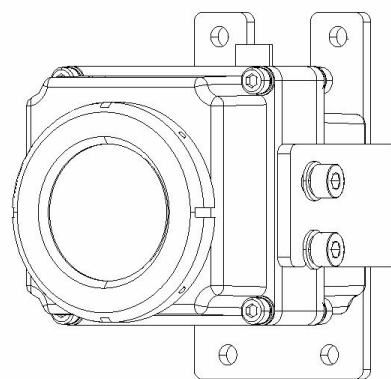


**USER
MANUAL**



Vehicle Infrared Night Vision Thermal Camera System

Zhejiang Dali Technolgy Co.,Ltd

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Thank you very much for choosing our product. We suggest that you carefully read the user manual before using this system. We believe it will be very helpful.

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Disclaimer of Liability

This manual may not be copied, transmitted, transcribed, archived, or translated into other languages and computer languages in any form or by any means (electronic, electromagnetic, optical, or manual, etc.) without the permission of Dali Technology.

This manual is organized for the convenience of users to use and understand our products. We will do our best to ensure the accuracy of the contents of this manual, but still cannot guarantee the completeness of the contents of this manual. Because our products are constantly being updated and upgraded, we reserve the right to make changes at any time without notice.

Version Record

Vehicle Infrared Night Vision System October 21, 2023 V1.0

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1. User Notice

1.1. Disclaimer

Please make sure that you have read and fully understand the instructions and this statement before using this product, and install and use the product strictly in accordance with the instructions. If the user fails to install and use the product in strict accordance with the instructions, it may cause great inconvenience, and may even cause property damage and personal injury. Users improper installation, improper use of the product caused by property damage and personal injury, the company does not assume any legal responsibility.

The Company does not assume any legal responsibility for property or personal injury resulting from errors or accidents caused by the user or a third party, or from misjudgment of the image in the course of using this product.

Prohibit individuals without driving license from using this product; Individuals with driving license can only use this product on vehicles permitted by specific driving qualifications.

1.2. Service Principle

This series of products comes with a one month replacement and a one-year warranty. The specific service principles are based on the provisions of the random warranty card, and warranty services are implemented; Production stoppage, elimination, special offers, processing machines, etc. shall be executed according to the time standards specified in written documents such as company notices.

1.3. Precautions

Please ensure that the device is powered off before installation, as live installation may cause injury to the operator or damage to the device.

Please do not look directly at high-intensity radiation sources such as the sun, laser, welding machine, etc. with the lens of the car mounted infrared night vision system.

Please keep the lens and monitor of the thermal imager clean, otherwise the thermal image display may not be clear. Please do not use liquid cleaning agents, glass cleaning agents, or aerosol lamps. Use a water control cloth to wipe the lens.

This system combines precision optical lenses and circuits sensitive to static electricity. Please do not throw or hit it, and pay attention to static electricity protection to avoid damage.

Please do not disassemble this system by yourself. If there is a malfunction, please contact the manufacturer in a timely manner, otherwise the warranty will not be provided.

This system cannot replace the human visual image formed by the headlights or with the help of the

headlights. Please pay attention to the road conditions while driving.

This system is designed to assist drivers in driving and cannot replace the use of the driver's eyes. Over-focusing on this system may lead to traffic accidents due to distraction.

This system can only detect target objects that are lower or higher than the ambient temperature. The system is unable to detect brake tail lights, turn signals, double jump lights, traffic lights, or character and number light information.

This system only provides a two-dimensional image and can only provide a rough reference distance between the target object and the vehicle;

1.4. Daily use and maintenance

To maximize and ensure your safe driving experience, and ensure that this system can provide you with high-quality assisted driving services normally, please make sure to follow the following:

- 1) Please confirm that the system is installed reliably before using this system. Please regularly check and confirm that the system is securely installed and free of foreign objects when using this product for a long time.
- 2) Please ensure that this system operates within the specified voltage and operating temperature range when in use. Do not frequently turn on or off the machine power, and the interval between rebooting after shutdown should not be less than 30 seconds.
- 3) To enhance imaging quality, the lens surface of this system is coated with an anti reflective film. Do not touch the lens surface directly with your hands. The acidic substances left by fingerprints can damage the coating and lens surface. When cleaning, please use a dedicated lens cloth or glasses cloth to wipe the lens.

