

# Appendix C

## Phantom Description

Schmid &amp; Partner Engineering AG

**s p e a g**

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 info@speag.com, http://www.speag.com

### Certificate of Conformity / First Article Inspection

Item	Oval Flat Phantom ELI 5.0
Type No	QD OVA 002 A
Series No	1108 and higher
Manufacturer	Untersee Composites Knebelstrasse 8, CH-8268 Mannenbach, Switzerland

#### Tests

Complete tests were made on the prototype units QD OVA 001 A, pre-series units QD OVA 001 B as well as on some series units QD OVA 001 B. Some tests are made on all series units QD OVA 002 A.

Test	Requirement	Details	Units tested
Shape	Internal dimensions, depth and sagging are compatible with standards	Bottom elliptical 600 x 400 mm, Depth 190 mm, dimension compliant with [1] for $f > 375$ MHz	Prototypes
Material thickness	Bottom: 2.0mm +/- 0.2mm	dimension compliant with [3] for $f > 800$ MHz	all
Material parameters	rel. permittivity 2 – 5, loss tangent $\leq 0.05$ , at $f \leq 6$ GHz	rel. permittivity 3.5 +/- 0.5 loss tangent $\leq 0.05$	Material samples
Material resistivity	Compatibility with tissue simulating liquids .	Compatible with SPEAG liquids. **	Phantoms, Material sample
Sagging	Sagging of the flat section in tolerance when filled with tissue simulating liquid.	within tolerance for filling height up to 155 mm	Prototypes, samples

\*\* Note: Compatibility restrictions apply certain liquid components mentioned in the standard, containing e.g. DGBE, DGMHE or Triton X-100. Observe technical note on material compatibility.

#### Standards

- [1] OET Bulletin 65, Supplement C, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields", Edition 01-01
- [2] IEEE 1528-2003, "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques, December 2003
- [3] IEC 62209-1 ed1.0, "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 1: Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", 2005-02-18
- [4] IEC 62209-2 ed1.0, "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", 2010-03-30

#### Conformity

Based on the sample tests above, we certify that this item is in compliance with the uncertainty requirements of body-worn SAR measurements and system performance checks as specified in [1 – 4] and further standards.

Date 25.7.2011

Signature / Stamp

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Doc No 881 – QD OVA 002 A - A

Page 1 (1)

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# System Validation from Original Equipment Supplier

**Calibration Laboratory of**  
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 Engineering AG  
 Zeughausstrasse 43, 8004 Zurich, Switzerland



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 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **SGS**  
 Taoyuan City

Certificate No. **D2450V2-727\_Apr25**

## CALIBRATION CERTIFICATE

Object D2450V2 - SN: 727



Calibration procedure(s) QA CAL-05.v12  
 Calibration Procedure for SAR Validation Sources between 0.7 - 3 GHz

Calibration date April 15, 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 (Certificate No.)	Scheduled Cal
Power Sensor R&S NRP-33T	SN: 100967	26-Mar-25 (No. 217-04290)	Mar-26
Power Sensor R&S NRP18A	SN: 101859	06-Feb-25 (No. 4030A315009541)	Feb-26
Spectrum Analyzer R&S FSV40	SN: 101832	29-Jan-25 (No. 4030A315009658)	Jan-26
3.5mm mismatch combination	SN: 1152	24-Mar-25 (No. 217-04293)	Mar-26
OCP DAK-12	SN: 1016	24-Sept-24 (No. OCP-DAK12-1016_Sep24)	Sep-25
OCP DAK-3.5	SN: 1249	23-Sept-24 (No. OCP-DAK3.5-1249_Sep24)	Sep-25
Reference Probe EX3DV4	SN: 7349	10-Jan-25 (No. EX3-7349_Jan25)	Jan-26
DAE4ip	SN: 1836	28-Oct-24 (No. DAE4ip-1836_Oct24)	Oct-25

Secondary Standards	ID	Check Date (in house)	Scheduled Check
ACAD Source Box	SN: 1000	28-May-24 (No. 675-ACAD_Source_Box-240528)	May-25
Signal Generator R&S SMB100A	SN: 182081	28-May-24 (No. 675-CAL16-S4588-240528)	May-25
Mismatch; SMA	SN: 1102	22-May-24 (No. 675-Mismatch_SMA-240522)	May-25

	Name	Function	Signature
Calibrated by	Leif Klysner	Laboratory Technician	
Approved by	Sven Kühn	Technical Manager	

Issued: April 15, 2025

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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-Worn 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.
- *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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D2450V2 - SN: 727

April 15, 2025

**Measurement Conditions**

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

DASY Version	DASY8 Module SAR	16.4.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with spacer
Zoom Scan Resolution	dx, dy = 5mm, dz = 1.5mm	Graded Ratio = 1.5 mm (Z direction)
Frequency	2450MHz ±1MHz	

**HSL parameters at 2450 MHz**

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal HSL parameters	22.0 °C	39.2	1.80 mho/m
Measured HSL parameters	(22.0 ±0.2)°C	37.9 ±6%	1.85 mho/m ±6%
HSL temperature change during test	< 0.5 °C		

**SAR result with HSL at 2450 MHz**

SAR averaged over 1 cm <sup>3</sup> (1 g) of HSL	Condition	
SAR for nominal HSL parameters	24 dBm input power	13.2 W/kg
SAR for nominal HSL parameters	normalized to 1W	52.6 W/kg ±17.0% (k = 2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of HSL	Condition	
SAR for nominal HSL parameters	24 dBm input power	6.21 W/kg
SAR for nominal HSL parameters	normalized to 1W	24.7 W/kg ±16.5% (k = 2)

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D2450V2 - SN: 727

April 15, 2025

**Appendix (Additional assessments outside the scope of SCS 0108)**

**Antenna Parameters with HSL at 2450 MHz**

Impedance	54.7 $\Omega$ + 2.2 j $\Omega$
Return Loss	-26.1 dB

**General Antenna Parameters and Design**

Electrical Delay (one direction)	1.148 ns
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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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D2450V2 - SN: 727

