



DX-BT39

One master multi slave serial port application guide

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Contents

1. Introduction	- 6 -
1.1. Basic parameters of serial port	- 6 -
1.2. AT command mode and pass-through mode	- 6 -
1.3. Module data throughput	- 7 -
2. PC Tool	- 8 -
2.1. Pc-side testing software	- 8 -
3. Serial port usage	- 9 -
3.1. Read and write the AT command using the serial port	- 9 -
3.1.1. Module test minimum system	- 9 -
3.1.2. Read and write AT command process on the computer side	- 10 -
3.1.3. MCU, speaking, reading and writing the AT command processes	- 11 -
3.2. Using a serial port communication	- 12 -
3.2.1. With the main module and communication from modules	- 12 -
3.2.2. The main module and the module used method	- 13 -
3.2.2.1. Manual search connection	- 13 -
3.2.2.2. Automatically search for connections	- 13 -
4. Related to the AT command explanation	- 14 -
4.1. Command format specification	- 14 -
4.2. Response Format Description	- 14 -
4.3. The AT command for example	- 15 -



4.4. List of AT commands	15 -
5. The AT command,	16 -
5.1. Basic commands	16 -
5.1.1. Test instructions	16 -
5.1.2. Query software version	16 -
5.1.3. Settings \ Query Bluetooth device name	17 -
5.1.4. Set \ Query - serial port stop bit	17 -
5.1.5. Set \ Query - serial port check bit	17 -
5.1.6. Set \ Query - Serial port Baud rate	18 -
5.1.7. Software Restart	18 -
5.1.8. factory data reset	18 -
5.1.9. Switch between AT command mode and data send mode	18 -
5.2. Broadcast packet command	19 -
5.2.1. Setup \ Query - Host SERVICE SERVICE UUID	19 -
5.2.2. Set \ Query - Host notification NOTIFY UUID\ WRITE WRITE UUID	19 -
5.2.3. Settings \ Query - Host writes WRITE UUID	20 -
5.3. Connect Instructions	20 -
5.3.1. Get a list of connected slaves	20 -
5.3.2. Manually search for Bluetooth devices	20 -
5.3.3. Connect the Bluetooth device manually	21 -
5.3.4. Settings \ query - automatically connected bluetooth devices	21 -
5.3.5. Settings \ Query - Connect to specified device 1	22 -



5.3.6. Set \ query 2 - the connection equipment	- 23 -
5.3.7. Settings \ Query - Connect to a specified device 3	- 23 -
5.3.8. Restore the list connection	- 24 -
5.3.9. Save an existing connection	- 24 -
5.3.10. Clear currently saved links (all)	- 24 -
5.3.11. Disconnect the specified link	- 24 -
5.3.12. Send some equipment specified	- 25 -
5.4. A list of error codes	- 25 -
6. Value-added services	- 26 -

Image indexing

Figure 1: Computer side serial port software	- 8 -
Figure 2: module	- 9 -
Figure 3: Computer serial port demonstration	- 10 -
Figure 4: Read and write AT command logic refer to	- 11 -
Figure 5: Master-slave module communication flow chart	- 12 -

1. Introduction

DX-BT39 is developed by SHEN ZHEN DX-SMART TECHNOLOGY CO.,LTD, using NORDIC nRF52833 chip, chip architecture as ARM architecture (M4, frequency is 64 MHz, follow the bluetooth BLE 5.1 protocol specification. Support the AT command, the user can according to need to change the baud rate of serial port, name of equipment parameters, such as flexible use. This module supports UART, SPI, I2C and other interfaces, supports IO port control and ADC acquisition. It has the advantages of low cost, low power consumption and high receiving sensitivity. It only needs to be equipped with a few peripheral components to realize its powerful functions, and can be customized to develop various projects according to customer needs.

1.1. Basic parameters of serial port

- Default parameter of module serial port: 9600bps/8/n/1 (baud rate/data bit/no check/stop bit)
- BLE module UUID: SERVICE UUID: FFE0
NOTIFY/WRITE UUID: FFE1
WRITE UUID: FFE2

1.2. AT command mode and pass-through mode

- The AT command mode: module in delivering instruction "+ + +", is the command mode, can respond to commands.
- Pass-through mode: After the module is connected to other devices, and sends the command "+ + +", it is pass-through mode, at this time, it can start to transmit data.



1.3. Module data throughput

Data throughput			
BT39 (main Module) - > Module - > BT27(one slave module)		BT27 (one slave module) - > Module - > BT39 (main Module)	
Baud rate	9600	Baud rate	9600
Connection time interval (ms)	15	Interconnection time (ms)	15
APP packets big (bytes)	81	UART packet Size (bytes)	47
Sending interval (ms)	100	Sending interval (ms)	100
Throughput (bytes/s)	810	Throughput (bytes/s)	470
Characteristic	Write without Response	Characteristic	Notify
BT39(master Module) ->Module -> BT27(8 slave modules)		BT27 from Module (8) - > Module - > BT39 (main Module)	
Baud rate	9600	Baud rate	9600
Connection time interval (ms)	15	Interconnection time (ms)	15
APP packets big (bytes)	52	UART packet Size (bytes)	20
Sending interval (ms)	100	Sending interval (ms)	200
Throughput (bytes/s)	520	Throughput (bytes/s)	400
Characteristic	Write without Response	Characteristic	Notify

Notes

The data in the above table is for reference only. This module supports the maximum MTU value of 244. The data throughput is related to the MTU value of the mobile phone Bluetooth and the connection interval, and the data is subject to the actual.

