AQP Master-Slave
Combined Module User Guide v2.6

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Shenzhen Ablue Intelligent Technology Development Co., Ltd.
WWW.abluetech.com

Revision

VERSION	DATE	RELEASE NOTE
V2.0	2020-03-23	First release
V2.1	2020-08-03	Wakeup、reset pin defineition modify
V2.2	2020-10-19	AT commond modify
V2.3	2021-5-24	AT commond :AT+ACNE description modify
V2.41	2023-04-13	Update PRT5638 Module
V2.42	2023-04-27	Update introduce
v2.5	2024-04-07	Increase iBeacon configuration, add the instruction for setting broadcast data, modify the scanning instruction, add filtering rules, and add the HFXC instruction
V2.6	2024-04-26	Update 9618PA Module

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1.Overview

1.1 Product Introduction

PTR56XX-MS is BLE module with a master-slave feature. PTR56XX module is based on nRF52832 with an ARM Cortex-M4F processor from Nordic Semiconductor. Therefore, the PTR56XX-MS 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 PTR56XX-MS.Development become easier.

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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 all of Bluetooth role(master and slave),easy to switch to different roles.
- Support multi-link architecture with one master and multiple slaves.
- 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 default serial port of the module is configured as 115200bps baud rate, 8 bits data, 1 stop bit, and none parity.
2. All the “AT Commands” must be used when the module is in “NONE CONNECTED 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.
4. Most of “AT Commands” take effect immediately while some of them take effect after the module has been reset.
5. 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. .
6. When some pins of the module are not in use, it is recommended that it is flowed.

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1.4 Typical Application Frame

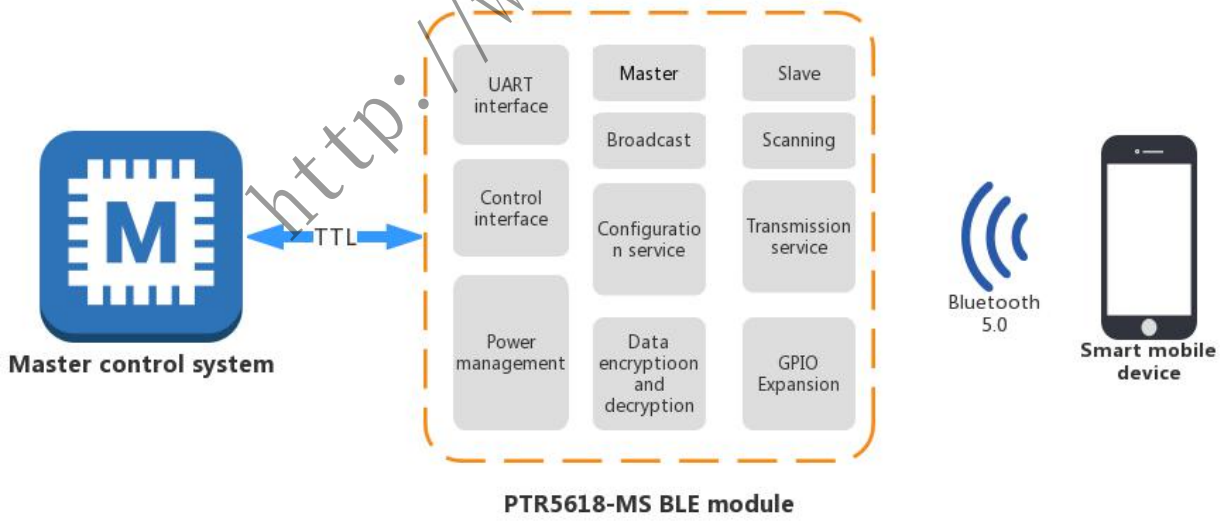

Figure 1 Application Diagram

1.5 Application scope of document

The document applies to PTR5618_AQP、PTR5618PA_AQP 、PTR5628_ARP、PTR5638_AQP、PTR9618PA.

2.Hardware Specification

2.1 PTR5618/5618PA

2.1.1 Package

The module package is shown in Figure 2(TOP VIEW). Please see the PTR5618/5618PA module data sheet for details.

