

D1750V2 - SN: 1003

July 11, 2024

Measurement Conditions

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

| | | |
|-------------------------------------|--------------------------|-------------------------------------|
| DASY Version | DASY8 Module SAR | |
| Extrapolation | Advanced Extrapolation | |
| Phantom | Modular Flat Phantom | |
| Distance Dipole Center - TSL | 10 mm | with spacer |
| Zoom Scan Resolution | dx, dy = 6mm, dz = 1.5mm | Graded Ratio = 1.5 mm (Z direction) |
| Frequency | 1750MHz ±1MHz | |

Head TSL parameters at 1750 MHz

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|--|---------------|--------------|----------------|
| Nominal Head TSL parameters | 22.0 °C | 40.1 | 1.37 mho/m |
| Measured Head TSL parameters | (22.0 ±0.2)°C | 40.6 ±6% | 1.35 mho/m ±6% |
| Head TSL temperature change during test | < 0.5 °C | | |

SAR result with Head TSL at 1750 MHz

| | | |
|---|--------------------|--------------------------|
| SAR averaged over 1 cm³ (1 g) of Head TSL | Condition | |
| SAR for nominal Head TSL parameters | 24 dBm input power | 9.34 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | 37.2 W/kg ±17.0% (k = 2) |

| | | |
|---|--------------------|--------------------------|
| SAR averaged over 10 cm³ (10 g) of Head TSL | Condition | |
| SAR for nominal Head TSL parameters | 24 dBm input power | 4.97 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | 19.8 W/kg ±16.5% (k = 2) |

D1750V2 - SN: 1003

July 11, 2024

Appendix (Additional assessments outside the scope of SCS 0108)**Antenna Parameters with Head TSL at 1750 MHz**

| | |
|-------------|-------------------------------|
| Impedance | 49.2 Ω – 0.4 $j\Omega$ |
| Return Loss | -41.0 dB |

General Antenna Parameters and Design

| | |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.214 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 |
|-----------------|-------|

D1750V2 - SN: 1003

July 11, 2024

System Performance Check Report

Summary

| Dipole | Frequency [MHz] | TSL | Power [dBm] |
|------------------|-----------------|-----|-------------|
| D1750V2 - SN1003 | 1750 | 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-- | | 1750, 0 | 7.96 | 1.35 | 40.6 |

Hardware Setup

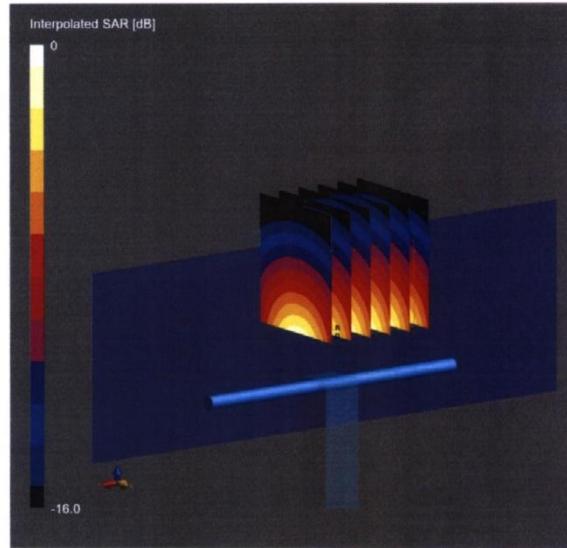
| Phantom | TSL, Measured Date | Probe, Calibration Date | DAE, Calibration Date |
|----------------|--------------------|-----------------------------|---------------------------|
| MFP V8.0 Right | HSL, 2024-07-11 | EX3DV4 - SN7349, 2024-06-03 | DAE4ip Sn1836, 2024-01-10 |

Scans Setup

| | Zoom Scan |
|---------------------|-----------------|
| Grid Extents [mm] | 30 x 30 x 30 |
| Grid Steps [mm] | 6.0 x 6.0 x 1.5 |
| Sensor Surface [mm] | 1.4 |
| Graded Grid | Yes |
| Grading Ratio | 1.5 |
| MAIA | N/A |
| Surface Detection | All points |
| Scan Method | Measured |

