BEST MODULES Quick Start Guide

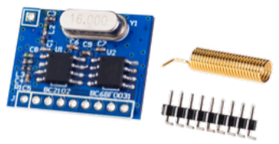
Name: Serial type 433MHz RF transmitting module

Model: BCM-2102-X03

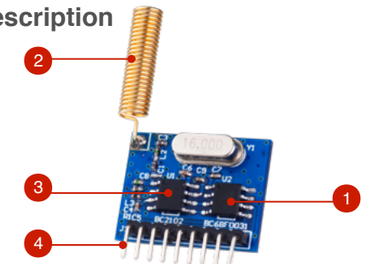
https://www.bestmodulescorp.com

1 Accessory list

1. Serial type RF wireless transmitting module
   - BCM-2102-X03 × 1
2. Spring antenna - 433.92MHz Antenna × 1
3. 90° pin header with 9 pins × 1



2 Component Description and Layout



1. BC68F0031
2. Spring antenna
3. BC2102
4. Pin header

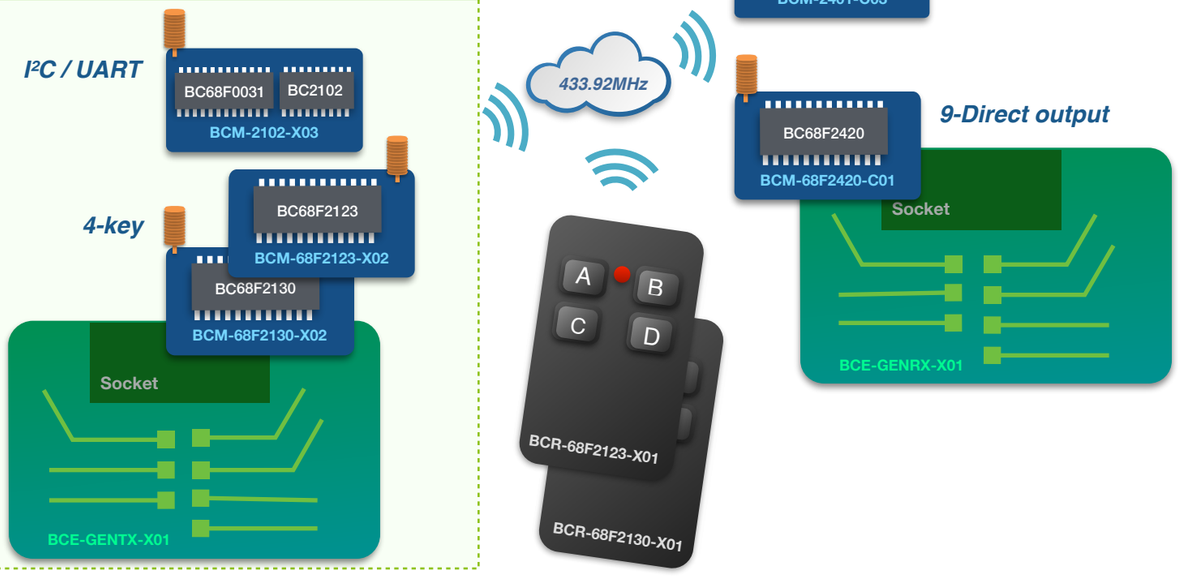
3 Pin Order

Pin #	Pin Name	Description
1	GND	GND
2	VDD	LED1
3	VDDRF	LED2
4	OCDSDA/KEY3	LED3
5	OCDSCK/RX/SCL	LED4
6	TX/SDA	
7	0: UART, 1: I²C	PA7
8	OCDSDA/3	PA0
9	NC	NC

4 Product Description

This product uses a custom transmitting signal protocol and should therefore be used together with the following products, which need to be purchased separately:

- Evaluation board: BCE-GENTX-X01
- Parallel type 433MHz RF receiving module: BCM-68F2420-C01
- Serial type 433MHz RF receiving module: BCM-2401-C03

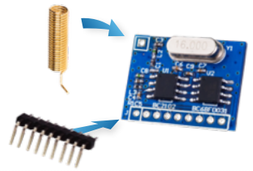


5 Functional Description

1. The product operating frequency is 433.92MHz.
2. Alternative communication interfaces including UART and I²C are integrated for the external Master MCU command transmission.
3. This product contains an RF transmitting IC, the BC2102, and a Master MCU, the BC68F0031. The MCU includes the required program, user programming is not necessary.
4. Refer to “Appendix: Communication Protocol” for more detailed information.

