FSC-BT80X

BT4.2 Programming User Guide

Version 3.1

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Version	Data	Notes	Author
1.0	2015/10/10	First Release	Tony
2.0	2016/05/20	Add commands	Navy
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深圳市飞易通科技有限公司
FEASYCOM

Contact Us:

Shenzhen Feasycom Technology Co., Ltd
Web: www.feasycom.com
Email:support@feasycom.com
Tel: +86-755-27924639,+86-755-23062695
Address: Room 2004-2005,20th Floor, Huichao Technology Building, Jinhai Road, Xixiang, Baoan District, Shenzhen,518100, China.

Contents

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1. Introduction

This specification presents design guidelines for software engineers that use FSC-BT80X 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
- I2C Master/Slave
- I2S Master/Slave
- Analog Input/Output

1.3 Supported Bluetooth Profile

- SPP (Serial Port Profile)
- GATT Server (Generic Attribute Profile)
- GATT Client (Generic Attribute Profile)
- HFP Sink (Hands-Free Profile)
- HFP Source (Hands-Free Profile)
- A2DP Sink (Advanced Audio Distribution Profile)
- A2DP Source (Advanced Audio Distribution Profile)
- AVRCP Controller (Audio/Video remote controller Profile)
- AVRCP Target (Audio/Video remote controller Profile)
- HID Keyboard (Human Interface Profile)
- PBAP Server (Phonebook Access Profile)

1.4 Command Format

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

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- 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. Pick up an incoming call when no call incoming actually
   << AT+HFPANSW
   >> 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
2. Call number “10086” use mobile phone when HFP connected
   >> +HFPSTAT=4
   >> +HFPCID=10086
   >> +HFPAUDIO=1
   >> +HFPSTAT=6

1.6 Module Default Settings

Local Name (BR/EDR)	FSC-BT80X
Local Name (LE)	FSC-BT80X-LE
Pin Code	0000
Secure Simple Pairing Mode	On
Physical UART Baudrate	115200bps/8/N/1

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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 (21 Bytes ASCII)
Example: Read module's firmware version << *AT+VER* >> *+VER=20171124,FSC-BT803(S)* >> *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)

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Example: Read Module's BR/EDR MAC address << *AT+ADDR* >> *+ADDR=DC0D30123456* >> *OK*

2.1.4 Read/Write Local Name

Format: AT+NAME {=Param1{, Param2}} Param1: BR/EDR/BLE local name (1~31 Bytes ASCII, default: FSC-BT80X) 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/BLE local name << *AT+NAME* >> *+NAME=Feasycom* >> *OK* **Example**: Change module's BR/EDR/BLE local name to "ABC" << *AT+NAME=ABC* >> *OK* **Example**: Change module's BR/EDR/BLE local name to "ABC" and enable suffix << *AT+NAME=ABC,1* >> *OK*

2.1.5 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*

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>> *+PIN=0000* **>>** *OK* **Example**: Change module's pin code to "1234" **<<** *AT+PIN=1234* **>>** *OK*

2.1.6 Turn On/Off Secure Simple Pairing

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

2.1.7 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

2.1.8 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= {

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Response2: +PLIST=Param1, Param2{, Param3}
Param1: (1~8) Paired device's index
Param2: (MAC) Paired device's MAC address
Param3: (UTF8) Paired device's local name
Response3: +PLIST=}

Example: Read module's paired record
<< AT+PLIST
>> +PLIST= {
+PLIST=1,1C5CF226D773, iPhone
+PLIST=2, A0BC30075421, Samsung Note 7
+PLIST=}
>> OK
Example: Clear module's paired record
<< AT+PLIST=0
>> OK

2.1.9 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/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

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2.1.10 Turn On/Off Pairing/Advertising Mode

Format: AT+PAIR=Param Param: Pair mode (0/1) (0) Turn Off (1) Turn On
Response: OK
Description: Module will enter pair mode itself if no connection established, and leave pair mode otherwise

2.1.11 Scan Nearby Devices

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

2.1.12 Release All Connections

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

2.1.13 Soft Reboot

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

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2.1.14 Restore Factory Settings

