NEGATIVE SLOPE TEMPERATURE SENSOR IC

FEATURES

- **Linear Output Voltage -8 mV/°C Output**
- **Active High On/Off Control**
- **2.7 to 10.0 V Supply Range**
- **Miniature Package (SOT-23-5)**
- **Minimum External Parts Count**
- **Low Power Consumption**

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**
- **Liquid Crystal Panel Contrast Adjustment**

DESCRIPTION

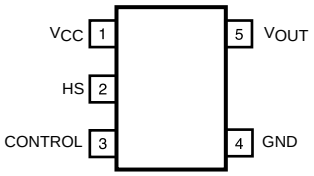
The TK11070 is a temperature sensor IC with a linear negative slope output of -8 mV/°C over the range of -30 to + 105 °C. Its wide operating voltage range of 2.7 to 10.0 V makes it suitable for a number of applications requiring accurate temperature control, such as electronic thermostats for climate control, refrigerators, and industrial process controls. The device is in the “on” state when the control pin is pulled to a logic high level. In the ”off” state, the standby current is 1 µA maximum.

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 TK11070 has a compensation pin for a 0.1 µF capacitor that ensures stability over the IC's operating temperature range.

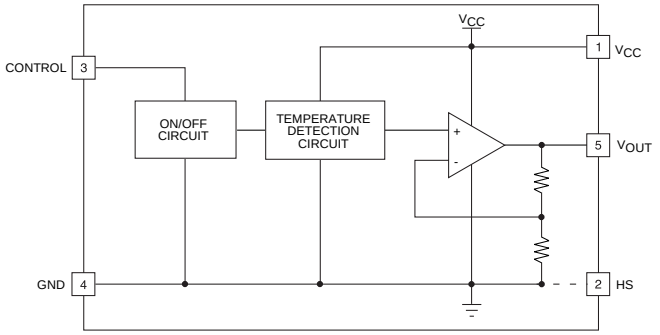
The TK11070 is available in a miniature SOT-23-5 surface mount package.

TK11070



Note: Pin 2 must connect to GND

BLOCK DIAGRAM



ORDERING INFORMATION

TK11070M □□

Tape/Reel Code

TAPE/REEL CODE
TL: Tape Left

ABSOLUTE MAXIMUM RATINGS

Supply Voltage ..... 12 V
Operating Voltage ..... 2.7 to 10.0 V
Power Dissipation (Note 1) ..... 150 mW
Junction Temperature ..... 150 °C
Storage Temperature Range ..... -55 to +150 °C
Operating Temperature Range ..... -30 to +105 °C
Lead Soldering Temperature (10 s) ..... 235 °C

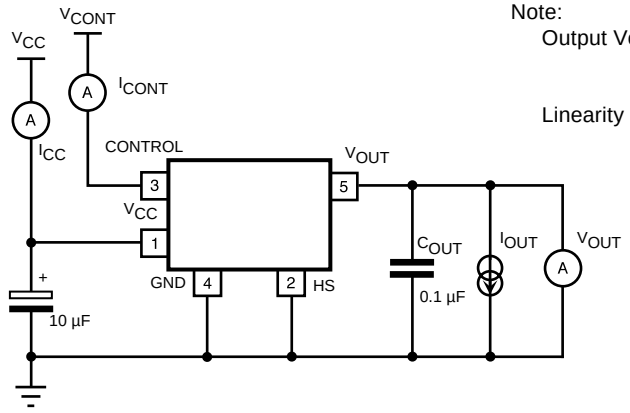
TK11070 ELECTRICAL CHARACTERISTICS

Test Conditions: V_{CC} = 3.0 V, V_{CONT} = 2.4 V, I_{OUT} = 0 µA, T_A = 25 °C, unless otherwise specified.

