Siman

SDM02 laser rangefinder module

SDM02 LiDAR is our latest laser ranging solution for drones, robotic vacuum cleaners, and industrial robots. Built on the DTOF (Doppler Time of Flight) principle, it features compact size, cost efficiency, superior performance, and strong resistance to ambient light interference, making it an ideal upgrade or replacement for these applications. For more product details, visit: www.siman.asia

warn	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 high-reflective objects (such as 3M tape) or mirrors. ➢ This product has no explosion-proof structure, and it is forbidden to use in flammable and explosive environments. ➢ Do not remove this product. ➢ Be sure to turn off the power before operating. Do not connect wires while powered on! 1. Avoid use in dust/steam or corrosive gas environment; 2. Avoid use in places where corrosive gases are generated; ➢ Do not use this product in water. ➢ When used outdoors, pay attention to adding a waterproof cover. ➢ The product features no reverse connection or overvoltage protection. Please follow the specifications for proper power supply and wiring. ➢ Add isolation for sending and receiving (e.g., use black foam to isolate transmission and reception) ➢ Wear anti-static gloves when handling the product to prevent damage.

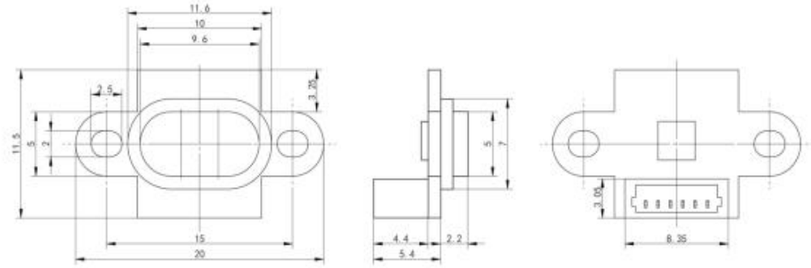
hookup

pin	Thread order definition	customer interface
1	3.3-5V	External power is on
2	GND	External power negative
3	TX/SCL	RX/SCL
4	RX/SDA	TX/SDA
5	Interface configuration input	Ground: Set to I2C mode when airborne or connected to 3.3V: Set to serial port mode when airborne Ground: Set to I2C mode when airborne or connected to 3.3V: Set to serial port mode when airborne
6	Reuse output	Switching mode: Enable UART mode, disable I2C mode

Specifications

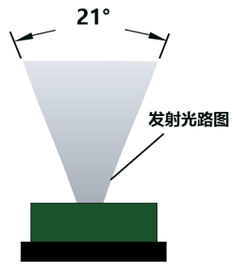
model	SDM02
measuring range	0.02-1.8m (90% reflectivity) 0.02-0.8m (10% reflectivity)
absolute accuracy	±10mm
repeatability precision	±10mm
measuring frequency	50Hz
Measure laser wavelength	940nm, Class 1
Field of View (FOV)	21°
Indicate laser wavelength	N/A
Indicate laser level	N/A
Environmental light resistance	0.6m@70KLux 2
communication mode	IIC/UART+IO
levels of protection	N/A
working voltage	3.0 ~ 5.5VDC
working current	3.3V@150mA (peak current) 3.3V@30mA (average current)
Average Power Consumption	< 0.1W
weight	0.7g
size	20 x 11.5 x 4.1mm
working temperature	-20~60℃
Electrical connections	6-pin 1.0mm terminal, ZX-SH1.0-6PLT specification, with 10cm soldering wire
Customize range	Supports customizing the shape structure and output protocol
explanatory note	1. This parameter was measured at 25℃ in an indoor environment. 2. This parameter was measured at 90% reflector and 25℃ outdoor temperature.

dimensional drawing



Distance measurement characteristics

Due to the divergence angle of the detection light source, in order to obtain the accurate distance value in the actual measurement, the surface area of the measured object should be greater than the diameter of the light spot of the light source at this distance. The distance measurement optical path diagram is as follows:



The diameters of SDM02's light spots at various distances are shown in the table below.

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

contact us

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UART TTL

Baud rate	115200bps (default), can be modified		
Data bit 8	Stop position 1		Check bit: None

output format

This product uses little-endian hexadecimal for both input and output.

Frame header	Distance value in two bytes		check bit
5C	B9	00	EC

5C: Fixed frame header 1 byte

B9 00: The two-byte distance value indicates a measured distance of 185mm.

