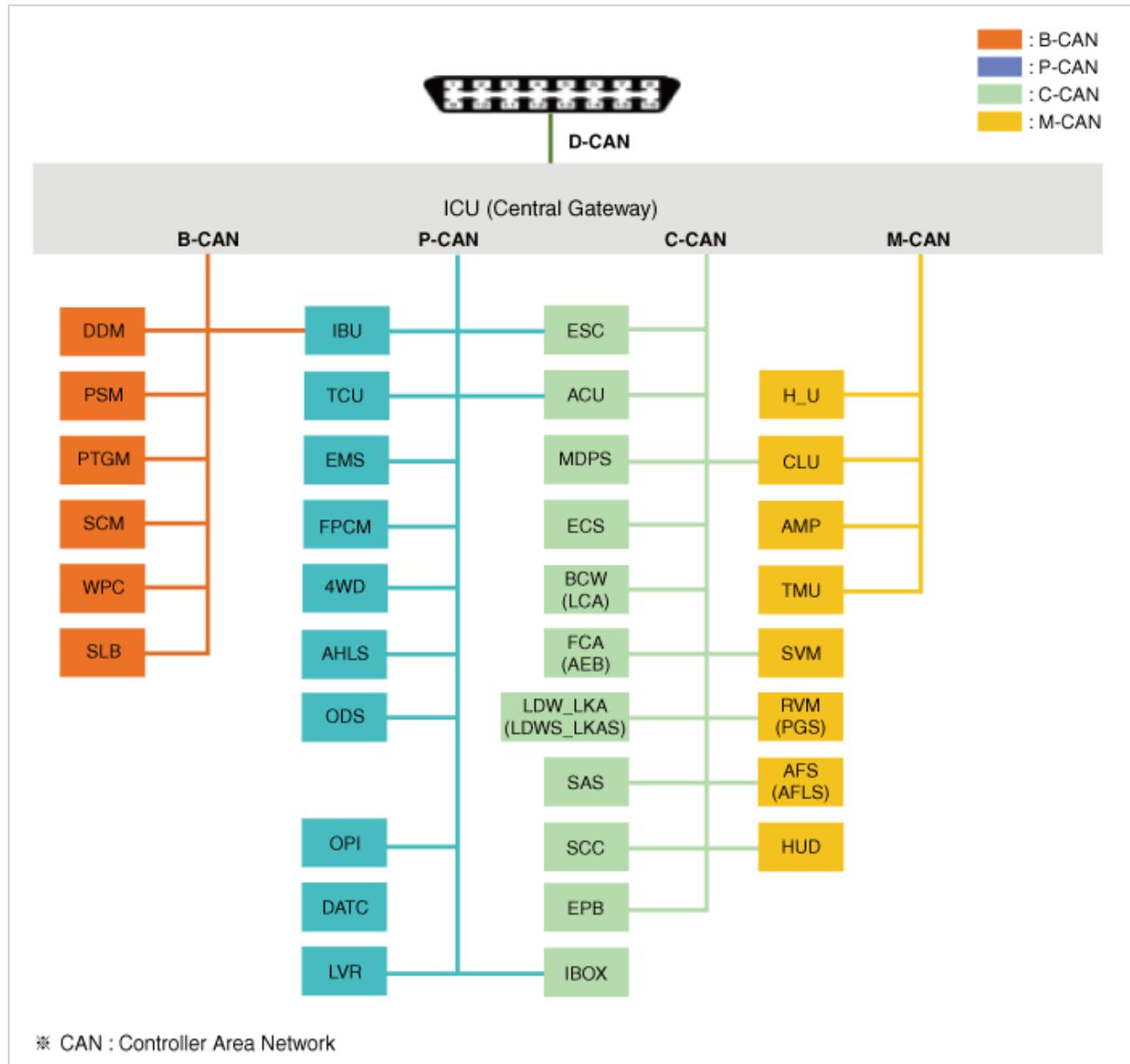




## Description

### Communication Network Diagram



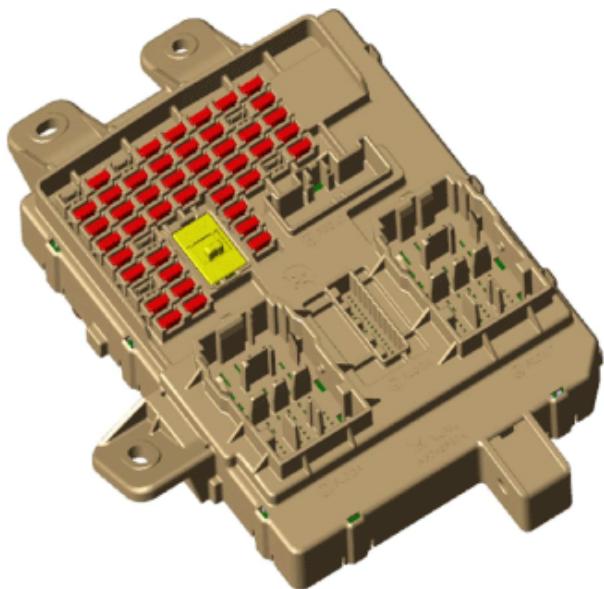
Abbreviation	Explanation
ACU	Airbag Control Unit
AFL	Adaptive Front-Lighting System
AMP	Amplifier
AUDIO	Audio Head Unit
SVM	Surround View Monitor
B_CAN	Body Controller Area Network
BCW	Blind-Spot Collision Warning
C_CAN	Chassis Controller Area Network
CDP	Compact Disk Player
CLU	Cluster Module
DATC	Dual Automatic Temp Control
DDM	Driver Door Module

ECM	Engine Control Module
F_PUMP	Fuel Pump Control Module
HUD	Head Up Display
IBU	Integrated Body Control Unit
ICU	Integrated Central Control Unit
IFB	Interface Box
IMS	Integrated Memory System
LDW	Lane Departure Warning
LKA	Land Keeping Assist
M_CAN	Multi media Controller Area Network
MDPS	Motor Driven Power Steering
