SAR Test Report

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ANNEX E: D750V3 Dipole Calibration Certificate

Add: No.51 Xueyu Tel: +86-10-623046	m Road, Haidian Dis	triet, Beijing, 100191, China 86-10-62304633-2504	NAS 校准 CALIBRATI CNAS LOSI
E-mail: ettl@chinat		www.chinattl.en	20-60299
CALIBRATION CI			0-00233
Object	D750V	3 - SN: 1045	
Calibration Procedure(s)	FF-Z11	-003-01	
	Calibra	tion Procedures for dipole validation kits	
Calibration date:	August	28, 2020	
pages and are part of the co All calibrations have been	asurements and ertificate.	the uncertainties with confidence probability the closed laboratory facility: environment	
measurements(SI). The me pages and are part of the co All calibrations have been	asurements and ertificate.	the closed laboratory facility: environment	
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measurements(SI). The me pages and are part of the co All calibrations have been humidity<70%. Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP6A Reference Probe EX3DV4	asurements and ertificate. a conducted in (M&TE critical fr ID # 106276 101369 SN 3617	the closed laboratory facility: environment or calibration) Cal Date(Calibrated by, Certificate No.) 12-May-20 (CTTL, No.J20X02965) 12-May-20 (CTTL, No.J20X02965) 30-Jan-20(SPEAG,No.EX3-3617_Jan20) 10-Feb-20(CTTL-SPEAG,No.Z20-60017) Cal Date(Calibrated by, Certificate No.)	temperature(22±3)°C an Scheduled Calibration May-21 May-21 Jan-21 Feb-21
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measurements(SI). The me pages and are part of the co All calibrations have been humidity<70%. Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP6A Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C	asurements and ertificate. a conducted in I (M&TE critical fi 106276 101369 SN 3617 SN 771 ID # ID #	the closed laboratory facility: environment or calibration) Cal Date(Calibrated by, Certificate No.) 12-May-20 (CTTL, No.J20X02965) 12-May-20 (CTTL, No.J20X02965) 30-Jan-20(SPEAG,No.EX3-3617_Jan20) 10-Feb-20(CTTL-SPEAG,No.Z20-60017) Cal Date(Calibrated by, Certificate No.) 25-Feb-20 (CTTL, No.J20X00516)	temperature(22±3)°C an Scheduled Calibration May-21 May-21 Jan-21 Feb-21 Scheduled Calibratio Feb-21
measurements(SI). The me pages and are part of the co All calibrations have been humidity<70%. Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP6A Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C NetworkAnalyzer E5071C	asurements and ertificate. a conducted in (M&TE critical fill 106276 101369 SN 3617 SN 771 ID # MY49071430 MY46110673	the closed laboratory facility: environment or calibration) Cal Date(Calibrated by, Certificate No.) 12-May-20 (CTTL, No.J20X02965) 12-May-20 (CTTL, No.J20X02965) 30-Jan-20(SPEAG,No.EX3-3617_Jan20) 10-Feb-20(CTTL-SPEAG,No.Z20-60017) Cal Date(Calibrated by, Certificate No.) 25-Feb-20 (CTTL, No.J20X00516) 10-Feb-20 (CTTL, No.J20X00515)	temperature(22±3)°C an Scheduled Calibration May-21 May-21 Jan-21 Feb-21 Scheduled Calibration Feb-21 Feb-21
measurements(SI). The me pages and are part of the co All calibrations have been humidity<70%. Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP6A Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C	asurements and ertificate. a conducted in (M&TE critical find) 106276 101369 SN 3617 SN 771 ID # MY49071430 MY46110673 Name	the closed laboratory facility: environment or calibration) Cal Date(Calibrated by, Certificate No.) 12-May-20 (CTTL, No.J20X02965) 12-May-20 (CTTL, No.J20X02965) 30-Jan-20(SPEAG,No.EX3-3617_Jan20) 10-Feb-20(CTTL-SPEAG,No.Z20-60017) Cal Date(Calibrated by, Certificate No.) 25-Feb-20 (CTTL, No.J20X00516) 10-Feb-20 (CTTL, No.J20X00515) Function	temperature(22±3)°C an Scheduled Calibration May-21 May-21 Jan-21 Feb-21 Scheduled Calibration Feb-21 Feb-21

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

Calibration is Performed According to the Following Standards:

- a) 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
- b) IEC 62209-1, "Measurement procedure for assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016
- c) IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- d) KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters;

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

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

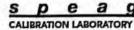
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Measurement Conditions

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

DASY Version	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz ± 1 MHz	

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Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.3 ± 6 %	0.87 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	2.07 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	8.37 W/kg ± 18.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.38 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	5.57 W/kg ± 18.7 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.5	0.96 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.4 ± 6 %	0.94 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C		

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.12 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	8.58 W/kg ± 18.8 % (k=2)
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	1.41 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	5.70 W/kg ±18.7 % (k=2)

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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.3Ω- 2.29jΩ
Return Loss	- 26.6dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.7Ω- 4.58jΩ	
Return Loss	- 25.6dB	

General Antenna Parameters and Design

Electrical Delay (one direction)	0.900 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 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 feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG

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DASY5 Validation Report for Head TSL

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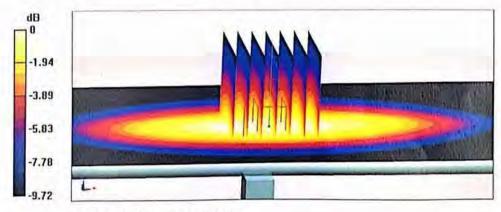
Date: 08.28.2020

Test Laboratory: CTTL, Beijing, China DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1045 Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1 Medium parameters used: f = 750 MHz; $\sigma = 0.873 \text{ S/m}$; $\varepsilon_r = 41.28$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Right Section **DASY5** Configuration:

- Probe: EX3DV4 SN3617; ConvF(10.07, 10.07, 10.07) @ 750 MHz; Calibrated: ٠ 2020-01-30
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2020-02-10
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 54.97 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 3.00 W/kg SAR(1 g) = 2.07 W/kg; SAR(10 g) = 1.38 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 = 68.7% Maximum value of SAR (measured) = 2.71 W/kg

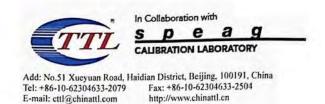


0 dB = 2.71 W/kg = 4.33 dBW/kg

Certificate No: Z20-60299

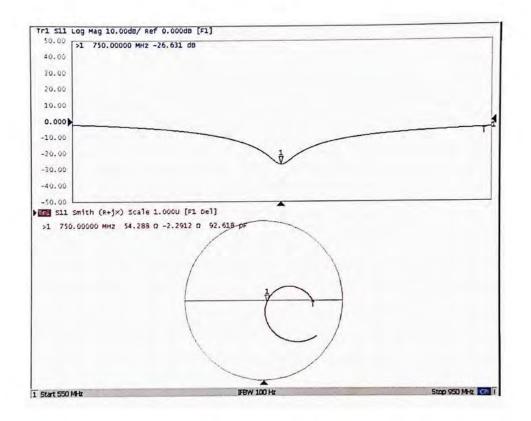
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Impedance Measurement Plot for Head TSL

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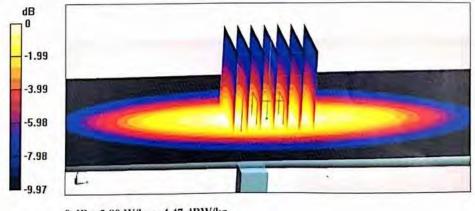


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DASY5 Validation Report for Body TSL Date: 08.28.2020 Test Laboratory: CTTL, Beijing, China DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1045 Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1 Medium parameters used: f = 750 MHz; $\sigma = 0.94 \text{ S/m}$; $\epsilon_r = 54.36$; $p = 1000 \text{ kg/m}^3$ Phantom section: Center Section **DASY5** Configuration: Probe: EX3DV4 - SN3617; ConvF(9.8, 9.8, 9.8) @ 750 MHz; Calibrated: . 2020-01-30 Sensor-Surface: 1.4mm (Mechanical Surface Detection) . Electronics: DAE4 Sn771; Calibrated: 2020-02-10 Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062 Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483) Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 53.84 V/m; Power Drift = -0.02 dB Peak SAR (extrapolated) = 3.14 W/kg SAR(1 g) = 2.12 W/kg; SAR(10 g) = 1.41 W/kg

Smallest distance from peaks to all points 3 dB below = 18.4 mm Ratio of SAR at M2 to SAR at M1 = 67.9% Maximum value of SAR (measured) = 2.80 W/kg



0 dB = 2.80 W/kg = 4.47 dBW/kg

Certificate No: Z20-60299

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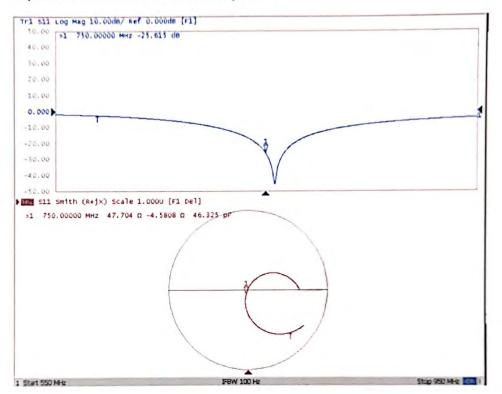


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Impedance Measurement Plot for Body TSL



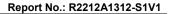
Certificate No: Z20-60299

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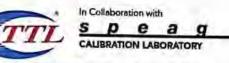
SAR Test Report