2. Product Introduction

2.1. Product Function Overview

Thank you for choosing our company's in car infrared night vision system. With a car mounted infrared night vision system, you feel like you have a pair of eyes that can perceive the darkness, helping you travel with peace of mind and safely return home.

The car mounted infrared night vision system is based on infrared thermal imaging technology to convert the thermal imaging content in the field of view into two-dimensional images, which are displayed on the display. It can effectively eliminate the strong light stimulation during oncoming traffic, as well as the interference of side glare on the line of sight, without any impact on the field of vision. Enable drivers to clearly observe vehicles, pedestrians, and obstacles on the road even in the dark, especially in harsh weather conditions such as rain, snow, haze, and sand, greatly improving the safety of drivers, passengers, and third parties. This system can automatically recognize pedestrians and vehicles appearing in front of the car, and mark the target position with a rectangular box and distance indicator on the infrared thermal image (this distance indicator has a large error for reference); At the same time, real-time assessment of potential collision hazards is conducted, and warning prompts are issued to the driver.

The in car infrared night vision system will greatly improve the driver's environmental perception ability, greatly enhance your driving safety factor and driving experience, and effectively ensure your personal and property safety.

2.2. Product Appearance

The vehicle infrared night vision system is shown in Figures 1, 2, and 3.



图 1 EX-VIB vehicle infrared night vision system



图 2 EX-VII vehicle infrared night vision system



图 3 EX-S1B vehicle infrared night vision system

Vehicle infrared night vision system consists of night vision camera assembly and night vision system controller assembly, the night vision camera assembly is installed in the front grille to detect pedestrians and vehicles in front, the night vision system controller assembly integrated algorithms are installed in the driver's cab to realize the detection of pedestrians and vehicles and alarm, the video is displayed in the LCD instrument, and the sound linkage can be realized at the same time.

- **Pedestrian Recognition Function**

The system only has good recognition performance for pedestrians walking or running upright in front of the car, but also has good performance for most of the pedestrians riding bicycles, electric cars and motorcycles. When there is a pedestrian target in front of the car, the system uses a rectangular box to mark the location of the pedestrian target and determine the degree of danger of collision, if there is danger, the system sends out different forms of alarms to the driver according to the distance from the target, as shown in Figure 4.



图 4 Human Recognition

- **Collision**

This system has good recognition performance for the automobile target that is traveling straight ahead and the oncoming automobile target. When there is a car target in front of the car, the system uses a rectangular box to mark the position of the pedestrian target, and at the same time judges the degree of danger of collision between the car and target, and if there is a danger of collision, the system sends out an alarm to the driver.



图 5 Vehicle Recognition

- **Recognition conditions**

Vehicle infrared night vision system can recognize most of the conventional posture pedestrians or front-vehicle targets, but for a few parts of unconventional pedestrians or front-vehicle targets, the recognition performance will be reduced, or even can not be recognized. The following is an overview of the targets that can and cannot be recognized by the system.

In general, the system can recognize pedestrians walking or running upright, as well as most of the pedestrians riding bicycles, electric cars and motorcycles, but in extremely harsh weather conditions and high ambient temperatures, the types of recognizable targets will be reduced accordingly.

- 1) Recognizable conditions

- The target in front of the lane is in an upright walking or running state: including front, back and side posture, gender is not limited.

- The target is not blocked: when the target is partially blocked, or seriously blocked, especially when the head of the pedestrian target is blocked, it is difficult for the system to accurately identify it.

- High differentiation of target thermal imaging: the pedestrian target is clearly presented on the infrared image and has certain distinctive features.

- The pedestrian target has a certain aspect ratio (about 1:2) in the infrared thermal imaging.
 - The target is within the recognized area in the infrared thermal imaging.
- 2) Non-recognition situation
- The target is in a non upright state such as significant bending or lying down.
 - The target is partially or severely obstructed.
 - The target is not within the recognition range of infrared thermal imaging.

