

Appendix C for KSCR230500093801

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 type="checkbox"/>	2	D450V3	1103	2021/04/21	2024/04/20
	<input checked="" type="checkbox"/>	3	D750V3	1188	2022/03/29	2025/03/28
	<input checked="" type="checkbox"/>	4	D835V2	4d114	2022/03/31	2025/03/30
	<input type="checkbox"/>	5	D900V2	1d079	2022/06/07	2025/06/06
	<input checked="" type="checkbox"/>	6	D1800V2	2d170	2022/03/31	2025/03/30
	<input checked="" 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 checked="" type="checkbox"/>	10	D2450V2	817	2022/04/01	2025/03/31
	<input type="checkbox"/>	11	D2600V2	1158	2022/03/31	2025/03/30
	<input checked="" type="checkbox"/>	12	D5GHzV2	1095	2022/06/01	2025/05/31
DAE	<input checked="" type="checkbox"/>	13	DAE4	1245	2023/04/25	2024/04/24
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.Dcccheck@sgs.com

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1 Dipole

1.1 CLA150 - SN 4025

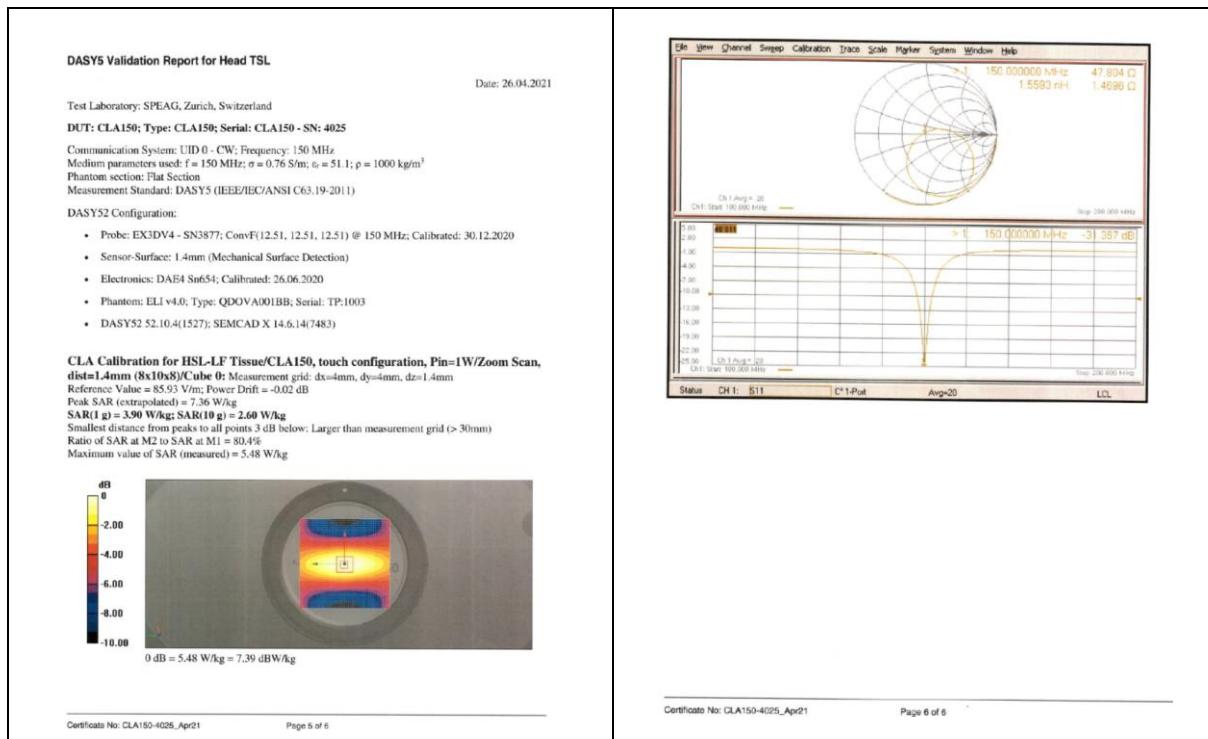
<p>Calibration Laboratory of Schmid & Partner Engineering AG Zugstrasse 45, 8001 Zurich, Switzerland</p> <p>Accredited by the Swiss Accreditation Service (SAS) The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates</p> <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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1.2 D450V3 - SN 1103

Calibration Laboratory of
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Engineering AG
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Multilateral Agreement for the recognition of calibration certificates

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																								
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Certificate No: D450V3-1103_Apr21 Page 1 of 6

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Multilateral Agreement for the recognition of calibration certificates

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 605864, "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 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

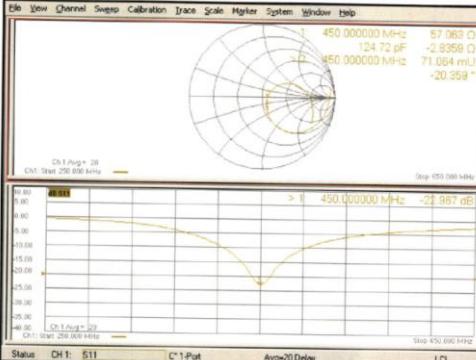
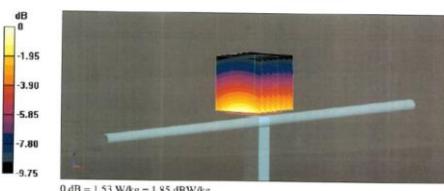
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Measurement Conditions		Appendix (Additional assessments outside the scope of SCS 0108)	
DASY system configuration, as far as not given on page 1.		Antenna Parameters with Head TSL	
DASY Version	DASY5	Impedance, transformed to feed point	57.1 Ω - 2.8 jΩ
Extrapolation	Advanced Extrapolation	Return Loss	-23.0 dB
Phantom	ELI Flat Phantom	General Antenna Parameters and Design	
Distance Dipole Center - TSL	15 mm	Electrical Delay (one direction)	1.346 ns
Zoom Scan Resolution	dx, dy, dz = 6 mm	After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.	
Frequency	450 MHz ± 1 MHz	The dipole is made of standard semi-gloss 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.	
Head TSL parameters		No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.	
The following parameters and calculations were applied.		Additional EUT Data	
Nominal Head TSL parameters	22.0 °C	Manufactured by	SPEAG
Measured Head TSL parameters	(22.0 ± 0.2) °C	SAR result with Head TSL	
Head TSL temperature change during test	< 0.5 °C	SAR averaged over 1 cm ³ (1 g) of 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	4.86 W/kg ± 18.1 % (Ko2)	
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 % (Ko2)	
Certificate No: D450V3-1103_Apr21		Certificate No: D450V3-1103_Apr21	
Page 3 of 6		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: UUD 0 - CW; Frequency: 450 MHz Medium parameters used: f = 450 MHz; σ = 0.87 S/m; ε _r = 43.1; ρ = 1000 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		Certificate No: D450V3-1103_Apr21	
Page 5 of 6		Page 6 of 6	



