

X-D1100 Technical Specification

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Change Record

Version	Revision Date	Revised Chapter	Revision Descriptions
V1.1.1	2023/03/02	All chapters	First Edition
V1.1.2	2023/11/15	All chapters	Refined the specification
V1.1.3	2024/04/10	Chapter 2	Updated the product specifications
V1.1.4	2024/06/13	Chapter 3	Updated the product installation instructions

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X-D1100 Technical Specification

1. Product Overview

The X-D1100 is an industrial camera based on the 3D iToF (indirect Time-of-Flight) technology solution.

The sensor emits the modulated near-infrared light which is reflected after encountering the object, calculates the phase difference between emission and reflection before transmit it into a time difference to convert the distance of the shot scene, so as to forms depth information and finally present the object's three dimensional profile in topographic maps with different colors representing different distances. This product can be widely used in industrial measurement, application scenarios with requirements of 3D images in consumer electronics and other fields.

The technical solution provides high precision (in millimeter) depth maps and 3D point cloud maps, with X-D1100 camera RGB integrated styles with RGB it can output pixel-aligned RGBD images. The multi-platform SDK can be provided to customers support Windows /Linux(PC or ARM)/ROS systems, which benefit more applications in different industries.

Product X-D1100 Features:

- Self-developed high precision calibration and correction algorithm
- Ambient light, multi-path, multi-machine interference resistant algorithm
- Post-processing algorithms: image denoising, flying spot elimination
- Deep customization available according to the user scenarios

2. Specification Parameter

2.1. Product pictures

The product pictures are shown as below:

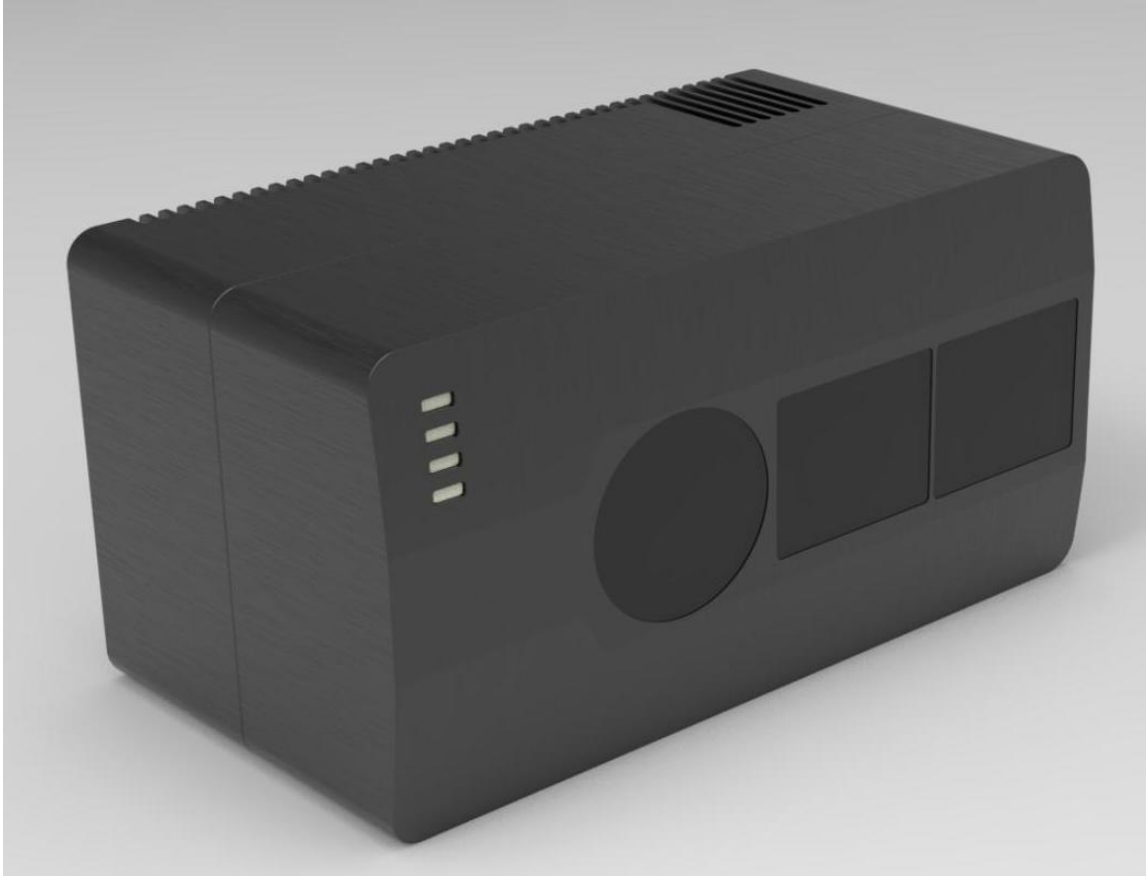


Figure 1. Front view effect picture of X-D1100



Figure 2. Rear view effect picture of X-D1100

2.2. Product specification

Classification Name	Performance Indicators	Index Parameter	Note
System parameter	Site environment	Indoors, outdoors	
	Anti-glare interference degree	90k lux	
	Operating temperature	-20°C~65°C	
	Safety class	The laser Class 1	
	Protection grade	IP67	
	Certification	CE、FCC	
	Safety class	CLASS 1	
Electric parameter	Communication interface	GbE(gigabit Ethernet)	
		DI*4	DI signals and DO signals are 24V PNP; The drive capacity of DO signal is 50mA
		DO*4	
		RS485*1	
	Power interface	17PIN signal interface	
	Supply voltage	20V~24V	

	Rated power consumption	DC24V / 18.144W	
ToF	Resolution	640 x 480 / 320 x 240	
	Frame rate	25fps@640 x 480 / 25fps@320 x 240	
	Ranging	0.3~10m@ 90% reflectivity	
	Ranging accuracy	1%@whole range	
	FOV	105°×75°	
	Wave length	940nm	
RGB	Maximum resolution	1920 x 1080	
	Frame rate	20fps	
	FOV	85° x 66°	
	Shutter mode	Rolling shutter	
SDK	Operating system	Windows, Linux, ROS	
	Algorithm SDK	Preprocessing: Correction algorithm, depth calculation algorithm, etc; Postprocessing: Filtering algorithm, point cloud conversion, etc	
	Settable parameters	Resolution, exposure time, algorithm level	

Table 1. Product specification sheet

3. Structure description and interface

3.1. Structural drawings

The structure drawings of product X-D1100 are as follows:

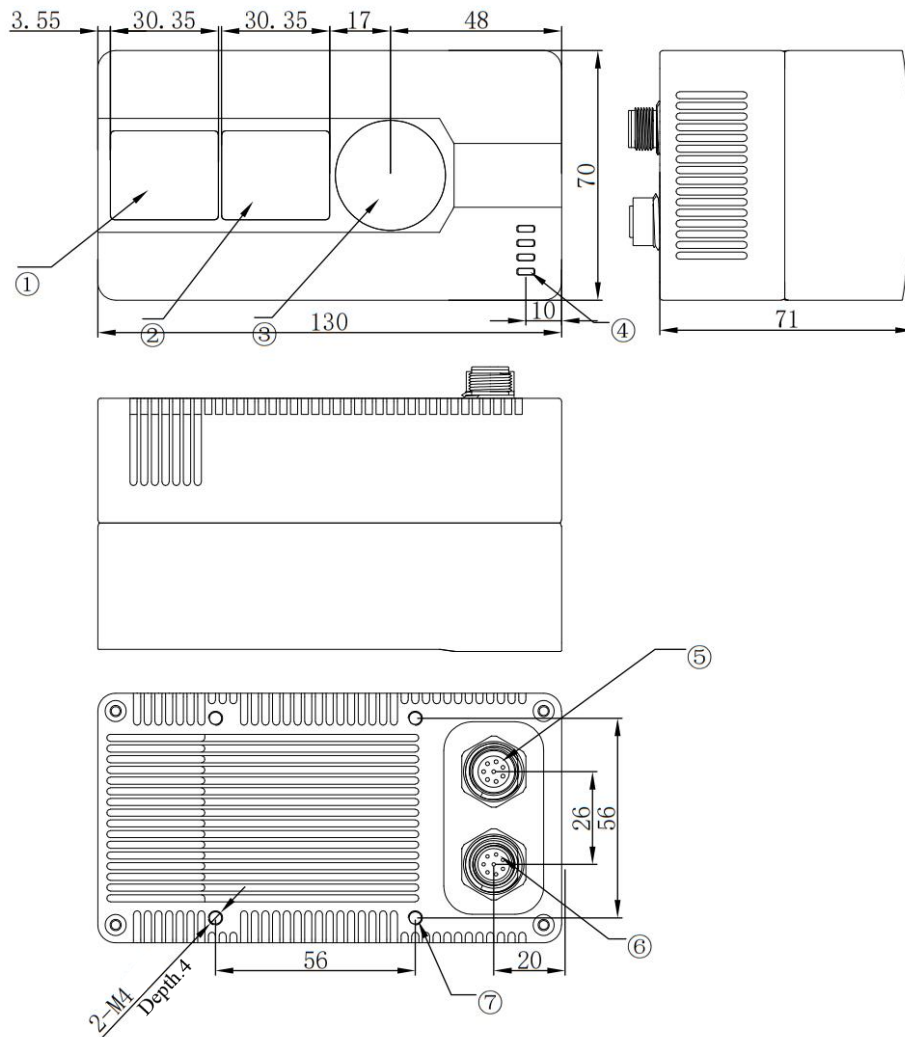


Figure 3. X-D1100 structure diagram

Unit :mm.

