LRF200H LiDAR Series Based on DTOF Principle

1 PRODUCT DESCRIPTION

The LRF200H is a mid-to-long-range LiDAR module utilizing 905nm laser technology and Time-of-Flight (ToF) principles for high-precision distance measurement. Designed to resist strong electromagnetic interference, it supports diverse indoor and outdoor applications, including positioning and collision avoidance monitoring for land transport vehicles and overhead bridge cranes. With broad measurement range and high accuracy, it integrates seamlessly into real-time data acquisition systems via standard interfaces (e.g., UART), supporting both single-shot and continuous ranging modes. Its compact design and low power consumption make it a reliable perception solution for autonomous systems, industrial automation, and intelligent transportation

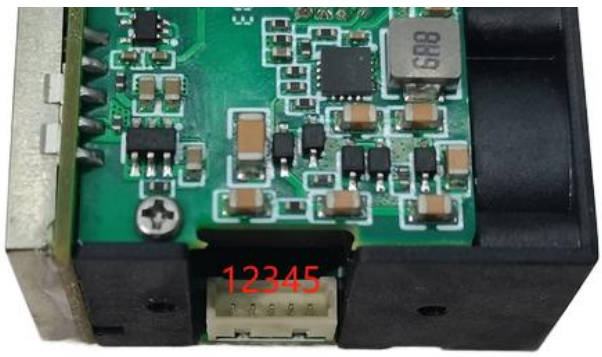


2 TECHNICAL SPECIFICATIONS

Category	Specification
Model	LRF200H
Range	0.05m～200m (90%reflectivity), 0.05m～70m (10%reflectivity)
Frequency	20Hz～10KHz (Default: 1KHz)
Accuracy	±10cm (<10m), 1% (≥10m)
Repeatability	±5cm (<10m), ±10cm@200m
Ambient Light Immunity	100KLux
Central Wavelength	905nm
Photobiological Safety	Class1
FOV	about 4mrad
Wavelength for Indication	N/A
Photobiological Safety for Indication	N/A
Supply Voltage	9~36VDC

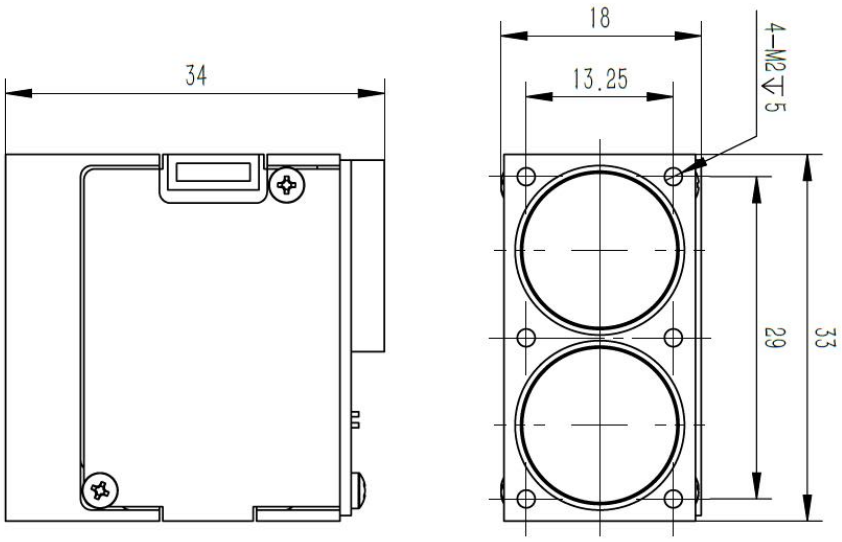
Peak Current	100mA
Average Current	30mA
Average Power Consumption	0.7W
Communication Interface	UART,IIC
Protection Level	N/A
Dimension	33 x 34 x 18 mm
Weight	20±2g
Operating Temperature	-20℃ ~ +60℃
Wire Specification	1.25mm, 5P 50cm stranded wires
Customization	available in appearance / structure / output protocol

3 DEFINITIONS OF PIN



No.	Definition / Wire Color	User Interface
1	9-36V (Red)	External Power +
2	Power GND (Black)	External Power -
3	Port GND (Yellow)	GND
4	TX (Green)	RX
5	RX (Blue)	TX

4 DIMENSIONS



Suggestions for Optical Window Selection and Coating:

1. **Material Recommendations**

It is recommended to use Chengdu Guangming Optical Glass H-K9L for the optical window material. H-K9L is the most common colorless optical glass, suitable for the laser range of 300nm to 2100nm, with high cost performance and excellent physical properties.

