FCC SAR Compliance Test Report

For

TECNO MOBILE LIMITED

FLAT N 16/F BLOCK B UNIVERSAL INDUSTRIAL CENTRE 19-25 SHAN MEI STREET

FOTAN NT HONGKONG

Model: T16RA Pro

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Report Number:	WSCT-A2LA-R&E240300011A-SAR
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Modified History

REV.	Modification Description	Issued Date	Remark
REV.1.0	Initial Test Report Relesse	02 August 2024	Liu Fuxin

1 General information

1.1 Notes

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

1.2 Application details

Date of receipt of test item: 2024-03-04
Start of test: 2024-03-05
End of test: 2024-05-10

1.3 Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for T16RA Pro is as below:

Band	Position	MAX ReportedSAR$_{1g}$(W/kg)	Limit (W/kg)
2.4G WIFI	Body-Worn 0mm	0.125	1.6
5.2G WIFI	Body-Worn 0mm	0.119	
5.4G WIFI	Body-Worn 0mm	0.098	
5.6G WIFI	Body-Worn 0mm	0.113	
5.8G WIFI	Body-Worn 0mm	0.095	
BT	Body-Worn 0mm	0.079	
Max.Simultaneous Transmission SAR(W/kg)			
Items	Body SAR (Gap 0mm)		1.6
Sum SAR	0.204		

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

1.4 EUT Information

Device Information:			
Product Type:	Laptop Computer		
Model:	T16RA Pro		
Brand Name:	TECNO		
Device Type:	Portable device		
Exposure Category:	uncontrolled environment / general population		
Production Unit or Identical Prototype:	Production Unit		
Antenna Type :	Integral Antenna		
Antenna Gain:	BT: 2.40dBi 2.4GWIFI: MAIN ANT: 2.40dBi /AUX ANT: 2.70 dBi 5GWIFI: MAIN ANT: 2.02dBi /AUX ANT: 2.91 dBi		
Device Operating Configurations:			
Supporting Mode(s) :	Wi-Fi , BT		
Modulation:	DSSS, OFDM/OFDMA GFSK/π/4-DQPSK/ 8-DPSK, GFSK		
Device Class :	Class B, No DTM Mode		
Operating Frequency Range(s):	Band	TX(MHz)	RX(MHz)
	Wi-Fi	2412~2462	
	Wi-Fi (5G)	Band 1: 5180-5240 MHz Band 2: 5260-5320 MHz Band 3: 5500-5700 MHz Band 4: 5745-5825 MHz	
	BT	2402~2480	2402~2480
Power Source:	Model: N160 Nominal Voltage: 11.61V Rated Capacity: 8612mAh Rated Energy: 99.99Wh Limited Charge Voltage: 13.35V		

Note:

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

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

2 Testing laboratory

Test Site	World Standardization Certification & Testing Group (Shenzhen) Co., Ltd.
Test Location	Building A-B, Baoshi Science & Technology Park, Baoshi Road, Bao'an District, Shenzhen, Guangdong, China
Telephone	+86-755-26996192
Fax	+86-755-86376605

3 ACCREDITATIONS

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

China	**CNAS** (Registration Number: L3732)
USA	**A2LA** (Certificate Number: 5768.01)

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

4 Test Environment

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

5 Applicant and Manufacturer

Applicant/Client Name:	TECNO MOBILE LIMITED
Applicant Address:	FLAT N 16/F BLOCK B UNIVERSAL INDUSTRIAL CENTRE 19-25 SHAN MEI STREET FOTAN NT HONGKONG
Manufacturer Name:	TECNO MOBILE LIMITED
Manufacturer Address:	FLAT N 16/F BLOCK B UNIVERSAL INDUSTRIAL CENTRE 19-25 SHAN MEI STREET FOTAN NT HONGKONG

6 Test standard/s:

IEC/IEEE 62209-1528	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate(SAR) in the Human Head from Wireless Communications Devices:Measurement Techniques
RSS-102	Radio Frequency Exposure Compliance of Radio communication Apparatus (All Frequency Bands(Issue 5 March 2015)
KDB447498 D01	General RF Exposure Guidance v06
KDB616217 D04	SAR for laptop and tabletsv01r03
KDB248227D01	SARmeas for 802.11a/b/g v02r02
KDB865664D01	SAR Measurement 100 MHz to 6 GHz v01r04
KDB865664D02	RF Exposure Reporting v01r02

6.1 RF exposure limits

HumanExposure	UncontrolledEnvironment GeneralPopulation	ControlledEnvironment Occupational
SpatialPeakSAR* (Brain/Body/Arms/Legs)	**1.60mW/g**	8.00mW/g
SpatialAverageSAR** (WholeBody)	0.08mW/g	0.40mW/g
SpatialPeakSAR*** (Heads/Feet/Ankle/Wrist)	4.00mW/g	20.00mW/g

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

Notes:

* TheSpatial PeakvalueoftheSAR averagedover any1gram oftissue(definedasatissue volumeintheshapeofacube) andovertheappropriateaveragingtime.

** TheSpatial AveragevalueoftheSARaveragedoverthewholebody.

*** TheSpatial PeakvalueoftheSAR averagedover any10gramsoftissue(definedasatissue volumeintheshapeofacube) andovertheappropriateaveragingtime.

UncontrolledEnvironmentsaredefinedaslocationswherethereistheexposureofindividuals whohavenoknowledgeor control oftheir exposure.

ControlledEnvironmentsaredefinedaslocationswherethereisexposurethatmaybeincurred bypersonswhoareawareofthepotential for exposure,(i.e.asaresultofemploymentor occupation.

6.2 SAR Definition

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

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

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

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

where:

σ = conductivity of the tissue (S/m)

ρ = mass density of the tissue (kg/m^3)

E = rms electric field strength (V/m)

7 SAR Measurement System

7.1 The Measurement System

ComosarisasystemthatisabletodeterminetheSARdistributioninsideaphantomofhumanbeing accordingtodifferentstandards.The Comosarsystem consistsof thefollowing items:

-Maincomputerto control allthesystem
-6 axisrobot
- Dataacquisitionsystem
-Miniature E-fieldprobe
-Device holder
- Head simulatingtissue

The followingfigure shows thesystem.

TheEUT undertestoperatingatthemaximumpowerlevelisplacedinthephoneholder,underthe phantom,whichisfilledwithheadsimulatingliquid. TheE-Fieldprobemeasurestheelectricfield insidethephantom. TheOpenSARsoftwarecomputestheresultstogiveaSARvalueina1gor10g mass.

7.2 Robot

The COMOSAR system uses the high precision robots KR 6 R900 sixx type out of the newer series from Satimo SA (France).Forthe 6-axis controller COMOSAR system, the KUKA robot controller version from Satimo is used.The KR 6 R900 sixx robot series have many features that are important for our application:

- High precision (repeatability 0.02 mm)
- High reliability (industrial design)
- Jerk-free straight movements
- Low ELF interference (the closed metallic construction shields against motor control fields)
- 6-axis controller

7.3 Probe

For themeasurementsthe Specific DosimetricE-FieldProbeSSE 5withfollowing specificationsisused

Figure 1 – MVG COMOSAR Dosimetric E field Dipole

- Dynamicrange:0.01-100W/kg

Probe Length	330 mm
Lengthof Individual Dipoles	4.5 mm
Maximum externaldiameter	8 mm
ProbeTip ExternalDiameter	5 mm
Distance betweendipoles/ probeextremity	2.7 mm

-Calibration range: 300MHzto 3GHzfor head&body simulating liquid.

