FRstress

The unique Stress Module for FlexRay

For testing and validating FlexRay systems there is a need for greater precision in studying a system' s behavior in response to errors and disturbances. FRstress generates reproducible disturbances on a channel in the FlexRay cluster. It can generate protocol errors as well as disturbances in bus physics that are activated by trigger conditions. This gives the developer and tester a high-performance stress module.

Functions and Advantages

FRstress is an easy-to-use hardware module whose integration in the system differs depending on the desired disturbance. For asynchronous disturbances and physical modifications of the bus line FRstress is connected as an additional network node. For bit-precise disturbances, on the other hand, FRstress is introduced directly into the bus line. A third mode just activates the trigger logic with high-impedance termination to drive external devices.

Functions

FRstress offers numerous functions such as:

- Generation of asynchronous and synchronous disturbance sequences
- Modification of individual frame bits including CRC recalculation (e.g. Sync flag)
- Switch-in RC network with adjustable resistances and an adjustable capacitor
- Switchable connections between the bus lines, to ground and to supply voltage
- Trigger logic to detect different positions in the FlexRay frame (including Header, Payload, etc.)
- 4 parallel trigger conditions and associated disturbance sequences
- Configuration via FIBEX databases
- Trigger output to drive external devices such as an oscilloscope or signal generator
- Synchronization capability for parallel operation of two FRstress modules to disturb both FlexRay channels

Application Areas

FRstress is the ideal tool for testing disturbance handling in FlexRay systems and nodes. It enables reproducible simulation of line problems. The following tasks can be implemented:

- Synchronous manipulation of bit fields of FlexRay frames (including Sync flag, FrameId, payload, frame trailer) with immediate CRC recalculation
- Disturbance of specific ECUs
- Simulation of slowly evolving failures
- Simulation of additional line lengths
- Tolerance analyses by delayed transmission between one node and the rest of the network.

Mode of Operation

A trigger condition is assigned to each disturbance sequence. In its quiescent state FRstress observes the FlexRay bus. As soon as a trigger condition is detected, the associated disturbance sequence is activated. This is a sequence of disturbance pulses on the bit

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Training

As part of our training program we offer a professional FlexRay training course at our classrooms in Stuttgart as well as at our customers' sites.
For information on Vectors FlexRay solutions go to:
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level. Each pulse can force a high or a low level on the bus or leave the bus undisturbed.
The four trigger/disturbance sequences work in parallel, so they can be used to set up complex test scenarios.

Trigger Condition

A trigger can be described flexibly by individual bits (0, 1 or ignore bit value). The following conditions are possible:

> Triggering on FlexRay frame elements (Header, payload trailer)
> Triggering on frame coding elements (BSS, FES)
> Manual triggering via the FRstress software
> External trigger: Voltage signal at trigger input (TTL level)

Disturbance

Depending on the FRstress operating mode, the system may be disturbed in different ways:

> The disturbance is put on the FlexRay bus as an asynchronous sequence.
> The disturbance sequence modifies elements of a FlexRay frame with bit precision. The result of the disturbance is visualized for a sub-segment.
> The number of repetitions can be set for a disturbance sequence.

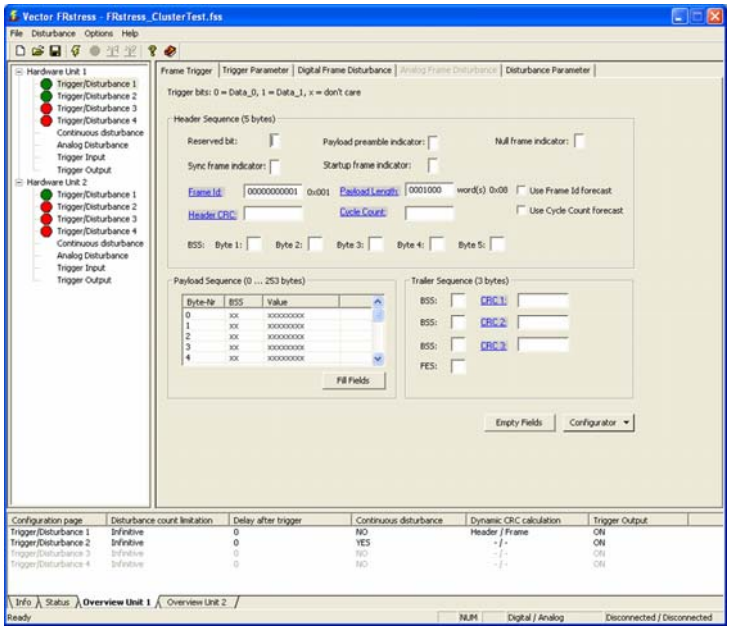
User Interface

FRstress is configured and controlled by a user-friendly Windows-based operating program. The user sets FlexRay parameters, trigger sources, disturbance sequences and for analog disturbances the values of line resistors and the capacitor. The FIBEX database is used to configure the trigger conditions.
The Windows-supported interface for program communication (Microsoft COM) enables, among other things:

> Control of the measurement flow by external applications,
> Automation of recurring test sequences.

Technical Data

FlexRay channels	1 disturbance module per FlexRay channel, synchronized operation with 2 modules
Resistance range	0 Ω..2.558 kΩ in 1.25 Ω steps
Capacitor	0 pF..3150 pF in 50 pF steps
Triggering	External, manual or on trigger conditions
Maximum disturbance sequence	4095 bits
Module configuration	USB
Ports	FlexRay in/out, trigger input & output Sync input, voltage supply
Supply voltage	8 V..40 V DC (5-pin connector)
Disturbance voltage range	0 V..40 V
Temperature range	-10°C..75°C
Dimensions	151 x 168 x 53 mm, aluminum



Trigger configuration with the FRstress configuration program

Included with Delivery

> FRstress module
> Configuration software for Windows 2000/XP
> Cable set and power pack