

## TEMPERATURE SENSOR IC

### FEATURES

- Linear Output Voltage 10 mV/°C Output
- Active High On/Off Control
- 4.5 to 10.0 V Supply Range
- Miniature Package (SOT-25)
- Minimum External Parts Count
- Low Power Consumption

### DESCRIPTION

The TK11031 is a temperature sensor IC with a linear output of 10 mV/°C over the range of -30 to +105 °C. Its wide operating voltage range of 4.5 to 10.0 V makes it suitable for a number of applications requiring accurate temperature control, such as electronic thermostats for climate control, refrigerators, and industrial process controls. The device is in the "on" state when the control pin is pulled to a logic high level.

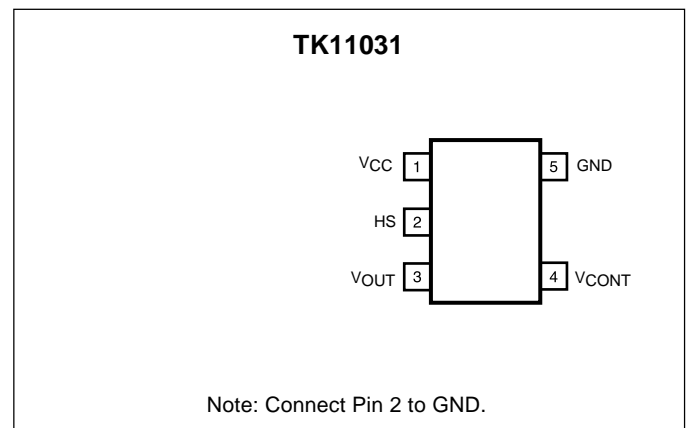
A typical application is to make a digital representation of temperature with an A/D converter, or to make a thermal detector with a comparator.

The TK11031 has a compensation pin for a 0.1 μF capacitor that ensures stability over the IC's operating temperature range.

The TK11031 is available in a miniature SOT-25 surface mount package.

### APPLICATIONS

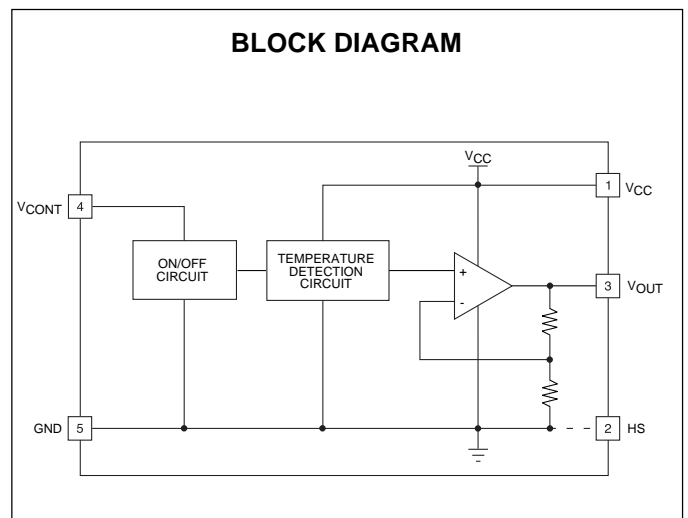
- Home and Industrial Thermostats
- Automotive Climate Control
- Battery Charger Temperature Monitor
- Notebook Computer Temperature Monitor
- Electronic Thermometers
- Fish Finder Water Temperature
- Industrial Process Controllers
- Home Appliance Temperature Control



**ORDERING INFORMATION**

TK11031M Tape/Reel Code

TAPE/REEL CODE  
TL: Tape Left



# TK11031

## ABSOLUTE MAXIMUM RATINGS

|                                  |             |   |                |
|----------------------------------|-------------|---|----------------|
| Supply Voltage .....             | 12 V        | Storage Temperature Range .....         | -55 to +150 °C |
| Operating Voltage .....          | 4.5 to 10 V | Operating Temperature Range .....       | -30 to +105 °C |
| Power Dissipation (Note 1) ..... | 150 mW      | Lead Soldering Temperature (10 s) ..... | 235 °C         |
| Junction Temperature .....       | 150 °C      |   |                |

