FCC SAR Compliance Test Report

For

SHENZHEN PORTKEYS ELECTRONIC TECHNOLOGY CO.,LTD

Room 201, Building 1 , No. 101, ShangWei Road, ShangWei Village, ZhangKengJing Community, GuanHu Street, LongHua District, ShenZhen

Model: BM7IIDS

Test Engineer:	Zeng Longhao *Zeng Longhao*
Report Number:	WSCT-A2LA-R&E240600028A-SAR
Report Date:	24 July 2024
FCC ID:	2A5UI-BM7IIDS
Check By:	Wei Liangmei *Wei Liangmei*
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Modified History

REV.	Modification Description	Issued Date	Remark
REV.1.0	Initial Test Report Relesse	24 July 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: 2024-06-20
Start of test: 2024-06-22
End of test: 2024-07-22

1.3 Statement of Compliance

The maximum results of Specific Absorption Rate(SAR) foundduring testing for BM7IIDS is asbelow:

Band	Position	MAX ReportedSAR$_{1g}$(W/kg)
2.4G WIFI	Body-Worn 0mm	0.271
BT	Body-Worn 0mm	0.138

ThedeviceisincompliancewithSpecificAbsorptionRate （ SAR ） forgeneralpopulation/uncontraolled exposurelimitsof1.6W/Kgasaveragedoverany1gtissueaccordingtotheFCCrule§2.1093,the ANSI/IEEEC95.1:2005,theNCRPReportNumber86foruncontrolledenvironment,accordingtothe IndustryCanadaRadioStandardsSpecificationRSS-102forGeneral Population/Uncontrolledexposure, andhadbeentestedinaccordancewiththemeasurementmethodsandproceduresspecifiedinIEEE Std1528-2013.

1.4 EUT Information

Product Name:	LCD monitors		
Model No :	BM7IIDS		
Additional Model:	BM7DS ,LH6W,LH6X,LH6P,LS7P ,RECKEYⅡ BTⅡ,BTⅢ WRX ,WTX,LH5X,Keygrip J,Keygrip N,Pico Mini,LINKEY Mini,LINKEY CTRL,LH5PⅢ,WRV7		
Trade Mark:	PortKeys		
Device Operating Configurations:			
Supported type:	Wi-Fi, BT		
Modulation:	OFDM/ DSSS,GFSK/π/4-DQPSK/ 8-DPSK		
BT version:	BT 3.0, BT 4.0		
Operating Frequency Range(s)	Band	TX(MHz)	RX(MHz)
	WIFI	2400-2483.5	2400-2483.5
	BT	2400-2483.5	2400-2483.5
Test Channel:	1-7-13 (Wi-Fi 2450)		
	0-39-78 (BT 3.0)		
	0-19-39 (BT4.0)		
Modulation mode:	GFSK, π/4- DQPSK, 8DPSK(BT) GFSK(BLE) DSSS(DBPSK, DQPSK, CCK, BPSK,QPSK, 16QAM,64QAM) for WIFI		
Antenna Gain:	BT/WIFI:3.0dBi		
Power Supply	DC 12V		

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
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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** (Registration NO: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:	SHENZHEN PORTKEYS ELECTRONIC TECHNOLOGY CO.,LTD
Applicant Address:	Room 201, Building 1 , No. 101, ShangWei Road, ShangWei Village, ZhangKengJing Community, GuanHu Street, LongHua District, ShenZhen
Manufacturer Name:	SHENZHEN PORTKEYS ELECTRONIC TECHNOLOGY CO.,LTD
Manufacturer Address:	Room 201, Building 1 , No. 101, ShangWei Road, ShangWei Village, ZhangKengJing Community, GuanHu Street, LongHua District, ShenZhen

