

---

# *tBLE-720*

## *RS-232/RS-422/RS-485 to*

### *Bluetooth Low Energy Converter*

User Manual v1.0



[www.icpdas.com](http://www.icpdas.com)



---

## **Warranty**

All products manufactured by ICP DAS are under warranty regarding defective materials for a period of one year from the date of delivery to the original purchaser.

## **Warning**

ICP DAS assumes no liability for damages resulting from the use of this product. ICP DAS reserves the right to change this manual at any time without notice. The information furnished by ICP DAS is believed to be accurate and reliable. However, no responsibility is assumed by ICP DAS for its use, or for any infringements of patents or other rights of third parties resulting from its use.

## **Copyright**

Copyright 2016 by ICP DAS. All rights are reserved.

## **Trademark**

The names used for identification only may be registered trademarks of their respective companies.

## **Technical Support**

If you have any problems, feel free to contact us via e-mail at [service@icpdas.com](mailto:service@icpdas.com)

## **Document Revision**

Version	Date	Note
1.0	2017/03/21	Release version

---

# Content

<b>1. INTRODUCTION</b>	<b>5</b>
1.1 FEATURES	6
1.2 APPLICATIONS	6
1.3 TRANSMISSION MODE	6
1.3.1 Broadcast Mode	7
1.3.2 Connection Mode	7
1.4 OPERATION MODE	8
1.5 BLUETOOTH LE ROLE	8
1.5.1 Master and Slave	9
1.5.2 Broadcaster and Observer	9
1.6 MASTER IDENTIFICATION MECHANISM	10
<b>2. HARDWARE</b>	<b>11</b>
2.1 SPECIFICATIONS	11
2.2 tBLE-720 FRONT VIEW	12
2.2.1 LED Indicator	12
2.2.2 DIP and Rotary Switch	14
2.2.3 Power Input Connector	15
2.2.4 Communication Connector	16
2.3 DIMENSIONS	17
<b>3. SOFTWARE</b>	<b>18</b>
3.1 THE AT COMMAND	18
3.1.1 The AT Command syntax	18
3.1.2 List of AT Command	19
3.1.3 +++	20
3.1.4 AT	20
3.1.5 ATE	21
3.1.6 AT+BC	21
3.1.7 AT+CL	23
3.1.8 AT+CN	24
3.1.9 AT+DI	25
3.1.10 AT+FC	26
3.1.11 AT+LA	27
3.1.12 AT+PN	28
3.1.13 AT+SFR	29
3.1.14 AT+SDN	30

---

3.1.15	<i>AT+GID</i> .....	32
3.1.16	<i>AT+TPL</i> .....	33
3.1.17	<i>AT+BCIV</i> .....	34
3.1.18	<i>AT+COML</i> .....	36
3.1.19	<i>AT+EKEY</i> .....	37
3.1.20	<i>AT+SKEY</i> .....	39
3.1.21	<i>Error Code Table</i> .....	40
3.2	THE BROADCAST MODE COMMAND.....	41
3.2.1	<i>+ADV</i> .....	41
3.2.2	<i>+ADS</i> .....	42
3.2.3	<i>+ADP</i> .....	43
3.2.4	<i>+ADR</i> .....	44
<b>4.</b>	<b>CONFIGURATION UTILITY</b> .....	<b>45</b>
4.1	MAIN WINDOW OF tBLE-720/BLE-USB UTILITY.....	45
4.2	SET CONFIGURATION ON UTILITY.....	45
4.2.1	<i>Basic Parameter Setting Page</i> .....	46
4.2.2	<i>Recovery Factory Setting Page</i> .....	49
4.3	TEST MODULE ON UTILITY.....	50
4.3.1	<i>Connection Mode</i> .....	50
4.3.2	<i>Broadcast Mode</i> .....	53
4.4	FIRMWARE UPGRADE ON UTILITY.....	55
4.4.1	<i>OTA Upgrade</i> .....	55
<b>5.</b>	<b>TECHNICAL SUPPORT</b> .....	<b>60</b>

# 1. Introduction

The tBLE-720 module is designed for serial network like RS-232, RS-422 or RS-485. It allow RS-232, RS-422 or RS-485 interface to be converted to Bluetooth low energy (LE) piconet network. User can choose tBLE-720 or mobile device (e.g. smart phone, tablet or notebook) to do the connection, which provides Bluetooth LE data conversion between two devices. The tBLE-720 has two transmission modes – advertisement and connection mode. User can use AT command or dip switch to change transmission mode. The tBLE-720 supports a lot of useful AT commands. They can set many parameters such as connection parameters, broadcast parameters and Bluetooth LE role.

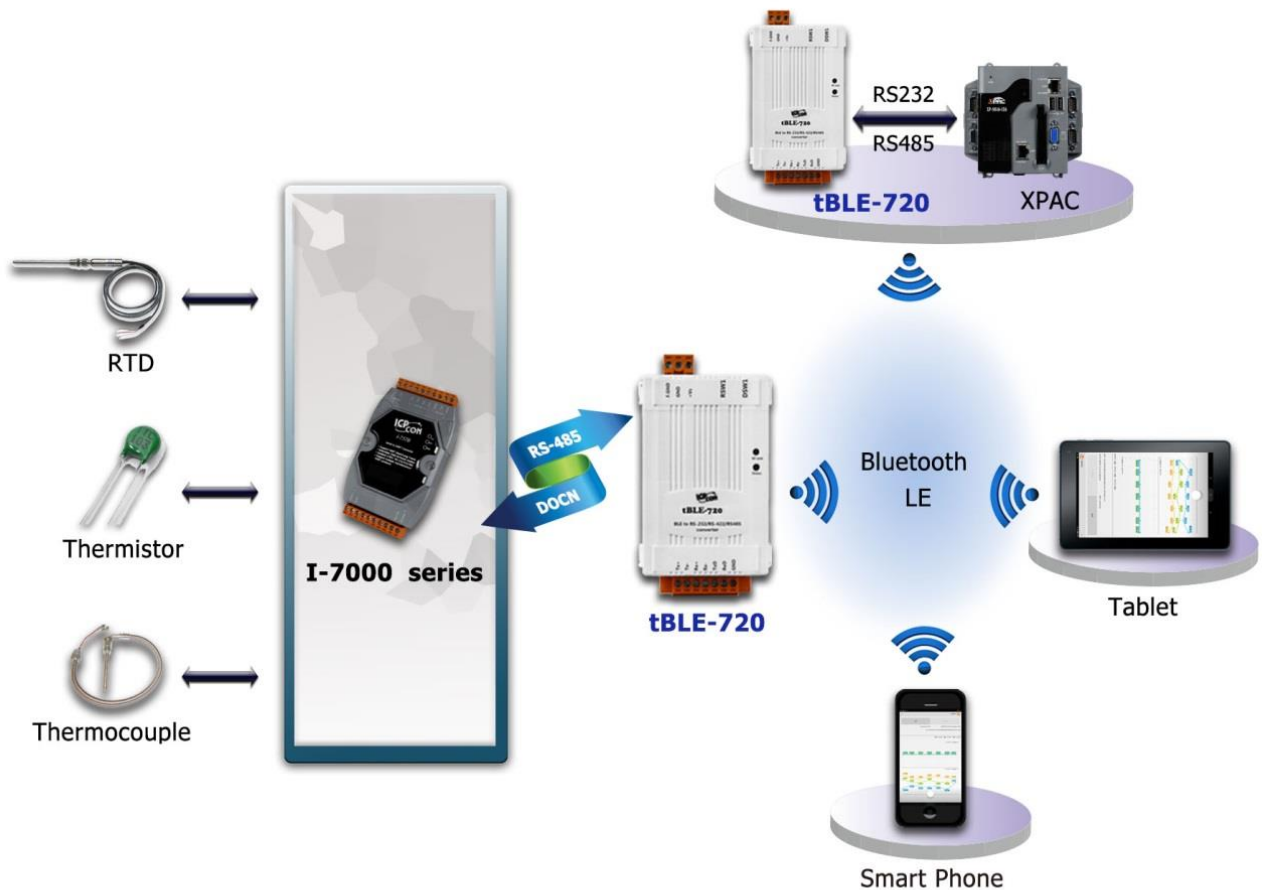


Figure 1-1. The application architecture of tBLE-72

---

## 1.1 Features

### [tBLE-720]

- Frequency: ISM 2.4 GHz
- Standard: Bluetooth 4.0
- Interface: RS-232, RS-422 and RS-485
- Baud Rate :9600~115200 bps
- Operating Temperatures: -25 °C ~ +75 °C
- Supports multiple connections – Max slave is 3
- Supports two types of communication- advertisements and connection
- Provides AT commands to setup the module
- Provides status / RF link indication LEDs
- Easy-to-use switch for baud rate and Bluetooth LE role setting
- GUI Configuration Software (Windows Version)
- Supports OTA firmware upgrade

### [BLE Utility]

ICP DAS provides the tBLE-720 configuration utility for Windows OS.

- Parameters configuration
- Firmware upgrade
- Easy test to transmit/receive
- Setting files management

## 1.2 Applications

- Building Automation
- Factory Automation
- Machine Automation
- Home Maintenance

## 1.3 Transmission Mode

The transmission mode of tBLE-720 can divide into two categories: Broadcast and connection. Each mode had different roles. The Broadcaster/Observer (scanner) was used in the broadcast mode. The Master/Slave was used in the connection mode.

---

### 1.3.1 Broadcast Mode

The broadcast mode is the new features in the Bluetooth LE. The Bluetooth LE Broadcaster device broadcasts packets to every device around it. The Bluetooth LE Observer device can receive the information without connection. The tBLE-720 supports another feature in broadcaster mode. The Broadcaster and Observer (refer to 1.5.2) had an identification ID, and it call “**Group ID**”. The “**Group ID**” (refer to 3.1.15) parameter specifies the logical group identity for tBLE-720 devices, and each tBLE-720 module must be set to the same value if it is in the same group as other modules.

The schematic diagram of broadcast mode was shown in Figure 1-2. It had two broadcasters and ten observers. The Observer 1~5 can receive packet from broadcaster A. The Observer 6~10 can receive packet from broadcaster B. The Observer 1~5 can receive the information without connection. The Observer 1 also can receive packet from broadcaster B, but the Observer 1 only can receive packet from broadcaster A because the Group ID is different.

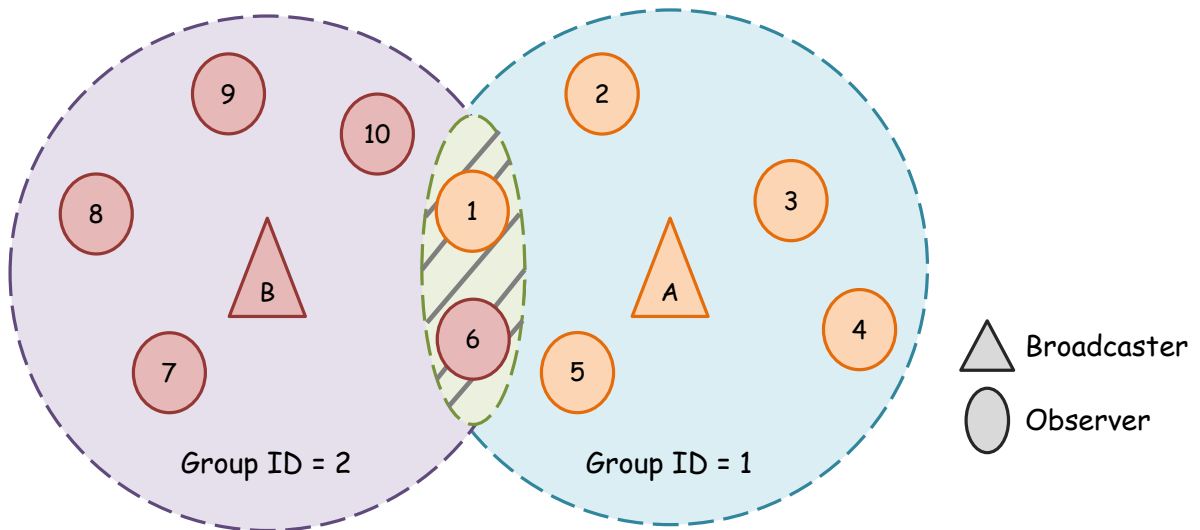


Figure 1-2. The schematic diagram of tBLE-720

### 1.3.2 Connection Mode

The connection mode need make a connection before packet exchange. The slave will broadcast after power on. If the master receive broadcast packet from the Slave and it will send connection request to the Slave. The Slave can connect to one Master unless it disconnect with current Master. The Master can connect with three Slaves. If the number of slave connections was reached to 3. The Master will not send connection request unless the connections was less than 3. The Slave and Master also had “Group ID” (refer to 3.1.15). The Slave and Master must be set to same “Group ID”, and the Master will send connection request to the Slave. The Slave had a master identification mechanism. The Slave receive connection request from Master. If the illegal Master was connected to the

Slave, and then the Slave will be disconnect from Master. The master identification mechanism can disable by AT command.

The schematic diagram of broadcast mode was shown in Figure 1-3. It had two Masters and six Slaves. The Master A will connect to the Slave 1~3, and the Master B will connect to the Slave 4~6. The Slave 1 is in the commutation range of Master B, but the Master will not send the connection request to the Slave 1 because the Group ID is different.

