

CANoe.DiVa

Automated Testing of Diagnostic Software in ECUs

What is CANoe.DiVa?

DiVa is a CANoe extension for automated testing of diagnostic software implementations in ECUs. Reproducible test cases are generated based on an ECU diagnostic description in CANdela or ODX format.

CANoe automatically executes these test cases and generates a conclusive test report. CANoe.DiVa then supports the evaluation and further processing of the test results.

Overview of Advantages

- > Automatic generation of test cases and their specification with comprehensive test coverage based on ECU diagnostic descriptions in ODX or CANdela format
- > Automated execution of test cases and generation of a test report
- > Supports different diagnostic standards and bus systems (CAN, FlexRay, DoIP, UDS, OBD, KWP2000, GMW3110) and OEM-specific interpretations and test specifications
- > Easy to configure test contents
- > Integration in the CANoe test environment

This means savings in time and effort while improving the quality of ECU diagnostic software at the same time.

Highlights of Version 11.0

OBD Fault Memory

- > Execution of fault memory test cases according to PVE („Production Vehicle Evaluation“)
- > Checking the „Monitoring“ requirements

Security

- > Integration of Vector Security Manager. The Vector Security Manager provides OEM-specific security functions, e.g. for diagnostic authentication.
- > Test of diagnostic authentication and service availability

Requirements Traceability

- > Exchange of generated test cases with popular test data management systems

Application

- > Full 64-bit compatibility

Manufacturer Support

- > Expansion and optimization of existing OEM extensions, e.g. in the area of security and software download.
- > New OEM extensions for further OEMs

The screenshot displays the CANoe.DiVa interface with a detailed test case analysis. The main window shows a 'Test Case Sequence' table with columns for Timestamp, Test Step, Description, and Result. The 'Write1' step for 'HardwareVersion_Write' is highlighted in red, indicating a failure. Below the table, a 'Raw' data view shows the hexadecimal values for SID-NR (0x7F) and SIDRQ-NR (0x2E). The bottom of the window shows a hex dump of the CAN bus traffic, including the test case ID and the specific test steps (Read1 and Write1) with their corresponding data bytes.

Timestamp	Test Step	Description	Result
4.885240	Read1	Read out stored data in order to write it back at the end of this test case. (HardwareVersion_Read)	-
4.912232	Read1	Positive response received as expected.	pass
4.914230	Write1	Override currently stored data. (HardwareVersion_Write)	-
4.942232	Write1	Expected a positive response - last received response was negative(Error(s) occurred)	fail

Report analysis in CANoe.DiVa

Functions

CANoe.DiVa consists of a configuration tool with a dedicated user interface, test case generator and runtime library for extended CANoe test functionality. The generator uses diagnostic descriptions in ODX or CANdela format to generate comprehensive test cases (good and bad cases). It generates a test module that is loaded to a CANoe test environment, as well as a test specification. The generated tests cover both protocol and application scope. The (re-) programming of ECUs for valid and invalid sequences is also checked. The test results are documented in a clear report. The test analysis is supported by CANoe.DiVa with functions for sorting, comparing, filtering, commenting and further processing of the test results.

Protocol Validation

- > Physical/functional addressing and timing
- > Protocol format: Processing of valid and invalid requests
- > Execution or rejection of services at various session and security levels
- > Data types and value limits

Validation of the Application: Diagnostic Parameter and Fault Memory

- > Parameter vs. parameter: Compare write/read
- > Compare parameters to expected values, e.g. values acquired over CCP/XCP
- > Compare parameter with I/O or network signals
- > Error states can be automatically provoked (network signal errors or electrical errors via VT System) and reset
- > Test of whether the ECU detects the error, reports it according to protocol and specification and again resets the error

Software Download Test

Validation of the flash programming of ECUs in conjunction with vFlash. CANoe.DiVa can generate tests for the bootloader supported by vFlash. vFlash supports over 100 bootloaders (1/2018).