MFC	Multi Function Camera
MTC	Manual Temp Control
ODS	Occupant Detection System
P_CAN	Powertrain Controller Area Network
PCM	Powertrain control module
PTG	Power Liftgate Module
RVM	Rear View Monitor
SCC	Smart Cruise Control
SCM	Steering Column Module
TCM	Transmission Control Module
VDC	Vehicle Dynamic Control
WPC	Wireless Power Charger

## Integrated Central Control Unit (ICU)

ICU (Integrated Central Control Unit) is an integrated model of smart junction block and central gateway.

It performs the function of conventional "Smart junction block" and the function of communication medium of "Central Gateway".



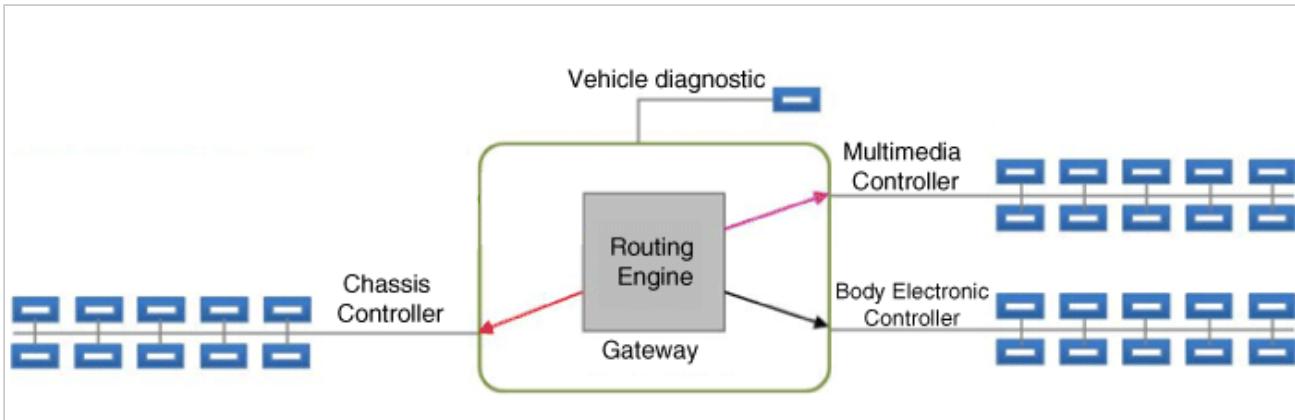
## Central Gateway (CGW)

CGW is a controller enabling communication among the controllers connected to the different networks.

