



THE DATASHEET OF BW16-KIT





BW16-Kit specification

Version V1.2.2

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Content

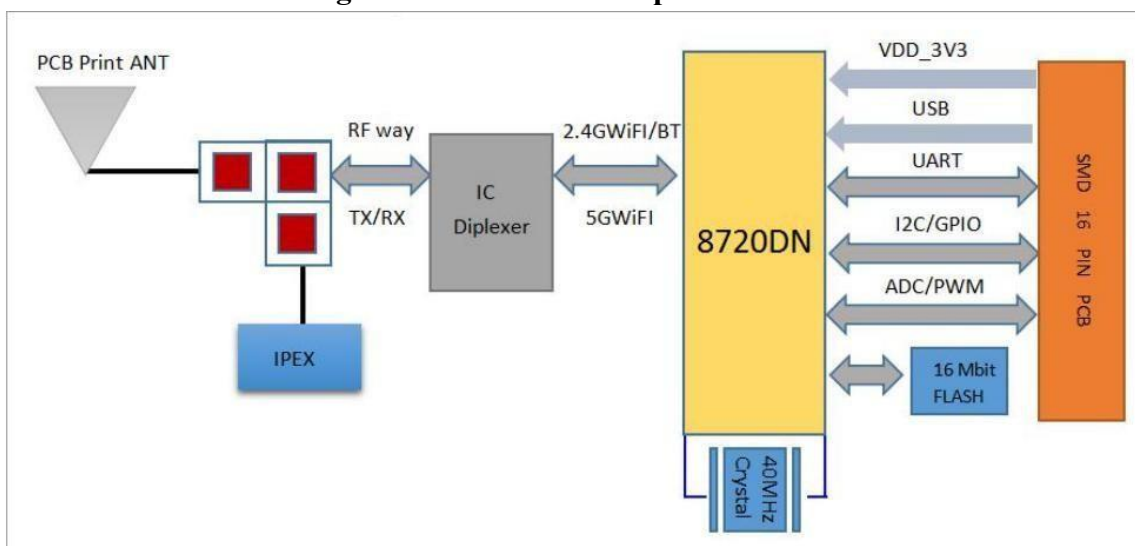
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1. Product Overview

BW16-Kit is a development board designed for the BW16 module. BW16 is a dual-frequency Wi-Fi + Bluetooth SoC module developed by B&T based on RTL8720DN chip. BW16 supports dual-frequency (2.4GHz or 5GHz) WLAN and low-power Bluetooth 5.0, integrates ARM V8 (compatible with Cortex-M4F) high-performance MCU, ARM V8M (compatible with Cortex-M0) low-power MCU, WLAN (802.11 a/B/g / n), MAC, Bluetooth baseband and RF baseband, and provides a set of configurable GPIO ports for the control of different peripheral devices.

It has the following features:

Figure 1 RTL8720DN chip architecture



1.1. Characteristic

- Supports 802.11a/B/g/n, 2.4GHz or 5GHz.
- Support HT20 and HT40 mode.
- Supports low-power Beacon listening mode, low-power receiver mode, and low-power suspension mode.
- Built-in AES / DES / SHA hardware engine.
- Supports TrustZone-M and secure startup.
- Support SWD to debug port access protection and disable mode.
- BLE 5.0 is supported.
- Bluetooth supports high power mode (7dBm, sharing the same PA with Wi-Fi).
- Wi-Fi and Bluetooth share the same antenna.

- Supports the STA/AP/STA + AP operation mode.
- Simple Config (apps) that support Android and IOS Wi-Fi one-click Network allocation.
- Supports Bluetooth-assisted network distribution.
- Supports local serial port upgrades and remote firmware upgrades (FOTA).
- Supports secondary development and programming in Linux and Window environments.
- Supports Arduino development.