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1.3 D750V3 - SN 1188

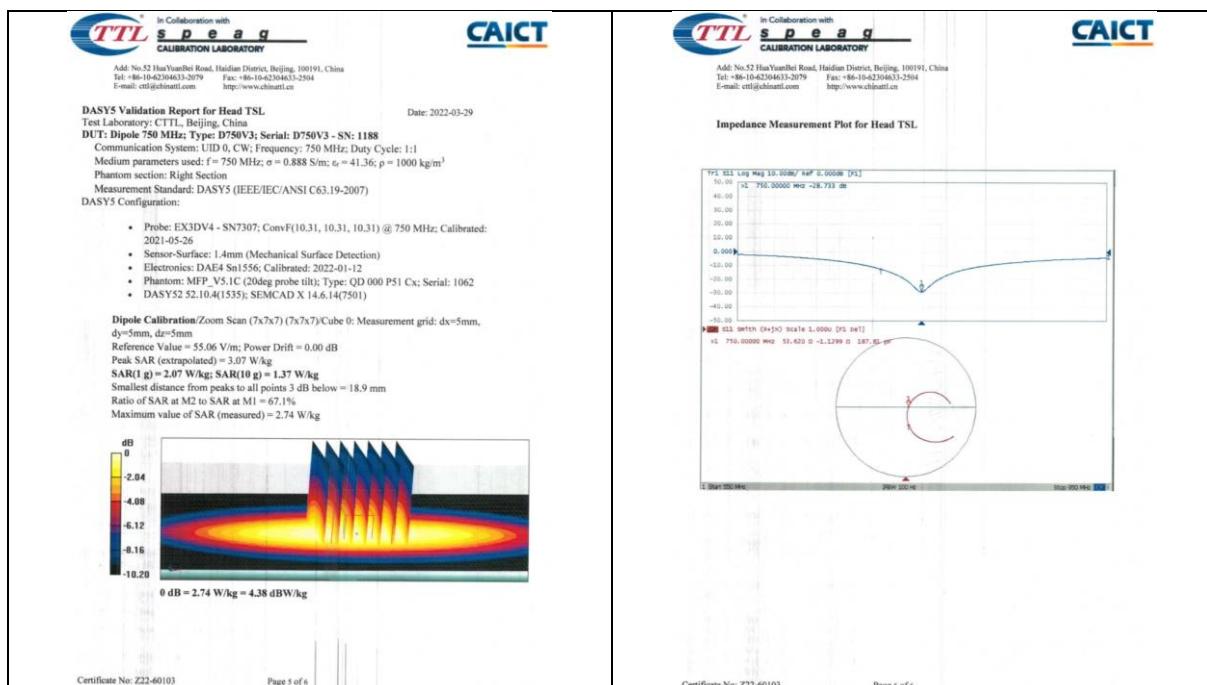
 <p>Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191 Tel: +86-10-62305112 Fax: +86-10-62304633-2594 E-mail: cttf@chinaitt.com http://www.chinaitt.com</p> <p>Client: SGS-CN Certificate No: Z22-60103</p> <p>CALIBRATION CERTIFICATE</p> <p>Object: D750V3 - SN: 1188</p> <p>Calibration Procedure(s): 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 (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 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 (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> <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 (CTTL, No.J21X08326)	Sep-22	Power sensor NRP8S	104291	24-Sep-21 (CTTL, No.J21X08326)	Sep-22	Reference Probe EX3DVA	SN 7307	26-May-21 (SPEAG No. EX3-7307, May21)	May-22	DAE4	SN 1556	12-Jan-22 (CTTL-SPEAG, No.Z22-60007)	Jan-23	Secondary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration	Signal Generator E4438C	MY49071430	13-Jan-22 (CTTL, No.J22X04049)	Jan-23	Network Analyzer E5071C	MY46110673	14-Jan-22 (CTTL, No.J22X04046)	Jan-23	 <p>Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2594 E-mail: cttf@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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<p>Certificate No: Z22-60103 Page 1 of 6</p> <p> <p>Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2594 E-mail: cttf@chinaitt.com http://www.chinaitt.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>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>750 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>42.0</td> <td>0.90 mho/m</td> </tr> <tr> <td>Measured Head TSL parameters</td> <td>(22.0 ± 0.2) °C</td> <td>41.4 ± 6 %</td> <td>0.89 mho/m ± 6 %</td> </tr> <tr> <td>Head TSL temperature change during test</td> <td><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 cm² (1 g) of Head TSL</td> <td>Condition</td> <td></td> </tr> <tr> <td>SAR measured</td> <td>250 mW Input power</td> <td>2.07 W/kg</td> </tr> <tr> <td>SAR for nominal Head TSL parameters</td> <td>normalized to 1W</td> <td>8.27 W/kg ± 18.8 % (k=2)</td> </tr> <tr> <td>SAR averaged over 10 cm² (10 g) of Head TSL</td> <td>Condition</td> <td></td> </tr> <tr> <td>SAR measured</td> <td>250 mW Input power</td> <td>1.37 W/kg</td> </tr> <tr> <td>SAR for nominal Head TSL parameters</td> <td>normalized to 1W</td> <td>5.48 W/kg ± 18.7 % (k=2)</td> </tr> </table> </p>		DASY Version	DASY2	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	750 MHz ± 1 MHz			Temperature	Permittivity	Conductivity	Nominal Head TSL parameters	22.0 °C	42.0	0.90 mho/m	Measured Head TSL parameters	(22.0 ± 0.2) °C	41.4 ± 6 %	0.89 mho/m ± 6 %	Head TSL temperature change during test	<1.0 °C	---	---	SAR averaged over 1 cm ² (1 g) of Head TSL	Condition		SAR measured	250 mW Input power	2.07 W/kg	SAR for nominal Head TSL parameters	normalized to 1W	8.27 W/kg ± 18.8 % (k=2)	SAR averaged over 10 cm ² (10 g) of Head TSL	Condition		SAR measured	250 mW Input power	1.37 W/kg	SAR for nominal Head TSL parameters	normalized to 1W	5.48 W/kg ± 18.7 % (k=2)	<p>Certificate No: Z22-60103 Page 2 of 6</p> <p> <p>Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2594 E-mail: cttf@chinaitt.com http://www.chinaitt.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>53.6Ω-1.13jΩ</td> </tr> <tr> <td>Return Loss</td> <td>-28.7dB</td> </tr> </table> <p>General Antenna Parameters and Design</p> <table border="1"> <tr> <td>Electrical Delay (one direction)</td> <td>0.947 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 the use of end caps, as long as the 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"> <tr> <td>Manufactured by</td> <td>SPEAG</td> </tr> </table> </p>		Impedance, transformed to feed point	53.6Ω-1.13jΩ	Return Loss	-28.7dB	Electrical Delay (one direction)	0.947 ns	Manufactured by	SPEAG
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1.4 D835V2 - SN 4d114

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 (CETL, No.J21X08326)	Sep-22
Power sensor NRP88	104291	24-Sep-21 (CETL, 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 (CETL-SPEAG No. Z22-60007)	Jan-23

Secondary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	13-Jan-22 (CETL, No.J22X00409)	Jan-23
Network Analyzer E5071C	MY4911073	14-Jan-22 (CETL, No.J22X00406)	Jan-23

Calibrated by: Zhao Jing
Reviewed by: Lin Hao
Approved by: Qi Dianyuan

Issued: April 6, 2022

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Certificate No: 222-60104 Page 1 of 6

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)

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Calibrated by: Zhao Jing
Reviewed by: Lin Hao
Approved by: Qi Dianyuan

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: 222-60104 Page 2 of 6

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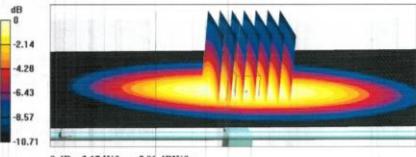
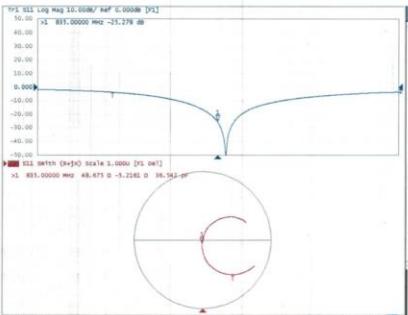
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<p>TTL s p e a g CALIBRATION LABORATORY</p> <p>Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504 E-mail: cttl@chinaitl.com http://www.chinaitl.cn</p> <p>CAICT</p> <p>Measurement 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>DASY52</td><td>V52.10.4</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" style="width: 100%; border-collapse: collapse;"> <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 ± 6 %</td><td>0.91 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><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>9.49 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>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 % (n=2)</td></tr> </table>	DASY Version	DASY52	V52.10.4	Extrapolation	Advanced Extrapolation		Phantom	Triple Flat Phantom 5.1C		Distance Dipole Center - TSL	15 mm	with Spacer	Zoom Scan Resolution	dx, dy, dz = 5 mm		Frequency	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 ± 6 %	0.91 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	2.37 W/kg	SAR for nominal Head TSL parameters	normalized to 1W	9.49 W/kg ± 18.8 % (n=2)	SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition		SAR measured	250 mW input power	1.54 W/kg	SAR for nominal Head TSL parameters	normalized to 1W	6.12 W/kg ± 18.7 % (n=2)	<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@chinaitl.com http://www.chinaitl.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>48.7Ω-5.2ΩjΩ</td></tr> <tr><td>Return Loss</td><td>-25.3dB</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>1.307 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 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, small end caps are added to the dipole arms in order to improve matching when loaded according to the standard. The antenna is not loaded according to 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" style="width: 100%; border-collapse: collapse;"> <tr><td>Manufactured by</td><td>SPEAG</td></tr> </table>	Impedance, transformed to feed point	48.7Ω-5.2ΩjΩ	Return Loss	-25.3dB	Electrical Delay (one direction)	1.307 ns	Manufactured by	SPEAG
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1.5 D900V2 - SN 1d079

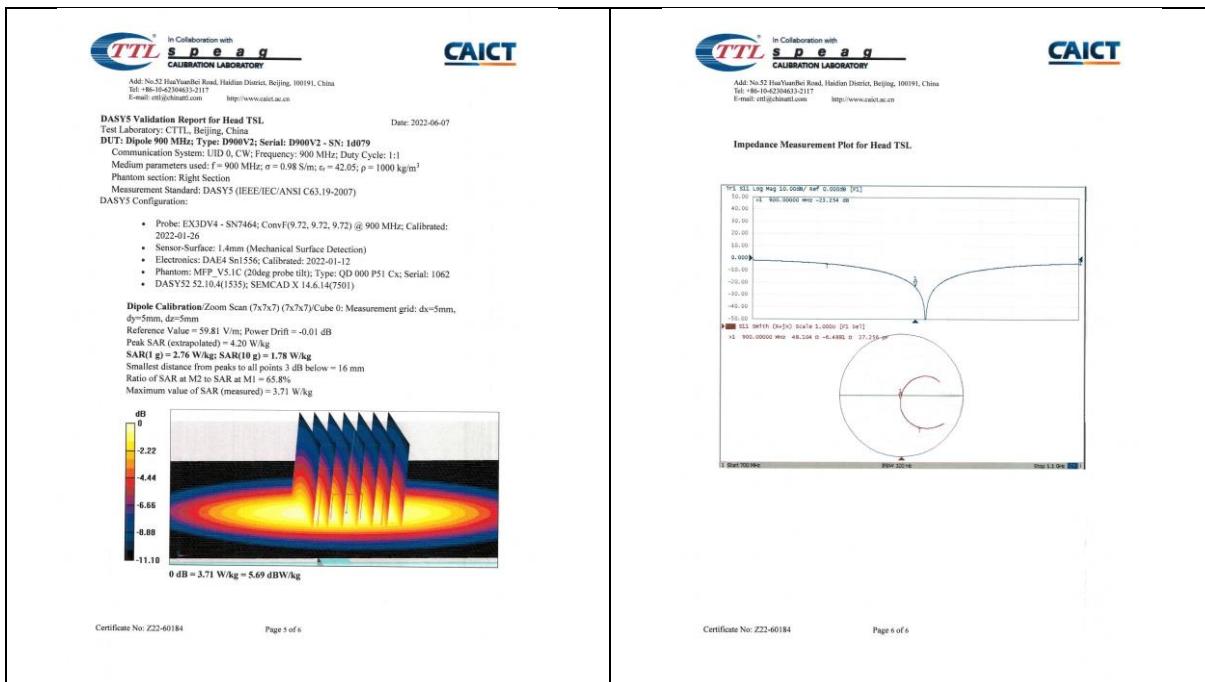
<div style="border: 1px solid black; padding: 10px;"> <p style="text-align: center;">   Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191 Tel: +86-10-62796531-2117 E-mail: off@caict.ac.cn http://www.caict.ac.cn Client: SGS-CN Certificate No: Z22-60184 </p> <p>CALIBRATION CERTIFICATE</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">Object</td> <td style="width: 90%;">D900V2 - SN: 1d079</td> </tr> <tr> <td>Calibration Procedure(s)</td> <td>FF-Z11-003-01 Calibration Procedures for dipole validation kits</td> </tr> <tr> <td>Calibration date:</td> <td>June 7, 2022</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 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. • ConvF: 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. <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: Z22-60184 Page 2 of 6</p> </div>																								
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Measured Head TSL parameters	(22.0 ± 0.2) °C	42.1 ± 6 %	0.98 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	2.76 W/kg																																																											
SAR for nominal Head TSL parameters	normalized to 1W	11.0 W/kg ± 18.8 % (n=2)																																																											
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition																																																												
SAR measured	250 mW input power	1.78 W/kg																																																											
SAR for nominal Head TSL parameters	normalized to 1W	7.09 W/kg ± 18.7 % (n=2)																																																											
Impedance, transformed to feed point	48.10 ± 8.49Ω																																																												
Return Loss	-23.3 dB																																																												
Electrical delay (one direction)	1.312 ns																																																												
Manufactured by	SPEAG																																																												