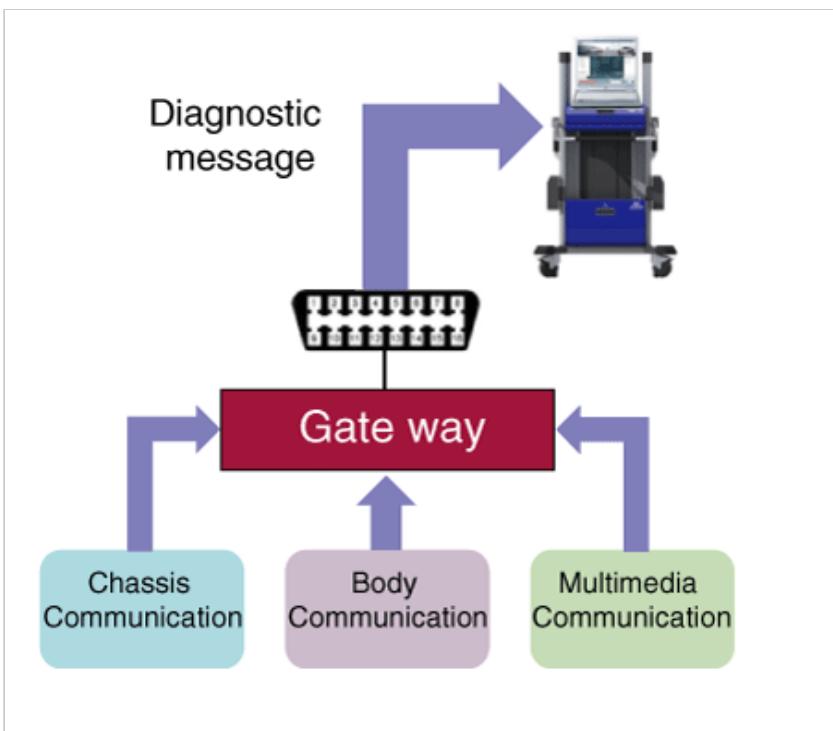
There are five CAN networks connected to CGW. B-CAN and M-CAN are connected to the low-speed CAN, C-CAN and P-CAN to the high-speed CAN while D-CAN is connected for inspection.

### 1. CGW Main Features

(1) Routing : Information exchange among different in-vehicle communication networks.



(2) Network security control : It only allows inspection communication (D-CAN) to connect in-vehicle communication network in order to prevent



(3) Additional functions

- If alarm light is ON, carry out remote diagnosis of Chassis system (C-CAN) through I-Box and gateway

**Information**

I-Box remote diagnosis (C-CAN) function via gateway shall be suspended.

- Dark current measurement: After sending forced electronic parts sleep message to each network from the diagnosis equipment, gateway also enters sleep mode.
- Operation current check: Check problem through operation of electronic parts

(4) Fault diagnosis on CAN signal transmission failure by communication control defect

(CGW records DTC for the controller with transmission failure.)

2. How to check CGW

(1) Although "No CGW CAN signal (TIMEOUT)" record appears when checking the DTC of the faulty electronic component, never determine it as the CGW failure. CGW is a controller that intermediates in-vehicle transmitting/receiving controllers. If one of the following two cases arises : (1) the transmitting controller fails to send a message to CGW, leading to CGW failing to send it to the receiving controller; (2) CGW sends the pre-determined value (Timeout Value), the corresponding receiver records the DTC of the failure of message transmission. Thus, to finally determine the controller that fails to send CAN signal, the DTC of CGW shall be checked. CGW records DTC only when it fails to receive the signal for more than 10 seconds with KEY ON. To identify the cause of no CAN signal transmission, the CGW DTC shall be checked after waiting for more than 20 seconds with KEY ON.

(2) If the CAN communication control unit is not reinstalled after being removed from the vehicle, CGW records the DTC of "No CAN signal" for the unit.

**NOTICE**

For example, the failure code of "DDM CAN signal is not out" is created when the removed DDM is not reinstalled.

