

ZY8266-12 Specification sheet

File Status: [] The draft [] Official release [✓] Being modified	File Identification:	
	Current Version:	1.0
	Author:	
	Date of Completion:	2022-11-11

Edition of history

Version/Status	Author	Participants	Start and end date	Note
1.0	tanzhiliang		22-11-11	First Edition

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一、Product Overview

ZY8266-12 is a Wi-Fi module developed by Zhou Yuan Technology. The core processor of this module, ESP8266, integrates industry-leading Tensilica L106 ultra-low power 32-bit MCU with 16-bit compact mode in a smaller package. The main frequency supports 80 MHz and 160 MHz, supports RTOS and integrates Wi-Fi MAC/ BB/RF/PA/LNA. ZY8266-12 Wi-Fi module supports standard IEEE802.11b/g/n protocol, complete TCP/IP protocol stack. Users can use the module to add networking capabilities to existing devices or to build standalone network controllers. ESP8266 is a high performance wireless SoC that provides maximum utility at the lowest cost and unlimited possibilities for embedding Wi-Fi capabilities into other systems.

The ESP8266 features a complete and self-contained Wi-Fi network that can be used independently or run as a slave from another host MCU. When the ESP8266 is a standalone application, it can be directly launched from an external flash. The built-in buffer memory is beneficial to improve the system performance and optimize the storage system.

In the other case, ESP8266 can be used as Wi-Fi only through SPI/SDIO interface or UART interface

Adaptor, applied to any microcontroller based design.

The ESP8266's powerful on-chip processing and storage capabilities allow it to integrate sensors and other application-specific devices through the GPIO port, significantly reducing upfront development costs.

Features

- Complete 802.11b/g/n Wi-Fi SoC module
- Built-in Tensilica L106 ultra-low power 32-bit micro MCU, main frequency support 80 MHz and 160 MHz, support RTOS
- Built-in 1 channel 10 bit high precision ADC
- Support the UART/GPIO/ADC/PWM/SPI, I2C interface
- SMD-22 encapsulation is used
- Wi-Fi integrated MAC/ BB/RF/PA/LNA
- Multiple dormancy modes are supported, with deep sleep current as low as 20uA
- Serial port speeds up to 4Mbps
- Embedded Lwip protocol stack
- Supports STA/AP/STA+AP working mode
- Smart Config (APP) /AirKiss (wechat) for Android and IOS
- Support for serial port local and remote firmware upgrade (FOTA)
- General AT command can be quickly picked up
- Support secondary development, integrated Windows, Linux development environment

Main parameters

Table 1 Main parameter description

Module Model	ZY8266-12
encapsulation	SMD-22
Size	24*16*3(± 0.2)MM
Form of antenna	PCB ANT
Range of spectrum	2400 ~ 2483.5MHz
Operating temperature	-40 ℃ ~ 85 ℃
Storage Environment	-40 ℃ ~ 125 ℃ , < 90%RH
Range of power supply	Supply voltage 3.0V ~ 3.6V, Supply current >500mA
Supported Interfaces	UART/GPIO/ADC/PWM/SPI/I2C
Number of IO ports	9
Serial port rate	Support 110 ~ 4608000 bps , default 115200 bps
Security	WEP/WPA-PSK/WPA2-PSK
SPI Flash	default 32Mbit
certification	FCC, CE, IC, REACH, RoHS, SRRC, NCC, TELEC, ANATEL, KCC

二、Electrical parameters

Electrical characteristics

parameter	conditions	Minimum value	Typical value	Maximum value	unit
Supply voltage	VDD	3.0	3.3	3.6	V
I/O	VIL/VIH	-	-0.3/0.75V _{IO}	0.25V _{IO} /3.6	V
	VOL/VOH	-	N/0.8V _{IO}	0.1V _{IO} /N	V
	IMAX	-	-	12	mA

Radio frequency performance

describe	Typical value	unit
Frequency of operation	2400 - 2483.5	MHz
Power output		
In 11n mode, the PA output power	13 \pm 2	dBm
In 11g mode, the PA output power	14 \pm 2	dBm
In 11b mode, the PA output power	16 \pm 2	dBm
Sensitivity of reception		
CCK, 1 Mbps	<=-90	dBm
CCK, 11 Mbps	<=-85	dBm
6 Mbps (1/2 BPSK)	<=-88	dBm
54 Mbps (3/4 64-QAM)	<=-70	dBm
HT20 (MCS7)	<=-67	dBm

Power consumption

The following power consumption data is based on a 3.3V power supply, ambient temperature of 25° C, and measured using an internal voltage regulator.

