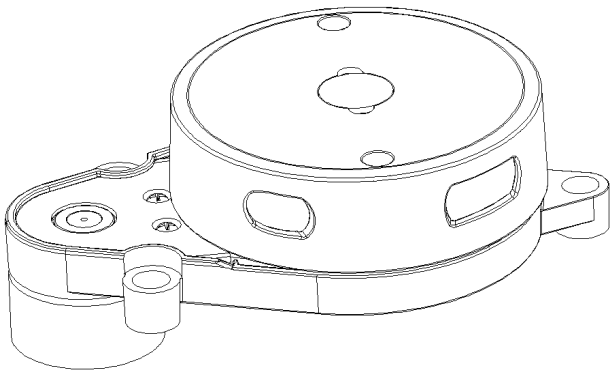
LDROBOT

Move Smarter

LiDAR LD14

Datasheet



深圳乐动机器人有限公司

SHENZHEN LDROBOT CO.,LTD.

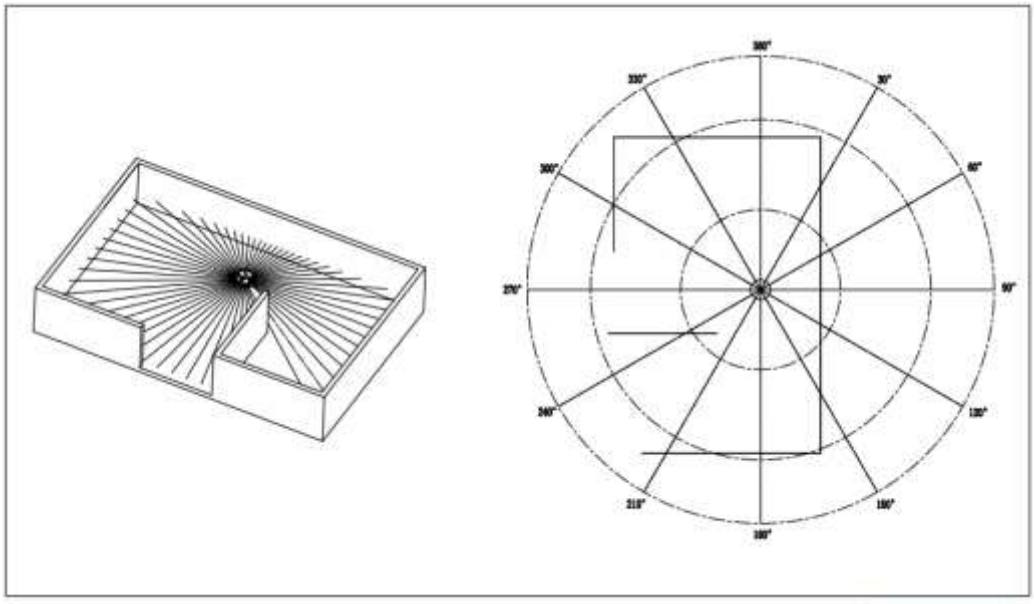
Contents

1. Product Description

The LD14 consists mainly of a laser ranging core, a wireless power transmission unit, a wireless communication unit, an angle measuring unit, a motor drive unit and a mechanical housing.

The LD14 ranging core uses triangulation technology, which can measure 2,300 times per second. Each time the distance is measured, the LD14 emits infrared laser light from a fixed angle, and the laser light is reflected to the receiving unit after encountering the target object. The distance is calculated through the triangular relationship formed by the laser, the target object and the receiving unit.

The diagram of the environmental scan formed by LD14 point cloud data is shown below:



The product is mainly suitable for the navigation and obstacle avoidance of robots (e.g. floor mopping robots and service robots) by performing a 360° scan of the indoor layout and building a map so that a walking path can be planned. It is also suitable for robotics education and research, etc.

