

FCC SAR Compliance Test Report

For

Shenzhen Efercro Electronic Technology Co., Ltd.

Room 901, Block E, Building 1, Section 1, Chuangzhi Yuncheng,
Liuxian Avenue, Xili Community, Xili Street, Nanshan District, Shenzhen

Model: X109

Test Engineer: Qu Zhihao *Qu Zhihao*

Report Number: WSCT-ANAB-R&E250900073A1-SAR

Report Date: 04 August 2026

FCC ID: 2AW9M-X109

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Modified History

REV.	Modification Description	Issued Date	Remark
REV.1.0	Initial Test Report Relesse	04 August 2026	Li Huaibi

Reported to the differences:

No.	Item	Before the change	After the change
1	Report No	WSCT-ANAB-R&E250900073A-SAR	WSCT-ANAB-R&E250900073A1-SAR
2	Fast charging	Not supported	Support

NOTE: The worst mode was subjected to verification tests(page 31).According to kdb 178919, adding a single fast-charging chip has no impact on the existing overall system TER, and there is no need to consider conducting additional tests.

1 General information

1.1 Notes

The test results of this test report relate exclusively to the test item specified in this test report. QTC Certification & Testing Co., Ltd. does not assume responsibility for any conclusions and generalisations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report is not to be reproduced or published in full without the prior written permission.

1.2 Application details

Date of receipt of test item: 2025-08-29
Start of test: 2025-08-29
End of test: 2025-09-18
Add Worst-case mode test : 2026-08-01

1.3 Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for X109 is as below:

Band	Position	MAX Reported SAR1g(W/kg)	Limit (W/kg)
2.4G WIFI	Body-Worn 0mm	0.536	1.6
5.2G WIFI	Body-Worn 0mm	0.311	
5.4G WIFI	Body-Worn 0mm	1.332	
5.6G WIFI	Body-Worn 0mm	0.843	
5.8G WIFI	Body-Worn 0mm	0.949	
BT	Body-Worn 0mm	0.117	
Max.Simultaneous Transmission SAR(W/kg)			
Items	Body SAR (Gap 0mm)		1.6
Sum SAR	1.449		

The device is in compliance with Specific Absorption Rate(SAR) for general population/uncontrolled exposure limits of 1.6W/Kg as averaged over any 1g tissue according to the FCC rule§2.1093,the ANSI/IEEEC95.1:2005,the NCRP Report Number 86 forun controlled environment,according to the Industry Canada Radio Standards Specification RSS-102 for General Population/ Uncontrolled exposure, and had been tested in accord ance with the measurement methods and proceduresspecified in IEEE Std1528-2013.

1.4 EUT Information

Device Information:	
Product Type:	Tablet
Model:	X109
Brand Name:	N/A
Device Type:	Portable device
Exposure Category:	uncontrolled environment / general population
Antenna Type :	Integral Antenna
Antenna Gain:	BT: 1.92dBi 2.4GWIFI: 1.51dBi 5GWIFI: 1.61dBi
Device Operating Configurations:	
Software version:	Android
Hardware version:	863KA MB V1.2
Modulation:	GFSK, $\pi/4$ - DQPSK, 8DPSK(BT) GFSK(BLE) IEEE 802.11b:DSSS (DBPSK, DQPSK, CCK) IEEE 802.11g/n:OFDM(BPSK,QPSK,16QAM,64QAM) IEEE 802.11a/ac: OFDM (BPSK/QPSK/16QAM/64QAM/256QAM) IEEE 802.11ax: OFDM/OFDMA (BPSK/QPSK/16QAM/64QAM/256QAM/1024QAM)
Supporting Mode& Operation frequency:	2.4G Wi-Fi: 2412-2462MHz BT:2402~2480 MHz 5G Wi-Fi :Band 1: 5180-5240 MHz Band 2: 5260-5320 MHz Band 3: 5500-5700 MHz Band 4: 5745-5825 MHz
Power Source:	Adapter1: G50-US-0502000 Input: 100-240V~0.35A MAX 50/60Hz Output: 5.0V~2.0A 10.0W Adapter2: PS10UA050K2000UU Input: 100-240V~0.35A MAX 50/60Hz Output: 5.0V~2.0A 10.0W Rechargeable Li-ion Polymer Battery: 2894130 Capacity:3.8V 5000mAh

Note:1.The test results of this test report relate exclusively to the test item specified in this test report. World Standardization Certification & Testing Group (Shenzhen) Co.,Ltd does not assume responsibility for any conclusions and generalisations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report is not to be reproduced or published in full without the prior written permission.

2. Per KDB 616217 D04 SAR for laptop and tablets, The standalone and simultaneous transmission SAR tests required for tablets are more conservative than the hotspot mode use configurations;therefore, additional testing for hotspot SAR is not required.

2 Testing laboratory

Test Site	World Standardization Certification & Testing Group (Shenzhen) Co., Ltd.
Laboratory :	Building A-B, Baoli'an Industrial Park, No.58 and 60, Tangtou Avenue, Shiyan Street, Bao'an District, Shenzhen City, Guangdong Province, China
TEL:	+86-755-26996192
FAX:	+86-755-86376605

3 ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025:2017.

USA	ANAB - Certificate Number: AT-3951
China	CNAS (Registration Number: L3732)
Canada	ISED(CAB identifier:CN0178)

Copies of granted accreditation certificates are available for downloading from our web site, <http://www.wsct-cert.com>

4 Test Environment

	Required	Actual
Ambient temperature:	18 – 25 °C	22 ± 2 °C
Tissue Simulating liquid:	22 ± 2 °C	22 ± 2 °C
Relative humidity content:	30 – 70 %	30 – 70 %

5 Applicant and Manufacturer

Applicant/Client Name:	Shenzhen Efercro Electronic Technology Co., Ltd.
Applicant Address:	Room 901, Block E, Building 1, Section 1, Chuangzhi Yuncheng, Liuxian Avenue, Xili Community, Xili Street, Nanshan District, Shenzhen
Manufacturer Name:	Shenzhen Efercro Electronic Technology Co., Ltd.
Manufacturer Address:	Room 901, Block E, Building 1, Section 1, Chuangzhi Yuncheng, Liuxian Avenue, Xili Community, Xili Street, Nanshan District, Shenzhen

6 Test standard/s:

IEC/IEEE 62209-1528	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate(SAR) in the Human Head from Wireless Communications Devices:Measurement Techniques
RSS-102	Radio Frequency Exposure Compliance of Radio communication Apparatus (All Frequency Bands(Issue 6 December 2023)
KDB447498 D04	Interim General RF Exposure Guidance v01
KDB616217 D04	SAR for laptop and tabletsv01r02
KDB248227D01	SARmeas for 802.11a/b/g v02r02
KDB865664D01	SAR Measurement 100 MHz to 6 GHz v01r04
KDB865664D02	RF Exposure Reporting v01r02

6.1 RF exposure limits

Human Exposure	Uncontrolled Environment General Population	Controlled Environment Occupational
Spatial Peak SAR* (Brain/Body/Arms/Legs)	1.60mW/g	8.00mW/g
Spatial Average SAR** (Whole Body)	0.08mW/g	0.40mW/g
Spatial Peak SAR*** (Heads/Feet/Ankle/Wrist)	4.00mW/g	20.00mW/g

The limit applied in this test report is shown in bold letters

Notes:

* The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

** The Spatial Average value of the SAR averaged over the whole body.

*** The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

Controlled Environments are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation).

6.2 SAR Definition

Specific Absorption Rate is defined as the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dV) of a given density (ρ).

$$SAR = \frac{d}{dt} \left(\frac{dW}{dm} \right) = \frac{d}{dt} \left(\frac{dW}{\rho dV} \right)$$

SAR is expressed in units of watts per kilogram (W/kg). SAR can be related to the electric field at a point by

$$SAR = \frac{\sigma |E|^2}{\rho}$$

where:

σ = conductivity of the tissue (S/m)

