

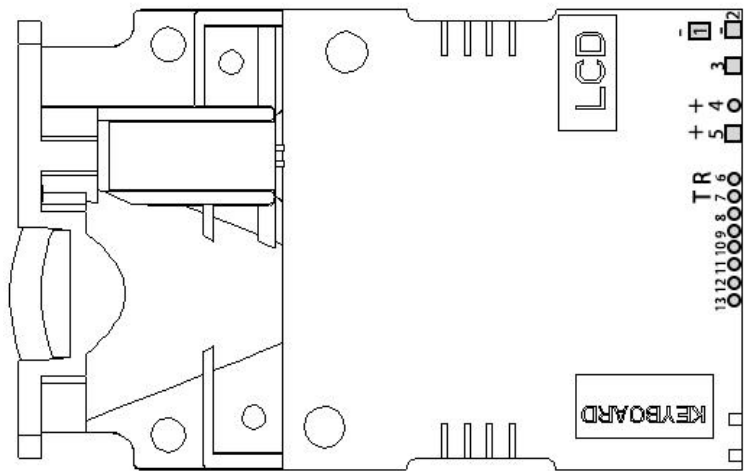
SDBM-100 Series Laser Ranging Module

The SDBM-100 series, developed by Siman Sensing Technologies, is an ITOF (Indirect Optical Flight Time) laser ranging module featuring rapid response and high-precision measurement. With a measurement accuracy of ±3mm, it updates data at 20Hz and has a maximum range of 150 meters. Its compact design and UART digital interface facilitate system integration and secondary development.

This product is widely used in industrial automation, robot navigation, intelligent warehousing, security monitoring and other high-precision distance measurement scenarios. With excellent performance-to-price ratio, it is the ideal choice for various distance measurement applications. For more product information, please visit: [www.siman.asia](http://www.siman.asia)

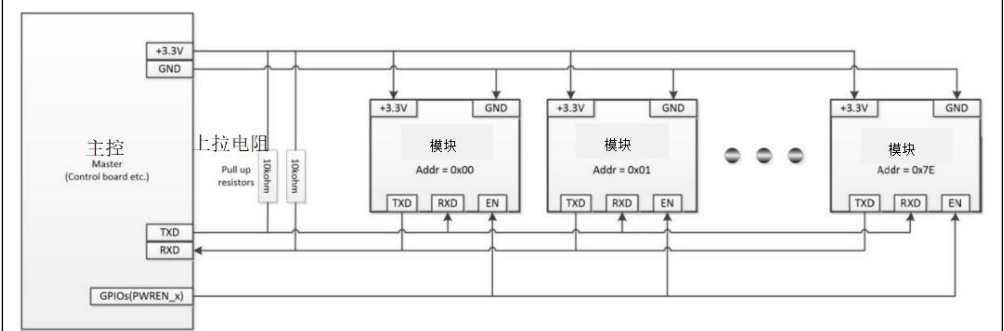
<div>warn</div>	Follow the equipment usage guidelines! This product is not a safety sensor and cannot be used for personnel protection.
<div><div><div></div></div></div>	<div><div><div>➤</div><div>Measuring laser (635nm): Class 2. Do not look directly at the beam or use optical instruments to observe.</div></div><div><div>➤</div><div>This product has no explosion-proof structure, and it is forbidden to use in flammable and explosive environments.</div></div><div><div>➤</div><div>Do not remove this product.</div></div><div><div>➤</div><div>Be sure to turn off the power before operating. Do not connect wires while powered on!</div></div><div><div>1.</div><div>Avoid use in dust/steam or corrosive gas environment;</div></div><div><div>2.</div><div>Avoid use in environments where corrosive gases are produced;</div></div><div><div>➤</div><div>Do not use this product in water.</div></div><div><div>➤</div><div>When used outdoors, pay attention to adding a waterproof cover.</div></div></div>

Pin definition
4 to 5 pins are required to power and control the laser distance measurement module.