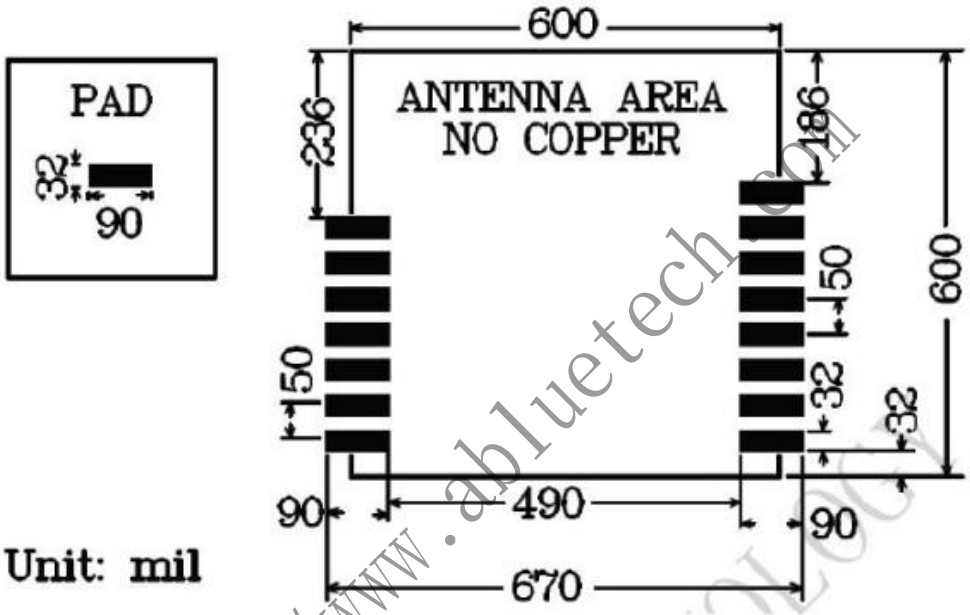

Figure 2 Package diagram

2.1.2 Pin Assignment

The module pin assignments are shown in Figure 3 (TOP VIEW).

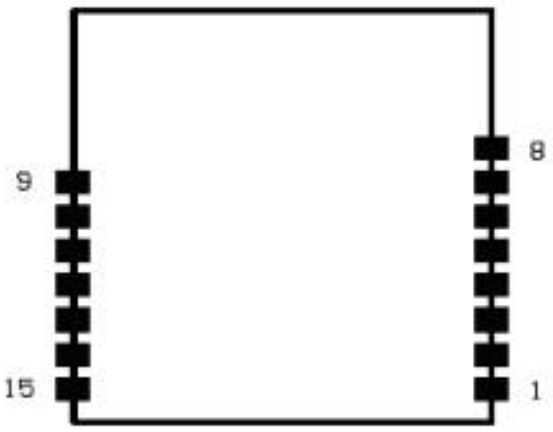

Figure 3 Pin Distribution

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Serial num	Abbreviation	Input/output	Explanation
1	WAKE	I	Module wakeup pin，keep low in normal 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 must be sent from the module to MCU,the pin become high level to notify MCU to prepare receiving.
7	GPIO3/RTS	I/O	This pin can be configured as an input or output pin. When the flow control is enabled, this pin can be used as RTS, but not general GPIO.
8	RESET	I	Module reset pin，keep low in normal 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 State 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/CTS	I/O	The pin can be configured as an input and output pin. When the flow control is enabled, this pin can be used as RTS, but not general GPIO.

Table 1 Pin Assignment

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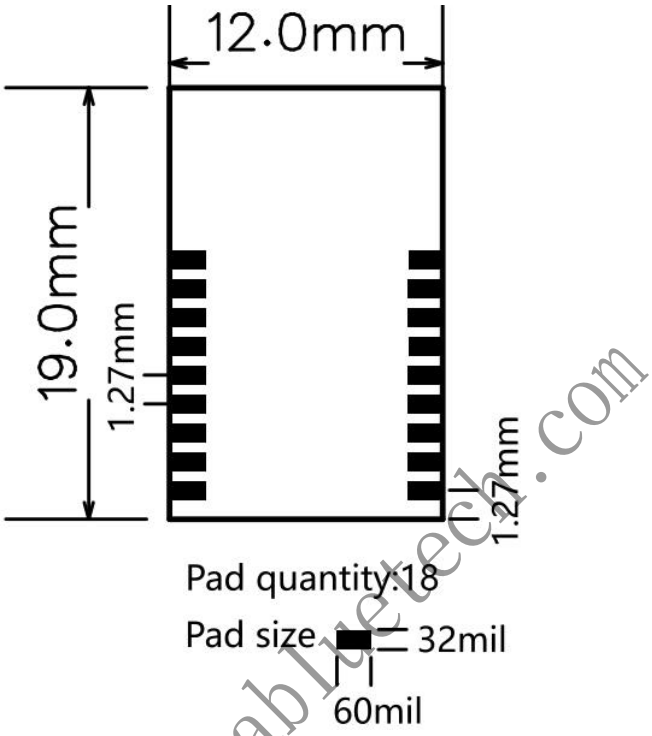
2.2 PTR5638

2.2.1 Package



Package diagram

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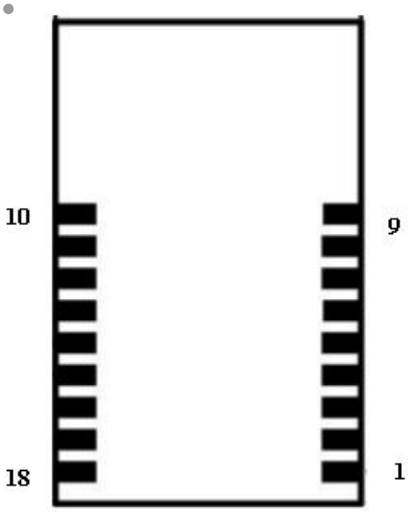
2.2.2 Pin Assignment

The module pin assignments are shown (TOP VIEW).



