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Bluetooth UART Transparent Module

BT01CL

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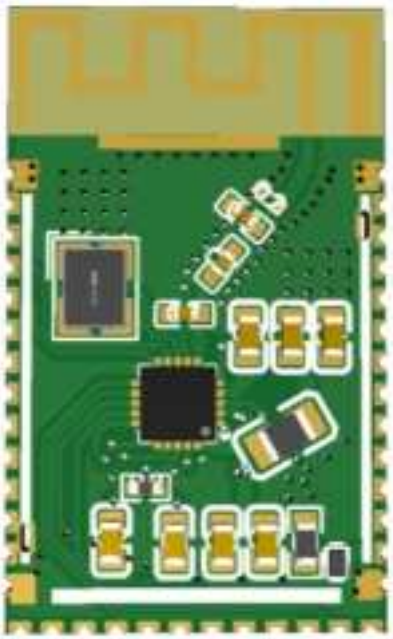
CONTENTS

Chapter 1. Product Overview

The BT01CL is a BLE 5.4 Slave Bluetooth UART Transparent Module developed by Ningbo Youwon. It enables communication with various serial port devices using specified communication protocols.

The BT01CL operates as a slave device by default. A master device (e.g., smartphone, host module) can actively establish a connection with it after scanning, requiring no user intervention during the pairing process. Once connected, users can treat it as a standard serial port device to transmit data directly to the module. The module automatically encapsulates the data into Bluetooth protocol packets and sends them to the master device. The master device simply receives the data via its serial interface.



1.1 Product Features

1. The module is based on BLE 5.4, offering faster transmission speed and longer communication range.
2. Industrial-grade, highly integrated design ensures higher performance, lower cost, and superior cost-effectiveness, supporting operation in -40°C to 85°C environments.
3. Low power consumption and long-range communication capabilities, achieving up to 150 meters under ideal conditions.;
4. Maximum transmit power of 8 dBm and operating voltage range of 1.8V–5.5V.
5. Supports customizable broadcast data configuration
6. Compact and universal form factor, adaptable to diverse application scenarios.

1.2 Key Application Scenarios

1. Smartwatches/Fitness Trackers, Hearing Aids/Health-Monitoring Earphones
2. In-Car Bluetooth Audio Systems, Cycling Helmets/Safety Devices
3. Voice-Controlled Devices, Wireless Microphones/Conference Systems
4. Translation Pens/Electronic Dictionaries, Wireless Office Headsets, Portable Bluetooth Speakers
5. Smart Sockets, Smart Lighting, Smart Locks
6. Wireless Fieldbus Systems, Wireless Conference Voting Systems
7. Sensor Applications (e.g., Temperature/Humidity, Pressure), Smart Agriculture, Smart Cities, and Future Smart Technologies.

Chapter 2. key technical indicators

2.1 key technical indicatorsare illustrated in *Table 1*

key technical indicatorsare		feature			notes
		min	type	max	
operating voltage（V）		1.8	3.3	4.5	
operating band（MHz）		2402-2480			
power consumption	RF Transmit Power（dBm）	-0.06			Different powers correspond to different distances
	Maximum transmission current（mA）	-	2.4	-	instantaneous power consumption
	maximum receiving current（mA）	-	1.9	-	
operating temperature（℃）		-40	-	85	
receiver sensitivity（dBm）		-	-95	-	
Baud rate(bps)		115200			
communication interface		UART			-
modulation mode		FSK			
antenna		onboard antenna			
maximum communication distance（m）		150			
size（mm）		25.16*15.22			length * width
interface spacing（mm）		1.27			-

