

Appendix C for KSCR230100008501

Calibration Certificate

Object	Apply	No	Model	SN	Calibration Date	Due date of calibration
Dipole	<input type="checkbox"/>	1	CLA150	4025	2021/04/26	2024/04/25
	<input checked="" type="checkbox"/>	2	D450V3	1103	2021/04/21	2024/04/20
	<input type="checkbox"/>	3	D750V3	1188	2022/03/29	2025/03/28
	<input type="checkbox"/>	4	D835V2	4d114	2022/03/31	2025/03/30
	<input type="checkbox"/>	5	D900V2	1d079	2022/06/07	2025/06/06
	<input type="checkbox"/>	6	D1800V2	2d170	2022/03/31	2025/03/30
	<input type="checkbox"/>	7	D1900V2	5d136	2022/06/07	2025/06/06
	<input type="checkbox"/>	8	D2000V2	1041	2022/06/06	2025/06/05
	<input type="checkbox"/>	9	D2300V2	1096	2022/03/31	2025/03/30
	<input type="checkbox"/>	10	D2450V2	817	2022/04/01	2025/03/31
	<input type="checkbox"/>	11	D2600V2	1158	2022/03/31	2025/03/30
	<input type="checkbox"/>	12	D5GHzV2	1095	2022/06/01	2025/05/31
DAE	<input checked="" type="checkbox"/>	13	DAE4	1245	2022/05/30	2023/05/29
Probe	<input checked="" type="checkbox"/>	14	EX3DV4	7767	2022/10/28	2023/10/27

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Attention: To check the authenticity of testing /inspection report & certificate, please contact us at telephone: (86-755) 8307 1443, or email: CN.Doccheck@sgs.com

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1 Dipole

1.1 CLA150 - SN 4025

<p>Calibration Laboratory of Schmid & Partner Engineering AG Zugstrasse 45, 8001 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>CALIBRATION CERTIFICATE</p> <table border="1"> <tr> <td>Object</td> <td>CLA150 - SN: 4025</td> </tr> <tr> <td>Calibration procedure</td> <td>QA CAL-15.v9 Calibration Procedure for SAR Validation Sources below 700 MHz</td> </tr> <tr> <td>Calibration date</td> <td>April 26, 2021</td> </tr> <tr> <td colspan="2">This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). 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All figures stated in the certificate are valid at the frequency indicated. • Antenna Parameters with TSL: The source is mounted in a touch configuration below the center marking of the flat phantom. • Return Loss: This parameter is measured with the source positioned under the liquid filled phantom (as described in the measurement condition clause). The Return Loss ensures low required 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.</p> <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: CLA150-4025_Apr21 Page 2 of 6</p>
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Nominal Head TSL parameters	Temperature	Permittivity	Conductivity																																																																																																																																																							
22.0 °C	62.3	0.78 mho/m																																																																																																																																																								
(22.0 ± 0.2) °C	51.1 ± 6 %	0.75 mho/m ± 6 %																																																																																																																																																								
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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 ² (10 g) of Head TSL	Condition																																																																																																																																																									
SAR measured	1 W input power	2.60 W/kg																																																																																																																																																								
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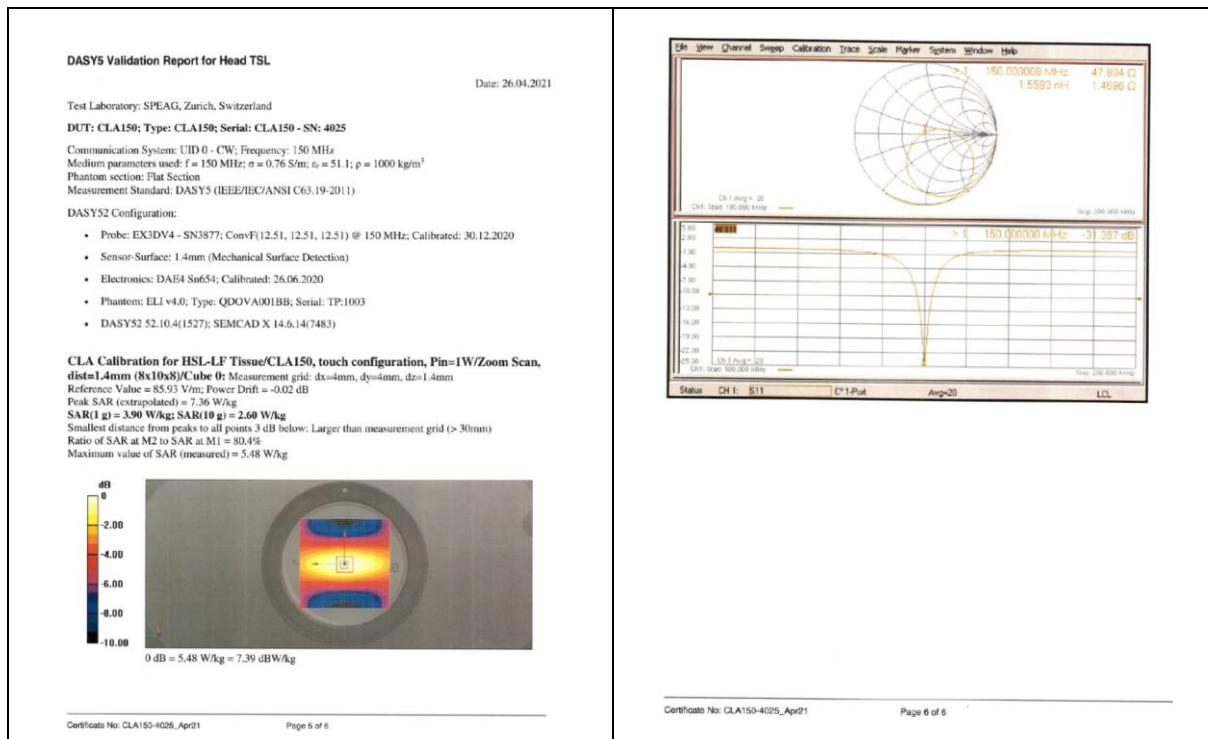
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1.2 D450V3 - SN 1103

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Client: SGS-CN (Auden) 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																								
<p>This calibration certificate documents the traceability to national standards, which realize the physical units of measurement (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 (29 ± 3)°C and humidity < 75%.</p> <p>Calibration Equipment used (M/TE critical for calibration)</p>																									
Primary Standards	<table border="1"> <tr> <th>ID #</th> <th>Cal Date (Certificate No.)</th> <th>Scheduled Calibration</th> </tr> <tr> <td>Power meter NIP</td> <td>SN: 140778</td> <td>09-Apr-21 (No. 2117-0201/0320)</td> </tr> <tr> <td>Power sensor NIP-291</td> <td>SN: 102584</td> <td>09-Apr-21 (No. 2117-0201)</td> </tr> <tr> <td>Power sensor NIP-291</td> <td>SN: 102585</td> <td>Apr-22</td> </tr> <tr> <td>Reference 20 dB Attenuator</td> <td>SN: CCG562 (206)</td> <td>09-Apr-21 (No. 2117-0343)</td> </tr> <tr> <td>Type-N minmax combination</td> <td>SN: 310982 / 06327</td> <td>09-Apr-21 (No. 2117-0344)</td> </tr> <tr> <td>Reference Probe EX3DV4</td> <td>SN: 3877</td> <td>30-Dec-20 (No. EX3-3077, Dec-20)</td> </tr> <tr> <td>DAE4</td> <td>SN: 954</td> <td>28-Jun-20 (No. DAE4-954, Jun-20)</td> </tr> </table>	ID #	Cal Date (Certificate No.)	Scheduled Calibration	Power meter NIP	SN: 140778	09-Apr-21 (No. 2117-0201/0320)	Power sensor NIP-291	SN: 102584	09-Apr-21 (No. 2117-0201)	Power sensor NIP-291	SN: 102585	Apr-22	Reference 20 dB Attenuator	SN: CCG562 (206)	09-Apr-21 (No. 2117-0343)	Type-N minmax combination	SN: 310982 / 06327	09-Apr-21 (No. 2117-0344)	Reference Probe EX3DV4	SN: 3877	30-Dec-20 (No. EX3-3077, Dec-20)	DAE4	SN: 954	28-Jun-20 (No. DAE4-954, Jun-20)
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Secondary Standards	<table border="1"> <tr> <th>ID #</th> <th>Check Date (in house)</th> <th>Scheduled Check</th> </tr> <tr> <td>Power meter E41198</td> <td>SN: G4B1290874</td> <td>09-Apr-16 (in house check Jun-20)</td> </tr> <tr> <td>Power meter E41198</td> <td>SN: 91410514</td> <td>In house check: Jun-22</td> </tr> <tr> <td>Power sensor E4412A</td> <td>SN: 200116019</td> <td>09-Apr-19 (in house check Jun-20)</td> </tr> <tr> <td>RF generator HP 8648C</td> <td>EN: URS440-011700</td> <td>In house check: Jun-22</td> </tr> <tr> <td>Network Analyzer Agilent E3036A</td> <td>SN: US410960477</td> <td>31-Mar-14 (in house check Oct-20)</td> </tr> </table>	ID #	Check Date (in house)	Scheduled Check	Power meter E41198	SN: G4B1290874	09-Apr-16 (in house check Jun-20)	Power meter E41198	SN: 91410514	In house check: Jun-22	Power sensor E4412A	SN: 200116019	09-Apr-19 (in house check Jun-20)	RF generator HP 8648C	EN: URS440-011700	In house check: Jun-22	Network Analyzer Agilent E3036A	SN: US410960477	31-Mar-14 (in house check Oct-20)						
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Calibrated by:	Name: Claudio Leutler Function: Laboratory Technician 																								
Approved by:	Name: Katja Povacic Function: Technical Manager 																								
Issued: April 23, 2021																									

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Certificate No: D450V3-1103_Apr21 Page 1 of 6

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Glossary:

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

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1628-2013, "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
- b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- d) KDB 605664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- e) DASY4/5 System Handbook

Method 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.
- Peak Power Absorbance 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

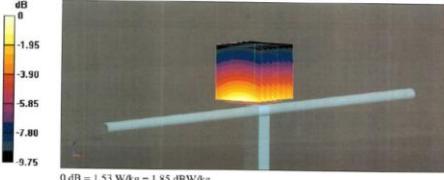
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Measurement Conditions DASY system configuration, as far as not given on page 1. <table border="1"> <tr><td>DASY Version</td><td>DASY5</td><td>V62.10.4</td></tr> <tr><td>Extrapolation</td><td colspan="2">Advanced Extrapolation</td></tr> <tr><td>Phantom</td><td>ELI Flat Phantom</td><td>Shell thickness: 2 ± 0.2 mm</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>$\Delta x, \Delta y, \Delta z = 6 \text{ mm}$</td><td></td></tr> <tr><td>Frequency</td><td>450 MHz ± 1 MHz</td><td></td></tr> </table>		DASY Version	DASY5	V62.10.4	Extrapolation	Advanced Extrapolation		Phantom	ELI Flat Phantom	Shell thickness: 2 ± 0.2 mm	Distance Dipole Center - TSL	15 mm	with Spacer	Zoom Scan Resolution	$\Delta x, \Delta y, \Delta z = 6 \text{ mm}$		Frequency	450 MHz ± 1 MHz		Appendix (Additional assessments outside the scope of SCS 0108) Antenna Parameters with Head TSL <table border="1"> <tr><td>Impedance, transformed to feed point</td><td>57.1 Ω - 2.8 jΩ</td></tr> <tr><td>Return Loss</td><td>-23.0 dB</td></tr> </table> General Antenna Parameters and Design <table border="1"> <tr><td>Electrical Delay (one direction)</td><td>1.346 ns</td></tr> </table> 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 semi-glossy copper cable. The outer 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 arms, small end caps are added to the dipole arms in order to improve matching when tested according to the test and measurement "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard. No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.		Impedance, transformed to feed point	57.1 Ω - 2.8 jΩ	Return Loss	-23.0 dB	Electrical Delay (one direction)	1.346 ns				
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Certificate No: D450V3-1103_Apr21 Page 3 of 6		Certificate No: D450V3-1103_Apr21 Page 4 of 6																													
DASY5 Validation Report for Head TSL Date: 21.04.2021 Test Laboratory: SPEAG, Zurich, Switzerland DUT: Dipole 450 MHz; Type: D450V3; Serial: D450V3- SN:1103 Communication System: UID 0 - CW; Frequency: 450 MHz Medium parameters used: $\epsilon_r = 450 \text{ MHz}$; $\sigma = 0.87 \text{ S/m}$; $\epsilon_t = 43.1$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011) DASY52 Configuration: <ul style="list-style-type: none"> 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: ELI v4.0; Type: QDOVA001BB; Serial: TP:1003 DASY52.52.10.4(1527); SEMCAD X 14.6.14(7483) Dipole Calibration for Head Tissue/d=15mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 39.18 W/kg; 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		Certificate No: D450V3-1103_Apr21 Page 6 of 6																													



