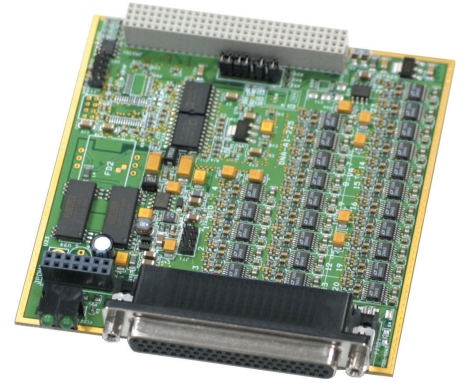# DNA/DNR-AI-225

High-Res Simultaneous Sampling Analog Input Layer

- DNA-AI-225 for "Cube" chassis
- DNR-AI-225 for "RACKtangle chassis"
- 25 A/D converters with differential inputs
- Direct Inputs for thermocouples (using DNA-STP-AI-U panel)
- 24-bit resolution, ±1.25V input range
- 5 S/s to 1000 S/s per channel sampling rates
- Entire analog front end isolated from digital circuitry
- Autocalibrated to eliminate initial offset and gain error
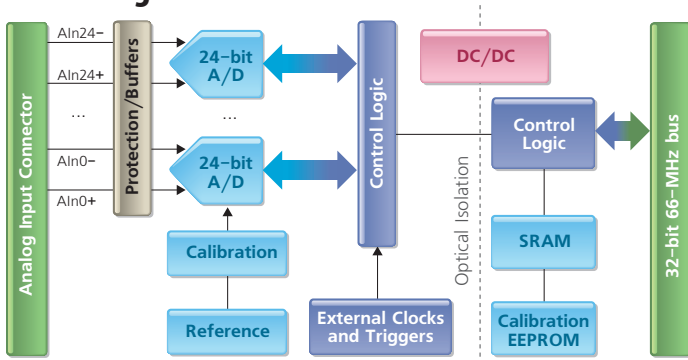
10-Year
Availability
Guarantee

Supports **UEIDaq Framework** Data Acquisition Software Library for Windows. Linux and QNX drivers available. Visit our website for more details.
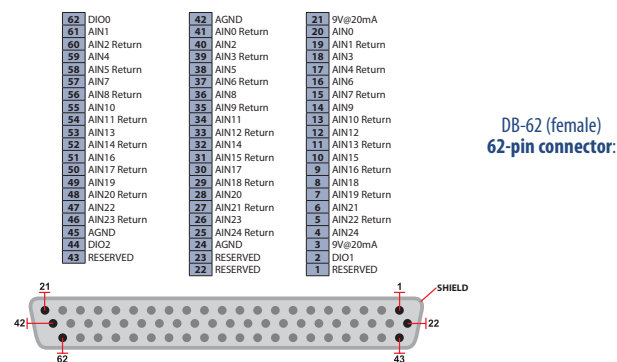
General Description:

True 24-bit resolution makes the DNA/DNR-AI-225 an ideal data acquisition board for a wide range of precision sensors, ranging from thermocouples, to seismic detectors, strain gages, and RTDs (requires external excitation). The DNA-AI-225 is designed for use in UEI's popular cube chassis while the DNR-AI-225 provides identical performance in the new RACKtangle chassis. The boards offer ultra-high resolution (as low as 0.5 µV at 5 Hz), true 24-bit resolution, one converter per channel with simultaneous sampling, and outstanding linearity. The DNA/DNR-AI-225 features sampling rates starting from 5Hz per channel (with 23.5 bits ENOBs) and up to 1 KHz per channel (19 bits ENOBs). Extremely low long-term gain and offset drifts, as well as drift vs. temperature ratio, allows the AI-225 series to be used in a wide range of applications.

The DNA/DNR-AI-225 interfaces directly to thermocouples with a resolution of 0.1° C or better for all thermocouple types across their full temperature range. The layer's unique calibration scheme eliminates initial offset and gain errors across all converters ensuring errors stay within microvolts across the operating range of the product. The software included will perform all required TC linearization and CJC compensation and return data in °C or °F if desired.

Block Diagram:

Pinout Diagram:

DB-62 (female)
62-pin connector:

Technical Specifications:

Resolution	24 bits
Number of A/Ds	25
Sampling rate	5 Hz to 1000 Hz
Onboard FIFO size	1024 samples

Input ranges:
  Bipolar
  Unipolar
	±1.25V (AIn+ & AIn- within -0.25 ..+5V)
	-0.25 .. 1.25V (AIn- connected to AGND directly or via up to 10 kOhm resistor)