2. PC Tool

2.1. Pc-side testing software

Please download and install the Uart Assistant computer serial port software in the data package for testing. The serial port software interface is as follows:

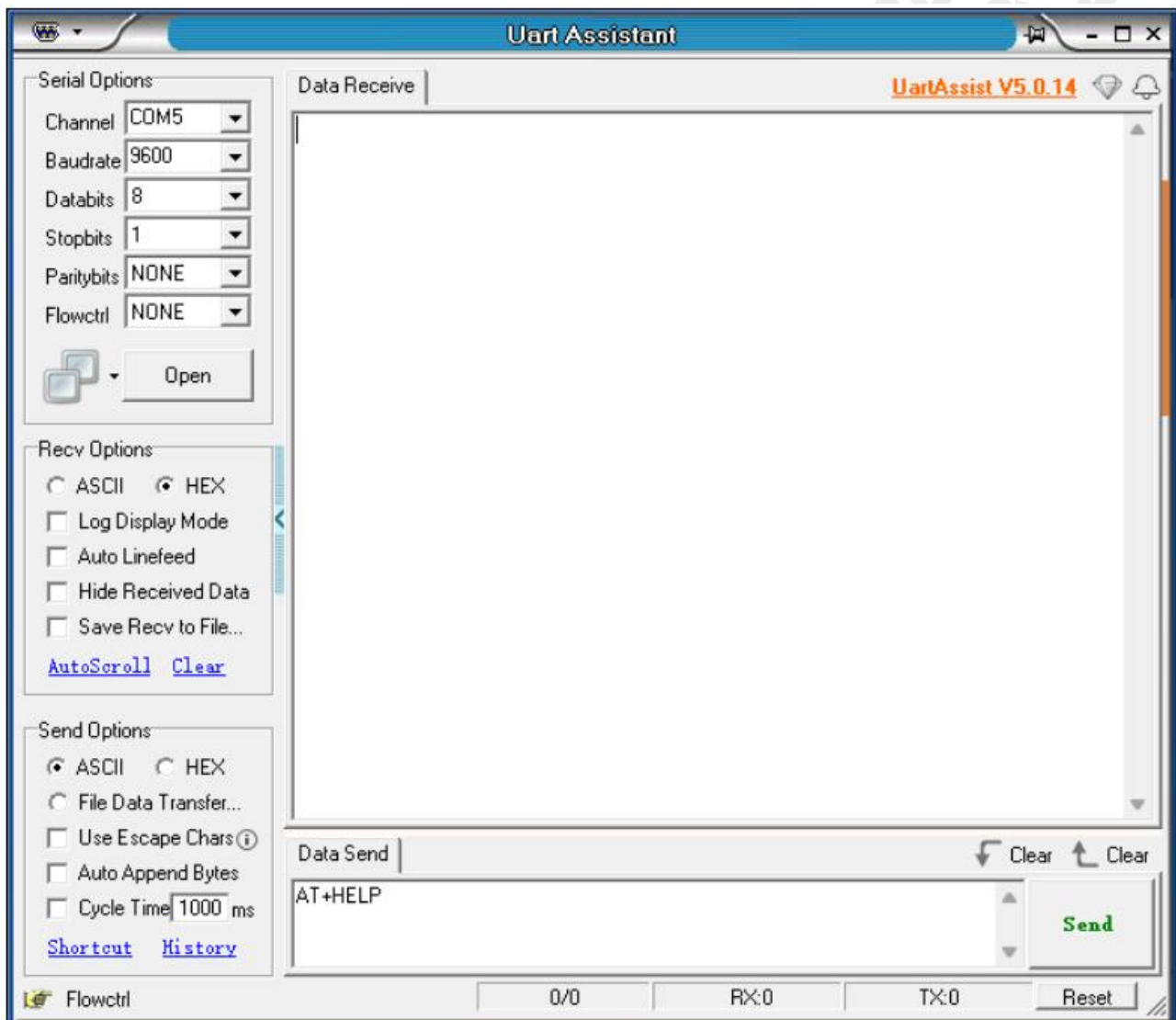


Figure 1: the PC serial port software diagram

3. Serial port usage

3.1. Read and write the AT command using the serial port

3.1.1. Module test minimum system

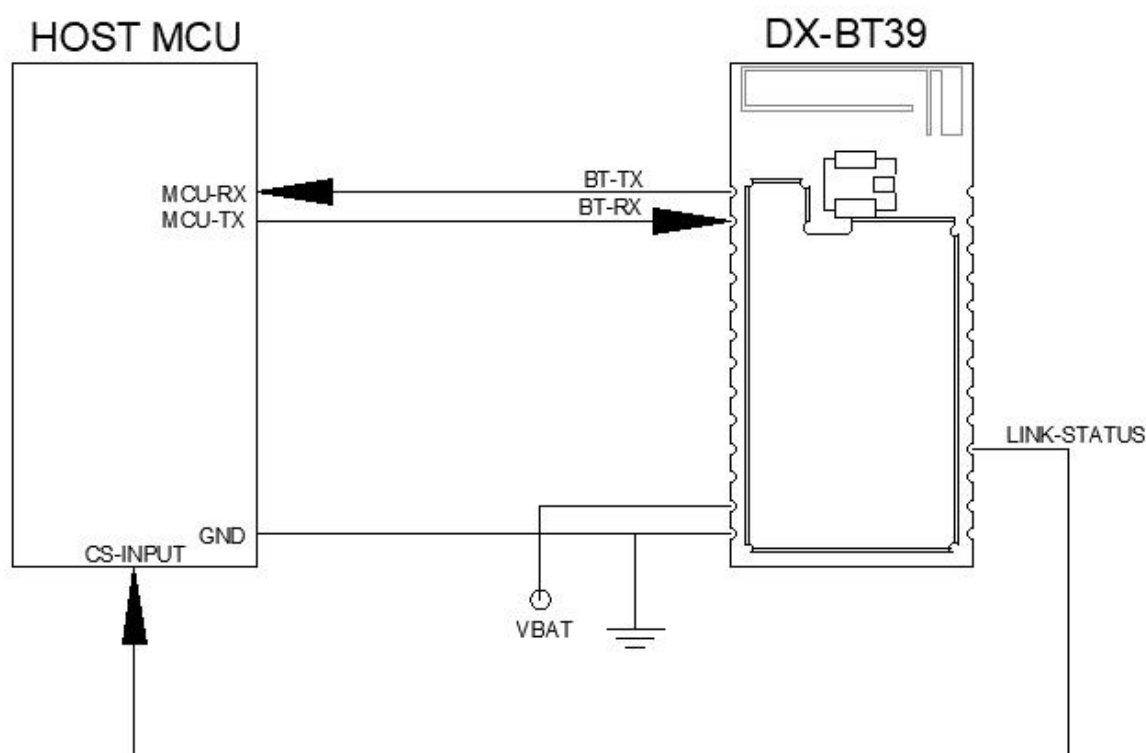


Figure 2: Module minimum system diagram

3.1.2. Read and write AT command process on the computer side

PC serial port assistant software installation, using TTL serial port and USB transfer module connection communication, connection reference "module test minimum system", and then send the AT command to query and configuration parameters. Note: the module power supply of 3.3 V.

Example: Change the baud rate of Bluetooth module to: 115200.

Install Uart Assistant computer serial port software, open the serial port software and select the corresponding COM port, install the default parameter configuration of the serial port software, that is, 9600bps/8/n/1 (baud rate/data bit/no parity/stop bit), fill in the corresponding command, and be sure to add carriage return and line feed (you can directly press the Enter key) or check "Add carriage return and line feed", and then send the command, as shown below:

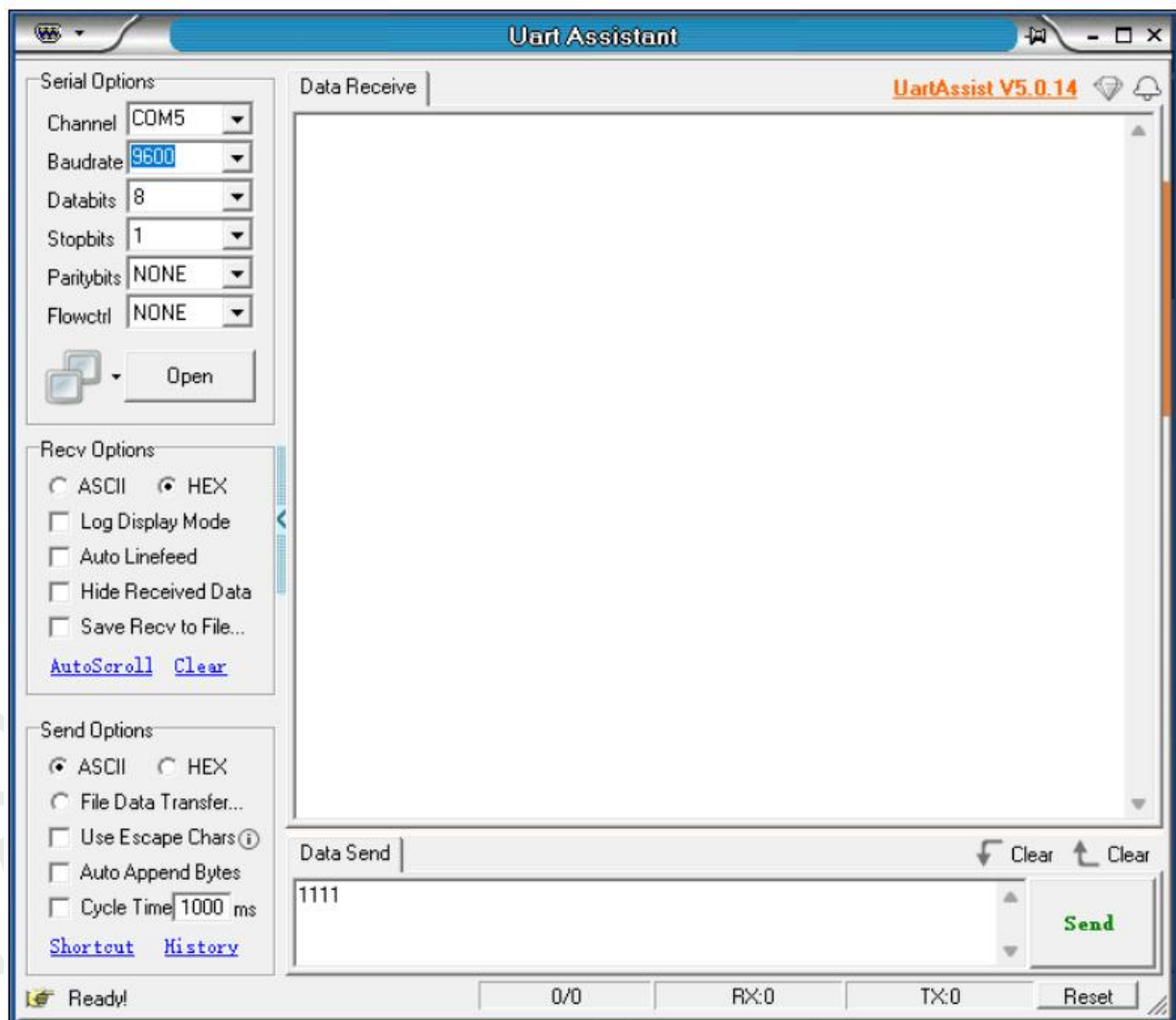


Figure 3: the computer serial port demo figure

3.1.3. MCU, speaking, reading and writing the AT command processes

Read and write AT command wiring at MCU side refer to "Module Test Minimum System". Baud rate, for example, modify the module and query module version, specific instruction program logic flow reference below:

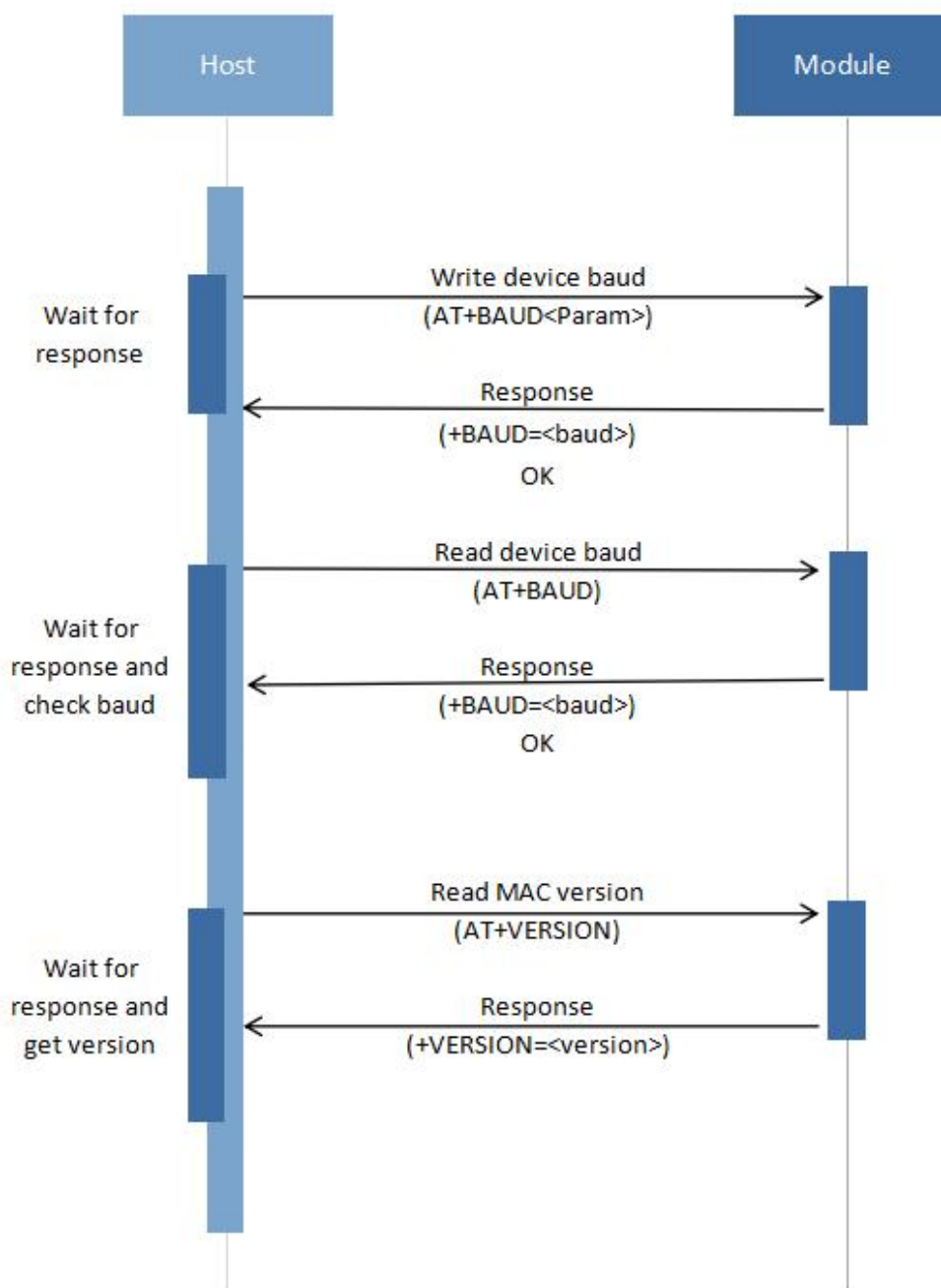


Figure 4: reading and writing the AT command logic reference

3.2. Using a serial port communication

3.2.1. With the main module and communication from modules

Main module and the module connection you need to use the AT command to connect and communications, the process below:

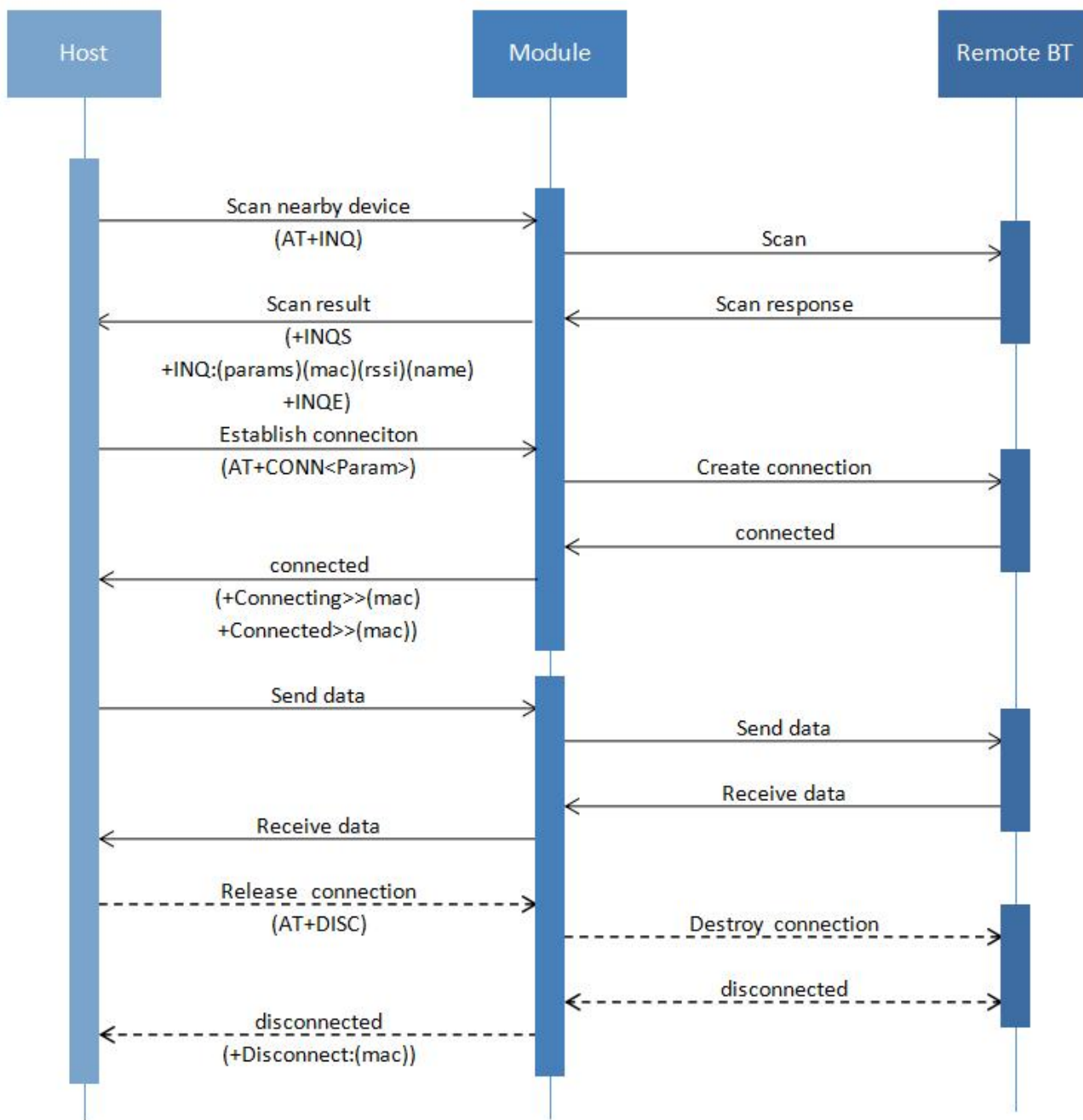


Figure 5: Master and slave module communication flow chart

3.2.2. The main module and the module used method

The main module for BT39, from module for our company from the module, matching using master-slave module, from the module maximum of 8.

