 - SN: 1036

March 11, 2025

## Impedance Measurement Plot for HSL



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Multilateral Agreement for the recognition of calibration certificates**Accreditation No.: **SCS 0108**

Client

**Sporton**  
Taoyuan City

Certificate No.

**D3700V2-1022\_Jul24****CALIBRATION CERTIFICATE**Object **D3700V2 - SN: 1022**Calibration procedure(s) **QA CAL-22.v7**  
**Calibration Procedure for SAR Validation Sources between 3 - 10 GHz**Calibration date **July 10, 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 | Paulo Pina | Laboratory Technician |           |
| Approved by   | Sven Kühn  | Technical Manager     |           |

Issued: July 10, 2024

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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**

## 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%.

D3700V2 - SN: 1022

July 10, 2024

## Measurement Conditions

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

|                              |                          |                                     |
|------------------------------|--------------------------|-------------------------------------|
| DASY Version                 | DASY8 Module SAR         | 16.4.0                              |
| Extrapolation                | Advanced Extrapolation   |                                     |
| Phantom                      | Modular Flat Phantom     |                                     |
| Distance Dipole Center - TSL | 10 mm                    | with spacer                         |
| Zoom Scan Resolution         | dx, dy = 5mm, dz = 1.4mm | Graded Ratio = 1.5 mm (Z direction) |
| Frequency                    | 3700MHz $\pm$ 1MHz       |                                     |

## Head TSL parameters at 3700 MHz

The following parameters and calculations were applied.

|                                         | Temperature        | Permittivity  | Conductivity        |
|-----------------------------------------|--------------------|---------------|---------------------|
| Nominal Head TSL parameters             | 22.0 °C            | 37.7          | 3.12 mho/m          |
| Measured Head TSL parameters            | (22.0 $\pm$ 0.2)°C | 38.2 $\pm$ 6% | 3.08 mho/m $\pm$ 6% |
| Head TSL temperature change during test | < 0.5 °C           |               |                     |

## SAR result with Head TSL at 3700 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 | 6.81 W/kg                     |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | 68.1 W/kg $\pm$ 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 | 2.52 W/kg                     |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 25.2 W/kg $\pm$ 19.5% (k = 2) |

D3700V2 - SN: 1022

July 10, 2024

**Appendix (Additional assessments outside the scope of SCS 0108)****Antenna Parameters with Head TSL at 3700 MHz**

|             |                                |
|-------------|--------------------------------|
| Impedance   | 52.3 $\Omega$ – 5.3 j $\Omega$ |
| Return Loss | -25.0 dB                       |

**General Antenna Parameters and Design**

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.125 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 |
|-----------------|-------|

D3700V2 - SN: 1022

July 10, 2024

## System Performance Check Report

## Summary

| Dipole           | Frequency [MHz] | TSL | Power [dBm] |
|------------------|-----------------|-----|-------------|
| D3700V2 - SN1022 | 3700            | 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-- |            | 3700, 0                         | 6.34              | 3.08                   | 38.2             |

## Hardware Setup

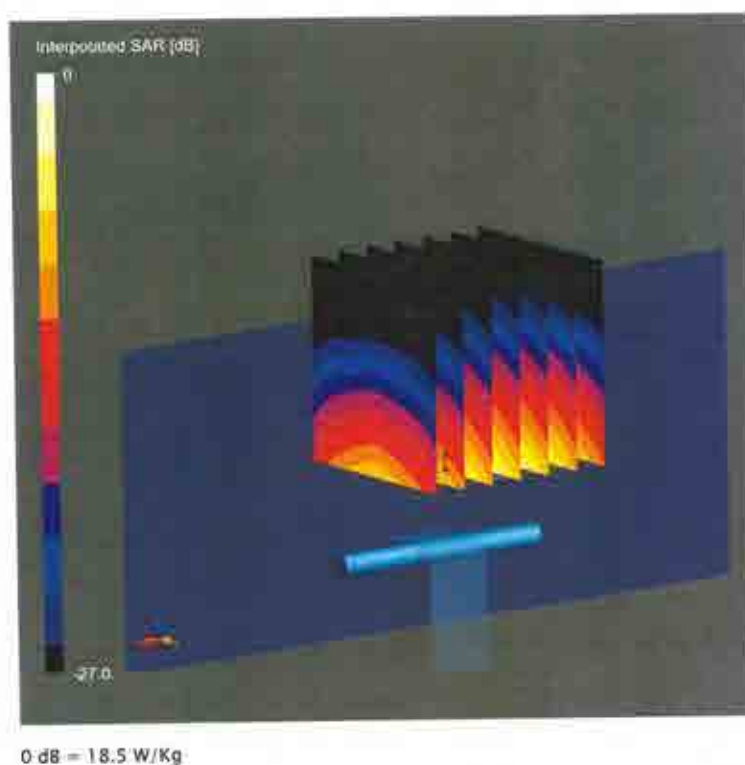
| Phantom        | TSL, Measured Date | Probe, Calibration Date     | DAE, Calibration Date     |
|----------------|--------------------|-----------------------------|---------------------------|
| MFP V8.0 Right | HSL, 2024-07-10    | EX3DV4 - SN7349, 2024-06-03 | DAE4ip Sn1836, 2024-01-10 |

## Scans Setup

|                     | Zoom Scan       |
|---------------------|-----------------|
| Grid Extents [mm]   | 28 x 28 x 28    |
| Grid Steps [mm]     | 5.0 x 5.0 x 3.4 |
| Sensor Surface [mm] | 1.4             |
| Graded Grid         | Yes             |
| Grading Ratio       | 1.5             |
| MAIA                | N/A             |
| Surface Detection   | VMS + 6p        |
| Scan Method         | Measured        |

## Measurement Results

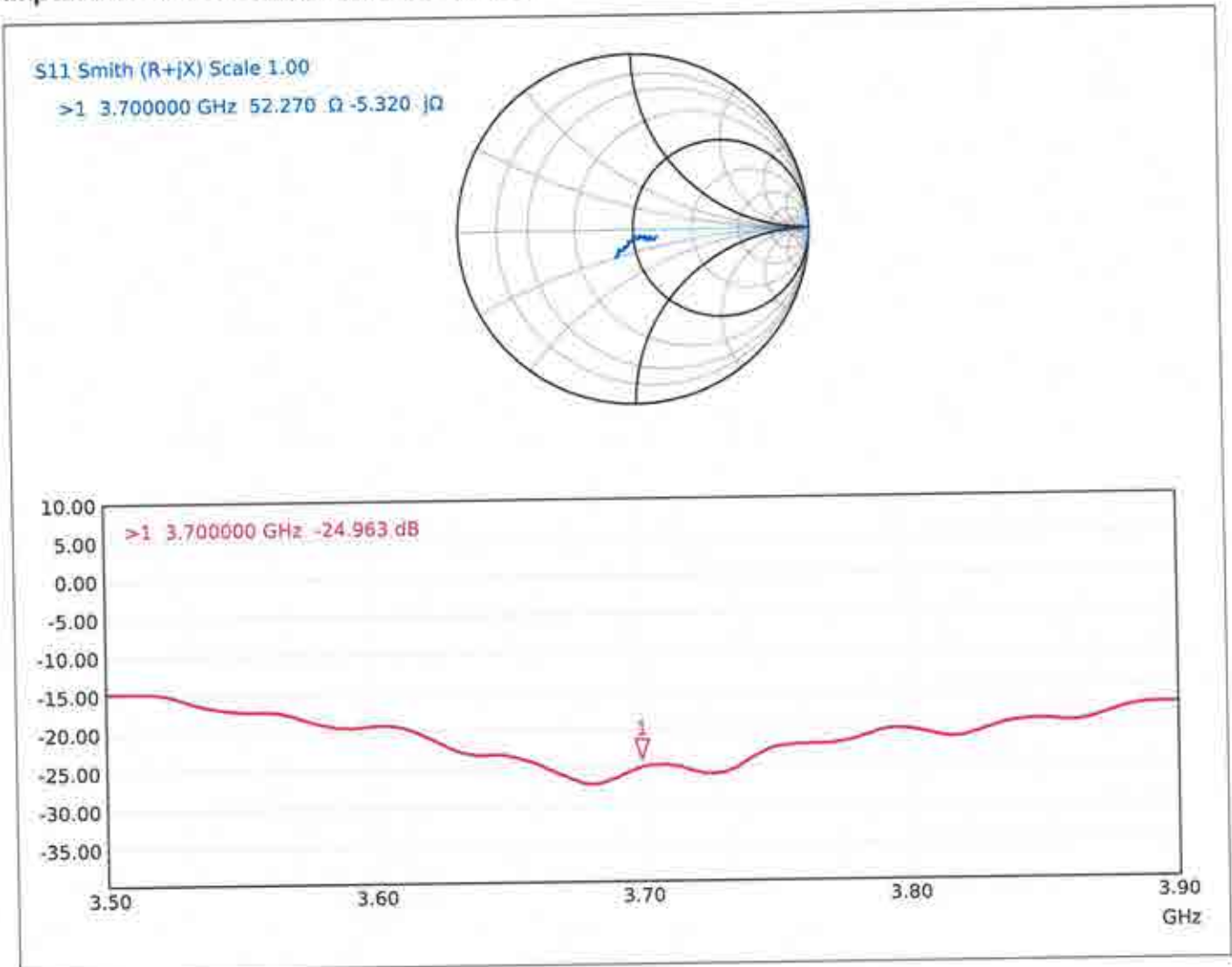
|                     | Zoom Scan           |
|---------------------|---------------------|
| Date                | 2024-07-10          |
| psSAR1g [W/Kg]      | 6.81                |
| psSAR10g [W/Kg]     | 2.52                |
| Power Drift [dB]    | -0.01               |
| Power Scaling       | Disabled            |
| Scaling Factor [dB] |                     |
| TSL Correction      | Positive / Negative |



D3700V2 - SN: 1022

July 10, 2024

## Impedance Measurement Plot for Head TSL





### D3700V2, serial no. 1022 Extended Dipole Calibrations

If dipoles are verified in return loss ( $< -20\text{dB}$ , within 20% of prior calibration), and in impedance (within 5 ohm of prior calibration), the annual calibration is not necessary and the calibration interval can be extended.

