TEST REPORT

Report No.	:	SHATBL2310017W01
FCC ID	:	2AH3O-TL8822CSL
Product Name	:	Rapsodo Mini
Brand Name	:	Rapsodo
Test Model	:	RB23
Series Model	:	N/A
Date of Sample Arrival	:	N/A
Issue Date	:	2023.10.30
Test Standards	:	FCC 47CFR 2.1091 447498 D04 lnterim General RF Exposure Guidance v01

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Report Approved by : Ghost Li.
(Ghost Li)

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(Terry Yang)

Contents

Revision History

Rev.	Issue Date	Revisions	Revised by
A0	2023.10.30	Initial Release	Ghost Li

DECLARATION OF REPORT

The device has been tested by ATBL, and the test results show that the equipment under test (EUT) is in compliance with the requirements of FCC 47CFR 2.1091. And it is applicable only to the tested sample identified in the report.

1. This report shall not be reproduced except in full, without the written approval of ATBL, this document only be altered or revised by ATBL, personal only, and shall be noted in the revision of the document.

2. The general information of EUT in this report is provided by the customer or manufacture, ATBL is only responsible for the test data but not for the information provided by the customer or manufacture.

3. The results in this report is only apply to the sample as tested under conditions. The customer or manufacturer is responsible for ensuring that the additional production units of this model have the same electrical and mechanical components.

1. General Information

1.1. Applicant

Name	:	Rapsodo Pte Ltd
Address	:	BIk 20 Ayer Rajah Crescent, #08-05 singapore,139964 Singapore

1.2. Manufacturer

Name	:	Rapsodo Pte Ltd
Address	:	BIk 20 Ayer Rajah Crescent, #08-05 singapore,139964 Singapore

1.3. Factory

Name	:	PCA Technology
Address	:	12, Jalan Bayu, Kawasan Perindustrian Tampoi Jaya, 81200 Johor Bahru, Johor, Malaysia

1.4. FCC ID

Whole machine reference BT/WIFI module(2AH3O-TL8822CSL),Because the entire machine is also equipped with a radar module(UXS-IPS937),Two modules can transmit simultaneously,Therefore conducting an exposure assessment.

FCCID: 2AH3O-TL8822CSL is a Bluetooth WiFi module with test report numbers STS2203118W01, STS2203118W02, and STS2203118W03. The following data are all referenced in the STS2203118H01 report.

FCCID: UXS-IPS937 is a radar module with test report number EMCC-080534GAD. The following data are all based on EMCC-080534GAD report.

1.5. General Description OF The EUT

General Information	
Equipment Name	Rapsodo Mini
Brand Name	Rapsodo
Model Name	RB23
Series Model	N/A
Model Difference	N/A
Operation Frequency	2.4G WLAN: 802.11b/g/n 20: 2412~2462 MHz 802.11n(40MHz):2422~2452MHz
	5G WLAN: 802.11a/ n(HT20)/ac(VHT20):5.180GHz-5.240GHz 802.11n(HT40)/ac(VHT40):5.190GHz-5.230GHz 802.11ac(VHT80): 5.210GHz 802.11a/ n(HT20)/ac(VHT20):5.260GHz-5.320GHz 802.11 n(HT40)/ac(VHT40):5.270GHz-5.310GHz 802.11ac(VHT80): 5.290GHz 802.11a/ n(HT20)/ac(VHT20):5.500GHz-5.700GHz 802.11 n(HT40)/ac(VHT40):5.510GHz-5.670GHz 802.11ac(VHT80): 5.530GHz-5.610GHz
	Radar module:24.075-24.175 GHz
Modulation Type	2.4G WLAN: 802.11b(DSSS):CCK,DQPSK,DBPSK 802.11g(OFDM):BPSK,QPSK,16-QAM,64-QAM 802.11n(OFDM):BPSK,QPSK,16-QAM,64-QAM
	5G WLAN: 802.11a(OFDM):BPSK,QPSK,16-QAM,64-QAM 802.11n(OFDM):BPSK,QPSK,16-QAM,64-QAM 802.11ac(OFDM):BPSK,QPSK,16-QAM,64-QAM,256-QAM
Antenna gain	2.4G/5G WLAN: ANT A: 4.3dBi, ANT B: 4.3 dBi, MIMO A+B:7.31 dBi Radar module:15dBi
Antenna Designation	Dipole Antenna, Patch Antenna
Power supply	DC 7.4V by Battery
Hardware version	Rev D
Software version	1.4.2

1.6. Test Factory

Name	:	Shanghai ATBL Technology Co., Ltd
Address	:	5-6/F., Unit 1, No 8, Free Trade One Life Science and Sci-Tech Industrial Park,No. 160 Basheng Road, Pudong, Shanghai, China

2. FCC 47CFR §2.1091 Requirement

2.1. Test Standards

Follow the maximum permissible exposure (MPE) limits specified in 447498 D04 Interim General Radio Frequency Exposure Guidelines v01. The gain of the antenna used in the product was extracted from the supplied antenna data sheet and the maximum total power input to the antenna was also measured. Calculate the distance from the product to the MPE limit by the formula.

