

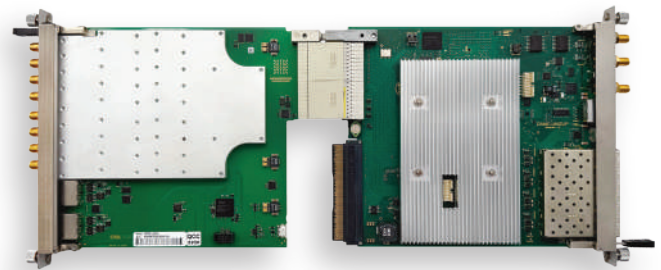
DAMC-UNIZUP

A High-Performance Universal AMC Board for MTCA.4 Systems

The DAMC-UNIZUP is a versatile, high-performance MTCA.4 AMC board based on AMD Zynq Ultrascale+ MPSoC, with the emphasis on the RTM I/O connectivity. The board was designed by DESY and industrialized by Instrumentation Technologies, ensuring seamless integration and cost-efficient deployment in large-scale applications. Initially developed for RT-focused applications such as the PETRA IV Beam Position Monitor (BPM) system, the DAMC-UNIZUP serves as a flexible platform capable of hosting data processing logic for a variety of applications, either receiving/sending digital data through the SFP+ slots, or from/to an RTM digitizer with direct MPSoC/PL interface over the Zone 3 connector.



Front panel of the DAMC-UNIZUP



DAMC-UNIZUP module (on the right) connected to the BPM RTM (Libera 2BPMRTM) card on the left

Technical Specifications	
Category	Details
MPSoC Options	AMD Zynq UltraScale+ XCZU7EG or XCZU11EG
CPU	Dual/Quad-Core ARM Cortex-A53, 1.2 up to 1.5 GHz*
Memory	4 GB DDR4 (PS) at 2400 MT/s + 4 GB DDR4 (PL) at 2666 MT/s*
PCIe	Gen 3 x4 or Gen3 x8 support, depending on RTM class configuration
Connectivity	4x SFP+ (12.5/16.375 Gbps), USB Type-C DisplayPort, USB 3.0, IX trigger and interlock connectors
Clocking	Flexible clocking with backplane (TCLK) and front-panel clock I/O, 2 PLLs and White Rabbit receiver support
Trigger Inputs	4x fast trigger differential inputs (LVDS, IX Type A) and 4x slow trigger inputs (RS-485, IX Type B) on the front panel
Storage	SD 3.0 (UHS) card slot (front panel) and 8 GB eMMC
Compliance	MTCA.4.1 D1.2/D1.3, full M-LVDS and DESY interlock support
Supported Tools	AMD Vivado, Petalinux, Yocto, SDSoC, and more
RTM class	D1.2 or D1.3 configuration support (assembly option)
Debug	Support for JSM via backplane, dual USB command line (front panel) and Serial-over-IPMI support

Applications

The DAMC-UNIZUP will be used for the BPM electronics of the PETRA IV project, where the signals from the BPM sensor are acquired and digitized by an RTM digitizing module (Libera 2BPMRTM), and passed to the DAMC-UNIZUP through the Zone 3 connector.

This makes the DAMC-UNIZUP a perfect AMC candidate for multi-channel signal processing applications like Beam Position Monitoring, where the RTM card is used to capture and digitize the analog signals, and the AMC is used to perform all the FPGA processing and to provide all the required SW interfaces.

