

Product Name: Wi-Fi Module

Type: MOE10XPX

Logo:



Applicant:



VERSION:1.0

ZHEJIANG MYLINKS INTELLIGENCE TECHNOLOGY CO., LTD

Version Information:

Date	Version	Author	Modification Description
2017. 2. 15	V1. 0	YaoJiaHong	



1. Overview

Mylinks provides the SMD module MOE10XPX that integrates ESP8266EX. The module has been adjusted to get the best RF performance. We recommend using MOE10XPX for tests or for further development.

Applications :

- Home Appliances
- Smart Plugs and Lights
- Industrial Wireless Control
- IP Cameras
- Wearable Electronics
- Security ID Tags
- Home Automation
- Mesh Network
- Baby Monitors
- Sensor Networks
- Wi-Fi Location-aware Devices
- Wi-Fi Position System Beacons

The module size is 16 mm x 24 mm x 3 mm. The gain of the on-board PCB antenna is 2dBi.



Figure 1: MOE10XPX Module

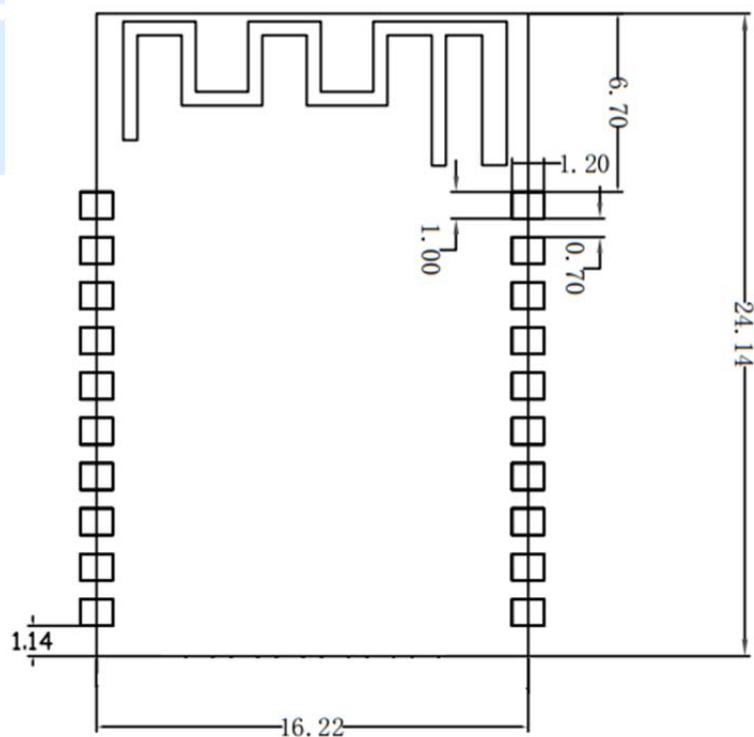
Table 1. MOE10XPX Specifications

Categories	Items	Specifications
Wi-Fi	Wi-Fi protocols	802.11 b/g/n
	Frequency range	2.4 GHz ~ 2.5 GHz (2400M ~ 2483.5M)
Hardware	Peripheral interface	UART · IIC · PWM · GPIO · ADC

	Operating voltage	3.0V--3.6V
	Operating current	Average: 80 mA
	Operating temperature range	-20°C~70°C
	Storage temperature	-40°C~85°C
	Package size	16 mm x 24 mm x 3 mm
Software	Wi-Fi mode	STA/AP/STA+AP
	Security	WEP/WPA-PSK/WPA2-PSK
	Encryption	WEP64/WEP128/TKIP/AES
	Firmware upgrade	UART Download/OTA (via network)
	Network protocols	AT Instruction Set, Web Page, Android/iOS, eLink

MOE10XPX with high temperature range option (-40° C ~ 125° C) is available for custom order.