April 15, 2025

System Performance Check Report

Summary

Dipole	Frequency [MHz]	TSL	Power [dBm]
D2450V2 - SN727	2450	HSL	24

Exposure Conditions

Phantom Section, ISL	Test Distance [mm]	Band	Group, URD	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat	10		CW, 0--	2450, 0	7.06	1.85	37.9

Hardware Setup

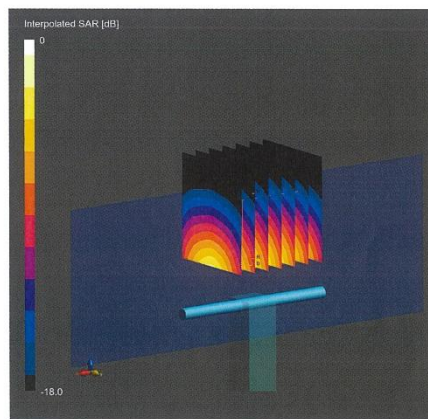
Phantom	TSL Measured Date	Probe, Calibration Date	DAF, Calibration Date
MFP V8.0 Cantar	HSL, 2025-04-15	FX3DV4 - SN7349, 2025-01-10	DAL4ip, Sn1836, 2024-10-28

Scans Setup

	Zoom Scan
Grid Extents [mm]	30 x 30 x 30
Grid Steps [mm]	5.0 x 5.0 x 1.5
Sensor Surface [mm]	1.4
Graded Grid	Yes
Grading Ratio	1.5
MAIA	N/A
Surface Detection	VMS = 6p
Scan Method	Measured

Measurement Results

	Zoom Scan
Date	2025-04-15
psSAR1g [W/Kg]	13.2
psSAR10g [W/Kg]	6.21
Power Drift [dB]	-0.01
Power Scaling	Disabled
Scaling Factor [dB]	
TSL Correction	Positive / Negative



0 dB = 26.9 W/Kg

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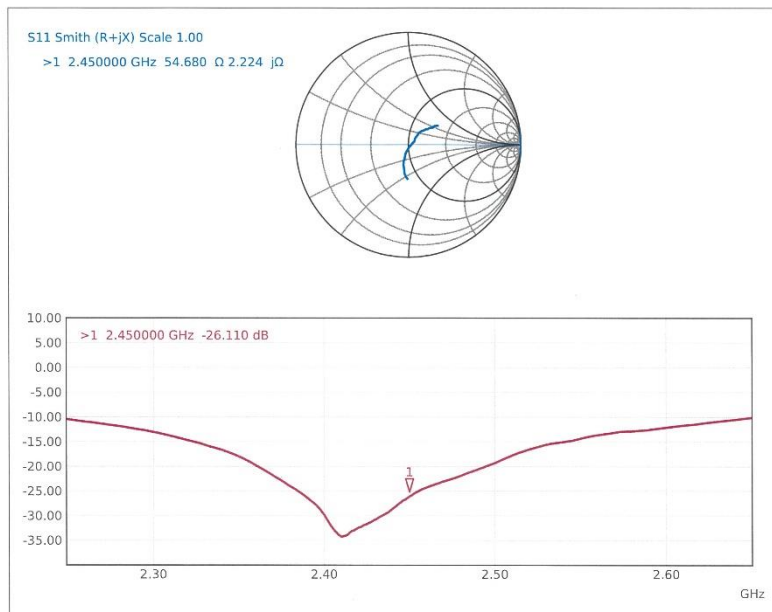
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D2450V2 - SN: 727

April 15, 2025

Impedance Measurement Plot for HSL



Certificate No: D2450V2-727\_Apr25

Page 6 of 6

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Accreditation No.: SCS 0108

Client **SGS**  
Taoyuan City

Certificate No. **D5GHzV2-1349\_Mar24**

**CALIBRATION CERTIFICATE**

Object	D5GHzV2 - SN:1349		
Calibration procedure(s)	QA CAL-22.v7 Calibration Procedure for SAR Validation Sources between 3-10 GHz		
Calibration date:	March 19, 2024		
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 (Certificate No.)	Scheduled Calibration
Power meter NRP2	SN: 104778	30-Mar-23 (No. 217-03804/03805)	Mar-24
Power sensor NRP-Z91	SN: 103244	30-Mar-23 (No. 217-03804)	Mar-24
Power sensor NRP-Z91	SN: 103245	30-Mar-23 (No. 217-03805)	Mar-24
Reference 20 dB Attenuator	SN: BH9394 (20k)	30-Mar-23 (No. 217-03809)	Mar-24
Type-N mismatch combination	SN: 310982 / 06327	30-Mar-23 (No. 217-03810)	Mar-24
Reference Probe EX3DV4	SN: 3503	07-Mar-24 (No. EX3-3503_Mar24)	Mar-25
DAE4	SN: 601	30-Jan-24 (No. DAE4-601_Jan24)	Jan-25
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Oct-22)	In house check: Oct-24
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-22)	In house check: Oct-24
Power sensor HP 8481A	SN: MY41093315	07-Oct-15 (in house check Oct-22)	In house check: Oct-24
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-22)	In house check: Oct-24
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-22)	In house check: Oct-24
Calibrated by:	Name Claudio Leubler	Function Laboratory Technician	Signature 
Approved by:	Sven Kühn	Technical Manager	
			Issued: March 20, 2024
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Certificate No: D5GHzV2-1349\_Mar24

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- b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

**Additional Documentation:**

- c) DASY System Handbook

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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 V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5250 MHz ± 1 MHz 5600 MHz ± 1 MHz 5750 MHz ± 1 MHz 5850 MHz ± 1 MHz	

**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	36.4 ± 6 %	4.57 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	---	---

**SAR result with Head TSL at 5250 MHz**

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.08 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>80.9 W/kg ± 19.9 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.31 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>23.1 W/kg ± 19.5 % (k=2)</b>

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**Head TSL parameters at 5600 MHz**

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	35.8 ± 6 %	4.97 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

**SAR result with Head TSL at 5600 MHz**

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.23 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>82.4 W/kg ± 19.9 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.35 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>23.5 W/kg ± 19.5 % (k=2)</b>

**Head TSL parameters at 5750 MHz**

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.4	5.22 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.6 ± 6 %	5.13 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

**SAR result with Head TSL at 5750 MHz**

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.08 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>80.8 W/kg ± 19.9 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.30 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>23.0 W/kg ± 19.5 % (k=2)</b>