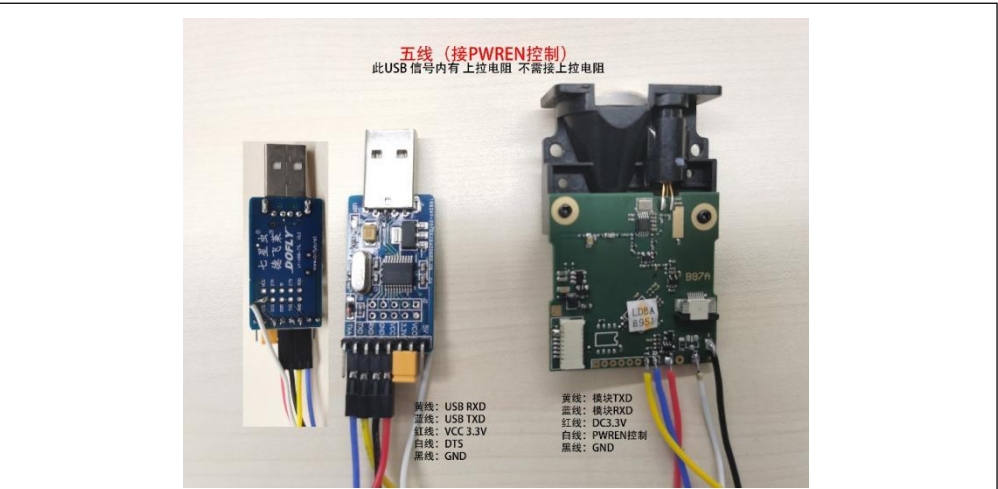
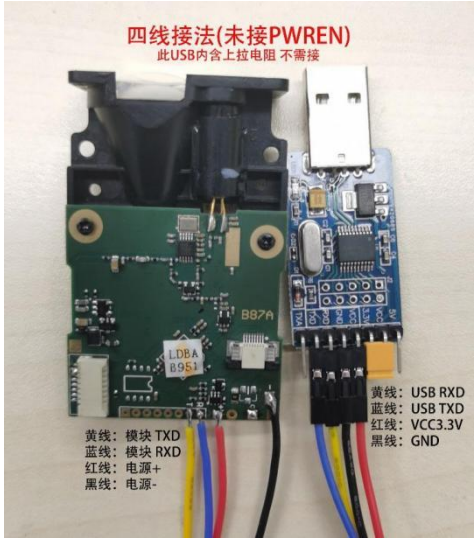


Pin functions				
pin Pin	name	function	Windows default	description
1	GND	the earth	Power supply	Module power supply
2	GND	the earth	Power supply	Module power supply (connected to 1)
3	PWREN	signal input	low Low	Module power control pin, high level effective
4	VCC+	source +	source	DC 2.5V~3.3V 90mA+
5	VCC+	source +	source	DC 2.5V~3.3V 90mA+ (4-way)
6	RXD	signal input	Gao High	Module serial port receive pin with open-drain
7	TXD	signal output	Gao High	Module serial port send pin, open-drain

The terminal application may require connecting multiple laser distance measurement modules to simultaneously read distance values. In a multi-slave system, ensure each module is assigned a unique address bit before network connection to prevent conflicts. Each module's default address bit is 0x00 before factory release.



