

## Appendix C for KSCR221200251401

## Calibration Certificate

| Object | Apply                               | No | Model   | SN    | Calibration Date |
|--------|-------------------------------------|----|---------|-------|------------------|
| Dipole | <input type="checkbox"/>            | 1  | CLA150  | 4025  | 2021/04/26       |
|        | <input type="checkbox"/>            | 2  | D450V3  | 1103  | 2021/04/21       |
|        | <input type="checkbox"/>            | 3  | D750V3  | 1188  | 2022/03/29       |
|        | <input type="checkbox"/>            | 4  | D835V2  | 4d114 | 2022/03/31       |
|        | <input type="checkbox"/>            | 5  | D900V2  | 1d079 | 2022/06/07       |
|        | <input type="checkbox"/>            | 6  | D1800V2 | 2d170 | 2022/03/31       |
|        | <input type="checkbox"/>            | 7  | D1900V2 | 5d136 | 2022/06/07       |
|        | <input type="checkbox"/>            | 8  | D2000V2 | 1041  | 2022/06/06       |
|        | <input type="checkbox"/>            | 9  | D2300V2 | 1096  | 2022/03/31       |
|        | <input checked="" type="checkbox"/> | 10 | D2450V2 | 817   | 2022/04/01       |
|        | <input type="checkbox"/>            | 11 | D2600V2 | 1158  | 2022/03/31       |
|        | <input type="checkbox"/>            | 12 | D5GHzV2 | 1095  | 2022/06/01       |
| DAE    | <input checked="" type="checkbox"/> | 13 | DAE4    | 1245  | 2022/05/30       |
| Probe  | <input checked="" type="checkbox"/> | 14 | EX3DV4  | 7767  | 2022/10/28       |



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## 1 Dipole

## 1.1 CLA150 - SN 4025

| Calibration Laboratory of<br>Schmid & Partner<br>Engineering AG<br>Zeughausstrasse 43, 8004 Zurich, Switzerland                                                                                                                                                               |                       | S Schweizerischer Kalibrierdienst<br>Service suisse d'étalonnage<br>Servizio svizzero di taratura<br>S Swiss Calibration Service |                       |
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| Accredited by the Swiss Accreditation Service (SAS)<br>The Swiss Accreditation Service is one of the signatories to the EA<br>Multilateral Agreement for the recognition of calibration certificates                                                                          |                       | Accreditation No.: SCS 0108                                                                                                      |                       |
| Client: SGS-CN (Auden)                                                                                                                                                                                                                                                        |                       | Certificate No: CLA150-4025_Apr21                                                                                                |                       |
| <b>CALIBRATION CERTIFICATE</b>                                                                                                                                                                                                                                                |                       |                                                                                                                                  |                       |
| Object: CLA150 - SN: 4025                                                                                                                                                                                                                                                     |                       |                                                                                                                                  |                       |
| Calibration procedure(s): QA CAL-15-v9<br>Calibration Procedure for SAR Validation Sources below 700 MHz                                                                                                                                                                      |                       |                                                                                                                                  |                       |
| Calibration date: April 26, 2021                                                                                                                                                                                                                                              |                       |                                                                                                                                  |                       |
| This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).<br>The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate. |                       |                                                                                                                                  |                       |
| All calibrations have been conducted in the closed laboratory facility: environment temperature $22 \pm 3^\circ\text{C}$ and humidity $< 70\%$ .                                                                                                                              |                       |                                                                                                                                  |                       |
| Calibration Equipment used (M&TE critical for calibration)                                                                                                                                                                                                                    |                       |                                                                                                                                  |                       |
| Primary Standards                                                                                                                                                                                                                                                             | ID #                  | Cal Date (Certificate No.)                                                                                                       | Scheduled Calibration |
| Power meter NRP                                                                                                                                                                                                                                                               | SN: 10476             | 09-Apr-21 (No. 217-03201/03202)                                                                                                  | Apr-22                |
| Power sensor NRP Z91                                                                                                                                                                                                                                                          | SN: 10344             | 09-Apr-21 (No. 217-03201)                                                                                                        | Apr-22                |
| Power sensor NRP Z91                                                                                                                                                                                                                                                          | SN: 10345             | 09-Apr-21 (No. 217-03202)                                                                                                        | Apr-22                |
| Reference 20 dB Attenuator                                                                                                                                                                                                                                                    | SN: C22862 (20dB)     | 09-Apr-21 (No. 217-03343)                                                                                                        | Apr-22                |
| Type-N mismatch combination                                                                                                                                                                                                                                                   | SN: 310692 / 00367    | 09-Apr-21 (No. 217-03344)                                                                                                        | Apr-22                |
| Reference Probe EX3004                                                                                                                                                                                                                                                        | SN: 3877              | 30-Dec-20 (No. EX30077-Dec20)                                                                                                    | Dec-21                |
| ENEA                                                                                                                                                                                                                                                                          | SN: 684               | 26-Jan-20 (No. D458-658-Jan20)                                                                                                   | Jun-21                |
| Secondary Standards                                                                                                                                                                                                                                                           | ID #                  | Check Date (in house)                                                                                                            | Scheduled Check       |
| Power meter S44135                                                                                                                                                                                                                                                            | SN: G841203074        | 06-Apr-18 (in house check Jun-20)                                                                                                | In house check Jun-22 |
| Power sensor E4113A                                                                                                                                                                                                                                                           | SN: MY41490067        | 06-Apr-18 (in house check Jun-20)                                                                                                | In house check Jun-22 |
| Power sensor E4113A                                                                                                                                                                                                                                                           | SN: 000100210         | 06-Apr-18 (in house check Jun-20)                                                                                                | In house check Jun-22 |
| RF generator HP 83642D                                                                                                                                                                                                                                                        | SN: US484001709       | 04-Apr-19 (in house check Jun-20)                                                                                                | In house check Jun-22 |
| Network Analyser Agilent E8363A                                                                                                                                                                                                                                               | SN: US41000477        | 31-Mar-14 (in house check Oct-20)                                                                                                | In house check Oct-21 |
| Calibrated by:                                                                                                                                                                                                                                                                | Name: Jeffrey Katsman | Function: Laboratory Technician                                                                                                  | Signature:            |
| Approved by:                                                                                                                                                                                                                                                                  | Name: Kaja Polovic    | Function: Technical Manager                                                                                                      | Signature:            |
| This calibration certificate shall not be reproduced except in full without written approval of the laboratory.                                                                                                                                                               |                       |                                                                                                                                  |                       |
| Issued: April 26, 2021                                                                                                                                                                                                                                                        |                       |                                                                                                                                  |                       |
| Certificate No: CLA150-4025_Apr21                                                                                                                                                                                                                                             |                       | Page 1 of 6                                                                                                                      |                       |

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| <b>Glossary:</b>                                                                                                                                                                                                                      |                                 |                                                                                                                                  |  |
| TSL                                                                                                                                                                                                                                   | Issue simulating liquid         |                                                                                                                                  |  |
| ConvF                                                                                                                                                                                                                                 | sensitivity in TSL / NORM x,y,z |                                                                                                                                  |  |
| N/A                                                                                                                                                                                                                                   | not applicable or not measured  |                                                                                                                                  |  |
| <b>Calibration is Performed According to the Following Standards:</b>                                                                                                                                                                 |                                 |                                                                                                                                  |  |
| a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Technique", June 2013                  |                                 |                                                                                                                                  |  |
| b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016                            |                                 |                                                                                                                                  |  |
| c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010                             |                                 |                                                                                                                                  |  |
| d) KDB 865864, "SAR Measurement Requirements for 100 MHz to 6 GHz"                                                                                                                                                                    |                                 |                                                                                                                                  |  |
| <b>Additional Documentation:</b>                                                                                                                                                                                                      |                                 |                                                                                                                                  |  |
| e) DASY4/5 System Handbook                                                                                                                                                                                                            |                                 |                                                                                                                                  |  |
| <b>Methods Applied and Interpretation of Parameters:</b>                                                                                                                                                                              |                                 |                                                                                                                                  |  |
| • <b>Measurement Conditions:</b> 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.                                  |                                 |                                                                                                                                  |  |
| • <b>Antenna Parameters with TSL:</b> The source is mounted in a touch configuration below the center marking of the flat phantom.                                                                                                    |                                 |                                                                                                                                  |  |
| • <b>Return Loss:</b> 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. |                                 |                                                                                                                                  |  |
| • <b>SAR measured:</b> SAR measured at the stated antenna input power.                                                                                                                                                                |                                 |                                                                                                                                  |  |
| • <b>SAR normalized:</b> SAR as measured, normalized to an input power of 1 W at the antenna connector.                                                                                                                               |                                 |                                                                                                                                  |  |
| • <b>SAR for nominal TSL parameters:</b> The measured TSL parameters are used to calculate the nominal SAR result.                                                                                                                    |                                 |                                                                                                                                  |  |
| The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.       |                                 |                                                                                                                                  |  |
| Certificate No: CLA150-4025_Apr21                                                                                                                                                                                                     |                                 | Page 2 of 6                                                                                                                      |  |

| Measurement Conditions                                    |                              |                                  |
|-----------------------------------------------------------|------------------------------|----------------------------------|
| DASY system configuration, as far as not given on page 1. |                              |                                  |
| DASY Version                                              | DASY5                        | V52.10.4                         |
| Extrapolation                                             | Advanced Extrapolation       |                                  |
| Phantom                                                   | ELIA Flat Phantom            | Shell thickness: $2 \pm 0.2$ mm  |
| EUT Positioning                                           | Touch Position               |                                  |
| Zoom Scan Resolution                                      | dx, dy = 4.0 mm, dz = 1.4 mm | Graded Ratio = 1.4 (Z direction) |
| Frequency                                                 | 150 MHz $\pm$ 1 MHz          |                                  |

| Head TSL parameters                                     |                                |                |                       |
|---------------------------------------------------------|--------------------------------|----------------|-----------------------|
| The following parameters and calculations were applied. |                                |                |                       |
|                                                         | Temperature                    | Permittivity   | Conductivity          |
| Nominal Head TSL parameters                             | $22.0^\circ\text{C}$           | 52.3           | 0.75 mS/m             |
| Measured Head TSL parameters                            | $(22.0 \pm 0.2)^\circ\text{C}$ | $51.1 \pm 6\%$ | $0.75$ mS/m $\pm 6\%$ |
| Head TSL temperature change during test                 | $< 0.5^\circ\text{C}$          | ---            | ---                   |

| SAR result with Head TSL                              |                  |                                     |
|-------------------------------------------------------|------------------|-------------------------------------|
| SAR averaged over $1\text{ cm}^3$ (1 g) of Head TSL   | Condition        |                                     |
| SAR measured                                          | 1 W input power  | 3.90 W/kg                           |
| SAR for nominal Head TSL parameters                   | normalized to 1W | $3.88\text{ W/kg} \pm 19.4\%$ (k=2) |
| SAR averaged over $10\text{ cm}^3$ (10 g) of Head TSL | condition        |                                     |
| SAR measured                                          | 1 W input power  | 2.60 W/kg                           |
| SAR for nominal Head TSL parameters                   | normalized to 1W | $2.59\text{ W/kg} \pm 18.0\%$ (k=2) |

| Appendix (Additional assessments outside the scope of SCS 0108) |                            |
|-----------------------------------------------------------------|----------------------------|
| <b>Antenna Parameters with Head TSL</b>                         |                            |
| Impedance, transformed to feed point                            | $47.9\Omega \pm 1.5\Omega$ |
| Return Loss                                                     | $-31.4\text{ dB}$          |
| <b>Additional EUT Data</b>                                      |                            |
| Manufactured by                                                 | SPEAG                      |

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|-----------------------------------|--|
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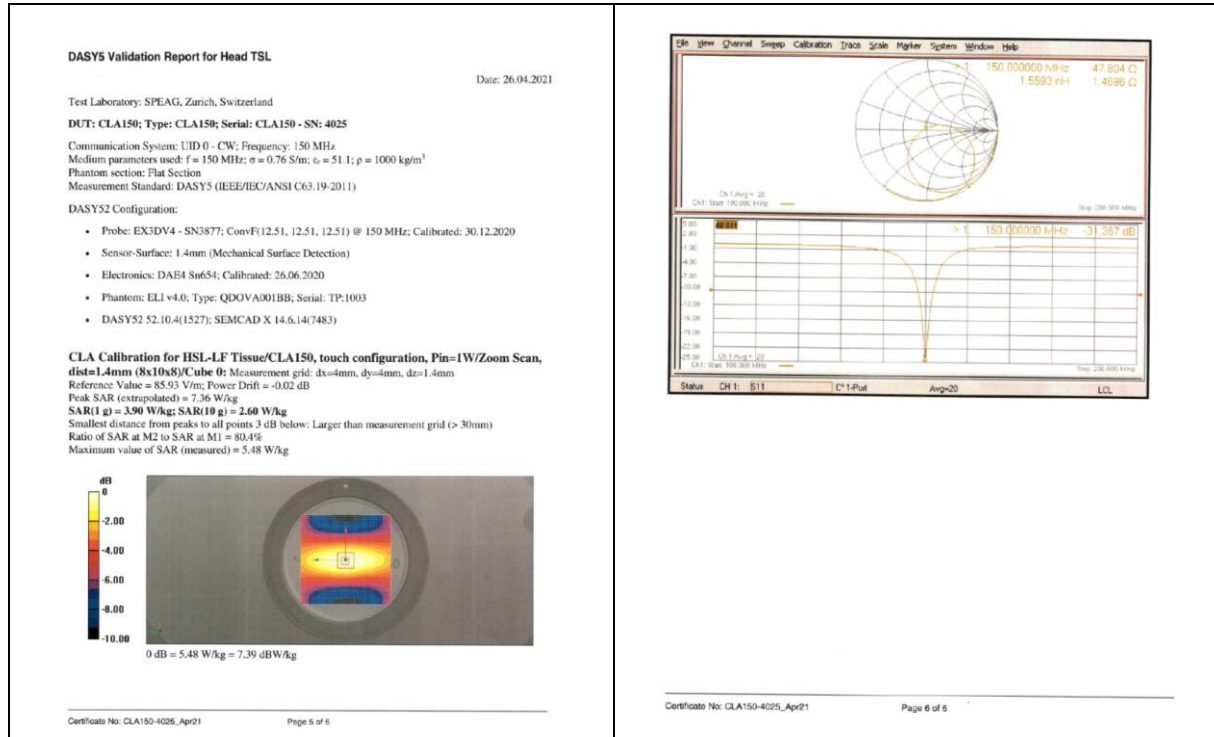
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|-----------------------------------|--|
| Page 4 of 6                       |  |



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## 1.2 D450V3 - SN 1103

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

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Client: **SGS-CN (Aude)** Certificate No: **D450V3-1103\_Apr21**

**CALIBRATION CERTIFICATE**

Object: **D450V3 - SN:1103**

Calibration procedure(s): **QA CAL-15-v9**  
Calibration Procedure for SAR Validation Sources below 700 MHz

Calibration date: **April 21, 2021**

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 (20 ± 2) °C and humidity < 70%.

Calibration Equipment used (MPE critical for calibration)

| Primary Standards           | ID #               | Cal Date (Certificate No.)      | Scheduled Calibration |
|-----------------------------|--------------------|---------------------------------|-----------------------|
| Power meter NRP             | SN: 104778         | 09-Apr-21 (No. 217-03201/03202) | Apr-22                |
| Power sensor NRP-291        | SN: 102344         | 09-Apr-21 (No. 217-03201)       | Apr-22                |
| Power sensor NRP-291        | SN: 102345         | 09-Apr-21 (No. 217-03202)       | Apr-22                |
| Reference 20 dB Attenuator  | SN: CC2852 (200)   | 09-Apr-21 (No. 217-03345)       | Apr-22                |
| Type-N mismatch combination | SN: 310827 / 06327 | 09-Apr-21 (No. 217-03344)       | Apr-22                |
| Reference Probe E30309      | SN: 3877           | 30-Dec-20 (No. E30-3877_Dec20)  | Dec-21                |
| DAEA                        | SN: 654            | 26-Jun-20 (No. D454-654_Jun20)  | Jun-21                |

Secondary Standards

| ID #                            | Check Date (in house)                               | Scheduled Check        |
|---------------------------------|-----------------------------------------------------|------------------------|
| Power meter E44198              | SN: GB41200274 06-Apr-16 (in house check Jun-20)    | In house check: Jun-22 |
| Power sensor E4412A             | SN: MY41496027 06-Apr-16 (in house check Jun-20)    | In house check: Jun-22 |
| Power sensor E4412A             | SN: 00018010 06-Apr-16 (in house check Jun-20)      | In house check: Jun-22 |
| RF generator HP 8548C           | SN: L053460101700 06-Aug-09 (in house check Jun-20) | In house check: Jun-22 |
| Network Analyzer Agilent E8358A | SN: U841980477 31-Mar-14 (in house check Oct-20)    | In house check: Oct-21 |

Calibrated by: **Christoph Leubner** Function: **Laboratory Technician**

Approved by: **Katja Polovic** Technical Manager

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Certificate No: D450V3-1103\_Apr21 Page 1 of 6

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Accreditation No: **SCS 0106**

**Glossary:**

TSL: Issue simulating liquid sensitivity in TSL / NORM x,y,z

ConvF: not applicable or not measured

N/A: not applicable or not measured

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

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

**Additional Documentation:**

- 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.

|                              |                        |                             |
|------------------------------|------------------------|-----------------------------|
| DASY Version                 | DASY5                  | V82.10.4                    |
| Extrapolation                | Advanced Extrapolation |                             |
| Phantom                      | ELJ Flat Phantom       | Shell thickness: 2 ± 0.2 mm |
| Distance Dipole Center - TSL | 15 mm                  | with Spacer                 |
| Zoom Scan Resolution         | dx, dy, dz = 5 mm      |                             |
| Frequency                    | 450 MHz ± 1 MHz        |                             |

## Head TSL parameters

The following parameters and calculations were applied:

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Head TSL parameters             | 22.0 °C         | 43.5         | 0.57 mho/m       |
| Measured Head TSL parameters            | (22.0 ± 0.2) °C | 43.1 ± 6 %   | 0.07 mho/m ± 8 % |
| Head TSL temperature change during test | < 0.5 °C        | ---          | ---              |

## SAR result with Head TSL

|                                                       |                    |                          |
|-------------------------------------------------------|--------------------|--------------------------|
| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL | Condition          |                          |
| SAR measured                                          | 250 mW input power | 1.14 W/kg                |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | 4.55 W/kg ± 18.1 % (k=2) |

|                                                         |                    |                          |
|---------------------------------------------------------|--------------------|--------------------------|
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | condition          |                          |
| SAR measured                                            | 250 mW input power | 0.757 W/kg               |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 3.06 W/kg ± 17.6 % (k=2) |

Certificate No: D450V3-1103\_Apr21

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## DASY5 Validation Report for Head TSL

Test Laboratory: SPEAG, Zurich, Switzerland

Date: 21.04.2021

DUT: Dipole 450 MHz; Type: D450V3; Serial: D450V3 - SN:1103

Communication System: UTD 0 - CW; Frequency: 450 MHz

Medium parameters used:  $f = 450$  MHz;  $\alpha = 0.87$  S/m;  $\epsilon_r = 43.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN3877; ConvF(10.64, 10.64, 10.64) @ 450 MHz; Calibrated: 30.12.2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn654; Calibrated: 26.06.2020
- Phantom: ELJ v4.0; Type: QDOVA001BB; Serial: TP:1003
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

## Dipole Calibration for Head Tissue(d=15mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 39.18 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 1.76 W/kg

SAR(1 g) = 1.14 W/kg; SAR(10 g) = 0.767 W/kg

Smallest distance from peaks to all points 3 dB below: Larger than measurement grid

Ratio of SAR at M2 to SAR at M1 = 64.9%

Maximum value of SAR (measured) = 1.53 W/kg

0 dB = 1.53 W/kg = 1.85 dBW/kg

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

### Antenna Parameters with Head TSL

|                                      |                  |
|--------------------------------------|------------------|
| Impedance, transformed to feed point | 57.1 Ω - j2.8 jΩ |
| Return Loss                          | -23.0 dB         |

### General Antenna Parameters and Design

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.346 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 overnight coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

