FCC SAR TEST REPORT

Application No.:	SZCR2408002986AT
Applicant:	DT Research, Inc.
Address of Applicant:	3RD FL NO 36 WUQUAN 7TH RD WUGU DISTRICT, NEW TAIPEI, Taiwan
Manufacturer:	DT Research, Inc.
Address of Manufacturer:	2000 Concourse Drive, San Jose, CA 95131, USA
Factory:	DT Research, Inc. Taiwan Branch
Address of Factory:	6F., No.36 Wuquan 7 th Rd., Wugu Dist. New Taipei City 248 Taiwan
Product Name:	Rugged Tablet
Model No.(EUT):	DT323RP, DT323xxxxx (x=0-9, A-Z, - or null, or ., or /), 323MDxxxxx (x=0-9, A-Z, - or null, or ., or /) ♣
♣	Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.
Trade mark:	DT Research
FCC ID:	YE3600-AX210NG
Standard(s) :	FCC 47CFR §2.1093
Date of Receipt:	2024-08-01
Date of Test:	2024-08-06 to 2024-09-15
Date of Issue:	2024-10-14
Test Result:	**Pass***

* In the configuration tested, the EUT complied with the standards specified above.

Keny Xu
EMC Laboratory Manager

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REVISION HISTORY

Revision Record			
Version	**Description**	**Date**	**Remark**
00	Original	2024-10-14	/

Authorized for issue by:				
		Roman Pan **Roman Pan / Project Engineer**		
		Eric Fu **Eric Fu / Reviewer**		

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TEST SUMMARY

Frequency Band	Maximum Reported SAR(W/kg)
	Body
WI-FI (2.4GHz)	1.17
BT	0.18
WI-FI (5GHz)	1.18
WI-FI (6GHz)	1.20
SAR Limited(W/kg)	1.6
Maximum Simultaneous Transmission SAR (W/kg)	
Scenario	Body
Sum SAR	1.23
SPLSR	/
SPLSR Limited	0.04

Frequency Band	Max Reported PD $4m^2$(W/m^2)
WI-FI (6GHz)	9.81
PD Limited (W/m^2)	10.0

Remark:

Model No.: DT323RP, DT323xxxxx (x=0-9, A-Z, - or null, or ., or /), 323MDxxxxx (x=0-9, A-Z, - or null, or ., or /)

Only the model DT323RP was tested, since according to the declaration from the applicant, the electrical circuit design, PCB layout, components used and internal wiring and functions were identical for the above models, with only difference on model No..

CONTENTS

1 General Information

1.1 General Description of EUT

Product Phase:	production unit		
Device Type:	portable device		
Exposure Category:	uncontrolled environment / general population		
Hardware Version:	R13		
Software Version:	302RP_0.00.14		
IMEI/SN:	023RW24250846		
Device Operating Configurations:			
Antenna Type:	PIFA antenna		
Antenna Gain:		Antenna 1	Antenna 2
	WIFI 2.4G	1.11dBi	2.68dBi
	WIFI 5.3G	3.36dBi	3.21dBi
	WIFI 5.8G	3.36dBi	3.21dBi
	WIFI 6G	1.93dBi	3.41dBi
	BT	1.11dBi	
	(Provided by Manufacturer)		
Modulation Mode:	WIFI: DSSS, OFDM, OFDMA		
	BT: GFSK, π/4DQPSK, 8DPSK		
	BLE: GFSK		
Frequency Bands:	Band	Tx (MHz)	Rx (MHz)
	WIFI 2.4G	2412~2472	2412~2472
	U-NII-1	5150~5250	5150~5250
	U-NII-2A	5250~5350	5250~5350
	U-NII-2C	5470~5725	5470~5725
	U-NII-3	5725~5895	5725~5895
	U-NII-5	5925~6425	5925~6425
	U-NII-6	6425~6525	6425~6525
	U-NII-7	6525~6875	6525~6875
	U-NII-8	6875~7125	6875~7125
	Bluetooth	2402~2480	2402~2480
Battery1 Information:	Model:	ACC-006-29(3ICP6/36/115)	
	Normal Voltage:	DC 11.4V	
	Rated capacity:	3800mAh	
	Battery Type:	Rechargeable lithium-Ion Battery	
	Manufacturer:	Guangdong Pow-Tech New Power Co., Ltd	

SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch Testing Center EC Laboratory
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1.2 DUT Antenna Locations

Please see the Appendix D

1.3 Test Specification

Identity	Document Title
FCC 47CFR §2.1093	Radio frequency Radiation Exposure Evaluation: Portable Devices
IEEE Std C95.1 – 1992	IEEE Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz
IEEE 1528-2013	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
KDB 248227 D01 802.11 Wi-Fi SAR v02r02	SAR GUIDANCE FOR IEEE 802.11 (Wi-Fi) TRANSMITTERS
KDB 447498 D04 v01	RF Exposure Procedures and Equipment Authorization Policies for Mobile and Portable Devices
KDB 865664 D01 v01r04	SAR Measurement Requirements for 100 MHz to 6 GHz
KDB 865664 D02 v01r02	RF Exposure Compliance Reporting and Documentation Considerations
KDB 616217 D04 v01r02	SAR EVALUATION CONSIDERATIONS FOR LAPTOP, NOTEBOOK, NETBOOK AND TABLET COMPUTERS
IEC/IEEE 62209-1528:2020	Measurement procedure for the assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Part 1528: Human models, instrumentation, and procedures (Frequency range of 4 MHz to 10 GHz)

1.4 RF exposure limits

Human Exposure	Uncontrolled Environment General Population	Controlled Environment Occupational
Spatial Peak SAR* (Brain*Trunk)	1.60 W/kg	8.00 W/kg
Spatial Average SAR** (Whole Body)	0.08 W/kg	0.40 W/kg
Spatial Peak SAR*** (Hands/Feet/Ankle/Wrist)	4.00 W/kg	20.00 W/kg

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.)

1.5 RF exposure limit for above 1GHz

According to ANSI/IEEE C95.1-1992, the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

Peak Spatially Averaged Power Density was evaluated over a circular area of 4cm2 per interim FCC Guidance for near-field power density evaluations per October 2018 TCB Workshop notes

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f2)	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f2)	30
30-300	27.5	0.073	0.2	30
300-1500			f/1500	30
1500-100,000			1.0	30

Note: 1.0 mW/cm^2 is equal to 10 W/m^2

1.6 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Nanshan District, Shenzhen, Guangdong, China. 518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

1.7 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• A2LA (Certificate No. 3816.01)

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

• VCCI (Member No. 1937)

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen EMC laboratory have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

• FCC –Designation Number: CN1336

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1336. Test Firm Registration Number: 787754.

• Innovation, Science and Economic Development Canada

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

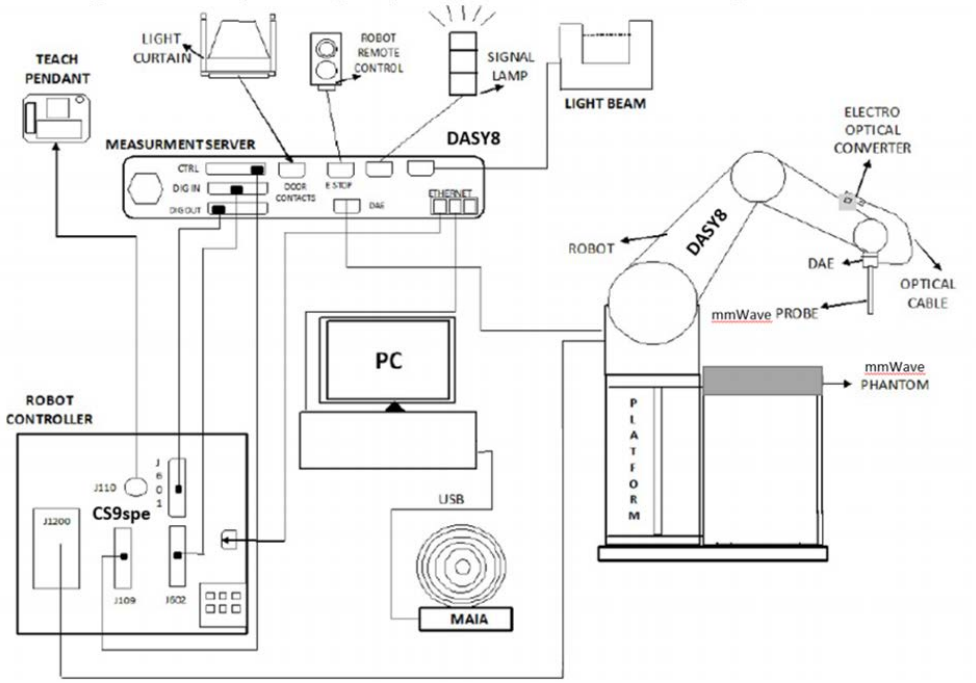
2 Laboratory Environment

Temperature	Min. = 18°C, Max. = 25 °C
Relative humidity	Min. = 30%, Max. = 70%
Ground system resistance	< 0.5 Ω
Ambient noise is checked and found very low and in compliance with requirement of standards. Reflection of surrounding objects is minimized and in compliance with requirement of standards.	

3 SAR Measurements System Configuration

3.1 Power density measurement system

Power density measurements for mmWave frequencies were performed using SPEAG DASY8 with cDASY8 5G module. The DASY8 included a high precision robotics system (Staubli), robot controller, desktop computer, near-field probe, probe alignment sensor, and the 5G phantom cover.



EUmmWVx probe:

The EUmmWVx probe is based on the pseudo-vector probe design, which not only measures the field magnitude but also derives its polarization ellipse. The design entails two small 0.8mm dipole sensors mechanically protected by high-density foam, printed on both sides of a 0.9mm wide and 0.12mm thick glass substrate. The body of the probe is specifically constructed to minimize distortion by the scattered fields. The probe consists of two sensors with different angles (1 and 2) arranged in the same plane in the probe axis. Three or more measurements of the two sensors are taken for different probe rotational angles to derive the amplitude and polarization information. The probe design allows measurements at distances as small as 2mm from the sensors to the surface of the device under test (DUT). The typical sensor to probe tip distance is 1.5 mm. The exact distance is calibrated.

3.2 The SAR Measurement System

This SAR Measurement System uses a Computer-controlled 3-D stepper motor system (SPEAG DASY professional system). A E-field probe is used to determine the internal electric fields. The SAR can be obtained from the equation SAR= σ (|Ei|2)/ ρ where σ and ρ are the conductivity and mass density of the tissue-Simulate.

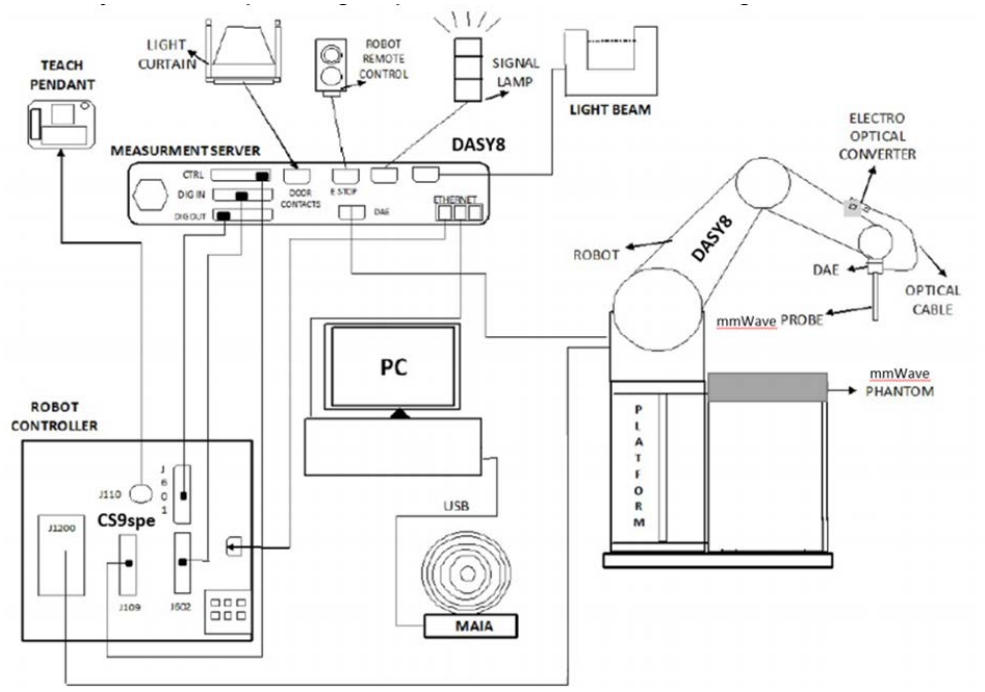
The DASY system for performing compliance tests consists of the following items:

A standard high precision 6-axis robot (Stabile RX family) with controller, teach pendant and software. An arm extension for accommodation the data acquisition electronics (DAE).

A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.

A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.

The Electro-optical converter (EOC) performs the conversion between optical and electrical of the signals for the digital communication to DAE and for the analog signal from the optical surface detection. The EOC is connected to the measurement server.



