



BU03-Kit Specification

Version V1.1.0

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Document resume

Version	Date	Develop/revise content	Edition	Approve
V1.0.0	2024.7.2	First Edition	XiaoCheng Li	Hong Xu
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1. Product Overview

BU03-Kit is a UWB development board developed by Ai-Thinker Co., Ltd. The development board is a test and evaluation board based on BU03 transceiver module and equipped with an ST master. The BU03 module integrates the onboard antenna, RF circuit, and power management. The BU03-Kit can be used in bidirectional ranging or TDOA positioning systems with positioning accuracy up to 10 cm and supports data rates of up to 6.8 Mbps. It can be widely used in the Internet of Things (IoT), mobile devices, wearable electronic devices, smart home and other fields.

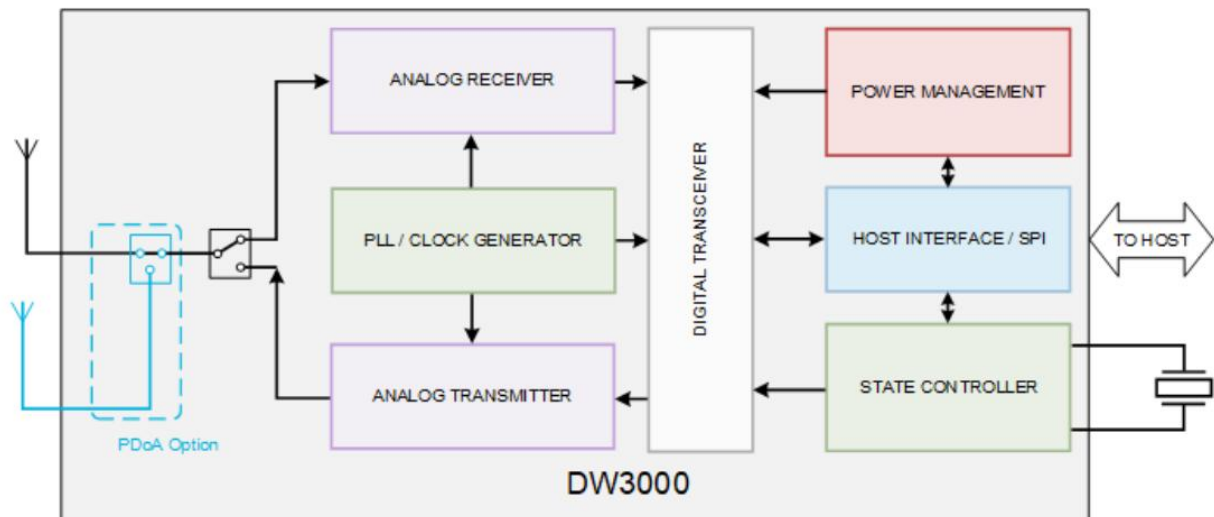


Figure 1 Main chip architecture diagram

1.1. Characteristic

- SMD-40 package
- Complies with the IEEE 802.15.4-2015 UWB standard
- Complies with the IEEE802.15.4z (BPRF mode)
- Channel 5 and channel 9 are supported
- Easy integration without RF design
- Integrated MAC support
- The use of RTLS infrastructure extends the range of communication
- Data rate 850 Kbps, 6.8 Mbps
- Supports bidirectional ranging and TDOA and PDOA positioning schemes
- Provides accurate positioning and data transfer
- Positioning accuracy 10 cm
- Supports high label density
- Integrated HW AES 256
- Supports the SPI interface
- 9 GPIO available
- Programmable adjustment of the transmit power
- The power supply voltage ranges from 2.5 V to 3.6 V
- BU03 module power consumption <1uA in sleep mode
- Suitable for button battery solutions

2. Main parameters

Table 1 Description of the main parameters

Model	BU03-Kit
Package	DIP-40
Size	35.56*55.00(±0.2)mm
Antenna	On-board PCB antenna
Center frequency	CH5(6489.5MHz)、CH9(7987.2MHz)
Operating temperature	-40℃ ~ 85℃
Storage temperature	-40℃ ~ 125℃, < 90%RH
Power supply	Power supply voltage USB Type-C or pin 3.3 or 5V power supply. Power supply current $\geq 500\text{mA}$
Interface	UART, I2C, SPI
I/O	20

2.1. Static electricity requirements

BU03-Kit is an electrostatic sensitive device, and special precautions must be taken when handling it.