ANNEX F: D835V2 Dipole Calibration Certificate

E-mail: cttl@chinat Client TA(Sh CALIBRATION CI	nanghai)	Certificate No:	Z20-60296	
	ERTIFICAT	E		
Object				
oujour	D835V	2 - SN: 4d020		
Calibration Procedure(s)	FF-Z11 Calibra	-003-01 tion Procedures for dipole validation k	its	
Calibration date:	August	28, 2020		
		the closed laboratory facility: enviro	nment temperate	ure(22±3)°C and
All calibrations have been humidity<70%. Calibration Equipment used	n conducted in	or calibration)		ure(22±3)°C and
All calibrations have been humidity<70%. Calibration Equipment used	n conducted in d (M&TE critical fo			-
All calibrations have been numidity<70%. Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP6A	ID # 106276 101369	Cal Date(Calibrated by, Certificate I 12-May-20 (CTTL, No.J20X02965) 12-May-20 (CTTL, No.J20X02965)	No.) Schedu	led Calibration May-21 May-21
All calibrations have been humidity<70%. Calibration Equipment used Primary Standards Power Meter NRP2	n conducted in d (M&TE critical fr ID # 106276 101369	or calibration) Cal Date(Calibrated by, Certificate I 12-May-20 (CTTL, No.J20X02965)	No.) Schedu In20)	led Calibration May-21
All calibrations have been humidity<70%. Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP6A Reference Probe EX3DV4	ID# 106276 101369 SN 3617	Cal Date(Calibrated by, Certificate N 12-May-20 (CTTL, No.J20X02965) 12-May-20 (CTTL, No.J20X02965) 30-Jan-20(SPEAG,No.EX3-3617_Ja 10-Feb-20(CTTL-SPEAG,No.Z20-60 Cal Date(Calibrated by, Certificate N	No.) Schedu In20) 1017)	led Calibration May-21 May-21 Jan-21
All calibrations have been humidity<70%. Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP6A Reference Probe EX3DV4 DAE4	ID # 106276 101369 SN 3617 SN 771 ID # MY49071430	Cal Date(Calibrated by, Certificate I 12-May-20 (CTTL, No.J20X02965) 12-May-20 (CTTL, No.J20X02965) 30-Jan-20(SPEAG,No.EX3-3617_Ja 10-Feb-20(CTTL-SPEAG,No.Z20-60	No.) Schedu In20) 1017)	led Calibration May-21 May-21 Jan-21 Feb-21
All calibrations have been humidity<70%. Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP6A Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C	ID # 106276 101369 SN 3617 SN 771 ID # MY49071430	Cal Date(Calibrated by, Certificate I 12-May-20 (CTTL, No.J20X02965) 12-May-20 (CTTL, No.J20X02965) 30-Jan-20(SPEAG,No.EX3-3617_Ja 10-Feb-20(CTTL-SPEAG,No.Z20-60 Cal Date(Calibrated by, Certificate N 25-Feb-20 (CTTL, No.J20X00516)	No.) Schedu (n20) (017) o.) Schedu	led Calibration May-21 May-21 Jan-21 Feb-21 led Calibration Feb-21
All calibrations have been humidity<70%. Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP6A Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C NetworkAnalyzer E5071C	n conducted in d (M&TE critical fe 106276 101369 4 SN 3617 SN 771 1D # MY49071430 MY46110673	Cal Date(Calibrated by, Certificate N 12-May-20 (CTTL, No.J20X02965) 12-May-20 (CTTL, No.J20X02965) 30-Jan-20(SPEAG,No.EX3-3617_Ja 10-Feb-20(CTTL-SPEAG,No.Z20-60 Cal Date(Calibrated by, Certificate N 25-Feb-20 (CTTL, No.J20X00516) 10-Feb-20 (CTTL, No.J20X00515)	No.) Schedu (n20) (017) o.) Schedu	led Calibration May-21 May-21 Jan-21 Feb-21 led Calibration Feb-21 Feb-21
All calibrations have been humidity<70%. Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP6A Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C	A conducted in (M&TE critical for 10# 106276 101369 SN 3617 SN 771 ID # MY49071430 MY46110673 Name	Cal Date(Calibrated by, Certificate I 12-May-20 (CTTL, No.J20X02965) 12-May-20 (CTTL, No.J20X02965) 30-Jan-20(SPEAG,No.EX3-3617_Ja 10-Feb-20(CTTL-SPEAG,No.Z20-60 Cal Date(Calibrated by, Certificate N 25-Feb-20 (CTTL, No.J20X00516) 10-Feb-20 (CTTL, No.J20X00515)	No.) Schedu (n20) (017) o.) Schedu	led Calibration May-21 May-21 Jan-21 Feb-21 led Calibration Feb-21 Feb-21







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Glossary: TSL ConvF N/A

tissue simulating liquid sensitivity in TSL / NORMx,y,z not applicable or not measured

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- b) IEC 62209-1, "Measurement procedure for assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016
- c) IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- d) KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

e) 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: Z20-60296

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Measurement Conditions

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

DASY Version	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.2±6%	0.88 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	2.37 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	9.65 W/kg ± 18.8 % (k=2)
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.57 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	6.37 W/kg ± 18.7 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	55.0 ± 6 %	0.96 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	اسب	

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.42 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	9.76 W /kg ± 18.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Body TSL	Condition	1000
SAR measured	250 mW input power	1.59 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	6.40 W/kg ± 18.7 % (k=2)

Certificate No: Z20-60296

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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.8Ω+ 1.73jΩ
Return Loss	- 26.2dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.0Ω- 2.47jΩ	
Return Loss	- 26.2dB	

General Antenna Parameters and Design

Electrical Delay (one direction)	1.258 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 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 feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG

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DASY5 Validation Report for Head TSL

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China Fax: +86-10-62304633-2504 http://www.chinattl.cn

Date: 08.28.2020

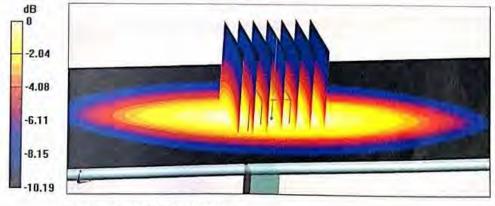
Test Laboratory: CTTL, Beijing, China DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d020 Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1 Medium parameters used: f = 835 MHz; $\sigma = 0.877$ S/m; $\varepsilon_r = 41.23$; $\rho = 1000$ kg/m³ Phantom section: Center Section

DASY5 Configuration:

- Probe: EX3DV4 SN3617; ConvF(9.66, 9.66, 9.66) @ 835 MHz; Calibrated: 2020-01-30
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2020-02-10
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062 .
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 58.09 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 3.46 W/kg SAR(1 g) = 2.37 W/kg; SAR(10 g) = 1.57 W/kg Smallest distance from peaks to all points 3 dB below = 16.6 mm Ratio of SAR at M2 to SAR at M1 = 68.1% Maximum value of SAR (measured) = 3.12 W/kg

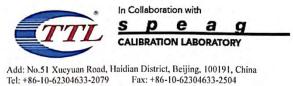


0 dB = 3.12 W/kg = 4.94 dBW/kg

Certificate No: Z20-60296

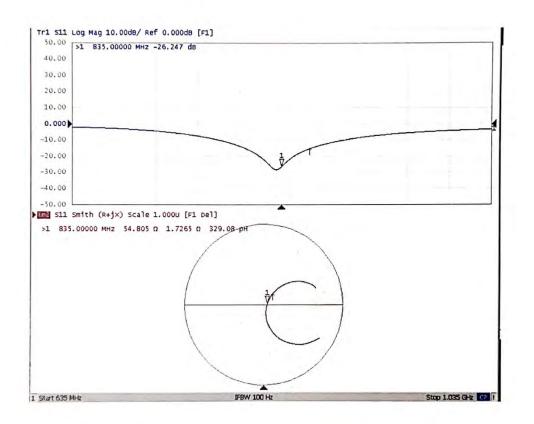
Page 5 of 8





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Impedance Measurement Plot for Head TSL



Certificate No: Z20-60296

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Date: 08.28.2020

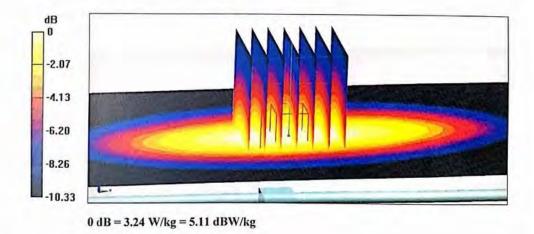




- Electronics: DAE4 Sn771; Calibrated: 2020-02-10
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

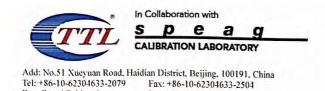
Reference Value = 56.88 V/m; Power Drift = -0.01 dB Peak SAR (extrapolated) = 3.65 W/kg SAR(1 g) = 2.42 W/kg; SAR(10 g) = 1.59 W/kg Smallest distance from peaks to all points 3 dB below = 15.8 mm Ratio of SAR at M2 to SAR at M1 = 66.5% Maximum value of SAR (measured) = 3.24 W/kg



Certificate No: Z20-60296

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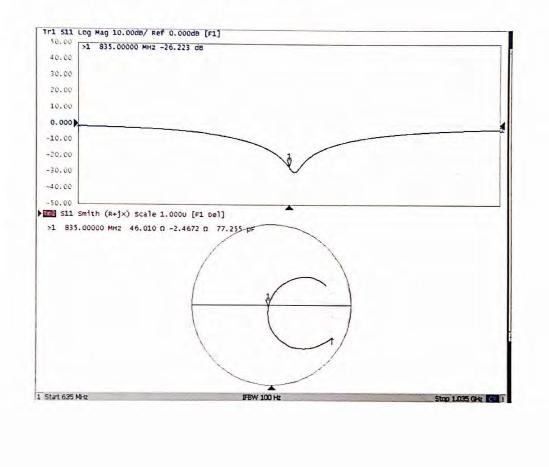




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Impedance Measurement Plot for Body TSL

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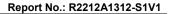
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ANNEX G: D1750V2 Dipole Calibration Certificate

		www.chinattl.cn	
Client TA(Sh	anghai)		-60079
CALIBRATION CI	ERTIFICAT	Έ	
Object	D1750	/2 - SN: 1033	
Calibration Procedure(s)	-		
		-003-01 tion Procedures for dipole validation kits	
Collibration data:			
Calibration date:	Febura	ry 25, 2020	
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bages and are part of the co All calibrations have been numidity<70%. Calibration Equipment used	ertificate.	the closed laboratory facility: environment	
bages and are part of the co All calibrations have been humidity<70%. Calibration Equipment used	ertificate.	the closed laboratory facility: environment	temperature(22±3)℃ and
Pages and are part of the ce All calibrations have been numidity<70%. Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP6A	ertificate. conducted in (M&TE critical for ID # 106276 101369	the closed laboratory facility: environment or calibration) Cal Date(Calibrated by, Certificate No.) 11-Apr-19 (CTTL, No.J19X02605) 11-Apr-19 (CTTL, No.J19X02605)	temperature(22±3)°C and Scheduled Calibration
All calibrations have been numidity<70%. Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP6A Reference Probe EX3DV4	ertificate. conducted in (M&TE critical for ID # 106276 101369 SN 3846	the closed laboratory facility: environment or calibration) Cal Date(Calibrated by, Certificate No.) 11-Apr-19 (CTTL, No.J19X02605) 11-Apr-19 (CTTL, No.J19X02605) 25-Mar-19(CTTL-SPEAG,No.Z19-60064)	temperature(22±3)°C and Scheduled Calibration Apr-20 Apr-20 Mar-20
Pages and are part of the ce All calibrations have been humidity<70%. Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP6A	ertificate. conducted in (M&TE critical for ID # 106276 101369	the closed laboratory facility: environment or calibration) Cal Date(Calibrated by, Certificate No.) 11-Apr-19 (CTTL, No.J19X02605) 11-Apr-19 (CTTL, No.J19X02605)	temperature(22±3) [°] C and Scheduled Calibration Apr-20 Apr-20
All calibrations have been numidity<70%. Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP6A Reference Probe EX3DV4	ertificate. conducted in (M&TE critical for ID # 106276 101369 SN 3846	the closed laboratory facility: environment or calibration) Cal Date(Calibrated by, Certificate No.) 11-Apr-19 (CTTL, No.J19X02605) 11-Apr-19 (CTTL, No.J19X02605) 25-Mar-19(CTTL-SPEAG,No.Z19-60064) 22-Aug-19(CTTL-SPEAG,No.Z19-60295)	temperature(22±3)°C and Scheduled Calibration Apr-20 Apr-20 Mar-20 Aug-20
bages and are part of the ce All calibrations have been numidity<70%. Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP6A Reference Probe EX3DV4 DAE4	ertificate. conducted in (M&TE critical for ID # 106276 101369 SN 3846 SN 1555	the closed laboratory facility: environment or calibration) Cal Date(Calibrated by, Certificate No.) 11-Apr-19 (CTTL, No.J19X02605) 11-Apr-19 (CTTL, No.J19X02605) 25-Mar-19(CTTL-SPEAG,No.Z19-60064)	temperature(22±3)°C and Scheduled Calibration Apr-20 Apr-20 Mar-20
All calibrations have been numidity<70%. Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP6A Reference Probe EX3DV4 DAE4 Secondary Standards	ertificate. conducted in (M&TE critical for ID # 106276 101369 SN 3846 SN 1555 ID # ID # MY49071430	the closed laboratory facility: environment or calibration) Cal Date(Calibrated by, Certificate No.) 11-Apr-19 (CTTL, No.J19X02605) 11-Apr-19 (CTTL, No.J19X02605) 25-Mar-19(CTTL-SPEAG,No.Z19-60064) 22-Aug-19(CTTL-SPEAG,No.Z19-60295) Cal Date(Calibrated by, Certificate No.)	temperature(22±3)°C and Scheduled Calibration Apr-20 Apr-20 Mar-20 Aug-20 Scheduled Calibration
All calibrations have been humidity<70%. Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP6A Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C	ertificate. conducted in (M&TE critical for ID # 106276 101369 SN 3846 SN 1555 ID # ID # MY49071430	the closed laboratory facility: environment or calibration) Cal Date(Calibrated by, Certificate No.) 11-Apr-19 (CTTL, No.J19X02605) 11-Apr-19 (CTTL, No.J19X02605) 25-Mar-19(CTTL-SPEAG,No.Z19-60064) 22-Aug-19(CTTL-SPEAG,No.Z19-60295) Cal Date(Calibrated by, Certificate No.) 10-Feb-20 (CTTL, No.J20X00516)	temperature(22±3)°C and Scheduled Calibration Apr-20 Apr-20 Mar-20 Aug-20 Scheduled Calibration Feb-21
All calibrations have been numidity<70%. Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP6A Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C NetworkAnalyzer E5071C	ertificate. conducted in (M&TE critical for 10 # 106276 101369 SN 3846 SN 1555 ID # MY49071430 MY46110673	the closed laboratory facility: environment or calibration) Cal Date(Calibrated by, Certificate No.) 11-Apr-19 (CTTL, No.J19X02605) 11-Apr-19 (CTTL, No.J19X02605) 25-Mar-19(CTTL-SPEAG,No.Z19-60064) 22-Aug-19(CTTL-SPEAG,No.Z19-60295) Cal Date(Calibrated by, Certificate No.) 10-Feb-20 (CTTL, No.J20X00516) 10-Feb-20 (CTTL, No.J20X00515)	temperature(22±3)°C and Scheduled Calibration Apr-20 Apr-20 Mar-20 Aug-20 Scheduled Calibration Feb-21 Feb-21
pages and are part of the ce All calibrations have been humidity<70%. Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP6A Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C	ertificate. conducted in (M&TE critical for 106276 101369 SN 3846 SN 1555 ID # MY49071430 MY46110673 Name	the closed laboratory facility: environment or calibration) Cal Date(Calibrated by, Certificate No.) 11-Apr-19 (CTTL, No.J19X02605) 11-Apr-19 (CTTL, No.J19X02605) 25-Mar-19(CTTL-SPEAG,No.Z19-60064) 22-Aug-19(CTTL-SPEAG,No.Z19-60295) Cal Date(Calibrated by, Certificate No.) 10-Feb-20 (CTTL, No.J20X00516) 10-Feb-20 (CTTL, No.J20X00515) Function	temperature(22±3)°C and Scheduled Calibration Apr-20 Apr-20 Mar-20 Aug-20 Scheduled Calibration Feb-21 Feb-21

