

Appendix C for KSCR220800133001

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	5d1136	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	7346	2022/03/30



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1 Dipole

1.1 CLA150 - SN 4025

<p>Calibration Laboratory of Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland</p> <p>Accredited by the Swiss Accreditation Service (SAS) The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates</p> <p>Client: SGS-CN (Auden) Certificate No.: CLA150-4025_Apr21</p> <p style="text-align: right;">Accreditation No.: SCS 0108</p> <hr/> <p style="text-align: center;">CALIBRATION CERTIFICATE</p> <p>Object: CLA150 - SN: 4025</p> <p>Calibration procedure(s): QA CAL-15-V9 Calibration Procedure for SAR Validation Sources below 700 MHz</p> <p>Calibration date: April 26, 2021</p> <p>The 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 < 70%.</p> <p>Calibration Equipment used (MPE critical for calibration)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Primary Standards</th> <th>ID #</th> <th>Cal Date (Certificate No.)</th> <th>Scheduled Calibration</th> </tr> </thead> <tbody> <tr> <td>Power meter NRP</td> <td>SN: 10476</td> <td>09-Apr-21 (No. 217-032010290)</td> <td>Apr-22</td> </tr> <tr> <td>Power sensor NRP Z91</td> <td>SN: 103344</td> <td>09-Apr-21 (No. 217-03201)</td> <td>Apr-22</td> </tr> <tr> <td>Power sensor NRP Z91</td> <td>SN: 103345</td> <td>09-Apr-21 (No. 217-03202)</td> <td>Apr-22</td> </tr> <tr> <td>Reference 20 dB Attenuator</td> <td>SN: 023360 (200)</td> <td>09-Apr-21 (No. 217-03343)</td> <td>Apr-22</td> </tr> <tr> <td>Type-N mismatch combination</td> <td>SN: 310982 / 00387</td> <td>09-Apr-21 (No. 217-03344)</td> <td>Apr-22</td> </tr> <tr> <td>Reference Probe EX3004 (DIE4)</td> <td>SN: 3877</td> <td>30-Dec-20 (No. EX3-3877_Dec20)</td> <td>Dec-21</td> </tr> <tr> <td></td> <td>SN: 664</td> <td>26-Jun-20 (No. DMS4-656_Jun20)</td> <td>Jun-21</td> </tr> </tbody> </table> <table border="1" style="width: 100%; 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All figures stated in this certificate are valid at the frequency indicated. Antenna Parameters with TSL: The source is mounted in a touch configuration below the center marking of the flat phantom. Return Loss: This parameter is measured with the source positioned under the liquid filled phantom (as described in the measurement condition clause). The Return Loss ensures low reflected power. No uncertainty required. SAR measured: SAR measured at the stated antenna input power. SAR normalized: SAR as measured, normalized to an input power of 1 W at the antenna connector. SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>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%.</p> </div> <p>Certificate No: CLA150-4025_Apr21 Page 2 of 6</p>		
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<p>Measurement Conditions DASY system configuration, as far as not given on page 1.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>DASY Version</th> <th>DASY5</th> <th>V32.10.4</th> </tr> </thead> <tbody> <tr> <td>Extrapolation</td> <td>Advanced Extrapolation</td> <td></td> </tr> <tr> <td>Phantom</td> <td>ELN Flat Phantom</td> <td>Shell thickness: 2 ± 0.2 mm</td> </tr> <tr> <td>EUT Positioning</td> <td>Touch Position</td> <td></td> </tr> <tr> <td>Zoom Scan Resolution</td> <td>dx, dy = 4.0 mm, dz = 1.4 mm</td> <td>Graded Ratio = 1.4 (Z direction)</td> </tr> <tr> <td>Frequency</td> <td>150 MHz ± 1 MHz</td> <td></td> </tr> </tbody> </table> <p>Head TSL parameters The following parameters and calculations were applied.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Parameter</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>52.3</td> <td>0.75 mho/m</td> </tr> <tr> <td>Measured Head TSL parameters</td> <td>(22.0 ± 0.2) °C</td> <td>51.1 ± 6 %</td> <td>0.75 mho/m ± 6 %</td> </tr> <tr> <td>Head TSL temperature change during test</td> <td>< 0.5 °C</td> <td>---</td> <td>---</td> </tr> </tbody> </table> <p>SAR result with Head TSL</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>SAR averaged over 1 cm³ (1 g) of Head TSL</th> <th>Condition</th> <th></th> </tr> </thead> <tbody> <tr> <td>SAR measured</td> <td>1 W input power</td> <td>3.90 W/kg</td> </tr> <tr> <td>SAR for nominal Head TSL parameters</td> <td>normalized to 1W</td> <td>3.88 W/kg ± 18.4 % (k=2)</td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>SAR averaged over 10 cm³ (10 g) of Head TSL</th> <th>condition</th> <th></th> </tr> </thead> <tbody> <tr> <td>SAR measured</td> <td>1 W input power</td> <td>2.60 W/kg</td> </tr> <tr> <td>SAR for nominal Head TSL parameters</td> <td>normalized to 1W</td> <td>2.59 W/kg ± 18.0 % (k=2)</td> </tr> </tbody> </table> <p>Certificate No: CLA150-4025_Apr21 Page 3 of 6</p>	DASY Version	DASY5	V32.10.4	Extrapolation	Advanced Extrapolation		Phantom	ELN Flat Phantom	Shell thickness: 2 ± 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 ± 1 MHz		Parameter	Temperature	Permittivity	Conductivity	Nominal Head TSL parameters	22.0 °C	52.3	0.75 mho/m	Measured Head TSL parameters	(22.0 ± 0.2) °C	51.1 ± 6 %	0.75 mho/m ± 6 %	Head TSL temperature change during test	< 0.5 °C	---	---	SAR averaged over 1 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 W/kg ± 18.4 % (k=2)	SAR averaged over 10 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 W/kg ± 18.0 % (k=2)	<p>Appendix (Additional assessments outside the scope of SCS 0108)</p> <p>Antenna Parameters with Head TSL</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td>Impedance, transformed to feed point</td> <td>47.9 Ω ± 1.5 Ω</td> </tr> <tr> <td>Return Loss</td> <td>-31.4 dB</td> </tr> </tbody> </table> <p>Additional EUT Data</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td>Manufactured by</td> <td>SPEAG</td> </tr> </tbody> </table> <p>Certificate No: CLA150-4025_Apr21 Page 4 of 6</p>	Impedance, transformed to feed point	47.9 Ω ± 1.5 Ω	Return Loss	-31.4 dB	Manufactured by	SPEAG
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 中国·江苏·昆山市留学生创业园伟业路10号 邮编 215300 t(86-512)57355888 f(86-512)57370818 sgs.china@sgs.com

DASY5 Validation Report for Head TSL

Date: 26.04.2021

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: CLA150; Type: CLA150; Serial: CLA150 - SN: 4025

Communication System: UID 0 - CW; Frequency: 150 MHz
Medium parameters used: $f = 150 \text{ MHz}$; $\sigma = 0.76 \text{ S/m}$; $\epsilon = 51.1$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN3877; ConvF(12.51, 12.51) @ 150 MHz; Calibrated: 30.12.2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DA54 Snt54; Calibrated: 26.06.2020
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP.1003
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

CLA Calibration for HSL-LF Tissue/CLA150, touch configuration, Pin=1W/Zoom Scan, dist=1.4mm (8x10x8)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 85.93 W/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 7.36 W/kg
SAR(1 g) = 3.90 W/kg; SAR(10 g) = 2.60 W/kg
Smallest distance from peaks to all points 3 dB below: Larger than measurement grid (> 30mm)
Ratio of SAR at M2 to SAR at M1 = 80.4%
Maximum value of SAR (measured) = 5.48 W/kg

0 dB = 5.48 W/kg = 7.39 dBW/kg

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Certificate No: CLA150-4025_Apr21 Page 6 of 6

1.2 D450V3 - SN 1103

Calibration Laboratory of Schmid & Partner Engineering AG
Ziegelhausstrasse 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 (22 ± 0.1) °C and humidity < 70%.

Calibration Equipment used (MPE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NP#	SN: 104778	09-Apr-21 (No. 217-03021/03030)	Apr-22
Power sensor NP#-Z91	SN: 103244	09-Apr-21 (No. 217-03021)	Apr-22
Reference 20 dB Attenuator	SN: CC2502 (200)	09-Apr-21 (No. 217-03343)	Apr-22
Type-N mission combination	SN: 310952 / 06327	09-Apr-21 (No. 217-03344)	Apr-22
Reference Probe E3039A	SN: 3077	30-Dec-20 (No. E30-3077_De20)	Dec-21
DAEA	SN: 654	05-Jun-20 (No. D454-654_Jun20)	Jun-21

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4418B	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 E4413A	SN: 00010010	06-Apr-16 (in house check Jun-20)	In house check Jun-22
HP generator HP 8648C	SN: US340601700	06-Apr-16 (in house check Jun-20)	In house check Jun-22
Network Analyzer Agilent E8358A	SN: US41980477	31-Mar-14 (in house check Oct-20)	In house check Oct-21

Calibrated by: **Christoph Leuber** (Function: Laboratory Technician)

Approved by: **Katja Polovic** (Function: Technical Manager)

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Certificate No: D450V3-1103_Apr21 Page 1 of 6

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Ziegelhausstrasse 43, 8004 Zurich, Switzerland

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

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 665664, "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%.