Anglebetween probeaxis(evaluation axis) andsuface normal line:less than30°

Figure 2 – MVG COMOSAR Dosimetric E field Dipole

Dynamicrange:0.01-100W/kg

Probe Length	330 mm
Lengthof Individual Dipoles	2 mm
Maximum externaldiameter	8 mm
ProbeTip ExternalDiameter	2.5 mm
Distance betweendipoles/ probeextremity	1 mm

-Calibration range: 5GHzto 6GHzfor head&body simulating liquid.

Anglebetween probeaxis(evaluation axis) andsuface normal line:less than30°

7.4 Measurement procedure

The following steps are used for each test position

- Establish a call with the maximum output power with a base station simulator.The connection between the mobile and the base station simulator is established via air interface.
- Measurement of the local E-field value at a fixed location.This value serves as a reference value for calculating a possible power drift.
- Measurement of the SAR distribution with a grid of 8 to 16 mm * 8 to 16 mm and a constant distance to the inner surface of the phantom.Since the sensors can not directly measure at the inner phantom surface,the values between the sensors and the inner phantom surface are extrapolated.With these values the area of the maximum SAR is calculated by an interpolation scheme.
- Around this point,a cube of 30 * 30 * 30 mm or 32 * 32 * 32 mm is assessed by measuring 5 or 8 * 5 or 8 * 4 or 5 mm.With these data,the peak spatial-average SAR value can be calculated.

7.5 Description of interpolation/extrapolation scheme

- The local SAR inside the phantom is measured using small dipole sensing elements inside a probe body.The probe tip must not be in contact with the phantom surface in order to minimise measurements errors,but the highest local SAR will occur at the surface of the phantom.

- An extrapolation is using to determinate this highest local SAR values.
  The extrapolation is based on afourth-order least-square polynomial fit of measured data.The local SAR value is then extrapolated from the liquid surface with a 1 mm step.

- The measurements have to be performed over a limited time(due to the duration of the battery) so the step of measurement is high.It could vary between 5 and 8 mm.To obtain an accurate assessment of the maximum SAR average over 10 grams and 1gram requires a very fine resolution in the three dimensional scanned data array.

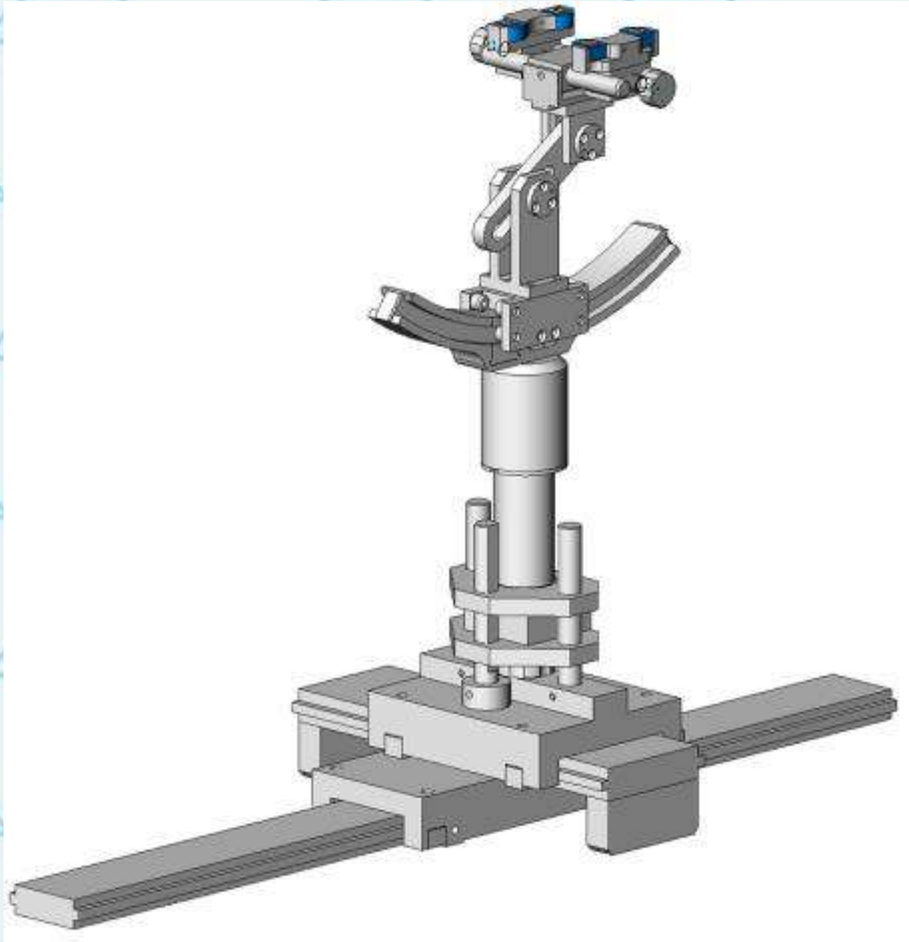
7.6 Phantom

For the measurements the Specific Anthropomorphic Mannequin (SAM) defined by the IEEE SCC-34/SC2groupisused. Thephantomisapolyurethaneshellintegratedinawoodentable. The thickness ofthe phantomamounts to2mm +/- 0.2mm.It enables thedosimetricevaluation of leftand rightphoneusageandincludesanadditionalflatphantompartforthesimplified performancecheck. The phantomset-upincludes acover,whichprevents theevaporation of theliquid.

SystemMaterial	Permittivity	LossTangent
Delrin	3.7	0.005

7.7 Device Holder

The positioning systemallows obtaining cheekand tilting position witha verygood accuracy.In compliancewithCENELEC,thetiltangle uncertaintyislower than1°.



Deviceholder

SystemMaterial	Permittivity	LossTangent
Delrin	3.7	0.005

7.8 Video Positioning System

- The video positioning system is used in OpenSAR to check theprobe. Which is composed of a camera, LED, mirror andmechanical parts. The camera is piloted by the main computerwith firewire link.

- During the process, the actual position of the probe tip with respect to the robot arm is measured, as well as the probe length and the horizontal probe offset. The software then corrects all movements, such that the robot coordinates are valid for the probe tip.

- The repeatability of this process is better than 0.1 mm. If a position has been taught with an aligned probe, the same position will be reached with another aligned probe within 0.1 mm, even if the other probe has different dimensions. Duringprobe rotations, the probe tip will keep its actual position.

