DRIVING ASSIST SYSTEM

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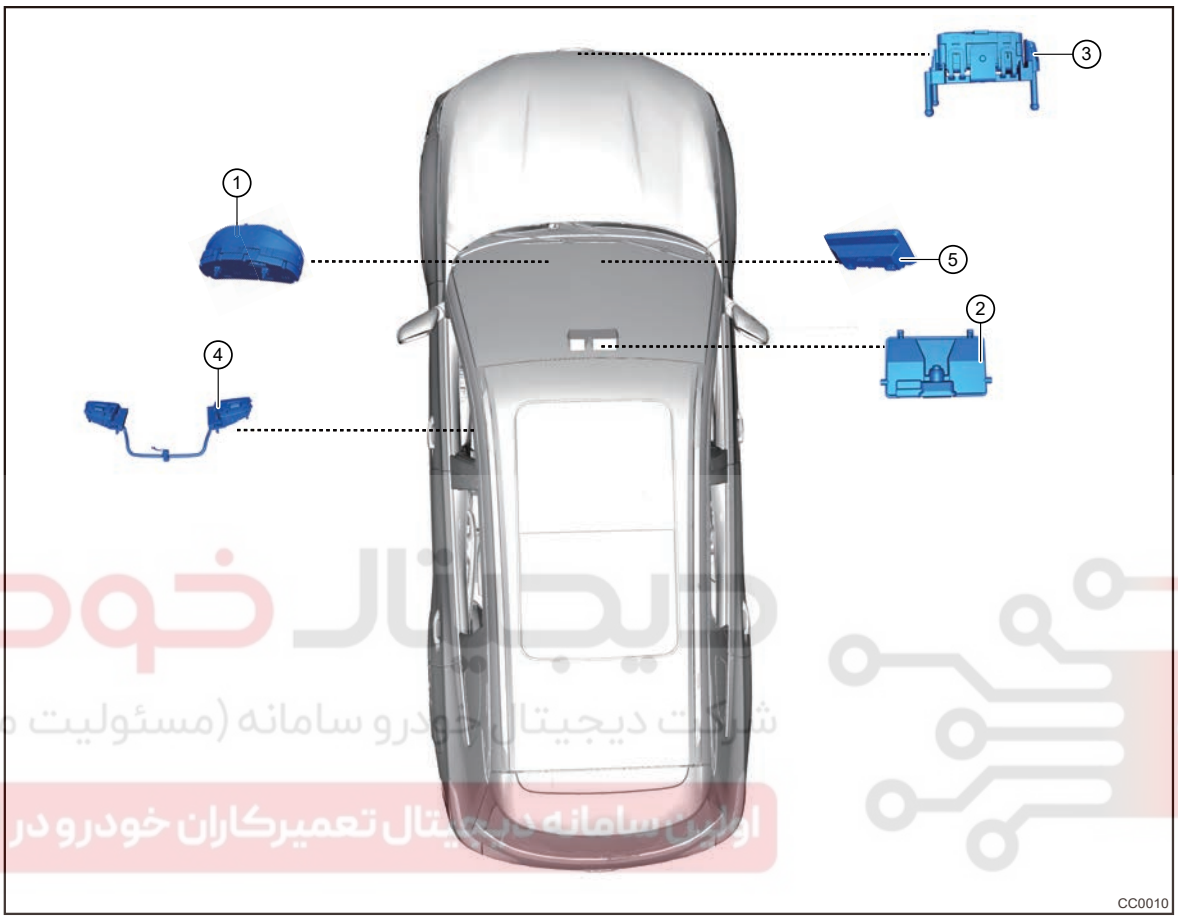
GENERAL INFORMATION

System Overview

Description



1	Instrument Cluster	2	Multi-function Front Camera
3	Microwave Radar Module	4	Multi-function Steering Wheel Button
5	Audio Head Unit		

System Principle

Constant Speed Cruise/Active Speed Limit ASL

Description

Turn on the constant speed cruise control switch after vehicle reaches a certain speed, and the set vehicle speed can be maintained by constant speed cruise control, without accelerator depressed. When active speed limit function is turned on, vehicle speed does not exceed the speed limit set. Cruise control system consists of the following components:

- Constant speed cruise control switch (multi-function switch).
- Instrument Cluster Meter (ICM).
- Engine Control Module (ECM).

- Transmission Control Unit (TCU).
- ABS/ESP control module.
- Accelerator pedal.
- Brake switch.
- Clutch switch.

CAUTION

Do not use cruise control in the following situations. Otherwise, it may result in a loss of vehicle control and cause an accident, resulting in serious injury or even death.

- In traffic congestion areas.
- On roads with sharp bends.
- On winding roads.
- On wet and slippery roads, such as those covered with rain, ice or snow.
- On steep hills. Vehicle speed may be higher (or lower) than the set speed. It will cause that engine speed rises sharply and briefly to increase the vehicle speed to the set speed range.

Operation

Engine Control Module (ECM) receives button signal from constant speed cruise control switch (multi-function switch), and then Engine Control Module (ECM) turns on the indicator on the meter via CAN net. According to speed signal, brake signal, acceleration and deceleration signal and current working conditions, ECM determines whether to enter or cancel cruise state. After entering state, ECM controls throttle opening angle to stabilize the vehicle within the set vehicle speed range.

Function Description

1. Cruise control mode inspection
   - With ignition switch is ON, when the cruise main switch is pressed, cruise indicator on the meter illuminates and blinks (pre-cruise state, normal condition).
   - When vehicle is driving at speed range of 40 km/h ~ 150 km/h, for example, press SET/- button of cruise when vehicle speed is 45 km/h, vehicle will drive at constant cruise speed of 45 km/h (the speed when SET/- button is pressed). Meanwhile, cruise indicator on the meter is always on without blinking. If the meter is color screen, it will be displayed on upper left corner of the screen.
2. Cruise setting
   - Under the cruise state, depress the accelerator pedal or brake pedal to increase or decrease vehicle speed. Press SET/- button of cruise system while release the accelerator pedal or brake pedal, vehicle is cruising at new vehicle speed, and indicator on the meter remains on. If the meter is color screen, the new set speed will be displayed on the screen.
3. Cruise short/long press to acceleration
   - In the cruise state, short press RES/+ button once (over 0.02 seconds) to increase vehicle speed by 2 km/h. Cruise indicator on the meter remains on. If the meter is color screen, the target cruise speed displayed on left bottom will increases by 1km/h.
   - Under the cruise state, long press the RES/+ button (over 0.4 second) to accelerates vehicle continuously. Release the RES/+ button to stop acceleration, and vehicle is cruising under the speed while the RES/+ button is released. Cruise indicator on the meter remains on. If the meter is color screen, the target cruise speed displayed on left bottom changes simultaneously with actual speed.
4. Cruise short/long press to declaration
   - In the cruise state, short press SET/- button once (over 0.02 seconds) to decrease vehicle speed by 2km/h. Cruise indicator on the meter remains on. If the meter is color screen, the target cruise speed displayed on left bottom will decrease by 1km/h.
   - ; Under the cruise state, long press the SET/- button (over 0.4 second) to decelerate vehicle continuously. Release the SET/- button to stop acceleration, and vehicle is cruising at speed when

the SET/- button is released. Cruise indicator on the meter remains on. If the meter is color screen, the target cruise speed displayed on left bottom changes simultaneously with actual speed.

5. Cruise resume
   - In the cruise state, depress the brake pedal to flash the cruise indicator on the meter (pre-cruise state, normal condition), and the vehicle speed decreases.
     a. When vehicle speed is over 40 km/h, release the brake pedal and press RES/+ button, then the vehicle accelerates until the cruise state before depressing the brake pedal is returned. Cruise indicator on the meter remains on.
     b. When vehicle speed is below 40 km/h, release the brake pedal and press RES+ button, the vehicle can not return to the cruise state before depressing the brake pedal. However, further depress the accelerator until vehicle speed is over 40km/h, release the brake pedal and press RES+ button, the vehicle accelerates until the cruise state before depressing the brake pedal is returned. Cruise indicator on the meter remains on.
6. Cruise cancellation
   - In the cruise state (for example, 45km/h):
     a. Press the cruise main switch to cancel the cruise state and indicator on the meter turns off;
     b. Press the CANCEL button to cancel the cruise state and cruise indicator on the meter blinks (- enters the pre-cruise state). If the meter is color screen, it will be displayed on upper left corner of the screen;
     c. When pull up the EPB button, depress brake pedal, engine speed exceeds set range (600～6240), gear shift exceeds set range (1～6), and vehicle speed exceeds set range (35～155), the cruise state is canceled, and indicator on the cruise indicator blinks. If the meter is color screen, it will be displayed on upper left corner of the screen.

Function Description of Active Speed Limit

1. Active speed limit entering
   a. With ignition switch is ON, when active speed limit LIM button is pressed, active speed limit indicator on the meter (left bottom of middle color screen) illuminates and sends default target limit vehicle speed “30km/h” and blinks indicating pre-limit state is entered.
   b. Vehicle does not start or vehicle speed is below 30 km/h while driving, press SET- button of the active speed limit function to set the target limit vehicle speed to 30 km/h. Meanwhile, active speed limit on the meter displays ON.
   c. When vehicle is driving at speed range of 30 - 200 km/h, for example, press SET/- button of active speed limit function when vehicle speed is 110 km/h, vehicle perform speed limit function at the target speed when SET/- button is pressed. Meanwhile, active speed limit on the meter displays ON.
2. Active speed limit cancellation
   a. Press active speed limit LIM button.
   b. Press the CANCEL button to cancel the speed limit state and active speed limit indicator on the meter displays.
   c. When KD is canceled, low voltage is too low (ub < 7 V), engine speed exceeds specified range (600～ 6240), active speed limit is canceled, active speed limit indicator on the meter blinks.
3. Active speed limit KD cancellation
   a. In the active speed limit state, when driver fully depresses the accelerator pedal for overtaking or others, speed limit state is canceled temporarily. Active speed limit indicator on the meter blinks.
   b. When actual vehicle speed is higher than the limited speed set previously after KD, speed limit state or overtaking state is not entered. Vehicle speed can be increased or decreased regardless of accelerator depressing level. Active speed limit indicator on the meter blinks. When actual speed is lower than the limited speed set previously, speed limit state is entered again and active speed limit on the meter displays ON.
4. Active speed limit overtaking state

a. During the active speed limit, if target limit speed is lower than actual vehicle speed through short press or long press, vehicle enters over speed state and active speed limit indicator on the meter blinks and buzzer sounds for 3 times until the actual speed is lower than new limit speed again. Vehicle enters speed limit state again and active speed limit on the meter displays ON.

5. Active speed limit short/long press to accelerate
   a. In the active speed limit state, short press RES/+ button once (over 0.02 seconds) to increase target limit speed by 1 km/h. Active speed limit on the meter displays ON.
   b. In active speed limit state, long press RES/+ button (over 0.4 seconds) to increase target limit speed from current speed to 5 times of current speed and then increases by unit of 5 km/h. Active speed limit on the meter displays ON.
6. Active speed limit short/long press to decelerate
   a. In the active speed limit state, short press SET- button once (over 0.02 seconds) to decrease target limit speed by 1 km/h. Active speed limit on the meter displays ON.
   b. In the active speed limit state, long press SET- button (over 0.4 second) to decrease target limit speed from current speed to 5 times of current speed and then decreases by unit of 5km/h. Active speed limit on the meter displays ON.
7. Inspection with cruise exiting active speed limit function
   a. In the active speed limit process, if cruise main switch is pressed, active speed limit is canceled, active speed limit indicator turns off, cruise indicator on the meter flashes, pre-cruise state is entered.

Adaptive Cruise

Description

Adaptive Cruise Control System (ACC) can keep vehicle driving at the speed set by the driver. When it detects a preceding vehicle and its speed is lower than the speed set by own vehicle, the system will keep the vehicle to drive with the set safety distance to preceding vehicle. The stop-and-go adaptive cruise control system can also follow the preceding vehicle to decelerate until vehicle stops. It can also start vehicle and follow the preceding vehicle automatically, or start driving according to driver’ s command.

CAUTION
Do not use adaptive cruise control in the following situations. Otherwise, it may result in a loss of vehicle control and cause an accident, resulting in serious injury or even death. • In traffic congestion areas. • On roads with sharp bends. • On winding roads. • On wet and slippery roads, such as those covered with rain, ice or snow. • On steep hills. Vehicle speed may be higher (or lower) than the set speed. It will cause that engine speed rises sharply and briefly to increase the vehicle speed to the set speed range.

Adaptive Cruise Function Instruction

Adaptive Cruise System (ACC), Automatic Emergency Braking System (AEB) and Front Collision Warning System (FCW) share a radar and camera sensor.

CAUTION

- ACC system can not violate the laws full screwdriver with a flat physics and there are some limitations, driver must always control the vehicle and take full responsibility for the vehicle.
- ACC system can not respond to stationary objects and vehicles, crossing vehicles, oncoming vehicles, pedestrians, bicycles, and animals.
- ACC system can only realize limited braking, if the vehicle ahead applies emergency braking suddenly, another vehicle cuts in front of the vehicle quickly, ACC system may not be able to respond or respond too slowly, in this case, driver should take over control of the vehicle in time.
- The driver must adjust the appropriate distance between the vehicle and the vehicle ahead according to traffic and weather conditions, and is responsible for the safe vehicle stopping. In severe weather such as rain, snow, fog, etc., ACC system may not be able to recognize vehicle ahead. In this case, ACC system should be turned off.
- ACC system is suitable for highways and roads in good condition, and is not recommended for urban roads, narrow roads, mountain roads, hills, tunnels, etc. If ACC system is used on curve, it may cause the loss of vehicle ahead target or delay of target selection due to the limitation of sensor detection range. In these cases, ACC system will control the vehicle to accelerate to set speed.
- If the vehicle is too close to a vehicle in adjacent lane, ACC system may select the vehicle as a front tracking target to respond.
- When following the vehicle ahead to stop, ACC system may not recognize the end of vehicle but the lower or upper part of vehicle (for example, rear axle of truck with a higher chassis, upper part of a lower flat trailer). In these cases, system will not be able to guarantee a proper stopping distance or even lead to collision. Therefore, the driver must be alert and take over control of vehicle at any time during this process.
- When ACC system controls the vehicle to stop for a short time, driver must ensure that there are no obstacles or other traffic participants, such as pedestrians, bicycles, animals, etc. in front of the vehicle.
- When the ACC system controls the vehicle, do not inadvertently step on accelerator pedal, otherwise, ACC system will not apply brake to vehicle, driver should be ready to brake actively at any time to ensure safety.
- Two sensors, radar and camera, are mounted on the front area of vehicle and behind the windshield. It should be noted that the field of vision of sensor should not be blocked by pollutants, and there should be no modification or license plate decoration frame in the front or surrounding areas, especially when the snow completely covers the sensor, the ACC system function will exit. The sensor may also be affected by vibration or collision, resulting in system performance degradation or no function. In this case, recalibrate the sensor.
- When ACC system function fails, yellow warning light on instrument cluster turns on, the ACC will not function at this time and need to be repaired.
- All the above precautions do not cover all the situations that may affect normal operation of system function. The system function may not bring expected effect due to other reasons. Driver must always take responsibility for the vehicle control.

1. Turn on the adaptive cruise
   a. Start the engine and press ACC ON/OFF button on steering wheel, then ACC system is ON and enters stand-by status. Gray icon on instrument cluster turns on. If a preceding vehicle is identified, gray icon on instrument cluster displays and it will not display without target.
2. System Activation
   a. When activation condition is met after ACC system is ON, press SET- button while driving to enable ACC function; With vehicle stopped and brake pedal depressed by driver, press SET- button and release brake pedal within 3 seconds (slightly depress acceleration pedal after 3 seconds) to enable ACC function. ACC icon turns to green after activation and default vehicle speed is 30 km/h.
   b. ACC system can be activated when the following conditions are met simultaneously:
      - Gear position is in forward range;

- Brake pedal is not depressed (when driving);
- Anti-lock brake system is not activated;
- Hill descent system is off;
- Electronic stability system is on;
- Electronic stability system is not activated;
- Driver door is closed;
- Driver seat belt is fastened;
- Vehicle is not in parking status;

c. When parking brake is applied, that is electronic parking brake system (EPB) or automatic parking (AVH) is in activated state, after SET- button is pressed to enable ACC system, there is a prompt “Please depress accelerator pedal to activate adaptive cruise system” on instrument cluster, driver will depress accelerator pedal lightly to activate adaptive cruise system according to the prompt.

3. Cruise speed setting

a. Increase set speed

- After ACC function is enabled, press RES+ button to increase set speed. Short press it once to increase speed by 1 km/h and long press it once to increase speed by 5 km/h. The speed can be increased to 150 km/h. When set speed is over 80 km/h, long press it once to increase speed by 10 km/h.

b. Decrease set speed

- After ACC function is enabled, for example, current set speed is more than 30 km/h, press SET- button to reduce set speed. Short press it once to decrease the speed by 1 km/h and long press it once to decrease the speed by 5 km/h. The speed can be decreased to 30 km/h. When set speed value is over 80 km/h, long press it once to reduce speed by 10 km/h.

c. There are no vehicles ahead in the same lane of this vehicle, or there are vehicles ahead in the same lane and driving speed is higher than set speed, the vehicle will drive at set speed.

d. There are vehicles ahead in the same lane and driving speed is not higher than set speed of the vehicle, ACC system will control the vehicle to follow the vehicles ahead.

e. When driving uphill, speed will be slightly lower than set speed, and when driving downhill, speed will be slightly higher than set speed.

4. Following distance adjustment

a. Press following distance adjustment button to adjust following distance, the distance is divided into three grades (“maximum distance”, “standard distance” and “minimum distance”). Grade is changed once when the button is pressed once. The instrument cluster synchronously shows the current grade. Following distance adjustment and memory function can be set on DVD head unit. Setting method is as follows: Enter “Vehicle Setting”→“Assist Driving Setting”, and set options of “Adaptive Cruise System”. When memory function is not set, system default following distance is “standard distance”.

b. Though following distance is in the same grade, distance between own vehicle and preceding vehicle changes according to vehicle speed of own vehicle. The distance increases with increase of speed.

c. If the following distance is “minimum distance”, the distance from vehicle ahead is very small when following the vehicle ahead at low speed. In view of safety considerations, the maximum distance should be selected when following on slippery road.

5. Function exiting

a. During normal operation of ACC system, if one or more of the following situations occur, ACC system functions will exit, and ACC icon on instrument cluster will change from green to gray.

- Depress brake pedal;
- Pull up electronic parking button;
- Change shift lever to position other than forward position;

- Press the pause button;
- Turn off the electronic stability system;
- Electronic stability system is activated;
- Anti-lock brake system is activated;
- Hill descent system is on;
- Driver door is open;
- Driver seat belt is unfastened;
- Acceleration pedal is depressed for more 15 minutes by driver;
- Automatic emergency braking system is activated.

6. Function restore
   a. After the above conditions that cause function to exit are restored, press RES+ button, ACC system function is activated again and restore the state before exiting.
7. Exceeding set speed
   a. During normal operation of ACC system, driver can depress acceleration pedal to override ACC control. After acceleration pedal is released, ACC returns to previous control state. During exceeding set speed, if the distance from vehicle ahead is too small, the instrument cluster will pop up “Ask the driver to take over vehicle”, accompanied by rapid alarm sound to remind driver to take a avoidance measures.
8. Curve speed control
   a. When the vehicle controlled by ACC system is driving into a curve , driving speed will be decreased appropriately to assist the driver to safely pass through the curve.
   b. This function can assist driving only in certain level. Driver should operate vehicle at all time and decreases vehicle speed while vehicle is driving into a curve.
   c. When driving into a curve, due to the limitation of radar sensor in detecting the target, the system may not be possible to detect the vehicle ahead of the same driving track in time, in this case, the driver should be ready to take over control of the vehicle at any time.
9. Stop-and-go function
   a. During driving following the vehicle ahead with stop-and-go ACC system, if the vehicle ahead decreases speed to stop, the vehicle also decreases speed to stop, after stopping:
      - Vehicle ahead starts to drive away within 3 seconds and the vehicle starts automatically to follow vehicle ahead.
      - If the vehicle ahead stops for more than 3 seconds, and starts to drive away within 3 seconds to 10 minutes, driver needs to depress acceleration pedal lightly to activate ACC system.
      - During 10 minutes of parking, when driver unfastens seat belt or opens driver door, Electrical Parking Brake (EPB) system will activate automatically for parking.
      - If parking for more than 10 minutes, ACC system exits and Electrical Parking Brake (EPB) system will activate automatically for parking.
      - Electronic stability system continues to brake during decreasing speed following the vehicle ahead, motor rotation can generate operating sound, this is normal.
      - When driving following the vehicle ahead, always pay attention to whether ACC icon is in green filled state. If it is in non-filled state, it means that the target ahead of ACC system has been lost, and the vehicle will accelerate according to set speed.
10. Power adaption mode
    a. Power system has ECO and SPORT modes. ACC system will match different control strategies according to the power mode selected by the driver. In the ECO mode, ACC system has a soft acceleration, and it has a fast acceleration in the SPORT mode.
11. Turn off the adaptive cruise system
    a. With ACC system ON, ACC system is turned off when pressing ACC ON/OFF button on steering wheel or active speed limit switch to turn on active speed limit function.

Front Collision Warning System (FCW)

Description

CAUTION
• Pre-collision system will not sound an alarm when the vehicle speed is lower than 30 km/h. For static target ahead, the system will not sound an alarm when the vehicle speed is higher than 85 km/h. • FCW and AEB share a same sensor, and detectable target is the same as AEB system. See the description of AEB system below for details. • When FCW sounds an alarm continuously, if the driver actively depresses brake pedal, it should be depressed with a large force to trigger emergency brake assist function, achieving the best braking effect. • System does not work if seat belt is not fastened and doors are not closed. • System does not work if electronic stability system and FCW are not in ON. • If yellow alarm symbol on instrument cluster comes on, please go to the Chery service station for inspection and repair.

For front collision warning system (FCW), when FCW system detects that there is a dangerous situation ahead, it will firstly trigger pre-alarm function. If driver does not brake or steer to avoid, the dangerous situation will continue to deteriorate, and FCW system will trigger emergency alarm function. In some sudden situations (such as fast cut in or strong braking of vehicle ahead), both alarms may be triggered at the same time.

Usage Description

1. Alarm Type
   a. FCW is ON by default when the vehicle is powered on, if user does not turn off this function and the speed is higher than 30 km/h, when system judges that there is potential collision risk, pre-alarm function will be triggered, an alarm symbol and warning text “Front Collision Warning System ON” pop up on instrument cluster accompanied by rapid alarm sound to remind driver to take avoidance measures.
   b. If collision risk continues to deteriorate and upgrade, the emergency alarm function will be activated, and a alarm symbol and warning text “Front Collision Warning System ON” also pop up on instrument cluster. At the same time, the system will adopt short brake to remind driver to take avoidance measures.
   c. When vehicle speed exceeds 65 km/h and is close to the vehicle ahead for a long time, a safety distance alarm message "Attention, vehicle/pedestrian approaches” pops up on instrument cluster to remind driver to adjust following distance properly.
2. System Off
   a. FCW system and safe distance alarm can be turned on or off through DVD head unit, After setting FCW system, it will still return to ON state at next ignition. After setting safe distance alarm, the previous setting options will be memorized.
3. Sensitivity Setting
   a. Alarm trigger time can be set on the DVD unit head. When the next ignition is performed after completing setting, system will memorize the last setting options and the setting options are divided into three distance levels: "Long", "Standard" and “Short". Distance level represents the different distance between the vehicle and the potential collision target when alarm function is triggered. If the setting is "Long", the alarm will be triggered earlier.

Automatic Emergency Braking System (AEB)

Description

For automatic emergency braking system (AEB) function is activated (there is no FCW alarm when speed is lower than 30 km/h), if driver does not take measures, collision risk will continue to deteriorate, and

system will start AEB automatically when the conditions are met, trying to avoid possible collision or reduce the speed during collision and reduce the loss caused by collision.

Usage Description

AEB is ON by default when the vehicle is powered on. It can be turned off on DVD head unit as necessary, but it will still be ON by default at the next ignition. Setting method are as follows: Enter "Vehicle Setting" → "Assist Driving Setting" to set options of "Automatic Emergency Braking System".

CAUTION

- System does not work if seat belt is not fastened and doors are not closed.
- System does not work if electronic stability system and AEB are not in ON.
- After vehicle is automatically braked to stop, vehicle will not remain stationary and driver needs to take over the vehicle.
- During the activation of AEB, if driver turns steering wheel quickly or depresses accelerator pedal firmly, AEB function will exit.
- AEB activation speed is higher than 4 km/h, the collision can not be avoided completely if the speed is higher than 40 km/h.
- For stationary vehicle, operating speed range of AEB is 4 km/h to 53 km/h. For pedestrians and cyclists, operating speed range of AEB is 4 km/h to 64 km/h.
- If yellow alarm symbol on instrument cluster turns on, system will not work, please go to the Chery service station for inspection and repair.

Detection Target

1. Vehicle target
   a. Targets can be detected by the system include passenger vehicles, buses and trucks. There are certain limitations in the detection of some restructured vehicles, such as cement tankers, special vehicles with higher or lower chassis, etc.
2. Bicycle target
   a. System can works best when it detects the contours of body and bicycle, as well as movements of normal ride. System does not regard an oncoming cyclist as a target.
3. Pedestrian target
   a. Only when the system detects that people's head, arm and leg swings conform to the characteristics of normal walking can it play its best role. Pedestrians crossing the lane of the vehicle will be regarded as targets. Pedestrians walking vertically in this lane, walking in curves and blocked by other objects may not be regarded as targets by the system.

