Ai-WB2-32S-Kit Specification

Version　V1.0.1

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Document resume

Version	Date	Develop/revise content	Edition	Approve
V1.0.0	2022.6.27	First formulated	Cong Chen	Hong Xu
V1.0.1	2022.7.20	Rending screen cover part changed	Cong Chen	Hong Xu

Content

1. Product Overview

Ai-WB2-32S-Kit is a development board designed for Ai-WB2-32S modules. Ai-WB2-32S is a Wi-Fi & BT 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.
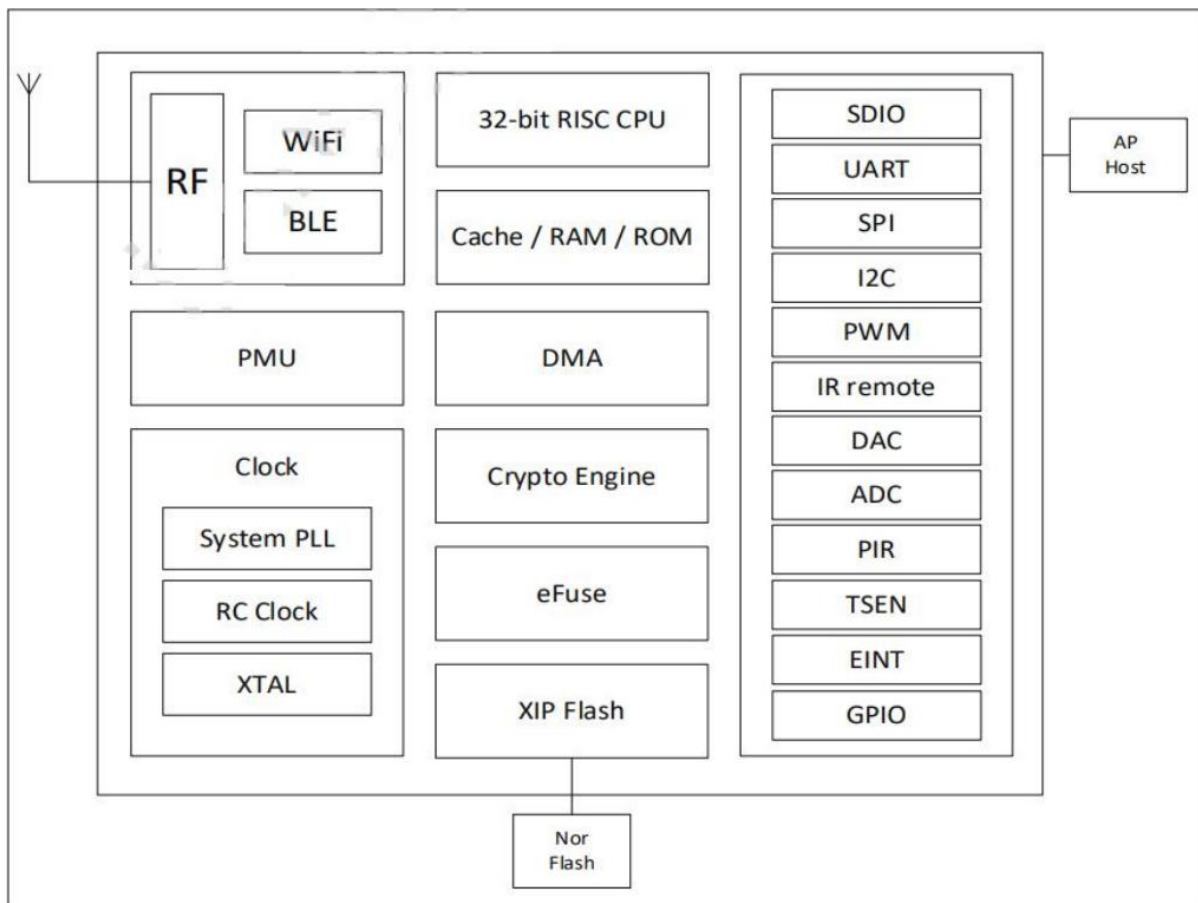
Figure 1 Main chip architecture diagram

