FSC-BT691

BT5.1 Programming User Guide

Version 4.3

Revision History

Version	Data	Notes	Author
1.0	2016/05/12	First Release	Eric
2.0	2016/10/13	Add Commands	Eric
3.0	2017/03/10	Add GPIO Indications	Navy
4.0	2021/02/20	Add hardware/function/performance description; update instruction set	Jeffrey
4.2	2022/01/18	Update the main function description	Min
4.3	2022/04/16	Update OTA instructions section	Min

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Contents

1. Introduction

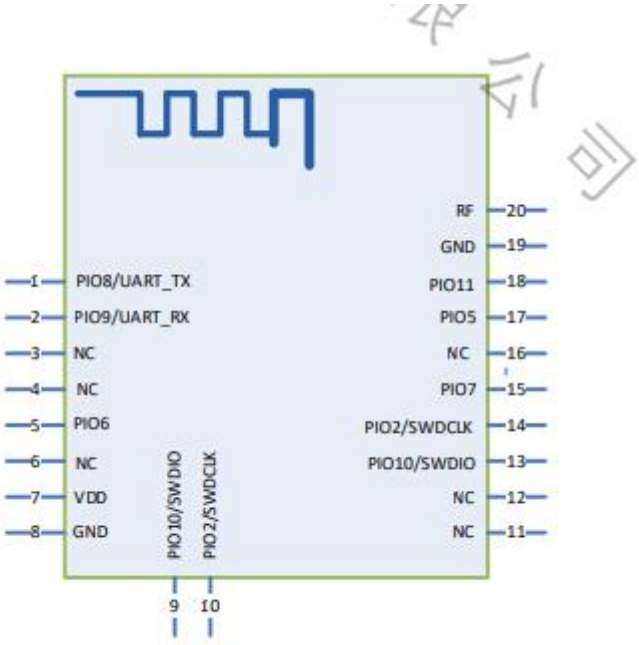
This specification presents design guidelines for software engineers that use FSC-BT691 module for Bluetooth requirements.

1.2 Module Default Settings

Local Name	Feasycom
Service-UUID	FFF0
Write-UUID	FFF2
Notify-UUID	FFF1
Physical Uart Baudrate	115200bps/8/N/1

2. Hardware Part

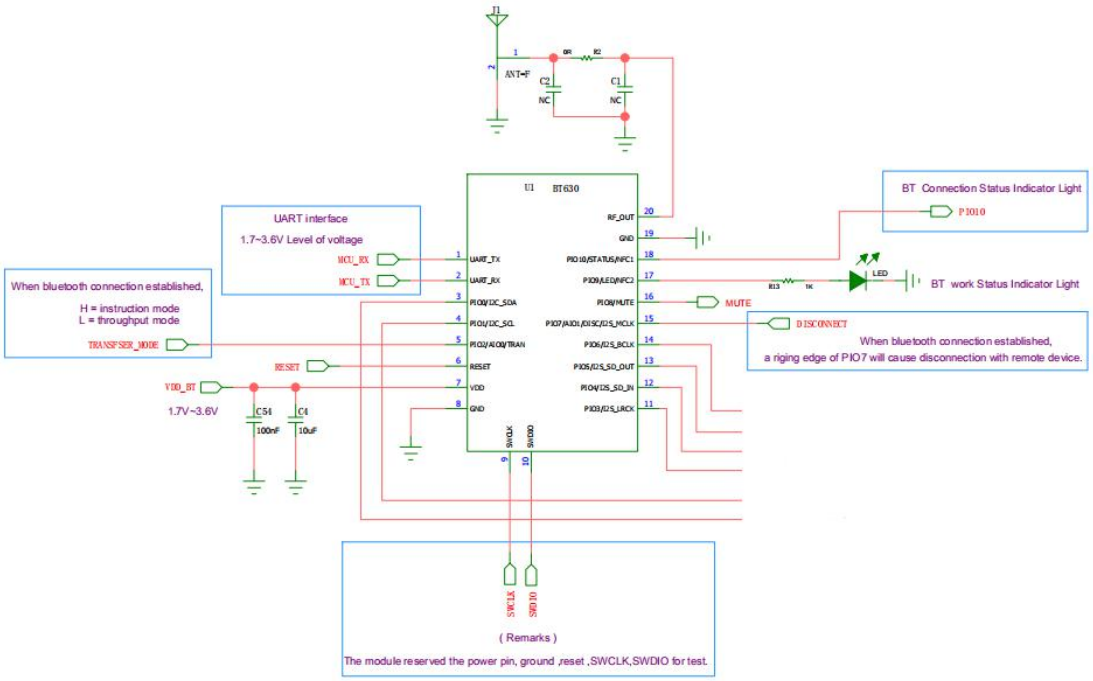
2.2 PIN Diagram



2.3 PIN Definition Description

PIN Name	Pin	Type	PIN Description
NC			Not recommended to connect
UART_TX	1	I/O	UART TX
UART_RX	2	I/O	UART RX
TRAN	5	I	When the Bluetooth connection is established and the pin function is enabled, the high level is the command mode, and the low level is the transparent transmission mode
VDD	7	Power	
GND	8,19	Power	
SWDIO	9	I/O	
SWDCLK	10	I/O	
DISC	15	I	When the Bluetooth connection is established and the pin function is enabled, the falling edge triggers the disconnection of the Bluetooth connection.
LED	17	O	Module work status
STATUS	18	O	Bluetooth connection status indicator
RF	20	RF	Use when using an external antenna

