# DHUR-AZ53 a/b/g/n/ac
# 1x1 Module
# User Manual

# Contents

## Product Introduction

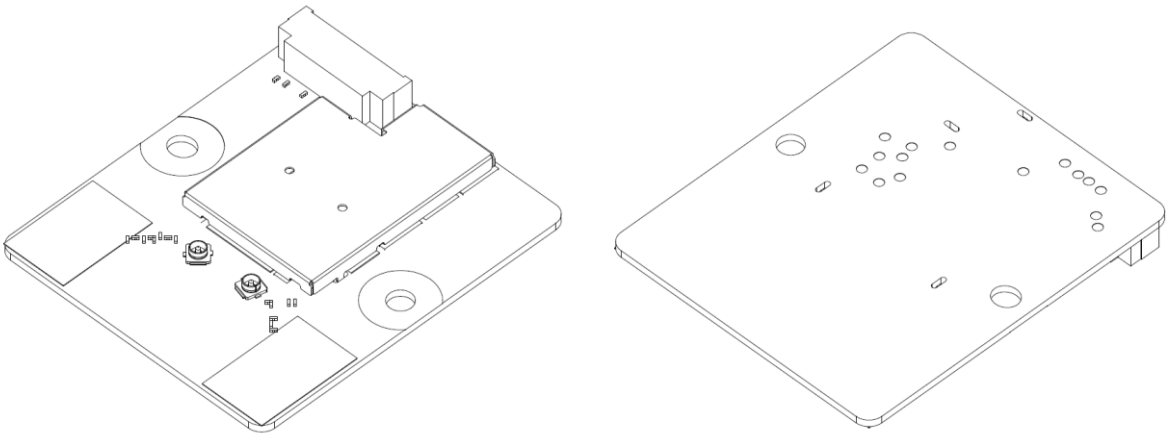
DHUR-AZ53 is an 802.11 a/b/g/n/ac WLAN/Bluetooth 5.0 combo module with USB interface based on MediaTek MT7653BUN chipset solution.

## 1-1. Features

- IEEE 802.11a/b/g/n/ac compatible + Bluetooth 5.0.
- Support 20MHz, 40MHz and 80MHz bandwidth in 2.4GHz band and 5GHz band.
- Support MU-MIMO TX/RX, STBC, LDPC, TX Beamformer and RX Beamformee.
- Supports Bluetooth 5 dual mode for 4x the range, 2x the speed
- Support SCO and eSCO link with re-transmission, up to 7 BT link 16 BLE link.
- 1 Wi-Fi external antenna and 1 BT external antenna
- PCB 4 Layers with 46.5 x 40 x1.0 $mm^3$

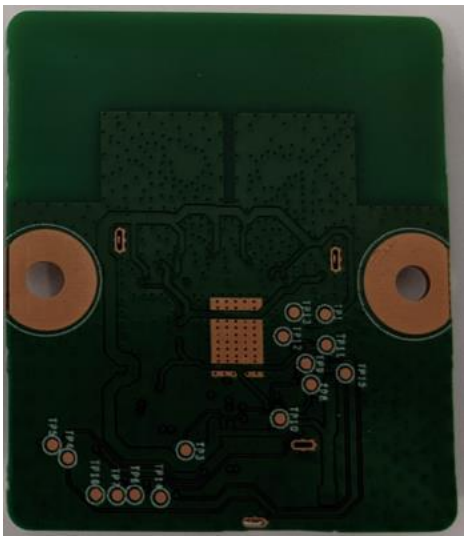
## 1-2.Interfaces and Power supply

- Power supply with VCC 5.0
- 10 pin wire to board
- USB 2.0 Interface



## 2 Product Photo

Top Side



Bottom Side

# 3. Product Specification

### 3-1. Electrical Specification

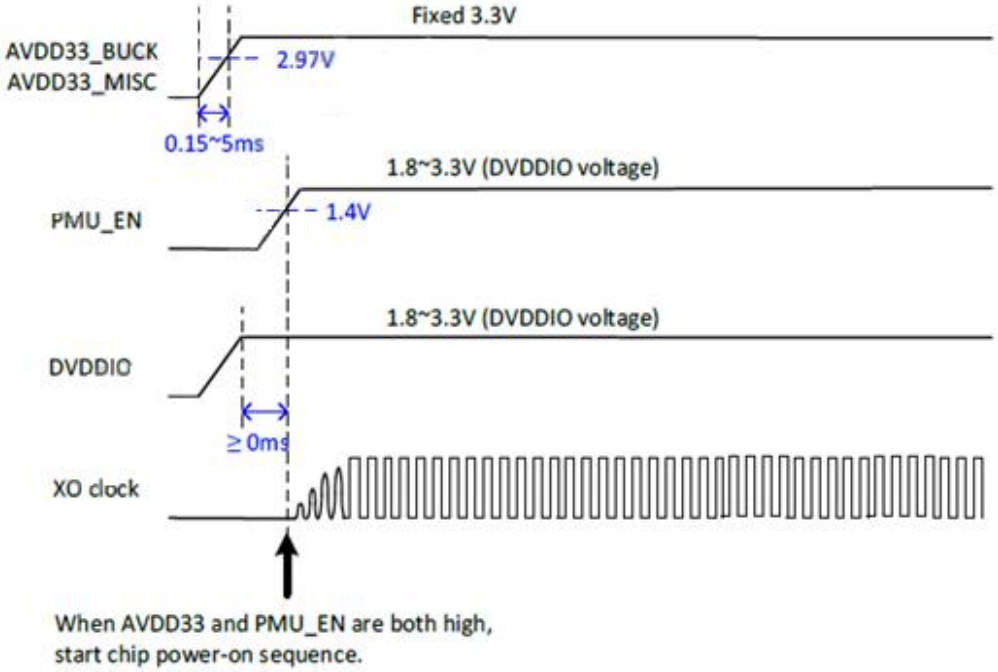
#### 3-1-1. Absolute Maximum Ratings

| Symbol (Board level) | Description | Min. | Max. | Units |
|---|---|---|---|---|
| 5V | 5V power supply | 0 | 6.0 | V |
| RESET | Controlled by SOC, GPIO input | -0.3 | 3.63 | V |
| BT_WAKE_HOST | BT wake up host, GPIO output | -0.3 | 3.63 | V |
| WoWLAN | Wake on Wireless LAN, GPIO output | -0.3 | 3.63 | V |
| BT_IR | BT_IR signal from MT7658, GPIO output | -0.3 | 3.63 | V |
| GPIO_X | BT_IR signal select, GPIO output | -0.3 | 3.63 | V |
| $H_{storage}$ | Storage humidity | 5 | 85 | %RH |
| $T_{storage}$ | Storage temperature | -40 | 85 | °C |

