

XD-S1000 Technical Specification

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Change Record

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V1.1.2	2023/10/07	Chapter V	Control command modification

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XD-S1000 Technical Specification

1. Product Overview

XD-S1000 laser distance measurement module is developed based on 905nm semiconductor laser, featuring small size, light weight and long measuring distance. Applications include handheld rangefinders, micro drones, range finding scopes, etc. With UART (TTL protocol) data transmission interface, host computer software, and communication protocol instruction set provided, it is convenient for secondary development.

Product XD-S1000 Features:

- Self-developed high-precision calibration and alignment algorithms;
- Small size and light weight;
- Measuring distance range is long;

1.1. Application Field

XD-S1000 is widely used in a wide range of fields:

- Handheld rangefinders, microdrones, rangefinding scopes, etc;

2. Specification Parameter

2.1. Product Pictures

The physical picture of the product is shown below:

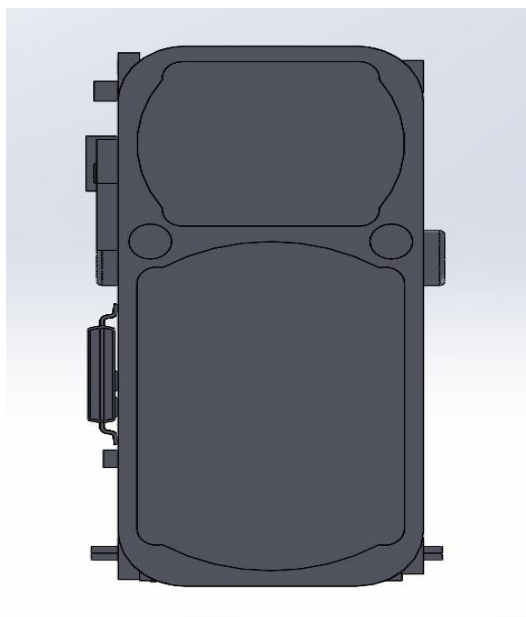


Figure 1 . XD-S1000 effect diagram1

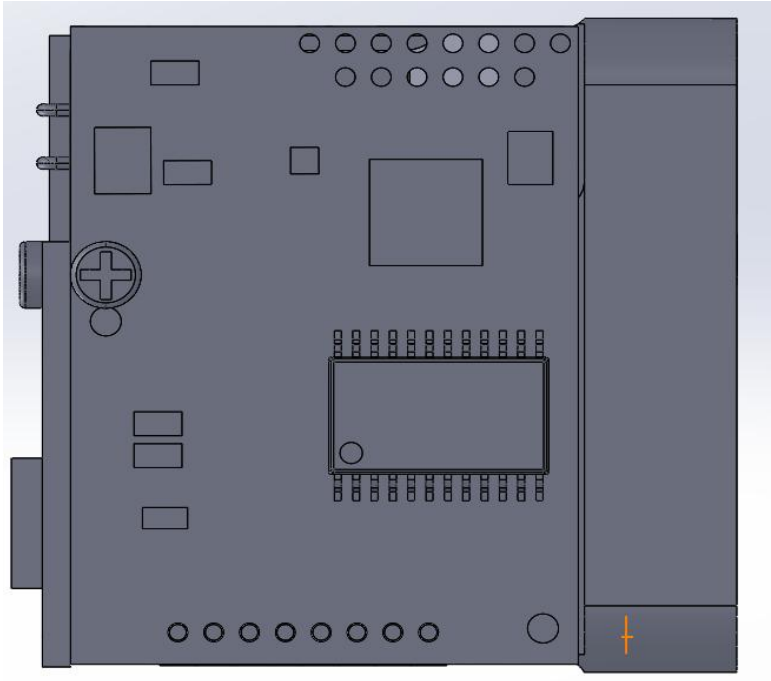


Figure 2 . XD-S1000 effect diagram 2

2.2. Product Specifications

Product-related specifications and parameters are as follows:

Table 1 . Product specification table

Classification Name	Performance Indicators	Index Parameter	Note
Key indicators	Ranging	5~1000m	
	Accuracy	±1m	
	Ranging frequency	≤4Hz	
	Inclination measurement	±90 ° (both directions), accuracy: <±1 °	
	laser emission angle	~6mrad	
	Caliber of fire	Φ10x7.5mm	
	Receiving caliber	Φ15x10mm	
	Wavelength	905nm	

System parameter	Working environment	Indoor & Semi-Outdoor	
	Operating temperature	-20°C ~ 60°C	
	Storage temperature	-30°C ~ 60°C	
	Magnitude of impact	1000G.1ms	
	Structural dimensions	≤25.8mm x 24.6mm x 12.9 mm	
	Weights	10±0.5g	
Electronic	Communications interface	UART (TTL-3.3)	
	Power connector	DC5521	
	Supply Voltage	DC3V~5V	
	Peak power consumption	≤650mW	
	Baud	115200bps	

3. Structure description and interface definition

3.1. Structure Description and Interfaces

The product XD-S1000 structure and dimensions are shown below:

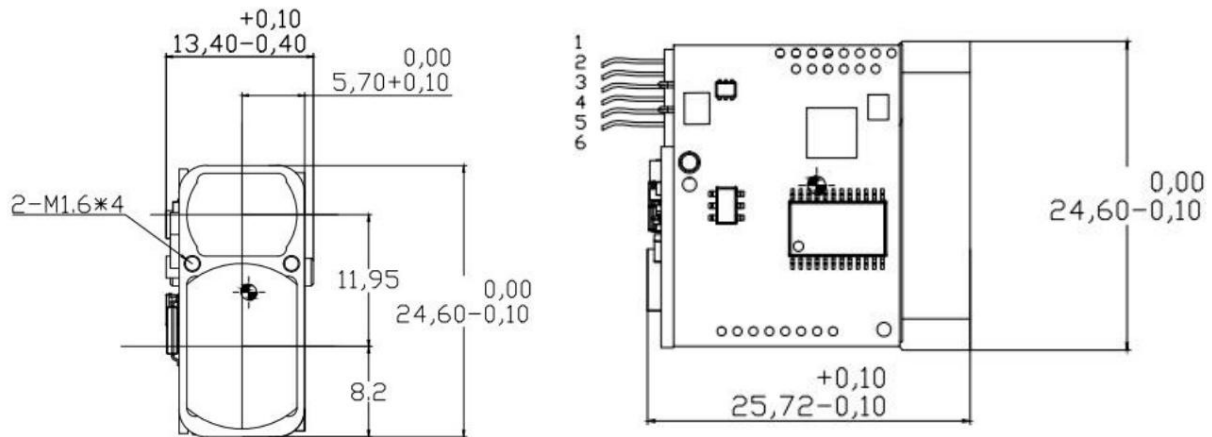


Figure 3 . XD-S1000 dimensional drawing

3.2. Hardware Interface Definitions

The product hardware interface structure is shown below:

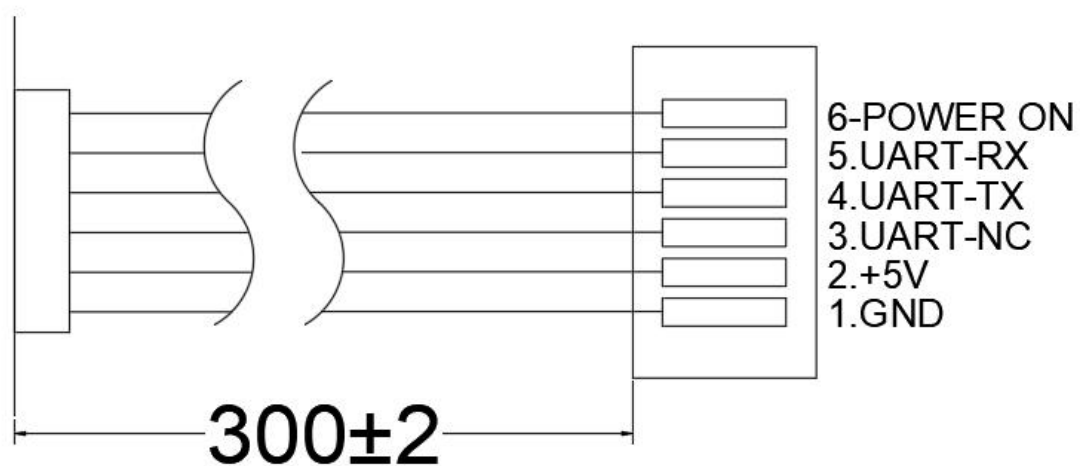


Figure 4 . Product interface diagram

The corresponding interface specification parameters in the product interface diagram are shown in the table below:

- Electrical Interface: UART (TTL-3.3V)
- Connector type: 6PIN 0.8mm pitch terminals

Table 2 . Connector Model List

Pin	Define	Clarification
1	GND	Serial Port Ground/Power Ground
2	VCC	Power supply: 3V~5V, maximum cannot exceed 5.5V, current >250mA

3	NC	--
4	UART_TX	Serial Transmitter, TTL 3.3V and TTL 5V
5	UART_RX	Serial Transmitter, TTL 3.3V and TTL 5V
6	POWER_ON	Power switch (high level active, low level power off, where high level is power level)

3.3. Basic Performance Measurement

The range of this product is defined under the following conditions.

- (1) Measurement targets with medium reflectivity: e.g. building walls.
- (2) Measurement of the reflective surface of the target perpendicular to the direction of laser emission.
- (3) The weather for the measurements is sunny, without device placed in direct sunlight.

4. Electrical Characteristics

4.1. Power Supply and Power Consumption

Product XD-S1000 power supply and power consumption related parameters are shown in the table below:

Table 3 . Power Supply Parameters and Specifications Table

Supply Voltage	DC3~5V
Peak power consumption	≤650mW
Standby power consumption	≤230mW

4.2. Reliability Standards

Product XD-S1000 reliability standard parameters are shown in the table below:

Table 4 . Table of Reliability Criteria

Operating temperature	-20°C~60°C
Storage temperature	-30°C~60°C
Magnitude of impact	1000G.1ms

5. Control Instructions

5.1. UART Interface

- Baud rate: 115200bps
- Start bit: 1 bit
- Data bits: 8 bits
- Stop bit: 1 bit
- Check digit: None
- Flow control: none

5.2. Control Commands

The baud rate can be set as follows: 9600bps, 14400bps, 19200bps, 38400bps, 57600bps, 115200bps, 230400bps, a total of seven baud rates can be set.

Note: Send Checksum = byte 3 + byte 4 + byte 5 + byte 6 + byte 7;

Receive Checksum = byte 1 + byte 2 + byte 3 + byte 4 + byte 5 + byte 6 + byte 7;

Note: Baud rate takes effect after setting, reset takes effect;

Byte 3 (Command) = 0x01: Set baud rate command;

Byte 7: Specific baud rate setting parameter;

5.2.1. Baud rate 9600bps Setting

(1) Send byte: 7=0x01; baud rate: 9600bps;

Table 5. 9600bps Transmit Settings

Byte 1	Bytes 2	Bytes 3	Bytes 4	Bytes 5	Bytes 6	Bytes 7	Bytes 8
0x55	0xAA	0x01	0xFF	0xFF	0xFF	0x01	0xFF

(2) The return value is: status=0x00, baud rate setting failure; status=0x01, baud rate setting success;

Table 6. 9600bps return values

Byte 1	Bytes 2	Bytes 3	Bytes 4	Bytes 5	Bytes 6	Bytes 7	Bytes 8
0x55	0xAA	0x01	status	0xFF	0xFF	0x01	check digit

5.2.2. Baud rate 14400bps Setting

(1) Send byte: 7=0x02; baud rate: 14400bps;

Table 7. 14400bps Transmit Settings

Byte 1	Bytes 2	Bytes 3	Bytes 4	Bytes 5	Bytes 6	Bytes 7	Bytes 8

0x55	0xAA	0x01	0xFF	0xFF	0xFF	0x02	0x00
------	------	------	------	------	------	------	------

