PTR 5610-S

Bluetooth Low Energy Module Specification V1.1

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VERSION	DATE	RELEASE NOTE
V1.0	2019-4-15	First release
V1.1	2019-7-16	update
V1.2	2019-12-20	Modify pin assignment

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1. Overview

1.1. Product introduction

PTR5610-S is a BLE module with a slave feature. The module is based on nRF52810 with an ARM Cortex-M4F processor from Nordic Semiconductor.Therefore the PTR5610-S features Bluetooth 5.0,high performance and ultra low power(ULP).

The user's MCU is connected to the module through a serial port (UART), so that it enables bidirectional communication of data with the mobile device. After receiving the data from the serial port of the user MCU, the module will automatically send it to the mobile device; The mobile device can write data to the module by the APP, and then the module sends the data it received to the user's MCU through the serial port.

Module features (such as serial port baud rate, broadcast interval, etc.) support both local and air configuration modes. Various parameters of the module can be configured by "AT Command", and parts of the "AT Command" can be stored in flash to ensure the configuration dose not lost when the module is power-off.

With the mentioned feature, users may spend less time and cost to developing products by using PTR5610-S.Development become easier.

1.2. Feature

- √   Support Bluetooth 5.0 protocol, high-speed transmission.
- √   Support a wide range of supply voltage from 1.8V to 3.6V.
- √   Support information encryption to improve transmission security;
- √   Support low power advertising mode.
- √   Support to modify the 128-bit UUID.
- √   Support local and on-air configuration to adapt to different needs.
- √   Support to configure 4 GPIO as input and output.
- √   Support access key to improve the reliability of connection.

1.3. Notice

1. The serial port of the module is operated by 8 data bits, 1 stop bit, and none parity.
2. All the "AT Commands" must be used when the module is in "Command mode".
3. All the "AT Commands" are filled in ASCII format. When the inputted command is wrong or exceeds its range, the module will return ERROR.

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4. Most of "AT Commands" take effect immediately while some of them take effect after the module has been reset.

5. The "AT Command" setting is valid in the current running cycle. If the setting needs to be saved, it can be achieved by software reset .

6. In an environment where the amount of data is very large or the signal is not good, the original data cannot be sent to the peer device in time, which will cause the serial port buffer overflow problem. In this case, you can consider managing the data transmission by reading the module DIN pin state to avoid data loss. .

