



Ai-WB2-13-Kit Specification

Version V1.0.1

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Document resume

Version	Date	Develop/revise content	Edition	Approve
V1.0.0	2022.6.20	First Edition	Fangke Huang	Hong Xu
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1. Product Overview

Ai-WB2-13-Kit is a development board designed for Ai-WB2-13 modules. Ai-WB2-13 is a Wi-Fi & Bluetooth module developed by Shenzhen Ai-Thinker Technology Co., Ltd. The module is equipped with BL602 chip as the core processor and supports Wi-Fi 802.11b/g/n protocol and BLE 5.0 protocol. The BL602 chip has a built-in 32-bit RISC CPU with low power consumption, 276KB RAM, and a wide range of peripheral interfaces, including SDIO, SPI, UART, VDC, IR remote, PWM, ADC, DAC, PIR, and GPIO. It can be widely used in Internet of Things (IoT), mobile devices, wearable electronic devices, smart home and other fields.

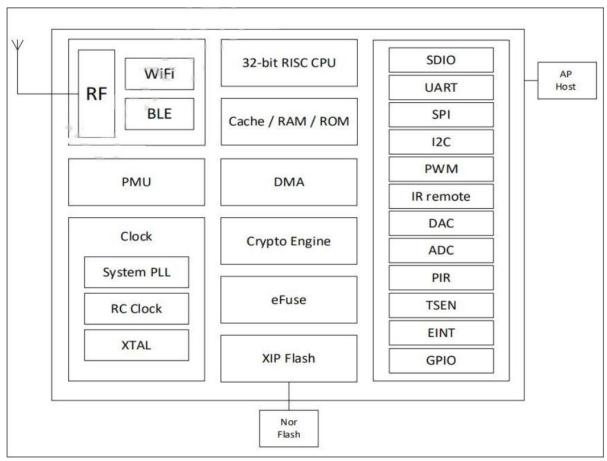


Figure 1 Main chip architecture diagram



1.1. Characteristic

- DIP-30 package
- Supports IEEE 802.11 B/g/n protocol
- Wi-Fi security supports WPS/WEP/WPA/WPA2 Personal/WPA2 Enterprise/WPA3
- Supports 20MHz bandwidth with a maximum speed of 72.2 Mbps
- Bluetooth BLE 5.0, Bluetooth Mesh
- Supports Station + BLE mode, Station + SoftAP + BLE mode
- Supports 32-bit RISC CPU and 276KB RAM.
- Secure Startup. Images with ECC-256 signatures are supported.
- Supports real-time AES decryption (OTFAD) in QSPI and SPI Flash, and supports AES 128 CTR mode
- Supports AES 128, 192, and 256-bit encryption engines
- Supports SHA-1/224/256
- Real random number generator (TRNG)
- The public key accelerator (PKA) supports large numbers of basic operations. The software provides application interfaces such as signature and verification
- Supports SDIO, SPI, UART, VDC, IR remote, PWM, ADC, DAC, PIR, and GPIO
- Integrated Wi-Fi MAC/BB/RF/PA/LNA/Bluetooth
- Supports multiple sleep modes with a deep sleep current of 12μA
- Quick Start of universal AT commands
- Supports secondary development and integrates Windows and Linux development environments



2. Main parameters

Table 1 main parameters

Model	Ai-WB2-13-Kit
Package	DIP-30
Size	49.66*25.40(±0.2)mm
Antenna	On-Board PCB antenna
Frequency	2400 ~ 2483.5MHz
Operation temperature	-40°C ~ 85°C
Storage environment	-40°C ~ 125°C, < 90%RH
Power supply	Support voltage 3.3V or 5V, power supply current≥500mA
Interfaces	UART/GPIO/ADC/PWM/I2C/SPI
I/O	11
UART rate	Default value: 115200 bps
Security	WPS/WEP/WPA/WPA2 Personal/WPA2 Enterprise/WPA3
Flash	Default: 4MByte

2.1. Power supply selection

Ai-WB2-13-Kit supports three power supply modes:

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

2.2. Static electricity requirements

Ai-WB2-13-Kit are electrostatic sensitive equipment, special precautions should be taken during handling.