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**Head TSL parameters at 5850 MHz**

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.2	5.32 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.5 ± 6 %	5.22 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

**SAR result with Head TSL at 5850 MHz**

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.98 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>79.9 W/kg ± 19.9 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.25 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>22.6 W/kg ± 19.5 % (k=2)</b>

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**Appendix (Additional assessments outside the scope of SCS 0108)**
**Antenna Parameters with Head TSL at 5250 MHz**

Impedance, transformed to feed point	46.8 $\Omega$ + 1.4 $j\Omega$
Return Loss	- 28.9 dB

**Antenna Parameters with Head TSL at 5600 MHz**

Impedance, transformed to feed point	52.4 $\Omega$ + 4.7 $j\Omega$
Return Loss	- 25.7 dB

**Antenna Parameters with Head TSL at 5750 MHz**

Impedance, transformed to feed point	52.6 $\Omega$ + 4.2 $j\Omega$
Return Loss	- 26.3 dB

**Antenna Parameters with Head TSL at 5850 MHz**

Impedance, transformed to feed point	54.7 $\Omega$ + 1.3 $j\Omega$
Return Loss	- 26.6 dB

**General Antenna Parameters and Design**

Electrical Delay (one direction)	1.200 ns
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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**

Date: 19.03.2024

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1349**

Communication System: UID 0 - CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz, Frequency: 5850 MHz

Medium parameters used:  $f = 5250$  MHz;  $\sigma = 4.57$  S/m;  $\epsilon_r = 36.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>,

Medium parameters used:  $f = 5600$  MHz;  $\sigma = 4.97$  S/m;  $\epsilon_r = 35.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>,

Medium parameters used:  $f = 5750$  MHz;  $\sigma = 5.13$  S/m;  $\epsilon_r = 35.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>,

Medium parameters used:  $f = 5850$  MHz;  $\sigma = 5.22$  S/m;  $\epsilon_r = 35.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.39, 5.39, 5.39) @ 5250 MHz, ConvF(5, 5, 5) @ 5600 MHz, ConvF(4.98, 4.98, 4.98) @ 5750 MHz, ConvF(4.89, 4.89, 4.89) @ 5850 MHz; Calibrated: 07.03.2024
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.01.2024
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5250 MHz/Zoom Scan,**

**dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 74.62 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 27.7 W/kg

**SAR(1 g) = 8.08 W/kg; SAR(10 g) = 2.31 W/kg**

Smallest distance from peaks to all points 3 dB below = 7.4 mm

Ratio of SAR at M2 to SAR at M1 = 70.7%

Maximum value of SAR (measured) = 18.2 W/kg

**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan,**

**dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 73.67 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 30.7 W/kg

**SAR(1 g) = 8.23 W/kg; SAR(10 g) = 2.35 W/kg**

Smallest distance from peaks to all points 3 dB below = 7.4 mm

Ratio of SAR at M2 to SAR at M1 = 67.9%

Maximum value of SAR (measured) = 19.2 W/kg

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**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan,**

**dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 71.84 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 31.7 W/kg

**SAR(1 g) = 8.08 W/kg; SAR(10 g) = 2.3 W/kg**

Smallest distance from peaks to all points 3 dB below = 7.5 mm

Ratio of SAR at M2 to SAR at M1 = 66%

Maximum value of SAR (measured) = 19.4 W/kg

**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5850 MHz/Zoom Scan,**

**dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 70.98 V/m; Power Drift = 0.09 dB

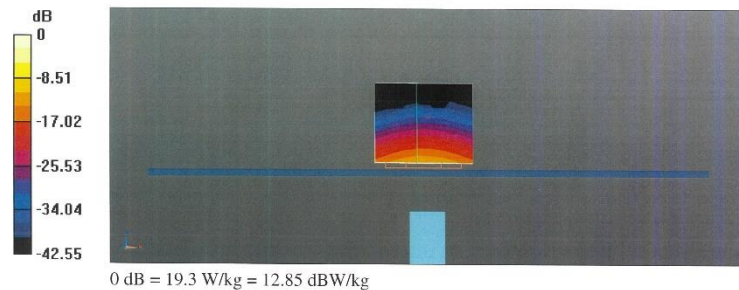
Peak SAR (extrapolated) = 32.2 W/kg

**SAR(1 g) = 7.98 W/kg; SAR(10 g) = 2.25 W/kg**

Smallest distance from peaks to all points 3 dB below = 7.5 mm

Ratio of SAR at M2 to SAR at M1 = 65.2%

Maximum value of SAR (measured) = 19.3 W/kg

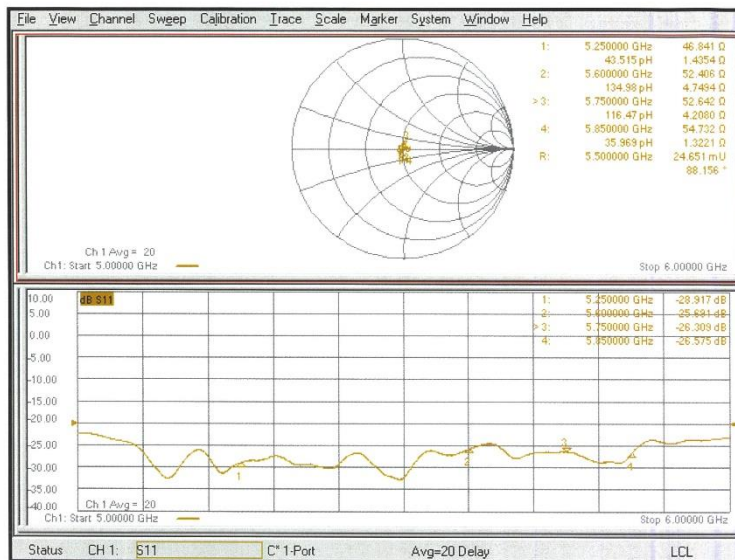


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Impedance Measurement Plot for Head TSL



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 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 0108

