Siman

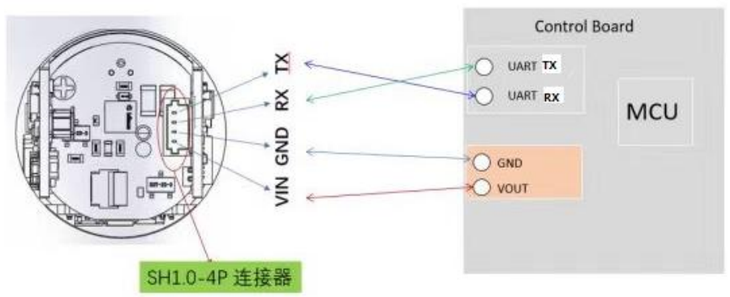
## SDEM laser ranging module

The SDEM is a high-performance, large-range, compact Dtof (Direct Time-of-Flight) laser rangefinder module independently developed by Siman. Featuring advanced DTOF technology, it delivers exceptional measurement accuracy with a maximum range exceeding 1000 meters while maintaining a slim profile and lightweight design. With a mere 22mm diameter, it seamlessly integrates into various compact devices.

The module features a UART interface, enabling high-speed data transmission and seamless system integration. It is ideal for applications such as UAV altitude control, industrial automation, robotic navigation, and intelligent transportation. With its high precision, reliability, and low power consumption, it serves as an optimal solution for distance measurement, particularly in scenarios requiring strict spatial and weight constraints. For more product details, please visit: www.siman.asia

| | |
|---|---|
| warn | Follow the equipment usage guidelines! This product is not a safety sensor and cannot be used for personnel protection. |
|  | ➢ Main measurement laser (905nm): Class 1 laser product. Safe under normal operating conditions.<br>➢ This product has no explosion-proof structure, and it is forbidden to use in flammable and explosive environments.<br>➢ Do not remove this product.<br>➢ Be sure to turn off the power before operating. Do not connect wires while powered on!<br>1. Avoid use in dust/steam or corrosive gas environment;<br>2. Use in places where corrosive gases are not generated;<br>➢ Do not use this product in water.<br>➢ When used outdoors, pay attention to adding a waterproof cover. |

**hookup**




| P1/J1 | name | function | functional description |
|---|---|---|---|
| 1 | GND | power input | Input: power ground, communication ground |
| 2 | VIN | power input | Input: 3~3.3V DC power supply, current> 300mA+ |
| 3 | UART TX | Communication output | Serial communication. The module's serial port sends control signals.<br>Terminal receiving pin (compatible with TTL3.3V/TTL5V) |
| 4 | UART RX | Communication input | Serial communication. The module's serial port receivin pin is connected to the control circuit.<br>Terminal send pin (compatible with TTL3.3V/TTL5V) |

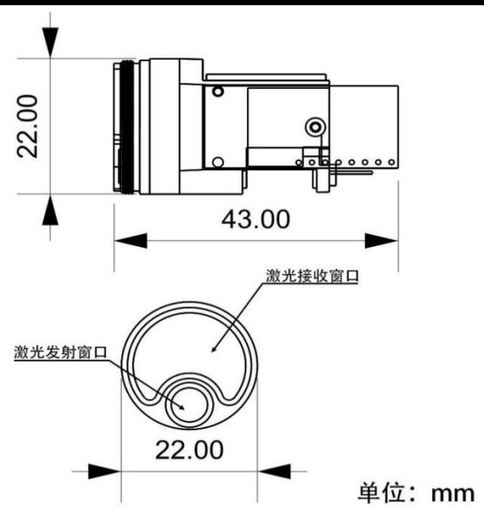
**Specifications**

| | |
|---|---|
| measuring range | 3...1000m@70% reflectivity |
| service voltage | Voltage range DC3...3.5V |
| resolution ratio | 0.1m |
| power dissipation | 330mW@3.3V |
| absolute accuracy | ±1m |
| specification and dimension | Φ22mm*43mm |
| Maximum single measurement time | 1s |
| weight | 30g |
| Ambient Light | 1000kLux outdoor sunlight |
| working temperature | -20~70℃ |
| illuminant | 905nm laser |
| Serial port level | TTL 3.3V |
| Laser safety level | 1 |
| Laser life | Over 100,000h |
| communication interface | UART<br>The baud rate is 115200bps |

