

# von-S51

LTE Cat. M1 OBD Device with  
**Outstanding performance & Price competitiveness**



## Vehicle Diagnostics & Management

von-S51 is LTE Cat. M1 global model of 'von Series' launched this year. The von-S51 offers outstanding performance from connectivity to cybersecurity for your best possible fleet management. With low data usage price of LTE Cat. M1 network, the cost for fleet tracking service now have more price competitiveness.

## Enhanced security against car hacking

### Secure boot

- Firmware security defense
- H/W Base Key Protection
- Proved Crypto Library
- Vehicle Bus security defense
- Key Management during Life cycle

### Data Anonymity

- No personal information stored
- Detect any ECU firmware hacking
- Encrypted, hashed VIN
- Hashed for all identification information
- Vehicle finger print extraction
- No data volume changes after being encrypted

### Authentication

- Protection from unauthorized access
- HMAC, TLS 1.2 supported
- Role-based access control
- Mutual authentication
- Protection from CAN injection

### Secret Sharing

- Support FTPS/HTTPS
- Support Shamir secret share
- Securitized network protocol
- Cooperative decryption by SSS
- GPS, Geofence, No GPS collection
- GPS collection as per setting

## Key Features

- **OpenAPI** provided for various 3<sup>rd</sup> party business
- **Store-forward** features supported for **out-of-network area**
- Precise GPS and accurate vehicle metric
- Remarkably **durable** for **high temperature** in vehicle (MFF2 SIM)
- **Wide vehicle coverage** including heavy-duty vehicle
- Secured, devices specific **FOTA**

## Technical Specifications and Features

<b>Interfaces</b>	<b>Engine Management:</b> <b>Protocol</b> ISO 9141-2, ISO 14230-4(KWP-2000), ISO 15765-4(CAN), SAE J1939 SAE J1979 Mode \$01~\$0A <b>Interface</b> SAE J1962 Standard OBD-II 16 PIN Connector  <b>Input/Output:</b> Beeper External port: Remote Car door open/close (Key fob) * Smartkey reverse engineering required for key fob USB port: USB 2.0, VCP Supported 3-LEDs Indicator: ECU, GPS, Network Internal GPS/Cellular antennas
<b>Cellular</b>	LTE Cat. M1 <b>Cat M.1</b> FDD: Bands 2 / 4 / 5 / 12 / 13 / 25 GSM: 850 / 1900
<b>SIM</b>	MFF2, Embedded SIM
<b>GPS Receiver</b>	Modem Built-in GPS, GPS, BLONASS, Galileo, QZSS, Beidou 3GPP compliant A-GPS Position Accuracy: ~2.5m
<b>Accelerometer</b>	BMI160, low power 9-axis (Accelerometer / Gyroscope / Magnetometer) Full scale ( $\pm 2g$ , $\pm 4g$ , $\pm 8g$ & $\pm 16g$ ) Various vehicle impact detection supported for car theft, accidents etc.
<b>Environmental</b>	<b>Operation Temperature:</b> -20 to +70°C (-4 to +158°F) <b>Storage Temperature:</b> -40 to +80°C (-40 to +176°F)
<b>Mechanical</b>	<b>Weight:</b> 46g <b>Dimensions:</b> 46mm(W) x 25mm(D) x 65mm(H)
<b>Electrical</b>	<b>Voltage:</b> DC 12V to 24V Consumption: Max. Power $\leq 4000mW$ Sleep mode: $\leq 60mW$
<b>Compliance</b>	<b>Standards:</b> Scheduled <b>Carriers:</b> Scheduled
<b>Firmware-Over-The-Air (FOTA) Support</b>	<b>Maximized data efficiency</b> <b>Firmware Updates:</b> For maintenance, new features and custom applications <b>Parameters:</b> For turning additional features on/off
<b>OS</b>	<b>Processor:</b> 32-bit ARM Cortex-M4 (1024KB Flash, 192KB SRAM) <b>Memory:</b> Internal Memory 8MB.
<b>Beeper</b>	<b>Driver Feedback:</b> Harsh braking, harsh acceleration, sharp turn, over-revving, Idling, speeding, seatbelt violations and other custom rules <b>Test Mode:</b> Diagnostic beeps for indicating ECU, Network and GPS connection status
<b>Virtual Ignition</b>	Any movement or speed change from 0 mph is considered as an act of engine start.