Measurement Results

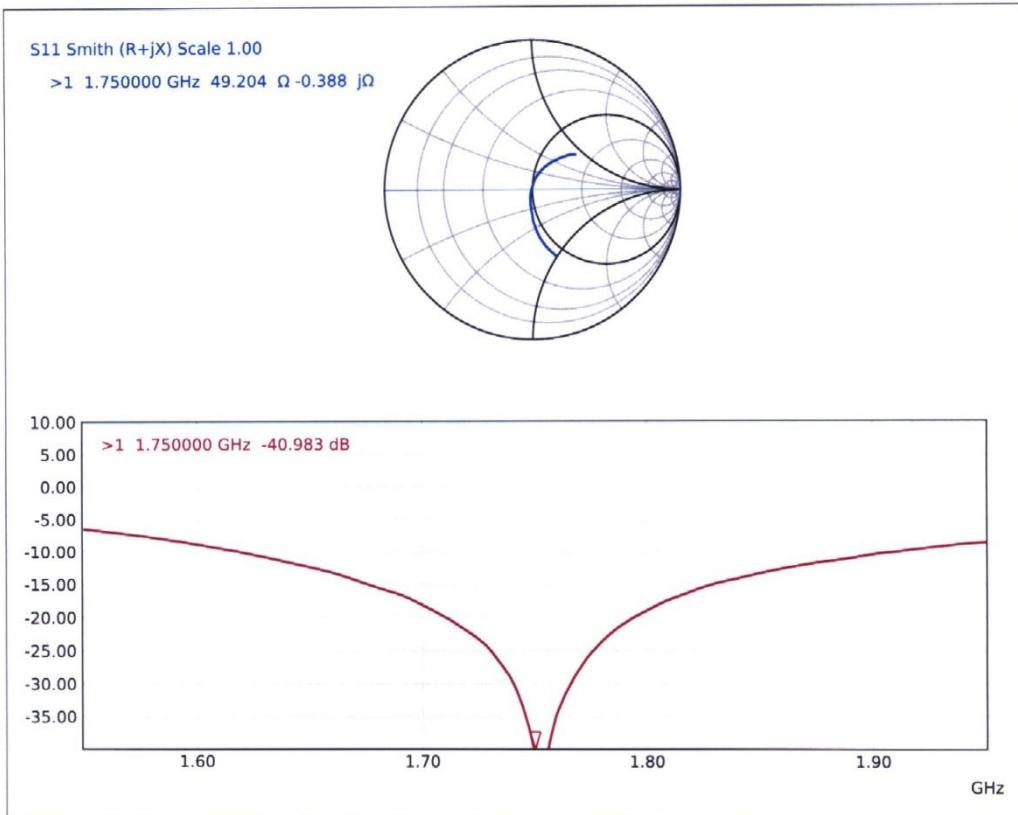
| | Zoom Scan |
|---------------------|---------------------|
| Date | 2024-07-11 |
| psSAR1g [W/Kg] | 9.34 |
| psSAR10g [W/Kg] | 4.97 |
| Power Drift [dB] | 0.00 |
| Power Scaling | Disabled |
| Scaling Factor [dB] | |
| TSL Correction | Positive / Negative |



D1750V2 - SN: 1003

July 11, 2024

Impedance Measurement Plot for Head TSL



1900 MHz Dipole Calibration Certificate

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



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S Swiss Calibration Service

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

Accreditation No.: **SCS 0108**

Client

CTTL
Beijing

Certificate No.

D1900V2-5d101_Jul24

CALIBRATION CERTIFICATE

Object **D1900V2 - SN: 5d101**

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

Calibration date **July 8, 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 8, 2024

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

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



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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%.

D1900V2 - SN: 5d101

July 8, 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 = 6mm, dz = 1.5mm Graded Ratio = 1.5 mm (Z direction) | | |
| Frequency | 1900MHz ±1MHz | | |

Head TSL parameters at 1900 MHz

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|--|---------------|--------------|----------------|
| Nominal Head TSL parameters | 22.0 °C | 40.0 | 1.40 mho/m |
| Measured Head TSL parameters | (22.0 ±0.2)°C | 41.3 ±6% | 1.38 mho/m ±6% |
| Head TSL temperature change during test | < 0.5 °C | | |

SAR result with Head TSL at 1900 MHz

| | | |
|---|--------------------|--------------------------|
| SAR averaged over 1 cm³ (1 g) of Head TSL | Condition | |
| SAR for nominal Head TSL parameters | 24 dBm input power | 9.83 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | 39.1 W/kg ±17.0% (k = 2) |

| | | |
|---|--------------------|--------------------------|
| SAR averaged over 10 cm³ (10 g) of Head TSL | Condition | |
| SAR for nominal Head TSL parameters | 24 dBm input power | 5.18 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | 20.6 W/kg ±16.5% (k = 2) |

