

3D HD

# Surround View Monitoring System

User's Manual



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# Safety Tips



Please read this manual carefully before using and pay attention to this section for the safety Instructions.



Serious traffic accidents may be caused by keeping watching on the screen or operating the system during driving. It is strong recommended that do not operate this system while driving.



SVM is a parking and driving assistant system which offers the road situation around the vehicle to eliminate blind spots and thus works perfectly as a visual guide for safe parking and driving. It may bring inconsistency between the screen image content with actual surroundings of the vehicle. Please handle this case according to actual situation.



Never hotplug the host device when power is connected. The host device can't be sinked in any kind of liquid. Please kindly pay attention to heat dissipation.



Please contact professional installation service providers in case of any abnormal situations.

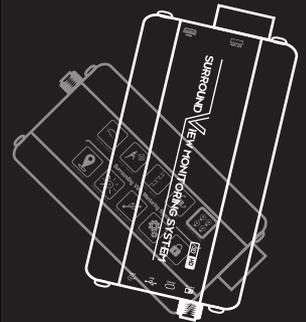
# Brief Introduction

## *Guide*

This guide is aimed at providing the basic illustration for topological structure of the SVM system, operating principle and basic concept to help users to understand the whole system installation procedure, camera calibration steps, and how to interact with the system menu.

## *Brief Introduction of System*

The SVM 3D Around View Monitoring Technology synthesizes images from four cameras to create a true 3D sophisticated view of a vehicle's surroundings. The technology enables flexible omni-directional monitoring around a vehicle from a dynamically definable perspective or "free eye point." Such kind of technology can display the complete vision of the positioning and moving path of the vehicle, it covers blind spot and thus works perfectly as a safe parking and driving guide even when restricted by adjacent vehicles and objects, parking line, etc. The system offers various SVM system configurations like -HDMI/L-VDS/AV with alternative version of 2D or 3D, and what's more, this system also integrated full channel car DVR function with 24 hours videos loop recording supported.



# Product Features

## *Product Features*

- ▲ Four 180 degrees ultra wide fish-eye cameras
- ▲ Seamless video merging based on dual core ARM CPU and hardware high efficiency acceleration engine.
- ▲ Arbitrary and dynamic 3D mode view angle switching for better surrounding environment observation
- ▲ Independent Fish-eye calibration parameter and algorithm for each camera.
- ▲ Pixel statistic engine for brightness balance among four channels real-time outside cameras.
- ▲ 3D video de-interlacing and noise reduction technology for CVBS signal decoding.
- ▲ Support alternative recording media for TF card and USB disk
- ▲ The simplest calibration steps with calibration tape and packing box, and system applicable for almost all types of vehicle which including Buses, Trucks, Lorries, Limousines, Tank and even Jumbo Jets. Typical length of the vehicle is 5.5m, 6.5m.
- ▲ Smart power managements to save automobile's battery
- ▲ High video recording resolution up to 1080p
- ▲ OE quality for main chipset with well protected circuit and devices in order to achieve the best system performance and stability.



# Product Features

## **Main application scenarios**



Side parking



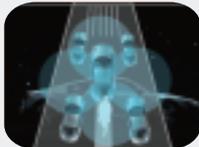
Reversing parking



Narrow Road/Lane



Slope sections



Blind Spots Coverage



Turning assist



Anti-fake accident



Car DVR



Crowded Road

## **Features Profile**

- 3D & 360° Seamless Merging
- 360° Blind Spots Coverage
- Dynamic & Intelligent View Angle Switching
- Flexible Omni-directional Monitoring
- Exclusive Fish-eye Distortion Correction
- Guided Camera Calibration

## **Optional Function**

- a. Driving Video Recording
- b. 24 Hour Parking Monitoring
- c. G-sensor Triggered Recording
- d. Visual Radar Extension

### Note:

This manual gives a basic and general feature description of the system, but it may vary from specific product model and application case. Please consult sales team for detail specifications before ordering.

# System Hardware Installation

**1 Wire routing inside the car**

Please refer to wiring diagram for more details. Please also be alert for the color and connector size of each extending cable. Wire routing should be from cameras to the host device side. All the cables should be gathered to the host device side

**3 Host Installation**

It is strong recommended that the host be installed inside/behind the tool cabinet which is much easier to take out the TF card or USB disk than behind the DVD monitor(central control panel)

**5 Functional Test**

To test the main functions and settings of the host device.

**7 Camera Calibration**

Camera calibration can be guided step by step with the help of system menu, once the calibration data is completely collected, system software will complete the video merging automatically.

**9 Reconversion**

To recover all the parts of the vehicle

## Installation Steps

**2 Cameras Installation**

Please refer to the corresponding section for detail installation steps. Embedded or out-cell installation for side cameras depends on the size of the side mirrors and also depends on the space available for installation especially for large vehicles. Glass lens need to pay specific attention when disassemble the side mirrors to protect it from being broken, and please also be careful when drill installation holes under the plastic cover of the mirrors.

**4 Wiring Test**

Do not turn on the power before all the wire connection is double checked. Do Hot-plug the host device is prohibited.

