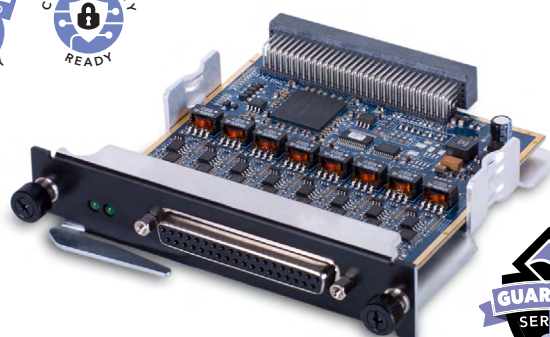# DNA/DNR-AI-218
## 8-Channel, 24-bit, fully isolated A/D board

- DNA-AI-218 for use in Cube chassis
- DNR-AI-218 for RACKtangle™ I/O chassis
- 8 differential analog input channels
- 350 Vrms isolation (channel to channel and channel to chassis)
- Simultaneous sampling (one A/D converter per channel)
- Built-in anti-aliasing filters (@ 48% of sample rate)
- 120 kHz per channel sample rate (480 kHz board max)
- 24-bit resolution
- Gains - 1, 2, 4, 8, 16, 32 and 64
- Extensive Built-in / Self test functionality

[DNR-AI-218 Shown]

## General Description:

The DNA-AI-218 and DNR-AI-218 are 8-channel fully isolated, simultaneously sampling A/D boards compatible with UEI's popular Cube and RACKtangle chassis respectively. The DNA/DNR versions are electronically identical. The DNx-AI-218 features 24-bit resolution, and 7 software selectable input ranges. Each channel also includes and isolated logic-level DIO bit.

### BENEFITS OF UEI'S GUARDIAN SERIES

✓ OVERVOLTAGE PROTECTION
✓ FIELD DISCONNECT

UEI's Guardian series boards include a sophisticated, reliable on-board monitoring system, allowing quick and easy system testing, sensor diagnostics monitoring and fault detection for rapid resolution in field or lab.
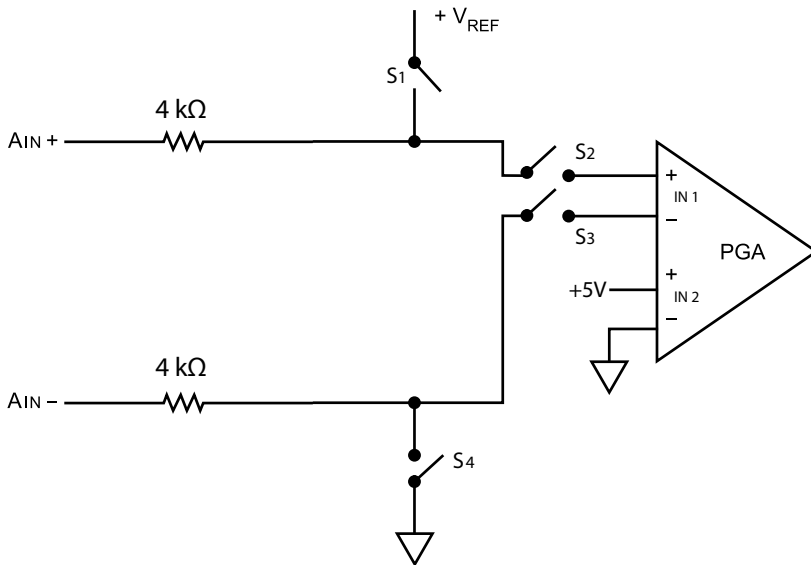
Learn more about UEI's Guardian series

An A/D per channel configuration allows channels to be sampled simultaneously at rates up to 120 kS/s each (480 kS/s max aggregate entire board). The A/D per channel configuration virtually eliminates input cross talk and channel settling time issues even when connected to high impedance signal sources.

Each channel is electrically isolated from all other channels as well as from the Cube or RACKtangle chassis. In addition to the isolation, each input is overvoltage protected up to ±40 V (power on or off). The inputs go into a high impedance mode when power is removed making the AI-218 ideal for use in redundant measurement/control applications.

All connections to the DNx-AI-218 are through a female DB37 connector. OEMs will find it easy to find mating connectors for custom cables, while end-users may take advantage of UEI's popular DNA-STP-37 screw terminal panel via the DNA-CBL-37 or DNA-CBL-37S series cables.

The DNx-AI-218 is a member of UEI's popular Guardian series, which provides high levels of user diagnostics. The AI-218 board provides both the ability to detect input overvoltage conditions as well as the ability to remotely disconnect the channel from field wiring.

Software is included, providing a comprehensive, yet easy-to-use API that supports all popular operating systems, including Windows, Linux, and most real-time operating systems—such as QNX, Intime, VXworks, and more. Additionally, the UEIDAQ Framework—an even higher level Windows driver—supplies complete support for those creating applications in many popular Windows programming languages, as well as data acquisition software packages such as LabVIEW and MATLAB/Simulink.