D1900V2 - SN: 5d101

July 8, 2024

Appendix (Additional assessments outside the scope of SCS 0108)**Antenna Parameters with Head TSL at 1900 MHz**

| | |
|-------------|-------------------------------|
| Impedance | 49.4 Ω + 4.2 $j\Omega$ |
| Return Loss | -27.3 dB |

General Antenna Parameters and Design

| | |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.203 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 |
|-----------------|-------|

D1900V2 - SN: 5d101

July 8, 2024

System Performance Check Report

Summary

| Dipole | Frequency [MHz] | TSL | Power [dBm] |
|-------------------|-----------------|-----|-------------|
| D1900V2 - SN5d101 | 1900 | 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-- | | 1900, 0 | 7.73 | 1.38 | 41.3 |

Hardware Setup

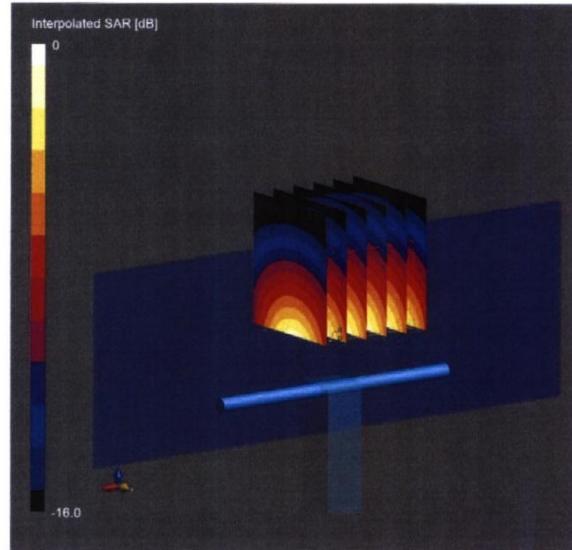
| Phantom | TSL, Measured Date | Probe, Calibration Date | DAE, Calibration Date |
|----------------|--------------------|-----------------------------|---------------------------|
| MFP V8.0 Right | HSL, 2024-07-08 | EX3DV4 - SN7349, 2024-06-03 | DAE4Ip Sn1836, 2024-01-10 |

Scans Setup

| | Zoom Scan |
|---------------------|-----------------|
| Grid Extents [mm] | 30 x 30 x 30 |
| Grid Steps [mm] | 6.0 x 6.0 x 1.5 |
| Sensor Surface [mm] | 1.4 |
| Graded Grid | Yes |
| Grading Ratio | 1.5 |
| MAIA | N/A |
| Surface Detection | All points |
| Scan Method | Measured |

