

# **AC-720M**

**802.11ac**

**Wireless LAN USB Module**

**User's Manual**

**Draft V0.1**

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## 1. Introduction

The IEEE 802.11b/g/n/ac 2.4G/5G Wireless LAN USB Module is the perfect solution for your wireless network applications based on the IEEE 802.11ac standard offering a data rate of up to 433Mbps in a wireless LAN environment.

The AC-720M wireless module can easily integrate into a wide range of devices such as IoT devices, Printer Servers, IP Cameras and Internet Video Server, etc. The wireless LAN USB module offers dramatic performance improvement. It provides high-speed wireless connection with data rate up to 433Mbps (one stream) and connects to farther distance.

## 2. Features

- . Supports 1Tx/1Rx to enable data rate up to 433Mbps link rate for 80MHz channel
- . Support IEEE 802.11ac dual band USB module
- . Support USB2.0 interface

## 3. Hardware Specifications

| Features                            | Additional Information                                                                                                                                                                   |                                                                                                         |
|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|
| RF Chipset Solution                 | QCA9377-7                                                                                                                                                                                |                                                                                                         |
| Standard Compliance                 | IEEE 802.11a/b/g/n/ac Wi-Fi Compliant                                                                                                                                                    |                                                                                                         |
| Host interface                      | USB 2.0                                                                                                                                                                                  |                                                                                                         |
| Operating Voltage                   | DC 5V±5%                                                                                                                                                                                 |                                                                                                         |
| Power Consumption                   | ≤750mA                                                                                                                                                                                   |                                                                                                         |
| Frequency Range & Number of Channel | 2.412 ~ 2.462 GHz:                                                                                                                                                                       | Channel 1~11                                                                                            |
|                                     | 5.180 - 5.240 GHz:                                                                                                                                                                       | 36, 38, 40, 42, 44, 46, 48                                                                              |
|                                     | 5.260 - 5.320 GHz:                                                                                                                                                                       | 52, 54, 56, 58, 60, 62, 64                                                                              |
|                                     | 5.500 - 5.720 GHz :                                                                                                                                                                      | 100, 102, 104, 106, 108, 110, 112, 116, 118, 120, 122, 124, 126, 128, 132, 134, 136, 138, 140, 142, 144 |
|                                     | 5.745 - 5.825 GHz:                                                                                                                                                                       | 149, 151, 153, 155, 157, 159, 161, 165                                                                  |
| Modulation                          | 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>802.11ac : OFDM (BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM) |                                                                                                         |
| Channel Bandwidths                  | 20/40/80MHz                                                                                                                                                                              |                                                                                                         |
| Data Rate                           | 802.11b: 1, 2, 5.5, 11 Mbps<br>802.11 a/g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps<br>802.11n: up to 72.2 Mbps<br>802.11ac: up to 433 Mbps                                                     |                                                                                                         |
| Antenna Connector                   | U.FL                                                                                                                                                                                     |                                                                                                         |
| Operating Temperature               | -30 ~ 75 °C                                                                                                                                                                              |                                                                                                         |
| Operating Humidity                  | <90% RH                                                                                                                                                                                  |                                                                                                         |
| Storage Temperature                 | -30 ~ 80 °C                                                                                                                                                                              |                                                                                                         |
| Storage Humidity                    | 10 ~ 90% RH                                                                                                                                                                              |                                                                                                         |