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

2.1.15 Read/Write Master/Slave Mode

Format: AT+ROLE{=Param} Param: Master/Slave mode (0/1, default:0) (0) Slave Mode(Sink) (1) Master Mode(Source)
Response: +ROLE=Param
Example: Read current Master/Slave mode << *AT+ROLE* >> *+ROLE=0* >> *OK*

2.1.16 I2S/PCM Format Configuration

Format: +I2SCFG{=Param1, Param2, Param3, Param4}	
Param1	0: Disable I2S/PCM for audio input/output 1: Enable I2S/PCM for audio input/output
Param2	0: I2S/PCM master role 1: I2S/PCM slave role
Param3	I2S resolution, only including16/20/24/32-bit I2S sampling rate, only including 44100/48000
Param4	Master(Source) mode can be set Slave(Sink) mode default 48000
Example: Read current I2S/PCM configuration << *AT+I2SCFG* >> *+I2SCFG=0,0,16,44100* **Example**: Set I2S/PCM configuration to: I2S slave,24-bit resolution,48000 sampling rate. << *AT+I2SCFG=1,1,24,48000*	

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>> OK

2.1.17 Turn On/Off Aptx Configuration

Format: AT+ATPXCFG{=Param} Param: APTX Configuration(0/1, default:0) (0) Turn Off (1) Turn On
Response: +APTXCFG=Param
Example: Read current APTX Configuration *<< AT+APTXCFG* *>> +APTXCFG=0* *>> OK* **Example:** Turn on APTX Configuration *<< AT+APTXCFG=1* *>> OK*

2.1.18 Turn On/Off Dual Stream Configuration(Source only)

Format: AT+DUALCFG{=Param} Param: Dual Stream Configuration(0/1, default:1) (0) Turn Off (1) Turn On
Response: +DUALCFG=Param
Example: Read current Dual Stream Configuration *<< AT+DUALCFG* *>> +DUALCFG=1* *>> OK* **Example:** Turn off Dual Stream Configuration *<< AT+DUALCFG=0* *>> OK*

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2.1.19 Auto Scan Connection(Source only)

Format: AT+AUTOCONN{=Param1,Param2}

Param1	0: Disable auto scan connection 1: Enable auto scan connection
Param2	0: Disable filter feasycom MAC address 1: Enable filter feasycom MAC address

Response: +AUTOCONN=Param1,Param2

Example: Read current auto scan connection

<< AT+AUTOCONN

>> +AUTOCONN=0,0

>> OK

Example: Turn on auto scan connection,and filter feasycom MAC address

<< AT+AUTOCONN=1,1

>> OK

2.1.20 Volume Setting

Format: AT+VOLUME {=Param}

Param: Audio volume (+/-)

Response: +VOLUME =Param

Example: Read current volume

<< AT+VOLUME

>> +VOLUME=14

Example: Increase volume

<< AT+VOLUME=+

>> OK

2.1.21 Turn On/Off Battery Charging Configuration

Format: AT+VBATCFG{=Param}

Param: Battery Charging Configuration(0/1, default:0)

(0) Turn Off

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(1) Turn On
Response: +VBATCFG=Param
Example: Read current Battery Charging Configuration << *AT+VBATCFG* >> *+VBATCFG=0* >> *OK* **Example:** Turn on Battery Charging Configuration << *AT+VBATCFG=1* >> *OK*

2.1.22 Read Battery Level

Format: AT+VBATREAD
Response: + VBATREAD=Param Param: Battery Level (1~6 Bytes ASCII)
Example: Read current battery level << *AT+VBATREAD* >> *+VBATREAD =3700* >> *OK*

2.2 HFP Commands

2.2.1 Read HFP State

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

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2.2.2 Establish HFP Connection

Format: AT+HFPCONN{=Param} Param: MAC address of target device (12 Bytes ASCII)
Description: Module will reconnect to last HFP device if parameter not existence
Example: Connect to last HFP device << *AT+HFPCONN* >> *OK* **Example2**: Connect to specific HFP device with MAC address << *AT+HFPCONN=1C5CF226D773* >> *OK*

2.2.3 Release HFP Connection

Format: AT+HFPDISC
Description: Release current HFP connection with remote device