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1.6 D1800V2 - SN 2d170

<p>Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504 E-mail: cttl@chinatlan.com http://www.chinatlan.com</p> <p>Client: SGS-CN Certificate No: Z22-60105</p> <p>CALIBRATION CERTIFICATE</p> <p>Object: D1800V2 - SN: 2d170</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 (M&TE critical for calibration)</p> <table border="1"> <tr> <td>Primary Standards</td> <td>ID #</td> <td>Cal Date (Calibrated by, Certificate No.)</td> <td>Scheduled Calibration</td> </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 NRP85</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.EK-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> <td>Secondary Standards</td> <td>ID #</td> <td>Cal Date (Calibrated by, Certificate No.)</td> <td>Scheduled Calibration</td> </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> </table> <p>Calibrated by: Zhao Jing Reviewed by: Lin Hao Approved by: Qi Dianyuan</p> <p>Issued: April 6, 2022</p> <p>Certificate No: Z22-60105 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 NRP85	104291	24-Sep-21 (CTTL, No.J21X08326)	Sep-22	Reference Probe EX3DV4	SN 7307	26-May-21(SPEAG No.EK-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	<p>Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304633-2117 Fax: +86-10-62304633-2504 E-mail: cttl@chinatlan.com http://www.chinatlan.com</p> <p>Impedance Measurement Plot for Head TSL</p> <p>10^6 SLL Log Mag ZL, DBMF, Imp, TSL, 0.0008 [F2] Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304633-2117 Fax: +86-10-62304633-2504 E-mail: cttl@chinatlan.com http://www.chinatlan.com</p> <p>Graph showing Impedance Measurement Plot for Head TSL. The plot shows a circular phantom section with a dipole probe. The graph displays impedance values in dB, ranging from -40 to 0. The plot shows a central dipole source with a surrounding field pattern. The graph includes a legend for dB values: 0, -2.22, -4.44, -6.66, -8.88, -11.10.</p> <p>Certificate No: Z22-60105 Page 6 of 6</p>
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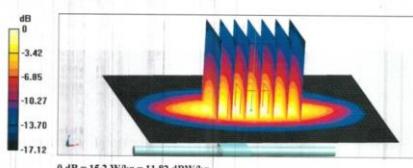
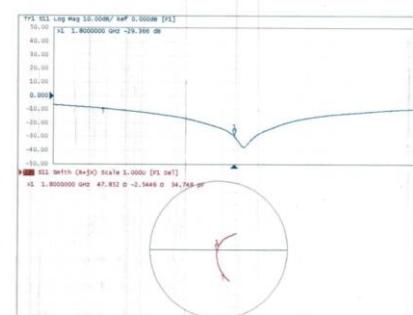
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<p>TTL SPEAG CALIBRATION LABORATORY Add: No.53 HuaYanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304613-2079 Fax: +86-10-62304613-2504 E-mail: ctt@chaintl.cn http://www.chaintl.cn</p> <p>CAICT</p> <p>Measurement Conditions DASY5 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>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" style="width: 100%; border-collapse: collapse;"> <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>40.6 ± 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> <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	40.6 ± 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 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> <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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1.7 D1900V2 - SN 5d136

<div style="border: 1px solid black; padding: 10px;"> <p style="text-align: center;">    Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191 Tel: +86-10-62394632-2117 E-mail: cict@caict.ac.cn http://www.caict.ac.cn Client: SGS-CN Certificate No: Z22-60185 </p> <p>CALIBRATION CERTIFICATE</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">Object</td> <td style="width: 90%;">D1900V2 - SN: 5d136</td> </tr> <tr> <td>Calibration Procedure(s)</td> <td>FF-Z11-003-01 Calibration Procedures for dipole validation kits</td> </tr> <tr> <td>Calibration date:</td> <td>June 7, 2022</td> </tr> </table> <p>This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements (SI). 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1.8 D2000V2 - SN 1041

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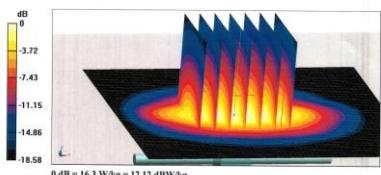
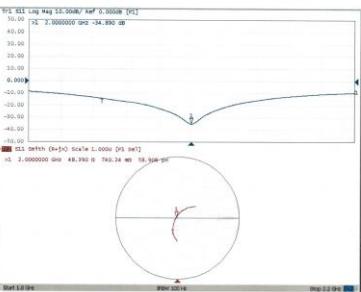
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<div style="text-align: center;">  <p>In Collaboration with CAICT</p> <p>Add: No.52 HuayuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304633-2117 E-mail: cttl@chinatll.com http://www.caict.ac.cn</p> <p>Measurement Conditions DASY 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></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>40.2 ± 6 %</td><td>1.39 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><td></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><td></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> </div>	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	Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m	Measured Head TSL parameters	(22.0 ± 0.2) °C	40.2 ± 6 %	1.39 mho/m ± 6 %	Head TSL temperature change during test	<1.0 °C	—	—	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)	<div style="text-align: center;">  <p>In Collaboration with CAICT</p> <p>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>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 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 end caps are added to the dipole arms in order to improve matching when loaded with the probe fixture. 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> </div>	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

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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 (MATE 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 NRP85</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> <td>Secondary Standards</td> <td>ID #</td> <td>Cal Date (Calibrated by, Certificate No.)</td> <td>Scheduled Calibration</td> </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> </tbody> </table> <table border="1"> <thead> <tr> <th>Calibrated by:</th> <th>Name</th> <th>Function</th> <th>Signature</th> </tr> </thead> <tbody> <tr> <td>Zhao Jing</td> <td>SAR Test Engineer</td> <td></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 Dianyuan</td> <td>SAR Project Leader</td> <td></td> </tr> </tbody> </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 NRP85	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	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>Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304613-2079 Fax: +86-10-62304613-2504 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 655684, "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 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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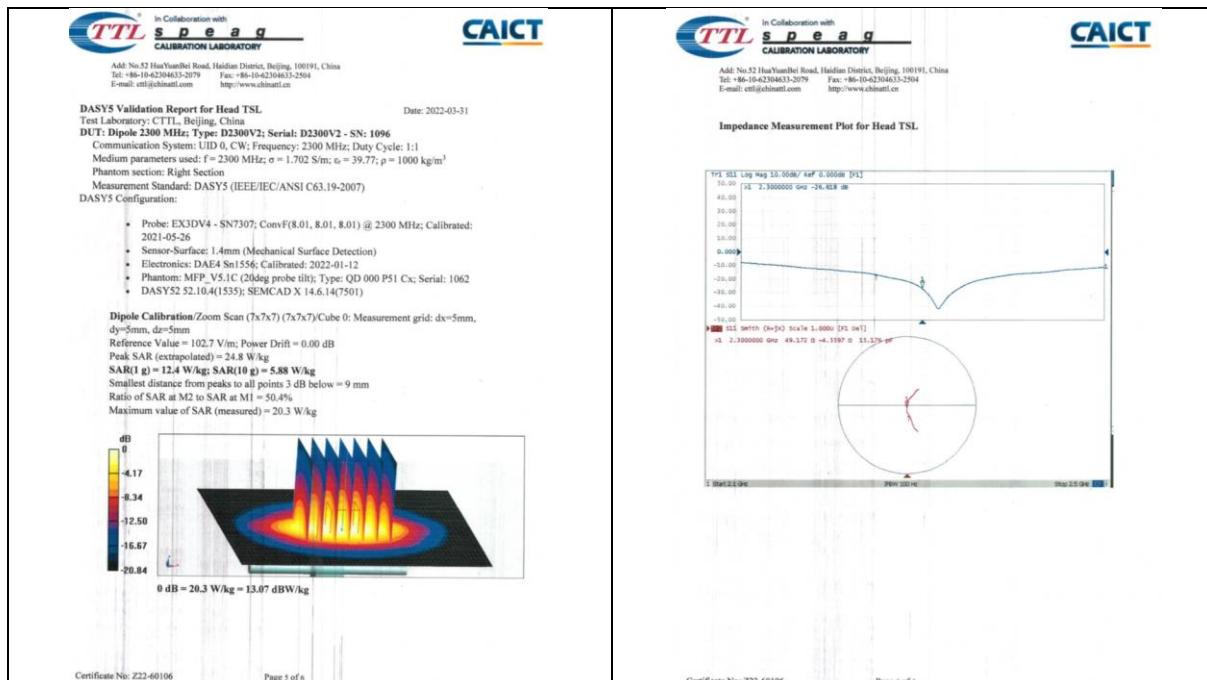
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1.10 D2450V2 - SN 817

TTL speag CALIBRATION LABORATORY

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CAICT

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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		
<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>			
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	104291	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			
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			

Glossary:

