ERDILRF

1535nm Eye-safe Laser Ranging Module

Model: LRF0105C

1. PRODUCT DESCRIPTION

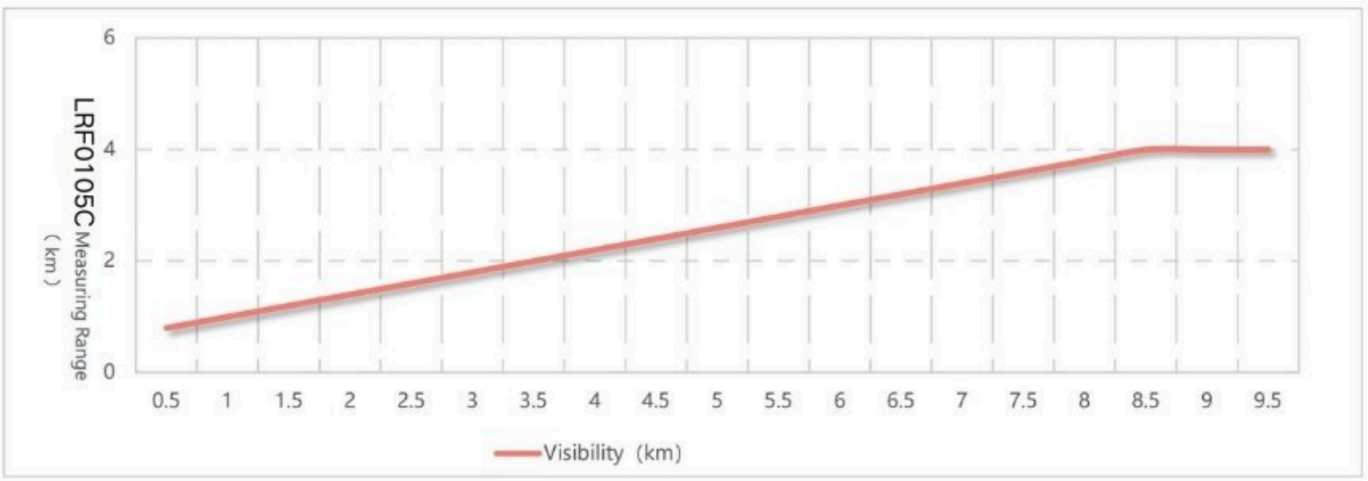
The LRF0105C is a mini 1535nm eye-safe laser rangefinder module delivering ≥3000m target and ≥1500m human-range performance with ±2m accuracy, ≤1mrad divergence and multi-target detection. Running from a 3–5V supply with ≤0.8W average power and 3.3V TTL control in a Φ34×47.5mm, 29g housing, it is ideal for UAV gimbals, handheld optics, smart robots and industrial sensing platforms.



2. TECHNICAL SPECIFICATIONS

PROJECT	PERFORMANCE INDICATORS
Model	LRF0105C
Laser Wavelength	1535±5nm
Eye- safety	Class I
Divergence Angle	≤1 mrad
Laser Energy	≥100 μJ
Launch Lens Diameter	Φ8 mm
Receiver Lens Diameter	Φ20 mm
Measuring Range (Reflectance 30%; visibility ≥ 5km.)	Reference target(2.3m×2.3m)≥3000m Measuring human target(0.5m×1.7m) ≥1500m
Minimum Range	≤15 m
Ranging Frequency	Single, 1Hz, 5Hz, 10Hz
Number of multi-target detections	Up to 3 targets
Ranging Accuracy	±2 m
Range Resolution	≤0.1 m
Precision Rate	≥98%
False Alarm Rate	≤1%
Pin-in-lead package model	FWF08002-S06B13W5M
Supply Voltage	DC3 ~ 5 V
Standby power consumption	≤1mW
Average power consumption	≤0.8W
Peak Power Consumption	≤1.5W

