Head TSL parameters at 5500 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.6	4.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.8 ± 6 %	4.86 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5500 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.34 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**83.4 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.37 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.7 W/kg ± 19.5 % (k=2)**

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	35.6 ± 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^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.17 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**81.7 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.32 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.2 W/kg ± 19.5 % (k=2)**

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	35.4 ± 6 %	5.14 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^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.99 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**79.9 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.28 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**22.8 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5800 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	35.3 ± 6 %	5.19 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5800 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.88 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**78.7 W/kg ± 19.9 % (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	**22.2 W/kg ± 19.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL at 5200 MHz

Impedance, transformed to feed point	47.5 Ω - 4.9 jΩ
Return Loss	- 25.0 dB

Antenna Parameters with Head TSL at 5250 MHz

Impedance, transformed to feed point	46.5 Ω - 3.0 jΩ
Return Loss	- 26.5 dB

Antenna Parameters with Head TSL at 5300 MHz

Impedance, transformed to feed point	46.3 Ω - 1.1 jΩ
Return Loss	- 27.9 dB

Antenna Parameters with Head TSL at 5500 MHz

Impedance, transformed to feed point	49.5 Ω - 2.3 jΩ
Return Loss	- 32.7 dB

Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	53.0 Ω + 1.7 jΩ
Return Loss	- 29.5 dB

Antenna Parameters with Head TSL at 5750 MHz

Impedance, transformed to feed point	51.5 Ω - 0.6 jΩ
Return Loss	- 35.8 dB

Antenna Parameters with Head TSL at 5800 MHz

Impedance, transformed to feed point	51.0 Ω - 2.4 jΩ
Return Loss	- 31.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.202 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

DASY5 Validation Report for Head TSL

Date: 12.06.2024

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1060

Communication System: UID 0 - CW; Frequency: 5200 MHz, Frequency: 5250 MHz, Frequency: 5300 MHz, Frequency: 5500 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz, Frequency: 5800 MHz
Medium parameters used: f = 5200 MHz; σ = 4.55 S/m; ε_r = 36.4; ρ = 1000 kg/m^3
Medium parameters used: f = 5250 MHz; σ = 4.6 S/m; ε_r = 36.3; ρ = 1000 kg/m^3
Medium parameters used: f = 5300 MHz; σ = 4.64 S/m; ε_r = 36.2; ρ = 1000 kg/m^3
Medium parameters used: f = 5500 MHz; σ = 4.86 S/m; ε_r = 35.8; ρ = 1000 kg/m^3
Medium parameters used: f = 5600 MHz; σ = 4.97 S/m; ε_r = 35.6; ρ = 1000 kg/m^3
Medium parameters used: f = 5750 MHz; σ = 5.14 S/m; ε_r = 35.4; ρ = 1000 kg/m^3
Medium parameters used: f = 5800 MHz; σ = 5.19 S/m; ε_r = 35.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.63, 5.63, 5.63) @ 5200 MHz, ConvF(5.39, 5.39, 5.39) @ 5250 MHz, ConvF(5.38, 5.38, 5.38) @ 5300 MHz, ConvF(5.04, 5.04, 5.04) @ 5500 MHz, ConvF(5, 5, 5) @ 5600 MHz, ConvF(4.98, 4.98, 4.98) @ 5750 MHz, ConvF(4.86, 4.86, 4.86) @ 5800 MHz; Calibrated: 07.03.2024
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 22.05.2024
- 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=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 75.67 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 27.1 W/kg
SAR(1 g) = 7.64 W/kg; SAR(10 g) = 2.18 W/kg
Smallest distance from peaks to all points 3 dB below = 7.2 mm
Ratio of SAR at M2 to SAR at M1 = 69.1%
Maximum value of SAR (measured) = 17.7 W/kg

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 = 77.05 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 26.8 W/kg
SAR(1 g) = 7.82 W/kg; SAR(10 g) = 2.23 W/kg
Smallest distance from peaks to all points 3 dB below = 7.2 mm
Ratio of SAR at M2 to SAR at M1 = 70.1%
Maximum value of SAR (measured) = 18.0 W/kg

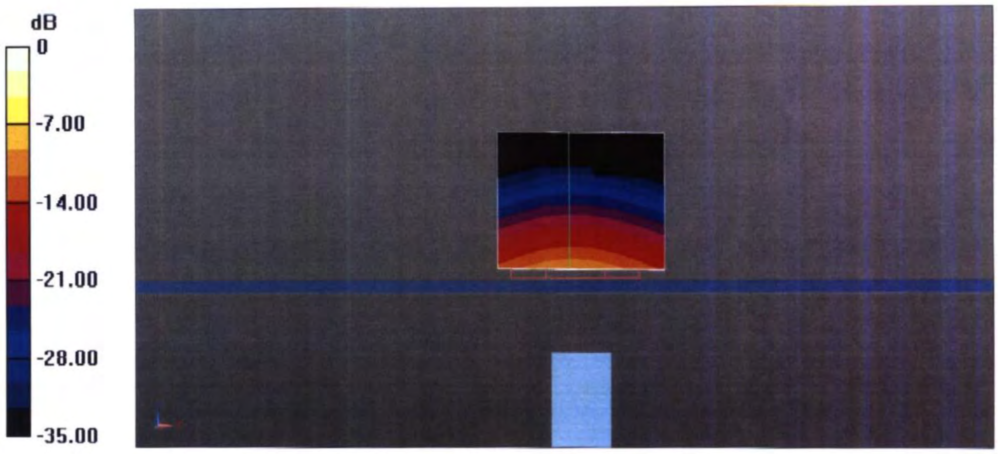
Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5300 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 76.66 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 28.3 W/kg
SAR(1 g) = 7.94 W/kg; SAR(10 g) = 2.28 W/kg
Smallest distance from peaks to all points 3 dB below = 7.2 mm
Ratio of SAR at M2 to SAR at M1 = 68.9%
Maximum value of SAR (measured) = 18.5 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 77.28 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 32.3 W/kg
SAR(1 g) = 8.34 W/kg; SAR(10 g) = 2.37 W/kg
Smallest distance from peaks to all points 3 dB below = 6.8 mm
Ratio of SAR at M2 to SAR at M1 = 66.4%
Maximum value of SAR (measured) = 20.0 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 = 76.70 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 30.7 W/kg
SAR(1 g) = 8.17 W/kg; SAR(10 g) = 2.32 W/kg
Smallest distance from peaks to all points 3 dB below = 7.2 mm
Ratio of SAR at M2 to SAR at M1 = 67.1%
Maximum value of SAR (measured) = 19.6 W/kg

