

905nm Laser Ranging Module

1

PRODUCT DESCRIPTION

This 905nm pulsed laser rangefinder module has a range of 1200m and is characterized by small size, light weight and long measuring distance. It can be applied to handheld rangefinder, micro UAV, rangefinder scope and so on. It has Uart (TTL_3.3V) data transmission interface, and provides the upper computer software and communication protocol instruction set, which is convenient for users to carry out secondary development.



2

TECHNICAL SPECIFICATIONS

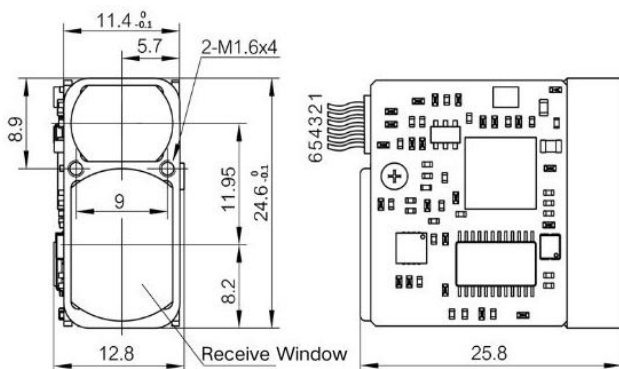
PROJECT	TECHNICAL DATA	
Model	LRF1200A	LRF2000A
Laser Wavelength	905nm	905nm
Eye Safety	Class 3R (IEC 60825-1)	Class 3R (IEC 60825-1)
Divergence Angle	1×6mrad	1×6mrad
Receiving Field of View (FOV)	≤20mrad	≤20mrad
Launch Lens Diameter	Φ10×7.5mm	Φ10×7.5mm
Receiver Lens Diameter	Φ15×10mm	Φ15×10mm
Measuring Range (building)	≥5~1200m	≥5~2000m
Ranging Accuracy	±1m	±1m
Ranging Frequency	3Hz (5~45m) ; 0.75~3Hz (45~1200m)	3Hz (5~45m) ; 0.75~3Hz (45~2000m)
Precision Rate	≥98%	≥98%
False Alarm Rate	≤1%	≤1%
Data Interface	UART (TTL_3.3V)	UART (TTL_3.3V)
Supply Voltage	DC 3~5 V	DC 3~5 V
Standby Power Consumption	≤1mW	≤1mW
Operating Power Consumption	≤1.5W	≤1.5W
Weight	10±0.5g	10±0.5g
Dimention (L×W×H)	25×26×13mm	25×26×13mm
Operation Temperature	-40~+60°C	-20~+55°C

Storage Temperature	-55~+65°C	-55~+65°C
Impact Resistance	1200 g, 1 ms	1200 g, 1 ms
Anti-vibration	5~50~5 Hz, 1 Octave range /min, 2.5 g	5~50~5 Hz, 1 Octave range /min, 2.5 g
Dependability	MTBF≥1500 h	MTBF≥1500 h
Activation Time	≤200ms;	≤200ms;
Waterproof rating	Lens IP67	Lens IP67
ESD Class	(Lens position) Contact discharge 6kV Air discharge 8kV	(Lens position) Contact discharge 6kV Air discharge 8kV
Electromagnetic Compatibility (EMC)	CE/FCC Certification	CE/FCC Certification
Eco-friendly	RoHS2.0	RoHS2.0

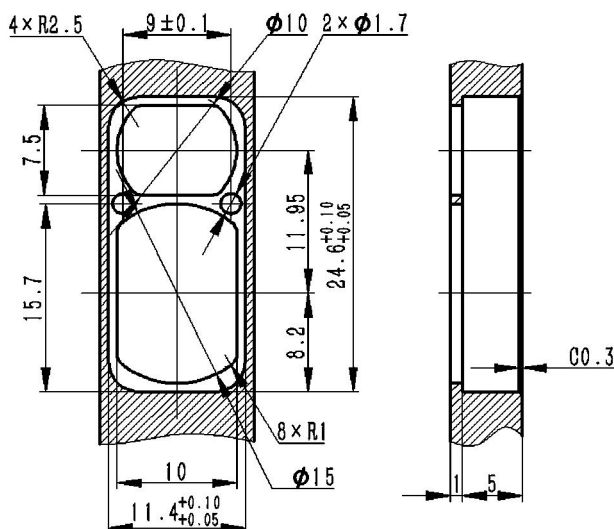
3

OUTLINE DIMENSION(mm)

