Ai-WB1-32S-Kit Specification

Version V1.1.0

Document resume

Version	Date	Develop/revise content	Edition	Approve
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1. Product Overview

Ai-WB1-32S-Kit is a development board for AI-WB1-32S module developed by Shenzhen Ai-Thinker Technology Co., LTD. Ai-wb1-32s-kit adopts Type-C socket, integrated WITH CH340C USB to TTL chip, and supports 2Mbps burning firmware.

Ai-WB1-32S is a Wi-Fi& Bluetooth module developed by Shenzhen Ai-Thinker Technology Co., LTD. The module is equipped with W800 chip as the core processor and supports Wi-Fi 802.11b/ G/N protocol and BLE 4.2 protocol. W800 chip has built-in low power 32-bit XT804 CPU, operating frequency 240MHz, built-in 2MB Flash, 288KB RAM and rich peripheral interfaces, including SDIO, PSRAM, SPI, UART, I2C, PWM, ADC, Touch Senser, Duplex I2S and GPIO, etc. It can be widely used in Internet of Things (IoT), mobile devices, wearable electronic devices, smart home and other fields.

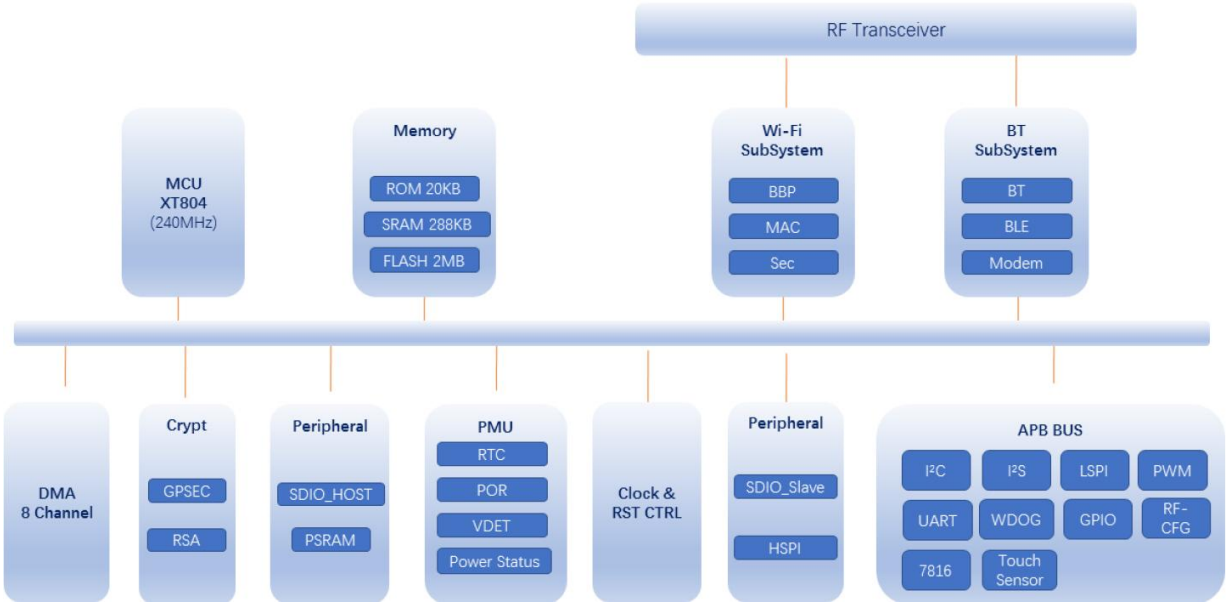


Figure 1 W800 Main chip architecture diagram

1.1. Characteristic

- Applicable to Ai-WB1-32S module
- Type-C interface
- Support IEEE 802.11 b/g/n protocol
- Wi-Fi security supports Wi-Fi WMM/WMM-PS/WPA/WPA2 /WPS
- Supports 20/40MHz bandwidth with a maximum speed of 150 Mbps
- Bluetooth BLE4.2
- Supports Station 、Station + SoftAP 、SoftAP mode
- Supports 32-bit XT804 CPU，288KB RAM
- MCU has built-in Tee security engine, and the code can distinguish security events from non-security events
- Integrated SASC/TIPC, memory and internal modules/interfaces can be configured with security attributes to prevent unsafe code access
- Modifying The firmware signature mechanism is enabled to implement secure Boot/ upgrade
- Have firmware encryption function to enhance code security
- Firmware encryption keys are distributed using asymmetric algorithms to enhance key security
- Hardware encryption module：RC4256，AES128，DES/3DES，SHA1/MD5，CRC32，2048RSA，True random number generator
- Support SDIO，PSRAM，SPI，UART，I2C，PWM，ADC，Touch senser，Duplex I2S 和 GPIO
- Integrated Wi-Fi MAC/BB/RF/PA/LNA/Bluetooth
- Multiple sleep modes are supported, and the standby current is less than 20 μ A
