Ai-M62-M2-I-Kit Specification

Version V1.1.1

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Document resume

Version	Date	Develop/revise content	Edition	Approve
V1.0.0	2023.03.31	First Edition	Cong Chen	Hong Xu
V1.1.1	2023.11.15	1、Update the chip block diagram and the supported peripheral interfaces; 2、Add important statements	Fangke Huang	Hong Xu

Content

1. Product Overview

The Ai-M62-M2-I-Kit is a development board designed for the Ai-M62-M2-I module. Ai-M62-M2-I is a Wi-Fi 6 + BLE 5.3 module developed by Shenzhen Ai-Thinker Technology Co., Ltd. The module is equipped with BL616 chip as the core processor, supports Wi-Fi 802.11b/g/n/ax protocol and BLE protocol, and supports Thread protocol. The BL616 system contains a low-power 32-bit RISC-V CPU with floating point cells, DSP units, cache, and memory, up to 320M.

Ai-M62-M2-I module has rich peripheral interfaces , including USB2.0, SDU, SD / MMC (SDH), SPI, UART, I2C, I2S, PWM, GPDAC, GPADC, ACOMP, and GPIO, etc. It can be widely used in audio and video multimedia, Internet of Things (IoT), mobile devices, wearable electronic devices, smart home and other fields.

Ai-M62-M2-I module Sec Eng module supports AES / SHA / PKA / TRNG and other functions, supports mirror encryption and signature startup, to meet the needs of various security applications in the field of the Internet of Things.

