

N6781

Dual/Quad Digital Multi Channel Analyzer - NIM



Features



- Dual or Quad Independent 16k Digital MCA in 1U NIM module
- Suited for high resolution digital nuclear Spectroscopy
- Fully controlled by the **CoMPASS** Software
- Selectable Input Dynamic Range and adjustable Digital Fine Gain
- Features **DPP-PHA** firmware for energy and time stamp calculation
- Digital oscilloscope function for an easy setup and signal monitoring
- Counting Rate up to 1 Mcps
- USB and Optical Link communication interfaces
- Drivers, libraries and API for Windows and Linux 32/64-bit

Description

The CAEN **Mod.N6781** is a 1-unit wide standard NIM module integrating **4 Independent 16k Digital MCA** for **digital nuclear Spectroscopy**. A version with **2 independent 16k MCA** is also available (**N6781A**). It is ideally suited for high energy resolution semiconductor detectors, like HPGe and Silicon, connected to a Charge Sensitive Preamplifier (CSP) but it can also properly work directly connected to a PMT with inorganic scintillators (NaI, CsI) and other types of crystal, provided that the pulse shape is exponential and the decay time is long enough (typ. > 200 ns).

The module houses **4x (or 2x) 100 MS/s 14-bit waveform digitizer (based on 724 series)** on single-ended inputs with BNC connectors, featuring 4-step software configurable input range and adjustable DC offset via a 16-bit DAC on each input in the full range.

The N6781 is equipped with a FPGA featuring the real-time Digital Pulse Processing for Pulse Height Analysis (**DPP-PHA firmware**) making the module a spectroscopy acquisition system providing energy (i.e. pulse height) and timing information as well as portions of the waveform and other traces for the fine tuning of the PHA settings.

Thanks to its two independent inputs of simultaneous acquisition, the N6781 is able to manage coincidences and anticoincidences between a pair of detectors, allowing the user, for example, to easily take advantage of background rejection or anti-Compton techniques.

The module has been designed to operate as a scalable multi-input, multi-board acquisition system, offering synchronization capabilities.

The N6781 houses **USB 2.0** and **Optical Link** interfaces. USB 2.0 allows data transfers up to **30 MB/s**. The Optical Link supports transfer rate of **80 MB/s** and offers Daisy-chain capability. Therefore, it is possible to connect up to 8/32 MCA modules to a single Optical Link Controller (Mod. **A5818/A4818**).

Operating modes:

- "Pulse Height Analysis (PHA)": pulse height histogram (1k-2k-4k-8k-16k) built at software level.
- "List mode": pulse height and time stamp for each event.
- "Oscilloscope" mode: input and internal filters waveforms.

Software available (Windows and Linux):

CAEN provides drivers for all the different types of physical communication channels, a set of C and LabView libraries (**CAENComm**, **CAENDigitizer**, **CAENDPP**), demo applications and utilities:

- **CAEN Toolbox**: GUI-based utility allowing users to update the firmware of digitizers, modify PLL settings, load licenses for paid firmware (when required), and access other useful features.
- **CoMPASS**: Multiparametric DAQ Software for Physics Applications designer for CAEN Digitizers running Pulse Shape Discrimination and Pulse Height Analysis, CAEN Pulse processors and MCAs.

Technical Specifications

Mechanical

- **Dimensions:** 1-unit wide NIM
- **Weight:** 1000 g (N6781 version)

Analog Input

Input Features

- BNC connector
- Single-ended, DC coupled
- Impedance: 1 k Ω
- Positive and negative signals accepted
- Programmable 4-step analog coarse gain (x1, x3, x10, x33) corresponding to 10Vpp-3Vpp-1Vpp-0.3Vpp
- Bandwidth: DC to 5 MHz
- Programmable DC offset adjustment on each input in the full scale range

Number of Inputs

- 4 inputs: DT578 1
- 2 inputs: DT578 1A

ADC

- **Resolution:** 14 bits
- **Sampling rate:** 100 MS/s simultaneously on each channel

Digital Signal Processing

- Trapezoidal filter for the energy calculation with adjustable rise time in the range 0 - 10 μ s and flat top in the range 0 - 5 μ s
- Manual and automated trigger threshold adjustment
- Manual and automated Pole-Zero cancellation; decay time up to 6.5 ms
- Digital decimation in steps of 2-4-8 allows to extend the time parameters range
- Digital fine gain
- Pile-up rejection and Live Time correction
- Baseline restorer with programmable averaging
- Trigger and Timing filter based on integrative-derivative component
- Time Stamp: 10 ns resolution, 31 bit and rollover tracking event
- Adjustable moving average low pass filter to reduce the high frequency noise

