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TC1046

High Precision Temperature-to-Voltage Converter

Features

- Supply Voltage Range: 2.7V to 4.4V
- Wide Temperature Measurement Range: -40ºC to +125ºC
- High Temperature Converter Accuracy: ± 2ºC, Max, at 25°C
- Linear Temperature Slope: 6.25mV/ºC
- Very Low Supply Current: 35μA Typical
- Small 3-Pin SOT-23B Package

Applications

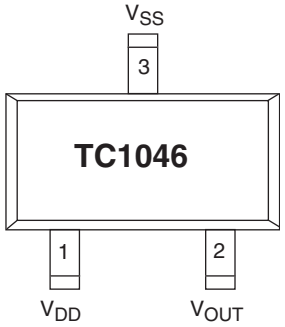
- Cellular Phones
- Power Supply Thermal Shutdown
- Temperature Controlled Fans
- Temperature Measurement/Instrumentation
- Temperature Regulators
- Consumer Electronics
- Portable Battery Powered Equipment

Device Selection Table

Part Number	Package	Temp. Range
TC1046VNB	3-Pin SOT-23B	-40°C to +125°C

Package Type

3-Pin SOT-23B*



Note: *3-Pin SOT-23B is equivalent to JEDEC TO-236

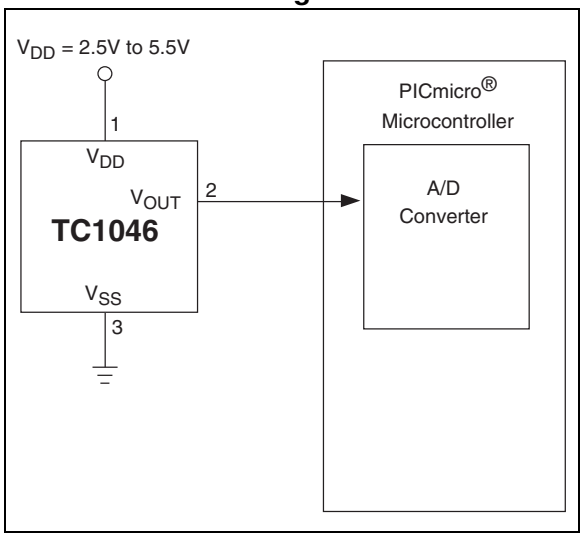
General Description

The TC1046 is a linear output temperature sensor whose output voltage is directly proportional to measured temperature. The TC1046 can accurately measure temperature from -40°C to +125°C.

The output voltage range for these devices is typically 174mV at -40°C, 424mV at 0°C, 580 mV at +25°C, and 1205mV at +125°C. A 6.25mV/°C voltage slope allows for the wide temperature range.

The TC1046 is packaged in a 3-Pin SOT-23B package, making them ideal for space critical applications.

Functional Block Diagram



1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings*

Supply Voltage .....+7V
Voltage on Any Pin with Respect to Supplies:
.....V_{SS} -0.3 to V_{DD} + 0.3V
Operating Temperature .....-40°C to +125°C
Storage Temperature Range .....-55°C to +150°C

*Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions above those indicated in the operation sections of the specifications is not implied. Exposure to Absolute Maximum Rating conditions for extended periods may affect device reliability.

TC1046 ELECTRICAL SPECIFICATIONS

Electrical Characteristics: These specifications apply for the entire supply voltage range and for T_A = -40°C to +125°C, unless otherwise specified.

