BW20-12F-Kit Specification

Version V1.0.0

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Document resume

Version	Date	Develop/revise content	Edition	Approve
V1.0.0	2024.08.07	First edition	Xiangfei Zeng	Hong Xu
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Content

1. Product overview

The BW20-12F-Kit is a development board designed for the BW20-12F module. BW20-12F is a dual-frequency Wi-Fi + BLE SoC module developed by Shenzhen Ai-Thinker Technology Co., Ltd. based on RTL8711 series chips, which supports dual-frequency (2.4 GHz or 5 GHz)802.11a/b/g/n WLAN protocol and Bluetooth 5.0 protocol. The BW20-12F integrates dual-core MCU, a ARM V8.1 (Cortex-M4F compatible) high-performance MCU with a maximum frequency of 330 MHz; a ARM V8M (Cortex-M0 compatible) low-power MCU.

The BW20-12F module has rich peripheral interfaces, including UART / GPIO / ADC / PWM / IIC / SPI / SDIO / IR/ SWD / USB et al. It can be widely used in the Internet of Things (IoT), mobile devices, wearable electronic devices, smart home and other fields.

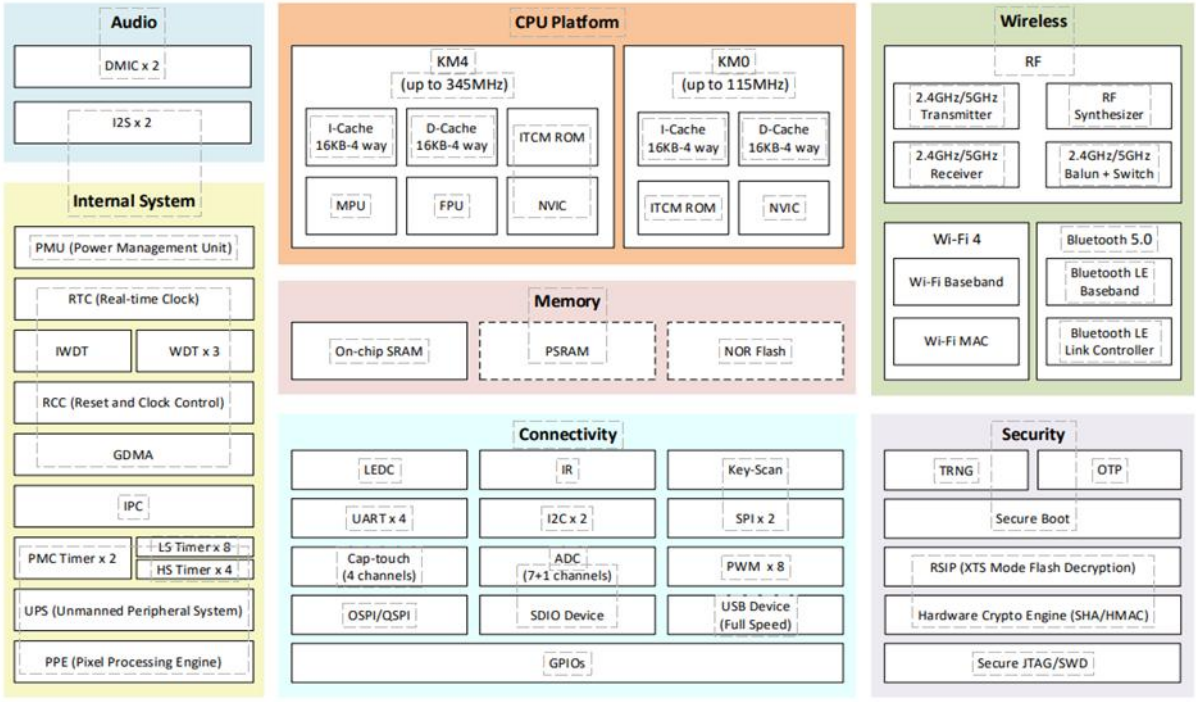


Figure 1 Main chip architecture diagram

1.1. Characteristic

- Support for the 802.11a/b/g/n protocol
- Supports both 2.4GHz and 5GHz
- Supports the HT 20 / HT 40 mode
- Support for BLE 5.0
- Support for BLE Long Range
- The Bluetooth supports a high-power mode
- LE data length extension
- Support for link-layer privacy
- Support for the hardware encryption engine
- Integrated dual-core MCU, up to 330 MHz
- Abundant interfaces, with 17 flexible IO ports
- Wi-Fi and Bluetooth share the same antenna
- Support for secondary development, and support for programming under Linux