CAUTION

- System can not violate the laws of physics and there are some limitations, driver must always control the vehicle and take full responsibility for the vehicle.
- Driver should control speed and the distance between the vehicle ahead and the vehicle according to weather, road surface and traffic conditions.
- System does not respond to animals or crossing vehicles, as well as oncoming vehicles, bicycles or pedestrians.
- Under some special circumstances, the system may perform unnecessary warning and braking, such as crossing the railroad track, entering the turning of the underground parking lot, etc. Some conditions will affect and weaken sensor detection, such as tunnel, the light of oncoming vehicle, the reflection of wet road surface, etc, affecting related functions of system.
- System performance will be greatly limited to the target that quickly cuts into the lane, the target that is detected after the vehicle changes the lane, and the target in the curve.
- All passengers on the vehicle must fasten their seat belts and secure the loaded objects to avoid danger when AEB system is triggered.
- Two sensors, radar and camera, are mounted on the front area of vehicle and behind the windshield. It should be noted that the field of vision of sensor should not be blocked by pollutants, and there should be no modification or license plate decoration frame in the front or surrounding areas, especially when the snow completely covers the sensor, the system function will exit. The sensor may also be affected by vibration or collision, resulting in system performance degradation or no function. In this case, recalibrate the sensor.
- When system function fails, yellow warning light on instrument cluster turns on, the system will not function at this time and need to be repaired.
- When installing non-full size spare tire, it is recommended to turn off FCW and AEB systems and replace original full size tire in time.
- All the above precautions do not cover all the situations that may affect normal operation of system function. The system function may not bring expected effect due to other reasons. Driver must always take responsibility for the vehicle control.

Lane Departure Warning System LDW

Description

Lane Departure Warning System (LDW) can help drivers reduce traffic accidents caused by lane departure and improve driving safety by providing alarm.T1D model adopts independent LDW. The system consists of a multi-function front camera and hyperscreen. On the instrument cluster, it warns (-sound and image) for unconscious (turn signal light is not on) deviation from the lane.When lane departure warning system is ON, camera will detect lane marking all the time and obtain the position parameters of the vehicle in the current lane through image processing. When it detects vehicle deviates from the lane, sensor will collect data and operation condition of driver, and then controller sends alarm message to remind immediately. If driver turns on turn signal light (active lane departure) and drive the vehicle to another lane, lane departure system will not make any alarm.

- System allows instrument cluster to send alarm signal (acoustic, visual), including two alarm methods.
- Support white solid line, continuous long white line, yellow solid line and continuous long yellow line lane detection. When one side of the lane line is missing or undetectable, a substituted virtual line and warning line on the virtual line side will be marked automatically (default width between two lanes is 3.75 m).

Function ON

1. Lane departure warning system will be turned on when following conditions are met at the same time:
   a. Camera initialization is completed.
   b. Driver turns on LDW function by hard switch or software, or it was turned on in the previous ignition cycle.

c. LDW does not detect trouble code.

d. LDW is turned on through vehicle configuration code.

CAUTION

- Drive the vehicle carefully, even though the vehicle is equipped with lane departure warning system.
- During the whole operation, you are responsible for controlling vehicle, monitoring management system, and intervening as necessary.
- If sensor is interfered, system will not function.
- Sensor may be misled by temporary construction markings line on the road, etc., resulting in false and incorrect alarms.
- In the cold or bad weather, system may not operate. Rain, snow, fog or intensive illumination can affect the sensor.
- If sensor can not trace road lines on the ground, system will not operate.
- The system may not operate in the road construction area.
- The system may not operate at sharp curve or narrow road.
- If suspension components of the vehicle are not approval by us, the system may not operate normally.
- Make sure the left and right cameras are free of foreign objects, such as bird dung, insect and ice etc.
- The system may not operate on the cement roads and other non-standard lanes.
- The system may not operate when there is only a single lane line or lane line is damaged.
- The system operates only when vehicle speed is more than 65 Km/h, and stops operating when vehicle speed decreases to 60 Km/m or less.

Function OFF

1. LDW will be deactivated if all of the following conditions are met.
   a. Driver turns off LDW function by switch or soft switch, or function was turned off in the previous ignition cycle;
   b. When LDW detects a permanent malfunction, driver needs to turn on the function again after malfunction is cleared.

HINT

Permanent malfunction

- Power voltage is more than 20.5 V.
- Power voltage is lower than 4.5 V.
- Camera permanent lighting failure (more than 45 minutes).
- Temperature is high, outside sensor temperature is more than 100 ℃.

Threshold Speed and Switch

Threshold ON speed is 65 km/h, threshold OFF speed is 60 km/h.

1. Vehicle has physical switch configuration
   a. LDW and LKA shares one hard switch which connects to instrument cluster and can be selected to operate detailed function; The signal is sent to central gateway through instrument cluster to indicate which function is selected by customer. System runs the previous option selected by customer in each ignition cycle. MPC2 memorizes customer option. IGN ON, after instrument cluster sends signal “LDWLKA_LaneAssitTypeReq=0X0”, and receives feedback signal “LDWLKA_LaneAssitTypefeedback” feedback value from MPC2, it synchronizes with MPC2.
2. Vehicle has no physical switch configuration

a. LDW switch is soft switch on audio unit. System runs the previous option selected by customer in each ignition cycle. MPC2 memorizes the option. IGN ON, after IHU sends signal “LDWonoffReq=0x2 default” and receives signal “LDWonoffsts” from MPC2, IHU synchronizes with MPC2. LDW function will be turned on by default next time.

Detection Requirement

Identification of Lane Line Types

No.	Road Type	Performance Requirements
1	Applicable road curvature radius	More than 250m (class II highway standard)
2	Effective lane width	(2.5 m, 5.2 m)
3	Effective lane marker line width	(8 cm, 60 cm)
4	Visible range of lane line	Influenced by environmental factors, the farthest visible range of lane line is 60-100 m
5	Lane line definition	Visible to the naked eye
6	Judging accuracy of distance between vehicle and lane line	The error is less than 4cm
7	Lane line types	Double line, solid line, virtual solid line, dotted line
8	Lane line colors	White, yellow, orange, blue
9	Road geometry	Straight, curve
10	Road conditions	Asphalt, cement

Alarm Threshold

- Furtherest warning line position from vehicle lane: After departure, 0.3 m away from inner edge of lane.
- Unconditional warning ending position: After departure, 0.75 m from inner edge of lane.
- Lateral departure speed variable threshold is supported. Detailed logic is shown as follows:

Warning Line Position (m)	Low Sensitivity	High Sensitivity
/	Wheels are 0 m from inner edge of lane	Wheels are 0.1 m from inner edge of lane

Function Strategy

1. System performs self-inspection. MPC sends signal to instrument cluster. Instrument cluster turns LDW system icon to green. After 3 seconds, MPC sends LDW-LKA-status to meter according to speed value.
2. The sensitivity can be adjusted through audio head unit. High and low options are available, and default value is low.
3. When vehicle speed is more than 65 km/h, WLDW function operates. LDW starts to alarm if lane departure is detected and the turn signal switch on the appropriate side is not operated.
4. When vehicle speed is more than 65 m/h, LDW function operates. LDW will not alarm under following conditions if there is no other restraint conditions.
   a. When vehicle passes curve and drives over the marking line at speed of more than 65 km/h, system will virtually move lane edge to inner side of lane by 10 cm as warning line, in order to avoid alarms that disturb the driver.

b. In the case of lane merging, the own lane narrows down gradually. If no departure occurs and vehicle drives over the marking line, LDW will not alarm.
c. If lane is too narrow (less than 2.5 m), system will virtually expand the left and right lane lines by 10cm as the warning lines to delay the alarm.
d. If there is only one marking line on the road, LDW only alarms for the side where lane marking line exists.

Lane Keeping Assist System (LKA)

Description
Lane keeping assist system is a assist system which can be used to assist driver, however, it can not replace the driver in driving. When selecting the lane keeping assist system, the driver has to always concentrate all his attention and hold the steering wheel. Get ready to correct the steering wheel or take over the vehicle at any time, otherwise it may cause an accident and personal injury.The lane keeping assist system is not able to recognize the lane line all the time. Sometimes it may mistake poor quality road surfaces, certain road structures or objects for the lane line. In this situation, be sure to turn off the lane assist system immediately.The lane keeping assist system detects lane line through front camera. When the lane lines on the left and right sides are identified by the system, the system applies corrective steering intervention to make the vehicle always drive in the middle of the lane. Driver can correct steering wheel at any time. When function is ON, it intervenes when the speed is higher than 60 km/h and exits when the speed is lower than 55 km/h.

Lane Keeping Assist System Setting
The lane keeping assist system switch is located on the central control fascia console. When the switch is pressed, the instrument cluster will have a corresponding display, which can switch between off, lane departure warning and lane keeping assist system. The lane keeping assist system can be turned on when lane keeping assist system is selected.When the lane keeping assist system is turned on, the indicator is illuminated in gray; When the function is turned on and activated, the indicator light is illuminated in green; When the function is off, the indicator light is not illuminated; When the module is faulty and the lane keeping assist system cannot operate normally, the system indicator is illuminated in yellow.

1. Though the lane keeping assist system is turned on, but the function will exit or cannot be activated under the following conditions:
   a. System recognizes that the driver has not operated the steering wheel for a period of time;
   b. The driver controls the steering wheel when system applies corrective steering control;
   c. When camera can not detect lane marking line target due to coverage or weather;
   d. When the lane line is too thin, broken, blurred.
   e. When driving on a curve with a small turning radius;
   f. Road is too narrow;
   g. Driving on a road without lane marking line;
   h. The vehicle has just entered the road with road lanes;
   i. Vehicle is changing lanes;
   j. The vehicle swings too fast in lateral direction;
   k. Vehicle speed is lower than 55 km/h or higher than 180 km/h;
   l. Driver turns on the turn signal light;
   m. Driver turns on the hazard warning light.
   n. Driver rapidly depresses accelerator pedal or deeply depresses brake pedal.
2. It is recommended to turn off the lane keeping assist system in the following situations:
   a. Drive the car in sport mode;
   b. Under bad whether, such as rain, snow, heavy fog;
   c. At night or surrounding light is dark;
   d. When driving on road with bad conditions;

e. When driving on paved road;

f. When driving on road with multiple curves.

CAUTION
• When lane is added or merged, driver needs to take active control. • When driving in complex traffic environment (such as road crossing, traffic congestion), driver needs to take active control. • When driving on a sharp curve, driver needs to take active control.

Speed limit marking recognition function

Description

Speed limit marking recognition function detects speed limit traffic mark on the road and displays the detected speed limit value on the instrument cluster.The displayed sign will disappear after driving for a certain distance or time. If a new sign is detected when it displays, the speed limit value displayed on the instrument cluster will be updated. If current speed is more than displayed value, instrument cluster will zoom in the icon or make a sound alarm.

Function ON and OFF

TSR function can be turned on and off in the instrument setting menu. After function is turned on, user can select options between visual warning and visual warning + audio warning. Vehicle will record setting value in the previous ignition cycle.

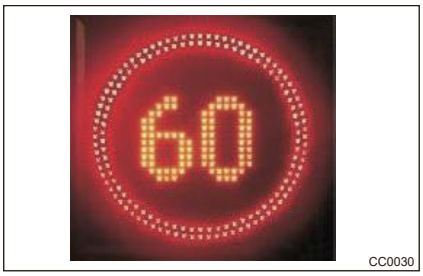
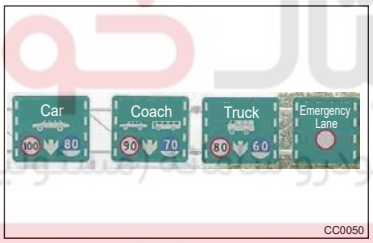
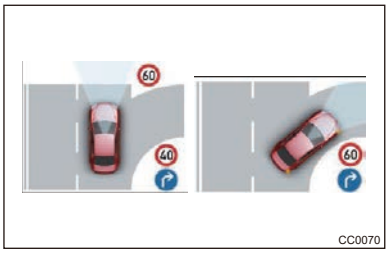
System state instrument cluster display

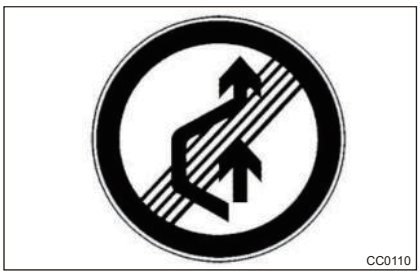
When the setting is image display only, if the speed limit sign is detected, the instrument cluster will display correspondingly. The displayed speed limit sign will disappear after driving for a period of time or distance. If there is a new speed limit sign, the display will be updated. When the vehicle speed is greater than the detected vehicle speed by 5 km/h, instrument cluster will zoom in the icon to alert the driver that vehicle is over speed.When the setting is imagine display + audio alert, if the speed limit sign is detected, the instrument cluster will display correspondingly. The displayed speed limit sign will disappear after driving for a period of time or distance. If there is a new speed limit sign, the display will be updated. When the vehicle speed is greater than the detected vehicle speed by 5 km/h, instrument cluster zoom in the icon to alert the driver that vehicle is over speed.

Recognizable traffic sign categories

Icons of recognizable speed limit sign:

Operation figure	Operation description
Condition Ⅰ: Common speed limit sign 	System can detect common speed limit sign and send speed limit command to driver;
Condition Ⅱ: Variable speed limit sign	System can detect variable speed limit sign and send speed limit command to driver;

Operation figure	Operation description
	
Condition Ⅲ: Area speed limit sign 	System can detect area speed limit sign and send speed limit command to driver;
Condition Ⅳ: Divided lane speed limit 	The system should only correspond to the speed limit sign of the lane;
Condition Ⅴ: Divided model speed limit 	The system should only display the highest limit speed among multiple speed limits;
Condition Ⅵ： Ramp 	When vehicle has not driven into the ramp, vehicle should display original speed limit information instead of the freeway off-ramp speed limit information; When vehicle drives into the ramp, system should display freeway off-ramp speed limit information; When navigation has route plan, ramp information will be sent 100 m before vehicle enters the ramp until it drives to ramp exit. After vehicle drives into ramp, it sends speed limit alarm and speed limit information;
Condition Ⅶ: Deactivating speed limit sign	System can detect speed limit deactivating sign and send speed limit deactivating command to driver;

Operation figure	Operation description
	
Condition Ⅷ: Deactivating speed limit sign and speed limit sign are shown at the same time 	When deactivating speed limit sign and speed limit sign are shown at the same time, speed limit information has a higher priority than deactivating speed limit information, camera will recognize speed limit information and send it to the driver;
Condition Ⅸ: Height limit, width limit, weight limit sign 	Height limit, width limit and weight limit signs are not allowed to be recognized by mistake. If the sign is recognized by mistake due to coverage, correct the speed limit information after coverage is removed;
Condition Ⅹ: Deactivating no overtaking sign 	Deactivating no overtaking sign is not allowed to be recognized as deactivating speed limit information.

Traffic Jam Assist (TJA) and Integrated Cruise Assist (ICA)

System introduction

1. For traffic jam assist system and integrated cruise assist system (TJA and ICA), TJA and ICA can reduce workload of drivers and provide driving assist function in monotonous driving environment or traffic jam. The function mainly relies on multi-function camera on the front windshield to detect lane lines for both vertical and horizontal control of vehicle.
2. It is called TJA when speed range is below 60 km/h, and vehicle will be kept running near lane center. If no lane line is detected, the vehicle will follow the vehicle ahead as a target. If lane line and vehicle target are not detected, the function will be cancelled.

3. It is called ICA when speed range is 60 km/h - 150 km/h, and vehicle will be kept running near lane center. If no lane line is detected, no matter whether there is a target vehicle ahead, the function will be cancelled.

System Activation

Just like the method for activating ACC, when all ACC activation conditions are met, press "SET-" button to activate ACC function first. Meanwhile, camera determines if there is a lane line or a vehicle ahead as a target. When activation conditions are met, green operating indicator on instrument cluster turns on, and cruising speed and following distance will be adjusted as ACC system.

Function exiting

During normal operation of TJA/ICA system, if one or more of the following situations occur, system functions will exit, and icon on instrument cluster will change from green to gray.

1. Any one of conditions for exiting ACC function;
2. Lanes are too wide or too narrow;
3. Curving radius of lane is too small;
4. Lane lines are not detected;
5. Driver actively turns steering wheel;
6. Steering wheel is out of hands;
7. Turn on turn signal light;
8. Turn on hazard warning light;
9. Vehicle speed is lower than 1 km/h.

CAUTION

Be sure to carefully read the following precautions when using TJA/ICA system:

- TJA/ICA is a driving assist system and can not violate the laws of physics, there are some limitations, driver must always control of the vehicle and take full responsibility for the vehicle.
- The vertical control of TJA/ICA system is carried out by ACC system, and horizontal control is carried out by Lane Keeping System (LKA). All precautions of ACC and LKA systems are also applicable to this system.
- This system does not provide automatic driving function and does not allow off-hand driving. Under such conditions as turning, crossing, merging and cutting in of vehicles ahead, driver should control the vehicle at all times to ensure the safety of vehicle.
- System performance is affected by weather, illumination and lane line clarity. For example, under the conditions of backlight, sunset, night, snow and ice on the road surface and unclear lane lines due to road wear, the performance will be significantly reduced or even lost.
- When system fails, yellow warning light on instrument cluster turns on, TJA/ICA will not function at this time and contact CHERY service station to check and repair.
- All the above precautions do not cover all the situations that may affect normal operation of system function. The system function may not bring expected effect due to other reasons. Driver must always take responsibility for the vehicle control.

GENERAL INFORMATION

Calibration Data Writing

Description

This operation process can be used for manual matching of new FRM and FCM modules and the operation of after-sales maintenance and replacement parts. After the new FRM and FCM modules are installed on vehicle, it can only be used normally after calibration program refresh and after ADAS station calibration or after-sales calibration.

Correspondence table between FRM and FCM after-sales refresh software and vehicle models

Table 01.1. T1D Correspondence table between FRM and FCM refresh file and vehicle models

Part No.	Vehicle Configuration	Refresh File (Driver)	Refresh File (-Calibration Parameters)
704000027AA（FRM） Main software: 00.00.09	Without LKA/TJA/ICA/APA	/	T1DXF-FRM000001V03.xml
	Without APA		T1DXF-FRM000010V03.xml
	With APA		T1DXF-FRM000011V03.xml
704000025AA（FCM） Main software: 00.00.07	Without LKA/TJA/ICA	FlashDriverV01.s19	T1DXF-FCM000000V04.s19
	With LKA/TJA/ICA		T1DXF-FCM000001V05.s19

⚠ Caution

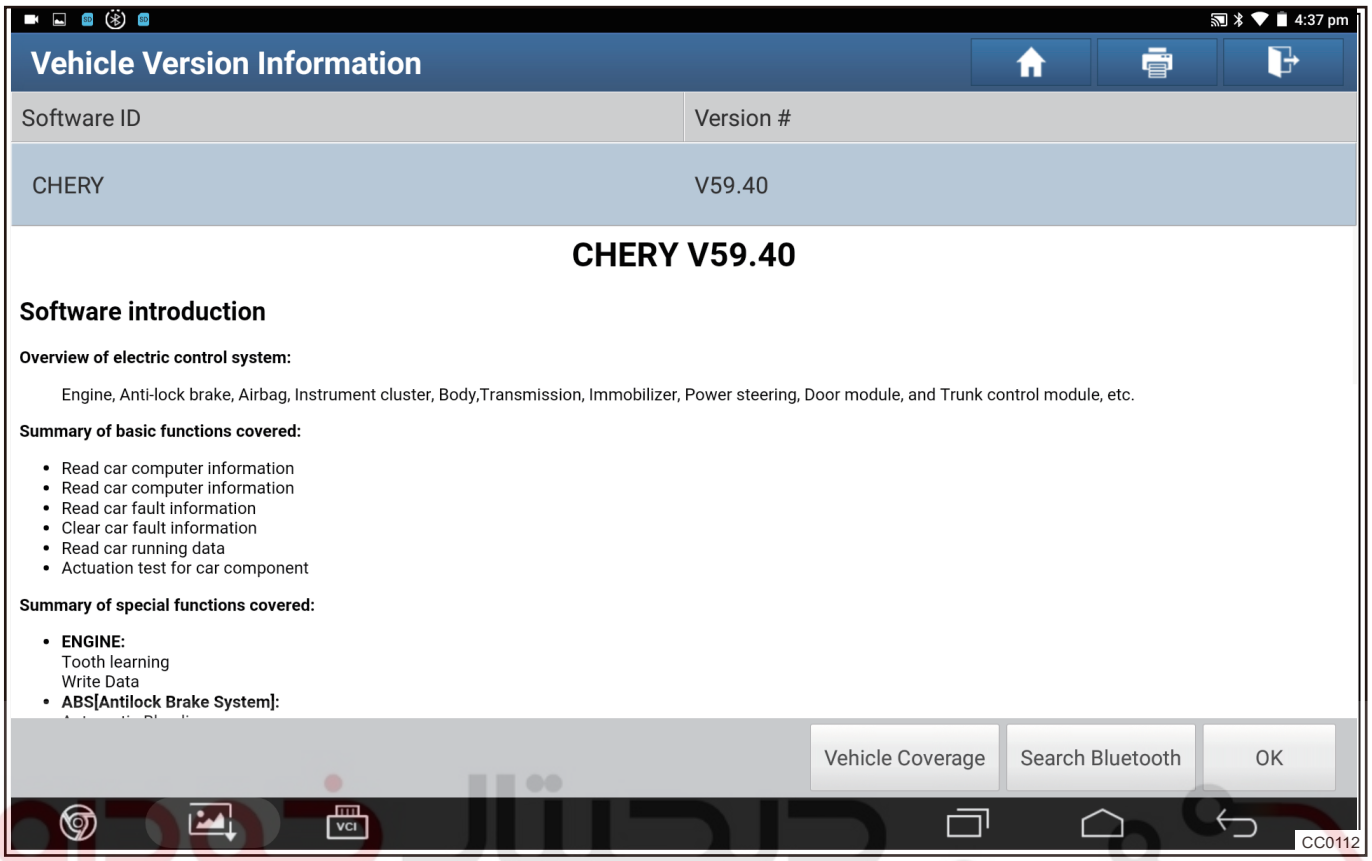
The version "VXX" of the refresh file is real-time, please refer to the refresh file provided after-sales.

Front Radar Module（FRM）

FRM Calibration Data Writing

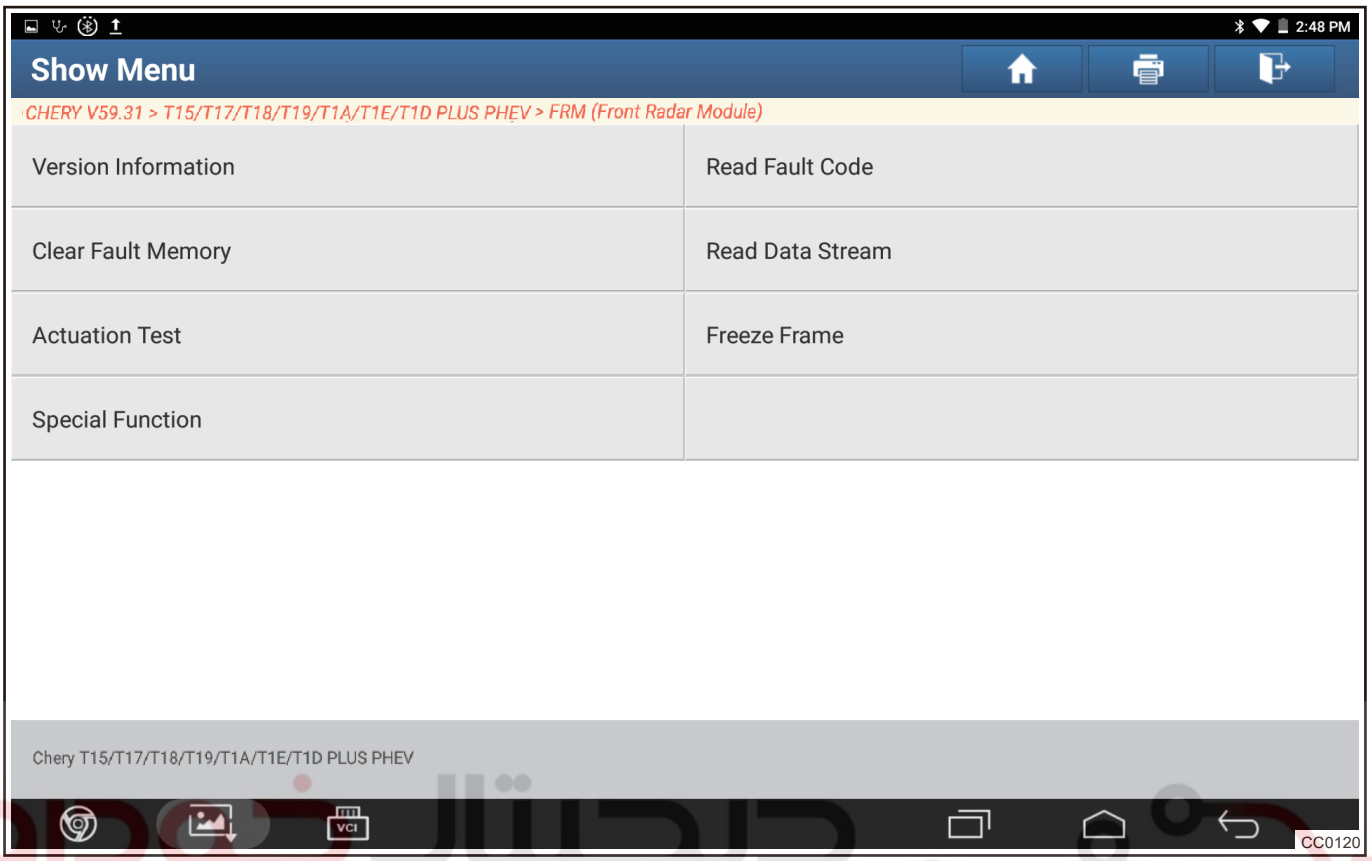
1. Connect diagnostic tester, enter the system.

