

Document ID :

Specification

MACHTALK Wi-Fi Module

CLOUD-ESP-01-3V

(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
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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-01-3V** 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, stamp hole interface, low power consumption, flexible in usage convenient. Using CLOUD-ESP-01-3V 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-01-3V module is shown in Figure 1.1, supply voltage is 3.3V. This module integrate Wi-Fi SoC chip ESP8266 and external 4Mb SPI Flash, crystal, antenna and other components. In addition, PCB antenna or external antenna can be configured according to different occasions.

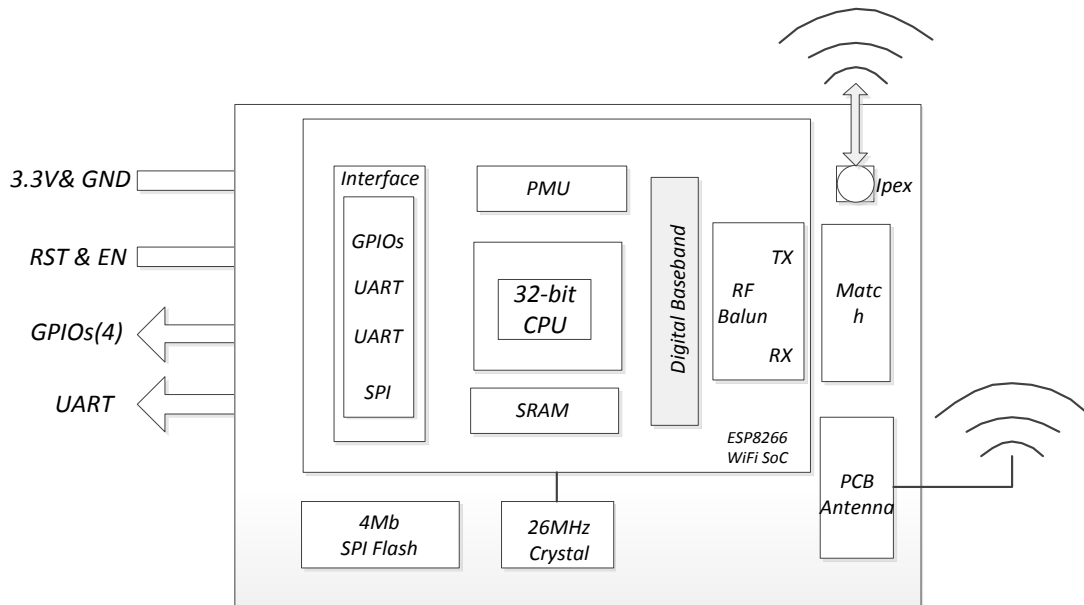


Figure 1.1 CLOUD-ESP-01-3V Module Block Diagram

1.3 Features

- ✓ Support IEEE 802.11 b/g/n protocol and Soft AP、WIFI Direct(P2P) mode.
- ✓ Support WEP、WPA2 encryption mode.
- ✓ Provide 1 UART(typical rate of 115200bps) and 4 GPIO Ports
- ✓ Built-in 32-bit CPU with low power consumption, provide secondary development SDK and serial port application guide
- ✓ RF ON/OFF control, sleep mode power management
- ✓ Effective power is less than 1.0mW in standby mode(DTM3)
- ✓ Module can be awakened, connect and transmit data packets within 2ms
- ✓ Leakage current is less than 10uA when powered off.
- ✓ Optional external antenna or onboard PCB antenna
- ✓ Support antenna diversity, 1X1 MIMO

2. Product Features

2.1 Physical Structure

CLOUD-ESP-01-3V MACHTALK Wi-Fi Module Use the stamp hole and hole is compatible , The length of this module is 30mm , and the width is 18mm. The specific package sizes are shown in Figure 2.1、Figure 2.2 & Table 2.1 .

