

Intelligent Vehicle Mounted Thermal Imaging Night Vision System



User Manual

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1. Introduction

In recent years, with the rapid development of artificial intelligence and autonomous driving technology, numerous systems for driver driving assistance have emerged in the market, and various innovative technologies can improve the comfort and safety of drivers while not interfering with their operations.

The core function of many driver assistance systems is to warn drivers of possible hazards in advance, thus avoiding traffic accidents.

Without the Night Vision System, for drivers driving at night, if encounter poor lighting, the drivers on the opposite lane using high beam, or bad weather like rain, fog and haze, there is no way to clearly see the distant pedestrians. At this time, it is exceedingly easy for vulnerable traffic participants (pedestrians, bicycles, motorcycles, electric vehicles, tricycles, etc.) to collide and cause irreparable damage. In this case, if the car is equipped with our Night Vision System of which the thermal imaging camera can capture the far-infrared heat radiation emitted by pedestrians and other vulnerable traffic participants, and which then forms a video image by the intensity of the heat radiation, drivers' view range will be greatly improved. As the Night Vision System is also equipped with advanced pedestrian recognition, it has the ability to provide advance warning, enabling drivers to easily deal with complex road conditions at night and

drive safely to avoid dangerous situations.



The picture above shows that after using the "night vision system", the driver can see the originally invisible pedestrian and road information clearly displayed on the screen, and the pedestrian is shown red, indicating the possibility of collision hazards. Also, the system can make a sound alert, so that the driver has sufficient time to deal with such hazards to reduce night traffic accidents.

2. Welcome

Thank you very much for choosing our Night Vision System for automobiles.

This assisted driving product uses advanced stabilization technology, sensor technology, image processing technology and efficient multi-threaded deep learning artificial intelligence recognition algorithm, to match the demand of the automotive aftermarket and the need of driving at night and in bad weather

conditions. the product uses non-cooling infrared detector and low-power high-performance artificial intelligence SOC. The imaging of the product has features of lightless imaging, anti-glare, penetrating smoke, fog, haze, with functions of intelligent pedestrian detection, anti-collision alarm, which can greatly improve the driver's night driving safety.

Before installing and using this product, please read in detail and keep this manual . Hope this product can meet your needs and serve you for a long time!

The Company reserves the right of final interpretation of the inconsistency of the manual with some functions and operations due to software and hardware upgrades.

▶ 普通视野



黑夜



眩光



雾天

▶ 热成像视野



3. Precautions

- Thermal imaging technology is widely used in military, aerospace and other fields. The product is only suitable for civil driving assistance. Please comply with the relevant laws of your country and do not use it for any illegal purposes.
- Please use the product in -30~70 degrees Celsius.
- The camera is IP67 waterproof while the controller is not .
- Please do not touch the camera lens directly with your hands when the lens needs to be cleaned to prevent the acid left by your fingers to damage the increased transmission film coated to improve the quality of imaging. Please use a special lens cloth or glasses cloth to wipe.
- Please do not direct the lens to the sun, large lasers, welding machines and other ultra-strong light sources for a long time, so as not to damage the precision optical devices.
- It is normal to have different imaging quality in different temperature as thermal imaging images through the object surface temperature difference. As the ambient temperature increases, the contrast of the thermal imaging video is reduced, it will make the temperature difference between the person and the environment get smaller.
- It is normal that the image has a short time lag (about 150ms) and then returns to normal as a result of the adoption of automatic shutter refresh

technology to ensure continuous acquisition of high quality images.

- Please go to the designated repair point as soon as possible to when the protection window is broken due to excessive external impact for the internal components in the high-strength protection window is designed to automatically heat up in low-temperature environments to defrost and melt ice.

4. Disclaimer

- The "Night Vision System" only provides the driver with driving and warning assistance. The driver should take full responsibility for the specific operation.
- The "Night Vision System" should be only used as a driver assistance and cannot handle all traffic, weather and road conditions.
- Please use the system in a safe manner.
- The Company shall not be liable for any damages incurred due to improper use of the system or due to image recognition.