TSL: tissue simulating liquid
ConvF: sensitivity in TSL / NORMx,y,z
N/A: not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEC/IEEE 62209-1528, "Measurement Procedure for The Assessment of Specific Absorption Rate of Human Exposure to Radio Frequency Fields from Hand-held and Body-mounted Wireless Communication Devices- Part 1528: Human Models, Instrumentation and Procedures (Frequency range of 4 MHz to 10 GHz)", October 2020
b) KDB 865861 - SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:
c) DASY4/S 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 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 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 1 of 6

Certificate No: Z22-60107 Page 2 of 6

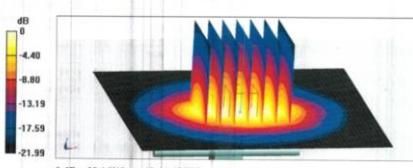
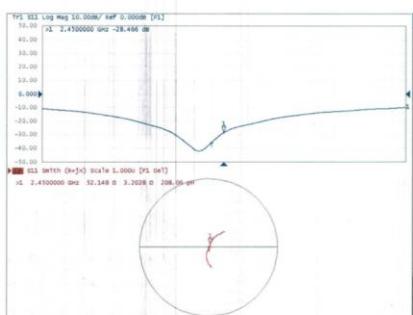
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<p>TTL In Collaboration with s p e a g CALIBRATION LABORATORY</p> <p>Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504 E-mail: ctfl@chinattl.com</p> <p>CAICT</p> <p>Measurement 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>2450 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>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" style="width: 100%; border-collapse: collapse;"> <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 % (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	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		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 % (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 In Collaboration with 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: ctfl@chinattl.com</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>52.10 ± 3.2Ω</td></tr> <tr><td>Return Loss</td><td>-28.5dB</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>1.066 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 overall dipole length is still according to the Standard. The SAR data are not affected by this change. 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: Z22-60107 Page 4 of 6</p>	Impedance, transformed to feed point	52.10 ± 3.2Ω	Return Loss	-28.5dB	Electrical Delay (one direction)	1.066 ns	Manufactured by	SPEAG
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1.11 D2600V2 - SN 1158

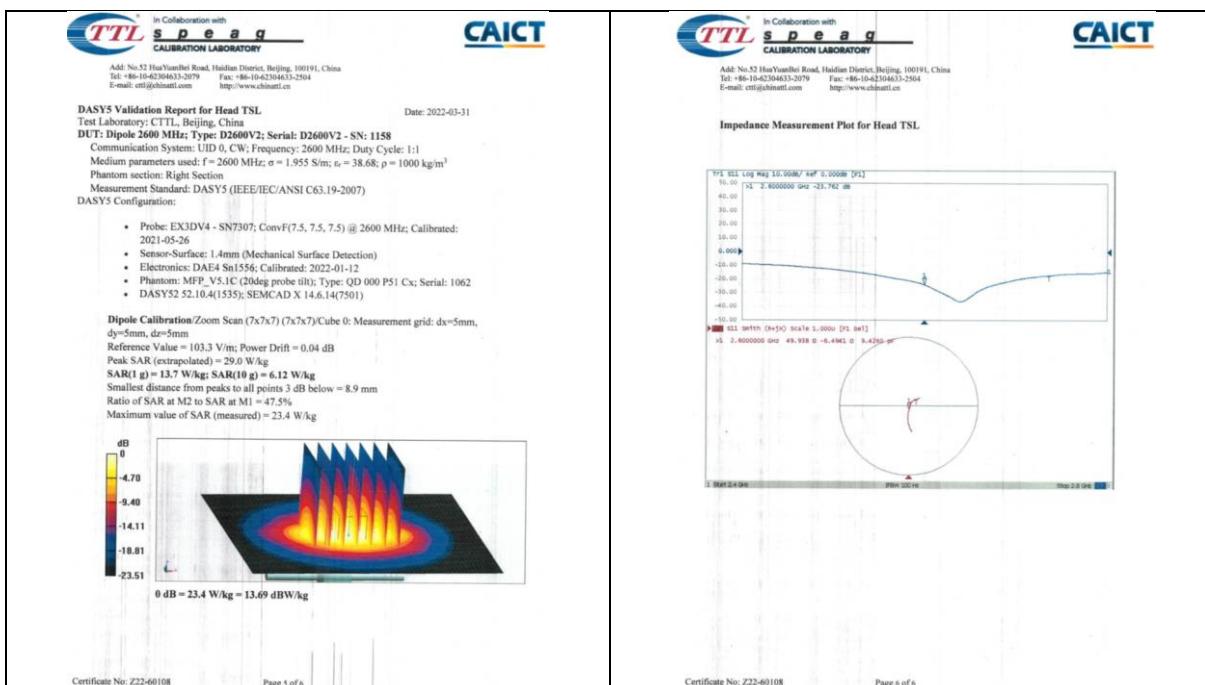
 <p>Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191 Tel: +86-10-62304633-2512 Fax: +86-10-62304633-2504 E-mail: cttl@chinattl.com http://www.chinattl.com</p> <p>Client SGS-CN Certificate No: Z22-60108</p> <p>CALIBRATION CERTIFICATE</p> <p>Object D2600V2 - SN: 1158</p> <p>Calibration Procedure(s) 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 (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 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.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 NRP8S	104291	24-Sep-21 (CTTL, No.J21X08326)	Sep-22	Reference Probe EX3DV4	SN 7307	26-May-21 (SPEAG No. EX3-7307, May21)	May-22	DAE4	SN 1556	12-Jan-22 (CTTL-SPEAG No.Z22-60007)	Jan-23	Secondary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration	Signal Generator E4438C	MY49071430	13-Jan-22 (CTTL, No.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>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,z 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 Procedure (Frequency range of 4 MHz to 10 GHz)", October 2020 b) KDB 655664, "SAR Measurement Requirements for 100 MHz to 6 GHz" <p>Additional Documentation:</p> <ul style="list-style-type: none"> c) DASY4/S 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 measured at the SMA connector to the feed point. The Return Loss ensures low reflected power. No absorption required. • Electrical Delay: One-way delay between the SMA connector and the antenna feed point. 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<p>Certificate No: Z22-60108 Page 1 of 6</p> <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@chinattl.com http://www.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>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>2600 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>39.0</td> <td>1.96 mho/m</td> </tr> <tr> <td>Measured Head TSL parameters</td> <td>(22.0 ± 0.2) °C</td> <td>38.7 ± 6 %</td> <td>1.96 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>13.7 W/kg</td> </tr> <tr> <td>SAR for nominal Head TSL parameters</td> <td>normalized to 1W</td> <td>54.8 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>6.12 W/kg</td> </tr> <tr> <td>SAR for nominal Head TSL parameters</td> <td>normalized to 1W</td> <td>24.5 W/kg ± 18.7 % (k=2)</td> </tr> </table> </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	2600 MHz ± 1 MHz			Temperature	Permittivity	Conductivity	Nominal Head TSL parameters	22.0 °C	39.0	1.96 mho/m	Measured Head TSL parameters	(22.0 ± 0.2) °C	38.7 ± 6 %	1.96 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	13.7 W/kg	SAR for nominal Head TSL parameters	normalized to 1W	54.8 W/kg ± 18.8 % (k=2)	SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition		SAR measured	250 mW input power	6.12 W/kg	SAR for nominal Head TSL parameters	normalized to 1W	24.5 W/kg ± 18.7 % (k=2)	<p>Certificate No: Z22-60108 Page 2 of 6</p> <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@chinattl.com http://www.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>49.9Ω - 6.4ΩjΩ</td> </tr> <tr> <td>Return Loss</td> <td>-23.8dB</td> </tr> </table> <p>General Antenna Parameters and Design</p> <table border="1"> <tr> <td>Electrical Delay (one direction)</td> <td>1.053 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 antenna is mounted in the "Measurement Conditions" paragraph. The SAR data are not affected by the 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"> <tr> <td>Manufactured by</td> <td>SPEAG</td> </tr> </table> </p>	Impedance, transformed to feed point	49.9Ω - 6.4ΩjΩ	Return Loss	-23.8dB	Electrical Delay (one direction)	1.053 ns	Manufactured by	SPEAG
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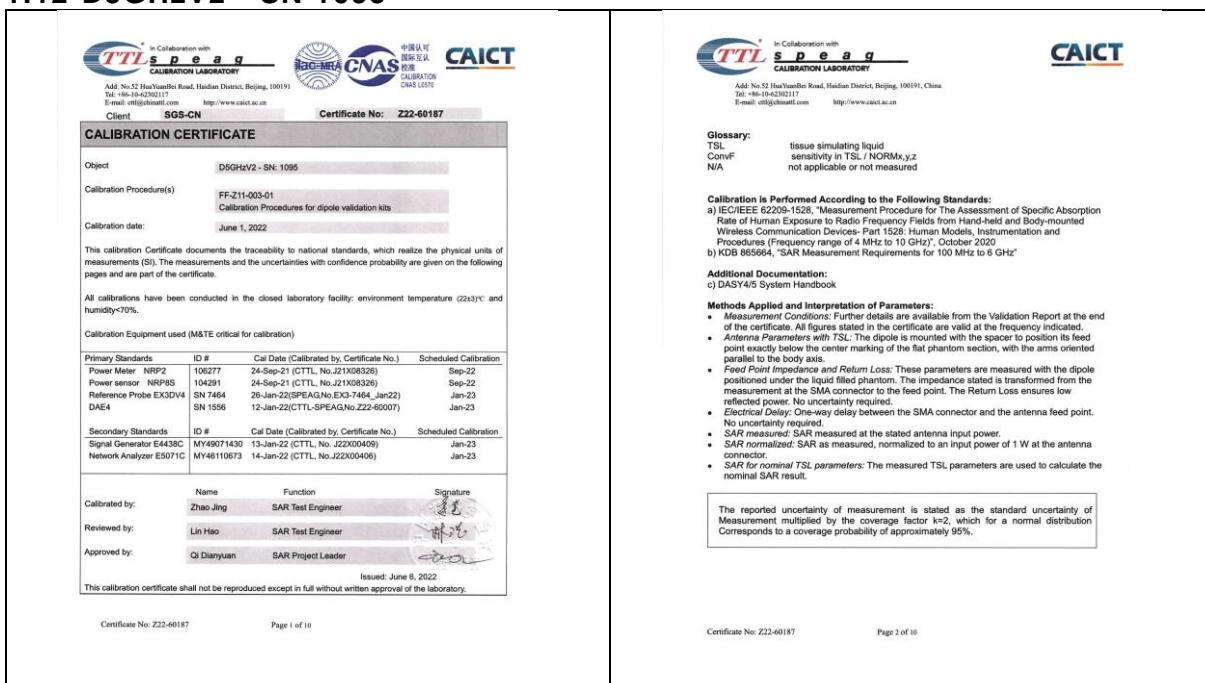
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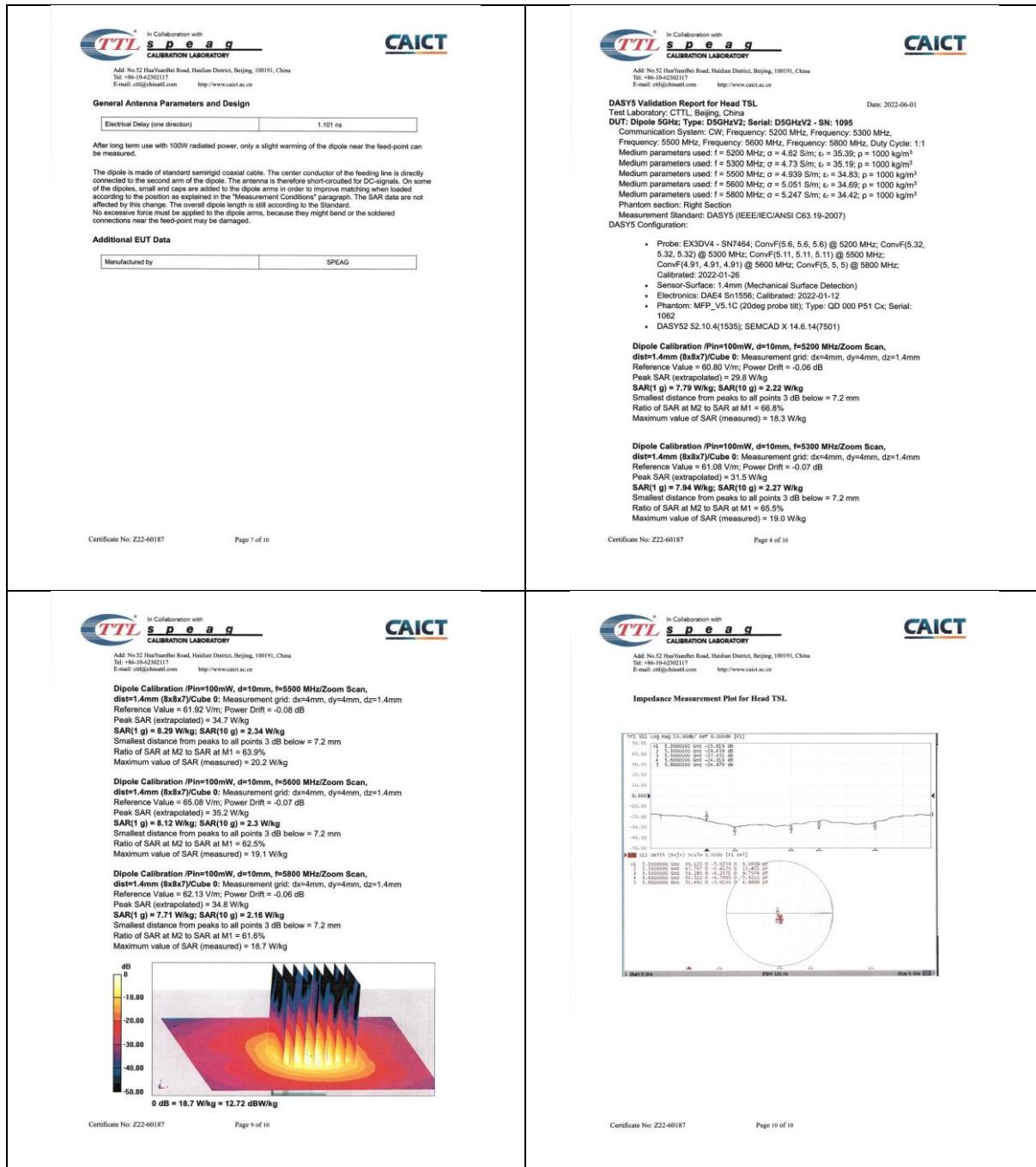
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2 DAE4 - SN 1245