- All measurements were made at the antenna interface without a SAW filter.
- All emission data were measured in continuous emission mode based on 90% duty cycle.

model	Minimum	Typical	Maximum	unit
Transmission 802.11b, CCK 11Mbps, POUT=+17dBm	-	170	-	mA
Transmission 802.11g, OFDM 54Mbps, POUT=+15dBm	-	140	-	mA
Transmission 802.11n, MCS7, POUT =+13dBm	-	120	-	mA
Receiving 802.11b, packet length 1024 bytes, -80dBm	-	50	-	mA
Receiving 802.11g, packet length 1024 bytes, -70dBm	-	56	-	mA
Receiving 802.11n, packet length 1024 bytes, -65dBm	-	56	-	mA
Modem-Sleep①	-	20	-	mA
Light-Sleep②		2	-	mA
Deep-Sleep③		20	-	mA
Power Off		0.5	-	mA

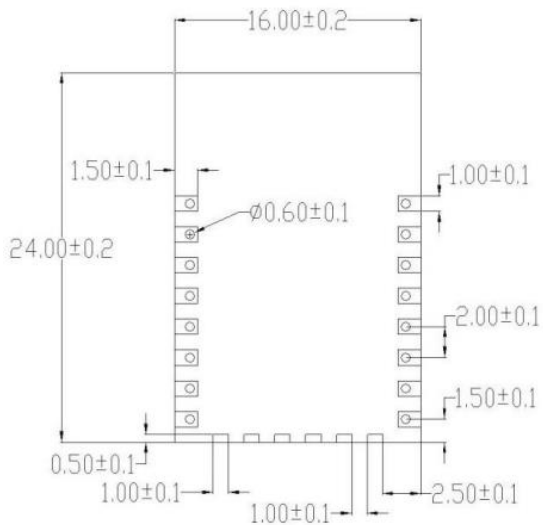
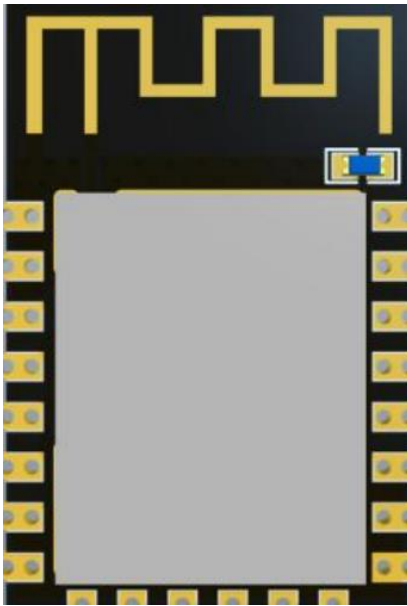
instructions:

■ Modem-sleep is used for applications that require the CPU to work at all times, such as PWM or I2S applications. If no data is being transmitted while maintaining a Wi-Fi connection, you can disable the circuit of the Wi-Fi Modem according to the 802.11 standard (such as U-APSD) to save power. For example, in DTIM3, every 300 ms of sleep, wake up 3 ms to receive AP Beacon packet, the overall average current is about 20 mA.

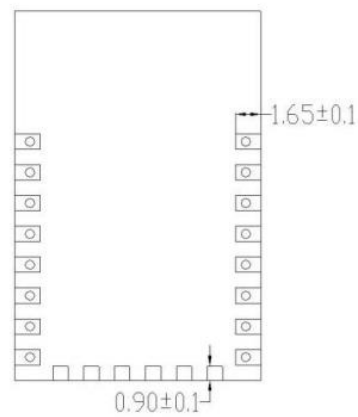
■ Light-sleep is used for applications where the CPU can pause, such as a Wi-Fi switch. If no data is being transmitted while maintaining a Wi-Fi connection, disable the circuit of the Wi-Fi Modem and stop the CPU according to the 802.11 standard (such as U-APSD) to save power. For example, in DTIM3, every 300 ms of sleep, wake up 3 ms to receive the Beacon packet of AP, the overall average current is about 2 mA.

■ Deep-sleep is used for applications that do not require constant Wi-Fi connection and only send data packets for a long time, such as sensors that measure temperature every 100s. For example, it takes 0.3s to 1s to connect the AP to send data every 300 seconds after waking up, so the overall average current can be much less than 1 mA. The current value of 20 μ A was measured at 2.5V.