- 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-WB1-32S-Kit
Suitable modules	Ai-WB1-32S
Package	DIP-38（2.54 Spacing standard row needle）
Size	25.4*55.78(±0.2)mm
Antenna	On-Board antenna
Operation temperature	-40 ℃ ~ 85 ℃
Storage environment	-40 ℃ ~ 125 ℃ , < 90%RH
Power supply	Supply voltage 5V, power supply current 500mA
Interfaces	UART/GPIO/ADC/PWM/I2C/SPI/Duplex I2S/SDIO
IO	18
Serial port rate	Support 110~2000000bps, default 115200 bps
Bluetooth	BLE 4.2
Security	Wi-Fi WMM/WMM-PS/WPA/WPA2 /WPS
Flash	Default:2MByte

2.1. Power supply selection

Ai-WB2-32S-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-WB1-32S-Kit is 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
Power supply		3V3/VDD		3.3	3.6	V
		5V	4.75	5.0	5.25	V
I/O	VIL	-	-0.3	-	0.8	V
	VIH	-	2.0	-	VDD+0.3	V
	VOL	-	-		0.4	V
	VOH	-	2.4		-	V
	IMAX	-	-	-	24	mA

2.4. WiFi RF performance

Table 3 Wi-Fi RF performance table

Description	Typical value			Unit
Spectrum Range	2400 ~ 2483.5MHz			MHz
Output power				
Model	**Min.**	**Typical value**	**Max.**	**Unit**
11n mode HT20, PA output power	-	12	-	dBm
In 11g mode, PA output power	-	13	-	dBm
In 11b mode, PA output power	-	18	-	dBm
Receiving sensitivity				
Model	**Min.**	**Typical value**	**Max.**	**Unit**
11b，1 Mbps	-	-95	-	dBm
11b，11 Mbps	-	-85	-	dBm
11g, 6 Mbps	-	-89	-	dBm
11g，54 Mbps	-	-72	-	dBm
11n，HT20 (MCS7)	-	-69	-	dBm

2.5. BLE RF performance

Table 4 BLE RF performance table

Description	Typical value			Unit
Spectrum Range	2400 ~ 2483.5MHz			MHz
Output power				
Rate Mode	**Min.**	**Typical value**	**Max.**	**Unit**
1Mbps	-	4	6	dBm
Receiving sensitivity				
Rate Mode	**Min.**	**Typical value**	**Max.**	**Unit**
1Mbps sensitivity@30.8%PER	-	-92	-	dBm

2.6. Power

The following power consumption figures are based on a single-module 3.3V power supply at 25° C ambient temperature using an internal voltage 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	Minimum value	Average value	Maximum	Company
Tx 802.11b，11Mbps，POUT=+19dBm	-	348	-	mA
Tx 802.11g，54Mbps，POUT =+15dBm	-	190	-	mA
Tx 802.11n，MCS7，POUT =+12dBm	-	190	-	mA
Rx 802.11b, 1024 bytes long	-	96	-	mA
Rx 802.11g, 1024 bytes long	-	96	-	mA
Rx 802.11n, 1024 bytes long SRAM retention	-	96	-	mA
Standby current	-	20	-	μA