2. Technical Parameters

2.1. Performance parameters

Parameter name	Unit	Mini value	Typical value	Max value	Remarks
Ranging scope	m	0.15~~8m			Tested on a white target with 80% reflectivity
		0.15~~5m			Tested on a black target with 4% reflectivity
Scanning frequency	Hz	2	6	8	Factory default with 6HZ
Ranging frequency	Hz	-	2300Hz	-	
Ranging accuracy	mm	-	5	10	0.15~~0.67m
	-	-	1.5%	3%	0.67~~6m
			2%	5%	6~~8m
Pitch angle error	°	-	-	2°	
Angular resolution	°	-	-	1	
Anti-background light	KLux	-	-	30	Refer to the ambient light test specification of LDROBOT
Machine life	h	1500	-	-	
Working temperature	℃	-10	25	50	
Storage temperature	℃	-30	25	70	

2.2. Electrical and mechanical parameters

Parameter name	Unit	Mini value	Typical value	Max value	Remarks
Input voltage	V	4.5V	5V	5.5V	
PWM high level	V	2.9	3.3	3.5	
PWM low level	V	-0.3	0	0.4	
Starting current	mA	-	400	-	
Working current	mA	-	240	-	
Machine dimension	mm	96.3*59.8*38.8 (L*W*H)			
Machine weight*	g	-	131	140	Without connecting line
Communication interface	-	UART@115200			
UART high level	V	2.9	3.3	3.5	
UART low level	V	-0.3	0	0.4	

Remarks: Actual weight may vary depending on configuration, manufacturing process, and measurement methods.

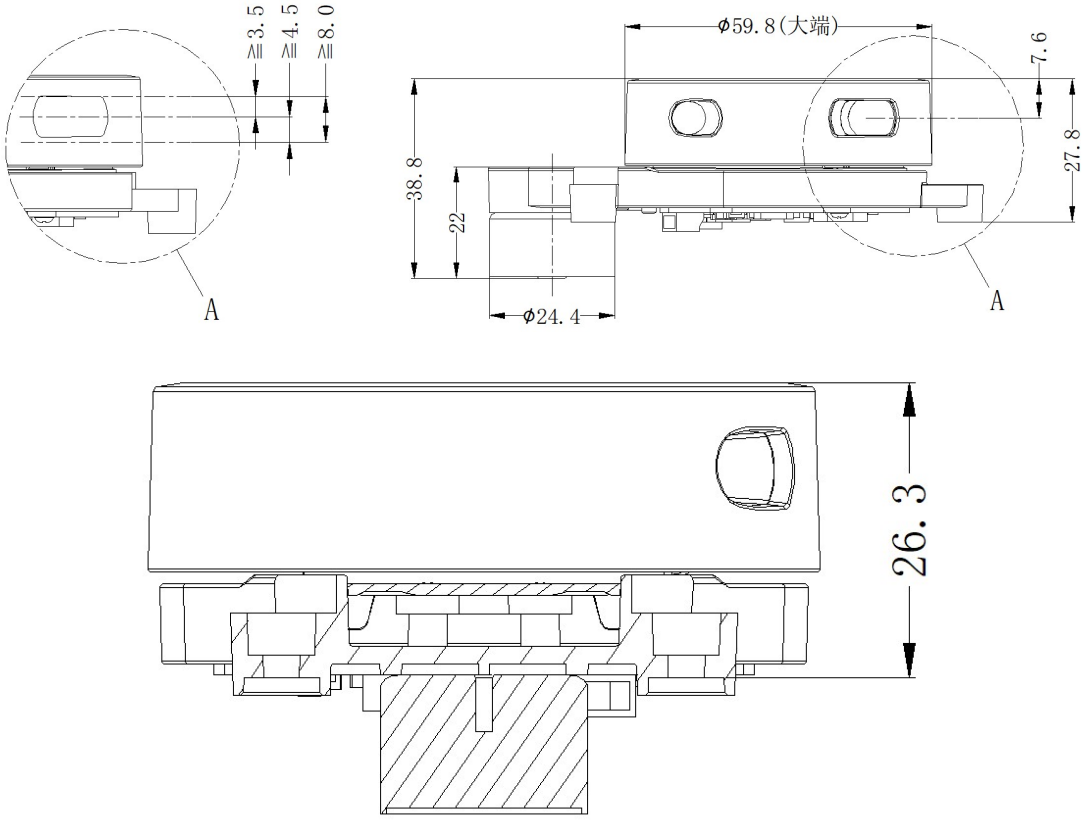
2.3. Optical parameters

Parameter name	Unit	Min value	Typical value	Max value	Remarks
Optical maser wavelength	nm	775	793	800	Infrared band
Laser power	mW	-	10	-	Peak laser power
Laser safety level	-	IEC-60825 Class 1			

