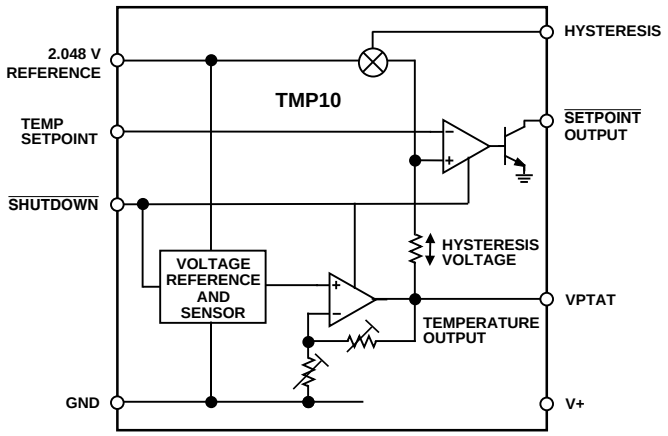
Single-Setpoint Temperature Controller

TMP10

FEATURES
Low Voltage Operation (2.7 V to 5.5 V)
Calibrated Directly in °C
10 mV/°C Scale Factor
±3°C Accuracy Over Temperature
±0.5°C Linearity (typ)
Onboard 2.048 V Precision Reference
Programmable Comparator Hysteresis
Either 1°C, 2°C, or 5°C
Specified –40°C to +125°C, Operation to +150°C
100 μA Max Quiescent Current
Shutdown Current: 1 μA max

APPLICATIONS
Environmental Control Systems
Thermal Protection
Battery Chargers
Fire Alarms
Power System Monitors
Power Supplies
CPU Thermal Management

FUNCTIONAL BLOCK DIAGRAM



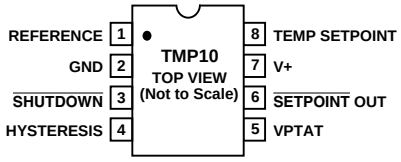
GENERAL DESCRIPTION

The TMP10 is a low voltage, precision, centigrade temperature sensor and controller. A voltage output that is linearly proportional to the Celsius (Centigrade) temperature, the VPTAT output, provides temperature measurement from –40°C to +125°C. The output scale factor is +10 mV/°C. The TMP10 does not require external calibration to provide typical accuracies of ±1°C at 25°C and ±2°C over the operating temperature range. An open-collector output comparator, and an onboard 2.048 V reference allow a single temperature setpoint to be established using two external resistors. One of three levels of thermal hysteresis, 1°C, 2°C, or 5°C, may be chosen for the temperature setpoint using the hysteresis pin. The hysteresis level is determined by connecting the hysteresis pin to: V_{REF}, GND, or leaving it floating. The TMP10 is designed for single supply operation from 2.7 V to 5.5 V. Supply current runs well below 100 μA providing very low self-heating, less than 0.1°C in still air. In addition, a shutdown function is provided to cut supply current to less than 1 μA for battery-powered applications. The TMP10 operates linearly up to +125°C from a single 2.7 V supply. Operation extends to +150°C with reduced accuracy when operating from a 5 V supply.

The TMP10 is available in 8-pin DIP, and SO-8 and TSSOP-8 surface-mount packages.

PIN CONFIGURATIONS

Plastic DIP, SO-8 and TSSOP-8 Packages



ORDERING GUIDE

Model	Accuracy at 25°C (°C max)	Linear Operating Temperature Range	Package Option*
TMP10FS	±2.0	–40°C to +125°C	SO-8
TMP10GS	±3.0	–40°C to +125°C	SO-8
TMP10GRU	±3.0	–40°C to +125°C	TSSOP-8
TMP10GP	±3.0	–40°C to +125°C	PDIP-8

*For outline information see Package Information section.

TMP10–SPECIFICATIONS (V_S = +2.7 V to +5.5 V, –40°C ≤ T_A ≤ +125°C unless otherwise noted.)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
VPTAT ACCURACY						
TMP10F		T_A = +25°C		±1	±2	°C
TMP10G		T_A = +25°C		±1	±3	°C
TMP10F		Over Rated Temperature		±2	±3	°C
TMP10G		Over Rated Temperature		±2	±4	°C
VPTAT OUTPUT						
Scale Factor		Over Rated Temperature		+10	+9.8/+10.2	mV/°C
Nominal Output Voltage	VPTAT	T_A = –40°C		100		mV
Nominal Output Voltage	VPTAT	T_A = +25°C		750		mV
Nominal Output Voltage	VPTAT	T_A = +125°C		1750		mV
Output Voltage Range			100		2000	mV
Output Load Current	I_L	Over Rated Temperature	0		200	µA
Capacitive Load Driving	C_L	No Oscillations (Note 1)	1000	10,000		pF
Device Turn-On Time		Output within ±1°C 100 kΩ//100 pF Load		0.5	1	ms
Power Supply Rejection Ratio	PSRR	Over Rated Supply		0.5		°C/V
Nonlinearity		Over Rated Temperature		0.5		°C
Long-Term Stability		T_A = +125°C for 1 kHrs		0.1		°C
REFERENCE						
Output Voltage	V_{REF}	T_A = +25°C	2.040	2.048	2.056	V
Output Voltage	V_{REF}	Over Rated Temperature	2.036	2.048	2.060	V
Temperature Coefficient	TC	Over Rated Temperature		15		ppm/°C
Output Current	I_{REF}	Over Rated Temperature			25	µA
COMPARATOR						
Offset Voltage	V_{OS}	T_A = +25°C		1		mV
Input Bias Current	I_B	T_A = +25°C		10	25	nA
Open-Collector Output	V_{OUT}	Over Rated Temperature I_{LOAD} = 400 µA			0.4	V
Open-Collector Output	I_{OUT}	Over Rated Temperature	0.5	1		mA
Hysteresis		Low		1		°C
		Medium		2		°C
		High		5		°C
SHUTDOWN INPUT						
Input High Voltage	V_{IH}	V_S = 2.7 V	1.8			V
Input Low Voltage	V_{IL}	V_S = 5.5 V			800	mV
POWER SUPPLY						
Supply Range	$+V_S$		2.7		5.5	V
Supply Current	I_{SY}	Unloaded at +5.5 V			100	µA
Shutdown Current	I_{SD}	Unloaded at +5.5 V		0.1	1	µA

Specifications subject to change without notice.