2. **Processing Recommendations**

The wedge angle tolerance of the optical window should be as small as possible, and we recommend a wedge angle tolerance of ≤3′ (tolerance grade ≤7);
The optical surface of the optical window should be as smooth as possible, and we recommend the arithmetic mean deviation of the profile (Ra) to be 0.012.

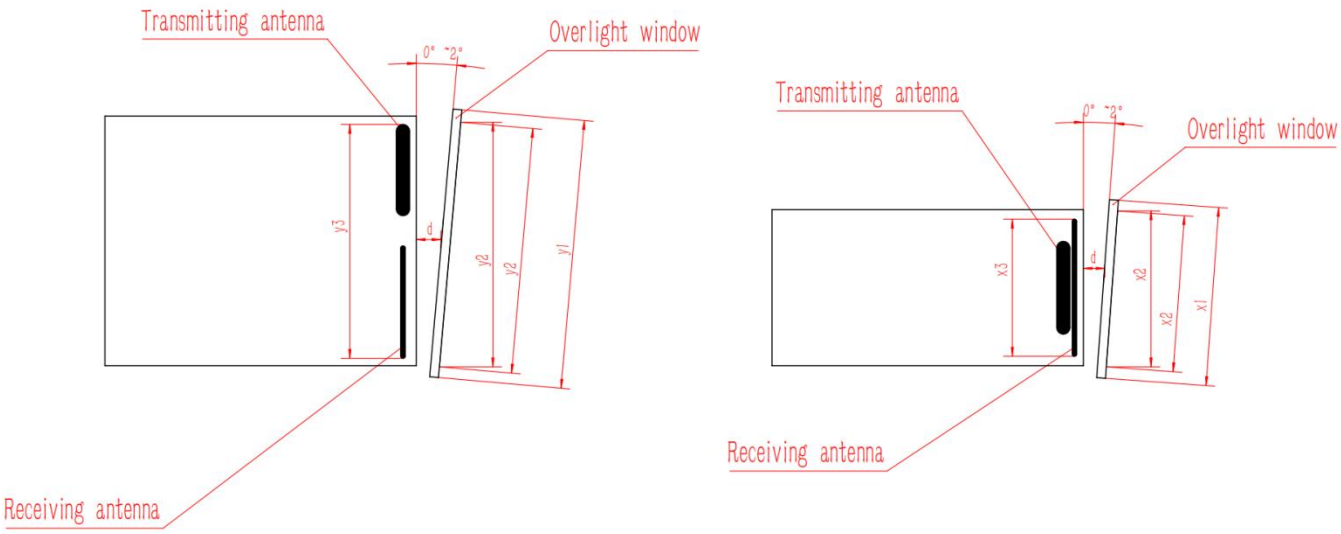
3. **Coating Recommendations**

For the optical window of the 905nm laser rangefinder, it is recommended to coat an anti-reflection film for 855nm to 955nm, with a transmittance of ≥99.5%. According to the specific use environment of the product, other protective films such as hydrophobic film or hard film can be optionally coated on the outer surface of the optical window. Other indicators refer to GJB2485-95, with a transmittance of ≥98%.

4. **Recommendations for Optical Window Shape and Usage**

The effective aperture of the optical window depends on different products, and its overall dimensions should ensure that the effective aperture of the optical window minus the outer diameter of the optical window is ≥2mm, and the outer diameter of the rangefinder antenna minus the projected size of the effective aperture of the optical window is ≥1.5mm, as shown in the schematic diagram below. Since the optical window has a certain absorption of laser, it is recommended that the thickness of the optical window itself be controlled within 2-4mm according to its overall dimensions. Due to the high transmittance of the optical window, it is recommended that the emission optical axis be parallel to the normal line of the optical window, and the schematic diagram of the positions of the optical window and the two lens barrels is shown below. Meanwhile, the air gap between the optical

window and the rangefinder should be less than 0.5mm, and Figure 5 shows the schematic diagrams of two ways of placing the optical window.



