

NCT47

High Precision Temperature- to-Voltage Converter

The NCT47 is linear output temperature sensor whose output voltage is directly proportional to measured temperature. The NCT47 can accurately measure temperature from -40°C to $+125^{\circ}\text{C}$.

For the NCT47, the output voltage range is typically 100mV at -40°C , 500mV at 0°C , 750mV at $+25^{\circ}\text{C}$, and 1.75V at $+125^{\circ}\text{C}$. A 10mV/ $^{\circ}\text{C}$ voltage slope allows for the wide temperature range. The NCT47 is packaged in space saving 3-Pin SOT-23B packages, making them ideal for space critical applications.

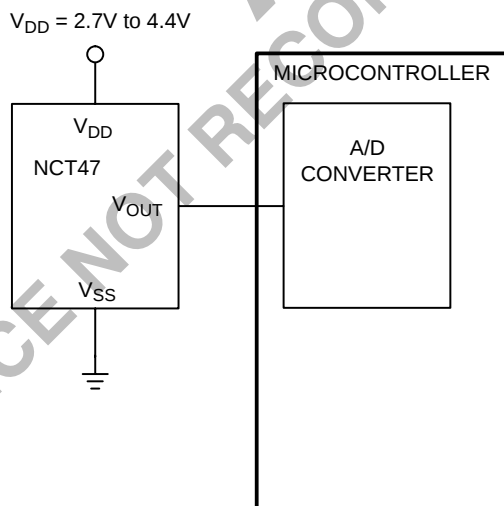
Features

- Wide Temperature Measurement Range: -40°C to 125°C
- High Temperature Converter Accuracy: $\pm 2^{\circ}\text{C}$ Max at 25°C
- Linear Temperature Slope: 10mV/ $^{\circ}\text{C}$
- 2.7V to 4.4V Operating Range
- Small 3-Pin SOT-23B Package
- Very Low Supply Current: 35 μA typical

Typical Applications

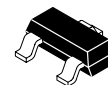
- Cellular Phones
- Power Supply Thermal Shutdown
- Temperature-Controlled Fans
- Temperature Measurement / Instrumentation
- Temperature Regulators
- Consumer Electronic
- Portable Battery Powered Equipment

FUNCTIONAL BLOCK DIAGRAM



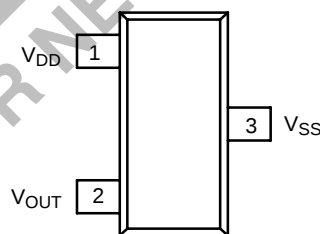
ON Semiconductor®

<http://onsemi.com>



SOT-23B
(TO-236)
CASE TBD

PIN CONFIGURATION (Top View)



SOT-23B*

NOTE: *SOT-23B is equivalent to JEDEC (TO-236)

ORDERING INFORMATION

Device	Package	Shipping
NCT47SNT1	SOT-23B	3000 Tape/Reel

NCT47

MAXIMUM RATINGS*

Symbol	Parameter	Value	Unit
V _{DD}	Supply Voltage	+7.0	V
V _{SS}	Voltage on Any Pin with Respect to Supplies	(V _{SS} – 0.3) to (V _{DD} + 0.3)	V
T _A	Operating Temperature Range	–40 to +125	°C
T _{stg}	Storage Temperature Range	–55 to +150	°C
T _{sol}	Lead Temperature (Soldering, 10 Seconds)	+260	°C

* Maximum Ratings are those values beyond which damage to the device may occur.

ELECTRICAL CHARACTERISTICS (T_A = –40°C to +125°C, V_{DD} = 2.7V to 4.4V, unless otherwise noted.)

Symbol	Characteristic	Min	Typ	Max	Unit
V _{DD}	Supply Voltage	2.7	—	4.4	V
I _Q	Supply Current, Operating	—	35	60	μA
A _V	Average Slope of Output Voltage	—	10	—	mV/°C
TMP _{ACY25}	Temperature Accuracy at 25°C T _A = 25°C	–2.0	±0.5	+2.0	°C
TMP _{ACY125}	Temperature Accuracy T _A = 125°C	–3.0	—	+3.0	°C
TMP _{ACY–40}	Temperature Accuracy T _A = –40°C	—	1.5	—	°C
V _{OUT–40}	Output Voltage at –40°C	—	100	—	mV
V _{OUT+25}	Output Voltage at 25°C	730	750	770	mV
V _{OUT+125}	Output Voltage at 125°C	1720	1750	1780	mV
I _{OUT}	Output Source and Sink Current	100	—	—	μA

PIN DESCRIPTION

Pin No.	Symbol	Description
1	V _{DD}	Input Supply Voltage
2	V _{OUT}	Temperature Sensor Output Terminal
3	V _{SS}	Ground Terminal

DETAILED DESCRIPTION

The NCT47 has an output voltage that varies linearly with temperature in degrees Celsius. Figure 1 shows a plot of the output voltage versus temperature for the NCT47. The

temperature slope is fixed at 10 mV/°C, and the output voltage at 0°C is 500 mV.

