

DMMC-Software-Development-Kit

VERSION 2.0

Highlights

- **DESY MMC API to reduce custom firmware development to a minimum**
- **Platform-independent environment with support for continuous integration**
- **Simple bring-up procedures without programming adapters**
- **Telemetry and remote debugging by using the feature set of the DMMC-STAMP SoM**
- **Maintained by DESY**

Features

Straight-forward firmware development: CMake based, VSCode® integrated and CI build via Docker®

High-level API for board-specific customization

Serial-over-IPMB (remote access of FPGA/SoC console)

Control of up to two FMC modules

Custom IPMI commands

Support of additional sensors

User FPGA/SoC in-system-update via HPM.1

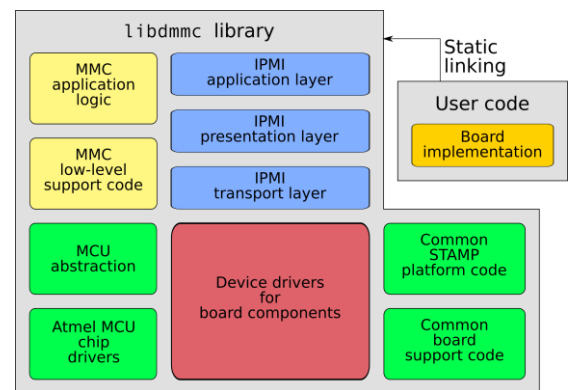
DC/DC converter control

Complete AMC power management via PMBUS™

MTCA system information forwarding to user-FPGA/SoC

User-specific DMMC-STAMP SoM GPIO pin control

Example implementations for several AMCs available (e.g. DAMC-FMC2ZUP)



The DESY MMC Software Development Kit (DMMC-SDK) is the base for a hardware specific MMC firmware development for the DMMC-STAMP SoM. To extend the pre-programmed default firmware the DMMC-SDK keeps the needed adaptations easy and reduces the coding effort to a minimum.

Using the DESY MMC Libraries within a custom firmware enables the whole set of hardware features of the DMMC-STAMP. Useful features like I2C sensor readout via IPMI (e.g. temperatures or AMC/RTM power status signals) and remote debugging functions become available out-of-the-box. User programmable on-board components like FPGAs, SoC or CPLDs can be upgraded in-application without connecting any external programmers.

The DMMC-SDK provides a clear separation between the DESY MMC Library and users hardware specific implementations. This means that firmware porting to newly developed boards is possible with minimal effort. The DMMC-SDK comes with a specified build environment using Docker®. It is CMake based, VS Code® integrated and supports CI build without using any third-party development tools. Provided with the DMMC-SDK are example applications for the latest DESY AMC MMC implementations.

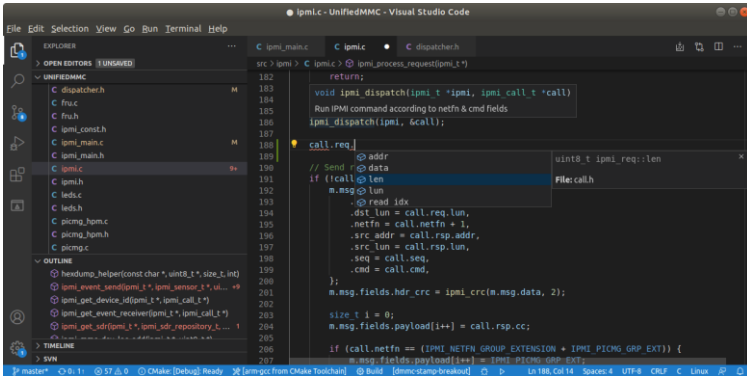


Figure 1: Visual Studio Code integration



Figure 2: DMMC-STAMP SoM Breakout Board

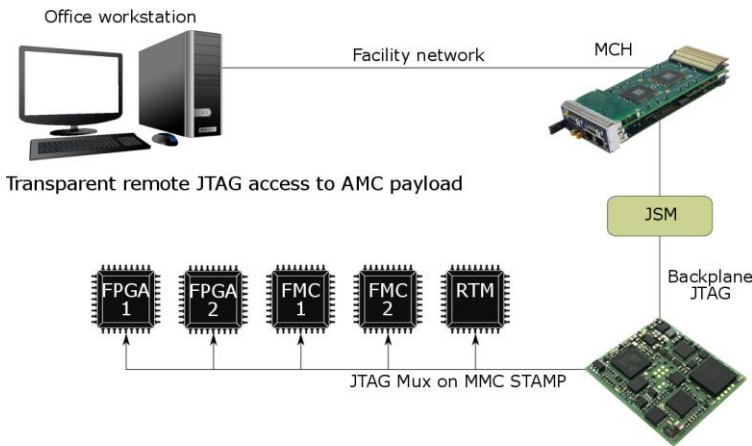


Figure 3: Remote debugging using the MicroTCA infrastructure

```
$ ipmitool -H MCH100191.tech.lab -P "" -B
AMC Hot Swap          0x00      ok
049162C0F354         0x00      ok
STAMP Temp            28 degrees C  ok
AMC MP 3V3            3.41 Volts   ok
AMC PP 12V            12.68 Volts  ok
ADC0                   0.03 Volts   ok
ADC1                   0.08 Volts   ok
ADC2                   0.03 Volts   ok
I_RT1 MP 3V3          0.01 Amps    ok
I_RT1 PP 12V          0.01 Amps    ok
CPLD Done             0xff        ok
RTM MP 3V3 PG         0x00        ok
RTM PP 12V PG         0x00        ok
RTM Fault             0x00        ok
PGood_A               0xff        ok
PGood_B               0xff        ok
FPGA1 Init            0x00        ok
FPGA1 Done            0x00        ok
FPGA2 Init            0x00        ok
FPGA2 Done            0x00        ok
Inlet Temp            34 degrees C  ok
Outlet Temp           31.50 degrees C ok
DC/DC1 1V2           34.50 degrees C ok
DC/DC2 Core           34 degrees C  ok
```

Figure 4: IPMI sensor readout

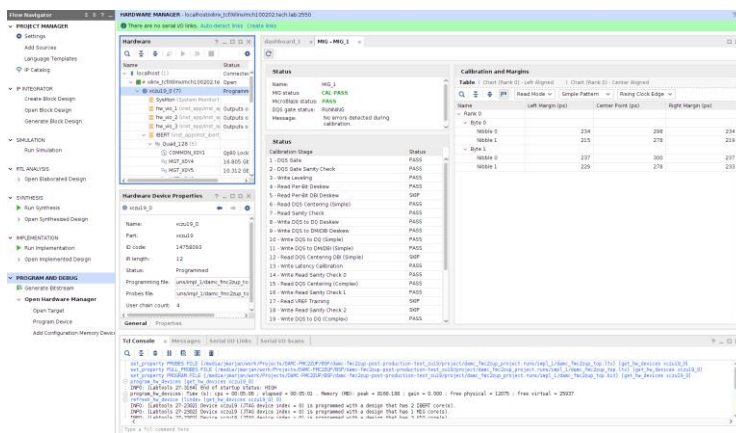


Figure 5: In-application debugging using the Xilinx Vivado™ tools