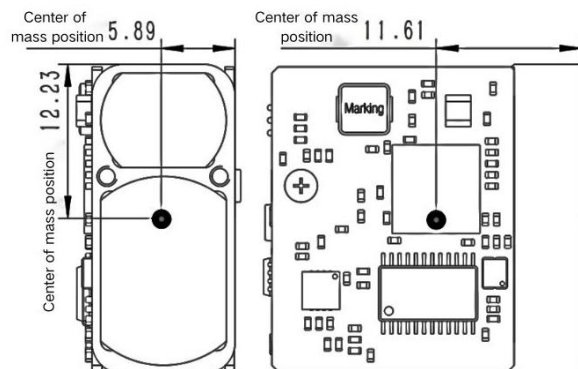
The external dimensions of the LRF1200A/LRF2000A ranging modules are as follows:



The installation interface of the LRF1200A/LRF2000A ranging modules is recommended to be designed as follows:



The center of mass positions of the LRF1200A/LRF2000A ranging modules are as follows:



The coating design requirements for the window lens of the LRF1200A/LRF2000A ranging module are as follows:

Technical Requirement

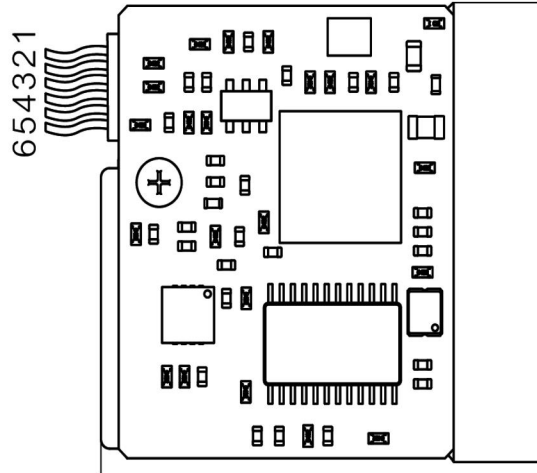
1. ⊕ Permeation enhancement membrane, $R < 0.5\% @ 905 \pm 15 \text{ nm}$.
2. Protective chamfering.

4

PIN INTERFACE

User Electrical interface: UART (TTL_3.3V)

The connector model of electrical interface is FWF08002-S06B13W5M(TXGA), and the specific wiring definition is shown in the table below.



Pin	Definition	Description
1	GND	Serial ground
2	Power positive	
3	UART_NC	
4	UART_TX	Serial transmitter, TTL_3.3V level
5	UART_RX	Serial receiver, TTL_3.3V level
6	POWER_ON	Power switch, TTL_3.3V level (>0.7V ON, <0.15V OFF, Default OFF)

5

EMBEDDED SOFTWARE

● Communication rate and format

Format standard Baud rate (bps):	Format standard Baud rate (bps): 9600/14400/19200/38400/57600/115200 (default)/128000/230400.
Byte data format:	1 start bit, 8 data bits, 1 stop bit, no parity

● Basic format for sending data packets

Zone description	Number of bytes	Range of values	Remarks
Frame headers	2	0x55 0xAA	Fixed values
Command codes	1	0~255	Indicates the control object of the current control command
Data 1	1	0~255	
Data 2	1	0~255	

Data 3	1	0~255	
Data 4	1	0~255	
Checksum	1	0~255	Checksum is the command code, data 1 to 4 all bytes of data summed to the lower 8 bits

● Basic format of return packets

Zone description	Number of bytes	Range of values	Remarks
Frame headers	2	0x55 0xAA	Fixed values
Command codes	1	0~255	Indicates the control object of the current control command
Data 1	1	0~255	
Data 2	1	0~255	
Data 3	1	0~255	
Data 4	1	0~255	
Checksum	1	0~255	Checksum is the command code, data 1 to 4 all bytes of data summed to the lower 8 bits

● Baud rate settings

The baud rates (bps) that can be set are: 9600, 14400, 19200, 38400, 57600bps, 115200, 128000, 230400, a total of eight baud rates can be set. The baud rate setting takes effect immediately after the baud rate is set and no re-powering is required.

Note: Transmit parity code = byte 3 + byte 4 + byte 5 + byte 6 + byte 7.

Receive checksum = byte 1 + byte 2 + byte 3 + byte 4 + byte 5 + byte 6 + byte 7.

Byte 3 (Command): 0x01 - set baud rate command.

Byte 7: specific baud rate setting parameters.

Sent to the Ranging module:

Byte	1	2	3	4	5	6	7	8
Description	0x55	0xAA	0x01	0xFF	0xFF	0xFF	0x01	0xFF

Byte 7, Byte 8: 0x01, 0xFF - baud rate 9600bps.

0x02, 0x00 - baud rate 14,400bps.

0x03, 0x01 - baud rate 19200 bps.

0x04, 0x02 - baud rate 38400bps.

0x05, 0x03 - baud rate 57600bps.

0x06, 0x04 - baud rate 115200bps.

0x07, 0x05 - baud rate 128000bps.