1.1. Characteristic

- DIP-38 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/BT

- 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-WB2-32S-Kit
Package	DIP-38
Size	55.05*25.4(±0.2)mm
Antenna	On-Board PCB antenna
Frequency	2400 ~ 2483.5MHz
Operation temperature	-40℃ ~ 85℃
Storage environment	-40℃ ~ 125℃, < 90%RH
Power supply	Supply voltage 3.3V or 5V, power supply current≥500mA
Interfaces	UART/GPIO/ADC/PWM/I2C/SPI
I/O	15
Serial port rate	Default value: 115200 bps
Security	WPS/WEP/WPA/WPA2 Personal/WPA2 Enterprise/WPA3
Flash	Default: 4MByte

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-WB2-32S-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		Conditio	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
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
Spectrum Range	2400 - 2483.5			MHz
Output power				
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	-	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	Typical value			Unit
Spectrum Range	2400 - 2483.5			MHz
Output power				
Rate Mode	**Min.**	**Typical value**	**Max.**	**Unit**
1Mbps	-	9	15	dBm
Receiving sensitivity				
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

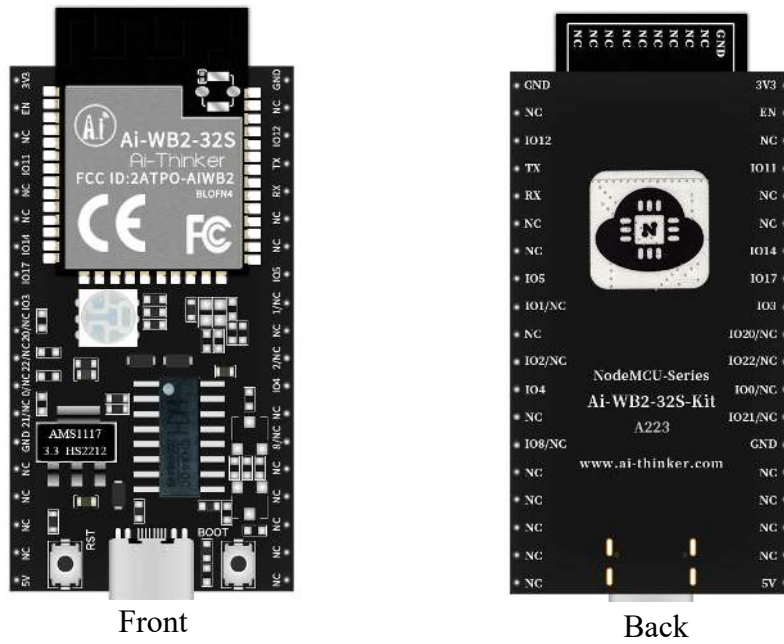| Pattern	Minimum	Average	Maxim	Comp
Tx 802.11b, 11Mbps, POUT = + 21dBm	-	260	-	mA
Tx 802.11g, 54Mbps, POUT = + 18dBm	-	245	-	mA
Tx 802.11n, MCS7, POUT = + 17dBm	-	230	-	mA
Rx 802.11b, 1024 bytes long	-	65	-	mA
Rx 802.11g, 1024 bytes long	-	65	-	mA
Rx 802.11n, 1024 bytes long	-	65	-	mA
Deep-Sleep	-	12	-	μA