三、 Size of appearance



正面



背面

四、 Pin definition

ZY8266-12 module is connected to a total of 16 interfaces, such as pin diagram, pin function definition table is interface definition.



ZY8266-12 Pin diagram

Table 1 Pin Function Definition

PIN No.	Name	Function Description
1	RST	reset
2	ADC	A/D conversion result. The input voltage ranges from 0 to 1V. The value ranges from 0 to 1024
3	EN	Enable end of chip, active high level
4	I016	GPIO16/ deep sleep awakening when connected to RST pin
5	I014	GPIO14/HSPI_CLK
6	I012	GPIO12/HSPI_MISO
7	I013	GPIO13/HSPI_MOSI/UART0_CTS
8	VCC	3.3V power supply (VDD);The recommended output current of the external power supply is more than 500mA
9	GND	grounding
10	I015	GPIO15/MTD0/HSPICS/UART0_RTS
11	I02	GPIO2/UART1_TXD
12	I00	GPIO0; Download mode: external pull down, Run mode: suspended or external pull up
13	I04	GPIO4
14	I05	GPIO5/IR_R
15	RXD	UART0_RXD/GPIO3
16	TXD	UART0_TXD/GPIO1

Table 2 Description of module startup modes

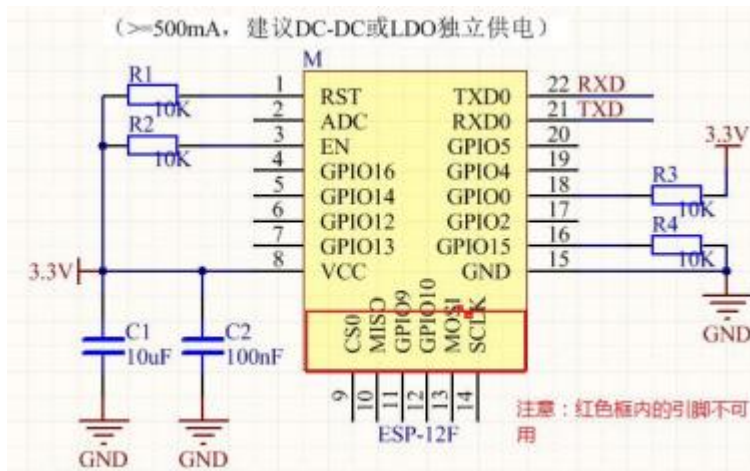
model	CH_PD(EN)	RST	GPIO15	GPIO0	GPIO2	TXD0
Download mode	high	high	low	low	high	high

Operating mode	high	high	low	high	high	high
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Note: Some pins have been pulled up internally, please refer to the schematic diagram

五、 Design guidance

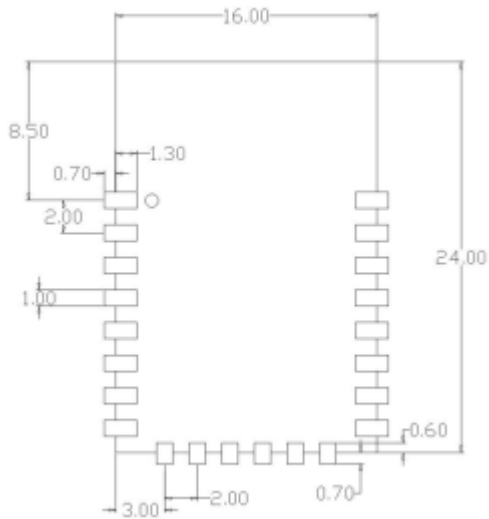
1、Circuit of application



Note:

- (1) Module peripheral circuit, GPIO0 must be pulled up to VCC, GPIO15 must be pulled down to GND.
- (2) EN feet and RST feet must be pulled up to VCC.
- (3) The module pin9-pin14 is unavailable.