If a DTC remains after replacing electronic components and the failure code is not erased, check whether the connector of the electronic component is properly connected, and whether the controller's CAN wiring operates normally. In case that the removed electronic component cannot be reinstalled, 'Erase Expected Network Config' service shall be performed. Refer to the DTC inspection guide for each failure code for the service execution method.

Otherwise, the DTC of "No CAN Signal" on the corresponding controller may not be deleted.

**NOTICE**

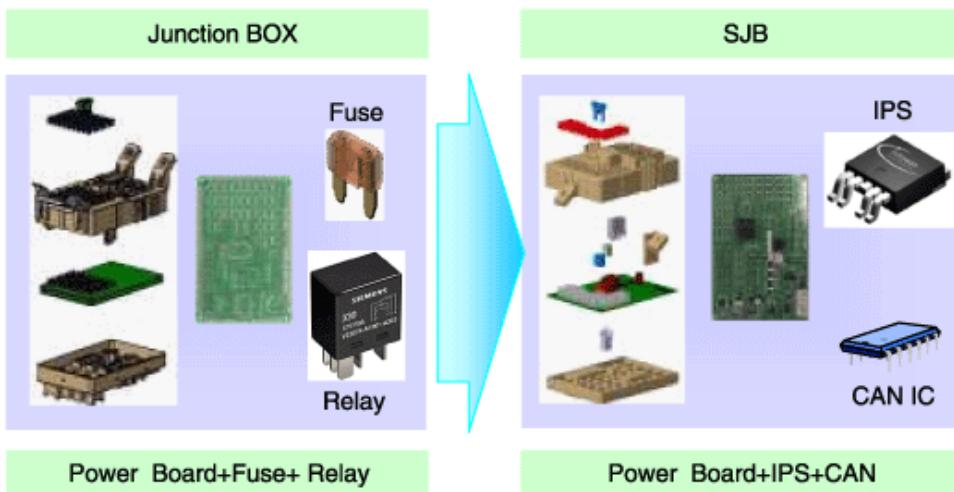
Perform the "Additional function" > "Network setting initialization" in examining device (GDS) by referring to DTC guide.

(3) IGN2 of SJB is ON when MCU is out of order (State of non-operation due to the external physical or electrical shock). The safety of the driver is secured by forcible lighting on the head lamp low, external and internal tail lamps when the headlamp low switch is ON.

(4) IGN2 is ON when the data transmitting/receiving is impossible by the failure on the CAN communication line (Both of high/low cables are shorted, BAT short in high/low, GND short in high/low) in case of failure on CAN communication line connected to SJB module. When the headlamp low switch is ON, the headlamp low and internal/external tail lamps are lighted forcibly.

## Smart Junction Block(SJB)

Smart Junction Block (SJB) is a module that performs the function of conventional Junction Box and some functions of BCM. It controls various components including lamps by using CAN communication and IPS (replacing the function of fuse and relay) or ARISU.



IPS stands for Intelligent Power Switch, which uses the semiconductor technology to replace the current role of fuse and relay.

The IPS chip has two functions :

- 1) the high current-based component control;
- 2) component protection from overcurrent.

**NOTICE**

The advantages of IPS are as follows:

- Reduce relay and consequently decrease weight and volume
- Remove the relay operation noise
- No need to replace fuses and increase the product life

- Capable to diagnose faulty parts

## SJB control entry

### 1. Switch signal input

#### (1) Assist seat belt switch

Assist seat belt reminder switch  
 Assist the door switch  
 Driver's seat belt switch  
 Driver's seat belt switch  
 Rear left seats door switch  
 Rear right seats door switch  
 Rear Safety seat belt switch Left  
 Rear Safety seat belt switch Right  
 Rear Center seat safety belt switch  
 IGN1 switch  
 IGN2 switch  
 Brake fluid sensor  
 Trunk open switch  
 Trunk lid handle switch  
 HID head lamp option  
 ADV HID head lamp option  
 Emergency switch  
 Headlight low beams switch  
 Hood switch  
 Dark disconnect switch  
 Left front / rear turn signal switch  
 Right front / rear turn signal switch

