

Specifications

802.11b/g/n Wi-Fi +BLE 4.2Module

BW15

Version: V 1.0

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Document development / revision / revocation resume

Version	Date	Development/revision	Development	Approval
V1.0	2020.08.12	First draft	Xu Xu	

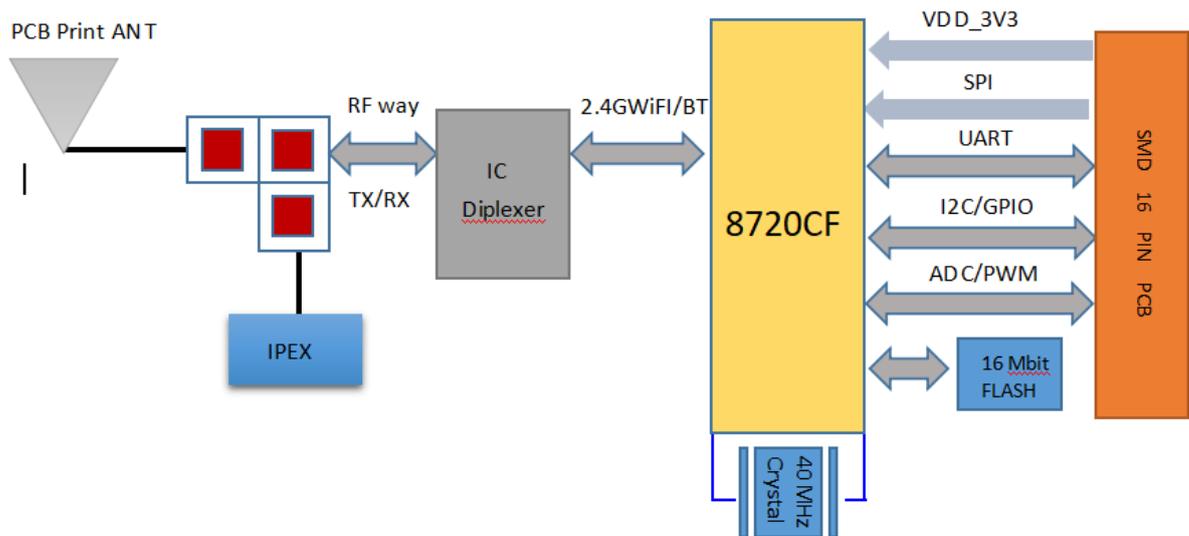
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1、Product Overview

BW15 module was developed by B&t, a highly integrated Wi-Fi and Bluetooth SOC module, The main chip RTL8720CF is a high integrated low power chip that supports 2.4 GHz wireless LAN (WLAN) and Bluetooth low power (v4.2); a combination of Real-M300MCU, in a single chip WLAN MAC, with the 1T1R function of WLAN baseband. And it provides configurable GPIO, and these GPIO are configured as digital peripherals, for different applications and control purposes.

BW15 also integrates internal memory to achieve complete WIFI and BLE4.2 protocol functions. Embedded memory configuration also supports simple application development.



Characteristics

- Support 802.11 b/g/n 1x1, 2.4GHz
- Support MCS7 up to 20 MHz /40MHz
- Low Power Architecture
- Support low power transmit/receive, suitable for short range applications

- Low power beacon listening mode, low power receiving mode, low power pending mode
- Built-in AES/SHA hardware engine
- Built-in 2 MB Flash
- Support BLE4.2BQB
- Support for central and peripheral models
- The internal coexistence mechanism between WIFI and BT shares the same antenna
- Supporting STA/AP/STA+AP operatingmode
- Support One-click distribution network for Android, IOS Smart Config (APP)/AirKiss
- Supports local serial port upgrades and remote firmware upgrades (OTA)
- General AT commands can be used quickly

Main parameters

Table 1 Main parameters description

Model	BW15
Package	SMD-16
Size	24*16*3(±0.2) MM
Antenna format	On-board PCB antenna/ IPEX antenna
Spectrum range	2400~2483.5 MHz
Bluetooth	Bluetooth 4.2BLE
Bluetooth Frequency	2.402 GHz -2.480GHz
Operating temperature	-40 °C ~ 85 °C
Storage environment	-40°C~125°C, <90%RH

