TC1047/TC1047A

Precision Temperature-to-Voltage Converter

Features

- Supply Voltage Range:
  - TC1047: 2.7V to 4.4V
  - TC1047A: 2.5V to 5.5V
- Wide Temperature Measurement Range: -40°C to +125°C
- High Temperature Converter Accuracy: ± 2°C, Max, at 25°C
- Linear Temperature Slope 10mV/°C (typ.)
- Available in 3-Pin SOT-23B Package
- Very Low Supply Current:
  - 35µA Typical

Applications

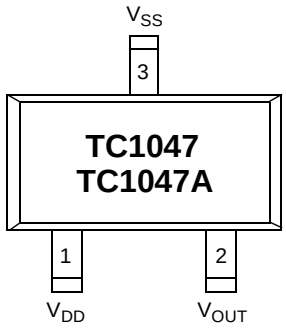
- Cellular Phones
- Power Supply Thermal Shutdown
- Temperature Controlled Fans
- Temperature Measurement/Instrumentation
- Temperature Regulators
- Consumer Electronics
- Portable Battery Powered Equipment

Device Selection Table

Part Number	Package	Temp. Range
TC1047VNB	3-Pin SOT-23B	-40°C to +125°C
TC1047AVNB	3-Pin SOT-23B	-40°C to +125°C

Package Type

3-Pin SOT-23B*



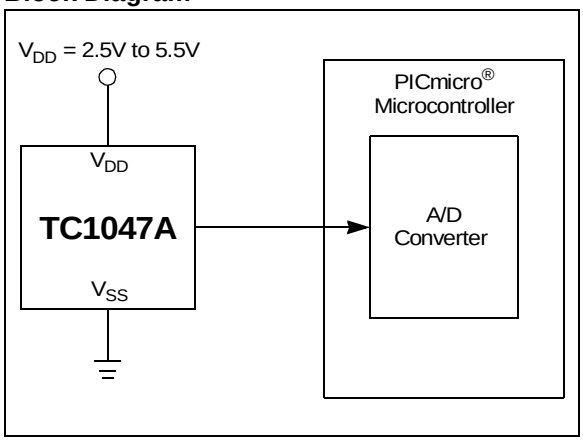
Note: * 3-Pin SOT-23B is equivalent to JEDEC TO-236

General Description

The TC1047 and TC1047A are linear voltage output temperature sensors whose output voltage is directly proportional to the measured temperature. The TC1047 and TC1047A can accurately measure temperature from -40°C to +125°C. With the TC1047, the supply voltage can vary between 2.7V and 4.4V. The power supply range of the TC1047A is from 2.5V to 5.5V.

The output voltage range for these devices is typically 100mV at -40°C, 500mV at 0°C, 750mV at +25°C, and 1.75V at +125°C. A 10mV/°C voltage slope output response allows for a predictable temperature measurement over a wide temperature range. The TC1047 and TC1047A are packaged in 3-Pin SOT-23B packages, making them ideal for space critical applications.

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.

TC1047/1047A ELECTRICAL SPECIFICATIONS

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

Symbol	Parameter	Min	Typ	Max	Units	Test Conditions
V_{DD}	Supply Voltage	2.7 2.5	— —	4.4 5.5	V	TC1047 TC1047A
I_Q	Supply Current, Operating	—	35	60	µA	
A_V	Average Slope of Output Voltage	—	10	—	mV/°C	
TMP_{ACY}	Temperature Accuracy	-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	— 730 1720	100 750 1750	— 770 1780	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.

