<table>
<thead>
<tr>
<th>Date</th>
<th>Version</th>
<th>Author</th>
<th>Release Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017.7.1</td>
<td>V1.0</td>
<td>Wang Chong</td>
<td>First Version</td>
</tr>
<tr>
<td>2017.9.4</td>
<td>V1.1</td>
<td>Wang Chong</td>
<td>Add ESP-01M, Delete ESP-12E</td>
</tr>
</tbody>
</table>
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6.3 Can’t Burn Normally

6.4 SDK Development Environment

6.5 Startup Information Description

7 Module Selection

8 Contact US
1 Product Overview

ESP8266 series wireless module is a series of cost-effective Wi-Fi SOC module which can be developed independently. The series modules support the standard IEEE802.11 b/g/n protocol, built-in complete TCP/IP protocol stack. Users can use this series of modules to add networking capabilities to existing devices, or to build standalone network controllers.

Ai-Thinker Technology can provide customers with a complete hardware, software reference program, in order to shorten your product development cycle, for your cost savings.

1.1 Product Features

- The smallest 802.11b/g/n Wi-Fi SOC module
- Using low-power 32-bit CPU, can also serve as the application processor
- Clocked at up to 160MHz
- Built-in 10 bit high precision ADC
- Support UART/GPIO/IIC/PWM/ADC/HSPI and other interfaces
- Integrated Wi-Fi MAC/BB RF PA LNA
- Supports multiple sleep modes, deep sleep current as low as 20uA
- Embedded Lwip protocol stack
- Support STA/AP/STA + AP work mode
- Supports Smart Config/AirKiss key distribution network
- Serial port rate up to 4Mbps
- General AT commands can be used quickly
- Support SDK secondary development
- Supports serial local upgrade and remote firmware upgrade (FOTA)

1.2 Application Plan

- Household appliances
- Industrial wireless control
- Wearable electronic products
- Home automation
- Infant Monitor
- Wireless location sensing device
- Smart socket/intelligent light
- IP camera
- Security ID tag
- Mesh network
- Sensor network
- Wireless positioning system beacon
2 Module Interface

2.1 Package Size

Figure 2.1 ESP-01/ESP-01S pin dimensions

图 2.2 ESP-01M 管脚尺寸图
Figure 2.3 ESP-07 pin dimensions

Figure 2.4 ESP-07S pin dimensions
Figure 2.5 ESP-12F pin dimensions

Figure 2.6 ESP-12S pin dimensions
Table 2.1 ESP series module size table

<table>
<thead>
<tr>
<th>Model</th>
<th>Length (mm)</th>
<th>Width (mm)</th>
<th>Height (mm)</th>
<th>PAD size (mm)</th>
<th>Pin Spacing (mm)</th>
<th>Shielded Shell (mm)</th>
<th>Thickness (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESP-01</td>
<td>24.7</td>
<td>14.4</td>
<td>11.0</td>
<td>1.5 x 1.5</td>
<td>2.54</td>
<td>-</td>
<td>1.0 ± 0.1</td>
</tr>
<tr>
<td>ESP-01S</td>
<td>24.7</td>
<td>14.4</td>
<td>11.0</td>
<td>1.5 x 1.5</td>
<td>2.54</td>
<td>-</td>
<td>1.0 ± 0.1</td>
</tr>
<tr>
<td>ESP-01M</td>
<td>18</td>
<td>18</td>
<td>2.8 ± 0.2</td>
<td>-</td>
<td>0.8</td>
<td>2.0</td>
<td>0.8 ± 0.1</td>
</tr>
<tr>
<td>ESP-07</td>
<td>21.2</td>
<td>16.0</td>
<td>3 ± 0.2</td>
<td>-</td>
<td>1.5</td>
<td>2.0</td>
<td>0.8 ± 0.1</td>
</tr>
<tr>
<td>ESP-07S</td>
<td>17.0</td>
<td>16.0</td>
<td>3 ± 0.3</td>
<td>1 x 1.2</td>
<td>1.5</td>
<td>2.0</td>
<td>0.8 ± 0.1</td>
</tr>
<tr>
<td>ESP-12F</td>
<td>24.0</td>
<td>16.0</td>
<td>3 ± 0.2</td>
<td>1 x 1.2</td>
<td>1.5</td>
<td>2.0</td>
<td>0.8 ± 0.1</td>
</tr>
<tr>
<td>ESP-12S</td>
<td>24.0</td>
<td>16.0</td>
<td>3 ± 0.2</td>
<td>1 x 1.2</td>
<td>1.5</td>
<td>2.0</td>
<td>0.8 ± 0.1</td>
</tr>
</tbody>
</table>

