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 = 71.92 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 30.7 W/kg

SAR(1 g) = 8.26 W/kg; SAR(10 g) = 2.36 W/kg

Smallest distance from peaks to all points 3 dB below = 7.2 mm

Ratio of SAR at M2 to SAR at M1 = 67.7%

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

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan,

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

Reference Value = 69.76 V/m; Power Drift = 0.09 dB

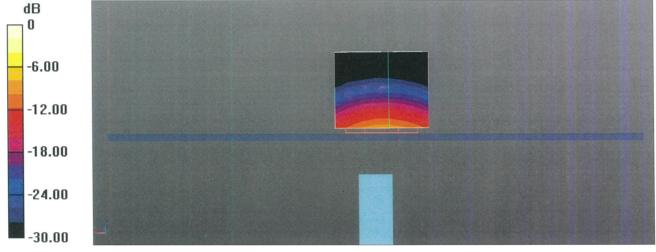
Peak SAR (extrapolated) = 31.9 W/kg

SAR(1 g) = 8.04 W/kg; SAR(10 g) = 2.29 W/kg

Smallest distance from peaks to all points 3 dB below = 7.2 mm

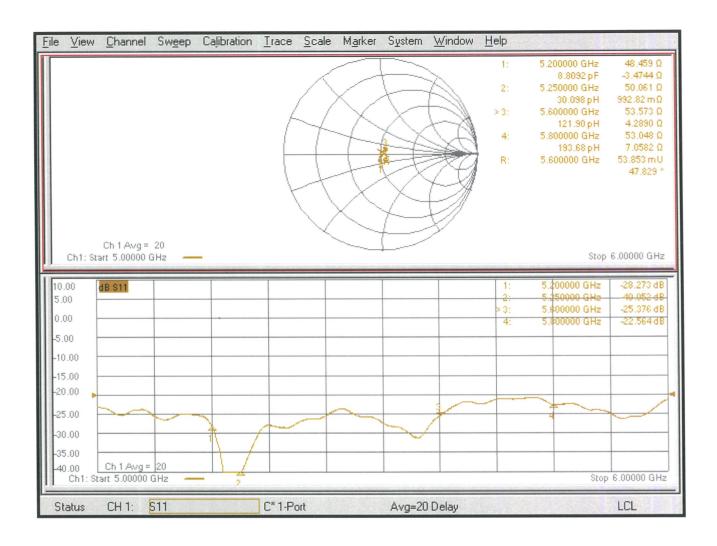
Ratio of SAR at M2 to SAR at M1 = 65.5%

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



0 dB = 19.2 W/kg = 12.84 dBW/kg

Impedance Measurement Plot for Head TSL



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





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Client

Dekra

Taoyuan City

Accreditation No.: SCS 0108

Certificate No. D6.5GHzV2-1021_Feb24

CALIBRATION CERTIFICATE

Object

D6.5GHzV2 - SN:1021

Calibration procedure(s)

QA CAL-22.v7

Calibration Procedure for SAR Validation Sources between 3-10 GHz

Calibration date:

February 12, 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	03-Apr-23 (No. 217-03806)	Apr-24
Reference 20 dB Attenuator	SN: BH9394 (20k)	30-Mar-23 (No. 217-03809)	Mar-24
Mismatch combination	SN: 84224 / 360D	03-Apr-23 (No. 217-03812)	Apr-24
Reference Probe EX3DV4	SN: 7405	12-Jun-23 (No. EX3-7405_Jun23)	Jun-24
DAE4	SN: 908	03-Jul-23 (No. DAE4-908_Jul23)	Jul-24
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
	Name	F	
Calibrated by	A CHARLEST THE RESIDENCE AND A CHARLEST THE RESIDENCE OF	Function	Signature
Calibrated by:	Aidonia Georgiadou	Laboratory Technician	May
Approved by:	Sven Kühn	Technical Manager	S-6

Issued: February 19, 2024

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Certificate No: D6.5GHzV2-1021_Feb24

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Calibration Laboratory of Schmid & Partner

Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland





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Swiss Calibration Service

Glossary:

TSL ConvF

N/A

tissue simulating liquid

sensitivity in TSL / NORM x,y,z

not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEC/IEEE 62209-1528, "Measurement Procedure For The Assessment Of Specific Absorption Rate Of Human Exposure To Radio Frequency Fields From Hand-Held And Body-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%.