2. Main parameters

Table 1: Description of the main parameters

Model	BW20-12F-Kit
Use for module	BW20-12F
Package	DIP-28
Size	28*60*4.2(±0.2)MM
Antenna type	On-board PCB antenna
Frequency range	2400~2483.5MHz and 5180~5825MHz
Working temperature	-40 ℃~85 ℃
Storage environment	-40 ℃~125 ℃，<90%RH
Power supply range	Support voltage 3.0V~3.6V，support current>500mA
Support interface	UART/GPIO/ADC/PWM/IIC/SPI/SDIO/IR/SWD/USB
Number of IO ports available	Default 17
Serial port rate	Default 115200bps
Bluetooth	BLE 5.0
SPI Flash	Default 4MByte

2.1. Power selection

The BW20-12F-Kit supports three power supply modes：

- Power supply by type-C interface (recommended)
- 5V and GND pin header connect supply
- 3V3 and GND pin header connect supply

2.2. Electrostatic requirements

BW20-12F-Kit is a static-sensitive device requiring special precautions during handling.

Figure 2 ESD E-static diagram

2.3. Electrical character

Table 2. Electrical characteristics table

Parameter		Condition	Min.	Typ	Max	Unit
Voltage supply		3V3	3.0	3.3	3.6	V
I/O	VIL	-	-	-	0.3*VDD	
	VIH	-	0.65*VDD	-	-	
	VOL	-	-	0.15*VDD	-	
	VOH	-	-	0.85*VDD	-	

2.4. Wi-Fi RF performance

Table 3 Wi-Fi RF Performance Table

Description	Typical			Unit
Frequency range	2400~2483.5 and 5180~5825			MHz
Output power				
Mode	**Min.**	**Typ.**	**Max**	**Unit**
11a mode, the PA output power	-	18	-	dBm
11b mode, the PA output power	-	19	-	dBm
11g mode, the PA output power	-	18	-	dBm
11n mode, the PA output power	-	17	-	dBm
Receiving sensitivity				
Mode	**Min.**	**Typ.**	**Max**	**Unit**
11b，1Mbps	-	-99	-	dBm
11b，11Mbps	-	-90	-	dBm
11a/g，6Mbps	-	-94	-	dBm
11a/g，54Mbps	-	-76	-	dBm
HT20（MCS0）	-	-93	-	dBm
HT20（MCS7）	-	-74	-	dBm
HT40（MCS0）	-	-91	-	dBm
HT40（MCS7）	-	-71	-	dBm

2.5. BLE RF performance

Table 4 BLE RF Performance Table

Description	Typ.			Un
Frequency range	2400 ~ 2484MHz			MHz
Output power				
Mode	**Min.**	**Typ.**	**Max**	**Unit**
1Mbps	-	15	-	dBm
2Mbps	-	15	-	dBm
Receiving sensitivity				
Mode	**Min.**	**Typ.**	**Max**	**Unit**
1Mbps @30.8%PER	-	-99	-	dBm
2Mbps @30.8%PER	-	-97	-	dBm

