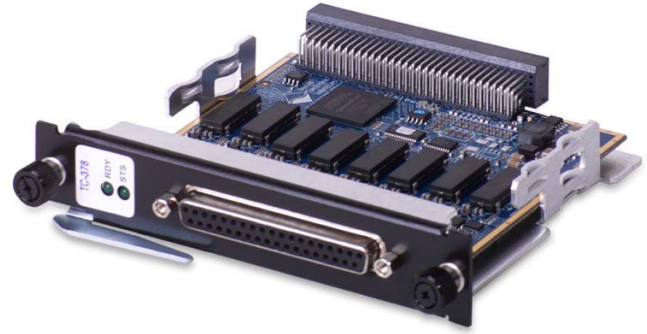


# DNx-TC-378

## 8-Channel Thermocouple Simulator

- DNA- / DNR- / DNF-TC-378 for use in "Cube" / RACKtangle / FLATRACK I/O chassis
- 8 independent fully isolated TC outputs
- CJ temp input allows CJ Compensation (if required)
- 1kHz per channel max update rate
- $\pm 100$  mV output range supports all common TCs
- Guardian series diagnostics provide output voltage and current readback.
- Simulates open Thermocouples
- Simultaneous update across all channels

10-Year  
Availability  
Guarantee



DNR-TC-378 shown

## General Description:

The DNA-TC-378, DNR-TC-378 and DNF-TC-378 are fully isolated, high-precision, 8-channel thermocouple simulator board compatible with UEI's popular "Cube", RACKtangle and FLATRACK I/O chassis respectively. The boards offer full 16-bit resolution and guarantee monotonicity over the entire operating temperature range. Each DNA/DNR-TC-378 channel provides an output range of  $\pm 100$  mV which encompasses the output ranges of all common thermocouples. Each output is capable of driving  $\pm 10$  mA though it's unlikely a TC input would require such high current.

The DNx-TC-378 provides extensive built-in-test diagnostics. An on-board A/D converter on each channel allows the user to monitor both output voltage and current. A solid state relay on each output allows the D/A channel to be disconnected from the field I/O so an open thermocouple can be simulated and the input systems open TC detection circuitry can be tested.

All 8 channels can be updated simultaneously, or they may be updated one at a time as data is written. A 1024 sample FIFO allows each D/A to be updated at 1 kHz per channel (8 kHz aggregate) without data loss.

The board provides three cold-junction input channels to measure temperature where the TC-378 is connected to the applications thermocouple input device. This cold-junction temperature can be utilized by the application software to compensate for error caused by the lack of actual cold-junction error (as there will not be the extraneous dissimilar metal connection that causes the whole CJC issue). The three cold-junction channels are fully electrically isolated from the TC channels, but not from each other.

Connections to the DNx-TC-378 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 DNA-STP-378 screw terminal panel. In addition to the screw terminals, the DNA-STP-378 also includes 3 cold junction sensors. Connections to the DNA-STP-378 are made via the DNA-CBL-37 or DNA-CBL-37S series cables.

The DNx-TC-378 series includes software drivers supporting all popular operating systems including: Windows, Linux, QNX, VXWorks, and most other popular Real-Time Operating Systems. Windows users may take advantage of the powerful UEIDAQ Framework which provides a simple and complete software interface to all popular Windows programming language and data acquisition and control applications (e.g. LabVIEW, MATLAB).

## Technical Specifications: (at 25°C unless otherwise noted)

<b>Analog Outputs</b>	8 channels
Resolution	16-bits
Output range	$\pm 100$ mV
Max Update Rate:	1 kHz/channel (8 kHz max aggregate)
FIFO Buffer Size	1024 samples
Output Accuracy	see table below for accuracy in °C
INL (no load)	$\pm 3$ LSB (0.018%) typical
DNL (no load)	$\pm 1$ LSB (0.006%) typical
Monotonicity	16 bits guaranteed over temperature
Gain Calibration Error	$\pm 10$ $\mu$ V, typ, $\pm 20$ $\mu$ V, max
Offset Calibration Error	$\pm 5$ $\mu$ V, typ, $\pm 10$ $\mu$ V, max
Output Impedance	$< 0.5$ $\Omega$ (typ)
Current Drive	$\pm 10$ mA/channel
Settling Time	1 ms to 16 bits
Power up state	0V $\pm 1$ mV
Open TC resistance	1 M $\Omega$ minimum
<b>Diagnostic readback</b>	
Voltage range	$\pm 2$ V
Voltage accuracy	$\pm 500$ $\mu$ V
Current range	$\pm 20$ mA
Current accuracy	$\pm 100$ $\mu$ A
<b>CJC Monitoring</b>	
CJC Sensor type	ADT 7420, (included on DNA-STP-378)
CJC sensor accuracy	$\pm 0.1$ °C typical, $\pm 0.35$ °C max (-40 °C to +105 °C)
Sample/Update rate	10 Hz
Isolation	350Vrms channel-to-channel and field wiring to chassis.
Power Consumption	4.0 W (not including output loads)
Operating Temp. (tested)	-40 °C to +85 °C
Operating Humidity	95%, non-condensing
Vibration IEC 60068-2-6	5 g, 10-500 Hz, sinusoidal
IEC 60068-2-64	5 g (rms), 10-500 Hz, broad-band 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
MTBF	$> 200,000$ hours

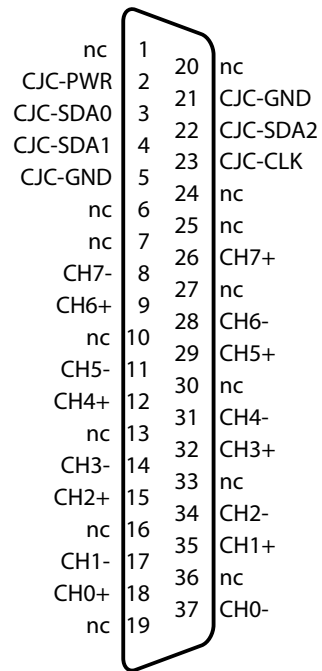
### DNx-TC-378 accuracy in °C when used with DNA-STP-378

Thermocouple Type	Typical Error at 0 °C (CJC 25°C)	Error at 0 °C (CJC -20 to 85°C)
E	$\pm 0.4$	$\pm 0.9$
J	$\pm 0.5$	$\pm 1.0$
K	$\pm 0.6$	$\pm 1.2$
N	$\pm 1.0$	$\pm 1.8$
R	$\pm 3.6$	$\pm 6.0$
S	$\pm 3.6$	$\pm 6.0$
T	$\pm 0.6$	$\pm 1.2$

Error Includes: Output voltage error, Error due to linearization math (when using UEI SW) and CJC measurement error

## Pinout Diagram:

DB-37 (female)  
37-pin connector:



## 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-TC-378	37 terminal screw terminal panel with 3 CJC sensors