Certificate No: D450V3-1103_Apr21 Page 2 of 6



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t(86-512)57355888 f(86-512)57370818 sgs.china@sgs.com

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

DASY Version	DASY5	V62.10.4
Extrapolation	Advanced Extrapolation	
Phantom	ELJ4 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 ± 0.8 %	0.57 mho/m ± 0 %
Head TSL temperature change during test	< 0.5 °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm ³ (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 ³ (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)

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Appendix (Additional assessments outside the scope of SCS 0106)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	57.1 Ω - 2.6 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 straight 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 design 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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Certificate No: D450V3-1103_Apr21 Page 4 of 6

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

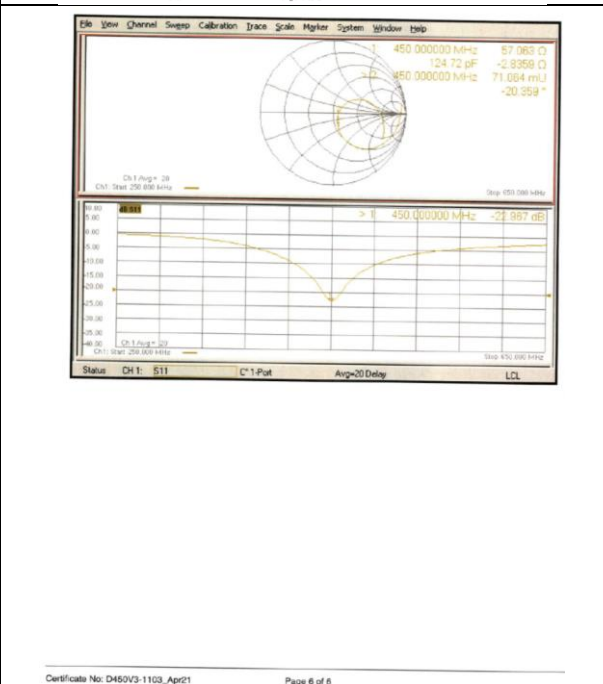
Communication System: UID 0 - CW; Frequency: 450 MHz
Medium parameters used: f = 450 MHz; α = 0.87 S/m; α_z = 43.1; ρ = 1000 kg/m³
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

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
- DASY52.10.4(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 W/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

Certificate No: D450V3-1103_Apr21 Page 5 of 6



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1.3 D750V3 - SN 1188

<p>Address: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191 Tel: +86-10-4236633-2512 Fax: +86-10-4236633-2504 E-mail: cti@china.ttl.com.cn http://www.china.ttl.com.cn</p> <p>Client: SGS-CN Certificate No: Z22-60103</p> <h3>CALIBRATION CERTIFICATE</h3> <p>Object: D750V3 - SN: 1188</p> <p>Calibration Procedure(s): FF-Z11-003-01 Calibration Procedures for dipole validation kits</p> <p>Calibration date: March 28, 2022</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 <70%.</p> <p>Calibration Equipment used (M&TE critical for calibration)</p> <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>102277</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> <tr> <th>Secondary Standards</th> <th>ID #</th> <th>Cal Date (Calibrated by, Certificate No.)</th> <th>Scheduled Calibration</th> </tr> <tr> <td>Signal Generator E4439C</td> <td>MY49671430</td> <td>13-Jan-22 (CTTL No.J22X00409)</td> <td>Jan-23</td> </tr> <tr> <td>Network Analyzer E5071C</td> <td>MY46110973</td> <td>14-Jan-22 (CTTL No.J22X00409)</td> <td>Jan-23</td> </tr> </tbody> </table> <p>Calibrated by: Zhao Jing SAR Test Engineer</p> <p>Reviewed by: Lin Hao SAR Test Engineer</p> <p>Approved by: Qi Dianyuan SAR Project Leader</p> <p>Issued: April 3, 2022</p> <p>This calibration certificate shall not be reproduced except in full without written approval of the laboratory.</p> <p>Certificate No: Z22-60103 Page 1 of 6</p>	Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration	Power Meter NRP2	102277	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	Secondary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration	Signal Generator E4439C	MY49671430	13-Jan-22 (CTTL No.J22X00409)	Jan-23	Network Analyzer E5071C	MY46110973	14-Jan-22 (CTTL No.J22X00409)	Jan-23	<p>Address: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-4236633-2079 Fax: +86-10-4236633-2504 E-mail: cti@china.ttl.com.cn http://www.china.ttl.com.cn</p> <h3>Glossary:</h3> <p>TSL: tissue simulating liquid ConvF: sensitivity in TSL / NORMx.yz N/A: not applicable or not measured</p> <p>Calibration is Performed According to the Following Standards:</p> <ul style="list-style-type: none"> 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 KDB 865684, "SAR Measurement Requirements for 100 MHz to 6 GHz" <p>Additional Documentation:</p> <ul style="list-style-type: none"> c) DASY4/5 System Handbook <p>Methods Applied and Interpretation of Parameters:</p> <ul style="list-style-type: none"> 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. <p>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%.</p> <p>Certificate No: Z22-60103 Page 2 of 6</p>																												
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DASY5 Validation Report for Head TSL Date: 2022-03-29
 Test Laboratory: CCTL, Beijing, China
DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1188
 Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
 Medium parameters used: $f = 750 \text{ MHz}$; $\sigma = 0.888 \text{ S/m}$; $\epsilon_r = 41.36$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Right Section
 Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
 DASY5 Configuration:

- Probe: EX3DV4 - SN7307; ConvF(10.31, 10.31, 10.31) @ 750 MHz; Calibrated: 2021-05-26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1556; Calibrated: 2022-01-12
- Phantom: MFP-V5.1C (20kg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- DASY52.52.10.4(1535); SEMCAD X 14.6.14(7501)

Dipole Calibration/Zoom Scan (7x7x7) (7x7x7) Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
 Reference Value = 55.06 V/m; Power Drift = 0.00 dB
 Peak SAR (extrapolated) = 3.07 W/kg
 SAR(1 g) = 2.07 W/kg; SAR(10 g) = 1.37 W/kg
 Smallest distance from peaks to all points 3 dB below = 18.9 mm
 Ratio of SAR at M2 to SAR at M1 = 67.1%
 Maximum value of SAR (measured) = 2.74 W/kg

Certificate No: Z22-60103 Page 5 of 6

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Impedance Measurement Plot for Head TSL

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1.4 D835V2 - SN 4d114

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Client: **SGS-CN** Certificate No: **Z22-60104**

CALIBRATION CERTIFICATE

Object: **D835V2 - SN: 4d114**

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 (CCTL, No.J21X08326)	Sep-22
Power sensor NRPBS	104291	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	MY48110673	14-Jan-22 (CCTL, No.J22X00409)	Jan-23

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

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

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

Signature: [Signatures]

Issued: April 6, 2022

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Certificate No: Z22-60104 Page 1 of 6

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CALIBRATION LABORATORY

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

Glossary:

TSL: tissue simulating liquid
 ConvF: sensitivity in TSL / NORMx.yz
 N/A: not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEC/IEEE 62209-1528, "Measurement Procedure for The Assessment of Specific Absorption Rate of Human Exposure to Radio Frequency Fields from Hand-held and Body-mounted Wireless Communication Devices- Part 1528: Human Models, Instrumentation and Procedures (Frequency range of 4 MHz to 10 GHz)", October 2020
- KDB 685664, "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%.

Certificate No: Z22-60104 Page 2 of 6

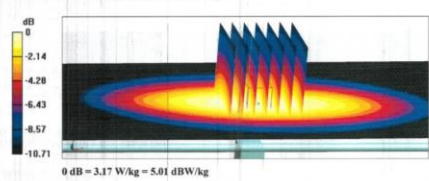
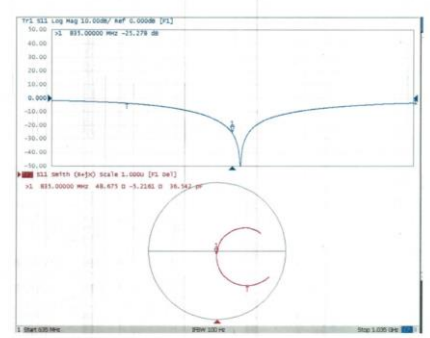


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 t(86-512)57355888 f(86-512)57370818 sgs.china@sgs.com

<p>TTL Speag In Collaboration with CAICT CALIBRATION LABORATORY</p> <p>Address: No. 52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-42304633-2079 Fax: +86-10-42304633-2504 E-mail: cti@china.ttl.com http://www.china.ttl.com</p> <p>Measurement Conditions DASY system configuration, as far as not given on page 1.</p> <table border="1"> <tr> <td>DASY Version</td> <td>DASY52</td> <td>VS2 10.4</td> </tr> <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>835 MHz ± 1 MHz</td> <td></td> </tr> </table> <p>Head TSL parameters The following parameters and calculations were applied.</p> <table border="1"> <tr> <td></td> <td>Temperature</td> <td>Permittivity</td> <td>Conductivity</td> </tr> <tr> <td>Nominal Head TSL parameters</td> <td>22.0 °C</td> <td>41.5</td> <td>0.90 mho/m</td> </tr> <tr> <td>Measured Head TSL parameters</td> <td>(22.0 ± 0.2) °C</td> <td>41.0 ± 8 %</td> <td>0.91 mho/m ± 8 %</td> </tr> <tr> <td>Head TSL temperature change during test</td> <td><1.0 °C</td> <td>---</td> <td>---</td> </tr> </table> <p>SAR result with Head TSL</p> <table border="1"> <tr> <td>SAR averaged over 1 cm³ (1g) of Head TSL</td> <td>Condition</td> <td></td> </tr> <tr> <td>SAR measured</td> <td>250 mW input power</td> <td>2.37 W/kg</td> </tr> <tr> <td>SAR for nominal Head TSL parameters</td> <td>normalized to 1W</td> <td>6.40 W/kg ± 18.6 % (k=2)</td> </tr> <tr> <td>SAR averaged over 10 cm³ (10g) of Head TSL</td> <td>Condition</td> <td></td> </tr> <tr> <td>SAR measured</td> <td>250 mW input power</td> <td>1.54 W/kg</td> </tr> <tr> <td>SAR for nominal Head TSL parameters</td> <td>normalized to 1W</td> <td>6.12 W/kg ± 18.7 % (k=2)</td> </tr> </table> <p>Certificate No: Z22-60104 Page 3 of 6</p>	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			Temperature	Permittivity	Conductivity	Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m	Measured Head TSL parameters	(22.0 ± 0.2) °C	41.0 ± 8 %	0.91 mho/m ± 8 %	Head TSL temperature change during test	<1.0 °C	---	---	SAR averaged over 1 cm ³ (1g) of Head TSL	Condition		SAR measured	250 mW input power	2.37 W/kg	SAR for nominal Head TSL parameters	normalized to 1W	6.40 W/kg ± 18.6 % (k=2)	SAR averaged over 10 cm ³ (10g) 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)	<p>TTL Speag In Collaboration with CAICT CALIBRATION LABORATORY</p> <p>Address: No. 52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-42304633-2079 Fax: +86-10-42304633-2504 E-mail: cti@china.ttl.com http://www.china.ttl.com</p> <p>Appendix (Additional assessments outside the scope of CNAS L0570)</p> <p>Antenna Parameters with Head TSL</p> <table border="1"> <tr> <td>Impedance, transformed to feed point</td> <td>48.7Ω - j22Ω</td> </tr> <tr> <td>Return Loss</td> <td>-25.3dB</td> </tr> </table> <p>General Antenna Parameters and Design</p> <table border="1"> <tr> <td>Electrical Delay (one direction)</td> <td>1.307 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>Additional EUT Data</p> <table border="1"> <tr> <td>Manufactured by</td> <td>SPEAG</td> </tr> </table> <p>Certificate No: Z22-60104 Page 4 of 6</p>	Impedance, transformed to feed point	48.7Ω - j22Ω	Return Loss	-25.3dB	Electrical Delay (one direction)	1.307 ns	Manufactured by	SPEAG
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1.5 D900V2 - SN 1d079