3. Appearance dimension

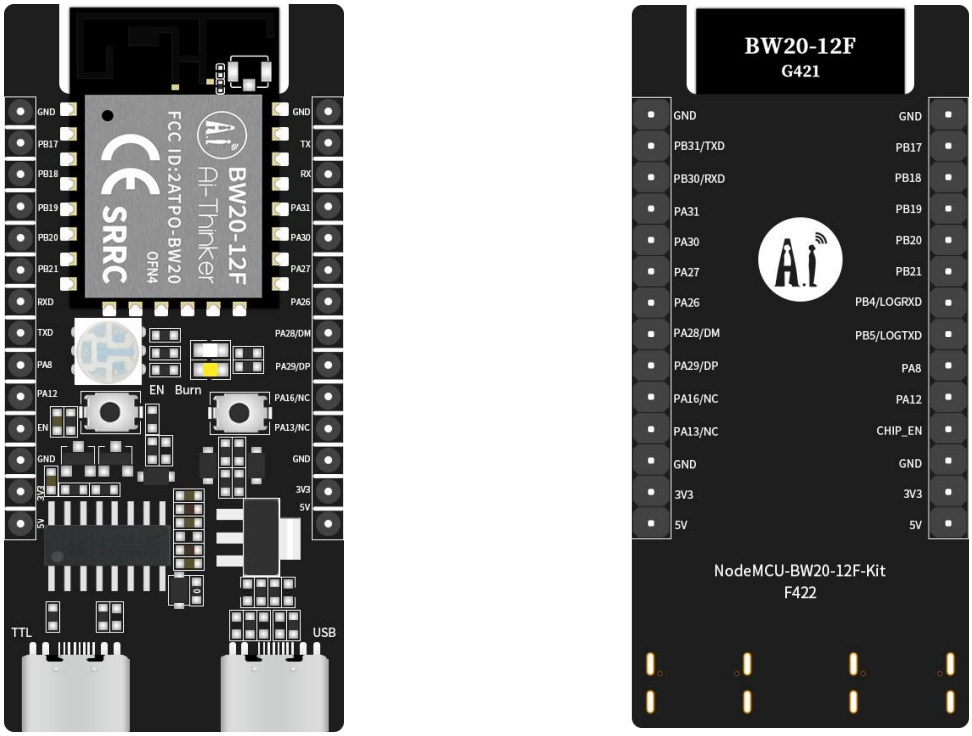


Figure 3 Appearance diagram (rendering diagram is for reference only, subject to physical objects)

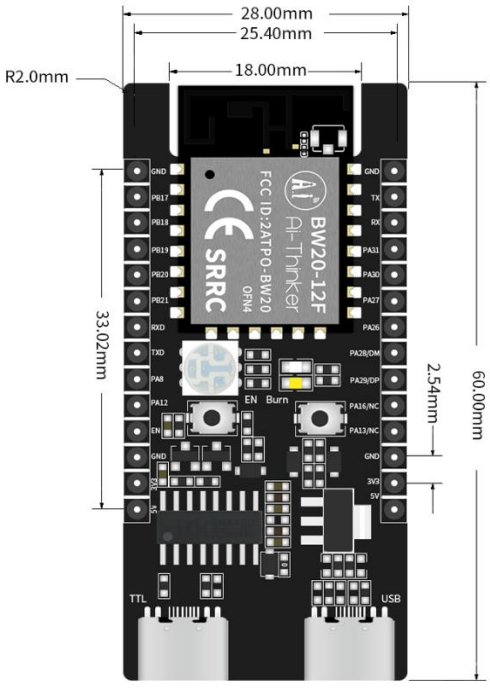


Figure 4 Size diagram

4. Description of the indicator light and the key button

The BW20-12F-Kit development board has 2 LED (Cold & Warm) & 1 RGB light, 2 buttons and 2 USB ports, as shown in the following figure:

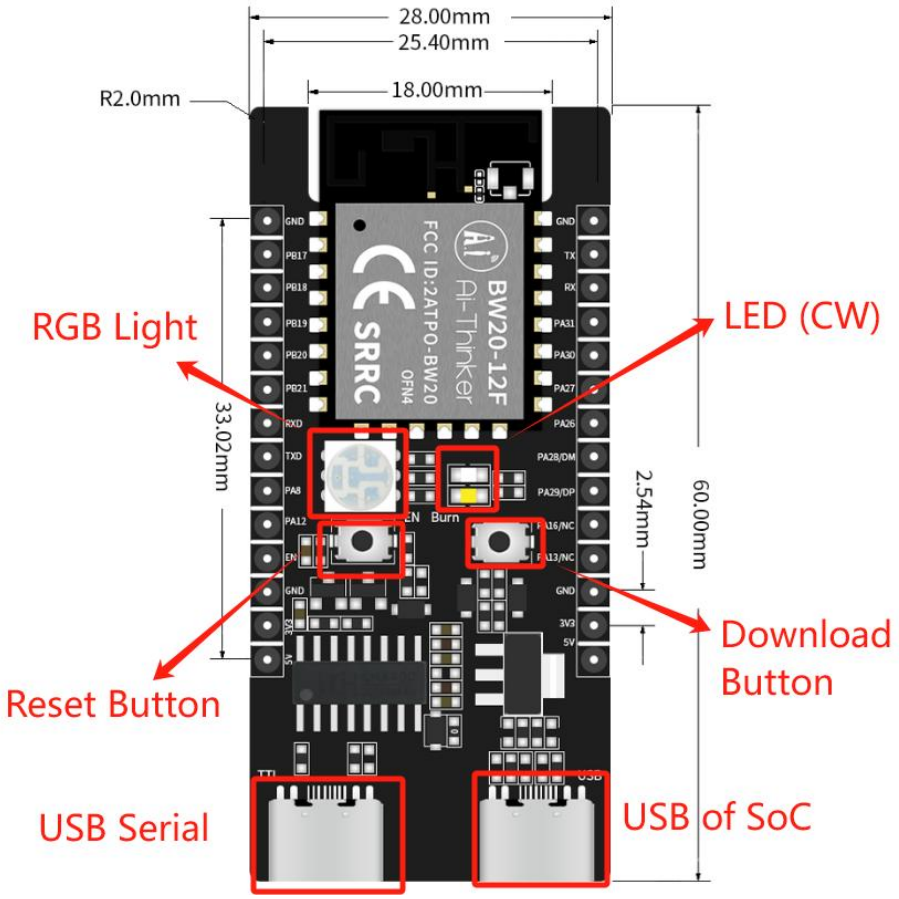


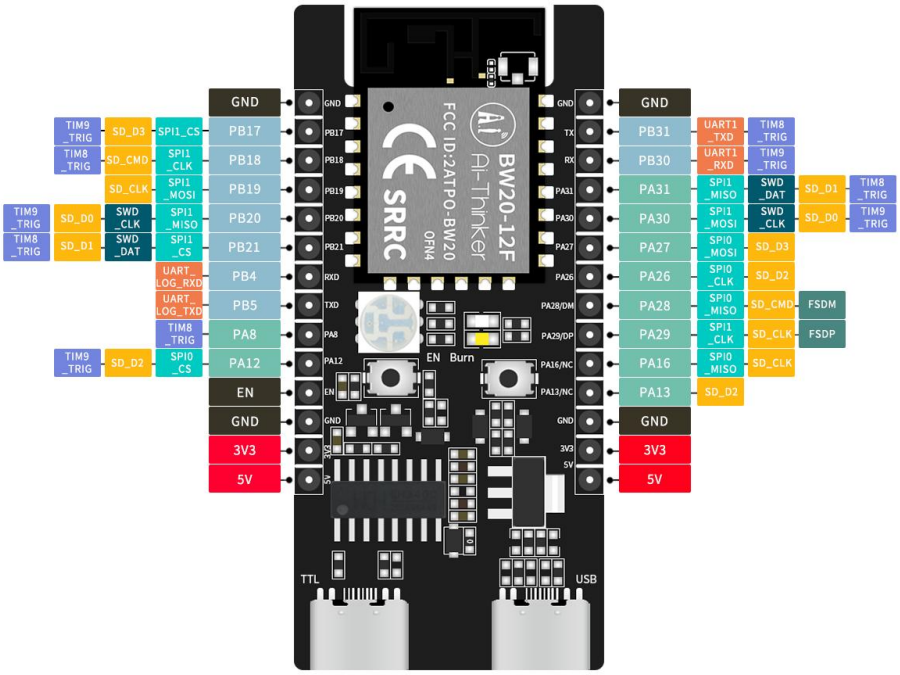
Figure 5 Location diagram of the indicator light and the keys