#### 3-1-2. Recommended Operating Conditions

| Symbol (Board level) | Status | Description | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| 5V | -- | 5V power supply | 4.5 | 5.0 | 5.5 | V |
| RESET | $V_{IH}$ | 3.3V Supply Voltage | 2.97 | 3.3 | 3.63 | V |
| WoWLAN | $V_{OH}$ | Wake on wireless LAN | 2.97 | 3.3 | 3.63 | V |
| BT_WAKE_HOST | $V_{IH}$ | BT wake up host | 2.97 | 3.3 | 3.63 | V |
| BT_IR | $V_{OH}$ | BT_IR signal form MT7658 | 2.97 | 3.3 | 3.63 | V |
| GPIO_X | $V_{IH}$ | BT_IR signal select | 2.97 | 3.3 | 3.63 | V |
| $T_{operating}$ | -- | Operating temperature | -10 | -- | 60 | °C |
| $H_{operating}$ | -- | Operating humidity | 5 | -- | 95 | %RH |

## 3-2. Chip Sequence




## 3-3. Wi-Fi Portion

| Item | Key specifications |
|---|---|
| Main chipset | MT7653BUN |
| TX/RX | 1T1R |
| Frequency range | 2.400 ~ 2.497GHz,5.15GHz ~ 5.85GHz |
| Modulation technique | ➢ **802.11 a/b/g**<br>DSSS (DBPSK, DQPSK, CCK)<br>OFDM (BPSK, QPSK, 16-QAM, 64-QAM)<br>DSSS (Direct Sequence Spread Spectrum) with<br>DBPSK (Differential Binary Phase Shift Keying 1Mbps),<br>DQPSK (Differential Quaternary Phase Shift Keying 2Mbps),<br>CCK (Complementary Code Keying 5.5&11Mbps),<br>OFDM (Orthogonal Frequency Division Multiplexing with BPSK for 6,9Mbps 、 QPSK for 12,18Mbps 、 16QAM for 24,36Mbps 、 64QAM for 48,54Mbps)<br>➢ **802.11n a/g**<br>OFDM (BPSK, QPSK, 16-QAM, 64-QAM)<br>➢ **802.11 ac**<br>OFDM (BPSK, QPSK, 16-QAM, 64-QAM,256-QAM) |
| Host interface | ➢ USB2.0 |

Power consumption @25 °C

| Description | Current | |
|---|---|---|
| | average | Unit |
| Sleep mode, radio off | 1.23 | mA |
| 2.4GHz RX Power saving, DTIM=1 | 2.39 | mA |
| 2.4GHz RX Active, HT20, MCS7 | 107 | mA |
| 2.4GHz TX CCK, 11Mbps | 413 | mA |
| 2.4GHz TX HT20, MCS7 | 342 | mA |
| 2.4GHz TX HT20, MCS0 | 365 | mA |
| 5GHz VHT80 RX Listen, 1RX | 129 | mA |
| 5GHz RX Active, VHT80, MCS9, Nss=1 | 150 | mA |
| 5GHz TX VHT80, MCS9, Nss=1 | 405 | mA |
| 5GHz TX VHT80, MCS0, Nss=1 | 426 | mA |

Output power (per chain; 2.4G tolerance +/-2.5 dB, 5G tolerance +/-3,0dB)

- 802.11a

| Test Frequencies | 6-36_Target | 48_Target | 54_Target |
|---|---|---|---|
| 5180 | 15.5 | 15.5 | 14.5 |
| 5320 | 15.5 | 15.5 | 14.5 |
| 5500 | 15.5 | 15.5 | 14.5 |
| 5600 | 15.5 | 15.5 | 14.5 |
| 5700 | 15.5 | 15.5 | 14.5 |
| 5825 | 15.5 | 15.5 | 14.5 |

- 802.11b

| Test Frequencies | 1/2_Target | 5.5_Target | 11_Target |
|---|---|---|---|
| 2412 | 18.5 | 18.5 | 18.5 |
| 2472 | 18.5 | 18.5 | 18.5 |
| 2484 | 18.5 | 18.5 | 18.5 |

- 802.11g

| Test Frequencies | 6-12_Target | 18_Target | 24_Target | 36_Target | 48_Target | 54_Target |
|---|---|---|---|---|---|---|
| 2412 | 16.5 | 16.5 | 16.5 | 16.5 | 16.5 | 15.5 |
| 2442 | 16.5 | 16.5 | 16.5 | 16.5 | 16.5 | 15.5 |
| 2472 | 16.5 | 16.5 | 16.5 | 16.5 | 16.5 | 15.5 |

- 802.11n

Freq. Range: HT20

| Test Freq | MCS 0 | MCS 1 | MCS 2 | MCS 3 | MCS 4 | MCS 5 | MCS 6 | MCS 7 |
|---|---|---|---|---|---|---|---|---|
| 5180 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| 5240 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| 5320 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| 5500 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| 5700 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| 5745 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| 5825 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |

Freq. Range: HT40

| Test Freq | MCS 0 | MCS 1 | MCS 2 | MCS 3 | MCS 4 | MCS 5 | MCS 6 | MCS 7 |
|---|---|---|---|---|---|---|---|---|
| 5190 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| 5230 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| 5270 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| 5510 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| 5670 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| 5755 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| 5795 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |

Freq. Range: HT20

| Test Freq | MCS 0 | MCS 1 | MCS 2 | MCS 3 | MCS 4 | MCS 5 | MCS 6 | MCS 7 |
|---|---|---|---|---|---|---|---|---|
| 2412 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 2437 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 2472 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |

Freq. Range: HT40

| Test Freq | MCS 0 | MCS 1 | MCS 2 | MCS 3 | MCS 4 | MCS 5 | MCS 6 | MCS 7 |
|---|---|---|---|---|---|---|---|---|
| 2412 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 2437 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 2472 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |

➢ 802.11ac

Freq. Range: VHT20

| Test Freq | MCS 0 | MCS 1 | MCS 2 | MCS 3 | MCS 4 | MCS 5 | MCS 6 | MCS 7 | MCS8 |
|---|---|---|---|---|---|---|---|---|---|
| 5180 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| 5240 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| 5320 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| 5500 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| 5700 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| 5745 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| 5825 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |

Freq. Range: VHT40

| Test Freq | MCS 0 | MCS 1 | MCS 2 | MCS 3 | MCS 4 | MCS 5 | MCS 6 | MCS 7 | MCS 8 | MCS 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| 5210 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 |
| 5290 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 |
| 5530 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 |
| 5610 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 |
| 5690 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 |
| 5775 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 |