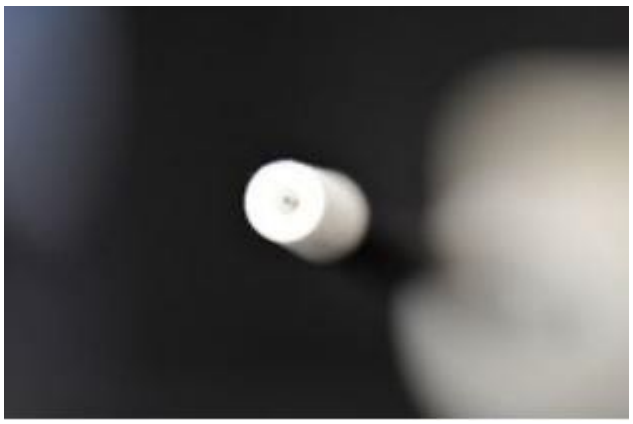
F-1. SAR Measurement System Configuration

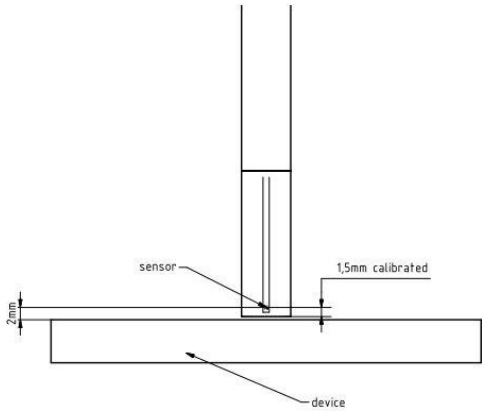
- A standard high precision 6-axis robot (Staübli TX/RX family) with controller, teach pendant and software. It includes an arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic field probe optimized and calibrated for the targeted measurements.

- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion offset measurements. mechanical surface detection. collision detection. etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- the Electro-optical Converter (E00) performs the conversion from optical to electrical signal for the digital communication to the DAE. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movements interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning. A computer running Win7 professional operating system and the DASY6 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc the phantom. the device holder and other accessories according to the targeted measurement.
- MAIA is a hardware interface (Antenna) used to evaluate the modulation and audio interference characteristics of RF signals.
- ANT is an ultra-wideband antenna for use with the base station simulators over 698 MHz to 6GHz.
- The base station simulator is an equipment used for SAR cellular tests in order to emulate the cellular signals characteristics and behavior between a regular base station and the equipment under test.
- Tissue simulating liquid.
- System Validation dipoles.
- Network emulator or RF test too.

3.3 EUmmWaVe probe

Frequency	750 MHz – 110 GHz
Probe Overall Length	320 mm
Probe Body Diameter	8.0 mm
Tip Length	23.0 mm
Tip Diameter	8.0 mm
Probe's two dipoles length	0.9 mm – Diode loaded
Dynamic Range	< 20 V/m - 10000 V/m with PRE-10 (min < 50 V/m - 3000 V/m)
Position Precision	< 0.2 mm
Distance between diode sensors and probe's tip	1.5 mm
Minimum Mechanical separation between probe tip and a Surface	0.5 mm
Applications	E-field measurements of 5G devices and other mm-wave transmitters operating above 10GHz in < 2 mm distance from device (free-space) Power density, H-field and far-field analysis using total field reconstruction.
Compatibility	cDASY6 + 5G-Module SW1.0 and higher





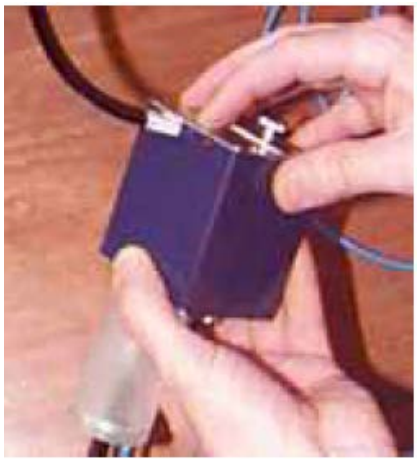
The EUmmWaVe probe is based on the pseudo-vector probe design, which not only measures the field magnitude but also derives its polarization ellipse. The design entails two small 0.8mm dipole sensors mechanically protected by high-density foam, printed on both sides of a 0.9mm wide and 0.12mm thick glass substrate. The body of the probe is specifically constructed to minimize distortion by the scattered fields. The probe consists of two sensors with different angles (1 and 2) arranged in the same plane in the probe axis. Three or more measurements of the two sensors are taken for different probe rotational angles to derive the amplitude and polarization information. The probe design allows measurements at distances as small as 2mm from the sensors to the surface of the device under test (DUT). The typical sensor to probe tip distance is 1.5 mm. The exact distance is calibrated.

3.4 Isotropic E-field Probe EX3DV4

	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available.
Frequency	10 MHz to > 6 GHz Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	± 0.3 dB in TSL (rotation around probe axis) ± 0.5 dB in TSL (rotation normal to probe axis)
Dynamic Range	10 µW/g to > 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 µW/g)
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields); the only probe that enables compliance testing for frequencies up to 6 GHz with precision of better 30%.
Compatibility	DASY3, DASY4, DASY52 SAR and higher, EASY4/MRI

3.5 Data Acquisition Electronics (DAE)

Model	DAE
Construction	Signal amplifier, multiplexer, A/D converter and control logic. Serial optical link for communication with DASY4/5 embedded system (fully remote controlled). Two step probe touch detector for mechanical surface detection and emergency robot stop.
Measurement Range	-100 to +300 mV (16 bit resolution and two range settings: 4mV,400mV)
Input Offset Voltage	< 5µV (with auto zero)
Input Bias Current	< 50 f A
Dimensions	60 x 60 x 68 mm



3.6 SAM Twin Phantom

Material	Vinylester, glass fiber reinforced (VE-GF)
Liquid Compatibility	Compatible with all SPEAG tissue simulating liquids (incl. DGBE type)
Shell Thickness	2 ± 0.2 mm (6 ± 0.2 mm at ear point)
Dimensions (incl. Wooden Support)	Length: 1000 mm Width: 500 mm Height: adjustable feet
Filling Volume	approx. 25 liters
Wooden Support	SPEAG standard phantom table

The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528 and IEC 62209-1. 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 evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by teaching three points with the robot.

Twin SAM V5.0 has the same shell geometry and is manufactured from the same material as Twin SAM V4.0, but has reinforced top structure.

3.7 ELI Phantom

Material	Vinylester, glass fiber reinforced (VE-GF)	
Liquid Compatibility	Compatible with all SPEAG tissue simulating liquids (incl. DGBE type)	
Shell Thickness	2.0 ± 0.2 mm (bottom plate)	
Dimensions	Major axis: 600 mm Minor axis: 400 mm	
Filling Volume	approx. 30 liters	
Wooden Support	SPEAG standard phantom table	

Phantom for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI is fully compatible with the IEC 62209-2 standard and all known tissue simulating liquids. ELI has been optimized regarding its performance and can be integrated into our standard phantom tables. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points. The phantom is compatible with all SPEAG dosimetric probes and dipoles.

ELI V5.0 has the same shell geometry and is manufactured from the same material as ELI4, but has reinforced top structure.

3.8 Device Holder for Transmitters

F-2. **Device Holder for Transmitters**

- The DASY device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation centres for both scales are the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.
- The DASY device holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity ε=3 and loss tangent δ=0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.

3.9 Measurement procedure

3.9.1 Scanning procedure

Step 1: Power reference measurement

The “reference” and “drift” measurements are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure.

Step 2: *Area scan*

The SAR distribution at the exposed side of the head was measured at a distance of 4mm from the inner surface of the shell. The area covered the entire dimension of the head and the horizontal grid spacing was 15mm*15mm or 12mm*12mm or 10mm*10mm.Based on the area scan data, the area of the maximum absorption was determined by spline interpolation.

Step 3: *Zoom scan*

Around this point, a volume of 30mm*30mm*30mm (fine resolution volume scan, zoom scan) was assessed by measuring 5x5x7 points (≤2GHz) and 7x7x7 points (≥2GHz). On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure:

The data at the surface was extrapolated, since the centre of the dipoles is 2.0mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2mm. (This can be variable. Refer to the probe specification).The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip. The maximum interpolated value was searched with a straight-forward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1g or 10g) were computed using the 3D-Spline interpolation algorithm. The volume was integrated with the trapezoidal algorithm. One thousand points were interpolated to calculate the average. All neighbouring volumes were evaluated until no neighboring volume with a higher average value was found.

The area and zoom scan resolutions specified in the table below must be applied to the SAR measurements 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.

			≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface			5 ± 1 mm	½·δ·ln(2) ± 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: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	≤ 1.5·$\Delta z_{Zoom}(n-1)$	
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 draft standard IEEE P1528-2011 for details. * When zoom scan is required and the *reported* SAR from the *area scan based 1-g SAR estimation* procedures of KDB 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.				

Step 4: Power reference measurement (drift)

The Power Drift Measurement job measures the field at the same location as the most recent power reference measurement job within the same procedure, and with the same settings. The indicated drift is mainly the variation of the DUT's output power and should vary max. ± 5 %

3.9.2 Data Storage

The DASY software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension ".DAE3". The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated. The measured data can be visualized or exported in different units or formats, depending on the selected probe type ([V/m], [A/m], [°C], [m W/g], [m W/cm²], [dBrel], etc.). Some of these units are not available in certain situations or show meaningless results, e.g., a SAR output in a lossless media will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

3.9.3 Data Evaluation by SEMCAD

The SEMCAD software automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software:

Probe parameters:	- Sensitivity	Normi, ai0, ai1, ai2
	- Conversion factor	ConvFi
	- Diode compression point	Dcpi
Device parameters:	- Frequency	f
	- Crest factor	cf
Media parameters:	- Conductivity	ε
	- Density	ρ

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY components. In the direct measuring mode of the multimeter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics.

If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as:

$$V_i = U_i + U_i^2 \cdot cf / dcp_i$$

With Vi = compensated signal of channel i (i = x, y, z)
Ui = input signal of channel i (i = x, y, z)
cf = crest factor of exciting field (DASY parameter)

dcp i = diode compression point (DASY parameter)

From the compensated input signals the primary field data for each channel can be evaluated:

E-field probes:

$$E_i = (V_i / Norm_i \cdot ConvF)^{1/2}$$

H-field probes:

$$H_i = (V_i)^{1/2} \cdot (a_{i0} + a_{i1} f + a_{i2} f^2) / f$$

With Vi = compensated signal of channel i (i = x, y, z)
Normi = sensor sensitivity of channel I (i = x, y, z)
[mV/(V/m)2] for E-field Probes
ConvF = sensitivity enhancement in solution
aij = sensor sensitivity factors for H-field probes
f = carrier frequency [GHz]
Ei = electric field strength of channel i in V/m
Hi = magnetic field strength of channel i in A/m

The RSS value of the field components gives the total field strength (Hermitian magnitude):

$$E_{tot} = (E_x^2 + E_Y^2 + E_z^2)^{1/2}$$

The primary field data are used to calculate the derived field units.

$$SAR = (Etot^2 \cdot \sigma) / (\varepsilon \cdot 1000)$$

With SAR = local specific absorption rate in mW/g
Etot = total field strength in V/m
σ= conductivity in [mho/m] or [Siemens/m]
ε= equivalent tissue density in g/cm3

Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid. The power flow density is calculated assuming the excitation field to be a free space field.

$$P_{pwe} = Etot^2{}_2 / 3770 \quad \text{or} \quad P_{pwe} = H_{tot}^2 \cdot 37.7$$

with Ppwe = equivalent power density of a plane wave in mW/cm2
Etot = total electric field strength in V/m
Htot = total magnetic field strength in A/m

4 SAR measurement variability and uncertainty

4.1 SAR measurement variability

Per KDB865664 D01 SAR measurement 100 MHz to 6 GHz v01r04, SAR measurement variability must be assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. The additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.

2) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.

3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).

4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

The same procedures should be adapted for measurements according to extremity and occupational exposure limits by applying a factor of 2.5 for extremity exposure and a factor of 5 for occupational exposure to the corresponding SAR thresholds.

4.2 SAR measurement uncertainty

Per KDB865664 D01 SAR Measurement 100 MHz to 6 GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg, the extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval. The equivalent ratio (1.5/1.6) is applied to extremity and occupational exposure conditions.

5 Description of Test Position

5.1 The Test Position

This EUT was tested in three different positions. In these positions, the surface of EUT is touching phantom with 0 mm. The SAR Exclusion Threshold in KDB 447498 D04 can be applied to determine SAR test exclusion for adjacent edge configurations. The closest distance from the antenna to an adjacent device surface is used to determine if SAR testing is required for the adjacent surfaces, with the adjacent surface positioned against the phantom and the surface containing the antenna positioned perpendicular to the phantom.

