GEM BCM Introduction

1 Outline

BCM is mainly used to control the body door lock module, window module, washing module, wiper module, interior light module, external light module, IMMO base station interface module, wireless key remote control receiving module, tire pressure detection module, power distribution control module, etc. Complete part of communication and diagnostic functions, and integrate keyless entry, one-button start, window controller and gateway function.

2 Operating principle

BCM collects various input signals (analog signals, digital signals, pulse signals, etc.) and controls the output of loads such as door locks, windows, car washes, wipers, interior lights and exterior lights according to the requirements of the body control function. Through CAN, LIN to complete communication and diagnostic functions, and support wireless remote control key, IMMO base station interface, tire pressure detection, power distribution control and other functions, and integrated keyless entry, one-button start, window controller and gateway function..

3 Technical performance

3.1 Main function

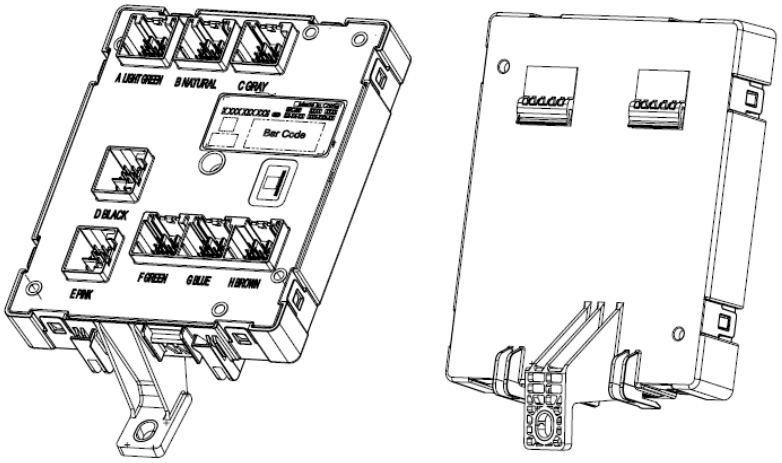
The main functions of the body controller are: central door lock control, remote key control, wiper washing control, external light control, interior light control, tire pressure detection, power distribution control, power saving mode, burglar alarm and alarm control, wireless key remote control Receive function and CAN network communication, LIN network communication, diagnosis, keyless entry, one-button start, window controller and gateway function

3.2 main technical parameters

3.2.1 Shape structure

The platform GEM housing material is plastic, and the outer surface of the housing does not require special trimming and treatment.

The external structure of the platform GEM shell is installed as follows (excluding the BCM connector female end):



Size：length ：222.2 mm±2 mm width：154.1 mm±2 mm height：76.7 mm±2 mm.

GEM The product identification label is attached to the upper right position of the BCM cover. The label represents customer information, version index number, barcode, serial number and other information.

3.2.2 Electrical characteristic parameter

a) Operating Voltage**:**

Full-function operating voltage range： 9 V ～16 V

Functionally limited voltage range： 6 V ～ 9 V,16 V ～ 24 V

Guaranteed diagnostic function voltage range： 9 V ～ 16 V

b) Overvoltage protection**:**

The BCM can withstand an overvoltage of 24 V ± 0.2 V for 60 seconds (ambient

temperature is 23 ℃ ± 5 ℃, other connections are correct), and if the system returns to normal operating voltage within 60 seconds, the BCM can still guarantee normal operation.

c) System reverse voltage protection:

The BCM can withstand a reverse voltage of 14.0 V for 10 minutes (23 ℃ ± 5 ℃). If the system returns to normal operating voltage within 10 minutes, BCM can still guarantee normal operation.

d) Battery power line contact **and** Auxiliary battery jump start warning**:**

If you need an auxiliary battery to jump start the vehicle during use, follow the jump start request: Connect the start voltage ≤24 V, time≤60 seconds.

3.2.3 Mechanical property parameter

a) Vibration Resistance Characteristics：

Under wide-band random vibration conditions, BCM has the same magnitude of vibration in the x, y, and z directions. The total average acceleration is 19.6 m/s, 27 hours per axis, and the temperature range is -40 ℃ to 85 ℃.

b) Temperature characteristic parameter：

Storage temperature： -40 ℃ ～ 90 ℃

Operating temperature： -40 ℃ ～ 85 ℃

c) Waterproof and dustproof grade：

IP5K0 (DIN40050-9)

d) product quality：

GEM LV2：Upper cover：163 g Bottom plate：135 g label：0.01 g PCBA：207g , total weight：505 g

4 ISO26262 functional safety requirements

ISO26262 functional safety is an international standard for passenger cars designed to prevent the risk of potential electrical and electronic system failures. In general, the functional safety requirements are defined by the development interface protocol DIA（Development Interface Agreement）agreed between the customer and the UAES. If the parties do not sign the agreement, the functional security definition is executed by default according to the UAES standard.

