YDLIDAR

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X3
DATA SHEET

www.ydlidar.com

Shenzhen EAI Technology Co.,Ltd.

CONTENTS

1 OVERVIEW

YDLIDAR X3 is a 360 degrees two-dimensional rangefinder (hereinafter referred to as X3) developed by EAI team. Based on the principle of triangulation, it is equipped with related optics, electricity, and algorithm design to achieve high-frequency and high-accuracy 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.

1.1 Product Features

- 360 degrees omnidirectional scanning ranging distance measurement
- Small distance error, stable performance and high accuracy
- Wide Ranging distance
- Strong resistance to ambient light interference
- Low power consumption, small size and long service life
- Laser power meets Class I laser safety standards
- Adjustable motor speed

1.2 Applications

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

1.3 Installation and Dimensions

Please confirm with sales staff for structural information.

2 SPECIFICATIONS

2.1 Performance Parameter

CHART 1 YDLIDAR X3 PERFORMANCE PARAMETER

Item	Min	Typical	Max	Unit	Remarks
Ranging frequency	/	3000	/	Hz	3000 times per second
Scanning frequency	5	8	10	Hz	/
Ranging distance	0.12	/	8	m	Indoor environment, 80% reflectivity object
Field of view	/	0-360	/	Deg	/
Systematic error	/	2	/	cm	Distance≤1m
Relative error	/	1%	3.5%@6m; 5%@8m	/	/
Angle resolution	0.6 (5Hz)	0.96 (8Hz)	1.2 (10Hz)	Deg	/
Tilt angle	0.25	1	1.75	Deg	/

Note 1: It is factory FQC standard value, 80% reflectivity material object.

Note 2: The relative error value indicates the accuracy of the Lidar measurement. Relative error (mean value) = (average measured distance-actual distance)/actual distance *100%, sample size: 100pcs.

Note 3: Lidar is a precision device, please avoid using Lidar under high or low temperature or strong vibration situation, the relative error parameter index will be relatively larger, and it may exceed the typical value.

2.2 Electrical Parameter

CHART 2 YDLIDAR X3 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
Supply current	1000	/	/	mA	The power supply for the lidar needs to meet the drive capability
Working current	/	350	500	mA	Normal working, motor rotates

2.3 Interface Definition

X3 provides a PHD1.25_4P receptacle with functional interfaces for system power, data communication and motor control.