Input over-/underrange	software detection
50/60Hz rejection	> 120dB of AC component for rates < 10Hz
Power supply rejection	> 120dB
Common mode rejection	120dB typical
Frontend bandwidth	1250Hz @ -3dB
Input impedance	100 MΩ
Input bias current	±15 nA
A/D conversion time	145 msec @ 5-Hz sampling, 1.1 msec @ 500-Hz sampling, 0.57 msec @ 1000-Hz sampling
System noise*	0.5 µV @ 5Hz, 5.0 µV @ 500 Hz, 7.0 µV @ 1000 Hz
Effective number of bits*	23.5 bits @ 5 Hz, 20.0 bits @ 500 Hz, 19.0 bits @ 1000 Hz
Nonlinearity	3 ppm
Total Harmonic Distortion+Nonlinearity+Noise	-110 dB
Input Protection	2kV ESD, ±15V over/under voltage
Isolation	350Vrms
Power consumption	3W - 3.9W
Operating temp. (tested)	-40°C to +85°C
Operating humidity	0-95%, 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	50 g, 3 ms half sine, 18 shocks @ 6 orientations 30 g, 11 ms half sine, 18 shocks @ 6 orientations
MTBF	520,000 hours

* Refer to the test results for detailed information

Connection Options:

| Cable	Terminal Panel	Description
DNA-CBL-62	DNA-STP-62	Connects to 62-way terminal panel.
DNA-CBL-62	DNA-STP-AI-U	Connects to the universal analog input terminal panel with built-in high-accuracy CJC temperature sensor, open TC detection circuitry and additional RC filters on every channel, as well as a precise 5.000V reference and circuitry for the voltage-excited RTDs.

