



Report No.: SUCR260400034210

Amendment 01

Page: 1 of 138

# Appendix C

## Calibration certificate

|                                       |
|---------------------------------------|
| 1. Dipole                             |
| CLA13-SN 1032                         |
| D750V3-SN 1214                        |
| D835V2-SN 4d161                       |
| D1750V2-SN1105                        |
| D1950V3-SN 1138                       |
| D2450V2-SN 922                        |
| D2600V2-SN 1158                       |
| D3500V2-SN 1133                       |
| D3900V2-SN 1083                       |
| D5GHzV2-SN 1174                       |
| D6.5GHzV2-SN 1102                     |
| 5G Verification Source 10 GHz-SN 2004 |
| 2. DAE                                |
| DAE4ip-SN 1826                        |
| DAE4ip-SN 1374                        |
| 3. Probe                              |
| EX3DV4-SN 3826                        |
| EX3DV4-SN 3982                        |
| EUmmWV4-SN 9718                       |
| 4. Dipole Extend                      |



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 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client

**SGS**  
 Suzhou

Certificate No.

**CLA13-1032\_Feb26**

## CALIBRATION CERTIFICATE

Object

**CLA13 - SN: 1032**

Calibration procedure(s)

**QA CAL-15.v12**  
 Calibration Procedure for SAR Validation Sources below 700 MHz

Calibration date

**February 18, 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  $(22 \pm 3)^{\circ}\text{C}$  and humidity  $< 70\%$ .

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards           | ID         | Cal Date (Certificate No.)             | Scheduled Cal |
|-----------------------------|------------|----------------------------------------|---------------|
| Power Sensor R&S NRP40T     | SN: 101861 | 29-Apr-25 (No. 2025-001450)            | Apr-26        |
| Power Sensor R&S NRP18A     | SN: 101859 | 06-Feb-25 (No. 4030A315009541)         | Feb-26        |
| Spectrum Analyzer R&S FSV40 | SN: 101832 | 23-Jan-26 (No. 4030A315011865)         | Jan-27        |
| 3.5mm mismatch combination  | SN: 1152   | 24-Mar-25 (No. 217-04293)              | Mar-26        |
| OCP DAK-12                  | SN: 1016   | 16-Sept-25 (No. OCP-DAK12-1016_Sep25)  | Sep-26        |
| OCP DAK-3.5                 | SN: 1249   | 16-Sept-25 (No. OCP-DAK3.5-1249_Sep25) | Sep-26        |
| Reference Probe EX3DV4      | SN: 7349   | 29-Jan-26 (No. EX3-7349_Jan26)         | Jan-27        |
| DAE4ip                      | SN: 1640   | 03-Nov-25 (No. DAE4ip-1640_Nov25)      | Nov-26        |

| Secondary Standards          | ID         | Check Date (in house)                      | Scheduled Check |
|------------------------------|------------|--------------------------------------------|-----------------|
| ACAD Setup 1                 | SN: 1000   | 27-May-25 (No. 675-ACAD_Source_Box-250527) | May-26          |
| Signal Generator R&S SMB100A | SN: 182081 | 27-May-25 (No. 675-CAL16-S4588-250527)     | May-26          |
| Mismatch; SMA                | SN: 1102   | 24-Apr-25 (No. 675-Mismatch_SMA-250424)    | Apr-26          |
| OCP DAK-12                   | SN: 1029   | 27-Feb-25 (No. OCP-DAK12-1029_Feb25)       | Feb-26          |
| OCP DAK-3.5                  | SN: 1336   | 10-Dec-25 (No. OCP-DAK3.5-1336_Dec25)      | Dec-26          |

|               | Name               | Function              | Signature |
|---------------|--------------------|-----------------------|-----------|
| Calibrated by | Aidonia Georgiadou | Laboratory Technician |           |
| Approved by   | Sven Kühn          | Technical Manager     |           |

Issued: February 18, 2026

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## Calibration Laboratory of

Schmid & Partner  
Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland



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

Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA  
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 0108

## Glossary

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

## Calibration is Performed According to the Following Standards

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

## Additional Documentation

- DASY System Handbook

## Methods Applied and Interpretation of Parameters

- *Measurement Conditions*: Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL*: The source is mounted in a touch configuration below the center marking of the flat phantom.
- *Return Loss*: This parameter is measured with the source positioned under the liquid filled phantom (as described in the measurement condition clause). The Return Loss ensures low reflected power. No uncertainty required.
- *SAR measured*: SAR measured at the stated antenna input power.
- *SAR normalized*: SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters*: The measured TSL parameters are used to calculate the nominal SAR result.

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

**Measurement Conditions**

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

|                 |                        |        |
|-----------------|------------------------|--------|
| DASY Version    | DASY8 Module SAR       | 17.0.2 |
| Extrapolation   | Advanced Extrapolation |        |
| Phantom         | ELI8 Flat Phantom      |        |
| EUT Positioning | Touch Position         |        |
| Frequency       | 13MHz $\pm$ 1MHz       |        |

**HSL parameters at 13 MHz**

The following parameters and calculations were applied.

|                                    | Temperature        | Permittivity  | Conductivity        |
|------------------------------------|--------------------|---------------|---------------------|
| Nominal HSL parameters             | 22.0 °C            | 55.0          | 0.75 mho/m          |
| Measured HSL parameters            | (22.0 $\pm$ 0.2)°C | 53.1 $\pm$ 6% | 0.73 mho/m $\pm$ 6% |
| HSL temperature change during test | < 0.5 °C           |               |                     |

**SAR result with HSL at 13 MHz**

| SAR averaged over 1 cm <sup>3</sup> (1 g) of HSL | Condition          |                                |
|--------------------------------------------------|--------------------|--------------------------------|
| SAR for nominal HSL parameters                   | 30 dBm input power | 0.418 W/kg $\pm$ 18.4% (k = 2) |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of HSL | Condition          |                                |
|----------------------------------------------------|--------------------|--------------------------------|
| SAR for nominal HSL parameters                     | 30 dBm input power | 0.261 W/kg $\pm$ 18.0% (k = 2) |

**Appendix (Additional assessments outside the scope of SCS 0108)****Antenna Parameters with HSL at 13 MHz**

|                                     |                               |
|-------------------------------------|-------------------------------|
| Impedance,transformed to feed point | $51.4\ \Omega + 6.2\ j\Omega$ |
| Return Loss                         | -24.1 dB                      |

**Additional EUT Data**

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

## System Performance Check Report

## Summary

| Dipole         | Frequency [MHz] | TSL | Power [dBm] |
|----------------|-----------------|-----|-------------|
| CLA13 - SN1032 | 13              | HSL | 30          |

## Exposure Conditions

| Phantom Section, TSL | Test Distance [mm] | Band | Group, UID | Frequency [MHz], Channel Number | Conversion Factor | TSL Conductivity [S/m] | TSL Permittivity |
|----------------------|--------------------|------|------------|---------------------------------|-------------------|------------------------|------------------|
| Flat                 | 0                  |      | CW, 0--    | 13, 0                           | 18.76             | 0.73                   | 53.1             |

## Hardware Setup

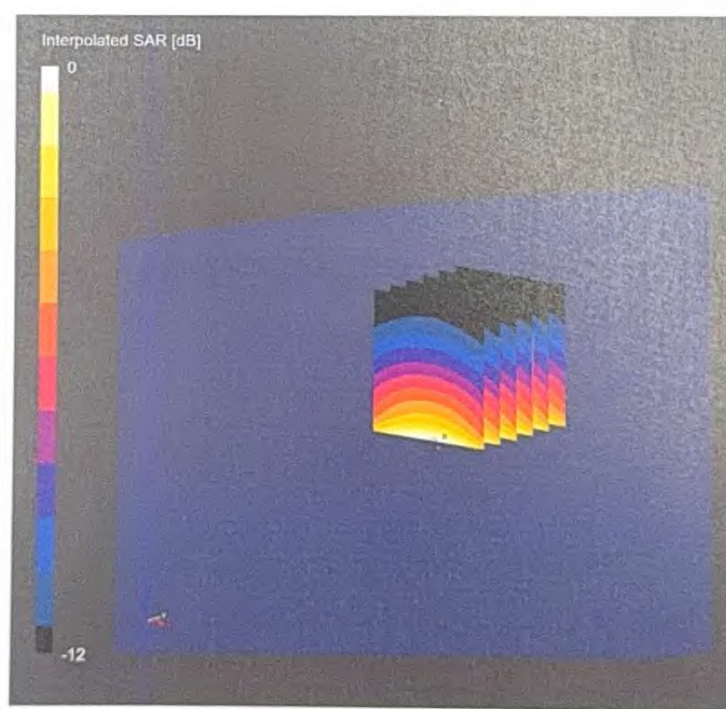
| Phantom    | TSL, Measured Date | Probe, Calibration Date     | DAE, Calibration Date     |
|------------|--------------------|-----------------------------|---------------------------|
| ELI V8.0-I | HSL, 2026-02-18    | EX3DV4 - SN7349, 2026-01-29 | DAE4ip Sn1640, 2025-11-03 |

