# ERDI LASER®

# 1535nm eyesafe Laser Rangefinder Module 1525C

## ⊒ DESCRIPTION

The ERDI LASER® LRF1525C laser rangefinder features an eye-safe, compact, and lightweight design, with reduced power consumption, extended longevity, and adaptability across a wide temperature spectrum. Commonly used in reconnaissance, surveying, and mapping, this shell-less module sports multiple interfaces for effortless integration into diverse systems. Users benefit from PC software and communication protocols, optimizing the usability of handheld devices and multifunction systems
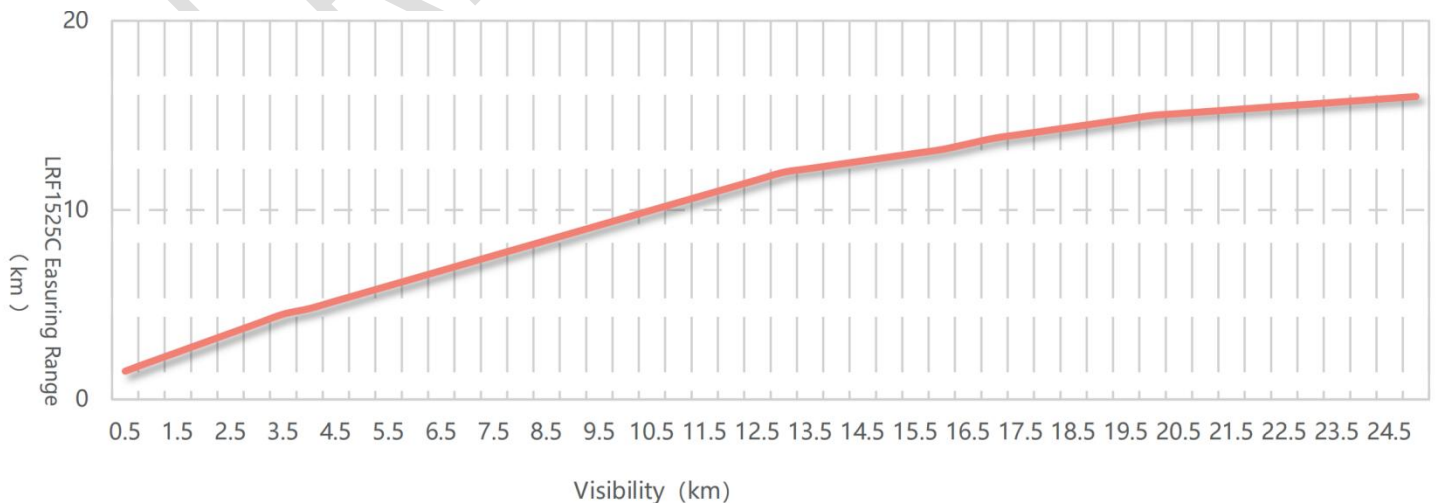
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## ⊒ FEATURES

- Single shot ranging and continuous ranging
- 3-target detection, front and back target indication
- Contain self-checking function
- Wake-on-lan function
- Number of emitted pulses during MNBF $\geq 1 \times 10^6$ times

## ⊒ APPLICATIONS

- Handheld devices
- Unmanned aerial vehicle
- Electro-optical pod
- Border surveillance