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
V_{OUT}	Output Voltage	T_A = -30 ° C		2.440		V
		T_A = -25° C	1.980	2.000	2.020	V
		T_A = 85 ° C	1.492	1.520	1.548	V
T_C	Temperature Coefficient	T_A = 25 to 85 ° C	-8.5	-8.0	-7.5	mV/° C
Line Reg	Line Regulation	V_{CC} = 3 to 10 V	-4	2	8	mV
Load Reg	Load Regulation	I_{OUT} = 0 µA to ± 10 µA	-8	0	8	mV
I_{CC}	Supply Current	V_{CONT} = 2.4 V		75	100	µA
I_{OUT}	Output Current	$\Delta V_{OUT} \leq$ 20 mV	-100		10	µA
I_{STBY}	Standby Supply Current	$V_{CONT} \leq$ 0.6 V			1	µA
CONTROL TERMINAL SPECIFICATIONS						
I_{CONT}	Control Current		2.0	3.5	6.0	µA
$V_{CONT(ON)}$	Control Voltage (ON)	V_{OUT} = 1.98 to 2.02 V, Output ON	1.8	2.4	V_{CC}	V
$V_{CONT(OFF)}$	Control Voltage (OFF)	V_{OUT} < 0.1 V, Output OFF	GND		0.6	V

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

TEST CIRCUIT



Note:

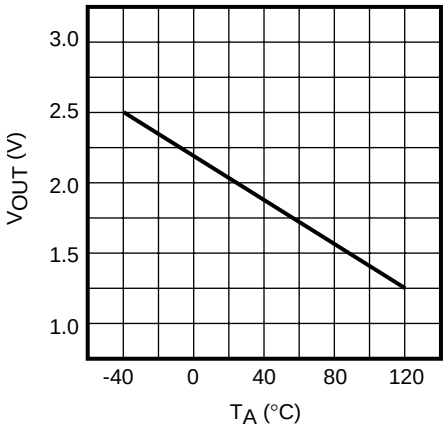
Output Voltage: $V_{OUT(TYP)} = 2.2\ V + (-8\ mV/°C) \times T_A$
where T_A is in °C

Linearity Error: $V_{ERR} = V_{OUT} - V_{OUT(TYP)}$
$T_{ERR} = V_{ERR} / (-8\ mV/°C)$

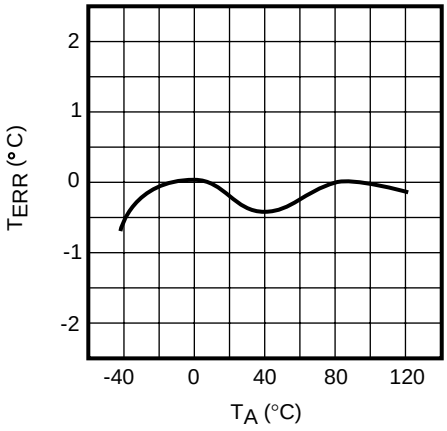
TYPICAL PERFORMANCE CHARACTERISTICS

V_{CC} = 3 V, V_{CONT} = 2.4 V, I_{OUT} = 0 µA, T_A = 25 °C, unless otherwise specified.

