



# AI-THINKER

**AI-THINKER ESP-12-F WiFi Manual V1.0**

## 1. Product Introduction

ESP-12-F is an ultra-low-power pass through UART-WiFi module, with the industry's highly competitive package size and ultra-low power technology.

Designed for mobile devices and networking applications designed to connect the device to the user's physical Wi-Fi wireless network for Internet or LAN through Letter achieve networking.

ESP-12-F package and diverse, the antenna can support on-board PCB antenna, three forms and stamps hole IPEX interface interface;

ESP-12-F is widely used in smart grids, intelligent transportation, smart furniture, handheld devices,

industrial control and other fields.**1.1.1**

Product Features

Support wireless 802.11 b / g / n standards

Support STA / AP / STA + AP three operating modes

Built-in TCP / IP protocol stack to support multiple TCP Client Connection

Support UART / GPIO data communication interface

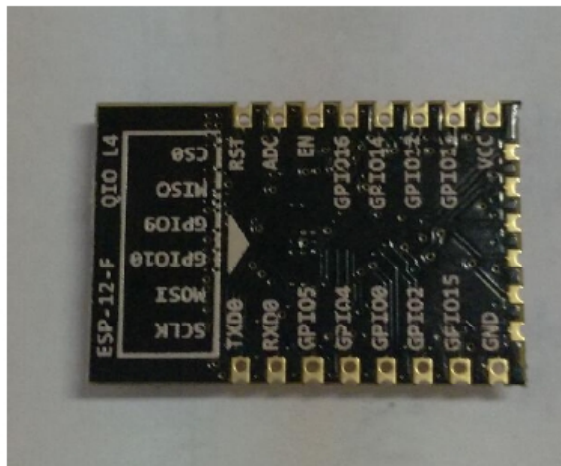
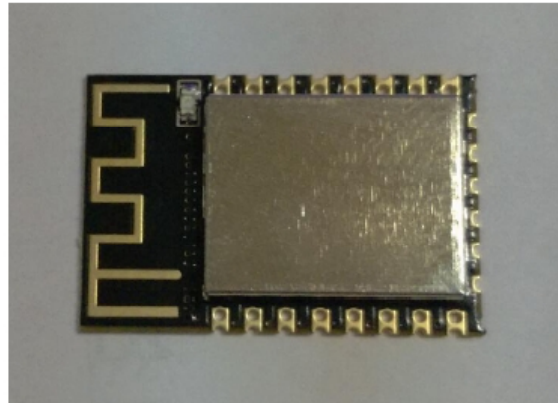
Support Smart Link Smart Networking

Remote firmware upgrade (OTA)

Built-in 32-bit MCU, can double as an application processor Built-in 32-bit MCU, can double as an application processor Ultra-low power consumption, ideal for battery-powered applications  
3.3V single power supply.

**1.1.2** Module package

**ESP-12-F using the stamp pad hole spacing and 2.0 output, when the SMT placement, and small quantities of experimental plug leads symmetrical 22 PIN.**



