



# TFmini Micro LiDAR Module (I<sup>2</sup>C)

## 1. Product Description

Based on TOF (Time of Flight) principle and integrated with unique optical and electrical designs, the product uses 850nm IR light source to achieve stable, precise, high sensitivity and high-speed distance detection.

The built-in algorithm adapted to different application environments can guarantee an excellent ranging performance at a low cost and in a tiny volume. Various adjustable configurations are available for flexible use by customers, which is more suitable for customers' product needs.

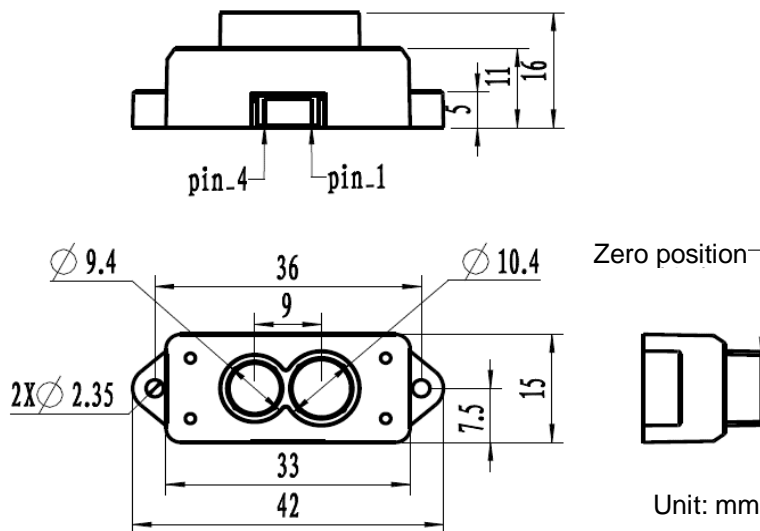
## 2. Technical Specifications and Parameters

Table 1 Main characteristic parameters of TFmini-I<sup>2</sup>C

| Parameter name        |                           | Parameters                  |
|-----------------------|---------------------------|-----------------------------|
| Product performance   | Detecting range           | 0.3m~12m <sup>①</sup>       |
|                       | Accuracy of measurement   | ±4cm@ (0.3-6m) <sup>②</sup> |
|                       |                           | ±6cm@ (6m-12m)              |
|                       | Range resolution          | 1cm                         |
|                       | Light intensity           | 70klux                      |
| Operating temperature | 0~60℃                     |                             |
| Optical parameters    | Light source              | LED                         |
|                       | Center wavelength         | 850nm                       |
|                       | Receiving half-angle      | 1.15°                       |
|                       | Emitting half-angle       | 1.5°                        |
| Electrical parameters | Power supply voltage      | 5V                          |
|                       | Average current           | ≤120mA                      |
|                       | Average power consumption | ≤0.6W                       |
|                       | Peak current              | 800mA                       |
|                       | Electrical level          | 3.3V                        |
| Miscellaneous         | Wire length               | 10cm                        |
|                       | Casing material           | ABS+PC                      |
|                       | Weight                    | 4.7g                        |
|                       | Storage temperature       | -20℃~75℃                    |

① Detect range based on a standard whiteboard with reflectivity 90% in indoor conditions

② Due to switching of range scale, the measuring value of individual point may differ from the actual value over a detecting range of 0.3m to 2m, however, the deviation is within ±6cm.