Serial num	Abbreviation	Input/output	Explanation
1	NC	/	/
2	NC	/	/
3	RX	I	RX pin of the serial port.
4	TX	O	TX pin of the serial port.
5	WAKE	I	Module wakeup pin，keep low in normal Rising edge: This pin is used as a wake-up function if the module enters deep sleep mode or low power advertise mode.
6	STATE	O	Indicative signal of Connection State Low level: the module is not connected High level: the module is connected
7	RESET	I	Module reset pin，keep low in normal Rising edge: A signal of rising edge on this pin will cause the module to reset.
8	SWCLK	/	/
9	SWDIO	/	/
10	GND	/	Module ground pin
11	VCC	/	Module power supply positive 1.8 ~ 3.6 V
12	NC	/	/
13	GPIO0	I/O	This pin can be configured as an input and output pin.
14	GPIO1	I/O	The pin can be configured as an input and output pin.
15	GPIO2/CTS	I/O	The pin can be configured as an input and output pin. When the flow control is enabled, this pin can be used as RTS, but not general GPIO.
16	GPIO3/RTS	I/O	This pin can be configured as an input or output pin. When the flow control is enabled, this pin can be used as RTS, but not general GPIO.
17	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 must be sent from the module to MCU,the pin become high level to notify MCU to prepare receiving.
18	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.

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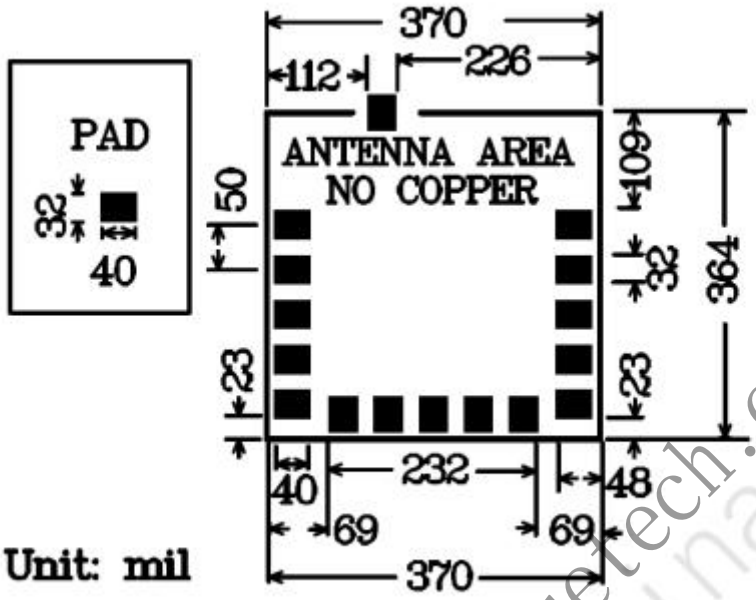
2.3 PTR5628

2.3.1 Package

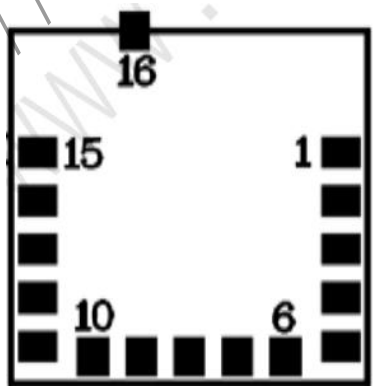
The module package is shown (TOP VIEW). Please see the PTR5628 module data sheet for details.



Package diagram

2.3.2 Pin Assignment

The module pin assignments are shown (TOP VIEW).



Serial num	Abbreviation	Input/output	Explanation
1	GND	/	Module ground pin
2	GPIO0	I/O	This pin can be configured as an input and output pin.
3	GPIO1	I/O	The pin can be configured as an input and output pin.
4	GPIO2/CTS	I/O	The pin can be configured as an input and output pin. When the flow control is enabled, this pin can be used as RTS,

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			but not general GPIO.
5	VCC	/	Module power supply positive 1.8 ~ 3.6 V
6	GPIO3/RTS	I/O	This pin can be configured as an input or output pin. When the flow control is enabled, this pin can be used as RTS, but not general GPIO.
7	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 must be sent from the module to MCU,the pin become high level to notify MCU to prepare receiving.
8	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.
9	TX	O	TX pin of the serial port.
10	RX	I	RX pin of the serial port.
11	STATE	O	Indicative signal of Connection State Low level: the module is not connected High level: the module is connected
12	WAKE	I	Module wakeup pin，keep low in normal Rising edge: This pin is used as a wake-up function if the module enters deep sleep mode or low power advertise mode.
13	RESET	I	Module reset pin，keep low in normal Rising edge: A signal of rising edge on this pin will cause the module to reset.
14	SWCLK	/	/
15	SWDIO	/	/

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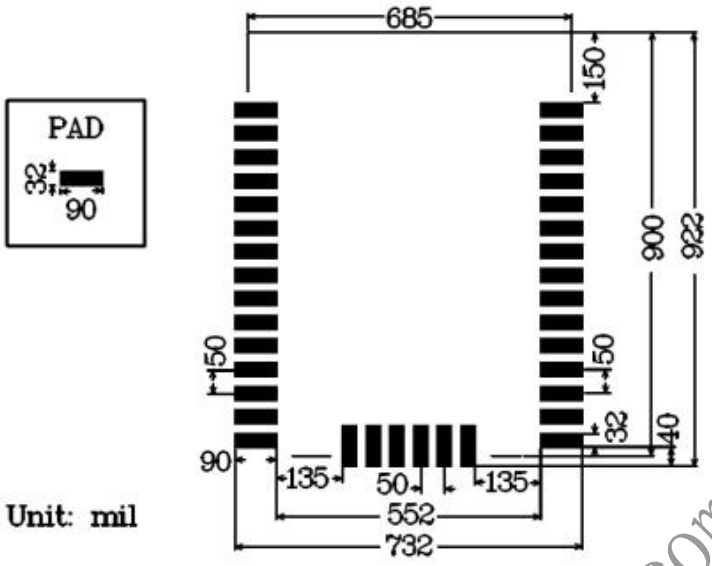
2.4 PTR9618PA

