# WNFQ-261ACNI(BT)

802.11ac/a/b/g/n Industrial-Grade

2T2R Wi-Fi+Bluetooth 5.0 Combo

M.2 2230 Module

## Industrial-Grade Wi-Fi+Bluetooth Combo Solution M.2 2230 Module

SparkLAN WNFQ-261ACNI(BT) is an 802.11ac/a/b/g/n Dual-Band Wi-Fi+Bluetooth M.2 230 module based on Qualcomm Atheros QCA6174A chipset. This highly integrated module supports most of WLAN capabilities with seamless roaming and advanced security for enterprise application. The wireless module complies with IEEE 802.11ac/a/b/g/n 2x2 MIMO. The Bluetooth Supports BT 5.0+HS, BLE and is backwards compatible with BT 1.X, 2.X Enhanced Data Rate. The integrated module provides PCIE Interface for Wi-Fi and USB interface for Bluetooth. The download speed are 300Mbps on N networks and 867Mbps on AC network.

Adopting the latest 802.11ac solution. WNFQ-261ACNI(BT) is ideal for next-generation high throughput enterprise networking and Industrial-graded (-40°C~+85°C) solution. Incorporated with advanced security encryption, such as WEP, WPA, WPA2 and 802.1x, it helps prevent user's devices from malicious attacks.

## Embedded Application

Applications include IPC/ Advertising machine/ OTT/ IPTV/ DVB/ STB / DV/ Mini Driving Recorder/ Intelligent Projector Pico/ VR/ AR terminal/ POS machine/ Vehicle mounted front/ Rear Terminal UAV/ Robot/ Intelligent Gateway/ Smart city and other electronic products.

## Key Feature

- Supports low power PCIe (w/L1 substate) interfaces for WLAN and USB1.1 interface for Bluetooth.
- Support Bluetooth 5.0+HS, BLE, ANT+ and be backwards compatible with Bluetooth 1.2, 2.X + enhanced data rate.
- NGFF (M.2) Form factor which is compliant with ROHS requirements.

## Specification

| | |
|---|---|
| **Standards** | IEEE 802.11ac/a/b/g/n (2T2R)<br>Bluetooth V5.0, V4.2, V4.1, V4.0 LE, V3.0+HS, V2.1+EDR |
| **Chipset** | Qualcomm Atheros QCA6174A-5 |
| **Data Rate** | 802.11b: 11Mbps<br>802.11a/g: 54Mbps<br>802.11n: MCS0~15<br>802.11ac: MCS0~9<br>Bluetooth: 1 Mbps, 2Mbps and Up to 3Mbps |
| **Operating Frequency** | IEEE 802.11ac/a/b/g/n<br>ISM Band, 2.400GHz~2.497GHz, 5.150GHz~5.845GHz<br>*Subject to local regulations |
| **Interface** | WLAN: PCIe<br>Bluetooth: USB |
| **Form Factor** | M.2 2230 |
| **Antenna** | 2 x IPEX MHF4 connectors<br>(ANT1 for WIFI+BT, ANT2 for WIFI) |
| **Modulation** | Wi-Fi:<br>802.11b: DSSS (DBPSK, DQPSK, CCK)<br>802.11g: OFDM (BPSK, QPSK, 16-QAM, 64-QAM)<br>802.11n: OFDM (BPSK, QPSK, 16-QAM, 64-QAM)<br>802.11a: OFDM (BPSK, QPSK, 16-QAM, 64-QAM)<br>802.11ac: OFDM (BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM)<br>Bluetooth:<br>Header: GFSK<br>Payload 2M: $\pi$/4-DQPSK<br>Payload 3M: 8-DPSK |
| **Power Consumption** | TX mode: 610mA<br>RX mode: 285mA |
| **Operating Voltage** | DC 3.3V |
| **Operating Temperature Range** | -40°C~85°C |
| **Storage Temperature Range** | -40°C~85°C |
| **Humidity** | 10%~95% (Operating) |

| (Non-Condensing) | 10%~95% (Storing) |
|---|---|
| **Dimension L x W x H (in mm)** | 30mm(±0.15mm) x 22mm(±0.15mm) x 1.95mm(±0.2mm) |
| **Weight (g)** | 2.4g |
| **Driver Support** | Windows 7/8.1/10, Linux (Open Source), Recommend Kernel v4.0+ |
| **Security** | 64/128-bits WEP, WPA, WPA2, WPA3, 802.1x |

