

HiLetgo ESP8266 NodeMCU CP2102 ESP-12E Development Board Open Source Serial Module User Manual

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ESP8266 User Manual

List of applicable FCC rules

FCC Part 15.247

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RF exposure considerations

This equipment complies with the FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator and any part of your body.

Label and compliance information

FCC ID label on the final system must be labeled with “Contains FCC ID: 2A54N-ESP8266” or “Contains transmitter module FCC ID: 2A54N-ESP8266”.

Information on test modes and additional testing requirements

Contact Shenzhen HiLetgo E-Commerce Co., Ltd will provide a stand-alone modular transmitter test mode. Additional testing and certification may be necessary when multiple modules are used in a host.

Additional testing, Part 15 Subpart B disclaimer

To ensure compliance with all non-transmitter functions the host manufacturer is responsible for ensuring compliance with the module(s) installed and fully operational. For example, if a host was previously authorized as an unintentional radiator under the Supplier's Declaration of Conformity procedure without a transmitter certified module and a module is added, the host manufacturer is responsible for ensuring that after the module is installed and operational the host continues to be compliant with the Part 15B unintentional radiator requirements. Since this may depend on the details of how the module is integrated with the host, Shenzhen HiLetgo E-Commerce Co., Ltd shall provide guidance to the host manufacturer for compliance with the Part 15B requirements.

FCC Warning

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.

NOTE 1: Any changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End-users must follow the specific operating instructions for satisfying RF exposure compliance.

Note 1: This module is certified that complies with RF exposure requirements under mobile or fixed conditions, this module is to be installed only in mobile or fixed applications.

A mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons. Transmitting devices designed to be used by consumers or workers that can be easily re-located, such as wireless devices associated with a personal computer, are considered to be mobile devices if they meet the 20-centimeter separation requirement.

A fixed device is defined as a device that is physically secured at one location and is not able to be easily moved to another location.

Note 2: Any modifications made to the module will void the Grant of Certification, this module is limited to OEM installation only and must not be sold to end-users, end-user have no manual instructions to remove or install the device, only software or operating procedure shall be placed in the end-user operating manual of final products.

Note 3: The module may be operated only with the antenna with which it is authorized. Any antenna that is of the same type and of equal or less directional gain as an antenna that is authorized with the intentional radiator may be marketed with and used with, that intentional radiator.

Note 4: For all products market in the US, OEM has to limit the operation channels in CH1 to CH11 for 2.4G band by supplied firmware programming tool. OEM shall not supply any tool or info to the end-user regarding Regulatory Domain change.

Preambles

The module supports standard IEEE802.11 b/g/n agreement, a complete TCP/IP protocol stack. Users can use the add modules to an existing device networking or building a separate network controller.

ESP8266 is high integration wireless SOCs, designed for space and power-constrained mobile platform designers. It provides an unsurpassed ability to embed Wi-Fi capabilities within other systems, or to function as a standalone application, with the lowest cost, and minimal space requirement.

ESP8266 offers a complete and self-contained Wi-Fi networking solution; it can be used to host the application or to offload Wi-Fi networking functions from another application processor.

When ESP8266EX hosts the application, it boots up directly from an external flash. It has an integrated cache to improve the performance of the system in such applications. Alternately, serving as a Wi-Fi adapter, wireless internet access can be added to any microcontroller-based design with simple connectivity (SPI/SDIO or I2C/UART interface).

ESP8266 is among the most integrated WiFi chip in the industry; it integrates the antenna switches, RF balun, power amplifier, low noise receive amplifier, filters, power management modules, it requires minimal external circuitry, and the entire solution, including the front-end module, is designed to occupy a minimal PCB area.

ESP8266 also integrates an enhanced version of Tensilica's L106 Diamond series 32-bit processor, with on-chip SRAM, besides the Wi-Fi functionalities. ESP8266EX is often integrated with external sensors and other application-specific devices through its GPIOs; codes for such applications are provided in examples in the SDK.

Features

- 802.11 b/g/n
- Integrated low power 32-bit MCU
- Integrated 10-bit ADC
- Integrated TCP/IP protocol stack
- Integrated TR switch, balun, LNA, power amplifier, and matching network
- Integrated PLL, regulators, and power management units
- Supports antenna diversity
- Wi-Fi 2.4 GHz, support WPA/WPA2
- Support STA/AP/STA+AP operation modes
- Support Smart Link Function for both Android and iOS devices
- SDIO 2.0, (H) SPI, UART, I2C, I2S, IRDA, PWM, GPIO
- STBC, 1×1 MIMO, 2×1 MIMO
- A-MPDU & A-MSDU aggregation and 0.4s guard interval
- Deep sleep power < 5uA
- Wake up and transmit packets in < 2ms
- Standby power consumption of < 1.0mW (DTIM3)
- +20dBm output power in 802.11b mode
- Operating temperature range -40C ~ 85C

