FLUKE TTBLE LE Bluetooth Module Instruction Manual

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FLUKE TTBLE LE Bluetooth Module

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- **Features**
  - **The FLUKE-TTBLE Module has the following features:**
    - On-board Ceramic Antenna
    - On-board Shield
    - Internal supply regulator
    - Internal 32MHz Crystal

Fluke-TTBLE Package and Pin Definition

No.	Name	Type
1	GND	P
2	VCC	P
3	GPIO0	O
4	GPIO1	I
5	SLEEP	I
6	RELOAD/LED I/O	
7	RST#	I
8	RXD	I
9	TXD	O
10	DTR#/BLESTA/GP I/O IO4	
11	DSR#/GPIO6 I/O	
12	AT	I

Functional Specification

Host Mode

- In host mode, the module can be connected to the device after initialization without requiring scanning or other operations.

Slave Mode

- In slave mode, the module will transmit fixed broadcast data and support modifying the chip name in the scan

response data.

- The default broadcast interval is 100mS. The slave supports four basic
- BLE services, where the transparent transmission service UUID is 0xFFF0.
- The UUIDs of the communication are 0xFFF1, 0xFFF2, and 0xFFF3.

Serial Transparent Transmission Function

- When there is a lot of BLE data, it will wait to be sent.
- If it has entered the AT mode currently, the data received by the BLE will be directly discarded.
- It is recommended that the host make some speed restrictions when sending to reduce packet loss and buffer overflow.
- Because BLE communication rate is related to its environment, it is recommended to use CTS/RTS flow control to prevent buffer overflow when the serial baud rate exceeds 9600bit/s and average RSSI of BLE is less than -70dBm.

AT Commands

No.	Command
1	AT…
2	AT+RESET
3	AT+VER
4	AT+SHOW
5	AT+SAVE
6	AT+EXIT
7	AT+UART
8	AT+MAC
9	AT+TPL
10	AT+BLESTA
11	AT+BLEMODE
12	AT+CCADD
13	AT+NAME
14	AT+PNAME
15	AT+CONN
16	AT+SCAN
17	AT+CONADD
18	AT+CLRCONADD

Frequently Asked Questions (FAQ)

- **Q:** How can I connect the FLUKE-TTBLE Module in host mode?
- **A:** To connect the module in host mode, you can simply initialize it without requiring any scanning or other operations.
- **Q:** What services does the slave mode support?
- **A:** In slave mode, the module supports four basic BLE services, including transparent transmission service with UUID 0xFFF0, and communication services with UUIDs 0xFFF1, 0xFFF2, and 0xFFF3.
- **Q:** How should I handle buffer overflow when using the serial transparent transmission function?
- **A:** To prevent buffer overflow, it is recommended to use CTS/RTS flow control when the serial baud rate exceeds 9600bit/s and the average RSSI of BLE is less than -70dBm.

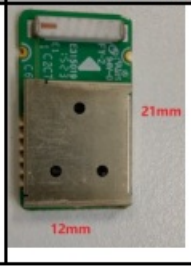
Introduction

- This document is intended to allow developers to work with the CH9141-based TTBLE Module.

Module Overview

- Fluke-TTBLE Module is developed based on CH9141 transparent transmission IC, which is a Module realizing bidirectional transparent transmission between Bluetooth low energy (BLE) and UART, Supporting broadcast mode, host mode and slave mode, BLE4.2.
- It supports serial AT configuration and BLE communication configuration in slave mode and MODEM contact signal.
- The baud rate of UART is up to 1Mbps. In the BLE slave mode, parameters such as BLE name and manufacturer information can be set, which can be easily configured through APP or serial port commands, which is convenient and fast.
- The virtual serial port driver on the computer is provided to directly use the serial port debugging tool for the BLE interface.
- It is compatible with the serial port application program, so it can communicate with the serial port without secondary development, easily realizing the exemption of wire plugging and not being limited by the cable distance.

