PB-03-Kit Specification

Version V1.0.0

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Document resume

Version	Date	Develop/revise content	Edition	Approve
V1.0.0	2021.12.02	First Edition	junx	HongXu

Content

1. Product Overview

PB-03-Kit is a development board designed for the PB-03 module. PB-03 is a BLE module developed by Shenzhen Ai-Thinker Technology Co.,Ltd., the core processor chip PHY6252. PHY6252 is a system-on-chip (SoC) for Bluetooth 5.2 applications, designed for various applications such as the Internet of Things (IoT), mobile devices, wearable electronic devices, and smart homes. It has a high-performance, low-power 32-bit processor, with 64KB SRAM, 256KB flash memory, 96KB ROM, 256bit efuse. The chip supports a variety of low power consumption working states, which can meet the power consumption requirements of various application scenarios. Features such as adjustable radio frequency output power can achieve the best balance between communication distance, communication speed, and power consumption.

It has the following characteristics:

- Integrated radio frequency transceiver, PA, radio frequency filter, antenna switch and power management.
- Excellent communication performance and stability in various wireless environments.
- Bluetooth rate support粌125Kbps笞500Kbps笞1Mbps笞2Mbps.
- Support broadcast expansion,multi-broadcast,channel selection.

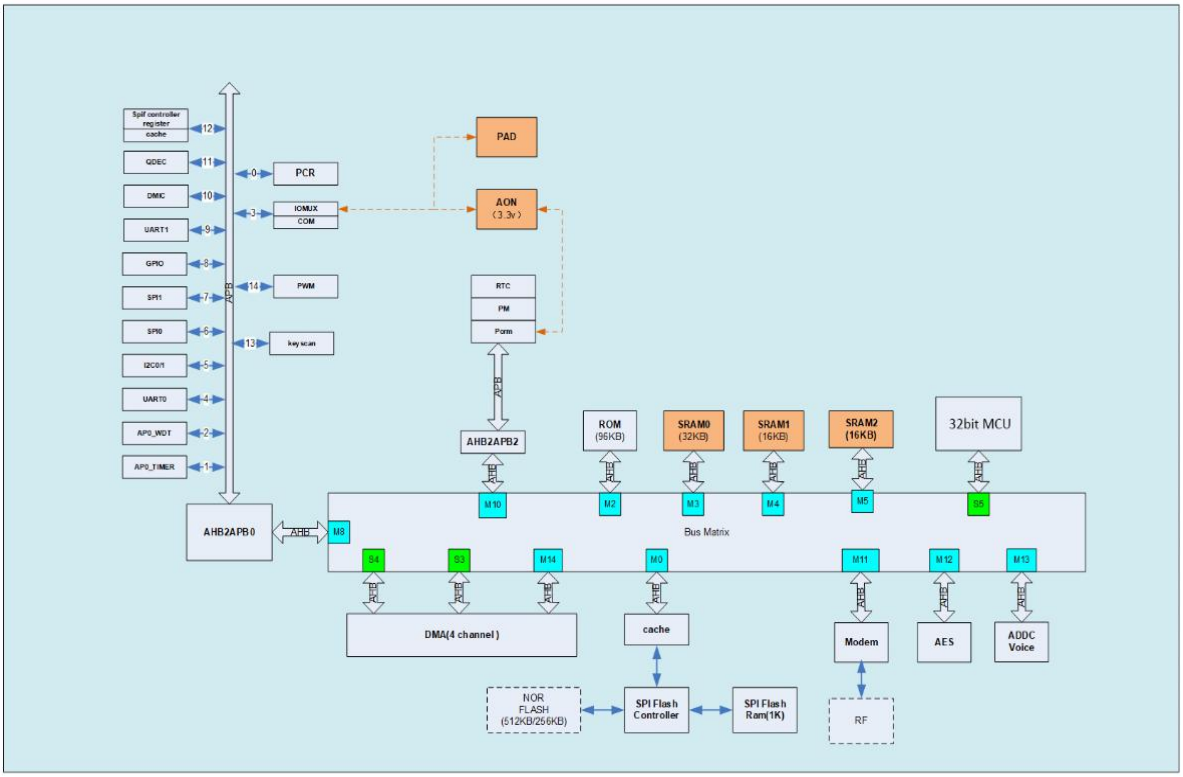

Figure 1 PHY6252 chip architecture diagram

1.1. Characteristic

- Support BLE5.2, rate support: 125Kbps, 500Kbps, 1Mbps, 2Mbps.
- Own 64 KB SRAM笥256KB flash笥96 KB ROM笥256bit efuse
- Support UART/GPIO/ADC/PWM/I2C/SPI/PDM/DMA interface
- Support multiple sleep modes,deep sleep current is less than 1uA
- Support for serial local upgrade and remote Firmware upgrade(FOTA)
- Universal AT commands can be used easy and quickly
- Support for secondary development,with an integrated Windows development environment

2. Main parameters

Table 1 Description of the main parameters

Development board Model	PB-03-Kit
Suitable module	PB-03
Package	DIP-30☒2.54 pitch standard pin header☒
Size	48.3*25.5(±0.2)mm
Antenna	On-board PCB antenna
Frequency	2400~2483.5MHz
Operating temperature	-40 ☒ ~ 85 ☒
Storage temperature	-40 ☒ ~ 125 ☒ , < 90%RH
