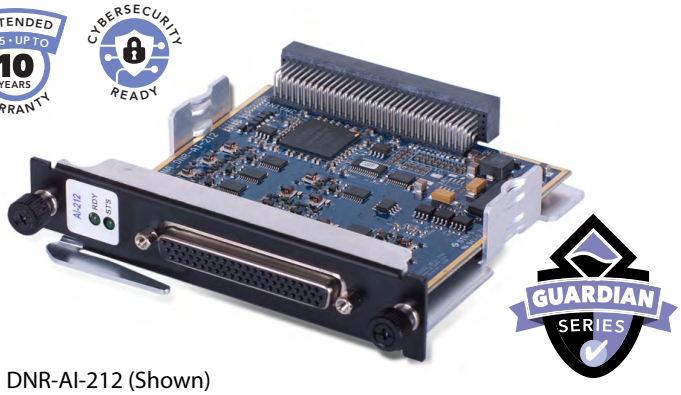
DNA/DNR-AI-212

12-Channel, fully isolated Thermocouple input board

- DNA-AI-212 for use in "CUBE" chassis
- DNR-AI-212 for RACKtangle™ I/O chassis
- 12 fully differential analog input channels
- Channel-to-channel and channel-to-chassis isolation
- Simultaneous sampling (one A/D converter per channel)
- 24-bit resolution
- Built-in anti-aliasing filters
- Built-in 50, 60 and 400 Hz rejection (sample rate 19.6 S/S or less)
- 1500 Hz, per channel sample rates
- Built-in CJC circuitry for Thermocouple monitoring



DNR-AI-212 (Shown)
Purchase includes DNA-STP-AI-212 screw terminal panel.

General Description:

The DNA/DNR-AI-212 are 12-channel fully isolated, simultaneously sampling thermocouple input boards compatible with UEI's popular Cube and RACKtangle chassis respectively. The DNA/DNR versions are electronically identical. The DNx-AI-212 features a ±2.048 V input range and 24-bit converters. At the gain of 16 used for most TC types the AI-212 provides an input resolution of 7.6 nanovolt.

An A/D per channel configuration allows simultaneous sampling at rates up to 1500 S/s each (18,000 S/s aggregate). The A/D per channel configuration virtually eliminates input cross talk and channel settling time issues.

BENEFITS OF UEI'S GUARDIAN SERIES

✓	OPEN INPUT DETECTION

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

The DNx-AI-212 is an ideal, high accuracy thermocouple measurement device, offering offset and gain errors of less than 0.1 °C on all standard thermocouples (including J, K, T, S, E, R). This accuracy combined with the 350 VDC/Vrms channel-to-channel and channel-to-chassis isolation makes the board a perfect solution for industrial temperature measurement, even when using non-isolated thermocouples in high voltage environments.

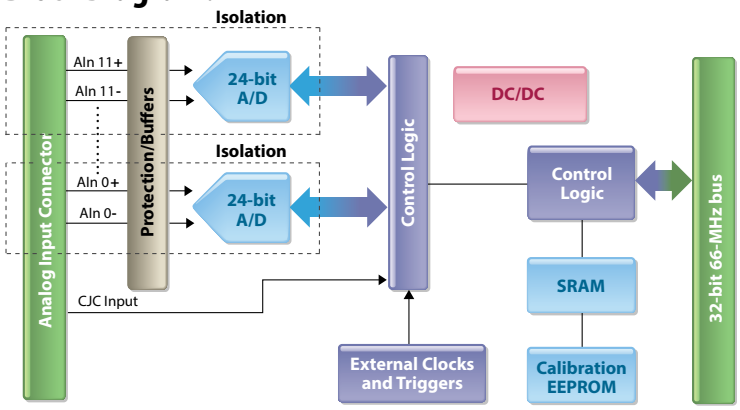
Additionally, the DNx-AI-212 is designed to take advantage of the extremely accurate ADT 7420 digital temperature sensor which provides a dedicated CJC measurement. The CJC sensor is mounted externally on the DNA-STP-AI-212 screw terminal panel (which is included with the purchase). The software included will perform all required TC linearization and CJC compensation and return data in °C, °K, °F or °R when desired. An open thermocouple detection circuit has also been implemented.

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: *(Sample rate 19.6 SPS unless otherwise noted)*

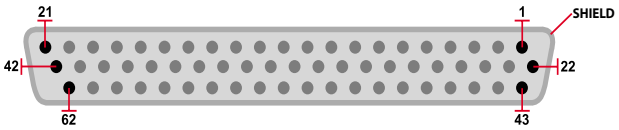
Number of channels:	12 fully differential plus
ADC resolution	24 bits
Sampling rate	Up to 1500 samples/sec per channel 18000 S/S board aggregate
TC measurement accuracy	See Table One
Input bias current	< 100 pA typical (open TC source off)
Input offset	< 3 uV @ 25 °C, (<6 µV -40 °C to +85 °C)
Gain error	±0.005% (typical)
Input INL error	6 ppm typical, 15 ppm max
Input impedance	>5000 MΩ
Input range	±2.048 Volt (gain = 1)
Gains	1, 2, 4, 8, 16, 32, 64 (adjusted to optimize range for TC type selected)
Anti-aliasing filtering	@47.6% of sample rate, ~100 dB/decade
50/60/400 Hz notch filtering	>70 dB at sample rate = 20 Hz or less
Common mode rejection	G=1: 90 dB, G=32: 125 dB (typical)
Channel to channel crosstalk	< 0.5 µVrms
CJC sensor type	ADT 7420, mounted on STP panel
Isolation	350 Vrms, channel-to-channel & channel-to-chassis
Overvoltage protection	-40 V to +40 V (power on or off)
Power consumption	4 W max
Operating temp. (tested)	-40 °C to +85 °C
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