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

### Additional EUT Data

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

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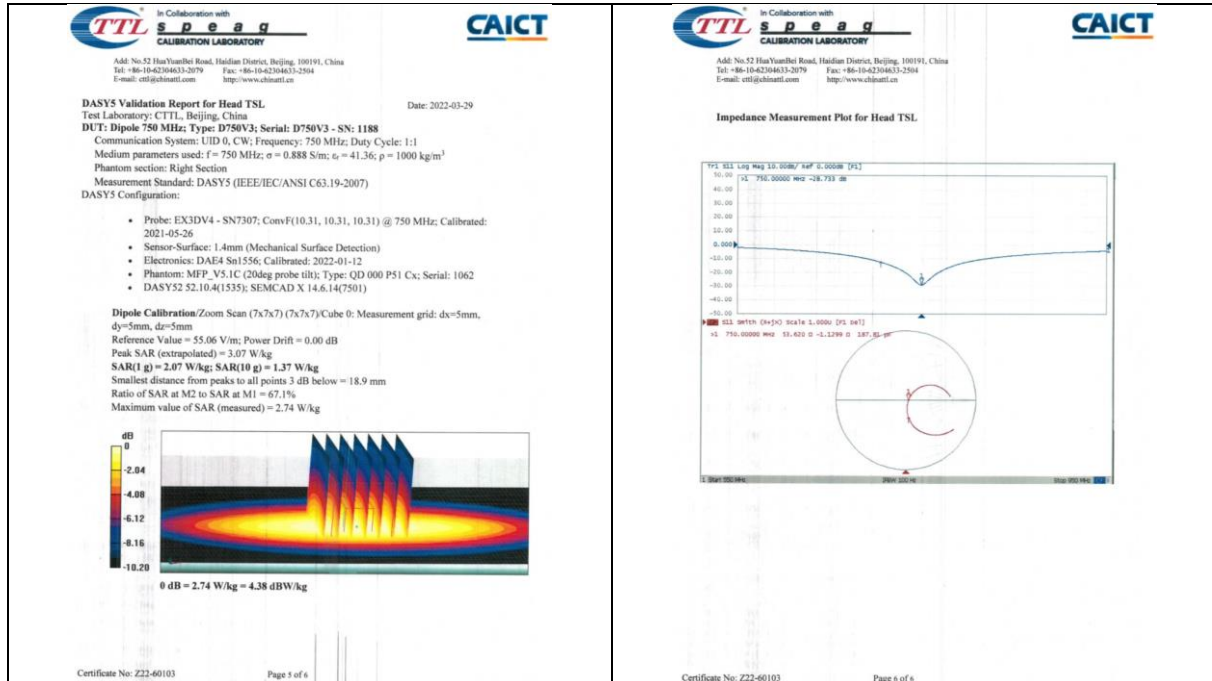
## 1.3 D750V3 - SN 1188

| TTL Speag CALIBRATION LABORATORY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |            | CAICT                                                                                                                                                                          |                       |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------------|------|------------------------------------------|-----------------------|-------------------------|------------|-------------------------------|--------|-------------------------|------------|-------------------------------|--------|------------------------|---------|-------------------------------------|--------|------|---------|-------------------------------------|--------|
| Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China<br>Tel: +86-10-42304633-2512 Fax: +86-10-42304633-2504<br>E-mail: cti@chinaetl.com http://www.chinaetl.cn                                                                                                                                                                                                                                                                                                                                                                                                                                            |            | Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China<br>Tel: +86-10-42304633-2079 Fax: +86-10-42304633-2504<br>E-mail: cti@chinaetl.com http://www.chinaetl.cn |                       |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
| Client: SGS-CN                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |            | Certificate No: Z22-60103                                                                                                                                                      |                       |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
| <b>CALIBRATION CERTIFICATE</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |            |                                                                                                                                                                                |                       |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
| Object: D750V3 - SN: 1188                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |            |                                                                                                                                                                                |                       |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
| Calibration Procedure(s): FF-Z11-003-01<br>Calibration Procedures for dipole validation kits                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |            |                                                                                                                                                                                |                       |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
| Calibration date: March 28, 2022                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |            |                                                                                                                                                                                |                       |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
| 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)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |            |                                                                                                                                                                                |                       |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
| <table border="1"><thead><tr><th>Primary Standards</th><th>ID #</th><th>Cal Date (Calibrated by Certificate No.)</th><th>Scheduled Calibration</th></tr></thead><tbody><tr><td>Power Meter NRP2</td><td>104277</td><td>24-Sep-21 (CTTL No.J21X08326)</td><td>Sep-22</td></tr><tr><td>Power sensor NRP88</td><td>104291</td><td>24-Sep-21 (CTTL No.J21X08326)</td><td>Sep-22</td></tr><tr><td>Reference Probe EX30V4</td><td>SN 7307</td><td>26-May-21 (SPEAG No EX3-7307_May21)</td><td>May-22</td></tr><tr><td>D4E4</td><td>SN 1556</td><td>12-Jan-22 (CTTL-SPEAG No.Z22-60007)</td><td>Jan-23</td></tr></tbody></table> |            |                                                                                                                                                                                |                       | Primary Standards   | ID # | Cal Date (Calibrated by Certificate No.) | Scheduled Calibration | Power Meter NRP2        | 104277     | 24-Sep-21 (CTTL No.J21X08326) | Sep-22 | Power sensor NRP88      | 104291     | 24-Sep-21 (CTTL No.J21X08326) | Sep-22 | Reference Probe EX30V4 | SN 7307 | 26-May-21 (SPEAG No EX3-7307_May21) | May-22 | D4E4 | SN 1556 | 12-Jan-22 (CTTL-SPEAG No.Z22-60007) | Jan-23 |
| Primary Standards                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | ID #       | Cal Date (Calibrated by Certificate No.)                                                                                                                                       | Scheduled Calibration |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
| Power Meter NRP2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 104277     | 24-Sep-21 (CTTL No.J21X08326)                                                                                                                                                  | Sep-22                |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
| Power sensor NRP88                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 104291     | 24-Sep-21 (CTTL No.J21X08326)                                                                                                                                                  | Sep-22                |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
| Reference Probe EX30V4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | SN 7307    | 26-May-21 (SPEAG No EX3-7307_May21)                                                                                                                                            | May-22                |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
| D4E4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | SN 1556    | 12-Jan-22 (CTTL-SPEAG No.Z22-60007)                                                                                                                                            | Jan-23                |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
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| Secondary Standards                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | ID #       | Cal Date (Calibrated by Certificate No.)                                                                                                                                       | Scheduled Calibration |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
| Signal Generator S4438C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | MY46071430 | 13-Jan-22 (CTTL No.J22X00409)                                                                                                                                                  | Jan-23                |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
| Network Analyzer E5071C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | MY46110673 | 14-Jan-22 (CTTL No.J22X00409)                                                                                                                                                  | Jan-23                |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
| Calibrated by: Zhao Jing SAR Test Engineer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |            | Signature: [Signature]                                                                                                                                                         |                       |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
| Reviewed by: Lin Hao SAR Test Engineer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |            | Signature: [Signature]                                                                                                                                                         |                       |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
| Approved by: Qi Dianyan SAR Project Leader                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |            | Signature: [Signature]                                                                                                                                                         |                       |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
| Issued: April 3, 2022                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |            |                                                                                                                                                                                |                       |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
| This calibration certificate shall not be reproduced except in full without written approval of the laboratory.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |            |                                                                                                                                                                                |                       |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
| Certificate No: Z22-60103                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |            | Page 1 of 6                                                                                                                                                                    |                       |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |

| TTL Speag CALIBRATION LABORATORY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                          | CAICT                                                                                                                                                                          |                  |              |             |              |                                           |                             |         |              |                          |                              |                                     |                  |                          |                                             |                   |     |              |                    |           |                                     |                  |                          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|--------------|-------------|--------------|-------------------------------------------|-----------------------------|---------|--------------|--------------------------|------------------------------|-------------------------------------|------------------|--------------------------|---------------------------------------------|-------------------|-----|--------------|--------------------|-----------|-------------------------------------|------------------|--------------------------|
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| <b>Measurement Conditions</b><br>DASY system configuration, as far as not given on page 1:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                          |                                                                                                                                                                                |                  |              |             |              |                                           |                             |         |              |                          |                              |                                     |                  |                          |                                             |                   |     |              |                    |           |                                     |                  |                          |
| <table border="1"><thead><tr><th>DASY Version</th><th>DASY52</th><th>V52.10.4</th></tr></thead><tbody><tr><td>Extrapolation</td><td>Advanced Extrapolation</td><td></td></tr><tr><td>Phantom</td><td>Triple Flat Phantom 5.1C</td><td></td></tr><tr><td>Distance Dipole Center - TSL</td><td>15 mm</td><td>with Spacer</td></tr><tr><td>Zoom Scan Resolution</td><td>dx, dy, dz = 5 mm</td><td></td></tr><tr><td>Frequency</td><td>750 MHz ± 1 MHz</td><td></td></tr></tbody></table>                                                                                                                                                                 |                          |                                                                                                                                                                                |                  | DASY Version | DASY52      | V52.10.4     | Extrapolation                             | Advanced Extrapolation      |         | Phantom      | Triple Flat Phantom 5.1C |                              | Distance Dipole Center - TSL        | 15 mm            | with Spacer              | Zoom Scan Resolution                        | dx, dy, dz = 5 mm |     | Frequency    | 750 MHz ± 1 MHz    |           |                                     |                  |                          |
| DASY Version                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | DASY52                   | V52.10.4                                                                                                                                                                       |                  |              |             |              |                                           |                             |         |              |                          |                              |                                     |                  |                          |                                             |                   |     |              |                    |           |                                     |                  |                          |
| Extrapolation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Advanced Extrapolation   |                                                                                                                                                                                |                  |              |             |              |                                           |                             |         |              |                          |                              |                                     |                  |                          |                                             |                   |     |              |                    |           |                                     |                  |                          |
| Phantom                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Triple Flat Phantom 5.1C |                                                                                                                                                                                |                  |              |             |              |                                           |                             |         |              |                          |                              |                                     |                  |                          |                                             |                   |     |              |                    |           |                                     |                  |                          |
| Distance Dipole Center - TSL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 15 mm                    | with Spacer                                                                                                                                                                    |                  |              |             |              |                                           |                             |         |              |                          |                              |                                     |                  |                          |                                             |                   |     |              |                    |           |                                     |                  |                          |
| Zoom Scan Resolution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | dx, dy, dz = 5 mm        |                                                                                                                                                                                |                  |              |             |              |                                           |                             |         |              |                          |                              |                                     |                  |                          |                                             |                   |     |              |                    |           |                                     |                  |                          |
| Frequency                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 750 MHz ± 1 MHz          |                                                                                                                                                                                |                  |              |             |              |                                           |                             |         |              |                          |                              |                                     |                  |                          |                                             |                   |     |              |                    |           |                                     |                  |                          |
| <b>Head TSL parameters</b><br>The following parameters and calculations were applied:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                          |                                                                                                                                                                                |                  |              |             |              |                                           |                             |         |              |                          |                              |                                     |                  |                          |                                             |                   |     |              |                    |           |                                     |                  |                          |
| <table border="1"><thead><tr><th></th><th>Temperature</th><th>Permittivity</th><th>Conductivity</th></tr></thead><tbody><tr><td>Nominal Head TSL parameters</td><td>22.0 °C</td><td>42.0</td><td>0.90 mho/m</td></tr><tr><td>Measured Head TSL parameters</td><td>(22.0 ± 0.2) °C</td><td>41.4 ± 6 %</td><td>0.89 mho/m ± 6 %</td></tr><tr><td>Head TSL temperature change during test</td><td>&lt;1.0 °C</td><td>---</td><td>---</td></tr></tbody></table>                                                                                                                                                                                           |                          |                                                                                                                                                                                |                  |              | Temperature | Permittivity | Conductivity                              | Nominal Head TSL parameters | 22.0 °C | 42.0         | 0.90 mho/m               | Measured Head TSL parameters | (22.0 ± 0.2) °C                     | 41.4 ± 6 %       | 0.89 mho/m ± 6 %         | Head TSL temperature change during test     | <1.0 °C           | --- | ---          |                    |           |                                     |                  |                          |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Temperature              | Permittivity                                                                                                                                                                   | Conductivity     |              |             |              |                                           |                             |         |              |                          |                              |                                     |                  |                          |                                             |                   |     |              |                    |           |                                     |                  |                          |
| Nominal Head TSL parameters                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 22.0 °C                  | 42.0                                                                                                                                                                           | 0.90 mho/m       |              |             |              |                                           |                             |         |              |                          |                              |                                     |                  |                          |                                             |                   |     |              |                    |           |                                     |                  |                          |
| Measured Head TSL parameters                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | (22.0 ± 0.2) °C          | 41.4 ± 6 %                                                                                                                                                                     | 0.89 mho/m ± 6 % |              |             |              |                                           |                             |         |              |                          |                              |                                     |                  |                          |                                             |                   |     |              |                    |           |                                     |                  |                          |
| Head TSL temperature change during test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <1.0 °C                  | ---                                                                                                                                                                            | ---              |              |             |              |                                           |                             |         |              |                          |                              |                                     |                  |                          |                                             |                   |     |              |                    |           |                                     |                  |                          |
| <b>SAR result with Head TSL</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                          |                                                                                                                                                                                |                  |              |             |              |                                           |                             |         |              |                          |                              |                                     |                  |                          |                                             |                   |     |              |                    |           |                                     |                  |                          |
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|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Condition                |                                                                                                                                                                                |                  |              |             |              |                                           |                             |         |              |                          |                              |                                     |                  |                          |                                             |                   |     |              |                    |           |                                     |                  |                          |
| SAR averaged over 1 cm² (1 g) of Head TSL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                          |                                                                                                                                                                                |                  |              |             |              |                                           |                             |         |              |                          |                              |                                     |                  |                          |                                             |                   |     |              |                    |           |                                     |                  |                          |
| SAR measured                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 250 mW input power       | 2.07 W/kg                                                                                                                                                                      |                  |              |             |              |                                           |                             |         |              |                          |                              |                                     |                  |                          |                                             |                   |     |              |                    |           |                                     |                  |                          |
| SAR for nominal Head TSL parameters                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | normalized to 1W         | 8.27 W/kg ± 18.8 % (k=2)                                                                                                                                                       |                  |              |             |              |                                           |                             |         |              |                          |                              |                                     |                  |                          |                                             |                   |     |              |                    |           |                                     |                  |                          |
| SAR averaged over 10 cm² (10 g) of Head TSL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                          |                                                                                                                                                                                |                  |              |             |              |                                           |                             |         |              |                          |                              |                                     |                  |                          |                                             |                   |     |              |                    |           |                                     |                  |                          |
| SAR measured                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 250 mW input power       | 1.37 W/kg                                                                                                                                                                      |                  |              |             |              |                                           |                             |         |              |                          |                              |                                     |                  |                          |                                             |                   |     |              |                    |           |                                     |                  |                          |
| SAR for nominal Head TSL parameters                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | normalized to 1W         | 5.48 W/kg ± 18.7 % (k=2)                                                                                                                                                       |                  |              |             |              |                                           |                             |         |              |                          |                              |                                     |                  |                          |                                             |                   |     |              |                    |           |                                     |                  |                          |

| TTL Speag CALIBRATION LABORATORY                                                                                                                                                                                                                                                                                      |                                | CAICT                                                                                                                                                                          |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
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| <b>Glossary:</b>                                                                                                                                                                                                                                                                                                      |                                |                                                                                                                                                                                |  |
| TSL                                                                                                                                                                                                                                                                                                                   | tissue simulating liquid       |                                                                                                                                                                                |  |
| ConvF                                                                                                                                                                                                                                                                                                                 | sensitivity in TSL / NORMx.y.z |                                                                                                                                                                                |  |
| N/A                                                                                                                                                                                                                                                                                                                   | not applicable or not measured |                                                                                                                                                                                |  |
| <b>Calibration is Performed According to the Following Standards:</b>                                                                                                                                                                                                                                                 |                                |                                                                                                                                                                                |  |
| 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"                                                                                                                                                                                                                                                    |                                |                                                                                                                                                                                |  |
| <b>Additional Documentation:</b>                                                                                                                                                                                                                                                                                      |                                |                                                                                                                                                                                |  |
| c) DASY4/5 System Handbook                                                                                                                                                                                                                                                                                            |                                |                                                                                                                                                                                |  |
| <b>Methods Applied and Interpretation of Parameters:</b>                                                                                                                                                                                                                                                              |                                |                                                                                                                                                                                |  |
| • <b>Measurement Conditions:</b> 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.                                                                                                                  |                                |                                                                                                                                                                                |  |
| • <b>Antenna Parameters with TSL:</b> 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.                                                                                                |                                |                                                                                                                                                                                |  |
| • <b>Feed Point Impedance and Return Loss:</b> 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.       |                                |                                                                                                                                                                                |  |
| • <b>Electrical Delay:</b> One-way delay between the SMA connector and the antenna feed point. No uncertainty required.                                                                                                                                                                                               |                                |                                                                                                                                                                                |  |
| • <b>SAR measured:</b> SAR measured at the stated antenna input power.                                                                                                                                                                                                                                                |                                |                                                                                                                                                                                |  |
| • <b>SAR normalized:</b> SAR as measured, normalized to an input power of 1 W at the antenna connector.                                                                                                                                                                                                               |                                |                                                                                                                                                                                |  |
| • <b>MY for nominal TSL parameters:</b> The measured TSL parameters are used to calculate the nominal SAR result.                                                                                                                                                                                                     |                                |                                                                                                                                                                                |  |
| The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.                                                                                       |                                |                                                                                                                                                                                |  |
| Certificate No: Z22-60103                                                                                                                                                                                                                                                                                             |                                | Page 2 of 6                                                                                                                                                                    |  |

| TTL Speag CALIBRATION LABORATORY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |               | CAICT                                                                                                                                                                          |  |                                      |               |             |         |
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| <b>Appendix (Additional assessments outside the scope of CNAS L0570)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |               |                                                                                                                                                                                |  |                                      |               |             |         |
| <b>Antenna Parameters with Head TSL</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |               |                                                                                                                                                                                |  |                                      |               |             |         |
| <table border="1"><thead><tr><th>Impedance, transformed to feed point</th><th>53.60- 1.13jΩ</th></tr></thead><tbody><tr><td>Return Loss</td><td>-28.7dB</td></tr></tbody></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |               |                                                                                                                                                                                |  | Impedance, transformed to feed point | 53.60- 1.13jΩ | Return Loss | -28.7dB |
| Impedance, transformed to feed point                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 53.60- 1.13jΩ |                                                                                                                                                                                |  |                                      |               |             |         |
| Return Loss                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | -28.7dB       |                                                                                                                                                                                |  |                                      |               |             |         |
| <b>General Antenna Parameters and Design</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |               |                                                                                                                                                                                |  |                                      |               |             |         |
| <table border="1"><thead><tr><th>Electrical Delay (one direction)</th><th>0.947 ns</th></tr></thead></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |               |                                                                                                                                                                                |  | Electrical Delay (one direction)     | 0.947 ns      |             |         |
| Electrical Delay (one direction)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0.947 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. |               |                                                                                                                                                                                |  |                                      |               |             |         |
| <b>Additional EUT Data</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |               |                                                                                                                                                                                |  |                                      |               |             |         |
| <table border="1"><thead><tr><th>Manufactured by</th><th>SPEAG</th></tr></thead></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |               |                                                                                                                                                                                |  | Manufactured by                      | SPEAG         |             |         |
| Manufactured by                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | SPEAG         |                                                                                                                                                                                |  |                                      |               |             |         |
| Certificate No: Z22-60103                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |               | Page 3 of 6                                                                                                                                                                    |  |                                      |               |             |         |



#### 1.4 D835V2 - SN 4d114

| TTL Speaq CALIBRATION LABORATORY                                                                                                                                                                                                                                           |                                                                    | CAICT                                                                                                                                                                           |                       |
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| Client: SGS-CN                                                                                                                                                                                                                                                             |                                                                    | Certificate No: Z22-60104                                                                                                                                                       |                       |
| <b>CALIBRATION CERTIFICATE</b>                                                                                                                                                                                                                                             |                                                                    |                                                                                                                                                                                 |                       |
| Object                                                                                                                                                                                                                                                                     | D835V2 - SN: 4d114                                                 |                                                                                                                                                                                 |                       |
| Calibration Procedure(s)                                                                                                                                                                                                                                                   | FF-Z11-003-01<br>Calibration Procedures for dipole validation kits |                                                                                                                                                                                 |                       |
| Calibration date:                                                                                                                                                                                                                                                          | March 31, 2022                                                     |                                                                                                                                                                                 |                       |
| 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                                                             | 24-Sep-21 (CCTL No.J21X08326)                                                                                                                                                   | Sep-22                |
| Power sensor NRPBS                                                                                                                                                                                                                                                         | 104261                                                             | 24-Sep-21 (CCTL No.J21X08326)                                                                                                                                                   | Sep-22                |
| Reference Probe EX3DV4                                                                                                                                                                                                                                                     | SN 7307                                                            | 26-May-21 (SPEAG No.EX3-7307_May21)                                                                                                                                             | May-22                |
| DAE4                                                                                                                                                                                                                                                                       | SN 1556                                                            | 12-Jan-22 (CCTL-SPEAG No.Z22-60007)                                                                                                                                             | Jan-23                |
| Secondary Standards                                                                                                                                                                                                                                                        | ID #                                                               | Cal Date (Calibrated by, Certificate No.)                                                                                                                                       | Scheduled Calibration |
| Signal Generator E4438C                                                                                                                                                                                                                                                    | MY49071430                                                         | 13-Jan-22 (CCTL No.J22X00409)                                                                                                                                                   | Jan-23                |
| Network Analyzer E5071C                                                                                                                                                                                                                                                    | MY46110673                                                         | 14-Jan-22 (CCTL No.J22X00409)                                                                                                                                                   | Jan-23                |
| Calibrated by:                                                                                                                                                                                                                                                             | Name                                                               | Function                                                                                                                                                                        | Signature             |
|                                                                                                                                                                                                                                                                            | Zhao Jing                                                          | SAR Test Engineer                                                                                                                                                               |                       |
| Reviewed by:                                                                                                                                                                                                                                                               | Lin Hao                                                            | SAR Test Engineer                                                                                                                                                               |                       |
| Approved by:                                                                                                                                                                                                                                                               | Qi Diqian                                                          | SAR Project Leader                                                                                                                                                              |                       |
| Issued: April 6, 2022                                                                                                                                                                                                                                                      |                                                                    |                                                                                                                                                                                 |                       |
| This calibration certificate shall not be reproduced except in full without written approval of the laboratory.                                                                                                                                                            |                                                                    |                                                                                                                                                                                 |                       |

Certificate No: Z22-60104 Page 1 of 6

**Glossary:**  
TSL: tissue simulating liquid  
ConvF: sensitivity in TSL / NORMx.y.z  
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 665664, "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.

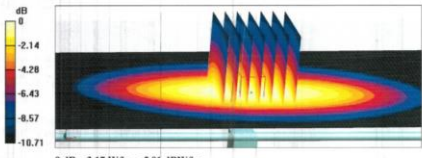
The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor k=2, which for a normal distribution Corresponds to a coverage probability of approximately 95%.