7.9 Tissue simulating liquids: dielectric properties

The following materials are used for producing the tissue-equivalent materials.
(Liquids used for testsare marked with☒):

Ingredients(% ofweight)	**Frequency (MHz)**				
frequency band	☐450	☐ 835	☐ 1800	☐1900	☐ 2450
Tissue Type	Head	Head	Head	Head	Head
Water	38.56	41.45	52.64	55.242	62.7
Salt (NaCl)	3.95	1.45	0.36	0.306	0.5
Sugar	56.32	56.0	0.0	0.0	0.0
HEC	0.98	1.0	0.0	0.0	0.0
Bactericide	0.19	0.1	0.0	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	36.8
DGBE	0.0	0.0	47.0	44.542	0.0
Ingredients(% ofweight)	**Frequency (MHz)**				
frequency band	☐450	☐ 835	☐ 1800	☐1900	☒ 2450
Tissue Type	Body	Body	Body	Body	Body
Water	51.16	52.4	69.91	69.91	73.2
Salt (NaCl)	1.49	1.40	0.13	0.13	0.04
Sugar	46.78	45.0	0.0	0.0	0.0
HEC	0.52	1.0	0.0	0.0	0.0
Bactericide	0.05	0.1	0.0	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0
DGBE	0.0	0.0	29.96	29.96	26.7

Salt: 99+% Pure Sodium Chloride

Sugar: 98+% Pure Sucrose

Water: De-ionized, 16MΩ+ resistivity

HEC: Hydroxyethyl Cellulose

DGBE: 99+% Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]

Triton X-100(ultra pure): Polyethylene glycol mono [4-(1,1,3,3-tetramethylbutyl)phenyl]ether

☐Simulating Head Liquid for 5G(HBBL3500-5800MHz), Manufactured by SPEAG:

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

☒Simulating Body Liquid for 5G(MBBL3500-5800MHz),Manufactured by SPEAG:

Ingredients	**(% by weight)**
Water	60-80%
Esters,Emulsifiers,Inhibitors	20-40%
Sodium salt	0-1.5%

7.10 Tissue simulating liquids: parameters

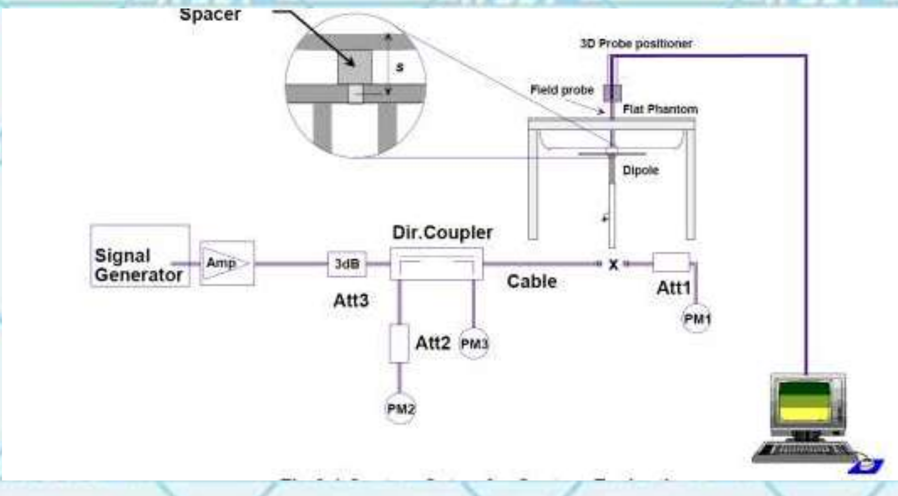
Tissue Type	Measured Frequency (MHz)	Target Tissue				Measured Tissue		Liquid Temp.	Test Date
		TargetPermittivity ε_r	Range of ±5%	TargetConductivity σ (S/m)	Range of ±5%	ε_r	σ (S/m)		
2450MHz Body	2410	52.80	50.16~55.44	1.91	1.81~2.00	52.50	1.94	21.6°C	2024-04-15
	2435	52.70	50.07~55.34	1.94	1.84~2.04	52.52	1.95		
	2450	52.70	50.07~55.34	1.95	1.85~2.05	52.73	1.96		
	2460	52.70	50.07~55.34	1.96	1.86~2.06	52.76	1.99		
5G Body	5200	49.00	46.55~51.45	5.30	5.03~5.56	49.86	5.19	21.6°C	2024-04-15
	5300	48.90	46.05~51.35	5.42	5.15~5.69	48.32	5.27		
	5800	48.20	45.79~50.61	6.00	5.70~6.30	47.74	6.09		
ε_r= Relative permittivity, σ= Conductivity									

8 System Check

8.1 System check procedure

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

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



8.2 System check results

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

System Check	Target SAR (1W) (+/-10%)				Measured SAR (Normalized to 1W)		Liquid Temp.	Test Date
	1-g (W/g)	Range of ±10% 1-g (W/g)	10-g (W/g)	Range of ±10% 10-g (W/g)	1-g (W/g)	10-g (W/g)		
D2450V2 Head	51.39	46.25~56.53	23.63	21.27~25.99	53.630	22.650	21.6°C	2024-04-15
D5200V2 Head	163.36	147.03~179.69	57.09	51.39~62.79	167.180	59.640	21.6°C	2024-04-15
D5300V2 Head	166.22	149.60~182.84	57.22	51.50~62.94	165.370	58.820	21.6°C	2024-04-15
D5800V2 Head	177.10	159.39~194.81	59.95	53.96~65.94	179.660	60.800	21.6°C	2024-04-15
Note: All SAR values are normalized to 1W forward power.								

Note:5G band system check USES standard waveguide, so the test results are standard en62209-2 table B2

9 SAR Test Test Configuration

9.1 Wi-Fi Test Configuration

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

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

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

Notes:
√ = "default test channels"
△= possible 802.11g channels with maximum average output ¼ dB the "default test channels"
= when output power is reduced for channel 1 and /or 11 to meet restricted band requirements the highest output channels closest to each of these channels should be tested.

802.11 Test Channels per FCC Requirements

9.2 WiFi 5G SAR Test Procedures

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

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

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

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

3)The two U-NII bands may be aggregated to support a 160 MHz channel on channel number 50.

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

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

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

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

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

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

1)The largest channel bandwidth configuration is selected among the multiple configurations with thesame specified maximum output power.

2)If multiple configurations have the same specified maximum output power and largest channelbandwidth, 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 bandwidthand lowest order modulation, the lowest data rate configuration among these configurations is selected.

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

1)The channel closest to mid-band frequency is selected for SAR measurement.

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

D)SAR Test Requirements for OFDM configurations

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

10 Detailed Test Results

10.1 Conducted Power measurements

Themeasuringconductedaveragepower(Unit:dBm)isshownasbelow.

10.1.1 Conducted Power of Wi-Fi 2.4G

MAIN ANT1

Mode	802.11b		
Channel/Frequency(MHz)	1(2412)	6(2437)	11(2462)
Average Power(dBm)	20.16	20.07	20.13
Mode	802.11g		
Channel/Frequency(MHz)	1(2412)	6(2437)	11(2462)
Average Power(dBM)	23.37	23.44	23.45
Mode	802.11n(HT20)		
Channel/Frequency(MHz)	1(2412)	6(2437)	11(2462)
Average Power(dBM)	23.18	23.28	23.16
Mode	802.11n(HT40)		
Channel/Frequency(MHz)	3(2422)	6(2437)	9(2452)
Average Power(dBm)	20.67	23.98	22.49
Mode	802.11ax 20		
Channel/Frequency(MHz)	1(2412)	6(2437)	11(2462)
Average Power(dBM)	23.68	23.74	20.00
Mode	802.11ax40		
Channel/Frequency(MHz)	3(2422)	6(2437)	9(2452)
Average Power(dBM)	20.89	24.16	22.82