Block Diagram:



Pinout Diagram:

DB-62 (female)



Pin	Signal	Pin	Signal	Pin	Signal
1	CJC I²C 3	22	CJC I²C 4	43	CJC I²C 2
2	CJC I²C 0	23	CJC I²C 1	44	CJC I²C CLK
3	5 VDC (50 mA Max)	24	CJC Gnd	45	CJC Gnd
4	CJC Ain	25	CJC I²C 5	46	CH 11 Gnd
5	CH 11-	26	Rsvd	47	CH 11+
6	Rsvd	27	CH 10 Gnd	48	CH 10-
7	CH 9 Gnd	28	CH 10+	49	Rsvd
8	CH 9+	29	CH 9-	50	CH 8 Gnd
9	CH 8-	30	Rsvd	51	CH 8+
10	Rsvd	31	CH 7 Gnd	52	CH 7-
11	CH 6 Gnd	32	CH 7+	53	Rsvd
12	CH 6+	33	CH 6-	54	CH 5 Gnd
13	CH 5-	34	Rsvd	55	CH 5+
14	Rsvd	35	CH 4 Gnd	56	CH 4-
15	CH 3 Gnd	36	CH 4+	57	Rsvd
16	CH 3+	37	CH 3-	58	CH 2 Gnd
17	CH 2-	38	Rsvd	59	CH 2+
18	Rsvd	39	CH 1 Gnd	60	CH 1-
19	CH 0 Gnd	40	CH 1+	61	Rsvd
20	CH 0+	41	CH 0-	62	DIO 1
21	DIO 0	42	DIO Gnd		

Thermocouple Accuracy:

DNA-AI-212 accuracy in °C when used with DNA-STP-AI-212
(Sample rate 19.6 SPS per channel or lower)

Thermocouple Type	Max Error (CJC 25°C), °C	Max Error (CJC -40 to 85°C), °C
B	±0.5	±0.8
C	±0.3	±0.6
E	±0.2	±0.5
J	±0.2	±0.4
K	±0.3	±0.6
N	±0.5	±0.8
R	±0.8	±1.1
S	±0.8	±1.1
T	±0.3	±0.6

Error Includes:

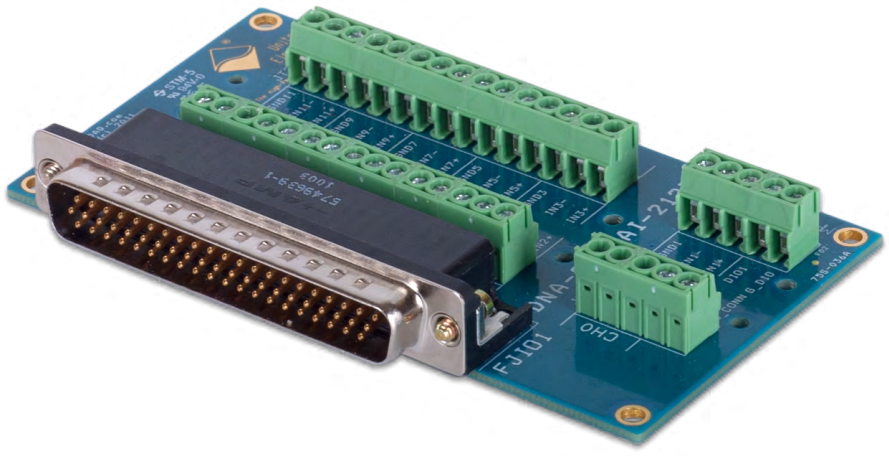
- Input measurement error
- Input noise (shorted input, P-P noise)
- Error due to linearization math
- CJC measurement error

Error Does Not Include:

- Inherent thermocouple error
- Error caused by thermal gradient on STP

Screw Terminal Panel:

(Part# DNA-STP-AI-212. One is included with each DNA-AI-212 ordered.)



Connection Options:

Part #	Description
DNA-CBL-62	Shielded 36 inch 62 conductor cable. (for 1, 10 and 20 foot lengths add a -X suffix where X is the length desired)
DNA-STP-AI-212	Screw terminal panel includes CJC and is included with the DNx-AI-212 purchase. Suitable for direct or remote connection to the DNx-AI-212 board.
Extended Warranty	Option to purchase UEI's extended 5 year warranty is available