

The Embedded Monitoring Processor of the ATLAS DCS EMCI-EMP interface



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EMCI-EMP Interface

The EMCI-EMP interface is a component of the ATLAS detector control system, which consists of the Embedded Monitoring and Control Interface (EMCI) and the Embedded Monitoring Processor (EMP).

EMCI:

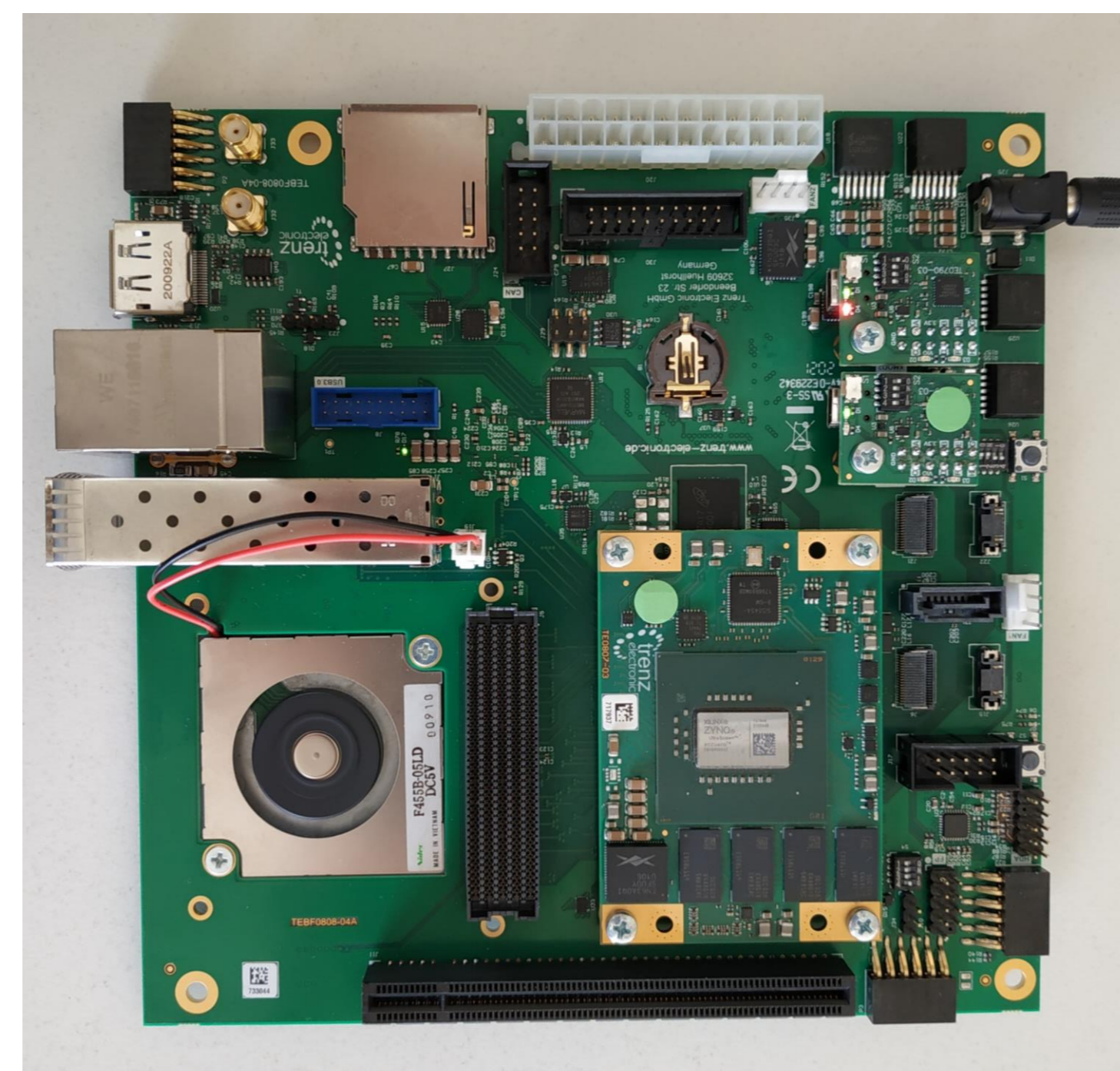
- Front-end
- Radiation hard
- Transmission to EMP via optical links

EMP:

- Back-end
- Radiation soft
- Optical connections to multiple EMCI



EMCI



EMP

Xilinx Tools

Xilinx offers a suite of software tools for Hardware Design (Vivado) and Software Design (Vitis), tailored for products like the Zynq UltraScale+ MPSoCs.