## ⊒ PERFORMANCE

## TECHNICAL SPECIFICATIONS

| Project | | Performance Indicators |
|---|---|---|
| Model | | LRF1525C |
| Laser Wavelength | | 1535±5nm |
| Eye Safety | | Class I (IEC 60825-1) |
| Divergence Angle | | ≤0.35 mrad |
| Receiving Field of View (FOV) | | ~2.0 mrad |
| Launch Lens Diameter | | Φ15mm |
| Receiver Lens Diameter | | Φ50mm |
| Measuring Range (Reflectance 30%; visibility ≥ 28km.) | Big Target （4m×6m） | ≥20000 m |
| | vehicle target(3m×3m) | ≥ 15000 m |
| | People(0.5m×1.7m) | ≥ 4300 m |
| | Drones(0.2m×0.3m) | ≥2100 m |
| Minimum Range | | 50 m |
| Ranging Frequency | | 0.5~10Hz |
| Ranging Accuracy | | ±1 m |
| Range Resolution | | ≤30 m |
| Precision Rate | | ≥98% |
| False Alarm Rate | | ≤1% |
| Number of multi-target detections | | Up to 3 targets |
| Electrical Interface | | molex- 532610771 |
| Supply Voltage | | DC12 V |
| Standby power consumption | | ≤1.2W |
| Average power consumption | | ≤2 W |
| Peak Power Consumption | | ≤3W |
| Weight | | ≤400g |
| Dimension (L×W×H) | | 125mm×85mm×58.5mm |
| Operating Temperature | | -40 ~ +70 ℃ |
| Storage Temperature | | -55 ~ +75 ℃ |
| Impact Resistance | | 1200 g/1 ms （GJB150.16A-2009） |
| Anti-vibration | | 5～50～5 Hz，1 Octave range /min，2.5 g |
| Ranging Logic | | First and last target, multi-target ranging, distance selectivity |
| Activation Time | | ≤950 ms |
| Data Interface | | TTL |
| Electrical isolation | | Isolation of power ground, communication ground and structure ground |
| Reliability | | MTBF ≥ 1500h |
| Optical axis stability | | ≤0.05 mrad |
| Non-parallelism between optical axis and mounting surface | | ≤0.5 mrad |
| Protection Class | | IP67 |
| ESD Class | | (Lens position) |

| | Contact discharge 6kV<br>Air discharge 8kV |
|---|---|
| Electromagnetic Compatibility (EMC) | CE/FCC Certification |
| Eco-friendly | RoHS2.0 |

# � STRUCTURAL DRAWING (mm)
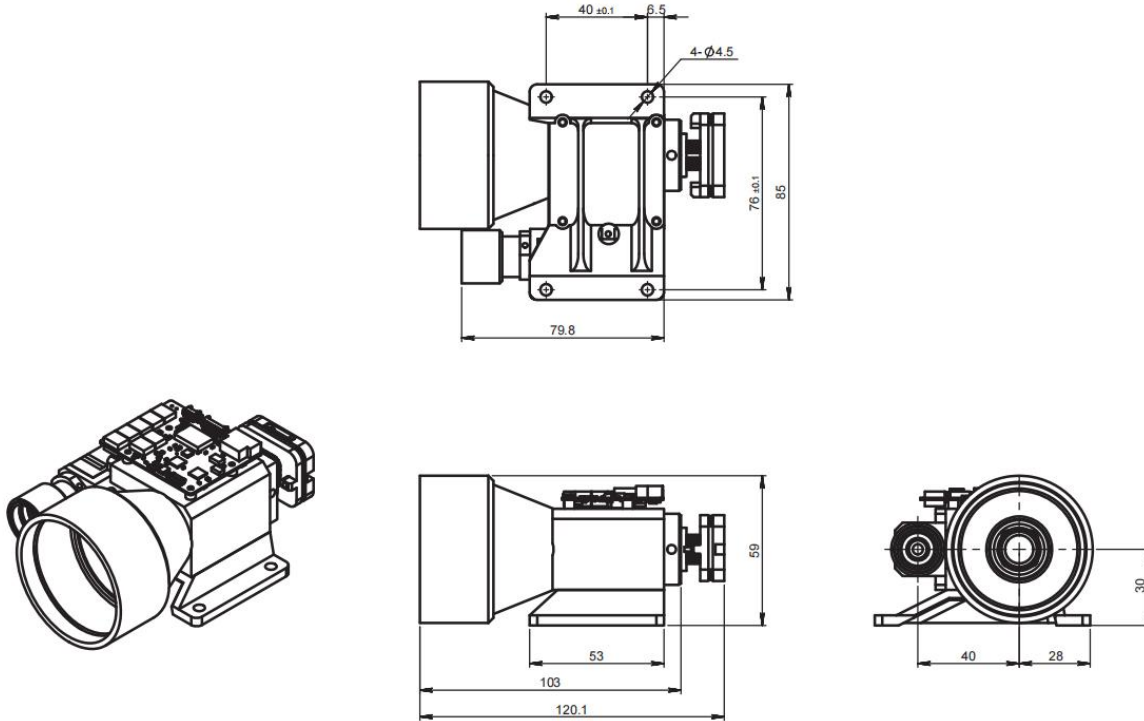


# � ELECTRICAL INTERFACE

Electrical connector model: Molex51021-0500. The detailed definition of the electrical interface is as follows:

