The Computer Stand-alone Test Reference Scheme of the Version of TFmini_I² C

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1. Test Scheme Overview

This test scheme can realize a simple method of stand-alone testing the TFmini_I²C version of the LiDAR by using a commercially available USB- I²C converter to connect a computer.

The USB- I²C converter used in the test scheme is not a product of the Benewake LiDAR. Please purchase it if you need it. Reference link: https://item.taobao.com/item.htm?id=530719835121 (UsenDz@ USBCOM2I2C).

2. Tool Preparation

(1) USB- I²C converter: UsenDz USBCOM2I2C, one

Note: This converter is in agreement with the TFmini_I²C protocol and can be used directly. Converters of other brands may not be available directly

Figure 1 USBCOM2I2C

(2) The TFmini_I²C version of the LiDAR, one

Figure 2 TFmini-I² C

(3) PC：Windows System, one

(4) Connection line：One connection line, one end of which is the LiDAR, the other end of which is the DuPont jack

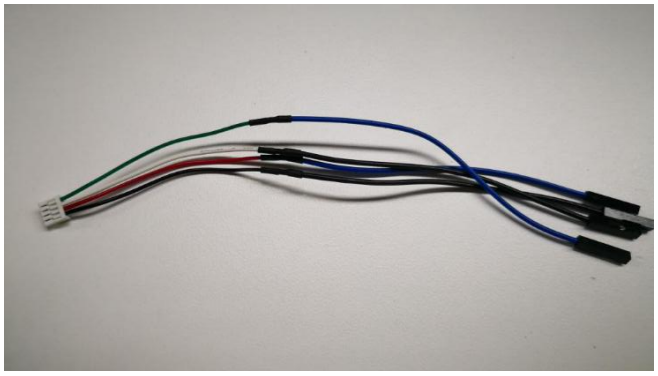

Figure 3 Connection line

(5) Serial Port Assistant Software

3. Connection

converter Interface specification： （Watch the product manual for details）

Signal	Type	Description
SCL	Output	I²C Bus Clock
SDA	Input / Output	I²C Bus Data
GND	Source	Power Ground
VCC	Source	3.3V voltage output, supporting maximum current 200 mA
5V	Source	5V voltage output, depends on the power supply capability of USB interface

Figure 4 Converter Interface specification

TFmini_I² C Interface specification： （Watch the product manual for details）

Numbering	PC line sequence	Corresponding connection item
①	SCL	SCL
②	SDA	SDA
③	+5V	Positive power supply
④	GND	Power ground

Figure 5 TFmini-I² C Pin definition

Connection：

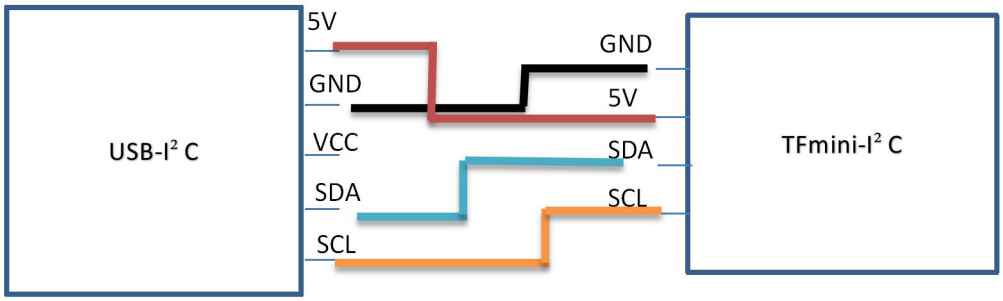

Figure 6 Connection diagram

4.Operation instructions

(1) Connection

After connecting in the correct sequence, insert it into the computer USB interface. After the correct connection, the weak red light can be seen from the LiDAR lens (the LiDAR needs the default internal trigger mode to see the weak red light).

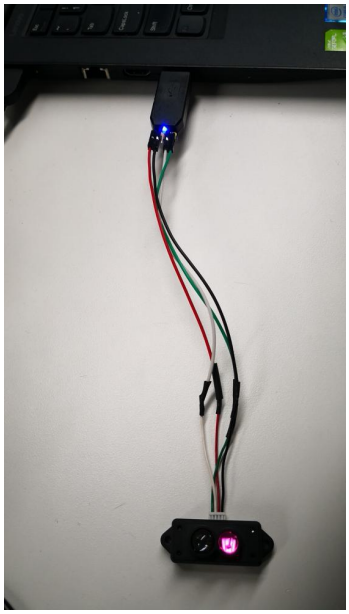

Figure 7 Correct connection schematic

(2) Reading Radar Values

Open PC's serial assistant software, select the correct port number (if there is no serial number, you may need to install the driver of this converter), baud rate 9600, hexadecimal transceiver.