Certificate No: Z20-60079

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Glossary:

TSL

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> tissue simulating liquid sensitivity in TSL / NORMx,y,z not applicable or not measured

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- b) IEC 62209-1, "Measurement procedure for assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016
- c) IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- d) KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

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Measurement Conditions

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

DASY Version	DASY52	V52.10.4
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	1750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.1	1.37 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.1 ± 6 %	1.35 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	8.93 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	35.9 W/kg ± 18.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	4.71 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	18.9 W/kg ± 18.7 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.4	1.49 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.4 ± 6 %	1.48 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C		

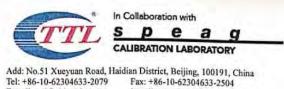
SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.24 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	36.9 W/kg ± 18.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	4.95 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	19.8 W/kg ± 18.7 % (k=2)

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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	48.8Ω- 0.06 jΩ	
Return Loss	- 38.3 dB	

Antenna Parameters with Body TSL

Impedance, transformed to feed point	44.5Ω- 0.85 jΩ	
Return Loss	- 24.5 dB	

General Antenna Parameters and Design

Electrical Delay (one direction)	1.085 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 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 feedpoint may be damaged.

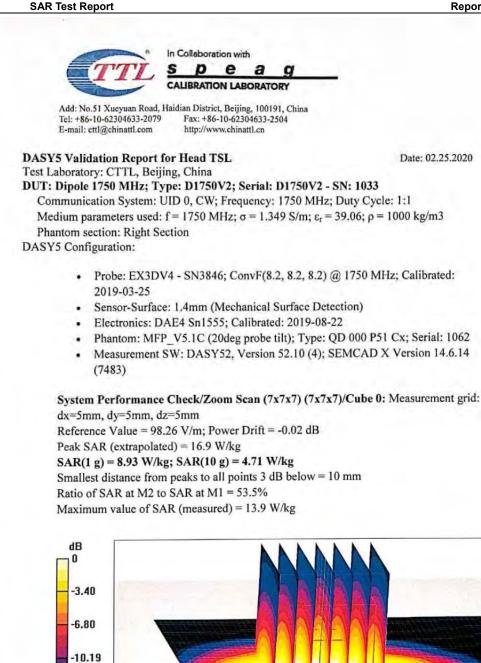
Additional EUT Data

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-16.99 0 dB = 13.9 W/kg = 11.43 dBW/kg

Certificate No: Z20-60079

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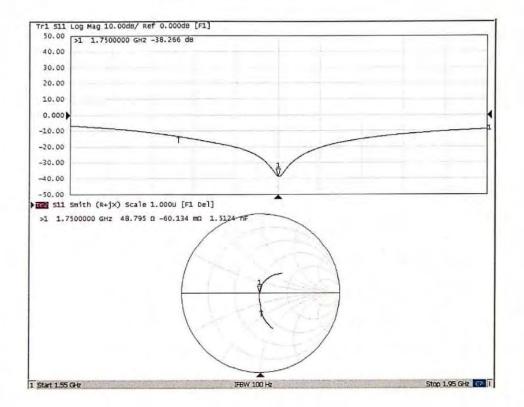


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Impedance Measurement Plot for Head TSL









DASY5 Validation Report for Body TSL Test Laboratory: CTTL, Beijing, China

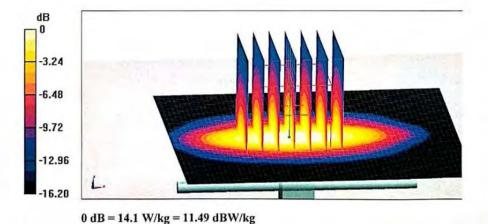
Date: 02.25.2020

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1033 Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1 Medium parameters used: f = 1750 MHz; $\sigma = 1.482$ S/m; $\varepsilon_r = 52.35$; $\rho = 1000$ kg/m3 Phantom section: Center Section

DASY5 Configuration:

- Probe: EX3DV4 SN3846; ConvF(7.8, 7.8, 7.8) @ 1750 MHz; Calibrated: 2019-03-25
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1555; Calibrated: 2019-08-22
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 94.32 V/m; Power Drift = 0.00 dB Peak SAR (extrapolated) = 16.9 W/kg SAR(1 g) = 9.24 W/kg; SAR(10 g) = 4.95 W/kg Smallest distance from peaks to all points 3 dB below = 9.2 mm Ratio of SAR at M2 to SAR at M1 = 56% Maximum value of SAR (measured) = 14.1 W/kg

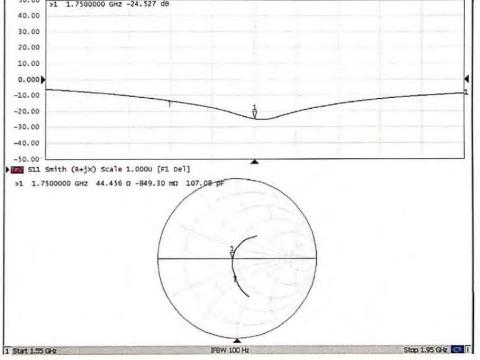


Certificate No: Z20-60079

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Certificate No: Z20-60079

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TA SAR Test Report

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Report No.: R2212A1312-S1V1

ANNEX H: D1900V2 Dipole Calibration Certificate

Client TA Client TA CALIBRATION C Object Calibration Procedure(s)	(Shanghai) ERTIFICAT		20-60297
Object		E	
and the second sec	D1000		
Calibration Procedure(s)	01900	/2 - SN: 5d060	
	-		
		-003-01 tion Procedures for dipole validation kits	
Calibration data	Ganora	tion Procedures for dipole validation kits	
Calibration date:	August	27, 2020	
humidity<70%.			
Calibration Equipment use			
Calibration Equipment use Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Calibration Equipment use Primary Standards Power Meter NRP2	ID # 106276	Cal Date(Calibrated by, Certificate No.) 12-May-20 (CTTL, No.J20X02965)	May-21
Calibration Equipment use Primary Standards Power Meter NRP2 Power sensor NRP6A	ID # 106276 101369	Cal Date(Calibrated by, Certificate No.) 12-May-20 (CTTL, No.J20X02965) 12-May-20 (CTTL, No.J20X02965)	
Calibration Equipment use Primary Standards Power Meter NRP2	ID # 106276 101369	Cal Date(Calibrated by, Certificate No.) 12-May-20 (CTTL, No.J20X02965)	May-21 May-21
Calibration Equipment use Primary Standards Power Meter NRP2 Power sensor NRP6A Reference Probe EX3DV4 DAE4	ID # 106276 101369 4 SN 3617	Cal Date(Calibrated by, Certificate No.) 12-May-20 (CTTL, No.J20X02965) 12-May-20 (CTTL, No.J20X02965) 30-Jan-20(SPEAG,No.EX3-3617_Jan20)	May-21 May-21 Jan-21
Calibration Equipment use Primary Standards Power Meter NRP2 Power sensor NRP6A Reference Probe EX3DV4	ID # 106276 101369 4 SN 3617 SN 771 ID #	Cal Date(Calibrated by, Certificate No.) 12-May-20 (CTTL, No.J20X02965) 12-May-20 (CTTL, No.J20X02965) 30-Jan-20(SPEAG,No.EX3-3617_Jan20) 10-Feb-20(CTTL-SPEAG,No.Z20-60017)	May-21 May-21 Jan-21 Feb-21
Calibration Equipment use Primary Standards Power Meter NRP2 Power sensor NRP6A Reference Probe EX3DV4 DAE4 Secondary Standards	ID # 106276 101369 4 SN 3617 SN 771 ID # 2 MY49071430	Cal Date(Calibrated by, Certificate No.) 12-May-20 (CTTL, No.J20X02965) 12-May-20 (CTTL, No.J20X02965) 30-Jan-20(SPEAG,No.EX3-3617_Jan20) 10-Feb-20(CTTL-SPEAG,No.Z20-60017) Cal Date(Calibrated by, Certificate No.)	May-21 May-21 Jan-21 Feb-21 Scheduled Calibration
Calibration Equipment use Primary Standards Power Meter NRP2 Power sensor NRP6A Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C	ID # 106276 101369 4 SN 3617 SN 771 ID # 2 MY49071430	Cal Date(Calibrated by, Certificate No.) 12-May-20 (CTTL, No.J20X02965) 12-May-20 (CTTL, No.J20X02965) 30-Jan-20(SPEAG,No.EX3-3617_Jan20) 10-Feb-20(CTTL-SPEAG,No.Z20-60017) Cal Date(Calibrated by, Certificate No.) 25-Feb-20 (CTTL, No.J20X00516)	May-21 May-21 Jan-21 Feb-21 Scheduled Calibration Feb-21
Calibration Equipment use Primary Standards Power Meter NRP2 Power sensor NRP6A Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E44380 NetworkAnalyzer E50710	ID # 106276 101369 4 SN 3617 SN 771 ID # 2 MY49071430 3 MY46110673	Cal Date(Calibrated by, Certificate No.) 12-May-20 (CTTL, No.J20X02965) 12-May-20 (CTTL, No.J20X02965) 30-Jan-20(SPEAG,No.EX3-3617_Jan20) 10-Feb-20(CTTL-SPEAG,No.Z20-60017) Cal Date(Calibrated by, Certificate No.) 25-Feb-20 (CTTL, No.J20X00516) 10-Feb-20 (CTTL, No.J20X00515)	May-21 May-21 Jan-21 Feb-21 Scheduled Calibration Feb-21 Feb-21
Calibration Equipment user Primary Standards Power Meter NRP2 Power sensor NRP6A Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C	ID # 106276 101369 4 SN 3617 SN 771 ID # 2 MY49071430 MY46110673 Name	Cal Date(Calibrated by, Certificate No.) 12-May-20 (CTTL, No.J20X02965) 12-May-20 (CTTL, No.J20X02965) 30-Jan-20(SPEAG,No.EX3-3617_Jan20) 10-Feb-20(CTTL-SPEAG,No.Z20-60017) Cal Date(Calibrated by, Certificate No.) 25-Feb-20 (CTTL, No.J20X00516) 10-Feb-20 (CTTL, No.J20X00515) Function	May-21 May-21 Jan-21 Feb-21 Scheduled Calibration Feb-21 Feb-21

Certificate No: Z20-60297

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lossary: TSL ConvF N/A

tissue simulating liquid sensitivity in TSL / NORMx,y,z not applicable or not measured

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- b) IEC 62209-1, "Measurement procedure for assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016
- c) IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- d) KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

e) 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: Z20-60297

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 http://www.chinattl.cn

Measurement Conditions

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

DASY Version	DASY52	V52.10.4
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.