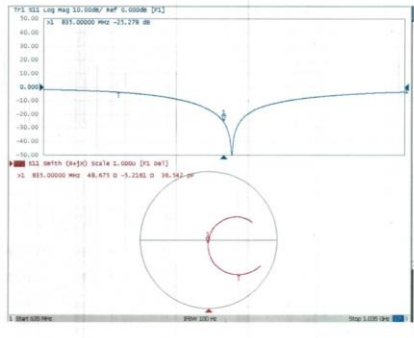
Certificate No: Z22-60104 Page 2 of 6



| TTL SPEAG CALIBRATION LABORATORY                                                                                                                                                                            |                          | CAICT                    |                  |
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| <b>Measurement Conditions</b><br>DASY system configuration, as far as not given on page 1.                                                                                                                  |                          |                          |                  |
| DASY Version                                                                                                                                                                                                | DASY52                   | VS2 10.4                 |                  |
| Extrapolation                                                                                                                                                                                               | Advanced Extrapolation   |                          |                  |
| Phantom                                                                                                                                                                                                     | Triple Flat Phantom 5.1C |                          |                  |
| Distance Dipole Center - TSL                                                                                                                                                                                | 15 mm                    | with Spacer              |                  |
| Zoom Scan Resolution                                                                                                                                                                                        | dx, dy, dz = 5 mm        |                          |                  |
| Frequency                                                                                                                                                                                                   | 835 MHz ± 1 MHz          |                          |                  |
| <b>Head TSL parameters</b><br>The following parameters and calculations were applied.                                                                                                                       |                          |                          |                  |
| Nominal Head TSL parameters                                                                                                                                                                                 | Temperature              | Permittivity             | Conductivity     |
|                                                                                                                                                                                                             | 22.0 °C                  | 41.5                     | 0.90 mho/m       |
| Measured Head TSL parameters                                                                                                                                                                                | (22.0 ± 0.2) °C          | 41.0 ± 5 %               | 0.91 mho/m ± 5 % |
| Head TSL temperature change during test                                                                                                                                                                     | <1.0 °C                  | ---                      | ---              |
| <b>SAR result with Head TSL</b>                                                                                                                                                                             |                          |                          |                  |
| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL                                                                                                                                                       | Condition                |                          |                  |
| SAR measured                                                                                                                                                                                                | 250 mW input power       | 2.37 W/kg                |                  |
| SAR for nominal Head TSL parameters                                                                                                                                                                         | normalized to 1W         | 9.40 W/kg ± 18.8 % (k=2) |                  |
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL                                                                                                                                                     | Condition                |                          |                  |
| SAR measured                                                                                                                                                                                                | 250 mW input power       | 1.54 W/kg                |                  |
| SAR for nominal Head TSL parameters                                                                                                                                                                         | normalized to 1W         | 6.12 W/kg ± 18.7 % (k=2) |                  |
| Certificate No: Z22-60104 Page 3 of 6                                                                                                                                                                       |                          |                          |                  |

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| <b>Appendix (Additional assessments outside the scope of CNAS L0570)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                |       |  |
| <b>Antenna Parameters with Head TSL</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                |       |  |
| Impedance, transformed to feed point                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 48.70 - j22.0Q |       |  |
| Return Loss                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | -25.3dB        |       |  |
| <b>General Antenna Parameters and Design</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                |       |  |
| Electrical Delay (one direction)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1.307 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.                                                                                                                                                                                                                                                                                                                                                                              |                |       |  |
| <b>Additional EUT Data</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                |       |  |
| Manufactured by                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | SPEAG          |       |  |
| Certificate No: Z22-60104 Page 4 of 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                |       |  |

| TTL SPEAG CALIBRATION LABORATORY                                                                                                                                                                                                                                                                                                                                                                       |  | CAICT |  |
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| <b>DASY5 Validation Report for Head TSL</b><br>Test Laboratory: CTTTL, Beijing, China<br>Date: 2022-03-31                                                                                                                                                                                                                                                                                              |  |       |  |
| DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 40114<br>Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1<br>Medium parameters used: f = 835 MHz; σ = 0.907 S/m; ε <sub>r</sub> = 40.98; ρ = 1000 kg/m <sup>3</sup><br>Phantom section: Right Section<br>Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)<br>DASY5 Configuration:                                   |  |       |  |
| <ul style="list-style-type: none"><li>Probe: EX3DV4 - SN7307; ConvF(10.13, 10.13, 10.13) @ 835 MHz; Calibrated: 2021-05-26</li><li>Sensor-Surface: 1.4mm (Mechanical Surface Detection)</li><li>Electronics: DAE4 Sn1556; Calibrated: 2022-01-12</li><li>Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062</li><li>DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)</li></ul>       |  |       |  |
| Dipole Calibration/Zoom Scan (7x7x7) (7x7x7) Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm<br>Reference Value = 57.88 V/m; Power Drift = 0.04 dB<br>Peak SAR (extrapolated) = 3.56 W/kg<br>SAR(1 g) = 2.37 W/kg; SAR(10 g) = 1.54 W/kg<br>Smallest distance from peaks to all points 3 dB below = 15.8 mm<br>Ratio of SAR at M2 to SAR at M1 = 66.2%<br>Maximum value of SAR (measured) = 3.17 W/kg |  |       |  |
|                                                                                                                                                                                                                                                                                                                     |  |       |  |
| 0 dB = 3.17 W/kg = 5.01 dBW/kg                                                                                                                                                                                                                                                                                                                                                                         |  |       |  |
| Certificate No: Z22-60104 Page 5 of 6                                                                                                                                                                                                                                                                                                                                                                  |  |       |  |

| TTL SPEAG CALIBRATION LABORATORY                                                                                                                                                                            |  | CAICT |  |
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| <b>Impedance Measurement Plot for Head TSL</b>                                                                                                                                                              |  |       |  |
|                                                                                                                         |  |       |  |
| Certificate No: Z22-60104 Page 6 of 6                                                                                                                                                                       |  |       |  |

## 1.5 D900V2 - SN 1d079

| In Collaboration with<br><b>TTL</b><br>CALIBRATION LABORATORY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |            | In Collaboration with<br><b>CAICT</b><br>CALIBRATION LABORATORY                                                              |                       |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------------|------|------------------------------------------|-----------------------|-------------------------|------------|-------------------------------|--------|-------------------------|------------|-------------------------------|--------|------------------------|---------|-------------------------------------|--------|------|---------|-------------------------------------|--------|
| Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191<br>Tel: +86-10-4204633-2117<br>E-mail: cti@china.com.cn                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |            | Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China<br>Tel: +86-10-4204633-2117<br>E-mail: cti@china.com.cn |                       |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
| Client: <b>SGS-CN</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |            | Certificate No: <b>Z22-60184</b>                                                                                             |                       |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
| <b>CALIBRATION CERTIFICATE</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |            |                                                                                                                              |                       |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
| Object: <b>D900V2 - SN: 1d079</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            |                                                                                                                              |                       |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
| Calibration Procedure(s): <b>FF-Z11-003-01</b><br>Calibration Procedures for dipole validation kits                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |            |                                                                                                                              |                       |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
| Calibration date: <b>June 7, 2022</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |            |                                                                                                                              |                       |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
| 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 (23±1)°C and humidity <70%.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |            |                                                                                                                              |                       |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
| Calibration Equipment used (MATE critical for calibration)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |            |                                                                                                                              |                       |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
| <table border="1"><thead><tr><th>Primary Standards</th><th>ID #</th><th>Cal Date (Calibrated by Certificate No.)</th><th>Scheduled Calibration</th></tr></thead><tbody><tr><td>Power Meter NRP2</td><td>106277</td><td>24-Sep-21 (CTTL No.J21X08326)</td><td>Sep-22</td></tr><tr><td>Power sensor NRP8S</td><td>104291</td><td>24-Sep-21 (CTTL No.J21X08326)</td><td>Sep-22</td></tr><tr><td>Reference Probe EX3DV4</td><td>SN 7464</td><td>28-Jan-22 (SPEAG No EX3-7464_Jan22)</td><td>Jan-23</td></tr><tr><td>DAE4</td><td>SN 1556</td><td>12-Jan-22 (CTTL-SPEAG No Z22-60007)</td><td>Jan-23</td></tr></tbody></table> |            |                                                                                                                              |                       | Primary Standards   | ID # | Cal Date (Calibrated by Certificate No.) | Scheduled Calibration | Power Meter NRP2        | 106277     | 24-Sep-21 (CTTL No.J21X08326) | Sep-22 | Power sensor NRP8S      | 104291     | 24-Sep-21 (CTTL No.J21X08326) | Sep-22 | Reference Probe EX3DV4 | SN 7464 | 28-Jan-22 (SPEAG No EX3-7464_Jan22) | Jan-23 | DAE4 | SN 1556 | 12-Jan-22 (CTTL-SPEAG No Z22-60007) | Jan-23 |
| Primary Standards                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | ID #       | Cal Date (Calibrated by Certificate No.)                                                                                     | Scheduled Calibration |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
| Power Meter NRP2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 106277     | 24-Sep-21 (CTTL No.J21X08326)                                                                                                | Sep-22                |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
| Power sensor NRP8S                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 104291     | 24-Sep-21 (CTTL No.J21X08326)                                                                                                | Sep-22                |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
| Reference Probe EX3DV4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | SN 7464    | 28-Jan-22 (SPEAG No EX3-7464_Jan22)                                                                                          | Jan-23                |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
| DAE4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | SN 1556    | 12-Jan-22 (CTTL-SPEAG No Z22-60007)                                                                                          | Jan-23                |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
| <table border="1"><thead><tr><th>Secondary Standards</th><th>ID #</th><th>Cal Date (Calibrated by Certificate No.)</th><th>Scheduled Calibration</th></tr></thead><tbody><tr><td>Signal Generator E4438C</td><td>MY48071430</td><td>13-Jan-22 (CTTL No.J22X00409)</td><td>Jan-23</td></tr><tr><td>Network Analyzer E5071C</td><td>MY48110673</td><td>14-Jan-22 (CTTL No.J22X00409)</td><td>Jan-23</td></tr></tbody></table>                                                                                                                                                                                               |            |                                                                                                                              |                       | Secondary Standards | ID # | Cal Date (Calibrated by Certificate No.) | Scheduled Calibration | Signal Generator E4438C | MY48071430 | 13-Jan-22 (CTTL No.J22X00409) | Jan-23 | Network Analyzer E5071C | MY48110673 | 14-Jan-22 (CTTL No.J22X00409) | Jan-23 |                        |         |                                     |        |      |         |                                     |        |
| Secondary Standards                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | ID #       | Cal Date (Calibrated by Certificate No.)                                                                                     | Scheduled Calibration |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
| Signal Generator E4438C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | MY48071430 | 13-Jan-22 (CTTL No.J22X00409)                                                                                                | Jan-23                |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
| Network Analyzer E5071C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | MY48110673 | 14-Jan-22 (CTTL No.J22X00409)                                                                                                | Jan-23                |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
| Calibrated by: <b>Zhao Jing</b> SAR Test Engineer <b>Signature</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |            |                                                                                                                              |                       |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
| Reviewed by: <b>Lin Hao</b> SAR Test Engineer <b>Signature</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |            |                                                                                                                              |                       |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
| Approved by: <b>Qi Dianyan</b> SAR Project Leader <b>Signature</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |            |                                                                                                                              |                       |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
| Issued: June 13, 2022                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |            |                                                                                                                              |                       |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
| This calibration certificate shall not be reproduced except in full without written approval of the laboratory.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |            |                                                                                                                              |                       |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |
| Certificate No: Z22-60184                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |            | Page 1 of 6                                                                                                                  |                       |                     |      |                                          |                       |                         |            |                               |        |                         |            |                               |        |                        |         |                                     |        |      |         |                                     |        |

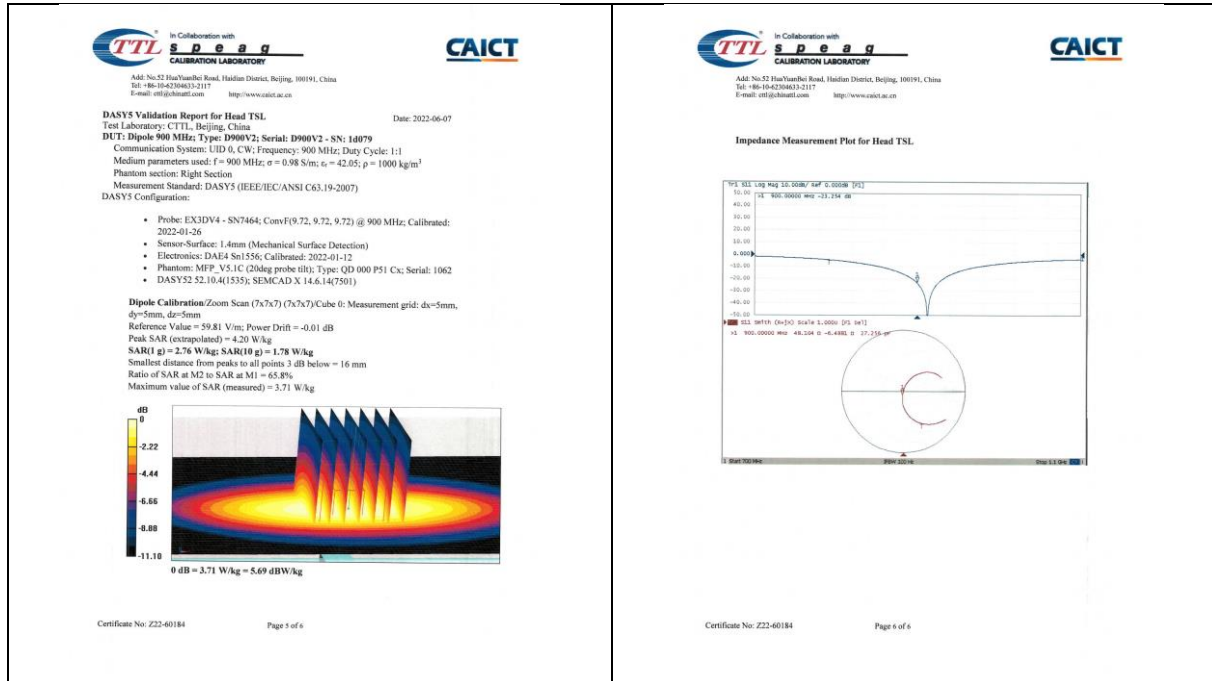
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| Certificate No: Z22-60184                                                                                                    |  | Page 2 of 6                                                                                                                  |  |

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|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|------------------------------------------------------------------------------------------------------------------------------|------------------|-------------------------------------------------------|-------------|--------------|---------------|-----------------------------|-----------|-------------------------------------|--------------------------|------------------------------|---------------------------------------------------------|------------|------------------|-----------------------------------------|--------------------|-----------|-------------------------------------|------------------|--------------------------|
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| <b>Measurement Conditions</b><br>DASY system configuration, as far as not given on page 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                          |                                                                                                                              |                  |                                                       |             |              |               |                             |           |                                     |                          |                              |                                                         |            |                  |                                         |                    |           |                                     |                  |                          |
| <table border="1"><thead><tr><th>DASY Version</th><th>DASY2</th><th>52.10.4</th></tr></thead><tbody><tr><td>Extrapolation</td><td>Advanced Extrapolation</td><td></td></tr><tr><td>Phantom</td><td>Triple Flat Phantom 5.1C</td><td></td></tr><tr><td>Distance Dipole Center - TSL</td><td>15 mm</td><td>with Spacer</td></tr><tr><td>Zoom Scan Resolution</td><td>dk, dy, dz = 5 mm</td><td></td></tr><tr><td>Frequency</td><td>900 MHz ± 1 MHz</td><td></td></tr></tbody></table>                                                                                                                                                              |                          |                                                                                                                              |                  | DASY Version                                          | DASY2       | 52.10.4      | Extrapolation | Advanced Extrapolation      |           | Phantom                             | Triple Flat Phantom 5.1C |                              | Distance Dipole Center - TSL                            | 15 mm      | with Spacer      | Zoom Scan Resolution                    | dk, dy, dz = 5 mm  |           | Frequency                           | 900 MHz ± 1 MHz  |                          |
| DASY Version                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | DASY2                    | 52.10.4                                                                                                                      |                  |                                                       |             |              |               |                             |           |                                     |                          |                              |                                                         |            |                  |                                         |                    |           |                                     |                  |                          |
| Extrapolation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Advanced Extrapolation   |                                                                                                                              |                  |                                                       |             |              |               |                             |           |                                     |                          |                              |                                                         |            |                  |                                         |                    |           |                                     |                  |                          |
| Phantom                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Triple Flat Phantom 5.1C |                                                                                                                              |                  |                                                       |             |              |               |                             |           |                                     |                          |                              |                                                         |            |                  |                                         |                    |           |                                     |                  |                          |
| Distance Dipole Center - TSL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 15 mm                    | with Spacer                                                                                                                  |                  |                                                       |             |              |               |                             |           |                                     |                          |                              |                                                         |            |                  |                                         |                    |           |                                     |                  |                          |
| Zoom Scan Resolution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | dk, dy, dz = 5 mm        |                                                                                                                              |                  |                                                       |             |              |               |                             |           |                                     |                          |                              |                                                         |            |                  |                                         |                    |           |                                     |                  |                          |
| Frequency                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 900 MHz ± 1 MHz          |                                                                                                                              |                  |                                                       |             |              |               |                             |           |                                     |                          |                              |                                                         |            |                  |                                         |                    |           |                                     |                  |                          |
| <b>Head TSL parameters</b><br>The following parameters and calculations were applied.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                          |                                                                                                                              |                  |                                                       |             |              |               |                             |           |                                     |                          |                              |                                                         |            |                  |                                         |                    |           |                                     |                  |                          |
| <table border="1"><thead><tr><th></th><th>Temperature</th><th>Permittivity</th><th>Conductivity</th></tr></thead><tbody><tr><td>Nominal Head TSL parameters</td><td>22.0 °C</td><td>41.5</td><td>0.97 nholm</td></tr><tr><td>Measured Head TSL parameters</td><td>(22.0 ± 0.2) °C</td><td>42.1 ± 6 %</td><td>0.98 nholm ± 6 %</td></tr><tr><td>Head TSL temperature change during test</td><td>+1.0 °C</td><td>---</td><td>---</td></tr></tbody></table>                                                                                                                                                                                         |                          |                                                                                                                              |                  |                                                       | Temperature | Permittivity | Conductivity  | Nominal Head TSL parameters | 22.0 °C   | 41.5                                | 0.97 nholm               | Measured Head TSL parameters | (22.0 ± 0.2) °C                                         | 42.1 ± 6 % | 0.98 nholm ± 6 % | Head TSL temperature change during test | +1.0 °C            | ---       | ---                                 |                  |                          |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Temperature              | Permittivity                                                                                                                 | Conductivity     |                                                       |             |              |               |                             |           |                                     |                          |                              |                                                         |            |                  |                                         |                    |           |                                     |                  |                          |
| Nominal Head TSL parameters                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 22.0 °C                  | 41.5                                                                                                                         | 0.97 nholm       |                                                       |             |              |               |                             |           |                                     |                          |                              |                                                         |            |                  |                                         |                    |           |                                     |                  |                          |
| Measured Head TSL parameters                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | (22.0 ± 0.2) °C          | 42.1 ± 6 %                                                                                                                   | 0.98 nholm ± 6 % |                                                       |             |              |               |                             |           |                                     |                          |                              |                                                         |            |                  |                                         |                    |           |                                     |                  |                          |
| Head TSL temperature change during test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | +1.0 °C                  | ---                                                                                                                          | ---              |                                                       |             |              |               |                             |           |                                     |                          |                              |                                                         |            |                  |                                         |                    |           |                                     |                  |                          |
| <b>SAR result with Head TSL</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                          |                                                                                                                              |                  |                                                       |             |              |               |                             |           |                                     |                          |                              |                                                         |            |                  |                                         |                    |           |                                     |                  |                          |
| <table border="1"><thead><tr><th>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</th><th>Condition</th><th></th></tr></thead><tbody><tr><td>SAR measured</td><td>250 mW input power</td><td>2.70 W/kg</td></tr><tr><td>SAR for nominal Head TSL parameters</td><td>normalized to 1W</td><td>11.0 W/kg ± 18.8 % (k=2)</td></tr><tr><td>SAR averaged over 19 cm<sup>3</sup> (10 g) of Head TSL</td><th>Condition</th><th></th></tr><tr><td>SAR measured</td><td>250 mW input power</td><td>1.79 W/kg</td></tr><tr><td>SAR for nominal Head TSL parameters</td><td>normalized to 1W</td><td>7.09 W/kg ± 18.7 % (k=2)</td></tr></tbody></table> |                          |                                                                                                                              |                  | SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL | Condition   |              | SAR measured  | 250 mW input power          | 2.70 W/kg | SAR for nominal Head TSL parameters | normalized to 1W         | 11.0 W/kg ± 18.8 % (k=2)     | SAR averaged over 19 cm <sup>3</sup> (10 g) of Head TSL | Condition  |                  | SAR measured                            | 250 mW input power | 1.79 W/kg | SAR for nominal Head TSL parameters | normalized to 1W | 7.09 W/kg ± 18.7 % (k=2) |
| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Condition                |                                                                                                                              |                  |                                                       |             |              |               |                             |           |                                     |                          |                              |                                                         |            |                  |                                         |                    |           |                                     |                  |                          |
| SAR measured                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 250 mW input power       | 2.70 W/kg                                                                                                                    |                  |                                                       |             |              |               |                             |           |                                     |                          |                              |                                                         |            |                  |                                         |                    |           |                                     |                  |                          |
| SAR for nominal Head TSL parameters                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | normalized to 1W         | 11.0 W/kg ± 18.8 % (k=2)                                                                                                     |                  |                                                       |             |              |               |                             |           |                                     |                          |                              |                                                         |            |                  |                                         |                    |           |                                     |                  |                          |
| SAR averaged over 19 cm <sup>3</sup> (10 g) of Head TSL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Condition                |                                                                                                                              |                  |                                                       |             |              |               |                             |           |                                     |                          |                              |                                                         |            |                  |                                         |                    |           |                                     |                  |                          |
| SAR measured                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 250 mW input power       | 1.79 W/kg                                                                                                                    |                  |                                                       |             |              |               |                             |           |                                     |                          |                              |                                                         |            |                  |                                         |                    |           |                                     |                  |                          |
| SAR for nominal Head TSL parameters                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | normalized to 1W         | 7.09 W/kg ± 18.7 % (k=2)                                                                                                     |                  |                                                       |             |              |               |                             |           |                                     |                          |                              |                                                         |            |                  |                                         |                    |           |                                     |                  |                          |
| Certificate No: Z22-60184                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                          | Page 3 of 6                                                                                                                  |                  |                                                       |             |              |               |                             |           |                                     |                          |                              |                                                         |            |                  |                                         |                    |           |                                     |                  |                          |

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| Certificate No: Z22-60184                                                                                                    |  | Page 4 of 6                                                                                                                  |  |

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| <b>Appendix (Additional assessments outside the scope of CNAS L0570)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |             |                                                                                                                              |  |                                  |             |                                      |  |             |          |
| <b>Antenna Parameters with Head TSL</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |             |                                                                                                                              |  |                                  |             |                                      |  |             |          |
| <table border="1"><thead><tr><th></th><th>48.10-8.49G</th></tr></thead><tbody><tr><td>Impedance, transformed to feed point</td><td></td></tr><tr><td>Return Loss</td><td>-23.3 dB</td></tr></tbody></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             |                                                                                                                              |  |                                  | 48.10-8.49G | Impedance, transformed to feed point |  | Return Loss | -23.3 dB |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 48.10-8.49G |                                                                                                                              |  |                                  |             |                                      |  |             |          |
| Impedance, transformed to feed point                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |             |                                                                                                                              |  |                                  |             |                                      |  |             |          |
| Return Loss                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | -23.3 dB    |                                                                                                                              |  |                                  |             |                                      |  |             |          |
| <b>General Antenna Parameters and Design</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |             |                                                                                                                              |  |                                  |             |                                      |  |             |          |
| <table border="1"><thead><tr><th>Electrical Delay (one direction)</th><th>1.312 ns</th></tr></thead><tbody><tr><td></td><td></td></tr></tbody></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |             |                                                                                                                              |  | Electrical Delay (one direction) | 1.312 ns    |                                      |  |             |          |
| Electrical Delay (one direction)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1.312 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. |             |                                                                                                                              |  |                                  |             |                                      |  |             |          |
| <b>Additional EUT Data</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |                                                                                                                              |  |                                  |             |                                      |  |             |          |
| <table border="1"><thead><tr><th>Manufactured by</th><th>SPEAG</th></tr></thead><tbody><tr><td></td><td></td></tr></tbody></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |             |                                                                                                                              |  | Manufactured by                  | SPEAG       |                                      |  |             |          |
| Manufactured by                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | SPEAG       |                                                                                                                              |  |                                  |             |                                      |  |             |          |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |             |                                                                                                                              |  |                                  |             |                                      |  |             |          |
| Certificate No: Z22-60184                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |             | Page 4 of 6                                                                                                                  |  |                                  |             |                                      |  |             |          |





## 1.6 D1800V2 - SN 2d170

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Client: **SGS-CN** Certificate No: **Z22-60105**

**CALIBRATION CERTIFICATE**

Object: **D1800V2 - SN: 2d170**

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

Calibration date: **March 31, 2022**

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  | 24-Sep-21 (CTTL No.J21X08326)            | Sep-22                |
| Power sensor NRP8S     | 104291  | 24-Sep-21 (CTTL No.J21X08326)            | Sep-22                |
| Reference Probe EX3DV4 | SN 7307 | 26-May-21 (SPEAG No.EX3-7307_May21)      | May-22                |
| DAE4                   | SN 1556 | 12-Jan-22 (CTTL-SPEAG No.Z22-60007)      | Jan-23                |

| Secondary Standards     | ID #       | Cal Date (Calibrated by Certificate No.) | Scheduled Calibration |
|-------------------------|------------|------------------------------------------|-----------------------|
| Signal Generator E4438C | MY49071430 | 13-Jan-22 (CTTL No.J22X00409)            | Jan-23                |
| Network Analyzer E5071C | MY46110573 | 14-Jan-22 (CTTL No.J22X00409)            | Jan-23                |

Calibrated by: **Zhao Jing** SAR Test Engineer

Reviewed by: **Lin Hao** SAR Test Engineer

Approved by: **Qi Diqian** SAR Project Leader

Issued April 6, 2022

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E-mail: cti@china.ttl.com http://www.china.ttl.com

Glossary:

TSL: tissue simulating liquid  
ConvF: sensitivity in TSL / NORMx.y.z  
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.

