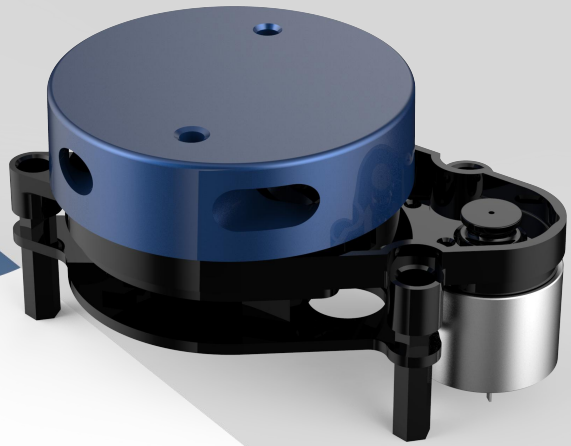
YDLIDAR X2
DATASHEET



DOC#：01.13.000100

https://www.facebook.com/ydlidar/

Contents

OVERVIEW

YDLIDAR X2 is a 360-degree two-dimensional rangefinder (hereinafter referred to as X2) developed by YDLIDAR team. Based on the principle of triangulation, it is equipped with related optics, electricity, and algorithm design to achieve high-frequency and high-precision distance measurement. The mechanical structure rotates 360 degrees to continuously output the angle information as well as the point cloud data of the scanning environment while ranging.

Product Features

- 360 degree omnidirectional scanning ranging distance measurement
- Small distance error,stable performance and high accuracy
- Ranging distance is no less than 8m
- Strong resistance to ambient light interference
- Low power consumption, small size and long life
- Laser power meets Class I laser safety standards
- Adjustable motor speed(7HZ recommend)
- Ranging frequency up to 3kHz (support customization)

Applications

- Robot navigation and obstacle avoidance
- Robot ROS teaching and research
- Regional security
- Environmental scanning and 3D reconstruction
- Commercial robot /Robot vacuum cleaner