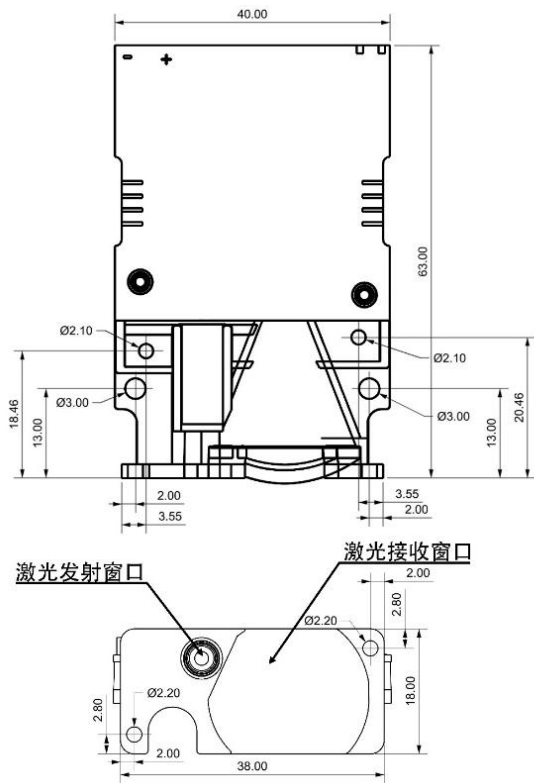
The TXD/RXD pins of the TTL-USB module lack external pull-up resistors, as the USB converter's TXD/RXD pins are equipped with built-in pull-up resistors. The white line PWREN may be omitted. If you're using PWREN, be sure to select DTS. RTS can control the module's power supply. Note: The TXD/RXD module pins are open-drain type. If the signal is connected to the microcontroller, add a pull-up resistor. (There are also modules without a pull resistor)



Maximum rated parameter				
Note: Exceeding one or more limit values may cause permanent damage to the module!				
category	least value Min	Normal	crest value Max	unit 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
working temperature	-40		+60	℃
Storage temperature	-40		+60	℃

Specifications					
model	SDBM-100 TF3	SDBM-100 TF20	SDBM-100 TB3	SDBM-100 TB20	SDBM-150 TF3
measuring range	0.03...100m indoor 90% reflectivity				
repeatability precision	±2mm				
accuracy	±3mm				
measuring frequency	3hz	20hz	3hz	20hz	3hz
laser light source	635nm, Class 2				
Measure the target object	Natural surface or dedicated reflector for static or dynamic targets				
Typical spot size ( oval )	10m:5x3mm, 25m:10x6mm 50m:15x10mm, 100m:30x20mm				
data interface	UART				
working voltage	DC+3.3V				
power dissipation	< 0.27W				
specification and dimension	63×40×18mm				
weight	13g				
working temperature	-20~60℃				
Storage temperature	-40~80℃				
Laser life	Over 10,000h				

install	With mounting holes
dimensional drawing	



单位: mm

**contact us**

**Siman**

**Ximan Sensing Technology Co., LTD**

URL: [www.siman.asia](http://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

