1500m Compact Long-Distance Laser RangeFinder Module
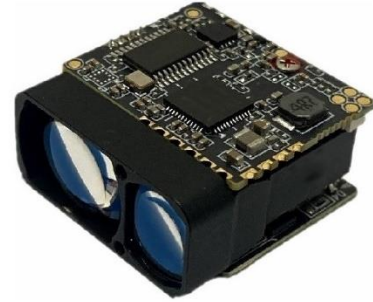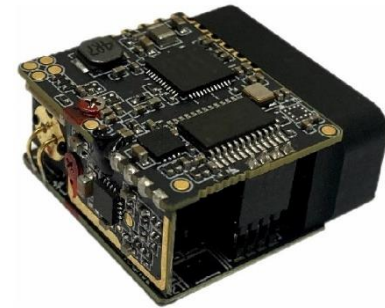
Key Properties

- Max Range: ≥1500m
- Min Range: 5m
- Accuracy: ±1m
- Frequency: 0.75~3Hz
- Wavelength: 905nm
- Divergence: 12mrad
- Laser Safety: Class 3R
- Communication Interface: TTL(UART)

Function

- Single measurement
- Continuous measurement
- Baud rate settings

Introduction

The LRF1500M1LSQ is an outdoor long-range, compact-volume solution product from IADIY. Its compact size has been designed to reduce the module to 25×26×13mm, with a maximum measurement range of over 1500m. It has been integrated by many customers into applications such as handheld devices, unmanned aerial vehicles (UAVs), unmanned surface vehicles (USVs), and gun scopes, among others.

The LRF1500M1LSQ utilizes a common 3.3V TTL UART communication interface and comes with testing software and a USB-TTL cable provided by IADIY, facilitating quick evaluation and integration development for users.

1. Specifications

Technical specifications	
Model name	LRF1500M1LSQ
Max Range	1500m
Min Range	5m
Accuracy	±1 m
Frequency	3 Hz @ 5~50m 0.75~3 Hz @ 50~1500m
Detection probability	≥98 %
False alarm rate	≤1 %
Optical Design	
Wavelength	905 nm
Divergence	12 mrad
Receive FOV	20 mrad
Emission aperture	Φ10×7.5mm
Receives aperture	Φ15x10mm
Laser Safety	Class 3R
Communication	
Communication Interface	3.3V TTL (UART)
Baud rate	9600~230400bps, default as 115200bps
Interface Connector	FWF08002-S06B13W5M (TXGA)
Power Consumption	
Input Voltage	DC 3 ~ 5V
Standby power consumption	≤1 mW
Average power consumption	≤1.5 W
Mechanical	
Dimension	25 × 26 × 13 mm
Weight	10±0.5 g
Environmental	
Operating Temperature	-40 ~ +60 °C
Storage Temperature	-55 ~ +65 °C
Protection Class	IP67
Mechanical Shock	1200g/1ms (GJB150.16A-2009)
Vibration	5~50~5 Hz，1 Octave range/min，2.5 g
Reliability	MTBF ≥ 1500 h
ESD Class	Contact discharge 6kV, Air discharge 8kV (Lens position)
Electromagnetic Compatibility (EMC)	CE/FCC
Environmental Compliance	RoHS2.0

Conditions of measurement:

1. The measurement target has medium reflectivity and is the size of a building wall.

2. The measurement target has a reflective surface that is perpendicular to the direction of laser emission.

3. The measurement is conducted in clear weather conditions, but not in direct sunlight.

2. Pin Assignment

The electrical interface connector model used by LRF1500M1LSQ is s FWF08002-S06B13W5M (TXGA), and the specific wiring definitions are shown in the table below.
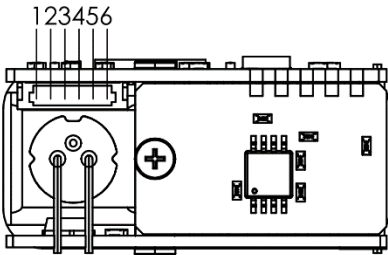

Pin	Definition	Description
1	GND	Power supply, ground
2	VIN	Power supply, DC 3~5V
3	NC	Reserve
4	UART_TX	Serial port transmitter, TTL_ 3.3V level
5	UART_RX	Serial port receiver, TTL_ 3.3V level
6	POWER_ON	Module power switch, TTL_ 3.3V level; Module ON (> 0.7V), Module OFF (< 0.15V)

