FSC-BT8XX

BT5.0 Programming User Guide

Version 3.3

Revision History

Version	Data	Notes	Author
1.0	2015/09/10	First Release	Tony
2.0	2016/03/21	Add LE GATT Commands	Jerry
3.0	2016/11/12	Add HID Commands	Navy
3.1	2016/12/13	Add GPIO Indications	Navy
3.2	2019/05/05	Add LE Commands	Navy
3.3	2019/08/08	Add AT+LEADDR、AT+LENAME	Navy

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Contents

1. Introduction

This specification presents design guidelines for software engineers that use FSC-BT8XX series modules for Bluetooth requirements.

1.1 Terms

Throughout this specification:

- { } : Content between {...} is optional
- << : Content behind << represents a *COMMAND* sent from Host to Module
- >> : Content behind >> represents a *RESPONSE* sent from Module to Host

1.2 Hardware Interface

- GPIO
- PWM
- UART
- SPI Master
- I2C Master/Slave
- Analog Input/Output

1.3 Supported Bluetooth Profile

- SPP (Serial Port Profile)
- GATT Server (Generic Attribute Profile)
- GATT Client (Generic Attribute Profile)
- HID Keyboard (Human Interface Profile)

1.4 Command Format

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

- All commands start with “AT”, end with <CR><LF>
- <CR> stands for "carriage return", corresponding hex is 0x0D
- <LF> stands for "line feed", corresponding hex is 0x0A
- If command has parameter, parameter keep behind “=”
- If command has multiple parameters, parameter must be separated by “,”
- If command has response, response start with <CR><LF>, end with <CR><LF>
- Module will always report command’s execution result using “OK” for success or

"ERROR" for failure

e.g.

1. Read module's BR/EDR local name

   << *AT+NAME*

   >> *+NAME=Feasycom*

   >> *OK*

2. Write a baudrate which is not supported

   << *AT+BAUD=0*

   >> *ERROR*

1.5 Indication Format

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

- All indications start with <CR><LF>, end with <CR><LF>
- If indication has parameter, parameter keep behind "="
- If indication has multiple parameters, parameter must be separated by ","

e.g.

1. Received "1234567890" from mobile phone via SPP profile

   >> *+SPPDATA=10,1234567890*

1.6 Module Default Settings

Local Name (BR/EDR)	FSC-BT826EN
Local Name (LE)	FSC-BT826EN-LE
Pin Code	0000
Secure Simple Pairing Mode	OFF
Physical UART Baudrate	115200bps/8/N/1

2. Command Table

2.1 General Commands

2.1.1 UART Communication Test

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

2.1.2 Read Firmware Version

Format: AT+VER
Response: +VER=Param Param: Firmware version (16 Bytes ASCII)
Example: Read module's firmware version << *AT+VER* >> *+VER=8.3.1,FSC-BT816S* >> *OK*

2.1.3 Read BR/EDR MAC Address

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

Example: Read Module's BR/EDR MAC address

<< AT+ADDR

>> +ADDR=DC0D30123456

>> OK

2.1.4 Read BLE MAC Address

Format: AT+LEADDR

Response: +LEADDR=Param

Param: Module's BLE MAC address (12 Bytes ASCII)

Example: Read Module's BLE MAC address

<< AT+LEADDR

>> +LEADDR=DD0D30123456

>> OK

2.1.5 Read/Write BR/EDR Local Name

Format: AT+NAME {=Param1{, Param2}}

Param1: BR/EDR local name (1~31 Bytes ASCII, default: FSC-BT826E)

Param2: MAC address suffix (0/1, default:0)

(0) Disable suffix

(1) Enable suffix "-XXXX" (lower 4 bytes of MAC address) after local name

Response: +NAME=Param

Description: Write local name if parameter existence, otherwise read current local name

Example: Read current BR/EDR local name

<< AT+NAME

>> +NAME=Feasycom

>> OK

Example: Change module's BR/EDR local name to "ABC"