6 Solder the antenna and pin header first

Note: The antenna must be placed vertically and kept away from metallic objects.



7 After soldering is complete, the product, which only supports 1 key, can be connected with either an external Master MCU or an evaluation board.

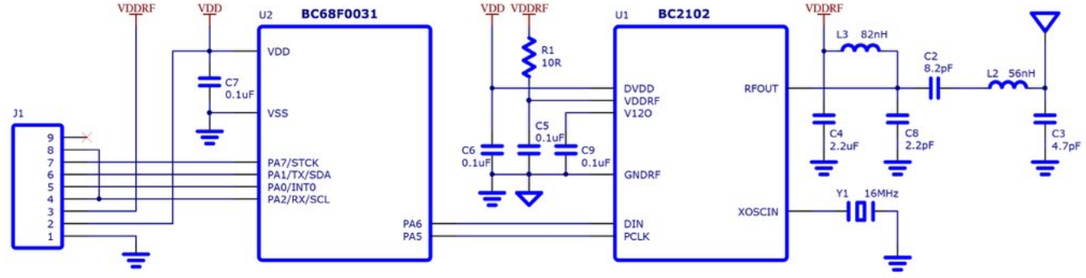
8 Module Mode Setup

Pin#7 is used for mode selection: If pin#7 is low, the UART mode is selected, if it is high, then the I2C mode will be selected. Refer to the “Pin Order”.

Note: The default mode is the I2C mode if pin#7 is unconnected.

9 Block Diagram

10 Circuit Schematic



11 Easy Trouble Shooting

1. If the LED is off, which indicates that there is perhaps a system failure, users should check the power and module installation.
2. If problems are unable to be resolved using the above methods, consult the “Technical Support” on the Best Module Official Website.

12 Specification

- Size (L × W × H): 8 × 22 × 10 (mm), without antenna and pin header
- Weight: 2.5 grams, without antenna and pin header
- Pin head pitch: 2mm
- Operating voltage: 2.2V~3.6V
- RF frequency: 433.92 MHz
- Transmitting power: 10dBm (10mW)
- Operating temperature: -40°C ~ +85°C

Hyper link BC68F0031 | BC68F2123 | BC68F2130 | BC68F2420 | BC2401 | BC2102

13 Appendix: Communication Protocol

1-1 Command Format

Command (8 bits)								Data (8 bits)							
C7	C6	C5	C4	C3	C2	C1	C0	D7	D6	D5	D4	D3	D2	D1	D0

The command formats are classified as two types:

a. CmdO: Only commands, without data

b. CmdD: Commands followed by data

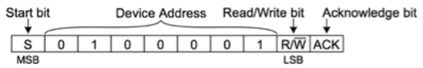
1-2 I²C Control Method

The I²C control method must distinguish the Master and Slave. Slave refers to the module being controlled while Master refers to the MCU used for module control. Device address is essential for this control method. The TX module device address is fixed as 0100001b and the RX module device address is fixed as 0100100b.

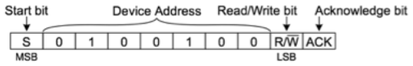
Note: The I²C clock speed must not exceed 100kHz.

I²C timing:

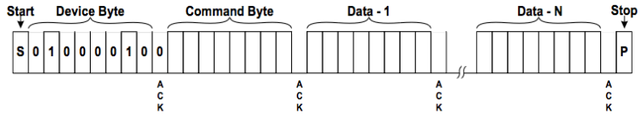
• Device Byte: TX



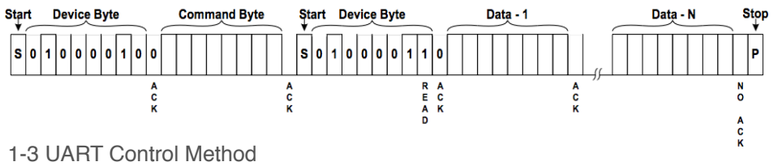
• Device Byte: RX



• Write Sequential – Taking TX device as an example



• Read Sequential – Taking TX device as an example



1-3 UART Control Method

The UART control method requires neither device byte nor Master/Slave distinction. However the module control is also implemented by commands sent from the Master MCU.

• Write command:

The Master MCU sends commands and parameters through the UART TX pin to the RX/SCL pin in the module. The module will function according to the received commands. Commands should be written sequentially if there are more than one command required.

• Read command:

Data reading is implemented by commands, therefore the Master MCU must send one command byte through the UART TX pin to the module, the module will then send out data through the module TX/SDA pin, after received the command, to the Master MCU UART RX pin.

