

Appendix C for KSCR221100225901

Calibration Certificate

Object	Apply	No	Model	SN	Calibration Date
Dipole	☐	1	CLA150	4025	2021/04/26
	☐	2	D450V3	1103	2021/04/21
	☒	3	D750V3	1188	2022/03/29
	☒	4	D835V2	4d114	2022/03/31
	☐	5	D900V2	1d079	2022/06/07
	☒	6	D1800V2	2d170	2022/03/31
	☒	7	D1900V2	5d136	2022/06/07
	☐	8	D2000V2	1041	2022/06/06
	☐	9	D2300V2	1096	2022/03/31
	☒	10	D2450V2	817	2022/04/01
	☐	11	D2600V2	1158	2022/03/31
	☒	12	D5GHzV2	1095	2022/06/01
DAE	☒	13	DAE4	1245	2022/05/30
Probe	☒	14	EX3DV4	7346	2022/03/30



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

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

No.10, Weiye Road, Innovation Park, Kunshan, Jiangsu, China 215300
中国·江苏·昆山市留学院创业园伟业路10号 邮编 215300

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

1 Dipole

1.1 CLA150 - SN 4025

Calibration Laboratory of Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland		S Schweizerischer Kalibrierdienst Service suisse d'étalonnage C Servizio svizzero di taratura S Swiss Calibration Service	
Accredited by the Swiss Accreditation Service (SAS) The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates		Accreditation No.: SCS 0108	
Client: SGS-CN (Auden)		Certificate No: CLA150-4025_Apr21	
CALIBRATION CERTIFICATE			
Object: CLA150 - SN: 4025			
Calibration procedure(s): QA CAL-15-v9 Calibration Procedure for SAR Validation Sources below 700 MHz			
Calibration date: April 26, 2021			
This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.			
All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.			
Calibration Equipment used (M&E critical for calibration)			
Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 10476	09-Apr-21 (No. 217-03201/03202)	Apr-22
Power sensor NRP Z91	SN: 10344	09-Apr-21 (No. 217-03201)	Apr-22
Power sensor NRP Z91	SN: 10345	09-Apr-21 (No. 217-03202)	Apr-22
Reference 20 dB Attenuator	SN: C22862 (203)	09-Apr-21 (No. 217-03343)	Apr-22
Type-N mismatch combination	SN: 310952 / 00357	09-Apr-21 (No. 217-03344)	Apr-22
Reference Probe EX30N4	SN: 3877	30-Dec-20 (No. C3X3077_Dec20)	Dec-21
EX44	SN: 684	26-Jun-20 (No. D458-658-Jun20)	Jun-21
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter S44135	SN: G841203074	06-Apr-15 (in house check Jun-20)	In house check Jun-22
Power sensor E4413A	SN: MY4149067	06-Apr-15 (in house check Jun-20)	In house check Jun-22
Power sensor E4413A	SN: 00010010	06-Apr-15 (in house check Jun-20)	In house check Jun-22
RF generator HP 8440D	SN: US4840107109	04-Aug-09 (in house check Jun-20)	In house check Jun-21
Network Analyser Agilent E8363A	SN: US41000477	31-Mar-14 (in house check Oct-20)	In house check Oct-21
Calibrated by:	Name: Jeffrey Katsman	Function: Laboratory Technician	Signature:
Approved by:	Name: Kaja Polovic	Function: Technical Manager	Signature:
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			
Issued: April 26, 2021			
Certificate No: CLA150-4025_Apr21		Page 1 of 6	

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

Head TSL parameters	
The following parameters and calculations were applied.	
Nominal Head TSL parameters	Temperature: 22.0 °C
Measured Head TSL parameters	Permittivity: 62.3
Head TSL temperature change during test	Conductivity: 0.75 mho/m
	(22.0 ± 0.2) °C
	51.1 ± 6 %
	0.75 mho/m ± 6 %
	< 0.5 °C

SAR result with Head TSL	
SAR averaged over 1 cm³ (1 g) of Head TSL	Condition
SAR measured	1 W input power
SAR for nominal Head TSL parameters	3.90 W/kg
	normalized to 1W
	3.88 W/kg ± 19.4 % (k=2)
SAR averaged over 10 cm³ (10 g) of Head TSL	condition
SAR measured	1 W input power
SAR for nominal Head TSL parameters	2.60 W/kg
	normalized to 1W
	2.59 W/kg ± 18.0 % (k=2)

Appendix (Additional assessments outside the scope of SCS 0108)	
Antenna Parameters with Head TSL	
Impedance, transformed to feed point	47.9 Ω ± 1.5 Ω
Return Loss	-31.4 dB
Additional EUT Data	
Manufactured by	SPLEAG

Certificate No: CLA150-4025_Apr21	
Page 2 of 6	

Certificate No: CLA150-4025_Apr21	
Page 3 of 6	

Certificate No: CLA150-4025_Apr21	
Page 4 of 6	

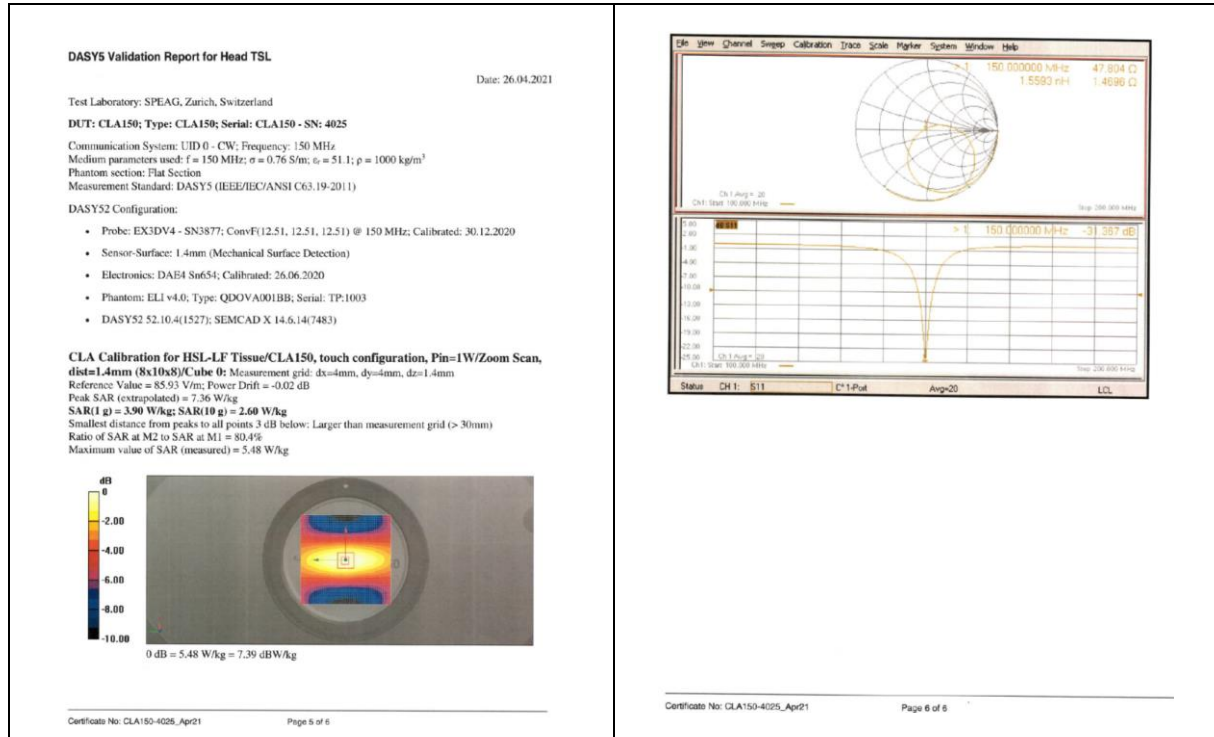


Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic formal documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

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

No.10, Weyue Road, Innovation Park, Kunshan, Jiangsu, China 215300
中国·江苏·昆山市留学生创业园伟业路10号 邮编 215300

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



1.2 D450V3 - SN 1103

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

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

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

CALIBRATION CERTIFICATE

Object: **D450V3 - SN: 1103**

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

Calibration date: **April 21, 2021**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (20 ± 2) °C and humidity < 70%.

Calibration Equipment used (MPE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104779	09-Apr-21 (No. 217-0301/0302)	Apr-22
Power sensor NRP-Z91	SN: 102644	09-Apr-21 (No. 217-0301)	Apr-22
Power sensor NRP-Z91	SN: 102645	09-Apr-21 (No. 217-0302)	Apr-22
Reference 20 dB Attenuator	SN: CG2852 (200)	09-Apr-21 (No. 217-03345)	Apr-22
Type-N mismatch combination	SN: 310852 / 06327	09-Apr-21 (No. 217-03344)	Apr-22
Reference Probe EX3DV4	SN: 3877	30-Dec-20 (No. EX3-3877 Dec20)	Dec-21
DA84	SN: 654	26-Jun-20 (No. DA84-654 Jun20)	Jun-21

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4118B	SN: GB41200274	06-Apr-16 (in house check Jun-20)	In house check Jun-22
Power sensor E4112A	SN: MY41496027	06-Apr-16 (in house check Jun-20)	In house check Jun-22
Power sensor E4112A	SN: 00018010	06-Apr-16 (in house check Jun-20)	In house check Jun-22
RF generator HP 8448C	SN: U03460.01700	06-Aug-19 (in house check Jun-20)	In house check Jun-22
Network Analyzer Agilent E8358A	SN: U841080477	31-Mar-14 (in house check Oct-20)	In house check Oct-21

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

Approved by: **Kelly Polovic** Technical Manager

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

Certificate No: D450V3-1103_Apr21 Page 1 of 6

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

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No: **SCS 0106**

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Certificate No: D450V3-1103_Apr21

Page 2 of 6



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

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

No.10, Weyue Road, Innovation Park, Kunshan, Jiangsu, China 215300
中国·江苏·昆山市留学生创业园伟业路10号 邮编 215300

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

Measurement Conditions		
DASY system configuration, as far as not given on page 1.		
DASY Version	DASY5	V62.10.4
Extrapolation	Advanced Extrapolation	
Phantom	ELJ Flat Phantom	Shell thickness: 2 ± 0.2 mm
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	$dx, dy, dz \leq 5$ mm	
Frequency	450 MHz ± 1 MHz	