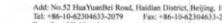
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1.3 D750V3 - SN 1188

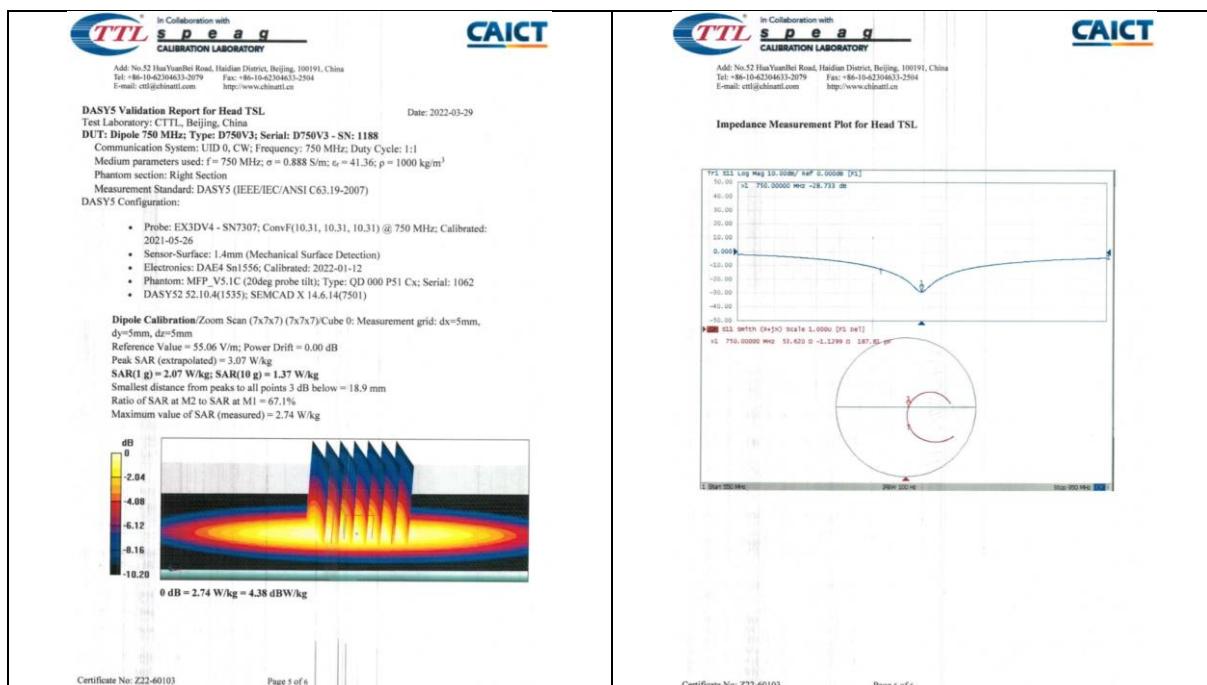
    <p>Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191 Tel: +86-10-62395012 Fax: +86-10-62346312-2504 E-mail: cftt@chinaitt.com http://www.chinaitt.com</p> <p>Client: SGS-CN Certificate No: Z22-60103</p> <p>CALIBRATION CERTIFICATE</p> <p>Object: D750V3 - SN: 1188</p> <p>Calibration Procedure(s): FF-Z11-003-01 Calibration Procedures for dipole validation kits</p> <p>Calibration date: March 29, 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 calibration 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"> <tr> <th>Primary Standards</th> <th>ID #</th> <th>Cal Date (Calibrated by, Certificate No.)</th> <th>Scheduled Calibration</th> </tr> <tr> <td>Power Meter NRP2</td> <td>105277</td> <td>24-Sep-21 (CFTT, No.J21X08326)</td> <td>Sep-22</td> </tr> <tr> <td>Power sensor NRP8S</td> <td>104291</td> <td>24-Sep-21 (CFTT, No.J21X08326)</td> <td>Sep-22</td> </tr> <tr> <td>Reference Probe EX3DVA</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 (CFTT-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 E4438C</td> <td>MY49071430</td> <td>13-Jan-22 (CFTT, No.J22X04049)</td> <td>Jan-23</td> </tr> <tr> <td>Network Analyzer E5071C</td> <td>MY46110673</td> <td>14-Jan-22 (CFTT, No.J22X04046)</td> <td>Jan-23</td> </tr> </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>		Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration	Power Meter NRP2	105277	24-Sep-21 (CFTT, No.J21X08326)	Sep-22	Power sensor NRP8S	104291	24-Sep-21 (CFTT, No.J21X08326)	Sep-22	Reference Probe EX3DVA	SN 7307	26-May-21 (SPEAG No. EX3-7307, May21)	May-22	DAE4	SN 1556	12-Jan-22 (CFTT-SPEAG, No.Z22-60007)	Jan-23	Secondary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration	Signal Generator E4438C	MY49071430	13-Jan-22 (CFTT, No.J22X04049)	Jan-23	Network Analyzer E5071C	MY46110673	14-Jan-22 (CFTT, No.J22X04046)	Jan-23	   <p>Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-62394633-2079 Fax: +86-10-62346312-2504 E-mail: cftt@chinaitt.com http://www.chinaitt.com</p> <p>Glossary: 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: 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 655864, "SAR Measurement Requirements for 100 MHz to 6 GHz"</p> <p>Additional Documentation: c) DASY4/S System Handbook</p> <p>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 measured value 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> <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>																													
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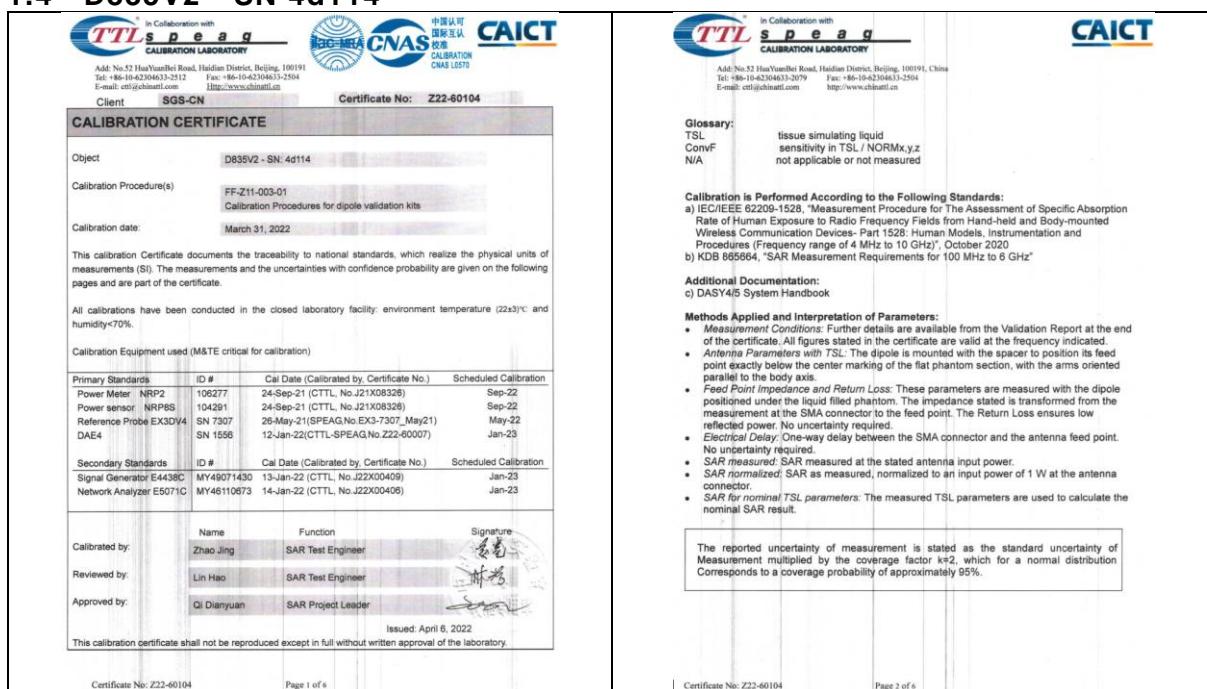
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1.4 D835V2 - SN 4d114



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<p>Certificate No: Z22-60104 Page 2 of 6</p> <p>TTL s p e a g CALIBRATION LABORATORY</p> <p>Add: No. 52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504 E-mail: cttl@chaintl.com http://www.chaintl.cn</p> <p>CAICT</p> <p>DASY5's Variations Report for Head TSL Test Laboratory: CAICT, Beijing China Date: 2022-03-31</p> <p>DUT: Dipole 835 MHz; Type: DR35V2; Serial: DR35V2 - SN: 4d114</p> <p>Communication System: UID 0; CW; Frequency: 835 MHz; Duty Cycle: 1:1</p> <p>Medium parameters used: $\epsilon' = 835 \text{ MHz}$; $\sigma = 0.907 \text{ S/m}$; $\tau_e = 40.98$; $\rho = 1000 \text{ kg/m}^3$</p> <p>Phantom section: Right Section</p> <p>Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)</p> <p>DASY5 Configuration:</p> <ul style="list-style-type: none"> • Probe: EX3DV4 - SN7307; ConvF(10.13, 10.13, 10.13) @ 835 MHz; Calibrated: 2021-05-26 • Sensor-Surface: 1.4mm (Mechanical Surface Detection) • Electronics: DAE4 8in1556; Calibrated: 2022-01-12 • Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062 • DASY52 S2.10.4(1535); SEMCAD X 14.6.14(7501) <p>Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5 \text{ mm}$, $dy=5 \text{ mm}$, $dz=5 \text{ mm}$</p> <p>Reference Value = 57.88 V/m; Power Drift = 0.04 dB</p> <p>Peak SAR (extrapolated) = 2.37 W/kg; SAR(10 g) = 1.54 W/kg</p> <p>SAR(1 g) = 2.37 W/kg; SAR(10 g) = 1.54 W/kg</p> <p>Smallest distance from peaks to all points 3 dB below = 15.8 mm</p> <p>Ratio of SAR at M2 to SAR at M1 = 66.2%</p> <p>Maximum value of SAR (measured) = 3.17 W/kg</p> <p></p>		<p>Certificate No: Z22-60104 Page 4 of 6</p> <p>TTL s p e a g CALIBRATION LABORATORY</p> <p>Add: No. 52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504 E-mail: cttl@chaintl.com http://www.chaintl.cn</p> <p>CAICT</p> <p>Impedance Measurement Plot for Head TSL</p> <p></p>																																																							
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1.5 D900V2 - SN 1d079

