# BW20-07S-Kit Specification

Version V1.0.0

# Document Resume

| Version | Date | Develop/Revise Content | Edition | Approval |
|---|---|---|---|---|
| V1.0.0 | 2025.11.06 | First edition | Zeng Xiangfei | Xu Hong |
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# Content

# 1. Product Overview

The BW20-07S Kit is a development board designed for the BW20-07S module. The BW20-07S is a dual-band Wi-Fi + BLE SoC module developed by Shenzhen Ai-Thinker Technology Co., Ltd. based on the RTL8711 series chip. It supports dual-band (2.4 GHz or 5 GHz) 802.11a/b/g/n WLAN protocols and Bluetooth 5.0 protocol. The BW20-07S integrates a dual-core MCU: a high-performance MCU compatible with Cortex-M 55 , with a maximum clock speed of 345 MHz; and a low-power MCU compatible with Cortex-M 23 , with a maximum clock speed of 115 MHz.

BW20-07S module has a rich set of peripheral interfaces, including UART. / GPIO / ADC / PWM / IIC / SPI / SDIO / IR / SWD / USB and other technologies. It can be widely used in the Internet of Things, mobile devices, wearable electronic devices, smart homes, and other fields.

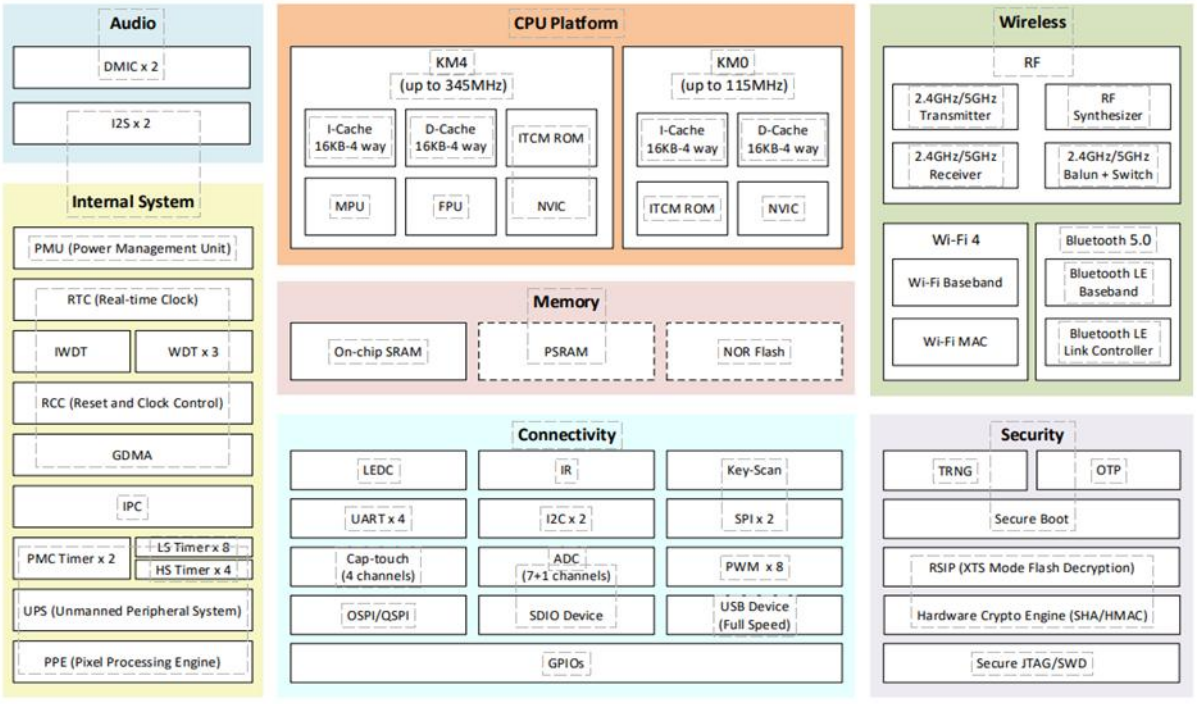



**Figure 1 Main chip architecture diagram**

## 1.1. Characteristic

- Supports 802.11a/b/g/n protocols
- Supports 2.4GHz and 5GHz
- Supports HT20/HT40 modes
- Supports BLE 5.0
- Supports BLE Long Range
- Bluetooth supports high-power mode
- Support LE data length extension
- Supports link-layer privacy
- Supports hardware encryption engine
- Integrated dual-core MCU, with a maximum clock speed of 330. MHz
- It features a rich array of interfaces, with 17 flexibly configurable I/O ports.
- Wi-Fi and Bluetooth share the same antenna.
- Supports secondary development and programming under Linux.