2. Pin Description



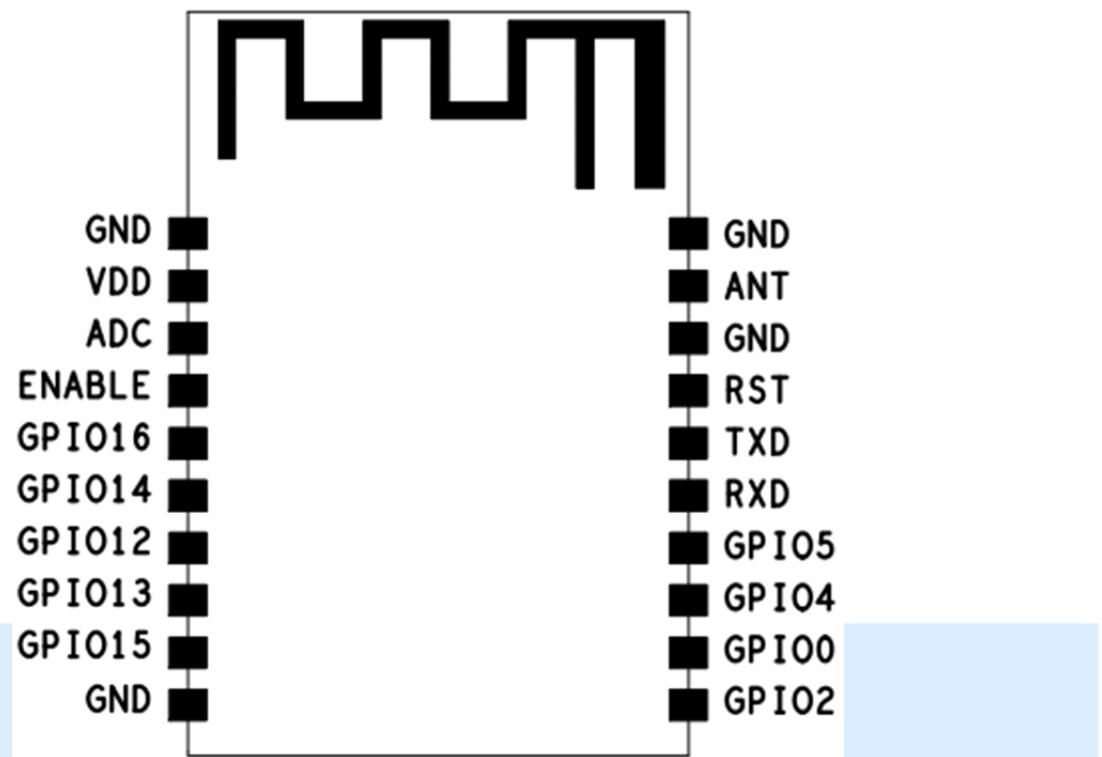


Figure 2: Top view of The MOE10XPX (Unit: mm)

Table 2. MOE10XPX Pin Definitions

PIN	Function	Description
1	GND	GND
2	VDD	3.3V power supply (VDD). It is recommended the maximum output current a power supply provides be of 500 mA or above.
3	ADC	ADC pin, Range : 0V-1V ;
4	ENABLE	Chip Enable High: On, chip works properly Low: Off, small current consumed
5	GPIO16	1) General Purpose Input/Output : GPIO16 ; 2) Deep-sleep wakeup (need to be connected to RST) ;

6	GPIO14	1) General Purpose Input/Output : GPIO14 ;
7	GPIO12	1) General Purpose Input/Output : GPIO12 ;
8	GPIO13	1) General Purpose Input/Output : GPIO13 ;
9	GPIO15	1) General Purpose Input/Output : GPIO15 ;
10	GND	GND
11	GPIO2	1) General Purpose Input/Output : GPIO2 ;
12	GPIO0	1) General Purpose Input/Output : GPIO0 ;
13	GPIO4	1) General Purpose Input/Output : GPIO4 ;
14	GPIO5	1) General Purpose Input/Output : GPIO5 ;
15	RXD	1) UART_RXD ; 2) General Purpose Input/Output : GPIO3 ;
16	TXD	1) UART_TXD ; 2) General Purpose Input/Output : GPIO1 ;
17	RST	External reset signal (Low voltage level: Active)
18	GND	GND
19	ANT	RF Antenna Interface Chip Output Impedance=50 Ω No matching required. It is suggested to retain the π -type matching network to match the antenna.
20	GND	GND

GPIO2, GPIO0, and GPIO15 are configurable on PCB as the 3-bit strapping register that determines the booting mode and the SDIO timing mode.