Head TSL parameters			
The following parameters and calculations were applied:			
	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	43.5	0.57 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	43.1 $\pm$ 6 %	0.07 mho/m $\pm$ 8 %
Head TSL temperature change during test	< 0.5 °C	---	---

SAR result with Head TSL		
SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.14 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	4.56 W/kg $\pm$ 18.1 % (k=2)

SAR result with Head TSL		
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 $\pm$ 17.6 % (k=2)

Appendix (Additional assessments outside the scope of SCS 0106)	
Antenna Parameters with Head TSL	
Impedance, transformed to feed point	57.1 Ω - 2.8 j Ω
Return Loss	-23.0 dB

General Antenna Parameters and Design	
Electrical Delay (one direction)	1.346 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

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

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

Additional EUT Data	
Manufactured by	SPEAG

Certificate No: D450V3-1103_Apr21

Page 5 of 6

Certificate No: D450V3-1103_Apr21

Page 4 of 6

DASY5 Validation Report for Head TSL

Date: 21.04.2021

Test Laboratory: SPEAG, Zurich, Switzerland

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

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

Medium parameters used: $f = 450$ MHz, $\alpha = 0.87$ S/m; $\epsilon_r = 43.1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

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

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

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

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

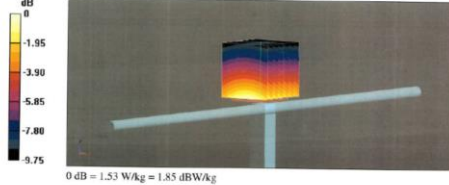
Peak SAR (extrapolated) = 1.76 W/kg

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

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

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

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

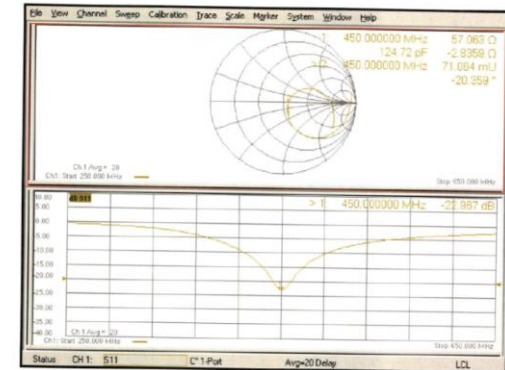


Certificate No: D450V3-1103_Apr21

Page 5 of 6

Certificate No: D450V3-1103_Apr21

Page 6 of 6



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx>; and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

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

No.10, Weiye Road, Innovation Park, Kunshan, Jiangsu, China 215300
中国·江苏·昆山市留学院创业园伟业路10号 邮编 215300

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

1.3 D750V3 - SN 1188

TTL Speag CALIBRATION LABORATORY		CAICT	
Add: No.52 HuaYuanbei Road, Haidian District, Beijing, 100191, China Tel: +86-10-42304633-2512 Fax: +86-10-42304633-2504 E-mail: cti@chinaetl.com http://www.chinaetl.cn		Add: No.52 HuaYuanbei Road, Haidian District, Beijing, 100191, China Tel: +86-10-42304633-2079 Fax: +86-10-42304633-2504 E-mail: cti@chinaetl.com http://www.chinaetl.cn	
Client: SGS-CN		Certificate No: Z22-60103	
CALIBRATION CERTIFICATE			
Object: D750V3 - SN: 1188			
Calibration Procedure(s): FF-Z11-003-01 Calibration Procedures for dipole validation kits			
Calibration date: March 28, 2022			
This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.			
All calibrations have been conducted in the closed laboratory facility: environment temperature (22±3)°C and humidity<70%.			
Calibration Equipment used (M&TE critical for calibration)			
Primary Standards	ID #	Cal Date (Calibrated by: Certificate No.)	Scheduled Calibration
Power Meter NRP2	104277	24-Sep-21 (CTTL No.J21X08328)	Sep-22
Power sensor NRP88	104291	24-Sep-21 (CTTL No.J21X08328)	Sep-22
Reference Probe EX30V4	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 S4438C	MY48071430	13-Jan-22 (CTTL No.J22X00409)	Jan-23
Network Analyzer E5071C	MY48110673	14-Jan-22 (CTTL No.J22X00409)	Jan-23
Calibrated by:	Name: Zhao Jing	Function: SAR Test Engineer	Signature:
Reviewed by:	Name: Lin Hao	Function: SAR Test Engineer	Signature:
Approved by:	Name: Qi Dianyan	Function: SAR Project Leader	Signature:
Issued: April 3, 2022			
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			
Certificate No: Z22-60103		Page 1 of 5	

TTL Speag CALIBRATION LABORATORY		CAICT	
Add: No.52 HuaYuanbei Road, Haidian District, Beijing, 100191, China Tel: +86-10-42304633-2079 Fax: +86-10-42304633-2504 E-mail: cti@chinaetl.com http://www.chinaetl.cn		Add: No.52 HuaYuanbei Road, Haidian District, Beijing, 100191, China Tel: +86-10-42304633-2079 Fax: +86-10-42304633-2504 E-mail: cti@chinaetl.com http://www.chinaetl.cn	
Measurement Conditions DASY system configuration, as far as not given on page 1:			
DASY Version	DASY52	VS2.10.4	
Extrapolation	Advanced Extrapolation		
Phantom	Triple Flat Phantom 5.1C		
Distance Dipole Center - TSL	15 mm	with Spacer	
Zoom Scan Resolution	dx, dy, dz = 5 mm		
Frequency	750 MHz ± 1 MHz		
Head TSL parameters The following parameters and calculations were applied:			
	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 result with Head TSL			
SAR averaged over 1 cm² (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 cm² (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)	
Certificate No: Z22-60103		Page 3 of 5	

TTL Speag CALIBRATION LABORATORY		CAICT	
Add: No.52 HuaYuanbei Road, Haidian District, Beijing, 100191, China Tel: +86-10-42304633-2079 Fax: +86-10-42304633-2504 E-mail: cti@chinaetl.com http://www.chinaetl.cn		Add: No.52 HuaYuanbei Road, Haidian District, Beijing, 100191, China Tel: +86-10-42304633-2079 Fax: +86-10-42304633-2504 E-mail: cti@chinaetl.com http://www.chinaetl.cn	
Glossary:			
TSL	tissue simulating liquid		
ConvF	sensitivity in TSL / NORMx.y.z		
N/A	not applicable or not measured		
Calibration is Performed According to the Following Standards:			
a) IEC/IEEE 62209-1528, "Measurement Procedure for The Assessment of Specific Absorption Rate of Human Exposure to Radio Frequency Fields from Hand-held and Body-mounted Wireless Communication Devices- Part 1528: Human Models, Instrumentation and Procedures (Frequency range of 4 MHz to 10 GHz)", October 2020			
b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"			
Additional Documentation:			
c) DASY4/5 System Handbook			
Methods Applied and Interpretation of Parameters:			
• Measurement Conditions: Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.			
• Antenna Parameters with TSL: The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.			
• Feed Point Impedance and Return Loss: These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.			
• Electrical Delay: One-way delay between the SMA connector and the antenna feed point. No uncertainty required.			
• SAR measured: SAR measured at the stated antenna input power.			
• SAR normalized: SAR as measured, normalized to an input power of 1 W at the antenna connector.			
• SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.			
The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.			
Certificate No: Z22-60103		Page 2 of 5	

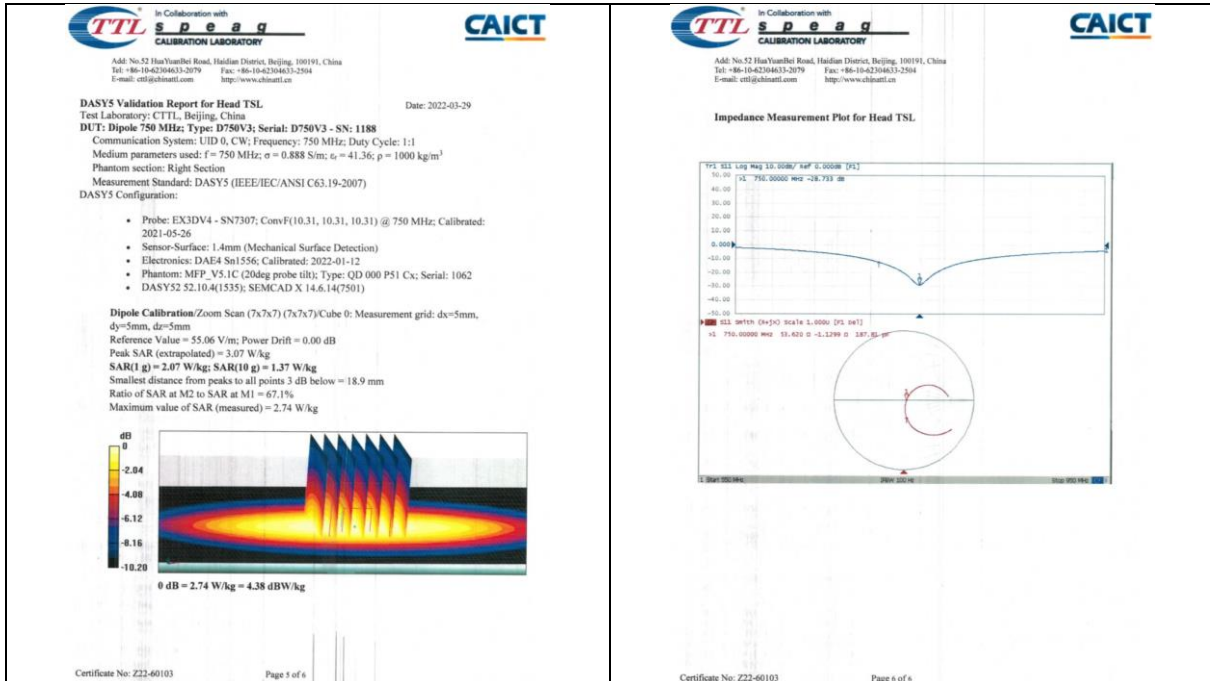
TTL Speag CALIBRATION LABORATORY		CAICT	
Add: No.52 HuaYuanbei Road, Haidian District, Beijing, 100191, China Tel: +86-10-42304633-2079 Fax: +86-10-42304633-2504 E-mail: cti@chinaetl.com http://www.chinaetl.cn		Add: No.52 HuaYuanbei Road, Haidian District, Beijing, 100191, China Tel: +86-10-42304633-2079 Fax: +86-10-42304633-2504 E-mail: cti@chinaetl.com http://www.chinaetl.cn	
Appendix (Additional assessments outside the scope of CNAS L0570)			
Antenna Parameters with Head TSL			
Impedance, transformed to feed point	53.60 - 1.13jΩ		
Return Loss	-28.7dB		
General Antenna Parameters and Design			
Electrical Delay (one direction)	0.947 ns		
After long term use with 100W radiated power, only a slight warming of the dipole near the feed-point can be measured.			
The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard. No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feed-point may be damaged.			
Additional EUT Data			
Manufactured by	SPEAG		
Certificate No: Z22-60103		Page 4 of 5	



