



Mobile Robot Vision Expert

M4 Mega
User Manual

Revision History

Revision Date	Version Number	Revision Description
13-Jan-25	V1.0	New Document
27-Feb-25	V1.1	Modify TOF Field of View

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1. Introduction

1.1 Document Purpose and Scope

This document presents the product specifications of the M4 Mega camera and provides developers with details on certain design aspects necessary for understanding and using the product.

1.2 Terminology

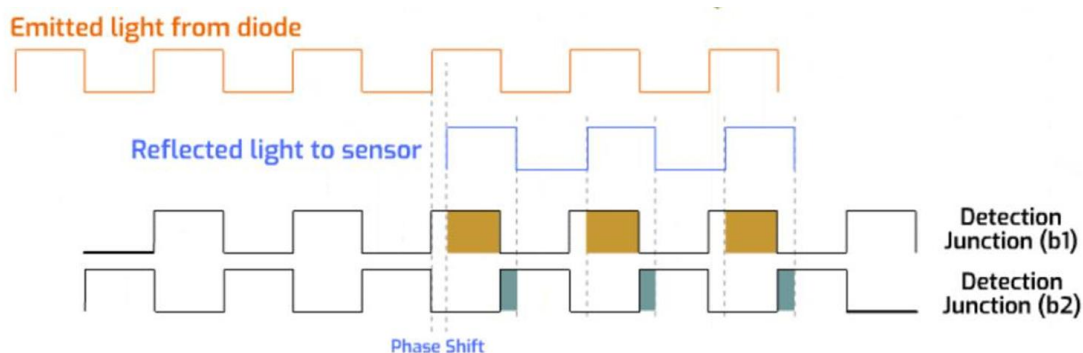
RGBD Camera	The camera supports simultaneous output of RGB images and depth images, ensuring temporal and spatial synchronization.
Depth	The depth video stream is similar to the color or monochrome video stream, where each pixel has a value representing the distance from the camera, i.e., 'depth'.
FOV	Field of View, used to describe the angular range of the camera imaging a given scene, mainly including Horizontal Field of View (HFOV), Vertical Field of View (VFOV), and Diagonal Field of View (DFOV).
IR Camera	Infrared camera, or infrared camera, in this product, mainly targets near-infrared band imaging.
RGB Camera	Color camera, or color camera
Depth Camera	Depth camera, where the depth imaging module generally consists of a dot projector, an infrared camera, and a depth processing unit, while the color imaging module generally refers to the color camera.
Soc	System-on-Chip, used for processing image data, depth calculation, application algorithm operations, and other functions.

1.3 Working Principle

M4 Mega employs the Indirect Time of Flight (ITOF) method for distance measurement. The camera emits laser pulses, and the receiving sensor chip

calculates the phase difference by comparing the received waveform with the emitted waveform, thereby determining the flight time of the laser pulse, Δt . The distance to the target from the camera can be calculated using the following formula:

- The distance = speed of light * $\Delta t/2$



1.4 Product Overview

M4 Mega is a compact, high-performance, cost-effective industrial RGBD camera. It features a built-in SONY CW iTOF camera and triple-channel true color RGB image output, providing high-performance depth data ranging from 0.2m to 5m. The camera internally aligns RGB and depth images both spatially and temporally.

2 Product Overview

2.1 Product Introduction



Figure 1 M4 MEGA Physical Appearance

- Power indicator light, slow flash after power on.
- 940 light source.
- Multi-machine interference detection module.
- TOF lens.
- RGB lens.

3. Specifications

3.1 Basic Specifications

Parameter	M4 Mega
Sensor Type	TOF (Time-of-Flight) depth camera
Output Format	Depth/RGB/IR Amplitude Map
TOF Resolution & Frame Rate	640x480 pixels @ Max 25fps, typical value 15fps
TOF FOV (H×V)	74° × 56°
RGB Resolution & Frame Rate	1280x960 pixels @ Max 25fps, typical value 15fps
RGB FOV (H×V)	86° × 55°
Range	0.2m-5m
Accuracy	<1% (4mm @ 1m)
Power Consumption	7W @ 24VDC
Laser Wavelength	940 nm
Dimensions (L×W×H)	92mm×47mm×51mm
Weight	190 g
Power Supply	24 VDC / 2A
Interface	Gigabit Ethernet / CAN / IO
IP Rating	IP67
Operating Temperature	-20°C~60°C
Storage Temperature	-25°C~85°C
SDK Support	C/C++/ROS
OS Compatibility	Windows 7/8/10/11, Linux, Arm Linux/ROS
Eye Safety	Class 1