Table 1 Interface definition

| External plug-in XS3 | Model：Molex51021-0500 | Remark |
|---|---|---|
| 1 | TTL RX | 3.3V |
| 2 | TTL TX | 3.3V |
| 3 | CTRL | 3.3V-5V power on, 0V power off |
| 4 | +5V | Positive power supply |
| 5 | GND | power supply ground |

# � COMMUNICATION PROTOCOL

Communication format: TTL communication, baud rate 115200bps;

Data format: 8 bits of data, one start bit, one stop bit, no parity check, the data consists of header byte, command part, data length, parameter part, check byte;.

Communication method: The main control and the distance measuring machine adopt a master-slave communication method. The main control sends control commands to the distance measuring machine, and the distance measuring machine receives and executes the instructions. In the ranging state, the ranging machine sends back the data and status of the ranging machine to the host computer according to the ranging cycle. The communication format and command content are as shown in the table below.

● Master sending

**The format of the sent message is as follows:**

| STX0 | CMD | LEN | DATA1H | DATA1L | CHK |
|------|-----|-----|--------|--------|-----|

**Send message format description**

Table 2 Description of sending message format

| No. | Name | illustrate | code | Remark |
|-----|------|-----------|------|--------|
| 1 | STX0 | Message start flag | 55(H) | |
| 2 | CMD | Command word | See table 3 | |
| 3 | LEN | Data length | The number of all bytes except the start flag, command word, and checksum | |
| 4 | DATAH | parameter | | |
| 5 | DATAL | | | |
| 6 | CHK | XOR check | Except for the validation byte, other bytes are XORed | |

**The command is described as follows:**

Table 3 Description of commands and data words sent by the main control to the distance measuring machine

| No. | command word | Functions | Data byte | Remarks | Length | sample code (computing) |
|-----|-------------|-----------|-----------|---------|--------|------------------------|
| 1 | 0x00 | Standby (continuous ranging stop) | DATAH=00（H）<br>DATAL=00（H） | Distance measuring machine stops working | 6 bytes | 55 00 02 00 00 57 |
| 2 | 0x01 | Single ranging | DATAH=00（H）<br>DATAL=00（H） | | 6 Bytes | 55 01 02 00 00 56 |
| 3 | 0x02 | Continuous ranging | DATAH=XX（H）<br>DATAL=YY（H） | DATA expresses the ranging period in ms. | 6 bytes | 55 02 02 03 E8 BE (1Hz ranging) |
| 4 | 0x03 | Self-test | DATAH=00（H）<br>DATAL=00（H） | | 6 Bytes | 55 03 02 00 00 54 |
| 5 | 0x04 | Distance selection and nearest distance setting | DATAH=XX（H）<br>DATAL=YY（H） | DATA expresses the blind zone value, unit 1m | 6 Bytes | 55 04 02 00 64 37 (100m closest) |
| 6 | 0x06 | Cumulative number of light out query | DATAH=00（H）<br>DATAL=00（H） | Cumulative number of light out query | 6 bytes | 55 06 02 00 00 51 |
| 7 | 0x11 | APD power on | DATAH=00（H）<br>DATAL=00（H） | | 6 bytes | 55 11 02 00 00 46 |
| 8 | 0x12 | APD power off | DATAH=00（H）<br>DATAL=00（H） | | 6 bytes | 55 12 02 00 00 45 |
| 9 | 0xEB | Number Query | DATAH=00（H）<br>DATAL=00（H） | | 6 bytes | 55 EB 02 00 00 BC |

● Master receive format

**The receive message format is as follows:**

| STX0 | CMD | LEN | DATAn | DATA0 | CHK |
|------|-----|-----|-------|-------|-----|

**Table 4 Description of receive message format**

| No. | Name | Description | Code | Remarks |
|-----|------|-------------|------|---------|
| 1 | STX0 | Message start flag 1 | 55(H) | |
| 2 | CMD_JG | Data command word | See Table 5 | |
| 3 | LEN | Data length | Number of all bytes except start flag, command word, and checksum | |
| 4 | Dn | Parameter | See Table 5 | |
| 5 | D0 | | | |
| 6 | CHK | Checksum | All bytes except parity byte | |

