# ESP-12E
# Brief  Spec

规格修改记录（**SPECIFICATION CHANGE HISTORY**）

| 编号 | 修订日期 | 修订内容 | 修订者 |
|---|---|---|---|
| 1 | 2012-5-5 | 最初版本 | Harri |

| Approve 批准 | Check 审核 | Preparation 拟制 | Date 日期 |
|---|---|---|---|
| | | | |

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# Product Description

## Description

ESP-12E is a low power consumption of the UART-WiFi module, with very competitive prices in the industry and ultra low power consumption technology, designed specifically for mobile devices and IOT applications, user's physical device can be connected to a Wi-Fi wireless network, Internet or intranet communication and networking capabilities. ESP-07 the use of small ceramic antenna package can support IPEX interface. users have a variety of installation options.

## Features

- ▪ 802.11 b/g/n protocol
- ▪ Wi-Fi Direct (P2P), soft-AP
- ▪ Integrated TCP/IP protocol stack
- ▪ +19.5dBm output power in 802.11b mode
- ▪ Power down leakage current of < 10uA
- ▪ Integrated low power 32-bit MCU
- ▪ SDIO 2.0, SPI, UART
- ▪ STBC, 1x1 MIMO, 2x1 MIMO
- ▪ A-MPDU & A-MSDU aggregation & 0.4μs guard interval
- ▪ Wake up and transmit packets in < 2ms
- ▪ Standby power consumption of < 1.0mW (DTIM3)

## Applications

- Smart power plugs
- Home automation
- Mesh network
- Industrial wireless control
- Baby monitors
- IP Cameras
- Sensor networks
- Wi-Fi location-aware devices
- Security ID tags
- Wi-Fi position system beacons

# Electrical performance

## Digital IO Pads

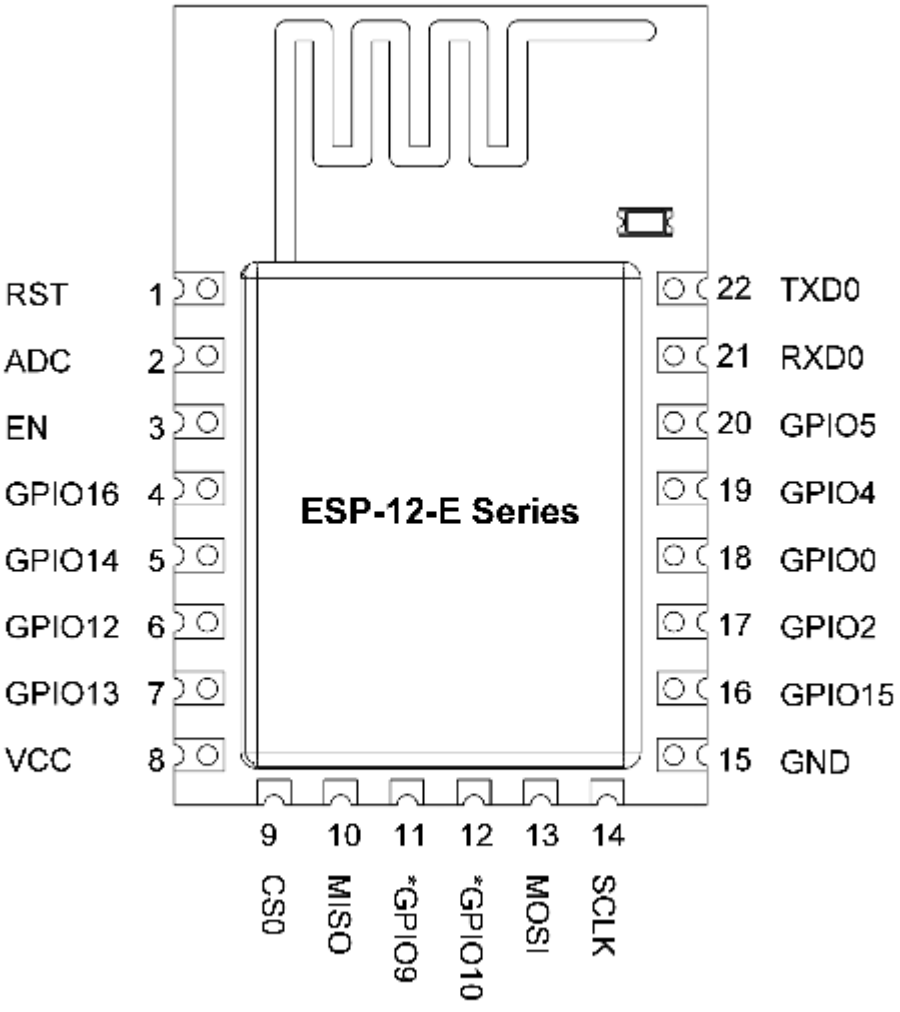
| Parameter | Symbol | Min | Max | Unit |
|---|---|---|---|---|
| InputLow voltage | Vil | -0.3 | 0.25xViO | V |
| InputHighVoltage | Vih | 0.75xVio | 3.3 | V |
| InputLeakageCurrent | Iil | | 50 | nA |
| OutputLowVoltage | Vol | | 0.1 xVio | V |
| OutputHighVoltage | Voh | 0.8xVio | | V |
| InputPinCapacitance | Cpad | | 5 | pF |
| VDDIO | Vio | 1.8 | 3.3 | V |
| MaximumDriveCapability | Imax | | 12 | mA |
| Temperature | Tamb | -40 | 125 | ℃ |