Functional safety level of power distribution control,KL15-1(IGN1) and KL15-2(IGN2) control level is ASIL B;KL50 control level is ASIL A.

The functional safety level of the brake light is ASIL B.

The functional safety level of the dipped headlamp is ASIL B.

The functional safety level of the wiper is ASIL A.

The functional safety level of the window controller is ASIL-A.

5 Parts drawing

Before the bulk product is officially delivered to the customer, the United Automotive Electronic Systems Co., Ltd（UAES） will provide the BCM form factor map for the customer to complete the design of the BCM installation location. The drawings will include a brief description of the BCM form factor and BCM installation, which will provide a reference for engineers' engineers to install BCM.

The external dimension map mainly contains the following contents:

1. Main assembly related dimension data;

2. BCM installation brief description;

3. Drawing change record;

4. Recommended harness connector information.

6 Installation requirements

6.1 Installation location

In order to meet the BCM requirements for temperature, vibration and dustproof and waterproof, UAES recommends installing the BCM in the cockpit (do not install in the engine compartment). If the OEM wants to install the BCM in another location, the installation location should be evaluated by the UAES engineer and the OEM's engineer. At the same time, in order to ensure the reliability of the BCM work, the engineers of the OEM should consider the installation point of the BCM on the vehicle and the design of the accessories related to its assembly to meet the vibration requirements of the BCM. The installation position of the BCM, the direction of the harness, and the surrounding environment are not allowed to be changed once the two parties confirm it (for example, other controllers are installed near the BCM), otherwise the BCM performance cannot be guaranteed.

For BCM assembly layout design engineers should consider the following installation location selection principles：

1. The BCM should be installed with the connector facing down and at an angle to the vertical position to prevent water from flowing in from the connector, causing a short circuit in the connector.

2. The installation of BCM should try to avoid places where dust is easy to accumulate. A large amount of dust accumulation will affect the reliability of BCM work.

3. The BCM should be installed as far as possible from the position where the temperature of the casing itself may exceed 70 ℃, and the surrounding parts should be prevented from releasing heat to radiate heat to the BCM;

4. The BCM shall be placed where the electromagnetic and radio frequency interference caused by other components of the BCM and its wiring harness is minimal;

5. BCM assembly in the cockpit should be firm and reliable, no looseness;

6. In order to protect the BCM and its harness from assembly and damage during assembly, the BCM and other components in the passenger compartment should have sufficient space;

7. Avoid installing BCM where oil, moisture and water droplets are easily spilled;

8. BCM harness should be fixed firmly to avoid supporting the harness through BCM. At the same time, the BCM harness shall be arranged to prevent and protect all the wires in the harness from damage due to wear and overheating;

9. It should be avoided that the BCM may be subjected to additional mechanical shock and external impact due to the installation position and assembly method of the BCM. The BCM should be avoided from being installed at the resonance point of the vehicle body;

10. Avoid fitting the BCM near areas where it is prone to contact with batteries or other acid-alkaline solutions. And the location where BCM is easily corroded;

11. Avoid fitting the BCM in a position near the positive terminal and the ignition power terminal that might touch the battery.

6.2 BCM grounding

The BCM system adopts the method of grounding the vehicle body. The specific requirement is to connect the grounding wire in the wiring harness directly to the vehicle body. The distance from the BCM to the grounding point needs to be guaranteed to float within +/-1V (recommended less than 20 cm).,The distance between the grounding points should not exceed 3 cm; In addition, the reference ground of BCM multi-channel analog gear switch should be grounded with BCM single point. Otherwise, there is a risk of misjudgement in the gear switch.