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Tel: +86-10-4230603-2117
E-mail: cti@chinaetl.com http://www.caict.ac.cn

DASY5 Validation Report for Head TSL Date: 2022-06-07

Test Laboratory: CTTI, Beijing, China
DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN: 14079
Communication System: UTD 0, CW; Frequency: 900 MHz; Duty Cycle: 1:1
Medium parameters used: f = 900 MHz; σ = 0.98 S/m; ε = 42.05; ρ = 1000 kg/m³
Phantom section: Right Section
Measurement Standard: DASY5 (IEE/IEEE/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN7464; Conv F(9.72, 9.72) @ 900 MHz; Calibrated: 2022-01-26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronic: DA44 SN1556; Calibrated: 2022-01-12
- Phantom: MFP_V5.1C (2ddeg probe kit); Type: QD 000 P51 Cx; Serial: 1062
- DASY52.52.10.4(1535); SEMCAD X 14.6.14(7501)

Dipole Calibration/Zoom Scan (7x7) (7x7) Cube 0; Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 59.81 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 4.20 W/kg
SAR(1g) = 2.78 W/kg; SAR(10g) = 1.78 W/kg
Smallest distance from peaks to all points 3 dB below = 16 mm
Ratio of SAR at M2 to SAR at M1 = 65.8%
Maximum value of SAR (measured) = 3.71 W/kg

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Impedance Measurement Plot for Head TSL

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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 NRP8V	104291	24-Sep-21 (CTTL No.J21X08326)	Sep-22
Reference Probe EX3DV4	SN 7307	26-May-21 (SPEAG No.JX3-7307_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	MY48110973	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 Dianyan, 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: Z22-60105 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:

- IEC/IEEE 62209-1528, "Measurement Procedure for The Assessment of Specific Absorption Rate of Human Exposure to Radio Frequency Fields from Hand-held and Body-mounted Wireless Communication Devices- Part 1528: Human Models, Instrumentation and Procedures (Frequency range of 4 MHz to 10 GHz)", October 2020
- KDB 855684, "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.
- 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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<p>TTL Speaq In Collaboration with CAICT CALIBRATION LABORATORY</p> <p>Address: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-42304633-2079 Fax: +86-10-42304633-2504 E-mail: cti@china.ttl.com http://www.chinatst.com</p> <p>Measurement Conditions DASYS system configuration, as far as not given on page 1.</p> <table border="1"> <tr> <td>DASY Version</td> <td>DASY52</td> <td>52.10.4</td> </tr> <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>10 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>1800 MHz ± 1 MHz</td> <td></td> </tr> </table> <p>Head TSL parameters The following parameters and calculations were applied.</p> <table border="1"> <tr> <td></td> <td>Temperature</td> <td>Permittivity</td> <td>Conductivity</td> </tr> <tr> <td>Nominal Head TSL parameters</td> <td>22.0 °C</td> <td>40.0</td> <td>1.40 mho/m</td> </tr> <tr> <td>Measured Head TSL parameters</td> <td>(22.0 ± 0.2) °C</td> <td>40.8 ± 8 %</td> <td>1.41 mho/m ± 8 %</td> </tr> <tr> <td>Head TSL temperature change during test</td> <td><1.0 °C</td> <td>---</td> <td>---</td> </tr> </table> <p>SAR result with Head TSL</p> <table border="1"> <tr> <td>SAR averaged over 1 cm³ (1 g) of Head TSL</td> <td>Condition</td> <td></td> </tr> <tr> <td>SAR measured</td> <td>250 mW input power</td> <td>9.73 W/kg</td> </tr> <tr> <td>SAR for nominal Head TSL parameters</td> <td>normalized to 1W</td> <td>38.9 W/kg ± 18.8 % (k=2)</td> </tr> <tr> <td>SAR averaged over 10 cm³ (10 g) of Head TSL</td> <td>Condition</td> <td></td> </tr> <tr> <td>SAR measured</td> <td>250 mW input power</td> <td>5.11 W/kg</td> </tr> <tr> <td>SAR for nominal Head TSL parameters</td> <td>normalized to 1W</td> <td>20.4 W/kg ± 18.7 % (k=2)</td> </tr> </table> <p>Certificate No: Z22-60105 Page 3 of 6</p>	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	1800 MHz ± 1 MHz			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	40.8 ± 8 %	1.41 mho/m ± 8 %	Head TSL temperature change during test	<1.0 °C	---	---	SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition		SAR measured	250 mW input power	9.73 W/kg	SAR for nominal Head TSL parameters	normalized to 1W	38.9 W/kg ± 18.8 % (k=2)	SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition		SAR measured	250 mW input power	5.11 W/kg	SAR for nominal Head TSL parameters	normalized to 1W	20.4 W/kg ± 18.7 % (k=2)	<p>TTL Speaq In Collaboration with CAICT CALIBRATION LABORATORY</p> <p>Address: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-42304633-2079 Fax: +86-10-42304633-2504 E-mail: cti@china.ttl.com http://www.chinatst.com</p> <p>Appendix (Additional assessments outside the scope of CNAS L0570)</p> <p>Antenna Parameters with Head TSL</p> <table border="1"> <tr> <td>Impedance, transformed to feed point</td> <td>47.90 - 2.54jΩ</td> </tr> <tr> <td>Return Loss</td> <td>-29.4dB</td> </tr> </table> <p>General Antenna Parameters and Design</p> <table border="1"> <tr> <td>Electrical Delay (one direction)</td> <td>1.116 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. 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>Additional EUT Data</p> <table border="1"> <tr> <td>Manufactured by</td> <td>SPEAG</td> </tr> </table> <p>Certificate No: Z22-60105 Page 4 of 6</p>	Impedance, transformed to feed point	47.90 - 2.54jΩ	Return Loss	-29.4dB	Electrical Delay (one direction)	1.116 ns	Manufactured by	SPEAG
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 t(86-512)57355888 f(86-512)57370818 sgs.china@sgs.com

1.7 D1900V2 - SN 5d136

<p>Client: SGS-CN Certificate No: Z22-60185</p> <h3>CALIBRATION CERTIFICATE</h3> <p>Object: D1900V2 - SN: 5d136</p> <p>Calibration Procedure(s): FF-Z11-003-01 Calibration Procedures for dipole validation kits</p> <p>Calibration date: June 7, 2022</p> <p>The 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 (23±)°C and humidity <70%.</p> <p>Calibration Equipment used (M&TE critical for calibration)</p> <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 NRP6S</td> <td>104291</td> <td>24-Sep-21 (CTTL No. J21X08326)</td> <td>Sep-22</td> </tr> <tr> <td>Reference Probe EKSDV4</td> <td>SN 7484</td> <td>28-Jan-22 (SPEAG No. EX3-7484_Jan22)</td> <td>Jan-23</td> </tr> <tr> <td>D4EA</td> <td>SN 1656</td> <td>12-Jan-22 (CTTL-SPEAG No. Z22-60007)</td> <td>Jan-23</td> </tr> </tbody> </table> <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>MY48671430</td> <td>13-Jan-22 (CTTL No. J22X00409)</td> <td>Jan-23</td> </tr> <tr> <td>Network Analyser E5071C</td> <td>MY48110073</td> <td>14-Jan-22 (CTTL No. J22X00409)</td> <td>Jan-23</td> </tr> </tbody> </table> <p>Calibrated by: Zhao Jing, SAR Test Engineer</p> <p>Reviewed by: Lin Hao, SAR Test Engineer</p> <p>Approved by: Qi Diaryuan, SAR Project Leader</p> <p>Issued: June 13, 2022</p> <p>This calibration certificate shall not be reproduced except in full without written approval of the laboratory.</p> <p>Certificate No: Z22-60185 Page 1 of 6</p>	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 EKSDV4	SN 7484	28-Jan-22 (SPEAG No. EX3-7484_Jan22)	Jan-23	D4EA	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	MY48671430	13-Jan-22 (CTTL No. J22X00409)	Jan-23	Network Analyser E5071C	MY48110073	14-Jan-22 (CTTL No. J22X00409)	Jan-23	<p>Glossary:</p> <p>TSL: tissue simulating liquid</p> <p>CompF: sensitivity in TSL / NORMx.y.z</p> <p>NA: not applicable or not measured</p> <p>Calibration is Performed According to the Following Standards:</p> <p>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</p> <p>b) KDB 865984, "SAR Measurement Requirements for 100 MHz to 6 GHz"</p> <p>Additional Documentation:</p> <p>c) DASY4/S System Handbook</p> <p>Methods Applied and Interpretation of Parameters:</p> <ul style="list-style-type: none"> 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. <p>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%.</p> <p>Certificate No: Z22-60185 Page 2 of 6</p>																								
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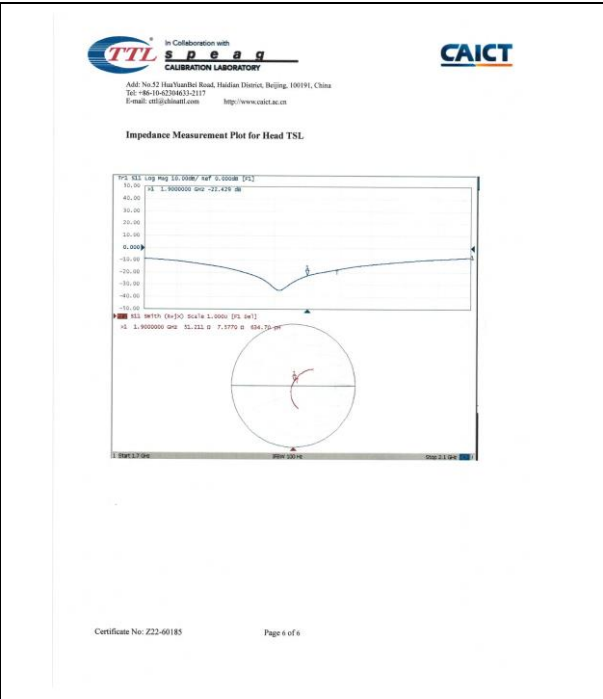
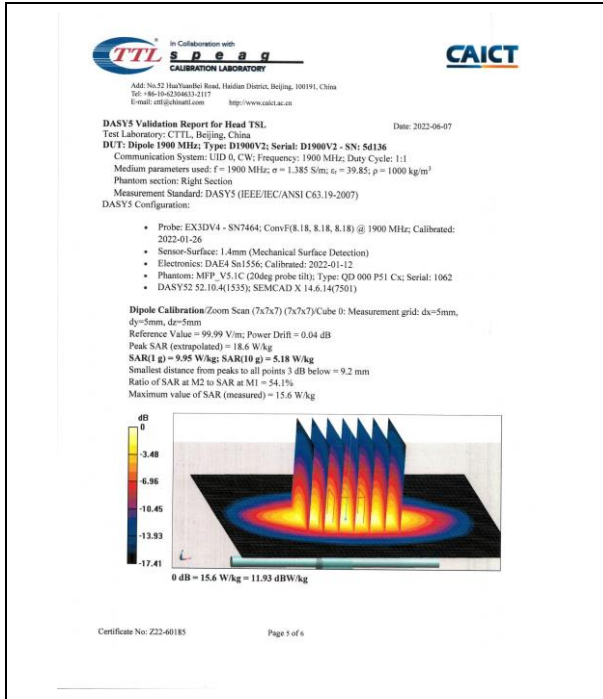