Power supply range	Supply voltage 3.0 V ~3.6 V, supply current >500 mA
Support interface	UART/GPIO/ADC/PWM /IIC /SPI

2、Electrical parameters

BW15 series of modules are electrostatic sensitive equipment, special preventive measures should be taken during handling



Tip:

BW15 modules are electrostatic sensitive devices (ESD) that require special ESD precautions and should normally be applied to ESD sensitive components. The correct ESD processing and packaging procedures must be adopted throughout the processing, transportation and operation of any application combined with the BW15 module. Do not touch the module by hand or use non-static soldering iron to avoid damage to the module.

Electrical characteristics

Parameter conditions	Minimum value	Typical values	Maximum value	Unit
IRSH33 3.3 V Inrush current	–	–	400	mA
Peak current RF TX CCK 11M 21dBm	–	–	600	mA
DC_IO_33(3.3V I/O rated current)	–	–	50	mA

Electrostatic protection (VESD)	-	-	2000	V
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WIFI RF performance

Description	Typical values	Unit
Operating frequency	2400 ~ 2483.5	MHz
Output power		
11n mode, PA output power	15±2	dBm
11g mode, PA output power	16±2	dBm
11b mode, PA output power	18±2	dBm
Receiving sensitivity		
CCK, 1Mbps	≤ -98	dBm
CCK, 11Mbps	≤ -90	dBm
6Mbps (1/2 BPSK)	≤ -94	dBm
54Mbps (3/4 64- QAM)	≤ -77	dBm
HT20 (MCS7)	≤ -74	dBm

Bluetooth RF Performance

Description	Typical values	Unit
Operating frequency	2400 ~ 2483.5	MHz
Output power		
PA output power is	7±2	dBm
Receiving sensitivity		
Receiving sensitivity	≤ -92	dBm