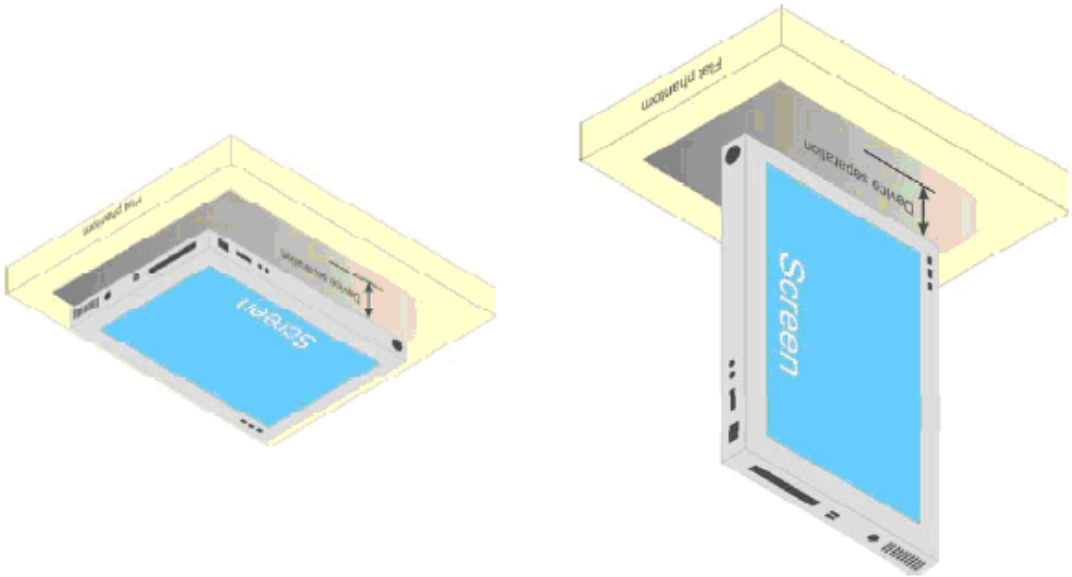


Fig Illustration for Lap-touching Position

6 SAR/APD System Verification Procedure

6.1 Tissue Simulate Liquid

6.1.1 Recipes for Tissue Simulate Liquid

The bellowing tables give the recipes for tissue simulating liquids to be used in different frequency bands：

Ingredients (% by weight)	Frequency (MHz)									
	450		835		915		1900		2450	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.45	52.4	41.05	56.0	54.9	40.4	62.7	73.2
Salt (NaCl)	3.95	1.49	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04
Sugar	56.32	46.78	56.0	45.0	56.5	41.76	0.0	58.0	0.0	0.0
HEC	0.98	0.52	1.0	1.0	1.0	1.21	0.0	1.0	0.0	0.0
Bactericide	0.19	0.05	0.1	0.1	0.1	0.27	0.0	0.1	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.8	0.0
DGBE	0.0	0.0	0.0	0.0	0.0	0.0	44.92	0.0	0.0	26.7
Dielectric Constant	43.42	58.0	42.54	56.1	42.0	56.8	39.9	54.0	39.8	52.5
Conductivity (S/m)	0.85	0.83	0.91	0.95	1.0	1.07	1.42	1.45	1.88	1.78
HSL5GHz is composed of the following ingredients： Water：50-65% Mineral oil：10-30% Emulsifiers：8-25% Sodium salt：0-1.5%										
MSL5GHz is composed of the following ingredients： Water：64-78% Mineral oil：11-18% Emulsifiers：9-15% Sodium salt：2-3%										

Table 2： Recipe of Tissue Simulate Liquid

6.1.2 Test Liquids Confirmation

Simulated tissue liquid parameter confirmation

The dielectric parameters were checked prior to assessment using the SPEAG DAK3.5 dielectric probe kit. The dielectric parameters measured are reported in each correspondent section.

IEEE SCC-34/SC-2 P1528 recommended tissue dielectric parameters

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in P1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations and extrapolated according to the head parameters specified in P1528

Target Frequency (MHz)	Head		Body	
	ε_r	σ (S/m)	ε_r	σ (S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800-2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73
5800	35.3	5.27	48.2	6.00
6000	35.22	5.51	35.07	5.48
6500	36.73	5.95	34.46	6.07
7000	35.06	6.14	33.88	6.65

(ε_r = relative permittivity, σ = conductivity and ρ = 1000 kg/m^3)

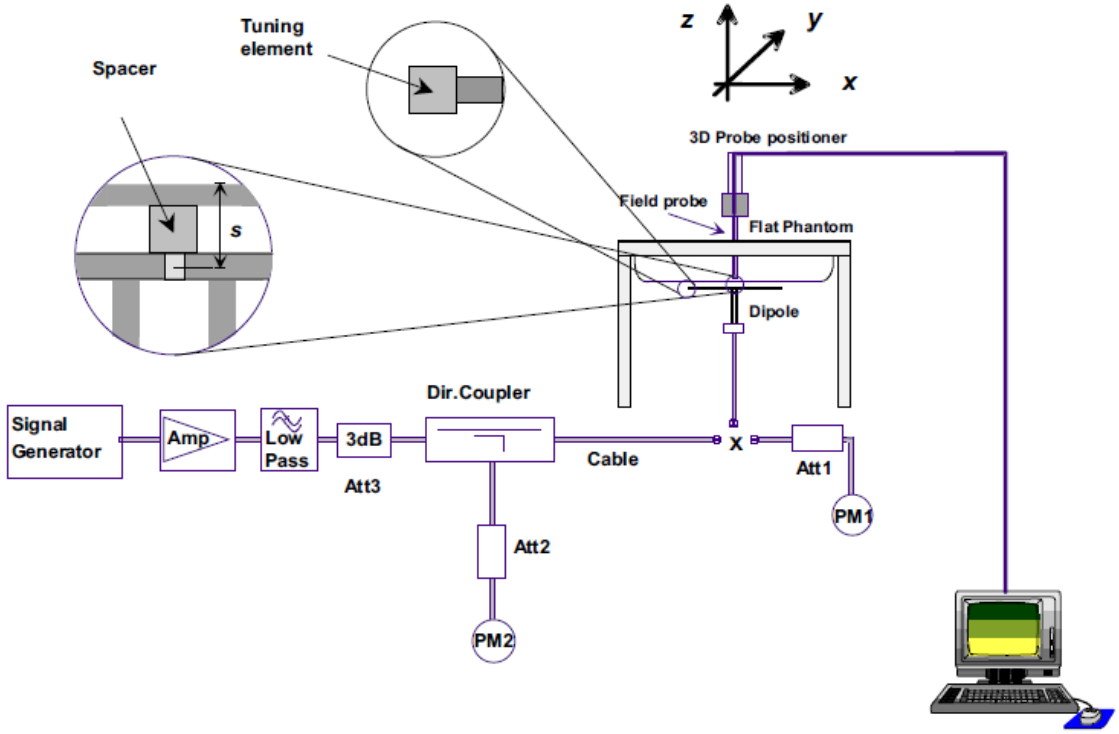
6.1.3 Measurement for Tissue Simulate Liquid

The dielectric properties for this Tissue Simulate Liquids were measured by using the SPEAG DAK3.5 dielectric probe kit in conjunction with Agilent Network Analyzer (300 KHz-8500 MHz). The Conductivity (σ) and Permittivity (ρ) are listed in bellow table. For the SAR measurement given in this report. The temperature variation of the Tissue Simulate Liquids was 22±2°C.

Measurement for Tissue Simulate Liquid									
Tissue Type	Measured Frequency（MHz）	Measured Tissue		Target Tissue (±5%)		Deviation (Within ±5%)		Liquid Temp. (℃)	Test Date
		ε_r	σ(S/m)	ε_r	σ(S/m)	ε_r	σ(S/m)		
2450 Head	2450	40.160	1.850	39.20	1.80	2.45%	2.78%	22.1	2024/9/14
5250 Head	5250	36.700	4.660	35.90	4.66	2.23%	0.00%	22.3	2024/9/15
5600 Head	5600	35.700	5.120	35.50	5.07	0.56%	0.99%	22.3	2024/9/16
5750 Head	5750	35.300	5.230	35.40	5.22	-0.28%	0.19%	22.3	2024/9/17
6500 Head	6500	34.300	6.010	34.50	6.07	-0.58%	-0.99%	22.1	2024/8/6

6.2 SAR System Check

The microwave circuit arrangement for system check is sketched in bellow figure. The daily system accuracy verification occurs within the flat section of the SAM phantom. A SAR measurement was performed to see if the measured SAR was within +/- 10% from the target SAR values. The tests were conducted on the same days as the measurement of the EUT. The obtained results from the system accuracy verification are displayed in the following table. During the tests, the ambient temperature of the laboratory was in the range 22±2°C, the relative humidity was in the range 60% and the liquid depth above the ear reference points was above 15 cm in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.



F-3. the microwave circuit arrangement used for SAR system verification

6.2.1 Justification for Extended SAR Dipole Calibrations

1) Referring to KDB865664 D01 requirements for dipole calibration, instead of the typical annual calibration recommended by measurement standards, longer calibration intervals of up to three years may be considered when it is demonstrated that the SAR target, impedance and return loss of a dipole have remain stable according to the following requirements. Each measured dipole is expected to evaluate with the following criteria at least on annual interval in Appendix C.

a) There is no physical damage on the dipole;

b) System check with specific dipole is within 10% of calibrated value;

c) Return-loss is within 10% of calibrated measurement;

d) Impedance is within 5Ω from the previous measurement.

2) Network analyzer probe calibration against air, distilled water and a shorting block performed before measuring liquid parameters.

6.2.2 Summary System Check Result(s)

SAR System Validation Result(s)											
Validation Kit		Measured SAR 250mW	Measured SAR 250mW	Measured SAR (normalized to 1W)	Measured SAR (normalized to 1W)	Target SAR (normalized to 1W)	Target SAR (normalized to 1W)	Deviation (Within ±10%)		Liquid Temp. (℃)	Test Date
		1g (W/kg)	10g (W/kg)	1g (W/kg)	10g (W/kg)	1-g(W/kg)	10-g(W/kg)	1-g(W/kg)	10-g(W/kg)		
D2450V2	Head	13.50	6.35	54.00	25.40	52.20	24.30	3.45%	4.53%	22.1	2024/9/14
Validation Kit		Measured SAR 100mW	Measured SAR 100mW	Measured SAR (normalized to 1W)	Measured SAR (normalized to 1W)	Target SAR (normalized to 1W)	Target SAR (normalized to 1W)	Deviation (Within ±10%)		Liquid Temp. (℃)	Test Date
		1g (W/kg)	10g (W/kg)	1g (W/kg)	10g (W/kg)	1-g(W/kg)	10-g(W/kg)	1-g(W/kg)	10-g(W/kg)		
D5GHzV2	Head(5.25GHz)	7.83	2.30	78.30	23.00	77.30	22.10	1.29%	4.07%	22.1	2024/9/14
	Head(5.6GHz)	8.30	2.39	83.00	23.90	81.30	23.10	2.09%	3.46%	22.3	2024/9/15
	Head(5.75GHz)	8.03	2.15	80.30	21.50	77.10	21.30	4.15%	0.94%	22.3	2024/9/16
D6500V2	Head(6.5GHz)	30.30	5.82	303.00	58.20	291.00	53.90	4.12%	7.98%	22.1	2024/8/6

6.2.3 Detailed System Check Results

Please see the Appendix A

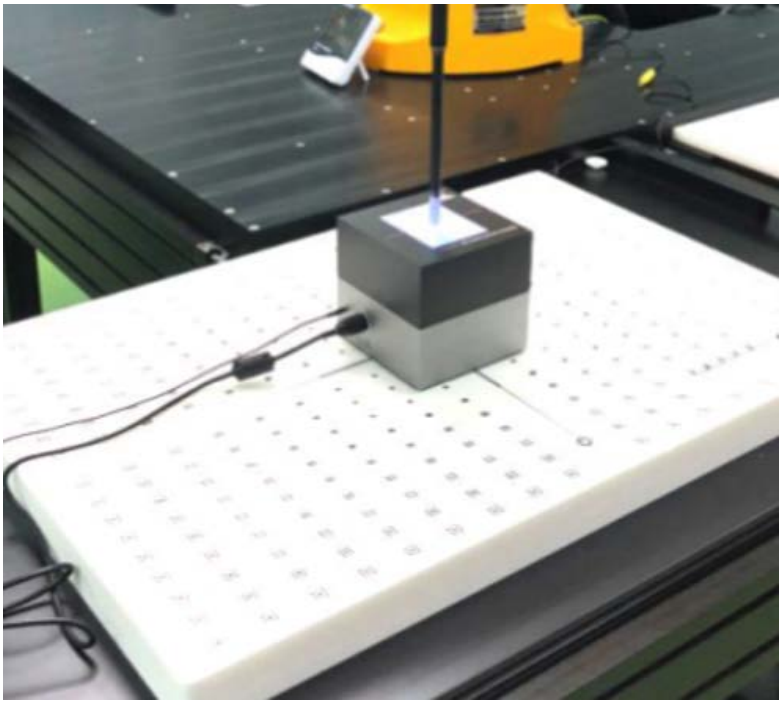
6.3 PD Test System Verification

The system was verified to be within ±0.66 dB of the power density targets on the calibration certificate according to the test system specification in the user's manual and calibration facility recommendation. The 0.66 dB deviation threshold represents the expanded uncertainty for system performance checks using SPEAG's mmWave verification sources. The same spatial resolution and measurement region used in the source calibration was applied during the system check.

The measured power density distribution of verification source was also confirmed through visual inspection to have no noticeable differences, both spatially (shape) and numerically (level) from the distribution provided by the manufacturer, per November 2017 TCBC Workshop Notes.

Frequency [GHz]	Grid step	Grid extent X/Y [mm]	Measurement points
10	0.25 ($\frac{\lambda}{4}$)	120/120	16 × 16
30	0.25 ($\frac{\lambda}{4}$)	60/60	24 × 24
60	0.25 ($\frac{\lambda}{4}$)	32.5/32.5	26 × 26
90	0.25 ($\frac{\lambda}{4}$)	30/30	36 × 36

Settings for measurement of verification sources



System Verification Setup Photo

6.3.1 PD System Verification Results

Frequent	Circular Measured PD	Circular Target PD	Circular Deviation (Within ±0.66dB)	Test Date
	4cm²	4cm²	4cm²	
10G HZ Source	183.00	174	0.22	2024/8/7

6.3.2 Detailed System Check Results

Please see the Appendix A

7 Test Configuration

7.1 Operation Configurations

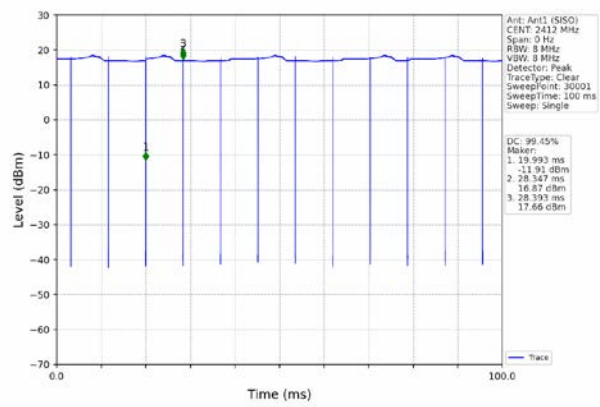
7.1.1 Wi-Fi Test Configuration

A Wi-Fi device must be configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools for SAR measurement.