3. System External Interface

3.1. Connector Definition

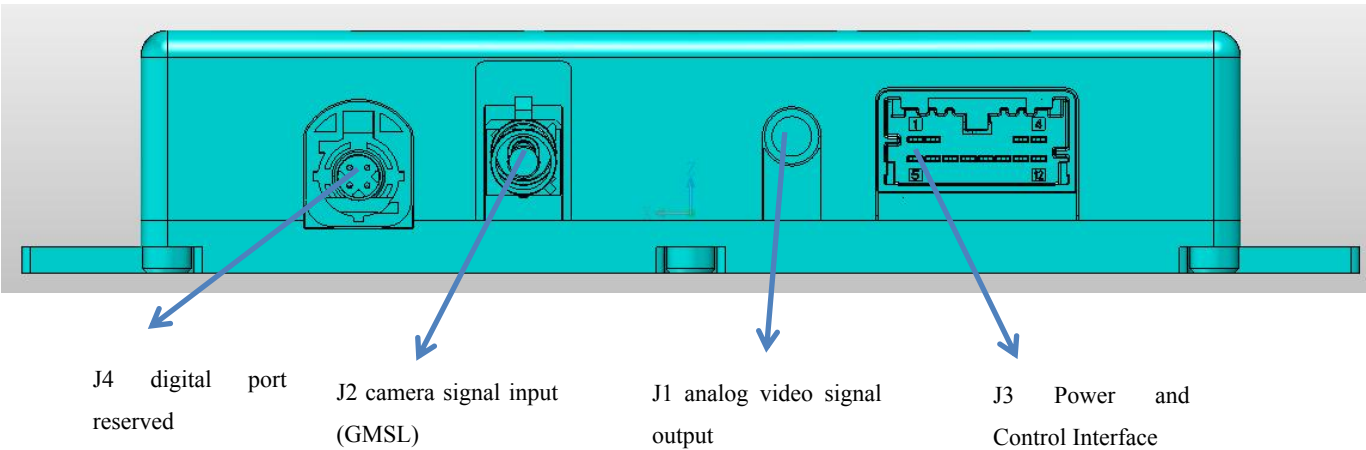


图 6 External Interface

Pin	ECU Port J1 Definition	
	Pin Definition	Interface Description
1	GMSL	Digital Video Input Connector
2	GND	Ground Connector
Pin	ECU Port J2 Definition	
	Pin Definition	Interface Description
1	Analog Video Signal	Analog Output Interface
2	Analog Video Signal Ground	
Pin	ECU Port J3 Definition	
	Pin Definition	Interface Description

1	12/24_POWER	DV12V/24V Power Connector
2	12/24_POWER	DV12V/24V power connector
3	GND	POWER GROUND
4	GND	POWER GROUND
5	Reserved	Reserved
6	Reserved	Reserved
7	Reserved	Reserved
8	Reserved	Reserved
9	Reserved	Reserved
10	RS485B	Signal Control
11	RS485A	
12	RS483 Ground	

4. Installation interface and requirements

- Night vision camera assembly module: two M3 screw holes on each side, which can be installed and fixed directly or through the adapter.

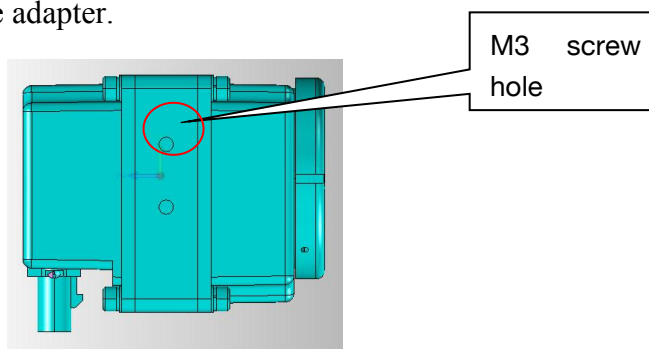
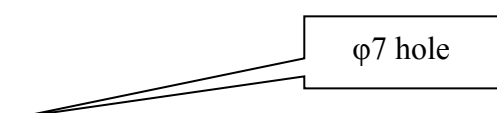


图 7 Night vision camera assembly mounting interface diagram

Installation Requirements:

- The night vision camera assembly should be mounted directly in front of the driver, behind the center grille and as far away as possible from the radiator tank and horn.
- The position of the night vision camera assembly should be more than 0.6 meters above the ground.
- The optical axis of the night vision camera assembly must be parallel to the middle surface of the vehicle body.
- The light of the night vision camera assembly must not be blocked by the center mesh, otherwise the imaging effect will be reduced.



- Night vision camera assembly cable should be along the original cable through the car body firewall into the car, while being secured with zip ties.
- Vision system controller assembly module: $\phi 7$ mounting holes on both sides.

