CAENels
Gear For Science

8-channel 20-bit
Bipolar Picoammeter
with MTCA.4 Rear I/O Series

AMC-PICO-8

- **The AMC-PICO-8 series is composed of a full-size standard AMC board with 8 Bipolar 20-bit current-input electrometer channels**

- **Input channels are capable of floating up to ±300 V respect to chassis ground**

- **Two independent full-scale ranges for each channel**

FEATURES

- **Double-width AMC board**
- **MTCA.4 standard**
- **High resolution Multi-Channel current measurements**
- **8 Bipolar Current-Input Channels**
- **Two independent full-scale ranges**
- **Up to 1 MSPS simultaneous and independent sampling**
- **20-bit resolution**
- **Low conversion time delay**
- **Input channels floating up to ±300 V**
- **Data processing on Virtex-5 FPGA**
- **Board Management on Spartan-6 FPGA**
- **uRTM D1.1 connectivity**
- **External Clock input on front panel**

APPLICATIONS

- **Photon Beam Position Monitors**
- **Multi-Channel Fast Current Acquisition**
- **Detector Readout**
- **Accelerator Controls**

AMC-PICO-8. The AMC-PICO-8 is an eight-channel double-width picoammeter AMC board in MTCA.4 format. The analog front-end allows measuring bipolar currents up to 1 mA in the standard version with a maximum sampling rate of **1 MSPS** per channel.

The analog front-end is composed of a specially designed transimpedance input stage for current sensing combined with analog signal conditioning and filtering stages making use of state-of-the-art electronics. The **20-bit resolution** is obtained from independent, simultaneous sampling and low-delay SAR (Successive Approximation Register) Analog to Digital Converters (ADCs).

Each channel has **two full-scale measuring ranges** (up to ±1 mA and ±1 µA respectively in the standard version) and the current source can be **floating up to ±300 V** respect to the chassis ground.This floating capability of the inputs is perfectly suitable for applications where the detector or current source needs to be biased.

The analog front end is designed in order to achieve low noise, low temperature dependence and very small unbalance between channels. The analog characteristics are further improved with calibration. Calibration data are stored in the **on-board EEPROM** memory and are loaded in the signal processing logic on power-up.

The on-board Virtex-5 FPGA performs the conversion from "raw" values acquired from ADCs to a single-precision floating point numbers, representing the measured current in Ampere. The floating point format is highly suitable for additional post-

processing. The signal-processing logic can also be configured to capture the signal on certain **trigger** condition. Additionally, the internal memory can also be programmed to store data before trigger condition happens, providing a valuable data to the user.
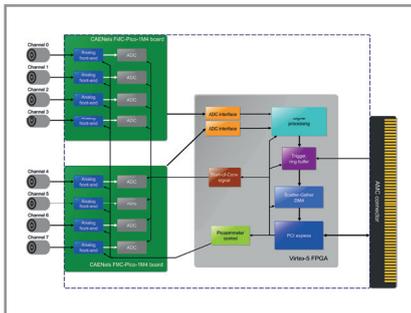
The communication with the Virtex-5 FPGA is performed with the **PCI express** bus. All system parameters (e.g. analog front end range, sampling frequency can be achieved by writing to appropriate registers from PCI express. The FPGA also embeds a Scatter-Gather DMA which can be used to transfer data to PCI express root port (e.g. CPU).

Technical Specifications — **AMC-PICO-8**

		Standard	"C1"	"C2"	"C3"
Board Size		Double-Width – Mid-Size			
Standard		MicroTCA.4: AMC.0, AMC.1 Module Management: IPMI Version 1.5, MMC V1.0			
Input Channels		8			
Input Current Polarity		Bipolar			
Input Channel Potential		±300 V respect to chassis ground (continuous)			
Current Measuring Ranges	RNG0	±1 mA	±110 µA	±10 mA	±1 mA
	RNG1	±1 µA	±3 µA	±500 µA	±100 µA
Sampling Resolution		20-bit			
Analog Bandwidth (-3 dB)		10 kHz	35 kHz	300 kHz	30 kHz
Rise Time (10-90%)		35 µs	10 µs	1.2 µs	12 µs
Sampling Rate		up to 1 MSPS			
Conversion Time		650 ns			
Trigger Inputs		- Internal - AMC port #17, #18, #19, #20			
Compatibility		Zone3 Classification: Class D1.1 AMC Backplane Support: Full			
Input Connectors		Triaxial - LEMO 00.650 Series (EPL.00.650)			
Operating Temperature		0 … 50 °C			

AMC-PICO-8 - *Block Diagram*

Ordering Code	Acronym	Description
AMCPICO8XAAA	**AMC-PICO-8**	8-channel AMC-MTCA.4 Bipolar Float. Picoammeter (±1 mA, ±1 µA, BW=10 kHz)
AMCPICO8C1XA	**AMC-PICO-8-C1**	8-channel AMC-MTCA.4 Bipolar Float. Picoammeter (±110 µA, ±3 µA, BW=35 kHz)
AMCPICO8C2XA	**AMC-PICO-8-C2**	8-channel AMC-MTCA Bipolar Float. Picoammeter (±10 mA, ±500 µA, BW=300 kHz)
AMCPICO8C3XA	**AMC-PICO-8-C3**	8-channel AMC-MTCA Bipolar Float. Picoammeter (±1 mA, ±100 µA, BW=30 kHz)