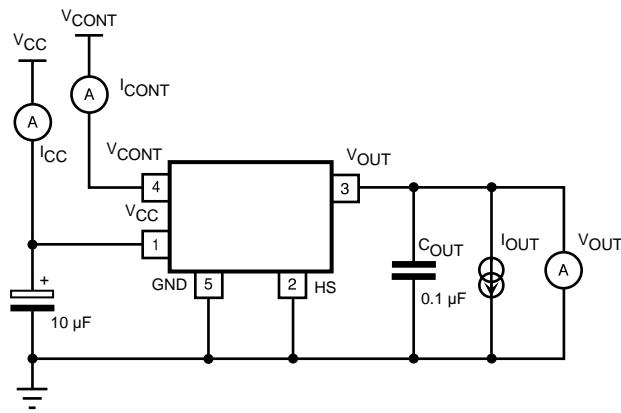
## TK11031 ELECTRICAL CHARACTERISTICS

Test Conditions:  $V_{CC} = 5.0\text{ V}$ ,  $V_{CONT} = 2.4\text{ V}$ ,  $I_{OUT} = 0\text{ }\mu\text{A}$ ,  $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise specified.

| SYMBOL                                 | PARAMETER               | TEST CONDITIONS  | MIN   | TYP   | MAX      | UNITS         |
|--|-------------------------|--|-------|-------|----------|---------------|
| $V_{OUT}$                              | Output Voltage          | $T_A = 25\text{ }^\circ\text{C}$                               | 2.952 | 2.982 | 3.012    | V             |
|  |                         | $T_A = 85\text{ }^\circ\text{C}$                               | 3.551 | 3.591 | 3.631    | V             |
|  |                         | $T_A = -30\text{ }^\circ\text{C}$                              |       | 2.435 |          | V             |
| $T_C$                                  | Temperature Coefficient | $T_A = 25\text{ }^\circ\text{C}$ to $85\text{ }^\circ\text{C}$ | 9.35  | 10.15 | 10.95    | mV/°C         |
| Line Reg                               | Line Regulation         | $V_{CC} = 5$ to $10\text{ V}$                                  | -20   | 5     | 20       | mV            |
| Load Reg                               | Load Regulation         | $I_{OUT} = 0$ to $400\text{ }\mu\text{A}$                      |       | 3     | 20       | mV            |
| $I_{CC}$                               | Supply Current          |  |       | 90    | 150      | $\mu\text{A}$ |
| $I_{OUT}$                              | Output Current          | $\Delta V_{OUT} \leq 20\text{ mV}$                             |       |       | 400      | $\mu\text{A}$ |
| $I_{CC(STBY)}$                         | Standby Supply Current  | $V_{CONT} \leq 0.6\text{ V}$                                   |       |       | 1        | $\mu\text{A}$ |
| <b>CONTROL TERMINAL SPECIFICATIONS</b> |                         |  |       |       |          |               |
| $V_{CONT(ON)}$                         | Control Voltage (ON)    | $V_{OUT} = 2.952$ to $3.012\text{ V}$ , Output ON              | 1.8   | 2.4   | $V_{CC}$ | V             |
| $V_{CONT(OFF)}$                        | Control Voltage (OFF)   | $V_{OUT} \leq 0.1\text{ V}$ , Output OFF                       | GND   |       | 0.6      | V             |
| $I_{CONT}$                             | Control Current         |  |       | 4.5   | 7.5      | $\mu\text{A}$ |

Note 1: Power dissipation is 150 mW when mounted as recommended. Derate at 1.2 mW/°C for operation above 25 °C.