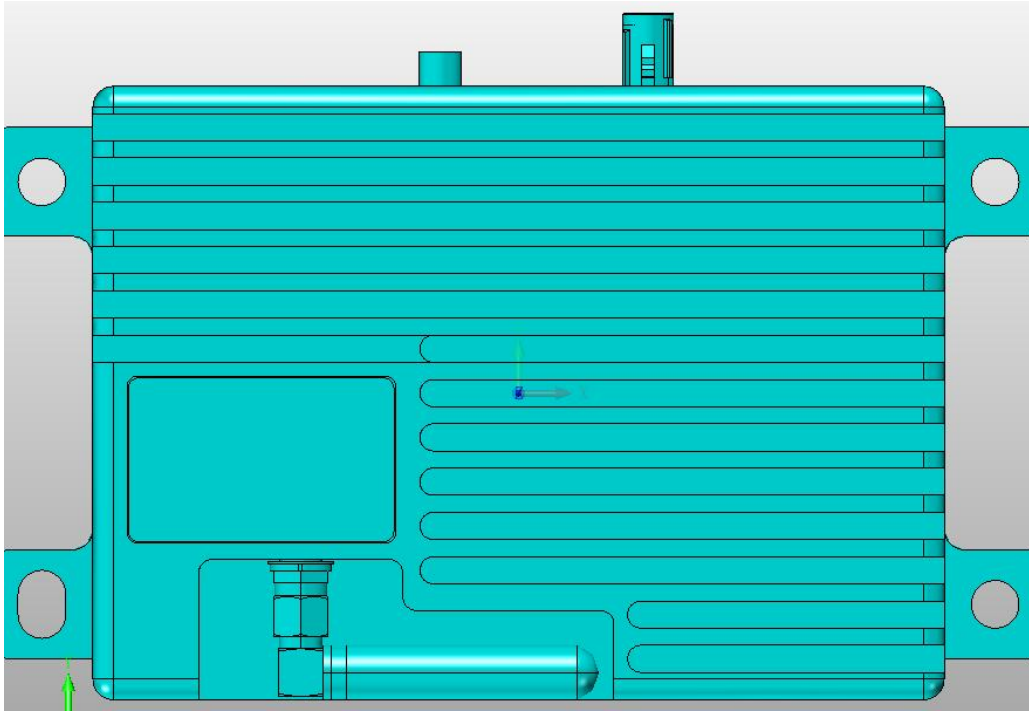


图 8 Night Vision System Controller Assembly ECU Mounting Interface Diagram

5. Dimension drawing

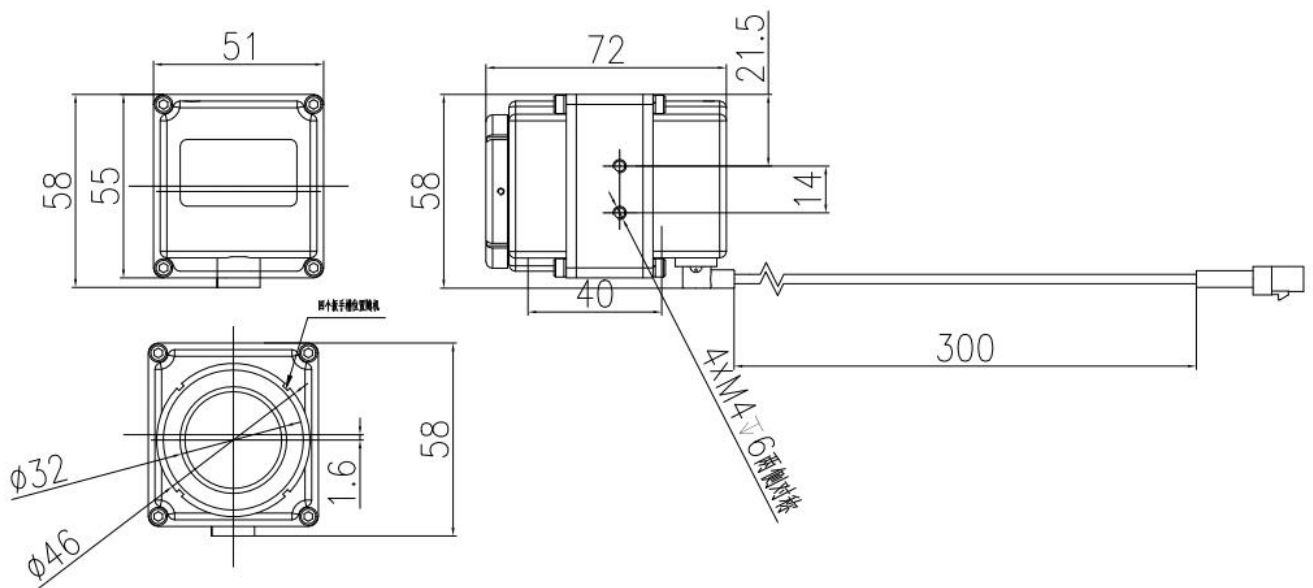