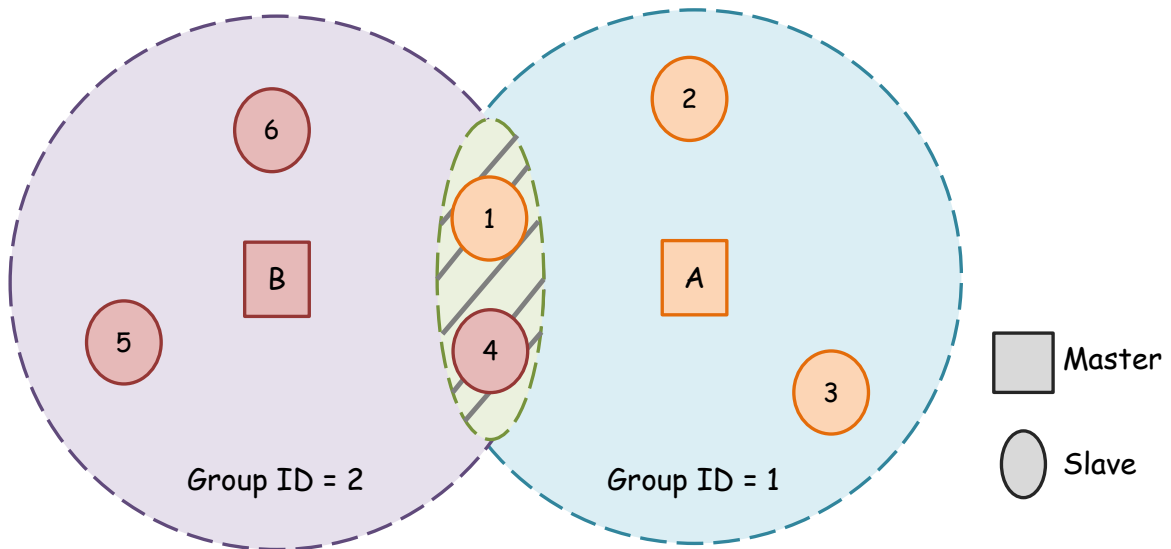


Figure 1-3. The schematic diagram of tBLE-720

## 1.4 Operation Mode

The module will in the initialization mode after power on. If the initialization was success, and the module will went to the transmission mode. The module can send data or it can receive the data in the transmission mode. User sends the “+++<CR>” to the module. It will be entered to the AT command mode. The module will in the AT command mode until 50 second without any commands or send the “ATE<CR>”. The AT command mode can refer to 3.13.1.

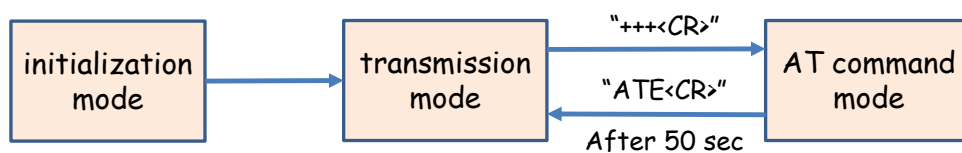


Figure 1-4. The block diagram of operation mode

## 1.5 Bluetooth LE Role

The Bluetooth Low Energy (LE) had four roles. The roles are Master (Central), Slave (Peripheral), Broadcaster and Observer. The Master and slave had used in the connection mode. The Broadcaster and Observer has used in the broadcast mode.



---

## 1.5.1 Master and Slave

First, there is the concept of Master (Central)/ Slave (Peripheral), which has to do with establishing a link. This is also known as the GAP role. A Peripheral can advertise, to let other devices know that it's there, but it's only a Central that can send a connection request to establish a connection. When a link has been established, the Central is also called a Master, while the Peripheral could be called a Slave. The Slave only can connect to a Master, but the Master can connect to three Slaves. The Slave will not sending broadcast packet after link has been established.

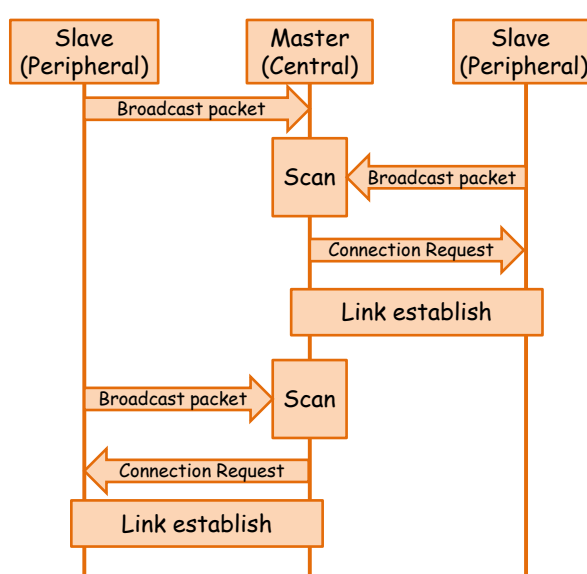


Figure 1-5. The workflow of Bluetooth LE connection

The Slave has two broadcast patterns. One is the high discoverable mode. The other is low discoverable mode. The Slave will be broadcasting for 30 second in high discoverable mode, and the broadcast interval is 20ms for 3 channels. The Slave will be broadcasting for 60 second in low discoverable mode, and the broadcast interval is 640ms for 3 channels. The Slave will in the high discoverable mode after power on. If the Slave didn't received connection request from the Master in high discoverable mode and it will switch to low discoverable mode. If the Slave didn't received connection request from the Master in low discoverable mode for 5 times (300 second) and it will switch back to high discoverable mode.

## 1.5.2 Broadcaster and Observer

The Broadcaster does so by constantly advertising, and the Broadcaster usually has useful data

in the advertising packet. The advertising packet is meant for everyone to see. The Broadcaster is broadcasting to others, so it never accepts connections. The Observer is the opposite of the Broadcaster: it passively listens to BLE devices in its area and processes the data from the advertising packets it receives.

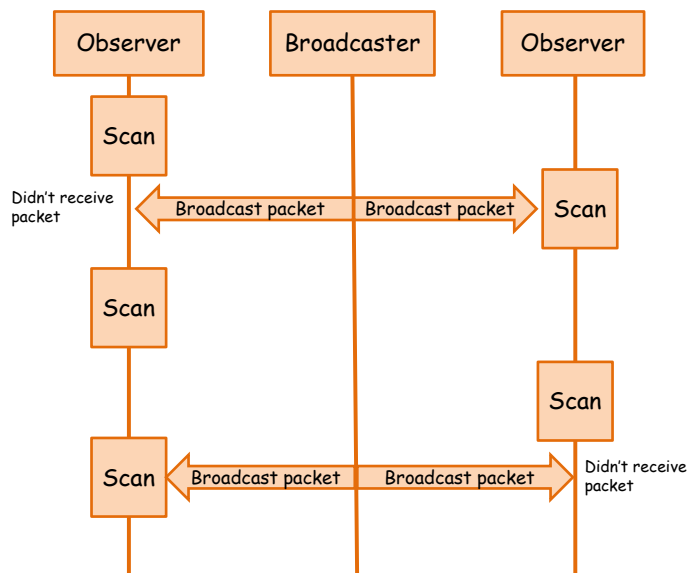


Figure 1-6. The workflow of Bluetooth LE broadcast

## 1.6 Master Identification Mechanism

The Slave had a master identification mechanism. The Master will send identification packet to the Slave. The Slave will check the identification packet that the identification packet was incorrect. The Slave will disconnect with the Master. The feature can enable by AT command (refer to 3.1.19).

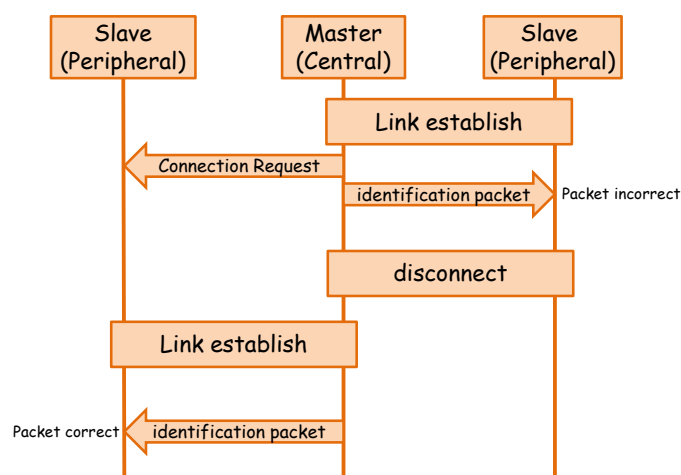


Figure 1-7. The architecture of master identification mechanism

## 2. Hardware

### 2.1 Specifications

Hardware		
MCU Module	32-bit microprocessor	
LED indication	Status / RF link	
Switch	Dip switch: Role / Rotary switch: Baud rate	
RF Specification		
Frequency Band	2.4 GHz ISM(2402~2480 MHz)	
Tx power	-20~4 dBm	
Rx sensitivity	-94 dBm	
Antenna type	1.0 dBi chip antenna	
Transmit Range	20 m	
RF data rate	85 kbps	
Max. Slaves Supported	3	
Bluetooth LE Interface		
Version	Bluetooth 4.0	
Connection Role	Master/Slave – connection mode observer /broadcaster – broadcast mode	
Communication Interface		
COM0	RS-232	TxD, RxD and GND
	RS-422	Tx+, Tx-, Rx+ and Rx-
	RS-485	Tx+ and Tx-
	Data Format	N,8,1
	Baud Rate	9600~115200 bps
Power		
Operating Voltage	+10 VDC ~ +30 VDC	
Power Consumption	1 W	
Mechanical		
Casing	Plastic	
Dimensions (W x L x H)	52 mm x 95 mm x 27 mm	
Installation	DIN-Rail	
Environment		
Operating Temperature	-25 ~ +75°C	
Storage Temperature	-25 ~ +75°C	
Relative Humidity	5 ~ 95% RH, Non-condensing	

## 2.2 tBLE-720 Front View

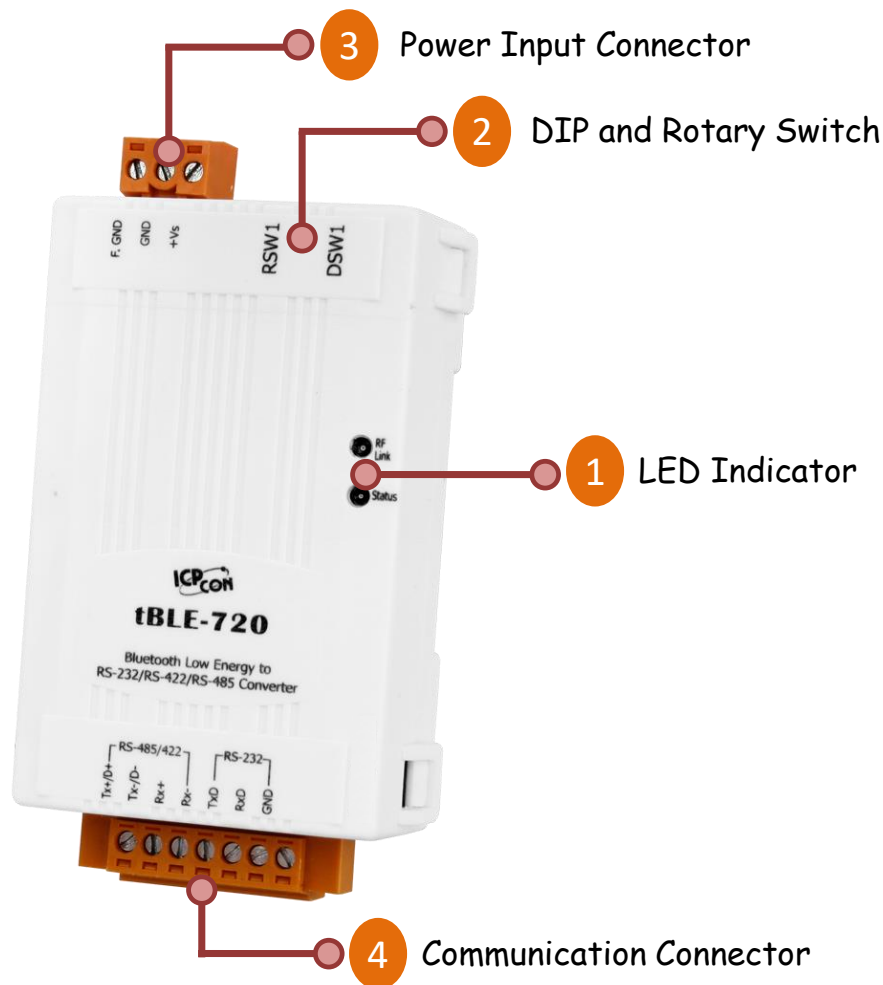


Figure 2-1. Front View of tBLE-720

### 2.2.1 LED Indicator

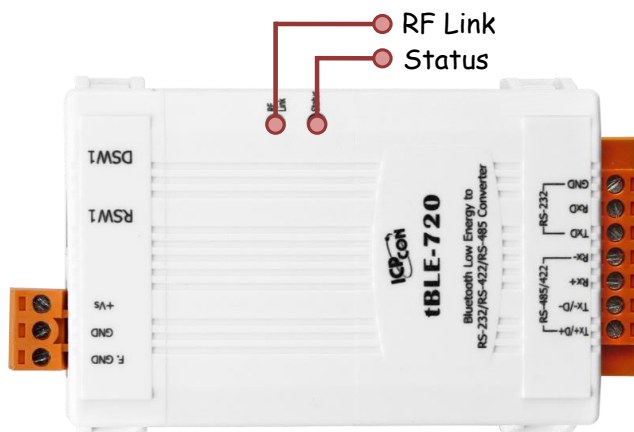


Figure 2-2. LED indicator

LED Indicator	LED Color	Description
RF Link	Green	The connection status of Bluetooth LE
Status	Orange	The module status of tBLE-720

The LED had different pattern in the connection and broadcast mode.

