



Client

BACL (Dongguan)

Certificate No:

25J02Z000718

CALIBRATION CERTIFICATE

Object

D5GHzV2 - SN: 1246

Calibration Procedure(s)

FF-Z11-0003-02
Calibration Procedures for dipole validation kits

Calibration date:

October 14, 2025

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	106276	16-May-25 (CTTL, No. 25J02X003423)	May-26
Power sensor NRP6A	101369	16-May-25 (CTTL, No. 25J02X003423)	May-26
Reference Probe EX3DV4	SN 7464	28-Jan-25(SPEAG, No. EX-7464_Jan25)	Jan-26
DAE4	SN 1588	29-Aug-25(CTTL-SPEAG, No. 25J02Z000631)	Aug-26

Secondary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
SignalGeneratorSMA200A	107732	22-Jan-25 (CTTL, No. 25J02X000388)	Jan-26
NetworkAnalyzer E5071C	MY46110673	18-Dec-24 (CTTL, No. 24J02X103932)	Dec-25
OCP DAK-3.5	1040	20-Jan-25(SPEAG, No. OCP-DAK3.5-1040_Jan25)	Jan-26

Calibrated by:

Reviewed by:

Approved by:

Name

Function

Signature

Zhao Jing

SAR Test Engineer

Lin Jun

SAR Test Engineer

Qi Dianyuan

SAR Project Leader

Issued: October 21, 2025

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



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Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

- 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 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.
- *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	DASY6	V17.0.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
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 $\pm$ 1 MHz 5600 MHz $\pm$ 1 MHz 5800 MHz $\pm$ 1 MHz	

Head TSL parameters at 5250MHz

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 $\pm$ 0.2) °C	35.7 $\pm$ 6 %	4.68 mho/m $\pm$ 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL at 5250MHz

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	20 dBm input power	7.94 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	79.3 W/kg $\pm$ 24 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	20 dBm input power	2.21 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	22.1 W/kg $\pm$ 24 % (k=2)



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Head TSL parameters at 5600MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.5	5.07 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.1 ± 6 %	5.06 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL at 5600MHz

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	20 dBm input power	8.13 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	81.1 W/kg ± 24 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	20 dBm input power	2.26 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	22.5 W/kg ± 24 % (k=2)

Head TSL parameters at 5800MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.3	5.27 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.7 ± 6 %	5.24 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL at 5800MHz

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	20 dBm input power	7.82 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	77.9 W/kg ± 24 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	20 dBm input power	2.15 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	21.4 W/kg ± 24 % (k=2)



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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL at 5250MHz

Impedance, transformed to feed point	48.9Ω- 2.71jΩ
Return Loss	- 30.5dB

Antenna Parameters with Head TSL at 5600MHz

Impedance, transformed to feed point	51.4Ω+ 3.87jΩ
Return Loss	- 27.8dB

Antenna Parameters with Head TSL at 5800MHz

Impedance, transformed to feed point	54.3Ω+ 4.47jΩ
Return Loss	- 24.5dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.097 ns
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After long term use with 100W radiated power, only a slight warming of the dipole near the feed-point can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard. No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feed-point may be damaged.

Additional EUT Data

Manufactured by	SPEAG
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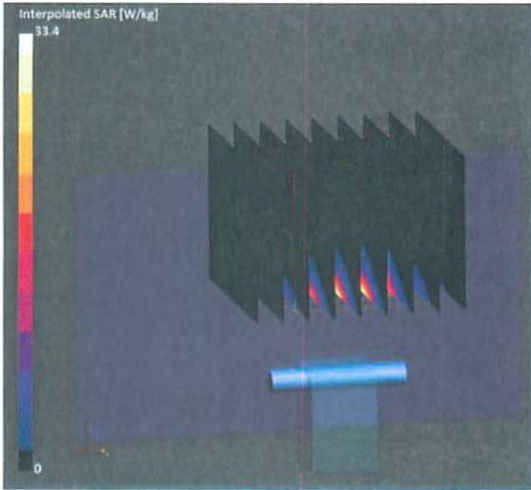
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DASY6 Validation Report for Head TSL

Date: 2025-10-14

Test Laboratory: CTTL, Beijing, China

Summary			
Dipole	Frequency [MHz]	TSL	Power [dBm]
D5GHzV2 – SN 1246	5250	HSL	20
Exposure Conditions			
Phantom	Position, Test	Band Group,	Frequency
Section, TSL	Distance [mm]	UID	[MHz]
Flat	10	CW,	5250
			5.29
			4.68
			35.7
Hardware Setup			
Phantom	TSL	Probe, Calibration Date	DAE, Calibration Date
MFP V8.0 Right	HSL5G	EX3DV4 – SN7464, 2025-01-28	DAE4 Sn1588, 2025-08-29
Scan Setup		Measurement Results	
	Zoom Scan		Zoom Scan
Grid Extents [mm]	22.0×22.0×22.0	psSAR1g [W/kg]	7.94
Grid Steps [mm]	4.0×4.0×1.4	psSAR10g [W/kg]	2.21
Sensor Surface [mm]	1.4	Power Drift [dB]	0.00
Graded Grid	Yes	Power Scaling	Disabled
Grading Ratio	1.4	Scaling Factor [dB]	
MAIA	N/A	TSL Correction	No correction
Surface Detection	VMS + 6p	M2/M1 [%]	61.9
Scan Method	Measured	Dist 3dB Peak [mm]	7.3