Measurement Results

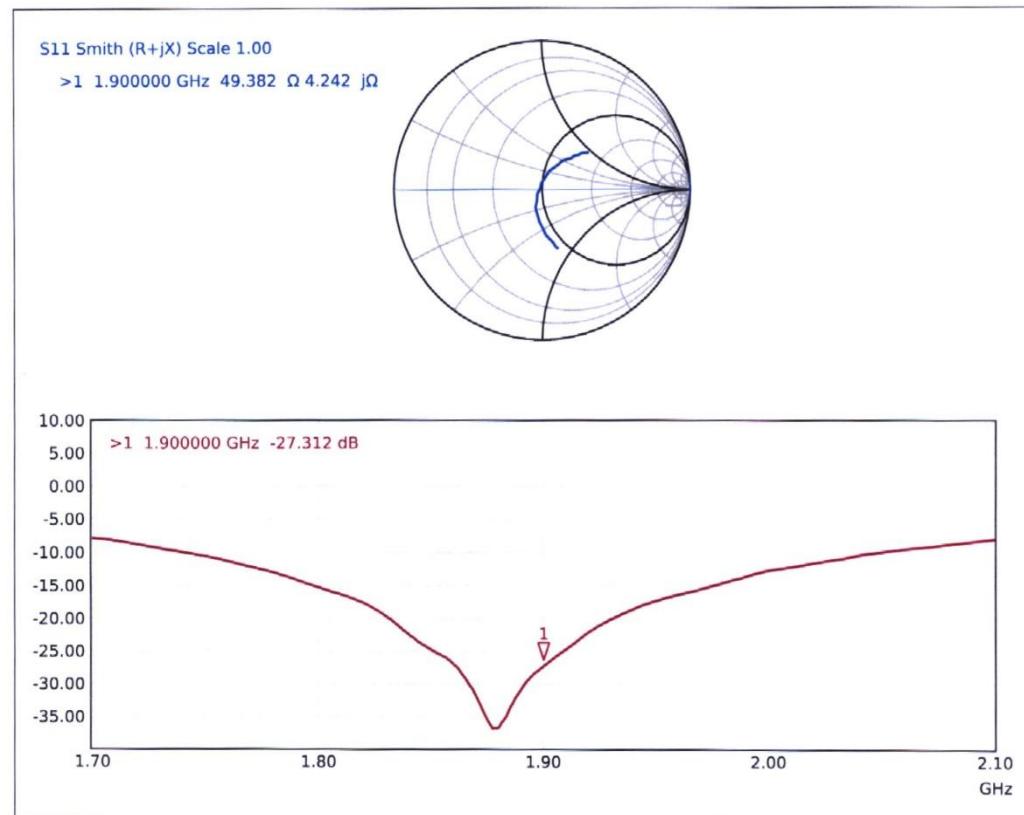
| | Zoom Scan |
|---------------------|---------------------|
| Date | 2024-07-08 |
| psSAR1g [W/Kg] | 9.83 |
| psSAR10g [W/Kg] | 5.18 |
| Power Drift [dB] | -0.01 |
| Power Scaling | Disabled |
| Scaling Factor [dB] | |
| TSL Correction | Positive / Negative |



D1900V2 - SN: 5d101

July 8, 2024

Impedance Measurement Plot for Head TSL



2450 MHz Dipole Calibration Certificate

Calibration Laboratory of
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 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client

CTTL
 Beijing

Certificate No.

D2450V2-853_Jul24

CALIBRATION CERTIFICATE

Object **D2450V2 - SN: 853**

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

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

Issued: July 10, 2024

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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%.

D2450V2 - SN: 853

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 = 1.5mm | Graded Ratio = 1.5 mm (Z direction) |
| Frequency | 2450MHz ±1MHz | |

Head TSL parameters at 2450 MHz

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|--|---------------|--------------|----------------|
| Nominal Head TSL parameters | 22.0 °C | 39.2 | 1.80 mho/m |
| Measured Head TSL parameters | (22.0 ±0.2)°C | 38.0 ±6% | 1.83 mho/m ±6% |
| Head TSL temperature change during test | < 0.5 °C | | |

SAR result with Head TSL at 2450 MHz

| | | |
|---|--------------------|--------------------------|
| SAR averaged over 1 cm³ (1 g) of Head TSL | Condition | |
| SAR for nominal Head TSL parameters | 24 dBm input power | 13.1 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | 52.2 W/kg ±17.0% (k = 2) |

| | | |
|---|--------------------|--------------------------|
| SAR averaged over 10 cm³ (10 g) of Head TSL | Condition | |
| SAR for nominal Head TSL parameters | 24 dBm input power | 6.16 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | 24.5 W/kg ±16.5% (k = 2) |

D2450V2 - SN: 853

July 10, 2024

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

| | |
|-------------|-------------------------------|
| Impedance | 52.4 Ω + 2.6 $j\Omega$ |
| Return Loss | -29.2 dB |

General Antenna Parameters and Design

| | |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.163 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 |
|-----------------|-------|

D2450V2 - SN: 853

July 10, 2024

System Performance Check Report

Summary

| Dipole | Frequency [MHz] | TSL | Power [dBm] |
|-----------------|-----------------|-----|-------------|
| D2450V2 – SN853 | 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 | 7.24 | 1.83 | 38.0 |