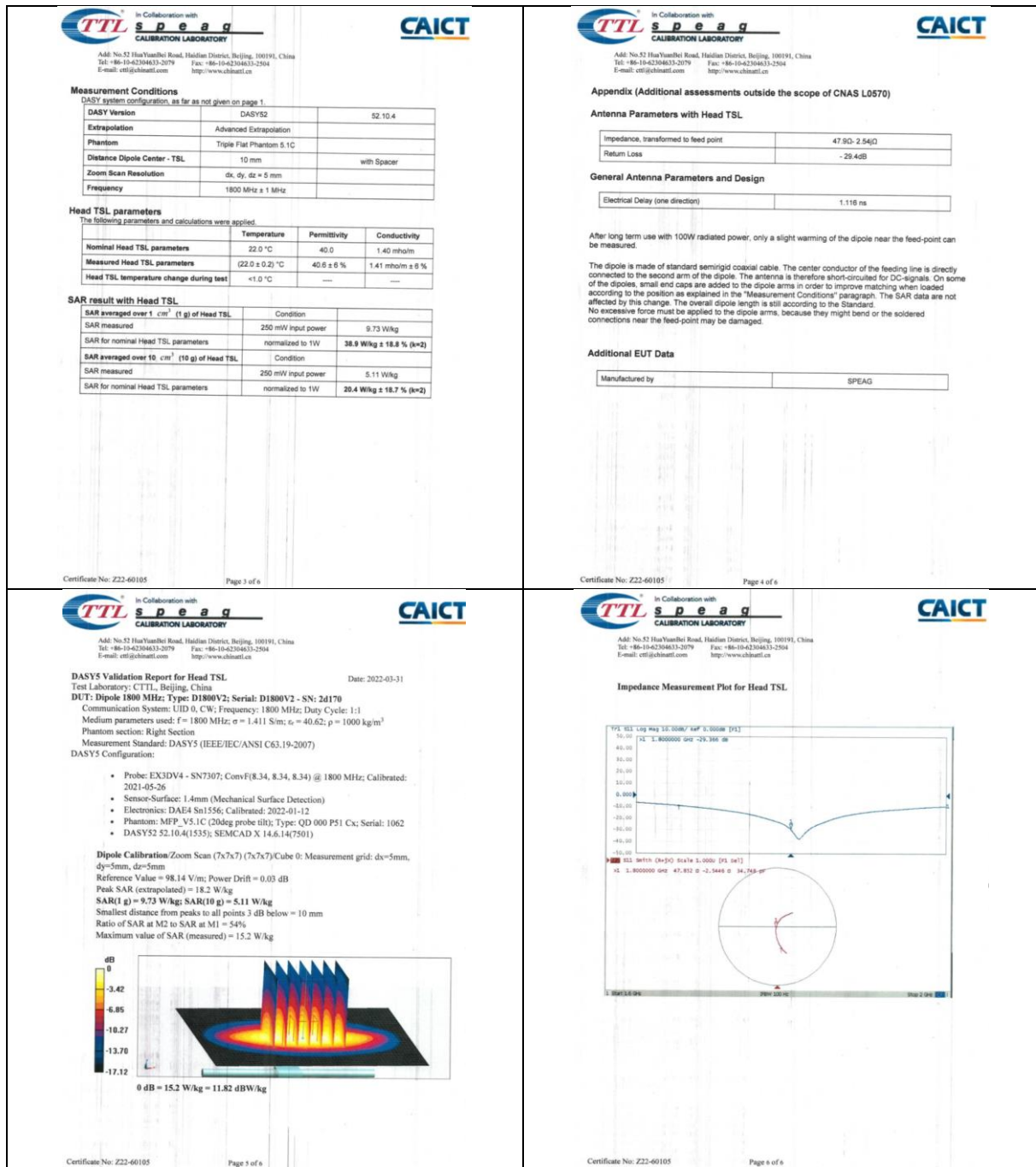
The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Certificate No: Z22-60105 Page 2 of 6



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## 1.7 D1900V2 - SN 5d136

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| Client: SGS-CN                                                                                                                                                                                                                                                             |                                                                    | Certificate No: Z22-60185                                                                                                     |                       |
| <b>CALIBRATION CERTIFICATE</b>                                                                                                                                                                                                                                             |                                                                    |                                                                                                                               |                       |
| Object                                                                                                                                                                                                                                                                     | D1900V2 - SN: 5d136                                                |                                                                                                                               |                       |
| Calibration Procedure(s)                                                                                                                                                                                                                                                   | FF-Z11-003-01<br>Calibration Procedures for dipole validation kits |                                                                                                                               |                       |
| Calibration date:                                                                                                                                                                                                                                                          | June 7, 2022                                                       |                                                                                                                               |                       |
| 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 (23±1)°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                                                             | 24-Sep-21 (CTTL No.J21X08326)                                                                                                 | Sep-22                |
| Power sensor NRP6S                                                                                                                                                                                                                                                         | 104291                                                             | 24-Sep-21 (CTTL No.J21X08326)                                                                                                 | Sep-22                |
| Reference Probe EXSDV4                                                                                                                                                                                                                                                     | SN 7464                                                            | 28-Jan-22(SPEAG No EX3-7464_Jan22)                                                                                            | Jan-23                |
| DAE4                                                                                                                                                                                                                                                                       | SN 1656                                                            | 12-Jan-22(CTTL-SPEAG No Z22-60007)                                                                                            | Jan-23                |
| Secondary Standards                                                                                                                                                                                                                                                        | ID #                                                               | Cal Date (Calibrated by: Certificate No.)                                                                                     | Scheduled Calibration |
| Signal Generator E4438C                                                                                                                                                                                                                                                    | MY48071430                                                         | 13-Jan-22 (CTTL No.J22X00409)                                                                                                 | Jan-23                |
| Network Analyser E5071C                                                                                                                                                                                                                                                    | MY48110073                                                         | 14-Jan-22 (CTTL No.J22X00409)                                                                                                 | Jan-23                |
| Calibrated by:                                                                                                                                                                                                                                                             | Name                                                               | Function                                                                                                                      | Signature             |
|                                                                                                                                                                                                                                                                            | Zhao Jing                                                          | SAR Test Engineer                                                                                                             |                       |
| Reviewed by:                                                                                                                                                                                                                                                               | Lin Hao                                                            | SAR Test Engineer                                                                                                             |                       |
| Approved by:                                                                                                                                                                                                                                                               | Qi Dianyan                                                         | SAR Project Leader                                                                                                            |                       |
| Issued: June 13, 2022                                                                                                                                                                                                                                                      |                                                                    |                                                                                                                               |                       |
| This calibration certificate shall not be reproduced except in full without written approval of the laboratory.                                                                                                                                                            |                                                                    |                                                                                                                               |                       |
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| Measurement Conditions                                                                                                                                                                                                                                                                                                |                                                         | Appendix (Additional assessments outside the scope of CNAS L0570)                                                             |                 |
| DASY system configuration, as far as not given on page 1:                                                                                                                                                                                                                                                             |                                                         | Antenna Parameters with Head TSL                                                                                              |                 |
| DASY Version                                                                                                                                                                                                                                                                                                          | DAEY52                                                  | Impedance, transformed to feed point                                                                                          |                 |
| Extrapolation                                                                                                                                                                                                                                                                                                         | Advanced Extrapolation                                  | 51.02+7.58jΩ                                                                                                                  |                 |
| Phantom                                                                                                                                                                                                                                                                                                               | Triple Flat Phantom 5.1C                                | Return Loss                                                                                                                   |                 |
| Distance Dipole Center - TSL                                                                                                                                                                                                                                                                                          | 10 mm                                                   | -22.4dB                                                                                                                       |                 |
| Zoom Scan Resolution                                                                                                                                                                                                                                                                                                  | 6x, dy, dz = 5 mm                                       | General Antenna Parameters and Design                                                                                         |                 |
| Frequency                                                                                                                                                                                                                                                                                                             | 1900 MHz ± 1 MHz                                        | Electrical Delay (one direction)                                                                                              |                 |
|                                                                                                                                                                                                                                                                                                                       |                                                         | 1.109 ns                                                                                                                      |                 |
| Head TSL parameters                                                                                                                                                                                                                                                                                                   | The following parameters and calculations were applied: |                                                                                                                               |                 |
| Nominal Head TSL parameters                                                                                                                                                                                                                                                                                           | Temperature                                             | Permittivity                                                                                                                  | Conductivity    |
| Measured Head TSL parameters                                                                                                                                                                                                                                                                                          | (22.0 ± 0.3) °C                                         | 39.9 ± 6 %                                                                                                                    | 1.39 mS/m ± 6 % |
| Head TSL temperature change during test                                                                                                                                                                                                                                                                               | <+1.0 °C                                                | ---                                                                                                                           | ---             |
| SAR result with Head TSL                                                                                                                                                                                                                                                                                              | Condition                                               |                                                                                                                               |                 |
| SAR averaged over 1 cm² (1 g) of Head TSL                                                                                                                                                                                                                                                                             | 250 mW input power                                      | 9.65 W/kg                                                                                                                     |                 |
| SAR for nominal Head TSL parameters                                                                                                                                                                                                                                                                                   | normalized to 1W                                        | 40.0 W/kg ± 18.8 % (k=2)                                                                                                      |                 |
| SAR averaged over 10 cm² (10 g) of Head TSL                                                                                                                                                                                                                                                                           | Condition                                               |                                                                                                                               |                 |
| SAR measured                                                                                                                                                                                                                                                                                                          | 250 mW input power                                      | 5.18 W/kg                                                                                                                     |                 |
| SAR for nominal Head TSL parameters                                                                                                                                                                                                                                                                                   | normalized to 1W                                        | 20.8 W/kg ± 18.7 % (k=2)                                                                                                      |                 |
| Glossary:                                                                                                                                                                                                                                                                                                             |                                                         | Tissue simulating liquid                                                                                                      |                 |
| ComF                                                                                                                                                                                                                                                                                                                  | sensitivity in TSL / NORMx.y.z                          |                                                                                                                               |                 |
| 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 865984, "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%.                                                                                       |                                                         |                                                                                                                               |                 |
| Certificate No: Z22-60185                                                                                                                                                                                                                                                                                             |                                                         | Page 2 of 6                                                                                                                   |                 |

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| Measurement Conditions                                                                                                                                                                                                                                                                                                |                                                         | Appendix (Additional assessments outside the scope of CNAS L0570)                                                             |                 |
| DASY system configuration, as far as not given on page 1:                                                                                                                                                                                                                                                             |                                                         | Antenna Parameters with Head TSL                                                                                              |                 |
| DASY Version                                                                                                                                                                                                                                                                                                          | DAEY52                                                  | Impedance, transformed to feed point                                                                                          |                 |
| Extrapolation                                                                                                                                                                                                                                                                                                         | Advanced Extrapolation                                  | 51.02+7.58jΩ                                                                                                                  |                 |
| Phantom                                                                                                                                                                                                                                                                                                               | Triple Flat Phantom 5.1C                                | Return Loss                                                                                                                   |                 |
| Distance Dipole Center - TSL                                                                                                                                                                                                                                                                                          | 10 mm                                                   | -22.4dB                                                                                                                       |                 |
| Zoom Scan Resolution                                                                                                                                                                                                                                                                                                  | 6x, dy, dz = 5 mm                                       | General Antenna Parameters and Design                                                                                         |                 |
| Frequency                                                                                                                                                                                                                                                                                                             | 1900 MHz ± 1 MHz                                        | Electrical Delay (one direction)                                                                                              |                 |
|                                                                                                                                                                                                                                                                                                                       |                                                         | 1.109 ns                                                                                                                      |                 |
| Head TSL parameters                                                                                                                                                                                                                                                                                                   | The following parameters and calculations were applied: |                                                                                                                               |                 |
| Nominal Head TSL parameters                                                                                                                                                                                                                                                                                           | Temperature                                             | Permittivity                                                                                                                  | Conductivity    |
| Measured Head TSL parameters                                                                                                                                                                                                                                                                                          | (22.0 ± 0.3) °C                                         | 39.9 ± 6 %                                                                                                                    | 1.39 mS/m ± 6 % |
| Head TSL temperature change during test                                                                                                                                                                                                                                                                               | <+1.0 °C                                                | ---                                                                                                                           | ---             |
| SAR result with Head TSL                                                                                                                                                                                                                                                                                              | Condition                                               |                                                                                                                               |                 |
| SAR averaged over 1 cm² (1 g) of Head TSL                                                                                                                                                                                                                                                                             | 250 mW input power                                      | 9.65 W/kg                                                                                                                     |                 |
| SAR for nominal Head TSL parameters                                                                                                                                                                                                                                                                                   | normalized to 1W                                        | 40.0 W/kg ± 18.8 % (k=2)                                                                                                      |                 |
| SAR averaged over 10 cm² (10 g) of Head TSL                                                                                                                                                                                                                                                                           | Condition                                               |                                                                                                                               |                 |
| SAR measured                                                                                                                                                                                                                                                                                                          | 250 mW input power                                      | 5.18 W/kg                                                                                                                     |                 |
| SAR for nominal Head TSL parameters                                                                                                                                                                                                                                                                                   | normalized to 1W                                        | 20.8 W/kg ± 18.7 % (k=2)                                                                                                      |                 |
| Glossary:                                                                                                                                                                                                                                                                                                             |                                                         | Tissue simulating liquid                                                                                                      |                 |
| ComF                                                                                                                                                                                                                                                                                                                  | sensitivity in TSL / NORMx.y.z                          |                                                                                                                               |                 |
| 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 865984, "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                                                                                                                                                                                                                                                                                                |                                                         | Appendix (Additional assessments outside the scope of CNAS L0570)                                                             |                 |
| DASY system configuration, as far as not given on page 1:                                                                                                                                                                                                                                                             |                                                         | Antenna Parameters with Head TSL                                                                                              |                 |
| DASY Version                                                                                                                                                                                                                                                                                                          | DAEY52                                                  | Impedance, transformed to feed point                                                                                          |                 |
| Extrapolation                                                                                                                                                                                                                                                                                                         | Advanced Extrapolation                                  | 51.02+7.58jΩ                                                                                                                  |                 |
| Phantom                                                                                                                                                                                                                                                                                                               | Triple Flat Phantom 5.1C                                | Return Loss                                                                                                                   |                 |
| Distance Dipole Center - TSL                                                                                                                                                                                                                                                                                          | 10 mm                                                   | -22.4dB                                                                                                                       |                 |
| Zoom Scan Resolution                                                                                                                                                                                                                                                                                                  | 6x, dy, dz = 5 mm                                       | General Antenna Parameters and Design                                                                                         |                 |
| Frequency                                                                                                                                                                                                                                                                                                             | 1900 MHz ± 1 MHz                                        | Electrical Delay (one direction)                                                                                              |                 |
|                                                                                                                                                                                                                                                                                                                       |                                                         | 1.109 ns                                                                                                                      |                 |
| Head TSL parameters                                                                                                                                                                                                                                                                                                   | The following parameters and calculations were applied: |                                                                                                                               |                 |
| Nominal Head TSL parameters                                                                                                                                                                                                                                                                                           | Temperature                                             | Permittivity                                                                                                                  | Conductivity    |
| Measured Head TSL parameters                                                                                                                                                                                                                                                                                          | (22.0 ± 0.3) °C                                         | 39.9 ± 6 %                                                                                                                    | 1.39 mS/m ± 6 % |
| Head TSL temperature change during test                                                                                                                                                                                                                                                                               | <+1.0 °C                                                | ---                                                                                                                           | ---             |
| SAR result with Head TSL                                                                                                                                                                                                                                                                                              | Condition                                               |                                                                                                                               |                 |
| SAR averaged over 1 cm² (1 g) of Head TSL                                                                                                                                                                                                                                                                             | 250 mW input power                                      | 9.65 W/kg                                                                                                                     |                 |
| SAR for nominal Head TSL parameters                                                                                                                                                                                                                                                                                   | normalized to 1W                                        | 40.0 W/kg ± 18.8 % (k=2)                                                                                                      |                 |
| SAR averaged over 10 cm² (10 g) of Head TSL                                                                                                                                                                                                                                                                           | Condition                                               |                                                                                                                               |                 |
| SAR measured                                                                                                                                                                                                                                                                                                          | 250 mW input power                                      | 5.18 W/kg                                                                                                                     |                 |
| SAR for nominal Head TSL parameters                                                                                                                                                                                                                                                                                   | normalized to 1W                                        | 20.8 W/kg ± 18.7 % (k=2)                                                                                                      |                 |
| Glossary:                                                                                                                                                                                                                                                                                                             |                                                         | Tissue simulating liquid                                                                                                      |                 |
| ComF                                                                                                                                                                                                                                                                                                                  | sensitivity in TSL / NORMx.y.z                          |                                                                                                                               |                 |
| 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 865984, "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%.                                                                                       |                                                         |                                                                                                                               |                 |
| Certificate No: Z22-60185                                                                                                                                                                                                                                                                                             |                                                         | Page 4 of 6                                                                                                                   |                 |

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| Measurement Conditions                                                                                                                                                                                                                                                                                                |                                                         | Appendix (Additional assessments outside the scope of CNAS L0570)                                                             |                 |
| DASY system configuration, as far as not given on page 1:                                                                                                                                                                                                                                                             |                                                         | Antenna Parameters with Head TSL                                                                                              |                 |
| DASY Version                                                                                                                                                                                                                                                                                                          | DAEY52                                                  | Impedance, transformed to feed point                                                                                          |                 |
| Extrapolation                                                                                                                                                                                                                                                                                                         | Advanced Extrapolation                                  | 51.02+7.58jΩ                                                                                                                  |                 |
| Phantom                                                                                                                                                                                                                                                                                                               | Triple Flat Phantom 5.1C                                | Return Loss                                                                                                                   |                 |
| Distance Dipole Center - TSL                                                                                                                                                                                                                                                                                          | 10 mm                                                   | -22.4dB                                                                                                                       |                 |
| Zoom Scan Resolution                                                                                                                                                                                                                                                                                                  | 6x, dy, dz = 5 mm                                       | General Antenna Parameters and Design                                                                                         |                 |
| Frequency                                                                                                                                                                                                                                                                                                             | 1900 MHz ± 1 MHz                                        | Electrical Delay (one direction)                                                                                              |                 |
|                                                                                                                                                                                                                                                                                                                       |                                                         | 1.109 ns                                                                                                                      |                 |
| Head TSL parameters                                                                                                                                                                                                                                                                                                   | The following parameters and calculations were applied: |                                                                                                                               |                 |
| Nominal Head TSL parameters                                                                                                                                                                                                                                                                                           | Temperature                                             | Permittivity                                                                                                                  | Conductivity    |
| Measured Head TSL parameters                                                                                                                                                                                                                                                                                          | (22.0 ± 0.3) °C                                         | 39.9 ± 6 %                                                                                                                    | 1.39 mS/m ± 6 % |
| Head TSL temperature change during test                                                                                                                                                                                                                                                                               | <+1.0 °C                                                | ---                                                                                                                           | ---             |
| SAR result with Head TSL                                                                                                                                                                                                                                                                                              | Condition                                               |                                                                                                                               |                 |
| SAR averaged over 1 cm² (1 g) of Head TSL                                                                                                                                                                                                                                                                             | 250 mW input power                                      | 9.65 W/kg                                                                                                                     |                 |
| SAR for nominal Head TSL parameters                                                                                                                                                                                                                                                                                   | normalized to 1W                                        | 40.0 W/kg ± 18.8 % (k=2)                                                                                                      |                 |
| SAR averaged over 10 cm² (10 g) of Head TSL                                                                                                                                                                                                                                                                           | Condition                                               |                                                                                                                               |                 |
| SAR measured                                                                                                                                                                                                                                                                                                          | 250 mW input power                                      | 5.18 W/kg                                                                                                                     |                 |
| SAR for nominal Head TSL parameters                                                                                                                                                                                                                                                                                   | normalized to 1W                                        | 20.8 W/kg ± 18.7 % (k=2)                                                                                                      |                 |
| Glossary:                                                                                                                                                                                                                                                                                                             |                                                         | Tissue simulating liquid                                                                                                      |                 |
| ComF                                                                                                                                                                                                                                                                                                                  | sensitivity in TSL / NORMx.y.z                          |                                                                                                                               |                 |
| 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 865984, "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%.                                                                                       |                                                         |                                                                                                                               |                 |
| Certificate No: Z22-60185                                                                                                                                                                                                                                                                                             |                                                         | Page 5 of 6                                                                                                                   |                 |