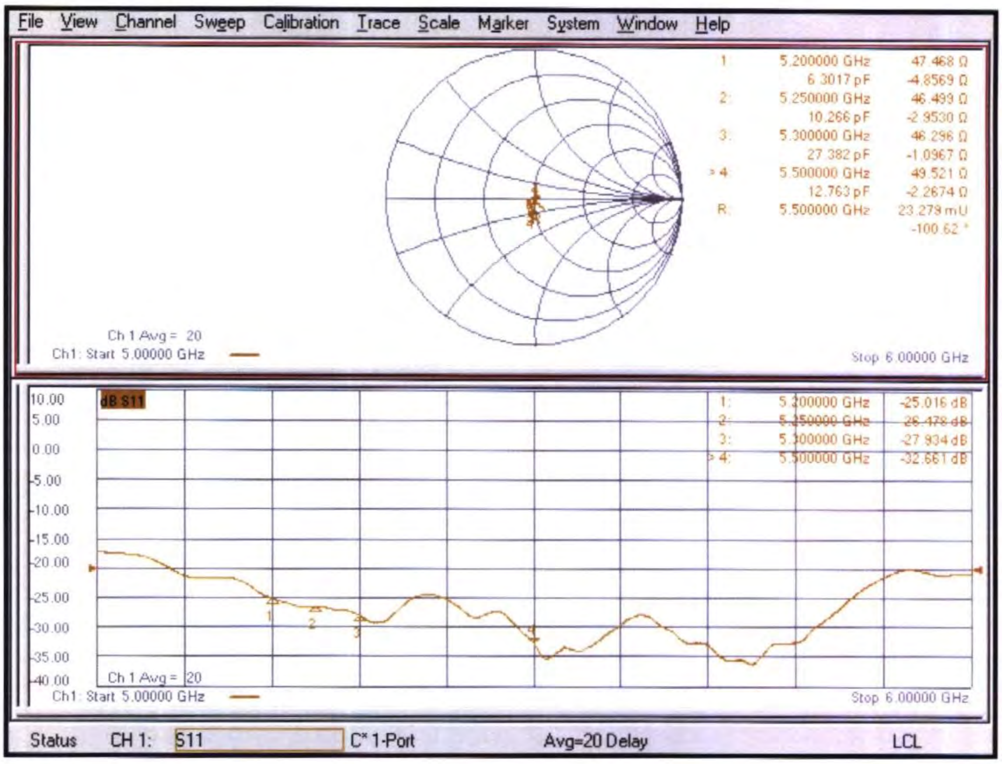
Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 74.11 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 31.5 W/kg
SAR(1 g) = 7.99 W/kg; SAR(10 g) = 2.28 W/kg
Smallest distance from peaks to all points 3 dB below = 7.2 mm
Ratio of SAR at M2 to SAR at M1 = 65.6%
Maximum value of SAR (measured) = 19.3 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 = 74.18 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 31.5 W/kg
SAR(1 g) = 7.88 W/kg; SAR(10 g) = 2.22 W/kg
Smallest distance from peaks to all points 3 dB below = 7.2 mm
Ratio of SAR at M2 to SAR at M1 = 65.1%
Maximum value of SAR (measured) = 19.3 W/kg