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1.8 D2000V2 - SN 1041

CALIBRATION CERTIFICATE

Client: **SGS-CN** Certificate No: **Z22-60186**

Object: D2000V2 - SN 1041

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

Calibration date: June 8, 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±)°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.J21X06326)	Sep-22
Power sensor NRP5	104291	24-Sep-21 (CCTL No.J21X06326)	Sep-22
Reference Probe EX3DV4	SN 7464	26-Jan-22(SPEAG No EX3-7464-Jan22)	Jan-23
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	MY48110673	14-Jan-22 (CCTL 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: June 13, 2022

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Certificate No: Z22-60186 Page 1 of 6

Glossary:

TSL: Issue simulating liquid
 ConvF: sensitivity in TSL / INORMx.y.z
 N/A: not applicable or not measured

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

- 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: Z22-60186 Page 2 of 6



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E-mail: ott@china.ttl.com http://www.caict.ac.cn

Measurement Conditions
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	2000 MHz ± 1 MHz	

Head TSL parameters
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 ± 0.5 %	1.39 mho/m ± 0.6 %	
Head TSL temperature change during test	<1.0 °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm ³ (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 ³ (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)

Certificate No: Z22-60186 Page 3 of 6

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E-mail: ott@china.ttl.com http://www.caict.ac.cn

Appendix (Additional assessments outside the scope of CNAS L6570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	48.4Ω ± 0.74Ω
Return Loss	-34.9dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.088 ns
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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 semi-rigid 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, spiral and caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

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

Additional EUT Data

Manufactured by	SPEAG
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Certificate No: Z22-60186 Page 4 of 6

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DASY5 Validation Report for Head TSL Date: 2022-06-06

Test Laboratory: CCTL, Beijing, China
DUT: Dipole 2000 MHz; Type: D2000V2; Serial: D2000V2 - SN: 1041
Communication System: UFD 0; CW; Frequency: 2000 MHz; Duty Cycle: 1:1
Medium parameters used: f = 2000 MHz; σ = 1.392 S/m; ε_r = 40.21; ρ = 1000 kg/m³
Phantom section: Right Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN7464; ConvF(R,2, 8,2) @ 2000 MHz; Calibrated: 2022-01-26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DA64 Sn1556; Calibrated: 2022-01-12
- Phantom: MFP_V5.1C (20dkg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- DASY52: S2.10.4(1535); SEMCAD X 14.6.14(7501)

Dipole Calibration/Zoom Scan (7x7x7) (7x7x7) Cube 0; Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 103.4 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 19.6 W/kg
SAR(1 g) = 10.4 W/kg; SAR(10 g) = 5.3 W/kg
Smallest distance from peaks to all points 3 dB below = 9.1 mm
Ratio of SAR at M2 to SAR at M1 = 53.0%Maximum value of SAR (measured) = 16.3 W/kg

Certificate No: Z22-60186 Page 5 of 6

In Collaboration with **TTL S P E A G** CALIBRATION LABORATORY and **CAICT**

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Impedance Measurement Plot for Head TSL

Certificate No: Z22-60186 Page 6 of 6



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1.9 D2300V2 - SN 1096

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<p>Client: SGS-CN Certificate No: Z22-60106</p>																																			
<p>CALIBRATION CERTIFICATE</p>																																			
<p>Object: D2300V2 - SN 1096</p>																																			
<p>Calibration Procedure(s): FF-Z11-003-01 Calibration Procedures for dipole validation kits</p>																																			
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<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 and 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.</p>																																			
<p>Additional EUT Data</p> <table border="1"> <thead> <tr> <th>Manufactured by</th> <th>SPEAG</th> </tr> </thead> </table>				Manufactured by	SPEAG																														
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DASY5 Validation Report for Head TSL Date: 2022-03-31

Test Laboratory: CTTL, Beijing, China
 DUT: Dipole 2300 MHz; Type: D2300V2; Serial: D2300V2 - SN: 1096
 Communication System: UID 0, CW; Frequency: 2300 MHz; Duty Cycle: 1:1
 Medium parameters used: $f = 2300$ MHz; $\sigma = 1.702$ S/m; $\epsilon = 39.77$; $\rho = 1000$ kg/m³
 Phantom section: Right Section
 Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
 DASY5 Configuration:

- Probe: EX3DV4 - SN7307; ConvF(R.0.1, 8.01, 8.01) @ 2300 MHz; Calibrated: 2021-05-26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Srt1556; Calibrated: 2022-01-12
- Phantom: MFP V5.1C (2ldag probe kit); Type: QD 000 P51 Cx; Serial: 1062
- DASY5 52.10.4(1535); SEMCAD X 14.6.14(7501)

Dipole Calibration/Zoom Scan (7x7x7) (7x7x7) Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
 Reference Value = 102.7 V/m; Power Drift = 0.00 dB
 Peak SAR (extrapolated) = 21.8 W/kg
 SAR(1 g) = 12.4 W/kg; SAR(10 g) = 5.88 W/kg
 Smallest distance from peaks to all points 3 dB below = 9 mm
 Ratio of SAR at M2 to SAR at M1 = 50.4%
 Maximum value of SAR (measured) = 20.3 W/kg

0 dB = 20.3 W/kg = 13.07 dBW/kg

Certificate No: Z22-60106 Page 1 of 6

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Impedance Measurement Plot for Head TSL

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1.10 D2450V2 - SN 817

TTL Speaq CALIBRATION LABORATORY
 In Collaboration with **CAICT**, **CNAS**, **中国认可 国家互认 校准 CAICT**, **CNAS 10578**

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

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&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by: Certificate No.)	Scheduled Calibration
Power Meter	NRP2	24-Sep-21 (CTTL No.J21X08326)	Sep-22
Power sensor	NRP8S	24-Sep-21 (CTTL No.J21X08326)	Sep-22
Reference Probe	EX3DV4	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	M749071430 13-Jan-22 (CTTL No. J22X00406)	Jan-23
Network Analyzer	E5071C	MY46110873 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 Dianyuan, SAR Project Leader

Signature: [Signatures]
 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:

- IEC/IEEE 62209-1528, "Measurement Procedure for The Assessment of Specific Absorption Rate of Human Exposure to Radio Frequency Fields from Hand-held and Body-mounted Wireless Communication Devices- Part 1528: Human Models, Instrumentation and Procedures (Frequency range of 4 MHz to 10 GHz)", October 2020
- KDB 865864, "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%.

Certificate No: Z22-60107 Page 2 of 6

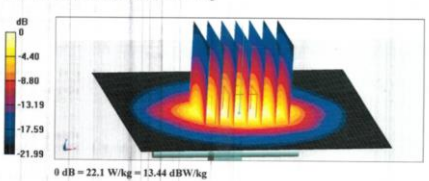
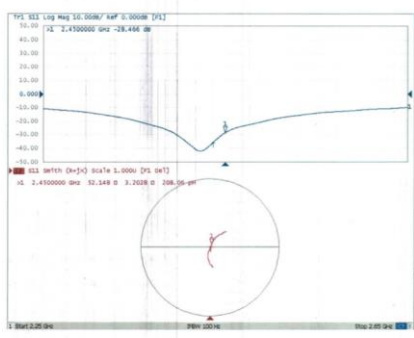


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<p>TTL Speaq CALIBRATION LABORATORY In Collaboration with CAICT</p> <p>Address: No. 52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-42304633-2079 Fax: +86-10-42304633-2504 E-mail: cti@china.ttl.com http://www.china.ttl.com</p> <p>Measurement Conditions DASYS system configuration, as far as not given on page 1</p> <table border="1"> <tr><td>DASY Version</td><td>DASY52</td><td>52.10.4</td></tr> <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>10 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>2450 MHz ± 1 MHz</td><td></td></tr> </table> <p>Head TSL parameters The following parameters and calculations were applied.</p> <table border="1"> <tr><th></th><th>Temperature</th><th>Permittivity</th><th>Conductivity</th></tr> <tr><td>Nominal Head TSL parameters</td><td>22.0 °C</td><td>39.2</td><td>1.80 mho/m</td></tr> <tr><td>Measured Head TSL parameters</td><td>(22.0 ± 0.2) °C</td><td>39.5 ± 6 %</td><td>1.79 mho/m ± 6 %</td></tr> <tr><td>Head TSL temperature change during test</td><td><1.0 °C</td><td>---</td><td>---</td></tr> </table> <p>SAR result with Head TSL</p> <table border="1"> <tr><td>SAR averaged over 1 cm³ (1 g) of Head TSL</td><td>Condition</td><td></td></tr> <tr><td>SAR measured</td><td>250 mW input power</td><td>13.2 W/kg</td></tr> <tr><td>SAR for nominal Head TSL parameters</td><td>normalized to 1W</td><td>53.0 W/kg ± 18.8 % (k=2)</td></tr> <tr><td>SAR averaged over 10 cm³ (10 g) of Head TSL</td><td>Condition</td><td></td></tr> <tr><td>SAR measured</td><td>250 mW input power</td><td>6.15 W/kg</td></tr> <tr><td>SAR for nominal Head TSL parameters</td><td>normalized to 1W</td><td>24.7 W/kg ± 18.7 % (k=2)</td></tr> </table> <p>Certificate No: Z22-60107 Page 3 of 6</p>	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	2450 MHz ± 1 MHz			Temperature	Permittivity	Conductivity	Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m	Measured Head TSL parameters	(22.0 ± 0.2) °C	39.5 ± 6 %	1.79 mho/m ± 6 %	Head TSL temperature change during test	<1.0 °C	---	---	SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition		SAR measured	250 mW input power	13.2 W/kg	SAR for nominal Head TSL parameters	normalized to 1W	53.0 W/kg ± 18.8 % (k=2)	SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition		SAR measured	250 mW input power	6.15 W/kg	SAR for nominal Head TSL parameters	normalized to 1W	24.7 W/kg ± 18.7 % (k=2)	<p>TTL Speaq CALIBRATION LABORATORY In Collaboration with CAICT</p> <p>Address: No. 52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-42304633-2079 Fax: +86-10-42304633-2504 E-mail: cti@china.ttl.com http://www.china.ttl.com</p> <p>Appendix (Additional assessments outside the scope of CNAS L0570)</p> <p>Antenna Parameters with Head TSL</p> <table border="1"> <tr><td>Impedance, transformed to feed point</td><td>52.10 ± 3.20Ω</td></tr> <tr><td>Return Loss</td><td>-28.5dB</td></tr> </table> <p>General Antenna Parameters and Design</p> <table border="1"> <tr><td>Electrical Delay (one direction)</td><td>1.066 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 serringid 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.</p> <p>Additional EUT Data</p> <table border="1"> <tr><td>Manufactured by</td><td>SPEAG</td></tr> </table> <p>Certificate No: Z22-60107 Page 4 of 6</p>	Impedance, transformed to feed point	52.10 ± 3.20Ω	Return Loss	-28.5dB	Electrical Delay (one direction)	1.066 ns	Manufactured by	SPEAG
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1.11 D2600V2 - SN 1158