6.3 Temperature requirement

When designing the BCM installation location, it is necessary to comprehensively consider all the vehicle installation environmental factors (ambient air temperature, air flow, ambient heat radiation source, etc.) that affect the BCM and the heat dissipation generated by the BCM's own internal circuit components. The

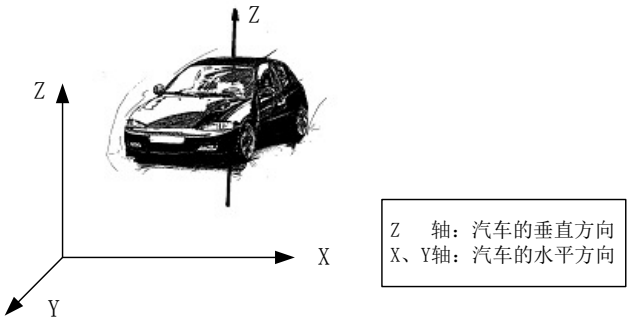
temperature measured at 2 cm from the front of the entire enclosure shall be such that the maximum permissible temperature limit (85 ℃) and the minimum permissible temperature limit (-40 ℃) shall not be exceeded under any extreme environmental conditions.

6.4 Vibration and shock requirements

The fittings and mounting bolts used to assemble the BCM shall withstand the maximum vibration and shock that can be generated at the installation location. The BCM shall not be damaged by the deformation of the fitting and the damage of the mounting screw holes. At the same time, it should be ensured that the assembly bracket or the mounting fixing hole cannot amplify the vibration and impact of the vehicle.

6.5 Waterproof, dustproof

In order to meet the waterproof and dustproof requirements of BCM, BCM installation should be kept at an angle to the horizontal and vertical positions to avoid water from the connector, the screw inflow, the connector short circuit, screw corrosion, etc.



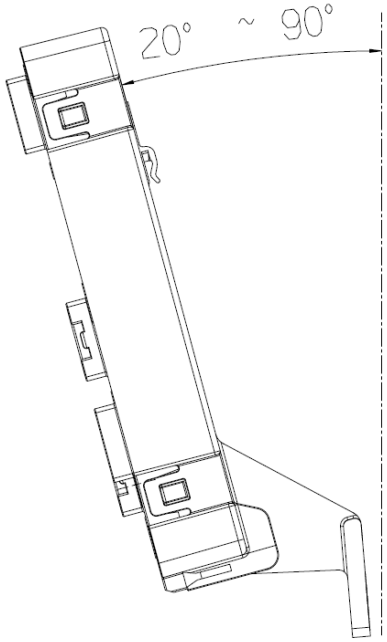


Figure1 Angle of installation

The installation angle recommended by UAES, in the vertical direction, allows the installation angle to be 20° to 90°, as shown in Figure 1. If the installation direction and angle are outside the recommended range, the UAES's engineers and the OEM's engineers will need to make an assessment.

In order to allow any liquid to automatically flow away from the BCM plug, the wire harness is preferably arranged in a downwardly inclined direction from the BCM lead (the BCM plug terminal faces downward). BCM should be installed to avoid any liquid flowing directly to the BCM connector..

The BCM does not ensure that all dust is prevented from entering, but the dust at the BCM interface is not excessively permeable, affecting the reliable operation of the BCM or impairing safety performance.

6.6 Fixation of BCM

BCM is fixed on the car with one M6 bolt and two snaps, specific parameters can refer to AZ drawings. It is recommended to use high-strength metal materials such as low-carbon steel for the mounting bracket. The metal bracket needs to be surface treated to prevent corrosion, and the metal bracket cannot cover or be close

to the BCM bottom plate. Otherwise, the sensitivity of the RKE will be affected. If the installation position is determined, Changes must be confirmed with the UESA engineer. If other materials are used, the customer must ensure that the BCM meets the requirements for vibration, heat dissipation, temperature, and EMC. If there is any deviation, it must be confirmed with UAES.

6.7 Distance from other sources of electronic noise

The fixed position of the BCM and its harness should be kept away from known sources of serious electronic noise. Such as electric motors, ignition coils, high voltage ignition lines, spark plugs, fuel injectors and generators and their wires.

7 Assembly and use

7.1 Assembly of BCM and its connectors

7.1.1 BCM assembly

BCM recommends the installation method of UAES design. If the customer adopts other schemes, it must obtain the consent of UAES.

7.1.2 BCM harness connector

The BCM connector has a function to prevent insertion errors to prevent the harness from being inserted incorrectly.

All mating terminals of the BCM end harness connector must use the terminal block corresponding to the harness connector type defined by the customer's drawing.

The customer ensures that the external force on the BCM end harness connector does not exceed twice the normal connector insertion force of 75N.

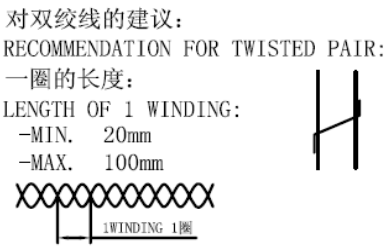
CAN should be twisted pair processing, otherwise the CAN signal is susceptible to interference.