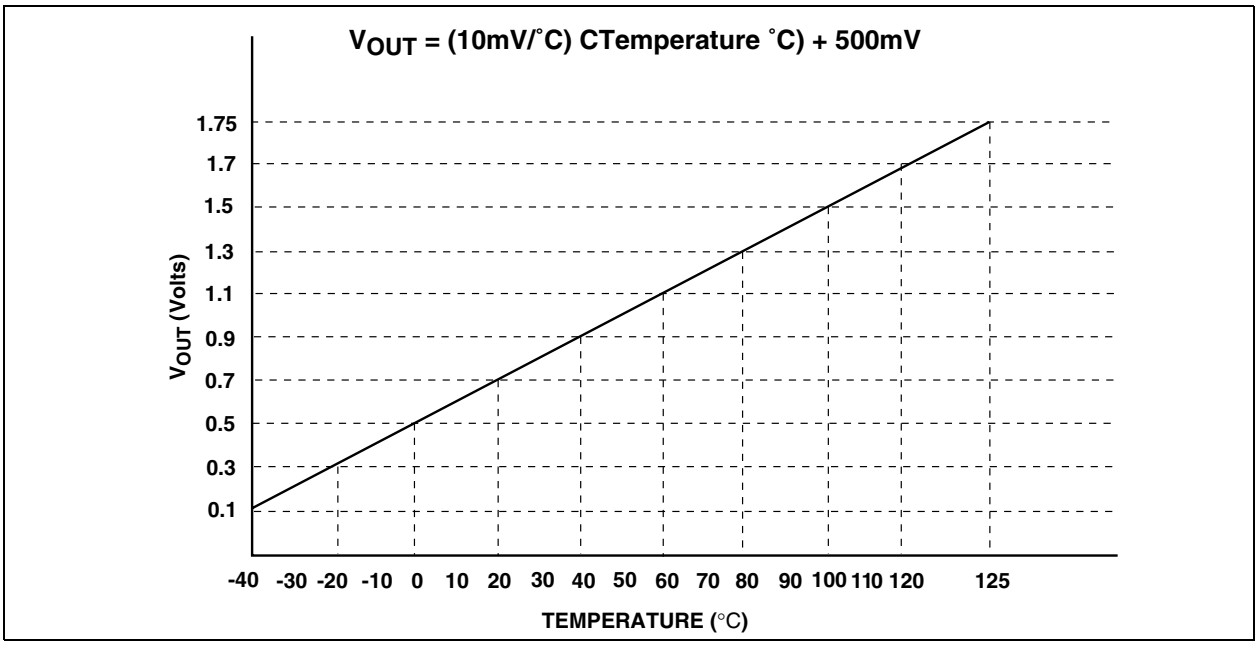
TABLE 2-1: PIN FUNCTION TABLE

Pin No. (3-Pin SOT-23B)	Symbol	Description
1	V_{DD}	Input Supply Voltage
2	V_{OUT}	Temperature Sensor Output Terminal
3	V_{SS}	Ground Terminal

3.0 DETAILED DESCRIPTION

The TC1047 and TC1047A have an output voltage that varies linearly with temperature in degrees Celsius. Figure 3-1 shows a plot of the output voltage versus temperature for the TC1047 and TC1047A. The temperature slope is fixed at 10mV/°C, and the output voltage at 0°C is 500mV.

FIGURE 3-1: OUTPUT VOLTAGE VS. TEMPERATURE



4.0 TYPICAL CHARACTERISTICS

Note: The graphs 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, the data presented may be outside the specified operating range (e.g., outside specified power supply range) and therefore outside the warranted range.

