

Front View Camera Module Learn

Calibration (without UGN)

The calibration process for the front view camera system is necessary when a front view camera module is replaced by a new one. **This process is required anytime the module is removed from it's bracket, or the windshield glass has been replaced,** and the frontview camera module has been mounted again properly. **Any maintenance, repair, or part replacement that impacts the vehicle ride height will also require frontview camera calibration.** This process shall be completed within 3–5 minutes when the correct driving conditions are met. If conditions are not met, the front view camera module shall continuously run the service point calibration until successfully completed. This process shall work across ignition cycles and shall not be required to be re-initialized at start up. If the Lane Departure Warning Switch is pressed during calibration, the indicator will flash momentarily and then stay out — this is normal operation.

During this time the Lane Departure Warning amber indicator will illuminate.

To calibrate the front camera, operate the vehicle in the following conditions until the calibration is complete:

- Clean windshield.
- Avoid lane changes.
- Maintain vehicle speeds between 56–90 km/h (35–56 MPH).
- Ensure the road contains visible references (well defined lane markings, curbs, etc.).

Calibration Procedure

1. Apply the parking brake.
2. Place the transmission in Park (if applicable)
3. Install scan tool
4. Navigate to the module diagnostics menu
5. Select Frontview Camera Module
6. Select Configuration / Reset Functions menu Item
7. Select the Frontview Camera Learn procedure and follow the directions displayed on the screen.
8. Drive the vehicle to complete calibration.

Once the procedure is complete, the amber indicator will turn off. Shortly after the green ready to assist light should turn on as long as all conditions are met for normal operation and the system is left ON. The system is then ready to assist.

Calibration (with UGN)

New modules must be SPS programmed prior to calibration, refer to [Control Module References](#)

The calibration process for the front view camera system is necessary when a front view camera module is replaced by a new one. **This process is required anytime the module is removed from it's bracket, or the windshield glass has been replaced,** and the frontview camera module has been mounted again properly. **Any maintenance, repair, or part replacement that impacts the vehicle ride height will also require frontview camera calibration.** This process shall be completed within 3–5 minutes when the correct driving conditions are met. If conditions are not met, the front view camera module shall continuously run the service point calibration until successfully completed. This process shall work across ignition cycles and shall not be required to be re-initialized at start up. If the Lane Departure Warning Switch is pressed during calibration, the indicator will flash momentarily and then stay out — this is normal operation.

Note: Calibration is not required if the existing module was reprogrammed. This procedure only needs to be conducted if the module was replaced.

Once SPS programming is complete, it is necessary to initiate the calibration using a scantool. During this time the “Service Driver Assist” service message will be displayed.

To calibrate the front camera, operate the vehicle in the following conditions until the calibration is complete:

- Clean windshield.
- Avoid lane changes.
- Maintain vehicle speeds between 56–90 km/h (35–56 MPH).
- Ensure the road contains visible references (well defined lane markings, curbs, etc.).

Calibration Procedure

Note: It is necessary to have the scan tool connected during the entire process. Do not back out of the screen or press any other buttons.

1. Apply the parking brake.
2. Place the transmission in Park (if applicable)
3. Install scan tool
4. Navigate to the module diagnostics menu
5. Select Frontview Camera Module
6. Select Configuration / Reset Functions menu Item
7. Select the Frontview Camera Learn procedure and follow the directions displayed on the screen.
8. Do not disconnect the scan tool, drive the vehicle to complete calibration.

Once the procedure is complete, the service message will turn off and normal operation will resume. Shortly after the green ready to assist light should turn on as long as all conditions are met for normal operation. The system is then ready to assist.

[If Slow to Calibrate](#)

The ideal calibration condition is driving on a 2 lane divided highway with markings on both sides of the lane. One or more of the following conditions may increase the length of time required to complete the self-calibration procedure:

- Heavy traffic
- Stop and go traffic
- Mountain roads
- Curves in roadway
- Poor contrast lane markings
- Botts' Dots type lane markings
- Operating the vehicle speed is greater than 90 km/h (56 MPH)
- Driving through snow or fog, or driving directly into the sun
- Camera not properly installed. Verify it is snapped into tabs and is secure. Refer to [Front View Camera Replacement](#).