01 - DRIVING ASSIST SYSTEM

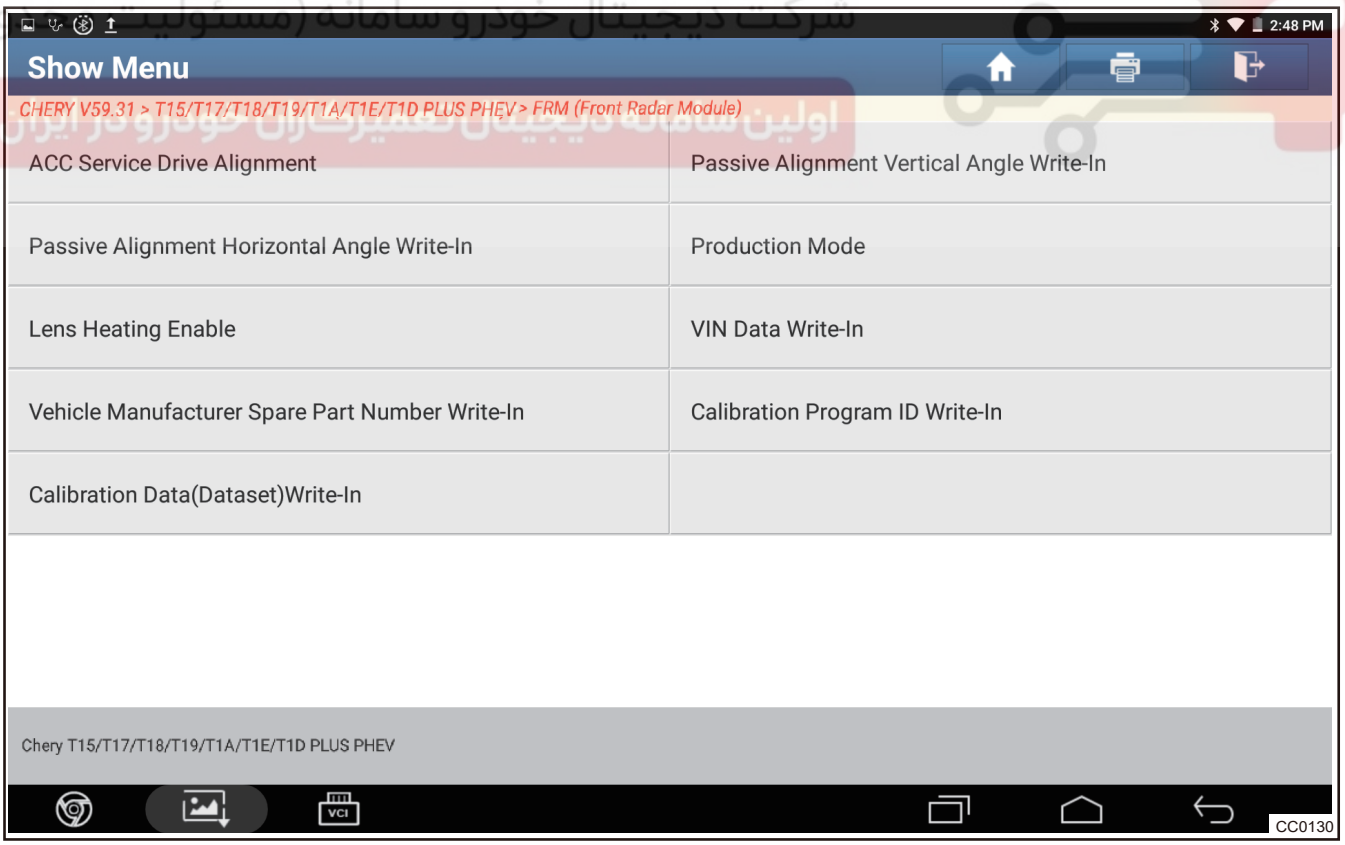


2. Select the correct model to enter FRM (Front Radar Module).

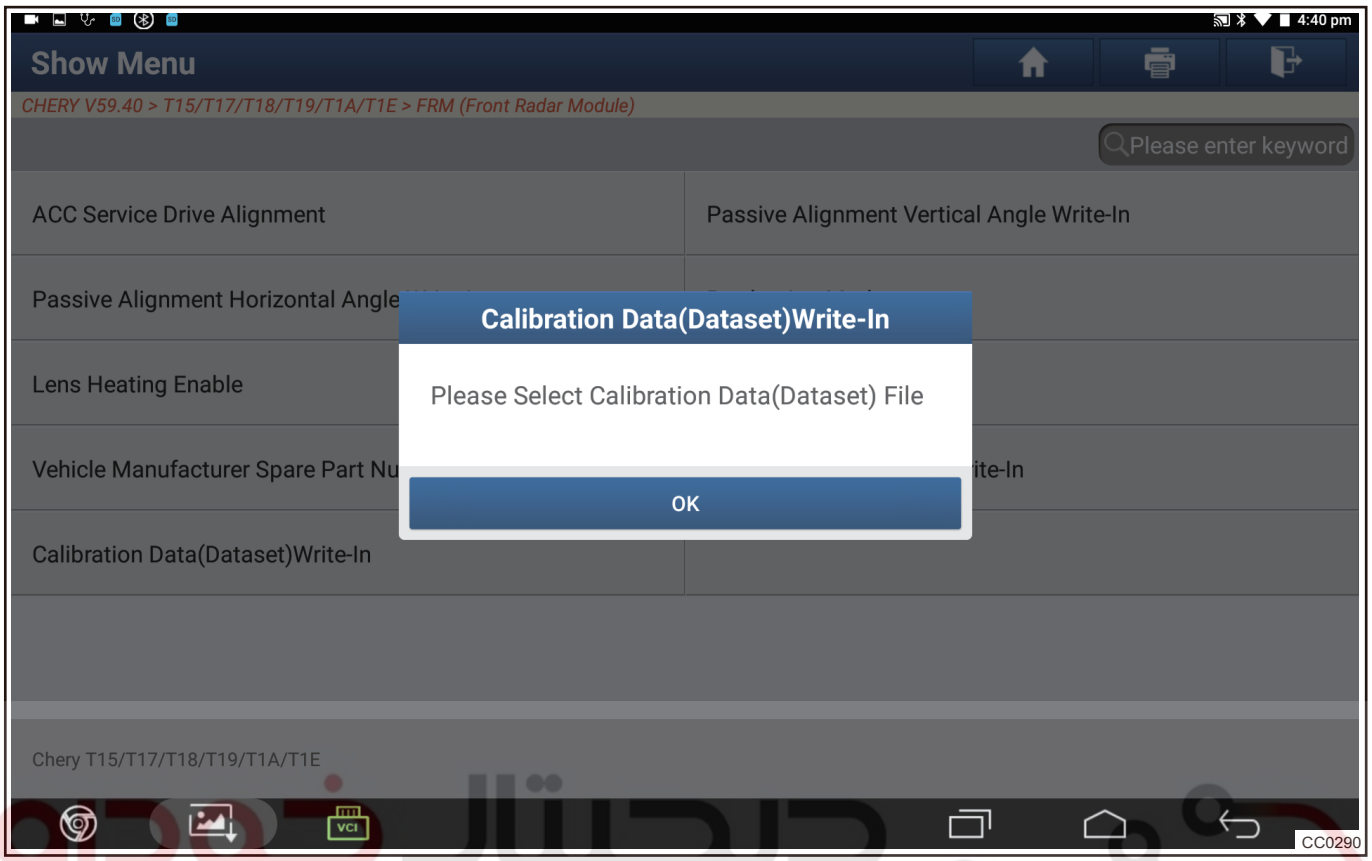
3. click special operation.



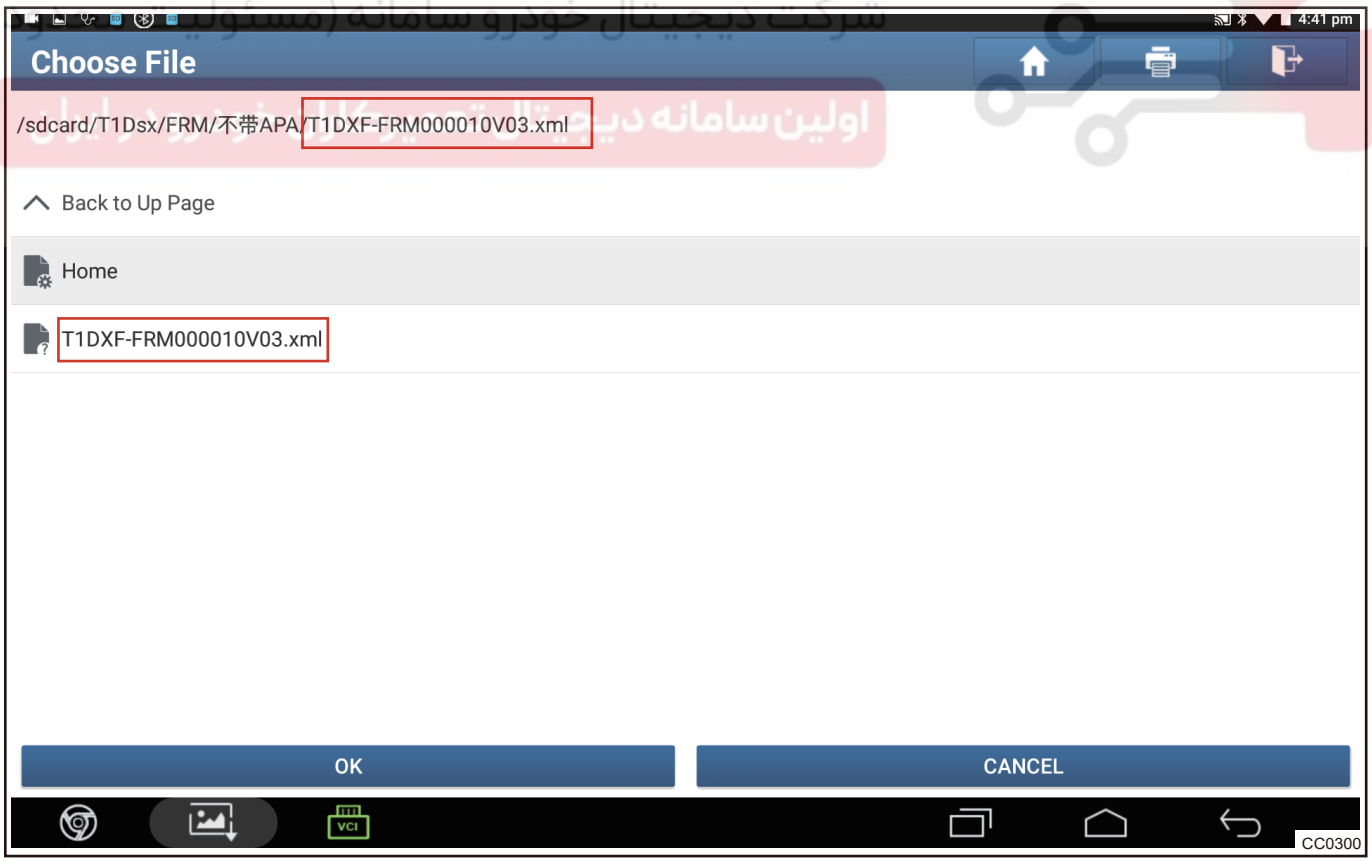
4. Click “Calibration Data(Dataset)Write-In”.



5. Please Select Calibration Data(Dataset) File.



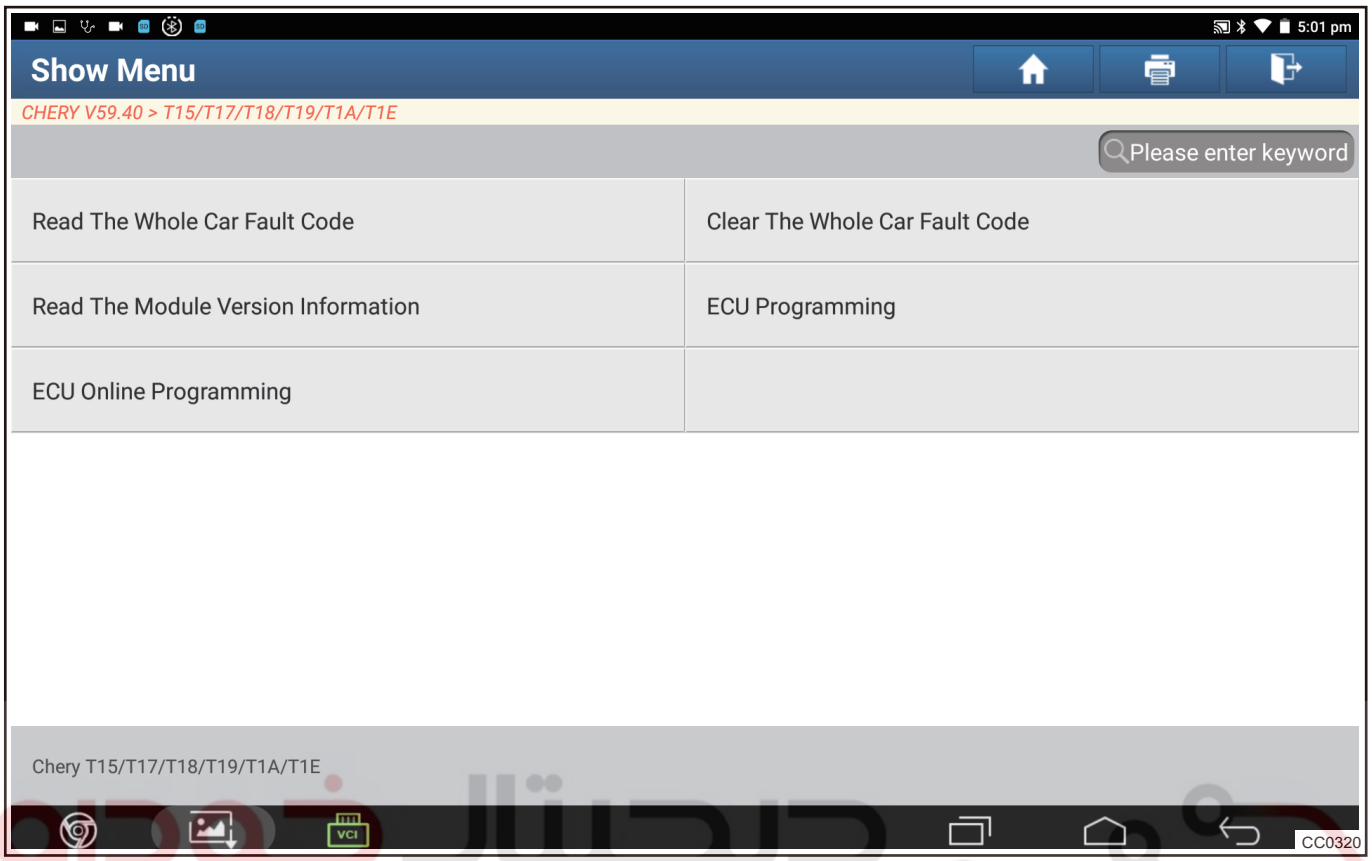
6. Select the correct calibration data according to the vehicle configuration and click OK.



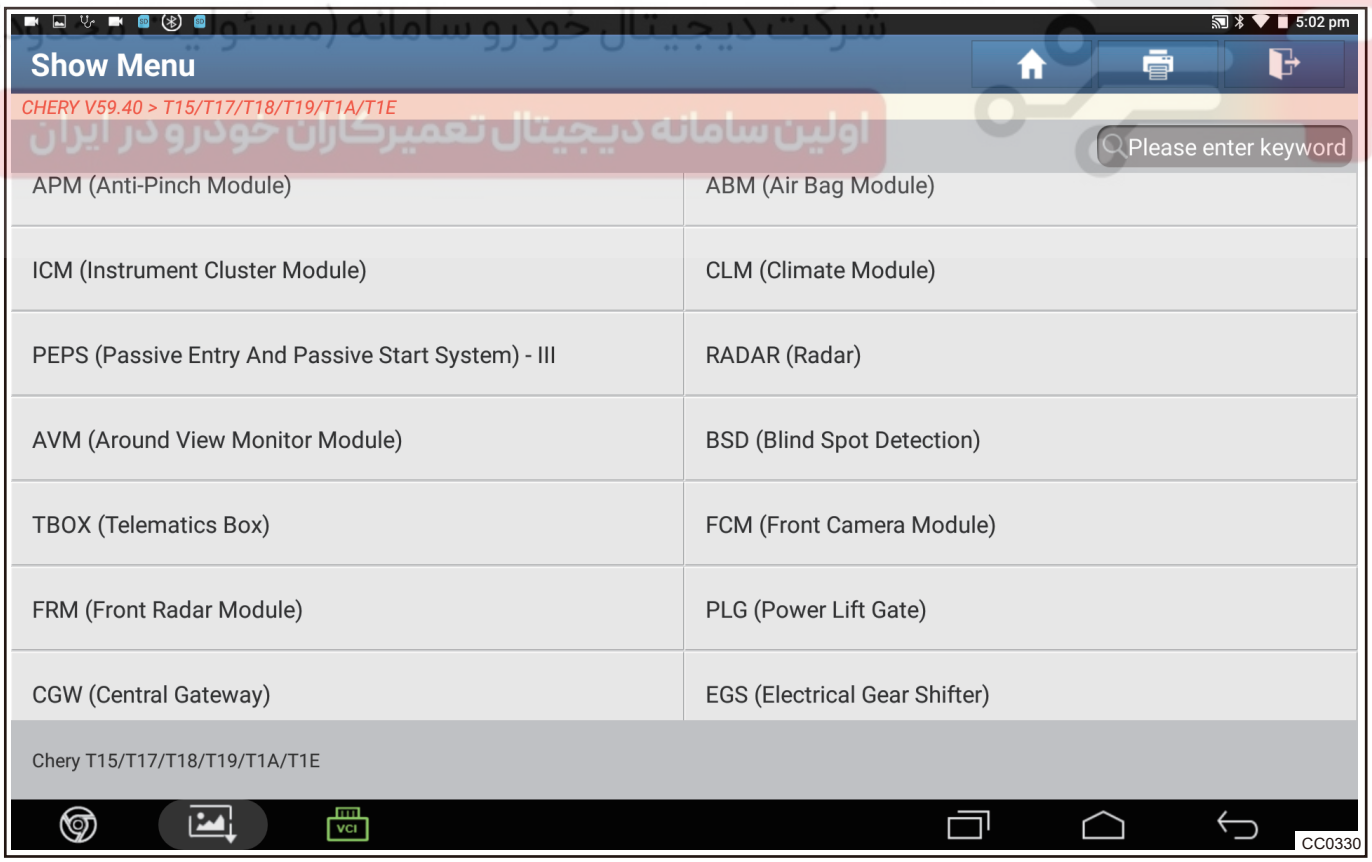
FCM Calibration Data Writing

1. Connect diagnostic tester and select model, then click “Multi-Service”.

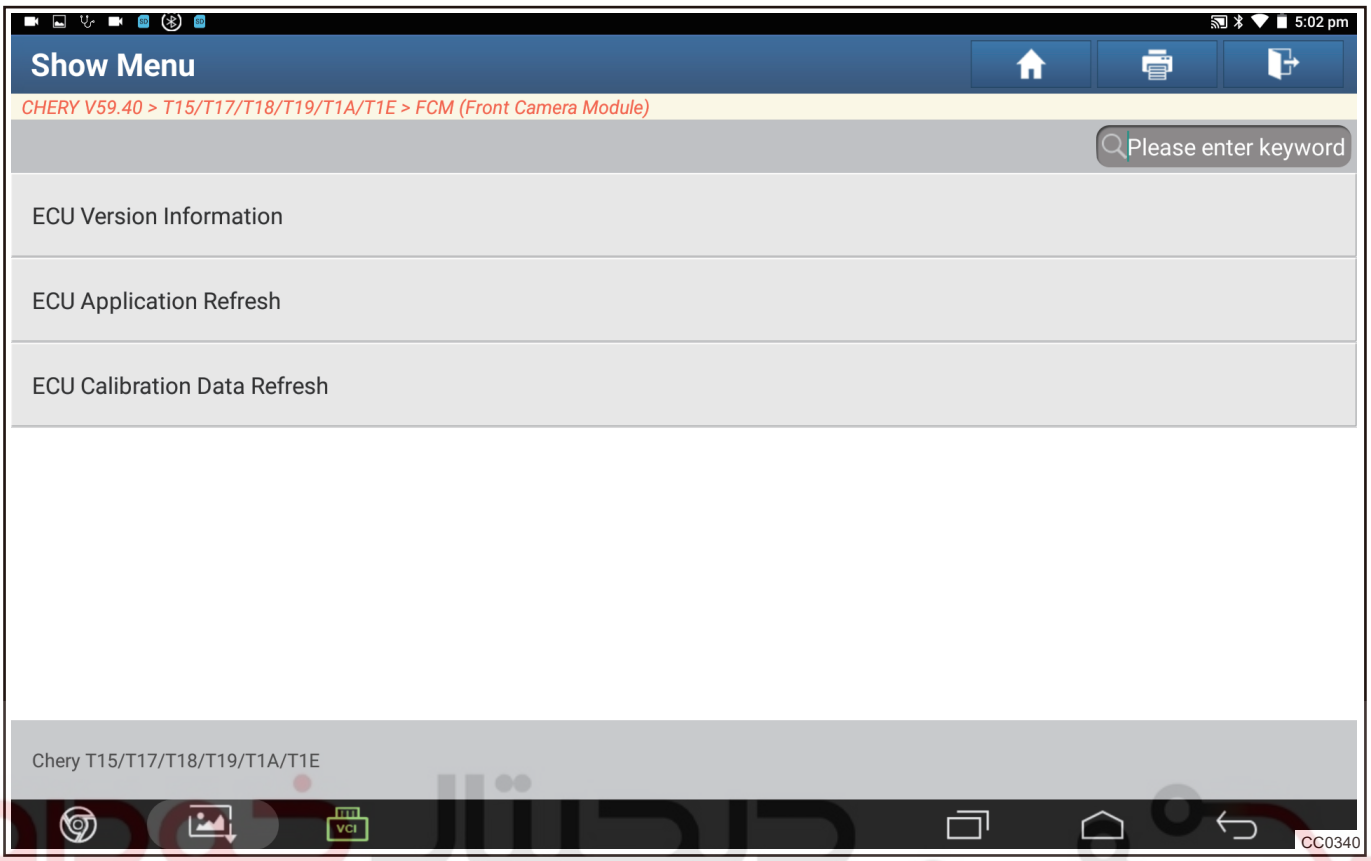
2. Click “Controller Software Refreshing”.

