

Document ID :

Specification

MACHTALK Wi-Fi Module

CLOUD-ESP-01-5V

(2.4GHz 802.11 b/g/n)

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Jining Zhongke SmartCity Electronic Technology Co. ,Ltd

REVISION HISTORY

Version	Revision Date	Revised Outline	Revised By	Checked By	Approver
V1.0		First edition	LIU WEIRONG	XIN DONGJIN	

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Terms and Abbreviations

Abbreviation	Description
Wi-Fi	Wireless Fidelity
ISM	Industrial Scientific Medical
UART	Universal Asynchronous Receiver & Transmitter
IO	Input & Output
SoC	System On a Chip
TCP	Transmission Control Protocol
IP	Internet Protocol
IEEE	Institute Of Electrical And Electronics Engineers
bps	Bits Per Second
OTA	Over-the-Air
MCU	Microcontroller Unit
AP	Access Point
STA	Station
RF	Radio Frequency
CCK	Corporate Control Key
DSSS	Direct Sequence Spread Spectrum
HT20	High Throughput 20
BPSK	Binary Phase Shift Keying
PER	Packet error ratio
OFDM	Orthogonal Frequency Division Multiplexing
MCS	Modulation and coding scheme

1. Introduction

1.1 Profile

The **CLOUD-ESP-01-5V** MACHTALK Wi-Fi Module is a new generation of embedded WIFI module product based on WIFI SOC chip(ESP8266) launched by **Espressif Systems (Shanghai) Co.,Ltd.** This module supports the 2.4 GHz ISM band radio frequency transceiver, basic network protocol, mobile terminal Swift link protocol, and MACHTALK application communication protocol, etc. Compared with other module, this module has the characteristics of compacted size, low power consumption, flexible in usage convenient. Using CLOUD-ESP-01-5V MACHTALK Wi-Fi Module, developers can easily connected intelligent terminal equipment to the Internet, Which can rich product function and improve product competitiveness.

The module including IEEE802.11 b/g/n, TCP/IP and UDP protocol stack can easily achieve the function of wireless network transmission and it is available in Soft AP、STA mode. The module has 4 GPIOs, sensors and other specific applications can be integrated through GPIO ports. The module can quickly switch between the Sleep/Wake pattern, which enable devices with low power consumption in standby mode.

The module is mainly used in a multitude of smart home appliances, smart home, medical monitoring, smart toys, automotive electronics, smart power grid & industrial control, etc.

This document introduces the structure of Wi-Fi module, electrical parameters, RF parameter, interface circuit, using environment etc.

1.2 Block Diagram

The block diagram of CLOUD-ESP-01-5V module is shown in Figure 1.1, supply voltage is 5V. This module integrate Wi-Fi SoC chip ESP8266 and external 8Mb SPI Flash, crystal, antenna and other components. In addition, PCB antenna or external antenna can be configured according to different occasions.