## OUTPUT POWER & SENSITIVITY

### 802.11b

| Data Rate | Tx ± 2dBm | Rx Sensitivity |
|---|---|---|
| 11Mbps | 15dBm | ≦-91dBm |

### 802.11g

| Data Rate | Tx ± 2dBm | Rx Sensitivity |
|---|---|---|
| 54Mbps | 15dBm | ≦-75dBm |

### 802.11n / 2.4GHz

| | Data Rate | Tx ± 2dBm (1TX) | Tx ± 2dBm (2TX) | Rx Sensitivity |
|---|---|---|---|---|
| HT20 | MCS7 | 13dBm | 16dBm | ≦-71dBm |
| HT40 | MCS7 | 13dBm | 16dBm | ≦-69dBm |

### 802.11a

| Data Rate | Tx ± 2dBm | Rx Sensitivity |
|---|---|---|
| 54Mbps | 13dBm | ≦-65dBm |

### 802.11n / 5GHz

| | Data Rate | Tx ± 2dBm (1TX) | Tx ± 2dBm (2TX) | Rx Sensitivity |
|---|---|---|---|---|
| HT20 | MCS7 | 10dBm | 13dBm | ≦-74dBm |
| HT40 | MCS7 | 10dBm | 13dBm | ≦-71dBm |

### 802.11ac

| | Data Rate | Tx ± 2dBm (1TX) | Tx ± 2dBm (2TX) | Rx Sensitivity |
|---|---|---|---|---|
| VHT80 | MCS9 | 10dBm | 13dBm | ≦-63dBm |

### Bluetooth

| Data Rate | Tx ± 2dBm (Class 1 Device) | Rx Sensitivity |
|---|---|---|
| 3Mbps | +2≦ Output Power ≦6dBm | <0.1% BR, BER at -83dBm |