Freq. Range: VHT80

| Test Freq | MCS 0 | MCS 1 | MCS 2 | MCS 3 | MCS 4 | MCS 5 | MCS 6 | MCS 7 | MCS 8 | MCS 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| 5210 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 |
| 5290 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 |
| 5530 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 |
| 5610 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 |
| 5690 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 |
| 5775 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 |

Sensitivity

➢ **802.11a**

| Modulation | Code Rate | IEEE Spec (1Rx dBm) | Typical (1Rx dBm) |
|---|---|---|---|
| BPSK | 1/2 | -82 | -89 |
| BPSK | 3/4 | -81 | -88 |
| QPSK | 1/2 | -79 | -87 |
| QPSK | 3/4 | -77 | -85 |
| 16-QAM | 1/2 | -74 | -82 |
| 16-QAM | 3/4 | -70 | -78 |
| 64-QAM | 2/3 | -66 | -74 |
| 64-QAM | 3/4 | -65 | -67 |

➢ **802.11b**

| Modulation | Code Rate | IEEE Spec (1Rx dBm) | Typical (1Rx dBm) |
|---|---|---|---|
| DBPSK | - | not specified | -97 |
| DQPSK | - | not specified | -94 |
| DQPSK | CCK | not specified | -92 |
| DQPSK | CCK | not specified | -90 |

➢ **802.11g**

| Modulation | Code Rate | IEEE Spec (1Rx dBm) | Typical (1Rx dBm) |
|---|---|---|---|
| BPSK | 1/2 | -82 | -94 |
| BPSK | 3/4 | -81 | -90 |
| QPSK | 1/2 | -79 | -91 |
| QPSK | 3/4 | -77 | -88 |
| 16-QAM | 1/2 | -74 | -84 |
| 16-QAM | 3/4 | -70 | -82 |
| 64-QAM | 2/3 | -66 | -79 |
| 64-QAM | 3/4 | -65 | -76 |

➢ **802.11ng（HT20）**

| Modulation | Code Rate | IEEE Spec (1Rx dBm) | Typical (1Rx dBm) |
|---|---|---|---|
| (MCS0) BPSK | 1/2 | -82 | -94 |
| (MCS1) QPSK | 1/2 | -79 | -91 |
| (MCS2) QPSK | 3/4 | -77 | -88 |
| (MCS3) 16-QAM | 1/2 | -74 | -82 |
| (MCS4) 16-QAM | 3/4 | -70 | -81 |
| (MCS5) 64-QAM | 2/3 | -66 | -79 |
| (MCS6) 64-QAM | 3/4 | -65 | -77 |
| (MCS7) 64-QAM | 5/6 | -64 | -74 |

**（HT40）**

| Modulation | Code Rate | IEEE Spec (1Rx dBm) | Typical (1Rx dBm) |
|---|---|---|---|
| (MCS0) BPSK | 1/2 | -79 | -88 |
| (MCS1) QPSK | 1/2 | -76 | -86 |
| (MCS2) QPSK | 3/4 | -74 | -84 |
| (MCS3) 16-QAM | 1/2 | -71 | -81 |
| (MCS4) 16-QAM | 3/4 | -67 | -78 |
| (MCS5) 64-QAM | 2/3 | -63 | -74 |
| (MCS6) 64-QAM | 3/4 | -62 | -69 |
| (MCS7) 64-QAM | 5/6 | -61 | -65 |

➢ **802.11na（HT20）**

| Modulation | Code Rate | IEEE Spec (1Rx dBm) | Typical (1Rx dBm) |
|---|---|---|---|
| (MCS0) BPSK | 1/2 | -82 | -89 |
| (MCS1) QPSK | 1/2 | -79 | -86 |
| (MCS2) QPSK | 3/4 | -77 | -84 |
| (MCS3) 16-QAM | 1/2 | -74 | -82 |
| (MCS4) 16-QAM | 3/4 | -70 | -79 |
| (MCS5) 64-QAM | 2/3 | -66 | -74 |
| (MCS6) 64-QAM | 3/4 | -65 | -73 |
| (MCS7) 64-QAM | 5/6 | -64 | -66 |

➢ **（HT40）**

| Modulation | Code Rate | IEEE Spec (1Rx dBm) | Typical (1Rx dBm) |
|---|---|---|---|
| (MCS0) BPSK | 1/2 | -79 | -86 |
| (MCS1) QPSK | 1/2 | -76 | -84 |
| (MCS2) QPSK | 3/4 | -74 | -82 |
| (MCS3) 16-QAM | 1/2 | -71 | -80 |
| (MCS4) 16-QAM | 3/4 | -67 | -80 |
| (MCS5) 64-QAM | 2/3 | -63 | -78 |
| (MCS6) 64-QAM | 3/4 | -62 | -76 |
| (MCS7) 64-QAM | 5/6 | -61 | -73 |

➢ **802.11ac（HT80）**

| Modulation | Code Rate | IEEE Spec (1Rx dBm) | Typical (1Rx dBm) |
|---|---|---|---|
| (MCS0) BPSK | 1/2 | -76 | -88 |
| (MCS1) QPSK | 1/2 | -73 | -86 |
| (MCS2) QPSK | 3/4 | -71 | -83 |
| (MCS3) 16-QAM | 1/2 | -68 | -80 |
| (MCS4) 16-QAM | 3/4 | -64 | -78 |
| (MCS5) 64-QAM | 2/3 | -60 | -76 |
| (MCS6) 64-QAM | 3/4 | -59 | -73 |
| (MCS7) 64-QAM | 5/6 | -58 | -71 |
| (MCS8) 256-QAM | 3/4 | -53 | -65 |
| (MCS9) 256-QAM | 5/6 | -51 | -59 |