Tip: Pay attention to canceling RTS selection.

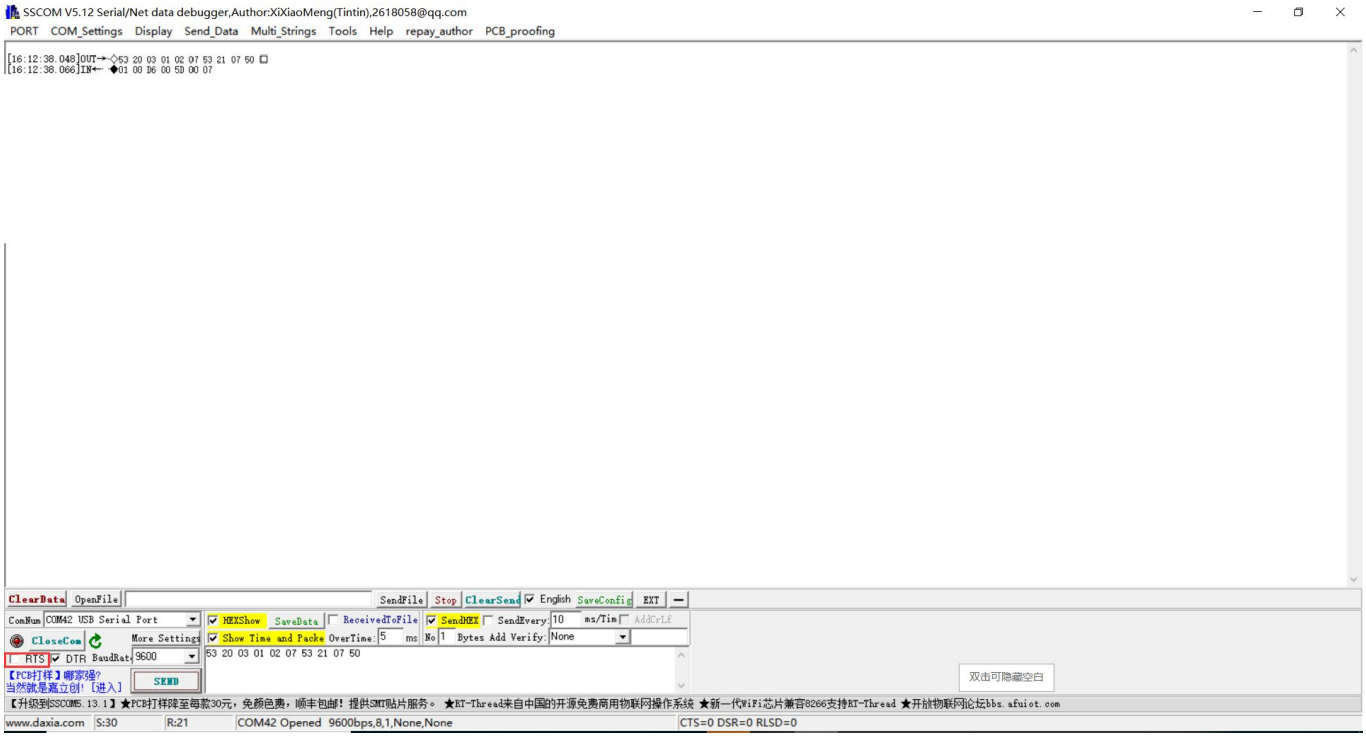

Figure 8 Serial Port Assistant Settings

Combined with TFmini-I^{2}C reading data sequence and USB-I^{2}C converter protocol, the corresponding reading commands are sent by serial port.