7.1.1.1 Duty cycle

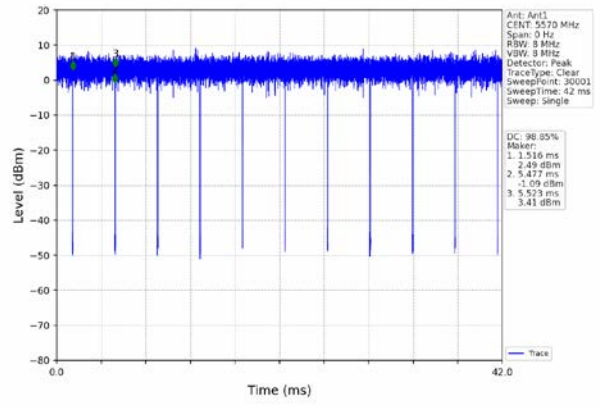
1) 2.4GHz Wi-Fi 802.11b:

WI-FI1 802.11b: Duty cycle=99.45%



2) 5GHz Wi-Fi 802.11ac:

802.11ac(VHT160)_MCH_5570MHz:98.85%



7.1.1.2 Initial Test Position SAR Test Reduction Procedure

DSSS and OFDM configurations are considered separately according to the required SAR procedures. SAR is measured in the initial test position using the 802.11 transmission mode configuration required by the DSSS procedure or initial test configuration and subsequent test configuration(s) according to the OFDM procedures. The initial test position procedure is described in the following:

1). When the reported SAR of the initial test position is ≤ 0.4 W/kg, further SAR measurement is not required for the other (remaining) test positions in that exposure configuration and 802.11 transmission mode combinations within the frequency band or aggregated band. SAR is also not required for that exposure configuration in the subsequent test configuration(s).
2). When the reported SAR of the initial test position is > 0.4 W/kg, SAR is repeated for the 802.11 transmission mode configuration tested in the initial test position using subsequent highest extrapolated or estimated 1-g SAR conditions determined by area scans or next closest/smallest test separation distance and maximum RF coupling test positions based on manufacturer justification, on the highest maximum output power channel, until the reported SAR is ≤ 0.8 W/kg or all required test positions (left, right, touch, tilt or subsequent surfaces and edges) are tested.
3). For all positions/configurations tested using the initial test position and subsequent test positions, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤ 1.2 W/kg or all required channels are tested. a) Additional power measurements may be required for this step, which should be limited to those necessary for identifying the subsequent highest output power channels.

7.1.1.3 Initial Test Configuration Procedures

An initial test configuration is determined for OFDM transmission modes according to the channel bandwidth, modulation and data rate combination(s) with the highest maximum output power specified for production units in each standalone and aggregated frequency band. SAR is measured using the highest measured maximum output power channel. For configurations with the same specified or measured maximum output power, additional transmission mode and test channel selection procedures are required. SAR test reduction for subsequent highest output test channels is determined according to *reported* SAR of the initial test configuration.

For next to the ear, hotspot mode and UMC mini-tablet exposure configurations where multiple test positions are required, the initial test position procedure is applied to minimize the number of test positions required for SAR measurement using the initial test configuration transmission mode. For fixed exposure conditions that do not have multiple SAR test positions, SAR is measured in the transmission mode determined by the initial test configuration.

When the *reported* SAR of the initial test configuration is > 0.8 W/kg, SAR measurement is required for subsequent next highest measured output power channel(s) in the initial test configuration until *reported* SAR is ≤ 1.2 W/kg or all required channels are tested.

7.1.1.4 Subsequent Test Configuration Procedures

SAR measurement requirements for the remaining 802.11 transmission mode configurations that have not been tested in the initial test configuration are determined separately for each standalone and aggregated frequency band, in each exposure condition, according to the maximum output power specified for production units. The initial test position procedure is applied to next to the ear, UMPC mini-tablet and hotspot mode configurations. When the same maximum output power is specified for multiple transmission modes, additional power measurements may be required to determine if SAR measurements are required for subsequent highest output

power channels in a subsequent test configuration. The subsequent test configuration and SAR measurement procedures are described in the following.

1）. When SAR test exclusion provisions of KDB Publication 447498 are applicable and SAR measurement is not required for the initial test configuration, SAR is also not required for the next highest maximum output power transmission mode subsequent test configuration(s) in that frequency band or aggregated band and exposure configuration.

2）. When the highest *reported* SAR for the initial test configuration (when applicable, include subsequent highest output channels), according to the initial test position or fixed exposure position requirements, is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR is not required for that subsequent test configuration.

3）. The number of channels in the initial test configuration and subsequent test configuration can be different due to differences in channel bandwidth. When SAR measurement is required for a subsequent test configuration and the channel bandwidth is smaller than that in the initial test configuration, all channels in the subsequent test configuration that overlap with the larger bandwidth channel tested in the initial test configuration should be used to determine the highest maximum output power channel. This step requires additional power measurement to identify the highest maximum output power channel in the subsequent test configuration to determine SAR test reduction.

a) SAR should first be measured for the channel with highest measured output power in the subsequent test configuration.

b) SAR for subsequent highest measured maximum output power channels in the subsequent test configuration is required only when the *reported* SAR of the preceding higher maximum output power channel(s) in the subsequent test configuration is > 1.2 W/kg or until all required channels are tested. i) For channels with the same measured maximum output power, SAR should be measured using the channel closest to the center frequency of the larger channel bandwidth channel in the initial test configuration.

4）. SAR measurements for the remaining highest specified maximum output power OFDM transmission mode configurations that have not been tested in the initial test configuration (highest maximum output) or subsequent test configuration(s) (subsequent next highest maximum output power) is determined by recursively applying the subsequent test configuration procedures in this section to the remaining configurations according to the following:

a) replace “subsequent test configuration” with “next subsequent test configuration” (i.e., subsequent next highest specified maximum output power configuration)

b) replace “initial test configuration” with “all tested higher output power configurations”

7.1.1.5 2.4 GHz Wi-Fi SAR Procedures

Separate SAR procedures are applied to DSSS and OFDM configurations in the 2.4 GHz band to simplify DSSS test requirements. For 802.11b DSSS SAR measurements, DSSS SAR procedure applies to fixed exposure test position and initial test position procedure applies to multiple exposure test positions. When SAR measurement is required for an OFDM configuration, the initial test configuration, subsequent test configuration and initial test position procedures are applied. The SAR test exclusion requirements for 802.11g/n OFDM configurations are described in following.

•802.11b DSSS SAR Test Requirements

SAR is measured for 2.4 GHz 802.11b DSSS using either a fixed test position or, when applicable, the initial test position procedure. SAR test reduction is determined according to the following:

1). When the reported SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.

2). When the reported SAR is > 0.8 W/kg, SAR is required for that exposure configuration using the next highest

measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel; i.e., all channels require testing.

•2.4 GHz 802.11g/n OFDM SAR Test Exclusion Requirements

When SAR measurement is required for 2.4 GHz 802.11g/n OFDM configurations, the measurement and test reduction procedures for OFDM are applied (section 5.3, including sub-sections). SAR is not required for the following 2.4 GHz OFDM conditions.
1). When KDB Publication 447498 SAR test exclusion applies to the OFDM configuration.
2). When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.

7.1.1.6 5 GHz Wi-Fi SAR Procedures

•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.

•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.

•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.
    a) The channel closest to mid-band frequency is selected for SAR measurement.
    b) 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.

•SAR Test Requirements for OFDM configurations

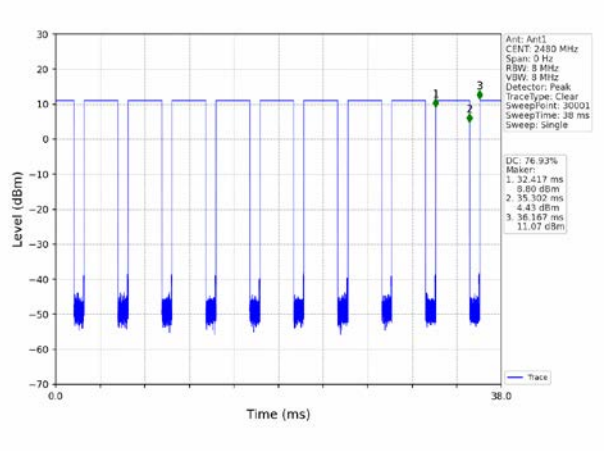
When SAR measurement is required for 802.11 a/n/ac OFDM configurations, each standalone and frequency aggregated band is considered separately for SAR test reduction. When the same transmitter and antenna(s) are used for U-NII-1 and U-NII-2A bands, additional SAR test reduction applies. When band gap 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.

7.1.2 Bluetooth Test Configuration

For the Bluetooth SAR tests, a communication link is set up with the test mode software for BT mode test. Bluetooth USES frequency hopping technology to divide the transmitted data into packets and transmit the packets respectively through 79 designated Bluetooth channels, 1MHz Bandwidth, frequency hops at 1600 hops/second per the Bluetooth standard. The Radio Frequency Channel Number (RFCN) is allocated to 0, 39 and 78 respectively in the case of 2402~2480 MHz during the test at each test frequency channel, the EUT is operated at the RF continuous emission mode.

7.1.2.1 Duty cycle

Bluetooth duty cycle: 76.93%



8 Test Result

8.1 Measurement of RF Conducted Power

8.1.1 Conducted Power Of Wi-Fi

WIFI 2.4GHz									
Mode	Channel	Frequency (MHz)	Data Rate(Mbps)	Average Power (dBm) Ant 1	Tune up (dBm)	Average Power (dBm) Ant 2	Tune up (dBm)	Average Power (dBm) MIMO	Tune up (dBm)
802.11b	1	2412	1	17.65	18.00	17.56	18.00	N/A	
	6	2437		17.62	18.00	17.43	18.00		
	11	2462		17.57	18.00	17.51	18.00		
	13	2472		17.55	18.00	17.42	18.00		
802.11g	1	2412	6	17.14	18.00	17.21	18.00	20.19	21.00
	6	2437		17.21	18.00	17.13	18.00	20.18	21.00
	11	2462		17.04	18.00	17.15	18.00	20.11	21.00
	13	2472		17.01	18.00	17.05	18.00	20.04	21.00
802.11n HT20	1	2412	HT0	17.05	18.00	17.18	18.00	20.13	21.00
	6	2437		17.02	18.00	17.00	18.00	20.02	21.00
	11	2462		17.01	18.00	17.06	18.00	20.05	21.00
	13	2472		16.98	18.00	17.01	18.00	20.01	21.00
802.11n HT40	3	2422	HT0	17.72	18.00	17.56	18.00	20.65	21.00
	6	2437		17.64	18.00	17.39	18.00	20.53	21.00
	9	2452		17.61	18.00	17.47	18.00	20.55	21.00
	11	2462		17.53	18.00	17.24	18.00	20.40	21.00
802.11ax/20 HE0	1	2412	MCS0	17.62	18.00	17.16	18.00	20.41	21.00
	6	2437		17.65	18.00	17.21	18.00	20.45	21.00
	11	2462		17.55	18.00	17.08	18.00	20.33	21.00
	13	2472		17.59	18.00	17.02	18.00	20.32	21.00
802.11ax/40 HE0	3	2422	MCS0	17.59	18.00	17.35	18.00	20.48	21.00
	6	2437		17.62	18.00	17.32	18.00	20.48	21.00
	9	2452		17.65	18.00	17.29	18.00	20.48	21.00
	11	2462		17.51	18.00	17.31	18.00	20.42	21.00

Mode	5GHz	Channel	Frequency (MHz)	Data Rate (Mbps)	Average Power (dBm) Ant1	Tune up	Average Power (dBm) Ant2	Tune up	Average Power (dBm) MIMO	Tune up
802.11a	U-NII-1	36	5180	6	10.56	11.00	11.22	12.00	/	/
		40	5200		10.43	11.00	11.06	12.00	/	/
		44	5220		10.47	11.00	11.42	12.00	/	/
		48	5240		10.55	11.00	11.21	12.00	/	/
	U-NII-2A	52	5260		10.66	11.00	11.06	12.00	/	/
		56	5280		10.53	11.00	11.14	12.00	/	/
		60	5300		10.48	11.00	11.16	12.00	/	/
		64	5320		10.75	11.00	11.08	12.00	/	/
	U-NII-2C	100	5500		10.16	11.00	11.54	12.00	/	/
		104	5520		10.21	11.00	11.62	12.00	/	/
		108	5540		10.03	11.00	11.45	12.00	/	/
		112	5560		10.07	11.00	11.48	12.00	/	/
		116	5580		10.05	11.00	11.44	12.00	/	/
		120	5600		10.15	11.00	11.51	12.00	/	/
		124	5620		10.11	11.00	11.50	12.00	/	/
		128	5640		10.14	11.00	11.37	12.00	/	/
		132	5660		10.02	11.00	11.42	12.00	/	/
		136	5680		10.06	11.00	11.49	12.00	/	/
		140	5700		10.22	11.00	11.55	12.00	/	/
		144	5720		10.32	11.00	11.28	12.00	/	/
	U-NII-3	149	5745		10.27	11.00	11.35	12.00	/	/
		153	5765		10.45	11.00	11.33	12.00	/	/
		157	5785		10.39	11.00	11.43	12.00	/	/
		161	5805		10.41	11.00	11.26	12.00	/	/
		165	5825		10.38	11.00	11.44	12.00	/	/