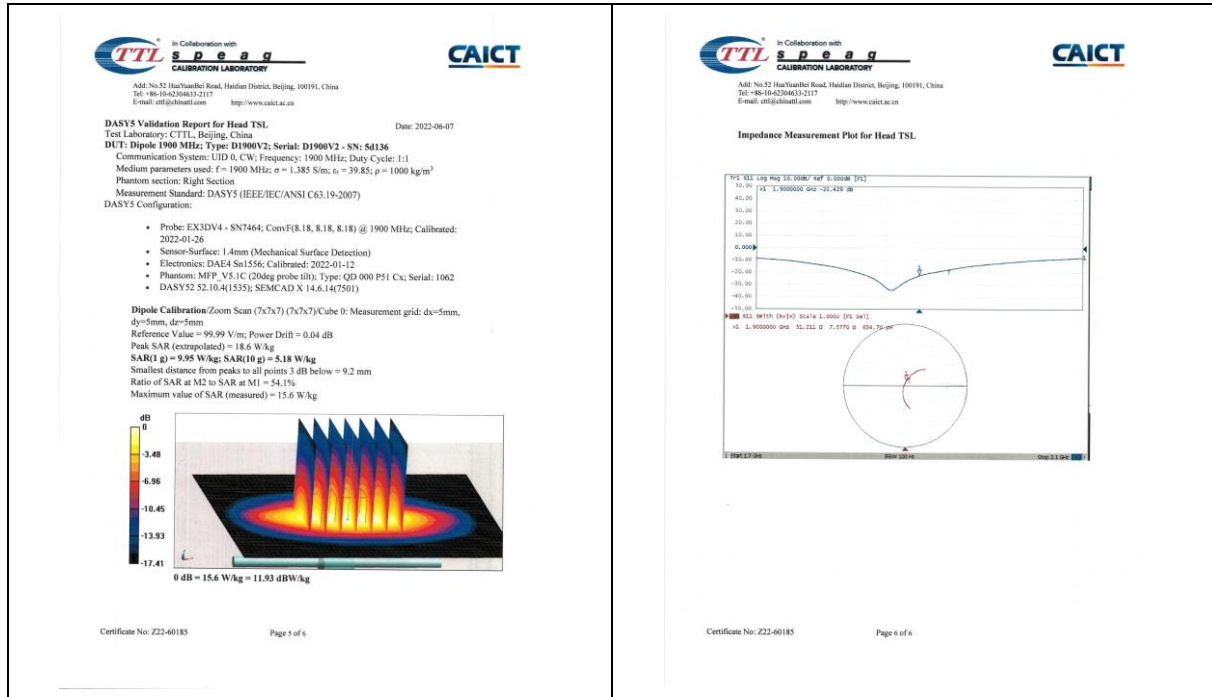
| TTL S p e a g<br>CALIBRATION LABORATORY                                                                                                                                                                                                                                                                               |                                                         | CAICT                                                                                                                         |                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|-----------------|
| Add: No.52 Huayuanbei Road, Haidian District, Beijing, 100191, China<br>Tel: +86-10-42204633-2117<br>E-mail: cti@china.com.cn                                                                                                                                                                                         |                                                         | Add: No.52 Huayuanbei Road, Haidian District, Beijing, 100191, China<br>Tel: +86-10-42204633-2117<br>E-mail: cti@china.com.cn |                 |
| Measurement Conditions                                                                                                                                                                                                                                                                                                |                                                         | Appendix (Additional assessments outside the scope of CNAS L0570)                                                             |                 |
| DASY system configuration, as far as not given on page 1:                                                                                                                                                                                                                                                             |                                                         | Antenna Parameters with Head TSL                                                                                              |                 |
| DASY Version                                                                                                                                                                                                                                                                                                          | DAEY52                                                  | Impedance, transformed to feed point                                                                                          |                 |
| Extrapolation                                                                                                                                                                                                                                                                                                         | Advanced Extrapolation                                  | 51.02+7.58jΩ                                                                                                                  |                 |
| Phantom                                                                                                                                                                                                                                                                                                               | Triple Flat Phantom 5.1C                                | Return Loss                                                                                                                   |                 |
| Distance Dipole Center - TSL                                                                                                                                                                                                                                                                                          | 10 mm                                                   | -22.4dB                                                                                                                       |                 |
| Zoom Scan Resolution                                                                                                                                                                                                                                                                                                  | 6x, dy, dz = 5 mm                                       | General Antenna Parameters and Design                                                                                         |                 |
| Frequency                                                                                                                                                                                                                                                                                                             | 1900 MHz ± 1 MHz                                        | Electrical Delay (one direction)                                                                                              |                 |
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| Nominal Head TSL parameters                                                                                                                                                                                                                                                                                           | Temperature                                             | Permittivity                                                                                                                  | Conductivity    |
| Measured Head TSL parameters                                                                                                                                                                                                                                                                                          | (22.0 ± 0.3) °C                                         | 39.9 ± 6 %                                                                                                                    | 1.39 mS/m ± 6 % |
| Head TSL temperature change during test                                                                                                                                                                                                                                                                               | <+1.0 °C                                                | ---                                                                                                                           | ---             |
| SAR result with Head TSL                                                                                                                                                                                                                                                                                              | Condition                                               |                                                                                                                               |                 |
| SAR averaged over 1 cm² (1 g) of Head TSL                                                                                                                                                                                                                                                                             | 250 mW input power                                      | 9.65 W/kg                                                                                                                     |                 |
| SAR for nominal Head TSL parameters                                                                                                                                                                                                                                                                                   | normalized to 1W                                        | 40.0 W/kg ± 18.8 % (k=2)                                                                                                      |                 |
| SAR averaged over 10 cm² (10 g) of Head TSL                                                                                                                                                                                                                                                                           | Condition                                               |                                                                                                                               |                 |
| SAR measured                                                                                                                                                                                                                                                                                                          | 250 mW input power                                      | 5.18 W/kg                                                                                                                     |                 |
| SAR for nominal Head TSL parameters                                                                                                                                                                                                                                                                                   | normalized to 1W                                        | 20.8 W/kg ± 18.7 % (k=2)                                                                                                      |                 |
| Glossary:                                                                                                                                                                                                                                                                                                             |                                                         | Tissue simulating liquid                                                                                                      |                 |
| ComF                                                                                                                                                                                                                                                                                                                  | sensitivity in TSL / NORMx.y.z                          |                                                                                                                               |                 |
| N/A                                                                                                                                                                                                                                                                                                                   | not applicable or not measured                          |                                                                                                                               |                 |
| Calibration is performed according to the following standards:                                                                                                                                                                                                                                                        |                                                         |                                                                                                                               |                 |
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| b) KDB 865984, "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.                                                                                                       |                                                         |                                                                                                                               |                 |
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| • SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.                                                                                                                                                                                                           |                                                         |                                                                                                                               |                 |
| The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.                                                                                       |                                                         |                                                                                                                               |                 |
| Certificate No: Z22-60185                                                                                                                                                                                                                                                                                             |                                                         | Page 6 of 6                                                                                                                   |                 |



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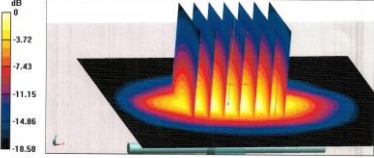
## 1.8 D2000V2 - SN 1041

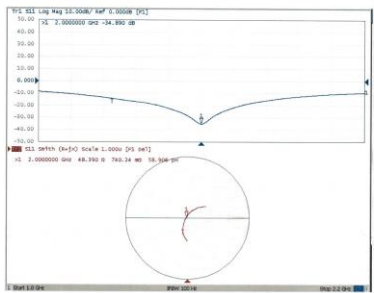
| TTL Speaq                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |            | CAICT                                    |                       |                     |      |                                          |                       |                         |            |                                |        |                         |            |                                |        |                        |         |                                      |        |      |         |                                      |        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|------------------------------------------|-----------------------|---------------------|------|------------------------------------------|-----------------------|-------------------------|------------|--------------------------------|--------|-------------------------|------------|--------------------------------|--------|------------------------|---------|--------------------------------------|--------|------|---------|--------------------------------------|--------|
| Client: SGS-CN                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |            | Certificate No: Z22-60186                |                       |                     |      |                                          |                       |                         |            |                                |        |                         |            |                                |        |                        |         |                                      |        |      |         |                                      |        |
| <b>CALIBRATION CERTIFICATE</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |            |                                          |                       |                     |      |                                          |                       |                         |            |                                |        |                         |            |                                |        |                        |         |                                      |        |      |         |                                      |        |
| Object: D2000V2 - SN: 1041                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |            |                                          |                       |                     |      |                                          |                       |                         |            |                                |        |                         |            |                                |        |                        |         |                                      |        |      |         |                                      |        |
| Calibration Procedure(s): FF-Z11-003-01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |            |                                          |                       |                     |      |                                          |                       |                         |            |                                |        |                         |            |                                |        |                        |         |                                      |        |      |         |                                      |        |
| Calibration date: June 8, 2022                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |            |                                          |                       |                     |      |                                          |                       |                         |            |                                |        |                         |            |                                |        |                        |         |                                      |        |      |         |                                      |        |
| This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements (B). 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)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |            |                                          |                       |                     |      |                                          |                       |                         |            |                                |        |                         |            |                                |        |                        |         |                                      |        |      |         |                                      |        |
| <table border="1"><thead><tr><th>Primary Standards</th><th>ID #</th><th>Cal Date (Calibrated by Certificate No.)</th><th>Scheduled Calibration</th></tr></thead><tbody><tr><td>Power Meter NRPZ</td><td>106277</td><td>24-Sep-21 (CTTL No. J21X08328)</td><td>Sep-22</td></tr><tr><td>Power sensor NRP8S</td><td>104291</td><td>24-Sep-21 (CTTL No. J21X08328)</td><td>Sep-22</td></tr><tr><td>Reference Probe EX3DV4</td><td>SN 7464</td><td>26-Jan-22 (SPEAG No. EX3-7464-Jan22)</td><td>Jan-23</td></tr><tr><td>DAE4</td><td>SN 1556</td><td>12-Jan-22 (CTTL-SPEAG No. Z22-60007)</td><td>Jan-23</td></tr></tbody></table> |            |                                          |                       | Primary Standards   | ID # | Cal Date (Calibrated by Certificate No.) | Scheduled Calibration | Power Meter NRPZ        | 106277     | 24-Sep-21 (CTTL No. J21X08328) | Sep-22 | Power sensor NRP8S      | 104291     | 24-Sep-21 (CTTL No. J21X08328) | Sep-22 | Reference Probe EX3DV4 | SN 7464 | 26-Jan-22 (SPEAG No. EX3-7464-Jan22) | Jan-23 | DAE4 | SN 1556 | 12-Jan-22 (CTTL-SPEAG No. Z22-60007) | Jan-23 |
| Primary Standards                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | ID #       | Cal Date (Calibrated by Certificate No.) | Scheduled Calibration |                     |      |                                          |                       |                         |            |                                |        |                         |            |                                |        |                        |         |                                      |        |      |         |                                      |        |
| Power Meter NRPZ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 106277     | 24-Sep-21 (CTTL No. J21X08328)           | Sep-22                |                     |      |                                          |                       |                         |            |                                |        |                         |            |                                |        |                        |         |                                      |        |      |         |                                      |        |
| Power sensor NRP8S                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 104291     | 24-Sep-21 (CTTL No. J21X08328)           | Sep-22                |                     |      |                                          |                       |                         |            |                                |        |                         |            |                                |        |                        |         |                                      |        |      |         |                                      |        |
| Reference Probe EX3DV4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | SN 7464    | 26-Jan-22 (SPEAG No. EX3-7464-Jan22)     | Jan-23                |                     |      |                                          |                       |                         |            |                                |        |                         |            |                                |        |                        |         |                                      |        |      |         |                                      |        |
| DAE4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | SN 1556    | 12-Jan-22 (CTTL-SPEAG No. Z22-60007)     | Jan-23                |                     |      |                                          |                       |                         |            |                                |        |                         |            |                                |        |                        |         |                                      |        |      |         |                                      |        |
| <table border="1"><thead><tr><th>Secondary Standards</th><th>ID #</th><th>Cal Date (Calibrated by Certificate No.)</th><th>Scheduled Calibration</th></tr></thead><tbody><tr><td>Signal Generator E4438C</td><td>MY49071430</td><td>13-Jan-22 (CTTL No. J22X00409)</td><td>Jan-23</td></tr><tr><td>Network Analyzer E5071C</td><td>MY48110673</td><td>14-Jan-22 (CTTL No. J22X00409)</td><td>Jan-23</td></tr></tbody></table>                                                                                                                                                                                                 |            |                                          |                       | Secondary Standards | ID # | Cal Date (Calibrated by Certificate No.) | Scheduled Calibration | Signal Generator E4438C | MY49071430 | 13-Jan-22 (CTTL No. J22X00409) | Jan-23 | Network Analyzer E5071C | MY48110673 | 14-Jan-22 (CTTL No. J22X00409) | Jan-23 |                        |         |                                      |        |      |         |                                      |        |
| Secondary Standards                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | ID #       | Cal Date (Calibrated by Certificate No.) | Scheduled Calibration |                     |      |                                          |                       |                         |            |                                |        |                         |            |                                |        |                        |         |                                      |        |      |         |                                      |        |
| Signal Generator E4438C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | MY49071430 | 13-Jan-22 (CTTL No. J22X00409)           | Jan-23                |                     |      |                                          |                       |                         |            |                                |        |                         |            |                                |        |                        |         |                                      |        |      |         |                                      |        |
| Network Analyzer E5071C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | MY48110673 | 14-Jan-22 (CTTL No. J22X00409)           | Jan-23                |                     |      |                                          |                       |                         |            |                                |        |                         |            |                                |        |                        |         |                                      |        |      |         |                                      |        |
| Calibrated by: Zhao Jing SAR Test Engineer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |            |                                          |                       |                     |      |                                          |                       |                         |            |                                |        |                         |            |                                |        |                        |         |                                      |        |      |         |                                      |        |
| Reviewed by: Lin Hao SAR Test Engineer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |            |                                          |                       |                     |      |                                          |                       |                         |            |                                |        |                         |            |                                |        |                        |         |                                      |        |      |         |                                      |        |
| Approved by: Qi Danyuan SAR Project Leader                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |            |                                          |                       |                     |      |                                          |                       |                         |            |                                |        |                         |            |                                |        |                        |         |                                      |        |      |         |                                      |        |
| Issued: June 13, 2022                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            |                                          |                       |                     |      |                                          |                       |                         |            |                                |        |                         |            |                                |        |                        |         |                                      |        |      |         |                                      |        |
| This calibration certificate shall not be reproduced except in full without written approval of the laboratory.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |            |                                          |                       |                     |      |                                          |                       |                         |            |                                |        |                         |            |                                |        |                        |         |                                      |        |      |         |                                      |        |
| Certificate No: Z22-60186 Page 1 of 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            |                                          |                       |                     |      |                                          |                       |                         |            |                                |        |                         |            |                                |        |                        |         |                                      |        |      |         |                                      |        |

| TTL Speaq                                                                                                                                                                                                                                                                                                             |  | CAICT                                                 |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-------------------------------------------------------|--|
| Glossary:                                                                                                                                                                                                                                                                                                             |  | Issue simulating liquid sensitivity in TSL: NORMx.y.z |  |
| TSL:                                                                                                                                                                                                                                                                                                                  |  | not applicable or not measured                        |  |
| CompF:                                                                                                                                                                                                                                                                                                                |  | N/A                                                   |  |
| 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) KDS 865964, "SAR Measurement Requirements for 100 MHz to 8 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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| • SAR normalized: SAR as measured, normalized to an input power of 1 W at the antenna connector.                                                                                                                                                                                                                      |  |                                                       |  |
| • SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.                                                                                                                                                                                                           |  |                                                       |  |
| The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor k=2, which for a normal distribution Corresponds to a coverage probability of approximately 95%.                                                                                       |  |                                                       |  |
| Certificate No: Z22-60186 Page 2 of 6                                                                                                                                                                                                                                                                                 |  |                                                       |  |

| In Collaboration with<br><b>TTL</b> <b>S P E A G</b><br>CALIBRATION LABORATORY                                                                                                                                                                                                                                                                                                                                                                                                                                              |                          | <b>CAICT</b>             |                  |
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| <b>Measurement Conditions</b><br>DASY system configuration, as far as not given on page 1.                                                                                                                                                                                                                                                                                                                                                                                                                                  |                          |                          |                  |
| DASY Version                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | DASY52                   | 52.10.4                  |                  |
| Extrapolation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Advanced Extrapolation   |                          |                  |
| Phantom                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Triple Flat Phantom S.1C |                          |                  |
| Distance Dipole Center - TSL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 10 mm                    | with Spacer              |                  |
| Zoom Scan Resolution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | dx, dy, dz = 5 mm        |                          |                  |
| Frequency                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 2000 MHz ± 1 MHz         |                          |                  |
| <b>Head TSL parameters</b><br>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          | 40.2 ± 6 %               | 1.39 mho/m ± 6 % |
| Head TSL temperature change during test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <1.0 °C                  | ---                      | ---              |
| <b>SAR result with Head TSL</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                          |                          |                  |
| SAR averaged over 1 cm <sup>2</sup> (1 g) of Head TSL                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Condition                |                          |                  |
| SAR measured                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 250 mW input power       | 10.4 W/kg                |                  |
| SAR for nominal Head TSL parameters                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | normalized to 1W         | 41.8 W/kg ± 18.8 % (k=2) |                  |
| SAR averaged over 10 cm <sup>2</sup> (10 g) of Head TSL                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Condition                |                          |                  |
| SAR measured                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 250 mW input power       | 5.30 W/kg                |                  |
| SAR for nominal Head TSL parameters                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | normalized to 1W         | 21.3 W/kg ± 18.7 % (k=2) |                  |
| <b>Appendix (Additional assessments outside the scope of CNAS L0570)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                          |                          |                  |
| <b>Antenna Parameters with Head TSL</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                          |                          |                  |
| Impedance, transformed to feed point                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 48.4Ω ± 0.74Ω            |                          |                  |
| Return Loss                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | -34.9dB                  |                          |                  |
| <b>General Antenna Parameters and Design</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                          |                          |                  |
| Electrical Delay (one direction)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1.088 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.                                                                                                                                                                                                                                                                                                                                                                              |                          |                          |                  |
| <b>Additional EUT Data</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                          |                          |                  |
| Manufactured by                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | SPEAG                    |                          |                  |
| Certificate No: Z22-60186 Page 3 of 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                          |                          |                  |

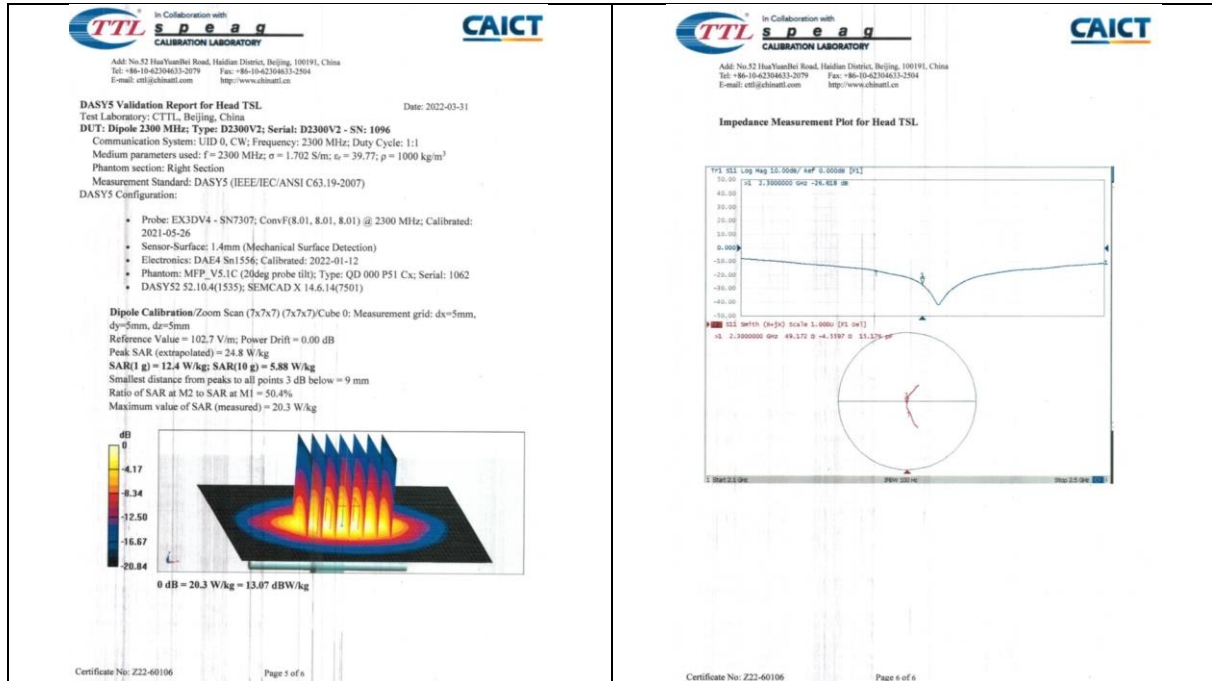
| In Collaboration with<br><b>TTL</b> <b>S P E A G</b><br>CALIBRATION LABORATORY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  | <b>CAICT</b> |  |
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| <b>DASY5 Validation Report for Head TSL</b><br>Test Laboratory: CTTL, Beijing, China<br>DUT: Dipole 2000 MHz; Type: D2000V2; Serial: D2000V2 - SN: 1041<br>Communication System: UTD 0, CW; Frequency: 2000 MHz; Duty Cycle: 1:1<br>Medium parameters used: f = 2000 MHz; σ = 1.392 S/m; ε <sub>r</sub> = 40.21; ρ = 1000 kg/m <sup>3</sup><br>Phantom section: Right Section<br>Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)<br>DASY5 Configuration: <ul style="list-style-type: none"><li>Probe: EX3DV4 - SN7464; ConvF(8.2, 8.2, 8.2) @ 2000 MHz; Calibrated: 2022-01-26</li><li>Sensor-Surface: 1.4mm (Mechanical Surface Detection)</li><li>Electronics: DA64 Sn1556; Calibrated: 2022-01-12</li><li>Phantom: MPP_V5.1C (20dkg probe tilt); Type: QD 000 P51 Cx; Serial: 1062</li><li>DASY52: 52.10.4(1555); SEMCAD X 14.6.14(7501)</li></ul> |  |              |  |
| Dipole Calibration/Zoom Scan (7x7x7) (7x7x7) Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm<br>Reference Value = 103.4 V/m; Power Drift = 0.03 dB<br>Peak SAR (extrapolated) = 19.6 W/kg<br>SAR(1 g) = 10.4 W/kg; SAR(10 g) = 5.3 W/kg<br>Smallest distance from peaks to all points 3 dB below = 9.1 mm<br>Ratio of SAR at M2 to SAR at M1 = 53.6%<br>Maximum value of SAR (measured) = 16.3 W/kg                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |              |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |              |  |
| Certificate No: Z22-60186 Page 5 of 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |              |  |

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| <b>Impedance Measurement Plot for Head TSL</b>                                                                                                        |  |              |  |
|                                                                   |  |              |  |
| Certificate No: Z22-60186 Page 6 of 6                                                                                                                 |  |              |  |