2.1 Pin Definition

Table 2.2 ESP Series Module Pin Function Definitions

<table>
<thead>
<tr>
<th>Pin Number</th>
<th>01 01S</th>
<th>07 07S 12S</th>
<th>12F</th>
<th>Pin Name</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>01S</td>
<td>01M</td>
<td>07 07S 12S</td>
<td>12F</td>
<td>RST</td>
<td>Reset Pin, Active Low</td>
</tr>
<tr>
<td>-</td>
<td>16</td>
<td>2</td>
<td>2</td>
<td>ADC</td>
<td>AD conversion, Input voltage range 0<del>1V, the value range is 0</del>1024.</td>
</tr>
<tr>
<td>6</td>
<td>9</td>
<td>3</td>
<td>3</td>
<td>EN</td>
<td>Chip Enabled Pin, Active High</td>
</tr>
<tr>
<td>-</td>
<td>17</td>
<td>4</td>
<td>4</td>
<td>IO16</td>
<td>Connect with RST pin to wake up Deep Sleep</td>
</tr>
<tr>
<td>-</td>
<td>15</td>
<td>5</td>
<td>5</td>
<td>IO14</td>
<td>HSPI_CLK, IR_T, I2C_SCL,</td>
</tr>
<tr>
<td>-</td>
<td>14</td>
<td>6</td>
<td>6</td>
<td>IO12</td>
<td>HSPI_MISO</td>
</tr>
<tr>
<td>-</td>
<td>5</td>
<td>7</td>
<td>7</td>
<td>IO13</td>
<td>HSPI_MOSI; UART0_CTS</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>8</td>
<td>8</td>
<td>VCC</td>
<td>Module power supply pin, the</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>-</td>
<td>9</td>
<td>CS0</td>
<td>Flash chip select signal</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10</td>
<td>MISO</td>
<td>Slave Output Master Input</td>
</tr>
<tr>
<td>-</td>
<td>11</td>
<td>-</td>
<td>11</td>
<td>IO9</td>
<td>GPIO9</td>
</tr>
<tr>
<td>-</td>
<td>12</td>
<td>-</td>
<td>12</td>
<td>IO10</td>
<td>GBIO10</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>-</td>
<td>13</td>
<td>MOSI</td>
<td>Master Output Slave Input</td>
</tr>
</tbody>
</table>
Note: Only GPIO4 and GPIO5 are low at boot time, the other GPIO are high.

### 2.2 Boot Mode

<table>
<thead>
<tr>
<th>Mode</th>
<th>CH_PD (EN)</th>
<th>RST</th>
<th>GPIO15</th>
<th>GPIO0</th>
<th>GPIO2</th>
<th>TXD0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Download mode</td>
<td>high</td>
<td>high</td>
<td>low</td>
<td>low</td>
<td>high</td>
<td>high</td>
</tr>
<tr>
<td>Running mode</td>
<td>high</td>
<td>high</td>
<td>low</td>
<td>high</td>
<td>high</td>
<td>high</td>
</tr>
<tr>
<td>Chip Test mode</td>
<td>high</td>
<td>high</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>low</td>
</tr>
</tbody>
</table>
3 Electrical Characteristics

3.1 Maximum Ratings

Table 3.1 Maximum Ratings

<table>
<thead>
<tr>
<th>Rated value</th>
<th>condition</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage Temperature</td>
<td>-</td>
<td>-40 ~ 90</td>
<td>°C</td>
</tr>
<tr>
<td>Maximum Welding</td>
<td>-</td>
<td>250</td>
<td>°C</td>
</tr>
<tr>
<td>Temperature</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply Voltage</td>
<td>IPC/JEDEC</td>
<td>+3.0 ~ 3.6</td>
<td>V</td>
</tr>
<tr>
<td>J-STD-020</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3.2 Suggested Working Environment

