Siman

SDBM-60 Series Laser Ranging Module

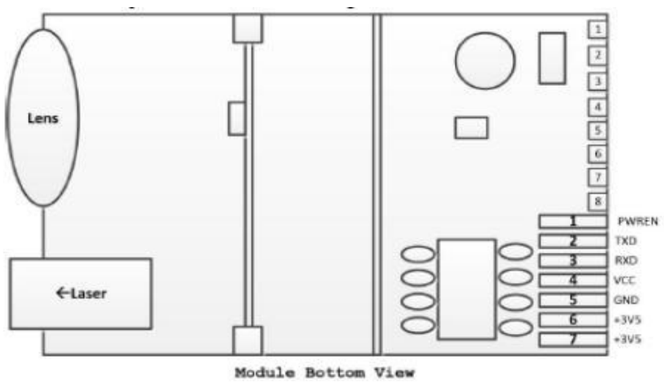
The SDBM-60 series, developed by Siman Sensing Technologies, is an ITOF (Indirect Optical Flight Time) laser ranging module featuring rapid response and high-precision measurement. With a measurement accuracy of ±3mm, it updates data at 20Hz and has a maximum range of 60 meters. Its compact design and 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

warn	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 use optical instruments to observe. ➢ 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 where corrosive gases are produced; ➢ Do not use this product in water. ➢ When used outdoors, pay attention to adding a waterproof cover.

Pin definition

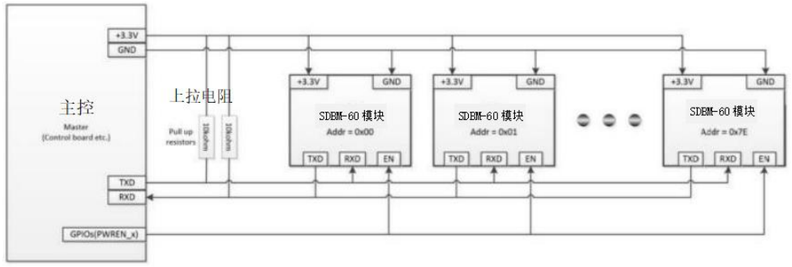
4 to 5 pins are required to power and control the laser distance measurement module.



Pin functions

pin Pin	name	function	Windows default	description
1	PWREN	signal input	low Low	Module power control pin, high level effective
2	TXD	signal output	Gao High	Module serial port send pin, open drain
3	RXD	signal input	Gao High	Module serial port receive pin, open-drain
4	VCC	source +	source	DC 2.5V~3.3V 300mA+
5	GND	source -	the earth	Module power supply

Terminal applications 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 TTL-USB module's TXD/RXD pins lack pull-up resistors as the USB converter's TXD/RXD pins inherently contain internal pull-up resistors; the green PWREN line may be omitted.

Note: The TXD/RXD module pins are open-drain.

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

(There are also modules without a pull resistor)

Maximum rated parameters

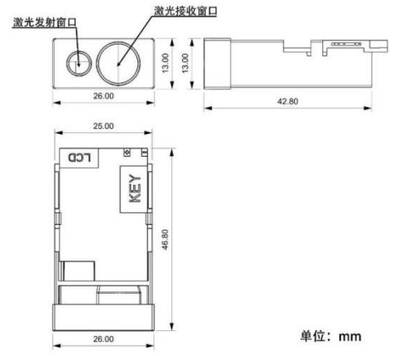
Note: Exceeding one or more limit values may cause permanent damage to the module!

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-60TF3**	**SDBM-60TF20**
measuring range	0.03...60m indoor 90% reflectivity	
repeatability precision	±2mm	
accuracy	±3mm	
measuring frequency	3hz	20hz
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	48.3×26×13mm	
weight	9g	
working temperature	-20~60℃	
Storage temperature	-40~70℃	
Laser life	Over 10,000h	

1. The standard distance difference remains within ±3mm across the full measurement range, unaffected by factors such as target surface flatness and color.
2. White targets deliver optimal results, with indoor measurements exceeding 60m
3. Outdoor measurement is best with a dedicated reflector
4. Measurement frequency: 3Hz, up to 3 times per second, capturing 3 distance data packets; 20Hz, up to 20 times per second, capturing 20 distance data packets

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

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UART Communication

Baud rate	19200bps（SDBM-60TF3）/115200bps（SDBM-60TF20）			
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	address	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