图 9 EX-VIB Night Vision Camera Assembly Dimension Drawing

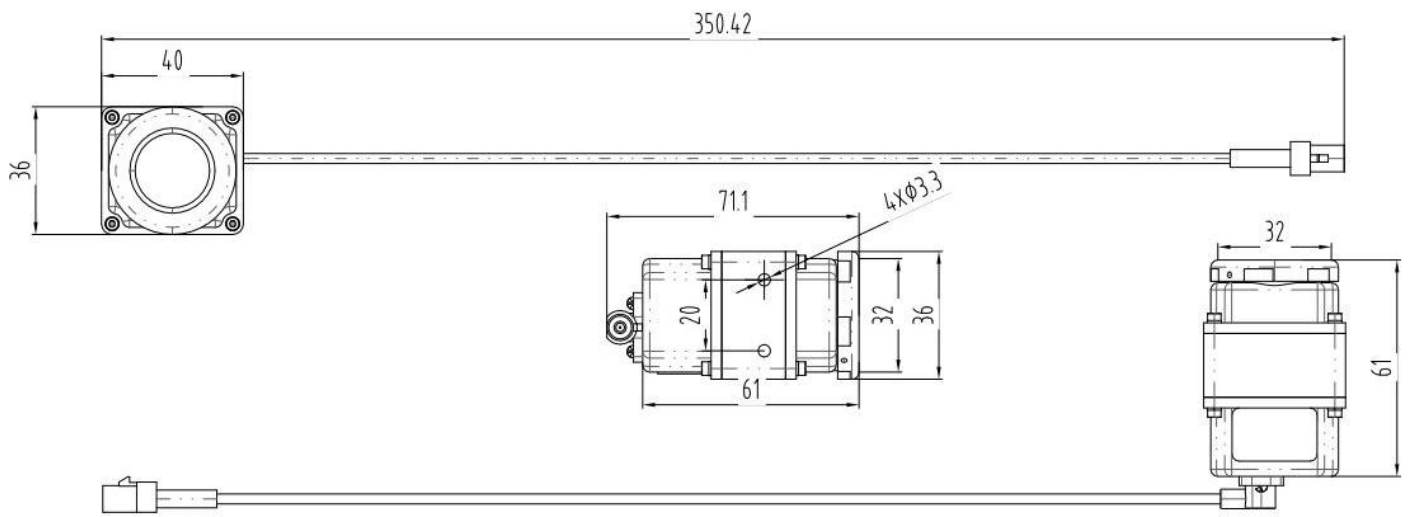


图 10 EX-VIIC Night Vision Camera Assembly Dimension Drawing

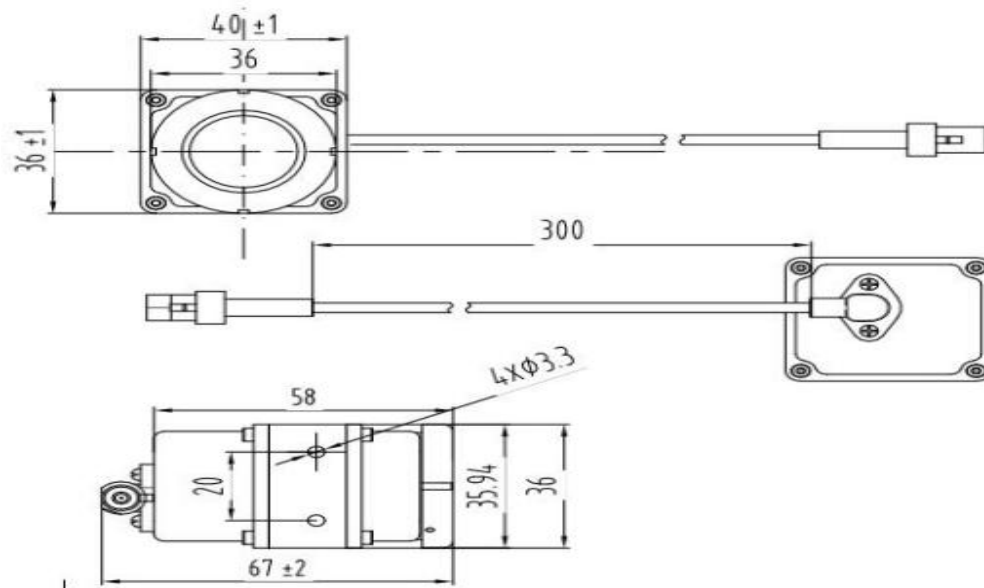