Figure 2 ESD anti-static diagram

2.2. Electrical characteristics

Table 2 Electrical characteristics table

Parameter	Name	Min.	Typical value	Max.	Unit
Supply voltage	VDD	1.7	3.3	3.6	V
Supply voltage	VCC	2.5	3.3	3.6	V
I/O	VIL	-	-	0.3*VDD1	V
	VIH	-	0.7*VDD1	-	V
	VOL	-	-	0.1*VDD1	V

	VOH	-	-	0.9*VDD1	-	V
	IMAX	-	-	-	10	mA

2.3. RF Parameter

Table 3 UWB RF parameters

Description	Typical value	Unit
CH5 center frequency	6489.6	MHz
CH9 center frequency	7987.2	MHz
Channel bandwidth	499.2	MHz

2.4. Power Consumption

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

Mode	Min.	Typical	Max.	Unit
CH5 is transmitting at 0.85Mbps	-	17.03	-	mA
CH5 is transmitting at 6.81Mbps	-	15.06	-	mA
CH5 is transmitting at 0.85Mbps	-	24.85	-	mA
CH5 is transmitting at 6.81Mbps	-	22.6	-	mA
CH5 receives at 0.85Mbps	-	39.81	-	mA
CH5 receives at 6.81Mbps	-	40.01	-	mA
CH5 receives at 0.85Mbps	-	49.23	-	mA
CH5 receives at 6.81Mbps	-	48.05	-	mA
Instantaneous start-up current	-	174	-	mA
Deep sleep	-	179	-	nA

3. Appearance dimensions

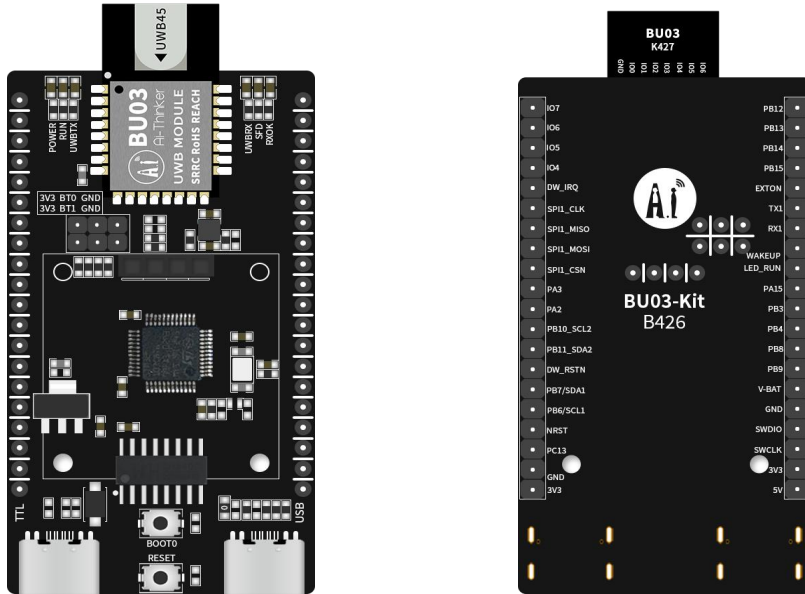


Figure 3 Appearance diagram (rendering diagram is for reference only, subject to the actual object)