### 3. Appearance and Construction

Fig. 1 Dimensions of TFmini-I<sup>2</sup>C module

### 4. Definition of Product Connectors

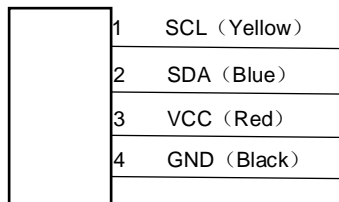


Fig. 2 Sequence of TFmini-I<sup>2</sup>C lines

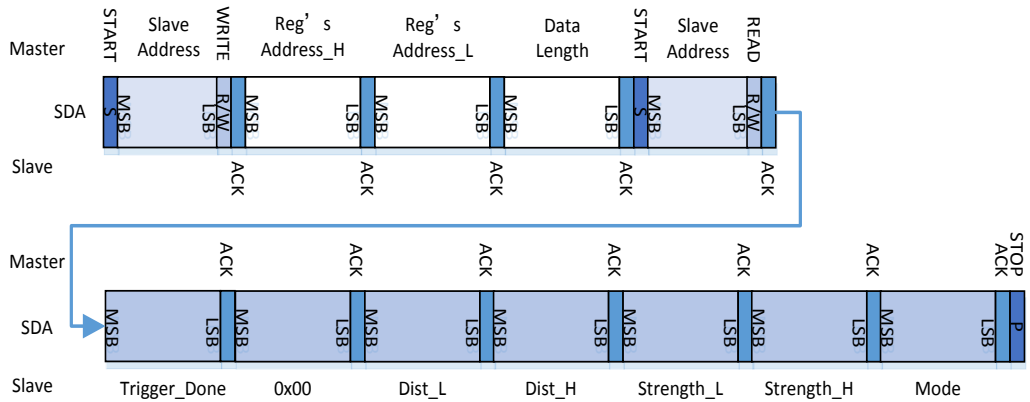
TFmini adopts GH1.25-4p connector. The line sequence is shown in Fig.2. Refer to Fig.1 for the position of corresponding pins.

### 5. Communication Protocol and Data Format

Table 2 Communication Protocol

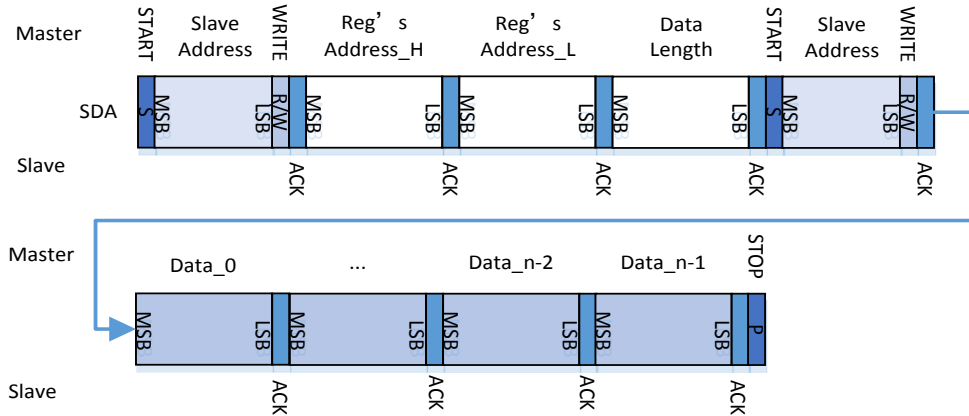
| Communication port        | I <sup>2</sup> C |
|---------------------------|------------------|
| Maximum transmission rate | 400kHz           |
| Master-slave mode         | Slave mode       |
| Address range             | 0X07~0X78        |
| Default address           | 0x07             |




 Table 3 Time sequence of radar data reading by I<sup>2</sup>C host


### Description of Data Encoding

|                        |  |
|------------------------|--|
| <b>START</b>           | Start signal   |
| <b>STOP</b>            | Stop signal  |
| <b>Slave Address</b>   | The slave address is 0x07 by default, and it is configurable.  |
| <b>R/W</b>             | Read/write flag; $R/\bar{W}=1$ indicates READ, and $R/\bar{W}=0$ indicates WRITE.  |
| <b>ACK</b>             | Master-slave response  |
| <b>Reg's Address_H</b> | Higher 8 bits of the register address. When reading distance information, Reg's Address_H=0x01   |
| <b>Reg's Address_L</b> | Lower 8 bits of the register address. When reading distance information, Reg's Address_L=0x02  |
| <b>Data Length</b>     | Number of bytes read/written. When reading distance information, Data Length=0x07  |
| <b>Trigger_Done</b>    | Distance measurement completion flag<br>When ranging information is valid, Trigger_Done = 0x01<br>When ranging information is invalid, Trigger_Done = 0x00, and the user should ignore frame data. |
| <b>Dist_L</b>          | Lower 8 bits of the distance value.  |
| <b>Dist H</b>          | Higher 8 bits of the distance value.   |
| <b>Strength L</b>      | Lower 8 bits of the signal strength value.   |
| <b>Strength H</b>      | Higher 8 bits of the signal strength value.  |
| <b>Mode</b>            | Range scale<br>Value range: 00 (short distance), 03 (intermediate distance) and 07 (long distance)<br>Automatic switching by default   |


