

Description and  
Operation

Wireless Power Charger System

During ACC or IG ON, battery voltage is supplied to the wireless power charger system to transmit an output of 5 W to mobile phone.

Mobile phones certified with the wireless charging standard WPC (Qi 1.1.2) or equipped with an exclusive wireless charging case can be used.

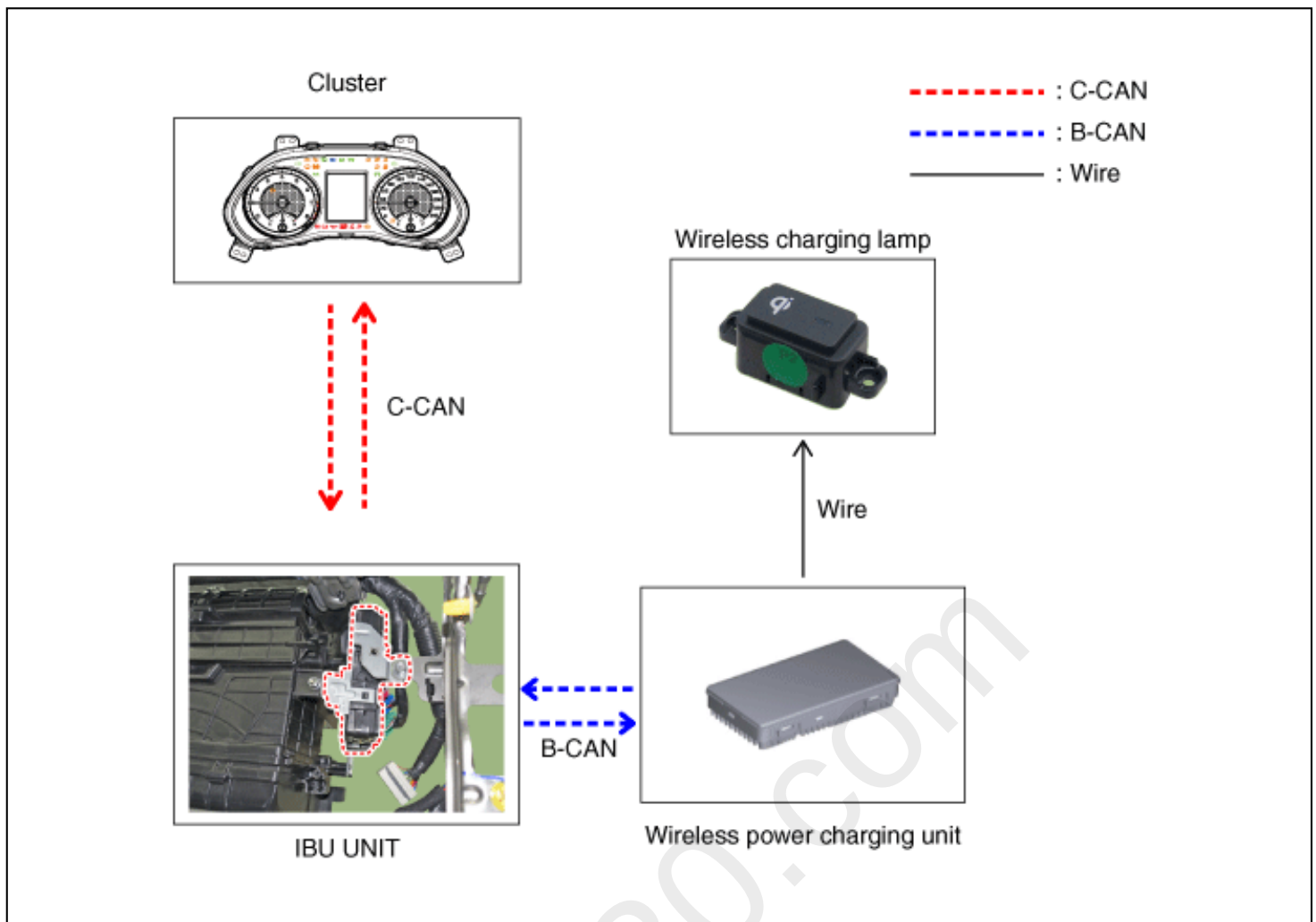


- WPC : Wireless Power Consortium
- Qi 1.1.2 : refers to certified product with the capability to transmit power of up to 5 W and detect metal and other impurities to prevent heating.



1. Power receiver : embedded with the secondary coil designed to receive the induced current from the charging pad.
2. Charging pad : electrical coils wound inside the plastic cover.
3. Coil : Rectangular and circular coils generate diverse electromagnetic fields.
  - 1)Connect power to the charging pad to generate electromagnetic fields in the coil.
  - 2)Current induced from electromagnetic induction phenomenon is sent to the power receiver to charge the battery.

System Configuration Diagram



1. Instrument cluster : Alerts about contact with mobile phone
2. IBU unit : Determines contact with mobile phone
3. Wireless charging lamp : Displays the charging status
4. SMK unit : Stops charging during the activation of LF

Major Functions of Wireless Power Charger System

1. Charging Function
  - (1) Activation method
    - a. Close all doors of the car.
    - b. Switch vehicle power to ACC or IG ON.
    - c. Place the wireless charging-enabled mobile phone on the tray.
  - (2) Charging status display

| Mode                  | Charging LED display |                                                                                       | Remarks |
|-----------------------|----------------------|---------------------------------------------------------------------------------------|---------|
| Stand by for charging | LED turned OFF       |  |         |
| Charging in process   | Amber LED turned ON  |  |         |

|                    |                     |                                                                                     |                                                                                           |
|--------------------|---------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| Charging completed | Green LED turned ON |   |                                                                                           |
| Charging error     | Amber LED blinks    |  | –Blinks 10 times for 10 seconds, then LED is turned off for 50 seconds (total 60 seconds) |

## 2. Alert for contact with mobile phone

### (1) Activation method

- Key OFF while the mobile phone is being charged.
- Checks if the mobile phone is placed on the wireless charging unit.
- Alert message for contact with mobile phone is displayed on the instrument panel (for about 4 - 5 seconds).



## 3. Overheating prevention

### (1) Activation method

- If the thermistor temperature inside the wireless charging module rises above a certain level (158°F (70°C)), charging will stop to protect the mobile phone battery.



- The amber LED of the charging display lamp blinks 10 times for 10 seconds, and then it is turned off for 50 seconds (total 60 seconds).
- The process is repeated for every 60 seconds.

- If the thermistor temperature falls below a certain level (149°F (65°C)), charging will restart.



When the charging function is re-operated, the amber LED of the charging indicator lamp is displayed.