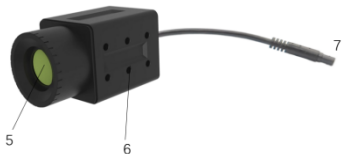
5. Characteristics

- **Easy installation:** the camera is small. The minimum size of it can reach 34*34*49 (mm). All will come with the full model applicable installation accessories or special installation accessories.
- **Video output:** CVBS and USB synchronous output is supported. Special models can access the original car screen.
- **Pedestrian identification:** With accurate algorithm, the system can identify pedestrians from 100 meters away (ambient temperature 23±5 degrees Celsius) and cars from 160 meters away.
- **Long-distance vision:** In total darkness, the system can detect 300-500 meters road conditions ahead.
- **Anti-glare:** Unaffected by high beam and glare, the system can effectively aid in driving safely.
- **See-through function:** Far-infrared radiation has a long wavelength and can effectively see through mists, soot, haze, etc and image normally.
- **Collision Warning:** With our special warning algorithm, the system can quickly and accurately warn the driver in advance of fast approaching and suddenly rushing-out pedestrians and other dangerous scenarios through the sound and screen.
- **GPS:** The system is also equipped with GPS.

6. Components



ECU



thermal camera

1. Controller data input and output interface
2. GPS antenna
3. ECU power interface
4. Alarm sound volume adjustment dial cod, debug port,TF card slot
(no filming function)
5. High strength protection window, effective protection of the lens
6. Three alternative mounting positions for multiple situations.
7. Camera and cable docking waterproof interface

7. Product LIST



1.thermal camera

2.ECU

3.GPS antenna

4.alarm speaker

5.data wiring harness

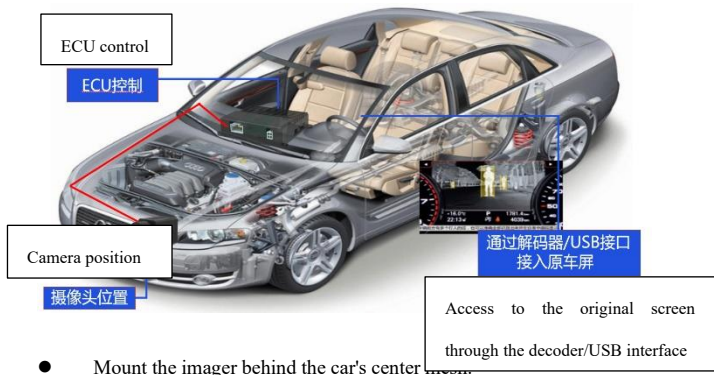
6.imager extension wiring harness

7.power wiring harness

NOTE:The standard product does not include a monitor. If needed, you can purchase a car-specific monitor with CVBS input. It is recommended to choose a 5-10 inch IPS high brightness screen to achieve the best performance. You can also choose our debugged monitor.

8. Installation

STATEMENT: This product is so precise that the installation has a very big impact on the use, please go to the Company's designated service points or professional auto repair store to install.



- Mount the imager behind the car's center console.
- Route the wiring harness through the engine compartment to the passenger compartment console.
- Choose video output according to your actual needs.



Original Screen



Retrofit Screen



Rearview Mirror Screen



Android Screen

Step 2: position the camera



- The camera should be installed inside the front bumper center mesh due to the impenetrability of far-infrared thermal radiation to glass.
- The preferred installation position is in the upper part of the front bumper, zone 1.
- The camera can also be installed zone 2, the lower part of the front bumper when the air inlet in zone 1 of your car is too small (horizontal

angle headroom is less than 15mm up and down and left and right) for infrared entry or completely closed.

- This installation method is applicable to all passenger cars, commercial vehicles and other models.
- The camera is not required to be installed in the middle position. Please install on the upper middle position according to the specific model.