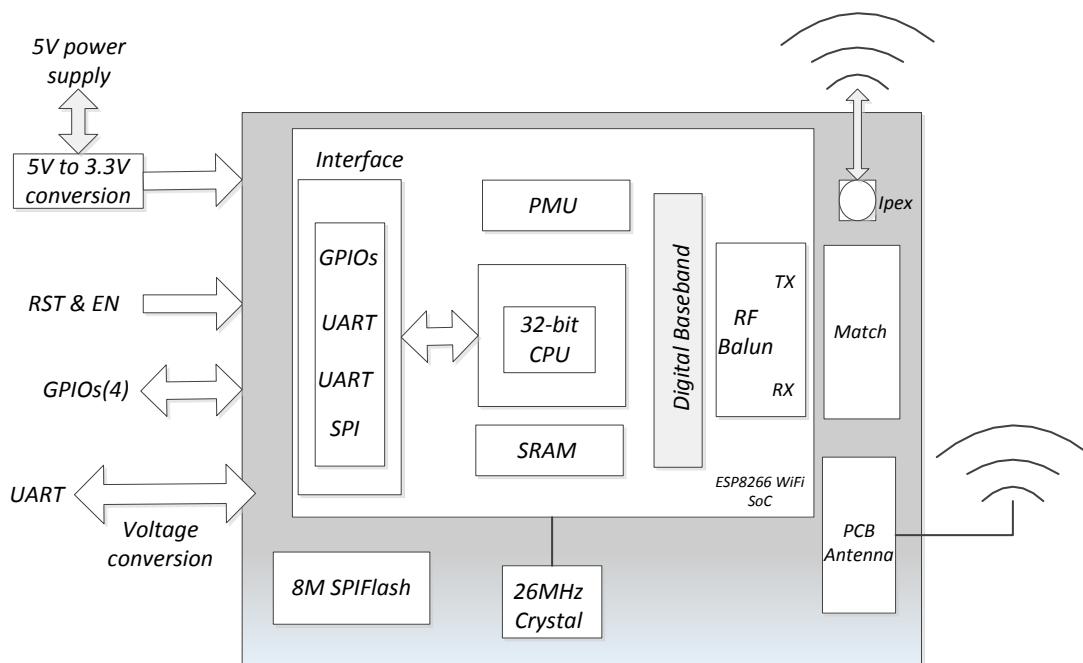


Figure 1.1 CLOUD-ESP-01-5V Module Block Diagram

1.3 Features

- ✓ Support IEEE 802.11 b/g/n protocol and Soft AP、WIFI Direct(P2P) mode.
- ✓ Support mobile terminal fast connection
- ✓ Support MACHTALK rapid connection protocol
- ✓ Support module and device controller remote upgrade (OTA)
- ✓ Support UART or I/O Data communication interface
- ✓ Integrated TCP/IP protocol stack, and support multiple TCP Client links
- ✓ Support server data recognition and encryption
- ✓ Optional external antenna or onboard PCB antenna
- ✓ High reliability , When external distraction is encountered , the module can quick recovery

2. Product Features

2.1 Physical Structure

CLOUD-ESP-01-5V MACHTALK Wi-Fi Module Use four cables as a power supply and data communication , The length of this module is 43.8mm , and the width is 28mm. The detailed Physical Dimensions are shown in Figure 2.1.

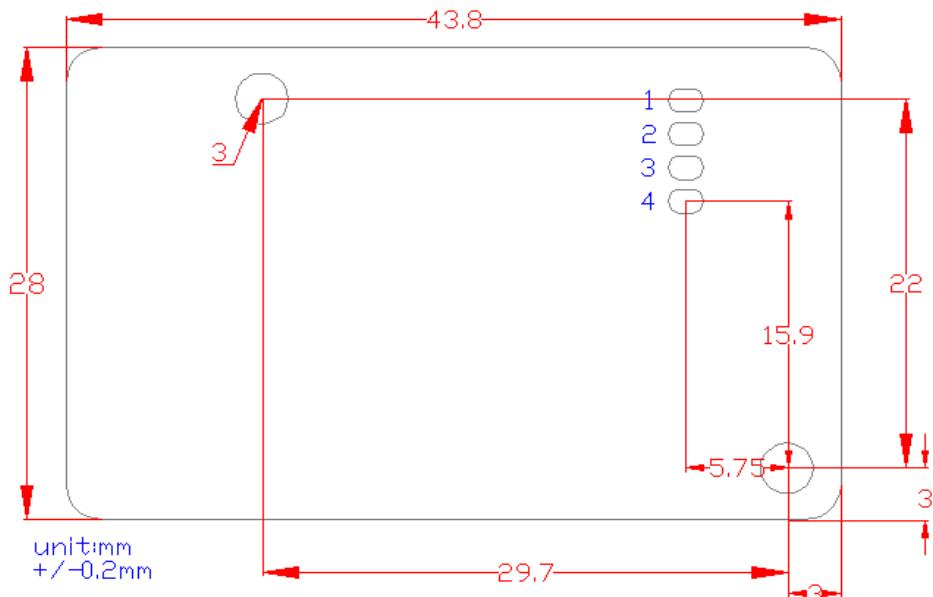


Figure 2.1 The Physical Dimensions CLOUD-ESP-01-35 MACHTALK Wi-Fi Module

2.2 Electrical Interface

2.2.1 Signal definition

Table 2.1 Hardware Interface of CLOUD-ESP-01-3V Module

Pin number	Function	Description
4	VCC	Power supply, 5V Power supply
3	TX	Data TX pin
2	RX	Data RX pin
1	GND	Ground Pin

2.2.2 Working Mode Introduction

Module can work in serial mode or I/O mode, module has definite its work mode in the model definition, user can choose according to order model information ordering the operation mode of the module.

Under serial-port mode, Pin2 is the TX of the UART communication (UART-TXD), Pin3 is the RX of UART communication (UART-RXD). The Baud rate is 9600bps, no verification, 8 digit data, 1 stop bit. Under I/O mode, Pin2 is the TX of I/O mode (IO-TX), Pin3 is the RX of I/O mode (IO-RX).