Table 1

Chapter 3. Interface and Size Description

3.1 The module dimensions are shown in *Figure 3-1*.

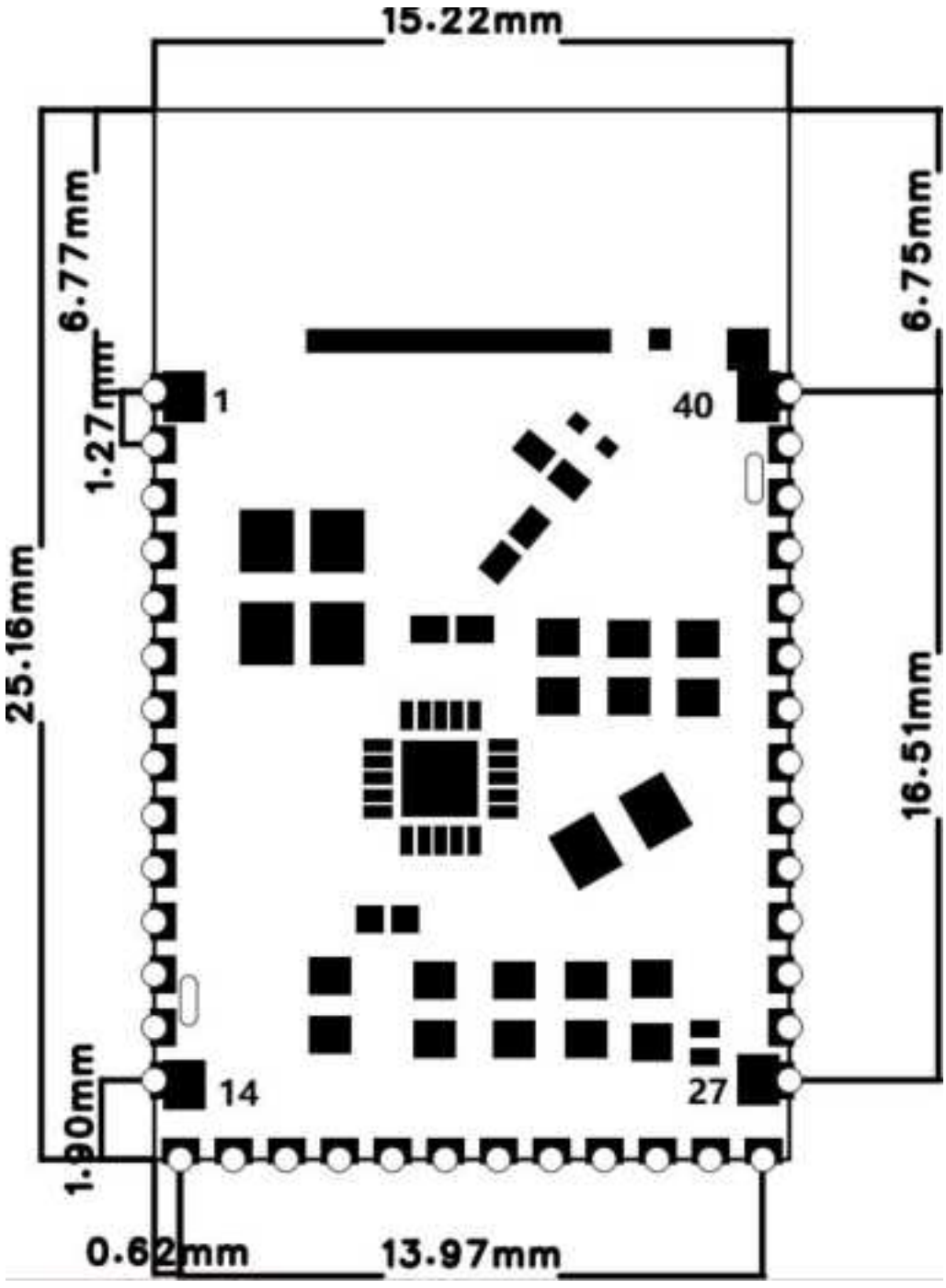


Figure 3-1

3.2 Module Interface Description

The definitions of each pin of the module are shown in *Table 2*

No	Pin-Name	pin direction	Function
1	GND	-	GND
2	SEL0	INPUT	Mode selection pin, can be connected to low level
3	SEL1	INPUT	Mode selection pin, can be connected to low level
4	RXD0	INPUT	USART RX
5	TXD0	OUTPUT	USART TX
6	WAKEUP	INPUT	Low-level wake-up module
7	INT	OUTPUT	Interrupt output pin
8	NC	-	
9	BleState	OUTPUT	Bluetooth connection indicator light
10-13	NC	-	
14	GND	-	GND
15	NC	-	
16	RXD1	INPUT	USART RX
17-20	NC	-	