Client **SGS**  
 Taoyuan City

Certificate No. **D6.5GHzV2-1006\_Aug24**

## CALIBRATION CERTIFICATE

Object **D6.5GHzV2 - SN:1006**

Calibration procedure(s) **QA CAL-22.v7  
 Calibration Procedure for SAR Validation Sources between 3-10 GHz**

Calibration date: **August 15, 2024**

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 (Certificate No.)	Scheduled Calibration
Power sensor R&S NRP33T	SN: 100967	28-Mar-24 (No. 217-04038)	Mar-25
Reference 20 dB Attenuator	SN: BH9394 (20k)	26-Mar-24 (No. 217-04046)	Mar-25
Mismatch combination	SN: 84224 / 360D	28-Mar-24 (No. 217-04050)	Mar-25
Reference Probe EX3DV4	SN: 7405	01-Jul-24 (No. EX3-7405_Jul24)	Jul-25
DAE4	SN: 908	27-Mar-24 (No. DAE4-908_Mar24)	Mar-25

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator Anapico APSIN20G	SN: 827	18-Dec-18 (in house check Jan-24)	In house check: Jan-25
Power sensor NRP-Z23	SN: 100169	10-Jan-19 (in house check Jan-24)	In house check: Jan-25
Power sensor NRP-18T	SN: 100950	28-Sep-22 (in house check Jan-24)	In house check: Jan-25
Network Analyzer Keysight E5063A	SN:MY54504221	31-Oct-19 (in house check Oct-22)	In house check: Oct-25

Calibrated by: **Aldonia Georgiadou** (Name) / **Laboratory Technician** (Function) / *[Signature]* (Signature)

Approved by: **Sven Kühn** (Name) / **Technical Manager** (Function) / *[Signature]* (Signature)

Issued: August 16, 2024

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**S** Schweizerischer Kalibrierdienst  
**C** Service suisse d'étalonnage  
**S** Servizio svizzero di taratura  
**S** Swiss Calibration Service

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Accreditation No.: **SCS 0108**

**Glossary:**

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

**Calibration is Performed According to the Following Standards:**

- a) 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.

**Additional Documentation:**

- b) 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 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 absorbed power density (APD):* The absorbed power density is evaluated according to Samaras T, Christ A, Kuster N, "Compliance assessment of the epithelial or absorbed power density above 6 GHz using SAR measurement systems", Bioelectromagnetics, 2021 (submitted). The additional evaluation uncertainty of 0.55 dB (rectangular distribution) is considered.

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	V16.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	5 mm	with Spacer
Zoom Scan Resolution	dx, dy = 3.4 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	6500 MHz $\pm$ 1 MHz	

**Head TSL parameters**

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	34.5	6.07 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	34.9 $\pm$ 6 %	6.32 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	---	---

**SAR result with Head TSL**

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	29.7 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>297 W/kg <math>\pm</math> 24.7 % (k=2)</b>

SAR averaged over 8 cm <sup>3</sup> (8 g) of Head TSL	Condition	
SAR measured	100 mW input power	6.63 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>66.4 W/kg <math>\pm</math> 24.4 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	100 mW input power	5.43 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>54.5 W/kg <math>\pm</math> 24.4 % (k=2)</b>

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**Appendix (Additional assessments outside the scope of SCS 0108)**
**Antenna Parameters with Head TSL**

Impedance, transformed to feed point	46.9 $\Omega$ - 7.3 $j\Omega$
Return Loss	- 21.7 dB

**APD (Absorbed Power Density)**

APD averaged over 1 cm <sup>2</sup>	Condition	
APD measured	100 mW input power	297 W/m <sup>2</sup>
APD measured	normalized to 1W	<b>2970 W/m<sup>2</sup> <math>\pm</math> 29.2 % (k=2)</b>

APD averaged over 4 cm <sup>2</sup>	condition	
APD measured	100 mW input power	133 W/m <sup>2</sup>
APD measured	normalized to 1W	<b>1330 W/m<sup>2</sup> <math>\pm</math> 28.9 % (k=2)</b>

\*The reported APD values have been derived using the psSAR1g and psSAR8g.

**General Antenna Parameters and Design**

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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**DASY6 Validation Report for Head TSL**

Measurement Report for D6.5GHz-1006, UID 0 -, Channel 6500 (6500.0MHz)

**Device under Test Properties**

Name, Manufacturer	Dimensions [mm]	IMEI	DUT Type
D6.5GHz	16.0 x 6.0 x 300.0	SN: 1006	-

**Exposure Conditions**

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz]	Conversion Factor	TSL Cond. [S/m]	TSL Permittivity
Flat, HSL	5.00	Band	CW,	6500	5.14	6.32	34.9

**Hardware Setup**

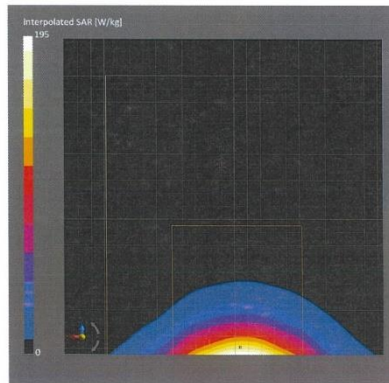
Phantom	TSL	Probe, Calibration Date	DAE, Calibration Date
MFP V8.0 Center - 1182	HBBL600-10000V6	EX3DV4 - SN7405, 2024-07-01	DAE4 Sn908, 2024-03-27

**Scan Setup**

	Zoom Scan
Grid Extents [mm]	22.0 x 22.0 x 22.0
Grid Steps [mm]	3.4 x 3.4 x 1.4
Sensor Surface [mm]	1.4
Graded Grid	Yes
Grading Ratio	1.4
MAIA	N/A
Surface Detection	VMS + 6p
Scan Method	Measured

**Measurement Results**

	Zoom Scan
Date	2024-08-15, 11:31
psSAR1g [W/Kg]	29.7
psSAR8g [W/Kg]	6.63
psSAR10g [W/Kg]	5.43
Power Drift [dB]	-0.00
Power Scaling	Disabled
Scaling Factor [dB]	
TSL Correction	No correction
M2/M1 [%]	49.4
Dist 3dB Peak [mm]	4.8