The specification of UART protocol and I/O communication protocol as shown in 《CLOUDXX serial Wi-Fi module user Manual》

2.2.3 Interface Voltage-logic

The interface logic level of the module is 5V TTL. Last step of module signal transmit circuit is NPN triode driver, the output pull-up a 10k ohm resistor. Module communication receiving using diode isolation, as shown in figure 2.2, the diode D1 is schottky diode, its voltage drop is less than or equal to 0.2 V, RXD5V pin is RXD pin and RXD3.3 V is directly connected to wi-fi SoC chip. in use, the output of the single chip microcomputer is push-pull output or open drain leakage (virtual) form. When the microcontroller is the drain leakage (virtual power supply) circuit, due to it need a external pull-down resistance, module logic 0 level cannot receive. The microcontroller of this type need a external driver.

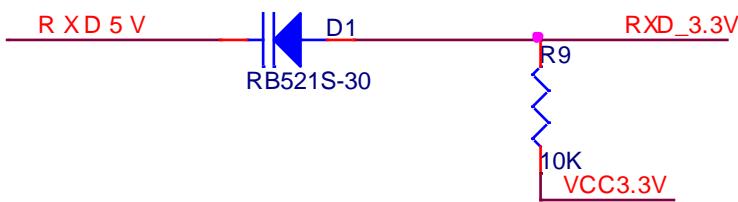


Figure 2.2 Module data receiving circuit diagram

2.2.4 power supply and power consumption

Table 2.2 CLOUD-ESP-01-5V module electrical parameter

Parameter	Description	Value	Condition
VCC (5V)	Input voltage	5V, +/-5%	
I _{max}	Peak current	390mA	VCC=5V
I _{avg}	Average current	60~150mA	VCC=5V

2.3 RF Parameters

Table 2.3 CLOUD-ESP-01-5V Module RF Parameters

ISM Band	2412~2484MHz	
	RF 工作模式	参数
发射功率	802.11b DSSS1Mbps	≥17dBm
	802.11b CCK11Mbps	≥15dBm
	802.11g 6Mbps(1/2BPSK)	≥15dBm
	802.11g OFDM54Mbps	≥14dBm
	802.11n HT20	≥12dBm
接收 灵敏度	802.11b 1Mbps @8%PER	≤-85dBm
	802.11g 54Mbps @10%PER	≤-70dBm
	802.11n MCS7 @10%PER	≤-65dBm
邻域抑制	OFDM, 6Mbps	37dB
	OFDM, 54Mbps	21dB
	HT20, MCS0	37dB

	HT20, MCS7	20dB
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2.4 LED lamp status description

This Module integration with four debugging LEDs, the locations of them are shown in figure 2.3.

LED4: Power indicator light. When the module has power supply, LED4 keeps on;

LED1: Wait for the configuration status indicator lights, in configuration process, the lights will shine , when the configuration is complete, indicator will keeps on.

LED2: indicator of platform connection, when the platform is connected, the indicator will keeps on, otherwise it will keeps off.

LED3: indicator of WiFi connection, when the module connected with the wireless router, it will keeps on, otherwise it will keeps off.