#### <Justification of the extended calibration>

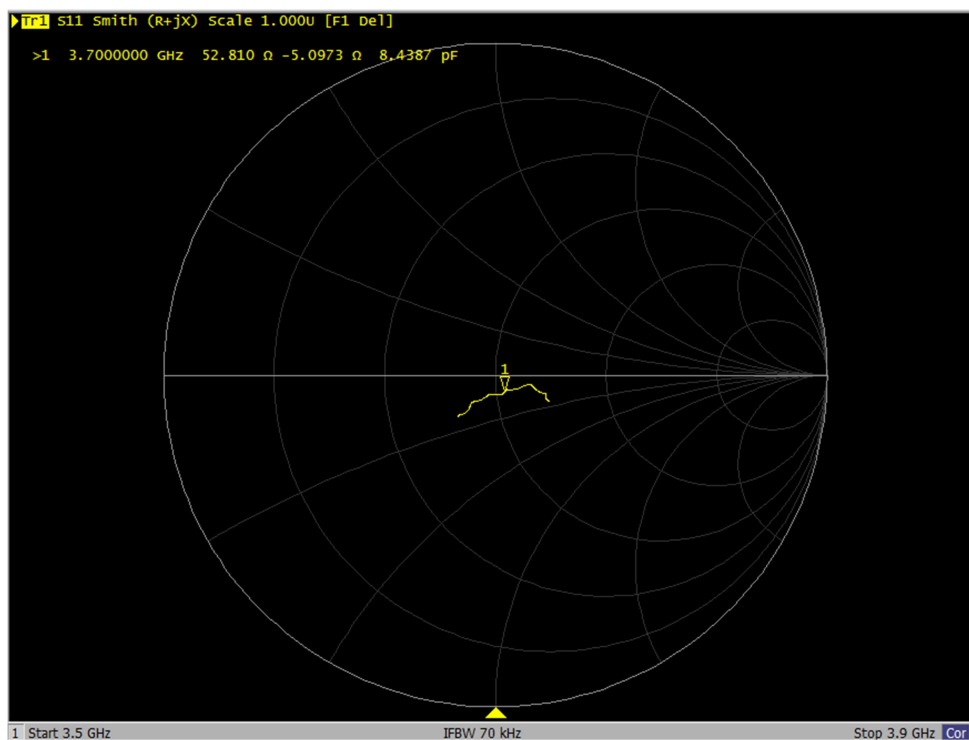
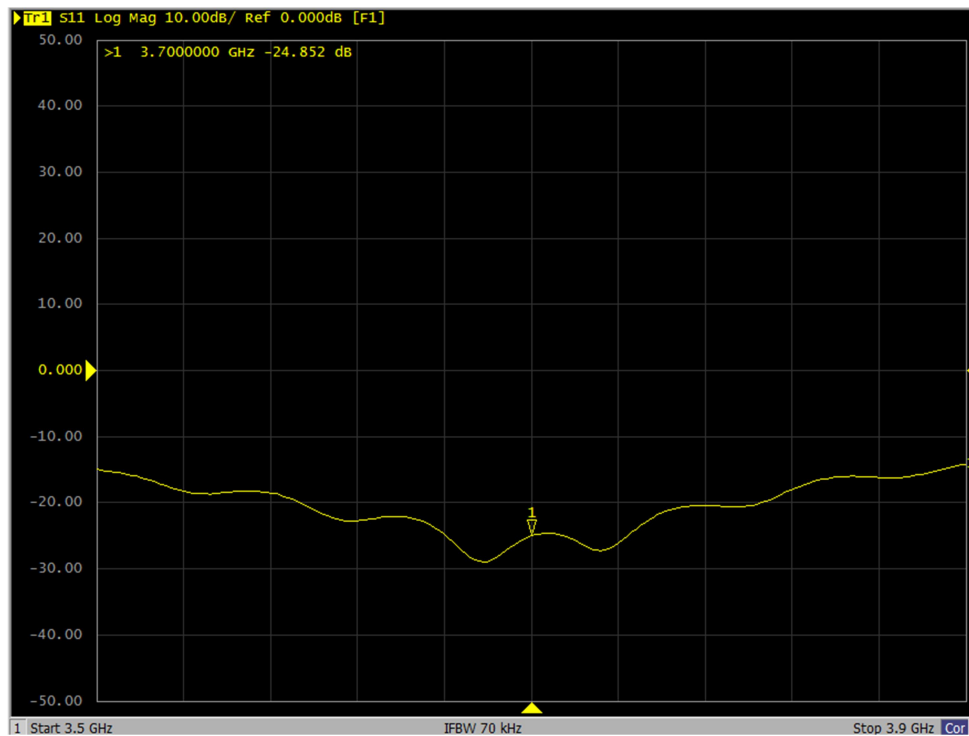
| D3700V2 – serial no. 1022   |                  |           |                      |             |                           |             |
|-----------------------------|------------------|-----------|----------------------|-------------|---------------------------|-------------|
| 3700MHZ                     |                  |           |                      |             |                           |             |
| Date of Measurement         | Return-Loss (dB) | Delta (%) | Real Impedance (ohm) | Delta (ohm) | Imaginary Impedance (ohm) | Delta (ohm) |
| 07.10.2024<br>(Cal. Report) | -24.963          |           | 52.27                |             | -5.320                    |             |
| 07.09.2025<br>(extended)    | -24.852          | 0.445     | 52.81                | 0.54        | -5.0973                   | 0.2227      |

The return loss is  $< -20\text{dB}$ , within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the verification result should support extended calibration.



<Dipole Verification Data> - D3700V2, serial no. 1022 (Data of Measurement : 07.09.2025)

3700 MHz - Head



SPORTON INTERNATIONAL INC.

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Client  
**Sporton**  
Taoyuan City

Certificate No. **D3900V2-1017\_Apr25**

## CALIBRATION CERTIFICATE

Object **D3900V2 - SN: 1017**

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

Calibration date **April 22, 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 Cal |
|-----------------------------|------------|----------------------------------------|---------------|
| Power Sensor R&S NRP-33T    | SN: 100967 | 26-Mar-25 (No. 217-04290)              | Mar-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   | 17-Apr-25 (No. DAE4ip-1836_Apr25)      | Apr-26        |

| 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 | Leif Klysner | Laboratory Technician |           |
| Approved by   | Sven Kühn    | Technical Manager     |           |

Issued: April 22, 2025

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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%.

D3900V2 - SN: 1017

April 22, 2025

**Measurement Conditions**

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

|                              |                                          |                                     |
|------------------------------|------------------------------------------|-------------------------------------|
| DASY Version                 | DASY8 Module SAR                         | 16.4.0                              |
| Extrapolation                | Advanced Extrapolation                   |                                     |
| Phantom                      | Modular Flat Phantom                     |                                     |
| Distance Dipole Center - TSL | 10 mm                                    | with spacer                         |
| Zoom Scan Resolution         | dx, dy = 5mm, dz = 1.4mm                 | Graded Ratio = 1.5 mm (Z direction) |
| Frequency                    | 3900MHz $\pm$ 1MHz<br>4100MHz $\pm$ 1MHz |                                     |

**HSL parameters at 3900 MHz**

The following parameters and calculations were applied

|                                    | Temperature         | Permittivity  | Conductivity        |
|------------------------------------|---------------------|---------------|---------------------|
| Nominal HSL parameters             | 22.0 °C             | 37.5          | 3.32 mho/m          |
| Measured HSL parameters            | (22.0 $\pm$ 0.2) °C | 38.9 $\pm$ 6% | 3.29 mho/m $\pm$ 6% |
| HSL temperature change during test | < 0.5 °C            |               |                     |

**SAR result with HSL at 3900 MHz**

| SAR averaged over 1 cm <sup>3</sup> (1 g) of HSL | Condition          |                               |
|--------------------------------------------------|--------------------|-------------------------------|
| SAR for nominal HSL parameters                   | 20 dBm input power | 7.02 W/kg                     |
| SAR for nominal HSL parameters                   | normalized to 1W   | 70.2 W/kg $\pm$ 19.9% (k = 2) |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of HSL | Condition          |                               |
|----------------------------------------------------|--------------------|-------------------------------|
| SAR for nominal HSL parameters                     | 20 dBm input power | 2.46 W/kg                     |
| SAR for nominal HSL parameters                     | normalized to 1W   | 24.6 W/kg $\pm$ 19.5% (k = 2) |

D3900V2 - SN: 1017

April 22, 2025

**HSL parameters at 4100 MHz**

The following parameters and calculations were applied.

|                                    | Temperature   | Permittivity | Conductivity   |
|------------------------------------|---------------|--------------|----------------|
| Nominal HSL parameters             | 22.0 °C       | 37.2         | 3.53 mho/m     |
| Measured HSL parameters            | (22.0 ±0.2)°C | 38.7 ±6%     | 3.48 mho/m ±6% |
| HSL temperature change during test | < 0.5 °C      |              |                |

**SAR result with HSL at 4100 MHz**

|                                                        |                    |                          |
|--------------------------------------------------------|--------------------|--------------------------|
| <b>SAR averaged over 1 cm<sup>3</sup> (1 g) of HSL</b> | Condition          |                          |
| SAR for nominal HSL parameters                         | 20 dBm input power | 6.70 W/kg                |
| SAR for nominal HSL parameters                         | normalized to 1W   | 67.0 W/kg ±19.9% (k = 2) |

|                                                          |                    |                          |
|----------------------------------------------------------|--------------------|--------------------------|
| <b>SAR averaged over 10 cm<sup>3</sup> (10 g) of HSL</b> | 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) |

D3900V2 - SN: 1017

April 22, 2025

**Appendix (Additional assessments outside the scope of SCS 0108)****Antenna Parameters with HSL at 3900 MHz**

|             |                                |
|-------------|--------------------------------|
| Impedance   | 49.1 $\Omega$ – 6.3 j $\Omega$ |
| Return Loss | -23.9 dB                       |

**Antenna Parameters with HSL at 4100 MHz**

|             |                                |
|-------------|--------------------------------|
| Impedance   | 60.8 $\Omega$ – 1.9 j $\Omega$ |
| Return Loss | -20.1 dB                       |

**General Antenna Parameters and Design**

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.104 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 |
|-----------------|-------|

D3900V2 - SN: 1017

April 22, 2025

## System Performance Check Report

## Summary

| Dipole           | Frequency [MHz] | TSL | Power [dBm] |
|------------------|-----------------|-----|-------------|
| D3900V2 - SN1017 | 3900            | HSL | 20          |

## Exposure Conditions

| Phantom Section, TSL | Test Distance [mm] | Sand | Group, UID | Frequency [MHz], Channel Number | Conversion Factor | TSL Conductivity [S/m] | TSL Permittivity |
|----------------------|--------------------|------|------------|---------------------------------|-------------------|------------------------|------------------|
| Flat                 | 10                 |      | CW, 0---   | 3900, 0                         | 6.37              | 3.29                   | 38.9             |

## Hardware Setup

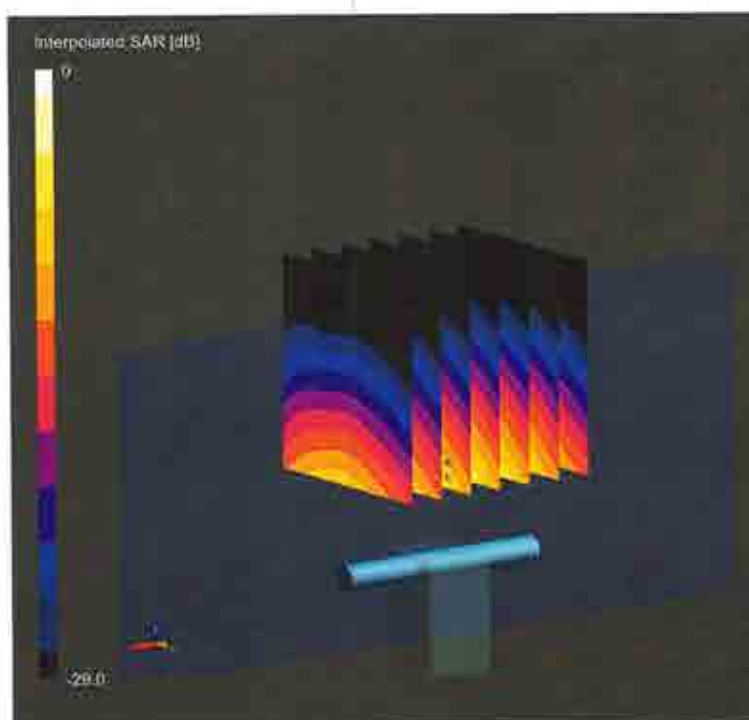
| Phantom         | TSL Measured Date | Probe, Calibration Date     | OAE, Calibration Date     |
|-----------------|-------------------|-----------------------------|---------------------------|
| MEP V8.0 Center | HSL 2025-04-22    | EX3DV4 - SN7349, 2025-01-10 | OAE4ip Sn1836, 2025-04-17 |

