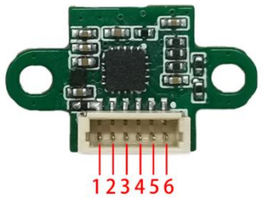
Siman

SDM02 Laser rangefindingModule

The SDM02 LiDAR is a brand-new laser ranging product launched by our company, designed for applications such as robot obstacle avoidance, lighting sensor systems, sanitary ware sensors, human presence detection, and material level monitoring. Based on the DTOF ranging principle, this product features a compact size, low cost, superior performance, and strong resistance to ambient light interference, making it an excellent upgrade and replacement option for related fields. For more product information, please visit: www.siman.asia

Warning	Please follow the equipment usage guidelines! This product is not a safety sensor and cannot be used for personnel protection.
	➢ Main measurement laser(940nm): Class 1 laser product,Do not look directly at the lens after power-on.Safe under normal operating conditions. ➢ The product may fail when measuring highly reflective objects (such as 3M tape) or mirror surfaces.. ➢ This product does not have an explosion-proof design and must not be used in flammable or explosive environments. ➢ Do not disassemble this product. ➢ Be sure to turn off the power before performing any operations. Do not perform wiring operations while the power is still on! 1. Avoid use in dusty/vapor environments or environments with corrosive gases; 2. Avoid inPlaces where corrosive gases are generatedUse; ➢ This product cannot be used in water. ➢ When using outdoors, be sure to add a waterproof cover. ➢ The product features reverse-polarity and overvoltage protection. Please supply power and connect the wires correctly according to the specification sheet. ➢ When using the product, it is necessary to add isolation between the transmitter and receiver (e.g., use black foam to isolate transmission and reception). ➢ When handling the product, please wear antistatic gloves to prevent the product from malfunctioning.

Wiring diagram

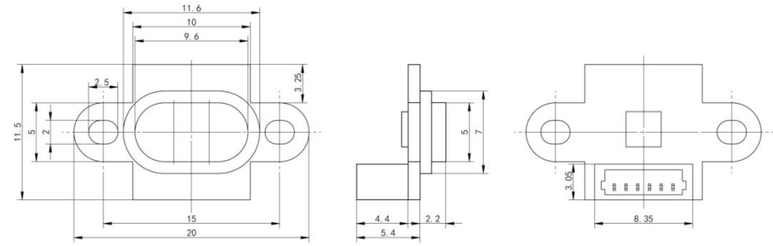


Pin	Line sequence definition	User interface
1	3.3-5V	External power positive
2	GND	External power negative
3	TX/SCL	RX/SCL
4	RX/SDA	TX/SDA
5	Interface configuration input	Ground: Start in I2C mode; Floating or connected to 3.3V: Start in serial port mode.
6	Reuse output	Digital input/output mode: Used in UART mode. Not available in I2C mode.

SpecificationsParameter

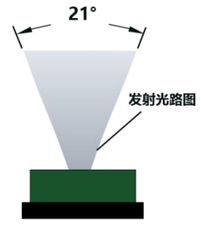
Model	SDM02
Measurement range	0.03-1.8m (90% reflectance))[1] 0.03-0.8m (10% reflectance)
AbsolutelyAccuracy	±10mm
Repeatability	±10mm
Measure frequency	50Hz
Measure laserWavelength	940nm,Class 1
Field of View FOV	21°
Laser wavelength indication	N/A
Anti-environmental light capability	0.6m@70KLux [2]
Communication method	IIC/UART+IO
Protection level	N/A
Operating voltage	3.0~5.5VDC
Operating current	3.3V@50mA (peak current) 3.3V@30mA (average current)
Average power consumption	<0.1W
Weight	0.7g
Size	20 x 11.5 x 4.1mm
Operating temperature	-20~60℃
Electrical connection	61.0mm pin terminal, model ZX-SH1.0-6PLT, paired with 10cm tinned stranded wire.
Customization scope	Supports customized external structural designs and customized output protocols.
Comment	1,1. This parameter was measured in an indoor environment at 25℃. 2. This parameter was measured outdoors at an ambient temperature of 25℃ with a 90% reflectance panel.

Dimensional drawing



Ranging characteristics

Since the probing light source has a certain divergence angle, in actual measurements, if an accurate distance value is required, the surface area of the object being measured must be larger than the diameter of the light spot at that distance.The optical path diagram for range measurement is as follows:



At different distancesSDM02The diameters of the light spots are shown in the following table:

distance	10cm	30cm	50cm	100cm
Spot diameter	4cm	12cm	19cm	37cm

Contact Us

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Communication Instructions:UART TTL		
Baud rate	115200bps (default), can be modified	
Data bit 8	Stop bit 1	Check digit: None

Output format			
This product uses the little-endian hexadecimal format for both input and output.			
Frame header	Distance value, two bytes		Check digit
5C	B9	00	46
5C: Fixed frame header, 1 byte			
B9 00:The distance value is represented by two bytes, indicating the measured distance as:185Mm, Little-endian mode, range 0 - 2000			
46: The check digit is one byte, starting from the second byte.00Start from the first byte to the second-to-last byteB9End, sum and negate..			