No Calibration

Conditions that will prevent completion of the self-calibration procedure:

- Dirty windshield glass or obstruction on windshield. This may include a tinted windshield, windshield tint strips, or vinyl strips or graphics on the windshield. Additionally, other obstructions such as brush guards or hood deflectors may obstruct view of the B174W Frontview Camera – Windshield and hinder its ability to complete the learn.
- Operating the vehicle with speed less than 56 km/h (35 MPH)
- No visible lane markings
- Severe weather where lane markings cannot be seen
- Steering Angle Sensor not calibrated. Refer to: [Steering Wheel Angle Sensor Centering](#)
- Vehicle Dynamic Sensor Offset not calibrated. Refer to: [Vehicle Dynamic Sensor Offset Calibration](#)
- B174W Frontview Camera – Windshield not properly installed. Verify it is snapped into tabs and is secure. Refer to [Front View Camera Replacement](#). Ensure the bracket is in the correct location by comparing to a known good vehicle. This is especially important if the windshield was recently replaced. Some aftermarket windshield may have the B174W Frontview Camera – Windshield in the incorrect location. Improper installation of a replacement windshield may also prevent completion of the learn if the windshield was not centered and leveled in the vehicle's windshield opening.

B174W Frontview Camera - Windshield: Programming and Setup

Note:

- DO NOT program a control module unless directed to by a service procedure or a service bulletin. If the control module is not properly configured with the correct calibration software, the control module will not control all of the vehicle features properly.
- Ensure the programming tool is equipped with the latest software and is securely connected to the data link connector. If there is an interruption during programming, programming failure or control module damage may occur.
- Stable battery voltage is critical during programming. Any fluctuation, spiking, over voltage or loss of voltage will interrupt programming. When required install the *EL-49642* SPS Programming Support Tool to maintain system voltage. If not available, connect a fully charged 12 V jumper or booster pack disconnected from the AC voltage supply. DO NOT connect a battery charger.
- Turn OFF or disable systems that may put a load on the vehicles battery such as; interior lights, exterior lights (including daytime running lights), HVAC, radio, etc.
- During the programming procedure, follow the SPS prompts for the correct ignition switch position.
- Clear DTCs after programming is complete. Clearing powertrain DTCs will set the Inspection/Maintenance (I/M) system status indicators to NO.
- Anytime the B174W Frontview Camera Module is removed from its mount, it must follow the Frontview Camera Module Learn procedure.

Following Replacement of Windshield

The B174W Frontview Camera Module must be calibrated, refer to [Front View Camera Module Learn](#).

Replace and Program Frontview Camera Module or Reprogram Frontview Camera Module (without UGN)

Note: Due to continuous improvements, the on screen selections may vary from instructions below.

To program a replacement or an existing Front View Camera Module, perform the following procedure:

1. Access the Service Programming System (SPS) and follow the on-screen instructions.
2. On the SPS Supported Controllers screen, select B174W Frontview Camera - Windshield – Programming and follow the on-screen instructions.
3. Clear DTCs
4. Following B174W Frontview Camera - Windshield replacement and reprogramming, the module must be calibrated. Refer to [Front View Camera Module Learn](#).

Replace and Program Frontview Camera Module or Reprogram Frontview Camera Module (with UGN)

To program a replacement or an existing B174W Frontview Camera - Windshield , perform the following procedure:

1. Access the Service Programming System (SPS) and follow the on-screen instructions.
 2. On the SPS Supported Controllers screen, select B174W Frontview Camera - Windshield – Programming and follow the on-screen instructions.
- Note:** After programming is performed, it is normal to have DTC B101E 4B set until calibration is complete.
3. If reprogramming an existing module that was previously calibrated, calibration is not required. The module retains its calibration settings during reprogramming. If a new module was programmed the module alignment must be calibrated. Using a scan tool, initiate the learn procedure for B174W Frontview Camera - Windshield . The scan tool must remain connected and on the calibration screen during the entire process.