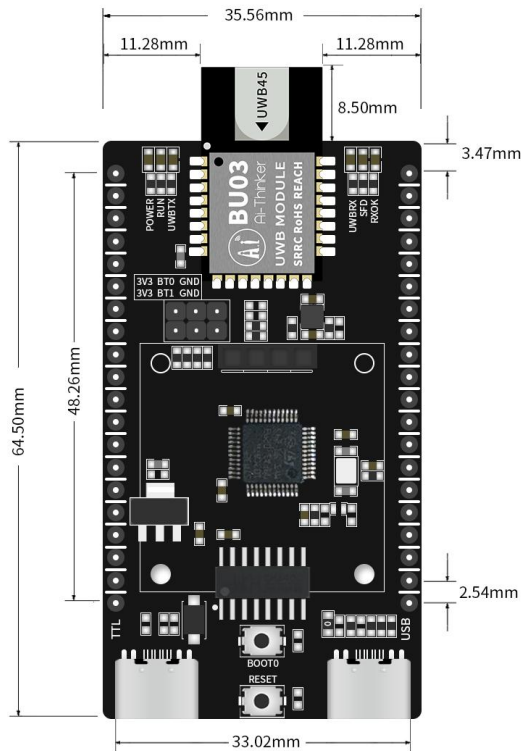


Figure 4 Module size diagram

4. Button and indicator description

A total of 40 pin pins are connected to the BU03-Kit development board. As shown in the diagram, the pin function definition table is the interface definition.

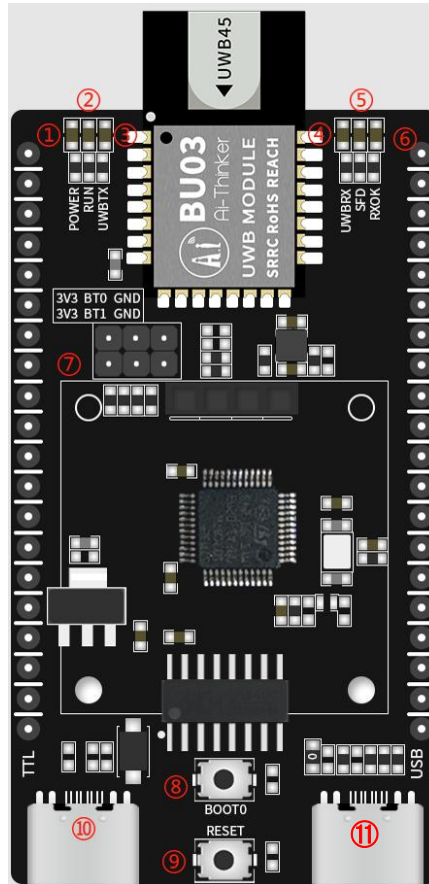


Figure 5 Pin diagram

①	POWER, Power indicator light, power on red;
②	RUN, Running indicator, running successfully on
③	UWB TX, Communication indicator 1, data transmission blinking;
④	UWB RX, Communication indicator 2, data reception blinking;
⑤	SFD, LED with undefined function;
⑥	RXOK, LED with undefined function;
⑦	Pin, STM32 serial port burn BOOT control;
⑧	BOOT, Burning control key;
⑨	RESET button, reset button;
⑩	Positioning and ranging data interface;
⑪	Serial port, support burning and AT command interaction;

5. Pin definition

BU03-Kit connects to a total of 40 interfaces. For example, in the pin diagram, the pin function definition table is the interface definition.