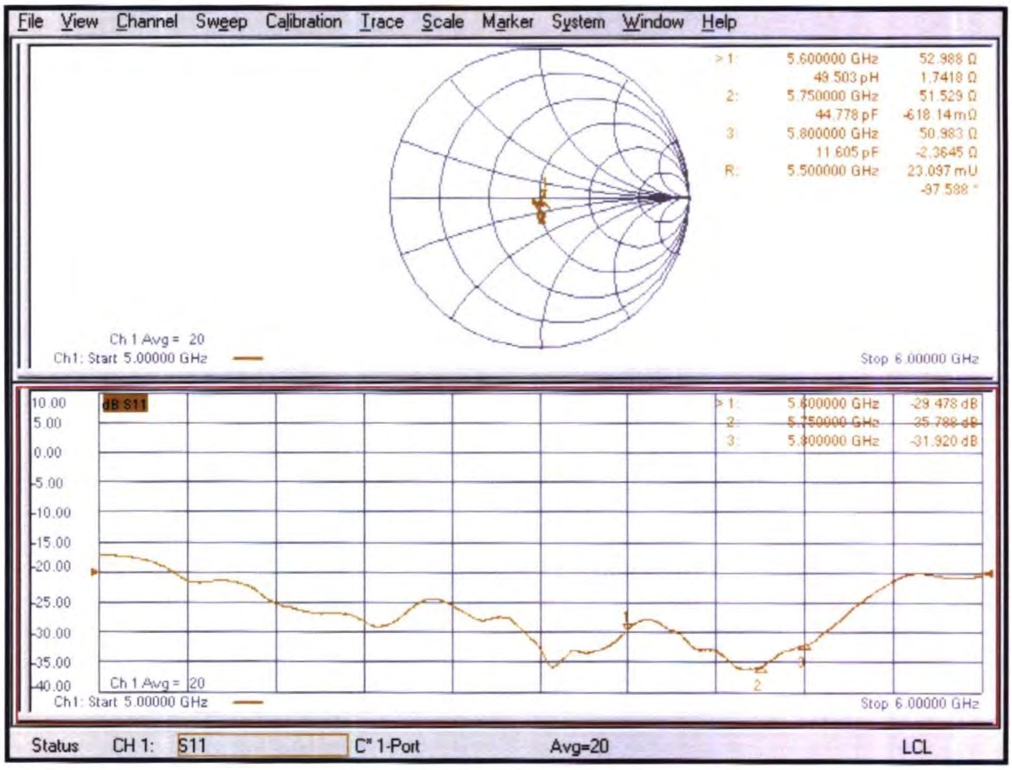


0 dB = 20.0 W/kg = 13.02 dBW/kg

Impedance Measurement Plot for Head TSL (5200, 5250, 5300, 5500 MHz)



Impedance Measurement Plot for Head TSL (5600, 5750, 5800 MHz)



Certificate No: D5GHzV2-1060_Jun24 Page 13 of 13

6.5GHz Dipole Calibration Certificate

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Accreditation No.: SCS 0108

Client **CTTL Beijing**

Certificate No. **D6.5GHzV2-1059_Oct24**

CALIBRATION CERTIFICATE

Object	D6.5GHzV2 - SN:1059
Calibration procedure(s)	QA CAL-22.v7 Calibration Procedure for SAR Validation Sources between 3-10 GHz
Calibration date:	October 07, 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 Sep-24)	In house check: Sep-26

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

Issued: October 8, 2024

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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%.

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 ± 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 %	6.21 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	100 mW input power	30.1 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**301 W/kg ± 24.7 % (k=2)**

SAR averaged over 8 cm^3 (8 g) of Head TSL	Condition	
SAR measured	100 mW input power	6.71 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**67.1 W/kg ± 24.4 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	5.50 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**55.0 W/kg ± 24.4 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.7 Ω - 5.0 jΩ
Return Loss	- 25.1 dB

APD (Absorbed Power Density)

APD averaged over 1 cm^2	Condition	
APD measured	100 mW input power	300 W/m^2
APD measured	normalized to 1W	**3000 W/m^2 ± 29.2 % (k=2)**

APD averaged over 4 cm^2	condition	
APD measured	100 mW input power	134 W/m^2
APD measured	normalized to 1W	**1340 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	SPEAG

DASY6 Validation Report for Head TSL

Measurement Report for D6.5GHz-1059, 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: 1059	-

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	6.21	34.4

Hardware Setup

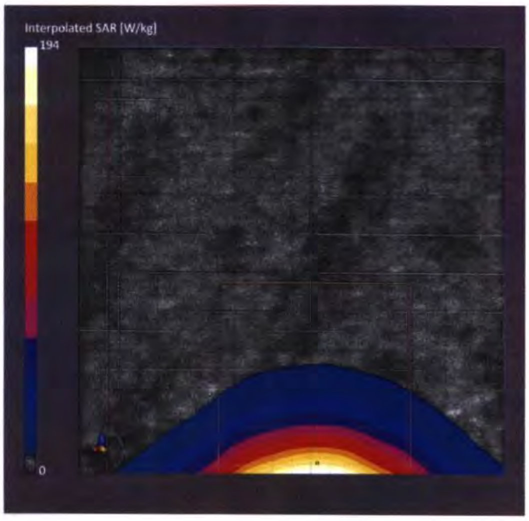
Phantom	TSL	Probe, Calibration Date	DAE, Calibration Date
MFP V8.0 Center - 1182	HBBL600-10000V6	EX3DV4 - SN7405, 2024-07-01	DAE4 Sn908, 2024-03-27

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

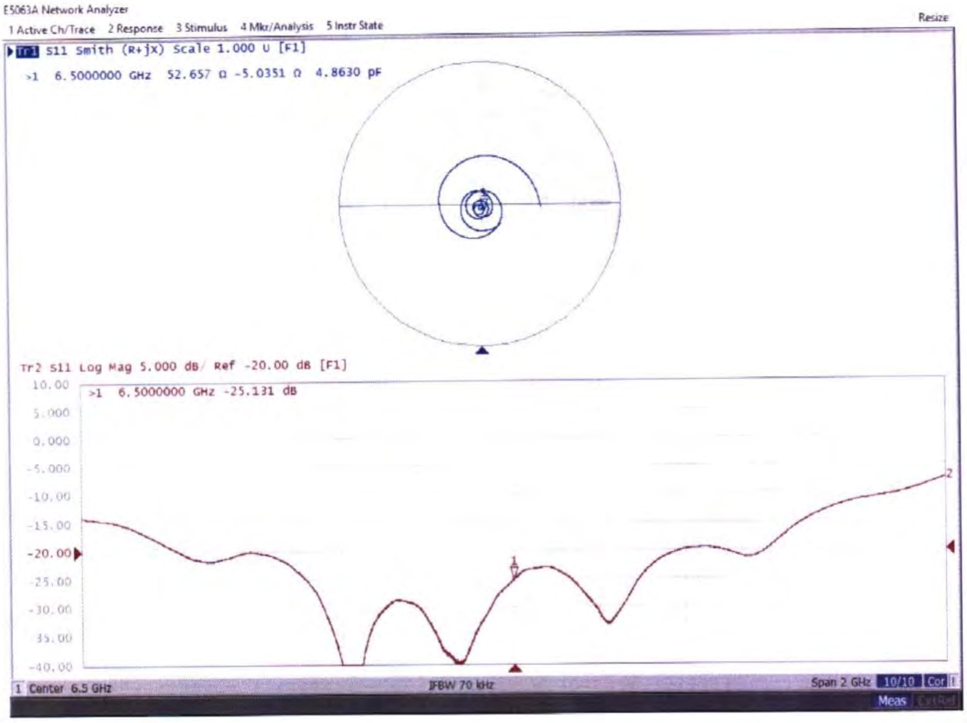
Measurement Results

	Zoom Scan
Date	2024-10-07, 12:00
psSAR1g [W/Kg]	30.1
psSAR8g [W/Kg]	6.71
psSAR10g [W/Kg]	5.50
Power Drift [dB]	0.02
Power Scaling	Disabled
Scaling Factor [dB]	
TSL Correction	No correction
M2/M1 [%]	50.0
Dist 3dB Peak [mm]	4.8