Operating Modes

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

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 Digital I/O

CLK-IN (AMP Modu II)

AC coupled differential Input Clock:
LVDS, ECL, PECL, LVPECL, CML
(single ended NIM/TTL available by
orderable cable);

Jitter < 100ppm requested; can be
used as external clock reference for
single board or to synchronize the
clocks of multiple boards, provided
through a Fan In

GPO (LEMO)

General Purpose Output: NIM/ TTL,
Zin = 50 Ω

Can be used to propagate the
global trigger in multi-board
synchronization (in combination
with TRG-IN), as output register or
Run ON/OFF status

GPI (LEMO)

General Purpose Input:
NIM/TTL, Zin = 50 Ω
Can be used as
SYNC/START in multi-
board synchronization or
Run ON/OFF Control

TRG-IN (LEMO)

External Trigger Input: NIM/TTL, Zin = 50 Ω
Can be used to force the event acquisition
from all the channels of the board, to
gate/veto the individual channel triggers, or
to propagate the common trigger in multi-
board synchronization (in combination with
GPO)

Communication interface

Optical Link

- CAEN CONET proprietary protocol Up to 80 MB/s transfer rate
- Daisy chain capability: it is possible to connect up to 8 or 32 ADC modules to a single Optical Link Controller (**A4818** or **A5818** respectively)

USB

- USB 2.0 compliant
- Up to 30 MB/s transfer rate

Firmware

- Firmware can be upgraded via USB/Optical Link

Software

- Fully controlled by **CoMPASS** Software
- For developers: general purpose C libraries with demo samples available

Power Requirements

N6781 (Typ.)

+6 VDC (Typ): 3.3 A
-6 VDC (Typ): 100 mA
+12 VDC (Typ): 280 mA

N6781A (Typ.)

+6 VDC (Typ): 2.5 A
-6 VDC (Typ): 80 mA
+12 VDC (Typ): 120 mA

Environmental

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

Ordering Options

Code	Description	
WN6781AXAAAA	N6781A - Dual Digital MCA	RoHS
WN6781XAAAAA	N6781 - Quad Digital MCA	RoHS

Accessories

A387



Input Filter cable BNC female to BNC male - 25 cm

A1424



Scintillation Preamplifier

A317



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

A1422



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

A386



AC coupler BNC female to BCN male

A318



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

DT4700



Clock Generator and FAN-OUT

Related Software

CAEN Toolbox



Multi-Functional Software Suite for the Upgrade of Front-end Boards, Bridges and Power Supplies

COMPASS



Multiparametric DAQ Software for Physics Applications

Related Software Libraries

CAENDPP Library



High level library for CAEN Digitizers running DPP firmware

Related Products

NIM8305



2 Slot Switching 450 W Mini Crate

NIM8302P



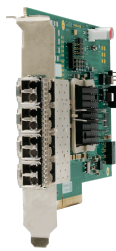
5U 5 slot 150 W Portable Crate

NIM8303



5U 12 slot 300/600 W Crate

A5818



CONET2 Controller based on PCI Express Gen 3 interface

NV8020A



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

NIM8306



2 Slot Switching 750 W Mini Crate

NIM8302



5U 10 slot 150 W Compact Crate

NIM8304



7U 12 slot smart fan unit Switching 2000 W Crate

A4818



USB 3.0 to CONET2 Adapter



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CAEN S.p.A.

Via Vetraia 11
55049 - Viareggio
Italy

Phone +39.0584.388.398

Fax +39.0584.388.959

info@caen.it

www.caen.it

CAEN GmbH

Brunnenweg 9
64331 Weiterstadt, Germany

Phone +49 (0)212.254.4077

Mobile +49 (0)151.16.548.484

info@caen-de.com

www.caen-de.com

CAEN Technologies, Inc.

1 Edgewater Street - Suite 101
Staten Island, NY 10305
USA

Phone +1.718.981.0401

Fax +1.718.556.9185

info@caentechnologies.com

www.caentechnologies.com

CAENspa India Private Limited

B205, BLDG42, B Wing,
Azad Nagar Sangam CHS,
Mhada Layout, Azad Nagar, Andheri West
Mumbai, Maharashtra 400053, India

info@caen-india.in

www.caen-india.in