➤ Connection mode

The RF link LED will blink for 3 second after tBLE-720 power on, and the status LED also will turn on for 3 second. The connection had two roles – master and slave. Each role had different LED pattern. The LED pattern was shown in following table:

Master		
LED Indicator	Status	Description
RF Link	Steady Lit	Connect to all slaves
	Blink (1 s)	Connect to slave, but not connect to all slaves
	Blink (200 ms)	Not connect to slave
Status	Steady Lit	Module initializes success(only turn on for 3 second after power on)
	Blink (50 ms)	Module initializes fail(keep turn on)
	Blink (200 ms)	Temporary Buffer was full
	Blink (50 ms)	RF receive data (flash once)

Slave		
LED Indicator	Status	Description
RF Link	Steady Lit	RF signal is good (RSSI is greater than -60 dBm)
	Blink (1 s)	RF signal is normal (RSSI is between -61 and -80 dBm)
	Blink (2 s)	RF signal is bad (RSSI is between -81 and -100 dBm)
	Blink (200 ms)	Not connect to master
Status	Steady Lit	Module initializes success(only turn on for 3 second after power on)
	Blink (50 ms)	Module initializes fail(keep turn on)
	Blink (200 ms)	Temporary Buffer was full
	Blink (50 ms)	RF receive data (flash once)

➤ Broadcast mode

The RF link LED and status LED will turn on for 3 second after tBLE-720 power on. The connection had two roles – broadcaster and observer (scanner). Each role had different LED pattern. The LED pattern was show in following table:

Broadcaster		
LED Indicator	Status	Description
RF Link	Steady Lit	The RF Link LED will keep on in the broadcast mode
Status	Steady Lit	Module initializes success(only turn on for 3 second after power on)
	Blink (50 ms)	Module initializes fail(keep turn on)
	Blink (1 s)	Broadcast is start
	Blink (2 s)	Broadcast is stop

Observer (scanner)		
LED Indicator	Status	Description
RF Link	Steady Lit	The RF Link LED will keep on in the broadcast mode
Status	Radiate (ON)	Module initializes success(only turn on for 3 second after power on)
	Blink (50 ms)	Module initializes fail(keep turn on)
	Blink (50 ms)	RF receive data (flash once)

### 2.2.2 DIP and Rotary Switch

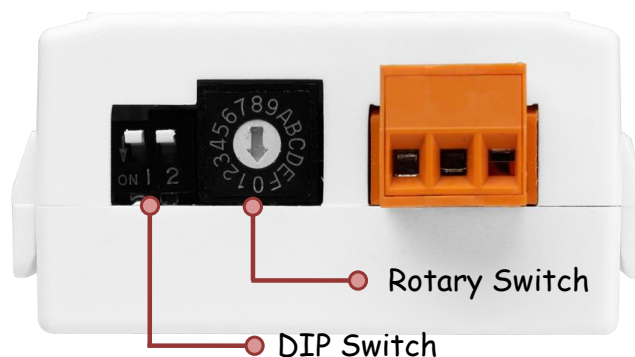


Figure 2-3. DIP and rotary switch

The DIP switch can change the send mode (refer to 1.3) and role (refer to 1.5). The rotary

switch is used to change the baud rate of RS-232/422/485 interface.

Switch Name	Description
DSW1	Send mode and Role switch
RSW1	Baud rate switch

DSW1 –DIP Switch for role and connection mode setting		
Pin No.	Description	Location
1	Role	ON – Master/Broadcaster OFF – Slave/Observer
2	Connection mode	ON – Advertisement mode OFF – Connection mode

RSW1 – Rotary Switch for Baud rate setting					
Location	Baud Rate	Location	Baud Rate	Location	Baud Rate
0	115200	2	38400	4	9600
1	57600	3	19200	5~F	-

### 2.2.3 Power Input Connector

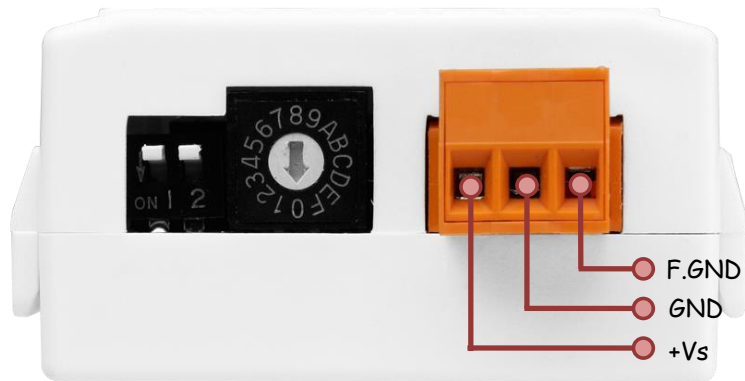


Figure 2-4. Power input connector

Pin Assignment	Description
+Vs	+10 ~ +30 VDC
GND	Power GND
F.GND	Frame Ground

## 2.2.4 Communication Connector



Figure 2-5. Communication connector

Pin Assignment	Interface
Tx+/D+	RS-422/RS-485
Tx-/D-	
Rx+	RS-422
Rx-	
TxD	RS-232
RxD	
GND	

*Only one of RS-232, RS-422 or RS-485 ports can be used at the same time.*

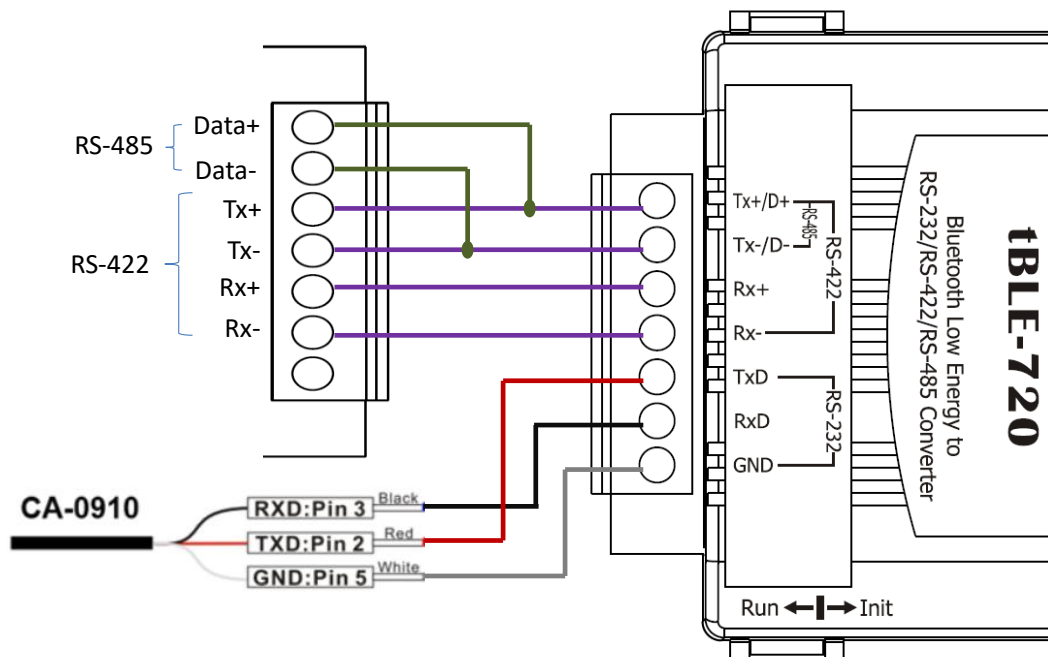


Figure 2-6. Wire connection of tBLE-720





Figure 2-7. CA-0910 cable

## 2.3 Dimensions

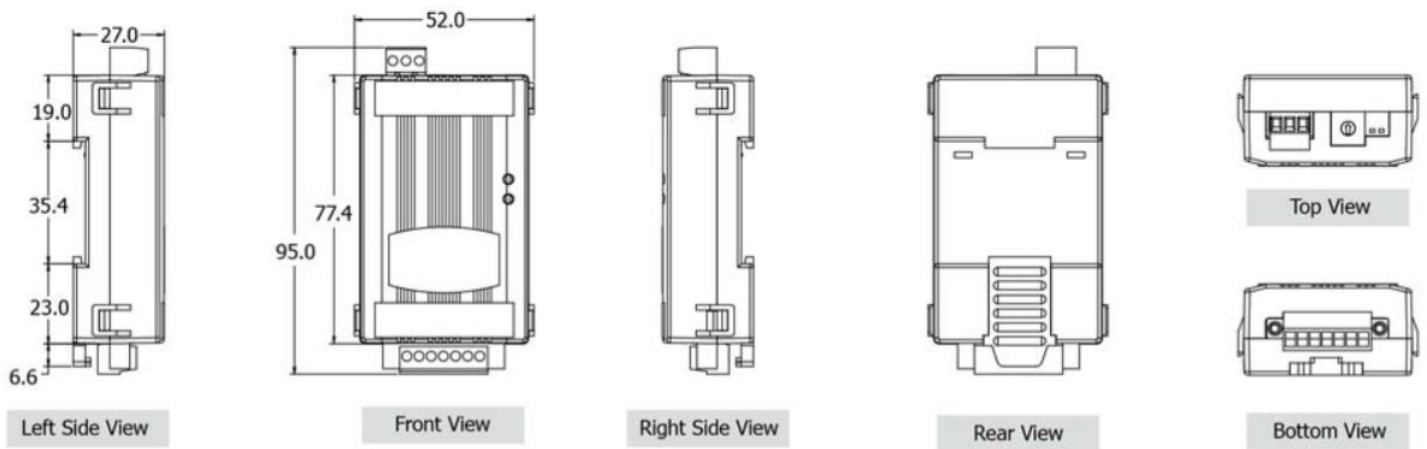


Figure 2-8. Dimensions of tBLE-720

---

## 3. Software

### 3.1 The AT Command

#### 3.1.1 The AT Command syntax

The AT commands help users to control or get the information of tBLE-720. The prefix “AT+” must be included at the beginning of each command line (except +++, AT and ATE), and the character <CR> is used to finish a command line. When the application would like to send a series of AT commands, leave a pause between the preceding and the following command until information responses (e.g. “OK”). In the present document, AT commands can divide into four types: Write Command, Read Command, Test Command and Execution Command. If the AT command isn't exist or syntax error, and the tBLE-720 would be reply error code. All of AT commands will valid when the module was entering to the AT command mode (except +++)). The correct flow of AT command was shown in [Figure 3-1](#).

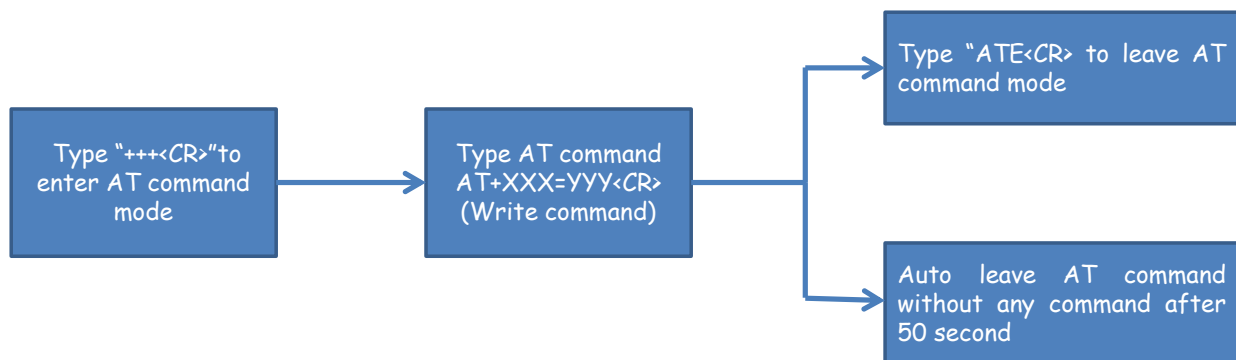


Figure 3-1. The flow of AT command

#### 1. Write Command

The write command can write configure to the tBLE-720. The format of write command is “AT+XXX=YYY<CR>”.The “AT+” is a beginning in the command, and the “XXX” is command name, and the “YYY” is a parameter, and the<CR> is end of the command. The syntax or parameter was incorrect and the tBLE-720 would be reply error code. The user didn't reset configure again because all of configure will be save in the local memory after receive write command.

#### 2. Read Command

The read command can read configure from the tBLE-720. The format of read command is “AT+XXX?<CR>”.The “AT+” is a beginning in the command, and the “XXX” is command

name, and the “?” is read command, and the<CR> is end of the command.

### 3. Test Command

The test command can examine the syntax of command and give the information about the command parameter. The format of test command is “AT+XXX=?<CR>”.The “AT+” is a beginning in the command, and the “XXX” is command name, and the “=?” is test command, and the<CR> is end of the command. All of AT commands supports the test command. If the syntax of command is correct. The tBLE-720 would be reply “OK<CR><LF>”.

### 4. Execution Command

The execution command can execute some functions (e.g. reset the module). The format of test command is “AT+XXX<CR>”.The “AT+” is a beginning in the command, and the “XXX” is command name, and the<CR> is end of the command.

#### 3.1.2 List of AT Command

The tBLE-720 supports AT commands. The command list was shown in the [Table 3-1](#).

Table 3-1. List of AT command

Command Name	Write	Read	Test	Execution	Description	Section
+++<CR>	✗	✗	✗	✓	Enter to AT command mode	<a href="#">3.1.3</a>
AT<CR>	✗	✗	✗	✓	Test command	<a href="#">3.1.4</a>
ATE<CR>	✗	✗	✗	✓	Leave AT command mode	<a href="#">3.1.5</a>
AT+BC<CR>	✓	✓	✓	✗	Broadcast Channel	<a href="#">3.1.6</a>
AT+CL<CR>	✗	✓	✓	✗	Connection list	<a href="#">3.1.7</a>
AT+CN<CR>	✗	✓	✓	✗	Connection amount	<a href="#">3.1.8</a>
AT+DI<CR>	✗	✓	✓	✗	Device information	<a href="#">3.1.9</a>
* AT+FC<CR	✗	✗	✓	✓	Factory setting	<a href="#">3.1.10</a>
AT+LA<CR>	✗	✓	✓	✗	Local address	<a href="#">3.1.11</a>
* AT+PN<CR>	✓	✓	✓	✗	Peer amount	<a href="#">3.1.12</a>
* AT+SFR<CR>	✗	✗	✓	✓	Software reset	<a href="#">3.1.13</a>

Command Name	Write	Read	Test	Execution	Description	Section
AT+SDN<CR>	✓	✓	✓	✗	Slave device number	3.1.14
AT+GID<CR>	✓	✓	✓	✗	Group ID	3.1.15
AT+TPL<CR>	✓	✓	✓	✗	RF power level	3.1.16
AT+BCIV<CR>	✓	✓	✓	✗	Broadcast interval	3.1.17
AT+COML<CR>	✗	✗	✓	✓	Command list	3.1.18
AT+EKEY<CR>	✓	✓	✓	✗	Enable master identification mechanism	3.1.19
* AT+SKEY<CR>	✓	✓	✓	✗	Set master identification key	3.1.20

\*: The write or execution command will reset the module.

### 3.1.3 +++

#### (1) Description

This command is used to set module into the AT command mode.

#### (2) Syntax

Execution command	Response
+++<CR>	Enter to AT mode<CR><LF>

#### (3) Example

```
+++<CR>
```

```
Enter to AT mode<CR><LF>
```

### 3.1.4 AT

#### (1) Description

This command is used for testing module when the module had entered to the AT command mode.