Certificate No: D6.5GHzV2-1059_Oct24 Page 5 of 6

Impedance Measurement Plot for Head TSL



5G Verification Source 10GHz Calibration Certificate

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Accreditation No.: **SCS 0108**

Client CTTL Beijing

Certificate No. 5G-Veri10-1005_Jan25

CALIBRATION CERTIFICATE

Object	5G Verification Source 10 GHz - SN: 1005
Calibration procedure(s)	QA CAL-45.v5 Calibration procedure for sources in air > 6 GHz
Calibration date	January 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 (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 E5063A	SN: MY54504221	30-Sept-24 (No. 675-CAL18-S4489-Sep24)	Sep-26

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

Issued: January 19, 2025

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Certificate No: 5G-Veri10-1005_Jan25 Page 1 of 8

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Accreditation No.: **SCS 0108**

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 (1cm^2 and 4cm^2) 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^2) averaged over the surface area of 1 cm^2 and 4cm^2 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%.

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	10.0 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 Power Density Avg (psPDn+, psPDtot+, psPDmod+) (W/m^2)		Uncertainty (k = 2)
				1cm^2	4cm^2	
10 mm	93.3	153	1.27 dB	58.4	54.7	1.28 dB

Distance Horn Aperture to Measurement Plane	Prad[1] (mW)	Max E-field (V/m)	Uncertainty (k = 2)	Power Density psPDn+, psPDtot+, psPDmod+ (W/m^2)		Uncertainty (k = 2)
				1cm^2	4cm^2	
10 mm	93.3	153	1.27 dB	57.9, 58.6, 58.8	54.2, 54.8, 55.0	1.28 dB

Square Averaging

Distance Horn Aperture to Measurement Plane	Prad[1] (mW)	Max E-field (V/m)	Uncertainty (k = 2)	Avg Power Density Avg (psPDn+, psPDtot+, psPDmod+) (W/m^2)		Uncertainty (k = 2)
				1cm^2	4cm^2	
10 mm	93.3	153	1.27 dB	58.4	54.5	1.28 dB

Distance Horn Aperture to Measurement Plane	Prad[1] (mW)	Max E-field (V/m)	Uncertainty (k = 2)	Power Density psPDn+, psPDtot+, psPDmod+ (W/m^2)		Uncertainty (k = 2)
				1cm^2	4cm^2	
10 mm	93.3	153	1.27 dB	57.9, 58.6, 58.8	54.0, 54.7, 54.9	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	93.3	153	1.27 dB	59.4, 60.1, 60.3	1.28 dB

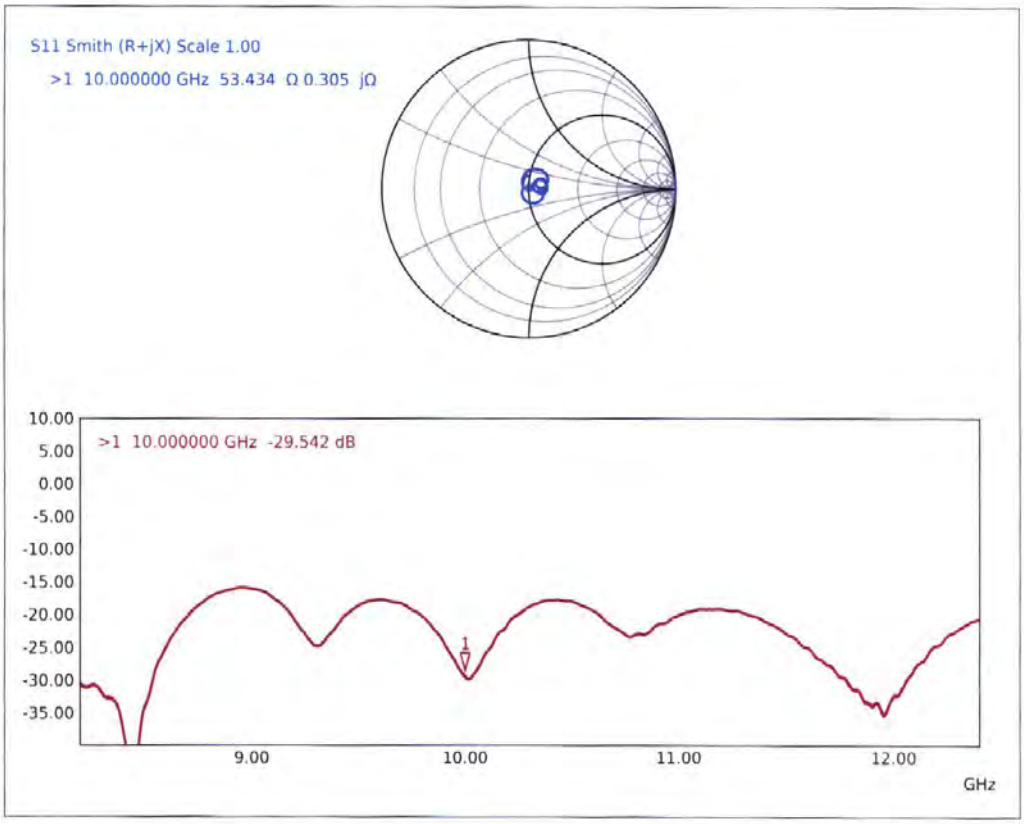
[1] Assessed ohmic and mismatch loss plus numerical offset: 0.30 dB