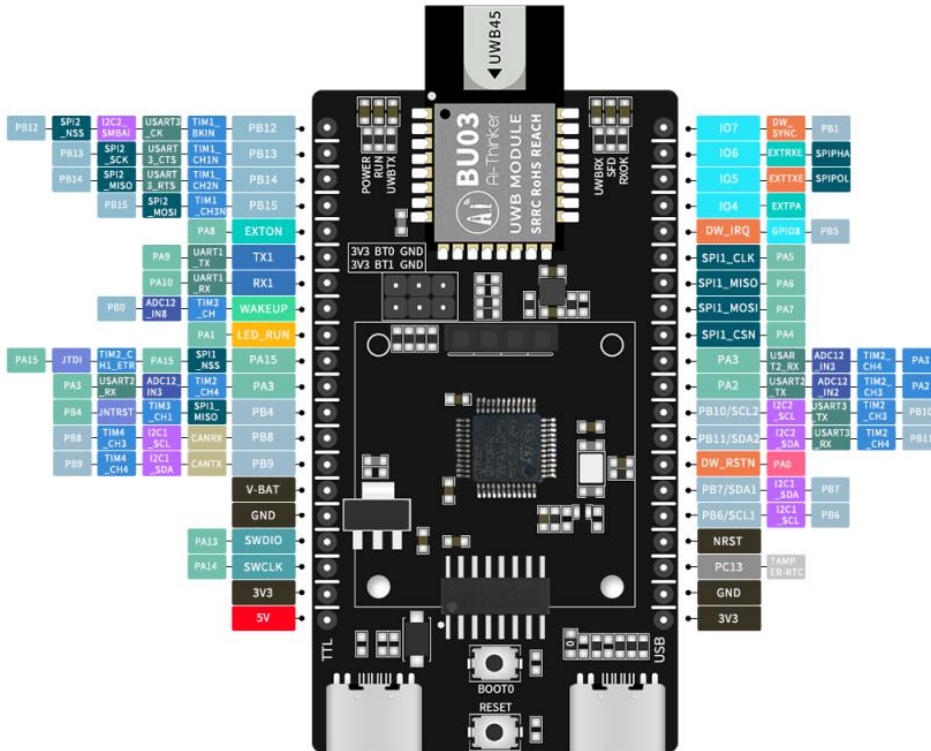


Table 6 Pin function definition table

No.	Name	Function
1	PB12	PB12,SPI2_NSS/I2C2_SMBAl/USART3_CK/TIM1_BKIN
2	PB13	PB13,SPI2_SCK/USART3_CTS/TIM1_CH1N
3	PB14	PB14,SPI2_MISO/USART3_RTSTIM1_CH2N
4	PB15	PB15,SPI2_MOSI/TIM1_CH3N
5	EXTON	EXTON_PA8
6	TX1	UART1_TX
7	RX1	UART1_RX
8	WAKEUP	PA0WKUP,PA0,WKUP/USART2_CTS(9)/ADC12_IN0/TIM2_CH1_ETR
9	LED_RUN	PA1_LED_RUN
10	PA15	JTDI,,TIM2_CH1_ETR/PA15/SPI1_NSS
11	PA3	PA3,,USART2_RX/ADC12_IN3/TIM2_CH4
12	PB4	JNTRST,TIM3_CH1/PB4/SPI1_MISO
13	PB8	PB8,TIM4_CH3,I2C1_SCL/CANRX
14	PB9	PB9,TIM4_CH4,I2C1_SDA/CANTX
15	V-BAT	V-BAT
16	GND	GND
17	SWDIO	SWDIO
18	SWCLK	SWCLK
19	3V3	3V3 power supply
20	5V	5V power supply

21	3V3	3V3 power supply
22	GND	GND
23	PC13	PC13-TAMPER-RTC,PC13,TAMPER-RTC
24	NRST	NRST
25	I2C1_SCL	I2C1_SCL/PB7
26	I2C1_SDA	I2C1_SDA/PB7
27	DW_RSTN	RSTN
28	I2C3_SDA	PB11,I2C2_SDA/USART3_RX,TIM2_CH4
29	I2C2_SCL	PB10,I2C2_SCL/USART3_TX,TIM2_CH3
30	PA2	PA2,USART2_TX/ADC12_IN2/TIM2_CH3
31	PA3	PA3,USART2_RX/ADC12_IN3/TIM2_CH4
32	SPI1_CSN	SPI1_CSN
33	SPI1_MOSI	SPI1_MOSI
34	SPI1_MISO	SPI1_MISO
35	SPI1_CLK	SPI1_CLK
36	DW_IRQ	DW_IRQ/GPIO8
37	IO4	IO4/EXTPA
38	IO5	IO5/EXTTXE/SPIPOL
39	IO6	IO6/EXTRXE/SPIPHA
40	IO7	DW_SYNC

