

## TSD20 Single-Point LiDAR Based on DTOF Principle

200Hz Measuring Frequency / 20 meters Range / Ambient Light Immunity 100Klux / Cost-effective

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### 一、Product Overview

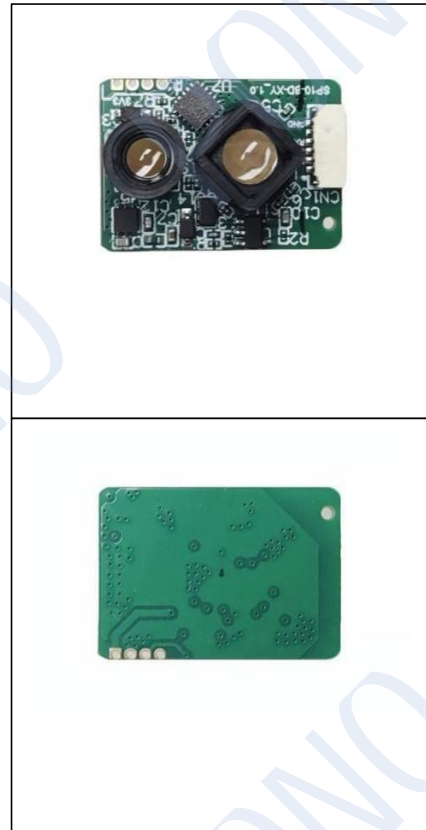
The TSD20 LiDAR is our newly launched laser ranging product and is specially designed for applications such as drones, sweeping robots, and industrial robots. Based on the DTOF principle, it features a compact size, low cost, superior performance, and high resistance to ambient light interference. This product is easy to use, flexible to install, convenient for expansion, and extremely cost-effective.

### 二、Features

- Based on DTOF principle (Direct Time of Flight)
- Maximum Measuring Range: 20 m
- Measuring Blind Zone: 5 cm
- Measuring Frequency: 200Hz
- Accuracy:  $\pm 5\text{cm}(<5\text{m})$ ,  $1\%( \geq 5\text{m})$
- Resolution: 1mm
- Operating Temperature:  $-20^{\circ}\text{C} \sim +60^{\circ}\text{C}$
- Supply Voltage: 3 ~ 3.6VDC
- Compact Size: 21 x 15 x 7.43 mm
- Weight: 2g
- Ambient Light Immunity: 100Klux

### 三、Applications


- Drone Altitude Holding and Obstacle Avoidance
- Robots Obstacle Avoidance
- Industrial Grade Light Curtain
- AGV Obstacle Avoidance
- High-speed Measuring and Safety Monitoring in Traffic and Industrial Automation



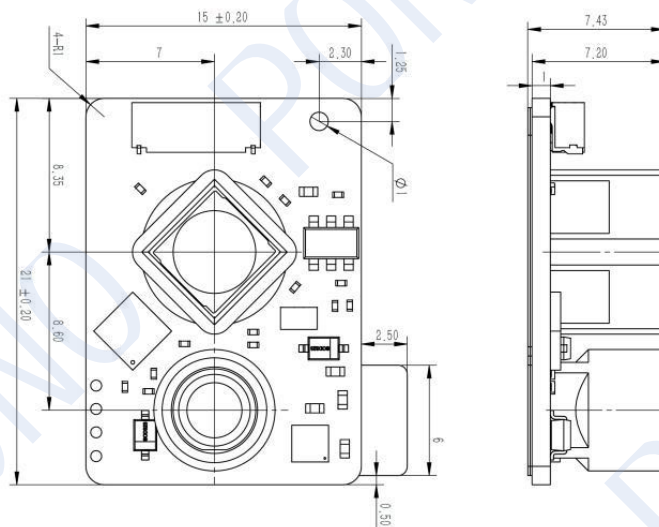
#### 四、Specifications

#	Model	TSD20
1	Range	0.05m ~ 20m (90%reflectivity), 0.05m ~ 20m (10%reflectivity)
2	Frequency	200Hz
3	Accuracy	±5cm(<5m), 1%(≥5m)
4	Repeatability	±10mm
5	Ambient Light Immunity	8m@100KLux
6	Central Wavelength	905nm
7	Photobiological Safety	Class 1
8	FOV	3.4°
9	Wavelength for Indication	N/A
10	Photobiological Safety for Indication	N/A
11	Supply Voltage	3.3~3.6VDC
12	Peak Current	140mA
13	Average Current	75mA
14	Average Power Consumption	<0.4W
15	Communication Interface	UART/IIC
16	Protection Level	N/A
17	Dimension	21x 15 x 7.43 mm
18	Weight	2g
19	Operating Temperature	-20℃ ~ +60℃
20	Wire Specification	6pin 0.8mm terminal, 20cm tinned stranded wires
21	Customization	available in appearance / structure / output protocol