2.4.1 Package

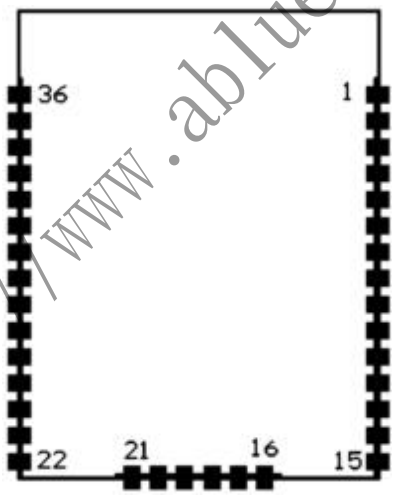
The module package is shown (TOP VIEW). Please see the PTR9618PA module data sheet for details.



封装图

2.4.2 Pin Assignment

The module pin assignments are shown (TOP VIEW).



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Serial num	Abbreviation	Input/output	Explanation
1	NC	/	/
2	NC	/	/
3	RESET	I	Module reset pin，keep low in normal Rising edge: A signal of rising edge on this pin will cause the module to reset.
4	NC	/	/
5	SWCLK	/	/
6	SWDIO	/	/
7	NC	/	/
8	GPIO3/RTS	I/O	This pin can be configured as an input or output pin. When the flow control is enabled, this pin can be used as RTS, but not general GPIO.
9	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 must be sent from the module to MCU,the pin become high level to notify MCU to prepare receiving.
10	NC	/	/
11	NC	/	/
12	NC	/	/
13	RX	I	RX pin of the serial port.
14	TX	O	TX pin of the serial port.
15	WAKE	I	Module wakeup pin，keep low in normal Rising edge: This pin is used as a wake-up function if the module enters deep sleep mode or low power advertise mode.
16	NC	/	/
17	NC	/	/
18	NC	/	/
19	NC	/	/

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20	NC	/	/
21	NC	/	/
22	NC	/	/
23	NC	/	/
24	NC	/	/
25	NC	/	/
26	NC	/	/
27	NC	/	/
28	GPIO2/CTS	I/O	The pin can be configured as an input and output pin. When the flow control is enabled, this pin can be used as RTS, but not general GPIO.
29	GPIO1	I/O	The pin can be configured as an input and output pin.
30	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.
31	GPIO0	I/O	This pin can be configured as an input and output pin.
32	STATE	O	Indicative signal of Connection State Low level: the module is not connected High level: the module is connected
33	NC	/	/
34	VCC	/	Module power supply positive 1.8 ~ 3.6 V
35	NC	/	/
36	GND	/	Module ground pin

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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.

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3.Function Description

3.1 AT Command Through Serial Port

All factory default parameters of the module have been listed in Table 4
When the module does not work in Master-Multiple-Link mode(See work mode), all data received from serial port will be treated as AT Command in disconnected state, while in connected state, they will be treated as unvarnished transmission data(The unvarnished transmission data is the data will be transmitted to a peer device such as mobile phone working as a central device).
When the module works in Master-single-link mode, all data received from serial port will be treated as AT Command, not only in connected state, but also in disconnected state. There is a AT Command for unvarnished transmission data, see Multi-Link Data Send.

3.2 AT Command Through Air

This transparent transmission module provides two Bluetooth services in the slave mode, one is used as data transparent transmission, and the other is used to provide module configuration parameters. The module configuration service provides a flexible and simple operation approach to mobile device users, which is convenient for applications in different occasions. This function is built on the device connection status, and by inputting AT commands through the write GATT Characteristic Properties channel of the module configuration service, the module responds and returns the response code through the notify Characteristic Properties channel.

The host working mode is not supported temporarily.

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3.3 Work Mode

There are four work modes in the PTR5618-MS module. They can be configured by AT Command.

- Slave Mode 1: The module works as a slave. Connection interval is shorter, data rate is faster.
- Slave Mode 2: The module works as a slave. Connection interval is longer, data rate is slower. If there is another PTR5618-MS module works in Master-multiple-link mode, you want to connect several slaves with this module, then you should configure the slaves as Slave Mode 2.
- Master-Single-Link Mode: The module works as a master. When the scan function is

enabled, the scannable advertises will printed output through serial port. The module can only connect one slave.

- Master-Multiple-Link Mode: The module works as a master. When the scan function is enabled, the scannable advertises will printed output through serial port. The module can connect up to 10 slaves. In this situation, the slave needs to work in Slave Mode 2.