## Scans Setup

|                     | Zoom Scan       |
|---------------------|-----------------|
| Grid Extents [mm]   | 28 x 28 x 28    |
| Grid Steps [mm]     | 5.0 x 5.0 x 1.4 |
| 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                | 2025-04-22          |
| psSAR1g [W/Kg]      | 7.02                |
| psSAR10g [W/Kg]     | 2.46                |
| Power Drift [dB]    | 0.00                |
| Power Scaling       | Disabled            |
| Scaling Factor [dB] |                     |
| TSL Correction      | Positive / Negative |



0 dB = 19.9 W/Kg

D3900V2 - SN: 1017

April 22, 2025

## System Performance Check Report

## Summary

| Dipole           | Frequency [MHz] | TSL | Power [dBm] |
|------------------|-----------------|-----|-------------|
| D3900V2 - SN1017 | 4100            | 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---   | 4100, 0                         | 6.39              | 5.48                   | 38.7             |

## Hardware Setup

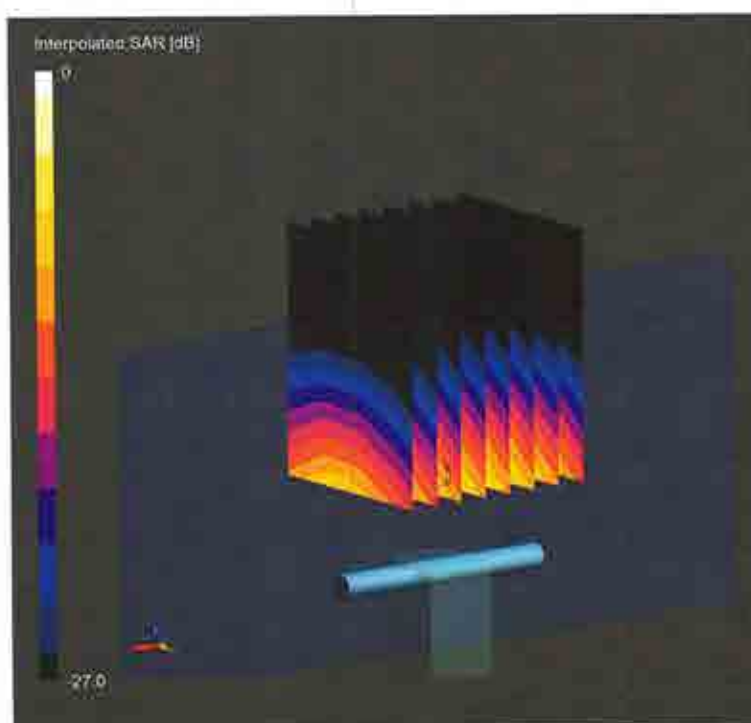
| Phantom         | TSL, Measured Date | Probe, Calibration Date     | DAE, Calibration Date     |
|-----------------|--------------------|-----------------------------|---------------------------|
| MFP V8.0 Center | HSL, 2025-04-22    | EX3DV4 - SN7349, 2025-01-10 | DAE4lp Sn1836, 2025-04-17 |

## Scans Setup

|                     | Zoom Scan       |
|---------------------|-----------------|
| Grid Extents [mm]   | 25 x 25 x 25    |
| 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

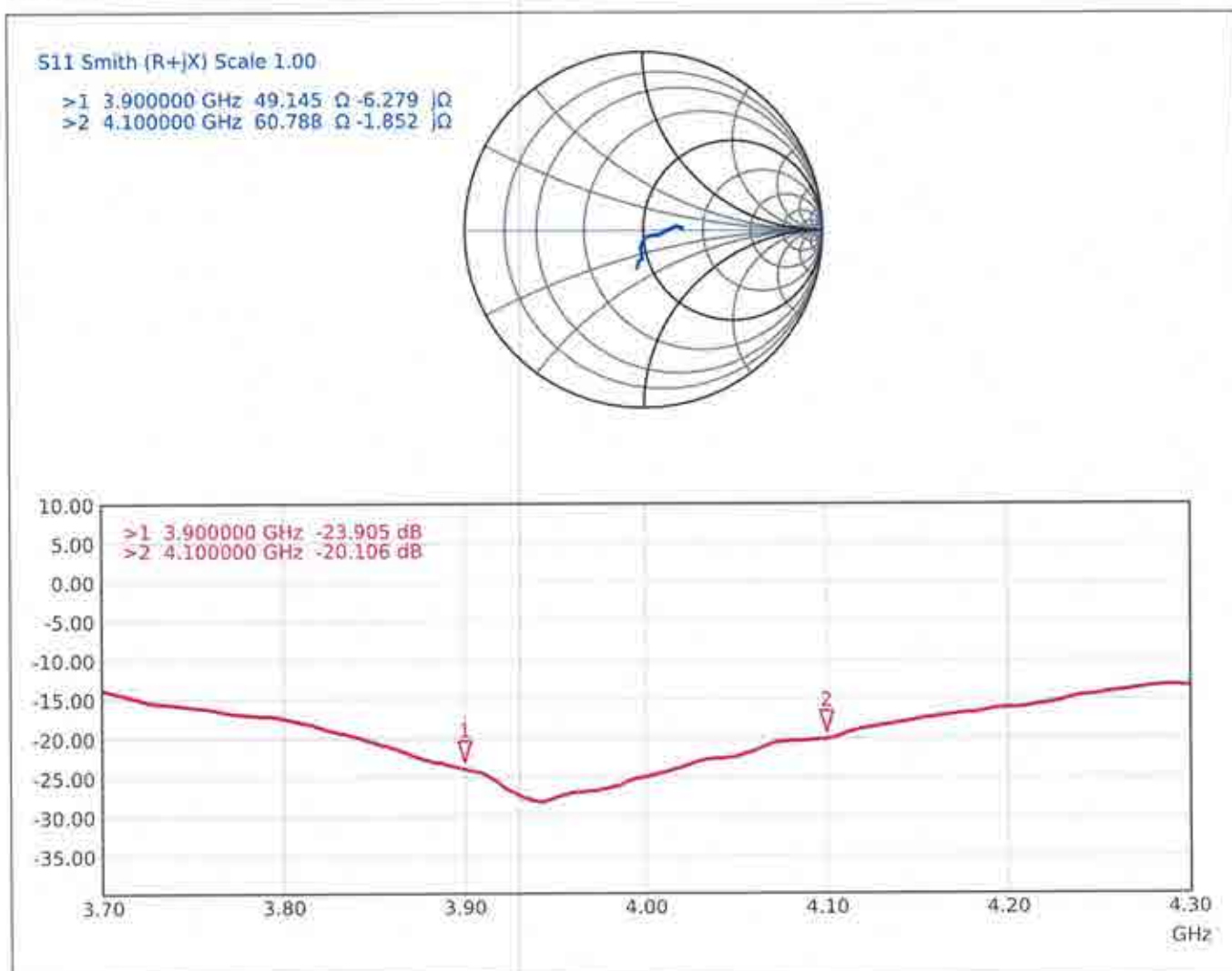
|                     | Zoom Scan           |
|---------------------|---------------------|
| Date                | 2025-04-22          |
| psSAR1g [W/Kg]      | 6.70                |
| psSAR10g [W/Kg]     | 2.33                |
| Power Drift [dB]    | 0.00                |
| Power Scaling       | Disabled            |
| Scaling Factor [dB] |                     |
| TSL Correction      | Positive / Negative |



D3900V2 - SN: 1017

April 22, 2025

## Impedance Measurement Plot for HSL



**Calibration Laboratory of****Schmid & Partner  
Engineering AG**

Zeughausstrasse 43, 8004 Zurich, Switzerland

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Client

**Sporton**  
Taoyuan City

Certificate No.

**D6.5GHzV2-1003\_Mar25****CALIBRATION CERTIFICATE**

Object

**D6.5GHzV2 - SN: 1003**

Calibration procedure(s)

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

Calibration date

**March 14, 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 Cal |
|--------------------------------------------|------------|----------------------------------------|---------------|
| Power Sensor R&S NRP-33T                   | SN: 100967 | 28-Mar-24 (No. 217-04038)              | Mar-25        |
| 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        |
| Mismatch; Short [S4188] Attenuator [S4423] | SN: 1152   | 28-Mar-24 (No. 217-04050)              | Mar-25        |
| 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   | 28-Oct-24 (No. DAE4ip-1836_Oct24)      | Oct-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                                                                                                   | Krešimir Franjić | Laboratory Technician |                        |
| Approved by                                                                                                     | Sven Kühn        | Technical Manager     |                        |
|                                                                                                                 |                  |                       | Issued: March 14, 2025 |
| This calibration certificate shall not be reproduced except in full without written approval of the laboratory. |                  |                       |                        |

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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> | 5 mm                       | with spacer                         |
| <b>Zoom Scan Resolution</b>         | dx, dy = 3.4mm, dz = 1.4mm | Graded Ratio = 1.4 mm (Z direction) |
| <b>Frequency</b>                    | 6500MHz $\pm$ 1MHz         |                                     |

## HSL parameters at 6500 MHz

The following parameters and calculations were applied.

|                                           | Temperature        | Permittivity  | Conductivity        |
|-------------------------------------------|--------------------|---------------|---------------------|
| <b>Nominal HSL parameters</b>             | 22.0 °C            | 34.5          | 6.07 mho/m          |
| <b>Measured HSL parameters</b>            | (22.0 $\pm$ 0.2)°C | 35.1 $\pm$ 6% | 6.24 mho/m $\pm$ 6% |
| <b>HSL temperature change during test</b> | < 0.5 °C           |               |                     |

## SAR result with HSL at 6500 MHz

|                                                        |                    |                              |
|--------------------------------------------------------|--------------------|------------------------------|
| <b>SAR averaged over 1 cm<sup>3</sup> (1 g) of HSL</b> | Condition          |                              |
| SAR for nominal HSL parameters                         | 20 dBm input power | 29.4 W/kg                    |
| SAR for nominal HSL parameters                         | normalized to 1W   | 294 W/kg $\pm$ 24.7% (k = 2) |

|                                                        |                    |                               |
|--------------------------------------------------------|--------------------|-------------------------------|
| <b>SAR averaged over 8 cm<sup>3</sup> (8 g) of HSL</b> | Condition          |                               |
| SAR for nominal HSL parameters                         | 20 dBm input power | 6.62 W/kg                     |
| SAR for nominal HSL parameters                         | normalized to 1W   | 66.2 W/kg $\pm$ 24.4% (k = 2) |

|                                                          |                    |                               |
|----------------------------------------------------------|--------------------|-------------------------------|
| <b>SAR averaged over 10 cm<sup>3</sup> (10 g) of HSL</b> | Condition          |                               |
| SAR for nominal HSL parameters                           | 20 dBm input power | 5.47 W/kg                     |
| SAR for nominal HSL parameters                           | normalized to 1W   | 54.7 W/kg $\pm$ 24.4% (k = 2) |

D6.5GHzV2 - SN: 1003

March 14, 2025

**Appendix (Additional assessments outside the scope of SCS 0108)****Antenna Parameters with HSL at 6500 MHz**

|             |                                |
|-------------|--------------------------------|
| Impedance   | 54.8 $\Omega$ – 1.5 j $\Omega$ |
| Return Loss | -26.4 dB                       |

**APD (Absorbed Power Density)**

| <b>APD averaged over 1 cm<sup>3</sup></b> | Condition          |                               |
|-------------------------------------------|--------------------|-------------------------------|
| APD measured                              | 20 dBm input power | 293 W/kg                      |
| APD measured                              | normalized to 1W   | 2930 W/kg $\pm$ 29.2% (k = 2) |

| <b>APD averaged over 4 cm<sup>3</sup></b> | Condition          |                               |
|-------------------------------------------|--------------------|-------------------------------|
| APD measured                              | 20 dBm input power | 132 W/kg                      |
| APD measured                              | normalized to 1W   | 1320 W/kg $\pm$ 28.9% (k = 2) |

\*The reported APD values have been derived using the psSAR1g and psSAR8g.