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx>; and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Attention: To check the authenticity of testing / inspection report & certificate, please contact us at telephone: (86-755) 8307 1443, or email: CN.Doccheck@sgs.com
No.10, Weiye Road, Innovation Park, Kunshan, Jiangsu, China 215300
中国·江苏·昆山市留学生创业园伟业路10号 邮编 215300

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



1.4 D835V2 - SN 4d114

TTL Speaq Calibration Laboratory		CAICT	
Add: No.52 HuaYuanbei Road, Haidian District, Beijing, 100191, China Tel: +86-10-4204633-2079 Fax: +86-10-4204633-2504 E-mail: cti@china.ttl.com http://www.china.ttl.com		Add: No.52 HuaYuanbei Road, Haidian District, Beijing, 100191, China Tel: +86-10-4204633-2079 Fax: +86-10-4204633-2504 E-mail: cti@china.ttl.com http://www.china.ttl.com	
Client: SGS-CN		Certificate No: Z22-60104	
CALIBRATION CERTIFICATE			
Object: D835V2 - SN: 4d114			
Calibration Procedure(s): FF-Z11-003-01 Calibration Procedures for dipole validation kits			
Calibration date: March 31, 2022			
This Calibration Certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.			
All calibrations have been conducted in the closed laboratory facility: environment temperature (22±3)°C and humidity <70%.			
Calibration Equipment used (M&E critical for calibration)			
Primary Standards	ID #	Cal Date (Calibrated by Certificate No.)	Scheduled Calibration
Power Meter NRP2	106277	24-Sep-21 (CTTL No.J21X08326)	Sep-22
Power sensor NRPBS	104261	24-Sep-21 (CTTL No.J21X08326)	Sep-22
Reference Probe EX3DV4	SN 7307	26-May-21 (SPEAG No.EX3-7307_May21)	May-22
DAE4	SN 1556	12-Jan-22 (CTTL-SPEAG No.Z22-60007)	Jan-23
Secondary Standards	ID #	Cal Date (Calibrated by Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	13-Jan-22 (CTTL No.J22X00409)	Jan-23
Network Analyzer E5071C	MY46110673	14-Jan-22 (CTTL No.J22X00409)	Jan-23
Calibrated by:	Name: Zhao Jing	Function: SAR Test Engineer	Signature: [Signature]
Reviewed by:	Name: Lin Hao	Function: SAR Test Engineer	Signature: [Signature]
Approved by:	Name: Qi Dianyan	Function: SAR Project Leader	Signature: [Signature]
Issued: April 6, 2022			
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			

Certificate No: Z22-60104 Page 1 of 6

TTL Speaq Calibration Laboratory		CAICT	
Add: No.52 HuaYuanbei Road, Haidian District, Beijing, 100191, China Tel: +86-10-4204633-2079 Fax: +86-10-4204633-2504 E-mail: cti@china.ttl.com http://www.china.ttl.com		Add: No.52 HuaYuanbei Road, Haidian District, Beijing, 100191, China Tel: +86-10-4204633-2079 Fax: +86-10-4204633-2504 E-mail: cti@china.ttl.com http://www.china.ttl.com	
Glossary:			
TSL	tissue simulating liquid		
ConvF	sensitivity in TSL / NORMx.y.z		
N/A	not applicable or not measured		
Calibration is Performed According to the Following Standards:			
a) IEC/IEEE 62209-1528, "Measurement Procedure for The Assessment of Specific Absorption Rate of Human Exposure to Radio Frequency Fields from Hand-held and Body-mounted Wireless Communication Devices- Part 1528: Human Models, Instrumentation and Procedures (Frequency range of 4 MHz to 10 GHz)", October 2020			
b) KDB 665664, "SAR Measurement Requirements for 100 MHz to 6 GHz"			
Additional Documentation:			
c) DASY4/5 System Handbook			
Methods Applied and Interpretation of Parameters:			
• Measurement Conditions: Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.			
• Antenna Parameters with TSL: The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.			
• Feed Point Impedance and Return Loss: These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.			
• Electrical Delay: One-way delay between the SMA connector and the antenna feed point. No uncertainty required.			
• SAR measured: SAR measured at the stated antenna input power.			
• SAR normalized: SAR as measured, normalized to an input power of 1 W at the antenna connector.			
• SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.			
The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor k=2, which for a normal distribution Corresponds to a coverage probability of approximately 95%.			

Certificate No: Z22-60104 Page 2 of 6



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic formal documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

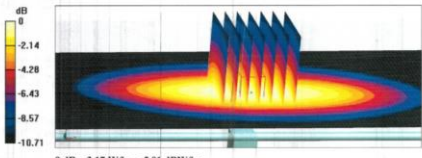
Attention: To check the authenticity of testing / inspection report & certificate, please contact us at telephone: (86-755) 8307 1443, or email: CN.Doccheck@sgs.com

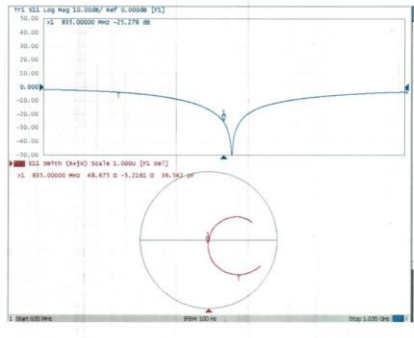
No.10, Weyue Road, Innovation Park, Kunshan, Jiangsu, China 215300
中国·江苏·昆山市留学生创业园伟业路10号 邮编 215300

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

TTL Calibration Laboratory		CAICT	
In Collaboration with		In Collaboration with	
Add: No. 52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-42304633-2079 Fax: +86-10-42304633-2504 E-mail: cti@china.ttl.com http://www.china.ttl.com		Add: No. 52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-42304633-2079 Fax: +86-10-42304633-2504 E-mail: cti@china.ttl.com http://www.china.ttl.com	
Measurement Conditions DASY system configuration, as far as not given on page 1.			
DASY Version	DASY52	VS2 10.4	
Extrapolation	Advanced Extrapolation		
Phantom	Triple Flat Phantom 5.1C		
Distance Dipole Center - TSL	15 mm	with Spacer	
Zoom Scan Resolution	dx, dy, dz = 5 mm		
Frequency	835 MHz $\pm$ 1 MHz		
Head TSL parameters The following parameters and calculations were applied.			
Nominal Head TSL parameters	Temperature	Permittivity	Conductivity
	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	41.0 $\pm$ 5 %	0.91 mho/m $\pm$ 5 %
Head TSL temperature change during test	<1.0 °C	---	---
SAR result with Head TSL			
SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition		
SAR measured	250 mW input power	2.37 W/kg	
SAR for nominal Head TSL parameters	normalized to 1W	9.40 W/kg $\pm$ 18.5 % (k=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 $\pm$ 18.7 % (k=2)	
Certificate No: Z22-60104 Page 3 of 6			

TTL Calibration Laboratory		CAICT	
In Collaboration with		In Collaboration with	
Add: No. 52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-42304633-2079 Fax: +86-10-42304633-2504 E-mail: cti@china.ttl.com http://www.china.ttl.com		Add: No. 52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-42304633-2079 Fax: +86-10-42304633-2504 E-mail: cti@china.ttl.com http://www.china.ttl.com	
Appendix (Additional assessments outside the scope of CNAS L0570)			
Antenna Parameters with Head TSL			
Impedance, transformed to feed point	48.70 - j22jQ		
Return Loss	-25.3dB		
General Antenna Parameters and Design			
Electrical Delay (one direction)	1.307 ns		
After long term use with 100W radiated power, only a slight warming of the dipole near the feed-point can be measured.			
The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.			
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feed-point may be damaged.			
Additional EUT Data			
Manufactured by	SPEAG		
Certificate No: Z22-60104 Page 4 of 6			

TTL Calibration Laboratory		CAICT	
In Collaboration with		In Collaboration with	
Add: No. 52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-42304633-2079 Fax: +86-10-42304633-2504 E-mail: cti@china.ttl.com http://www.china.ttl.com		Add: No. 52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-42304633-2079 Fax: +86-10-42304633-2504 E-mail: cti@china.ttl.com http://www.china.ttl.com	
DASY Validation Report for Head TSL Test Laboratory: CTTL, Beijing, China Date: 2022-03-31 DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d114 Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1 Medium parameters used: f = 835 MHz; σ = 0.907 S/m; ϵ_r = 40.98; ρ = 1000 kg/m ³ Phantom section: Right Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007) DASY5 Configuration: - Probe: EX3DV4 - SN7307; ConvF(10.13, 10.13, 10.13) @ 835 MHz; Calibrated: 2021-05-26 - Sensor-Surface: 1.4mm (Mechanical Surface Detection) - Electronics: DA/E4 Sn1556; Calibrated: 2022-01-12 - Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062 - DASY52 52.10.4(1535); SEMCAD X 14.6(147501)			
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7) Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 57.88 V/m; Power Drift = 0.04 dB Peak SAR (extrapolated) = 3.56 W/kg SAR(1 g) = 2.37 W/kg; SAR(10 g) = 1.54 W/kg Smallest distance from peaks to all points 3 dB below = 15.8 mm Ratio of SAR at M2 to SAR at M1 = 66.2% Maximum value of SAR (measured) = 3.17 W/kg			
			
