

D2450V2 - SN: 727

April 15, 2025

**Appendix (Additional assessments outside the scope of SCS 0108)****Antenna Parameters with HSL at 2450 MHz**

|             |                                |
|-------------|--------------------------------|
| Impedance   | 54.7 $\Omega$ + 2.2 j $\Omega$ |
| Return Loss | -26.1 dB                       |

**General Antenna Parameters and Design**

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.148 ns |
|----------------------------------|----------|

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

**Additional EUT Data**

|                 |       |
|-----------------|-------|
| Manufactured by | SPEAG |
|-----------------|-------|

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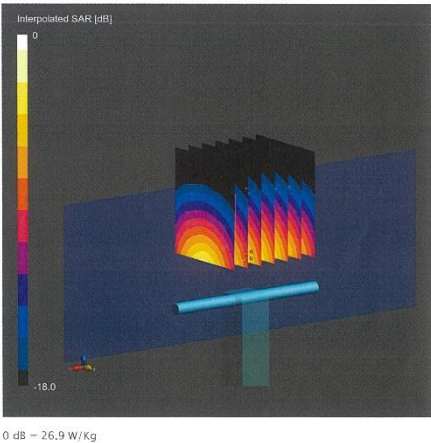
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D2450V2 - SN: 727 April 15, 2025

System Performance Check Report

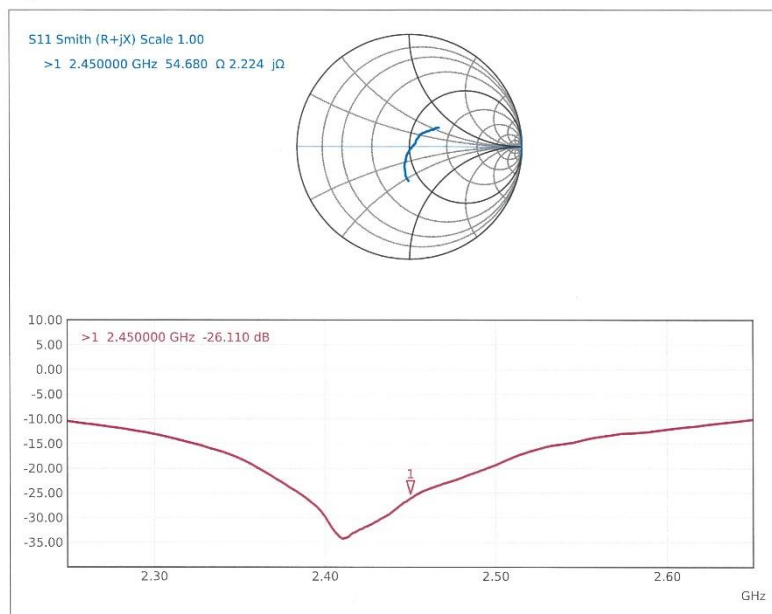
| Summary              |                    |                 |                             |                                 |                   |                           |                  |  |
|----------------------|--------------------|-----------------|-----------------------------|---------------------------------|-------------------|---------------------------|------------------|--|
| Dipole               |                    | Frequency [MHz] |                             |                                 | TSL               |                           | Power [dBm]      |  |
| D2450V2 - SN727      |                    | 2450            |                             |                                 | HSL               |                           | 24               |  |
| Exposure Conditions  |                    |                 |                             |                                 |                   |                           |                  |  |
| Phantom Section, TSL | Test Distance [mm] | Band            | Group, UID                  | Frequency [MHz], Channel Number | Conversion Factor | TSL Conductivity [S/m]    | TSL Permittivity |  |
| Flat                 | 10                 |                 | CW, 0---                    | 2450, 0                         | 7.06              | 1.85                      | 37.9             |  |
| Hardware Setup       |                    |                 |                             |                                 |                   |                           |                  |  |
| Phantom              | TSL, Measured Date |                 | Probe, Calibration Date     |                                 |                   | DAF, Calibration Date     |                  |  |
| MFP V8.0 Center      | HSL, 2025-04-15    |                 | FX3DV4 - SN7349, 2025-01-10 |                                 |                   | DAL4ip Sn1836, 2024-10-28 |                  |  |
| 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                 |                    |                 |                             | 2025-04-15                      |                   |                           |                  |  |
| psSAR1g [W/Kg]       |                    |                 |                             | 13.2                            |                   |                           |                  |  |
| psSAR10g [W/Kg]      |                    |                 |                             | 6.21                            |                   |                           |                  |  |
| Power Drift [dB]     |                    |                 |                             | -0.01                           |                   |                           |                  |  |
| Power Scaling        |                    |                 |                             | Disabled                        |                   |                           |                  |  |
| Scaling Factor [dB]  |                    |                 |                             |                                 |                   |                           |                  |  |
| TSL Correction       |                    |                 |                             | Positive / Negative             |                   |                           |                  |  |



D2450V2 - SN: 727

April 15, 2025

## Impedance Measurement Plot for HSL



Certificate No: D2450V2-727\_Apr25

Page 6 of 6

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Accreditation No.: SCS 0108

Client **SGS**  
Taoyuan City

Certificate No. **D2450V2-727\_Apr25**

## CALIBRATION CERTIFICATE

Object **D2450V2 - SN: 727**

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

Calibration date **April 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 ± 3)°C and humidity < 70%.  
Calibration Equipment used (M&TE critical for calibration)

| Primary Standards           | ID         | Cal Date (Certificate No.)             | Scheduled Cal |
|-----------------------------|------------|----------------------------------------|---------------|
| Power Sensor R&S NRP-33T    | SN: 100967 | 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   | 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                                                                                                   | Leif Klysner | Laboratory Technician |           |
| Approved by                                                                                                     | Sven Köhn    | Technical Manager     |           |
| This calibration certificate shall not be reproduced except in full without written approval of the laboratory. |              |                       |           |

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Page 1 of 6

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## Glossary

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

## Calibration is Performed According to the Following Standards

- IEC/IEEE 62209-1528, "Measurement Procedure For The Assessment Of Specific Absorption Rate Of Human Exposure To Radio Frequency Fields From Hand-Held And Body-Worn Wireless Communication Devices - Part 1528: Human Models, Instrumentation And Procedures (Frequency Range of 4 MHz to 10 GHz)", October 2020.
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

