

Railways & Transport Application

Automated Train Operation Control

- ESM™ EM4N
- Embedded System Module
- PowerPC® MPC8245
- 2 Fast Ethernet, 2 COMs
- Graphics, CAN bus etc. in on-board FP
- -40 to +85°C operation temperature
- Conformal coating
- 6U VMEbus custom carrier boards for
- Custom IP cores implemented on EM4
- ELinOS Embedded Linux



Driverless underground systems are becoming more and more important in public mass transport from an economical and organizational point of view. The demand for adequate mass transport solutions is rapidly increasing, especially in the growing markets in Asia, like China or India. But new underground lines in Europe are also being more and more often operated by new driverless trains. Besides the safe and quick transport of thousands of people with trains that stop at the station precise to the centimeter without interaction of a driver, driverless trains can also be optimized in speed and energy consumption.

In this application a 6U VMEbus system is the basis for the automated train control. The computing core is an ESM™ Embedded System Module powered by an MPC8245 running at 300MHz clock frequency. Two Fast Ethernets and two COMs are already implemented on the ESM™. All other I/O connectivity is realized on an ESM™ carrier board in 6U VMEbus format that has been developed by the customer himself. The additional functionality is implemented by means of IP cores in the FPGA which is located on the ESM™ module. The SRAM controller which is for example implemented in the FPGA transfers data between the ESM™ module and the VMEbus carrier board.

ESM™ Embedded System Modules are complete computers on a plug-on module. They consist of the hardware (CPU, chip set, memory, I/O) which is not fixed to any application-specific function, and an FPGA programmed in VHDL code, which provides I/O that is also still independent of a specific application. ESM™ modules are based on PCI. They have two system connectors: J1 has a fixed signal assignment, while J2 is variable depending on the final application-specific configuration of the ESM™ and the carrier board. J2 also feeds the I/O signals of the functions programmed in the FPGA to the carrier card.