3.4. Serial Protocol Introduce

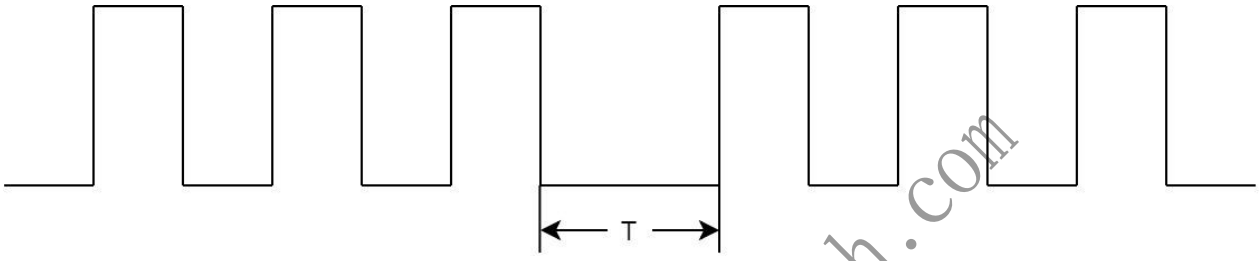

Figure 4 Serial Protocol

In Figure 4, T=2ms, "T" is the time between two octets transmitted through serial port (It's also called as 'frame interval'). If the time interval between two octets of serial port data received by the module is greater than the value "T", two frames of data are sent by the user. If the time interval is less than the value, the data is still the same frame.

DIN and DON pin are used for indicating the state(either busy or not) of the module.
When the output level of DIN is high, the module is busy, RX pin is not allowed to receive data.
When the output level of DIN is low, the module is idle, RX pin can receive data from an external MCU.

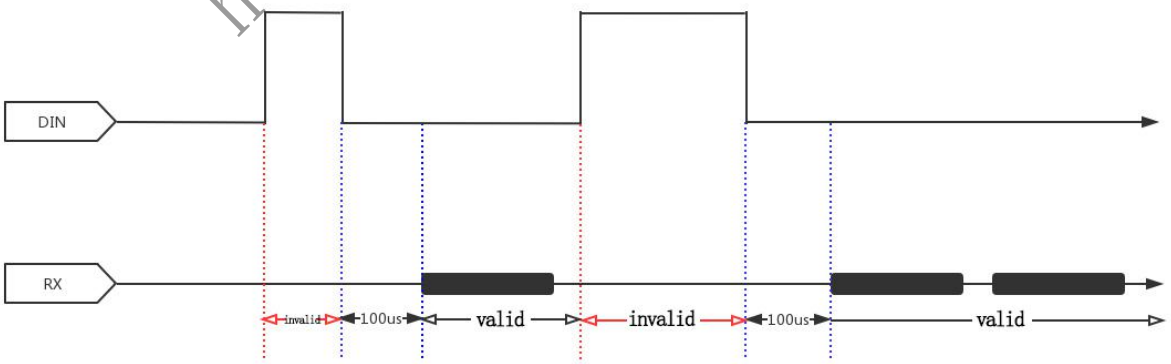

Figure 5 DIN timing sequence

When the output level of DON is high, the module will send data from TX pin to the external MCU.

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When the output level of DON is low, no data is sent by TX pin.

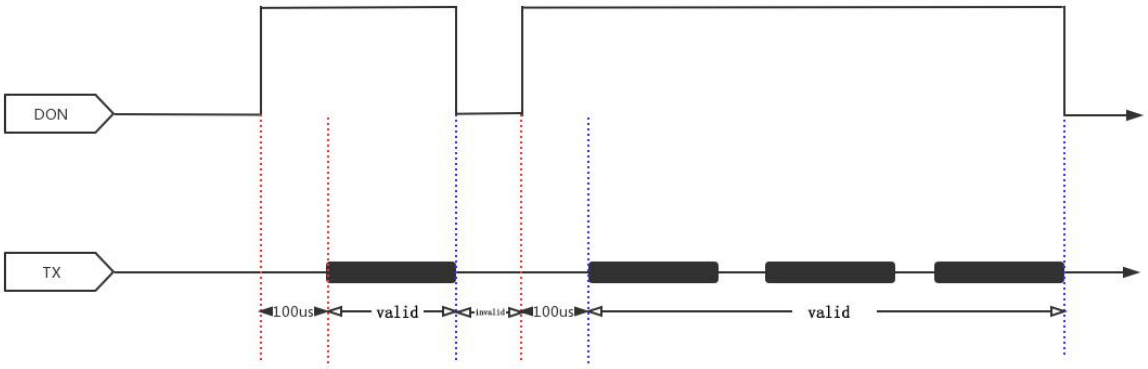

Figure 6 DON timing sequence

3.5 Setting Procedure

PTR5618-MS module instruction set is divided into five parts according to the function: Basic Command, Master Command, Slave Command, General Command and Extended Function Command.

