A1442

16/32 Channel Charge Sensitive Preamplifier

Data Sheet

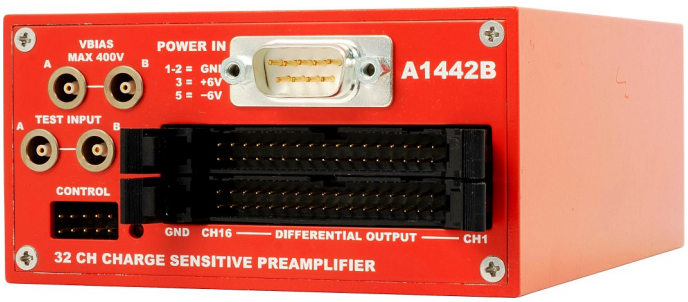
The **A1442** is ideally suited for single or double sided multi-strip silicon detectors as well as for multi-channel detectors with common Bias. Its compact size and low power consumption make it ideal for direct detector coupling in a high vacuum system. It is available in both **16**-channel (**A1442A**) and **32**-channel (**A1442B**) versions.

Preamplifier output signals are in true differential supporting low-cost twisted flat cables for the output connection.

The preamplifier also provides a **SUM** output of the 16-channels, allowing the user to calculate the timing of pulse shape measurements of the complete strip from a single signal.

Preamplifier sensitivity can be easily changed by a **factor of 5** by way of a simple jumper on the front panel. The 32-channel version (A1442B) can be operated as two independent 16-channel preamplifiers with separate Voltage-Bias and Test inputs and two separate SUM outputs.

- **16-channel or 32-channel version available**
- **x1 or x5 sensitivity switchable via font panel jumper**
- **Maximum output voltage +/- 4,5 V Diff:**
  - **200 MeV (SI) @ 1X**
  - **40 MeV (Si) @ 5X**
- **Dimension (mm): 100 x 50 x 130**
- **Input bias voltage (± 400 V Max) (1/2 LEMO 00 connector);**
- **ESD input protection**
- **TEST pulse input with inversion or non inversion buffer. (1 or 2 LEMO 00)**
- **Low power consumption for in vacuum use (< 1000 mW for 16-ch. version)**
- **True Differential output (with 100 Ω Diff. back termination)**
- **1 or 2 Sum output, each sum of 16 channel.**
- **Noise < 5 KeV on 0 pF input and < 23 eV/pF slope**
- **Rise Time < 10 ns @ 0 pF, < 20 ns @ 200 pF**



Specification

Polarity

Positive or Negative Charge Input polarity
Output polarity: Differential

Energy Ranges

Sensitivity Switch, factor 5
- 200 MeV (Si) @ 1X (20 mV/MeV)
- 40 MeV (Si) @ 5X (100 mV/MeV)

Output voltage

Differential ± 4.5 V_{Diff} max

Noise

< 5 KeV on 0 pF input and < 23 eV/pF slope

Rise Time

< 10 ns @ 0 pF detector capacitance
< 20 ns @ 200 pF detector capacitance

Decay time

50 µs

Packaging

Shielded Box
Dimensions (WxHxD):
100 x 50 x 130 mm^3 (without connectors)
Weight:
A1442A: 170 g
A1442B: 210 g

Inputs

DETECTOR INPUT

Detector input (AC coupled) - 22 MΩ to VBIAS
25 pin D-SUB female; (1 for 16-ch. 2 for 32-ch.)
ESD input protection

VBIAS

HV BIAS input / Detector bias voltage
± 400 V Max
Nr.2 LEMO-00 connector
- A/B for A1422B (32-ch.)
- for A1442A (16-ch.) two inputs are wire connected

TEST

Nr.2 LEMO-00 connector
- A/B for A1422B (32-ch.)
- for A1442A (16-ch.) two inputs are wire connected

POWER IN

Power supply input connector
Power supply voltage:
Pin 3 +6 V DC
Pin 5 -6 V DC
D-type 9 pin male connector

Outputs

DIFFERENTIAL OUTPUTS

Amplifier Out
Differential ± 4.5 V_{Diff} max
100 Ω Diff. back termination
17+17 pin Header Male Output Connector; (1 for 16-ch. 2 for 32-ch.)

SUM OUT

Single ended, 50 Ω back termination
+/-3.5V Max
Each channel is summed with a weight of 0.2

Switches

5+5 PIN HEADER 100 mils for Gain setting, Test inversion setting, Sum Output and Test termination.