| | |
|---|---|
| Transmit spectrum mask | For transmitted spectral mask for 11b shall be less than –50dBr for 22MHz<f<fc+22MHz.<br>For transmitted spectral mask for 11g shall be less than –40dBr for fc–30MHz<f<fc+30MHz.<br>For transmitted spectral mask for 11n 20MHz shall be less than –45dBr for fc–30MHz<f<fc+30MHz.<br>For transmitted spectral mask for 11n 40MHz shall be less than –45dBr for fc–60MHz<f<fc+60MHz. |
| Transmit spectrum flatness | For 802.11g the average energy of the constellations in each of spectral lines –16..-1 and +1..+16 will deviate no more than +/- 2dB from their average energy.<br>For 802.11n 40MHz mode, the average energy of the constellations in each of spectral lines –42..-2 and +2..+42 will deviate no more than +/- 2dB from their average energy.<br>The transmitted spectral flatness should be within +2/- 4dB. |
| Transmit center frequency tolerance | The transmitted center frequency tolerance shall be ±20 ppm maximum. |
| Carrier suppression | 802.11a:<br>The leakage of the center frequency component shall not exceed -15 dB relative to overall transmitted power or, equivalently, +2 dB relative to the average energy of the rest of the sub-carriers.<br>802.11b:<br>The RF carrier suppression, measured at the channel center frequency, shall be at least 15 dB below the peak SIN(x)/x power spectrum.<br>802.11g:<br>The leakage of the center frequency component shall not exceed -15 dB relative to overall transmitted power or, equivalently, +2 dB relative to the average energy of the rest of the sub-carriers.<br>802.11n:<br>For all 20 MHz modes of transmission, the leakage of center frequency component shall not exceed -15 dB relative to overall transmitted power or, equivalently, +2 dB relative to the average energy of rest of sub-carriers.<br>For all 40 MHz modes of transmission, the center frequency leakage shall not exceed -18 dB relative to overall transmitted power, or, equivalently, +2 dB relative to the average energy of rest of sub-carriers. |
| Transmit power on ramp and power down ramp time | ➢ The transmitting power-on ramp for 10% to 90% of maximum power m shall be no greater than 2 µs.<br>➢ The transmitting power-down ramp for 90% to 10% of maximum power shall be no greater than 2 µs. |
| Receiver maximum input level | ➢ 802.11a<br>Modulation Code Rate IEEE Spec (1Rx dBm)<br>>-30<br>➢ 802.11b<br>Modulation IEEE Spec (1Rx dBm)<br>DBPSK >-10<br>DQPSK >-10<br>CCK >-10<br>➢ 802.11g<br>Modulation Code Rate IEEE Spec (1Rx dBm)<br>>-20<br>➢ 802.11na<br>Modulation Code Rate IEEE Spec (1Rx dBm)<br>>-30<br>➢ 802.11ng<br>Modulation Code Rate IEEE Spec (1Rx dBm)<br>>-20<br>➢ 802.11ac<br>Modulation Code Rate IEEE Spec (1Rx dBm)<br>>-30 |
| PCB dimension | ➢ 46.0+/-0.1mm x 40.00+/-0.1mm x 1.0+/-0.1mm 4L FR4 |

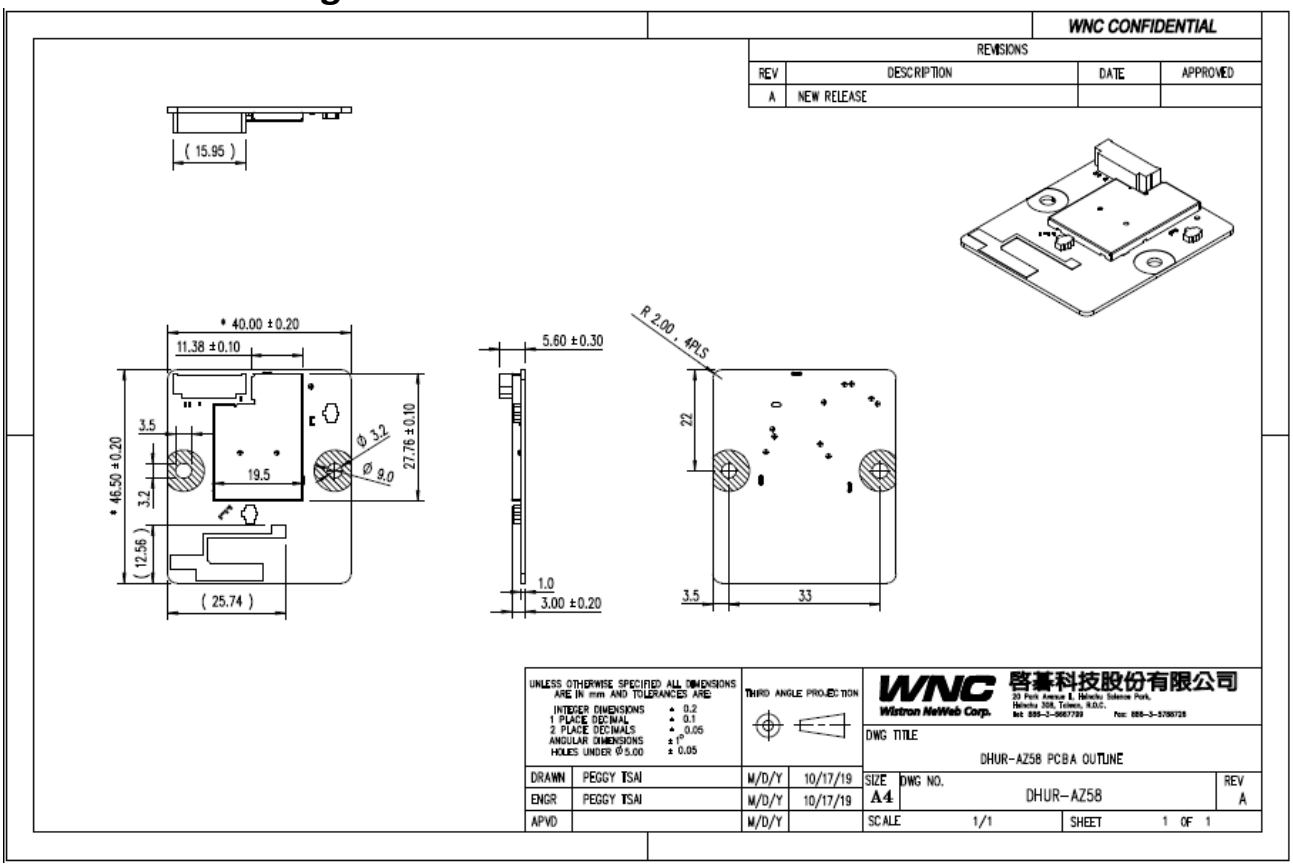
| | |
|---|---|
| Transfer data rate | ➢ 802.11a: 6, 9, 12, 18, 24, 36, 48, 54Mbps<br>➢ 802.11b: 1, 2, 5.5, 11Mbps<br>➢ 802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps<br>➢ 802.11n: @800GI(400GI)<br>● 20MHz BW<br>▪ 1 Nss: 65(72.2) Mbps maximal<br>● 40MHz BW<br>▪ 1 Nss: 135(150) Mbps maximal<br>➢ 802.11ac: @800GI(400GI)<br>● 80MHz BW<br>▪ 1 Nss: 390(433.3) Mbps maximal |
| Security | WEP, WPA ,WPA2 ,AES, TKIP |
| Operation temperature | -10° ~ 60° C |
| Storage temperature | - 45° ~ 85° C ,R.H:90%（non-condensing） |
| Antenna | ➢ 1 RF connector on module for Wi-Fi external antenna. |