Mode	5GHz	Channel	Frequency(MHz)	Data Rate(Mbps)	Average Power (dBm) Ant1	Tune up	Average Power (dBm) Ant2	Tune up	Average Power (dBm) MIMO	Tune up
802.11n-HT20	U-NII-1	36	5180	HT0	10.54	11.00	10.98	12.00	13.78	14.00
		40	5200		10.37	11.00	11.07	12.00	13.74	14.00
		44	5220		10.46	11.00	11.04	12.00	13.77	14.00
		48	5240		10.51	11.00	11.12	12.00	13.84	14.00
	U-NII-2A	52	5260		10.28	11.00	11.08	12.00	13.71	14.00
		56	5280		10.43	11.00	11.02	12.00	13.75	14.00
		60	5300		10.56	11.00	11.11	12.00	13.85	14.00
		64	5320		10.44	11.00	11.21	12.00	13.85	14.00

	U-NII-2C	100	5500		10.06	11.00	11.49	12.00	13.84	14.00
		104	5520		10.19	11.00	11.53	12.00	13.92	14.00
		108	5540		10.11	11.00	11.45	12.00	13.84	14.00
		112	5560		10.15	11.00	11.53	12.00	13.90	14.00
		116	5580		10.04	11.00	11.61	12.00	13.91	14.00
		120	5600		10.08	11.00	11.47	12.00	13.84	14.00
		124	5620		10.01	11.00	11.55	12.00	13.86	14.00
		128	5640		10.16	11.00	11.38	12.00	13.82	14.00
		132	5660		10.11	11.00	11.47	12.00	13.85	14.00
		136	5680		10.15	11.00	11.51	12.00	13.89	14.00
		140	5700		10.05	11.00	11.47	12.00	13.83	14.00
		144	5720		10.07	11.00	11.45	12.00	13.82	14.00
	U-NII-3	149	5745		10.33	11.00	10.79	12.00	13.58	14.00
		153	5765		10.46	11.00	10.85	12.00	13.67	14.00
		157	5785		10.27	11.00	10.66	12.00	13.48	14.00
		161	5805		10.45	11.00	10.73	12.00	13.60	14.00
		165	5825		10.41	11.00	10.87	12.00	13.66	14.00

Mode	5GHz	Channel	Frequency(MHz)	Data Rate(Mbps)	Average Power (dBm) Ant1	Tune up	Average Power (dBm) Ant2	Tune up	Average Power (dBm) MIMO	Tune up
802.11n-HT40	U-NII-1	38	5190	HT0	10.85	11.50	11.44	12.00	14.17	14.50
		46	5230		10.77	11.50	11.57	12.00	14.20	14.50
	U-NII-2A	54	5270		10.98	11.50	11.43	12.00	14.22	14.50
		62	5310		10.99	11.50	11.39	12.00	14.20	14.50
	U-NII-2C	102	5510		10.55	11.00	11.29	12.00	13.95	14.00
		110	5550		10.43	11.00	11.15	12.00	13.82	14.00
		118	5590		10.37	11.00	11.31	12.00	13.88	14.00
		126	5630		10.49	11.00	11.42	12.00	13.99	14.00
		134	5670		10.41	11.00	11.38	12.00	13.93	14.00
		142	5710		10.55	11.00	11.36	12.00	13.98	14.00
	U-NII-3	151	5755		10.89	11.00	11.01	12.00	13.96	14.00
		159	5795		10.96	11.00	11.00	12.00	13.99	14.00

Mode	5GHz	Channel	Frequency(MHz)	Data Rate(Mbps)	Average Power (dBm) Ant1	Tune up	Average Power (dBm) Ant2	Tune up	Average Power (dBm) MIMO	Tune up
802.11ac VHT20	U-NII-1	36	5180	VHT0	10.43	11.00	10.96	12.00	13.71	14.00
		40	5200		10.37	11.00	11.07	12.00	13.74	14.00
		44	5220		10.26	11.00	11.09	12.00	13.71	14.00
		48	5240		10.28	11.00	11.07	12.00	13.70	14.00

	U-NII-2A	52	5260		10.25	11.00	11.12	12.00	13.72	14.00
		56	5280		10.44	11.00	11.21	12.00	13.85	14.00
		60	5300		10.41	11.00	11.16	12.00	13.81	14.00
		64	5320		10.66	11.00	11.05	12.00	13.87	14.00
	U-NII-2C	100	5500		10.11	11.00	11.45	12.00	13.84	14.00
		104	5520		10.23	11.00	11.59	12.00	13.97	14.00
		108	5540		10.07	11.00	11.51	12.00	13.86	14.00
		112	5560		10.15	11.00	11.55	12.00	13.92	14.00
		116	5580		10.01	11.00	11.67	12.00	13.93	14.00
		120	5600		10.05	11.00	11.63	12.00	13.92	14.00
		124	5620		10.16	11.00	11.58	12.00	13.94	14.00
		128	5640		10.06	11.00	11.55	12.00	13.88	14.00
		132	5660		10.14	11.00	11.47	12.00	13.87	14.00
		136	5680		10.11	11.00	11.43	12.00	13.83	14.00
		140	5700		10.09	11.00	11.55	12.00	13.89	14.00
		144	5720		10.16	11.00	11.44	12.00	13.86	14.00
	U-NII-3	149	5745		10.39	11.00	10.98	12.00	13.71	14.00
		153	5765		10.48	11.00	10.77	12.00	13.64	14.00
		157	5785		10.26	11.00	10.75	12.00	13.52	14.00
		161	5805		10.51	11.00	10.84	12.00	13.69	14.00
		165	5825		10.36	11.00	10.91	12.00	13.65	14.00

Mode	5GHz	Channel	Frequency(MHz)	Data Rate(Mbps)	Average Power (dBm) Ant1	Tune up	Average Power (dBm) Ant2	Tune up	Average Power (dBm) MIMO	Tune up
802.11ac VHT40	U-NII-1	38	5190	VHT0	11.16	11.50	11.23	12.00	14.21	14.50
		46	5230		11.11	11.50	11.37	12.00	14.25	14.50
	U-NII-2A	54	5270		11.07	11.50	11.42	12.00	14.26	14.50
		62	5310		11.27	11.50	11.28	12.00	14.29	14.50
	U-NII-2C	102	5510		10.56	11.00	11.27	12.00	13.94	14.00
		110	5550		10.49	11.00	11.19	12.00	13.86	14.00
		118	5590		10.57	11.00	11.35	12.00	13.99	14.00
		126	5630		10.61	11.00	11.29	12.00	13.97	14.00
		134	5670		10.68	11.00	11.21	12.00	13.96	14.00
		142	5710		10.55	11.00	11.26	12.00	13.93	14.00
	U-NII-3	151	5755		10.87	11.00	10.02	12.00	13.48	14.00
		159	5795		10.94	11.00	10.19	12.00	13.59	14.00

Mode	5GHz	Channel	Frequency(MHz)	Data Rate(Mbps)	Average Power (dBm) Ant1	Tune up	Average Power (dBm) Ant2	Tune up	Average Power (dBm) MIMO	Tune up

802.11ac VHT80	U-NII-1	42	5210	VHT0	11.05	11.50	11.59	12.00	14.34	14.50
	U-NII-2A	58	5290		11.26	11.50	11.65	12.00	14.47	14.50
	U-NII-2C	106	5530		10.42	11.00	11.48	12.00	13.99	14.00
		122	5610		10.31	11.00	11.46	12.00	13.93	14.00
		138	5690		10.41	11.00	11.49	12.00	13.99	14.00
	U-NII-3	155	5775		11.06	11.50	11.34	12.00	14.21	14.50
Mode	5GHz	Channel	Frequency(MHz)	Data Rate(Mbps)	Average Power (dBm) Ant1	Tune up	Average Power (dBm) Ant2	Tune up	Average Power (dBm) MIMO	Tune up
802.11ac VHT160	U-NII-1 & U-NII-2A	50	5250	VHT0	10.97	11.50	11.78	12.50	14.40	14.50
	U-NII-2C	114	5570		10.95	11.50	11.89	12.50	14.46	14.50
Mode	5GHz	Channel	Frequency(MHz)	Data Rate(Mbps)	Average Power (dBm) Ant1	Tune up	Average Power (dBm) Ant2	Tune up	Average Power (dBm) MIMO	Tune up
802.11ax HEW20	U-NII-1	36	5180	MCS0	10.55	11.00	11.05	12.00	13.82	14.00
		40	5200		10.43	11.00	11.11	12.00	13.79	14.00
		44	5220		10.47	11.00	10.89	12.00	13.70	14.00
		48	5240		10.52	11.00	10.95	12.00	13.75	14.00
	U-NII-2A	52	5260		10.67	11.00	11.21	12.00	13.96	14.00
		56	5280		10.38	11.00	11.16	12.00	13.80	14.00
		60	5300		10.46	11.00	11.05	12.00	13.78	14.00
		64	5320		10.25	11.00	11.48	12.00	13.92	14.00
	U-NII-2C	100	5500		10.11	11.00	11.55	12.00	13.90	14.00
		104	5520		10.23	11.00	11.42	12.00	13.88	14.00
		108	5540		10.04	11.00	11.56	12.00	13.88	14.00
		112	5560		10.11	11.00	11.37	12.00	13.80	14.00
		116	5580		10.21	11.00	11.49	12.00	13.91	14.00
		120	5600		10.27	11.00	11.55	12.00	13.97	14.00
		124	5620		10.17	11.00	11.51	12.00	13.90	14.00
		128	5640		10.11	11.00	11.43	12.00	13.83	14.00
		132	5660		10.15	11.00	11.27	12.00	13.76	14.00
		136	5680		10.06	11.00	11.55	12.00	13.88	14.00
		140	5700		10.13	11.00	11.42	12.00	13.83	14.00
		144	5720		10.01	11.00	11.33	12.00	13.73	14.00
	U-NII-3	149	5745		10.37	11.00	11.48	12.00	13.97	14.00
		153	5765		10.42	11.00	11.45	12.00	13.98	14.00
		157	5785		10.38	11.00	11.45	12.00	13.96	14.00
		161	5805		10.47	11.00	11.42	12.00	13.98	14.00

		165	5825		10.41	11.00	11.41	12.00	13.95	14.00
Mode	5GHz	Channel	Frequency(MHz)	Data Rate(Mbps)	Average Power (dBm) Ant1	Tune up	Average Power (dBm) Ant2	Tune up	Average Power (dBm) MIMO	Tune up
802.11ax HEW40	U-NII-1	38	5190	MCS0	10.47	11.00	11.36	12.00	13.95	14.00
		46	5230		10.45	11.00	11.41	12.00	13.97	14.00
	U-NII-2A	54	5270		10.59	11.00	11.27	12.00	13.95	14.00
		62	5310		10.44	11.00	11.45	12.00	13.98	14.00
	U-NII-2C	102	5510		10.41	11.00	11.32	12.00	13.90	14.00
		110	5550		10.21	11.00	11.29	12.00	13.79	14.00
		118	5590		10.16	11.00	11.54	12.00	13.91	14.00
		126	5630		10.03	11.00	11.67	12.00	13.94	14.00
		134	5670		10.15	11.00	11.53	12.00	13.90	14.00
		142	5710		10.11	11.00	11.57	12.00	13.91	14.00
	U-NII-3	151	5755		10.66	11.00	11.26	12.00	13.98	14.00
		159	5795		10.54	11.00	11.24	12.00	13.91	14.00
Mode	5GHz	Channel	Frequency(MHz)	Data Rate(Mbps)	Average Power (dBm) Ant1	Tune up	Average Power (dBm) Ant2	Tune up	Average Power (dBm) MIMO	Tune up
802.11ax HEW80	U-NII-1	42	5210	MCS0	10.55	11.00	11.37	12.00	13.99	14.00
	U-NII-2A	58	5290		10.58	11.00	11.36	12.00	14.00	14.00
	U-NII-2C	106	5530		10.34	11.00	11.45	12.00	13.94	14.00
		122	5610		10.27	11.00	11.52	12.00	13.95	14.00
		138	5690		10.11	11.00	11.51	12.00	13.88	14.00
	U-NII-3	155	5775		10.62	11.00	11.33	13.00	14.00	14.00
Mode	5GHz	Channel	Frequency(MHz)	Data Rate(Mbps)	Average Power (dBm) Ant1	Tune up	Average Power (dBm) Ant2	Tune up	Average Power (dBm) MIMO	Tune up
802.11ax HEW160	U-NII-1 & U-NII-2A	50	5250	MCS0	11.21	11.50	11.49	12.50	14.36	14.50
	U-NII-2C	114	5570		11.16	11.50	11.58	12.50	14.39	14.50