## 五、Definitions of Pins

		
No.	Definition / Wire Color	User Interface
1	NC (Red)	/
2	3.3 (Black)	External Power +
3	TX (SCL) (Yellow)	RX (SCL)
4	RX (SDA) (Green)	TX (SDA)
5	NC (Blue)	/
6	GND (White)	External Power -

## 六、Dimensions



## 七、Measuring Characteristic

Because of the divergence angle, there would be a light spot with changing size on the target surface depending on the distance. In actual use, the surface area of the target object should be larger than the light spot so that the distance can be accurately measured.

The diameters of the light spot of TSD20 in different distances are shown below:

Distance	1m	2m	5m	10m	20m
Diameter of the light spot	6cm	12cm	30cm	60cm	1.2m

## 八、Communication Protocol: UART

### 1. Communication Interface

UART	
Baud Rate	460800 (adjustable)
Data Bit	8
Stop Bit	1
Parity Bit	None

### 2. Output Format

Both the input and output of this product adopt the Hexadecimal Little-Endian Mode.

Frame Header	Distance 2 Bytes		Check Byte
5C	02	11	EC
Frame header 1 byte	Distance value 2 bytes means the measuring distance is 4354mm, little-endian, range 0-65535. When out of range, it would output 50000		From 02 to 11, opposite of the Check byte, 1 byte

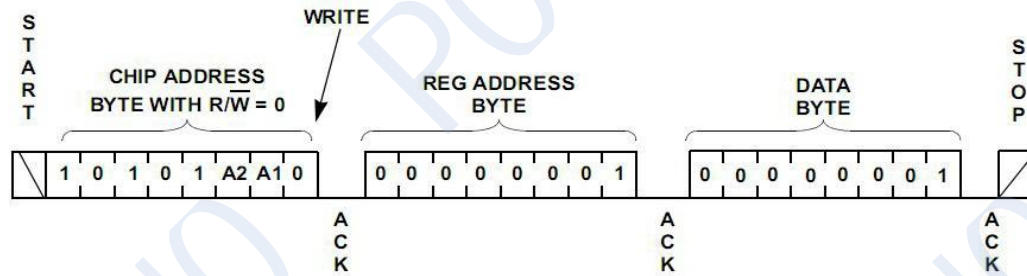
### 3. UART Commands

#	Description	Send	Return	Note
1	Reading serial no.	5A 0D 02 0D 0D checksum	5A 8D 02 10 01 checksum	10 01 means the serial no. is 272: little-endian, the serial no. shown in the upper computer is: S00272 (Add S before the number).
2	Reading software version no.	5A 16 02 16 16 checksum	5A 96 02 03 02 checksum	03 02 means the software version no. is V2.3: little-endian, 02 represents 2, 03 represents 3, Add a point (.) in the middle.
3	Baud rate setting	5A 06 02 80 04 checksum	5A 86 02 80 04 checksum	60 00 (9600) C0 00 (19200) 80 01 (38400) 80 04 (115200) 00 09 (230400) 00 0A (256000) 00 12 (460800) Any other baud rate is not available

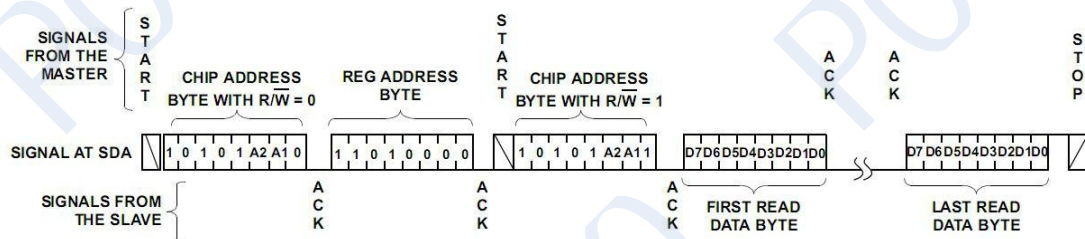
## 九、Communication Protocol: IIC

TSD20LiDAR IIC slave interface supports maximum clock frequency 400K. The default address is 0x52 (7bit address mode).