3. Dimensions

3.1 The overall dimensions and user installation interface of the ranging module are depicted in the figure below.
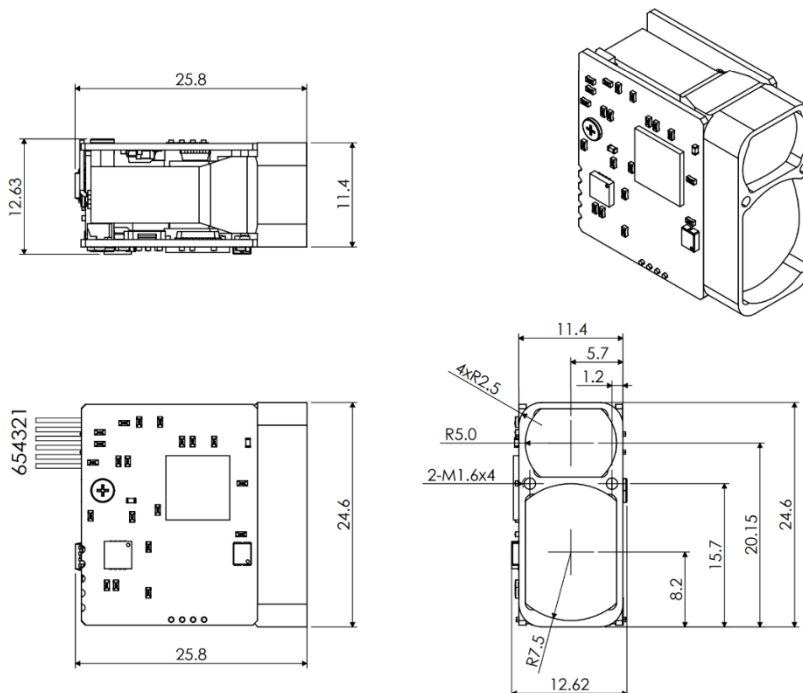
3.2 The center of mass of the LRF1500M1LSQ ranging module is located as follows:
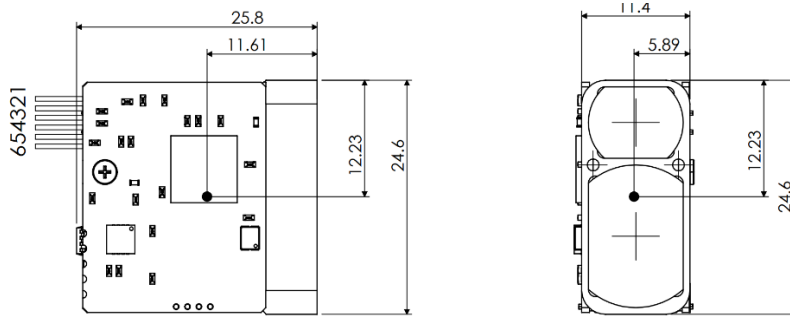
3.3 The window lens coating design requirements for the LRF1500M1LSQ rangefinder module are as follows: permeation enhancement membrane, R<0.5%@905±15nm

4. Communication

4.1 UART configuration parameters:

At a default baud rate of 115200 bps, the protocol is set to 8N1, and byte data is in hexadecimal.

Baud rate: 9600 / 14400 / 19200 / 38400 / 57600 / 115200(default) / 128000 / 230400

Data bits: 8

Parity bits: None

Stop bits: 1

Note: Data is returned in hexadecimal format, and all results are output after multiplying the actual data by 10.

4.2 Data Frame Format for sending and return

Description	Number of bytes	Value	Remark
Frame header	2	0x55 0xAA	Fixed value
Command code	1	0~255	Indicates the function parameters of the current 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	Sum of command codes, data1~4 and considering only the lower 8 bits

4.3 Command code list

Command code	Description
0x01	Baud rate setting
0x88	Single measurement
0x89	Continuous measurement
0x8E	Stop measurement

4.4 Command description

4.4.1 Single measurement

Send								
Byte	1	2	3	4	5	6	7	8
Describe	0x55	0xAA	0x88	0xFF	0xFF	0xFF	0xFF	0x84

Receive								
Byte	1	2	3	4	5	6	7	8
Describe	0x55	0xAA	0x88	Status	0xFF	DATA_H	DATA_L	Checksum
*Status: 0 is single measurement failed (DATA_H=0xFF, DATA_L=0xFF)								
1 is single measurement successful								
*DATA_H: High byte of the measurement result								
*DATA_L: Low byte of the measurement result								
*Example: When DATA_H = 0x23 and DATA_L = 0x45, the distance is calculated as (0x23*256 + 0x45) / 10 = 902.9 m.								

4.4.2 Continuous measurement

Send								
Byte	1	2	3	4	5	6	7	8
Describe	0x55	0xAA	0x89	0xFF	0xFF	0xFF	0xFF	0x85

Receive								
Byte	1	2	3	4	5	6	7	8
Describe	0x55	0xAA	0x89	Status	0xFF	DATA_H	DATA_L	Checksum
*Status: 0 is single measurement failed (DATA_H=0xFF, DATA_L=0xFF)								
1 is single measurement successful (DATA_H , DATA_L=measurement result)								
*DATA_H: High byte of the measurement result								
*DATA_L: Low byte of the measurement result								
*Example: When DATA_H = 0x23 and DATA_L = 0x45, the distance is calculated as (0x23*256 + 0x45) / 10 = 902.9 m.								