## Additional Documentation

- DASY System Handbook

## Methods Applied and Interpretation of Parameters

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

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

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D2450V2 - SN: 727

April 15, 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                    | 2450MHz $\pm$ 1MHz       |                                     |

**HSL parameters at 2450 MHz**

The following parameters and calculations were applied.

|                                    | Temperature         | Permittivity  | Conductivity        |
|------------------------------------|---------------------|---------------|---------------------|
| Nominal HSL parameters             | 22.0 °C             | 39.2          | 1.80 mho/m          |
| Measured HSL parameters            | (22.0 $\pm$ 0.2) °C | 37.9 $\pm$ 6% | 1.85 mho/m $\pm$ 6% |
| HSL temperature change during test | < 0.5 °C            |               |                     |

**SAR result with HSL at 2450 MHz**

| SAR averaged over 1 cm <sup>3</sup> (1 g) of HSL | Condition          |                               |
|--------------------------------------------------|--------------------|-------------------------------|
| SAR for nominal HSL parameters                   | 24 dBm input power | 13.2 W/kg                     |
| SAR for nominal HSL parameters                   | normalized to 1W   | 52.6 W/kg $\pm$ 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 | 6.21 W/kg                     |
| SAR for nominal HSL parameters                     | normalized to 1W   | 24.7 W/kg $\pm$ 16.5% (k = 2) |

Certificate No: D2450V2-727\_Apr25

Page 3 of 6

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| Return Loss | -26.1 dB                       |

**General Antenna Parameters and Design**

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.148 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.

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|                 |       |
|-----------------|-------|
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D2450V2 - SN: 727

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## System Performance Check Report

## Summary

| Dipole          | Frequency [MHz] | TSL | Power [dBm] |
|-----------------|-----------------|-----|-------------|
| D2450V2 - SN727 | 2450            | HSL | 24          |

## Exposure Conditions

| Phantom Section, TSL | Test Distance [mm] | Band     | Group, URD | Frequency [MHz], Channel Number | Conversion Factor | TSL Conductivity [S/m] | TSL Permittivity |
|----------------------|--------------------|----------|------------|---------------------------------|-------------------|------------------------|------------------|
| Flat                 | 10                 | CW, 0--- |            | 2450, 0                         | 7.06              | 1.85                   | 37.9             |

## Hardware Setup

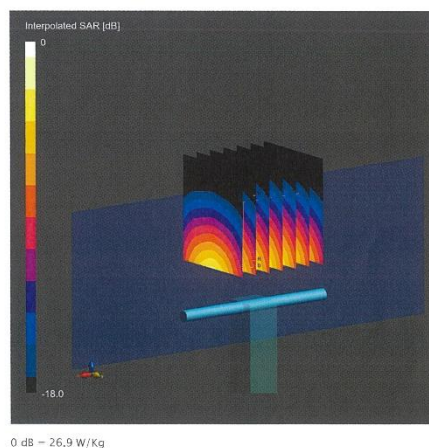
| Phantom         | TSL, Measured Date | Probe, Calibration Date     | DAF, Calibration Date      |
|-----------------|--------------------|-----------------------------|----------------------------|
| MFP V8.0 Center | HSL, 2025-04-15    | FX3DV4 - SN7349, 2025-01-10 | DAL4ip, Sn1836, 2024-10-28 |

## 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                | 2025-04-15          |
| psSAR1g [W/Kg]      | 13.2                |
| psSAR10g [W/Kg]     | 6.21                |
| Power Drift [dB]    | -0.01               |
| Power Scaling       | Disabled            |
| Scaling Factor [dB] |                     |
| TSL Correction      | Positive / Negative |



Certificate No: D2450V2-727\_Apr25

Page 5 of 6

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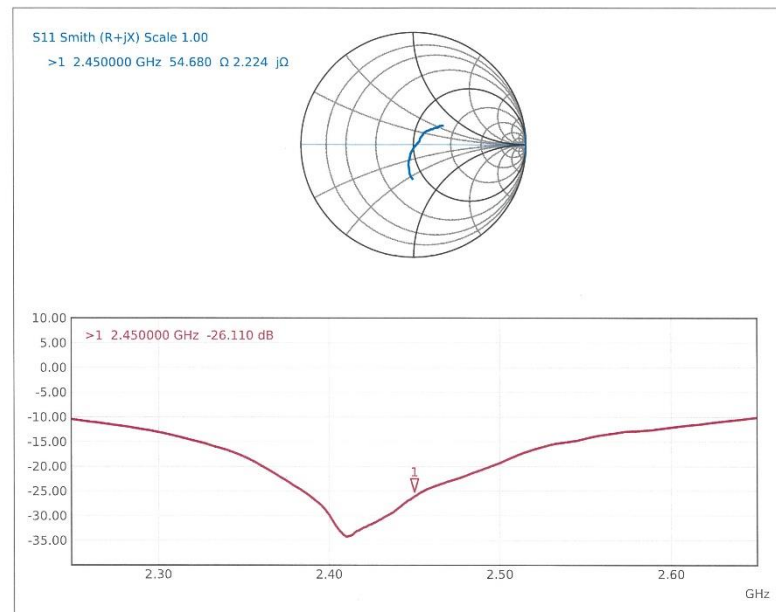
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Page 6 of 6

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Zeughausstrasse 43, 8004 Zurich, Switzerland



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Accreditation No.: SCS 0108

Client **SGS**  
Taoyuan City

Certificate No. **D5GHzV2-1349\_Mar24**

## CALIBRATION CERTIFICATE

Object: D5GHzV2 - SN:1349

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

Calibration date: March 19, 2024

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).  
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards               | ID #               | Cal Date (Certificate No.)        | Scheduled Calibration  |
|---------------------------------|--------------------|-----------------------------------|------------------------|
| Power meter NRP2                | SN: 104778         | 30-Mar-23 (No. 217-03804/03805)   | Mar-24                 |
| Power sensor NRP-Z91            | SN: 103244         | 30-Mar-23 (No. 217-03804)         | Mar-24                 |
| Power sensor NRP-Z91            | SN: 103245         | 30-Mar-23 (No. 217-03805)         | Mar-24                 |
| Reference 20 dB Attenuator      | SN: BH9394 (20k)   | 30-Mar-23 (No. 217-03809)         | Mar-24                 |
| Type-N mismatch combination     | SN: 310982 / 06327 | 30-Mar-23 (No. 217-03810)         | Mar-24                 |
| 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: Name: Claudio Leubler Function: Laboratory Technician

Approved by: Sven Kühn Technical Manager

Signature

Issued: March 20, 2024

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

Certificate No: D5GHzV2-1349\_Mar24

Page 1 of 9

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**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%.

