Siman

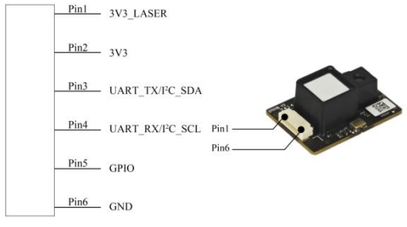
SDAM laser ranging module

SDAM is a fully integrated single-channel direct time-of-flight (dToF) laser ranging module developed by Siman Sensing Technologies. Featuring a self-developed high-sensitivity infrared-enhanced SPAD sensor with a 20-meter range, it incorporates time-correlated photon threshold algorithms, histogram-based statistical processing, and a fast Time-Delay Correlation (TDC) architecture. This enables high-precision ranging while maintaining 12-meter performance at 100Klux ambient light levels, with built-in reflectivity correction functionality.

The SDAM integrated power module features a 3.3V single-supply design with built-in temperature compensation. Supporting I²C and UART interfaces, it offers easy integration and operation. Its compact, reliable optical package delivers a small footprint and lightweight design, making it an ideal choice for micro-sized DTOF applications. Widely used in industrial automation and intelligent transportation, this product excels in high-precision measurement scenarios across industries including robotics, security, and medical fields. 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.
	➢ Measurement laser (905nm): Class 1 laser product. Safe under normal operating conditions. ➢ 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 environments that produce corrosive gases; ➢ Do not use this product in water. ➢ When used outdoors, pay attention to adding a waterproof cover.

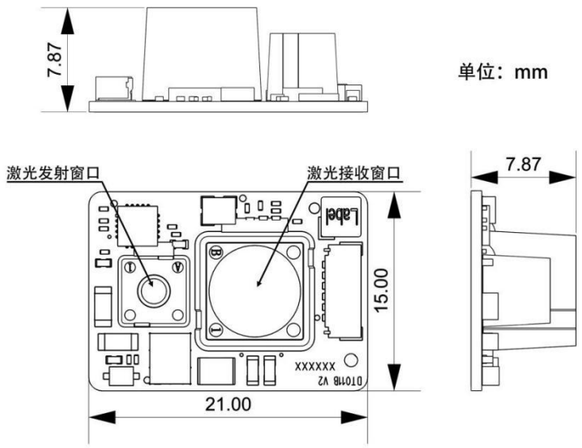
hookup



Pin functions		
order number	Port name (terminal cable color)	Port function description
1	3.3V Laser (Red)	The module laser is powered by a 3.3V boost circuit.
2	3.3V power supply (black)	The power supply module is powered by a low-voltage circuit with a voltage of 3.3V.
3	UART_TX/I²C_SDA (Yellow)	The module supports both UART and I²C communication modes, with GPIO port 5 configured in external pull-up/pull-down mode for mode selection. 1) When operating in UART mode, this port functions as the module's TX port (UART's transmit pin) for communication output. 2) When operating in I²C mode, this port functions as the SDA signal for the I²C bus;
4	UART_RX/I²C_SCL (green)	The module supports both UART and I²C communication modes, with GPIO port 5 configured in external pull-up/pull-down mode for mode selection. 1) When operating in UART mode, this port functions as the RX port for UART communication, serving as the module's communication input pin. 2) When operating in I²C mode, this port functions as the SCL signal for the I²C bus;
5	GPIO(Lan)	The module supports both UART and I²C communication modes. 1) When the GPIO port is set to external pull-down mode, the module operates in UART mode, during which the GPIO pin is inactive. 2) When the GPIO port is activated in external pull-up or floating state, the module operates in I²C mode. In this configuration, the GPIO port functions as an interrupt output pin, delivering a high-level pulse signal upon completion of a measurement frame.
6	GND(white)	landing
Note: The 3/4/5 interfaces are multiplexed interfaces, while UART and I2C are in two modes.		

Specifications	
model	**SDAM**
measuring range	0.2...20m
Sun protection	12m 100Klux sunlight
accuracy	±3cm 0.2m~6m; ， ±1% >6m (Reflectivity of the corresponding target surface is 18%~88%)
measuring frequency	Default is 100fps. 50/100/250fps are adjustable.
Measure laser light source	905nm, Class 1
Field of View	1.3°
(FOV)	
interface type	I²C 、 UART
temperature compensation	have
Reflectance correction	have
working voltage	DC+3.3V
Standby current	Typical 49mA@3.3V DC
working current	Typical 100mA@3.3V DC
Standby power consumption	160mW
Work Power Consumption	329mW
weight	1.35g
size	21mm×15mm×7.87mm
working temperature	-20~50℃
Storage temperature	-40~85℃
Electrical connections	6-pin terminal strip with 0.8mm spacing and single-ended piercing terminals
human-computer interaction	Supports real-time display of host computer software
Anti-static rating	Human Body Model Anti-static Grade (HBM): 2000V Machine Model Anti-static Rating (MM): 200V Charging Device Model Anti-static (CDM): 500V Reference standards: HBM: JESD22-A114; CDM: JESD22-C101 MM:JESD22-A11