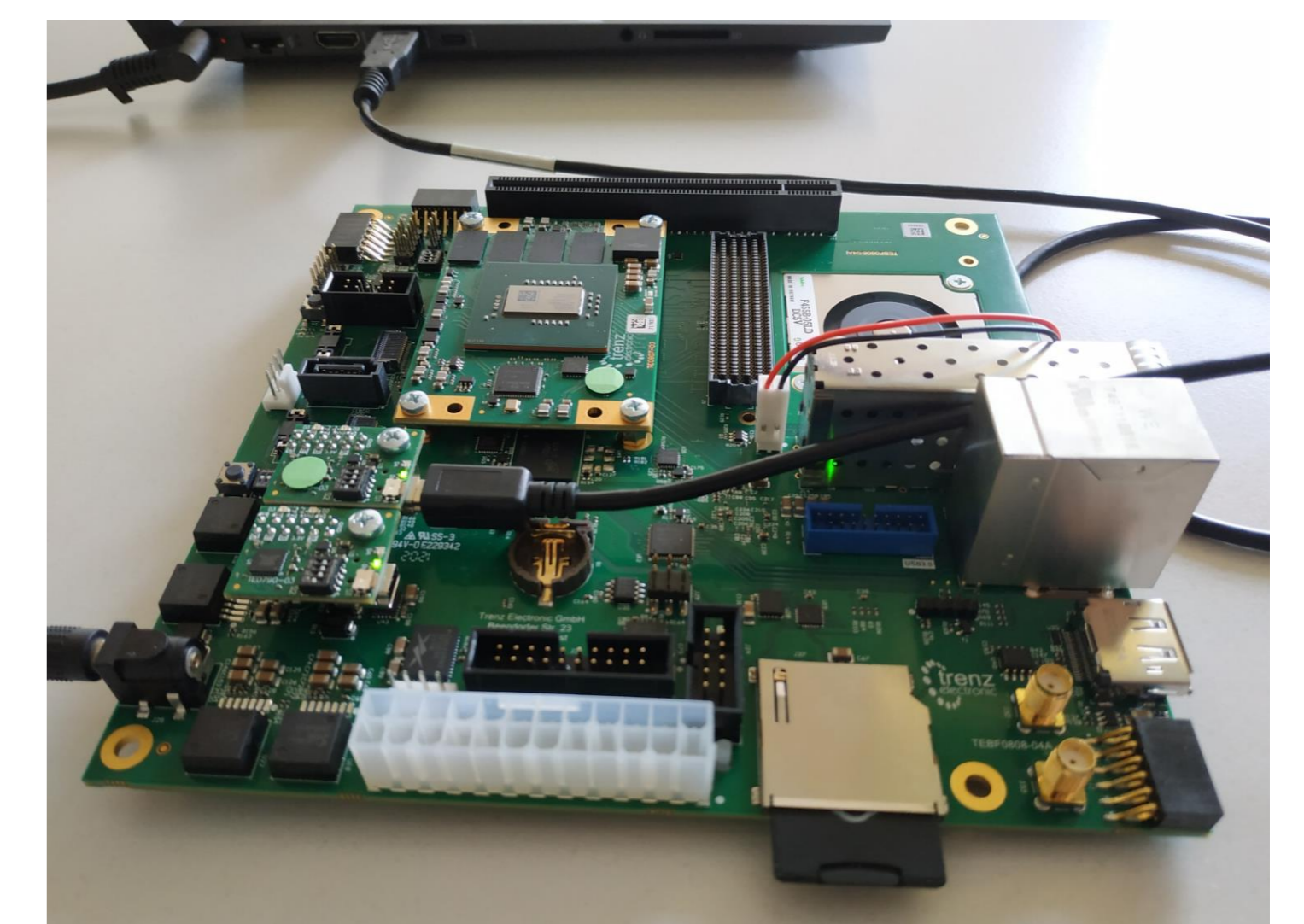
Petalinux: Petalinux is a tool to create and deploy a Linux OS on the Zynq device. It generates the bootloader, Linux kernel and file system.



SD Boot

Once the Linux bootloader, image and filesystem have been created, the EMP can be booted easily via an SD card, which contains the bootloader and image.

NFS: The filesystem can be stored on a remote server and be accessed by the device through the network (Network File System), so that changes can be easily carried out.