<< AT+NAME=ABC

>> OK

Example: Change module's BR/EDR local name to "ABC" and enable suffix

<< AT+NAME=ABC,1 *>> OK*

2.1.6 Read/Write BLE Local Name

Format: AT+LENAME {=Param1{, Param2}} Param1: BLE local name (1~31 Bytes ASCII, default: FSC-BT826E-LE) Param2: MAC address suffix (0/1, default:0) (0) Disable suffix (1) Enable suffix "-XXXX" (lower 4 bytes of MAC address) after local name
Response: +LENAME=Param
Description: Write local name if parameter existence, otherwise read current local name
Example: Read current BLE local name *<< AT+LENAME* *>> +LENAME=Feasycom-LE* *>> OK* **Example**: Change module's BLE local name to "ABC" *<< AT+LENAME=ABC* *>> OK* **Example**: Change module's BLE local name to "ABC" and enable suffix *<< AT+LENAME=ABC,1* *>> OK*

2.1.7 Read/Write Pin Code

Format: AT+PIN{=Param} Param: Pin code (4~15 Bytes ASCII, default:0000)
Response: +PIN=Param
Example: Read module's pin code *<< AT+PIN* *>> +PIN=0000* *>> OK*

Example: Change module's pin code to "1234" **<<** *AT+PIN=1234* **>>** *OK*

2.1.8 Turn On/Off Secure Simple Pairing *<need reboot>*

Format: AT+SSP{=Param} Param: Simple pairing (0/1, default:1) (0) Turn off (1) Turn on
Response: +SSP=Param
Description: Pin code input will be bypassed if simple pairing is on in pairing procedure

2.1.9 Read/Write UART Baudrate

Format: AT+BAUD{=Param} Param: Baudrate (2400/4800/9600/19200/38400/57600/115200/230400/256000/460800/512000/921600, default:115200)
Response: +BAUD=Param
Description: Module's baudrate will be changed immediately after received this command

2.1.10 Read/Write Class Of Device *<need reboot>*

Format: AT+COD{=Param} Param: Class of device (6 bytes ASCII, default:240404 Handsfree device)
Response: +COD=Param

2.1.11 Read/Write Run Mode

Format: AT+MODE{=Param} Param: Run Mode (1~4, default:4) (1) SPP Mode (2) HID Mode (3) BLE Mode (4) SPP+BLE Mode
Response: +MODE=Param
Description: After the command is executed, the BT8XX switches to the new Run Mode
Example: Read current Run Mode << *AT+MODE* >> *+MODE=4* >> *OK* **Example:** Change module's Run Mode to HID Mode << *AT+MODE=2* >> *OK*

2.1.12 Read/Clear Paired Record

Format: AT+PLIST{=Param} Param:(0/(1~8)/12 Bytes MAC address) (0) Clear all paired record (1~8) Clear specific paired record with index (MAC) Clear specific paired record with MAC address
Response1: +PLIST= { **Response2**: +PLIST=Param1, Param2 Param1: (1~8) Paired device's index Param2: (MAC) Paired device's MAC address **Response3**: +PLIST=}
Example: Read module's paired record << *AT+PLIST* >> *+PLIST= {* *+PLIST=1,1C5CF226D773*

+PLIST=2, A0BC30075421

+PLIST=}

>> *OK*

Example: Clear module's paired record

<< *AT+PLIST=0*

>> *OK*

2.1.13 Turn On/Off Throughput Mode

Format: AT+TPMODE{=Param}

Param: Throughput mode (0/1, default:0)

(0) Turn Off

(1) Turn On

Response: +TPMODE=Param

Description: When SPP/HID/GATT profile connected and throughput mode is on, the AT command will be de-active, every byte received via physical UART will be sent to air, vice visa

Example: Read current throughput mode

<< *AT+TPMODE*

>> *+TPMODE=1*

>> *OK*

Example: Turn off throughput mode

<< *AT+TPMODE=0*

>> *OK*

2.1.14 Turn On/Off Low Power Mode

Format: AT+LPM{=Param}

Param: Low Power Mode (0/1, default:0)

(0) Turn Off

(1) Turn On

Response: +LPM=Param

Description: This instruction is only applicable to BT816S module

Example: Read current Low Power Mode << *AT+LPM* >> *+LPM=0* >> *OK* **Example:** Turn on Low Power Mode << *AT+LPM=1* >> *OK*

2.1.15 Turn On/Off Hardware Flow Control *<need reboot>*

Format: AT+FLOWCTL{=Param} Param: Hardware Flow Control (0/1, default:1) (0) Turn Off (1) Turn On
Response: +FLOWCTL=Param