3. Appearance size

Front   Back

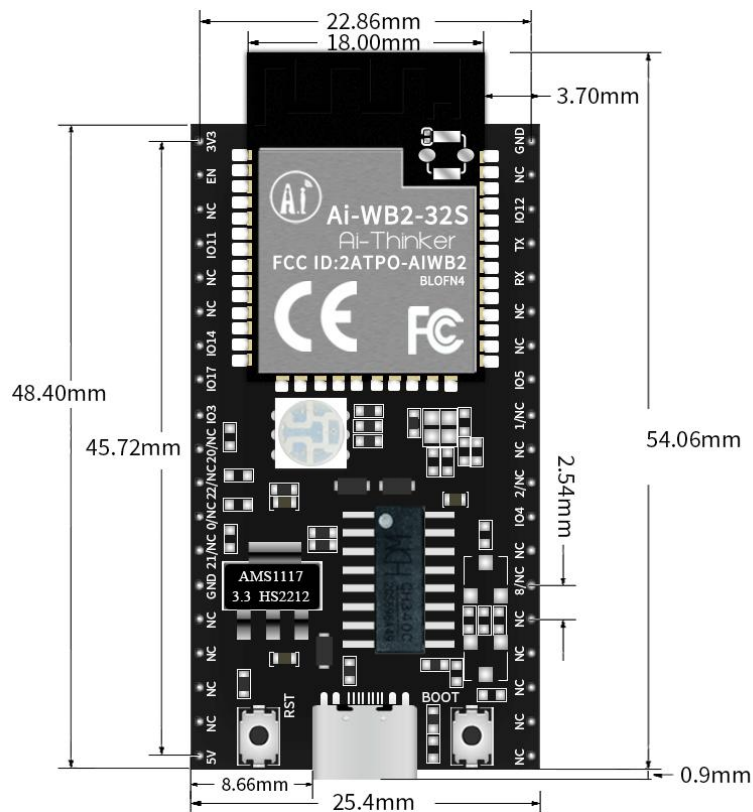**Figure 3 External view (For reference only)**

Figure 4 size chart

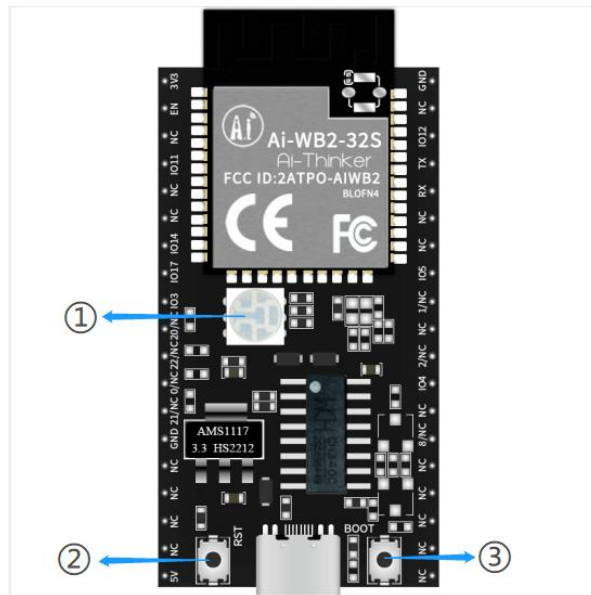# 4. Indicator light and button description