Read the latest module status

direction: 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

direction: 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 bit is a parity check, calculated as the hexadecimal sum of all preceding bytes (excluding 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 version number

transmit by radio

byte	0	1	2	3	4
name	First	address	register		verification
data	0xAA	0x80	0x00	0x0C	0x8C

Type: Read command

From address: 0x00

Register address: 0x000C

Function: Read the software 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	0x0C	0x00	0x01	0xVV	0xYY	sum

The SW version number is 0xVVYY

Read module serial number

transmit 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

receive

byte	0	1	2	3	4	5	6	7	8
name	First	address	register		Effective Calculation		effective byte		verification
data	0xAA	0x80	0x00	0x0E	0x00	0x01	0xSS	0xNN	sum

The HW version number is 0xSSNN

Read input voltage

transmit 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)

<table>
<tr><td></td><td>receive</td><td>
<table>
<tr><td>byte</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr>
<tr><td>name</td><td>First</td><td>address</td><td colspan="2">register</td><td colspan="2">Effective Calculation</td><td colspan="2">effective byte</td><td>verification</td></tr>
<tr><td>data</td><td>0xAA</td><td>0x80</td><td>0x00</td><td>0x06</td><td>0x00</td><td>0x01</td><td>0x32</td><td>0x19</td><td>sum</td></tr>
</table>
Input voltage = 3219mV
</td></tr>
<tr><td rowspan="4">Read measurement results</td><td>transmit by radio</td><td>
<table>
<tr><td>byte</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr>
<tr><td>name</td><td>First</td><td>address</td><td colspan="2">register</td><td>verification</td></tr>
<tr><td>data</td><td>0xAA</td><td>0x80</td><td>0x00</td><td>0x22</td><td>0xA2</td></tr>
</table>
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
</td></tr>
<tr><td>receive</td><td>
<table>
<tr><td>byte</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6:9</td><td>10:11</td><td>12</td></tr>
<tr><td>name</td><td>First</td><td>address</td><td colspan="2">register</td><td colspan="2">Effective Calculation</td><td>Effective distance value</td><td>signal quality</td><td>verification</td></tr>
<tr><td>data</td><td>0xAA</td><td>0x00</td><td>0x00</td><td>0x22</td><td>0x00</td><td>0x03</td><td>0xAABBCCDD</td><td>0x0101</td><td>sum</td></tr>
</table>
</td></tr>
<tr><td></td><td>
<table>
<tr><td>byte</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr>
<tr><td>name</td><td>First</td><td>address</td><td colspan="2">register</td><td colspan="2">Effective Calculation</td><td colspan="2">effective byte</td><td>verification</td></tr>
<tr><td>data</td><td>0xAA</td><td>0x00</td><td>0x00</td><td>0x10</td><td>0x00</td><td>0x01</td><td>0x00</td><td>0xYY</td><td>sum</td></tr>
</table>
</td></tr>
<tr><td>Set module address</td><td>transmit by radio</td><td>
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.
</td></tr>
<tr><td></td><td>receive</td><td>
<table>
<tr><td>byte</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr>
<tr><td>name</td><td>First</td><td>address</td><td colspan="2">register</td><td colspan="2">Effective Calculation</td><td colspan="2">effective byte</td><td>verification</td></tr>
<tr><td>data</td><td>0xAA</td><td>0x00</td><td>0x00</td><td>0x10</td><td>0x00</td><td>0x01</td><td>0x00</td><td>0xYY</td><td>sum</td></tr>
</table>
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 returns the measurement results.
</td></tr>
<tr><td rowspan="2">Set module measurement offset</td><td>transmit by radio</td><td>
<table>
<tr><td>byte</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr>
<tr><td>name</td><td>First</td><td>address</td><td colspan="2">register</td><td colspan="2">Effective Calculation</td><td colspan="2">effective byte</td><td>verification</td></tr>
<tr><td>data</td><td>0xAA</td><td>0x00</td><td>0x00</td><td>0x12</td><td>0x00</td><td>0x01</td><td>0xZZ</td><td>0xYY</td><td>sum</td></tr>
</table>
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.
</td></tr>
<tr><td>receive</td><td>
<table>
<tr><td>byte</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr>
<tr><td>name</td><td>First</td><td>address</td><td colspan="2">register</td><td colspan="2">Effective Calculation</td><td colspan="2">effective byte</td><td>verification</td></tr>
