

# Quick Implementation of TF-Luna-IIC and Computer Communication Operation Instructions

## 1. Overview

This document enables first-time users to quickly understand the tools and methods for conducting IIC communication tests, connect the LiDAR to PC by consulting the corresponding instruction manual, and complete product testing under the IIC communication protocol by sending commands to obtain distance values and modify the slave's address.

This document applies to the product model: TF-Luna (IIC interface) (verify the product hardware version and firmware version before testing).

## 2. Test Preparation

### 2.1. Tool preparation

Serial port testing tool (Serial Assistant), USBCOM2I2C converter<sup>1</sup>, 4P DuPont Line, TF-Luna.

## 3. IIC communication test

### 3.1. Pin Description

**Note: If you are testing other hardware versions, please consult the corresponding product manual for pin definition confirmation of the electrical interface.**

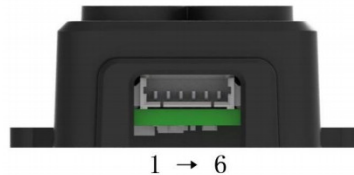


Fig.1 Pinout

Table 1 Line Sequence Description

Number	Colour	Function
1	Red	+5V
2	White	RXD/SDA
3	Green	TXD/SCL
4	Black	GND
5	Interface Configuration Input	Grounding: Activate to IIC mode; Suspended or connected to 3.3V: Use UART mode
6	Multiplexed Output	Multiplexed output: Switching mode function: Switching output

<sup>1</sup> <https://fr.aliexpress.com/item/32830015255.html>

IIC mode and switch mode off:  
data ready indication



Fig.2 USBCOM2I2C converter

Table 2 Description of the USBCOM2I2C converter IIC interface

Signal	Function	Explanation
SCL	Output	IIC Bus Clock
SDA	Input/Output	IIC Bus Data
GND	Power	GND
VCC	Power	3.3V output, support max. current 200mA
5V	Power	3.3V output, depends on USB port power capability

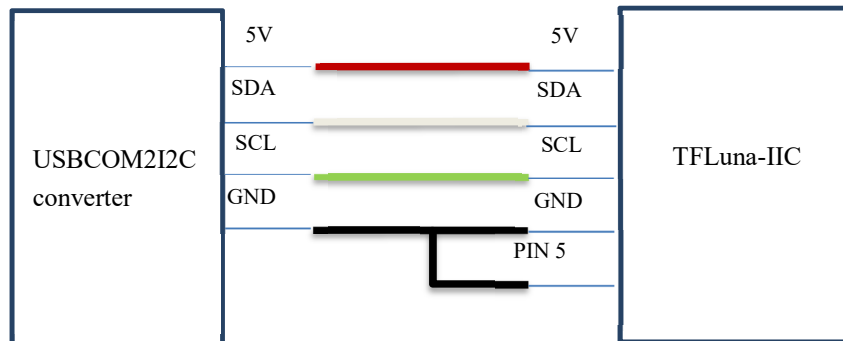


Fig.3 connect TFLuna-IIC and USBCOM2I2C converter

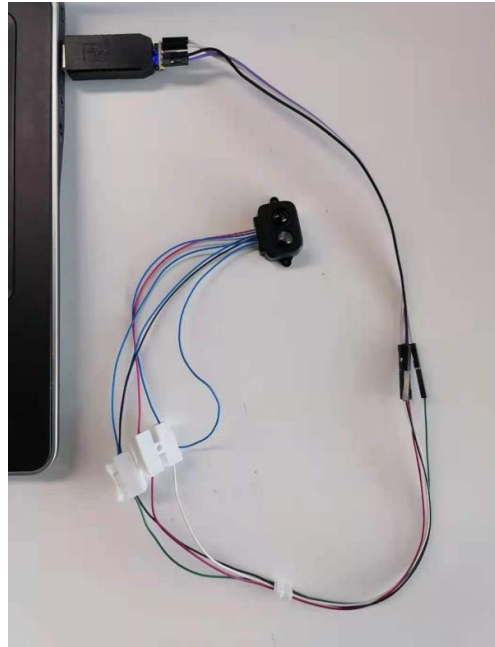


Fig.4 USBCOM2I2C converter connecting TFLuna-IIC to PC

### 3.2. Test Steps

#### 3.2.1. Establishing connection with PC

Connect the IIC-USB converter, check whether the computer COM driver recognizes the converter. If the board is not recognized by the computer, the drivers may not be installed, please install the driver. *(Note: If the USBCOM2I2C converter is not recognized, please refer to the "USBCOM2I2C converter User Manual" to view the driver download address, download and install the driver).*