**Order model**

| | | |
|---|---|---|
| product model | SDEM-600 | SDEM-1000 |
| range | 600m | 1000m |

**dimensional drawing**




**contact us**

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Scan the QR code to follow us

**UART Communication**

| | | | | |
|---|---|---|---|---|
| Baud rate | 115200bps | | | |
| Start position: 1 | Data bit 8 | Stop position 1 | Check bit: None | Flow control: None |

**control command**

1) All communication code streams in this system adopt little-endian mode;
2) After accumulating the entire message as an U8 array, the lower 8 bits are used as the CRC checksum value.

| function | data | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | tes | 0 | 1 | 2 | 3 | 4-5 | 6-7 | 8 |
| | me | MsgType | MsgCode | BrdId | PayLoadLen | MeaType | MeaTimes | CR |
| | ta | 0xFA | 0x01 | 0xXX | 0x04 | 0xAAAA | 0xBBBB | 0xZ |
| Start/Stop measurement | After starting the measurement, the module continuously measures and returns data until the specified number of measurements is reached or a stop command is received. For the format of measurement data, see Measurement Reporting.<br>BrdId = 0xXX specifies the module ID for message reception (default module ID is 0; 0xFF indicates broadcast messages)<br>MeaType = 0xAAAA indicates whether to start or stop measurement, where 1 means start and 0 means stop.<br>MeaTimes = 0xBBBB indicates the number of consecutive measurements, where 0 means infinite and 1 means a single measurement.<br>Start a single measurement example: fa 01 ff 04 01 00 01 00 00<br>Start continuous measurement example: fa 01 ff 04 01 00 00 00 ff<br>Stop measurement example: fa 01 ff 04 00 00 00 00 fe | | | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| tes | 0 | 1 | 2 | 3 | 5 | 6 | 7 | 8 | 9 |
| me | MsgType | MsgCode | BrdId | PayLoadLen | DataValidInd | | Distance | | CRC |
| ta | 0xFB | 0x03 | 0xXX | 0x04 | 0xAAAA | | 0xBBBB | | 0xZZ |
| it | | | | | | | dm | | |

Measure Report

After starting the measurement, the module returns the measurement value after each measurement (the maximum duration for a single measurement is 1.5s) until the specified number of measurements is reached or a measurement stop message is received.
BrdId = 0xXX indicates the module ID for transmission
DataValidInd = 0xAAAA indicates whether the data is valid: 1 means the measurement data is valid, and 0 means it is invalid.
Distance = 0xBBBB indicates the measured distance in decimeters (dm).

Example: Parse the message fb 03 00 04 01 00 4c 00 4f

| tes | 0 | 1 | 2 | 3 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| me | MsgType | MsgCode | BrdId | PayLoadLen | DataValidInd | | Distance | | CRC |
| ta | 0xFB | 0x03 | 0xXX | 0x04 | 0xAAAA | | 0xBBBB | | 0xZZ |
| se | fb | 03 | 00 | 04 | 0100 | | 4c00 | | 4f |
| | | | | | valid data | | 76dm | | |

Set module parameters

transmit by radio

| Bytes | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|
| Name | MsgType | MsgCode | BrdId | PayLoadLen | Type | | Value | | CRC |
| Data | 0xFA | 0x06 | 0xXX | 0x04 | 0xAAAA | | 0xBBBB | | 0xZZ |

BrdId = 0xXX specifies the receiving module ID, where 0xFF indicates a broadcast message.