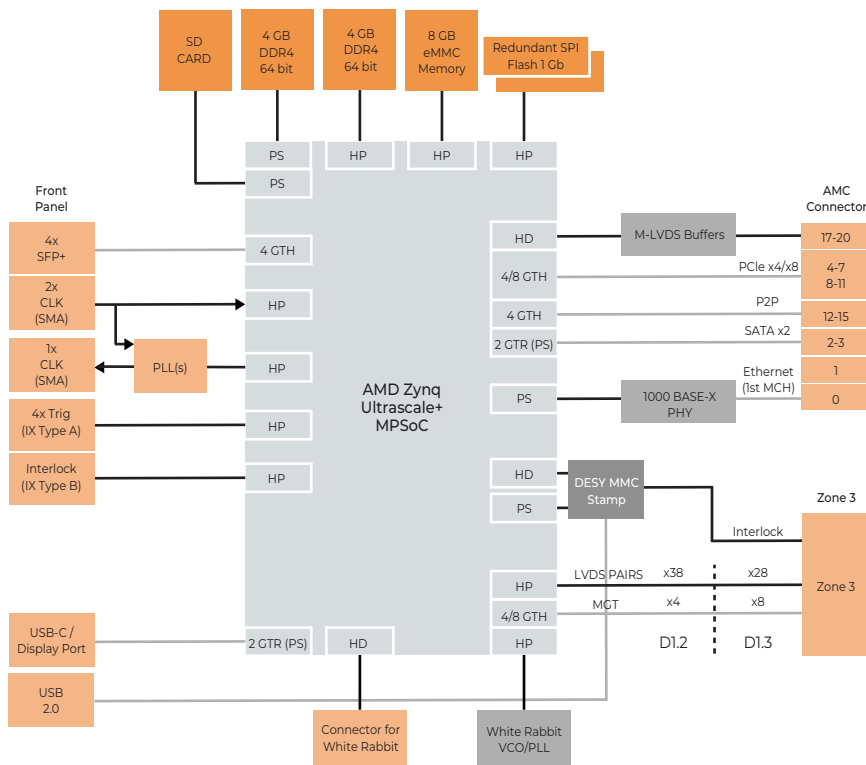
Block Diagram

The DAMC-UNIZUP AMC board was developed with an emphasis on the rich RTM I/O connectivity, while still providing the standard AMC backplane connections, such as the PCIe, SATA, Ethernet, M-LVDS and MGT p2p links. The standard DESY MMC Stamp takes care of the IPMI management functions, in-system firmware update and remote access.

Depending on the assembly option, the RTM interface features either D1.2 or D1.3 digital standard connectivity, allowing to implement ADC/DAC interfaces such as the JESD204B/C", serial LVDS and parallel LVDS/LVCMOS.

The ZynqMP Processor System (PS) holds up to 4 ARM 64-bit CPU cores, running at up to 1.5 GHz*. There are two independent 4GB DDR4 memory banks available, one through the PS, and the other through the PL, allowing for plenty of space for the measurement buffers, as well as excellent OS support. The board can boot either from the SD card, from QSPI Flash or from eMMC, and thanks to the USB-C and Display Port support, it can act as a full workstation with a classic monitor/keyboard/mouse console.

The front panel provides 4 SFP+ ports for fast serial communication at up to 12.5/16.375 Gbit/s data rate, SMA clock I/O(s) connected to a flexible clocking tree, featuring two PLL clock managers, allowing for sourcing external reference clocks, and for generating them, as well as fast triggers and standard DESY Interlock interfaces.



Legend

PS	ZynqMP Processing system
PL	Programmable Logic
HP	High Performance I/O (pins) connected to PL
HD	High Density I/O (pins) connected to PL
GTH	GTH type of Multi-Gigabit serial Transceiver, connected to PL
GTR	GTR type of Multi-Gigabit serial Transceiver, connected to PS
P2P	Multi-Gigabit Transceiver Point-To-Point links
MGT	Multi-Gigabit serial Transceiver
PCIe	PCI Express link
SATA	Serial Advanced Technology Attachment link
SMA	SubMiniature version A (connector)
SFP	Small Form-factor Pluggable (network interface module format)

Ordering information

Ordering code	Product name	Description
MUNI1.000.000	DAMC-UNIZUP	AMC card equipped with XCZU7EG-1FFVC1156E and RTM class D1.2*
MUNI1.000.010	DAMC-UNIZUP	AMC card equipped with XCZU7EG-1FFVC1156E and RTM class D1.3*
MUNI1.000.001	DAMC-UNIZUP	AMC card equipped with XCZU11EG-2FFVC1156E and RTM class D1.2*
MUNI1.000.011	DAMC-UNIZUP	AMC card equipped with XCZU11EG-2FFVC1156E and RTM class D1.3*

* the actual CPU core frequency is dependent on MPSoC Speed Grade. Connect with Instrumentation Technologies for options not listed in this table.