2.4 Hardware Design Rules



- The module will work when only connect with VDD, GND, UART Rx and UART of the module.
- User can get the Bluetooth connection status by connecting to the STATUS pin (PIN18) of the module.
- User can get the working status by connecting to the LED pin (PIN17) of the module.
- User can connect the TRAN pin (PIN5) so that the module can respond to AT commands in the transparent transmission mode.
- User can connect to the DISC pin (PIN15) to actively disconnect when Bluetooth is connected, or use commands to disconnect.
- User can connect the RESET pin (PIN6) to reset the module by hardware.

3. Function Part

3.2 GPIO instructions

3.2.1 LED Pin

PIN17 (Output)	
Low Level	Initializing
Blink in 1Hz	Ready to connecting
High Level	Connected

3.2.2 Status Pin

PIN18 (Output)	
Low Level	Disconnected
High Level	Connected

3.3 Introduction to Low Power Mode

3.3.1 Low Power Mode Setting

Turn on or turn off the low power consumption function through the command "AT+LPM{=Param}".

3.3.2 Low Power Operation Strategy

There are two ways to wake up after entering low power consumption mode:
1. Send the first packet of data by UART to wake up the mode. The UART will work after being awakened. Module will close the UART and enter into low power mode if no UART or APP data received within 10s
2. Wake up by sending data via app. In low power mode, receiving app data will wake up UART and output data. Module will close the UART and enter into low power mode if no UART or APP data received within 10s

4. Bluetooth Protocol Part

4.2 Supported Bluetooth Profile

- GATT Server (Generic Attribute Profile)
- GATT Client (Generic Attribute Profile)

4.3 Throughput GATT Server

Type	UUID	Authority	Description
Service	0xFFF0		Throughput service
Write Characteristic	0xFFF2	Write Request,Write Command	Characteristic value sent to the serial port
Notify Characteristic	0xFFF1	Notify	Characteristic value reported by the serial port

5. AT Command Part

5.2 Specification

Applies to the entire document:

- { } ： The content included in {...} is optional
- << ：The content after << represents the COMMAND sent by the host to the module
- >> ： The content after >> means the RESPONSE of the module to the host

5.2.1 Command Format

AT+ Command {=Param1{, Param2{, Param3...}}} <CR><LF>

- All commands start with "AT" and end with <CR><LF>
- <CR> stands for carriage return character, corresponding to ascii hex is 0x0D
- <LF> stands for newline character, corresponding to ascii hex is 0x0A
- If the command contains parameters, the parameters should be located after "="
- If the instruction contains multiple parameters, the parameters should be separated by ","
- If the command returns with a response, the response starts with <CR><LF> and ends with <CR><LF>
- The module should always return the result of the instruction execution (return "OK" on success, and "ERROR" on failure)

e.g.

1. Read Local Name
   << *AT+NAME*
   >> *+NAME=Feasycom*
   >> *OK*

2. Write unsupported Uart Baudrate
   << *AT+BAUD=0*
   >> *ERROR*

5.3 General Commands

5.3.1 Notification Format

Format: AT
Response: OK
Description: Test the UART communication between HOST and Module after power on or change baudrate.
Example: UART communication test << *AT* >> *OK*

<CR><LF>+ Indication {=Param1{, Param2{, Param3...}}} <CR><LF>

- All notifications start with <CR><LF> and end with <CR><LF>
- If the notification contains parameters, the parameters should be placed after "="
- If the notification contains multiple parameters, the parameters should be separated by ","

e.g.

1. When the GATT Server profile receives "1234567890" sent by the mobile phone
2. >> *+GATTDATA=10,1234567890*

5.3.2 Read Firmware Version

Format: AT+VER
Response: +VER=Param Param: Firmware version (15 Bytes ASCII)
Example: Read module's firmware version << *AT+VER* >> *+VER=1.0.1,FSC-BT691* >> *OK*

5.3.3 Read MAC Address

Format: AT+ADDR
Response: +ADDR=Param Param: Module's MAC address (12 Bytes ASCII)

5.3.4 Read/Write Local Name

Format: AT+NAME {=Param1{, Param2}} Param1: LE local name (1~29 Bytes ASCII, default: Feasycom) Param2: MAC address suffix (0/1, default: 0) (0) Disable suffix (1) Enable suffix"-XXXX" (lower 4 bytes of MAC address)
Response: +NAME=Param
Description: Write local name if there are parameter, otherwise just read current local name
Example: Read current local name << *AT+NAME* >> *+NAME=Feasycom* >> *OK* **Example**: Change module's local name to "ABC" << *AT+NAME=ABC* >> *OK* **Example**: Change module's local name to "ABC" and enable suffix << *AT+NAME=ABC,1* >> *OK*

