

Efficient and Reproducible Validation for FlexRay Networks



TTX Disturbance Node – The Disturbance Injection Device for FlexRay

Testing the Robustness of FlexRay Networks and Physical Layers

Controlled fault injection is a cost-saving way to test and validate FlexRay™ systems. TTX Disturbance Node provides all necessary means to inject realistic network disturbances into a FlexRay-based system, whether simple, single upsets or complex fault scenarios. It allows developers and test engineers to examine the robustness of the FlexRay network as well as the effects of network faults on system behavior and fault handling capabilities of the system.

Programmable XML-based Tool

TTX Disturbance Node provides the user with a powerful, fully programmable XML-based tool for establishing completely reproducible fault scenarios for distributed systems. The second-generation of TTX Disturbance Node allows injecting faults on the entire network under test, or to split the network and inject faults only in the communication nodes that are under test. Using XML-based fault scenario definitions, TTX Disturbance Node provides the capability to design and perform complex, repeatable fault injection scenarios, making it the most versatile device for stressing FlexRay networks. Various classes of faults are supported, thus allowing analysis of system behavior at the physical, logical, and application layers.

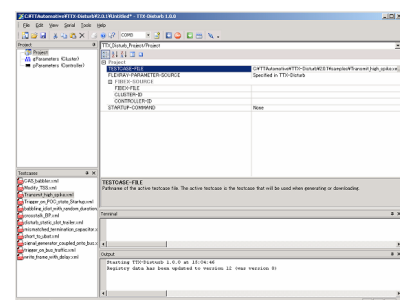
TTX Disturbance Node provides enhanced trigger possibilities, modification of timing behavior of the FlexRay network, and generation of valid and invalid frames. It can be used effectively to test the stability and marginal behavior of the physical layer configuration.

Test Scenarios for System Reliability Testing

TTX Disturbance Node test scenarios cover exceptional situations, which are not covered by test scenarios during normal operation. By injecting faults, it enables the construction of unusual operation scenarios and the detection of weaknesses in the reliability of the system.

Configuration with Graphical User Interface

The TTX Disturbance Node features TTX Disturb a graphical user interface for configuration and control. The device supports import of configuration requirements from a FIBEX file as well as manual configuration. Aside from download of specific test cases to the TTX Disturbance Node, TTX Disturb allows management of several test case files. The tool can be used in batch mode operation for test automation. Supported operating systems are Windows 2000 and XP.



Hardware

- Examination of the application behavior in the presence of disturbances
- TTX-Disturbance Node is invisible to the network unless activated
- Physical layer tests: mismatched termination and short-circuit
- XML environment for setting up reproducible fault injection campaigns
- Analysis of disturbance effects on signal shape (using oscilloscope)
- Support of several bit rates (2.5, 5 and 10 Mbit/s)

Interfaces

- FlexRay interface based on the FlexRay communication controller Freescale MFR4310
- Disturbances on one or two channels
- RS232 interface for download of configuration data and disturbance setup
- RS232 to USB converter provided
- BNC socket for trigger input and trigger output and power supply
- Real-time connection to any oscilloscope via external trigger line for parallel physical- and protocol analysis

Specifications

- Dimensions (mm): 172 x 172 x 55
- Weight: 924 g
- Operating temperature: 10°C to +50°C
- Storage temperature: -40°C to +85°C
- Robust housing
- Power requirements: input voltage 9 to 60 V DC at max. 15 W and max. 2 A

Trigger Conditions

- Triggers for external hardware (oscilloscope, signal generator, HF burst generator) to disturb arbitrary or specific transmissions with any kind of custom signal/burst
- Selectable disturbance triggers:
 - Synchronized to FlexRay
 - External trigger input
 - Asynchronous/strictly periodic
 - Pseudo-random (reproducible)
- Trigger on wake-up pattern, start-up, bus idle, POC state, and bit pattern

Configurable Disturbances

- User-configured disturbances – single, multiple, periodic, intermittent, permanent
- Disturbance of one or both FlexRay channels simultaneously
- “Bus break” feature: separate a bus into two groups to force effect of dual cable break
- Short-circuit and open-circuit faults on differential lines
- Mismatched termination
- Specific enforcement of bus to “high” or “low” with a strong driver
- Sending of predefined constant test frames in any empty time slot
- Sending of manipulated constant test frames, e.g. wrong header CRC
- Input trigger for event-triggered disturbances
- Frame manipulation of TSS, FSS, FES, BSS and DTS patterns
- Suppression or delay of frames
- Modification of individual frame bits with optional recalculation of header and frame CRC
- Bus separation mode to disturb the start-up and time properties (e.g. delay of start-up frames)

For further information, including price and availability, contact products@tttech-automotive.com

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