Weight	≤29±1 g
Dimension (L×W×H)	Φ34mm×47.5mm
Operating Temperature	-40 ~ +70 ℃
Storage Temperature	-55 ~ +75 ℃
Impact Resistance	Per factory shock test procedure
Vibration Resistance	Per factory vibration test procedure



3. MECHANICAL DIMENSIONS

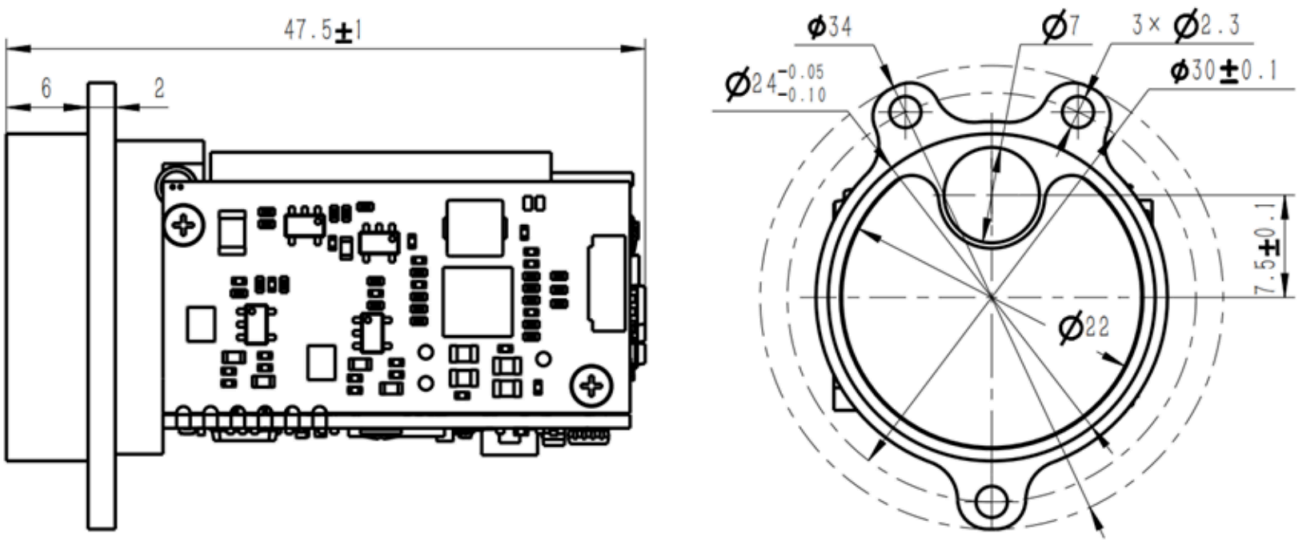


Figure 1 Outline Dimensions(mm)