Certificate No: Z22-60104 Page 5 of 6			

TTL Calibration Laboratory		CAICT	
In Collaboration with		In Collaboration with	
Add: No. 52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-42304633-2079 Fax: +86-10-42304633-2504 E-mail: cti@china.ttl.com http://www.china.ttl.com		Add: No. 52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-42304633-2079 Fax: +86-10-42304633-2504 E-mail: cti@china.ttl.com http://www.china.ttl.com	
Impedance Measurement Plot for Head TSL			
			
Certificate No: Z22-60104 Page 6 of 6			



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx>; and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Attention: To check the authenticity of testing / inspection report & certificate, please contact us at telephone: (86-755) 8307 1443, or email: CN.Doccheck@sgs.com
No. 10, Weiye Road, Innovation Park, Kunshan, Jiangsu, China 215300
中国·江苏·昆山市留学院创业园伟业路10号 邮编 215300

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

1.5 D900V2 - SN 1d079

In Collaboration with CALIBRATION LABORATORY		CAICT																																	
Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-4204633-2117 E-mail: cti@sgs.com.cn		Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-4204633-2117 E-mail: cti@sgs.com.cn																																	
Client: SGS-CN		Certificate No: Z22-60184																																	
CALIBRATION CERTIFICATE																																			
Object: D900V2 - SN: 1d079																																			
Calibration Procedure(s): FF-Z11-003-01 Calibration Procedures for dipole validation kits																																			
Calibration date: June 7, 2022																																			
This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.																																			
All calibrations have been conducted in the closed laboratory facility: environment temperature (23±3)°C and humidity<70%.																																			
Calibration Equipment used (M&TE critical for calibration)																																			
<table border="1"><thead><tr><th>Primary Standards</th><th>ID #</th><th>Cal Date (Calibrated by Certificate No.)</th><th>Scheduled Calibration</th></tr></thead><tbody><tr><td>Power Meter NRP2</td><td>106277</td><td>24-Sep-21 (CTTL No.J21X08326)</td><td>Sep-22</td></tr><tr><td>Power sensor NRP8S</td><td>104291</td><td>24-Sep-21 (CTTL No.J21X08326)</td><td>Sep-22</td></tr><tr><td>Reference Probe EX3DV4</td><td>SN 7464</td><td>28-Jan-22 (SPEAG No.EK3-7464_Jan22)</td><td>Jan-23</td></tr><tr><td>DAE4</td><td>SN 1556</td><td>12-Jan-22 (CTTL-SPEAG No.Z22-60007)</td><td>Jan-23</td></tr><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>MY48071430</td><td>13-Jan-22 (CTTL No.Z22X00409)</td><td>Jan-23</td></tr><tr><td>Network Analyzer E5071C</td><td>MY48110673</td><td>14-Jan-22 (CTTL No.Z22X00409)</td><td>Jan-23</td></tr></tbody></table>				Primary Standards	ID #	Cal Date (Calibrated by Certificate No.)	Scheduled Calibration	Power Meter NRP2	106277	24-Sep-21 (CTTL No.J21X08326)	Sep-22	Power sensor NRP8S	104291	24-Sep-21 (CTTL No.J21X08326)	Sep-22	Reference Probe EX3DV4	SN 7464	28-Jan-22 (SPEAG No.EK3-7464_Jan22)	Jan-23	DAE4	SN 1556	12-Jan-22 (CTTL-SPEAG No.Z22-60007)	Jan-23	Secondary Standards	ID #	Cal Date (Calibrated by Certificate No.)	Scheduled Calibration	Signal Generator E4438C	MY48071430	13-Jan-22 (CTTL No.Z22X00409)	Jan-23	Network Analyzer E5071C	MY48110673	14-Jan-22 (CTTL No.Z22X00409)	Jan-23
Primary Standards	ID #	Cal Date (Calibrated by Certificate No.)	Scheduled Calibration																																
Power Meter NRP2	106277	24-Sep-21 (CTTL No.J21X08326)	Sep-22																																
Power sensor NRP8S	104291	24-Sep-21 (CTTL No.J21X08326)	Sep-22																																
Reference Probe EX3DV4	SN 7464	28-Jan-22 (SPEAG No.EK3-7464_Jan22)	Jan-23																																
DAE4	SN 1556	12-Jan-22 (CTTL-SPEAG No.Z22-60007)	Jan-23																																
Secondary Standards	ID #	Cal Date (Calibrated by Certificate No.)	Scheduled Calibration																																
Signal Generator E4438C	MY48071430	13-Jan-22 (CTTL No.Z22X00409)	Jan-23																																
Network Analyzer E5071C	MY48110673	14-Jan-22 (CTTL No.Z22X00409)	Jan-23																																
Calibrated by: Name: Zhao Jing, Function: SAR Test Engineer, Signature: [Signature]																																			
Reviewed by: Name: Lin Hao, Function: SAR Test Engineer, Signature: [Signature]																																			
Approved by: Name: Qi Dianyan, Function: SAR Project Leader, Signature: [Signature]																																			
Issued: June 13, 2022																																			
The calibration certificate shall not be reproduced except in full without written approval of the laboratory.																																			
Certificate No: Z22-60184		Page 1 of 6																																	

In Collaboration with CALIBRATION LABORATORY		CAICT	
Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-4204633-2117 E-mail: cti@sgs.com.cn		Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-4204633-2117 E-mail: cti@sgs.com.cn	
Glossary:		tissue simulating liquid sensitivity in TSL / NORMx,y,z not applicable or not measured	
Calibration is Performed According to the Following Standards:			
a) IEC/IEEE 62209-1528, "Measurement Procedure for The Assessment of Specific Absorption Rate of Human Exposure to Radio Frequency Fields from Hand-held and Body-mounted Wireless Communication Devices- Part 1528: Human Models, Instrumentation and Procedures (Frequency range of 4 MHz to 10 GHz)", October 2020			
b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"			
Additional Documentation:			
c) DAS14/5 System Handbook			
Methods Applied and Interpretation of Parameters:			
• Measurement Conditions: Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.			
• Antenna Parameters with TSL: The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.			
• Feed Point Impedance and Return Loss: These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.			
• Electrical Delay: One-way delay between the SMA connector and the antenna feed point. No uncertainty required.			
• SAR measured: SAR measured at the stated antenna input power.			
• SAR normalized: SAR as measured, normalized to an input power of 1 W at the antenna connector.			
• SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.			
The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.			
Certificate No: Z22-60184		Page 2 of 6	

In Collaboration with CALIBRATION LABORATORY		CAICT																			
Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-4204633-2117 E-mail: cti@sgs.com.cn		Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-4204633-2117 E-mail: cti@sgs.com.cn																			
Measurement Conditions																					
DAS1 system configuration, as far as not given on page 1.																					
<table border="1"><thead><tr><th>DAS1 Version</th><th>DAS1S2</th><th>52.10.4</th></tr></thead><tbody><tr><td>Extrapolation</td><td>Advanced Extrapolation</td><td></td></tr><tr><td>Phantom</td><td>Triple Flat Phantom S.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>900 MHz ± 1 MHz</td><td></td></tr></tbody></table>				DAS1 Version	DAS1S2	52.10.4	Extrapolation	Advanced Extrapolation		Phantom	Triple Flat Phantom S.1C		Distance Dipole Center - TSL	15 mm	with Spacer	Zoom Scan Resolution	dx, dy, dz = 5 mm		Frequency	900 MHz ± 1 MHz	
DAS1 Version	DAS1S2	52.10.4																			
Extrapolation	Advanced Extrapolation																				
Phantom	Triple Flat Phantom S.1C																				
Distance Dipole Center - TSL	15 mm	with Spacer																			
Zoom Scan Resolution	dx, dy, dz = 5 mm																				
Frequency	900 MHz ± 1 MHz																				
Head TSL parameters																					
The following parameters and calculations were applied.																					
<table border="1"><thead><tr><th></th><th>Temperature</th><th>Permittivity</th><th>Conductivity</th></tr></thead><tbody><tr><td>Nominal Head TSL parameters</td><td>22.0 °C</td><td>41.5</td><td>0.97 nholm</td></tr><tr><td>Measured Head TSL parameters</td><td>(22.0 ± 0.2) °C</td><td>42.1 ± 6 %</td><td>0.98 nholm ± 6 %</td></tr><tr><td>Head TSL temperature change during test</td><td><1.0 °C</td><td>---</td><td>---</td></tr></tbody></table>					Temperature	Permittivity	Conductivity	Nominal Head TSL parameters	22.0 °C	41.5	0.97 nholm	Measured Head TSL parameters	(22.0 ± 0.2) °C	42.1 ± 6 %	0.98 nholm ± 6 %	Head TSL temperature change during test	<1.0 °C	---	---		
	Temperature	Permittivity	Conductivity																		
Nominal Head TSL parameters	22.0 °C	41.5	0.97 nholm																		
Measured Head TSL parameters	(22.0 ± 0.2) °C	42.1 ± 6 %	0.98 nholm ± 6 %																		
Head TSL temperature change during test	<1.0 °C	---	---																		
SAR result with Head TSL																					
<table border="1"><thead><tr><th>SAR averaged over 1 cm² (1 g) of Head TSL</th><th>Condition</th><th></th></tr></thead><tbody><tr><td>SAR measured</td><td>250 mW input power</td><td>2.70 W/kg</td></tr><tr><td>SAR for nominal Head TSL parameters</td><td>normalized to 1W</td><td>11.0 W/kg ± 18.8 % (k=2)</td></tr><tr><td>SAR averaged over 10 cm² (10 g) of Head TSL</td><th>Condition</th><th></th></tr><tr><td>SAR measured</td><td>250 mW input power</td><td>1.73 W/kg</td></tr><tr><td>SAR for nominal Head TSL parameters</td><td>normalized to 1W</td><td>7.09 W/kg ± 18.7 % (k=2)</td></tr></tbody></table>				SAR averaged over 1 cm ² (1 g) of Head TSL	Condition		SAR measured	250 mW input power	2.70 W/kg	SAR for nominal Head TSL parameters	normalized to 1W	11.0 W/kg ± 18.8 % (k=2)	SAR averaged over 10 cm ² (10 g) of Head TSL	Condition		SAR measured	250 mW input power	1.73 W/kg	SAR for nominal Head TSL parameters	normalized to 1W	7.09 W/kg ± 18.7 % (k=2)
SAR averaged over 1 cm ² (1 g) of Head TSL	Condition																				
SAR measured	250 mW input power	2.70 W/kg																			
SAR for nominal Head TSL parameters	normalized to 1W	11.0 W/kg ± 18.8 % (k=2)																			
SAR averaged over 10 cm ² (10 g) of Head TSL	Condition																				
SAR measured	250 mW input power	1.73 W/kg																			
SAR for nominal Head TSL parameters	normalized to 1W	7.09 W/kg ± 18.7 % (k=2)																			
Certificate No: Z22-60184		Page 3 of 6																			