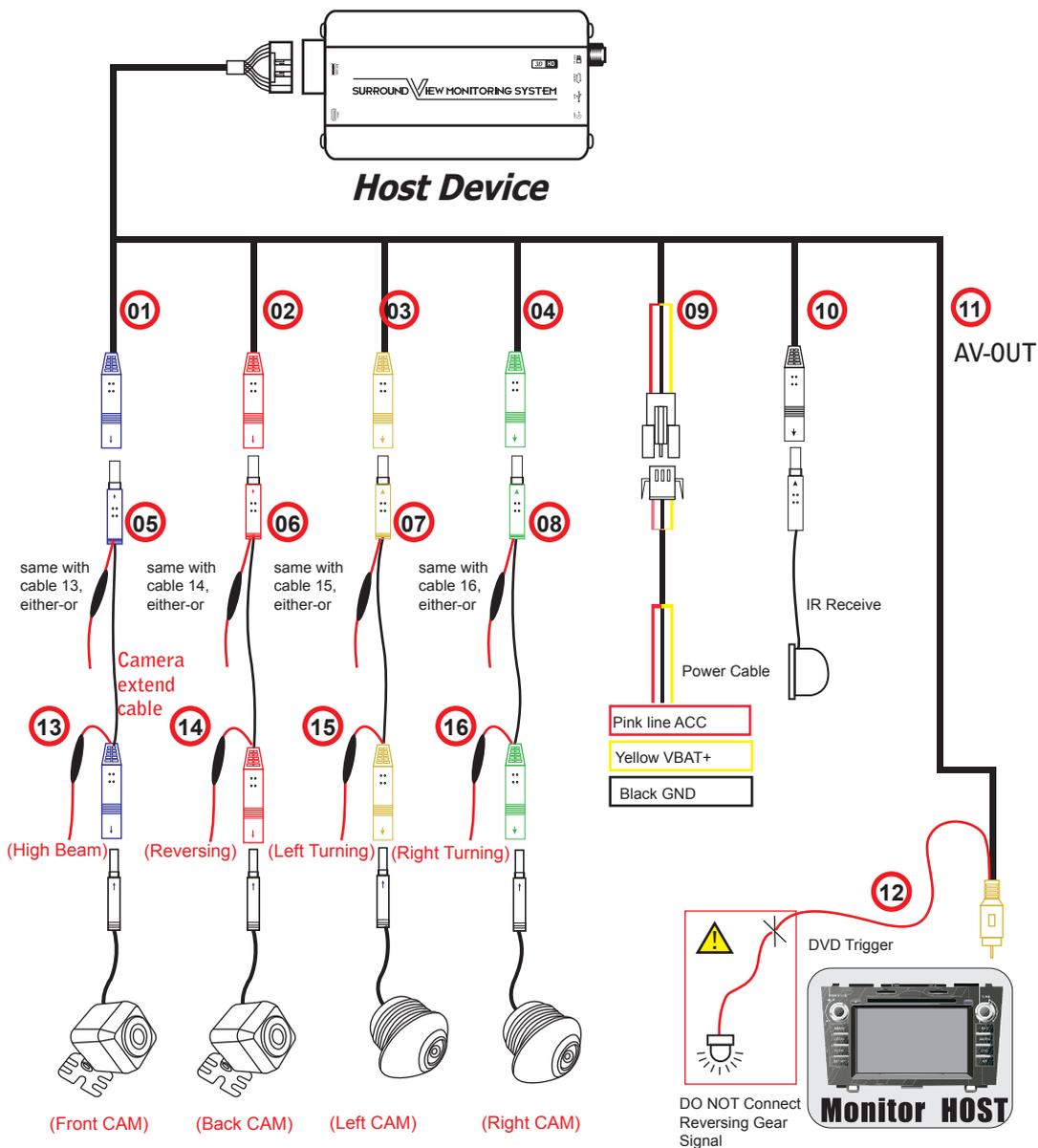
**6 Side Camera 's Angle Adjusting**

Rolling the camera to select a proper angle which can make the side calibration tap be overlapped with the reference guide line on the screen.

**8 Device Fixing**

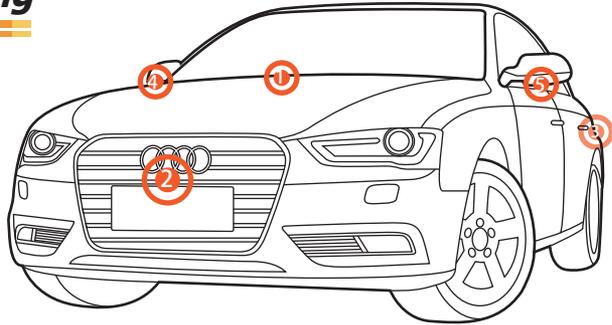
Fixing the wire connections, cameras and host device

# Wiring Diagram



# Cameras Distribution

## Perspective Drawing



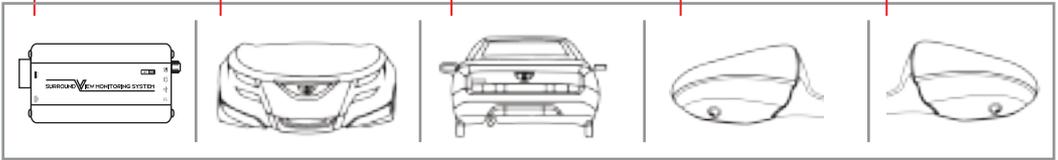
① Host

② Front Camera

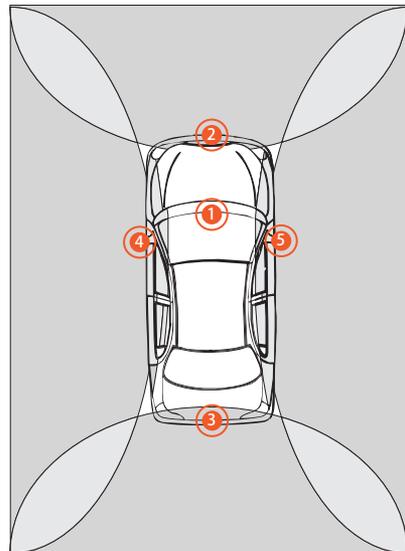
③ Rear Camera

④ Left Camera

⑤ Right Camera

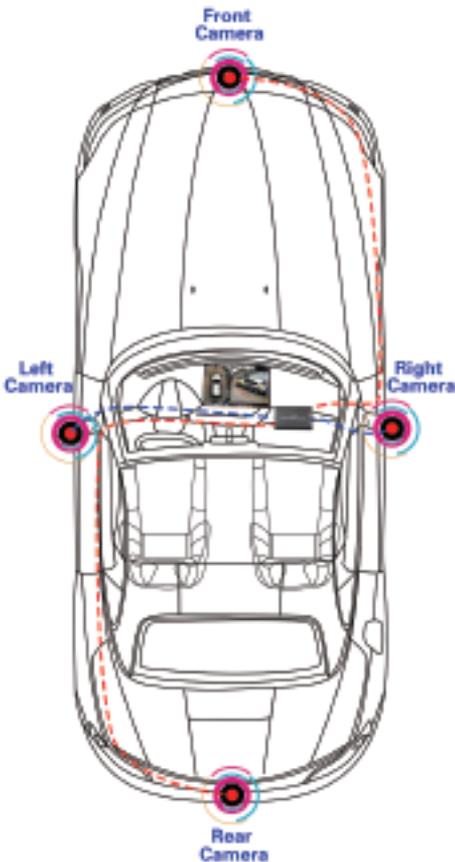


## Top view



# Wire Routing Flow Chart

## Wire Routing



## Wiring Process

### Front Camera

1. Disassemble the tool cabinet
2. Distribute the extending cable of front camera from the logo position and go along with the original wire distributing tube to the tool cabinet position.

### Rear Camera

1. Unpack the inner panel of the trunk.
2. Distribute the extending cable of the rear camera from the license plate lamp and go along the original wire distribution tube to the tool cabinet position.

### Left and Right Camera

1. Disassemble the wing mirrors and unpack the side trim panels of front cab doors
2. Disassemble the glass lens of wing mirrors, and then distribute the extending cables of side cameras from the original tube of wing mirrors to the interlayers of the front cab doors.
3. Gathering all the extending cables from the interlayers of cab doors to the tool cabinet position

Instructions on how to disassemble the two glass lens of side wing mirrors)

In General, Most of Japanese cars more prefer to use plastic-buckle structure for side wing mirrors, the inner upside part of the wing mirror is a "L" shape buckle, while the bottom side is U-shaped instead. Using the flat plastic screw driver and gently insert to the middle bottom position to remove the glass lens, please pay full attention to protect the it from being broken.

Germany cars more prefer to use ball head clip directly, the steps to disassemble the side wing mirrors is nearly the same.



# Camera Installation

## Camera installation demonstration of universal front camera



In the middle of vehicle logo



Inside the front turbogrid plates installation

### The Installation method of front camera:

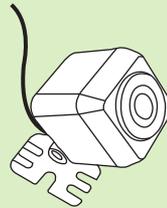
- 1.Insert the front camera to the center of the front vehicle logo.
- 2.Connect the front camera with the extending cable.
- 3.Please double check the field of the view is wide enough or not from the system preview menu window, and the camera should not be covered by front bumper.
- 4.Fix the front camera with screw and the metal pad accessories.

# Camera Installation

## Camera installation demonstration for universal rear camera

### Rear Camera Installation Steps

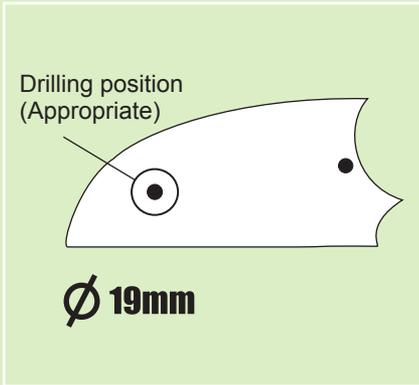
1. Unpack the inner panel of the trunk and take out the left license plate LED.
2. Stick locating plate of the rear camera in the right place for drilling a hole, and then drill a hole to install the camera on the position of the left side of license plate lamp.
3. Distribute the extending cable of the rear camera from the license plate lamp and go along the original wire distribution tube to the tool cabinet position.
4. To connect reversing signal of the rear camera extending cable to the 12V anode of the reversing lamp.
5. When video in DVD monitor works well after camera connected, you can recover the trunk panel.