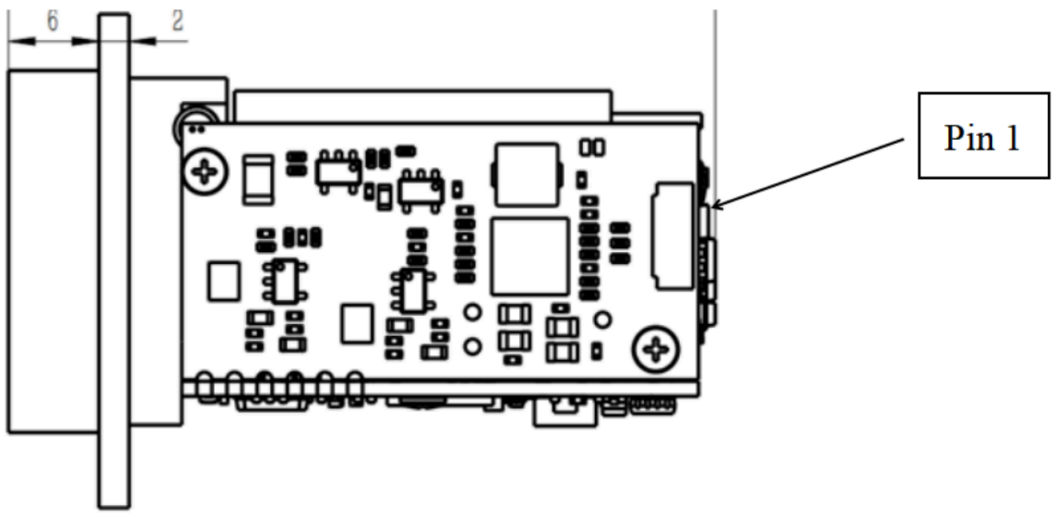
4. PIN INTERFACE

a) Power supply voltage: 3~5V;

The host computer realizes cross-linking test with the rangefinder through a 6PIN connector (FWF08002-S06B13W5M (Teska connector)). The pin definition of the communication port on the rangefinder is shown in the table.

Product electrical pin definition

Pin	Identification number	Definition of electrical characteristics	Cable color
P-1	COM	Input power negative pole	Power supply
P-2	VIN+	Input power positive pole	
P-3	-	(Empty)	
P-4	TTL_TXD	Signal output port	From rangefinder to host computer
P-5	TTL_RXD	Signal input port	From host computer to rangefinder
P-6	POWER_CTL	Low power control port	＞0.7V to turn on, ＜0.15V to turn off



Connector connection 1 pin position

5. COMMUNICATION PROTOCOL

1. Interface Overview

The system is connected to the laser rangefinder through the TTL interface. The system sends control commands to the laser rangefinder through the serial port and receives the status and self-test information of the laser rangefinder.

2. Communication interface

The data transmission between the rangefinder and the host computer includes the following:

- Control commands: including single, 1Hz ranging commands, 5Hz ranging commands (expandable), query commands, etc.;
- Return data: including distance information, ambient temperature, rangefinder status, etc.

The data exchange between the rangefinder and the host computer adopts TTL communication, and its characteristics are as follows:

- Baud rate: 115200bps (factory)/57600bps/9600bps;
- Byte structure: low bit first, high bit last;
- Byte composition: 1 start bit, 8 data bits, 1 stop bit, no check.

3. Basic format of data packet

Table 1 Data packet format

Segment description	Segment length (bytes)	Ranges	Notes
Frame header	2	0xEE 0x16	Fixed value
Data length	1	2~9	The data length is the total number of bytes of the device code, command code, and command parameters.
Device code	1	0x03	Fixed value
Command code	1	0~255	Indicates the control object of the current control command
Command parameters	0~4	0~255	Indicates the control object parameters of the current control command
Checksum	1	0~255	The checksum is the sum of all the byte data of the device code, command code, and command parameters, and takes the lower 8 bits.

4. Control instructions

Table 2 Control instructions table

Command Code	Description	Command parameter bytes
0x01	Equipment self-test	0
0x02	Single distance measurement	0
0x03	Set first/last/multi-target	1
0x04	Continuous distance measurement	0
0x05	Stop distance measurement	0
0xA0	Set laser distance measurement module baud rate	4
0xA1	Set continuous distance measurement frequency	2
0xA2	Set minimum gate distance	2
0xA3	Query minimum gate distance	0
0xA4	Set maximum gate distance	2
0xA5	Query maximum gate distance	0
0x90	Query total number of light outputs	0
0x91	Query the number of light outputs during this power-on	0

5. Response data (ranging module → system)

Table 3 Response data table

Command Code	Description	Command parameter bytes
0x01	Device self-check	4
0x02	Single distance measurement	7
0x03	Set first/last/multi-target	0
0x04	Continuous distance measurement	4
0x05	Stop distance measurement	0
0x06	Distance measurement exception (This command is sent back after the single distance measurement or continuous distance measurement response command is sent back only when the status in the distance measurement exception command is abnormal)	4
0xA0	Set the baud rate of the laser ranging module	4
0xA1	Set the continuous ranging frequency	2
0xA2	Set the minimum gate distance	2
0xA3	Query the minimum gate distance	2
0xA4	Set the maximum gate distance	2
0xA5	Query the maximum gate distance	2
0x90	Query the total number of light outputs	3
0x91	Query the number of light outputs during this power-on	3