Symbol	Parameter	Min	Typ	Max	Units	Test Conditions
V_{DD}	Supply Voltage	2.7	—	4.4	V	
I_Q	Supply Current, Operating	—	35	60	µA	
A_V	Average Slope of Output Voltage	—	6.25	—	mV/°C	
TMP_{ACY}	Temperature Accuracy at 25°C	-2 -3 —	±0.5 ±0.5 1.0	+2 +3 —	°C °C °C	T_A = 25°C T_A = +125°C T_A = -40°C
V_{OUT}	Output Voltage	— 568 1187	174 580 1205	193 592 1224	mV mV mV	T_A = -40°C T_A = 25°C T_A = +125°C
I_{OUT}	Output Source and Sink Current	100	—	—	µA	

2.0 PIN DESCRIPTIONS

The descriptions of the pins are listed in Table 2-1

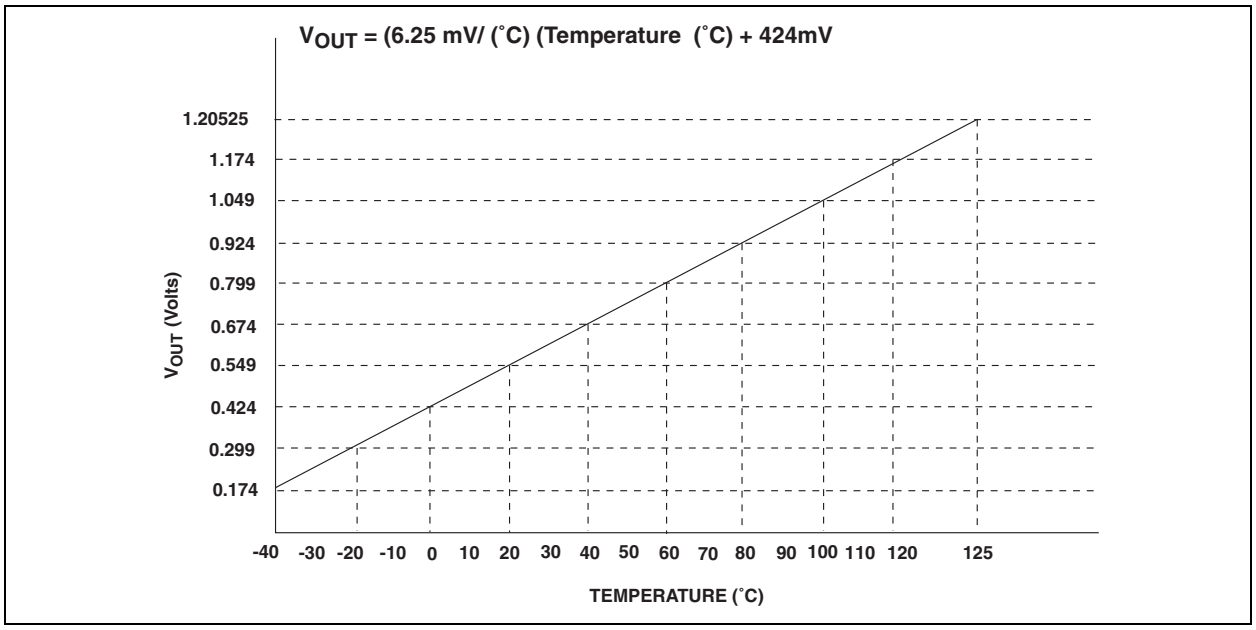
TABLE 2-1: PIN FUNCTION TABLE

Pin Number (3-Pin SOT-23B)	Symbol	Description
1	V_{DD}	Input Supply Voltage
2	V_{OUT}	Temperature Sensor Output
3	V_{SS}	Ground

3.0 DETAILED DESCRIPTION

The TC1046 has an output voltage that varies linearly with temperature in degrees Celsius. See Figure 3-1, “Output Voltage versus Temperature” for the TC1046. The temperature slope is fixed at 6.25mV/°C and the output voltage at 0°C is 424mV.