AUX ANT2

Mode	802.11b		
Channel/Frequency(MHz)	1(2412)	6(2437)	11(2462)
Average Power(dBm)	17.70	17.71	17.62
Mode	802.11g		
Channel/Frequency(MHz)	1(2412)	6(2437)	11(2462)
Average Power(dBM)	19.97	20.76	20.58
Mode	802.11n(HT20)		
Channel/Frequency(MHz)	1(2412)	6(2437)	11(2462)
Average Power(dBM)	19.94	20.67	20.55
Mode	802.11n(HT40)		
Channel/Frequency(MHz)	1(2412)	6(2437)	11(2462)
Average Power(dBm)	18.89	21.23	21.18
Mode	802.11ax 20		
Channel/Frequency(MHz)	1(2412)	6(2437)	11(2462)
Average Power(dBm)	20.39	21.14	20.90
Mode	802.11ax 40		
Channel/Frequency(MHz)	3(2422)	6(2437)	9(2452)
Average Power(dBm)	19.35	21.45	**21.51**

MIMO Mode

Mode	802.11n(HT20)		
Channel/Frequency(MHz)	1(2412)	6(2437)	11(2462)
Average Power(dBM)	24.87	25.18	25.06
Mode	802.11n(HT40)		
Channel/Frequency(MHz)	1(2412)	6(2437)	11(2462)
Average Power(dBm)	22.88	**25.83**	24.89
Mode	802.11ax 20		
Channel/Frequency(MHz)	1(2412)	6(2437)	11(2462)
Average Power(dBm)	25.35	25.64	23.48
Mode	802.11ax 40		
Channel/Frequency(MHz)	3(2422)	6(2437)	9(2452)
Average Power(dBm)	23.20	**26.02**	25.22

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

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

10.1.2 Conducted Power of Wi-Fi 5G

Band	Mode	Channel	Frequency(MHz)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
Ant 1						
U-NII-1 (5150-5250)	802.11a	36	5180	15.00±1.0	14.58	No
		48	5240	14.50±1.0	14.26	No
	802.11n-HT20	36	5180	15.00±1.0	14.67	No
		48	5240	14.50±1.0	14.23	No
	802.11n-HT40	38	5190	15.50±1.0	15.50	No
		46	5230	16.50±1.0	16.06	Yes
	802.11ac-VHT20	36	5180	15.00±1.0	14.67	No
		48	5240	14.50±1.0	14.25	No
	802.11ac-VHT40	38	5190	15.50±1.0	15.45	No
		46	5230	16.00±1.0	15.90	No
	802.11ac-VHT80	42	5210	16.00±1.0	15.71	No
	802.11ax- HT160	50	5250	10.50±1.0	10.36	No
	802.11ax-HT20	36	5180	15.00±1.0	14.54	No
		48	5240	14.50±1.0	14.16	No
	802.11ax-HT40	38	5190	15.50±1.0	15.10	No
		46	5230	16.00±1.0	15.60	No
	802.11ax-HT80	42	5210	16.00±1.0	15.39	No
Ant 2						
Band	Mode	Channel	Frequency(MHz)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
U-NII-1 (5150-5250)	802.11a	36	5180	12.50±1.0	12.33	No
		48	5240	12.00±1.0	11.82	No
	802.11n-HT20	36	5180	13.00±1.0	12.69	No
		48	5240	12.50±1.0	12.14	No
	802.11n-HT40	38	5190	14.50±1.0	14.05	Yes
		46	5230	14.00±1.0	13.70	No
	802.11ac-VHT20	36	5180	13.00±1.0	12.67	No
		48	5240	12.50±1.0	12.08	No
	802.11ac-VHT40	38	5190	14.00±1.0	13.91	No
		46	5230	14.00±1.0	13.58	No
	802.11ac-VHT80	42	5210	14.00±1.0	13.88	No
	802.11ax- HT160	50	5250	11.00±1.0	10.74	No
	802.11ax-HT20	36	5180	13.00±1.0	12.57	No
		48	5240	12.50±1.0	12.05	No
	802.11ax-HT40	38	5190	14.00±1.0	13.67	No
		46	5230	13.00±1.0	13.00	No
	802.11ax-HT80	42	5210	13.50±1.0	13.28	No
MIMO						
Band	Mode	Channel	Frequency(MHz)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
U-NII-1 (5150-5250)	802.11n-HT20	36	5180	17.00±1.0	16.80	No
		48	5240	16.50±1.0	16.32	No
	802.11n-HT40	38	5190	18.00±1.0	17.85	No
		46	5230	18.50±1.0	18.05	Yes
	802.11ac-VHT20	36	5180	17.00±1.0	16.79	No
		48	5240	16.50±1.0	16.31	No
	802.11ac-VHT40	38	5190	18.00±1.0	17.76	No
		46	5230	18.00±1.0	17.90	No
	802.11ac-VHT80	42	5210	18.00±1.0	17.90	No
	802.11ax- HT160	50	5250	17.00±1.0	13.56	No
	802.11ax-HT20	36	5180	14.00±1.0	16.68	No
		48	5240	17.00±1.0	16.24	No
	802.11ax-HT40	38	5190	16.50±1.0	17.45	No
		46	5230	17.50±1.0	17.50	No
	802.11ax-HT80	42	5210	17.50±1.0	17.47	No

Ant 1						
Band	Mode	Channel	Frequency (MHz)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
U-NII-2a (5250-5350)	802.11a	52	5260	14.50±1.0	14.12	No
		64	5320	14.50±1.0	14.25	No
	802.11n-HT20	52	5260	14.50±1.0	14.15	No
		64	5320	14.50±1.0	14.27	No
	802.11n-HT40	54	5270	16.00±1.0	**15.71**	Yes
		62	5310	15.00±1.0	14.89	No
	802.11ac-VHT20	52	5260	14.50±1.0	14.10	No
		64	5320	14.50±1.0	14.26	No
	802.11ac-VHT40	54	5270	16.00±1.0	15.62	No
		62	5310	15.00±1.0	14.80	No
	802.11ac-VHT80	58	5290	14.00±1.0	13.96	No
	802.11ax-HT20	52	5260	14.50±1.0	14.04	No
		64	5320	14.50±1.0	14.21	No
	802.11ax-HT40	54	5270	15.50±1.0	15.35	No
		62	5310	14.50±1.0	14.47	No
	802.11ax-HT80	58	5290	14.00±1.0	13.63	No

Ant 2						
Band	Mode	Channel	Frequency (MHz)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
U-NII-2a (5250-5350)	802.11a	52	5260	12.00±1.0	11.65	No
		64	5320	12.50±1.0	12.06	No
	802.11n-HT20	52	5260	12.00±1.0	11.96	No
		64	5320	12.50±1.0	12.35	No
	802.11n-HT40	54	5270	14.00±1.0	13.51	No
		62	5310	14.00±1.0	**13.63**	Yes
	802.11ac-VHT20	52	5260	12.00±1.0	11.92	No
		64	5320	12.50±1.0	12.27	No
	802.11ac-VHT40	54	5270	13.50±1.0	13.43	No
		62	5310	13.50±1.0	13.48	No
	802.11ac-VHT80	58	5290	13.50±1.0	13.10	No
	802.11ax-HT20	52	5260	12.00±1.0	11.90	No
		64	5320	12.50±1.0	12.21	No
	802.11ax-HT40	54	5270	13.00±1.0	12.82	No
		62	5310	13.00±1.0	12.92	No
	802.11ax-HT80	58	5290	12.50±1.0	12.49	No