# 2. Main parameters

**Table 1. Description of Main Parameters**

| | |
|---|---|
| **Model** | BW20-07S - Kit |
| **Packaging** | DIP-28 |
| **Size** | 2 8 * 6 0 * 4 .2 ( mm) |
| **Antenna type** | I-PEX connector (4th generation) |
| **Frequency range** | 2400~2483.5MHz and 5180 ~ 5825MHz |
| **Operating temperature** | -40 ℃ ~ 85 ℃ |
| **Storage environment** | -40 ℃ ~ 125 ℃ , <90%RH |
| **Power supply range** | USB power supply voltage: 4.5V ~ 5.5V , power supply current: >500mA |
| **Supported interfaces** | UART / GPIO / ADC / PWM / IIC / SPI / SDIO / IR / SWD / USB |
| **Available I/O** | Default 1 7 |
| **Serial port speed** | 921600 bps |
| **Bluetooth** | BLE 5.0 |
| **Security** | WPS / WEP / WPA / WPA2 / WPA3 / WPA-EAP / WPA2-EAP / WPA3-EAP |
| **Flash** | Default 4MByte |

## 2.1. Power supply selection

The BW20-07S Kit supports three power supply methods :

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

## 2.2. Static electricity requirements

The BW20-07S Kit is an electrostatic sensitive device and requires special precautions during handling.

**Figure 2 ESD anti-static diagra**

## 2.3. Electrical characteristics

**Table 2 Electrical Characteristics Table**

| Parameter | | Condition | Minimum value | Typical value | Maximum value | Unit |
|---|---|---|---|---|---|---|
| USB power supply voltage | | 5 | 4.5 | 5 | 5.5 | V |
| Module power supply voltage | | 3.3 | 3.0 | 3.3 | 3.6 | |
| I/O | VIL | - | - | - | 0.3*VDD | |
| | VIH | - | 0.65*VDD | - | - | |
| | VOL | - | - | 0.15*VDD | - | |

## 2.4. Wi-Fi RF performance

**Table 3 Wi-Fi RF Performance Table**

| Describe | Typical value | | | Unit |
|---|---|---|---|---|
| Frequency range | 2400~2483.5 and 5180 ~ 5825 | | | MHz |
| **Output power** | | | | |
| **Mode** | **Minimum value** | **Typical value** | **Maximum value** | **Unit** |
| In 11a mode, the PA output power is | - | 18 | - | dBm |
| In 11b mode, the PA output power is | - | 19 | - | dBm |
| In 11g mode, the PA output power is | - | 18 | - | dBm |
| In 11n mode, the PA output power is | - | 17 | - | dBm |
| **Receiver sensitivity** | | | | |
| **Mode** | **Minimum value** | **Typical value** | **Maximum value** | **Unit** |
| 11b, 1Mbps | - | -99 | - | dBm |
| 11b, 11Mbps | - | -90 | - | dBm |
| 11a/g, 6Mbps | - | -94 | - | dBm |
| 11a/g, 54Mbps | - | -76 | - | dBm |
| HT20 ( MCS 0) | - | -93 | - | dBm |
| HT20 ( MCS7 ) | - | -74 | - | dBm |
| HT 4 0 ( MCS 0) | - | -91 | - | dBm |
| HT 4 0 ( MCS7 ) | - | -71 | - | dBm |