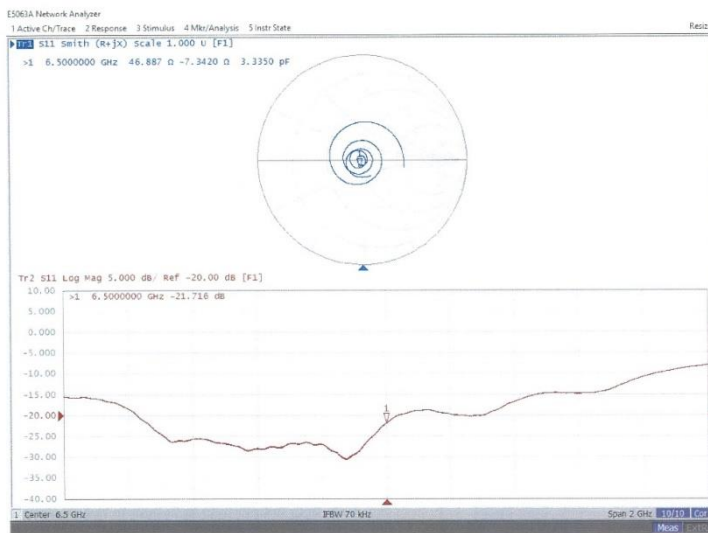


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### Impedance Measurement Plot for Head TSL



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Accreditation No.: SCS 0108

Client **SGS**  
Taoyuan City

Certificate No. **D7GHzV2-1007\_Aug24**

## CALIBRATION CERTIFICATE

Object: **D7GHzV2 - SN:1007**

Calibration procedure(s): **QA CAL-22.v7  
Calibration Procedure for SAR Validation Sources between 3-10 GHz**

Calibration date: **August 15, 2024**

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 (Certificate No.)	Scheduled Calibration
Power sensor R&S NRP33T	SN: 100967	28-Mar-24 (No. 217-04038)	Mar-25
Reference 20 dB Attenuator	SN: BH9394 (20k)	26-Mar-24 (No. 217-04046)	Mar-25
Mismatch combination	SN: 84224 / 360D	28-Mar-24 (No. 217-04050)	Mar-25
Reference Probe EX3DV4	SN: 7405	01-Jul-24 (No. EX3-7405_Jul24)	Jul-25
DAE4	SN: 908	27-Mar-24 (No. DAE4-908_Mar24)	Mar-25

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator Anapico APSIN20G	SN: 827	18-Dec-18 (in house check Jan-24)	In house check: Jan-25
Power sensor NRP-ZZ3	SN: 100169	10-Jan-19 (in house check Jan-24)	In house check: Jan-25
Power sensor NRP-18T	SN: 100950	28-Sep-22 (in house check Jan-24)	In house check: Jan-25
Network Analyzer Keysight E5063A	SN:MY54504221	31-Oct-19 (in house check Oct-22)	In house check: Oct-25

Calibrated by:	Name	Function	Signature
	Aidonia Georgiadou	Laboratory Technician	
Approved by:	Sven Kühn	Technical Manager	

Issued: August 16, 2024

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

Certificate No: D7GHzV2-1007\_Aug24

Page 1 of 6

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Accreditation No.: **SCS 0108**

**Glossary:**

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

**Calibration is Performed According to the Following Standards:**

- a) 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.

**Additional Documentation:**

- b) 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 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 absorbed power density (APD):* The absorbed power density is evaluated according to Samaras T, Christ A, Kuster N, "Compliance assessment of the epithelial or absorbed power density above 6 GHz using SAR measurement systems", Bioelectromagnetics, 2021 (submitted). The additional evaluation uncertainty of 0.55 dB (rectangular distribution) is considered.

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	V16.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	5 mm	with Spacer
Zoom Scan Resolution	dx, dy = 3.0 mm, dz = 1.2 mm	Graded Ratio = 1.2 (Z direction)
Frequency	7000 MHz ± 1 MHz	

**Head TSL parameters**

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	33.9	6.65 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.0 ± 6 %	6.94 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

**SAR result with Head TSL**

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	28.6 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>286 W/kg ± 24.7 % (k=2)</b>
<b>SAR averaged over 8 cm<sup>3</sup> (8 g) of Head TSL</b>		
	condition	
SAR measured	100 mW input power	6.16 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>61.6 W/kg ± 24.4 % (k=2)</b>
<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b>		
	condition	
SAR measured	100 mW input power	5.03 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>50.4 W/kg ± 24.4 % (k=2)</b>

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**Appendix (Additional assessments outside the scope of SCS 0108)**

**Antenna Parameters with Head TSL**

Impedance, transformed to feed point	54.1 $\Omega$ - 4.9 j $\Omega$
Return Loss	- 24.3 dB

**APD (Absorbed Power Density)**

APD averaged over 1 cm <sup>2</sup>	Condition	
APD measured	100 mW input power	286 W/m <sup>2</sup>
APD measured	normalized to 1W	<b>2860 W/m<sup>2</sup> ± 29.2 % (k=2)</b>

APD averaged over 4 cm <sup>2</sup>	condition	
APD measured	100 mW input power	123 W/m <sup>2</sup>
APD measured	normalized to 1W	<b>1230 W/m<sup>2</sup> ± 28.9 % (k=2)</b>

\* The reported APD values have been derived using the psSAR1g and psSAR8g.

**General Antenna Parameters and Design**

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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**DASY6 Validation Report for Head TSL**

Measurement Report for D7GHz-1007, UID 0 -, Channel 7000 (7000.0MHz)

**Device under Test Properties**

Name, Manufacturer	Dimensions [mm]	IMEI	DUT Type
D7GHz	14.0 x 6.0 x 297.0	SN: 1007	-

**Exposure Conditions**

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz]	Conversion Factor	TSL Cond. [S/m]	TSL Permittivity
Flat, HSL	5.00	Band	CW,	7000	5.80	6.94	34.0

**Hardware Setup**

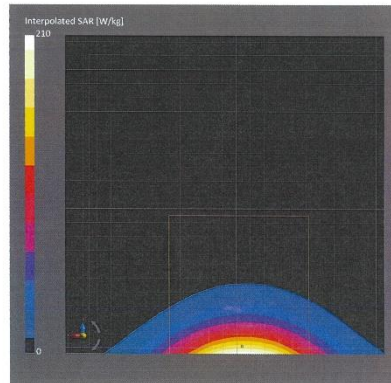
Phantom	TSL	Probe, Calibration Date	DAE, Calibration Date
MFP V8.0 Center - 1182	HBBL600-1000V6	EX3DV4 - SN7405, 2024-07-01	DAE4 Sn908, 2024-03-27

