Siman

SDBM-100Series Laser RangingModule

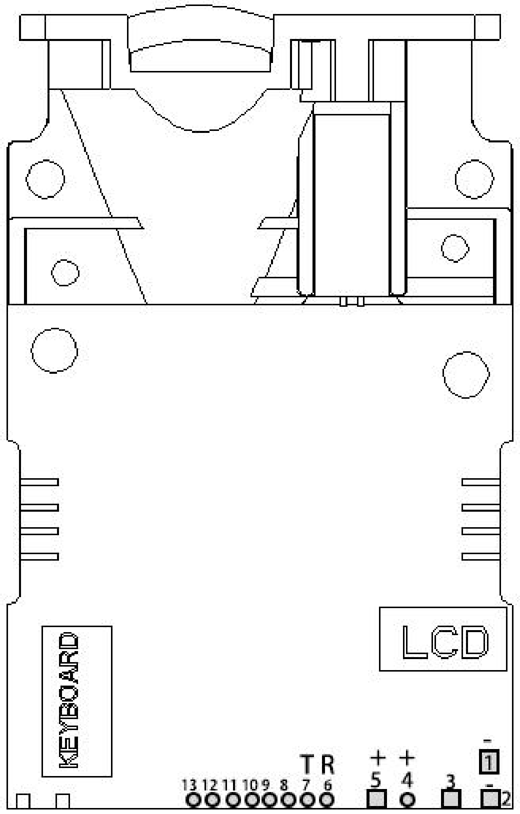
The SDBM-100 series is an ITOF (Indirect Time-of-Flight) laser ranging module developed by Siman Sensor Technology. It features rapid response and high-precision distance measurement capabilities. This module achieves a ranging accuracy of up to ±3 mm, with a data update rate of up to 20 Hz and a maximum measurable range of 150 meters. Its compact design and UART digital interface make it easy to integrate into systems and facilitate secondary development.

This product is widely used in industrial automation,Various high-precision ranging applications, including robot navigation, intelligent warehousing, and security surveillance.,With an excellent performance-to-price ratio, it is an ideal choice for various ranging applications.To learn more about the product, 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.
⚠	➢ Measuring laser (635nm): Class 2 — Do not look directly at the beam or observe it using optical instruments. ➢ 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 using in environments that produce corrosive gases.; ➢ This product cannot be used in water. ➢ When using outdoors, be sure to add a waterproof cover.

Pin definitions

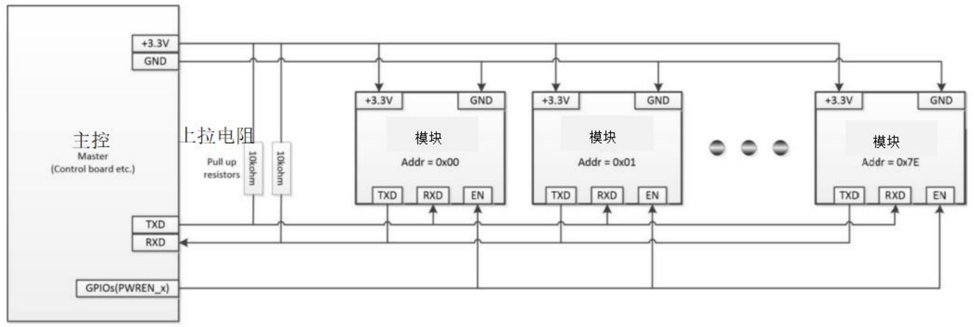
Four to five pins at most are needed to power and control the laser ranging module.



Pin Function

Pin	Name	Function	Default value	Description
1	GND	ground	Power ground	Module power ground
2	GND	ground	Power ground	Module power ground (connected to 1)
3	PWREN	Signal input	Low	Module power-on control pin, high level effective.
4	VCC+	Power +	Power supply	DC 2.5V~3.3V 90mA+
5	VCC+	Power +	Power supply	DC 2.5V~3.3V 90mA+ (with 4-way)
6	RXD	Signal input	High	Module serial port receive pin, open-drain
7	TXD	Signal output	High	Module serial port transmit pin, open-drain

The terminal application may need to connect multiple laser ranging modules simultaneously to read distance values. In a multi-slave system, before each module connects to the network, be sure to set each module to a different address to avoid conflicts. By default, each module comes with an address of 0x00 from the factory.