#### (2) IPS&ARISU

Left Headlight low beams  
 Right Headlight low beams  
 Right Headlight high beams  
 Right Headlight high beams  
 Front left / right fog lamp  
 Room Taillight  
 Outdoor Left taillight  
 Outdoor Light taillight  
 Left front / rear turn signals  
 Right front / rear turn signals  
 Static bending left lamps  
 Static bending right lamp  
 DRL Left lamp  
 DRL right lamp  
 Trunk room lamp  
 Body resistance Cut control  
 Front left turn signal output  
 Front right turn signal output

#### (3) Relay Control

Rear glass heat rays relay  
 Anti-theft alarm horn relay  
 Trunk lid relay  
 Room lamp relay  
 Front glass heat rays relay  
 Rear fog lamp relay  
 Headlight high beams relay

### 2. SJB protection

#### (1) PCL (Programmable Current Limit) functions

- PCL replaces the junction box function of protecting wires.
- How to operate : If the lamp current exceeds the standard level, cut off the current to protect the lamp.
- Lamp cut off time : 300ms or less.

- Applied components : all lamp components controlled by SJB
- Output the error code according to the error detection conditions.

## (2) OCL (Open Current Limit)

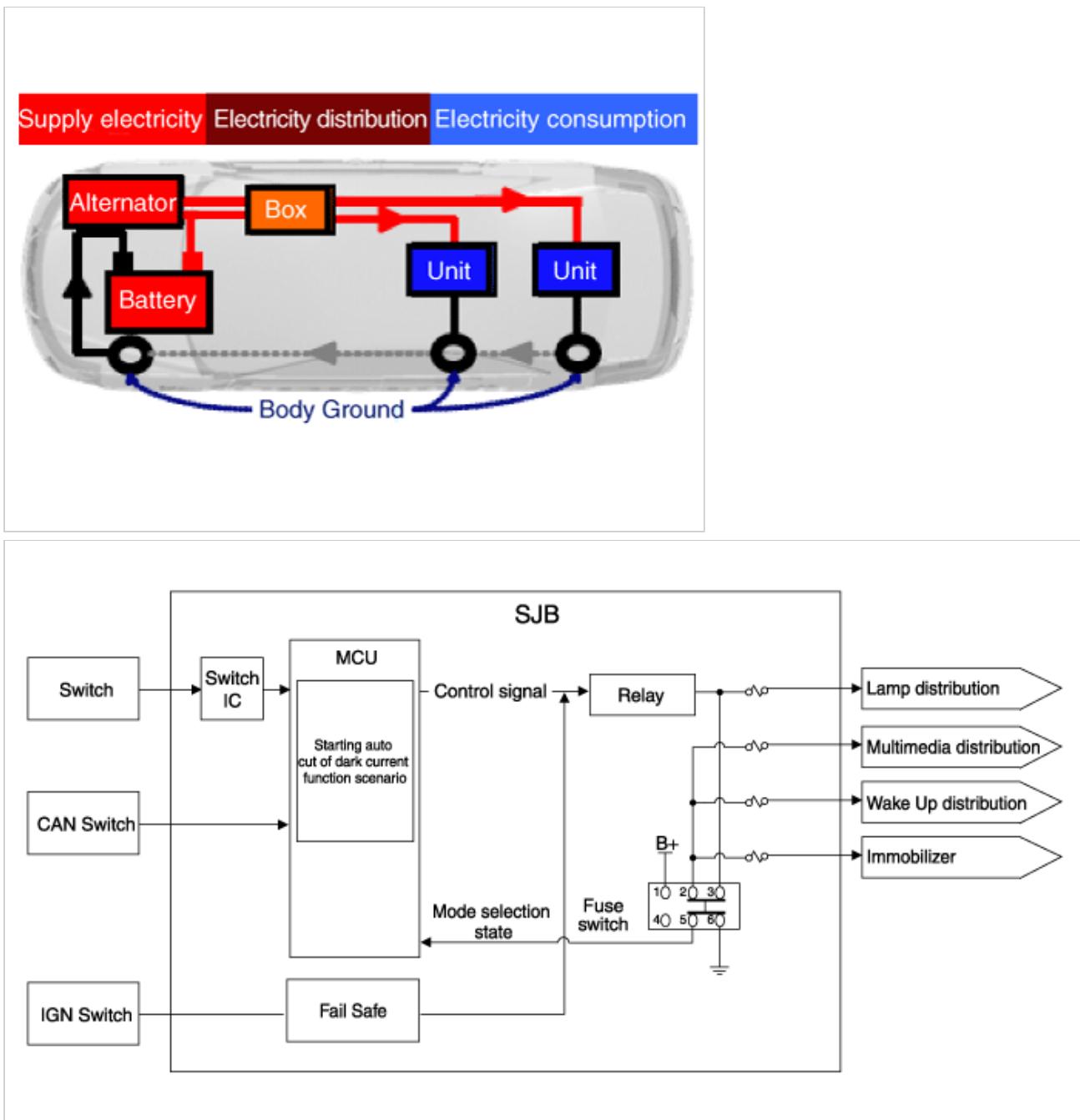
- OCL detects the lamp open state and informs the user of it.
- How to operate : Detect the current of the lamp and if it is below the standard level, change the lamp operation.
- Applied components : 4 turn signal lamps
- Output the error code according to the error detection conditions.