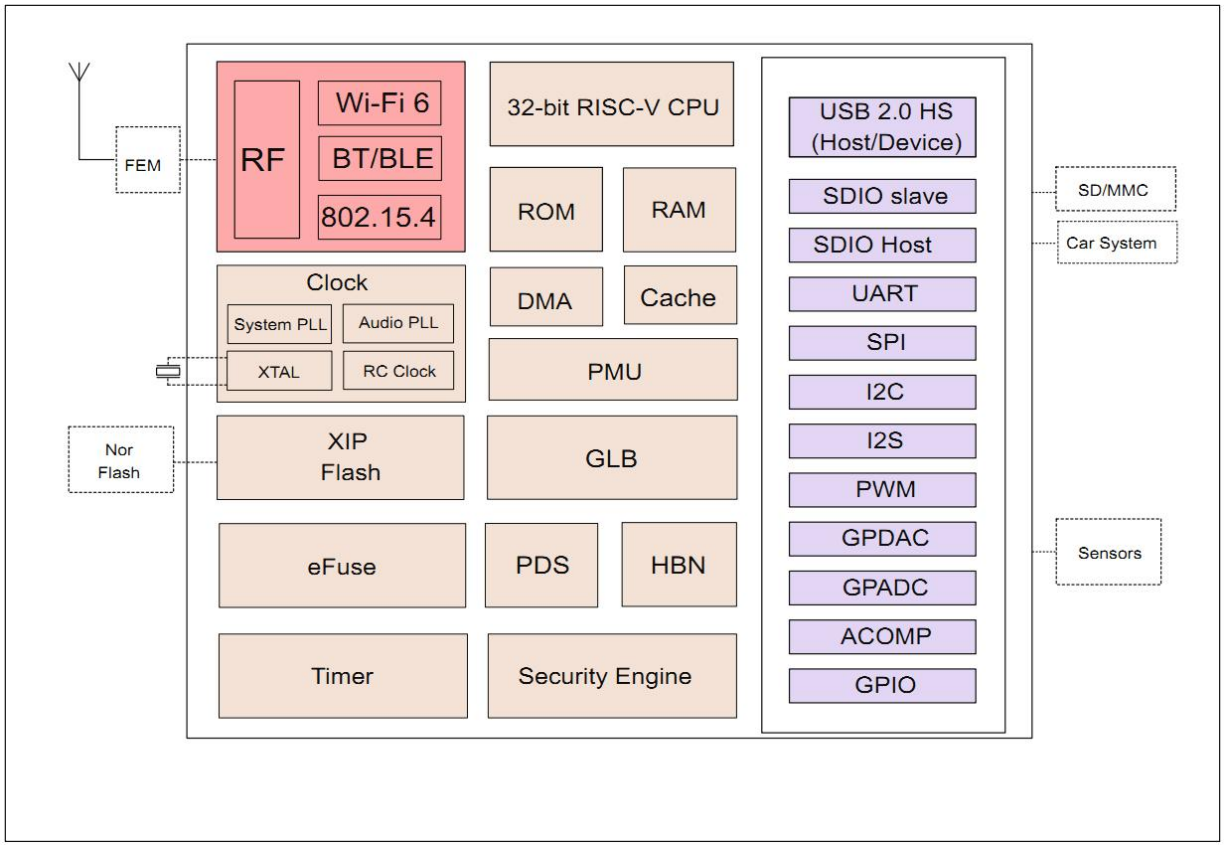

Figure 1 Main chip block diagram

1.1. Characteristic

- The package is DIP-30
- Support 2.4GHz frequency
- Support IEEE 802.11 b/g/n/ax
- Support BLE5.3
- Support Thread
- Support Wi-Fi/BLE/Thread coexistence
- Wi-Fi security support WPS/WEP/WPA/WPA2/WPA3
- Support 20/40MHz bandwidth ， 1T1R， speed up to 229.4 Mbps
- Support STA、SoftAP、STA+SoftAP and sniffer mode
- A 32-bit RISC-VCPU with FPU and DSP, with a maximum main frequency of up to 320M
- 532KB SRAM，128KB ROM，4Kb eFuse
- Support USB2.0, SDU, SD / MMC (SDH), SPI, UART, I2C, I2S, PWM, GPDAC, GPADC, ACOMP, and GPIO, etc
- Integrated RF Balun、PA/LNA
- Support safe startup; safe debugging
- Support XIP QSPI On-The-Fly AES deciphering (OTFAD)
- Support TrustZone
- Support AES-CBC/CCM/GCM/XTS mode
- Support MD5、SHA-1/224/256/384/512
- Support TRNG（True random number generator）
- Support PKA for RSA / ECC（Public key accelerator）
- Support the Wi-Fi fast connection for BLE
- General AT instructions can be quickly used
- Support for secondary development, with integrated Windows, Linux development environments

2. Main parameters

Table 1 Description of the main parameters

Development baord model	Ai-M62-M2-I-Kit
Development board package	DIP-30
Size	49.34*25.40(±0.2)mm
Antenna	IPEX
Frequency	2400 ~ 2483.5MHz
Operating temperature	-40℃ ~ 85℃
Storage temperature	-40℃ ~ 125℃ , < 90%RH
Power supply	Support voltage 3.3V or 5V， supply current ≥500mA
Interface	USB2.0, SDU, SD / MMC (SDH), SPI, UART, I2C, I2S, PWM, GPDAC, GPADC, ACOMP, and GPIO, etc
IO	18
UART rate	Default 115200 bps
Security	WPS/WEP/WPA/WPA2/WPA3
Flash	4MByte

2.1. Power selection

Ai-M62-M2-I-Kit three power supply modes are supported：

- Type-C interface power supply（recommend）
- 5V and GND pin header power supply
- 3V3 and GND pin header power supply

2.2. Static electricity requirement

Ai-M62-M2-I-Kit is an electrostatic sensitive device. Therefore, you need to take special precautions when carrying it.