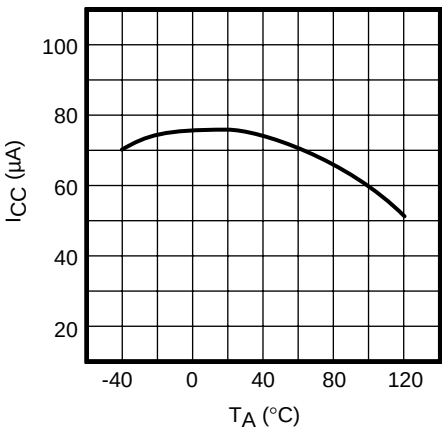
OUTPUT VOLTAGE vs. TEMPERATURE



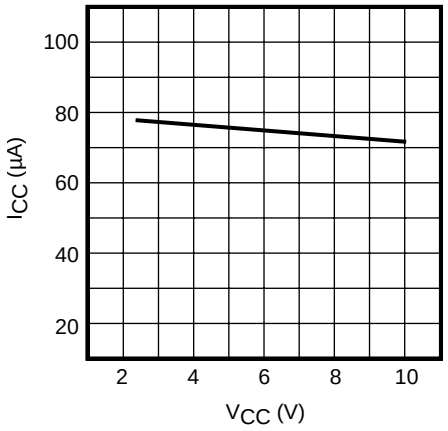
LINEARITY ERROR vs. TEMPERATURE



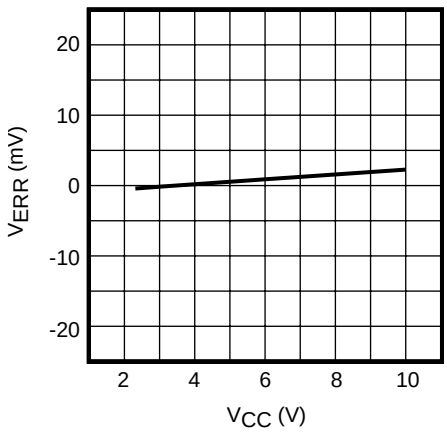
INPUT CURRENT vs. TEMPERATURE



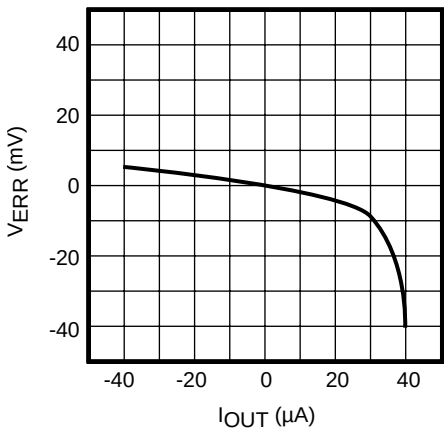
INPUT CURRENT vs. INPUT VOLTAGE



LINE REGULATION



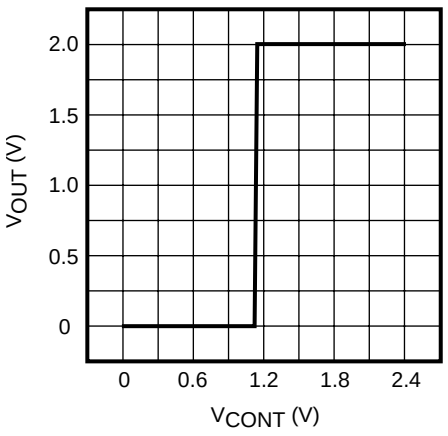
LOAD REGULATION



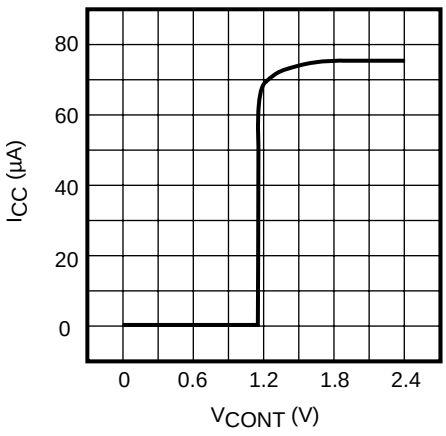
TYPICAL PERFORMANCE CHARACTERISTICS (CONT.)

V_{CC} = 3 V, V_{CONT} = 2.4 V, I_{OUT} = 0 µA, T_A = 25 °C, unless otherwise specified.