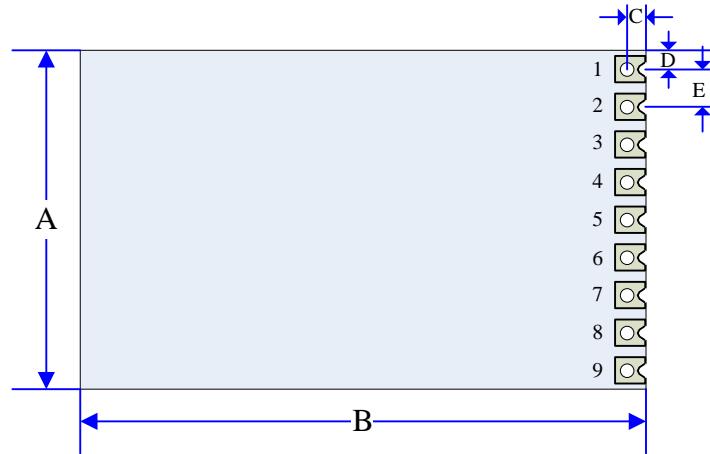


Figure 2.1 The Front view CLOUD-ESP-01-3V MACHTALK Wi-Fi Module

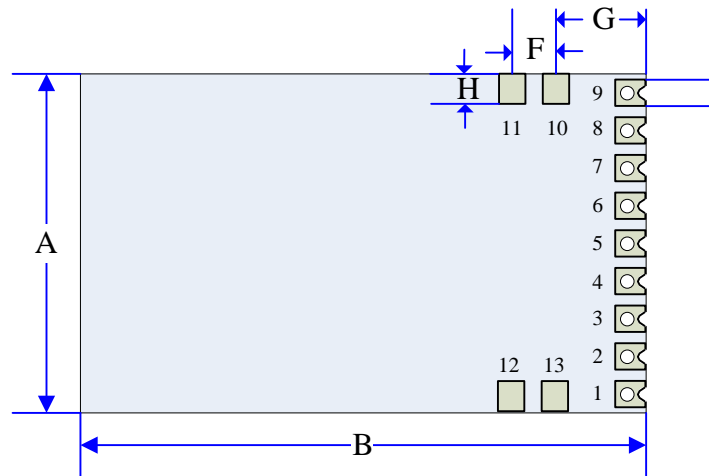


Figure 2.2 The Back View CLOUD-ESP-01-3V MACHTALK Wi-Fi Module

Table 2.1 The Size Defined of CLOUD-ESP-01-3V Module

Size Label	Parameters (mm)
------------	-----------------

A	18
B	30
C	1
D	1
E	2
F	2
G	4.7
H	1.2

2.2 Electrical Interface

2.2.1 Signal definition

Table 2.2 Hardware Interface of CLOUD-ESP-01-3V Module

Pin number	Function	Interface Type	Description
1	VCC	Power	Power Pin, 3.3V Power supply
2	GND	Ground	Ground Pin
3	RST	Input	Reset Pin. When the external Voltage is low, module Reset. (Default voltage is high.)
4	RXD	Input	Data RX pin, can be used as a UART RX, or RX of I/O Mode
5	TXD	Output	Data TX pin, can be used as a UART TX, or the reception of I/O Mode. When starting, make sure that the pin is not to be low voltage.
6	FLAG	Input	Mode configure pin, when it is high voltage, the module working in serial port mode, when it is low voltage, the module working in I/O Mode. (Default voltage is high.)

7	ONLINE_ST ATUS	Output	MACHTALK Online Flag, when it is high voltage, the module is offline, when it is low voltage, the module is online.
8	BAND_SWI TCH	Input	UART communication baud rate configure pin, when it is high voltage, the Baud rate is 115200, and when it is low voltage, the Baud rate is 9600. The default voltage is low.
9	WiFi_STAT US	Output	Wi-Fi Online Flag, High Voltage represent that the module is not connect to Wi-Fi Device, Low voltage represent that the module is connecting to Wi-Fi Device.
10	Test0	I/O	Test pin, No connection when not in use.
11	Test2	I/O	Test pin, Used for Module log printing, No connection when not in use.
12	Test4	I/O	Test pin, No connection when not in use.
13	Test5	I/O	Test pin, No connection when not in use.

2.2.2 Working Mode Introduction

Module can work in UART Mode or I/O Mode. Through configuration of module Pin 6, users can configure the module working in UART mode or I/O mode.

Under serial mode, Pin5 is the TX of the UART communication (UART-TXD), Pin4 is the RX of UART communication (UART-RXD). The Baud Rate can configure by Pin8, when it is high voltage, the Baud rate is 115200bps, no verification 8 digit data, 1 stop bit and when it is low voltage, 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).

