Ai-WS1-CBE-Kit Specification

Version   V1.0.0

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Document resume

Version	Date	Develop/revise content	Edition	Approve
V1.0.0	2024.10.28	First Edition	Zekai Qian	Hong Xu

Content

1. Product overview

Ai-WS1-CBE-Kit is a Wi-Fi 6+BLE5.2+SLE1.0 module development board developed by Ai-Thinker Co., LTD. It is equipped with Ai-WS1-CBE module, and adopts the design of USB Goldfinger Dongle, and takes Hi3873E chip as the core processor. Supports Wi-Fi 802.11b/g/n/ax, BLE and SLE. Hi3873E built-in high-performance self-developed 32bit CPU, up to 240MHz main frequency.

Hi3873E chip integrates a high-performance 32bit microprocessor and a security processing engine. Provide UART and GPIO interfaces, while supporting USB2.0 interface, the highest speed of 480Mbps; As a slave machine, the chip is built to the host MCU through USB interface to run.
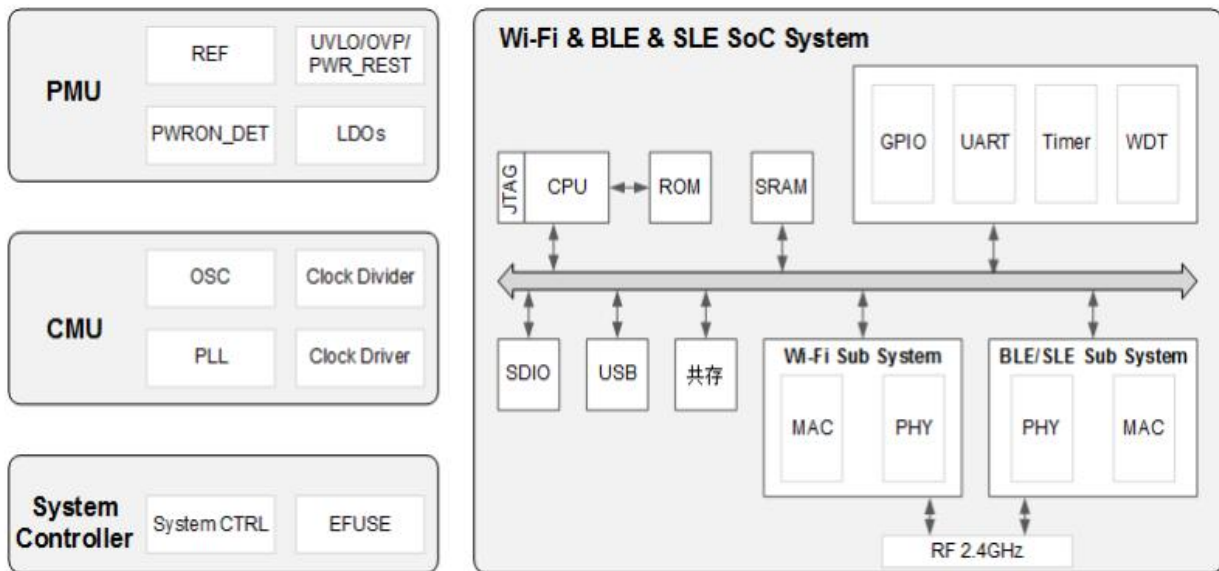
Figure 1 Main chip architecture diagram

1.1. Characteristics

- Adopt USB gold finger design

- Support 2.4GHz operating band

- Support IEEE 802.11 b/g/n/ax

- Support BLE4.0/4.1/4.2/5.0/5.1/5.2

- Support SLE1.0

- Wi-Fi security supports WPA/WPA2/WPA3 Personal/WPS2.0

- Supports 20/40MHz bandwidth, 1T1R, up to 150Mbps

- Support STA、SoftAP、STA+SoftAP and STA+PTP co-existence model

- Support UART、USB2.0 and GPIO etc.

- Radio Frequency Integrated Balun、PA/LNA

2. Main parameter

Table 1 Description of Main Parameters

Model	Ai-WS1-CBE-Kit
Package	DIP-16
Size	26.0*30.0(±0.2)mm No plug-in section
Antenna	On-Board
Frequency	2400～2483.5MHz
Operating temperature	-40℃～85℃
Storage temperature	-40℃～125℃,＜90%RH
Power supply	The power supply voltage is 3V to 3.6V, and the power supply current is ≥500mA
Interface	UART、USB2.0 and GPIO etc.
IO	12
Security	WPA/WPA2/WPA3 Personal/WPS2.0
Flash	Without Flash

2.1. Electrostatic requirement

Ai-WS1-CBE-Kit is an electrostatic sensitive device, and special precautions should be taken when handling it.