---

(2) Syntax

Execution command	Response
AT<CR>	OK<CR><LF>

(3) Example

```
AT<CR>
```

```
OK<CR><LF>
```

```
AT
```

```
AT<CR>
```

```
Error: 05<CR><LF> (refer to 3.1.21)
```

### 3.1.5 ATE

(1) Description

This command is used to leave the AT command mode.

(2) Syntax

Execution command	Response
ATE<CR>	OK<CR><LF>

(3) Example

```
ATE<CR>
```

```
OK<CR><LF>
```

### 3.1.6 AT+BC

(1) Description

The Bluetooth LE used 3 channels (CH37~39) for frequency hopping in broadcast mode.

This command allow user to change the broadcast channel when the module was in the broadcast mode. User can choose one channel for broadcasting, or choose three channels for broadcasting. The command only change the broadcast command in the broadcast mode, and the broadcast will not be change in the connection mode.

(2) Syntax

Write Command	Response
AT+BC=<channel><CR>	OK<CR><LF> Error: 01<CR><LF> (refer to 3.1.21)
Read Command	Response
AT+BC?<CR>	+BC: <channel><CR><LF> OK<CR><LF>
Test Command	Response
AT+BC=?<CR>	+BC: 0~3<CR><LF> OK<CR><LF>

(3) Parameter

<channel>	0: CH 37~39 1: CH 37 (2402 MHz) 2: CH 38 (2426 MHz) 3: CH 39 (2480 MHz) Default: 0
-----------	--

(4) Example

```
AT+BC=1<CR>
```

```
OK<CR><LF>
```

```
AT+BC?<CR>
```

```
+BC: 1 <CR><LF>
```

```
OK<CR><LF>
```

```
AT+BC=7<CR>
```

```
Error: 01<CR><LF> (refer to 3.1.21)
```

---

```
AT+BC=?<CR>
```

```
+BC: 0~3<CR><LF>
```

```
OK<CR><LF>
```

```
AT+BC<CR>
```

```
Error: 04<CR><LF> (refer to 3.1.21)
```

### 3.1.7 AT+CL

#### (1) Description

This command is used to query which device was connected in connection mode.

#### (2) Syntax

Read Command	Response
AT+CL?<CR>	+CL: <a href="#">&lt;mac address&gt;</a> , <a href="#">&lt;RSSI&gt;</a> <CR><LF> OK<CR><LF>
Test Command	Response
AT+CL=?<CR>	+CL: ADDRESS,RSSI<CR><LF> OK<CR><LF>

#### (3) Parameter

<a href="#">&lt;mac address&gt;</a>	6 Byte MAC address Range: 000DE06D0000 ~ 000DE06DFFFF 0: not connect to peer device
<a href="#">&lt;RSSI &gt;</a>	RSSI(Received Signal Strength Indicator) of peer device

#### (4) Example

```
AT+CL?<CR>
```

---

+CL: 0<CR><LF> (not connect to peer device)

OK<CR><LF>

AT+CL?<CR>

+CL: 000DE06D001F,-61<CR><LF>

OK<CR><LF>

AT+CL?<CR>

+CL: 000DE06D001F,-61<CR><LF>

+CL: 000DE06D0003,-55<CR><LF>

OK<CR><LF>

AT+CL=?<CR>

+CL: ADDRESS,RSSI<CR><LF>

OK<CR><LF>

AT+CL=1<CR>

Error: 03<CR><LF> (refer to [3.1.21](#))

AT+CL<CR>

Error: 04<CR><LF> (refer to [3.1.21](#))

### 3.1.8 AT+CN

#### (1) Description

This command can show how many peer devices had connected into itself.

#### (2) Syntax

Read Command	Response
AT+CN?<CR>	+CN: <amount><CR><LF> OK<CR><LF>
Test Command	Response
AT+CN=?<CR>	+CN: 1~3<CR><LF> OK<CR><LF>



---

(3) Parameter

<amount>	Peer device amount Range: 1~3
----------	----------------------------------

(4) Example

```
AT+CN?<CR>
```

```
+CN: 0<CR><LF> (not connect to any peer)
```

```
OK<CR><LF>
```

```
AT+CN?<CR>
```

```
+CN: 1<CR><LF>
```

```
OK<CR><LF>
```

```
AT+CN=?<CR>
```

```
+CN: 0 <CR><LF>
```

```
OK<CR><LF>
```

```
AT+CN=1<CR>
```

```
Error: 03<CR><LF> (refer to 3.1.21)
```

```
AT+CN<CR>
```

```
Error: 04<CR><LF> (refer to 3.1.21)
```

### 3.1.9AT+DI

(1) Description

This command can show the device information.

(2) Syntax

Read Command	Response
AT+DI?<CR>	Manufacturer: <manufacturer> Firmware Version: <version> BLE Version: <stack version> OK<CR><LF>

Test Command	Response
AT+DI=?<CR>	OK<CR><LF>

### (3) Parameter

<manufacturer>	The identification of manufacturer.
<version>	The identification of firmware version.
<stack version>	The identification of Bluetooth LE stack version.

### (4) Example

```
AT+DI=?<CR>
```

```
OK<CR><LF>
```

```
AT+DI?<CR>
```

```
Manufacturer: ICDPAS<CR><LF>
```

```
Firmware Version: 1.0<CR><LF>
```

```
BLE Version: 4.1<CR><LF>
```

```
OK<CR><LF>
```

```
AT+DI=1<CR>
```

```
Error: 03<CR><LF> (refer to 3.1.21)
```

```
AT+DI<CR>
```

```
Error: 04<CR><LF> (refer to 3.1.21)
```

## 3.1.10 AT+FC

### (1) Description

This command allows users for recovering module to factory setting and resetting the module after 500 ms. All of the parameters will be reset to default value.

---

(2) Syntax

Execution Command	Response
AT+FC<CR>	OK<CR><LF>
Test Command	Response
AT+FC=?<CR>	OK<CR><LF>

(3) Example

```
AT+FC=?<CR>
```

```
OK<CR><LF>
```

```
AT+FC?<CR>
```

```
OK<CR><LF>
```

```
AT+FC=1<CR>
```

```
Error: 03<CR><LF> (refer to 3.1.21)
```

```
AT+FC?<CR>
```

```
Error: 02<CR><LF> (refer to 3.1.21)
```

### 3.1.11 AT+LA

(1) Description

This command is used to show the address of local device.

(2) Syntax

Read Command	Response
AT+LA?<CR>	+LA: <a href="#">&lt;mac address&gt;</a> <CR><LF> OK<CR><LF>
Test Command	Response
AT+LA=?<CR>	+LA: ADDRESS<CR><LF> OK<CR><LF>

(3) Parameter

<code>&lt;mac address&gt;</code>	6 Byte MAC address Range: 000DE06D0000 ~ 000DE06DFFFF
----------------------------------	--

(4) Example

```
AT+LA?<CR>
+LA: 000DE06D0013<CR><LF>
OK<CR><LF>
AT+LA=?<CR>
+LA: ADDRESS<CR><LF>
OK<CR><LF>
AT+LA=1<CR>
Error: 03<CR><LF> (refer to 3.1.21)
AT+LA<CR>
Error: 04<CR><LF> (refer to 3.1.21)
```

### 3.1.12 AT+PN

(1) Description

This command can set the amount of maximum slave. If the master connected to all the slaves, and the RF data rate will be reduce. The module will be rebooting that the module received write command in the connection mode.

(2) Syntax

Write Command	Response
<code>AT+PN=&lt;amount&gt;&lt;CR&gt;</code>	<code>OK&lt;CR&gt;</code> <code>Error: 01&lt;CR&gt;&lt;LF&gt;</code> (refer to 3.1.21)
Read Command	Response
<code>AT+PN?&lt;CR&gt;</code>	<code>+PN: &lt;amount&gt;&lt;CR&gt;&lt;LF&gt;</code> <code>OK&lt;CR&gt;&lt;LF&gt;</code>
Test Command	Response
<code>AT+PN=?&lt;CR&gt;</code>	<code>+PN: 1~3&lt;CR&gt;&lt;LF&gt;</code> <code>OK&lt;CR&gt;&lt;LF&gt;</code>

---

(3) Parameter

<code>&lt;amount&gt;</code>	Peer device amount Range: 1~3 Default: 3
-----------------------------	--

(4) Example

```
AT+PN=1<CR>
```

```
OK<CR><LF>
```

```
AT+PN?<CR>
```

```
+PN: 1<CR><LF>
```

```
OK<CR><LF>
```

```
AT+PN=?<CR>
```

```
+PN: 1~3<CR><LF>
```

```
OK<CR><LF>
```

```
AT+PN=7<CR>
```

```
Error: 01<CR><LF> (refer to 3.1.21)
```

```
AT+PN<CR>
```

```
Error: 04<CR><LF> (refer to 3.1.21)
```

### 3.1.13 AT+SFR

(1) Description

This command can reboot the module. The module will be rebooting after 500 ms.

(2) Syntax

Execution Command	Response
AT+SFR<CR>	OK<CR><LF>
Test Command	Response
AT+SFR=?<CR>	OK<CR><LF>

(3) Example

```
AT+SFR=?<CR>
```

```
OK<CR><LF>
```

```
AT+SFR?<CR>
```

```
OK<CR><LF>
```

```
AT+SFR=1<CR>
```

```
Error: 03<CR><LF> (refer to 3.1.21)
```

```
AT+SFR?<CR>
```

```
Error: 02<CR><LF> (refer to 3.1.21)
```

### 3.1.14 AT+SDN

(1) Description

This command can set the device name of slave when the slave was broadcast in the connection mode. The master (mobile device) can use the device name to identify slave.

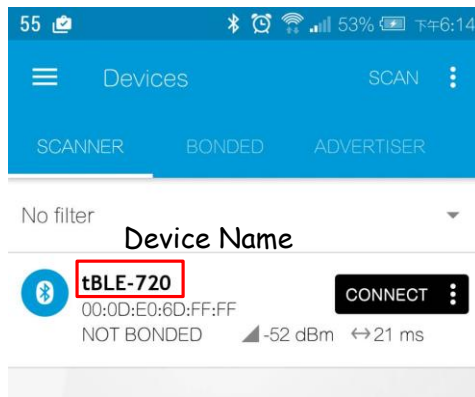


Figure 3-2. Screenshot of mobile device APP

(2) Syntax

Write Command	Response
AT+SDN=<number><CR>	OK<CR> Error: 01<CR><LF> (refer to 3.1.21)

Read Command	Response
AT+SDN?<CR>	+SDN: <number><CR><LF> OK<CR><LF>
Test Command	Response
AT+SDN=?<CR>	+SDN: 0~999<CR><LF> OK<CR><LF>

### (3) Parameter

<number>	The number of device Range: 0~999 Default: 720
----------	--

### (4) Example

```
AT+SDN=1<CR>
```

```
OK<CR><LF>
```

```
AT+SDN?<CR>
```

```
+SDN: 1<CR><LF>
```

```
OK<CR><LF>
```

```
AT+SDN=77<CR>
```

```
OK<CR><LF>
```

```
AT+SDN=777<CR>
```

```
OK<CR><LF>
```

```
AT+SDN=?<CR>
```

```
+SDN: 0~999<CR><LF>
```

```
OK<CR><LF>
```

```
AT+SDN=1000<CR>
```

```
Error: 01<CR><LF> (refer to 3.1.21)
```

```
AT+SDN=ABCD<CR>
```

---

Error: 01<CR><LF> (refer to [3.1.21](#))

```
AT+SDN<CR>
```

Error: 04<CR><LF> (refer to [3.1.21](#))

### 3.1.15 AT+GID

#### (1) Description

This command is used to change the “Group ID” at the module. The device will receive the packet when both of the Group ID is same in the broadcast or connection mode. The Group ID isn’t same and the device will discard the packet. The Group ID is “0”, and it will receive all packets of the group.

#### (2) Syntax

Write Command	Response
AT+GID=<number><CR>	OK<CR> Error: 01<CR><LF> (refer to <a href="#">3.1.21</a> )
Read Command	Response
AT+GID?<CR>	+GID: <number><CR><LF> OK<CR><LF>
Test Command	Response
AT+GID=?<CR>	+GID: 0~99<CR><LF> OK<CR><LF>

#### (3) Parameter

<number>	The number of Group ID Range: 0~99 Default: 0
----------	---

#### (4) Example

```
AT+GID=1<CR>
```



---

OK<CR><LF>

AT+GID?<CR>

+GID: 1<CR><LF>

OK<CR><LF>

AT+GID=77<CR>

OK<CR><LF>

AT+GID=?<CR>

+GID: 0~99<CR><LF>

OK<CR><LF>

AT+GID=100<CR>

Error: 01<CR><LF> (refer to [3.1.21](#))

AT+GID=AB<CR>

Error: 01<CR><LF> (refer to [3.1.21](#))

AT+GID<CR>

Error: 04<CR><LF> (refer to [3.1.21](#))

### 3.1.16 AT+TPL

#### (1) Description

This command can change the RF power when the module was send the broadcast or connection packet.

#### (2) Syntax

Write Command	Response
AT+TPL=<Level><CR>	OK<CR> Error: 01<CR><LF> (refer to <a href="#">3.1.21</a> )
Read Command	Response
AT+TPL?<CR>	+TPL: <Level><CR><LF> OK<CR><LF>
Test Command	Response
AT+TPL=?<CR>	+TPL: 0~8<CR><LF> OK<CR><LF>

---

(3) Parameter

<b>&lt; Level &gt;</b>	The RF power level Range: 0~8 0: 0 dBm 1: 1 dBm 2: 2 dBm 3: 3 dBm 4: 4 dBm 5: -5 dBm 6: -10 dBm 7: -15 dBm 8: -20 dBm Default: 4
------------------------	---

(4) Example

```
AT+TPL=1<CR>
```

```
OK<CR><LF>
```

```
AT+TPL?<CR>
```

```
+TPL: 1<CR><LF>
```

```
OK<CR><LF>
```

```
AT+TPL=?<CR>
```

```
+TPL: 0~8<CR><LF>
```

```
OK<CR><LF>
```

```
AT+TPL=10<CR>
```

```
Error: 01<CR><LF> (refer to 3.1.21)
```

```
AT+TPL<CR>
```

```
Error: 04<CR><LF> (refer to 3.1.21)
```

### 3.1.17 AT+BCIV

(1) Description

This command can change the broadcast interval in the broadcast mode.