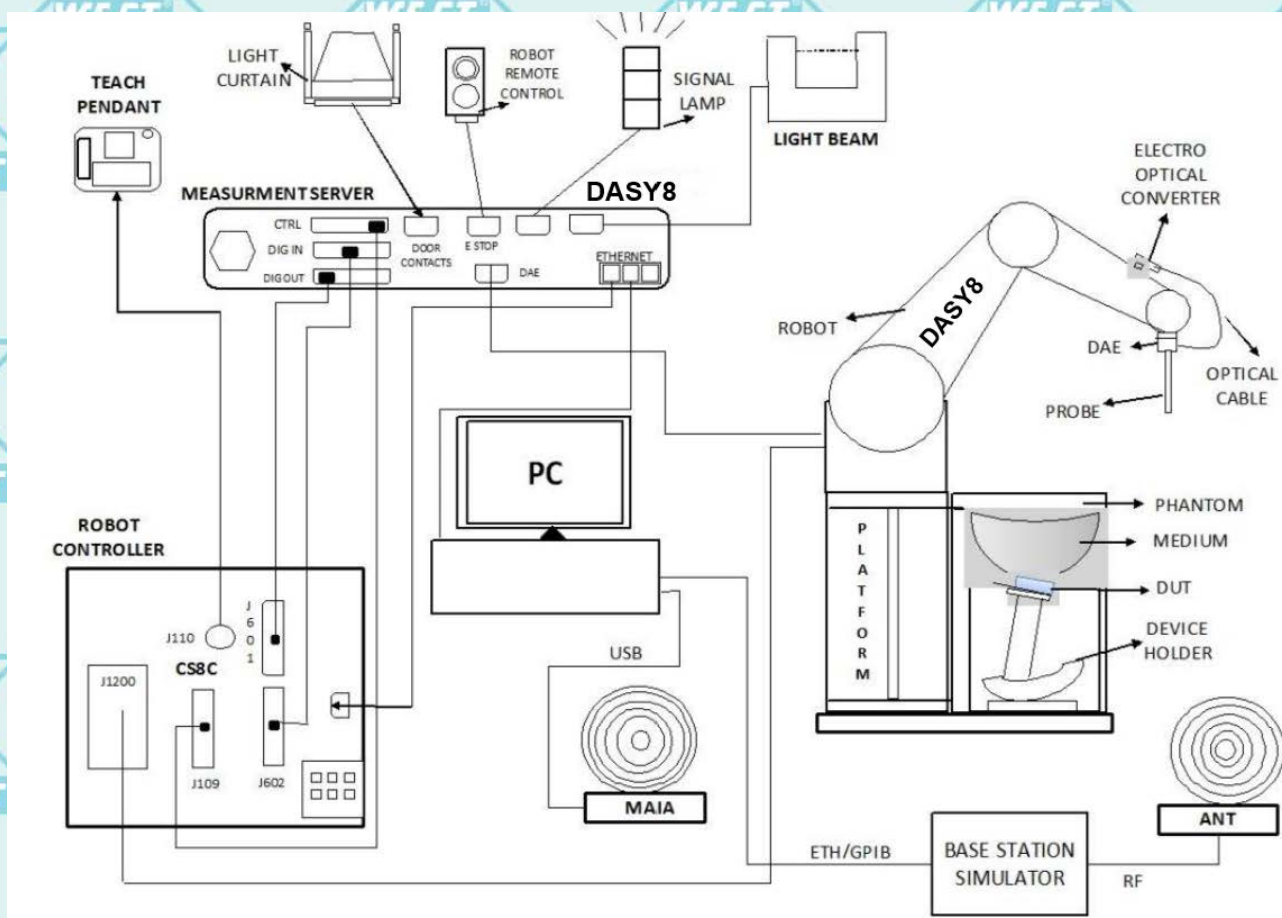
ρ = mass density of the tissue (kg/m³)

E = rms electric field strength (V/m)

7 SAR Measurement System

7.1 The Measurement System

DASY8 is a flexible, high-precision near-field scanner optimized for automated measurements in free-space and tissue simulating liquids (TSL), using the most advanced probes covering the frequency range from 3 kHz to 110 GHz. The software enables point, area, and volume measurements and conformal scanning of complex geometries.



The DASY8 SAR module consists of an isotropic dosimetric probe (SAR) mounted on the TX2 precision robot, which allows field scanning inside anthropomorphic phantoms filled with tissue-simulating liquids. The probes are miniaturized, sensitive, isotropic, linear, stable and calibrated with precise boundary compensation. The spatial accuracy of probe positioning within the phantom is better than 0.2 mm. Scanning is optimized and adaptive to the induced field. The spatial SAR peak is determined without reconstruction.

7.2 Robot

The DASY8 system uses the high-precision industrial robots TX2-60L and TX2-90XL from Stäubli SA (France). The TX2 family of robots provides the ideal combination of speed, rigidity, size, and precision:

- High precision (repeatability 0.03 mm)
- High reliability and low maintenance costs (industrial design)
- ELF interference (motor control fields are shielded by the closed metallic construction)
- Hygienic encapsulated 6-axis arm enabled by a hollow shaft gearbox, no external cables.



7.3 Probe

The SAR measurement is conducted with the dosimetric probe (manufactured by SPEAG). The probe is specially designed and calibrated for use in liquid with high permittivity. The dosimetric probe has special calibration in liquid at different frequency. This probe has a built in optical surface detection system to prevent from collision with phantom.

For the measurements the Specific Dosimetric E-Field Probe EX3DV4-SN:7951 with following specifications is used



Frequency: 4MHz – 10GHz ;

Linearity: ± 0.2 dB (30MHz – 10GHz)

Dynamic Range: 10 μ W/g $\rightarrow$ 100 mW/g

Linearity: ± 0.2 dB (noise: typically <1 μ W/g)

Directivity (typical): ± 0.1 dB in TSL (rotation around probe axis)

± 0.3 dB in TSL (rotation normal to probe axis)

Sensor Arrangement	Triangular
Connector Angle	46.9°
Probe Overall Length	337mm
Probe Body Diameter	10mm
Tip Length	9mm
Tip Diameter	2.5mm
Probe Tip to Sensor X Calibration Point	1mm
Probe Tip to Sensor Y Calibration Point	1mm
Probe Tip to Sensor Z Calibration Point	1mm
Recommended Measurement Distance from Surface	1.4mm

7.4 DAE

DAE4ip– Data Acquisition Electronics 4 with Integrated Power

Data Acquisition Electronics 4 with an integrated power supply for time unlimited measurements.

Performance:

- Measurement range: -100–+300 mV (16-bit resolution and two range settings: 4 mV, 400 mV)
- Input offset voltage: <5μV (with auto zero)
- Input resistance: 200MΩ
- Input bias current: <50 fA
- Power supply: integrated (from the DASY8 measurement server)
- Dimensions (L × W × H): 60×60×68 mm
- Calibration: ISO/IEC 17025 calibration service available.



7.5 Phantom

The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEC/IEEE 62209-1528. It enables the dosimetric evaluation of left—and right-hand phone usage as well as body-mounted usage at the flat phantom region. A cover prevents the liquid from evaporating. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by teaching three points with the robot.



Material	Vinyl ester, fiberglass reinforced (VE-GF)
Liquid Compatibility	The phantom shell is compatible with SPEAG's tissue-simulating liquids (sugar and oil-based). However, using other liquids may render the phantom warranty void (see note or consult SPEAG support).
Shell Thickness	$2 \pm 0.2\text{mm}$ ($6 \pm 0.2\text{mm}$ at ear point)
Dimensions (incl. Wooden Support)	Length: 1000 mm Width: 500 mm Height: adjustable feet
Filling Volume	approx. 25 liters
Support	DASY6/8: standard-size platform slot DASY52 stand-alone: SPEAG standard phantom table
Accessories	Mounting Device and Adaptors

7.6 Device Holder

The DASY instrument holder is designed to accommodate the various positions specified in the standard. It has two scales for instrument rotation (with respect to the body axis) and instrument tilt (with respect to the line between the ear reference points). The center of rotation for both scales is the Ear Reference Point (ERP). This eliminates the need to reposition the instrument when changing angles.

The DASY instrument holder is made of low-loss POM material with the following dielectric parameters: relative permittivity $\epsilon=3$ and loss tangent $\delta=0.02$. The amount of dielectric material in the immediate vicinity of the device was reduced because measurements indicated that the influence of the clamp on the test results could be reduced.



Device holder

The positioning system allows obtaining cheek and tilting position with a very good accuracy. In compliance with CENELEC, the tilt angle uncertainty is lower than 1° .

7.7 SAR Scan General Requirement

According to kdb865664 D01 v01r04:

Probe boundary effect error compensation is required for measurements with the probe tip closer than half a probe tip diameter to the phantom surface. Both the probe tip diameter and sensor offset distance must satisfy measurement protocols; to ensure probe boundary effect errors are minimized and the higher fields closest to the phantom surface can be correctly measured and extrapolated to the phantom surface for computing 1-g SAR. Tolerances of the post-processing algorithms must be verified by the test laboratory for the scan resolutions used in the SAR measurements, according to the reference distribution functions specified in IEEE Std 1528-2013. The area and zoom scan resolutions specified in the table below must be applied to the SAR measurements and fully documented in SAR reports, unless further guidance has been provided by the FCC.