<div style="border: 1px solid black; padding: 10px;"> <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. The DAE shall be packed into a larger box or container which protects the DAE from impacts during transportation. The package shall be labeled "FRAGILE" and "FRAGILE INSTRUMENT" if a fragile instrument is inside.</p> <p>E-Stop Failures: Touch detection may be malfunctioning due to broken magnets. If a 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 probe. To prevent E-stop failure, the customer shall always mount the probe to dust and dirt carefully and keep the DAE unit in a dry environment if not used for measurements.</p> <p>Repair: Minor repairs are performed at no cost during the annual calibration. However, SPEAG reserves the right to charge for any repair especially if a rough unprofessional handling caused the defect.</p> <p>DAISY Configuration Files: Since the exact value of the DAE input resistances, as measured during the calibration procedure of a DAE unit, are not used by the DAISY software, a nominal value of 200 MΩm is given in the corresponding configuration file.</p> <p>Important Note: Warranty 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> </div>	<p>Calibration Laboratory of Schmid & Partner Engineering AG Zoeghalstrasse 43, 8004 Zurich, Switzerland Phone +41 44 245 2000, Fax +41 44 245 9779 www.speag.chwww.speag.ch</p> <p>ILAC-MRA</p> <p>S Schweizerischer Kalibrierdienst Service suisse d'kalibrage Servizio svizzero di taratura Swiss Calibration Service</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 Kunshan City, China</p> <p>Accreditation No.: SCS 0108</p> <p>Certificate No.: DAE4-1245_Apr23</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">April 25, 2023</td> </tr> <tr> <td colspan="4"> <p>This calibration certificate documents the traceability to national standards, when realize the physical units of measurement (Sp). 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Glossary

DAE data acquisition electronics
Connector angle information used in DAISY 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 DAISY 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 angle of the connector 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 - Counter Resolution: 16 bit
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	405.243 ± 0.02% (k=2)	403.938 ± 0.02% (k=2)	405.064 ± 0.02% (k=2)
Low Range	3.99474 ± 1.50% (k=2)	3.99478 ± 1.50% (k=2)	4.00994 ± 1.50% (k=2)

