# Modern FMC/FMC+ Carrier and IO Solutions in MicroTCA.4

**MT ARD ST3 Meeting, 23. - 24. September 2020**

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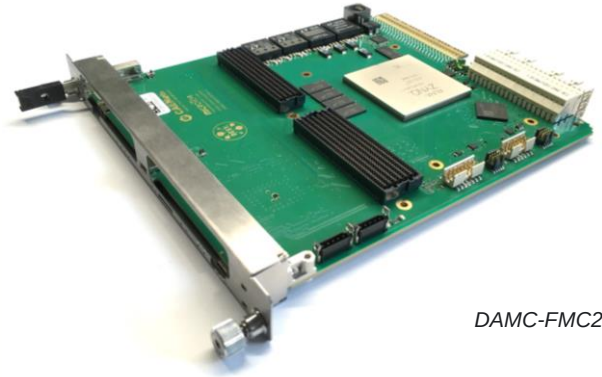
MicroTCA TECHNOLOGY LAB
A HELMHOLTZ INNOVATION LAB

DESY.

# Overview

Requirements

- Modern AMC in MicroTCA.4 for FMC controls
- Backward compatibility to existing boards
- Set of requirements that satisfies a wide range of applications



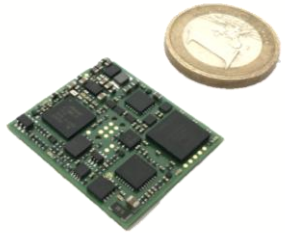
*DAMC-FMC2ZUP*

Purpose and Applications

- High-speed ADC/DAC controls and data acquisition (e.g. JESD204B, JESD204C)
- Legacy board (DAMC-FMC25/20) replacement
- High-speed camera interfacing and image processing
- Artificial Intelligence and Machine Learning

*DMMC-STAMP*

- *System on a Module*
- *Full MicroTCA management*
- *Preprogrammed Solution*



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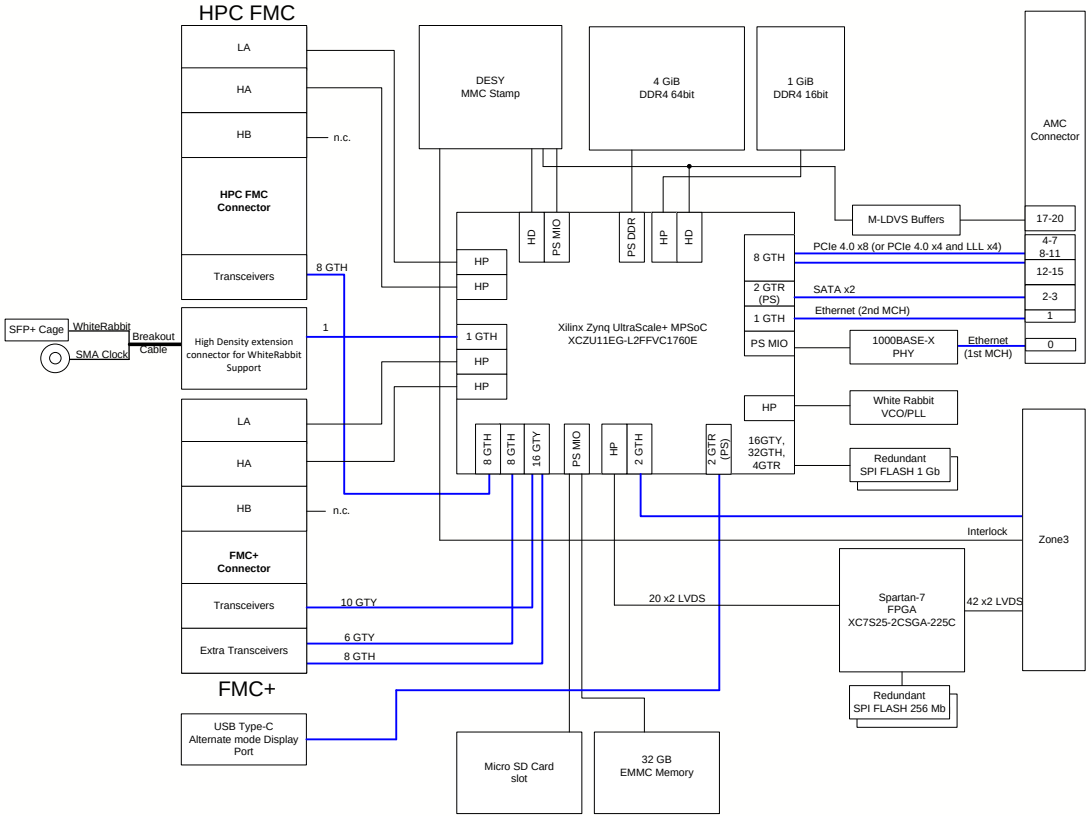
# DAMC-FMC2ZUP

