

10D-RTD3



Linearized 3-Wire RTD Input, Analog-Sensor-to-Digital Signal Conditioner

DESCRIPTION

10D-RTD3 linearized temperature input modules are designed to interface with 3-wire Pt100 sensors used in industrial, test, and measurement applications.

Each module provides a single channel of temperature input that is filtered, isolated, amplified, and converted into 24-bit digital data for precise measurement of temperature signals.

RTD excitation is provided by the module using a precision current source. Excitation current does not flow in the input signal leads, which allows RTD measurements to be made independently of lead resistance. Low excitation current (250µA) minimizes self-heating of the RTD, further reducing measurement errors.

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 \pm full-scale. All 10D modules are housed in rugged thermoplastic packages and are specified to operate over the industrial temperature range of -40°C to $+85^{\circ}\text{C}$.

FEATURES

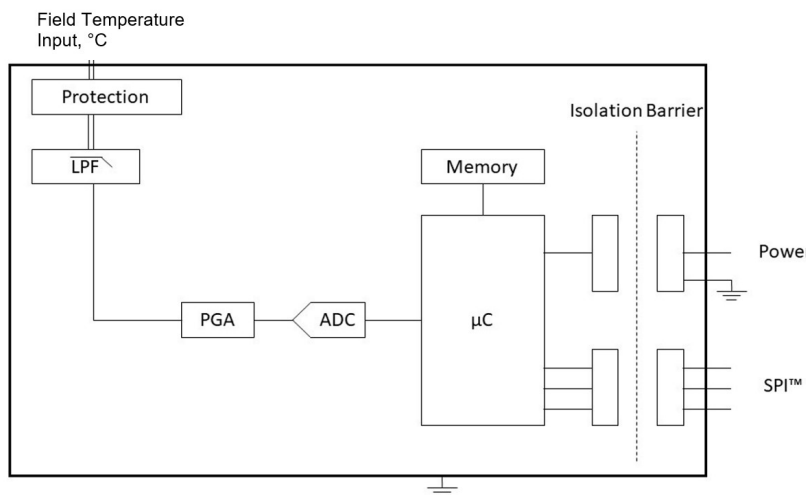
- Interface to 100Ω Platinum RTDs
- 1 Input Channel
- Configurable for Alarms and Averaging
- Linearizes RTD Signals
- 1500Vrms Input-to-Digital Isolation
- Input Protected up to 240Vrms
- CE Compliant
- 24-Bit Resolution
- Operating Temperature: -40°C to $+85^{\circ}\text{C}$

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-RTD3 Block Diagram

Specifications

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

| Module | 10D-RTD3-xxx-xx |
|--|--|
| 10D-RTD3-xxx-xx | 1-channel Pt100 RTD Input |
| Input Range | See Ordering Information |
| Input Protection Continuous ⁽¹⁾ Transient | 240Vrms (max) EN61000-6-2 |
| Sensor Excitation Current | 250µA |
| Lead Resistance Effect | ±0.005°C/Ω ⁽²⁾ |
| CMV | |
| Input-to-Digital Transient | 1500Vrms (max) EN61000-6-2 |
| CMR (50Hz or 60Hz) | 120dB |
| NMR | 40dB/decade |
| Accuracy | See Ordering Information |
| Stability Offset Gain | ±20 ppm/°C ±50 ppm/°C |
| Bandwidth, -3dB | 3Hz |
| Sampling Rate | 2000 S/s |
| Alarms | Low, High |
| Open Input Response | Upscale |
| ADC Resolution | 24-bit |
| Discrete Inputs | 1 |
| Discrete Outputs | 2 |
| Discrete Output Current Drive | 4mA |
| 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 | 52mA |
| 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 Immunity | Class A |
| EN61000-6-2 | ISM, Group 1 |
| RF | Performance A ±0.5% Span |
| ESD, EFT | Error Performance B |

NOTES:

*Contact factory or your local Dataforth sales office for maximum values.

(1) 240Vrms between +IN and -IN, +EXC, or -EXC pins.

120Vrms between -IN and +EXC, or -EXC pins.

120Vrms between +EXC and -EXC pins.

(2) "Ω" refers to the resistance in one lead.

(3) Includes linearity/conformity, hysteresis, and repeatability.

(4) Refer to timing diagram in user manual.

Ordering Information

| Model | Input Range | Output | Accuracy ⁽³⁾ | |
|-----------------|------------------|--------|-------------------------|---------|
| 10D-RTD3-1H1-01 | -200°C to +850°C | SPI | ±0.03% | ±0.32°C |
| 10D-RTD3-1H1-02 | -200°C to +395°C | SPI | ±0.03% | ±0.18°C |
| 10D-RTD3-1H1-03 | -179°C to +191°C | SPI | ±0.03% | ±0.11°C |
| 10D-RTD3-1H1-04 | -92°C to +94°C | SPI | ±0.04% | ±0.07°C |

RTD Standards

| Type | Alpha Coefficient | DIN | JIS | IEC |
|---------|-------------------|-----------|-----------------|--------|
| 100Ω Pt | 0.00385 | DIN 43760 | JIS C 1604-1989 | IEC751 |