The TTL-USB module's TXD/RXD pins do not require pull-up resistors because the USB converter's TXD/RXD pins are internally equipped with pull-up resistors.

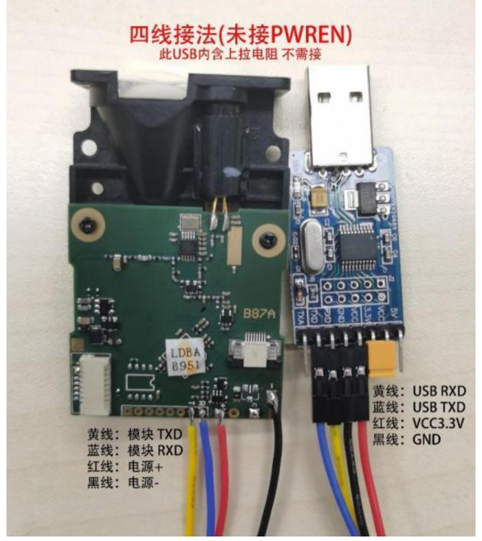
The white line PWREN can be left unconnected;

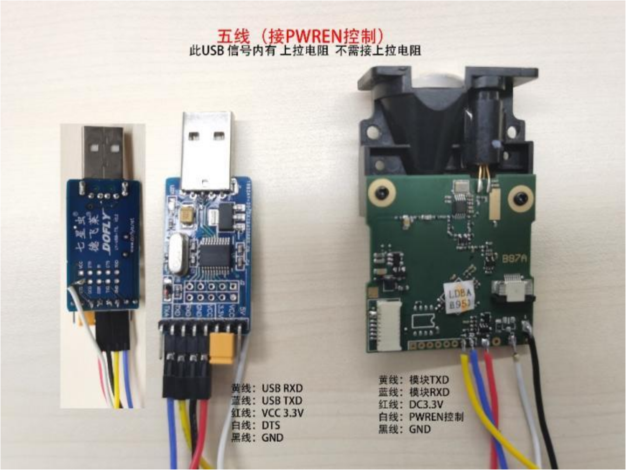
If you connect PWREN, be sure to check DTS; RTS can control the module's power supply.

Please note: The module's TXD/RXD pins are open-drain type;

If the signal is connected to a microcontroller, please add a pull-up resistor.

（There are also modules that don't require pull-up resistors.)





Absolute Maximum Ratings

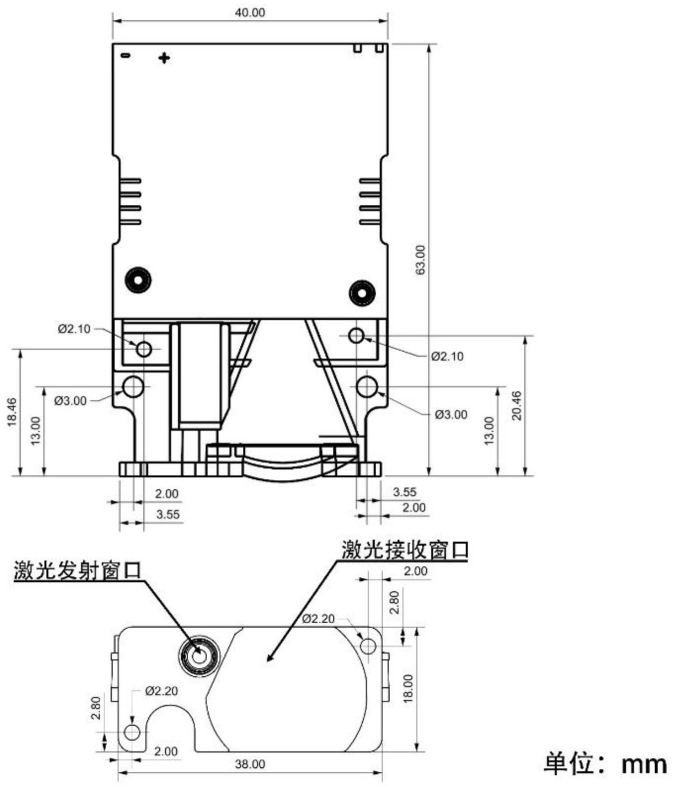
Attention: Exceeding one or more limit values may cause permanent damage to the module!