Connector Angle

Connector Angle to be used in DAISY system	32.0 ° ± 1 °

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<p>Appendix (Additional assessments outside the scope of SCS0106)</p> <p>1. 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<p>Calibration Laboratory of Schmid & Partner Engineering AG Zugstrasse 43, 8024 Zurich, Switzerland</p> <p>Accredited by the Swiss Accreditation Service (SAS)</p> <p>IBG-MRA </p> <p>S Schweizerischer Kalibrierdienst Service suisse d'kalibrage Service svizzero di tamponi Swiss Calibration Service</p> <p>Accreditation No.: SCS 0108</p> <p>As accredited by the Swiss Accreditation Service (SAS)</p> <p>IBG-MRA </p> <p>S Schweizerischer Kalibrierdienst Service suisse d'kalibrage Service svizzero di tamponi Swiss Calibration Service</p> <p>Accreditation No.: SCS 0108</p> <p>As accredited by the Swiss Accreditation Service (SAS)</p> <p>IBG-MRA </p> <p>S Schweizerischer Kalibrierdienst Service suisse d'kalibrage Service svizzero di tamponi Swiss Calibration Service</p> <p>Accreditation No.: SCS 0108</p> <p>Glossary</p> <p>TSL: Issue simulating liquid NORM_{xx,y,z}: sensitivity in free space Conf_{xx}: sensitivity in TSL, NORM_{xx,y,z} d_{xx}: distance between probe and TSL CF: crest factor (1/duty cycle) of the RF signal I, C, D: modulation dependent linearization parameters Polarization_{xx}: Polarization of Polarization_{xx}: θ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\theta = 0$ 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 62209-1526, "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 1526: Human Models, Instrumentation And Procedures Frequency Range of 4 MHz to 10 GHz", October 2020. b) ICR 805654, "SAR Measurement Requirements for 100-MHz to 8 GHz", Multilateral Agreement for the recognition of calibration certificates</p> <p>Methodology and Interpretation of Parameters:</p> <p>NORM_{xx,y,z}: Assessed for E-field polarization $\theta = 0$ / 900MHz in TEM-cell / > 1800MHz, P22 waveguide, NORM_{xx,y,z} (see below Conf_{xx}) NORM_{xx,y,z}: Assessed for E-field polarization $\theta = 0$, i.e., the uncertainties of NORM_{xx,y,z} does not affect the E-field uncertainty inside TSL (see below Conf_{xx}) NORM_{xx,y,z}: Assessed for E-field polarization $\theta = 0$, i.e., the uncertainty of the frequency response is included in the stated uncertainty of Conf_{xx} DCC_{xx}: DCC is numerical linearization parameters assessed based on the data of power sweep with CW signal, DCC_{xx} is the extreme version less than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of Conf_{xx} DCP_{xx}: DCP is numerical linearization parameters assessed based on the data of power sweep with CW signal, DCP_{xx} is the extreme version less than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of Conf_{xx} PAR: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics A_{xx}, B_{xx}, C_{xx}, D_{xx}: A_{xx}, B_{xx}, C_{xx}, D_{xx} are numerical linearization parameters assessed based on the data of power sweep with CW signal, A_{xx}, B_{xx}, C_{xx}, D_{xx} do not depend on frequency nor mode, VR is the maximum calibration range expressed in RMS voltage across the diode Conf_{xx}: Conf_{xx} is the numerical linearization parameters: Assessed in fat phantom using E-field (or Temperature) Transfer Function for a specific frequency range. The uncertainty of the frequency response is included in the stated uncertainty of Conf_{xx} Boundary Compensation: Assessed in fat phantom using E-field (or Temperature) Transfer Function for a specific frequency range. The uncertainty of the frequency response is included in the stated uncertainty of Conf_{xx} Spherical Iceretry (3D deviation from Iceretry): In a field of low gradients realized using a flat phantom exposed by a patch antenna No tolerance required: No tolerance required. Connector Angle: The angle is assessed using the information gained by determining the NORM_{xx} (no uncertainty required).</p> <p>This calibration certificate shall not be reproduced except in full without written approval of the laboratory.</p>		
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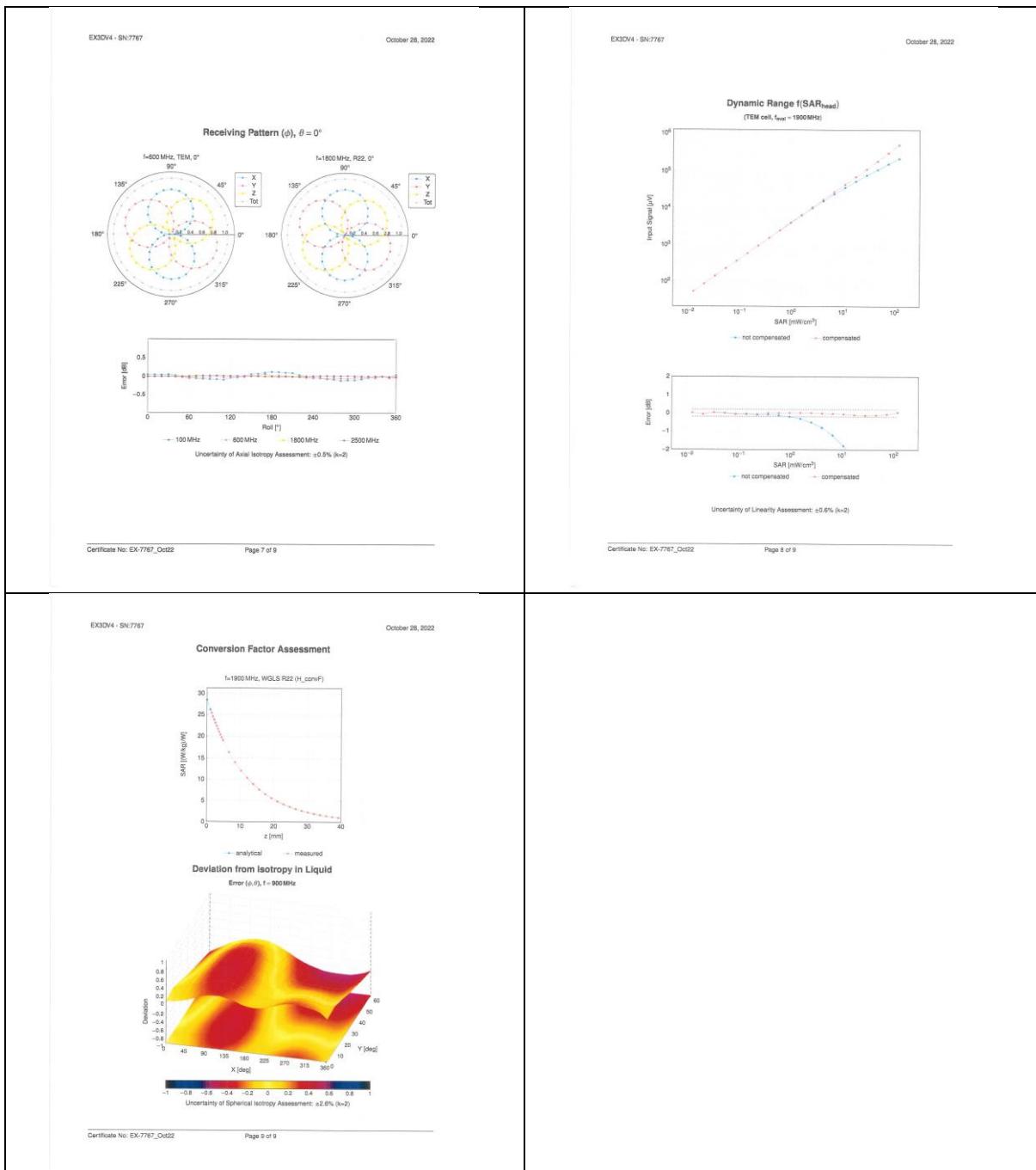
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<p>EX3DV4 - SN:7767</p> <p>October 29, 2022</p> <p>Parameters of Probe: EX3DV4 - SN:7767</p> <p>Calibration Parameter Determined in Head Tissue Simulating Media</p> <table border="1"> <thead> <tr> <th>I (MHz)^d</th> <th>Relative Permittivity^e</th> <th>Conductivity^f (S/m)</th> <th>Conv^g X</th> <th>Conv^g Y</th> <th>Conv^g Z</th> <th>Alpha^h</th> <th>Degⁱ (mm)</th> <th>Unc (k = 2)</th> </tr> </thead> <tbody> <tr><td>150</td><td>52.3</td><td>0.76</td><td>14.06</td><td>14.06</td><td>0.00</td><td>1.00</td><td>$\pm 13.3\%$</td><td></td></tr> <tr><td>450</td><td>43.5</td><td>0.87</td><td>11.90</td><td>11.90</td><td>0.16</td><td>1.30</td><td>$\pm 13.3\%$</td><td></td></tr> <tr><td>750</td><td>41.9</td><td>0.89</td><td>10.26</td><td>10.26</td><td>0.65</td><td>0.80</td><td>$\pm 12.0\%$</td><td></td></tr> <tr><td>835</td><td>41.5</td><td>0.90</td><td>10.00</td><td>10.00</td><td>0.45</td><td>0.89</td><td>$\pm 12.0\%$</td><td></td></tr> <tr><td>1750</td><td>40.1</td><td>1.37</td><td>9.32</td><td>9.32</td><td>0.36</td><td>0.80</td><td>$\pm 12.0\%$</td><td></td></tr> <tr><td>1900</td><td>40.0</td><td>1.40</td><td>8.91</td><td>8.91</td><td>0.33</td><td>0.80</td><td>$\pm 12.0\%$</td><td></td></tr> <tr><td>2100</td><td>39.8</td><td>1.49</td><td>8.60</td><td>8.60</td><td>0.30</td><td>0.86</td><td>$\pm 12.0\%$</td><td></td></tr> <tr><td>2300</td><td>39.5</td><td>1.57</td><td>8.44</td><td>8.44</td><td>0.33</td><td>0.90</td><td>$\pm 12.0\%$</td><td></td></tr> <tr><td>2450</td><td>39.2</td><td>1.80</td><td>8.24</td><td>8.24</td><td>0.32</td><td>0.93</td><td>$\pm 12.0\%$</td><td></td></tr> <tr><td>2600</td><td>39.0</td><td>1.96</td><td>7.99</td><td>7.99</td><td>0.27</td><td>0.90</td><td>$\pm 12.0\%$</td><td></td></tr> <tr><td>3300</td><td>38.2</td><td>2.71</td><td>7.55</td><td>7.55</td><td>0.30</td><td>1.25</td><td>$\pm 13.1\%$</td><td></td></tr> <tr><td>3500</td><td>37.9</td><td>2.91</td><td>7.45</td><td>7.45</td><td>0.30</td><td>1.25</td><td>$\pm 13.1\%$</td><td></td></tr> <tr><td>3700</td><td>37.7</td><td>3.12</td><td>7.20</td><td>7.20</td><td>0.30</td><td>1.25</td><td>$\pm 13.1\%$</td><td></td></tr> <tr><td>3900</td><td>37.6</td><td>3.32</td><td>6.84</td><td>6.84</td><td>0.40</td><td>1.60</td><td>$\pm 13.1\%$</td><td></td></tr> <tr><td>4100</td><td>37.2</td><td>3.53</td><td>6.53</td><td>6.53</td><td>0.40</td><td>1.60</td><td>$\pm 13.1\%$</td><td></td></tr> <tr><td>4200</td><td>37.1</td><td>3.63</td><td>6.30</td><td>6.30</td><td>0.40</td><td>1.70</td><td>$\pm 13.1\%$</td><td></td></tr> <tr><td>4400</td><td>36.9</td><td>3.84</td><td>6.17</td><td>6.17</td><td>0.40</td><td>1.70</td><td>$\pm 13.1\%$</td><td></td></tr> <tr><td>4600</td><td>36.7</td><td>4.04</td><td>6.15</td><td>6.15</td><td>0.40</td><td>1.70</td><td>$\pm 13.1\%$</td><td></td></tr> <tr><td>4800</td><td>36.4</td><td>4.26</td><td>6.13</td><td>6.13</td><td>0.40</td><td>1.90</td><td>$\pm 13.1\%$</td><td></td></tr> <tr><td>4900</td><td>36.3</td><td>4.40</td><td>6.07</td><td>6.07</td><td>0.40</td><td>1.80</td><td>$\pm 13.1\%$</td><td></td></tr> <tr><td>5000</td><td>36.0</td><td>4.96</td><td>5.65</td><td>5.65</td><td>0.40</td><td>1.80</td><td>$\pm 13.1\%$</td><td></td></tr> <tr><td>5300</td><td>35.9</td><td>4.76</td><td>5.48</td><td>5.48</td><td>0.40</td><td>1.80</td><td>$\pm 13.1\%$</td><td></td></tr> <tr><td>5500</td><td>35.6</td><td>4.96</td><td>5.30</td><td>5.30</td><td>0.40</td><td>1.80</td><td>$\pm 13.1\%$</td><td></td></tr> <tr><td>5600</td><td>35.5</td><td>5.07</td><td>5.14</td><td>5.14</td><td>0.40</td><td>1.80</td><td>$\pm 13.1\%$</td><td></td></tr> <tr><td>5800</td><td>35.3</td><td>5.27</td><td>5.10</td><td>5.10</td><td>0.40</td><td>1.80</td><td>$\pm 13.1\%$</td><td></td></tr> </tbody> </table> <p>^d Frequency validity above 300 MHz at ±10% by design for EX3DV4.4 and higher class. Page 5, also it is mentioned at 250 MHz. The uncertainty is the RSS of the Conv^g uncertainty of calibration frequency and the uncertainty for the indicated frequency range. Frequency validity below 300 MHz is ±10.2%. ^e At 100 MHz for Conv^g assessments at 10.0, 12.5, 15.0, 17.5, 20.0, 22.5, 25.0, 27.5, 30.0, 32.5, 35.0, 37.5, 40.0, 42.5, 45.0, 47.5, 50.0, 52.5, 55.0, 57.5, 60.0, 62.5, 65.0, 67.5, 70.0, 72.5, 75.0, 77.5, 80.0, 82.5, 85.0, 87.5, 90.0, 92.5, 95.0, 97.5, 100.0, 102.5, 105.0, 107.5, 110.0, 112.5, 115.0, 117.5, 120.0, 122.5, 125.0, 127.5, 130.0, 132.5, 135.0, 137.5, 140.0, 142.5, 145.0, 147.5, 150.0, 152.5, 155.0, 157.5, 160.0, 162.5, 165.0, 167.5, 170.0, 172.5, 175.0, 177.5, 180.0, 182.5, 185.0, 187.5, 190.0, 192.5, 195.0, 197.5, 200.0, 202.5, 205.0, 207.5, 210.0, 212.5, 215.0, 217.5, 220.0, 222.5, 225.0, 227.5, 230.0, 232.5, 235.0, 237.5, 240.0, 242.5, 245.0, 247.5, 250.0, 252.5, 255.0, 257.5, 260.0, 262.5, 265.0, 267.5, 270.0, 272.5, 275.0, 277.5, 280.0, 282.5, 285.0, 287.5, 290.0, 292.5, 295.0, 297.5, 300.0, 302.5, 305.0, 307.5, 310.0, 312.5, 315.0, 317.5, 320.0, 322.5, 325.0, 327.5, 330.0, 332.5, 335.0, 337.5, 340.0, 342.5, 345.0, 347.5, 350.0, 352.5, 355.0, 357.5, 360.0, 362.5, 365.0, 367.5, 370.0, 372.5, 375.0, 377.5, 380.0, 382.5, 385.0, 387.5, 390.0, 392.5, 395.0, 397.5, 400.0, 402.5, 405.0, 407.5, 410.0, 412.5, 415.0, 417.5, 420.0, 422.5, 425.0, 427.5, 430.0, 432.5, 435.0, 437.5, 440.0, 442.5, 445.0, 447.5, 450.0, 452.5, 455.0, 457.5, 460.0, 462.5, 465.0, 467.5, 470.0, 472.5, 475.0, 477.5, 480.0, 482.5, 485.0, 487.5, 490.0, 492.5, 495.0, 497.5, 500.0, 502.5, 505.0, 507.5, 510.0, 512.5, 515.0, 517.5, 520.0, 522.5, 525.0, 527.5, 530.0, 532.5, 535.0, 537.5, 540.0, 542.5, 545.0, 547.5, 550.0, 552.5, 555.0, 557.5, 560.0, 562.5, 565.0, 567.5, 570.0, 572.5, 575.0, 577.5, 580.0, 582.5, 585.0, 587.5, 590.0, 592.5, 595.0, 597.5, 600.0, 602.5, 605.0, 607.5, 610.0, 612.5, 615.0, 617.5, 620.0, 622.5, 625.0, 627.5, 630.0, 632.5, 635.0, 637.5, 640.0, 642.5, 645.0, 647.5, 650.0, 652.5, 655.0, 657.5, 660.0, 662.5, 665.0, 667.5, 670.0, 672.5, 675.0, 677.5, 680.0, 682.5, 685.0, 687.5, 690.0, 692.5, 695.0, 697.5, 700.0, 702.5, 705.0, 707.5, 710.0, 712.5, 715.0, 717.5, 720.0, 722.5, 725.0, 727.5, 730.0, 732.5, 735.0, 737.5, 740.0, 742.5, 745.0, 747.5, 750.0, 752.5, 755.0, 757.5, 760.0, 762.5, 765.0, 767.5, 770.0, 772.5, 775.0, 777.5, 780.0, 782.5, 785.0, 787.5, 790.0, 792.5, 795.0, 797.5, 800.0, 802.5, 