D6.5GHzV2 - SN: 1003

March 14, 2025

### General Antenna Parameters and Design

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

D6.5GHzV2 - SN: 1003

March 14, 2025

## System Performance Check Report

## Summary

| Dipole             | Frequency [MHz] | TSL | Power [dBm] |
|--------------------|-----------------|-----|-------------|
| D6.5GHzV2 - SN1003 | 6500            | 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                 | 5                  |      | CW, 0--    | 6500, 0                         | 5.49              | 6.24                   | 35.1             |

## Hardware Setup

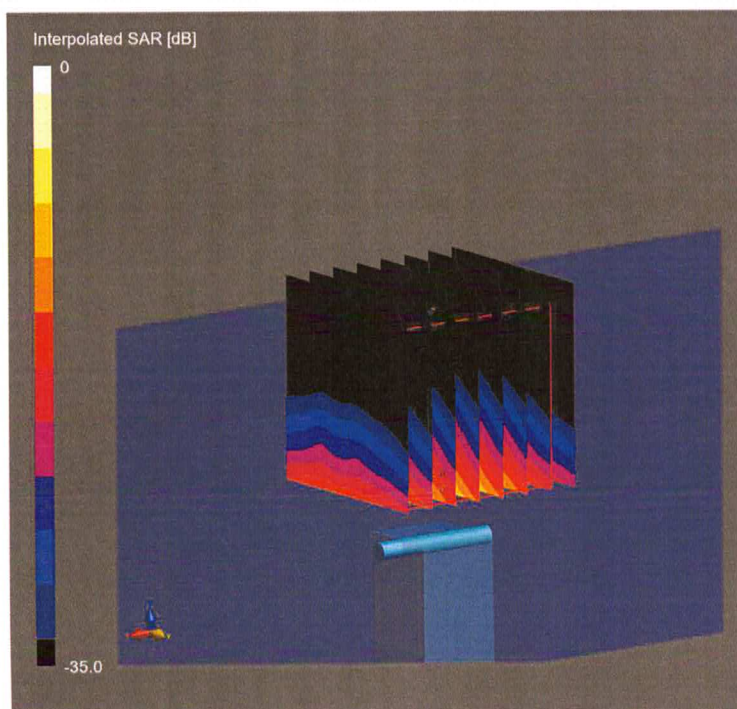
| Phantom         | TSL, Measured Date | Probe, Calibration Date     | DAE, Calibration Date     |
|-----------------|--------------------|-----------------------------|---------------------------|
| MFP V8.0 Center | HSL, 2025-03-14    | EX3DV4 - SN7349, 2025-01-10 | DAE4Ip Sn1836, 2024-10-28 |

## Scans Setup

|                     | Zoom Scan       |
|---------------------|-----------------|
| Grid Extents [mm]   | 22 x 22 x 22    |
| Grid Steps [mm]     | 3.4 x 3.4 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        |

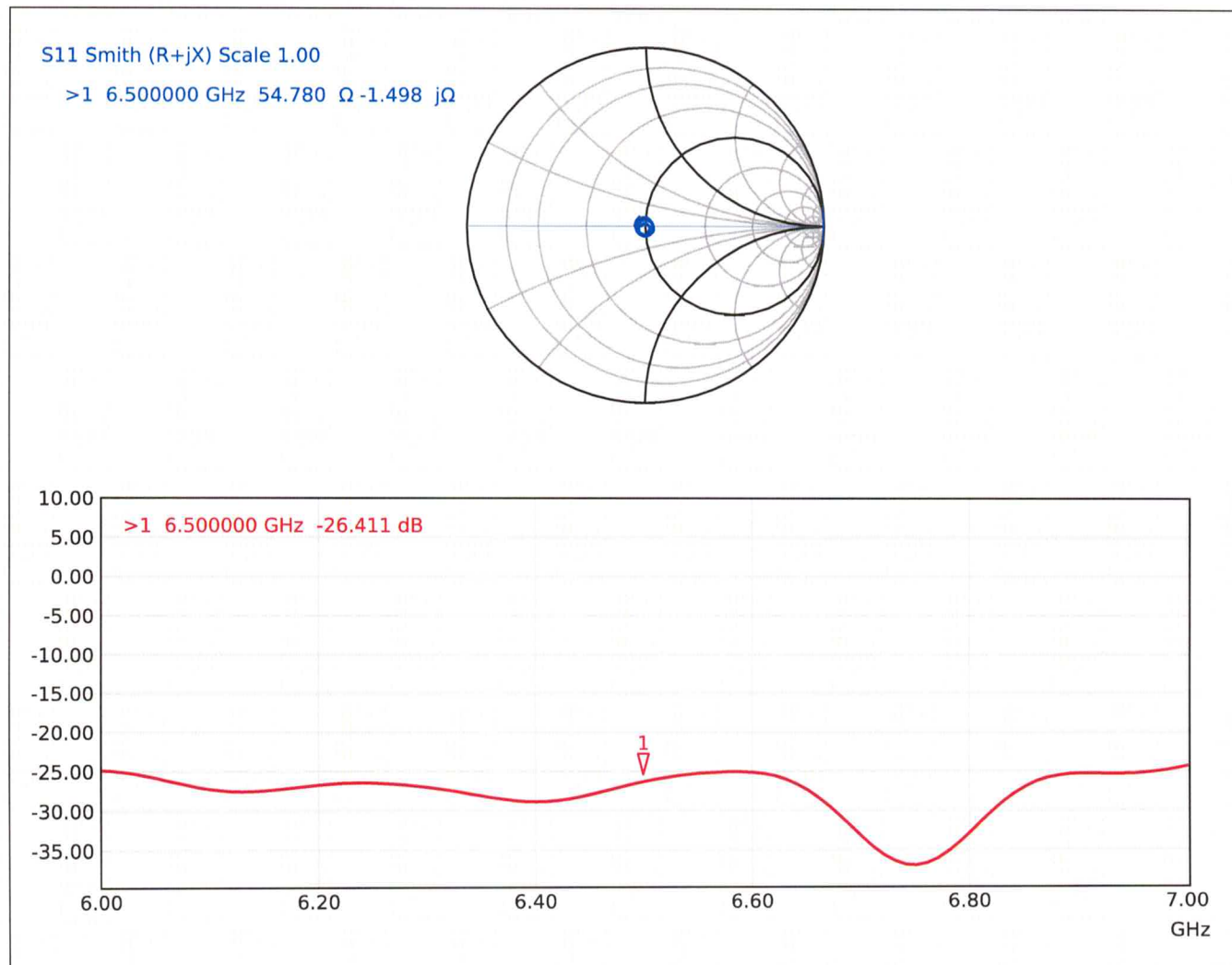
## Measurement Results

|                     | Zoom Scan           |
|---------------------|---------------------|
| Date                | 2025-03-14          |
| psSAR1g [W/Kg]      | 29.4                |
| psSAR10g [W/Kg]     | 5.47                |
| Power Drift [dB]    | -0.01               |
| Power Scaling       | Disabled            |
| Scaling Factor [dB] |                     |
| TSL Correction      | Positive / Negative |



D6.5GHzV2 - SN: 1003

March 14, 2025

**Impedance Measurement Plot for HSL**

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Accreditation No.: **SCS 0108**

Client **Sporton**  
**Taoyuan City**

Certificate No. **D5GHzV2-1171\_Apr24**

## CALIBRATION CERTIFICATE

Object **D5GHzV2 - SN:1171**

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

Calibration date: **April 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  $(22 \pm 3)^{\circ}\text{C}$  and humidity  $< 70\%$ .

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards               | ID #               | Cal Date (Certificate No.)        | Scheduled Calibration  |
|---------------------------------|--------------------|-----------------------------------|------------------------|
| 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                 |
| Power sensor NRP-Z91            | SN: 103245         | 26-Mar-24 (No. 217-04037)         | Mar-25                 |
| Reference 20 dB Attenuator      | SN: BH9394 (20k)   | 26-Mar-24 (No. 217-04046)         | Mar-25                 |
| Type-N mismatch combination     | SN: 310982 / 06327 | 26-Mar-24 (No. 217-04047)         | Mar-25                 |
| Reference Probe EX3DV4          | SN: 3503           | 07-Mar-24 (No. EX3-3503_Mar24)    | Mar-25                 |
| DAE4                            | SN: 601            | 30-Jan-24 (No. DAE4-601_Jan24)    | Jan-25                 |
| Secondary Standards             | ID #               | Check Date (in house)             | Scheduled Check        |
| Power meter E4419B              | SN: GB39512475     | 30-Oct-14 (in house check Oct-22) | In house check: Oct-24 |
| Power sensor HP 8481A           | SN: US37292783     | 07-Oct-15 (in house check Oct-22) | In house check: Oct-24 |
| Power sensor HP 8481A           | SN: MY41093315     | 07-Oct-15 (in house check Oct-22) | In house check: Oct-24 |
| RF generator R&S SMT-06         | SN: 100972         | 15-Jun-15 (in house check Oct-22) | In house check: Oct-24 |
| Network Analyzer Agilent E8358A | SN: US41080477     | 31-Mar-14 (in house check Oct-22) | In house check: Oct-24 |

Calibrated by: **Paulo Pina** **Laboratory Technician**

Approved by: **Sven Kühn** **Technical Manager**

Signature

Issued: April 23, 2024

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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 source is mounted in a touch configuration below the center marking of the flat phantom.
- Return Loss:** This parameter is measured with the source positioned under the liquid filled phantom (as described in the measurement condition clause). The Return Loss ensures low reflected power. 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.

|                              |                                                                                              |                                  |
|------------------------------|----------------------------------------------------------------------------------------------|----------------------------------|
| DASY Version                 | DASY52                                                                                       | V52.10.4                         |
| Extrapolation                | Advanced Extrapolation                                                                       |                                  |
| Phantom                      | Modular Flat Phantom V5.0                                                                    |                                  |
| Distance Dipole Center - TSL | 10 mm                                                                                        | with Spacer                      |
| Zoom Scan Resolution         | $dx, dy = 4.0 \text{ mm}, dz = 1.4 \text{ mm}$                                               | Graded Ratio = 1.4 (Z direction) |
| Frequency                    | 5250 MHz $\pm 1 \text{ MHz}$<br>5600 MHz $\pm 1 \text{ MHz}$<br>5800 MHz $\pm 1 \text{ MHz}$ |                                  |

## Head TSL parameters at 5250 MHz

The following parameters and calculations were applied.

|                                         | Temperature                 | Permittivity    | Conductivity                  |
|-----------------------------------------|-----------------------------|-----------------|-------------------------------|
| Nominal Head TSL parameters             | 22.0 °C                     | 35.9            | 4.71 mho/m                    |
| Measured Head TSL parameters            | $(22.0 \pm 0.2) \text{ °C}$ | $37.1 \pm 6 \%$ | $4.65 \text{ mho/m} \pm 6 \%$ |
| Head TSL temperature change during test | $< 0.5 \text{ °C}$          | ----            | ----                          |

## SAR result with Head TSL at 5250 MHz

| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL | Condition          |                                                 |
|-------------------------------------------------------|--------------------|-------------------------------------------------|
| SAR measured                                          | 100 mW input power | 7.82 W/kg                                       |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | <b>78.7 W/kg <math>\pm 19.9 \%</math> (k=2)</b> |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | condition          |                                                 |
|---------------------------------------------------------|--------------------|-------------------------------------------------|
| SAR measured                                            | 100 mW input power | 2.25 W/kg                                       |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | <b>22.7 W/kg <math>\pm 19.5 \%</math> (k=2)</b> |