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters

Impedance, transformed to feed point	53.4 Ω + 0.3 jΩ
Return Loss	-29.5 dB

Impedance Measurement Plot



DASY Report

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 172.0	SN: 1005	–

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

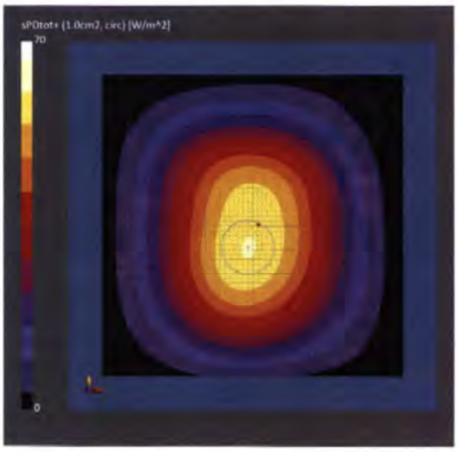
Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave Phantom -	Air -	EUmmWV3 - SN9374_F1-55GHz, 2024-08-28	DAE4ip - SN1602, 2024-11-06

Scans Setup

Sensor Surface [mm]	10.0
MAIA	MAIA not used

Measurement Results

Scan Type	5G Scan
Date	2025-01-14
Avg. Area [cm^2]	1.00
Avg. Type	Circular Averaging
psPDn+ [W/m^2]	57.9
psPDtot+ [W/m^2]	58.6
psPDmod+ [W/m^2]	58.8
Max(Sn) [W/m^2]	59.4
Max(Stot) [W/m^2]	60.1
Max(|Stot|) [W/m^2]	60.3
E_{max} [V/m]	153
Power Drift [dB]	0.01



DASY Report

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 172.0	SN: 1005	–

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

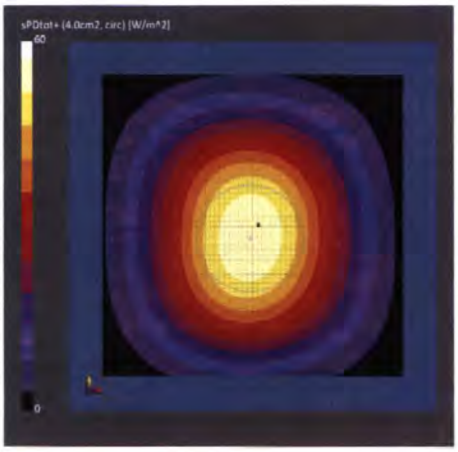
Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave Phantom -	Air -	EUmmWV3 - SN9374_F1-55GHz, 2024-08-28	DAE4ip - SN1602, 2024-11-06

Scans Setup

Sensor Surface [mm]	10.0
MAIA	MAIA not used

Measurement Results

Scan Type	5G Scan
Date	2025-01-14
Avg. Area [cm^2]	4.00
Avg. Type	Circular Averaging
psPDn+ [W/m^2]	54.2
psPDtot+ [W/m^2]	54.8
psPDmod+ [W/m^2]	55.0
Max(Sn) [W/m^2]	59.4
Max(Stot) [W/m^2]	60.1
Max(|Stot|) [W/m^2]	60.3
E_{max} [V/m]	153
Power Drift [dB]	0.01



DASY Report

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 172.0	SN: 1005	–

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

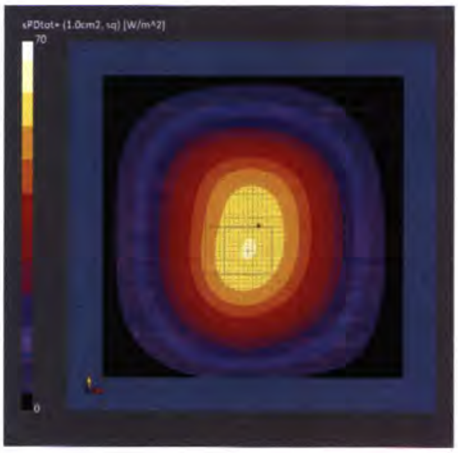
Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave Phantom –	Air –	EUmmWV3 – SN9374_F1-55GHz, 2024-08-28	DAE4ip – SN1602, 2024-11-06

Scans Setup

Sensor Surface [mm]	10.0
MAIA	MAIA not used

Measurement Results

Scan Type	5G Scan
Date	2025-01-14
Avg. Area [cm^2]	1.00
Avg. Type	Square Averaging
psPDn+ [W/m^2]	57.9
psPDtot+ [W/m^2]	58.6
psPDmod+ [W/m^2]	58.8
Max(Sn) [W/m^2]	59.4
Max(Stot) [W/m^2]	60.1
Max(|Stot|) [W/m^2]	60.3
E_{max} [V/m]	153
Power Drift [dB]	0.01



DASY Report

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 172.0	SN: 1005	-

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

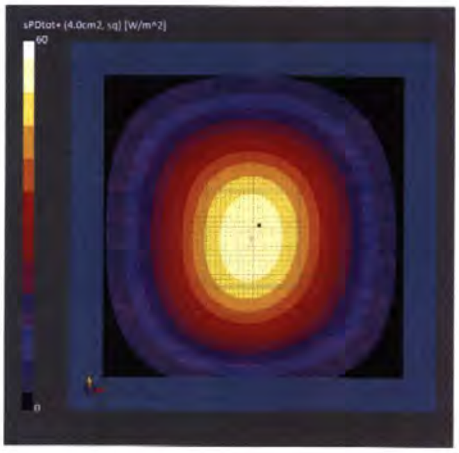
Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave Phantom -	Air -	EUmmWV3 - SN9374_F1-55GHz, 2024-08-28	DAE4ip - SN1602, 2024-11-06

