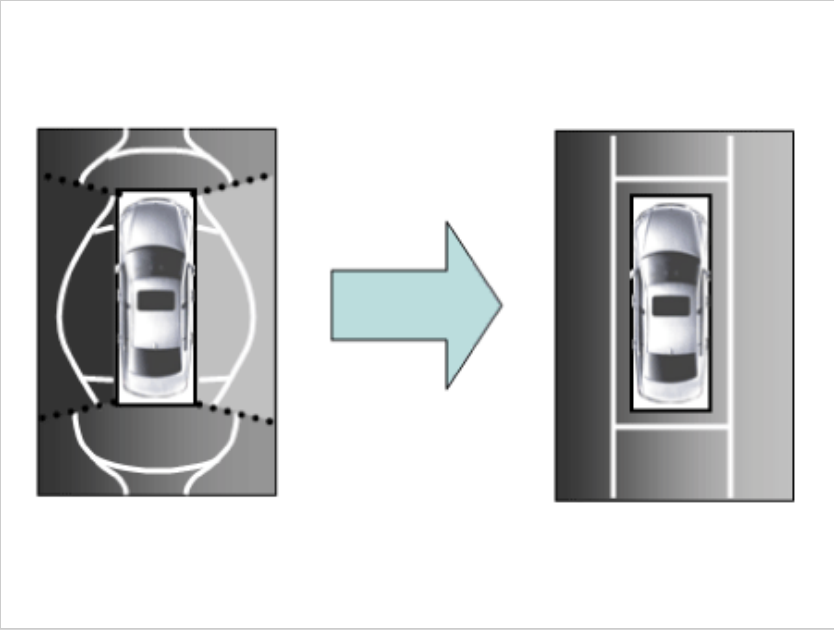
Description

Surround View Monitor (SVM) allows video monitoring of 360 degrees around the vehicle. The system consists of 4 ultra optical cameras mounted around the vehicle (front, both sides and rear).

The video images from these cameras are applied with distortion compensation, time point conversion, and video merging technologies to provide sky-view image of the vehicle"s surrounding area, as well as various other view modes.

The SVM System provides video feed of the vehicle"s surrounding area while parking or during low speed driving to the driver to enhance safety and driver"s convenience.

Also, it features steering wheel synchronized guide line indication, front and rear object warning, and A/S (including In-Line) tolerance compensation.



This system displays the video images from ultra optical cameras mounted on 4 sides of the vehicle, on the Head Unit Screen. It shows 360 degrees sky-view image of the vehicle"s arounding area, as well as various other view modes.

Major Features

1. Display Surrounding Area of Vehicle in Video

   The surrounding area video display function displays 360 degrees video image captured from four cameras on the Head Unit Screen while the vehicle is moving at low speed or reversing. The SVM System displays total 8 video modes for displaying surrounding video based on the vehicle driving state and the driver"s selection.

2. Guide Line Indication & Steering Wheel Synchronized Feature

   The Guide Line Indication & Steering Wheel Synchronized Feature is the function that assists the driver in parking by synchronizing the steering wheel with the rear view video display marked with a guide line to help anticipate the direction of the reversing vehicle.

3. Front/Rear Object Warning (Obstacle Detection Feature)

   The system receives obstacle warning signal from the PDW or PA sensors mounted on the front/rear of the vehicle and displays the obstacle location on the AVN Head Unit Screen.

4. Tolerance Compensation (including A/S)

   Manual Tolerance Compensation Software is embedded in the SVM ECM to compensate the SVM deviation that may occur due to assembly line installation tolerance. You must first setup proper work environment in order to perform correct tolerance compensation.

Main Features

No.	Main Features	Detailed Description	Notes
1	8 Display View Modes	• 4 Front & 4 Rear Display View Modes	Merged Video Display of 8 Modes
2	Front Assist Mode Selection Feature	• Display only the Front Mode by using the Front Mode Selection Switch	Same as the PDW SVM Switch
3	Rear Steering Synchronized Parking Guide Line Display	• Displays Parking Guide Line by synchronizing with the steering wheel when going reverse.	Display over the Rear Video
4	PDW Obstacle Indication	• Display obstacle warning from rear and front PDW	Display both on the Cluster and the Head Unit
5	User Setting Option	• Select Steering Wheel Synchronized Guide Line Indication • Select Front/Rear Obstacle Indication	Provides additional screen settings

		• Select Initial Front/Rear View Screen	
6	Assembly Line & A/S Tolerance Compensation Feature	• Compensation - Tolerance Compensation for camera installation deviation and assembly line tolerance is required	Compensation function recognition logic applied

SVM Mode Entry Conditions

The vehicle information is accessed regularly, even after entering SVM mode. When the conditions are met, conversion from front mode to rear mode is available, and vice versa.

When the mode is converted, the view displayed on the screen can be the initial view or the previous view depending on the conditions.

If the mode for conversion is the initial entry, the default view is selected based on the front or rear. If a continuous front-rear conversion mode occurs as forward and backward movement are repeated for parking, the previous view is recalled and displayed.

– Initial Entry : When the rear and front view modes in SVM mode are displayed on the screen for the first time.

– Re-entry: When switching from SVM mode to another mode, without turning off SVM, and returning to the previous mode (e.g. Rear → Front → Rear: Re-enter rear mode / Front → Rear → Front: Re-enter front mode)

Switch mode	Vehicle speed	Gear	SVM Switch	Display view
Rear → Front	Below 20 km/h	R Range or P Range excluded	ON	Initial Entry: Front view set in the initial view mode option
				Re-entry: The last view mode displayed in the previous front mode
Front → Rear	Irrelevant	Reverse Gear	Irrelevant	Initial Entry: Rear view set in the initial view mode option
				Re-entry: The last view mode displayed in the previous rear mode

SVM Mode Disengagement

If the conditions below are satisfied while in SVM mode, the SVM is turned OFF and no video is displayed.