UART instructionExample: The device is this product, and the host is the control receiving end.

Function	**direction**	**Data**	**Definition**
Modify the baud rate	Send	5A 06 02 80 04 73(checksum)	60 00（9600） C0 00 (19200) 80 01（38400） 80 04（115200） 00 09（230400） 00 0A (256000) 00 12（460800） Other baud rates are not supported.
	Return	5A 86 02 80 04 F3(checksum)	

Function	**direction**	**Data**	**Definition**
Stop ranging	Send	5A 0A 02 00 00 F3(checksum)	Return 5A 8A 02 00 00 73 Stop ranging
	Return	5A 8A 02 00 00 73(checksum)	
Start ranging	Send	5A 0A 02 02 00 F1(checksum)	Return 5A 8A 02 02 00 71 Start ranging
	Return	5A 8A 02 02 00 71(checksum)	
Read the product serial number	Send	5A 0D 04 0D 0D 0D 0D 0D 0D 9E(checksum)	01 50 15 56 In FA 71 little-endian mode, the product serial number displayed on the host computer is: S125,320,000,000,001 (with an "S" added before the 15-digit number).
	Return	5A 8D 06 01 50 15 56 FA 71 45(checksum)	
Read the software version number	Return	5A 96 02 03 02 62(checksum)	V2.3: Little-endian mode, where 02 represents 2 and 03 represents 3, with a period (.) in between.
Switch function enabled	Send	5A 0A 02 04 00 EF(checksum)	Return the 5A 8A 02 04 00 6F switch enable, enabled by default.
	Return	5A 8A 02 04 00 6F(checksum)	
Switch function disabled	Send	5A 0A 02 05 00 EE(checksum)	Return 5A 8A 02 05 00 6E switch status disabled
	Return	5A 8A 02 05 00 6E(checksum)	
Switch forward	Send	5A 0B 00 04 00 F0(checksum)	Return 5A 8A 04 04 00 6B to forward, default is forward.
	Return	5A 8A 04 04 00 6B(checksum)	
Switch reverse	Send	5A 0B 00 05 00 EF(checksum)	Return 5A 8A 05 05 00 69, switching to forward.
	Return	5A 8A 05 05 00 69(checksum)	
Switch distance setting	Send	5A 0C 01 00 64 8E(checksum)	Returning 5A 8A 01 00 64 0F indicates that the switch distance has been successfully set to 100mm; the default value is 100mm.
	Return	5A 8A 01 00 64 0F(checksum)	
Hysteresis Distance Setting	Send	5A 0C 02 00 0A E7(checksum)	Returning 5A 8A 02 00 0A 69 indicates that the hysteresis distance of 10mm has been successfully set; the default value is 10mm.
	Return	5A 8A 02 00 0A 69(checksum)	
Data confidence	Send	5A 0C 03 00 0A E6(checksum)	64 1Byte, indicating a data confidence level of 100, Range 0-100
	Return	5A 8A 02 00 64 0F(checksum)	
Restore factory settings	Send	5A 0F 02 00 00 EE(checksum)	Return 5A 8A 02 00 00 73, The UART parameters have been successfully restored to factory settings.
	Return	5A 8A 02 00 00 73(checksum)	

Validation function

```
uint8_t Check_Sum(uint8_t *_pbuff, uint16_t _cmdLen)
{
    uint8_t cmd_sum=0;
    uint16_t i;
    for(i=0;i<_cmdLen;i++)
   {
        cmd_sum += _pbuff[i];
    }
        cmd_sum = (~cmd_sum);
        return  cmd_sum;
}
```