Category	Minimum Min	Typical value: Normal	Maximum Max	Units
Voltage VCC	-0.3	3.0	5.5	V
GND		0	0	V
TXD	-0.3		VCC+0.3	V
RXD	-0.3		VCC+0.3	V
PWREN	-0.3	VCC	4.0	V
Operating temperature	-20		+50	℃
Storage temperature	-40		+60	℃

Specification parameters

Model	SDBM-100 GF3	SDBM-100 TF3	SDBM-100 TF20	SDBM-100 TB3	SDBM-100 TB20	SDBM-150 TF3
Measurement range	0.03…100m (indoor 90% reflectance)					
Repeatability	±2mm					
Accuracy	±3mm					
Measure frequency	3hz	3hz	20hz	3hz	20hz	3hz
Laser light source	532nm, green laser	635nm,Class2				
Measure the target object	Natural surfaces or dedicated reflectors for static or dynamic targets					
Typical spot size（Oval)	10m location: ϕ 5mm　25m location: ϕ 10mm 50m location: ϕ 25mm　100m location: ϕ 50mm					
Data interface	UART					
Operating voltage	DC+3.3V					
Power consumption	<0.27 W					
Specification dimensions	63×40×18mm					
Weight	13g					
Operating temperature	-20~50℃					
Storage temperature	-40~60℃					
Laser lifetime	>10000 h					
Install	With mounting holes					

Dimensional drawing



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Scan the code to follow us.

Communication Instructions:UART

Baud rate	19200bps（SDBM-100TF3/SDBM-100TB3/SDBM-150TF3） 115200bps（SDBM-100TF20/SDBM-100TB20)			
Start bit: 1	Data bit 8	Stop bit 1	Check digit: None	Flow control: None

Control flow characters

All communication commands are issued by the motherboard, while the laser ranging module plays a supporting role by responding to requests from the host.

The UART question-and-answer process is shown in the figure below.

Command Format Framework

Byte	0	1		2	3	4	5	6	7	8
Bits	[7:0]	[7]	[6:0]	[7:0]	[7:0]	[7:0]	[7:0]	[7:0]	[7:0]	[7:0]
Name	First	R/W	Address	Register		Effective computation		Effective bytes		Verification
For example	0xAA	0	0x51	0x00	0x20	0x00	0x01	0x00	0x00	0x72

The table above provides an example of a host.ToSlave devicethe single measurement request command, within this command framework:
First byte withStarting with the fixed header byte 0xAA; ReportMisalignedWith0Starts with XE;
R/W stands forposition, 0Indicates writing, 1Indicates reading;
0x51YesAddressposition,Scope0x00 to 0x7F（Supports up to 127one address bit); 0x00 is the default

address.;0x7F is the broadcast address., inOne primary, multiple secondary networksYou can send this address to enable simultaneous work.;

The first2and3Byte isRegister;

The last byte isFrame checksum, checksum =The 1st+2+3+4+5+6+7Sum of digits,Excluding the first byte,Byte overflow ignored;

Control register

Serial number	Register	Naming	Function
1	0x0000	REG_ERR_CODE	System status code
2	0x0006	REG_BAT_VLTG	Operating voltage
3	0x0010	REG_ADDRESS	Module address
4	0x0012	REG_OFFSET	Module measurement result offset
5	0x0020	REG_MEA_START	Start measuring
6	0x0022	REG_MEA_RESULT	Measurement results
7	0x01BE	REG_CTRL_LD	Laser diode control

Command

Function	direction	Data

Read the module's latest status

Send

byte	0	1	2	3	4
name	head	address	register		check
data	0xAA	0x80	0x00	0x00	0x80

Type: ReadCommand

From address: 0x00

RegisterAddress: 0x0000

Function: Reads the module's status after the previous command has been executed.