## 1.9 D2300V2 - SN 1096

| TTL S p e a g<br>CALIBRATION LABORATORY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  | CAICT                                                                                                                                                                        |  |
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| Client: SGS-CN                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  | Certificate No: Z22-60106                                                                                                                                                    |  |
| <b>CALIBRATION CERTIFICATE</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |                                                                                                                                                                              |  |
| Object: D2300V2 - SN: 1096                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |                                                                                                                                                                              |  |
| Calibration Procedure(s): FF-Z11-003-01<br>Calibration Procedures for dipole validation kits                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |                                                                                                                                                                              |  |
| Calibration date: March 31, 2022                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |                                                                                                                                                                              |  |
| 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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  | 108277 24-Sep-21 (CTTL No.J21X08328) Sep-22                                                                                                                                  |  |
| Power sensor NRP8S                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  | 104291 24-Sep-21 (CTTL No.J21X08328) Sep-22                                                                                                                                  |  |
| Reference Probe EX30V4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  | SN 7307 26-May-21 (SPEAG No.EK3-7307_May21) May-22                                                                                                                           |  |
| DAE4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  | SN 1556 12-Jan-22 (CTTL-SPEAG No.Z22-60007) Jan-23                                                                                                                           |  |
| Secondary Standards                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  | ID # Cal Date (Calibrated by Certificate No.) Scheduled Calibration                                                                                                          |  |
| Signal Generator E4438C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  | MY49071430 13-Jan-22 (CTTL No.J22X00406) Jan-23                                                                                                                              |  |
| Network Analyzer E5071C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  | MY48110673 14-Jan-22 (CTTL No.J22X00406) Jan-23                                                                                                                              |  |
| Calibrated by: Zhao Jing SAR Test Engineer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  | Signature: [Signature]                                                                                                                                                       |  |
| Reviewed by: Lin Hao SAR Test Engineer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  | Signature: [Signature]                                                                                                                                                       |  |
| Approved by: Qi Diqian SAR Project Leader                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  | Signature: [Signature]                                                                                                                                                       |  |
| Issued: April 6, 2022                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |                                                                                                                                                                              |  |
| This calibration certificate shall not be reproduced except in full without written approval of the laboratory.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |                                                                                                                                                                              |  |
| Certificate No: Z22-60106                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  | Page 1 of 6                                                                                                                                                                  |  |
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| <b>Measurement Conditions</b><br>DASY system configuration, as far as not given on page 1:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |                                                                                                                                                                              |  |
| DASY Version                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  | DASY2                                                                                                                                                                        |  |
| Extrapolation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  | Advanced Extrapolation                                                                                                                                                       |  |
| Phantom                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  | Triple Flat Phantom 5.1C                                                                                                                                                     |  |
| Distance Dipole Center - TSL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  | 10 mm with Spacer                                                                                                                                                            |  |
| Zoom Scan Resolution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  | dx, dy, dz = 5 mm                                                                                                                                                            |  |
| Frequency                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  | 2300 MHz ± 1 MHz                                                                                                                                                             |  |
| <b>Head TSL parameters</b><br>The following parameters and calculations were applied:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |                                                                                                                                                                              |  |
| Nominal Head TSL parameters                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  | Temperature 22.0 °C Permittivity 39.5 Conductivity 1.67 mho/m                                                                                                                |  |
| Measured Head TSL parameters                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  | (22.0 ± 0.2) °C 39.8 ± 6 % 1.70 mho/m ± 6 %                                                                                                                                  |  |
| Head TSL temperature change during test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  | <1.0 °C — —                                                                                                                                                                  |  |
| <b>SAR result with Head TSL</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |                                                                                                                                                                              |  |
| SAR averaged over 1 cm <sup>2</sup> (1 g) of Head TSL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  | Condition                                                                                                                                                                    |  |
| SAR measured                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  | 250 mW input power 12.4 W/kg                                                                                                                                                 |  |
| SAR for nominal Head TSL parameters                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  | normalized to 1W 49.2 W/kg ± 18.8 % (k=2)                                                                                                                                    |  |
| SAR averaged over 10 cm <sup>2</sup> (10 g) of Head TSL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  | Condition                                                                                                                                                                    |  |
| SAR measured                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  | 250 mW input power 5.88 W/kg                                                                                                                                                 |  |
| SAR for nominal Head TSL parameters                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  | normalized to 1W 23.4 W/kg ± 18.7 % (k=2)                                                                                                                                    |  |
| Certificate No: Z22-60106                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  | Page 3 of 6                                                                                                                                                                  |  |
| TTL S p e a g<br>CALIBRATION LABORATORY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  | CAICT                                                                                                                                                                        |  |
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| <b>Appendix (Additional assessments outside the scope of CNAS L0570)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |                                                                                                                                                                              |  |
| <b>Antenna Parameters with Head TSL</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |                                                                                                                                                                              |  |
| Impedance, transformed to feed point                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  | 49.20 - 4.56jΩ                                                                                                                                                               |  |
| Return Loss                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  | -26.6dB                                                                                                                                                                      |  |
| <b>General Antenna Parameters and Design</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |                                                                                                                                                                              |  |
| Electrical Delay (one direction)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  | 1.083 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. |  |                                                                                                                                                                              |  |
| <b>Additional EUT Data</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |                                                                                                                                                                              |  |
| Manufactured by                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  | SPEAG                                                                                                                                                                        |  |
| Certificate No: Z22-60106                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  | Page 4 of 6                                                                                                                                                                  |  |





## 1.10 D2450V2 - SN 817

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Client: **SGS-CN** Certificate No: **Z22-60107**

**CALIBRATION CERTIFICATE**

Object: **D2450V2 - SN: 817**

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

Calibration date: **April 1, 2022**

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&E critical for calibration)

| Primary Standards      | ID #    | Cal Date (Calibrated by Certificate No.) | Scheduled Calibration |
|------------------------|---------|------------------------------------------|-----------------------|
| Power Meter: NRP2      | 106277  | 24-Sep-21 (CTTL No.J21X08320)            | Sep-22                |
| Power sensor: NRP8S    | 104291  | 24-Sep-21 (CTTL No.J21X08320)            | Sep-22                |
| Reference Probe EX3DV4 | SN 7307 | 25-May-21(SPEAG.No.EX3-7307_May21)       | May-22                |
| DAE4                   | SN 1556 | 12-Jan-22(CTTL-SPEAG.No.Z22-60007)       | Jan-23                |

| Secondary Standards     | ID #       | Cal Date (Calibrated by Certificate No.) | Scheduled Calibration |
|-------------------------|------------|------------------------------------------|-----------------------|
| Signal Generator E4438C | MY49071430 | 13-Jan-22 (CTTL No.J22X00406)            | Jan-23                |
| Network Analyzer E5071C | MY46110673 | 14-Jan-22 (CTTL No.J22X00406)            | Jan-23                |

Calibrated by: **Zhao Jing** SAR Test Engineer  
Reviewed by: **Lin Hao** SAR Test Engineer  
Approved by: **Qi Dianyan** SAR Project Leader

Issued: April 6, 2022

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Certificate No: Z22-60107 Page 1 of 6

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**Glossary:**

TSL: tissue simulating liquid  
ConvF: sensitivity in TSL / NORMx.y.z  
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%.

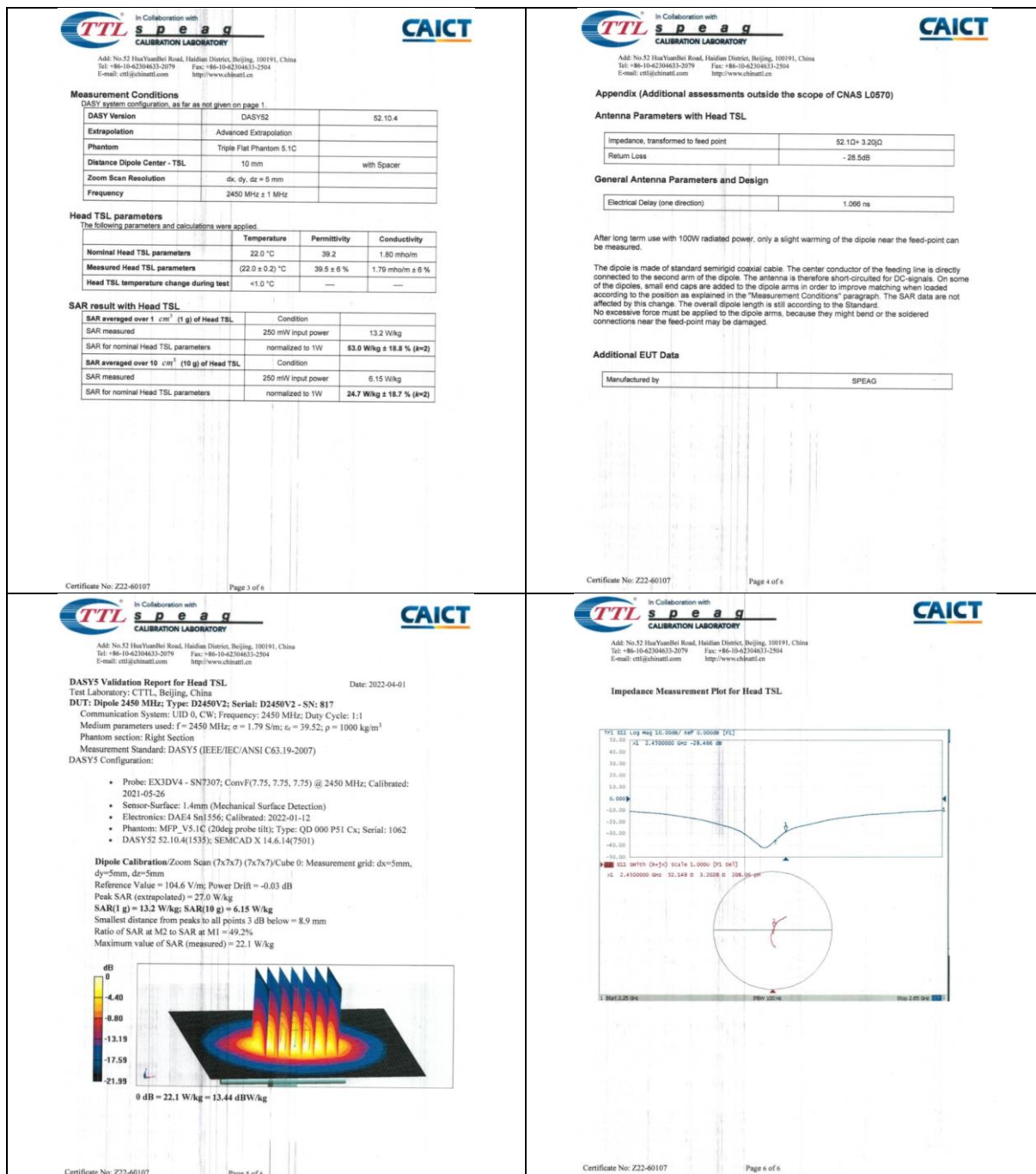
Certificate No: Z22-60107 Page 2 of 6



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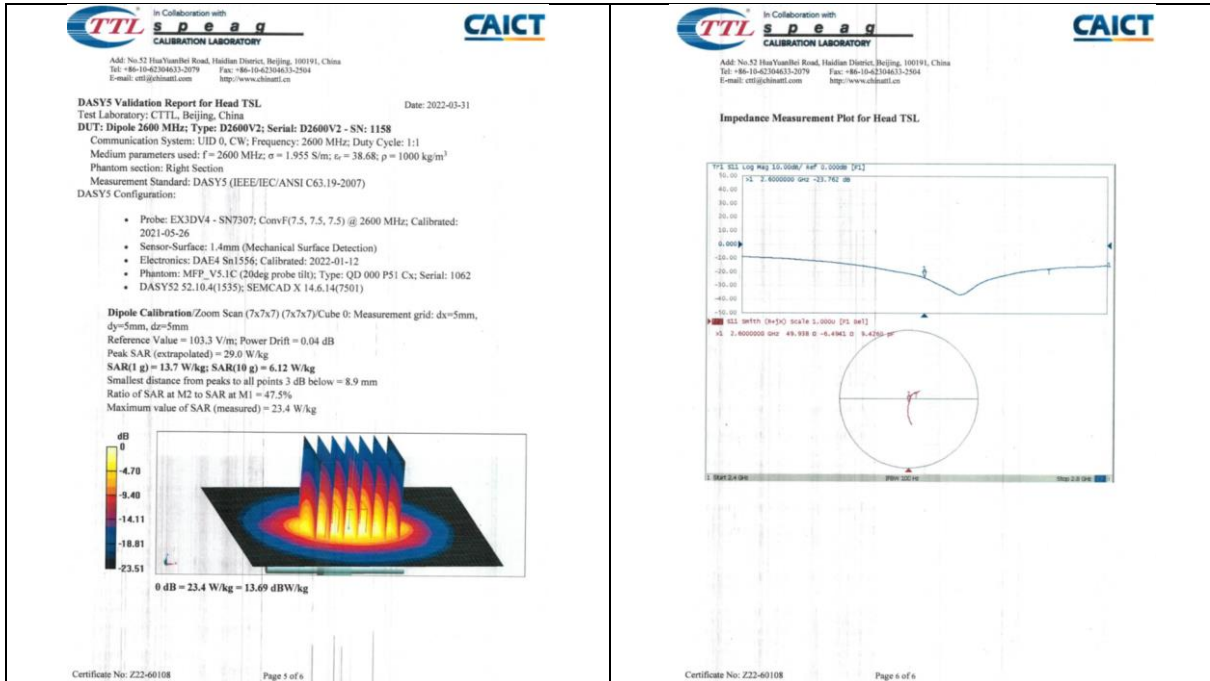
## 1.11 D2600V2 - SN 1158

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| <b>CALIBRATION CERTIFICATE</b>                                                                                                                                                                                                                                             |                                                                    |                                                                                                                                                                                |                       |
| Object                                                                                                                                                                                                                                                                     | D2600V2 - SN: 1158                                                 |                                                                                                                                                                                |                       |
| Calibration Procedure(s)                                                                                                                                                                                                                                                   | FF-Z11-003-01<br>Calibration Procedures for dipole validation kits |                                                                                                                                                                                |                       |
| Calibration date:                                                                                                                                                                                                                                                          | March 31, 2022                                                     |                                                                                                                                                                                |                       |
| 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                                                             | 24-Sep-21 (CTTL No.J21X08326)                                                                                                                                                  | Sep-22                |
| Power sensor NRP8S                                                                                                                                                                                                                                                         | 104291                                                             | 24-Sep-21 (CTTL No.J21X08326)                                                                                                                                                  | Sep-22                |
| Reference Probe EX3DVA                                                                                                                                                                                                                                                     | SN 7307                                                            | 26-May-21 (SPEAG No EX3-7307_May21)                                                                                                                                            | May-22                |
| DAE4                                                                                                                                                                                                                                                                       | SN 1556                                                            | 12-Jan-22 (CTTL-SPEAG No Z22-60007)                                                                                                                                            | Jan-23                |
| Secondary Standards                                                                                                                                                                                                                                                        | ID #                                                               | Cal Date (Calibrated by Certificate No.)                                                                                                                                       | Scheduled Calibration |
| Signal Generator E4438C                                                                                                                                                                                                                                                    | MY49071430                                                         | 13-Jan-22 (CTTL No.Z22X00406)                                                                                                                                                  | Jan-23                |
| Network Analyzer E5071C                                                                                                                                                                                                                                                    | MY48110673                                                         | 14-Jan-22 (CTTL No.Z22X00406)                                                                                                                                                  | Jan-23                |
| Calibrated by:                                                                                                                                                                                                                                                             | Name                                                               | Function                                                                                                                                                                       | Signature             |
|                                                                                                                                                                                                                                                                            | Zhao Jing                                                          | SAR Test Engineer                                                                                                                                                              |                       |
| Reviewed by:                                                                                                                                                                                                                                                               | Lin Hao                                                            | SAR Test Engineer                                                                                                                                                              |                       |
| Approved by:                                                                                                                                                                                                                                                               | Qi Diaryuan                                                        | SAR Project Leader                                                                                                                                                             |                       |
| Issued: April 6, 2022                                                                                                                                                                                                                                                      |                                                                    |                                                                                                                                                                                |                       |
| This calibration certificate shall not be reproduced except in full without written approval of the laboratory.                                                                                                                                                            |                                                                    |                                                                                                                                                                                |                       |
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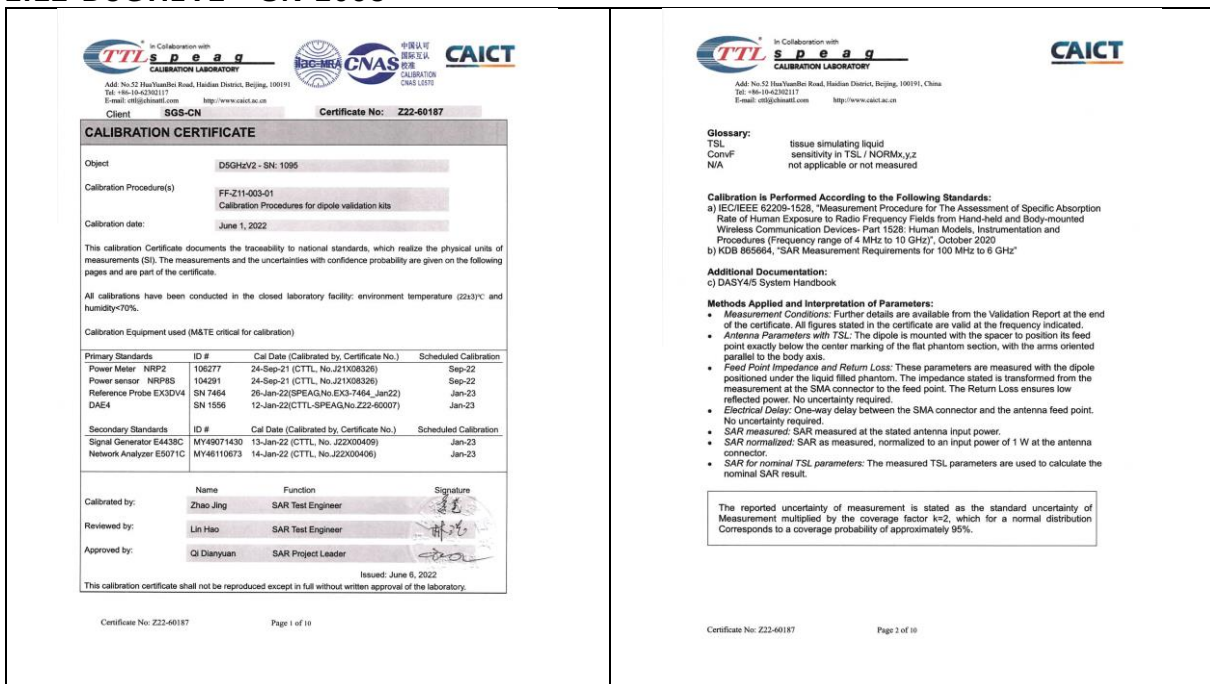
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| <b>Measurement Conditions</b><br>DASY system configuration, as far as not given on page 1:                                                                                     |                          |                                                                                                                                                                                |                  |
| DASY Version                                                                                                                                                                   | DASY52                   | 52.10.4                                                                                                                                                                        |                  |
| Extrapolation                                                                                                                                                                  | Advanced Extrapolation   |                                                                                                                                                                                |                  |
| Phantom                                                                                                                                                                        | Triple Flat Phantom 5.1C |                                                                                                                                                                                |                  |
| Distance Dipole Center - TSL                                                                                                                                                   | 10 mm                    | with Spacer                                                                                                                                                                    |                  |
| Zoom Scan Resolution                                                                                                                                                           | dx, dy, dz = 5 mm        |                                                                                                                                                                                |                  |
| Frequency                                                                                                                                                                      | 2600 MHz ± 1 MHz         |                                                                                                                                                                                |                  |
| <b>Head TSL parameters</b><br>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          | 36.7 ± 6 %                                                                                                                                                                     | 1.96 mho/m ± 6 % |
| Head TSL temperature change during test                                                                                                                                        | <1.0 °C                  | ---                                                                                                                                                                            | ---              |
| <b>SAR result with Head TSL</b>                                                                                                                                                |                          |                                                                                                                                                                                |                  |
|                                                                                                                                                                                | Condition                |                                                                                                                                                                                |                  |
| SAR averaged over 1 cm <sup>2</sup> (1 g) of Head TSL                                                                                                                          |                          |                                                                                                                                                                                |                  |
| SAR measured                                                                                                                                                                   | 250 mW input power       | 13.7 W/kg                                                                                                                                                                      |                  |
| SAR for nominal Head TSL parameters                                                                                                                                            | normalized to 1W         | 54.8 W/kg ± 18.8 % (k=2)                                                                                                                                                       |                  |
| SAR averaged over 10 cm <sup>2</sup> (10 g) of Head TSL                                                                                                                        | Condition                |                                                                                                                                                                                |                  |
| SAR measured                                                                                                                                                                   | 250 mW input power       | 6.12 W/kg                                                                                                                                                                      |                  |
| SAR for nominal Head TSL parameters                                                                                                                                            | normalized to 1W         | 24.6 W/kg ± 18.7 % (k=2)                                                                                                                                                       |                  |
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| <b>Glossary:</b>                                                                                                                                                                                                                                                                                                       |                                |                                                                                                                                                                                |  |
| TSL                                                                                                                                                                                                                                                                                                                    | tissue simulating liquid       |                                                                                                                                                                                |  |
| ConvF                                                                                                                                                                                                                                                                                                                  | sensitivity in TSL / NORMx.y.z |                                                                                                                                                                                |  |
| N/A                                                                                                                                                                                                                                                                                                                    | not applicable or not measured |                                                                                                                                                                                |  |
| <b>Calibration is Performed According to the Following Standards:</b>                                                                                                                                                                                                                                                  |                                |                                                                                                                                                                                |  |
| 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 865864, "SAR Measurement Requirements for 100 MHz to 6 GHz"                                                                                                                                                                                                                                                     |                                |                                                                                                                                                                                |  |
| <b>Additional Documentation:</b>                                                                                                                                                                                                                                                                                       |                                |                                                                                                                                                                                |  |
| c) DASY4/S System Handbook                                                                                                                                                                                                                                                                                             |                                |                                                                                                                                                                                |  |
| <b>Methods Applied and Interpretation of Parameters:</b>                                                                                                                                                                                                                                                               |                                |                                                                                                                                                                                |  |
| • <b>Measurement Conditions:</b> 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.                                                                                                                   |                                |                                                                                                                                                                                |  |
| • <b>Antenna Parameters with TSL:</b> 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.                                                                                                 |                                |                                                                                                                                                                                |  |
| • <b>Feed Point Impedance and Return Loss:</b> 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.        |                                |                                                                                                                                                                                |  |
| • <b>Electrical Delay:</b> One-way delay between the SMA connector and the antenna feed point. No uncertainty required.                                                                                                                                                                                                |                                |                                                                                                                                                                                |  |
| • <b>SAR measured:</b> SAR measured at the stated antenna input power.                                                                                                                                                                                                                                                 |                                |                                                                                                                                                                                |  |
| • <b>SAR normalized:</b> SAR as measured, normalized to an input power of 1 W at the antenna connector.                                                                                                                                                                                                                |                                |                                                                                                                                                                                |  |
| • <b>SAR for nominal TSL parameters:</b> 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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| <b>Appendix (Additional assessments outside the scope of CNAS L0570)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                    |               |                                                                                                                                                                                |  |
| <b>Antenna Parameters with Head TSL</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |               |                                                                                                                                                                                |  |
| Impedance, transformed to feed point                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 49.90- 6.49jΩ |                                                                                                                                                                                |  |
| Return Loss                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | -23.8dB       |                                                                                                                                                                                |  |
| <b>General Antenna Parameters and Design</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |               |                                                                                                                                                                                |  |
| Electrical Delay (one direction)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1.053 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.                                                                                                                                                                                                                                                                                                                                                                              |               |                                                                                                                                                                                |  |
| <b>Additional EUT Data</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |               |                                                                                                                                                                                |  |
| Manufactured by                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | SPEAG         |                                                                                                                                                                                |  |
| Certificate No: Z22-40108                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |               | Page 4 of 6                                                                                                                                                                    |  |



## 1.12 D5GHZV2 - SN 1095



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## Measurement Conditions

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

|                              |                                                                                                  |                                  |
|------------------------------|--------------------------------------------------------------------------------------------------|----------------------------------|
| DAISY Version                | DAISY2                                                                                           | 52.10.4                          |
| Extrapolation                | Advanced Extrapolation                                                                           |                                  |
| Phantom                      | Triple Flat Phantom 5.1C                                                                         |                                  |
| Distance Dipole Center - TSL | 10 mm                                                                                            | with Spacer                      |
| Zoom Scan Resolution         | dx, dy = 4 mm, dz = 1.4 mm                                                                       | Graded Ratio = 1.4 (Z direction) |
| Frequency                    | 5200 MHz ± 1 MHz<br>5300 MHz ± 1 MHz<br>5500 MHz ± 1 MHz<br>5600 MHz ± 1 MHz<br>5800 MHz ± 1 MHz |                                  |

## Head TSL parameters at 5200MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Head TSL parameters             | 22.0 °C         | 36.0         | 4.66 mho/m       |
| Measured Head TSL parameters            | (22.0 ± 0.2) °C | 35.4 ± 6 %   | 4.62 mho/m ± 6 % |
| Head TSL temperature change during test | <1.0 °C         | ---          | ---              |

