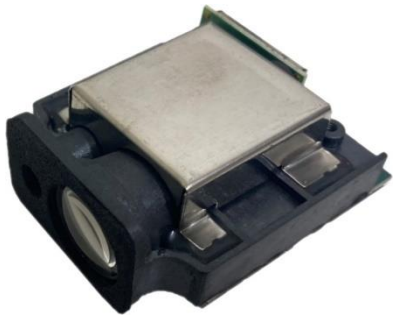
80m / 140m / 200m

Dual Laser Calibration Laser Rangefinder Module



Key Properties

- Measurement Range: 0.05m ~ 80/140/200m
- Measurement Frequency: 1~20 Hz
- Measurement Accuracy: ±1mm @ 40m
  ±2mm @ 80m
  ±7mm @ 140m
  ±15mm @ 200m
- Wavelength: 650 nm
- Laser Safety: Class 2, <1mW
- Communication Interface: TTL (UART)
- Dual Laser Calibration

Product Code

Product	Measure Range	Frequency	Type	Communication Interface
LRF: Laser Range Finder	80M: 80m 140M: 140m 200M: 200m	20: 20Hz(max)	PD: Precise Dual Laser Calibration	Default: TTL (UART) USB: USB Converter
Example: LRF80M20PD				

Introduction

LRFX0M20PD is a high-precision laser rangefinder module that use dual-laser calibration design. It can eliminate environmental interference and electronic system errors, and has better stability and accuracy compared to general single-laser rangefinder modules.

The dual-laser calibration design uses two laser light sources and two sensor to calibrate the error of the module. One laser light source and sensor are used to measure the distance to the target, while the other laser light source and sensor are used to compensate for atmospheric interference and device errors.

Compared to general single-laser ranging modules, the dual-laser calibration design has a closed-loop feedback circuit, which can eliminate the feedback problem of open-loop circuits and measurement repetition errors of the module, thus making LRFX0M20PD more advantageous and able to maintain absolute accuracy under different environmental conditions.

LRFX0M20PD provide distance options of 80m, 140m, and 200m based on different optical and circuit designs.

1. Specifications

Technical specifications	
Model Name	LRF80M20PD / LRF140M20PD / LRF200M20PD
Measurement Range	5m ~ 80m / 140m / 200m (indoor) 0.05~30m (outdoor)
Measurement Frequency	1~20Hz
Measurement Accuracy	±1mm (at 40m) ±2mm (at 80m) ±7mm (at 140m) ±15mm (at 200m)
Wavelength	650nm
Laser Safety	Class 2, <1mW
Measurement Method	Phase-Shift (with dual-laser calibration)
Communication	
Communication Interface	3.3V TTL (UART)
Interface Connector	8 Position 0.5 mm FFC & FPC Connectors
Baud Rate	9600 bps
Electrical	
Input Voltage	3.3~4.2V DC
Power Consumption	100 mA
Mechanical	
Dimensions	42 x 42 x 18mm
Weight	60g
Protection	IP40
Environmental	
Operating Temperature	-10°C~50°C
Storage Temperature	-20°C~80°C

Note:

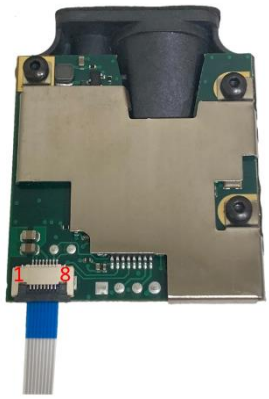
1. Different measurement targets and environments can cause a reduction in measuring range or a large measurement error due to factors such as excessively high ambient light intensity, extremely high or low ambient temperatures, weak or strong reflection from the target, or rough and uneven target surfaces.

2. The measurement range and accuracy are based on natural targets (with a reflectivity of 10% to 80%) under an ambient illumination of 20,000 lux. If the illumination is higher than the aforementioned value or the reflectivity of the target is lower than the aforementioned range, a reflector board should be used.

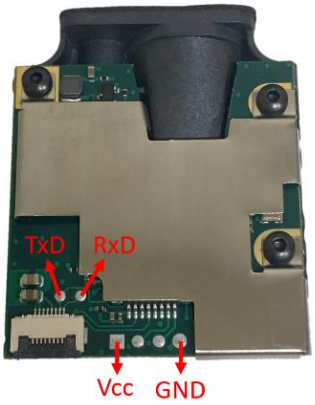
2. Pin Assignment

LRFX0M20PD provides FPC connector and soldering points.