805.0, 807.5, 810.0, 812.5, 815.0, 817.5, 820.0, 822.5, 825.0, 827.5, 830.0, 832.5, 835.0, 837.5, 840.0, 842.5, 845.0, 847.5, 850.0, 852.5, 855.0, 857.5, 860.0, 862.5, 865.0, 867.5, 870.0, 872.5, 875.0, 877.5, 880.0, 882.5, 885.0, 887.5, 890.0, 892.5, 895.0, 897.5, 900.0, 902.5, 905.0, 907.5, 910.0, 912.5, 915.0, 917.5, 920.0, 922.5, 925.0, 927.5, 930.0, 932.5, 935.0, 937.5, 940.0, 942.5, 945.0, 947.5, 950.0, 952.5, 955.0, 957.5, 960.0, 962.5, 965.0, 967.5, 970.0, 972.5, 975.0, 977.5, 980.0, 982.5, 985.0, 987.5, 990.0, 992.5, 995.0, 997.5, 1000.0, 1002.5, 1005.0, 1007.5, 1010.0, 1012.5, 1015.0, 1017.5, 1020.0, 1022.5, 1025.0, 1027.5, 1030.0, 1032.5, 1035.0, 1037.5, 1040.0, 1042.5, 1045.0, 1047.5, 1050.0, 1052.5, 1055.0, 1057.5, 1060.0, 1062.5, 1065.0, 1067.5, 1070.0, 1072.5, 1075.0, 1077.5, 1080.0, 1082.5, 1085.0, 1087.5, 1090.0, 1092.5, 1095.0, 1097.5, 1100.0, 1102.5, 1105.0, 1107.5, 1110.0, 1112.5, 1115.0, 1117.5, 1120.0, 1122.5, 1125.0, 1127.5, 1130.0, 1132.5, 1135.0, 1137.5, 1140.0, 1142.5, 1145.0, 1147.5, 1150.0, 1152.5, 1155.0, 1157.5, 1160.0, 1162.5, 1165.0, 1167.5, 1170.0, 1172.5, 1175.0, 1177.5, 1180.0, 1182.5, 1185.0, 1187.5, 1190.0, 1192.5, 1195.0, 1197.5, 1200.0, 1202.5, 1205.0, 1207.5, 1210.0, 1212.5, 1215.0, 1217.5, 1220.0, 1222.5, 1225.0, 1227.5, 1230.0, 1232.5, 1235.0, 1237.5, 1240.0, 1242.5, 1245.0, 1247.5, 1250.0, 1252.5, 1255.0, 1257.5, 1260.0, 1262.5, 1265.0, 1267.5, 1270.0, 1272.5, 1275.0, 1277.5, 1280.0, 1282.5, 1285.0, 1287.5, 1290.0, 1292.5, 1295.0, 1297.5, 1300.0, 1302.5, 1305.0, 1307.5, 1310.0, 1312.5, 1315.0, 1317.5, 1320.0, 1322.5, 1325.0, 1327.5, 1330.0, 1332.5, 1335.0, 1337.5, 1340.0, 1342.5, 1345.0, 1347.5, 1350.0, 1352.5, 1355.0, 1357.5, 1360.0, 1362.5, 1365.0, 1367.5, 1370.0, 1372.5, 1375.0, 1377.5, 1380.0, 1382.5, 1385.0, 1387.5, 1390.0, 1392.5, 1395.0, 1397.5, 1400.0, 1402.5, 1405.0, 1407.5, 1410.0, 1412.5, 1415.0, 1417.5, 1420.0, 1422.5, 1425.0, 1427.5, 1430.0, 1432.5, 1435.0, 1437.5, 1440.0, 1442.5, 1445.0, 1447.5, 1450.0, 1452.5, 1455.0, 1457.5, 1460.0, 1462.5, 1465.0, 1467.5, 1470.0, 1472.5, 1475.0, 1477.5, 1480.0, 1482.5, 1485.0, 1487.5, 1490.0, 1492.5, 1495.0, 1497.5, 1500.0, 1502.5, 1505.0, 1507.5, 1510.0, 1512.5, 1515.0, 1517.5, 1520.0, 1522.5, 1525.0, 1527.5, 1530.0, 1532.5, 1535.0, 1537.5, 1540.0, 1542.5, 1545.0, 1547.5, 1550.0, 1552.5, 1555.0, 1557.5, 1560.0, 1562.5, 1565.0, 1567.5, 1570.0, 1572.5, 1575.0, 1577.5, 1580.0, 1582.5, 1585.0, 1587.5, 1590.0, 1592.5, 1595.0, 1597.5, 1600.0, 1602.5, 1605.0, 1607.5, 1610.0, 1612.5, 1615.0, 1617.5, 1620.0, 1622.5, 1625.0, 1627.5, 1630.0, 1632.5, 1635.0, 1637.5, 1640.0, 1642.5, 1645.0, 1647.5, 1650.0, 1652.5, 1655.0, 1657.5, 1660.0, 1662.5, 1665.0, 1667.5, 1670.0, 1672.5, 1675.0, 1677.5, 1680.0, 1682.5, 1685.0, 1687.5, 1690.0, 1692.5, 1695.0, 1697.5, 1700.0, 1702.5, 1705.0, 1707.5, 1710.0, 1712.5, 1715.0, 1717.5, 1720.0, 1722.5, 1725.0, 1727.5, 1730.0, 1732.5, 1735.0, 1737.5, 1740.0, 1742.5, 1745.0, 1747.5, 1750.0, 1752.5, 1755.0, 1757.5, 1760.0, 1762.5, 1765.0, 1767.5, 1770.0, 1772.5, 1775.0, 1777.5, 1780.0, 1782.5, 1785.0, 1787.5, 1790.0, 1792.5, 1795.0, 1797.5, 1800.0, 1802.5, 1805.0, 1807.5, 1810.0, 1812.5, 1815.0, 1817.5, 1820.0, 1822.5, 1825.0, 1827.5, 1830.0, 1832.5, 1835.0, 1837.5, 1840.0, 1842.5, 1845.0, 1847.5, 1850.0, 1852.5, 1855.0, 1857.5, 1860.0, 1862.5, 1865.0, 1867.5, 1870.0, 1872.5, 1875.0, 1877.5, 1880.0, 1882.5, 1885.0, 1887.5, 1890.0, 1892.5, 1895.0, 1897.5, 1900.0, 1902.5, 1905.0, 1907.5, 1910.0, 1912.5, 1915.0, 1917.5, 1920.0, 1922.5, 1925.0, 1927.5, 1930.0, 1932.5, 1935.0, 1937.5, 1940.0, 1942.5, 1945.0, 1947.5, 1950.0, 1952.5, 1955.0, 1957.5, 1960.0, 1962.5, 1965.0, 1967.5, 1970.0, 1972.5, 1975.0, 1977.5, 1980.0, 1982.5, 1985.0, 1987.5, 1990.0, 1992.5, 1995.0, 1997.5, 2000.0, 2002.5, 2005.0, 2007.5, 2010.0, 2012.5, 2015.0, 2017.5, 2020.0, 2022.5, 2025.0, 2027.5, 2030.0, 2032.5, 2035.0, 2037.5, 2040.0, 2042.5, 2045.0, 2047.5, 2050.0, 2052.5, 2055.0, 2057.5, 2060.0, 2062.5, 2065.0, 2067.5, 2070.0, 2072.5, 2075.0, 2077.5, 2080.0, 2082.5, 2085.0, 2087.5, 2090.0, 2092.5, 2095.0, 2097.5, 2100.0, 2102.5, 2105.0, 2107.5, 2110.0, 2112.5, 2115.0, 2117.5, 2120.0, 2122.5, 2125.0, 2127.5, 2130.0, 2132.5, 2135.0, 2137.5, 2140.0, 2142.5, 2145.0, 2147.5, 2150.0, 2152.5, 2155.0, 2157.5, 2160.0, 2162.5, 2165.0, 2167.5, 2170.0, 2172.5, 2175.0, 2177.5, 2180.0, 2182.5, 2185.0, 2187.5, 2190.0, 2192.5, 2195.0, 2197.5, 2200.0, 2202.5, 2205.0, 2207.5, 2210.0, 2212.5, 2215.0, 2217.5, 2220.0, 2222.5, 2225.0, 2227.5, 2230.0, 2232.5, 2235.0, 2237.5, 2240.0, 2242.5, 2245.0, 2247.5, 2250.0, 2252.5, 2255.0, 2257.5, 2260.0, 2262.5, 2265.0, 2267.5, 2270.0, 2272.5, 2275.0, 2277.5, 2280.0, 2282.5, 2285.0, 2287.5, 2290.0, 2292.5, 2295.0, 2297.5, 2300.0, 2302.5, 2305.0, 2307.5, 2310.0, 2312.5, 2315.0, 2317.5, 2320.0, 2322.5, 2325.0, 2327.5, 2330.0, 2332.5, 2335.0, 2337.5, 2340.0, 2342.5, 2345.0, 2347.5, 2350.0, 2352.5, 2355.0, 2357.5, 2360.0, 2362.5, 2365.0, 2367.5, 2370.0, 2372.5, 2375.0, 2377.5, 2380.0, 2382.5, 2385.0, 2387.5, 2390.0, 2392.5, 2395.0, 2397.5, 2400.0, 2402.5, 2405.0, 2407.</p>	I (MHz) ^d	Relative Permittivity ^e	Conductivity ^f (S/m)	Conv ^g X	Conv ^g Y	Conv ^g Z	Alpha ^h	Deg ⁱ (mm)	Unc (k = 2)	150	52.3	0.76	14.06	14.06	0.00	1.00	$\pm 13.3\%$		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	0.65	0.80	$\pm 12.0\%$		835	41.5	0.90	10.00	10.00	0.45	0.89	$\pm 12.0\%$		1750	40.1	1.37	9.32	9.32	0.36	0.80	$\pm 12.0\%$		1900	40.0	1.40	8.91	8.91	0.33	0.80	$\pm 12.0\%$		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	0.32	0.93	$\pm 12.0\%$		2600	39.0	1.96	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	1.25	$\pm 13.1\%$		3700	37.7	3.12	7.20	7.20	0.30	1.25	$\pm 13.1\%$		3900	37.6	3.32	6.84	6.84	0.40	1.60	$\pm 13.1\%$		4100	37.2	3.53	6.53	6.53	0.40	1.60	$\pm 13.1\%$		4200	37.1	3.63	6.30	6.30	0.40	1.70	$\pm 13.1\%$		4400	36.9	3.84	6.17	6.17	0.40	1.70	$\pm 13.1\%$		4600	36.7	4.04	6.15	6.15	0.40	1.70	$\pm 13.1\%$		4800	36.4	4.26	6.13	6.13	0.40	1.90	$\pm 13.1\%$		4900	36.3	4.40	6.07	6.07	0.40	1.80	$\pm 13.1\%$		5000	36.0	4.96	5.65	5.65	0.40	1.80	$\pm 13.1\%$		5300	35.9	4.76	5.48	5.48	0.40	1.80	$\pm 13.1\%$		5500	35.6	4.96	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	$\pm 13.1\%$	
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1750	40.1	1.37	9.32	9.32	0.36	0.80	$\pm 12.0\%$																																																																																																																																																																																																																																			
1900	40.0	1.40	8.91	8.91	0.33	0.80	$\pm 12.0\%$																																																																																																																																																																																																																																			
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	0.32	0.93	$\pm 12.0\%$																																																																																																																																																																																																																																			
2600	39.0	1.96	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	1.25	$\pm 13.1\%$																																																																																																																																																																																																																																			
3700	37.7	3.12	7.20	7.20	0.30	1.25	$\pm 13.1\%$																																																																																																																																																																																																																																			
3900	37.6	3.32	6.84	6.84	0.40	1.60	$\pm 13.1\%$																																																																																																																																																																																																																																			
4100	37.2	3.53	6.53	6.53	0.40	1.60	$\pm 13.1\%$																																																																																																																																																																																																																																			
4200	37.1	3.63	6.30	6.30	0.40	1.70	$\pm 13.1\%$																																																																																																																																																																																																																																			
4400	36.9	3.84	6.17	6.17	0.40	1.70	$\pm 13.1\%$																																																																																																																																																																																																																																			
4600	36.7	4.04	6.15	6.15	0.40	1.70	$\pm 13.1\%$																																																																																																																																																																																																																																			
4800	36.4	4.26	6.13	6.13	0.40	1.90	$\pm 13.1\%$																																																																																																																																																																																																																																			
4900	36.3	4.40	6.07	6.07	0.40	1.80	$\pm 13.1\%$																																																																																																																																																																																																																																			
5000	36.0	4.96	5.65	5.65	0.40	1.80	$\pm 13.1\%$																																																																																																																																																																																																																																			
5300	35.9	4.76	5.48	5.48	0.40	1.80	$\pm 13.1\%$																																																																																																																																																																																																																																			
5500	35.6	4.96	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	$\pm 13.1\%$																																																																																																																																																																																																																																			