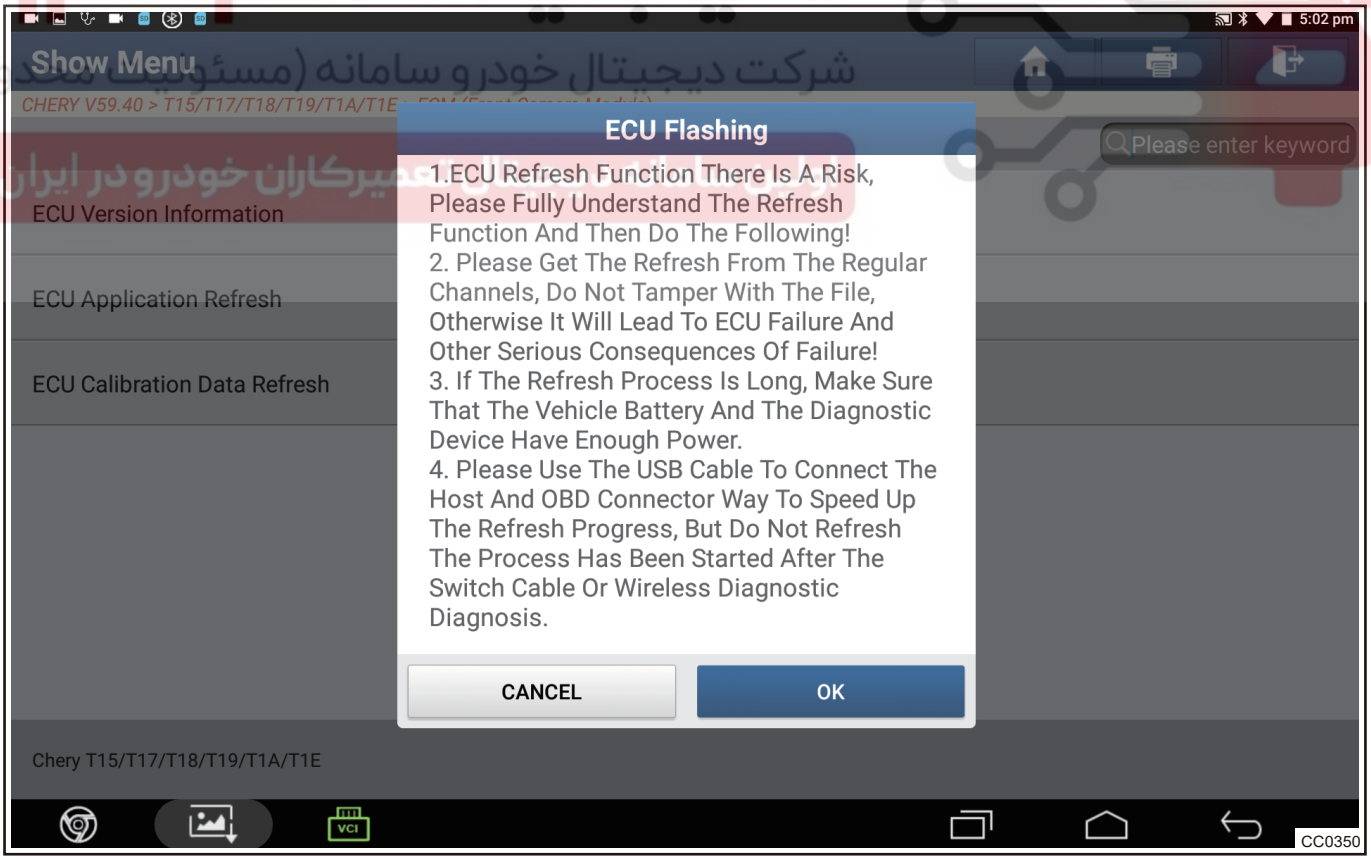


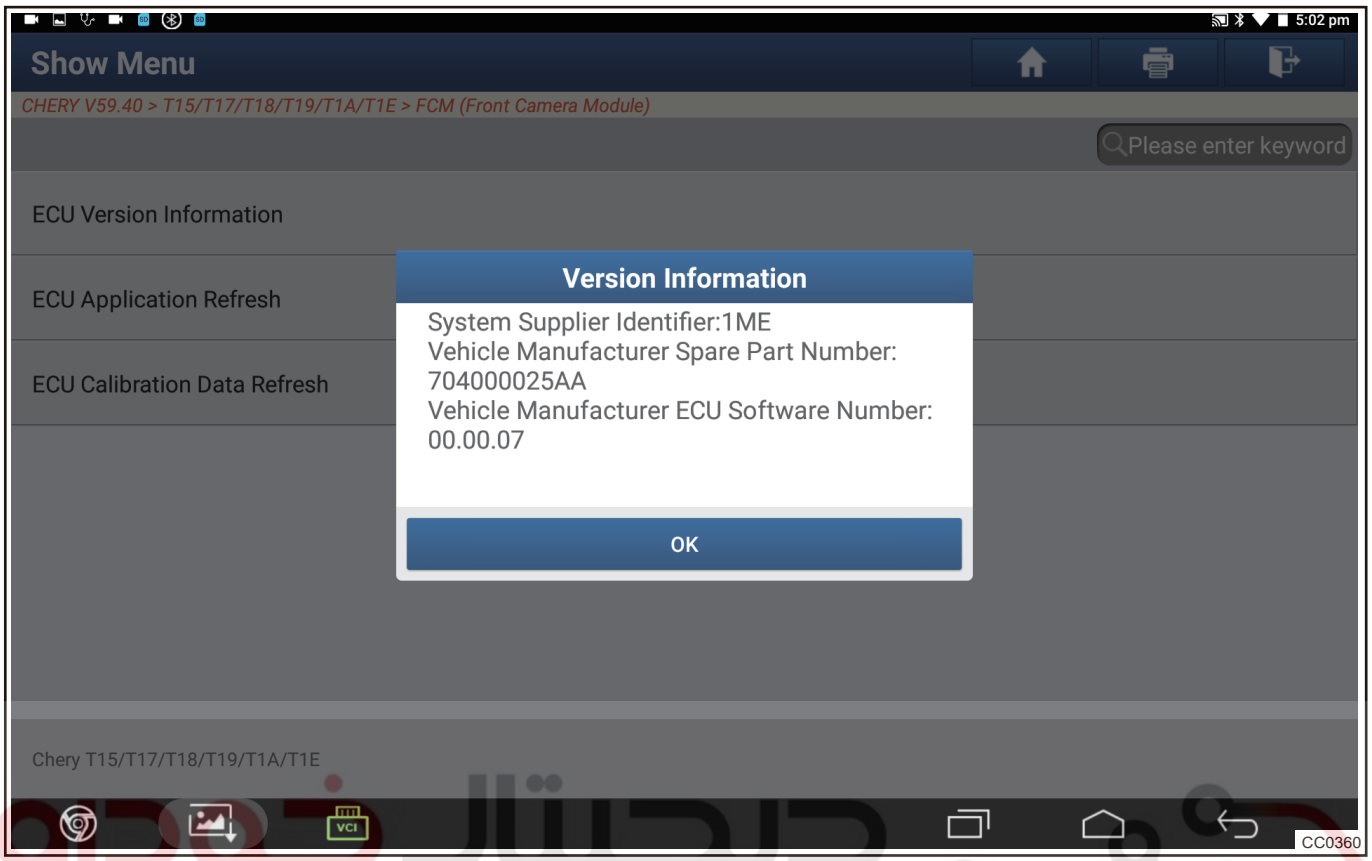
3. Select "FCM (Front Camera Module)".



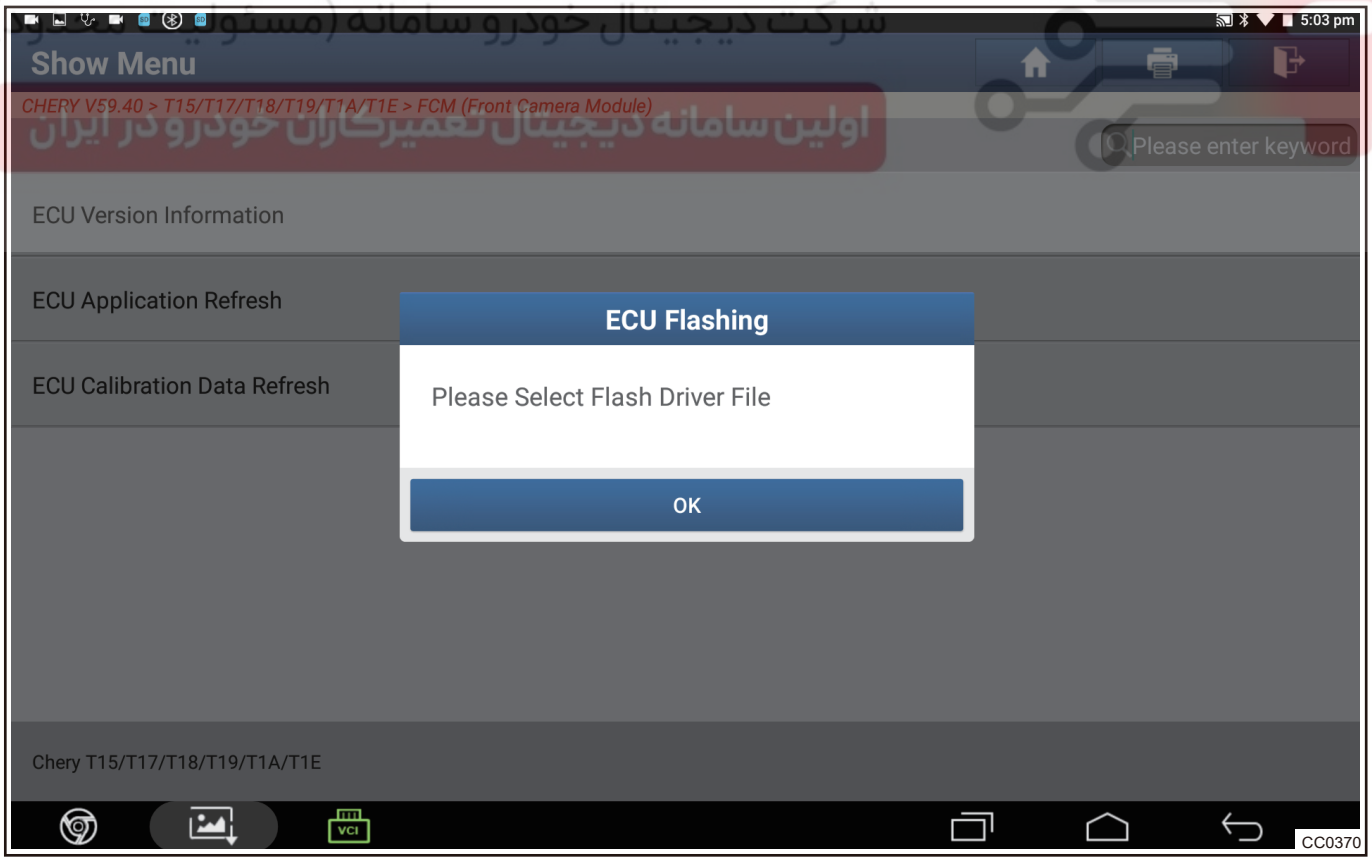
4. After entering, select the calibration program refresh, confirm the FCM version information and click OK.


5:02 pm
Show Menu
CHERY V59.40 > T15/T17/T18/T19/T1A/T1E > FCM (Front Camera Module)
Please enter keyword
ECU Version Information
ECU Application Refresh
ECU Calibration Data Refresh
Chery T15/T17/T18/T19/T1A/T1E
VCI
CC0340


5:02 pm
Show Menu
Please enter keyword
ECU Version Information
ECU Application Refresh
ECU Calibration Data Refresh
ECU Flashing
1.ECU Refresh Function There Is A Risk, Please Fully Understand The Refresh Function And Then Do The Following!
2. Please Get The Refresh From The Regular Channels, Do Not Tamper With The File, Otherwise It Will Lead To ECU Failure And Other Serious Consequences Of Failure!
3. If The Refresh Process Is Long, Make Sure That The Vehicle Battery And The Diagnostic Device Have Enough Power.
4. Please Use The USB Cable To Connect The Host And OBD Connector Way To Speed Up The Refresh Progress, But Do Not Refresh The Process Has Been Started After The Switch Cable Or Wireless Diagnostic Diagnosis.
CANCEL
OK
Chery T15/T17/T18/T19/T1A/T1E
VCI
CC0350



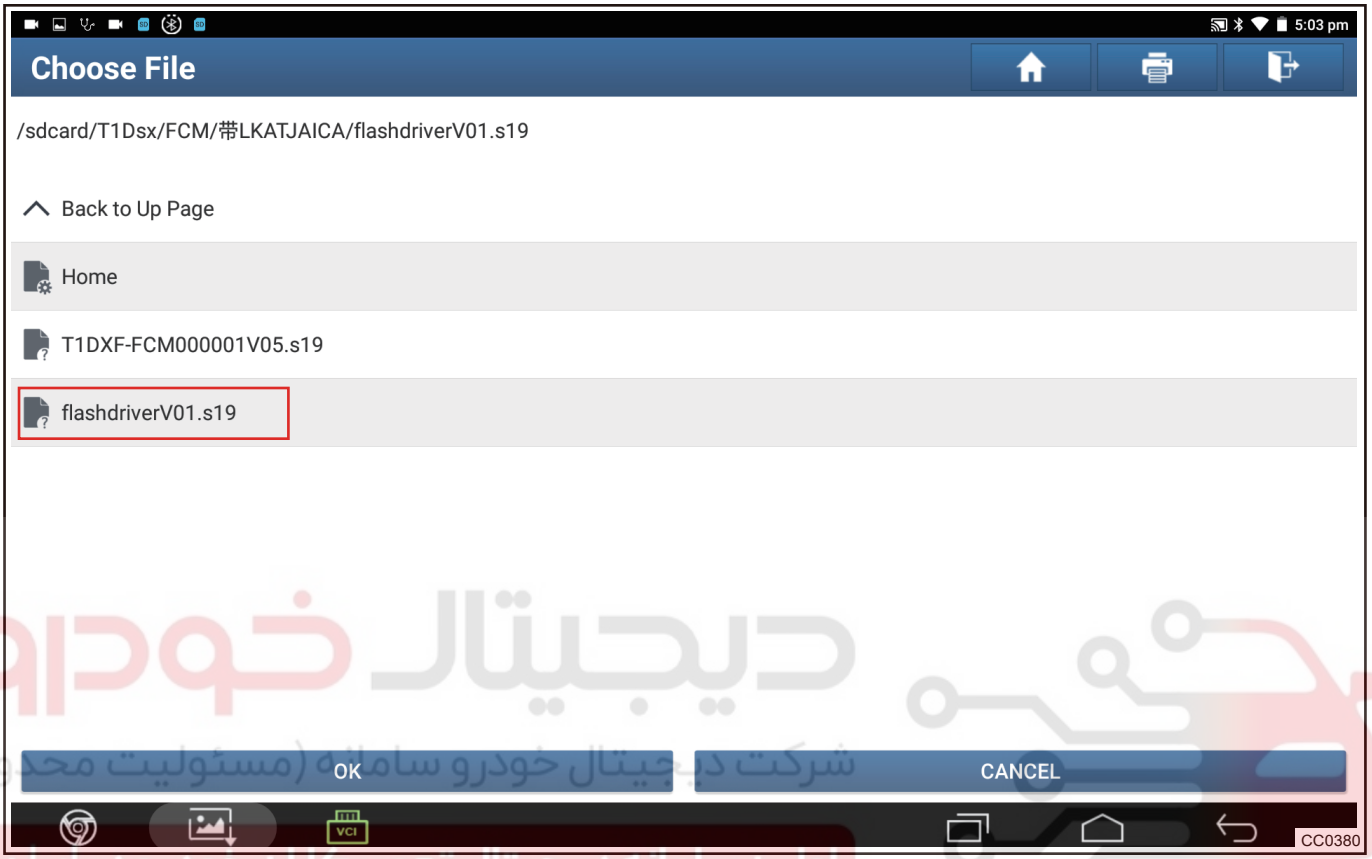
5. Please Select Flash Driver File。



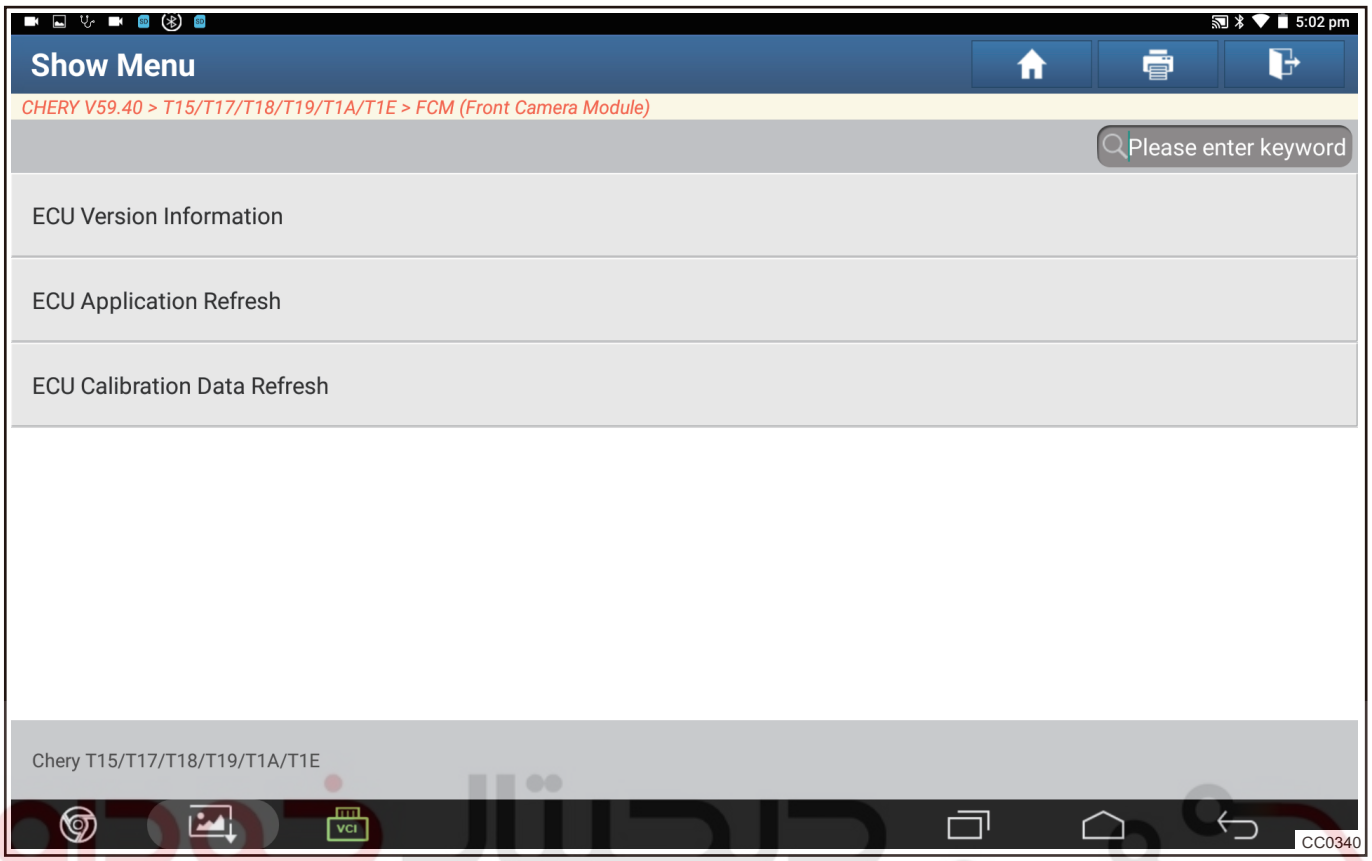
⚠ Caution

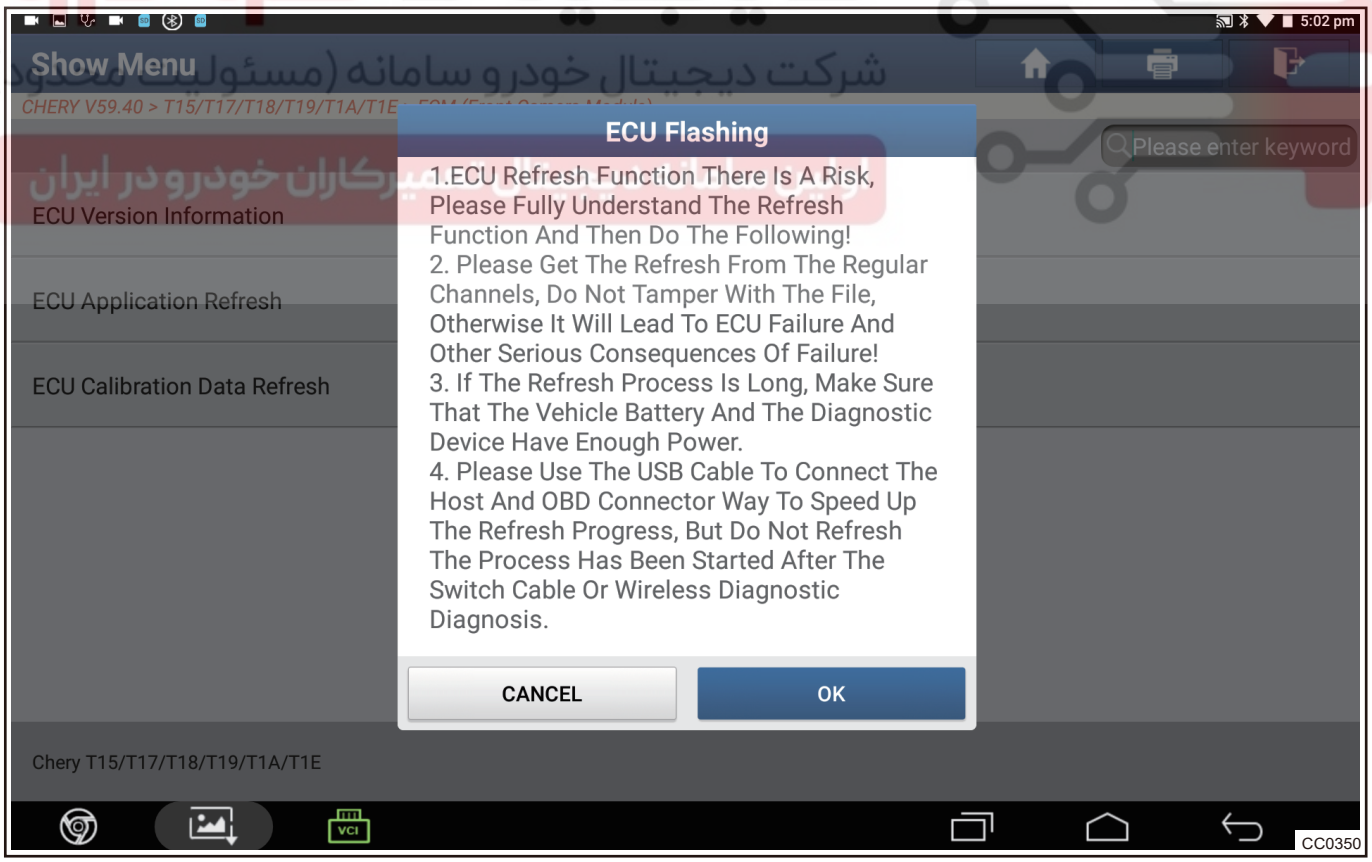
According to the refresh command, first select the driver, and then select the calibration data package.

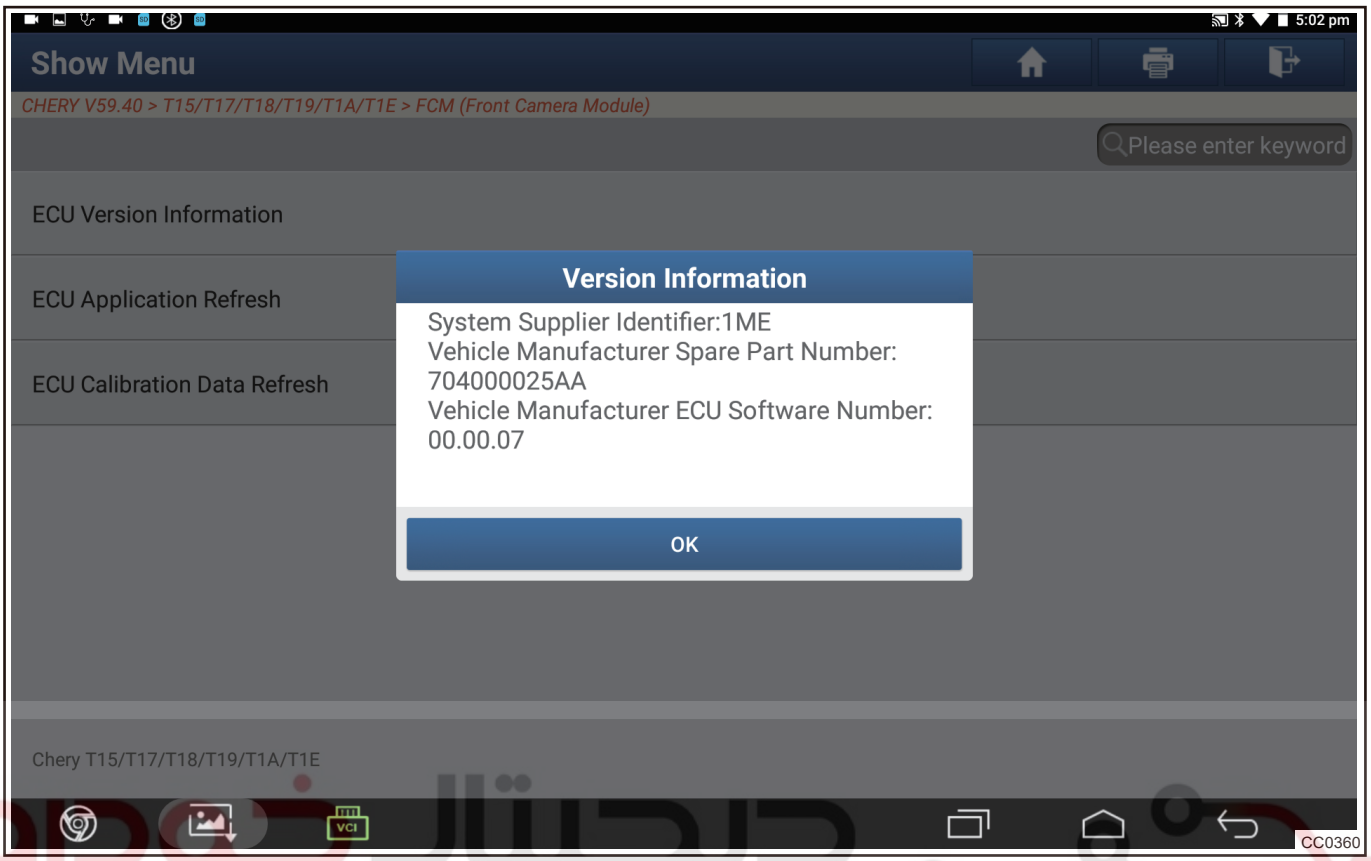
6. Select the correct driver according to the vehicle configuration and click OK.