**Scan Setup**

	Zoom Scan
Grid Extents [mm]	22.0 x 22.0 x 22.0
Grid Steps [mm]	3.0 x 3.0 x 1.2
Sensor Surface [mm]	1.4
Graded Grid	Yes
Grading Ratio	1.2
MAIA	N/A
Surface Detection	VMS + 6p
Scan Method	Measured

**Measurement Results**

	Zoom Scan
Date	2024-08-15, 12:48
psSAR1g [W/Kg]	28.6
psSAR8g [W/Kg]	6.16
psSAR10g [W/Kg]	5.03
Power Drift [dB]	0.07
Power Scaling	Disabled
Scaling Factor [dB]	
TSL Correction	No correction
M2/M1 [%]	46.1
Dist 3dB Peak [mm]	4.3

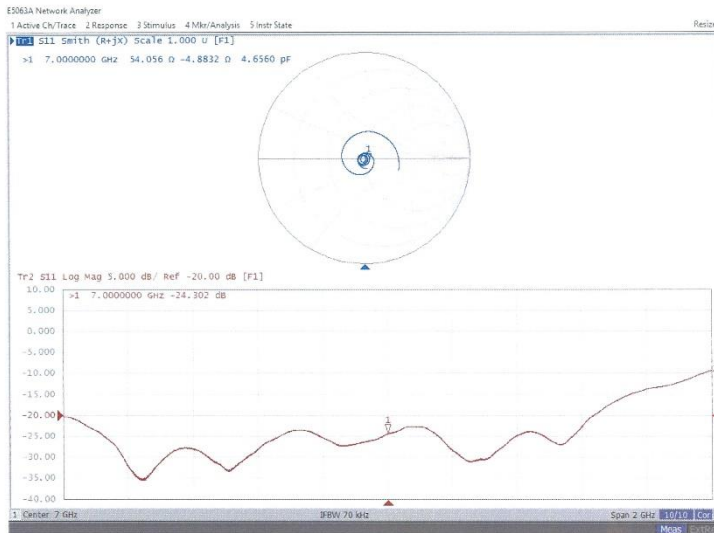


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Impedance Measurement Plot for Head TSL



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Accreditation No.: SCS 0108

Client **SGS**  
 Taoyuan City

Certificate No. **5G-Veri10-1070\_Aug24**

## CALIBRATION CERTIFICATE

Object	5G Verification Source 10 GHz - SN: 1070		
Calibration procedure(s)	QA CAL-45.v5 Calibration procedure for sources in air above 6 GHz		
Calibration date:	August 16, 2024		
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)			
<b>Primary Standards</b>	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Reference Probe EUmWV3	SN: 9374	04-Dec-23 (No. EUmWV3_Dec23)	Dec-24
DAE4ip	SN: 1602	08-Nov-23 (No. DAE4ip-1602_Nov23)	Nov-24
<b>Secondary Standards</b>	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMF100A	SN: 100184	29-Nov-23 (in house check Nov-23)	In house check: Nov-24
Power sensor R&S NRP18S-10	SN: 101258	29-Nov-23 (in house check Nov-23)	In house check: Nov-24
Network Analyzer Keysight E5063A	SN: MY54504221	31-Oct-19 (in house check Oct-22)	In house check: Oct-25
Calibrated by:	Name Joanna Lleshaj	Function Laboratory Technician	Signature 
Approved by:	Sven Kühn	Technical Manager	
			Issued: August 20, 2024
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			

Certificate No: 5G-Veri10-1070\_Aug24

Page 1 of 8

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



**S** Schweizerischer Kalibrierdienst  
**C** Service suisse d'étalonnage  
**S** Servizio svizzero di taratura  
**S** Swiss Calibration Service

**Glossary**

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

Accreditation No.: SCS 0108

CW Continuous wave

**Calibration is Performed According to the Following Standards**

- Internal procedure QA CAL-45, Calibration procedure for sources in air above 6 GHz.
- IEC/IEEE 63195-1, "Assessment of power density of human exposure to radio frequency fields from wireless devices in close proximity to the head and body (frequency range of 6 GHz to 300 GHz)", May 2022

**Methods Applied and Interpretation of Parameters**

- *Coordinate System:* z-axis in the waveguide horn boresight, x-axis is in the direction of the E-field, y-axis normal to the others in the field scanning plane parallel to the horn flare and horn flange.
- *Measurement Conditions:* (1) 10 GHz: The radiated power is the forward power to the horn antenna minus ohmic and mismatch loss. The forward power is measured prior and after the measurement with a power sensor. During the measurements, the horn is directly connected to the cable and the antenna ohmic and mismatch losses are determined by far-field measurements. (2) 30, 45, 60 and 90 GHz: The verification sources are switched on for at least 30 minutes. Absorbers are used around the probe cub and at the ceiling to minimize reflections.
- *Horn Positioning:* The waveguide horn is mounted vertically on the flange of the waveguide source to allow vertical positioning of the EUmmW probe during the scan. The plane is parallel to the phantom surface. Probe distance is verified using mechanical gauges positioned on the flare of the horn.
- *E-field distribution:* E field is measured in two x-y-plane (10mm, 10mm +  $\lambda/4$ ) with a vectorial E-field probe. The E-field value stated as calibration value represents the E-field-maxima and the averaged (1cm<sup>2</sup> and 4cm<sup>2</sup>) power density values at 10mm in front of the horn.
- *Field polarization:* Above the open horn, linear polarization of the field is expected. This is verified graphically in the field representation.

**Calibrated Quantity**

- Local peak E-field (V/m) and average of peak spatial components of the poynting vector (W/m<sup>2</sup>) averaged over the surface area of 1 cm<sup>2</sup> and 4cm<sup>2</sup> at the nominal operational frequency of the verification source. Both square and circular averaging results are listed.