0x08, 0x06 - baud rate 230400 bps.

The Ranging module returns:

Byte	1	2	3	4	5	6	7	8
Description	0x55	0xAA	0x01	status	0xFF	0xFF	0x01	Checksum

Status: 0x00 - baud rate setting failure.

0x01 - baud rate set successfully.

Byte 7: 0x01 - baud rate 9600 bps.

0x02 - baud rate 14400 bps.

0x03 - baud rate 19,200 bps.
 0x04 - baud rate 38400 bps.
 0x05 - baud rate 57600 bps.
 0x06 - baud rate 115200 bps.
 0x07 - baud rate 128,000bps.
 0x08 - baud rate 230,400 bps.

● Single measurement

Sent to the Ranging module:

Byte	1	2	3	4	5	6	7	8
Description	0x55	0xAA	0x88	0xFF	0xFF	0xFF	0xFF	Checksum

The Ranging module returns:

Byte	1	2	3	4	5	6	7	8
Description	0x55	0xAA	0x88	Status	0xFF	DATA_H	DATA_L	Checksum

Status: 0 - single measurement failure (DATA_H=0xFF, DATA_L=0xFF).

1 - single measurement success (DATA_H=measurement result high Byte;
 DATA_L=measurement result low Byte).

● Continuous measurement

Sent to the Ranging module:

Byte	1	2	3	4	5	6	7	8
Description	0x55	0xAA	0x89	0xFF	0xFF	0xFF	0xFF	Checksum

The Ranging module returns:

Byte	1	2	3	4	5	6	7	8
Description	0x55	0xAA	0x89	Status	0xFF	DATA_H	DATA_L	Checksum

Status: 0 - multiple measurement failure (DATA_H=0xFF, DATA_L=0xFF).

1 - multiple measurement success (DATA_H=measurement result high Byte; DATA_L=measurement result low Byte).

● Stop continuous measurement

Sent to the Ranging module:

Byte	1	2	3	4	5	6	7	8
Description	0x55	0xAA	0x8E	0xFF	0xFF	0xFF	0xFF	Checksum

The Ranging module returns:

Byte	1	2	3	4	5	6	7	8
Description	0x55	0xAA	0x8E	Status	0xFF	0xFF	0xFF	Checksum

Status: 0 - stopping multiple measurements from failing.

1 - stopping multiple measurements successfully.

Note: Data is returned in hexadecimal, all data results will be output by multiplying the real data by 10.

Example: dist = 1200.3m, output data is 12003, converted to 4E23 in hexadecimal, i.e. Data1 = 0x4E, Data2 = 0x23.

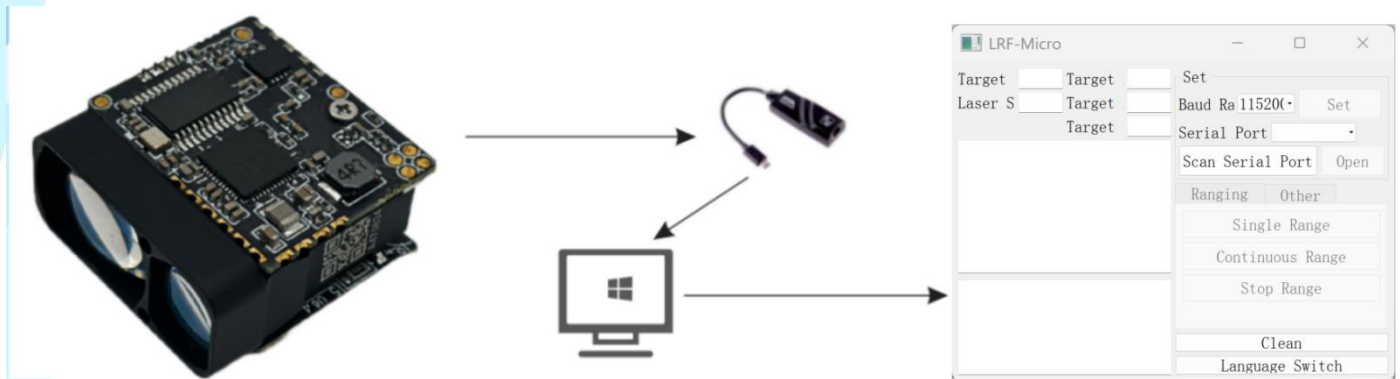
6

OPERATION STEPS

Step 1: Insert the data cable into the ranging module, which can supply power to the module and output the measurement data at the same time. (Note: Do not insert the plug in the wrong direction, and strictly control the power supply voltage range between 3.3V and 5V.)

Step 2: Install the Serial Port Genius software and connect to a computer or other control devices through an adapter interface.

Step 3: After the software is installed, open the display interface.