dimensional drawing



contact us

Siman

Ximan Sensing Technology Co., LTD

URL: www.siman.asia

Wanda Mall 1, Qingpu District, Shanghai

11 Changchun Road, High-tech Zone,

Zhengzhou City, Henan Province

Email: 17317261651@163.com

Scan the QR code to follow us

Communication Note: UART			
Baud rate	921600bps (default), can be modified		
Start position 1	Data bit 8	Stop position 1	Check bit: None

This article performs CRC16 data calculation on each frame, which includes all data except the check.

CRC-16 verification uses the Modbus verification method. The specific parameters are as follows:

The polynomial is: 0×8005

Initial value: 0×ffff

Result XOR value: 0×0000

Reverse input data: Yes

Reverse output data: Yes

Agreement Summary

number	command name	Command code
1	Start Flow	0x01
2	End flow	0x02
3	version number	0x0a
4	Set baud rate	0x10
5	Get baud rate	0x11
6	Set I²C address	0x12
7	Get I²C address	0x13
8	Set frame rate	0x1A
9	Get frame rate	0x1B

Protocol Frame Format

The entire protocol has two forms of communication:

The commands 0x01,0x02, and 0x0a all use a PC-to-remote machine question-and-answer format (i.e., one question, one answer). Command 0×

01 The master-slave communication adopts periodic response (periodic response according to the set frame rate).

Send frame format (from host to slave):

head of contracted labour	device number	device type	CMD	Keep	length	Data	CRC16
1byte	1 byte	1 byte	1 byte	1 byte	2 byte	N byte	2 byte

Response frame format (slave → master):

head of contracted labour	device number	device type	CMD	Keep	length	Data	CRC16
1 byte	1 byte	1 byte	1 byte	1 byte	2 byte	N byte	2 byte

1) Baotou: 1 byte, i.e., 0xA5.

2) Device number: 1 byte, i.e., 0x03.

3) Device type: 1 byte, depending on the type of the lower-level machine evaluation board, is 0x20.

4) CMD: A 1-byte command function code that specifies the operation to be executed by the slave device from the master device.

5) Reserve space: 1 byte for future use.

6) Length: 2 bytes, indicating the data length in the data area (high bit first, low bit last).

7) Data: A N-byte section containing relevant data, parsed according to each command.

8) CRC16: A 2-byte value containing the CRC16 checksum of all data, with the high bit first and the low bit last.

The command codes and their corresponding functions are shown in the table below, where the command codes are in hexadecimal. The "command" in the response frame is the same as the command in the sending frame, that is, the same command is sent and responded to.

Command and Analysis

Match the command with its corresponding response command. All data in the table or with 0x prefix are in hexadecimal format.

function	**data**								
Start measurement command	**direction**	head of contracted labour	device number	device type	CMD	Keep	length	Data	CRC16
	transmit by radio	0×A5	0×03	0×20	0×01	0×00	0 × 00 0×00	0 bytes	Calculate based on actual Calculate based on actual
	receive	0×A5	0×03	0×20	0×01	0×00	0 × 00 0×01	1 byte	
	Sample of upper computer sending: A5 03 20 01 00 00 00 6E 02 Slave device response example: A5 03 20 01 00 00 0E FF FF FF FF FF FF 4B 03 5E 00 24 23 01 00 BB D8 01: Initiate command flow (send once, then the slave device will respond periodically) 00: Reserved byte 00 0E: Data area length FF FF: Secondary peak centroid FF FF: Temperature code FF FF: Secondary peak intensity 4B 03: The centroid of the main peak (with the lower peak preceding the higher one in distance measurement, converted to 034B = 843mm) 5E 00: Main Peak Calibration 24 23: Main peak intensity 01 00: Sunlight Base BB D8: 16-bit CRC checksum (high byte first, low byte last) Note: The above is the low first, the high last								
Check version number	direction	head of contracted labour	device number	device type	CMD	Keep	length	Data	CRC16
	transm	0×A5	0×03	0×20	0×0A	1 byte	0×00 0×00	not have	Calculate based on actual