Stick locating plate of the rear camera in the right place for drilling a hole then tear off the locating plate when completing hole drilling, and finally fix the camera with a screw driver.

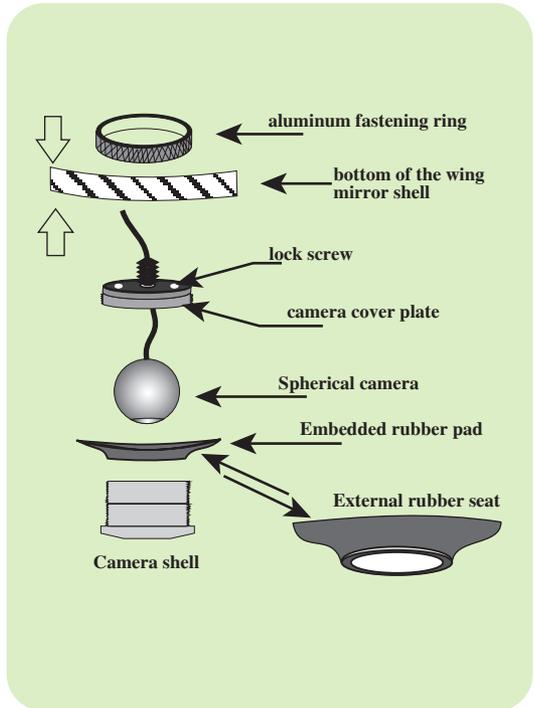
# Camera Installation

## Drilling Location Diagram



Choose a proper drill bit according to the camera size  
Find a flat area near to the edge of the wing mirror bottom plastic shell as much as possible for getting enough pixel content. You should leave enough spare space for the glass face of wing mirrors so that the glass face can be adjusted freely. What's more, keep in mind that camera field of view (FOV) should be prevented from covering by the plastic shells.

## The installation diagram of universal camera



# Camera Installation

## ***Right and Left Camera Installation***

1.As showing in the left picture, stick the locating plate of the rear camera to the bottom of the wing mirrors.

2.Using the corresponding drilling bit to drill holes at the bottom of plastic shell, and then tear off the positioning stickers.

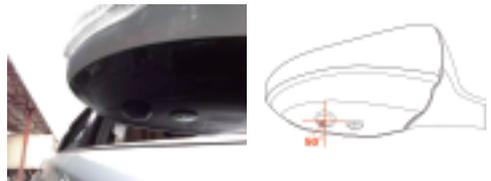
3.Select the embedded mounting or external outboard mounting for side cameras according to the spare space of the plastic shell.

4.If the drilling location available in the bottom of the plastic shell is not flat, please use a rubber pad provided along with the product packing list.

5.Install the internal spherical camera core, and connect the cables, then lock screw of side cameras tightly but keep the spherical camera core of side cameras can still be rotated.

6.Connect the extending cables which are waiting for the coming testing and debugging procedure.

7.Open the center screen to see the preview image of the side cameras, keep in mind that keep the left calibration tap visible while get as many pixel as possible, and a another important comments is that keep all the calibration point distributed properly on the center screen. Recommended distribution is list blow.



### **⚠ TIP ⚠**

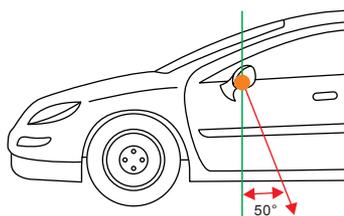
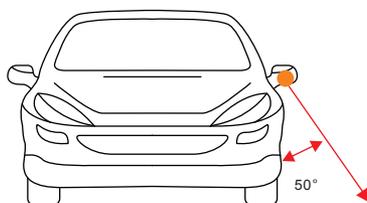
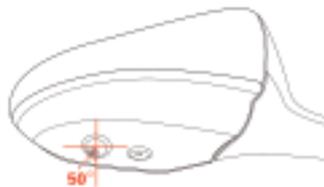
Drilling hole diameter of outboard mounting is "6mm", Drilling hole diameter of embedded mounting is "18 ~ 26mm", Please select the appropriate location to drill the hole for universal cameral models. And keep in mind that the glass face of the side mirror should be free adjusted, so that the embedded camera should not block the movement of the glass face.

# Camera Installation

## Cameras Angle Adjusting

For adapting to different shape of wing mirror plastic shell, the angle and direction of side cameras are always designed to be free adjusted. Rotate the side cameras according to the image to keep vehicle body in image closely to the side calibration line and meanwhile keep the pixel in wider angles and farther places can be captured as many as possible. Keep the left and right calibration point distributed in symmetrical position in the screen.

Next step, the mirroring setting of the camera sensor need to be set according to camera installation direction. The guideline for this setting is to make the pixel content of the image as same as the instruction show in the system calibration preview menu. Generally speaking, except for the rear camera, all other cameras must be original image.



# Host Device Installation

## Host Device Installation Steps

1. Disassemble the panel of central control unit, and connect the reversing video channel of DVD monitor or other display screen(AV in).

### 2. The host control unit installation:

**IR Mode:** Put the infrared receiver in a proper position.

**Rotary encoder Mode:** Selecting a appropriate position of the central control panel or beside the hand grip of the vehicle to drill a hole of 3.5mm in diameter, using the screw to fix the bottom panel, and connect the cables to the tool cabinet.

**2.4G button mode:** Please paste the button to the reserved installation position of the original vehicle.

3. Please connect the anode of the left/right turning signal from the fuse box to host wire harness, or from side mirror turning LED indicator to the camera side of the extending cable.

4. Connect the power cable to batter supplier line and connect the wire harness to the host device..

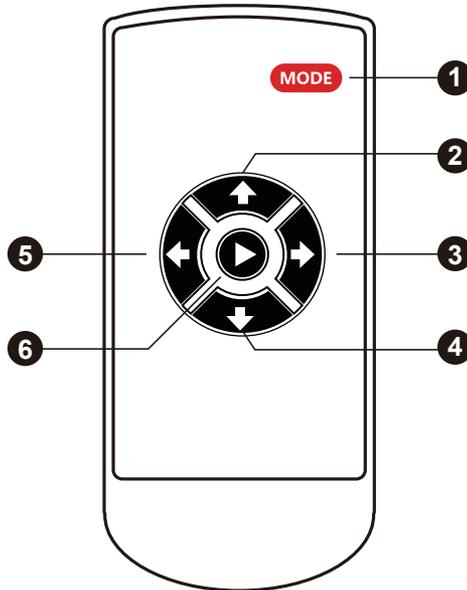
5. Fix the host device in the tool cabinet or the space behind the central control panel, DO NOT cover the heat dissipation hole.

6. Connect all the cables for the coming function testing and debugging procedure, and assemble the panel back to the control unit.