OFF Mode	Vehicle speed	Gear	SVM Switch	Notes
Front mode	Over 20 km/h	R Range or P Range	OFF	If any of the three conditions is satisfied
Rear mode	Irrelevant	Except R gear	Irrelevant	If any of the two conditions is satisfied

SVM Options

Considering the user''s convenience, the SVM provides three options for the user to select from.

The window for changing options (parking guide settings) is displayed on the AVN. Only the changed options are forwarded to the SVM unit through M_CAN.

These three options are applied as soon as they are selected by the user. Based on the conditions, the initial views displayed are as follows.

Option	Function	Default setting
Guideline steering interlocking	Interlocks with steering to display the driving direction of the vehicle during parking.	Classification code
Close range warning indicator	Indicates front and rear obstacle detection	Classification code
Initial view mode setting	Default view displayed when entering SVM mode	Front + Surround view
		Rear + Surround view

Operations for Guideline Steering Interlocking Indications

The guideline for steering interlocking trace is indicated by using the value of steering wheel angle periodically received by SVM unit via C-CAN.

A combination of the rear area that displays 130 degree image of the rear mode (two-split mode) and the expected car movement trace displayed on the wide view is displayed.

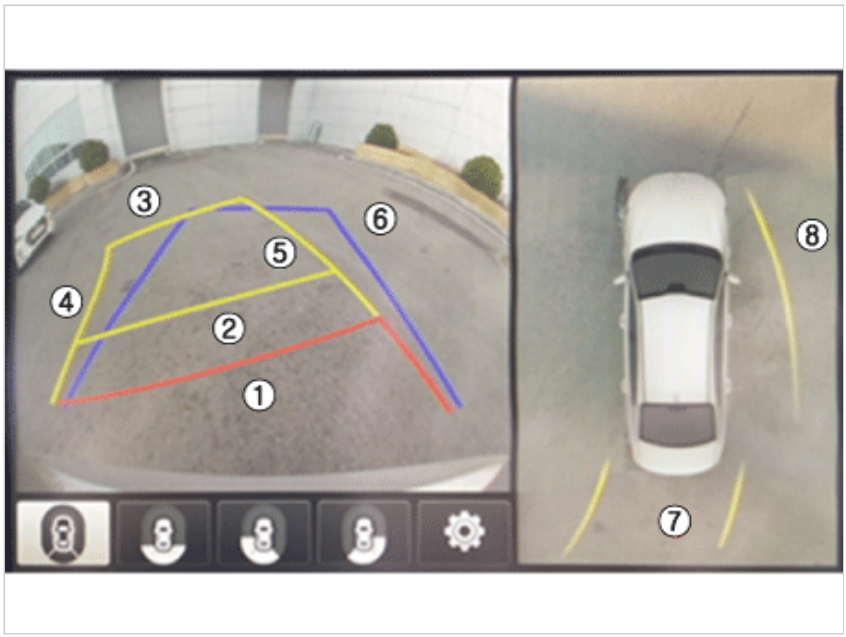
1. View modes for guideline steering interlocking indications

Mode	View	Applied area	Notes
Rear	Surround view + rear	Rear image (two-split mode)	

			
	Left rear + rear	Rear image (two-split mode)	
	Right rear + rear	Rear image (two-split mode)	
	Rear wide view	Wide view image	

2. Specifications for guideline steering interlocking trace lines

Description	Number	Distance	Color
Steering wheel interlocking trace lines	①	0.5 m	Red
	②	1.0 m	Yellow
	③	3.0 m	Yellow
	④	Vehicle left side end + 0.3 m	Red + Yellow
	⑤	Vehicle right side end + 0.3 m	Red + Yellow
Neutral trace line	⑥	3.0 m	Blue
Surround views mode trace lines	⑦	Surround View + 0.3 m	Yellow
	⑧		Yellow



SVM System Input/Output

1. Camera input

Item		Specification
Lens angle of view		190 degrees
Angle of view	Horizontal	186 degrees
	Vertical	135 degrees
Function		Provides the original image of the wide angle image (no additional function)
Application location		Same camera applied to the front, rear, left and right

2. SVM image output
   The SVM unit carries out distortion compensation and video merging on the image from 4 cameras installed around the vehicle, indicates steering interlocking guidelines and others, and sends the output in analog.
3. SVM switch
   When the switch is ON, this is used as a control input signal that operates the front view mode.
4. Ignition input
   The SVM unit displays images only when IGN2 ON. With IGN2 OFF, it is in SVM OFF state, and limits image output.
   SVM unit uses signal input from IGN pin or M_CAN communication to determine whether IGN2 is ON or OFF.
5. Output switch indicator lamp
   SVM units sends output power in PWM waves from the LED located in the SVM switch to show the user that the switch is pressed.
6. Input chassis CAN (C_CAN)
   The SVM unit uses C_CAN to receive information about the vehicle"s condition and to decide whether to carry out main SVM operations.
7. Multimedia CAN input/output (M_CAN)
   M-CAN signal is changed to C-CAN signal by IGPM (routing function or central gateway) and then SVM unit can use this C-CAN signal.
   M_CAN is used to communicate with ICU to send and receive the following information.
   - Send SVM mode conversion requests for SVM output images (e.g. Navi mode→SVM mode)
   - Send requests for user SVM view conversion
   - Send compensation coordinates for tolerance compensation
   - Send warning messages to be displayed on the AVN
   - Send any user option changes