## 1.1. Features

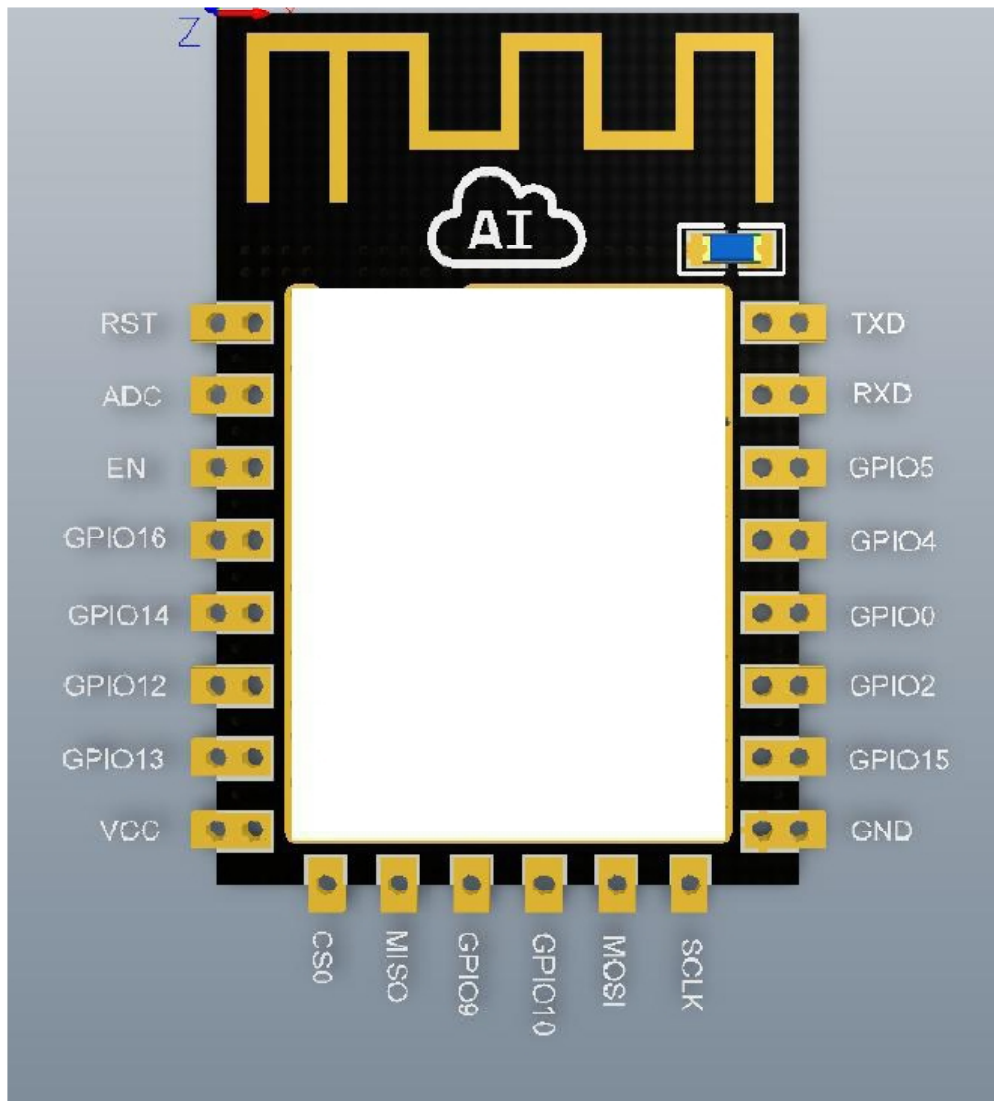
for low-power operation, advance signal processing, and spur cancellation and radio co-existence features for common cellular, Bluetooth, DDR, LVDS, LCD interference mitigation.