Band	Mode	Channel	Frequency (MHz)	Data Rate	Average Power (dBm) Ant1	Tune up	Average Power (dBm) Ant2	Tune up	Average Power (dBm) MIMO	Tune up
U-NII-5 6.2GHz	802.11a	1	5955	6Mbps	10.07	11	10.05	11	13.07	14.00
		45	6175		10.11	11	10.11	11	13.12	14.00
		93	6415		10.27	11	10.22	11	13.26	14.00
	802.11n HT20	1	5955	MCS0	10.01	11	10.07	11	13.05	14.00
		45	6175		10.14	11	10.15	11	13.16	14.00
		93	6415		10.36	11	10.14	11	13.26	14.00
	802.11n HT40	3	5985	MCS0	10.23	11	10.27	11	13.26	14.00
		43	6165		10.17	11	10.24	11	13.22	14.00
		91	6405		10.21	11	10.26	11	13.25	14.00
	802.11ac VHT20	1	5955	MCS0	10.16	11	10.23	11	13.21	14.00
		45	6175		10.11	11	10.10	11	13.12	14.00
		93	6415		10.05	11	10.05	11	13.06	14.00
	802.11ac VHT40	3	5985	MCS0	10.28	11	10.26	11	13.28	14.00
		43	6165		10.33	11	10.23	11	13.29	14.00
		91	6405		10.24	11	10.16	11	13.21	14.00
	802.11ac VHT80	7	5985	MCS0	10.22	11	10.19	11	13.22	14.00
		39	6145		10.36	11	10.36	11	13.37	14.00
		87	6385		10.73	11	10.27	11	13.52	14.00
	802.11ac VHT160	15	6025	MCS0	10.62	11.5	10.92	11.5	13.78	14.50
		47	6185		10.89	11.5	11.06	11.5	14.19	14.50
		79	6345		10.81	11.5	10.77	11.5	13.80	14.50
	802.11ax HEW20	1	5955	MCS0	10.22	11	10.29	11	13.27	14.00
		45	6175		10.17	11	10.33	11	13.26	14.00
		93	6415		10.13	11	10.24	11	13.20	14.00
	802.11ax HEW40	3	5985	MCS0	10.26	11	10.22	11	13.25	14.00
		43	6165		10.21	11	10.34	11	13.29	14.00
		91	6405		10.23	11	10.35	11	13.30	14.00
	802.11ax HEW80	7	5985	MCS0	10.44	11	10.37	11	13.42	14.00
		39	6145		10.37	11	10.35	11	13.37	14.00
		87	6385		10.48	11	10.43	11	13.47	14.00
	802.11ax HEW160	15	6025	MCS0	10.46	11.5	10.37	11	13.43	14.00
		47	6185		10.79	11.5	10.44	11	13.63	14.00
		79	6345		10.92	11.5	10.58	11	13.76	14.00
U-NII-6 6.5GHz	802.11a	97	6435	6Mbps	10.13	11	10.16	11	13.16	14.00
		105	6475		10.14	11	10.04	11	13.10	14.00

		113	6515		10.04	11	10.21	11	13.14	14.00
	802.11n HT20	97	6435	MCS0	10.08	11	10.26	11	13.18	14.00
		105	6475		10.04	11	10.33	11	13.20	14.00
		113	6515		10.15	11	10.22	11	13.20	14.00
	802.11n HT40	99	6445	MCS0	10.19	11	10.06	11	13.14	14.00
		107	6485		10.26	11	10.17	11	13.23	14.00
	802.11ac VHT20	97	6435	MCS0	10.22	11	10.11	11	13.18	14.00
		105	6475		10.32	11	10.35	11	13.35	14.00
		113	6515		10.41	11	10.26	11	13.35	14.00
	802.11ac VHT40	99	6445	MCS0	10.27	11	10.28	11	13.29	14.00
		107	6485		10.22	11	10.15	11	13.20	14.00
	802.11ac VHT80	103	6465	MCS0	10.77	11	10.44	11	13.62	14.00
		119	6545		10.84	11	10.51	11	13.69	14.00
	802.11ac VHT160	111	6505	MCS0	11.11	11.5	11.03	11.5	14.08	14.50
	802.11ax HEW20	97	6435	MCS0	10.16	11	10.35	11	13.27	14.00
		105	6475		10.22	11	10.27	11	13.26	14.00
		113	6515		10.06	11	10.25	11	13.17	14.00
	802.11ax HEW40	99	6445	MCS0	10.01	11	10.31	11	13.17	14.00
		107	6485		10.24	11	10.44	11	13.35	14.00
	802.11ax HEW80	103	6465	MCS0	10.33	11	10.43	11	13.39	14.00
		119	6545		10.59	11	10.29	11	13.45	14.00
	802.11ax HEW160	111	6505	MCS0	10.99	11.5	10.87	11.5	13.94	14.50
U-NII-7 6.7GHz	802.11a	117	6535	6Mbps	10.25	11	10.36	11	13.32	14.00
		149	6695		10.22	11	10.31	11	13.28	14.00
		181	6855		10.34	11	10.40	11	13.38	14.00
	802.11n HT20	117	6535	MCS0	10.29	11	10.25	11	13.28	14.00
		149	6695		10.25	11	10.13	11	13.20	14.00
		181	6855		10.14	11	10.23	11	13.20	14.00
	802.11n HT40	115	6525	MCS0	10.23	11	10.28	11	13.27	14.00
		147	6685		10.42	11	10.35	11	13.40	14.00
		179	6845		10.25	11	10.44	11	13.36	14.00
	802.11ac VHT20	117	6535	MCS0	10.31	11	10.16	11	13.25	14.00
		149	6695		10.26	11	10.36	11	13.32	14.00
		181	6855		10.17	11	10.27	11	13.23	14.00
	802.11ac VHT40	115	6525	MCS0	10.24	11	10.31	11	13.29	14.00
		147	6685		10.26	11	10.46	11	13.37	14.00
		179	6845		10.33	11	10.42	11	13.39	14.00
		135	6625	MCS0	10.79	11	10.55	11	13.68	14.00

	802.11ac VHT80	151	6705		10.68	11	10.71	11	13.71	14.00
		167	6785		10.85	11	10.66	11	13.77	14.00
	802.11ac VHT160	143	6665	MCS0	11.19	11.5	11.02	11.5	14.12	14.50
		175	6825		11.20	11.5	10.91	11.5	14.15	14.50
	802.11ax HEW20	117	6535	MCS0	10.23	11	10.51	11	13.38	14.00
		149	6695		10.16	11	10.24	11	13.21	14.00
		181	6855		10.45	11	10.36	11	13.42	14.00
	802.11ax HEW40	115	6525	MCS0	10.38	11	10.45	11	13.43	14.00
		147	6685		10.24	11	10.24	11	13.25	14.00
		179	6845		10.25	11	10.34	11	13.31	14.00
	802.11ax HEW80	135	6625	MCS0	10.51	11	10.31	11	13.42	14.00
		151	6705		10.46	11	10.30	11	13.39	14.00
		167	6785		10.59	11	10.49	11	13.55	14.00
	802.11ax HEW160	143	6665	MCS0	10.88	11.5	10.75	11.5	13.83	14.50
		175	6825		10.96	11.5	10.69	11.5	13.84	14.50
U-NII-8 7.0GHz	802.11a	185	6875	6Mbps	10.11	11	10.23	11	13.18	14.00
		209	6995		10.27	11	10.24	11	13.27	14.00
		233	7115		10.05	11	10.15	11	13.11	14.00
	802.11n HT20	185	6875	MCS0	10.01	11	10.11	11	13.07	14.00
		209	6995		10.32	11	10.22	11	13.28	14.00
		233	7115		10.27	11	10.26	11	13.28	14.00
	802.11n HT40	187	6885	MCS0	10.11	11	10.37	11	13.25	14.00
		227	7085		10.22	11	10.24	11	13.24	14.00
	802.11ac VHT20	185	6875	MCS0	10.36	11	10.21	11	13.30	14.00
		209	6995		10.24	11	10.45	11	13.36	14.00
		233	7115		10.22	11	10.24	11	13.24	14.00
	802.11ac VHT40	187	6885	MCS0	10.16	11	10.16	11	13.17	14.00
		227	7085		10.31	11	10.35	11	13.34	14.00
	802.11ac VHT80	183	6865	MCS0	10.88	11.5	10.65	11.5	13.78	14.50
		199	6945		10.91	11.5	10.59	11.5	13.76	14.50
		215	7025		11.14	11.5	10.72	11.5	13.95	14.50
	802.11ac VHT160	207	6985	MCS0	11.37	11.5	10.95	11.5	14.18	14.50
	802.11ax HEW20	185	6875	MCS0	10.22	11	10.22	11	13.23	14.00
		209	6995		10.21	11	10.16	11	13.20	14.00
		233	7115		10.14	11	10.12	11	13.14	14.00
	802.11ax HEW40	187	6885	MCS0	10.06	11	10.37	11	13.23	14.00
		227	7085		10.22	11	10.43	11	13.34	14.00
		183	6865	MCS0	10.78	11	10.29	11	13.55	14.00

	802.11ax HEW80	199	6945		10.62	11	10.44	11	13.54	14.00
		215	7025		10.77	11	10.51	11	13.65	14.00
	802.11ax HEW160	207	6985	MCS0	11.24	11.5	11.06	11.5	14.16	14.50

Note:

a) Power must be measured at each transmit antenna port according to the DSSS and OFDM transmission configurations in each standalone and aggregated frequency band.

b) Power measurement is required for the transmission mode configuration with the highest maximum output power specified for production units.

1) When the same highest maximum output power specification applies to multiple transmission modes, the largest channel bandwidth configuration with the lowest order modulation and lowest data rate is measured.

2) When the same highest maximum output power is specified for multiple largest channel bandwidth configurations with the same lowest order modulation or lowest order modulation and lowest data rate, power measurement is required for all equivalent 802.11 configurations with the same maximum output power.

c) For each transmission mode configuration, power must be measured for the highest and lowest channels; and at the mid-band channel(s) when there are at least 3 channels. For configurations with multiple mid-band channels, due to an even number of channels, both channels should be measured.

8.1.2 Conducted Power Of BT

BT(Ant1)			Average Conducted Power(dBm)	Tune up (dBm)
Modulation	Channel	Frequency(MHz)		
GFSK	0	2402	9.69	11.50
	39	2441	10.24	11.50
	78	2480	11.05	11.50
π/4DQPSK	0	2402	8.28	9.50
	39	2441	8.84	9.50
	78	2480	9.34	9.50
8DPSK	0	2402	8.33	9.50
	39	2441	8.88	9.50
	78	2480	9.38	9.50
BLE(Ant1)			Average Conducted Power(dBm)	Tune up (dBm)
Modulation	Channel	Frequency(MHz)		
GFSK 1M	0	2402	4.97	5.50
	19	2440	4.82	5.50
	39	2480	5.25	5.50
GFSK 2M	0	2402	4.99	5.50
	19	2440	4.82	5.50
	39	2480	5.27	5.50

8.2 SAR-based Exemption

The following SAR test exclusion Thresholds based on KDB 447498 D04 Interim General RF Exposure Guidance v01 Appendix B B.4

Antenna1

Band	Exposure Condition	f (GHz)	Pmax (dBm)	Pmax (mw)	EIRP (dBm)	EIRP (mw)	separation distance**(cm)**				
							Back side	Left side	Right side	Top side	Bottom side
WIFI 2.4G	Body 0mm	2.450	21.00	125.89	22.10	162.18	0.50	32.10	0.20	3.50	16.80
WIFI 5.2G	Body 0mm	5.200	14.50	28.18	17.86	61.09	0.50	32.10	0.20	3.50	16.80
WIFI 5.3G	Body 0mm	5.300	14.50	28.18	17.86	61.09	0.50	32.10	0.20	3.50	16.80
WIFI 5.5G	Body 0mm	5.500	14.50	28.18	17.86	61.09	0.50	32.10	0.20	3.50	16.80
WIFI 5.8G	Body 0mm	5.800	14.50	28.18	17.86	61.09	0.50	32.10	0.20	3.50	16.80
BT	Body 0mm	2.450	11.50	14.13	12.60	18.20	0.50	32.10	0.20	3.50	16.80

Band	Calculated Value					SAR Test(Yes or No)				
	Back side	Left side	Right side	Top side	Bottom side	Back side	Left side	Right side	Top side	Bottom side
WIFI 2.4G	2.74	3060.00	0.48	111.14	2196.29	Yes	No	Yes	Yes	No
WIFI 5.2G	1.50	3060.00	0.23	83.59	2134.59	Yes	No	Yes	No	No
WIFI 5.3G	1.48	3060.00	0.22	82.99	2133.05	Yes	No	Yes	No	No
WIFI 5.5G	1.44	3060.00	0.21	81.84	2130.06	Yes	No	Yes	No	No
WIFI 5.8G	1.38	3060.00	0.20	80.21	2125.78	Yes	No	Yes	No	No
BT	2.74	3060.00	0.48	111.14	2196.29	Yes	No	Yes	No	No

Antenna2

Band	Exposure Condition	f (GHz)	Pmax (dBm)	Pmax (mw)	EIRP (dBm)	EIRP (mw)	separation distance**(cm)**				
							Back side	Left side	Right side	Top side	Bottom side
WIFI 2.4G	Body 0mm	2.450	21.00	125.89	23.68	233.35	0.50	15.60	14.40	0.20	21.00
WIFI 5.2G	Body 0mm	5.200	14.50	28.18	17.71	59.02	0.50	15.60	14.40	0.20	21.00
WIFI 5.3G	Body 0mm	5.300	14.50	28.18	17.71	59.02	0.50	15.60	14.40	0.20	21.00
WIFI 5.5G	Body 0mm	5.500	14.50	28.18	17.71	59.02	0.50	15.60	14.40	0.20	21.00
WIFI 5.8G	Body 0mm	5.800	14.50	28.18	17.71	59.02	0.50	15.60	14.40	0.20	21.00

Band	Calculated Value					SAR Test(Yes or No)				
	Back side	Left side	Right side	Top side	Bottom side	Back side	Left side	Right side	Top side	Bottom side
WIFI 2.4G	2.74	1907.52	1638.12	0.48	3060.00	Yes	No	No	Yes	No
WIFI 5.2G	1.50	1831.62	1552.50	0.23	3060.00	Yes	No	No	Yes	No
WIFI 5.3G	1.48	1829.74	1550.39	0.22	3060.00	Yes	No	No	Yes	No
WIFI 5.5G	1.44	1826.08	1546.30	0.21	3060.00	Yes	No	No	Yes	No
WIFI 5.8G	1.38	1820.86	1540.45	0.20	3060.00	Yes	No	No	Yes	No

Note:

1. Maximum power is the source-based time-average power and represents the maximum RF output power among production units
2. Per KDB 447498 D04, for larger devices, the test separation distance of adjacent edge configuration is determined by the closest separation between the antenna and the user.
3. Per KDB 447498 D04, standalone SAR test exclusion threshold is applied; If the distance of the antenna to the user is < 5mm, 5mm is used to determine SAR exclusion threshold
4. Per KDB 447498 D04, the 1-g and 10-g SAR test exclusion thresholds for 300 MHz to 6 GHz

This method shall only be used at separation distances from 0.5 cm to 40 cm and at frequencies from 0.3 GHz to 6 GHz (inclusive). Pth is given by Formula (B.2).