## Receiver Sensitivity

| Description | MIN | Typical | MAX | Unit |
|---|---|---|---|---|
| Input frequency | 2412 | | 2484 | MHz |
| Input impedance | | 50 | | Ω |
| Input reflection | | | -10 | dB |
| Output power of PA for 72.2Mbps | 14 | 15 | 16 | dBm |
| Output power of PA for 11b mode | 17.5 | 18.5 | 19.5 | dBm |
| **Sensitivity** | | | | |
| CCK 1Mbps | | -98 | | dBm |
| CCK 11Mbps | | -91 | | dBm |
| 6Mbps(1/2BPSK) | | -93 | | dBm |
| 54Mbps(3/4 64-QAM) | | -75 | | dBm |
| HT20 · MCS7 ( 65Mbps · 72.2Mbps ) | | -71 | | dBm |
| **Adjacent Channel Rejection** | | | | |
| OFDM · 6Mbps | | 37 | | dB |
| OFDM · 54Mbps | | 21 | | dB |
| HT20 · MCS0 | | 37 | | dB |
| HT20 · MCS7 | | 20 | | dB |

## Current Consumption

| Mode | MIN | Typical | MAX | Unit |
|---|---|---|---|---|
| Send 802.11b · CCK 1Mbps · Pout=+19.5dBm | | 215 | | mA |
| Send 802.11b · CCK 11Mbps · Pout=+18.5dBm | | 197 | | mA |
| Send 802.11g · OFDM54 Mbps · Pout=+16dBm | | 145 | | mA |
| Send 802.11n · MCS7 · Pout=+14dBm | | 135 | | mA |
| Receive 802.11b · Length 1024 Byte · -80dBm | | 100 | | mA |
| Receive 802.11g · Length 1024 Byte · -70dBm | | 100 | | mA |
| Receive 802.11n · Length 1024 Byte · -65dBm | | 102 | | mA |
| Standby | | 70 | | mA |
| Power Down | | 0.5 | | μA |



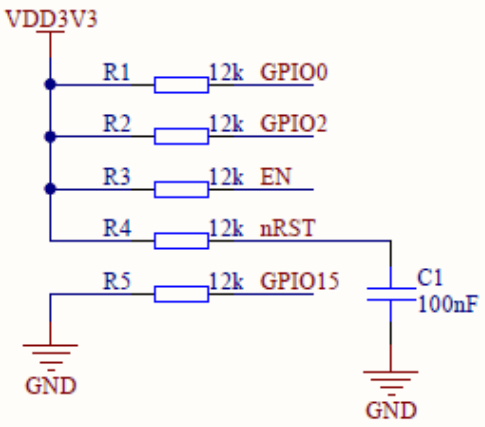

* Can only be used on ESP12-D.