## 3. SJB fail safe function

- (1) When the MCU is out of order (not operating due to a physical or electrical shock from the outside), and IGN2 and head lamp low switch are on, SJB forces the head lamp low and exterior/interior lamps to turn on in order to secure the driver's safety.
- (2) When the data transmission/reception fails due to a failed CAN communication line connected with SJB module (disconnection of both high and low line, high/low BAT short, high/low GND short), the head lamp low and interior/exterior tail lamps are forced to turn on if IGN2 is on and the head lamp low switch is on.

## 4. Auto Cut System of Dark Current

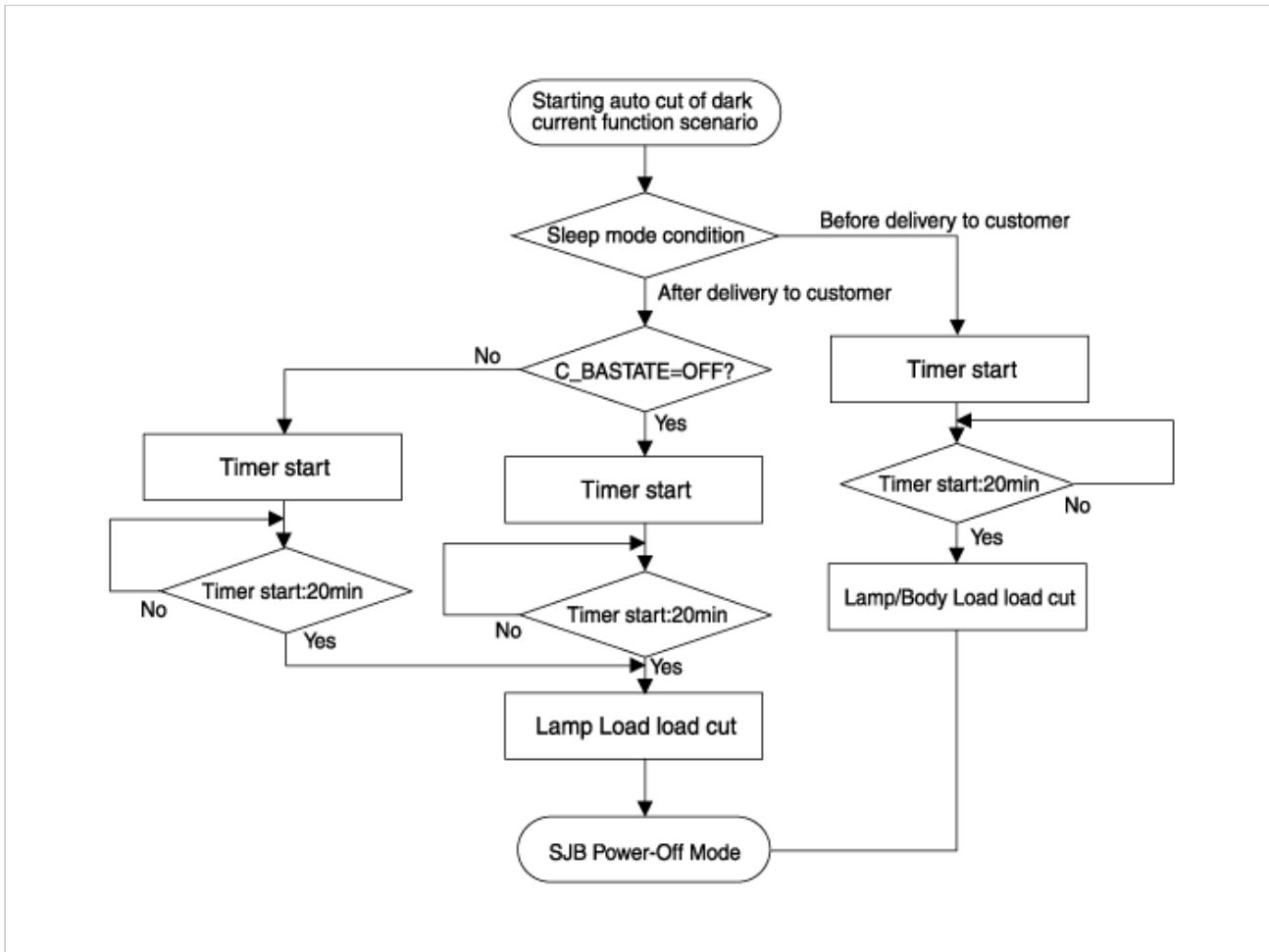
- (1) Description : It cuts automatically power to be provided with components for reducing useless dark current according to vehicle state.