## Block Diagram
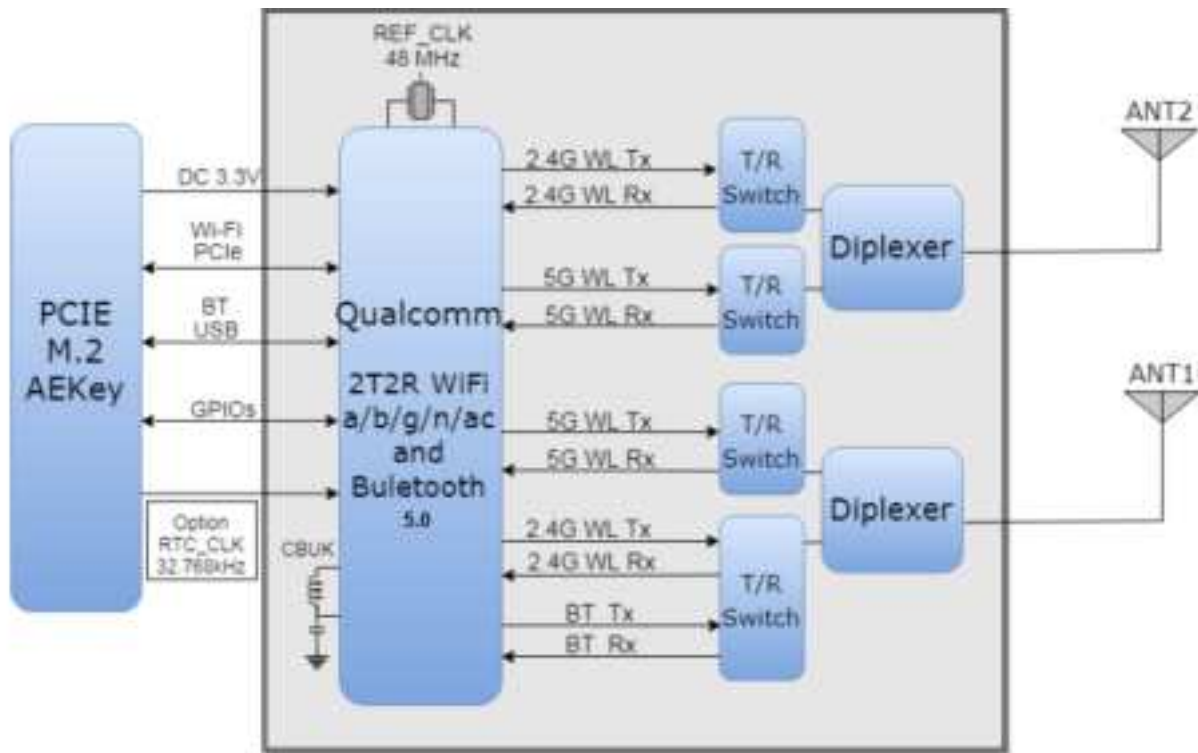


## Mechanical Dimension (mm)
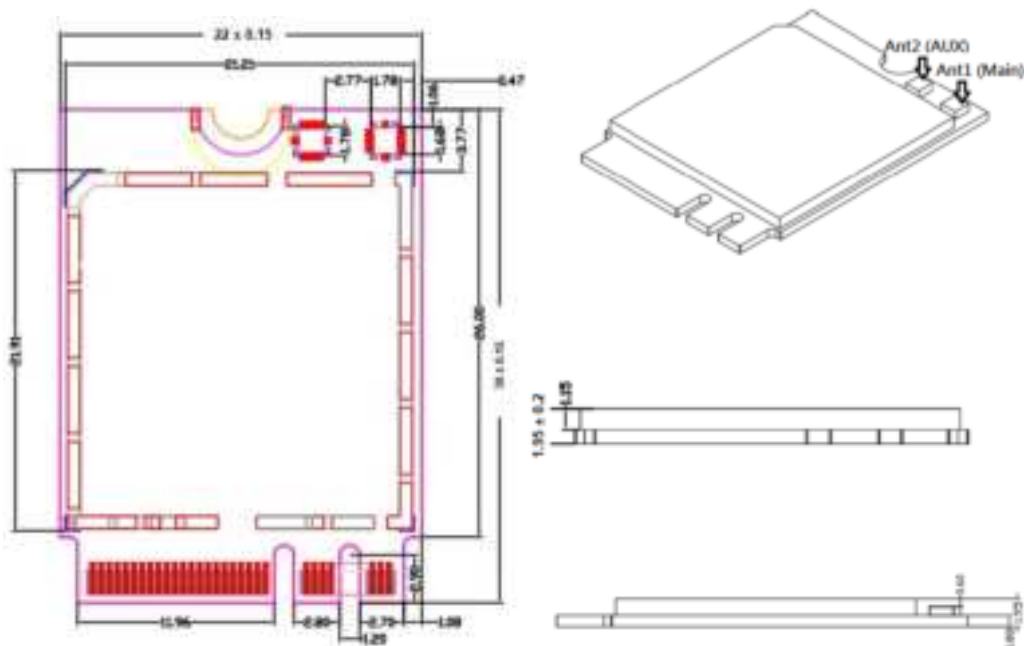
## MHF4 connector spec.



Unit: mm
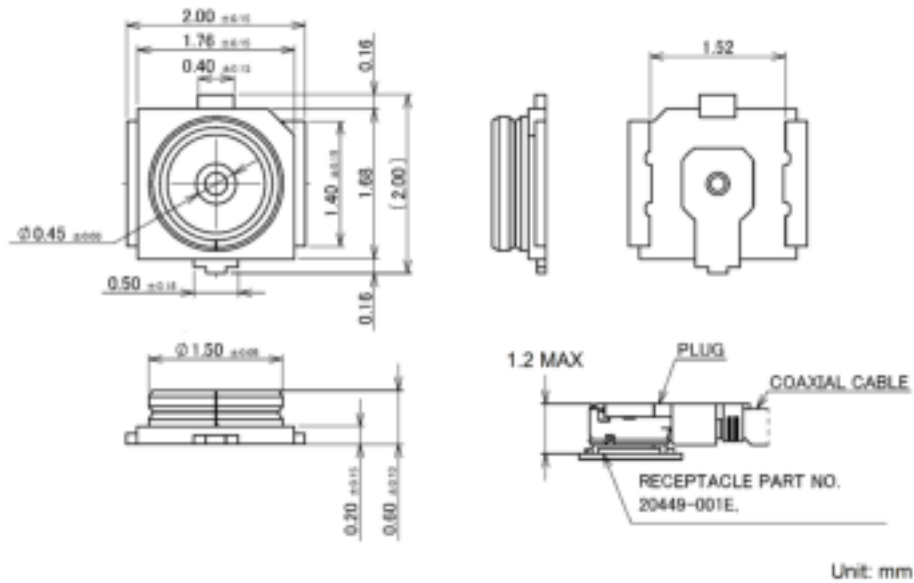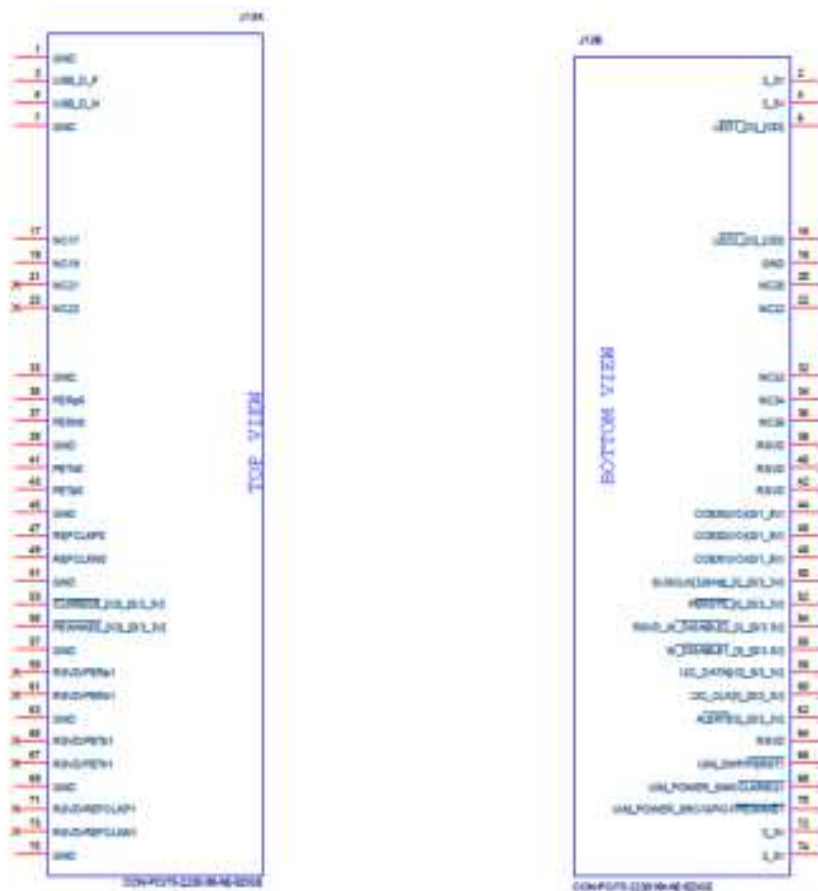
## Pin Assignment

## Pin Assignment

| TOP | | | |
|---|---|---|---|
| Pin# | Pin Name | Type | Description |
| 1 | GND | - | Ground connections |
| 3 | USB_D_P | I/O | USB serial differential data Positive |
| 5 | USB_D_N | I/O | USB serial differential data Negative |
| 7 | GND | - | Ground connections |
| 17 | NC | - | No connect |
| 19 | NC | - | No connect |
| 21 | NC | - | No connect |
| 23 | NC | - | No connect |
| 33 | GND | - | Ground connections |
| 35 | PCIE_RX_P | I | PCI Express receive data-Positive |
| 37 | PCIE_RX_N | I | PCI Express receive data-Negative |
| 39 | GND | - | Ground connections |
| 41 | PCIE_TX_N | O | PCI Express transmit data- Negative |
| 43 | PCIE_TX_P | O | PCI Express transmit data- Positive |
| 45 | GND | - | Ground connections |
| 47 | PCIE_RCLK_P | I | PCI Express differential clock input- Positive |
| 49 | PCIE_RCLK_N | I | PCI Express differential clock input- Negative |
| 51 | GND | - | Ground connections |
| 53 | PCIE_CLKREQ_L | I/O | PCIe clock request |
| 55 | PCIE_WAKE_L | O | PCIe wake signal |
| 57 | GND | - | Ground connections |
| 59 | NC | - | No connect |
| 61 | NC | - | No connect |
| 63 | GND | - | Ground connections |
| 65 | NC | - | No connect |
| 67 | NC | - | No connect |
| 69 | GND | - | Ground connections |
| 71 | NC | - | No connect |
| 73 | NC | - | No connect |
| 75 | GND | - | Ground connections |

