Modular train communication system

Companies
Sys Tec Electronic GmbH
Railtec Systems GmbH

Links
www.systec-electronic.com
www.railtec-systems.ch

With introducing more multimedia services for customers and passengers in the transportation sector, demands on communication systems in trains are increasing, while the space available for electronics is often limited. To satisfy the need for performance in demanding applications and to close the gap to the ix86 platforms, SYS TEC Electronic (Germany) recently developed a 19-inch rack mountable communication platform.

The system was optimized for use in rolling stock applications and comprises a CPU module, backplane, power supply module as well as an I/O module. The system is compliant with EN 50155 Class Tx and allows for operation at temperatures from -40 °C to +70 °C without the need
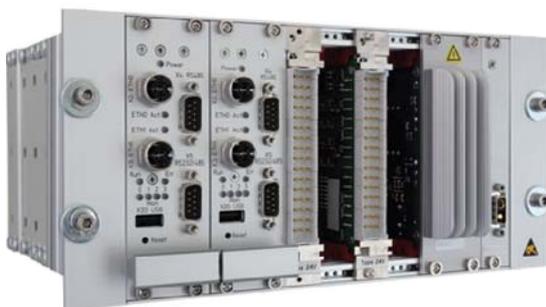

Figure 1: CPU module
(Source: Railtec Systems)

Figure 2: Train communication system
(Source: Railtec Systems)

for active cooling. Besides the electronic design, heat management issues turned out to be challenging. Dedicated heat spreading and heat sinking concepts were developed and implemented to allow for a safe operation within the specified operating conditions.

The CPU module is based on an on-module ECU core E660 system with a 1,3-GHz Intel Atom E660T MCU and a Linux board support package. It features a CAN port, two Gigabit Ethernet ports, two EIA-485/EIA-422 ports, EIA-232 as well as USB. The complementary middleware are CANopen protocol stack source code and Ethernet Powerlink protocol stack source code.

The module provides a basic memory configuration of 4 GiB on-board SSD and up to 2 GiB of DDR2-800 SDRAM. A separate on-board system diagnostics controller on the ECU core performs essential monitoring tasks, such as temperature surveillance and power-on management to ensure recovery from critical states, performs continuous supply voltage monitoring and provides a secondary watchdog timer.

The I/O Module provides eight digital inputs, two fast counter inputs, eight digital outputs and two analog inputs. The digital input and output channels support an input voltage range from 24 VDC to 110 VDC including user-configurable filtering options, reverse polarity and overload protection. The analog input channels support input signals types from ±10 V, ±20 mA, 0 V_{DC} to 10 V_{DC} and 0 mA to 20 mA.

The power supply module supports an input voltage range of 24 V_{DC} to 110 V_{DC}. It provides VME-bus compliant voltage levels of 5 V_{DC} and 12 V_{DC} with up to 100 W output power to the backplane. VME-bus compliant signals as well as system-specific power fail event information are provided to the CPU module.

Although the developed modules can work with standard VME32 backplanes, their best performance is revealed with the Backplane that was developed specifically for this train communication system. It provides optimized heat-spreading and heat transfer characteristics and allows for use of standard VME power supply units.

The company designed the presented modules for Railtec Systems (Switzerland). The serial production is scheduled at manufacturer's production facility in Reichenbach (Germany). The firm offers automation solutions based on the IEC 61131-3, CAN, CANopen and Ethernet Powerlink.   *Olga Fischer*