In Collaboration with CALIBRATION LABORATORY		CAICT					
Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-4204633-2117 E-mail: cti@sgs.com.cn		Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-4204633-2117 E-mail: cti@sgs.com.cn					
Appendix (Additional assessments outside the scope of CNAS L0570)							
Antenna Parameters with Head TSL							
<table border="1"><thead><tr><th>Impedance, transformed to feed point</th><th>48.10 - 8.49jΩ</th></tr><tr><th>Return Loss</th><th>-23.3 dB</th></tr></thead></table>				Impedance, transformed to feed point	48.10 - 8.49jΩ	Return Loss	-23.3 dB
Impedance, transformed to feed point	48.10 - 8.49jΩ						
Return Loss	-23.3 dB						
General Antenna Parameters and Design							
<table border="1"><thead><tr><th>Electrical Delay (one direction)</th><th>1.312 ns</th></tr></thead></table>				Electrical Delay (one direction)	1.312 ns		
Electrical Delay (one direction)	1.312 ns						
After long term use with 100W radiated power, only a slight warming of the dipole near the feed-point can be measured.							
The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard. No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feed-point may be damaged.							
Additional EUT Data							
<table border="1"><thead><tr><th>Manufactured by</th><th>SPEAG</th></tr></thead></table>				Manufactured by	SPEAG		
Manufactured by	SPEAG						
Certificate No: Z22-60184		Page 4 of 6					

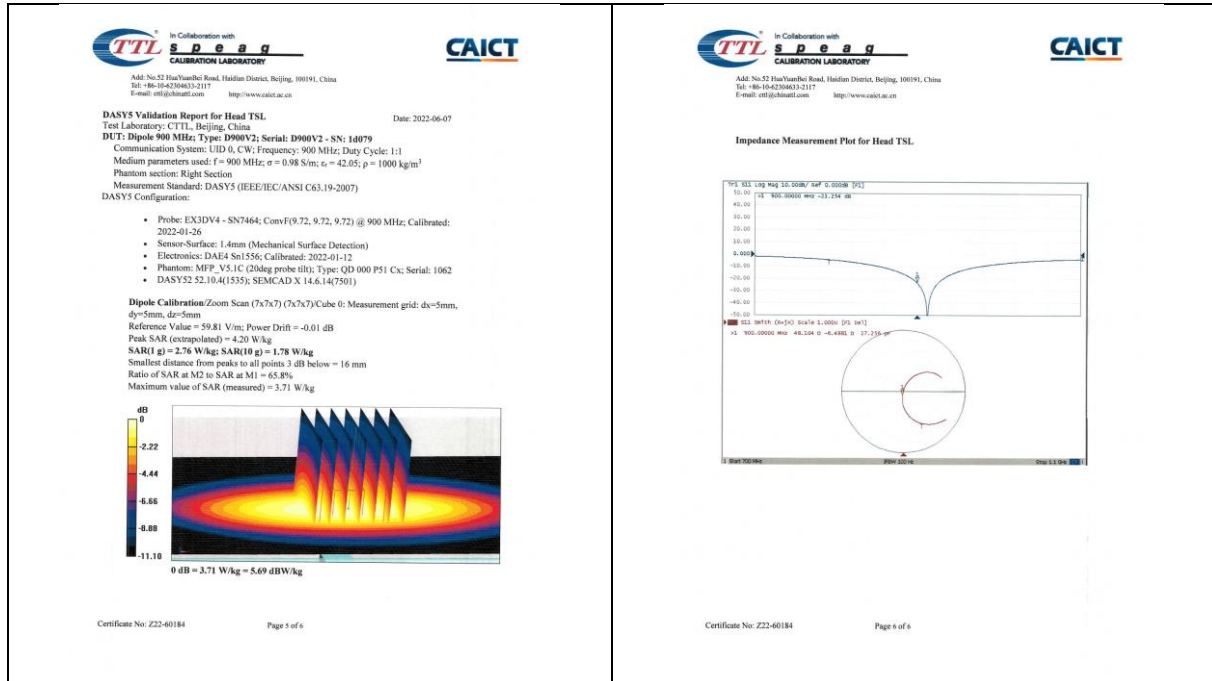


Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

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

No.10, Weiye Road, Innovation Park, Kunshan, Jiangsu, China 215300
中国·江苏·昆山市留学生创业园伟业路10号 邮编 215300

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



1.6 D1800V2 - SN 2d170

TTL In Collaboration with **CAICT**
CALIBRATION LABORATORY

Address: No.52 HuaYuanbei Road, Haidian District, Beijing, 100191, China
Tel: +86-10-42306033-2117 Fax: +86-10-42306033-2118
E-mail: cti@china.ttl.com http://www.china.ttl.com

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

CALIBRATION CERTIFICATE

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

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

Calibration date: **March 31, 2022**

This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility, environment temperature (22±3)°C and humidity <70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by Certificate No.)	Scheduled Calibration
Power Meter NRP2	106277	24-Sep-21 (CTTL No.J21X08326)	Sep-22
Power sensor NRP8S	104291	24-Sep-21 (CTTL No.J21X08326)	Sep-22
Reference Probe EX3DV4	SN 7307	26-May-21 (SPEAG No.EX3-7307_May21)	May-22
DAE4	SN 1556	12-Jan-22 (CTTL-SPEAG No.Z22-60007)	Jan-23

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

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

Issued April 6, 2022

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

Certificate No: Z22-60105 Page 1 of 6

TTL In Collaboration with **CAICT**
CALIBRATION LABORATORY

Address: No.52 HuaYuanbei Road, Haidian District, Beijing, 100191, China
Tel: +86-10-42306033-2079 Fax: +86-10-42306033-2504
E-mail: cti@china.ttl.com http://www.china.ttl.com

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

- c) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Certificate No: Z22-60105 Page 2 of 6



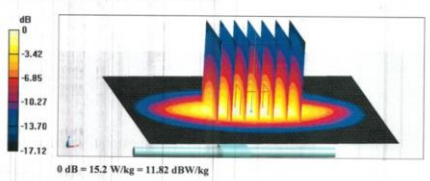
Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

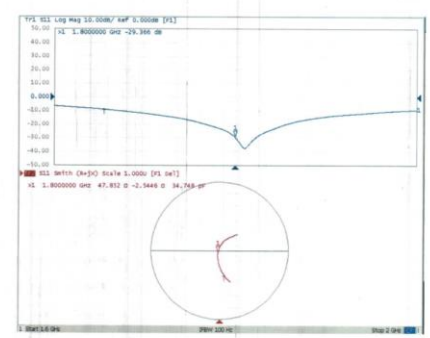
Attention: To check the authenticity of testing/inspection report & certificate, please contact us at telephone: (86-755) 8307 1443, or email: CN.Doccheck@sgs.com

No.10, Weiye Road, Innovation Park, Kunshan, Jiangsu, China 215300
中国·江苏·昆山市留学生创业园伟业路10号 邮编 215300

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

TTL Speaq Calibration Laboratory		CAICT	
Add: No.52 HuaYanbei Road, Haidian District, Beijing, 100191, China Tel: +86-10-42304633-2079 Fax: +86-10-42304633-2504 E-mail: cti@china.ttl.com http://www.china.ttl.com		Add: No.52 HuaYanbei Road, Haidian District, Beijing, 100191, China Tel: +86-10-42304633-2079 Fax: +86-10-42304633-2504 E-mail: cti@china.ttl.com http://www.china.ttl.com	
Measurement Conditions DASY system configuration, as far as not given on page 1.			
DASY Version	DASY52	52.10.4	
Extrapolation	Advanced Extrapolation		
Phantom	Triple Flat Phantom 5.1C		
Distance Dipole Center - TSL	10 mm	with Spacer	
Zoom Scan Resolution	dx, dy, dz = 5 mm		
Frequency	1800 MHz ± 1 MHz		
Head TSL parameters The following parameters and calculations were applied.			
	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.8 ± 6 %	1.41 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	---	---
SAR result with Head TSL			
SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition		
SAR measured	250 mW input power	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)	
Appendix (Additional assessments outside the scope of CNAS L0570)			
Antenna Parameters with Head TSL			
Impedance, transformed to feed point	47.90-2.54jΩ		
Return Loss	-29.4dB		
General Antenna Parameters and Design			
Electrical Delay (one direction)	1.116 ns		
After long term use with 100W radiated power, only a slight warming of the dipole near the feed-point can be measured.			
The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard. No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feed-point may be damaged.			
Additional EUT Data			
Manufactured by	SPEAG		
Certificate No: Z22-60105 Page 3 of 6			