# Camera Calibration

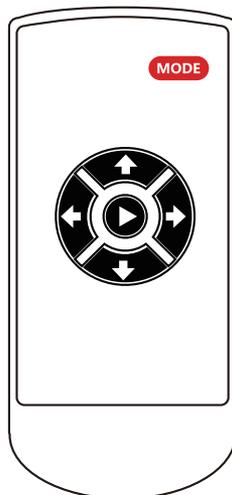
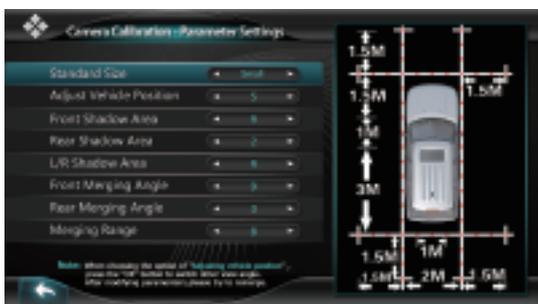
## Remote Controller Introduction



Key Number	Description	Function
[1]	MODE	Enter Setting Menu
		In SVM Mode, long press 2 seconds enter into 4CH recording mode
[2]	UP	In Menu menu, select last menu option
		In SVM Mode, short press enter high beam mode, press again back to SVM mode
[3]	RIGHT	In SVM model, long press enter into right 360 rotatable mode
[4]	DOWN	In SVM mode, long press enter into reversing gear mode
		In menu setting, select next menu option
[5]	LEFT	In SVM model, long press enter into 360 rotateable mode
[6]	Confirm	Confirm selected option

# Camera Calibration

## || Calibration Parameters Setting ||

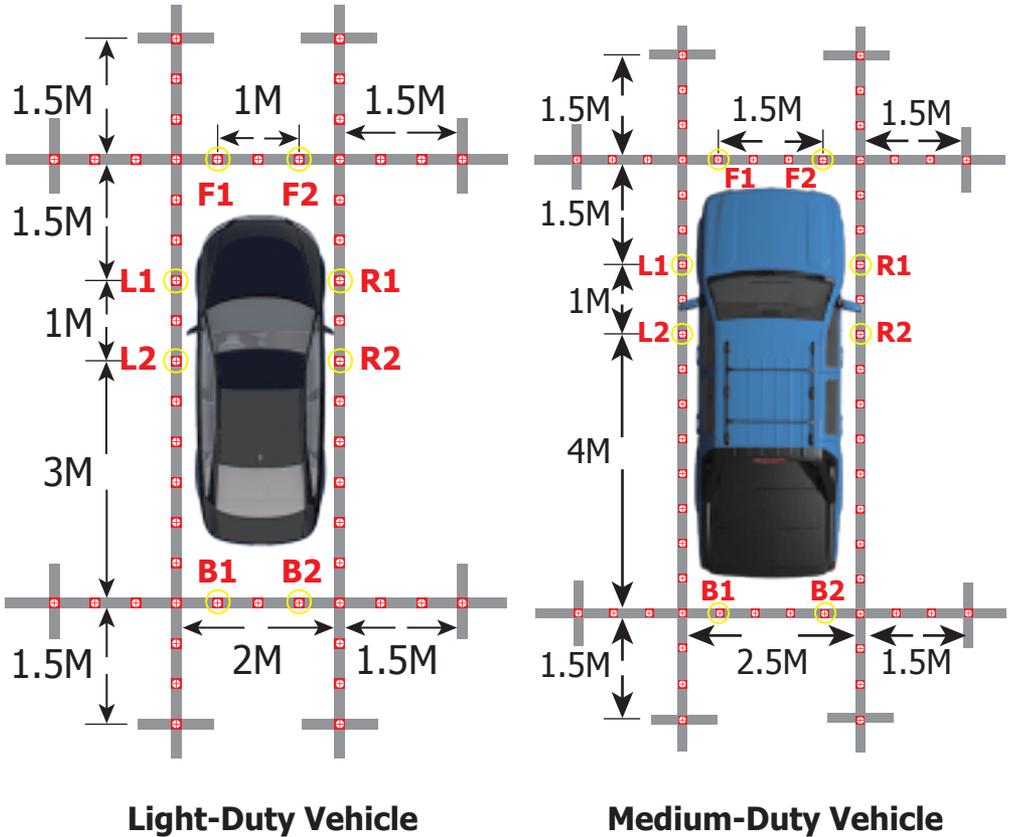


First of all, please press the "MODE" button on the remote controller in a short time to enter system menu, the default passwords is "360", then press the "OK" button to Image Calibration Menu.

Second, please select the correct calibration size for the applied vehicle model, set the shadow area and each step of the shadow setting is 5cm, then select the camera sensor type, please keep it as the default if you are not sure with the sensor type.

# Camera Calibration

## Calibration Tape Sticking



Light-Duty Vehicle

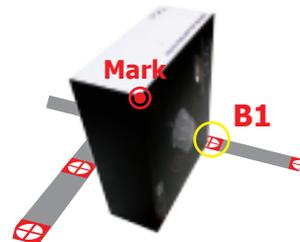
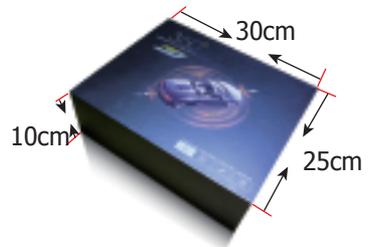
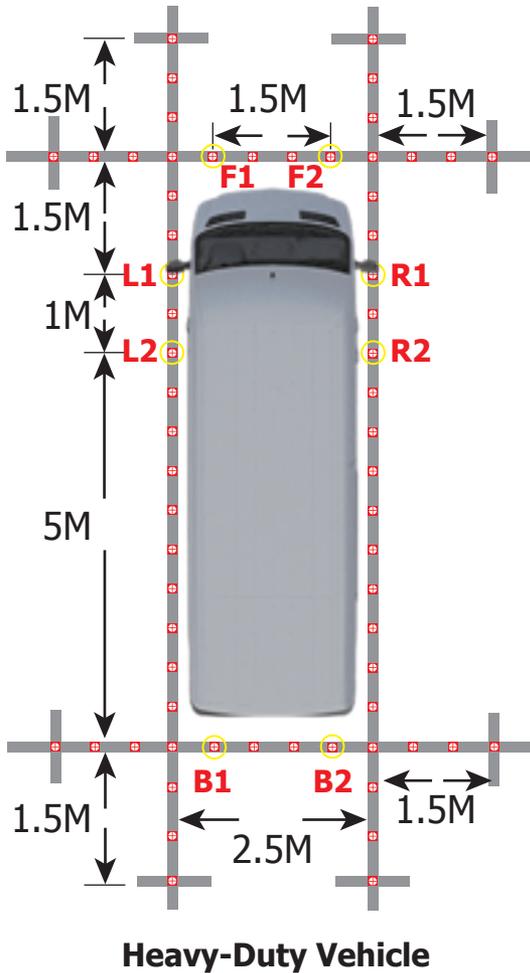
Medium-Duty Vehicle

### ⚠ TIP ⚠

- As the menu diagram shows, pasting the calibration tape around the vehicle.
- Please refer to the calibration pictures of different vehicle models and sizes to select the correct one for matching your vehicle.