3.2.2.1. Manual search connection

1. Search slave machine: AT+INQ;
2. Connection from machine: the AT + CONN < param >, < param > to search out from the machine serial number, connect to multiple from machine can repeat this step;
3. To obtain a LIST from machine: the AT + LIST;
4. Specify from the machine to send data: the AT + DEVICE < param1 > < param2 >, param1 for step 3 from the machine serial number, param2 is sent to the data from the machine;
5. Send all from the machine to send data: "+ + +", return to Transfer, you can send data;
6. Exit pass-through mode: send "+++"; Return AT, indicating that you have switched to AT instruction mode.

Note:

- a. For binding from the machine address code, can send command AT + SAVE after step 2, the directive sent cannot continue search from the machine, if you need to search from the machine, you need to send command AT + CLEAD clear binding;
- b. Binding from the machine address code, automatic back even failure, can send command AT + RECOVER to reconnect.

3.2.2.2. Automatically search for connections

1. Open automatically search: the AT + AUTOCONN < param >, < param > for the number of connections from the machine, the range of 0 ~ 8;
2. Restart the module: the AT + RESET, command AT + AUTOCONN need to restart the effect;
3. To obtain a LIST from machine: the AT + LIST;
4. Specify from the machine to send data: the AT + DEVICE < param1 > < param2 >, param1 for step 3 from the machine serial number, param2 is sent to the data from the machine;
5. Send data to all slaves: send "+++ ", return Transfer, you can send data;
6. Exit the passthrough mode: send "+ + +", return to the AT, has switched to the AT command mode.

Note:

- a. If you want to connect the slave with the specified name, send the instruction AT+FILTER1<param>, AT+FILTER2<param>, AT+FILTER3<param> before step 1 (you can specify one name or multiple names. Up to three), < param > from machine for specified bluetooth name;
- b. This mode will automatically binding from the machine address code, such as automatic back even failure, can send command AT + RECOVER to reconnect;
- c. If you want to remove from the machine address code and does not need to connect again,

in order to send the following command: AT + AUTOCONN0, AT + CLEAD, AT + RESET.

4. Related to the AT command explanation

4.1. Command format specification

The AT + Command < param1, param2, param3 > < CR > < LF >

- All of the instructions in the AT the beginning, < CR > < LF > over, in this document to show command and response table, omitted the < CR > < LF >, show only the command and response.
- All the AT command characters to uppercase.
- < > for optional content, if there are multiple parameters in command, separated with a comma ", ", actually does not include the brackets in the command.
- < CR > to enter characters \r, hex 0 x0d.
- <LF> is the newline character \n, which is 0X0A in hexadecimal.
- Instruction execution is successful, returns the corresponding command ends with a OK, failure return EEROR = < >, "< >" content for the corresponding error code (see 5.7).

4.2. Response Format Description

+ Indication < = param1, param2, param3 > < CR > < LF >

- The response instruction begins with the plus sign "+" and ends with <CR><LF>
- Is equal to "=" in response to the parameters
- If there are multiple arguments in the response argument, they are separated by a comma ","



4.3. The AT command for example

Example: modify the bluetooth device baud rate to 115200

Send: AT + BAUD9

Returns: + BAUD = 9

OK

4.4. List of AT commands

instruction	Functions	instructions
AT	Test instruction	Used to test the serial port
AT+VERSION	Query version number	According to the different modules and customization demand version will have difference
AT+NAME	Query Bluetooth name	Default: BT39
AT+STOP	Set \ Query serial port stop bit	Default: 0 (1 stop bit)
AT+PARI	Set \ Query serial port check bits	Default: 0 (no parity)
AT+BAUD	Set \ Query baud rate	Default: 3 (9600)
AT+RESET	Software restart	-
AT+DEFAULT	factory data reset	-
+++	Switch the AT command mode and data delivery mode	-
AT+LUUID	Set the UUID	Default: ffe0
AT+MCHAR	Open NOTTYFY	Default value: ffe1
AT+MWRITE	Write UUID	Default: ffe2
AT+LIST	Get the list of connected slaves	-
AT+INQ	Manually search for Bluetooth devices	-
AT+CONN	Connect your Bluetooth device manually	-
AT+AUTOCONN	Open Auto Connect	Closed by default
AT+FILTER1	Filter device name prefix 1	After setting the filter Bluetooth name, the module will only connect Bluetooth devices



		with that name.
AT+FILTER2	Filter device name prefix 2	-
AT+FILTER3	Filtration equipment name prefix 3	-
AT+RECOVER	Recover list connection	-
AT+SAVE	Saving an existing connection	-
AT+CLEAD	To get rid of the current save connections (all)	-
AT+DISC	Disconnect the designated link connection	-
AT+DEVICE	Send some equipment specified	-

