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RF Exposure Evaluation Report

Report No.: CQASZ20250100185E-06
Applicant: Shenzhen Qingfen Tingxiu Information Technology Co., Ltd
Address of Applicant: 24th Floor, Baotai Building, 182 Design Park, No. 182, Bulan Road, Li Lang Community, Nanwan Street, Longgang District, Shenzhen
Equipment Under Test (EUT):
EUT Name: Mini PC
Model No.: T2, T3, T4, T5, T6, T7, T8, T9, S1, S2
Test Model No.: T2
Brand Name: FIREBAT
FCC ID: 2BB7B-T2
Standards: 47 CFR Part 1.1307
47 CFR Part 1.1310
KDB447498 D01 General RF Exposure Guidance v06
Date of Receipt: 2025-01-23
Date of Test: 2025-01-23 to 2025-04-28
Date of Issue: 2025-05-16
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
CQASZ20250100185E-06	Rev.01	Initial report	2025-05-16

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3 General Information

3.1 Client Information

Applicant:	Shenzhen Qingfen Tingxiu Information Technology Co., Ltd
Address of Applicant:	24th Floor, Baotai Building, 182 Design Park, No. 182, Bulan Road, Li Lang Community, Nanwan Street, Longgang District, Shenzhen
Manufacturer:	Shenzhen Qingfen Tingxiu Information Technology Co., Ltd
Address of Manufacturer:	24th Floor, Baotai Building, 182 Design Park, No. 182, Bulan Road, Li Lang Community, Nanwan Street, Longgang District, Shenzhen
Factory:	Shenzhen Qingfen Tingxiu Information Technology Co., Ltd
Address of Factory:	24th Floor, Baotai Building, 182 Design Park, No. 182, Bulan Road, Li Lang Community, Nanwan Street, Longgang District, Shenzhen

3.2 General Description of EUT

Product Name:	Mini PC
Model No.:	T2, T3, T4, T5, T6, T7, T8, T9, S1, S2
Test Model No.:	T2
Trade Mark:	FIREBAT
Software Version:	P0_AK_10_0108
Hardware Version:	P0AK10N150-V02X
EUT Power Supply:	Power supply DC12V form adapter Adapter: Model:AD0301-1202500UB Input:100-2240V~50-60Hz 0.8A Max Output:12V 2.5A 30.0W

3.3 General Description of BT Classic

Operation Frequency:	2402MHz~2480MHz
Bluetooth Version:	Bluetooth Spec 5.0
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)
Modulation Type:	GFSK, $\pi/4$ DQPSK, 8DPSK
Number of Channel:	79
Transfer Rate:	1Mbps/2Mbps/3Mbps
Hopping Channel Type:	Adaptive Frequency Hopping systems
Sample Type:	☒ Mobile ☐ Portable
Antenna Type:	FPC antenna
Antenna Gain:	2.78dBi

3.4 General Description of BLE

Operation Frequency:	2402MHz~2480MHz
Bluetooth Version:	Bluetooth Spec 5.0
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)
Modulation Type:	GFSK
Number of Channel:	40
Transfer Rate:	1Mbps/2Mbps
Hopping Channel Type:	Adaptive Frequency Hopping systems
Sample Type:	☒ Mobile ☐ Portable ☐ Fix Location
Antenna Type:	FPC antenna
Antenna Gain:	2.78dBi

3.5 General Description of 2.4G WIFI Classic

Operation Frequency:	IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz IEEE 802.11n(HT40): 2422MHz to 2452MHz
Type of Modulation:	802.11b: DSSS(CCK/QPSK/BPSK) 802.11g: OFDM(BPSK/QPSK/16QAM/64QAM) 802.11n : OFDM (64QAM, 16QAM, QPSK, BPSK)
Number of Channel:	IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels IEEE 802.11n HT40: 7 Channels
Channel Separation:	5MHz
Transfer Rate:	802.11b: 1M/2M/5.5M/11M bps 802.11g: 6M/9M/12M/18M/24M/36M/48M/54M bps 802.11n: 7.2M/14.4M/21.7M/28.9M/43.3M/57.8M/65M/72.2M bps
Sample Type:	☒ Mobile ☐ Portable
Antenna Type:	FPC antenna
Antenna Gain:	2.78dBi