(2) Return value: status=0x00, baud rate setting failure; status=0x01, baud rate setting success;

Table 8 . 14400bps Return Values

Byte 1	Bytes 2	Bytes 3	Bytes 4	Bytes 5	Bytes 6	Bytes 7	Bytes 8
0x55	0xAA	0x01	status	0xFF	0xFF	0x02	check digit

5.2.3. Baud Rate 19200bps Setting

(1) Send byte: 7=0x03; baud rate: 19200bps;

Table 9 . 19200bps Transmit Settings

Byte 1	Bytes 2	Bytes 3	Bytes 4	Bytes 5	Bytes 6	Bytes 7	Bytes 8
0x55	0xAA	0x01	0xFF	0xFF	0xFF	0x03	0x01

(2) Return value: status=0x00, baud rate setting failure; status=0x01, baud rate setting success;

Table 10 . 19200bps return values

Byte 1	Bytes 2	Bytes 3	Bytes 4	Bytes 5	Bytes 6	Bytes 7	Bytes 8
0x55	0xAA	0x01	status	0xFF	0xFF	0x03	check digit

5.2.4. Baud Rate 38400bps Setting

(1) Send byte: 7=0x04; baud rate: 38400bps;

Table 11 . 38400bps Transmit Settings

Byte 1	Bytes 2	Bytes 3	Bytes 4	Bytes 5	Bytes 6	Bytes 7	Bytes 8
0x55	0xAA	0x01	0xFF	0xFF	0xFF	0x04	0x02

(2) Return value: status=0x00, baud rate setting failure; status=0x01, baud rate setting success;

Table 12 . 38400bps Return Values

Byte 1	Bytes 2	Bytes 3	Bytes 4	Bytes 5	Bytes 6	Bytes 7	Bytes 8
0x55	0xAA	0x01	status	0xFF	0xFF	0x04	check digit

5.2.5. Baud Rate 57600bps Setting

(1) Send byte: 7=0x05; baud rate: 57600bps;

Table 13 . 57600bps Transmit Settings

Byte 1	Bytes 2	Bytes 3	Bytes 4	Bytes 5	Bytes 6	Bytes 7	Bytes 8
0x55	0xAA	0x01	0xFF	0xFF	0xFF	0x05	0x03

(2) Return value: status=0x00, baud rate setting failure; status=0x01, baud rate setting success;

Table 14 . 57600bps Return Values

Byte 1	Bytes 2	Bytes 3	Bytes 4	Bytes 5	Bytes 6	Bytes 7	Bytes 8
0x55	0xAA	0x01	status	0xFF	0xFF	0x05	check digit

5.2.6. Baud Rate 115200bps Setting

(1) Send byte: 7=0x06; baud rate: 115200bps;

Table 15 . 115200bps Transmit Settings

Byte 1	Bytes 2	Bytes 3	Bytes 4	Bytes 5	Bytes 6	Bytes 7	Bytes 8
0x55	0xAA	0x01	0xFF	0xFF	0xFF	0x06	0x04

(2) Return value: status=0x00, baud rate setting failure; status=0x01, baud rate setting success;

Table 16 . 115200bps Return Values

Byte 1	Bytes 2	Bytes 3	Bytes 4	Bytes 5	Bytes 6	Bytes 7	Bytes 8
0x55	0xAA	0x01	status	0xFF	0xFF	0x06	check digit

5.2.7. Baud Rate 230400bps Setting

(1) Send byte: 7=0x08; baud rate: 230400bps;

Table 17 . 230400bps Transmit Settings

Byte 1	Bytes 2	Bytes 3	Bytes 4	Bytes 5	Bytes 6	Bytes 7	Bytes 8
0x55	0xAA	0x01	0xFF	0xFF	0xFF	0x08	0x06

(2) Return value: status=0x00, baud rate setting failure; status=0x01, baud rate setting success;