	it by radio								
	receive	0×A5	0×03	0×20	0×0A	1 byte	0×00 0×01	1 byte	
	Sample of host computer sending: A5 03 20 0a 00 00 00 6C 26 Command code area: 0x0a Data Area: No data Slave machine response example: A5 03 20 0A 00 00 12 44 54 53 36 30 31 32 5F 41 50 50 5F 56 31 2E 32 36 43 0F 0B 0A: Query version command 00: Reserved 00 12: Data area length (high byte first, low byte last) 44 54 53 36 30 31 32 5F 41 50 50 5F 56 31 2E 32 36 43: Version number DTS6012_APP_XXXXX 0F 0B:16-bit CRC check (high byte first, low byte last)								
End measurement task	direction	head of contracted labour	device number	device type	CMD	Keep	length	Data	CRC16
	transmit by radio	0×A5	0×03	0×20	0×02	1 byte	0×00 0×00	not have	Calculate based on actual
	receive	0×A5	0×03	0×20	0×02	1 byte	0×00 0×01	1 byte	
	Sample of host computer sending: A5 03 20 02 00 00 00 6E 46 Command code area: 0x02. This command is for frame rate overlay. Data Area: No data Slave machine response: A5 03 20 02 00 00 01 00 7C C6 Command code area: 0x02. This command terminates the measurement. Data Area: Returns a byte variable. A return of 0 indicates a successful setting, while a return of 1 indicates a failed setting.								

	0×7C 0×C6: 16-bit CRC checksum (high byte first, low byte last)							
Set baud rate	direction	head of contracted labour	device number	device type	CMD	Keep	length	Data	CRC16
	transmit by radio	0×A5	0×03	0×20	0×10	1 byte	0×00 0×01	1 byte	Calculate based on actual
	receive	0×A5	0×03	0×20	0×10	1 byte	0×00 0×04	4 bytes	
	Sample of host computer sending: A5 03 20 10 00 00 01 0C 7E 7A Command code area: 0×10, baud rate setting command. Data area: 1 byte, 0-12 baud rate selection code. Slave response: Example: 0×A5 0×03 0×20 0×10 0×00 0×00 0×04 0×00 0×0E 0×10 0×00 0×2B 0×E0 0×10: Set baud rate command 0×00: Reserved 0×00 0×04: Data area length (high byte first, low byte last) 0×00 0×0E 0×10 0×00: The baud rate is 921600 (high byte first, low byte last) 0×2B 0×E0: 16-bit CRC check (high byte first, low byte last)								

波特 rate selection code	Baud rate
0×00	9600
0×01	14400
0×02	19200
0×03	38400
0×04	43000
0×05	57600
0×06	76800
0×07	115200
0×08	128000
0×09	230400
0×0A	256000
0×0B	460800
0×0C	921600

Get baud rate	direction	head of contracted labour	device number	device type	CMD	Keep	length	Data	CRC16
	transmit by radio	0×A5	0×03	0×20	0×11	1 byte	0×00 0×00	not have	Calculate based on actual
	receive	0×A5	0×03	0×20	0×11	1 byte	0×00 0×04	4 bytes	
	Sample of host computer sending: A5 03 20 11 00 00 00 6A C2 Command code area: 0×11, baud rate acquisition command. Data Area: None Slave response: Example: 0×A5 0×03 0×20 0×11 0×00 0×00 0×04 0×00 0×0E 0×10 0×00 0×E7 0×21 0×11: Get baud rate command 0×00: Reserved 0×00 0×04: Data area length (high byte first, low byte last) 0×00 0×0E 0×10 0×00: baud rate 921600 (high byte first, low byte last) 0×E7 0×21:16-bit CRC check (high byte first, low byte last)								
Set I²C address	direction	head of contracted labour	device number	device type	CMD	Keep	length	Data	CRC16
	transmit by radio	0×A5	0×03	0×20	0×12	1 byte	0×00 0×01	1 byte	Calculate based on actual
	receiv	0×A5	0×03	0×20	0×12	1 byte	0×00 0×01	1 byte	

	e								
	Sample of host computer sending: A5 03 20 12 00 00 01 00 07 BF Command code area: 0×12, I²C address setting command. Data area: 1 byte in total. Data[0] is the I²C device address (7 bits <1+0). Slave response: Example: 0×A5 0×03 0×2 0 0×12 0×00 0×00 0×01 0×A2 0×06 0×86 0×12: Set I²C address command 0×00: Reserved 0×00 0×01: Data area length (high byte first, low byte last) 0×A2: Set I²C address 0×06 0×86:16-bit CRC checksum (high byte first, low byte last)								
Get I²C address	direction	head of contracted labour	device number	device type	CMD	Keep	length	Data	CRC16
	transmit by radio	0×A5	0×03	0×20	0×13	1 byte	0×00 0×00	not have	Calculate based on actual
	receive	0×A5	0×03	0×20	0×13	1 byte	0×00 0×01	1 byte	
	Sample of host computer sending: A5 03 20 13 00 00 00 6B 7A Command code area: 0×13, I²C address acquisition command. Data range: None Slave response: Example: 0×A5 0×03 0×2 0 0×13 0×00 0×00 0×01 0×A2 0×C6 0×BB 0×13: Get I²C command 0×00: Reserved 0×00 0×01: Data area length (high byte first, low byte last) 0×A2: Retrieved I²C address 0×C6 0×BB: 16-bit CRC check (high byte first, low byte last)								
Get frame rate	direction	head of contracted labour	device number	device type	CMD	Keep	length	Data	CRC16
	tran	0×A5	0×03	0×20	0×1B	0×00	0×00 0×00	not have	Calculate based