Scans Setup

Sensor Surface [mm]	10.0
MAIA	MAIA not used

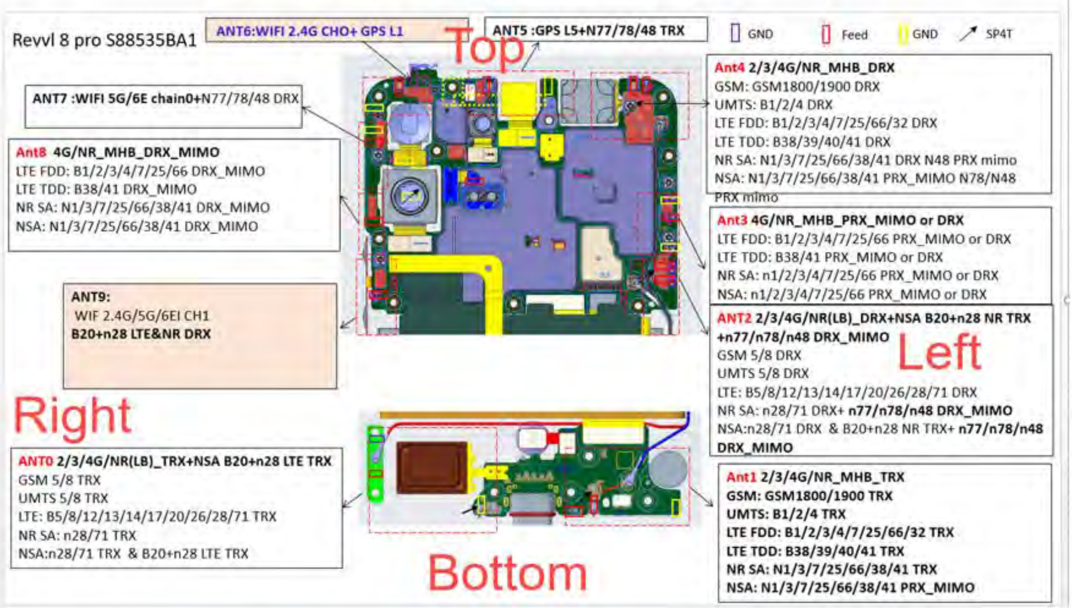
Measurement Results

Scan Type	5G Scan
Date	2025-01-14
Avg. Area [cm^2]	4.00
Avg. Type	Square Averaging
psPDn+ [W/m^2]	54.0
psPDtot+ [W/m^2]	54.7
psPDmod+ [W/m^2]	54.9
Max(Sn) [W/m^2]	59.4
Max(Stot) [W/m^2]	60.1
Max(|Stot|) [W/m^2]	60.3
E_{max} [V/m]	153
Power Drift [dB]	0.01



ANNEX I SAR Sensor Triggering Data Summary

SAR sensor trigger distance



SAR sensor trigger distance(unit: mm)

distance	Front Side	Back Side	Left Side	Right Side	Top Side	Bottom Side
ANT0	/	13	/	13	/	/
ANT1	16	19	/	/	/	17
ANT3	/	14	/	/	/	/
ANT4/ANT5	20	27	16	/	25	/
ANT7	20	27	/	39	16	/

Per FCC KDB Publication 616217 D04v01r02, this device was tested by the manufacturer to determine the proximity sensor triggering distances for some positions. The measured output power within ±5mm of the triggering points (or until touching the phantom) is included for front, rear and each applicable edge.

To ensure all production units are compliant it is necessary to test SAR at a distance 1mm less than the smallest distance from the device and SAR phantom (determined from these triggering tests according to the KDB 616217 D04v01r02) with the device at maximum output power without power reduction. These SAR tests are included in addition to the SAR tests for the device touching the SAR phantom, with reduced power.

ANT0:

Rear

Moving device toward the phantom:

sensor near or far(KDB 616217 6.2.6)											
Distance [mm]	**18**	**17**	**16**	**15**	**14**	**13**	**12**	**11**	**10**	**9**	**8**
Main antenna	Far	Far	Far	Far	Far	Near	Near	Near	Near	Near	Near

Moving device away from the phantom:

sensor near or far(KDB 616217 6.2.6)											
Distance [mm]	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
Main antenna	Near	Near	Near	Near	Near	Near	Far	Far	Far	Far	Far

Right

Moving device toward the phantom:

sensor near or far(KDB 616217 6.2.6)											
Distance [mm]	**18**	**17**	**16**	**15**	**14**	**13**	**12**	**11**	**10**	**9**	**8**
Main antenna	Far	Far	Far	Far	Far	Near	Near	Near	Near	Near	Near

Moving device away from the phantom:

sensor near or far(KDB 616217 6.2.6)											
Distance [mm]	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
Main antenna	Near	Near	Near	Near	Near	Near	Far	Far	Far	Far	Far

ANT1:

Front

Moving device toward the phantom:

sensor near or far(KDB 616217 6.2.6)											
Distance [mm]	**21**	**20**	**19**	**18**	**17**	**16**	**15**	**14**	**13**	**12**	**11**
Main antenna	Far	Far	Far	Far	Far	Near	Near	Near	Near	Near	Near

Moving device away from the phantom:

sensor near or far(KDB 616217 6.2.6)											
Distance [mm]	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**
Main antenna	Near	Near	Near	Near	Near	Near	Far	Far	Far	Far	Far