1	Vcc
2	Vcc
3	GND
4	GND
5	Vcc
6	Vcc
7	TxD
8	RxD

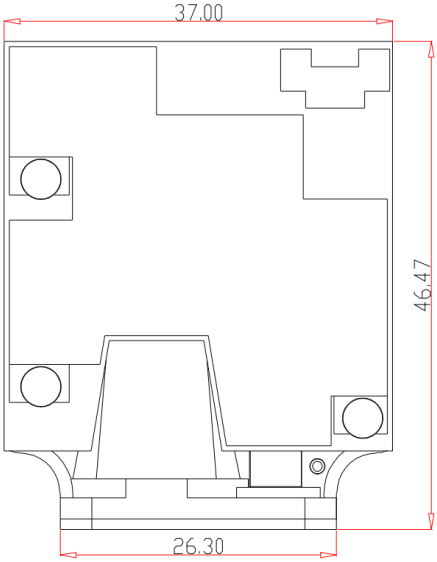


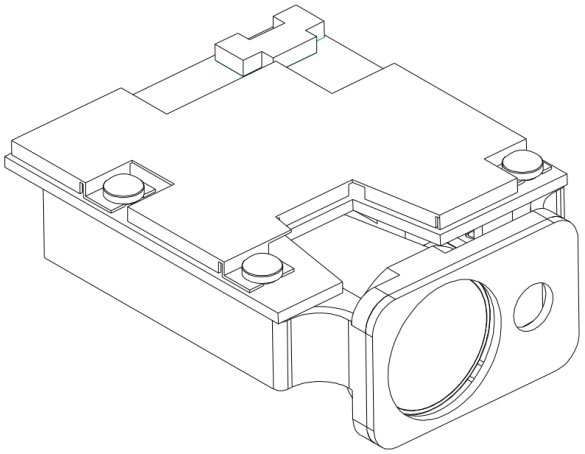
FPC Connector

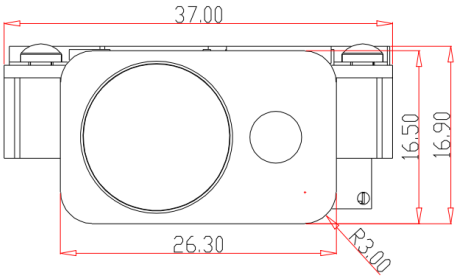


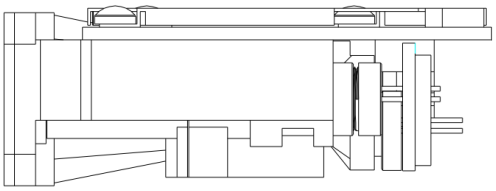
Soldering Points

3. Dimensions









4. Communication

4.1 UART configuration parameters:

8N1 with default 9600 baud rate, byte data are expressed in hexadecimal.

Data bits: 8

Parity bits: None

Stop bits: 1

4.2 Command List

Function	Chapter
Single Measurement	4.2.1
Continuous Measurement	4.2.2
Stop Measurement	4.2.3
Laser ON/OFF	4.2.4
Set Address	4.2.5
Set Frequency	4.2.6
Set Offset	4.2.7
Set Resolution	4.2.8
Set Interval Time	4.2.9
Measure Upon Power-On Enable/Disable	4.2.10
Single Measurement (broadcast)	4.2.11
Read Buffer	4.2.12

*__ADD__ is the address of the module, with a default address of 0x80. The broadcast address is 0xFA.

*__CHK__ is the checksum, sum up all the preceding bytes and take the complement.

Example: 0xFA, 0x06, 0x04 CHK

CHK=0xFA + 0x06 + 0x04 = 0x04(carry ignored)

The complement of 0x04 is 0xFC, CHK is 0xFC.

4.2.1 Single Measurement

Send	ADD 06 02 CHK Example: 80 06 02 78
Receive	ADD 06 82 **3X 3X 3X 2E 3X 3X 3X** CHK (Under the resolution setting of 1mm) ADD 06 82 **3X 3X 3X 2E 3X 3X 3X 3X** CHK (Under the resolution setting of 0.1mm)

*The **bold text** represents the measurement result data, which is in ASCII format. For example, the measurement result "123.456 meters" is displayed as "31 32 33 2E 34 35 36" in ASCII format.

* Please refer to chapter 4.2.8 for the configuration of 1mm/0.1mm resolution setting.

* When measurement fails, return "ADD 06 82 ‘E’ ‘R’ ‘R’ ‘-’ ‘-’ 3X 3X CHK” (in 1mm resolution)

* When measurement fails, return "ADD 06 82 ‘E’ ‘R’ ‘R’ ‘-’ ‘-’ ‘-’ 3X 3X CHK” (in 0.1mm resolution)

4.2.2 Continuous Measurement

Send	ADD 06 03 CHK Example: 80 06 03 77
Receive	ADD 06 83 **3X 3X 3X 2E 3X 3X 3X** CHK (Under the resolution setting of 1mm) ADD 06 83 **3X 3X 3X 2E 3X 3X 3X 3X** CHK (Under the resolution setting of 0.1mm)

*The **bold text** represents the measurement result data, which is in ASCII format. For example, the measurement result "123.456 meters" is displayed as "31 32 33 2E 34 35 36" in ASCII format.