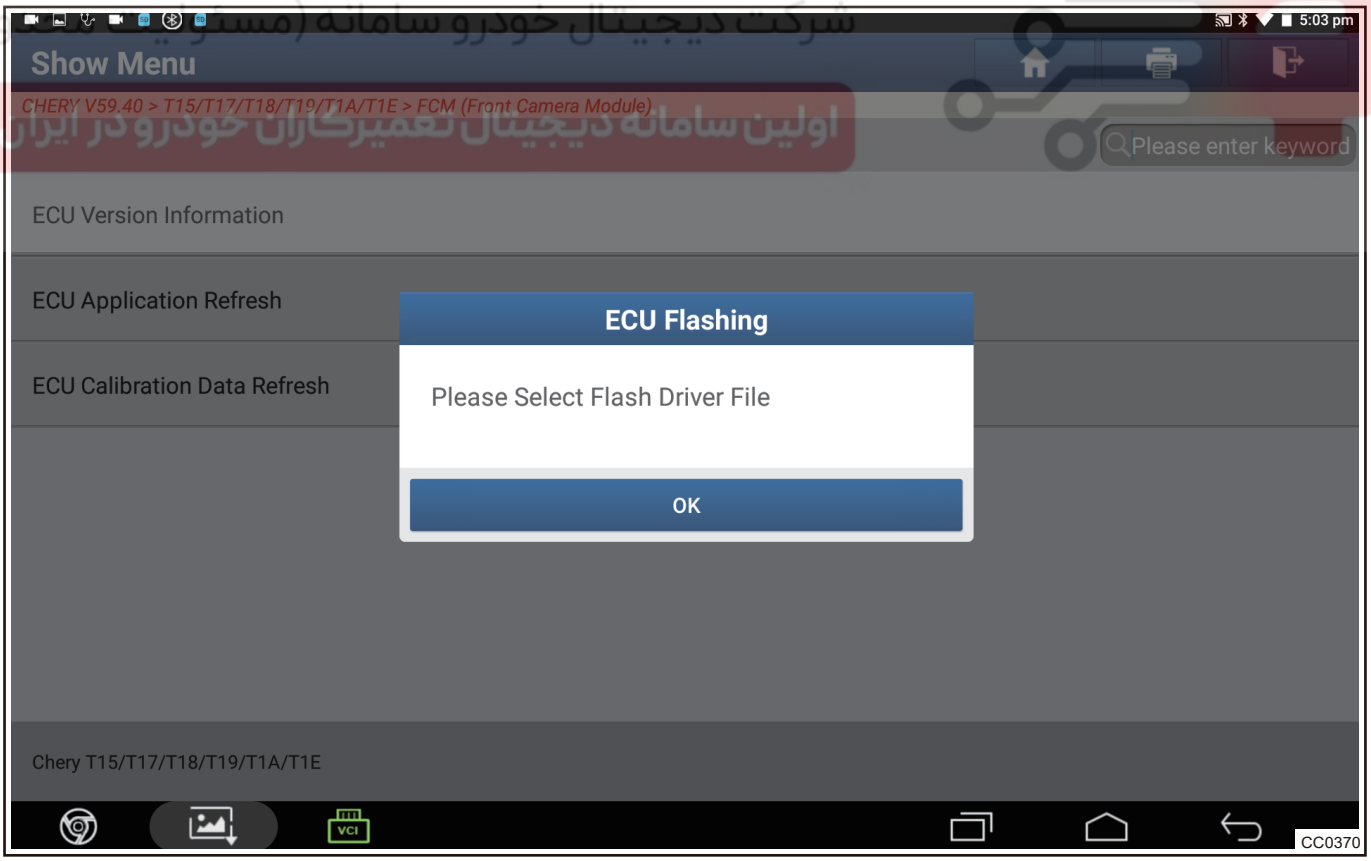
7. After the driver is written successfully, select the calibration program refresh, confirm the FCM version information and click OK.



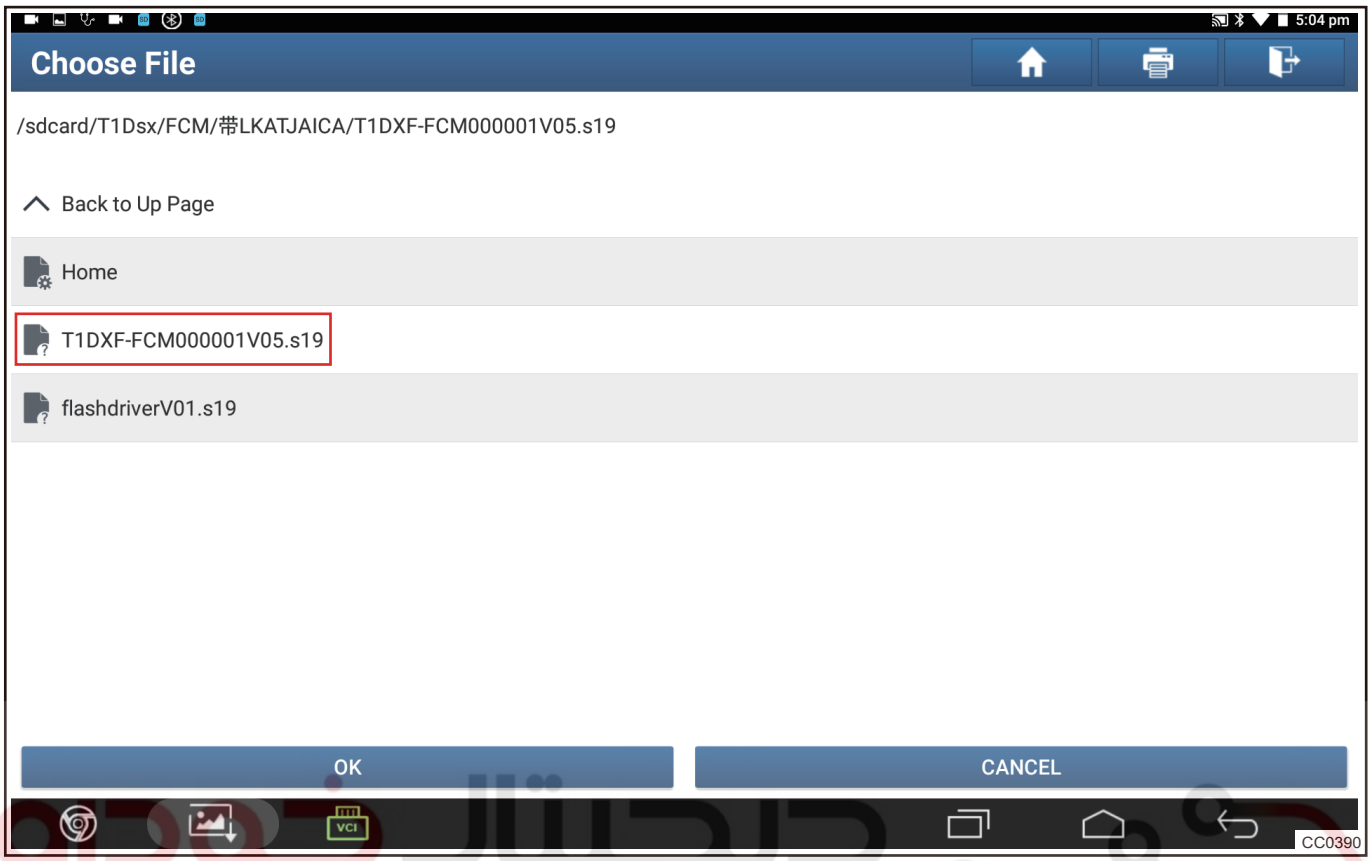




8. Please Select Flash Driver File。



9. Select the correct calibration data according to the vehicle configuration and click OK.

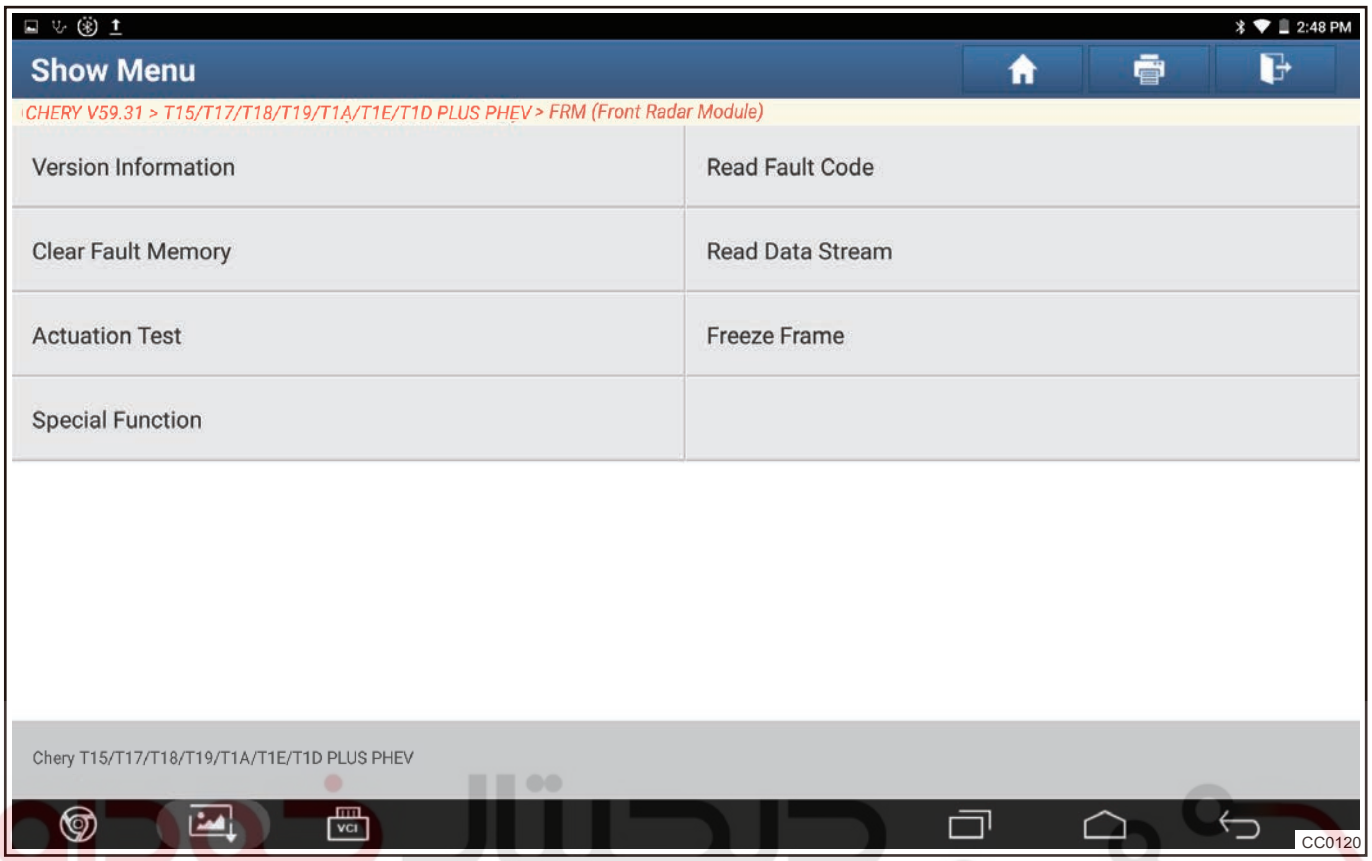


Matching Learning

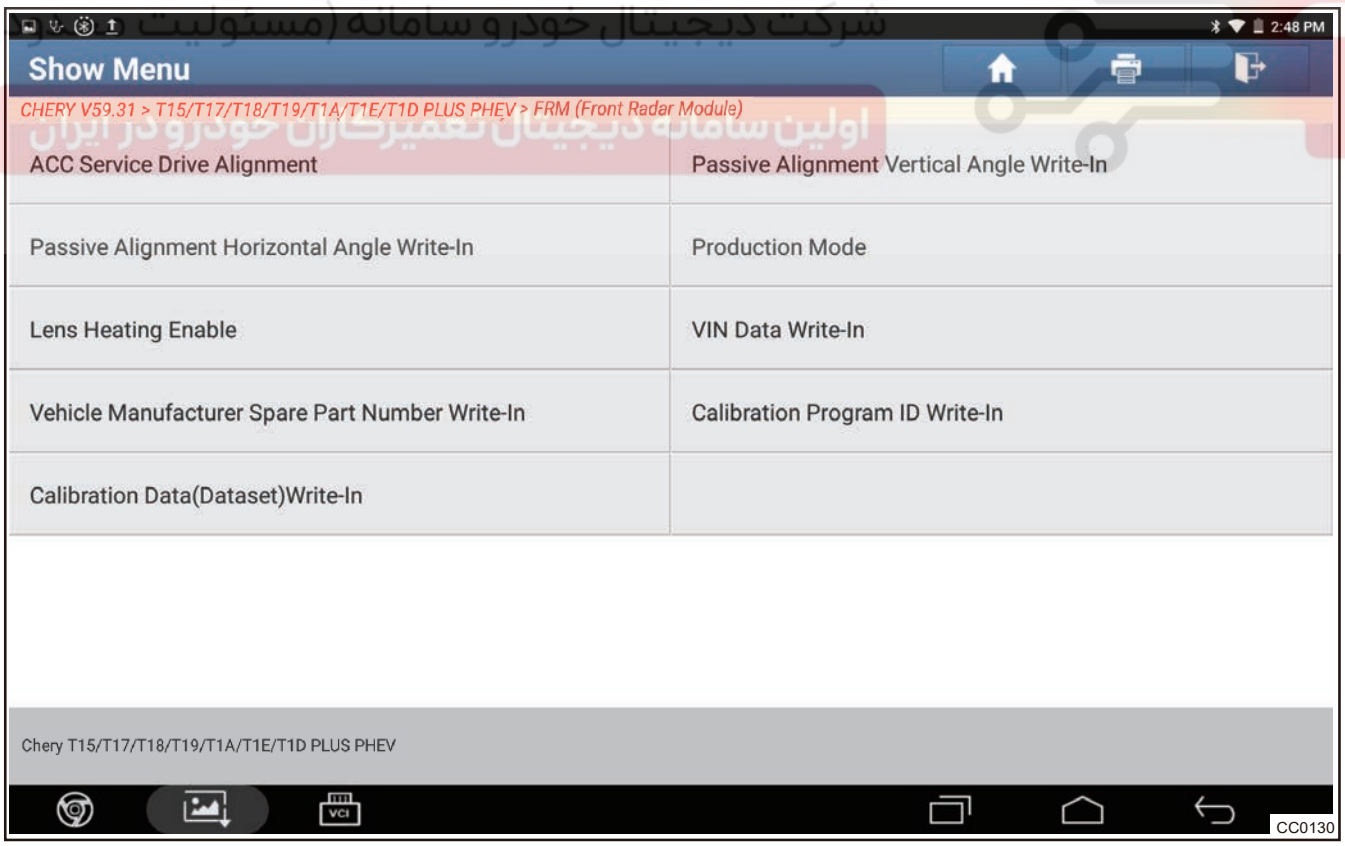
Microwave Radar Module

Writing VIN code

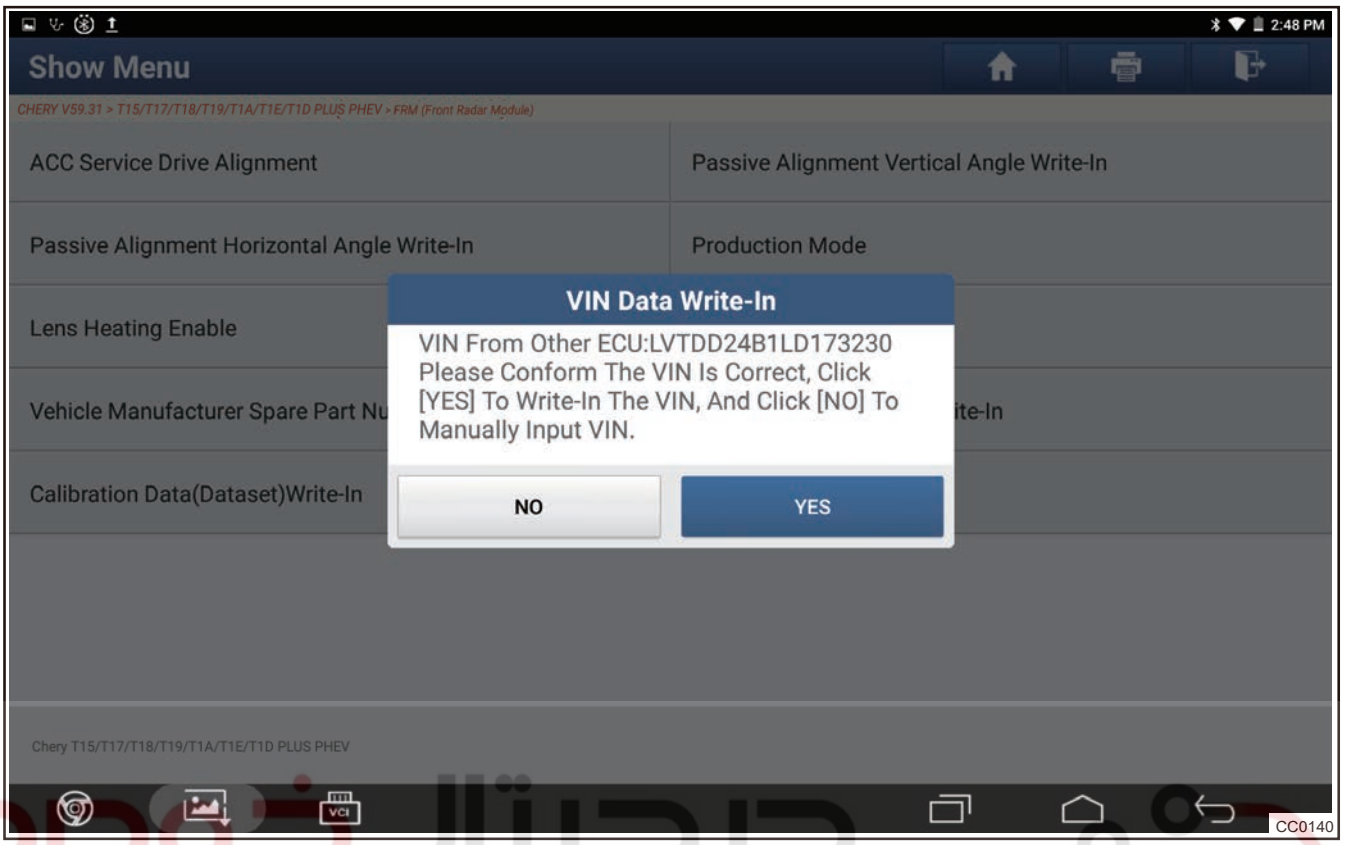
1. Connect diagnostic tester, enter the system, select model and click special operation.



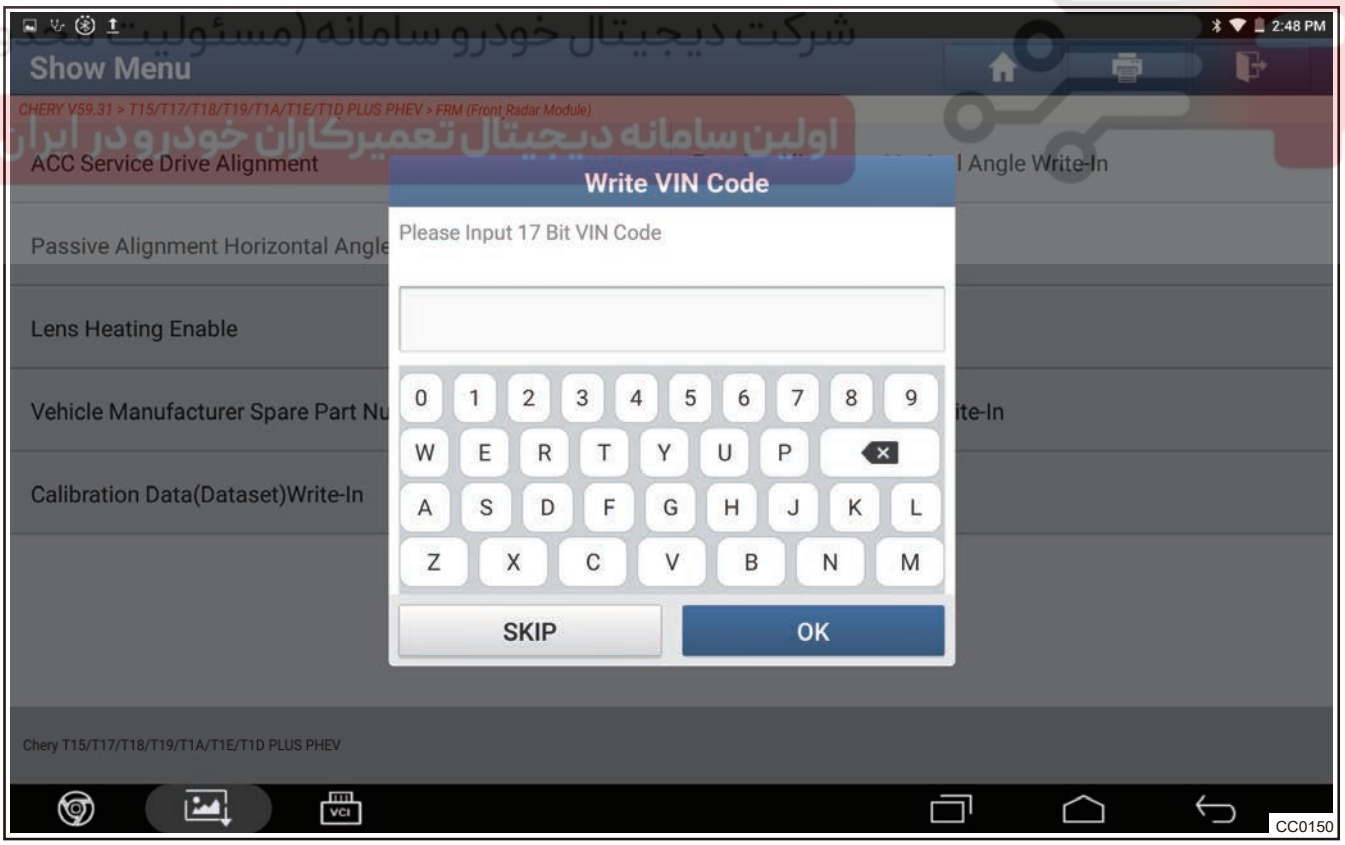
2. Click “Write VIN Code”.



3. Compare VIN code displayed on screen with vehicle. If the code is same, click “Yes”, otherwise click “No” and input it manually.



4. Input corresponding VIN code and click “OK”.



Front Radar After-Sales Driving Calibration
Use a spirit level to calibrate the vertical direction of radar. The requirements for calibration are as follows:

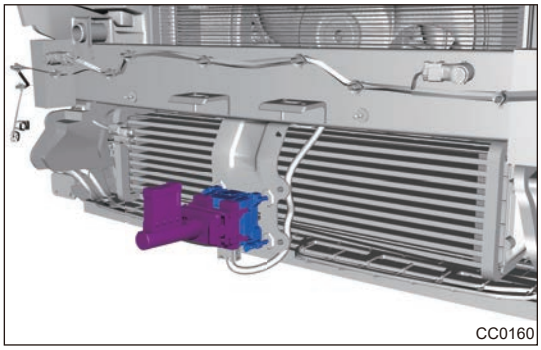
- Calibration site for parking vehicle must be horizontal, with an inclination of -0.3 - 0.3°, or inclination of calibration site can be measured.
- Keep the radar surface clean, especially ensure the positioning accuracy of three installation positioning points of the spirit level.
- Use SDA to calibrate the horizontal direction of radar. Environmental requirements for calibration are as follows:
  - Keep the radar surface clean and free of snow, soil and other objects.
  - Avoid calibration in rainy and snowy weather.
  - There should be stationary metal targets on both sides of road, such as lampposts, signboards, etc. Highway or elevated road with metal railings are recommended. When driving calibration is started, the vehicle must drive under certain conditions to gradually increase the progress bar of driving calibration to 100% and complete the driving calibration process. The driving conditions of calibration are as follows:

Limitations	Threshold	Out of Limit Hint
Minimum speed	40 km/h	Speed is too low
Maximum speed	120 km/h	Speed is too high
Minimum longitudinal acceleration	-0.5 m/s2	Longitudinal acceleration is too low
Maximum longitudinal acceleration	1.0 m/s2	Longitudinal acceleration is too high
Maximum lateral acceleration	2.0 m/s2	Lateral acceleration is too high
Maximum steering qulv	0.001 /m	Curvature is too large
ABS, ASR, ESP, MSR trigger		Vehicle dynamic condition interference (ABS, ASR, ESP, MSR, etc. trigger)

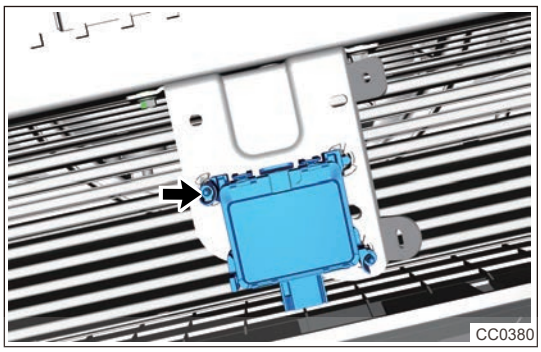
After sales calibration of medium distance radar is performed by combining level calibration and driving calibration. Use a spirit level to calibrate the vertical direction firstly, then use driving calibration service to calibrate the horizontal direction, and finally make the deviation between driving axis and radar axis within a certain range. Radar calibration is required when:

- When replacing radar assembly with a new one, for example, replace radar or radar bracket.
- When the driving axis of the vehicle changes, for example, four-wheel alignment was performed again, etc.
- When the radar reports an error and reads the error code as "Front Radar not Calibrated" by diagnostic equipment.

1. Park the vehicle in a horizontal area, remove components around radar, front bumper and front radar cover, install front collision warning tool correctly, observe data showed on display of front collision warning tool. Adjust calibration bolt (right lower bolt) vertically so that data showed on display is close to 0°.


CC0160

- Horizontal angle calibration method
  - The calibration tool for the horizontal direction is diagnostic tester + hexagonal 3.5 sleeve. After radar calibration, adjust the calibration bolt (upper left corner) according to the angular deviation value indicated by the diagnostic tester.