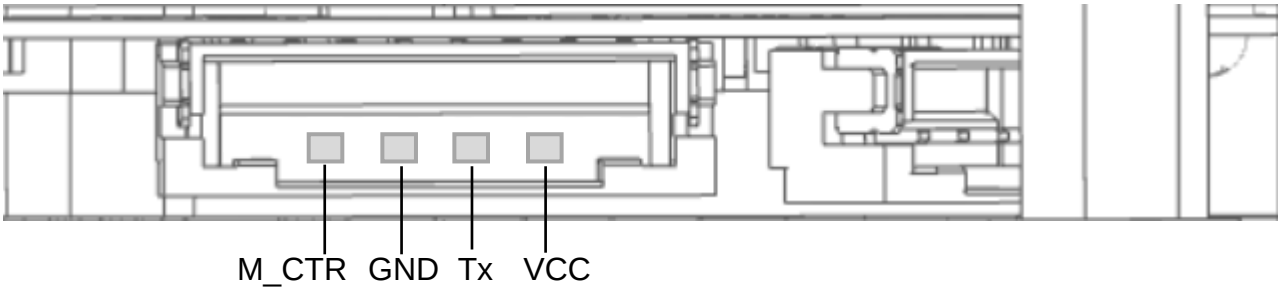

FIG 1 YDLIDAR X3 INTERFACES

2.4 Interface Electric

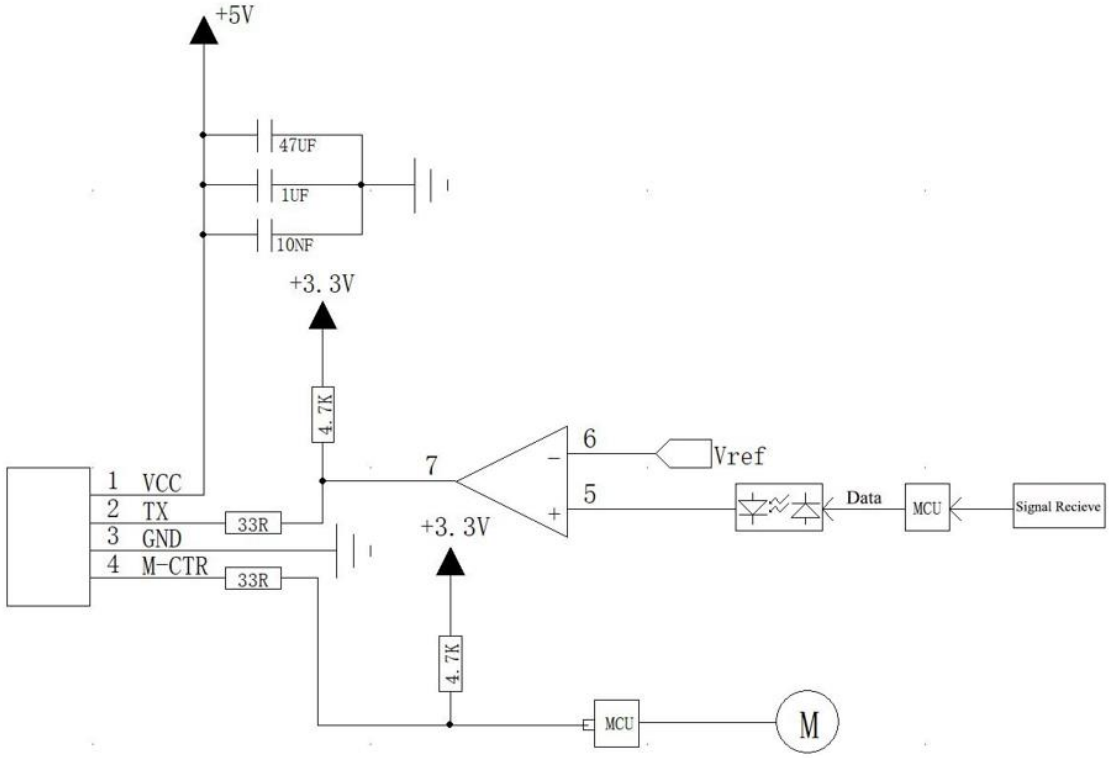

FIG 2 YDLIDAR X3 INTERFACE CIRCUIT

CHART 3 YDLIDAR X3 INTERFACE DEFINITION

Pin	Type	Description	Defaults	Range	Remarks
VCC	Power supply	Power supply voltage Positive	5V	4.8V-5.2V	/
Tx	Output	System serial port output	/	/	Data stream: LiDAR→Peripherals
GND	Power supply	Power supply voltage Negative	0V	0V	/
M_CTR	Input	Motor speed control end	/	0V-3.3V	PWM speed control

2.5 Data Communication

X3 uses a 3.3V serial port (UART) for duplex communication. The user can connect the external system and the product through the physical interface on the product, and

communicate in accordance with the system communication protocol to obtain the scanned point cloud in real time Its communication parameters are as follows:

CHART 4 YDLIDAR X3 SERIAL SPECIFICATION

Item	Min	Typical	Max	Unit	Remarks
Baud rate	/	115200	/	bps	8-bit data bit,1 stop bit, no parity
High signal level	2.4	3.3	3.5	V	/
Low signal level	0	0	0.6	V	/

2.6 Motor Control

The X3 motor driver has its own speed control function, and the peripheral can control the speed of the X3 motor by inputting a control signal through the M_CTR pin in the interface. The speed can be adjusted by inputting the PWM signal, the larger the PWM duty cycle, the higher the motor speed.