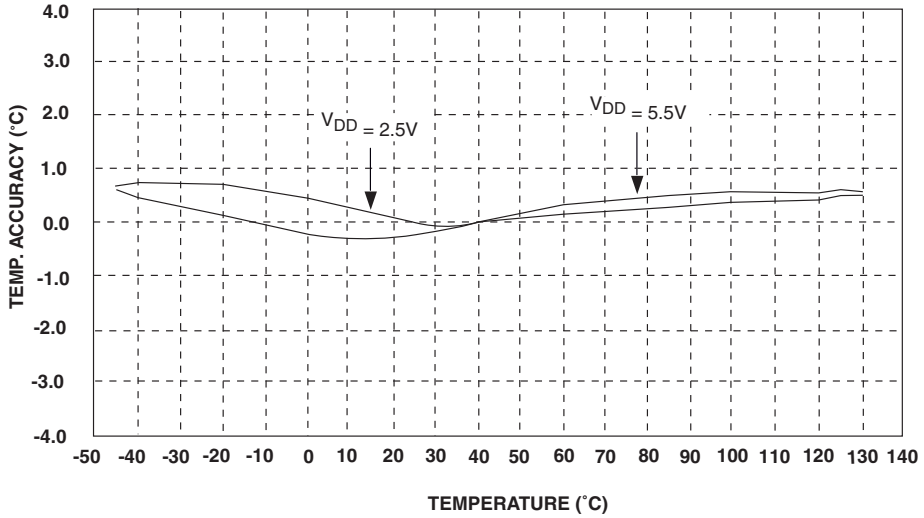
FIGURE 3-1: OUTPUT VOLTAGE VS. TEMPERATURE



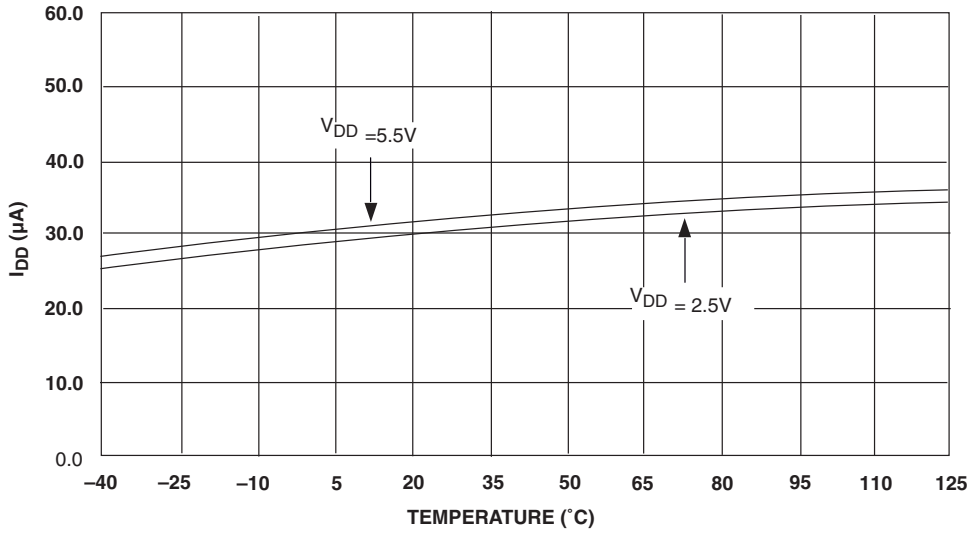
4.0 TYPICAL CHARACTERISTICS

Note: The graphs and tables provided following this note are a statistical summary based on a limited number of samples and are provided for informational purposes only. The performance characteristics listed herein are not tested or guaranteed. In some graphs or tables, the data presented may be outside the specified operating range (e.g., outside specified power supply range) and therefore outside the warranted range.