2.2. Limit

For single RF sources (i.e., any single fixed RF source, mobile device, or portable device, as defined in paragraph (b)(2) of this section): A single RF source is exempt if:

(A) The available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption may not be used in conjunction with other exemption criteria other than those in paragraph (b)(3)(ii)(A) of Part 1.1307. Medical implant devices may only use this exemption and that in paragraph (b)(3)(ii)(A);

(B) Or the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold Pth (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). Pth is given by:

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

Where

$$x = -\log_{10}\left(\frac{60}{ERP_{20\,cm}\sqrt{f}}\right) \text{ and } f \text{ is in GHz;}$$

and

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

d = the separation distance (cm);

(C) Or using below table and the minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. For the exemption in Table 1 to apply, R must be at least λ/2π, where λ is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical dimensions of the radiating structure(s) do not exceed the electrical length of λ/4 or if the antenna gain is less than that of a half-wave dipole (1.64 linear

value).

RF Source frequency (MHz)	Threshold ERP(watts)
0.3- 1.34	1,920 R^2 .
1.34-30	3,450 R^2/f^2 .
30-300	3.83 R^2 .
300- 1,500	0.0128 R^2f.
1,500- 100,000	19.2R^2 .

For multiple RF sources: Multiple RF sources are exempt if:

(A) The available maximum time-averaged power of each source is no more than 1 mW and there is a separation distance of two centimeters between any portion of a radiating structure operating and the nearest portion of any other radiating structure in the same device, except if the sum of multiple sources is less than 1 mW during the time-averaging period, in which case they may be treated as a single source (separation is not required). This exemption may not be used in conjunction with other exemption criteria other than those is paragraph (b)(3)(i)(A) of Part 1.1307. Medical implant devices may only use this exemption and that in paragraph (b)(3)(i)(A).

(B) in the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

Where: $$\sum_{i=1}^{a} \frac{P_i}{P_{th,i}} + \sum_{j=1}^{b} \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^{c} \frac{Evaluated_k}{Exposure\ Limit_k} \leq 1$$

a = number of fixed, mobile, or portable RF sources claiming exemption using paragraph (b)(3)(i)(B) of Part 1.1307 for Pth, including existing exempt transmitters and those being added.

b = number of fixed, mobile, or portable RF sources claiming exemption using paragraph (b)(3)(i)(C) of Part 1.1307 for Threshold ERP, including existing exempt transmitters and those being added.

c = number of existing fixed, mobile, or portable RF sources with known evaluation for the specified minimum distance including existing evaluated transmitters.

Pi = the available maximum time-averaged power or the ERP, whichever is greater, for fixed, mobile, or portable RF source i at a distance between 0.5 cm and 40 cm (inclusive).

Pth,i = the exemption threshold power (Pth) according to paragraph (b)(3)(i)(B) of this section

for fixed, mobile, or portable RF source i.

ERPj = the ERP of fixed, mobile, or portable RF source j.

ERPth,j = exemption threshold ERP for fixed, mobile, or portable RF source j, at a distance of at least $\lambda/2\pi$ according to the applicable formula of paragraph (b)(3)(i)(C) of Part 1.1307.

Evaluatedk = the maximum reported SAR or MPE of fixed, mobile, or portable RF source k either in the device or at the transmitter site from an existing evaluation at the location of exposure.

Exposure Limitk = either the general population/uncontrolled maximum permissible exposure (MPE) or specific absorption rate (SAR) limit for each fixed, mobile, or portable RF source k, as applicable from §1.1310.

2.3. Test Result

Turn up		
Mode	**Detector**	**Turn up Power**
2.4G WLAN	AV	14±1 dBm
5G WLAN	AV	13±1 dBm

Frequency	Detector	Field Strength
24.12GHz	AV	111.1 dBuv/m

Protocol	Fre. (GHz)	Separation distance (cm)	Max Turn up power (dBm)	ANT Gain (dBi)	Max EIRP (dBm)	Max EIRP (mW)	Limit (mW)	Ratio	Result
BLE	2.480	20	8	2	10.0	10.00	3060	0.003	Pass
2.4GWLAN	2.462	20	15	4.3	19.3	85.11	3060	0.028	Pass
5GWLAN	5.580	20	14	4.3	18.3	67.61	3060	0.022	Pass

Fre.(GHz)	Separation distance(cm)	Field Strength (dBuv/m)	Max EIRP(mW)	Limit(mW)	Ratio	Result
24.12	20	111.1	38.90	172800	0.0002	Pass

dBuv/m converted to effective isotropic radiation power (EIRP):P (dBm)=E (dBuv/m) -95.2

111.1(dBuv/m)-95.2=15.9(dBm)

W=0.001*10^(dBm/10)

0.001*10^(15.9/10)=0.03890(W)=38.90(mW)

Multiple transmission:

BLE+2.4GWLAN=0.003+0.028=0.031＜1

BLE+5GWLAN=0.003+0.022=0.025＜1

2.4GWLAN+5GWLAN=0.028+0.022=0.05＜1

24.12GHz+BLE=0.0002+0.003=0.0032＜1

24.12GHz+2.4GWLAN=0.0002+0.028=0.0282＜1

24.12GHz+5GWLAN=0.0002+0.022=0.0222＜1

Note1: The Maxinum power is less than the limit, complies with the exemption requirements.

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