In the process of using the module, users need to adjust the relevant settings according to the application scenario. The overall operation process can be carried out in the following order:

1. Use Basic Command to configure the basic function of the module such as Baud rate, work mode, and TX power. For more detail about Basic Command you can refer to chapter 4.1
2. Use Extended Function Command to configure the Extended function of the module such as encryption, GPIO IN and OUT function. If you don't want any extended function you can skip this step. For more detail about Extended Function Command you can refer to chapter 4.5.
3. Use Master Command or Slave Command to configure the module, such as SERVICE UUID, CHARACTERISTIC UUID. Either using Master Command or Slave Command is depend on the work mode you set in Basic Command. For more detail about Master Command and Slave Command please refer to chapters 4.2 and 4.3.
4. Reset the module to save the configuration. For Reset Command please refer to chapter 4.1.8

3.6. AT Command Format

The module instructions are parsed in the following format:

1. Symbol:
   <>: Basic part
   []: selective part

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{}: Single election

，: Parameter interval symbol

：: Array interval symbol

2. Construction:

<header><name>[operation symbol][parameter]

Header: “AT+”

name：name of the operation

operation symbol: “=”

parameter：content

3. Error Code:

Error code	Illustrate
ERROR:invalidCMD	Invalid command
ERROR:invalidParam	Invalid parameter
ERROR:NotConnect	Not connect
ERROR:procFailure	Failed
ERROR:bufFull	Buffer full
ERROR:NOLINK	No link

Table 3• error code

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3.7 Factory Default Setting

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 Mode 1
Slave data service UUID	6940-0001-B5A3-F393-E0A9-E501-24DC-CA99
Slave TX Characteristic UUID	6940-0002-B5A3-F393-E0A9-E501-24DC-CA99
Slave RX Characteristic UUID	6940-0003-B5A3-F393-E0A9-E501-24DC-CA99
Slave Configuration service UUID	7F51-0004-B5A3-F393-E0A9-E501-24DC-CA9E
Slave TX Configuration Characteristic UUID	7F51-0005-B5A3-F393-E0A9-E501-24DC-CA9E
Slave RX Configuration Characteristic UUID	7F51-0006-B5A3-F393-E0A9-E501-24DC-CA9E

Auto connect	Disable
Switch mode	Disable
Encryption	Disable
Key	000000
GPIO-0	Disable
GPIO-1	Disable
GPIO-2	Disable
GPIO-3	Disable
Master data service UUID	6940-0001-B5A3-F393-E0A9-E501-24DC-CA99
Master TX Characteristic UUID	6940-0003-B5A3-F393-E0A9-E501-24DC-CA99
Master RX Characteristic UUID	6940-0002-B5A3-F393-E0A9-E501-24DC-CA99
Master Configuration service UUID	7F51-0004-B5A3-F393-E0A9-E501-24DC-CA9E
Master TX Configuration Characteristic UUID	7F51-0006-B5A3-F393-E0A9-E501-24DC-CA9E
Master RX Configuration Characteristic UUID	7F51-0005-B5A3-F393-E0A9-E501-24DC-CA9E

Table 4 factory default setting

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4. AT Command

4.1Basic Command

4.1.1 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.

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4.1.2 Flow control

Command	ACK	Instruction
AT+HWFC=[Index]	OK+HWFC	[Index] 0：close hardware flow control 1：open hardware flow control [Instance] send：AT+HWFC=1 return：OK+HWFC
AT+HWFC=?	OK+HWFC=[Index]	[Index] ditto [Instance] send：AT+HWFC=?

		return：OK+HWFC=0

4.1.3 Work Mode

Command	ACK	Instruction
AT+WKMD=[Index]	OK+WKMD	[Index] 0: Slave mode1 1: Slave mode2 2: Master-Single link mode 3: Master-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

功能描述：设置或查询透传模块的透传工作模式，默认为从机模式 1。
*需配合复位指令保存生效，掉电保持。

4.1.4 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
AT+TXPW=?	OK+TXPW=[Index]	[Index]:ditto [Instance]

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		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.

4.1.5 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.

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4.1.6 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.

4.1.7 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.

4.1.8 Factory Default Setting

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

Description:The module will restart after 200ms,and recover all configuration to the default setting.
*The command takes effect immediately.

4.1.9 Software Reset

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

Description:The module will reset and restart after 200ms,and retain all configuration.
*The command takes effect immediately.

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4.1.10 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.

4.1.11 External high-frequency clock

Command	ACK	Instruction
AT+HFXC=[param]	OK+HFXC	[Param] 0，off；1，turn。 [Instance] Send：AT+HFXC=1 Return：OK+HFXC

Description：Starting the external high-frequency clock of the module will increase the power consumption by about 0.3mA.

*The command takes effect immediately.

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4.2 Slave Command

4.2.1 Advertise Name

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

*There can be no spaces in the advertise name.

4.2.2 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

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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 is used.

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

4.2.3 Advertisement Type

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 is used.

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

4.2.4 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.

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4.2.5 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.

4.2.6 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.

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

4.2.7 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.

4.2.8 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:

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		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.

4.2.9 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.

4.2.10 iBeacon Configuration

Command	ACK	Instruction
AT+BEACON=[on],[uuid],[major],[minor],[measure_power]	OK+BEACON	[on]:0,of;1,turn. [uuid]16 byte UUID,Hexadecimal form.

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		[major]:0-65535. [minor]:0-65535. [measure_power]:The RSSI at a distance of 1 meter from the device.AT+BEACON=1,b6ef255ccf5796a55b4cdc190000dfd6,21024,1327,-58 Return：OK+BEACON
AT+BEACON=?	OK+BEACON=[Param]	[on]::0,of;1,turn. [uuid]16 byte UUID,Hexadecimal form. [major]:0-65535. [minor]:0-65535. [measure_power]:The RSSI at a distance of 1 meter from the device. [Instance] Send：AT+BEACON=? Return ：OK+BEACON=0,b6ef255ccf5796a55b4cdc190000dfd6,2024,327,-55

Description：Take effect immediately after configuration, and the soft reset instruction saves and takes effect.