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### 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 mm, dz = 1.4 mm                                                 | Graded Ratio = 1.4 (Z direction) |
| Frequency                    | 5250 MHz ± 1 MHz<br>5600 MHz ± 1 MHz<br>5750 MHz ± 1 MHz<br>5850 MHz ± 1 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 ± 0.2) °C | 36.4 ± 6 %   | 4.57 mho/m ± 6 % |
| Head TSL temperature change during test | < 0.5 °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 | 8.08 W/kg                       |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | <b>80.9 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 | 2.31 W/kg                       |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | <b>23.1 W/kg ± 19.5 % (k=2)</b> |

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#### Head TSL parameters at 5600 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Head TSL parameters             | 22.0 °C         | 35.5         | 5.07 mho/m       |
| Measured Head TSL parameters            | (22.0 ± 0.2) °C | 35.8 ± 6 %   | 4.97 mho/m ± 6 % |
| Head TSL temperature change during test | < 0.5 °C        | ----         | ----             |

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

| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL | Condition          |                                 |
|-------------------------------------------------------|--------------------|---------------------------------|
| SAR measured                                          | 100 mW input power | 8.23 W/kg                       |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | <b>82.4 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 | 2.35 W/kg                       |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | <b>23.5 W/kg ± 19.5 % (k=2)</b> |

#### Head TSL parameters at 5750 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Head TSL parameters             | 22.0 °C         | 35.4         | 5.22 mho/m       |
| Measured Head TSL parameters            | (22.0 ± 0.2) °C | 35.6 ± 6 %   | 5.13 mho/m ± 6 % |
| Head TSL temperature change during test | < 0.5 °C        | ----         | ----             |

#### SAR result with Head TSL at 5750 MHz

| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL | Condition          |                                 |
|-------------------------------------------------------|--------------------|---------------------------------|
| SAR measured                                          | 100 mW input power | 8.08 W/kg                       |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | <b>80.8 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 | 2.30 W/kg                       |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | <b>23.0 W/kg ± 19.5 % (k=2)</b> |

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#### Head TSL parameters at 5850 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Head TSL parameters             | 22.0 °C         | 35.2         | 5.32 mho/m       |
| Measured Head TSL parameters            | (22.0 ± 0.2) °C | 35.5 ± 6 %   | 5.22 mho/m ± 6 % |
| Head TSL temperature change during test | < 0.5 °C        | ----         | ----             |

#### SAR result with Head TSL at 5850 MHz

| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL | Condition          |                                 |
|-------------------------------------------------------|--------------------|---------------------------------|
| SAR measured                                          | 100 mW input power | 7.98 W/kg                       |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | <b>79.9 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 | 2.25 W/kg                       |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | <b>22.6 W/kg ± 19.5 % (k=2)</b> |

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

##### Antenna Parameters with Head TSL at 5250 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 46.8 $\Omega$ + 1.4 j $\Omega$ |
| Return Loss                          | - 28.9 dB                      |

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

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 52.4 $\Omega$ + 4.7 j $\Omega$ |
| Return Loss                          | - 25.7 dB                      |

##### Antenna Parameters with Head TSL at 5750 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 52.6 $\Omega$ + 4.2 j $\Omega$ |
| Return Loss                          | - 26.3 dB                      |

##### Antenna Parameters with Head TSL at 5850 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 54.7 $\Omega$ + 1.3 j $\Omega$ |
| Return Loss                          | - 26.6 dB                      |

#### General Antenna Parameters and Design

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.200 ns |
|----------------------------------|----------|

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

#### Additional EUT Data

|                 |       |
|-----------------|-------|
| Manufactured by | SPEAG |
|-----------------|-------|

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## DASY5 Validation Report for Head TSL

Date: 19.03.2024

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1349**

Communication System: UID 0 - CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz, Frequency: 5850 MHz

Medium parameters used:  $f = 5250 \text{ MHz}$ ;  $\sigma = 4.57 \text{ S/m}$ ;  $\epsilon_r = 36.4$ ;  $\rho = 1000 \text{ kg/m}^3$ ,

Medium parameters used:  $f = 5600 \text{ MHz}$ ;  $\sigma = 4.97 \text{ S/m}$ ;  $\epsilon_r = 35.8$ ;  $\rho = 1000 \text{ kg/m}^3$ ,

Medium parameters used:  $f = 5750 \text{ MHz}$ ;  $\sigma = 5.13 \text{ S/m}$ ;  $\epsilon_r = 35.6$ ;  $\rho = 1000 \text{ kg/m}^3$ ,

Medium parameters used:  $f = 5850 \text{ MHz}$ ;  $\sigma = 5.22 \text{ S/m}$ ;  $\epsilon_r = 35.5$ ;  $\rho = 1000 \text{ kg/m}^3$

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(4.98, 4.98, 4.98) @ 5750 MHz, ConvF(4.89, 4.89, 4.89) @ 5850 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=4mm, dy=4mm, dz=1.4mm

Reference Value = 74.62 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 27.7 W/kg

**SAR(1 g) = 8.08 W/kg; SAR(10 g) = 2.31 W/kg**

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

Ratio of SAR at M2 to SAR at M1 = 70.7%

Maximum value of SAR (measured) = 18.2 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=4mm, dy=4mm, dz=1.4mm

Reference Value = 73.67 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 30.7 W/kg

**SAR(1 g) = 8.23 W/kg; SAR(10 g) = 2.35 W/kg**

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

Ratio of SAR at M2 to SAR at M1 = 67.9%

Maximum value of SAR (measured) = 19.2 W/kg

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**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan,****dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 71.84 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 31.7 W/kg