## 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   | VMS + 6p        |
| Scan Method         | Measured        |

## Measurement Results

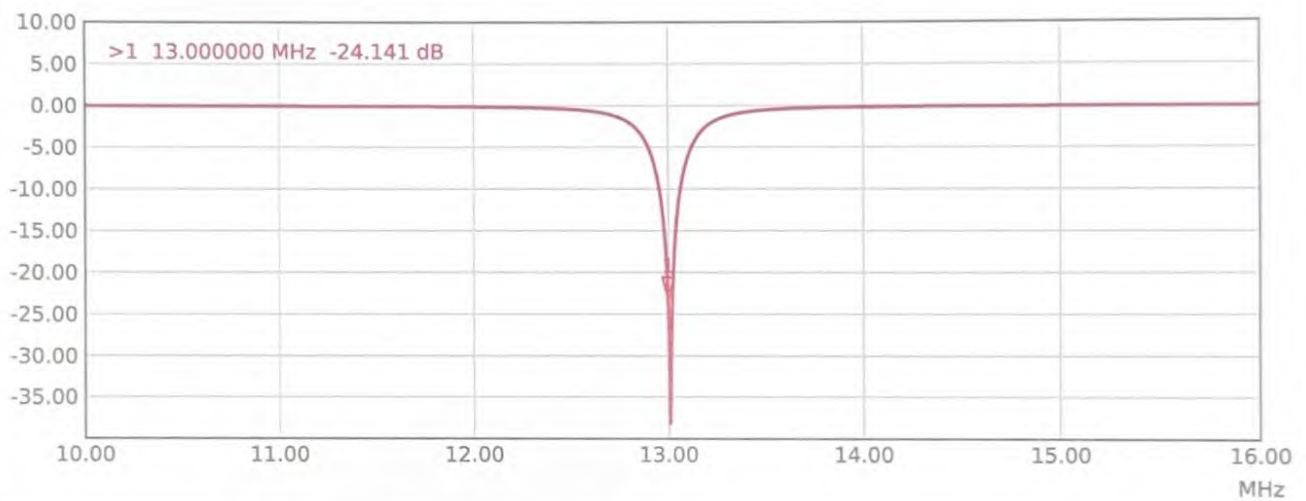
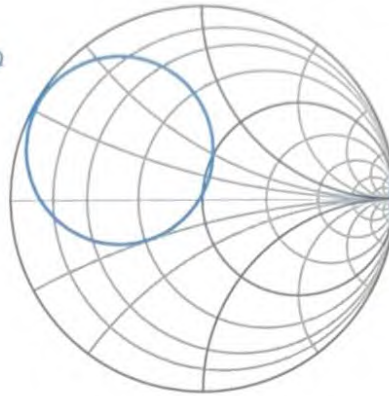
|                     | Zoom Scan           |
|---------------------|---------------------|
| Date                | 2026-02-18          |
| psSAR1g [W/Kg]      | 0.418               |
| psSAR10g [W/Kg]     | 0.261               |
| Power Drift [dB]    | -0.01               |
| Power Scaling       | Disabled            |
| Scaling Factor [dB] |                     |
| TSL Correction      | Positive / Negative |



0 dB = 0.839 W/Kg

## Impedance Measurement Plot for HSL

S11 Smith (R+jX) Scale 1.00

>1 13.000000 MHz 51.387  $\Omega$  6.152  $j\Omega$ 

Client: **SGS**

Certificate No: **25J02Z000195**

## CALIBRATION CERTIFICATE

Object **D750V3 - SN: 1214**

Calibration Procedure(s) **FF-Z11-003-01**  
**Calibration Procedures for dipole validation kits**

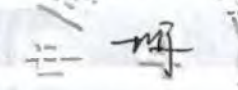
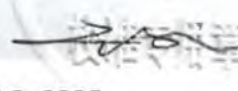
Calibration date: **April 1, 2025**

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 (Calibrated by, Certificate No.) | Scheduled Calibration |
|-------------------------|------------|-------------------------------------------|-----------------------|
| Power Meter NRP2        | 106276     | 17-May-24 (CTTL, No. J24X04107)           | May-25                |
| Power sensor NRP6A      | 101369     | 17-May-24 (CTTL, No. J24X04107)           | May-25                |
| Reference Probe EX3DV4  | SN 7307    | 24-May-24(SPEAG, No. EX-7307_May24)       | May-25                |
| DAE4                    | SN 1588    | 13-Sep-24(CTTL-SPEAG, No. 24J02Z000713)   | Sep-25                |
| Secondary Standards     | ID #       | Cal Date (Calibrated by, Certificate No.) | Scheduled Calibration |
| Signal Generator E4438C | MY49071430 | 19-Dec-24 (CTTL, No. 24J02X103931)        | Dec-25                |
| NetworkAnalyzer E5071C  | MY46110673 | 18-Dec-24 (CTTL, No. 24J02X103932)        | Dec-25                |
| OCP DAKS                | SN 0015    | 09-Oct-24(SPEAG, No. OCP-DAKS-0015_Oct24) | Oct -25               |

|                | Name        | Function           | Signature                                                                             |
|----------------|-------------|--------------------|---------------------------------------------------------------------------------------|
| Calibrated by: | Zhao Jing   | SAR Test Engineer  |  |
| Reviewed by:   | Lin Jun     | SAR Test Engineer  |  |
| Approved by:   | Qi Dianyuan | SAR Project Leader |  |

Issued: April 8, 2025

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In Collaboration with

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http://www.caict.ac.cn

### Glossary:

|       |                                            |
|-------|--------------------------------------------|
| TSL   | tissue simulating liquid                   |
| ConvF | sensitivity in TSL / NORM <sub>x,y,z</sub> |
| N/A   | not applicable or not measured             |

### Calibration is Performed According to the Following Standards:

- a) IEC/IEEE 62209-1528, "Measurement Procedure for The Assessment of Specific Absorption Rate of Human Exposure to Radio Frequency Fields from Hand-held and Body-mounted Wireless Communication Devices- Part 1528: Human Models, Instrumentation and Procedures (Frequency range of 4 MHz to 10 GHz)", October 2020
- b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

### Additional Documentation:

- c) DASY4/5 System Handbook

### Methods Applied and Interpretation of Parameters:

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

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



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## Measurement Conditions

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

|                                     |                          |             |
|-------------------------------------|--------------------------|-------------|
| <b>DASY Version</b>                 | DASY52                   | V52.10.4    |
| <b>Extrapolation</b>                | Advanced Extrapolation   |             |
| <b>Phantom</b>                      | Triple Flat Phantom 5.1C |             |
| <b>Distance Dipole Center - TSL</b> | 15 mm                    | with Spacer |
| <b>Zoom Scan Resolution</b>         | dx, dy, dz = 5 mm        |             |
| <b>Frequency</b>                    | 750 MHz $\pm$ 1 MHz      |             |

## Head TSL parameters

The following parameters and calculations were applied.

|                                                | Temperature         | Permittivity   | Conductivity         |
|------------------------------------------------|---------------------|----------------|----------------------|
| <b>Nominal Head TSL parameters</b>             | 22.0 °C             | 41.9           | 0.89 mho/m           |
| <b>Measured Head TSL parameters</b>            | (22.0 $\pm$ 0.2) °C | 42.0 $\pm$ 6 % | 0.91 mho/m $\pm$ 6 % |
| <b>Head TSL temperature change during test</b> | <1.0 °C             | —              | —                    |

## SAR result with Head TSL

|                                                               |                    |                                                |
|---------------------------------------------------------------|--------------------|------------------------------------------------|
| <b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b>   | Condition          |                                                |
| SAR measured                                                  | 250 mW input power | 2.17 W/kg                                      |
| SAR for nominal Head TSL parameters                           | normalized to 1W   | <b>8.54 W/kg <math>\pm</math> 18.8 % (k=2)</b> |
| <b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b> | Condition          |                                                |
| SAR measured                                                  | 250 mW input power | 1.47 W/kg                                      |
| SAR for nominal Head TSL parameters                           | normalized to 1W   | <b>5.80 W/kg <math>\pm</math> 18.7 % (k=2)</b> |



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## Appendix (Additional assessments outside the scope of CNAS L0570)

### Antenna Parameters with Head TSL

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 50.7 $\Omega$ - 3.08j $\Omega$ |
| Return Loss                          | - 30.1dB                       |

### General Antenna Parameters and Design

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 0.941 ns |
|----------------------------------|----------|

After long term use with 100W radiated power, only a slight warming of the dipole near the feed-point 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 feed-point may be damaged.