#### 4. Foreign matter detection

(1) Charging will be stopped if there is a coin or other metallic object between the wireless charging unit and the mobile phone.

[Foreign matter]



- Foreign matter : All metallic objects such as coins, clips, and precious metals
- The amber LED of the charging display lamp blinks 10 times for 10 seconds, and then it is turned off for 50 seconds (total 60 seconds).
- The process is repeated for every 60 seconds.



Be careful as touching the foreign matter by hand may cause burns.

(2) After the system has detected foreign matter and stopped charging the mobile phone, the charging will resume in about 60 seconds once the foreign matter has been removed.



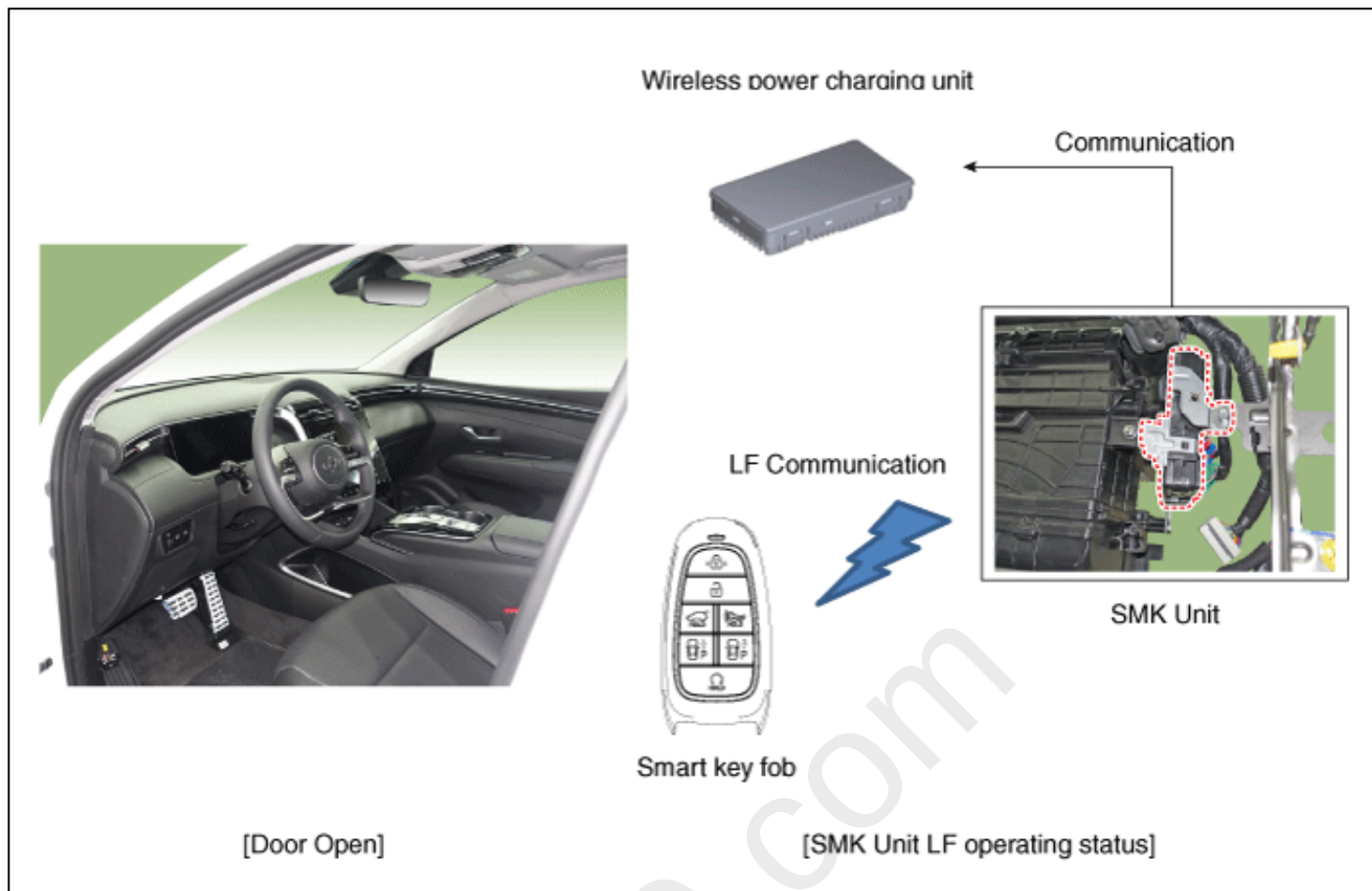
When the charging function is restarted, the amber LED of the charging display lamp will be turned on.

#### 5. SMK unit LF frequency interference prevention

This function prevents interference between the wireless charging frequency and smart key unit frequency band.

(1) Wireless charging is stopped when the door is open or the SMK unit is in LF mode (searching for smart key).

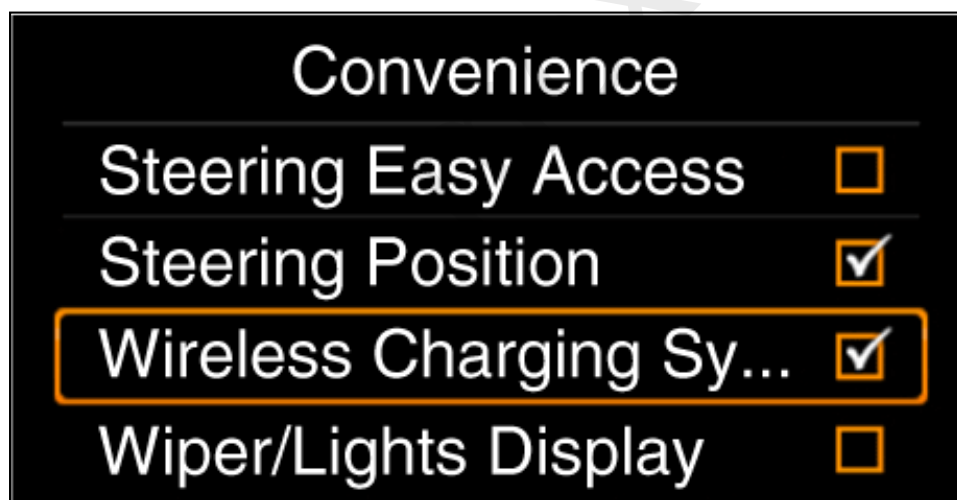
e.g. Wireless charging function is stopped if the driver carries the smart key out of the vehicle during IG ON.



Charging will stop and the amber LED of the charging display lamp will turn off.

(2) It will return to normal operating status when the LF mode of the SMK unit is completed.