* Please refer to chapter 4.2.8 for the configuration of 1mm/0.1mm resolution setting.

* When measurement fails, return "ADD 06 83 'E' 'R' 'R' '-' '-' 3X 3X CHK" (in 1mm resolution)

* When measurement fails, return "ADD 06 83 'E' 'R' 'R' '-' '-' '-' 3X 3X CHK" (in 0.1mm resolution)

4.2.3 Stop Measurement

Send	ADD 04 02 CHK Example: 80 04 02 7A
Receive	ADD 04 82 CHK

4.2.4 Laser ON/OFF

Send	ADD 06 05 01 CHK (Laser ON) ADD 06 05 00 CHK (Laser OFF) Example: 80 06 05 01 74 (Laser ON)

4.2.5 Set Address

Send	ADD_old 04 01 **ADD_new** CHK Example: FA 04 01 80 81 (set address as 0x80)
Receive	ADD 04 81 CHK (Address setting successful) ADD 84 81 02 CHK (Address setting failed)

*ADD_old is the original address, and **ADD_new** is the new address to be set.

*The address setting range is 0x00 ~ 0xFF.

*The default address is 0x80.

*The broadcast address is 0xFA.

4.2.6 Set Frequency

Send	ADD 04 0A 00 CHK (3Hz) ADD 04 0A 05 CHK (5Hz) ADD 04 0A 0A CHK (10Hz) ADD 04 0A 14 CHK (20Hz) Example: FA 04 0A 00 F8 (set frequency as 3Hz)
Receive	ADD 04 8A CHK (Frequency setting successful) ADD 84 8A 01 CHK (Frequency setting failed)

4.2.7 Set Offset

Send	ADD 04 06 **SIGN DIST** CHK Example: FA 04 06 2D 01 CE (set offset as -1)
Receive	ADD 04 8B CHK (Offset setting successful) ADD 84 8B 01 CHK (Offset setting failed)

*__SIGN__ is the positive or negative offset value, where 0x2D is negative and 0x2B is positive.

*__DIST__ is the offset to be set.

4.2.8 Set Resolution

Send	ADD 04 0C 01 CHK (1mm) ADD 04 0C 02 CHK (0.1mm) Example: FA 04 0C 01 F5 (set resolution as 1mm)
Receive	ADD 04 8C CHK (Resolution setting successful) ADD 84 8C 01 CHK (Resolution setting failed)

4.2.9 Set Interval Time

Send	ADD 04 05 **INTE** CHK Example: FA 04 05 01 FC (set interval as 1sec)
Receive	ADD 04 85 CHK (Interval time setting successful) ADD 84 85 01 CHK (Interval time setting failed)

*__INTE__ represents the interval time (sec) to be set.

* Interval Time is the time interval between each measurements during continuous measurement.

4.2.10 Measure Upon Power-On Enable/Disable

Send	ADD 04 0D 00 CHK (Disable) ADD 04 0D 01 CHK (Enable) Example: FA 04 0D 01 F4 (Enable Measure Upon Power-On)
Receive	ADD 04 8D CHK (Setting successful) ADD 84 8D 01 CHK (Setting failed)

*When Enable status is set, the module will start continuous measurement immediately after power-on.

4.2.11 Single Measurement (broadcast)

Send	FA 06 06 FA
Receive	* No response from module. For measurement results please use Read Buffer command. Please refer to Section 4.2.12 for details.

4.2.12 Read Buffer

Send	ADD 06 07 CHK
Receive	*Please refer to Section 4.2.1, "Receive" part, for Single Measurement.

Laser Safety

The light emitted from these devices has been set in accordance with IEC60825. However, staring into the beam, whether directly or indirectly, must be avoided.

Class I

The maximum permissible exposure(MPE) cannot be exceeded, it includes High-power lasers within an enclosure that prevents exposure to the radiation and that cannot be opened without shutting down the laser. For example, a continuous laser at 600nm can emit up to 0.39mW, but for shorter wavelengths, the maximum emission is lower.

Class II

“Caution”, visible laser light less than 1.0mW. Considered eye safe, normal exposure to this type of beam will not cause permanent damage to the retina.

Class IIIA

“Danger”, visible laser light between 1.0mW and 5.0mW. Considered eye safe with caution. Focusing of this light into the eye could cause some damage.

Class IIIB

“Danger”, infrared(IR), and high power visible lasers considered dangerous to the retina if exposed. NB: it is important to note that while complying with the above classifications, unless otherwise stated. Our laser diode products are not certified and are designed solely for use in OEM products. The way in which device is used in the final product may alter its original design classification, and it is the responsibility of the OEM to ensure compliance with the relevant standards.

Specifications are subject to change without notice.