**SAR(1 g) = 8.08 W/kg; SAR(10 g) = 2.3 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%

Maximum value of SAR (measured) = 19.4 W/kg

**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5850 MHz/Zoom Scan,****dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 70.98 V/m; Power Drift = 0.09 dB

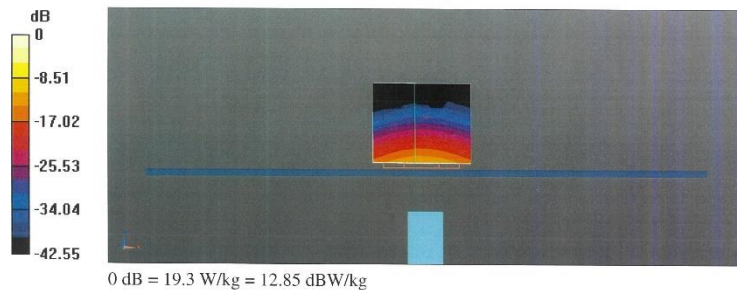
Peak SAR (extrapolated) = 32.2 W/kg

**SAR(1 g) = 7.98 W/kg; SAR(10 g) = 2.25 W/kg**

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

Ratio of SAR at M2 to SAR at M1 = 65.2%

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

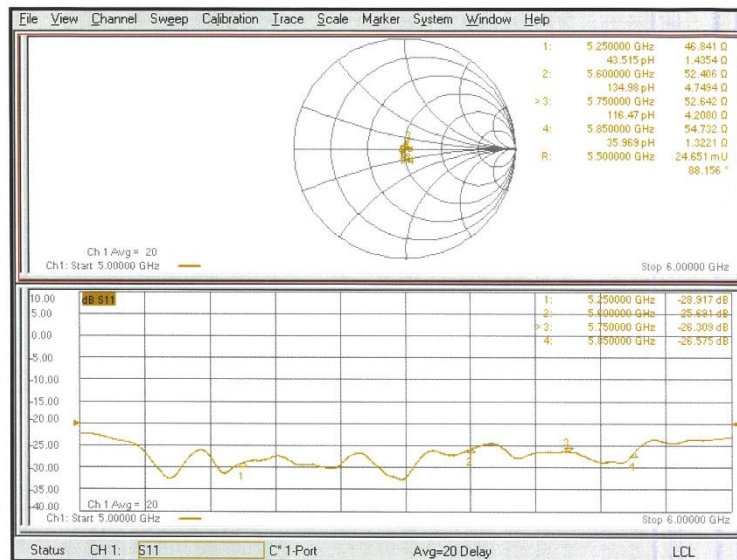


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## Impedance Measurement Plot for Head TSL



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## Calibration Laboratory of

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Engineering AG

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C Service suisse d'étalonnage  
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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 0108

Client  
SGS  
Taoyuan City

Certificate No. D6.5GHzV2-1006\_Aug25

## CALIBRATION CERTIFICATE

Object D6.5GHzV2 - SN: 1006

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

Calibration date August 12, 2025

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).  
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.  
All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.  
Calibration Equipment used (M&TE critical for calibration)

| Primary Standards           | ID         | Cal Date (Certificate No.)             | Scheduled Cal |
|-----------------------------|------------|----------------------------------------|---------------|
| Power Sensor R&S NRP-33T    | SN: 100967 | 30-Apr-25 (No. 1020-300791789)         | Apr-26        |
| Power Sensor R&S NRP18A     | SN: 101859 | 06-Feb-25 (No. 4030A315009541)         | Feb-26        |
| Spectrum Analyzer R&S FSV40 | SN: 101832 | 29-Jan-25 (No. 4030A315009658)         | Jan-26        |
| 3.5mm mismatch combination  | SN: 1152   | 24-Mar-25 (No. 217-04299)              | Mar-26        |
| OCF DAK-12                  | SN: 1016   | 24-Sept-24 (No. OCF-DAK12-1016_Sep24)  | Sep-25        |
| OCF DAK-3.5                 | SN: 1249   | 23-Sept-24 (No. OCF-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          |
| OCF DAK-12                   | SN: 1029   | 27-Feb-25 (No. OCF-DAK12-1029_Feb25)       | Feb-26          |
| OCF DAK-3.5                  | SN: 1336   | 09-Dec-24 (No. OCF-DAK3.5-1336_Dec24)      | Dec-25          |

|                                                                                                                 | Name       | Function              | Signature |
|-----------------------------------------------------------------------------------------------------------------|------------|-----------------------|-----------|
| Calibrated by                                                                                                   | Paulo Pina | Laboratory Technician |           |
| Approved by                                                                                                     | Sven Kühn  | Technical Manager     |           |
| Issued: August 13, 2025                                                                                         |            |                       |           |
| This calibration certificate shall not be reproduced except in full without written approval of the laboratory. |            |                       |           |

Certificate No: D6.5GHzV2-1006\_Aug25

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## 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%.

Certificate No: D6.5GHzV2-1006\_Aug25

Page 2 of 7

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D6.5GHzV2 - SN: 1006

August 12, 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 | 5 mm                       | with spacer                         |
| Zoom Scan Resolution         | dx, dy = 3.4mm, dz = 1.4mm | Graded Ratio = 1.4 mm (Z direction) |
| Frequency                    | 6500MHz $\pm$ 1MHz         |                                     |

#### HSL parameters at 6500 MHz

The following parameters and calculations were applied.

|                                    | Temperature         | Permittivity  | Conductivity        |
|------------------------------------|---------------------|---------------|---------------------|
| Nominal HSL parameters             | 22.0 °C             | 34.5          | 6.07 mho/m          |
| Measured HSL parameters            | (22.0 $\pm$ 0.2) °C | 35.1 $\pm$ 6% | 6.28 mho/m $\pm$ 6% |
| HSL temperature change during test | < 0.5 °C            |               |                     |

