

743 Digitizer Family

8/16 Channel 12-bit 3.2 GS/s Switched Capacitor Digitizer



A cost effective Fast Switched Capacitor Digitizer with a new advanced software tool

Features

- 12-bit @ 3.2 GS/s, 1024 samples per event
- 3.2, 1.6, 0.8, 0.4 GS/s software selectable sampling frequencies
- Analog inputs on MCX coax. connectors
- VME64/64X (16 ch.), NIM (8 ch.) and Desktop (8 ch.) modules
- 2.5 Vpp input dynamic range with programmable DC offset adj.
- Self-trigger capability thanks to one analog discriminator per channel with programmable threshold
- Adjustable post-trigger delay (up to 1.25 μ s @ 3.2 GS/s)
- One pulser per channel allows for reflectometer and test functions
- Rate and Time measurements through one hit rate monitor per channel
- On-board charge calculation for fast histogramming
- VME64/64X, USB and Optical Link communication interfaces
- Multi-board synchronization features
- 16 programmable LVDS I/Os
- Daisy chain capability
- Fully supported by the **WaveCatcher** readout software
- Demo software tools, C and LabVIEW libraries

The 743 is a family of 12-bit, 3.2 GS/s Switched Capacitor Digitizers developed in collaboration with CEA/IRFU & CNRS/IN2P3/LAL and based on the SAMLONG chip. It is available in three form factors: VME (16 input channels), NIM (8 input channels) and Desktop (8 input channels). Considering the sampling frequency and the bit number, it is well suited for very fast signals as the ones generated by scintillators coupled to PMTs, Silicon Photomultipliers, APD, Diamond detectors and others.

The analog input signals are continuously sampled into the SAMLONG chip in a circular memory buffer (1024 cells) at the default frequency of 3.2 GS/s (312.5 ps of sampling period); frequencies of 1.6, 0.8 or 0.4 GS/s can also be selected. As a trigger signal arrives, all the analog memory buffers are frozen and then digitized with a resolution of 12 bits into a digital memory buffer with independent read and write access. Up to 7 full events per channel can be stored (where 1 event = 1024 x 12 bits). During the analog to digital conversion process, the x743 cannot handle further triggers, thus generating a Dead Time.

Each channel is equipped with an individual discriminator with programmable threshold, which generates trigger requests. Requests from all channels are processed by the board to generate a common trigger causing all the channels to acquire an event simultaneously. These requests are also used by counters to continuously calculate the individual channel hit rates, also during the Dead Time. The common trigger can also be provided externally via the front panel Trigger Input or via software.

Each x743 module features an “on-board charge calculation” mode (Charge Mode) to generate fast histograms. The detector signal directly digitized can be processed on-line within a user configurable charge integration window.



x743 is based on the SAMLONG chip, a Switched Capacitor Array IC. This technology relies on a set of capacitors that continuously sample the analog input signals at a fixed time interval corresponding to the sampling period.

As soon as the trigger is issued, capacitors are decoupled from the input signals after a programmable delay. Therefore, the trigger freezes the currently stored signal in the sampling capacitance cells. Subsequently, the cells are multiplexed into the 12-bit ADC.

Applications

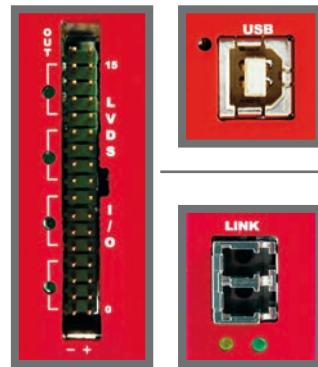
- Nuclear and Particle Physics
- Astroparticle Physics
- Time of Flight
- Medical Imaging (PET)



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USB

An USB 2.0 link is provided in NIM and Desktop form factors for an easy data readout.

Digital I/O

Digital I/Os are provided in VME boards that can be used for individual trigger propagation to external trigger logic. This feature makes VME form factor ideal to scale up the acquisition channels where a global trigger generation is mandatory.

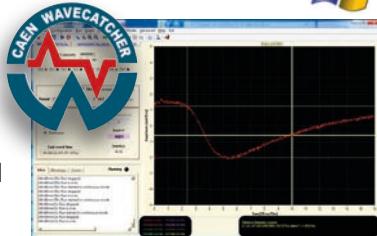
Optical Link

An Optical link is provided in any form factor for high performance data readout through CAEN proprietary daisy-chainable CONET communication protocol.

Software

WaveCatcher

Advanced Software Tool for 743 Digitizers



WaveCatcher software is a complete read-out tool made by CNRS/IN2P3/LAL capable to control a single board belonging to the CAEN 743 Digitizer series.

This tool offers a graphical user friendly interface which permits to take benefit of all the functionalities of the hardware: sampling frequency, different trigger modes, waveforms and charge data acquisition, channel pulses, etc.

WaveCatcher also features different tools for on-line measurements and histograms plotting: graphical cursors, noise level, raw hit rates, charge amplitude and time measurements, time distance histograms between channels (fixed threshold and digital CFD methods), charge histograms, FFT, etc.



All CAEN Control Software are available for **free download** on the web site.

Ordering Option

Code	Description	Form Factor
WV1743XAAAAA	V1743 - 16 Ch. 12 bit 3.2GS/s Switched-Capacitor Digitizer: 3 events/ch (1kS/event), EP3C16, SE	6U-VME64
WVX1743XAAAAA	VX1743 - 16 Ch. 12 bit 3.2GS/s Switched-Capacitor Digitizer: 3 events/ch (1kS/event), EP3C16, SE	6U-VME64X
WDT5743XAAAAA	DT5743 - 8 Ch. 12 bit 3.2GS/s Switched-Capacitor Digitizer: 3 events/ch (1kS/event), EP3C16, SE	Desktop
WN6743XAAAAA	N6743 - 8 Ch. 12 bit 3.2GS/s Switched-Capacitor Digitizer: 3 events/ch (1kS/event), EP3C16, SE	NIM

 **Small details
Great differences**



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