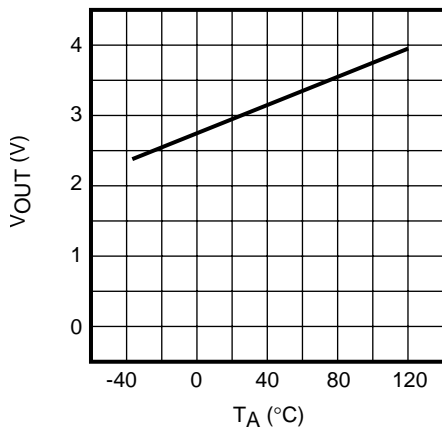
**TEST CIRCUIT**



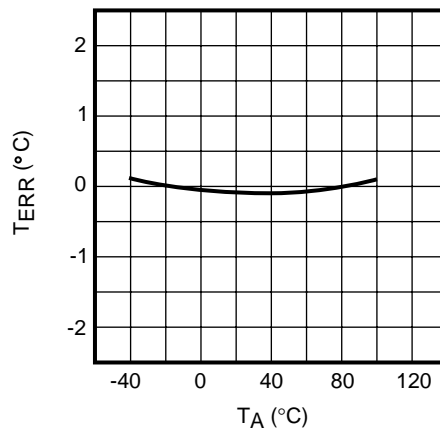
**TYPICAL PERFORMANCE CHARACTERISTICS**

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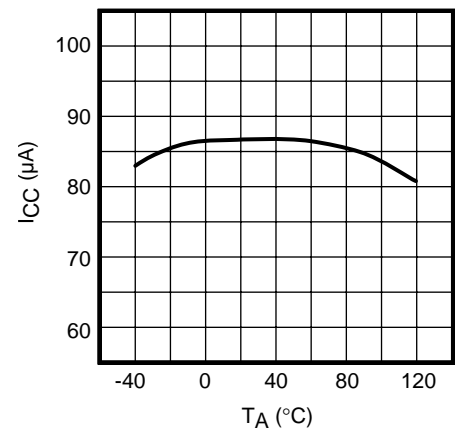
**OUTPUT VOLTAGE vs. TEMPERATURE**