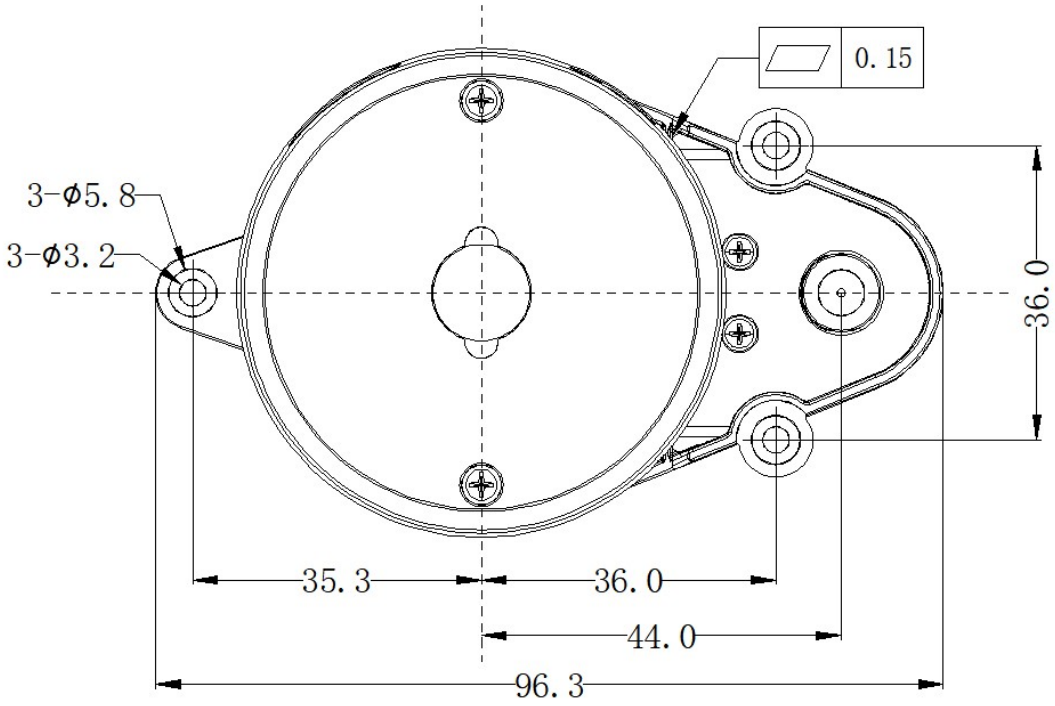
3. Installation and Use

3.1. Product dimensions

The laser emission and reception in the ranging unit of the LD14 requires an optical window, which needs to be exposed in the structure. The partial occlusion of this window by external systems will affect the ranging performance of the LiDAR to some extent. The diagram below shows the optical window dimensions (in mm).

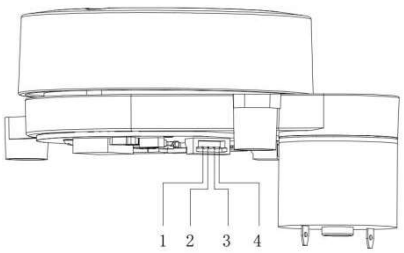


Other mounting dimensions are shown in the following diagram with a tolerance of ±0.3 (in mm):



3.2. Communication interface

LD14 is connected to external systems via a ZH1.5T-4P 1.25mm connector for power supply and data reception, with the interface definitions and parameter requirements shown in the following diagram/table:



