

MPE REPORT

Report No.: SRTC2024-9004(F)-24011502(I)
Product Name: WiFi/BT Module
Model Name: MWH633B
Applicant: Qingdao Intelligent & Precise Electronics Co., Ltd.
Manufacturer: Qingdao Intelligent & Precise Electronics Co., Ltd.

| Reference Specification |
|-------------------------|
| FCC Part §1.1310 |

The State Radio_monitoring_center Testing Center (SRTC)

15th Building, No.30, Shixing Street, Shijingshan District,

Beijing, P.R.China

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1 GENERAL INFORMATION

1.1 Notes of the test report

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1.2 Information about the testing laboratory

| | |
|----------------------|---|
| Company: | The State Radio_monitoring_center Testing Center (SRTC) |
| Test Site 1: | 15th Building, No.30 Shixing Street, Shijingshan District |
| Test Site 2: | No.80, Zhaojiachang, Beizang, Daxing District |
| City: | Beijing |
| Country or Region: | P.R.China |
| Contacted person: | Liu Jia |
| Tel: | +86 10 57996183 |
| Fax: | +86 10 57996388 |
| Email: | liujiaf@srtc.org.cn |
| Designation Number: | CN1267 |
| Registration number: | 239125 |

1.3 Applicant's details

| | |
|----------|--|
| Company: | Qingdao Intelligent & Precise Electronics Co., Ltd. |
| Address: | No.218 Qianwangang Road, Qingdao Economic & Technological Development Zone, Qingdao City, Shandong Province, P. R. China |

1.4 Manufacturer's details

| | |
|----------|--|
| Company: | Qingdao Intelligent & Precise Electronics Co., Ltd. |
| Address: | No.218 Qianwangang Road, Qingdao Economic & Technological Development Zone, Qingdao City, Shandong Province, P. R. China |

1.5 Test Environment

| | |
|---|------------|
| Date of Receipt of test sample at SRTC: | 2024-01-15 |
| Testing Start Date: | 2024-01-16 |
| Testing End Date: | 2024-01-31 |

| | | |
|---------------------|------------------|--------------|
| Environmental Data: | Temperature (°C) | Humidity (%) |
|---------------------|------------------|--------------|

| | | |
|-----------------|-----|-----|
| Ambient | 25 | 40 |
| Maximum Extreme | 70 | --- |
| Minimum Extreme | -10 | --- |

| | |
|--|-----|
| Normal Supply Voltage (V d.c.): | 5.0 |
| Maximum Extreme Supply Voltage (V d.c.): | 5.5 |
| Minimum Extreme Supply Voltage (V d.c.): | 4.5 |

2 DESCRIPTION OF THE DEVICE UNDER TEST

2.1 Final Equipment Build Status

BT

| | |
|--------------------|----------------------------|
| Frequency Range: | 2.402GHz~2.480GHz |
| Number of Channel: | 79 |
| Modulation Type: | GFSK, $\pi/4$ DQPSK, 8DPSK |
| Duplex Mode: | TDD |
| Channel Spacing: | 1MHz |
| Data Rate: | 1Mbps, 2 Mbps, 3 Mbps |
| Power Supply: | DC supply |
| Antenna gain: | 5.29dBi |
| Software Revision: | NA |
| Hardware Revision: | V1.00 |
| IMEI: | #23 |
| Antenna type: | Slot |

BLE

| | |
|--------------------|---------------------------------------|
| Frequency Range: | 2.402GHz~2.480GHz |
| Number of Channel: | 40 |
| Modulation Type: | GFSK |
| Equipment Class: | DTS |
| Channel Spacing: | 2MHz |
| Data Rate: | LE 1Mbps/2Mbps Coded 500K /Coded 125K |
| Power Supply: | DC supply |
| Antenna gain: | 5.29dBi |
| Software Revision: | NA |
| Hardware Revision: | V1.00 |
| IMEI: | #23 |
| Antenna type: | Slot |

Wi-Fi 2.4G

| | |
|------------------------------|---|
| Frequency Band: | 2.412GHz~2.462GHz |
| Number of Channel For 20MHz: | 11 |
| Number of Channel For 40MHz: | 7 |
| Modulation Type: | 802.11b 802.11g 802.11n (HT20/HT40) 802.11ax (HE20/HE40) |
| Power Supply: | DC supply |
| Antenna gain: | ANT0: 1.98dBi ANT1: 1.81dBi |
| Directional Gain: | 1.9dBi |
| Software Revision: | NA |
| Hardware Revision: | V1.00 |
| IMEI: | #23 |
| Antenna type: | Slot |