6. Turn the wireless charging function ON/OFF with USM.



Protection of Wireless Power Charger System

| Item                              | Condition                                               | Status                       |
|-----------------------------------|---------------------------------------------------------|------------------------------|
| Protects against low/high voltage | Protects and stops charging under 7.0 V and over 16.5 V | LED OFF<br>(Stops operation) |
|                                   | Charges over 7.5 V and under 16.0 V                     |                              |
| Protects against reverse voltage  | Protects and stops charging in case of reverse voltage  | LED OFF<br>(Stops operation) |

|                                                      |                                                                                                                          |                                                                          |
|------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| Protects against overcurrent                         | Protects and stops charging in case of detecting 4.5 A                                                                   | Amber LED blinks                                                         |
| Protects against overheating                         | Protects and stops charging in case of detecting 158°F (70°C) by internal temperature sensor of wireless charging module | Amber LED blinks                                                         |
|                                                      | Resumes under 149°F (65°C)                                                                                               |                                                                          |
| Foreign matter (Coins, clips, precious metals, etc.) | Protects and stops charging in case of detecting foreign matter (overheating prevention)                                 | Amber LED blinks                                                         |
| Prevents frequency interference                      | Protects and stops charging by activating SMK in case door or tailgate is open                                           | LED OFF (Stops operation)                                                |
|                                                      | Resumes in 3.5 seconds after all doors and tailgate are closed and SMK operation is completed                            |                                                                          |
| Alert for contact with mobile phone                  | During key-off with contact with mobile phone                                                                            | Displays warning message on the instrument panel (for about 4-5 seconds) |

## Components



[1]

1. Wireless power charging unit



[2]

2. Wireless power charging lamp

## Troubleshooting

### Wireless Power Charger System Troubleshooting

| Trouble status   | Inspection item               | Inspection |
|------------------|-------------------------------|------------|
| Not charged      | Check the mobile phone status | R-1        |
| Amber LED blinks | Overcurrent                   | R-2        |
|                  | Overheating                   | R-2        |
|                  | Foreign matter                | R-2        |

#### R-1. Check the wireless power charger system operation

1. If the placement of a mobile phone is not detected
  - (1) If the internal temperature of the mobile phone battery is high, the mobile phone itself turns "OFF" the power.

☐

The temperature at which the power is automatically turned "OFF" differs by mobile phone model.
  - (2) If the mobile phone was placed outside the charging range
  - (3) If the mobile phone was placed by its LCD side on the charging pad surface (if the phone was placed upside down)
  - (4) If the mobile phone was turned 180°
2. Check that the amber LED of the wireless charging lamp turns on when the mobile phone is in normal condition and is correctly placed.

#### R-2. Check for overcurrent, overheating and foreign matter

1. Overcurrent : Charging stops in overcurrent of over 4.5 A
  - (1) The overcurrent error status will be reset when the current falls under 4.5 A or when ACC is turned off and on.
2. Overheating : The unit will be automatically turned "OFF" when the internal temperature of the wireless charging unit is over 158°F (70°C).
  - (1) The error status will be reset when the internal temperature of the wirelss charging unit falls under 149°F (65°C).

3. Foreign matter : When metallic objects such as coins, clips and precious metals are detected, charging will be stopped to prevent overheating.

(1) Error status will be reset when foreign matter is removed.



- The amber LED of the charging display lamp blinks 10 times for 10 seconds, and then it is turned off for 50 seconds (total 60 seconds).
- The process is repeated for every 60 seconds.
- Turning ACC OFF/ON resets the error status and returns to normal operation.

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Specification

| Item                  | Specification              |
|-----------------------|----------------------------|
| Rated voltage         | DC 12V                     |
| Operating voltage     | DC 9.0 - 16.0V             |
| Operating temperature | -86 to 167°F (-30 to 75°C) |
| Dark current          | MAX 1mA                    |
| Output power          | 5 W                        |
| Output frequency      | 120 ± 7.7 kHz              |

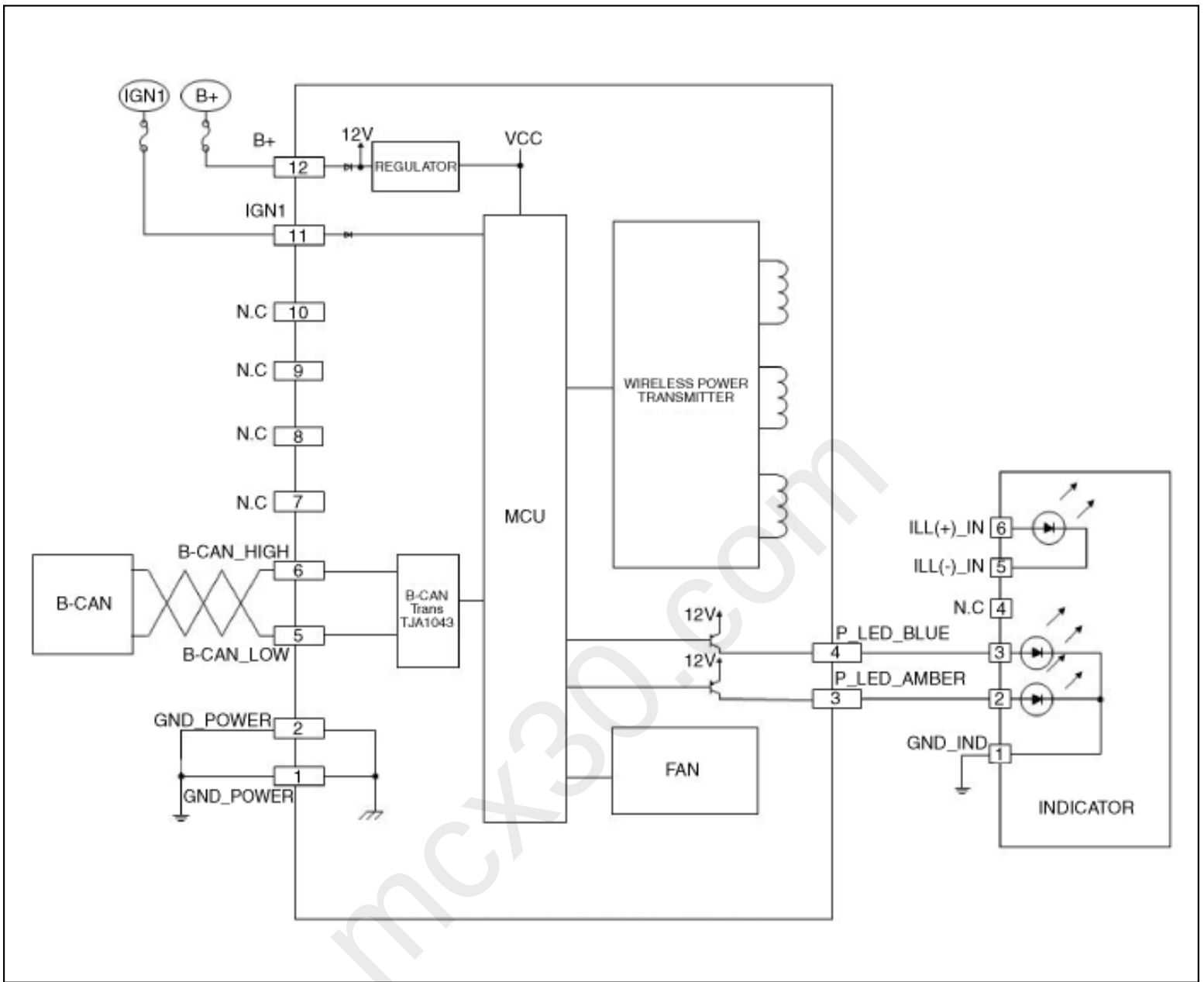
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Components