CANoe.DiVa generates, among others, the following tests:

- > Valid flashing and testing of diagnostic communication with regard to timing and format.
- > Flashing when under / overvoltage.
- > Abort the flash sequence at different points and targeted interruption of the power supply during flashing.

Requirements Mapping

- > Creation of requirements or import of requirements from requirements systems (e.g., Doors) or test data management systems
- > Generated tests can be mapped to requirements. This facilitates the tracking of the requirements
- > Display of all test results for individual requirements
- > Returning test results to the system

Application Areas

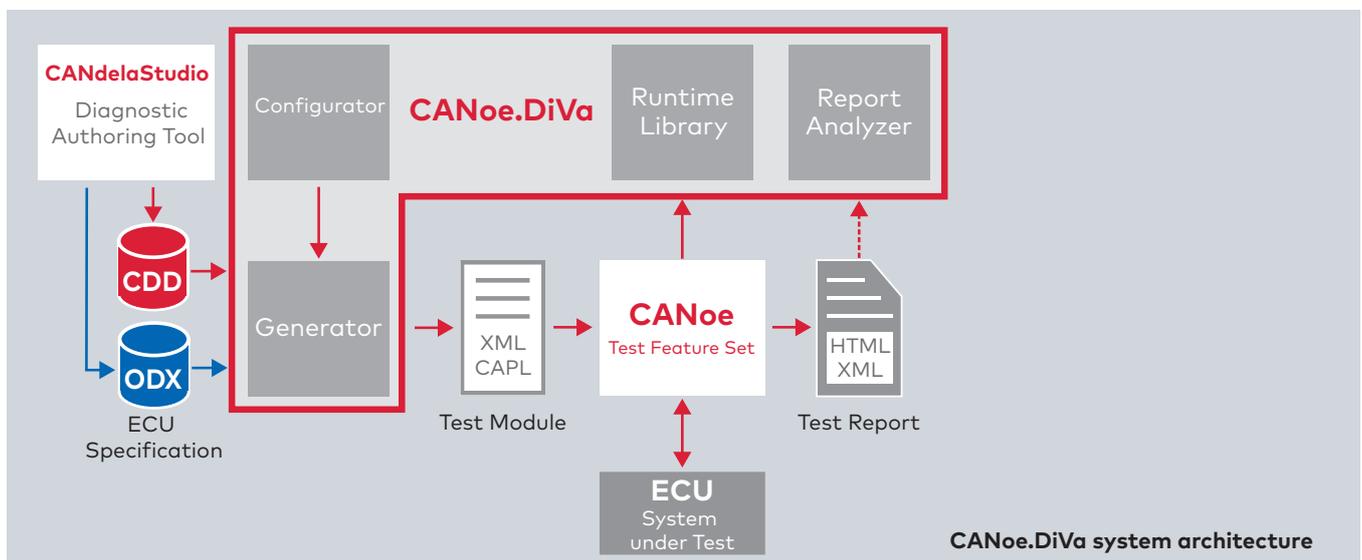
Only with the help of test automation, it is possible to secure the extensive diagnostic interfaces of ECUs. CANoe.DiVa contributes a large part to this: The system supplier needs extensive tests to support development as well as regression and release tests. Automotive OEMs also need systematic tests, especially in integration and release on the vehicle level.

CANoe.DiVa is designed to be used by automotive OEMs and suppliers. CANoe.DiVa is not tailored to a specific automotive OEM, but it allows OEM specific adaptations and extensions by configuration and/or plug-ins.

Supported Bus Systems/Diagnostic Standards/Protocols

- > CAN/CAN FD, FlexRay, DoIP, LIN, etc.
- > ISO 14229 (UDS): 2006/2013, ISO 15765 (Diagnostics on CAN), ISO 14230 (KWP 2000), ISO 15031/ J1979 (OBDII), ISO 27145 (WWH-OBD)
- > GMW 3110
- > Specific test support for numerous automotive OEMs

More information: www.vector.com/diva



CANoe.DiVa system architecture