#### SAR result with HSL at 6500 MHz

| SAR averaged over 1 cm <sup>3</sup> (1 g) of HSL | Condition          |                              |
|--------------------------------------------------|--------------------|------------------------------|
| SAR for nominal HSL parameters                   | 20 dBm input power | 29.5 W/kg                    |
| SAR for nominal HSL parameters                   | normalized to 1W   | 295 W/kg $\pm$ 24.7% (k = 2) |

| SAR averaged over 8 cm <sup>3</sup> (8 g) of HSL | Condition          |                               |
|--------------------------------------------------|--------------------|-------------------------------|
| SAR for nominal HSL parameters                   | 20 dBm input power | 6.63 W/kg                     |
| SAR for nominal HSL parameters                   | normalized to 1W   | 66.3 W/kg $\pm$ 24.4% (k = 2) |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of HSL | Condition          |                               |
|----------------------------------------------------|--------------------|-------------------------------|
| SAR for nominal HSL parameters                     | 20 dBm input power | 5.48 W/kg                     |
| SAR for nominal HSL parameters                     | normalized to 1W   | 54.8 W/kg $\pm$ 24.4% (k = 2) |

Certificate No: D6.5GHzV2-1006\_Aug25

Page 3 of 7

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August 12, 2025

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

## Antenna Parameters with HSL at 6500 MHz

|             |                                |
|-------------|--------------------------------|
| Impedance   | 46.4 $\Omega$ – 6.8 j $\Omega$ |
| Return Loss | -21.9 dB                       |

## APD (Absorbed Power Density)

| APD averaged over 1 cm <sup>3</sup> | Condition          |                               |
|-------------------------------------|--------------------|-------------------------------|
| APD measured                        | 20 dBm input power | 294 W/kg                      |
| APD measured                        | normalized to 1W   | 2940 W/kg $\pm$ 29.2% (k = 2) |

| APD averaged over 4 cm <sup>3</sup> | 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.

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D6.5GHzV2 - SN: 1006

August 12, 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 |
|-----------------|-------|

Certificate No: D6.5GHzV2-1006\_Aug25

Page 5 of 7

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D6.5GHzV2 - SN: 1006

August 12, 2025

## System Performance Check Report

## Summary

| Dipole             | Frequency [MHz] | TSL | Power [dBm] |
|--------------------|-----------------|-----|-------------|
| D6.5GHzV2 - SN1006 | 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              | 6.28                   | 35.1             |

## Hardware Setup

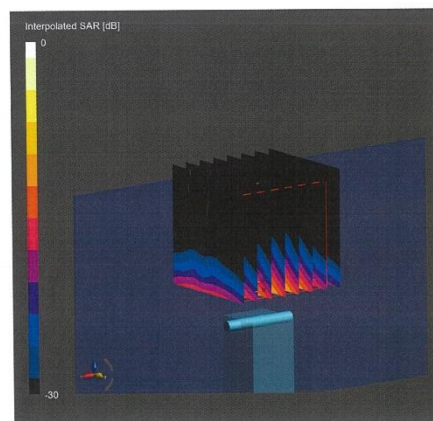
| Phantom         | TSL, Measured Date | Probe, Calibration Date     | DAE, Calibration Date     |
|-----------------|--------------------|-----------------------------|---------------------------|
| MFP V8.0 Center | HSL, 2025-08-12    | DX3DV4 - SN7349, 2025-01-10 | DAE4ip Sn1836, 2025-04-17 |

## 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                | 2025-08-12          |
| psSAR1g [W/Kg]      | 29.3                |
| psSAR10g [W/Kg]     | 5.48                |
| Power Drift [dB]    | 0.01                |
| Power Scaling       | Disabled            |
| Scaling Factor [dB] |                     |
| TSL Correction      | Positive / Negative |



0 dB = 185 W/Kg

Certificate No: D6.5GHzV2-1006\_Aug25

Page 6 of 7

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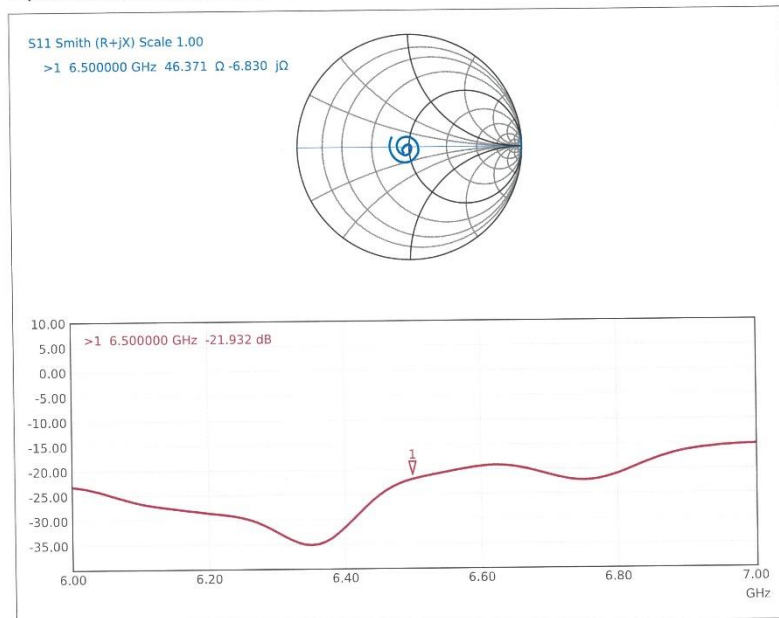
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D6.5GHzV2 - SN: 1006

August 12, 2025

## Impedance Measurement Plot for HSL



Certificate No: D6.5GHzV2-1006\_Aug25

Page 7 of 7

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Client  
SGS  
Taoyuan City

Certificate No. D7GHzV2-1007\_Aug25

### CALIBRATION CERTIFICATE

Object D7GHzV2 - SN: 1007

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

Calibration date August 12, 2025

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| Mismatch; SMA                | SN: 1102   | 24-Apr-25 (No. 675-Mismatch_SMA-250424)    | Apr-26          |
| OCF DAK-12                   | SN: 1029   | 27-Feb-25 (No. OCF-DAK12-1029_Feb25)       | Feb-26          |
| OCF DAK-3.5                  | SN: 1336   | 09-Dec-24 (No. OCF-DAK3.5-1336_Dec24)      | Dec-25          |