## 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            | $(22.0 \pm 0.2) \text{ °C}$ | $36.5 \pm 6 \%$ | $5.05 \text{ mho/m} \pm 6 \%$ |
| Head TSL temperature change during test | $< 0.5 \text{ °C}$          | ----            | ----                          |

## SAR result with Head TSL at 5600 MHz

| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL | Condition          |                                                 |
|-------------------------------------------------------|--------------------|-------------------------------------------------|
| SAR measured                                          | 100 mW input power | 8.10 W/kg                                       |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | <b>81.4 W/kg <math>\pm 19.9 \%</math> (k=2)</b> |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | condition          |                                                 |
|---------------------------------------------------------|--------------------|-------------------------------------------------|
| SAR measured                                            | 100 mW input power | 2.32 W/kg                                       |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | <b>23.4 W/kg <math>\pm 19.5 \%</math> (k=2)</b> |

### 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 | 36.2 ± 6 %   | 5.27 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 measured                                          | 100 mW input power | 7.85 W/kg                       |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | <b>78.9 W/kg ± 19.9 % (k=2)</b> |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | condition          |                                 |
|---------------------------------------------------------|--------------------|---------------------------------|
| SAR measured                                            | 100 mW input power | 2.23 W/kg                       |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | <b>22.4 W/kg ± 19.5 % (k=2)</b> |

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

### Antenna Parameters with Head TSL at 5250 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 47.4 $\Omega$ - 7.3 j $\Omega$ |
| Return Loss                          | - 22.0 dB                      |

### Antenna Parameters with Head TSL at 5600 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 53.9 $\Omega$ - 3.4 j $\Omega$ |
| Return Loss                          | - 26.0 dB                      |

### Antenna Parameters with Head TSL at 5800 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 54.6 $\Omega$ - 5.6 j $\Omega$ |
| Return Loss                          | - 23.2 dB                      |

### General Antenna Parameters and Design

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1,206 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 |
|-----------------|-------|

**DASY5 Validation Report for Head TSL**

Date: 19.04.2024

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1171**

Communication System: UID 0 - CW; Frequency: 5250 MHz, Frequency: 5600 MHz

Frequency: 5800 MHz

Medium parameters used:  $f = 5250$  MHz;  $\sigma = 4.65$  S/m;  $\epsilon_r = 37.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>Medium parameters used:  $f = 5600$  MHz;  $\sigma = 5.05$  S/m;  $\epsilon_r = 36.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>Medium parameters used:  $f = 5800$  MHz;  $\sigma = 5.27$  S/m;  $\epsilon_r = 36.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.39, 5.39, 5.39) @ 5250 MHz, ConvF(5, 5, 5) @ 5600 MHz, ConvF(4.86, 4.86, 4.86) @ 5800 MHz; Calibrated: 07.03.2024
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.01.2024
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5250 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:**Measurement grid:  $dx=4$ mm,  $dy=4$ mm,  $dz=1.4$ mm

Reference Value = 73.37 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 26.3 W/kg

**SAR(1 g) = 7.82 W/kg; SAR(10 g) = 2.25 W/kg**

Smallest distance from peaks to all points 3 dB below = 7.4 mm

Ratio of SAR at M2 to SAR at M1 = 71.3%

Maximum value of SAR (measured) = 17.9 W/kg

**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:**Measurement grid:  $dx=4$ mm,  $dy=4$ mm,  $dz=1.4$ mm

Reference Value = 72.14 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 29.8 W/kg

**SAR(1 g) = 8.10 W/kg; SAR(10 g) = 2.32 W/kg**

Smallest distance from peaks to all points 3 dB below = 7.5 mm

Ratio of SAR at M2 to SAR at M1 = 68.4%

Maximum value of SAR (measured) = 19.3 W/kg

**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm**

Reference Value = 70.59 V/m; Power Drift = 0.01 dB

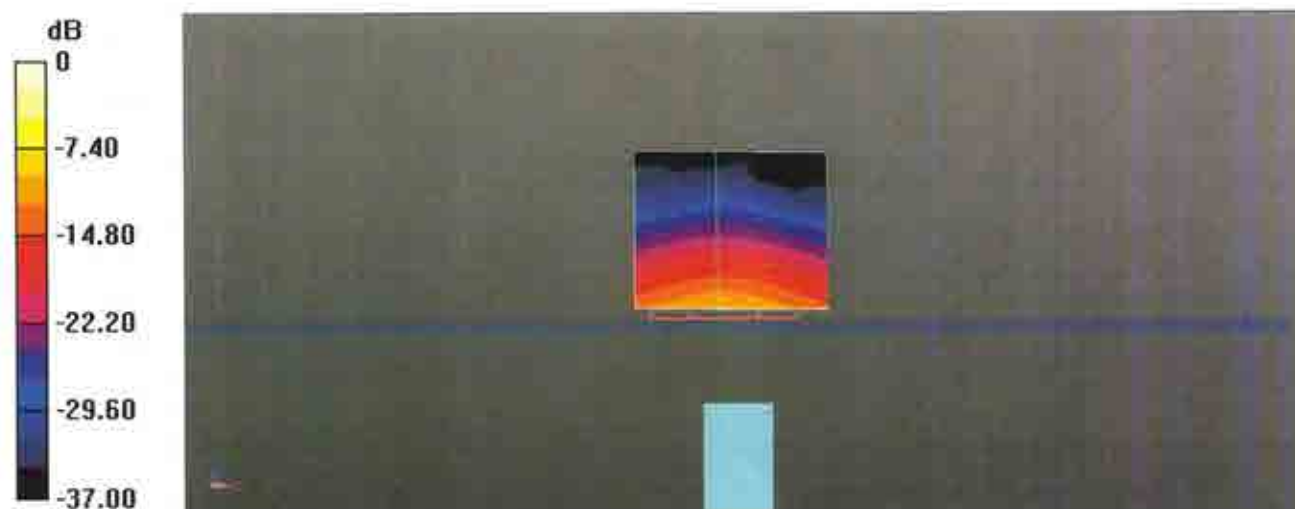
Peak SAR (extrapolated) = 30.6 W/kg

**SAR(1 g) = 7.85 W/kg; SAR(10 g) = 2.23 W/kg**

Smallest distance from peaks to all points 3 dB below = 7.5 mm

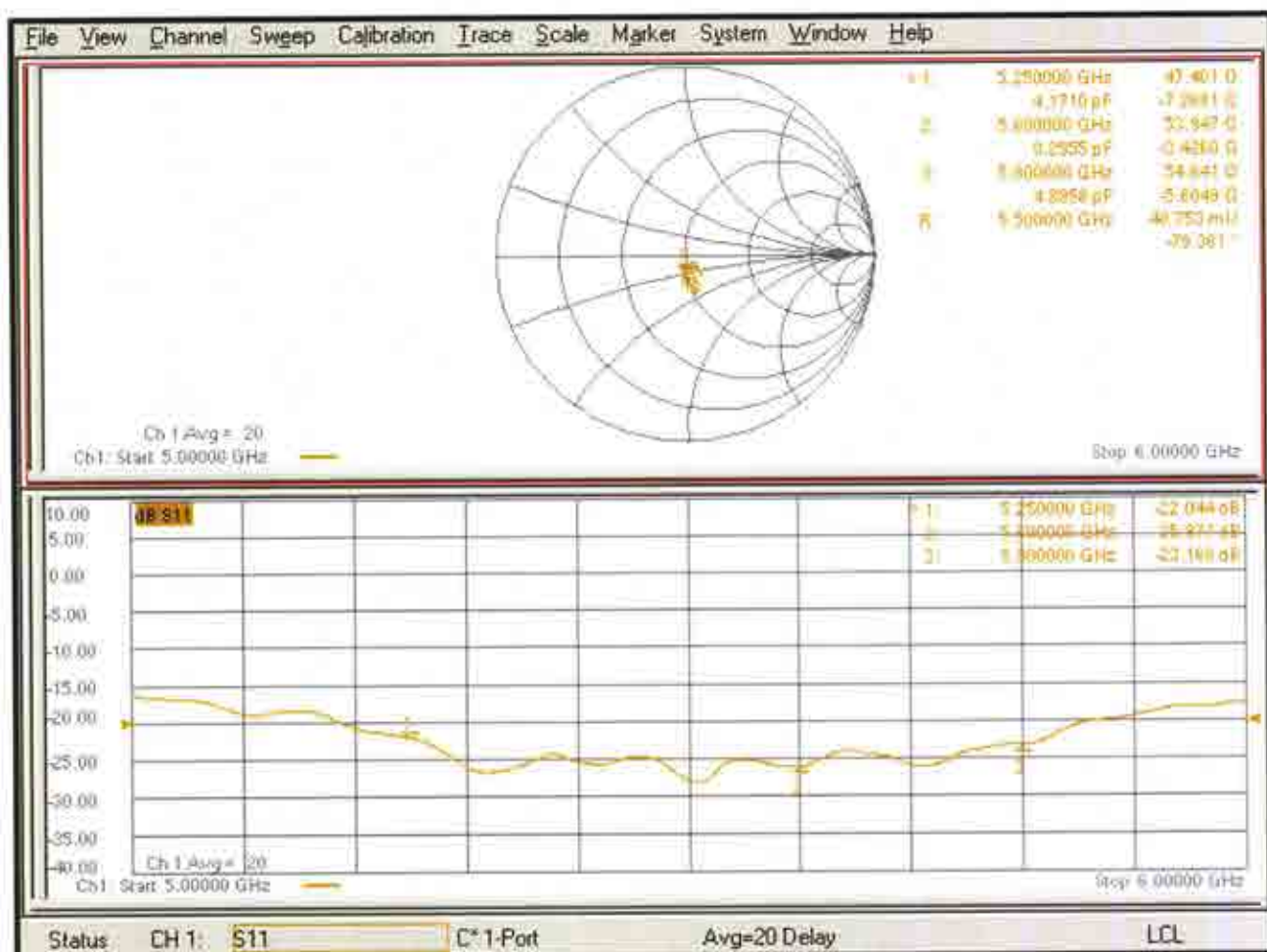
Ratio of SAR at M2 to SAR at M1 = 66.5%

Maximum value of SAR (measured) = 18.9 W/kg



0 dB = 19.3 W/kg = 12.85 dBW/kg

# Impedance Measurement Plot for Head TSL





## D5000HzV2, serial no. 1171 Extended Dipole Calibrations

If dipoles are verified in return loss ( $< -20\text{dB}$ , within 20% of prior calibration), and in impedance (within 5 ohm of prior calibration), the annual calibration is not necessary and the calibration interval can be extended.