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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 (22±5°C) and humidity<70%.</p> <p>Calibration Equipment used (M&TE critical for calibration)</p> <table border="1"> <tr> <th>Primary Standards</th> <th>ID #</th> <th>Cal Date (Calibrated by, Certificate No.)</th> <th>Scheduled Calibration</th> </tr> <tr> <td>Power Meter: NIP82</td> <td>10277</td> <td>24-Sep-21 (CTTL, No. J22X00260)</td> <td>Sept-22</td> </tr> <tr> <td>Power sensor: NIP85</td> <td>104091</td> <td>24-Sep-21 (CTTL, No. J21X03262)</td> <td>Sept-22</td> </tr> <tr> <td>Reference Probe EX3DV4</td> <td>SN 7464</td> <td>26-Jan-22(SPEAG No EX3-7464, Jan22)</td> <td>Jan-23</td> </tr> <tr> <td>DAE4</td> <td>SN 1558</td> <td>12-Jan-22(CTTL-SPEAG No.222-80007)</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 E4438C</td> <td>MY49071430</td> <td>13-Jan-22 (CTTL, No.J22X00409)</td> <td>Jan-23</td> </tr> <tr> <td>Network Analyzer E5071C</td> <td>MY46110673</td> <td>14-Jan-22 (CTTL, No.J22X00406)</td> <td>Jan-23</td> </tr> </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: 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: Z22-60184 Page 1 of 6</p> </div>	Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration	Power Meter: NIP82	10277	24-Sep-21 (CTTL, No. J22X00260)	Sept-22	Power sensor: NIP85	104091	24-Sep-21 (CTTL, No. J21X03262)	Sept-22	Reference Probe EX3DV4	SN 7464	26-Jan-22(SPEAG No EX3-7464, Jan22)	Jan-23	DAE4	SN 1558	12-Jan-22(CTTL-SPEAG No.222-80007)	Jan-23	Secondary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration	Signal Generator E4438C	MY49071430	13-Jan-22 (CTTL, No.J22X00409)	Jan-23	Network Analyzer E5071C	MY46110673	14-Jan-22 (CTTL, No.J22X00406)	Jan-23	<div style="text-align: center;">   <p>in Collaboration with TTL Speag CALIBRATION LABORATORY Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-62796531-3217 E-mail: off@caict.ac.cn http://www.caict.ac.cn</p> <p>Glossary: TSL: tissue simulating liquid ConvF: sensitivity in TSL / NORMxyz N/A: not applicable or not measured</p> <p>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 895994, "SAR Measurement Requirements for 100 MHz to 6 GHz"</p> <p>Additional Documentation: o DASY4.5 System Handbook</p> <p>Methods Applied and Interpretation of Parameters:</p> <ul style="list-style-type: none"> • Antenna Configuration: Further details are available from the Validation Report at the end of the certificate. All parameters 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. • Impedance and Return Loss: These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance value is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required. • SAR measured: One day 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: Z22-60184 Page 2 of 6</p> </div>																													
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<div style="display: flex; justify-content: space-around;"> <div style="width: 45%;"> <div style="text-align: center;">  <p>in Collaboration with TTL Speag CALIBRATION LABORATORY Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-62796531-2117 E-mail: off@caict.ac.cn http://www.caict.ac.cn</p> <p>Measurement system configuration, as far as not given on page 1:</p> <table border="1"> <tr> <td>DASY Version</td> <td>DASY92</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>15 mm</td> <td>with Spacer</td> </tr> <tr> <td>Zoom Scan Resolution</td> <td>$\Delta x, \Delta y, \Delta z = 5 \text{ mm}$</td> <td></td> </tr> <tr> <td>Frequency</td> <td>900 MHz $\pm 1 \text{ MHz}$</td> <td></td> </tr> </table> <p>Head TSL parameters 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>22.0 °C</td> <td>41.5</td> <td>0.97 mho/m</td> <td></td> </tr> <tr> <td>Measured Head TSL parameters</td> <td>(22.0 ± 0.2) °C</td> <td>42.1 $\pm 6\%$</td> <td>0.98 mho/m $\pm 6\%$</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>2.76 W/kg</td> </tr> <tr> <td>SAR for nominal Head TSL parameters</td> <td>normalized to 1W</td> <td>11.0 W/kg $\pm 18.8\%$ (n=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>1.78 W/kg</td> </tr> <tr> <td>SAR for nominal Head TSL parameters</td> <td>normalized to 1W</td> <td>7.09 W/kg $\pm 18.7\%$ (n=2)</td> </tr> </table> </div> </div></div>		DASY Version	DASY92	52.10.4	Extrapolation	Advanced Extrapolation		Phantom	Triple flat Phantom 5.1C		Distance Dipole Center - TSL	15 mm	with Spacer	Zoom Scan Resolution	$\Delta x, \Delta y, \Delta z = 5 \text{ mm}$		Frequency	900 MHz $\pm 1 \text{ MHz}$		Nominal Head TSL parameters	Temperature	Permittivity	Conductivity	22.0 °C	41.5	0.97 mho/m		Measured Head TSL parameters	(22.0 ± 0.2) °C	42.1 $\pm 6\%$	0.98 mho/m $\pm 6\%$	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	2.76 W/kg	SAR for nominal Head TSL parameters	normalized to 1W	11.0 W/kg $\pm 18.8\%$ (n=2)	SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition		SAR measured	250 mW input power	1.78 W/kg	SAR for nominal Head TSL parameters	normalized to 1W	7.09 W/kg $\pm 18.7\%$ (n=2)	<div style="text-align: center;">  <p>in Collaboration with CAICT CALIBRATION LABORATORY Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-62796531-3217 E-mail: off@caict.ac.cn http://www.caict.ac.cn</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>48.10 - 8.49jΩ</td> </tr> <tr> <td>Return Loss</td> <td>-23.3 dB</td> </tr> </table> <p>General Antenna Parameters and Design</p> <table border="1"> <tr> <td>Electrical (one direction)</td> <td>1.312 ns</td> </tr> </table> <p>After long term use with 100W radiated power, only a slight warming of the dipole near the feed-point is measured.</p> <p>The dipole is made of standard enrigid coaxial cable. The center conductor of the testing 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 with the liquid phantom. The measurement complies with the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The dipole impedance 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> </div>	Impedance, transformed to feed point	48.10 - 8.49jΩ	Return Loss	-23.3 dB	Electrical (one direction)	1.312 ns	Manufactured by	SPEAG
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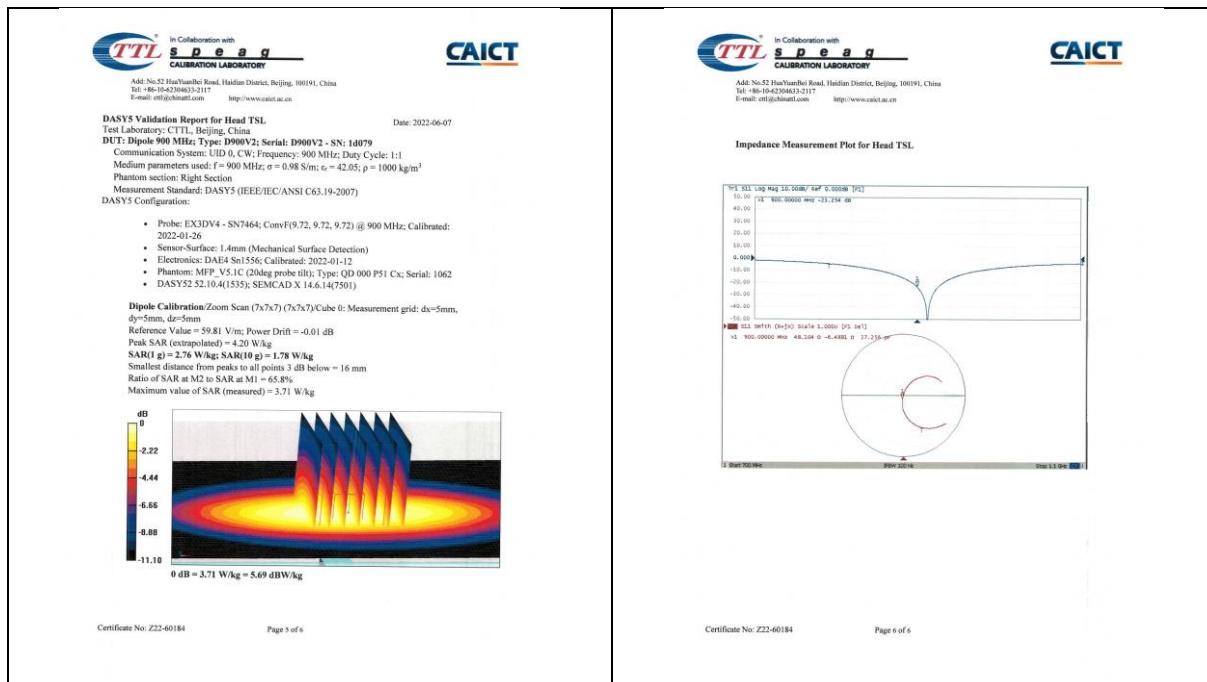
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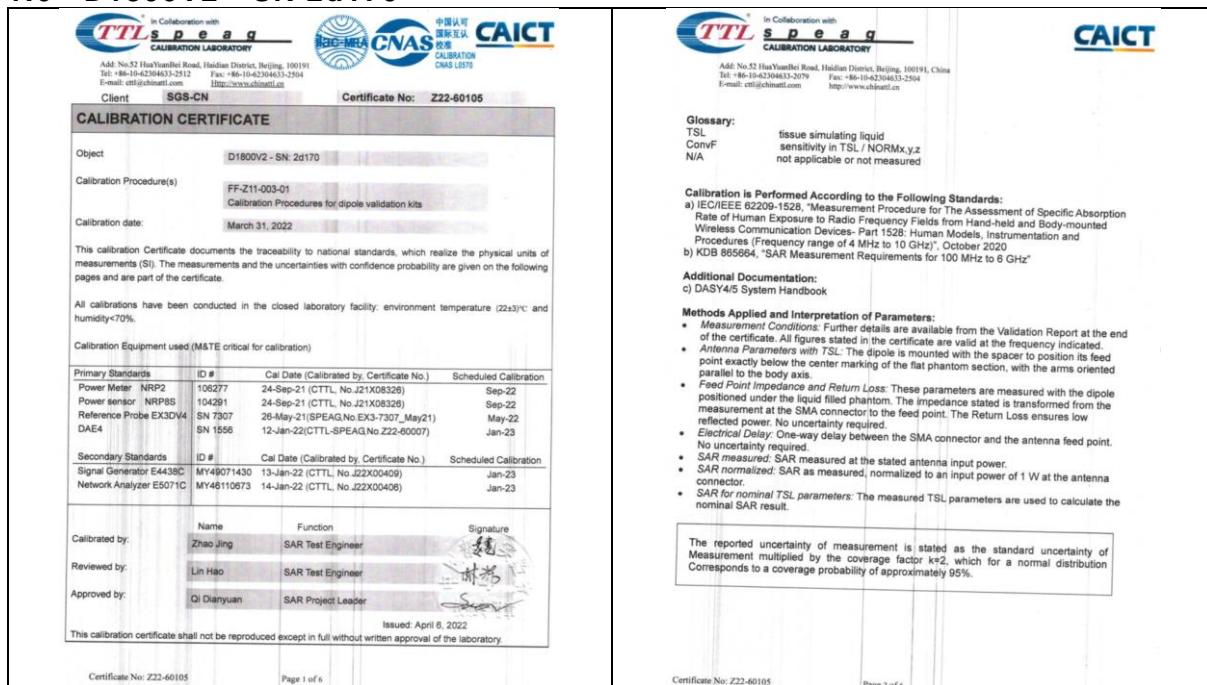
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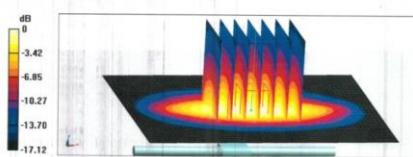
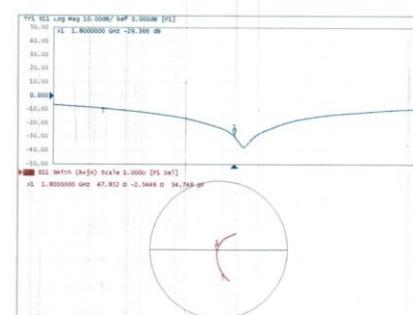
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<p>TTL SPEAG CALIBRATION LABORATORY Add: No.53 HuaYanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304613-2079 Fax: +86-10-62304613-2504 E-mail: ctt@chaintl.cn http://www.chaintl.cn</p> <p>CAICT</p> <p>Measurement Conditions DASY system configuration, as far as not given on page 1.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>DASY Version</td><td>DASY2</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" style="width: 100%; border-collapse: collapse;"> <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>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>40.6 ± 6 %</td><td>1.41 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" style="width: 100%; border-collapse: collapse;"> <tr><td>SAR averaged over 1 cm³ (1 g) of Head TSL</td><td>Condition</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></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>	DASY Version	DASY2	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	40.6 ± 6 %	1.41 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	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 SPEAG CALIBRATION LABORATORY Add: No.53 HuaYanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304613-2079 Fax: +86-10-62304613-2504 E-mail: ctt@chaintl.cn http://www.chaintl.cn</p> <p>CAICT</p> <p>Appendix (Additional assessments outside the scope of CNAS L0570)</p> <p>Antenna Parameters with Head TSL</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <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" style="width: 100%; border-collapse: collapse;"> <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 standard. The overall dipole is measured in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole 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" style="width: 100%; border-collapse: collapse;"> <tr><td>Manufactured by</td><td>SPEAG</td></tr> </table>	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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1.7 D1900V2 - SN 5d136