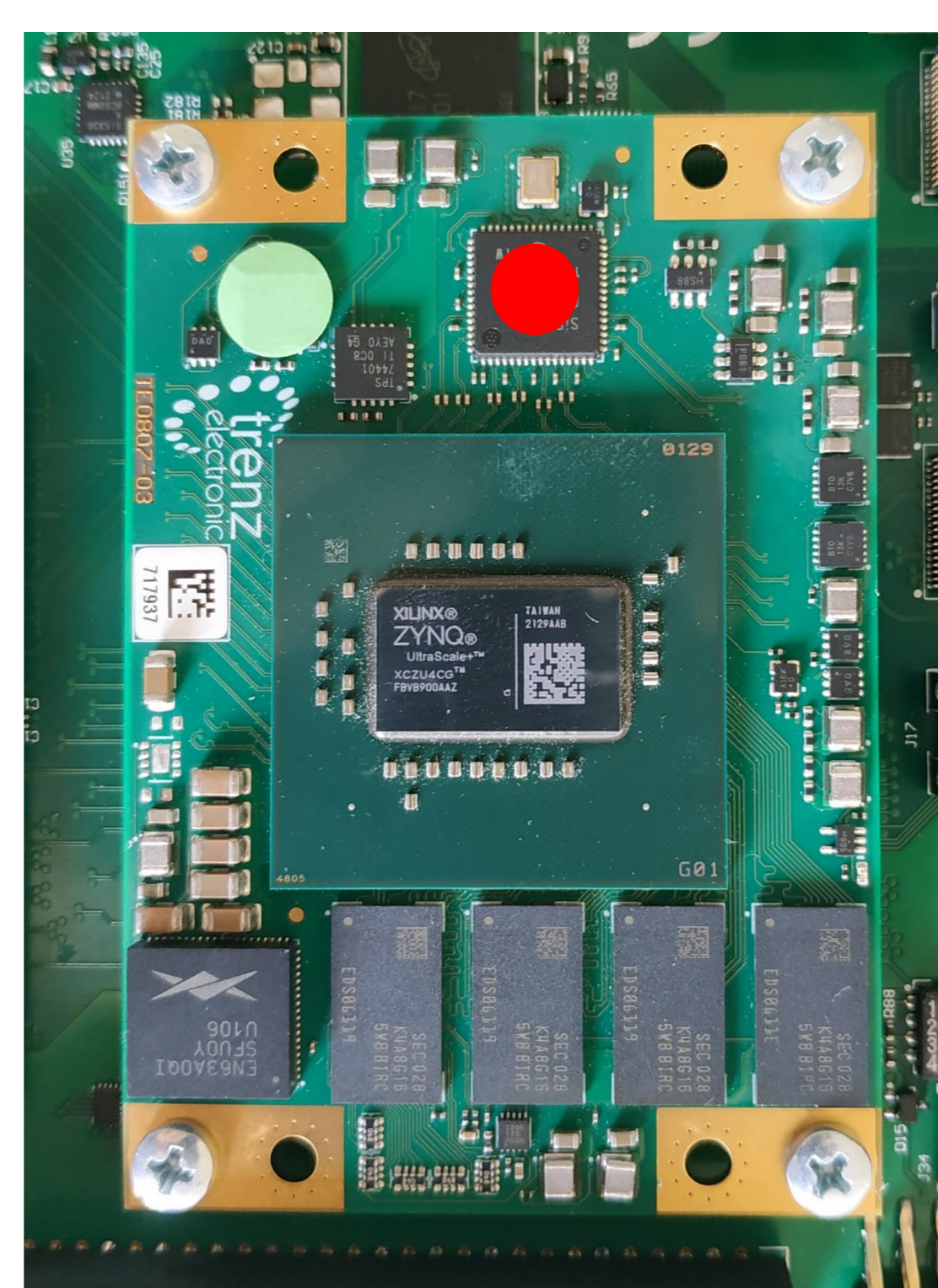
SD Boot

Embedded Monitoring Processor

The EMP consists of a Trenz TE0807 MPSoC module, fitted on a Trenz TEBF0808 carrier board.

Xilinx Zynq UltraScale+

- Processing System (CPU)
- Programmable Logic (FPGA)
- 4 GB DDR4, 512MB Flash
- SD Boot
- 12V or 5V power supply
- USB, Ethernet, UART



MPSoC Module

I2C Control of Clock Generator Chip

The aim of the project is to develop a piece of software to control the clock chip of the device via the I2C bus.

Programmable Clock Generator:

- Located on the SoM (●)
- Controlled via its I2C control interface pins, which are connected to the carrier board

I2C:

- Serial Communication Protocol
- Allows communication between components on the same IC
- Synchronous
- 8-bit data frame
- Master – slave hierarchy