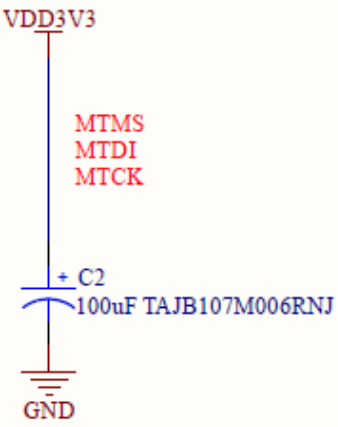
| PIN | Function | Description |
|---|---|---|
| 1 | RST | 1 ) Reset Pin. Active low ;<br>2 ) NC Or External MCU control ; |
| 2 | ADC/TOUT | 1 ) 10-bit ADC Analog Input 0-1V ; |
| 3 | EN | 1 ) Module Enable. Active HIGH |
| 4 | GPIO16 | 1 ) GPIO (WEAK UP) |
| 5 | GPIO14 | 1 ) GPIO |
| 6 | GPIO12 | 1 ) GPIO |
| 7 | GPIO13 | 1 ) GPIO<br>2 ) UART2 RXD |
| 8 | VDD | 1 ) Power supply . 3.3V IN ; |
| 9 | CS0 | 1 ) Chip selection of SPI interface. |
| 10 | MISO | 1 ) MISO of SPI interface. |
| 11 | GPIO9 | 1 ) GPIO (Only available on ESP-12-D) |
| 12 | GPIO10- | 1 ) GPIO (Only available on ESP-12-D) |
| 13 | MOSI | 1 ) MOSI of SPI interface. |
| 14 | SCLK | 1 ) Clock of SPI interface. |
| 15 | CND | 1 ) Power Ground |
| 16 | GPIO15 | 1 ) GPIO<br>2 ) UART2 TXD |
| 17 | GPIO2 | 1 ) GPIO<br>2 ) WIFI status. Connection inside the module LED |
| 18 | GPIO0 | 1 ) GPIO |
| 19 | GPIO4 | 1 ) GPIO |
| 20 | GPIO5 | 1 ) GPIO |
| 21 | RXD0 | 1 ) UART0 RXD |
| 22 | TXD0 | 1 ) UART0 TXD |

## BOOT Mode

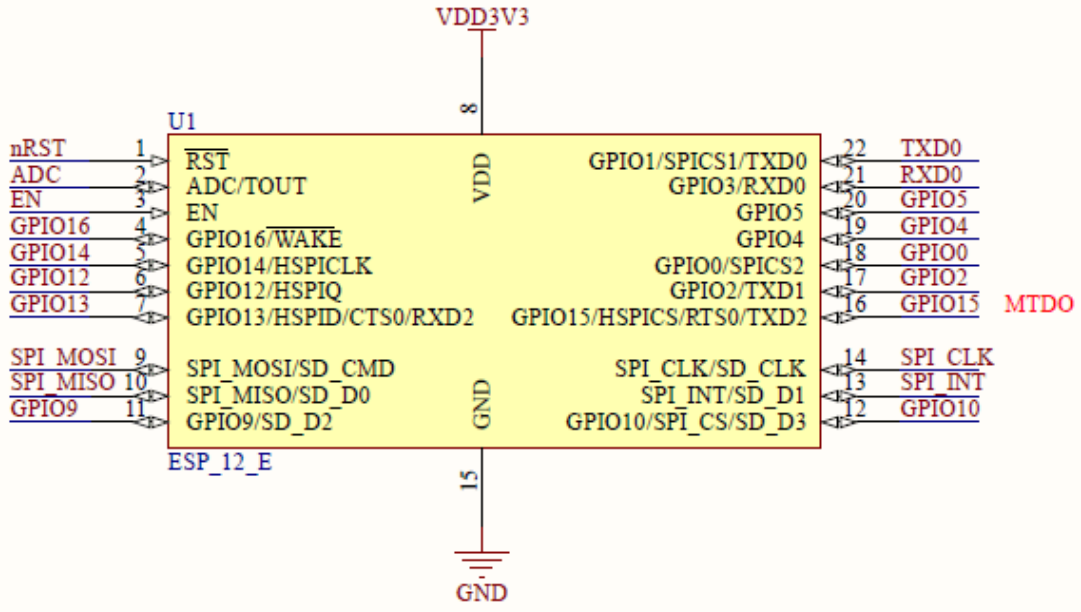
| GPIO15 | GPIO0 | GPIO2 | |
|---|---|---|---|
| **1** | X | X | SDIO/SPI WIFI |
| **0** | 0 | 1 | UART Download |
| **0** | 1 | 1 | Flash BOOT |