MIMO						
Band	Mode	Channel	Frequency (MHz)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
U-NII-2a (5250-5350)	802.11n-HT20	52	5260	16.50±1.0	16.20	No
		64	5320	16.50±1.0	16.43	No
	802.11n-HT40	54	5270	18.00±1.0	**17.76**	Yes
		62	5310	17.50±1.0	17.32	No
	802.11ac-VHT20	52	5260	16.50±1.0	16.16	No
		64	5320	16.50±1.0	16.39	No
	802.11ac-VHT40	54	5270	18.00±1.0	17.67	No
		62	5310	17.50±1.0	17.20	No
	802.11ac-VHT80	58	5290	17.00±1.0	16.56	No
	802.11ax-HT20	52	5260	16.50±1.0	16.11	No
		64	5320	16.50±1.0	16.33	No
	802.11ax-HT40	54	5270	17.50±1.0	17.28	No
		62	5310	17.00±1.0	16.77	No
	802.11ax-HT80	58	5290	16.50±1.0	16.11	No

Ant 1						
Band	Mode	Channel	Frequency (MHz)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
U-NII-2c (5470-5725)	802.11a	100	5500	13.50±1.0	13.36	No
		140	5700	13.50±1.0	13.20	No
	802.11n-HT20	100	5500	13.50±1.0	13.34	No
		140	5700	13.50±1.0	13.18	No
	802.11n-HT40	102	5510	13.50±1.0	13.49	No
		134	5670	15.00±1.0	14.65	No
	802.11ac-VHT20	100	5500	13.50±1.0	13.30	No
		140	5700	13.50±1.0	13.18	No
	802.11ac-VHT40	102	5510	15.00±1.0	13.35	No
		134	5670	14.50±1.0	14.54	No
	802.11ac-VHT80	106	5530	14.00±1.0	13.85	No
		122	5610	15.50±1.0	15.21	Yes
	802.11ax- HT160	114	5570	11.50±1.0	11.36	No
	802.11ax-HT20	100	5500	13.50±1.0	13.33	No
		140	5700	13.50±1.0	13.05	No
	802.11ax-HT40	102	5510	13.50±1.0	13.13	No
		134	5670	14.50±1.0	14.26	No
	802.11ax-HT80	106	5530	13.50±1.0	13.47	No
		122	5610	15.00±1.0	14.96	No

Ant 2						
Band	Mode	Channel	Frequency (MHz)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
U-NII-2c (5470-5725)	802.11a	100	5500	12.00±1.0	11.66	No
		140	5700	13.00±1.0	12.53	No
	802.11n-HT20	100	5500	12.00±1.0	12.00	No
		140	5700	13.00±1.0	12.85	No
	802.11n-HT40	102	5510	13.50±1.0	13.06	No
		134	5670	14.50±1.0	14.35	No
	802.11ac-VHT20	100	5500	12.00±1.0	11.91	No
		140	5700	13.00±1.0	12.80	No
	802.11ac-VHT40	102	5510	13.00±1.0	12.95	No
		134	5670	14.50±1.0	14.23	No
	802.11ac-VHT80	106	5530	14.00±1.0	13.85	No
		122	5610	15.00±1.0	14.55	Yes
	802.11ax- HT160	114	5570	12.50±1.0	12.39	No
	802.11ax-HT20	100	5500	12.00±1.0	11.81	No
		140	5700	13.00±1.0	12.73	No
	802.11ax-HT40	102	5510	12.50±1.0	12.33	No
		134	5670	14.00±1.0	13.64	No
	802.11ax-HT80	106	5530	13.50±1.0	13.28	No
		122	5610	14.00±1.0	13.99	No

MIMO						
Band	Mode	Channel	Frequency (MHz)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
U-NII-2c (5470-5725)	802.11n-HT20	100	5500	16.00±1.0	15.73	No
		140	5700	16.50±1.0	16.03	No
	802.11n-HT40	102	5510	16.50±1.0	16.29	No
		134	5670	18.00±1.0	17.51	No
	802.11ac-VHT20	100	5500	16.00±1.0	15.67	No
		140	5700	16.00±1.0	16.00	No
	802.11ac-VHT40	102	5510	16.50±1.0	16.16	No
		134	5670	17.50±1.0	17.40	No
	802.11ac-VHT80	106	5530	17.00±1.0	16.86	No
		122	5610	18.00±1.0	17.90	Yes
	802.11ax- HT160	114	5570	15.00±1.0	14.92	No
	802.11ax-HT20	100	5500	16.00±1.0	15.65	No
		140	5700	16.00±1.0	15.90	No
	802.11ax-HT40	102	5510	16.00±1.0	15.76	No
		134	5670	17.00±1.0	16.97	No
	802.11ax-HT80	106	5530	16.50±1.0	16.39	No
		122	5610	18.00±1.0	17.51	No

Ant 1						
Band	Mode	Channel	Frequency (MHz)	Tune-up	Average Powe(dBm)	SAR Test (Yes/No)
U-NII-3 (5725-5825)	802.11a	149	5745	13.00	12.89	No
		165	5825	12.50	12.27	No
	802.11n-HT20	149	5745	13.00	12.97	No
		165	5825	12.50	12.38	No
	802.11n-HT40	151	5755	14.50	14.21	No
		159	5795	14.50	14.26	Yes
	802.11ac-VHT20	149	5745	13.00	12.99	No
		165	5825	12.50	12.33	No
	802.11ac-VHT40	151	5755	14.50	14.12	No
		159	5795	14.50	14.17	No
	802.11ac-VHT80	155	5775	14.00	13.72	No
	802.11ax-HT20	149	5745	13.00	12.82	No
		165	5825	12.50	12.17	No
	802.11ax-HT40	151	5755	14.00	13.85	No
		159	5795	14.00	13.87	No
	802.11ax-HT80	155	5775	13.50	13.44	No
Ant 2						
Band	Mode	Channel	Frequency (MHz)	Tune-up	Average Powe(dBm)	SAR Test (Yes/No)
U-NII-3 (5725-5825)	802.11a	149	5745	12.00	11.91	No
		165	5825	12.00	11.67	No
	802.11n-HT20	149	5745	12.50	12.23	No
		165	5825	12.50	12.11	No
	802.11n-HT40	151	5755	14.00	13.64	No
		159	5795	14.00	13.77	No
	802.11ac-VHT20	149	5745	12.50	12.17	No
		165	5825	12.50	12.01	No
	802.11ac-VHT40	151	5755	14.00	13.55	No
		159	5795	14.00	13.56	No
	802.11ac-VHT80	155	5775	14.50	**14.40**	Yes
	802.11ax-HT20	149	5745	12.50	12.15	No
		165	5825	12.50	12.02	No
	802.11ax-HT40	151	5755	13.00	13.00	No
		159	5795	13.00	12.96	No
	802.11ax-HT80	155	5775	14.00	13.69	No
MIMO						
Band	Mode	Channel	Frequency (MHz)	Tune-up	Average Powe(dBm)	SAR Test (Yes/No)
U-NII-3 (5725-5825)	802.11n-HT20	149	5745	16.00	15.63	No
		165	5825	15.50	15.26	No
	802.11n-HT40	151	5755	17.00	16.94	No
		159	5795	17.50	17.03	No
	802.11ac-VHT20	149	5745	16.00	15.61	No
		165	5825	15.50	15.18	No
	802.11ac-VHT40	151	5755	17.00	16.85	No
		159	5795	17.00	16.89	No
	802.11ac-VHT80	155	5775	17.50	**17.08**	Yes
	802.11ax-HT20	149	5745	16.00	15.51	No
		165	5825	15.50	15.11	No
	802.11ax-HT40	151	5755	16.50	16.46	No
		159	5795	16.50	16.45	No
	802.11ax-HT80	155	5775	17.00	16.58	No