Receive

byte	0	1	2	3	4	5	6	7	8
name	head	address	register		effective calculation		valid byte		check
data	0xAA	0x80	0x00	0x00	0x00	0x01	0xYY	0xZZ	sum

Sum is the checksum, and the checksum algorithm is the hexadecimal sum of all preceding bytes except the first byte AA.

Byte 0xZZ is frommachineThe returned status code

Normal reply: AA 80 00 00 00 01 00 00 81

Read the hardware version number

Send

byte	0	1	2	3	4
name	head	address	register		check
data	0xAA	0x80	0x00	0x0A	0x8A

Type: Read command

Register address: 0x000A

Function: Read out the HW version number of the module.

Receive

byte	0	1	2	3	4	5	6	7	8
name	head	address	register		effective calculation		valid byte		check
data	0xAA	0x80	0x00	0x0A	0x00	0x01	0xVV	0xYY	sum

The HW version number is 0xVVYY.

Read the software version number

Send

byte	0	1	2	3	4
name	head	address	register		check
data	0xAA	0x80	0x00	0x0C	0x8C

Type: Read command

From address: 0x00

Register address: 0x000C

Function: Read out the module'sSoftwareVersion number

Receive

byte	0	1	2	3	4	5	6	7	8
name	head	address	register		effective calculation		valid byte		check
data	0xAA	0x80	0x00	0x0C	0x00	0x01	0xVV	0xYY	sum

The SW version number is 0xVVYY.

Read module serial number

Send

byte	0	1	2	3	4
name	head	address	register		check
data	0xAA	0x80	0x00	0x0E	0x8E

Type: Read command,From address: 0x00

Register address: 0x000E

Function:ReadModule serial number

Receive

byte	0	1	2	3	4	5	6	7	8
name	head	address	register		effective calculation		valid byte		check
data	0xAA	0x80	0x00	0x0E	0x00	0x01	0xSS	0xNN	sum

The HW version number is 0xSSNN.

Read the input voltage

Send

byte	0	1	2	3	4
name	head	address	register		check
data	0xAA	0x80	0x00	0x06	0x86

Type: Read command,From address: 0x00

Register address: 0x0006

Function: Read the module's input voltage.（BCD encoding）

Receive

byte	0	1	2	3	4	5	6	7	8
name	head	address	register		effective calculation		valid byte		check
data	0xAA	0x80	0x00	0x06	0x00	0x01	0x32	0x19	sum

Input voltage = 3219 mV

Read the measurement results

Send

byte	0	1	2	3	4
name	head	address	register		check
data	0xAA	0x80	0x00	0x22	0xA2

Type: Read command; This command is used to read measurement results when initiating multi-slave mode;

From address: 0x00

Register address: 0x0022

Function: Read out the distance measurement result

Receive

byte	0	1	2	3	4	5	6:9	10:11	12
name	head	address	register		effective calculation		effective distance value	effective distance value	check
data	0xAA	0x00	0x00	0x22	0x00	0x03	0xAABBCCDD	0x0101	sum

Set the module address

Send

byte	0	1	2	3	4	5	6	7	8
name	head	address	register		effective calculation		valid byte		check
data	0xAA	0x00	0x00	0x10	0x00	0x01	0x00	0xYY	sum

Type: Write command; Used to modify the module ID; after modifying the ID, other corresponding instructions need to be adjusted according to the address;

From address: 0x00

Register address: 0x0010

0xYYIndicates the modified address

Function:Set the module addressThe address will not be lost after the power is cut.

Receive

byte	0	1	2	3	4	5	6	7	8
name	head	address	register		effective calculation		valid byte		check
data	0xAA	0x00	0x00	0x10	0x00	0x01	0x00	0xYY	sum

Set the address to 0xYY (!!! Note: Only bits [6:0] of the address are used; other bits will be ignored).