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

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Issued: August 13, 2025

Certificate No: D7GHzV2-1007\_Aug25

Page 1 of 7

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Accreditation No.: SCS 0108

## Glossary

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

## Calibration is Performed According to the Following Standards

- IEC/IEEE 62209-1528, "Measurement Procedure For The Assessment Of Specific Absorption Rate Of Human Exposure To Radio Frequency Fields From Hand-Held And Body-Worn Wireless Communication Devices - Part 1528: Human Models, Instrumentation And Procedures (Frequency Range of 4 MHz to 10 GHz)", October 2020.
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

## Additional Documentation

- DASY System Handbook

## Methods Applied and Interpretation of Parameters

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

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

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D7GHzV2 - SN: 1007

August 12, 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 | 5 mm                     | with spacer                         |
| Zoom Scan Resolution         | dx, dy = 3mm, dz = 1.4mm | Graded Ratio = 1.4 mm (Z direction) |
| Frequency                    | 7000MHz $\pm$ 1MHz       |                                     |

**HSL parameters at 7000 MHz**

The following parameters and calculations were applied.

|                                    | Temperature         | Permittivity  | Conductivity        |
|------------------------------------|---------------------|---------------|---------------------|
| Nominal HSL parameters             | 22.0 °C             | 33.9          | 6.65 mho/m          |
| Measured HSL parameters            | (22.0 $\pm$ 0.2) °C | 34.2 $\pm$ 6% | 6.91 mho/m $\pm$ 6% |
| HSL temperature change during test | < 0.5 °C            |               |                     |

**SAR result with HSL at 7000 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 | 28.7 W/kg                    |
| SAR for nominal HSL parameters                         | normalized to 1W   | 287 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 | 6.20 W/kg                     |
| SAR for nominal HSL parameters                         | normalized to 1W   | 62.0 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 | 5.12 W/kg                     |
| SAR for nominal HSL parameters                           | normalized to 1W   | 51.2 W/kg $\pm$ 24.4% (k = 2) |

Certificate No: D7GHzV2-1007\_Aug25

Page 3 of 7

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August 12, 2025

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

## Antenna Parameters with HSL at 7000 MHz

|             |                                |
|-------------|--------------------------------|
| Impedance   | 54.7 $\Omega$ - 5.7 j $\Omega$ |
| Return Loss | -23.0 dB                       |

## APD (Absorbed Power Density)

| APD averaged over 1 cm <sup>3</sup> | Condition          |                               |
|-------------------------------------|--------------------|-------------------------------|
| APD measured                        | 20 dBm input power | 286 W/kg                      |
| APD measured                        | normalized to 1W   | 2860 W/kg $\pm$ 29.2% (k = 2) |

| APD averaged over 4 cm <sup>3</sup> | Condition          |                               |
|-------------------------------------|--------------------|-------------------------------|
| APD measured                        | 20 dBm input power | 124 W/kg                      |
| APD measured                        | normalized to 1W   | 1240 W/kg $\pm$ 28.9% (k = 2) |

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

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August 12, 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 |
|-----------------|-------|

Certificate No: D7GHzV2-1007\_Aug25

Page 5 of 7

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D7GHzV2 - SN: 1007

August 12, 2025

## System Performance Check Report

## Summary

| Dipole           | Frequency [MHz] | TSL | Power [dBm] |
|------------------|-----------------|-----|-------------|
| D7GHzV2 - SN1007 | 7000            | 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--- | 7000, 0    |                                 | 5.7E              | 6.91                   | 34.2             |

## Hardware Setup

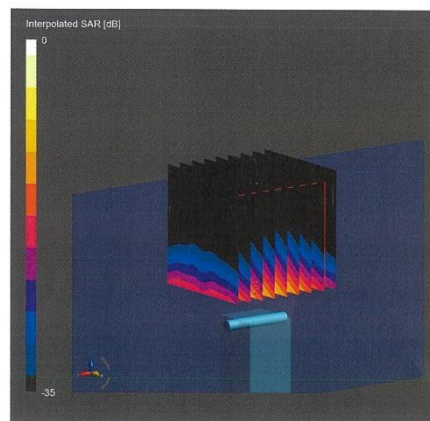
| Phantom         | TSL, Measured Date | Probe, Calibration Date     | DAF, Calibration Date     |
|-----------------|--------------------|-----------------------------|---------------------------|
| MFP V8.0 Center | HSL, 2025-08-12    | EX3DV4 - SN7349, 2025-01-10 | DAE4ip Sn1836, 2025-04-17 |

## Scans Setup

|                     | Zoom Scan       |
|---------------------|-----------------|
| Grid Extents [mm]   | 22 x 22 x 22    |
| Grid Steps [mm]     | 3.0 x 3.0 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                | 2025-08-12          |
| ptSAR1g [W/Kg]      | 28.7                |
| ptSAR10g [W/Kg]     | 5.12                |
| Power Drift [dB]    | 0.01                |
| Power Scaling       | Disabled            |
| Scaling Factor [dB] |                     |
| TSL Correction      | Positive / Negative |



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Page 6 of 7

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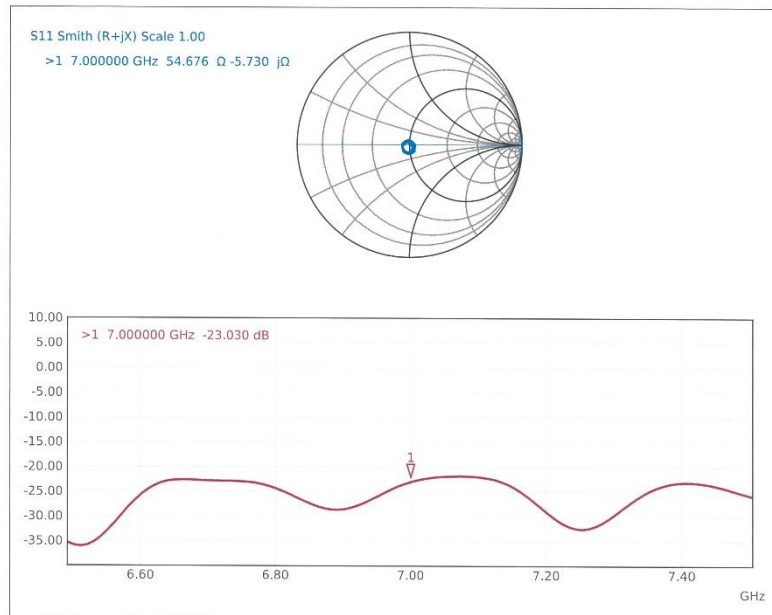
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## Impedance Measurement Plot for HSL