## 2.5. BLE radio frequency performance

**Table 4 BLE RF Performance Table**

| Describe | Typical value | | | Unit |
|---|---|---|---|---|
| Spectrum range | 2400 ~ 2484 MHz | | | MHz |
| **Output power** | | | | |
| **Mode** | **Minimum value** | **Typical value** | **Maximum value** | **Unit** |
| 1Mbps | - | 15 | - | dBm |
| 2Mbps | - | 15 | - | dBm |
| **Receiver sensitivity** | | | | |
| **Mode** | **Minimum value** | **Typical value** | **Maximum value** | **Unit** |
| 1Mbps @30.8%PER | - | -99 | - | dBm |
| 2Mbps @30.8%PER | - | -97 | - | dBm |

## 2.6. Power consumption

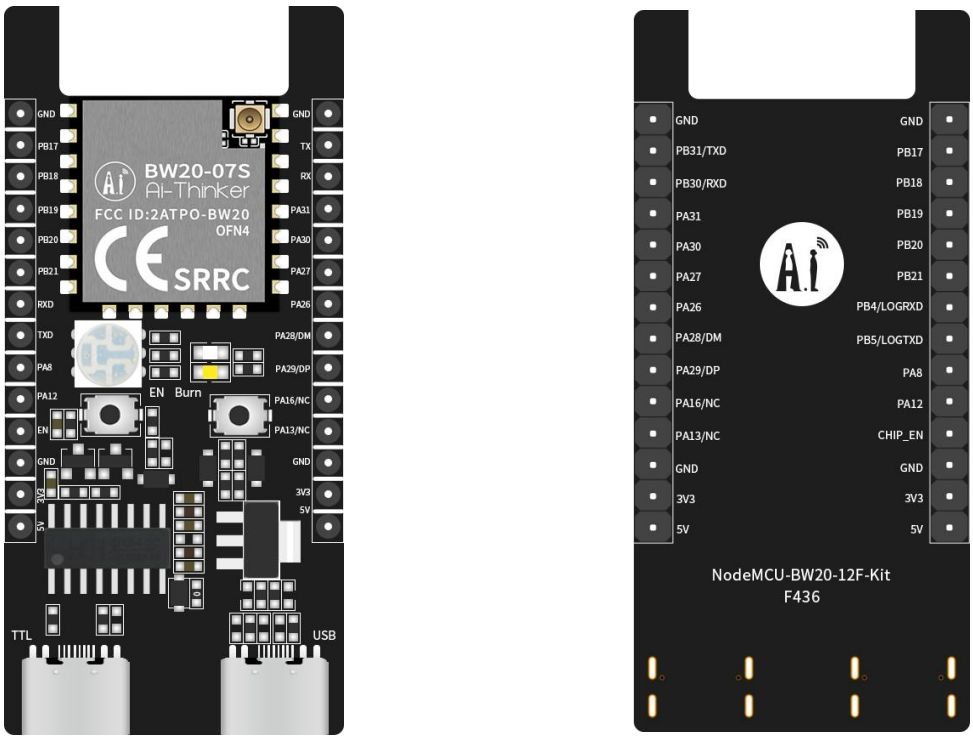
The following power consumption data are based on a 3.3 V power supply and an ambient temperature of 25° C .

- all transmit modes is measured at the antenna interface .
- All launch data were measured in continuous launch mode with a 100 % duty cycle.

**Table 5 Power Consumption Table**

| Mode | Minimum value | Average value | Maximum value | unit |
|---|---|---|---|---|
| Transmitting 802.11b , 11 Mbps , POUT = +22 | - | 328.41 | - | mA |
| Transmitting 802.11g , 54Mbps , POUT = +1 9 | - | 94.75 | - | mA |
| Transmit 802.11n , MCS7 , POUT = +1 9 dBm | - | 93.57 | - | mA |
| Receive 802.11b , packet length 1024 bytes | - | 47.27 | - | mA |
| Received 802.11g , packet length 1024 bytes. | - | 47.04 | - | mA |
| Receive 802.11n , packet length 1024 bytes | - | 47.07 | - | mA |