Figure 2 ESD preventive measures

2.2. Electrical characteristic

Table 2 Table of Electrical Characteristics

Parameters		Conditio	Min.	Typical value	Max.	Unit
Supply voltage		VDD	3	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

2.3. Wi-Fi RF performance

Table 3 Wi-Fi RF Performance Table

Description	Typical value	Unit
Spectrum range	2400 ~ 2483.5MHz	MHz
Output power		
Mode	**Min.**	**Typical**	**Max.**	**Unit**

Mode	Min.	Typical	Max.	Unit
11ax mode HE40, PA output power	-	15	-	dBm
11ax mode HE20, PA output power	-	16	-	dBm
11n mode HT40, PA output power	-	16	-	dBm
11n mode HT20, PA output power	-	17	-	dBm
In 11g mode, PA output power	-	18	-	dBm
In 11b mode, PA output power	-	22	-	dBm
Receiving sensitivity				
Mode	**Min.**	**Typical**	**Max.**	**Unit**
11b, 1 Mbps	-	-98	-	dBm
11b, 11 Mbps	-	-90	-	dBm
11g, 6 Mbps	-	-95	-	dBm
11g, 54 Mbps	-	-77	-	dBm
11n, HT20 (MCS7)	-	-74	-	dBm
11ax, HE20 (MCS9)	-	-70	-	dBm
11ax, HE40 (MCS9)	-	-67	-	dBm

2.4. 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	Max.	Unit
1Mbps	-	15	19	dBm
2Mbps	-	15	19	dBm
Receiving sensitivity				
Rate mode	Min.	Typical	Max.	Unit
1Mbps sensitivity @30.8%PER	-	-99	-	dBm
2Mbps sensitivity @30.8%PER	-	-97	-	dBm

2.5. SLE RF performance

Table 5 RF performance of SLE

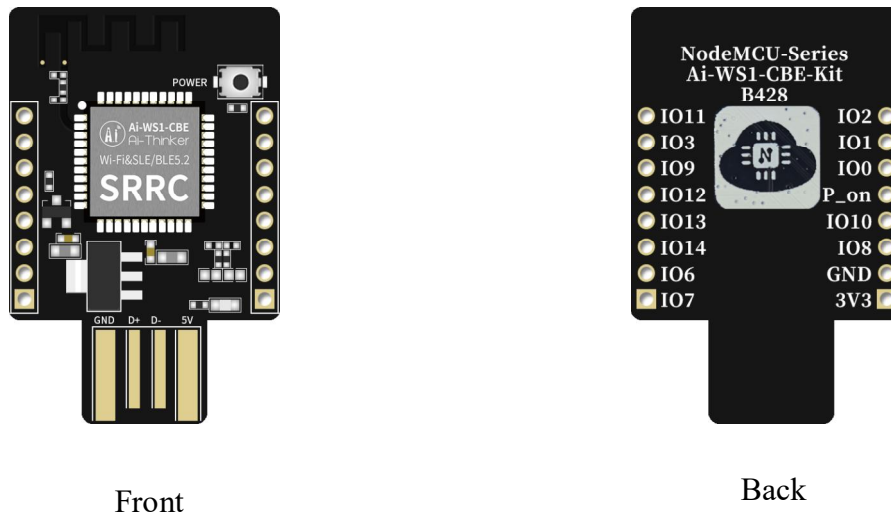| Description	Typical value			Unit
Spectrum range	2400 ~ 2483.5MHz			MHz
Output power				
Rate mode	Min.	Typical	Max.	Unit
1Mbps	-	15	19	dBm
2Mbps	-	15	19	dBm
Receiving sensitivity				
Receiving sensitivity	Receiving	Receiving	Receiving	Receiv
1Mbps sensitivity @30.8%PER	-	-99	-	dBm
2Mbps sensitivity @30.8%PER	-	-97	-	dBm

3. Appearance size

Front

Back

Figure 3 appearance diagram(Rendering diagram is for reference only, subject to actual objects)
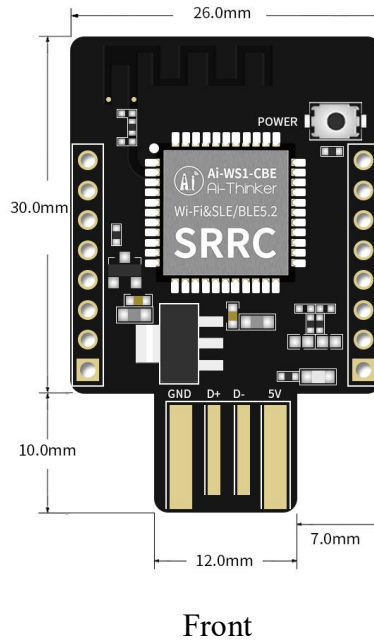