## Reference Schematic



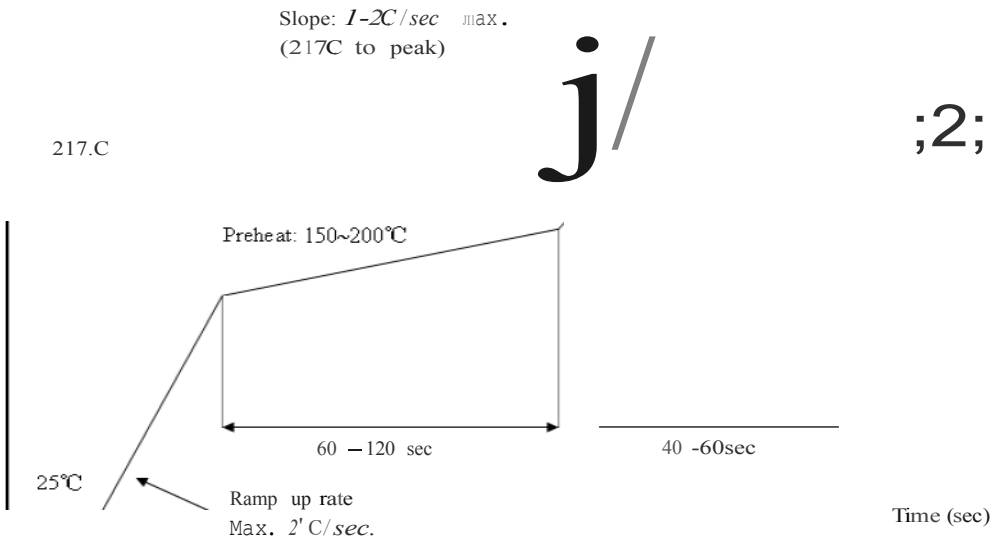



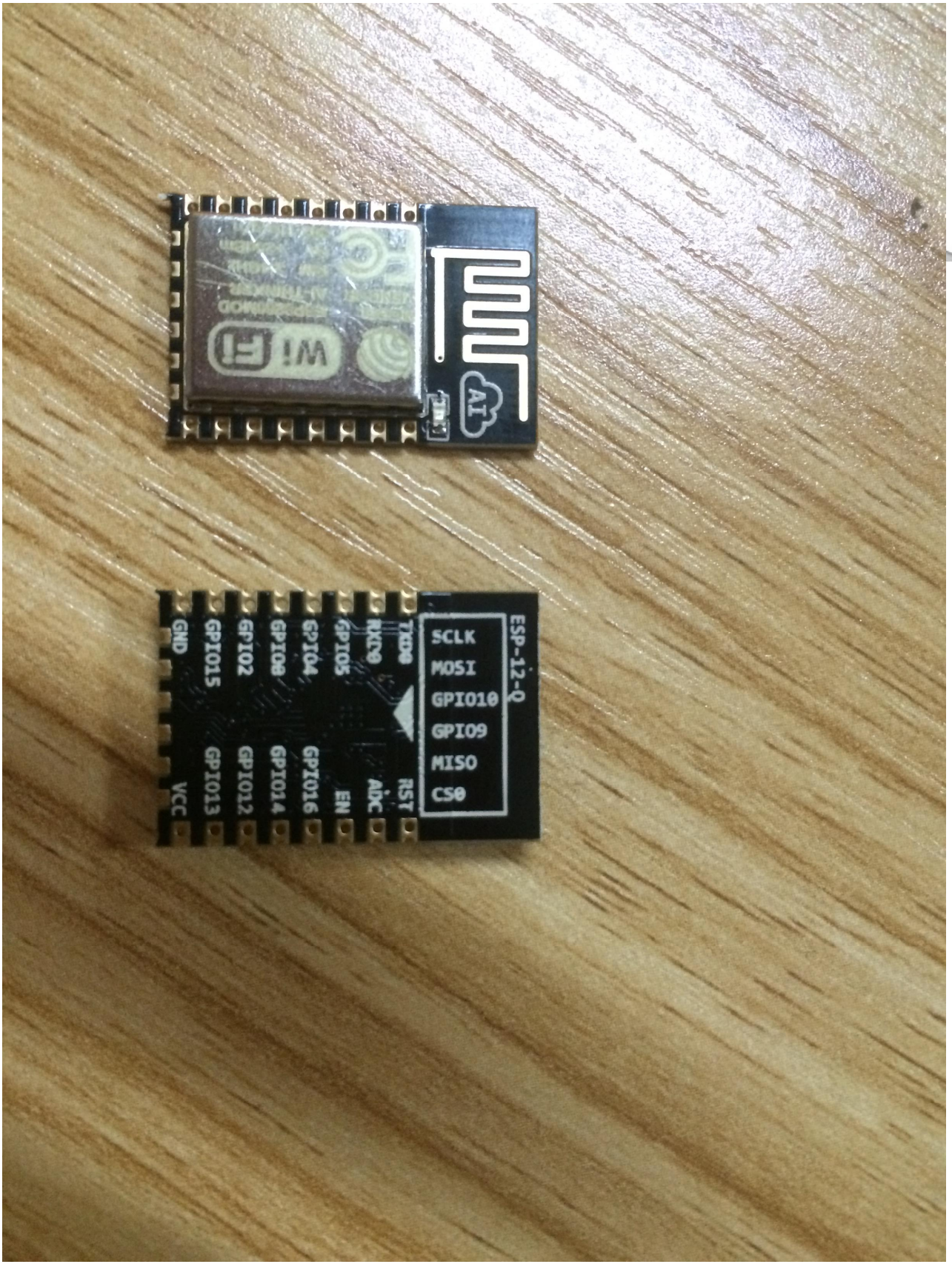

MATTERS NEEDING ATTENTION
On every boot/reset/wakeup,
GPIO15 MUST keep LOW, GPIO2 MUST keep HIGH.
GPIO0 HIGH ->RUN MODE, LOW -> FLASH MODE.
When you need to use the sleep mode,GPIO16 and RST should be connected,
and GPIO16 will output LOW to reset the system at the time of wakeup.