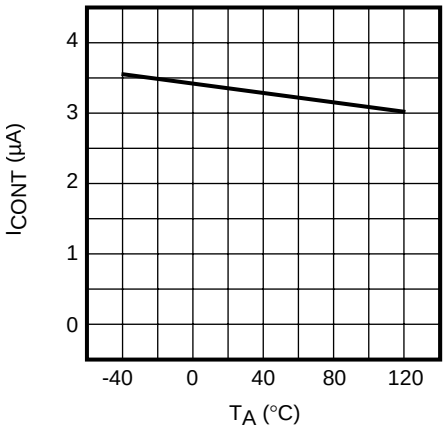
OUTPUT VOLTAGE vs. CONTROL VOLTAGE



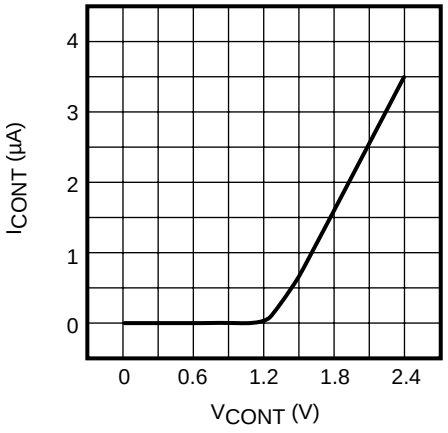
INPUT CURRENT vs. CONTROL VOLTAGE



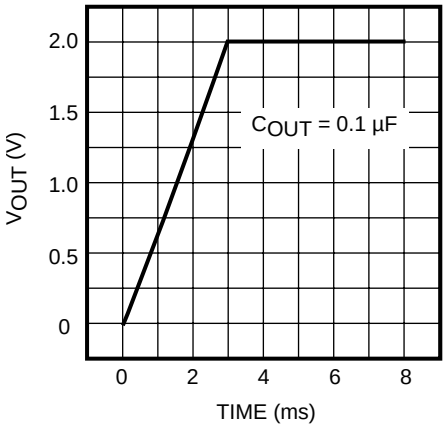
CONTROL CURRENT vs. TEMPERATURE



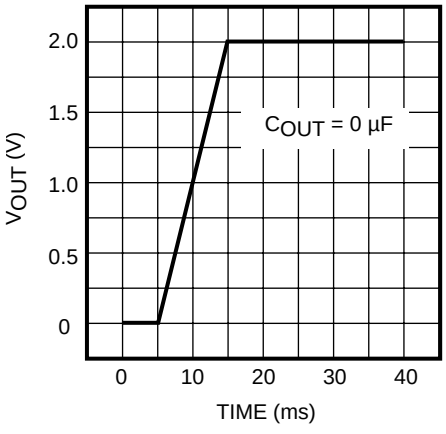
CONTROL CURRENT vs. CONTROL VOLTAGE



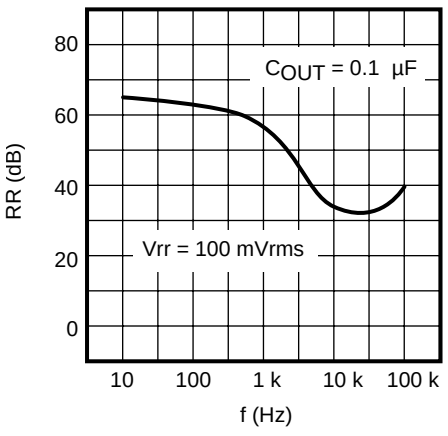
CONTROL VOLTAGE RESPONSE A



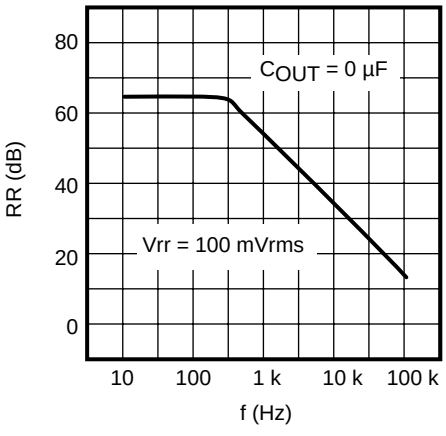
CONTROL VOLTAGE RESPONSE B



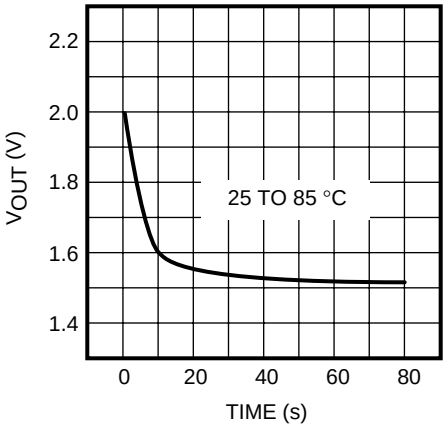
RIPPLE REJECTION RATIO A



