



905nm 1500m Semiconductor Multi-Pulse Rangefinder Module Enhanced

Model:LRF1500A

OVERVIEW



The LRF1500A laser distance measurement module is a new type of lightweight and compact distance measurement module operating at a wavelength of 905nm. With a maximum measuring range of $\geq 1500\text{m}$, it adopts the UART-TTL interface and is equipped with testing software, which facilitates further development by users. It features small size, light weight, and reliable performance. It can be used in aviation, communication, geology, policing, outdoor sports, and other occasions.

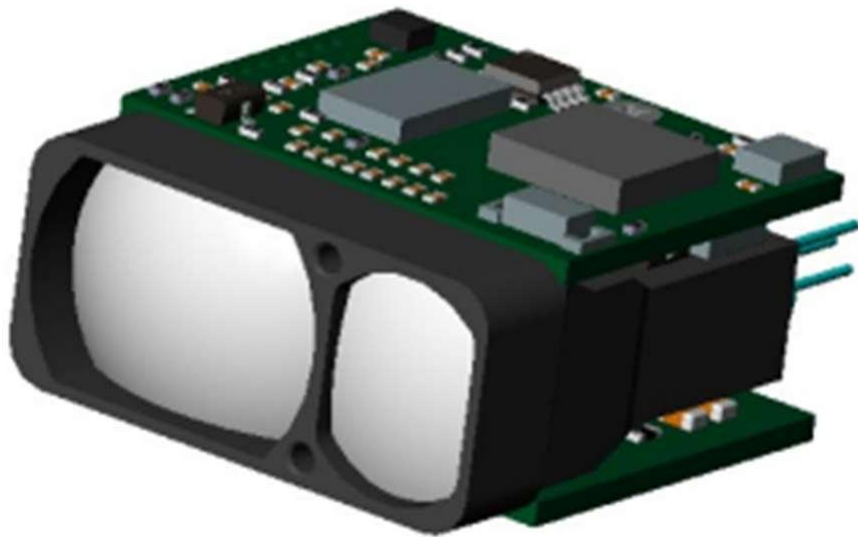
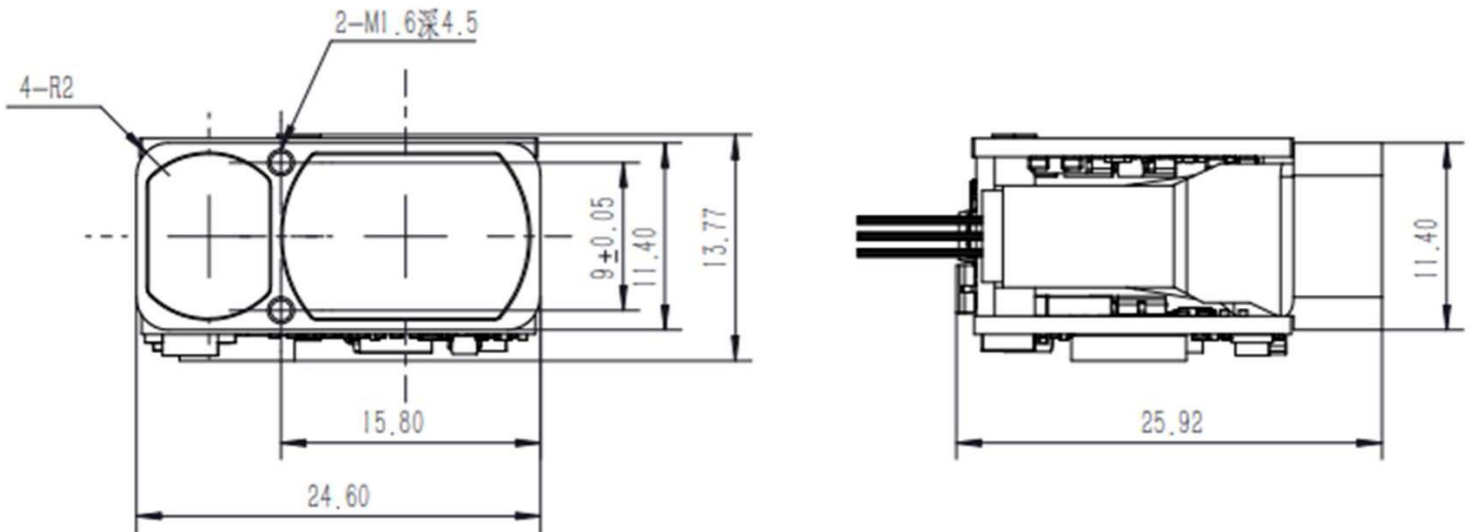
TECHNICAL SPECIFICATIONS