TTL Speaq Calibration Laboratory		CAICT	
Add: No.52 HuaYanbei Road, Haidian District, Beijing, 100191, China Tel: +86-10-42304633-2079 Fax: +86-10-42304633-2504 E-mail: cti@china.ttl.com http://www.china.ttl.com		Add: No.52 HuaYanbei Road, Haidian District, Beijing, 100191, China Tel: +86-10-42304633-2079 Fax: +86-10-42304633-2504 E-mail: cti@china.ttl.com http://www.china.ttl.com	
DASY5 Validation Report for Head TSL Test Laboratory: TTL, Beijing, China Date: 2022-03-31 DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN: 2d170 Communication System: UID 0, CW; Frequency: 1800 MHz; Duty Cycle: 1:1 Medium parameters used: f = 1800 MHz; σ = 1.411 S/m; ε = 40.62; ρ = 1000 kg/m ³ Phantom section: Right Section Measurement Standard: DASY5 (IEEE/ANSI C63.19-2007) DASY5 Configuration: - Probe: EX3DV4 - SN7307; ConvF(8.34, 8.34, 8.34) @ 1800 MHz; Calibrated: 2021-05-26 - Sensor-Surface: 1.4mm (Mechanical Surface Detection) - Electronics: DAE4 Sn1556; Calibrated: 2022-01-12 - Phantom: MFP, V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062 - DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501) Dipole Calibration/Zoom Scan (7x7x7) (Cube 0): Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 98.14 V/m; Power Drift = 0.03 dB Peak SAR (extrapolated) = 18.2 W/kg SAR(1 g) = 9.73 W/kg; SAR(10 g) = 5.11 W/kg Smallest distance from peaks to all points 3 dB below = 10 mm Ratio of SAR at M2 to SAR at M1 = 54% Maximum value of SAR (measured) = 15.2 W/kg			
			
Certificate No: Z22-60105 Page 3 of 6			

TTL Speaq Calibration Laboratory		CAICT	
Add: No.52 HuaYanbei Road, Haidian District, Beijing, 100191, China Tel: +86-10-42304633-2079 Fax: +86-10-42304633-2504 E-mail: cti@china.ttl.com http://www.china.ttl.com		Add: No.52 HuaYanbei Road, Haidian District, Beijing, 100191, China Tel: +86-10-42304633-2079 Fax: +86-10-42304633-2504 E-mail: cti@china.ttl.com http://www.china.ttl.com	
Impedance Measurement Plot for Head TSL			
			
Certificate No: Z22-60105 Page 6 of 6			

1.7 D1900V2 - SN 5d136

TTL S p e a g CALIBRATION LABORATORY		CAICT	
Add: No.52 Huayuan Road, Haidian District, Beijing, 100191, China Tel: +86-10-4226633-2117 E-mail: cti@sgs.com.cn		Add: No.52 Huayuan Road, Haidian District, Beijing, 100191, China Tel: +86-10-4226633-2117 E-mail: cti@sgs.com.cn	
Client: SGS-CN		Certificate No: Z22-60185	
CALIBRATION CERTIFICATE			
Object	D1900V2 - SN: 5d136		
Calibration Procedure(s)	FF-Z11-003-01 Calibration Procedures for dipole validation kits		
Calibration date:	June 7, 2022		
This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.			
All calibrations have been conducted in the closed laboratory facility: environment temperature (23±1)°C and humidity <70%.			
Calibration Equipment used (M&TE critical for calibration)			
Primary Standards	ID #	Cal Date (Calibrated by: Certificate No.)	Scheduled Calibration
Power Meter NRP2	106277	24-Sep-21 (CTTL No.J21X08326)	Sep-22
Power sensor NRP6S	104291	24-Sep-21 (CTTL No.J21X08326)	Sep-22
Reference Probe EXSDV4	SN 7464	28-Jan-22 (SPEAG No EX3-7464_Jan22)	Jan-23
DAE4	SN 1556	12-Jan-22 (CTTL-SPEAG No Z22-60007)	Jan-23
Secondary Standards	ID #	Cal Date (Calibrated by: Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY48071430	13-Jan-22 (CTTL No.J22X00409)	Jan-23
Network Analyzer E5071C	MY48110073	14-Jan-22 (CTTL No.J22X00409)	Jan-23
Calibrated by:	Name	Function	Signature
	Zhao Jing	SAR Test Engineer	
Reviewed by:	Lin Hao	SAR Test Engineer	
Approved by:	Qi Dianyan	SAR Project Leader	
Issued: June 13, 2022			
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			
Certificate No: Z22-60185		Page 1 of 6	

TTL S p e a g CALIBRATION LABORATORY		CAICT	
Add: No.52 Huayuan Road, Haidian District, Beijing, 100191, China Tel: +86-10-4226633-2117 E-mail: cti@sgs.com.cn		Add: No.52 Huayuan Road, Haidian District, Beijing, 100191, China Tel: +86-10-4226633-2117 E-mail: cti@sgs.com.cn	
Measurement Conditions DASY system configuration, as far as not given on page 1.			
DASY Version	DASY52	52.10.4	
Extrapolation	Advanced Extrapolation		
Phantom	Triple Flat Phantom 5.1C		
Distance Dipole Center - TSL	10 mm	with Spacer	
Zoom Scan Resolution	dx, dy, dz = 5 mm		
Frequency	1900 MHz ± 1 MHz		
Head TSL parameters The following parameters and calculations were applied:			
Nominal Head TSL parameters	Temperature	Permittivity	Conductivity
	22.0 °C	40.0	1.40 nH/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.9 ± 6 %	1.39 nH/m ± 6 %
Head TSL temperature change during test	<+1.0 °C	---	---
SAR result with Head TSL			
SAR averaged over 1 cm ² (1 g) of Head TSL	Condition		
SAR measured	250 mW input power	9.55 W/kg	
SAR for nominal Head TSL parameters	normalized to 1W	40.0 W/kg ± 16.8 % (k=2)	
SAR averaged over 10 cm ² (10 g) of Head TSL	Condition		
SAR measured	250 mW input power	5.18 W/kg	
SAR for nominal Head TSL parameters	normalized to 1W	20.8 W/kg ± 18.7 % (k=2)	
Certificate No: Z22-60185		Page 3 of 6	

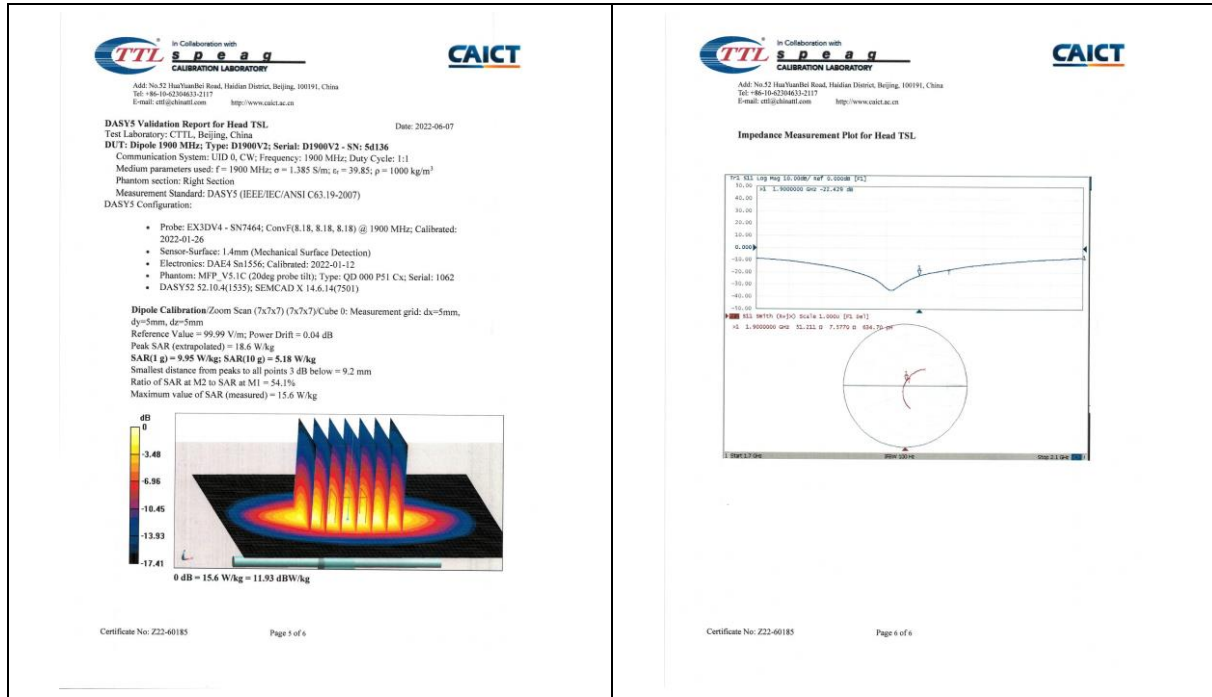
TTL S p e a g CALIBRATION LABORATORY		CAICT	
Add: No.52 Huayuan Road, Haidian District, Beijing, 100191, China Tel: +86-10-4226633-2117 E-mail: cti@sgs.com.cn		Add: No.52 Huayuan Road, Haidian District, Beijing, 100191, China Tel: +86-10-4226633-2117 E-mail: cti@sgs.com.cn	
Appendix (Additional assessments outside the scope of CNAS L0570)			
Antenna Parameters with Head TSL			
Impedance, transformed to feed point	51.02 ± 7.58 Ω		
Return Loss	-22.4 dB		
General Antenna Parameters and Design			
Electrical Delay (one direction)	1.109 ns		
After long term use with 100W radiated power, only a slight warming of the dipole near the feed-point can be measured.			
The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC signals. On some of the dipoles, small and caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard. No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feed-point may be damaged.			
Additional EUT Data			
Manufactured by	SPEAG		
Certificate No: Z22-60185		Page 4 of 6	



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Attention: To check the authenticity of testing / inspection report & certificate, please contact us at telephone: (86-755) 8307 1443, or email: CN.Doccheck@sgs.com
No.10, Weiye Road, Innovation Park, Kunshan, Jiangsu, China 215300
中国·江苏·昆山市留学生创业园伟业路10号 邮编 215300

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



1.8 D2000V2 - SN 1041

Page 1 of 6:

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

Object: D2000V2 - SN 1041

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

Calibration date: June 8, 2022

This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements (B). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility; environment temperature (22±3)°C and humidity <70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by Certificate No.)	Scheduled Calibration
Power Meter NRP2	106277	24-Sep-21 (CTTL No. J21X08328)	Sep-22
Power sensor NRP8S	104291	24-Sep-21 (CTTL No. J21X08328)	Sep-22
Reference Probe EX3DV4	SN 7464	26-Jan-22 (SPEAG No. EX3-7464, Jan22)	Jan-23
DAE4	SN 1556	12-Jan-22 (CTTL-SPEAG No. Z22-60007)	Jan-23