4.4.3 Stop continuous measurement

Send								
Byte	1	2	3	4	5	6	7	8
Describe	0x55	0xAA	0x8E	0xFF	0xFF	0xFF	0xFF	0x8A

Receive								
Byte	1	2	3	4	5	6	7	8
Describe	0x55	0xAA	0x8E	Status	0xFF	0xFF	0xFF	Checksum
*Status: 0 is stop measurement failed, 1 is stop measurement successful.								

4.4.4 Baud rate setting

Send								
Byte	1	2	3	4	5	6	7	8
Describe	0x55	0xAA	0x01	0xFF	0xFF	0xFF	Baudrate	Checksum

*Baudrate: 0x01 is 9600bps   (Checksum=0xFF)

0x02 is 14400 bps   (Checksum=0x00)

0x03 is 19200 bps   (Checksum=0x01)

0x04 is 38400 bps   (Checksum=0x02)

0x05 is 57600 bps   (Checksum=0x03)

0x06 is 115200 bps   (Checksum=0x04)

0x07 is 128000bps   (Checksum=0x05)

0x08 is 230400bps   (Checksum=0x06)

Receive								
Byte	1	2	3	4	5	6	7	8
Describe	0x55	0xAA	0x01	Status	0xFF	0xFF	Baudrate	Checksum

*Status: 0 is setting failed, 1 is setting successful.

*Baudrate: 0x01 is 9600bps

0x02 is 14400 bps

0x03 is 19200 bps

0x04 is 38400 bps

0x05 is 57600 bps

0x06 is 115200 bps

0x07 is 128000bps

0x08 is 230400bps

5. Package List

	NAME	Qty.
1	LRF1500M1LSQ Laser rangefinder module	1
2	Serial port cable	1
3	Product manual (electronic version)	1
4	Product test report	1

6. Notes

6.1 Safety mark

	【**Danger**】 Be cautious of laser radiation. This product falls under safety class 3R. Ensure proper safety precautions and avoid direct exposure to the laser.
	【**Warning**】 Any nonstandard operation may result in product damage and potential personal injury.
	【**Electrostatic protection**】 Static electricity can cause irreversible damage to the internal components of the product. Exercise caution and implement proper electrostatic protection measures during use.
	【**Environmental humidity**】 During transportation, storage, and use, avoid exposing this product to humid environments. Working in high humidity conditions, which may lead to condensation and frost, can impact ranging performance and may damage the module.

6.2 Precautions for use

6.2.1 During transportation and storage, please keep the product stored in the provided packaging. When using the product, ensure it is kept away from water and other liquids to prevent dust or other contaminants. Keep the optical glass surface (transmitting and receiving windows) clean. If there is dust or stubborn deposits that are difficult to remove, please contact the after-sales department.

6.2.2 Do not disassemble any parts of the product. Any modifications made to the electronic, mechanical, and optical components will void the warranty. Before using the product, carefully read the manual. Usage beyond specified working conditions (working voltage/temperature range, impact vibration level, etc.) may cause permanent damage, voiding the warranty. If damage occurs, contact the after-sales department for assistance.

6.2.3 Ranging objects with low surface reflectivity in strong light environments may reduce ranging performance. Ranging through materials like glass, optical filters, plexiglass, or other translucent substances may result in significant ranging errors. Rapid temperature changes and adverse weather conditions such as rain, snow, fog, haze, and dust can affect performance.

6.2.4 Avoid ranging targets within 5m, especially close-range highly reflective targets (glass, smooth metal surfaces, etc.). Prevent multiple ranging modules from operating toward each other at close range, and avoid high-energy laser light sources shooting directly at the receiving antenna of the ranging module. Keep the receiving lens blocked during product assembly and commissioning to prevent potential permanent damage to detection components.

6.3 Factors that Affect Ranging Capability and Accuracy

6.3.1 Target Reflectivity: Typically, the higher the target's reflectivity, the better the ranging capability and the faster the response. For example, a medium reflectivity target can be measured up to 1500 meters, while a low reflectivity target may only reach up to 800 meters.

6.3.2 Measurement Angle: The performance improves with a more favorable measurement angle. When the laser measures the target vertically, the range capability is enhanced and the response is faster. Conversely, extreme angles may not achieve the range capability and response speed specified in this manual.

6.3.3 Measurement Environment: Other factors that affect the ranging capability and response speed include the intensity of environmental conditions.

6.4The range is defined under the following conditions:

6.4.1The measurement target has medium reflectivity and is the size of a building wall.

6.4.2The measurement target has a reflective surface that is perpendicular to the direction of laser emission.

6.4.3The measurement is conducted in clear weather conditions, but not in direct sunlight.