	smit by radio								on actual
	receive	0×A5	0×03	0×20	0×1B	0×00	0×00 0×01	1 byte	
	Sample of host computer sending: A5 03 20 1B 00 00 00 69 1A Command code area: 0×1B, get frame rate command. Data Area: None Slave response: Example: 0×A5 0×03 0×20 0×1B 0×00 0×00 0×01 0×01 0×7E 0×1A n 0×1B: Get frame rate command n 0×00: reserved byte n 0×00 0×01: Data area length (high byte first, low byte last) n 0×01:1 byte, 0×00:50FPS, 0×01:100FPS, 0×02:250FPS. n 0×7E 0×1A:16-bit CRC check (high byte first, low byte last) Note: If no frame rate information is set, the value is 0×FF by default and configured as 100FPS by default.								
Set frame rate	direction	head of contracted labour	device number	device type	CMD	Keep	length	Data	CRC16
	transmit by radio	0×A5	0×03	0×20	0×1A	0×00	0×00 0×01	1 byte	Based on actual calculation
	receive	0×A5	0×03	0×20	0×1A	0×00	0×00 0×01	1 byte	
	Sample of host computer sending: A5 03 20 1A 00 00 01 01 27 BE Command code area: 0×1A, set frame rate command. Data area: 1 byte. 0×00:50FPS, 0×01:100FPS, 0×02:250FPS. Slave response:								

	Example: 0×A5 0×03 0×20 0×1A 0×00 0×00 0×01 0×01 0×BE 0×27 0×1A: Set frame rate command 0×00: reserved 0×00 0×01: Data area length (high byte first, low byte last) 0×01: Return the set frame rate 0×00 0×01: Data area length (high byte first, low byte last) 0×01:1 byte, 0×00:50FPS, 0×01:100FPS, 0×02:250FPS. 0×BE 0×27:16-bit CRC check (high byte first, low byte last)

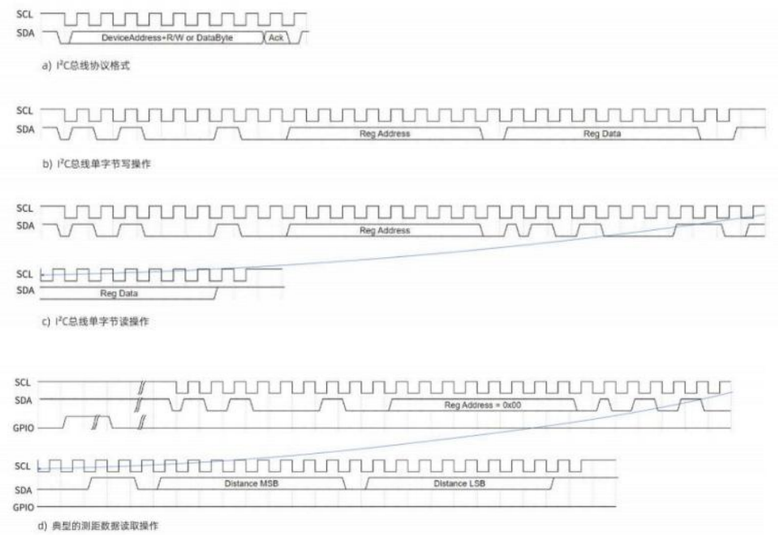
I²C protocol content

The I²C controller address is 7 bits, with the 0×51 and 0 bits designated for read/write (0×51<1) | (w/r).

Logical sequence

UART bus timing

I²C bus timing



IIC Register Table

The IIC controller address is 0x51 (7-bit), where the 0th bit is the read/write bit (0x51<1) | (w/r).

address	Register Meaning	Write properties	remarks
0x00	Measure height in 8-bit units	RO	Distance is represented in 2-byte units (mm)
0x01	8-bit measurement distance	RO	Distance is represented in 2-byte units (mm)
0x02	Start/End measurement command	RW	Write 1 to start measurement, laser on, distance data starts to refresh, write 0 to end measurement, laser off.

0x03	Test Register	RO	Default value 0x3B
Note: Firmware versions may output distance information without requiring the start measurement command.			