Secondary Standards	ID #	Cal Date (Calibrated by Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	13-Jan-22 (CTTL No. Z22X00409)	Jan-23
Network Analyzer E5071C	MY48110673	14-Jan-22 (CTTL No. Z22X00409)	Jan-23

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

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

Page 2 of 6:

Glossary:
TSL: Issue simulating liquid
ConF: 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) K98 865964, "SAR Measurement Requirements for 100 MHz to 6 GHz"
c) DASYS4/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 flat phantom section, with the arms oriented parallel to the body axis.
• **Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
• **Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
• **SAR measured:** SAR measured at the stated antenna input power.
• **SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
• **SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

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



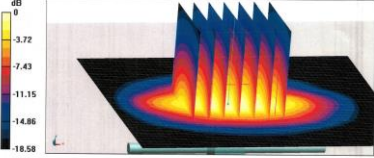
Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx>, and, for electronic formal documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.
Attention: To check the authenticity of testing / inspection report & certificate, please contact us at telephone: (86-755) 8307 1443, or email: CN.Doccheck@sgs.com

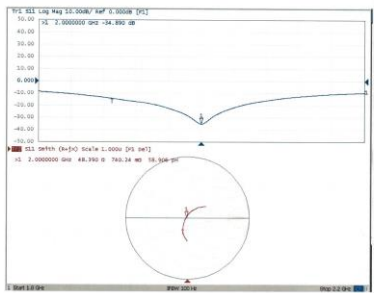
No.10, Welye Road, Innovation Park, Kunshan, Jiangsu, China 215300
中国·江苏·昆山市留学生创业园伟业路10号 邮编 215300

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

In Collaboration with TTL s p e a g CALIBRATION LABORATORY		CAICT	
Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-6230633-2117 E-mail: ott@china.ttl.com http://www.caict.ac.cn			
Measurement Conditions DASY system configuration, as far as not given on page 1.			
DASY Version	DASY52	52.10.4	
Extrapolation	Advanced Extrapolation		
Phantom	Triple Flat Phantom S.1C		
Distance Dipole Center - TSL	10 mm	with Spacer	
Zoom Scan Resolution	dx, dy, dz = 5 mm		
Frequency	2000 MHz ± 1 MHz		
Head TSL parameters The following parameters and calculations were applied:			
	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.2 ± 0.5 %	1.39 mho/m ± 0.5 %
Head TSL temperature change during test	<1.0 °C	---	---
SAR result with Head TSL			
SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition		
SAR measured	250 mW input power	10.4 W/kg	
SAR for nominal Head TSL parameters	normalized to 1W	41.8 W/kg ± 18.8 % (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)	
Certificate No: Z22-60186 Page 3 of 6			

In Collaboration with TTL s p e a g CALIBRATION LABORATORY		CAICT	
Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-6230633-2117 E-mail: ott@china.ttl.com http://www.caict.ac.cn			
Appendix (Additional assessments outside the scope of CNAS L0570)			
Antenna Parameters with Head TSL			
Impedance, transformed to feed point	48.4Ω ± 0.74Ω		
Return Loss	-34.9dB		
General Antenna Parameters and Design			
Electrical Delay (one direction)	1.088 ns		
After long term use with 100W radiated power, only a slight warming of the dipole near the feed-point can be measured.			
The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.			
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feed-point may be damaged.			
Additional EUT Data			
Manufactured by	SPEAG		
Certificate No: Z22-60186 Page 4 of 6			

In Collaboration with TTL s p e a g CALIBRATION LABORATORY		CAICT	
Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-6230633-2117 E-mail: ott@china.ttl.com http://www.caict.ac.cn			
DASY5 Validation Report for Head TSL Test Laboratory: CTTL, Beijing, China DUT: Dipole 2000 MHz; Type: D2000V2; Serial: D2000V2 - SN: 1041 Communication System: UTD 0, CW; Frequency: 2000 MHz; Duty Cycle: 1:1 Medium parameters used: f = 2000 MHz; σ = 1.392 S/m; ε _r = 40.21; ρ = 1000 kg/m ³ Phantom section: Right Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007) DASY5 Configuration: - Probe: EX3DV4 - SN7464; ConvF(8.2, 8.2, 8.2) @ 2000 MHz; Calibrated: 2022-01-26 - Sensor-Surface: 1.4mm (Mechanical Surface Detection) - Electronics: DA64 Sn1556; Calibrated: 2022-01-12 - Phantom: MPP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062 - DASY52: S2.10.4(1555); SEMCAD X 14.6.14(7501)			
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7) Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 103.4 V/m; Power Drift = 0.03 dB Peak SAR (extrapolated) = 19.6 W/kg SAR(1 g) = 10.4 W/kg; SAR(10 g) = 5.3 W/kg Smallest distance from peaks to all points 3 dB below = 9.1 mm Ratio of SAR at M2 to SAR at M1 = 53.6% Maximum value of SAR (measured) = 16.3 W/kg			
			
Certificate No: Z22-60186 Page 5 of 6			

In Collaboration with TTL s p e a g CALIBRATION LABORATORY		CAICT	
Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-6230633-2117 E-mail: ott@china.ttl.com http://www.caict.ac.cn			
Impedance Measurement Plot for Head TSL			
			
Certificate No: Z22-60186 Page 6 of 6			



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

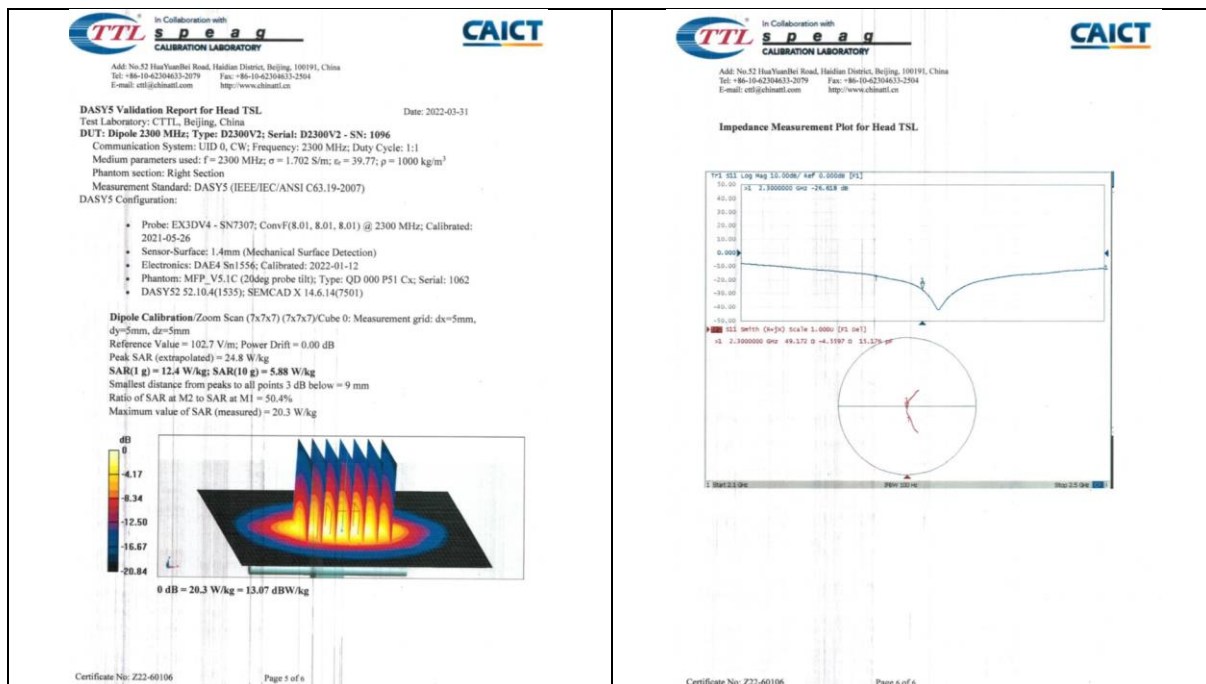
Attention: To check the authenticity of testing / inspection report & certificate, please contact us at telephone: (86-755) 8307 1443, or email: CN.Doccheck@sgs.com

No.10, Weiye Road, Innovation Park, Kunshan, Jiangsu, China 215300
中国·江苏·昆山市留学生创业园伟业路10号 邮编 215300