Figure 5 Ai-WB2-32S-Kit indicator light and key position

Table 6 Ai-WB2-32S-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-WB2-32S-Kit, a total of 38 interfaces are connected, for example, the pin function definition table is the interface definition.
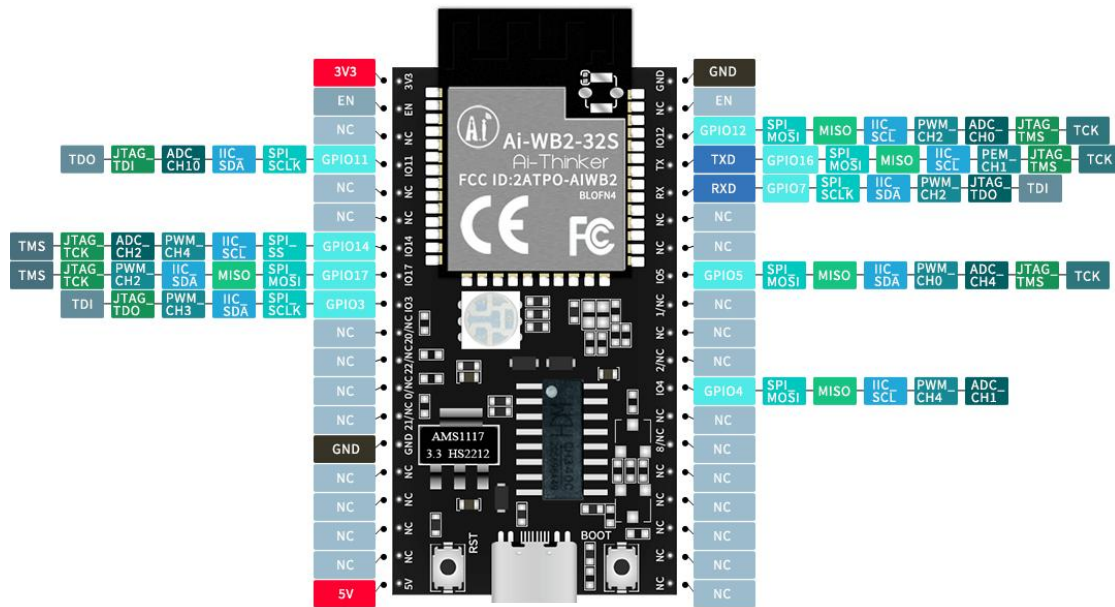
Front

Back

Figure 6 pin diagram

Table 7 Definition table of pin functions

No.	Name	Function
1	3V3	3.3V power supply; The output current of the external power supply is recommended to be above 500mA
2	EN	By default, it is enabled as a chip, and the high level is effective
3	NC	Empty feet
4	IO11	GPIO11/SPI_SCLK/IIC_SDA/ADC_CH10/JTAG_TDI/TDO
5	NC	Empty feet
6	Empty feet	Empty feet
7	IO14	GPIO14/SPI_SS/IIC_SCL/PWM_CH4/ADC_CH2/JTAG_TCK/TMS
8	IO17	GPIO17/SPI_MOSI/MISO/IIC_SDA/PWM_CH2/JTAG_TCK/TMS
9	IO3	GPIO3/SPI_SCLK/IIC_SDA/PWM_CH3/JTAG_TDO/TDI
10	IO20/NC	The default NC is unavailable
11	IO22/NC	The default NC is unavailable
12	IO0/NC	The default NC is unavailable
13	IO21/NC	The default NC is unavailable
14	GND	Ground
15	NC	Empty feet
16	NC	Empty feet
17	NC	Empty feet
18	NC	Empty feet
19	5V	5V power supply; External power supply output current is recommended to be above 500mA
20	NC	Empty feet
21	NC	Empty feet
22	NC	Empty feet
23	NC	Empty feet
24	NC	Empty feet
25	IO8/NC	The default NC is unavailable.
26	NC	Empty feet
27	IO4	GPIO4/SPI_MOSI/MISO/IIC_SCL/PWM_CH4/ADC_CH1
28	IO2/NC	The default NC is unavailable