Power Requirements

+6 V < 600 mW
-6 V < 400 mW

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WARNING During normal operation, a potentially hazardous high voltage bias is applied to a detector via the preamplifier. Only qualified personnel should carry out installation, operation and maintenance procedures of this unit. Furthermore, the preamplifier bias circuit has a very long time constant and therefore this circuitry can remain at high voltage for a very long time. If the user does not exercise adequate caution, this voltage can cause personal injury due to electrical shock. Pease observe the following precautions:

- Completely discharge the detector bias circuit by switching off the bias supply before connecting a cable, to the Input/Detector connector.
- If you are using a variable power supply, bring the voltage value to zero and wait for at least 30-60 seconds. The bias circuitry will discharge itself through the output of the bias supply.

WARNING Do not connect the **DETECTOR INPUT** to exposed circuitry. Connect the preamplifier to a Detector/Power Supply properly grounded to safety hearth.

Operation

Care must be taken in the use of A1442 with high voltage detectors.

Please remember to:

- Turn down gradually bias voltage prior to connect or disconnect preamp input
- Avoid fast changes in bias voltage
- Avoid Detector breakdown or discharge

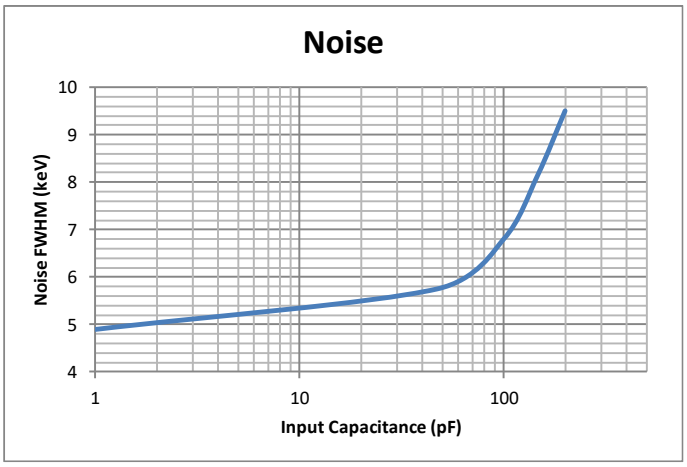

Fig. 1: Maximum Noise vs Input Capacitance

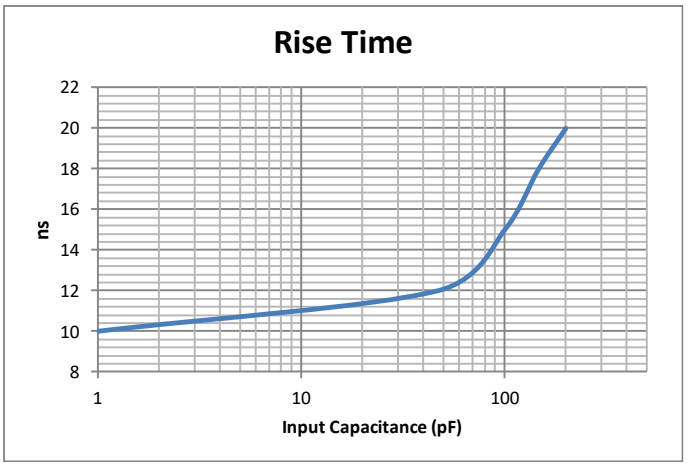

Fig. 2: Typical Rise Time vs Input Capacitance

Panel Layout