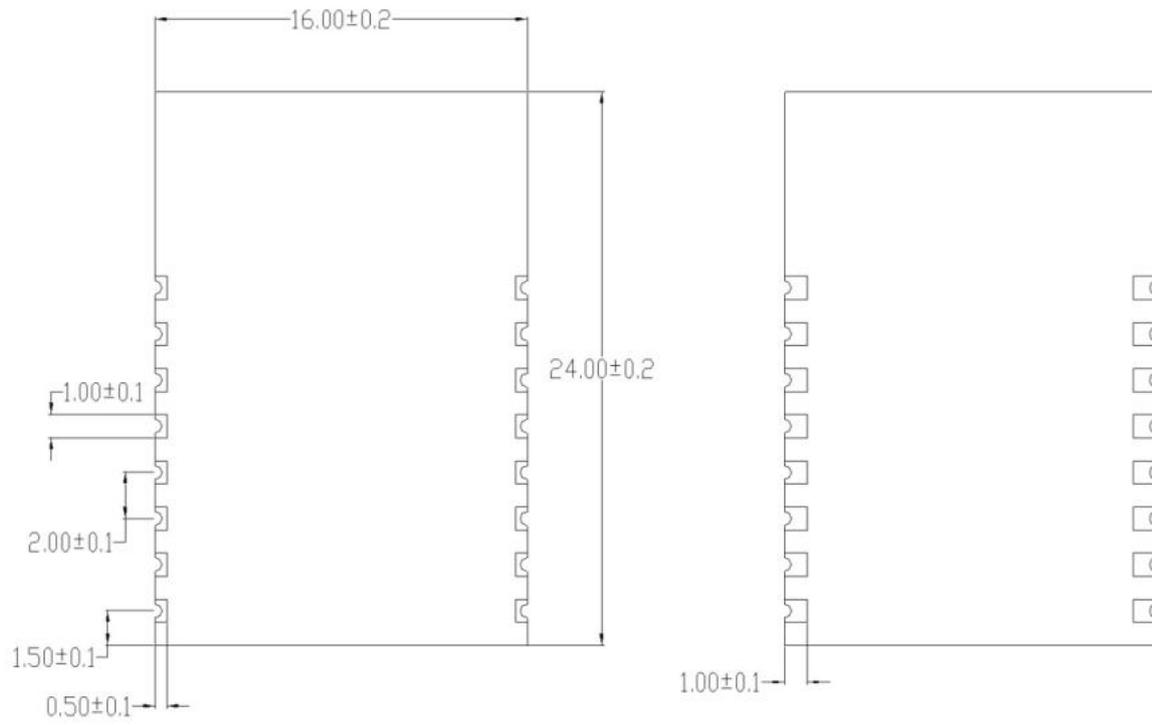
Power consumption

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

- All measurements are completed at the antenna interface without SAW filters.
- all emission data were measured in the mode of continuous emission based on a 90% duty cycle.

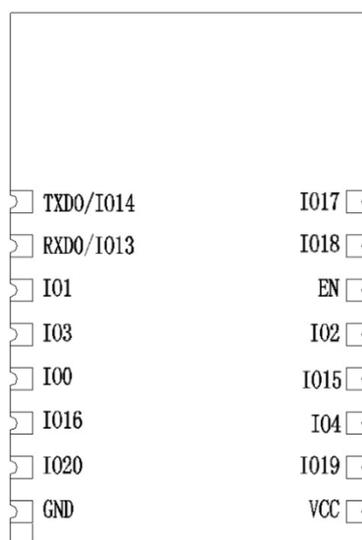
Mode	Minimum value	Typical values	Maximum value	Unit
Transfer 802.11 b,CCK 11Mbps,POUT=+17 dBm	-	250	-	mA
Transfer 802.11 g,OFDM 54Mbps,POUT =+15 dBm	-	210	-	mA
Transfer 802.11 n,MCS7,POUT =+13 dBm	-	195	-	mA
Receive 802.11 b, packet length 1024 bytes ,-80 dBm	-	50	-	mA
Receive 802.11 g, packet length 1024 bytes ,-70 dBm	-	56	-	mA
Receive 802.11 n, packet length 1024 bytes ,-65 dBm	-	56	-	mA
Modem-Sleep①	-	20	-	mA
Light-Sleep②	-	2	-	mA
Deep-Sleep③	-	28	-	uA
Power Off	-	0.5	-	uA

3、Appearance dimensions



4、Pin definition

The BW15 module has a total of 16 interfaces. As shown in the pin diagram, the pin function definition table is the interface definition.