图 11 EX-VIIB Night Vision Camera Assembly Dimension Drawing

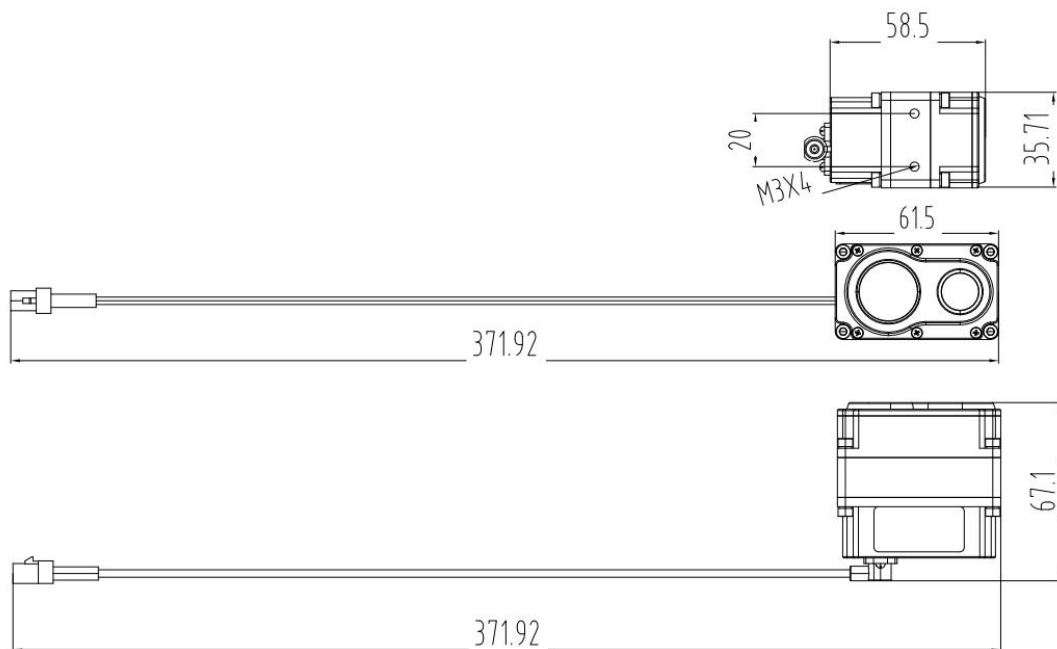


图 12 EX-S1 Series Dual-optical Fusion Night Vision Camera Assembly Dimension Drawing

