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Report Template Version: V05

Report Template Revision Date: 2021-11-03

RF Exposure Evaluation Report

Report No.: CQASZ20231202220E-03
Applicant: Shenzhen Rinocloud Technology Co., Ltd.
Address of Applicant: Complex A201, Qianwan Road 1, Qianhai Cooperation Zone, Shenzhen, China
Equipment Under Test (EUT):
EUT Name: WiFi Bluetooth module
Model No.: XY3721-B3C, XY3721-B3C-IPEX
Test Model No.: XY3721-B3C
Brand Name: N/A
FCC ID: 2A9TO-XY3721-B3C
Standards: 47 CFR Part 1.1307
47 CFR Part 1.1310
447498 D04 Interim General RF Exposure Guidance v01
Date of Receipt: 2023-12-05
Date of Test: 2023-12-05 to 2023-12-18
Date of Issue: 2024-01-23
Test Result: PASS*

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

Tested By:

Lewis Zhou

(Lewis Zhou)

Reviewed By:

Timo Lei

(Timo Lei)

Approved By:

Jack Ai

(Jack Ai)



1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20231202220E-03	Rev.01	Initial report	2024-01-23

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3 General Information

3.1 Client Information

Applicant:	Shenzhen Rinocloud Technology Co., Ltd.
Address of Applicant:	Complex A201, Qianwan Road 1, Qianhai Cooperation Zone, Shenzhen, China
Manufacturer:	Shenzhen Rinocloud Technology Co., Ltd.
Address of Manufacturer:	Complex A201, Qianwan Road 1, Qianhai Cooperation Zone, Shenzhen, China
Factory:	Shenzhen Rinocloud Technology Co., Ltd.
Address of Factory:	Complex A201, Qianwan Road 1, Qianhai Cooperation Zone, Shenzhen, China

3.2 General Description of EUT

Product Name:	WiFi Bluetooth module
Model No.:	XY3721-B3C, XY3721-B3C-IPEX
Test Model No.:	XY3721-B3C
Trade Mark:	N/A
Software Version:	1.0.0
Hardware Version:	V1.0
EUT Power Supply:	Power supply DC 2.7V~3.6V

3.3 General Description of BLE

Operation Frequency:	2402MHz~2480MHz
Bluetooth Version:	Bluetooth Spec 5.2
Modulation Type:	GFSK
Number of Channel:	40
Transfer Rate:	1Mbps
Sample Type:	☒ Mobile ☐ Portable
Antenna Type:	PCB antenna
Antenna Gain:	2.54dBi

3.4 General Description of 2.4G WIFI Classic

Operation Frequency:	2412MHz~2462MHz
Type of Modulation:	IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE for 802.11g : OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n(HT20) : OFDM (64QAM, 16QAM, QPSK, BPSK)
Number of Channel:	IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels
Channel Separation:	5MHz
Transfer Rate:	IEEE for 802.11b: 1Mbps/2Mbps/5.5Mbps/11Mbps IEEE for 802.11g : 6Mbps/9Mbps/12Mbps/18Mbps/24Mbps/36Mbps/48Mbps/54Mbps IEEE for 802.11n(HT20) : 6.5Mbps/13Mbps/19.5Mbps/26Mbps/39Mbps/52Mbps/58.5Mbps/65Mbps
Sample Type:	☒ Mobile ☐ Portable
Antenna Type:	PCB antenna
Antenna Gain:	2.54dBi

Note:

The above parameters will directly affect the test results. The information is provided by the applicant.

4 MPE Evaluation

4.1 RF Exposure Compliance Requirement

4.1.1 Limits

The table applies to any RF source (i.e., single fixed, mobile, and portable transmitters) and specifies power and distance criteria for each of the five frequency ranges used for the MPE limits. These criteria apply at separation distances from any part of the radiating structure of at least $\lambda/2\pi$. The thresholds are based on the general population MPE limits with a single perfect reflection, outside of the reactive near-field, and in the main beam of the radiator. For mobile devices that are not exempt per Table B.1 [Table 1 of § 1.1307(b)(1)(i)(C)] at distances from 20 cm to 40 cm and in 0.3 GHz to 6 GHz, evaluation of compliance with the exposure limits in § 1.1310 is necessary if the ERP of the device is greater than ERP_{20cm} in Formula (B.1) [repeated from § 2.1091(c)(1) and § 1.1307(b)(1)(i)(B)].

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

If the ERP is not easily obtained, then the available maximum time-averaged power may be used (i.e., without consideration of ERP only if the physical dimensions of the radiating structure(s) do not exceed the electrical length of $\lambda/4$ or if the antenna gain is less than that of a half-wave Dipole.

SAR-based exemptions are constant at separation distances between 20 cm and 40 cm to avoid discontinuities in the threshold when transitioning between SAR-based and MPE-based exemption criteria at 40 cm, considering the importance of reflections.

4.1.2 Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

4.1.3 EUT RF Exposure

1) For BLE

Measurement Data

GFSK mode							
Test channel	conducted power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	ERP (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
						(dBm)	(mW)
Lowest(2402 MHz)	2.86	2.54	5.4	3.25	3.5±1	4.5	2.82
Middle(2440 MHz)	3.23	2.54	5.77	3.62	3.5±1	4.5	2.82
Highest(2480 MHz)	3.37	2.54	5.91	3.76	3.5±1	4.5	2.82

The ERP of this product is less than 3060mW

Note: 1) Refer to report No. CQASZ20231202220E-01 for EUT test Max Conducted Peak Output Power value.

2) EUT's module is more than 20cm away from the human body.

2) For 2.4G WIFI Classic

Measurement Data

11B mode							
Test channel	conducted power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	ERP (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
						(dBm)	(mW)
Lowest(2412 MHz)	14.97	2.54	17.51	15.36	15.5±1	16.5	44.67
Middle(2437 MHz)	16.42	2.54	18.96	16.81	17.0±1	18.0	63.10
Highest(2462 MHz)	17.19	2.54	19.73	17.58	17.5±1	18.5	70.79
11G mode							
Test channel	conducted power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	ERP (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
						(dBm)	(mW)
Lowest(2412 MHz)	13.13	2.54	15.67	13.52	13.5±1	14.5	28.18
Middle(2437 MHz)	14.95	2.54	17.49	15.34	15.5±1	16.5	44.67
Highest(2462 MHz)	16.89	2.54	19.43	17.28	17.5±1	18.5	70.79
11N20 mode							
Test channel	conducted power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	ERP (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
						(dBm)	(mW)
Lowest(2412 MHz)	12.56	2.54	15.1	12.95	13.0±1	14.0	25.12
Middle(2437 MHz)	14.18	2.54	16.72	14.57	14.5±1	15.5	35.48
Highest(2462 MHz)	15.42	2.54	17.96	15.81	15.5±1	16.5	44.67

The ERP of this product is less than 3060mW

Note: 1) Refer to report No. CQASZ20231202220E-02 for EUT test Max Conducted AV Output Power value.

2) EUT's module is more than 20cm away from the human body.

*** END OF REPORT ***