CC0380

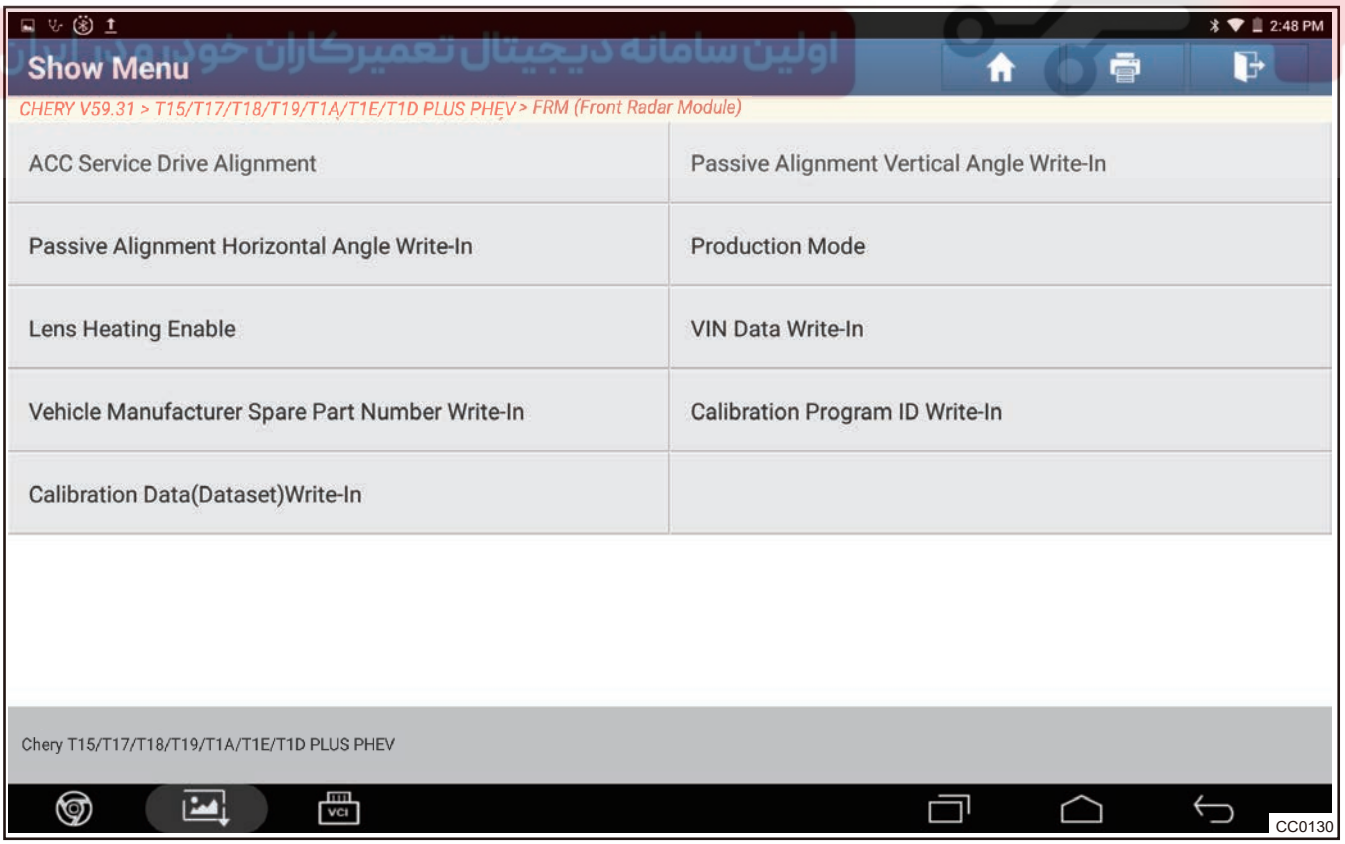
CAUTION

The radar snap is non-reusable part, the snap force of the reused snap will be reduced, affecting the stability of the radar installation, and the 3 snaps must be replaced with new ones after radar disassembly.

WARNING

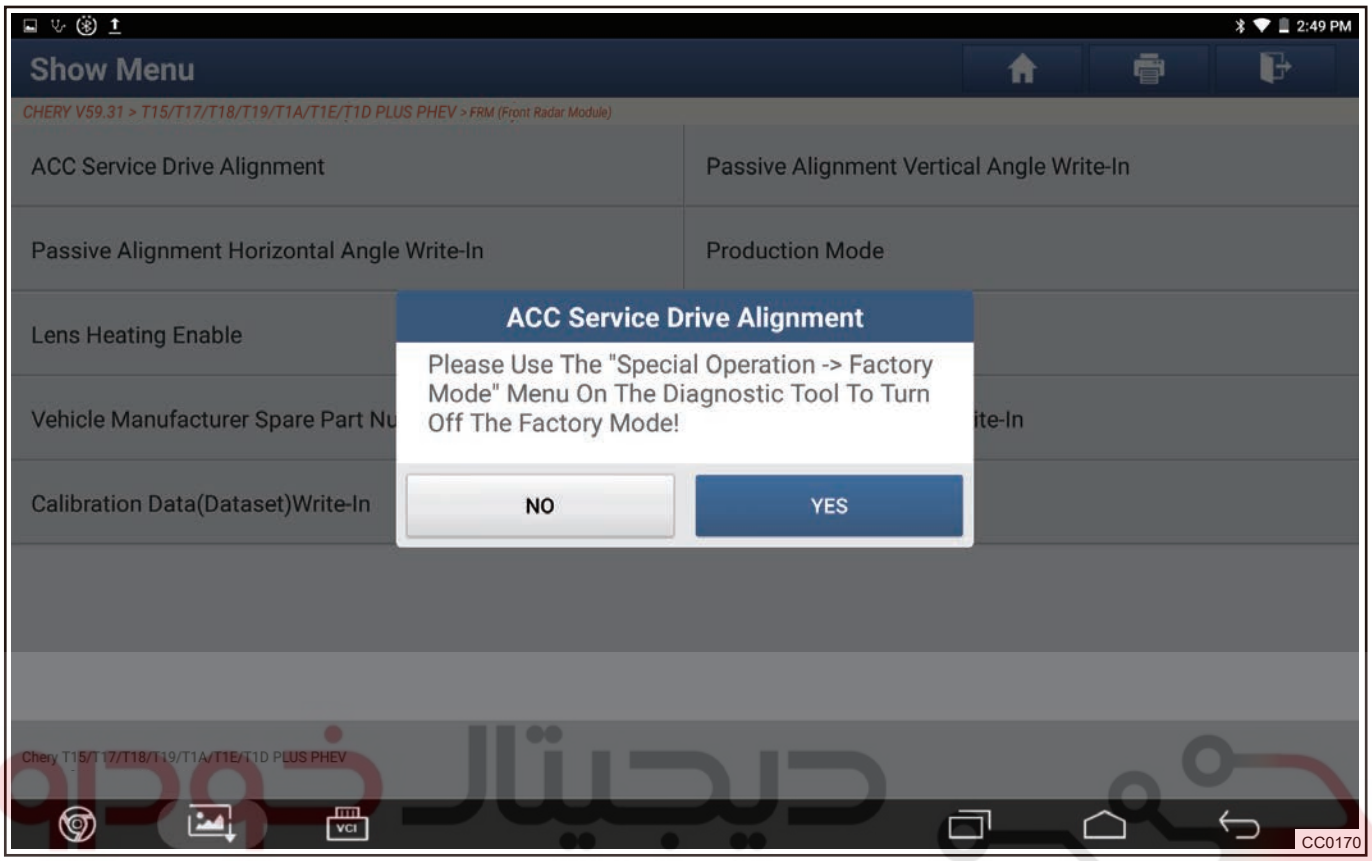
Turn off factory mode before calibrating.

1. Click “Front Radar After-sales Driving Calibration”.

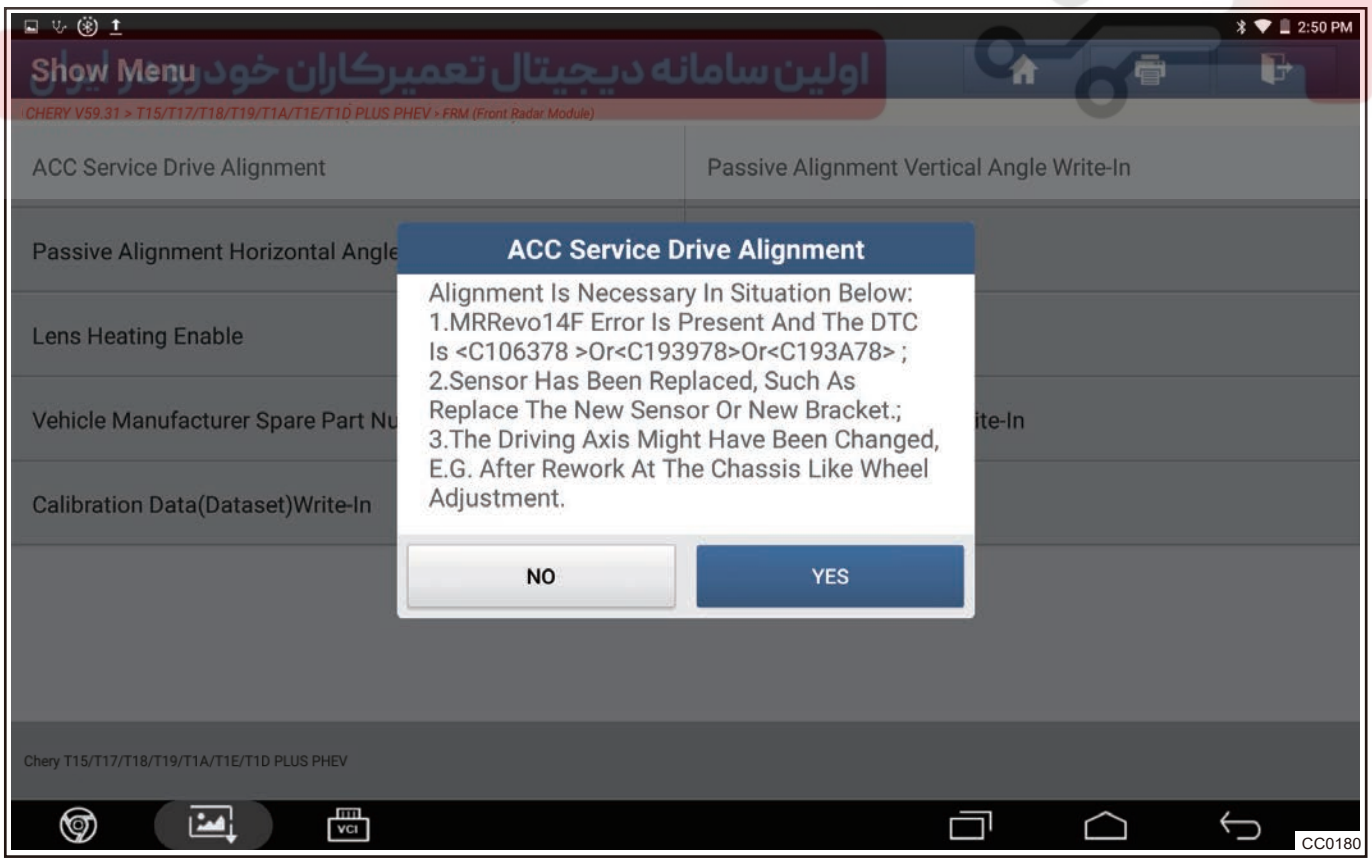


CC0130

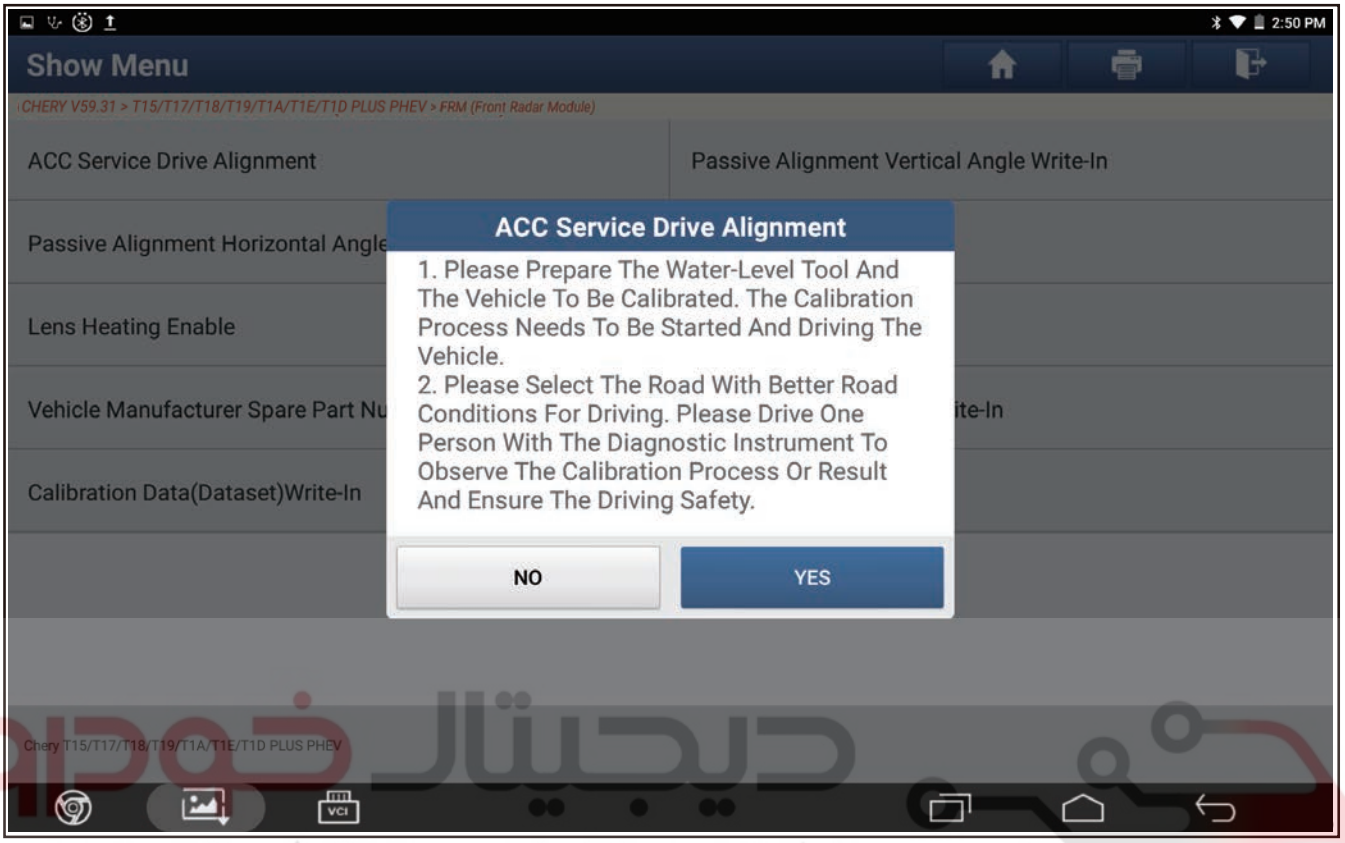
2. Turn off factory mode before calibration, click "YES" if you are sure to turn off.



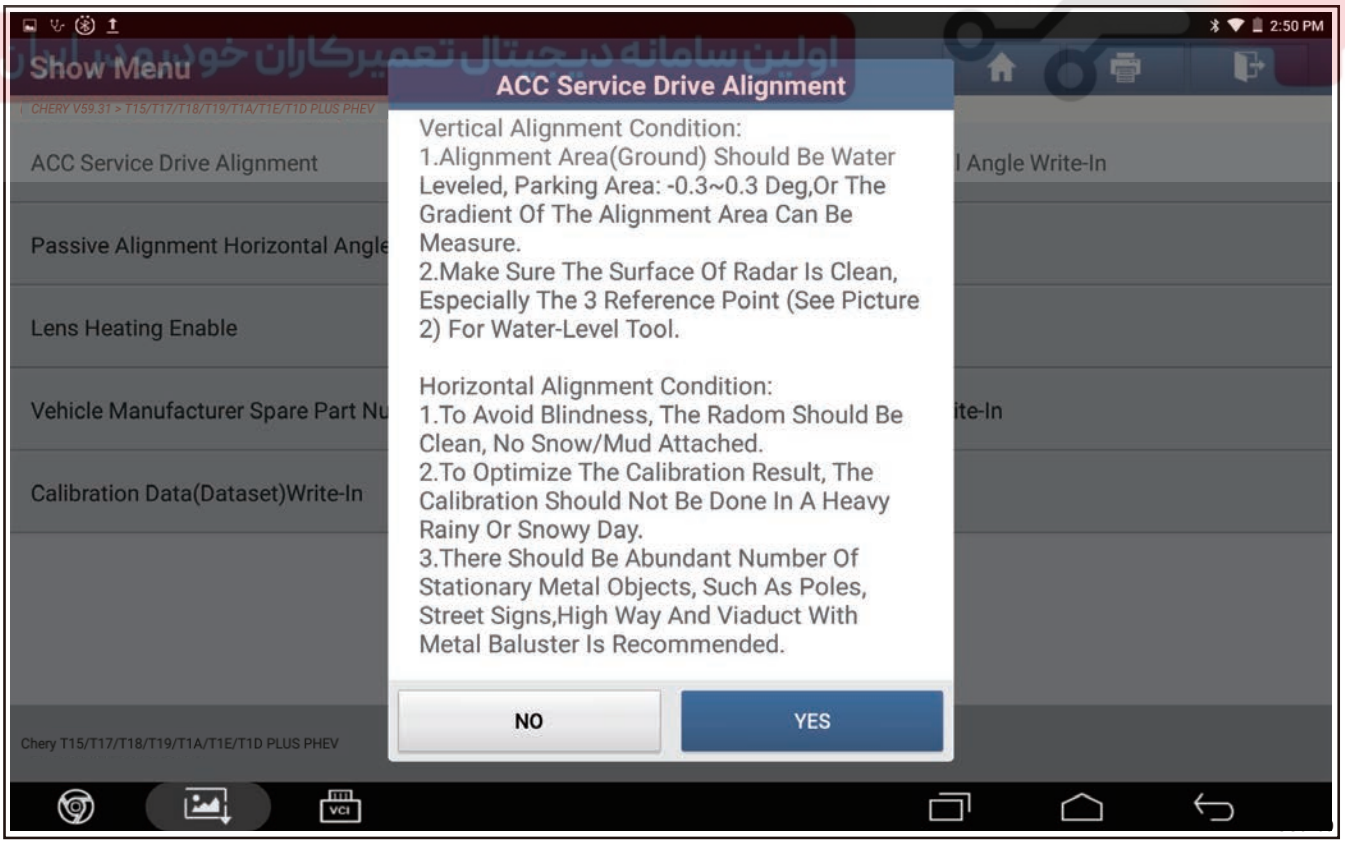
3. Read precautions, confirm and click “Yes”.

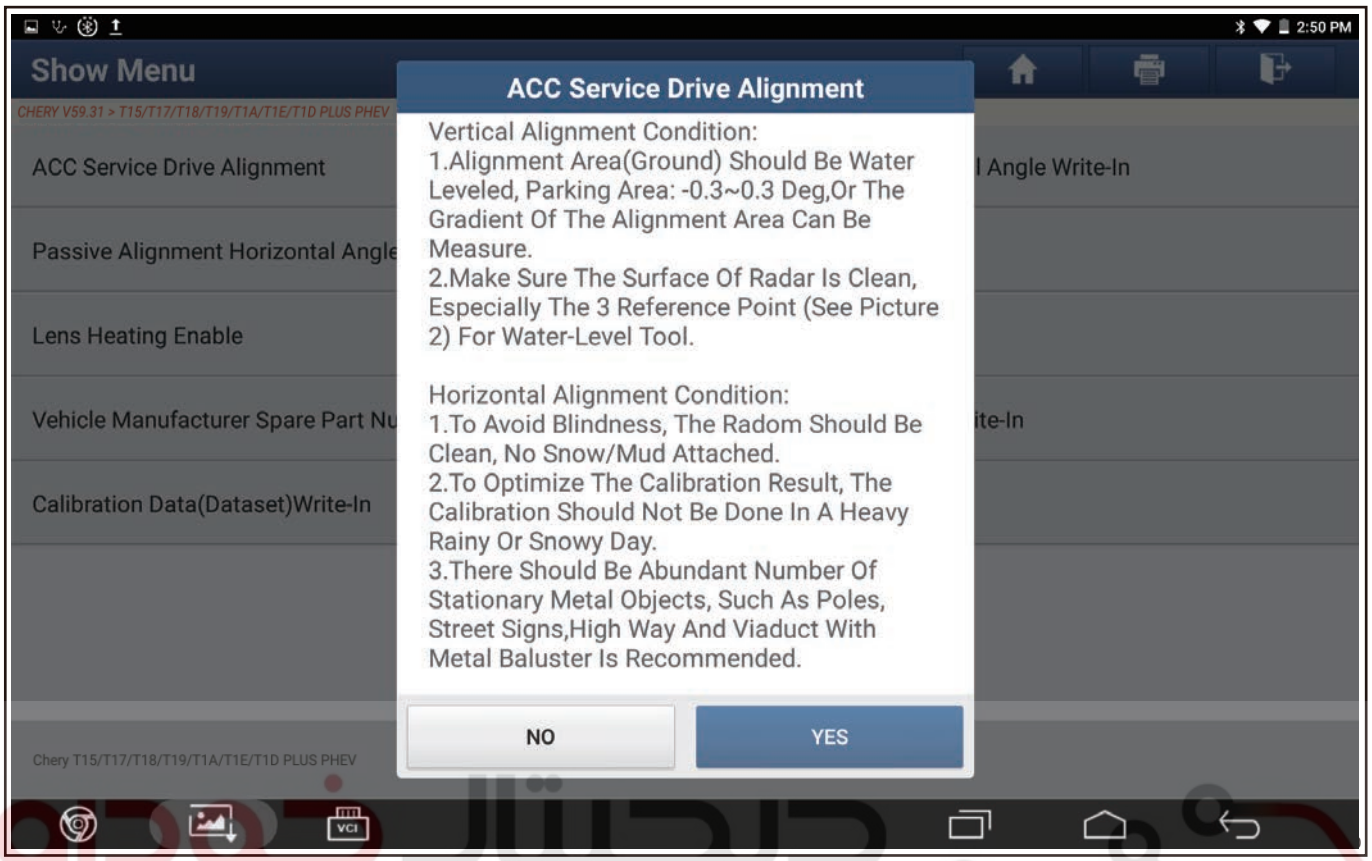


4. Use front collision warning tool to calibrate vertical direction, and click "Yes" after completing items prompted by diagnostic tester.



5. Calibrate horizontal direction with driving calibration, and click “Yes”.

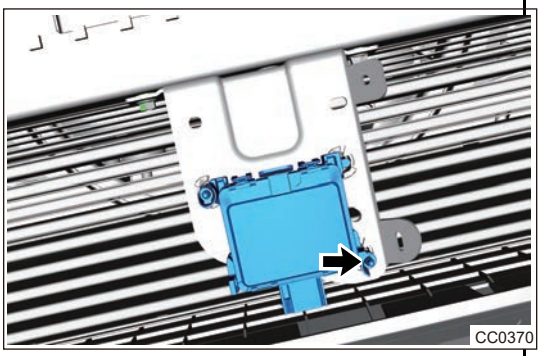




6. Start driving calibration and drive according to driving conditions until the calibration progress bar reaches 100%. When the progress bar reaches 100%, the calibration is completed and there will be a pop-up box in the diagnostic tester interface that will display the calibrated horizontal deflection angle.

Warning

- If the progress bar never reaches 100% (more than 20 minutes), it may be that the radar vertical angle deviation is too large, it is necessary to terminate the calibration, use the level to adjust the radar vertical angle (bolt at the lower right corner).



- The interface of diagnostic tester pops up the window of "-former radar after-sales calibration failure", which shows that the horizontal deviation is too large. This is caused by too large deviation of radar horizontal angle, so you need to adjust the radar horizontal calibration bolts according to the requirements of calibration results and then recalibrate.

HINT

Adjust horizontal calibration bolt according to requirements of calibration result; If the result exceeds threshold once, after adjusting calibration bolt, perform driving calibration again to ensure the calibration is completed.