	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	41.1 ± 6 %	1.40 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	9.82 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	39.5 W/kg ± 18.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	5.04 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	20.2 W/kg ± 18.7 % (k=2)

Body TSL parameters The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.5 ± 6 %	1.51 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C		

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.89 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	39.8 W/kg ± 18.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	5.13 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	20.6 W/kg ± 18.7 % (k=2)

Certificate No: Z20-60297

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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.50+ 6,58j0	
Return Loss	- 23.3dB	

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.0Ω+ 6,72jΩ	
Return Loss	- 22.9dB	

General Antenna Parameters and Design

Electrical Delay (one direction)	1.061 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 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 feedpoint may be damaged.

Additional EUT Data

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Manufactured by	SPEAG

Certificate No: 720-60297

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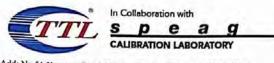
In Collaboration with	
CALIBRATION LABORATORY	
Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504 E-mail: ettl@chinattl.com http://www.chinattl.cn	
DASY5 Validation Report for Head TSL Test Laboratory: CTTL, Beijing, China	Date: 08.27.2020
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN	l: 5d060
Communication System: UID 0, CW; Frequency: 1900 MHz; Du	
Medium parameters used: $f = 1900 \text{ MHz}$; $\sigma = 1.404 \text{ S/m}$; $\varepsilon_r = 41$.12; $\rho = 1000 \text{ kg/m3}$
Phantom section: Center Section DASY5 Configuration:	
DASTS Configuration:	
 Probe: EX3DV4 - SN3617; ConvF(8.14, 8.14, 8.14) 2020-01-30 	@ 1900 MHz; Calibrated:
 Sensor-Surface: 1.4mm (Mechanical Surface Detecti 	ion)
 Electronics: DAE4 Sn771; Calibrated: 2020-02-10 	
 Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 	000 P51 Cx; Serial: 1062
 Measurement SW: DASY52, Version 52.10 (4); SEN (7483) 	MCAD X Version 14.6.14
System Performance Check/Zoom Scan (7x7x7) (7x7x7)/	Cube 0: Measurement grid:
dx=5mm, dy=5mm, dz=5mm	
Reference Value = 100.3 V/m ; Power Drift = -0.03 dB	
Peak SAR (extrapolated) = 19.0 W/kg SAR(1 g) = 9.82 W/kg ; SAR(10 g) = 5.04 W/kg	
SAR(1 g) = 3.62 wing, SAR(10 g) = 3.64 wing Smallest distance from peaks to all points 3 dB below = 10 r	mm
Ratio of SAR at M2 to SAR at M1 = 51.9%	
Maximum value of SAR (measured) = 15.6 W/kg	
dB	
-10.92	
-14.56	

0 dB = 15.6 W/kg = 11.93 dBW/kg

Certificate No: Z20-60297

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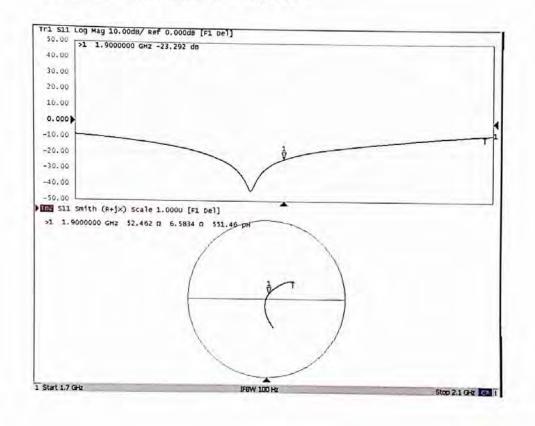


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 E-mail: cttl@chinattl.com
 http://www.chinattl.cn

Impedance Measurement Plot for Head TSL



Certificate No: Z20-60297

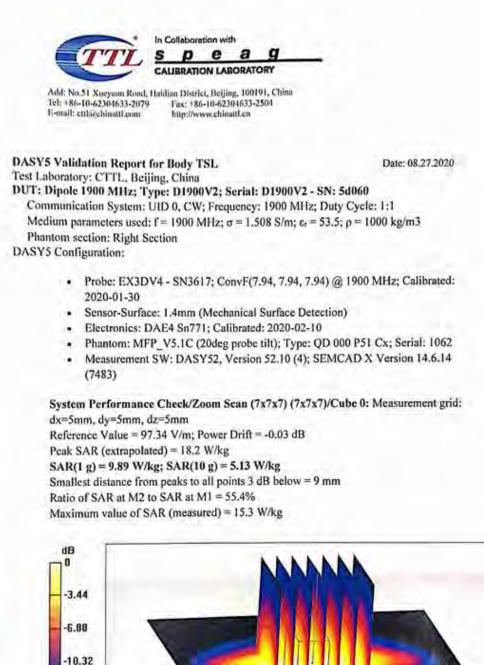
Page 6 of 8



-13.76

17.20

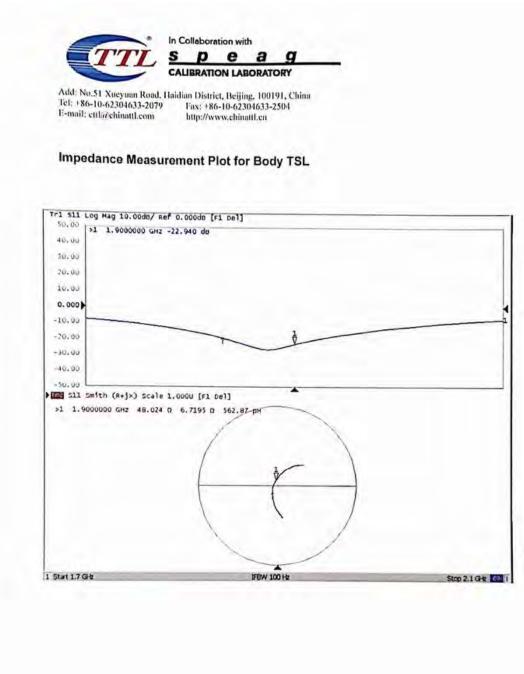
Certificate No: Z20-60297



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0 dB = 15.3 W/kg = 11.85 dBW/kg





Certificate No: Z20-60297

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Report No.: R2212A1312-S1V1

ANNEX I: D2300V2 Dipole Calibration Certificate

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



Schweizerischer Kalibrierdienst Service suisse d'étalonnage Servizio svizzero di taratura

Swiss Calibration Service

Accreditation No.: SCS 0108

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 TA-SH (Auden)

Certificate No: D2300V2-1131_Sep22

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Object	D2300V2 - SN:11	131	
Calibration procedure(s)	QA CAL-05.v11 Calibration Proce	dure for SAR Validation Sources	between 0.7-3 GHz
Calibration date:	September 09, 20	022	
		onal standards, which realize the physical un	
he measurements and the uncertain	ainties with confidence p	robability are given on the following pages an	nd are part of the certificate.
All calibrations have been conducte	ed in the closed laborator	ry facility: environment temperature (22 \pm 3)°	C and humidity < 70%.
Calibration Equipment used (M&TE	critical for calibration		
Calibration Equipment used (walle	chicanor caloration		
Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-22 (No. 217-03525/03524)	Apr-23
ower sensor NRP-Z91	SN: 103244	04-Apr-22 (No. 217-03524)	Apr-23
ower sensor NRP-Z91	SN: 103245	04-Apr-22 (No. 217-03525)	Apr-23
	SN: 103245 SN: BH9394 (20k)	04-Apr-22 (No. 217-03525) 04-Apr-22 (No. 217-03527)	
Reference 20 dB Attenuator	and the fact of the second second		Apr-23
Reference 20 dB Attenuator ype-N mismatch combination	SN: BH9394 (20k)	04-Apr-22 (No. 217-03527)	Apr-23 Apr-23
Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4	SN: BH9394 (20k) SN: 310982 / 06327	04-Apr-22 (No. 217-03527) 04-Apr-22 (No. 217-03528)	Apr-23 Apr-23 Apr-23
Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4	SN: BH9394 (20k) SN: 310982 / 06327 SN: 7349	04-Apr-22 (No. 217-03527) 04-Apr-22 (No. 217-03528) 31-Dec-21 (No. EX3-7349_Dec21)	Apr-23 Apr-23 Apr-23 Dec-22
Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards	SN: BH9394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601	04-Apr-22 (No. 217-03527) 04-Apr-22 (No. 217-03528) 31-Dec-21 (No. EX3-7349_Dec21) 31-Aug-22 (No. DAE4-601_Aug22)	Apr-23 Apr-23 Apr-23 Dec-22 Aug-23
Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B	SN: BH9394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601	04-Apr-22 (No. 217-03527) 04-Apr-22 (No. 217-03528) 31-Dec-21 (No. EX3-7349_Dec21) 31-Aug-22 (No. DAE4-601_Aug22) Check Date (in house)	Apr-23 Apr-23 Apr-23 Dec-22 Aug-23 Scheduled Check
Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A	SN: BH9394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475	04-Apr-22 (No. 217-03527) 04-Apr-22 (No. 217-03528) 31-Dec-21 (No. EX3-7349_Dec21) 31-Aug-22 (No. DAE4-601_Aug22) Check Date (in house) 30-Oct-14 (in house check Oct-20)	Apr-23 Apr-23 Apr-23 Dec-22 Aug-23 Scheduled Check In house check: Oct-22
Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A Power sensor HP 8481A	SN: BH9394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783	04-Apr-22 (No. 217-03527) 04-Apr-22 (No. 217-03528) 31-Dec-21 (No. EX3-7349_Dec21) 31-Aug-22 (No. DAE4-601_Aug22) Check Date (in house) 30-Oct-14 (in house check Oct-20) 07-Oct-15 (in house check Oct-20)	Apr-23 Apr-23 Apr-23 Dec-22 Aug-23 Scheduled Check In house check: Oct-22 In house check: Oct-22
Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A Power sensor HP 8481A RF generator R&S SMT-06	SN: BH9394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: MY41093315	04-Apr-22 (No. 217-03527) 04-Apr-22 (No. 217-03528) 31-Dec-21 (No. EX3-7349_Dec21) 31-Aug-22 (No. DAE4-601_Aug22) Check Date (in house) 30-Oct-14 (in house check Oct-20) 07-Oct-15 (in house check Oct-20) 07-Oct-15 (in house check Oct-20)	Apr-23 Apr-23 Apr-23 Dec-22 Aug-23 Scheduled Check In house check: Oct-22 In house check: Oct-22 In house check: Oct-22
Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A Power sensor HP 8481A RF generator R&S SMT-06 Network Analyzer Agilent E8358A	SN: BH9394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: MY41093315 SN: 100972	04-Apr-22 (No. 217-03527) 04-Apr-22 (No. 217-03528) 31-Dec-21 (No. EX3-7349_Dec21) 31-Aug-22 (No. DAE4-601_Aug22) Check Date (in house) 30-Oct-14 (in house check Oct-20) 07-Oct-15 (in house check Oct-20) 07-Oct-15 (in house check Oct-20) 15-Jun-15 (in house check Oct-20)	Apr-23 Apr-23 Apr-23 Dec-22 Aug-23 Scheduled Check In house check: Oct-22 In house check: Oct-22 In house check: Oct-22 In house check: Oct-22 In house check: Oct-22
Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A Power sensor HP 8481A RF generator R&S SMT-06	SN: BH9394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: MY41093315 SN: 100972 SN: US41080477	04-Apr-22 (No. 217-03527) 04-Apr-22 (No. 217-03528) 31-Dec-21 (No. EX3-7349_Dec21) 31-Aug-22 (No. DAE4-601_Aug22) Check Date (in house) 30-Oct-14 (in house check Oct-20) 07-Oct-15 (in house check Oct-20) 07-Oct-15 (in house check Oct-20) 15-Jun-15 (in house check Oct-20) 31-Mar-14 (in house check Oct-20)	Apr-23 Apr-23 Apr-23 Dec-22 Aug-23 Scheduled Check In house check: Oct-22 In house check: Oct-22 Signature
Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A Power sensor HP 8481A RF generator R&S SMT-06 Network Analyzer Agilent E8358A Calibrated by:	SN: BH9394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: WY41093315 SN: 100972 SN: US41080477 Name Joanna Liesha)	04-Apr-22 (No. 217-03527) 04-Apr-22 (No. 217-03528) 31-Dec-21 (No. EX3-7349_Dec21) 31-Aug-22 (No. DAE4-601_Aug22) Check Date (in house) 30-Oct-14 (in house check Oct-20) 07-Oct-15 (in house check Oct-20) 07-Oct-15 (in house check Oct-20) 15-Jun-15 (in house check Oct-20) 31-Mar-14 (in house check Oct-20) Function Laboratory Technician	Apr-23 Apr-23 Apr-23 Dec-22 Aug-23 Scheduled Check In house check: Oct-22 In house check: Oct-22 Signature
Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A Power sensor HP 8481A RF generator R&S SMT-06 Network Analyzer Agilent E8358A	SN: BH9394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: MY41093315 SN: 100972 SN: US41080477 Name	04-Apr-22 (No. 217-03527) 04-Apr-22 (No. 217-03528) 31-Dec-21 (No. EX3-7349_Dec21) 31-Aug-22 (No. DAE4-601_Aug22) Check Date (in house) 30-Oct-14 (in house check Oct-20) 07-Oct-15 (in house check Oct-20) 07-Oct-15 (in house check Oct-20) 15-Jun-15 (in house check Oct-20) 31-Mar-14 (in house check Oct-20) Function	Apr-23 Apr-23 Apr-23 Dec-22 Aug-23 Scheduled Check In house check: Oct-22 In house check: Oct-22 In house check: Oct-22 In house check: Oct-22 In house check: Oct-22