5.3.5 Read/Write UART Baudrate

Format: AT+BAUD{=Param} Param: Baudrate (1200/2400/4800/9600/19200/38400/57600/115200/ 230400, default:115200)

Response: +BAUD=Param
Description: Module's baudrate will be changed immediately after received this command

5.3.6 Read/Write TX Power

Format: AT+TXPOWER{=Param} **Param:** TX power (0~11, default:8)
Response: +TXPOWER=Param
Description: If there is a parameter behind the command, the TX power is written, if not, read the TX power. AT+TXPOWER=0 Correspond to: 0dbm AT+TXPOWER=1 Correspond to: 1dbm AT+TXPOWER=2 Correspond to: 1.5dbm AT+TXPOWER=3 Correspond to: 2.5dbm AT+TXPOWER=4 Correspond to: 2.5dbm AT+TXPOWER=5 Correspond to: 2.5dbm AT+TXPOWER=6 Correspond to: 2.5dbm AT+TXPOWER=-5 Correspond to: -5dbm AT+TXPOWER=-9 Correspond to: -5dbm AT+TXPOWER=-3 Correspond to: -3.5dbm AT+TXPOWER=-2Correspond to: -2dbm AT+TXPOWER=-1Correspond to: -1dbm
Example: Read currently TX power << *AT+TXPOWER* >> *+TXPOWER=8* >> *OK* **Example:** Setting currently TX power << *AT+TXPOWER=11* >> *OK*

5.3.7 Turn On/Off Low Power Mode

Format: AT+LPM{=Param} Param: Low Power Mode (0/1, default: 0)

(0)Turn off low power mode (1)Turn on low power mode
Response: +LPM=Param

5.3.8 Read/Write AD Interval

Format: AT+ADVIN{=Param} Param: Broadcast Interval (100~10000 ms, default: 687ms)
Response: +ADVIN=Param

5.3.9 Soft Reboot

Format: AT+REBOOT Param1: Scan for broadcast devices (default scan) Param2: Scan timeout setting (200ms~2s, 100 equals 1000ms) Param3: Scan filter name/MAC (12-bit canonical MAC is filtered by MAC, other content is filtered by name)
Filter parameters exist: Response: +FILTER_MAC= Param3 Response: + FILTER_NAME= Param3
Description: Module release all Bluetooth connections with remote device then reboot

Example: Default scan
<< AT+SCAN=1
>> OK
+SCAN{
+SCAN=0,dc0d300002f9,-48,9,FSC-BT618
+SCAN}
Example: Set a timeout of 5s and filter devices with "BT618" in the name
<< AT+SCAN=1,500,BT618
>>OK
>>+SCAN{
>>+SCAN=0,dc0d300002f9,-48,9,FSC-BT618
>> +SCAN}

5.3.10 Connect The Slave Device

Format: AT+OTA{=Param1} **Param1:**Connect to the peer device (peer 12-bit MAC address + 1-bit type)
Time out **Response**: AT+OTA=Param1
Description:1-bit type is the first data (0/1) of scan data
Example: Connection scan slave device address << AT+LECCONN=dc0d300002f90 >> OK

5.3.11 Air UpgrateSoft Reboot

Format: AT+OTA{=Param1} **Param1:**set/enter password
Response: AT+OTA=Param1
Description:0, set the password; 1, enter the password, do not save; after enabling the password function, it is required before upgrading/setting Enter the password first AT+OTA=0,123456\r\n Set password AT+OTA=1,123456\r\n Enter password Note: To set/modify the password, need to enter the password first
Example: query password <<AT+OTA >>+OTA=123456 >> OK

5.3.12 Software Reset

Format: AT+RESTORE

Description:Module restores settings to factory settings and then resets

5.3.13 Restore Factory Settings

Format: AT+RESTORE
Description: Module restore all factory settings then reboot

6. Specification Performance Part

6.2 Module Power Consumption

Operating mode	Operating parameters	Average current
Broadcast mode (0 dBm、Uart off)	100ms AD Interval	76.62uA
	200ms AD Interval	42.35 uA
	400ms AD Interval	20.98 uA
	1000ms AD Interval	9.96 uA
LE Connection Status	20ms Connection interval Uart off	149 uA
	20ms Connection interval Uart on	287 uA
	300ms Connection interval Uart off	10 uA
	300ms Connection interval Uart on	242 uA

6.3 Time Parameter

Type	Min.	Type.	Max.	Description
Power-on time		230ms		Enable UART response time
Wake up time		200ms		The UART sends the wake-up data, and then starts to calculate

6.4 Data Transfer Rate

Baudrate	Pack size	Pack interval	Bluetooth connection interval	Reporting method	Maximum transfer rate
115200	182	16ms	15ms	Notify	11375 Byte/s