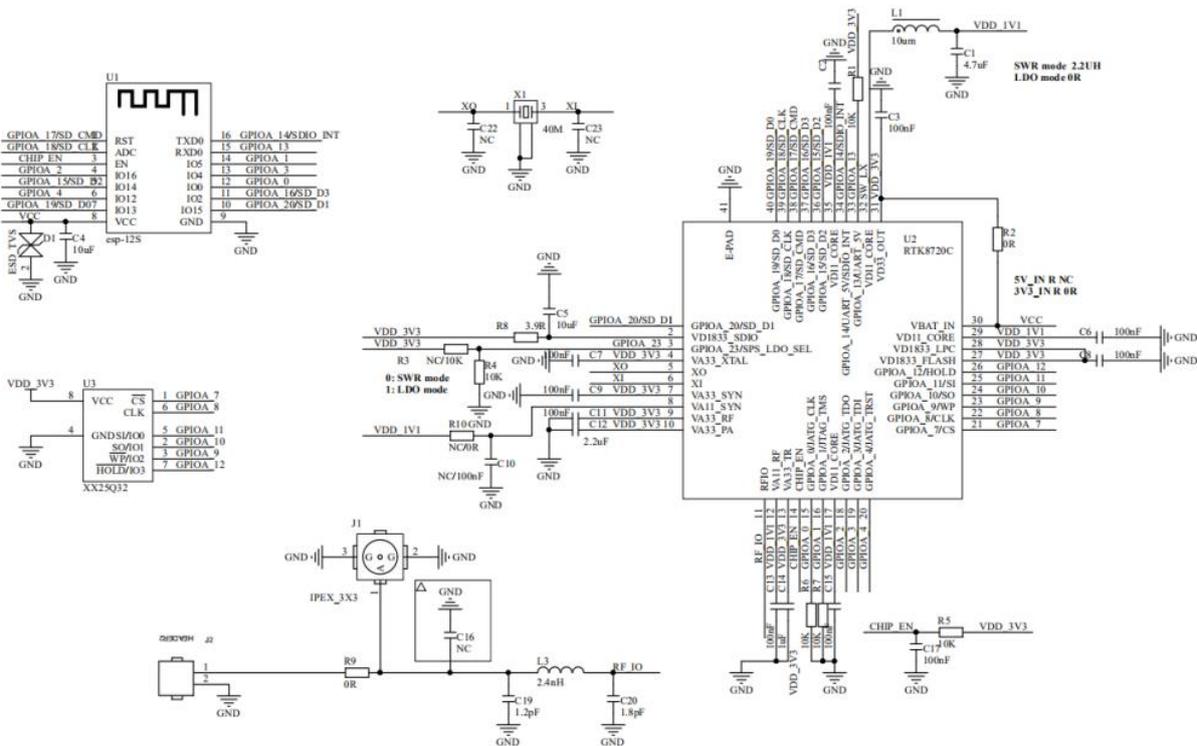
BW15 pin diagram

Function definition of pin

No.	Name	Functional Description
1	I017	GPIOA_17/SD_CMD/SPI_M_D2/PWM5
2	I018	GPIOA_18/SD_CLK/SPI_M_D3/PWM6
3	EN	Chip Enable End
4	I02	GPIOA_2/UART1_IN/SPI_CS/I2C_SCL/PWM2
5	I015	GPIOA_15/SD_D2/SPI_M_CS/UART2_IN/SPI_CS/I2C_SCL/PWM3
6	I04	GPIOA_4/UART1_CTS/SPI_MOSI/PWM4
7	I019	GPIOA_19/SD_D0/SPI_M_D0/UART2_CTS/SPI_MOSI/I2C_SCL/PWM7
8	VCC	3.3 V Electricity (VDD); maximum 500 mA
9	GND	Ground
10	I020	GPIOA_20/SD_D1/SPI_M_D1/UART2_RTS/SPI_MISO/I2C_SDA/PWM0
11	I016	GPIOA_16/SD_D3/SPI_M_CLK/UART2_OUT/SPI_SCL/I2C_SDA/

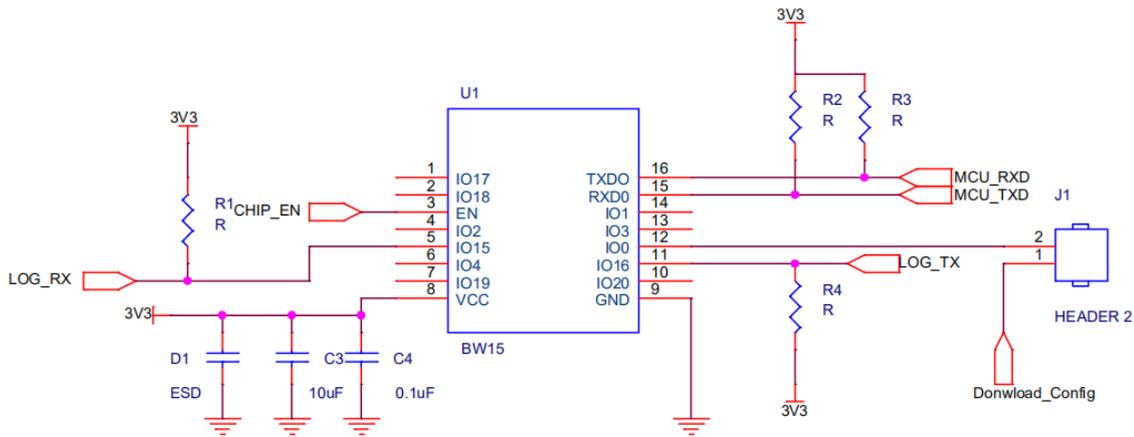
		PWM4
12	I00	GPIOA_0/UART1_IN/EXT_32K/PWM0
13	I03	GPIOA_3/UART1_OUT/SPI_SCL/I2C_SDA/PWM3
14	I01	GPIOA_1/UART1_OUT/PWM1
15	I013	LP_UART_RXD
16	I014	LP_UART_TXD