Table 3.2 Recommended working environment

<table>
<thead>
<tr>
<th>Work Environment</th>
<th>Name</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature</td>
<td></td>
<td>-20</td>
<td>20</td>
<td>85</td>
<td>°C</td>
</tr>
<tr>
<td>Supply Voltage</td>
<td>VDD</td>
<td>3.0</td>
<td>3.3</td>
<td>3.6</td>
<td>V</td>
</tr>
</tbody>
</table>

3.3 Digital Port Features

Table 3.3 Digital Port Features

<table>
<thead>
<tr>
<th>Port</th>
<th>Name</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input logic level low</td>
<td>VIL</td>
<td>-0.3</td>
<td>-</td>
<td>0.25 * VDD</td>
<td>V</td>
</tr>
<tr>
<td>Input logic level high</td>
<td>VIH</td>
<td>0.75 * VDD</td>
<td>-</td>
<td>VDD + 0.3</td>
<td>V</td>
</tr>
<tr>
<td>Output logic level low</td>
<td>VOL</td>
<td>N</td>
<td>-</td>
<td>0.1 * VDD</td>
<td>V</td>
</tr>
<tr>
<td>Output logic level high</td>
<td>VOH</td>
<td>0.8 * VDD</td>
<td>-</td>
<td>N</td>
<td>V</td>
</tr>
</tbody>
</table>

Note: Unless otherwise specified, the test conditions are: VDD = 3.3 V and temperature 20 °C.

3.4 Power Consumption

All measurements are made at the antenna interface without SAW filters.
All transmit data is based on a 90% duty cycle measured in the continuous firing mode.

### Table 3.4 Power consumption

<table>
<thead>
<tr>
<th>Mode</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmit 802.11b, CCK 11Mbps, POUT = + 17dBm</td>
<td>170</td>
<td></td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>Transmit 802.11g, OFDM 54Mbps, POUT = + 15dBm</td>
<td>140</td>
<td></td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>Transmit 802.11n, MCS7, POUT = + 13dBm</td>
<td>120</td>
<td></td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>Receive 802.11b, packet length 1024 bytes, -80dBm</td>
<td>50</td>
<td></td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>Receive 802.11g, packet length 1024 bytes, -70dBm</td>
<td>56</td>
<td></td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>Receive 802.11n, packet length 1024 bytes, -65dBm</td>
<td>56</td>
<td></td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>Modem-Sleep①</td>
<td>20</td>
<td></td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>Light-Sleep②</td>
<td>2</td>
<td></td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>Deep-Sleep③</td>
<td>20</td>
<td></td>
<td></td>
<td>uA</td>
</tr>
<tr>
<td>Power Off</td>
<td>1</td>
<td></td>
<td></td>
<td>uA</td>
</tr>
</tbody>
</table>

Note: Modem-Sleep is used to require the CPU to remain in operation, such as PWM or I2S. When there is no data transmission while maintaining a WiFi connection, power off the WiFi Modem circuit according to the 802.11 standard (eg U-APSD). For example, in DTIM3, every sleep 300ms, wake up 3ms to receive AP's Beacon packets, etc., the overall average current is about 20mA.

Note ②: Light-Sleep for CPU can be suspended applications, such as WiFi switch. If there is no data transmission while maintaining a WiFi connection, the WiFi Modem circuit can be switched off and the CPU is powered down according to the 802.11 standard (eg U-APSD). For example, at DTIM3, every sleep 300 ms, wake up 3 ms to receive AP’s Beacon packets, etc., the overall average current is about 2 mA.

Note: Deep-Sleep is used for applications that do not have to keep the WiFi connection for a long time, such as a sensor that measures the temperature once every 100 seconds. Every 300 s wake up after 0.3s - 1s connected to the AP to send data, the overall average current can be much smaller than 2mA.
3.5 Transmit Power

Table 3.5 RF parameters

<table>
<thead>
<tr>
<th>Describe</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>802.11b@11Mbps</td>
<td>14</td>
<td>16</td>
<td>18</td>
<td>dBm</td>
</tr>
<tr>
<td>802.11g@54Mbps</td>
<td>12</td>
<td>14</td>
<td>16</td>
<td>dBm</td>
</tr>
<tr>
<td>802.11n@HT20, MCS7</td>
<td>11</td>
<td>13</td>
<td>15</td>
<td>dBm</td>
</tr>
</tbody>
</table>