### Additional EUT Data

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

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**DASY5 Validation Report for Head TSL**

Date: 2025-04-01

Test Laboratory: CTTL, Beijing, China

**DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1214**

Communication System: UID 0, CW; Frequency: 750 MHz

Medium parameters used:  $f = 750 \text{ MHz}$ ;  $\sigma = 0.91 \text{ S/m}$ ;  $\epsilon_r = 42.04$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Right Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

**DASY5 Configuration:**

- Probe: EX3DV4 - SN7307; ConvF(9.25, 9.17, 10.18) @ 750 MHz; Calibrated: 2024-05-28
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1588; Calibrated: 2024-09-13
- Phantom: MFP\_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

**Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$** 

Reference Value = 55.64 V/m; Power Drift = -0.01 dB

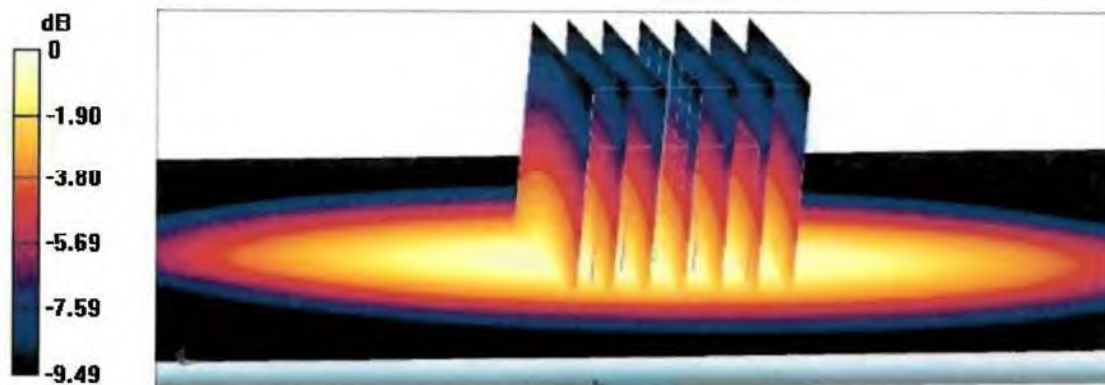
Peak SAR (extrapolated) = 3.07 W/kg

**SAR(1 g) = 2.17 W/kg; SAR(10 g) = 1.47 W/kg**

Smallest distance from peaks to all points 3 dB below = 18 mm

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

Maximum value of SAR (measured) = 2.80 W/kg



0 dB = 2.80 W/kg = 4.47 dBW/kg



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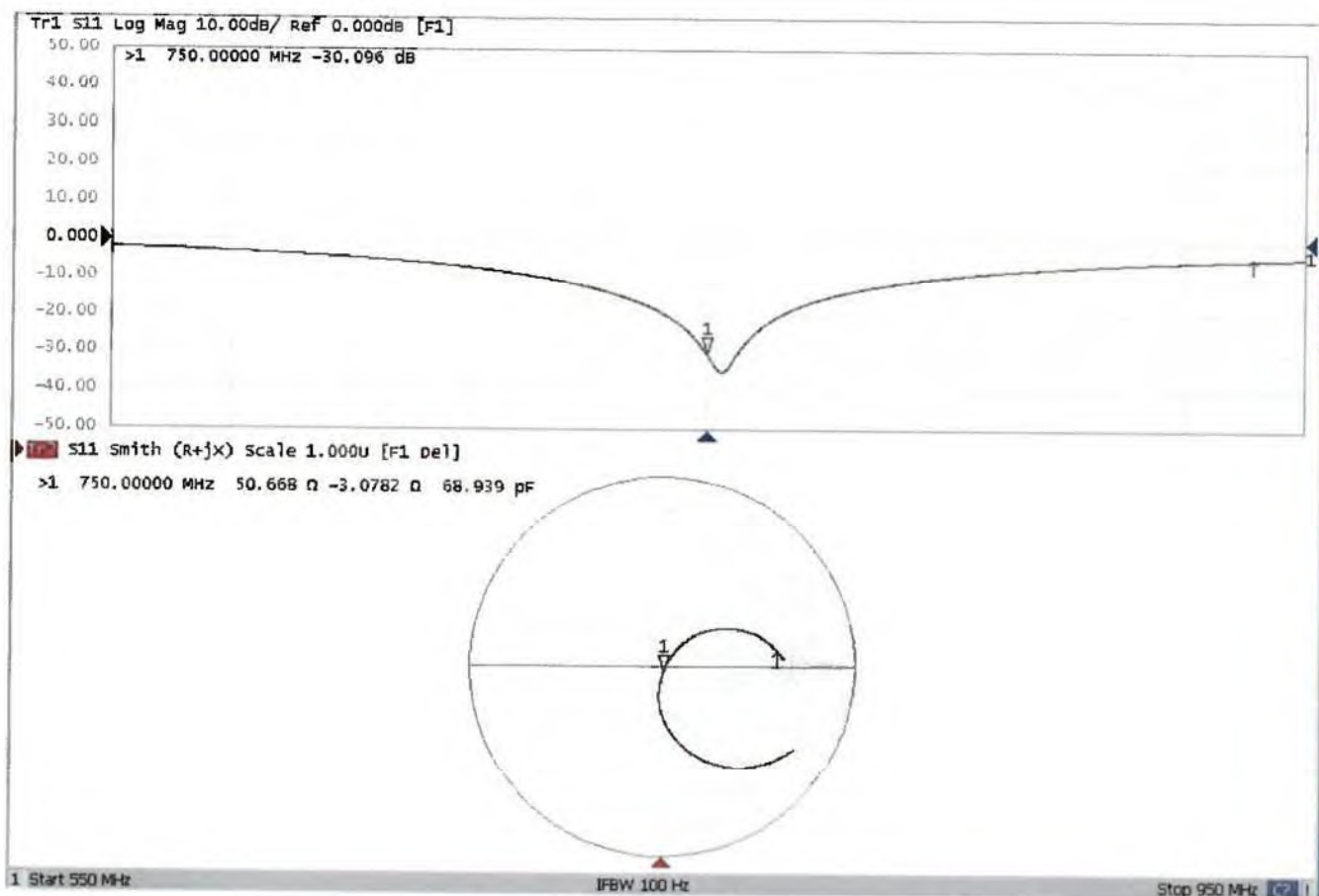
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## Impedance Measurement Plot for Head TSL



Client **SGS**

Certificate No: **J23Z60379**

## CALIBRATION CERTIFICATE

Object **D835V2 - SN: 4d161**

Calibration Procedure(s) **FF-Z11-003-01**  
Calibration Procedures for dipole validation kits

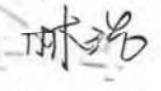
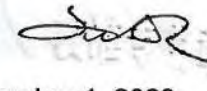
Calibration date: **August 25, 2023**

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.

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| Power Meter NRP2        | 106277     | 22-Sep-22 (CTTL, No.J22X09561)            | Sep-23                |
| Power sensor NRP8S      | 104291     | 22-Sep-22 (CTTL, No.J22X09561)            | Sep-23                |
| Reference Probe EX3DV4  | SN 3617    | 31-Mar-23(CTTL-SPEAG,No.Z23-60161)        | Mar-24                |
| DAE4                    | SN 1556    | 11-Jan-23(CTTL-SPEAG,No.Z23-60034)        | Jan-24                |
| Secondary Standards     | ID #       | Cal Date (Calibrated by, Certificate No.) | Scheduled Calibration |
| Signal Generator E4438C | MY49071430 | 05-Jan-23 (CTTL, No. J23X00107)           | Jan-24                |
| NetworkAnalyzer E5071C  | MY46110673 | 10-Jan-23 (CTTL, No. J23X00104)           | Jan-24                |

|                | Name        | Function           | Signature                                                                             |
|----------------|-------------|--------------------|---------------------------------------------------------------------------------------|
| Calibrated by: | Zhao Jing   | SAR Test Engineer  |  |
| Reviewed by:   | Lin Hao     | SAR Test Engineer  |  |
| Approved by:   | Qi Dianyuan | SAR Project Leader |  |

Issued: September 1, 2023

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|       |                                            |
|-------|--------------------------------------------|
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| ConvF | sensitivity in TSL / NORM <sub>x,y,z</sub> |
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- b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

### Additional Documentation:

- c) DASY4/5 System Handbook

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- **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.
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## Measurement Conditions

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

|                                     |                          |             |
|-------------------------------------|--------------------------|-------------|
| <b>DASY Version</b>                 | DASY52                   | V52.10.4    |
| <b>Extrapolation</b>                | Advanced Extrapolation   |             |
| <b>Phantom</b>                      | Triple Flat Phantom 5.1C |             |
| <b>Distance Dipole Center - TSL</b> | 15 mm                    | with Spacer |
| <b>Zoom Scan Resolution</b>         | dx, dy, dz = 5 mm        |             |
| <b>Frequency</b>                    | 835 MHz $\pm$ 1 MHz      |             |

## Head TSL parameters

The following parameters and calculations were applied.

|                                                | Temperature         | Permittivity   | Conductivity         |
|------------------------------------------------|---------------------|----------------|----------------------|
| <b>Nominal Head TSL parameters</b>             | 22.0 °C             | 41.5           | 0.90 mho/m           |
| <b>Measured Head TSL parameters</b>            | (22.0 $\pm$ 0.2) °C | 42.1 $\pm$ 6 % | 0.90 mho/m $\pm$ 6 % |
| <b>Head TSL temperature change during test</b> | <1.0 °C             | ----           | ----                 |

## SAR result with Head TSL

| <b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b>   | Condition          |                                                |
|---------------------------------------------------------------|--------------------|------------------------------------------------|
| SAR measured                                                  | 250 mW input power | 2.40 W/kg                                      |
| SAR for nominal Head TSL parameters                           | normalized to 1W   | <b>9.60 W/kg <math>\pm</math> 18.8 % (k=2)</b> |
| <b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b> | Condition          |                                                |
| SAR measured                                                  | 250 mW input power | 1.54 W/kg                                      |
| SAR for nominal Head TSL parameters                           | normalized to 1W   | <b>6.16 W/kg <math>\pm</math> 18.7 % (k=2)</b> |



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## Appendix (Additional assessments outside the scope of CNAS L0570)

### Antenna Parameters with Head TSL

|                                      |               |
|--------------------------------------|---------------|
| Impedance, transformed to feed point | 50.3Ω- 3.44jΩ |
| Return Loss                          | - 29.3dB      |

### General Antenna Parameters and Design

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.342 ns |
|----------------------------------|----------|

After long term use with 100W radiated power, only a slight warming of the dipole near the feed-point 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 feed-point may be damaged.