Figure 2 ESD anti-static diagram



2.3. Electrical characteristics

Table 2 Electrical Characteristics Table

Parameter		Condition	Min.	Typical value	Max.	Unit
Interface Power supply (Type-C)		VDD	4.5	5	5.3	V
Power supply voltage (pin)		VDD	2.7	3.3	3.6	V
	VIL	-	-	-	0.3*VDDIO	V
	VIH	-	0.7*VDDIO	-	-	V
I/O	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	
Spectrum Range		2400 - 2483.5		MHz	
	Output pov	ver			
Model	Min.	Typical value	Max.	Unit	
11n mode HT20, PA output power	-	16	-	dBm	
In 11g mode, PA output power	-	17	-	dBm	
In 11b mode, PA output power	r - 19 -		dBm		
Receiving sensitivity					
Model Min. Typical value Max. Unit					
11b,1 Mbps	-	-98	-	dBm	
11b,11 Mbps	-	-90	-	dBm	
11g, 6 Mbps	-	-93	-	dBm	
11g,54 Mbps	-	-76	-	dBm	
11n, HT20 (MCS7)	-	-73	-	dBm	



2.5. BLE RF performance

Table 4 BLE RF performance table

Description		Unit		
Spectrum Range	2400 - 2483.5			MHz
	Output power			
Rate Mode	Min. Typical value Max.			
1Mbps	-	9	15	dBm
Rec	ceiving sensitiv	rity		
Rate Mode	Min.	Typical value	Max.	Unit
1Mbps sensitivity @ 30.8% PER	96 -			dBm

2.6. Power

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

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

Table 5 Power Consumption Table

Model	Min.	AVG	Max.	Unit
Tx 802.11b, 11Mbps, POUT = + 21dBm	-	260	-	mA
Tx 802.11g, 54Mbps, POUT = + 18dBm	-	245	-	mA
Tx 802.11n, MCS7, POUT = + 17dBm	-	230	-	mA
Rx 802.11b, 1024 bytes long	-	65	-	mA
Rx 802.11g, 1024 bytes long	-	65	-	mA
Rx 802.11n, 1024 bytes long	-	65	-	mA
Deep-Sleep	-	12	-	μΑ



3. Appearance size

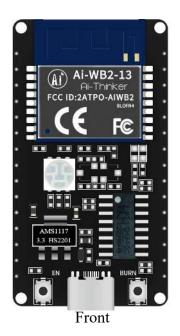




Figure 3 External view (For reference only)

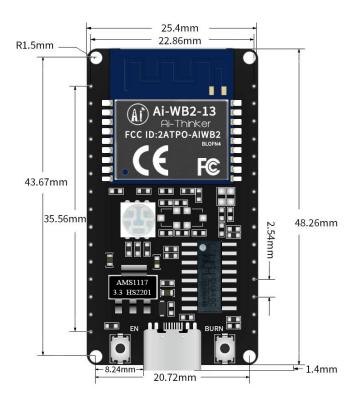


Figure 4 size chart



4. Indicator light and button description

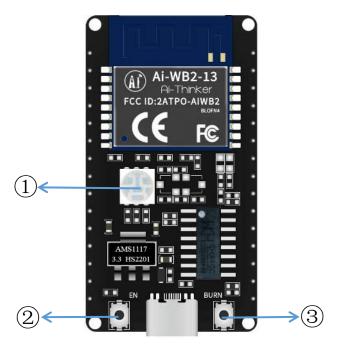


Figure 5 Ai-WB2-13-Kit indicator light and key position Table 6 Ai-WB2-13-Kit indicator light and key position

1	RGB light (red light is connected to IO14, Green Light is connected to IO17, blue light is connected to IO3, high level effective)		
2	Reset button		
3	To burn the button, you need to press the Burn button and then press the reset button.		



