Siman

SDBM-60Series Laser RangingModule

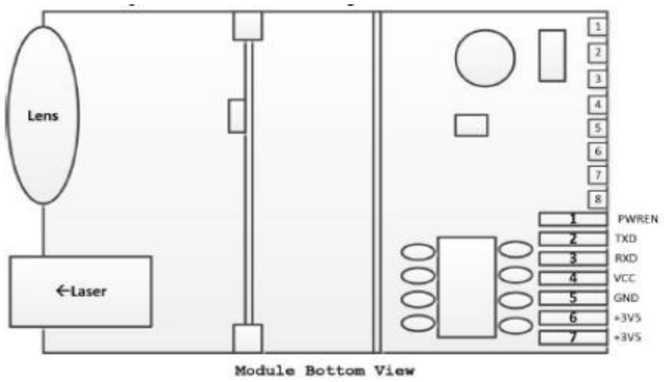
SDBM-60SeriesIt is a product developed by Siman Sensor Technology Co., Ltd.ITOF (Indirect Time of Flight)Laser rangefindingModule,It features rapid response and high-precision ranging capabilities. This module achieves a ranging accuracy of up to ±3 mm, with a data update rate as high as 20 Hz and a maximum ranging distance of up to 60 meters. Its compact design and UART digital interface output facilitate system integration and 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

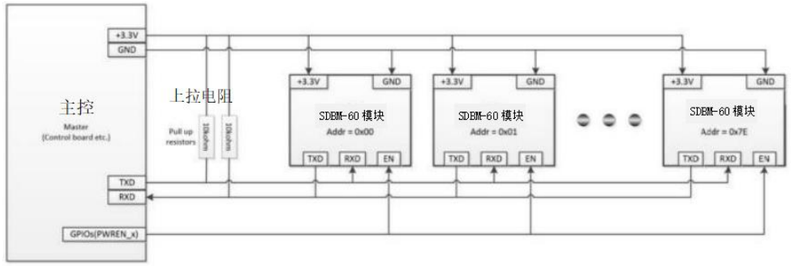
Four to five pins at most are needed to power and control the laser ranging module.



Module Bottom View

Pin Function				
Pin	Name	Function	Default value	Description
1	PWREN	Signal input	Low	Module power-on control pin, high level effective.
2	TXD	Signal output	High	Module serial port transmit pin, open-drain
3	RXD	Signal input	High	Module serial port receive pin, open-drain
4	VCC	Power +	Power supply	DC 2.5V~3.3V 300mA+
5	GND	Power supply -	ground	Module power ground

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 green line PWREN can be left unconnected.

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	Maximum Max	Units
		Normal		
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-60TF3	SDBM-60TF20
Measurement range	0.03…60m (indoor 90% reflectivity)	
Repeatability	±2mm	
Accuracy	±3mm	
Measure frequency	3hz	20hz
Laser light source	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	
Data interface	UART	
Operating voltage	DC+3.3V	
Power consumption	<0.27 W	
Specification dimensions	48.3×26×13mm	
Weight	9g	
Operating temperature	-20~50℃	
Storage temperature	-40~60℃	
Laser lifetime	>10000 h	

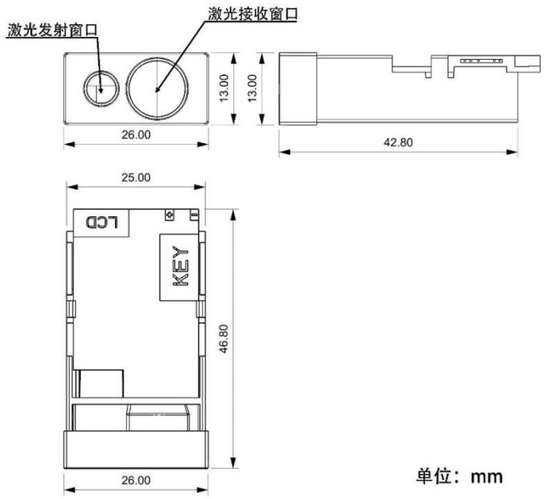
1.Within the full measurement range and at a standard distance deviation of ± 3 mm, the measurement results may be affected by factors such as target flatness and color.

2.White targets deliver the best results; indoors, measurements can be taken beyond 60 meters.

3.For optimal measurement results outdoors, it’s best to use a dedicated reflector.

4.At a measurement frequency of 3 Hz, up to 3 distance data packets can be acquired per second; at a measurement frequency of 20 Hz, up to 20 distance data packets can be acquired per second.