FIGURE 4-1: TEMPERATURE ACCURACY VS. TEMPERATURE

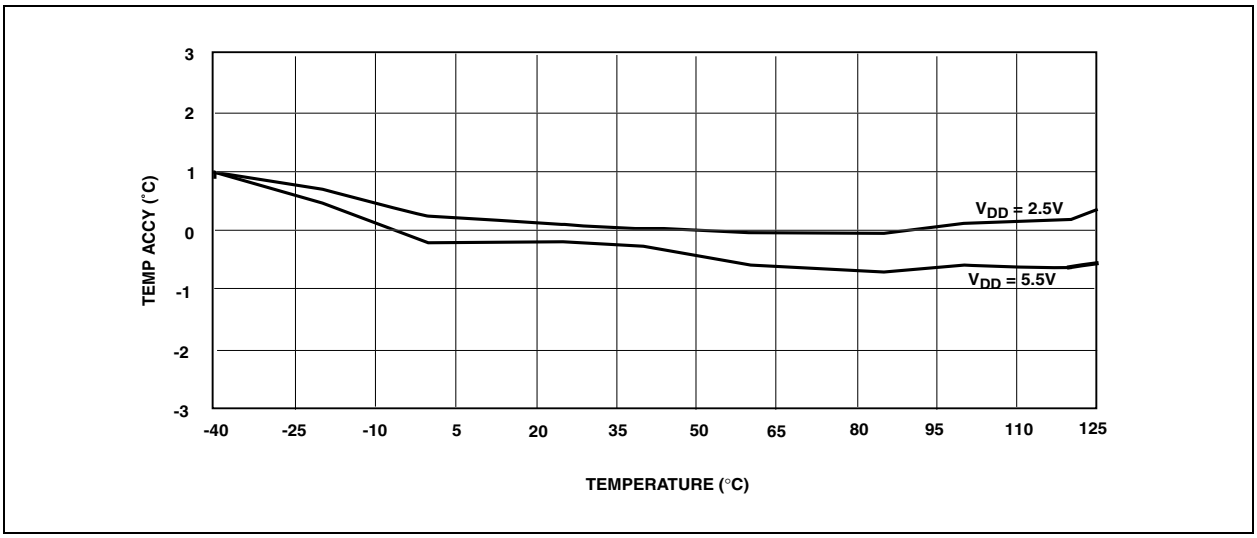
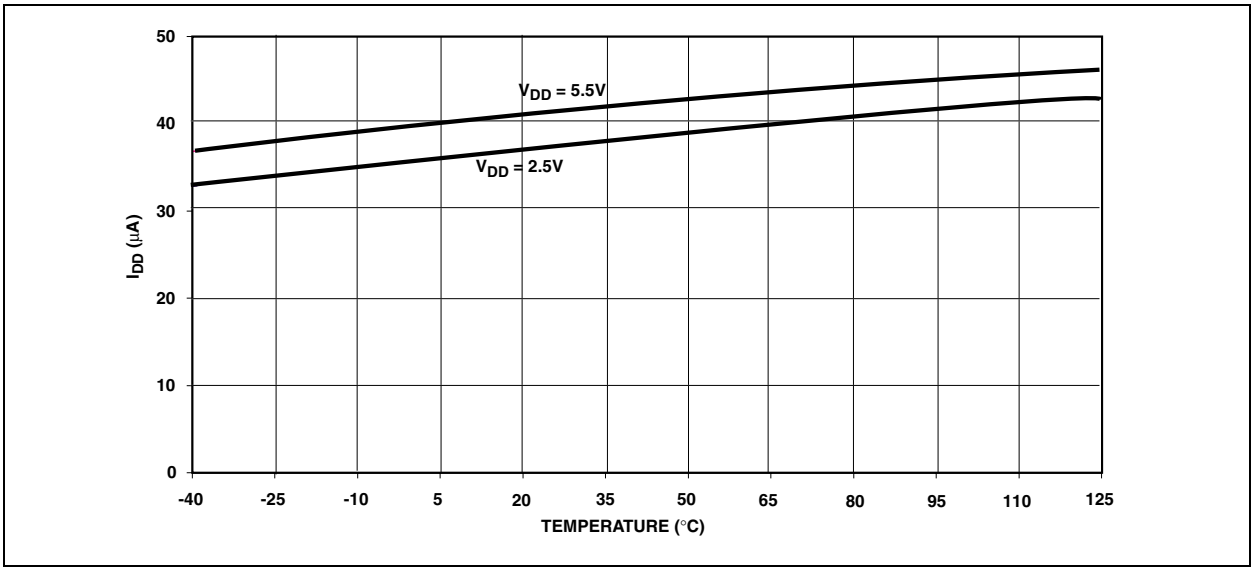


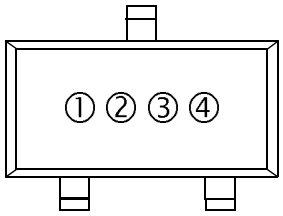
FIGURE 4-2: SUPPLY CURRENT VS. TEMPERATURE