# 3. External dimensions




Front Back

**Figure 3 Appearance (Rendered image for reference only, the actual product shall prevail)**

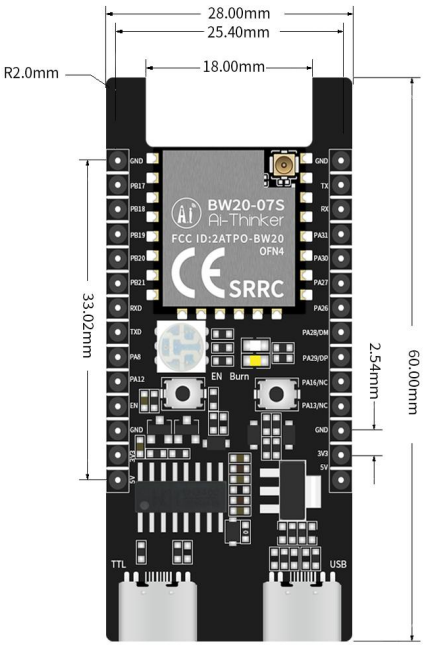



**Figure 4 Dimensions**

# 4. Indicator light and button instructions

The BW20-07S -Kit development board has two warm and cool LEDs , one RGB light, two buttons, and two USB ports, as shown in the picture below:

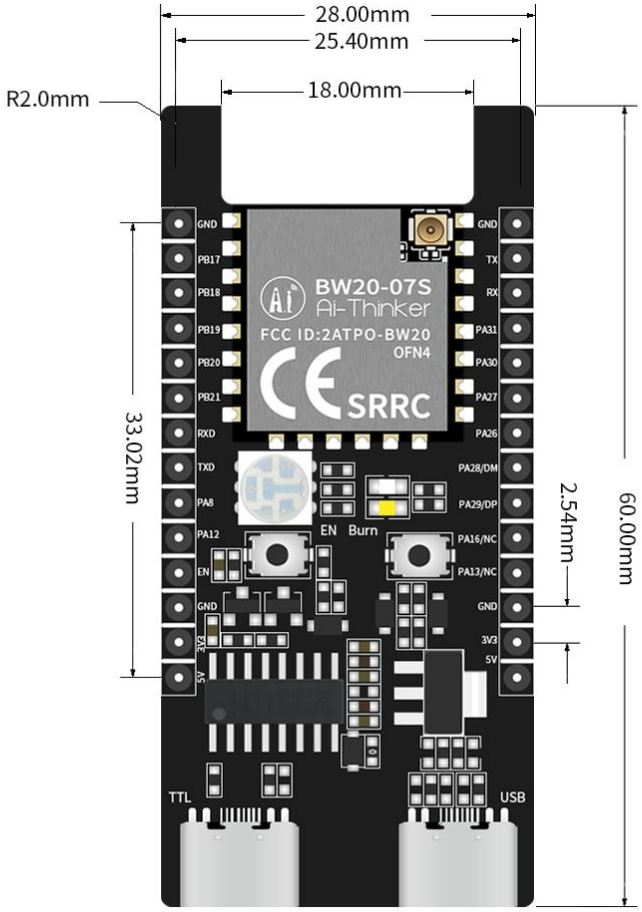


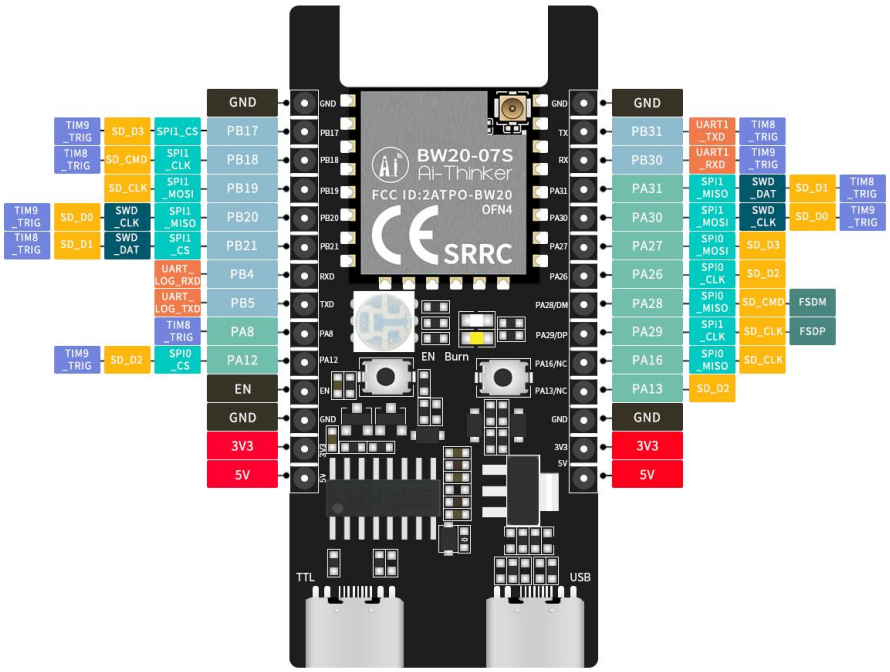

**Figure 5. Location diagram of indicator lights and buttons**

**Table 6 Indicator Light Status and Button Function Table**

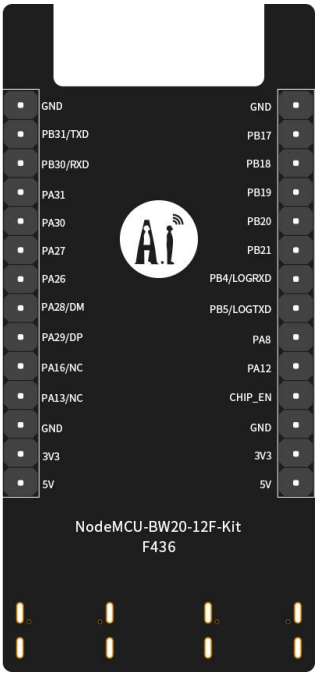
| Indicator light or button | LED status or button function | Remark |
|---|---|---|
| RGB lights | PB18, PB19, and PB17 of the development board respectively. | The three I/O pins of the RGB LED control the three primary colors: red, blue, and green. |
| Reset button | Connect to EN pin | Press and release to reset. |
| Burn button | Connect to LOG_TX pin | First, press and hold the burn button , then press and release the reset button , and then release the burn button again to enter burn mode. |

# 5. Pin Definitions

The BW20-07S -Kit has a total of 19 I/O ports, as shown in the pin diagram. The pin function definition table is the interface definition.




**front**




**back**

**Figure 6. Schematic diagram of development board pinout**

**Table 7 Pin Function Definitions**

| Pin No. | Pin name | Function Description |
|---|---|---|
| 1 | GND | Grounding |
| 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, the RX pin for downloading firmware. |
| 8 | LOG_TX | UART_LOG_TXD, the TX pin for downloading firmware. |
| 9 | PA8 | TIM8_TRIG |
| 10 | PA12 | SPI0_CS /SD_D2/TIM9_TRIG |
| 11 | EN | Chip enable pin, pull-up active |
| 12 | GND | Grounding |
| 13 | 3V3 | 3.3V power supply (VDD), external power supply output current of 500mA or higher is recommended. |
| 14 | 5V | 5V power supply (VBUS), external power supply output current of 500mA or higher is recommended. |
| 15 | GND | Grounding |
| 16 | PB31/TXD | UART1_TXD |
| 17 | PB30/RXD | UART1_RXD |
| 18 | PA31 | SPI1_MISO /SWD_DAT /SD_D1 , the default function is SWD DATA , which can be configured as PA31 after IC boot. |
| 19 | PA30 | SPI1_MOSI /SWD_CLK /SD_D0 , the default function is SWD CLK , which can be configured to 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 | This pin is unavailable by default; it is occupied by the module's internal Flash memory. Please contact Ai-Thinker for assistance. SPI0_MISO /SD_CLK / This pin is NC when using external Flash. |
| 25 | PA13 | This pin is unavailable by default; it is used by the module's internal Flash memory. Please contact Anxinke for permission to use it. (SD_D2 / External Flash: This pin is NC) |
| 26 | GND | Grounding |
| 27 | 3V3 | 3.3V power supply (VDD), external power supply output current of 500mA or higher is recommended. |
| 28 | 5V | 5V power supply (VBUS), external power supply output current of 500mA or higher is recommended. |