Figure 2 ESD preventive measures

2.3. Electrical characteristic

Table 2 Electrical characteristics table

Parameters		Condition	Min.	Typical value	Max.	Unit
Voltage		VDD	4.5	5	5.3	V
Voltage Supply		VDD	2.97	3.3	3.6	V
I/O	VIL	-	-	-	0.3*VDDIO	V
	VIH	-	0.7*VDDIO	-	-	V
	VOL	-	-	0.1*VDDIO	-	V
	VOH	-	-	0.9*VDDIO	-	V
	IMAX	-	-	-	15	mA

2.4. Wi-Fi RF Performance

Table 3 Wi-Fi RF Performance Table

Description	Typical value			Unit
Frequency range	2400 ~ 2483.5MHz			MHz
Output power				
Mode	**Min.**	**Typical value**	**Max.**	**Unit**
11ax Mode HE40, PA output power	-	16	-	dBm
11ax Mode HE20, PA output power	-	17	-	dBm
11n Mode HT40, PA output power	-	19	-	dBm
11n Mode HT20, PA output power	-	19	-	dBm
11g Mode, PA output power	-	19	-	dBm
11b Mode, PA output power	-	22	-	dBm
Receive Sensitivity				
Mode	**Min.**	**Typical value**	**Max.**	**Unit**
11b, 1 Mbps	-	-98	-	dBm
11b, 11Mbps	-	-90	-	dBm
11g, 6 Mbps	-	-93	-	dBm
11g, 54 Mbps	-	-76	-	dBm
11n，HT20 (MCS7)	-	-73	-	dBm
11ax，HE20 (MCS9)	-	-70	-	dBm
11ax，HE40 (MCS9)	-	-67	-	dBm

2.5. BLE RF Performance

Table 4 BLE RF performance table

Description	Typical value			Unit
Frequency range	2400 - 2483.5			MHz
Output Power				
Rate Mode	**Min.**	**Typical value**	**Max.**	**Unit**
1Mbps	-	10	15	dBm
2Mbps	-	10	15	dBm
Receive Sensitivity				
Rate Mode	**Min.**	**Typical value**	**Max.**	**Unit**
1Mbps sensitivity@30.8%PER	-	-99	-	dBm
2Mbps sensitivity@30.8%PER	-	-97	-	dBm

2.6. Power consumption

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

- All measurements are made at the antenna interface with a filter.
- All transmission data are based on 100% duty cycle in continuous transmission mode.

Table 5 Power consumption table

Mode	Min.	AVG	Max.	Unit
Tx 802.11b, 11Mbps，POUT=+22dBm	-	442	-	mA
Tx 802.11g, 54Mbps，POUT =+19dBm	-	296	-	mA
Tx 802.11n， MCS7， POUT =+19dBm	-	301	-	mA
Tx 802.11ax, MCS9， POUT =+17dBm	-	269	-	mA
Rx 802.11b, packet length 1024 byte	-	59	-	mA
Rx 802.11g, packet length 1024 byte	-	59	-	mA
Rx 802.11n, packet length 1024 byte	-	59	-	mA
Rx 802.11ax, packet length 1024 byte	-	59	-	mA