6. Schematic

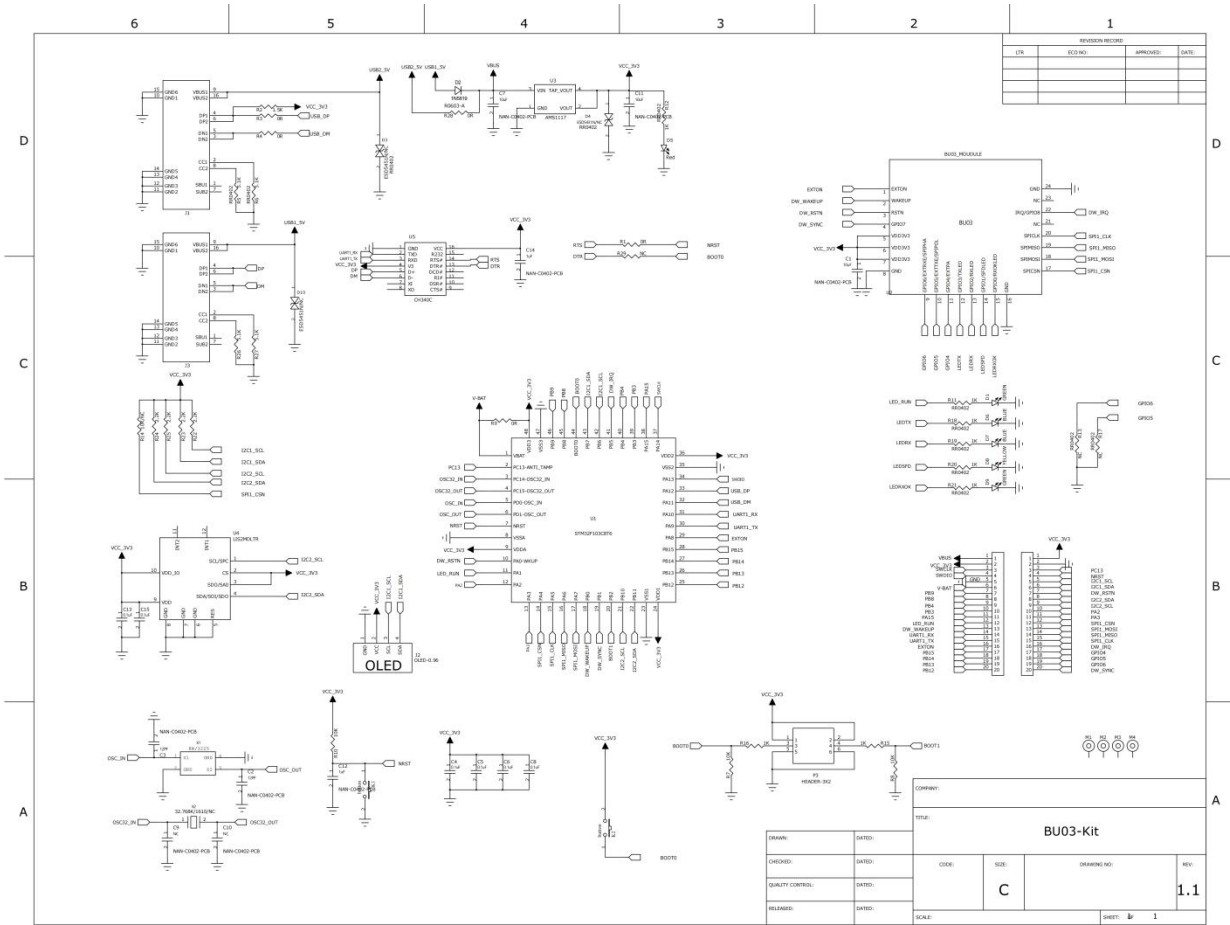


Figure 6 schematic diagram

7. Product packaging information

Packing List	Package	Pack Quantity Units	Pack Quantity Units(Sealed bag)
BU03-Kit	Foam + electrostatic bag	1pcs	10pcs

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