Installation and dimensions

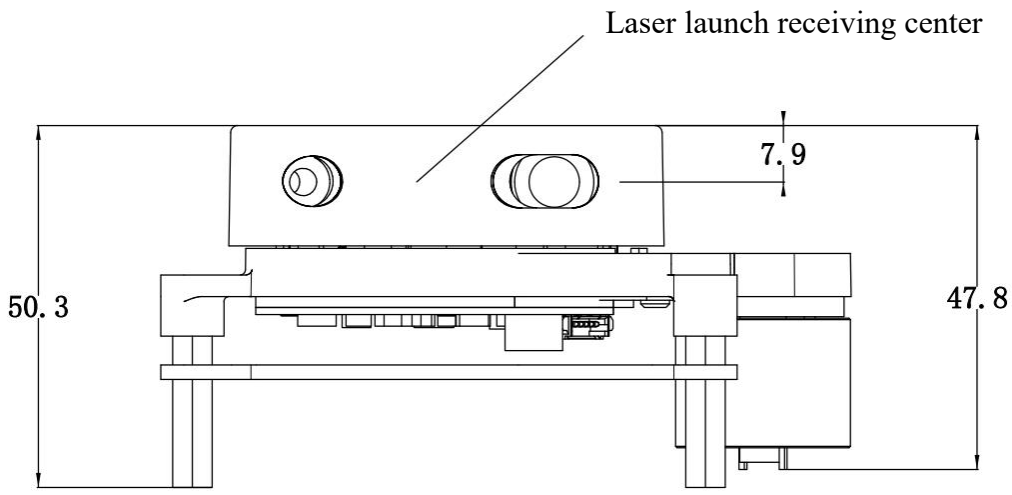


FIG1 YDLIDAR X2 FRONT STRUCTURAL SIZE

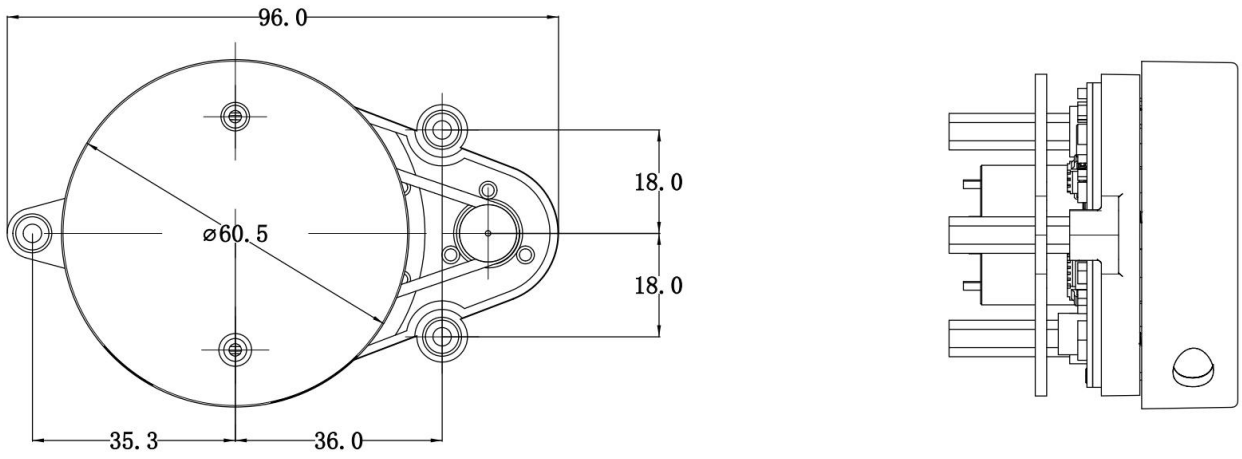


FIG2 YDLIDAR X2 MECHANICAL DIMENSIONS

SPECIFICATIONS

Product Parameter

CHART1 YDLIDAR X2 PRODUCT PARAMETER

Item	Min	Typical	Max	Unit	Remarks
Ranging frequency	-	3000	-	Hz	3000 times per second
Motor frequency	-	7	-	Hz	PWM or Voltage Regulation
Ranging distance	0.10	-	>8	m	Indoor
Scanning angle	-	0~360	-	Deg	-
Absolute error	-	2	-	cm	Distance≤0.5m
Relative error	-	1.5%	-	-	0.5m<Distance≤6m
	-	2.0%	-	-	6m<Distance≤8m
Angle resolution	0.82	0.84	0.86	Deg	Scanning frequency=7

Note 1: The ranging range and relative accuracy above are the factory inspection standard value;

Note 2: The relative error value indicates the accuracy of the Lidar measurement.

*Relative error = (Measuring distance - Actual distance) / Actual distance * 100%.*

Please avoid using Lidar under high-temperature, high-low temperature or strong vibration use scenarios, which might cause a 3% relative error parameter index.

Electrical Parameter

CHART2 YDLIDAR X2 ELECTRICAL PARAMETER

Item	Min	Typical	Max	Unit	Remarks
Supply voltage	4.8	5	5.2	V	Excessive voltage might damage the Lidar while low affect normal performance
Voltage ripple	0	50	100	mV	Excessive ripple affect normal performance
Starting current	300	400	500	mA	Higher current required at start-up
Working current	200	350	380	mA	Normal working

Interface Definition

X2 provides a PH1.25-4P female connector with functional interfaces for system power, data communication and motor control.

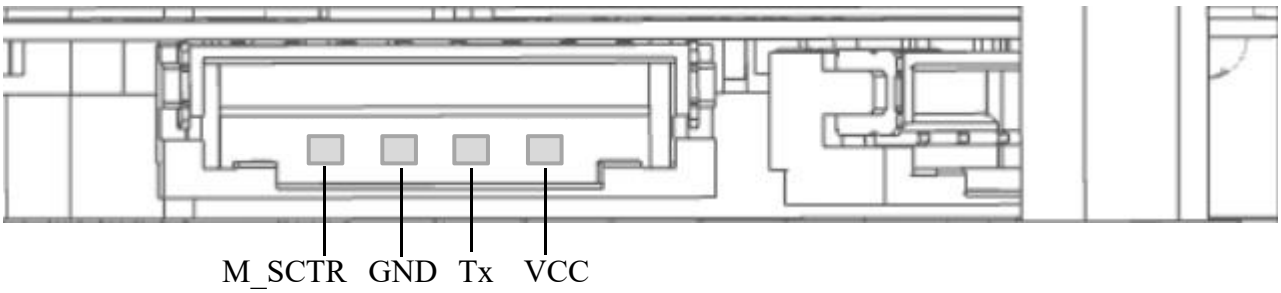


FIG3 YDLIDAR X2 INTERFACES

CHART3 YDLIDAR X2 INTERFACE DEFINITION

Pin	Type	Description	Defults	Range	Remarks
VCC	Power Supply	Positive	5V	4.8V~5.2V	-
Tx	Output	System serial output	-	-	Data stream：Lidar➔Peripherals
GND	Power Supply	negative	0V	0V	-
M_SCTR	Input	Motor speed control terminal	1.8V	0V~3.3V	Voltage or PWM speed regulation

Data communication

With a 3.3V level serial port (UART), users can connect the external system and the product through the physical interface.After that,you can obtain the real-time scanned point cloud data,device information as well as device status.The communication protocol of parameters are as follows：

CHART4 YDLIDAR X2 SERIAL SPECIFICATION

Item	Min	Typical	Max	Unit	Remarks
Baud rate	-	115200	-	bps	8-bit data bit,1 stop bit,no parity
High Signal Level	1.8	3.3	3.5	V	Signal voltage>1.8V
Low signal Level	0	0	0.5	V	Signal voltage<0.5V

Motor control

X2’s motor driver supports speed control function and can be adjusted by the M_SCTR pin.