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

1.9 D2300V2 - SN 1096

TTL Speaq CALIBRATION LABORATORY		CAICT																					
Add: No.52 HuaYuanbei Road, Haidian District, Beijing, 100191 Tel: +86-10-42304633-2512 Fax: +86-10-42304633-2504 E-mail: cti@chinaatl.com http://www.chinaatl.cn		Add: No.52 HuaYuanbei Road, Haidian District, Beijing, 100191, China Tel: +86-10-42304633-2079 Fax: +86-10-42304633-2504 E-mail: cti@chinaatl.com http://www.chinaatl.cn																					
Client	SGS-CN	Certificate No.	Z22-60106																				
CALIBRATION CERTIFICATE																							
Object	D2300V2 - SN: 1096																						
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	108277	24-Sep-21 (CTTL No.J21X08328)	Sep-22																				
Power sensor NRPBS	104291	24-Sep-21 (CTTL No.J21X08328)	Sep-22																				
Reference Probe EX30V4	SN 7307	26-May-21 (SPEAG No.EK3-7307_May21)	May-22																				
DAE4	SN 1556	12-Jan-22 (CTTL-SPEAG No.Z22-60007)	Jan-23																				
Secondary Standards	ID #	Cal Date (Calibrated by Certificate No.)	Scheduled Calibration																				
Signal Generator E4438C	MY49071430	13-Jan-22 (CTTL No.J22X00406)	Jan-23																				
Network Analyzer E5071C	MY48110673	14-Jan-22 (CTTL No.J22X00406)	Jan-23																				
Calibrated by:	Name	Function	Signature																				
	Zhao Jing	SAR Test Engineer																					
Reviewed by:	Lin Hao	SAR Test Engineer																					
Approved by:	Qi Diqian	SAR Project Leader																					
Issued: April 6, 2022																							
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.																							
Certificate No: Z22-60106		Page 1 of 6																					
Measurement Conditions DASY system configuration, as far as not given on page 1: DASY Version: DASY2 Extrapolation: Advanced Extrapolation Phantom: Triple Flat Phantom 5.1C Distance Dipole Center - TSL: 10 mm with Spacer Zoom Scan Resolution: dx, dy, dz = 5 mm Frequency: 2300 MHz ± 1 MHz		Appendix (Additional assessments outside the scope of CNAS L0570) Antenna Parameters with Head TSL <table border="1"> <tr> <td>Impedance, transformed to feed point</td> <td>49.20 - 4.56jΩ</td> </tr> <tr> <td>Return Loss</td> <td>-26.6dB</td> </tr> </table> General Antenna Parameters and Design <table border="1"> <tr> <td>Electrical Delay (one direction)</td> <td>1.083 ns</td> </tr> </table> After long term use with 100W radiated power, only a slight warming of the dipole near the feed-point can be measured. The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small and caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard. No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feed-point may be damaged.		Impedance, transformed to feed point	49.20 - 4.56jΩ	Return Loss	-26.6dB	Electrical Delay (one direction)	1.083 ns														
Impedance, transformed to feed point	49.20 - 4.56jΩ																						
Return Loss	-26.6dB																						
Electrical Delay (one direction)	1.083 ns																						
SAR result with Head TSL <table border="1"> <tr> <th>SAR averaged over 1 cm² (1 g) of Head TSL</th> <th>Condition</th> <th></th> </tr> <tr> <td>SAR measured</td> <td>250 mW input power</td> <td>12.4 W/kg</td> </tr> <tr> <td>SAR for nominal Head TSL parameters</td> <td>normalized to 1W</td> <td>49.2 W/kg ± 18.8 % (k=2)</td> </tr> <tr> <th>SAR averaged over 10 cm² (10 g) of Head TSL</th> <th>Condition</th> <th></th> </tr> <tr> <td>SAR measured</td> <td>250 mW input power</td> <td>5.88 W/kg</td> </tr> <tr> <td>SAR for nominal Head TSL parameters</td> <td>normalized to 1W</td> <td>23.4 W/kg ± 18.7 % (k=2)</td> </tr> </table>		SAR averaged over 1 cm ² (1 g) of Head TSL	Condition		SAR measured	250 mW input power	12.4 W/kg	SAR for nominal Head TSL parameters	normalized to 1W	49.2 W/kg ± 18.8 % (k=2)	SAR averaged over 10 cm ² (10 g) of Head TSL	Condition		SAR measured	250 mW input power	5.88 W/kg	SAR for nominal Head TSL parameters	normalized to 1W	23.4 W/kg ± 18.7 % (k=2)	Additional EUT Data <table border="1"> <tr> <td>Manufactured by</td> <td>SPEAG</td> </tr> </table>		Manufactured by	SPEAG
SAR averaged over 1 cm ² (1 g) of Head TSL	Condition																						
SAR measured	250 mW input power	12.4 W/kg																					
SAR for nominal Head TSL parameters	normalized to 1W	49.2 W/kg ± 18.8 % (k=2)																					
SAR averaged over 10 cm ² (10 g) of Head TSL	Condition																						
SAR measured	250 mW input power	5.88 W/kg																					
SAR for nominal Head TSL parameters	normalized to 1W	23.4 W/kg ± 18.7 % (k=2)																					
Manufactured by	SPEAG																						
Certificate No: Z22-60106		Page 3 of 6																					
Add: No.52 HuaYuanbei Road, Haidian District, Beijing, 100191, China Tel: +86-10-42304633-2079 Fax: +86-10-42304633-2504 E-mail: cti@chinaatl.com http://www.chinaatl.cn		Add: No.52 HuaYuanbei Road, Haidian District, Beijing, 100191, China Tel: +86-10-42304633-2079 Fax: +86-10-42304633-2504 E-mail: cti@chinaatl.com http://www.chinaatl.cn																					
Certificate No: Z22-60106		Page 2 of 6																					



1.10 D2450V2 - SN 817

TTL In Collaboration with **CAICT**
CALIBRATION LABORATORY

Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62504633-2079 Fax: +86-10-62504633-2504
E-mail: cti@china.ttl.com http://www.china.ttl.com

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

CALIBRATION CERTIFICATE

Object: **D2450V2 - SN: 817**

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

Calibration date: **April 1, 2022**

This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22±3)°C and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by: Certificate No.)	Scheduled Calibration
Power Meter: NRP2	106277	24-Sep-21 (CTTL No.J21X08320)	Sep-22
Power sensor: NRP8S	104291	24-Sep-21 (CTTL No.J21X08320)	Sep-22
Reference Probe EX3DV4	SN 7307	26-May-21(SPEAG.No.EK3-7307_May21)	May-22
DAE4	SN 1556	12-Jan-22(CTTL-SPEAG.No.Z22-60007)	Jan-23

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

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

Signature: [Signatures]
Issued: April 6, 2022

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

Certificate No: Z22-60107 Page 1 of 6

TTL In Collaboration with **CAICT**
CALIBRATION LABORATORY

Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62504633-2079 Fax: +86-10-62504633-2504
E-mail: cti@china.ttl.com http://www.china.ttl.com

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEC/IEEE 62209-1528, "Measurement Procedure for The Assessment of Specific Absorption Rate of Human Exposure to Radio Frequency Fields from Hand-held and Body-mounted Wireless Communication Devices- Part 1528: Human Models, Instrumentation and Procedures (Frequency range of 4 MHz to 10 GHz)", October 2020
b) KDB 655664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

c) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Certificate No: Z22-60107 Page 2 of 6

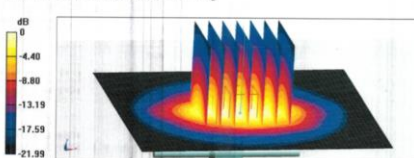
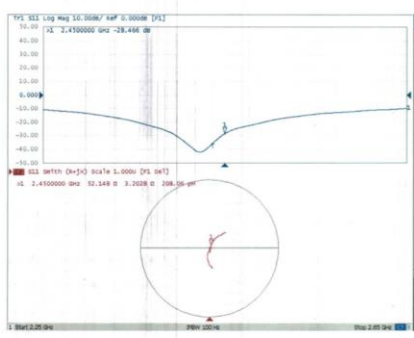


Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic formal documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

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

No.10, Weiye Road, Innovation Park, Kunshan, Jiangsu, China 215300
中国·江苏·昆山市留学生创业园伟业路10号 邮编 215300

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

TTL Speaq Calibration Laboratory		CAICT	
Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-4204633-2079 Fax: +86-10-4204633-2504 E-mail: cti@chinaul.com http://www.chinaul.cn		Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-4204633-2079 Fax: +86-10-4204633-2504 E-mail: cti@chinaul.com http://www.chinaul.cn	
Measurement Conditions DASY system configuration, as far as not given on page 1.			
DASY Version	DASY52	52.10.4	
Extrapolation	Advanced Extrapolation		
Phantom	Triple Flat Phantom 5.1C		
Distance Dipole Center - TSL	10 mm	with Spacer	
Zoom Scan Resolution	dx, dy, dz = 5 mm		
Frequency	2450 MHz ± 1 MHz		
Head TSL parameters The following parameters and calculations were applied.			
	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.5 ± 6 %	1.79 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	---	---
SAR result with Head TSL			
SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition		
SAR measured	250 mW input power	13.2 W/kg	
SAR for nominal Head TSL parameters	normalized to 1W	53.0 W/kg ± 18.8 % (k=2)	
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition		
SAR measured	250 mW input power	6.15 W/kg	
SAR for nominal Head TSL parameters	normalized to 1W	24.7 W/kg ± 18.7 % (k=2)	
Certificate No: Z22-60107 Page 3 of 6			
TTL Speaq Calibration Laboratory		CAICT	
Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-4204633-2079 Fax: +86-10-4204633-2504 E-mail: cti@chinaul.com http://www.chinaul.cn		Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-4204633-2079 Fax: +86-10-4204633-2504 E-mail: cti@chinaul.com http://www.chinaul.cn	
DASY5 Validation Report for Head TSL Date: 2022-04-01			
Test Laboratory: CTTL, Beijing, China			
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 817			
Communication System: UTD 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1			
Medium parameters used: f = 2450 MHz; σ = 1.79 S/m; ε _r = 39.52; ρ = 1000 kg/m ³			
Phantom section: Right Section			
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)			
DASY5 Configuration:			
- Probe: EX3DV4 - SN7307; ConvF(7.75, 7.75, 7.75) @ 2450 MHz; Calibrated: 2021-05-26 - Sensor-Surface: 1.4mm (Mechanical Surface Detection) - Electronics: DA14 Sni556; Calibrated: 2022-01-12 - Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062 - DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)			
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm			
Reference Value = 104.6 V/m; Power Drift = -0.03 dB			
Peak SAR (extrapolated) = 27.0 W/kg			
SAR(1 g) = 13.2 W/kg; SAR(10 g) = 6.15 W/kg			
Smallest distance from peaks to all points 3 dB below = 8.9 mm			
Ratio of SAR at M2 to SAR at M1 = 49.2%			
Maximum value of SAR (measured) = 22.1 W/kg			
			
Certificate No: Z22-60107 Page 4 of 6			
TTL Speaq Calibration Laboratory		CAICT	
Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-4204633-2079 Fax: +86-10-4204633-2504 E-mail: cti@chinaul.com http://www.chinaul.cn		Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-4204633-2079 Fax: +86-10-4204633-2504 E-mail: cti@chinaul.com http://www.chinaul.cn	
Impedance Measurement Plot for Head TSL			
			
Certificate No: Z22-60107 Page 5 of 6			



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx>; and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Attention: To check the authenticity of testing /inspection report & certificate, please contact us at telephone: (86-755) 8307 1443, or email: CN.Doccheck@sgs.com
No.10, Weiye Road, Innovation Park, Kunshan, Jiangsu, China 215300
中国·江苏·昆山市留学生创业园伟业路10号 邮编 215300

t(86-512)57355888 t(86-512)57370818 www.sgsgroup.com.cn
t(86-512)57355888 t(86-512)57370818 sgs.china@sgs.com