5.0 PACKAGE INFORMATION

5.1 Package Marking Information

3-Pin SOT-23B



1 & 2 = part number code + temperature range and voltage

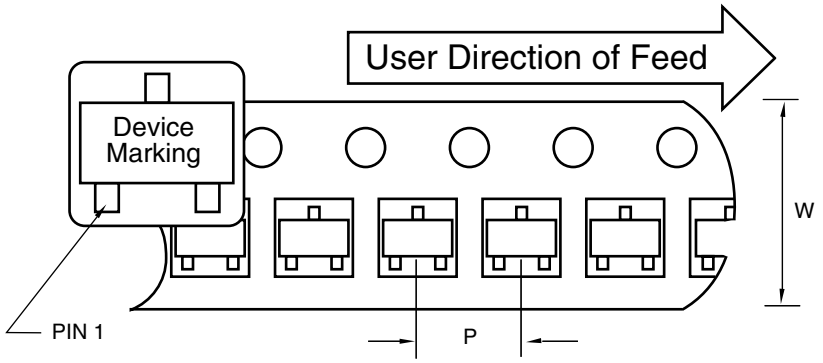
Part Number	Code
TCM1047	AL
TCM1047A	BL

3 = year and quarter code

4 = lot ID number

5.2 Taping Form

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



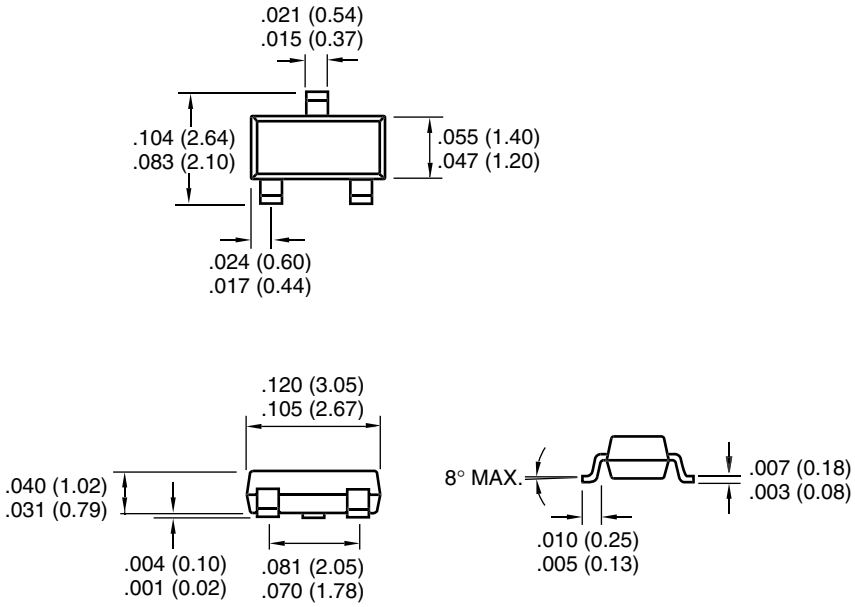
Standard Reel Component Orientation
For TR Suffix Device
(Mark Right Side Up)

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

3-Pin SOT-23B



Dimensions: inches (mm)

NOTES:

PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, refer to the factory or the listed sales office.

PART NO.	X
Device	Temperature Range

Device:	DSTEMP:	High Precision Temp-to-Voltage Converter
	DSTEMPxTR:	High Precision Temp-to-Voltage Converter (Tape and Reel)
Temperature Range:	V =	-40°C to +125°C
Package:	NB =	3-pin SOT-23B

Examples:

a) DSTEMPVNBTR: High Precision Temp-to-Voltage Converter

SALES AND SUPPORT

Data Sheets

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:

1. Your local Microchip sales office
2. The Microchip Corporate Literature Center U.S. FAX: (480) 792-7277
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Please specify which device, revision of silicon and Data Sheet (include Literature #) you are using.

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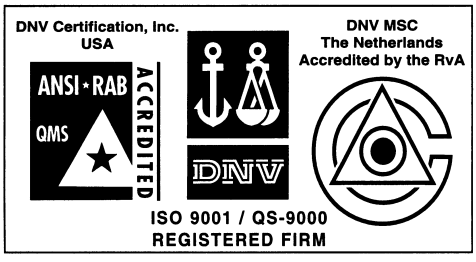
NOTES:



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