Project	Technical data
Model	LRF1500A
Laser Wavelength	905nm
Eye Safety	Class 1
Divergence Angle	$\leq 6\text{mrad}$
Display accuracy	0.1m
Launch Lens Diameter	7mm \times 10mm
Receiver Lens Diameter	15mm \times 10mm
Measuring Range (3m x 3m Target)	$\geq 10\sim 1500\text{m}$
Ranging Accuracy	10 $\leq L \leq 100\text{m}$: $\pm 1\text{m}$ L > 100m: $\pm (1+L*0.4\%)\text{m}$
Display Accuracy	0.1m
Ranging Frequency	$\geq 1\text{Hz}$
Accurately measuring probability	$\geq 98\%$ (10-400)m; $\geq 80\%$ (401-1500)m
Start Time	$\leq 500\text{ms}$
Data Interface	UART (TTL_3.3V)
Supply Voltage	3.3 $\pm 0.1\text{V}$
Standby Power Consumption	$\leq 700\text{mW}$
Operating Power Consumption	$\leq 1.5\text{W}$
Weight	$\leq 12\text{g}$
Dimension	14mm \times 25mm \times 26mm
Operation Temperature	-20 $\sim +55^\circ\text{C}$
Storage Temperature	-55 $\sim +65^\circ\text{C}$
Impact Resistance	1200g, 1ms
Anti-vibration	800g/ms (10 times/s in the optical axis direction)
Dependability	MTBF $\geq 1500\text{ h}$



Protection Class	IP67(Head piece)
ESD Class	(Lens position) Contact discharge 6kV Air discharge 8kV
Electromagnetic Compatibility (EMC)	CE/FCC Certification
Eco-friendly	RoHS2.0

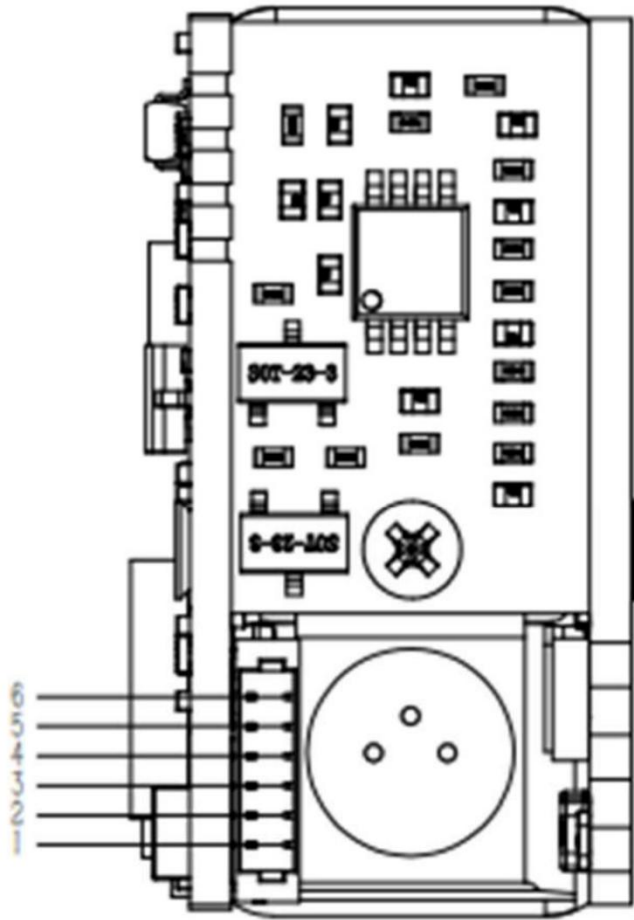
MECHANICAL DIMENSION(mm)



ELECTRICAL INTERFACE

User Electrical Interface: UART (TTL 3.3V)

Connector Model No.: FWF08002-S06B13W5M, wire sequence and specific definitions are shown below:



Pin	Definition	Illustrate
1	GND	Earth (wire)
2	Power supply	3.3V DC power supply
3	NC	Empty pin
4	TTL_TXD	Serial transmitter, TTL level 3.3V
5	TTL_RXD	Serial Receiver, TTL Level 3.3V
6	Enable Pin	low level power on

COMMUNICATION PROTOCOL

Communication mode: using serial communication mode

Baud rate: **115200 (default)**

Data Bits: 8 Bits

Length of a frame: 8 bytes

DATA PROTOCOL

		Frame header H	Frame header L	Function word	D1	D2	D3	D4	Calibration
	Send	55	AA						SUM(function word +DATA1+...+DATA4)
	Reply	55	AA						SUM(frame header H + frame header L + ...+DATA4)