### <Justification of the extended calibration>

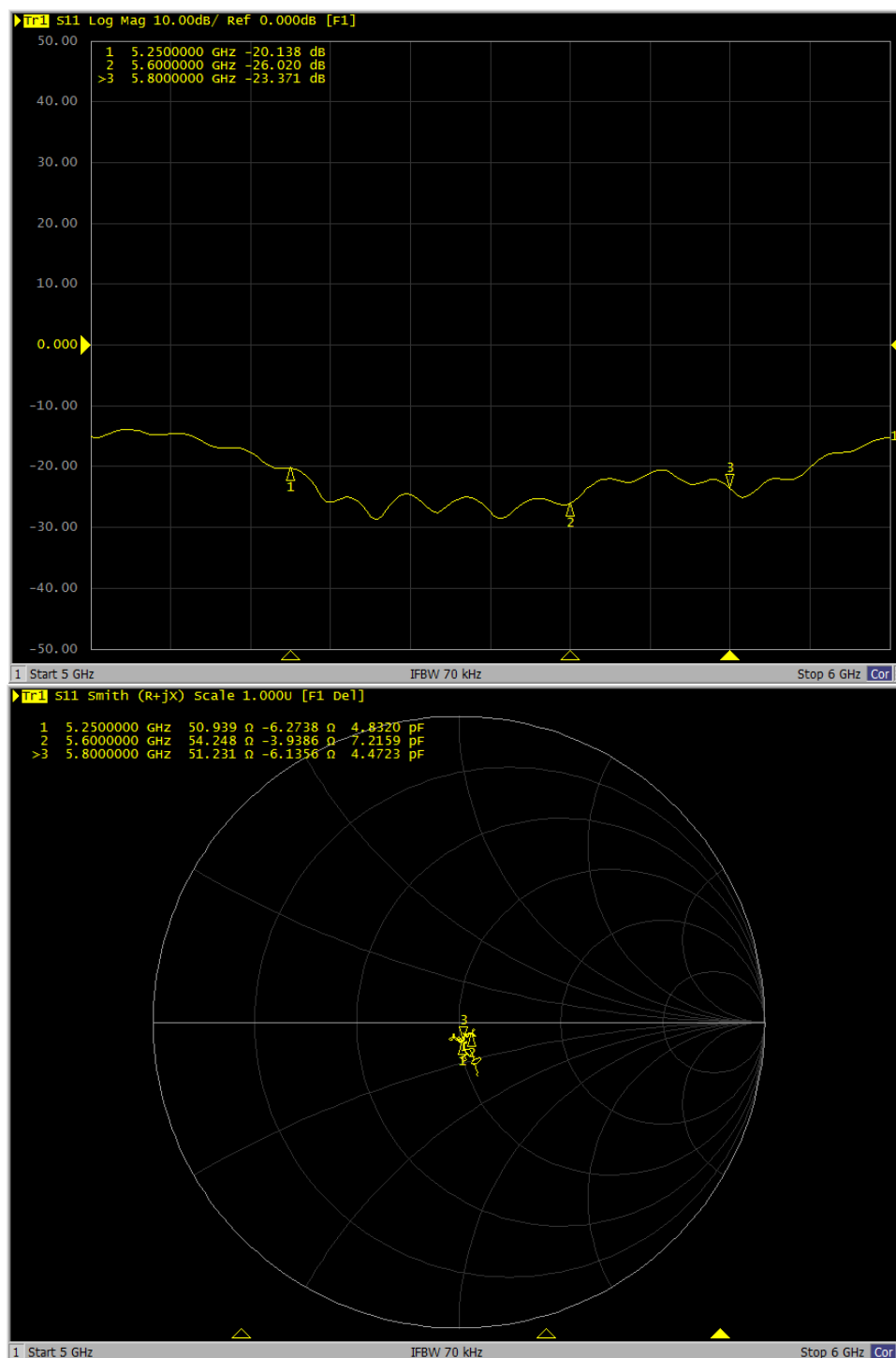
| D5000HzV2 – serial no. 1171 |                  |           |                      |             |                           |             |
|-----------------------------|------------------|-----------|----------------------|-------------|---------------------------|-------------|
| 5250MHZ                     |                  |           |                      |             |                           |             |
| Date of Measurement         | Return-Loss (dB) | Delta (%) | Real Impedance (ohm) | Delta (ohm) | Imaginary Impedance (ohm) | Delta (ohm) |
| 04.19.2024<br>(Cal. Report) | -22.044          |           | 47.401               |             | -7.2681                   |             |
| 04.18.2025<br>(extended)    | -20.138          | 8.646     | 50.939               | 3.538       | -6.2738                   | 0.9943      |
| 5600MHZ                     |                  |           |                      |             |                           |             |
| Date of Measurement         | Return-Loss (dB) | Delta (%) | Real Impedance (ohm) | Delta (ohm) | Imaginary Impedance (ohm) | Delta (ohm) |
| 04.19.2024<br>(Cal. Report) | -25.977          |           | 53.947               |             | -3.4260                   |             |
| 04.18.2025<br>(extended)    | -26.02           | 0.166     | 54.248               | 0.301       | -3.9386                   | -0.5126     |
| 5800MHZ                     |                  |           |                      |             |                           |             |
| Date of Measurement         | Return-Loss (dB) | Delta (%) | Real Impedance (ohm) | Delta (ohm) | Imaginary Impedance (ohm) | Delta (ohm) |
| 04.19.2024<br>(Cal. Report) | -23.168          |           | 54.641               |             | -5.6049                   |             |
| 04.18.2025<br>(extended)    | -23.371          | 0.876     | 51.231               | -3.410      | -6.1356                   | -0.5307     |

The return loss is  $< -20\text{dB}$ , within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the verification result should support extended calibration.



<Dipole Verification Data> - D5000 V2, serial no. 1171 (Data of Measurement : 04.18.2025)

5000 MHz - Head



SPORTON INTERNATIONAL INC.

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



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Accreditation No.: **SCS 0108**

Client

**Sporton**  
Taoyuan City

Certificate No.

**5G-Ver10-1020\_Jan25**

## CALIBRATION CERTIFICATE

Object **5G Verification Source 10 GHz - SN: 1020**

Calibration procedure(s) **QA CAL-45.v5**  
**Calibration procedure for sources in air > 6 GHz**

Calibration date **January 14, 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 Cal |
|-------------------------------|----------|-----------------------------------|---------------|
| Reference Probe SPEAG EUMMWV3 | SN: 9374 | 28-Aug-24 (No. Eumm_9374_Aug24)   | Aug-25        |
| DAE4ip                        | SN: 1602 | 06-Nov-24 (No. DAE4ip-1602_Nov24) | Nov-25        |

| Secondary Standards              | ID             | Check Date (in house)                    | Scheduled Check |
|----------------------------------|----------------|------------------------------------------|-----------------|
| Signal Generator R&S SMF100A     | SN: 100184     | 26-Nov-24 (No. 5G-Source-Cal-IHC-202411) | Nov-25          |
| Power Sensor R&S NRP18S-10       | SN: 101258     | 26-Nov-24 (No. 5G-Source-Cal-IHC-202411) | Nov-25          |
| Network Analyzer Keysight E5063A | SN: MY54504221 | 30-Sept-24 (No. 675-CAL18-S4489-Sep24)   | Sep-26          |

|               |              |                       |           |
|---------------|--------------|-----------------------|-----------|
|               | Name         | Function              | Signature |
| Calibrated by | Leif Klysner | Laboratory Technician |           |
| Approved by   | Sven Kühn    | Technical Manager     |           |

Issued: January 19, 2025

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

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



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Accreditation No.: **SCS 0108****Glossary**

CW Continuous wave

**Calibration is Performed According to the Following Standards**

- Internal procedure QA CAL-45, Calibration procedure for sources in air above 6 GHz.
- IEC/IEEE 63195-1, "Assessment of power density of human exposure to radio frequency fields from wireless devices in close proximity to the head and body (frequency range of 6 GHz to 300 GHz)", May 2022

**Methods Applied and Interpretation of Parameters**

- *Coordinate System:* z-axis in the waveguide horn boresight, x-axis is in the direction of the E-field, y-axis normal to the others in the field scanning plane parallel to the horn flare and horn flange.
- *Measurement Conditions:* (1) 10 GHz: The radiated power is the forward power to the horn antenna minus ohmic and mismatch loss. The forward power is measured prior and after the measurement with a power sensor. During the measurements, the horn is directly connected to the cable and the antenna ohmic and mismatch losses are determined by far-field measurements. (2) 30, 45, 60 and 90 GHz: The verification sources are switched on for at least 30 minutes. Absorbers are used around the probe cub and at the ceiling to minimize reflections.
- *Horn Positioning:* The waveguide horn is mounted vertically on the flange of the waveguide source to allow vertical positioning of the EUmmW probe during the scan. The plane is parallel to the phantom surface. Probe distance is verified using mechanical gauges positioned on the flare of the horn.
- *E-field distribution:* The E-field is measured in two x-y-planes (10mm, 10mm +  $\lambda/4$ ) with a vectorial E-field probe. The E-field value stated as calibration value represents the E-field-maxima and the averaged (1cm<sup>2</sup> and 4cm<sup>2</sup>) power density values at 10mm in front of the horn.
- *Field polarization:* Above the open horn, linear polarization of the field is expected. This is verified graphically in the field representation.

**Calibrated Quantity**

- Local peak E-field (V/m) and average of peak spatial components of the poynting vector (W/m<sup>2</sup>) averaged over the surface area of 1 cm<sup>2</sup> and 4cm<sup>2</sup> at the nominal operational frequency of the verification source. Both square and circular averaging results are listed.

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.

|                                |                               |      |
|--------------------------------|-------------------------------|------|
| DASY Version                   | DASY8 Module mmWave           | V3.2 |
| Phantom                        | 5G Phantom                    |      |
| Distance Horn Aperture - plane | 10 mm                         |      |
| Number of measured planes      | 2 (10mm, 10mm + $\lambda/4$ ) |      |
| Frequency                      | 10.0 GHz $\pm$ 10 MHz         |      |

## Calibration Parameters, 10 GHz

### Circular Averaging

| Distance Horn Aperture to Measurement Plane | Prad <sup>1</sup> (mW) | Max E-field (V/m) | Uncertainty (k = 2) | Avg Power Density<br>Avg ( psPDn+, psPDtot+, psPDmod+ )<br>(W/m <sup>2</sup> ) |                  | Uncertainty (k = 2) |
|---------------------------------------------|------------------------|-------------------|---------------------|--------------------------------------------------------------------------------|------------------|---------------------|
|                                             |                        |                   |                     | 1cm <sup>2</sup>                                                               | 4cm <sup>2</sup> |                     |
| 10 mm                                       | 93.3                   | 151               | 1.27 dB             | 58.0                                                                           | 53.7             | 1.28 dB             |

| Distance Horn Aperture to Measurement Plane | Prad <sup>1</sup> (mW) | Max E-field (V/m) | Uncertainty (k = 2) | Power Density<br>psPDn+, psPDtot+, psPDmod+<br>(W/m <sup>2</sup> ) |                  | Uncertainty (k = 2) |
|---------------------------------------------|------------------------|-------------------|---------------------|--------------------------------------------------------------------|------------------|---------------------|
|                                             |                        |                   |                     | 1cm <sup>2</sup>                                                   | 4cm <sup>2</sup> |                     |
| 10 mm                                       | 93.3                   | 151               | 1.27 dB             | 57.8, 58.0, 58.3                                                   | 53.4, 53.6, 54.0 | 1.28 dB             |

### Square Averaging

| Distance Horn Aperture to Measurement Plane | Prad <sup>1</sup> (mW) | Max E-field (V/m) | Uncertainty (k = 2) | Avg Power Density<br>Avg ( psPDn+, psPDtot+, psPDmod+ )<br>(W/m <sup>2</sup> ) |                  | Uncertainty (k = 2) |
|---------------------------------------------|------------------------|-------------------|---------------------|--------------------------------------------------------------------------------|------------------|---------------------|
|                                             |                        |                   |                     | 1cm <sup>2</sup>                                                               | 4cm <sup>2</sup> |                     |
| 10 mm                                       | 93.3                   | 151               | 1.27 dB             | 58.0                                                                           | 53.6             | 1.28 dB             |

| Distance Horn Aperture to Measurement Plane | Prad <sup>1</sup> (mW) | Max E-field (V/m) | Uncertainty (k = 2) | Power Density<br>psPDn+, psPDtot+, psPDmod+<br>(W/m <sup>2</sup> ) |                  | Uncertainty (k = 2) |
|---------------------------------------------|------------------------|-------------------|---------------------|--------------------------------------------------------------------|------------------|---------------------|
|                                             |                        |                   |                     | 1cm <sup>2</sup>                                                   | 4cm <sup>2</sup> |                     |
| 10 mm                                       | 93.3                   | 151               | 1.27 dB             | 57.8, 58.0, 58.3                                                   | 53.3, 53.6, 53.9 | 1.28 dB             |