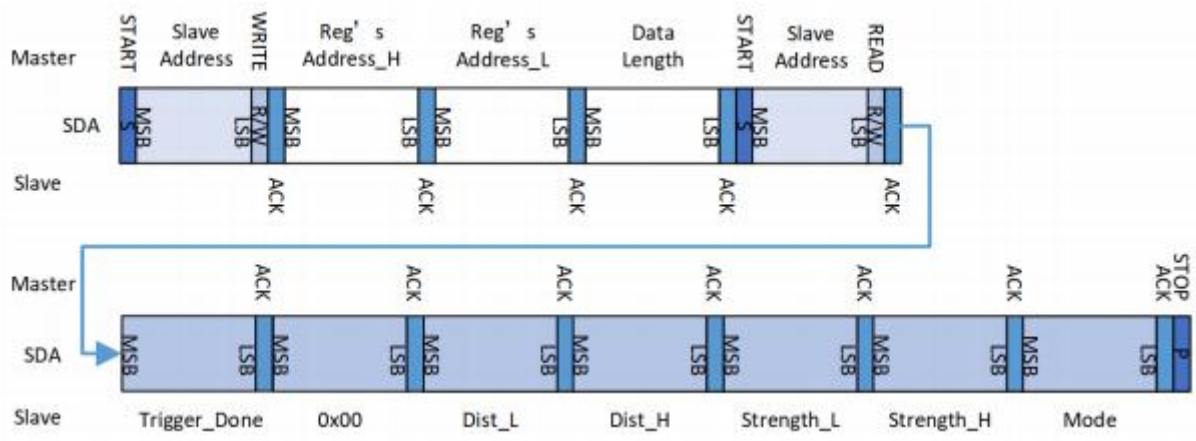

Figure 9 TFmini-I^{2}C reading data sequence

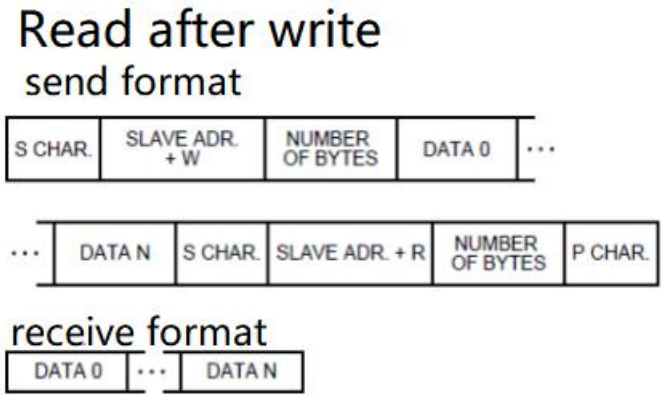

Figure 10 USB-I^{2}C Converter mainframe command format of reading after writing

Read command example: If the address of TFmini-I^{2}C is 0x10, the command to read the measurement distance of TFmini- I^{2}C through the serial port is:

53 20 03 01 02 07 53 21 07 50

Command explanation:

0x53： The S command of the USB-I^{2}C adapter initiates the start signal; (Watch the adapter manual for details)

0x20： Slave address is 0x10， WRITE operation; (The upper 7 bits represent the address, the lowest bit represents the read/write; the 0x10 binary represents 0001 0000, so the left shift is 0010 0000, the lowest bit is written as 0, so it is 00100000 or 0x20)

0x03： Write 3 bytes of data;

0x01： The upper 8 bits of the slave register address;

0x02： The lower 8 bits of the slave register address;(Read the data of LiDAR, the register address is 0x0102, Watch the TFmini-I^{2}C instruction manual for details)

0x07：Bytes such as distance information;(Read radar data this value is 7, Watch the TFmini-I^{2}C instruction manual for details)

0x53： The s command of the USB-I^{2}C adapter initiates the start signal; (Watch the adapter manual for details)

0x21：Slave address is 0x10，READ operation; (The upper 7 bits represent the address, the lowest bit represents the read/write; the 0x10 binary represents 0001 0000, so the left shift is 0010 0000, the lowest bit is read as 0, so it is 00100001 or 0x21)

0x07： Write 7 bytes of data;

0x50： The P command of the USB-I^{2}C adapter initiates the stop signal; (Watch the adapter manual for details)

TFmini-I^{2}C should return 7 bytes of data, they are Trigger_Done、0x00、Dist_L、Dist_H、Strength_L、Strength_H and Mode;(Watch the adapter manual for details of data meaning)

For example, return 01 00 D6 00 6C 00 07 , data explanation:

0x01： Indicates the current frame measurement result;

0x00： Fixed value;

0xD6： The lower 8 bits of the distance value;

0x00： The upper 8 bits of the distance value;(The distance of 0x00D6 means 214cm)

0x6C： The lower 8 bits of the intensity value;

0x00： The upper 8 bits of the intensity value;(The intensity of 0x006C is 108)

0x07： The range of ranging is 07.

(3) Setting LiDAR parameters

Combined with the TFmini-I^{2}C setting parameter timing and the USB-I^{2}C adapter protocol, the corresponding setting command is sent using the serial port.