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

10.1.3 Conducted Power of BT

The maximum output power of BT is:

Mode	GFSK mode		
Channel/Frequency(MHz)	0(2402)	39(2441)	78(2480)
Peak Power(dBm)	10.68	11.07	**11.28**
Mode	Pi/4DQPSK mode		
Channel/Frequency(MHz)	0(2402)	39(2441)	78(2480)
Peak Power(dBm)	9.38	9.47	9.40
Mode	8DPSK mode		
Channel/Frequency(MHz)	0(2402)	39(2441)	78(2480)
Peak Power(dBm)	9.21	9.43	9.33

The maximum output power of BLE is:

Mode	1Mbps		
Channel/Frequency(MHz)	0(2402)	19(2440)	39(2480)
Peak Power(dBm)	7.63	7.81	7.64
Mode	2Mbps		
Channel/Frequency(MHz)	0(2402)	19(2440)	39(2480)
Peak Power(dBm)	**7.75**	**7.84**	7.65

10.1.4 Tune-up powertolerance

Band	Tune-up power tolerance(dBm)			
WIFI	2.4G (MAIN ANT1)		802.11b	Max output power =20.5±1.0dbm
			802.11g	Max output power =23.5±1.0dbm
			802.11n (HT20)	Max output power = 23.5 ±1.0dbm
			802.11n (HT40)	Max output power =24.0±1.0dbm
			802.11ax20	Max output power =24.0±1.0dbm
			802.11ax40)	Max output power =24.5±1.0dbm
	2.4G (AUX ANT2)		802.11b	Max output power =18.0±1.0dbm
			802.11g	Max output power =21.0±1.0dbm
			802.11n (HT20)	Max output power =21.0±1.0dbm
			802.11n (HT40)	Max output power =21.5±1.0dbm
			802.11ax20	Max output power =21.5±1.0dbm
			802.11ax40)	Max output power =22.0±1.0dbm
	2.4G (MIMOMode)		802.11n (HT20)	Max output power =25.5 ±1.0dbm
			802.11n (HT40)	Max output power =26.0 ±1.0dbm
			802.11ax20	Max output power =26.0 ±1.0dbm
			802.11ax40)	Max output power =26.5±1.0dbm
	U-NII-1 (5150-5250)	Ant 1	802.11n (HT20)	Max output power =16.5±1.0dbm
		Ant 2	802.11ac(VHT80)	Max output power =14.5±1.0dbm
		MIMO	802.11n(HT40)	Max output power =18.5±1.0dbm
	U-NII-2a (5250-5350)	Ant 1	802.11n(HT40)	Max output power =16.0±1.0dbm
		Ant 2	802.11n(HT40)	Max output power =14.0±1.0dbm
		MIMO	802.11n(HT40)	Max output power =18.0±1.0dbm
WIFI	U-NII-2c (5470-5725)	Ant 1	802.11ac(VHT80)	Max output power =15.5±1.0dbm
		Ant 2	802.11ac(VHT80)	Max output power =15.0±1.0dbm
		MIMO	802.11ac(VHT80)	Max output power =18.0±1.0dbm
	U-NII-3 (5725-5825)	Ant 1	802.11n(HT40)	Max output power =14.5±1.0dbm
		Ant 2	802.11ac(VHT80)	Max output power =14.5±1.0dbm
		MIMO	802.11ac(VHT80)	Max output power =17.5±1.0dbm
BT	GFSK mode			Max output power =11.5dBm±1.0dbm
	Pi/4DQPSK mode			Max output power =9.5dBm±1.0dbm
	8DPSK mode			Max output power =9.5dBm±1.0dbm
BLE	1Mbps Power			Max output power =8.0dBm±1.0dbm
	2Mbps Power			Max output power =8.0dBm±1.0dbm

10.2 SAR test results

Notes:

1) Per KDB447498 D01v05 r02,the SAR test shall be performed at the high, middle and low frequency channels of each operating mode. If the scaled SAR measured at mid-band channel for each test configuration is at least 3.0 dB lower than the SAR limit (< 0.8 W/kg), testing at the high and low channels is optional.

2) Per KDB447498 D01v05r02, testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is: ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz. When the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel must be used.

3)Per KDB447498 D01v06, All measurement SAR result is scaled-up to account for tune-up tolerance is compliant.

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

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

6) Per KDB865664 D01v01r04,for each frequency band,repeated SAR measurement is required only when the measured SAR is ≥0.8W/Kg; if the deviation among the repeated measurement is ≤20%,and the measured SAR <1.45W/Kg,only one repeated measurement is required.

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

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

10.2.1 Results overview of Wi-Fi 2.4G

Mode	Test Position of Body with 0mm	Test channel /Freq.(MHz)	SAR Value (W/kg)		Power Drift (%)	Conducted Power (dBm)	Tune-up Limit (dBm)	Scaled SAR1-g (W/kg)	Scaling Factor
			1-g	10-g					
WLAN2.4g(gap 0mm)									
802.11ax 40 MAIN ANT1	Front	6/2437	0.095	0.052	4.790	24.16	24.50	0.103	1.081
	Back	6/2437	0.077	0.040	2.490	24.16	24.50	0.083	1.081
802.11ax 40 AUX ANT2	Front	9/2452	0.083	0.054	4.190	21.51	22.00	0.093	1.119
	Back	9/2452	0.075	0.031	4.890	21.51	22.00	0.084	1.119
802.11ax 40 MIMO-ANT	Front	6/2437	0.112	0.065	0.740	26.02	26.50	**0.125**	1.117
	Back	6/2437	0.091	0.053	-2.210	26.02	26.50	0.102	1.117