7. When some pins of the module are not in use, it is recommended that it is suspended.

1.4. Typical application frame
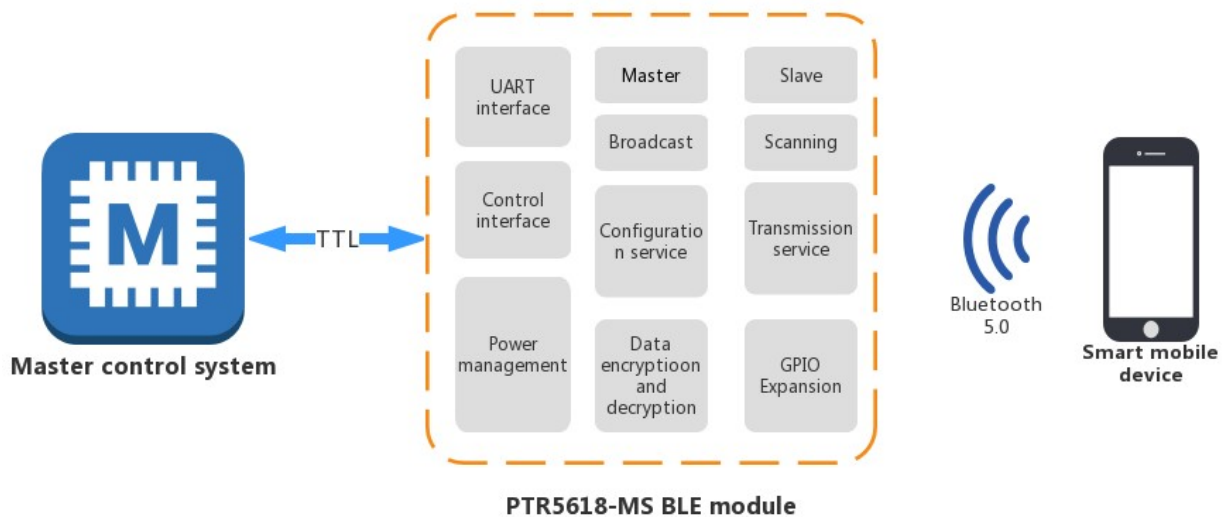
Figure 1 Application Diagram

2. Hardware specification

2.1. Package

The module package is shown in Figure 2(TOP VIEW). Please see the PTR5610 module data sheet for details.
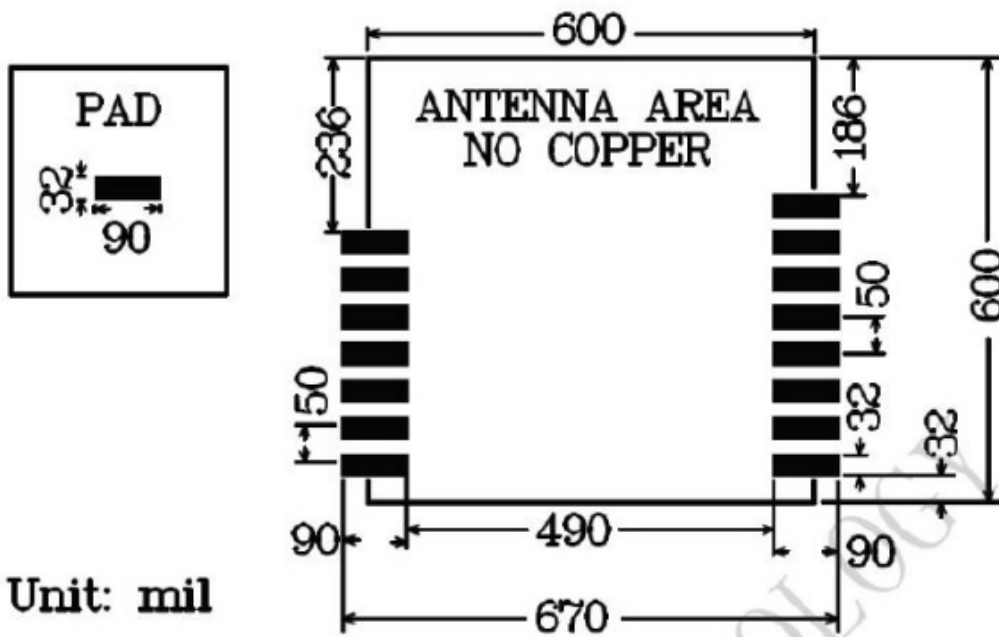
Figure 2　Package diagram

2.2. Pin assignment

The module pin assignments are shown in Figure 3 (TOP VIEW). Please see the PTR5610 module data sheet for details.

Figure 2 Pin Distribution

2.3. Pin definition

Serial num	Abbreviation	Input/output	Explanation
1	WAKE	I	Rising edge: This pin is used as a wake-up function if the module enters deep sleep mode or low power advertise

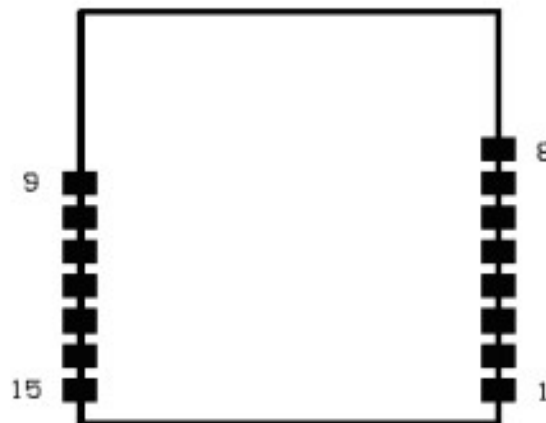|			mode.
2	TX	O	TX pin of the serial port.
3	RX	I	RX pin of the serial port.
4	SWDIO	/	/
5	SWCLK	/	/
6	DON	O	Indicative signal of data output. Low level: No data is sent by the module . The signal is pulled down to low level after the data sending is complete. High level: When there is a stream of data has to be sent from the module to MCU, the pin become high level to notify MCU to prepare receiving.
7	GPIO3	I/O	This pin can be configured as an input or output pin.
8	RESET	I	Module reset pin Rising edge: A signal of rising edge on this pin will cause the module to reset.
9	GND	/	Module ground pin
10	VCC	/	Module power supply positive 1.8 ~ 3.6 V
11	STATE	O	Indicative signal of connection status Low level: the module is not connected High level: the module is connected
12	GPIO0	I/O	This pin can be configured as an input and output pin.
13	DIN	O	Indicative signal of data input: Low level: Data can be sent from MCU to the module. High level: The module is busy, the MCU cannot send data to the module.
14	GPIO1	I/O	The pin can be configured as an input and output pin.
15	GPIO2	I/O	The pin can be configured as an input and output pin.