2.1.16 Turn On/Off Power On Auto Reconnect *<need reboot>*

Format: AT+AUTOCONN{=Param} Param: Option (0/1, default:1) (0) Turn Off (1-15) Turn on
Response: +AUTOCONN=Param
Description: Module will attempt to connect last device after power on if set and +MODE=1/+MODE=2

2.1.17 Release All Connections

Format: AT+DSCA
Description: Module release all Bluetooth connections with remote device

2.1.18 Soft Reboot

Format: AT+REBOOT
Description: Module release all Bluetooth connections with remote device then reboot

2.1.19 Restore Factory Settings

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

2.1.20 Scan Nearby Devices

Format: AT+SCAN =Param1{, Param2{, Param3}} Param1:(0~2) (0) Stop scan (1) Scan nearby BR/EDR devices (2) Scan nearby BLE devices Param2:(1~48) Scan period. unit:1.28s, default:12.8s
Description: Refer to Chapter 3 for format description of scan result

2.1.21 PIO Function Configuration

Format: AT+PIOCFG{=Param1,Param2}	
Param1	0: Disable Command/Transmission mode switch function 1: Enable Command/Transmission mode switch function
Param2	0: Disable Bluetooth disconnect function 1: Enable Bluetooth disconnect function
Response: +PIOCFG=Param1,Param2	

2.2 Bluetooth Serial Commands (BR/EDR SPP)

2.2.1 Read SPP State

Format: AT+SPPSTAT
Response: +SPPSTAT=Param Param: Refer to Chapter 3 for state description

2.2.2 Establish SPP Connection

Format: AT+SPPCONN{=Param} Param: MAC address of target device (12 Bytes ASCII)
Description: If the parameter does not exist, the module will attempt to connect to the last device

2.2.3 Release SPP Connection

Format: AT+SPPDISC
Description: Release current SPP connection with remote device

2.2.4 Send Data Via SPP

Format: AT+SPPSEND=Param1, Param2 Param1: Payload length (1~180) Param2: Payload (1~180Bytes UTF8)
Description: If throughput mode is on, this command is de-active
Example: Send data “1234567890” to remote device via SPP << *AT+SPPSEND=10,1234567890* >> *OK*

2.3 Bluetooth Serial Commands (LE Peripheral)

2.3.1 Read LE Peripheral State

Format: AT+GATTSTAT
Response: +GATTSTAT=Param Param: Refer to Chapter 3 for state description

2.3.2 Send Data Via LE Peripheral

Format: AT+GATTSEND=Param1, Param2 Param1: Payload length (1~155) Param2: Payload (1~155 Bytes UTF8)
Description: If throughput mode is on, this command is de-active
Example: Send data "1234567890" to remote device via LE Peripheral << *AT+GATTSEND=10,1234567890* >> *OK*

2.4 Bluetooth Serial Commands (LE Central)

2.4.1 Read LE Central State

Format: AT+LESTAT
Response: +LESTAT=Param Param: Refer to Chapter 3 for state description

2.4.2 Establish LE Central Connection

Format: AT+LECONN=Param1{,Param2,Param3,Param4} Param1: MAC address of target device & MAC address type (13 Bytes ASCII)

Param2: Service-UUID, Support 16 Bit and 128 Bit (4 Bytes/32 Bytes ASCII) Param3: Write-UUID, Support 16 Bit and 128Bit (4 Bytes/32 Bytes ASCII) Param4: Notify-UUID, Support 16 Bit and 128Bit (4 Bytes/32 Bytes ASCII)
Description: If parameter 2, parameter 3, parameter 4 do not exist, the module will automatically search for the GATT service connected to the remote device
Example: Specified remote device service connections << *AT+LECONN=123456ABCDEF0,FFF0,FFF2,FFF1* >> *OK*

2.4.3 Send Data Via LE Central

Format: AT+LESEND=Param1, Param2 Param1: Payload length (1~180) Param2: Payload (1~180 Bytes UTF8)
Description: If throughput mode is on, this command is de-active
Example: Send data "1234567890" to remote device via LE Central << *AT+LESEND=10,1234567890* >> *OK*