Calibration Laboratory of Schmid & Partner Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland





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С Servizio svizzero di taratura

S Swiss Calibration Service

Accreditation No.: SCS 0108

Accredited by the Swiss Accreditation Service (SAS)

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Glossarv:

eurofins

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

Calibration is Performed According to the Following Standards:

- a) IEC/IEEE 62209-1528, "Measurement Procedure For The Assessment Of Specific Absorption Rate Of Human Exposure To Radio Frequency Fields From Hand-Held And Body-Worn Wireless Communication Devices - Part 1528: Human Models, Instrumentation And Procedures (Frequency Range of 4 MHz to 10 GHz)", October 2020.
- b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

c) DASY 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 source is mounted in a touch configuration below the center marking of the flat phantom.
- · Return Loss: This parameter is measured with the source positioned under the liquid filled phantom (as described in the measurement condition clause). The Return Loss ensures low reflected power. No uncertainty required.
- SAR measured: SAR measured at the stated antenna input power.
- SAR normalized: SAR as measured, normalized to an input power of 1 W at the antenna . connector.
- SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.

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: D2300V2-1131_Sep22

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Measurement Conditions

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

DASY Version	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2300 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.5	1.67 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.4 ± 6 %	1.69 mho/m ± 6 %
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	12.7 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	50.1 W/kg ± 17.0 % (k=2)
SAR averaged over 10 cm ² (10 g) of Head TSL	condition	
SAR averaged over 10 cm ³ (10 g) of Head TSL SAR measured	condition 250 mW input power	6.19 W/kg

Certificate No: D2300V2-1131_Sep22

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Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	45.8 Ω + 2.3 jΩ	
Return Loss	- 26.1 dB	

General Antenna Parameters and Design

Electrical Delay (one direction)	1.163 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 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 feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
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Certificate No: D2300V2-1131_Sep22

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Date: 09.09.2022

DASY5 Validation Report for Head TSL

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2300 MHz; Type: D2300V2; Serial: D2300V2 - SN: 1131

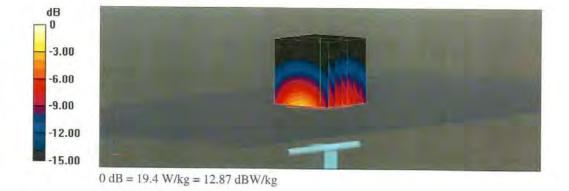
Communication System: UID 0 - CW; Frequency: 2300 MHz Medium parameters used: f = 2300 MHz; $\sigma = 1.69$ S/m; $\varepsilon_r = 38.4$; $\rho = 1000$ kg/m³ Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 SN7349; ConvF(7.98, 7.98, 7.98) @ 2300 MHz; Calibrated: 31.12.2021
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 31.08.2022
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm /Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 118.4 V/m; Power Drift = 0.05 dB Peak SAR (extrapolated) = 22.8 W/kg SAR(1 g) = 12.7 W/kg; SAR(10 g) = 6.19 W/kg Smallest distance from peaks to all points 3 dB below = 9 mm Ratio of SAR at M2 to SAR at M1 = 56.1% Maximum value of SAR (measured) = 19.4 W/kg

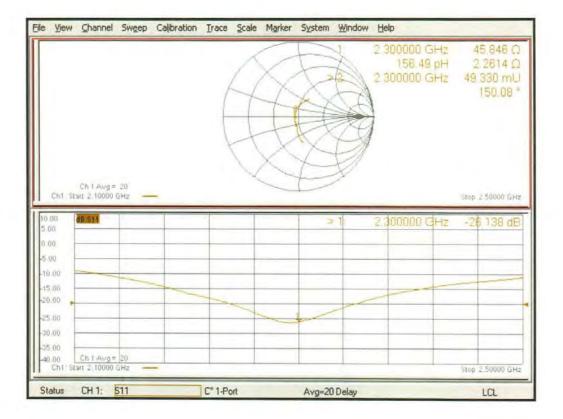


Certificate No: D2300V2-1131_Sep22

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Impedance Measurement Plot for Head TSL



Certificate No: D2300V2-1131_Sep22

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Report No.: R2212A1312-S1V1

ANNEX J: D2450V2 Dipole Calibration Certificate

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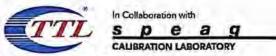
SAR Test Report

E-mail: cttl@chinal Client TA(S CALIBRATION CI Object Calibration Procedure(s)	hanghai) ERTIFICAT	E	20-60298
CALIBRATION C			
	D2450	n 110 art	
Calibration Procedure(s)		/2 - SN: 786	
		000.04	
	FF-Z11 Calibra	-003-01 tion Procedures for dipole validation kits	
Calibration date:			
solution date.	August	27, 2020	
$\alpha_{1}\alpha_{1}\alpha_{1}\alpha_{2}\alpha_{3}\alpha_{4}\alpha_{5}\alpha_{5}\alpha_{5}\alpha_{5}\alpha_{5}\alpha_{5}\alpha_{5}\alpha_{5$			
humidity<70%. Calibration Equipment used	d (M&TE critical f	or calibration)	
Calibration Equipment used	ID#	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Calibration Equipment used Primary Standards Power Meter NRP2	ID # 106276	Cal Date(Calibrated by, Certificate No.) 12-May-20 (CTTL, No.J20X02965)	May-21
Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP6A	ID # 106276 101369	Cal Date(Calibrated by, Certificate No.) 12-May-20 (CTTL, No.J20X02965) 12-May-20 (CTTL, No.J20X02965)	May-21 May-21
Calibration Equipment used Primary Standards Power Meter NRP2	ID # 106276 101369	Cal Date(Calibrated by, Certificate No.) 12-May-20 (CTTL, No.J20X02965)	May-21
Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP6A Reference Probe EX3DV4 DAE4	ID # 106276 101369 SN 3617 SN 771	Cal Date(Calibrated by, Certificate No.) 12-May-20 (CTTL, No.J20X02965) 12-May-20 (CTTL, No.J20X02965) 30-Jan-20(SPEAG,No.EX3-3617_Jan20) 10-Feb-20(CTTL-SPEAG,No.Z20-60017)	May-21 May-21 Jan-21 Feb-21
Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP6A Reference Probe EX3DV4 DAE4 Secondary Standards	ID # 106276 101369 SN 3617 SN 771 ID #	Cal Date(Calibrated by, Certificate No.) 12-May-20 (CTTL, No.J20X02965) 12-May-20 (CTTL, No.J20X02965) 30-Jan-20(SPEAG,No.EX3-3617_Jan20) 10-Feb-20(CTTL-SPEAG,No.Z20-60017) Cal Date(Calibrated by, Certificate No.)	May-21 May-21 Jan-21
Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP6A Reference Probe EX3DV4 DAE4	ID # 106276 101369 SN 3617 SN 771 ID # MY49071430	Cal Date(Calibrated by, Certificate No.) 12-May-20 (CTTL, No.J20X02965) 12-May-20 (CTTL, No.J20X02965) 30-Jan-20(SPEAG,No.EX3-3617_Jan20) 10-Feb-20(CTTL-SPEAG,No.Z20-60017)	May-21 May-21 Jan-21 Feb-21 Scheduled Calibration
Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP6A Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C	ID # 106276 101369 SN 3617 SN 771 ID # MY49071430	Cal Date(Calibrated by, Certificate No.) 12-May-20 (CTTL, No.J20X02965) 12-May-20 (CTTL, No.J20X02965) 30-Jan-20(SPEAG,No.EX3-3617_Jan20) 10-Feb-20(CTTL-SPEAG,No.Z20-60017) Cal Date(Calibrated by, Certificate No.) 25-Feb-20 (CTTL, No.J20X00516)	May-21 May-21 Jan-21 Feb-21 Scheduled Calibration Feb-21
Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP6A Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C NetworkAnalyzer E5071C	ID # 106276 101369 SN 3617 SN 771 ID # MY49071430 MY46107873	Cal Date(Calibrated by, Certificate No.) 12-May-20 (CTTL, No.J20X02965) 12-May-20 (CTTL, No.J20X02965) 30-Jan-20(SPEAG,No.EX3-3617_Jan20) 10-Feb-20(CTTL-SPEAG,No.Z20-60017) Cal Date(Calibrated by, Certificate No.) 25-Feb-20 (CTTL, No.J20X00516) 10-Feb-20 (CTTL, No.J20X00515)	May-21 May-21 Jan-21 Feb-21 Scheduled Calibration Feb-21 Feb-21
Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP6A Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C	ID # 106276 101369 SN 3617 SN 771 ID # MY49071430 MY46107873 Name	Cal Date(Calibrated by, Certificate No.) 12-May-20 (CTTL, No.J20X02965) 12-May-20 (CTTL, No.J20X02965) 30-Jan-20(SPEAG,No.EX3-3617_Jan20) 10-Feb-20(CTTL-SPEAG,No.Z20-60017) Cal Date(Calibrated by, Certificate No.) 25-Feb-20 (CTTL, No.J20X00516) 10-Feb-20 (CTTL, No.J20X00515) Function	May-21 May-21 Jan-21 Feb-21 Scheduled Calibration Feb-21 Feb-21

Certificate No: Z20-60298

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

Calibration is Performed According to the Following Standards:

- a) 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", September 2013
- b) IEC 62209-1, "Measurement procedure for assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016
- c) IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- d) KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

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Measurement Conditions

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

DASY Version	DASY52	V52.10.4
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	2

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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	13.0 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	52.3 W/kg ± 18.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	5.99 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	24.0 W/kg ± 18.7 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.1 ± 6 %	1.94 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	15ec	1.100

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.1 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	52.4 W/kg ± 18.8 % (k=2)
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	6.08 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	24.3 W/kg ± 18.7 % (k=2)

Certificate No: Z20-60298

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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.5Ω+ 1.44 jΩ
Return Loss	- 26.9dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.9Ω+ 5.09 jΩ	
Return Loss	- 25.8dB	

General Antenna Parameters and Design

Electrical Delay (one direction)	1.018 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 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 feedpoint may be damaged.

