YDLIDAR

DOC#:01.13.005700

YDLIDAR TSA DATA SHEET

www.ydlidar.com

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1 PRODUCT OVERVIEW

YDLIDAR TSA is a 360 degrees 2D LiDAR (hereinafter referred to as TSA) developed by EAI team. Based on the principle of ToF, it is equipped with related optics, electricity, and algorithm design to achieve high-precision laser distance measurement, while measuring the distance, the mechanical structure rotates 360degrees to continuously obtain angle information, thereby realizing 360 degrees scanning distance measurement and outputting point cloud data of the scanning environment.

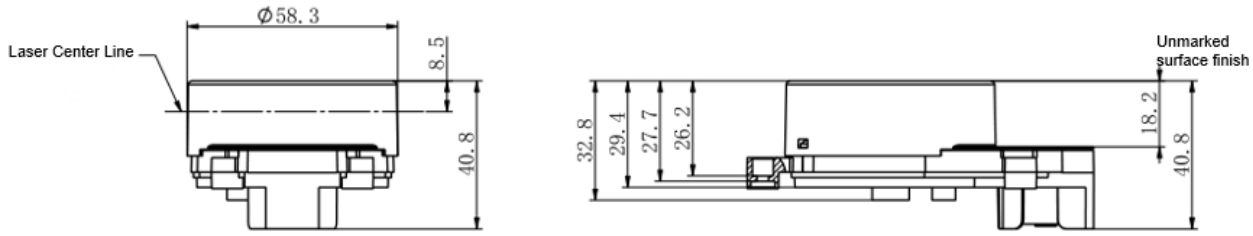
1.1 Product Features

- 360 degrees scanning and ranging,6Hz scan frequency
- High accuracy, stable performance
- Fully enclosed, dustproof and waterproof
- Wide measuring range
- Strong ability to resist ambient light interference
- Class I eye safety
- Magneto-optical fusion technology realizes wireless communication and wireless power supply

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 home service robots/ robot vacuum cleaners

1.3 Installation and Dimensions



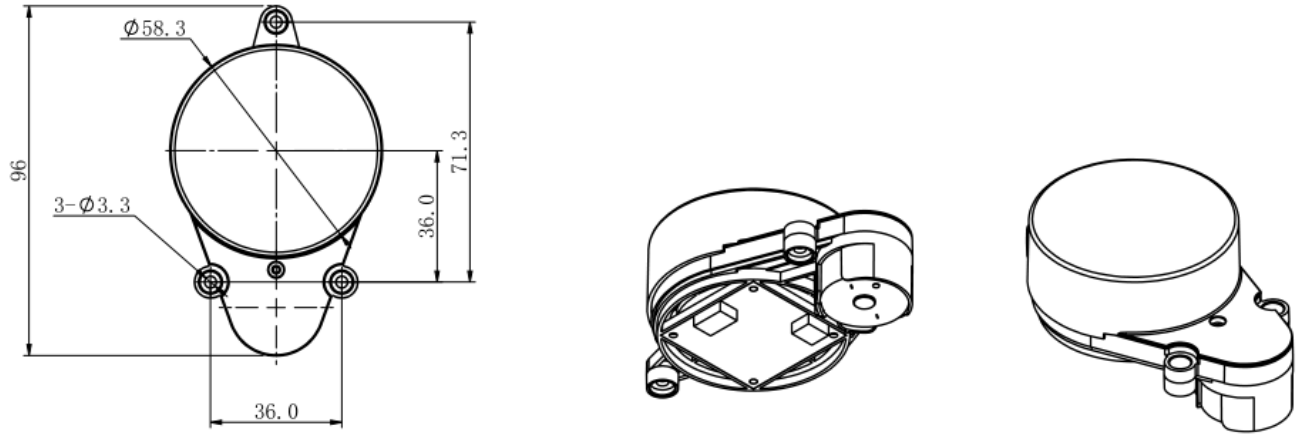


FIG 1 YDLIDAR TSA INSTALLATION AND MECHANICAL SIZE (UNIT:MM)

2 SPECIFICATIONS

2.1 Product Parameter

CHART 1 YDLIDAR TSA PRODUCT PARAMETER

Item	Min	Typical	Max	Unit	Remarks
Ranging frequency	/	3000	/	Hz	/
Scan frequency	5	6	8	Hz	/
Ranging distance	0.12	/	8	m	80% reflectivity
Fileld of view	/	0-360	/	Deg	/
Systematic error	/	±40	/	mm	80% reflectivity
Tilt angle	0.25	1	1.75	Deg	/
Angle resolution	/	0.72 (frequency@ 6Hz)	/	Deg	/

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

Note2: Lidar is a precision device, please avoid using Lidar under high or low temperature or strong vibration situation, the systematic error parameter index will be relatively larger, and it may exceed the typical value.