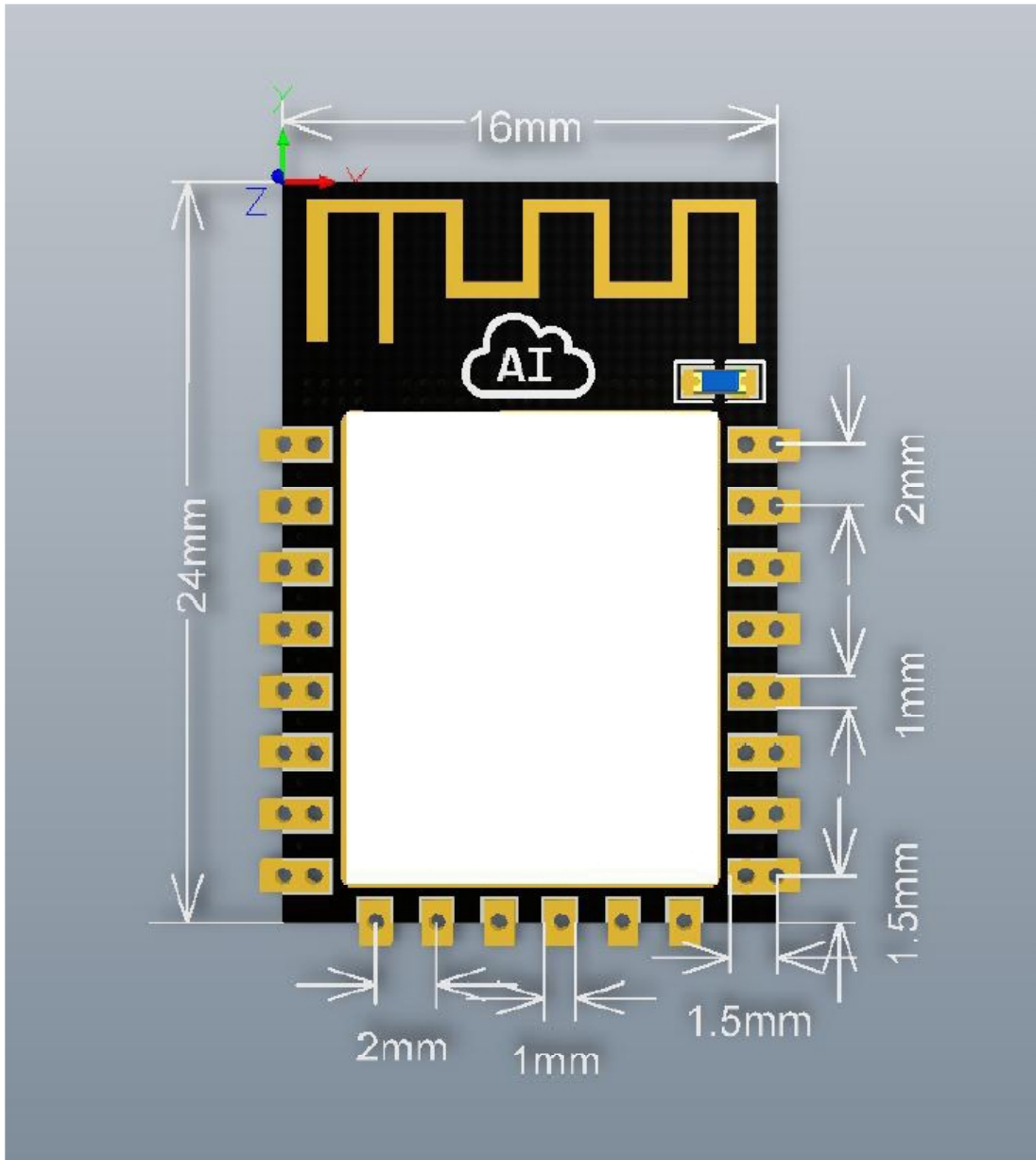
- 802.11 b/g/n
- Integrated low power 32-bit MCU
- Integrated 10-bit ADC
- Integrated TCP/IP protocol stack
- Integrated TR switch, balun, LNA, power amplifier and matching network
- Integrated PLL, regulators, and power management units
- Supports antenna diversity
- Wi-Fi 2.4 GHz, support WPA/WPA2
- Support STA/AP/STA+AP operation modes
- Support Smart Link Function for both Android and iOS devices
- SDIO 2.0, (H) SPI, UART, I2C, I2S, IRDA, PWM, GPIO
- STBC, 1x1 MIMO, 2x1 MIMO
- A-MPDU & A-MSDU aggregation standard interval
- Deep sleep power <10uA, Power down leakage current < 5uA
- Wake up and transmit packets in < 2ms
- Standby power consumption of < 1.0mW (DTIM3)
- +16dBm output power in 802.11b mode
- Operating temperature range -40C ~ 125C
- FCC,CE, and ROHS certified

## 1.2. Parameters

|                            |                             |  |
|----------------------------|-----------------------------|--|
| <b>WiFi Parameters</b>     | Certificates                | FCC/CE/ROSH  |
|                            | WiFi Protocles              | 802.11 b/g/n   |
|                            | Frequency Range             | 2.4GHz-2.5GHz (2400M-2483.5M)  |
| <b>Hardware Parameters</b> | Peripheral Bus              | UART/SDIO/SPI/I2C/I2S/Ir Remote Control                                  |
|                            |                             | GPIO/PWM   |
|                            | Operating Voltage           | 3.0~3.6V   |
|                            | Operating Current           | Average value: 80mA  |
|                            | Operating Temperature Range | -40°~125°  |
|                            | Ambient Temperature Range   | Normal temperature   |
|                            | Package Size                | 24mm*16mm*3mm  |
| External Interface         | N/A                         |  |
| <b>Software Parameters</b> | Wi-Fi mode                  | station/softAP/SoftAP+station  |
|                            | Security                    | WPA/WPA2   |
|                            | Encryption                  | WEP/TKIP/AES   |
|                            | Firmware Upgrade            | UART Download / OTA (via network) / download and write firmware via host |
|                            | Ssoftware Development       | Supports Cloud Server Development / SDK for custom firmware development  |
|                            | Network Protocols           | IPv4, TCP/UDP/HTTP/FTP   |
|                            | User Configuration          | AT Instruction Set, Cloud Server, Android/iOS App                        |

### 1.5.Pins and size





Note: This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.

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.

This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

15.105 Information to the user.

(b) For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

Note: 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 or more 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.

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 and your body.

This radio module must not be installed to co-locate and operating simultaneously with other radios in host system, additional testing and equipment authorization may be required to operating simultaneously with other radio.

**Radiation Exposure Statement:**

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.

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



The availability of some specific channels and/or operational frequency bands are country dependent and are firmware programmed at the factory to match the intended destination.

The firmware setting is not accessible by the end user.

The final end product must be labelled in a visible area with the following:

“Contains Transmitter Module **2ADUIESP-12-F**”