3. Functional Description

3.1 MCU

The module integrates the Tensilica L106 32-bit microcontroller (MCU) and ultra-low-power 16-bit RSIC. The CPU clock speed is 80 MHz and can reach a maximum value of 160MHz. The system can readily run a Real Time Operating System (RTOS). Currently, the WiFi stack only takes up 20% of CPU time. The remaining CPU time (80% of total MIPS) can be used for user applications. The CPU can interface through:

- Programmable RAM/ROM interfaces (iBus) that connect to memory controller and can access the external flash.
- Data RAM interface (dBus) that connects to the memory controller.
- AHB interface that accesses the register.

3.2 Memory

3.2.1. Internal SRAM and ROM

ESP8266EX Wi-Fi SoC integrates the memory controller and memory units including ROM and SRAM. MCU can access the memory units through iBus, dBus, and AHB interfaces. All memory units can be accessed upon request. A memory arbiter determines the running sequence in the arrival order of requests. According to our current version of SDK, the SRAM space available to users is assigned as follows:

- RAM size < 50 kB, that is, when ESP8266EX is working in Station mode and connects to the router, available space in the Heap + Data sector is around 50 kB.
- There is no programmable ROM in ESP8266EX, therefore, the user program must be stored in an external SPI flash.

3.2.2. SPI Flash

ESP8266EX supports SPI flash. Theoretically speaking, ESP8266EX can support an upto-16-MB SPI flash. M0E10XPX currently integrates a 2-MB SPI flash. M0E10XPX supports these SPI modes: Standard SPI, DIO (Dual I/O), DOUT (Dual Output), QIO (Quad I/O) and QOUT (Quad Output).

3.3. Crystal Oscillator

M0E10XPX uses a 26-MHz crystal oscillator. The accuracy of the crystal oscillator should be ± 10 PPM. The operating temperature range is -20° C to 70° C; and the storage temperature range is -40° C to 85° C.

When using the download tool, please select the right type of crystal oscillator. In circuitdesign, capacitors C1 and C2 which connect to the earth are added to the input and output terminals of the crystal oscillator respectively. The values of the two capacitors can be flexible, ranging from 6 pF to 22 pF, however, the specific capacitive values depend on further testing of, and adjustment to, the overall performance of the whole circuit. Normally, the capacitive values of C1 and C2 are within 10 pF for the 26-MHz crystal oscillator. The crystal oscillator should be placed as close to the XTAL pins as possible (without the traces being too long). It is good practice to add high density ground vias around the clock trace for great insulation. There should be no vias on the input and output traces, which means the traces cannot cross layers. Place the input and output bypass capacitors on the near left or right side of the chip. Do not place them on the traces. Do not route high-frequency digital signal lines in the four-layer board. It is best not to route any signal line under the crystal oscillator. The larger the copper area on the top layer is, the better. As crystal oscillator is a sensitive component, do not place magnetic components such as high current inductor nearby.