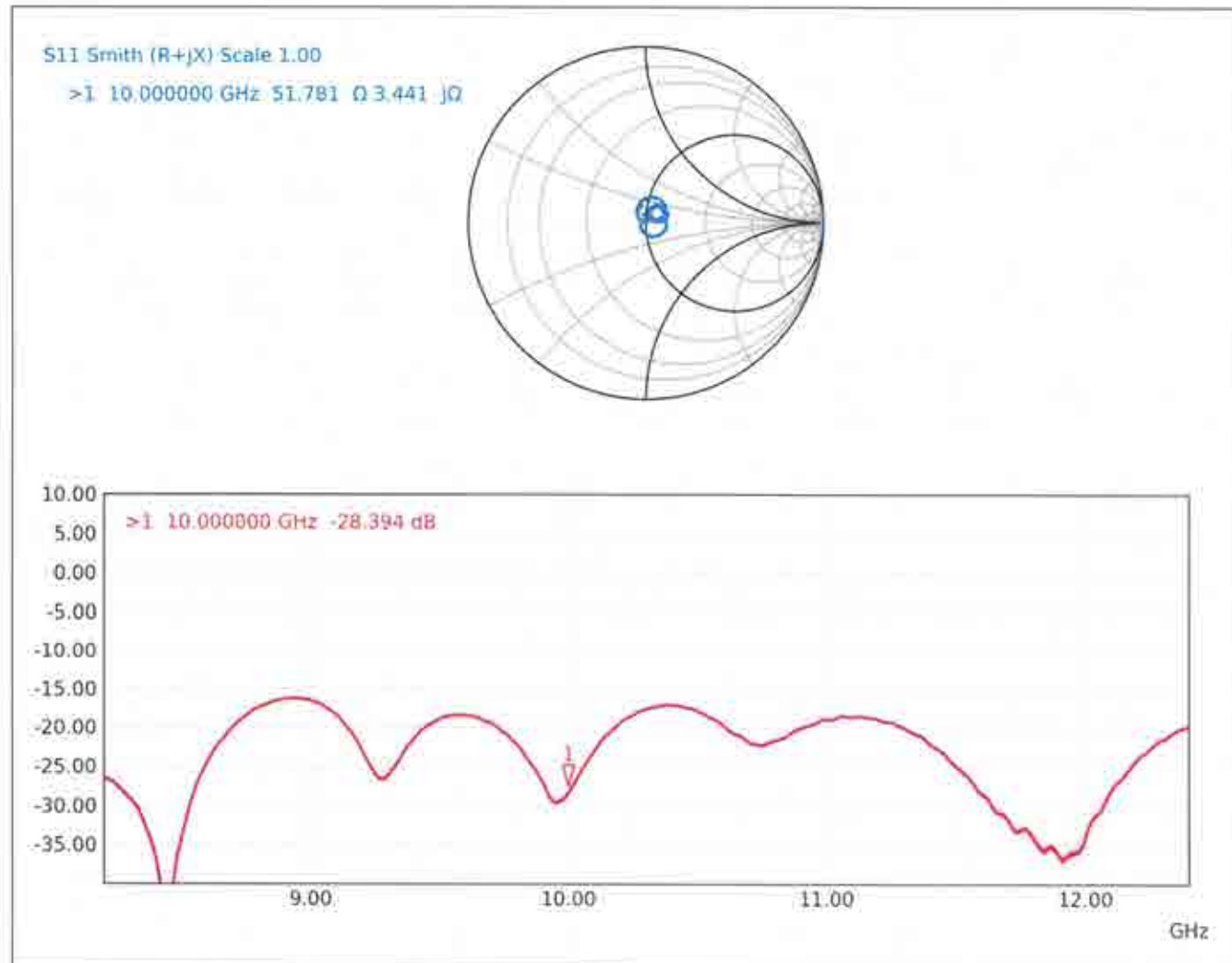
### Max Power Density

| Distance Horn Aperture to Measurement Plane | Prad <sup>1</sup> (mW) | Max E-field (V/m) | Uncertainty (k = 2) | Max Power Density<br>Sn, Stot,  Stot <br>(W/m <sup>2</sup> ) | Uncertainty (k = 2) |
|---------------------------------------------|------------------------|-------------------|---------------------|--------------------------------------------------------------|---------------------|
| 10 mm                                       | 93.3                   | 151               | 1.27 dB             | 59.5, 59.6, 59.9                                             | 1.28 dB             |

<sup>1</sup> Assessed ohmic and mismatch loss plus numerical offset: 0.30 dB

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

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 51.8 $\Omega$ + 3.4 j $\Omega$ |
| Return Loss                          | -28.4 dB                       |

**Impedance Measurement Plot**

5G Verification Source 10 GHz - SN: 1020

January 14, 2025

## DASY Report

Measurement Report for 5G Verification Source 10 GHz, UID 0 --, Channel 10000.0 (10000.0 MHz)

## Device Under Test Properties

| Model, Manufacturer           | Dimensions [mm]       | IMEI     | DUT Type |
|-------------------------------|-----------------------|----------|----------|
| 5G Verification Source 10 GHz | 100.0 x 100.0 x 172.0 | SN: 1020 | --       |

## Exposure Conditions

| Phantom Section | Position, Test Distance [mm] | Band            | Group, UID | Frequency [MHz], Channel Number | Conversion Factor |
|-----------------|------------------------------|-----------------|------------|---------------------------------|-------------------|
| 5G --           | 10.0 mm                      | Validation band | CW, 0--    | 10000.0, 10000                  | 1.0               |

## Hardware Setup

| Phantom           | Medium | Probe, Calibration Date                | DAE, Calibration Date        |
|-------------------|--------|----------------------------------------|------------------------------|
| mmWave Phantom -- | Air -- | EUMmWV3 -- SN9374_F1-55GHz, 2024-08-28 | DAE4ip -- SN1602, 2024-11-06 |

## Scans Setup

| Sensor Surface [mm] | 10.0          |
|---------------------|---------------|
| MAIA                | MAIA not used |

## Measurement Results

| Scan Type                      | 5G Scan            |
|--------------------------------|--------------------|
| Date                           | 2025-01-14         |
| Avg. Area [cm <sup>2</sup> ]   | 1.00               |
| Avg. Type                      | Circular Averaging |
| psPDn+ [W/m <sup>2</sup> ]     | 57.8               |
| psPDtot+ [W/m <sup>2</sup> ]   | 58.0               |
| psPDmod+ [W/m <sup>2</sup> ]   | 58.3               |
| Max(Sn) [W/m <sup>2</sup> ]    | 59.9               |
| Max(Stot) [W/m <sup>2</sup> ]  | 59.6               |
| Max(StotI) [W/m <sup>2</sup> ] | 59.9               |
| E <sub>max</sub> [V/m]         | 151                |
| Power Drift [dB]               | -0.02              |



5G Verification Source 10 GHz - SN: 1020

January 14, 2025

## DASY Report

Measurement Report for 5G Verification Source 10 GHz, UID 0 -, Channel 10000.0 (10000.0 MHz)

## Device Under Test Properties

| Model, Manufacturer             | Dimensions [mm]       | IMEI     | DUT Type |
|---------------------------------|-----------------------|----------|----------|
| 5G Verification Source 10 GHz - | 100.0 x 100.0 x 172.0 | SN: 1020 | -        |

## Exposure Conditions

| Phantom Section | Position, Test Distance [mm] | Band            | Group, UID | Frequency [MHz], Channel Number | Conversion Factor |
|-----------------|------------------------------|-----------------|------------|---------------------------------|-------------------|
| SG -            | 10.0 mm                      | Validation band | CW, 0 -    | 10000.0, 10000                  | 1.0               |

## Hardware Setup

| Phantom          | Medium | Probe, Calibration Date               | DAE, Calibration Date       |
|------------------|--------|---------------------------------------|-----------------------------|
| mmWave Phantom - | Air -  | EUMmWV3 - SN9374_F1-55GHz, 2024-08-28 | DAE4lp - SN1602, 2024-11-06 |

## Scans Setup

| Sensor Surface [mm] | 10.0          |
|---------------------|---------------|
| MAIA                | MAIA not used |

## Measurement Results

| Scan Type                       | SG Scan            |
|---------------------------------|--------------------|
| Date                            | 2025-01-14         |
| Avg. Area [cm <sup>2</sup> ]    | 4.00               |
| Avg. Type                       | Circular Averaging |
| psPDm+ [W/m <sup>2</sup> ]      | 53.4               |
| psPDtot+ [W/m <sup>2</sup> ]    | 53.6               |
| psPDmod+ [W/m <sup>2</sup> ]    | 54.0               |
| Max(Sn) [W/m <sup>2</sup> ]     | 59.5               |
| Max(Stot) [W/m <sup>2</sup> ]   | 59.6               |
| Max( Stot ) [W/m <sup>2</sup> ] | 59.9               |
| E <sub>max</sub> [V/m]          | 151                |
| Power Drift [dB]                | -0.02              |



5G Verification Source 10 GHz - SN: 1020

January 14, 2025

## DASY Report

Measurement Report for 5G Verification Source 10 GHz, UID 0 -, Channel 10000.0 (10000.0 MHz)

## Device Under Test Properties

| Model, Manufacturer           | Dimensions [mm]       | IMEI     | DUT Type |
|-------------------------------|-----------------------|----------|----------|
| 5G Verification Source 10 GHz | 100.0 x 100.0 x 172.0 | SN: 1020 | -        |

## Exposure Conditions

| Phantom Section | Position, Test Distance [mm] | Band            | Group, UID | Frequency [MHz], Channel Number | Conversion Factor |
|-----------------|------------------------------|-----------------|------------|---------------------------------|-------------------|
| SG -            | 10.0 mm                      | Validation band | CW, 0—     | 10000.0, 10000                  | 1.0               |

## Hardware Setup

| Phantom          | Medium | Probe, Calibration Date                | DAE, Calibration Date       |
|------------------|--------|----------------------------------------|-----------------------------|
| mmWave Phantom - | Air -  | EUmmiWV3 - SN9374_F1-55GHz, 2024-08-28 | DAE4ip - SN1602, 2024-11-05 |

## Scans Setup

| Sensor Surface [mm] | 10.0          |
|---------------------|---------------|
| MAIA                | MAIA not used |

## Measurement Results

| Scan Type                       | SG Scan          |
|---------------------------------|------------------|
| Date                            | 2025-01-14       |
| Avg. Area [cm <sup>2</sup> ]    | 1.00             |
| Avg. Type                       | Square Averaging |
| psPDn+ [W/m <sup>2</sup> ]      | 57.8             |
| psPDtot+ [W/m <sup>2</sup> ]    | 58.0             |
| psPDmod+ [W/m <sup>2</sup> ]    | 58.3             |
| Max(Sn) [W/m <sup>2</sup> ]     | 59.5             |
| Max(Stot) [W/m <sup>2</sup> ]   | 59.6             |
| Max( Stot ) [W/m <sup>2</sup> ] | 59.9             |
| E <sub>max</sub> [V/m]          | 151              |
| Power Drift [dB]                | -0.02            |



## DASY Report

Measurement Report for 5G Verification Source 10 GHz, UID 0 -, Channel 10000.0 (10000.0 MHz)