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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 (23±3)°C and humidity<70%.</p> <p>Calibration Equipment used (M&TE critical for calibration)</p> <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>102577</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 EX3/DVA</td> <td>SN 7307</td> <td>26-May-21(SPEAG.No.EX3-7307_May21)</td> <td>May-22</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> <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.J22X00406)</td> <td>Jan-23</td> </tr> <tr> <td>Network Analyzer E5071C</td> <td>MY46110673</td> <td>14-Jan-22 (CTTL No.J22X00406)</td> <td>Jan-23</td> </tr> </tbody> </table> <p>Calibrated by: Zhao Jing SAR Test Engineer</p> <p>Reviewed by: Lin Hao SAR Test Engineer</p> <p>Approved by: Qi Dianyuan SAR Project Leader</p> <p>Issued: April 6, 2022</p> <p>This calibration certificate shall not be reproduced except in full without written approval of the laboratory.</p> <p>Certificate No: Z22-60108 Page 1 of 6</p>	Primary Standards	ID #	Cal Date (Calibrated by Certificate No.)	Scheduled Calibration	Power Meter NRP2	102577	24-Sep-21 (CTTL No.J21X08326)	Sep-22	Power sensor NRP8S	104291	24-Sep-21 (CTTL No.J21X08326)	Sep-22	Reference Probe EX3/DVA	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.J22X00406)	Jan-23	Network Analyzer E5071C	MY46110673	14-Jan-22 (CTTL No.J22X00406)	Jan-23	<p>Address: No. 52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-42304633-2079 Fax: +86-10-42304633-2504 E-mail: cti@china.ttl.com http://www.chinatit.com</p> <p>Glossary:</p> <p>TSL: tissue simulating liquid ConvF: sensitivity in TSL / NORMx.y.z N/A: not applicable or not measured</p> <p>Calibration is Performed According to the Following Standards:</p> <p>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"</p> <p>Additional Documentation:</p> <p>c) DASY4/S System Handbook</p> <p>Methods Applied and Interpretation of Parameters:</p> <ul style="list-style-type: none"> 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. 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Impedance, transformed to feed point	49.90 - 6.49jΩ																																																											
Return Loss	-23.8dB																																																											
Parameter	Value																																																											
Electrical Delay (one direction)	1.053 ns																																																											
Parameter	Value																																																											
Manufactured by	SPEAG																																																											



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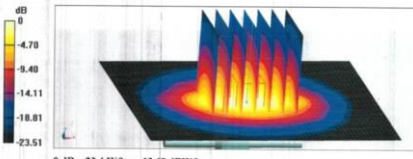
Address: No. 52 HuaYuanBei Road, Haidian District, Beijing, 100191, China
 Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
 E-mail: cti@china.ttl.com http://www.china.ttl.com

Date: 2022-03-31

DASY5 Validation Report for Head TSL
 Test Laboratory: CTTL, Beijing, China
 DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1158
 Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1
 Phantom parameters used: $f = 2600$ MHz; $\sigma = 1.955$ S/m; $\epsilon_r = 38.68$; $\rho = 1000$ kg/m³
 Phantom section: Right Section
 Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
 DASY5 Configuration:

- Probe: EX3DV4 - SN7307; ConvF(7.5, 7.5, 7.5) @ 2600 MHz; Calibrated: 2021-05-26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1556; Calibrated: 2022-01-12
- Phantom: MFP-V5.1C (2ldag probe fill); Type: QD 000 P51 Cx; Serial: 1062
- DASY52.52.10.4(1535); SEMCAD X 14.6.14(7501)

Dipole Calibration/Zoom Scan (7x7x7) (7x7x7) Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
 Reference Value = 103.3 V/m; Power Drift = 0.04 dB
 Peak SAR (extrapolated) = 29.0 W/kg
 SAR(1 g) = 13.7 W/kg; SAR(10 g) = 6.12 W/kg
 Smallest distance from peaks to all points 3 dB below = 8.9 mm
 Ratio of SAR at M2 to SAR at M1 = 47.5%
 Maximum value of SAR (measured) = 23.4 W/kg



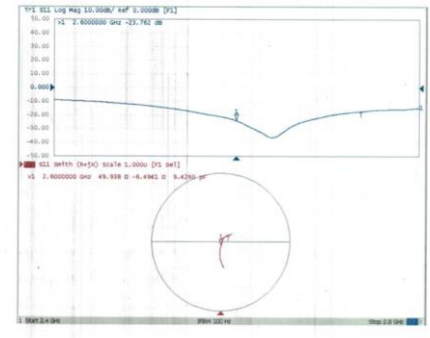
0 dB = 23.4 W/kg = 13.69 dBW/kg

Certificate No: Z22-60108 Page 5 of 6

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Impedance Measurement Plot for Head TSL



Certificate No: Z22-60108 Page 6 of 6

1.12 D5GHzV2 - SN 1095

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Client: **SGS-CN** Certificate No: **Z22-60187**

CALIBRATION CERTIFICATE

Object: D5GHzV2 - SN: 1095

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

Calibration date: June 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 (23±1)°C and humidity 70%.

Calibration Equipment used (MTE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by: Certificate No.)	Scheduled Calibration
Power Meter NRP2	106277	24-Sep-21 (CTTL No.J21008326)	Sep-22
Power sensor NRP8S	104291	24-Sep-21 (CTTL No.J21008326)	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

Secondary Standards	ID #	Cal Date (Calibrated by: Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY48071430	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

Reviewed by: Lin Hao, SAR Test Engineer

Approved by: Qi Dianyan, SAR Project Leader

Issued: June 6, 2022

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

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Glossary:

TSL: Issue 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/G 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: Z22-60187 Page 2 of 10



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<p>Certificate No: Z22-60187 Page 3 of 10</p>																			

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<p>Head TSL parameters at 5800MHz The following parameters and calculations were applied.</p> <table border="1"> <tr> <td>Nominal Head TSL parameters</td> <td>Temperature</td> <td>Permittivity</td> <td>Conductivity</td> </tr> <tr> <td></td> <td>22.0 °C</td> <td>35.3</td> <td>5.27 mho/m</td> </tr> <tr> <td>Measured Head TSL parameters</td> <td>(22.0 ± 0.2) °C</td> <td>34.4 ± 6 %</td> <td>5.25 mho/m ± 6 %</td> </tr> <tr> <td>Head TSL temperature change during test</td> <td><1.0 °C</td> <td>---</td> <td>---</td> </tr> </table>		Nominal Head TSL parameters	Temperature	Permittivity	Conductivity		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	---	---		
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<p>SAR result with Head TSL at 5800MHz</p> <table border="1"> <tr> <td>SAR averaged over 1 cm³ (1 g) of Head TSL</td> <td>Condition</td> <td></td> </tr> <tr> <td>SAR measured</td> <td>100 mW input power</td> <td>7.71 W/kg</td> </tr> <tr> <td>SAR for nominal Head TSL parameters</td> <td>normalized to 1W</td> <td>76.7 W/kg ± 24.4 % (k=2)</td> </tr> <tr> <td>SAR averaged over 10 cm³ (10 g) of Head TSL</td> <td>Condition</td> <td></td> </tr> <tr> <td>SAR measured</td> <td>100 mW input power</td> <td>2.16 W/kg</td> </tr> <tr> <td>SAR for nominal Head TSL parameters</td> <td>normalized to 1W</td> <td>21.8 W/kg ± 24.2 % (k=2)</td> </tr> </table>		SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition		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 ³ (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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<p>Certificate No: Z22-60187 Page 5 of 10</p>																			

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<p>Appendix (Additional assessments outside the scope of CNAS L0570)</p>					
<p>Antenna Parameters with Head TSL at 5200MHz</p> <table border="1"> <tr> <td>Impedance, transformed to feed point</td> <td>46.1D-8.03jD</td> </tr> <tr> <td>Return Loss</td> <td>-23.6dB</td> </tr> </table>		Impedance, transformed to feed point	46.1D-8.03jD	Return Loss	-23.6dB
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<p>Antenna Parameters with Head TSL at 5500MHz</p> <table border="1"> <tr> <td>Impedance, transformed to feed point</td> <td>50.3D-4.26jD</td> </tr> <tr> <td>Return Loss</td> <td>-27.4dB</td> </tr> </table>		Impedance, transformed to feed point	50.3D-4.26jD	Return Loss	-27.4dB
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<p>Antenna Parameters with Head TSL at 5600MHz</p> <table border="1"> <tr> <td>Impedance, transformed to feed point</td> <td>54.5D-4.80jD</td> </tr> <tr> <td>Return Loss</td> <td>-24.0dB</td> </tr> </table>		Impedance, transformed to feed point	54.5D-4.80jD	Return Loss	-24.0dB
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Return Loss	-24.0dB				
<p>Antenna Parameters with Head TSL at 5800MHz</p> <table border="1"> <tr> <td>Impedance, transformed to feed point</td> <td>51.5D-5.61jD</td> </tr> <tr> <td>Return Loss</td> <td>-24.9dB</td> </tr> </table>		Impedance, transformed to feed point	51.5D-5.61jD	Return Loss	-24.9dB
Impedance, transformed to feed point	51.5D-5.61jD				
Return Loss	-24.9dB				
<p>Certificate No: Z22-60187 Page 6 of 10</p>					