			≤ 3 GHz	>3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface			5 mm ± 1 mm	$\frac{1}{2} \delta \ln(2)$ mm ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location			30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx Area, Δy Area			≤ 2 GHz: ≤ 15 mm 2-3 GHz: ≤ 12 mm	3-4 GHz: ≤ 12 mm 4-6 GHz: ≤ 10 mm
			When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	
Maximum zoom scan spatial resolution: Δx Zoom, Δy Zoom			≤ 2 GHz: ≤ 8 mm 2-3 GHz: ≤ 5 mm*	3-4 GHz: ≤ 5 mm* 4-6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: Δz Zoom (n)		≤ 5 mm	3-4 GHz: ≤ 4 mm 4-5 GHz: ≤ 3 mm 5-6 GHz: ≤ 2 mm
	graded grid	Δz Zoom (1): between 1 st two points closest to phantom surface	≤ 4 mm	3-4 GHz: ≤ 3 mm 4-5 GHz: ≤ 2.5 mm 5-6 GHz: ≤ 2 mm
		Δz Zoom (n>1): between subsequent points	≤ 1.5 · Δz Zoom (n-1) mm	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3-4 GHz: ≥ 28 mm 4-5 GHz: ≥ 25 mm 5-6 GHz: ≥ 22 mm

Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see IEEE Std 1528-2013 for details.

* When zoom scan is required and the reported SAR from the area scan based 1-g SAR estimation procedures of KDB Publication 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.

7.8 Measurement procedure

Power Drift :

All SAR tests were performed with a fully charged battery under the DUT and transmitting at maximum output power. The DASY measurement software uses the power reference measurement and power drift measurement procedures to monitor the power drift of the DUT during SAR testing. Both methods measure the field value at a specified reference position before and after the SAR test. The software calculates the field difference in dB. If the power drift exceeds 5%, the SAR is retested.

Area scan:

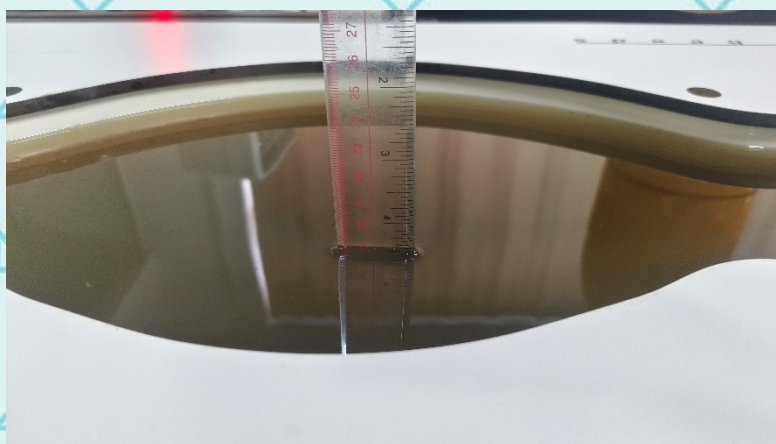
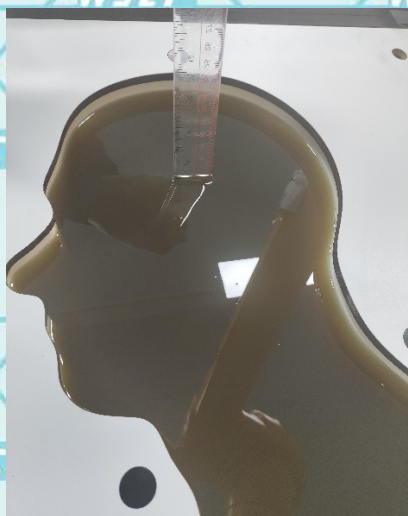
All antennas and radiating structures that may contribute to the measured SAR or influence the SAR distribution must be included in the area scan. The areas of the transmitter(s), antenna(s) and host device, when projected onto the phantom, must be within the area scan measurement region. The area scan measurement resolution must enable the extrapolation algorithms of the SAR system to correctly identify the peak SAR location(s) for subsequent zoom scan measurements to correctly determine the 1-g SAR. Area scans are performed at a constant distance from the phantom surface, determined by the measurement frequencies.

Zoom Scan:

Except when area scan based 1-g SAR estimation applies, a zoom scan measurement is required at the highest peak SAR location determined in the area scan to determine the 1-g SAR. When the 1-g SAR of the highest peak is within 2 dB of the SAR limit, additional zoom scans are required for other peaks within 2 dB of the highest peak that have not been included in any zoom scan to ensure there is no increase in SAR. The zoom scan volume must be larger than the required minimum dimensions described 7.7. There must be at least one measurement point within the first 5 mm from the phantom surface for measurements ≤ 3 GHz, two measurement points for measurements ≤ 5 GHz and three measurement points for measurements above 5 GHz. When graded grids are used, which only applies in the direction normal to the phantom surface, the initial grid separation closest to the phantom surface and subsequent graded grid increment ratios must satisfy the required protocols in 7.7. The 1-g SAR averaging volume must be fully contained within the zoom scan measurement volume boundaries; otherwise, the measurement must be repeated by shifting or expanding the zoom scan volume. The similar requirements also apply to 10-g SAR measurements.

7.9 Tissue simulating liquids: dielectric properties

For SAR measurement of the field distribution inside the phantom, the phantom must be filled with homogeneous tissue simulating liquid to a depth of at least 15 cm. For head SAR testing, the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm. The simulating liquids should be checked at the beginning of a series of SAR measurements to determine if the dielectric parameters are within the tolerances of the specified target values. The measured conductivity and relative permittivity should be within $\pm 5\%$ of the target values.



Simulating Head Liquid for 5G(HBBL600-10000MHz V6), Manufactured by SPEAG:

Ingredients	(% by weight)
Water	50-65%
Mineral oil	10-30%
Emulsifiers	8-25%
Sodium salt	0-1.5%

7.10 Tissue simulating liquids: parameters

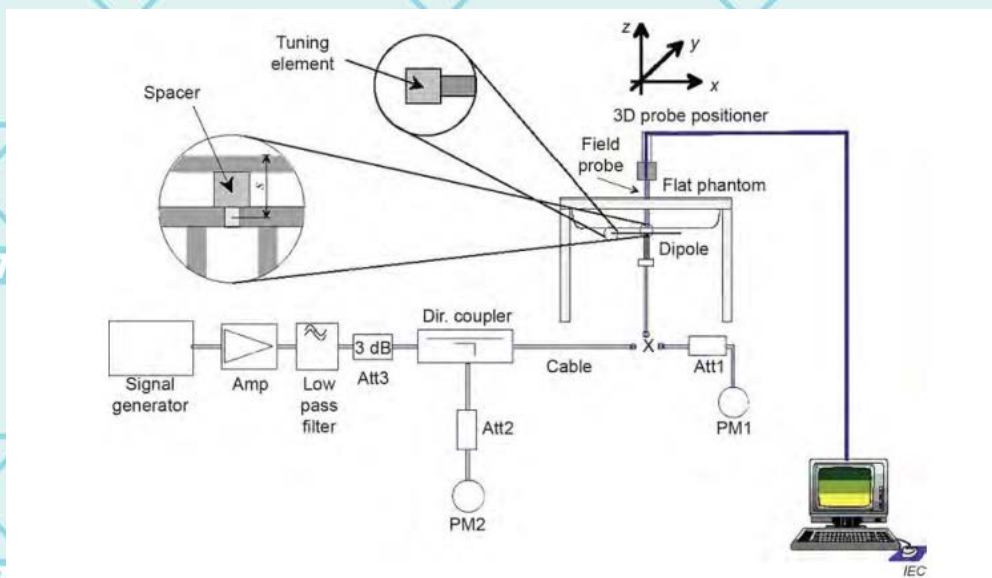
Used Target Frequency	Target Tissue		Measured Tissue		Liquid Temp.	Test Date
	ϵ_r (+/-5%)	σ (S/m) (+/-5%)	ϵ_r	σ (S/m)		
2450MHz Head	39.20 (37.24~41.16)	1.80 (1.71~1.89)	40.27	1.82	21.6°C	2025/09/15
2550MHz Head	39.10 (37.15~41.05)	1.91 (1.82~2.01)	40.80	1.90	21.6°C	2025/09/15
5200MHz Head	36.00 (34.20~37.80)	4.66 (4.43~4.89)	36.30	4.54	21.6°C	2025/09/16
5400MHz Head	35.80 (34.01~37.59)	4.86 (4.62~5.10)	35.90	4.76	21.6°C	2025/09/16
5500MHz Head	35.60 (33.82~37.38)	4.96 (4.71~5.20)	35.80	4.88	21.6°C	2025/09/16
5600MHz Head	35.50 (33.73~37.27)	5.07 (4.82~5.32)	35.50	5.07	21.6°C	2025/09/17
5800MHz Head	35.30 (33.54~37.06)	5.27 (5.01~5.53)	35.30	5.23	21.6°C	2025/09/19
5200MHz Head	36.00 (34.20~37.80)	4.66 (4.43~4.89)	37.10	4.59	21.6°C	2026/08/01
ϵ_r = Relative permittivity, σ = Conductivity						

8 System Check

8.1 System check procedure

The System check is performed by using a System check dipole which is positioned parallel to the planar part of the SAM phantom at the reference point. The distance of the dipole to the SAM phantom is determined by a spacer. The dipole is connected to the signal source consisting of signal generator and amplifier via a directional coupler, N-connector cable and adaption to SMA. It is fed with a power of 100 mW. To adjust this power a power meter is used. The power sensor is connected to the cable before the System check to measure the power at this point and do adjustments at the signal generator. At the outputs of the directional coupler both return loss as well as forward power are controlled during the validation to make sure that emitted power at the dipole is kept constant. This can also be checked by the power drift measurement after the test (result on plot).

