



VEHIR

N-Driver P302

User Manual for In-Vehicle Infrared Camera



Technology for Better Mobility

ABOUT US



A wholly-owned subsidiary
of Guide Infrared



The leading company
in the automotive infrared industry

VEHIR relies on the military technology reserves of its group company Guide Infrared, with a full industrial chain layout of infrared technology. It independently researches, develops and manufactures products, with safe and controllable core technologies. It is committed to applying far-infrared technology to intelligent vehicles and becoming an industry leader in the field of vehicle-mounted infrared thermal imaging.

The company's main products include two categories: advanced driver assistance systems (ADAS) and intelligent cockpits. Among them, the vehicle-mounted thermal imaging intelligent driving system has a world-leading technical level, with functions such as pedestrian and vehicle detection, recognition and alarm; it can easily cope with complex road conditions such as night, haze, and strong light glare, greatly improving the vehicle's full-time perception capability, and is particularly suitable for night driving and intelligent driving fields.

Thank you very much for choosing our product. It is recommended that you carefully read the user manual before using this product. We believe it will be of great help to you in correctly using this product.

Core Advantages

Leading enterprise in infrared thermal imaging

- Asia's largest infrared thermal imaging industrial park.
- Domestic No.1 and global No.2 in infrared thermal imaging market share.
- Domestically pioneered dual-color and dual-band infrared detector, with world-leading key performance indicators.

Military Heritage Quality Assurance

- Deep pilot unit for military-civilian integration.
- The first private second-class confidentiality qualification unit in Hubei Province.
- China's first private overall weapon system development unit.

Core Technology, Independent Control

- Complete independent intellectual property rights, with nearly 100 national patents.
- A full infrared industrial chain R&D base covering from underlying infrared core.
- components to top-level complete optoelectronic systems.

Multiple Breakthroughs in Intelligent Driving Projects

- Multiple trial-manufacturing and under-development intelligent driving application projects.
- China's first pre-installed mass-produced vehicle-mounted infrared thermal imaging products for passenger cars and commercial vehicles.

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Responsibility Statement

Without the Company's permission, this manual shall not be copied, distributed, transcribed, archived, or translated into other languages or computer languages in any form or by any means (electronic, electromagnetic, optical, manual, etc.).

This manual is compiled to facilitate users' use and understanding of the Company's products. We will make every effort to ensure the accuracy of the content of this manual, but we cannot guarantee the completeness of the content. As our products are constantly updated and upgraded, the Company reserves the right to modify them at any time without prior notice.

Version record

Version	Date	Remarks
/	20th May 2025	Initial version compilation


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1.Product Introduction

N-Driver P302 is a cost-effective product with 640×512 resolution launched for the special automobile modification market. It is compatible with various mainstream vehicle models and domain control platforms; it meets the core demands of the special modification industry for rapid deployment, low cost, high compatibility and secondary development. At the same time, it has extremely low product power consumption and small product size, providing LVDS digital interface output and plug-and-play convenience. It expands the user's visual boundary under harsh weather conditions such as no light at night, strong light glare, haze, rain and snow, reduces the probability of traffic accidents, and improves the safety of assisted driving.

The product can be used for post-installation and assisted driving of off-road vehicles, special vehicles, mining vehicles, freight logistics vehicles, port and airport shuttle buses, and remote dispatching tractors. The product has a flexible installation method, which can be installed on the front grille of the vehicle, or at different positions of the rear or roof of the vehicle; it has waterproof and dustproof capabilities and supports flowing water flushing.



The image shows a silver car on a road at night. A sensor unit is positioned next to the car. A red thermal image overlay shows a pedestrian and a dog. The background is dark with blue light trails.