Certificate No: D6.5GHzV2-1021_Feb24

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Measurement Conditions

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

	3	
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 ± 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 ± 0.2) °C	34.4 ± 6 %	6.18 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		4424

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	29.4 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	294 W/kg ± 24.7 % (k=2)

SAR averaged over 8 cm³ (8 g) of Head TSL	Condition	
SAR measured	100 mW input power	6.58 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	65.7 W/kg ± 24.4 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	5.40 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	53.9 W/kg ± 24.4 % (k=2)

Certificate No: D6.5GHzV2-1021_Feb24

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.5 Ω - 2.5 jΩ
Return Loss	- 27.6 dB

APD (Absorbed Power Density)

APD averaged over 1 cm ²	Condition	
APD measured	100 mW input power	293 W/m²
APD measured	normalized to 1W	2930 W/m ² ± 29.2 % (k=2)

APD averaged over 4 cm ²	condition	
APD measured	100 mW input power	132 W/m²
APD measured	normalized to 1W	1320 W/m ² ± 28.9 % (k=2)

^{*}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	
Manufactured by	SPEAG
	J SFEAG

Certificate No: D6.5GHzV2-1021_Feb24

DASY6 Validation Report for Head TSL

Measurement Report for D6.5GHz-1021, UID 0 -, Channel 6500 (6500.0MHz)

Name, Manufacturer	Dimensions [mm]	IMEI	DUT Type
D6.5GHz	$16.0 \times 6.0 \times 300.0$	SN: 1021	_

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	5.50	6.18	34.4

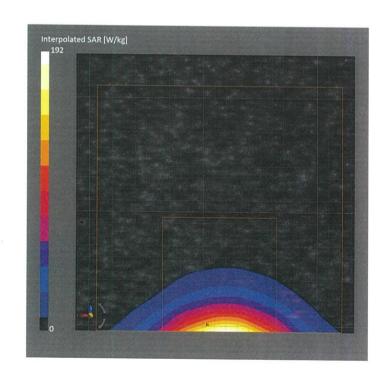
Hardware Setup

Phantom	TSL	Probe, Calibration Date	DAE, Calibration Date
MFP V8.0 Center - 1182	HBBL600-10000V6	EX3DV4 - SN7405, 2023-06-12	DAE4 Sn908, 2023-07-03

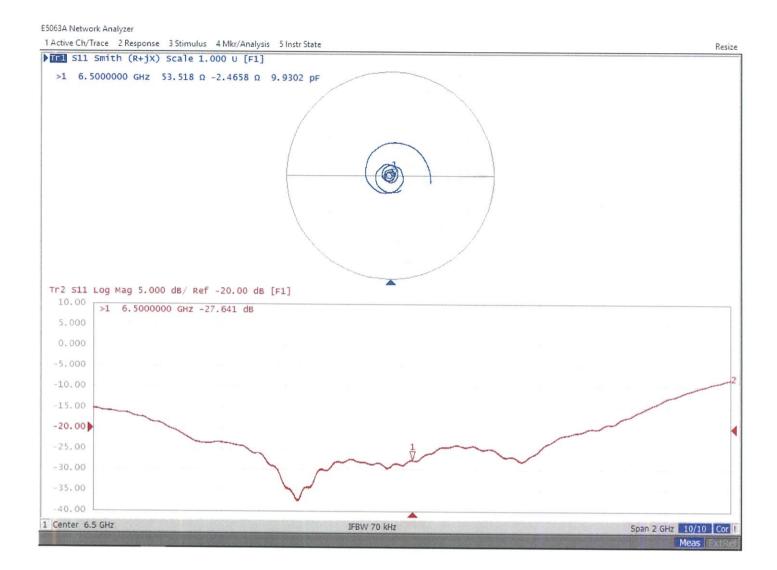
Scan Setup

	Zoom Scan		Zoom Scan
Grid Extents [mm]	22.0 x 22.0 x 22.0	Date	2024-02-12, 11:00
Grid Steps [mm]	$3.4 \times 3.4 \times 1.4$	psSAR1g [W/Kg]	29.4
Sensor Surface [mm]	1.4	psSAR8g [W/Kg]	6.58
Graded Grid	Yes	psSAR10g [W/Kg]	5.40
Grading Ratio	1.4	Power Drift [dB]	-0.01
MAIA	N/A	Power Scaling	Disabled
Surface Detection	VMS + 6p	Scaling Factor [dB]	
Scan Method	Measured	TSL Correction	No correction
		M2/M1 [%]	49.6
		Dist 3dB Peak [mm]	4.6

Measurement Results

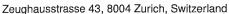


Impedance Measurement Plot for Head TSL



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Client

DEKRA
Taoyuan City

Certificate No.