Dimensional drawing



单位：mm

Contact Us

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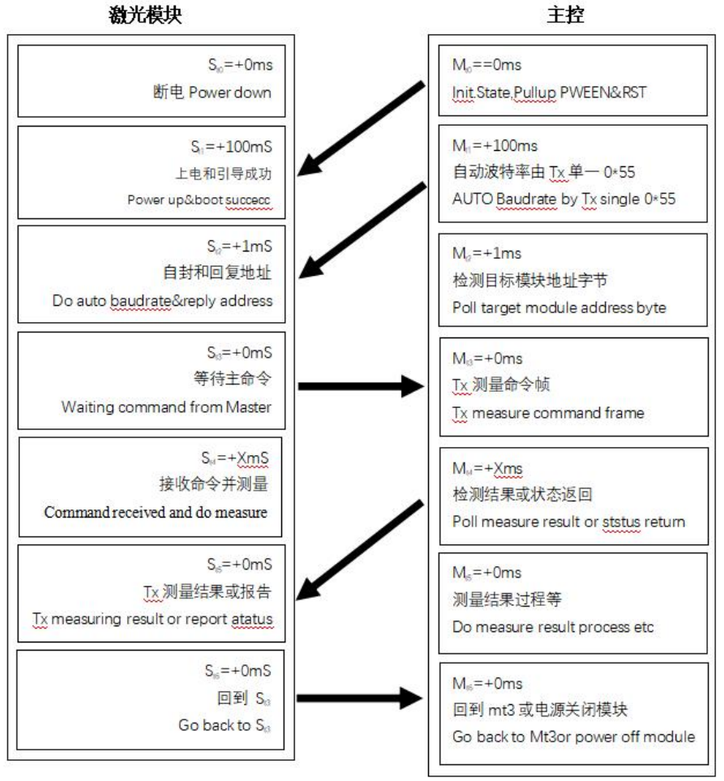
Communication Instructions:UART				
Baud rate	19200bps（SDBM-60TF3）/115200bps（SDBM-60TF20)			
Start bit: 1	Data bit 8	Stop bit 1	Check digit: None	Flow control: None

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

<table>
<tr><td></td><td></td><td>Register address: 0x000C
Function: Read out the module'sSoftwareVersion number</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>head</td><td>address</td><td colspan="2">register</td><td colspan="2">effective calculation</td><td colspan="2">valid byte</td><td>check</td></tr>
<tr><td>data</td><td>0xAA</td><td>0x80</td><td>0x00</td><td>0x0C</td><td>0x00</td><td>0x01</td><td>0xVV</td><td>0xYY</td><td>sum</td></tr>
</table></td></tr>
<tr><td></td><td></td><td>The SW version number is 0xVVYY.</td></tr>
<tr><td>Read module serial number</td><td>Send</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>head</td><td>address</td><td colspan="2">register</td><td>check</td></tr>
<tr><td>data</td><td>0xAA</td><td>0x80</td><td>0x00</td><td>0x0E</td><td>0x8E</td></tr>
</table></td></tr>
<tr><td></td><td></td><td>Type: Read command,From address: 0x00
Register address: 0x000E
Function:ReadModule serial number</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>head</td><td>address</td><td colspan="2">register</td><td colspan="2">effective calculation</td><td colspan="2">valid byte</td><td>check</td></tr>
<tr><td>data</td><td>0xAA</td><td>0x80</td><td>0x00</td><td>0x0E</td><td>0x00</td><td>0x01</td><td>0xSS</td><td>0xNN</td><td>sum</td></tr>
</table></td></tr>
<tr><td></td><td></td><td>The HW version number is 0xSSNN.</td></tr>
<tr><td></td><td>Send</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>head</td><td>address</td><td colspan="2">register</td><td>check</td></tr>
<tr><td>data</td><td>0xAA</td><td>0x80</td><td>0x00</td><td>0x06</td><td>0x86</td></tr>
</table></td></tr>
<tr><td>Read the input voltage</td><td></td><td>Type: Read command,From address: 0x00
Register address: 0x0006
Function: Read the module's input voltage.（BCD encoding）</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>head</td><td>address</td><td colspan="2">register</td><td colspan="2">effective calculation</td><td colspan="2">valid byte</td><td>check</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></td></tr>
<tr><td></td><td></td><td>Input voltage = 3219 mV</td></tr>
<tr><td></td><td>Send</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>head</td><td>address</td><td colspan="2">register</td><td>check</td></tr>
<tr><td>data</td><td>0xAA</td><td>0x80</td><td>0x00</td><td>0x22</td><td>0xA2</td></tr>
</table></td></tr>
<tr><td>Read the measurement results</td><td></td><td>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</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>6:9</td><td>10:11</td><td>12</td></tr>
<tr><td>name</td><td>head</td><td>address</td><td colspan="2">register</td><td>effective calculati</td><td>effective distance</td><td>effective</td><td>check</td></tr>
</table></td></tr>
<tr><td></td><td></td><td><table>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td>on</td><td>value</td><td>distance value</td><td></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>Set the module address</td><td>Send</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>head</td><td>address</td><td colspan="2">register</td><td colspan="2">effective calculation</td><td colspan="2">valid byte</td><td>check</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></td><td></td><td>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.</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>head</td><td>address</td><td colspan="2">register</td><td colspan="2">effective calculation</td><td colspan="2">valid byte</td><td>check</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></td><td></td><td>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 attempt to measure distance simultaneously—but no measurement results will be returned.Reply.HostOnly when accessing a single-address slave device will the measurement results be returned.</td></tr>
<tr><td>Set the module to measure the offset.</td><td>Send</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>head</td><td>address</td><td colspan="2">register</td><td colspan="2">effective calculation</td><td colspan="2">valid byte</td><td>check</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></td><td></td><td>Type: Write command
From address: 0x00
Register address: 0x0012
0xYYThe offset to be adjusted
Function:SettingsMeasure the offset</td></tr>
<tr><td></td><td></td><td>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.</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>head</td><td>address</td><td colspan="2">register</td><td colspan="2">effective calculation</td><td colspan="2">valid byte</td><td>check</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>Turn the laser on or off</td><td>Send</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>head</td><td>address</td><td colspan="2">register</td><td colspan="2">effective calculation</td><td colspan="2">valid byte</td><td>check</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></td></tr>
<tr><td></td><td></td><td>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.</td></tr>
<tr><td></td><td>Receive</td><td>Same as sending</td></tr>
<tr><td>Single automatic measurement</td><td>Send</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>head</td><td>address</td><td colspan="2">register</td><td colspan="2">effective calculation</td><td colspan="2">valid byte</td><td>check</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></td></tr>
<tr><td></td><td></td><td>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.</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>6:9</td><td>10:11</td><td>12</td></tr>
<tr><td>name</td><td>head</td><td>address</td><td colspan="2">register</td><td colspan="2">effective calculation</td><td>effective distance value</td><td>effective distance value</td><td>check</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>check</td></tr>
</table></td></tr>
<tr><td></td><td></td><td>Type: Slave reply
From address: 0x00</td></tr>
</table>