6 Test standard/s:

No.	Identity	Document Title
1	IEC/IEEE 62209-1528	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate in the Human Head from Wireless Communications Devices: Measurement Techniques
2	KDB447498 D01	General RF Exposure Guidance v06
3	KDB447498 D04	Interim General RF Exposure Guidance v01
4	KDB865664 D01	SAR measurement 100MHz to 6GHz v01r04
5	KDB865664 D02	RF Exposure Reporting v01r02
6	KDB941225 D01	3G SAR Procedures v03r01
7	KDB941225 D05	SAR for LTE Devices v02r05
8	KDB248227 D01	802.11 Wi-Fi SAR v02r02
9	KDB941225 D06	Hotspot Mode v02r01
10	KDB648474 D04	Handset SAR v01r03
11	KDB690783 D01	SAR Listings on Grant v01r03

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

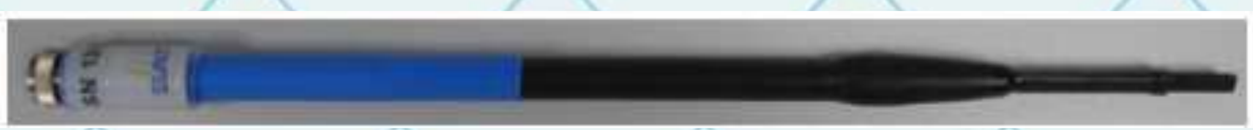


Figure 1 – MVG COMOSAR Dosimetric E field Dipole

- 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 oBLEain 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.

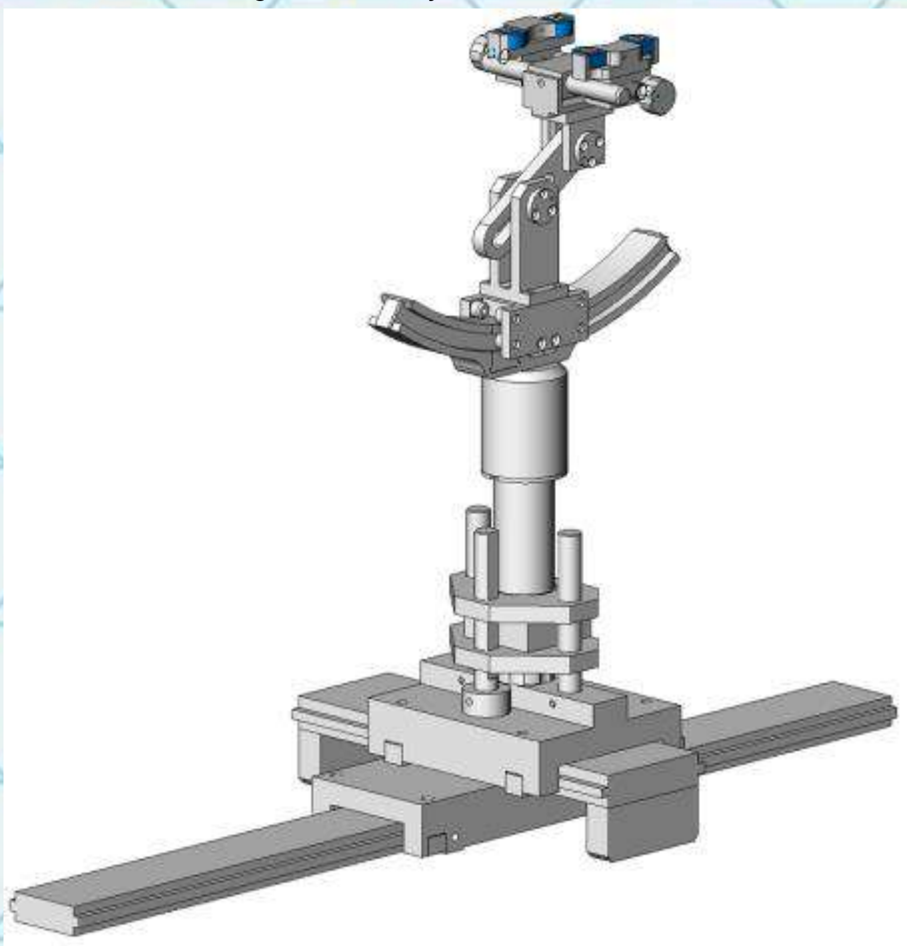
7.6 Phantom

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 oBLEaining 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