5. Pin definition

Ai-WB2-13-Kit, a total of 30 interfaces are connected, for example, the pin function definition table is the interface definition.

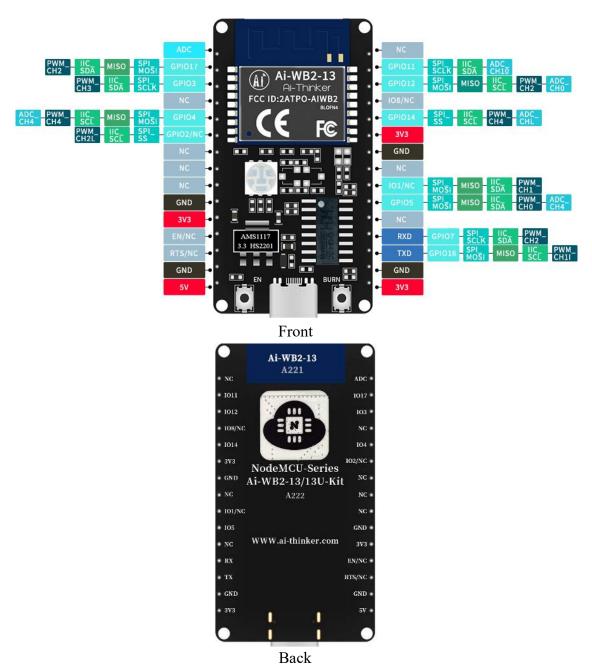


Figure 6 pin diagram

Table 7 Definition table of pin functions

No.	Name	Function
1	ADC	ADC pin, divided voltage with IO11 pin



2			
4 NC Empty fect 5 IO4 GPIO4/SPI_MOSI/MISO/IIC_SCL/PWM_CH4/ADC_CH4 IO2/NC It is not recommended and is shared with the internal Flash of the module. If you need to use it, please contact Ai-Thinker GPIO2/SPI_SS/IIC_SCL/PWM_CH2 7 NC Empty feet 8 NC Empty feet 9 NC Empty feet 10 GND Ground 11 3V3 3.3V power supply 12 EN/NC By default, it is enabled as a chip. The high level is effective and cannot be used together with RST. 13 RST/NC By default, it is suspended and can be customized as a reset pin. It is valid at a low level. If you need to use it, please contact Ai-Thinker 14 GND Conductive earth 15 5V 5V power supply 16 3V3 3.3V power supply 17 GND Ground 18 TX TXD/GPIO16/SPI_MOSI/MISO/IIC_SCL/PWM_CH1 19 RX RXD/GPIO7/SPI_SCLK/IIC_SDA/PWM_CH2 20 NC Empty feet 21 IO5 GPIO5/SPI_MOSI/MISO/IIC_SDA/PWM_CH0/ADC_CH4 1It is not recommended and is shared with the internal Flash of the module. If you need to use it, please contact Ai-Thinker GPIO1/SPI_MOSI/MISO/IIC_SDA/PWM_CH1 23 NC Empty feet 24 GND Ground 25 3V3 3.3V power supply 26 IO14 GPIO14/SPI_SS/IIC_SCL/PWM_CH4/ADC_CH2 27 IO8/NC The default NC is unavailable 28 IO12 GPIO12/SPI_MOSI/MISO/IIC_SCL/PWM_CH2/ADC_CH0 29 IO11 GPIO11/SPI_SCLK/IIC_SDA/ADC_CH10	2	IO17	GPIO17/SPI_MOSI/MISO/IIC_SDA/PWM_CH2
Solution Incomplete Incom	3	IO3	GPIO3/SPI_SCLK/IIC_SDA/PWM_CH3
IO2/NC It is not recommended and is shared with the internal Flash of the module. If you need to use it, please contact Ai-Thinker GPIO2/SPI_SS/IIC_SCL/PWM_CH2	4	NC	Empty feet
If you need to use it, please contact Ai-Thinker GPIO2/SPI SS/IIC SCL/PWM_CH2	5	IO4	GPIO4/SPI_MOSI/MISO/IIC_SCL/PWM_CH4/ADC_CH4
8 NC Empty feet 9 NC Empty feet 10 GND Ground 11 3V3 3.3V power supply 12 EN/NC By default, it is enabled as a chip. The high level is effective and cannot be used together with RST. 13 RST/NC By default, it is suspended and can be customized as a reset pin. It is valid at a low level. If you need to use it, please contact Ai-Thinker 14 GND Conductive earth 15 5V 5V power supply 16 3V3 3.3V power supply 17 GND Ground 18 TX TXD/GPIO16/SPI_MOSI/MISO/IIC_SCL/PWM_CH1 19 RX RXD/GPIO7/SPI_SCLK/IIC_SDA/PWM_CH2 20 NC Empty feet 21 IO5 GPIO5/SPI_MOSI/MISO/IIC_SDA/PWM_CH0/ADC_CH4 11 is not recommended and is shared with the internal Flash of the module. If you need to use it, please contact Ai-Thinker GPIO1/SPI_MOSI/MISO/IIC_SDA/PWM_CH1 23 NC Empty feet 24 GND Ground 25 3V3 3.3V power supply 26 IO14 GPIO14/SPI_SS/IIC_SCL/PWM_CH4/ADC_CH2 27 IO8/NC The default NC is unavailable 28 IO12 GPIO15/SPI_MOSI/MISO/IIC_SDA/ADC_CH10	6	IO2/NC	If you need to use it, please contact Ai-Thinker