Power supply	Voltage: 5V, Current>200mA
Interface	UART/GPIO/ADC/PWM/I2C/I2S/SPI/PDM/DMA
IO	19
UART rate	Default 115200 bps
Bluetooth	BLE 5.2
Security	AES-128
Flash	256KB
Power consumption	Deep sleep mode (no broadcast)☒7.2uA☒Single module☒ Shutdown mode☒0.57uA☒Single module☒ Launch mode☒TX☒8dBm☒☒11.5mA☒Single module☒ The bottom plate of the development board☒4mA

2.1. Power supply selection

You can choose one of the following three power supply methods to power the PB-03-Kit:

- Micro-USB interface power supply (default)
- 5V and GND pin header power supply
- 3V3 and GND pin header power supply

It is recommended to choose the first power supply mode: Micro-USB interface power supply.

2.2. Static electricity requirements

PB-03-Kit development board is an electrostatic sensitive device,and special precautions must be taken when handling it.

Figure 3 ESD anti-static diagram

2.3. Electrical characteristics

Table 2 Electrical characteristics table

Parameters		Conditions	Min	Typical value	Max	Unit
Power supply voltage		VDD	4.5	5	5.3	V
I/O	V_{IL}/V_{IH}	-	-0.3/0.75VIO	-	0.25VIO/4.5	V
	V_{OL}/V_{OH}	-	N/0.8VIO	-	0.1VIO/N	V
	I_{MAX}	-	-	-	12	mA

2.4. Bluetooth RF performance

Table 3 BLE RF performance table

Description	Typical values			Unit
Operating frequency	2400-2483.5			MHz
Output power				
Mode	Min	Typical values	Max	Unit
BLE 2Mbps	-20	8	10	dBm
BLE 1Mbps	-20	8	10	dBm
BLE 500Kbps	-20	8	10	dBm
BLE 125kbps	-20	8	10	dBm
Receiving sensitivity				
Mode	Min	Typical values	Max	Unit
BLE 2Mbps	-	-93	-	dBm

BLE 1Mbps	-	-96	-	dBm
BLE 500Kbps	-	-97	-	dBm
BLE 125Kbps	-	-102	-	dBm

2.5. Power consumption

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

- All measurements were completed without the SAW filter at the antenna interface.
- All emission data were measured based on the TX_Burst_Test&RX_Burst_Test mode.

Table 4 Power consumption table

Mode	Min	Average value	Max	Unit
TX_Burst_Test Power output 8dBm	-	11.5	-	mA
TX_Burst_Test Power output 5dBm	-	9	-	mA
TX_Burst_Test Power output 0dBm	-	8	-	mA
RX_Burst_Test	-	9.4	-	mA
Deep Sleep(With broadcast,1 second interval)	-	50.58	-	uA
Deep Sleep(With broadcast, 2 second interval)	-	28.25	-	uA
Deep Sleep(Without broadcast)	-	7.2	-	uA
Power Off	-	0.57	-	uA