RIPPLE REJECTION RATIO B



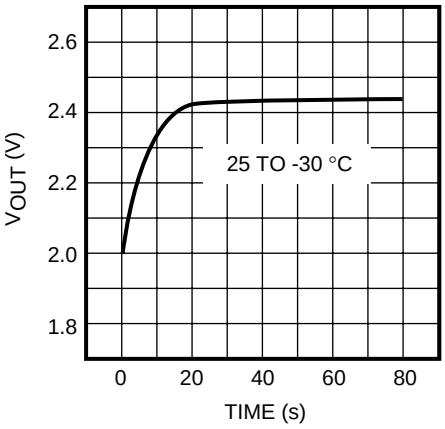
TEMPERATURE RESPONSE A



TYPICAL PERFORMANCE CHARACTERISTICS (CONT.)

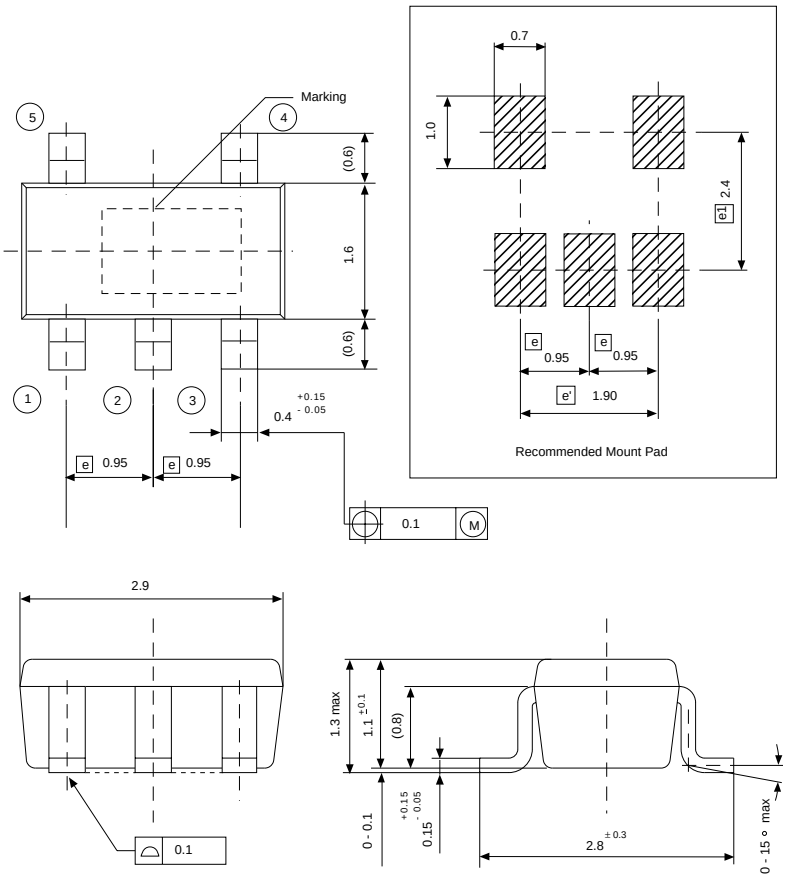
V_{CC} = 3 V, V_{CONT} = 2.4 V, I_{OUT} = 0 µA, T_A = 25 °C, unless otherwise specified.

TEMPERATURE RESPONSE B



PACKAGE OUTLINE

SOT-26 (SOT-23-6)



Dimensions are shown in millimeters
Tolerance: x.x = ± 0.2 mm (unless otherwise specified)

Marking Information

	Marking
TK11070	70C

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