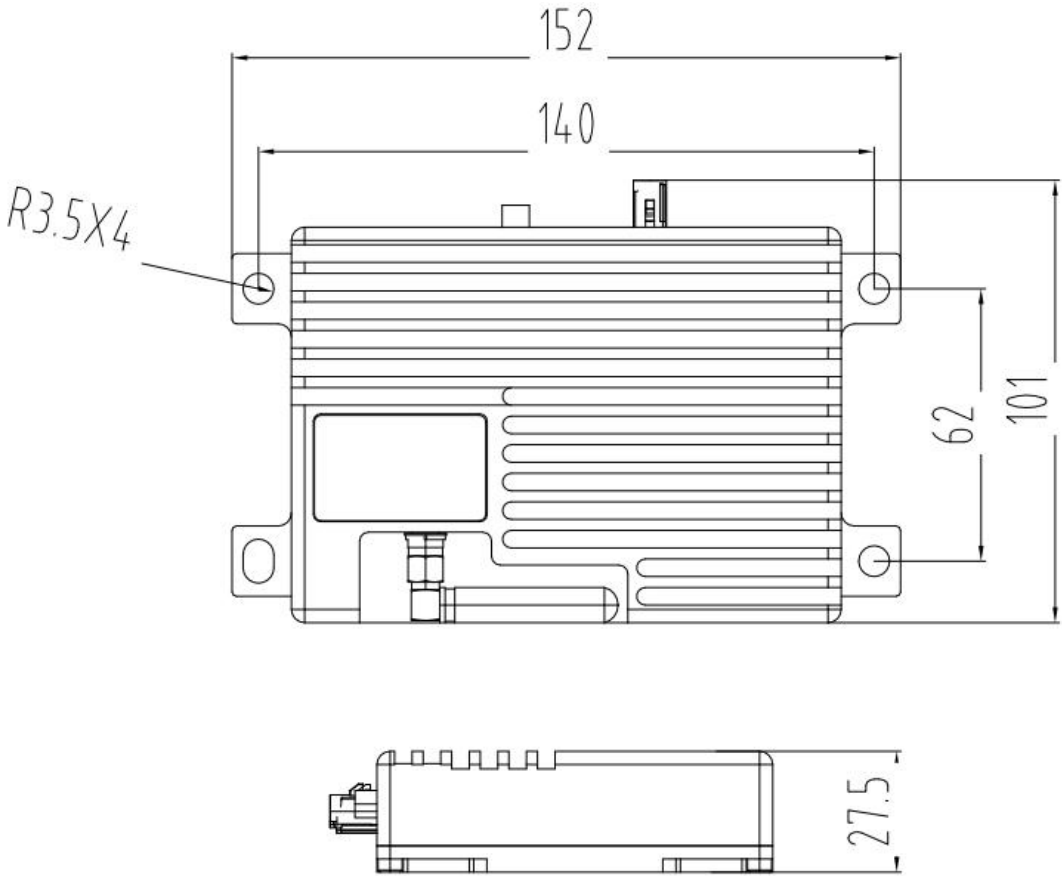


图 13 Night Vision System Controller Assembly Dimensions

6. Technical Specifications

Technical Specifications of Vehicle Night Vision System EX series						
N o.	Items		Parameters			
			EX- VII C	EX-VIIB	EX-VIB	EX-S1B
1	Detec tor	Resolution	384× 288	640×512	640×512	640×512
		Pixel Pitch	12μm		17μm	12μm
		NETD	≤50mK			
2	IR	Focal Length	9mm	13.5mm	19mm	13.5mm

		FOV	28°× 21°, ±5%	32°×24°, ±5%	32°×24°, ±5%	32°×24°, ±5%
3	Visible Light	Detector Type	--	--	--	1/2" SONY CMOS
		Resolution	--	--	--	1920×1080
		FOV	--	--	--	The same as infrared
		Minimum Illumination	--	--	--	Min. illumination 0.001lux
4	Image	Palette	Black hot, white hot, iron red, amber, etc.			
		Image Adjustment	Auto adjustment of brightness and contrast			
		Image Enhancement	Auto			
		Mode	Infrared			Daytime fusion, nighttime fusion, framing edge fusion, infrared, and visible light cycle switching
5	System	Start-up Time	Power on imaging stability time ≤ 10s			
		Language	Chinese/English			
		Window Heating	Yes			
		Switch Function	The ECU defaults to directly powering on and control the switch of the thermal imager			
		Communication Function	RS485			
		Image output	Frame rate 25Hz			
		Early warning function	Equipped with driving detection and warning function			
6	Power Supply	Power Input	Rated DC24V, voltage range 9V~32V			
		System power consumption	≤6W (≤10W (when heating and defrosting))			
7	Interface	Power Interface	DC24V, voltage range 9V~32V			
		Video Interface	Analog High Definition AHD			
		Communication Interface	RS485			
		WiFi	Support Android/Apple APP software			
8	Mechanical	Color	Black color			
		Lens Protection	High Strength Protection Window			
9	Environmental	Working Temperature	-40°C ~85°C			
		Storage Temperature	-40°C ~90°C			
		Protection level	IP69K (Night Vision Camera Assembly)/IP40 (Night Vision System Controller Assembly)			

10	Physical	Weight	Camera	$\leq 159\text{g}$		$\leq 252\text{g}$	$\leq 216\text{g}$
			Controller	$\leq 380\text{g}$			
		Dimension	Camera	71×40×36mm	67×40×36mm	$\leq 72 \times 51 \times 64\text{mm}$	$\leq 67.1 \times 61.5 \times 35.7\text{mm}$
			Controller	$\leq 152 \times 101 \times 27.5\text{mm}$ (LWH)			
11	Image Detection	Detection Distance		Human (1.8*0.5m) 400m	200m	Vehicle (2.3*2.3m)	
		Recognition Distance		Human (1.8*0.5m) 120m	90m	Vehicle (2.3*2.3m)	

7. Instructions for using night vision systems

After fixing the installation of the thermal imaging system. Please test the device to ensure that the system functions properly.

