# V1782

## Octal Digital Multi Channel Analyzer

| 8 | 32 K | DC |
|---|---|---|
| Inputs | Channels | Coupling |

The CAEN V1782 is an octal digital multi-channel analyzer in VME form factor, with eight independent 32k digital MCAs for high-resolution gamma-ray spectroscopy with segmented HPGe, Clover, silicon and medium-fast scintillator detectors. It provides software-selectable coarse gain (x1, x2, x4, x8), jumper-selectable x0.2 attenuation and 10 µs AC coupling for TRP detectors. Digital pulse processing delivers energy and timestamp in list mode, with adjustable shaping, baseline restoration, fine gain and pile-up rejection. Coincidence and anti-coincidence logic support background rejection and anti-Compton techniques.

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# Overview

## Product Highlights

- Eight independent 32k digital MCA in VME form factor
- Software selectable coarse gain (x1, x2, x4, x8)
- 10 µs AC coupling jumper selectable for TRP detectors
- Features Digital Pulse Processing for PHA, providing Energy and Timestamp in list mode
- Online pile-up rejection and software dead time evaluation
- Configurable coincidence or anti-coincidence of the input analog signals for background rejection and anti-compton shield
- Drivers, libraries and API for Windows and Linux 32/64 bit
- Perfectly suited for high resolution gamma ray spectroscopy with single and segmented HPGe, Clover and Silicon detectors and compatible with medium-fast scintillator like NaI, CsI, BGO
- Jumper selectable x0.2 attenuation
- Digital oscilloscope for an easy acquisition parameters setup and signal monitoring
- Software adjustable digital shaping filter, baseline restoration and fine gain
- Suited also for high count rate application
- VME and Optical Link communication interface
- CoMPASS software to manage the acquisition and perform basic spectrum analysis

## Product Description

| AT A GLANCE | |
|---|---|
| Inputs | **8** |
| Channels | **32 K** |
| No. of LV Preamp. Outputs | **0** |
| Coupling | **DC** |
| Package | **VME** |
| No. of HV Outputs | **0** |

The CAEN **Mod.V1782** is the new **Octal 32k digital MCA**. Designed for high energy resolution semiconductor detector is perfectly suited for those application in which the number of input channels start becoming relevant such as when segmented HPGe, Clovers and silicon detectors are involved.
The V1782 provides four steps of software selectable coarse gain and two possible jumper selectable dynamical ranges (0.2-0.4-0.8-1.6 Vpp and 1-2-4-8 Vpp).
It is also compatible with Transistor reset preamplifier thanks to the jumper selectable 10 µs AC coupling.

Like the other members of the x781 family, the V1782 integrates advanced firmware algorithm for the processing of any kind of exponential signal or coming from charge sensitive preamplifier and can be easily adapted to different detectors and application ensuring an effective processing even at high count rates.
These algorithms includes advanced tools for the baseline restoration and pile-up rejection.

Thanks to the multiple input simultaneous acquisition, the module is able to manage coincidence and anticoincidence logic between segment of the same detector or different detectors, allowing the user to take advantage of background rejection or anti-Compton techniques.

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# Overview (continued)

The V1782 provides at the same time energy, time stamp and, if required, digitized pulse in a configurable acquisition windows in order to perform further off line analysis.
Acquisition settings and simple analysis operation are performed using CoMPASS software that provides energy spectra up to 32k channels. The spectra can be exported and imported in ASCII o N42.42 compliant files.

CAEN provides also the drivers for the supported communication interfaces, C and Labview libraries (CAENComm, CAENDigitizer, CAENDPP) demo application and utilities.

# Technical Specifications

## MECHANICAL

- **Form Factor:** 2-unit wide VME 6U module
- **Weight:** 800 g

## ENVIRONMENTAL

- **Operational Conditions**: 0 to 50°C Temperature Range
- **Compliance**: EMC compliant

## ANALOG INPUT

**Number of Inputs:** 8

**Input Features:**

- BNC connector
- Single ended, DC and 10 µs AC coupling hardware selectable
- Impedance: 1 kΩ
- Positive and negative signals accepted
- Analog Coarse Gain: x1, x2, x4, x8 software selectable (Gain 1 = 1 Vpp); gain attenuation x0.2 by on-board jumper
- Programmable DC offset adjustment on each input in the full-scale range

## ADC

- **Resolution:** 16 bits
- **Sampling Rate:** 100 MS/s (simultaneously on each input)

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# Technical Specifications (continued)

## DIGITAL SIGNAL PROCESSING

- Trapezoidal filter for the energy calculation: adjustable rise time 0.02 to 40 µs; flat top 0.02 to 40 µs
- Trigger and Timing filter based on integrative-derivative component (30-bit time stamp, 10 ns resolution, 10 s range, 64-bit extension by software, roll-over tracking event)
- Trigger threshold adjustment
- Digital fine gain: 1 to 2.2 in steps of 0.0001
- Trapezoid tail correction; decay time 0.1 to 650 µs
- Trigger time tag discrimination by RC-CR2 filter; shaping time 0.01 to 2.4 µs
- Trigger hold-off (imposed dead-time) to prevent after pulses: 0 to 40 µs
- Programmable Pile-up Guard duration: 0 to 80 µs beyond the end of the flat top
- Baseline restorer: fast, medium, slow