Type = 0xAAAA parameter type

Value = 0xBBBB. New settings take effect after resetting all parameters except the module ID setting, which takes effect immediately.

Example: fa 06 ff 04 00 00 00 00 03

receive

| Bytes | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|
| Name | MsgType | MsgCode | BrdId | PayLoad | Err | | Type | | CRC |
| Data | 0xFB | 0x07 | 0xXX | 0x04 | 0xAAAA | | 0xBBBB | | 0xZZ |

BrdId = 0xXX indicates the module ID for transmission

Err = 0xAAAA indicates success or failure, where 0 means success and non-zero means failure,

Type = 0xBBBB parameter type

Example: fb 07 00 04 00 00 00 00 06

Module parameter type

| type | name | Windows default | span | meaning |
|---|---|---|---|---|
| 0 | module ID | 0 | 0-254 | 1) The module ID in the request message identifies the receiving module;<br>2) The module ID in response or report messages indicates the message source;<br>3) When the sender ignores the receiver's module ID or wants to broadcast the message, set the module ID to 0xFF |
| 1 | Serial port baud rate | 1152 | 9216,1152,384,192,96,24,12 | Unit: 100bps |

Read module parameters

transmit by radio

| Bytes | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| Name | MsgType | MsgCode | BrdId | PayLoadLen | Type | | CRC |
| Data | 0xFA | 0x08 | 0xXX | 0x02 | 0xAAAA | | 0xZZ |

BrdId = 0xXX specifies the receiving module ID, where 0xFF indicates a broadcast message.

Type = 0xAAAA parameter type

Example: fa 08 ff 02 00 00 03

receive

| Bytes | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|
| Name | MsgType | MsgCode | BrdId | PayLoad | Type | | Value | | CRC |
| Data | 0xFB | 0x09 | 0xXX | 0x04 | 0xAAAA | | 0xBBBB | | 0xZZ |

BrdId = 0xXX indicates the module ID for transmission

Type = 0xAAAA parameter type

Value = 0xBBBB parameter value

Example: fb 09 00 04 00 00 00 00 08

Note: CRC stream calculation and usage

1. For a single measurement message, the message code stream is: fa 01 ff 04 01 00 01 00 00

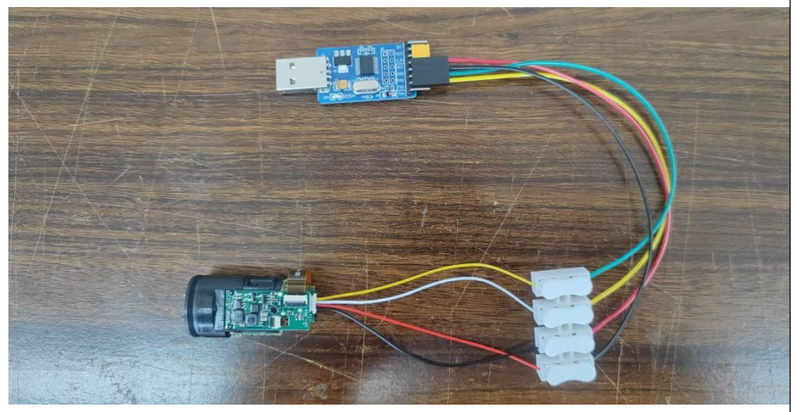
Sum the entire message using the U8 array: 0xfa + 0x01 + 0xff + 0x04 + 0x01 + 0x00 + 0x01 + 0x00 = 0x200