## 3.4 BT Portion

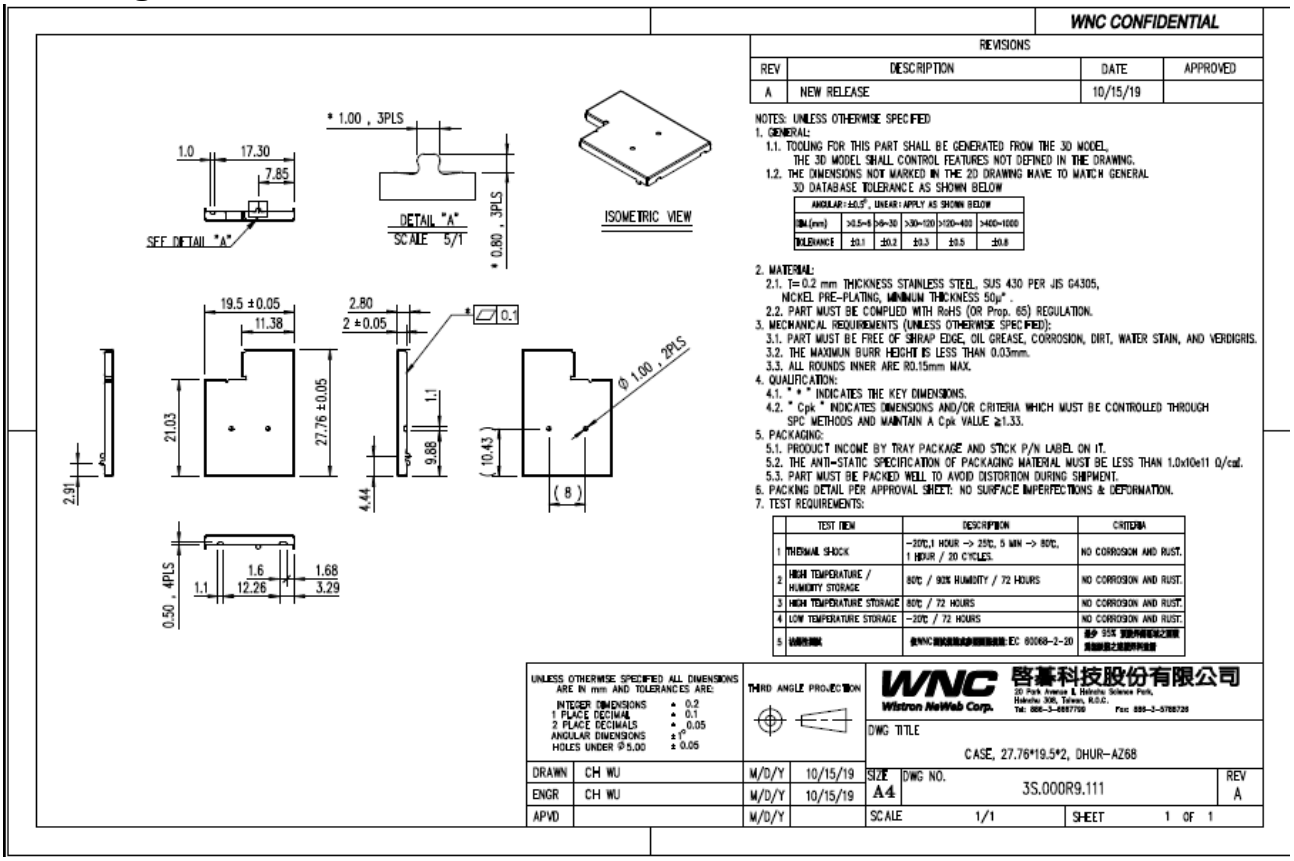
<table>
<tr><th>Item</th><th>Key specifications</th></tr>
<tr><td>Main chipset</td><td>➢ MT7653BUN</td></tr>
<tr><td>Compliance</td><td>➢ Bluetooth 5.0</td></tr>
<tr><td>Frequency range</td><td>➢ 2400 ~ 2483.5MHz</td></tr>
<tr><td>Initial carrier frequency tolerance</td><td>➢ +/- 40kHz (typical)</td></tr>
<tr><td>Modulation technique</td><td>➢ Frequency hopping, 1600 hops/sec</td></tr>
<tr><td>Channel spacing</td><td>➢ 1MHz</td></tr>
<tr><td>Channels support</td><td>➢ 79 channels</td></tr>
<tr><td>Power consumption @25° C</td><td>
<table>
<tr><th rowspan="2">Description</th><th colspan="2">Current</th></tr>
<tr><th>average</th><th>Unit</th></tr>
<tr><td>Sleep mode, radio off</td><td>1.73</td><td>mA</td></tr>
<tr><td>Bluetooth TX</td><td>86.5</td><td>mA</td></tr>
<tr><td>Bluetooth RX</td><td>29.4</td><td>mA</td></tr>
<tr><td>Bluetooth SCO connection, HV3 packets + sniff mode + scan<br>(Page scan internal = 1.28sec, inquiry scan interval = 2.56s, sniff interval = 500ms)</td><td>3.2</td><td>mA</td></tr>
<tr><td>Bluetooth page scan + inquiry scan<br>(Page scan interval = 1.28s, inquiry scan interval = 2.56s)</td><td>2.14</td><td>mA</td></tr>
<tr><td>Bluetooth page scan<br>(Page scan interval = 1.28s)</td><td>1.92</td><td>mA</td></tr>
</table>
Note：<br>※The maximum current consumption would be impacted by radiation environment and the driver mechanism.</td></tr>
<tr><td>Output power (dBm)</td><td>➢ + 4 dBm ≤ Output Power ≤ +10dBm （Class I Device）</td></tr>
</table>

| | |
|---|---|
| Sensitivity | ➢ -80 dBm (typ.) for pi/4-DQPSK, 0.1%BER |
| Operation temperature | ➢ -10° ~ 60° C |
| Storage temperature | ➢ -45° ~ 85° C , R.H. : 90%（non-condensing） |
| Antenna | ➢ 1 RF connector on module for BT external antenna. |

## 4. Mechanical Drawing



# 5. Shielding cover Information

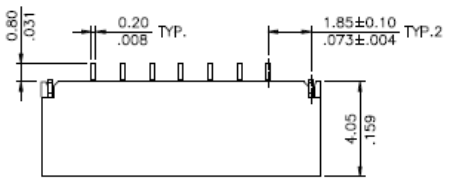


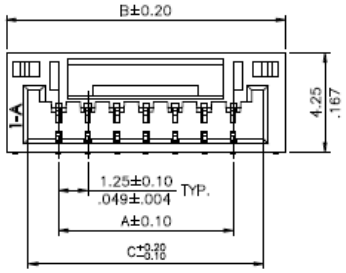
# 6. Connector Information

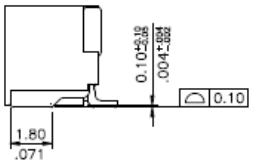
Material :
Insulation: High temperature plastic UL 94V-0, Color Nature(Halogen-Free)
Contact : Phosphor Bronze
Fixed Tab : Phosphor Bronze with Tin Plated