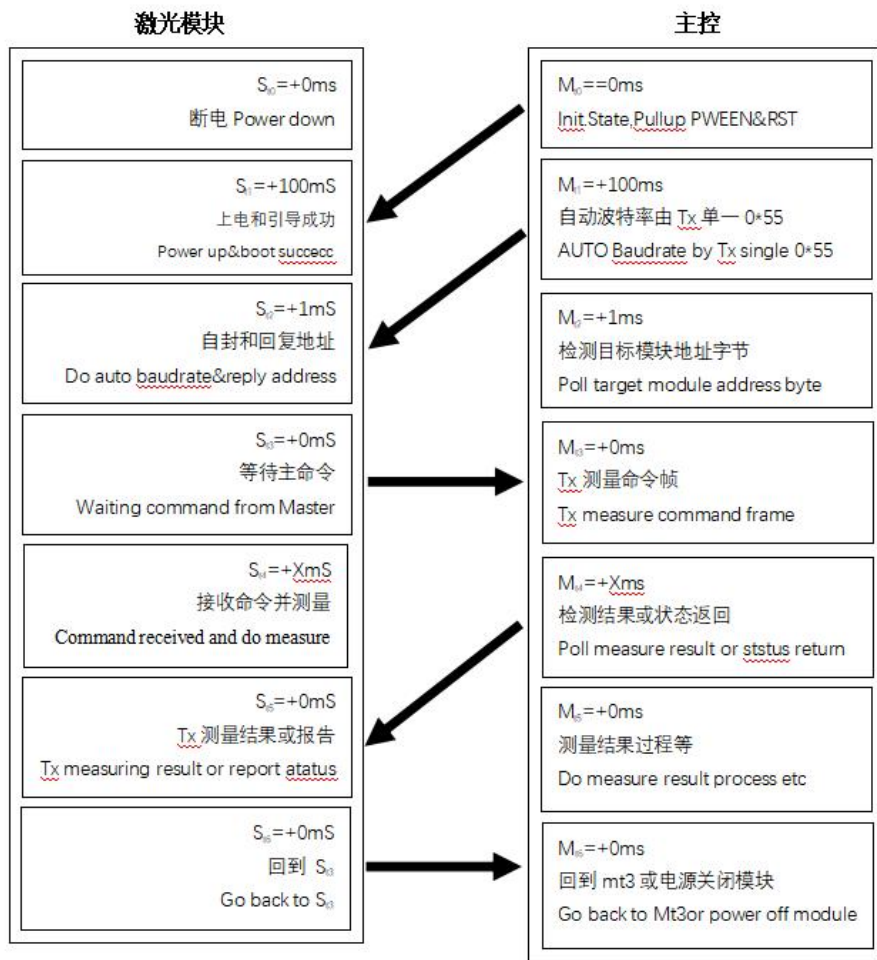
## UART Communication

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

## Control flow characters

All communication commands are sent by the motherboard, with the laser ranging module providing auxiliary support to respond to the host's requests.

The Q&A flow for UART 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	addresses	register		Effective Calculation		effective byte		verification
give an example	0xAA	0	0x51	0x00	0x20	0x00	0x01	0x00	0x00	0x72

The table above shows an example of a single measurement request command from the host to the slave. In this command framework:

The first byte starts with the fixed header byte 0xAA; an error occurs when it starts with 0xEE.

R/W stands for read/write, where 0 indicates write and 1 indicates read.

0x51 is the address bit, ranging from 0x00 to 0x7F (supporting up to 127 address bits). 0x00 is the default address, while 0x7F is the broadcast address. In a master-slave network, this broadcast address enables simultaneous operation.

The 2nd and 3rd bytes are registers;

The last byte serves as the frame checksum, calculated as the sum of bytes 1 through 7 (excluding the first byte), with byte overflow being ignored.

## control register

order number	register	nominate	function
1	0x0000	REG_ERR_CODE	System status code
2	0x0006	REG_BAT_VLTG	working 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 result
7	0x01BE	REG_CTRL_LD	Laser diode control

**order**

function	direction	data																			
Read the latest module status	transmit by radio	byte		0		1		2		3		4									
		name		First		address		register			verification										
		data		0xAA		0x80		0x00		0x00		0x80									
		Type: Read command From address: 0x00 Register address: 0x0000 Function: Read the status of the module after the previous command is executed																			
	receive	byte		0		1		2		3		4		5		6		7		8	
		name		First		address		register			Effective Calculation			effective byte			verification				
		data		0xAA		0x80		0x00		0x00		0x00		0x01		0xYY		0xZZ		sum	
		The sum is the parity bit, calculated as the hexadecimal sum of all preceding bytes except the first byte (AA). Byte 0xZZ is the status code returned by the machine Normal reply: AA 80 00 00 00 01 00 00 81																			
	Read the hardware version number	transmit by radio	byte		0		1		2		3		4								
			name		First		address		register			verification									
data			0xAA		0x80		0x00		0x0A		0x8A										
Type: Read command Register address: 0x000A Function: Read the hardware version number of the module																					
receive		byte		0		1		2		3		4		5		6		7		8	
		name		First		address		register			Effective Calculation			effective byte			verification				
		data		0xAA		0x80		0x00		0x0A		0x00		0x01		0xVV		0xYY		sum	
		The HW version number is 0xVVYY																			
Read the software		transmit by radio	byte		0		1		2		3		4								
			name		First		address		register			verification									
	data		0xAA		0x80		0x00		0x0C		0x8C										