Table 1   Pin Definition

2.4. Layout considerations

Bluetooth pass-through module works in the 2.4g wireless frequency band, but for wireless communication, it is relatively easy to be interfered by the external environment. So when laying out the module, there are a few points to note:

1. The wireless 2.4G signals can be shielded easily by metal materials,it is necessary to avoid metal materials around the module. If the shell of the product is made of metal materials, it may also have greater absorption of wireless signals.
2. Do not rout below the module as far as possible.
3. The antenna of the module should be placed as close as possible to the edge of the PCB of a main board, and the antenna direction should not be toward the center of the PCB, and ensure the underside of the antenna plate is hollowed out, and parallel to the direction of the antenna is not allowed to be copper or traced.

3. AT Command

3.1. Basic function

3.1.1. Baud rate

Command	ACK	Instruction
AT+BAUD=[Index]	OK+BAUD	[Index] 0:9600 (bps) 1:19200 (bps) 2:38400 (bps) 3:57600 (bps) 4:115200 (bps) 5:512000 (bps) 6:1000000 (bps) [Instance] Send:AT+BAUD=0 Return:OK+BAUD
AT+BAUD=?	OK+BAUD=[Index]	[Index]ditto [Instance] Send:AT+BAUD=? Return:OK+BAUD=0

Description:Set or check the baud rate of the module's uart port.The default setting is 115200bps,8 data bit,1 stop bit,none parity.

*The command takes effect immediately,and be saved after AT+RESET command is used.

3.1.2. Transmit power

Command	ACK	Instruction
AT+TXPW=[Index]	OK+TXPW	[Index] 0:+4 (dbM) 1:0 (dbM) 2:- 4 (dbM) 3:- 8 (dbM) 4:- 12 (dbM) 5:- 16 (dbM) 6:- 20 (dbM) 7:- 40 (dbM) [Instance] Send:AT+TXPW=0 return:OK+TXPW

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Command	ACK	Instruction
AT+TXPW=?	OK+TXPW=[Index]	[Index]:ditto [Instance] Send:AT+TXPW=? Return:OK+TXPW=0

Description:Set or check the module's transmit power.The default setting is 0 dbm.

*The command takes effect immediately,and be saved after AT+RESET command is used.

3.1.3. MAC address

Command	ACK	Instruction
AT+MAC=[Param]	OK+MAC	[Param] 6 bytes MAC address [Instance] Send: AT+MAC=C5:11:4C:1B:D0:52 Return:OK+MAC
AT+MAC=?	OK+MAC=[Param]	[Param] 6bytes MAC address [Instance] Send:AT+MAC=? Return: OK+MAC=C5:11:4C:1B:D0:52

Description:Set or check the module's MAC.The default MAC address parameter is randomly generated by the chip.

*Command takes effect immediately in the non-connected state, and the configure is saved after AT+RESET command is used.

*In connected state,command takes effect after disconnected,and the configure is saved automatically.

3.1.4. Transmission speed on Bluetooth

Command	ACK	Instruction
AT+RATE=[Index]	OK+RATE	[Index] 0:low speed 1:middle speed 2:high speed [Instance] Send:AT+RATE=0 Return:OK+RATE
AT+RATE=?	OK+RATE=[Index]	[Index]ditto [Instance] Send:AT+RATE=?

		Return:OK+RATE=0

Description:Set or check the module's transmission speed.The default setting is low speed.

*Command takes effect immediately in the non-connected state, and the configure is saved after AT+RESET command is used.
*In connected state,command takes effect after disconnected,and the configure is saved automatically.