S/N	Signal name	Type	Description	Min value	Typical value	Max value
1	PWM	Input	Motor control signal	0V	-	3.3V
2	GND	Power supply	Negative pole	-	0V	-
3	TX	Output	LiDAR data output	0V	3.3V	3.5V
4	P5V	Power supply	Positive pole	4.5V	5V	5.5V

3.3. Data communication

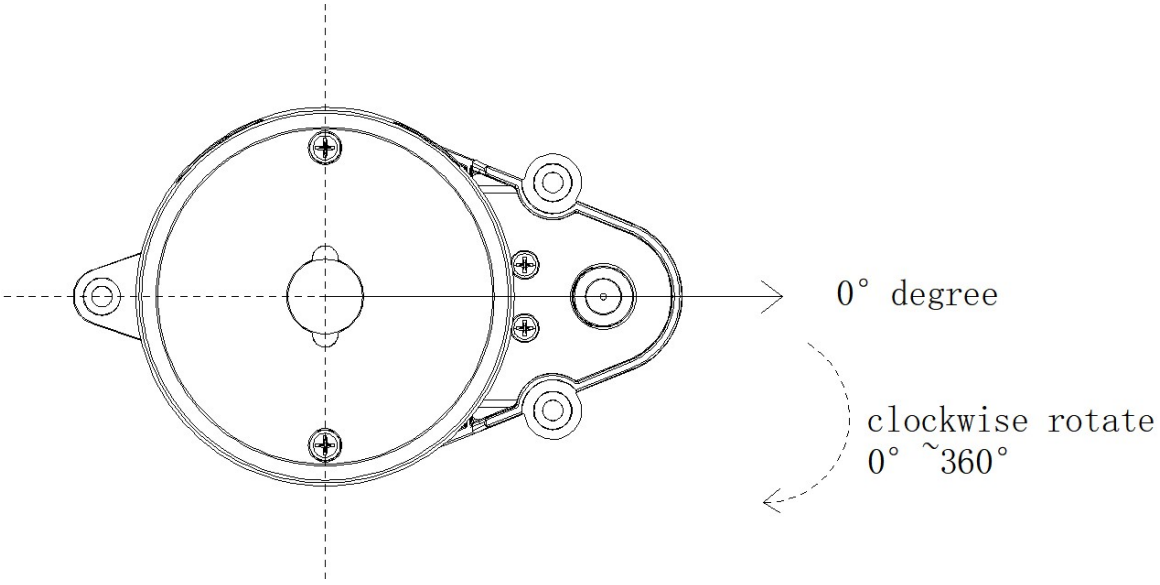
The data communication of the LD14 is sent in one direction using a Universal Asynchronous Receiver Transmitter (UART) with the transmission parameters shown in the following table:

Baud rate	Data length	Stop bit	Parity check bit	Flow control
115200	8 Bits	1	N/A	N/A

With one-way communication, LD14 starts sending measurement data as soon as the rotation is stabilized, without sending any commands. The measurement data follow the serial software communication protocol of module. See LD14 development manual.

3.4. Coordinate system definition

The LD14 use the left-handed coordinate system, the rotation center is the coordinate origin, the direction of the connection between the rotation center and the center of the driving wheel is zero degree direction, and the rotation angle increases in the clockwise direction .