5. The AT command,

5.1. Basic commands

5.1.1. Test instructions

Function	Instructions	Response	Instructions
Test instructions	AT	OK	For testing the serial port

5.1.2. Query software version

Features	Instructions	Response	Instructions
Query version number	AT+VERSION	+VERSION=<version>	<p><version> The software version number</p> <p>The version will be different depending on the module and custom requirements</p>

5.1.3. Settings \ Query Bluetooth device name

Features	Instructions	Response	Instructions
Query Bluetooth name	AT+NAME	+NAME= <name>	<name> Bluetooth name, up to 20 bytes long Default name: BT39
Set Bluetooth name	AT+NAME<name>	+NAME= <name> OK	

Notes:

After setting this instruction, it should be restarted to take effect.

5.1.4. Set \ Query - serial port stop bit

Features	Instructions	Response	Instructions
Query the serial port stop bit	AT+STOP	+STOP= <param>	< param> sequence number 1:1 stop bit And stop bit Default: 1
Set the serial port stop bit	AT+STOP<param>	+STOP= <param> OK	

Notes:

After setting this instruction, it should be restarted to take effect.

5.1.5. Set \ Query - serial port check bit

Features	Instructions	Response	Instructions
Query the serial port check bit	AT+PARI	+PARI= <param>	< param> sequence number 0: No validation 1: even check Default value: 0
Set the serial port check bit	AT+PARI<param>	+PARI= <param> OK	

Notes:

After setting this instruction, it should be restarted to take effect.

5.1.6. Set \ Query - Serial port Baud rate

Features	Instructions	Response	Instructions
Query baud rate	AT+BAUD	+BAUD=<baud>	< baud > baud rate corresponding to the serial number
			0: 1200 5: 19200 1: 2400 6: 38400 2: 4800 7: 56000 3: 9600 8: 57600 4: 14400 9: 115200 Default: 3(9600)
Set baud rate	AT+BAUD<baud>	+BAUD=<baud> OK	

Notes:

After the instruction is set, it needs to be restarted to take effect.

5.1.7. Software Restart

Features	Instructions	Response	Instructions
Software restart	AT+RESET	Power On	

5.1.8. factory data reset

Features	Instructions	Response	Instructions
factory data reset	AT+DEFAULT	OK Power On	

5.1.9. Switch between AT command mode and data send mode

Functions	Instructions	Response	Instructions
Switch between AT command mode and data send mode	+++	Transfer or AT	Transfer: Enter data pass-through mode AT: Enter the AT command mode



5.2. Broadcast packet command

5.2.1. Setup \ Query - Host SERVICE SERVICE UUID

Features	Instructions	Response	Instructions
Query the host service UUID	AT+LUUID	+LUUID = <param>	<param> Host service UUID
Set the host service UUID	AT+LUUID<param>	+LUUID = <param> OK	Default host service UUID: ffe0

Notes:

After setting this instruction, it should be restarted to take effect. If you need to change the UUID to 128 bits, please contact our customer service staff to customize the program.

For example:

Modify the main module service UUID xffe0 equal to 0

Send: AT+LUUIDffe0

Returns: OK

5.2.2. Set \ Query - Host notification NOTIFY UUID\ WRITE WRITE UUID

Features	Instructions	Response	Instructions
Query module notification \ Write UUID	AT+MCHAR	+MCHAR= <param>	<param> advise \ write parameters Default value: ffe1
Set Module notification \ Write UUID	AT+MCHAR<param>	+MCHAR= <param> OK	This channel is read-write and can be read or written

Notes:

After setting this instruction, it should be restarted to take effect.



5.2.3. Settings \ Query - Host writes WRITE UUID

Features	Instructions	Response	Instructions
Query host write UUID	AT+MWRITE	+MWRITE= <param> <param> Host writes UUID	
Set the host to write UUID	AT+MWRITE<param>	+MWRITE= <param> OK	Default value: ffe2

Remarks:

After setting this instruction, it should be restarted to take effect.

5.3. Connect Instructions

5.3.1. Get a list of connected slaves

Features	Instructions	Response	Instructions
Get a list of connected slaves	AT+LIST	+LIST: 1 <name> <mac> 8 <name> <mac> +LIST END:	<mac> : Address code < name > : device name

5.3.2. Manually search for Bluetooth devices

Features	Instructions	Response	Instructions
Searching for Bluetooth devices	AT+INQ	OK +INQ: <param> <name> <mac> <rss> <param> <name> <mac> <rss> +INQ END:	<param> sequence number <name> Device name < > MAC address code <rss> signal value

Remarks:

This command cannot be used with AT+AUTOCONN.

5.3.3. Connect the Bluetooth device manually

function	Instructions	Response	Instructions
Connect a Bluetooth device	AT+CONN<param>	+Connection>> <mac> +Connected>> <mac>	< param > : the AT + INQ query to the module of serial number <mac> : address code of the module

Example:

Send: AT+INQ

Returns: OK

+INQ:

1	BT27	48872d911e22	-34
2	WF24-BLE	48872d00124a	-76
3	CP29-2A48	0022113b2a48	-76

+INQ END:

BT27 to connect...