Twisted pair is required for all antenna harnesses.

The length of the PEPS antenna harness (after twisted pair processing) does not exceed 3 meters.

IMMO backup start antenna harness length (after twisted pair processing) does not

exceed 2m, it is recommended to separate the line.



If the customer chooses a wire harness connector other than the recommended one, it needs to negotiate with UAES to determine.

7.2 User guide

BCM applications must meet the following requirements：

In the process of vehicle assembly, sparks caused by static electricity may cause BCM damage. Therefore, in the process of preparing the production assembly process, the BCM assembly should be arranged in the final stage of the production process as much as possible, thus reducing the chance and probability of BCM suffering from electrostatic damage.

When assembling the BCM with the harness connector, be sure to ensure that the system power is disconnected. Do not plug or unplug the BCM with the ignition switch open.

Under live conditions, avoid contact with the pins of the body control module or the exposed parts of the wire harness of the body control module.

Do not use BCMs with obvious physical damage. The surface of the BCM's outer casing must not be coated with any unapproved material. It is not allowed to spray paint or other insulating liquid onto the pins of the BCM. BCM must be disconnected from the Car body when repairing shell by electric welding. Otherwise, the BCM will be burned out.

When the battery is connected to an external battery pump, it should be in firm contact with the battery electrode.

No tool or other object shall be used to hit any part of BCM.

The test BCM shall not be installed on the product vehicle.

Load Dump(1) protection is not available in BCM. In the case of Load Dump(1), the generator voltage produces a high abrupt pulse due to a sudden decrease in load, and if

the pulse peak and pulse width are large enough, it may cause damage to the BCM. Therefore, please confirm that the avalanche diode is installed inside the generator for protection, and the avalanche voltage is lower than 35 V.

(1)Load Dump refers to the disconnection of the battery from the generator due to corrosion of the power line during the operation of the generator.

8 Fault analysis and elimination

The fault diagnosis protocol is determined by the customer and the UAES.

9 Maintenance and repair

BCM does not require any maintenance, maintenance or calibration work.

10 Transportation and storage

10.1 Hoisting, transportation precautions

During the transportation process, BCM should pay attention to handling it gently and avoid over-pressing the packing box to avoid damage to BCM.

10.2 Storage conditions, storage period and precautions

BCM should be stored in a cool, dry, dust-free environment, and BCM must never be exposed to liquid contaminants. BCM can be stored for 2 years under the condition of storage conditions. The BCM has a storage temperature range of 0 ℃ to 30 ℃ and a humidity range of 0 to 80% RH.

11 Other

11.1 Receipt and inspection

The consignee should check each box to confirm that the label on the box, the part number and the part number requested for delivery are the same. If damage is found, it must be promptly reported to the relevant department of UAES.

11.2 Unpacking check notes

Care should be taken when handling the unpacking and avoid over-pressing the

package to avoid damage to the BCM.

Care should be taken when unpacking to avoid scratching the BCM.

Special care should be taken when transporting inside the plant to avoid damage and contamination of the BCM.

11.3 Content of check

a) Check if the BCM label meets the requirements;

b) Check the BCM housing for obvious physical damage;

c) Check the BCM pins for physical damage.

12 After-sales service and guarantee

Customers can return and claim in accordance with the return regulations and claims regulations in the contract in accordance with the terms set out in the quality assurance agreement signed with UAES.

The UAES customer service engineer is responsible for promptly contacting the customer, returning the product returned due to quality problems to the company, and receiving the return and exchange of the customer's BCM product in the manner specified in the agreement. If UAES does not have a resident customer service engineer in the customer's area, the salesperson can notify the customer of the contact method of the customer service engineer of the company. The specific matters of after-sales service will be handled by the customer service engineer.

Whether the customer complains about the company's products orally or in writing, the Department that receives these complaints is obliged to transmit the customer's information to the sales department and the customer service engineer in a timely manner. The customer service engineer is responsible for contacting the customer, confirming the specific situation and details of the customer's reflections and complaints, and coordinating the connection when necessary. Personnel from relevant internal departments went to the scene for confirmation.

13 Wireless Specification

	LV2 High	LV2 Low
Operating Frequency Range	125kHz TX 433MHz RX	125kHz TX 433MHz RX
Maximum RF Output Power	102dBuV/m@3m	82dBuV/m@3m

14 FCC Statements

Please note that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

—Reorient or relocate the receiving antenna.

—Increase the separation between the equipment and receiver.

—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

—Consult the dealer or an experienced radio/TV technician for help.