2.2 Electrical Parameter

CHART 2 YDLIDAR TSA ELECTRICAL PARAMETER

Item	Min	Typical	Max	Unit	Remarks
Supply voltage	4.8	5.0	5.2	V	Excessive voltage might damage the Lidar while low affect normal performance
Voltage ripple	0	50	100	mV	High ripple affects performance or even distance measurement
Start-up current	/	1200	1400	mA	Higher current is required when the device starts
Sleeping current	/	<50	/	mA	System sleeps, motor stops
Working current	/	300	350	mA	System works, motor rotates

2.3 Interface Definition

TSA provides MX1.25-4P receptacle interface, which integrates system power supply and data communication functions.

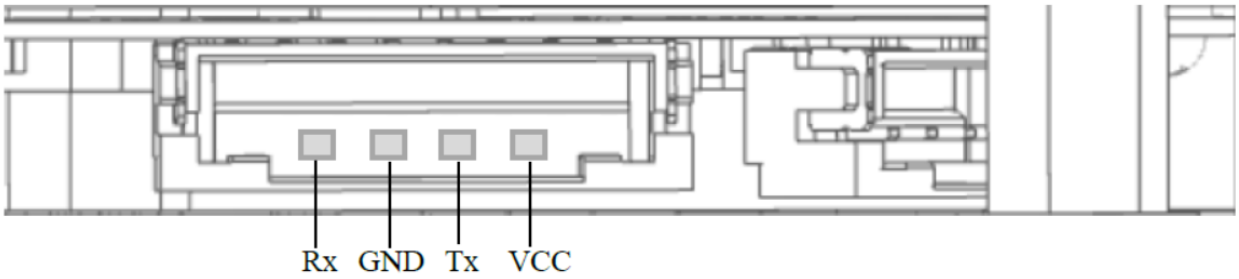


FIG 2 YDLIDAR TSA INTERFACES

CHART 3 YDLIDAR TSA INTERFACE DEFINITION

Pin	Type	Description	Defults	Range	Remarks
VCC	Power supply	Positive	5V	4.8V-5.2V	/
Tx	Output	System serial port output	/	/	Data stream: Lidar→Peripherals
Rx	Input	System serial port Input	/	/	Data stream: Peripherals→Lidar
GND	Power supply	Negative	0V	0V	/

2.4 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 scannedpoint cloud data, device information as well as device status, and can set the working mode of the equipment, etc. The communication protocol of parameters are as follows:

CHART 4 YDLIDAR TSA SERIAL SPECIFICATION

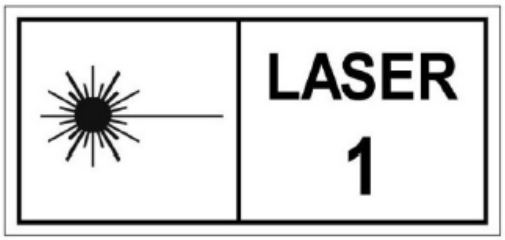
Item	Min	Typical	Max	Unit	Remarks
Baud rate	/	230400	/	bps	8-bit data bit,1 stop bit, no parity
High signal level	1.8	3.3	3.4	V	/
Low signal level	0	0	0.5	V	/

2.5 Motor Control

TSA has its own motor driver with motor speed control function, and provides a command interface instead of a hardware interface for motor control. For details, please refer to the development manual of this product.

2.6 Optical Characteristic

The infrared point pulse laser used in TSA can ensure the safety of human and pet. The lidar has passed testing and conformed to Class I, 21 CFR 1040.10 and 1040.11 safety level, except for IEC 60825-1 Ed. 3., as described in Laser Notice No. 56, dated May 8, 2019.