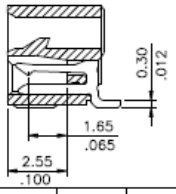
| Circuits | Dimension | | |
|---|---|---|---|
| | A | B | C |
| 2 | 1.25(.049) | 5.75(.226) | 3.85(.152) |
| 3 | 2.50(.098) | 7.00(.276) | 5.10(.201) |
| 4 | 3.75(.148) | 8.25(.325) | 6.35(.250) |
| 5 | 5.00(.197) | 9.50(.374) | 7.60(.299) |
| 6 | 6.25(.246) | 10.75(.423) | 8.85(.348) |
| 7 | 7.50(.295) | 12.00(.472) | 10.10(.398) |
| 8 | 8.75(.344) | 13.25(.522) | 11.35(.447) |
| 9 | 10.00(.394) | 14.50(.571) | 12.60(.496) |
| 10 | 11.25(.443) | 15.75(.620) | 13.85(.545) |
| 11 | 12.50(.492) | 17.00(.669) | 15.10(.594) |
| 12 | 13.75(.541) | 18.25(.719) | 16.35(.644) |
| 13 | 15.00(.591) | 19.50(.768) | 17.60(.693) |
| 14 | 16.25(.640) | 20.75(.817) | 18.85(.742) |
| 15 | 17.50(.689) | 22.00(.866) | 20.10(.791) |
| 18 | 21.25(.837) | 25.75(1.014) | 23.85(.939) |
| 20 | 23.75(.935) | 28.25(1.112) | 26.35(1.037) |

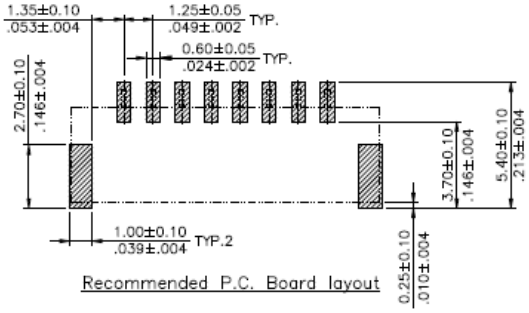
ORDERING CODE:
CI40 ** M * H R0 -NH
① ② ③ ④ ⑤ ⑥ ⑦
① SERIES NO.:
② NO. OF CIRCUITS:
③ CONTACTS TYPE: M= SMT
④ PLATING OPTION:
1= TIN OVER NICKEL PLATED
2= GOLD FLASH PALTING OVER 1.27μm(50μ") NICKEL
⑤ TAIL STYLE: H= RIGHT ANGLE
⑥ OPTION: R0= TAPE & REEL PACKING
⑦ -NH= FOR LEAD FREE IR PROCESSES AND HALOGEN-FREE




Recommended P.C. Board layout

Halogen-Free | Lead Free Process | RoHS Compliant

| SYM | NAME | DATE | REVISIONS | | | DATE |
|---|---|---|---|---|---|---|
| 1 | | | CVILUX CORP. 2017.04.19 ISSUED | DRAWN BY: | Clark | 04/19-17 |
| 2 | | | | ENGINEER: | Clark | 04/19-17 |
| 3 | | | | CHECKED BY: | David | 04/19-17 |
| 4 | | | | APPROVED BY: | David | 04/19-17 |

UNIT: mm / inch
TOLERANCE UNLESS OTHERWISE SPECIFIED
X ± 0.30/.012 X° ± 3°
.XX ± 0.25/.010 .X' ± 0.5'
.XXX ± 0.20/.008 .XX' ±

TITLE: 1.25MM(.049") RIGHT ANGLE SMT TYPE HEADER
MATERIAL:
FINISH:

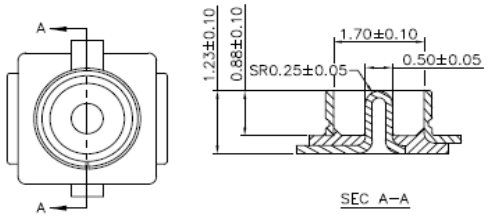
潤崔股份有限公司 CviLux Corporation

| DRAWING NO. | CI4001SA | PART NO. | CI40**M*HR0-NH |
|---|---|---|---|
| SCALE | 5 / 1 | SHEET | 1 OF 1 |

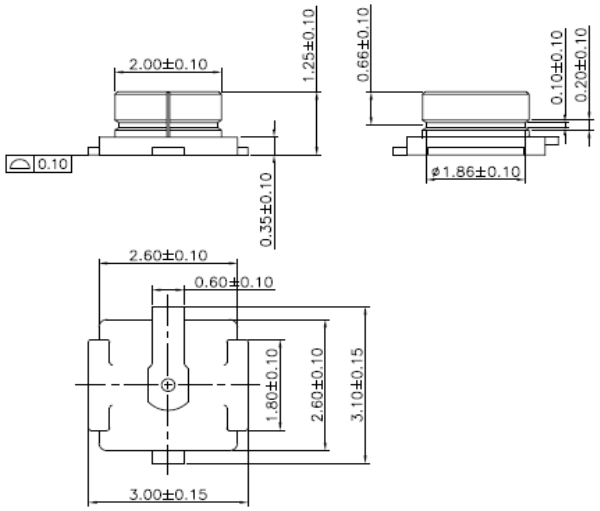
# 7. Coaxial RF Connector

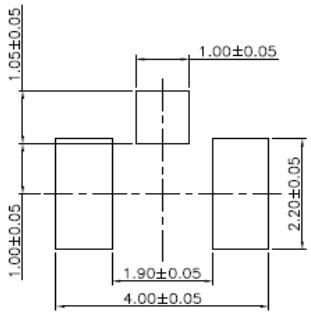
| REV. | ECN. NO. | APPD. |
|---|---|---|
| A | BC-07-7064499 | Yusen |

NOTES: UNLESS OTHERWISE SPECIFIED
1. ALL DIMENSION ARE IN MILLIMETER
2. DIMENSION SHALL BE INTERPRETED PER ASME Y14.5M-1994
3. MATERIAL: 307-0500-1009
HOUSING: THERMOPLASTIC, UL 94V-0 RATING
CONTACT: COPPER ALLOY, GOLD PLATING
METAL SHELL: COPPER ALLOY, SILVER OR GOLD PLATING
4. PRODUCT NO. MATRIX: SEE 307-0500-1393
5. SPEC. OF PRODUCT PLEASE REFER TO FOXCONN DWG :307-0300-1393
6. THE CONCENTRATIONS OF Br&Cl CAN SATISFY THE REQUIREMENT OF HALOGEN-FREE IN DOCMENT "EPI12".