2.5 Bluetooth Serial Commands (BR/EDR HID)

2.5.1 Read HID State

Format: AT+HIDSTAT
Response: +HIDSTAT=Param Param: Refer to Chapter 3 for state description

2.5.2 Establish HID Connection

Format: AT+HIDCONN{=Param}

Param: MAC address of target device (12 Bytes ASCII)
Description: If the parameter does not exist, the module will attempt to connect to the last device

2.5.3 Release HID Connection

Format: AT+HIDDISC
Description: Release current HID connection with remote device

2.5.4 Read/Write HID Send Delay

Format: AT+HIDDLY{=Param} Param: HID Send Delay (2~4 Bytes ASCII,Default:10)
Response: +HIDDLY=Param
Description: Different phones may require different delay settings to achieve the best HID transmission speed and stability
Example: Read current HID Send Delay << *AT+HIDDLY* >> *+HIDDLY=10* >> *OK*

2.5.5 Read/Write HID Transfer Mode

Format: AT+HIDMODE{=Param} Param: HID Mode (0 ~ 10 , Default:1)
Response: +HIDMODE=Param
Description: This command applies to keyboards in multiple countries. Refer to Chapter 3 for format description of hid mode

Example: Read current HID Mode << *AT+HIDMODE* >> *+HIDMODE=0* >> *OK* **Example**: Change module's hid mode to Spain Keyboard **<<** *AT+HIDMODE=4* **>>** *OK*

2.5.6 IOS Device On-screen Keyboard Toggle

Format: AT+HIDOSK
Description: This instruction applies only to the IOS Device

2.5.7 Send Data Via HID

Format: AT+HIDSEND=Param1, Param2 Param1: Payload length (1~180) Param2: Payload (1~180Bytes UTF8)
Description: If throughput mode is on, this command is de-active
Example: Send data "1234567890" to remote device via HID << *AT+HIDSEND=10,1234567890* >> *OK*

3. Indication Table

3.1 General Indications

3.1.1 Scan Result

Format: +SCAN =Param1, Param2, Param3, Param4{, Param5, Param6} Param1: Index (1~8)

Param2: Device address type (0~2)
(0)LE public address
(1)LE random address
(2)BR/EDR address
Param3: MAC address (12 Bytes ASCII)
Param4: RSSI (-255 ~ 0)
Param5: Size of Param6 if exist
Param6: Device Name for BR/EDR devices or advertising data for LE devices

Description: Param5/Param6 may not exist if remote device out of distance

Example: Scan nearby BR/EDR devices
<< *AT+SCAN=1*
>> *OK*
+SCAN={
+SCAN=1,2, DC0D30000003, -32,8, Feasycom
+SCAN=2,2, DC0D30000044, -64,8, Feasycom_1234
+SCAN=3,2, DC0D30000097, -47,8, TESTHID
+SCAN=}

3.2 Bluetooth Serial Indications

3.2.1 SPP State

Format: +SPPSTAT=Param
Param:(0~3)
(0) Unsupported
(1) Standby
(2) Connecting
(3) Connected

3.2.2 LE Peripheral State

Format: +GATTSTAT=Param
Param:(0~3)
(0) Unsupported
(1) Standby
(2) Connecting

(3) Connected

3.2.3 LE Central State

Format: +LESTAT=Param
Param:(0~3)
(0) Unsupported
(1) Standby
(2) Connecting
(3) Connected

3.2.4 HID State

Format: +HIDSTAT=Param
Param:(0~3)
(0) Unsupported
(1) Standby
(2) Connecting
(3) Connected

3.2.5 HID Transfer Mode

Format: +HIDMODE=Param
Param:(0~10)
(0) HID Key Value
(1) English Keyboard
(2) USA Keyboard
(3) Turkey Keyboard
(4) Spain Keyboard
(5) Portugal Keyboard
(6) France Keyboard
(7) Germany Keyboard
(8) Italy Keyboard
(9) Czech Keyboard
(10) Japan Keyboard

3.2.6 HID Send Success

Format: +HIDSEND
Description: HID mode buffer data transmission success indication HIDSEND

3.3 GPIO Indications

3.3.1 LED Pin

PIN32 (Output)	
Low Level	Initializing
Blink in 1Hz	Ready to connecting
High Level	Connected

3.3.2 State Pin

PIN33 (Output)	
Low Level	Disconnected
High Level	Connected