

# Product Manual

**SINGLE-CHIP 802.11b/g/n 1T1R WLAN  
WIFI Module**

**BW10**

Version: V1.0

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## Change History of Revision

# 1. Overview

The BW10 is a highly integrated Wi-Fi SOC module ,Main chip RTL8710BX is a highly integrated single-chip low power 802.11n Wireless LAN (WLAN) network controller. It combines an ARM-CM4F MCU, WLAN MAC, a 1T1R capable WLAN baseband, and RF in a single chip. It also provides a bunch of configurable GPIOs which are configured as digital peripherals for different applications and control usage.

BW10 integrates internal memories for complete WIFI protocol functions. The embedded memory configuration also provides simple application developments.

# 2. Features

## General

- Package SMT-21 PIN (20mmx18mm)
- CMOS MAC, Baseband PHY, and RF in a single chip for 802.11b/g/n compatible WLAN
- Complete 802.11n solution for 2.4GHz band
- Compatible with 802.11n specification

## Standards Supported

- 802.11b/g/n compatible WLAN
- 802.11e QoS Enhancement (WMM)

- 802.11i (WPA, WPA2). Open, shared key, and pair-wise key authentication services
- WIFI WPS support
- WIFI Direct support
- Light Weight TCP/IP protocol

## **WLAN PHY Features**

- 802.11n OFDM
- One Transmit and one Receive path (1T1R)
- 20MHz bandwidth transmission
- Short Guard Interval (400ns)
- DSSS with DBPSK and DQPSK, CCK modulation with long and short preamble
- OFDM with BPSK, QPSK, 16QAM, and 64QAM modulation. Convolutional Coding Rate: 1/2, 2/3, 3/4, and 5/6
- Maximum data rate 54Mbps in 802.11g and 72.2Mbps in 802.11n

## **Peripheral Interfaces**

- 1 common UART interface
- 1 log UART with standard baud rate support
- 2 I2C interfaces are shared with the UART interfaces
- 1 SPI interface are shared with the UART interface
- 5 PWM interfaces
- 1 SWD interface

- All of the above interfaces can be used as GPIO

## 3. Applications

- M2M
- Smart LED/Plug
- Remote sensing

## 4. General Specification

Model	BW10
Product Name	WIFI module
Major Chipset	RTL8710BX
Standard	802.11 b/g/n
Interface	UART,I2C,SPI,GPIO,SWD,PWM
Power Supply	3.3±10% V
Operating Temperature	-20 ~ +85° C ambient temperature
Storage Temperature	-40 ~ 125°C ambient temperature
Humidity	5 to 93 % maximum (non-condensing)
Dimension	20 x18x 3mm (LxWxH) ±0.2mm

# 5. Electrical Specifications

## 1) DC Characteristics

Current Consumption	Min.	Typ.	Max.	Unit
DC 3.3V	-	50	300	mA

## 2) RF Characteristics for IEEE802.11b

Items	Contents			
Specification	IEEE802.11b			
Mode	CCK 11 Mbps			
Channel frequency	2412 ~ 2462 MHz			
Freq.Error( $\pm 15$ ppm)	$\pm 10$ ppm			
RX (PER $\leq -76$ dBm@8%)	-85 dBm			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level ( dBm)		18		dBm
EVM ( $\leq -9$ dB)		-22		dB

## 3) RF Characteristics for IEEE802.11g

Items	Contents			
Specification	IEEE802.11g			
Mode	OFDM 54Mbps			
Channel frequency	2412 ~ 2462 MHz			
Freq.Error( $\pm 15$ ppm)	$\pm 10$ ppm			
RX (PER $\leq -65$ dBm@10%)	-73 dBm			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level ( dBm)		16		dBm
EVM ( $\leq -25$ )		-30		dB