The effective aperture of the optical window y_2 - the outer diameter of the optical window y_1>2mm
The outer diameter of the rangefinder antennay$_3$-the projection size of the effective aperture of the optical window y_2，>1.5mm
The air gap d between the optical window and the rangefinder should be as small as possible

The effective aperture of the optical window x_2 - the outer diameter of the optical window x_1>2mm
The outer diameter of the rangefinder antenna x_3-the projection size of the effective aperture of the optical window x_2，>1.5mm
The air gap d between the optical window and the rangefinder should be as small as possible

Schematic diagrams of two ways of the external dimensions and placement of the optical window

5 COMMUNICATION PROTOCOL: UART

5.1 Communication Interface

UART	
Baud Rate	460800 (adjustable)
Data Bit	8
Stop Bit	1
Parity Bit	None

5.2 Data Communication Protocol

For both input and output, this product adopts Hexadecimal Little-Endian Mode 4-Byte Output.

(1)Default frequency 1kHz. One full data has 4 bytes. The format shown as follows:

Frame Header	Distance 2 Bytes		Check Byte
5C	02	11	EC

5C: Frame header 1 byte

02 11: Distance value 2 bytes means the measuring distance is 4354cm, little-endian, range 0-65535cm. When out of range, it would output 65535cm.

EC: From 02 to 11, opposite of the Check byte, 1 byte

（2）Set and Read Commands:

①Reading serial no.

Send	5A	0D	02	0D	0D	Check
Return	5A	8D	02	10	01	Check

10 01 means the serial no. is 272: little-endian, the serial no. shown in the upper computer is: S00272 (Add S before the number).

②UART Baud rate setting

Send	5A	06	02	80	04	Check
Return	5A	86	02	80	04	Check

80 04 as a decimal is 1152: little-endian, it means the baud rate is set to 115200=1152*100

The following list shows 7 available baud rates. Other baud rate settings would not get respond.

Hexadecimal	Decimal	Baud rate
60 00	96	9600
C0 00	192	19200
80 01	384	38400
80 04	1152	115200
00 09	2304	230400
00 0A	2560	256000
00 12	4608	460800

③Read the software version no.

Send	5A	16	02	16	16	Check
Return	5A	96	02	03	02	Check

03 02 means the software version no. is V2.3: little-endian, 02 represents 2, 03 represents 3, Add a

point (.) in the middle.

④Output frequency setting

Send	5A	0B	02	E7	03	Check
Return	5A	8B	02	E7	03	Check

E7 03 means the frequency division is set to 999： little-endian, here the frequency is set to f=1000000/(999+1)=1000Hz.

5.3 Check function ： The above check bytes are all used in this check function.

Begin with the second byte and end with the last second byte, find the inverse of the sum.

```
uint8_t Check_Sum(uint8_t *_pbuff, uint16_t _cmdLen)
{
uint8_t cmd_sum=0;
uint16_t i;
for(i=0;i<_cmdLen;i++)
{
cmd_sum += _pbuff[i];
  }
  cmd_sum = (~cmd_sum);
  return   cmd_sum;
}
```

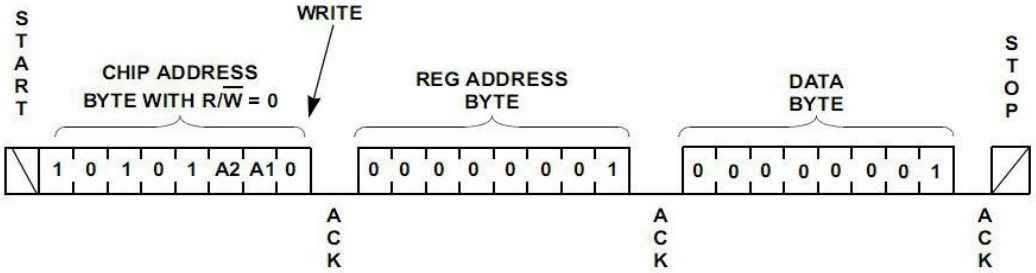
6 COMMUNICATION PROTOCOL: IIC

6.1 The default address is 0x33.

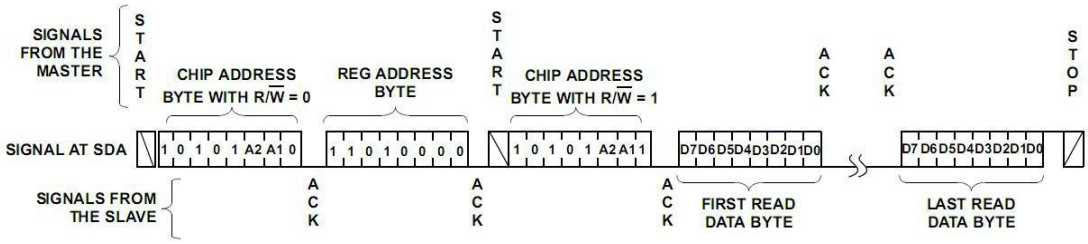
6.2 Communication Protocol

The data speed is from1KHz~ 400KHz. Using the registers to communicate with the host. For the list of registers and addresses, please refer to **6.3**.