9 NC Empty feet 10 GND Ground 11 3V3 3.3V power supply 12 EN/NC By default, it is enabled as a chip. The high level is effective and cannot be used together with RST. 13 RST/NC By default, it is suspended and can be customized as a reset pin. It is valid at a low level. If you need to use it, please contact Ai-Thinker 14 GND Conductive earth 15 5V 5V power supply 16 3V3 3.3V power supply 17 GND Ground 18 TX TXD/GPIO16/SPI_MOSI/MISO/IIC_SCL/PWM_CH1 19 RX RXD/GPIO7/SPI_SCLK/IIC_SDA/PWM_CH2 20 NC Empty feet 21 IO5 GPIO5/SPI_MOSI/MISO/IIC_SDA/PWM_CH0/ADC_CH4 11 is not recommended and is shared with the internal Flash of the module. If you need to use it, please contact Ai-Thinker GPIO1/SPI_MOSI/MISO/IIC_SDA/PWM_CH1 23 NC Empty feet 24 GND Ground 25 3V3 3.3V power supply 26 IO14 GPIO14/SPI_SS/IIC_SCL/PWM_CH4/ADC_CH2 27 IO8/NC The default NC is unavailable 28 IO12 GPIO15/SPI_MOSI/MISO/IIC_SDA/ADC_CH10	7	NC	Empty feet
10 GND Ground 11 3V3 3.3V power supply 12 EN/NC By default, it is enabled as a chip. The high level is effective and cannot be used together with RST. 13 RST/NC By default, it is suspended and can be customized as a reset pin. It is valid at a low level. If you need to use it, please contact Ai-Thinker 14 GND Conductive earth 15 5V 5V power supply 16 3V3 3.3V power supply 17 GND Ground 18 TX TXD/GPIO16/SPI_MOSI/MISO/IIC_SCL/PWM_CH1 19 RX RXD/GPIO7/SPI_SCLK/IIC_SDA/PWM_CH2 20 NC Empty feet 21 IO5 GPIO5/SPI_MOSI/MISO/IIC_SDA/PWM_CH0/ADC_CH4 22 IO1/NC It is not recommended and is shared with the internal Flash of the module. If you need to use it, please contact Ai-Thinker GPIO1/SPI_MOSI/MISO/IIC_SDA/PWM_CH1 23 NC Empty feet 24 GND Ground 25 3V3 3.3V power supply 26 IO14 GPIO14/SPI_SS/IIC_SCL/PWM_CH4/ADC_CH2 27 IO8/NC The default NC is unavailable 28 IO12 GPIO12/SPI_MOSI/MISO/IIC_SDA/ADC_CH10	8	NC	Empty feet
11 3V3 3.3V power supply 12 EN/NC By default, it is enabled as a chip. The high level is effective and cannot be used together with RST. 13 RST/NC By default, it is suspended and can be customized as a reset pin. It is valid at a low level. If you need to use it, please contact Ai-Thinker 14 GND Conductive earth 15 5V 5V power supply 16 3V3 3.3V power supply 17 GND Ground 18 TX TXD/GPIO16/SPI_MOSI/MISO/IIC_SCL/PWM_CH1 19 RX RXD/GPIO7/SPI_SCLK/IIC_SDA/PWM_CH2 20 NC Empty feet 21 IO5 GPIO5/SPI_MOSI/MISO/IIC_SDA/PWM_CH0/ADC_CH4 22 IO1/NC It is not recommended and is shared with the internal Flash of the module. If you need to use it, please contact Ai-Thinker GPIO1/SPI_MOSI/MISO/IIC_SDA/PWM_CH1 23 NC Empty feet 24 GND Ground 25 3V3 3.3V power supply 26 IO14 GPIO14/SPI_SS/IIC_SCL/PWM_CH4/ADC_CH2 27 IO8/NC The default NC is unavailable 28 IO12 GPIO12/SPI_MOSI/MISO/IIC_SDA/ADC_CH10	9	NC	Empty feet