Please note: Do not set the slave address to the broadcast address 0x7F. This address is reserved for master-slave networks with one master and multiple slaves. When you send a command using the broadcast address, all slaves will simultaneously measure distance—but no measurement results will be returned.Reply.HostOnly when accessing a single-address slave device will the measurement results be returned.

Set the module to measure the offset.

Send

byte	0	1	2	3	4	5	6	7	8
name	head	address	register		effective calculation		valid byte		check
data	0xAA	0x00	0x00	0x12	0x00	0x01	0xZZ	0xYY	sum

Type: Write command

From address: 0x00

Register address: 0x0012

0xYYThe offset to be adjusted

Function:SettingsMeasure the offset

For example, if the offset 0xZZYY = 0x7B (+123), then it representsMeasure distance valueAdd 123 millimeters. If the offset is 0xZZYY = 0xFF85 (-123), it indicates a measurement.Distance valueIt will be reduced by 123 millimeters.If you want to restore the original measured values from the factory after making modifications, simply set the offset to 0.

Receive

byte	0	1	2	3	4	5	6	7	8
name	head	address	register		effective calculation		valid byte		check

data	0xAA	0x00	0x00	0x12	0x00	0x01	0xZZ	0xYY	sum

Turn the laser on or off

Send

byte	0	1	2	3	4	5	6	7	8
name	head	address	register		effective calculation		valid byte		check
data	0xAA	0x00	0x01	0xBE	0x00	0x01	0x00	0xZZ	sum

Type: Write command
From address: 0x00
Register address: 0x01BE
Function: Turns the laser beam on or off. If 0xZZ = 0x01, the laser is turned on; if 0xZZ = 0x00, the laser is turned off.

Receive

Same as sending

Single automatic measurement

Send

byte	0	1	2	3	4	5	6	7	8
name	head	address	register		effective calculation		valid byte		check
data	0xAA	0x00	0x00	0x20	0x00	0x01	0x00	0x00	0x21

Type: Write command; Send one command, the laser lights up once, and return one distance measurement value;
From address: 0x00
Register address: 0x0020
Function: Start the slave device to perform a single measurement in automatic mode.

Receive

byte	0	1	2	3	4	5	6:9	10:11	12
name	head	address	register		effective calculation		effective distance value	effective distance value	check
data	0xAA	0x00	0x00	0x22	0x00	0x03	0xAABBCCDD	0x0101	check

Type: Slave reply
From address: 0x00
Register address: 0x0022
Function: Return the measurement result to the host; the measurement result = 0xAABBCCDD mm.(Byte6: 9), needs to be converted to decimalSignal quality = 0x101, signal qualityNumerical valueThe smaller the value, the stronger the laser signal and the more reliable the distance measurement.The higher the degree

Single slow-speed measurem

Send

byte	0	1	2	3	4	5	6	7	8
name	head	address	register		effective calculation		valid byte		check
data	0xAA	0x00	0x00	0x20	0x00	0x01	0x00	0x01	0x22

ent

Type: Write command
From address: 0x00
Register address: 0x0020
Function: StartModulePerform a single measurement in slow mode.

Receive

Same as single auto mode.

byte	0	1	2	3	4	5	6	7	8
name	head	address	register		effective calculation		valid byte		check
data	0xAA	0x00	0x00	0x20	0x00	0x01	0x00	0x02	0x23

Single rapid measurement

Send

Type: Write command
From address: 0x00
Register address: 0x0020
Function: The startup module performs a single measurement in fast mode.

Receive

Same as single auto mode.

Start continuous automatic measurement

Send

byte	0	1	2	3	4	5	6	7	8
name	head	address	register		effective calculation		valid byte		check
data	0xAA	0x00	0x00	0x20	0x00	0x01	0x00	0x04	0x25

Type: Write command; From address: 0x00
Register address: 0x0020
Function: Send a single command to initiate continuous automatic measurements and continuously return distance values.

Receive

Same as single auto mode.