Hardware Setup

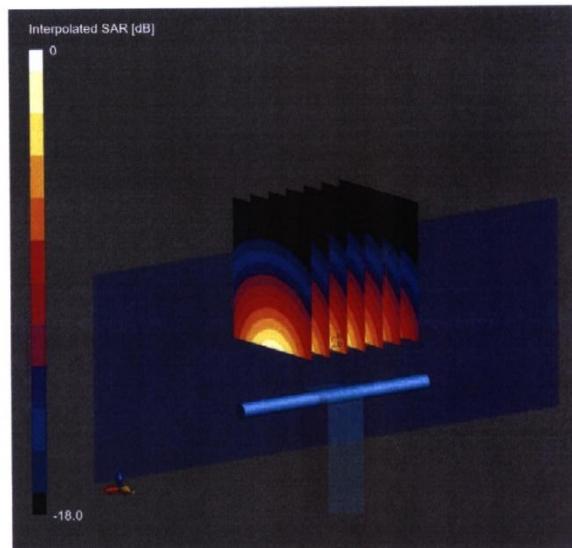
| Phantom | TSL, Measured Date | Probe, Calibration Date | DAE, Calibration Date |
|-----------------|--------------------|-----------------------------|---------------------------|
| MFP V8.0 Center | HSL, 2024-07-10 | EX3DV4 – SN7349, 2024-06-03 | DAE4ip Sn1836, 2024-01-10 |

Scans Setup

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

Measurement Results

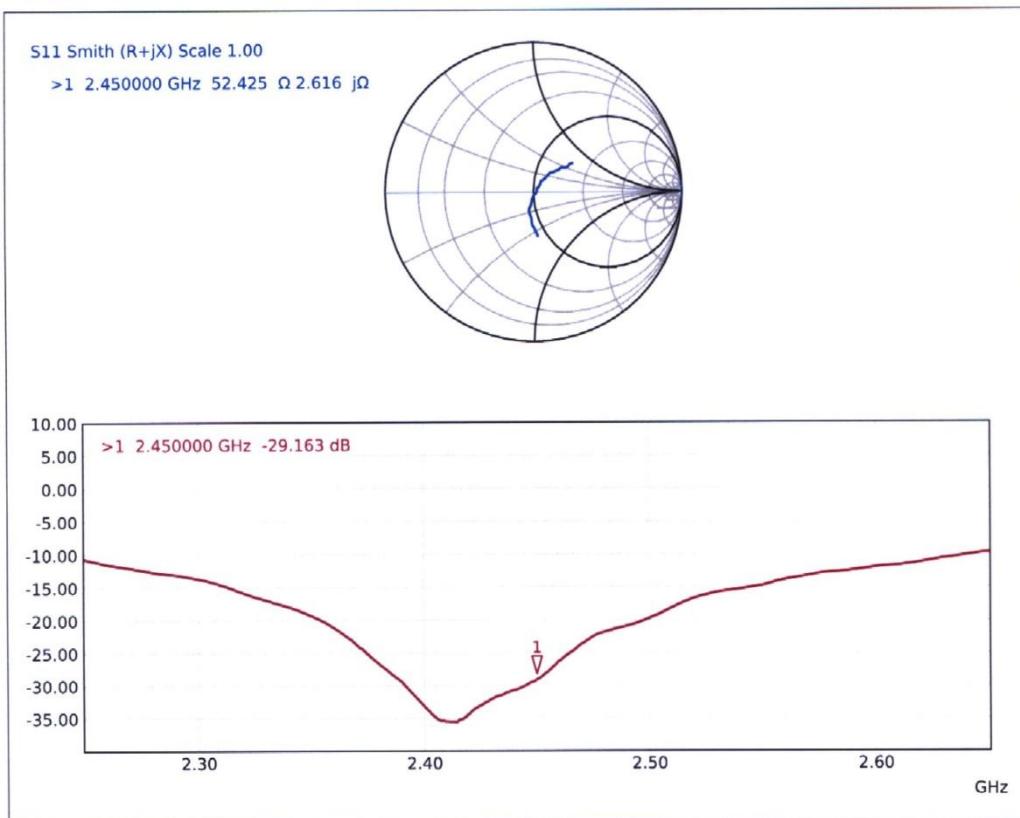
| | Zoom Scan |
|---------------------|---------------------|
| Date | 2024-07-10 |
| psSAR1g [W/Kg] | 13.1 |
| psSAR10g [W/Kg] | 6.16 |
| Power Drift [dB] | 0.00 |
| Power Scaling | Disabled |
| Scaling Factor [dB] | |
| TSL Correction | Positive / Negative |



D2450V2 - SN: 853

July 10, 2024

Impedance Measurement Plot for Head TSL



2600 MHz Dipole Calibration Certificate

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



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Accreditation No.: **SCS 0108**

Client

CTTL
 Beijing

Certificate No.