Table 2.3 Introduction of CLOUD-ESP-01-3V Module Operating Mode

Mode	Date Rate	FLAG	BAND_SWITCH
UART mode	115200bps	1	1
	9600bps	1	0
I/O mode	X	0	X

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

This module has working status indicator pin, developer can easily know the working status of this module in development. The developer can identify interface level by the oscilloscope or other test equipment to discriminant module working condition, or by indicator LED.

2.2.3 Absolute Maximum Tolerance

Table 2.4 shows the Maximum Tolerance of this Module , the module must working under the Maximum Tolerance.

Table 2.4 Module Maximum Tolerance

Pin	Description	Maximum Tolerance	Units
VCC	Power supply	-0.3~4.0	V
VIH Min	I/O Pin Minimum Input voltage	-0.3	V
VIH MAX	I/O Pin Maximum Input voltage	VCC+0.3	V
RFin	RF Maximum Input power	+10	dBm

2.2.4 Recommend Application Condition

The Data interface circuit of this 3.3V module comply with LVCMOS level

specification, Input level threshold need to comply with the specifications in Table 2.2 .

Table 2.2 Recommend Working Condition

Pin	Description	Minimum	Typical	Maximum	UNIT
VCC	Power supply Voltage	3.15	3.3	3.45	V
Icc	Power supply Current		120	390mA	mA
VOL	The output high level threshold		$\leq 0.2V$		DATA TX Pin
VOH	The output low level threshold		$\geq 3.1V$		
VIL	The Input low level threshold		$\leq 0.5V$		DATA RX pin
VIH	The Input high level threshold		$\geq 2.5V$		

2.3 RF Parameters

Table 2.5 CLOUD-ESP-01-3V Module RF Parameters

ISM Band	2412~2484MHz	
	RF Operation Mode	Parameters
TX power	802.11b DSSS1Mbps	$\geq 17dBm$
	802.11b CCK11Mbps	$\geq 15dBm$
	802.11g 6Mbps(1/2BPSK)	$\geq 15dBm$
	802.11g OFDM54Mbps	$\geq 14dBm$

	802.11n HT20	$\geq 12\text{dBm}$
RX sensitivity	802.11b 1Mbps @8%PER	$\leq -85\text{dBm}$
	802.11g 54Mbps @10%PER	$\leq -70\text{dBm}$
	802.11n MCS7 @10%PER	$\leq -65\text{dBm}$
Adjacent channel rejection	OFDM, 6Mbps	37dB
	OFDM, 54Mbps	21dB
	HT20, MCS0	37dB
	HT20, MCS7	20dB

2.4 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!

2.5 Working condition

Working Condition: Temperature 0~85°C,

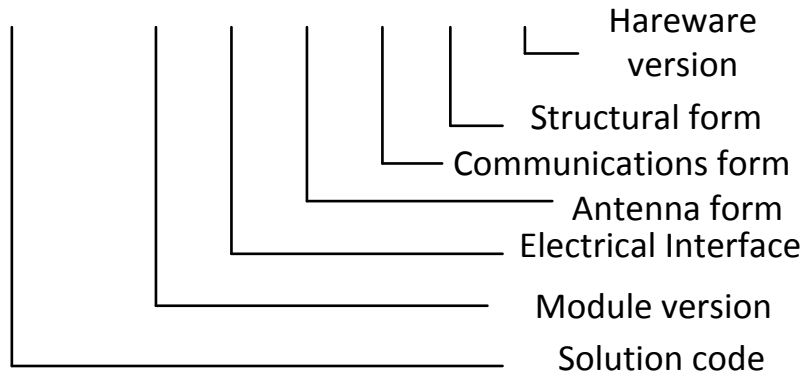
Relative Humidity: 5%~90%R.H. (non-condensing)

Storage Condition: Temperature -25~100°C,

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

3. Ordering Information & Model Coding

CLOUD-ESP-01-3V-A-U-U-01



CLOUD-ESP-01-3V 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
3V	3.3V POWER, Communication interface 3.3V 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 label with "Contains FCC ID: 2AFXZ-GC938263".