21	TXD1	OUTPUT	USART TX
22-26	NC		
27	GND	-	GND
28	NC		
29	VCC	INPUT	VCC
30	GND	-	GND
31	REST	INPUT	Hardware reset pin
32-39	NC		
40	GND	-	GND

Table 2

Chapter 4. interface rate setting

4.1 The module's factory default parameters are shown in *Table 3*.

module model	Transmit Power	frequency	rate
ZFB0-BT01CL	-0.06dBm	2402-2480MHz	1Mbps

Table 3

Chapter 5. AT Command

5.1 AT command instructions

5.1.1 check command

sned：AT+[CMD]=?\r\n

check successful：AT+OK\r\n[DATA]

check failed：ERR:[err_code]\r\n

5.1.2 set command

send：AT+[CMD]=[DATA]\r\n

set successful：AT+OK

Set failed：ERR:[err_code]\r\n

5.2 command list

No	Command	Notes	example
1	GVER	Retrieve the software version number	S:AT+GVER=? R:AT+OK R:BTO1CL-V1.01 _
2	DEVID	Retrieve the device's MAC address	S:AT+DEVID=? R:AT+OK R:DE70057B1312
3	NAME	Retrieve the device's name	S:AT+NAME=? R:AT+OK R:BTO1CL#7B1312
4		Modify the device	S:AT+NAME=ZFBLE_TRANS_TEST

		name	R:AT+OK
5	BAUD	Retrieve the device's baud rate	S:AT+BAUD=? R:AT+OK R:115200
6		Modify the device's baud rate	S:AT+BAUD=9600 R:AT+OK
7	TX	Retrieve the current transmission power	S:AT+TX=? R:AT+OK R:0
8		Modify the current transmission power	S:AT+TX=0 R:AT+OK
9	ADV	Retrieve the current ADV status	S:AT+ADV=? R:AT+OK R:1
10		Modify the current ADV status	S:AT+ADV=0 R:AT+OK
11	ADVPARAM	Retrieve the current ADV interval	S:AT+ADVPARAM=? R:AT+OK R:32 note：The broadcast interval unit is 0.625ms
12		Modify the current ADV interval	S:AT+ADVPARAM=50 R:AT+OK
13	DISC	disconnect	S:AT+DIS=[CH] note: CH=[8]->slave channel CH=[0-2]->master channel

			R:AT+OK
14	AT>	Change channel	S:AT>[CH] R:AT+OK
15	POWEROFF	The module enter soft power-off	S:AT+POWEROFF R:AT+OK
respond to the command			
16	IM_READY	Initialization successful	R:IM_READY
17	CON	Connected	R:AT+CON=SUCCESS
18		Disconnected	R:AT+CON=STOP

Chapter 6. Antenna description

The ZFBO-BT01CL module uses an onboard antenna, so users do not need to pair it with an additional antenna.