# 6. Schematic diagram

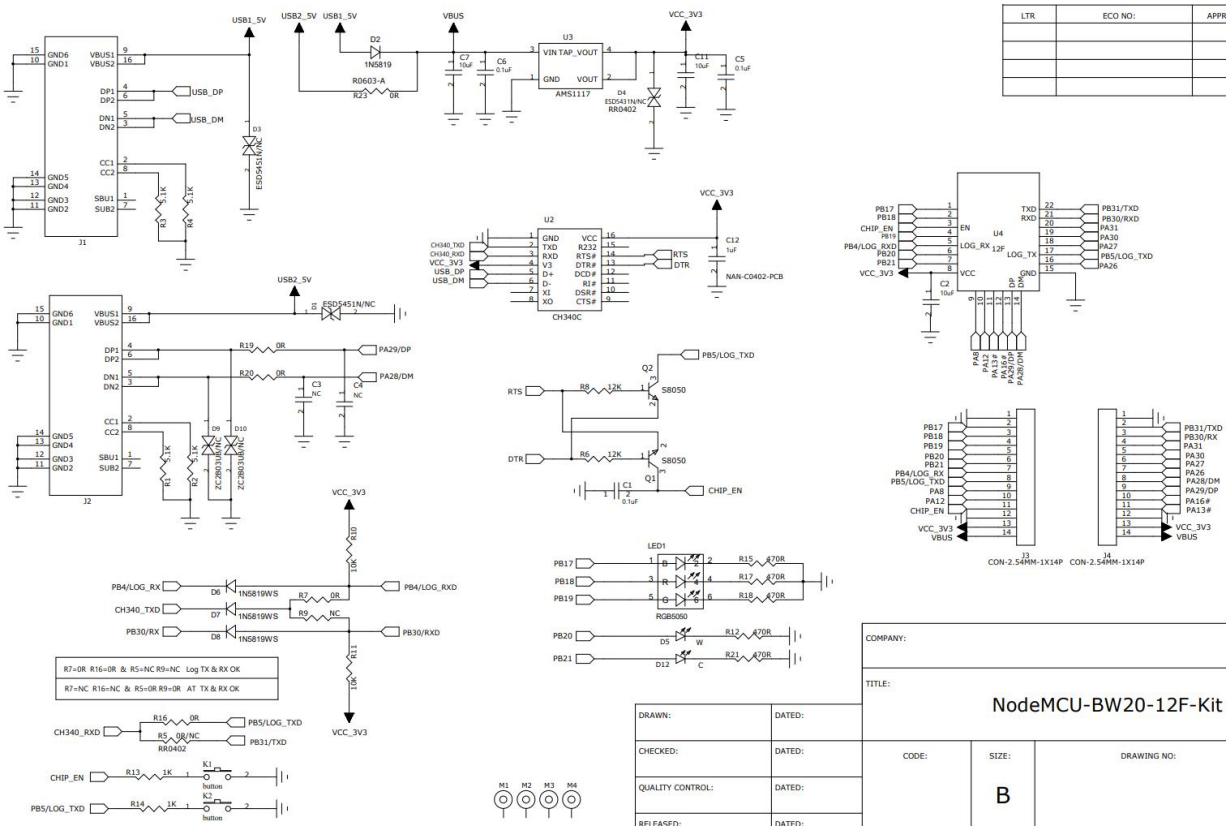



**Figure 7 Schematic diagram of the development board**

# 7. Product Precautions

The BW20-07S -Kit's onboard USB serial port corresponds to serial port 0, with pins LOG_RXD and LOG_TXD . The development board can only be upgraded by flashing new firmware via the onboard USB serial port or by connecting a TTL module to the LOG_RXD and LOG_TXD pins.

# 8. Product Packaging Information

**Table 8 Packaging Information**

| Packing list | Packaging | Quantity per pack (static bags) | Quantity per package (sealed bag) |
|---|---|---|---|
| BW20-07S -Kit | Foam + anti-static bag | 1 PCS | 10pcs |

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