10D-xTC

Linearized Thermocouple Input, Analog-Sensor-to-Digital Front End Signal Conditioner

DESCRIPTION

10D-xTC linearized thermocouple input modules are designed to interface with a wide range of standard thermocouple types commonly used in industrial test and measurement applications. Supported thermocouple types include J, K, T, R, and S.

Each module provides a single channel of differential analog input which is filtered, amplified, and converted to 24-bit digital data for precise measurement of sensor signals.

The module features industry-leading built-in cold junction compensation and delivers instrument class measurement accuracy across the entire industrial temperature range of –40°C to +85°C. For applications where sensor connection is made more than 1" away from the module, the module can be configured to use an external sensor.

Discrete output pins can be mapped to configurable low and high alarms to provide essential monitoring and warning functions to ensure optimum process flow and fail-safe operation.

Input-to-digital isolation is rated at a robust 1500Vrms and all field-side inputs are protected against accidental power-line connections up to 240Vrms. These features safeguard measurement and control equipment from the harmful effects of signal noise, transient surges, ground loops, and other industrial hazards.

Over-range and under-range up to 10% beyond specified input values are supported with accuracy guaranteed to ±full-scale. All 10D modules are housed in rugged thermoplastic packages.

FEATURES

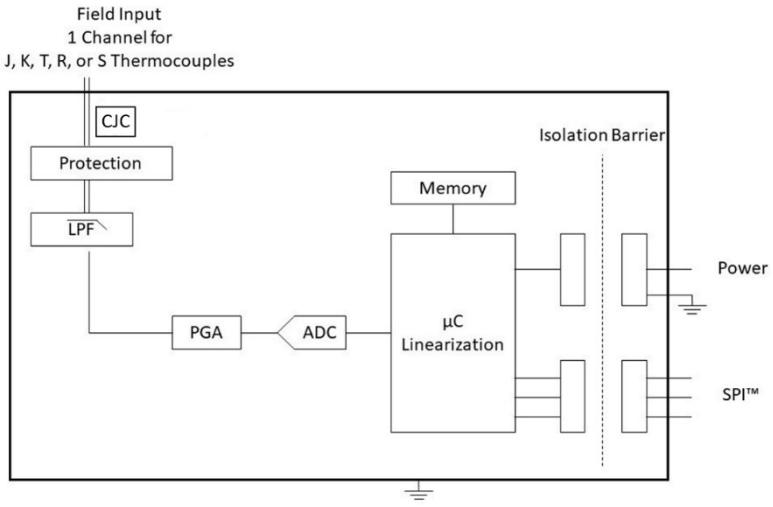
- Interface to Thermocouple Types: J, K, T, R, and S
- 1 Input Channel
- Configurable for Alarms and Averaging
- 1500Vrms Input-to-Digital Isolation
- Input Protected up to 240Vrms
- CE Compliant
- 24-Bit Resolution
- Operating Temperature: –40°C to +85°C

BENEFITS

- Small Footprint
- Simplifies Sensor Interface and Signal Conditioning Design
- Reduces System BOM
- Provides Isolation of External Sensors
- Protects Sensitive System Components
- Breaks Ground Loops
- Reduces EMC Concerns

APPLICATIONS

- Signal Conditioning
- Signal Isolation
- Signal Filtering
- Industrial Process Control
- Test and Measurement
- System and Signal Monitoring



10D-xTC Block Diagram

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Specifications

Typical* at T_A = +25°C and +3.3VDC power

Module	10D-xTC-xxx-xx
10D-xTC-xxx-xx	1-channel Thermocouple Input
Input Range	See Ordering Information
Input Protection	
Continuous	240Vrms (max)
Transient	EN61000-6-2
CMV	1500Vrms (max)
Input-to-Digital	EN61000-6-2
Transient	120dB
CMR (50Hz or 60Hz)	40dB/decade
NMR	
Accuracy	See Ordering Information
Stability	
Offset	±10ppm/°C
Gain	±50ppm/°C
Bandwidth, -3dB	3Hz
Sampling Rate	1500 S/s
Alarms	Low, High
Open Input Response	Upscale
ADC Resolution	24-bit
Discrete Inputs	1
Discrete Outputs	2
Discrete Output Drive Current	4mA
CJC	Local or Remote(3)
CJC Resolution	12-bit
Interface	SPI(4)
Clock Input	1MHz (max)
SPI Mode	1
Bit Order	MSB First
Power Supply Voltage	+3.0 to +5.25VDC
Power Supply Current	46mA
Mechanical Dimensions (h)(w)(d)	0.350" x 2.00" x 1.00" (8.89mm x 50.8mm x 25.4mm)
Environmental	
Operating Temp. Range	–40°C to +85°C
Storage Temp. Range	–40°C to +85°C
Relative Humidity	0 to 95% Noncondensing
Emissions EN61000-6-4	ISM, Group 1
Radiated, Conducted	Class A
Immunity EN61000-6-2	ISM, Group 1
RF	Performance A ±0.5% Span Error
ESD, EFT	Performance B

Ordering Information

Model	TC Type‡	Input Range	Output	Accuracy(2)	
10D-JTC-1H1-01	J	-100°C to +760°C	SPI	±0.03%	±0.26°C
10D-JTC-1H1-02	J	-100°C to +375°C	SPI	±0.03%	±0.14°C
10D-JTC-1H1-03	J	-100°C to +173°C	SPI	±0.03%	±0.08°C
10D-JTC-1H1-04	J	-23°C to +70°C	SPI	±0.06%	±0.06°C
10D-KTC-1H1-01	K	-100°C to +1350°C	SPI	±0.03%	±0.44°C
10D-KTC-1H1-02	K	-100°C to +633°C	SPI	±0.03%	±0.22°C
10D-KTC-1H1-03	K	-100°C to +304°C	SPI	±0.03%	±0.12°C
10D-TTC-1H1-02	T	-100°C to +400°C	SPI	±0.03%	±0.15°C
10D-TTC-1H1-03	T	-100°C to +209°C	SPI	±0.04%	±0.12°C
10D-TTC-1H1-04	T	-56°C to +97°C	SPI	±0.06%	±0.09°C
10D-RTC-1H1-02	R	0°C to +1768°C	SPI	±0.03%	±0.53°C
10D-RTC-1H1-03	R	0°C to +1040°C	SPI	±0.05%	±0.52°C
10D-STC-1H1-02	S	0°C to +1768°C	SPI	±0.04%	±0.71°C
10D-STC-1H1-03	S	0°C to +1123°C	SPI	±0.05%	±0.56°C

‡Thermocouple Alloy Combinations

Standards: DIN IEC 548, ANSI MC96-1-82, JIS C 1602-1981

Type	Material
J	Iron vs. Copper-Nickel
K	Nickel-Chromium vs. Nickel-Aluminum
T	Copper vs. Copper-Nickel
R	Platinum-13% Rhodium vs. Platinum
S	Platinum-10% Rhodium vs. Platinum

NOTES:
*Contact factory or your local Dataforth sales office for maximum values.
(1) 240Vrms between +IN and -IN pins.
(2) Includes conformity, hysteresis and repeatability. Does not include CJC accuracy.
(3) Remote sense using 2N3906 PNP transistor.
(4) Refer to timing diagram in user manual.

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