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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 (22±5)°C and humidity<70%.</p> <p>Calibration Equipment used (M&TE criteria 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 sensor RPR2</td> <td>102277</td> <td>24-Jan-22 (CTTL No.J22X0029)</td> <td>Sep-22</td> </tr> <tr> <td>Power sensor RPR85</td> <td>104291</td> <td>24-Jan-22 (CTTL No.J21X0032)</td> <td>Sep-22</td> </tr> <tr> <td>Reference Probe EX3DV4</td> <td>SN 7464</td> <td>26-Jan-22(SPEAG No EX3-7464, Jan22)</td> <td>Jan-23</td> </tr> <tr> <td>DAEA</td> <td>SN 1558</td> <td>12-Jan-22(CTTL-SPEAG No 222-6007)</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 E4438C</td> <td>MY49071430</td> <td>13-Jan-22 (CTTL No.J22X00409)</td> <td>Jan-23</td> </tr> <tr> <td>Network Analyzer E5071C</td> <td>MY48110673</td> <td>14-Jan-22 (CTTL No.J22X00406)</td> <td>Jan-23</td> </tr> </tbody> </table> <table border="1"> <tr> <td>Calibrated by:</td> <td>Zhao Jing</td> <td>SAR Test Engineer</td> <td></td> </tr> <tr> <td>Reviewed by:</td> <td>Lin Hao</td> <td>SAR Test Engineer</td> <td></td> </tr> <tr> <td>Approved by:</td> <td>Qi Danyuan</td> <td>SAR Project Leader</td> <td></td> </tr> </table> <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 sensor RPR2	102277	24-Jan-22 (CTTL No.J22X0029)	Sep-22	Power sensor RPR85	104291	24-Jan-22 (CTTL No.J21X0032)	Sep-22	Reference Probe EX3DV4	SN 7464	26-Jan-22(SPEAG No EX3-7464, Jan22)	Jan-23	DAEA	SN 1558	12-Jan-22(CTTL-SPEAG No 222-6007)	Jan-23	Secondary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration	Signal Generator E4438C	MY49071430	13-Jan-22 (CTTL No.J22X00409)	Jan-23	Network Analyzer E5071C	MY48110673	14-Jan-22 (CTTL No.J22X00406)	Jan-23	Calibrated by:	Zhao Jing	SAR Test Engineer		Reviewed by:	Lin Hao	SAR Test Engineer		Approved by:	Qi Danyuan	SAR Project Leader		  <p>Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-62904532-2117 E-mail: caiit@kunshan.com</p> <p>Glossary:</p> <ul style="list-style-type: none"> TSL: tissue simulating liquid Conv/F: sensitivity in TSL / NORMLx,y,z N/A: not applicable or not measured <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 Personal Communication Devices- Part 1528: Human Models, Instrumentation and Procedure (Frequency range of 4 MHz to 10 GHz)", October 2020 b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz" <p>Additional Documentation:</p> <ul style="list-style-type: none"> DASY4.3 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 this document. All figures and tables 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 transferred from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required. Electrical Delay: The electrical delay between the SMA connector and the antenna feed point. 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 feed point. 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: Z22-60185 Page 2 of 6</p>
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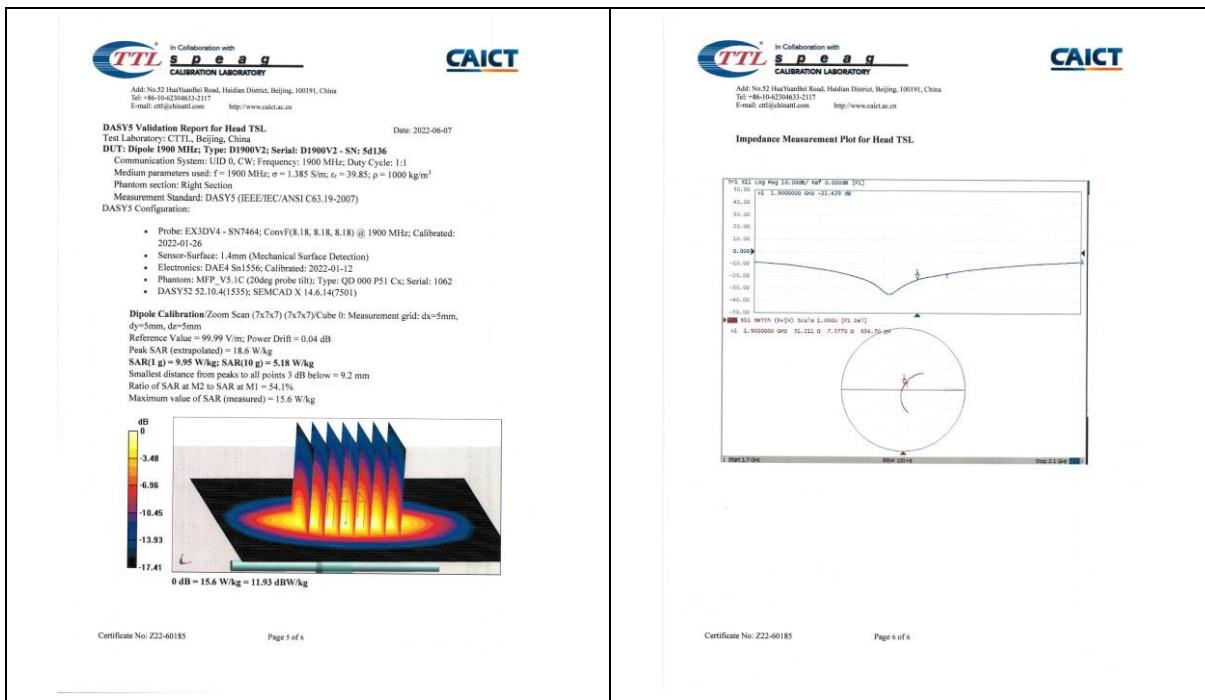
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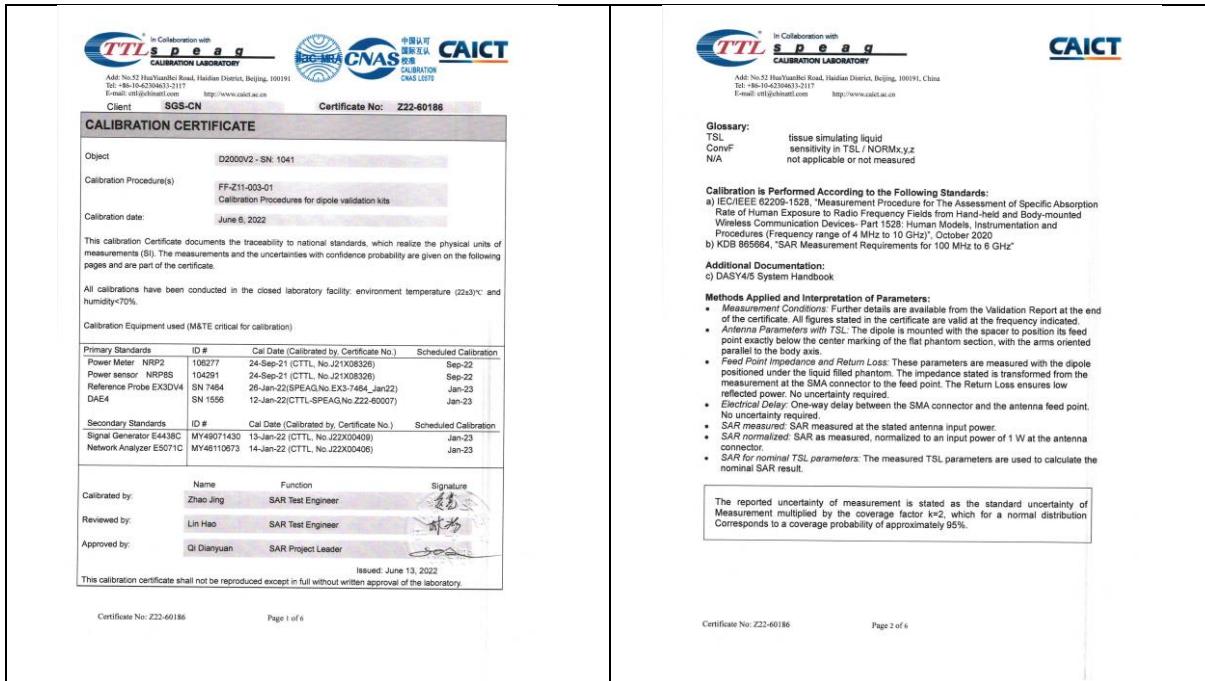
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1.8 D2000V2 - SN 1041