Send: AT + CONN1

Returns: + Connection > > 0x48872d911e22

+Connected>>0x48872d911e22

5.3.4. Settings \ query - automatically connected bluetooth devices

Features	Instructions	Response	Instructions
The query module connection mode	AT+AUTOCONN	+AUTOCONN<param>	<param> : 0 - 8 the number of connected slave modules

Set the number
of module AT+AUTOCONN<param> OK
connections

Notes:

1, open automatically after the connection, the main module will automatically according to the connection number of set up search and connect our from the module. If there are more than one slave module, it will be connected randomly.

2, open automatically after the connection, the main module will live connection of memory from the module of bluetooth address. After the connection is broken, the main module to search connection from the module. After a restart or power outage, the master initiates a connection to the remembered Bluetooth address. If you need to connect a new device, you can clear the memory Bluetooth address by long pressing the button or sending AT+CLEAR through the serial port.

After 3, set this directive to restart to take effect.

Examples:

Send: AT+AUTOCONN1
Returns: OK
Send: AT+RESET
Return: Power on
+Connection>>0x48872d911e22
+Connected>>0x48872d911e22

5.3.5. Settings \ Query - Connect to specified device 1

Features	Instructions	Response	Instructions
Query the Bluetooth device name	AT+FILTER1	+FILTER1= <name>	<name> : The specified Bluetooth device name Parameters: 1 - 20 Default value: NULL
Set the Bluetooth device name	AT+FILTER1 <name>	OK	

Notes:



- 1、 For example, the name of the Bluetooth device to be connected is: 1234. After the setting is completed, the module will automatically connect the Bluetooth device with the name. If there are multiple Bluetooth devices with the same name, it will be randomly connected.
- 2、 This instruction can only be opened in the AT + AUTOCONN.
- 3、 Set the bluetooth name, module connected only the name of a bluetooth device.
- 4、 Up to three specified devices can be set.
- 5、 After setting the instruction, it needs to be restarted to take effect.

For example:

```
Send: AT + FILTER1234
Return: OK
Send: AT + RESET
Return: Power on
      +Connection>>0x48872d911e22
      +Connected>>0x48872d911e22
```

5.3.6. Set \ query 2 - the connection equipment

function	Instructions	Response	Notes
Query the Bluetooth device name	AT+FILTER2	+FILTER2= <name>	<name> : The specified Bluetooth device name Parameters: 1 - 20 Default value: NULL
Set the Bluetooth device name	AT+FILTER2<name>	OK	

Notes:

After setting this instruction, it should be restarted to take effect.

5.3.7. Settings \ Query - Connect to a specified device 3

function	Instructions	Response	Notes
Query the Bluetooth device name	AT+FILTER3	+FILTER3= <name>	<name> The specified Bluetooth device name Parameters: 1 -20



Set the Bluetooth
device name

AT+FILTER3<name>

OK

Default value: NULL

Notes:

After setting this instruction, it should be restarted to take effect.

5.3.8. Restore the list connection

Features	Instructions	Response	Notes
Restore the list connection	AT+RECOVER	OK	Restore devices that have held, single connection timeout

5.3.9. Save an existing connection

Features	Instructions	Response	Instructions
Saving existing connections	AT+SAVE	OK	Manually save existing connected devices

Remarks:

After setting this instruction, it should be restarted to take effect.

5.3.10. Clear currently saved links (all)

Features	Instructions	Response	Instructions
Clear the currently saved connection	AT+CLEAD	OK	Clearance AT + AUTOCONN this instruction after the connection of the bluetooth address

Remark:

After setting this instruction, it should be restarted to take effect.

5.3.11. Disconnect the specified link

Features	Instructions	Response	Instructions
----------	--------------	----------	--------------



Disconnect the specified link AT+DISC<param> +disconnected>><mac> < param > : have connection module code
"MAC > : the module address code

For example:

Send: AT+DISC1

Return: +disconnected>>0x48872d911d82

5.3.12. Send some equipment specified

Features	Instructions	Response	Instructions
Specify send to a device	AT+DEVICE<param1> <param2>	-	< param1 > : device needs to send data <param2> : The data to send

For example:

Send: AT+DEVICE112345

Receive from device: 12345

5.4. A list of error codes

EEROR = < > error code detailed information listed below:

The return value	Error Message Description
101	Parameter length error
102	Parameter format is wrong
103	Abnormal parameter data
104	Instruction error



6. Value-added services

In order to meet the various functional requirements of customers, our company can provide the following technical value-added services:

- Custom module applications, such as: IO mouth custom functions, the AT command customization, custom and so on broadcast packets.
- Custom module PCB hardware, hardware requirements can be tailored to customer needs.
- A variety of customized Bluetooth solutions can be customized according to customer needs, a full set of Bluetooth software and hardware solutions.
- A full set of networking solutions customization, can be customized according to customer needs, a full set of networking, gateway solutions.

If you have the above customized requirements, please contact our business personnel directly.