3.1.5. Work mode

Command	ACK	Instruction
AT+WKMD=[Index]	OK+WKMD	[Index] 0:Slave-single link mode 1:Slave-multiple link mode [Instance] Send:AT+WKMD=0 Return:OK+WKMD
AT+WKMD=?	OK+WKMD=[Index]	[Index]:ditto [Instance] Send:AT+WKMD=? Return:OK+WKMD=0

Description:Set or check the module's work mode.The default setting is Slave-single link mode.

Slave-single link mode:If the module is configured as a slave,set the work mode to Slave-single link mode means the module can establish a connection with only one master.

Slave-multiple link mode:If the module is configured as a slave,set the work mode to Slave-multiple link mode means that the module will change the parameters such as connect interval,slave legacy to adjust a master with multiple-link feature.

*The command takes effect and be saved after AT+RESET command is used.

3.1.6. Sleep

Command	ACK	Instruction
AT+SLEEP	OK+SLEEP	[Instance] Send:AT+SLEEP Return:OK+SLEEP

Description:Get into deep sleep mode(system_off).When the module is in deep sleep mode,it can be waked up only if a rising edge is detected on the PIN WAKE.
*The command takes effect immediately.

3.1.7. Factory default setting

Command	ACK	Instruction
AT+FADR	OK+FADR	[Instance] Send:AT+FADR Return:OK+FADR

Description:The module will restart after 150ms,and recover all configuration to the default setting.
*The command takes effect immediately.

3.1.8. Software reset

Command	ACK	Instruction
AT+RESET	OK+RESET	[Instance] Send:AT+RESET Return:OK+RESET

Description:The module will reset and restart after 150ms,and retain all configuration.
*The command takes effect immediately.

3.1.9. Firmware version

Command	ACK	Instruction
AT+FWNM	OK+FWNM=[Param]	[Param] 2 bytes information [Instance] Send:AT+FWNM Return:OK+FWNM=0001

Description:Check the firmware version of the module.
*The command takes effect immediately.

3.2. Slave command

3.2.1. Advertise name

Command	ACK	Instruction
AT+NAME=[Param]	OK+NAME	[Param] Advertise name [Instance] Send:AT+NAME=XUNTONG Return:OK+NAME

Command	ACK	Instruction
AT+NAME=?	OK+NAME=[Param]	[Param]ditto [Instance] Send:AT+NAME=? Return:OK+NAME=XUNTONG

Description:Set or check the advertise name,the length of the name is up to 29 bytes,the excess will be discarded.The default name is "XT_" + "6-bytes MAC address of the Bluetooth chip"
Notice: The advertise name can only be constituted by numbers, characters, or underscores.
*Command takes effect immediately in the non-connected state, and the configure is saved after AT+RESET command is used.
*In connected state,command takes effect after disconnected,and the configure is saved automatically.

3.2.2. Advertise interval

Command	ACK	Instruction
AT+ADIT=[Index]	OK+ADIT	[Index] 0:20　　（ms） 1:50　　（ms） 2:100　　（ms） 3:200　　（ms） 4:300　　（ms） 5:500　　（ms） 6:1000　（ms） 7:2000　（ms） 8:4000　（ms） 9:8000　（ms） [Instance] Send:AT+ADIT=0 Return:OK+ADIT
AT+ADIT=?	OK+ADIT=[Index]	[Index]ditto [Instance] Send:AT+ADIT=? Return:OK+ADIT=0

Description:Set or check the advertise interval,the default setting is 300ms.
*Command takes effect immediately in the non-connected state, and the configure is saved after AT+RESET command is used.
*In connected state,command takes effect after disconnected,and the configure is saved automatically.

3.2.3. Advertisement type

Command	ACK	Instruction

Command	ACK	Instruction

AT+ADST=[Index]	OK+ADST	[Index]
		0: stop advertising
		1: start connectable advertisement
		2: start non-connect advertisement
		3: start low-power
		   connectable advertisement
		4: start low-power
		   non-connect advertisement
		[Instance]
		Send:AT+ADST=0
		Return:OK+ADST

AT+ADST=?	OK+ADST=[Index]	[Index]ditto [Instance] Send:AT+ADST=? Return:OK+ADST=0

Description:Set or check the advertisement type,the default setting is connectable advertisement.