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t(86-512)57355888 f(86-512)57370818 sgs.china@sgs.com

<p>TTL In Collaboration with speaq CALIBRATION LABORATORY</p> <p>CAICT</p> <p>Address: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-62021117 E-mail: cti@speaq.com http://www.caict.ac.cn</p> <p>General Antenna Parameters and Design</p> <p>Electrical Delay (one direction): 1.101 ns</p> <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>Additional EUT Data</p> <p>Manufactured by: SPEAG</p> <p>Certificate No: Z22-60187 Page 7 of 10</p>	<p>TTL In Collaboration with speaq CALIBRATION LABORATORY</p> <p>CAICT</p> <p>Address: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-62021117 E-mail: cti@speaq.com http://www.caict.ac.cn</p> <p>DASY5 Validation Report for Head TSL</p> <p>Test Laboratory: CTTL, Beijing, China Date: 2022-06-01</p> <p>DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1095</p> <p>Communication System: CW; Frequency: 5200 MHz; Frequency: 5300 MHz; Frequency: 5500 MHz; Frequency: 5600 MHz; Frequency: 5800 MHz; Duty Cycle: 1:1 Medium parameters used: f = 5200 MHz; $\sigma = 4.62$ S/m; $\epsilon_r = 35.38$; $\rho = 1000$ kg/m³ Medium parameters used: f = 5300 MHz; $\sigma = 4.73$ S/m; $\epsilon_r = 35.19$; $\rho = 1000$ kg/m³ Medium parameters used: f = 5500 MHz; $\sigma = 4.939$ S/m; $\epsilon_r = 34.83$; $\rho = 1000$ kg/m³ Medium parameters used: f = 5600 MHz; $\sigma = 5.051$ S/m; $\epsilon_r = 34.68$; $\rho = 1000$ kg/m³ Medium parameters used: f = 5800 MHz; $\sigma = 5.247$ S/m; $\epsilon_r = 34.42$; $\rho = 1000$ kg/m³</p> <p>Phantom section: Right Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007) DASY5 Configuration:</p> <ul style="list-style-type: none"> 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 Sensor-Surface: 1.4mm (Mechanical Surface Detection) Electronics: DAE4 Sn1556; Calibrated: 2022-01-12 Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062 DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501) <p>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 Reference Value = 60.80 V/m; Power Drift = -0.06 dB Peak SAR (extrapolated) = 29.8 W/kg SAR(1 g) = 7.73 W/kg; SAR(10 g) = 2.22 W/kg Smallest distance from peaks to all points 3 dB below = 7.2 mm Ratio of SAR at M2 to SAR at M1 = 66.8% Maximum value of SAR (measured) = 18.3 W/kg</p> <p>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 Reference Value = 61.08 V/m; Power Drift = -0.07 dB Peak SAR (extrapolated) = 31.5 W/kg SAR(1 g) = 7.94 W/kg; SAR(10 g) = 2.27 W/kg Smallest distance from peaks to all points 3 dB below = 7.2 mm Ratio of SAR at M2 to SAR at M1 = 65.5% Maximum value of SAR (measured) = 19.0 W/kg</p> <p>Certificate No: Z22-60187 Page 8 of 10</p>
<p>TTL In Collaboration with speaq CALIBRATION LABORATORY</p> <p>CAICT</p> <p>Address: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-62021117 E-mail: cti@speaq.com http://www.caict.ac.cn</p> <p>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 Reference Value = 61.92 V/m; Power Drift = -0.08 dB Peak SAR (extrapolated) = 34.7 W/kg SAR(1 g) = 8.28 W/kg; SAR(10 g) = 2.34 W/kg Smallest distance from peaks to all points 3 dB below = 7.2 mm Ratio of SAR at M2 to SAR at M1 = 63.9% Maximum value of SAR (measured) = 20.2 W/kg</p> <p>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 Reference Value = 65.08 V/m; Power Drift = -0.07 dB Peak SAR (extrapolated) = 35.2 W/kg SAR(1 g) = 8.12 W/kg; SAR(10 g) = 2.3 W/kg Smallest distance from peaks to all points 3 dB below = 7.2 mm Ratio of SAR at M2 to SAR at M1 = 62.5% Maximum value of SAR (measured) = 19.1 W/kg</p> <p>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 Reference Value = 62.13 V/m; Power Drift = -0.06 dB Peak SAR (extrapolated) = 34.8 W/kg SAR(1 g) = 7.71 W/kg; SAR(10 g) = 2.16 W/kg Smallest distance from peaks to all points 3 dB below = 7.2 mm Ratio of SAR at M2 to SAR at M1 = 61.6% Maximum value of SAR (measured) = 18.7 W/kg</p> <p>Certificate No: Z22-60187 Page 9 of 10</p>	<p>TTL In Collaboration with speaq CALIBRATION LABORATORY</p> <p>CAICT</p> <p>Address: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-62021117 E-mail: cti@speaq.com http://www.caict.ac.cn</p> <p>Impedance Measurement Plot for Head TSL</p> <p>Certificate No: Z22-60187 Page 10 of 10</p>



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2 DAE4 - SN 1245

<div style="text-align: center; border-bottom: 1px solid black; margin-bottom: 10px;"> </div> <p>IMPORTANT NOTICE</p> <p>USAGE OF THE DAE4</p> <p>The DAE unit is a delicate, high precision instrument and requires careful treatment by the user. There are no serviceable parts inside the DAE. Special attention shall be given to the following points:</p> <p>Battery Exchange: The battery cover of the DAE4 unit is fixed using a screw, over tightening the screw may cause the threads inside the DAE to wear out.</p> <p>Shipping of the DAE: Before shipping the DAE to SPEAG for calibration, remove the batteries and pack the DAE in an anti-static bag. This anti-static bag shall then be packed into a larger box or container which protects the DAE from impacts during transportation. The package shall be marked to indicate that a fragile instrument is inside.</p> <p>E-Stop Failures: 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 DAE carefully and keep the DAE unit in a non-dusty environment if not used for measurements.</p> <p>Repair: 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>DASY Configuration Files: Since the exact values of the DAE input resistances, as measured during the calibration procedure of a DAE unit, are not used by the DASY software, a nominal value of 200 MOhm is given in the corresponding configuration file.</p> <p>Important Note: Warning and calibration is void if the DAE unit is disassembled partly or fully by the Customer.</p> <p>Important Note: 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>Important Note: To prevent damage of the DAE probe connector pins, use great care when installing the probe to the DAE. Carefully connect the probe with the connector notch oriented in the mating position. Avoid any rotational movement of the probe body versus the DAE while turning the locking nut of the connector. The same care shall be used when disconnecting the probe from the DAE.</p> <p style="font-size: small; margin-top: 20px;">TN_EH160306AE_DAE4.docx 07.03.2019</p>	<div style="text-align: center; border-bottom: 1px solid black; margin-bottom: 10px;"> </div> <p>Calibration Laboratory of Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland</p> <p style="text-align: right;">Schweizerischer Kalibrierdienst Service suisse d'étalonnage Servizio svizzero di taratura Swiss Calibration Service</p> <p style="text-align: right;">Accredited by the Swiss Accreditation Service (SAS) The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates</p> <p style="text-align: right;">Accreditation No.: SCS 0108</p> <p>Client: SGS-CN (Auden) Certificate No.: DAE4-1245_May22</p> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p style="text-align: center; margin: 0;">CALIBRATION CERTIFICATE</p> <p>Object: DAE4 - SD 000 D04 BM - SN: 1245</p> <p>Calibration procedure(s): QA CAL-06 v30 Calibration procedure for the data acquisition electronics (DAE)</p> <p>Calibration date: May 30, 2022</p> </div> <p style="font-size: x-small;">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 style="font-size: x-small;">All calibrations have been conducted in the closed laboratory facility, environment temperature (22 ± 3)°C and humidity < 70%.</p> <p style="font-size: x-small;">Calibration Equipment used (M&E critical for calibration)</p> <table border="1" style="width: 100%; border-collapse: collapse; font-size: x-small;"> <thead> <tr> <th>Primary Standards</th> <th>ID #</th> <th>Exp. Date (Certificate No.)</th> <th>Scheduled Calibration</th> </tr> </thead> <tbody> <tr> <td>Kelvin 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" style="width: 100%; border-collapse: collapse; font-size: x-small;"> <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 Box v3.1</td> <td>SE LMS 100 AA 1002</td> <td>24-Jan-22 (in house check)</td> <td>In house check: Jan-23</td> </tr> </tbody> </table> <div style="margin-top: 10px;"> <p>Calibrated by: Name: Dominique Shelten Function: Laboratory Technician Signature: </p> <p>Approved by: Sven Kuhn Technical Manager </p> <p style="text-align: right; font-size: x-small;">Issued: May 30, 2022</p> </div> <p style="font-size: x-small;">This calibration certificate shall not be reproduced except in full without written approval of the laboratory.</p> <p style="font-size: x-small;">Certificate No: DAE4-1245_May22 Page 1 of 5</p>	Primary Standards	ID #	Exp. 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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°																				



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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 Y + Input	-20000.14	1.12	-0.01
Channel Y - Input	19994.72	1.58	0.00
Channel Z + Input	20001.22	-1.00	-0.00
Channel Z - Input	-20003.05	-1.57	0.01
Channel Z + Input	19992.84	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 Z + Input	-199.23	-0.06	0.03
Channel Z - Input	2001.36	0.08	0.00
Channel Z + Input	200.09	-1.53	-0.76
Channel Z - Input	-199.89	-1.57	0.79

2. Common mode sensitivity

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

Common mode Input Voltage (mV)	High Range Average Reading (µV)	Low Range Average Reading (µV)
Channel X	-3.87	-7.69
-200	9.12	7.79
Channel Y	-8.68	-9.28
200	8.52	6.36
Channel Z	-5.36	-5.80
-200	3.58	3.08

3. Channel separation

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

Input Voltage (mV)	Channel X (µV)	Channel Y (µV)	Channel Z (µV)	
Channel X	200	-	4.07	-3.14
Channel Y	200	9.36	-	4.27
Channel Z	200	10.11	7.14	-

Certificate No: DAE4-1245_May22 Page 4 of 5

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	-2.61	0.58	0.60

6. Input Offset Current

Nominal input circuitry offset current on all channels: $-25nA$

7. Input Resistance (Typical values for information)

	Zeroing (Ω)	Measuring (MΩ)
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 7346

Calibration Laboratory of Schmid & Partner Engineering AG
Zugspitzstrasse 63, 8044 Zurich, Switzerland