### Additional EUT Data

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

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**DASY5 Validation Report for Head TSL**

Date: 2023-08-25

Test Laboratory: CTTL, Beijing, China

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d161**

Communication System: UID 0, CW; Frequency: 835 MHz

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.904$  S/m;  $\epsilon_r = 42.11$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

**DASY5 Configuration:**

- Probe: EX3DV4 - SN3617; ConvF(10.1, 10.1, 10.1) @ 835 MHz; Calibrated: 2023-03-31
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1556; Calibrated: 2023-01-11
- Phantom: MFP\_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

**Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 57.83 V/m; Power Drift = -0.02 dB

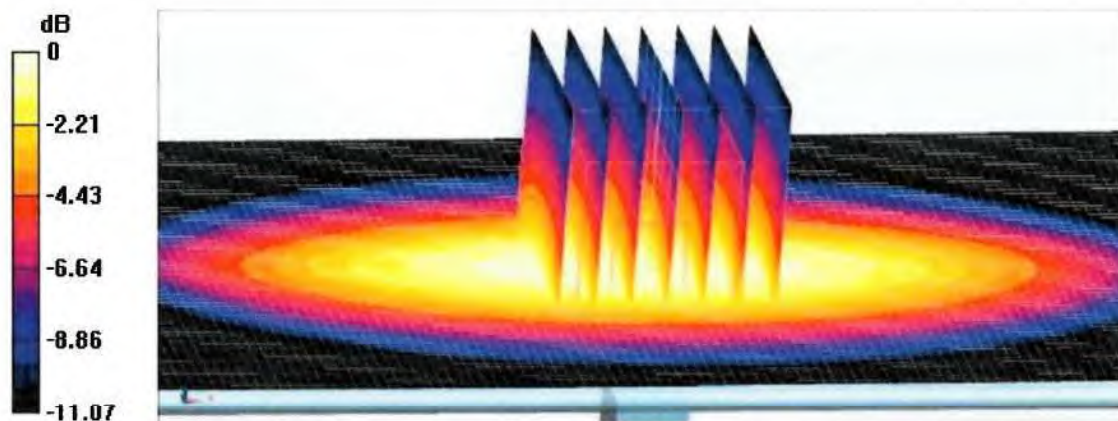
Peak SAR (extrapolated) = 3.89 W/kg

**SAR(1 g) = 2.4 W/kg; SAR(10 g) = 1.54 W/kg**

Smallest distance from peaks to all points 3 dB below = 17.5 mm

Ratio of SAR at M2 to SAR at M1 = 62.1%

Maximum value of SAR (measured) = 3.34 W/kg

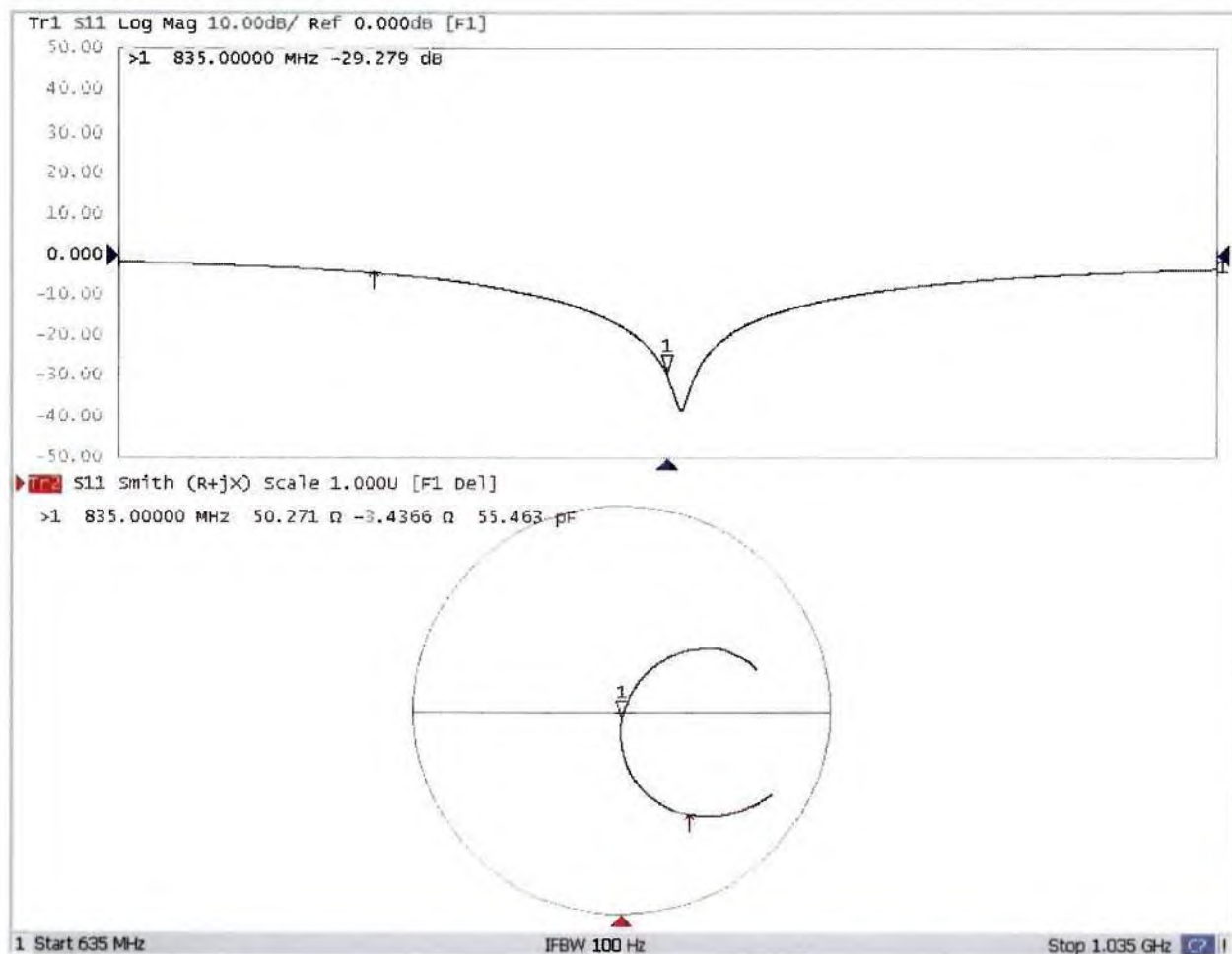


0 dB = 3.34 W/kg = 5.24 dBW/kg



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### Impedance Measurement Plot for Head TSL



Client **SGS**

Certificate No: **23J02Z80118**

## CALIBRATION CERTIFICATE

Object **D1750V2 - SN: 1105**

Calibration Procedure(s) **FF-Z11-003-01**  
**Calibration Procedures for dipole validation kits**

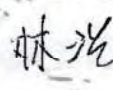
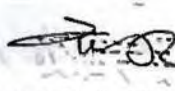
Calibration date: **November 3, 2023**

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 (Calibrated by, Certificate No.) | Scheduled Calibration |
|-------------------------|------------|-------------------------------------------|-----------------------|
| Power Meter NRP2        | 106276     | 15-May-23 (CTTL, No.J23X04183)            | May-24                |
| Power sensor NRP6A      | 101369     | 15-May-23 (CTTL, No.J23X04183)            | May-24                |
| Reference Probe EX3DV4  | SN 7464    | 19-Jan-23(CTTL-SPEAG,No.Z22-60565)        | Jan-24                |
| DAE4                    | SN 1556    | 11-Jan-23(CTTL-SPEAG,No.Z23-60034)        | Jan-24                |
| Secondary Standards     | ID #       | Cal Date (Calibrated by, Certificate No.) | Scheduled Calibration |
| Signal Generator E4438C | MY49071430 | 05-Jan-23 (CTTL, No. J23X00107)           | Jan-24                |
| Network Analyzer E5071C | MY46110673 | 10-Jan-23 (CTTL, No. J23X00104)           | Jan-24                |

|                | Name        | Function           | Signature                                                                             |
|----------------|-------------|--------------------|---------------------------------------------------------------------------------------|
| Calibrated by: | Zhao Jing   | SAR Test Engineer  |  |
| Reviewed by:   | Lin Hao     | SAR Test Engineer  |  |
| Approved by:   | Qi Dianyuan | SAR Project Leader |  |

Issued: November 7, 2023

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### Glossary:

|       |                                            |
|-------|--------------------------------------------|
| TSL   | tissue simulating liquid                   |
| ConvF | sensitivity in TSL / NORM <sub>x,y,z</sub> |
| N/A   | not applicable or not measured             |

### Calibration is Performed According to the Following Standards:

- a) IEC/IEEE 62209-1528, "Measurement Procedure for The Assessment of Specific Absorption Rate of Human Exposure to Radio Frequency Fields from Hand-held and Body-mounted Wireless Communication Devices- Part 1528: Human Models, Instrumentation and Procedures (Frequency range of 4 MHz to 10 GHz)", October 2020
- b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