- ① Protective glass over the D-Vesel;
- ② Protective glass over the Sensor;
- ③ Protective glass over RGB module;
- ④ Status indicator lamp;

- ⑤ 8PIN external Internet interface;
- ⑥ 17PIN external power interface;
- ⑦ Mounting holes (4 in total) for M4 screws, in depth 4mm

3.2. Accessories

Suggested adapter:24V/5A;

Adaptive hardware interface: The product is configured with a M12-17 aviation connector and a M12-8 Pin aviation connector (see Figure 4 and Figure 5 for detailed definition) . Positions may be reversed due to different version.

3.3. Connection Schematic Diagram

The product connection schematic diagram is as follows:

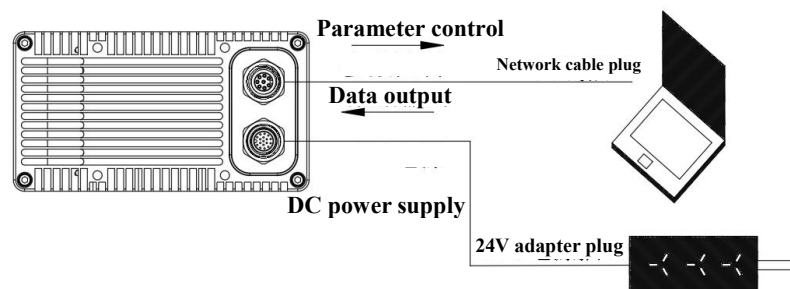
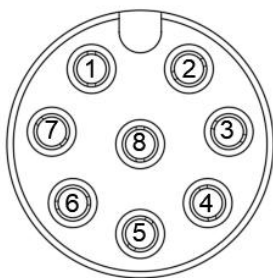
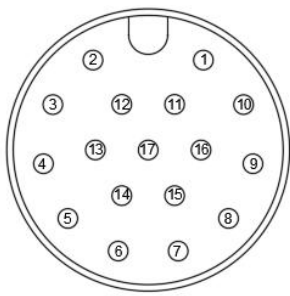


Figure 4. product connection diagram

3.4. Hardware interface definition



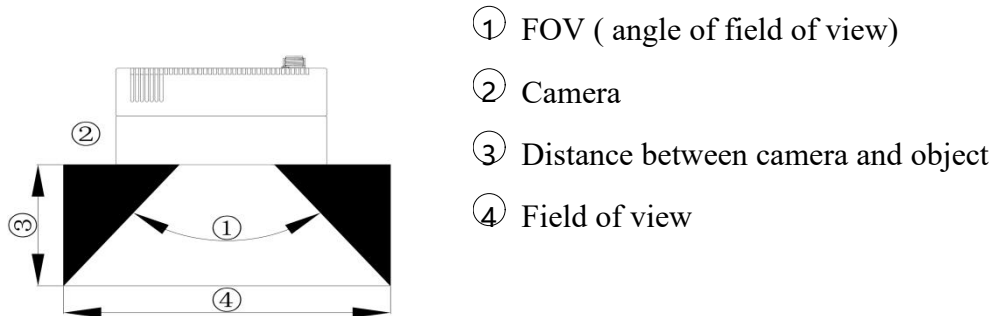
No.	Pin definition
1	DC-
2	DD+
3	DD-
4	DA+
5	DB+
6	DA+
7	DC+
8	DB-



No.	Pin definition	No.	Pin definition
1	POWER+	10	DI-IN2
2	POWER+	11	DO-2
3	GND-24V	12	DI-IN3
4	TX-DEBANG	13	DO-3
5	RX-DEBANG	14	DI-IN4
6	NC	15	DO-4
7	NC	16	POWER-
8	DI-IN1	17	POWER-
9	DO-1		

Figure 5. Hardware interface definition

3.5. Installation Instructions



- ① FOV (angle of field of view)
- ② Camera
- ③ Distance between camera and object
- ④ Field of view

The installation instructions are as follows:

- (1) The target object must be completely within the field of view ④.
- (2) When installing or positioning, please consider the tolerances.
- (3) The distance between the camera and the target, named as ranging, has a maximum value need to be noticed during the actual use.
- (4) The smaller the value of ③, the higher the accuracy.
- (5) When selecting the installation position, the cleanliness of the external lens of the camera should be considered.
- (6) There should be no other transparent object between the camera and the measured object, because reflected lights or light go through the transparent object will cause measurement distortion.