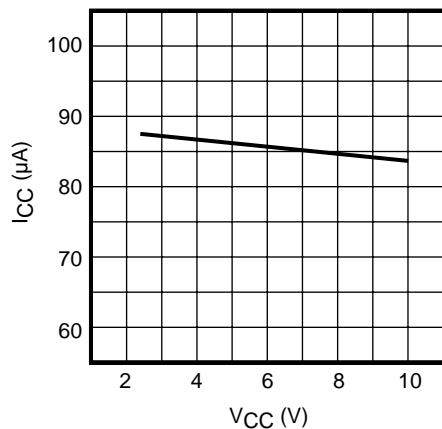
**LINEARITY ERROR vs. TEMPERATURE**



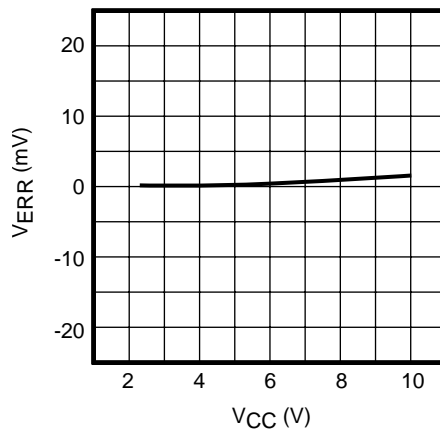
**INPUT CURRENT vs. TEMPERATURE**



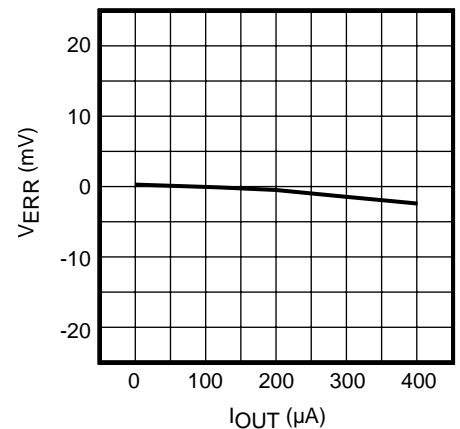
**INPUT CURRENT vs. INPUT VOLTAGE**



**LINE REGULATION**

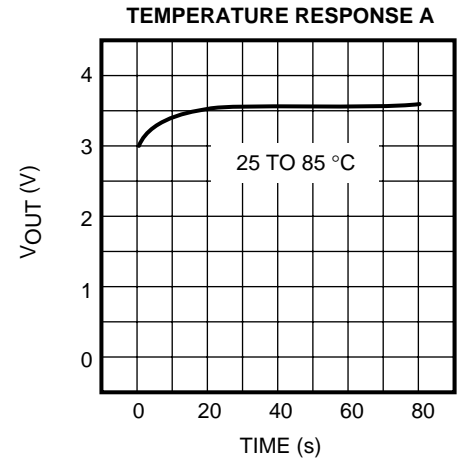