3.6 General Description of 5G WIFI Classic

Operation Frequency:	IEEE 802.11a/n/ac(20M): 5150MHz ~5250 MHz IEEE802.11n/ac(40M): 5150MHz ~5250 MHz IEEE802.11n/ac(80M): 5150MHz ~5250 MHz IEEE 802.11a/n/ac(20M): 5250MHz ~5350 MHz IEEE802.11n/ac(40M): 5250MHz ~5350 MHz IEEE802.11n/ac(80M): 5250MHz ~5350 MHz IEEE 802.11a/n/ac(20M): 5470MHz ~5725 MHz IEEE802.11n/ac(40M): 5470MHz ~5725 MHz IEEE802.11n/ac(80M): 5470MHz ~5725 MHz IEEE 802.11a/n/ac(20M): 5725MHz ~5850 MHz IEEE802.11n/ac(40M): 5725MHz ~5850 MHz IEEE802.11n/ac(80M): 5725MHz ~5850 MHz
Channel Numbers:	IEEE 802.11a/n/ac(20M): 5150MHz ~5250MHz/ 4 channel IEEE 802.11n/ac(40M): 5150MHz ~5250MHz/ 2 channel IEEE 802.11n/ac(80M): 5150MHz ~5250MHz/ 1 channel IEEE 802.11a/n/ac(20M): 5250MHz ~5350MHz/ 4 channel IEEE 802.11n/ac(40M): 5250MHz ~5350MHz/ 2 channel IEEE 802.11n/ac(80M): 5250MHz ~5350MHz/ 1 channel IEEE 802.11a/n/ac(20M): 5470MHz ~5725MHz/ 9 channel IEEE 802.11n/ac(40M): 5470MHz ~5725MHz/ 4 channel IEEE 802.11n/ac(80M): 5470MHz ~5725MHz/ 2 channel IEEE 802.11a/n/ac(20M): 5725MHz ~5850MHz/ 5 channel IEEE 802.11n/ac(40M): 5725MHz ~5850MHz/ 2 channel IEEE 802.11n/ac(80M): 5725MHz ~5850MHz/ 1 channel
Type of Modulation:	OFDM
Sample Type:	☒ Mobile ☐ Portable
Test Software of EUT:	Serial
Antenna Type:	FPC antenna
Antenna gain:	3.36dBi
Cable loss:	1.0 dB

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

According to FCC Part1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in part1.1307(b)

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

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

F= Frequency in MHz

Friis Formula

Friis transmission formula: $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

P_d is the limit of MPE, 1 mW/cm². If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

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

Antenna Gain: 2.78dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.9 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Measurement Data

GFSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	2.81	3.0±1	4	2.51
Middle(2440MHz)	3.87	4.0±1	5	3.16
Highest(2480MHz)	2.62	3.0±1	4	2.51

The worst case:

Maximum tune-up Power (mW)	Antenna Gain (dBi)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
3.16	2.78	0.0011932436	1.0	PASS

Note: 1) Refer to report No. CQASZ20250100185E-02 for EUT test Max Conducted Peak Output Power value.

2) $P_d = (P_{out} * G) / (4 * \pi * R^2) = (3.16 * 1.9) / (4 * 3.1416 * 20^2) = 0.0011932436$

2) For BT

Antenna Gain: 2.78dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.9 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Measurement Data

$\pi/4$ DQPSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	12.23	12.5±1	13.5	22.39
Middle(2440MHz)	12.35	12.5±1	13.5	22.39
Highest(2480MHz)	12.05	12.5±1	13.5	22.39

The worst case:

Maximum tune-up Power (mW)	Antenna Gain (dBi)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
22.39	2.78	0.0084475181	1.0	PASS

Note: 1) Refer to report No. CQASZ20250100185E-01 for EUT test Max Conducted Peak Output Power value.

2) $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot R^2) = (22.39 \cdot 1.9) / (4 \cdot 3.1416 \cdot 20^2) = 0.0084475181$

3) For 2.4G WIFI

Antenna Gain: 2.78dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.9 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Measurement Data

11B mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2412MHz)	19.48	19.5±1	20.5	112.20
Middle(2437MHz)	20.98	21.0±1	22	158.49
Highest(2462MHz)	19.00	19.0±1	20	100.00

The worst case:

Maximum tune-up Power (mW)	Antenna Gain (dBi)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
158.49	1.78	0.0598038480	1.0	PASS

Note: 1) Refer to report No. CQASZ20250100185E-03 for EUT test Max Conducted AV Output Power value.

2) $P_d = (P_{out} * G) / (4 * \pi * R^2) = (158.49 * 1.9) / (4 * 3.1416 * 20^2) = 0.0598038480$

4) For 5G WIFI Classic

Antenna Gain: 3.36dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.17 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Measurement Data

11A mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(5260MHz)	12.62	13.0±1	14	25.12
Middle(5280MHz)	9.33	9.5±1	10.5	11.22
Highest(5320MHz)	13.37	13.5±1	14.5	28.18

The worst case:

Maximum tune-up Power (mW)	Antenna Gain (dBi)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
28.18	3.36	0.0121542770	1.0	PASS

Note: 1) Refer to report No. CQASZ20250100185E-04 for EUT test Max Conducted AV Output Power value.

2) $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot R^2) = (28.18 \cdot 2.17) / (4 \cdot 3.1416 \cdot 20^2) = 0.0121542770$

Simultaneous transmission:

MPE ratios(BT)+MPE ratios(BLE)+MPE ratios(2.4G WIFI)+MPE ratios(5G WIFI)

$= 0.0084475181/1 + 0.0011932436/1 + 0.059803848/1 + 0.012154277/1$

$= 0.0815988867 \leq 1$

*** END OF REPORT ***