7

PRECAUTIONS

1. When using this module, do not look directly into the laser beam.
2. Do not use a lens barrel or other additional optical devices to operate this module to avoid increasing the risk of eye damage.
3. Do not disassemble the module. Disassembling the product will result in the loss of the right to repair.
4. When transporting, please add sufficient cushioning materials to the packaging box to avoid damage to the module.
5. Do not place the module on an unstable high place to prevent it from falling and being damaged.
6. Do not place the module in a harsh environment or near a heat source to prevent uncontrollable impacts on the module.
7. When there is a sharp change in temperature, there will be condensation fog on the surface of the main lens of the module. Do not use the module at this time.
8. If the exposed lens is dirty, gently wipe it clean with a lens cleaning cloth. Do not use other items to wipe it to avoid damaging the coating layer on the surface of the lens.
9. This module comes with a one-year quality guarantee and lifetime maintenance. In case of quality problems of its own, it can be replaced free of charge. For problems caused by human factors, repair and replacement of parts will be charged according to the actual situation of the product.

The factors that affect the ranging ability, ranging response speed, and speed measurement accuracy include:

Target reflectivity: Generally, the higher the target reflectivity, the better the ranging ability and the faster

the ranging response speed. For example, for a target with medium reflectivity, a distance of 1500 meters can be measured, for a target with high reflectivity, a distance of not less than 1800 meters can be measured, and for a target with low reflectivity, it may only be possible to measure a distance of 600 meters. (Targets that are difficult to form diffuse reflection, such as the water surface, may not be measurable.)

Target shape: When the area of the reflective surface of the measured target is too small or uneven, the ranging ability and ranging response speed will be correspondingly reduced.

- **Measurement angle:** When the laser angle is vertically incident on the reflective surface of the measured target, the ranging ability is better and the ranging response speed is faster. Conversely, the ranging ability and ranging response speed will decrease. Using it at extreme measurement angles cannot ensure that the ranging ability and ranging response speed specified in this manual can be achieved.

Measurement environment: The factors affecting the ranging ability and ranging response speed also include the intensity of sunlight, the concentration of water vapor and suspended particulate matter in the air, the angle of deviation from the sunlight irradiation, etc. (For example, in rainy, foggy, snowy, or hazy weather conditions, the measuring range will be reduced.)

The measuring range of this series of ranging telescopes is defined under the following conditions:

- 1) The measured target has a medium reflectivity, such as the wall surface of a building.
- 2) The reflective surface of the measured target is perpendicular to the direction of laser emission.
- 3) The measuring weather is sunny but not under direct sunlight.

Suggestion: When measuring distant targets, please fix this module with a tripod to reduce the shaking of the module during the measurement process, so as to obtain better measurement results.

I. The factors that affect the ranging ability and ranging response speed include:

Target reflectivity: Generally, the higher the target reflectivity, the better the ranging ability and the faster the ranging response speed. For example, for a target with medium reflectivity, a distance of 600 meters can be measured; for a target with high reflectivity, a distance of not less than 800 meters can be measured; and for a target with low reflectivity, it may only be possible to measure a distance of 300 meters. (For targets that are difficult to form diffuse reflection, such as the water surface, it may not be possible to measure the distance.)

Target shape: When the reflective surface of the measured target is too small or uneven, the ranging ability and ranging response speed will be correspondingly reduced.

Measurement angle: When the laser angle is vertically incident on the reflective surface of the measured target, the ranging ability is better and the ranging response speed is faster. Conversely, the ranging ability and ranging response speed will decrease. Using it at extreme measurement angles cannot ensure that the ranging ability and ranging response speed specified in this manual can be achieved.

Measurement environment: The factors affecting the ranging ability and ranging response speed also include the intensity of sunlight, the concentration of water vapor and suspended particulate matter in the air, the angle of deviation from the sunlight irradiation, etc. (For example, in rainy, foggy, snowy, or hazy

weather conditions, the measuring range will be reduced.)

II. Suitable Targets for Measurement This product can measure targets with high reflectivity (such as highway road signs), targets with medium reflectivity (such as the walls of buildings), and targets with low reflectivity (such as trees, golf flagsticks, animals, etc.). When the reflectivity drops to a certain level, the measuring range will be correspondingly reduced.



Highway road sign



The wall surface of a building



Trees



Animal

The measuring range of this module is defined under the following conditions:

- 1) The measured target has a medium reflectivity, such as the wall surface of a building.
- 2) The reflective surface of the measured target is perpendicular to the direction of laser emission.
- 3) The measuring weather is sunny but not under direct sunlight.

Remarks:

It is recommended that when you measure distant targets, you fix this module with a tripod to reduce the shaking of the module during the measurement process, so as to obtain better measurement results.