---

(2) Syntax

Write Command	Response
AT+BCIV=<Interval><CR>	OK<CR> Error: 01<CR><LF> (refer to 3.1.21)
Read Command	Response
AT+BCIV?<CR>	+BCIV: <Interval><CR><LF> OK<CR><LF>
Test Command	Response
AT+BCIV=?<CR>	+BCIV: 20~10000<CR><LF> OK<CR><LF>

(3) Parameter

< Interval >	The broadcast interval Range: 20~10000 Unit: ms Default: 1000
--------------	--

(4) Example

```
AT+BCIV=50<CR>
```

```
OK<CR><LF>
```

```
AT+BCIV?<CR>
```

```
+BCIV: 50<CR><LF>
```

```
OK<CR><LF>
```

```
AT+BCIV=?<CR>
```

```
+BCIV: 20~10000<CR><LF>
```

```
OK<CR><LF>
```

```
AT+BCIV=10<CR>
```

---

Error: 01<CR><LF> (refer to 3.1.21)

AT+BCIV=60000<CR>

Error: 01<CR><LF> (refer to 3.1.21)

AT+BCIV<CR>

Error: 04<CR><LF> (refer to 3.1.21)

### 3.1.18 AT+COML

#### (1) Description

This command can show that the module had supported commands.

#### (2) Syntax

Test Command	Response
AT+COML=?<CR>	OK<CR><LF>
Execution Command	Response
AT+COML=?<CR>	AT<CR><LF> ATE<CR><LF> AT+BC<CR><LF> AT+CL<CR><LF> AT+CN<CR><LF> AT+DI<CR><LF> AT+FC<CR><LF> AT+LA<CR><LF> AT+PN<CR><LF> AT+GID<CR><LF> AT+SDN<CR><LF> AT+SFR<CR><LF> AT+TPL<CR><LF> AT+BCIV<CR><LF> AT+COML<CR><LF> AT+EKEY<CR><LF> AT+SKEY<CR><LF> OK<CR><LF>

---

(3) Example

```
AT+COML=?<CR>
```

```
OK<CR><LF>
```

```
AT+COML?<CR>
```

```
AT<CR><LF>
```

```
ATE<CR><LF>
```

```
AT+BC<CR><LF>
```

```
AT+CL<CR><LF>
```

```
AT+CN<CR><LF>
```

```
AT+DI<CR><LF>
```

```
AT+FC<CR><LF>
```

```
AT+LA<CR><LF>
```

```
AT+PN<CR><LF>
```

```
AT+GID<CR><LF>
```

```
AT+SDN<CR><LF>
```

```
AT+SFR<CR><LF>
```

```
AT+TPL<CR><LF>
```

```
AT+BCIV<CR><LF>
```

```
AT+COML<CR><LF>
```

```
AT+EKEY<CR><LF>
```

```
AT+SKEY<CR><LF>
```

```
OK<CR><LF>
```

### 3.1.19 AT+EKEY

(1) Description

This command is used to enable or disable Master identification mechanism (refer to [1.6](#)).

(2) Syntax

Write Command	Response
AT+EKEY=<status><CR>	OK<CR> Error: 01<CR><LF> (refer to <a href="#">3.1.21</a> )

Read Command	Response
AT+EKEY?<CR>	+EKEY: <status><CR><LF> OK<CR><LF>
Test Command	Response
AT+EKEY=?<CR>	+EKEY: 0~1<CR><LF> OK<CR><LF>

### (3) Parameter

< status >	<p>The enable or disable Master identification mechanism</p> <p>Range: 0~1</p> <p>0: Disable</p> <p>1: Enable</p> <p>Default: 0</p>
------------	---

### (4) Example

```
AT+EKEY=1<CR>
```

```
OK<CR><LF>
```

```
AT+EKEY?<CR>
```

```
+EKEY: 1<CR><LF>
```

```
OK<CR><LF>
```

```
AT+EKEY=?<CR>
```

```
+ROLE: 0~1<CR><LF>
```

```
OK<CR><LF>
```

```
AT+EKEY=10<CR>
```

```
Error: 01<CR><LF> (refer to 3.1.21)
```

```
AT+EKEY<CR>
```

```
Error: 04<CR><LF> (refer to 3.1.21)
```

### 3.1.20 AT+SKEY

#### (1) Description

The user enables the Master identification mechanism and the Master will be sending identification packet to the Slave. This command can change the identification packet of Master identification mechanism.

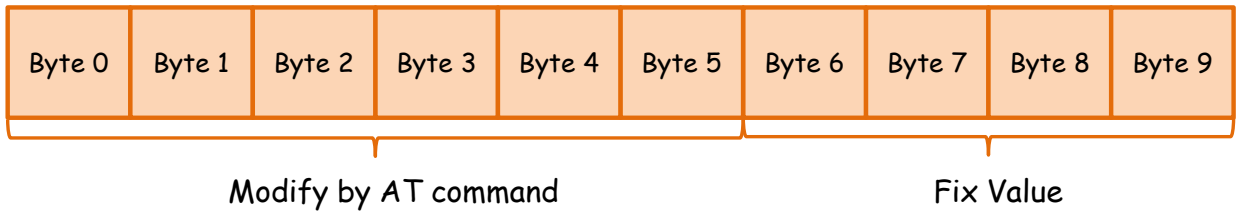


Figure 3-3. The identification packet

#### (2) Syntax

Write Command	Response
AT+SKEY=<KEY><CR>	OK<CR> Error: 01<CR><LF> (refer to 3.1.21)
Read Command	Response
AT+SKEY?<CR>	+EKEY: <KEY><CR><LF> OK<CR><LF>
Test Command	Response
AT+SKEY=?<CR>	+SKEY: KEY<CR><LF> OK<CR><LF>

#### (3) Parameter

< KEY >	The key of Master identification mechanism Key length: 6 Byte Key value: 0x20~0xFF (ASCII) Default: ICPDAS
---------	---

#### (4) Example

---

AT+SKEY=ABCDEF<CR>

OK<CR><LF>

AT+SKEY?<CR>

+SKEY: ABCDEF<CR><LF>

OK<CR><LF>

AT+SKEY=?<CR>

+SKEY: 0~1<CR><LF>

OK<CR><LF>

AT+SKEY=<0x01><0x21><0x02><0x23><0x24><0xFF><CR>

Error: 01<CR><LF> (refer to [3.1.21](#))

AT+SKEY<CR>

Error: 04<CR><LF> (refer to [3.1.21](#))

### 3.1.21 Error Code Table

Error code	Mode	Description
01	AT command mode	The parameter of AT command is error
02		This command didn't support read mode
03		This command didn't support write mode
04		This command didn't support execution mode
05		Unknown AT command
06		Unknown AT command mode
07		Set baud rate fail
C1	Connection mode	Not connect to peer device
C2		Illegal master



A1	Broadcast mode	Header error
A2		Broadcast packet is too long
A3		Broadcast packet is null
A4		This features was not supported in broadcaster role
A5		This features was not supported in Observer role

### 3.2 The Broadcast Mode Command

The module also supports few commands in broadcast mode. User can send this command and didn't need to enter the command mode. The prefix "+AD" must be included at the beginning of each command line, and the character <CR> is used to finish a command line.

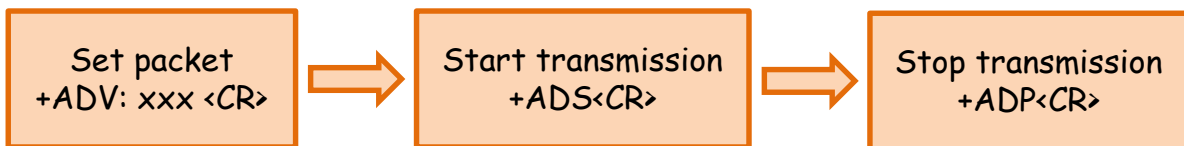


Figure 3-4. Start transmission in broadcast mode

#### 3.2.1 +ADV

##### (1) Description

This command was used to set the broadcast packet in the Broadcaster. The maximum length of the broadcast packet is 21 Bytes.

##### (2) Syntax

Execution Command	Response
+ADV:<packet><CR>	OK<CR><LF> Error: A1<CR><LF> (refer to 3.1.21) Error: A2<CR><LF> (refer to 3.1.21) Error: A5<CR><LF> (refer to 3.1.21)

(3) Parameter

< packet >	The broadcast packet Length: 21 Bytes
------------	--

(4) Example

```
+ADV:ABCDE<CR>
```

```
OK<CR><LF>
```

```
+ADV:012345678901234567890<CR>
```

```
OK<CR><LF>
```

```
+ADV:01234567890123456789ABCD<CR>
```

```
Error: A2<CR><LF> (refer to 3.1.21)
```

```
+ADV:012345<CR>
```

```
Error: A5<CR><LF> (refer to 3.1.21)
```

```
+ADV012345<CR>
```

```
Error: A1<CR><LF> (refer to 3.1.21)
```

### 3.2.2+ADS

(1) Description

This command is used to enable broadcast packet transmission.

(2) Syntax

Execution Command	Response
+ADS<CR>	OK<CR><LF> Error: A1<CR><LF> (refer to 3.1.21) Error: A3<CR><LF> (refer to 3.1.21) Error: A5<CR><LF> (refer to 3.1.21)

---

(3) Example

+ADS<CR>

OK<CR><LF>

+ADS<CR>

Error: A1<CR><LF> (refer to [3.1.21](#))

+ADS<CR>

Error: A3<CR><LF> (refer to [3.1.21](#))

+ADS<CR>

Error: A5<CR><LF> (refer to [3.1.21](#))

### 3.2.3 +ADP

(1) Description

This command is used to stop broadcast packet transmission.

(2) Syntax

Execution Command	Response
+ADP<CR>	OK<CR><LF> Error: A1<CR><LF> (refer to <a href="#">3.1.21</a> ) Error: A5<CR><LF> (refer to <a href="#">3.1.21</a> )

(3) Example

+ADP<CR>

OK<CR><LF>

+ADP<CR>

Error: A1<CR><LF> (refer to [3.1.21](#))

+ADP<CR>

---

---

Error: A5<CR><LF> (refer to 3.1.21)

### 3.2.4+ADR

#### (1) Description

This command can show the RSSI of Broadcaster when the module was the Observer.

#### (2) Syntax

Execution Command	Response
+ADR<CR>	+ADR: <mac address>,<RSSI> OK<CR><LF> Error: A1<CR><LF> (refer to 3.1.21) Error: A4<CR><LF> (refer to 3.1.21)

#### (3) Parameter

< mac address >	The mac address of peer device Range: 000DE06D0000 ~ 000DE06DFFFF Length: 6 Bytes
< RSSI >	The RSSI of Broadcaster

#### (4) Example

+ADR<CR>

+ADR: 000DE06D0001,-051<CR><LF>

+ADR<CR>

+ADR: 000DE06D0001,-051<CR><LF>

+ADR: 000DE06D0002,-060<CR><LF>

+ADR<CR>

Error: A1<CR><LF> (refer to 3.1.21)

+ADR<CR>

Error: A4<CR><LF> (refer to 3.1.21)

## 4. Configuration Utility

The tBLE-720/BLEUSB utility had four functions. It can load the configuration, write the configuration, update the firmware and test the module.

### 4.1 Main Window of tBLE-720/BLE-USB Utility

User can load the configuration in the main page. First, it need select the COM port and baud rate. Second, it need press “Open Port” button, and the utility would automatically load the configuration. If load configuration was success, and the result was shown in Figure 4-1. If load configuration was fail, and the result was shown in Figure 4-2.

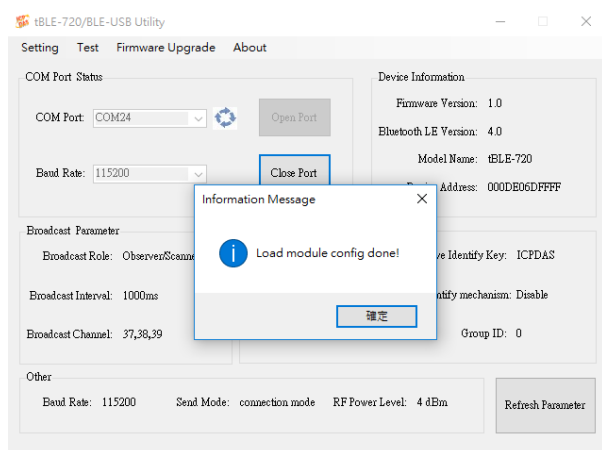


Figure 4-1. load success

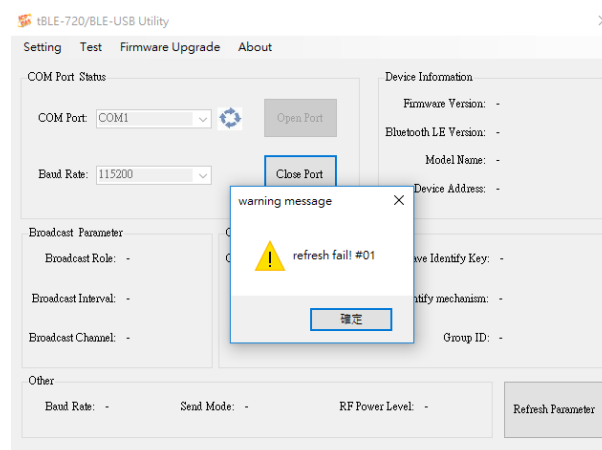


Figure 4-2. load fail

### 4.2 Set Configuration on Utility

The setting page was shown in Figure 4-3. The “Basic Parameter Setting” page can set up the configuration. The “Recovery Factory Setting” can recovery module to factory setting.

