**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.

**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 Diagnostic Sequences
With CANoe.DiVA you can test ECU-specific diagnostic sequences in freely selectable system states (e.g. ignition on/off). Any diagnostic sequences from applications based on the ISO D-PDU API are supported - and of course all sequences defined in VDS (Vector Diagnostic Scripting).
> Continuous testing of diagnostic sequences and (D-PDU API) diagnostic systems within the CANoe test environment using CANoe’s environment stimulation capabilities.
> Evaluation and documentation of outputs of diagnostic sequences in the test report.
> Checking of used diagnostic services against diagnostic specification: e.g. timing behavior, format, data contents.
> Simple and fast setup of self-defined diagnostic sequences in VDS, e.g. via the CANoe Macro Recorder. Self-generated VDS scripts or sequences can also be used easily.

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 ECU flash programming in conjunction with vFlash and D-PDU based diagnostic testers. CANoe.DiVa can generate tests for the bootloader supported by vFlash.
> 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
> Automated control of CANoe.DiVa for integration into an existing build and test environment (e.g. Jenkins or Subversion)

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

Highlights of Version 15
Test of Diagnostic Sequences with VDS
> Test of ECU-specific diagnostic sequences in VDS (C# with Vector Diagnostic Assembly).
> Easy recording of diagnostic sequences without programming knowledge via CANoe Macro Recorder and verification within a CANoe.DiVa test.
> Textual output of the sequences also appear in the test report - with evaluation pass/fail.

Advantages:
> Automated, early and continuous testing of whether a specific diagnostic sequence is handled by the ECU as expected - to ensure the sequence interacts with the ECU software.
> Familiar CANoe and CANoe.DiVa functions are available, such as:
> Stimulation of the ECU environment
> Documentation, analysis and post-processing of test results
> Automation of test execution

Further Optimizations
> CANoe 64-bit runtime support
> Revised graphical user interface
> Reduced memory consumption during test execution
> New and revised manufacturer-specific test extensions

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 adaptions and extensions by configuration and/or plug-ins.

Supported Bus Systems/Diagnostic Standards/Protocols
> CAN/CAN FD, FlexRay, DoIP, LIN, etc.
> ISO 14229 (UDS): 2006/2013/2020, ISO 15765 (Diagno-
> stics 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