10.2.2 Results overview of Wi-Fi 5G

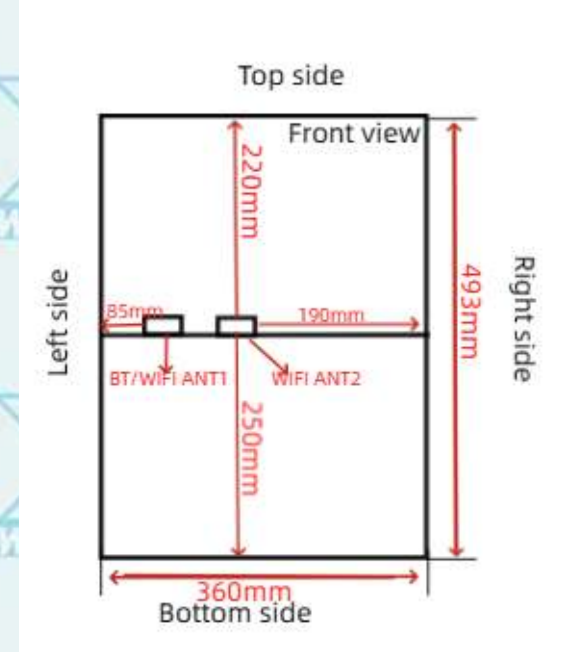
Mode	Test Position of Body with 0mm	Test channel /Freq.(MHz)	SAR Value (W/kg)		Power Drift (%)	Conducted Power (dBm)	Tune-up Limit (dBm)	Scaled SAR1-g (W/kg)	Scaling Factor
			1-g	10-g					
WLAN5.2g(gap 0mm)									
802.11n-HT40 ANT1	Front	46/5230	0.078	0.023	-2.020	16.06	16.50	0.086	1.107
	Back	46/5230	0.079	0.031	-1.550	16.06	16.50	0.087	1.107
802.11ac-VHT80 ANT2	Front	38/5190	0.068	0.020	4.920	14.05	14.50	0.075	1.109
	Back	38/5190	0.077	0.032	-3.010	14.05	14.50	0.085	1.109
802.11n(HT40) MIMO-ANT	Front	46/5230	0.107	0.052	1.070	18.05	18.50	**0.119**	1.109
	Back	46/5230	0.094	0.042	3.780	18.05	18.50	0.104	1.109
Mode	**Test Position of Body with 0mm**	**Test channel /Freq.(MHz)**	**SAR Value (W/kg)**		**Power Drift (%)**	**Conducted Power (dBm)**	**Tune-up Limit (dBm)**	**Scaled SAR1-g (W/kg)**	**Scaling Factor**
			1-g	**10-g**					
WLAN5.4g(gap 0mm)									
802.11n-HT40 ANT1	Front	54/5270	0.059	0.023	-0.330	15.71	16.00	0.063	1.069
	Back	54/5270	0.076	0.026	-1.470	15.71	16.00	0.081	1.069
802.11n-HT40 ANT2	Front	62/5310	0.059	0.020	-2.990	13.63	14.00	0.064	1.089
	Back	62/5310	0.066	0.036	-4.250	13.63	14.00	0.072	1.089
802.11n-HT40 MIMO-ANT	Front	54/5270	0.093	0.047	-3.750	17.76	18.00	**0.098**	1.057
	Back	54/5270	0.074	0.032	3.310	17.76	18.00	0.078	1.057
WLAN5.6g(gap 0mm)									
802.11ac-VHT80 ANT1	Front	122/5610	0.065	0.023	-3.890	15.21	15.50	0.069	1.069
	Back	122/5610	0.072	0.019	-3.370	15.21	15.50	0.077	1.069
802.11ac(VHT80) ANT2	Front	122/5610	0.060	0.026	2.390	14.55	15.00	0.067	1.109
	Back	122/5610	0.092	0.037	4.190	14.55	15.00	0.102	1.109
802.11ac(VHT80) MIMO-ANT	Front	122/5610	0.110	0.065	-3.510	17.90	18.00	**0.113**	1.023
	Back	122/5610	0.096	0.059	-2.970	17.90	18.00	0.098	1.023
WLAN5.8g(gap 0mm)									
802.11n-HT40 ANT1	Front	159/5795	0.071	0.030	-4.620	14.26	14.50	0.075	1.057
	Back	159/5795	0.050	0.008	2.170	14.26	14.50	0.053	1.057
802.11ac-VHT80 ANT2	Front	155/5775	0.062	0.018	2.550	14.40	14.50	0.063	1.023
	Back	155/5775	0.054	0.023	3.360	14.40	14.50	0.055	1.023
802.11ac-VHT80 MIMO-ANT1	Front	155/5775	0.086	0.044	-2.480	17.08	17.50	**0.095**	1.102
	Back	155/5775	0.073	0.020	2.740	17.08	17.50	0.080	1.102

10.2.3 Results overview of BT

Test Position of Body with 0mm	Test channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (%)	Conducted Power (dBm)	Tune-up Limit(dBm)	Scaled SAR_{1-g} (W/kg)	Scalig factor
			1-g	10-g					
BTantenna to side									
Front side	78/2480	GFSK	0.060	0.028	-4.480	11.28	11.50	0.063	1.052
Rear side	78/2480	GFSK	0.075	0.038	0.210	11.28	11.50	**0.079**	1.052
Left side	78/2480	GFSK	0.047	0.026	-3.680	11.28	11.50	0.049	1.052
Top side	78/2480	GFSK	0.046	0.010	0.620	11.28	11.50	0.048	1.052

11 Multiple Transmitter Information

The SAR measurement positions of each side are as below:



<Rear Side>

Side	Wi-Fi/BT antenna **(0 degree) to Side**
	SAR Consideration
Front Side	Yes
Rear Side	Yes
Left Side	Yes
Right Side	Yes
Top Side	Yes
Bottom Side	No

Note: According to section 6.1.4.5 device with swivel antennas, if the antennas can be rotated to two planes, an evaluation should be performed and documented on the report to decide the highest exposure conditions, and only that position need consideration.

In addition, in case of this antenna, the two representative positions 0degree and 90degree shall be evaluated independently for each required EUT edge. When evaluating the test surfaces, the nearest distance between the antenna and the edges is applicable.

11.1.1 Stand-alone SAR test exclusion

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR,where

• f(GHz) is the RF channel transmit frequency in GHz

• Power and distance are rounded to the nearest mW and mm before calculation

• The result is rounded to one decimal place for comparison

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

Body-Wornposition

Mode	Pmax(dBm)	Pmax(mW)	Distance(mm)	f(GHz)	Calculation Result	exclusion Threshold	SAR test exclusion
BT	11.28	13.43	5.00	2.45	4.449	7.50	Yes

11.1.2 Simultaneous Transmission SAR Summation Scenario

Mode	Position	Ant 1WIFI 1g(W/kg)	Ant 1 BT 1g(W/kg)	Ant 1 WIFI+ BT 1g(W/kg)
2.4Gwifi (MIMO)	Front	0.125	0.063	0.188
	Back	0.102	0.079	0.181
5.2Gwifi (MIMO)	Front	0.119	0.063	0.182
	Back	0.104	0.079	0.183
5.4Gwifi (MIMO)	Front	0.098	0.063	0.161
	Back	0.078	0.079	0.157
5.6Gwifi (MIMO)	Front	0.113	0.063	0.176
	Back	0.098	0.079	0.177
5.8Gwifi (MIMO)	Front	0.095	0.063	0.158
	Back	0.080	0.079	0.159

11.2 Measurement uncertainty evaluation for SAR test

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

Measurement Uncertainty evaluation for SAR test								
Uncertainty Component	Tol. (±%)	Prob. Dist.	Div.	C_i (1g)	C_i (10g)	1g U_i (±%)	10g U_i (±%)	V_i
measurement system								
Probe Calibration	5.8	N	1	1	1	5.8	5.8	∞
Axial Isotropy	3.5	R	$\sqrt{3}$	$(1-C_p)^{1/2}$	$(1-C_p)^{1/2}$	1.43	1.43	∞
Hemispherical Isotropy	5.9	R	$\sqrt{3}$	$\sqrt{C_p}$	$\sqrt{C_p}$	2.41	2.41	∞
Boundary Effect	1	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Linearity	4.7	R	$\sqrt{3}$	1	1	2.71	2.71	∞
system Detection Limits	1	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Modulation response	3	N	1	1	1	3.00	3.00	∞
Readout Electronics	0.5	N	1	1	1	0.50	0.50	∞
Response Time	0	R	$\sqrt{3}$	1	1	0.00	0.00	∞
Integration Time	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
RF Ambient Conditions-Noise	3	R	$\sqrt{3}$	1	1	1.73	1.73	∞
RF Ambient Conditions-Reflections	3	R	$\sqrt{3}$	1	1	1.73	1.73	∞
Probe Positioner Mechanical Tolerance	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Probe positioning with respect to Phantom Shell	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Extrapolation, interpolation and Integration Algorithms for Max.SAR Evaluation	2.3	R	$\sqrt{3}$	1	1	1.33	1.33	∞
Test sample Related								
Test Sample Positioning	2.6	N	1	1	1	2.60	2.60	11
Device Holder Uncertainty	3	N	1	1	1	3.00	3.00	7
Output Power Variation-SAR drift measurement	5	R	$\sqrt{3}$	1	1	2.89	2.89	∞
SAR scaling	2	R	$\sqrt{3}$	1	1	1.15	1.15	∞