# Camera Calibration

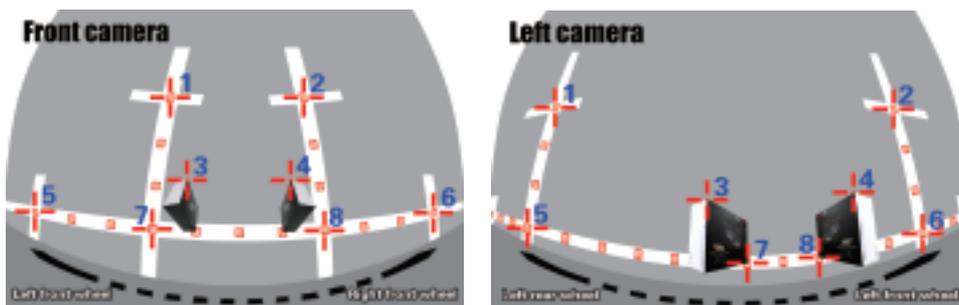
## Calibration Tape Sticking



# Camera Calibration

## ***Calibration Points Marking***

You can start calibrating the four cameras one by one when the cursor is twinkling. Moving the cursor to the corresponding locations by the remote controller buttons of up/down/left/right, then press the “ok” button to mark the current calibration point in the screen and then the system menu will guide you to the next calibration pixel point in order from 1 to 8 one by one, please see the correct location and sequence of the calibration points as below pictures:



Press the red “Mode” button to toggle to previous calibration point selection when needed.

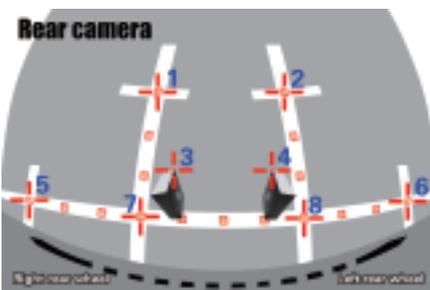
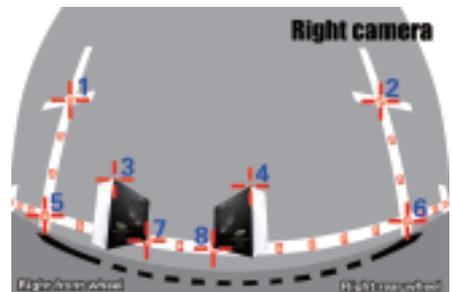
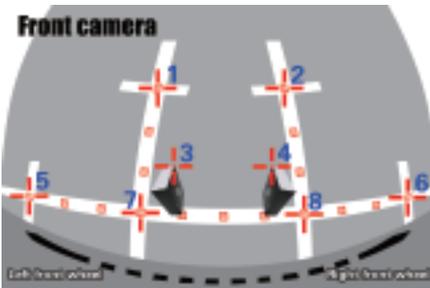
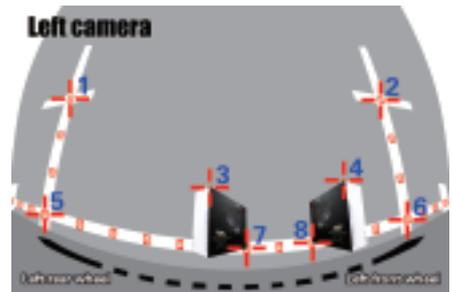
### **⚠ TIP ⚠**

The calibration locations of No.7 calibration pixel point and No.8 calibration pixel point between the front&rear cameras and the sides cameras are totally different. The more accurate calibration points you mark, the better quality of the panoramic image merging will be.

# Camera Calibration

## Placing Packing Box

There are always 8 calibration points for each camera which need to be marked in the screen, the third pixel point and fourth calibration point are always special points which are actually the diagonal corner of the packing box. The SVM packing boxes can be divided into outer and inner one so that each packing box can be used for calibration 1 camera each time.



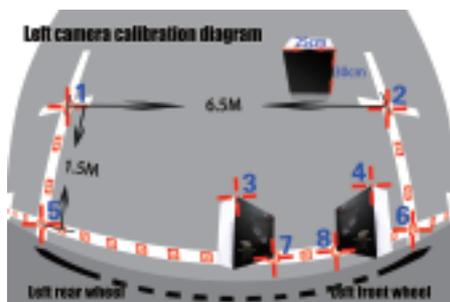
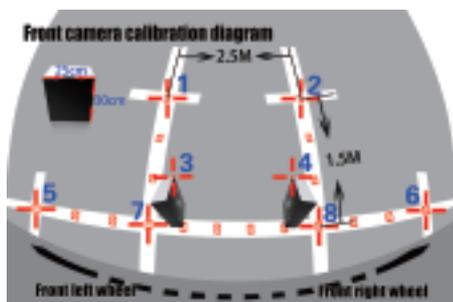
### ⚠ TIP ⚠

Put the 2 packing boxes (Outer and Inner) in the correct position separately as the pictures above illustrated. You can also use other boxes instead as a calibration reference objects, the dimension requirements of the box must be 30cm in height and 25cm in width.

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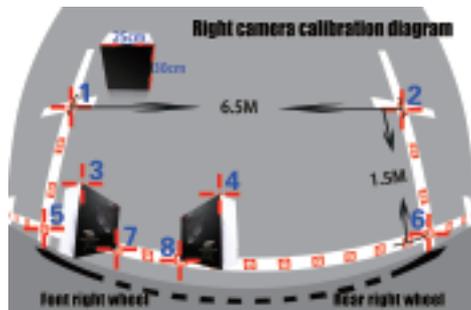
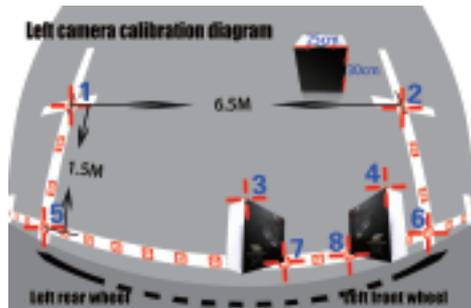
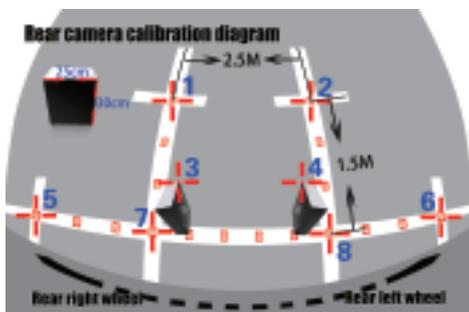
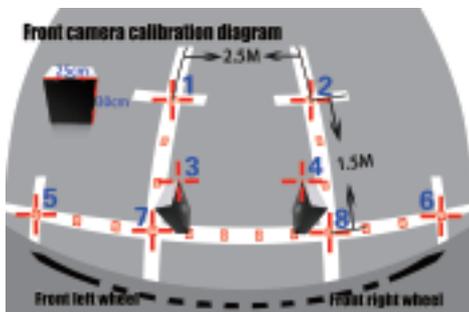
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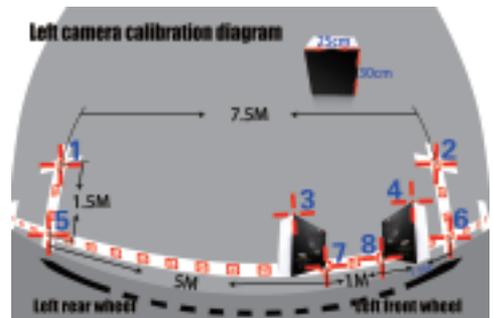
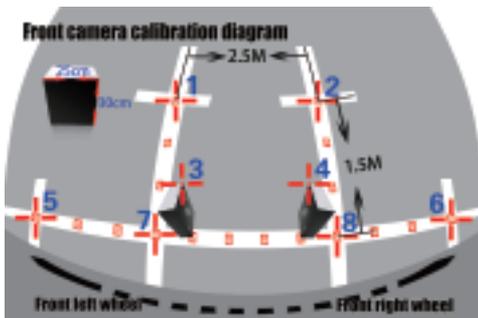
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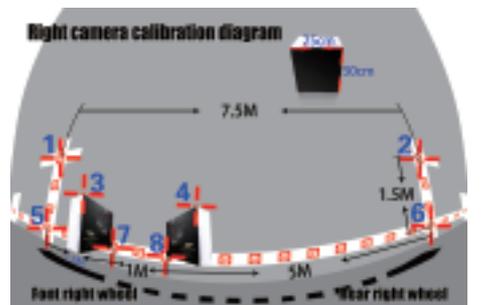
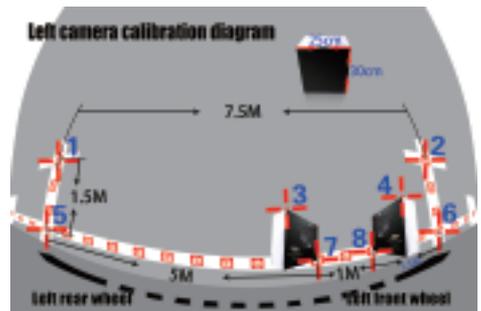
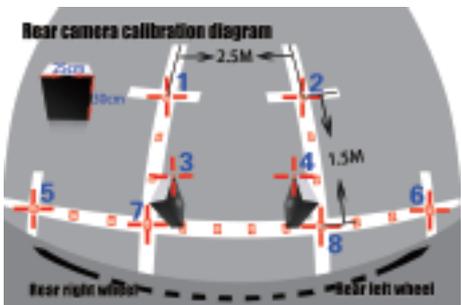
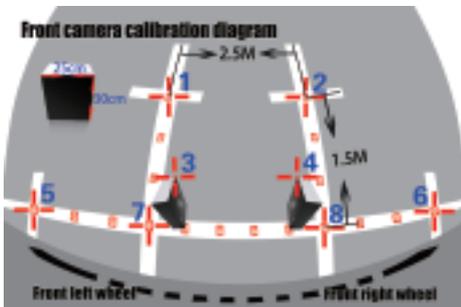
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# Camera Calibration