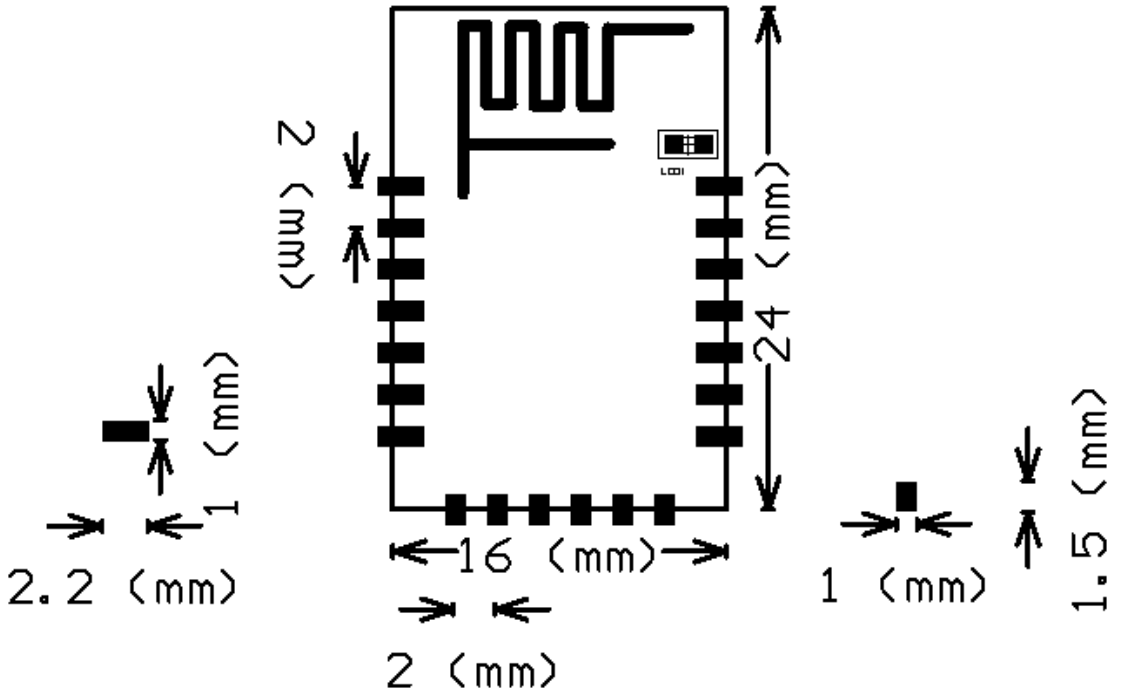


# Reßow Profile

Refer to IPC/JEDEC standard; Peak Temperature : <250°C; Number of Times: 2 times;




Wi Fi
AI
ESP-12-Q
SCLK
MOSI
GPIO10
GPIO9
MISO
CS0
RST
ADC
EN
GPIO16
GPIO14
GPIO12
GPIO13
VCC
GPIO15
GPIO2
GPIO0
GPIO4
GPIO5
RXD0
TXD0
GND


2 (mm)
24 (mm)
1 (mm)
2.2 (mm)
16 (mm)
2 (mm)
1 (mm)
1.5 (mm)