UART format: 8-bit data, no parity bit & 1 stop bit

Bit rate: 19200 bps

2-1 Control Command

To allow the Master MCU controls the RF module, control commands of TX and RX modules are provided as follows:

2-2 TX Control Command – only for TX module

Command Name	C7	C6	C5	C4	C3	C2	C1	C0	Data Length	CmdO	CmdD	Comment
SET_RF_FREQ	0	0	0	1	0	0	0	0	1		v	
SET_TX_POWER	0	0	0	1	0	0	1	0	1		v	
START_RF_TX	0	0	1	0	0	0	1	1	2		v	
STOP_RF_TX	0	0	0	0	0	0	0	0	0	v		
GET_STATUS	1	0	0	0	0	0	0	1	1		v	
GET_VER	1	0	0	1	0	0	0	0	2		v	

• SET_RF_FREQ: Select the RF frequency band

2-byte command: 1-byte command + 1-byte parameter

Command value: 10h

Parameter value: 00~03h for RF frequency band selection

00h: 315MHz, 01h: 433.92MHz, 02h: 868MHz, 03h: 915MHz

Note that module will setup the initial value based on the matched frequency band, therefore this command is not required under general situations.

Note: The command execution time is less than 4ms, the next command must wait until this execution is complete.

• SET_TX_POWER: Setup the TX power

2-byte command: 1-byte command + 1-byte parameter

Command value: 12h

Parameter value: 00~0Fh for TX power selection, the greater value indicates that the greater power capacity is selected, the corresponding values are to be determined.

Note:

Note: The command execution time is less than 2ms, the next command must wait until this execution is complete.

• START_RF_TX: Activate the RF and send 1-byte data

3-byte command: 1-byte command + 2-byte parameter

Command value: 23h

Parameter value:

1st byte: Setup transmitting times, if the value is 00h then it will not stop transmitting until a “STOP_RF_TX” command is received.

2nd byte: Data to be transmitted

• STOP_RF_TX: Stop RF transmitting

1-byte command: 1-byte command + 0-byte parameter

Command value: 00h

Parameter value: No parameter

• GET_STATUS: Read the TX module status

2-byte command: 1-byte command + 1-byte read-back parameter

Command value: 81h

Parameter value: 1-byte read-back parameter, described as below

b0~2: Reserved

b3: 1=RF is transmitting data

b4: 1=RF is transmitting data infinitely

b5~7: Reserved

• GET_VER: Read module version

3-byte command: 1-byte command + 2-byte read-back parameter

Command value: 90h

Parameter value: 2-byte read-back parameter, the first byte is the major version while the second byte is the minor version.

2-3 RX Control Command – only for RX module

Command Name	C7	C6	C5	C4	C3	C2	C1	C0	Data Length	CmdO	CmdD	Comment
START_RF_RX	0	0	0	0	0	0	0	1	0	v		
ENTRY_SADDR_MD	0	0	0	0	0	0	1	0	0	v		
GET_STATUS	1	0	0	0	0	0	0	1	1		v	
GET_RX_DATA	1	0	0	0	0	0	1	0	1		v	
GET_VER	1	0	0	1	0	0	0	0	2		v	

• START_RF_RX: RX module enters the receiving status

The module will automatically enter the receiving status after power on.

1-byte command: 1-byte command + 0-byte parameter

Command value: 01h

Parameter value: no parameter

• ENTRY_SADDR_MD: Enter the match status

To receive data, the RX module must match to a TX module first. This command is therefore provided.

1-byte command: 1-byte command + 0-byte parameter

Command value: 02h

Parameter value: No parameter

Note: If the RX module operates without an external Master MCU for command control, connect the module KEY/INTB pin to ground before powering on. Then remove the connection after the module is powered on for over 2 seconds, in this way the module can also enter the match status.

• GET_STATUS: Read RX module status

2-byte command: 1-byte command + 1-byte read-back parameter

Command value: 81h

Parameter value: 1-byte read-back parameter, described below.

b0~1: Reserved

B2: 1=RX is in the match status

B3: 1=RX is in the receiving status

B4: 1=RX has completed the match

B5: 1=RX module has data to be read

b6~7: Reserved

• GET_RX_DATA: Read RX module data

2-byte command: 1-byte command + 1-byte read-back parameter

Command value: 82h

Parameter value: 1-byte data

• GET_VER: Read module version

3-byte command: 1-byte command + 2-byte read-back parameter

Command value: 90h

Parameter value: 2-byte read-back parameter, the first byte is the major version while the second byte is the minor version.