## 4. Pin Assignment & Pinout Information

Figure 4-1. The wireless module Pin Assignment

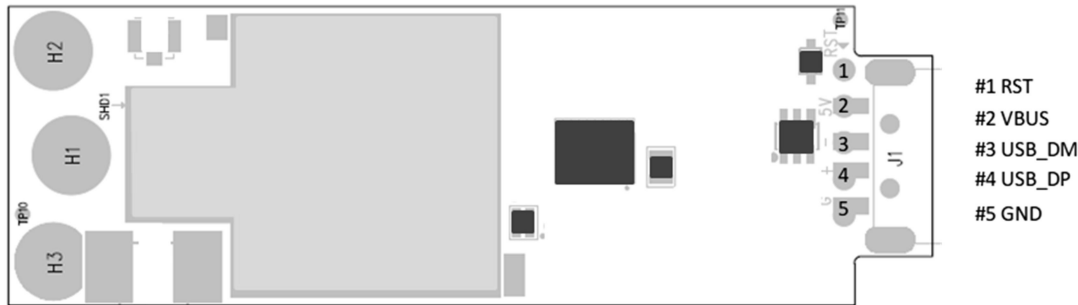


Table 4-1: The wireless module Pin Description

| Pin # | Pin Name       | Type          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------|----------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | RST            | Digital Input | <ul style="list-style-type: none"> <li>- Active-low hard Reset pin</li> <li>- When the Reset pin is asserted low, the module is in the Reset state. When the Reset pin is asserted high, the module functions normally</li> <li>- This pin must connect to a host output that is low by default on power-up. If the host output is tri-stated, add a 1M Ohm pull-down resistor to ensure a low level at power-up</li> <li>- Signal Level 3.3V is High</li> </ul> |
| 2     | VBUS (+5 Vdc)  | Power         | <ul style="list-style-type: none"> <li>- Power supply pin for DC/DC converter</li> <li>- Power supply voltage DC +5 V <math>\pm 5\%</math></li> </ul>                                                                                                                                                                                                                                                                                                            |
| 3     | USB_D-, USB_DM | AI,AO         | USB 2.0 Differential pair                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 4     | USB_D+, USB_DP | AI,AO         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 5     | GND            | GND           | Ground pin                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

## 5. Hardware Installation

The following sections in this chapter describe how to install AC-720M Module

### 5.1. Installation Overview

AC-720M USB Module is designed for Access Point, Router, ATU-R, Printer Server series, IP Camera series and Internet Video Server only.

### 5.2. Safety Recommendations

**The safety guidelines are as follows:**

- Keep the board area clear and dust-free before, during, and after installation.
- Keep tools away from walk areas where you and others could fall over them.
- Do not wear loose clothing or jewelry, such as earrings, bracelets, or chains, that could get caught in the board.

- Wear safety glasses if you are working under any conditions that might be hazardous to your eyes.
- Do not perform any action that creates a potential hazard to people or makes the equipment unsafe.
- Never attempt to lift an object that is too heavy for one person to handle.

### 5.3. Maintaining Safety with Electricity

**Warning: Before working on a board or working near power supplies, unplug the power cord on AC units; on DC units, disconnect the power at the circuit breaker.**

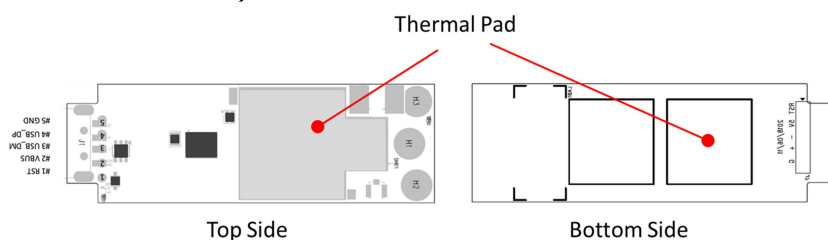
Follow these guidelines when working on equipment powered by electricity:

- Do not work alone if potentially hazardous conditions exist anywhere in your work space.
- Never assume that power is disconnected from a circuit; always check the circuit, extension cables, frayed power cords, and missing safety grounds.
- If an electrical accident occurs, proceed as follows:
  1. Use caution; do not become a victim yourself.
  2. Disconnect power from the system.
  3. If possible, send another person to get medical aid. Otherwise, assess the condition of the victim and then call for help.
  4. Determine if the person needs rescue breathing or external cardiac compressions; then take appropriate action.