4. Electrical Characteristics

4.1 Absolute Maximum Ratings

Table 3. Absolute Maximum Ratings

Rating	Condition	Value	Unit
Storage temperature		-40 ~ 85	°C
Maximum soldering temperature		260	°C
Supply voltage	IPC/JEDEC J-STD-020	3.0 ~ 3.6	V

4.2. Recommended Operating Conditions

Table 4. Recommended Operating Conditions

Operating condition	Symbol	Min	Typ	Max	Unit
Operating temperature	-	-20	20	70	°C
Supply voltage	VDD	3.0	3.3	3.6	V

4.3. Digital Terminal Characteristics

Table 5. Digital Terminal Characteristics

Terminals	Symbol	Min	Typ	Max	Unit
Input logic level low	VIL	-0.3	-	0.25 VDD	V
Input logic level high	VIH	0.75 VDD	-	VDD + 0.3	V
Output logic level low	VOL	N	-	0.1 VDD	V
Output logic level high	VOH	0.8 VDD	-	N	V

4.4. RF Performance

Table 6. RF Performance

Description	Min	Typ	Max	Unit
Input frequency	2400		2483.5	MHz
Input impedance	–	50	–	ohm
Input reflection	–	–	–10	dB
PA output power at 72.2 Mbps	15.5	16.5	17.5	dBm
PA output power in 11b mode	19.5	20.5	21.5	dBm
Sensitivity				
CCK, 1 Mbps	–	–98	–	dBm
CCK, 11 Mbps	–	–91	–	dBm
6 Mbps (1/2 BPSK)	–	–93	–	dBm
54 Mbps (3/4 64-QAM)	–	–75	–	dBm
HT20, MCS7 (65 Mbps, 72.2 Mbps)	–	–72	–	dBm
Adjacent channel rejection				
OFDM, 6 Mbps	–	37	–	dB
OFDM, 54 Mbps	–	21	–	dB
HT20, MCS0	–	37	–	dB
HT20, MCS7	–	20	–	dB

4.5. Sensitivity

Table 7. Sensitivity

Parameters	Min	Typ	Max	Unit
Input frequency	2412	–	2484	MHz
Input impedance	–	50	–	ohm
Input reflection	–	–	–10	dB
PA output power at 72.2 Mbps	15.5	16.5	17.5	dBm
PA output power in 11b mode	19.5	20.5	21.5	dBm

Sensitivity				
DSSS, 1 Mbps	–	–98	–	dBm
CCK, 11 Mbps	–	–91	–	dBm
6 Mbps (1/2 BPSK)	–	–93	–	dBm
54 Mbps (3/4 64-QAM)	–	–75	–	dBm
HT20, MCS7 (65 Mbps, 72.2 Mbps)	–	–72	–	dBm
Adjacent channel rejection				
OFDM, 6 Mbps	–	37	–	dB
OFDM, 54 Mbps	–	21	–	dB
HT20, MCS0	–	37	–	dB
HT20, MCS7	–	20	–	dB

4.6. Power Consumption

The following power consumption data were obtained from the tests with a 3.3V power supply and a voltage stabilizer, in 25° C ambient temperature.

- All tests were performed at the antenna port without SAW filter.
- All data are based on 90% duty cycle in continuous transmission mode

Table 8. Power Consumption

Modes	Min	Typ	Max	Unit
Tx 802.11b, CCK 11 Mbps, POUT = +17 dBm	–	170	–	mA
Tx 802.11g, OFDM 54 Mbps, POUT = +15 dBm	–	140	–	mA
Tx 802.11n, MCS7, POUT = +13 dBm	–	120	–	mA
Rx 802.11b, 1024 bytes packet length, -80 dBm	–	50	–	mA
Rx 802.11g, 1024 bytes packet length, -70 dBm	–	56	–	mA
Rx 802.11n, 1024 bytes packet length, -65 dBm	–	56	–	mA
Modem-Sleep	–	15	–	mA
Light-Sleep	–	0.9	–	mA

Deep-Sleep	–	20	–	uA
Power Off	–	0.5	–	uA

4.7 Reflow Profile

Table 9. Reflow Profile

Indicator	Value
Ramp-up Rate (TS Max to TL)	3°C/second max.
Preheat	150°C
Temperature Min. (TS Min.)	175°C
Temperature Typ. (TS Typ.)	200°C
Temperature Min. (TS Max.)	60 ~ 180 seconds
Time (TS)	
Ramp-up Rate (TL to TP)	3°C/second max.
Time maintained above: Temperature (TL)/Time (TL)	217°C/60 ~ 150 seconds
Peak temperature (TP)	260°C max, for 10 seconds
Target Peak Temperature (TP Target)	260°C + 0/-5°C
Time within the actual Peak Temperature of 5°C	20 ~ 40 seconds
TS max to TL (Ramp-down Rate)	6°C/second max.
Time from 25°C to Peak Temperature (t)	8 minutes max