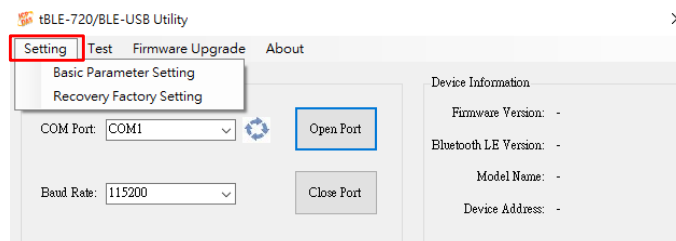


Figure 4-3. Setting configuration page

---

## 4.2.1 Basic Parameter Setting Page

The basic parameter setting page was shown in the Figure 4-4. The basic parameter setting had 6 steps. User can load the configuration in the step 1. The configuration can save in the step6. The “Next” button can go into next step. The “Previous” button can go back to previous step.

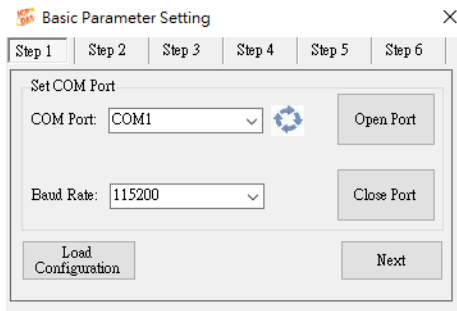


Figure 4-4. Basic parameter setting

### ■ Step1

The step 1 was established serial wire connection between tBLE-720 and host PC. If the COM port already opened in the main page, the COM port will automatically open when you enter this page. If the configuration was saved in the step 6, you could load the configuration by “Load Configuration” button. The filename extension of configuration is \*.txt. The Figure 4-5 is a warning message when the COM port opens fail. Please check the COM port number and baud rate is correct.

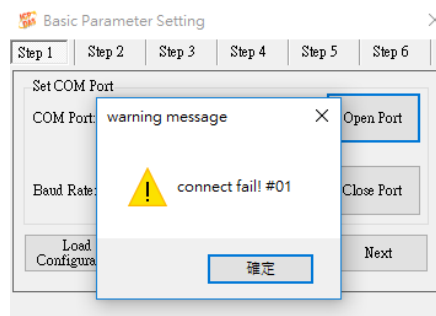


Figure 4-5. Open COM port fail

### ■ Step2 ~ 5

User can select different parameters in the step2 to step5. When the configuration was selected, you could click the “Next” button. The “Next” button will be switching to next step. You also can use the “Previous” button, and it will back to the previous step. All of

---

the configurations will upload to the module in the step6.

## ■ Step2

The Step 2 can change broadcast parameter.

- Broadcast role: the broadcast role only can change by the DIP switch (refer to 2.2.2).
- Broadcast channel: change the broadcast channel when the module was in the broadcast mode (refer to 3.1.6).
- Broadcast Interval: how often to send a broadcast packet

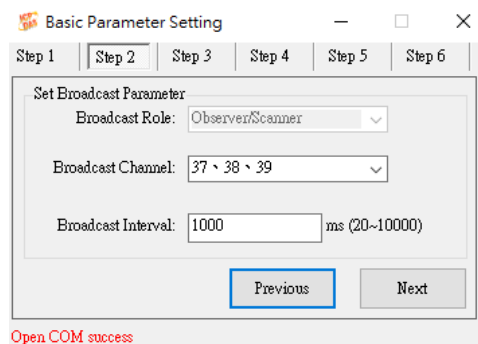


Figure 4-6. Broadcast parameter setting

## ■ Step 3

The step 3 can change the connection parameter.

- Connection role: the connection role only can change by the DIP switch (refer to 2.2.2)
- Peer amount: Maximum amount of slave (refer to 3.1.12)
- Slave device number: the device name of slave when slave is advertising.(refer to 3.1.14)
- Group ID: the ID of connection group (refer to 3.1.15).

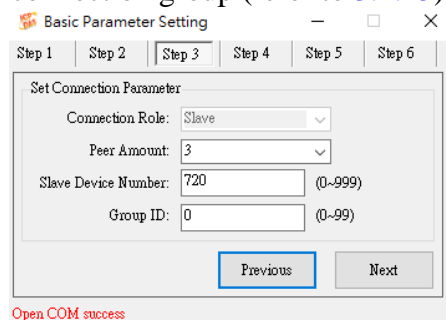


Figure 4-7. Connection parameter setting

## ■ Step4

The step 4 is used to change the Master identify mechanism.

- Enable Master Identify Mechanism: Enable or disable Master identify mechanism (refer to 1.6 and 3.1.19).
- Identify Key: Set the identification packet (refer to 1.6 and 3.1.20).

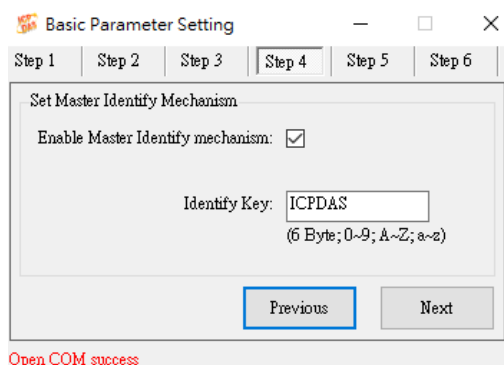


Figure 4-8. Master identify mechanism setting

## ■ Step5

The step 5 can change the baud rate, send mode and RF power.

- Baud rate: the baud rate only can change by the rotary switch (refer to 2.2.2).
- Send Mode: the transmission mode only can change by the DIP switch (refer to 2.2.2).
- RF power level: the RF power level (refer to 3.1.16).

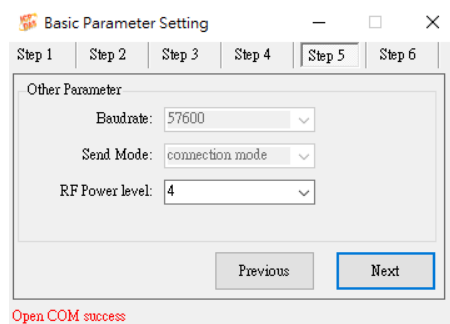


Figure 4-9. Other parameter setting

## ■ Step6

The step 6 is final step in the basic parameter setting page. You can save the configuration



by “Save Configuration” button, but it need select a store path before you click “Save Configuration” button. Please click the “Upload Setting” to upload the configuration into the tBLE-720. The utility will show an information message after the configuration was done. The tBLE-720 will automatically restart by itself after the configuration uploaded complete. The utility will show an error message that the configuration had uploaded fail. Please re-power on the tBLE-720, and back to the step 1.

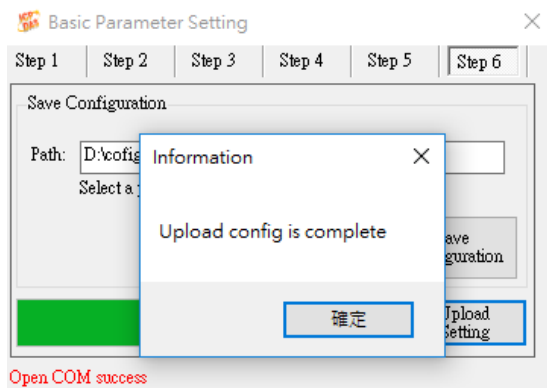


Figure 4-10. Upload complete

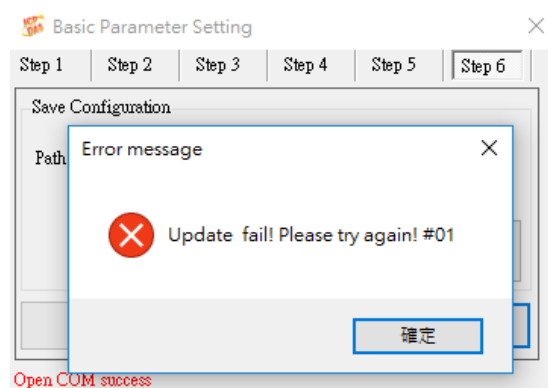


Figure 4-11. Upload fail

#### 4.2.2 Recovery Factory Setting Page

The “Recovery Factory Setting” Page can recovery module to factory setting. First, Please click “Open Port” button to make a serial connection between tBLE-720 and host PC. Second, Please click the “Recovery” button to start recovery process, and the utility will show a message after recovery process is complete. If the recovery process is fail, tBLE-720 need re-power and do it again.

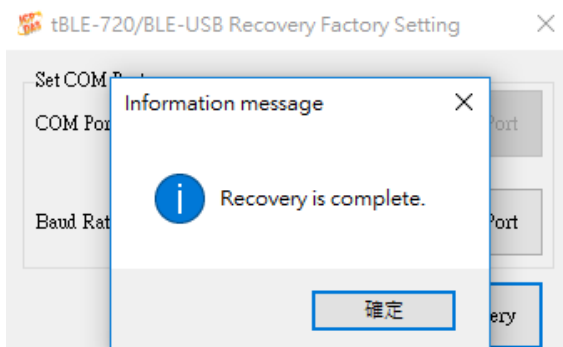


Figure 4-12. Recovery success

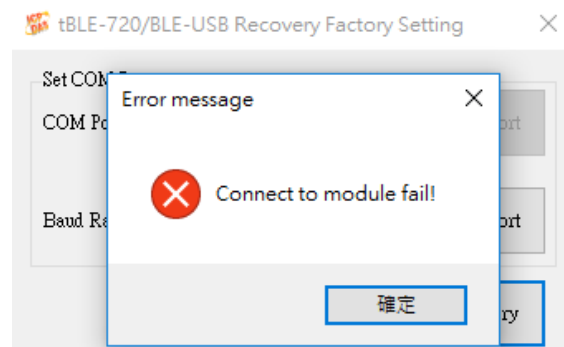


Figure 4-13. Recovery fail

### 4.3 Test Module on Utility

The module test page was shown in the Figure 4-14. The utility supports two types for the module test. The “connection Mode” is used to test module in the connection mode (refer to 1.3.2). The “Broadcast Mode” is used to test the module in the broadcast mode (refer to 1.3.1)

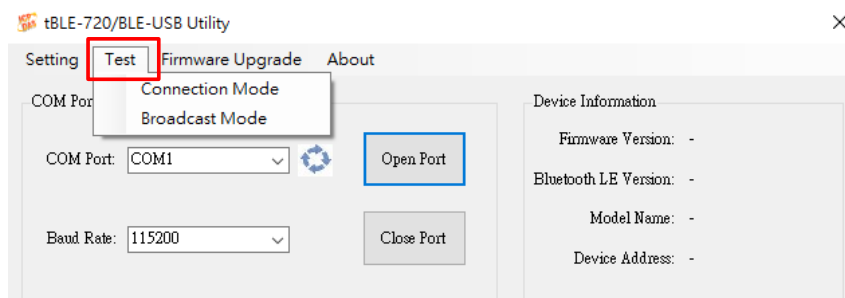


Figure 4-14. Module test page

#### 4.3.1 Connection Mode

The main page of connection mode was shown in the Figure 4-15. This page can send or receive data from peer device in connection mode. It also can load the configuration from the module.

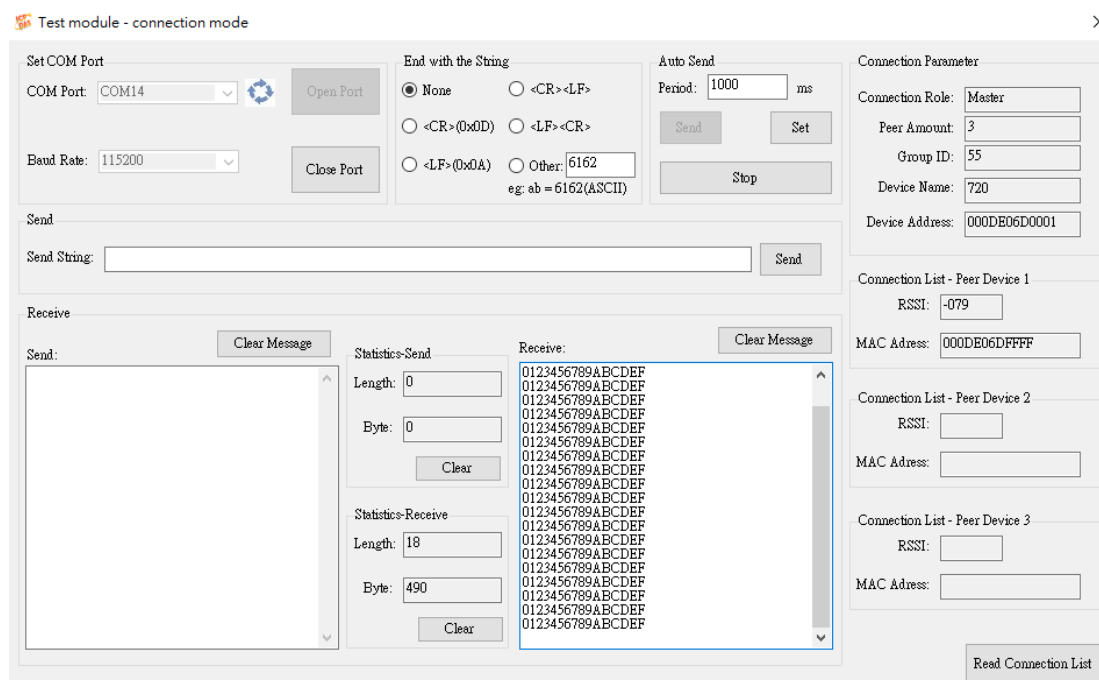


Figure 4-15. Main page of connection mode

---

- Open the COM port

It needs to make a serial connection between tBLE-720 and host PC. The utility will check the transmission mode after you click the “Open Port” button. If the module wasn’t in the connection mode, the warning message would be shown after you clicked the “Open Port” button. User need switch module to the connection mode (refer to 4.2). If the serial port setting was incorrect, the error would be shown after you clicked the “Open Port” button. Please check the serial setting is correct, and re-open COM port again.

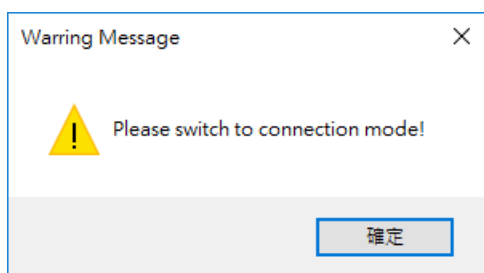


Figure 4-16. Warring message

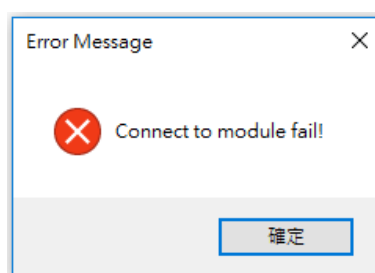


Figure 4-17. Error message

- Send data to peer device

You can type data in the textbox and click the “Send” button. The data of textbox will send to the peer device. This data will also show print to the textbox.