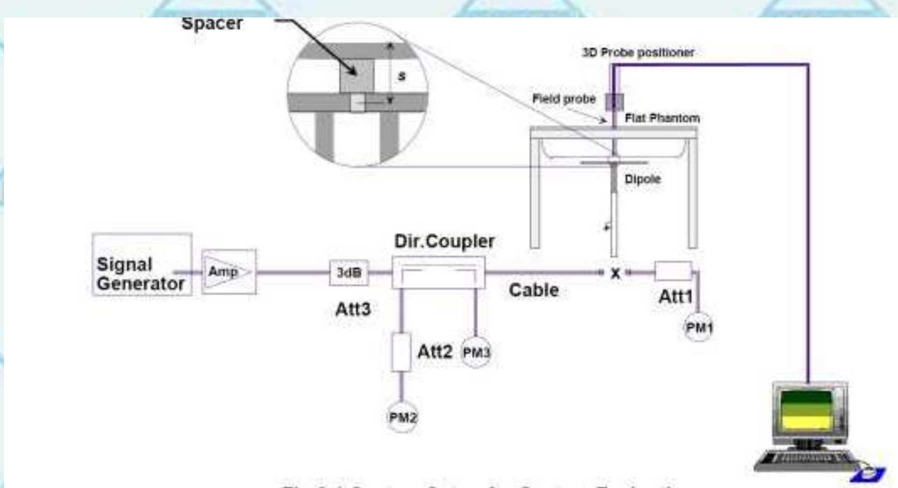
Tissue Type	Measured Frequency (MHz)	Target Tissue				Measured Tissue		Liquid Temp.	Test Date
		TargetPermittivity ε_r	Range of ±5%	TargetConductivity σ (S/m)	Range of ±5%	ε_r	σ (S/m)		
2450MHz Body	2410	52.80	50.16~55.44	1.91	1.81~2.00	52.50	1.94	21.6°C	2024-07-20
	2435	52.70	50.07~55.34	1.94	1.84~2.04	52.52	1.95		
	2450	52.50	50.07~55.34	1.91	1.85~2.05	52.73	1.93		
	2460	52.70	50.07~55.34	1.96	1.86~2.06	52.76	1.99		
ε_r= Relative permittivity, σ= Conductivity									

8 System Check

8.1 System check procedure

The System check is performed by using a System checkdipole 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 checkresults

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 Body	51.68	46.25~56.53	23.65	21.27~25.99	53.550	22.720	21.6°C	2024-07-20
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

10 Detailed Test Results

10.1 Conducted Power measurements

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

10.1.1 Conducted Power of Wi-Fi 2.4G

802.11b			
Channel/Frequency(MHz)	1(2412)	6(2437)	11(2462)
Average Power(dBM)	17.63	17.57	18.10
802.11g			
Channel/Frequency(MHz)	1(2412)	6(2437)	11(2462)
Average	17.65	17.34	18.06
802.11n-HT20			
Channel/Frequency(MHz)	1(2412)	6(2437)	11(2462)
Average	16.38	16.36	**18.39**
802.11n-HT40			
Channel/Frequency(MHz)	20(2422)	6(2437)	50(2452)
Average	17.40	17.07	17.05

Note:

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

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

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

10.1.2 Conducted Power of BT

The maximum output power of BT is:

Mode	GFSK mode		
Channel/Frequency(MHz)	0(2402)	39(2441)	78(2480)
Peak Power(dBm)	8.75	9.33	9.60
Mode	Pi/4DQPSK mode		
Channel/Frequency(MHz)	0(2402)	39(2441)	78(2480)
Peak Power(dBm)	8.64	9.39	9.58
Mode	8DPSK mode		
Channel/Frequency(MHz)	0(2402)	39(2441)	78(2480)
Peak Power(dBm)	9.05	9.63	**9.93**

The maximum output power of BLE is:

Mode	1Mbps		
Channel/Frequency(MHz)	0(2402)	19(2440)	39(2480)
Peak Power(dBm)	6.45	9.55	**10.07**

