DAMC-DS5014DR

The DAMC-DS5014DR, a high-speed Digitizer, leveraging the cutting-edge AMD ZYNQ Ultrascale+ RFSoC Technology in a MicroTCA.4 form factor.

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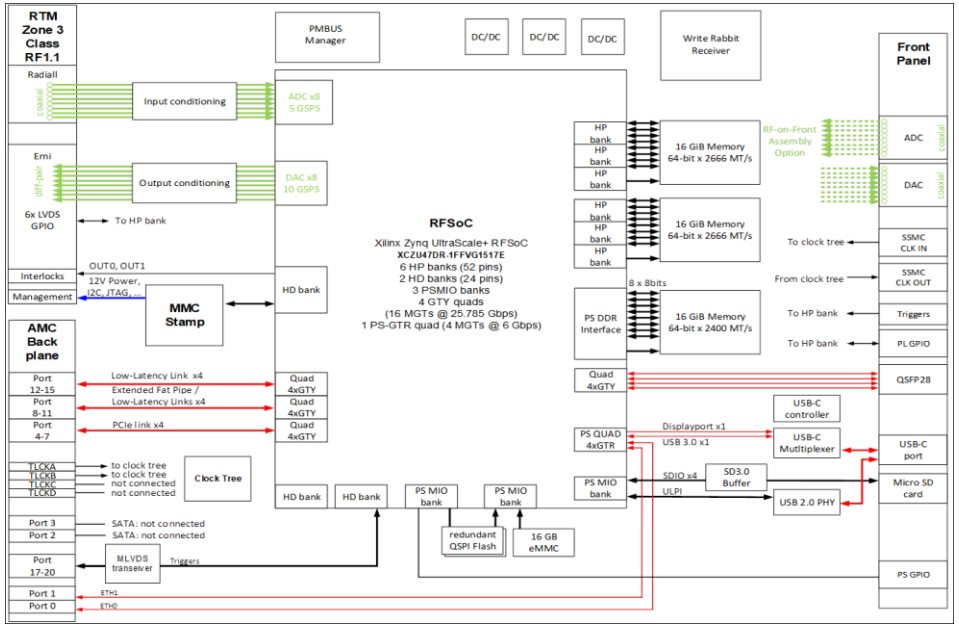
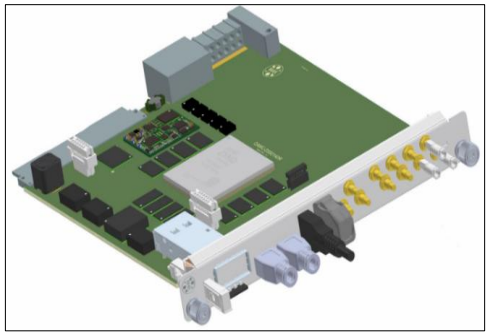
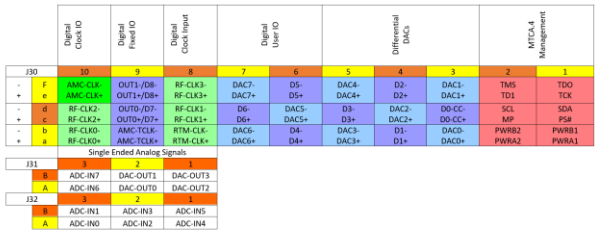
Main Features

- **Form Factor:** Mid-size, double-width Advanced Mezzanine Card (AMC) board.
- **Processing Core:** 3rd-generation Zynq Ultrascale+ RFSoC ZU47DR with 930k logic cells and 4272 DSP slices.
- **Data Conversion:** 8-channel, 14-bit ADCs at 5 GSPS with 6 GHz analog bandwidth; 8-channel, 14-bit DACs at 10 GSPS.
- **Analog Input Features:**
  - Hybrid AC/DC coupling for input channels.
  - Signal pre-conditioning on the AMC board.
  - 8 single-ended inputs via Zone 3 Radiall COAXIPACK2 from RTM, supporting AC (0.03–6 GHz) or DC (DC–6 GHz) coupling.
  - User-customizable signal conditioning on the Rear Transition Module (RTM).
- **Analog Output Features:**
  - 4 differential outputs via ERNI to RTM, DC-coupled (DC–2.5 GHz).
  - 4 single-ended outputs via Radiall to RTM, AC-coupled (0.03–6 GHz).
- **RF Connectivity:** Zone 3 RF connector compliant with Class RF1.1.
- **High-Speed Interfaces:**
  - QSFP28+ supporting 100Gb Ethernet or optical PCIe Gen.4 x4 (16 Gbps/lane).
  - PCIe Gen.4.0 x8 for data transfer to the MicroTCA.4 backplane.
- **Timing and Triggers:** Eight independent timing/trigger inputs for event-coincident data capture.
- **CPU Functionality:**
  - Operates as a CPU module with a front-panel USB Type-C supporting DisplayPort and USB 3.
  - Up to 16 GB PS DDR4 and 32 GB PL DDR4 memory.
  - Runs Yocto Linux from eMMC, QSPI or SD card.
- **Clock Synchronization:** High-frequency clock synthesizer with inputs from RTM, front panel, or backplane.
- **White Rabbit Support:** CERN White Rabbit endpoint capability for precise timing.





3D Layout



Zone 3 – Class RF1.1 pin assignment J30, J31, and J32 connector, AMC side view.

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DS5014DR Analog Frontend Evaluation Board and High-Frequency Synthesizer Evaluation board

- **Primary Objective:** **Assess the performance of the DS5014DR's hybrid coupling system, supporting both AC and DC coupling channels.**
- **Hybrid Coupling Mechanism**: **Utilizes an assembly option to toggle between AC and DC coupling modes.**
- **AC Coupling Characteristics:** **Employs a passive Balun design, supporting input frequencies from 30 MHz to 6 GHz.**
- **DC Coupling Characteristics:** **Features an RF fully differential amplifier (TRF1305B2) with a bandwidth from DC to 7 GHz, offering three power gain variants:**
  - **5 dB (TRF1305A2)**
  - **10 dB (TRF1305B2)**
  - **15 dB (TRF1305C2)**
- **DC Coupling Input Specifications:** **In single-ended mode, supports a dynamic range of 1 Vpp (±0.5 V) with a 0 V DC common mode input voltage.**
- **Evaluation Using DS5014DR-AFE Board:** **Measures analog converter dynamic performance, including:**
  - **Noise floor**
  - **Time latency**
  - **Static and Dynamic performance metrics**
- **RF Switch and ADC Design:** **Incorporates an RF switch and an RF-ADC with an interleaving architecture, potentially requiring calibration.**