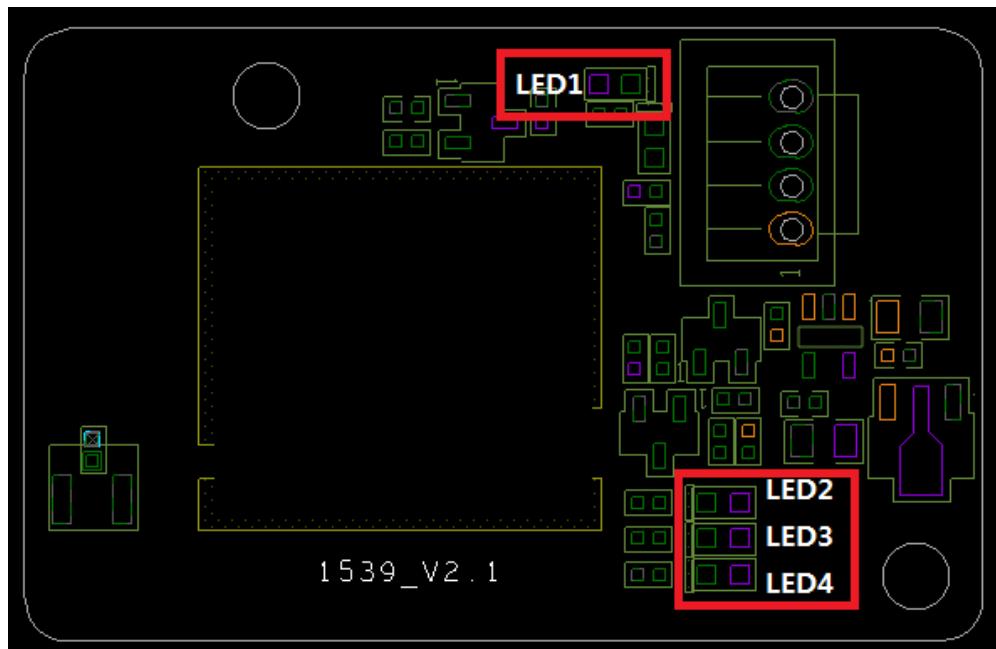


Figure2.3 Instructions of LED lamp Location

2.5 Antenna form

This Module integrated with on-board antenna and IPEX RF connector. Developers can flexibly choose antenna form according to their own conditions. The radiation efficiency of on-board antenna is bigger than 90%. When using this type antenna, the module need to be placed in a no metal shielding region. When installation, the on-board antenna needs enough free space. Under specific application scenario, developer can connect external antenna through IPEX RF connector.

Specific antenna form Module, please refer to Ordering Information!

2.6 Working condition

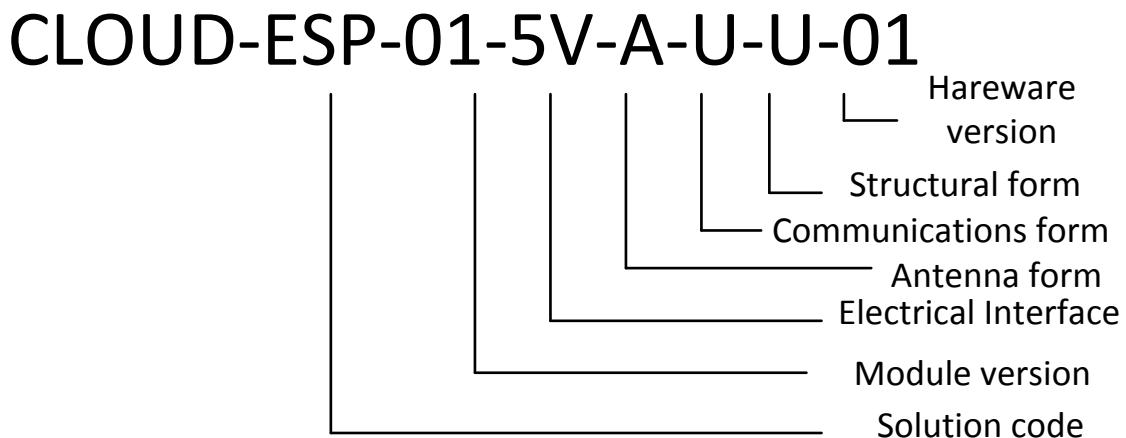
Working Condition: Temperature 0~85°C,

Relative Humidity: 5%~90%R.H. (non-condensing)

Storage Condition: Temperature -25~100°C,

Relative Humidity: 5%~90%R.H. (non-condensing)

3. Ordering Information & Model Coding



CLOUD-ESP-01-5V Represented that the MACHTALK Wi-Fi Module is adopting ESP8266 SOC solution of Espressif Systems (Shanghai) Co.Ltd.

Solution Code

Code	Description
ESP	Espressif Systems solution series modules

Solution Number

Code	Description
ESP-01	Espressif Systems ESP8266 solution module

Electrical Interface

Code	Description
5V	3.3V POWER, Communication interface 5V logic module

Antenna Form

Code	Description
A	On-board antenna
I	IPEX RF Connector

Communication Interface

Code	Description
U	UART Communication Mode
I	IO Communication Mode

Structural Form

Code	Description
U	Stamp Hole Type Design, Size: 18*30mm

Hardware Version

Code	Description
01	V1.00
02	V1.01
....

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5. Warning

Caution:

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.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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.

MPE Reminding

To satisfy FCC RF exposure requirements, a separation distance of 20 cm or more should be maintained between the antenna of this device and persons during device operation. To ensure compliance, operations at closer than this distance is not recommended.

Region Selection

Limited by local law regulations, version for North America does not have region selection option.

Information for the OEM Integrators

This device is intended for OEM integrators only. Please see the full grant of equipment document for restrictions.

Label Information to the End User by the OEM or Integrators

If the FCC ID of this module is not visible when it is installed inside another device, then the outside of the device into which the module is installed must be labeled with "Contains FCC ID: 2AFXZ-GC938264".