The Module is listed as follows:

Module	Size and Package	Feature
Fluke-TTBLE		On-board Ceramic Antenna On-board Shield Internal supply regulator Internal 32MHz Crystal

Typical application block diagram

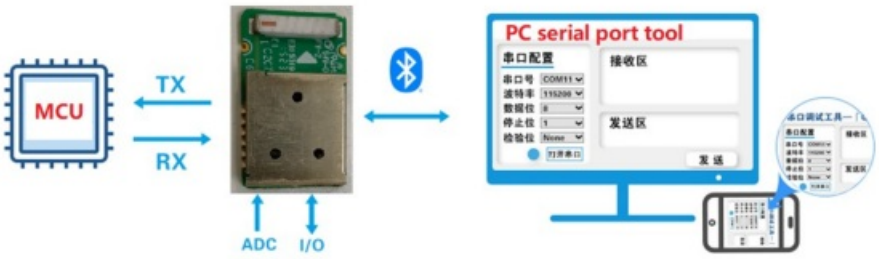


Figure1. PC/mobile communication with embedded MCU via TTBLE

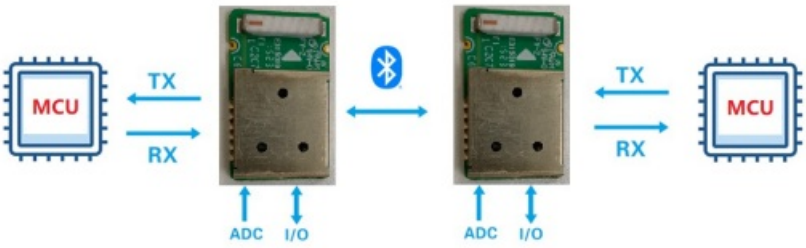
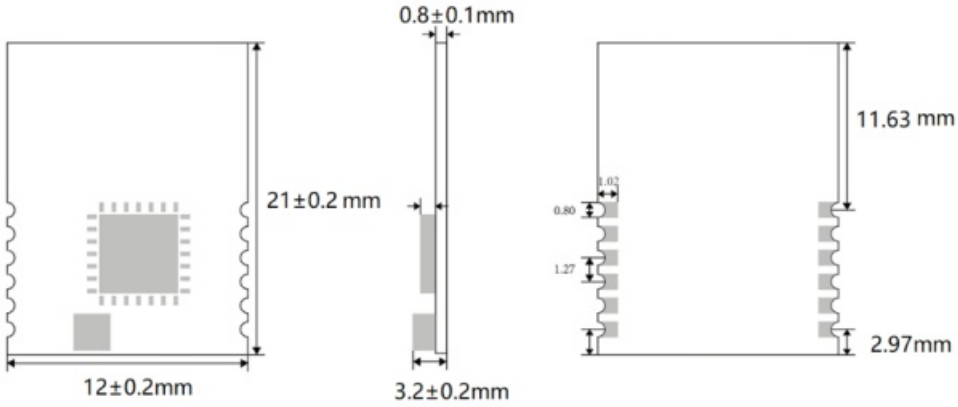


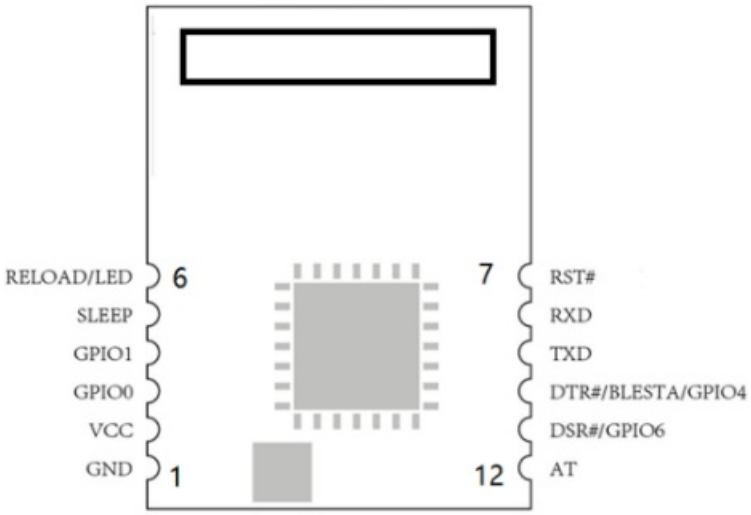
Figure2. Communication between embedded MCUs via TTBLE