SEC A-A



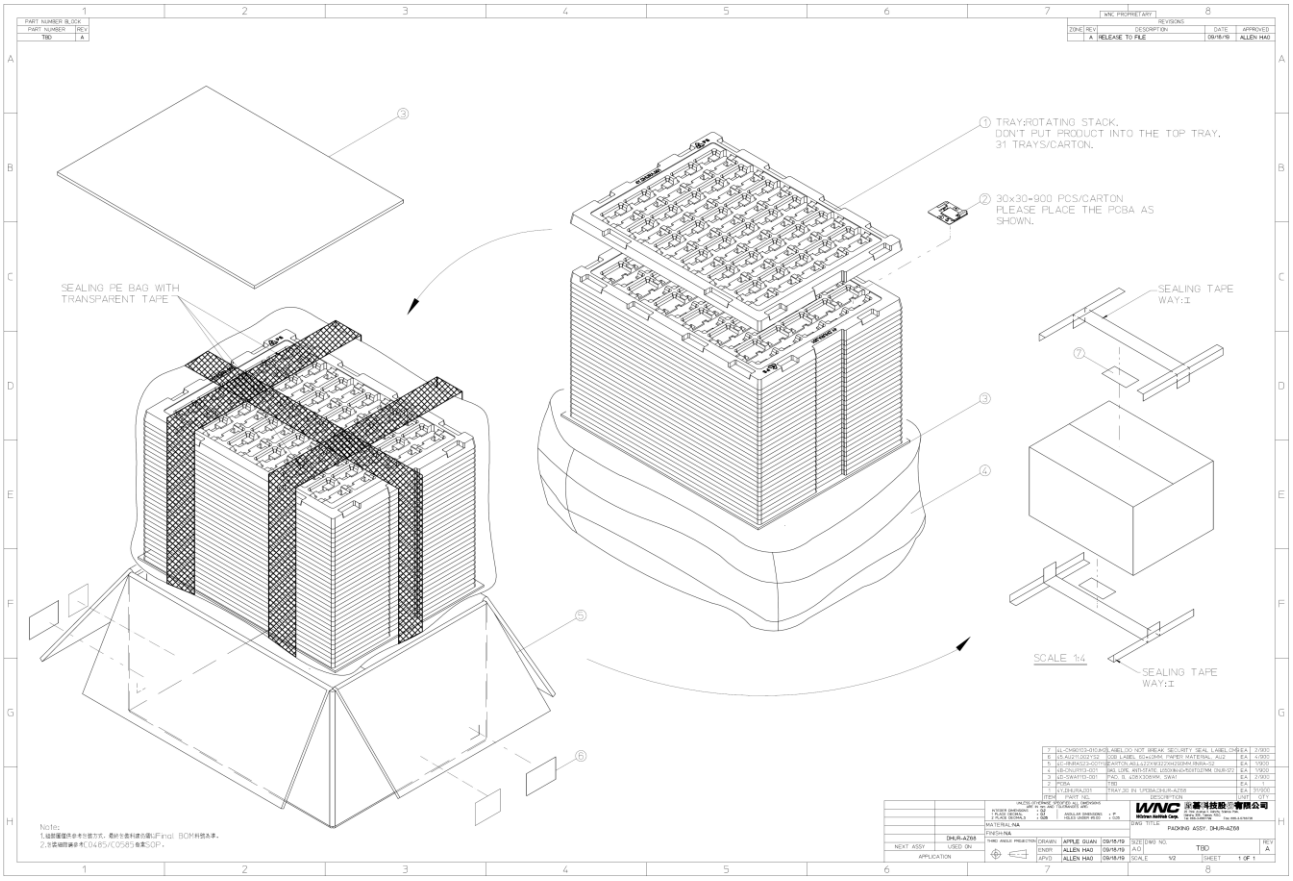




RECOMMENDED P.C.B. LAYOUT

| | | | | |
|---|---|---|---|---|
| X.± | X°± | UNITS mm | NAME(INTENDED USE) RF HEADER | FOXCONN HON HAI PRECISION IND. CO.,LTD. TAIPEI, TAIWAN, R.O.C. |
| .X± 0.2 | .X'± | MAT'L | PART NO.(INTENDED USE) KK23 SERIES | TITLE: CUSTOMER DWG., SMT, RF HEADER |
| .XX± 0.1 | .XX'± | FINISH | APPD: Jake W.Y | DWG NO.: 307-0000-1393 |
| .XXX± | .XXX'± | Q'TY | CHKD: D.J Chen | SCALE N/A SHEET 1/2 REV. AX4 |
| | | | DR: Fenghua Yu 2/23'09 | |

THESE DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY OF HON HAI PRECISION IND. CO., LTD. AND SHALL NOT BE REPRODUCED, COPIED OR USED IN ANY MANNER WITHOUT THE PRIOR WRITTEN CONSENT OF HON HAI PRECISION IND. CO., LTD.

# 8. Packing


① TRAY:ROTATING STACK,
DON'T PUT PRODUCT INTO THE TOP TRAY.
31 TRAYS/CARTON.
② 30x30=900 PCS/CARTON
PLEASE PLACE THE PCBA AS
SHOWN.
SEALING PE BAG WITH
TRANSPARENT TAPE
SEALING TAPE
WAY:1
SCALE 1/4
SEALING TAPE
WAY:1

**Federal Communication Commission Interference Statement**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

**IMPORTANT NOTE:**
**Radiation Exposure Statement:**
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Country Code selection feature to be disabled for products marketed to the US/CANADA

**Integration instructions for host product manufacturers**
**Applicable FCC rules to module**
FCC Part 15.247

**Summarize the specific operational use conditions**
The module is must be installed in mobile device.
This device is intended only for OEM integrators under the following conditions:
1) The antenna must be installed such that 20 cm is maintained between the antenna and users, and
2) The transmitter module may not be co-located with any other transmitter or antenna
3) For all products market in US, OEM has to limit the operation channels in CH1 to CH11 for 2.4G band
by supplied firmware programming tool. OEM shall not supply any tool or info to the end-user regarding
to Regulatory Domain change.

As long as 3 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.
IMPORTANT NOTE: In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization. The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module.
The end user manual shall include all required regulatory information/warning as show in this manual.

**Limited module procedures**
Not applicable

**Trace antenna designs**
Not applicable

**RF exposure considerations**
20 cm separation distance and co-located issue shall be met as mentioned in "Summarize the specific operational use conditions".
Product manufacturer shall provide below text in end-product manual
"This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body."