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<p>TTL In Collaboration with s p e a g CALIBRATION LABORATORY Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304633-2117 E-mail: cttl@chinatll.com http://www.caict.ac.cn</p> <p>CAICT</p> <p>Measurement Conditions DASY system configuration, as far as given on page 1.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <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>2000 MHz ± 1 MHz</td><td></td></tr> </table> <p>Head TSL parameters The following parameters and calculations were applied.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>Temperature</td><td>Permittivity</td><td>Conductivity</td></tr> <tr><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>40.2 ± 6 % 1.39 mho/m ± 6 %</td></tr> <tr><td>Head TSL temperature change during test</td><td><1.0 °C</td><td>—</td></tr> </table> <p>SAR result with Head TSL</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>SAR averaged over 1 cm³ (1 g) of Head TSL</td><td>Condition</td></tr> <tr><td>SAR measured</td><td>250 mW input power</td><td>10.4 W/kg</td></tr> <tr><td>SAR for nominal Head TSL parameters</td><td>normalized to 1W</td><td>41.8 W/kg ± 18.8 % (n=2)</td></tr> <tr><td>SAR averaged over 10 cm³ (10 g) of Head TSL</td><td>Condition</td></tr> <tr><td>SAR measured</td><td>250 mW input power</td><td>5.30 W/kg</td></tr> <tr><td>SAR for nominal Head TSL parameters</td><td>normalized to 1W</td><td>21.3 W/kg ± 18.7 % (n=2)</td></tr> </table> <p>Certificate No: Z22-60186 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	2000 MHz ± 1 MHz		Temperature	Permittivity	Conductivity	22.0 °C	40.0	1.40 mho/m	Measured Head TSL parameters	(22.0 ± 0.2) °C	40.2 ± 6 % 1.39 mho/m ± 6 %	Head TSL temperature change during test	<1.0 °C	—	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 % (n=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 % (n=2)	<p>TTL In Collaboration with s p e a g CALIBRATION LABORATORY Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304633-2117 E-mail: cttl@chinatll.com http://www.caict.ac.cn</p> <p>CAICT</p> <p>Appendix (Additional assessments outside the scope of CNAS L057)</p> <p>Antenna Parameters with Head TSL</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>Impedance, transformed to feed port</td><td>48.40+ 0.74jΩ</td></tr> <tr><td>Return Loss</td><td>-34.9dB</td></tr> </table> <p>General Antenna Parameters and Design</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>Electrical Delay (one direction)</td><td>1.088 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 testing 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 caps are added to the dipole arms in order to improve matching when loaded with the probe. These caps are removed. Measured "Antenna Conductance" paragraph. The SAR data are not affected by this change. The overall dipole length is still adapted to the antenna.</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" style="width: 100%; border-collapse: collapse;"> <tr><td>Manufactured by</td><td>SPEAG</td></tr> </table> <p>Certificate No: Z22-60186 Page 4 of 6</p>	Impedance, transformed to feed port	48.40+ 0.74jΩ	Return Loss	-34.9dB	Electrical Delay (one direction)	1.088 ns	Manufactured by	SPEAG
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1.9 D2300V2 - SN 1096

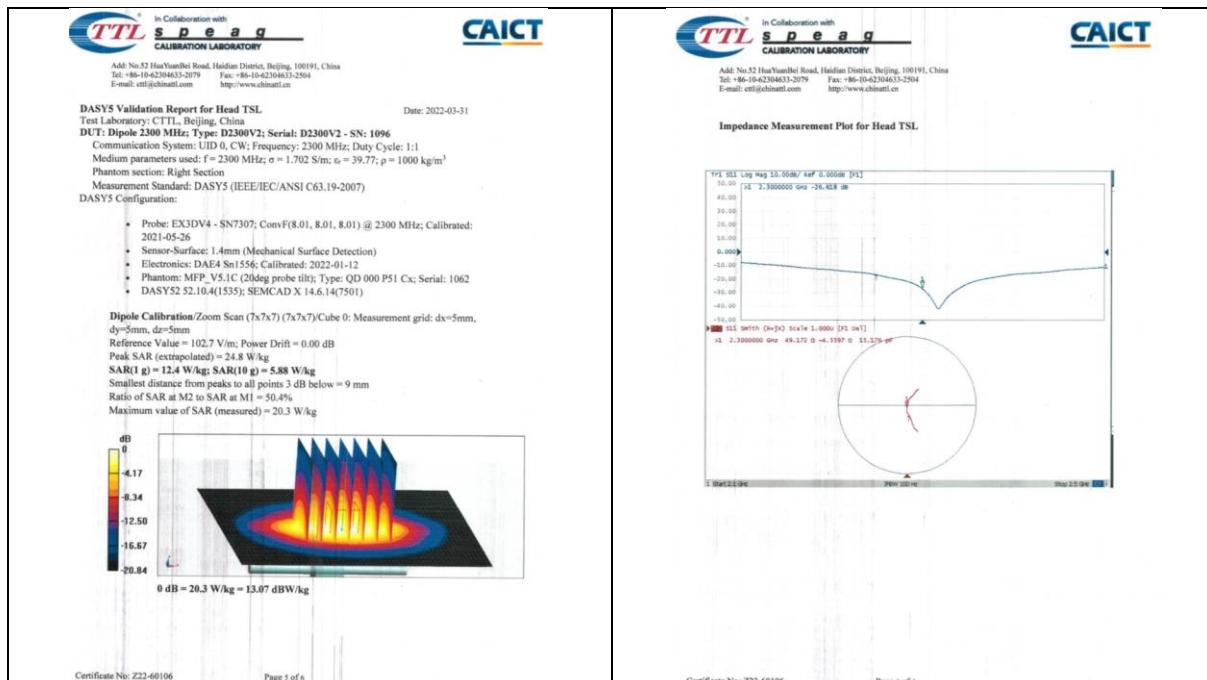
   <p>Object: D2300V2 - SN: 1096</p> <p>Calibration Procedure(s): FF-Z11-003-01 Calibration Procedures for dipole validation kits</p> <p>Calibration date: March 31, 2022</p> <p>This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements (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 (MATE critical for calibration)</p> <table border="1"> <tr> <th>Primary Standards</th> <th>ID #</th> <th>Cal Date (Calibrated by, Certificate No.)</th> <th>Scheduled Calibration</th> </tr> <tr> <td>Power Meter NRP2</td> <td>106277</td> <td>24-Sep-21 (CTTL, No. J21X08326)</td> <td>Sep-22</td> </tr> <tr> <td>Power sensor NRP8S</td> <td>104291</td> <td>24-Sep-21 (CTTL, No. J21X08326)</td> <td>Sep-22</td> </tr> <tr> <td>Reference Probe EX3DV4</td> <td>SN 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. 222-60007)</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 E4438C</td> <td>MY49071430</td> <td>13-Jan-22 (CTTL, No. J22X00409)</td> <td>Jan-23</td> </tr> <tr> <td>Network Analyzer E5071C</td> <td>MY46110673</td> <td>14-Jan-22 (CTTL, No. J22X00406)</td> <td>Jan-23</td> </tr> </table> <p>Calibrated by: Zhao Jing Reviewed by: Lin Hao Approved by: Qi Dianyuan</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>		Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration	Power Meter NRP2	106277	24-Sep-21 (CTTL, No. J21X08326)	Sep-22	Power sensor NRP8S	104291	24-Sep-21 (CTTL, No. J21X08326)	Sep-22	Reference Probe EX3DV4	SN 7307	26-May-21 (SPEAG No. EX3-7307, May21)	May-22	DAE4	SN 1556	12-Jan-22 (CTTL-SPEAG No. 222-60007)	Jan-23	Secondary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration	Signal Generator E4438C	MY49071430	13-Jan-22 (CTTL, No. J22X00409)	Jan-23	Network Analyzer E5071C	MY46110673	14-Jan-22 (CTTL, No. J22X00406)	Jan-23	  <p>Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191 Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504 E-mail: ctli@chinaitt.com http://www.chinaitt.cn</p> <p>Glossary: 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: 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 655664, "SAR Measurement Requirements for 100 MHz to 6 GHz"</p> <p>Additional Documentation: c) DASY4/S System Handbook</p> <p>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 measured value 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> <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>																												
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1.10 D2450V2 - SN 817

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CALIBRATION CERTIFICATE

Client: SGS-CN Certificate No: Z22-60107

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	106277 24-Sep-21 (CTTL, No.J21X08326)	Sep-22
Power sensor	NRP8S	104291 24-Sep-21 (CTTL, No.J21X08326)	Sep-22
Reference Probe EX3D04	SN 7307	26-May-21(SPEAG)No EX3 7307 (May21)	May-22
DAE4	SN 1556	12-Jan-22(CTTL-SPEAG, No Z22-60007)	Jan-23
Secondary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	13-Jan-22 (CTTL, No.J22X00409)	Jan-23
Network Analyzer E5071C	MY48110673	14-Jan-22 (CTTL, No.J22X00406)	Jan-23
Calibrated by:	Name	Function	Signature
Reviewed by:	Zhao Jing	SAR Test Engineer	
Approved by:	Lin Hao	SAR Test Engineer	
Issued: April 6, 2022			
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Certificate No: Z22-60107 Page 1 of 6

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Certificate No: Z22-60107 Page 2 of 6

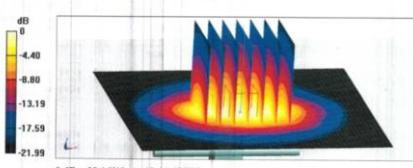
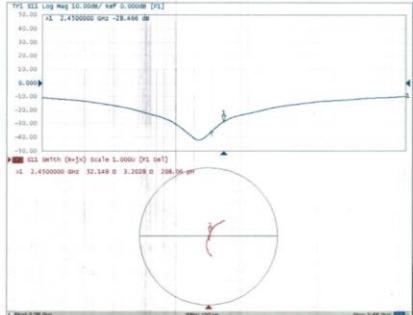
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 <p>In Collaboration with CAICT</p> <p>Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504 E-mail: ctfl@chinattl.com</p> <p>Measurement Conditions DASY system configuration, as far as not given on page 1.</p> <table border="1"> <tr><td>DASY Version</td><td>DASY2</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><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>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>83.0 W/kg ± 18.8 % (n=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 % (n=2)</td></tr> </table>		DASY Version	DASY2	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	83.0 W/kg ± 18.8 % (n=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 % (n=2)	 <p>In Collaboration with CAICT</p> <p>Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504 E-mail: ctfl@chinattl.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 ± 3.29Ω</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 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 standard. The dipole arms are soldered to the feeding line. 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>		Impedance, transformed to feed point	52.10 ± 3.29Ω	Return Loss	-28.5dB	Electrical Delay (one direction)	1.066 ns	Manufactured by	SPEAG
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<p>Certificate No: Z22-60107 Page 3 of 6</p> <p> CAICT</p> <p>Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504 E-mail: ctfl@chinattl.com</p> <p>DASY3 Validation Report for Head TSL Test Laboratory: CTTL, Beijing China DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 817 Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1 Medium parameters used: $\epsilon_r = 2450$ MHz; $\sigma = 1.79$ S/m; $\epsilon_0 = 39.52$; $\rho = 1000$ kg/m³ Phantom section: Right Section Measurement Standard: DASY3 (IEEE/IEC/ANSI C63.19-2007) DASY3 Configuration:</p> <ul style="list-style-type: none"> Probe: EX3DVA4 - SN7307; ConvF(7.75, 7.75, 7.75) @ 2450 MHz; Calibrated: 2021-05-26 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 DASY2 52.10.4(535); SEMCAD X 14.6.14(591) <p>Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)Cu6 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 104.6 V/m; Power Drift = -0.03 dB Peak SAR (1 g) = 13.2 W/kg; SAR(10 g) = 6.15 W/kg Smallest distance from peaks to all points 3 dB below = 8.9 mm Ratio of SAR at M2 to SAR at M1 = 49.2% Maximum value of SAR (measured) = 22.1 W/kg</p> <p></p>		<p>Certificate No: Z22-60107 Page 4 of 6</p> <p> CAICT</p> <p>Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504 E-mail: ctfl@chinattl.com</p> <p>Impedance Measurement Plot for Head TSL</p> <p></p>																																																													