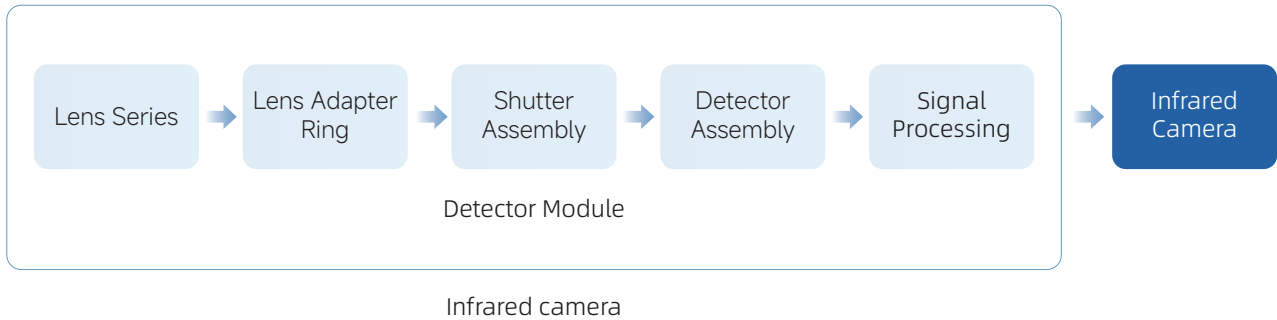
 <p>Passive thermal imaging, no dependence on light sources;</p>	 <p>Full-time and all-weather perception, easily coping with harsh climate environments;</p>	 <p>Shutterless algorithm, ensuring smooth and non-laggy images during travel;</p>
 <p>Digital video output, supporting various modifications and secondary development;</p>	 <p>Small size and low power consumption, easy to install and integrate;</p>	 <p>Intelligent defrosting, automatic window heating;</p>

2.Product Technical Specifications

Infrared Detector	
Detector Type	Vanadium Oxide Uncooled Infrared Focal Plane Detector
Response Band	8~14 μm
NETD	$\leq 40\text{mk}@25^{\circ}\text{C}$, F#1.0
Detector Array	640(H)x 512(V)
Image Display Performance	
Focal Length	9.1mm
Field of View	48°x V37°
Spatial Resolution	1.32 mrad
Video Output Interface	LVDS Coaxial
Video Output Format	YUV422-8bit
Video Output Resolution	640x512
Detection Distance	Person: 1.75 m x 0.5 m $\geq 300\text{m}$; Vehicle: 1.75 m x 1.75 m $\geq 400\text{m}$
System Characteristics	
Rated Voltage	DC9~16V (Typical 12V)
Overall Power Consumption	$\leq 1.25\text{W}@ (12\text{V Power Supply, Window Heating Not Activated})$;
	$\leq 4.5\text{W}@ (12\text{V Power Supply, Window Heating Activated})$
Imaging Startup Time	$\leq 6\text{s}$ (Normal Temperature)
Automatic Heating Function	Automatically starts intelligent heating when the window temperature is lower than $2^{\circ}\text{C} \pm 2^{\circ}\text{C}$;
	Automatically turns off the heating function when the window temperature is higher than $7^{\circ}\text{C} \pm 2^{\circ}\text{C}$
Shutterless Algorithm	Supports Shutterless Algorithm
Image Algorithms	3D Noise Reduction RAW, Image Enhancement
Physical Characteristics	
Camera Size/Weight	32mm35mm36mm (Excluding Connectors and Bracket);
	Weight $\leq 90\text{g}$ (Excluding Bracket)
Camera Protection Level	IP69K for Window Part, IP67 for Other Parts
Environmental Parameters	
Operating Temperature	$-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$
Storage Temperature	$-40^{\circ}\text{C} \sim +95^{\circ}\text{C}$
Environmental Reliability	GB/T 28046.4-2011/GB/T 30038-2013
Mechanical Performance	GB/T 28046.3-2011/ISO 20567-1

