ZD Automotive

Focus on Technology • Shaping the Future

ZD BOX 2i

Version 1.1

ZD BOX 2i

ZD BOX 2i is a universal bus interface product designed by ZD for domain controller based electrical architectures. ZD BOX 2i supports all current standard vehicle bus interfaces, meeting diverse bus requirements while offering the advantage of high port density in a single device. It comprehensively covers various business requirements from R&D to testing in the automotive industry, such as simulation and monitoring of in-vehicle Ethernet communication between domain controllers, and communication between domain controllers and their sub-controllers based on CAN/CAN FD and LIN bus.



Key benefits:

- Single device support for common bus systems, including CAN/CANFD, LIN and Vehicle Ethernet standards.
- Equipped with a standard Gigabit Ethernet interface.
- As a bus interface device, it connects to a host computer via a USB 3.0 type C interface.
- Automotive standard design for wide voltage and temperature range to meet various environmental requirements from laboratory to real vehicle testing.
- Hardware DIP switches allow customers to conveniently configure the operation mode of the vehicle Ethernet.
- Together with ZD's software and hardware products, it provides a complete solution.
    - Combined with the VBT (Vehicle Bus Tool) desktop bus tool software, it can simulate and monitor CAN/CAN FD, LIN, Vehicle Ethernet 100/1000Base-T1 signals.
    - Combined with ZD's Automated Test Service Pack, it can be quickly deployed in automated test environments as a bus interface,

supporting automated test operations for signal-level bus data simulation, monitoring and assertion.

- Provides an interface for hardware upgrades.

Vehicle Bus Tool Desktop Software

The Vehicle Bus Tool (VBT) is a highly efficient and user-friendly bus tool software developed by ZD for their in-house developed bus hardware device, the ZD Box 2i. In addition to providing signal level simulation and monitoring capabilities, it also supports various upper layer protocols such as encapsulation and parsing of UDS, XCP/CCP and other protocols. It provides offline analysis capabilities for standard bus record files based on MF4 and BLF, which can be used in conjunction with the ZD Datalogger Series. Customers can use the toolchain products provided by ZD for the full range of bus logging and simulation scenarios.

Key features of the VBT:

- Intuitive and easy-to-use user interface:
  - Graphical bus topology for setting up simulation projects.
  - Supports convenient operations such as file drag-and-drop, minimalist design emphasising functionality.
- High performance:
  - Software framework designed for high throughput.
  - Supports high concurrency, heterogeneous bus simulation and monitoring.
- Data parsing and analysis:
  - Supports bus definition files such as DBC, ARXML.
  - Supports bus data formats such as asc, blf, mf4, pcap.
  - Supports parsing from raw frame to signal level.
  - Signal oscilloscope functionality.
- Programmable scripting support for integrating custom data processing algorithms.
- Integrated device configuration and signaling functionality for easy integration of ZD Box2i into customer application frameworks.

- Upper layer protocol support:
  - UDS diagnostic protocol
  - CCP/XCP calibration protocol
  - SOME/IP
  - BAP and other OEM specific protocols

Application Scenarios

- **Automotive Controller Development and Testing**

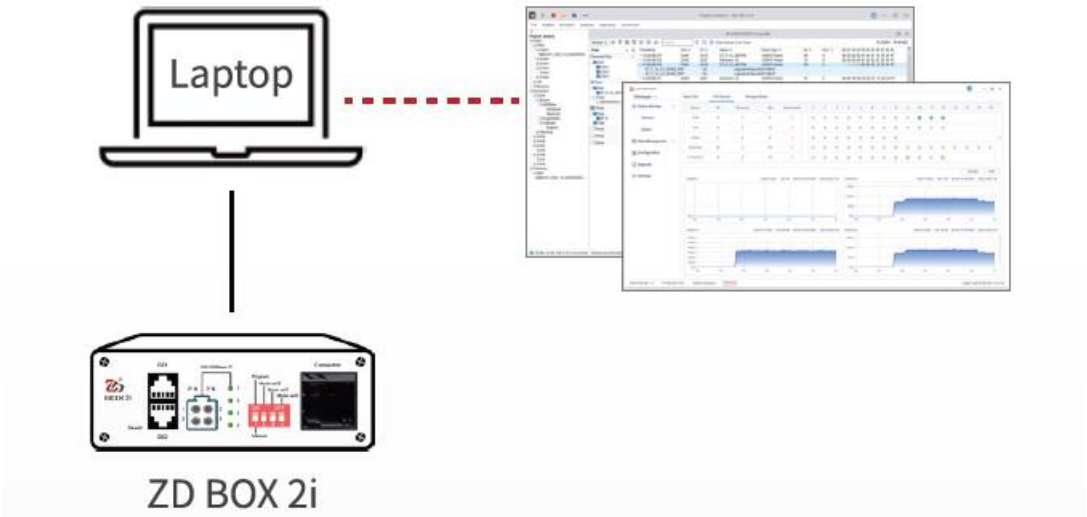
The ZD Box 2i, used in conjunction with VBT software, can be used extensively in the development, testing and analysis of individual Electronic Control Units (ECUs) and entire ECU networks in the automotive and other industries. Key features include

- Signal Analysis:

  By analysing the communication between ECUs in the vehicle, design and test engineers can assess the operational status of the system under test. The ZD Box2i can be integrated into the in-vehicle controller network for monitoring through its online tracing feature. With the signal oscilloscope function, it can monitor events on the communication link in real time. The VBT software also supports offline trace analysis, which can analyse the interactive functions of the tested system by offline parsing of bus data.
- Signal simulation and stimulation:

  To develop and test individual vehicle controllers, it's necessary to simulate their bus environment. The ZD Box2i can not only provide the background signals required by the unit under test (residual bus simulation), but also trigger specific functions of the controller by simulating special signals. This type of signal-level function triggering meets the needs of in-vehicle controller

developers and testers for stable scenario reproduction.