The laser and optical lens finish the transmission and reception of the laser signal to achieve high-frequency ranging while working. The detailed optical parameters are as follows:

CHART 5 YDLIDAR TSA LASER OPTICAL PARAMETERS

Item	Min	Typical	Max	Unit	Remarks
Laser wavelength	895	905	915	nm	Infrared band
Laser power	/	15	25	W	Peak power
FDA	Class I IEC60825-1				

Note: The personal adjustment or reassembly of the Lidar may result inhazardousradiation exposure.

2.7 Polar Coordinate System Definition

In order to facilitate secondary development, TSA internally defines a polar coordinate system. The polar coordinate of the system takes the center of the rotating core of TSA as the pole. The deviation of plus or minus 3 degrees, as shown in the figure:

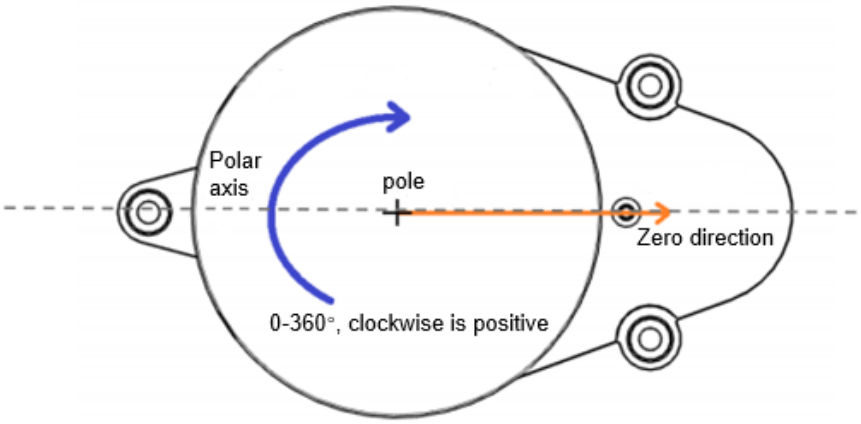


FIG 3 YDLIDAR TSA POLAR COORDINATE SYSTEM DEFINITION

2.8 Others

CHART 6 YDLIDAR TSA OTHERS

Item	Min	Typical	Max	Unit	Remarks
Operating temperature	0	25	50	℃	Long-term working in a high temperature environment will reduce the life span
Lighting environment	/	/	10000	Lux	For reference only
weight	/	94	/	g	N.W.

3 DEVELOPMENT AND SUPPORT

TSA provides a wealth of software interfaces, which can realize the motor enabling control, speed control, range unit enabling control and output control of the system. On this basis, users can also implement the power control and scan control purpose.

Also, the 3D model of TSA is disclosed. YDLIDAR provides the graphics debugging Workstation under Windows, as well as the corresponding SDK and ROS development kit to users, which could be downloaded from our website: https://www.ydlidar.com/.

In order to facilitate users' development, TSA development manual, SDK development manual and ROS user manual are also provided. Please download them from our website.

4 POINTS FOR ATTENTION

This lidar uses a non-enclosed brushed motor. According to the operating principle of the brushed motor, this product cannot be used in volatile and releasing environments containing low molecular compounds such as Si (silicon), S (sulfur), P (phosphorus):

- **Risk analysis**

The electrical contacts between the brush and the commutator in a brushed motor will repeatedly connected and disconnected during the operation of the motor, generating electrical sparks When the motor is in an environment with vapor such as silicon, sulfur, and phosphorus, molecules or compounds such as silicon, sulfur, and phosphorus (such as SiC, SiO2, etc.) will be adsorbed at the contact, causingthe increases in the contacts resistance between the brush and the commutator electrical contact, which may lead to poor contact, blocked rotation or other situations.

- **Usage suggestions**

1. Avoid using volatile and releasing materials containing compounds such as Si, S, P, etc., including but not limited to heat dissipation adhesive, insulation adhesive, AB adhesive, etc.
2. In terms of structural design, keeping away from the volatilization and releasing environment and materials containing low molecular compounds such as Si (silicon), S (sulfur), P (phosphorus), etc., and reserve a certain space to ensure air flow and reduce the possible concentration of low molecular compounds.

5 REVISE

Date	Version	Content
2020-11-26	1.0	Compose a first draft
2021-12-16	1.1	Optimize the working temperature, lighting environment, weight parameters, and add tilt angle
2022-01-14	1.2	Optimize mechanical size drawing and interface definition
2024-01-29	1.3	Add section 4