### Additional Documentation:

- c) DASY4/5 System Handbook

### Methods Applied and Interpretation of Parameters:

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

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



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## Measurement Conditions

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

|                                     |                          |             |
|-------------------------------------|--------------------------|-------------|
| <b>DASY Version</b>                 | DASY52                   | 52.10.4     |
| <b>Extrapolation</b>                | Advanced Extrapolation   |             |
| <b>Phantom</b>                      | Triple Flat Phantom 5.1C |             |
| <b>Distance Dipole Center - TSL</b> | 10 mm                    | with Spacer |
| <b>Zoom Scan Resolution</b>         | dx, dy, dz = 5 mm        |             |
| <b>Frequency</b>                    | 1750 MHz $\pm$ 1 MHz     |             |

## Head TSL parameters

The following parameters and calculations were applied.

|                                                | Temperature         | Permittivity   | Conductivity         |
|------------------------------------------------|---------------------|----------------|----------------------|
| <b>Nominal Head TSL parameters</b>             | 22.0 °C             | 40.1           | 1.37 mho/m           |
| <b>Measured Head TSL parameters</b>            | (22.0 $\pm$ 0.2) °C | 41.2 $\pm$ 6 % | 1.36 mho/m $\pm$ 6 % |
| <b>Head TSL temperature change during test</b> | <1.0 °C             | —              | —                    |

## SAR result with Head TSL

| <b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b>   | Condition          |                                                |
|---------------------------------------------------------------|--------------------|------------------------------------------------|
| SAR measured                                                  | 250 mW input power | 8.99 W/kg                                      |
| SAR for nominal Head TSL parameters                           | normalized to 1W   | <b>36.3 W/kg <math>\pm</math> 18.8 % (k=2)</b> |
| <b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b> | Condition          |                                                |
| SAR measured                                                  | 250 mW input power | 4.80 W/kg                                      |
| SAR for nominal Head TSL parameters                           | normalized to 1W   | <b>19.3 W/kg <math>\pm</math> 18.7 % (k=2)</b> |



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## Appendix (Additional assessments outside the scope of CNAS L0570)

### Antenna Parameters with Head TSL

|                                      |               |
|--------------------------------------|---------------|
| Impedance, transformed to feed point | 47.8Ω- 2.61jΩ |
| Return Loss                          | - 29.1dB      |

### General Antenna Parameters and Design

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

After long term use with 100W radiated power, only a slight warming of the dipole near the feed-point 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 feed-point may be damaged.

### Additional EUT Data

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

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**DASY5 Validation Report for Head TSL**

Date: 2023-11-03

Test Laboratory: CTTL, Beijing, China

**DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1105**

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1750$  MHz;  $\sigma = 1.36$  S/m;  $\epsilon_r = 41.18$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

**DASY5 Configuration:**

- Probe: EX3DV4 - SN7464; ConvF(8.54, 8.54, 8.54) @ 1750 MHz; Calibrated: 2023-01-19
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1556; Calibrated: 2023-01-11
- Phantom: MFP\_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

**Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm**

Reference Value = 92.17 V/m; Power Drift = 0.03 dB

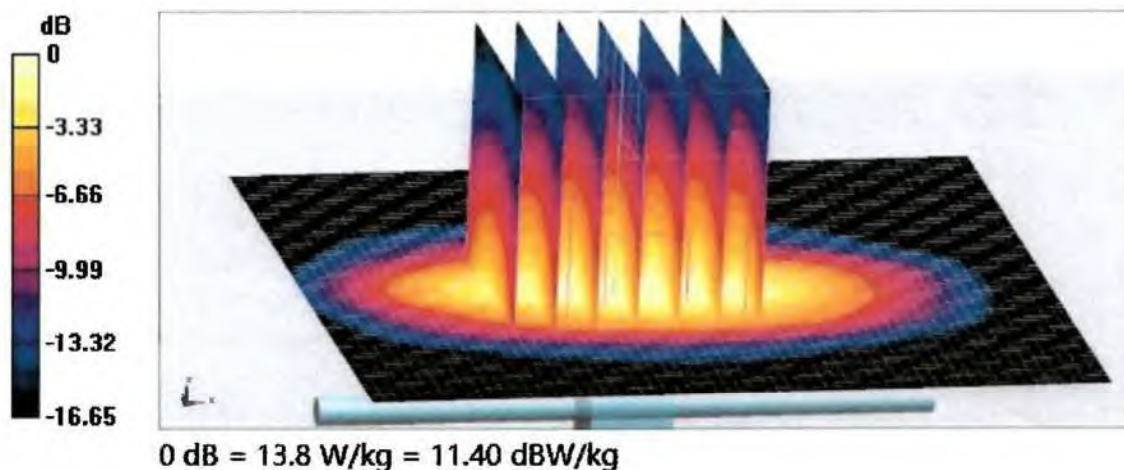
Peak SAR (extrapolated) = 16.6 W/kg

**SAR(1 g) = 8.99 W/kg; SAR(10 g) = 4.8 W/kg**

Smallest distance from peaks to all points 3 dB below = 9.8 mm

Ratio of SAR at M2 to SAR at M1 = 54.8%

Maximum value of SAR (measured) = 13.8 W/kg





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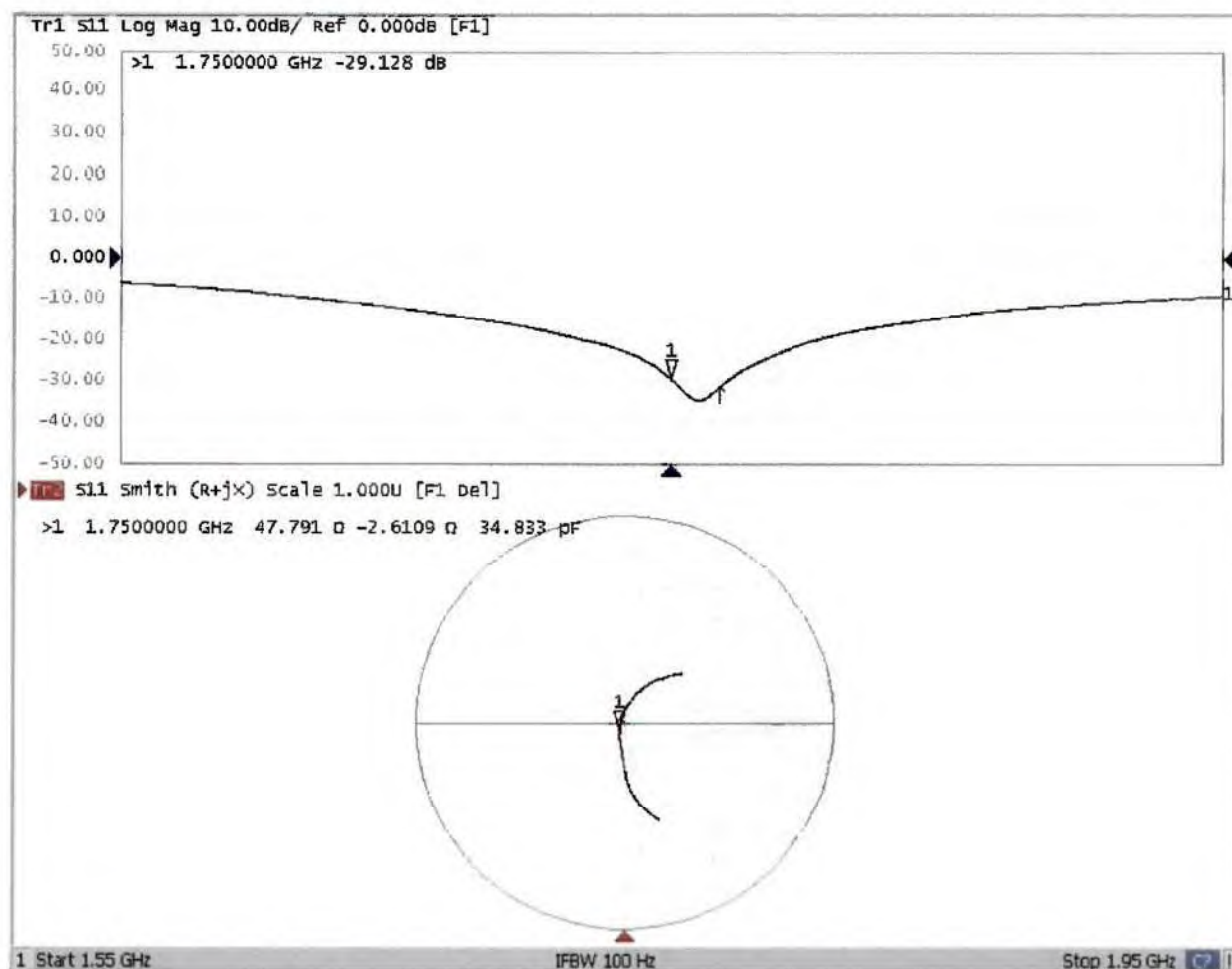
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## Impedance Measurement Plot for Head TSL



Client **SGS (Shenzhen)**

Certificate No: **25J02Z000728**

## CALIBRATION CERTIFICATE

Object **D1950V3 - SN: 1138**

Calibration Procedure(s) **FF-Z11-0003-02**  
**Calibration Procedures for dipole validation kits**

Calibration date: **October 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  $(22\pm3)^{\circ}\text{C}$  and humidity  $<70\%$ .