5. Schematics

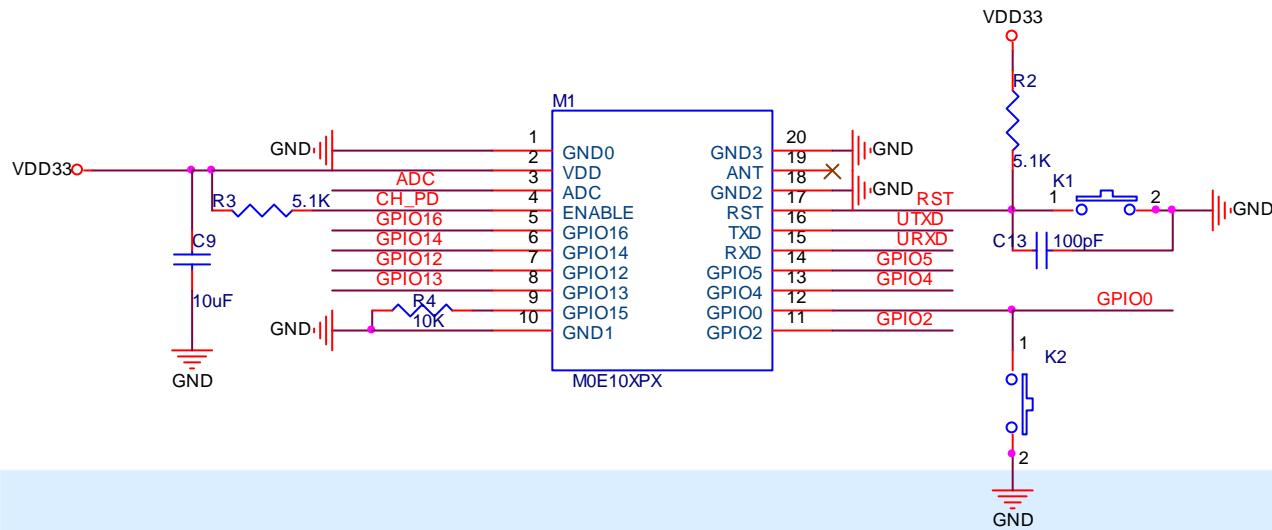


Figure 3. M0E10XPX Peripheral Schematics



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Federal Communications Commission (FCC) Declaration of Conformity

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 the 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.

Any changes or modifications to this equipment not expressly approved by Espressif may cause harmful interference and void the user's authority to operate this equipment. 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.

FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator& your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

OEM/Integrators Installations User Manual

Note: The module is limited to OEM installation ONLY; The OEM integrator is responsible for ensuring that the end-user has no manual instructions to remove or install module)

The module is limited to installation in mobile or fixed application.

The separate approval is required for all other operating configuration, including portable configuration with respect to Part 2.1093 and different antenna configuration

This product is mounted inside of the end product only by professional installers OEM. They use this module with changing the power and control signal setting by software of end product within the scope of this application. End user can not change this setting.

The equipment complies with RF exposure limits. This module is limited to installation in mobile or fixed applications. The antenna used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

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: 2ALEUM0E10XPX ”

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

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

Hereby, Zhejiang Mylinks intelligence Technology Co., Ltd., declares that this Wi-Fi Module / M0E10XPX, is In compliance with the essential Requirements and other relevant provisions of Directive 1999/5/EC.

Environment friendly disposal



You can help protect the environment!

Please remember to respect the local regulations: hand in the non-working electrical equipments to an appropriate waste disposal centre.