Single register write sequence is as follow：



Multiple registers read sequence is as follow:

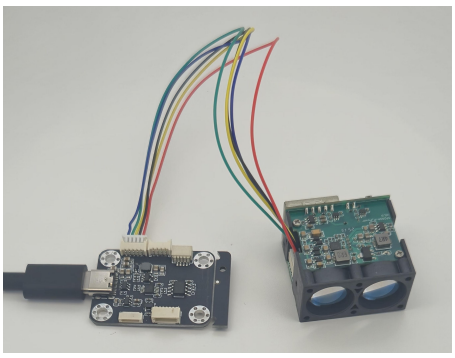


6.3 Definitions of Registers

No.	Register address	Register definition	Attribute	Remarks
0	0x00	Distance-High byte	read only	2byte for distance
1	0x01	Distance-Low byte	read only	2byte for distance
2	0x02	Software version no.-High byte	read only	
3	0x03	Software version no.-Low byte	read only	
4	0x04	serial no.-High byte	read only	
5	0x05	serial no.-Low byte	read only	
6	0x06	change the slave address	write only	0x00-0x7F
7	0x07	to default setting	write only	0x07register write in 0x07
8	0x08	change to UART	write only	0x08register write in 0x08

7 QUICK TEST

Test materials: TTL to USB adapter board, DC power, upper computer / serial port assistant.



After the LRF200H successfully connected to your computer，select the baud rate and click “connect”, then the data can be monitored on the upper computer.

Area 1: Set the parameters and click “connect”

Area 2: Set the baud rate

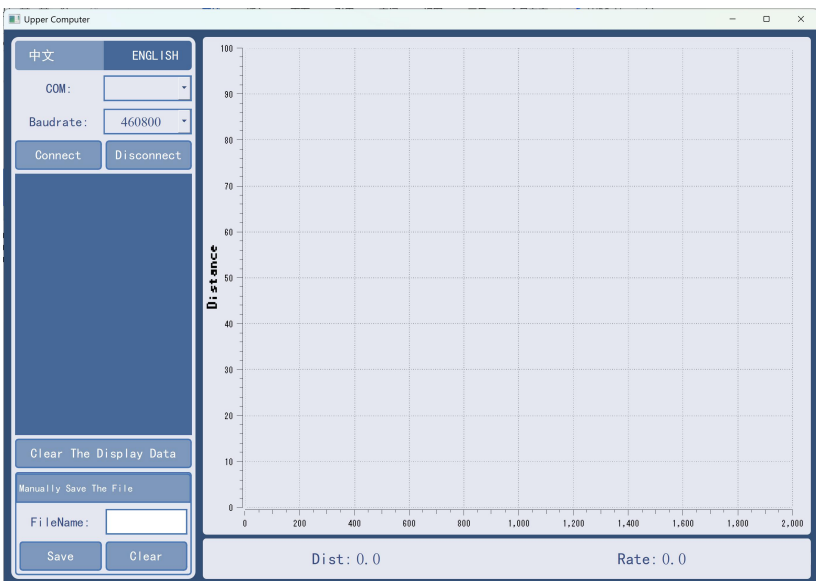
Area 3: Read the serial no.

Area 4: Read the software version no.

Connect the TTL-USB adapter board to the computer, and then click “detect the serial port”. When the serial port no. comes out, click “connect” (it is shown as the default in the following figure). The default frequency is 1000/50Hz, and the default baud rate is 460800 (adjustable). Data bit 8, stop bit 1, no parity bit.

The LRF200H ranging module actively output data (4 bytes each frame) after completing the connection. When out of its measuring range, it would output 0xFFFF (65535).

Here is a sample figure of upper computer:



8 UPDATE HISTORY

Version	Date (YY/MM/DD)	Content
V0.5	22/08/31	Mass produced first editions
V1.0	24/12/30	Updated the format
V2.0	25/03/05	Revised some parameters
V2.1	25/03/06	Added the IIC protocol