A compact size, 64-channel, 80-125 MSPS, 14-bit dynamic range ADC module for the PANDA Electromagnetic Calorimeter

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ADC for EMC
- PANDA EMC Readout System

- Photosensor 
  - APD
  - VPTT

- Preamplifier 
  - APFEL (GSI)

- Compute Node 
  - 225 ADC 64-ch
  - 225 ADC 128-ch
  - 22 Data Concentrator, 16-ch

- Data Concentrator

- 3,600 Photosensor
- 11,952 Photosensor

- 14400 Preamplifier
- 47808 Preamplifier

- 375 ADC 128-ch
- 125 ADC 64-ch

- 225 Compute Node

- 15000 crystals
- Dual photosensor readout
- Dual range

- High channel density

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ADC for EMC-Endcap
- Production of 250 pcs for EMC Forward Endcap

ADC Production

Batches of 50 pieces every 5 weeks
Payment for each batch is made after the successful test
The money are used for financing components for the next batch

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ADC for EMC-Endcap

- Post-production functional tests
ZYNQ-Board
– Data Readout Module
- Tested
- Running Linux/PetaLinux
- Communicating over Ethernet
- Prepared for data taking with any data format

ADC for EMC-Endcap
- Final ADC Tests - ZYNQ Board

XC7Z030, 512 MB DDR3, RTC

4xSFP+ (6.6 Gb/s)
GbE, USART, USB, HDMI

4xNIM(I/O)
SDHC
ADC for EMC-Endcap

- Post-production functional tests

ZYNQ-Board

- KINTEX-7
- ARM
- DDR3
- Flash
- RTC
- SDHC
- HDMI
- USB
- ETH

ADC 64K3

- FPGAs
- SFP

ADC TEST

- SFP
- JTAG
- USB

Microcontroller

- ATmega328P
- ADC backplane connector
- Power and monitor
- Power regulators
- ADC
- ADC 64K3
- Pulse generator/multiplexer
- Controlled-ramp power supply
- I2C

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ADC for EMC-Endcap
- Production of 250 pcs for EMC Forward Endcap

Current pool

1 pc  v.221 (64ch, 125 MSPS - Shashlyk)
2 pcs v.217 (64-ch, 80 MSPS – Giessen)
48 pcs v.222 (32-ch. DR, 80 MSPS – Forward Endcap)

Tests:
- Start-up voltages and currents
- JTAG configuration and Flash boot
- PLL and clocks
- ADC calibration and functionality
- GTX, SFP and Versatile Link

- 33 tested OK
- 13 tested OK, returned for correcting one voltage regulator
- 2 problems with 1 ADC each – to be investigated

6 pcs  Stand-alone power supply (v.222)
6 pcs  Mezzanine power supply (v.222)
7 pcs  Input patch panel u-FL (positive signal polarity)
2 pcs  Automatic tester
Backward crate compartment

- TOP Power Supply (Digital 1.0V, 1.5V, 2.5V, 3.3V)
- Signal connectors
- Crate Control
- Bottom Power Supply (Analog 2.5V)

Cooling surface
ADC for EMC-Endcap

- Crate backplane preparation

Front side
(ADC compartment)

ADC connectors
ADC for EMC-Endcap

- Crate backplane preparation

Back side
(Signal and PS compartment)

Upper PS connectors
Signal connectors
Crate Control connectors
Lower PS connectors

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ADC for EMC-Endcap

- Crate backplane preparation

Back side
(Signal and PS compartment)

Upper PS connectors
Signal connectors
Crate Control connectors
Lower PS connectors

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Backward crate compartment

- TOP Power Supply (Digital 1.0V, 1.5V, 2.5V, 3.3V)
- Signal connectors
- Crate Control
- Bottom Power Supply (Analog 2.5V)
Backward crate compartment

- TOP Power Supply (Digital 1.0V, 1.5V, 2.5V, 3.3V)
- Signal connectors
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TRIPLE SLOT MODULE

**TX/RX** - GTX Triple module loop (HF buffered)
Can be used for re-routing of faulty main transceivers or for multiplexing of the readout

**I²C AUX** – provides differential I2C control for the detector ASICS (requested by Barrel).
Can be used for indicating FPGA configuration status (DONE) to the control system

**I²C PWR** – For monitoring of the ADC voltages and currents

**TX/RX** – can be freely used inside of the Crate Control board. Either looped or fed to a control FPGA

**JTEN** – JTAG enable for operation on the slot

**JTAG** – Common lines (buffered)

**CTRL** – PS control

**Control** – A daisy-chain interface for crate control (optical interface out?)

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Thank You!