## *Image Calculation*



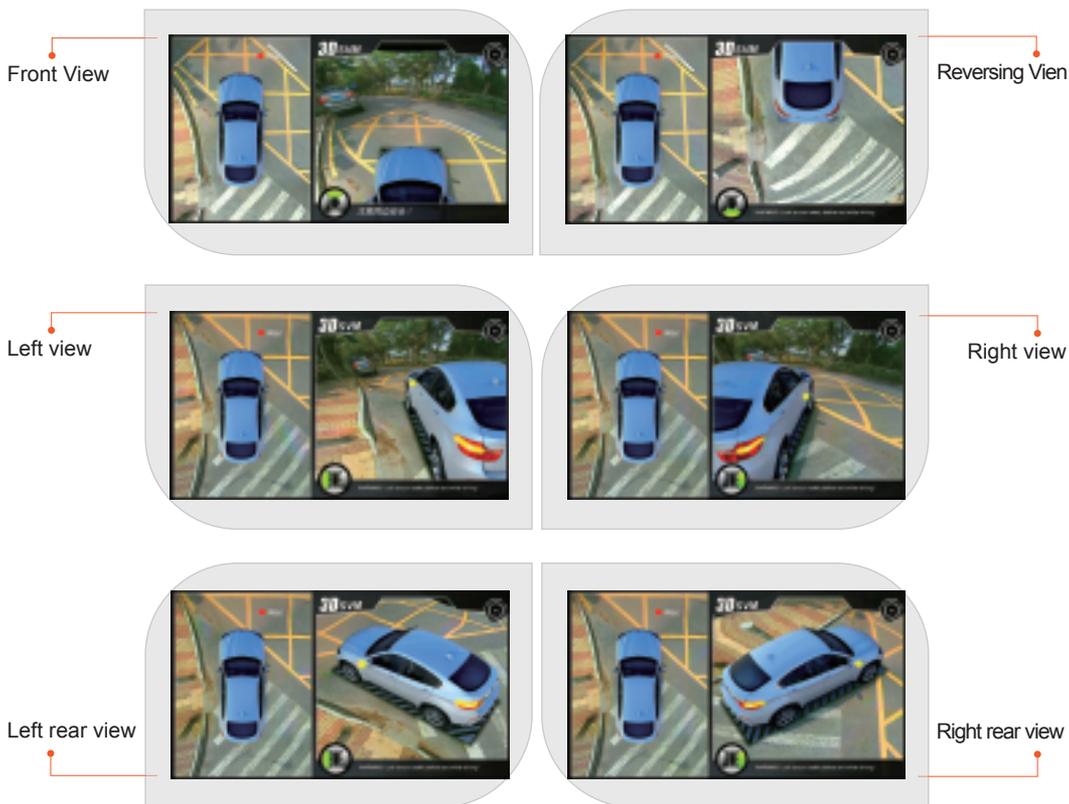
Press "OK" to go ahead.

Please do not shut down during this operation,

System will reboot automatically.

# User Settings

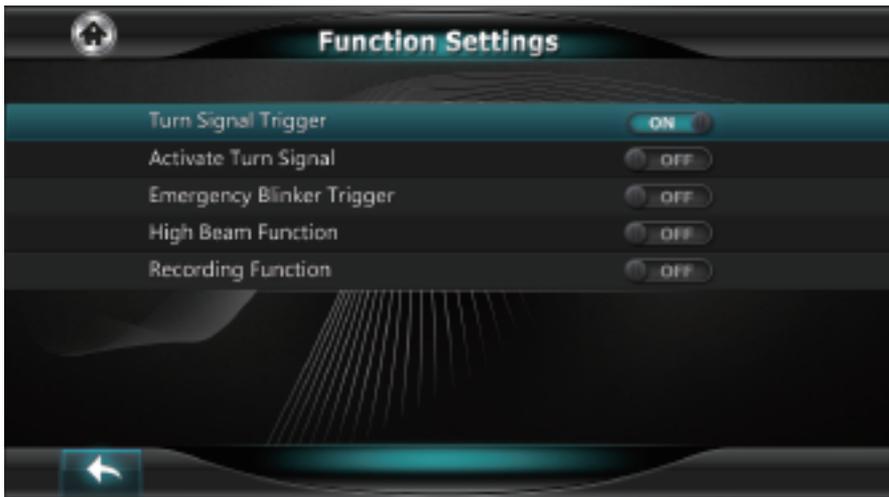
## View Modes



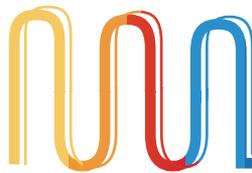
Menu → User Settings → Window Configuration

# User Settings

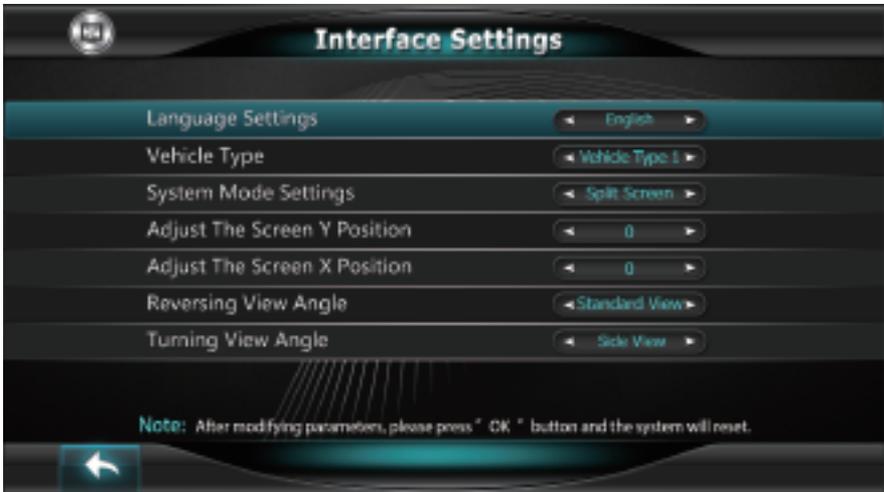
## Parameters Setting and Menu Description