*Command takes effect immediately in the non-connected state, and the configure is saved after AT+RESET command is used.

*In connected state,command takes effect after disconnected,and the configure is saved automatically.

3.2.4. Slave data service UUID

Command	ACK	Instruction
AT+SSERN=[Param]	OK+SSERN	[Param] 16 bytes UUID [Instance] Send: AT+SSERN=69:40:00:01:B5:A3:F3:93:E0:A9:E5:0E:24:DC:CA:99 Return:OK+SSERN
AT+SSERN=?	OK+SSERN=[Param]	[Param] 16 bytes UUID [Instance] Send:AT+SSERN=? Return: OK+SSERN=69:40:00:01:B5:A3:F3:93:E0:A9:E5:0E:24:DC:CA:99

Description:Set or check the BASE UUID of the slave's service,the length of the UUID is 16 bytes, the default UUID is 69:40:00:01:B5:A3:F3:93:E0:A9:E5:0E:24:DC:CA:99.

*The command takes effect and be saved after AT+RESET command is used.

3.2.5. Slave TX characteristic UUID

Command	ACK	Instruction
AT+SCHAT=[Param]	OK+SCHAT	[Param] 16 bytes UUID [Instance] Send: AT+SCHAT=69:40:00:02:B5:A3:F3:93:E0:A9:E5:0E:24:DC:CA:99 Return:OK+SCHAT
AT+SCHAT=?	OK+SCHAT=[Param]	[Param] 16 bytes UUID [Instance] Send:AT+SCHAT=? Return: OK+SCHAT=69:40:00:02:B5:A3:F3:93:E0:A9:E5:0E:24:DC:CA:99

Description:Set or check the UUID of the slave's TX Characteristic,the length of the UUID is 16 bytes, the default UUID is 69:40:00:02:B5:A3:F3:93:E0:A9::E5:0E:24:DC:CA:99.
*The command takes effect and be saved after AT+RESET command is used.

3.2.6. Slave RX characteristic UUID

Command	ACK	Instruction
AT+SCHAR=[Param]	OK+SCHAR	[Param] 16bytesUUID [Instance] Send: AT+SCHAR=69:40:00:03:B5:A3:F3:93:E0:A9:E5:0E:24:DC:CA:99 Return:OK+SCHAR
AT+SCHAR=?	OK+SCHAR=[Param]	[Param] 16bytesUUID [Instance] Send:AT+SCHAR=? Return: OK+SCHAR=69:40:00:03:B5:A3:F3:93:E0:A9:E5:0E:24:DC:CA:99

Description:Set or check the UUID of the slave's RX Characteristic,the length of the UUID is 16 bytes, the default UUID is 69:40:00:03:B5:A3:F3:93:E0:A9:E5:0E:24:DC:CA:99.
*The command takes effect and be saved after AT+RESET command is used.

3.2.7. Slave service configuration UUID

Command	ACK	Instruction
AT+SSECN=[Param]	OK+SSECN	[Param] 16 bytes UUID [Instance] Send: AT+SSECN=7F:51:00:04:B5:A3 :F3:93:E0:A9:E5:0E:24:DC:CA:99 Return:OK+SSECN
AT+SSECN=?	OK+SSECN=[Param]	[Param] 16 bytes UUID [Instance] Send:AT+SSECN=? Return: OK+SSECN=7F:51:00:04:B5:A3 :F3:93:E0:A9:E5:0E:24:DC:CA:99

Description:Set or check the BASE UUID of the slave's configuration service ,the length of the UUID is 16 bytes, the default UUID is 7F:51:00:04:B5:A3:F3:93:E0:A9:E5:0E:24:DC:CA:9E.(The configuration service is used for configuring the module through mobile device)
*The command takes effect and be saved after AT+RESET command is used.