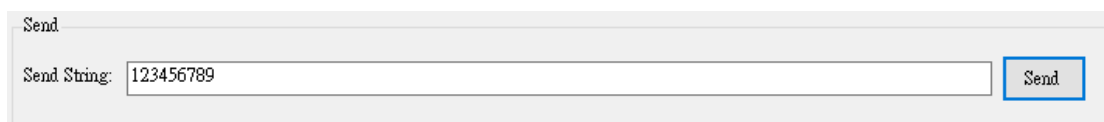


Figure 4-18. Textbox and Send button

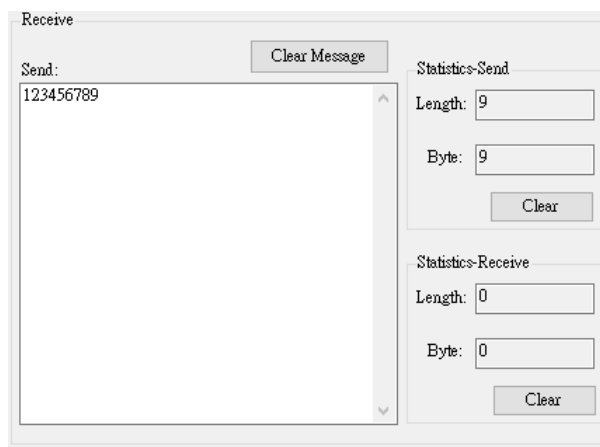


Figure 4-19. Print to the textbox

---

- End with the String

It will add into the end of the string. You can select the types you want to add into the end of the string.

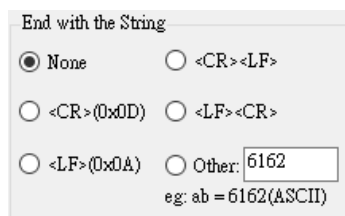


Figure 4-20. End with the String

- Auto Send

This feature will send the message automatically. First, it need set the time interval in the textbox. Second, please click “Set” button and the “Send” button will be enable. Third, please click “Send” button to start transmission the packet.

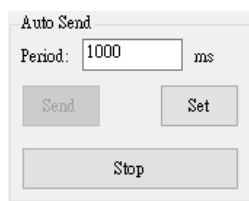


Figure 4-21. Auto send

- Receive Data

When the module was received data from the peer device. It will print the data to the textbox.

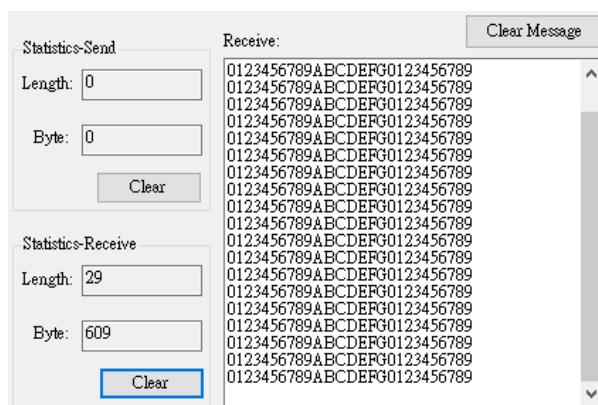


Figure 4-22. Receive data

## ■ Module Configuration

The utility will load the module configuration when the “Open Port” had clicked. It will print the connection role, peer amount, group ID, device name and address to the textbox. In addition, you can click the “Read Connection List” button; it will show the status of connection.

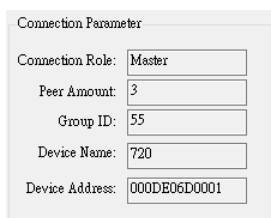


Figure 4-23. Module Configuration



Figure 4-24. Read button



Figure 4-25. Status of connection

## 4.3.2 Broadcast Mode

The main page of broadcast mode was shown in the Figure 4-26. This page can send or receive data from peer device in broadcast mode. It also can load the configuration from the module.

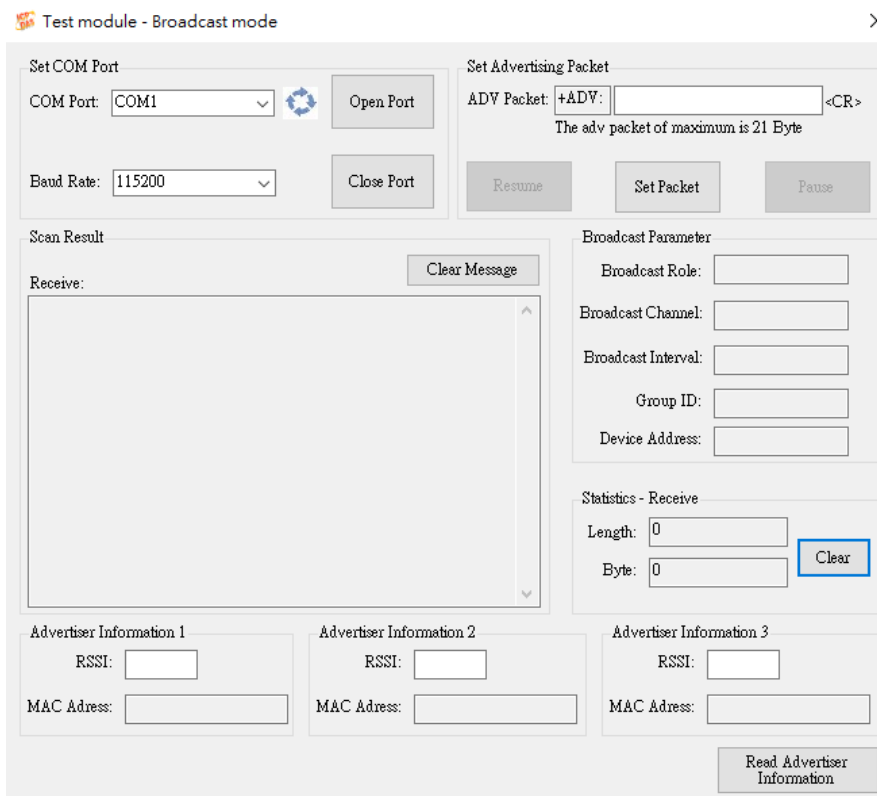


Figure 4-26. Main page of broadcast mode

---

- Open the COM port

It needs to make a serial connection between tBLE-720 and host PC. The utility will check the broadcast mode after you click the “Open Port” button. If the module wasn’t in the broadcast mode, the warning message would be shown after you clicked the “Open Port” button. User need switch module to the broadcast mode (refer to 4.2). If the serial port setting was incorrect, the error would be shown after you clicked the “Open Port” button. Please check the serial setting is correct, and re-open COM port again.

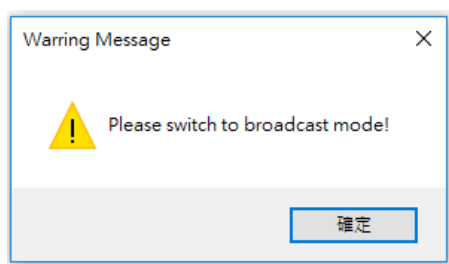


Figure 4-27. Warning message

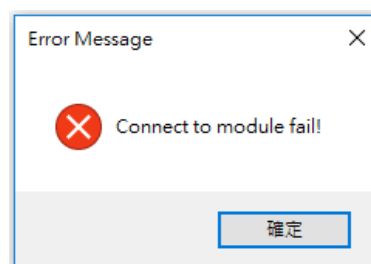


Figure 4-28. Error message

- Send data to peer device

Only the Broadcast can send the packet to the peer device. This feature will disable when the module is the Observer. You need to set the packet in the textbox and click the “Set Packet” button to send the packet. It will appear an information message after you click the button, and then the Broadcast will start sending the packet with timer interval. You also can pause or resume the packet.

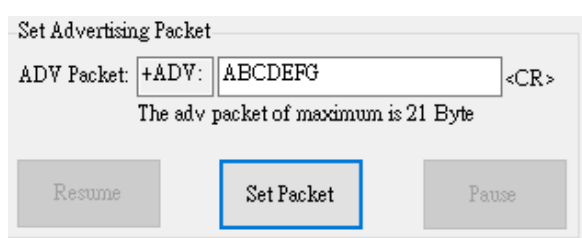


Figure 4-29. Set the packet

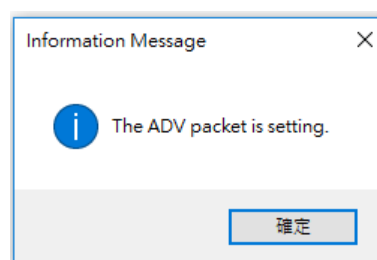
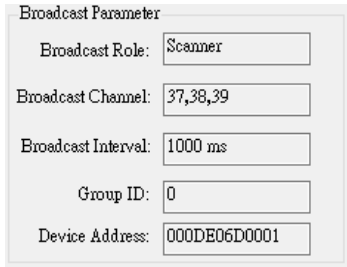


Figure 4-30. Information message

- Module Configuration

The utility will load the module configuration when the “Open Port” had clicked. It will print the broadcast role, broadcast channel, broadcast interval, group ID and address to the textbox. In addition, you can click the “Read Advertiser Information” button; it will show the status of peer device.



Broadcast Parameter

Broadcast Role:

Broadcast Channel:

Broadcast Interval:

Group ID:

Device Address:

Figure 4-31. Module Configuration

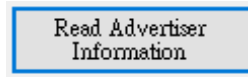
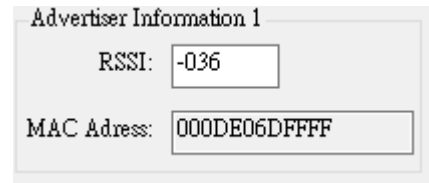


Figure 4-32. Read button



Advertiser Information 1

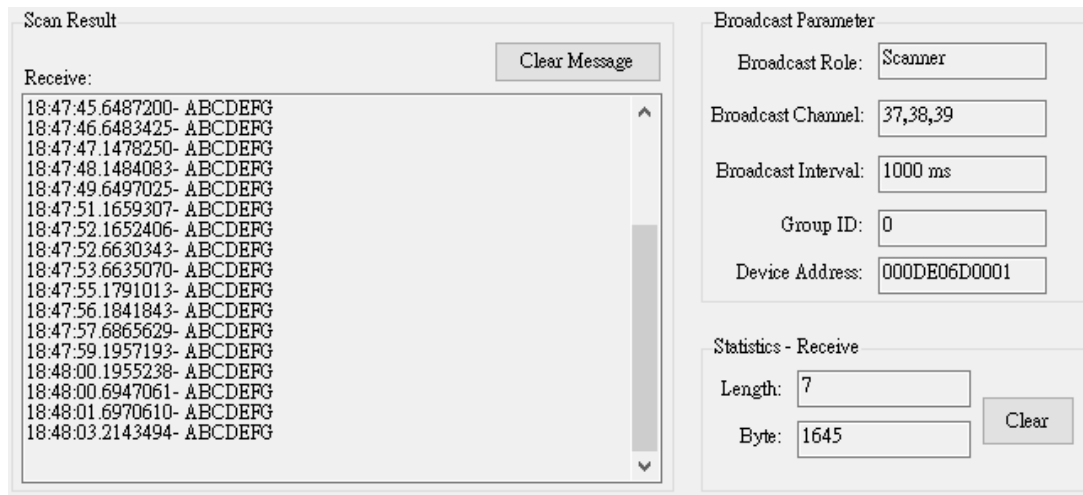
RSSI:

MAC Address:

Figure 4-33. status of peer device

## Receive Data

When the module was received data from the Broadcaster. It will print the data to the textbox.



Scan Result

Receive:

```

18:47:45.6487200- ABCDEF
18:47:46.6483425- ABCDEF
18:47:47.1478250- ABCDEF
18:47:48.1484083- ABCDEF
18:47:49.6497025- ABCDEF
18:47:51.1659307- ABCDEF
18:47:52.1652406- ABCDEF
18:47:52.6630343- ABCDEF
18:47:53.6635070- ABCDEF
18:47:55.1791013- ABCDEF
18:47:56.1841843- ABCDEF
18:47:57.6865629- ABCDEF
18:47:59.1957193- ABCDEF
18:48:00.1955238- ABCDEF
18:48:00.6947061- ABCDEF
18:48:01.6970610- ABCDEF
18:48:03.2143494- ABCDEF

```

Clear Message

Broadcast Parameter

Broadcast Role:

Broadcast Channel:

Broadcast Interval:

Group ID:

Device Address:

Statistics - Receive

Length:

Byte:

Clear

Figure 4-34. Receive data

## 4.4 Firmware Upgrade on Utility

The utility support two types for firmware upgrade. One is general, and the other is OTA upgrade. The general upgrade is used to upload the firmware by RS-232/422/485 interface. The OTA firmware upgrade need Bluetooth interface in your computer.

### 4.4.1 OTA Upgrade

The OTA firmware upgrade need Bluetooth interface in your computer. The Bluetooth interface must be compiling with the Bluetooth 4.0 standards. If you don't have Bluetooth interface in your computer, you need to buy a [BLE USB dongle](#). Users just need to execute "Firmware Upgrade" and follow the below steps to complete the firmware upgrade process.

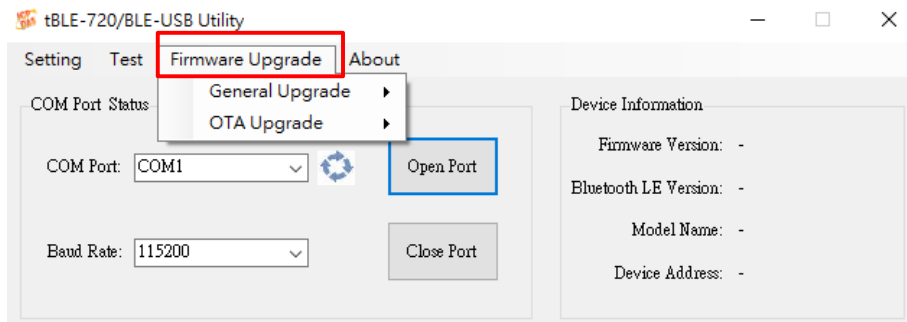


Figure 4-35. Firmware upgrade page

- Disable the Master identification mechanism

You need to disable the Master identification mechanism (refer to 3.1.19). The Master identification mechanism can be disabled by utility (refer to 4.2.1) or AT command.