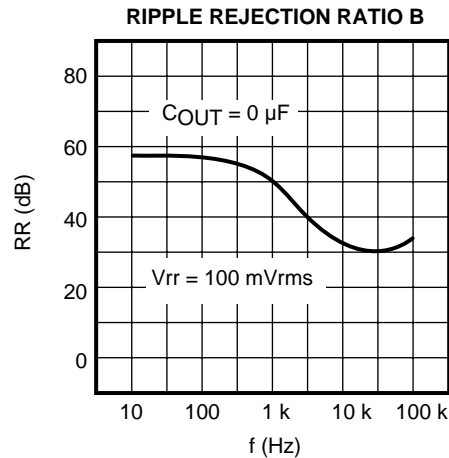
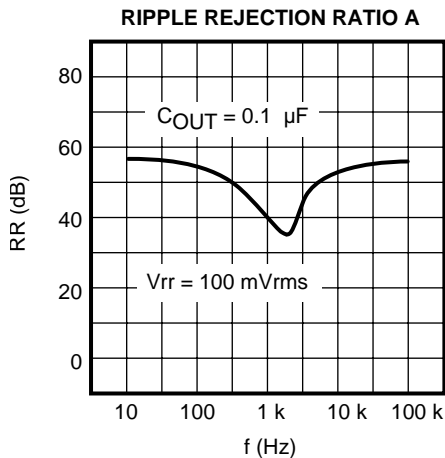
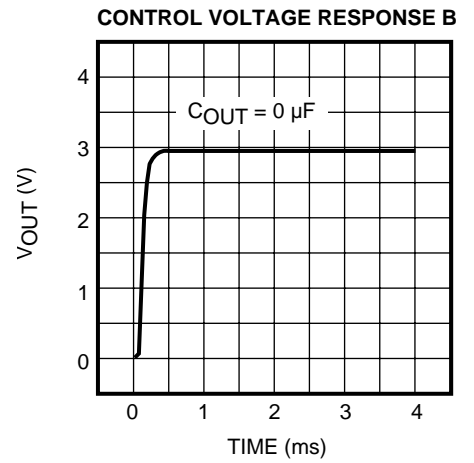
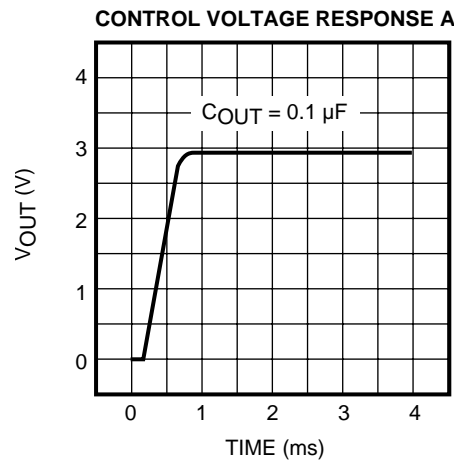
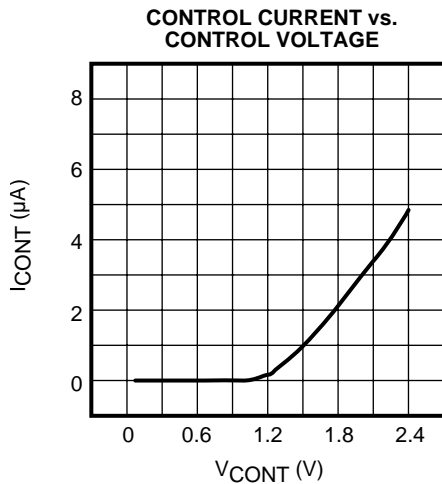
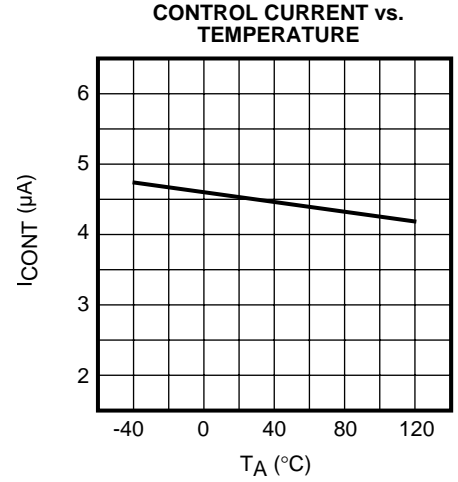
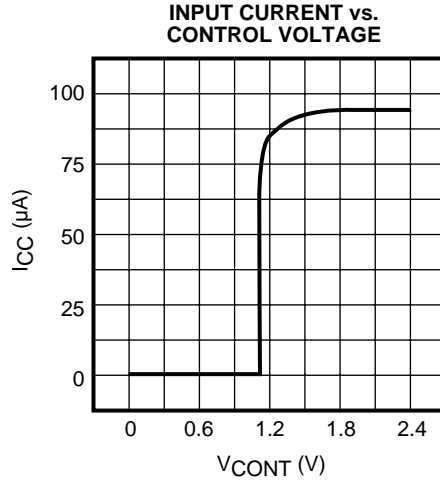
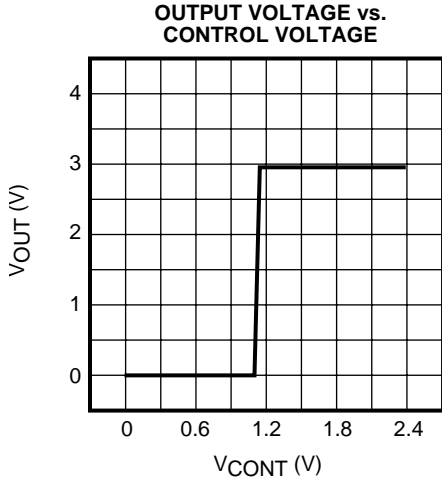