By default, it is enabled as a chip. The high level is effective and cannot be used together with RST. RST/NC By default, it is suspended and can be customized as a reset pin. It is valid at a low level. If you need to use it, please contact Ai-Thinker Conductive earth SV SV power supply GND Ground TX TXD/GPIO16/SPI_MOSI/MISO/IIC_SCL/PWM_CH1 RX RXD/GPIO7/SPI_SCLK/IIC_SDA/PWM_CH2 DOING Fit is not recommended and is shared with the internal Flash of the module. If you need to use it, please contact Ai-Thinker GND Ground It is not recommended and is shared with the internal Flash of the module. If you need to use it, please contact Ai-Thinker GPIO1/SPI_MOSI/MISO/IIC_SDA/PWM_CH1 RW CHO/ADC_CH4 It is not recommended and is shared with the internal Flash of the module. If you need to use it, please contact Ai-Thinker GPIO1/SPI_MOSI/MISO/IIC_SDA/PWM_CH1 RW CHO/ADC_CH4 GND Ground GROUND Ground GPIO14/SPI_SS/IIC_SCL/PWM_CH4/ADC_CH2 IO18/NC The default NC is unavailable GPIO12/SPI_MOSI/MISO/IIC_SCL/PWM_CH2/ADC_CH0 GPIO11/SPI_SCLK/IIC_SDA/ADC_CH10	10	GND	Ground
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15 5V 5V power supply 16 3V3 3.3V power supply 17 GND Ground 18 TX TXD/GPIO16/SPI_MOSI/MISO/IIC_SCL/PWM_CH1 19 RX RXD/GPIO7/SPI_SCLK/IIC_SDA/PWM_CH2 20 NC Empty feet 21 IO5 GPIO5/SPI_MOSI/MISO/IIC_SDA/PWM_CH0/ADC_CH4 22 IO1/NC It is not recommended and is shared with the internal Flash of the module. If you need to use it, please contact Ai-Thinker GPIO1/SPI_MOSI/MISO/IIC_SDA/PWM_CH1 23 NC Empty feet 24 GND Ground 25 3V3 3.3V power supply 26 IO14 GPIO14/SPI_SS/IIC_SCL/PWM_CH4/ADC_CH2 27 IO8/NC The default NC is unavailable 28 IO12 GPIO12/SPI_MOSI/MISO/IIC_SDA/ADC_CH10	13	RST/NC	· ·
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17 GND Ground 18 TX TXD/GPIO16/SPI_MOSI/MISO/IIC_SCL/PWM_CH1 19 RX RXD/GPIO7/SPI_SCLK/IIC_SDA/PWM_CH2 20 NC Empty feet 21 IO5 GPIO5/SPI_MOSI/MISO/IIC_SDA/PWM_CH0/ADC_CH4 22 IO1/NC It is not recommended and is shared with the internal Flash of the module. If you need to use it, please contact Ai-Thinker GPIO1/SPI_MOSI/MISO/IIC_SDA/PWM_CH1 23 NC Empty feet 24 GND Ground 25 3V3 3.3V power supply 26 IO14 GPIO14/SPI_SS/IIC_SCL/PWM_CH4/ADC_CH2 27 IO8/NC The default NC is unavailable 28 IO12 GPIO12/SPI_MOSI/MISO/IIC_SCL/PWM_CH2/ADC_CH0 29 IO11 GPIO11/SPI_SCLK/IIC_SDA/ADC_CH10	15	5V	5V power supply
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19 RX RXD/GPIO7/SPI_SCLK/IIC_SDA/PWM_CH2 20 NC Empty feet 21 IO5 GPIO5/SPI_MOSI/MISO/IIC_SDA/PWM_CH0/ADC_CH4 22 IO1/NC It is not recommended and is shared with the internal Flash of the module. If you need to use it, please contact Ai-Thinker GPIO1/SPI_MOSI/MISO/IIC_SDA/PWM_CH1 23 NC Empty feet 24 GND Ground 25 3V3 3.3V power supply 26 IO14 GPIO14/SPI_SS/IIC_SCL/PWM_CH4/ADC_CH2 27 IO8/NC The default NC is unavailable 28 IO12 GPIO12/SPI_MOSI/MISO/IIC_SCL/PWM_CH2/ADC_CH0 29 IO11 GPIO11/SPI_SCLK/IIC_SDA/ADC_CH10	17	GND	Ground