## 4) RF Characteristics for IEEE802.11n (BW20\_MCS7/BW40\_MCS7)

Items	Contents			
Specification	IEEE802.11n BW20_MCS7/BW40_MCS7			
Mode	BW20_MCS7/BW40_MCS7 65 Mbps			
Channel frequency	2412 ~ 2462 MHz for BW20/2422 ~ 2452 MHz for BW40			

Freq.Error( $\pm 15$ ppm)	$\pm 10$ ppm			
RX (PER $\leq -64$ dBm@10%)	-72 dBm			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level ( dBm)		15		dBm
EVM ( $\leq -28$ )		-30		dB

## 6. Package Dimensions & Pin Definition

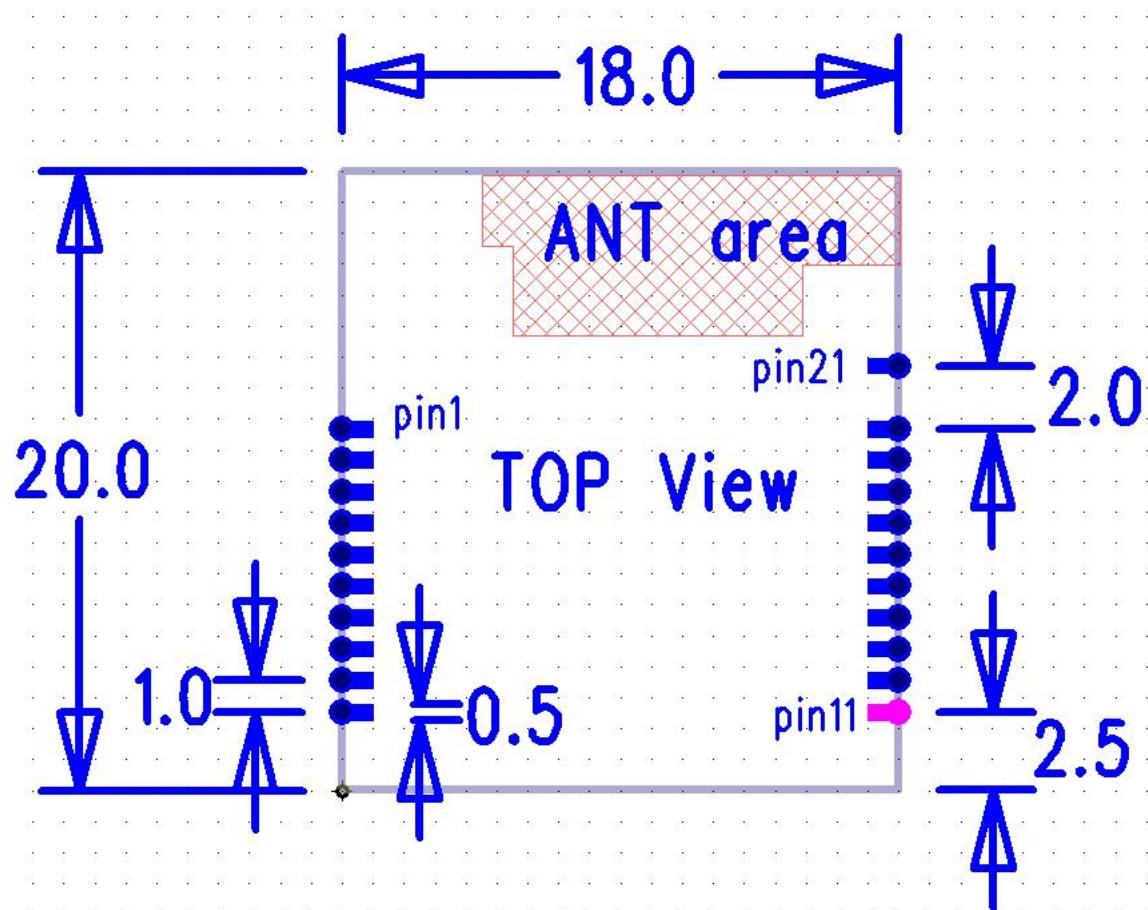


Fig. Module front view

Pin No.	Definition	I/O	Description	
1	GND	GND	GND	

2	RF_OUT	RF	Reserved,WLAN RF OUT,Compatible with PCB printed antenna
3	GND	GND	GND
4	NC	NC	Not Connect
5	CHIP_EN	I	Enable chip. 1: enable chip; 0: shutdown chip
6	GPIOA_14	IO	GPIO pin. The MUX function can be referred to Pin Function Table
7	GPIOA_15	IO	GPIO pin. The MUX function can be referred to Pin Function Table
8	GPIOA_0	IO	GPIO pin. The MUX function can be referred to Pin Function Table
9	GPIOA_12	IO	GPIO pin. The MUX function can be referred to Pin Function Table
10	GND	IO	GPIO pin. The MUX function can be referred to Pin Function Table
11	VDD33	Power	3.3V INPUT,300mA MAX
12	GND	GND	GND
13	VBAT_MEAS	NA	Reserved
14	GPIOA_5	IO	GPIO pin. The MUX function can be referred to Pin Function Table
15	GPIOA_18	IO	GPIO pin. The MUX function can be referred to Pin Function Table
16	GPIOA_19	IO	GPIO pin. The MUX function can be referred to Pin Function Table
17	GPIOA_22	IO	GPIO pin. The MUX function can be referred to Pin Function Table
18	GPIOA_23	IO	GPIO pin. The MUX function can be referred to Pin Function Table
19	GPIOA_30	IO	GPIO pin. The MUX function can be referred to Pin Function Table
20	GPIOA_29	IO	GPIO pin. The MUX function can be referred to Pin Function Table