Wi-Fi 5G

| | | |
|---|--|-------------------------------|
| Frequency Band(s): | U-NII-1:5150MHz-5250MHz U-NII-2A:5250MHz-5350MHz U-NII-2C:5470MHz-5725MHz U-NII-3:5725MHz-5850MHz | |
| The DFS related operating mode(s) of the equipment: | <input type="checkbox"/> | Master |
| | <input type="checkbox"/> | Slave with radar detection |
| | <input checked="" type="checkbox"/> | Slave without radar detection |
| Modulation Type: | 802.11a 802.11n (HT20/HT40) 802.11ac (VHT20/VHT40/VHT80) 802.11ax (HE20/HE40/HE80) | |
| Antenna Type: | IFA | |
| Antenna gain | ANT0: 3.87dBi ANT1: 4.76dBi | |
| Directional Gain: | 4.34dBi | |




| | |
|--------------------|-----------|
| Power Supply: | DC supply |
| Software Revision: | NA |
| Hardware Revision: | V1.00 |
| IMEI: | #23 |

3 REFERENCE SPECIFICATION

| Specification | Version | Title |
|---------------|---------|--|
| Part 1.1310 | Latest | Radio frequency radiation exposure limits. |

4 RESULT SUMMARY

| Case | Verdict |
|------|---------|
| MPE | Pass |

| | |
|--|--|
| This Test Report Is Issued by: Mr. Peng Zhen  | Checked by: Mr. Li Bin  |
| Tested by:  | Issued date: 2024/02/09 |

5. CALCULATION RESULT

5.1 Maximum permissible exposure (MPE)

Limit:

(A) Limits for Occupational/Controlled Exposure

| Frequency Range (MHz) | Electric Field Strength (E) (V/m) | Magnetic Field Strength (H) (A/m) | Power Density (S) (mW/cm ²) | Averaging Time E ² , H ² or S (minutes) |
|-----------------------|-----------------------------------|-----------------------------------|---|---|
| 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

| Frequency Range (MHz) | Electric Field Strength (E) (V/m) | Magnetic Field Strength (H) (A/m) | Power Density (S) (mW/cm ²) | Averaging Time E ² , H ² or S (minutes) |
|-----------------------|-----------------------------------|-----------------------------------|---|---|
| 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 *Plane-wave equivalent power density

Result:

According to §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission’s guidelines.

The MPE was calculated at 20 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$S = PG / (4\pi R^2)$$

Where S = power density in mW/cm²

P = transmit power in mW

G = numeric gain of transmit antenna

R = distance (cm)

Standalone Transmission Result

| Band | Freq. (MHz) | Maximum Power (dBm) | ANT Gain (dBi) | Maximum EIRP (dBm) | Maximum EIRP(mW) | Power Density at 20cm (mW/cm ²) | Limit (mW/cm ²) | Power Density/ Limit |
|-----------|-------------|---------------------|----------------|--------------------|------------------|---|-----------------------------|----------------------|
| BT | 2402 | 15.05 | 5.29 | 20.34 | 108.143 | 0.022 | 1 | 0.022 |
| BLE | 2402 | 14.80 | 5.29 | 20.09 | 102.094 | 0.020 | 1 | 0.020 |
| WIFI 2.4G | 2452 | 21.32 | 1.98 | 23.30 | 213.796 | 0.043 | 1 | 0.043 |
| WIFI 5.2G | 5180 | 15.47 | 4.34 | 19.81 | 95.719 | 0.019 | 1 | 0.019 |
| WIFI 5.3G | 5320 | 20.27 | 4.34 | 24.61 | 289.068 | 0.058 | 1 | 0.058 |
| WIFI 5.6G | 5670 | 15.49 | 3.89 | 19.38 | 86.696 | 0.017 | 1 | 0.017 |
| WIFI 5.8G | 5825 | 15.69 | 3.89 | 19.58 | 90.782 | 0.018 | 1 | 0.018 |

Simultaneous Transmission Result

| Power Density1 / Limit | Power Density2 / Limit | Σ(Power Density / Limit) |
|------------------------|------------------------|--------------------------|
| 0.022 | 0.058 | 0.080 |

Note: Simultaneous Transmission Limit = Power_1 / Limit_1 + Power_2 / Limit_2 < 1.

---End of Test Report---