



S Series: dToF-Based RGBD Cameras

Specification and User Manual

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Revision History

Revision Date	Version Number	Revision Description
13-Jan-25	V1.0	Initial release
27-Feb-25	V1.1	Modify TOF field of view.
29-Dec-25	V1.2	I/O function removed
6-Jan-26	V1.3	Supplement the multimodal data diagram of the camera's indoor and outdoor scenes, the camera field of view diagram and some FAQs.
8-Jan-26	V1.4	Add descriptions of the intensity image features, supplement the description of the output data format and visualization.
4-Apr-26	V2.0	Add New model S10 Ultra

1. Product Overview

1.1 Introduction

The **S Series** is a family of compact, industrial-grade RGBD cameras built on dToF (direct Time-of-Flight) technology, designed for mobile robot perception and depth sensing in demanding environments.

The series currently includes two models:

- **S10:** A compact industrial-grade RGBD camera providing synchronized depth and RGB data over a range of 0.3~8 meters. It features internal spatial and temporal alignment between depth maps and color images, supports multiple data streams (depth, intensity, RGB, point clouds, and processed obstacle avoidance results), and operates reliably indoors and outdoors under up to 100 KLUX ambient light. With low power consumption and frame rates up to 20 fps, the S10 is ideal for real-time responsive navigation and obstacle avoidance.
- **S10 Ultra:** A small-form-factor, wide-field-of-view, cost-effective industrial-grade RGBD camera that extends the sensing range up to 42 meters (0.3m~42m). In addition to core dToF capabilities, the S10 Ultra features RGB-D-IMU fusion with a built-in IMU (output at 200Hz), effectively supporting mainstream SLAM algorithms such as Fast-LIO, and LIVO (LiDAR-Inertial-Visual Odometry). It delivers spatially and temporally aligned RGB and depth data, supports software trigger, and is available in an MIPI module version for volume demand. The fully solid-state design (no moving parts) ensures enhanced vibration resistance and stability.
- **S11:** A high-cost-effectiveness RGBD camera designed for obstacle avoidance with a detection range of up to 5 meters. It supports USB, Ethernet, and MIPI (MIPI available only for volume demand), offering flexible connectivity options for various integration requirements.

Both models leverage dToF architecture for inherent robustness against multipath interference, wide dynamic range across target reflectivities, sunlight resistance up to 100 KLUX, and simultaneous operation of multiple units without interference.

1.2 Product Status

1.2.1 S10

- Status: Launched in Q3 2025
- Certification: CE, Laser Safety Class 1
- Availability: Available for immediate order

1.2.2 S10 Ultra

- Status: Pre-order
- Certification: In preparation; planned to be completed in Q3 2026
- Availability: Accepting pre-orders. First testing unit available in May. Larger volumes require confirmation.

1.2.3 S11

- Status: Final retuning
- Certification: Planned for Q3 2026
- Availability: Accepting pre-orders. First testing unit available in May. Larger volumes require confirmation.

2. Specifications

Parameter	S10	S10 Ultra
Laser Wavelength	940nm	940nm
Output Format	Depth/RGB/IR Amplitude Map	Depth/RGB/IR Amplitude Map
TOF FOV (H×V)	120° × 80°	120° × 80°
RGB Resolution & Frame Rate	1632×1224 @Max. 20fps (typ. 15fps)	1280×1080 @Max 20fps (typ. 10fps)
RGB FOV (H×V)	120° × 80°	120° × 110°
Range	0.3~8m (90% reflectivity); 0.3~3m (5% reflectivity)	0.2~42m (90% reflectivity); 0.2~30m (5% reflectivity)
Accuracy	≤3 cm	≤4 cm
Average Power Consumption	≤4W	< 9W
Dimensions (L×W×H)	80 × 37 × 25 mm	106 × 69 × 43 mm
Weight	190 g	440 g
Power Supply	12V~28V	12~27V
Interface	Ethernet	Ethernet
IP Rating	IP54	IP67
Operating Temperature	-20°C~60°C	-20°C~75°C
Storage Temperature	-40°C~85°C	-40°C~85°C

Parameter	S10	S10 Ultra
Time Synchronization	PTP	PTP
SDK Support	C/C++/Python	C/C++/Python
OS Compatibility	Windows 7/8/10/11, Linux, Arm Linux/ROS1/ROS2	Windows 7/8/10/11, Linux, Arm Linux/ ROS1/ROS2
Ambient Light Resistance	100 KLUX	100 KLUX

Table 1 Product Basic Specification Parameters

3. Hardware Description

3.1 S10 Camera

3.1.1 Camera Interfaces

There are two interfaces on the S10 camera end: DC24V power interface, 100M Ethernet interface.