Chapter 7. Module Basic Circuitry and Common Issues

7.1 The basic application circuit is shown in *Figure 7-1.*

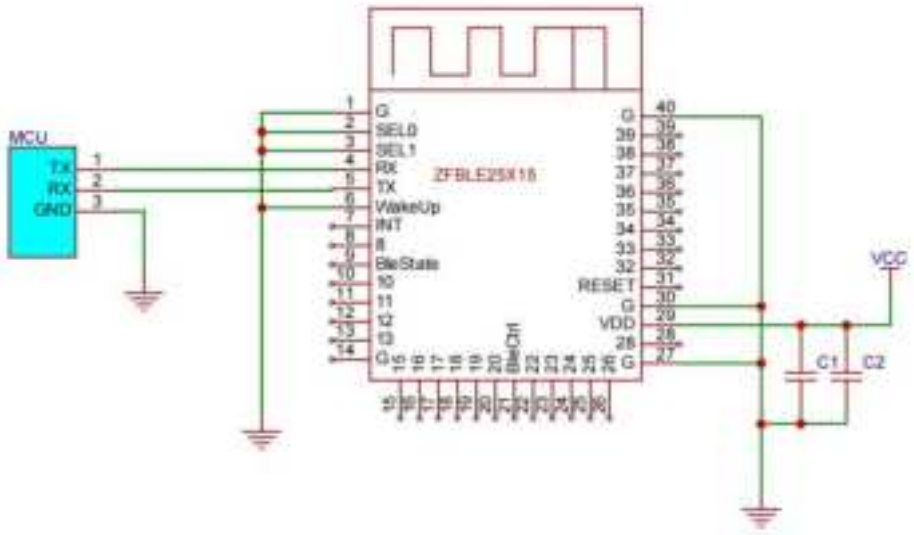


Figure 7-1

7.2 Common Issues

1. At room temperature, if the power supply voltage is lower than the recommended value, the transmission power will decrease as the voltage drops.

2. If there are metal objects near the antenna or if it is placed inside a metal enclosure, signal attenuation will be severe.

3. When there are obstacles in the direct line of communication, the communication distance will be reduced accordingly.

4. Temperature, humidity, and co-channel interference can lead to an increase in packet loss rate during communication.

5. Radio waves are absorbed and reflected by the ground, resulting in poorer test performance when testing close to the ground.

6. Seawater has a strong ability to absorb radio waves, leading to poor test performance near the seashore.

7. Errors in setting the power register or an excessively high air data rate (the higher the air data rate, the shorter the communication distance) can also cause issues

Chapter 8. Precautions

8.1 Precautions

1、Power Supply Selection

The positive and negative poles of the power supply must be correctly connected. Reverse connection may cause permanent damage to the module. It is recommended to use a DC regulated power supply for powering the module, with minimal power supply ripple factor. The module must be reliably grounded, and the power supply voltage should be maintained within the recommended range without significant or frequent fluctuations. Exceeding the maximum voltage value may cause permanent damage to the module.

2、Precautions for Secondary Development

During secondary development, attention should be paid to the routing method. For example, high-frequency digital routing, high-frequency analog routing, and power supply routing must avoid passing beneath the module. If it is necessary to pass beneath the module, the part of the module soldered on the Top Layer in contact should be covered with ground copper (fully covered with copper and properly grounded), and the digital part near the module should be routed on the Bottom Layer. If the module is soldered or placed on the Top Layer, it is incorrect to route randomly on the Bottom Layer or other layers, as this will affect the module's stray parameters and receive sensitivity to varying degrees.

Furthermore, routing with significant electromagnetic interference (such as high-frequency digital, high-frequency analog, and power supply routing) around the module can greatly affect the module's performance. Depending on the intensity of the interference, it is recommended to keep an appropriate distance from the module or, if possible, implement appropriate isolation and shielding.

Chapter 9. Packaging and Transportation Instructions

The standard accompanying list for the module includes: one ZFB0-BT01CL module.

Each module is packaged and sealed in an electrostatic bag, providing electrostatic protection as well as safeguarding the components from direct impact by external forces. The module and antenna are packaged separately and then boxed together.

Chapter 10. Technical Support and After-Sales Service

The company provides free technical support to customers during the usage and secondary development processes. Additionally, we offer a one-year warranty and lifetime maintenance as part of our after-sales service.

To meet diverse customer requirements in terms of structure, the company can also specially design products with smaller sizes or different shapes for customers. Furthermore, we can develop communication protocols tailored to specific scenarios based on customer needs.

The company is capable of custom-developing entirely new products that meet customer requirements according to their technical specifications.

Chapter 11. FCC Requirement

changes or modifications not expressly approved by the party responsible for compliance could void the user′ s authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

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Please notice that if the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: “Contains FCC ID:XXXXXX” any similar wording that expresses the same meaning may be used.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled

environment. This equipment should be installed and operated with a minimum distance of 20cm

between the radiator & your body. This transmitter must not be co-located or operating in

conjunction with any other antenna or transmitter.