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4.2.11 AT + ADVDATA Sets the Broadcast Packet Data

Command	ACK	Instruction
AT+ADVDATA=[param]	OK+ADVDATA	[param] Maximum 31-byte data, in hexadecimal form. AT+ADVDATA=020106050931323334 Return：OK+ADVDATA
AT+ADVDATA=?	OK+ADVDATA=[Param]	[param] Maximum 31-byte data, in hexadecimal form, and return 0 if not set. [Instance] Send：AT+ADVDATA=?

		Unconfigured：OK+ADVDATA =0 Configured ： OK+ADVDATA =020106050931323334

Description： The configuration takes effect immediately, and the soft reset instruction saves the effective configuration.
Please fill in accordance with the Bluetooth broadcast data specification.

4.2.12 AT+RSPDATA Sets the Broadcast Scan Response Packet Data

指令	应答	备注
AT+RSPDATA =[param]	OK+RSPDATA	[param] Maximum 31-byte data, in hexadecimal form. AT+RSPDATA=020106050931323334 返回：OK+RSPDATA
AT+RSPDATA =?	OK+RSPDATA =[Param]	[param] ：Maximum 31-byte data, in hexadecimal form, and return 0 if not set. [Instance] Send：AT+RSPDATA=? Unconfigured：OK+RSPDATA=0 Configured ：OK+RSPDATA=020106050931323334

Description： The configuration takes effect immediately, and the soft reset instruction saves the effective configuration.
Please fill in accordance with the Bluetooth broadcast data specification.

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4.2.13 AT+NAME/iBeacon/AT+RSPDATA and AT+ADVDATA are used to set the broadcast scan response packet data

There are three types of broadcast data for the module:
1、Default broadcast: The broadcast name can be set using AT+NAME.
2、IBeacon.
3、Raw data mode: The data is set using AT+RSPDATA and AT+ADVDATA.

Priority： iBeacon > Raw data mode > Default broadcast
When the data set using AT+ADVDATA and AT+RSPDATA is incorrect, the module will: ADV DATA ERROR, and automatically recover.

Use the default broadcast. Please check and reset AT+ADVDATA and AT+RSPDATA.
When using the original data broadcast, it is necessary to add the broadcast name data in the setting, otherwise the module has no broadcast name.

4.3 Master Command

4.3.1 Scan

Command	ACK	Instruction
AT+SCAN	OK+SCAN [Param]	[Param] Device name+MAC+RSSI [Instance] Send:AT+SCAN Return: OK+SCAN _NAME:XXXX _ADDR:XXXXXX _RSSI:XX ********** Maximum:20

Description:Search for surrounding Bluetooth broadcast information during a specific time period.Up to 20 sets of device information.
*The command takes effect immediately if the module in the non-connect state.

Scan with filtering condition mode

Command	ACK	Instruction
AT+SCAN=[timeout],[RSSI],[name],[adv_data]	OK+SCAN [Param]	[timeout]:Scan timeout time, [0, 60]. 0 indicates continuous scanning. [RSSI]：Signal strength filtering. [name]：Filtering name, with the rule of "containing". [adv_data]：Filtering broadcast data, with the rule of "containing". Filtering condition application： [RSSI] && ([name] || [adv_data]) [Param]

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		Broadcast name + MAC address + signal strength. [Instance] RSSI filtering：AT+SCAN=,-50,, Scan for 5 seconds：AT+SCAN=5,,, Filter name “ABC”：AT+SCAN=,,ABC, Filter raw data “020106”：AT+SCAN=,,,020106 Multiple condition application：AT+SCAN=,-50,ABC,020106 AT+SCAN=5,-50,ABC,020106 AT+SCAN=,-50,,020106 OK+SCAN _NAME:XXXX _ADDR:XXXXXX _RSSI:XX ********** ..... Up to 20 sets of information.

*In the non-connected state, the instruction takes effect immediately and the operation is not saved.

*After scanning 20 sets of different device information, stop scanning, and the multi-host mode cannot continuously scan.

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4.3.2 Connection

Command	ACK	Instruction
AT+CONN=[Param]	OK+CONNECTING OK+CONNECTED=[Conn_handle,Param]	[Conn_handle] The number of conn_hanlde,from 0 to 9. [Param] 6 bytes MAC of the peer [Instance] Send:AT+CONN=c5:11:4c:1b:d0:52 Connecting Return:OK+CONNECTING Connect successful

		Return:OK+CONNECTED=0,c5:11 :4c:1b:d0:52
AT+CONN=?	[Conn_handle,Param]	[Conn_handle] The number of conn_hanlde,from 0 to 9. [Param] 6 bytes MAC of the peer [Instance] Send:AT+CONN=? Return: _HANDLE:0 _ADDR:c5:11:4c:1b:d0:52 ..... Maximum:10

Description:Set or check the module’s connection information.

*The command takes effect immediately if the module in the non-connect state.

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4.3.3 Auto Connect

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

Description:Set or check the module’s auto connection function,the default setting is disable.