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Client: **Auden** Certificate No: **EX3-7346_Mar22**

CALIBRATION CERTIFICATE

Object: **EX3DV4 - SN 7346**

Calibration procedure(s): **QA CAL-01 v9; QA CAL-14 v6; QA CAL-23 v5; QA CAL-25 v7**
Calibration procedure for domestic E-field probes

Calibration date: **March 30, 2022**

This calibration certificate documents the traceability to national standards, which include 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 <math>< 70\%</math>

Calibration Equipment used (MATE: critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NMP	SN: 194779	09-Apr-21 (No. 217-0231/0230)	Apr-22
Power sensor NMP-291	SN: 193244	09-Apr-21 (No. 217-0231)	Apr-22
Power sensor NMP-291	SN: 193243	09-Apr-21 (No. 217-0230)	Apr-22
Reference 20dB attenuator	SN: C22582 (20b)	09-Apr-21 (No. 217-0234)	Apr-22
DAE4	SN: 660	13-Oct-21 (No. DAE4-085; DAE41)	Oct-22
Reference Probe ES3D2	SN: 3013	17-Dec-21 (No. ES3-2013; Dec21)	Dec-22

Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4418B	SN: G841292874	06-Apr-16 (in house check Jun-20)	In house check Jun-22
Power sensor E4413A	SN: MY41498987	06-Apr-16 (in house check Jun-20)	In house check Jun-22
Power sensor E4413A	SN: 080110181	06-Apr-16 (in house check Jun-20)	In house check Jun-22
RF generator HP 8648D	SN: US344210193	04-Apr-09 (in house check Jun-20)	In house check Jun-22
Network Analyzer E8309A	SN: USA1090477	31-Mar-14 (in house check Oct-20)	In house check Oct-22

Calibrated by: **Ben Kuhn** Function: **Laboratory Technician** Signature: *[Signature]*

Approved by: **Ben Kuhn** Function: **Deputy Manager** Signature: *[Signature]*

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

Issued: March 31, 2022

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Client: **Auden** Certificate No: **EX3-7346_Mar22**

Glossary:

- TSL: Issue simulating liquid
- NORM_{x,y,z}: sensitivity in free space
- Conf: sensitivity in TSL / NORM_{x,y,z}
- DCP: diode compression point
- CF: crest factor (10µsly cycle) of the RF signal
- A, B, C, D: modulation dependent linearization parameters
- Polarization: α rotation around probe axis
- Polarization β : β rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\beta = 0$ 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:

- IEC/IEEE 62203-1:2018 "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 1:318: Human Models, Instrumentation And Procedures (Frequency Range of 4 MHz to 10 GHz); October 2020
- KD8 865664 "SAR Measurement Requirements for 100 MHz to 6 GHz"

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}: Assessed for E-field polarization $\beta = 0$ (f = 800 MHz in TEM-cell; f = 1800 MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} do not affect the E-field uncertainty inside TSL (see below Conf).
- NORM_{x,y,z} = NORM_{x,y,z} * 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 Conf.
- DCP_{x,y,z}: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). 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.
- Any z: Any z: C_{x,y,z}; D_{x,y,z}; W_{x,y,z}; 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. W is the maximum calibration range expressed in RMS voltage across the diode.
- Conf and Boundary Effect Parameters: Assessed in flat phantom using E-Field (or Temperature Transfer Standard for f < 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f = 800 MHz. The same values are used for assessments of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are not calibrated in DASY4 software but assessed. The uncertainty in TSL corresponds to NORM_{x,y,z} * Conf where the uncertainty corresponds to that given for Conf. A frequency dependent Conf is used in DASY7 version 4.4 and higher which allows extending the validity from a 50 MHz to 100 MHz.
- Spherical geometry: DCP 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 (or probe axis). No tolerance required.
- Connector Angle: The angle is assessed using the information gained by determining the NORM_x (no uncertainty required).

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EX3DV4-SN7346 March 30, 2022

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7346

Basic Calibration Parameters

Norm	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
$\mu\text{V}/(\text{V}/\text{mm})^2$	0.48	0.47	0.61	$\pm 10.1\%$
DCP (mV) ²	101.4	106.0	106.9	

Calibration Results for Modulation Response

UID	Communication System Name	A dB	B dB	C dB	D dB	VR mV	Max dBv	Max Unc ^(k=2)
0	CW	X: 0.00	0.00	1.00	0.00	143.5	$\pm 3.0\%$	$\pm 4.7\%$
		Y: 0.00	0.00	1.00	0.00	130.3		
		Z: 0.00	0.00	1.00	0.00	130.0		
10303-AAA	Pulse Waveform (200Hz, 10%)	X: 3.33	68.90	11.66	10.00	86.0	$\pm 3.5\%$	$\pm 9.8\%$
		Y: 4.03	70.70	12.35	9.00	86.0		
		Z: 1.63	61.25	6.76	8.00	86.0		
10303-AAA	Pulse Waveform (200Hz, 20%)	X: 3.00	70.65	11.31	6.99	86.0	$\pm 2.4\%$	$\pm 9.6\%$
		Y: 11.51	81.32	14.72	8.00	86.0		
		Z: 0.83	66.00	5.11	8.00	86.0		
10304-AAA	Pulse Waveform (200Hz, 40%)	X: 7.41	79.85	12.51	3.88	86.0	$\pm 2.7\%$	$\pm 9.6\%$
		Y: 26.93	87.62	15.51	9.00	86.0		
		Z: 0.18	138.38	0.01	9.00	86.0		
10305-AAA	Pulse Waveform (200Hz, 60%)	X: 2.07	75.13	6.52	2.22	120.0	$\pm 1.7\%$	$\pm 9.6\%$
		Y: 20.92	91.58	16.29	120.0	120.0		
		Z: 7.94	126.51	16.87	120.0	120.0		
10307-AAA	QPSK Waveform, 1 MHz	X: 1.47	64.88	13.82	1.00	150.0	$\pm 4.2\%$	$\pm 9.6\%$
		Y: 1.56	66.27	14.65	0.00	150.0		
		Z: 0.45	61.88	11.05	150.0	150.0		
10308-AAA	QPSK Waveform, 10 MHz	X: 1.96	66.27	14.65	0.00	150.0	$\pm 1.1\%$	$\pm 9.6\%$
		Y: 2.06	67.33	15.38	150.0	150.0		
		Z: 1.21	64.75	13.38	150.0	150.0		
10306-AAA	64-QAM Waveform, 100 MHz	X: 2.63	68.51	18.25	3.01	150.0	$\pm 1.0\%$	$\pm 9.6\%$
		Y: 2.72	70.81	19.05	150.0	150.0		
		Z: 1.76	64.72	15.99	150.0	150.0		
10309-AAA	64-QAM Waveform, 40 MHz	X: 3.34	66.30	15.25	0.00	150.0	$\pm 2.0\%$	$\pm 9.6\%$
		Y: 3.42	68.42	16.36	150.0	150.0		
		Z: 2.70	65.12	14.74	150.0	150.0		
10414-AAA	WLAN CCDF, 64-QAM, 60MHz	X: 4.11	65.35	13.27	0.00	150.0	$\pm 3.6\%$	$\pm 9.6\%$
		Y: 4.70	65.54	15.41	150.0	150.0		
		Z: 3.83	66.16	15.26	150.0	150.0		

Note: For details on UID parameters see Appendix

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%.

* The uncertainty of Norm X, Y, Z do not affect the E-field uncertainty inside TSL (see Pages 1 and 2)
 ** Numerical simulation parameter, uncertainty not required
 † Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

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EX3DV4-SN7346 March 30, 2022

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7346

Sensor Model Parameters

SI	SI	a	T1	T2	T3	T4	T5	T6
IP	IP	V ²	ms.V ²	ms.V ²	ms	V ²	V ²	V ²
X	39.2	291.80	35.10	5.63	0.03	5.02	1.42	0.12
Y	37.1	270.84	34.12	6.29	0.00	5.01	1.82	0.05
Z	9.7	69.74	33.37	4.96	0.00	4.94	0.61	0.00

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-166.1
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	237 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

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

Certificate No: EX3-7346_Mar22 Page 4 of 24

EX3DV4-SN7346 March 30, 2022

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7346

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz)	Relative Permittivity ¹	Conductivity (S/m) ²	ConvF X	ConvF Y	ConvF Z	Alpha ³	Depth ⁴ (mm)	Unc (k=2)
750	41.9	0.89	10.56	10.56	10.56	0.55	0.85	$\pm 12.0\%$
835	41.5	0.90	10.12	10.12	10.12	0.42	0.96	$\pm 12.0\%$
900	41.5	0.97	10.10	10.10	10.10	0.53	0.80	$\pm 12.0\%$
1450	40.5	1.20	9.26	9.26	9.26	0.50	0.80	$\pm 12.0\%$
1750	40.1	1.37	8.83	8.83	8.83	0.34	0.86	$\pm 12.0\%$
1900	40.0	1.40	8.48	8.48	8.48	0.35	0.85	$\pm 12.0\%$
2000	40.0	1.40	8.35	8.35	8.35	0.34	0.86	$\pm 12.0\%$
2300	39.5	1.67	7.86	7.86	7.86	0.39	0.90	$\pm 12.0\%$
2450	39.2	1.80	7.63	7.63	7.63	0.41	0.90	$\pm 12.0\%$
2800	39.0	1.98	7.33	7.33	7.33	0.44	0.90	$\pm 12.0\%$
3300	38.2	2.71	7.15	7.15	7.15	0.30	1.35	$\pm 13.1\%$
3500	37.9	2.91	7.14	7.14	7.14	0.30	1.35	$\pm 13.1\%$
3700	37.7	3.12	6.85	6.85	6.85	0.30	1.35	$\pm 13.1\%$
3900	37.5	3.32	6.71	6.71	6.71	0.40	1.60	$\pm 13.1\%$
4100	37.2	3.53	6.58	6.58	6.58	0.40	1.60	$\pm 13.1\%$
4200	37.1	3.63	6.30	6.30	6.30	0.40	1.70	$\pm 13.1\%$
4400	36.9	3.84	6.24	6.24	6.24	0.40	1.70	$\pm 13.1\%$
4600	36.7	4.04	6.11	6.11	6.11	0.40	1.70	$\pm 13.1\%$
4800	36.4	4.25	6.08	6.08	6.08	0.40	1.80	$\pm 13.1\%$
4900	36.3	4.40	5.84	5.84	5.84	0.40	1.80	$\pm 13.1\%$
5200	36.0	4.66	5.25	5.25	5.25	0.40	1.80	$\pm 13.1\%$
5300	35.9	4.78	5.12	5.12	5.12	0.40	1.80	$\pm 13.1\%$
5500	35.6	4.98	4.85	4.85	4.85	0.40	1.80	$\pm 13.1\%$
5800	35.5	6.07	4.70	4.70	4.70	0.40	1.80	$\pm 13.1\%$
5900	35.3	6.27	4.75	4.75	4.75	0.40	1.80	$\pm 13.1\%$

¹ Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). Value 4 is restricted to ± 50 MHz. The uncertainty is the RSS of the Conf² uncertainty at calibration frequency and the uncertainty for the measured frequency and.