3.2.8. Slave TX configuration Characteristic UUID

Command	ACK	Instruction
AT+SCHCC=[Param]	OK+SCHCC	[Param] 16 bytes UUID [Instance] Send: AT+SCHCC=7F:51:00:05:B5:A3 :F3:93:E0:A9:E5:0E:24:DC:CA:99 Return:OK+SCHCC
AT+SCHCC=?	OK+SCHCC=[Param]	[Param] 16 bytes UUID [Instance] Send:AT+SCHCC=? Return: OK+SCHCC=7F:51:00:05:B5:A3 :F3:93:E0:A9:E5:0E:24:DC:CA:99

Description:Set or check the UUID of the slave's TX configuration characteristic UUID,the length of the UUID is 16 bytes, the default UUID is 7F:51:00:05:B5:A3:F3:93:E0:A9:E5:0E:24:DC:CA:9E.(The TX configuration characteristic is

used for sending data to mobile device.)

*The command takes effect and be saved after AT+RESET command is used.

3.2.9. Slave RX configuration Characteristic UUID

Command	ACK	Instruction
AT+SCHCR=[Param]	OK+SCHCR	[Param] 16bytesUUID [Instance] Send: AT+SCHCR=7F:51:00:06:B5:A3 :F3:93:E0:A9:E5:0E:24:DC:CA:9 9 Return:OK+SCHCR
AT+SCHCR=?	OK+SCHCR=[Param]	[Param] 16bytesUUID [Instance] Send:AT+SCHCR=? Return: OK+SCHCR=7F:51:00:06:B5:A3 :F3:93:E0:A9:E5:0E:24:DC:CA:9 9

Description:Set or check the UUID of the slave's RX configuration characteristic UUID,the length of the UUID is 16 bytes, the default UUID is 7F:51:00:06:B5:A3:F3:93:E0:A9:E5:0E:24:DC:CA:9E.(The TX configuration characteristic is used for receiving configuration from mobile device.)

*The command takes effect and be saved after AT+RESET command is used.

3.3. Common Command

3.3.1. Switch mode enable

Command	ACK	Instruction
AT+STRD=[Index]	OK+STRD	[Index] 0:disable 1:enable [Instance] Send:AT+STRD=0 Return:OK+STRD
AT+STRD=?	OK+STRD=[Index]	[Index]ditto [Instance] Send:AT+STRD=?

| | | Return:OK+STRD=0 |

Description:If enable, the mode of the module can be switched between Transmission Mode and Command Line Mode.The default setting is "disable".

*The command takes effect and be saved after AT+RESET command is used.

3.3.2. Switch Transmission Mode to Command Line Mode

Command	ACK	Instruction
AT++++	OK+CMD	[Instance] When recent mode is Transmission Mode Send:AT++++ Return:OK+CMD

Description:Switch the working mode from Transmission Mode Command Line Mode.The command can not be used until the data exchange has been stopped for 200ms.

*The command takes effect immediately.

3.3.3. Switch Command Line Mode to Transmission Mode

Command	ACK	Instruction
AT+ENRT	OK+ENRT	[Instance] When recent mode is Command Line Mode Send:AT+ENRT Return:OK+ENRT

Description:Switch the working mode from Command Line Mode to Transmission Mode.

*The command takes effect immediately.

3.4. Extended function command

3.4.1. Encryption

Command	ACK	Instruction
AT+EYPT=[Index-1,Index-2]	OK+EYPT	[Index-1] 0: disable information encryption 1: enable Information encryption [Index-2] 0: enable passkey 1: disable passkey [Instance] Send:AT+EYPT=0,0

		Return:OK+EYPT
AT+EYPT=?	OK+EYPT=[Index-1,Index-2]	[Index-1]ditto [Index-2]ditto [Instance] Send:AT+EYPT=? Return:OK+EYPT=0,0

Description:Set or check the encryption function,the default setting is "AT+EYPT=0,0".

Information encryption:For encryption of the information over the air.

Passkey:If the peer do not transfer a right passkey,the link will be disconnected automatically.

*The command takes effect immediately.

3.4.2. Key setting

Command	ACK	Instruction
AT+SKEY=[Param]	OK+SKEY	[Param] 6 bytes key [Instance] Send:AT+SKEY=123456 Return:OK+SKEY
AT+SKEY=?	OK+SKEY=[Param]	[Param]ditto [Instance] Send:AT+SKEY=? Return:OK+SKEY=123456

Description:Set or check key for encryption. default setting is "000000".
*The command takes effect and be saved after AT+RESET command is used.