<b>Recording Parameters</b>	<b>Fast &amp; memory-efficient data filtering</b> supported. Extracting essential data only based on refining algorithm. Event data (e.g. Car accidents) GPS RRM Voltage Accelerometer etc.
<b>Trip summary</b>	Trip summary provided after end of operating vehicles.
<b>Battery Drain Prevention</b>	GPS Aided parking status monitoring Vehicle power state monitoring Wake up by various scenarios

## Installation Guide

### 1. Preparing for Installation

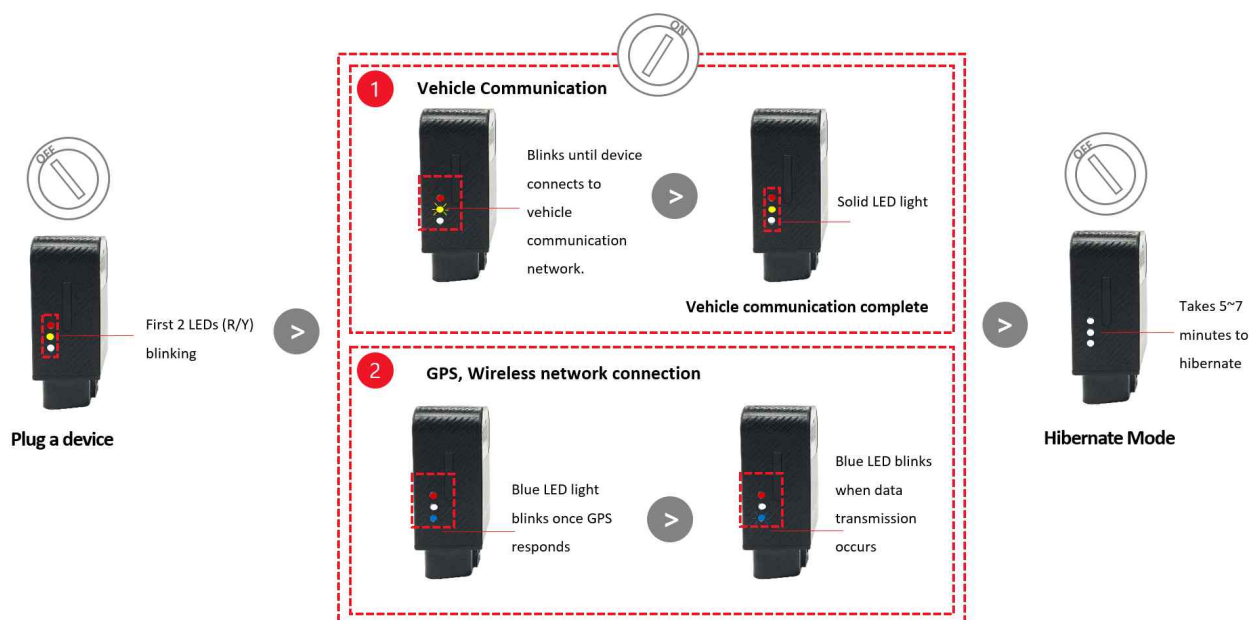
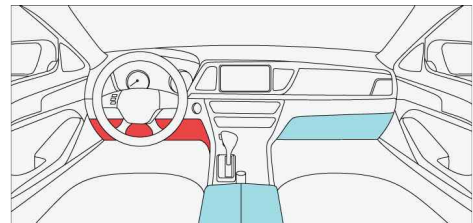
- Before installing your device, please ensure that the device has updated with the latest firmware and your vehicle is fully compatible. A vehicle must be not in operation with engine-off.
- Vehicle mounting modifications could be carried out depending on types of vehicle. Removal of fuse box cover or additional wiring harness (e.g. An extension cable (Optional)) might be required since some vehicle have different OBD connector system. In this case, please ensure that all in-vehicle devices and extension cabling to the OBD connector must be securely fastened and kept clear from all vehicle controls such as gas or brake pedal for safety.