3. Appearance dimensions

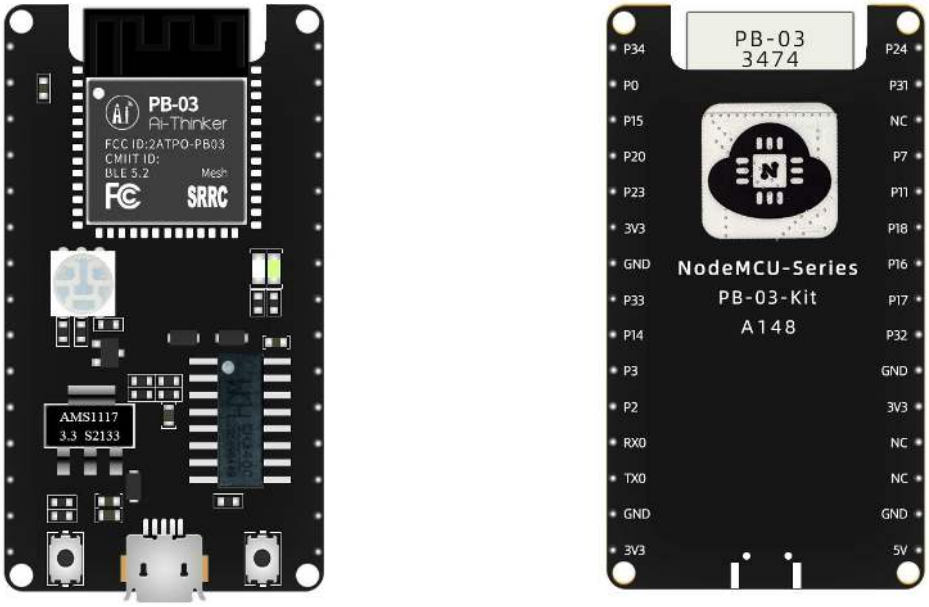

Figure 4 PB-03-Kit appearance (Pictures and silkscreen are for reference only笕

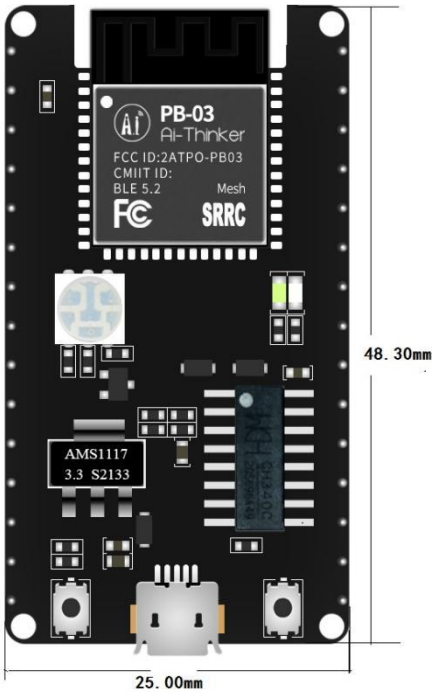

Figure 5 **Development board size drawing**

4. Indicator and button description

PB-03-Kit has 3 indicator lights, namely: RGB light, yellow light and white light. Two buttons are brought out, namely: RST button (left) and Restore button (right), as shown in the figure below:

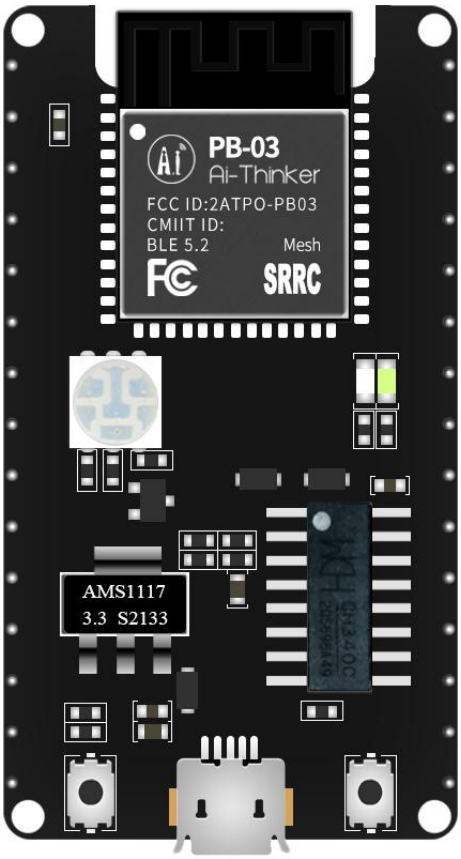

Figure 6 PB-03-Kit indicator and button location

Table 5 Indicator status and key function table

Indicator light or button	LED status or button function	Remark
RGB light	Red light（P7）	/
	Green light (P11)	
	Blue light (P18)	
White light	Cool light（P34）	/
Yellow light	Warm light（P0）	/
Restore button	Restore factory settings button（P15）	/
RST button	Restart button	/

5. Pin definition

PB-03-Kit has a total of 30 pins. As shown in the pin diagram, the pin function definition table is the interface definition.

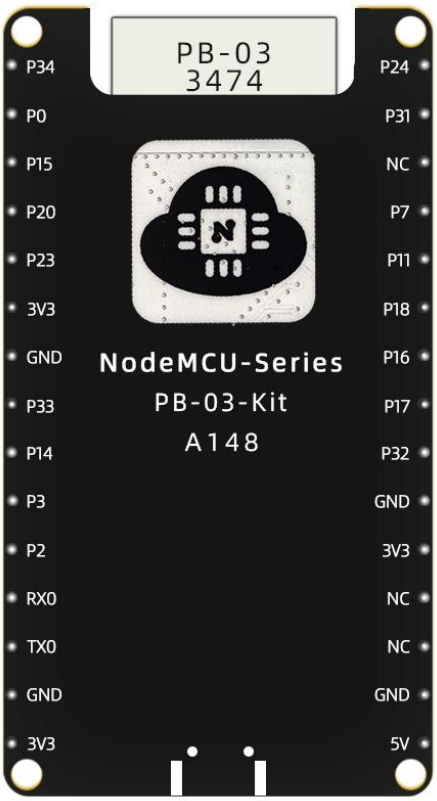

Figure 7 Schematic diagram of development board pins (bottom view)

Table 6 Pin function definition table

No.	Name	Function
1	P24	GPIO24
2	P31	GPIO31
3	NC	Empty
4	P7	GPIO7
5	P11	GPIO11
6	P18	GPIO18
7	P16	GPIO16
8	P17	GPIO17
9	P32	GPIO32
10	GND	Ground Pin
11	3V3	3.3V power supply

12	NC	Empty
13	NC	Empty
14	GND	Ground Pin
15	5V	5V power supply
16	3V3	3.3V power supply
17	GND	Ground Pin
18	TX0	TXD/GPIO9
19	RX0	RXD/GPIO10
20	P2	GPIO2/SWD debug data inout
21	P3	GPIO3/SWD debug clock
22	P14	GPIO14/ADC input 3
23	P33	GPIO33
24	GND	Ground Pin
25	3V3	3.3V power supply
26	P23	GPIO23/ADC input 1/micbias reference
27	P20	GPIO20/ADC input 9/PGA positive input
28	P15	GPIO15/ADC input 4/micbias output
29	P0	GPIO0
30	P34	GPIO34

6. Schematic

PB-03-Kit schematic.