System check results have to be equal or near the values determined during dipole calibration (target SAR in table above) with the relevant liquids and test system.



8.2 System check results

The system Check is performed for verifying the accuracy of the complete measurement system and performance of the software. The following table shows System check results for all frequency bands and tissue liquids used during the tests (plot(s) see annex A).

System Check	Target SAR (1W) (+/-10%)		Measured SAR (Normalized to 1W)		Liquid Temp.	Test Date
	1-g (W/kg)	10-g (W/kg)	1-g (W/kg)	10-g (W/kg)		
D2550V2 Body	54.10 (48.69~59.51)	24.70 (22.23~27.17)	55.80	25.60	21.6°C	2025/09/15
D5200V2 Body	76.00 (68.40~83.60)	22.00 (19.80~24.20)	71.70	20.70	21.6°C	2025/09/16
D5300V2 Body	80.60 (72.54~88.66)	23.30 (20.97~25.63)	80.80	23.10	21.6°C	2025/09/16
D5500V2 Body	85.60 (77.04~94.16)	24.50 (22.05~26.95)	79.00	22.50	21.6°C	2025/09/16
D5600V2 Body	83.30 (74.97~91.63)	24.10 (21.69~26.51)	78.70	22.40	21.6°C	2025/09/17
D5800V2 Body	79.00 (71.10~86.90)	22.70 (20.43~24.97)	77.60	22.00	21.6°C	2025/09/19
D5200V2 Body	76.00 (68.40~83.60)	22.00 (19.80~24.20)	75.20	21.90	21.6°C	2026/08/01

Note: 1. All SAR values are normalized to 1W forward power.

2. The actual forward power output to the dipole antenna is 20dbm(100mw), so the measured value differs ten times from the table

9 SAR Test Test Configuration

9.1 Wi-Fi Test Configuration

For the 802.11b/g SAR tests, a communication link is set up with the test mode software for Wi-Fi mode test. The Absolute Radio Frequency Channel Number (ARFCN) is allocated to 1, 6 and 11 respectively in the case of 2450 MHz. During the test, at the each test frequency channel, the EUT is operated at the RF continuous emission mode. Each channel should be tested at the lowest data rate. 802.11b/g operating modes are tested independently according to the service requirements in each frequency band. 802.11b/g modes are tested on channel 1, 6, 11; however, if output power reduction is necessary for channels 1 and/or 11 to meet restricted band requirements the highest output channel closest to each of these channels must be tested instead.

SAR is not required for 802.11g/n channels when the maximum average output power is less than 0.25dB higher than that measured on the corresponding 802.11b channels.

Mode	Band	GHz	Channel	"Default Test Channels"	
				802.11b	802.11g
802.11b/g	2.4 GHz	2412	1#	√	△
		2437	6	√	△
		2462	11#	√	△

Notes:

√ = "default test channels"

△ = possible 802.11g channels with maximum average output $\frac{1}{4}$ dB the "default test channels"

= when output power is reduced for channel 1 and /or 11 to meet restricted band requirements the highest output channels closest to each of these channels should be tested.

802.11 Test Channels per FCC Requirements

9.2 WiFi 5G SAR Test Procedures

A) U-NII-1 and U-NII-2A Bands

For devices that operate in only one of the U-NII-1 and U-NII-2A bands, the normally required SAR procedures for OFDM configurations are applied. For devices that operate in both U-NII bands using the same transmitter and antenna(s), SAR test reduction is determined according to the following:

1) When the same maximum output power is specified for both bands, begin SAR measurement in U-NII-2A band by applying the OFDM SAR requirements. If the highest reported SAR for a test configuration is ≤ 1.2 W/kg, SAR is not required for U-NII-1 band for that configuration (802.11 mode and exposure condition); otherwise, both bands are tested independently for SAR.

2) When different maximum output power is specified for the bands, begin SAR measurement in the band with higher specified maximum output power. The highest reported SAR for the tested configuration is adjusted by the ratio of lower to higher specified maximum output power for the two bands. When the adjusted SAR is ≤ 1.2 W/kg, SAR is not required for the band with lower maximum output power in that test configuration; otherwise, both bands are tested independently for SAR.

3) The two U-NII bands may be aggregated to support a 160 MHz channel on channel number 50. Without additional testing, the maximum output power for this is limited to the lower of the maximum output power certified for the two bands. When SAR measurement is required for at least one of the bands and the highest reported SAR adjusted by the ratio of specified maximum output power of aggregated to standalone band is > 1.2 W/kg, SAR is required for the 160 MHz channel. This procedure does not apply to an aggregated band with maximum output higher than the standalone band(s); the aggregated band must be tested independently for SAR. SAR is not required when the 160 MHz channel is operating at a reduced maximum power and also qualifies for SAR test exclusion.

B) U-NII-2C and U-NII-3 Bands

The frequency range covered by these bands is 380 MHz (5.47 – 5.85 GHz), which requires a minimum of at least two SAR probe calibration frequency points to support SAR measurements. When Terminal Doppler Weather Radar (TDWR) restriction applies, all channels that operate at 5.60 – 5.65 GHz must be included to apply the SAR test reduction and measurement procedures.

When the same transmitter and antenna(s) are used for U-NII-2C band and U-NII-3 band or 5.8 GHz band of §15.247, the bands may be aggregated to enable additional channels with 20, 40 or 80 MHz bandwidth to span across the band gap, as illustrated in Appendix B. The maximum output power for the additional band gap channels is limited to the lower of those certified for the bands. Unless band gap channels are permanently disabled, they must be considered for SAR testing. The frequency range covered by these bands is 380 MHz (5.47 – 5.85 GHz), which requires a minimum of at least two SAR probe calibration frequency points to support SAR measurements. To maintain SAR measurement accuracy and to facilitate test reduction, the channels in U-NII-2C band above 5.65 GHz may be grouped with the 5.8 GHz channels in U-NII-3 or §15.247 band to enable two SAR probe calibration frequency points to cover the bands, including the band gap channels. When band gap channels are supported and the bands are not aggregated for SAR testing, band gap channels must be considered independently in each band according to the normally required OFDM SAR measurement and probe calibration frequency points requirements.

C) OFDM Transmission Mode SAR Test Configuration and Channel Selection Requirements

The initial test configuration for 5 GHz OFDM transmission modes is determined by the 802.11 configuration with the highest maximum output power specified for production units, including tune-up tolerance, in each standalone and aggregated frequency band. SAR for the initial test configuration is measured using the highest maximum output power channel determined by the default power measurement procedures. When multiple configurations in a frequency band have the same specified maximum output power, the initial test configuration is determined according to the following steps applied sequentially.

- 1) The largest channel bandwidth configuration is selected among the multiple configurations with the same specified maximum output power.
- 2) If multiple configurations have the same specified maximum output power and largest channel bandwidth, the lowest order modulation among the largest channel bandwidth configurations is selected.
- 3) If multiple configurations have the same specified maximum output power, largest channel bandwidth and lowest order modulation, the lowest data rate configuration among these configurations is selected.
- 4) When multiple transmission modes (802.11a/g/n/ac) have the same specified maximum output power, largest channel bandwidth, lowest order modulation and lowest data rate, the lowest order 802.11 mode is selected; i.e., 802.11a is chosen over 802.11n then 802.11ac or 802.11g is chosen over 802.11n. After an initial test configuration is determined, if multiple test channels have the same measured maximum output power, the channel chosen for SAR measurement is determined according to the following. These channel selection procedures apply to both the initial test configuration and subsequent test configuration(s), with respect to the default power measurement procedures or additional power measurements required for further SAR test reduction. The same procedures also apply to subsequent highest output power channel(s) selection.

- 1) The channel closest to mid-band frequency is selected for SAR measurement.
- 2) For channels with equal separation from mid-band frequency; for example, high and low channels or two mid-band channels, the higher frequency (number) channel is selected for SAR measurement.

D) SAR Test Requirements for OFDM configurations

When SAR measurement is required for 802.11 a/n/ac OFDM configurations, each standalone and frequency aggregated band is considered separately for SAR test reduction. When the same transmitter and antenna(s) are used for U-NII-1 and U-NII-2A bands, additional SAR test reduction applies. When band gap channels between U-NII-2C band and 5.8 GHz U-NII-3 or §15.247 band are supported, the highest maximum output power transmission mode configuration and maximum output power channel across the bands must be used to determine SAR test reduction, according to the initial test configuration and subsequent test configuration requirements. In applying the initial test configuration and subsequent test configuration procedures, the 802.11 transmission configuration with the highest specified maximum output power and the channel within a test configuration with the highest measured maximum output power should be clearly distinguished to apply the procedures.