<table>
<tr><td></td><td></td><td>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</td></tr>
<tr><td>Single slow-speed measurement</td><td>Send</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>head</td><td>address</td><td colspan="2">register</td><td colspan="2">effective calculation</td><td colspan="2">valid byte</td><td>check</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></td><td></td><td>Type: Write command
From address: 0x00
Register address: 0x0020
Function: StartModulePerform a single measurement in slow mode.</td></tr>
<tr><td></td><td>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>head</td><td>address</td><td colspan="2">register</td><td colspan="2">effective calculation</td><td colspan="2">valid byte</td><td>check</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 rapid measurement</td><td>Send</td><td>Type: Write command
From address: 0x00
Register address: 0x0020
Function: The startup module performs a single measurement in fast mode.</td></tr>
<tr><td></td><td>Receive</td><td>Same as single auto mode.</td></tr>
<tr><td>Start continuous automatic measurement</td><td>Send</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>head</td><td>address</td><td colspan="2">register</td><td colspan="2">effective calculation</td><td colspan="2">valid byte</td><td>check</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; From address: 0x00
Register address: 0x0020
Function: Send a single command to initiate continuous automatic measurements and continuously return distance values.</td></tr>
<tr><td></td><td>Receive</td><td>Same as single auto mode.</td></tr>
<tr><td>Start continuous slowQuickMeasurement</td><td>Send</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>head</td><td>address</td><td colspan="2">register</td><td colspan="2">effective calculation</td><td colspan="2">valid byte</td><td>check</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</td></tr>
<tr><td></td><td></td><td>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>Send</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>head</td><td>address</td><td colspan="2">register</td><td colspan="2">effective calculation</td><td colspan="2">valid byte</td><td>check</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 measurements in fast mode.</td></tr>
<tr><td></td><td>Receive</td><td>Same as single auto mode.</td></tr>
<tr><td>Slave response error</td><td>Send</td><td>If an error occurs during the measurement phase, the laser ranging module will return an error report box.:<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>head</td><td>address</td><td colspan="2">register</td><td colspan="2">effective calculation</td><td colspan="2">valid byte</td><td>check</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></td></tr>
<tr><td></td><td></td><td>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, please refer to...Status code</td></tr>
<tr><td>Exit continuous measurement</td><td>Send</td><td>When the host is in continuous measurement mode, sending a single byte 0x58 (the uppercase character ‘X’) will immediately stop the continuous measurement mode.</td></tr>
<tr><td>Initiate multi-slave measures</td><td></td><td>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.</td></tr>
<tr><td></td><td>Send</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>head</td><td>address</td><td colspan="2">register</td><td colspan="2">effective calculation</td><td colspan="2">valid byte</td><td>check</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></td></tr>
<tr><td></td><td></td><td>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 device, 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</td></tr>
<tr><td></td><td>Receive</td><td>No reply</td></tr>
</table>

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（SDBM-60TF3）	Status code（SDBM-60TF20）	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 areas. 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 in 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 preventive measures. 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 against them.

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.