5G-Veri10-2006_Apr25

CALIBRATION CERTIFICATE

Object

5G Verification Source 10 GHz - SN: 2006

Calibration procedure(s)

QA CAL-45.v5

Calibration procedure for sources in air > 6 GHz

Calibration date

April 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 $(22\pm3)^{\circ}$ C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Cal
Reference Probe SPEAG EUmmWV3	SN: 9374	28-Aug-24 (No. Eumm_9374_Aug24)	Aug-25
DAE4ip	SN: 1602	06-Nov-24 (No. DAE4ip-1602 Nov24)	Nov-25

Secondary Standards	ID	Check Date (in house)	Scheduled Check
Signal Generator R&S SMF100A	SN: 100184	26-Nov-24 (No. 5G-Source-Cal-IHC-202411)	Nov-25
Power Sensor R&S NRP18S-10	SN: 101258	26-Nov-24 (No. 5G-Source-Cal-IHC-202411)	Nov-25
Network Analyzer Keysight F5063A	SN: MY54504221	30-Sept-24 (No. 675-CAL18-S4489-Sep24)	Sep-26

Name Function Signature

Calibrated by Joanna Lleshaj Laboratory Technician

Approved by Sven Kühn Technical Manager

Issued: April 15, 2025

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Accreditation No.: SCS 0108

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Glossary

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: The E-field is measured in two x-y-planes (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 (1cm² and 4cm²) 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/m²) averaged over the surface area of 1 cm² and 4cm² 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%.

Page 2 of 8 Certificate No: 5G-Veri10-2006_Apr25

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 + λ/4)	
Frequency	10.0 GHz ± 10 MHz	

Calibration Parameters, 10 GHz

Circular Averaging

Distance Horn Aperture to Measurement Plane	Prad ¹ (mW)	Max E-field (V/m)	Uncertainty (k = 2)	Avg Powe Avg (psPDn+, psP (W/	Dtot+, psPDmod+)	Uncertainty (k = 2)
				1cm ²	4cm ²	
10 mm	138.0	291	1.27 dB	223	177	1.28 dB

Distance Horn Aperture to Measurement Plane	Prad ¹ (mW)	Max E-field (V/m)	Uncertainty (k = 2)	Power psPDn+, psPDt (W/	ot+, psPDmod+	Uncertainty (k = 2)
				1cm ²	4cm ²	
10 mm	138.0	291	1.27 dB	222, 222, 224	175, 176, 181	1.28 dB

Square Averaging

Distance Horn Aperture to Measurement Plane	Prad ¹ (mW)	Max E-field (V/m)	Uncertainty (k = 2)	Avg Powe Avg (psPDn+, psP (W/	Dtot+, psPDmod+)	Uncertainty (k = 2)
				1cm ²	4cm ²	
10 mm	138.0	291	1.27 dB	223	177	1.28 dB

Distance Horn Aperture to Measurement Plane	Prad ¹ (mW)	Max E-field (V/m)	Uncertainty (k = 2)	Power I psPDn+, psPDt (W/	ot+, psPDmod+	Uncertainty (k = 2)
				1cm ²	4cm ²	
10 mm	138.0	291	1.27 dB	222, 222, 224	175, 175, 180	1.28 dB

Max Power Density

Distance Horn Aperture to Measurement Plane	Prad ¹ (mW)	Max E-field (V/m)	Uncertainty (k = 2)	Max Power Density Sn, Stot, Stot (W/m ²)	Uncertainty (k = 2)
10 mm	138.0	291	1.27 dB	242, 242, 242	1.28 dB

Certificate No: 5G-Veri10-2006_Apr25

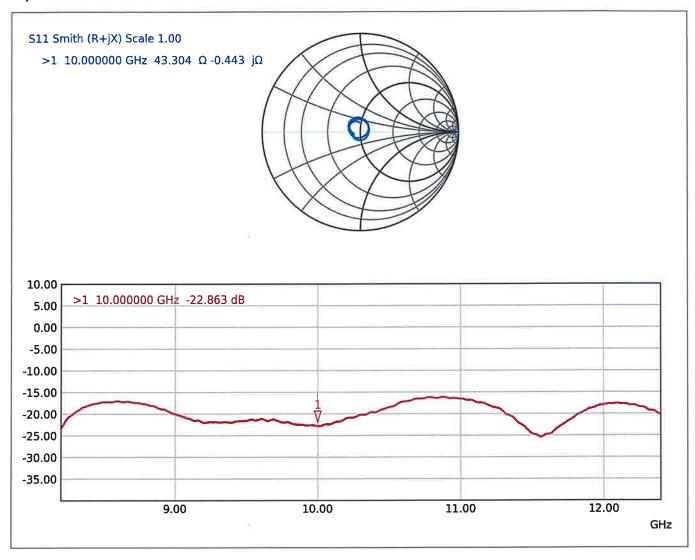
¹Assessed ohmic and mismatch loss plus numerical offset: 0.60 dB

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters

Impedance, transformed to feed point	$43.3 \Omega - 0.4 j\Omega$		
Return Loss	-22.9 dB		

Impedance Measurement Plot



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

Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
5G Verification Source 10 GHz	100.0 × 100.0 × 100.0	SN: 2006	