10 Detailed Test Results

10.1 Conducted Power measurements

The measuring conducted average power(Unit: dBm) is shown as below.

10.1.1 Conducted Power of Wi-Fi 2.4G

MAIN ANT1

Mode	802.11b		
Channel/Frequency(MHz)	1(2412)	6(2437)	11(2462)
Average Power(dBm)	19.03	17.96	18.26
Mode	802.11g		
Channel/Frequency(MHz)	1(2412)	6(2437)	11(2462)
Average Power(dBm)	23.76	23.58	22.84
Mode	802.11n(HT20)		
Channel/Frequency(MHz)	1(2412)	6(2437)	11(2462)
Average Power(dBm)	23.69	23.35	22.63
Mode	802.11n(HT40)		
Channel/Frequency(MHz)	3(2422)	6(2437)	9(2452)
Average Power(dBm)	23.03	23.31	22.96
Mode	802.11ax 20		
Channel/Frequency(MHz)	1(2412)	6(2437)	11(2462)
Average Power(dBm)	18.00	17.65	17.08
Mode	802.11ax 40		
Channel/Frequency(MHz)	3(2422)	6(2437)	9(2452)
Average Power(dBm)	17.15	17.55	17.09

<KDB 248227 D01, SAR Guidance for Wi-Fi Transmitters>

(1) For handsets operating next to ear, hotspot mode or mini-tablet configurations, the initial test position procedures were applied. The test position with the highest extrapolated peak SAR will be used as the initial test position. When the reported SAR of initial test position is ≤ 0.4 W/kg, SAR testing for remaining test positions is not required. Otherwise, SAR is evaluated at the subsequent highest peak SAR positions until the reported SAR result is ≤ 0.8 W/kg or all test positions are measured.

(2) For Wi-Fi 2.4 GHz, the highest measured maximum output power channel for DSSS was selected for SAR measurement. When the reported SAR is ≤ 0.8 W/kg, no further SAR testing is required. Otherwise, SAR is evaluated at the next highest measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel. For OFDM modes (802.11g/n), SAR is not required when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and it is ≤ 1.2 W/kg.

10.1.2 Conducted Power of Wi-Fi 5G

Band 1						
Band	Mode	Channel	Frequency(MHz)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
U-NII-1 (5150-5250)	802.11a	36	5180	13.50±1.0	13.03	No
		48	5240	14.50±1.0	14.28	Yes
	802.11n-HT20	36	5180	12.50±1.0	12.39	No
		48	5240	13.00±1.0	12.82	No
	802.11n-HT40	38	5190	13.00±1.0	12.68	No
		46	5230	13.00±1.0	12.85	No
	802.11ac-VHT20	36	5180	12.00±1.0	11.96	No
		48	5240	13.00±1.0	12.79	No
	802.11ac-VHT40	38	5190	12.00±1.0	11.99	No
		46	5230	13.00±1.0	12.61	No
	802.11ac-VHT80	42	5210	12.00±1.0	12.00	No
		36	5180	12.00±1.0	11.62	No
	802.11ax-HT20	48	5240	13.00±1.0	12.64	No
		38	5190	12.50±1.0	12.31	No
	802.11ax-HT40	46	5230	13.00±1.0	12.71	No
		42	5210	12.00±1.0	11.76	No

Band 2						
Band	Mode	Channel	Frequency (MHz)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
U-NII-2a (5250-5350)	802.11a	52	5260	14.50±1.0	14.01	Yes
		64	5320	12.50±1.0	12.40	No
	802.11n-HT20	52	5260	13.00±1.0	12.79	No
		64	5320	11.50±1.0	11.29	No
	802.11n-HT40	54	5270	13.00±1.0	12.56	No
		62	5310	12.00±1.0	11.93	No
	802.11ac-VHT20	52	5260	12.50±1.0	12.46	No
		64	5320	11.50±1.0	11.03	No
	802.11ac-VHT40	54	5270	13.00±1.0	12.70	No
		62	5310	12.00±1.0	11.56	No
	802.11ac-VHT80	58	5290	12.00±1.0	11.58	No
		52	5260	12.50±1.0	12.36	No
	802.11ax-HT20	64	5320	11.00±1.0	10.90	No
		54	5270	12.00±1.0	11.92	No
	802.11ax-HT40	62	5310	11.00±1.0	10.99	No
		58	5290	11.50±1.0	11.32	No

Band 3						
Band	Mode	Channel	Frequency (MHz)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
U-NII-2c (5470-5725)	802.11a	100	5500	10.50±1.0	9.90	Yes
		140	5700	8.00±1.0	7.80	No
	802.11n-HT20	100	5500	9.00±1.0	8.71	No
		140	5700	8.00±1.0	7.92	No
	802.11n-HT40	102	5510	9.50±1.0	9.27	No
		134	5670	8.50±1.0	8.37	No
	802.11ac-VHT20	100	5500	9.00±1.0	8.65	No
		140	5700	7.50±1.0	7.43	No
	802.11ac-VHT40	102	5510	9.00±1.0	8.64	No
		134	5670	8.00±1.0	7.73	No
	802.11ac-VHT80	106	5530	8.00±1.0	7.89	No
		122	5610	8.50±1.0	8.41	No
	802.11ax-HT20	100	5500	8.50±1.0	8.40	No
		140	5700	8.50±1.0	8.22	No

Band 4						
Band	Mode	Channel	Frequency (MHz)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
U-NII-3 (5725-5825)	802.11a	149	5745	7.50±1.0	7.10	No
		165	5825	7.00±1.0	6.60	No
	802.11n-HT20	149	5745	7.00±1.0	6.76	No
		165	5825	6.50±1.0	6.43	No
	802.11n-HT40	151	5755	8.00±1.0	7.74	No
		159	5795	7.50±1.0	7.22	No
	802.11ac-VHT20	149	5745	7.00±1.0	6.67	No
		165	5825	6.50±1.0	6.45	No
	802.11ac-VHT40	151	5755	7.50±1.0	7.35	No
		159	5795	7.50±1.0	7.11	No
	802.11ac-VHT80	155	5775	7.50±1.0	7.00	No
		149	5745	7.50±1.0	7.35	No
	802.11ax-HT20	165	5825	7.50±1.0	7.36	No
		151	5755	8.00±1.0	7.85	Yes

<KDB 248227 D01, SAR Guidance for Wi-Fi Transmitters>

For WLAN 5 GHz, the initial test configuration was selected according to the transmission mode with the highest maximum output power. When the reported SAR of initial test configuration is > 0.8 W/kg, SAR is required for the subsequent highest measured output power channel until the reported SAR result is ≤ 1.2 W/kg or all required channels are measured. For other transmission modes, SAR is not required when the highest reported SAR for initial test configuration is adjusted by the ratio of subsequent test configuration to initial test configuration specified maximum output power and it is ≤ 1.2 W/kg.

10.2 Conducted Power of BT

EDR	Mode	Maximum Tune-up(dBm)	Average Conducted Output Power (dBm)		
			0	39	78
			2402MHz	2441MHz	2480MHz
	GFSK	-5.00	-5.93	-5.63	-5.81
	$\pi/4$ QPSK	-6.00	-7.20	-6.91	-7.11
	8DPSK	-6.00	-6.36	-6.21	-6.53
BLE	Mode	Maximum Tune-up(dBm)	Average Conducted Output Power (dBm)		
			0	19	39
			2402MHz	2440MHz	2480MHz
	1Mbps	-5.00	-6.09	-5.84	-6.04
	2Mbps	-5.00	-6.13	-5.89	-6.11

Note

- Per KDB 447498 D04 Interim General RF Exposure Guidance v01, the 1-g SAR test exclusion thresholds for 300 MHz to 6 GHz at test separation distances ≤ 40 cm are determined by:

$$P_{th} \text{ (mW)} = ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases} \quad (\text{B.1})$$

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases} \quad (\text{B.2})$$

where

$$x = -\log_{10} \left(\frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right)$$

and f is in GHz, d is the separation distance (cm), and $ERP_{20 \text{ cm}}$ is per Formula (B.1).

*When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine estimated SAR.

- Per KDB 248227 D01 v02r02, choose the highest output power channel to test SAR and determine further SAR exclusion.
- The output power of all data rate were prescan, just the worst case (the lowest data rate) of all mode were shown in report.