Parameter	M4 Mega
Sunlight Resistance	100KLUX

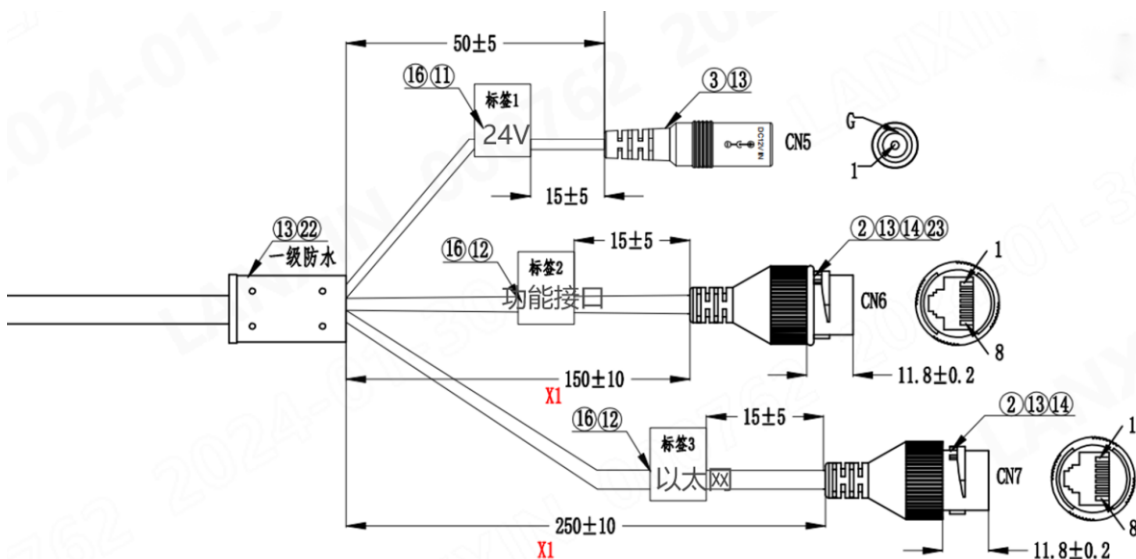
3.2 Electrical Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Supply Voltage	VDD	—	18	24	30	V
Digital I/O Voltage	—	—	—	3.3	—	V
CAN Interface Voltage	—	—	—	24	—	V
Operating Temperature	Ta	—	-20	—	60	°C
Operating Humidity	—	—	20	—	80	%
Storage Temperature	—	—	-25	—	80	°C
Storage Humidity	—	—	20	—	80	%

3.3 Interface Definitions

3.3.1. Camera Interface Details

Camera interfaces include three ports: a DC24v power port, a Gigabit Ethernet port, and a functional interface (IO/CAN).



Port	Pin	Signal	Description
Ethernet	1	MDI0_N	Gigabit Ethernet
Ethernet	2	MDI0_P	Gigabit Ethernet
Ethernet	3	MDI1_N	Gigabit Ethernet
Ethernet	6	MDI1_P	Gigabit Ethernet
Ethernet	4	MDI2_N	Gigabit Ethernet
Ethernet	5	MDI2_P	Gigabit Ethernet
Ethernet	7	MDI3_N	Gigabit Ethernet
Ethernet	8	MDI3_P	Gigabit Ethernet
Ethernet	—	Function Orange	Wire colour code (TIA-568B)
CAN	—	CANH	CAN High
CAN	—	CANL	CAN Low
CAN	—	GND	CAN Ground

CAN	—	Orange-White	Wire colour
CAN	—	Green-White	Wire colour
CAN	—	Green	Wire colour
Digital I/O	—	OUT1	IO Output 1
Digital I/O	—	OUT2	IO Output 2
Digital I/O	—	COM	IO Common
Digital I/O	—	IN1	IO Input 1
Digital I/O	—	IN2	IO Input 2
Digital I/O	—	Blue	Wire colour
Digital I/O	—	Blue-White	Wire colour
Digital I/O	—	Brown-White	Wire colour
Digital I/O	—	Brown	Wire colour
Power	1	24V+	DC input + (5.5-2.1 mm jack)
Power	2	24V- / G	DC input ground