3.6 Receive Sensitivity

Table 3.6 Receiving Sensitivity

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSSS, 1 Mbps</td>
<td>-95</td>
<td></td>
<td></td>
<td>dBm</td>
</tr>
<tr>
<td>CCK, 11 Mbps</td>
<td>-80</td>
<td></td>
<td></td>
<td>dBm</td>
</tr>
<tr>
<td>6 Mbps (1/2 BPSK)</td>
<td>-88</td>
<td></td>
<td></td>
<td>dBm</td>
</tr>
<tr>
<td>54 Mbps (3/4 64-QAM)</td>
<td>-70</td>
<td></td>
<td></td>
<td>dBm</td>
</tr>
<tr>
<td>HT20, MCS7 (65 Mbps, 72.2 Mbps)</td>
<td>-67</td>
<td></td>
<td></td>
<td>dBm</td>
</tr>
</tbody>
</table>

4 Hardware Guidance

4.1 Typical Applications

Note: You can’t use USB to TTL 3.3V or 5V power supply, it is recommended to use two dry batteries or after conversion through the LDO 3.3V, it is strongly recommended to buy a new development board.

Figure 4.1 Typical application of ESP-01
Figure 4.2 Typical application of ESP-01S

Figure 4.3 Typical application of ESP-01M

Figure 4.4 Typical application of ESP-07

Figure 4.5 Typical application of ESP-07S
4.2 PCB Antenna Display Instructions

The ESP8266 series module can be soldered to the PCB board. In order to get the best RF performance of the end product, please pay attention to the rational design of the module and the placement of the antenna on the bottom plate according to this guide.

Option 1 (recommended):
Place the module along the edge of the PCB board, and the antenna is placed outside the frame or along the board and the bottom is hollowed out;

Option 2:
The module placed along the PCB board side, the antenna placed along the board and the bottom of the hollow;

Option 3:
Place the module along the board side of the board, the antenna placed along the
board and the bottom are not copper.

Figure 4.7 ESP-12S antenna placement instructions

4.3 Module Peripheral Routing Instructions

The ESP8266 series modules integrate high-speed GPIO and peripheral interfaces, which can cause severe switching noise. If some applications require high power and EMI characteristics, it is recommended to connect 10 to 100 ohms in series on digital I/O lines. This can suppress overshoot when switching power supplies and make the signal smooth. Series resistance can also prevent electrostatic discharge (ESD) to some extent.

4.4 GPIO Level Conversion

Figure 4.8 Transistor level conversion
4.5 Power Supply Reference Design

![Power supply reference design](image)

*Figure 4.9 Power supply reference*

4.6 ADC Supply Reference Design

![ADC supply reference design](image)

*Figure 4.10 ADC supply reference*
4.7 Automatically Download Reference Design

Figure 4.11 Automatically Download Reference Design

4.8 Reflow oven temperature curve

Figure 4.12 Reflow furnace temperature curve
5 Usage Guide

ESP8266 series module factory default built-in AT firmware, and the default baud rate of 115200, can refer to 4.1 typical application diagram to build the minimum system circuit, then the AT command operation.

Serial and network debugging tools download: http://wiki.ai-thinker.com/tools

5.1 Introduction To The Basic AT Command

This chapter only describes the common AT commands, please refer to http://wiki.aithinker.com/esp8266/docs#at.

5.1.1 AT

<table>
<thead>
<tr>
<th>parameters</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Test AT is OK</td>
</tr>
<tr>
<td>Example</td>
<td>AT OK</td>
</tr>
</tbody>
</table>

5.1.2 AT+GMR

<table>
<thead>
<tr>
<th>parameters</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Returns the firmware version information</td>
</tr>
<tr>
<td>Example</td>
<td>AT+GMR</td>
</tr>
<tr>
<td></td>
<td>AT version:1.2.0.0(Jul 1 2016 20:04:45)</td>
</tr>
<tr>
<td></td>
<td>SDK version:1.5.4.1(39cb9a32)</td>
</tr>
<tr>
<td></td>
<td>Ai-Thinker Technology Co. Ltd.</td>
</tr>
<tr>
<td></td>
<td>Dec 2 2016 14:21:16</td>
</tr>
<tr>
<td></td>
<td>OK</td>
</tr>
</tbody>
</table>