2.2.4 Dial/Redial Phone Number

Format: AT+HFPDIAL{=Param} Param: Phone number (1~25 Bytes ASCII)
Description: Dial specific number if parameter existence, otherwise redial
Example: Redial << *AT+HFPDIAL* >> *OK* **Example:** Dial number “075527924639” << *AT+HFPDIAL=075527924639* >> *OK*

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2.2.5 Send DTMF code

Format: AT+HFPDTMF=Param Param: DTMF code (0~9/#/*)
Example: Send DTMF code "#" while talking << *AT+HFPDTMF=#* >> *OK*

2.2.6 Pick Up Incoming Call

Format: AT+HFPANSW
Description: Pick up incoming call

2.2.7 Reject/Hung up Call

Format: AT+HFPCHUP
Description: Reject incoming call or hung up outgoing/active call

2.2.8 Transfer Voice Audio

Format: AT+HFPADTS{=Param} Param: Transfer direction (0/1) (0) Transfer voice audio from module to remote device (1) Transfer voice audio from remote device to module
Description: Transfer voice audio between module and remote device by default if no parameter existence

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2.3 A2DP/AVRCP Commands

2.3.1 Read A2DP State

Format: AT+A2DPSTAT
Response: +A2DPSTAT=Param Param: Refer to Chapter 3 for state description

2.3.2 Establish A2DP Connection

Format: AT+A2DPCONN{=Param} Param: MAC address of target device (12 Bytes ASCII)
Description: Module will reconnect to last A2DP device if no parameter existence
Example: Connect to last A2DP device << *AT+A2DPCONN* >> *OK* **Example2**: Connect to specific A2DP device with MAC address << *AT+A2DPCONN=1C5CF226D773* >> *OK*

2.3.3 Release A2DP Connection

Format: AT+A2DPDISC
Description: Release current A2DP connection with remote device

2.3.4 Establish/Release A2DP Audio Connection (Source only)

Format: AT+A2DPAUDIO{=Param} Param: Operation (0/1) (0) Release A2DP Audio connection with remote a2dp sink device

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(1) Establish A2DP Audio connection with remote a2dp sink device
Description: Audio start streaming from source to sink once connection established

2.3.5 Track Play/Pause

Format: AT+PLAYPAUSE
Description: Send play or pause command to remote media player according to current play status

2.3.6 Track Stop

Format: AT+STOP
Description: Send stop command to remote media player

2.3.7 Track Forward

Format: AT+FORWARD
Description: Send forward command to remote media player

2.3.8 Track Backward

Format: AT+BACKWARD
Description: Send backward command to remote media player

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2.4 Bluetooth Serial Commands (BR/EDR SPP)

2.4.1 Read SPP State

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

2.4.2 Establish SPP Connection

Format: AT+SPPCONN=Param Param: MAC address of target device (12 Bytes ASCII)
Description: If target device is mobile phone, mobile phone must have initialized a RFCOMM service before this

2.4.3 Release SPP Connection

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

2.4.4 Send Data Via SPP

Format: AT+SPPSEND=Param1, Param2 Param1: Payload length (1~256) Param2: Payload (1~256Bytes 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*

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2.5 Bluetooth Serial Commands (LE GATT)

2.5.1 Read GATT State

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

2.5.2 Release GATT Connection

Format: AT+GATTDISC
Description: Release current GATT connection with remote device

2.5.3 Send Data Via GATT

Format: AT+GATTSEND=Param1, Param2 Param1: Payload length (1~100) Param2: Payload (1~100 Bytes UTF8)
Description: If throughput mode is on, this command is de-active
Example: Send data "1234567890" to remote device via GATT << *AT+GATTSEND=10,1234567890* >> *OK*

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3. Indication Table

3.1 General Indications

3.1.1 Device State

Format: +DEVSTAT=Param Param 0: Power Off; 1: Power On; 2: BR/EDR Scanning
Example: Module is power on **>>** *+DEVSTAT=1*

3.1.2 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 BR/EDR nearby devices in 6.4s *<<* *AT+SCAN=1,5* *>>* *OK* *+SCAN=1,2, DC0D30000003, -32,8, Feasycom* *+SCAN=2,2, DC0D30000044, -64,8, Feasycom_1234* *+SCAN=3,2, DC0D30000097, -47,8, TESTHID*