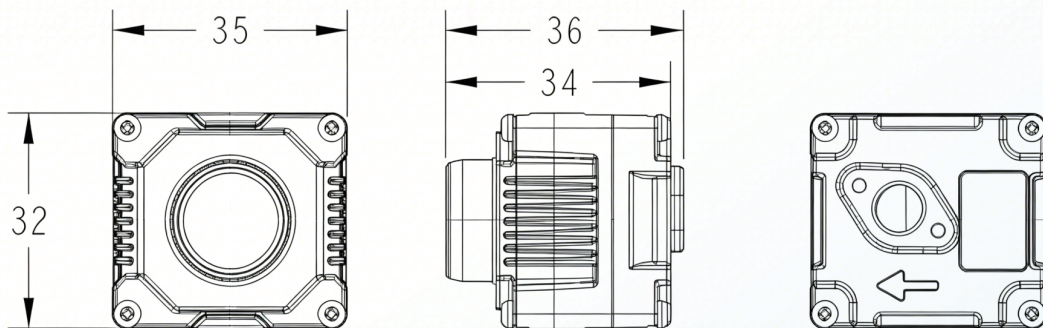
3.Product Hardware Description

3.1 Infrared Camera Lens Block Diagram

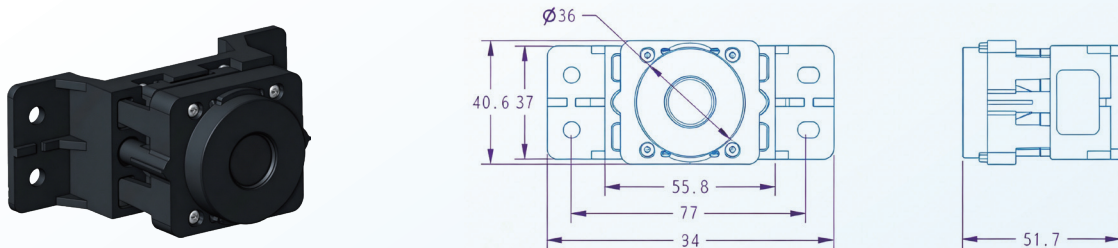


3.2 Product Structure Dimension Diagram

- Camera overall dimensions: 35mm x 32mm x 36mm



- Actual mounting bracket and dimensional specifications as follows:

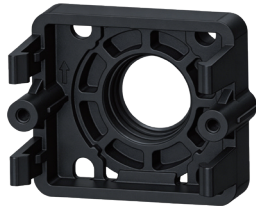


3.3 Bracket Installation Instructions

This product is divided into two parts: the camera body and the mounting bracket. Both the camera body and the mounting bracket body are designed with arrow marks to provide reference for product installation. The arrow marks are shown in the following figures:



(a) Camera Body



(b) Upper Mounting Bracket



(c) Lower Mounting Bracket

· Installation Steps:

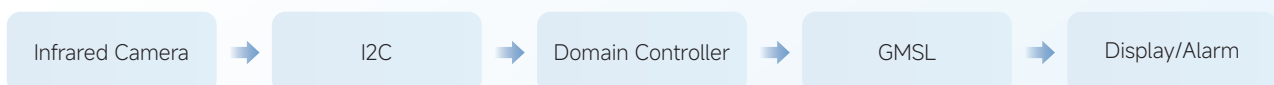
When installing the bracket, according to the principle of "arrows in the same direction", first place the camera body on the lower mounting bracket;

Then, flip the assembly from the previous step, and fasten the upper mounting bracket to the lower mounting bracket according to the same "arrows in the same direction" principle;

Finally, use two ST2.9 self-tapping screws to lock the upper and lower mounting brackets. So far, the assembly of the entire machine's mounting bracket is completed.

4. Product Software Description

4.1 Product Connection Operation Instructions



4.2 Camera Access (Serdes Register Configuration)

- Example: The register configuration reference is as follows:

4.3 Camera Intrinsic Parameter Reading

4.3.1 Camera I2C Address Description

The infrared camera adopts I2C communication mode and is used as an I2C slave. The 7-bit device address is 0x33, that is, the write address is 0x66 and the read address is 0x67. The I2C register of the infrared camera has a 16BIT address, and the size of a single register is fixed at 16BIT.

4.3.2 Internal Reference Notes

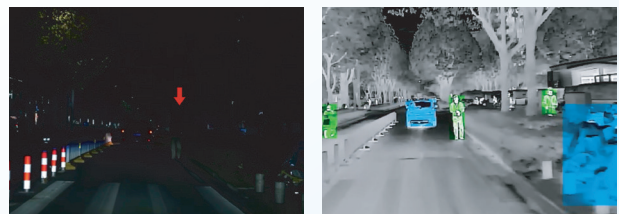
In addition, there are reprojection error rms and optical distortion rate opticalDistortion.

Read 128 bytes from the 0x700 register address corresponding to the camera's I2C device address as the intrinsic parameter data.