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Circuit  
Diagram

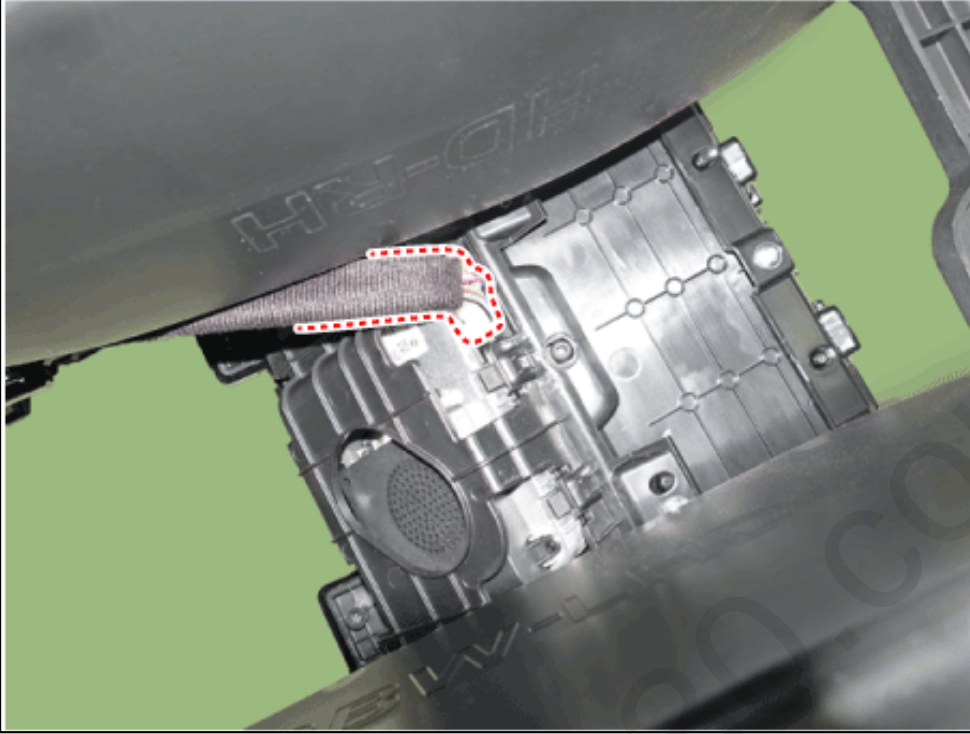


## Removal

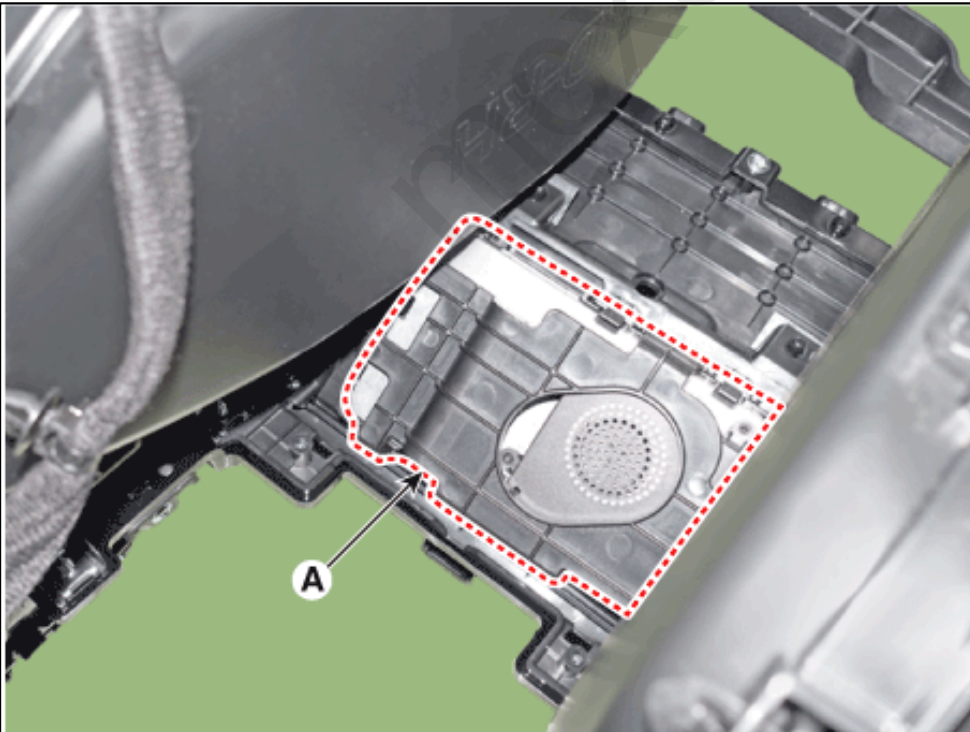


Handling wireless charging system parts by wet hands may cause electric shock.

1. Disconnect the negative (-) battery terminal.
2. Remove the floor console assembly.  
**(Refer to Body - "Floor Console Assembly")**
3. Disconnect the wireless charging unit connector (A).