Front

Figure 4 dimension diagram

4. Pin definition

A total of 16 pins are connected to the Ai-WS1-CBE-Kit development board, such as the pin diagram, and the pin function definition table is the interface definition.
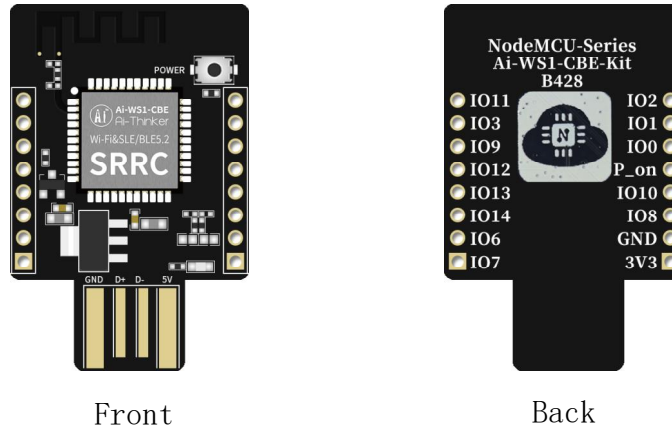
Front   Back

Figure 5 Pin diagram

Table 6 Pin function definition table

No.	Name	Functional description
1	IO2	GPIO2
2	IO1	GPIO1
3	IO0	GPIO0
4	P_on	Boot pin
5	IO10	GPIO10
6	IO8	GPIO8
7	GND	Ground
8	3V3	3.3V power supply. The recommended output current of the external power supply is more than 500mA
9	IO7	GPIO7
10	IO6	GPIO6
11	IO14	GPIO14
12	IO13	GPIO13
13	IO12	GPIO12
14	IO9	GPIO9
15	IO3	GPIO3
16	IO11	GPIO11

Ai-WS1-CBE-Kit development board has a key, which is the POWER key and plays a reset role.

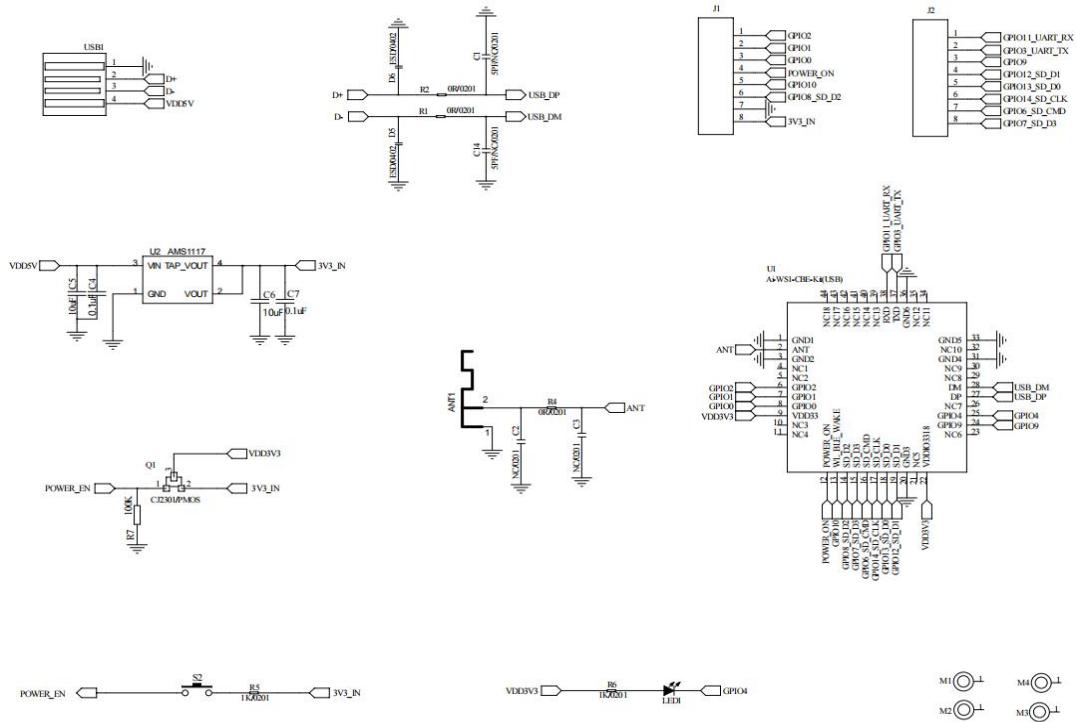image omitted

5. Schematic diagram

Figure 6 Schematic Diagram

6. Product packaging information

Table 7 Packaging information table

Packing List	Package	Quantity per packet (Electrostatic bag)	Quantity per packet (Sealed bag)
Ai-WS1-CBE-Kit	Foam + electrostatic bag	1pcs	20pcs

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