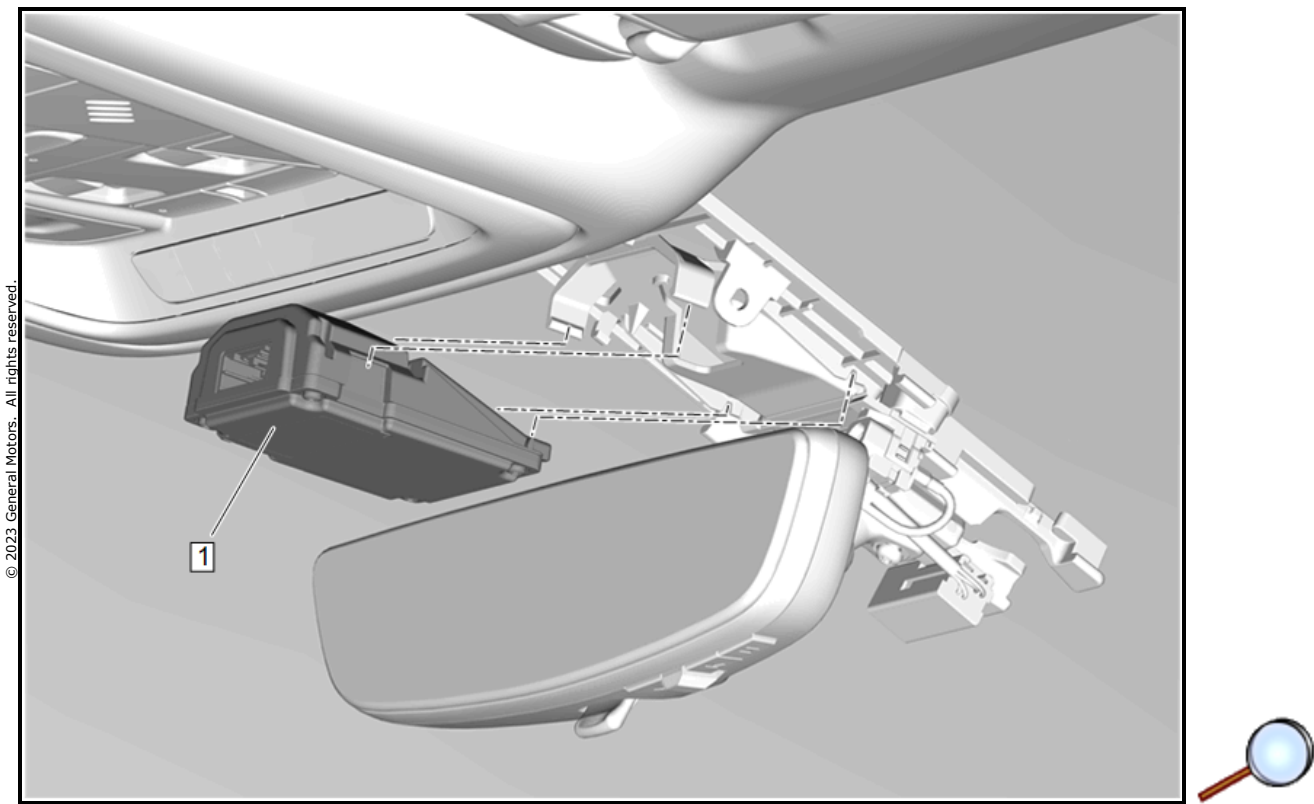
Refer to [Front View Camera Module Learn](#).

Unsuccessful Programming Recovery

In the event of an interrupted or unsuccessful programming event, perform the following steps:

1. DO NOT turn the ignition OFF. Ensure that all B174W Frontview Camera - Windshield , DLC and programming tool connections are secure and the TIS terminal operating software is up to date.
 2. Attempt to reprogram the B174W Frontview Camera - Windshield .
 3. If the B174W Frontview Camera - Windshield can still not be programmed, turn the ignition OFF for at least one minute.
 4. Turn the ignition ON and attempt to reprogram the B174W Frontview Camera - Windshield . The B174W Frontview Camera - Windshield should program.
- ⇒ If the B174W Frontview Camera - Windshield still cannot be programmed, replace the B174W Frontview Camera - Windshield .

Front View Camera Replacement



Front View Camera Replacement

Callout	Component Name
<p>Warning: While operating, electrical control modules can produce heat and become hotter than their surroundings. To prevent burns allow sufficient time for the module to cool before removal.</p> <p>Preliminary Procedure</p> <p>Windshield Multifunction Sensor Mount Bracket Cover Replacement</p>	
1	Front View Camera Procedure

Callout	Component Name
	<div>1. Disconnect the electrical connector.</div> <div>2. Release the retaining tabs.</div> <div>3. Perform the necessary programming and setup procedure: Control Module References</div>

Radar Sensor Module - Long Range Learn

Note: An ADAPTIVE CRUISE TEMPORARILY UNAVAILABLE message may be displayed on the driver information center if this calibration procedure is required. The B233B Radar Sensor Module – Long Range may have become misaligned.