3. Appearance size

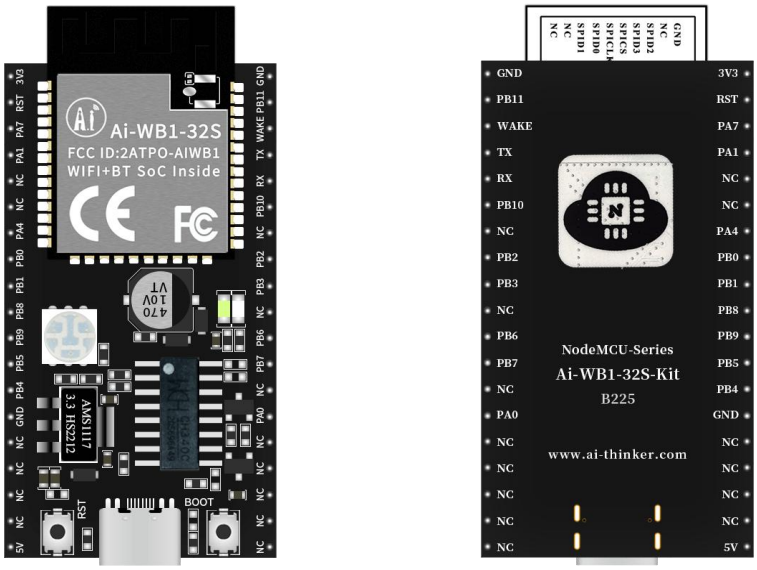


Figure 3 External view (For reference only)

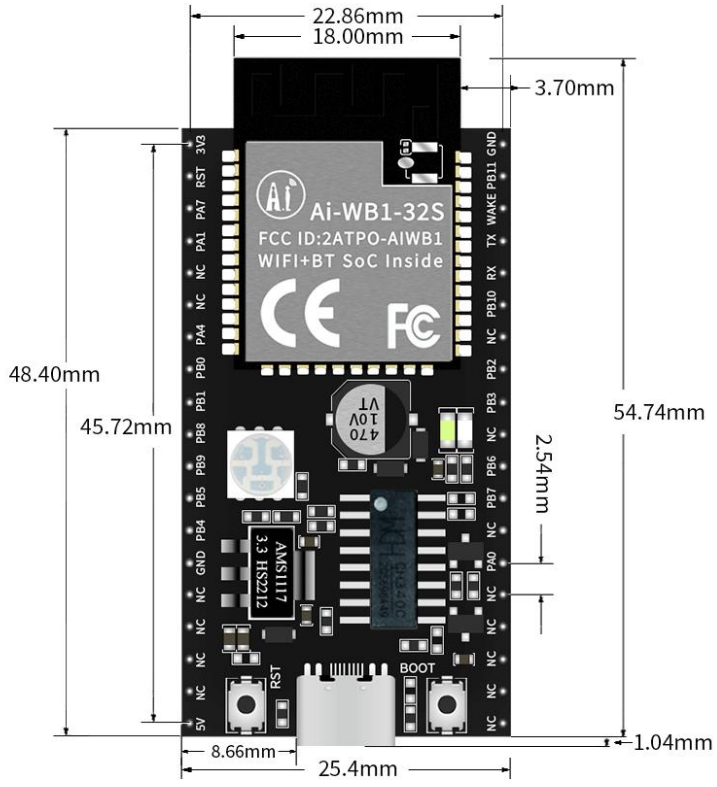


Figure 4 size chart

4. Indicator light and button description

Ai-WB1-32S-Kit is also connected with heating and cooling lights and RGB lights, and also leads to RST (reset button) and BOOT (download button), as shown below:

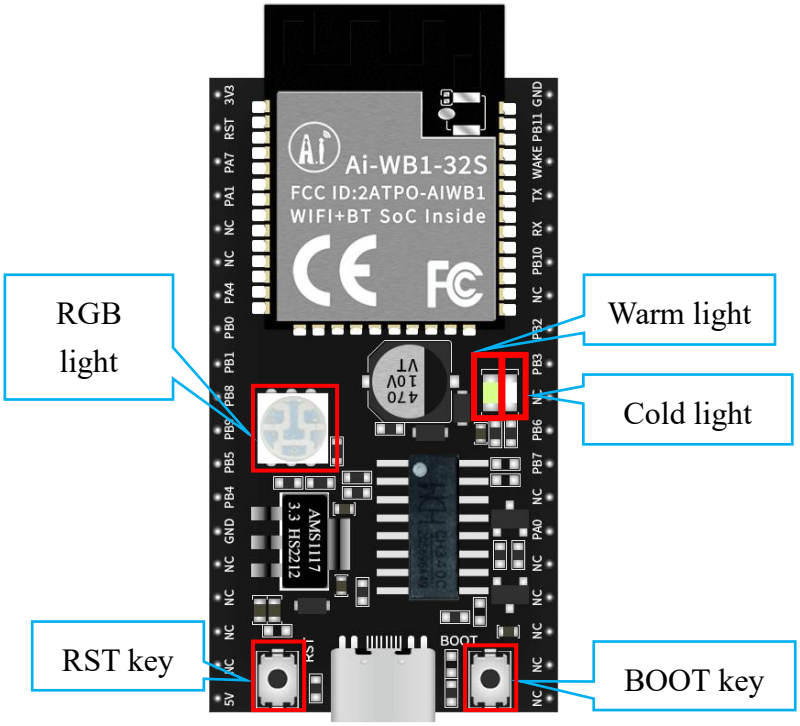


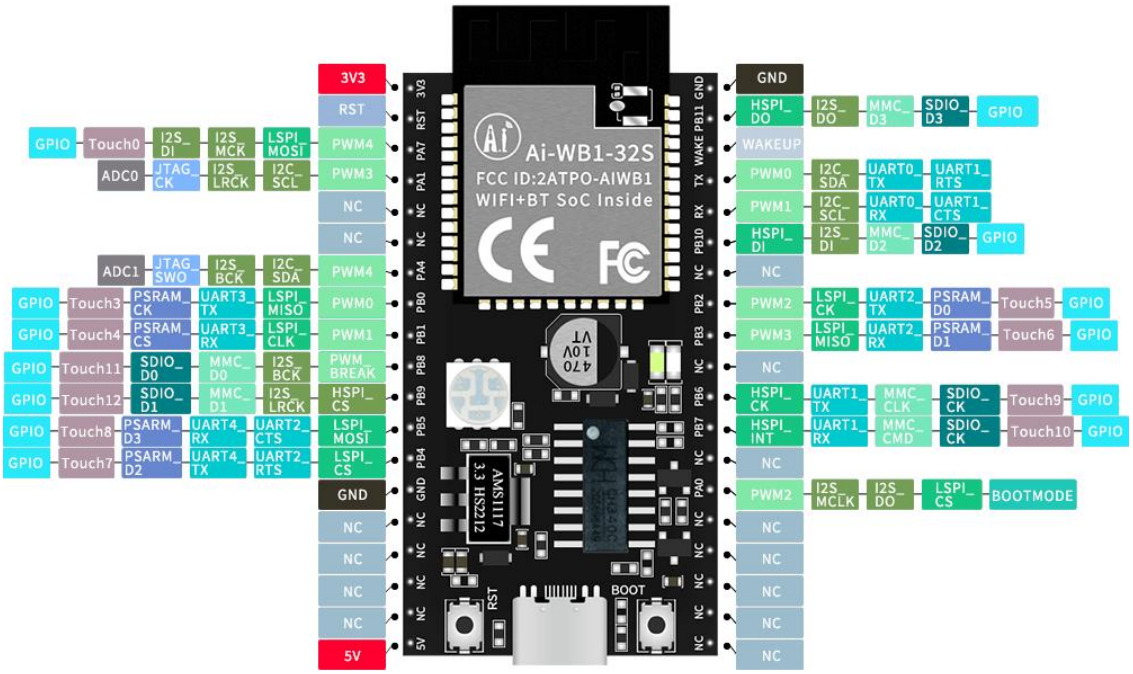
Figure 5 indicator light and key position

Table 6 Indicator/button I/O mapping table

Device	Function	GPIO
RGB light	R（red light）	PA4
	G（green light）	PB0
	B（blue light）	PB1
Cold light	/	PB2
Warm light	/	PB3
RST key	reset button	RST
BOOT key	download button	PA0

5. Pin definition

Ai-WB1-32S-Kit,a total of 38 interfaces are connected, for example, the pin function definition table is the interface definition.