Rear

Moving device toward the phantom:

sensor near or far(KDB 616217 6.2.6)											
Distance [mm]	**24**	**23**	**22**	**21**	**20**	**19**	**18**	**17**	**16**	**15**	**14**
Main antenna	Far	Far	Far	Far	Far	Near	Near	Near	Near	Near	Near

Moving device away from the phantom:

sensor near or far(KDB 616217 6.2.6)											
Distance [mm]	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
Main antenna	Near	Near	Near	Near	Near	Near	Far	Far	Far	Far	Far

Bottom Edge

Moving device toward the phantom:

sensor near or far(KDB 616217 6.2.6)											
Distance [mm]	**22**	**21**	**20**	**19**	**18**	**17**	**16**	**15**	**14**	**13**	**12**
Main antenna	Far	Far	Far	Far	Far	Near	Near	Near	Near	Near	Near

Moving device away from the phantom:

sensor near or far(KDB 616217 6.2.6)											
Distance [mm]	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**
Main antenna	Near	Near	Near	Near	Near	Near	Far	Far	Far	Far	Far

ANT3:

Rear

Moving device toward the phantom:

sensor near or far(KDB 616217 6.2.6)											
Distance [mm]	**19**	**18**	**17**	**16**	**15**	**14**	**13**	**12**	**11**	**10**	**9**
Main antenna	Far	Far	Far	Far	Far	Near	Near	Near	Near	Near	Near

Moving device away from the phantom:

sensor near or far(KDB 616217 6.2.6)											
Distance [mm]	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**
Main antenna	Near	Near	Near	Near	Near	Near	Far	Far	Far	Far	Far

ANT4/5:

Front

Moving device toward the phantom:

sensor near or far(KDB 616217 6.2.6)											
Distance [mm]	**25**	**24**	**23**	**22**	**21**	**20**	**19**	**18**	**17**	**16**	**15**
Main antenna	Far	Far	Far	Far	Far	Near	Near	Near	Near	Near	Near

Moving device away from the phantom:

sensor near or far(KDB 616217 6.2.6)											
Distance [mm]	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
Main antenna	Near	Near	Near	Near	Near	Near	Far	Far	Far	Far	Far

Rear

Moving device toward the phantom:

sensor near or far(KDB 616217 6.2.6)											
Distance [mm]	**32**	**31**	**30**	**29**	**28**	**27**	**26**	**25**	**24**	**23**	**22**
Main antenna	Far	Far	Far	Far	Far	Near	Near	Near	Near	Near	Near

Moving device away from the phantom:

sensor near or far(KDB 616217 6.2.6)											
Distance [mm]	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**
Main antenna	Near	Near	Near	Near	Near	Near	Far	Far	Far	Far	Far

Top Edge

Moving device toward the phantom:

sensor near or far(KDB 616217 6.2.6)											
Distance [mm]	**30**	**29**	**28**	**27**	**26**	**25**	**24**	**23**	**22**	**21**	**20**
Main antenna	Far	Far	Far	Far	Far	Near	Near	Near	Near	Near	Near

Moving device away from the phantom:

sensor near or far(KDB 616217 6.2.6)											
Distance [mm]	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
Main antenna	Near	Near	Near	Near	Near	Near	Far	Far	Far	Far	Far

Left Edge

Moving device toward the phantom:

sensor near or far(KDB 616217 6.2.6)											
Distance [mm]	**21**	**20**	**19**	**18**	**17**	**16**	**15**	**14**	**13**	**12**	**11**
Main antenna	Far	Far	Far	Far	Far	Near	Near	Near	Near	Near	Near

Moving device away from the phantom:

sensor near or far(KDB 616217 6.2.6)											
Distance [mm]	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**
Main antenna	Near	Near	Near	Near	Near	Near	Far	Far	Far	Far	Far

ANT7:

Front

Moving device toward the phantom:

sensor near or far(KDB 616217 6.2.6)											
Distance [mm]	**25**	**24**	**23**	**22**	**21**	**20**	**19**	**18**	**17**	**16**	**15**
Main antenna	Far	Far	Far	Far	Far	Near	Near	Near	Near	Near	Near

Moving device away from the phantom:

sensor near or far(KDB 616217 6.2.6)											
Distance [mm]	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
Main antenna	Near	Near	Near	Near	Near	Near	Far	Far	Far	Far	Far

Rear

Moving device toward the phantom:

sensor near or far(KDB 616217 6.2.6)											
Distance [mm]	**32**	**31**	**30**	**29**	**28**	**27**	**26**	**25**	**24**	**23**	**22**
Main antenna	Far	Far	Far	Far	Far	Near	Near	Near	Near	Near	Near

Moving device away from the phantom:

sensor near or far(KDB 616217 6.2.6)											
Distance [mm]	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**
Main antenna	Near	Near	Near	Near	Near	Near	Far	Far	Far	Far	Far

Top Edge

Moving device toward the phantom:

sensor near or far(KDB 616217 6.2.6)											
Distance [mm]	**21**	**20**	**19**	**18**	**17**	**16**	**15**	**14**	**13**	**12**	**11**
Main antenna	Far	Far	Far	Far	Far	Near	Near	Near	Near	Near	Near

Moving device away from the phantom:

sensor near or far(KDB 616217 6.2.6)											
Distance [mm]	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**
Main antenna	Near	Near	Near	Near	Near	Near	Far	Far	Far	Far	Far