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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 (22±3)°C and humidity >70%.</p> <p>Calibration Equipment used (M&TE critical for calibration)</p> <table border="1"> <tr> <th>Primary Standards</th> <th>ID #</th> <th>Cal Date (Calibrated by, Certificate No.)</th> <th>Scheduled Calibration</th> </tr> <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 NRP8</td> <td>104291</td> <td>24-Sep-21 (CTTL, No.J21X08326)</td> <td>Sep-22</td> </tr> <tr> <td>Reference Probe EX3DV4</td> <td>SN 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> <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 E4438C</td> <td>MY49071430</td> <td>13-Jan-22 (CTTL, No.J22X04049)</td> <td>Jan-23</td> </tr> <tr> <td>Network Analyzer E5071C</td> <td>MY46110673</td> <td>14-Jan-22 (CTTL, No.J22X04046)</td> <td>Jan-23</td> </tr> </table> <table border="1"> <tr> <th>Calibrated by:</th> <th>Name</th> <th>Function</th> <th>Signature</th> </tr> <tr> <td>Zhao Jing</td> <td>SAR Test Engineer</td> <td></td> <td></td> </tr> <tr> <th>Reviewed by:</th> <td>Lin Hao</td> <td>SAR Test Engineer</td> <td></td> </tr> <tr> <th>Approved by:</th> <td>Qi Dianyuan</td> <td>SAR Project Leader</td> <td></td> </tr> </table> <p>Issued: April 6, 2022</p> <p>This calibration certificate shall not be reproduced except in full without written approval of the laboratory.</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 NRP8	104291	24-Sep-21 (CTTL, No.J21X08326)	Sep-22	Reference Probe EX3DV4	SN 7307	26-May-21 (SPEAG No. EX3-7307, May21)	May-22	DAE4	SN 1556	12-Jan-22 (CTTL-SPEAG No. Z22-60007)	Jan-23	Secondary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration	Signal Generator E4438C	MY49071430	13-Jan-22 (CTTL, No.J22X04049)	Jan-23	Network Analyzer E5071C	MY46110673	14-Jan-22 (CTTL, No.J22X04046)	Jan-23	Calibrated by:	Name	Function	Signature	Zhao Jing	SAR Test Engineer			Reviewed by:	Lin Hao	SAR Test Engineer		Approved by:	Qi Dianyuan	SAR Project Leader		  <p>In Collaboration with SGS CALIBRATION LABORATORY Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504 E-mail: cttl@chinattl.com http://www.chinattl.com</p> <p>Glossary: TSL tissue simulating liquid ConvF sensitivity in TSL / NORMx,y N/A not applicable or not measured</p> <p>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 Procedure (Frequency range of 4 MHz to 10 GHz)", October 2020 b) KDB 655664, "SAR Measurement Requirements for 100 MHz to 6 GHz"</p> <p>Additional Documentation: c) DASY4/S System Handbook</p> <p>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 fat 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 measured at the SMA connector to the feed point. The Return Loss ensures low reflected power. No de-embedding 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> <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>												
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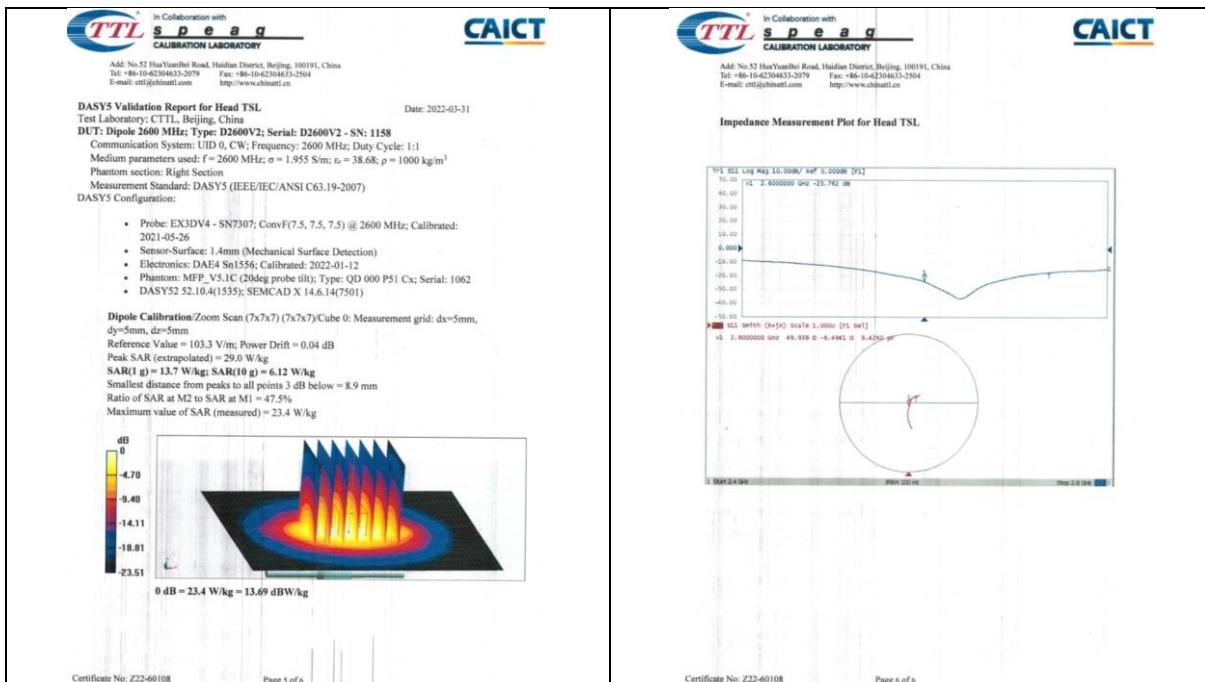
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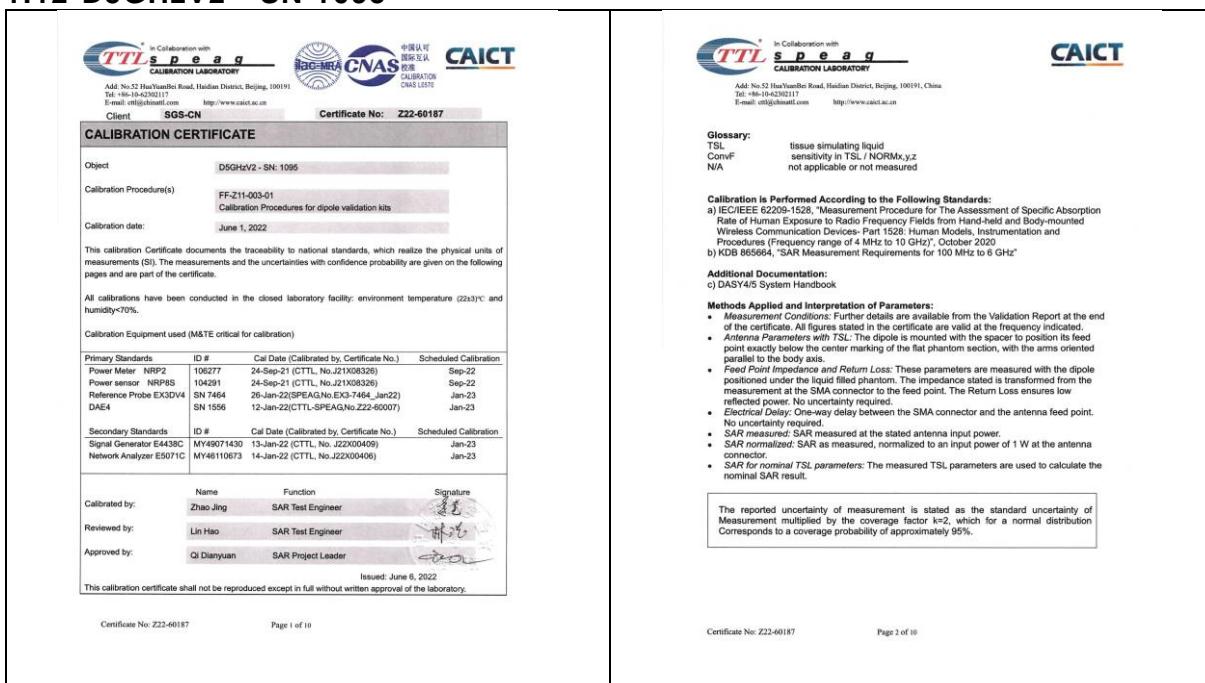
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1.12 D5GHzV2 - SN 1095



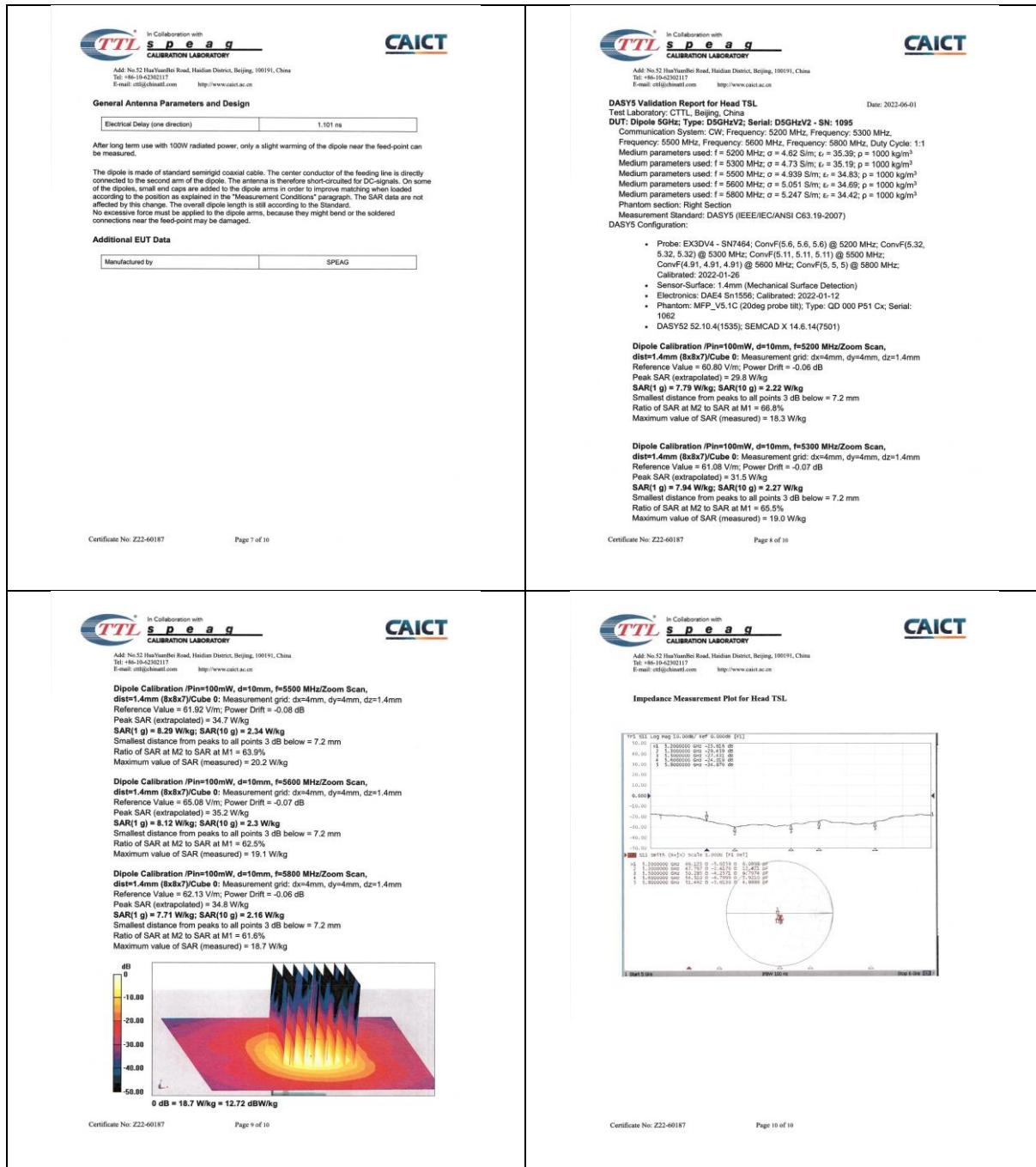
<p>SGS In Collaboration with TTL speag CALIBRATION LABORATORY Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-62302117 E-mail: cait@caict.ac.cn http://www.caict.ac.cn</p> <p>CAICT</p> <p>Head TSL parameters at 5600MHz The following parameters and calculations were applied.</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>35.5</td><td>5.07 mho/m</td></tr> <tr><td>Measured Head TSL parameters</td><td>(22.0 ± 0.2) °C</td><td>34.7 ± 6 %</td><td>5.05 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 at 5600MHz</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>8.12 W/kg</td></tr> <tr><td>SAR for nominal Head TSL 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2 DAE4 - SN 1245