Table 18 . 230400bps return values

Byte 1	Bytes 2	Bytes 3	Bytes 4	Bytes 5	Bytes 6	Bytes 7	Bytes 8
0x55	0xAA	0x01	Status	0xFF	0xFF	0x08	check digit

5.2.8. Single Measurement Commands

(1) Single measurement commands are as follows;

Table 19 . Single Measurement Commands

Byte 1	Bytes 2	Bytes 3	Bytes 4	Bytes 5	Bytes 6	Bytes 7	Bytes 8
0x55	0xAA	0x88	0xFF	0xFF	0xFF	0xFF	check digit

(2) Status = 0, single measurement failure; DATA_H = 0xFF, DATA_L = 0xFF;
Status = 1, single measurement success; DATA_H = measurement result high byte; DATA_L = measurement result low byte;

Table 20 . Single Measurement Return Values

Byte 1	Bytes 2	Bytes 3	Bytes 4	Bytes 5	Bytes 6	Bytes 7	Bytes 8
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0x55	0xAA	0x88	Status	0xFF	DATA_H	DATA_L	check digit
------	------	------	--------	------	--------	--------	-------------

5.2.9. Continuous Measurement Commands

(1) The following are the commands for continuous measurement;

Table 21 . Continuous Measurement Commands

Byte 1	Bytes 2	Bytes 3	Bytes 4	Bytes 5	Bytes 6	Bytes 7	Bytes 8
0x55	0xAA	0x89	0xFF	0xFF	0xFF	0xFF	check digit

(2) Status = 0, multiple measurement failure; DATA_H = 0xFF, DATA_L = 0xFF;
 Status = 1, multiple measurement success; DATA_H = measurement result high byte; DATA_L = measurement result low byte;

Table 22 . Continuous Measurement Return Values

Byte 1	Bytes 2	Bytes 3	Bytes 4	Bytes 5	Bytes 6	Bytes 7	Bytes 8
0x55	0xAA	0x89	Status	0xFF	DATA_H	DATA_L	check digit

5.2.10. Continuous Measurement Stop Commands

(1) The following is the continuous measurement stop command;

Table 21 . Continuous Measurement Stop Commands

Byte 1	Bytes 2	Bytes 3	Bytes 4	Bytes 5	Bytes 6	Bytes 7	Bytes 8
0x55	0xAA	0x8E	0xFF	0xFF	0xFF	0xFF	check digit

(2) Status = 0 to turn off multiple measurement failures; Status = 1 to turn off multiple measurement successes;

Table 22 . Return values for continuous measurement stop

Byte 1	Bytes 2	Bytes 3	Bytes 4	Bytes 5	Bytes 6	Bytes 7	Bytes 8
0x55	0xAA	0x8E	Status	0xFF	0xFF	0xFF	check digit

6. Appendix

6.1. System Integration Guide

Before users choose XD-S1000 camera for development, please contact X-Dynamics staff to obtain technical specifications and other information. Preliminary assessment, commissioning, verification and other steps can be processed to determine whether it meets the requirements of mass production.

Recommended process:

- Read the XD-S1000 technical specifications;
- Purchase and get the XD-S1000 demo through official channels;

- Before development, please contact X-Dynamics staff to obtain the user manuals and other materials;
- Choose the appropriate development platform according to the need.
- Choose the appropriate development platform according to the need.
- During the product development based on functions, if with any questions, please timely contact with X-Dynamics staff.
- Determine the mass production proposal of the final product.

6.2. Recommendations for Use

Factors that affect ranging capability, accuracy include:

- Target reflectivity: Usually the higher the target reflectivity, the better the ranging capability and the faster the response speed, for example, for medium reflectivity targets it can be measured to 1000m while for low reflectivity targets it may only be measured to 400m.
- Measuring Angle: The better the ranging capability, the faster the response when the laser angle is measured vertically to the target, and vice versa. Extreme use does not ensure that the range capabilities and range response speeds specified in this manual.
- Measurement environment: Factors affecting the response speed of ranging capability also include the intensity of sunlight, the concentration of water vapor and suspended particulate matter in the air, and the angle of deviation from sunlight exposure.