After replacing and programming the B233B Radar Sensor Module – Long Range, it is necessary to perform a calibration procedure to align the radar. This is indicated by DTC B101E 4B being set as current. Calibration is performed while driving the vehicle with the scan tool connected. Calibration is initialized using a scan tool and the scan tool must remain connected until calibration is complete. During this time the SERVICE DRIVER ASSIST message will be displayed on the driver information center. Once the procedure is complete, the message will turn off and normal operation will resume.

Calibration is not required if the existing B233B Radar Sensor Module – Long Range was only programmed. Calibration needs to be conducted if the B233B Radar Sensor Module – Long Range was replaced or removed and re-secured.

If calibration is not successful, it could be due to improper driving environment, radar and bracket assembly bent out of position, or incorrect radar mounting. A typical driving environment is usually sufficient to calibrate the module within 10–30 minutes. Visually inspect for damaged, bent, or broken B233B Radar Sensor Module – Long Range bracket. Brackets out of level more than 2 degrees will not calibrate or self-learn. Discuss with the customer about vehicle history and possible past accident. Replace bracket if damaged.

Calibration Procedure

1. Verify no other DTCs, except for DTC B101E 4B, are set.

⇒ **If other DTCs are set**

Diagnose any other DTCs first. Refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#).

⇓ **If no other DTCs are set**

2. Prior to driving the vehicle make sure the surface in front of the B233B Radar Sensor Module – Long Range is clean. Also, verify the mounting area is not damaged and allows the B233B Radar Sensor Module – Long Range to face the intended direction.
3. Prepare the scan tool to be mobile for Long Range Radar Calibration driving phase. The scan tool needs to stay connected during the driving phase of the calibration.
4. Engine running.

Note: Once calibration has begun, do not back out of screen or press any other buttons on the scan tool until the calibration is complete.

5. Select Long Range Radar Sensor Module Learn on the scan tool and follow any on-screen instructions. The driver information center will display the SERVICE DRIVER ASSIST message during calibration.
6. Drive the vehicle within the following conditions for 10–30 minutes or until calibration is complete. The SERVICE DRIVER ASSIST message will turn off when calibration is complete.
 - Drive at speeds greater than 56 kph (35 mph)
 - Minimize tight curves

- Avoid extreme acceleration or deceleration
 - Follow one or multiple vehicles. (typical vehicle traffic is sufficient, but vehicles 30m – 50m (100 –165ft) away are most effective at decreasing the calibration time)
 - Drive in an environment that has stationary objects on the side of the road (street signs, guard rails, mail boxes, fences, etc)
7. Verify proper calibration by observing that the SERVICE DRIVER ASSIST message turns off within 10–30 minutes of normal driving.

⇒ **If the SERVICE DRIVER ASSIST message fails to turn off**

7.1. Verify DTC B390C 66 is not set

⇒ If the DTC is set

Refer to [DTC B390C](#).

⇓ If the DTC is not set

7.2. Refer to If Slow to Calibrate below and repeat the calibration procedure following recommended operating conditions.

⇓ **If the SERVICE DRIVER ASSIST message turns off**

8. Drive at speeds greater than 40 kph (25 mph) and verify engagement of adaptive cruise control.

⇒ **If adaptive cruise control will not engage**

Check vehicle for DTCs and correct as required.

⇓ **If adaptive cruise control engages**

9. All OK.

If Slow to Calibrate

The ideal calibration condition is driving on a freeway or two lane road with medium traffic. One or more of the following conditions may increase the length of time required to complete the self-calibration procedure:

- Visually inspect for damaged, bent, or broken Long Range Radar bracket. Brackets out of level more than 2 degrees will not calibrate or self-learn. Discuss with the customer about vehicle history and possible past accident. Replace bracket if damaged.
- Heavy traffic – following too close behind vehicles for long periods (more than 40 min)
- Stop and go or very slow traffic
- Mountain roads
- Constant sharp curves in roadway
- No traffic – if no traffic is available, may need to add vehicle ahead to support calibration
- Limited or no stationary structures on side of the road — need structures such as street signs, guard rails, mail boxes, parked cars, etc.
- Driving in tunnels

B233B Radar Sensor Module - Long Range: Programming and Setup

Note:

- DO NOT program a control module unless directed to by a service procedure or a service bulletin. If the Long Range Radar Sensor Module is not properly configured with the correct calibration software, the Long Range Radar Sensor Module will not control all of the vehicle features properly.
- Ensure the programming tool is equipped with the latest software and is securely connected to the data link connector. If there is an interruption during programming or programming failure, Long Range Radar Sensor Module damage may occur.
- Stable battery voltage is critical during programming. Any fluctuation, spiking, over voltage or loss of voltage will interrupt programming. When required install the *EL-49642* SPS Programming Support Tool to maintain system voltage. If not available, connect a fully charged 12 V jumper or booster pack disconnected from the AC voltage supply. DO NOT connect a battery charger.
- Turn OFF or disable systems that may put a load on the vehicles battery such as; interior lights, exterior lights (including daytime running lights), HVAC, radio, etc.
- During the programming procedure, follow the SPS prompts for the correct ignition switch position.
- Clear DTCs after programming is complete. Clearing powertrain DTCs will set the Inspection/Maintenance (I/M) system status indicators to NO.