CHART 5 YDLIDAR X3 M_CTR INTERFACE FUNCTION DESCRIPTION

Item	Function description	Remarks
Constant low level	The lidar enters the standby state and the motor stops working	Standby
Input PWM signal	The lidar enters the working state, and the scanning frequency is controlled by the input signal	PWM (10KHz/3.3Vpp)
Constant high level	The lidar enters the working state, the scanning frequency is reset to the default value	The default value is 6±0.2Hz
Hanging	The lidar enters the working state, the scanning frequency is reset to the default value	The default value is 6±0.2Hz

Among them, the PWM signal of M_CTR has the following requirements:

CHART 6 YDLIDAR X3 MOTOR PWM SIGNAL SPECIFICATIONS

Item	Min	Typical	Max	Unit	Remarks
PWM frequency	/	10	/	KHz	PWM as a square wave signal

The correspondence between the duty cycle of the PWM signal and the scanning frequency will vary depending on the individual lidar, the power supply, and the environment. The correspondence relationship in the following figure is for reference only:

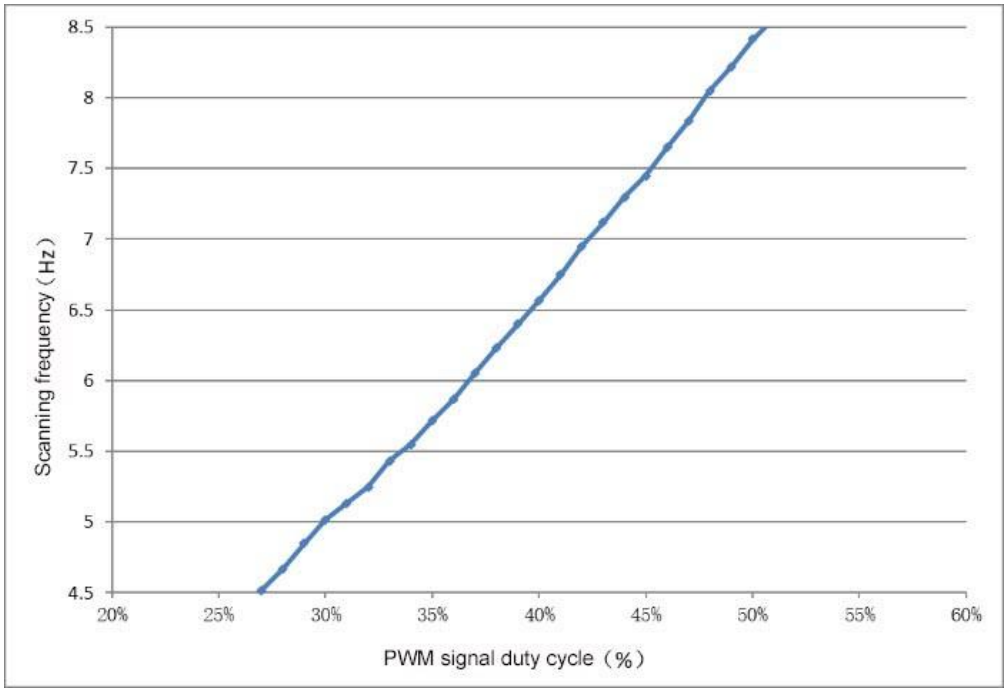

FIG 3 THE RELATIONSHIP BETWEEN YDLIDAR X3 PWM SIGNAL DUTY CYCLE AND SCANNING FREQUENCY (FOR REFERENCE ONLY)

2.7 Optical Characteristics

The infrared point pulse laser used in X3 meets FDA Class I laser safety standards. When the system is working, lasers and optical lenses complete the transmission and reception of laser signals to achieve high-frequency ranging. To ensure the system's ranging performance, please ensure that the laser and optical lens of the X3 are kept clean. The laser optical parameters are as follows:

CHAR 7 YDLIDAR X3 LASER OPTICAL PARAMETERS

Item	Min	Typical	Max	Unit	Remarks
Laser wavelength	775	793	800	nm	Infrared band
Laser power	/	1	3	mW	Average power value
FDA	Class I				

2.8 Polar Coordinate System Definition

In order to facilitate secondary development, X3 defines a polar coordinate system internally. The polar coordinates of the system take the center of the rotating core of X3 as the pole. The specified angle is clockwise as positive, and the zero angle is located directly in front of the X3 motor. Due to individual differences, there is a deviation of plus or minus 3 degrees.

2.9 Others

CHART 8 YDLIDAR X3 OTHERS

Item	Min	Typical	Max	Unit	Remarks
Operating temperature	0	20	40	℃	No condensation
Storage temperature	-10	20	60	℃	With package
Lighting environment	0	550	2000	Lux	Reference only
Weight	/	135	/	g	N.W.

3 REVISION

Date	Version	Content
2021-11-30	1.0	Revision