D2600V2-1012_Jul24

CALIBRATION CERTIFICATE

| | |
|--------------------------|---|
| Object | D2600V2 - SN: 1012 |
| Calibration procedure(s) | QA CAL-05.v12 Calibration Procedure for SAR Validation Sources between 0.7 - 3 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 ± 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 | 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 |

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

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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%.

D2600V2 - SN: 1012

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 = 1.5mm | Graded Ratio = 1.5 mm (Z direction) |
| Frequency | 2600MHz ±1MHz | |

Head TSL parameters at 2600 MHz

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|--|---------------|--------------|----------------|
| Nominal Head TSL parameters | 22.0 °C | 39.0 | 1.96 mho/m |
| Measured Head TSL parameters | (22.0 ±0.2)°C | 37.4 ±6% | 1.99 mho/m ±6% |
| Head TSL temperature change during test | < 0.5 °C | | |

SAR result with Head TSL at 2600 MHz

| SAR averaged over 1 cm³ (1 g) of Head TSL | Condition | |
|---|--------------------|--------------------------|
| SAR for nominal Head TSL parameters | 24 dBm input power | 13.8 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | 54.9 W/kg ±17.0% (k = 2) |

| SAR averaged over 10 cm³ (10 g) of Head TSL | Condition | |
|---|--------------------|--------------------------|
| SAR for nominal Head TSL parameters | 24 dBm input power | 6.24 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | 24.8 W/kg ±16.5% (k = 2) |

D2600V2 - SN: 1012

July 10, 2024

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

| | |
|-------------|-------------------------------|
| Impedance | 47.3 Ω – 6.6 $j\Omega$ |
| Return Loss | -22.7 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: 1012

July 10, 2024

System Performance Check Report

Summary

| Dipole | Frequency [MHz] | TSL | Power [dBm] |
|------------------|-----------------|-----|-------------|
| D2600V2 - SN1012 | 2600 | 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-- | | 2600, 0 | 7.29 | 1.99 | 37.4 |

Hardware Setup

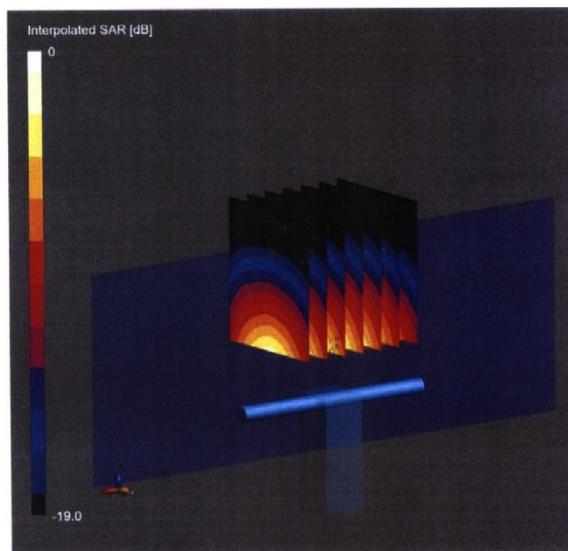
| Phantom | TSL, Measured Date | Probe, Calibration Date | DAE, Calibration Date |
|-----------------|--------------------|-----------------------------|---------------------------|
| MFP V8.0 Center | HSL, 2024-07-10 | EX3DV4 - SN7349, 2024-06-03 | DAE4ip Sn1836, 2024-01-10 |

Scans Setup

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

Measurement Results

| | Zoom Scan |
|---------------------|---------------------|
| Date | 2024-07-10 |
| psSAR1g [W/Kg] | 13.8 |
| psSAR10g [W/Kg] | 6.24 |
| Power Drift [dB] | 0.00 |
| Power Scaling | Disabled |
| Scaling Factor [dB] | |
| TSL Correction | Positive / Negative |