## SAR result with Head TSL at 5200MHz

|                                                         | Condition          |                          |
|---------------------------------------------------------|--------------------|--------------------------|
| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL   | 250 mW input power | 7.79 W/kg                |
| SAR measured                                            | 100 mW input power | 7.79 W/kg                |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 77.6 W/kg ± 24.4 % (k=2) |
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | Condition          |                          |
| SAR measured                                            | 250 mW input power | 2.22 W/kg                |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 22.1 W/kg ± 24.2 % (k=2) |

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## Head TSL parameters at 5300MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Head TSL parameters             | 22.0 °C         | 35.9         | 4.76 mho/m       |
| Measured Head TSL parameters            | (22.0 ± 0.2) °C | 35.2 ± 6 %   | 4.73 mho/m ± 6 % |
| Head TSL temperature change during test | <1.0 °C         | ---          | ---              |

## SAR result with Head TSL at 5300MHz

|                                                         | Condition          |                          |
|---------------------------------------------------------|--------------------|--------------------------|
| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL   | 100 mW input power | 7.94 W/kg                |
| SAR measured                                            | 100 mW input power | 7.94 W/kg                |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 79.1 W/kg ± 24.4 % (k=2) |
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | Condition          |                          |
| SAR measured                                            | 100 mW input power | 2.27 W/kg                |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 22.6 W/kg ± 24.2 % (k=2) |

## Head TSL parameters at 5500MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Head TSL parameters             | 22.0 °C         | 35.8         | 4.96 mho/m       |
| Measured Head TSL parameters            | (22.0 ± 0.2) °C | 34.8 ± 6 %   | 4.94 mho/m ± 6 % |
| Head TSL temperature change during test | <1.0 °C         | ---          | ---              |

## SAR result with Head TSL at 5500MHz

|                                                         | Condition          |                          |
|---------------------------------------------------------|--------------------|--------------------------|
| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL   | 100 mW input power | 6.29 W/kg                |
| SAR measured                                            | 100 mW input power | 6.29 W/kg                |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 62.5 W/kg ± 24.4 % (k=2) |
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | Condition          |                          |
| SAR measured                                            | 100 mW input power | 2.34 W/kg                |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 23.3 W/kg ± 24.2 % (k=2) |

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## Head TSL parameters at 5600MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Head TSL parameters             | 22.0 °C         | 35.5         | 5.07 mho/m       |
| Measured Head TSL parameters            | (22.0 ± 0.2) °C | 34.7 ± 6 %   | 5.05 mho/m ± 6 % |
| Head TSL temperature change during test | <1.0 °C         | ---          | ---              |

## SAR result with Head TSL at 5600MHz

|                                                         | Condition          |                          |
|---------------------------------------------------------|--------------------|--------------------------|
| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL   | 100 mW input power | 8.12 W/kg                |
| SAR measured                                            | 100 mW input power | 8.12 W/kg                |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 80.8 W/kg ± 24.4 % (k=2) |
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | Condition          |                          |
| SAR measured                                            | 100 mW input power | 2.30 W/kg                |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 22.9 W/kg ± 24.2 % (k=2) |

## Head TSL parameters at 5800MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Head TSL parameters             | 22.0 °C         | 35.3         | 5.27 mho/m       |
| Measured Head TSL parameters            | (22.0 ± 0.2) °C | 34.4 ± 6 %   | 5.25 mho/m ± 6 % |
| Head TSL temperature change during test | <1.0 °C         | ---          | ---              |

## SAR result with Head TSL at 5800MHz

|                                                         | Condition          |                          |
|---------------------------------------------------------|--------------------|--------------------------|
| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL   | 100 mW input power | 7.71 W/kg                |
| SAR measured                                            | 100 mW input power | 7.71 W/kg                |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 76.7 W/kg ± 24.4 % (k=2) |
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | Condition          |                          |
| SAR measured                                            | 100 mW input power | 2.16 W/kg                |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 21.8 W/kg ± 24.2 % (k=2) |

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

### Antenna Parameters with Head TSL at 5200MHz

|                                      |              |
|--------------------------------------|--------------|
| Impedance, transformed to feed point | 48.1D-5.03jΩ |
| Return Loss                          | -23.6dB      |

### Antenna Parameters with Head TSL at 5300MHz

|                                      |              |
|--------------------------------------|--------------|
| Impedance, transformed to feed point | 47.8D-2.42jΩ |
| Return Loss                          | -28.5dB      |

### Antenna Parameters with Head TSL at 5500MHz

|                                      |              |
|--------------------------------------|--------------|
| Impedance, transformed to feed point | 50.3D-4.26jΩ |
| Return Loss                          | -27.4dB      |

### Antenna Parameters with Head TSL at 5600MHz

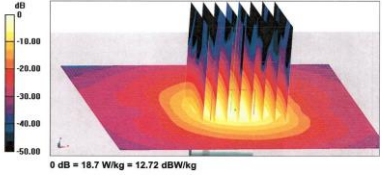
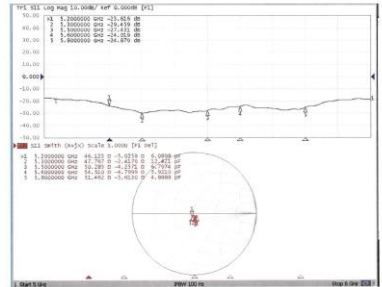
|                                      |              |
|--------------------------------------|--------------|
| Impedance, transformed to feed point | 54.5D-4.80jΩ |
| Return Loss                          | -24.0dB      |

### Antenna Parameters with Head TSL at 5800MHz

|                                      |              |
|--------------------------------------|--------------|
| Impedance, transformed to feed point | 51.5D-5.61jΩ |
| Return Loss                          | -24.9dB      |

Certificate No: Z22-60187

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| <p>In Collaboration with<br/><b>TTL</b> <b>s p e a q</b><br/>CALIBRATION LABORATORY</p> <p>CAICT</p> <p>Address: No. 52 HuaYuanBei Road, Haidian District, Beijing, 100191, China<br/>Tel: +86-10-62302117<br/>E-mail: <a href="mailto:cn@sgs.com">cn@sgs.com</a> <a href="http://www.caict.ac.cn">http://www.caict.ac.cn</a></p> <p><b>General Antenna Parameters and Design</b></p> <table border="1"><tr><td>Electrical Delay (one direction)</td><td>1.101 ns</td></tr></table> <p>After long term use with 100W radiated power, only a slight warming of the dipole near the feed-point can be measured.</p> <p>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.</p> <p>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.</p> <p><b>Additional EUT Data</b></p> <table border="1"><tr><td>Manufactured by</td><td>SPEAG</td></tr></table> <p>Certificate No: Z22-60187 Page 7 of 10</p>                                                                                                                                                                                                                                                                                                                                                                                                                                             | Electrical Delay (one direction)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1.101 ns | Manufactured by | SPEAG | <p>In Collaboration with<br/><b>TTL</b> <b>s p e a q</b><br/>CALIBRATION LABORATORY</p> <p>CAICT</p> <p>Address: No. 52 HuaYuanBei Road, Haidian District, Beijing, 100191, China<br/>Tel: +86-10-62302117<br/>E-mail: <a href="mailto:cn@sgs.com">cn@sgs.com</a> <a href="http://www.caict.ac.cn">http://www.caict.ac.cn</a></p> <p><b>DASY5 Validation Report for Head TSL</b></p> <p>Test Laboratory: CTTL, Beijing, China<br/>Date: 2022-06-01</p> <p><b>DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1095</b></p> <p>Communication System: CW; Frequency: 5200 MHz; Frequency: 5300 MHz;<br/>Frequency: 5500 MHz; Frequency: 5600 MHz; Frequency: 5800 MHz; Duty Cycle: 1:1<br/>Medium parameters used: <math>f = 5200</math> MHz; <math>\sigma = 4.62</math> S/m; <math>\epsilon_r = 35.19</math>; <math>\rho = 1000</math> kg/m<sup>3</sup><br/>Medium parameters used: <math>f = 5300</math> MHz; <math>\sigma = 4.73</math> S/m; <math>\epsilon_r = 35.19</math>; <math>\rho = 1000</math> kg/m<sup>3</sup><br/>Medium parameters used: <math>f = 5500</math> MHz; <math>\sigma = 4.939</math> S/m; <math>\epsilon_r = 34.83</math>; <math>\rho = 1000</math> kg/m<sup>3</sup><br/>Medium parameters used: <math>f = 5600</math> MHz; <math>\sigma = 5.051</math> S/m; <math>\epsilon_r = 34.89</math>; <math>\rho = 1000</math> kg/m<sup>3</sup><br/>Medium parameters used: <math>f = 5800</math> MHz; <math>\sigma = 5.247</math> S/m; <math>\epsilon_r = 34.42</math>; <math>\rho = 1000</math> kg/m<sup>3</sup><br/>Phantom section: Right Section<br/>Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)<br/>DASY5 Configuration:</p> <ul style="list-style-type: none"><li>Probe: EX3DV4 - SN7484; ConvF(5.6, 5.6, 5.6) @ 5200 MHz; ConvF(5.32, 5.32, 5.32) @ 5300 MHz; ConvF(5.11, 5.11, 5.11) @ 5500 MHz; ConvF(4.91, 4.91, 4.91) @ 5600 MHz; ConvF(5, 5, 5) @ 5800 MHz; Calibrated: 2022-01-26</li><li>Sensor-Surface: 1.4mm (Mechanical Surface Detection)</li><li>Electronics: DA64 Sn1556; Calibrated: 2022-01-12</li><li>Phantom: MPF_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062</li><li>DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)</li></ul> <p><b>Dipole Calibration /Pin=100mW, d=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm</b><br/>Reference Value = 60.80 V/m; Power Drift = -0.06 dB<br/>Peak SAR (extrapolated) = 6.80 W/kg<br/>SAR(1 g) = 7.79 W/kg; SAR(10 g) = 2.22 W/kg<br/>Smallest distance from peaks to all points 3 dB below = 7.2 mm<br/>Ratio of SAR at M2 to SAR at M1 = 66.8%<br/>Maximum value of SAR (measured) = 18.3 W/kg</p> <p><b>Dipole Calibration /Pin=100mW, d=10mm, f=5300 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm</b><br/>Reference Value = 61.08 V/m; Power Drift = -0.07 dB<br/>Peak SAR (extrapolated) = 31.5 W/kg<br/>SAR(1 g) = 7.94 W/kg; SAR(10 g) = 2.27 W/kg<br/>Smallest distance from peaks to all points 3 dB below = 7.2 mm<br/>Ratio of SAR at M2 to SAR at M1 = 65.5%<br/>Maximum value of SAR (measured) = 19.0 W/kg</p> <p>Certificate No: Z22-60187 Page 8 of 10</p> |
| Electrical Delay (one direction)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       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| Manufactured by                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        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| <p>In Collaboration with<br/><b>TTL</b> <b>s p e a q</b><br/>CALIBRATION LABORATORY</p> <p>CAICT</p> <p>Address: No. 52 HuaYuanBei Road, Haidian District, Beijing, 100191, China<br/>Tel: +86-10-62302117<br/>E-mail: <a href="mailto:cn@sgs.com">cn@sgs.com</a> <a href="http://www.caict.ac.cn">http://www.caict.ac.cn</a></p> <p><b>Dipole Calibration /Pin=100mW, d=10mm, f=5500 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm</b><br/>Reference Value = 61.92 V/m; Power Drift = -0.08 dB<br/>Peak SAR (extrapolated) = 34.7 W/kg<br/>SAR(1 g) = 8.20 W/kg; SAR(10 g) = 2.34 W/kg<br/>Smallest distance from peaks to all points 3 dB below = 7.2 mm<br/>Ratio of SAR at M2 to SAR at M1 = 63.9%<br/>Maximum value of SAR (measured) = 20.2 W/kg</p> <p><b>Dipole Calibration /Pin=100mW, d=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm</b><br/>Reference Value = 65.08 V/m; Power Drift = -0.07 dB<br/>Peak SAR (extrapolated) = 35.2 W/kg<br/>SAR(1 g) = 8.12 W/kg; SAR(10 g) = 2.3 W/kg<br/>Smallest distance from peaks to all points 3 dB below = 7.2 mm<br/>Ratio of SAR at M2 to SAR at M1 = 62.5%<br/>Maximum value of SAR (measured) = 19.1 W/kg</p> <p><b>Dipole Calibration /Pin=100mW, d=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm</b><br/>Reference Value = 62.13 V/m; Power Drift = -0.06 dB<br/>Peak SAR (extrapolated) = 34.8 W/kg<br/>SAR(1 g) = 7.71 W/kg; SAR(10 g) = 2.16 W/kg<br/>Smallest distance from peaks to all points 3 dB below = 7.2 mm<br/>Ratio of SAR at M2 to SAR at M1 = 61.6%<br/>Maximum value of SAR (measured) = 18.7 W/kg</p> <p><b>0 dB = 16.7 W/kg = 12.72 dBW/kg</b></p>  <p>Certificate No: Z22-60187 Page 9 of 10</p> | <p>In Collaboration with<br/><b>TTL</b> <b>s p e a q</b><br/>CALIBRATION LABORATORY</p> <p>CAICT</p> <p>Address: No. 52 HuaYuanBei Road, Haidian District, Beijing, 100191, China<br/>Tel: +86-10-62302117<br/>E-mail: <a href="mailto:cn@sgs.com">cn@sgs.com</a> <a href="http://www.caict.ac.cn">http://www.caict.ac.cn</a></p> <p><b>Impedance Measurement Plot for Head TSL</b></p>  <p>Certificate No: Z22-60187 Page 10 of 10</p> |          |                 |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

## 2 DAE4 - SN 1245

| <p>Schmid &amp; Partner Engineering AG<br/>Zugstrasse 10, 8004 Zurich, Switzerland<br/>Phone +41 44 245 9700, Fax +41 44 245 9770<br/>www.spgg.ch, info@spgg.ch</p> <p><b>s p e a g</b></p> <p><b>IMPORTANT NOTICE</b></p> <p><b>USAGE OF THE DAE4</b></p> <p>The DAE4 unit is a delicate, high precision instrument and requires careful treatment by the user. There are no serviceable parts inside the DAE4. Special attention shall be given to the following points:</p> <p><b>Battery Exchange:</b> The battery cover of the DAE4 unit is fixed using a screw, over tightening the screw may cause the threads inside the DAE4 to wear out.</p> <p><b>Shipping of the DAE4:</b> Before shipping the DAE4 to SPEAG for calibration, remove the batteries and pack the DAE4 in an anti-static bag. This anti-static bag shall then be packed into a larger box or container which protects the DAE4 from impacts during transportation. The package shall be marked to indicate that a fragile instrument is inside.</p> <p><b>E-stop Failures:</b> Touch detection may be malfunctioning due to broken magnets in the E-stop. Rough handling of the E-stop may lead to damage of these magnets. Touch and collision errors are often caused by dust and dirt accumulated in the E-stop. To prevent E-stop failure, the customer shall always mount the probe to the DAE4 carefully and keep the DAE4 unit in a non-dusty environment if not used for measurements.</p> <p><b>Repair:</b> Minor repairs are performed at no extra cost during the annual calibration. However, SPEAG reserves the right to charge for any repair especially if rough unprofessional handling caused the defect.</p> <p><b>DASY Configuration Files:</b> Since the exact values of the DAE4 input resistances, as measured during the calibration procedure of a DAE4 unit, are not used by the DASY software, a nominal value of 200 MOhm is given in the corresponding configuration file.</p> <p><b>Important Note:</b><br/>Warranty and calibration is void if the DAE4 unit is disassembled partly or fully by the Customer.</p> <p><b>Important Note:</b><br/>Never attempt to grease or oil the E-stop assembly. Cleaning and readjusting of the E-stop assembly is allowed by certified SPEAG personnel only and is part of the annual calibration procedure.</p> <p><b>Important Note:</b><br/>To prevent damage of the DAE4 probe connector pins, use great care when installing the probe to the DAE4. Carefully connect the probe with the connector notch oriented in the mating position. Avoid any rotational movement of the probe body versus the DAE4 while turning the locking nut of the connector. The same care shall be used when disconnecting the probe from the DAE4.</p> <p>TN_EH190306AE DAE4.docx 07.03.2019</p> | <p>Calibration Laboratory of<br/>Schmid &amp; Partner<br/>Engineering AG<br/>Zugstrasse 10, 8004 Zurich, Switzerland</p> <p>Accredited by the Swiss Accreditation Service (SAS)<br/>The Swiss Accreditation Service is one of the signatories to the EA<br/>Multilateral Agreement for the recognition of calibration certificates</p> <p>Accreditation No.: SCS 0108</p> <p>Client: <b>SGS-CN (Auden)</b> Certificate No.: <b>DAE4-1245_May22</b></p> <p><b>CALIBRATION CERTIFICATE</b></p> <p>Object: <b>DAE4 - SD 000 D04 BM - SN: 1245</b></p> <p>Calibration procedure(s): <b>QA CAL-06 v30</b><br/>Calibration procedure for the data acquisition electronics (DAE)</p> <p>Calibration date: <b>May 30, 2022</b></p> <p>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.</p> <p>All calibrations have been conducted in the closed laboratory facility; environment temperature (22 ± 3) °C and humidity &lt; 70%.</p> <p>Calibration Equipment used (MATE critical for calibration)</p> <table border="1"><thead><tr><th>Primary Standards</th><th>ID #</th><th>Cal Date (Certificate No.)</th><th>Scheduled Calibration</th></tr></thead><tbody><tr><td>Kethley Multimeter Type 2001</td><td>SN: 0810276</td><td>31-Aug-21 (No.31368)</td><td>Aug-22</td></tr></tbody></table> <table border="1"><thead><tr><th>Secondary Standards</th><th>ID #</th><th>Check Date (in house)</th><th>Scheduled Check</th></tr></thead><tbody><tr><td>Auto DAE Calibration Unit</td><td>SE LWS 003 AA 1001</td><td>24-Jan-22 (in house check)</td><td>In house check: Jan-23</td></tr><tr><td>Calibrator Blue V2.1</td><td>SE LWS 006 AA 1002</td><td>24-Jan-22 (in house check)</td><td>In house check: Jan-23</td></tr></tbody></table> <p>Calibrated by: <b>Dominique Stettin</b> Function: <b>Laboratory Technician</b> Signature: <i>[Signature]</i></p> <p>Approved by: <b>Ben Kohn</b> Technical Manager Signature: <i>[Signature]</i></p> <p>This calibration certificate shall not be reproduced except in full without written approval of the laboratory. Issued: May 30, 2022</p> <p>Certificate No.: DAE4-1245_May22 Page 1 of 5</p> | Primary Standards          | ID #                   | Cal Date (Certificate No.) | Scheduled Calibration | Kethley Multimeter Type 2001 | SN: 0810276           | 31-Aug-21 (No.31368)  | Aug-22                | Secondary Standards | ID #                  | Check Date (in house) | Scheduled Check       | Auto DAE Calibration Unit                 | SE LWS 003 AA 1001 | 24-Jan-22 (in house check) | In house check: Jan-23 | Calibrator Blue V2.1 | SE LWS 006 AA 1002 | 24-Jan-22 (in house check) | In house check: Jan-23 |
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| Primary Standards                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | ID # 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| Kethley Multimeter Type 2001                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           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31-Aug-21 (No.31368)       | Aug-22                 |                            |                       |                              |                       |                       |                       |                     |                       |                       |                       |                                           |                    |                            |                        |                      |                    |                            |                        |
| Secondary Standards                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ID # 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| Auto DAE Calibration Unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              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24-Jan-22 (in house check) | In house check: Jan-23 |                            |                       |                              |                       |                       |                       |                     |                       |                       |                       |                                           |                    |                            |                        |                      |                    |                            |                        |
| Calibrator Blue V2.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   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24-Jan-22 (in house check) | In house check: Jan-23 |                            |                       |                              |                       |                       |                       |                     |                       |                       |                       |                                           |                    |                            |                        |                      |                    |                            |                        |
| <p>Calibration Laboratory of<br/>Schmid &amp; Partner<br/>Engineering AG<br/>Zugstrasse 10, 8004 Zurich, Switzerland</p> <p>Accredited by the Swiss Accreditation Service (SAS)<br/>The Swiss Accreditation Service is one of the signatories to the EA<br/>Multilateral Agreement for the recognition of calibration certificates</p> <p>Accreditation No.: SCS 0108</p> <p><b>Glossary</b></p> <p>DAE: data acquisition electronics<br/>Connector angle: information used in DASY system to align probe sensor X to the robot coordinate system.</p> <p><b>Methods Applied and Interpretation of Parameters</b></p> <ul style="list-style-type: none"><li>• <b>DC Voltage Measurement:</b> Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.</li><li>• <b>Connector angle:</b> The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.</li><li>• The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.<ul style="list-style-type: none"><li>• <b>DC Voltage Measurement Linearity:</b> Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.</li><li>• <b>Common mode sensitivity:</b> Influence of a positive or negative common mode voltage on the differential measurement.</li><li>• <b>Channel separation:</b> Influence of a voltage on the neighbor channels not subject to an input voltage.</li><li>• <b>AD Converter Values with inputs shorted:</b> Values on the internal AD converter corresponding to zero input voltage.</li><li>• <b>Input Offset Measurement:</b> Output voltage and statistical results over a large number of zero voltage measurements.</li><li>• <b>Input Offset Current:</b> Typical value for information; Maximum channel input offset current, not considering the input resistance.</li><li>• <b>Input resistance:</b> Typical value for information; DAE input resistance at the connector, during internal auto-zeroing and during measurement.</li><li>• <b>Low Battery Alarm Voltage:</b> Typical value for information. Below this voltage, a battery alarm signal is generated.</li><li>• <b>Power consumption:</b> Typical value for information. Supply currents in various operating modes.</li></ul></li></ul> <p>Certificate No.: DAE4-1245_May22 Page 2 of 5</p>                                                                                                                                                                 | <p><b>DC Voltage Measurement</b></p> <p>AD - Converter Resolution nominal<br/>High Range: 1LSB = 6.1 μV, full range = -190...+920 mV<br/>Low Range: 1LSB = 61 μV, full range = -1...+3mV<br/>DASY measurement parameters: Auto Zero-Time: 3 sec; Measuring time: 3 sec</p> <table border="1"><thead><tr><th>Calibration Factors</th><th>X</th><th>Y</th><th>Z</th></tr></thead><tbody><tr><td>High Range</td><td>405.265 ± 0.02% (k=2)</td><td>403.974 ± 0.02% (k=2)</td><td>406.092 ± 0.02% (k=2)</td></tr><tr><td>Low Range</td><td>3.99534 ± 1.50% (k=2)</td><td>3.99508 ± 1.50% (k=2)</td><td>4.01015 ± 1.50% (k=2)</td></tr></tbody></table> <p><b>Connector Angle</b></p> <table border="1"><thead><tr><th>Connector Angle to be used in DASY system</th><th>30.0° ± 1°</th></tr></thead></table> <p>Certificate No.: DAE4-1245_May22 Page 3 of 5</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Calibration Factors        | X                      | Y                          | Z                     | High Range                   | 405.265 ± 0.02% (k=2) | 403.974 ± 0.02% (k=2) | 406.092 ± 0.02% (k=2) | Low Range           | 3.99534 ± 1.50% (k=2) | 3.99508 ± 1.50% (k=2) | 4.01015 ± 1.50% (k=2) | Connector Angle to be used in DASY system | 30.0° ± 1°         |                            |                        |                      |                    |                            |                        |
| Calibration Factors                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Y                          | Z                      |                            |                       |                              |                       |                       |                       |                     |                       |                       |                       |                                           |                    |                            |                        |                      |                    |                            |                        |
| High Range                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 405.265 ± 0.02% (k=2)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 403.974 ± 0.02% (k=2)      | 406.092 ± 0.02% (k=2)  |                            |                       |                              |                       |                       |                       |                     |                       |                       |                       |                                           |                    |                            |                        |                      |                    |                            |                        |
| Low Range                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 3.99534 ± 1.50% (k=2)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 3.99508 ± 1.50% (k=2)      | 4.01015 ± 1.50% (k=2)  |                            |                       |                              |                       |                       |                       |                     |                       |                       |                       |                                           |                    |                            |                        |                      |                    |                            |                        |
| Connector Angle to be used in DASY system                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 30.0° ± 1°                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                            |                        |                            |                       |                              |                       |                       |                       |                     |                       |                       |                       |                                           |                    |                            |                        |                      |                    |                            |                        |