## Device Under Test Properties

| Model, Manufacturer           | Dimensions [mm]       | IMEI     | DUT Type |
|-------------------------------|-----------------------|----------|----------|
| 5G Verification Source 10 GHz | 100.0 x 100.0 x 172.0 | SN: 1020 | -        |

## Exposure Conditions

| Phantom Section | Position, Test Distance [mm] | Band            | Group, UID | Frequency [MHz], Channel Number | Conversion Factor |
|-----------------|------------------------------|-----------------|------------|---------------------------------|-------------------|
| SG -            | 10.0 mm                      | Validation band | CW, 0 -    | 10000.0, 10000                  | 1.0               |

## Hardware Setup

| Phantom          | Medium | Probe, Calibration Date                 | DAE, Calibration Date       |
|------------------|--------|-----------------------------------------|-----------------------------|
| mmWave Phantom - | Air -  | EUMmWV3 - SN9374_F1 - 55GHz, 2024-08-28 | OAE4ip - SN1602, 2024-11-06 |

## Scans Setup

| Sensor Surface [mm] | 10.0          |
|---------------------|---------------|
| MAIA                | MAIA not used |

## Measurement Results

| Scan Type                       | SG Scan          |
|---------------------------------|------------------|
| Date                            | 2025-01-14       |
| Avg. Area [cm <sup>2</sup> ]    | 4.00             |
| Avg. Type                       | Square Averaging |
| psPDn+ [W/m <sup>2</sup> ]      | 53.3             |
| psPDtot+ [W/m <sup>2</sup> ]    | 53.6             |
| psPDmod+ [W/m <sup>2</sup> ]    | 53.9             |
| Max(Sn) [W/m <sup>2</sup> ]     | 59.5             |
| Max(Stot) [W/m <sup>2</sup> ]   | 59.6             |
| Max( Stot ) [W/m <sup>2</sup> ] | 59.9             |
| E <sub>max</sub> [V/m]          | 151              |
| Power Drift [dB]                | -0.02            |



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Accreditation No.: **SCS 0108**

Client **Sporton**  
Taoyuan City

Certificate No: **DAE4-778\_Jan25**

## CALIBRATION CERTIFICATE

Object **DAE4 - SD 000 D04 BM - SN: 778**

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

Calibration date: **January 15, 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        | 27-Aug-24 (No:40547)       | Aug-25                 |
| 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 |

Calibrated by: **Name** **Adrian Gehring** **Function** **Laboratory Technician** **Signature**

Approved by: **Sven Kühn** **Technical Manager**

Issued: January 15, 2025

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Accreditation No.: **SCS 0108**

## Glossary

**DAE** data acquisition electronics  
**Connector angle** information used in DASY system to align probe sensor X to the robot coordinate system.

## Methods Applied and Interpretation of Parameters

- **DC Voltage Measurement:** Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- **Connector angle:** The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
  - **DC Voltage Measurement Linearity:** Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
  - **Common mode sensitivity:** Influence of a positive or negative common mode voltage on the differential measurement.
  - **Channel separation:** Influence of a voltage on the neighbor channels not subject to an input voltage.
  - **AD Converter Values with inputs shorted:** Values on the internal AD converter corresponding to zero input voltage
  - **Input Offset Measurement:** Output voltage and statistical results over a large number of zero voltage measurements.
  - **Input Offset Current:** Typical value for information; Maximum channel input offset current, not considering the input resistance.
  - **Input resistance:** Typical value for information; DAE input resistance at the connector, during internal auto-zeroing and during measurement.
  - **Low Battery Alarm Voltage:** Typical value for information. Below this voltage, a battery alarm signal is generated.
  - **Power consumption:** Typical value for information. Supply currents in various operating modes.

## DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1  $\mu$ 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          | $404.582 \pm 0.02\%$ (k=2) | $403.381 \pm 0.02\%$ (k=2) | $404.932 \pm 0.02\%$ (k=2) |
| Low Range           | $3.98275 \pm 1.50\%$ (k=2) | $3.96124 \pm 1.50\%$ (k=2) | $3.97717 \pm 1.50\%$ (k=2) |

## Connector Angle

|                                           |                           |
|-------------------------------------------|---------------------------|
| Connector Angle to be used in DASY system | $114.5^\circ \pm 1^\circ$ |
|-------------------------------------------|---------------------------|

## 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 | 200033.35                 | -3.50                        | -0.00     |
| Channel X + Input | 20008.98                  | 2.91                         | 0.01      |
| Channel X - Input | -20004.26                 | 2.50                         | -0.01     |
| Channel Y + Input | 200031.80                 | -5.27                        | -0.00     |
| Channel Y + Input | -20006.12                 | 0.16                         | 0.00      |
| Channel Y - Input | -20005.24                 | 1.61                         | -0.01     |
| Channel Z + Input | 200033.31                 | -3.96                        | -0.00     |
| Channel Z + Input | 20003.42                  | -2.48                        | -0.01     |
| Channel Z - Input | -20008.21                 | -1.24                        | 0.01      |

| Low Range         | Reading ( $\mu\text{V}$ ) | Difference ( $\mu\text{V}$ ) | Error (%) |
|-------------------|---------------------------|------------------------------|-----------|
| Channel X + Input | 2001.06                   | 0.01                         | 0.00      |
| Channel X + Input | 200.75                    | 0.01                         | 0.00      |
| Channel X - Input | -199.23                   | -0.10                        | 0.05      |
| Channel Y + Input | 2000.86                   | -0.13                        | -0.01     |
| Channel Y + Input | 200.20                    | -0.52                        | -0.26     |
| Channel Y - Input | -199.81                   | -0.62                        | 0.31      |
| Channel Z + Input | 2000.92                   | 0.00                         | 0.00      |
| Channel Z + Input | 200.44                    | -0.21                        | -0.10     |
| Channel Z - Input | -200.34                   | -1.13                        | 0.57      |

### 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                            | -3.84                                        | -4.85                                       |
|           | - 200                          | 5.32                                         | 4.34                                        |
| Channel Y | 200                            | -1.28                                        | -1.50                                       |
|           | - 200                          | -1.01                                        | -0.86                                       |
| Channel Z | 200                            | -15.33                                       | -15.44                                      |
|           | - 200                          | 13.53                                        | 13.17                                       |

### 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                | -                           | -1.79                       | -2.13                       |
| Channel Y | 200                | 9.30                        | -                           | 0.02                        |
| Channel Z | 200                | 3.27                        | 6.52                        | -                           |

**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 | 16080            | 16209           |
| Channel Y | 16169            | 15735           |
| Channel Z | 16450            | 14982           |

**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 | 0.80               | -0.39                  | 1.57                   | 0.38                      |
| Channel Y | -0.66              | -2.08                  | 1.10                   | 0.54                      |
| Channel Z | -0.47              | -1.84                  | 0.56                   | 0.47                      |

**6. Input Offset Current**

Nominal Input circuitry offset current on all channels: &lt;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 **Sporton**  
Taoyuan City

Certificate No: **DAE4-703\_Apr25**

## CALIBRATION CERTIFICATE

Object **DAE4 - SD 000 D04 BM - SN: 703**

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

Calibration date: **April 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  $(22 \pm 3)^{\circ}\text{C}$  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        | 27-Aug-24 (No:40547)       | Aug-25                 |
| 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 |
|--------------|-----------|-------------------|

Issued: April 17, 2025

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Accreditation No.: **SCS 0108**

## Glossary

**DAE** data acquisition electronics  
**Connector angle** information used in DASY system to align probe sensor X to the robot coordinate system.

## Methods Applied and Interpretation of Parameters

- *DC Voltage Measurement*: Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- *Connector angle*: The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
  - *DC Voltage Measurement Linearity*: Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
  - *Common mode sensitivity*: Influence of a positive or negative common mode voltage on the differential measurement.
  - *Channel separation*: Influence of a voltage on the neighbor channels not subject to an input voltage.
  - *AD Converter Values with inputs shorted*: Values on the internal AD converter corresponding to zero input voltage
  - *Input Offset Measurement*: Output voltage and statistical results over a large number of zero voltage measurements.
  - *Input Offset Current*: Typical value for information; Maximum channel input offset current, not considering the input resistance.
  - *Input resistance*: Typical value for information: DAE input resistance at the connector, during internal auto-zeroing and during measurement.
  - *Low Battery Alarm Voltage*: Typical value for information. Below this voltage, a battery alarm signal is generated.
  - *Power consumption*: Typical value for information. Supply currents in various operating modes.

**DC Voltage Measurement**

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1 $\mu$ V 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          | 404.987 $\pm$ 0.02% (k=2) | 404.538 $\pm$ 0.02% (k=2) | 404.961 $\pm$ 0.02% (k=2) |
| Low Range           | 3.98632 $\pm$ 1.50% (k=2) | 3.97504 $\pm$ 1.50% (k=2) | 3.99719 $\pm$ 1.50% (k=2) |

**Connector Angle**

|                                           |                                     |
|-------------------------------------------|-------------------------------------|
| Connector Angle to be used in DASY system | 238.5 $^{\circ}$ $\pm$ 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 | 200031.13                 | -4.16                        | -0.00     |
| Channel X  | + Input | 20005.90                  | 0.45                         | 0.00      |
| Channel X  | - Input | -20003.21                 | 4.31                         | -0.02     |
| Channel Y  | + Input | 200031.52                 | -4.13                        | -0.00     |
| Channel Y  | + Input | 20004.41                  | -0.99                        | -0.00     |
| Channel Y  | - Input | -20003.41                 | 4.24                         | -0.02     |
| Channel Z  | + Input | 200029.51                 | -5.96                        | -0.00     |
| Channel Z  | + Input | 20005.01                  | -0.36                        | -0.00     |
| Channel Z  | - Input | -20005.21                 | 2.45                         | -0.01     |

| Low Range |         | Reading ( $\mu\text{V}$ ) | Difference ( $\mu\text{V}$ ) | Error (%) |
|-----------|---------|---------------------------|------------------------------|-----------|
| Channel X | + Input | 2000.42                   | 0.08                         | 0.00      |
| Channel X | + Input | 200.96                    | 0.75                         | 0.38      |
| Channel X | - Input | -199.95                   | -0.27                        | 0.14      |
| Channel Y | + Input | 2000.54                   | 0.27                         | 0.01      |
| Channel Y | + Input | 199.43                    | -0.61                        | -0.30     |
| Channel Y | - Input | -200.92                   | -1.15                        | 0.58      |
| Channel Z | + Input | 2000.06                   | -0.20                        | -0.01     |
| Channel Z | + Input | 199.34                    | -0.70                        | -0.35     |
| Channel Z | - Input | -200.84                   | -1.10                        | 0.55      |

### 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                            | 3.39                                         | 1.91                                        |
|           | - 200                          | -1.75                                        | -3.20                                       |
| Channel Y | 200                            | 8.72                                         | 8.35                                        |
|           | - 200                          | -11.24                                       | -11.15                                      |
| Channel Z | 200                            | -5.00                                        | -4.76                                       |
|           | - 200                          | 3.62                                         | 3.20                                        |

### 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                | -                           | -2.16                       | -3.10                       |
| Channel Y | 200                | 8.86                        | -                           | -0.38                       |
| Channel Z | 200                | 4.91                        | 6.80                        | -                           |

**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 | 16065            | 16470           |
| Channel Y | 16139            | 14466           |
| Channel Z | 16152            | 16020           |

**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 | 0.55               | -0.96                  | 2.27                   | 0.40                      |
| Channel Y | -0.62              | -1.63                  | 0.89                   | 0.37                      |
| Channel Z | -0.38              | -1.51                  | 1.03                   | 0.35                      |

**6. Input Offset Current**

Nominal Input circuitry offset current on all channels: &lt;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                |