3. Appearance Dimensions

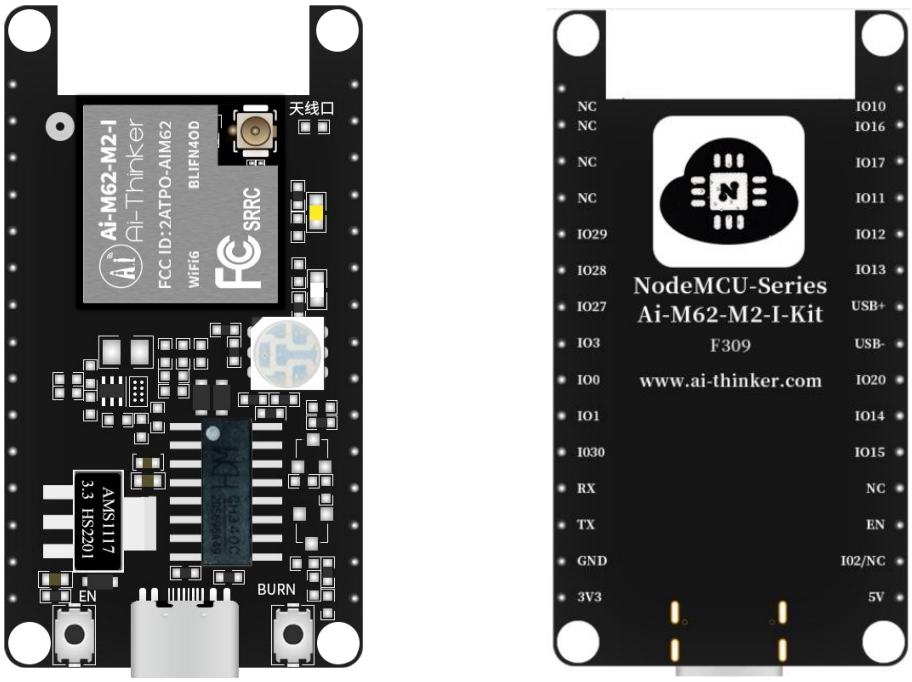

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Figure 3 Appearance diagram (Rendering figure is for reference only,subject to physical objects)