4. Remove the wireless power charging unit (A).



## Installation

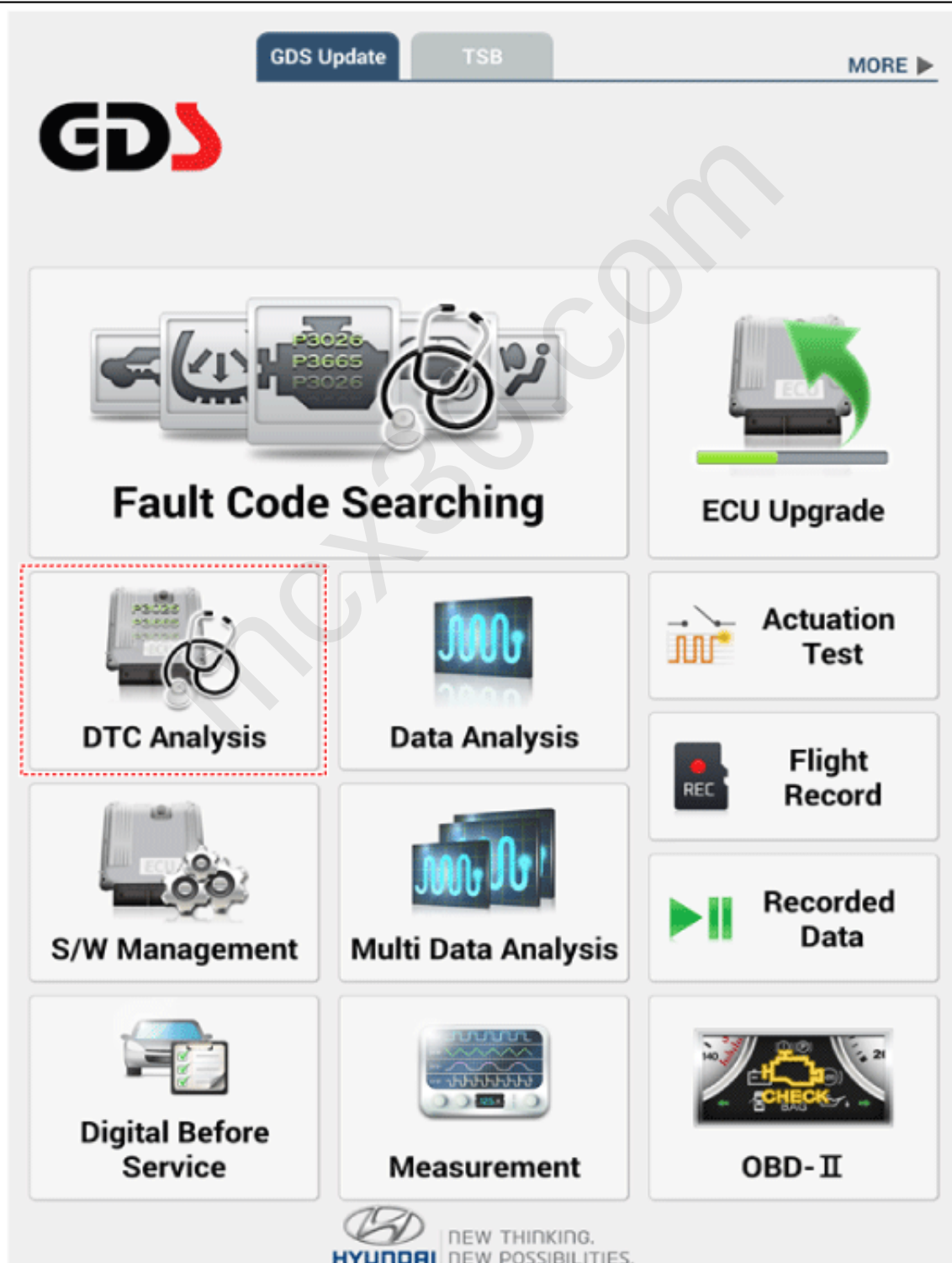
1. Install the wireless power charging unit.

2. Connect the wireless power charging unit connector.
3. Install the floor console assembly.
4. Connect the negative (-) terminal