<div style="text-align: center;"> <p>s p e a g</p> <p><small>Schmid & Partner Engineering AG Zugstrasse 43, 8004 Zurich, Switzerland Phone +41 44 245 7000, Fax +41 44 245 5779 www.speag.ch, info@speag.ch</small></p> <p>IMPORTANT NOTICE</p> <p>USAGE OF THE DAE4</p> <p>The DAE4 unit is a delicate, high precision instrument and requires careful treatment by the user. There are no serviceable parts inside the 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 DAE4: Before shipping the DAE4 to SPEAG for calibration, remove the batteries and pack the DAE in an anti-static bag. The 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 accumulation on the E-stop. Therefore, the user shall always mount the probe to the DAE carefully and never touch the DAE unit in a non-dust-free environment. It is not recommended to use the E-stop for safety applications.</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: Warranty and calibration is valid 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>TN_EH190306AE DAE4.docx 07.03.2019</p> </div>	<div style="text-align: center;"> <p>Calibration Laboratory of Schmid & Partner Engineering AG Zugstrasse 43, 8004 Zurich, Switzerland</p> <p>Accredited by The Swiss Accreditation Service (SCS) 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. DAE4-1245_May22</p> <p>CALIBRATION CERTIFICATE</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">Object</td> <td colspan="3">DAE4 - SD 000 D04 BM - SN: 1245</td> </tr> <tr> <td>Calibration procedure(s)</td> <td colspan="3">QA CAL-06.v30 Calibration procedure for the data acquisition electronics (DAE)</td> </tr> <tr> <td>Calibration date:</td> <td colspan="3">May 30, 2022</td> </tr> <tr> <td colspan="4"> <p>This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). 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Accreditation No.: SCS 0108

Glossary

- DAE data acquisition electronics
- Connector angle information used in DASY system to align probe sensor X to the robot coordinate system.

Methods Applied and Interpretation of Parameters

- **DC Voltage Measurement:** Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- **Connector angle:** The probe angle of the probe sensor is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
- **DC Voltage Measurement Linearity:** Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
- **Common mode sensitivity:** Influence of a positive or negative common mode voltage on the differential measurement.
- **Channel separation:** Influence of a voltage on the neighbor channels not subject to an input voltage.
- **AD Converter Values with inputs shorted:** Values on the internal AD converter corresponding to zero input voltage
- **Input Offset Measurement:** Output voltage and statistical results over a large number of zero voltage measurements.
- **Input Offset Current:** Typical value for information; Maximum channel input offset current, not considering the input resistance.
- **Input resistance:** Typical value for information; DAE input resistance at the connector, during internal auto-zeroing and during measurement.
- **Low Battery Alarm Voltage:** Typical value for information. Below this voltage, a battery alarm signal is generated.
- **Power consumption:** Typical value for information. Supply currents in various operating modes.

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DC Voltage Measurement
AD - Converter Resolution nominal
- High Range: 1LSB = 6.1mV, full range = -100...+300 mV
- Low Range: 1LSB = 61mV, full range = -1...+3mV
DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	X	Y	Z
High Range	405.265 ± 0.02% (k=2)	403.974 ± 0.02% (k=2)	405.092 ± 0.02% (k=2)
Low Range	3.99594 ± 1.50% (k=2)	3.99508 ± 1.50% (k=2)	4.01015 ± 1.50% (k=2)

Connector Angle

Connector Angle to be used in DASY system	30.0 ° ± 1 °

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Appendix (Additional assessments outside the scope of SCS0108)																																																																																																																																																																																																																																																						
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3 EX3DV4 - SN 7767

<p>Calibration Laboratory of Schmid & Partner Engineering AG Ziegliststrasse 43, 8024 Zurich, Switzerland 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: EX-7767_Oct22</p> <p>CALIBRATION CERTIFICATE</p> <p>Object: EX3DV4 - SN:7767</p> <p>Calibration procedure(s): QA CAL-01.v8, QA CAL-12.v9, QA CAL-14.v6, QA CAL-23.v5, QA CAL-25.v7 Calibration procedure for dosimetric E-field probes</p> <p>Calibration date: October 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 laboratory facility, environment temperature (22 ± 3)°C and humidity < 70%.</p> <p>Calibration equipment used (MATTIE critical for calibration):</p> <table border="1"> <tr> <td>Primary Standards</td> <td>ID</td> <td>Cal Date (Certificate No.)</td> <td>Scheduled Calibration</td> </tr> <tr> <td>Power meter RFP</td> <td>BRN 14478</td> <td>04-Apr-18 (No. 217/03294)</td> <td>Apr-23</td> </tr> <tr> <td>Power sensor NRP-Z91</td> <td>BRN 103244</td> <td>04-Apr-18 (No. 217/03294)</td> <td>Apr-23</td> </tr> <tr> <td>QCP-DAM-0.5 (weighted)</td> <td>BRN 1249</td> <td>29-Oct-22 (QCP-DAM-0.5-1249_002)</td> <td>Oct-23</td> </tr> <tr> <td>QCP-DAM-1.0 (weighted)</td> <td>BRN 1250</td> <td>29-Oct-22 (QCP-DAM-1.0-1250_002)</td> <td>Oct-23</td> </tr> <tr> <td>Reference 20 dB Attenuator</td> <td>BRN 220562 (20a)</td> <td>04-Apr-22 (No. 217/03294)</td> <td>Apr-23</td> </tr> <tr> <td>DAE4-1245</td> <td>BRN 860</td> <td>10-Oct-22 (No. DAE4-1245_002)</td> <td>Oct-23</td> </tr> <tr> <td>Reference Probe E33029</td> <td>BRN 861</td> <td>27-Oct-22 (No. E33029_002)</td> <td>Oct-23</td> </tr> <tr> <td>Boundary Sensors</td> <td>BR</td> <td>Check Date (in house)</td> <td>Scheduled Check</td> </tr> <tr> <td>Power meter E4419B</td> <td>BRN GB41399874</td> <td>06-Apr-18 (in house check Jun-22)</td> <td>In house check: Jun-24</td> </tr> <tr> <td>Power sensor E4413A</td> <td>BRN U74148607</td> <td>06-Apr-18 (in house check Jun-22)</td> <td>In house check: Jun-24</td> </tr> <tr> <td>Power sensor E4413B</td> <td>BRN U74148608</td> <td>06-Apr-18 (in house check Jun-22)</td> <td>In house check: Jun-24</td> </tr> <tr> <td>RF generator HP 8448C</td> <td>BRN U8364001790</td> <td>04-Aug-19 (in house check Jun-22)</td> <td>In house check: Jun-24</td> </tr> <tr> <td>Network Analyzer E3308A</td> <td>BRN U841005477</td> <td>31-Mar-14 (in house check Oct-22)</td> <td>In house check: Oct-24</td> </tr> </table> <p>Calibration by: Altona Georgiades Function: Laboratory Technician Signature: </p> <p>Approved by: Sven Kohn Function: Technical Manager Signature: </p> <p>This calibration certificate shall not be reproduced except in full without written approval of the laboratory.</p>	Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration	Power meter RFP	BRN 14478	04-Apr-18 (No. 217/03294)	Apr-23	Power sensor NRP-Z91	BRN 103244	04-Apr-18 (No. 217/03294)	Apr-23	QCP-DAM-0.5 (weighted)	BRN 1249	29-Oct-22 (QCP-DAM-0.5-1249_002)	Oct-23	QCP-DAM-1.0 (weighted)	BRN 1250	29-Oct-22 (QCP-DAM-1.0-1250_002)	Oct-23	Reference 20 dB Attenuator	BRN 220562 (20a)	04-Apr-22 (No. 217/03294)	Apr-23	DAE4-1245	BRN 860	10-Oct-22 (No. DAE4-1245_002)	Oct-23	Reference Probe E33029	BRN 861	27-Oct-22 (No. E33029_002)	Oct-23	Boundary Sensors	BR	Check Date (in house)	Scheduled Check	Power meter E4419B	BRN GB41399874	06-Apr-18 (in house check Jun-22)	In house check: Jun-24	Power sensor E4413A	BRN U74148607	06-Apr-18 (in house check Jun-22)	In house check: Jun-24	Power sensor E4413B	BRN U74148608	06-Apr-18 (in house check Jun-22)	In house check: Jun-24	RF generator HP 8448C	BRN U8364001790	04-Aug-19 (in house check Jun-22)	In house check: Jun-24	Network Analyzer E3308A	BRN U841005477	31-Mar-14 (in house check Oct-22)	In house check: Oct-24	<p>Calibration Laboratory of Schmid & Partner Engineering AG Ziegliststrasse 43, 8024 Zurich, Switzerland 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>Glossary</p> <p>TSL: Issue simulating liquid NORMx,y,z: sensitivity in free space ConfF: sensitivity in TSL, NORMx,y,z DCCP: Dose calibration compensation CF: crest factor (1/duty cycle) of the RF signal A, C, D: modulation dependent linearization parameters Polarization φ: Polarization angle Polarization θ: rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., θ = 0 is normal to probe axis Connector Angle: Information used in DASY system to align probe sensor X to the robot coordinate system</p> <p>Calibration is Performed According to the Following Standards:</p> <p>a) IEEE/IEEE 62209-1928, "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 1928: Human Models, Instrumentation And Procedures Frequency Range of 4 MHz to 10 GHz", October 2020. b) IEC 606564, "SAR Measurement Requirements for 100-MHz to 8 GHz"</p> <p>Methodology Applied and Interpretation of Parameters:</p> <p>NORMx,y,z: Assessed for E-field polarization θ = 0 / 900MHz in TEM-cell / > 1800MHz, R22 wavelength. NORMx,y,z below ConfF.</p> <p>NORMx,y,z: frequency response values, i.e., the uncertainties of NORMx,y,z does not affect the E-field uncertainty inside TSL (see below ConfF).</p> <p>NORMx,y,z = NORMx,y,z * frequency (see Frequency Response Chart). This linearization is implemented in DASY and extreme versions take up to 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConfF.</p> <p>DCCP: DCCP is a numerical linearization parameters assessed based on the data of power sweep with CW signal. DCCP is not affected by frequency or media.</p> <p>PAR: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics.</p> <p>Av,y,z,Bx,y,z, Cx,y,z, Dx,y,z, VRx,y,z, A, B, C, D: are numerical linearization parameters assessed based on the data of power sweep with CW signal. These parameters are not affected by frequency or media.</p> <p>VR: VR is the maximum calibration range expressed in RMS voltage across the diode.</p> <p>ConfF and Boundary Effect Parameters: Assessed in fat phantom using E-field (or Temperature Transfer) method for a 4x4x4 cm3 volume. The boundary effect is assessed for a 4x4x4 cm3 volume.</p> <p>The same set-ups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of typical boundary conditions in TSL. The same set-ups are used for NORMx,y,z to improve probe accuracy close to the boundary.</p> <p>ConfF: A frequency dependent ConfF is used in DASY version 4.0 and higher which allows extending the validity from 400MHz to 8GHz.</p> <p>Spherical isotropy (3D deviation from isotropy): in a field of low gradients realized using a flat phantom exposed by a patch antenna.</p> <p>No tolerance required.</p> <p>Connector Angle: The angle is assessed using the information gained by determining the NORMx (no uncertainty required).</p>
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EX3DV4 - SN:7767