5、Schematic diagram



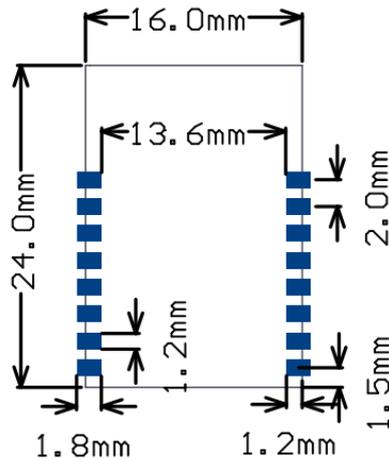
6、Design guidance

1、Application circuit



2、Recommended Module Package Design Size

Note: This is the BW15 module package diagram, It is recommended to design the PCB board according to this diagram, so that the module can work normally on the PCB board; and when designing the pads, please pay attention to the design of the pads on the PCB. The pad is retracted and offset, and the PCB pad is expanded from the module pad do not affect the use of the module.



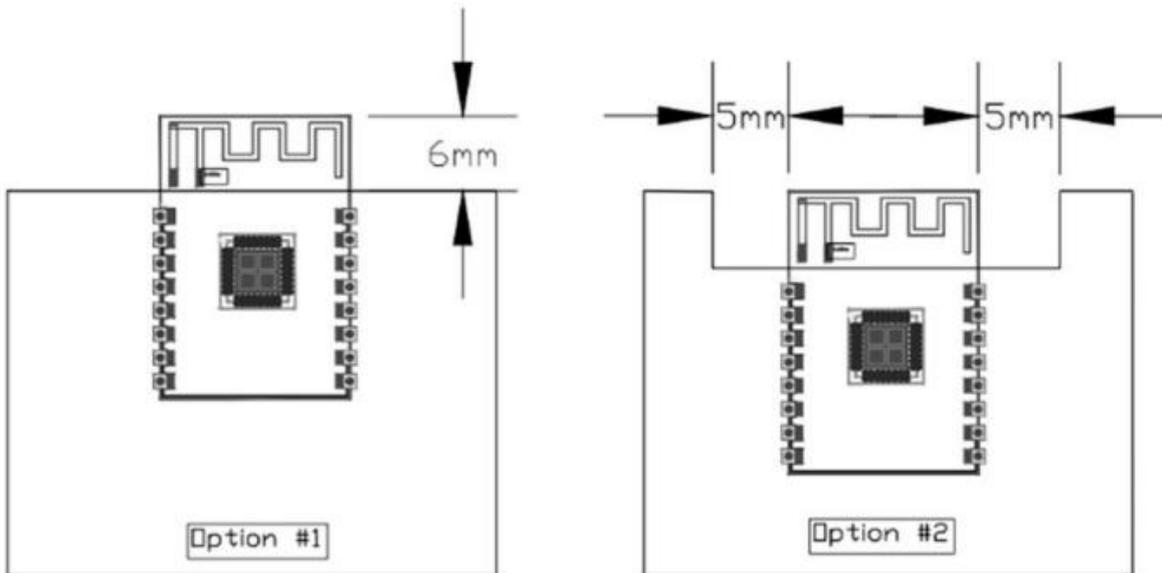
3、Antenna layout requirements

(1)、 the installation position on the motherboard, the following two ways are recommended:

Scheme 1: put the module on the edge of the motherboard, and the antenna area extends out of the edge of the motherboard.