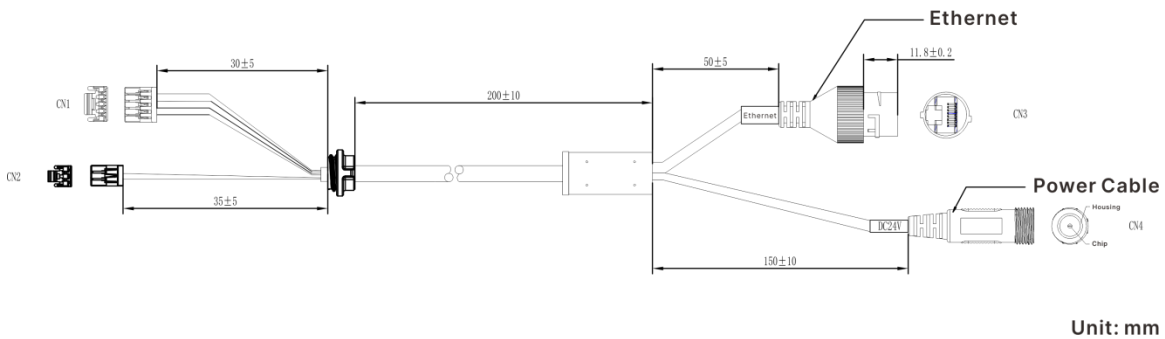


Figure 1 - S10 Camera Interface Diagram

3.1.2 Component Overview

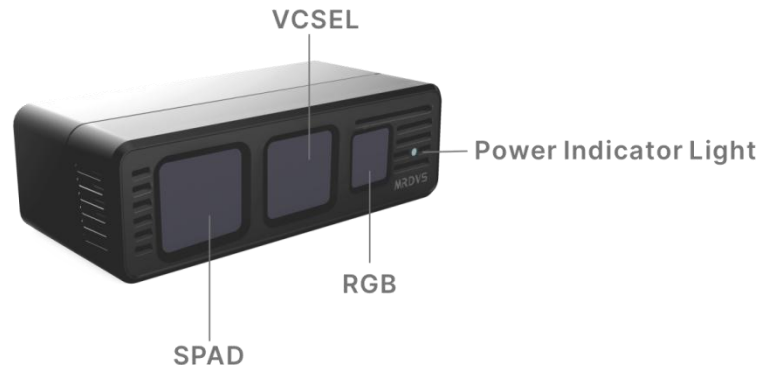


Figure 2 - Overview of S10 Camera

3.1.3 Mechanical Dimensions

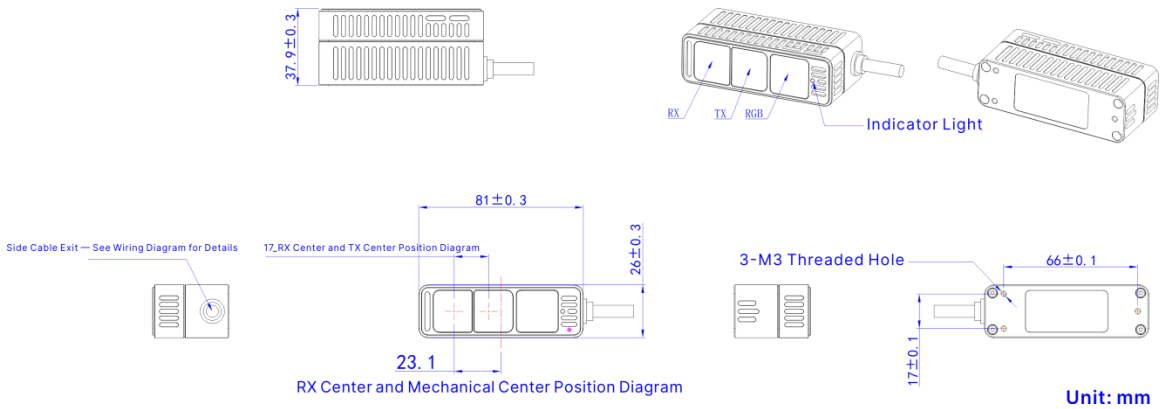


Figure 3 - S10 Camera Dimensions Diagram

3.1.4 Photo of the physical product



Figure 4 - S10 Photography

3.2 S10 Ultra Camera

3.2.1 Camera Interfaces

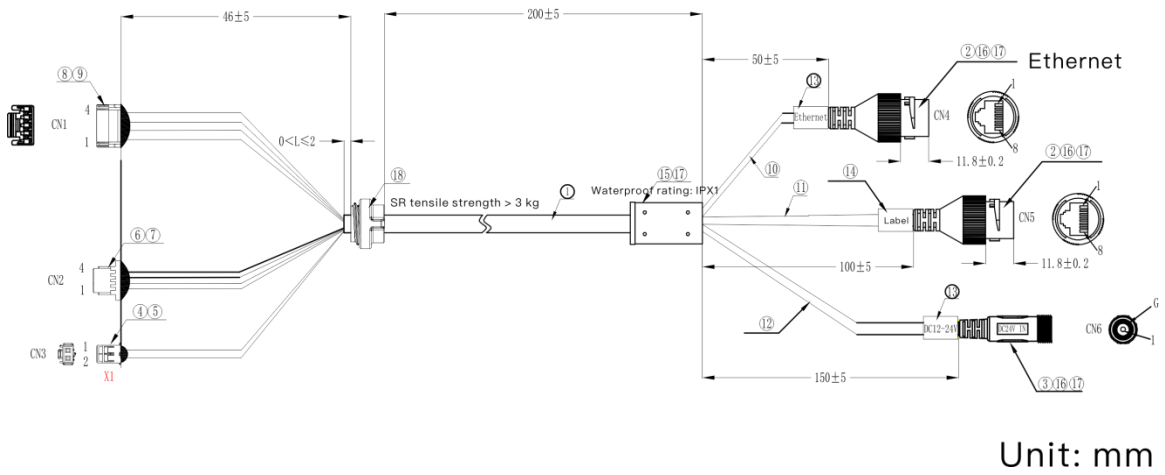


Figure 5 - S10 Ultra Camera Interface Diagram

3.2.2 Component Overview

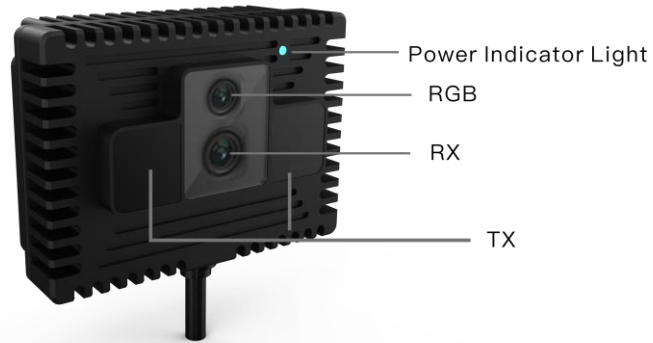


Figure 6 - Overview of S10 Ultra Camera

3.2.3 Mechanical Dimensions

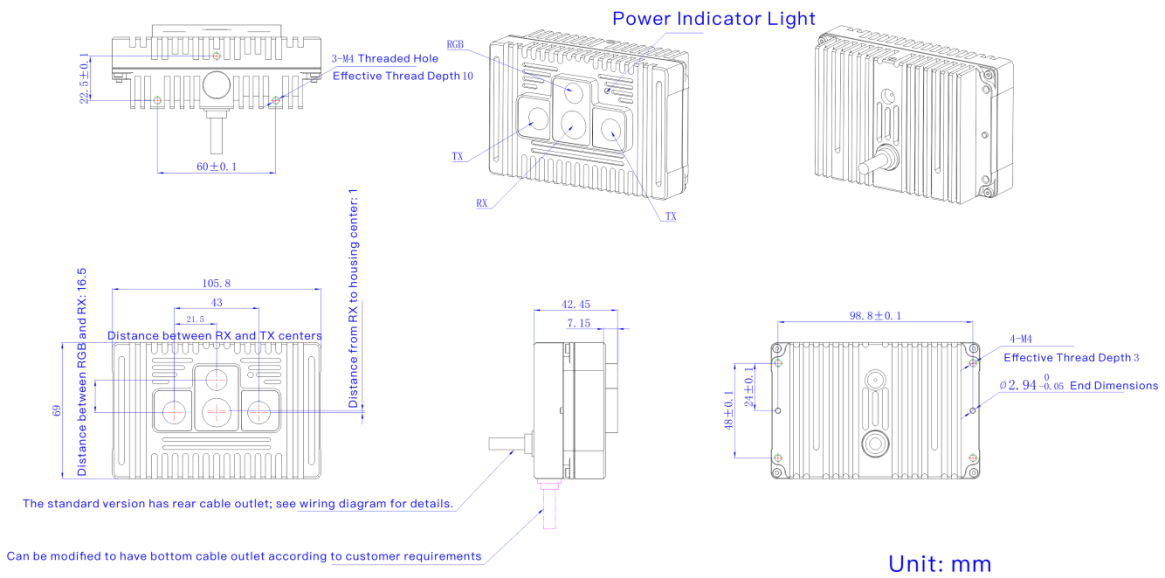


Figure 7 - S10 Ultra Camera Dimensions Diagram

3.2.4 Photo of the physical product



Figure 8 - S10 Ultra Photography



Figure 9 - S10 Ultra MIPI Photography

4. Output Data Formats and Visualization

This chapter details the data formats output by the S Series cameras and provides guidance on how to visualize them using common third-party software.

4.1 Data Output Formats and Samples

The S Series cameras can output multiple synchronized data streams shown as below.