Test Results

All tests were conducted under the following conditions: UUT (unit under test) was located inside the temperature-controlled chamber. Except for where noted otherwise, all signal sources were connected outside the test chamber at room temperature.
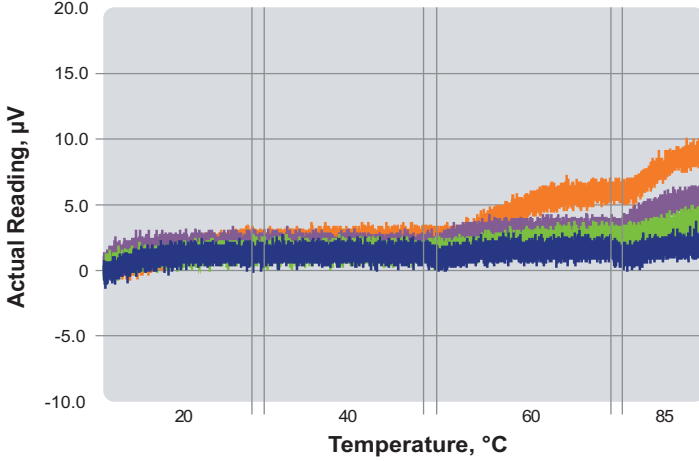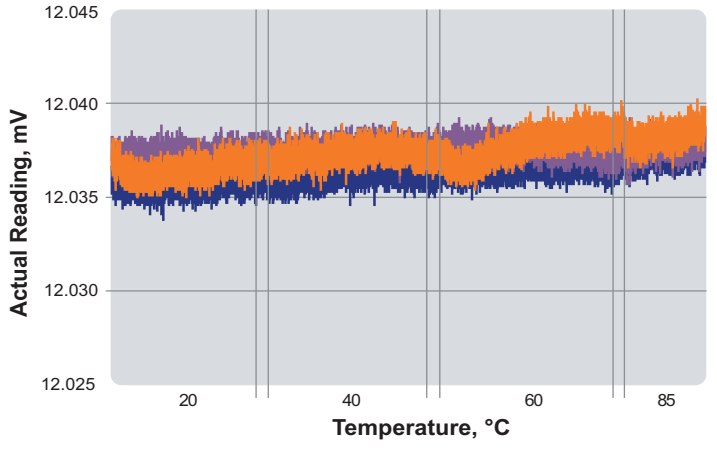
Typical Reading of 0.0V
(10Hz acquisition rate)
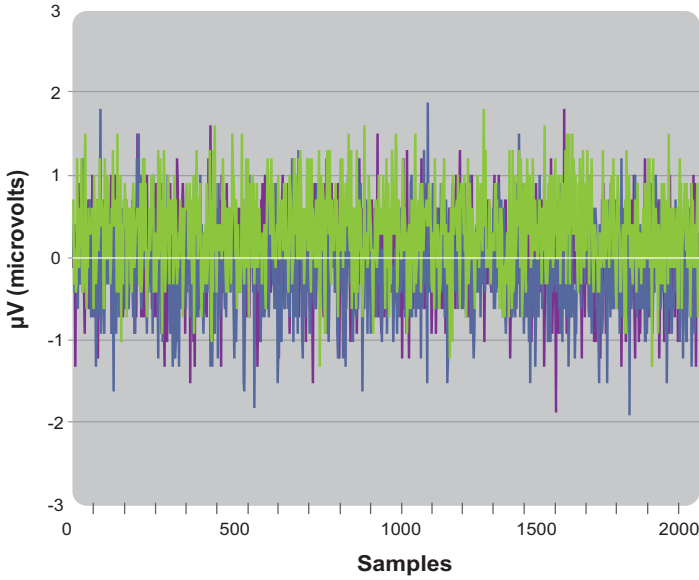
Long-term Temperature Stress at 65°C
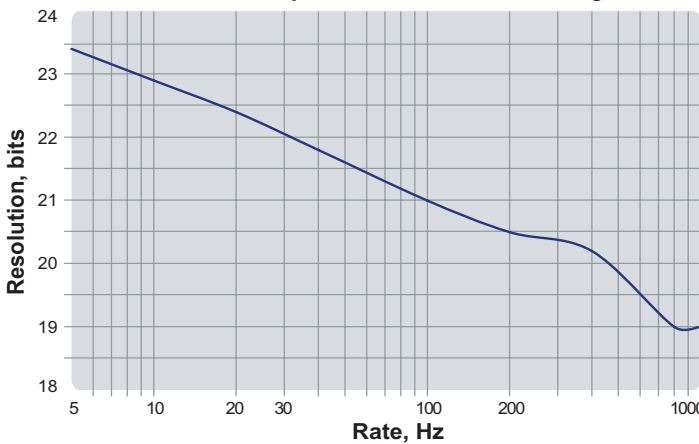(0.567900 V applied to all channels; 10Hz acquisition rate)
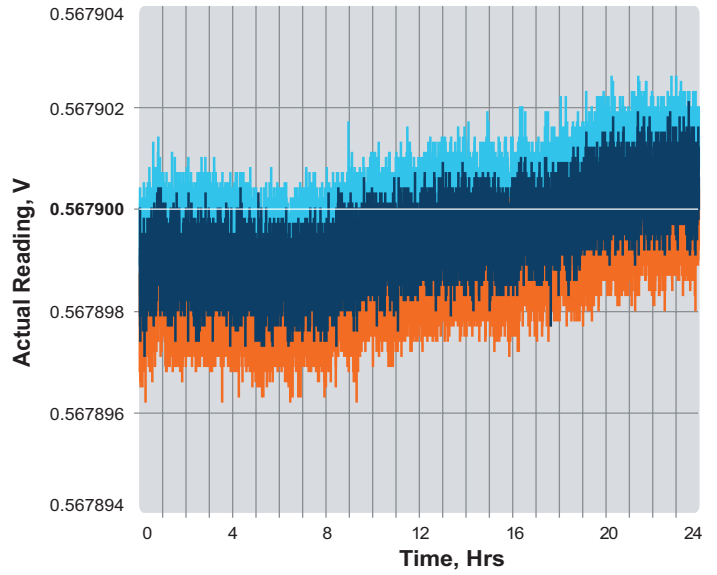
Offset Error vs Temperature
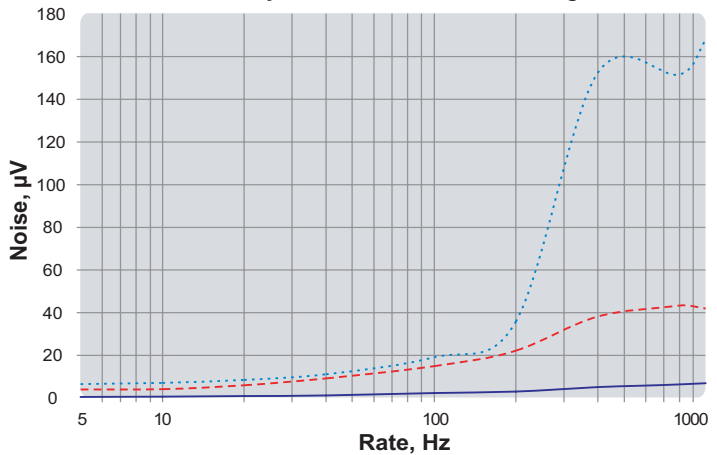(Shorted inputs on every channel)

Typical TC Gain Error vs Temperature
(12.03 mV applied to all channels)

Resolution vs Acquisition Rate (3 - 1000 Hz range)

Noise vs Acquisition Rate (3 - 1000 Hz range)

.... Peak-peak noise across all channels

- - - Peak-peak noise on noisiest channel

——— 100 points RMS noise on noisiest channel

DNA-AI-225 accuracy in °C when used with DNA-STP-AI-U

Thermocouple Type	Max Error (CJC 25°C), °C	Max Error (CJC 0 to 85°C), °C
B	±1.0	±1.3
C	±0.7	±1.0
E	±0.6	±0.9
J	±0.6	±0.9
K	±0.6	±0.9
N	±0.6	±0.9
R	±0.8	±1.1
S	±0.9	±1.2
T	±0.6	±0.9

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