<tr><td>data</td><td>0xAA</td><td>0x00</td><td>0x00</td><td>0x12</td><td>0x00</td><td>0x01</td><td>0xZZ</td><td>0xYY</td><td>sum</td></tr>
</table>
</td></tr>
<tr><td rowspan="3">Turn laser on or off</td><td>transmit by radio</td><td>
<table>
<tr><td>byte</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr>
<tr><td>name</td><td>First</td><td>address</td><td colspan="2">register</td><td colspan="2">Effective Calculation</td><td colspan="2">effective byte</td><td>verification</td></tr>
<tr><td>data</td><td>0xAA</td><td>0x00</td><td>0x01</td><td>0xBE</td><td>0x00</td><td>0x01</td><td>0x00</td><td>0xZZ</td><td>sum</td></tr>
</table>
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.
</td></tr>
<tr><td>receive</td><td>Send the same</td></tr>
<tr><td></td><td></td></tr>
<tr><td rowspan="3">Single automatic measurement</td><td>transmit by radio</td><td>
<table>
<tr><td>byte</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr>
<tr><td>name</td><td>First</td><td>address</td><td colspan="2">register</td><td colspan="2">Effective Calculation</td><td colspan="2">effective byte</td><td>verification</td></tr>
<tr><td>data</td><td>0xAA</td><td>0x00</td><td>0x00</td><td>0x20</td><td>0x00</td><td>0x01</td><td>0x00</td><td>0x00</td><td>0x21</td></tr>
</table>
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
</td></tr>
<tr><td>receive</td><td>
<table>
<tr><td>byte</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6:9</td><td>10:11</td><td>12</td></tr>
</table>
</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>
<table>
<tr><td>name</td><td>First</td><td>address</td><td colspan="2">register</td><td colspan="2">Effective Calculation</td><td>Effective distance value</td><td>signal quality</td><td>verification</td></tr>
<tr><td>data</td><td>0xAA</td><td>0x00</td><td>0x00</td><td>0x22</td><td>0x00</td><td>0x03</td><td>0xAABBCCDD</td><td>0x0101</td><td>verification</td></tr>
</table>
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.
</td></tr>
<tr><td>Single slow measurement</td><td>transmit by radio</td><td>
<table>
<tr><td>byte</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr>
<tr><td>name</td><td>First</td><td>address</td><td colspan="2">register</td><td colspan="2">Effective Calculation</td><td colspan="2">effective byte</td><td>verification</td></tr>
<tr><td>data</td><td>0xAA</td><td>0x00</td><td>0x00</td><td>0x20</td><td>0x00</td><td>0x01</td><td>0x00</td><td>0x01</td><td>0x22</td></tr>
</table>
</td></tr>
<tr><td rowspan="3"></td><td></td><td>
Type: Write command
From address: 0x00
Register address: 0x0020
Function: The startup module performs a single measurement in slow mode
</td></tr>
<tr><td rowspan="2">receive</td><td>
Same as single auto mode
<table>
<tr><td>byte</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr>
<tr><td>name</td><td>First</td><td>address</td><td colspan="2">register</td><td colspan="2">Effective Calculation</td><td colspan="2">effective byte</td><td>verification</td></tr>
<tr><td>data</td><td>0xAA</td><td>0x00</td><td>0x00</td><td>0x20</td><td>0x00</td><td>0x01</td><td>0x00</td><td>0x02</td><td>0x23</td></tr>
</table>
</td></tr>
<tr><td>Single quick measurement</td><td>transmit by radio</td><td>
Type: Write command
From address: 0x00
Register address: 0x0020
Function: The startup module performs a single measurement in rapid mode
</td></tr>
<tr><td></td><td>receive</td><td>Same as single auto mode</td></tr>
<tr><td rowspan="3">Start continuous automatic measurement</td><td>transmit by radio</td><td>
<table>
<tr><td>byte</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr>
<tr><td>name</td><td>First</td><td>address</td><td colspan="2">register</td><td colspan="2">Effective Calculation</td><td colspan="2">effective byte</td><td>verification</td></tr>
<tr><td>data</td><td>0xAA</td><td>0x00</td><td>0x00</td><td>0x20</td><td>0x00</td><td>0x01</td><td>0x00</td><td>0x04</td><td>0x25</td></tr>
</table>
Type: Write command; Source address: 0x00
Register address: 0x0020
Function: Send a command to automatically measure and return distance values continuously.
</td></tr>
<tr><td>recei</td><td>Same as single auto mode</td></tr>
<tr><td></td><td></td><td></td></tr>
</table>