2、Recommended module packaging design size



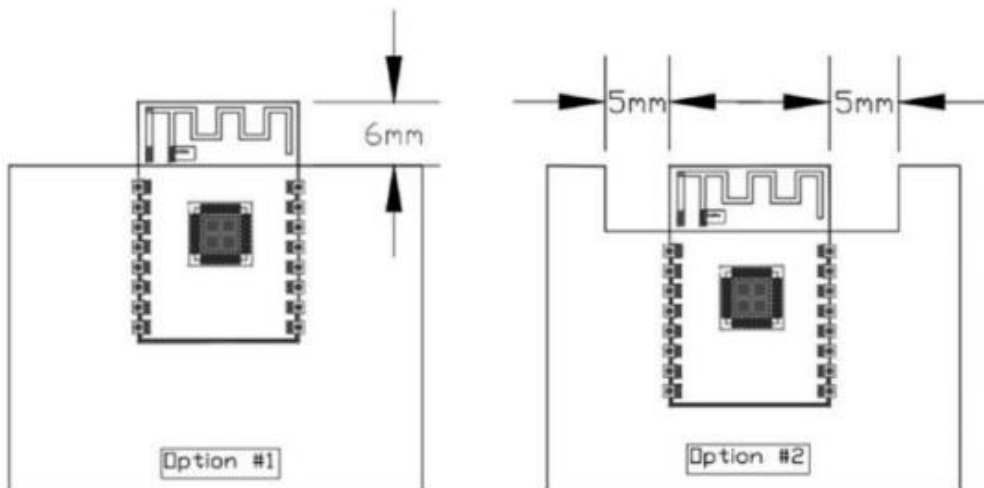
Note: This is ZY8266-12 module packaging diagram, it is recommended to design the PCB board according to this diagram, so that the module can work normally on the PCB board; In addition, when designing the pad, it should be noted that the specific module designed on the PCB pad should not correspond to the inner shrinkage deviation of the pad, while the PCB pad should not affect the use of the module by expanding the pad relative to the module.

3、Antenna layout Requirements

(1) The following two ways are recommended for the installation position on the motherboard:
Scheme 1: Put the module on the edge of the motherboard, and the antenna area extends out of the motherboard edge.

Scheme 2: Put the module on the edge of the motherboard, the motherboard edge in the antenna position hollowed out an area.

(2) In order to meet the performance of onboard antenna, it is forbidden to place metal parts around the antenna, far away from high-frequency devices.



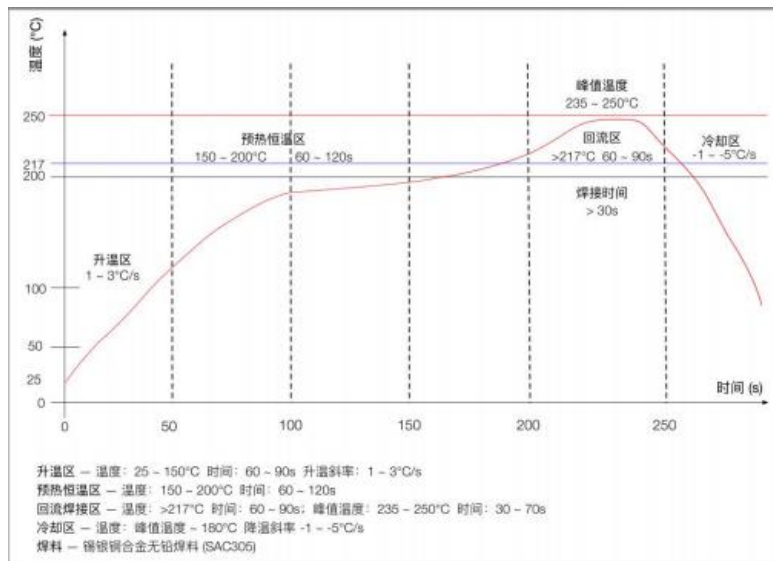
4、Power supply

- (1) 3.3V voltage is recommended, and the peak current is above 500mA
- (2) LDO power supply is recommended; If DC-DC is used, it is recommended to control ripple within 30mV.
- (3) It is recommended to reserve the position of dynamic response capacitor for DC-DC power supply circuit, which can optimize the output ripple when the load changes greatly.
- (4) ESD device is recommended for 3.3V power interface.

5、Use of GPIO port

- (1) Some GPIO ports are drawn from the periphery of the module. If necessary, it is suggested to use a resistance of 10-100 ohms in series on the I/O port.
This can inhibit overshoot, is more stable level on both sides. It helps EMI and ESD.
- (2) Pull up and down special I/O ports, please refer to the usage instructions of the specifications, which will affect the startup configuration of the module.
- (3) The I/O port of the module is 3.3V. If the I/O level of the main control does not match that of the module, the level conversion circuit needs to be added.
- (4) If the I/O port is directly connected to the peripheral port or the pin terminal, reserve an ESD component near the I/O cable to the terminal.

六、 Reflow soldering curve



七、 Packaging information

As shown below, the packaging of ZY8266-12 is braided.