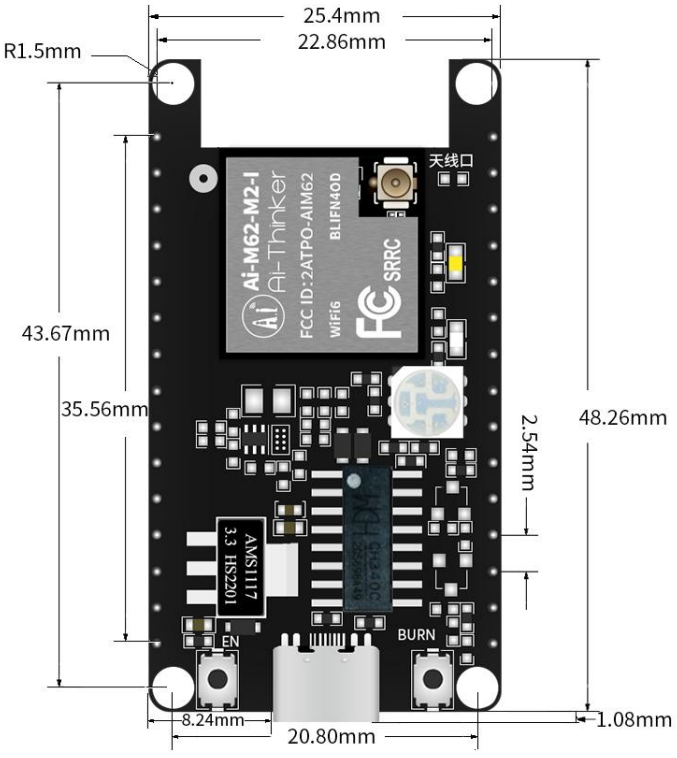


Figure 4 Dimension diagram

4. Description of the indicator light and the key button

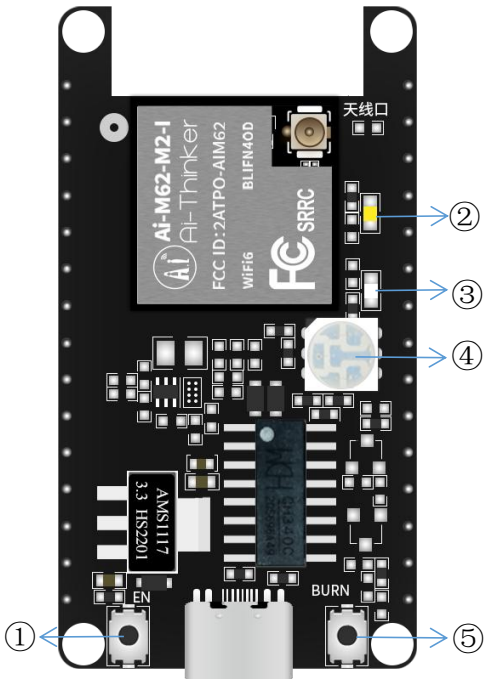


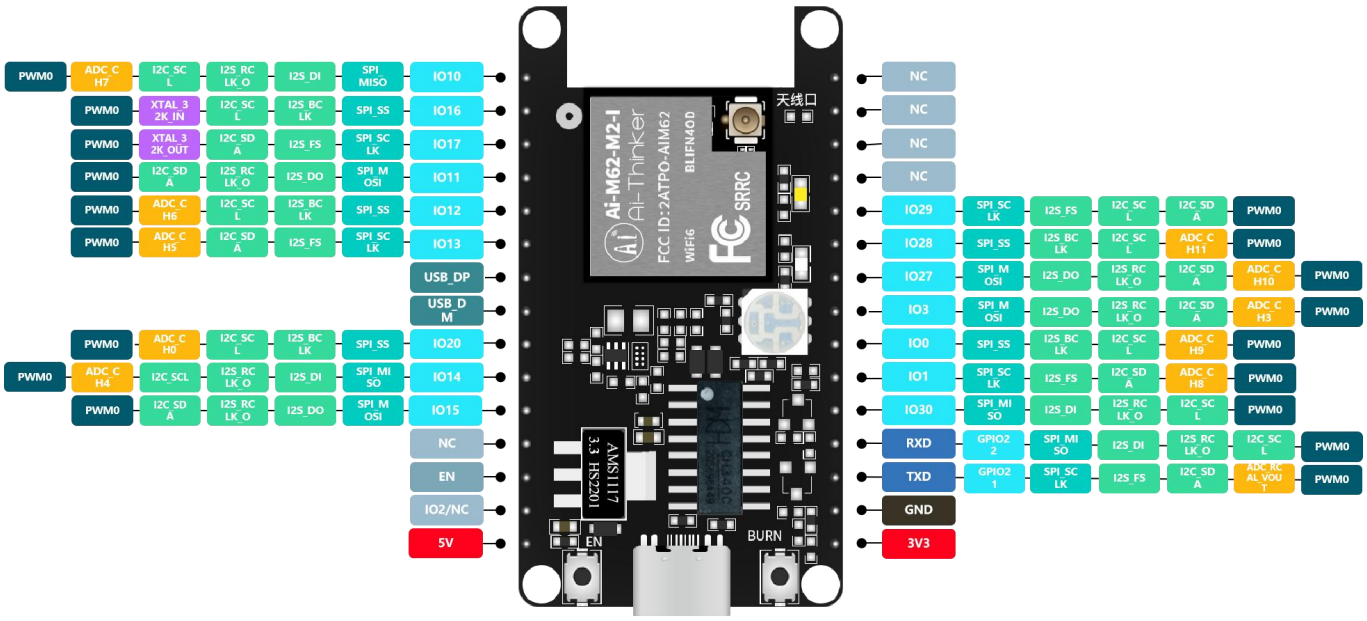
Figure 5 Ai-M62-32S-Kit indicator light and key position

Table 6 Ai-M62-32S-Kit indicator light and key position

①	RGB light（red light connect to IO1,green light connect IO30,blue light connect toIO0）
②	Reset buttom
③	White light (IO 29)
④	Warm light (IO 27)
⑤	Burning key. When burning, it is necessary to press the burn key and reset key successively, and then release the reset button and burn key successively

5. Pin definition

Ai-M62-M2-I-Kit connects with 30 interfaces, as shown in the schematic diagram of the pin, and the pin function definition table is the interface definition.