2. Main parameters

Table 1 main parameters

| | |
|------------------------------|--|
| Model | BW16-Kit |
| Suitable modules | BW16 |
| Package | DIP-22(2.54 spacing standard row pin) |
| Size | 50.4*25.4(±0.2)mm |
| Antenna | Board-mounted PCB antenna |
| Spectrum Range | 2400-2483.5MHz or 5180-5825MHz |
| WiFi | Supports 802.11 a/B/g/n |
| Bluetooth | BLE 5.0 |
| Operation temperature | -40°C ~ 85°C |
| Storage environment | -40 °C ~ 125 °C , < 90%RH |
| Power supply | Supply voltage 5V current greater than 500mA |
| Interfaces | UART/GPIO/ADC/PWM/IIC/SPI/SWD |
| I/O ports | 13 GPIO (including TX0\RX0 and TX1\RX1) |
| Security | AES / DES / SHA |
| Flash | Default value: 2MB. Valid values: 4MB. |

2.1. Power supply selection

You can choose one of the following three power supply methods to supply power to BW16-Kit:

- Type-C interface power supply (default)
- 5V and GND pin power supply
- 3V3 and GND pin power supply

We recommend that you select the first power supply mode: Type-C interface power supply.

2.2. Static electricity requirements

BW16-Kit Development Board is electrostatic sensitive equipment, special preventive measures should be taken when carrying.



Figure 2 ESD anti-static diagram

2.3. Electrical characteristics

Table 2 Electrical Characteristics Table

| Parameter | Conditio | Minimum | Typical | Maximum | Com |
|---------------------|----------|---------|---------|---------|-----|
| Supply voltage | VDD | 4.5 | 5 | 5.3 | V |
| Digital I/O voltage | - | 1.76 | 1.8-3.3 | 3.3 | V |

2.4. BW16-Kit RF performance

Table 3 2.4g Wi-Fi RF performance table

| Depaint | Typical value | | | Compa |
|-------------------------------|---------------|---------|---------|-------|
| Spectrum Range | 2400-2483.5 | | | MHz |
| Output power | | | | |
| Rate mode | Minimum | Typical | Maximum | Compa |
| In 11b mode, PA output power | - | 16 | - | dBm |
| In 11G mode, PA output power | - | 15 | - | dBm |
| 11n mode HT20,PA output power | - | 14 | - | dBm |
| 11n mode HT40,PA output power | - | 14 | - | dBm |
| Receiving sensitivitiy | | | | |
| Rate mode | Minimum | Typical | Maximum | Compa |
| 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 |
| 11n,HT40 (MCS7) | - | -71 | - | dBm |

Table 4 RF performance of 5G Wi-Fi

| Depaint | Typical value | | | Compa |
|-------------------------------|---------------|---------|---------|-------|
| Spectrum Range | 5180-5825MHz | | | MHz |
| Output power | | | | |
| Rate mode | Minimum | Typical | Maximum | Compa |
| In 11a mode, PA output power | - | 14 | - | dBm |
| 11n mode HT20,PA output power | - | 13 | - | dBm |
| 11n mode HT40,PA output power | - | 13 | - | dBm |
| Receiving sensitivity | | | | |
| Rate mode | Minimum | Typical | Maximum | Compa |
| 11a,6 Mbps | - | -93 | - | dBm |
| 11a,54 Mbps | - | -76 | - | dBm |
| 11n,HT40 (MCS7) | - | -73 | - | dBm |
| 11n,HT20 (MCS7) | - | -71 | - | dBm |

Table 5 BLE RF performance table

| Depaint | Typical value | | | Compa |
|-------------------------------|---------------|---------|---------|-------|
| Spectrum Range | 2400-2483.5 | | | MHz |
| Output power | | | | |
| Rate mode | Minimum | Typical | Maximum | Compa |
| 1Mbps | - | 6 | - | dBm |
| Receiving sensitivity | | | | |
| Rate mode | Minimum | Typical | Maximum | Compa |
| 1Mbps sensitivity @ 30.8% PER | - | -96 | - | dBm |