Start continuous slow QuickMeasurement

Send

byte	0	1	2	3	4	5	6	7	8
name	head	address	register		effective calculation		valid byte		check
data	0xAA	0x00	0x00	0x20	0x00	0x01	0x00	0x05	0x26

Type: Write command
From address: 0x00
Register address: 0x0020
Function: Start the slave device for slow, continuous measurement.

Receive

Same as single auto mode.

Start continuous rapid measurement

Send

byte	0	1	2	3	4	5	6	7	8
name	head	address	register		effective calculation		valid byte		check
data	0xAA	0x00	0x00	0x20	0x00	0x01	0x00	0x06	0x27

Type: Write command
From address: 0x00
Register address: 0x0020
Function: Start the slave device to perform continuous measurements in fast mode.

Receive

Same as single auto mode.

Slave response error

Send

If an error occurs during the measurement phase, the laser ranging module will return an error report box.:

byte	0	1	2	3	4	5	6	7	8
name	head	address	register		effective calculation		valid byte		check
data	0xEE	0x00	0x00	0x00	0x00	0x01	0x00	0x0F	0x10

Type: Slave reply
From address: 0x00
Register address: 0x0000
Function: Reports an error status code to the host; error code = 0x000F. For more error codes, refer to:Status code

Exit continuous measurement

Send

When the host is in continuous measurement mode, sending a single byte 0x58 (the uppercase character ‘X’) will immediately stop the continuous measurement mode.

Initiate multi-slave measures

The host sends a single-measurement command to the slave address 0x7F. The slave module simultaneously begins measuring the distance but does not return any data. Measurement results are returned only when the host accesses each individual slave. Before issuing a command to read the measurement results, the host should first read the status code of the slave to ensure that no erroneous measurements have occurred during the process.

Send

byte	0	1	2	3	4	5	6	7	8
name	head	address	register		effective calculation		valid byte		check
data	0xAA	0x7F	0x00	0x20	0x00	0x01	0x00	0x00	0xA0

Type: Write command
From address: 0x00
Register address: 0x0020
Function: Start all slave devices to perform a single measurement in automatic mode.
After sending this command, if the slave device responds with its status, the master device polls the address status code 0x0000 for each slave, indicating no errors, and then sends...Read the measurement resultsCommand to read the result distance. Each slave device'sMeasurementThe result will not be overwritten until the next success.MeasurementCommandMeasure outThe New DistanceValue

Receive

No reply

Measurement mode

MeasurementModeThere are two types: one is single measurement, and the other is continuous measurement.

Single timeMeasurement: The host sends a measurement command once, the module operates once, the laser lights up once, and a measured distance value is returned.;

Continuous measurementThe host sends a measurement command once, and the module operates continuously with the laser remaining lit.ContinuousReturn measurementDistanceValue; if you wantTo stop continuous measurement, the host needs to send one byte: 0x58 (the uppercase character “X” in ASCII).

Each measurement mode has 3 operating modes.squareFormula:

1.Automatic measurement: Automatically adjusts the measurement speed and distance accuracy based on the returned distance value and signal quality.

2.Slow measurement: The slowest measurement speed, but with the highest accuracy in distance values;

3.Fast measurement: The measured distance values have relatively low precision, but the measurement speed is the fastest.

Method / Mode	Automatic	Slow speed	Quick
Single measurement	Single automatic	Single slow pace	Single rapid
Continuous measurement	Continuous automatic	Continuous slow pace	Continuous and rapid
Measurement speed	Automatic	Slow	Quick
Measurement accuracy	Automatic	High	Low

Status code

Status code（3HZ）	Status code（20HZ）	Description
0x0000	0x0000	No errors
0x0001	0xFFFF	InputVoltageToo low,Power supplyThe voltage should⩾2.2V
0x0002		An internal error—no problem.
0x0003	0xFFFD	Module temperature too low (< -20℃)The high- and low-temperature-resistant version does not have this error.
0x0004	0xFFFC	Module temperature too high (> +40℃) The high- and low-temperature-resistant version does not have this error.
0x0005	0xFFFB	The target is beyond range.
0x0006	0xFFFA	Invalid measurement result
0x0007	0xFFF9	The backlight is too strong.
0x0008	0xFFF8	The laser signal is too weak.
0x0009	0xFFF7	The laser signal is too strong.
0x000A	0xFFF6	Hardware failure 1
0x000B	0xFFF5	Hardware failure 2
0x000C	0xFFF4	Hardware failure 3
0x000D	0xFFF3	Hardware failure 4
0x000E	0xFFF2	Hardware failure 5
0x000F	0xFFF1	The laser signal is unstable.
0x0010		Hardware failure 6
0x0011		Hardware failure 7
0x0081	0xFFC3	Invalid/Communication error