10.3 Tune-up power to larence

Band	Tune-up power tolerance(dBm)		
WIFI	2.4G	802.11b	Max output power =19.50±1.0dbm
		802.11g	Max output power =24.00±1.0dbm
		802.11n (HT20)	Max output power =24.00±1.0dbm
		802.11n (HT40)	Max output power =23.50±1.0dbm
		802.11ax20	Max output power =18.50±1.0dbm
		802.11ax40	Max output power =18.00±1.0dbm
	U-NII-1 (5150-5250)	802.11a	Max output power =14.50±1.0dbm
	U-NII-2a (5250-5350)	802.11a	Max output power =14.50±1.0dbm
	U-NII-2c (5470-5725)	802.11a	Max output power =10.50±1.0dbm
	U-NII-3 (5725-5825)	802.11ax-HT40	Max output power =8.00±1.0dbm
BT	GFSK mode		Max output power =-5.00±1.0dbm
	Pi/4DQPSK mode		Max output power =-6.00±1.0dbm
	8DPSK mode		Max output power =-6.00±1.0dbm
BLE	1Mbps Power		Max output power =-5.00±1.0dbm
	2Mbps Power		Max output power =-5.00±1.0dbm

11 SAR test results

Notes:

1) Per KDB447498, the SAR test shall be performed at the high, middle and low frequency channels of each operating mode. If the scaled SAR measured at mid-band channel for each test configuration is at least 3.0 dB lower than the SAR limit ($< 0.8 \text{ W/kg}$), testing at the high and low channels is optional.

2) Per KDB447498, testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is: $\leq 0.8 \text{ W/kg}$ or 2.0 W/kg , for 1-g or 10-g respectively, when the transmission band is $\leq 100 \text{ MHz}$. When the maximum output power variation across the required test channels is $> \frac{1}{2} \text{ dB}$, instead of the middle channel, the highest output power channel must be used.

3) Per KDB447498, All measurement SAR result is scaled-up to account for tune-up tolerance is compliant.

4) Per KDB648474 D04v01r03, body-worn accessory testing is typically associated with voice operations. Therefore, GSM voice was evaluated for body-worn with headset SAR.

5) Per KDB248227 D01v02r02, the procedures required to establish specific device operating configurations for testing the SAR of 802.11 a/b/g transmitters.

6) Per KDB865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is $\geq 0.8 \text{ W/Kg}$; if the deviation among the repeated measurement is $\leq 20\%$, and the measured SAR $< 1.45 \text{ W/Kg}$, only one repeated measurement is required.

7) Per KDB865664 D02v01r02, SAR plot is only required for the highest measured SAR in each exposure configuration, wireless mode and frequency band combination; Plots are also required when the measured SAR is $> 1.5 \text{ W/kg}$, or $> 7.0 \text{ W/kg}$ for occupational exposure. The published RF exposure KDB procedures may require additional plots; for example, to support SAR to peak location separation ratio test exclusion and/or volume scan post-processing (Refer to appendix B for details).

8) Per KDB6162147 D04v01r02, the SAR requirements for laptop and tablet computers, and its to determine the minimum test separation distance .

11.1 Results overview of Wi-Fi

11.1.1 Results overview of Wi-Fi 2.4G

Mode	Test Position of Body with 0mm	Test channel /Freq.(MHz)	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up Limit (dBm)	Scaling Factor	Scaled SAR1-g (W/kg)
			1-g	10-g					
WLAN2.4g(gap 0mm)									
802.11g	Front	1/2412	0.356	0.125	0.130	23.76	24.00	1.057	0.376
	Back	1/2412	0.507	0.186	0.020	23.76	24.00	1.057	0.536
	Left	1/2412	0.019	0.007	0.060	23.76	24.00	1.057	0.020
	Right	1/2412	0.103	0.053	0.120	23.76	24.00	1.057	0.109
	Top	1/2412	0.009	0.004	-0.070	23.76	24.00	1.057	0.010
	Bottom	1/2412	0.025	0.011	-0.080	23.76	24.00	1.057	0.026

11.1.2 Results overview of Wi-Fi 5G

Mode	Test Position of Body with 0mm	Test channel /Freq.(MHz)	SAR Value (W/kg)		Power Drift (dB)	Conduct ed Power (dBm)	Tune-up Limit (dBm)	Scaling Factor	Scaled SAR1-g (W/kg)
			1-g	10-g					
WLAN5.2g(gap 0mm)									
802.11a	Front	48/5240	0.125	0.059	0.110	14.28	14.50	1.052	0.131
	Back	48/5240	0.296	0.070	0.120	14.28	14.50	1.052	0.311
	Left	48/5240	0.011	0.005	0.070	14.28	14.50	1.052	0.012
	Right	48/5240	0.071	0.029	-0.010	14.28	14.50	1.052	0.075
	Top	48/5240	0.006	0.003	0.180	14.28	14.50	1.052	0.006
	Bottom	48/5240	0.026	0.010	-0.090	14.28	14.50	1.052	0.027
Mode	Test Position of Body with 0mm	Test channel /Freq.(MHz)	SAR Value (W/kg)		Power Drift (dB)	Conduct ed Power (dBm)	Tune-up Limit (dBm)	Scaling Factor	Scaled SAR1-g (W/kg)
			1-g	10-g					
WLAN5.4g(gap 0mm)									
802.11a	Front	52/5260	0.582	0.206	0.130	14.01	14.50	1.119	0.652
	Back	52/5260	1.190	0.319	-0.010	14.01	14.50	1.119	1.332
	Left	52/5260	0.026	0.011	-0.160	14.01	14.50	1.119	0.029
	Right	52/5260	0.491	0.121	0.090	14.01	14.50	1.119	0.550
	Top	52/5260	0.013	0.005	0.100	14.01	14.50	1.119	0.015
	Bottom	52/5260	0.046	0.021	-0.070	14.01	14.50	1.119	0.051
Add worst mode test									
802.11a	Back	52/5260	1.130	0.324	-0.15	14.01	14.50	1.119	1.264

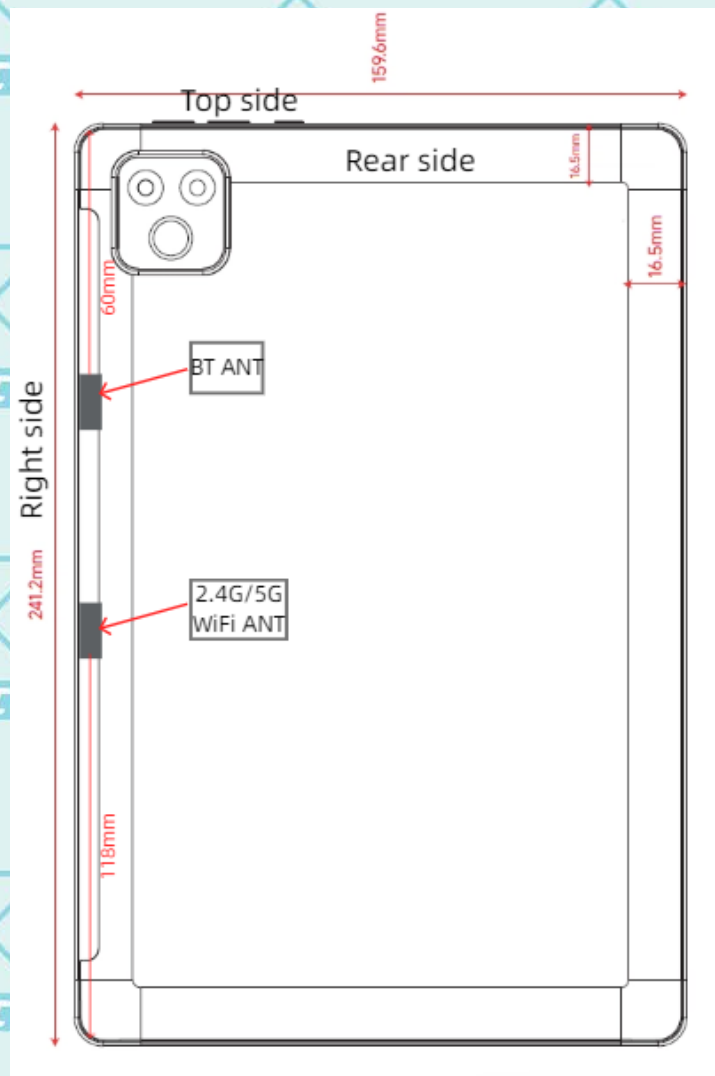
Mode	Test Position of Body with 0mm	Test channel /Freq.(MHz)	SAR Value (W/kg)		Power Drift (dB)	Conducte d Power (dBm)	Tune-up Limit (dBm)	Scaling Factor	Scaled SAR1-g (W/kg)
			1-g	10-g					
WLAN5.6g(gap 0mm)									
802.11a	Front	102/5510	0.359	0.082	0.130	9.90	10.50	1.148	0.412
	Back	102/5510	0.734	0.147	0.180	9.90	10.50	1.148	0.843
	Left	102/5510	0.021	0.008	-0.110	9.90	10.50	1.148	0.024
	Right	102/5510	0.192	0.043	-0.070	9.90	10.50	1.148	0.220
	Top	102/5510	0.007	0.002	0.120	9.90	10.50	1.148	0.008
	Bottom	102/5510	0.026	0.011	0.160	9.90	10.50	1.148	0.030
WLAN5.8g(gap 0mm)									
802.11ax40	Front	155/5775	0.422	0.156	-0.170	7.85	8.00	1.035	0.437
	Back	155/5775	0.917	0.231	0.150	7.85	8.00	1.035	0.949
	Left	155/5775	0.024	0.010	-0.030	7.85	8.00	1.035	0.025
	Right	155/5775	0.243	0.079	0.130	7.85	8.00	1.035	0.252
	Top	155/5775	0.009	0.004	0.060	7.85	8.00	1.035	0.009
	Bottom	155/5775	0.029	0.012	0.050	7.85	8.00	1.035	0.030