- (7) Extra glass on the camera lens is not suggested because of light energy decrement caused by transmittance reduction.
- (8) The coverage area ④ of the product is directly related to the distance ③. Please refer to the FOV extension position of 3D or consult from technician personnel to get more parameters information.

3.6. Heat Dissipation Suggestion

The housing design can meet the heat dissipation needs of this product but if further reduction of the temperature rise to improve the product effect is required, the following solutions to improve the heat dissipation efficiency can be considered:

1. Install the product in cross ventilation area.
2. Placed some metal materials on the fixed position where directly contact with the product in order to assist heat dissipation.
3. Add a fan or radiating fin to assist heat dissipation.

4. Electrical Characteristics

4.1. Power Supply and power consumption

X-D1100 related parameters are shown as follows:

Table 2. Power supply parameters and specifications

Average power consumption	18.144W (24V)
Average current	0.756A (24V)
Peak current	3.36A (24V)
Rated voltage	24V
Nominal input voltage range	20V~24V
Minimum input voltage	20V
Maximum input voltage	26.4V
Electrical connection between the main-board and product housing	No directly connected

4.2. Reliability Standards

The reliability standard parameters of X-D1100 are shown as below:

Table 3. Reliability standards

Operating temperature	-20°C ~ 65°C
Storage temperature	-40°C ~ 80°C
Protect grade	IP67

5. Version Updating and Relevant SDK

5.1. Version Updating

- (1) Version upgrade/downgrade can be carried out through the upper computer independently developed by X-Dynamics. For detailed operations, please refer to the corresponding upper computer user manual;
- (2) When upgrade processed, the camera needs to be restarted to take effect the new version. The communication modes such as network ports need to be kept in a stable state during the upgrading, otherwise, it may cause upgrade failure. If the upgrade fails, please just restart the camera and repeat the upgrade steps after camera is recognized.

5.2. SDK Instructions

SDK for Windows, Linux and ROS platforms are available. Please contact the relevant sales person for the latest SDK.

Table 4. SDK brief description table

SDK	Providing a general SDK development kit, including basic API, Demo programs, help documents, and some tool software;
Supported platform	Support cross-platform development. Windows/Linux(PC or ARM)/ROS;

6. Appendix

6.1. System Integration Guidance

Before using X-D1100 iToF camera for development, please contact X-Dynamics staff to get technical specifications, user manuals, upper computer info. etc. Preliminary assessment, commissioning, verification and other steps can be processed to determine whether it meets the requirements of mass production.

Recommended process:

- Read the X-D1100 specifications.
- Purchase and obtain X-D1100 samples 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.
- 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. Use Suggestions

- (1) Remove the protective film in front of the lens before using the 3D camera;
- (2) Camera(especially for the position of the lens) should be as far away from heat sources as possible during the installation or using;
- (3) When using the 3D camera, please avoid the lens of the product being scratched by sharp objects;
- (4) Avoid frequent use of alcohol (organic solvent) to wipe the lens surface which take risk of damage to the coating. It is recommended to wipe with a pure lint-free cloth;
- (5) In scenes such as strong high-frequency vibration or external impact, please add appropriate protection conditions for the camera;
- (6) In severe environments such as over humid or strong dust condition, please add appropriate protection conditions for the camera;
- (7) Please refer to the 3D camera installation guide during the installation, and do not install the camera in any way may cause serious deformation to the camera.

6.3. Attentions

- (1) Self-purchased cables or cutting& re-connecting cables from the original ones need strict accordance with the cable definition in the specification, otherwise wrong cable may burn the camera, or cause abnormal signal.
- (2) During the using or testing, please never start power-on work when the 3D camera is installed backwards to table etc. or there is any non-transparent materials covering on the laser emitting surface. It can help avoid components damaged from overheated laser.
- (3) Although the 3D camera has passed the certification according to EN60825-1 CLASS 1, it is still recommended to avoid any human eyes looking directly at the lens of working device in close distance.
- (4) If the image frame rate is insufficient or the flow cannot be turned on during the using, it is recommended to reconnect the camera correctly after good contacts confirmed.
- (5) Disassembling the camera is prohibited.