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	DASY8 Module mmWave	V3.2
Phantom	5G Phantom	
Distance Horn Aperture - plane	10 mm	
Number of measured planes	2 (10mm, 10mm + $\lambda/4$ )	
Frequency	10 GHz $\pm$ 10 MHz	

### Calibration Parameters, 10 GHz

#### Circular Averaging

Distance Horn Aperture to Measured Plane	Prad <sup>1</sup> (mW)	Max E-field (V/m)	Uncertainty (k = 2)	Avg Power Density		Uncertainty (k = 2)
				Avg (psPDn+, psPDtot+, psPDmod+) (W/m <sup>2</sup> )		
				1 cm <sup>2</sup>	4 cm <sup>2</sup>	
10 mm	93.3	152	1.27 dB	60.3	56.2	1.28 dB

Distance Horn Aperture to Measured Plane	Prad <sup>1</sup> (mW)	Max E-field (V/m)	Uncertainty (k = 2)	Power Density		Uncertainty (k = 2)
				psPDn+, psPDtot+, psPDmod+ (W/m <sup>2</sup> )		
				1 cm <sup>2</sup>	4 cm <sup>2</sup>	
10 mm	93.3	152	1.27 dB	60.1, 60.3, 60.5	55.9, 56.2, 56.4	1.28 dB

#### Square Averaging

Distance Horn Aperture to Measured Plane	Prad <sup>1</sup> (mW)	Max E-field (V/m)	Uncertainty (k = 2)	Avg Power Density		Uncertainty (k = 2)
				Avg (psPDn+, psPDtot+, psPDmod+) (W/m <sup>2</sup> )		
				1 cm <sup>2</sup>	4 cm <sup>2</sup>	
10 mm	93.3	152	1.27 dB	60.3	56.1	1.28 dB

Distance Horn Aperture to Measured Plane	Prad <sup>1</sup> (mW)	Max E-field (V/m)	Uncertainty (k = 2)	Power Density		Uncertainty (k = 2)
				psPDn+, psPDtot+, psPDmod+ (W/m <sup>2</sup> )		
				1 cm <sup>2</sup>	4 cm <sup>2</sup>	
10 mm	93.3	152	1.27 dB	60.1, 60.3, 60.4	55.8, 56.1, 56.3	1.28 dB

#### Max Power Density

Distance Horn Aperture to Measured Plane	Prad <sup>1</sup> (mW)	Max E-field (V/m)	Uncertainty (k = 2)	Max Power Density	Uncertainty (k = 2)
				Sn, Stot,  Stot  (W/m <sup>2</sup> )	
10 mm	93.3	152	1.27 dB	61.8, 61.8, 62.0	1.28 dB

<sup>1</sup> Assessed ohmic and mismatch loss plus numerical offset: 0.30 dB

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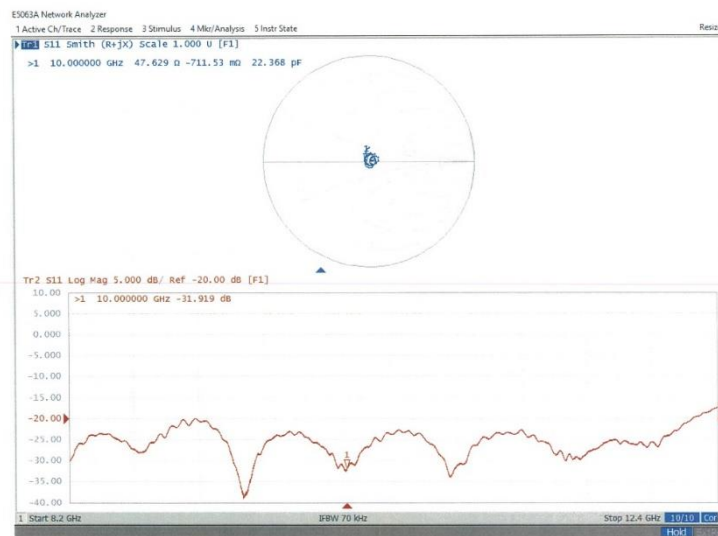
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**Appendix (Additional assessments outside the scope of SCS 0108)**

**Antenna Parameters**

Impedance, transformed to feed point	47.6 $\Omega$ - 0.7 j $\Omega$
Return Loss	- 31.9 dB

**Impedance Measurement Plot**



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**DASY Report**

Measurement Report for 5G Verification Source 10 GHz, UID 0 -, Channel 10000 (10000.0MHz)

**Device under Test Properties**

Name, Manufacturer	Dimensions [mm]	IMEI	DUT Type
5G Verification Source 10 GHz	100.0 x 100.0 x 172.0	SN: 1070	-

**Exposure Conditions**

Phantom Section	Position, Test Distance [mm]	Band	Group	Frequency [MHz], Channel Number	Conversion Factor
5G -	10.0 mm	Validation band	CW	10000.0, 10000	1.0

**Hardware Setup**

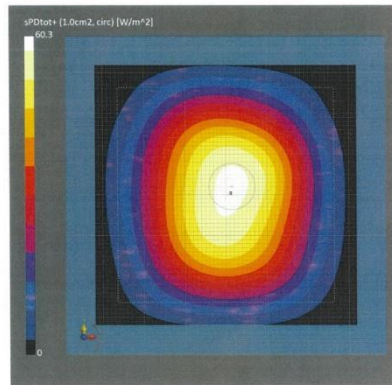
Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave Phantom - 1002	Air	EUmmWV3 - SN9374_F1-55GHz, 2023-12-04	DAE4ip Sn1602, 2023-11-08

**Scan Setup**

Sensor Surface [mm]	10.0
MAIA	MAIA not used

**Measurement Results**

Date	2024-08-16, 09:41
Avg. Area [cm <sup>2</sup> ]	1.00
Avg. Type	Circular Averaging
psPDn+ [W/m <sup>2</sup> ]	60.1
psPDtot+ [W/m <sup>2</sup> ]	60.3
psPDmod+ [W/m <sup>2</sup> ]	60.5
Max(Sn) [W/m <sup>2</sup> ]	61.8
Max(Stot) [W/m <sup>2</sup> ]	61.8
Max( Stot ) [W/m <sup>2</sup> ]	62.0
E <sub>max</sub> [V/m]	152
Power Drift [dB]	-0.02