Precautions

SDBM is an optical instrument whose operation is affected by environmental conditions. Consequently, the achievable measurement range varies depending on the application environment, while the ranging accuracy remains unaffected by such factors. The following conditions may influence the measurement range:

Factors Affecting the Range:

Element	Factors that extend the measurement range	Factors that shorten the measurement range
Target surface	Dedicated reflector plates, reflective film plates	Dull, non-glossy surfaces; green and blue surfaces
Air particles	Clean air	Dust, fog, heavy rain, blizzard
Sunlight intensity	Dark environment	The target is brightly illuminated.

Factors Affecting Measurement Accuracy

（1）Rough surface

When measuring rough surfaces (such as plaster walls), aim at the center of the shiny area. To avoid measuring deep into the plaster joints, use a target plate.

（2）Surface transparency

To avoid measurement errors, please do not measure directly on the surface of transparent objects, such as colorless liquids (e.g., water) or dust-free glass. For materials or liquids that you are unfamiliar with, it’s best to perform a preliminary test first. Measurement errors may occur when aiming at a target through a glass window or when there are multiple objects within your line of sight.

（3） Moist, smooth, or high-gloss surfaces

When the aiming angle is very small, the laser will be reflected away. At this point, SDB...M The received signal would become too weak, and it might also be possible to measure the distance to the target hit by the reflected laser. If aimed at a right angle, SDB...M The received signal may be too strong.

（4）The measurement can be performed only when the target area is large enough to accommodate the laser spot—whether it’s a sloped surface or a curved surface.

（5） Multipath Reflection

When the laser light returning from other objects exceeds the reflected light from the target, incorrect measurement results may occur. On the measurement optical path, please avoid various reflective surfaces.

Safety Precautions

The following guidance can enable SDB.M The person in charge and the user should familiarize themselves in advance with any potential hazards involved in the operation and take appropriate precautions. The instrument’s responsible person should ensure that all users read and follow these instructions carefully.

If SDBM It is part of the system, and the system manufacturer must be responsible for all safety-related issues, such as manuals, labeling, and instructions.

Instrument Usage

Permitted uses:

SDBM The permitted scope of use is: distance measurement.

Disabled range:

Using the instrument without following the guidelines and operating it beyond the declared specifications can compromise the safety system.;

Remove the instructions and hazard signs.;

Use tools (such as a screwdriver) to open the device for modification or upgrade.;

Aim directly at the sun using accessories from manufacturers not approved by Siman.;

Intentionally introduce other dazzling objects.;

At measurement sites without safety facilities (such as measurements conducted on roadways, etc.)

Warning: The prohibited usage method, if employed, may result in personal injury, instrument malfunction, and loss.,The instrument operator is responsible for informing users of its hazards and how to take precautions.

Without clarifying SDBMDo not perform any operations before using it.

Use under conditions suitable for human survival.

Do not use in flammable or explosive environments.

Scope of Responsibility

Responsibilities of the original equipment manufacturer Siman:

Siman is responsible for providing products under completely safe conditions, including this manual, software, and original accessories.

Responsibility of non-Siman attachment manufacturers:

Non-Siman accessory manufacturers are responsible for the development, availability, and safety instructions of their own products. They are also responsible for ensuring the secure online integration with Siman products.

Serious Use Hazard:

Warning: Do not place the SDB.M The laser must be directed straight at the sun; otherwise, the instrument could be damaged.

Don't use SDB.MThe laser is directed straight at the human eye for a prolonged period.