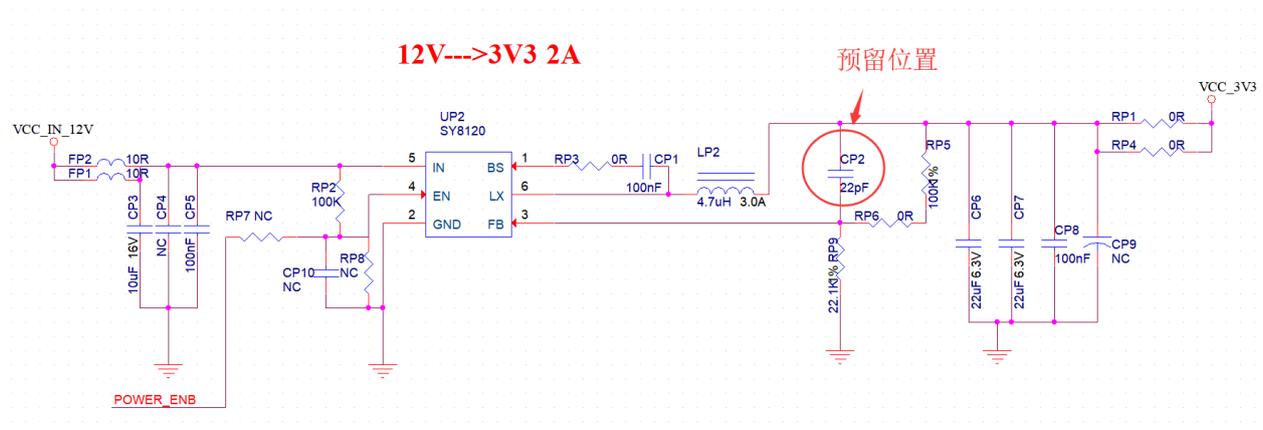
Scheme two: put the module on the edge of the motherboard, the edge of the motherboard in the antenna position empty an area.

(2)、 in order to meet the performance of on-board antenna, it is forbidden to place metal parts around the antenna, away from high-frequency components..



4. power supply

- (1)、 Recommended 3.3 V voltage, peak current above 500 mA
- (2)、 It is recommended to use LDO for power supply; if DC-DC is used, the ripple is recommended to be controlled within 30mV.
- (3)、 It is recommended to reserve the position of the dynamic response capacitor for the DC-DC power supply circuit, which can optimize the output ripple when the load changes greatly.
- (4). It is recommended to add ESD devices to the 3.3V power interface



5. GPIO port use

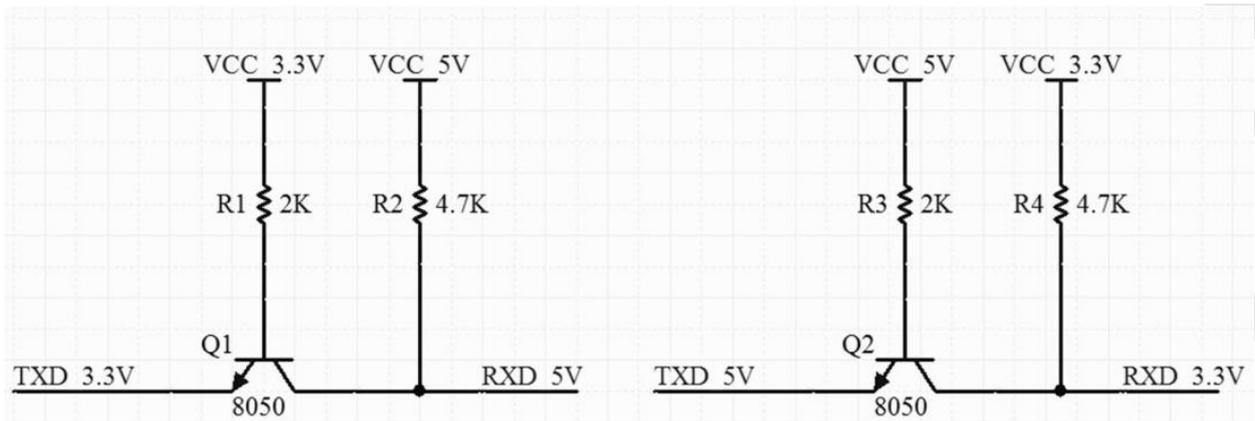
- (1)、 module periphery have lead some GPIO interfaces, if you need to use, it is recommended the resistance of 10-100 ohms in series on the IO port. This can

suppress overshoot, and two sides of the level more stable. and help for both EMI and ESD.