Replace and Program Radar Sensor Module - Long Range or Reprogram Radar Sensor Module - Long Range

To program a replacement or an existing Long Range Radar Sensor Module, perform the following procedure:

1. Access the Service Programming System (SPS) and follow the on-screen instructions.
2. On the SPS Supported Controllers screen, select B233B Radar Sensor Module - Long Range – Programming and follow the on-screen instructions.
3. Ignition OFF and all vehicle systems OFF. It may take up to 2 minutes for all vehicle systems to power down.
4. Following programming, the module alignment must be calibrated.

Refer to [Radar Sensor Module - Long Range Learn](#).

Unsuccessful Programming Recovery

In the event of an interrupted or unsuccessful programming event, perform the following steps:

1. Ignition ON. Ensure the control module, DLC and programming tool connections are secure and the SPS software is up to date.
2. Verify the control module can be reprogrammed.

⇒ **If the control module cannot be reprogrammed**

- 2.1. Ignition OFF for one minute, ignition ON.

2.2. Verify the control module can be reprogrammed.

⇒ If the control module cannot be reprogrammed, replace the control module.

⇓ If the control module can be reprogrammed.

2.3. All OK.

⇓ **If the control module can be reprogrammed**

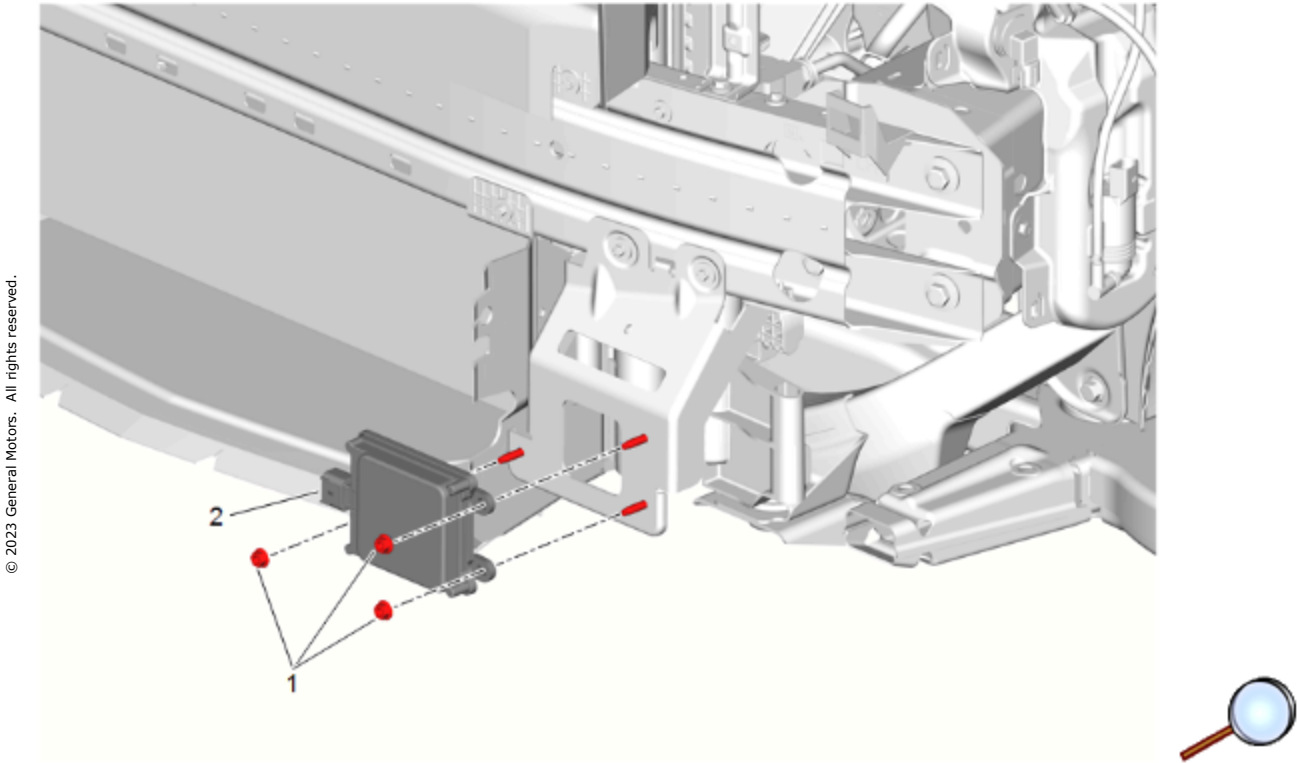
3. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