are versi on num ber		Type: Read command From address: 0x00 Register address: 0x000C Function: Read the software version number of the module											
	receiv e	byte	0	1	2	3	4	5	6	7	8		
		name	First	addres s	register		Effective Calculatio n		effective byte		verifi cation		
		data	0xAA	0x80	0x00	0x0C	0x00	0x01	0xVV	0xYY	sum		
		The SW version number is 0xVVYY											
Read mod ule serial num ber	trans mit by radio	byte	0		1		2		3		4		
		name	First		address		register				verification		
		data	0xAA		0x80		0x00		0x0E		0x8E		
		Type: Read command, from address: 0x00 Register address: 0x000E Function: Read the module serial number											
	receiv e	byte	0	1	2	3	4	5	6	7	8		
		name	First	addres s	register		Effective Calculatio n		effective byte		verifi cation		
data		0xA A	0x80	0x00	0x0E	0x00	0x01	0xS S	0xN N	sum			
		The HW version number is 0xSSNN											
Read input volta ge	trans mit by radio	byte	0		1		2		3		4		
		name	First		address		register				verification		
		data	0xAA		0x80		0x00		0x06		0x86		
		Type: Read command, from address: 0x00 Register address: 0x0006 Function: Read the module input voltage (BCD encoding)											
	receiv e	byte	0	1	2	3	4	5	6	7	8		
		nam e	First	addres s	register		Effective Calculation		effective byte		verifi cation		
data		0xA A	0x80	0x00	0x06	0x00	0x01	0x32	0x19	sum			
		Input voltage = 3219mV											
Read meas urem ent result s	trans mit by radio	byte	0		1		2		3		4		
		name	First		address		register				verification		
		data	0xAA		0x80		0x00		0x22		0xA2		
		Type: Read command. This command is used to read measurement results when enabling multi-slave mode. From address: 0x00 Register address: 0x0022 Function: Read the distance measurement result											
	receiv e	byt e	0	1	2	3	4	5	6:9		10:11		12

		name	First	address	register		Effective Calculation		Effective distance value		signal quality	verification
		data	0xAA	0x00	0x00	0x22	0x00	0x03	0xAABBC CDD		0x0101	sum
Set module address	transmit by radio	byte	0	1	2	3	4	5	6	7	8	
		name	First	address	register		Effective Calculation		effective byte		verification	
		data	0xAA	0x00	0x00	0x10	0x00	0x01	0x00	0xYY	sum	
	Type: Command write; modifies the module ID; after modifying the ID, other related instructions must be adjusted accordingly; From address: 0x00 Register address: 0x0010 0xYY indicates the modified address Function: Set module address. The address will not be lost after power failure.											
	receive	byte	0	1	2	3	4	5	6	7	8	
		name	First	address	register		Effective Calculation		effective byte		verification	
		data	0xAA	0x00	0x00	0x10	0x00	0x01	0x00	0xYY	sum	
	Set the address to 0xYY (!! Note: Only bits [6:0] are taken; other bits are ignored). Note: Do not set the slave address to the broadcast address 0x7F. This address is reserved for a master-slave network. When a broadcast address command is sent, all slaves measure distance simultaneously but do not respond with measurement results. The host accesses a single slave address and only then returns the measurement results.											
	Set module measurement offset	transmit by radio	byte	0	1	2	3	4	5	6	7	8
			name	First	address	register		Effective Calculation		effective byte		verification
data			0xAA	0x00	0x00	0x12	0x00	0x01	0xZZ	0xYY	sum	
Type: Write command From address: 0x00 Register address: 0x0012 0xYY indicates the offset to adjust Function: Set measurement offset For example, if the offset 0xZZYY = 0x7B (+123), the measured distance value will be increased by 123 mm. If the offset 0xZZYY =0xFF85 (-123), the measured distance value will be decreased by 123 mm. To restore the original factory measurement value after modification, simply set the offset to 0.												
receive		byte	0	1	2	3	4	5	6	7	8	
	name	First	address	register		Effective		effective		veri		