Table 5 Indicator light status and key function table

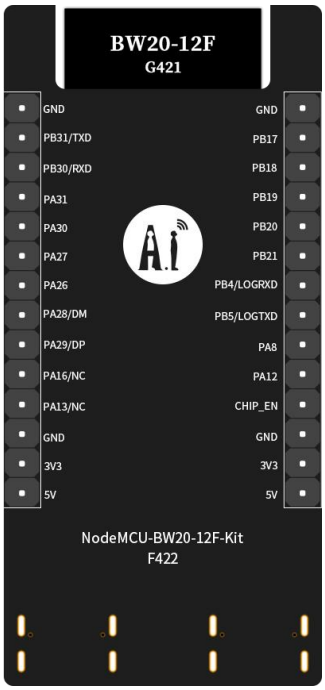
Indicator light or button	LED status or key press function	Remarks
RGB light	RGB light respectively c connects to PB18、PB19、PB17	RGB lamp three IO pins correspond to the three primary colors of red, blue and green
Reset button	Connect EN pin	Release the reset after pressing
Burn key	Connect LOG_TX pin	First press and hold the burn button, then press the reset button to release, and then release the burn button, that is, enter the burn mode

5. Pin definition

BW20-12F-Kit has 19 IO ports, such as the schematic diagram of the pin, and the pin function definition table is the interface definition.



Front



Back

Figure 6 Schematic of development pins

Table 6 Definitions of pin function

No	Name	Function description
1	GND	Connect to ground
2	PB17	SPI1_CS/SD_D3
3	PB18	SPI1_CLK/SD_CMD
4	PB19	SPI1_MOSI/SD_CLK
5	PB20	SPI1_MISO/SWD_CLK/SD_D0
6	PB21	SPI1_CS/SWD_DAT/SD_D1
7	LOG_RX	UART_LOG_RXD，RX pin for download firmware
8	LOG_TX	UART_LOG_TXD，EX pin for download firmware
9	PA8	TIM8_TRIG
10	PA12	SPI0_CS/SD_D2/TIM9_TRIG
11	EN	The chip enables pin and pull up effectively
12	GND	Connect to ground
13	3V3	For 3.3V power supply (VDD), the output current of external power supply is recommended to be above 500 mA
14	5V	For 5V power supply (VBUS), the output current of the external power supply is recommended to be above 500 mA
15	GND	Connect to ground
16	PB31/TXD	UART1_TXD
17	PB30/RXD	UART1_RXD
18	PA31	SPI 1 _ MISO / SWD _ DAT / SD_D1, the default function is SWD DATA, which can be configured as PA31 after IC boot
19	PA30	SPI 1 _ MOSI / SWD _ CLK / SD_D0, the default function is SWD DATA, which can be configured as PA30 after IC boot
20	PA27	SPI0_MOSI/SD_D3
21	PA26	SPI0_CLK/SD_D2
22	DM	PA28/SPI0_MISO/SD_CMD/FSDM
23	DP	PA29/SPI1_CLK/SD_CLK/FSDP
24	PA16	The default is not available and the IO is occupied by Flash inside the module. If you need to use it, please contact Ai-Thinker. SPI 0 _ MISO _ SD / CLK / external Flash
25	PA13	The default is not available and the IO is occupied by Flash inside the module. If you need to use it, please contact Ai-Thinker. SD_D2 / External Flash
26	GND	Connect to ground

27	3V3	For 3.3V power supply (VDD), the output current of external power supply is recommended to be above 500 mA
28	5V	For 5V power supply (VBUS), the output current of the external power supply is recommended to be above 500 mA