11.2 Results overview of BT

Test Position of Body with 0mm	Test channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conduct ed Power (dBm)	Tune-up Limit(dBm)	Scaled SAR _{1-g} (W/kg)	Scalig factor
			1-g	10-g					
BT antenna to side									
Front	39/2441	GFSK	0.056	0.025	0.110	-5.63	-5.00	0.065	1.156
Back	39/2441	GFSK	0.101	0.035	-0.090	-5.63	-5.00	0.117	1.156
Left	39/2441	GFSK	0.009	0.004	0.130	-5.63	-5.00	0.010	1.156
Right	39/2441	GFSK	0.024	0.009	-0.170	-5.63	-5.00	0.028	1.156
Top	39/2441	GFSK	0.012	0.005	0.140	-5.63	-5.00	0.014	1.156
Bottom	39/2441	GFSK	0.008	0.003	-0.120	-5.63	-5.00	0.009	1.156

12 Multiple Transmitter Information

The SAR measurement positions of each side are as below:



<Rear Side>

Mode	Front side	Rear side	Left side	Right side	Top side	Bottom side
Wi-Fi/BT Antenna	Yes	Yes	Yes	Yes	Yes	Yes

Per KDB 616217 Laptop host platform test requirements: When antennas are incorporated in the keyboard section of a laptop computer, SAR is required for the bottom surface of the keyboard. Provided tablet use conditions are not supported by the laptop computer, SAR tests for bystander exposure from the edges of the keyboard and display screen of laptop computers are generally not required.

12.1 Simultaneous Transmission SAR Summation Scenario

Mode	Position	WIFI MaxSAR 1g(W/kg)	Ant 1 BT 1g(W/kg)	WIFI + BT 1g(W/kg)
2.4Gwifi	Front	0.376	0.065	0.441
	Back	0.536	0.117	0.653
	Left	0.010	0.014	0.024
	Right	0.020	0.009	0.029
	Top	0.109	0.028	0.137
	Bottom	0.026	0.010	0.036
5.2Gwifi	Front	0.131	0.065	0.196
	Back	0.311	0.117	0.428
	Left	0.006	0.014	0.020
	Right	0.012	0.009	0.021
	Top	0.075	0.028	0.103
	Bottom	0.027	0.010	0.037
5.4Gwifi	Front	0.652	0.065	0.717
	Back	1.332	0.117	1.449
	Left	0.029	0.014	0.043
	Right	0.015	0.009	0.024
	Top	0.348	0.028	0.376
	Bottom	0.051	0.010	0.061
5.6Gwifi	Front	0.412	0.065	0.477
	Back	0.843	0.117	0.960
	Left	0.008	0.014	0.022
	Right	0.030	0.009	0.039
	Top	0.117	0.028	0.145
	Bottom	0.024	0.010	0.034
5.8Gwifi	Front	0.437	0.065	0.502
	Back	0.949	0.117	1.066
	Left	0.009	0.014	0.023
	Right	0.025	0.009	0.034
	Top	0.148	0.028	0.176
	Bottom	0.030	0.010	0.040

12.2 Measurement uncertainty evaluation for SAR test

The following table includes the uncertainty table of the IEEE 1528. The values are determined by SPEAG. The breakdown of the individual uncertainties is as follows:

DASY8 Uncertainty Budget								
According to IEC/IEEE 62209-1528 (Frequency band: 300MHz-3GHz range)								
Symbol	Error Description	Uncert. value	Prob. Dist.	Div.	(c <i>i</i>) (1g)	(c <i>i</i>) (10g)	Std. Unc (1g)	Std. Unc (10g)
Measurement System Errors								
CF	Probe Calibration	±13.3%	N	2	1	1	±6.7%	±6.7%
CF _{drift}	Probe Calibration Drift	±1.7%	R	$\sqrt{3}$	1	1	±1.0%	±1.0%
LIN	Probe Linearity	±4.7%	R	$\sqrt{3}$	1	1	±2.7%	±2.7%
BBS	Broadband Signal	±2.8%	R	$\sqrt{3}$	1	1	±1.6%	±1.6%
ISO	Probe Isotropy	±7.6%	R	$\sqrt{3}$	1	1	±4.4%	±4.4%
DAE	Other Probe+Electronic	±0.8%	N	1	1	1	±0.8%	±0.8%
AMB	RF Ambient	±1.8%	N	1	1	1	±1.8%	±1.8%
Δ _{sys}	Probe Positioning	±0.006 mm	N	1	0.14	0.14	±0.10%	±0.10%
DAT	Data Processing	±1.2%	N	1	1	1	±1.2%	±1.2%
Phantom and Device Errors								
LIQ(σ)	Conductivity (meas.) DAK	±2.5%	N	1	0.78	0.71	±2.0%	±1.8%
LIQ(T _σ)	Conductivity (temp.) BB	±3.3%	R	$\sqrt{3}$	0.78	0.71	±1.5%	±1.4%
EPS	Phantom Permittivity	±14.0%	R	$\sqrt{3}$	0	0	±0%	±0%
DIS	Distance DUT – TSL	±2.0%	N	1	2	2	±4.0%	±4.0%
D _{xyz}	Device Positioning	±1.0%	N	1	1	1	±1.0%	±1.0%
H	Device Holder	±3.6%	N	1	1	1	±3.6%	±3.6%
MOD	DUT Modulation ^m	±2.4%	R	$\sqrt{3}$	1	1	±1.4%	±1.4%
TAS	Time-average SAR	±1.7%	R	$\sqrt{3}$	1	1	±1.0%	±1.0%
RF _{drift}	DUT drift	±2.5%	N	1	1	1	±2.5%	±2.5%
VAL	Val Antenna Unc. ^{val}	±0.0%	N	1	1	1	±0.0%	±0.0%
RF _{in}	Unc. Input Power ^{val}	±0.0%	N	1	1	1	±0.0%	±0.0%
Correction to the SAR results								
C(ε, σ)	Deviation to Target	±1.9%	N	1	1	0.84	±1.9%	±1.6%
C(R)	SAR scaling ^p	±0.0%	R	$\sqrt{3}$	1	1	±0.0%	±0.0%
u(ΔSAR)	Combined Uncertainty						±11.3%	±11.2%
U	Expanded Uncertainty						±22.6%	±22.5%

DASY8 Uncertainty Budget

According to IEC/IEEE 62209-1528
(Frequency band: 3GHz-6GHz range)

Symbol	Error Description	Uncert. value	Prob. Dist.	Div.	(ci) (1g)	(ci) (10g)	Std. Unc (1g)	Std. Unc (10g)
Measurement System Errors								
CF	Probe Calibration	±13.1%	N	2	1	1	±6.55%	±6.55%
CF _{drift}	Probe Calibration Drift	±1.7%	R	$\sqrt{3}$	1	1	±1.0%	±1.0%
LIN	Probe Linearity	±4.7%	R	$\sqrt{3}$	1	1	±2.7%	±2.7%
BBS	Broadband Signal	±2.6%	R	$\sqrt{3}$	1	1	±1.5%	±1.5%
ISO	Probe Isotropy	±7.6%	R	$\sqrt{3}$	1	1	±4.4%	±4.4%
DAE	Other Probe+Electronic	±1.2%	N	1	1	1	±1.2%	±1.2%
AMB	RF Ambient	±1.8%	N	1	1	1	±1.8%	±1.8%
Δ _{sys}	Probe Positioning	±0.005 mm	N	1	0.29	0.29	±0.2%	±0.20%
DAT	Data Processing	±2.3%	N	1	1	1	±2.3%	±2.3%
Phantom and Device Errors								
LIQ(σ)	Conductivity (meas.) DAK	±2.5%	N	1	0.78	0.71	±2.0%	±1.8%
LIQ(T _σ)	Conductivity (temp.) BB	±3.4%	R	$\sqrt{3}$	0.78	0.71	±1.5%	±1.4%
EPS	Phantom Permittivity	±14.0%	R	$\sqrt{3}$	0.25	0.25	±2.0%	±2.0%
DIS	Distance DUT – TSL	±2.0%	N	1	2	2	±4.0%	±4.0%
D _{xyz}	Device Positioning	±1.0%	N	1	1	1	±1.0%	±1.0%
H	Device Holder	±3.6%	N	1	1	1	±3.6%	±3.6%
MOD	DUT Modulation ^m	±2.4%	R	$\sqrt{3}$	1	1	±1.4%	±1.4%
TAS	Time-average SAR	±1.7%	R	$\sqrt{3}$	1	1	±1.0%	±1.0%
RF _{drift}	DUT drift	±2.5%	N	1	1	1	±2.5%	±2.5%
VAL	Val Antenna Unc. ^{val}	±0.0%	N	1	1	1	±0.0%	±0.0%
RF _{in}	Unc. Input Power ^{val}	±0.0%	N	1	1	1	±0.0%	±0.0%
Correction to the SAR results								
C(ε, σ)	Deviation to Target	±1.9%	N	1	1	0.84	±1.9%	±1.6%
C(R)	SAR scaling ^p	±0.0%	R	$\sqrt{3}$	1	1	±0.0%	±0.0%
u(ΔSAR)	Combined Uncertainty						±11.6%	±11.6%
U	Expanded Uncertainty						±23.3%	±23.1%