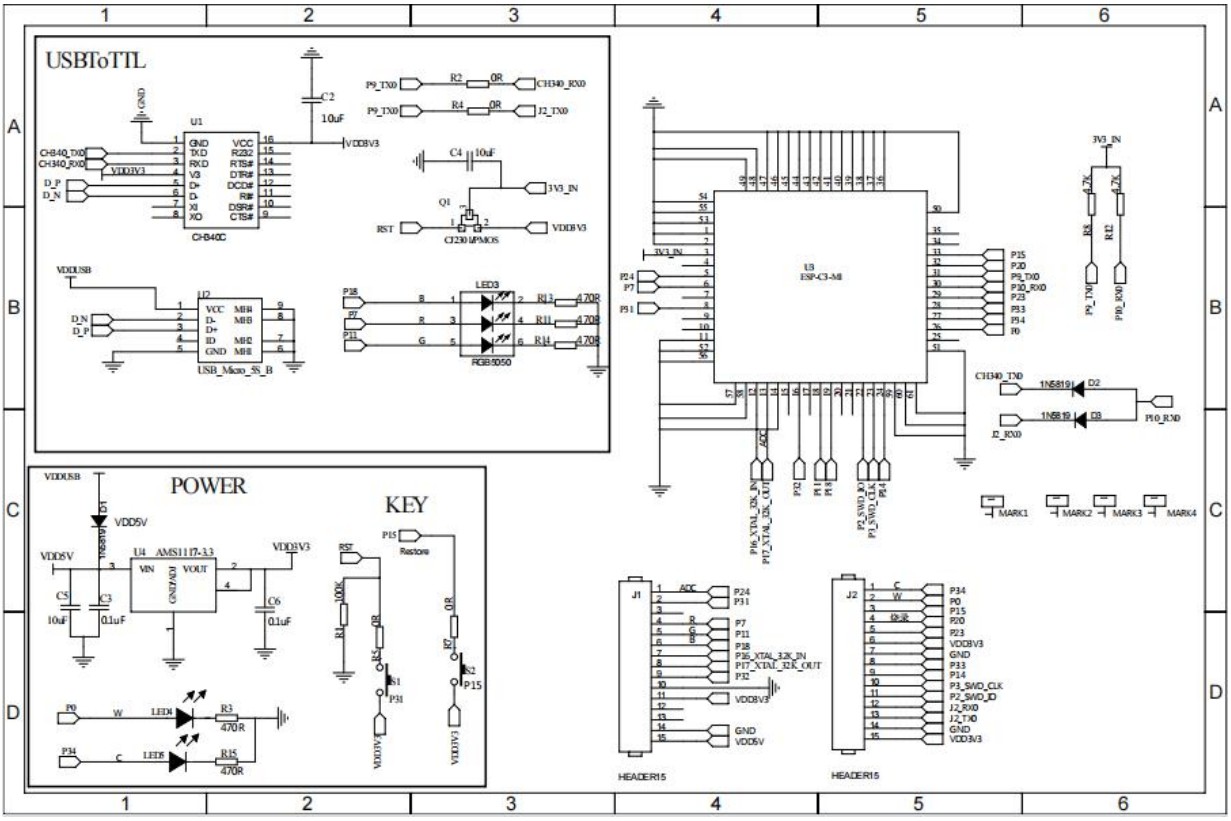

Figure 8 Schematic diagram of the development board

7. Product related models

Table 7 Product related model list

Module	Power supply	Package	Size	Antenna
PB-03	3.3V笘I>200mA	SMD-52	16.6*13.2*2.8(±0.2)mm	On-board PCB
PB-03F	3.3V笘I>200mA	SMD-22	24.0*16.0*3.1(±0.2)mm	On-board PCB
PB-03M	3.3V笘I>200mA	DIP-18	18.0*18.0*2.8(±0.2)mm	On-board PCB
PB-03-Kit	5V笘I>200mA	DIP-30	48.30*25.00(±0.2)mm	On-board PCB
PB-03F-Kit	5V笘I>200mA	DIP-30	48.30*25.00(±0.2)mm	On-board PCB
PB-03M-Kit	5V笘I>200mA	DIP-20	35.30*28.42(±0.2)mm	On-board PCB
Product related information粌https://docs.ai-thinker.com				

8. Product precautions

Since the chip used by the PB-03 module does not have an RST pin, the reset button of the PB-03-Kit is directly powered off and then powered on to reset. When downloading and burning firmware, you need to use the RST pin to power on and reset.

9. Product packaging information

Table 8 Packaging Information Table

Packing list	Packing method	Quantity per pack 【Electrostatic bag】	Quantity per pack 【Sealed bag】
PB-03-Kit	Foam + static bag	1pcs	20pcs

10.Contact us

Ai-Thinker offical website　Office forum　Develop DOCS

LinkedIn　Tmall shop　Taobao shop　Alibaba shop

Technic support email：support@aithinker.com

Domestic business cooperation：sales@aithinker.com

Overseas business cooperation：overseas@aithinker.com

Company Address：Room 403,408-410, Block C, Huafeng Smart Innovation Port, Gushu 2nd Road, Xixiang, Baoan District, Shenzhen.

Tel：0755-29162996

WeChat mini program

WeChat official account

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