[Control Module References](#) for control module replacement, programming and setup.

Forward Range Radar Sensor Replacement



Forward Range Radar Sensor Replacement

Callout	Component Name
Preliminary Procedure Front Bumper Fascia Removal and Installation	
1	Forward Range Radar Sensor Nut [3x] Caution: Refer to Fastener Caution . Tighten 9 Y (80 lb in)

Callout	Component Name
2	<div>Forward Range Radar Sensor</div> <div>Procedure</div> <div><div>1. Disconnect the electrical connector.</div><div>2. Perform the necessary programming and setup procedure: Control Module References</div></div>

Active Safety System Description and Operation

The active safety system is a comprehensive feature set designed to help a driver avoid collisions or reduce crash damage while driving. The K124 Active Safety Control Module is the primary controller for the active safety system. The K124 Active Safety Control Module communicates on multiple serial data busses to share information with various control modules throughout the vehicle. The K124 Active Safety Control Module uses various sensors and control modules to monitor the vehicle surroundings and take deliberate action to avoid collisions or reduce crash damage. **The active safety system tightly integrates the forward collision alert, adaptive cruise control, and active emergency braking systems into a single cohesive system.**

The K124 Active Safety Control Module communicates via serial data on the object detection bus with the B174W Frontview Camera - Windshield and B233B Radar Sensor Module - Long Range to create a virtual fusion image of the area in front of the vehicle. The K124 Active Safety Control Module observes an actual visual image of the area directly ahead of the vehicle, within 60 m (197 ft), with the B174W Frontview Camera - Windshield. The B233B Radar Sensor Module - Long Range is used to measure the distance to objects that are up to 200 m (656 ft) in front the vehicle. Within 60 m (197 ft) of the vehicle, all of these inputs are combined to create a fusion image of the area in front of the vehicle. At up to 200 m (656 ft), the B233B Radar Sensor Module - Long Range will detect and begin tracking objects immediately in front of the vehicle. Within 60 m (197 ft), the B174W Frontview Camera - Windshield will confirm objects that have been detected by the B233B Radar Sensor Module - Long Range.

The fusion image created by the K124 Active Safety Control Module is used to detect collision risks and take action based on the immediacy of the risk. The a collision risk exists, the K124 Active Safety Control Module will alert the driver using the forward collision alert system. This will provide the driver with a visual and audible or haptic alert that a collision risk has been detected. If the driver does not take action to reduce the risk of collision, such as changing lanes or applying the brakes, the intelligent brake assist system will pre-fill the brake hydraulic system to reduce system response time and increase pressure when quickly applying the brakes. If a collision risk is imminent, the K124 Active Safety Control Module will enter automatic collision preparation, which will automatically apply the brakes in an effort to mitigate the collision or reduce collision damage.

The K124 Active Safety Control Module communicates with the B99 Steering Wheel Angle Sensor and the B119 Multi-axis Acceleration Sensor via serial data on the chassis expansion bus. These sensors are used to determine the intended vehicle path. Using the steering data and vehicle acceleration data, the K124 Active Safety Control Module will determine where the vehicle will be traveling and focus attention on objects in this path. An example would be a driver quickly changing lanes to avoid a collision. This would mitigate the collision risk in the previous lane and the K124 Active Safety Control Module would quickly transition to tracking objects for any collision risk in the new lane based on intended vehicle path. The K124 Active Safety Control Module also communicates with the K17 Electronic Brake Control Module to instigate the braking functions of intelligent brake assist and automatic collision preparation.