Menu Item	List Options	Description
Turn Signal Trigger	ON/OFF	Turning Signal is optional after engine is fired, this option is a global switch for left and right turning indicator, when this option is set to ON, when the turning event is triggered, the SVM system will response to this event, and vice, versa.
Activate Turn Signal	ON/OFF	When the SVM is going to standby mode, this option is use to control whether the SVM system can be activated through turning signals.
Emergency Blinker Trigger	ON/OFF	When the SVM is going to standby mode, this option is use to control whether the SVM system can be activated from Emergency Blinker, and you can also use Emergency Blinker to set it back to standby mode again when this option is set to ON.
High Beam Function	ON/OFF	Just like the turning signal, high beam signal is useful to toggle the free-eye point and change the view angle for surround safety.
Recording Function	ON/OFF	This is also a global switch to control whether the recording function is ON or OFF.



# User Settings

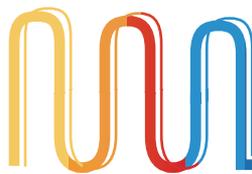


Menu Item	List Options	Description
Language Settings	English/ Simplified Chinese	
Vehicle Type	Vehicle Type 1..... Vehicle Type 10	
System Mode Settings	Split Screen	
Adjust The Screen Y Position	-9 ~ +9 Pixel	Screen TCON horizontal front porch and back porch control.
Adjust The Screen X Position	-9 ~ +9 Pixel	Screen TCON vertical front porch and back porch control.
Reversing View Angle	Standard View Mirror View	
Turning View Angle	Entire View Side View	

# User Settings



Menu Item	List Options	Description
System Restore	Default/ User Preference	Default is not functional at this moments, and choose user preference to restore user preference of video settings/window configurations etc.
Upgrade Options	Default/ Upgrade 3D Mode/ Upgrade All Export Calibration Data Import Calibration Data	Default is not functional at this moments, and choose firmware when you are about to update the firmware for the core board and choose Car 3D Model if you are about to change another Car Model for better match with the car brand.
Version Information	HW.6030.R2.80 SW.6030.R2.14 FW.6030.R2.04	
Permission Setting	Default	
Reserved Menu	Default	



# User Settings



Menu Item	List Options	Description
Hazard Blinker Trigger Duration	30S/1Min/ 3Min/5Min/	Since the system can be activated through external Emergency Blinker, you can also set the duration time, but do remember to turn ON the Emergency Blinker Activation function first in Function Settings Menu.
Display Turn Delay	0S/10S/15S/30S Infinity	Since some specific DVD model will have a problem with AV-IN signal is coming at the early phase during system boot. Please set this option to 10s~15s if this kind of DVD you are using have such problem.
Trigger Delay	0S/3S/5S/ 10S/30S	Screen saver mode after turning/reversing trigger
Revering/Turning Trigger Duration	0S/3S/5S	This option is similar as Emergency Blinker Wakeup Duration, you can adjust the duration time for Turning/Reversing signal here also.
Back to Default View Latency	0H	Back to default view time after returing from left/right turning or reverse gearing.

# User Settings



Menu Item	List Options	Description
Saturation	-9 ~ +9	Adjust input video saturation
Brightness	-9 ~ +9	Adjust input video brightness
Contrast	-9 ~ +9	Adjust input video contrast
Sharpness	-7 ~ +8	Adjust input video sharpness



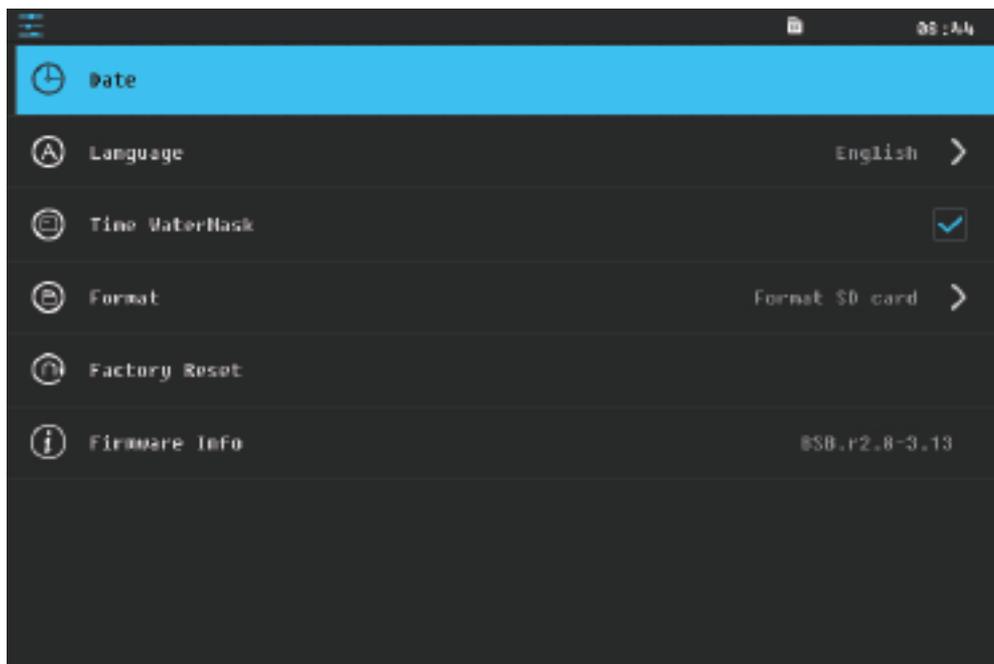
## Video Recording Functions

1. Long press “Mode” button to switch to recording system menu.
2. Press the “OK” button to stop current recording.
3. Using “Up/Down” button to navigate between recorded files as per date and timeline.
4. Press “OK” button again if the current recording file is just the right one you want to playback, and you can enlarge any of the 4 cameras to full screen mode by pressing left /right/up/down Button.



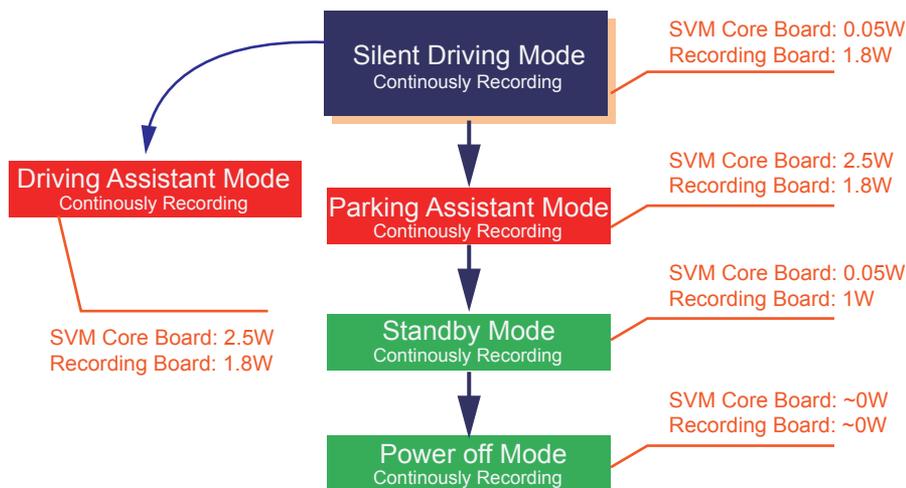
# Recording Parameters

## Basic Settings



Menu Item	List Options	Description
Date		Change system time
Language	English/Simplified Chinese	
Time Watermark	ON/OFF	
Format		Format the TF Card or USB Disk
Factory Reset		
Firmware Info		

# Smart Power Management Strategy



## Silent Driving Mode

Silent Driving Mode is the most frequency used while driving, the recording system will continuously take the outside video and record the compressed video on the recording media such as TF card or USB disk. Note that USB disk have a higher priority over TF card.