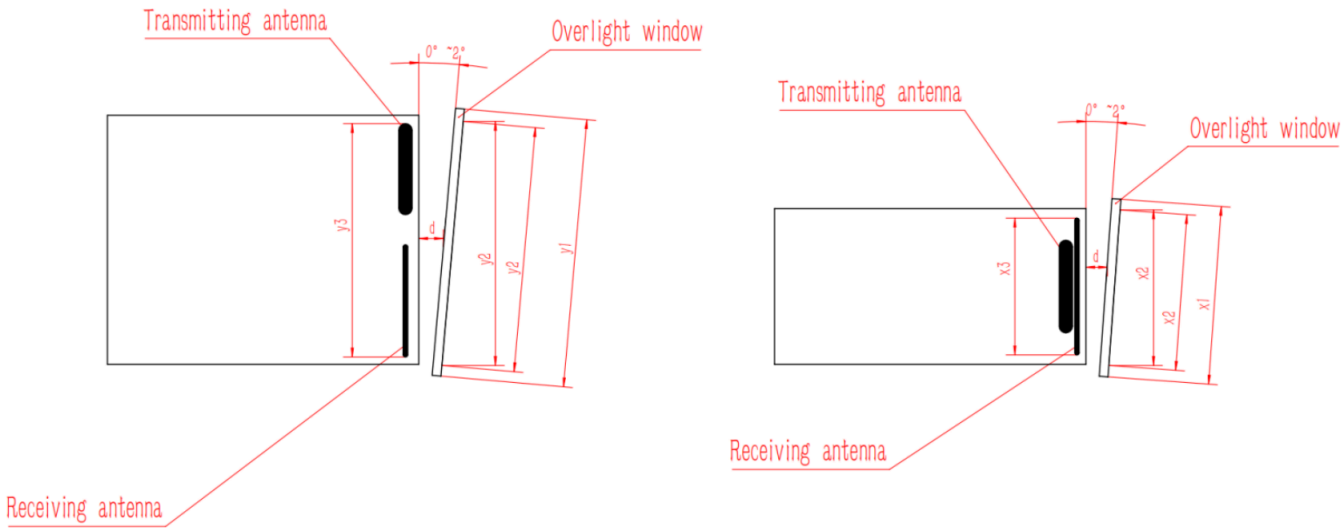
6. OPTICAL COATING RECOMMENDATION

For 1535 nm laser rangefinders, it is recommended that the optical window be coated with an **anti-reflective (AR) coating** optimized for 1525 nm–1545 nm, with transmittance ≥ 99%.
Depending on the actual application environment, additional protective coatings such as **hydrophobic** or **hard coatings** can be applied to the external surface. Other performance criteria should comply with the factory environmental test procedure, with overall transmittance > 97%.

7.2.2 Optical Window Geometry and Installation Recommendations

- The **effective aperture** of the optical window should be determined according to the specific product design.
- The **outer diameter** of the window should ensure:
  - (Effective aperture – outer diameter) ≥ 2 mm
  - (Antenna outer diameter – projection of effective aperture) ≥ 1.5 mm
    (See schematic illustration below.)

- Since the optical window introduces some laser absorption, its **thickness** should be controlled within **2 – 4 mm**, depending on overall dimensions.
- Due to the high transmittance of the window, the **emission optical axis** should be aligned with the **window normal** within **2°–4°**.
  (See the schematic diagram showing the relative positions of the window and optical barrels.)
- The **air gap** between the optical window and the rangefinder should be minimized. Figure 3 illustrates two recommended configurations for optical window placement.



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