2. Take the lower 8 bits of the accumulated value as the CRC value: i.e., 0x00

## Operation Guide

**The module is connected to the USB-TTL converter as shown in the figure below.**

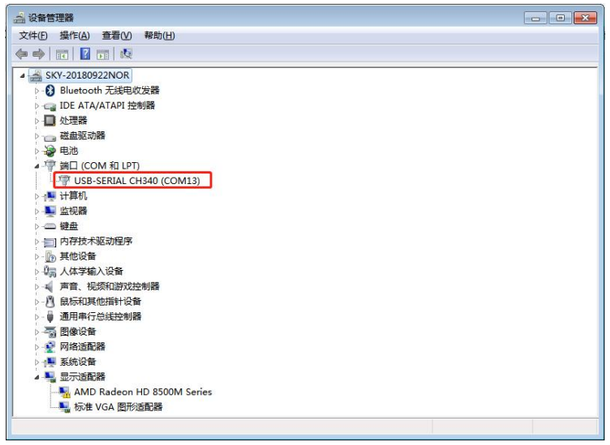
- If you're using a USB-TTL adapter like ours, here's how to connect it:
- If you're using a different USB-TTL model, connect a pull-up resistor (a resistor between the red VCC and yellow TXD lines).
- When connecting the TTL signal to a microcontroller, install a pull-up resistor (a resistor between VCC and TXD).



**Test demo software**

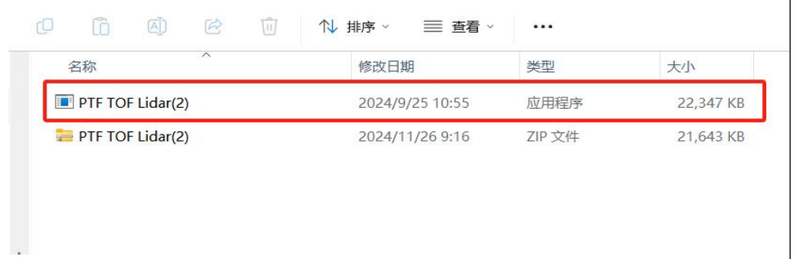
Before starting the test, we need to confirm:

1. Insert and install the CH341 USB-TTL converter driver on your computer. The following indicates successful installation.




2、Download the host computer software: www.siman.asia;

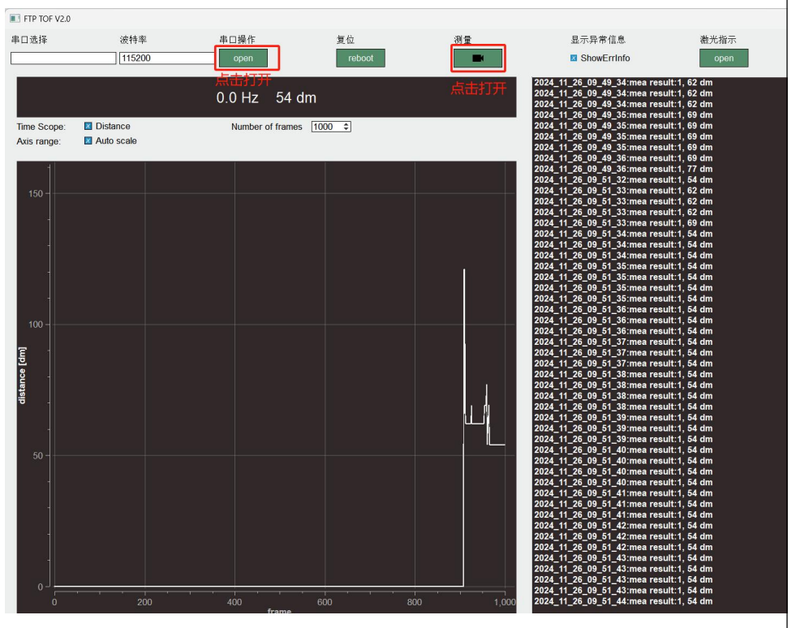
3. Open the host computer's folder, select the corresponding.exe folder, and double-click "PTF TOF Lidar" to launch the software.




4. The following window will appear: The serial port number is correct. Click "Open Serial Port".


5. The Porter rate is selected as 115200;


6. Open the serial port, click "open" below the serial port operation, then click the icon button below the measurement to start the measurement.




7. Click "Save Data" to save all interface data in txt format.