Step 3: install the camera



- The bracket is universal and can be easily installed on a variety of models.
- By bending and cutting, the bracket has various installation models and can be adjusted after mounting.
- A variety of mounting screws and clips accessories / car-specific mounting accessories is provided. Please fix the camera appropriately according to the materials and structures of the center mesh.

- The effect diagram

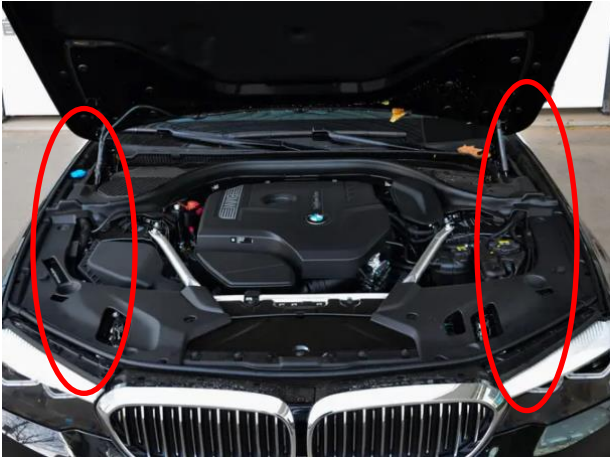


Step 4: adjust the camera angle



- The camera should be parallel to the direction of the car and the screen should be kept vertical (installed horizontally).
- The road in the distance is shown about 1:1 with the sky on the screen.
- After the commissioning, the insurance carrier/center grille should be restored to its original place.

Step 5: arrange the camera wiring harness



- Generally, camera wiring harness should be arranged through one side of the engine compartment then led from under the A pillar into the cab.
- wiring harness can be leaded to the cab in all models.
- All wiring harness provided are car-dedicated, thermostable and cold-resistant, BLXY and double layer shielding.
- wiring harness should be arranged away from the engine case and are suggested to be parallel and tied to the original wiring harness of cars.

Step 6: install ACC Relay



- The car-dedicated relay is provided with a small-size fuses.
- Usually the fuse box is beside the A pillars or under the steering wheel.
- Attach AC12V to car standing electricity and ACC to ACC relay interface. The ground wire should be grounded.
- The reserved DC5V output in power wiring harness could be ignored in installation.
- The system is suggested to be installed in the cooperative installation service point or professional auto repair shop.
- The device automatically shuts down without causing loss of battery power after the ACC power off or when the car is locked

Step 7: install GPS



- Place GPS antenna under the A pillar and front glass or inside the A pillar.

Step 8: connect monitor

8.1 extensional monitor



- A 7-inch IPS 1024 * 600 (or 5-inch) resolution high-definition monitor is suggested

- Refer to step 6 for monitor power connection from ACC.
- Please connect the CVBS input plumper of the night vision ECU to the display input.
- The monitor can be glued to the front lid or suctioned to the front glass as desired.

8.2 original screen/Android screen



- At present, the device supports CVBS and USB output. If your original screen is an Android one and supports the installation of third-party Android APP, you can find the corresponding dealer to obtain a special APP. The USB video output in ECU output wiring harness should be accessed to the car USB data port. Open the APP when using the system.
- If your original screen cannot install APP, please contact your dealer to

buy a special decoder and input it to the original screen in a lossless way.

- The main functions of this product are upgrading gradually, so please focus on the actual controller functions.

Step 10: turn on the system

- After completing the above steps, hide the relevant wiring harness.
- The system automatically run when ACC is on.
- First run requires 18 seconds of boot-up time (including thermal imaging camera warm-up).
- Wait until the thermal images appear on the screen.