## Technical Specifications:

| | |
|---|---|
| Number of channels: | 8 fully differential |
| ADC resolution / type | 24 bits / SAR. (AD7766) |
| Sampling rate | 120 kS/s per channel (max); 480 kS/s max aggregate for entire board |
| FIFO depth | 2048 samples |
| Input bias current | < 2 nA typical |
| Input offset | <4 µV; G=1, <2 µV; G=2, <1 µV; G>2 (@ 25 ℃) (-40 ℃ to +85 ℃ spec is 2.5 times 25 ℃ offset) |
| Input INL error | < 0.004 % (40 ppm) max |
| Input impedance | 10 MΩ ±1% |
| Input range | ±10 V (gain = 1) |
| Input resolution | 1.19 µV (gain = 1), 18.6 nV (gain = 64) |
| Gains | 1, 2, 4, 8, 16, 32, 64 |
| Common mode rejection | 110 dB typical |
| Chan to Chan crosstalk | < 1 µVrms |
| Isolation | 350 Vrms (channel to channel and channel to chassis) |
| Digital I/O bits | 8 (one per isolated A/D channel) |
| Digital I/O logic levels | Input: 5/3.3 V levels, Output: 3.3 V levels |
| Overvoltage protection | -40 V to +40 V (power on or off) |
| Power off leakage current | < 10 µA (-40 V to + 40 V) |
| Power consumption | 4.5 W max |
| Operating temp. (tested) | -40 ℃ to +85 ℃ |
| Operating humidity | 95%, non-condensing |
| Vibration IEC 60068-2-6 IEC 60068-2-64 | 5 g, 10–500 Hz, sinusoidal 5 g (rms), 10–500Hz, broadband random |
| Shock IEC 60068-2-27 | 100 g, 3 ms half sine, 18 shocks @ 6 orientations 30 g, 11 ms half sine, 18 shocks @ 6 orientations |
| Altitude | 120,000 ft |
| MTBF | 290,000 hours |

## Block Diagram:
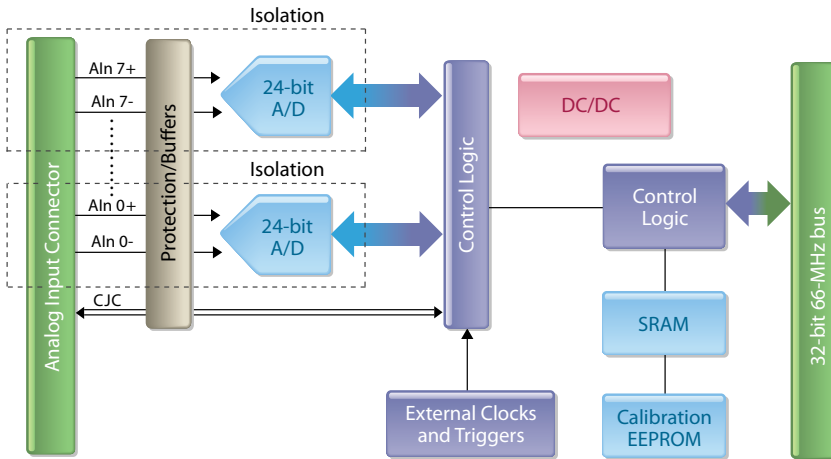


## Simplified Input Configuration:

| | | | |
|---|---|---|---|
| AIn 7- | 1 | 20 | AIn 7+ |
| Gnd 7 | 2 | 21 | DIO 7 |
| Rsvd | 3 | 22 | Rsvd |
| AIn 6- | 4 | 23 | AIn 6+ |
| Gnd 6 | 5 | 24 | DIO 6 |
| AIn 5- | 6 | 25 | AIn 5+ |
| Gnd 5 | 7 | 26 | DIO 5 |
| AIn 4- | 8 | 27 | AIn 4+ |
| Gnd 4 | 9 | 28 | DIO 4 |
| AIn 3- | 10 | 29 | AIn 3+ |
| Gnd 3 | 11 | 30 | DIO 3 |
| AIn 2- | 12 | 31 | AIn 2+ |
| Gnd 2 | 13 | 32 | DIO 2 |
| AIn 1- | 14 | 33 | AIn 1+ |
| Gnd 1 | 15 | 34 | DIO 1 |
| AIn 0- | 16 | 35 | AIn 0+ |
| Gnd 0 | 17 | 36 | DIO 0 |
| Rsvd | 18 | 37 | Rsvd |
| Rsvd | 19 | | |

### Self-test theory of operation

Switches built into the front end of the DNx-AI-228 series allow a comprehensive self-test of the input stages, even while still connected to the field wiring. Switches between the input resistor voltage divider and input PGA (see S1 and S4 above) allow a fixed reference voltage to be connected to the PGA inputs. As the resistance between the reference and the field wiring is high, the reference easily overdrives any input signal generated by an external source allowing a direct and accurate reading of the reference.

In addition, the PGA utilzed on the AI-228 series has two input channels. A secondary check of the input system may be conducted by setting the PGA input to read from the second input channel, which is connected to a 5 Volt reference.

## Connection Options:

| Part # | Description |
|---|---|
| DNA-CBL-37S | Shielded 37 conductor cable (3 foot standard, 1, 5, 10 and 20 foot lengths available) |
| DNA-CBL-37 | Unshielded ribbon 37 conductor cable (3 foot length. Other lengths available on a special order basis) |
| DNA-STP-37 | 37 terminal screw terminal panel supports |
| Extended Warranty | Option to purchase UEI's extended 5 year warranty is available |