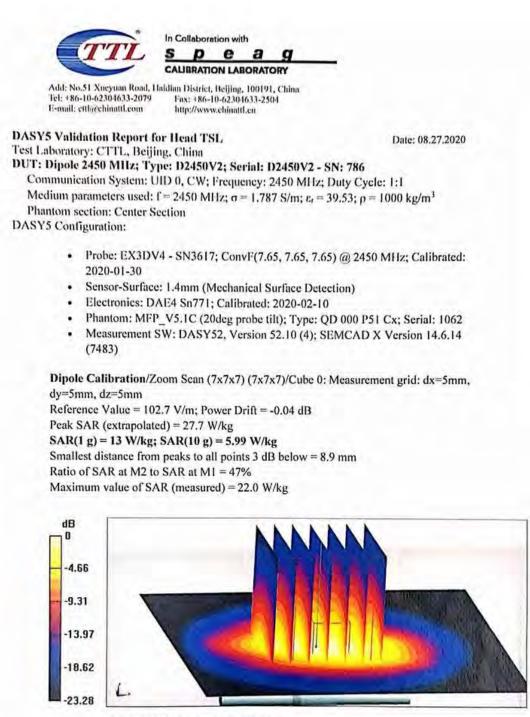
Additional EUT Data

Manufactured by	SPEAG

Certificate No: Z20-60298

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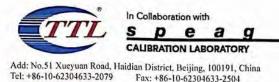


0 dB = 22.0 W/kg = 13.42 dBW/kg

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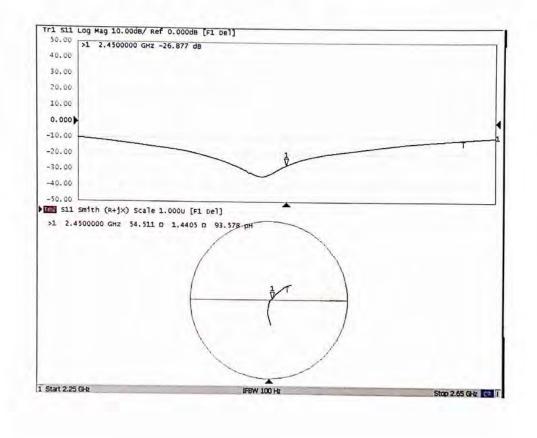




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Impedance Measurement Plot for Head TSL

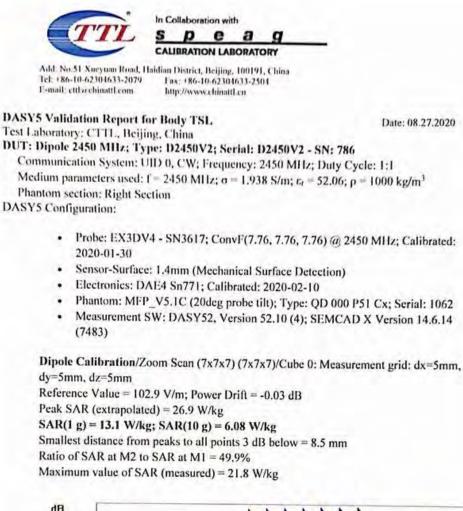
E-mail: cttl@chinattl.com

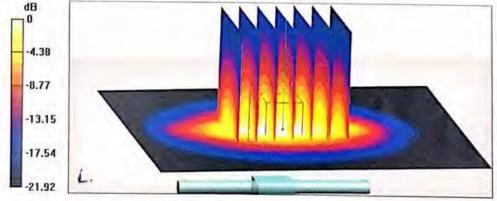


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0 dB = 21.8 W/kg = 13.38 dBW/kg

Certificate No: Z20-60298

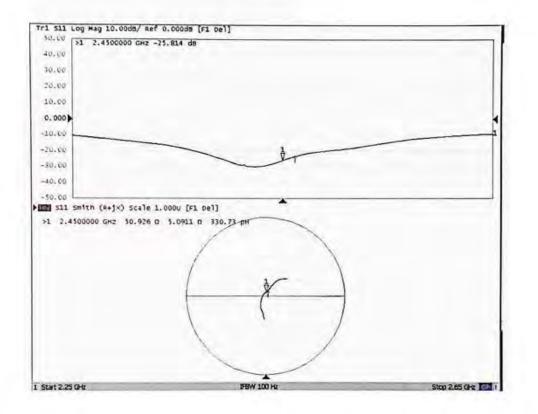
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Impedance Measurement Plot for Body TSL



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ANNEX K: D2600V2 Dipole Calibration Certificate

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SAR Test Report

	CALIBRAT		中国认可国际互认
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	nanghai)		21-60156
CALIBRATION CE	RTIFICAT	E	
Object	D2600\	/2 - SN: 1025	
Calibration Procedure(s)			
animalia (alianapanala)	FF-Z11-		
	Calibrat	tion Procedures for dipole validation kits	
Calibration date:	April 23	, 2021	
All calibrations have been	conducted in t	he closed laboratory facility: environment	tomporature (22,319) an
humidity<70%. Calibration Equipment used			
humidity<70%. Calibration Equipment used			Scheduled Calibration
humidity<70%. Calibration Equipment used Primary Standards Power Meter NRP2	(M&TE critical fo	or calibration)	
humidity<70%. Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP6A	(M&TE critical fo ID # 106276 101369	Cal Date(Calibrated by, Certificate No.) 12-May-20 (CTTL, No.J20X02965) 12-May-20 (CTTL, No.J20X02965)	Scheduled Calibration
humidity<70%. Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP6A Reference Probe EX3DV4	(M&TE critical fo ID # 106276 101369 SN 3617	Cal Date(Calibrated by, Certificate No.) 12-May-20 (CTTL, No.J20X02965) 12-May-20 (CTTL, No.J20X02965) 27-Jan-21(SPEAG,No.EX3-3617_Jan21)	Scheduled Calibration May-21 May-21 Jan-22
humidity<70%. Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP6A	(M&TE critical fo ID # 106276 101369	Cal Date(Calibrated by, Certificate No.) 12-May-20 (CTTL, No.J20X02965) 12-May-20 (CTTL, No.J20X02965)	Scheduled Calibration May-21 May-21
humidity<70%. Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP6A Reference Probe EX3DV4 DAE4	(M&TE critical fo ID # 106276 101369 SN 3617	Cal Date(Calibrated by, Certificate No.) 12-May-20 (CTTL, No.J20X02965) 12-May-20 (CTTL, No.J20X02965) 27-Jan-21(CTTL, No.J20X02965) 08-Jan-21(CTTL-SPEAG,No.Z21-60003)	Scheduled Calibration May-21 May-21 Jan-22 Jan-22
humidity<70%. Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP6A Reference Probe EX3DV4	(M&TE critical fo ID # 106276 101369 SN 3617 SN 777	Cal Date(Calibrated by, Certificate No.) 12-May-20 (CTTL, No.J20X02965) 12-May-20 (CTTL, No.J20X02965) 27-Jan-21(SPEAG,No.EX3-3617_Jan21)	Scheduled Calibration May-21 May-21 Jan-22
humidity<70%. Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP6A Reference Probe EX3DV4 DAE4 Secondary Standards	(M&TE critical fo ID # 106276 101369 SN 3617 SN 777 ID #	Cal Date(Calibrated by, Certificate No.) 12-May-20 (CTTL, No.J20X02965) 12-May-20 (CTTL, No.J20X02965) 27-Jan-21 (CTTL, No.J20X02965) 28-Jan-21 (CTTL-SPEAG,No.Z21-60003) Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration May-21 May-21 Jan-22 Jan-22 Scheduled Calibration
humidity<70%. Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP6A Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C	(M&TE critical fo ID # 106276 101369 SN 3617 SN 777 ID # MY49071430	Cal Date(Calibrated by, Certificate No.) 12-May-20 (CTTL, No.J20X02965) 12-May-20 (CTTL, No.J20X02965) 27-Jan-21 (SPEAG, No.EX3-3617_Jan21) 08-Jan-21 (CTTL-SPEAG, No.Z21-60003) Cal Date(Calibrated by, Certificate No.) 01-Feb-21 (CTTL, No.J21X00593)	Scheduled Calibration May-21 May-21 Jan-22 Jan-22 Scheduled Calibration Jan-22 Jan-22
humidity<70%. Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP6A Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C Network Analyzer E5071C	(M&TE critical fo ID # 106276 101389 SN 3617 SN 777 ID # MY49071430 MY46110673 Name	Cal Date(Calibrated by, Certificate No.) 12-May-20 (CTTL, No.J20X02965) 12-May-20 (CTTL, No.J20X02965) 27-Jan-21(SPEAG,No.EX3-3617_Jan21) 08-Jan-21(CTTL-SPEAG,No.Z21-60003) Cal Date(Calibrated by, Certificate No.) 01-Feb-21 (CTTL, No.J21X00593) 14-Jan-21 (CTTL, No.J21X00232) Function	Scheduled Calibration May-21 May-21 Jan-22 Jan-22 Scheduled Calibration Jan-22
humidity<70%. Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP6A Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C Network Analyzer E5071C	(M&TE critical fo ID # 106276 101369 SN 3617 SN 777 ID # MY49071430 MY46110673	Cal Date(Calibrated by, Certificate No.) 12-May-20 (CTTL, No.J20X02965) 12-May-20 (CTTL, No.J20X02965) 27-Jan-21 (SPEAG, No.EX3-3617_Jan21) 08-Jan-21 (CTTL-SPEAG, No.Z21-60003) Cal Date(Calibrated by, Certificate No.) 01-Feb-21 (CTTL, No.J21X00593) 14-Jan-21 (CTTL, No.J21X00232)	Scheduled Calibration May-21 May-21 Jan-22 Jan-22 Scheduled Calibration Jan-22 Jan-22
humidity<70%. Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP6A Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C	(M&TE critical fo ID # 106276 101389 SN 3617 SN 777 ID # MY49071430 MY46110673 Name	Cal Date(Calibrated by, Certificate No.) 12-May-20 (CTTL, No.J20X02965) 12-May-20 (CTTL, No.J20X02965) 27-Jan-21(SPEAG,No.EX3-3617_Jan21) 08-Jan-21(CTTL-SPEAG,No.Z21-60003) Cal Date(Calibrated by, Certificate No.) 01-Feb-21 (CTTL, No.J21X00593) 14-Jan-21 (CTTL, No.J21X00232) Function	Scheduled Calibration May-21 May-21 Jan-22 Jan-22 Scheduled Calibration Jan-22 Jan-22
humidity<70%. Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP6A Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C Network Analyzer E5071C	(M&TE critical fo ID # 106276 101359 SN 3617 SN 777 ID # MY49071430 MY46110673 Name Zhao Jing	Cal Date(Calibrated by, Certificate No.) 12-May-20 (CTTL, No. J20X02965) 12-May-20 (CTTL, No. J20X02965) 27-Jan-21 (SPEAG, No. EX3-3617_Jan21) 08-Jan-21 (CTTL-SPEAG, No. Z21-60003) Cal Date(Calibrated by, Certificate No.) 01-Feb-21 (CTTL, No. J21X00593) 14-Jan-21 (CTTL, No. J21X00232) Function SAR Test Engineer	Scheduled Calibration May-21 May-21 Jan-22 Jan-22 Scheduled Calibration Jan-22 Jan-22
humidity<70%. Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP6A Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C Network Analyzer E5071C Calibrated by: Reviewed by:	(M&TE critical fo ID # 106276 101389 SN 3617 SN 777 ID # MY49071430 MY46110673 Name Zhao Jing Lin Hao	Cal Date(Calibrated by, Certificate No.) 12-May-20 (CTTL, No. J20X02965) 12-May-20 (CTTL, No. J20X02965) 27-Jan-21 (SPEAG, No. EX3-3617_Jan21) 08-Jan-21 (CTTL-SPEAG, No. Z21-60003) Cal Date(Calibrated by, Certificate No.) 01-Feb-21 (CTTL, No. J21X00593) 14-Jan-21 (CTTL, No. J21X00232) Function SAR Test Engineer SAR Test Engineer	Scheduled Calibration May-21 May-21 Jan-22 Jan-22 Scheduled Calibration Jan-22 Jan-22 Signature 反常 子子名