				s			Calculation		byte		fica tion
		data	0xA A	0x00	0x0 0	0x1 2	0x00	0x01	0x ZZ	0xY Y	su m
Turn laser on or off	trans mit by radio	byte	0	1	2	3	4	5	6	7	8
		name	First	addre ss	register		Effective Calculation		effective byte		veri fica tion
		data	0xAA	0x00	0x01	0xB E	0x0 0	0x0 1	0x0 0	0xZ Z	su m
		Type: Write command From address: 0x00 Register address: 0x01BE Function: Turn the laser beam on or off. If 0xZZ = 0x01, the laser is on; if 0xZZ = 0x00, the laser is off.									
	receiv e	Send the same									
Singl e auto matic meas urem ent	trans mit by radio	byte	0	1	2	3	4	5	6	7	8
		name	First	addre ss	register		Effective Calculatio n		effective byte		veri fica tion
		data	0xAA	0x00	0x0 0	0x2 0	0x0 0	0x0 1	0x0 0	0x0 0	0x2 1
		Type: Write command; send one instruction, laser illuminates once, and returns one distance measurement value. From address: 0x00 Register address: 0x0020 Function: Start the slave device to perform a single measurement in automatic mode									
	receiv e	byt e	0	1	2	3	4	5	6:9		10:11
na me		Fir st	add ress	register		Effective Calculation		Effective distance value		signal qualit y	verificati on
dat a		0x A A	0x0 0	0x 00	0x2 2	0x0 0	0x0 3	0xAAB BCCDD		0x010 1	verificati on
Type: Reply from subordinate From address: 0x00 Register address: 0x0022 Function: Send the measurement result back to the host. The measurement result = 0xAABBCCDD millimeters (Byte6: 9), which needs to be converted to decimal. Signal quality = 0x101. The smaller the signal quality value, the stronger the laser signal and the higher the reliability of the distance result.											
Singl e slow meas urem	trans mit by radio	byte	0	1	2	3	4	5	6	7	8
		name	Fir st	addr ess	register		Effective Calculation		effective byte		verificat ion
		data	0xA A	0x0 0	0x00	0x20	0x0 0	0x0 1	0x0 0	0x0 1	0x22

ent												
		Type: Write command From address: 0x00 Register address: 0x0020 Function: The startup module performs a single measurement in slow mode										
	receiv e	Same as single auto mode										
		byte	0	1	2	3	4	5	6	7	8	
		name	First	addre ss	register		Effective Calculation		effective byte		verifi cation	
		data	0xA A	0x00	0x00	0x20	0x0 0	0x0 1	0x0 0	0x02	0x23	
Quic k singl e meas urem ent	trans mit by radio	Type: Write command From address: 0x00 Register address: 0x0020 Function: The startup module performs a single measurement in rapid mode										
	receiv e	Same as single auto mode										
		byte	0	1	2	3	4	5	6	7	8	
Start conti nuou s auto matic meas urem ent	trans mit by radio	nam e	First	addre ss	register		Effective Calculation		effective byte		veri fica tion	
		data	0xAA	0x00	0x00	0x20	0x0 0	0x01	0x0 0	0x0 4	0x2 5	
		Type: Write command; Source address: 0x00 Register address: 0x0020 Function: Send a command to automatically measure and return distance values continuously.										
	receiv e	Same as single auto mode										
	Start conti nuou s slow meas urem ent	trans mit by radio	byte	0	1	2	3	4	5	6	7	8
name			First	addres s	register		Effective Calculation		effective byte		veri fica tion	
data			0xA A	0x00	0x00	0x20	0x0 0	0x0 1	0x0 0	0x0 5	0x2 6	
		Type: Write command From address: 0x00 Register address: 0x0020 Function: Start the slave device for slow continuous measurement										
receiv e		Same as single auto mode										
Start conti nuou s rapid meas	trans mit by radio	byte	0	1	2	3	4	5	6	7	8	
		name	First	addre ss	register		Effective Calculation		effective byte		veri fica tion	
		data	0xAA	0x00	0x00	0x20	0x00	0x01	0x0 0	0x0 6	0x2 7	