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards      | ID #       | Cal Date (Calibrated by, Certificate No.)   | Scheduled Calibration |
|------------------------|------------|---------------------------------------------|-----------------------|
| Power Meter NRP2       | 106276     | 16-May-25 (CTTL, No. 25J02X003423)          | May-26                |
| Power sensor NRP6A     | 101369     | 16-May-25 (CTTL, No. 25J02X003423)          | May-26                |
| Reference Probe EX3DV4 | SN 7464    | 28-Jan-25(SPEAG, No. EX-7464_Jan25)         | Jan-26                |
| DAE4                   | SN 1588    | 29-Aug-25(CTTL-SPEAG, No. 25J02Z000631)     | Aug-26                |
| Secondary Standards    | ID #       | Cal Date (Calibrated by, Certificate No.)   | Scheduled Calibration |
| SignalGeneratorSMA200A | 107732     | 22-Jan-25 (CTTL, No. 25J02X000388)          | Jan-26                |
| NetworkAnalyzer E5071C | MY46110673 | 18-Dec-24 (CTTL, No. 24J02X103932)          | Dec-25                |
| OCP DAK-3.5            | 1040       | 20-Jan-25(SPEAG, No. OCP-DAK3.5-1040_Jan25) | Jan-26                |

|                | Name        | Function           | Signature                                                                             |
|----------------|-------------|--------------------|---------------------------------------------------------------------------------------|
| Calibrated by: | Zhao Jing   | SAR Test Engineer  |  |
| Reviewed by:   | Lin Jun     | SAR Test Engineer  |  |
| Approved by:   | Qi Dianyuan | SAR Project Leader |  |

Issued: October 21, 2025

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### Glossary:

|       |                                            |
|-------|--------------------------------------------|
| TSL   | tissue simulating liquid                   |
| ConvF | sensitivity in TSL / NORM <sub>x,y,z</sub> |
| 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-mounted 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.
- *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.

|                                     |                            |                                  |
|-------------------------------------|----------------------------|----------------------------------|
| <b>DASY Version</b>                 | DASY6                      | V17.0.0                          |
| <b>Extrapolation</b>                | Advanced Extrapolation     |                                  |
| <b>Phantom</b>                      | Modular Flat Phantom       |                                  |
| <b>Distance Dipole Center - TSL</b> | 10 mm                      | with Spacer                      |
| <b>Zoom Scan Resolution</b>         | dx, dy = 6 mm, dz = 1.5 mm | Graded Ratio = 1.5 (Z direction) |
| <b>Frequency</b>                    | 1950 MHz $\pm$ 1 MHz       |                                  |

## Head TSL parameters at 1950 MHz

The following parameters and calculations were applied.

|                                                | Temperature         | Permittivity   | Conductivity         |
|------------------------------------------------|---------------------|----------------|----------------------|
| <b>Nominal Head TSL parameters</b>             | 22.0 °C             | 40.0           | 1.40 mho/m           |
| <b>Measured Head TSL parameters</b>            | (22.0 $\pm$ 0.2) °C | 41.0 $\pm$ 6 % | 1.42 mho/m $\pm$ 6 % |
| <b>Head TSL temperature change during test</b> | <1.0 °C             | ----           | ----                 |

## SAR result with Head TSL at 1950 MHz

|                                                               |                    |                                              |
|---------------------------------------------------------------|--------------------|----------------------------------------------|
| <b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b>   | Condition          |                                              |
| SAR measured                                                  | 24 dBm input power | 10.2 W/kg                                    |
| SAR for nominal Head TSL parameters                           | normalized to 1W   | <b>40.7 W/kg <math>\pm</math> 20 % (k=2)</b> |
| <b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b> | Condition          |                                              |
| SAR measured                                                  | 24 dBm input power | 5.30 W/kg                                    |
| SAR for nominal Head TSL parameters                           | normalized to 1W   | <b>21.2 W/kg <math>\pm</math> 20 % (k=2)</b> |



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## Appendix (Additional assessments outside the scope of CNAS L0570)

### Antenna Parameters with Head TSL at 1950 MHz

|                                      |               |
|--------------------------------------|---------------|
| Impedance, transformed to feed point | 48.0Ω- 2.78jΩ |
| Return Loss                          | - 29.1dB      |

### General Antenna Parameters and Design

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.102 ns |
|----------------------------------|----------|

After long term use with 100W radiated power, only a slight warming of the dipole near the feed-point 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 feed-point may be damaged.

### Additional EUT Data

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



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## DASY6 Validation Report for Head TSL

Date: 2025-10-15

Test Laboratory: CTTL, Beijing, China

### Summary

| Dipole            | Frequency [MHz] | TSL | Power [dBm] |
|-------------------|-----------------|-----|-------------|
| D1950V3 – SN 1138 | 1950            | HSL | 24          |

### Exposure Conditions

| Phantom Section, TSL | Position, Test Distance [mm] | Band Group, UID | Frequency [MHz] | Conversion Factor | TSL Cond. [S/m] | TSL Permittivity |
|----------------------|------------------------------|-----------------|-----------------|-------------------|-----------------|------------------|
| Flat                 | 10                           | CW,             | 1950            | 7.33              | 1.42            | 41.0             |

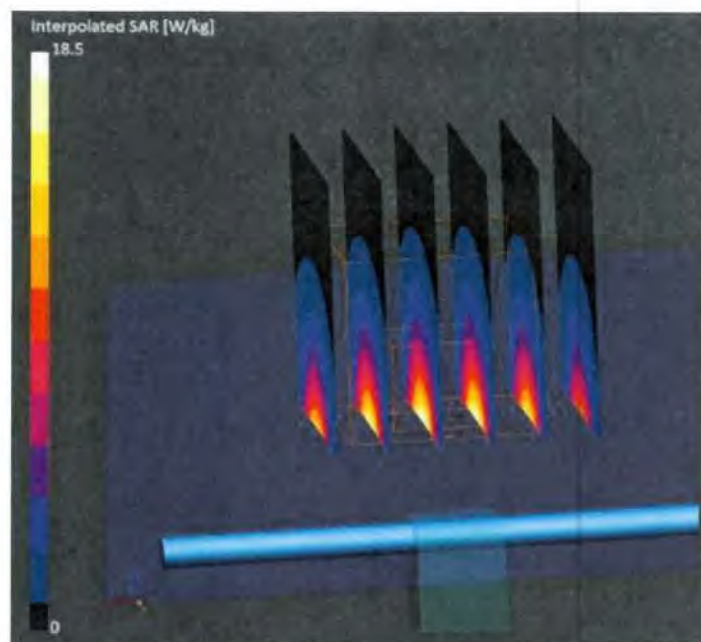
### Hardware Setup

| Phantom        | TSL      | Probe, Calibration Date     | DAE, Calibration Date   |
|----------------|----------|-----------------------------|-------------------------|
| MFP V8.0 Right | HSL 1950 | EX3DV4 - SN7464, 2025-01-28 | DAE4 Sn1588, 2025-08-29 |

### Scan Setup

### Measurement Results

| Zoom Scan           |                | Zoom Scan           |               |
|---------------------|----------------|---------------------|---------------|
| Grid Extents [mm]   | 30.0×30.0×30.0 | psSAR1g [W/kg]      | 10.2          |
| Grid Steps [mm]     | 6.0×6.0×1.5    | psSAR10g [W/kg]     | 5.30          |
| Sensor Surface [mm] | 1.4            | Power Drift [dB]    | 0.00          |
| Graded Grid         | Yes            | Power Scaling       | Disabled      |
| Grading Ratio       | 1.5            | Scaling Factor [dB] |               |
| MAIA                | N/A            | TSL Correction      | No correction |
| Surface Detection   | VMS + 6p       | M2/M1 [%]           | 83.7          |
| Scan Method         | Measured       | Dist 3dB Peak [mm]  | 9.6           |