Front

Back

Figure 5 pin diagram

Table 6 Definition table of pin functions

No.	Name	Function
1	3V3	3.3V power suppl
2	RST	as chip enable, high level enable
3	PA7	PWM4/LSPI_MOSI/I2S_MCK/I2S_DI/Touch0/GPIO
4	PA1	JTAG_CK/I2C_SCL/PWM3/I2S_LRCK/ADC0
5	NC	Empty feet
6	NC	Empty feet
7	PA4	JTAG_SWO/I2C_SDA/PWM4/I2S_BCK/ADC1
8	PB0	PWM0/LSPI_MISO/UART3_TX/PSRAM_CK/Touch3/GPIO
9	PB1	PWM1/LSPI_CLK/UART3_RX/PSRAM_CS/Touch4/GPIO
10	PB8	I2S_BCK/MMC_D0/PWM_BREAK/SDIO_D0/Touch11/GPIO
11	PB9	I2S_LRCK/MMC_D1/HSPI_CS/SDIO_D1/Touch12/GPIO
12	PB5	LSPI_MOSI/UART2_CTS/UART4_RX/PSARM_D3/Touch8/GPIO
13	PB4	LSPI_CS/UART2_RTS/UART4_TX/PSRAM_D2/Touch7/GPIO
14	GND	Ground
15、16、17、18	NC	Empty feet
19	5V	5V power supply
20、21、22、23、24	NC	Empty feet
25	PA0	I2S_MCLK/LSPI_CS/PWM2/I2S_DO/BOOTMODE
26	NC	Empty feet
27	PB7	UART1_RX/MMC_CMD/HSPI_INT/SDIO_CMD/Touch10/GPIO
28	PB6	UART1_TX/MMC_CLK/HSPI_CK/SDIO_CK/Touch9/GPIO
29	NC	Empty feet
30	PB3	PWM3/LSPI_MISO/UART2_RX/PSRAM_D1/Touch6/GPIO
31	PB2	PWM2/LSPI_CK/UART2_TX/PSRAM_D0/Touch5/GPIO

32	NC	Empty feet
33	PB10	I2S_DI/MMC_D2/HSPI_DI/SDIO_D2/GPIO
34	RX	UART0_RX/PWM1/UART1_CTS/I2C_SCL
35	TX	UART0_TX/PWM0/UART1_RTS/I2C_SDA
36	WAKE	WAKEUP Wake function
37	PB11	I2S_DO/MMC_D3/HSPI_DO/SDIO_D3/GPIO
38	GND	Ground

6. Precautions

Ai-WB1-32S-Kit is used for serial communication, the Type-C interface cannot be connected to the TX and RX interfaces of pin row at the same time; otherwise, the Type-C interface cannot send data.