**Master receive status description:**

Table 5 Description of the data word sent from the rangefinder to the master control

| No. | command word | Functions | Data byte | Remarks | Total length |
|-----|--------------|-----------|-----------|---------|--------------|
| 1 | 0x00 | Standby (continuous ranging stop) | D1=00（H）<br>D0=00（H） | | 6 bytes |
| 2 | 0x03 | Self-test | D7 ~D0 | D0: char type, indicates APD temperature in degrees Celsius;<br>D1: APD high-voltage value, unit V;<br>D3-D2: blind value, unit 1m;<br>D5-D4: -5V voltage, unit 0.01V.<br>D7-D6:+5V voltage, unit 0.01V | 12 bytes |
| 3 | 0x04 | Setting of the nearest distance to the opt-in, unit m | D1 D0 | DATA expresses the closest distance value in 1m;<br>First high then low | 6 bytes |
| 4 | 0x06 | Cumulative number of light out query | D3~D0 | DATA expresses the number of times the light is emitted, 4 bytes, the high byte comes first | 8 bytes |
| 5 | 0x11 | APD power on | DATAH=00（H）<br>DATAL=00（H） | APD with high voltage | 6 Bytes |
| 6 | 0x12 | APD power off | DATAH=00（H）<br>DATAL=00（H） | APD without high voltage | 6 Bytes |
| 7 | 0xED | Work timeout | 0x00 0x00 | The laser is in laser protection and cannot measure the distance. | 6 bytes |
| 8 | 0xEE | Validation error | 0x00 0x00 | | 6 bytes |
| 9 | 0XEF | Serial communication timeout | 0x00 0x00 | | 6 bytes |
| 10 | 0x01 | Single Distance Measurement | D9<br>D8 D7 D6<br>D5 D4 D3<br>D2 D1 D0 | D8-D6 first target distance (unit 0.1m)<br>D5-D3 second target distance (data is 0 when single target) (unit 0.1m)<br>D2-D0 third target distance (data is 0 when single target) (unit 0.1m)<br>3 target from near to far<br>D9 (bit7-bit0) flag byte:<br>D9 bit 7 indicates main wave; 1: with main wave, 0: without main wave.<br>D9 bit 6 indicates return wave; 1: with return wave, 0: without return wave<br>D9 bit 5 indicates the laser status; 1: laser normal, 0: laser failure<br>D9 bit 4 timeout alarm; 1 normal, 0 timeout<br>D9 bit 3 invalid, =1<br>D9 bit 2 indicates APD status; 1: normal, 0: error<br>D9 bit 1 indicates whether there is a former | 14 bytes |

| No. | command word | Functions | Data byte | Remarks | Total length |
|---|---|---|---|---|---|
| | | | | target; 1: target, 0: no target (the target before the main target is the former target) D9 bit 0 indicates whether there is an after-target; 1: with target, 0: without target (the target after the main target is the after-target) | |
| 11 | 0x02 | Continuous distance measurement | D9<br>D8 D7 D6<br>D5 D4 D3<br>D2 D1 D0 | D8-D6 first target distance (unit 0.1m)<br>D5-D3 second target distance (data is 0 when single target) (unit 0.1m)<br>D2-D0 third target distance (data is 0 when single target) (unit 0.1m)<br>3 target from near to far<br>D9 (bit7-bit0) flag byte:<br>D9 bit 7 indicates main wave; 1: with main wave, 0: without main wave.<br>D9 bit 6 indicates return wave; 1: with return wave, 0: without return wave<br>D9 bit 5 indicates the laser status; 1: laser normal, 0: laser failure<br>D9 bit 4 timeout alarm; 1 normal, 0 timeout<br>D9 bit 3 invalid, =1<br>D9 bit 2 indicates APD status; 1: normal, 0: error<br>D9 bit 1 indicates whether there is a former target; 1: target, 0: no target (the target before the main target is the former target)<br>D9 bit 0 indicates whether there is an after-target; 1: with target, 0: without target (the target after the main target is the after-target) | 14 bytes |
| 14 | 0xEB | Number Search | D16…… D0 | D15 D12 Complete model<br>D11 D10 Product number<br>D9 D6 Software version<br>D5 D4 APD number<br>D3 D2 Laser number<br>D1 D0 FPGA version | 20 bytes |

Remarks: ① Undefined data byte/bit, default is 0;