The Active Safety System analyzes data from the various control modules and sensors listed below:

- K124 Active Safety Control Module
- B174W Frontview Camera - Windshield
- B233B Radar Sensor Module - Long Range
- K17 Electronic Brake Control Module

Component Description

K124 Active Safety Control Module

The K124 Active Safety Control Module analyzes data from various modules, sensors, and switches to provide enhanced safety features. In addition to providing alerts, the K124 Active Safety Control Module will provide driver assistance through integrated brake assist, automatic collision preparation, rear emergency braking, and adaptive cruise control. Inputs and outputs can either be connected directly to the K124 Active Safety Control Module or communicate through serial data. The K124 Active Safety Control Module communicates on a dedicated object detection bus, as well as the chassis expansion bus and low speed GMLAN.

Forward collision alert and lane departure warning can be user selected to either a haptic signal utilizing the driver's safety alert seat or using beeps through the infotainment system. This setting can be found in the vehicle personalization menus. See the owner's manual for more detailed information on vehicle personalization.

If there is a DTC set in any of the modules that the K124 Active Safety Control Module uses as inputs, it will send a "Service Driver Assist" message to the P16 Instrument Cluster to alert the driver of a problem with the system. No other specific details are given unless the driver attempts to activate a specific system. For example if the driver attempts to turn on lane keep assist, the P16 Instrument Cluster will display "Lane Keep Assist Unavailable" and the indicator will flash and then go out. A scan tool must be used to read the DTCs that are causing the malfunction to help find the problem. Some of the inputs to the K124 Active Safety Control Module can affect forward facing features, rear facing features, or all features. Systems to check to determine which area to focus lane keep assist and adaptive cruise control. If none of the active safety system features are operative, there may be an issue with another module on the vehicle not providing the proper data to the K124 Active Safety Control Module. If all K124 Active Safety Control Module features are inoperative, check the Adaptive Cruise Control Inhibit History and Disengage History scan tool data for the reason for the malfunction. Definitions of parameters and suggestions on what to look for can be found in [K124 Active Safety Control Module: Scan Tool Information](#). Any item with a "Yes" was the reason why the adaptive cruise control system was inoperative at that time. In some cases verifying the module is the correct part number, has the latest version of software is necessary, and is calibrated properly.

- K124 Active Safety Control Module inputs:
 - B174W Frontview Camera - Windshield
 - B233B Radar Sensor Module - Long Range
 - B119 Multi-axis Acceleration Sensor
 - B99 Steering Wheel Angle Sensor
 - B5 Wheel Speed Sensors
 - Adaptive cruise control gap switch
 - Lane keep assist switch
- K124 Active Safety Control Module outputs:
 - K9 Body Control Module
 - K17 Electronic Brake Control Module
 - K20 Engine Control Module

- P16 Instrument Cluster
- P29 Head-Up Display
- K40 Seat Memory Control Module (safety alert seat)
- Lane keep assist switch indicator
- Infotainment system

B174W Frontview Camera - Windshield

The B174W Frontview Camera - Windshield is located behind the windshield, looking out at the road ahead and detects lane markings and objects directly ahead, within a distance of approximately 60 meters (197 ft). The B174W Frontview Camera - Windshield is used for lane departure warning and forward collision alert systems. The B174W Frontview Camera - Windshield communicates with the K124 Active Safety Control Module via serial data on the object detection bus.

Using information from the B174W Frontview Camera - Windshield, the K124 Active Safety Control Module will provide forward collision alert and lane keep assist to the driver when appropriate. The alerts and warnings can be user-selected to be audible through the audio system or haptic using the active safety seat.

B233B Radar Sensor Module - Long Range

The B233B Radar Sensor Module - Long Range is located behind the front fascia and is used in the 30–200 m (98–656 ft) range. The B233B Radar Sensor Module - Long Range communicates with the K124 Active Safety Control Module via serial data on the object detection bus. In addition to the wiring harness ground, the module is grounded through the mounting bracket.

K17 Electronic Brake Control Module

The K17 Electronic Brake Control Module performs the braking activities of the active safety system. When requested by the K124 Active Safety Control Module, the K17 Electronic Brake Control Module will prepare or apply the brakes as necessary in response to an imminent collision.

Active Safety System Operation

Forward Collision Alert

The forward collision alert system is a convenience feature of the K124 Active Safety Control Module, B174W Frontview Camera - Windshield, and B233B Radar Sensor Module - Long Range that issues a warning to the driver when a potential collision risk exists. When the system detects a vehicle in the path ahead, the green vehicle ahead indicator is illuminated on the P16 Instrument Cluster. If the vehicle ahead is being followed too closely, the vehicle ahead indicator will be amber. When approaching another vehicle too rapidly, the collision alert symbol will flash in the P29 Head-Up Display. An audible alert sound will simultaneously sound or the safety alert seat will provide haptic feedback. The visual alert cannot be changed, but the driver can select between audible or haptic alerts in the vehicle personalization menus. Refer to the vehicle owner manual for more detailed information on vehicle personalization.