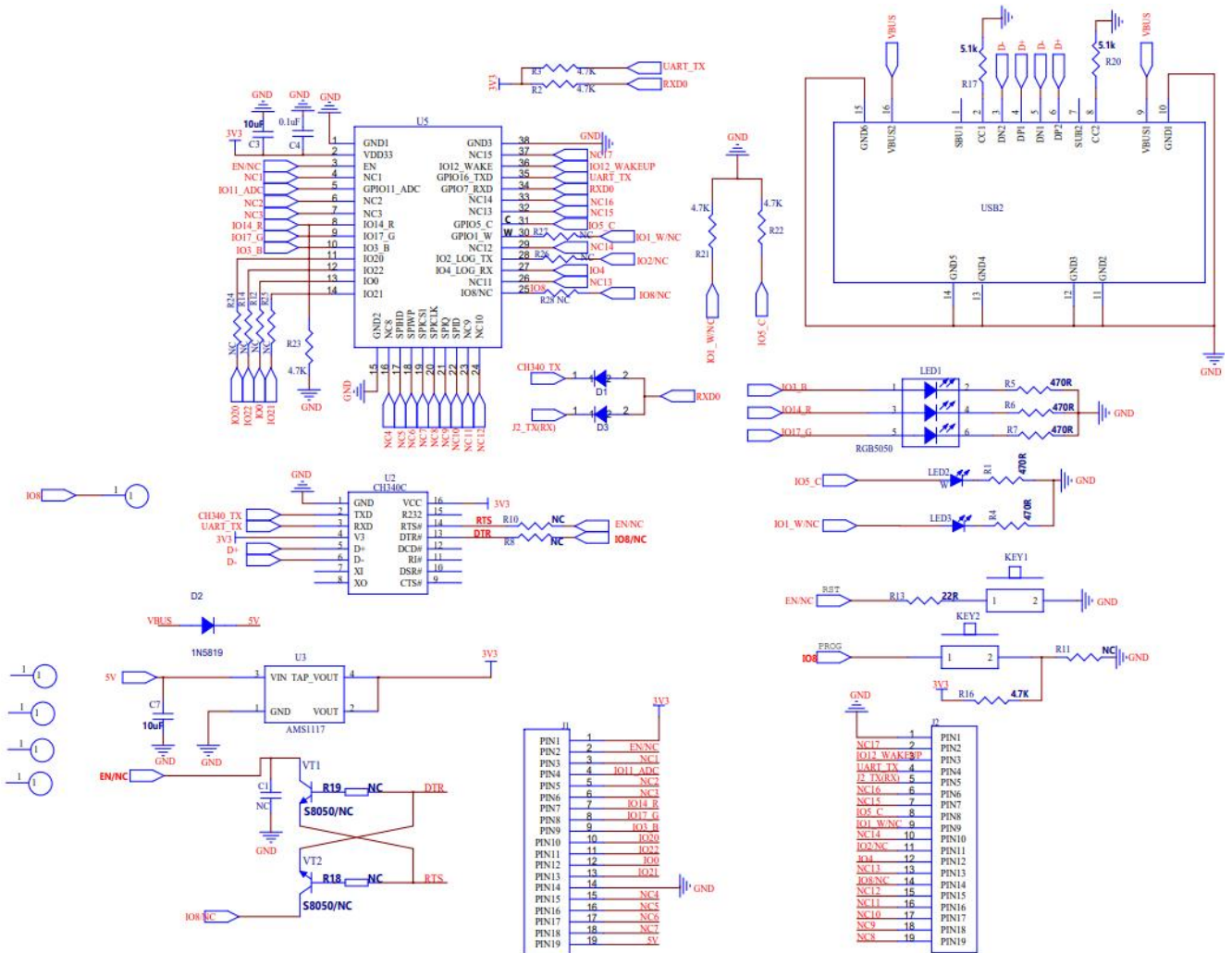| 29	NC	Empty feet
30	IO1/NC	The default NC is unavailable
31	IO5	GPIO5/SPI_MOSI/MISO/IIC_SDA/PWM_CH0/ADC_CH4/JTAG_T
32	NC	Empty feet
33	NC	Empty feet
34	RX	RXD/GPIO7/SPI_SCLK/IIC_SDA/PWM_CH2/JTAG_TDO/TDI
35	TX	TXD/GPIO16/SPI_MOSI/MISO/IIC_SCL/PWM_CH1/JTAG_TMS/T
36	IO12	GPIO12/SPI_MOSI/MISO/IIC_SCL/PWM_CH2/ADC_CH0/JTAG_T
37	NC	Empty feet
38	GND	Ground

6. Schematic diagram

Figure 7 schematic diagram

7. Product packaging information

Table 8 packing information table

Packing List	Packaging method	Per package (Electrostatic bag)	Per package (Sealed bag)
Ai-WB2-32S-Kit	Foam+ Electrostatic bag	1pcs	20pcs

8. Contact us

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