3.3.2. Hardware Trigger Functionality

1. Hardware trigger functionality is only effective when the product is set to hardware trigger mode. In this mode, the camera operates in a 'wait for trigger' state, starting an exposure frame only upon receiving a valid hardware trigger pulse on IO input 1, and then returns to waiting state after completion.
2. The hardware trigger signal requires a voltage range of 3.3V to 24V, with a driving current capability of at least 10mA. It is recommended to add a decoupling circuit to the hardware trigger pin to prevent misfiring due to pulse interference.
3. Steps to set up hardware trigger functionality in LxCameraViewer software:

- a. Open camera.
 - b. Check if obstacle avoidance algorithm is disabled.
 - c. Stop stream.
 - d. Basic tools.
 - e. Capture settings
 - f. Switch to hardware.
 - g. Trigger mode.
 - h. Set relevant parameters.
 - i. Start stream and wait for external signal trigger.
4. Hardware Trigger Parameters:
- a. **Filter Time:** Time to wait for rechecking the trigger signal after receiving a trigger signal. This is used to filter out noise, typically less than 5ms. Setting it too high might filter out valid triggers.
 - b. **Minimum Interval:** The interval between two consecutive automatic trigger signals, ranging from 70000 to 100000000 microseconds. This value must be greater than the integration time.
 - c. **Trigger Time:** Delay time after rechecking the trigger signal, set to 0 for immediate triggering, ranging from 0 to 100000000 microseconds.
 - d. **Trigger Frame Count:** Number of frames triggered in a single hardware trigger, ranging from 1 to 200 frames.

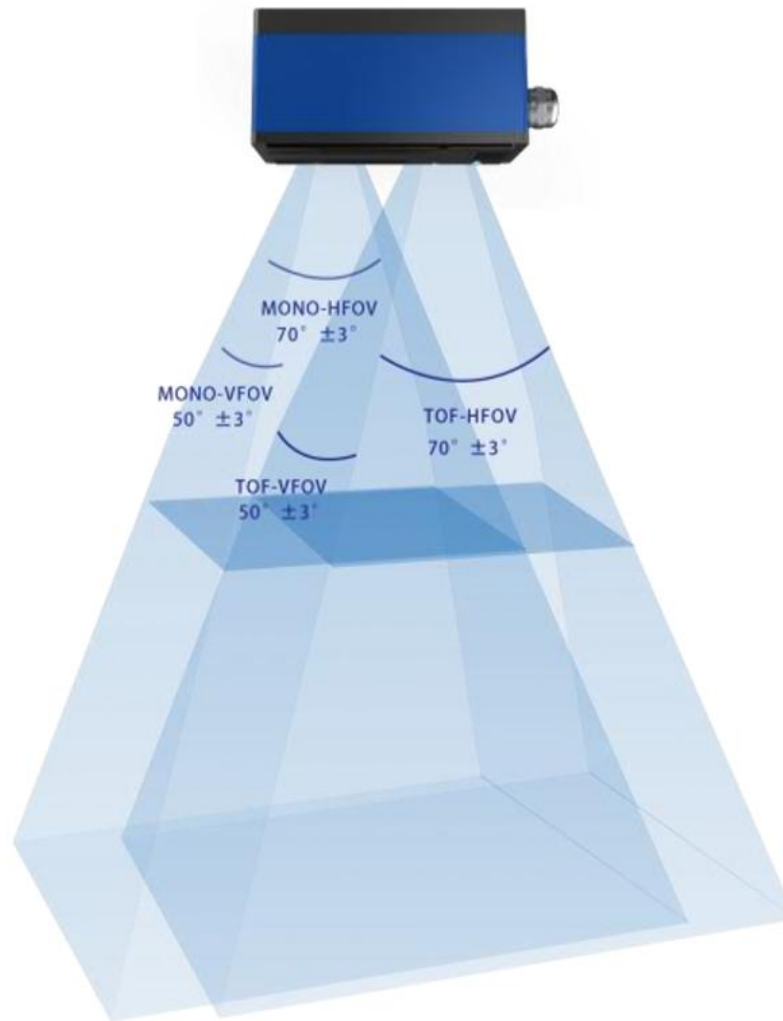
Examples of Hardware Triggering:

- **Example 1:** Filter time: 1000ms, Minimum interval: 70000 (minimum value), Trigger time: 2000ms, Trigger frame count: 10.
After receiving a trigger signal, delay 1ms to recheck the signal, trigger the first frame after 2ms, then wait 70ms to trigger the second frame, and continue until the 10th frame is triggered. Any trigger signals received during the triggering period will be ignored.