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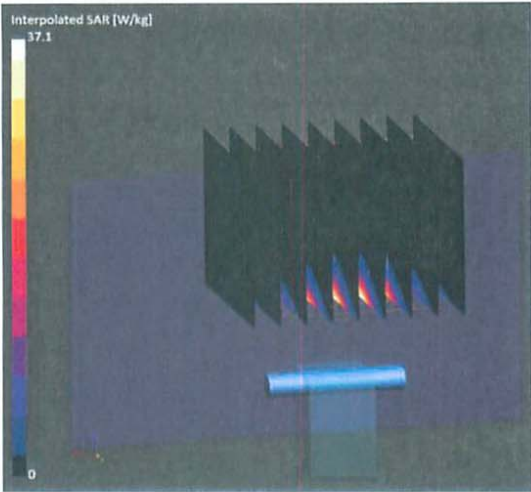
http://www.caict.ac.cn

DASY6 Validation Report for Head TSL

Test Laboratory: CTTL, Beijing, China

Date: 2025-10-14

Summary						
Dipole		Frequency [MHz]		TSL	Power [dBm]	
D5GHzV2 – SN 1246		5600		HSL	20	
Exposure Conditions						
Phantom	Position, Test	Band Group,	Frequency	Conversion	TSL Cond.	TSL
Section, TSL	Distance [mm]	UID	[MHz]	Factor	[S/m]	Permittivity
Flat	10	CW,	5600	5.04	5.06	35.1
Hardware Setup						
Phantom	TSL	Probe, Calibration Date			DAE, Calibration Date	
MFP V8.0 Right	HSL5G	EX3DV4 – SN7464, 2025-01-28			DAE4 Sn1588, 2025-08-29	
Scan Setup		Measurement Results				
		Zoom Scan		Zoom Scan		
Grid Extents [mm]		22.0×22.0×22.0		psSAR1g [W/kg]		8.13
Grid Steps [mm]		4.0×4.0×1.4		psSAR10g [W/kg]		2.26
Sensor Surface [mm]		1.4		Power Drift [dB]		0.01
Graded Grid		Yes		Power Scaling		Disabled
Grading Ratio		1.4		Scaling Factor [dB]		
MAIA		N/A		TSL Correction		No correction
Surface Detection		VMS + 6p		M2/M1 [%]		58.5
Scan Method		Measured		Dist 3dB Peak [mm]		7.4





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DASY6 Validation Report for Head TSL

Date: 2025-10-14

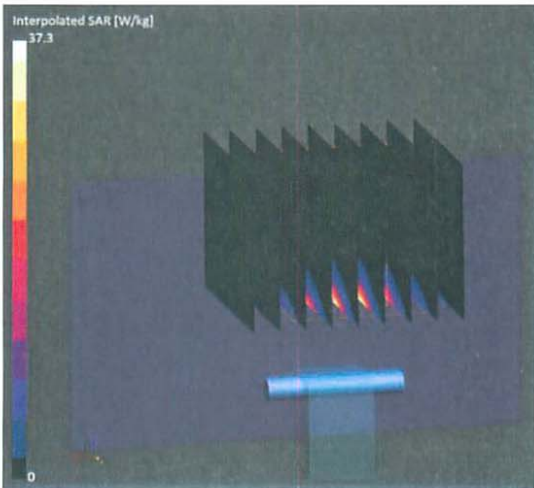
Test Laboratory: CTTL, Beijing, China

Summary			
Dipole	Frequency [MHz]	TSL	Power [dBm]
D5GHzV2 – SN 1246	5800	HSL	20

Exposure Conditions						
Phantom	Position, Test	Band Group,	Frequency	Conversion	TSL Cond.	TSL
Section, TSL	Distance [mm]	UID	[MHz]	Factor	[S/m]	Permittivity
Flat	10	CW,	5800	4.91	5.24	34.7

Hardware Setup			
Phantom	TSL	Probe, Calibration Date	DAE, Calibration Date
MFP V8.0 Right	HSL5G	EX3DV4 – SN7464, 2025-01-28	DAE4 Sn1588, 2025-08-29

Scan Setup		Measurement Results	
	Zoom Scan		Zoom Scan
Grid Extents [mm]	22.0×22.0×22.0	psSAR1g [W/kg]	7.82
Grid Steps [mm]	4.0×4.0×1.4	psSAR10g [W/kg]	2.15
Sensor Surface [mm]	1.4	Power Drift [dB]	-0.01
Graded Grid	Yes	Power Scaling	Disabled
Grading Ratio	1.4	Scaling Factor [dB]	
MAIA	N/A	TSL Correction	No correction
Surface Detection	VMS + 6p	M2/M1 [%]	56.8
Scan Method	Measured	Dist 3dB Peak [mm]	7.4





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Impedance Measurement Plot for Head TSL