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

## 1. DC Voltage Linearity

| High Range        | Reading (µV) | Difference (µV) | Error (%) |
|-------------------|--------------|-----------------|-----------|
| Channel X + Input | 19994.45     | 1.52            | 0.00      |
| Channel X + Input | 20004.58     | 2.22            | 0.01      |
| Channel X - Input | -20001.14    | 1.12            | -0.01     |
| Channel Y + Input | 19994.72     | 1.58            | 0.00      |
| Channel Y + Input | 20001.22     | -1.00           | -0.00     |
| Channel Y - Input | -20003.05    | -1.57           | 0.01      |
| Channel Z + Input | 19992.44     | 0.19            | 0.00      |
| Channel Z + Input | 20003.09     | 0.58            | 0.00      |
| Channel Z - Input | -20001.73    | -0.27           | 0.00      |

| Low Range         | Reading (µV) | Difference (µV) | Error (%) |
|-------------------|--------------|-----------------|-----------|
| Channel X + Input | 2001.91      | 0.41            | 0.02      |
| Channel X + Input | 202.54       | 0.65            | 0.32      |
| Channel X - Input | -197.86      | 0.07            | -0.04     |
| Channel Y + Input | 2002.05      | 0.58            | 0.03      |
| Channel Y + Input | 201.27       | -0.57           | -0.28     |
| Channel Y - Input | -196.23      | -0.06           | 0.03      |
| Channel Z + Input | 2001.96      | 0.08            | 0.00      |
| Channel Z + Input | 200.09       | -1.53           | -0.76     |
| Channel Z - Input | -199.85      | -1.57           | 0.79      |

## 2. Common mode sensitivity

| Common mode Input Voltage (mV) | High Range Average Reading (µV) | Low Range Average Reading (µV) |
|--------------------------------|---------------------------------|--------------------------------|
| Channel X                      | -5.87                           | -7.69                          |
| -200                           | 9.12                            | 7.79                           |
| Channel Y                      | -8.68                           | -9.28                          |
| -200                           | 8.52                            | 6.36                           |
| Channel Z                      | -5.36                           | -5.60                          |
| -200                           | 3.58                            | 3.06                           |

## 3. Channel separation

| Input Voltage (mV) | Channel X (µV) | Channel Y (µV) | Channel Z (µV) |
|--------------------|----------------|----------------|----------------|
| Channel X          | 200            | -              | 4.07           |
| Channel Y          | 200            | 9.36           | -              |
| Channel Z          | 200            | 10.11          | 7.14           |

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## 4. AD-Converter Values with inputs shorted

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

|           | High Range (LSB) | Low Range (LSB) |
|-----------|------------------|-----------------|
| Channel X | 15984            | 17040           |
| Channel Y | 16562            | 16768           |
| Channel Z | 16035            | 15668           |

## 5. Input Offset Measurement

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

| Input 10MΩ | Average (µV) | min. Offset (µV) | max. Offset (µV) | Std. Deviation (µV) |
|------------|--------------|------------------|------------------|---------------------|
| Channel X  | 1.00         | -0.15            | 1.93             | 0.45                |
| Channel Y  | -0.18        | -1.28            | 0.94             | 0.45                |
| Channel Z  | -0.58        | -2.81            | 0.58             | 0.60                |

## 6. Input Offset Current

Nominal input circuitry offset current on all channels: &lt;25nA

## 7. Input Resistance (Typical values for information)

|           | Zeroing (ΩOff) | Measuring (ΩChn) |
|-----------|----------------|------------------|
| Channel X | 200            | 200              |
| Channel Y | 200            | 200              |
| Channel Z | 200            | 200              |

## 8. Low Battery Alarm Voltage (Typical values for information)

| Typical values | Alarm Level (VDC) |
|----------------|-------------------|
| Supply (+ Vcc) | +7.9              |
| Supply (- Vcc) | -7.6              |

## 9. Power Consumption (Typical values for information)

| Typical values | Switched off (mA) | Stand by (mA) | Transmitting (mA) |
|----------------|-------------------|---------------|-------------------|
| Supply (+ Vcc) | +0.01             | +8            | +14               |
| Supply (- Vcc) | -0.01             | -8            | -9                |

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## 3 EX3DV4 - SN 7767

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Swiss Calibration Service

Accreditation No: SCS 0108

Client: SGS-CN (Auden)

Certificate No: EX-7767\_Oct22

## CALIBRATION CERTIFICATE

Object: EX3DV4 - SN:7767

Calibration procedure(s): QA CAL-01-v9, QA CAL-12-v9, QA CAL-14-v6, QA CAL-23-v5,  
QA CAL-25-v7  
Calibration procedure for dosimetric E-field probes

Calibration date: October 28, 2022

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 &lt; 70%.

Calibration Equipment used (DATE critical for calibration)

| Primary Standards          | ID               | Cal. Date (Certificate No.)       | Scheduled Calibration |
|----------------------------|------------------|-----------------------------------|-----------------------|
| Power meter NRP            | SN: 104778       | 04-Apr-22 (No. 217-03528-03524)   | Apr-23                |
| Power sensor NRP-291       | SN: 103944       | 04-Apr-22 (No. 217-03524)         | Apr-23                |
| DCP DAK-3.1 (Impedance)    | SN: 1545         | 25-Oct-22 (DCP DAK3-1545, Oct22)  | Oct-23                |
| DCP DAK-12                 | SN: 1014         | 25-Oct-22 (DCP DAK12-1014, Oct22) | Oct-23                |
| Reference 30 dB Attenuator | SN: C25582 (20c) | 04-Apr-22 (No. 217-03607)         | Apr-23                |
| DAE4                       | SN: 961          | 15-Oct-22 (No. DAE4-880 Oct22)    | Oct-23                |
| Reference Probe E53502     | SN: 3013         | 27-Oct-22 (No. E535-3013, Oct22)  | Nov-22                |

| Secondary Standards     | ID                | Check Date (in house)             | Scheduled Check       |
|-------------------------|-------------------|-----------------------------------|-----------------------|
| Power meter E4418B      | SN: G841268474    | 05-Apr-16 (in house check Jun-20) | In house check Jun-24 |
| Power sensor E4418A     | SN: SN: V41498687 | 05-Apr-16 (in house check Jun-20) | In house check Jun-24 |
| Power sensor E4415A     | SN: 100517510     | 05-Apr-16 (in house check Jun-20) | In house check Jun-24 |
| RF generator HP 8540C   | SN: US840101705   | 04-Aug-09 (in house check Jun-20) | In house check Jun-24 |
| Network Analyzer F8555A | SN: G84158417     | 27-May-14 (in house check Oct-20) | In house check Oct-24 |

|                |                         |                                 |                        |
|----------------|-------------------------|---------------------------------|------------------------|
| Calibrated by: | Name: Adonis Georgiadou | Function: Laboratory Technician | Signature: [Signature] |
| Approved by:   | Brian Kohn              | Technical Manager               | Signature: [Signature] |

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Swiss Calibration Service

Accreditation No: SCS 0108

## Glossary

|                      |                                                                                                                                 |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------|
| TSL                  | Issue simulating liquid                                                                                                         |
| NORMA <sub>xyz</sub> | sensitivity in free space                                                                                                       |
| CompF                | sensitivity in TSL, NORMA <sub>xyz</sub>                                                                                        |
| DCP                  | diode compression point                                                                                                         |
| CP                   | crest factor (1/3 duty cycle) of the RF signal                                                                                  |
| A, B, C, D           | modulation dependent linearization parameters                                                                                   |
| Polarization θ       | rotation around probe axis                                                                                                      |
| Polarization φ       | rotation around air axis that is in the plane normal to probe axis (at measurement center), i.e., φ = 0 is normal to probe axis |
| Connector Angle      | information used in DASY system to align probe sensor X to the robot coordinate system                                          |

## 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-Worn Wireless Communication Devices - Part 1528: Human Models, Instrumentation And Procedures (Frequency Range of 4 MHz to 10 GHz)", October 2020.
- b) IEC 60958, "SAR Measurement Requirements for 100 MHz to 6 GHz"

## Methods Applied and Interpretation of Parameters:

- NORMA<sub>xyz</sub>: Assessed for E-field polarization θ = 0 (f = 800 MHz in TEM-cell; f = 1800 MHz: R22 waveguide). NORMA<sub>xyz</sub> are only intermediate values, i.e., the uncertainties of NORMA<sub>xyz</sub> does not affect the E-field uncertainty made TSL (see below CompF).
- NORMA<sub>xyz</sub> + NORMA<sub>xyz</sub> \* frequency response (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of CompF.
- DCP<sub>xyz</sub>: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal. DCP does not depend on frequency nor media.
- PAR: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics.
- A<sub>xyz</sub>, B<sub>xyz</sub>, C<sub>xyz</sub>, D<sub>xyz</sub>, V<sub>RF,xyz</sub>, A, B, C, D are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media, VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConfF and Boundary Effect Parameters: Assessed in far phantom using E-field or Temperature Transfer Standard for f = 800 MHz and made waveguide using analytical field distribution based on power measurements for f = 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORMA<sub>xyz</sub> \* CompF whereby the uncertainty corresponds to that given for CompF. A frequency dependent CompF is used in DASY4 version 4.4 and higher which allows extending the validity from ±50 MHz to ±100 MHz.
- Spherical anisotropy (3D deviation from isotropy): In a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- Connector Angle: The angle is assessed using the information gained by determining the NORMA (no uncertainty required).

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EX3DV4 - SN:7767

October 28, 2022

Parameters of Probe: EX3DV4 - SN:7767

Basic Calibration Parameters

|                                           | Sensor X | Sensor Y | Sensor Z | Unc (k = 2) |
|-------------------------------------------|----------|----------|----------|-------------|
| Norm (aV/(mm <sup>2</sup> )) <sup>A</sup> | 0.87     | 0.89     | 0.56     | ±10.1%      |
| DCP (mV) <sup>B</sup>                     | 103.4    | 107.3    | 105.7    | ±4.7%       |

Calibration Results for Modulation Response

| URS | Communication System Name | A      | B     | C    | D    | VR    | Max   | Max   |
|-----|---------------------------|--------|-------|------|------|-------|-------|-------|
|     |                           | dB     | dB/μV |      | dB   | dec   | dec   | dec   |
| 0   | CW                        | X 0.00 | 0.00  | 1.00 | 0.00 | 184.7 | ±3.5% | ±4.7% |
|     |                           | Y 0.00 | 0.00  | 1.00 |      | 186.7 |       |       |
|     |                           | Z 0.00 | 0.00  | 1.00 |      | 179.3 |       |       |

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%.

<sup>A</sup> The uncertainties of Norm X,Y,Z do not affect the E<sub>1</sub>-field uncertainty inside T85 (see Page 5).

<sup>B</sup> Uncertainty parameter uncertainty for maximum specified field strength.

<sup>C</sup> Uncertainty is determined using the min. deviation from three responses applying rectangular distribution and is expressed for the square of the field value.

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October 28, 2022

Parameters of Probe: EX3DV4 - SN:7767

Other Probe Parameters

|                                               |            |
|-----------------------------------------------|------------|
| Sensor Arrangement                            | Triangular |
| Connector Angle                               | 144.8°     |
| Mechanical Surface Detection Mode             | angled     |
| Optical Surface Detection Mode                | displaced  |
| Probe Overall Length                          | 337mm      |
| Probe Body Diameter                           | 16mm       |
| Tip Length                                    | 2mm        |
| Tip Diameter                                  | 2.5mm      |
| Probe Tip to Sensor X Calibration Point       | 1mm        |
| Probe Tip to Sensor Y Calibration Point       | 1mm        |
| Probe Tip to Sensor Z Calibration Point       | 1mm        |
| Recommended Measurement Distance from Surface | 1.4mm      |

Note: Measurement distance from surface can be increased to 3-4mm for an Area Scan job.

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October 28, 2022

Parameters of Probe: EX3DV4 - SN:7767

Calibration Parameter Determined in Head Tissue Simulating Media

| f (MHz) <sup>C</sup> | Relative Permittivity <sup>D</sup> | Conductivity <sup>E</sup> (S/m) | CompF X | CompF Y | CompF Z | Alpha <sup>F</sup> | Depth <sup>G</sup> (mm) | Unc (k = 2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|--------------------|-------------------------|-------------|
| 150                  | 52.3                               | 0.79                            | 14.08   | 14.08   | 14.08   | 0.00               | 1.00                    | ±13.2%      |
| 450                  | 43.5                               | 0.87                            | 11.90   | 11.90   | 11.90   | 0.16               | 1.20                    | ±13.3%      |
| 750                  | 41.9                               | 0.89                            | 10.26   | 10.26   | 10.26   | 0.00               | 0.80                    | ±12.0%      |
| 835                  | 41.5                               | 0.90                            | 10.00   | 10.00   | 10.00   | 0.43               | 0.80                    | ±12.0%      |
| 1750                 | 40.1                               | 1.37                            | 9.32    | 9.32    | 9.32    | 0.36               | 0.86                    | ±12.0%      |
| 1900                 | 40.0                               | 1.40                            | 8.91    | 8.91    | 8.91    | 0.33               | 0.86                    | ±12.0%      |
| 2100                 | 39.8                               | 1.49                            | 8.60    | 8.60    | 8.60    | 0.30               | 0.86                    | ±12.0%      |
| 2200                 | 39.5                               | 1.67                            | 8.44    | 8.44    | 8.44    | 0.33               | 0.90                    | ±12.0%      |
| 2450                 | 39.2                               | 1.80                            | 8.24    | 8.24    | 8.24    | 0.32               | 0.90                    | ±12.0%      |
| 2600                 | 39.0                               | 1.96                            | 7.99    | 7.99    | 7.99    | 0.27               | 0.90                    | ±12.0%      |
| 3000                 | 38.2                               | 2.71                            | 7.55    | 7.55    | 7.55    | 0.30               | 1.25                    | ±13.1%      |
| 3600                 | 37.9                               | 2.91                            | 7.45    | 7.45    | 7.45    | 0.30               | 1.35                    | ±13.1%      |
| 3700                 | 37.7                               | 3.12                            | 7.20    | 7.20    | 7.20    | 0.30               | 1.35                    | ±13.1%      |
| 3900                 | 37.5                               | 3.32                            | 6.84    | 6.84    | 6.84    | 0.40               | 1.69                    | ±13.1%      |
| 4100                 | 37.2                               | 3.53                            | 6.63    | 6.63    | 6.63    | 0.40               | 1.80                    | ±13.1%      |
| 4200                 | 37.1                               | 3.65                            | 6.39    | 6.39    | 6.39    | 0.40               | 1.70                    | ±13.1%      |
| 4400                 | 36.9                               | 3.84                            | 6.17    | 6.17    | 6.17    | 0.40               | 1.70                    | ±13.1%      |
| 4600                 | 36.7                               | 4.04                            | 6.15    | 6.15    | 6.15    | 0.40               | 1.70                    | ±13.1%      |
| 4800                 | 36.4                               | 4.26                            | 6.13    | 6.13    | 6.13    | 0.45               | 1.90                    | ±13.1%      |
| 4900                 | 36.3                               | 4.40                            | 6.07    | 6.07    | 6.07    | 0.40               | 1.80                    | ±13.1%      |
| 5200                 | 36.0                               | 4.66                            | 5.65    | 5.65    | 5.65    | 0.40               | 1.80                    | ±13.1%      |
| 5300                 | 35.9                               | 4.76                            | 5.48    | 5.48    | 5.48    | 0.40               | 1.80                    | ±13.1%      |
| 5600                 | 35.6                               | 4.96                            | 5.30    | 5.30    | 5.30    | 0.40               | 1.80                    | ±13.1%      |
| 5900                 | 35.5                               | 5.07                            | 5.14    | 5.14    | 5.14    | 0.40               | 1.80                    | ±13.1%      |
| 5900                 | 35.3                               | 5.27                            | 5.10    | 5.10    | 5.10    | 0.40               | 1.80                    | ±13.1%      |

<sup>C</sup> Frequency validity above 300 MHz at ±100 MHz only applies for CDP v4.4 and higher (see Page 5), while it is relevant to ±50 MHz. The uncertainty is the 95% of the CompF parameter at calibration frequency and the uncertainty for the relative frequency term. Frequency validity below 300 MHz is ±1%, 2%, 4%, 5% and 7.5% for CompF assessments at 30, 60, 120, 150 and 300 MHz, respectively. Validity of CompF assessed at 60 MHz is ±1.5%, 3%, 4%, 5% and 7.5% for frequencies below 300 MHz. Below 300 MHz, the validity of the relative frequency term is ±1.5%.

<sup>D</sup> As frequencies below 30 MHz, the validity of the relative frequency term is ±1.5% if liquid compensation formula is applied to measured S10 values. At frequencies above 30 MHz, the validity of the relative frequency term is ±1.5% if liquid compensation formula is applied to measured S10 values.

<sup>E</sup> Alpha coefficients are determined during calibration. SRFAD warns that the remaining deviation due to the frequency effect after compensation is always less than ±1% for frequencies below 3 GHz and below ±2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

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EX3DV4 - SN:7767

October 28, 2022

Frequency Response of E-Field

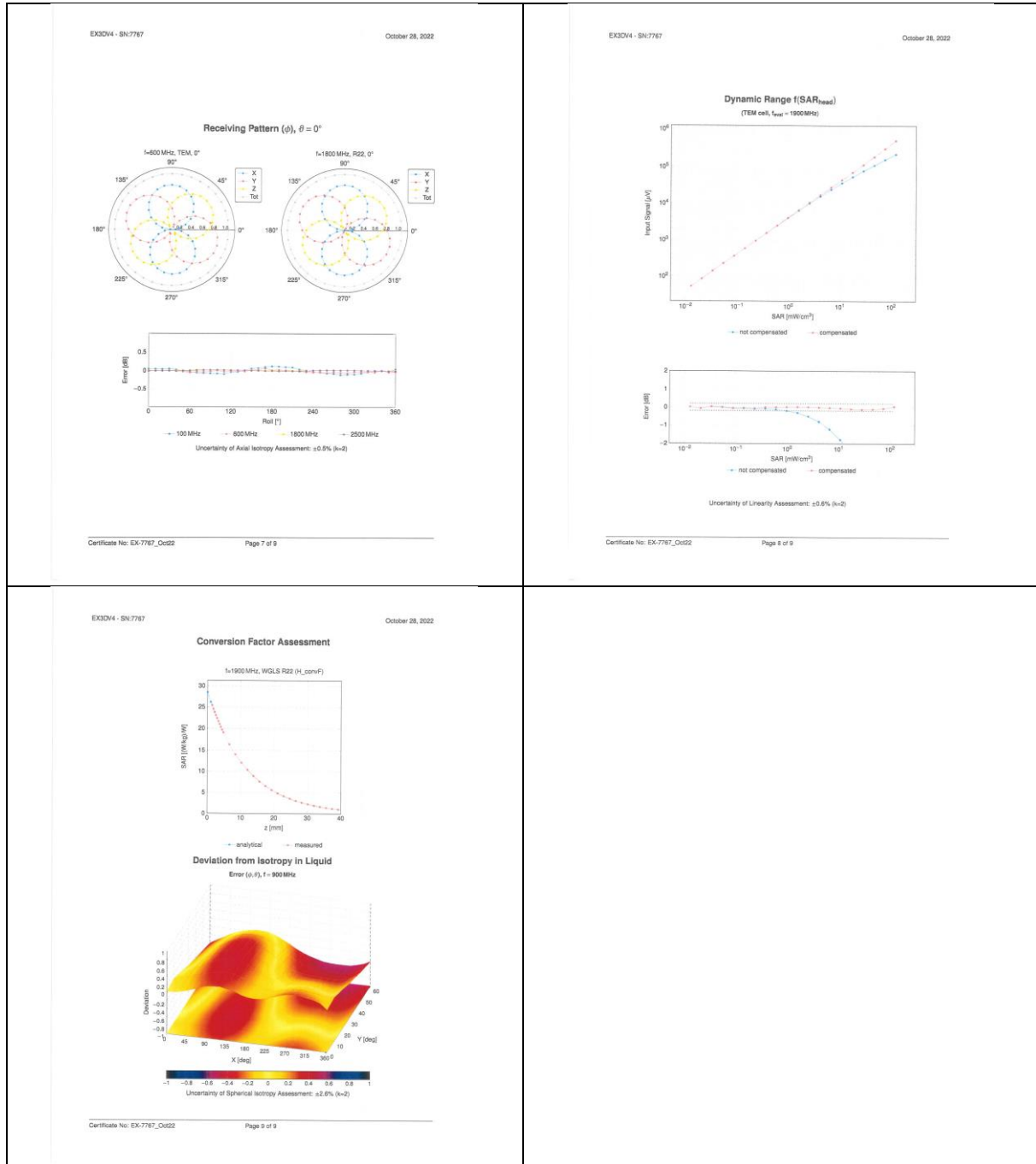
(TEM-Cell:01110 EXX, Waveguide:R22)

The graph plots the normalized frequency response of the E-field against frequency in MHz. The x-axis ranges from 200 to 3000 MHz with major ticks every 200 MHz. The y-axis ranges from 0.5 to 1.5 with major ticks every 0.1 units. Two data series are shown: TEM (red line with '+' markers) and R22 (blue line with '+' markers). Both series start at a normalized response of approximately 1.15 at 200 MHz and decrease slightly to about 1.0 at 3000 MHz. The TEM series is slightly higher than the R22 series in the middle frequency range.

Uncertainty of Frequency Response of E-Field: ±0.3% (k=2)

Certificate No: EX-7767\_Oct22

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#### 4 Impedance and return loss

| Dipole CLA150 SN 4025 |                 |            |                        |                |
|-----------------------|-----------------|------------|------------------------|----------------|
| Head Liquid           |                 |            |                        |                |
| Date of Measurement   | Return Loss(dB) | $\Delta$ % | Impedance ( $\Omega$ ) | $\Delta\Omega$ |
| 2021/4/26             | -31.4           | /          | 47.8                   | /              |
| Dipole D450V3 SN 1103 |                 |            |                        |                |
| Head Liquid           |                 |            |                        |                |
| Date of Measurement   | Return Loss(dB) | $\Delta$ % | Impedance ( $\Omega$ ) | $\Delta\Omega$ |
| 2021/4/21             | -23             | /          | 57.1                   | /              |



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