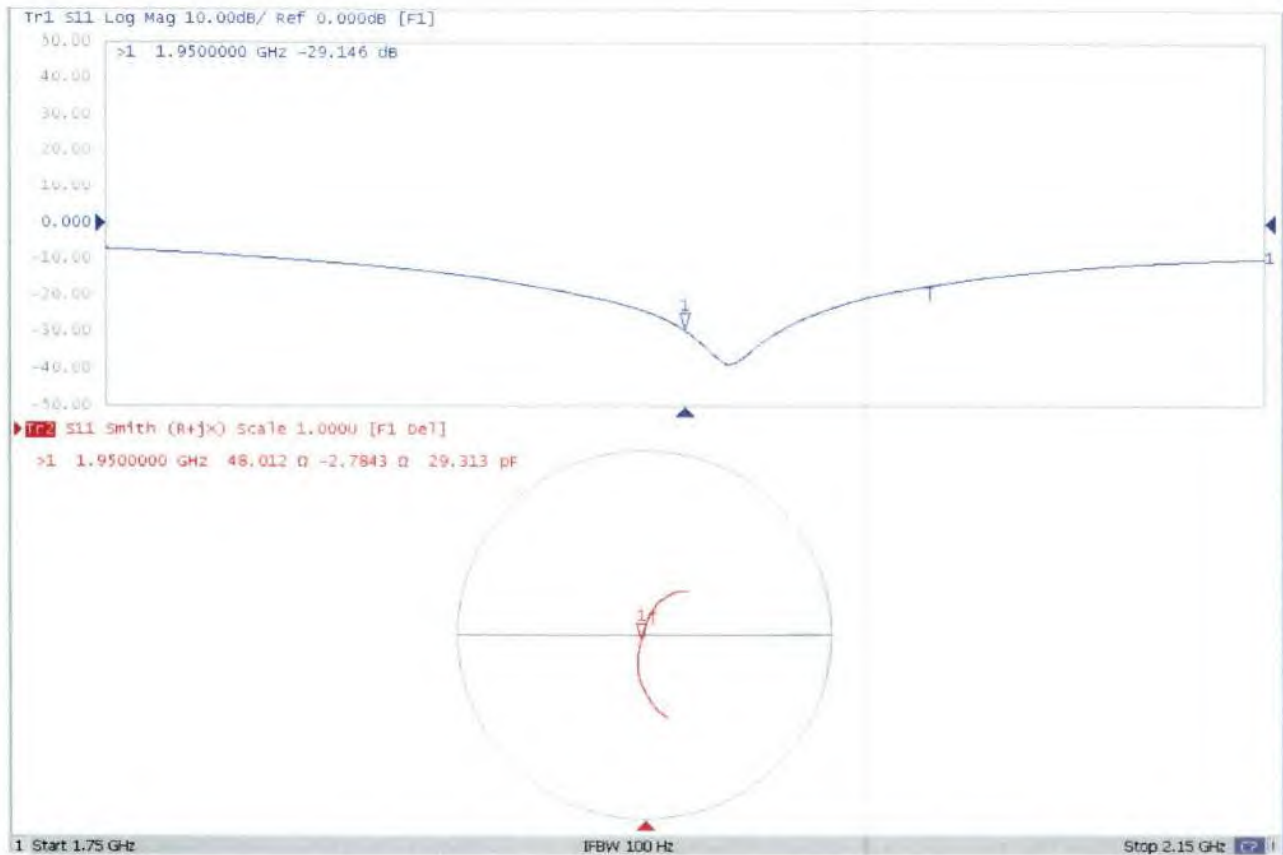


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## Impedance Measurement Plot for Head TSL



Client **SGS**

Certificate No: **J23Z60380**

## CALIBRATION CERTIFICATE

Object **D2450V2 - SN: 922**

Calibration Procedure(s) **FF-Z11-003-01**  
Calibration Procedures for dipole validation kits

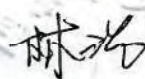
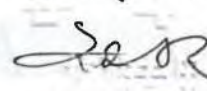
Calibration date: **August 28, 2023**

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 (Calibrated by, Certificate No.) | Scheduled Calibration |
|-------------------------|------------|-------------------------------------------|-----------------------|
| Power Meter NRP2        | 106277     | 22-Sep-22 (CTTL, No.J22X09561)            | Sep-23                |
| Power sensor NRP8S      | 104291     | 22-Sep-22 (CTTL, No.J22X09561)            | Sep-23                |
| Reference Probe EX3DV4  | SN 3617    | 31-Mar-23(CTTL-SPEAG,No.Z23-60161)        | Mar-24                |
| DAE4                    | SN 1556    | 11-Jan-23(CTTL-SPEAG,No.Z23-60034)        | Jan-24                |
| Secondary Standards     | ID #       | Cal Date (Calibrated by, Certificate No.) | Scheduled Calibration |
| Signal Generator E4438C | MY49071430 | 05-Jan-23 (CTTL, No. J23X00107)           | Jan-24                |
| NetworkAnalyzer E5071C  | MY46110673 | 10-Jan-23 (CTTL, No. J23X00104)           | Jan-24                |

|                | Name        | Function           | Signature                                                                             |
|----------------|-------------|--------------------|---------------------------------------------------------------------------------------|
| Calibrated by: | Zhao Jing   | SAR Test Engineer  |  |
| Reviewed by:   | Lin Hao     | SAR Test Engineer  |  |
| Approved by:   | Qi Dianyuan | SAR Project Leader |  |

Issued: September 1, 2023

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### Glossary:

|       |                                            |
|-------|--------------------------------------------|
| TSL   | tissue simulating liquid                   |
| ConvF | sensitivity in TSL / NORM <sub>x,y,z</sub> |
| N/A   | not applicable or not measured             |

### Calibration is Performed According to the Following Standards:

- a) IEC/IEEE 62209-1528, "Measurement Procedure for The Assessment of Specific Absorption Rate of Human Exposure to Radio Frequency Fields from Hand-held and Body-mounted Wireless Communication Devices- Part 1528: Human Models, Instrumentation and Procedures (Frequency range of 4 MHz to 10 GHz)", October 2020
- b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

### Additional Documentation:

- c) DASY4/5 System Handbook

### Methods Applied and Interpretation of Parameters:

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

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



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## Measurement Conditions

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

|                                     |                          |             |
|-------------------------------------|--------------------------|-------------|
| <b>DASY Version</b>                 | DASY52                   | 52.10.4     |
| <b>Extrapolation</b>                | Advanced Extrapolation   |             |
| <b>Phantom</b>                      | Triple Flat Phantom 5.1C |             |
| <b>Distance Dipole Center - TSL</b> | 10 mm                    | with Spacer |
| <b>Zoom Scan Resolution</b>         | dx, dy, dz = 5 mm        |             |
| <b>Frequency</b>                    | 2450 MHz $\pm$ 1 MHz     |             |

## Head TSL parameters

The following parameters and calculations were applied.

|                                                | Temperature         | Permittivity   | Conductivity         |
|------------------------------------------------|---------------------|----------------|----------------------|
| <b>Nominal Head TSL parameters</b>             | 22.0 °C             | 39.2           | 1.80 mho/m           |
| <b>Measured Head TSL parameters</b>            | (22.0 $\pm$ 0.2) °C | 39.0 $\pm$ 6 % | 1.84 mho/m $\pm$ 6 % |
| <b>Head TSL temperature change during test</b> | <1.0 °C             | ---            | ---                  |

## SAR result with Head TSL

| <b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b>   | Condition          |                                                |
|---------------------------------------------------------------|--------------------|------------------------------------------------|
| SAR measured                                                  | 250 mW input power | 13.3 W/kg                                      |
| SAR for nominal Head TSL parameters                           | normalized to 1W   | <b>52.7 W/kg <math>\pm</math> 18.8 % (k=2)</b> |
| <b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b> | Condition          |                                                |
| SAR measured                                                  | 250 mW input power | 6.19 W/kg                                      |
| SAR for nominal Head TSL parameters                           | normalized to 1W   | <b>24.6 W/kg <math>\pm</math> 18.7 % (k=2)</b> |



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## Appendix (Additional assessments outside the scope of CNAS L0570)

### Antenna Parameters with Head TSL

|                                      |                            |
|--------------------------------------|----------------------------|
| Impedance, transformed to feed point | $53.2\Omega + 5.45j\Omega$ |
| Return Loss                          | - 24.3dB                   |

### General Antenna Parameters and Design

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.068 ns |
|----------------------------------|----------|

After long term use with 100W radiated power, only a slight warming of the dipole near the feed-point 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 feed-point may be damaged.

### Additional EUT Data

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

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**DASY5 Validation Report for Head TSL**

Date: 2023-08-28

Test Laboratory: CTTL, Beijing, China

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 922**

Communication System: UID 0, CW; Frequency: 2450 MHz

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.835$  S/m;  $\epsilon_r = 39.03$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

**DASY5 Configuration:**

- Probe: EX3DV4 - SN3617; ConvF(7.68, 7.68, 7.68) @ 2450 MHz; Calibrated: 2023-03-31
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1556; Calibrated: 2023-01-11
- Phantom: MFP\_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

**Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 97.74 V/m; Power Drift = -0.03 dB

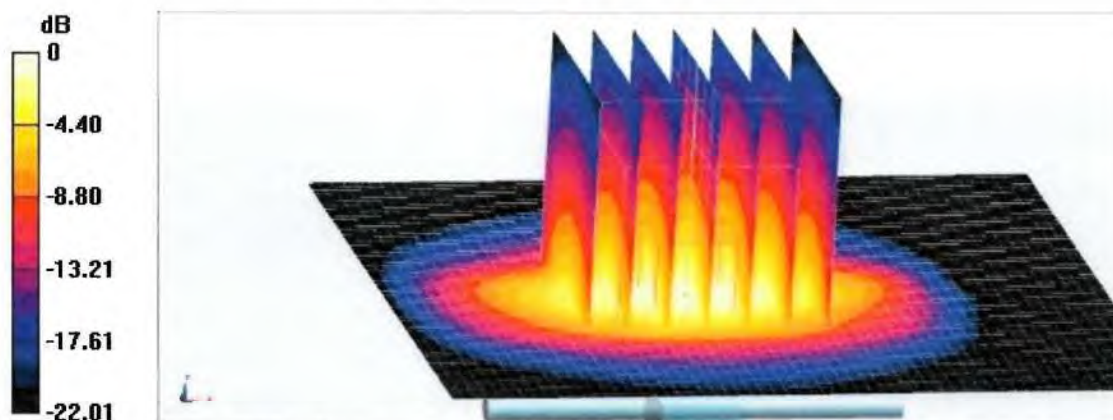
Peak SAR (extrapolated) = 27.6 W/kg

**SAR(1 g) = 13.3 W/kg; SAR(10 g) = 6.19 W/kg**

Smallest distance from peaks to all points 3 dB below = 9 mm

Ratio of SAR at M2 to SAR at M1 = 49.1%

Maximum value of SAR (measured) = 22.1 W/kg

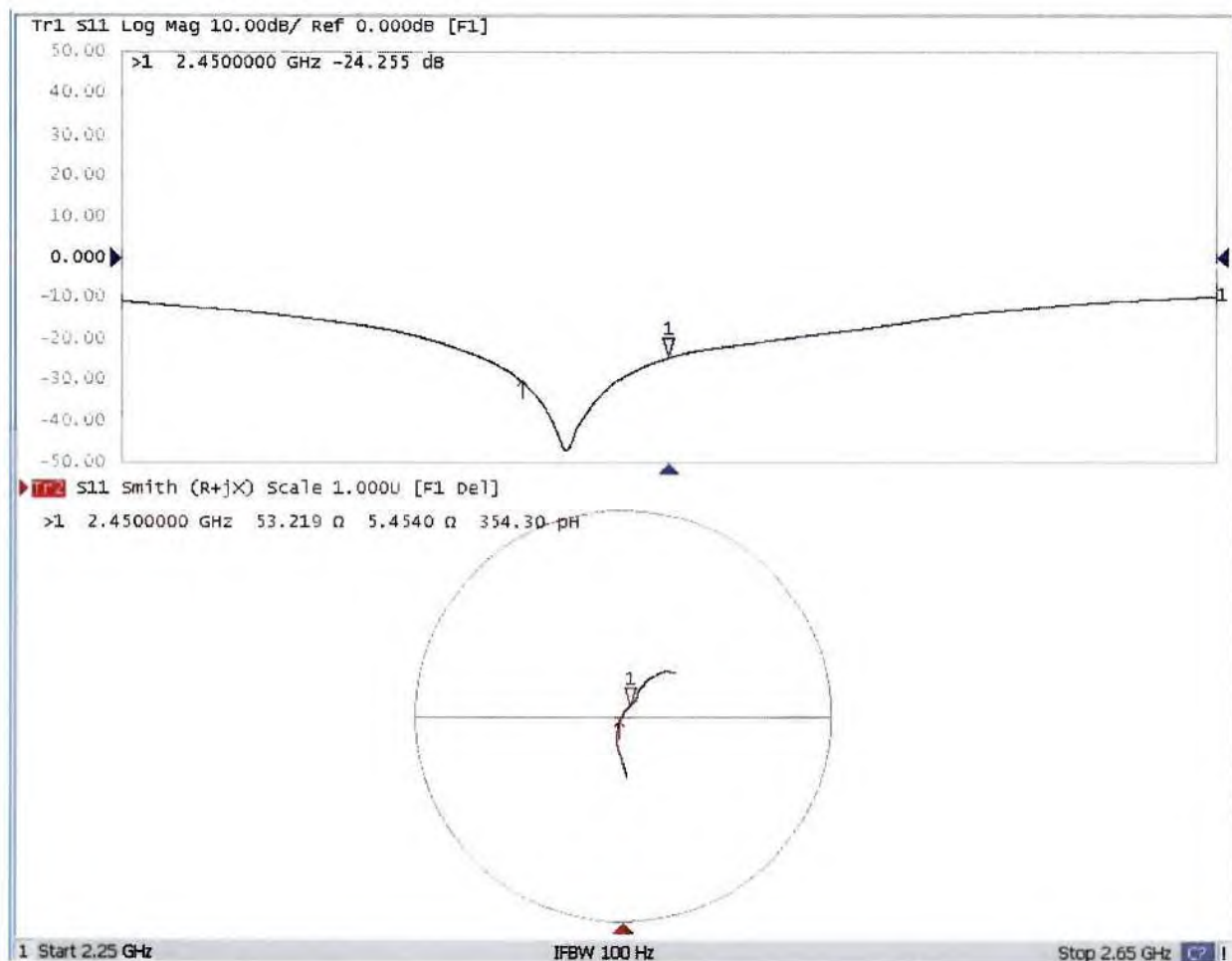


0 dB = 22.1 W/kg = 13.44 dBW/kg



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### Impedance Measurement Plot for Head TSL



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Client: **SGS**

Certificate No: **25J02Z000198**

## CALIBRATION CERTIFICATE

Object **D2600V2 - SN: 1158**

Calibration Procedure(s) **FF-Z11-003-01**  
**Calibration Procedures for dipole validation kits**

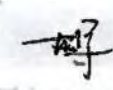
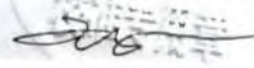
Calibration date: **March 31, 2025**

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 (Calibrated by, Certificate No.) | Scheduled Calibration |
|-------------------------|------------|-------------------------------------------|-----------------------|
| Power Meter NRP2        | 106276     | 17-May-24 (CTTL, No. J24X04107)           | May-25                |
| Power sensor NRP6A      | 101369     | 17-May-24 (CTTL, No. J24X04107)           | May-25                |
| Reference Probe EX3DV4  | SN 7307    | 24-May-24(SPEAG, No. EX-7307_May24)       | May-25                |
| DAE4                    | SN 1588    | 13-Sep-24(CTTL-SPEAG, No. 24J02Z000713)   | Sep-25                |
| Secondary Standards     | ID #       | Cal Date (Calibrated by, Certificate No.) | Scheduled Calibration |
| Signal Generator E4438C | MY49071430 | 19-Dec-24 (CTTL, No. 24J02X103931)        | Dec-25                |
| NetworkAnalyzer E5071C  | MY46110673 | 18-Dec-24 (CTTL, No. 24J02X103932)        | Dec-25                |
| OCP DAKS                | SN 0015    | 09-Oct-24(SPEAG, No. OCP-DAKS-0015_Oct24) | Oct -25               |

|                | Name        | Function           | Signature                                                                             |
|----------------|-------------|--------------------|---------------------------------------------------------------------------------------|
| Calibrated by: | Zhao Jing   | SAR Test Engineer  |  |
| Reviewed by:   | Lin Jun     | SAR Test Engineer  |  |
| Approved by:   | Qi Dianyuan | SAR Project Leader |  |

Issued: April 8, 2025

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### Glossary:

|       |                                            |
|-------|--------------------------------------------|
| TSL   | tissue simulating liquid                   |
| ConvF | sensitivity in TSL / NORM <sub>x,y,z</sub> |
| N/A   | not applicable or not measured             |

### Calibration is Performed According to the Following Standards:

- a) IEC/IEEE 62209-1528, "Measurement Procedure for The Assessment of Specific Absorption Rate of Human Exposure to Radio Frequency Fields from Hand-held and Body-mounted Wireless Communication Devices- Part 1528: Human Models, Instrumentation and Procedures (Frequency range of 4 MHz to 10 GHz)", October 2020
- b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

### Additional Documentation:

- c) DASY4/5 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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<http://www.caict.ac.cn>**Measurement Conditions**

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

|                                     |                          |             |
|-------------------------------------|--------------------------|-------------|
| <b>DASY Version</b>                 | DASY52                   | 52.10.4     |
| <b>Extrapolation</b>                | Advanced Extrapolation   |             |
| <b>Phantom</b>                      | Triple Flat Phantom 5.1C |             |
| <b>Distance Dipole Center - TSL</b> | 10 mm                    | with Spacer |
| <b>Zoom Scan Resolution</b>         | dx, dy, dz = 5 mm        |             |
| <b>Frequency</b>                    | 2600 MHz $\pm$ 1 MHz     |             |

**Head TSL parameters**

The following parameters and calculations were applied.

|                                                | <b>Temperature</b>  | <b>Permittivity</b> | <b>Conductivity</b>  |
|------------------------------------------------|---------------------|---------------------|----------------------|
| <b>Nominal Head TSL parameters</b>             | 22.0 °C             | 39.0                | 1.96 mho/m           |
| <b>Measured Head TSL parameters</b>            | (22.0 $\pm$ 0.2) °C | 39.2 $\pm$ 6 %      | 1.97 mho/m $\pm$ 6 % |
| <b>Head TSL temperature change during test</b> | <1.0 °C             | —                   | —                    |

**SAR result with Head TSL**

|                                                               |                    |                                                |
|---------------------------------------------------------------|--------------------|------------------------------------------------|
| <b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b>   | <b>Condition</b>   |                                                |
| SAR measured                                                  | 250 mW input power | 13.8 W/kg                                      |
| SAR for nominal Head TSL parameters                           | normalized to 1W   | <b>55.2 W/kg <math>\pm</math> 18.8 % (k=2)</b> |
| <b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b> | <b>Condition</b>   |                                                |
| SAR measured                                                  | 250 mW input power | 6.18 W/kg                                      |
| SAR for nominal Head TSL parameters                           | normalized to 1W   | <b>24.7 W/kg <math>\pm</math> 18.7 % (k=2)</b> |



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## Appendix (Additional assessments outside the scope of CNAS L0570)

### Antenna Parameters with Head TSL

|                                      |               |
|--------------------------------------|---------------|
| Impedance, transformed to feed point | 46.9Ω- 5.43jΩ |
| Return Loss                          | - 23.8dB      |

### General Antenna Parameters and Design

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.054 ns |
|----------------------------------|----------|

After long term use with 100W radiated power, only a slight warming of the dipole near the feed-point 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 feed-point may be damaged.

### Additional EUT Data

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