(2)、 The IO ports for pull up and down, please refer to the specification, this will affect the module startup configuration.

(3)、 The module IO port is 3.3 V, if the main control does not match the IO level of the module, the level conversion circuit needs to be added.

(4)、 if the IO port is directly connected to the peripheral interface, or pin and other terminals, it is recommended to reserve ESD device near the terminal.



Graph level conversion circuit

7、Packaging information

As shown below, the BW15 is packed in ribbons:



OEM/Integrators Installation Manual

Important Notice to OEM integrators

INTEGRATION INSTRUCTIONS

FCC rules

The BW15 is an WIFI+BT Module. It operates on the 2400 ~2500 MHz band and, therefore, is within U.S. FCC part 15.247 standard.

Modular installation instruction

1,BW15 Integrates high-speed GPIO and peripheral interface. Please pay attention to the installation direction (pin direction).

2,Antenna could not be in no-load state when module is working. During debugging, it is suggested to add 50 ohms load to the antenna port to avoid damage or performance degradation of the module under long-time no-load condition.

3,When the module needs to output 31dBm or more power, it needs a voltage supply of 5.0V or more to achieve the expected output power.

4,When working at full load, it is recommended that the entire bottom surface of the module be attached to the housing or heat dissipation plate, and it is not recommended to conduct heat dissipation through air or screw column heat conduction.

5,UART1 and UART2 are serial ports with the same priority. The port which receives commands returns information.

Trace antenna designs

Not Applicable

RF exposure considerations

To maintain compliance with FCC's RF Exposure guidelines, This equipment should be installed and operated with minimum distance between 20cm the radiator your body: Use only the supplied antenna.

Antennas

The BW15 is an UHF RFID Module beams signals and communicates with its antenna, which is PCB Antenna .

The PCB Antenna gain is 1dBi

LABEL OF THE END PRODUCT

The final end product must be labeled in a visible area with the following:

Host must Contains FCC ID: 2AXVG-BW15. If the size of the end product is larger than 8x10cm, then the following FCC part 15.19 statement has to also be available on the label: This device complies with Part 15 of FCC rules. Operation is subject to the following two conditions:

(1)this device may not cause harmful interference and

(2)this device must accept any interference received, including interference that may cause undesired operation.

Information on test modes and additional testing requirements

Data transfer module demo board can control the EUT work in RF test mode at specified test channel.

Additional testing, Part 15 Subpart B disclaimer

The module without unintentional-radiator digital circuit, so the module does not required an evaluation by FCC Part 15 Subpart B. The host should be evaluated by the FCC Subpart B.

ATTENTION

This device is intended only for OEM integrators under the following conditions: 1) The antenna must be installed such that 20 cm is maintained between the antenna and users, and

2) This device and its antenna(s) must not be co-located with any other transmitters except in accordance with FCC multi-transmitter product procedures. Referring to the multi-transmitter policy, multiple transmitter(s) and module(s) can be operated simultaneously without C2P.

3) For all products market in US, OEM has to limit the Operating Frequency: 2400 ~2500MHz by supplied firmware programming tool. OEM shall not supply any tool or info to the end-user regarding to Regulatory Domain change.

USERS MANUAL OF THE END PRODUCT:

In the user manual of the end product, the end user has to be informed to keep at least 20cm separation with the antenna while this end product is installed and operated. The end user has to be informed that the FCC radio-frequency exposure guidelines for an uncontrolled environment can be satisfied. The end user has to also be informed that any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

If the size of the end product is smaller than 8x10cm, then additional FCC part 15.19 statement is required to be available in the users manual: This device complies with Part 15 of FCC rules. Operation is subject to the following two conditions:

(1) this device may not cause harmful interference and

(2) this device must accept any interference received, including interference that may cause undesired operation.

FCC WARNING

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generate, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-- Reorient or relocate the receiving antenna.

-- Increase the separation between the equipment and receiver.

-- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-- Consult the dealer or an experienced radio/TV technician for help.

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