Phantom and Tissue Parameters								
Phantom Uncertainty (shape and thickness tolerances)	4	R	$\sqrt{3}$	1	1	2.31	2.31	∞
Uncertainty in SAR correction for deviation (in permittivity and conductivity)	2	N	1	1	0.84	2.00	1.68	∞
Liquid conductivity（meas.）	2.5	N	1	0.64	0.43	1.60	1.08	5
Liquid conductivity (target.)	5	R	$\sqrt{3}$	0.64	0.43	1.85	1.24	5
Liquid Permittivity（meas.）	2.5	N	1	0.60	0.49	1.50	1.23	∞
Liquid Permittivity (target.)	5	R	$\sqrt{3}$	0.60	0.49	1.73	1.42	∞
Combined Standard Uncertainly		Rss				10.63	10.54	
Expanded Uncertainty{95% CONFIDENCE INTERRVAL}		k				21.26	21.08	

11.3 Measurement uncertainty evaluation for system check

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

Uncertainty For System Performance Check								
Uncertainty Component	Tol. (±%)	Prob. Dist.	Div.	C_i 1g	C_i 10g	1g U_i(±%)	10g U_i (±%)	V_i
measurement system								
Probe Calibration	5.8	N	1	1	1	5.80	5.80	∞
Axial Isotropy	3.5	R	$\sqrt{3}$	$(1-C_p)^{1/2}$	$(1-C_p)^{1/2}$	1.43	1.43	∞
Hemispherical Isotropy	5.9	R	$\sqrt{3}$	$\sqrt{C_p}$	$\sqrt{C_p}$	2.41	2.41	∞
Boundary Effect	1	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Linearity	4.7	R	$\sqrt{3}$	1	1	2.71	2.71	∞
system detection Limits	1	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Modulation response	0	N	1	1	1	0.00	0.00	∞
Readout Electronics	0.5	N	1	1	1	0.50	0.50	∞
Response Time	0	R	$\sqrt{3}$	1	1	0.00	0.00	∞
Integration Time	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
RF ambient Conditions - Noise	3	R	$\sqrt{3}$	1	1	1.73	1.73	∞
RF ambient Conditions – Reflections	3	R	$\sqrt{3}$	1	1	1.73	1.73	∞
Probe positioned Mechanical Tolerance	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Probe positioning with respect to Phantom Shell	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Extrapolation, interpolation and integration Algorithms for Max. SAR Evaluation	2.3	R	$\sqrt{3}$	1	1	1.33	1.33	∞
Dipole								
Deviation of experimental source from numerical source	4	N	1	1	1	4.00	4.00	∞
Input power and SAR drift measurement	5	R	$\sqrt{3}$	1	1	2.89	2.89	∞
Dipole axis to liquid Distance	2	R	$\sqrt{3}$	1	1	1.16	1.16	∞

Phantom and Tissue Parameters								
Phantom Uncertainty (shape and thickness tolerances)	4	R	$\sqrt{3}$	1	1	2.31	2.31	∞
Uncertainty in SAR correction for deviation (in permittivity and conductivity)	2	N	1	1	0.84	2.00	1.68	∞
Liquid conductivity（meas.）	2.5	N	1	0.64	0.43	1.60	1.08	5
Liquid conductivity (target.)	5	R	$\sqrt{3}$	0.64	0.43	1.85	1.24	5
Liquid Permittivity（meas.）	2.5	N	1	0.60	0.49	1.50	1.23	∞
Liquid Permittivity (target.)	5	R	$\sqrt{3}$	0.60	0.49	1.73	1.41	∞
Combined Standard Uncertainty		Rss				10.28	9.98	
Expanded Uncertainty (95% Confidence interval)		k				20.57	19.95	

12 Test equipment and ancillaries used for tests

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

	Manufacturer	Device Type	Type(Model)	Serial number	calibration	
					Last Cal.	Due Date
☒	SATIMO	COMOSAR DOSIMETRIC E FIELD PROBE	SSE2	3323-EPGO-424	2023-07-09	2024-07-08
☒	SATIMO	COMOSAR 750 MHz REFERENCE DIPOLE	SID750	SN 48/16 DIP0G750-444	2023-06-25	2026-06-24
☒	SATIMO	COMOSAR 835 MHz REFERENCE DIPOLE	SID835	SN 14/13 DIP0G835-235	2023-06-25	2026-06-24
☒	SATIMO	COMOSAR 900 MHz REFERENCE DIPOLE	SID900	SN 14/13 DIP0G900-231	2023-06-25	2026-06-24
☒	SATIMO	COMOSAR 1800 MHz REFERENCE DIPOLE	SID1800	SN 14/13 DIP1G800-232	2023-06-25	2026-06-24
☐	SATIMO	COMOSAR 1900 MHz REFERENCE DIPOLE	SID1900	SN 14/13 DIP1G900-236	2023-06-25	2026-06-24
☒	SATIMO	COMOSAR 2000 MHz REFERENCE DIPOLE	SID2000	SN 14/13 DIP2G000-237	2023-06-25	2026-06-24
☒	SATIMO	COMOSAR 2450 MHz REFERENCE DIPOLE	SID2450	SN 14/13 DIP2G450-238	2023-06-25	2026-06-24
☒	SATIMO	COMOSAR 2600 MHz REFERENCE DIPOLE	SID2600	SN 28/14 DIP2G600-327	2023-06-25	2026-06-24
☒	SATIMO	Software	OPENSAR	N/A	N/A	N/A
☒	SATIMO	Phantom	COMOSAR IEEE SAM PHANTOM	SN 14/13 SAM99	N/A	N/A
☒	R & S	Universal Radio Communication Tester	CMU 200	119733	2023-11-02	2024-11-01
☒	R & S	Universal Radio Communication Tester	CMW500	144459	2023-11-02	2024-11-01
☒	R & S	Universal Radio Communication Tester	E7515B	MY60192341	2023-11-02	2024-11-01
☒	HP	Network Analyser	8753D	3410A08889	2023-11-02	2024-11-01
☒	HP	Signal Generator	E4421B	GB39340770	2023-11-02	2024-11-01
☒	Keithley	Multimeter	Keithley 2000	4014539	2023-11-02	2024-11-01
☒	SATIMO	Amplifier	Power Amplifier	MODU-023-A-0004	2023-11-02	2024-11-01
☒	Agilent	Power Meter	E4418B	GB43312909	2023-11-02	2024-11-01
☒	Agilent	Power Meter Sensor	E4412A	MY41500046	2023-11-02	2024-11-01

Annex A: System performance verification

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

Annex B: Measurement results

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

Annex C: Calibrationreports

(Please See the Calibration reports of annex C.)

Annex D: Photographs