CAUTION

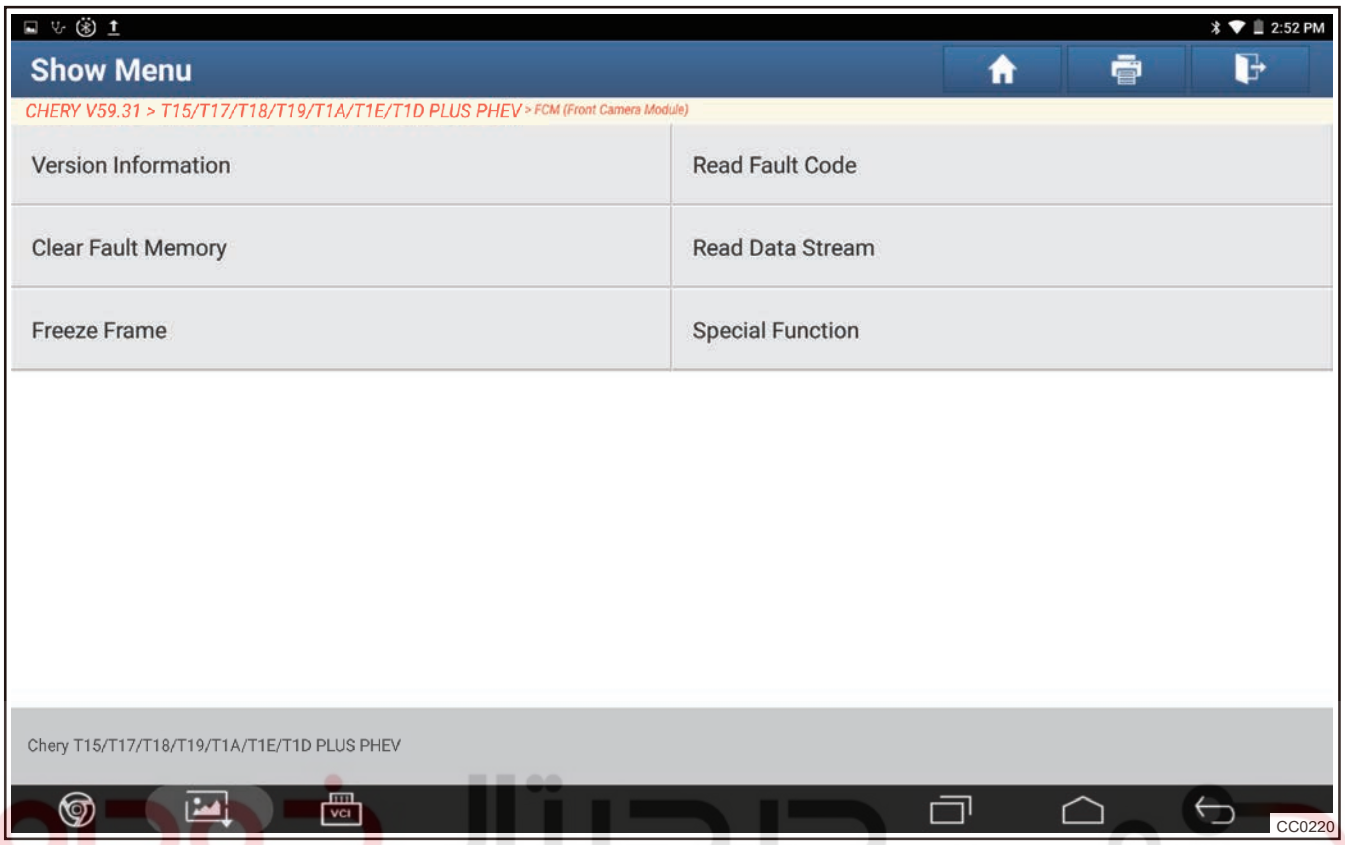
Calibration may fail if following conditions occur:

- Driving conditions always do not meet requirements: Surrounding references, road conditions.
- Communication between diagnostic tester and body is interrupted during calibration.
- Installation deviation of radar is too large.

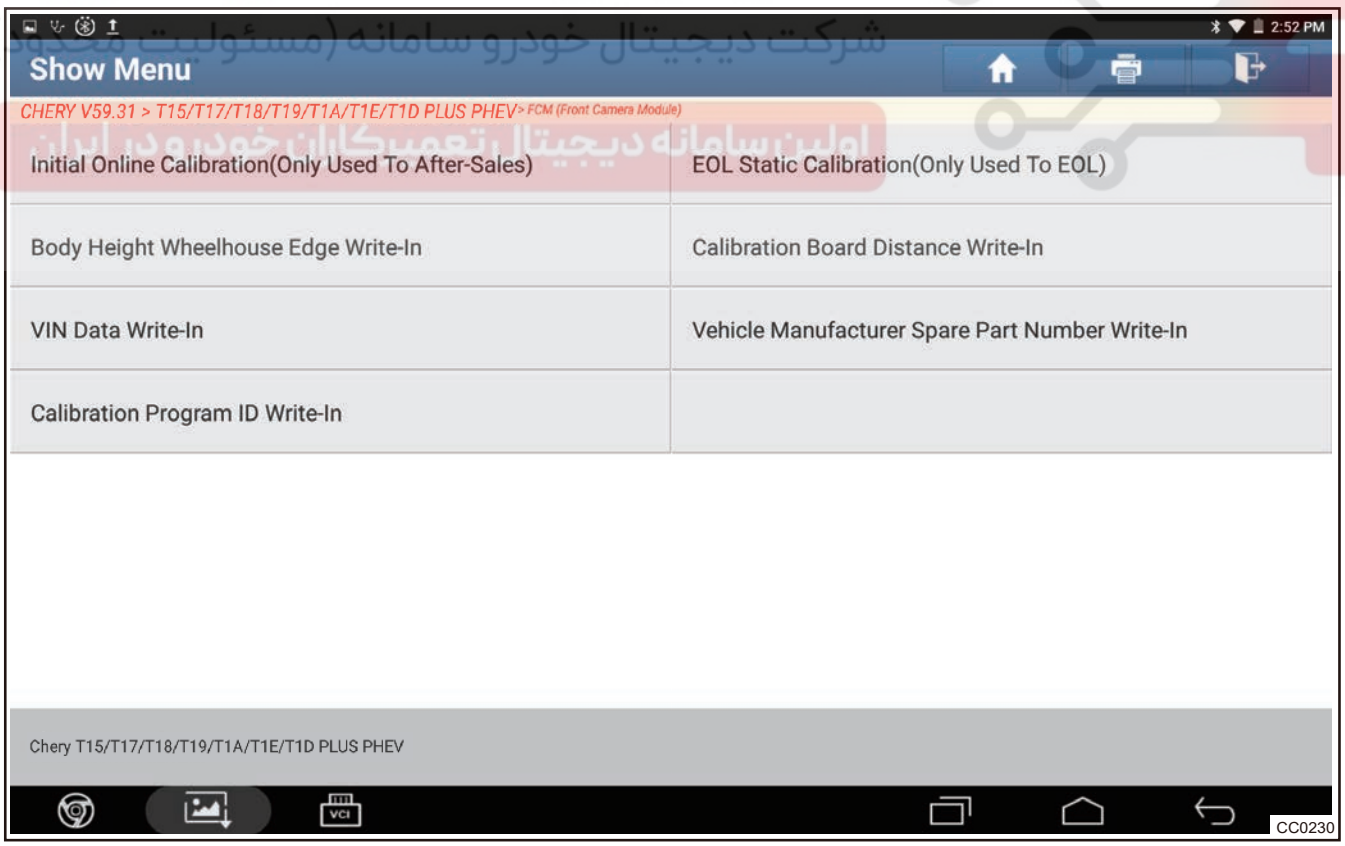
Multi-function Front Camera

Writing VIN code

1. Connect diagnostic tester, enter the system, select model and click special operation.

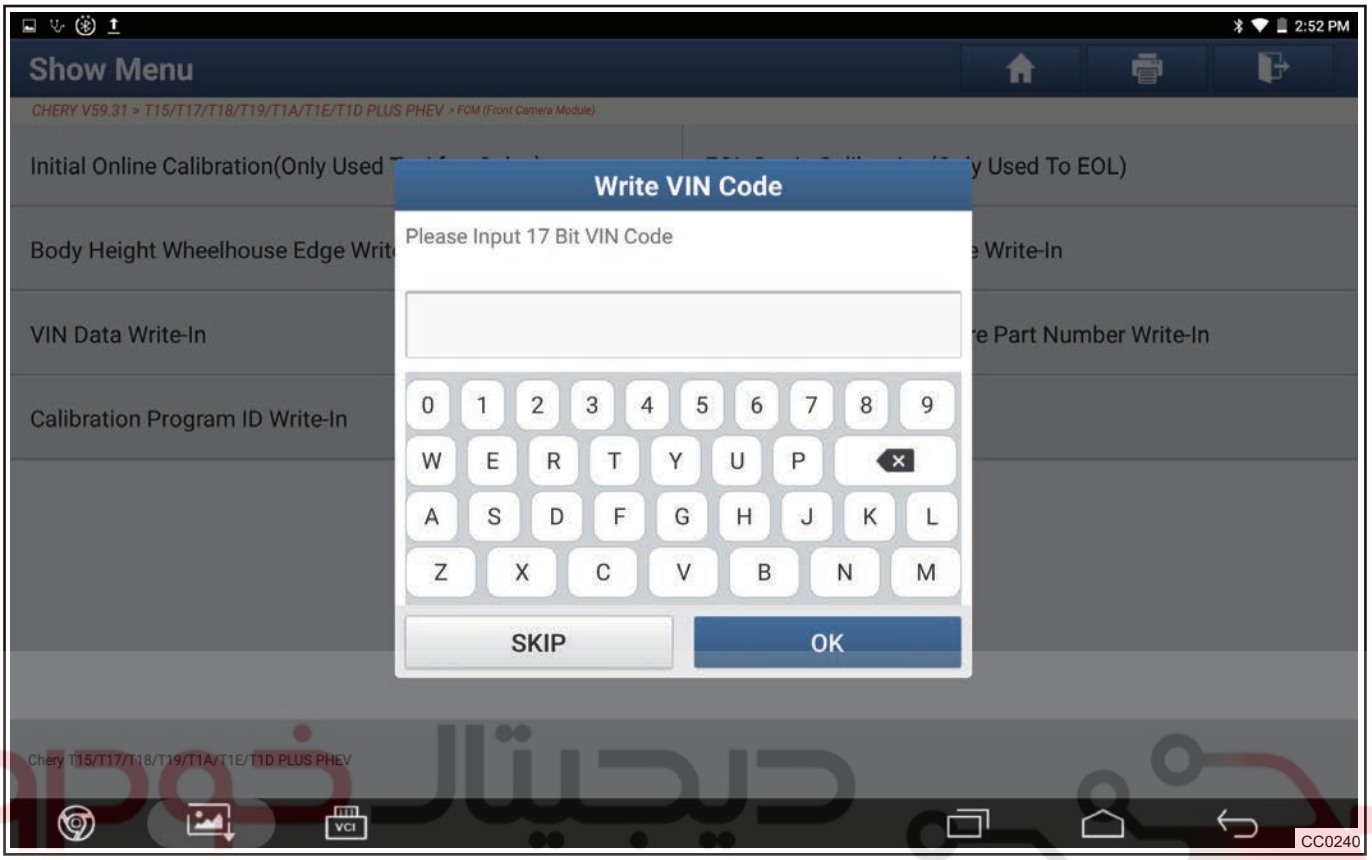


2. Click “Write VIN Code”.



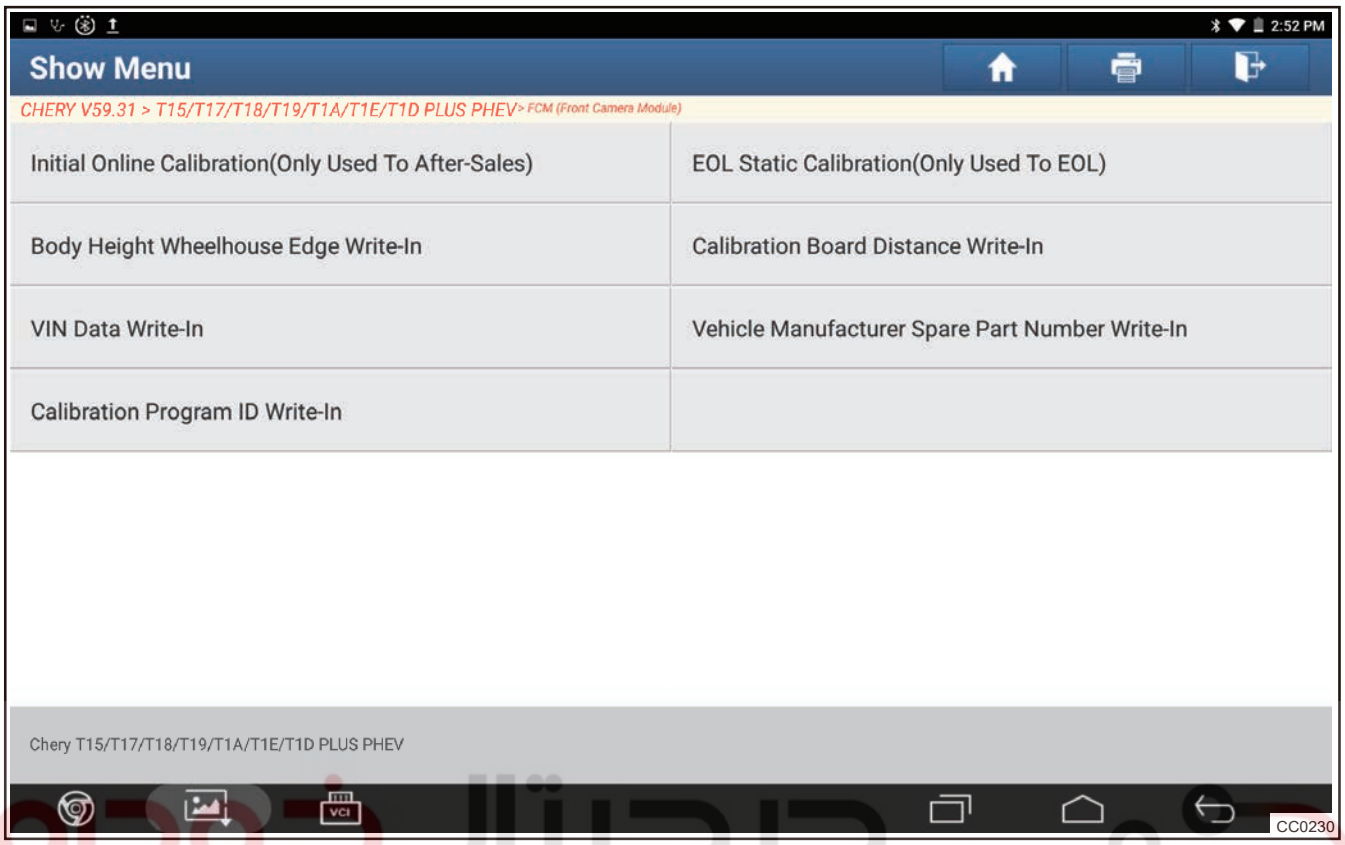
3. Compare VIN code displayed on screen with vehicle. If the code is same, click “Yes”, otherwise click “No” and input it manually.

4. Input corresponding VIN code and click “OK”.

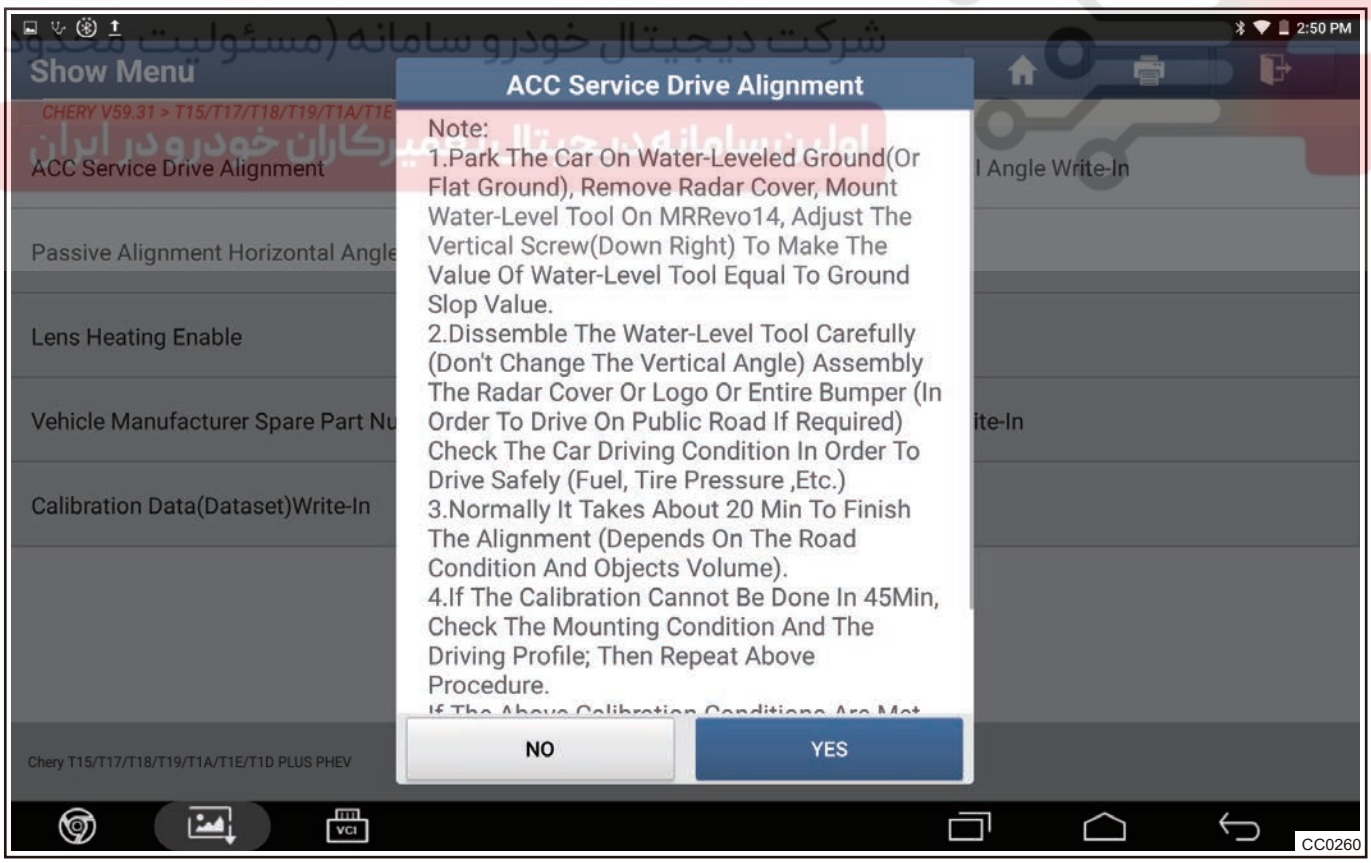


Online initialization calibration

1. Click “Online Initialization Calibration (Only for After-Sales)”.

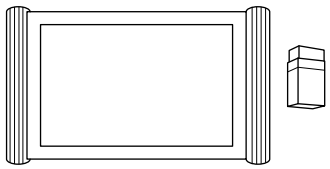
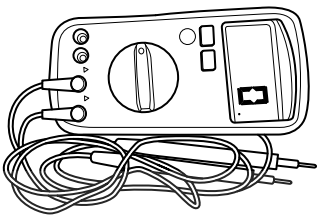


2. Carefully read calibration precautions, confirm and click “Yes”.



3. According to the information, drive the vehicle for 6 minutes.
4. Calibration is finished.

Special Tools

Tool Name	Tool Drawing
X-431 PAD Diagnostic Tester	 RCH0001006
Digital Multimeter	 RCH0002006

DIAGNOSIS & TESTING

Problem Symptoms Table

Constant Speed Cruise/Active Speed Limit/Adaptive Cruise

Hint:
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Symptom	Suspected Area
Vehicle speed can not be set (Meter indicator does not illuminate)	Wire harness or connector
	Instrument cluster
	Engine Control Module (ECM)
Vehicle speed can not be set (Meter indicator comes on normally)	Constant speed cruise control switch
	Brake switch
	ESP and EPB
	Wire harness or connector
	Body Control Module (BCM)
	Engine Control Module (ECM)

Diagnostic Help

1. Connect diagnostic tester X-431 3G (the latest software) to Data Link Connector (DLC), and make it communicate with vehicle electronic module through data network.
2. Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
3. If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.
4. Only use a digital multimeter to measure voltage of electronic system.
5. Refer to any Technical Bulletin that may apply to this malfunction.
6. Visually check related wire harness and connector.
7. Check and clean all CD system grounds related to the latest DTCs.
8. If numerous trouble codes are set, refer to circuit diagram and look for any common ground circuit or power supply circuit applied to DTC.

Intermittent DTC Troubleshooting

If malfunction is intermittent, perform the followings:

- Check if connector is loose.
- Check if wire harness is worn, pierced, pinched or partially broken.
- Monitor diagnostic tester (the latest software) data that is related to this circuit.
- Wiggle related wire harnesses and connectors and observe if signal is interrupt in related circuit.
- If possible, try to duplicate the conditions under which DTC was set.
- Look for data that has changed or DTC to reset during wiggling test.
- Look for broken, bent, protruded or corroded terminals.
- Inspect airbag components and mounting areas for damage, foreign matter, etc. that will cause incorrect signals.
- Check and clean all wire harness connectors and ground parts related to DTC.

- If multiple trouble codes were set, refer to circuit diagrams to look for any common ground circuit or power supply circuit applied to DTC.
- Refer to any Technical Bulletin that may apply to this malfunction.

Ground Inspection

Ground points are very important to the proper operation of circuits. Ground points are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) may increase load resistance. This situation may change the way in which a circuit operates. Circuits are very sensitive to proper grounding. A loose or corroded ground can seriously affect the control circuit. Check the ground points as follows:

1. Remove ground bolt or nut.
2. Check all contact surfaces for tarnish, dirt and rust, etc.
3. Clean as necessary to ensure that contact is in good condition.
4. Reinstall ground bolt or nut securely.
5. Check if any additional accessories interfere with ground circuit.
6. If several wire harnesses are crimped into one ground terminal, check for proper crimp condition. Make sure that all wire harnesses are clean and securely fastened while providing a proper ground path.

Front Camera Module (FCM) DTC Chart

DTC	DTC Definition
U007388	CAN Communication Error - Communication Bus Off Error (Public CAN)
U12A188	CAN Communication Error - Communication Bus Off Error (Private CAN)
U012987	CAN Communication Error - Lost Communication with BSM
U014087	CAN Communication Error - Lost Communication with BCM
U014687	CAN Communication Error - Lost Communication with CGW
U010087	CAN Communication Error - Lost Communication with EMS
U013187	CAN Communication Error - Lost Communication with EPS
U015587	CAN Communication Error - Lost Communication with ICM
U024587	CAN Communication Error - Lost Communication with IHU
U012687	CAN Communication Error - Lost Communication with SAM
U012387	CAN Communication Error - Lost Communication with YAS
U12E187	CAN Communication Error - Lost Communication with FRM
U041881	CAN Communication Error - Invalid Data from Brake System Control Module

DTC	DTC Definition
U042281	CAN Communication Error - Invalid Data from BCM
U044781	CAN Communication Error - Invalid Data Received from Gateway “A”
U040181	CAN Communication Error - Invalid Data from EMS
U042081	CAN Communication Error - Invalid Data from EPS
U042381	CAN Communication Error - Invalid Data from ICM
U054681	CAN Communication Error - Invalid Data from IHU
U042881	CAN Communication Error - Invalid Data Received from SAM
U051381	CAN Communication Error - Invalid Data from YAS
U051382	CAN communication error - Invalid Data from Cruise Control Front Distance Range Sensor
U051383	Software Configuration Error
C190016	Supply Voltage Error - Low Voltage
C190017	Supply Voltage Error - High Voltage
C190116	Circuit Voltage Error - Below Threshold
C190117	Circuit Voltage Error - Above Threshold
C190244	Parameter Error - Dataset Error
C190354	Parameter Error - Initial Calibration Data Missing
C190346	Parameter Error - Initial Calibration Data Out of Range
C190446	Parameter Error - Online Calibration Data Out of Range
C190594	Process Error - Initial Calibration Timeout
C19064B	Temperature Error - ECU Temperature Out of Range
C190797	Electronic Error - Camera Blindness
C190749	Electronic Error - Internal Electronic Failure Temporary
C190709	Electronic Error - Internal Electronic Failure Permanent

DTC Diagnosis Procedure

DTC	**C190244**	**Parameter Error - Dataset Error**
DTC	**C190749**	**Electronic Error - Internal Electronic Failure Temporary**
DTC	**C190709**	**Electronic Error - Internal Electronic Failure Permanent**

DTC	DTC Definition	Possible Cause
C190244	Parameter Error - Dataset Error	Front camera module is damaged
C190749	Electronic Error - Internal Electronic Failure Temporary	
C190709	Electronic Error - Internal Electronic Failure Permanent	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check for DTCs**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Using diagnostic tester, clear DTCs and read front camera control system DTCs again.

(b) Check if DTCs occur again.

OK → **System is normal**

NG

2	**Check if front camera operates normally**

NG → **Replace front camera module assembly**

OK → **Turn off vehicle power supply (-disconnect the negative battery cable), then clear DTCs again**

DTC	**C190116**	**Circuit Voltage Error - Below Threshold**
DTC	**C190117**	**Circuit Voltage Error - Above Threshold**
DTC	**C190016**	**Supply Voltage Error - Low Voltage**
DTC	**C190017**	**Supply Voltage Error - High Voltage**

DTC	DTC Definition	Possible Cause
C190116	Circuit Voltage Error - Below Threshold	• Wire harness • Front camera module is damaged
C190117	Circuit Voltage Error - Above Threshold	
C190016	Supply Voltage Error - Low Voltage	
C190017	Supply Voltage Error - High Voltage	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check fuse

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Check if fuse EF15 7.5A of engine compartment fuse and relay box is blown.

NG → **Replace fuse**

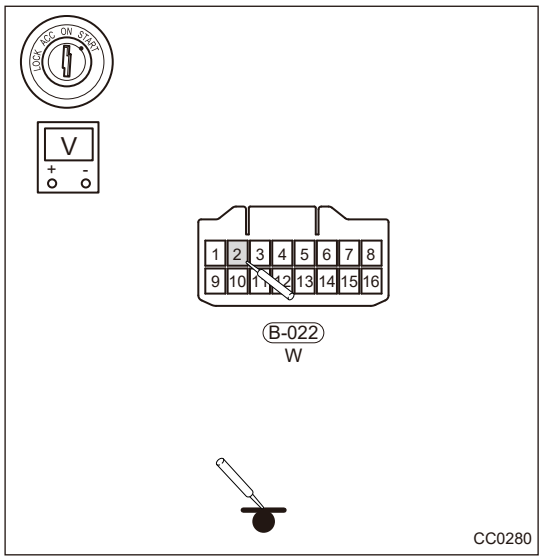
OK

2	Check instrument panel fuse box output voltage

(a) Turn ENGINE START STOP switch to ON.