3. Appearance size

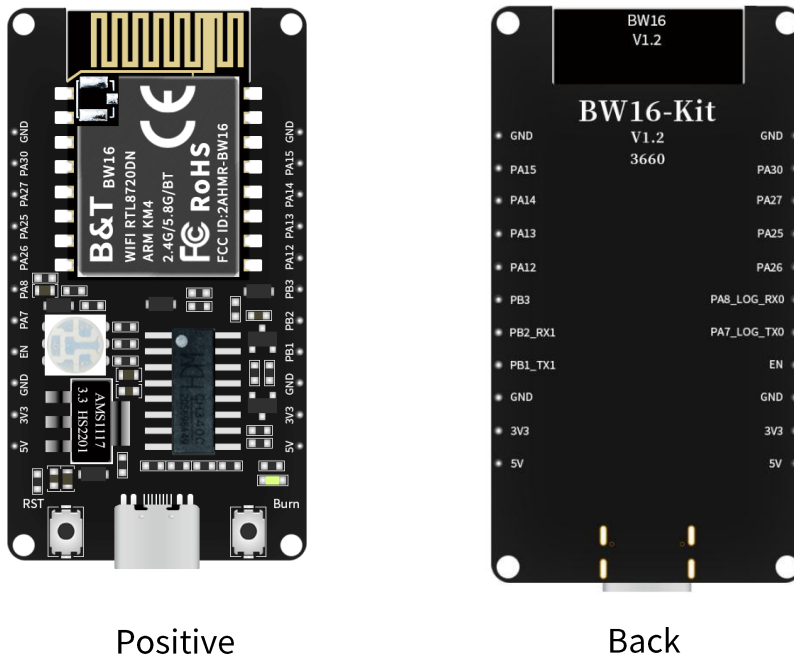


Figure 3 External view of BW16-Kit (For reference only)

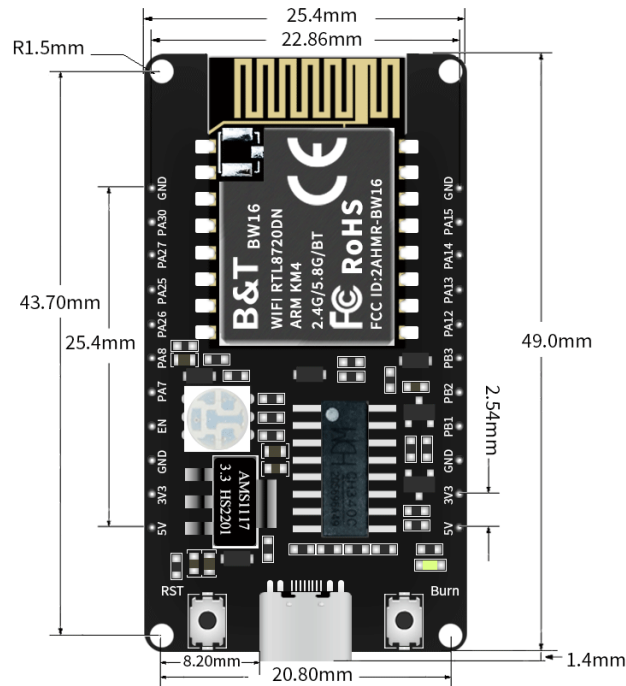


Figure 4 development board size chart

4. Indicator light and button description

There is a power indicator light and an RGB light in the BW16-Kit, leading to two buttons: "RST" key and "Burn" key, as shown in the following figure:

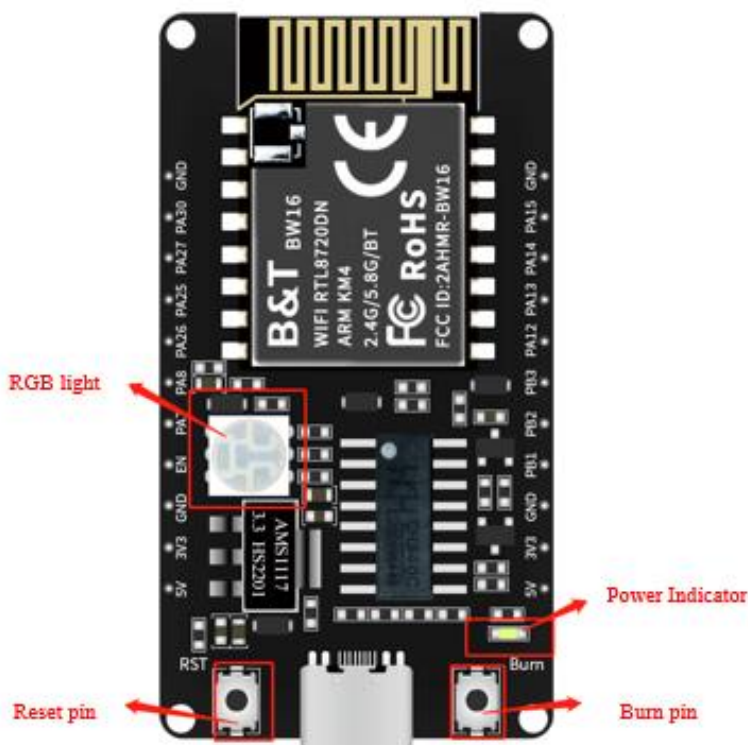


Figure 5 BW16-Kit indicator light and key position

Table 6 indicator status and key function table

| Indicator light or button | LED status or button function | Remarks |
|---------------------------|--|--|
| Power Indicator | 5V power indicator | When power is supplied to the development board, the indicator light is on |
| RGB light | RGB lights are connected to PA12, PA13, PA14 of the Development Board respectively | The three IO pins of RGB lamp correspond to the three primary colors of red, blue and green. |
| RST key | Reset key | / |
| Burn key | Set the Development Board to burn mode | Keep press Burn button, then press RTS button and release, finally release Burn button, entering burn mode |

5. Pin definition

BW16-Kit, 13 interfaces are connected, As shown in the diagram of pins, the pin function definition table is the interface definition.