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

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

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).

The example values shown in Table B.2 are for illustration only.

Table B.2—Example Power Thresholds (mW)

Frequency (MHz)	Distance (mm)									
	5	10	15	20	25	30	35	40	45	50
300	39	65	88	110	129	148	166	184	201	217
450	22	44	67	89	112	135	158	180	203	226
835	9	25	44	66	90	116	145	175	207	240
1900	3	12	26	44	66	92	122	157	195	236
2450	3	10	22	38	59	83	111	143	179	219
3600	2	8	18	32	49	71	96	125	158	195
5800	1	6	14	25	40	58	80	106	136	169

5. when 10-g extremity SAR applies, SAR test exemption may be considered by applying a factor of 2.5 to the SAR-based exemption thresholds.
6. please refer to page 6 of this report for antenna gain.

8.3 Measurement of SAR Data

8.3.1 SAR Result Of 2.4GHz Wi-Fi

Wi-Fi 2.4G SAR Test Record												
Test position	Test mode	Test Ch./Freq.	Duty Cycle	Duty Cycle Scaled factor	SAR (W/kg) 1-g	SAR (W/kg) 10-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp.(℃)
Body Test data Ant 1(Separate 0mm)												
Back side	802.11b	1/2412	99.45%	1.012	1.070	0.437	-0.06	17.65	18.00	1.084	**1.174**	22.4
Back side - Repeated	802.11b	1/2412	99.45%	1.012	1.030	0.425	0.09	17.65	18.00	1.084	1.130	22.4
Back side	802.11b	6/2437	99.45%	1.012	0.992	0.401	0.01	17.62	18.00	1.091	1.096	22.4
Right side	802.11b	1/2412	99.45%	1.006	0.706	0.301	0.04	17.65	18.00	1.084	0.769	22.4
Top side	802.11b	1/2412	99.45%	1.006	0.211	0.102	0.10	17.65	18.00	1.084	0.230	22.4
Body Test data Ant 2(Separate 0mm)												
Back side	802.11b	1/2412	99.45%	1.006	0.048	0.021	0.13	17.56	18.00	1.107	0.053	22.4
Right side	802.11b	1/2412	99.45%	1.006	0.003	0.001	-0.12	17.56	18.00	1.107	0.003	22.4
Top side	802.11b	1/2412	99.45%	1.012	0.518	0.237	-0.02	17.56	18.00	1.107	0.580	22.4
Body Test data MIMO(Separate 0mm)												
Back side	802.11n40	3/2422	98.83%	1.012	0.808	0.349	0.04	20.65	21.00	1.084	0.886	22.4
Back side	802.11n40	9/2452	98.83%	1.012	0.755	0.303	0.02	20.55	21.00	1.109	0.847	22.4
Right side	802.11n40	3/2422	98.83%	1.012	0.727	0.334	0.03	20.65	21.00	1.084	0.797	22.4
Top side	802.11n40	3/2422	98.83%	1.012	0.546	0.254	0.01	20.65	21.00	1.084	0.599	22.4
Top side with accessories-Black	802.11n40	3/2422	98.83%	1.012	0.054	0.028	0.02	20.65	21.00	1.084	0.059	22.4
Top side with accessories-Green	802.11n40	3/2422	98.83%	1.012	0.033	0.019	0.01	20.65	21.00	1.084	0.036	22.4
Top side with accessories-Blue	802.11n40	3/2422	98.83%	1.012	0.028	0.017	0.09	20.65	21.00	1.084	0.031	22.4

Test Position	Channel/ Frequency (MHz)	Measured SAR (1g)	1st Repeated SAR (1g)	Ratio	2nd Repeated SAR (1g)	3rd Repeated SAR (1g)
Back side	1/2412	1.07	1.03	1.039	N/A	N/A
Note: 1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.						
2) A second repeated measurement was preformed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).						
3) A third repeated measurement was preformed only if the original, first or second repeated measurement was ⩾ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.						
4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg						

5) The same procedures should be adapted for measurements according to extremity and occupational exposure limits by applying a factor of 2.5 for extremity exposure and a factor of 5 for occupational exposure to the corresponding SAR thresholds. The repeated measurement results must be clearly identified in the SAR report.

Note:

1) The SAR limit is 1.6 W/kg.
2) The maximum Scaled SAR value is marked in bold. Graph results refer to Appendix B
3) If the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s). Per Kdb248227 D01, When the reported SAR is > 0.8 W/kg, SAR is required for that exposure configuration using the next highest measured output power channel.
4) Each channel was tested at the lowest data rate.
5) Per KDB248227 D01, for Body SAR test of Wi-Fi2.4G, SAR is measured for 2.4 GHz 802.11b DSSS using the initial test position procedure. The highest reported SAR for DSSS is adjusted by the ratio of OFDM 802.11g/n to DSSS specified maximum output power and the adjusted SAR is < 1.2 W/kg, so SAR for 802.11g/n is not required.

8.3.2 SAR Result of Bluetooth

Bluetooth SAR Test Record												
Test position	Test mode	Test Ch./Freq.	Duty Cycle	Duty Cycle Scaled factor	SAR (W/kg) 1-g	Power drift(dB)	Conducted power (dBm)	Tune up Limit (dBm)	Scaled factor	Scaled SAR (W/kg) 1-g	Liquid Temp.	SAR limit (W/kg)
Body Test data Ant 1(Separate 0mm)												
Back side	DH5	78/2480	76.93%	1.300	0.127	-0.17	11.05	11.50	1.109	**0.183**	22.3	1.6
Right side	DH5	78/2480	76.93%	1.300	0.079	0.01	11.05	11.50	1.109	0.114	22.3	1.6
Top side	DH5	78/2480	76.93%	1.300	0.035	0.02	11.05	11.50	1.109	0.050	22.3	1.6
Top side with accessories-Black	DH5	78/2480	76.93%	1.300	0.005	0.02	11.05	11.50	1.109	0.007	22.3	1.6
Top side with accessories-Green	DH5	78/2480	76.93%	1.300	0.004	0.01	11.05	11.50	1.109	0.006	22.3	1.6
Top side with accessories-Blue	DH5	78/2480	76.93%	1.300	0.005	0.14	11.05	11.50	1.109	0.007	22.3	1.6

Note:

1) The maximum Scaled SAR value is marked in bold. Graph results refer to Appendix B
2) The scaled SAR = Measured SAR(W/kg) * Duty Cycle Scaled factor * Scaled factor
3) Duty Cycle Scaled factor = 100% Duty Cycle / Measured Duty Cycle
4) If the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s). When the reported SAR is > 0.8 W/kg, SAR is required for that exposure configuration using the next highest measured output power channel.

8.3.3 SAR Result Of 5GHz Wi-Fi

Wi-Fi 5G SAR Test Record Ant1												
Test position	Test mode	Test Ch./ Freq.	Duty Cycle	Duty Cycle Scaled factor	SAR (W/kg) 1-g	SAR (W/kg) 10-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp.(℃)
Body Test data U-NII-2A (Separate 0mm)												
Back side	802.11ac160	50/5250	98.83%	1.012	0.311	0.107	0.05	10.97	11.50	1.130	0.356	22.4
Right side	802.11ac160	50/5250	98.83%	1.012	0.991	0.242	0.07	10.97	11.50	1.130	1.133	22.4
Top side	802.11ac160	50/5250	98.83%	1.012	0.053	0.013	-0.04	10.97	11.50	1.130	0.061	22.4
Body Test data U-NII-2C (Separate 0mm)												
Back side	802.11ac160	114/5570	98.83%	1.012	0.374	0.111	0.03	10.95	11.50	1.135	0.430	22.4
Right side	802.11ac160	114/5570	98.83%	1.012	1.010	0.250	0.02	10.95	11.50	1.135	1.160	22.4
Top side	802.11ac160	114/5570	98.83%	1.012	0.067	0.014	0.06	10.95	11.50	1.135	0.077	22.4
Body Test data U-NII-3 (Separate 0mm)												
Back side	802.11ac80	155/5775	98.83%	1.012	0.404	0.122	0.08	11.06	11.50	1.107	0.452	22.4
Right side	802.11ac80	155/5775	98.83%	1.012	0.952	0.250	0.09	11.06	11.50	1.107	1.066	22.4
Top side	802.11ac80	155/5775	98.83%	1.012	0.070	0.020	0.11	11.06	11.50	1.107	0.078	22.4

Wi-Fi 5G SAR Test Record Ant2												
Test position	Test mode	Test Ch./ Freq.	Duty Cycle	Duty Cycle Scaled factor	SAR (W/kg) 1-g	SAR (W/kg) 10-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp.(℃)
Body Test data U-NII-2A (Separate 0mm)												
Back side	802.11ac160	50/5250	98.85%	1.012	0.082	0.024	0.13	11.78	12.50	1.180	0.098	22.4
Right side	802.11ac160	50/5250	98.85%	1.012	0.068	0.014	0.04	11.78	12.50	1.180	0.081	22.4
Top side	802.11ac160	50/5250	98.85%	1.012	0.989	0.295	0.01	11.78	12.50	1.180	**1.181**	22.4
Top side Repeat	802.11ac160	50/5250	98.85%	1.012	0.962	0.288	0.08	11.78	12.50	1.180	1.149	22.4
Top side with accessories-Black	802.11ac160	50/5250	98.85%	1.012	0.089	0.039	0.03	11.78	12.50	1.180	0.106	22.4
Top side with accessories-Green	802.11ac160	50/5250	98.85%	1.012	0.051	0.026	0.14	11.78	12.50	1.180	0.061	22.4
Top side with accessories-Blue	802.11ac160	50/5250	98.85%	1.012	0.042	0.022	0.11	11.78	12.50	1.180	0.050	22.4
Body Test data U-NII-2C (Separate 0mm)												
Back side	802.11ac160	114/5570	98.85%	1.012	0.110	0.027	0.02	11.89	12.50	1.151	0.128	22.4
Right side	802.11ac160	114/5570	98.85%	1.012	0.073	0.017	0.08	11.89	12.50	1.151	0.085	22.4
Top side	802.11ac160	114/5570	98.85%	1.012	0.996	0.339	0.15	11.89	12.50	1.151	1.160	22.4

Body Test data U-NII-3 (Separate 0mm)												
Back side	802.11ac80	155/5775	98.85%	1.012	0.091	0.025	0.14	11.34	12.00	1.164	0.107	22.4
Right side	802.11ac80	155/5775	98.85%	1.012	0.114	0.022	0.02	11.34	12.00	1.164	0.134	22.4
Top side	802.11ac80	155/5775	98.85%	1.012	0.831	0.236	0.03	11.34	12.00	1.164	0.979	22.4
Back side	802.11ac80	155/5775	98.85%	1.012	0.091	0.025	0.14	11.34	12.00	1.164	0.107	22.4

Wi-Fi 5G SAR Test Record MIMO												
Test position	**Test mode**	**Test Ch./ Freq.**	**Duty Cycle**	**Duty Cycle Scaled factor**	**SAR (W/kg) 1-g**	**SAR (W/kg) 10-g**	**Power drift (dB)**	**Conducted Power(dBm)**	**Tune up Limit(dBm)**	**Scaled factor**	**Scaled SAR 1-g (W/kg)**	**Liquid Temp.(℃)**
Body Test data U-NII-2A (Separate 0mm)												
Back side	802.11ac160	50/5250	98.85%	1.012	0.396	0.109	0.14	14.40	14.50	1.023	0.410	22.4
Right side	802.11ac160	50/5250	98.85%	1.012	0.887	0.228	0.13	14.40	14.50	1.023	0.918	22.4
Top side	802.11ac160	50/5250	98.85%	1.012	0.780	0.216	0.11	14.40	14.50	1.023	0.807	22.4
Body Test data U-NII-2C (Separate 0mm)												
Back side	802.11ac160	114/5570	98.85%	1.012	0.429	0.122	-0.08	14.46	14.50	1.009	0.438	22.4
Right side	802.11ac160	114/5570	98.85%	1.012	1.070	0.255	0.05	14.46	14.50	1.009	1.092	22.4
Top side	802.11ac160	114/5570	98.85%	1.012	0.497	0.158	-0.02	14.46	14.50	1.009	0.507	22.4
Body Test data U-NII-3 (Separate 0mm)												
Back side	802.11ac80	155/5775	98.85%	1.012	0.386	0.116	0.06	14.21	14.50	1.069	0.417	22.4
Right side	802.11ac80	155/5775	98.85%	1.012	0.969	0.433	0.01	14.21	14.50	1.069	1.048	22.4
Top side	802.11ac80	155/5775	98.85%	1.012	0.468	0.152	0.07	14.21	14.50	1.069	0.506	22.4

Note:

1) The SAR limit is 1.6 W/kg.
2) The maximum Scaled SAR value is marked in bold. Graph results refer to Appendix B
3) If the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s). Per Kdb248227 D01, When the reported SAR is > 0.8 W/kg, SAR is required for that exposure configuration using the next highest measured output power channel.
4) Each channel was tested at the lowest data rate.
5) 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. As 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.
6) When the highest reported SAR for the initial test configuration is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR test for the other 802.11 modes are not required.