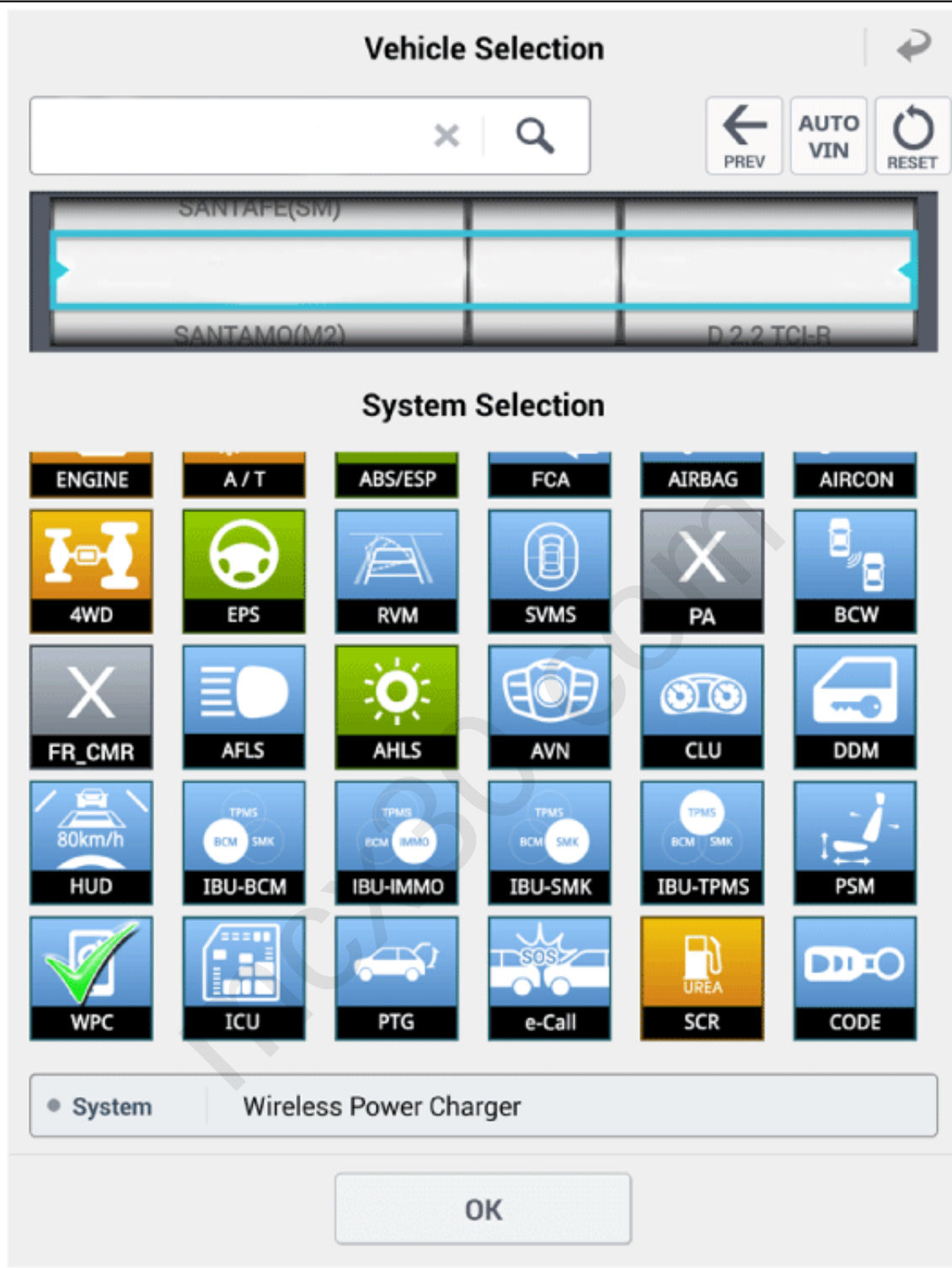
Inspection

#### Diagnosis With Diagnostic Tool

1. In the body electrical system, failure can be quickly diagnosed by using the vehicle diagnostic system (diagnostic tool). The diagnostic system(diagnostic tool) provides the following information.
  - (1) Fault Code Searching : Checking failure and code number (DTC)
  - (2) Data Analysis : Checking the system input/output data state
  - (3) Actuation test : Checking the system operation condition
  - (4) S/W Management : Controlling other features including system option setting and zero point adjustment
2. If diagnose the vehicle by diagnostic tool, select "DTC Analysis" and "Vehicle".



3. Select the 'WPC' to search the current state of the input/output data.



| Data Analysis                                                                                                                        |       |      |         |
|--------------------------------------------------------------------------------------------------------------------------------------|-------|------|---------|
| <div> <div>&lt;</div> <div>Stop</div> <div>Graph</div> <div>Selective Display</div> <div>Actuation Test</div> <div>&gt;</div> </div> |       |      |         |
| Sensor Name(15)                                                                                                                      | Value | Unit | Link Up |
| Charging Voltage                                                                                                                     | 0.00  | V    |         |
| Charging Current                                                                                                                     | 0.000 | A    |         |
| Charging Power                                                                                                                       | 0.000 | W    |         |
| Battery Voltage                                                                                                                      | 11.44 | V    |         |
| ACC Voltage                                                                                                                          | 0.00  | V    |         |
| Active Coil ID                                                                                                                       | 0     | -    |         |
| Coil1 TempSensor1                                                                                                                    | 28    | 'C   |         |
| Coil2 TempSensor2                                                                                                                    | 28    | 'C   |         |
| Coil3 TempSensor3                                                                                                                    | 27    | 'C   |         |
| ACC                                                                                                                                  | OFF   | -    |         |
| Charging Status LED (Yellow) On/Off                                                                                                  | OFF   | -    |         |
| Charging Status LED (Yellow) Blinking                                                                                                | OFF   | -    |         |
| Charging Status LED (Green) Blinking                                                                                                 | OFF   | -    |         |
| Frequency Interference with SMK                                                                                                      | OFF   | -    |         |
| Charging Status                                                                                                                      | OFF   | -    |         |

4. To forcibly actuate the input value of the module to be checked, select option 'Actuation Test'.

| Actuation Test                  |  |   |  |
|---------------------------------|--|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| ● Test Item(2)                  |  |                                                                                     |                                                                                    |
| Charging Status LED (Yellow) On |  |  |                                                                                    |
| Charging Status LED (Green) On  |  |  |                                                                                    |

| Data Analysis                                                                                                               |       |      |  |  |
|-----------------------------------------------------------------------------------------------------------------------------|-------|------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <div> <div>&lt;</div> <div>Stop</div> <div>Graph</div> <div>Selective Display</div> <div>Group</div> <div>&gt;</div> </div> |       |      |                                                                                   |                                                                                     |
| Sensor Name(15)                                                                                                             | Value | Unit |                                                                                   |                                                                                     |
| Charging Voltage                                                                                                            | 0.00  | V    |                                                                                   |                                                                                     |
| Charging Current                                                                                                            | 0.000 | A    |                                                                                   |                                                                                     |
| Charging Power                                                                                                              | 0.000 | W    |                                                                                   |                                                                                     |
| Battery Voltage                                                                                                             | 7.12  | V    |                                                                                   |                                                                                     |
| ACC Voltage                                                                                                                 | 6.48  | V    |                                                                                   |                                                                                     |
| Active Coil ID                                                                                                              | 0     | -    |                                                                                   |                                                                                     |
| Coil1 TempSensor1                                                                                                           | 15    | 'C   |                                                                                   |                                                                                     |
| Coil2 TempSensor2                                                                                                           | 16    | 'C   |                                                                                   |                                                                                     |