6. Schematic diagram

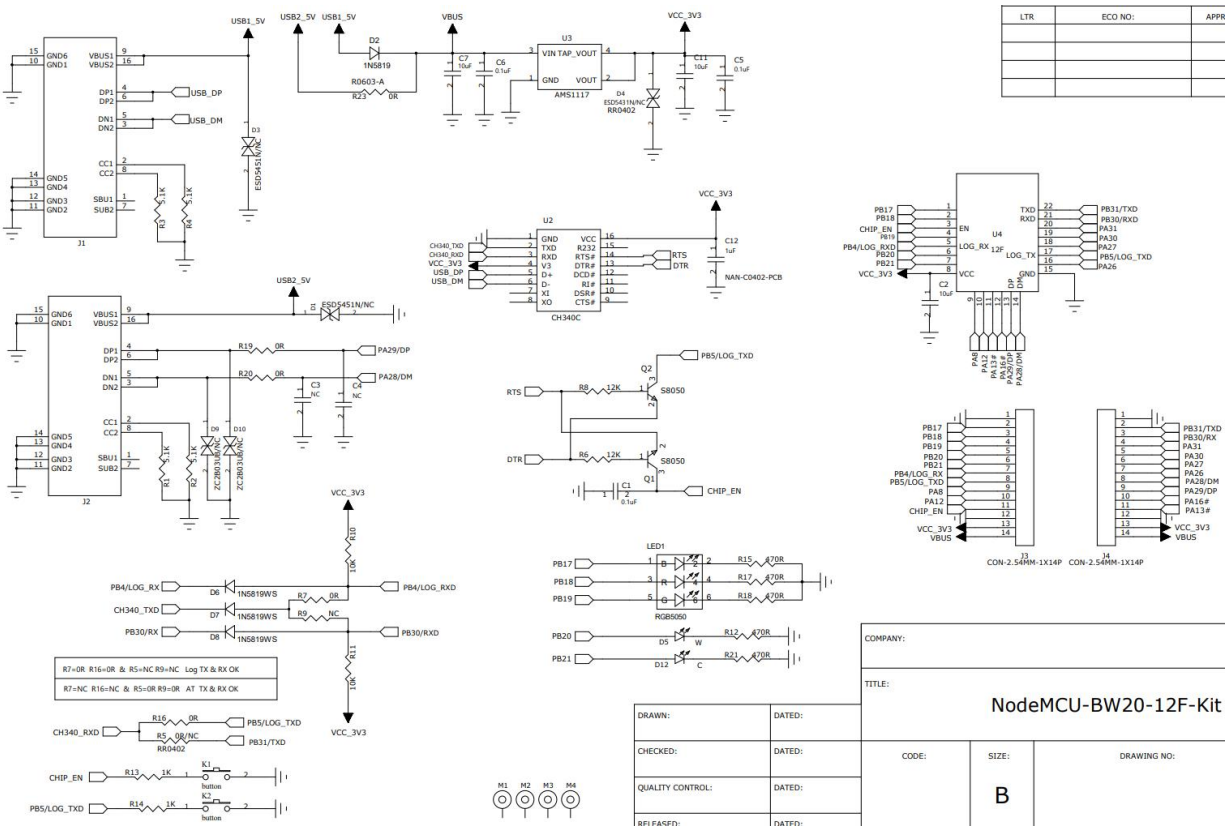


Figure 7. Schematic diagram of the development board

7. Precautions for products

The onboard USB serial port of BW 20-12F-Kit corresponds to the serial port 0, with the pins being LOG _ RXD and LOG _ TXD. The development board can only choose to burn the new firmware through the onboard USB serial port or through the LOG _ RXD and LOG _ TXD pins connected to the TTL module.

8. Product packaging information

Table 7. Packaging information sheet

Packing list	Packing method	Quantity per pack (electrostatic bag)	Quantity per pack (sealed bag)
BW20-12F-Kit	Bubble cotton + electrostatic bag	1 PCS	10pcs

9. Contact us

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