### 5.4. Installing the AC-720M

**Before you install the AC-720M module, ground yourself by touching a piece of metal to avoid electrostatic discharge (ESD). You should also take the following precautions to prevent damage to the AC-720M module and Keep the AC-720M module in its antistatic-shielded bag until you are ready to install it.**

1. Install the AC-720M on the platform.
2. Tighten the screw.
3. Install the antenna cable.
4. Power on after confirming the installation is ok. (If you want to install the heat sink, just install the **Thermal Pad** here.)



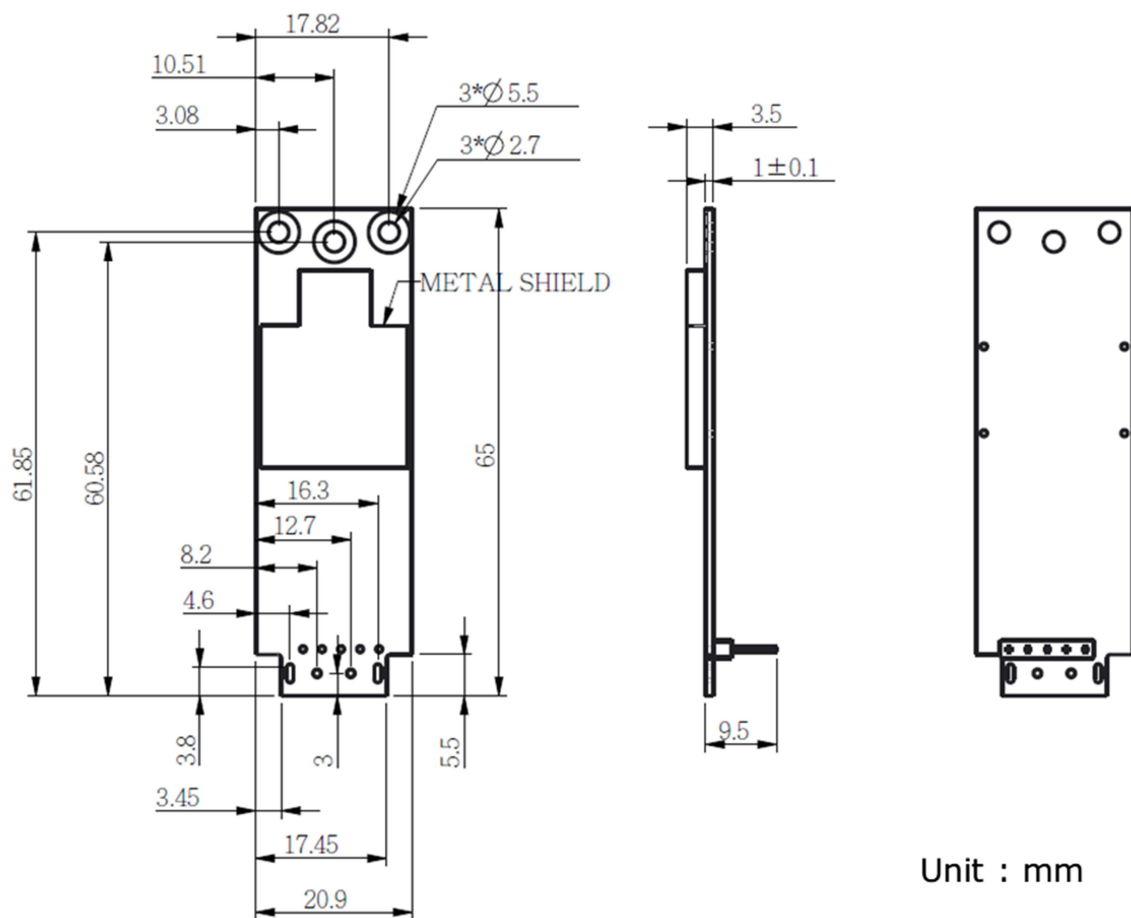
### Important!