After the device is powered on, you will hear a slight "click" sound. This is the sound for internal image correction. It is caused by the mechanical shutter opening and closing, and correction can cause the image to freeze briefly. This phenomenon of sound and image freezing occurs every certain interval of time.

The usage steps are as follows (please follow the steps)

Step 1: As shown in Figure 14, connect the FAKRA connector of the night vision camera to the FAKRA plug of the night vision system controller assembly.



图 14 Connecting the Video Cable

Step 2: Connect the night vision system controller assembly to the display with the BNC cable as shown in Figure 15.



图 15 Connecting the video output cable

Step 3: Connect the DC24V power supply, as shown in Figure 16. Press and hold the power button on the control box to turn on the power (the red indicator light on the control box will light up). Under normal circumstances, you will hear two "click" sounds from the night vision camera, which is the shutter correction in the initialization state.



图 16 Connecting the power cable

8. Instructions for use of the control box

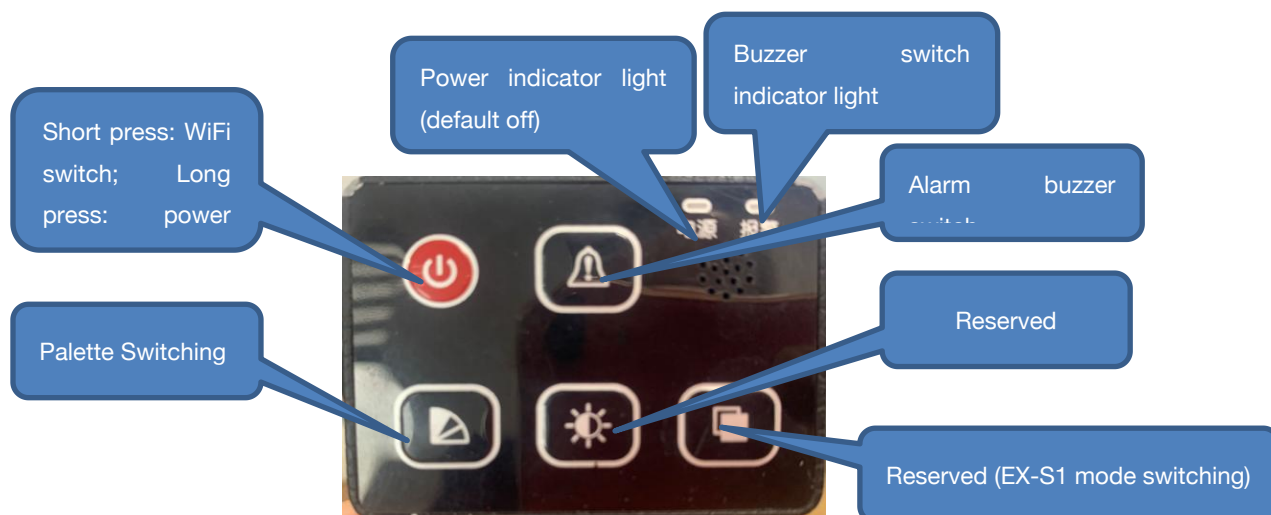
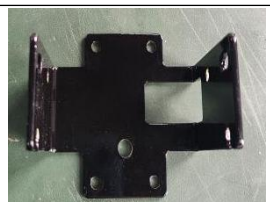


图 17 Control box button definition

9. Standard and optional accessories

9.1. List of standard and optional accessories

The material list inside the packaging box of the vehicle infrared night vision system is as follows:

Name		Quantity	Remarks
Vehicle infrared night vision system		1	
Cables	Power and Control Cable	1	
	Fakra Cable	1	
	SAM Output Video Cable	1	
User Manual		1	
Qualification Certificate		1	
Mounting bracket (optional)		1	

There is no display screen in the product packaging, you can purchase the display screen yourself.

Finally, thank you once again for choosing DALI TECHNOLOGY vehicle infrared night vision system products, wish you a happy driving! Dali Technology is at your service!