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3.2 HFP Indications

3.2.1 HFP State

Format: +HFPSTAT=Param
Param:(0~6)
(0) Unsupported
(1) Standby
(2) Connecting
(3) Connected
(4) Outgoing Call
(5) Incoming Call
(6) Active Call

3.2.2 HFP Device Information

Format: +HFPDEV=Param1{, Param2}
Param1: (12 Bytes ASCII), Remote device's MAC address of current HFP connection
Param2: (UTF8), Remote device's name of current HFP connection

Example: HFP connect success with device (name: "iPhone", MAC address: 1C5CF226D774)
>> *+HFPDEV=1C5CF226D774, iPhone*

3.2.3 Incoming/Outgoing Call Number

Format: +HFPCID=Param
Param:(1~25 Bytes ASCII), Call number

Example: Dial number 10086
<< *AT+HFPDIAL=10086*
>> *+HFPSTAT=4*
+HFPCID=10086
+HFPCIE=China Mobile
+HFPAUDIO=1
Example: Incoming call with number 13265463800
>> *+HFPSTAT=5*

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+HFPCID=13265463800
+HFPCIE=Jerry
+HFPAUDIO=1

3.2.4 Incoming/Outgoing Call Name

Format: +HFPCIE=Param
Param:(UTF8), Call name

Description: Not every mobile phone support this indication

3.2.5 HFP Voice Audio State

Format: +HFPAUDIO=Param
Param:(0/1)
(0) HFP voice audio disconnected, audio input/output routed to remote device
(1) HFP voice audio connected, audio input/output routed to module

3.2.6 HFP Device Network Signal Strength

Format: +HFPSIG=Param
Param:(0~5) Network signal strength of remote device

3.2.7 HFP Device Network Operator Selection

Format: +HFPNET=Param
Param:(UTF8) Network operator selection of remote device

3.2.8 HFP Device Roaming State

Format: +HFPROAM=Param
Param:(0/1) Roaming state of remote device

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3.2.9 HFP Device Battery Level

Format: +HFPBATT=Param
Param:(0~5) Battery level of remote device

3.3 A2DP/AVRCP Indications

3.3.1 A2DP State

Format: +A2DPSTAT=Param
Param:(0~5)
(0) Unsupported
(1) Standby
(2) Connecting
(3) Connected
(4) Media Streaming
(5) Media Paused

3.2.2 A2DP Device Information

Format: +A2DPDEV=Param1{, Param2}
Param1: (12 Bytes ASCII), Remote device's MAC address of current A2DP connection
Param2: (UTF8), Remote device's name of current A2DP connection

Example: A2DP connect success with device (name: "iPhone", MAC address: 1C5CF226D774)
>> *+A2DPDEV=1C5CF226D774, iPhone*

3.3.3 AVRCP State

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

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(3) Connected

3.3.4 Media Player State

Format: +PLAYSTAT=Param
Param:(0~2)
(0) Stopped
(1) Playing
(2) Paused

3.3.5 Audio Encoding Format

Format: +ENCODER=Param
Param:(ASCII), SBC/FASTSTREAM/APTX/APTX-LL

3.3.6 Audio Decoding Format

Format: +DECODER=Param
Param:(ASCII), SBC/FASTSTREAM/APTX/APTX-LL

3.4 Bluetooth Serial Indications

3.4.1 SPP State

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

3.4.2 GATT State

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

3.4.3 SPP Received Data

Format: +SPPDATA=Param1, Param2
Param1: Payload length
Param2: Payload

Description: If throughput mode is on, only Param2 will be present

Example: Received data "1234567890" from remote device via SPP
<< *+SPPDATA=10,1234567890*

3.4.4 GATT Received Data

Format: +GATTDATA=Param1, Param2
Param1: Payload length
Param2: Payload

Description: If throughput mode is on, only Param2 will be present

Example: Received data "1234567890" from remote device via GATT
<< *+GATTDATA=10,1234567890*

3.5 GPIO Indications

3.5.1 LED Pin

LED1(Output)	
Low Level	Initializing
Blink in 1Hz	Ready to connecting
High Level	Connected

3.5.2 State Pin

PIO3(Output)	
Low Level	Disconnected
High Level	Connected