## OPERATING MODES

- Pulse Height Analysis (PHA): 1k-2k-4k-8k-16k-32k pulse height histogram built at software level
- List mode: pulse height and time stamp for each event
- Oscilloscope mode: signal inspection of input pulses and internal filters outputs

## TRIGGER MODES

- Uncorrelated: each channel operates independently (based on channel self-trigger)
- Correlated: coincidence/anticoincidence among channels and/or an external trigger (TRG-IN)
- External: channels are triggered by external trigger only (TRG-IN)

## FRONT PANEL I/Os

- **CLK-IN (3-pin AMPMODU II)**: AC-coupled differential clock input LVDS, ECL, PECL, LVPECL, CML (single-ended NIM/TTL adaptor orderable); Jitter < 100ppm requested
- **CLK-OUT (3-pin AMPMODU II):** AC-coupled differential clock output
- **TRG-IN (LEMO):** General purpose single-ended digital input Software programmable functions NIM/TTL, Zin = 50 Ω
- **TRG-OUT (LEMO)**: General Purpose Digital output Software programmable functions NIM/ TTL, Zin = 50 Ω
- **S-IN (LEMO):** TTTReset/AcqStartStop digital Input NIM/TTL, Zin = 50 Ω
- **LVDS I/O (32-pin AMPMODU II):** 16 general purpose differential LVDS I/O; An input pattern from the LVDS I/O can be associated to each trigger as an event marker Multiple functions configurable by register

## ANALOG MONITOR OUPTUT

- 12-bit / 100MHz DAC FPGA controlled
- 1 Vpp dynamics, 50 Ω termination
- Configurable for test signals

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# Technical Specifications (continued)

## COMMUNICATION INTERFACE

- **Optical Link**
  CAEN CONET proprietary protocol, Up to 80 MB/s transfer rate; Daisy chain capability by connecting up to 8 or 32 ADC modules to a single Optical Link Controller (A4818 or A5818 respectively)
- **VME**
  VME 64X compliant interface, Data transfer mode: BLT32, MBLT64 (70 MB/s using CAEN Bridge) CBLT32/64, 2eVME, 2eSST (up to 200 MB/s)

## FIRMWARE

- DPP-PHA firmware can be upgraded via VMEbus/Optical Link

## SOFTWARE

- Fully controlled by CoMPASS spectroscopy software (up to 32k PHA histogram supported).
- General purpose C libraries with demo samples available for developers Windows® and Linux® OS supported

## CONSUMPTIONS

- 5.6 A @ +5V;
- 0.320 A @ +12 V;
- 0.180 A @ -12V

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# Ordering Information



| ORDERING CODE | DESCRIPTION |
|---|---|
| 7V1782XAAAAA | V1782 – Octal 32K Digital Multi Channel Analyzer |
| WV1782XAAAAA | V1782 – Octal 32K Digital Multi Channel Analyzer |

1. Ordering codes and descriptions are reproduced from the product record. Availability is confirmed at order entry.

## Accessories

**A317** — Cable assembly for Clock distribution 3-pin AMPMODU IV female terminations – 18 cm / 25cm

**A318** — Adapter for Clock signal FISCHER S101A004 male to 3-pin AMPMODU IV female – 10 cm

**A952** — Cable assembly 2.54mm 34 pin female to 2.54mm 34 pin female - 50 cm

**A953** — Cable assembly 2.54mm 34 pin female to two 2.54mm 34 pin female – 50 cm

**A954** — Cable assembly 2.54mm 34 pin female to two 2.54mm 16 pin female - 50 cm

**A1422** — Low-Noise Fast-Rise-Time Charge-Sensitive Preamplifiers (Boxed)

**A1424** — Scintillation Preamplifier

**DT4700** — Clock Generator and FAN-OUT

## Related Products

**A4818** — USB 3.0 to CONET2 Adapter

**A5818** — CONET2 Controller based on PCI Express Gen 3 interface

**NV8020A** — 7U CRATE VME/NIM 8 slot VME64 365W, 5 slot NIM 150W

**V3718** — VME to USB 2.0 / Optical Link Bridge

**V4718** — VME to USB 3.0/Ethernet/Optical Link Bridge

**VME8001** — 1U 2 Slot VME64 Mini Crate

**VME8004B** — 2U 4 Slot VME64 Mini Crate

**VME8004X** — 2U 4 Slot VME64X Mini Crate

**VME8008B** — 4U 8 Slot VME64 Mini Crate

**VME8008X** — 4U 8 Slot VME64X Mini Crate

**VME8011** — 7U 21 Slot VME64 Low Cost Crate

**VME8100** — 8U 21 Slot VME64/64X Enhanced Crate Series

**VME8200** — 9U 21Slot VME64X Enhanced Crate series

## Software & Control Tools

**CAENComm Library** — Interface library for CAEN Data Acquistion Modules

**CAENDigitizer Library** — Library of functions for CAEN Digitizers high level management

**COMPASS** — Multiparametric DAQ Software for Physics Applications

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