- This equipment should be installed and operated with a minimum distance of 20cm between the antenna and your body.
- Before installing and using the wireless module, carefully read the manual that came with the package.
- Use ONLY the bundled RF cable and antenna.
- Any changes or modifications to this device not expressly approved by ASUS could cause harmful interference to radio communications and void the user's authority to operate the equipment.

## 6. Antenna Information

|                          |                    |
|--------------------------|--------------------|
| Antenna Type             | Dipole             |
| Antenna connector        | R-SMA              |
| Antenna Peak Gain (dBi)  | 3 dBi              |
| Horizontal Beam Width    | 360                |
| Impedance                | 50 Ohm             |
| VSWR                     | <2:1               |
| Manufacturer Part number | L-Com HG2458RD-RSP |

## 7. Module Outline Drawings



Unit : mm

## 8. Regulatory Approval

Regulatory Approvals received for AC-720M:

- United States/FCC ID: M4Y-AC720M

### 8.1. FCC Compliance Information

**Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user authority to operate the equipment.**

The 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 needed.
- 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.

### **FOR MOBILE DEVICE USAGE (>20cm/low power)**

### 8.2. 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. and must not be co-located or operating in conjunction with any other antenna or transmitter. End-users and installers must be provide with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.

**This module is intended for OEM integrators only. Per FCC KDB 996369 D03 OEM Manual v01 guidance, the following conditions must be strictly followed when using this certified module:**

### 8.3. KDB 996369 D03 OEM Manual v01 rule sections:

#### 8.3.1. List of applicable FCC rules

This module has been tested for compliance to FCC Part 15

#### 8.3.2. Summarize the specific operational use conditions

The module is tested for standalone mobile RF exposure use condition. Any other usage conditions such as co-location with other transmitter(s) or being used in a portable condition will need a separate reassessment through a class II permissive change application or new certification.

#### 8.3.3. Limited module procedures

Not applicable.

#### 8.3.4. Trace antenna designs

Not applicable.

#### 8.3.5. RF exposure considerations

This equipment complies with FCC mobile radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator & your body. If the module is installed in a portable host, a separate SAR evaluation is required to confirm compliance with relevant FCC portable RF exposure rules.

#### 8.3.6. Antennas

The following antennas have been certified for use with this module; antennas of the same type with equal or lower gain may also be used with this module. The antenna must be installed such that 20 cm can be maintained between the antenna and users.

|                   |        |
|-------------------|--------|
| Antenna Type      | Dipole |
| Antenna connector | U.FL   |

#### 8.3.7. Labeling and compliance information

The final end product must be labeled in a visible area with the following: "Contains FCC ID: M4Y-AC720M". The grantee's FCC ID can be used only when all FCC compliance requirements are met.

Contains Transmitter Module FCC ID: M4Y-AC720M

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.

The user's manual for the finished product must include the following statement:

**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.

**8.3.8. Information on test modes and additional testing requirements**

This transmitter is tested in a standalone mobile RF exposure condition and any co-located or simultaneous transmission with other transmitter(s) or portable use will require a separate class II permissive change re-evaluation or new certification.

**8.3.9. Additional testing, Part 15 Subpart B disclaimer**

This transmitter module is tested as a subsystem and its certification does not cover the FCC Part 15 Subpart B (unintentional radiator) rule requirement applicable to the final host. The final host will still need to be reassessed for compliance to this portion of rule requirements if applicable.

As long as all 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 cannot 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 cannot 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.

**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.

**OEM/Host manufacturer responsibilities**

OEM/Host manufacturers are ultimately responsible for the compliance of the Host and Module. The final product must be reassessed against all the essential requirements of the FCC rule such as FCC Part 15 Subpart B before it can be placed on the US market. This includes reassessing the transmitter module for compliance with the Radio and EMF essential requirements of the FCC rules. This module must not be incorporated into any other device or system without retesting for compliance as multi-radio and combined equipment