Features

- Support broadcast mode, master mode and slave mode at BLE 4.2.
- Support serial port AT configuration and BLE transmission configuration.
- Provide computer-end BLE virtual serial port driver.
- Compatible with existing serial port software and tools, and no secondary development is required.
- Modulation Mode: GFSK
- Maximum transmission power: 0dBm
- Channel Band Width :2MHz
- The power-off sleep current is 0.3uA.
- Transmission distance: 50 m
- Adjustable 8 positions of transmission power.
- Support 3.3V to 5V operating voltage.
- Frequency range 2400MHz to 2483.5MHz
- The maximum communication baud rate is 1Mbps.
- Support obtaining the chip supply voltage parameters.
- Operation temperature: -20℃~60℃.

Fluke-TTBLE package and Pin definition


0.8±0.1mm
21±0.2 mm
12±0.2mm
3.2±0.2mm
11.63 mm
1.02
0.80
1.27
2.97mm


RELOAD/LED
SLEEP
GPIO1
GPIO0
VCC
GND
6
1
7
12
RST#
RXD
TXD
DTR#/BLESTA/GPIO4
DSR#/GPIO6
AT

No.	Name	Type	Pin definition
1	GND	P	Power GND
2	VCC	P	Power Supply In
3	GPIO0	O	Sync output IO
4	GPIO1	I	Sync input IO
5	SLEEP	I	Sleep Control, 0: Sleep, internal pullup
6	RELOAD/LED	I/O	RELOAD: Restore factory settings pin, active low LED: Chip status indicator signal output
7	RST#	I	Chip reset pin, active low.
8	RXD	I	Serial port receive pin
9	TXD	O	Serial port transmit pin
10	DTR#/BLESTA/ GP IO4	I/O	DTR#: MODEM output signal of UART, data terminal ready. BLESTA: B LE connection status output. GPIO4: General-purpose input and output.
11	DSR#/GPIO6	I/O	DSR#: MODEM input signal of UART, data device ready. GPIO6: General-purpose input and output.
12	AT	I	AT transparent transmission function switching pin 0: AT mode 1: Transparent transmission mode

Functional Specification

Host Mode

- The host mode only supports the TTBLE slave module of our company.
- This mode supports scan connection and direct MAC address connection.
- The device that scan echoes only displays the TTBLE slave module.
- After scanning, the results of the scan echo can be used for serial number connection.
- When connecting, input the serial number and slave connection password in AT mode.
- Or directly input the MAC address and password of the slave needed to be connected without scanning, and the chip will automatically connect to the device.
- The host mode supports set the MAC for automatic connection.
- If set, the host will automatically connect to the device after initialization.
- This method does not require scanning or other operations.

Slave Mode

- In slave mode, the module will transmit fixed broadcast data and support modification of the chip name in the scan response data, that is, the module name described below.
- The default broadcast interval is 100mS.
- The slave supports four basic BLE services, where the transparent transmission service UUID is 0xFFF0. The UUIDs of the communication are 0xFFF1, 0xFFF2, and 0xFFF3.
- Please refer to the following table for instructions.

UUID	Property	Description
0xFFF1	Public Notice	The data received by UART will be transmitted to the host through this channel, and the host needs to enable notification. The data will be packaged in the size of MTU, and the exceeded data will be transmitted by the chip in separate package.
0xFFF2	Write only	Host transmit data channel, data will be sent out through UART.
0xFFF3	Read, write	Configuration channel, IO synchronization and other functions.