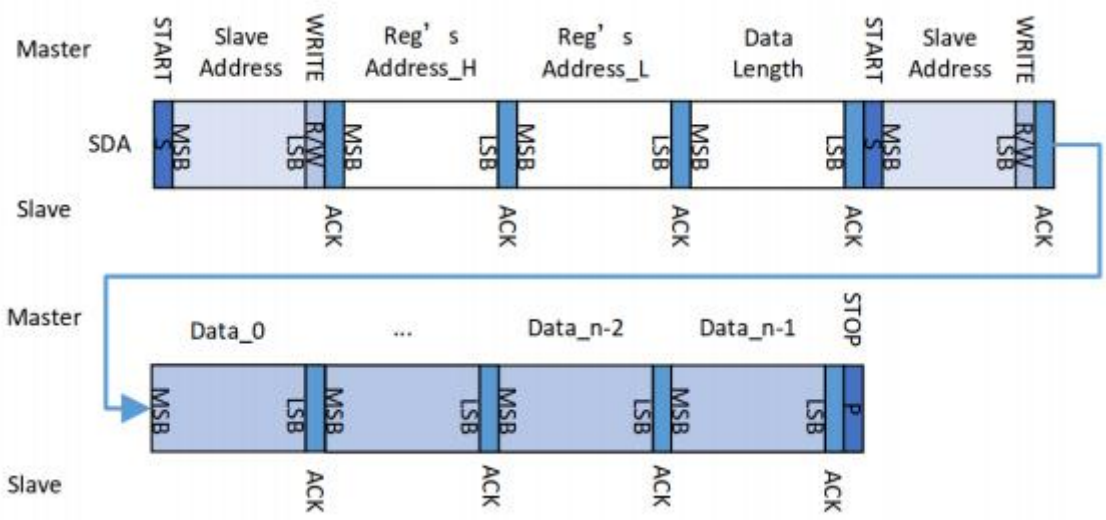

Figure 11 Configure TFmini-I^{2}C parameter timing

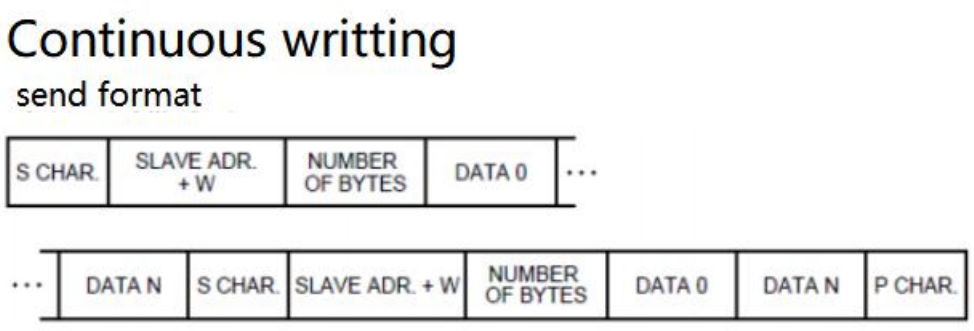

Figure 12 USB-I^{2}C adapter host continuous write command format

The TFmini-I^{2}C currently configurable parameter list is detailed in the TFmini-I^{2}C instruction manual.

Example of setting the Lidar address command:

If you want to change the radar address from 0x10 to 0x11, the computer sets the TFmini-I^{2}C command through the serial port as:

53 20 03 00 26 01 53 20 01 11 50

Command explanation:

0x53：The S command of the USB-I^{2}C adapter initiates the start signal; (Watch the adapter manual for details)

0x20： Slave address is 0x10, WRITE operation; (The upper 7 bits represent the address, the lowest bit represents the read/write)

0x03：Write 3 bytes of data;

0x00：The upper 8 bits of the slave register address;

0x26：The lower 8 bits of the slave register address;(Read the data of LiDAR, the register address is 0x0026, watch the TFmini-I^{2}C instruction manual for details)

0x01：This parameter is 1 byte of data;

0x53：The S command of the USB-I^{2}C adapter initiates the start signal; (Watch the adapter manual for details)

0x20： Slave address is 0x10, WRITE operation; (The upper 7 bits represent the address, the lowest bit represents the read/write)

0x01：Write 1 byte of data;

0x11：Write the new address is 0x11;

0x50：The P command of the USB-I^{2}C adapter initiates the stop signal; (Watch the adapter manual for details)

Tip: After changing the LiDAR address, the LiDAR needs to be powered back on to take effect. The new address should be marked to avoid inconvenience.