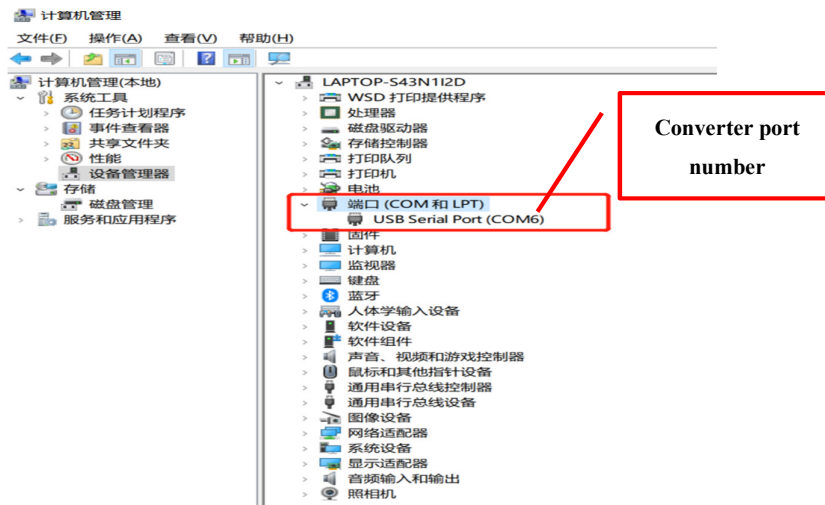
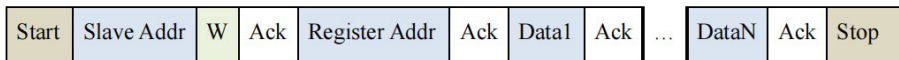


Fig. 5 Port number identification

Open the Serial Assistant, select the correct port number, baud rate: 9600, cancel the RTS option, no checksum (select "none" for checksum), and open the serial connection.

When pin-5 is grounded, the TF-Luna starts to work in IIC communication mode, which is initiated by the host and the TF-Luna is a slave that can only passively send and receive data. After the host writes the configuration command frame to the LiDAR, it needs to wait long enough to process the command and then read the feedback operation, the recommended waiting time is 100ms.

写寄存器时序:



读寄存器时序:

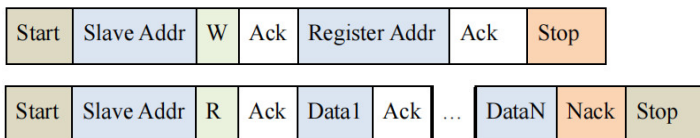


Fig.6 TFLuna-IIC Mode Communication Timing

### 3.2.2. Get the distance value

The command to obtain the measured distance of TF-Luna via serial port is: 53 20 05 5A 05 00 01 60 50 53 21 09 50.

Send the command as shown in the figure below.

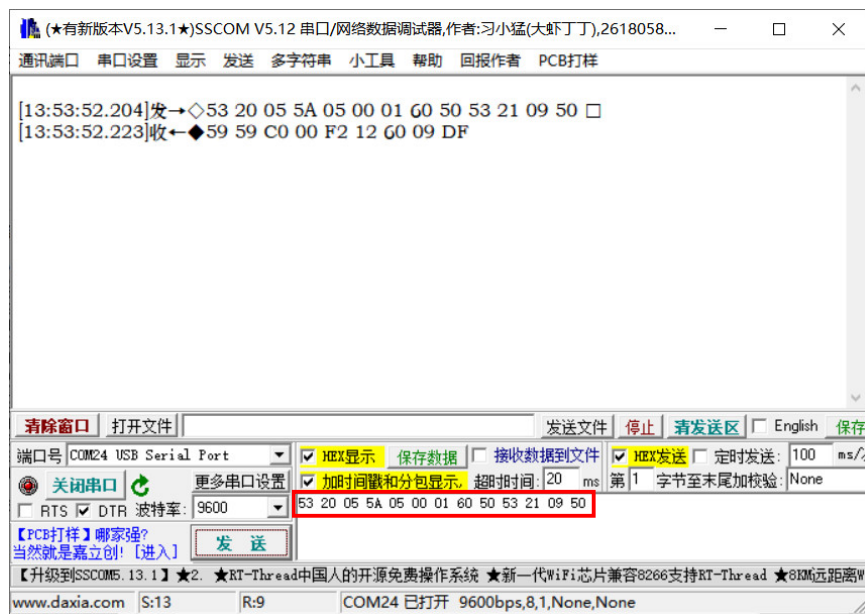


Fig.2 Acquisition of distance values

Command Explanation:

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**0x53:** S command of the USBCOM2I2C converter, initiating the "start" signal.

**0x20:** Write operation (The IIC protocol specifies that the high 7 bits represent the addressing address of the slave node; the lowest bit represents the read/write: 0 for write operation and 1 for read operation. TF-Luna default slave address is 0x10 (HEX), and 0x10 in binary is 00010000. Since the higher 7 bits represent the address, first shift 00010000 one bit left to 00100000; because this instruction sends a "write" operation, the lowest bit is 0, i.e. 00100000, which is 0x20 in decimal).

**0x05:** Write 5 bytes of data.

**5A 05 00 01 60:** Get the distance value.

**0x50:** P command of the USBCOM2I2C converter, initiating the "stop" signal.

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**0x53:** S command of the USBCOM2I2C converter, initiating the start signal.