5.1.3 AT+RST

<table>
<thead>
<tr>
<th>parameters</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>soft restart module</td>
</tr>
<tr>
<td>Example</td>
<td>AT+RST</td>
</tr>
<tr>
<td></td>
<td>OK</td>
</tr>
</tbody>
</table>
5.1.4 AT+RESTORE

<table>
<thead>
<tr>
<th>parameters</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Reset the module to factory settings</td>
</tr>
<tr>
<td>Example</td>
<td>AT+RESTORE</td>
</tr>
<tr>
<td></td>
<td>OK</td>
</tr>
</tbody>
</table>

5.2 Use Examples

This section explains how to configure two modules through the serial port on the PC side to communicate with each other over TCP/UDP. For more examples, please refer to: http://wiki.ai-thinker.com/esp8266/examples/at_demo. Test, through the PC side instead of one end of the module to establish the appropriate connection.

5.2.1 TCP Communication Test

TCP Server is in AP mode and TCP Client is Station mode.

**TCP Server Configuration:**
Ai-Thinker Technology Co. Ltd.

ready
AT+CWMODE=2  //configured for AP mode
OK
AT+CWSAP_DEF="TCP_Server","12345678",5,4  //Configure AP information

OK
AT+CIFSR  //Query the local IP address
+CIFSR:APIP,"192.168.4.1"
+CIFSR:APMAC,"a2:20:a6:19:c7:0a"
OK
AT+CIPMUX=1  //open multiple links
OK
AT+CPSERVER=1  //open the server

OK
0,CONNECT     //There is a client connected to the server
+IPD,0,10:Ai-Thinker  //received 10 data (Ai-Thinker)
AT+CPSERVER=0  //Close the server

OK
0,CLOSED       //TCP connection is off

**TCP Client Configuration:**
Ai-Thinker Technology Co. Ltd.

ready
AT+CWMODE=1   //configured for station mode

OK
AT+CWJAP_DEF="TCP_Server","12345678"   //Connect to AP

WIFI CONNECTED
WIFI GOT IP

OK
AT+CIFSR      //Query the local IP address
+CIFSR:STAIP,"192.168.4.2"
+CIFSR:STAMAC,"5c:cf:7f:91:8b:3b"

OK
AT+CIPMUX=0   //open single link

OK
AT+CIPSTART="TCP","192.168.4.1",333   //Connect to TCP server
CONNECT

OK
AT+CIPSEND=10 //send 10 bytes of data to the server side
OK > //After the emergence of the symbol serial port to send
Ai-Thinker (without carriage return line)
Recv 10 bytes //The serial port receives the data
SEND OK //sent successfully
CLOSED //TCP connection is closed

5.2.2 UDP Communication Test

One is in AP mode, the local port is 8001, and the other is Station mode. the
local port is 8002.

AP Configuration:
Ai-Thinker Technology Co. Ltd.
ready
AT+CWMODE=2 //configured for AP mode
OK
AT+CWSAP_DEF="TCP_Server","12345678",5,4 //AP information
OK
AT+CIFSR //Query the local IP address
+CIFSR:APIP,"192.168.4.1"
+CIFSR:APMAC,"a2:20:a6:19:c7:0a"
OK
AT+CIPSTART="UDP","192.168.4.2",8002,8001,0 //Open UDP connection
CONNECT
OK
+IPD,10:Ai-Thinker //received 10 data (Ai-Thinker)
AT+CIPSEND=10 //send 10 bytes of data to the server
OK
> //After the emergence of the symbol serial port to send
Ai-Thinker (without carriage return line)
Recv 10 bytes //The serial port receives the data

SEND OK
AT+CIPCLOSE //close the UDP connection
CLOSED

OK

Station Configuration:
Ai-Thinker Technology Co. Ltd.

ready
AT+CWMODE=2 //configured for station mode

OK
AT+CWSAP_DEF="TCP_Server","12345678",5,4 //Connect to AP

OK
AT+CIFSR //Query the local IP address
+CIFSR:STAIP,"192.168.4.2"
+CIFSR:STAMAC,"5c:cf:7f:91:8b:3b"

OK
AT+CIPSTART="UDP","192.168.4.1",8001,8002,0 //Open UDP connection
CONNECT

OK
AT+CIPSEND=10 //send 10 bytes of data to the server

OK
>
//After the emergence of the symbol serial port to send
Ai-Thinker (without carriage return line)

Recv 10 bytes //The serial port receives the data

SEND OK
6 FAQ

6.1 Garbage Instructions When Power Is On

ESP8266 chip itself supports 26MHz and 40MHz crystal, if the use of 40MHz crystal, the default baud rate of 115200, if the use of 26MHz crystal, the UART0 power after the baud rate = 26 * 115200/40 = 74880, the letter can be ESP8266 Series modules are used 26MHz, because the general serial port tool does not support the baud rate, so there will be printed on the garbled.