5.Product Function Overview

5.1 All-Weather Operation, Enhanced Night Vision Function

The system's infrared image can break through night barriers, be used all-weather, expand the driver's field of vision, and solve the problem of limited field of vision during night driving.



5.2 Anti-Glare Function



The system's infrared image is not affected by light changes, reduces the driver's exposure to glare and sudden light changes during driving, and solves the problems of glare during night driving and sudden light changes when entering and exiting tunnels. Normal View Infrared View.

5.3 Fog, Haze and Sand Penetration Function

The system's infrared image can still form clear images in heavy fog, haze and sand weather, improving the driver's driving vision in harsh weather.

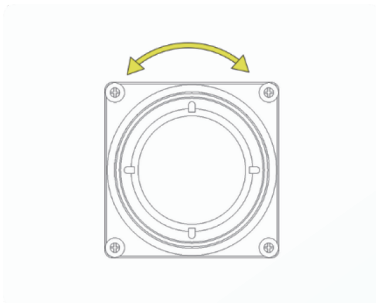


6. Product Software Description

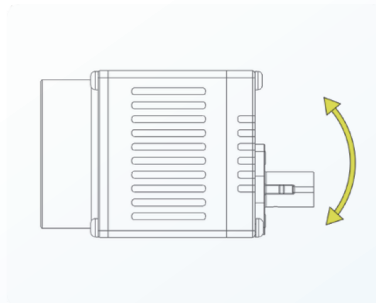
Before using this infrared intelligent driving system, please carefully refer to the following installation plan to ensure your normal use.

Design the mounting bracket according to the actual situation of the vehicle;

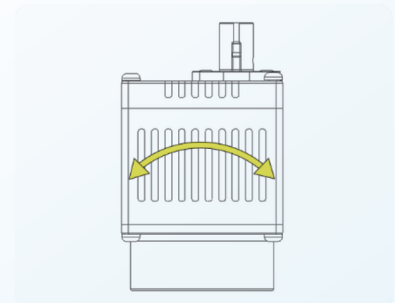
- It is recommended to install the infrared camera at a suitable position on the front grille of the vehicle, and as far away from the radiator water tank and speaker as possible.
- The manufacturing process requirement of the bracket is a deviation $<1^\circ$;
- The installation height range of the infrared camera is between 40 ~120cm (the specific situation depends on the vehicle height)



Roll error: < 3 degree



Pitch pointing error: < 3 degree



Yaw pointing error: < 3 degree

7. Common Fault Diagnosis

7.1 No Video Image

- Please confirm that the power cable is reliably connected
- Please confirm that the video cable is reliably connected

7.2 Image with "Lines" or Ghosting

- Check if the image is frozen or if you hear a "click" sound from the vehicle-mounted infrared thermal imaging camera. If you never see the image freeze or hear the "click" sound (it may take a few minutes to appear), the built-in shutter of the thermal image may be faulty. Please go to an authorized maintenance point for repair.

7.3 Image Shaking

- Check your mounting bracket to confirm that the bracket is firmly and reliably installed.

7.4 Dim Image

- Check if your video cable connection is reliable. If it is damaged, please contact the supplier or consult our company for maintenance advice.

8. Daily Use and Maintenance

To maximize and ensure your safe driving experience and ensure that the system normally provides you with high-quality assisted driving services, please be sure to follow the following items.

Before using the system, please confirm that the system is reliably installed. For long-term use of this product, please regularly check and confirm that the system is firmly installed and free from foreign object obstruction.

When using, please ensure that the system works within the specified voltage and operating temperature range. Do not frequently switch the machine power on and off. The interval between restarting after shutdown shall not be less than 30 seconds.

To enhance imaging quality, the surface of the system's lens is coated with an anti-reflection film. Do not touch the lens surface directly with your hands. The acidic substances left by fingerprints will damage the coating and the lens surface. When cleaning is needed, please wipe the lens with a special lens cloth or glasses cloth.

9. Friendly Reminders

The vehicle-mounted infrared thermal imaging camera adopts a fully sealed waterproof design. Do not disassemble it by yourself. The company will not provide warranty for machine damage caused by the customer's self-disassembly. When the machine malfunctions, please contact the supplier or consult our company in a timely manner for maintenance advice.

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