**0x21:** Read operation (IIC protocol specifies that the high 7 bits represent the addressing address of the slave node; the lowest bit represents the read/write: 0 for write operation and 1 for read operation. TFLuna default slave address is 0x10 (HEX), and 0x10 in binary is 00010000. Since the higher 7 bits represent the address, first shift 00010000 one bit left to 00100000; because this instruction sends a "read" operation, the lowest bit is 1, i.e. 00100001, which is 0x21 in HEX).

**0x09:** Read 9 bytes of data.

**0x50:** P command of the USBCOM2I2C converter, initiating the “stop” signal.

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After sending the above command, the TFLuna-IIC returns 9 bytes of data in the following format.

Table 3 Data frame format

Byte0-1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
0x59 59	Dist_L	Dist_H	Strength_L	Strength_H	Temp_L	Temp_H	Checksum
Explanation of data codes							
<b>Byte0</b>	0x59, Frame header(same for each frame)						
<b>Byte1</b>	0x59, Frame header(same for each frame)						
<b>Byte2</b>	Dist_L, Low octet of distance						
<b>Byte3</b>	Dist_H, High octet of distance						
<b>Byte4</b>	Strength_L, Low octet of strength						
<b>Byte5</b>	Strength_H, High octet of strength						
<b>Byte6</b>	Temp_L, Low octet of temperature						
<b>Byte7</b>	Temp_H, Low octet of temperature						
<b>Byte8</b>	The cumulative sum of the first eight bytes of data, taking the lower eight bits						

For example, the returned data: 59 59 A9 00 0F 3E 60 09 11. The meaning of the returned data is explained as follows.

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**0x59 0x59:** Frame header;

**0xA9:** Lower 8 bits of the distance value;

**0x00:** Higher distance value 8 bits (distance value 0x00A9, 169cm in decimal).

**0x0F:** Signal strength value lower 8 bits.

**0x3E:** Signal strength higher 8 bits (signal strength 0x3E0F i.e. 15887).

**0x60:** Chip temperature lower 8 bits;

**0x09:** Chip temperature higher 8 bits (temperature value  $2400/8 - 256 = 44^{\circ}$ ).

**0x11:** Checksum.

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### 3.2.3. Change slave address

The format of the command to change the slave address is as follows. For example, to change the slave address to 20, you need to send the command: 53 20 05 5A 05 0B 20 8A 50 53 41 05 50.

The command is explained as follows:

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**0x53:** S command of the USBCOM2I2C converter, initiating the "start" signal.

**0x20:** Write operation.

**0x05:** Write 5 bytes of data.

**5A 05 0B 20 8A:** Modify the IIC slave address. To change the slave address to 20, the byte corresponding to ADDR is 20 (HEX).

**0x50:** P command of the USBCOM2I2C converter, initiating the “stop” signal.

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**0x53:** S command of the USBCOM2I2C converter, initiating the “start” signal.

**0x41:** Read operation.

**0x05:** Read 5 bytes of data.

**0x50:** P command of the USBCOM2I2C converter, initiating the “stop” signal.

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Send the command as shown in the figure below. LiDAR returns the original command if configuration is successful.

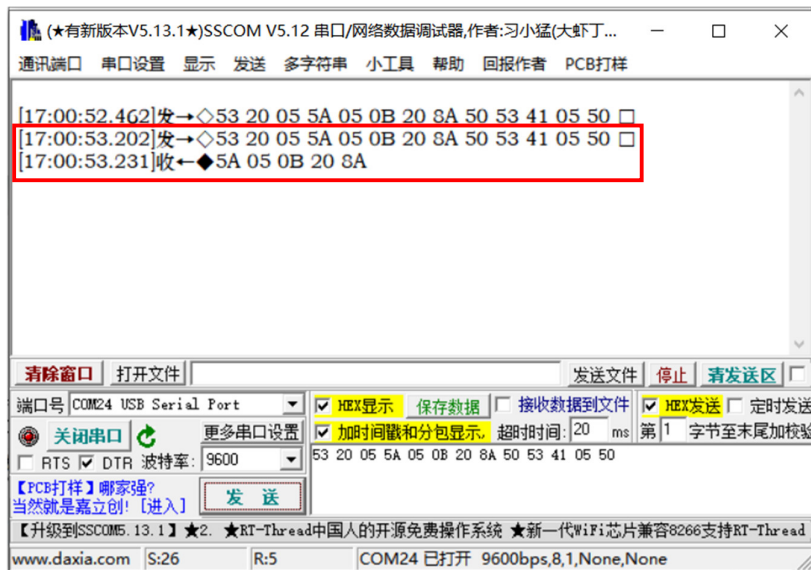


Fig.3 Modifying the IIC slave address and obtaining the range value

After changing the address to 20, the command to obtain the distance value is: 53 40 05 5A 05 00 01 60 50 53 41 09 50. Refer to 3.2.2. for the explanation of the command meaning.

For more details, please refer to the manual of TF-Luna.