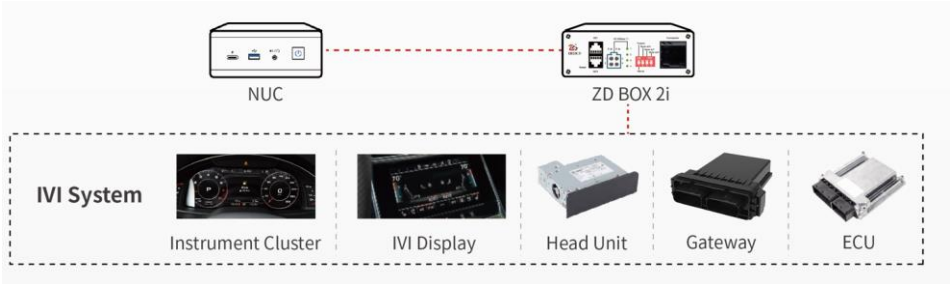


- **Test Automation Scenarios**

Thanks to the comprehensive API interface provided by VBT, the ZD Box 2i can be easily integrated as a bus interface device into various automated test frameworks. Based on bus signal-based test automation and coupled with in-house developed automated test service components, ZD offers a complete test automation solution for the intelligent cockpit domain, including image/text/voice recognition, bus signal stimulation and evaluation, and peripheral control functions.

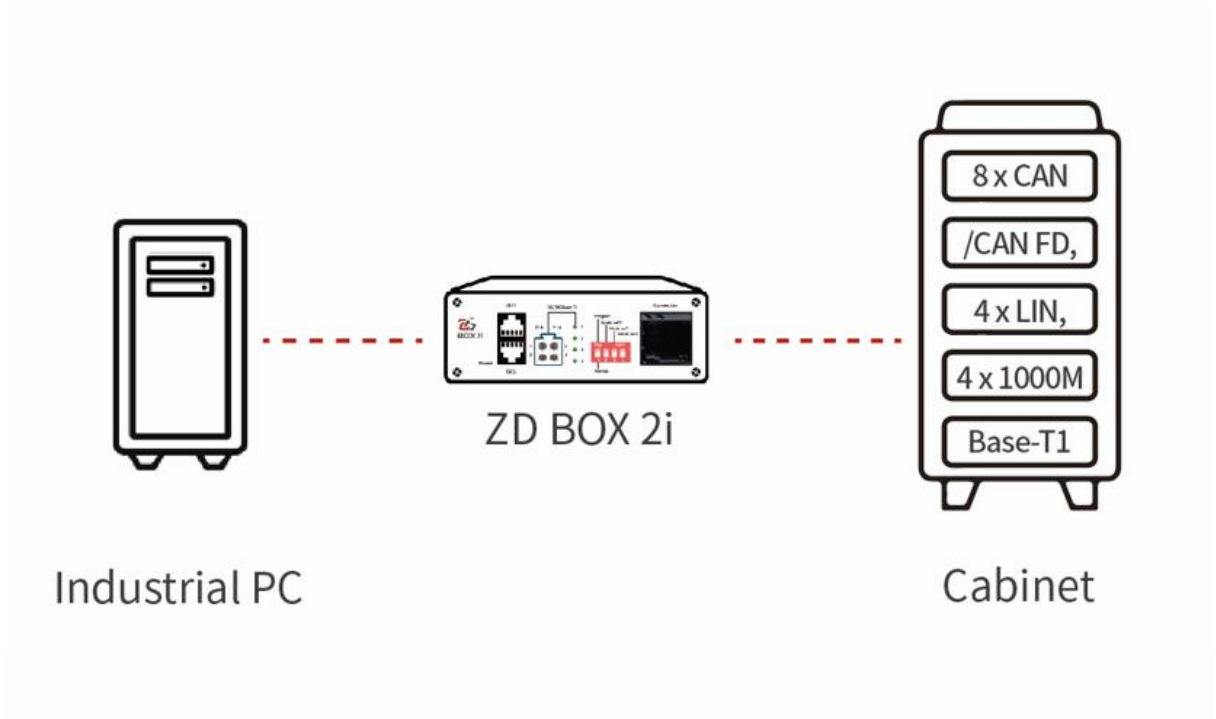
Typical functions include

- Testing the latency caused by human-machine interaction on the bus system.
- Simulating body control units, such as vehicle door status signals, to assess the accuracy of human-machine interaction functions.
- Monitoring in-vehicle infotainment system functions by analysing bus signals, particularly in relation to vehicle status and remote vehicle control functions.



- **HiL Heterogeneous Bus Synchronisation Simulation Scenarios**

The ZD Box2i supports simultaneous simulation of heterogeneous buses such as CAN/CANFD, LIN, 100/1000 Base-T1 through high-bandwidth communication with the host computer. Using the efficient API provided by VBT, the RTOS-based host computer can precisely control the timing and cycle of multiple bus signals. When developing and testing controllers that integrate heterogeneous buses, such as gateways or body domain controllers, the ZD Box2i can provide customers with a solution that minimises hardware requirements.



SPECIFICATION

INTERFACES	• 8 * CAN/CAN FD / CAN SIC • 4* LIN（Master/Slave） • 4 * 100/1000Base-T1 • 2 * 1000Base-T (RJ45) • USB3.0 Type C for host computer
WORKING ENVIRONMENTS	• Temperatur Range: -40°C to +70°C • Operation Voltage: 8V—24V DC
DIMENSIONS AND WEIGHT	• Dimension: 146 * 154 * 42mm (Width * Height * Depth) • Weight: 750g

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