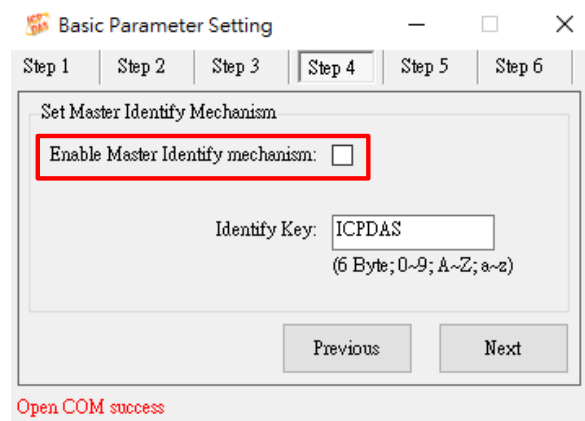


Figure 4-36. Disable Master Identification mechanism by utility

- Switch tBLE-720 to connection mode and Slave

The OTA only works when the tBLE-720 is the Slave in the connection mode. You can use the dip switch (refer to 2.2.2) to change the role and transmission mode.



Figure 4-37. change the role and transmission mode



■ Connect the tBLE-720 by your computer

You need to connect the tBLE-720 by your Bluetooth interface on your computer. The device name is tBLE-XXX. The “XXX” can change by AT command (refer to 3.1.14) or the utility (refer to 4.2.1). If the Bluetooth interface didn't scan any device, please re-power the tBLE-720. Ensure your device is advertising so the PC can find it.



Figure 4-38. Connect tBLE-720 with Windows 10

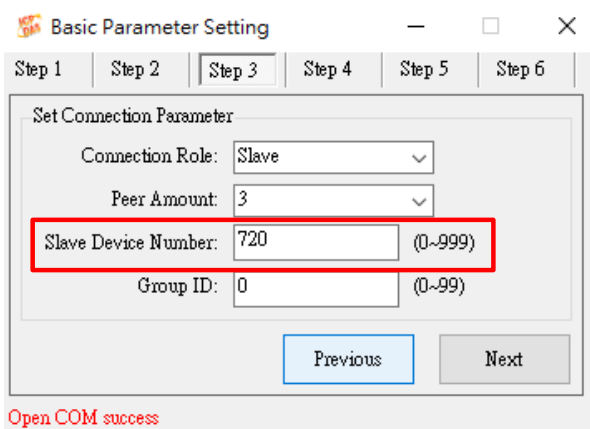


Figure 4-39. Change slave device number by utility

■ Upgrade the firmware

Step 1: Open the OTA firmware upgrade page

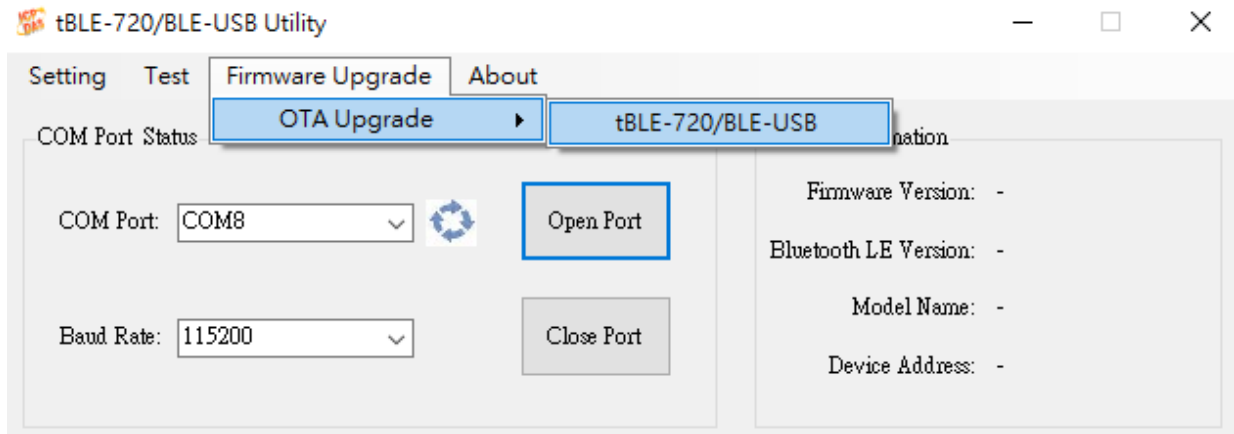


Figure 4-40. Open the firmware upgrade page

Step 2: check the OTA step, and click “OK” button.

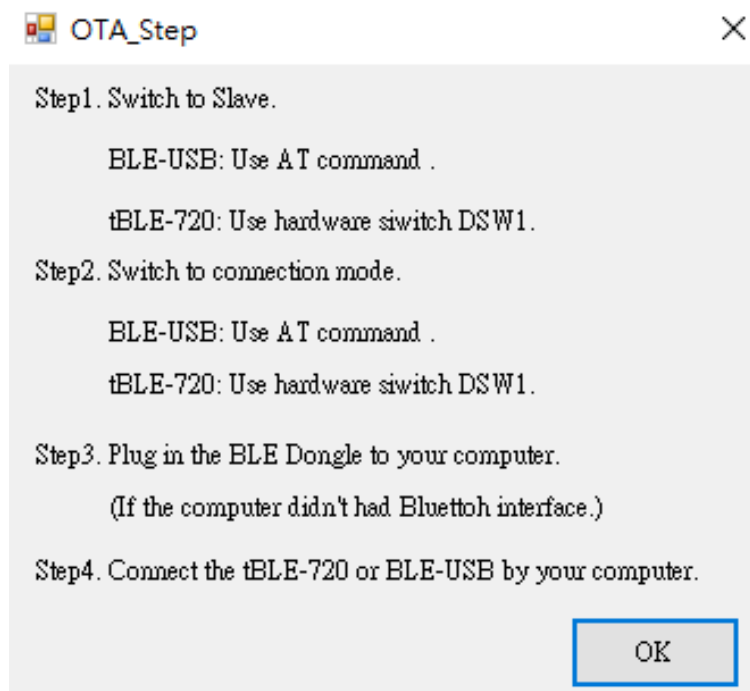


Figure 4-41. OTA step

Step 3: Click the “Open” button. Select the firmware path. The filename extension of firmware is \*.signed.

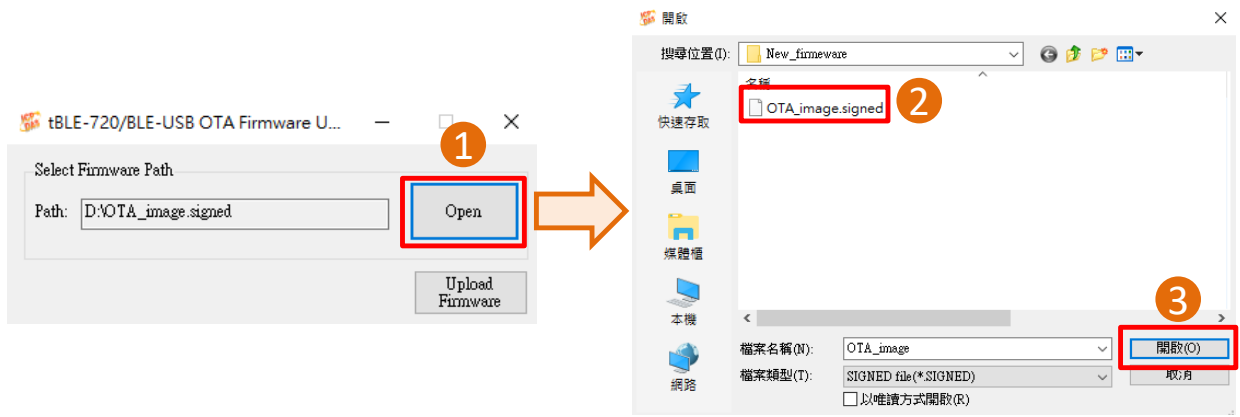


Figure 4-42. Select firmware path

Step 4: Click the “Upload Firmware” button. The OTA program will be opening after click the “Upload Firmware” button.

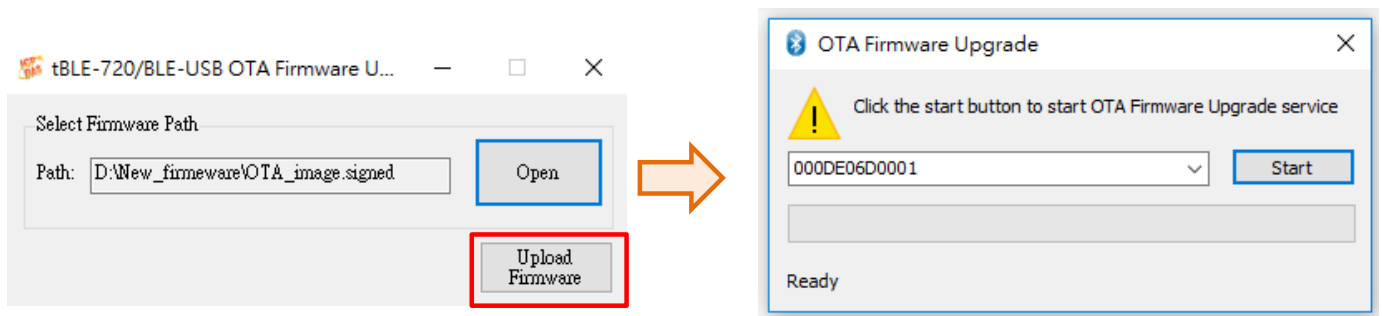


Figure 4-43. Click the “Upload Firmware”

Step 5: Choose the device address. You can use the AT command (refer to 3.1.11) to make sure the device address.

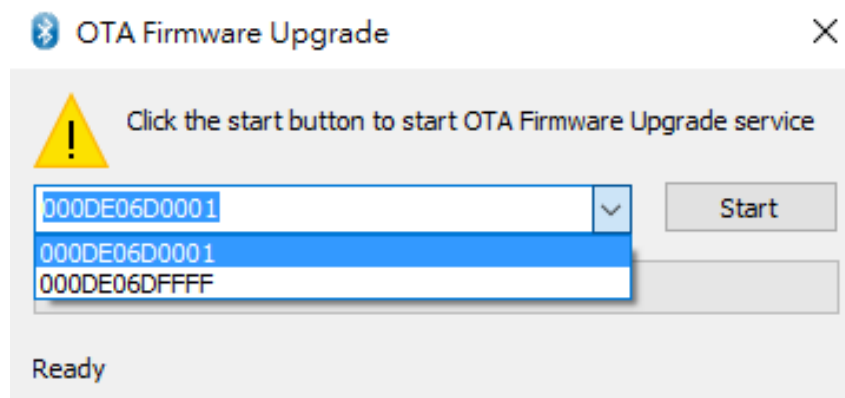


Figure 4-44. Select device address

Step 6. The OTA firmware upgrade will be start after click the “Start” button.

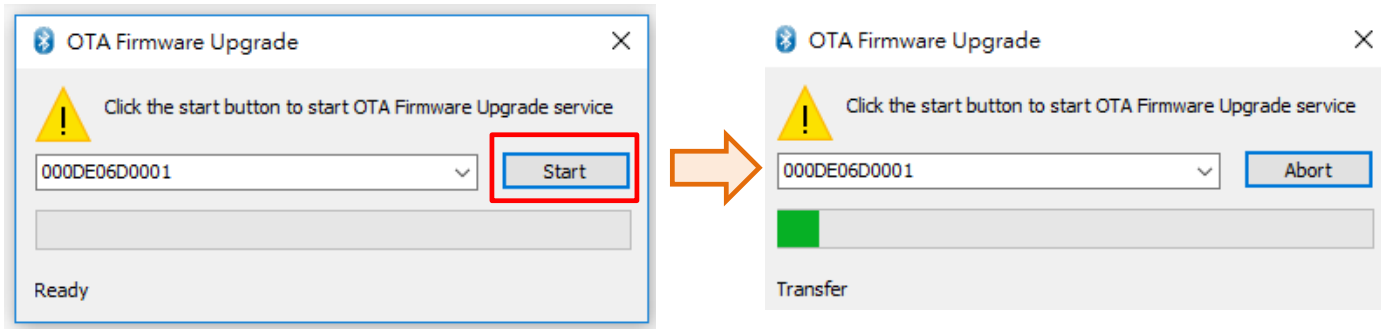


Figure 4-45. Click the “Start” button

Step 7. Click the “Done” button

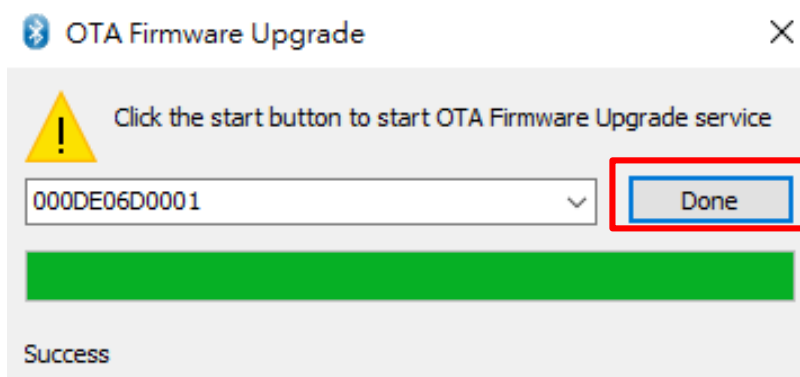


Figure 4-46. Click the “Done” button

## 5. Technical support

Please contact us if you have any questions about products.

ICP DAS website: <http://www.icpdas.com>

Email: [service@icpdas.com](mailto:service@icpdas.com)