## Driving Assistant Mode Parking Assistant Mode

During this mode, maximum power is expected to consume, since both the recording board and SVM core board is full functional. But this mode will never last for a long time, driving assistant mode is usually last for several seconds, and parking assistant mode usually work for 1~2 mins.

## Standby Mode

At this mode, the recording system is standby, and if any vibration is detected by the G-sensor, our SVM system will power up the external Cameras and LEDs immediately and start video recording.

## Power Off Mode

The system is power off except for the Real Time Clock chip and G-sensor, and the whole system is also capable to awake from the vibration events. But under some special case such like the battery is lower than 11V, and system will never be awaked except for the event of engine start.



# Specification

## Packing List



Host

Front Camera

Rear Camera

Left Camera

Right Camera

Remotre Controller



Main Wire Harness

Front Extend Cable

Rear Extend Cable

Left Extend Cable

Right Extend Cable

Drilling Bit

**⚠ TIP ⚠**  
The configuration may generate differences due to different vehicle size or product model



IR Receiver

Calibration Tape



# Specification

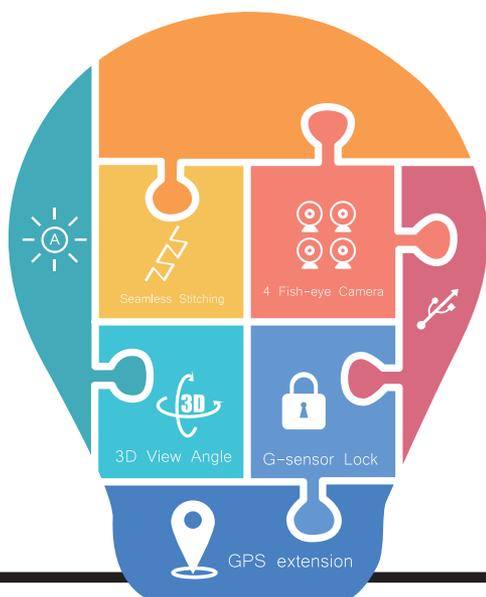


## Datesheet



Type	Specification	
Video	Video Interface	BMW Mini connector
	Input / Output Impedance	75Ω
	Amplitude	Typical 1Vpp, 1.2Vpp Maximum
	Bandwidth	27M
	Sampling Frequency	74.25MHZ
	Resolution	1280X720@30fps
	Signal standard	AHD2.0(Nextchip)
	SNR	83dB
Indicator Lamp /Blinker	High beam	Optional
	Left/Right Turning Blinker	Yes
	Reversing Lamp	Yes
G-sensor	BM250E	Bosch
Compression	Algorithm	H.264 Baseline@L3.1
	Resolution	1080p@15fps
	Bitrates	5Mbps, 3Gbyte/Hour
	Recording Media	USB Disk(High Priority)/TF
Disk Capacity	TF CARD	32G SDIO3.0/SDIO2.0
	USB Disk	64G USB2.0
Power Consumption	4-CH DVR + SVM mode	490mA
	Sleep Mode	<3mA
Dimension	L*W*H	123*81*25mm(Host Metal box)
Weight		220g
Environments	Normal Working	-30℃~+85℃
	Storage	-40℃~+105℃
	Relative Humidity	0~95%
Voltage Tolerance	Working Voltage	9.5V~36V





# Surround View Monitoring System



## Trouble 1

### Some part of the image is blank after execution of Fast Merging mode

If you are indeed confirmed that all these above-mentioned steps are correct, please use your smart phone to take a photo after you finish each step when move done all cross cursor to these corresponding calibration points to us, our system can dump all these calibration data to TF card and our technical team will help you to find the root cause of the problem once we get your calibration data. Please contact our sales if you need more instructions on how to dump the calibration data.

## Trouble 2

### Picture after merging is not accurate or seamless

This problem is mainly caused by the installation position, and it usually occurs with the lower chassis vehicles. The picture quality captured by the camera will be poor and so that the calibration error will be magnified.

This issue could be result of lack of enough care taken while moving the cursor between the calibration points .

## Trouble 3

### Some part of the picture after merging is mirrored

If you have selected some OEM camera from your own supplier chain, please confirm whether the image from the sensor is mirrored or not, and if mirrored, please choose the mirror function in the menu.

## Trouble 4

### The corner part of the picture is blank

These problem may be caused by the camera itself, please make sure if the camera get sufficient pixel content after camera installation(whether the installation position is too close to the ground)



## The merging result is completely fail **Trouble 5**

1. Be careful to choose a proper vehicle size when starting the camera calibration. The vehicle type parameter must be set according to the size of the vehicle. Mismatch could result to such issues.
2. Make sure there should be no obtuse mistakes e.g., while calibrating the rear camera you are mistakenly choosing the front camera or making a mistake for the left/right direction.
3. Please use your smart phone to take a photo after you finish each step when move done all cross cursor to these corresponding calibration points to us, our system can dump all these calibration data to TF card and our technical team will help you to find the root of the problem once we get your calibration data. Please contact us if you need more instructions on how to dump the calibration data.



# Tips & Warranty

We warrants the equipment it manufactures to be free from defects in material and workmanship. If equipment fails because of such defects and We are notified within two (2) years from the date of shipment, We will, at its option, repair or replace the equipment provided that the equipment has not been subjected to mechanical ,electrical or other abuse or modifications. Equipment that falls under conditions other than those covered will be repaired at the current price of Parts and labor in effect at the time of repair. Such repairs are warranted for ninety (90) days from the day of reshipment to the Buyer.

This warranty is in lieu of all other warranties expressed or implied, including without limitation any implied warranty or merchantability or fitness for any particular purpose, all of which are expressly disclaimed.

1. Proof of sale may be required in order to claim warranty.
2. Copper cables are limited to a 30 day warranty and cables must be in their original condition.

The information in this manual has been carefully checked and is believed to be accurate. However, We assume no responsibility for any inaccuracies that may be contained in this manual. In no event we will be liable for direct, indirect, special, incidental, or consequential damages resulting from any defect or omission in this manual, even if advised of the possibility of such damages. The technical information contained herein regarding the features and specifications is subject to change without notice. For the latest warranty coverage information, please visit the web page.



# Service Promise



As a leading R&D enterprise in the Automobile industry, we are committed to engineering and manufacturing our products to the highest standards of quality, performance, and value. From our advanced product design, manufacturing and quality control procedures to our friendly and knowledgeable support teams, our commitment to satisfy you is paramount. In every interaction with us, you can be confident you will receive our commitment to Service, Support, and Solutions. For 7 years, our objective has been to ensure that every customer is completely satisfied with every purchase. To underscore this commitment, we offer our Satisfaction Guarantee. This means we will work diligently to resolve any issue you have with your purchase until you are completely satisfied. Our employees are prepared to do whatever it takes to make certain that the entire process of doing business with us is a positive and professionally rewarding experience for you. We greatly appreciate your business. It is our intent to keep you as a customer for life.