<table>
<tr><td></td><td>ve</td><td></td></tr>
<tr><td>Start continuous slow measurement</td><td>transmit by radio</td><td>
<table>
<tr><td>byte</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr>
<tr><td>name</td><td>First</td><td>address</td><td colspan="2">register</td><td colspan="2">Effective Calculation</td><td colspan="2">effective byte</td><td>verification</td></tr>
<tr><td>data</td><td>0xAA</td><td>0x00</td><td>0x00</td><td>0x20</td><td>0x00</td><td>0x01</td><td>0x00</td><td>0x05</td><td>0x26</td></tr>
</table>
Type: Write command
From address: 0x00
Register address: 0x0020
Function: Start the slave device for slow continuous measurement</td></tr>
<tr><td></td><td>receive</td><td>Same as single auto mode</td></tr>
<tr><td>Start continuous rapid measurement</td><td>transmit by radio</td><td>
<table>
<tr><td>byte</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr>
<tr><td>name</td><td>First</td><td>address</td><td colspan="2">register</td><td colspan="2">Effective Calculation</td><td colspan="2">effective byte</td><td>verification</td></tr>
<tr><td>data</td><td>0xAA</td><td>0x00</td><td>0x00</td><td>0x20</td><td>0x00</td><td>0x01</td><td>0x00</td><td>0x06</td><td>0x27</td></tr>
</table>
Type: Write command
From address: 0x00
Register address: 0x0020
Function: Start the slave device to perform continuous measurement in rapid mode</td></tr>
<tr><td></td><td>receive</td><td>Same as single auto mode</td></tr>
<tr><td>Incorrect machine response</td><td rowspan="2">transmit by radio</td><td>If an error occurs during the measurement phase, the laser ranging module will return an error report frame:
<table>
<tr><td>byte</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr>
<tr><td>name</td><td>First</td><td>address</td><td colspan="2">register</td><td colspan="2">Effective Calculation</td><td colspan="2">effective byte</td><td>verification</td></tr>
<tr><td>data</td><td>0xEE</td><td>0x00</td><td>0x00</td><td>0x00</td><td>0x00</td><td>0x01</td><td>0x00</td><td>0x0F</td><td>0x10</td></tr>
</table>
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.</td></tr>
<tr><td></td></tr>
<tr><td>Exit continuous measurement</td><td>transmit by radio</td><td>When the host is in continuous measurement mode, sending a byte 0x58 (the uppercase character 'X') will immediately stop the continuous measurement mode.</td></tr>
<tr><td>Enable secondary device measures</td><td></td><td>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.</td></tr>
<tr><td></td><td>transmit by radio</td><td>
<table>
<tr><td>byte</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr>
<tr><td>name</td><td>First</td><td>address</td><td colspan="2">register</td><td colspan="2">Effective Calculation</td><td colspan="2">effective byte</td><td>verification</td></tr>
<tr><td>data</td><td>0xAA</td><td>0x7F</td><td>0x00</td><td>0x20</td><td>0x00</td><td>0x01</td><td>0x00</td><td>0x00</td><td>0xA0</td></tr>
</table>
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.</td></tr>
<tr><td></td><td>receive</td><td>No reply</td></tr>
</table>

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	Single slow	Single quick
continuous measurement	transfer	Slow continuous	Fast Continuous
Measure speed	voluntarily	slow	fast
certainty of measurement	voluntarily	Gao	low

condition code

Status code (SDBM-60TF3)	Status code (SDBM-60TF20)	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°C). 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	0xFFF1	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

(1) Rough surface

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.

(2) Transparent surface

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.

(3) Wet, smooth or high gloss surfaces

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.

(4) Inclined surface, circular surface When the target area is large enough to accommodate the laser spot, the measurement can be carried out.

(5) Multiple path reflections

Incorrect measurements may occur when the laser returning from other objects exceeds the target reflected light. Avoid various reflectors in the measurement path.

Security precautions

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.

If SDBM is part of a system, the system vendor must be responsible for all security-related issues, such as manuals, labels, and guidance.

instrumenttation

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 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.