Right Edge

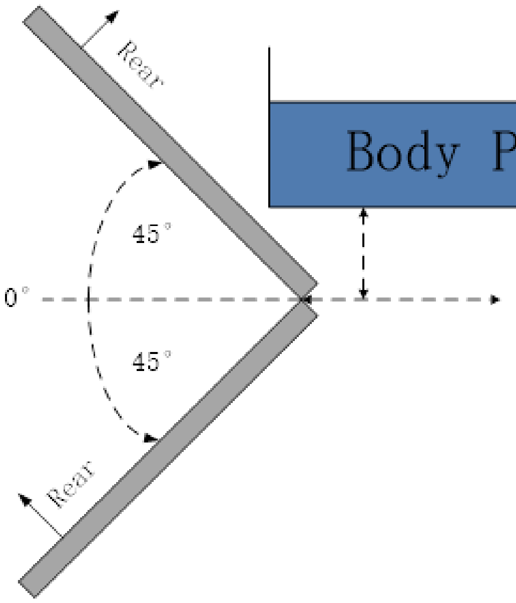
Moving device toward the phantom:

sensor near or far(KDB 616217 6.2.6)											
Distance [mm]	**44**	**43**	**42**	**41**	**40**	**39**	**38**	**37**	**36**	**35**	**34**
Main antenna	Far	Far	Far	Far	Far	Near	Near	Near	Near	Near	Near

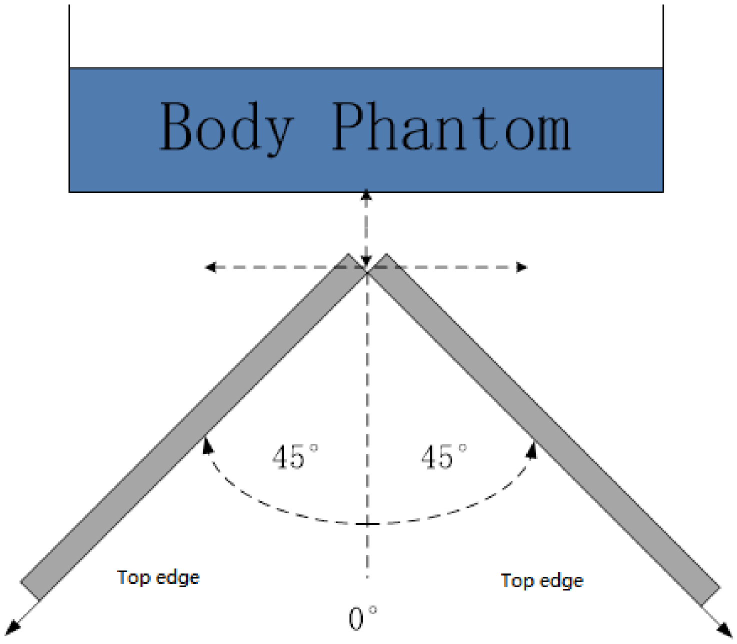
Moving device away from the phantom:

sensor near or far(KDB 616217 6.2.6)											
Distance [mm]	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**
Main antenna	Near	Near	Near	Near	Near	Near	Far	Far	Far	Far	Far

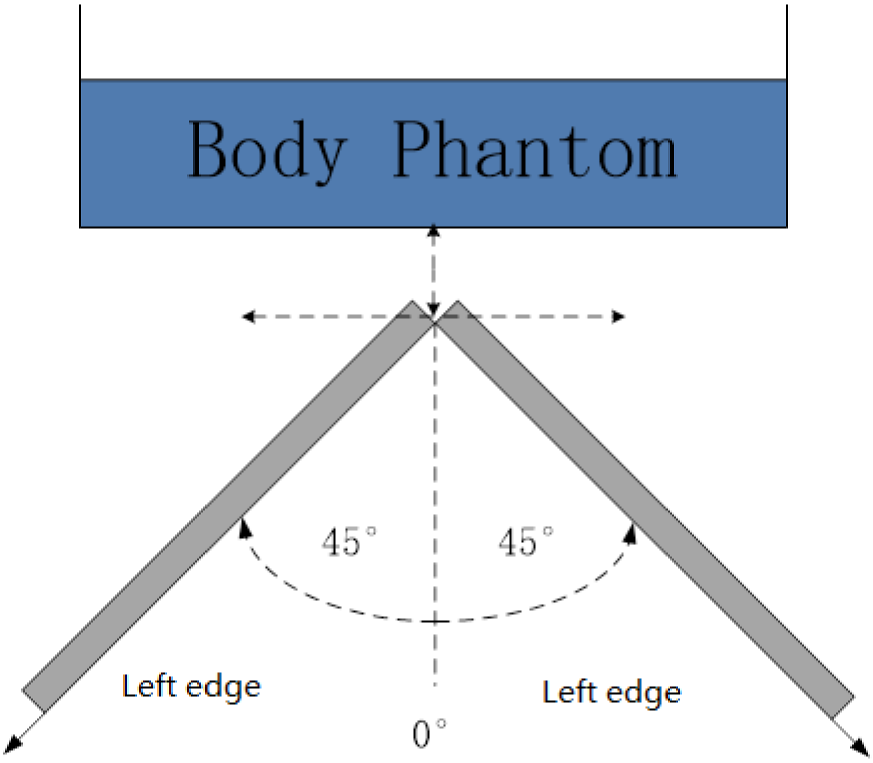
Per FCC KDB Publication 616217 D04v01r02, the influence of table tilt angles to proximity sensor triggering is determined by positioning each edge that contains a transmitting antenna, perpendicular to the flat phantom, at the smallest sensor triggering test distance by rotating the device around the edge next to the phantom in ≤ 10° increments until the tablet is ±45° or more from the vertical position at 0°.



The front/rear edge evaluation



The bottom/top edge evaluation



The left/right edge evaluation

Based on the above evaluation, we come to the conclusion that the sensor triggering is not released and normal maximum output power is not restored within the ±45° range at the smallest sensor triggering test distance declared by manufacturer.

ANNEX J Accreditation Certificate

ilac-MRA A2LA

Accredited Laboratory

A2LA has accredited

TELECOMMUNICATION TECHNOLOGY LABS, CAICT

Beijing, People's Republic of China

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).

Presented this 23rd day of July 2024.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 7049.01
Valid to July 31, 2026

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