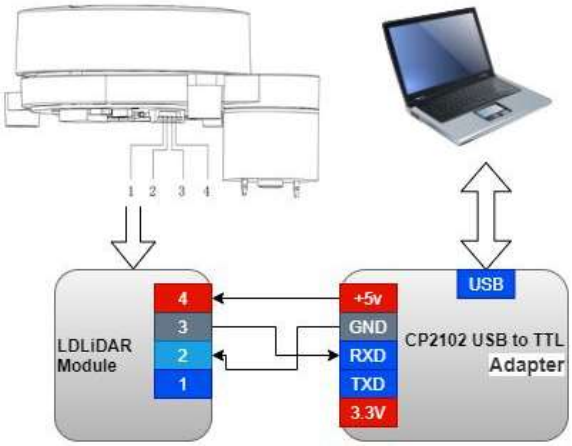


3.5. Demo presentation

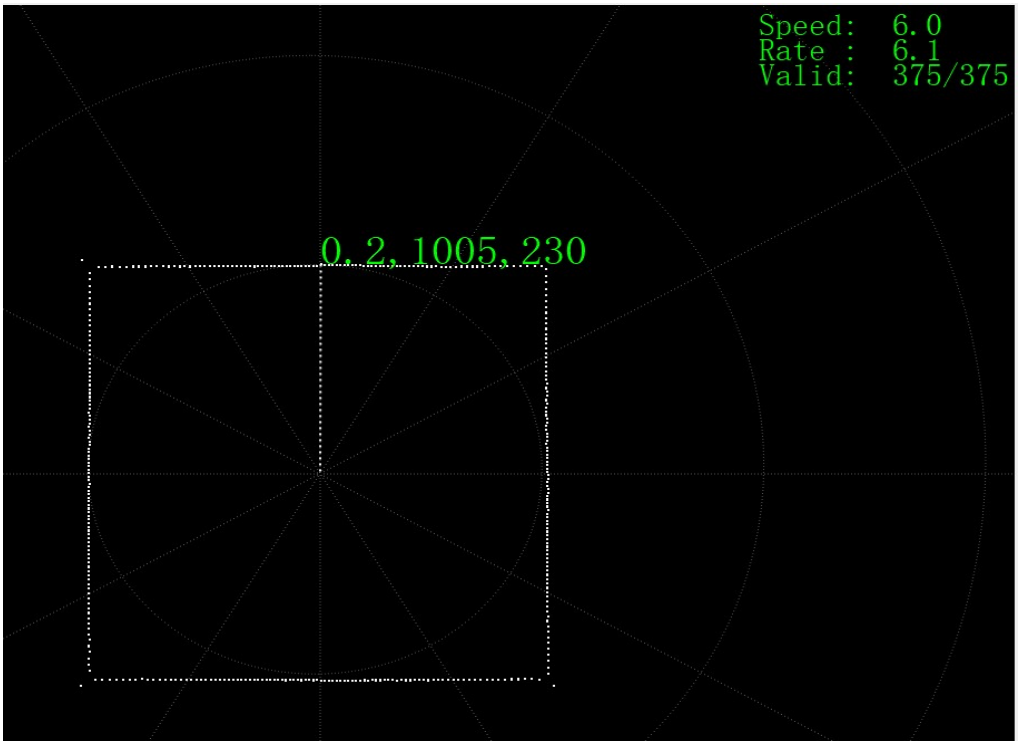
How to set up a demo test environment for LD14 LiDAR:

1. Obtain the upper computer of LiDAR from FAE and unzip it to the local;

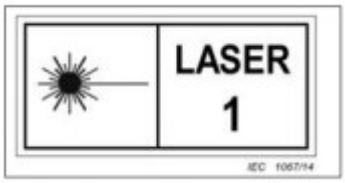
2. Connect the LD14 laser LiDAR to PC through connecting line, as shown in the picture below:



3. Place it in the test environment and click the start button of the upper computer to present the scan results, as shown in the picture below:



4. Safety and Scope of Application



LD14 is provided with a low-powered infrared laser as the emitting light source to ensure safety for humans and pets. It is qualified in the tests of Class I laser safety standards. The LD14 complies with 21 CFR 1040.10 and 1040.11 with the exception of deviations from Laser Notice No. 50 dated June 24, 2007.

Attention: Self-adjustment or modification of this product may result in dangerous radiation exposure.

5. Remarks

5.1. Target surface reflectivity

1. The reflectivity represents the test result of the C84-III reflectivity tester;

2. The reflectivity of white target in LDROBOT laboratory is 80.6%; that of the black target is 4.1%.

3. The ranging accuracy is the average of 50 consecutive data calculations within ±1° of the yaw angle collected at each distance point

6. Revision Records

Version	Revision date	Revision contents
1.0	2022-05-10	Initial creation