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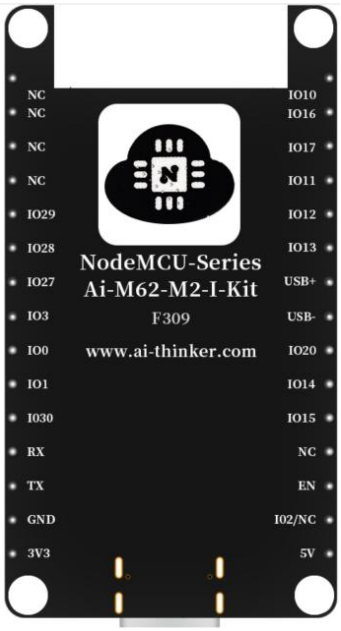

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Figure 6 Schematic diagram of module pins

Table 7 Pin function definition table

No.	Name	Function
1	IO10	GPIO10/SPI_MISO/I2S_DI/I2S_RCLK_O/I2C_SCL/ADC_CH7/PWM0
2	IO16	Default available, the IO port is shared with the 32.768KHz crystal vibration output PIN foot inside the module. If the module of the internal patch 32.768KHz crystal vibration is customized, the IO is in the NC state.GPIO16/SPI_SS/I2S_BCLK/I2C_SCL/XTAL_32K_IN/PWM0
3	IO17	Default available, the IO port is shared with the 32.768KHz crystal vibration output PIN foot inside the module. If the module of the internal patch 32.768KHz crystal vibration is customized, the IO is in the NC state.GPIO17/SPI_SCLK/I2S_FS/I2C_SDA/XTAL_32K_OUT/PWM0
4	IO11	GPIO11/SPI_MOSI/I2S_DO/I2S_RCLK_O/I2C_SDA/PWM0
5	IO12	GPIO12/SPI_SS/I2S_BCLK/I2C_SCL/ADC_CH6/PWM0
6	IO13	GPIO13/SPI_SCLK/I2S_FS/I2C_SDA/ADC_CH5/PWM0
7	USB+	USB_DM
8	USB-	USB_DP
9	IO20	GPIO20/SPI_SS/I2S_BCLK/I2C_SCL/ADC_CH0/PWM0
10	IO14	GPIO14/SPI_MISO/I2S_DI/I2S_RCLK_O/I2C_SCL/ADC_CH4/PWM0
11	IO15	GPIO15/SPI_MOSI/I2S_DO/I2S_RCLK_O/I2C_SDA/PWM0
12	NC	NC
13	EN	Default as a chip enabled, high level effective
14	IO2/NC	Default NC, not available, if you want to use, please contact Ai-Thinker. If pin out, it support the Bootstrap/GPIO2/SPI_MISO/I2S_DI/I2S_RCLK_O/I2C_SCL/ADC_CH2/PWM0
15	5V	5V power supply
16	3V3	3.3Vpower supply
17	GND	Ground
18	TX	TXD/GPIO21/SPI_SCLK/I2S_FS/I2C_SDA/ADC_RCAL_VOUT/PWM0
19	RX	RXD/GPIO22/SPI_MISO/I2S_DI/I2S_RCLK_O/I2C_SCL/PWM0
20	IO30	GPIO30/SPI_MISO/I2S_DI/I2S_RCLK_O/I2C_SCL/PWM0
21	IO1	GPIO1/SPI_SCLK/I2S_FS/I2C_SDA/ADC_CH8/PWM0
22	IO0	GPIO0/SPI_SS/I2S_BCLK/I2C_SCL/ADC_CH9/PWM0
23	IO3	GPIO3/SPI_MOSI/I2S_DO/I2S_RCLK_O/I2C_SDA/ADC_CH3/PWM0
24	IO27	GPIO27/SPI_MOSI/I2S_DO/I2S_RCLK_O/I2C_SDA/ADC_CH10/PWM0

25	IO28	GPIO28/SPI_SS/I2S_BCLK/I2C_SCL/ADC_CH11/PWM0
26	IO29	GPIO29/SPI_SCLK/I2S_FS/I2C_SDA/PWM0
27	NC	NC
28	NC	NC
29	NC	NC
30	NC	NC