Small end mode, range 0-2000			
EC: The parity bit is calculated by summing the bytes from the second byte (00) to the second-to-last byte (B9), then taking the bitwise complement of the result.			
UART command example: The device is this product, and the host is the control receiver.			
function	**direction**	**data**	**definition**
Read product serial number	transmit by radio	5A 0D 04 0D 0D 0D 0D BA	The code 10 01 00 00 indicates product serial number 272 in little-endian format. The host computer displays the serial number as S0000000272 (with 'S' prefixed to the 10-digit number).
	return	5A 8D 04 10 01 00 00 5D	
Read software version number	transmit by radio	5A 16 02 16 16 BB	03 02 indicates the product software version V2.3: the lower-end mode, where 02 stands for 2 and 03 for 3, with a dot (.) in between.
	return	5A 96 02 03 02 62	
Change baud rate	transmit by radio	5A 06 02 80 04 73	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	
function	**direction**	**data**	**definition**
Switch IIC command	transmit by radio	5A 1F 02 1F 1F A0	Return 5A 9F 02 1F 1F 20. Switch successful
	return	5A 9F 02 1F 1F 20	
Stop measuring distance	transmit by radio	5A 0A 02 00 00 F3	Return 5A 8A 02 00 00 73 to stop distance measurement
	return	5A 8A 02 00 00 73	
Enable distance measurement	transmit by radio	5A 0A 02 02 00 F1	Return 5A 8A 02 02 00 71 to enable distance measurement
	return	5A 8A 02 02 00 71	
Switch forward	transmit by radio	5A 0B 00 04 00 F0	Return 5A 8A 04 04 00 6B to forward mode, default is forward
	return	5A 8A 04 04 00 6B	
Reverse switch	transmit by radio	5A 0B 00 05 00 EF	Return 5A 8A 05 05 00 69 to forward
	return	5A 8A 05 05 00 69	

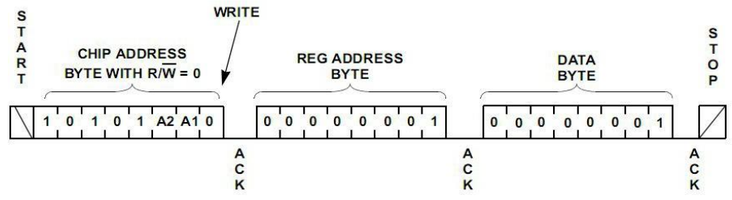
Switch distance setting	transmit by radio	5A 0C 01 00 64 8E	Return 5A 8A 01 00 64 0F indicates the switch distance is successfully set to 100mm. The default is 100mm.
	return	5A 8A 01 00 64 0F	
Delay distance setting	transmit by radio	5A 0C 02 00 0A E7	Return 5A 8A 02 00 0A 69 indicates successful setting of 10mm hysteresis distance. The default is 10mm.
	return	5A 8A 02 00 0A 69	
Data confidence	transmitted by radio	5A 0C 03 00 0A E6	64 1 byte, indicating a 100% data confidence level Range 0-100
	return	5A 8A 02 00 64 0F	
Factory Calibration	transmit by radio	5A 0A 02 03 00 F0	Return 5A 8A 02 03 00 70 indicates successful factory calibration
	return	5A 8A 02 03 00 70	
Restore appearance settings	transmit by radio	5A 0F 02 00 00 EE	The parameters of 5A 8A 02 00 00 73UART have been successfully restored to factory settings.
	return	5A 8A 02 00 00 73	

IIC protocol

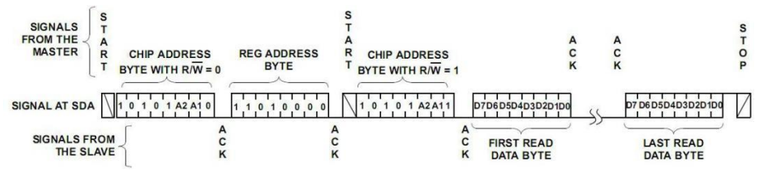
The SDM02 LiDAR IIC slave interface supports clock frequencies up to 400K.

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

The I2C single-register write timing is as follows:



I2C multi-register read sequence:



Register definition:

Register address	Register Meaning	Read/Write Properties	remarks
0x00	Distance-High Byte	read only	Distance is represented by 2 bytes
0x01	Distance-Low Byte	read only	Distance is represented by 2 bytes
0x02	Laser-enabled control	write only	0: Off, 1: On
0x03	ladar ID	read only	Default 0x4A for communication read/write testing
0x04	IIC to UART	write only	Write 0xA5 to register 0x04 and 0x5A to register 0x05.
0x05		write only	
0x06	Software version number-high byte	read only	The software version number is 2 bytes, with the high byte first and the low byte last.
0x07	Software version number-low byte	read only	
0x08	Serial Number-High Byte	read only	The serial number is 4 bytes, with the high byte first and the low byte last, ranging from 1 to 4294967294.
0x09	Serial number-second byte	read only	
0x0A	Serial number-second-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	factory data reset	write only	Write 0x01 to restore factory settings
0x0E	Data confidence	read only	1 byte, range 0-100

Switching mode:

When users only need to detect the presence of a target within a specific range, the SDM02's switch mode can be activated via the UART switch enable command. In this mode, detection information is indicated by the high/low voltage levels on pin 6.

The following diagram illustrates the operation of the switch mode using the near-high far-low configuration (positive light activation) as an example. When the hysteresis distance (distance_delay) is set to 0mm and the switch distance (Dist) is configured at 100mm (default), pin 6 outputs a high level when the target distance is less than Dist, and a low level when greater. If the target distance coincides with Dist, measurement fluctuations may cause frequent high-to-low or low-to-high level transitions at pin 6. To mitigate this, adjusting distance_delay creates a hysteresis range: when distance_delay is 10mm (default), the low-to-high transition only occurs when the target distance exceeds Dist+distance_delay, while the high-to-low transition triggers when the target distance is below Dist. For bidirectional switching, users can configure the forward/reverse direction via UART commands and adjust the light activation distance and hysteresis distance.