urement		Type: Write command From address: 0x00 Register address: 0x0020 Function: Start the slave device to perform continuous measurement in rapid mode									
	receive	Same as single auto mode									
Incorrect machine response	transmit by radio	If an error occurs during the measurement phase, the laser ranging module will return an error report frame:									
		byte	0	1	2	3	4	5	6	7	8
		name	First	addresses	register		Effective Calculation		effective byte		verification
		data	0xEE	0x00	0x00	0x00	0x00	0x01	0x00	0x0F	0x10
		Type: Reply from subordinate From address: 0x00 Register address: 0x0000 Function: Reports the error status code to the host. Error code = 0x000F. For more error codes, refer to the status codes.									
Exit continuous measurement	transmit by radio	When the host is in continuous measurement mode, sending a byte 0x58 (the uppercase character 'X') will immediately stop the continuous measurement mode.									
Enable secondary device measures		The host sends a single measurement command from address 0x7F. The slave modules simultaneously measure distance but return no data. The host only returns measurement results after accessing each slave. Before issuing a read command, the host must check the slave's status code to ensure no erroneous measurements occurred during the process.									
	transmit by radio	byte	0	1	2	3	4	5	6	7	8
		name	First	addresses	register		Effective Calculation		effective byte		verification
		data	0xAA	0x7F	0x00	0x20	0x00	0x01	0x00	0x00	0xA0
		Type: Write command From address: 0x00 Register address: 0x0020 Function: Initiate single measurements for all slaves in automatic mode After sending this command, if the slave responds with its status, the host polls each slave's address status code 0x0000 (indicating no error) and then sends a read measurement command to retrieve the distance result. Each slave's measurement result will not be overwritten until the next successful measurement command acquires a new distance value.									
	receive	No reply									

measurement pattern			
There are two kinds of measurement mode, one is single measurement, the other is continuous measurement;			
Single measurement: the host sends a measurement command, the module works once, the laser lights up once, and a measurement distance value is returned.			
Continuous measurement: The host sends a measurement command, and the module operates continuously with the laser on, returning the measured distance value continuously. To stop continuous measurement, the host must send a 1-byte value 0x58 (ASCII uppercase 'X').			
Each measurement mode has three working modes:			
1. Automatic measurement: automatically adjust the measurement speed and distance accuracy according to the return distance value and signal quality;			
2. Slow measurement: the slowest measurement speed, but the highest accuracy of the measured distance value;			
3. Fast measurement: The distance value measured is relatively low in accuracy, but the measurement speed is the fastest.			
way pattern	voluntarily	low speed	fast
single measurement	Auto single	Slow single	Single quick
continuous measurement	transfer	Slow continuous	Fast Continuous
Measure speed	voluntarily	slow	fast
certainty of measurement	voluntarily	Gao	low
condition code			
Status code (3HZ)	Status code (20HZ)	description	
0x0000	0x0000	inerrancy	
0x0001	0xFFFF	The input voltage is too low. The power supply voltage should be ≥ 2.2V	
0x0002		Internal error, no problem	
0x0003	0xFFFD	The module temperature is too low (<-20℃). This error does not occur in the high/low-temperature resistant version.	
0x0004	0xFFFC	The module temperature is too high (> +40℃). This error does not occur in the high/low-temperature version.	
0x0005	0xFFFB	Target is beyond range	
0x0006	0xFFFA	Invalid measurement result	
0x0007	0xFFF9	The background light is too bright	
0x0008	0xFFF8	The laser signal is too weak	
0x0009	0xFFF7	The laser signal is too strong	
0x000A	0xFFF6	Hardware fault 1	
0x000B	0xFFF5	Hardware fault 2	
0x000C	0xFFF4	Hardware fault 3	
0x000D	0xFFF3	Hardware fault 4	
0x000E	0xFFF2	Hardware fault 5	