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

*After enabling it, timer will be started. If the connection fails for more than 5 minutes, the automatic connection will be stopped. Enable this function by re-power on.

4.3.4 Auto Connection Setting

Command	ACK	Instruction
AT+ACNS=[N,Param]	OK+ACNS	[N] The number of the peers,from 1 to 10. [Param] The N peers of MAC address [Instance] Send: AT+ACNS=2,c5:11:4c:1b:d0:52,c5:11:4c:1b:d0:53 Return:OK+ACNS
AT+ACNS=?	[N,Param]	[N]ditto [Param]ditto [Instance] Send:AT+ACNS=? Return: _No:1 _ADDR:c5:11:4c:1b:d0:52 _NO:2 _ADDR:c5:11:4c:1b:d0:53 Maximum:10

Description:Set or check the auto-connect state.Send the command like "AT+ACNS=2,c5:11:4c:1b:d0:52,c5:11:4c:1b:d0:53" to auto connect with the 2 device witch Mac Address is c5:11:4c:1b:d0:52 and c5:11:4c:1b:d0:53.

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

* This function should be used before "AUTO CONNET" ,Setting first and then enable.

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4.3.5 Multi-link Data Send

Command	ACK	Instruction
AT+SEND=[Param,Data]	OK+SEND	[Param] {Conn_handle} Send data to a specified slave,the number of conn_handle is from 0 to 9. {FF} Send data to all the connected slave. [Data] The data will be sent,the data length is up to 140 bytes.

		[Instance] Send:AT+SEND=0,123456ABCD Return:OK+SEND

Description:Send data to the slaves in multi-link.
*The command takes effect immediately in connected state.

In multi-link,the data receive from the slaves will be repackaged according to the format below. Users must reassemble it.

Format	Instruction
[Header][Conn_handle][Data]	[Header] 2 static bytes,“0x52 0x45” [Conn_handle] Conn_handle number,indicate from which slave the data was sent [Data] The receive data,up to 140 bytes. [Instance] receive:0x52 0x45 0x00 0xaa 0xbb

Description:In multi-link condition, the data that the master receive from different slaves will be repackaged.

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4.3.6 Master Data Service UUID

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

4.3.7 Master TX Characteristic UUID

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

Description:Set or check the UUID of the master’ s TX 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.

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4.3.8 Master RX Characteristic UUID

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

		OK+CCHAR=69:40:00:02:B5:A3 :F3:93:E0:A9:E5:0E:24:DC:CA:99

Description:Set or check the UUID of the master’s RX 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.

4.3.9 Master Configuration Service UUID

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

Description:Set or check the UUID of the master’s configuration service base UUID,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:99.(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.

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4.3.10 Master TX configuration Characteristic UUID

Command	ACK	Instruction
AT+CCHCC=[Param]	OK+CCHCC	[Param] 16bytesUUID [Instance] Send: AT+CCHCC=7F:51:00:06:B5:A3 :F3:93:E0:A9:E5:0E:24:DC:CA:99

		Return:OK+CCHCC
AT+CCHCC=?	OK+CCHCC=[Param]	[Param] 16bytesUUID [Instance] Send:AT+CCHCC=? Return: OK+CCHCC=7F:51:00:06:B5:A3 :F3:93:E0:A9:E5:0E:24:DC:CA:99

Description:Set or check the UUID of the master’s TX 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:99.(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.

4.3.11 Master RX configuration Characteristic UUID

Command	ACK	Instruction
AT+CCHCR=[Param]	OK+CCHCR	[Param] 16bytesUUID [Instance] Send: AT+CCHCR=7F:51:00:05:B5:A3 :F3:93:E0:A9:E5:0E:24:DC:CA:9 9 Return:OK+CCHCR
AT+CCHCR=?	OK+CCHCR=[Param]	[Param] 16bytesUUID [Instance] Send:AT+CCHCR=? Return: OK+CCHCR=7F:51:00:05:B5:A3 :F3:93:E0:A9:E5:0E:24:DC:CA:9 9

Description:Set or check the UUID of the master’s RX 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:99.(The RX configuration characteristic is used for receiving configuration data from mobile device.)

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

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4.4 General Command

4.4.1 Disconnect

Command	ACK	Instruction
AT+DISCON=[Param]	OK+DISCON	[Param] {Conn_handle} Disconnect a specified link, the number of conn_handle is from 0 to 9. {FF} Disconnect the single-link or all the multi-link. [Instance] Slave mode: Send:AT+DISCON=FF Master mode,disconnect single-link: Send:AT+DISCON=0 Master mode,disconnect all: Send:AT+DISCON=FF Return:OK+DISCON

Description:The command is used in connected state.

*The command takes effect immediately in connected state.

4.4.2 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”.

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

4.4.3 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 cannot be used until the data exchange has been stopped for 200ms.

*The command takes effect immediately.

4.4.4 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.

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4.5The multi-host mode cannot save the operation during scanning

4.5.1 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.

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4.5.2 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.

4.5.3 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 [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.

4.5.4 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

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		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.

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5.Appendix

5.1 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 section 3.3.3).**
- **Q: The module cannot be connected.**
- **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 section 3.3.3).**
- **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 cannot communicate with the host(the command or data cannot be sent through uart port) .**
- **A: Make sure the module and the host(MCU) are in a common GND.**

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6.Important Notice

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