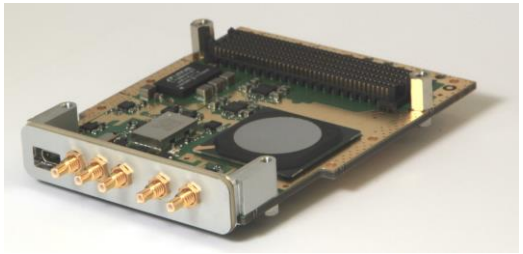
## Main Features

- Xilinx ZYNQ Ultrascale+ MPSoC (XCZU11EG-L2)
  653k Logic Cells, 2.928 DSP slices
- 52 transceivers
  (32 GTH, 16 GTY, 4GTR)
- Quad core ARM processor with MALI graphics
- White Rabbit support
- PCIe Gen3 x8 (in supported systems)
- DisplayPort and USB to front panel

*Pin compatibile:* ***XCZU17EG*** *(926k logic cells) and* ***XCZU19EG*** *(1143k logic cells)*



# DAMC-FMC2ZUP + DFMC-DS800



*DFMC-DS800*

DFMC-DS800

- 12-bits, 500/800 MSP/s dual channel, 1/1.6 GSP/s single channel ADC
- Analog input bandwidth: >2.5 GHz
- External clock input, high stability TCXO, ultra-low phase noise PLL with VCSO on-board
- Low latency: 50 ns @ 800 MHz)

*DAMC-FMC2ZUP + DFMC-DS800*

First Application Validation

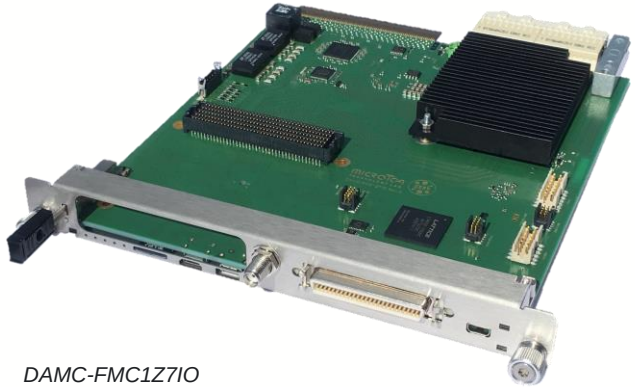
- Direct sampling data acquisition
- LVDS interface between ADC and programmable logic
- High performance FPGA clocking scheme due to ADC requirements
- Demanding requirements in terms of throughput:

$$800\ MHz * 16\ b * 4\ ch = 51.2\ Gbps = 6.4\ GBps$$

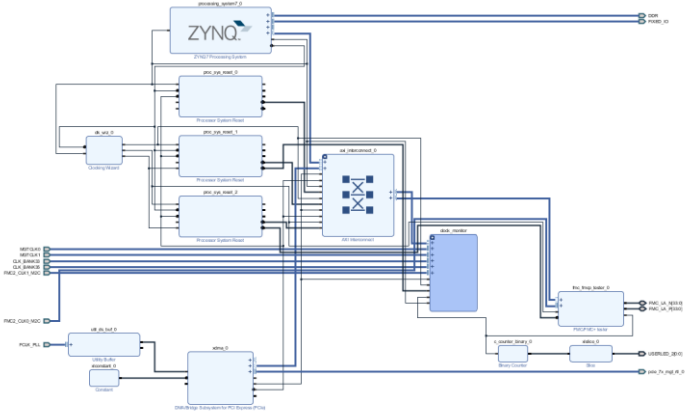
# DAMC-FMC1Z7IO

## Main Features

- Cost-optimized
- Xilinx Zynq-7000 SoC (xc7z030 and higher)
- 48 bidirectional IOs: 3.3V and true 5V
- FMC socket
- PCIe x2 Gen2 (x4 optional)
- Full backplane and RTM connectivity
- Dual core ARM processor
- HDMI and USB to front panel



*DAMC-FMC1Z7IO*




## Modular Design Approach

- Base for an entry-level MicroTCA system
- AMC-CPU independent operation using Yocto Linux on ARM
- Support of a various set of DESY FMC and RTM boards (e.g. DFMC-AD16, -MD22, DRTM-PZT4, DRTM-AD84)

# Thank You!

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## Services

- Custom developments
- High-end test & measurement services
- System configuration & integration, LLRF design

## Upcoming Events

**MTCA Trainings**

- Basic: 07. – 08. October 2020
  20. – 21. January 2021
- Advanced: 04. – 05. November 2020
  24. – 25. February 2021

**Exhibitions**

- IEEE Real Time Conference : 12. – 23. October 2020

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