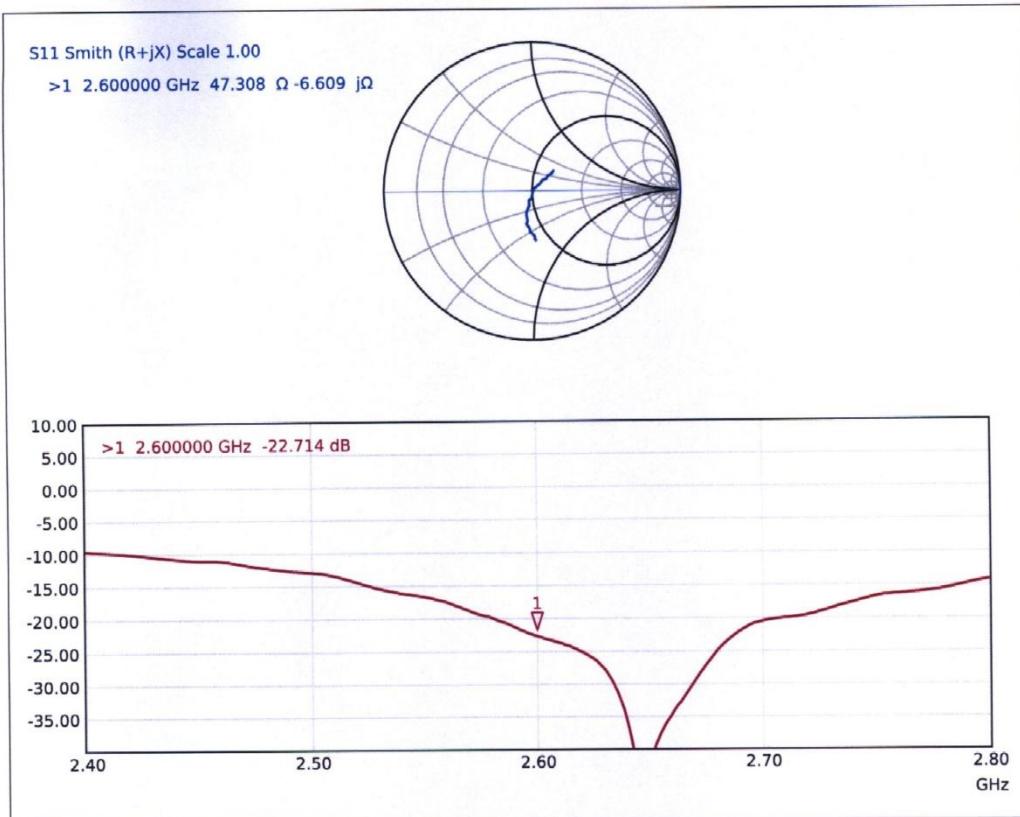


Certificate No: D2600V2-1012_Jul24

Page 5 of 6

D2600V2 - SN: 1012

July 10, 2024

Impedance Measurement Plot for Head TSL

5GHz Dipole Calibration Certificate

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Accreditation No.: SCS 0108

Client

CTTL
 Beijing

Certificate No.

D5GHzV2-1262_Jan25

CALIBRATION CERTIFICATE

Object D5GHzV2 - SN: 1262

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

Calibration date January 17, 2025

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

| Primary Standards | ID | Cal Date (Certificate No.) | Scheduled Cal |
|--|------------|--|---------------|
| Power Sensor R&S NRP-33T | SN: 100967 | 28-Mar-24 (No. 217-04038) | Mar-25 |
| Power Sensor R&S NRP18A | SN: 101859 | 22-Jul-24 (No. 4030A315008547) | Jul-25 |
| Spectrum Analyzer R&S FSV40 | SN: 101832 | 25-Jan-24 (No. 4030-315007551) | Jan-25 |
| Mismatch; Short [S4188] Attenuator [S4423] | SN: 1152 | 28-Mar-24 (No. 217-04050) | Mar-25 |
| OCP DAK-12 | SN: 1016 | 24-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 | Paulo Pina | Laboratory Technician |  |
| Approved by | Sven Kühn | Technical Manager |  |

Issued: January 23, 2025

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S Swiss Calibration Service

Accreditation No.: **SCS 0108**

Glossary

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Additional Documentation

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D5GHzV2 - SN: 1262

January 17, 2025

Measurement Conditions

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

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

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)°C | 35.6 \pm 6% | 4.58 mho/m \pm 6% |
| Head TSL temperature change during test | < 0.5 °C | | |

SAR result with Head TSL at 5250 MHz

| | | |
|---|--------------------|-------------------------------|
| SAR averaged over 1 cm³ (1 g) of Head TSL | Condition | |
| SAR for nominal Head TSL parameters | 20 dBm input power | 7.78 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | 77.8 W/kg \pm 19.9% (k = 2) |

| | | |
|---|--------------------|-------------------------------|
| SAR averaged over 10 cm³ (10 g) of Head TSL | Condition | |
| SAR for nominal Head TSL parameters | 20 dBm input power | 2.23 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | 22.3 W/kg \pm 19.5% (k = 2) |