Serial Transparent Transmission Function

- The serial transparent transmission uses a UART, and the default factory baud rate is 115200bit/s. The UART receive buffer of the chip is 512 bytes, and the serial port will transmit data by BLE in real time while receiving data. It is recommended to ensure the end of data transmission when performing AT configu ration.
- When entering the AT configuration, the currently received transparent transmission data will be lost if it is not saved, and data that has been saved in the receiving buffer will continue to be sent when exiting the AT mode.
- The data received by the BLE will be sent directly to the UART, and the data will not be temporarily stored.
- When there is a lot of BLE data, it will wait to be sent. If it has entered the AT mode currently, the data received by the BLE will be directly discarded. It is recommended that the host make some speed restrictions when sending to reduce packet loss and buffer overflow.
- Because the BLE communication rate is related to its environment, it is recommended to use CTS/RTS flow control to prevent buffer overflow when the serial baud rate exceeds 9600bit/s and the average RSSI of BLE is less than -70dBm.

AT Commands

No.	Command	Description
1	AT…	Enter AT configuration
2	AT+RESET	Reset chip
3	AT+VER	Get the chip version number
4	AT+SHOW	Display chip information
5	AT+SAVE	Save current parameters
6	AT+EXIT	Exit AT configuration
7	AT+UART	Inquire/set UART parameters
8	AT+MAC	Inquire local MAC address
9	AT+TPL	Inquire/set transmission power
10	AT+BLESTA	Inquire BLE status
11	AT+BLEMODE	Inquire/set the BLE working mode
12	AT+CCADD	Inquire current MAC address
13	AT+NAME	Inquire/set chip name
14	AT+PNAME	Inquire/set device name
15	AT+CONN	Connect directly according to the given BLE device parameters
16	AT+SCAN	Host scan command
17	AT+CONADD	Inquire/set default connection parameters
18	AT+CLRCONADD	Clear default connection parameters
19	AT+SLEEP	Set chip sleep mode
20	AT+BAT	Read supply voltage of chip
21	AT+BLECFGEN	BLE configuration interface switch
22	AT+RFCALI	Set BLE RF calibration
23	AT+BSTA	Set BLE status pin

Information about radio frequency compliance

The finished goods shall be overall considered radio frequency compliance. The information hereby shall be added to the finished goods user's manual as warning content.

USA/Canada FCC/IC Information

This equipment has been tested and found to comply with the limits for a Class B digital device, under part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used by the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. Suppose this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on. In that case, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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.

The notices to the user:

1. Any changes or modifications that are not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
2. **PMN:** LE Bluetooth Module
3. The antenna gain is 3.0dBi

This device complies with Industry Canada license-exempt RSS standard(s).
Operation is subject to the following two conditions:

1. this device may not cause interference, and
2. this device must accept any interference, including interference that may cause undesired operation of the device.

The term "IC" before the radio certification number only signifies the device meets the Industry's Canadian technical specifications.
Note
Changes or modifications to the wireless 2.4 GHz radio not expressly approved by Fluke Corporation could void the user's authority to operate the equipment. The radio transmitter has been approved by Industry Canada to operate only with the antenna supplied. Use of any other antenna is strictly prohibited for use with this product. This equipment complies with radio frequency exposure limits set forth by the FCC/ISED for an uncontrolled environment. The TTBLE module has been labelled with its own FCC ID and IC number, and if the FCC ID and IC number are not visible when the module is installed inside another device, then the outside of the finished product into which the module is installed must display a label referring to the enclosed module.
This Host exterior label must use the words: Contains FCC ID: T68-TTBLE and/or Contains IC: 6627A-TTBLE

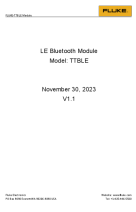
Taiwan NCC information

When the TTBLE module is used and built in the end product, the end product shall be considered to be marked with the content and NCC symbol plus module certificate ID as below.

- Fluke Electronics
- PO Box 9090 Everett WA 98206.9090 USA
- **Website:** www.fluke.com.
- **Tel:** +1-425-446-5500
- **November** 30, 2023 V1.1
- LE Bluetooth Module

- **Model:** TTBLE

Documents / Resources

	**FLUKE TTBLE LE Bluetooth Module** [pdf] Instruction Manual TTBLE, TTBLE LE Bluetooth Module, LE Bluetooth Module, Bluetooth Module, Module

References

- **Fluke Corporation: Fluke Electronics, Calibration and Networks**
- **User Manual**