Certificate No: Z21-60156

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Glossary:

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

Calibration is Performed According to the Following Standards:

- a) 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
- b) IEC 62209-1, "Measurement procedure for assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless
- communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)°, July 2016
- c) IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- d) KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

e) 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: Z21-60156

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

DASY Version	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2600 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.0	1.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) *C	39.9±6%	1.94 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C		_

SAR result with Head TSL

SAR averaged over 1 cm3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.9 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	56.1 W/kg ± 18.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	6.10 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	24.5 W/kg ± 18.7 % (k=2)

Certificate No: Z21-60156

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Appendix(Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.1Q-7.19jQ	
Return Loss	- 22.9dB	

General Antenna Parameters and Design

Electrical Delay (one direction)	1.055 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 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 feedpoint may be damaged.

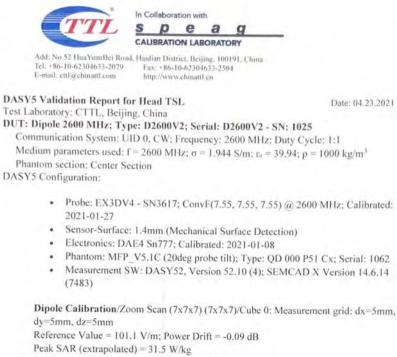
Additional EUT Data

Manufactured by	
Manufactured by	SPEAG

Certificate No: Z21-60156

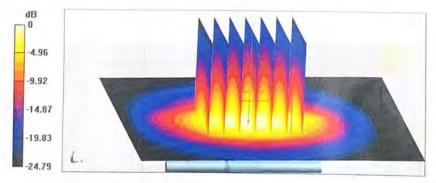
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SAR(1 g) = 13.9 W/kg; SAR(10 g) = 6.1 W/kg Smallest distance from peaks to all points 3 dB below = 9 mm Ratio of SAR at M2 to SAR at M1 = 44%





0 dB = 24.4 W/kg = 13.87 dBW/kg

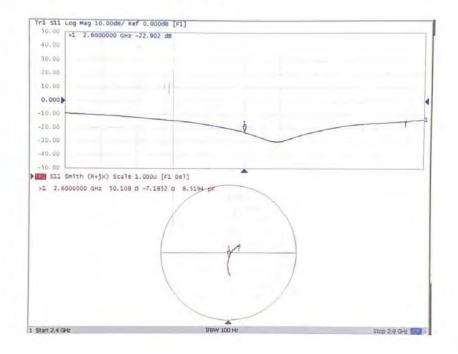
Certificate No: Z21-60156

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Impedance Measurement Plot for Head TSL



Certificate No: Z21-60156

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Report No.: R2212A1312-S1V1

ANNEX L: D5GHzV2 Dipole Calibration Certificate

Client TA(S	shanahall		
	Shanghai)		20-60080
CALIBRATION CI	ERTIFICAT	E	in the second
Object	D5GHz	V2 - SN: 1151	
Calibration Procedure(s)		-003-01 tion Procedures for dipole validation kits	
Calibration date:	Febura	ry 27, 2020	
Calibration Equipment used Primary Standards Power Meter NRP2	ID #	Cal Date(Calibrated by, Certificate No.)	
Power Meter NRP2 Power sensor NRP6A	106276 101369	11-Apr-19 (CTTL, No.J19X02605) 11-Apr-19 (CTTL, No.J19X02605)	Scheduled Calibratic Apr-20 Apr-20
	SN 3846	25-Mar-19(CTTL-SPEAG,No.Z19-60064)	Mar-20
ReferenceProbe EX3DV4 DAE4	SN 1555	22-Aug-19(CTTL-SPEAG,No.Z19-60295)	Aug-20
	SN 1555	Cal Date(Calibrated by, Certificate No.)	
DAE4			
DAE4 Secondary Standards Signal Generator E4438C NetworkAnalyzerE5071C	ID # MY49071430	Cal Date(Calibrated by, Certificate No.) 10-Feb-20 (CTTL, No.J20X00516)	Scheduled Calibratio Feb-21
DAE4 Secondary Standards Signal Generator E4438C	ID # MY49071430 MY46110673	Cal Date(Calibrated by, Certificate No.) 10-Feb-20 (CTTL, No.J20X00516) 10-Feb-20 (CTTL, No.J20X00515)	Scheduled Calibratio Feb-21 Feb-21
DAE4 Secondary Standards Signal Generator E4438C NetworkAnalyzerE5071C	ID # MY49071430 MY46110673 Name	Cal Date(Calibrated by, Certificate No.) 10-Feb-20 (CTTL, No.J20X00516) 10-Feb-20 (CTTL, No.J20X00515) Function	Scheduled Calibratio Feb-21 Feb-21
DAE4 Secondary Standards Signal Generator E4438C NetworkAnalyzerE5071C	ID # MY49071430 MY46110673 Name Zhao Jing	Cal Date(Calibrated by, Certificate No.) 10-Feb-20 (CTTL, No.J20X00516) 10-Feb-20 (CTTL, No.J20X00515) Function SAR Test Engineer	Scheduled Calibratio Feb-21 Feb-21
DAE4 <u>Secondary Standards</u> Signal Generator E4438C NetworkAnalyzerE5071C Calibrated by: Reviewed by: Approved by:	ID # MY49071430 MY46110673 Name Zhao Jing Lin Hao Qi Dianyuan	Cal Date(Calibrated by, Certificate No.) 10-Feb-20 (CTTL, No.J20X00516) 10-Feb-20 (CTTL, No.J20X00515) Function SAR Test Engineer SAR Test Engineer SAR Project Leader	Scheduled Calibration Feb-21 Feb-21 Signature

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Glossary:

TSL	
ConvF	
N/A	

tissue simulating liquid sensitivity in TSL / NORMx,y,z not applicable or not measured

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- b) IEC 62209-1, "Measurement procedure for assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016
- c) IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- d) KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

e) 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: Z20-60080

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Measurement Conditions

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

DASY Version	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5250 MHz ± 1 MHz 5600 MHz ± 1 MHz 5750 MHz ± 1 MHz	

g

Head TSL parameters at 5250 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.9	4.71 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	36.9±6%	4.59 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C		

SAR result with Head TSL at 5250 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.76 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	78.0 W/kg ± 24.4 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	100 mW input power	2.22 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	22.3 W/kg ± 24.2 % (k=2)

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ad TSL parameters at 5600 MHz The following parameters and calculations were	applied.			
	Temperature	Permitti	ivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.5	1	5.07 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	36.3 ±	6 %	4.96 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C			
R result with Head TSL at 5600 MH	7			
SAR averaged over 1 cm^3 (1 g) of Head TSI		tion	1	
SAR measured	100 mW in	put power	1	8.02 W/kg
SAR for nominal Head TSL parameters	normalize	d to 1W	80.5	W/kg ± 24.4 % (<i>k</i> =2)
SAR averaged over 10 cm ³ (10 g) of Head 1	TSL Condit	tion		
SAR measured	100 mW in	put power		2.29 W/kg
SAR for nominal Head TSL parameters	normalize	d to 1W	23.0	W/kg ± 24.2 % (k=2)
ad TSL parameters at 5750 MHz	applied.	Domiti	vity	Conductivity
he following parameters and calculations were	Temperature	Permitta		-
he following parameters and calculations were Nominal Head TSL parameters	Temperature 22.0 °C	35.4		5.22 mho/m
The following parameters and calculations were Nominal Head TSL parameters Measured Head TSL parameters		200		
Nominal Head TSL parameters	22.0 °C (22.0 ± 0.2) °C	35.4		
Nominal Head TSL parameters Measured Head TSL parameters Head TSL temperature change during test	22.0 °C (22.0 ± 0.2) °C <1.0 °C	35.4		
Nominal Head TSL parameters Measured Head TSL parameters Head TSL temperature change during test R result with Head TSL at 5750 MH:	22.0 °C (22.0 ± 0.2) °C <1.0 °C	35.4 36.1 ± 1		
Nominal Head TSL parameters Measured Head TSL parameters Head TSL temperature change during test R result with Head TSL at 5750 MH: SAR averaged over 1 cm ³ (1 g) of Head TSL	22.0 °C (22.0 ± 0.2) °C <1.0 °C z L Condit	35.4 36.1 ± 1		5.12 mho/m ± 6 9
Nominal Head TSL parameters Measured Head TSL parameters Head TSL temperature change during test R result with Head TSL at 5750 MH:	22.0 °C (22.0 ± 0.2) °C <1.0 °C	35.4 36.1 ± 1 	6 %	5.22 mho/m 5.12 mho/m ± 6 % 7.72 W/kg W/kg ± 24.4 % (<i>k</i> =2)

Certificate No: Z20-60080

SAR measured

SAR averaged over 10 cm³ (10 g) of Head TSL

SAR for nominal Head TSL parameters

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Condition

100 mW input power

normalized to 1W

2.18 W/kg

21.9 W/kg ± 24.2 % (k=2)





In Collaboration with s p e а a CALIBRATION LABORATORY

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Body TSL parameters at 5250 MHz The following parameters and calculations were applied.