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Page 7 of 7

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Client **SGS**  
Taoyuan City

Certificate No. **5G-Veri10-1021\_Jan26**

## CALIBRATION CERTIFICATE

Object 5G Verification Source 10 GHz - SN: 1021

Calibration procedure(s) QA CAL-45.v6  
Calibration procedure for sources in air > 6 GHz

Calibration date January 15, 2026

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).  
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.  
All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.  
Calibration Equipment used (M&TE critical for calibration)

| Primary Standards       | ID       | Cal Date (Certificate No.)        | Scheduled Cal |
|-------------------------|----------|-----------------------------------|---------------|
| Reference Probe EUMMWV3 | SN: 9374 | 26-Aug-25 (No. Eumm_9374_Aug25)   | Aug-26        |
| DAE4ip                  | SN: 1602 | 30-Oct-25 (No. DAE4ip-1602_Oct25) | Oct-26        |

| Secondary Standards              | ID             | Check Date (in house)                  | Scheduled Check |
|----------------------------------|----------------|----------------------------------------|-----------------|
| Signal Generator R&S SMF100A     | SN: 100184     | 25-Nov-25 (No. IHCK_5G_VS_Nov25)       | Nov-26          |
| Power Sensor R&S NRP18S-10       | SN: 101258     | 25-Nov-25 (No. IHCK_5G_VS_Nov25)       | Nov-26          |
| Network Analyzer Keysight E5063A | SN: MY54504221 | 30-Sept-24 (No. 675-CAL18-S4489-Sep24) | Sep-26          |

|                                                                                                                 | Name           | Function              | Signature |
|-----------------------------------------------------------------------------------------------------------------|----------------|-----------------------|-----------|
| Calibrated by                                                                                                   | Joanna Lleshaj | Laboratory Technician |           |
| Approved by                                                                                                     | Sven Kühn      | Technical Manager     |           |
| Issued: January 16, 2026                                                                                        |                |                       |           |
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## 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%.

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5G Verification Source 10 GHz - SN: 1021

January 15, 2026

### 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             | 58.7                                                                           | 54.8             | 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             | 58.4, 58.7, 58.9                                                   | 54.5, 54.9, 55.1 | 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             | 58.7                                                                           | 54.7             | 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             | 58.4, 58.7, 58.9                                                   | 54.4, 54.8, 55.0 | 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                    |  | Uncertainty (k = 2) |
|---------------------------------------------|------------------------|-------------------|---------------------|--------------------------------------|--|---------------------|
|                                             |                        |                   |                     | Sn, Stot,  Stot  (W/m <sup>2</sup> ) |  |                     |
| 10 mm                                       | 93.3                   | 151               | 1.27 dB             | 59.8, 60.0, 60.2                     |  | 1.28 dB             |

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

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5G Verification Source 10 GHz - SN: 1021

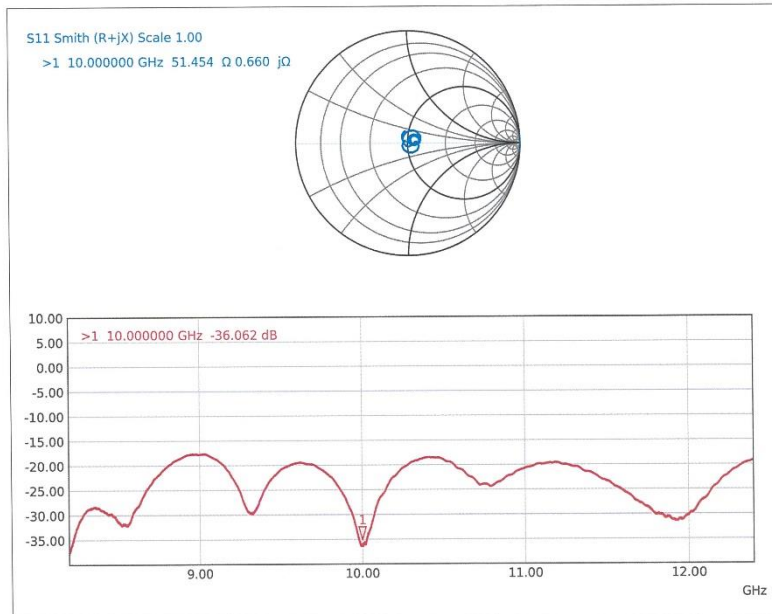
January 15, 2026

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

## Antenna Parameters

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 51.5 $\Omega$ + 0.7 j $\Omega$ |
| Return Loss                          | -36.1 dB                       |

## Impedance Measurement Plot



Certificate No: 5G-Veri10-1021\_Jan26

Page 4 of 8

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5G Verification Source 10 GHz - SN: 1021

January 15, 2026

## 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: 1021 | -        |

## 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

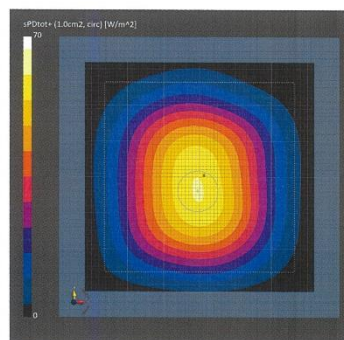
| Phantom           | Medium | Probe, Calibration Date                 | DAE, Calibration Date       |
|-------------------|--------|-----------------------------------------|-----------------------------|
| mmWave Phantom -- | Air -- | EJmmWV3 - SN9374_F1 - 55GHz, 2025-08-26 | DAE4ip - SN1602, 2025-10-30 |