I2C single register write sequence is as follow:



I2C multiple registers read sequence is as follow:

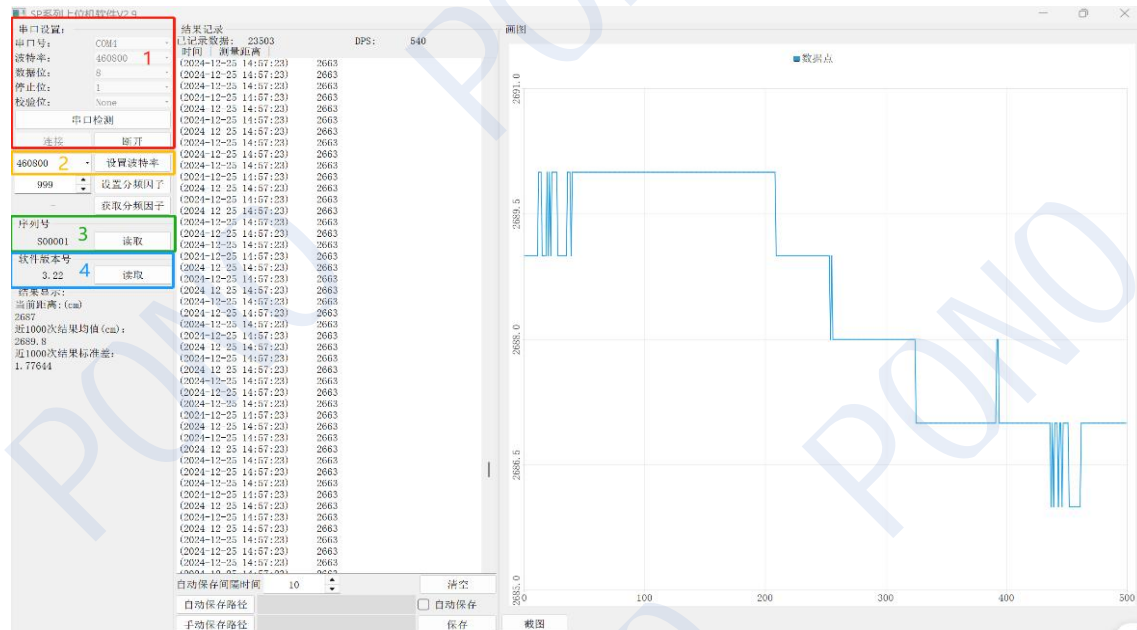


Definitions of registers

No.	Register address	Register definition	Attribute	Remarks
0	0x00	Distance-High byte	read only	2byte for distance
1	0x01	Distance-Low byte	read only	2byte for distance
3	0x02	Laser control	write only	0: laser off; 1: laser on
4	0x03	LiDAR ID	read only	default 0x4A, be used to communicate read&write tests

## ✚、Quick Test

Test materials: TTL to USB adapter board, 3.3V DC power, upper computer / serial port assistant. After the TSD20 successfully connected to your computer, select the baud rate and click “connect”, then the data can be monitored on the upper computer. Here is a sample figure of upper computer:



Area 1: Set the parameters and click “connect”

## Area 2: Set the baud rate

Area 3: Read the serial no.

Area 4: Read the software version no.

## 十一、Attentions

- There is NO protection for reverse polarity and overvoltage, please strictly follow the specification for correct power supply and wiring.
- The photobiological safety of this product is Class 1, so please DO NOT look straight at the lens after successfully connected.
- When operating this product in a dusty place, it is better to add a piece of red transparent glass or acrylic plate over the lens for dust prevention. (905nm wavelength needs a transmittance  $\geq 85\%$ .)
- When touching this product, please wear anti-static gloves to prevent the product from failing.
- There is a risk of failure when using this product to measure high-reflective objects (such as 3M tapes) and mirrors.