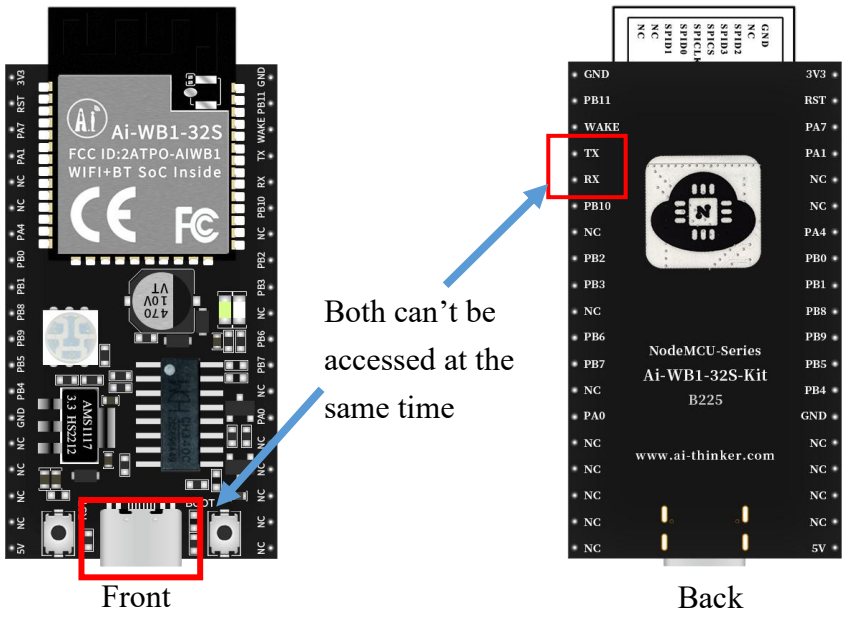


Figure 8 Interface diagram

7. Schematic diagram

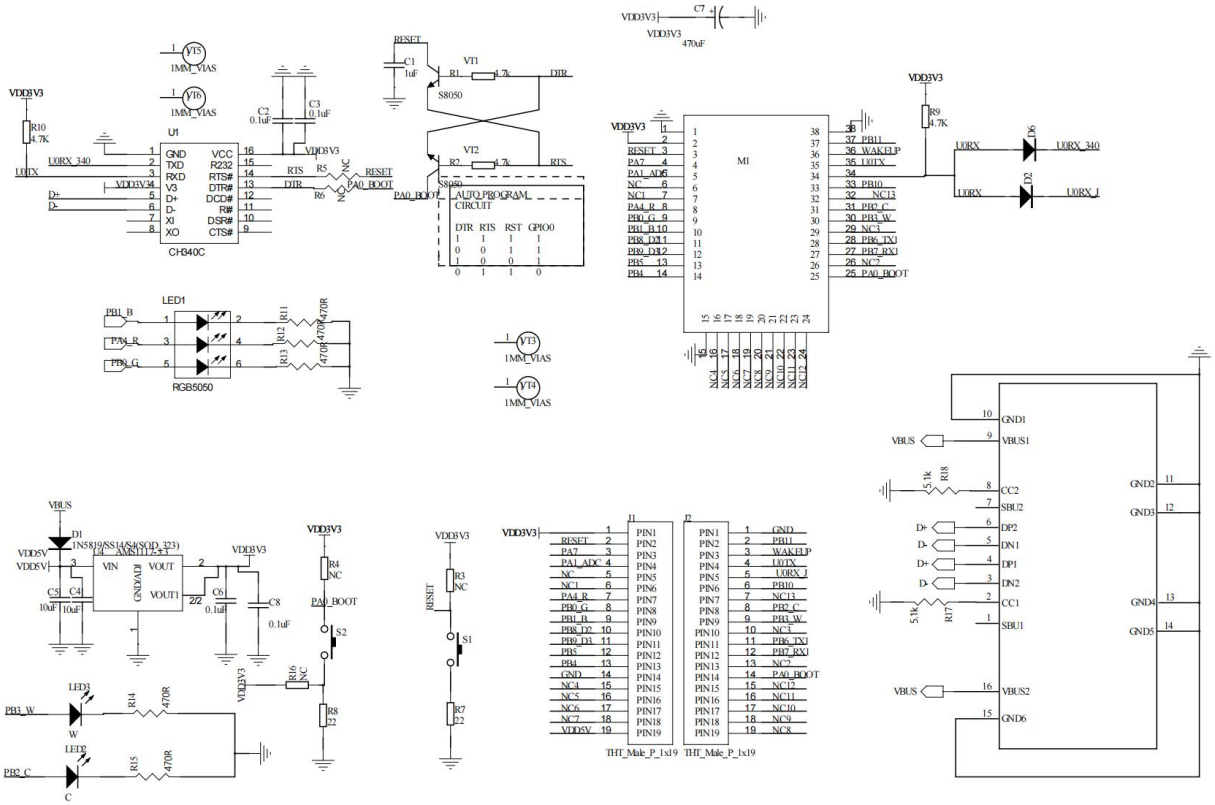


Figure 7 schematic diagram

8. Product Related models

Table 8 product related model table

Model	Power supply	Package	Size	Antenna
Ai-WB1-12F	3.0V ~ 3.6V，I≥500mA	SMD-22	24.0*16.0*3.1(±0.2)mm	On-board PCB antenna
Ai-WB1-32S	3.0V ~ 3.6V，I≥500mA	SMD-38	25.5*18.0*3.1(±0.2)mm	Default onboard PCB antenna/compatible
Ai-WB1-12F-Kit	3.3V or 5V, I>500mA	DIP-30	25.41*55.19(±0.2)mm	On-board PCB antenna
Ai-WB1-32S-Kit	3.3V or 5V, I>500mA	DIP-38	25.4*55.78(±0.2)mm	On-board PCB antenna
Product Information: https://docs.ai-thinker.com				

9. Product packaging information

Table 9 packing information table

Packing List	Packaging method	Per package (Electrostatic bag)	Per package (Sealed bag)
Ai-WB1-32S-Kit	Foam+ Electrostatic bag	1pcs	20pcs

10.Contact us

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