6. Schematic-diagram

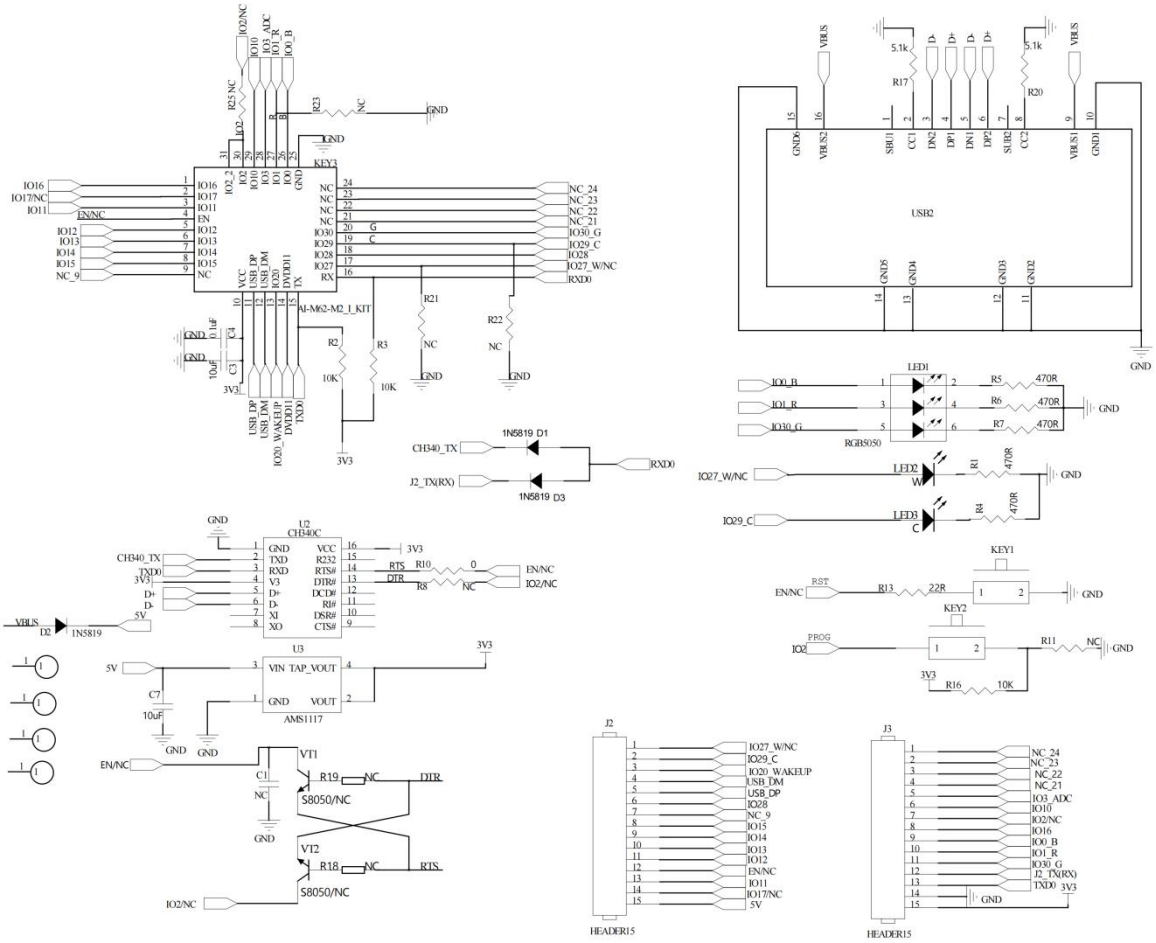

Figure 7 Module schematic

7. Product packing information

Table 8 Packing information table

Packing list	Manner of packing	MOQ (Electrostatic bag)	SPQ（sealing bag）
Ai-M62-M2-I-Kit	Bubble cotton + electrostatic bag	1pcs	20pcs

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