Parameters

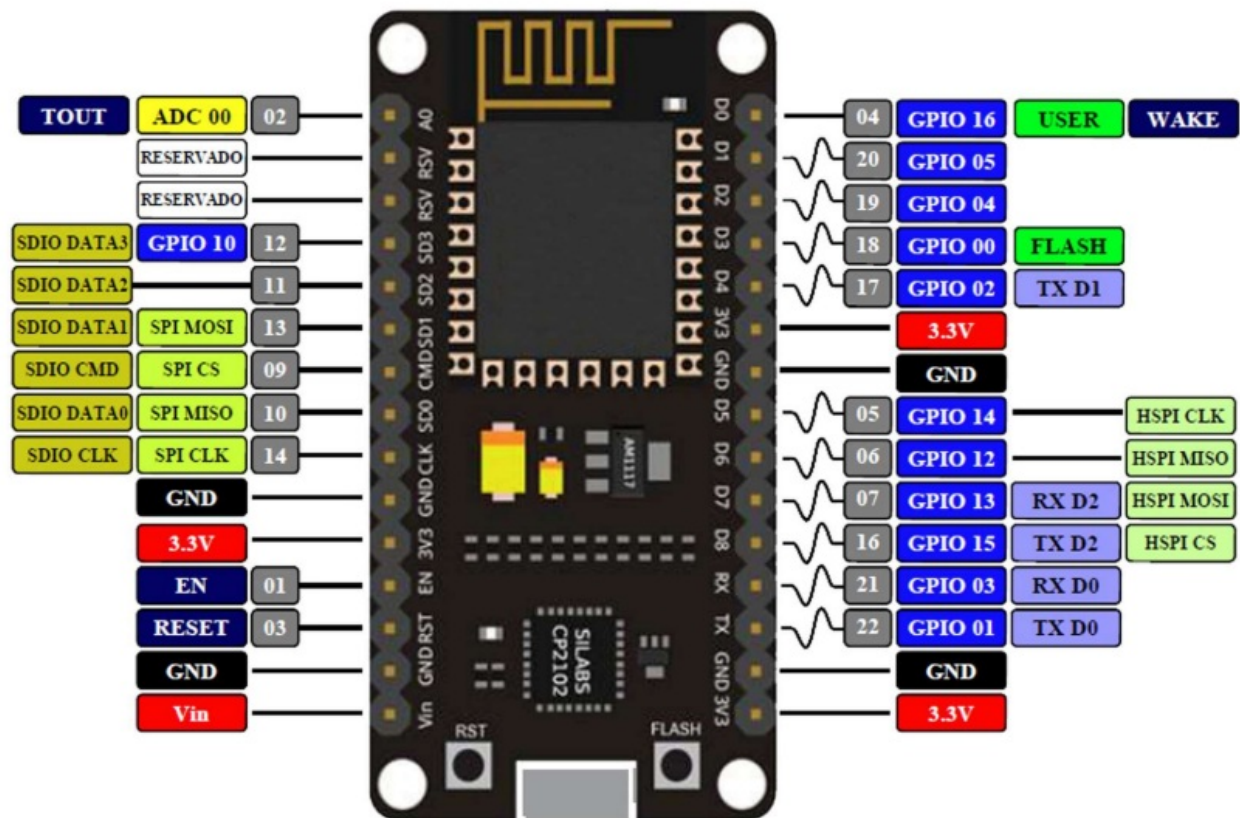
Table 1 below describes the major parameters.

Table 1 Parameters

Categories	Items	Values
Win Parameters	Wifi Protocols	802.11 b/g/n
	Frequency Range	2.4GHz-2.5GHz (2400M-2483.5M)
Hardware Parameters	Peripheral Bus	UART/HSPI/12C/12S/Ir Remote Control
		GPIO/PWM

	Operating Voltage	3.3V
	Operating Current	Average value: 80mA
	Operating Temperature Range	-400-125°
	Ambient Temperature Range	Normal temperature
	Package Size	18mm*20mm*3mm
	External Interface	N/A
Software Parameters	Wi-Fi mode	station/softAP/SoftAP+station
	Security	WPA/WPA2
	Encryption	WEP/TKIP/AES
	Firmware Upgrade	UART Download / OTA (via network) / download and write firmware via host
	Software Development	Supports Cloud Server Development / SDK for custom firmware development
	Network Protocols	IPv4, TCP/UDP/HTTP/FTP
	User Configuration	AT Instruction Set, Cloud Server, Android/iOS APP

Pin Descriptions



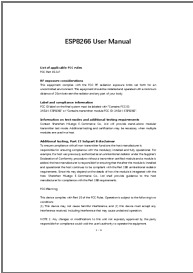
Pin No.	Pin Name	Pin Description
1	3V3	Power Supply
2	GND	Ground
3	TX	GP101,UOTXD,SPI_CS1
4	RX	GPIO3, UORXD
5	D8	GPI015, MTDO, UORTS, HSPI CS
6	D7	GPIO13, MTCK, UOCTS, HSPI MOST
7	D6	GPIO12, MTDI, HSPI MISO
8	D5	GPIO14, MTMS, HSPI CLK
9	GND	Ground
10	3V3	Power Supply

11	D4	GPIO2, U1TXD
12	D3	GPIO0, SPICS2
13	D2	GPIO4
14	D1	GP105

15	DO	GPIO16, XPD_DCDC
16	AO	ADC,TOUT
17	RSV	RESERVED
18	RSV	RESERVED
19	SD3	GPIO10, SDIO DATA3, SPIWP, HSPIWP
20	SD2	GPIO9, SDIO DATA2, SPIHD, HSPIHD
21	SD1	GPIO8, SDIO DATA1, SPIMOSI, U1RXD
22	CMD	GPIO11, SDIO CMD, SPI_CSO
23	SDO	GPIO7, SDIO DATA0, SPI_MISO
24	CLK	GPIO6, SDIO CLK, SPI_CLK
25	GND	Ground
26	3V3	Power Supply
27	EN	Enable
28	RST	Reset
29	GND	Ground

30	Vin	Power Input
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Documents / Resources

	<p>HiLetgo ESP8266 NodeMCU CP2102 ESP-12E Development Board Open Source Serial Module [pdf] User Manual</p> <p>ESP8266, 2A54N-ESP8266, 2A54NESP8266, ESP8266 NodeMCU CP2102 ESP-12E Development Board Open Source Serial Module, NodeMCU CP2102 ESP-12E Development Board Open Source Serial Module</p>
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