VME BASED DIGITIZERS FOR WAVEFORM MONITORING SYSTEM OF LINEAR INDUCTION ACCELERATOR LIA-20

BINP, RUSSIA

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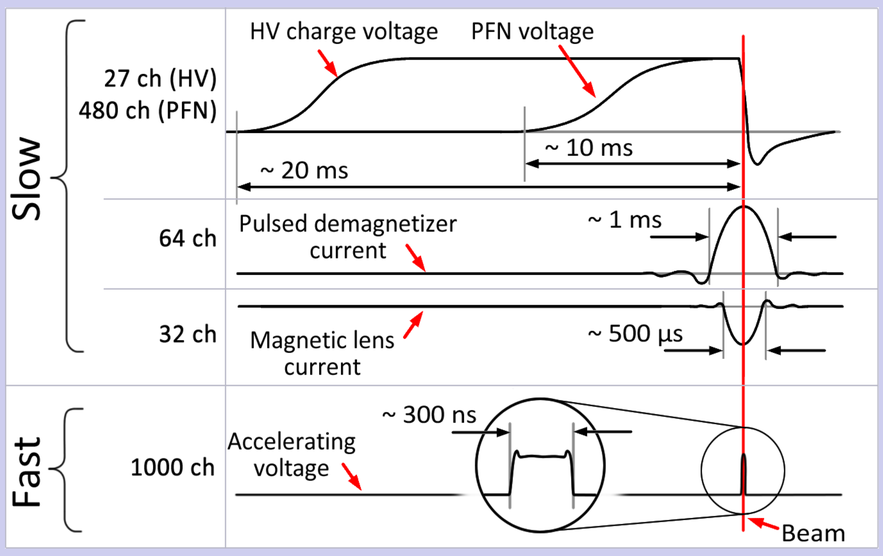
Waveform monitoring system plays a special role in the control system of powerful pulse installations providing the most complete information about the installation functioning and its parameters. Such systems use modular structure and are built using waveform digitizers with various interface buses. The report describes the family of VME modules used in the waveform monitoring system of a linear induction accelerator LIA-20. In order to organize intermodular synchronization the VME-64 bus expansion implemented in the VME64-BINP crates is applied in the waveform digitizers. Details in THMPL10

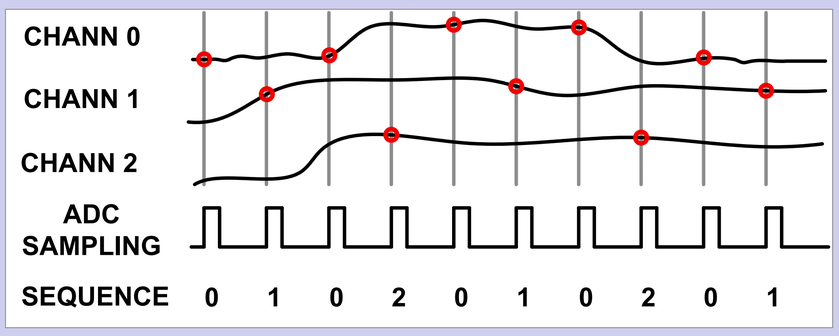
Monitored signals



SLOW DIGITIZERS ADCx32

ADCx32 is the digitizer module that uses four 8 channel multiplexed 1 MSPS SAR ADCs with programmable channel sequencing. The sequence configuration determines sampling rate for each ADC channel individually.

Sampling example

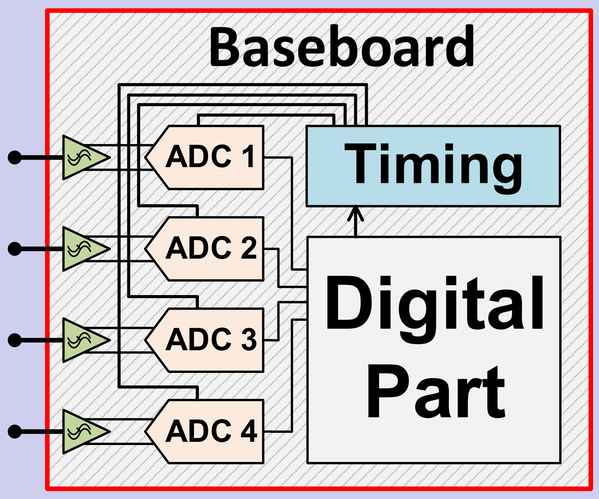


HV charger & PFN voltages	
Sampling rate	1 MSPS (max)
Bandwidth, -3dB	50 kHz
Number of channels	4 simultaneous
Total number of channels	8 x 4 = 32
Voltage ranges	±1 V, ±2 V, ±4 V, ±8 V
Resolution	12 bit
Buffer length	524 288 samples/ch
SNR	75.3 dB_{FS} in the BW