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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
2023/4/26	-32.3	-2.87%	46.5	1.3
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
2023/4/26	-23.9	-3.91%	56.2	0.9
Dipole D750V3 SN 1188				
Head Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
2022/3/29	-28.7	/	53.6	/
2023/3/29	-28.3	1.39%	53.2	0.4
Dipole D835V2 SN 4d114				
Head Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
2022/3/31	-25.3	/	48.7	/
2023/3/31	-24.6	2.77%	49.1	0.4
Dipole D900V2 SN 1d079				
Head Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
2022/6/7	-23.3	/	48.1	/
2023/6/7	-23.6	-1.29%	48.3	0.2
Dipole D1800V2 SN 2d170				
Head Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
2022/3/31	-29.4	/	47.9	/
2023/3/31	-28.9	1.70%	47.2	0.7
Dipole D1900V2 SN 5d136				
Head Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
2022/6/7	-22.4	/	51.2	/
Dipole D2000V2 SN 1041				
Head Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
2022/6/6	-34.9	/	48.4	/
Dipole D2300V2 SN 1096				
Head Liquid				

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Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
2022/3/31	-26.6	/	49.2	/
2023/3/31	-27.1	-1.88%	49.4	0.2
Dipole D2450V2 SN 817				
Head Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
2022/4/1	-28.5	/	52.1	/
2023/4/1	-28.0	1.75%	51.6	0.5
Dipole D2600V2 SN 1158				
Head Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
2022/3/31	-23.8	/	49.9	/
2023/3/31	-23.3	2.10%	50.3	0.4
Dipole D5GHzV2 SN 1095 for 5200				
Head Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
2022/6/1	-23.6	/	46.1	/
Dipole D5GHzV2 SN 1095 for 5300				
Head Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
2022/6/1	-29.5	/	47.8	/
Dipole D5GHzV2 SN 1095 for 5500				
Head Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
2022/6/1	-27.4	/	50.3	/
Dipole D5GHzV2 SN 1095 for 5600				
Head Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
2022/6/1	-24.0	/	54.5	/
Dipole D5GHzV2 SN 1095 for 5800				
Head Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
2022/6/1	-24.9	/	51.5	/

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