20 NC Empty feet 21 IO5 GPIO5/SPI_MOSI/MISO/IIC_SDA/PWM_CH0/ADC_CH4 22 IO1/NC It is not recommended and is shared with the internal Flash of the module. If you need to use it, please contact Ai-Thinker GPIO1/SPI_MOSI/MISO/IIC_SDA/PWM_CH1 23 NC Empty feet 24 GND Ground 25 3V3 3.3V power supply 26 IO14 GPIO14/SPI_SS/IIC_SCL/PWM_CH4/ADC_CH2 27 IO8/NC The default NC is unavailable 28 IO12 GPIO12/SPI_MOSI/MISO/IIC_SCL/PWM_CH2/ADC_CH0 29 IO11 GPIO11/SPI_SCLK/IIC_SDA/ADC_CH10	18	TX	TXD/GPIO16/SPI_MOSI/MISO/IIC_SCL/PWM_CH1
It is not recommended and is shared with the internal Flash of the module. If you need to use it, please contact Ai-Thinker GPIO1/SPI_MOSI/MISO/IIC_SDA/PWM_CH1 Rempty feet GND Ground STANSON GROUND GPIO14/SPI_SS/IIC_SCL/PWM_CH4/ADC_CH2 IO14 GPIO14/SPI_SS/IIC_SCL/PWM_CH4/ADC_CH2 The default NC is unavailable GPIO12/SPI_MOSI/MISO/IIC_SCL/PWM_CH2/ADC_CH0 GPIO11/SPI_SCLK/IIC_SDA/ADC_CH10	19	RX	RXD/GPIO7/SPI_SCLK/IIC_SDA/PWM_CH2
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If you need to use it, please contact Ai-Thinker GPIO1/SPI_MOSI/MISO/IIC_SDA/PWM_CH1 NC Empty feet GND Ground Sylvar Supply GPIO14/SPI_SS/IIC_SCL/PWM_CH4/ADC_CH2 IO8/NC The default NC is unavailable GPIO12/SPI_MOSI/MISO/IIC_SCL/PWM_CH2/ADC_CH0 GPIO11/SPI_SCLK/IIC_SDA/ADC_CH10	21	IO5	GPIO5/SPI_MOSI/MISO/IIC_SDA/PWM_CH0/ADC_CH4
24 GND Ground 25 3V3 3.3V power supply 26 IO14 GPIO14/SPI_SS/IIC_SCL/PWM_CH4/ADC_CH2 27 IO8/NC The default NC is unavailable 28 IO12 GPIO12/SPI_MOSI/MISO/IIC_SCL/PWM_CH2/ADC_CH0 29 IO11 GPIO11/SPI_SCLK/IIC_SDA/ADC_CH10	22	IO1/NC	If you need to use it, please contact Ai-Thinker
25 3V3 3.3V power supply 26 IO14 GPIO14/SPI_SS/IIC_SCL/PWM_CH4/ADC_CH2 27 IO8/NC The default NC is unavailable 28 IO12 GPIO12/SPI_MOSI/MISO/IIC_SCL/PWM_CH2/ADC_CH0 29 IO11 GPIO11/SPI_SCLK/IIC_SDA/ADC_CH10	23	NC	Empty feet
26 IO14 GPIO14/SPI_SS/IIC_SCL/PWM_CH4/ADC_CH2 27 IO8/NC The default NC is unavailable 28 IO12 GPIO12/SPI_MOSI/MISO/IIC_SCL/PWM_CH2/ADC_CH0 29 IO11 GPIO11/SPI_SCLK/IIC_SDA/ADC_CH10	24	GND	Ground
27 IO8/NC The default NC is unavailable 28 IO12 GPIO12/SPI_MOSI/MISO/IIC_SCL/PWM_CH2/ADC_CH0 29 IO11 GPIO11/SPI_SCLK/IIC_SDA/ADC_CH10	25	3V3	3.3V power supply
28 IO12 GPIO12/SPI_MOSI/MISO/IIC_SCL/PWM_CH2/ADC_CH0 29 IO11 GPIO11/SPI_SCLK/IIC_SDA/ADC_CH10	26	IO14	GPIO14/SPI_SS/IIC_SCL/PWM_CH4/ADC_CH2
29 IO11 GPIO11/SPI_SCLK/IIC_SDA/ADC_CH10	27	IO8/NC	The default NC is unavailable
	28	IO12	GPIO12/SPI_MOSI/MISO/IIC_SCL/PWM_CH2/ADC_CH0
30 NC Empty feet	29	IO11	GPIO11/SPI_SCLK/IIC_SDA/ADC_CH10
	30	NC	Empty feet