October 28, 2022

Parameters of Probe: EX3DV4 - SN:7767

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k = 2)
Norm (mV/V(m²)) ¹	0.67	0.69	0.56	$\pm 10.1\%$
DCP (mV) ²	103.4	107.3	105.7	$\pm 4.7\%$

Calibration Results for Modulation Response

UID	Communication System Name	A	B	C	D	Vf	Max. dev.	Max. Unc ³	Unc (k = 2)
		dB	dB ⁴ /µV		dB	mV			
0	CW	X	0.00	0.00	1.00	0.90	168.7	$\pm 3.5\%$	$\pm 4.7\%$
		Y	0.00	0.00	1.00	0.90	170.3		
		Z	0.00	0.00	1.00	0.90	170.3		

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

¹ The uncertainty of Norm (X,Y,Z) does not effect the E-field uncertainty inside TBS (see Page 5).
² Uncertainty of parameter uncertainty for maximum field strength.
³ Uncertainty is determined using the true deviation from linear response assuming rectangular distribution and is expressed as the square of the field value.

EX3DV4 - SN:7767

October 28, 2022

Parameters of Probe: EX3DV4 - SN:7767

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle	144.8°
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 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.

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EX3DV4 - SN:7767

October 28, 2022

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ⁵	Relative Permittivity ⁶	Conductivity ⁷ (S/m)	Convf X	Convf Y	Convf Z	Alpha ⁸	Depth ⁹ (mm)	Unc (k = 2)
150	52.3	0.76	14.06	14.06	0.00	1.00	$\pm 13.5\%$	
450	43.5	0.87	11.90	11.90	0.16	1.30	$\pm 13.3\%$	
750	41.9	0.89	10.26	10.26	0.55	0.80	$\pm 12.0\%$	
835	41.5	0.90	10.00	10.00	0.43	0.89	$\pm 12.0\%$	
1760	40.1	1.37	9.32	9.32	0.36	0.86	$\pm 12.0\%$	
1900	40.0	1.40	8.91	8.91	0.33	0.86	$\pm 12.0\%$	
2100	39.8	1.49	8.60	8.60	0.30	0.86	$\pm 12.0\%$	
2300	39.5	1.57	8.44	8.44	0.33	0.90	$\pm 12.0\%$	
2450	39.2	1.80	8.24	8.24	0.36	0.90	$\pm 12.0\%$	
2800	39.0	1.98	7.99	7.99	0.27	0.90	$\pm 12.0\%$	
3300	38.2	2.71	7.55	7.55	0.30	1.25	$\pm 13.1\%$	
3500	37.9	2.91	7.45	7.45	0.30	1.35	$\pm 13.1\%$	
3700	37.7	3.12	7.20	7.20	0.30	1.35	$\pm 13.1\%$	
3900	37.5	3.32	6.84	6.84	0.40	1.60	$\pm 13.1\%$	
4100	37.2	3.53	6.63	6.63	0.40	1.60	$\pm 13.1\%$	
4200	37.1	3.63	6.30	6.30	0.40	1.70	$\pm 13.1\%$	
4400	35.9	3.84	6.17	6.17	0.40	1.70	$\pm 13.1\%$	
4600	35.7	4.04	6.15	6.15	0.40	1.70	$\pm 13.1\%$	
4800	35.4	4.25	6.13	6.13	0.40	1.90	$\pm 13.1\%$	
4950	35.3	4.40	6.07	6.07	0.40	1.80	$\pm 13.1\%$	
5200	36.0	4.96	5.65	5.65	0.40	1.80	$\pm 13.1\%$	
5300	35.9	4.79	5.48	5.48	0.40	1.80	$\pm 13.1\%$	
5500	35.6	4.99	5.30	5.30	0.40	1.80	$\pm 13.1\%$	
5600	35.5	5.07	5.14	5.14	0.40	1.80	$\pm 13.1\%$	
5800	35.3	5.27	5.10	5.10	0.40	1.80	$\pm 13.1\%$	

⁵ Frequency weight: 2000 MHz, 1.0 MHz weight: 0.200, 4.4 MHz weight: 0.100 (see Page 2, table 1, for more details). The uncertainty is the RMS of the Convf uncertainty at each frequency and the uncertainty for the reported frequency band. Frequency weight between 0.100 and 0.200, 4.40 and 70.00 MHz for Convf assessments at 0.15, 6.1, 12.8, 15.0 and 35.0 MHz respectively. Weight of Convf assessed at 6.1-6.4 MHz, and Convf 40.0, 35.0 and 70.00 MHz for Convf assessments at 15.0, 35.0, 100.0 and 350.0 MHz respectively.

⁶ At frequencies below 3 GHz, the validity of these parameters (x and z) can be reduced to $\pm 15\%$ if liquid compensation formulas are applied to measured SAR values. The uncertainty of the measured SAR values is the same as the uncertainty of the measured Convf uncertainty for indicated target times parameters.

⁷ All frequency weights are determined using a 100 MHz bandwidth. The uncertainty of the measured SAR values is the same as the uncertainty of the measured Convf uncertainty for indicated target times parameters.

⁸ Frequency weights are determined using a 100 MHz bandwidth. SPREAD parameters that the remaining possible due to the boundary effect after compensation is always less than $\pm 1\%$ for frequencies below 4 GHz and never $\pm 2\%$ for frequencies between 4-6 GHz or any instance larger than half the probe tip distance from the boundary.

EX3DV4 - SN:7767

October 28, 2022

Frequency Response of E-Field

(TEM-Cell:IIH10 EXX, Waveguide:R22)

Frequency (MHz)	TEM (Normalized)	R22 (Normalized)
0	1.0	1.15
100	1.0	1.10
200	1.0	1.05
300	1.0	1.02
400	1.0	1.00
500	1.0	0.98
600	1.0	0.97
700	1.0	0.96
800	1.0	0.95
900	1.0	0.95
1000	1.0	0.95
1500	1.0	0.95
2000	1.0	0.95
2500	1.0	0.95
3000	1.0	0.95
3500	1.0	0.95

Uncertainty of Frequency Response of E-field: $\pm 6.3\% (k=2)$

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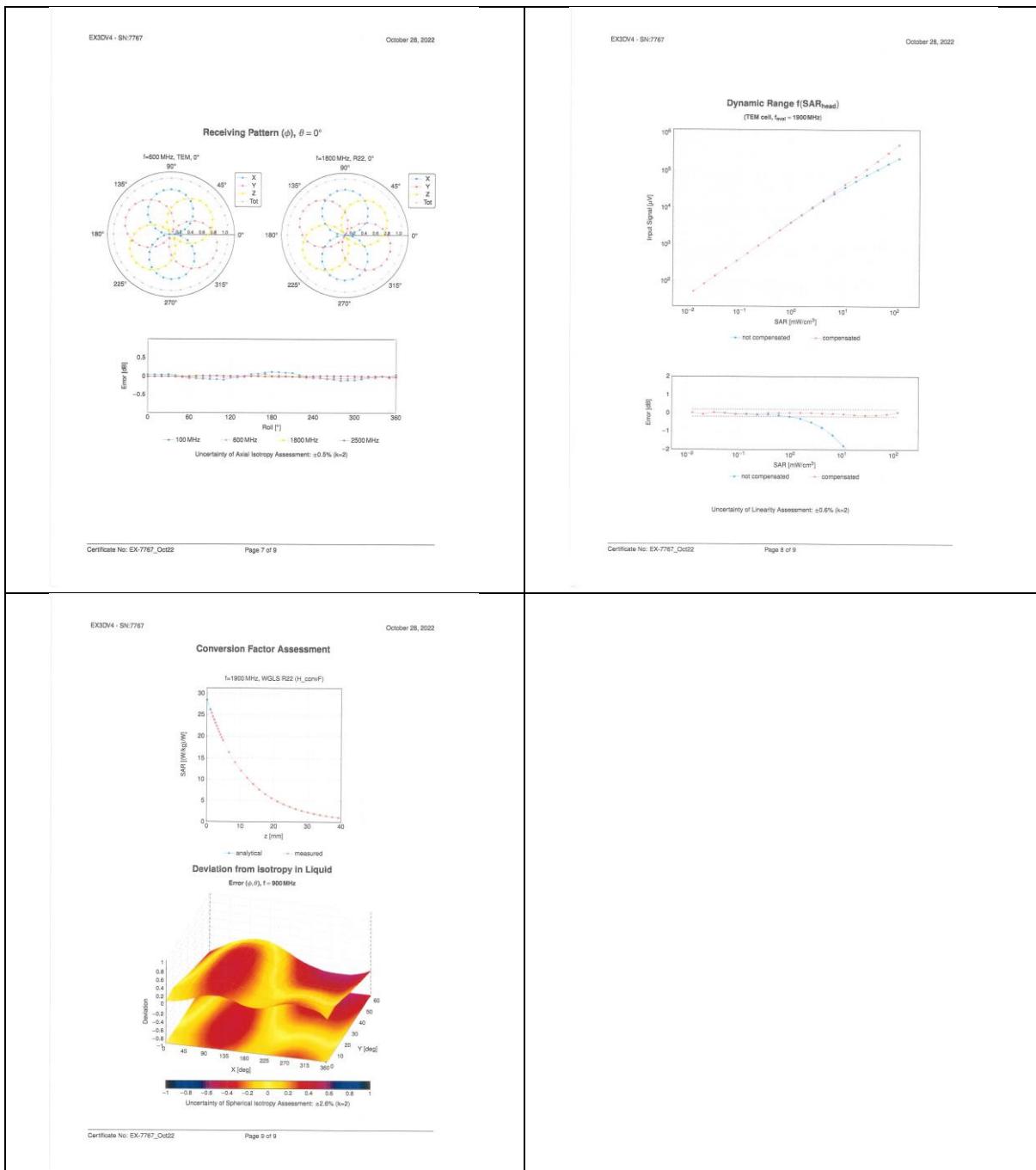
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4 Impedance and return loss

Dipole CLA150 SN 4025				
Head Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
2021/4/26	-31.4	/	47.8	/
2022/4/26	-32.5	-3.5%	47.1	-0.7
Dipole D450V3 SN 1103				
Head Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
2021/4/21	-23	/	57.1	/
2022/4/26	-23.4	-1.74%	56.6	-0.5

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