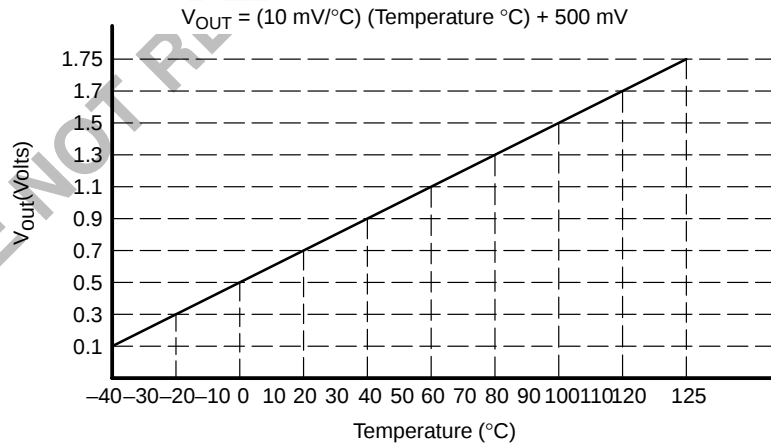


Figure 1. Output Voltage vs. Temperature

TYPICAL CHARACTERISTICS

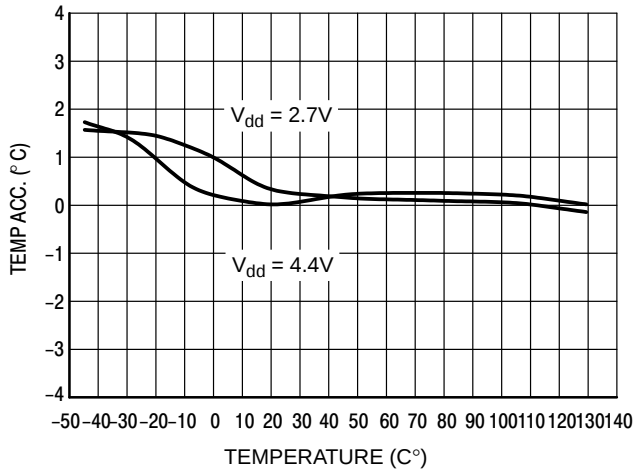


Figure 2. Temperature Accuracy vs Temperature

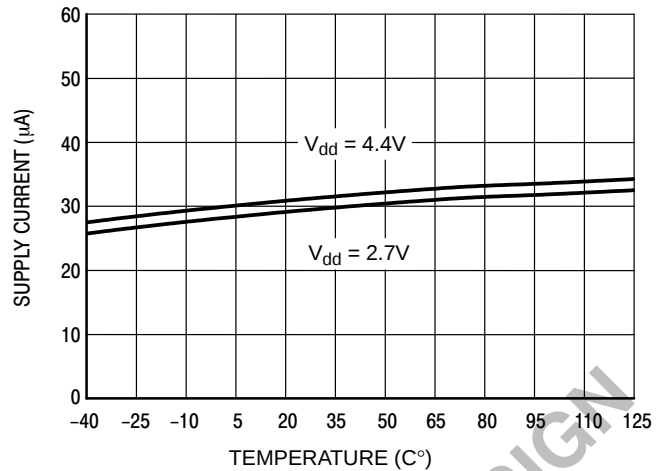
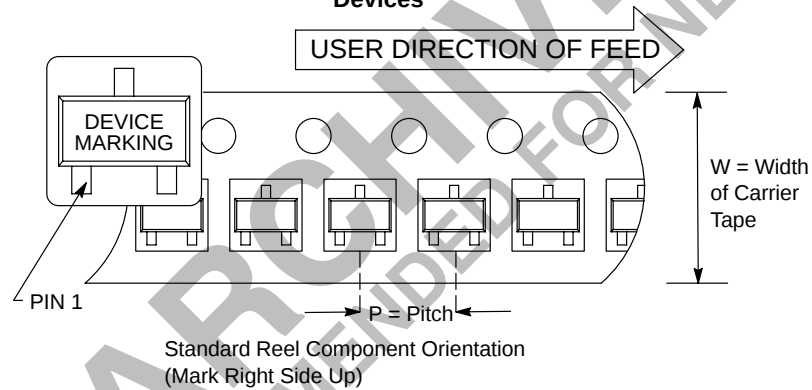


Figure 3. Supply Current vs Temperature

TAPING FORM

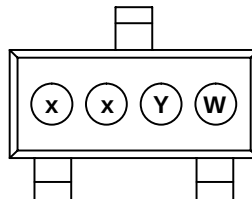
Component Taping Orientation for 3-Pin SOT-23B (JEDEC TO-236)
Devices

Tape & Reel Specifications Table

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

MARKING DIAGRAM

SOT-23B

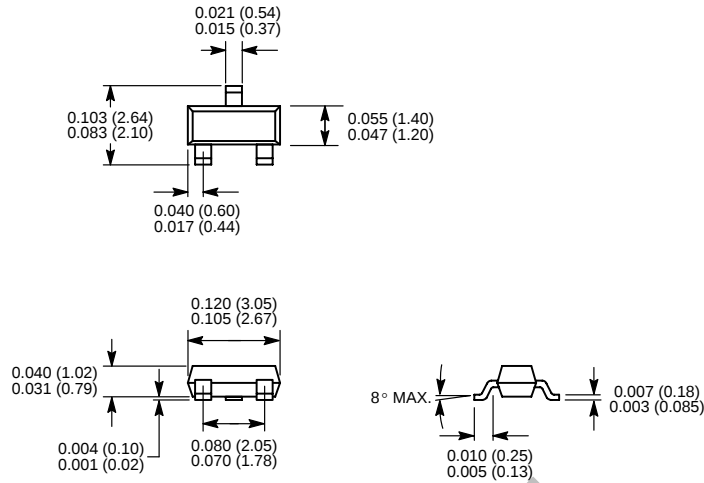


xx = part number code & temperature range
YW = Date Code

NCT47

PACKAGE DIMENSIONS

3-Pin SOT-23B (JEDEC TO-236)



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