² At frequencies 0-10 GHz, the validity of tissue parameters (a and c) can be relaxed to $\pm 10\%$ if equal compensation formula is applied to the uncertainty for the measured frequency and.

³ AlphaDepth is the RSS of the Conf² uncertainty for indicated target tissue parameters.

⁴ AlphaDepth are determined during calibration. SPS-ACD warrants that the remaining deviation due to the boundary effect after compensation is always less than: 1% for frequencies below 3 GHz, below $\pm 2\%$ for frequencies between 3-6 GHz, and below $\pm 4\%$ for frequencies between 6-10 GHz at any distance larger than half the probe tip diameter from the boundary.

Certificate No: EX3-7346_Mar22 Page 5 of 24

EX3DV4-SN7346 March 30, 2022

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7346

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz)	Relative Permittivity ¹	Conductivity (S/m) ²	ConvF X	ConvF Y	ConvF Z	Alpha ³	Depth ⁴ (mm)	Unc (k=2)
6500	34.5	6.07	5.30	5.30	5.30	0.20	2.50	$\pm 18.0\%$

¹ Frequency validity above 60 GHz is ± 700 MHz. The uncertainty is the RSS of the Conf² uncertainty at calibration frequency and the uncertainty for the measured frequency and.

² At frequencies 0-10 GHz, the validity of tissue parameters (a and c) can be relaxed to $\pm 10\%$ if equal compensation formula is applied to the uncertainty for the measured frequency and.

³ AlphaDepth is the RSS of the Conf² uncertainty for indicated target tissue parameters.

⁴ AlphaDepth are determined during calibration. SPS-ACD warrants that the remaining deviation due to the boundary effect after compensation is always less than: 1% for frequencies below 3 GHz, below $\pm 2\%$ for frequencies between 3-6 GHz, and below $\pm 4\%$ for frequencies between 6-10 GHz at any distance larger than half the probe tip diameter from the boundary.

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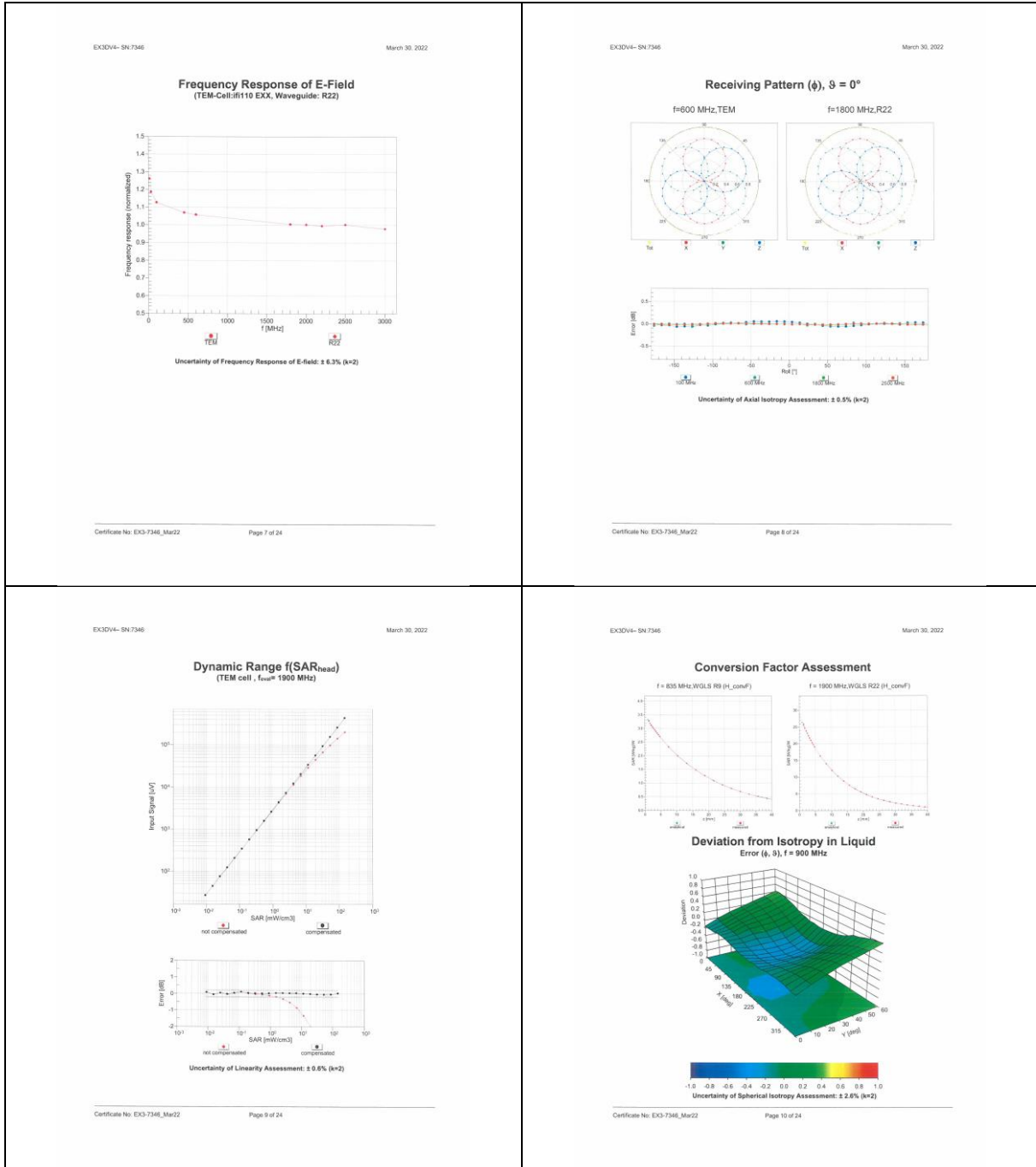


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Table with columns: UID, Rev, Modulation, Communication System Name, Group, Pass (dB), Limit (dB). Contains test results for EX3204-SN-7346.

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Table with columns: UID, Rev, Modulation, Communication System Name, Group, Pass (dB), Limit (dB). Contains test results for EX3204-SN-7346.

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Table with columns: UID, Rev, Modulation, Communication System Name, Group, Pass (dB), Limit (dB). Contains test results for EX3204-SN-7346.

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Table with columns: UID, Rev, Modulation, Communication System Name, Group, Pass (dB), Limit (dB). Contains test results for EX3204-SN-7346.

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Table with columns: Item No., Description, Test Method, Result, and Date. Contains data for EX3746-SN-7346 on March 30, 2022.

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Table with columns: Item No., Description, Test Method, Result, and Date. Contains data for EX3746-SN-7346 on March 30, 2022.

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Table with columns: Item No., Description, Test Method, Result, and Date. Contains data for EX3746-SN-7346 on March 30, 2022.

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Table with columns: Item No., Description, Test Method, Result, and Date. Contains data for EX3746-SN-7346 on March 30, 2022.

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Table with columns: EX3DV4-SN 7346, March 30, 2022, and a list of test results for various frequencies and standards.

Table with columns: EX3DV4-SN 7346, March 30, 2022, and a list of test results for various frequencies and standards.

Table with columns: EX3DV4-SN 7346, March 30, 2022, and a list of test results for various frequencies and standards.

Table with columns: EX3DV4-SN 7346, March 30, 2022, and a list of test results for various frequencies and standards.



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<p>EX3D14-SN 7346</p> <p>March 30, 2022</p> <p>15985 AAA 5G NR DL (CP-OFDM, TM 3.1, 40 MHz, 64-QAM, 30 MHz) SG NR FR1 TDD 9.54 ± 9.8 %</p> <p>15986 AAA 5G NR DL (CP-OFDM, TM 3.1, 50 MHz, 64-QAM, 30 MHz) SG NR FR1 TDD 9.50 ± 9.8 %</p> <p>15987 AAA 5G NR DL (CP-OFDM, TM 3.1, 60 MHz, 64-QAM, 30 MHz) SG NR FR1 TDD 9.53 ± 9.8 %</p> <p>15988 AAA 5G NR DL (CP-OFDM, TM 3.1, 70 MHz, 64-QAM, 30 MHz) SG NR FR1 TDD 9.38 ± 9.8 %</p> <p>15989 AAA 5G NR DL (CP-OFDM, TM 3.1, 80 MHz, 64-QAM, 30 MHz) SG NR FR1 TDD 9.33 ± 9.8 %</p> <p>15990 AAA 5G NR DL (CP-OFDM, TM 3.1, 90 MHz, 64-QAM, 30 MHz) SG NR FR1 TDD 9.52 ± 9.8 %</p> <p>¹ Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.</p>	<p>EX3D14-SN 7346</p> <p>March 30, 2022</p> <p>15985 AAA 5G NR DL (CP-OFDM, TM 3.1, 40 MHz, 64-QAM, 30 MHz) SG NR FR1 TDD 9.54 ± 9.8 %</p> <p>15986 AAA 5G NR DL (CP-OFDM, TM 3.1, 50 MHz, 64-QAM, 30 MHz) SG NR FR1 TDD 9.50 ± 9.8 %</p> <p>15987 AAA 5G NR DL (CP-OFDM, TM 3.1, 60 MHz, 64-QAM, 30 MHz) SG NR FR1 TDD 9.53 ± 9.8 %</p> <p>15988 AAA 5G NR DL (CP-OFDM, TM 3.1, 70 MHz, 64-QAM, 30 MHz) SG NR FR1 TDD 9.38 ± 9.8 %</p> <p>15989 AAA 5G NR DL (CP-OFDM, TM 3.1, 80 MHz, 64-QAM, 30 MHz) SG NR FR1 TDD 9.33 ± 9.8 %</p> <p>15990 AAA 5G NR DL (CP-OFDM, TM 3.1, 90 MHz, 64-QAM, 30 MHz) SG NR FR1 TDD 9.52 ± 9.8 %</p> <p>¹ Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.</p>
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4 Impedance and return loss

Dipole CLA150 SN 4025				
Head Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
2021/4/26	-31.4	/	47.8	/
Dipole D450V3 SN 1103				
Head Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
2021/4/21	-23	/	57.1	/



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