0x000F	0xFFFF1	The laser signal is unstable
0x0010		Hardware fault 6
0x0011		Hardware fault 7
0x0081	0xFFC3	Invalid/communication error
matters need attention		
SDBM is an optical instrument whose operation is affected by environmental conditions. As a result, the achievable range varies during application, while the ranging accuracy remains unaffected by such factors. The following conditions may influence the range:		
Factors affecting the range:		
essential factor	Factors affecting extended measurement range	Shorten measurement factors
Target surface	Special reflector, reflective film plate	A matte surface, green or blue
Air particles	Clean air	Dust, fog, rain, snowstorm
Sunlight intensity	Dark environment	The target is well lit
Reasons affecting measurement accuracy		
<div>(1) Rough surface</div> <div>When measuring rough surfaces (such as plaster walls), align with the center of the shiny area. Use a target board to avoid measuring deep into the plaster joints.</div> <div>(2) Transparent surface</div> <div>To avoid measurement errors, do not measure against the surface of transparent objects such as colorless liquids (e.g., water) or glass (dust-free). For unfamiliar materials or liquids, perform a trial measurement first. When aiming through a glass window or when there are multiple objects in the line of sight, the measurement will be incorrect.</div> <div>(3) Wet, smooth or high gloss surfaces</div> <div>When the aiming angle is small, the laser is reflected. In this case, the SDBM receives a weak signal, or it may detect the distance to the target hit by the reflected laser. If the aiming angle is at a right angle, the SDBM may receive a strong signal.</div> <div>(4) Inclined surface, circular surface</div> <div>When the target area is large enough to accommodate the laser spot, the measurement can be carried out.</div> <div>(5) Multiple path reflections</div> <div>Incorrect measurements may occur when the laser returning from other objects exceeds the target reflected light. Avoid various reflectors in the measurement path.</div>		
Security precautions		
<div>The following guidelines help SDBM managers and users anticipate potential operational risks and take preventive measures. Equipment managers must ensure all users read and follow these instructions.</div> <div>If SDBM is part of a system, the system vendor must be responsible for all security-related issues, such as manuals, labels, and guidance.</div>		

instrumentation
Allowed uses:
SDBM is allowed for distance measurement
Disabled scope:
Use of the instrument outside the stated range without following the instructions, which damages the safety system;
Remove instructions and hazard signs;
Use tools (such as screwdrivers) to modify or upgrade the device;
Do not aim directly at the sun using accessories from manufacturers not approved by Siman.
Intentionally introduce other shiny objects;
At measurement sites without safety facilities (such as road measurements)
Warning: The prohibited use method If the use may cause personal injury, instrument failure and loss, the instrument responsible has the responsibility to inform the user of the danger and how to prevent it.
Do not proceed until you understand how to use SDBM.
Use under conditions suitable for human survival.
Do not use in flammable and explosive environments.
scope cover
Responsibility of the original equipment manufacturer Siman:
Siman is responsible for providing products under fully safe conditions, including this manual, software, and original accessories.
Non-Siman attachment manufacturer's liability:
Non-Siman accessory manufacturers are responsible for the development, availability, and safety specifications of their products. They are also responsible for the safety of Siman products online.
Major hazard:
Warning: Do not point the SDBM laser directly at the sun, as it may damage the instrument.
Do not point the SDBM laser directly at the human eye for an extended period.