10.1.3 Tune-up powertolerance

Band	Tune-up power tolerance(dBm)	
2.4G Wifi	802.11b	Max output power =18.5±1.0dbm
	802.11g	Max output power =18.5±1.0dbm
	802.11n-HT20	Max output power =18.5±1.0dbm
	802.11n-HT40	Max output power =17.5±1.0dbm
BT	GFSK	Max output power =10.0dBm±1.0dbm
	Pi/4DQPSK	Max output power =10.0dBm±1.0dbm
	8DPSK	Max output power =10.0dBm±1.0dbm
BLE	1Mbps	Max output power =10.5dBm±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	Position	Ch.	Freq. (MHz)	1g Meas SAR (W/kg)	10g Meas SAR (W/kg)	Power Drift (%)	Duty cycle (%)	Duty cycle Factor	Meas. Power (dBm)	Max. tune-up power (dBm)	Scaling Factor	1g Scaled SAR (W/kg)
2.4g (2.4~2.4835) 802.11b	Front	11	2462	0.236	0.092	-2.020	100.00	1.000	18.39	18.50	0.242	1.026
	Back	11	2462	0.264	0.122	-1.020	100.00	1.000	18.39	18.50	**0.271**	1.026
	Right	11	2462	0.223	0.074	3.940	100.00	1.000	18.39	18.50	0.229	1.026
	Bottom	11	2462	0.200	0.059	-0.150	100.00	1.000	18.39	18.50	0.205	1.026

Results overview of BT

Mode	Position	Ch.	Freq. (MHz)	1g Meas SAR (W/kg)	10g Meas SAR (W/kg)	Power Drift (%)	Duty cycle (%)	Duty cycle Factor	Meas. Power (dBm)	Max. tune-up power (dBm)	Scaling Factor	1g Scaled SAR (W/kg)
Bluetooth	Front	78	2480	0.101	0.054	-2.590	100.00	1.000	9.93	10.00	0.103	1.016
	Back	78	2480	0.136	0.087	0.360	100.00	1.000	9.93	10.00	**0.138**	1.016
	Right	78	2480	0.085	0.043	-3.630	100.00	1.000	9.93	10.00	0.086	1.016
	Bottom	78	2480	0.059	0.019	-3.780	100.00	1.000	9.93	10.00	0.060	1.016

Note:

1.The maximum SAR Value of each test band is marked bold.

2.SAR plot is provided only for the highest measured SAR in each exposure configuration, wireless mode and frequency band combination.

3.Per KDB 447498 D01 v06, for each exposure position, if the highest output power channel Reported SAR ≤ 0.8W/kg, other channels SAR testing is not necessary.

4.Per KDB 447498 D01 v06, head/body-worn use is evaluated with the device positioned at 0mm/10 mm from a head/flat phantom respectively filled with head tissue-equivalent medium.

5.Per KDB Publication 941225 D06 where SAR test considerations for handsets (L x W ≥ 9 cm x 5 cm) are based on a composite test separation distance of 10 mm from the front, back and edges of the device with antennas 2.5 cm or closer to the edge of the device, determined from general mixed use conditions for this type of devices. Since the hotspot SAR results may overlap with the body-worn accessory SAR requirements, the more conservative configurations can be considered, thus excluding some body-worn accessory SAR tests.

6.Per KDB 447498 D01 v06, the report SAR is measured SAR value adjusted for maximum tune-up tolerance. Scaling Factor=10^[(tune-up limit power(dBm) - Ave.power power (dBm))/10], where tune-up limit is the maximum rated power among all production units.

7.Reported SAR(W/kg)=Measured SAR (W/kg)*Scaling Factor.

11 Multiple Transmitter Information

The SAR measurement positions of each side are as below:

<Rear Side>

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

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 Simultaneous Transmission Possibilities

Note: The device does not support simultaneous BT and Wi-Fi ,because the BT and Wi-Fishare the same antenna and can't transmit simultaneously.

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	3523-EPGO-428	2024-06-18	2025-06-17
☐	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.)