Forward collision alert does not provide a warning to help avoid a crash, unless it detects a vehicle. Forward collision alert may not detect a vehicle ahead if the B174W Frontview Camera - Windshield is blocked by dirt, snow, or ice, or if the windshield is damaged. It may also not detect a vehicle on winding or hilly roads, or in conditions that can limit visibility such as fog, rain, or snow, or if the

headlamps or windshield are not cleaned or in proper condition. Keep the windshield, headlamps, and B174W Frontview Camera - Windshield area clean and in good repair.

Forward collision alert may provide unnecessary alerts for turning vehicles, vehicles in other lanes, objects that are not vehicles, or shadows. These alerts are normal operation and the vehicle does not need service.

Forward Automatic Braking

Forward automatic braking uses the K124 Active Safety Control Module, B174W Frontview Camera - Windshield, and B233B Radar Sensor Module - Long Range to determine if an imminent collision risk exists. If the brakes have not been applied, the system will automatically apply the brakes all the way to a complete stop in an effort to mitigate the collision or reduce collision damage. The system has a detection range of approximately 60 m (197 ft) and will only function when a vehicle is detected, as indicated by the green vehicle ahead indicator is illuminated on the P16 Instrument Cluster.

Automatic collision preparation is not a substitute for normal vehicle braking and should not be relied on to brake the vehicle. Automatic collision preparation may not detect a vehicle ahead if the B174W Frontview Camera - Windshield is blocked by dirt, snow, or ice, or if the windshield is damaged. It may also not detect a vehicle on winding or hilly roads, or in conditions that can limit visibility such as fog, rain, or snow, or if the headlamps or windshield are not cleaned or in proper condition. Keep the windshield, headlamps, and B174W Frontview Camera - Windshield area clean and in good repair.

Intelligent Brake Assist

Intelligent brake assist is designed to pre-fill the brake hydraulic system to reduce system response time and increase pressure when quickly applying the brakes. Using the K124 Active Safety Control Module, B174W Frontview Camera - Windshield, and B233B Radar Sensor Module - Long Range, the system monitors the approach speed and distance to a vehicle ahead. If the Intelligent brake assist system determines a collision risk exists, it will begin preparations to the brake hydraulic system. When active, minor brake pedal pulsations or pedal movement may occur and this should be considered normal. Intelligent brake assist will resort to normal braking operation after an intelligent brake assist even has occurred when the brake pedal is released.

Front Pedestrian Braking

Front pedestrian braking uses the K124 Active Safety Control Module, B174W Frontview Camera - Windshield, and B233B Radar Sensor Module - Long Range to identify and help avoid or reduce the harm caused by front-end crashes with nearby pedestrians. When a pedestrian is detected, an amber pedestrian indicator is illuminated. When approaching a detected pedestrian too quickly, front pedestrian braking provides will flash the pedestrian indicator red and an audible alert sound will simultaneously sound or the safety alert seat will provide haptic feedback. Front pedestrian braking can provide a boost to braking via Intelligent brake assist or, if no action is taken by the driver, automatically brake the vehicle through forward automatic braking.

The front pedestrian braking system can detect and alert to pedestrians in a forward gear at speeds between 8 km/h (5 mph) and 80 km/h (50 mph). During daytime driving, the system detects pedestrians up to a distance of approximately 40 m (131 ft). During nighttime driving, system performance is very limited. Through vehicle personalization, front pedestrian braking can be set to Off, Alert, or Alert and Brake.

Lane Keep Assist

The lane keep assist system is a convenience feature that utilizes the B174W Frontview Camera - Windshield and K124 Active Safety Control Module to maintain the vehicle location between identified lane markings. The B174W Frontview Camera - Windshield is located behind the windshield, looking out at the road ahead and detecting any lane markings. If the vehicle begins to approach an identified lane marking, automatic correction will be applied by the electric power steering to move the vehicle back toward the center the lane. An integrated function of lane keep assist is lane departure warning. When the vehicle unintentionally leaves a detected lane, visual and audible or haptic alerts are given to the driver. The visual alert cannot be changed, but the driver can select between audible or haptic alerts in the vehicle personalization menus.

Refer to [Lane Keep Assist Description and Operation](#) for more information about the lane keep assist function.