Exposure Conditions

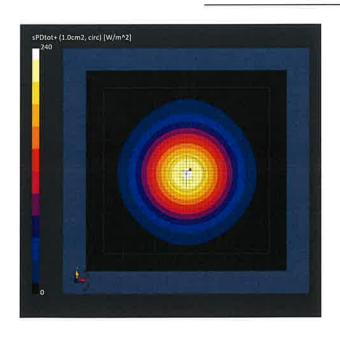
Phantom Section	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor
5G -	10.0 mm	Validation band	CW, 0	10000.0,10000	1.0

Hardware Setup

Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave Phantom -	Air -	EUmmWV3 - SN9374_F1-55GHz, 2024-08-28	DAE4ip - SN1602, 2024-11-06

Scans Setup 10.0 MAIA MAIA not used

Measurement Results	
Scan Type	5G Scan
Date	2025-04-14
Avg. Area [cm ²]	1.00
Avg. Type	Circular Averaging
psPDn+ [W/m²]	222
psPDtot+ [W/m²]	222
psPDmod+ [W/m²]	224
Max(Sn) [W/m ²]	242
Max(Stot) [W/m ²]	242
Max(Stot) [W/m ²]	242
E _{max} [V/m]	291
Power Drift [dB]	0.0



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

Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
5G Verification Source 10 GHz	100.0 x 100.0 x 100.0	SN: 2006	02

Exposure Conditions

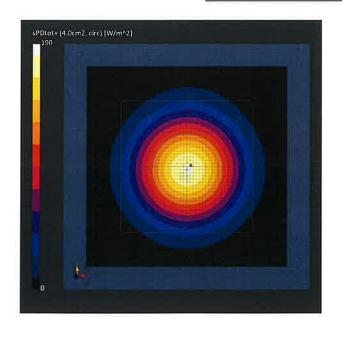
Phantom Section	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor
5G -	10.0 mm	Validation band	CW, 0	10000.0,10000	1.0

Hardware Setup

Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave Phantom -	Air -	EUmmWV3 - SN9374_F1 -55GHz, 2024-08-28	DAE4ip - SN1602, 2024-11-06

Scans Setup 10.0 MAIA MAIA not used

Measurement Results	
Scan Type	5G Scan
Date	2025-04-14
Avg. Area [cm²]	4.00
Avg. Type	Circular Averaging
psPDn+ [W/m²]	175
psPDtot+ [W/m²]	176
psPDmod+ [W/m²]	181
Max(Sn) [W/m ²]	242
Max(Stot) [W/m ²]	242
Max(Stot) [W/m ²]	242
E _{max} [V/m]	291
Power Drift [dB]	0.0



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

Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IME	DUT Type	
5G Verification Source 10 GHz	100.0 x 100.0 x 100.0	SN: 2006	(4)	

Exposure Conditions

Phantom Section	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor
5G -	10.0 mm	Validation band	CW, 0	10000.0,10000	1.0

Hardware Setup

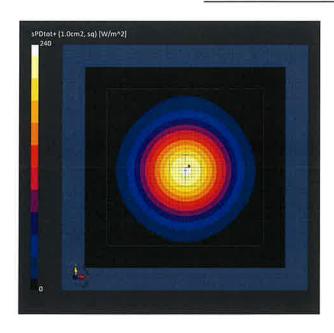
Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date	
mmWave Phantom -	Air =	EUmmWV3 - SN9374_F1-55GHz, 2024-08-28	DAE4ip - SN1602, 2024-11-06	

Scans Setup

Sensor Surface [mm]	10.0
MAIA	MAIA not used

Measurement Results

Scan Type	5G Scan
Date	2025-04-14
Avg. Area [cm ²]	1.00
Avg. Type	Square Averaging
psPDn+ [W/m ²]	222
psPDtot+ [W/m²]	222
psPDmod+ [W/m²]	224
Max(Sn) [W/m ²]	242
Max(Stot) [W/m ²]	242
Max(Stot) [W/m²]	242
E _{max} [V/m]	291
Power Drift [dB]	0.0



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

Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
5G Verification Source 10 GHz	100.0 x 100.0 x 100.0	SN: 2006	82

Exposure Conditions

Phantom Section	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor
5G +	10.0 mm	Validation band	CW, 0	10000.0,10000	1.0

Hardware Setup

Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave Phantom -	Air –	EUmmWV3 - SN9374_F1-55GHz, 2024-08-28	DAE4ip - SN1602, 2024-11-06

Scans Setup 10.0 MAIA MAIA not used

Scan Type	5G Scan
Date	2025-04-14
Avg. Area [cm²]	4.00
Avg. Type	Square Averaging
psPDn+ [W/m²]	175
psPDtot+ [W/m²]	175
psPDmod+ [W/m²]	180
Max(Sn) [W/m ²]	242
Max(Stot) [W/m ²]	242
Max(Stot) [W/m ²]	242
E _{max} [V/m]	291
Power Drift [dB]	0.0