3.4.3. GPIO output setting

Command	ACK	Instruction
AT+GPIOO=[N, Level]	OK+GPIOO	[N] The number of GPIO,range from 0 to 3 [Level] 0:low 1:high 2:disable [Instance] Send:AT+GPIOO=0,0 Return:OK+GPIOO
AT+GPIOO=?	OK+GPIOO=[N, Level]	ditto [Level]ditto

Command	ACK	Instruction
		[Instance] Send:AT+GPIOO=? Return: OK+GPIOO=0,0 ....Maximum: 4

Description:Set or check output state of GPIO,the default setting is "disable" .

*The command takes effect immediately,and be saved after AT+RESET command is used.

3.4.4. GPIO input setting

Command	ACK	Instruction
AT+GPIOI=[N, Effective,Data]	OK+GPIOI	[N] The number of GPIO,range from 0 to 3. [Effective] 0:falling edge 1:rising edge 2:disable [Data] The length of customer data is up to 10 bytes. [Instance] Send:AT+GPIOI=0,1,hello Return:OK+GPIOI
AT+GPIOI=?	OK+GPIOI=[N, Effective,Data]	[N]ditto [Effective]ditto [Data]ditto [Instance] Send:AT+GPIOI=? Return: OK+GPIOI=0,1,hello Maximum:4

Description:Set or check input state of GPIO,the default setting is "disable" .

*The command takes effect immediately,and be saved after AT+RESET command is used.

4. Appendix

4.1. Troubleshooting

◆ **Q**: Can not scan the advertise.

A: Check whether the status of the device is not in the advertise state by using AT command

"AT+ADST=?"(This AT command is related to).

◆ Q: The module can not be connect.
   A: Check whether the status of the device is in the non-connect state by using AT command
        "AT+ADST=?"(This AT command is related to).

◆ Q: No reaction when the AT command is sent.
   A: Check whether the AT Command is end with a "\r",if there is a "\r",please remove it.

◆ Q: The module can not communicate with the host(the command or data can not be sent
        through uart port) .
   A: Make sure the module and the host(MCU) are in a common GND.

4.2. Default parameter list

Function Descriptor	Parameter
Advertisement type	Connectable advertisement
Advertise interval	300ms
Advertise name	XT_(6 bytes of MAC Address)
Baud rate	115200bps
Transmit power	0dbm
Transmission speed	Low speed
Work mode	Salve-Single-Link
Slave data service UUID	6940-0001-B5A3-F393-E0A9-E50E-24DC-CA99
Slave TX Characteristic UUID	6940-0002-B5A3-F393-E0A9-E50E-24DC-CA99
Slave RX Characteristic UUID	6940-0003-B5A3-F393-E0A9-E50E-24DC-CA99
Slave configuration service UUID	7F51-0004-B5A3-F393-E0A9-E50E-24DC-CA9E
Slave configuration Characteristic UUID	7F51-0005-B5A3-F393-E0A9-E50E-24DC-CA9E
Slave RX configuration Characteristic UUID	7F51-0006-B5A3-F393-E0A9-E50E-24DC-CA9E
Switch mode	Disable
Encryption	Disable
Key	000000
GPIO-0	Disable
GPIO-1	Disable
GPIO-2	Disable
GPIO-3	Disable

FCC Statement

FCC standards: FCC CFR Title 47 Part 15 Subpart C Section 15.247
Integral antenna with antenna gain 0dBi

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.

If any hardware modify or RF control software modify will be made by host manufacturer,C2PC or new certificate should be apply to get approval,if those change and modification made by host manufacturer not expressly approved by the party responsible for compliance ,then it is illegal.

FCC Radiation Exposure Statement
This modular complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

If the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains Transmitter Module FCC ID: 2AA72-PTR5610 Or Contains FCC ID: 2AA72-PTR5610"
When the module is installed inside another device, the user manual of the host must contain below warning statements;
1. 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.
(2) This device must accept any interference received, including interference that may cause undesired operation.
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.

2. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product.
Any company of the host device which install this modular with limit modular approval should perform the test of radiated & conducted emission and spurious emission,etc. according to FCC part 15C : 15.247 and 15.209 & 15.207 ,15B Class B requirement, Only if the test result comply with FCC part 15C : 15.247 and 15.209 & 15.207 ,15B Class B requirement，then the host can be sold legally.