

## CAN FD demonstrator and CAN FD products

At the Embedded World exhibition in Nuremberg (Germany) Bosch presented its CAN FD demonstrator, which integrates micro-controllers with CAN FD modules from Freescale and ST-Microelectronics. Toolmakers and suppliers of interface boards also announced CAN FD support.

WHILE THE INTERNET OF THINGS (IoT) was the dominantly advertised topic on the largest fair for embedded electronics, other interesting technologies were presented as well. One of them was CAN FD. The improved CAN protocol, known as CAN with flexible data-rate (FD), was demonstrated at Bosch's small booth. A couple of other companies also presented CAN FD products. Documentation and detailed information was often only available under-the-counter or verbally.

Bosch's demonstrator was impressive. Face-lifted from last year, it had a length of about 70 m with mixed topologies. Besides the bus-line it comprised a passive star similar to the one used in Mercedes cars. The CAN FD network runs at a 500-kbit/s arbitration bit-rate. In the data-phase, the speed was increased to 4 Mbit/s. Of course, this was under laboratory conditions, meaning about 20 °C. The demonstrator also integrated two evaluation boards jointly developed by Freescale and ST-Microelectronics.

The boards were equipped with the MPC5777M by Freescale respectively with the SPC57 K line by ST-Microelectronics. Both micro-controllers use the MCAN core from Bosch. The current MCAN version allows a general switching from transmitting classical CAN frames, CAN FD frames with up to 8 byte, or frames with a length of up to 64 byte. The next version of the IP core will support a message-wise decision, if the frame is send classically or with a flexible data-rate.

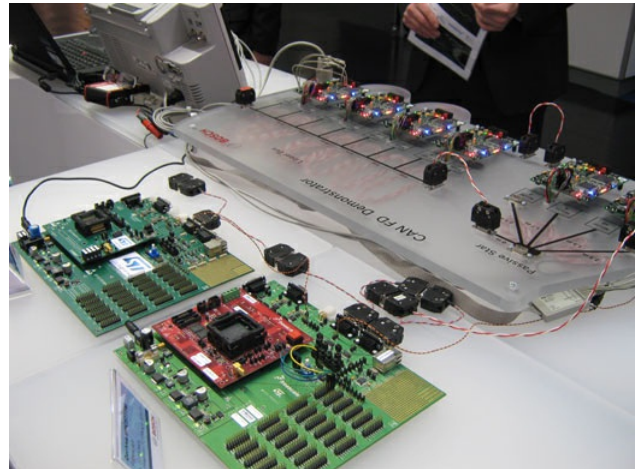
The SPC57 micro-controller features two CAN FD ports plus one TTCAN interface, which also supports CAN FD. The product complies with ASIL-d and is designed for engine control applications. It also comprises the Generic Timer Module by Bosch optimized for powertrain solutions minimizing CPU load. The MCU comes in a 144-pin or 176-pin QFP housing. The MPC5777M runs at 200 MHz and provides up to four CAN FD ports. Additionally, it is equipped with a TTCAN module, which is also CAN FD capable. It could be used as a sub-network to synchronize two or more electrical motors in an e-vehicle. The TTCAN protocol is standardized in ISO 11898-4. The MCU designed for engine control and other powertrain applications including transmission control complies with the ISO 26262 and IEC 61508 functional safety standards.

Renesas and Microchip also have CAN FD implementations in the pipeline. The Japanese chipmaker already has samples of an MCU implementing the MCAN by Bosch. Later this year, evaluation boards will be available. The company also develops its own CAN FD core. Products using this core will be announced at the end of this year. These MCUs from Renesas are designed for body control applications. Microchip is going to introduce a CAN FD stand-alone controller featuring the IP core by Kvaser (Sweden). First samples will be available soon. Also Spansion is implementing CAN FD based on the Bosch core in its micro-controllers. First samples are expected in late spring or early summer. Non-automotive users are still waiting for ARM-based micro-controllers with CAN FD support such as the STM32 series by STMicroelectronics or the LPC series by NXP.

### Tools and interface boards

The toolmakers and interface board providers are ready for CAN FD. Etas, Intrepid, and Vector have already updated their bus analyzers to support the improved CAN protocol. Schleißeimer will also provide a CAN FD update as well as the support for higher-layer protocols such as CANopen and J1939.

Peak exhibited PC interface boards using the self-developed CAN FD core. Ixxat also demonstrated CAN FD interface products featuring CAN FD connectivity. These products use the IniCAN core from Inicore (USA). Interpid showed first prototypes of its ValueCAN FD modules using the MCAN-based FPGA by Bosch. Vector also uses FPGAs in its CAN FD capable PC interfaces.



The CAN FD demonstrator comprises several CAN FD prototype boards based on the FPGA by Bosch and two evaluation boards by Freescale and ST-Microelectronics (Photo: CiA)



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