Components



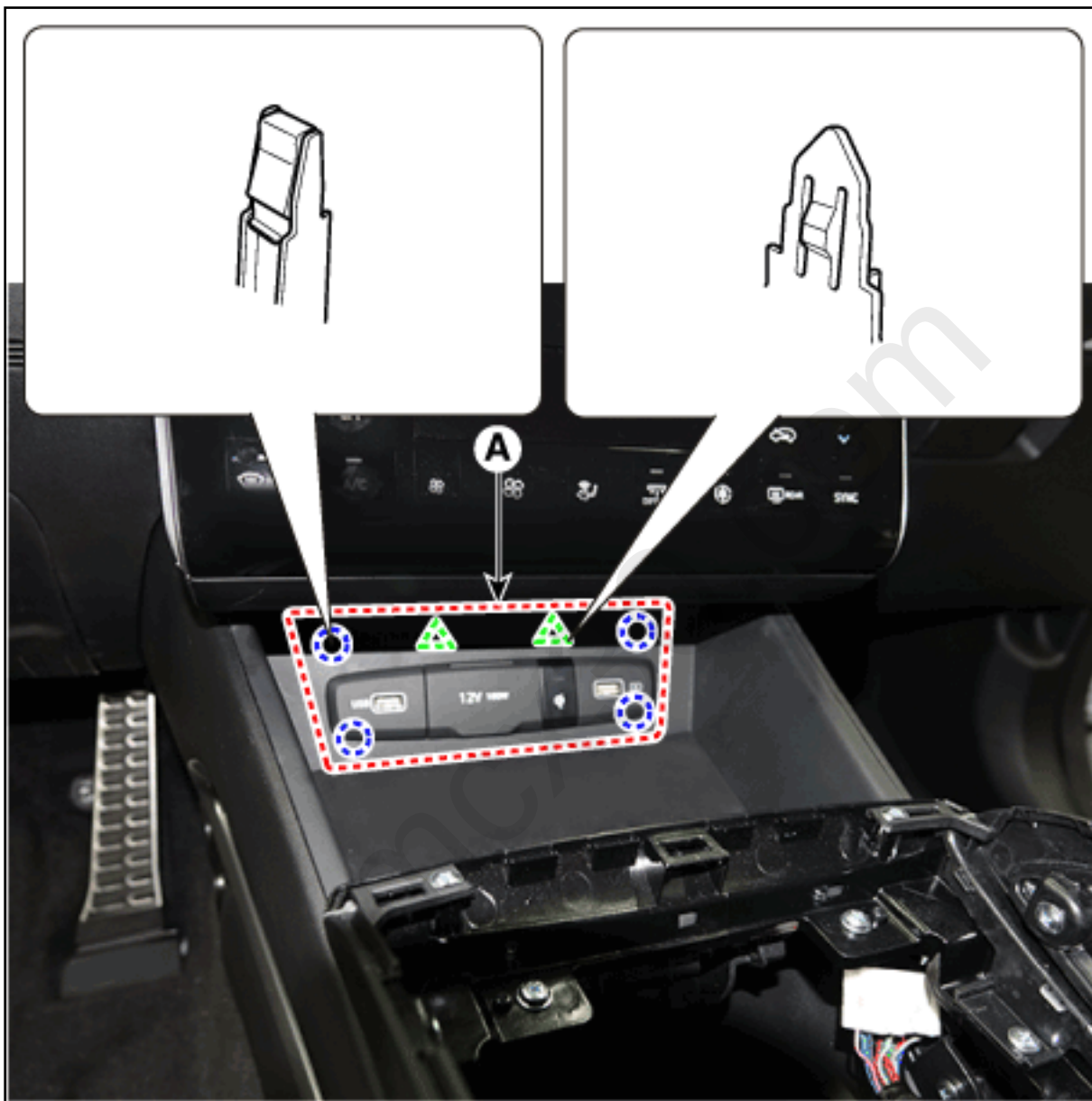
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## Removal