6. Schematic diagram

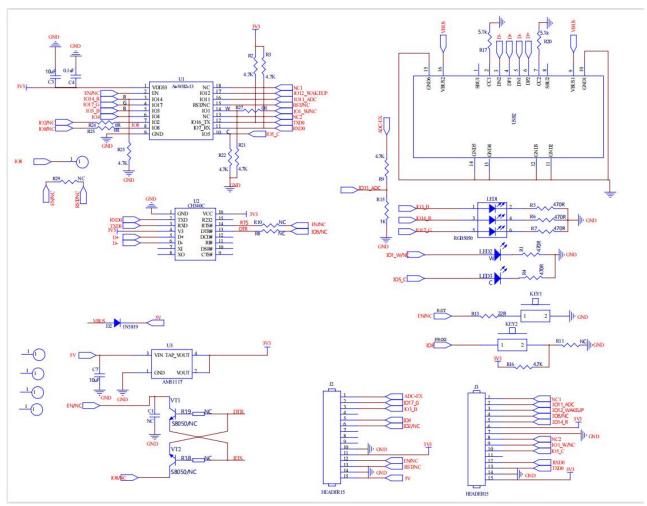


Figure 7 schematic diagram



7. Product package information

Table 8 packing information table

Packing List	Package	Per package (Electrostatic bag)	Per package (Sealed bag)
Ai-WB2-13-Kit	Foam+ Electrostatic bag	1pcs	20pcs

8. Contact us

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WeChat mini program



WeChat official account



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