FAST DIGITIZERS FAMILY ADC4x250

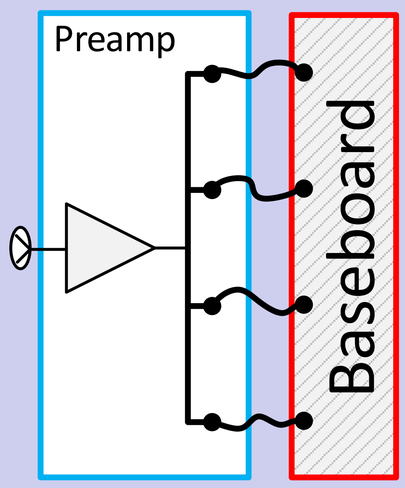
ADC4x250 is the set of three digitizers. All modules are built on common hardware baseboard with mezzanine style input amplifiers.

ADC4X250 hardware baseboard



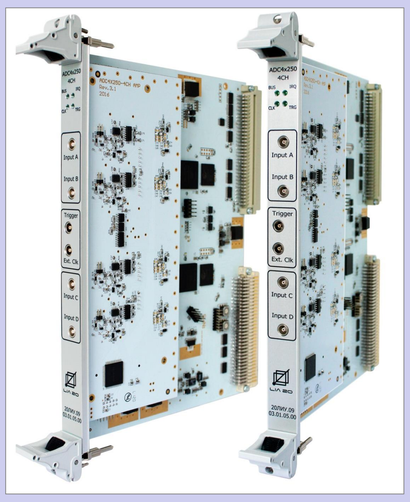
- VME64-BINP Crate backplane synchronization: simultaneous sampling for all modules in crate Details in THMPL10
- Front panel synchronization
- 4 x 12 bit ADC
- 36 Mbit total memory

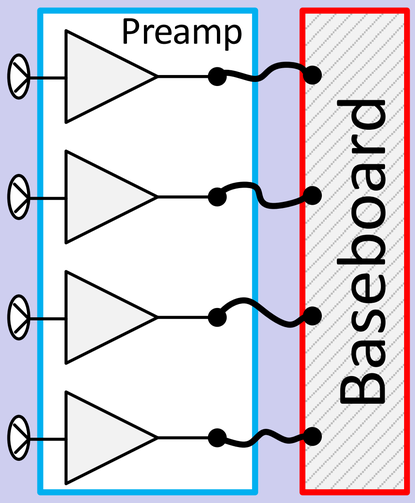
ADC4X250-1CH



Kicker's waveforms	
Sampling rate	1000 MSPS
Bandwidth, -3dB	300 MHz
Number of channels	1
Input ranges	±0.5 V, ±1 V, ±2 V, ±4 V
Buffer length	3 145 728 samples/ch
SNR	62 dB_{FS}

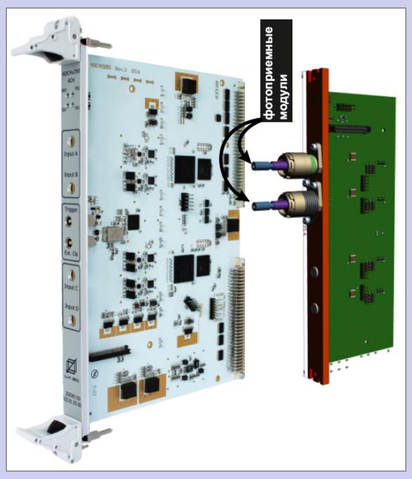
ADC4X250-4CH

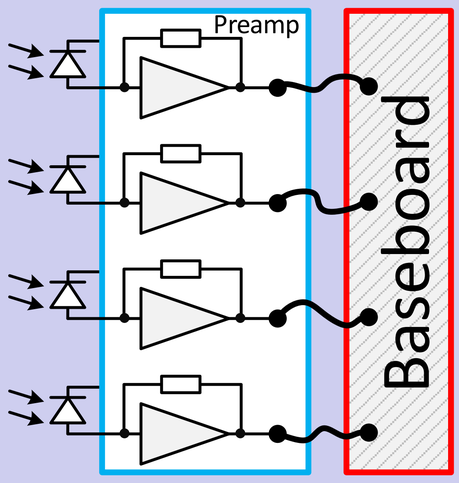




Accelerating voltage waveforms	
Sampling rate	250 MSPS
Bandwidth, -3dB	75 MHz
Number of channels	4 simultaneous
Input ranges	±0.5 V, ±1 V, ±2 V, ±4 V
Buffer length	786 432 samples/ch
SNR	62.7 dB_{FS}

ADC4X250-APD





Optical diagnostic	
Sampling rate	250 MSPS
Bandwidth, -3dB	120 MHz
Number of channels	4 simultaneous
Input ranges	10 kΩ (86 $µA_{max}$) 40 kΩ (21 $µA_{max}$)
Buffer length	786 432 samples/ch
Noise	119 nA @ 10 kΩ 87 nA @ 40 kΩ