(2) SJB had 3 modes, "Normal Mode", "Sleep Mode", "Power Off Mode". Auto cut of dark current practice in "Sleep Mode".

- "Sleep" condition : IG OFF, constant input switch, CAN network doesn't activate.
- "Sleep" resolutive condition : Any switch inputs, CAN network activates, KEY ON, IGN ON
- "Power OFF" condition : The setting time of timer which is used by cutting a load power expires.
- "Normal Mode" : SJB function normally activates.
- "Sleep Mode" : It is low power mode and activates for reducing electricity consumption of SJB or IPM. Auto cut of dark current function activates.
- "Power OFF Mode" : Power of MCU and circumferential circuit is cut for minimizing electricity consumption. Operation stops.

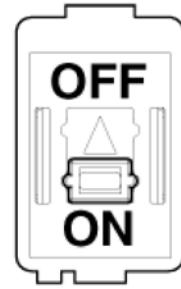
(3) The explanation - The auto cut of dark current



Before delivering to customer	Fuse switch OFF
<ul style="list-style-type: none"> <li>• All door close &amp; RKE door lock or Constant switch state (Auto cut of dark current scenario starts.)</li> <li>– After "sleep" state is for 20 min.</li> <li>– SJB power down(SJB dark current : 200 <math>\mu</math>A) and cutting power of Lamp /Body Load/Wake up</li> </ul>	

After delivering to customer	Fuse switch ON
<ul style="list-style-type: none"> <li>• All door close &amp; Constant switch state : C_BAState=OFF (Auto cut of dark current scenario starts.)</li> <li>– After "sleep" state is for 20 min.</li> <li>– SJB power down(SJB dark current : 200 <math>\mu</math>A) and cutting power of Lamp Load</li> <li>• In case RKE door lock : C_BAState=ON &amp; Trunk SW=CLOSE</li> </ul>	

- (Auto cut of dark current scenario starts.)
- After "Sleep" state 35s-65s (Waiting time of other unit : 30-60s + SJB sleep counts 5s)
- SJB Powerdown(SJB dark current : 200  $\mu$ A) and cutting power of Lamp Load



#### (4) Problem when fuse switch setting is wrong

: If a fuse switch is set to OFF(Before delivering to customer) by a customer or technician and auto cut function of dark current activates, the following problems may occur.

Symptom	Related part
• Door lock/unlock, trunk open don't activate by RKE. (Wakeup of each module don't activate.)	IBU
• Digital clock is reset.(Memory is reset.)	Digital clock
• Audio setting values (volume, frequency setting) are reset. (Memory is reset.)	Audio

\* If fuse switch OFF(before delivering to customer) is set, power of IBU, Digital clock and audio is shut off.