DASY8 Uncertainty Budget

According to IEC/IEEE 62209-1528

(Frequency band: 6 GHz–10 GHz range)

Symbol	Error Description	Uncert. value	Prob. Dist.	Div.	(c_i) (1 g)	(c_i) (10 g)	Std. Unc. (1 g)	Std. Unc. (10 g)
Measurement System Errors								
CF	Probe Calibration	±18.6%	N	2	1	1	±9.3%	±9.3%
CF _{drift}	Probe Calibration Drift	±1.7%	R	√3	1	1	±1.0%	±1.0%
LIN	Probe Linearity	±4.7%	R	√3	1	1	±2.7%	±2.7%
BBS	Broadband Signal	±2.6%	R	√3	1	1	±1.5%	±1.5%
ISO	Probe Isotropy	±7.6%	R	√3	1	1	±4.4%	±4.4%
DAE	Other Probe+Electronic	±2.4%	N	1	1	1	±2.4%	±2.4%
AMB	RF Ambient	±1.8%	N	1	1	1	±1.8%	±1.8%
Δ _{sys}	Probe Positioning	±0.005 mm	N	1	0.50	0.50	±0.3%	±0.3%
DAT	Data Processing	±3.5%	N	1	1	1	±3.5%	±3.5%
Phantom and Device Errors								
LIQ(σ)	Conductivity (meas.) ^{DAK}	±2.5%	N	1	0.78	0.71	±2.0%	±1.8%
LIQ(T _σ)	Conductivity (temp.) ^{BB}	±2.4%	R	√3	0.78	0.71	±1.1%	±1.0%
EPS	Phantom Permittivity	±14.0%	R	√3	0.5	0.5	±4.0%	±4.0%
DIS	Distance DUT – TSL	±2.0%	N	1	2	2	±4.0%	±4.0%
D _{xyz}	Device Positioning	±1.0%	N	1	1	1	±1.0%	±1.0%
H	Device Holder	±3.6%	N	1	1	1	±3.6%	±3.6%
MOD	DUT Modulation ^m	±2.4%	R	√3	1	1	±1.4%	±1.4%
TAS	Time-average SAR	±1.7%	R	√3	1	1	±1.0%	±1.0%
RF _{drift}	DUT drift	±2.5%	N	1	1	1	±2.5%	±2.5%
VAL	Val Antenna Unc. ^{val}	±0.0%	N	1	1	1	±0.0%	±0.0%
RF _{in}	Unc. Input Power ^{val}	±0.0%	N	1	1	1	±0.0%	±0.0%
Correction to the SAR results								
C(ε, σ)	Deviation to Target	±1.9%	N	1	1	0.84	±1.9%	±1.6%
C(R)	SAR scaling ^p	±0.0%	R	√3	1	1	±0.0%	±0.0%
u(ΔSAR)	Combined Uncertainty						±14.2%	±14.1%
U	Expanded Uncertainty						±28.4%	±28.3%

12.3 Measurement uncertainty evaluation for system check

The following table includes the uncertainty table of the IEEE 1528. The values are determined by SPEAG. The breakdown of the individual uncertainties is as follows:

Uncertainty For System Performance Check								
Uncertainty Component	Tol. (±%)	Prob. Dist.	Div.	C _i 1g	C _i 10g	1g U _i (±%)	10g U _i (±%)	V _i
measurement system								
Probe Calibration	6.7	N	1	1	1	6.70	6.70	∞
Axial Isotropy	4.7	R	$\sqrt{3}$	0.7	0.7	1.90	1.90	∞
Hemispherical Isotropy	9.6	R	$\sqrt{3}$	0.7	0.7	3.88	3.88	∞
Boundary Effect	1	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Linearity	4.7	R	$\sqrt{3}$	1	1	2.71	2.71	∞
system detection Limits	1	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Modulation response	0	N	1	1	1	0.00	0.00	∞
Readout Electronics	0.3	N	1	1	1	0.30	0.30	∞
Response Time	0	R	$\sqrt{3}$	1	1	0.00	0.00	∞
Integration Time	0	R	$\sqrt{3}$	1	1	0.00	0.00	∞
RF ambient Conditions - Noise	1	R	$\sqrt{3}$	1	1	0.58	0.58	∞
RF ambient Conditions – Reflections	1	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Probe positioned Mechanical Tolerance	0.8	R	$\sqrt{3}$	1	1	0.46	0.46	∞
Probe positioning with respect to Phantom Shell	6.7	R	$\sqrt{3}$	1	1	3.87	3.87	∞
Extrapolation, interpolation and integration Algorithms for Max. SAR Evaluation	2.0	R	$\sqrt{3}$	1	1	1.15	1.15	∞
Dipole								
Deviation of experimental source from numerical source	5.5	N	1	1	1	3.18	3.18	∞
Input power and SAR drift measurement	2.0	R	$\sqrt{3}$	1	1	1.15	1.15	∞
Dipole axis to liquid Distance	3.4	R	$\sqrt{3}$	1	1	1.96	1.96	∞
Phantom and Tissue Parameters								
Phantom Uncertainty (shape and thickness tolerances)	4.0	R	$\sqrt{3}$	1	1	2.31	2.31	∞
Uncertainty in SAR correction for deviation (in permittivity and conductivity)	2	N	1	1	0.84	2.0	1.68	∞
Liquid conductivity (meas.)	2.5	N	1	0.78	0.71	1.13	1.03	5
Liquid conductivity (target.)	5	R	$\sqrt{3}$	0.78	0.71	3.90	3.55	5
Liquid Permittivity (meas.)	2.5	N	1	0.23	0.26	0.33	0.38	∞
Liquid Permittivity (target.)	5	R	$\sqrt{3}$	0.23	0.26	1.15	1.30	∞
Combined Standard Uncertainty		Rss				11.29	11.18	
Expanded Uncertainty (95% Confidence interval)		k				20.57	19.95	

13 Test equipment and ancillaries used for tests

To simplify the identification of the test equipment and/or ancillaries which were used, the reporting of the relevant test cases only refer to the test item number as specified in the table below.

	Manufacturer	Device Type	Type(Model)	Serial number	calibration	
					Last Cal.	Due Date
☒	SPEAG	E-Field PROBE	EX3DV4	7951	2025-09-10	2026-09-09
☒	SPEAG	Validation Sources	D2550V2	1015	2024-08-16	2027-08-15
☒	SPEAG	Validation Sources	D5GHzV2	1412	2024-10-17	2027-10-16
☒	SPEAG	DAE	DAE4ip	1921	2025-09-04	2026-09-03
☒	HP	Network Analyser	8753D	3410A08889	2025-10-15	2026-10-14
☒	HP	Signal Generator	E4421B	GB39340770	2025-10-15	2026-10-14
☒	Keithley	Multimeter	Keithley 2000	4014539	2025-10-15	2026-10-14
☒	SATIMO	Amplifier	Power Amplifier	MODU-023-A-0004	2025-10-15	2026-10-14
☒	Agilent	Power Meter	E4418B	GB43312909	2025-10-15	2026-10-14
☒	Agilent	Power Meter Sensor	E4412A	MY41500046	2025-10-15	2026-10-14
☒	SPEAG	E-Field PROBE	EX3DV4	7955	2025-09-30	2026-09-29
☒	SPEAG	DAE	DAE4ip	1924	2025-09-24	2026-09-23

Annex A: System Check

(Please See the SAR Measurement Plots of annex A.)

Annex B: Measurement Results

(Please See the SAR Measurement Plots of annex B.)

Annex C: Calibration Reports

(Please See the Calibration reports of annex C.)

Annex D: Test setup photos

The end of report