Temperature Accuracy vs. Temperature

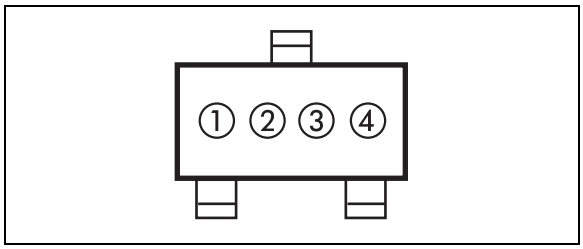


Supply Current I_{DD} vs. Temperature



5.0 PACKAGING INFORMATION

5.1 Package Marking Information



1 & 2 = part number code + temperature range and voltage (two letter code)

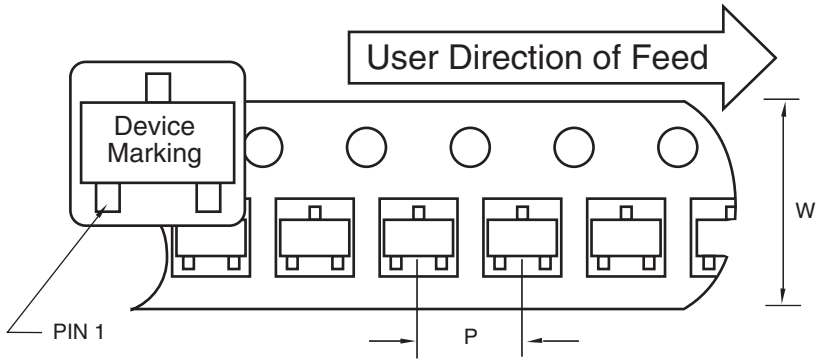
Ex: 1046VNB = AK

3 = Year and two-month period code

4 = Lot ID number

5.2 Taping Form

Component Taping Orientation for 3-Pin SOT-23B (JEDEC TO-236) Devices



Standard Reel Component Orientation
For TR Suffix Device
(Mark Right Side Up)

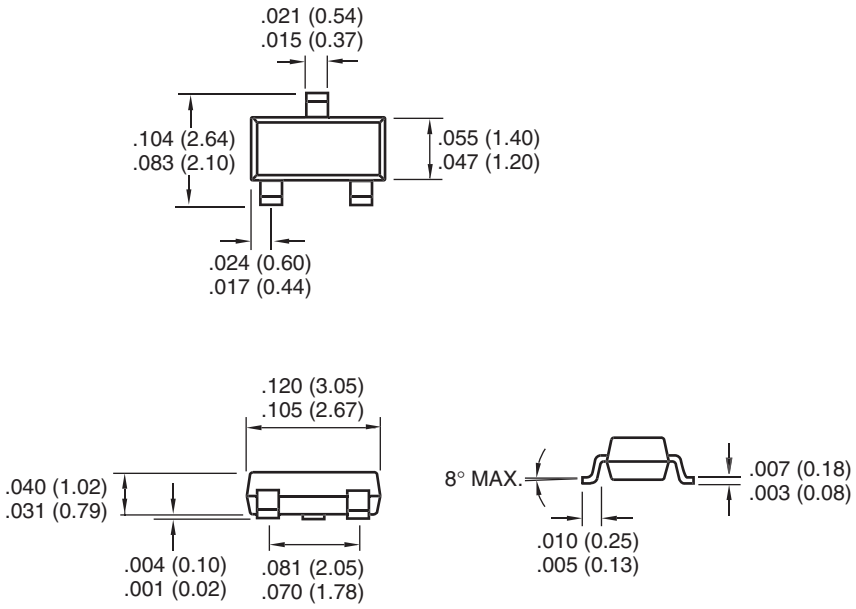
Carrier Tape, Number of Components Per Reel and Reel Size

Package	Carrier Width (W)	Pitch (P)	Part Per Full Reel	Reel Size
3-Pin SOT-23B	8 mm	4 mm	3000	7 in

5.3 Package Dimensions

Note: For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging

3-Pin SOT-23B



Dimensions: inches (mm)

6.0 REVISION HISTORY

Revision C (December 2012)

Added a note to each package outline drawing.

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Products supported by a preliminary Data Sheet may have an errata sheet describing minor operational differences and recommended workarounds. To determine if an errata sheet exists for a particular device, please contact one of the following:

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