MEASUREMENT INSTRUCTION

Single ranging	Send	55	AA	88	FF	FF	FF	FF	SUM[3: 7]
55 AA 88 FF FF FF FF 84									



	Reply	55	AA	88	STA	FF	DIS_H	DIS_L	SUM[1: 7]
		STA = 0 measurement failure; STA = 1: The measurement was successful DIS_H: high bytes of the measured result; DIS_L: The lower bytes of the measurement result Data returns are returned in hexadecimal, and all data results are output by multiplying the real data by 10							
Continuous ranging	send	55	AA	89	FF	FF	FF	FF	SUM[3: 7]
		55 AA 89 FF FF FF FF 85							
	Reply	55	AA	88	STA	FF	DIS_H	DIS_L	SUM[1: 7]
		STA = 0 measurement failure; STA = 1: The measurement was successful DIS_H: high bytes of the measured result; DIS_L: The lower bytes of the measurement result Data returns are returned in hexadecimal, and all data results are output by multiplying the real data by 10							
Stop ranging	send	55	AA	8E	FF	FF	FF	FF	SUM[3: 7]
		55 AA 8E FF FF FF FF 8A							
	Reply	55	AA	8E	STA	FF	FF	FF	SUM[1: 7]
		STA= 0 closes multiple measurement failures; STA = 1 closes multiple measurements successfully							
Angular measurement	send	55	AA	8A	FF	FF	FF	FF	SUM[3: 7]
		55 AA 8A FF FF FF FF 86							
	Reply	55	AA	8A	STA	FF	ANG_H	ANG_L	SUM[1: 7]
		STA = 0 Measurement failure; STA = 1: Measurement success ANG_H: Measurement result high byte; ANG_L: Measurement result low byte, data return to hexadecimal return, all data results will be the real data multiplied by 10 output, only in the movement with an angle sensor effective							

POWER-ON SELF-TEST

Self-test information	Reply	55	AA	80	STA	00	00	ErrCode	SUM[1: 7]
		STA= 0 Boot initialization failed, ErrCode is the error code; STA= 1 Boot initialization success. By default, initialization success does not reply to such messages.							

SETTING UP THE SYSTEM

Baud rate	Send	55	AA	TYPE	FF	FF	FF	FF	SUM[3: 7]
		TYPE = 01 sets the baud rate to 9600 bps TYPE = 02 Set the baud rate to 14400 bps TYPE = 03 Set the baud rate to 19200 bps TYPE = 04 Set the baud rate to 38400bps TYPE = 05 Set the baud rate to 56000 BPS TYPE = 06 Set the baud rate to 57600bps TYPE = 07 Set the baud rate to 115200bps TYPE = 08 Set the baud rate to 128000bps TYPE = 09 Set the baud rate to 230400bps The baud rate does not change immediately after it is set and only takes effect after a restart							
	Reply	55	AA	TYPE	STA	FF	FF	FF	SUM[1: 7]
		STA = 0 setting failure; STA = 1 is set successfully							
External circuit enable	Send	55	AA	70	AB	CD	00	00	SUM[3: 7]
		55 AA 70 AB CD 00 00 E8							
	Reply	55	AA	70	STA	00	00	00	SUM[1: 7]
		STA = 0, enable failure; STA = 1, enabling success							
		55	AA	71	AB	CD	00	00	SUM[3: 7]
		55 AA 71 AB CD 00 00 E9							
		55	AA	71	STA	00	00	00	SUM[1: 7]
		STA = 0, disable failure; If STA = 1, it is disabled successfully							

ErrCode

Error code	Description	Remarks
0x00	No echo signal was received	
0x16	Out of range: below the minimum range	
0x18	No echo signal was received	
0x00~0x07	Hardware error	



- In this mode, the device consumes minimal power. The MCU is in an off state and does not respond to any commands.
- When a measurement is needed, pull the enable pin low to switch the device into normal working mode and automatically perform one measurement.
- After the measurement is complete, pull the enable pin high to return the device to low-power mode, with power consumption below 10mW.

➤ SECONDARY LOW- POWER MODE

- In this mode, the device's power consumption is reduced, and the MCU is in standby mode, capable of responding to other commands.
- Send the "External Circuit Disabled" command to switch the device into secondary low-power mode.
- When a measurement is needed, simply send a "Measurement" related command to automatically switch the device into normal working mode for measurement.
- Alternatively, send the "External Circuit Enabled" command to switch the device into normal working mode independently.

➤ NOTES

1. The verification content for sending and receiving may differ, so please pay attention to discrimination.
2. The checksum is the lower eight bits of the sum of the bytes requiring verification.
3. All data is transmitted and received in hexadecimal.

➤ PRECAUTIONS

- Please avoid looking directly at the laser when using this module.
- Please use sufficient cushioning material during transportation.
- If the exposed lens is dirty, gently wipe it with a lens cleaning cloth, and if necessary, use an alcohol solution to clean it.
- Do not dismantle the module; dismantled products will no longer be covered by our after-sales warranty.
- The module has a one-year warranty and lifetime maintenance; in case of quality issues, it can be replaced free of charge; for issues caused by human factors, we will provide charged repair and replacement of parts based on the actual condition of the product.

The basic conditions for distance measurement with this module are as follows:

- The measurement target has a medium reflectivity, such as the surface of a light-colored building.
- The reflective surface of the measurement target is perpendicular or nearly perpendicular to the laser emission direction.
- Measurements are taken under moderate weather conditions, and the laser module is not directly exposed to sunlight.
- Minimize module vibration during measurement.