**WARNING!** If the devices/or cables do not remain securely attached, vibration in the vehicle can lead to a loose connection which could cause indirect or direct failure of the vehicle's ECU. Please inspect the devices and cabling regularly.

### 2. In-vehicle Installation

#### 1) OBD Port Location

- OBD port is usually located under the dashboard (Red Area).
- If OBD port is not found, please look for the port in the blue areas.
- Once OBD port has found in the fuse box, please connect OBD device to the port.
- If the device has connected properly, the three LEDs on the device start blinking in the actions below.
- If fuse box does not close after pushing OBD port inward, please use a purchasable extension cable.



## 2) How to close a fuse box after a device installed (For Hyundai, KIA vehicle owners)

- After finding OBD port, please remove OBD connector by pinching the sides of a connector and pushing it towards the floor (Refer to the left image).
- Then close the fuse box with a cover.



Figure 2: Removing OBD Connector and Installation



Figure 1 : Fuse box covered with von-S51

### \* Switching to a New Car

- Contact service provider before removing von-S51 from an old vehicle.
- Make sure the new vehicle has OBD port and compatible with the service.
- The engine must be turned off before unplugging the device. Then plug the device to a new vehicle and turn on the engine.
  - \* Note: Engine must be running for 3~4 minutes. Device will be updated automatically through FOTA. (Firmware Over-The-Air)

**WARNING!** Do not attempt to install, reconfigure, remove, damage or tamper any device while the vehicle in operation. Any types of service for the device must be done only in stationary vehicles which are turned off. If not, It can cause abnormal electrical connections or malfunctions of vehicle controls, resulting in serious personal injury or substantial damage to your vehicle.

**WARNING!** After the installation, verify that no dashboard warning lights or a marked drop in performance are indicated on your vehicle. If you notice any types of malfunctions or warning signs while the vehicle in motion, do not to continue to operate the vehicle and please contact your authorized service provider.

### 3. Important Safety Information and Limitation of Use

**WARNING!** Keep your all in-vehicle devices/cabling tidy and well maintained without environmental contaminants such as water or any types of debris. If not, this might result in malfunctioning of the vehicle, leading to a fire hazard or short-circuiting.

**WARNING!** Not all vehicles share compatibility. Do not attempt to arbitrarily swap and install the devices in your vehicle from another vehicle. If you do so, it may cause unexpected electrical/mechanical problems while in operation such as sudden power loss or shutdown of engine.

**WARNING!** This product does not contain any user serviceable components. Configuration and repairs must only be conducted by explicitly authorized distributor or service provider. The warranty is void if products are altered or modified in any way (including, but not limited to, attempted warranty repair other than by an authorized service representatives).

#### [Appendix.1] 3-LEDs Indicator Information

No.	Description	Indicators				Status
		Red	Green	Blue	Beep	
1	Firmware Update ongoing	ON	Blink (0.1s)	N/A	X	Normal
2	OBD Connected (Message received through OBD)	-	-	N/A	Beep (0.1s)	Normal
3	OBD Waiting (Receiving message after engine off)	ON	Blink (1s)	N/A	X	Normal
4	Engine Running (Maintain RPM over 300)	ON	ON	N/A	X	Normal
5	Sleep Mode (Wait for 5 min, after engine off)	OFF	OFF	N/A	X	Normal
6	No SIM found	Blink (1s)	Blink (1s)	N/A	Beep (0.1s)	Service Check Require <a href="#">4.2 Refer to Telco Configuration</a>
7	Network Connection Error	Blink (1s)	Blink (1s)	N/A	Beep (0.1s)	Service Check Require <a href="#">4.2 Refer to Telco Configuration</a>