八、 Contact us

Company address: 2nd Floor, Building H, Juyin Technology Industrial Park, Bulan Road,
Longgang District, Shenzhen

Contact number: 0755-82772544

FCC Statement

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.

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

If the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains Transmitter Module FCC ID: 2A9JH-ZY8266 or Contains FCC ID: 2A9JH-ZY8266"

When the module is installed inside another device, the user manual of the host must contain below warning statements;

1. 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.
 - (2) This device must accept any interference received, including interference that may cause undesired operation.
2. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product.

Any company of the host device which install this modular with Single modular approval should perform the test of radiated emission and spurious emission according to FCC part 15C: 15.247 and 15.209 requirement, Only if the test result comply with FCC part 15C: 15.247 and 15.209 requirement, then the host can be sold legally.

This device is intended only for OEM integrators under the following conditions:
(For module device use)

- 1) The antenna must be installed such that 20 cm is maintained between the antenna and users, and
- 2) The transmitter module may not be co-located with any other transmitter or antenna.

As long as 2 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end product for any additional compliance requirements required with this module installed.

FCC Radiation Exposure Statement

This modular complies with FCC RF 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. This modular must be installed and operated with a minimum distance of 20 cm between the radiator and user body.

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.

**Integration instructions for host product manufacturers according to KDB 996369
D03 OEM Manual v01****2.2 List of applicable FCC rules**

FCC Part 15 Subpart C 15.247 & 15.207 & 15.209

2.3 Specific operational use conditions

The module is a WIFI module with 2.4G WIFI function.

Operation Frequency: 802.11b/g/n 20: 2412~2462 MHz

Number of Channel: 802.11b/g/n20: 11CH

Modulation:

802.11b(DSSS): CCK, DQPSK, DBPSK

802.11g(OFDM): BPSK, QPSK, 16-QAM, 64-QAM

802.11n(OFDM): BPSK, QPSK, 16-QAM, 64-QAM

Type: PCB Antenna

Gain: 0dBi

The module can be used for mobile applications with a maximum 0dBi antenna. The host manufacturer installing this module into their product must ensure that the final composite product complies with the FCC requirements by a technical assessment or evaluation to the FCC rules, including the transmitter operation. The host manufacturer has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module. The end user manual shall include all required regulatory information/warning as shown in this manual.

2.4 Limited module procedures

Not applicable. The module is a Single module and complies with the requirement of FCC Part 15.212.

2.5 Trace antenna designs

Not applicable. The module has its own antenna, and doesn't need a host's printed board microstrip trace antenna etc.

2.6 RF exposure considerations

The module must be installed in the host equipment such that at least 20mm is maintained between the antenna and users' body; and if RF exposure statement

or module layout is changed, then the host product manufacturer required to take responsibility of the module through a change in FCC ID or new application. The FCC ID of the module cannot be used on the final product. In these circumstances, the host manufacturer will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

2.7 Antennas

Antenna Specification are as follows:

Type: PCB Antenna

Gain: 0dBi

This device is intended only for host manufacturers under the following conditions:

The transmitter module may not be co-located with any other transmitter or antenna;

The module shall be only used with the internal antenna(s) that has been originally tested and certified with this module. The antenna must be either permanently attached or employ a unique antenna coupler.

As long as the conditions above are met, further transmitter test will not be required. However, the host manufacturer is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.).

2.8 Label and compliance information

Host product manufacturers need to provide a physical or e-label stating “Contains FCC ID: 2A9JH-ZY8266” with their finished product.

2.9 Information on test modes and additional testing requirements

Operation Frequency: 802.11b/g/n 20: 2412~2462 MHz

Number of Channel: 802.11b/g/n20: 11CH

Modulation:

802.11b (DSSS): CCK, DQPSK, DBPSK

802.11g (OFDM): BPSK, QPSK, 16-QAM, 64-QAM

802.11n (OFDM): BPSK, QPSK, 16-QAM, 64-QAM

Host manufacturer must perform test of radiated & conducted emission and spurious emission, etc according to the actual test modes for a stand-alone modular transmitter in a host, as well as for multiple simultaneously transmitting modules or other transmitters in a host product.

Only when all the test results of test modes comply with FCC requirements, then the end product can be sold legally.

2.10 Additional testing, Part 15 Subpart B disclaimer

The modular transmitter is **only** FCC authorized for FCC Part 15 Subpart C 15.247 & 15.207 & 15.209 and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. If the grantee markets their product as being Part 15 Subpart B compliant (when it also contains unintentional-radiator digital circuitry), then the grantee shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.