Nonreactive transparency of the CAN Interface

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Abstract

CAN Interface

imc device series, like the imc CRONOS*compact*, imc CRONOS*flex*, imc C-SERIES, imc BUSDAQ and others, are offered with CAN interfaces as an additional option or also as a standard feature. When hooking up to CAN communication busses in vehicles or plants, where additional CAN units are involved, it is often important to guarantee, that the CAN interface remains neutral with respect to existing CAN communication.

Switching off an imc device

This is important, particularly in the case when the imc device is connected to the bus but switched off. Under the assumption that the device doesn't have any irregular defects, it is guaranteed under these conditions that the existing bus communication between the other (still active) units is not disturbed.

Reactionless transparency during "passive monitoring" with an active imc device

In a reverse scenario, it is the task of an active imc device to perform "passive monitoring" of the bus communication without affecting the traffic in any way. In this case, the acknowledgment mechanism of the CAN bus plays a role, which is controlled by the "Acknowledge" bit (ACK). This procedure can be explicitly enabled or disabled in the imc CAN interface via software.

Generally, with default settings, any message correctly received by an imc CAN interface is to be acknowledged with ACK. This is usually the desired behavior, even for a passive monitoring device. However, while consequently even a listening device is interacting with the bus traffic, this could potentially affect processes like other devices transitioning to power-savings or "sleep modes". For example, a master control unit (ECU) might be programmed to enter sleep mode as soon as it detects no other active nodes on the bus. Such monitoring with active acknowledgment would then be considered as bus activity – impeding the master to enter idle state.

This could require the passive monitoring device to explicitly suppress acknowledgment in order to be considered truly nonreactive. imc devices allow such settings. They can be flexibly changed through software settings in the device configuration ("experiment") – and not just as a fixed hardware variant!

Technical details

CAN Transceiver

The applied CAN transceivers driving the signals on the bus have high impedance when power is off, thus leaving the bus unaffected. Impact of additional ESD suppression components (depending on product type and version) as well as the Sleep / wake-up detection is independent of power state. Interaction would only occur in case of hardware faults.

Termination

Please note the configurable internal termination resistor of the imc CAN interface. With the device off, the termination is always inactive (high impedance). When the device is on, the software configuration determines whether the termination is active.

Isolation

To ensure maximum robustness during active operation, all imc devices generally connect to the CAN bus via a galvanically isolated interface. This means that the bus transceivers are operated from an isolated and independent supply and can therefor freely adapt to arbitrary existing electrical conditions and potentials of the bus – being thus completely nonreactive with respect to signal integrity.

Acknowledge

Usually, CAN messages sent from a master, are acknowledged when properly received (Check Sum) by every receiving slave by setting the ACK bits on the bus. After preparation of the device, the CAN interface is activated and executes acknowledgments, even when not performing running measurements.

While this is typically the desired default setting, it can be changed by using the CAN Assistant, so that acknowledgment by the imc CAN interface is suppressed. This setting only allows read-only operation. Such completely passive and reactionless monitoring clients are then no longer detected by a sending master.

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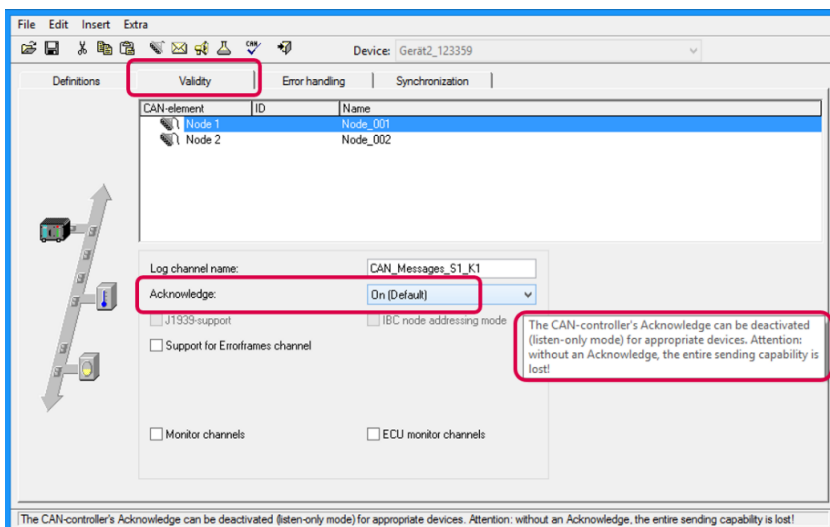
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