

N1068

16 ch Programmable Spectroscopy Amplifier and 16ch CFD



Features



- 16 channels is a one unit wide NIM module
- Differential and Single ended versions available
- Dedicated version for germanium detector
- Pile-up rejection facility individually selectable
- Programmable positive or negative input polarity per each channel
- ± 4 V input dynamics on 50 Ω (SE) and 110 Ω (Differential)
- Active baseline restorer with programmable output offset
- 16 channels CFD with 5 step delay individually jumper selectable
- 12-bit programmable delay on ECL CFD output (range: 200 - 800 ns)
- Timing filter amplifiers with programmable differentiation and integration time
- CFD, Energy or Timing filter multiplexed output
- Multiplicity trigger (NIM) with programmable threshold
- Programmable 4 (5 for N1068GE) shaping time per channel
- Programmable fast unipolar input mode for PMT and all fast charge detectors
- 8 step coarse gain and 7-bit fine gain for energy amplifier
- Low Noise
- Programmable 8-bit pole zero adjustment
- Completely programmable via USB, Ethernet and RS485: Thresholds, shaping times, gains, Pole-Zero, etc.
- OR output and Multiplicity output
- Low Power

Description

The CAEN **Mod.N1068** is a **16 channel Programmable Spectroscopy Amplifier** with Time Filter, Constant Fraction Discriminator (CFD) and pile-up rejection, implemented in a single width NIM module. This module is designed to be used with Germanium, and many other detectors types connected to charge sensitive preamplifiers. Also adapted for fast input signal like PMT and all fast charge detectors. Available dedicated version for **germanium** detector (**N1068GE**). N1068 has the following input configurations:

- Single Ended (50 Ω Impedance): **N1068S** and **N1068GE**
- Differential (110 Ω impedance): **N1068DB**

The first stage of the Amplifier circuits is the polarity selector circuit which select the positive or negative input polarity. Follow two different sections which provide the **Energy** and **Timing** information. The Energy section is composed by a Spectroscopy amplifier with CR-RC⁵ shaping type and different time constants: pole-zero compensation, an 8-step coarse gain (2, 4, 8, 16, 32, 64, 128, 256), a 7-bit fine gain (from 1 to 2) and a DC restorer circuit. The time constants have the following values:

- N1068DB, N1068S: 0.5, 1, 2, 4 μ s
- N1068GE: 0.5, 1, 2, 4, 16 μ s

The **Timing section** is composed by a Timing filter with a differential stage followed by an integration stage both with two-time constants. An amplifier stage provides 4 gain values. This timing signal is sent to a Constant Fraction Discriminator section (Constant Fraction = 30%). The CFD has an auto walk compensation and the delay time is selectable individually for each channel by 5 step jumpers. The width and delay of CFD OUT is individually programmable; the delay can be enabled or disabled. The trigger stage foresees a Programmable Multiplicity Trigger and Multiplicity signal, an analog sum output of every channel CFD out; Multiplicity signal can be daisy chained with those provided by other modules. Chaining with a Sum Output available as well. Pile-up rejection is configurable individually for each channel. When enabled each time a pile-up event occurs, the Energy output is set to the saturation value. The **USB 2.0**, **Ethernet** and **RS485** interfaces allow to handle all functional parameters.

The N1068 is supported by freely downloadable **CAEN-CSA** software, available for both Windows and Linux OS.

Technical Specifications

Packaging

One unit wide NIM unit

Power requirements

6V 2.9 A; -6V 1.8 A; +12V 250 mA; -12V 250 mA

Input

- Positive or negative pulses, max. amplitude of $\pm 4V$
- 50 Ω impedance (SE), 110 Ω (Differential)
- Input polarity must be set via terminal

OUT

- Unipolar/Gaussian signal with a dynamic range of $0 \div \pm 8 V$ max (on 1 M Ω)
- 50 Ω output impedance
- Common offset adjust ($-200 \div +200$ mV) 8-bit resolution

XOUT

- Unipolar/Gaussian signal, further 10x fixed amplification of the OUT value, with a dynamic range of $0 \div \pm 8 V$ max (on 1 M Ω)
- 50 Ω output impedance
- Common offset adjust ($-200 \div +200$ mV) 8-bit resolution

CFD OUT

Diff. ECL output, width $65 \div 1430$ ns $\pm 5\%$, 5 bit adjustable

MUX

Output, on LEMO connector and on double row connector:

- Options: energy, timing, disabled; $0 \div \pm 8V$ max (on 1 M Ω)
- 50 Ω output impedance
- High Impedance when disabled

MUX CFD

CFD out of channel with MUX enabled. Standard NIM output on double row connector

MUL

Multiplicity output: analog sum of CFD OUT, -2 mA current output per hit; -100 mV on 50 Ω

MUL DISC

- Standard NIM output on double row connector
- Multiplicity Trigger Discriminator (Time over threshold) with Programmable Threshold

Integral non linearity

$\leq \pm 0.02\%$ in 10% \div 90% of the full scale @ Gain=45 and 0.5 μs shaping time ($\leq \pm 0.3\%$ typ. for any shaping time)

OR

Logical OR of the CFD Output, on LEMO connector, standard NIM output, width 140÷1500 ns \pm 5%, 5 bit adjustable. Individually Enable

Temperature stability [0÷50°C]

Gain: < 70 ppm/°C. DC level Output: < 10 μ V/°C

Equivalent Input Noise

< 15 μ V RMS (Gain=100, 4 μ s shaping time)

Interchannel Crosstalk

<-55 dB at max Gain, 4 μ s shaping time and 4 V input on adjacent channel

Coarse Gain Range

Adjustable (2, 4, 8, 16, 32, 64, 128, 256)

Shaping Time

(0.5, 1, 2, 4) μ s; 0.5 μ s with fast unipolar input select (0.5F)
GE version: (1, 4, 8, 16) μ s; 1 μ s with fast unipolar input select (1F)

Fine Gain Range

From 1 to 2 , 7-bit adjustable

Pole-zero Adjustment

Done via software on 256 steps to match preamp tails in the 20 to 2000 μ s range

Timing Filter Time Constant

Diff. (100, 500 ns), Int. (20, 80 ns)

Timing Gain

Adjustable 1, 4

CFD Threshold

0 ÷ 2048 mV (12-bit resolution)

CFD Delay Time

Selectable by jumper (5 steps): 8 ns, 16 ns, 24 ns, 32 ns, 40 ns

CFD WALK

< \pm 500 ps on 60 mV ÷ 2V input with 10 ns rise time, 50 μ s duration

Delay on CFD ECL Output

18÷1380 ns \pm 5%, 5 bit adjustable. Individually Enable

Pile-up rejection

Individually selectable; when a pile-up event occurs an output saturation is forced

Interfaces

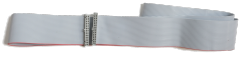
- USB: USB B type female connector; USB 2.0 compliant
- ETH: 10/100 Base-T female connector; TTL signals (TCP/IP)
- RS485 on 10+10 pin header General I/O

Ordering Options

Code	Description	
WN1068DBXAAA	N1068DB - 16 Ch Programmable Spectroscopy Amplifier & CFD Differential	RoHS
WN1068GEXAAA	N1068GE - 16 Ch Programmable Spectroscopy Amplifier & CFD for Germanium Detector	RoHS
WN1068SXAAA	N1068S - 16 Ch Programmable Spectroscopy Amplifier & CFD SE	RoHS

Accessories

A952



Cable assembly 2.54mm 34 pin female to 2.54mm 34 pin female - 50 cm

A385



Adapter 2.54mm 34-pin female to 16x LEMO 00 female (or MCX male) - 50 cm / 1 m

Related Software Libraries

CAEN HV Wrapper Library



Library for CAEN Power Supply Control

Related Products

NIM8302P



5U 5 slot 150 W Portable Crate

NIM8305



2 Slot Switching 450 W Mini Crate

A1442



16/32 Channel charge sensitive preamplifier

CAEN-CSA



Spectroscopy Amplifier Control Software

NIM8306



2 Slot Switching 750 W Mini Crate

NIM8303



5U 12 slot 300/600 W Crate

NIM8304



7U 12 slot smart fan unit Switching 2000 W Crate

N1168



16 ch Fast Scintillator Programmable Signal Processor and 16 ch CFD

NIM8302



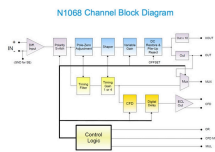
5U 10 slot 150 W Compact Crate

N6741



32 Ch Peak Sensing ADC

Gallery



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