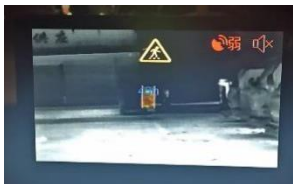
Normal power-on pictures:



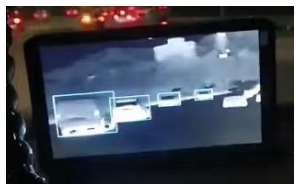
a. System booting in



b. camera booting in



c. Sound alarm off when GPS is



Searching or the car stops

d. the GPS signal is strong and the vehicle speed exceeds 30KM/H

9. Early Alarm

This system can output visual and audio alarm according to the collision risk level coming with pedestrian car recognition, pedestrian distance measurement, and intelligent warning algorithm, by integrating car dynamic analysis and comprehensive artificial intelligence algorithm. The audio alarm will be



automatically on (except for motor vehicles) when the vehicle exceeds 30km/h at night, and off during the day.

As shown in the figure above, by comprehensive analysis, the pedestrian identified on the left has no collision risk, so it is marked with a frame. The pedestrian in the middle enters the risk zone so it is filled with yellow, and the right one enters the dangerous zone so it is filled with red and triggers sound warnings.

Upgrade

- 1、 Please copy the firmware file (obtained from the official website or dealer) to the root directory of TF card, insert the card into the slot, turn on the power, and the machine will be upgraded automatically after starting.
- 2、 Please do not power off or do other operations during the upgrade process.
- 3、 The system will restart automatically after the upgrade is completed
- 4、 After the upgrade is completed, please delete the upgrade file in the TF card or remove the TF card, otherwise, the IF card with the upgrade program will repeat the upgrade after each boot.

10. Main PARAMETERS

Camera	Type of detector	Vanadium oxide non-cooling infrared focus plane detector
	Resolution	256×192 / 384*288
	Lens	Focal length:1.0mm FOV:18°* 13°(256×192)
	Automatic defrost	Yes
	Pixel spacing	12μm
	Image display	automatic shutter refresh,white hot,≤25Hz
	Protection level	IP67
	Operating temperature	-30°C - 70°C
	Size	≤49*34*34(L×W×H mm)
Controller	operating voltage	DC9-36V
	Power consumption	≤5W (heating≤7W)
	Video output and other interface	CVBS、USB、CAN、UART
	Boot time	≤18S
	Automatic identification type	Pedestrians, bicycles, two-wheeled electric vehicles, tricycles, motorcycles
	Automatic identification distance	≤80-100m(256*192)

	Identification efficiency	Identification rate \geq 95 %, Real-time \geq 21 FPS
	Early warning method	screen and sound warning
	Operating temperature	-30°C - 70°C
	Size	\leq 110*100*25 (L×W×H mm)

11. Product Interface Definition

INTERFACE	NUMBER	SIGNAL	SIGNAL DECRPTIONS
Host power interface (4P Wire Harness)	1	NULL	
	2	Red BAT+	Connect the positive terminal of the battery (car standing electricity)
	3	Orange ACC	Connect the ACC switch of the power take-off box
	4	Black GND	Connect the negative terminal of the battery
Host external interface (16PWire Harness)	1-2	SPK+, SPK-	2P warning speaker interface
	3-6	Video Input	Waterproof interface, connect to thermal imaging camera
	7	RS232-TXD	reserved

	9	RS232-RXD	reserved
	8、 10	CAN_L、 CAN_H	reserved
	11	Black GND	reserved
	11-14	USB Video Output	UVC signal output, connect to smart devices (cell phones, tablets, computers, Android screens)
	15-16	CVBS Video Output	Connect to monitor or special decoder

PS:

- CVBS and USB video output synchronized output by default
- Camera and host connection cable length 5.5 meters (including extension cable)
- USB video output cable is 2 meters long
- CVBS video output cable is 1 meter long

Troubleshooting Common Faults

Faults	Cause	Solution
Power-on abnormalities	Relay	Detect the contact
	Controller connection interface	Check/Replace
	ACC	Check the fuse box

Image abnormalities	Controller	Check/repair the controller
	Camera	Check/repair the camera
	APP	Reload the APP
	Circuit	Check the circuit