You can use the security serial interface assistant to configure the baud rate 74880 to view the startup information.

Note: part of the USB to TTL does not support 74880 baud rate, the computer comes with RS232 to TTL does not support 74880 baud rate, recommend the use of FT232, CP2102, CH340 and other chips.

6.2 How To Shield The Power When The Garbled

U0TXD default power will be system printing, through the UART's internal pin switching function, user_init () call system_uart_swap () function, the new U0TXD change to GPIO15, U0RXD change to GPIO13, the hardware connection on the two cited Feet can be serial communication.

Note: After the exchange, the download pin on the hardware is still the original U0TXD and U0RXD.

6.3 Can’t Burn Normally

Refer to http://wiki.ai-thinker.com/esp_download to download, pay attention to download before the module to ensure that the download mode.
6.4 SDK Development Environment

Refer to http://wiki.ai-thinker.com/ai_ide_install to build the SDK development environment.

6.5 Startup Information Description

Start, if the power and serial port connection is normal, then the baud rate 74880 to see the first sentence is as follows:

```
ets Jan 8 2013, rst cause: 1, boot mode: (3, 6)
```

The start and start modes of the module can be analyzed based on the print information:

rst cause:
1: Power restart
2: External reset
4: Hardware watchdog reset

boot mode:

The second in parentheses has no practical meaning, the first can refer to the following table to start the information analysis:

<table>
<thead>
<tr>
<th>Value</th>
<th>Mode</th>
<th>GPIO0</th>
<th>GPIO2</th>
<th>GPIO15</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>Download Mode</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>-</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>Run mode</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>-</td>
<td>0</td>
<td>0</td>
<td>1</td>
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<tr>
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<td>-</td>
<td>0</td>
<td>1</td>
<td>1</td>
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<tr>
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</tr>
<tr>
<td>7</td>
<td>-</td>
<td>1</td>
<td>1</td>
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7 Module Selection

<table>
<thead>
<tr>
<th>model</th>
<th>ESP-01</th>
<th>ESP-01S</th>
<th>ESP-01M</th>
<th>ESP-07</th>
<th>ESP-07S</th>
<th>ESP-12F</th>
<th>ESP-12S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Package</td>
<td>DIP-8</td>
<td>DIP-8</td>
<td>SMD-18</td>
<td>SMD-16</td>
<td>SMD-16</td>
<td>SMD-22</td>
<td>SMD-16</td>
</tr>
<tr>
<td>Size(mm)</td>
<td>24.7*14.4</td>
<td>24.7*14.4</td>
<td>18*18</td>
<td>21.2*16.0</td>
<td>17.0*16.0</td>
<td>24.0*16.0</td>
<td>24.0*16.0</td>
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<tr>
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<td>-----------</td>
<td>-----------</td>
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<td>4</td>
<td>2</td>
<td>4</td>
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<tr>
<td>Flash size</td>
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<td>8Mbit</td>
<td>8Mbit</td>
<td>8Mbit</td>
<td>32Mbit</td>
<td>32Mbit</td>
<td>32Mbit</td>
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<tr>
<td>Certificati on</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>FCC/CE</td>
<td>FCC/CE</td>
<td>FCC/CE</td>
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<tr>
<td>Antenna</td>
<td>PCB</td>
<td>PCB</td>
<td>PCB</td>
<td>Ceramic IPEX</td>
<td>IPEX</td>
<td>PCB</td>
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</tr>
<tr>
<td>Indicator light</td>
<td>TXD0 POWER</td>
<td>GPIO2</td>
<td>GPIO2 POWER</td>
<td>-</td>
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<td>9</td>
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</tbody>
</table>

For more selection information please see [http://wiki.ai-thinker.com/esp8266](http://wiki.ai-thinker.com/esp8266) or contact us.
8 Contact US

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