21	GND	GND	GND

Pin Function Table

PIN name	UART	SPI Master	SPI Slave	SPI Flash	I2C	SDIO	PWM/TIME R	EXT32K	I2S	Others
GPIOA_14							PWM0	SWD_CLK		
GPIOA_1							PWM1	SWD_DATA		

5										
GPIOA_0							PWM2	ext_32k		
GPIOA_1 2							PWM3			
GPIOA_6				SPIC_CS		SD_D2				
GPIOA_7				SPIC_DA TA1		SD_D3				
GPIOA_8				SPIC_DA TA2		SD_CMD				
GPIOA_9				SPIC_DA TA0		SD_CLK				
GPIOA_1 0				SPIC_CL K		SD_D0				
GPIOA_1 1				SPIC_DA TA3		SD_D1				
GPIOA_5						SDIO_SI DEBAND _INT	PWM4			WAKEUP_1
GPIOA_1 8	UART0_ RXD	SPI1_CLK	SPI0_SC K		I2C1_SCL	SD_D2	TIEMER4_ TRIG		I2S_MCK	WAKEUP_0
GPIOA_1 9	UART0_ CTS	SPI1_CS	SPI0_CS		I2C0_SDA	SD_D3	TIEMER5_ TRIG		I2S_SD_TX	ADC1
GPIOA_2 2	UART0_ RTS	SPI1_MIS O	SPI0_MI SO		I2C0_SCL	SD_D0	PWM5		I2S_WS	WAKEUP_2
GPIOA_2 3	UART0_ TXD	SPI1_MO SI	SPI0_M OSI		I2C0_SDA	SD_D1	PWM0			WAKEUP_3
GPIOA_3 0	UART2_I og_TX				I2C0_SDA		PWM3	RTC_OUT		
GPIOA_2 9	UART2_I og_RX				I2C0_SCL		PWM4			

## 7. Installation

The BW10 can be connected to an AP as a WIFI client. There is an appropriate development board supplies DC 3.3V to BW10 Module.

### FCC WARNING

This device complies with part 15 of the 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.

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 generates, 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.

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.

#### **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 operation channels in CH1 to CH11 for 2.4G band 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 users 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.

#### **LABEL OF THE END PRODUCT:**

The final end product must be labeled in a visible area with the following " Contains FCC ID: 2ARI3-BW1X. 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.