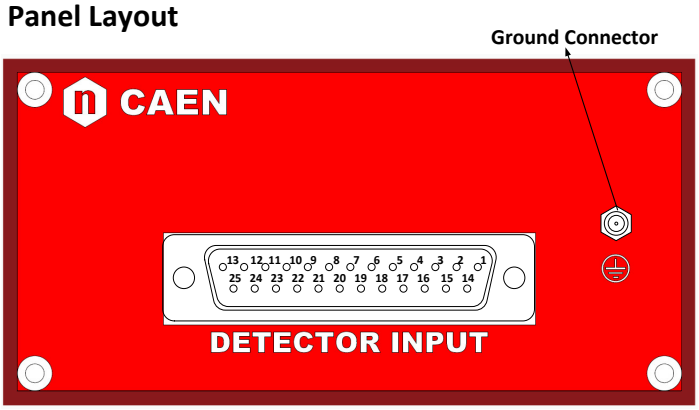

Fig. 3: A1442A back Panel and Connector pin numbering

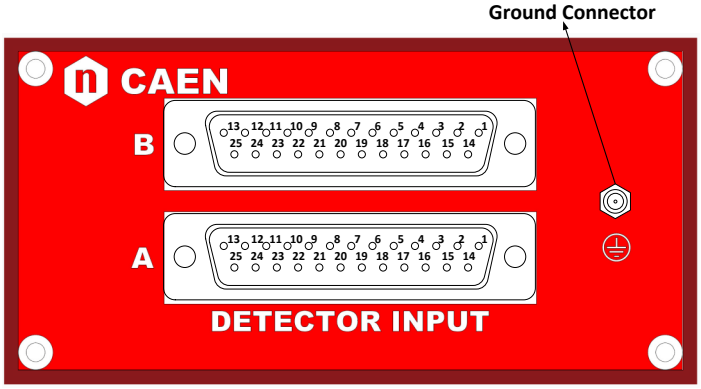

Fig. 4: A1442B Back Panel and Connectors pin numbering

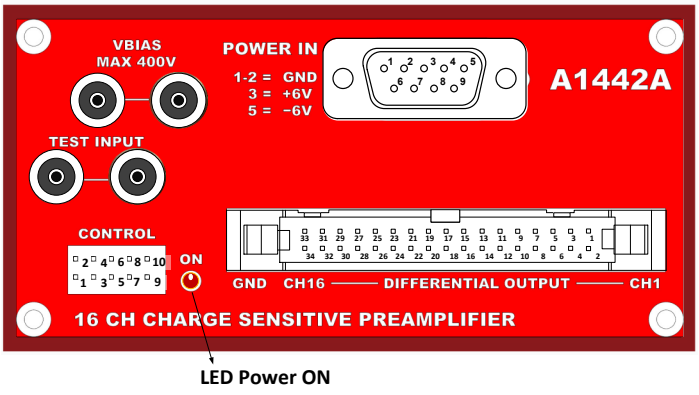

Fig. 5: A1442A Front Panel and Connectors pin numbering

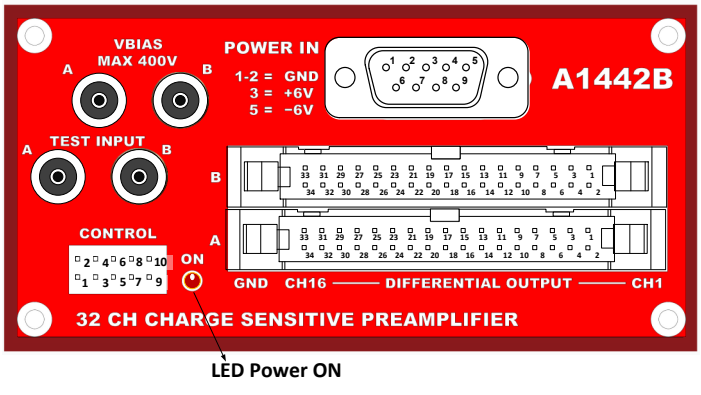

Fig. 6: A1442B Front Panel and Connectors pin numbering

Control Connector pin-out

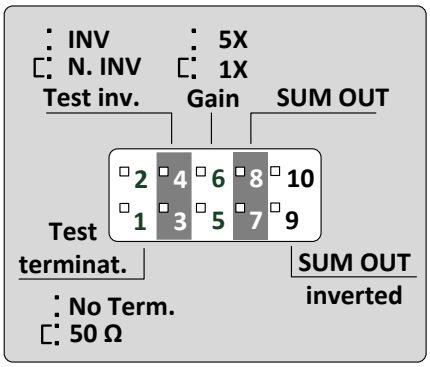

Fig. 7: A1442A Control Connector pin definition

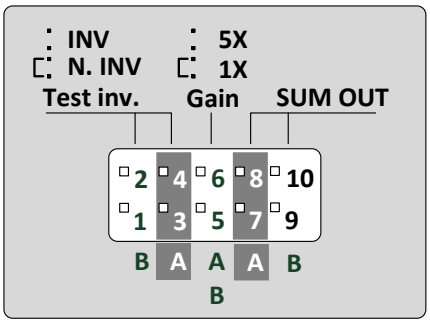

Fig. 8: A1442B Control Connector pin definition

Pin 1-2: Test Termination
With Jumper OFF the TEST Termination OFF
With Jumper ON the TEST 50 Ω Termination ON

Pin 3-4: Test Inversion Control
With Jumper OFF the TEST input signal is inverted
With Jumper ON the TEST input is Not inverted

Pin 5-6: Gain selection
With Jumper OFF the Preamplifier Gain is 5X
With Jumper ON the Preamplifier Gain is 1X

Pin 7-8: Sum Output
Ch1 to Ch16 summed Output (Signal on pin 7, GND on pin 8)

Pin 9-10: B-Inverted Sum Output
Ch1 to Ch16 summed Output (Signal on pin 9, GND on pin 10)

Pin 1-2: B Test Inversion Control
With Jumper OFF the B-TEST input signal is inverted
With Jumper ON the B-TEST input is Not inverted

Pin 3-4: A Test Inversion Control
With Jumper OFF the A-TEST input signal is inverted
With Jumper ON the A-TEST input is Not inverted

Pin 5-6: Gain selection
With Jumper OFF the Preamplifier Gain is 5X
With Jumper ON the Preamplifier Gain is 1X

Pin 7-8: A-Sum Output: "A section"
Ch1 to Ch16 summed Output (Signal on pin7, GND on pin 8)