## Pin Assignment

| BOTTOM | | | |
|---|---|---|---|
| Pin# | Pin Name | Type | Description |
| 2 | VDD_3V3 | I | VDD system power supply input |
| 4 | VDD_3V3 | I | VDD system power supply input |
| 6 | WLAN_LED | OD | WLAN LED |
| 16 | BT_LED | OD | Bluetooth LED |
| 18 | GND | - | Ground connections |
| 20 | NC | - | No connect |
| 22 | NC | - | No connect |
| 32 | NC | - | No connect |
| 34 | NC | - | No connect |
| 36 | NC | - | No connect |
| 38 | NC | - | No connect |
| 40 | NC | - | No connect |
| 42 | NC | - | No connect |
| 44 | NC | - | No connect |
| 46 | NC | - | No connect |
| 48 | NC | - | No connect |
| 50 | 32KHz_CLK_IN | I | 32.768KHz CLOCK INPUT |
| 52 | PCIE_PERST_L | I | PCIe host indication to reset the device Active low. |
| 54 | BT_RF_KILL_L | I | Turn off BT RF analog and front-end. Active low. |
| 56 | WLAN_RF_KILL_L | I | Turn off WLAN RF analog and front-end. Active low. |
| 58 | NC | - | No connect |
| 60 | NC | - | No connect |
| 62 | NC | - | No connect |
| 64 | NC | - | No connect |
| 66 | NC | - | No connect |
| 68 | NC | - | No connect |
| 70 | NC | - | No connect |
| 72 | VDD_3V3 | I | VDD system power supply input |
| 74 | VDD_3V3 | I | VDD system power supply input |

## Certification

**Dipole Ant.**

| | | | |
|---|---|---|---|
| ■ | **FCC** | ■ | **CE** (RED EN 300 328 V2.2.2 / EN 301 893 V2.1.1) |
| ■ | **IC** | ■ | **MIC** |
| ☐ | **NCC** | ☐ | **ASNZS** |

## Ordering Information

| Product Name | Part Number | Description |
|---|---|---|
| WNFQ-261ACNI(BT) | R9701810007 | 802.11ac/a/b/g/n Industrial Grade 2T2R WiFi + BT5.0 M.2 2230 Module |

## Optional Accessory

| Product Name | Part Number | Description |
|---|---|---|
| AD-103AG | R3410110203 | Dipole Antenna, 2dBi 2.4GHz/5GHz, RP-SMA(M) connector |
| AD-302N | R3410110221 | Dipole Antenna, 3dBi/2dBi 2.4G/5GHz, RP-SMA(M) connector |
| AD-303N | R3410110222 | Dipole Antenna, 3dBi/3dBi 2.4G/5GHz, RP-SMA(M) connector |
| AD-305N | R3410110223 | Dipole Antenna, 5dBi/5dBi 2.4G/5GHz, RP-SMA(M) connector |
| CBIRF-NE150 | R3470300025 | RF Cable, I-PEX/MHF4 to RP-SMA(F); L:150mm; Coaxial 0.81 Black |
| CBIRF-NE250 | R3470300026 | RF Cable, I-PEX/MHF4 to RP-SMA(F); L:250mm; Coaxial 0.81 Black |
| GEPH-023 | 401GEPH16-022G000000032-001 | PCB WLAN Dual Bands Antenna Φ1.13mm Micro-Coaxial Cable with IPEX4L MHF Connector |

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WNFQ-261ACNI(BT)
ver.1.6

**Federal Communication Commission Interference Statement**

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.

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

Operations in the 5.15-5.25GHz band are restricted to indoor usage only.

This device meets all the other requirements specified in Part 15E, Section 15.407 of the FCC Rules.

**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 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.

As long as **2** conditions above are met, further <u>transmitter</u> 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 <u>can not be met</u> (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID <u>can not</u> 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.

**End Product Labeling**

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: "**Contains FCC ID: RYK-WNFQ261ACNIBT**". The grantee's FCC ID can be used only when all FCC compliance requirements are met.

**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.

15B notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.