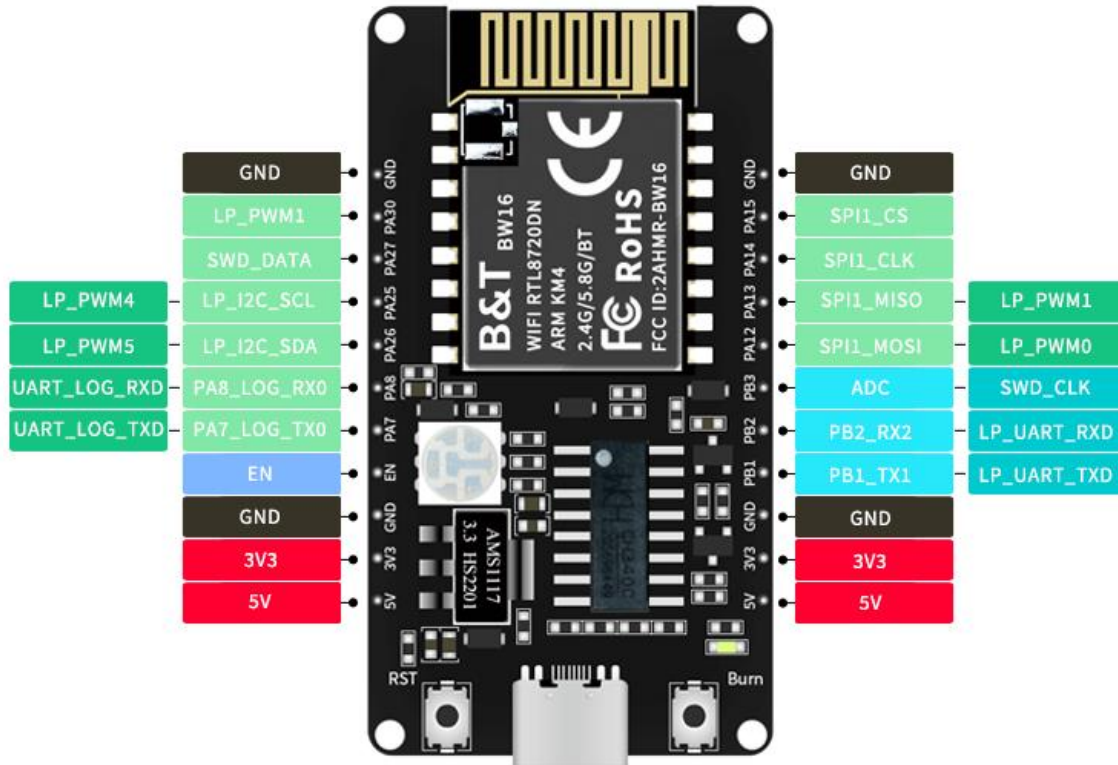


Figure 6 schematic diagram of development board pin

Table 7 definition table of pin functions

| Foot sequence | Name | Description |
|---------------|-------------|----------------------|
| 1 | GND | Conductive earth |
| 2 | PA30 | LP_PWM1 |
| 3 | PA27 | SWD_DATA |
| 4 | PA25 | LP_I2C_SCL/LP_PWM4 |
| 5 | PA26 | LP_I2C_SDA/LP_PWM5 |
| 6 | PA8_LOG_RX0 | UART_LOG_RXD |
| 7 | PA7_LOG_TX0 | UART_LOG_TXD |
| 8 | EN | Chip Enable terminal |
| 9 | GND | Conductive earth |
| 10 | 3V3 | 3.3V power supply |
| 11 | 5V | 5V power supply |
| 12 | 5V | 5V power supply |
| 13 | 3V3 | 3.3V power supply |
| 14 | GND | Conductive earth |
| 15 | PB1_TX1 | LP_UART_TXD |
| 16 | PB2_RX1 | LP_UART_RXD |
| 17 | PB3 | ADC/SWD_CLK |
| 18 | PA12 | LP_PWM0/SPI1_MOSI |
| 19 | PA13 | LP_PWM1/SPI1_MISO |
| 20 | PA14 | SPI1_CLK |
| 21 | PA15 | SPI1_CS |
| 22 | GND | Conductive earth |

7. Product Related models

Table 8 product related model table

| Model | Power supply | Package | Size | Antenna |
|--|---------------------------|---------|-------------------|--|
| BW16 | 3.0V ~ 3.6V, I > 500mA | SMD-16 | 24*16*3(±0.2)mm | PCB antenna/IPEX seat compatible |
| BW16-Kit | 5V, I > 500mA | DIP-22 | 50.4*25.4(±0.2)mm | Board-mounted PCB antenna |
| Product Information: https://docs.ai-thinker.com | | | | |

8. Product considerations

In BW16-Kit version, the interface Type-C corresponds to serial port 0, and the pins are UART_LOG_RXD(PA8_LOG_RX0) and UART_LOG_TXD(PA7_LOG_TX0). The development board can only choose to install new firmware through the Type-C or through the UART_LOG_RXD, UART_LOG_TXD pin connected to the TTL module to complete the firmware upgrade.

9. Product packaging information

Table 9 packing information table

| Packing List | Packaging method | Quantity per package (Electrostatic bag) |
|--------------|--------------------------|---|
| BW16-Kit | Foam + electrostatic bag | 1 piece |

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[Technical support Email: support@aithinker.com](#)

[Domestic business cooperation: sales@aithinker.com](#)

[Overseas business cooperation: overseas@aithinker.com](#)

Company address: Room 403,408-410, Building C, Huafeng Intelligence Innovation Port, Gushu, Xixiang, Baoan District, Shenzhen.

Tel: 0755-29162996



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