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**DASY Report**

Measurement Report for 5G Verification Source 10 GHz, UID 0 -, Channel 10000 (10000.0MHz)

**Device under Test Properties**

Name, Manufacturer	Dimensions [mm]	IMEI	DUT Type
5G Verification Source 10 GHz	100.0 x 100.0 x 172.0	SN: 1070	-

**Exposure Conditions**

Phantom Section	Position, Test Distance [mm]	Band	Group,	Frequency [MHz], Channel Number	Conversion Factor
5G -	10.0 mm	Validation band	CW	10000.0, 10000	1.0

**Hardware Setup**

Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave Phantom - 1002	Air	ELmmWV3 - SN9374_F1-55GHz, 2023-12-04	DAE4ip Sn1602, 2023-11-08

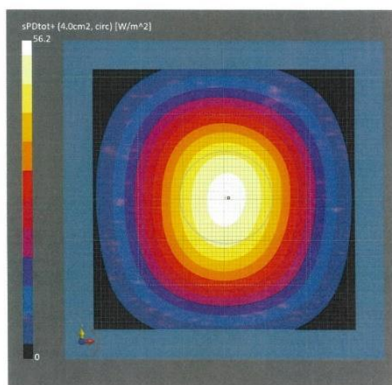
**Scan Setup**

Sensor Surface [mm]
MAIA

5G Scan
10.0
MAIA not used

**Measurement Results**

Date	5G Scan
2024-08-16, 09:41	2024-08-16, 09:41
Avg. Area [cm <sup>2</sup> ]	4.00
Avg. Type	Circular Averaging
psPDn+ [W/m <sup>2</sup> ]	55.9
psPDtot+ [W/m <sup>2</sup> ]	56.2
psPDmod+ [W/m <sup>2</sup> ]	56.4
Max(Sn) [W/m <sup>2</sup> ]	61.8
Max(Stot) [W/m <sup>2</sup> ]	61.8
Max( Stot ) [W/m <sup>2</sup> ]	62.0
E <sub>max</sub> [V/m]	152
Power Drift [dB]	-0.02



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**DASY Report**

Measurement Report for 5G Verification Source 10 GHz, UID 0 -, Channel 10000 (10000.0MHz)

**Device under Test Properties**

Name, Manufacturer	Dimensions [mm]	IMEI	DUT Type
5G Verification Source 10 GHz	100.0 x 100.0 x 172.0	SN: 1070	-

**Exposure Conditions**

Phantom Section	Position, Test Distance [mm]	Band	Group,	Frequency [MHz], Channel Number	Conversion Factor
5G -	10.0 mm	Validation band	CW	10000.0, 10000	1.0

**Hardware Setup**

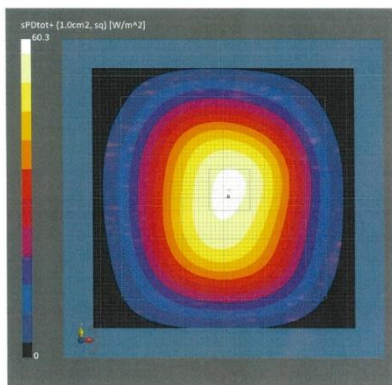
Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave Phantom - 1002	Air	EUmmWV3 - SN9374_F1-55GHz, 2023-12-04	DAE4ip Sn1602, 2023-11-08

**Scan Setup**

Sensor Surface [mm]	10.0
MAIA	MAIA not used

**Measurement Results**

5G Scan	5G Scan
Date	2024-08-16, 09:41
Avg. Area [cm <sup>2</sup> ]	1.00
Avg. Type	Square Averaging
psPDn+ [W/m <sup>2</sup> ]	60.1
psPDtot+ [W/m <sup>2</sup> ]	60.3
psPDmod+ [W/m <sup>2</sup> ]	60.4
Max(Sn) [W/m <sup>2</sup> ]	61.8
Max(Stot) [W/m <sup>2</sup> ]	61.8
Max( Stot ) [W/m <sup>2</sup> ]	62.0
E <sub>max</sub> [V/m]	152
Power Drift [dB]	-0.02



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**DASY Report**

Measurement Report for 5G Verification Source 10 GHz, UID 0 -, Channel 10000 (10000.0MHz)

**Device under Test Properties**

Name, Manufacturer	Dimensions [mm]	IMEI	DUT Type
5G Verification Source 10 GHz	100.0 x 100.0 x 172.0	SN: 1070	-

**Exposure Conditions**

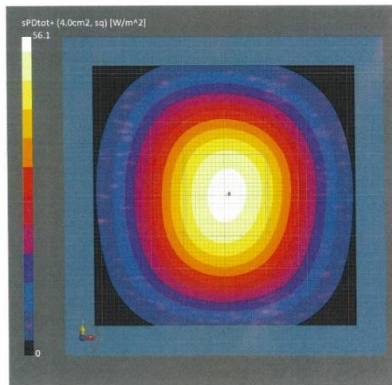
Phantom Section	Position, Test Distance [mm]	Band	Group,	Frequency [MHz], Channel Number	Conversion Factor
5G -	10.0 mm	Validation band	CW	10000.0, 10000	1.0

**Hardware Setup**

Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave Phantom - 1002	Air	EUMmWV3 - SN9374_F1-55GHz, 2023-12-04	DAE4ip Sn1602, 2023-11-08

**Scan Setup**

Sensor Surface [mm]	5G Scan	Measurement Results	5G Scan
MAIA	10.0	Date	2024-08-16, 09:41
	MAIA not used	Avg. Area [cm <sup>2</sup> ]	4.00
		Avg. Type	Square Averaging
		psPDn+ [W/m <sup>2</sup> ]	55.8
		psPDtot+ [W/m <sup>2</sup> ]	56.1
		psPDmod+ [W/m <sup>2</sup> ]	56.3
		Max(Sn) [W/m <sup>2</sup> ]	61.8
		Max(Stot) [W/m <sup>2</sup> ]	61.8
		Max( Stot ) [W/m <sup>2</sup> ]	62.0
		E <sub>max</sub> [V/m]	152
		Power Drift [dB]	-0.02



**- End of report -**

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