The lower the voltage / the smaller the PWM duty cycle, the higher the motor speed.

For example:

The maximum speed is 0V/duty cycle 0% means when the M_SCTP input 0V voltage,the

motor rotates at the highest speed.

Following is the PWM signal requirements of M_SCTP :

CHART5 YDLIDAR X2 MOTOR PWM SIGNAL SPECIFICATION

Item	Min	Typical	Max	Unit	Remarks
PWM Frequency	-	10	-	KHz	PWM is the wave signal
Duty cycle range	50%	85%	100%		The smaller the duty cycle,the faster the speed

Optical Characteristic

X2 uses an infrared point pulsed laser that meets FDA Class I laser safety standards. The laser and optical lens finish the transmission and reception of the laser signal to achieve high-frequency ranging while working. To ensure system ranging performance, please keep the laser and optical lens clean. The detailed optical parameters are as follows:

CHART6 YDLIDAR X2 LASER OPTICAL PARAMETERS

Item	Min	Typical	Max	Unit	Remarks
Laser wavelength	775	785	795	nm	Infrared band
Laser power	-	3	5	mW	Peak power
FDA	Class I				

Polar coordinate system definition

In order to facilitate secondary development, X2 internally defines a polar coordinate system.

Pole: the center of the rotating core of the X2;

Positive direction: clockwise;

Zero angle: directly in front of the X2 motor;

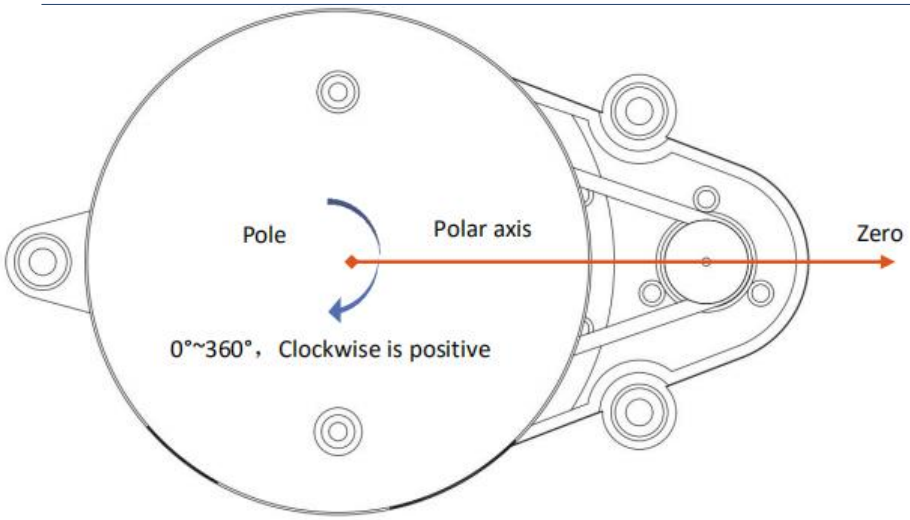


FIG4 YDLIDAR X2 POLAR COORDINATE SYSTEM DEFINITION

Others

CHART7 YDLIDAR X2 OTHERS

Item	Min	Typical	Max	Unit	Remarks
Operating temperature	0	20	50	℃	High temperature environment will reduce life expectancy
Lighting environment	0	550	2000	Lux	For reference only
weight	-	200	-	g	N.W.

Development and support

With a wealth of hardware and software interfaces,X2 can support motor enable control, speed control, and enable control&output control of the ranging core. Thus,users can also implement the power control and scan control purpose.

Also, the 3D model is open.YDLIDAR provides the graphical debugging client-PointCloud Viewers,together with the corresponding SDK development kit and Ros development kit.

For the X2 development manual, SDK development manual and Ros manual,please download from our official website: www.ydlidar.com

Revision

Date	Version	Contents
2019-04-24	1.0	First writing
2019-04-25	1.1	Modify the X2interface definition
2019-05-09	1.2	❖ Modify the accuracy description ❖ Increase the absolute error to 2cm when the ranging distance less than 0.5m, ❖ Update the page number of the document to 8 pages, ❖ Update the document code to 01.13.000100, ❖ Modify the M_SCTR typo text