8.3.4 SAR Result Of 6GHz Wi-Fi

Wi-Fi 6G SAR Test Record Ant1													
Test position	Test mode	Test Ch./ Freq.	Duty Cycle	Duty Cycle Scaled factor	SAR (W/kg) 1-g	APD W/m² (4cm²)	Power drift (dB)	Cond Power (dBm)	Tune up Limit (dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Scaled APD W/m²(4cm²)	Liquid Temp.(℃)
Body Test data (Separate 0mm)													
Back side	11ac 160	207/6985	100.00%	1.000	0.313	2.570	0.01	11.37	11.50	1.030	0.323	2.648	22.3
Right side	11ac 160	207/6985	100.00%	1.000	0.664	5.270	-0.01	11.37	11.50	1.030	0.684	5.430	22.3
Top side	11ac 160	207/6985	100.00%	1.000	0.048	1.330	0.15	11.37	11.50	1.030	0.049	1.370	22.3
Right side	11ac 160	47/6185	100.00%	1.000	1.040	6.150	-0.01	10.89	11.50	1.151	**1.197**	7.077	22.3
Right side-Repeated	11ac 160	47/6185	100.00%	1.000	0.998	5.950	0.08	10.89	11.50	1.151	1.148	6.847	22.3
Right side	11ac 160	111/6505	100.00%	1.000	0.834	5.890	-0.09	11.11	11.50	1.094	0.912	6.443	22.3
Right side	11ac 160	175/6825	100.00%	1.000	0.760	5.960	-0.08	11.20	11.50	1.072	0.814	6.386	22.3
Right side	11ac 160	143/6665	100.00%	1.000	0.698	5.370	-0.04	11.19	11.50	1.074	0.750	5.767	22.3

Wi-Fi 6G SAR Test Record Ant2													
Test position	Test mode	Test Ch./ Freq.	Duty Cycle	Duty Cycle Scaled factor	SAR (W/kg) 1-g	APD W/m² (4cm²)	Power drift (dB)	Cond Power (dBm)	Tune up Limit (dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Scaled APD W/m²(4cm²)	Liquid Temp.(℃)
Body Test data (Separate 0mm)													
Back side	11ac 160	47/6185	100.00%	1.000	0.134	0.947	0.09	11.06	11.50	1.107	0.148	1.048	22.3
Right side	11ac 160	47/6185	100.00%	1.000	0.012	0.099	-0.17	11.06	11.50	1.107	0.013	0.110	22.3
Top side	11ac 160	47/6185	100.00%	1.000	0.705	4.650	0.06	11.06	11.50	1.107	0.780	5.146	22.3
Top side	11ac 160	111/6505	100.00%	1.000	0.702	4.570	-0.08	11.03	11.50	1.114	0.782	5.092	22.3
Top side	11ac 160	143/6665	100.00%	1.000	0.728	4.690	0.02	11.02	11.50	1.117	**0.813**	5.238	22.3
Top side	11ac 160	207/6985	100.00%	1.000	0.715	4.700	-0.02	10.95	11.50	1.135	0.812	5.335	22.3
Top side	11ac 160	15/6025	100.00%	1.000	0.710	4.790	-0.09	10.92	11.50	1.143	0.811	5.474	22.3

Wi-Fi 6G SAR Test Record MIMO													
Test position	Test mode	Test Ch./ Freq.	Duty Cycle	Duty Cycle Scaled factor	SAR (W/kg) 1-g	APD W/m² (4cm²)	Power drift (dB)	Cond Power (dBm)	Tune up Limit (dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Scaled APD W/m²(4cm²)	Liquid Temp.(℃)
Body Test data (Separate 0mm)													

Back side	11ac 160	47/6185	100.00%	1.000	0.192	6.030	-0.01	14.19	14.50	1.074	0.206	6.476	22.3
Right side	11ac 160	47/6185	100.00%	1.000	0.678	4.020	-0.02	14.19	14.50	1.074	0.728	4.317	22.3
Top side	11ac 160	47/6185	100.00%	1.000	0.754	4.900	-0.02	14.19	14.50	1.074	0.810	5.263	22.3
Top side	11ac 160	111/6505	100.00%	1.000	0.757	4.880	-0.03	14.08	14.50	1.102	**0.834**	5.376	22.3
Top side	11ac 160	175/6825	100.00%	1.000	0.747	4.820	-0.08	14.15	14.50	1.084	0.810	5.225	22.3
Top side	11ac 160	207/6985	100.00%	1.000	0.687	4.490	-0.13	14.18	14.50	1.076	0.740	4.833	22.3
Top side	11ac 160	143/6665	100.00%	1.000	0.754	4.770	-0.04	14.12	14.50	1.091	0.823	5.206	22.3
Top side with accessories-Black	11ac 160	143/6665	100.00%	1.000	0.077	0.435	0.01	14.12	14.50	1.091	0.084	0.475	22.3
Top side with accessories-Green	11ac 160	143/6665	100.00%	1.000	0.062	0.359	-0.04	14.12	14.50	1.091	0.068	0.392	22.3
Top side with accessories-Blue	11ac 160	143/6665	100.00%	1.000	0.049	0.320	0.17	14.12	14.50	1.091	0.053	0.349	22.3

Test Position	Channel/ Frequency (MHz)	Measured SAR (1g)	1st Repeated SAR (1g)	Ratio	2nd Repeated SAR (1g)	3rd Repeated SAR (1g)
Right side	47/6185	1.04	0.998	1.042	N/A	N/A

Note: 1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.

2) A second repeated measurement was preformed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).

3) A third repeated measurement was preformed only if the original, first or second repeated measurement was ⩾ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg

5) The same procedures should be adapted for measurements according to extremity and occupational exposure limits by applying a factor of 2.5 for extremity exposure and a factor of 5 for occupational exposure to the corresponding SAR thresholds. The repeated measurement results must be clearly identified in the SAR report.

Note:

7) The SAR limit is 1.6 W/kg.

8) The maximum Scaled SAR value is marked in bold. Graph results refer to Appendix B

9) If the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s). Per Kdb248227 D01, When the reported SAR is > 0.8 W/kg, SAR is required for that exposure configuration using the next highest measured output power channel.

10) Each channel was tested at the lowest data rate.

11) 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. As 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.

12) When the highest reported SAR for the initial test configuration is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR test for the other 802.11 modes are not required.

8.3.5 PD Test Data

Wi-Fi 6E SAR Test Record MIMO														
Test position	Test mode	Test ch./Freq.	Dist (mm)	Grid Step (λ)	Duty Cycle (%)	Duty Cycle Scaled factor	iPDn	iPD ratio	Measured PD 4cm^2 (W/m^2)	Power drift (dB)	Cond Power (dBm)	Tune up Limit (dBm)	Scaled factor	Scaled PD 4cm^2 (W/m^2)
Power Density Test DATA														
Back side	11ac 160M	47/6185	2	0.0625	100.0	1	/	/	1.38	-0.05	14.19	14.50	1.074	1.48
Right side	11ac 160M	47/6185	2	0.0625	100.0	1	/	/	6.88	0.03	14.19	14.50	1.074	7.39
Top side	11ac 160M	47/6185	9.7	0.0625	100.0	1	307.00	0.86	3.86	-0.11	14.19	14.50	1.074	4.15
Top side	11ac 160M	47/6185	2	0.0625	100.0	1	252.00		8.44	0.01	14.19	14.50	1.074	9.06
Top side	11ac 160M	111/6505	2	0.0625	100.0	1	/	/	7.08	-0.04	14.08	14.50	1.102	7.80
Top side	11ac 160M	175/6825	2	0.0625	100.0	1	/	/	4.71	-0.04	14.15	14.50	1.084	5.11
Top side	11ac 160M	207/6985	2	0.0625	100.0	1	/	/	6.89	0.01	14.18	14.50	1.076	7.42
Top side	11ac 160M	143/6665	2	0.0625	100.0	1	/	/	3.93	0.12	14.12	14.50	1.091	4.29

9 Multiple Transmitter Evaluation

9.1.1 Simultaneous SAR test evaluation

Simultaneous Transmission

NO.	Simultaneous Transmission Configuration	Body
1	WIFI 2.4GHz Main(Ant2)+BT Aux(Ant1)	Yes
2	WIFI 5GHz Main(Ant2)+BT Aux(Ant1)	Yes
3	WIFI 6GHz Main(Ant2)+BT Aux(Ant1)	Yes
4	WIFI 2.4GHz MIMO	Yes
5	WIFI 5GHz MIMO	Yes
6	WIFI 6GHz MIMO	Yes

Exposure position	WiFi 2.4G Ant1	WiFi 2.4G Ant2	WiFi 2.4G MIMO	WiFi 5G Ant1	WiFi 5G Ant2	WiFi 5G MIMO	WiFi 6G Ant1	WiFi 6G Ant2	WiFi 6G MIMO	BT Ant1
	1	2	3	4	5	6	7	8	9	10
Back side	1.174	0.053	0.886	0.452	0.128	0.438	0.323	0.148	0.206	0.183
Right side	0.769	0.003	0.797	1.160	0.134	1.092	1.197	0.013	0.728	0.114
Top side	0.230	0.580	0.599	0.078	1.181	0.807	0.049	0.813	0.834	0.050

Exposure position	Summed SAR 2+10	Summed SAR 5+10	Summed SAR 8+10	Volume scan
Back side	0.236	0.311	0.331	NO
Right side	0.117	0.248	0.127	NO
Top side	0.63	1.231	0.863	NO

10 Equipment list

Test Platform	SPEAG DASY Professional
Description	SAR & PD Test System
Software Reference	cDASY8 V16.2.4.2524

Hardware Reference

	Equipment	Manufacturer	Model	Inventory No.	Calibration Date	Due date of calibration
☒	Test Phantom	SPEAG	SAM Twin	SZ-WSR-A-027	NCR	NCR
☒	Test Phantom	SPEAG	mmWave	SZ-WSR-A-029	NCR	NCR
☒	Data Acquisition Unit	SPEAG	DAE4	SZ-WSR-M-029	2024/1/3	2025/1/2
☒	Data Acquisition Unit	SPEAG	DAE4	SZ-WSR-M-031	2024/3/18	2025/3/17
☒	Data Acquisition Unit	SPEAG	DAE4ip	SZ-WSR-M-078	2023/9/12	2024/9/11
☒	Dipole	SPEAG	D2450V2	SZ-WSR-M-039	2022/11/2	2025/11/1
☒	Dipole	SPEAG	D5GHzV2	SZ-WSR-M-046	2022/11/1	2025/10/31
☒	Dipole	SPEAG	D6.5GHzV2	SZ-WSR-M-080	2023/9/11	2026/9/10
☒	Probe	SPEAG	EX3DV4	SZ-WSR-M-027	2024/7/17	2025/7/16
☒	Probe	SPEAG	EUmmWV4	SZ-WSR-M-048	2023-08-18	2024-08-17
☒	Probe	SPEAG	EX3DV4	SZ-WSR-M-079	2023/9/11	2024/9/10
☒	5G Verification Source	SPEAG	10GHz	SZ-WSR-M-049	2023-08-21	2024-08-20
☒	RF Bi-Directional Coupler	Agilent	86205-60001	SZ-WSR-A-004	NCR	NCR
☒	Signal Generator	Agilent	N5171B	SZ-WSR-M-006	2024/01/30	2025/01/29
☒	Preamplifier	Mini-Circuits	ZHL-42W	SZ-WSR-A-001	NCR	NCR
☒	Preamplifier	Compliance Directions Systems Inc.	AMP28-3W	SZ-WSR-A-002	NCR	NCR
☒	Power Meter	Agilent	E4416A	SZ-WSR-M-007	2024/01/30	2025/01/29
☒	Power Sensor	Agilent	8481H	SZ-WSR-M-008	2024/01/30	2025/01/29
☒	Power Sensor	R&S	NRP-Z92	SZ-WSR-M-009	2024/01/30	2025/01/29
☒	Attenuator	SHX	TS2-3dB	SZ-WSR-A-012	NCR	NCR
☒	Humidity and Temperature Indicator	CHIGAO	HTC-1	SZ-WSR-M-013	2024/05/28	2025/05/27

Note: All the equipments are within the valid period when the tests are performed.
All measurement facilities used to collect the measurement data are located at
No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Nanshan District, Shenzhen, Guangdong, China. 518057.

Appendix A: Detailed System Check Results

Appendix B: Detailed Test Results

Appendix C: Calibration certificate

Appendix D: Photographs

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