Register address

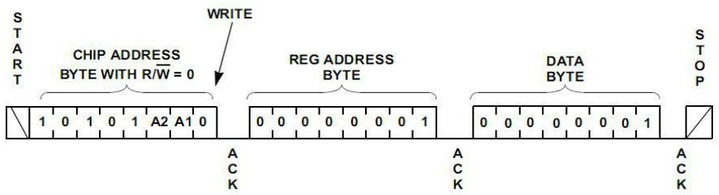
Register address	**Register Meaning**	**Read/Write attribute**	**Note**
0x00	Distance - High Byte	Read-only	Distance is represented using 2 bytes.
0x01	Distance - Low Byte	Read-only	Distance is represented using 2 bytes.
0x02	Laser-enabled control	Just write	0: Turn off the laser, 1: Turn on the laser
0x03	LiDAR ID	Read-only	Default value: 0x4A, used for communication read/write testing.
0x04	Reserved		
0x05	Reserved		
0x06	Software Version Number - High Byte	Read-only	The software version number is 2 bytes, with the high byte first and the low byte second.
0x07	Software Version Number - Low Byte	Read-only	
0x08	Serial Number - High Byte	Read-only	The serial number is 4 bytes long, with the high byte first and the low byte last, ranging from 1 to 4,294,967,294.
0x09	Serial Number - Next Highest Byte	Read-only	
0x0A	Serial Number - Next-to-Lowest Byte	Read-only	
0x0B	Serial Number - Low Byte	Read-only	
0x0C	IIC slave address	Read/Write	IIC slave address, 7-bit mode, range 0 - 127
0x0D	Restore factory settings	Just write	Write 0x01 to restore factory settings.
0x0E	Data confidence	Read-only	1Byte, range 0-100

IIC communication protocol

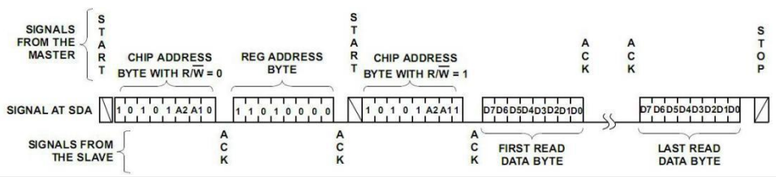
SDM02The LiDAR IIC slave interface supports a clock frequency of up to 400K.

The factory default address is 0x52 (7-bit address mode).

The I2C single-register write timing is as follows:

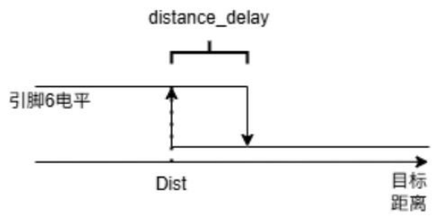


I2C Multi-Register Read Timing Sequence:



Digital mode

When users are only concerned with whether a target exists within a certain distance range, they can enable the switch mode of the SDM02 by using the UART switch function to activate the corresponding command. In this mode, the detection information is indicated by high and low voltage levels at pin 6.

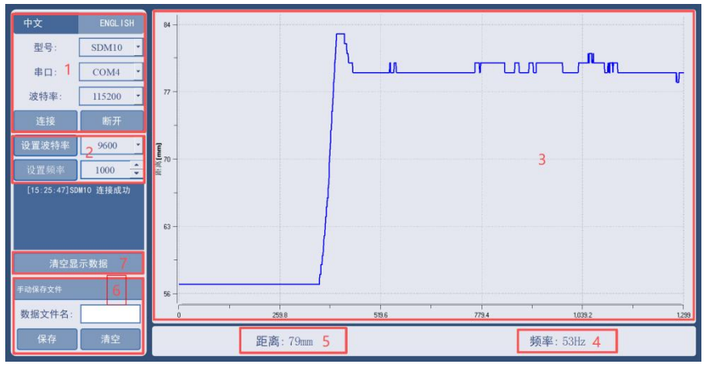


As illustrated in the figure above, taking the near-high-far-low mode (with positive switching hysteresis) as an example, we’ll explain how the switch-mode operation works. When the hysteresis distance, "distance_delay," is set to 0 mm and the switch-distance, "Dist," is set to 100 mm (the default value is 100 mm), pin 6 outputs a high level when the target distance is less than Dist, and a low level when the target distance exceeds Dist. If the target distance happens to be exactly at the Dist value, due to the inherent variability in distance measurement, pin 6 may experience frequent toggling between high and low levels. To avoid this issue, you can set the "distance_delay" to create a hysteresis interval. When "distance_delay" is set to 10 mm (the default value is 10 mm), a high-to-low transition will occur only when the target distance exceeds Dist + distance_delay, while a low-to-high transition will occur only when the target distance falls below Dist. If you need to reverse the direction of the high and low level outputs, you can use UART commands to switch between forward and reverse modes, as well as adjust the switch distance and hysteresis distance accordingly.

Fast Test:

Test Bill of Materials: TTL-to-USB adapter, 3.3V power supply, host computer/serial port assistant. After SDM02 is properly connected, select the baud rate and click OK to view the desired data on the host computer.

The host computer displays the following:



Region 1: Set the corresponding serial port baud rate and other parameters for the model, click Disconnect, then click Connect.

Region 2: Set the baud rate

Region 3: Real-time Distance Line Chart

Region 4: Read real-time frequency

Region 5: Read the real-time distance value

Region 6: Save data to a file

Area 7: Clear all displayed data