 Table 4 Time sequence of I<sup>2</sup>C configuration radar register


| Description of Data Encoding |  |                 |                   |     |                   |        |        |     |
|------------------------------|--|-----------------|-------------------|-----|-------------------|--------|--------|-----|
| START                        | Start signal   |                 |                   |     |                   |        |        |     |
| STOP                         | Stop signal  |                 |                   |     |                   |        |        |     |
| Slave Address                | The slave address is 0x07 by default, and it is configurable.  |                 |                   |     |                   |        |        |     |
| R/W                          | Read/write flag: $R/\overline{W} = 1$ indicates READ ; $R/\overline{W} = 0$ Indicates WRITE.   |                 |                   |     |                   |        |        |     |
| ACK                          | Master-slave response  |                 |                   |     |                   |        |        |     |
| Reg's Address_H              | Higher 8 bits of the register address  |                 |                   |     |                   |        |        |     |
| Reg's Address_L              | Low 8 bits of the register address   |                 |                   |     |                   |        |        |     |
| Data Length                  | Number of bytes read/written. Data_0 ~ Data_n-1 (total bytes)  |                 |                   |     |                   |        |        |     |
| Data_n                       | Register configuration value. For a double-byte parameter, the lower 8 bits are located in front of the higher 8 bits.<br>Mapping of data to register address:   |                 |                   |     |                   |        |        |     |
|                              | <table border="1"> <tr> <td>Reg's Address+0</td> <td>Reg's Address+1</td> <td>...</td> <td>Reg's Address+n-1</td> </tr> <tr> <td>Data_0</td> <td>Data_1</td> <td>...</td> <td>Data_n-1</td> </tr> </table> | Reg's Address+0 | Reg's Address+1   | ... | Reg's Address+n-1 | Data_0 | Data_1 | ... |
| Reg's Address+0              | Reg's Address+1  | ...             | Reg's Address+n-1 |     |                   |        |        |     |
| Data_0                       | Data_1   | ...             | Data_n-1          |     |                   |        |        |     |

## 6. Relevant Configuration Registers

 Table 5 Description of Configuration Radar Registers of I<sup>2</sup>C

| (Register name) | (Reg's Address) | Value range | Description | Default value |
|-----------------|-----------------|-------------|-------------|---------------|
|-----------------|-----------------|-------------|-------------|---------------|



|   |                  |                  |   |       |
|---|------------------|------------------|---|-------|
| <b>Slave address</b>                                  | 0x0026           | [0x78, 0x07]     | It takes effect only after being turned on again  | 0x07  |
| <b>Fixed range scale</b>                              | 0x0050           | 0x00, 0x03, 0x07 | /   | 0x00  |
| <b>Ranging mode</b>                                   | 0x0051           | [0xFF, 0x00]     | 0x00 indicates automatic switching among ranging modes.<br>Non-zero indicates fixed range scale.  | 0x00  |
| <b>Measuring range output limiting mode</b>           | 0x0055           | [0xFF, 0x00]     | 0x00 indicates that the measuring range output limiting mode is disabled;<br>Non-zero indicates that the measuring range output limiting mode is enabled. | 0x01  |
| <b>Measuring range output limiting threshold</b>      | [0x0057, 0x0056] | [0xFFFF, 0x0000] | Unit: mm  | 12000 |
| <b>Signal strength threshold value (lower limit)</b>  | [0x0059, 0x0058] | [0xFFFF, 0x0000] | /   | 20    |
| <b>Signal strength threshold value (upper limit)</b>  | [0x005B, 0x005A] | [0xFFFF, 0x0000] | /   | 65535 |
| <b>Upper limit of signal strength threshold value</b> | [0x005D, 0x005C] | [0xFFFF, 0x0000] | Unit: mm  | 0     |
| <b>Unit of distance data</b>                          | 0x0066           | [0xFF, 0x00]     | 0x00 indicates that distance is in millimeters (mm);<br>Non-zero indicates distance is in centimeters (cm).   | 0x01  |
| <b>Restore default configuration</b>                  | 0x0070           | 0x02             | 0x02 indicates that the Client mode is restored   | /     |

Note: For double-byte parameters, the higher 8 bits of parameter data is stored in the higher 8-bit address while the lower 8 bits of parameter data is stored in the lower 8-bit address.

## 7. Product Certification Standards



EN62471:

 Photobiological Safety  
Certifications