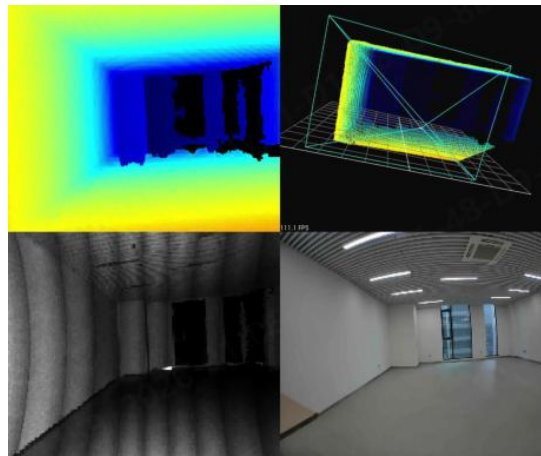


Figure 10 - Example GUI Visualization: Camera Multimodal Data

(Top Left: Depth Map | Bottom Left: Intensity Map | Top Right: Point Cloud Map | Bottom Right: RGB Map)





	20240407_191957513_a.pgm	2024/4/7 19:19	PGM 文件	2,401 KB
	20240407_191957513_d.pgm	2024/4/7 19:19	PGM 文件	2,401 KB
	20240407_191957513_r.png	2024/4/7 19:19	PNG 文件	1,825 KB
	20240407_191957513_t.pcd	2024/4/7 19:19	PCD 文件	19,201 KB

Figure 11 - Example Saved Output Data Files

(From top to bottom: Intensity Map (.a.pgm), Depth Map (.d.pgm), RGB Image (.r.png), Point Cloud (.t.pcd))

Output Data Type	Description	Format
Depth Map	A pseudocolor image where each pixel's color corresponds to the distance from the camera. Warmer colors (e.g., red/yellow) represent closer objects, cooler colors (e.g., blue/purple) represent farther objects.	.pgm
Intensity (Amplitude) Map	A grayscale image representing the strength of the reflected infrared signal. Higher values indicate stronger reflection. Please note the vertical striping appears due to the dToF SPAD sensor's region-based exposure architecture and parallax. This is an inherent characteristic of dToF technology and does not affect depth accuracy.	.pgm
Point Cloud	A 3D point cloud file (PCD format) containing XYZ coordinates for each pixel, derived from the depth map and camera intrinsics.	.pcd
RGB Image	A standard color image from the onboard RGB camera, spatially aligned with the depth map.	.png

Table 2 Output Data Type and Description

4.2 Recommended Third-Party Software

We recommend the following free, open-source software to inspect the exported data files:

- For Point Cloud (*.pcd files):
 - Recommended Software: CloudCompare

- Download Link: [CloudCompare - Open Source project](#)
- Usage: Open the .pcd file directly to visualize, rotate, measure, and analyze the 3D point cloud.
- For Depth and Intensity Maps (*.pgm files):
 - Recommended Software: ImageJ
 - Download Link: [ImageJ](#)
 - Usage: Open the .pgm file. You can use the analysis tools to check pixel values, profiles, and histograms. Note that depth maps are typically encoded in millimeters.
- For RGB Images (*.png files):
 - These can be opened with any standard image viewer (e.g., Windows Photos, Preview on macOS).