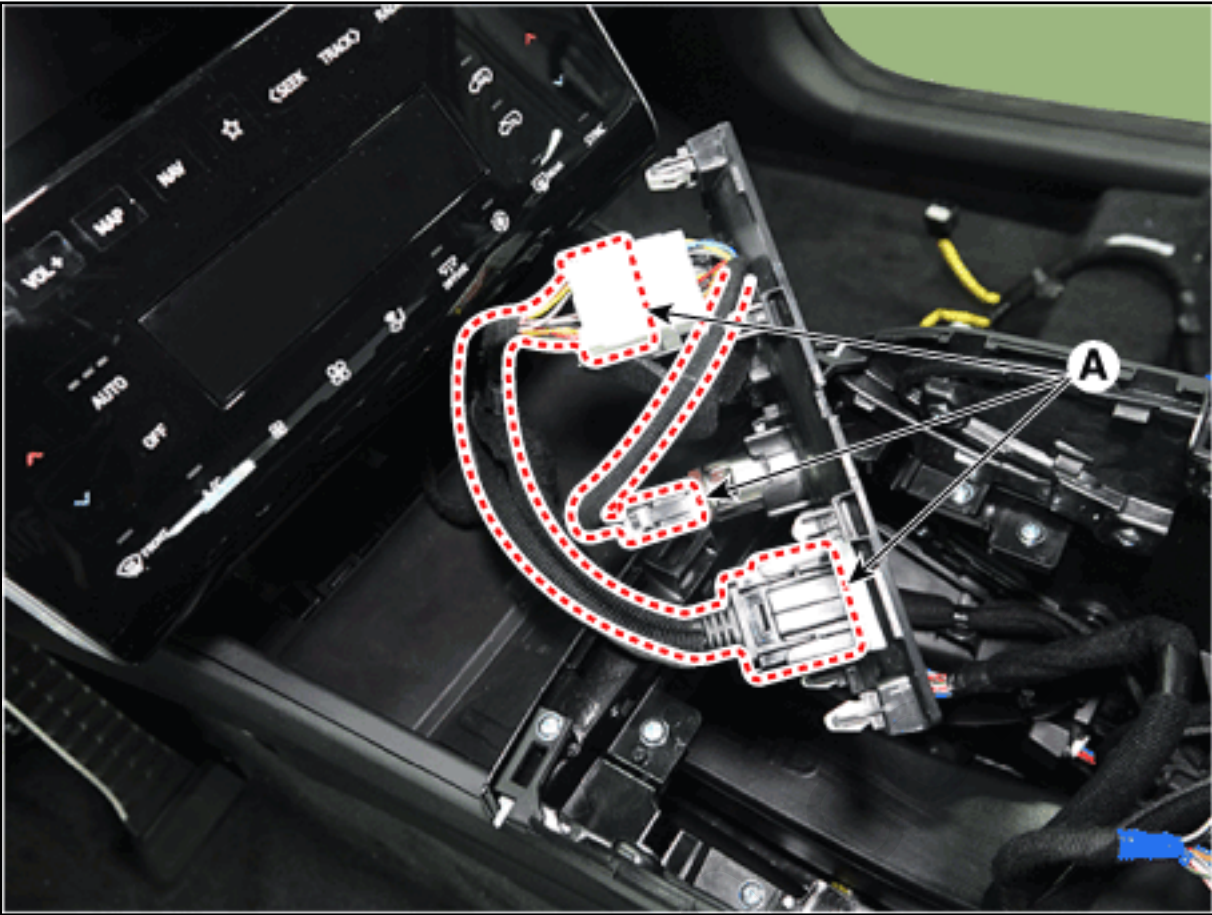


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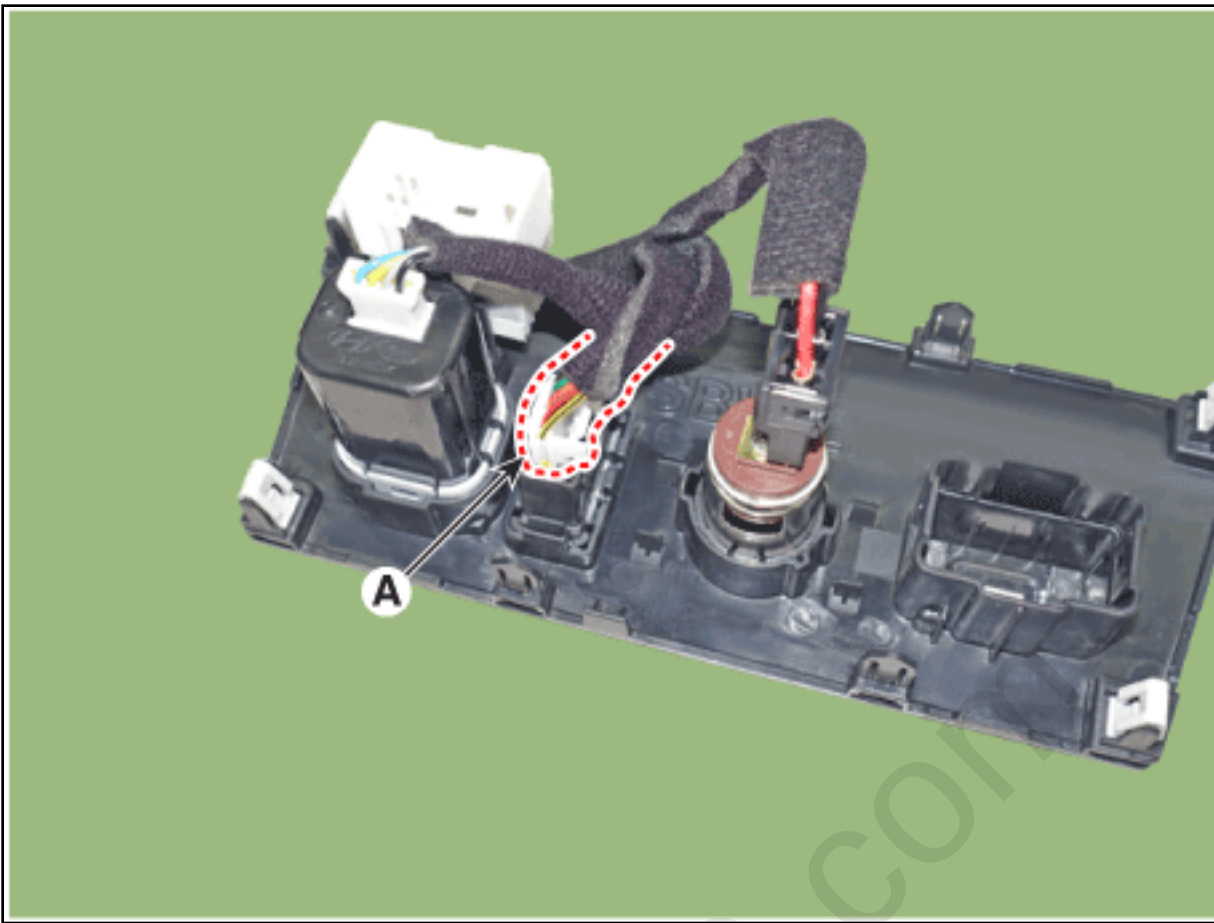
1. Disconnect the negative (-) battery terminal.
2. Remove the floor console tray assembly (A).



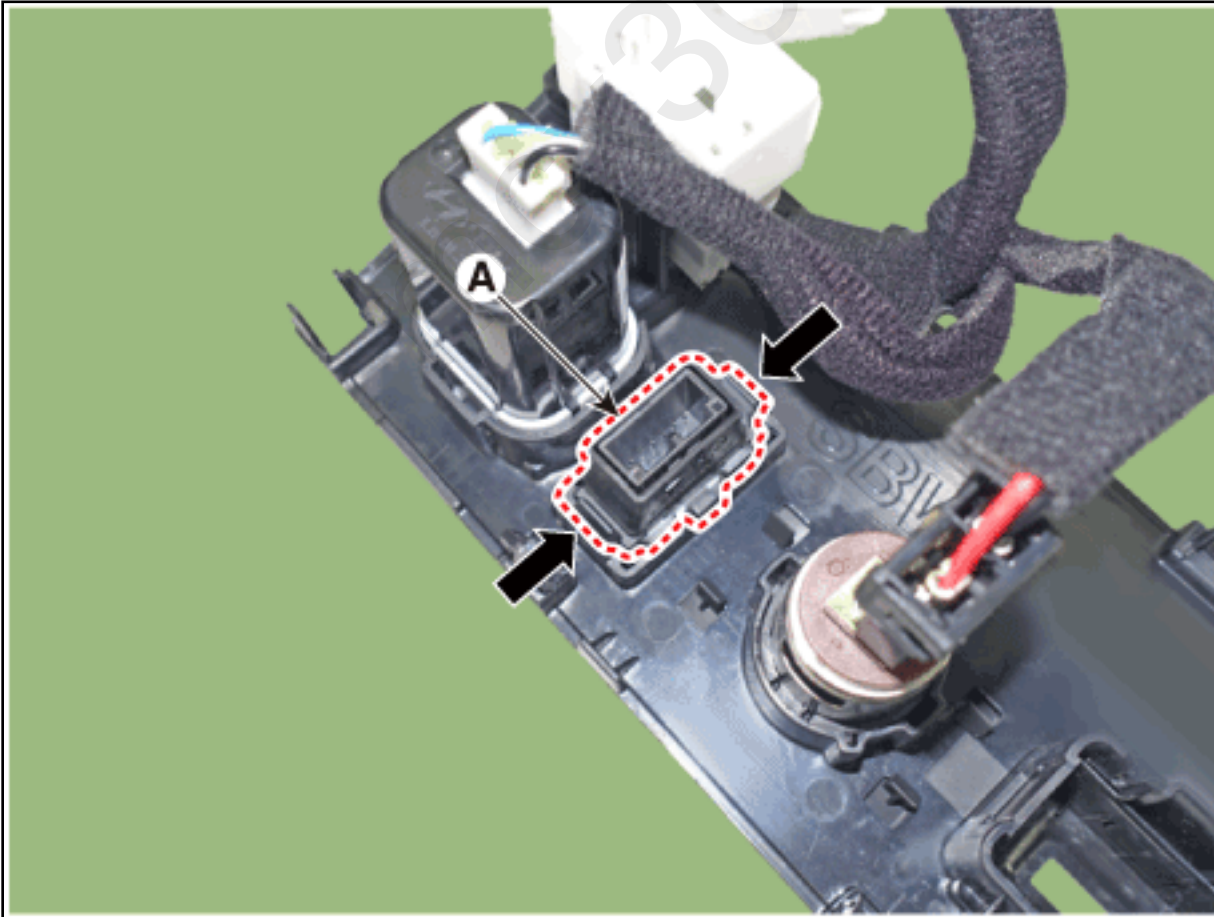
3. Disconnect the floor console tray connectors (A).



4. Disconnect the wireless charging lamp connector (A).



5. Remove the wireless charging lamp (A).



## Installation

1. Install the wireless charging lamp.
2. Connect the wireless charging lamp connector.
3. Install the floor console tray assembly.
4. Connect the negative (-) battery terminal.

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