**LOAD REGULATION**



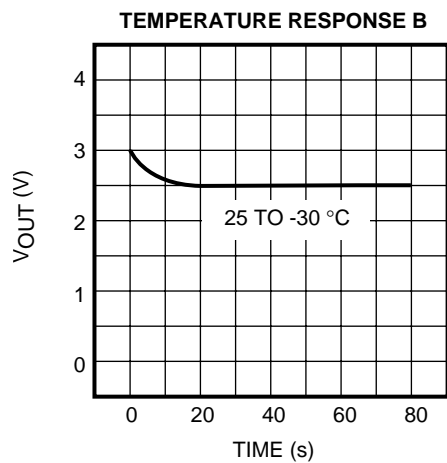
**TYPICAL PERFORMANCE CHARACTERISTICS (CONT.)**

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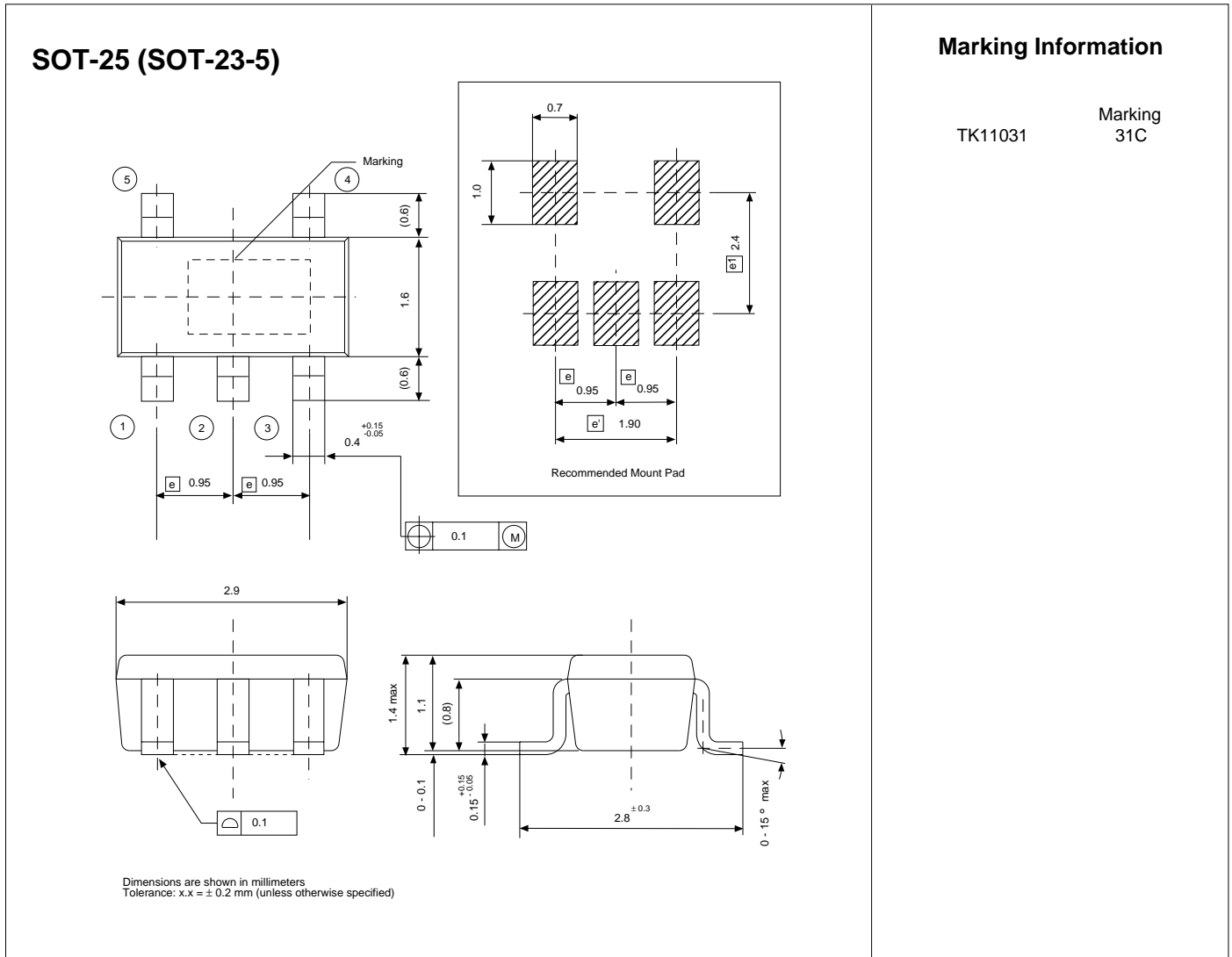


**TYPICAL PERFORMANCE CHARACTERISTICS (CONT.)**

$V_{CC} = 5\text{ V}$ ,  $V_{CONT} = 2.4\text{ V}$ ,  $I_{OUT} = 0\text{ }\mu\text{A}$ ,  $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise specified.



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