## Scans Setup

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

## Measurement Results

| Scan Type                       | 5G Scan            |
|---------------------------------|--------------------|
| Date                            | 2026-01-15         |
| Avg. Area [cm <sup>2</sup> ]    | 1.00               |
| Avg. Type                       | Circular Averaging |
| ptPDn+ [W/m <sup>2</sup> ]      | 58.4               |
| ptPDrot+ [W/m <sup>2</sup> ]    | 58.7               |
| ptPDmod+ [W/m <sup>2</sup> ]    | 58.9               |
| Max(Sn) [W/m <sup>2</sup> ]     | 59.8               |
| Max(Stot) [W/m <sup>2</sup> ]   | 60.0               |
| Max( Stot ) [W/m <sup>2</sup> ] | 60.2               |
| E <sub>max</sub> [V/m]          | 151                |
| Power Drift [dB]                | 0.01               |



Certificate No: 5G-Veri10-1021\_Jan26

Page 5 of 8

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5G Verification Source 10 GHz - SN: 1021

January 15, 2026

## 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: 1021 | --       |

## 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

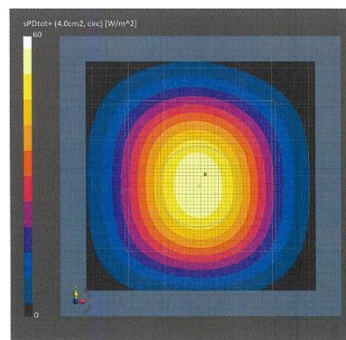
| Phantom           | Medium | Probe, Calibration Date                 | DAE, Calibration Date       |
|-------------------|--------|-----------------------------------------|-----------------------------|
| mmWave Phantom -- | Air -- | EJmmWV3 - SN9374_J1 - 55GHz, 2025-08-26 | DAE4ip - SN1602, 2025-10-30 |

## Scans Setup

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

## Measurement Results

|                                 |                    |
|---------------------------------|--------------------|
| Scan Type                       | 5G Scan            |
| Date                            | 2026-01-15         |
| Avg. Area [cm <sup>2</sup> ]    | 4.00               |
| Avg. Type                       | Circular Averaging |
| psPDn+ [W/m <sup>2</sup> ]      | 54.5               |
| psPDtot+ [W/m <sup>2</sup> ]    | 54.9               |
| psPDmod+ [W/m <sup>2</sup> ]    | 55.1               |
| Max(Sn) [W/m <sup>2</sup> ]     | 59.8               |
| Max(Stot) [W/m <sup>2</sup> ]   | 60.0               |
| Max( Stot ) [W/m <sup>2</sup> ] | 60.2               |
| E <sub>max</sub> [V/m]          | 151                |
| Power Drift [dB]                | 0.01               |



Certificate No: 5G-Veri10-1021\_Jan26

Page 6 of 8

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5G Verification Source 10 GHz - SN: 1021

January 15, 2026

## 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: 1021 | -        |

## 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

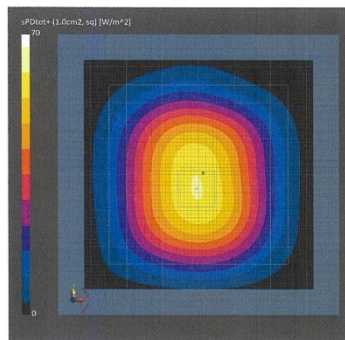
| Phantom        | Medium | Probe, Calibration Date               | DAE, Calibration Date       |
|----------------|--------|---------------------------------------|-----------------------------|
| mmWave Phantom | Air -  | EUMMWP3 - SN9374_F1-55GHz, 2025-08-26 | DAE4ip - SN1602, 2025-10-30 |

## Scans Setup

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

## Measurement Results

| Scan Type                      | 5G Scan          |
|--------------------------------|------------------|
| Date                           | 2026-01-15       |
| Avg. Area [cm <sup>2</sup> ]   | 1.00             |
| Avg. Type                      | Square Averaging |
| psPDn+ [W/m <sup>2</sup> ]     | 58.4             |
| psPDtot+ [W/m <sup>2</sup> ]   | 58.7             |
| psPDmod+ [W/m <sup>2</sup> ]   | 58.9             |
| Max(Sn) [W/m <sup>2</sup> ]    | 59.8             |
| Max(Stot) [W/m <sup>2</sup> ]  | 60.0             |
| Max(Sstot) [W/m <sup>2</sup> ] | 60.2             |
| E <sub>max</sub> [V/m]         | 151              |
| Power Drift [dB]               | 0.01             |



Certificate No: 5G-Veri10-1021\_Jan26

Page 7 of 8

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5G Verification Source 10 GHz - SN: 1021

January 15, 2026

## 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: 1021 | -        |

## 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

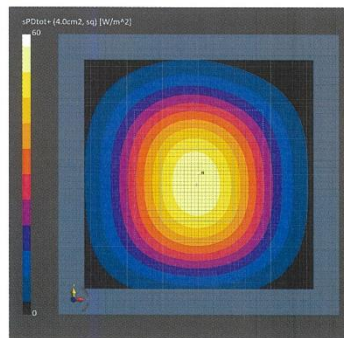
| Phantom           | Medium | Probe, Calibration Date               | DAE, Calibration Date       |
|-------------------|--------|---------------------------------------|-----------------------------|
| mmWave Phantom -- | Air -- | EJmmWV3 - SN9374_F1-55GHz, 2025-08-26 | DAE4ip - SN1662, 2025-10-30 |

## Scans Setup

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

## Measurement Results

| Scan Type                       | 5G Scan          |
|---------------------------------|------------------|
| Date                            | 2026-01-15       |
| Avg. Area [cm <sup>2</sup> ]    | 4.00             |
| Avg. Type                       | Square Averaging |
| psPDn+ [W/m <sup>2</sup> ]      | 54.4             |
| psPDtot+ [W/m <sup>2</sup> ]    | 54.8             |
| psPDmod+ [W/m <sup>2</sup> ]    | 55.0             |
| Max(Sn) [W/m <sup>2</sup> ]     | 59.8             |
| Max(Stot) [W/m <sup>2</sup> ]   | 60.0             |
| Max( Stot ) [W/m <sup>2</sup> ] | 60.2             |
| F <sub>max</sub> [V/m]          | 151              |
| Power Drift [dB]                | 0.01             |



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Page 8 of 8

**- End of report -**

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