<u>.</u>	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.9	5.36 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	48.1 ± 6 %	5.27 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C		

SAR result with Body TSL at 5250 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.37 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	73.4 W/kg ± 24.4 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Body TSL	Condition	
SAR measured	100 mW input power	2.09 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	20.8 W/kg ± 24.2 % (k=2)

Body TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.5	5.77 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	47.4 ± 6 %	5.74 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C		

SAR result with Body TSL at 5600 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.78 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	77.4 W/kg ± 24.4 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Body TSL	Condition	
SAR measured	100 mW input power	2.21 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	22.0 W/kg ± 24.2 % (k=2)

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Body TSL parameters at 5750 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.3	5.94 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	47.1 ± 6 %	5.96 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C		

SAR result with Body TSL at 5750 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.38 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	73.5 W/kg ± 24.4 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Body TSL	Condition	
SAR measured	100 mW input power	2.07 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	20.6 W/kg ± 24.2 % (k=2)

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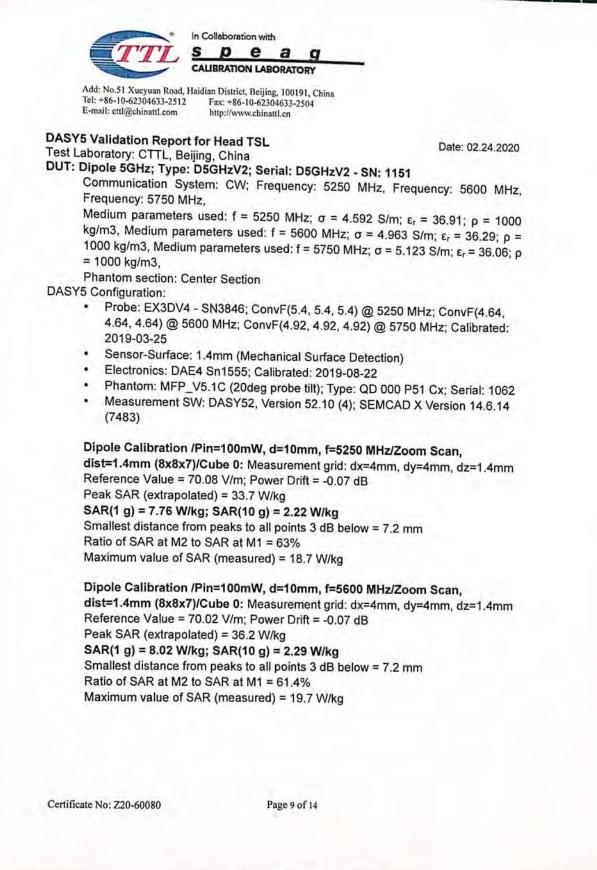
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Appendix (Additional assessments outside Antenna Parameters with Head TSL at 5250	and the second
Impedance, transformed to feed point	52.4Ω - 6.47jΩ
Return Loss	- 23.4dB
Antenna Parameters with Head TSL at 5600	MHz
Impedance, transformed to feed point	57.0Ω - 3.86jΩ
Return Loss	- 22.6dB
Antenna Parameters with Head TSL at 5750	MHz
Impedance, transformed to feed point	55.9Ω + 0.16jΩ
Return Loss	- 25.0dB
Impedance, transformed to feed point	MHz 51.6Ω - 5.33jΩ
Return Loss	- 25.3dB
ntenna Parameters with Body TSL at 5600	MHz
Impedance, transformed to feed point	57.6Ω - 2.15jΩ
Return Loss	- 22.7dB
ntenna Parameters with Body TSL at 5750	MHz
Impedance, transformed to feed point	55.4Ω + 1.94jΩ
Return Loss	- 25.2dB

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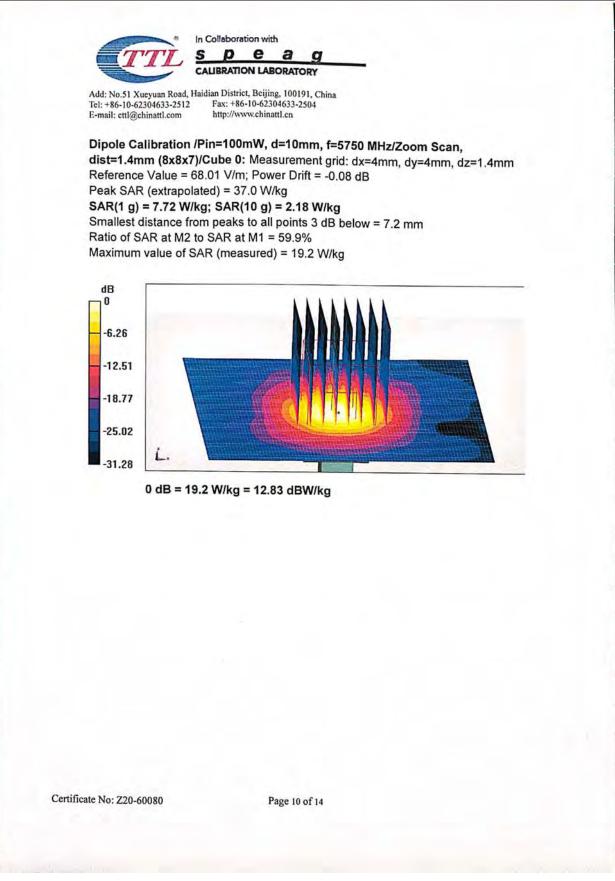


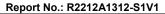
Tel: +86-10-62304633-2512 Fax: +86	ct, Beijing, 100191, China -10-62304633-2504 vw.chinattl.cn		
General Antenna Parameters and	Design		
Electrical Delay (one direction)		1.066 ns	
After long term use with 100W radiated p be measured.	power, only a slight war	ning of the dipole near the feedpo	oint can
The dipole is made of standard semirigio connected to the second arm of the dipole of the dipoles, small end caps are added according to the position as explained in affected by this change. The overall dipole No excessive force must be applied to the connections near the feedpoint may be of Additional EUT Data	to the dipole arms in o the "Measurement Cor ble length is still according the dipole arms, because	fore short-circuited for DC-signal rder to improve matching when lo ditions" paragraph. The SAR dat	s. On som aded a are not
Manufactured by		SPEAG	

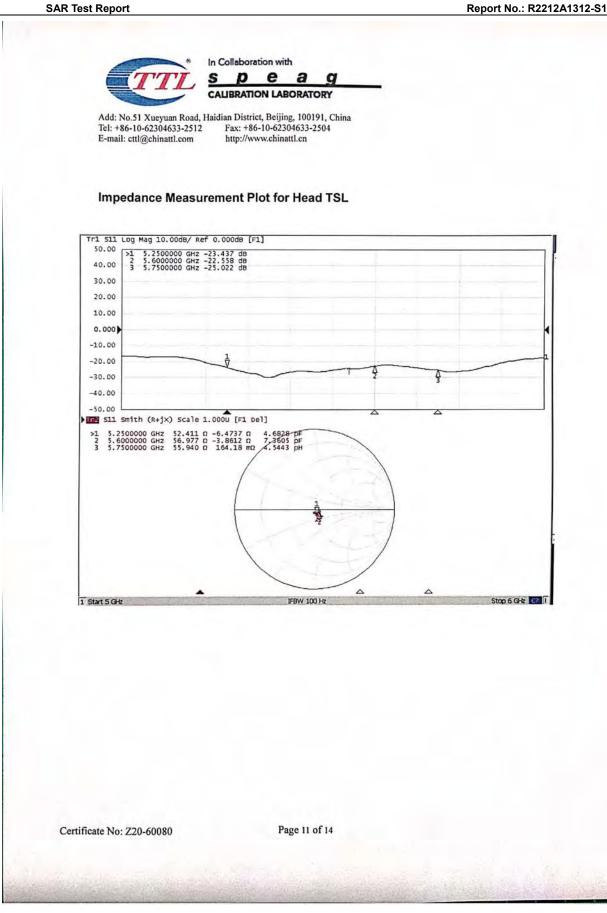












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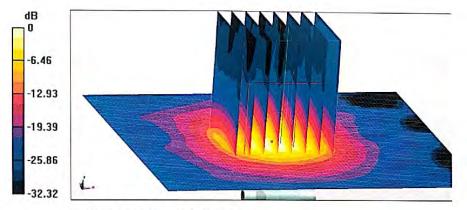


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Dipole Calibration /Pin=100mW, d=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm Reference Value = 62.00 V/m; Power Drift = -0.02 dB Peak SAR (extrapolated) = 33.5 W/kg SAR(1 g) = 7.38 W/kg; SAR(10 g) = 2.07 W/kg Smallest distance from peaks to all points 3 dB below = 7.2 mm Ratio of SAR at M2 to SAR at M1 = 61.1% Maximum value of SAR (measured) = 17.8 W/kg

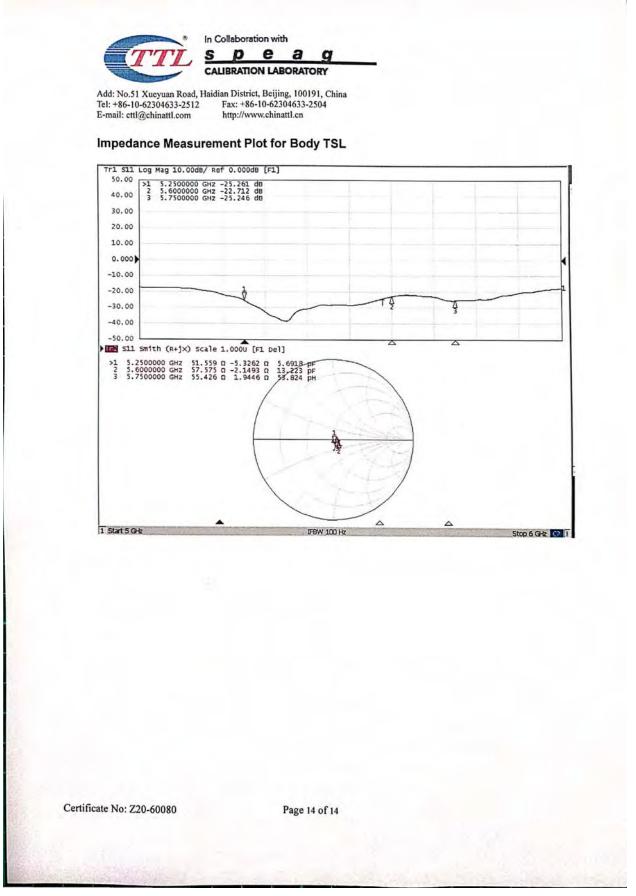


0 dB = 17.8 W/kg = 12.50 dBW/kg

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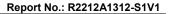
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ANNEX M: DAE4 Calibration Certificate (SN: 1291)

	Shanghai)	Certificate	No: Z22-60098
CALIBRATION	CERTIFICATE		(公司)送来(1)
Object	DAE4 - S	IN: 1291	
Calibration Procedure(s)	FF-211-0	02-01 on Procedure for the Data Acquis	ition Electronics
Calibration date:	March 24	, 2022	1000000000
All calibrations have be numidity<70%. Calibration Equipment us Primary Standards	sed (M&TE critical for	e closed laboratory facility: enviror calibration) Date(Calibrated by, Certificate No.)	nment temperature(22±3)°C and Scheduled Calibration
Process Calibrator 753	1971018 15	5-Jun-21 (CTTL, No.J21X04465)	Jun-22
	Name	Function	Signature
	Name	runcuon	Signature
Calibrated by:	Yu Zongying	SAR Test Engineer	- Friend +
Calibrated by: Reviewed by:	Yu Zongying Lin Hao	SAR Test Engineer	AT the
			A the









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Glossary:

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

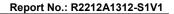
Methods Applied and Interpretation of Parameters:

- DC Voltage Measurement: Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- Connector angle: The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The report provide only calibration results for DAE, it does not contain other performance test results.

Certificate	No:	Z22-60098
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DC Voltage Measurement

High Range:	1LSB =	6.1µV,	full range =	-100+300 mV
Low Range:	1LSB =	61nV .	full range =	-1+3mV

Calibration Factors	x	Y	z
High Range	402.577 ± 0.15% (k=2)	$403.249 \pm 0.15\%$ (k=2)	$403.164 \pm 0.15\%$ (k=2)
Low Range	3.97371 ± 0.7% (k=2)	3.97778 ± 0.7% (k=2)	$3.97281 \pm 0.7\%$ (k=2)

Connector Angle

Connector Angle to be used in DASY system				167° ± 1 °	
				4	
ertificate No: Z22-60	098	Page 3 of 3			



ANNEX N: The EUT Appearance

The EUT Appearance are submitted separately.



ANNEX O: Test Setup Photos

The Test Setup Photos are submitted separately.