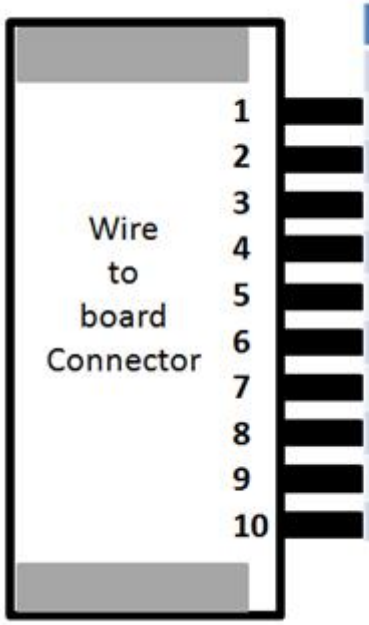
**Antennas**

| Brand | Model | Type | Peak gain ( dBi ) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Connector | 2400~2483.5MHz | 5150~5250MHz | 5250~5350MHz | 5470~5725MHz | 5725~5850MHz |
| WNC | WF1_ANT | PIFA | NA | 3.16 | 2.17 | 1.71 | 1.49 | 1.61 |
| WNC | 81.EK615.GAA | PIFA | IPEX | 2.26 | 6.34 | 6.34 | 6.54 | 6.93 |
| WNC | 81.EK615.GAF | PIFA | IPEX | 3.09 | 4.23 | 4.23 | 5.35 | 4.06 |

**Label and Compliance Information**
Product manufacturers need to provide a physical or e-label stating
“Contains FCC ID: NKR-DHURAZ53” with finished product
**Information on Test Modes and Additional Testing Requirements**
Test tool: QA Tool, Version: V0.02.6 for WLAN；WCn Combo Tool, Version: V2.1749.00 for BT shall be used to set the module to transmit continuously.

**Additional Testing, Part 15 Subpart B Disclaimer**
The module is only FCC authorized for the specific rule parts listed on the grant, and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed

Pin Assignment




| Pin Assignment | | | |
|---|---|---|---|
| Pin No. | Pin name | Remark | I/O |
| 1 | RESET | Reset controlled by main SOC | I |
| 2 | BT_WAKE_HOST | BT wake up host | O |
| 3 | GND | GND | - |
| 4 | WoWLAN | Wake on Wireless LAN | O |
| 5 | GND | GND | - |
| 6 | USB_DM | USB Communication signal USB_DM | I/O |
| 7 | USB_DP | USB Communication signal USB_DP | I/O |
| 8 | 5V | VDD 5V | I |
| 9 | BT_IR | BT_IR signal for MT7668 | O |
| 10 | GPIO_X | BT_IR signal select | O |

Wire to board connector: CI4010M1HR0-NH

# Industry Canada statement:

*This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:*

*(1) This device may not cause interference*
*(2) This device must accept any interference, including interference that may cause undesired operation of the device*

*L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :*
*(1) L'appareil ne doit pas produire de brouillage;*
*(2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.*

**Caution:**

(i) the device for operation in the band 5150–5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems;

(ii) for devices with detachable antenna(s), the maximum antenna gain permitted for devices in the bands 5250-5350 MHz and 5470-5725 MHz shall be such that the equipment still complies with the e.i.r.p. limit;

(iii) for devices with detachable antenna(s), the maximum antenna gain permitted for devices in the band 5725-5850 MHz shall be such that the equipment still complies with the e.i.r.p. limits as appropriate; and

Operations in the 5.25-5.35GHz band are restricted to indoor usage only.

**Avertissement:**

(i) les dispositifs fonctionnant dans la bande de 5 150 à 5 250 MHz sont réservés uniquement pour une utilisation à l'intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux;

(ii) pour les dispositifs munis d'antennes amovibles, le gain maximal d'antenne permis pour les dispositifs utilisant les bandes de 5 250 à 5 350 MHz et de 5 470 à 5 725 MHz doit être conforme à la limite de la p.i.r.e;

(iii) pour les dispositifs munis d'antennes amovibles, le gain maximal d'antenne permis (pour les dispositifs utilisant la bande de 5 725 à 5 850 MHz) doit être conforme à la limite de la p.i.r.e. spécifiée, selon le cas;

Les opérations dans la bande de 5.25-5.35GHz sont limités à un usage intérieur seulement.

**Radiation Exposure Statement:**
This equipment complies with Canada radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

**Déclaration d'exposition aux radiations:**
Cet équipement est conforme Canada limites d'exposition aux radiations dans un environnement non contrôlé. Cet équipement doit être installé et utilisé à distance minimum de 20cm entre le radiateur et votre corps.

**This device is intended only for OEM integrators under the following conditions:**

1) The transmitter module may not be co-located with any other transmitter or antenna.

As long as 1 condition above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

**Cet appareil est conçu uniquement pour les intégrateurs OEM dans les conditions suivantes:**

1) Le module émetteur peut ne pas être coïmplanté avec un autre émetteur ou antenne.

Tant que les 1 condition ci-dessus sont remplies, des essais supplémentaires sur l'émetteur ne seront pas nécessaires. Toutefois, l'intégrateur OEM est toujours responsable des essais sur son produit final pour toutes exigences de conformité supplémentaires requis pour ce module installé.

**IMPORTANT NOTE:**

In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the Canada authorization is no longer considered valid and the IC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate Canada authorization.

**NOTE IMPORTANTE:**

Dans le cas où ces conditions ne peuvent être satisfaites (par exemple pour certaines configurations d'ordinateur portable ou de certaines co-localisation avec un autre émetteur), l'autorisation du Canada n'est plus considéré comme valide et l'ID IC ne peut pas être utilisé sur le produit final. Dans ces circonstances, l'intégrateur OEM sera chargé de réévaluer le produit final (y compris l'émetteur) et l'obtention d'une autorisation distincte au Canada.

**End Product Labeling**

The final end product must be labeled in a visible area with the following: “Contains IC: 4441A-DHURAZ53”.

**Plaque signalétique du produit final**

Le produit final doit être étiqueté dans un endroit visible avec l'inscription suivante: "Contient des IC: 4441A-DHURAZ53".

**Manual Information To the End User**

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user’s manual of the end product which integrates this module.
The end user manual shall include all required regulatory information/warning as show in this manual.

**Manuel d'information à l'utilisateur final**

L'intégrateur OEM doit être conscient de ne pas fournir des informations à l'utilisateur final quant à la façon d'installer ou de supprimer ce module RF dans le manuel de l'utilisateur du produit final qui intègre ce module.
Le manuel de l'utilisateur final doit inclure toutes les informations réglementaires requises et avertissements comme indiqué dans ce manuel.