5. Software Download and Development Support

Different packages of the SDK (for C/C++, Python, ROS 1, ROS 2) and the GUI viewer binaries (for Windows and Ubuntu), along with their corresponding user manuals, can be downloaded via the MRDVS GitHub channel:

<https://github.com/Lanxin-MRDVS/CameraSDK/releases>

6. Environment and Reliability

Item		S10	S10 Ultra
Operating Environment	Operating Temperature	-20°C to 60°C	-20°C to 75°C
	Humidity	Relative Humidity: 0%~95%RH, Non-condensing	Relative Humidity: Max. 90% RH
	Illuminance	0KLUX ~ 100KLUX	0KLUX ~ 100KLUX


Item		S10	S10 Ultra
Storage Environment	Temperature	-40°C to 85°C	-40°C to 85°C
	Humidity	Relative Humidity: 10%~95%RH, Non-condensing	Relative Humidity: Max. 90% RH

Table 3 Product Integration Guide

7. Certification Statement

Note: The certifications listed in this chapter have been completed for the S10. For the S10 Ultra and S11, these certificates have not yet been obtained and are planned to be acquired in Q3 2026.

7.1 Laser Security Level

	Laser Safety Guidelines
	<p>This product emits invisible laser radiation during operation. Avoid exposure to the eyes to prevent injury.</p> <p>The laser emitted by this product complies with Class 1 safety requirements. According to EN 60825, it poses no hazard to humans during normal use.</p>

Note:CLASS1 refers to the laser eye safety standard level 1, which means that there is no risk of harm to the human eye under normal operation and reasonably foreseeable misuse.

7.2 European Directives



This product complies with EU CE conformity assessment requirements and meets the specifications of harmonized standards EN IEC 61000-6-2:2019 and EN IEC 61000-6-4:2019.

7.3 European Union RoHS Statement

This product meets RoHS Directive (2011/65/EU Annex II & amendment (EU) 2015/863) requirements. Restricted substances (Cadmium, Lead, etc., including phthalates) passed testing per applicable RoHS standards.

7.4 European Union Regulation

This product complies with the requirements of Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH).

8. Frequently Asked Questions

Serial number	Question	Description
1	No data after opening the camera with host computer software.	<ul style="list-style-type: none"> ·Please check if the firewall is turned off. The firewall needs to be turned off. ·Set IP address within the same network segment. ·Check if the switch is malfunctioning. ·Replace the computer. ·Configure multiple network segments.
2	The host computer has obtained multiple IP addresses.	The camera has detected the same IP within the local area network. You need to select the desired IP to activate it.
3	Software installation location.	If installed in the default C drive, there may be permission settings.
4	The edges of nearby white objects are less precise.	Optimized the glare algorithm, but detection of black objects may be incomplete.
5	Reflective pillar location is overexposed.	Turn on the glare suppression algorithm.

Serial number	Question	Description
6	The camera app cannot display images, or the depth map is very small.	Try to refresh the GUI viewer to the latest version.
7	Failed to exclusively acquire application permissions.	Ensure that only one user is connected to the camera at the same time.
8	Imaging of the detected object is sparse or missing.	<ul style="list-style-type: none"> ·Check the high exposure parameters (typically between 600 and 1200). ·Check the low signal threshold (typically between 10 and 30).

Table 4 Frequently Asked Questions

Get More Support

 <https://mrdvs.com/>

 <https://github.com/Lanxin-MRDVS/CameraSDK>

 service@mrdvs.com

Appendix 1 Quick Started Guide

1. Power Connection

Connect the camera to a DC power supply. The blue power indicator will flash slowly, indicating normal power-on.

2. Network Connection

Connect the camera to the computer using a Cat6 Ethernet cable.

3. Computer Network Configuration

Set your computer's IP address to the same subnet as the camera (default camera IP: 192.168.100.82) and disable the computer's firewall.

4. Initial Image Testing & Adjustment

Launch the GUI viewer to perform an initial image quality check and adjust basic parameters as needed.