Pin 9-10: B-Sum Output : "B section"
Ch1 to Ch16 summed Output (Signal on pin9, GND on pin 10)

I/O and Power Supply connectors pin-out

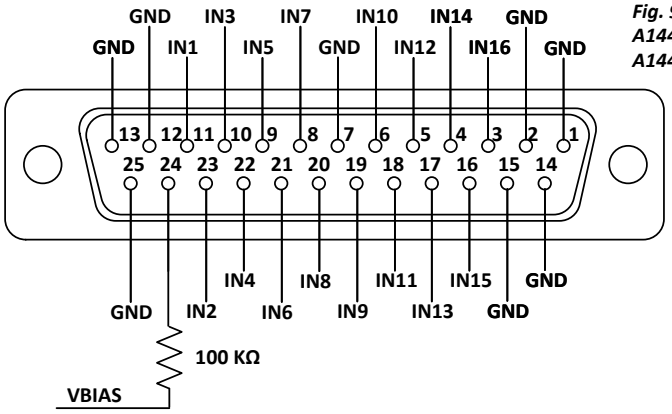

Fig. 9: A1442 DETECTOR INPUT pin-out:
A1442A: DETECTOR INPUT: IN1..16 / VBIAS
A1442B: DETECTOR INPUT A: IN_A1..16 / VBIAS_A
DETECTOR INPUT B: IN_B1..16 / VBIAS_B

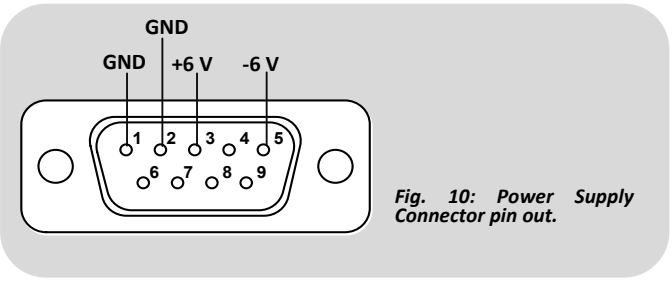

Fig. 10: Power Supply Connector pin out.

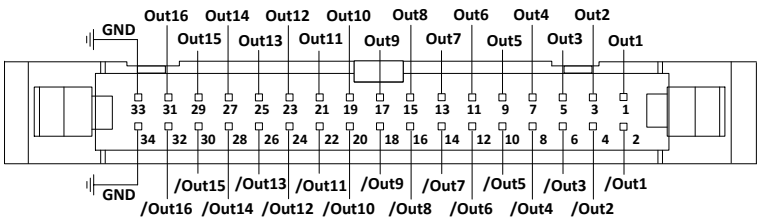

Fig. 11: A1442 Output Connectors pin-out:
A1442A: DIFFERENTIAL OUTPUT Out1..16
A1442B: DIFFERENTIAL OUTPUT OutA1..16, OutB 1..16

Ordering Option

Ordering code	Description
WA1442A020XA	A1442A020 - 16 Ch. Charge Sensitive Preamplifiers 20 mV/MeV
WA1442B020XA	A1442B020 - 32 Ch. Charge Sensitive Preamplifiers 20 mV/MeV

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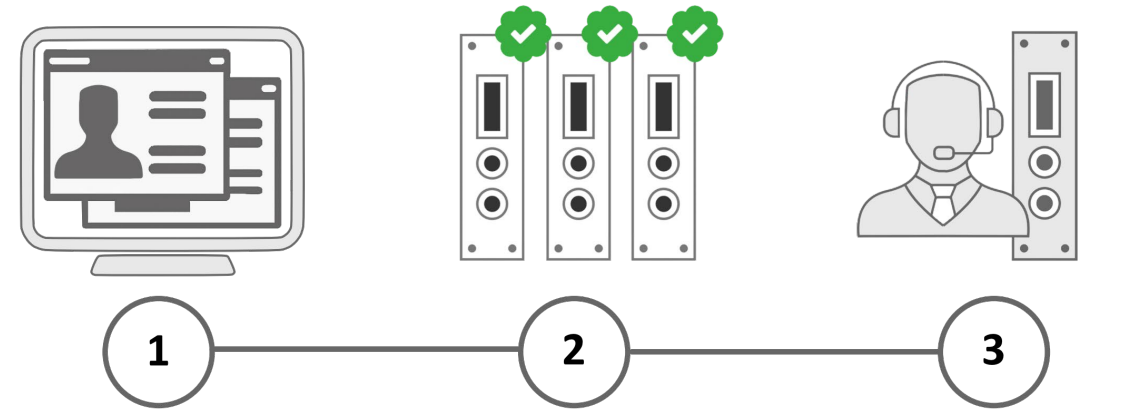

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