- **Example 2:** Filter time: 1000ms, Minimum interval: ineffective, Trigger time: 0ms, Trigger frame count: 1. After receiving a trigger signal, delay 1ms to recheck the signal, then immediately trigger once. If the trigger frame count is 1, the minimum interval is ineffective.
- **Example 3:** Filter time: 1000ms, Minimum interval: 200000, Trigger time: 0ms, Trigger frame count: 200.

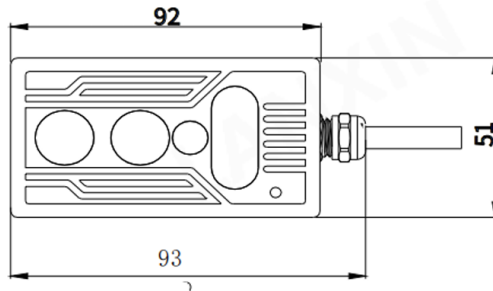
4. Camera Integration Guide

4.1 Structural Design

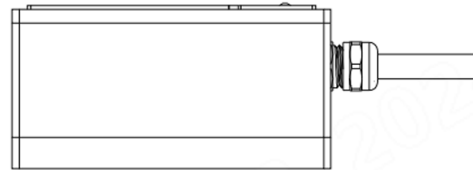


4.2 Camera views

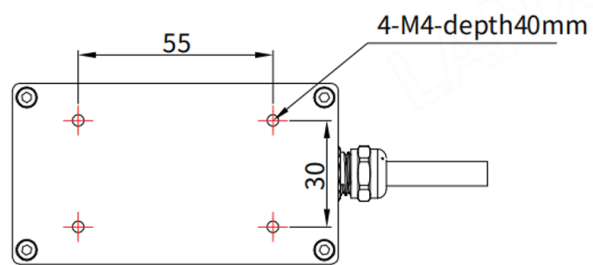
Front view



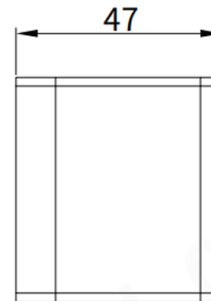
Top view



Rear view



Side view



5. Environment and Reliability

Item		Specification
Operating Environment	Temperature	-20°C to 60°C
	Humidity	Relative Humidity: 0%~95%RH, Non-condensing
	Illuminance	0KLUX--100KLUX
Storage Environment	Temperature	-25°C to 85°C
	Humidity	Relative Humidity: 10%~95%RH, Non-condensing
Normal Operating Temperature Rise		Case Temperature Rise <25°C
ESD Level		Contact Discharge ±4KV, Air Discharge ±8KV
RE Level		Complies with GB 9254 CLASS A
Operating Life		Over 3 years
Environmental Certification		RoHS

6. Quick Start Guide

6.1 Connection Test

Connect the camera DC power to 24V/2A for power supply. The blue power indicator light flashes slowly, indicating normal power-on.

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

The camera's default IP address is 192.168.100.82.

Set the computer's IP to the same subnet as the camera and turn off the computer's firewall.

Run the accompanying host software to capture the camera's image.

6.2 IO Wiring Instructions

Interface	Attribute	Note
IN1	Input	Discrete input signal, active high, supports 24V/open connection
IN2	Input	Discrete input signal, active high, supports 24V/open connection
OUT1	Output	Discrete output signal, ground/open signal, supports 24V pull-up
OUT2	Output	Discrete output signal, ground/open signal, supports 24V pull-up
COM	GND	The common ground for discrete output signals, IN1 and IN_COM1 are used in pairs.

7. Frequently Asked Questions QA

Serial number	Question	Description
1	No response when clicking to open the camera	Please check if the firewall is turned off. The firewall needs to be turned off.
2	The host computer obtains multiple IPs	The same IP in the local area network is obtained by the camera. You need to select the desired IP to open.
3	Unstable data when opening the camera	It is recommended to use a Gigabit Ethernet cable for the camera. The initial data will be unstable when using a 100M Ethernet cable.
4	Software installation location	If installed in the default C drive, there may be permission settings.

8. Laser precautions

This product emits invisible lasers during operation, which should be avoided to prevent damage to human eyes. The laser emitted by this product complies with Class 1 safety standards according to EN60825 requirements and does not pose a hazard to human health under normal use conditions.