(b) Measure voltage between front compartment fuse and relay box B-022 terminal E2 and ground (using a digital multimeter).

Multimeter Connection	Condition	Specified Condition
B-022 (E2) - Body ground	ON	9-16V



NG → **Replace the instrument panel fuse box assembly**

OK

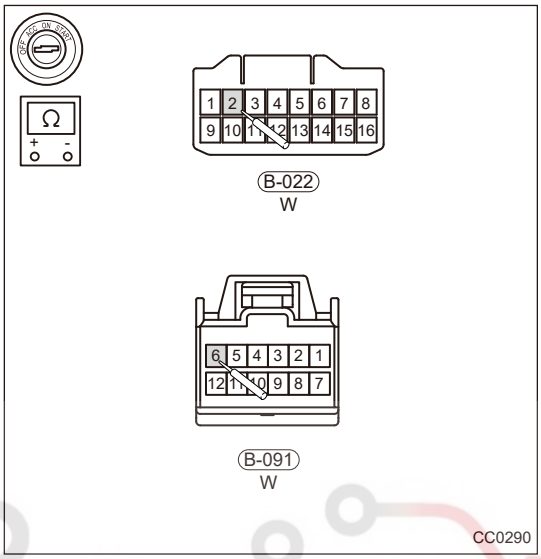
3	Check for open in wire harness

(a) Turn ENGINE START STOP switch to OFF, and disconnect the negative battery cable.

(b) Disconnect front camera module connector B-091 and engine compartment fuse and relay box connector B-022.

(c) Using ohm band of digital multimeter, measure if resistance between connector B-022 (E2) and connector B-091 (6) is normal to check wire harness for open.

Multimeter Connection	Condition	Specified Condition
B-022 (E2) - B-091 (6)	ENGINE START STOP switch "OFF"	< 1 Ω



NG → **Handle and repair related wire harness**

OK

4	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace front camera module assembly**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	C190797	Electronic Error - Camera Blindness

DTC	DTC Definition	Possible Cause
C190797	Electronic Error - Camera Blindness	Front camera module is damaged

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).

- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check for DTCs**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Using diagnostic tester, clear DTCs and read front camera control system DTCs again.

(b) Check if DTCs occur again.

OK → **System is normal**

NG

2	**Check if front camera is covered by foreign objects and clean dirts from front camera surface**

NG → **Replace front camera module assembly**

OK → **Turn off vehicle power supply (- disconnect the negative battery cable), then clear DTCs again**

DTC	**C19064B**	**Temperature Error - ECU Temperature Out of Range**

DTC	DTC Definition	Possible Cause
C19064B	Temperature Error - ECU Temperature Out of Range	Overheating protection

1	**Clear DTC to relieve overheat protection**

DTC	**C190346**	**Parameter Error - Initial Calibration Data Out of Range**
DTC	**C190354**	**Parameter Error - Initial Calibration Data Missing**
DTC	**C1905-94**	**Process Error - Initial Calibration Timeout**
DTC	**C1904-46**	**Parameter Error - Online Calibration Data Out of Range**

DTC	DTC Definition	Possible Cause
C190346	Parameter Error - Initial Calibration Data Out of Range	Recalibration
C190354	Parameter Error - Initial Calibration Data Missing	
C1905-94	Process Error - Initial Calibration Timeout	
C1904-46	Parameter Error - Online Calibration Data Out of Range	

Hint:
Possible cause of malfunction: Front camera calibration is not performed or corresponding calibration conditions are not met.

1	**Refer to front camera calibration method and perform calibration again**

DTC	**U130055**	**Software Configuration Error**

DTC	DTC Definition	Possible Cause
U130055	Software Configuration Error	Rewrite configuration data

Hint:
Possible cause of malfunction: Configuration data is not written into module.

1	**Rewrite configuration data**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Using diagnostic tester, enter system “Special operation” to perform configuration data writing.

OK → **Perform running test after clearing DTCs**

DTC	**U007388**	**CAN Communication Error - Communication Bus Off Error (-Public CAN)**
DTC	**U12A188**	**CAN Communication Error - Communication Bus Off Error (-Private CAN)**
DTC	**U012987**	**CAN Communication Error - Lost Communication with BSM**
DTC	**U014087**	**CAN Communication Error - Lost Communication with BCM**
DTC	**U014687**	**CAN Communication Error - Lost Communication with CGW**
DTC	**U010087**	**CAN Communication Error - Lost Communication with EMS**
DTC	**U013187**	**CAN Communication Error - Lost Communication with EPS**
DTC	**U015587**	**CAN Communication Error - Lost Communication with ICM**
DTC	**U024587**	**CAN Communication Error - Lost Communication with IHU**
DTC	**U024588**	**CAN Communication Error - Lost Communication with SAM**
DTC	**U024589**	**CAN Communication Error - Lost Communication with YAS**
DTC	**U024590**	**CAN Communication Error - Lost Communication with FRM**
DTC	**U024591**	**CAN Communication Error - Invalid Data from Brake System Control Module**
DTC	**U024592**	**CAN Communication Error - Invalid Data from BCM**
DTC	**U024593**	**CAN Communication Error - Invalid Data Received from Gateway “A”**
DTC	**U024594**	**CAN Communication Error - Invalid Data from EMS**
DTC	**U024595**	**CAN Communication Error - Invalid Data from EPS**
DTC	**U024596**	**CAN Communication Error - Invalid Data from ICM**

DTC	**U024597**	**CAN Communication Error - Invalid Data from IHU**
DTC	**U024598**	**CAN Communication Error - Invalid Data Received from SAM**
DTC	**U024599**	**CAN Communication Error - Invalid Data from YAS**
DTC	**U0245100**	**CAN communication error - Invalid Data from Cruise Control Front Distance Range Sensor**

DTC Confirmation Procedure
Refer to CAN communication system

Front Radar Module (FRM) DTC Chart

DTC	DTC Definition
U007388	CAN Communication Error - Communication Bus Off Error (Public CAN)
U003888	CAN Communication Error - Communication Bus Off Error (Private CAN)
U012687	CAN Communication Error - Lost Communication with SAM
U012987	CAN Communication Error - Lost Communication with BSM
U015587	CAN Communication Error - Lost Communication with ICM
U014087	CAN Communication Error - Lost Communication with BCM
U010087	CAN Communication Error - Lost Communication with EMS
U010187	CAN Communication Error - Lost Communication with TCU
U014287	CAN Communication Error - Lost Communication with TCU
U12E087	CAN Communication Error - Lost Communication with FCM
U042881	CAN Communication Error - Invalid Data Received from SAM
U041881	CAN Communication Error - Invalid Data from Brake System Control Module
U042381	CAN Communication Error - Invalid Data Received from ICM
U042281	CAN Communication Error - Invalid Data from BCM
U040181	CAN Communication Error - Invalid Data Received from EMS
U044781	CAN Communication Error - Invalid Data Received from CGW

DTC	DTC Definition
U014687	CAN Communication Error - Lost Communication with CGW
U040281	CAN Communication Error - Invalid DLC received from TCU
U044381	CAN Communication Error - Invalid DLC received from TCU
U12E086	CAN Communication Error - Invalid Data Received from FCM
C106017	Supply Voltage Too High
C106016	Supply Voltage Too Low
C193009	Communication Failure
C193102	Radar Signal Interference
C19324B	Temperature Too High
C193317	Radar Internal Voltage Too Low
C193405	Radar Hardware and Software Mismatch
C193604	Steering Angle and Wheel Tire Angle Offset
C193707	Tire Size Incorrect
C193804	Radar Modulation Abnormal
C193978	Radar Horizontal Angle Misaligned
C193A78	Radar Vertical Angle Misaligned
C193B76	Radar Surface Contaminated or Covered with Foreign Object
C193C09	Radar Digital Signal Processor Power Abnormal
C193D04	Radar Hardware Failure
C193E78	Radar Calibration Incomplete
C193F53	DTC Production Mode Active
C193C76	Radar Surface Contaminated or Covered with Foreign Object
C193E76	Radar Surface Contaminated or Covered with Foreign Object
C193F76	Radar Surface Contaminated or Covered with Foreign Object
C193D76	Radar Waveform Disturbed
C193076	Radar Unavailable
U300051	Data Not Programmed
530104	Radar Hardware Failure

DTC	DTC Definition
530204	Radar Reference Speed Unavailable
530709	Vehicle Transmission Device Activated
530801	Vehicle Voltage Failure
531210	Radar Heater Unavailable
53134B	Temporary Failure
531476	Radar Position Failure
982700	Code Incomplete

CAUTION
The system will also perform "C106C05, C130478, C130578" fault alarm when the vehicle is driving in the desert open scene.

DTC diagnosis procedure

DTC	**C106017**	**Supply Voltage Too High**
DTC	**C106016**	**Supply Voltage Too Low**
DTC	**C193317**	**Radar Internal Voltage Too Low**
DTC	**530801**	**Vehicle Voltage Failure**

DTC	DTC Definition	Possible Cause
C106017	Supply Voltage Too High	• Battery • Wire harness • Front Radar Module
C106016	Supply Voltage Too Low	
C193317	Radar Internal Voltage Too Low	
530801	Vehicle Voltage Failure	

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check voltage**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery cable.

(c) Check battery voltage (not less than 12 V) with a digital multimeter.

NG → **Replace battery**

OK ↓

2	**Check charging system**

(a) Turn ENGINE START STOP switch to OFF.

(b) Check positive and negative battery cables for broken or damage.

(c) Turn ENGINE START STOP switch to ON.

(d) Start the engine.

(e) Check if voltage of positive and negative battery is normal with a digital multimeter (13.5V-14.8V).

NG → **Repair or replace positive and negative battery cables and alternator**

OK ↓

3	**Check fuse**

(a) Check if fuse EF15 7.5A is blown.

NG → **Replace fuse**

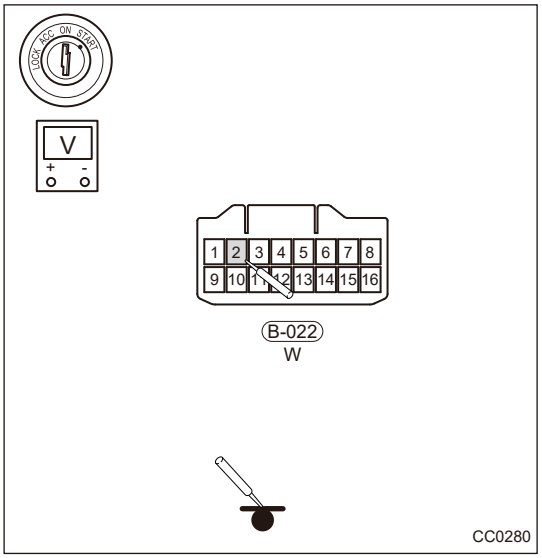
OK ↓

4	**Check engine compartment fuse and relay box output voltage**

(a) Turn ENGINE START STOP switch to ON.

(b) Check the voltage between terminal E2 of fuse and relay box B-022 and ground. (When using digital multimeter).

Multimeter Connection	Condition	Specified Condition
B-022 (E2) - Body ground	ON	9-16V



NG → **Replace the instrument panel fuse box assembly**

OK →

5	Check for open in wire harness

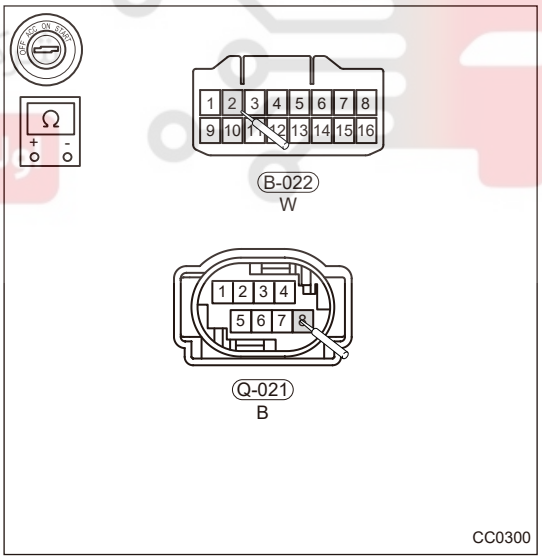
(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery cable.

(c) Disconnect front radar module connector Q-021 and fuse box connector B-022.

(d) Using ohm band of digital multimeter, measure if resistance between connector B-022 (E2) and connector Q-021 (8) is normal to check wire harness for open.

Multimeter Connection	Condition	Specified Condition
B-022 (E2) - Q-021 (8)	ENGINE START STOP switch “OFF”	⩽ 1 Ω



NG → **Handle and repair related wire harness**

OK →

6	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG	**Replace front radar module assembly**
OK	**Conduct test and confirm malfunction has been repaired**

DTC	C193604	Steering Angle and Wheel Tire Angle Offset

DTC	DTC Definition	Possible Causes
C193604	Steering Angle and Wheel Tire Angle Offset	Steering angle position is not calibrated

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check for DTCs

(a) Using diagnostic tester, clear DTCs and read front radar control system DTCs again.

(b) Check if DTCs occur again.

OK	**System is normal**

NG

2	Check steering angle position

NG	**Refer to calibrated steering angle position of steering system**
OK	**Turn off vehicle power supply (-disconnect the negative battery cable), then clear DTCs again**

DTC	C193707	Tire Size Incorrect

DTC	DTC Definition	Possible Causes
C193707	Tire Size Incorrect	Different tire type

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check for DTCs**

(a) Using diagnostic tester, clear DTCs and read front radar control system DTCs again.
(b) Check if DTCs occur again.

OK → **System is normal**

NG

2	**Check if the tire size is the same as original tire size**

NG → **Replace tire of same type**

OK → **Turn off vehicle power supply (-disconnect the negative battery cable), then clear DTCs again**

DTC	**C193102**	**Radar Signal Interference**
DTC	**C193D76**	**Radar Waveform Disturbed**

DTC	DTC Definition	Possible Causes
C193102	Radar Signal Interference	The vehicle may be equipped with other interference components
C193D76	Radar Waveform Disturbed	

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check for DTCs**

(a) Using diagnostic tester, clear DTCs and read front radar control system DTCs again.

(b) Check if DTCs occur again.

OK → **System is normal**

NG

2	Check if the vehicle is equipped with other interference components

NG → **Remove add-on components and test function**

OK → **Turn off vehicle power supply (-disconnect the negative battery cable), then clear DTCs again**

DTC	C193B76	Radar Surface Contaminated or Covered with Foreign Object
DTC	C193C76	Radar Surface Contaminated or Covered with Foreign Object
DTC	C193E76	Radar Surface Contaminated or Covered with Foreign Object
DTC	C193F76	Radar Surface Contaminated or Covered with Foreign Object

DTC	DTC Definition	Possible Causes
C193B76	Radar Surface Contaminated or Covered with Foreign Object	• Front radar module assembly • There is dirt on radar surface
C193C76	Radar Surface Contaminated or Covered with Foreign Object	
C193E76	Radar Surface Contaminated or Covered with Foreign Object	
C193F76	Radar Surface Contaminated or Covered with Foreign Object	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check for DTCs

(a) Using diagnostic tester, clear DTCs and read front radar control system DTCs again.

(b) Check if DTCs occur again.

OK	**System is normal**

NG

2	**Check if front radar is covered by foreign matters and clean dirt on the surface of front radar**

NG	**Replace front radar module assembly**
OK	**Turn off vehicle power supply (-disconnect the negative battery cable), then clear DTCs again**

DTC	**C19324B**	**Temperature Too High**

DTC	DTC Definition	Possible Causes
C19324B	Temperature Too High	Overheating protection

1	**Clear DTC to relieve overheat protection**

DTC	**C193804**	**Radar Modulation Abnormal**
DTC	**C193978**	**Radar Horizontal Angle Misaligned**
DTC	**C193A78**	**Radar Vertical Angle Misaligned**
DTC	**C193E78**	**Radar Calibration Incomplete**

DTC	DTC Definition	Possible Causes
C193804	Radar Modulation Abnormal	Recalibration
C193978	Radar Horizontal Angle Misaligned	
C193A78	Radar Vertical Angle Misaligned	
C193E78	Radar Calibration Incomplete	

Hint:

Possible cause of malfunction: Front radar calibration is not performed or corresponding calibration conditions are not met.

1	**Refer to front radar calibration method and perform calibration again**

DTC	**982700**	**Code Incomplete**
DTC	**U300051**	**Data Not Programmed**

DTC	DTC Definition	Possible Causes
982700	Code Incomplete	Configuration data is not written into module
U300051	Data Not Programmed	

Hint:
Possible cause of malfunction: Configuration data is not written into module.

1	**Rewrite configuration data**

(a) Using diagnostic tester, enter system "Special operation" to perform configuration data writing.

OK → **Perform running test after clearing DTCs**

DTC	C193F53	DTC Production Mode Active

DTC	DTC Definition	Possible Causes
C193F53	DTC Production Mode Active	Production mode turns on

1	**Turn production mode off**

(a) Use diagnostic tester, enter system "Special Operation" to turn off production mode.

OK → **Perform running test after clearing DTCs**

DTC	**C193009**	**Communication Failure**
DTC	**C193405**	**Radar Hardware and Software Mismatch**
DTC	**C193804**	**Radar Modulation Abnormal**
DTC	**C193C09**	**Radar Digital Signal Processor Power Abnormal**
DTC	**530204**	**Radar Reference Speed Unavailable**
DTC	**53134B**	**Temporary Failure**
DTC	**531210**	**Radar Heater Unavailable**

DTC	DTC Definition	Possible Causes
C193009	Communication Failure	PEPS control module or interior wire harness is damaged
C193405	Radar Hardware and Software Mismatch	
C193804	Radar Modulation Abnormal	
C193C09	Radar Digital Signal Processor Power Abnormal	
530204	Radar Reference Speed Unavailable	
53134B	Temporary Failure	

DTC	DTC Definition	Possible Causes
531210	Radar Heater Unavailable	

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check for DTCs**

(a) Using diagnostic tester, clear DTCs and read front radar control system DTCs again.
(b) Check if DTCs occur again.

OK → **System is normal**

NG

2	**Check if front radar operates normally**

NG → **Replace front radar module assembly**

OK → **Turn off vehicle power supply (- disconnect the negative battery cable), then clear DTCs again**

DTC	**530104**	**Radar Hardware Failure**
DTC	**C193076**	**Radar Unavailable**
DTC	**C193D04**	**Radar Hardware Failure**

DTC	DTC Definition	Possible Causes
530104	Radar Hardware Failure	Front radar module
C193076	Radar Unavailable	
C193D04	Radar Hardware Failure	

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check for DTCs**

(a) Using diagnostic tester, clear DTCs and read front radar control system DTCs again.
(b) Check if DTCs occur again.

OK → **System is normal**

NG

2	**Replace front radar module**

(a) Replace the front radar module.
(b) Perform running test after clearing DTCs.

OK → **Replace front radar module assembly**

DTC	U007388	CAN Communication Error - Communication Bus Off Error (-Public CAN)
DTC	U003888	CAN Communication Error - Communication Bus Off Error (-Private CAN)
DTC	U012687	CAN Communication Error - Lost Communication with SAM
DTC	U012987	CAN Communication Error - Lost Communication with BSM
DTC	U015587	CAN Communication Error - Lost Communication with ICM
DTC	U014087	CAN Communication Error - Lost Communication with BCM
DTC	U010087	CAN Communication Error - Lost Communication with EMS
DTC	U010187	CAN Communication Error - Lost Communication with TCU
DTC	U014287	CAN Communication Error - Lost Communication with TCU
DTC	U12E087	CAN Communication Error - Lost Communication with FCM
DTC	U0428-81	CAN Communication Error - Invalid Data Received from SAM
DTC	U041881	CAN Communication Error - Invalid Data from Brake System Control Module
DTC	U042381	CAN Communication Error - Invalid Data Received from ICM
DTC	U042281	CAN Communication Error - Invalid Data from BCM
DTC	U040181	CAN Communication Error - Invalid Data Received from EMS
DTC	U044781	CAN Communication Error - Invalid Data Received from CGW
DTC	U040281	CAN Communication ERROR - Invalid Data Received from TCU
DTC	U044381	CAN Communication ERROR - Invalid Data Received from TCU
DTC	U12E086	CAN Communication Error - Invalid Data Received from FCM
DTC	U014687	CAN Communication Error - Lost Communication with CGW

DTC Confirmation Procedure
Refer to CAN communication system

Diagnostic Information and Steps

DTC	C1940 04	Critical Functionality Not Available

Description

DTC	DTC Definition	Possible Cause
C1940 04	Critical Functionality Not Available	• Microwave radar dirt • Driving on desert roads, tunnels or snow roads etc. • FRM assembly

Confirmation Procedure

Confirm that battery voltage is over 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect diagnostic tester (the latest software) to diagnostic interface.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

1	Confirm vehicle driving road conditions when the malfunction occurs

(a) Whether the vehicle is driving on desert roads, tunnels or snow roads etc. when the malfunction occurs.

OK → **The front microwave radar cannot receive the reflected waves from the road surroundings when the vehicle is driving on the above road conditions.**

NG

2	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding malfunction diagnosis.

(c) Read the malfunction information and confirm that the malfunction has been solved.

NG → **Replace with a new FRM and calibrate to check if malfunction reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

ON-VEHICLE SERVICE

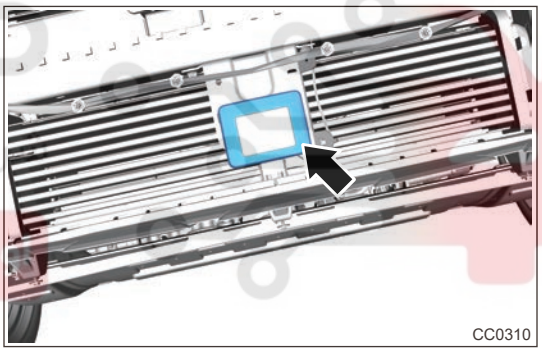
Microwave Radar

Removal

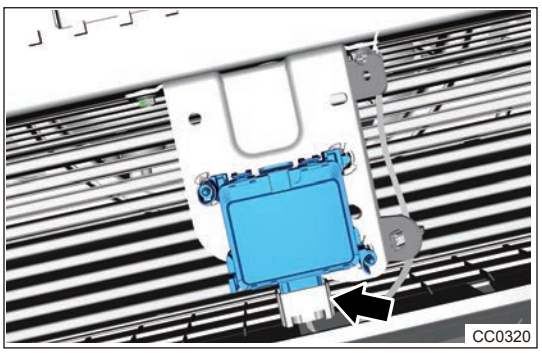
WARNING

- Be sure to wear necessary safety equipment to prevent accidents, when removing front bumper assembly.
- Appropriate force should be applied, when removing front bumper assembly. Be careful not to operate roughly.
- Try to prevent body paint surface from being scratched, when removing front bumper assembly.
- Avoid breaking claws, when disassembling front bumper assembly.
- Avoid damage when detaching fixing clip of microwave radar.

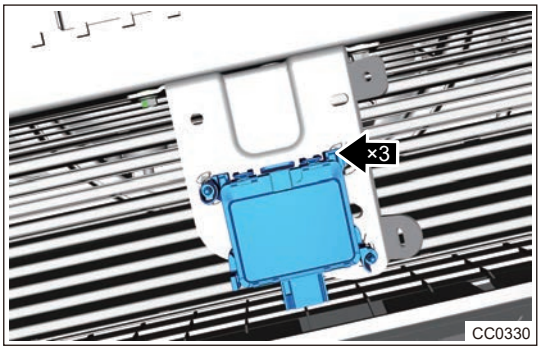
1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the front bumper assembly.
4. Use an interior crow plate to pry off microwave radar cover.



5. Disconnect the microwave radar connector.



6. Detach 3 fixing clips from top and bottom sides of microwave radar.



7. Remove the front microwave radar module.

Installation

CAUTION

- Try to prevent body paint surface from being scratched, when installing front bumper assembly.
- Make sure that front bumper is installed correctly and fitting clearance between front bumper and body is appropriate, when installing front bumper assembly.

1. Installation is in the reverse order of removal.

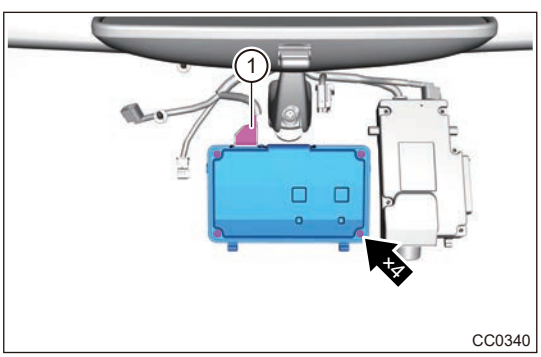
Multi-function Front Camera

Removal

WARNING

- Be sure to wear necessary safety equipment to prevent accidents, when removing multi-function front camera.
- Appropriate force should be applied when removing multi-function front camera. Be careful not to operate roughly.
- Remove multi-function front camera to perform matching calibration.

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the inside rear view mirror left protective cover.
4. Remove the inside rear view mirror right protective cover.
5. Disconnect multi-function front camera connector (1) and remove 4 fixing screws from multi-function front camera.



Installation

CAUTION
• Be sure to tighten fixing screws to specified torques when installing multi-function front camera.

1. Installation is in the reverse order of removal.