

Low Dropout Positive Fixed Voltage Regulator

FEATURES

- Space Saving 3-Pin DPAK, 8-Pin SOIC and 3-Pin SOT-223 Power Packages
- 1.0V Dropout
- Output Current in Excess of 800mA
- Thermal Protection
- Short Circuit Protection
- Output Trimmed to 1.0% Tolerance

TYPICAL APPLICATIONS

- Systems Requiring Post Regulation
- Telecom Equipment
- Industrial or Process Equipment
- Battery Chargers and Regulators
- Powering DSP Applications

GENERAL DESCRIPTION

The TC33269 Series is a low dropout, medium current, fixed positive voltage regulator specifically designed for use in low input voltage applications. This device offers the circuit designer an economical solution for precision voltage regulation, while keeping power losses to a minimum.

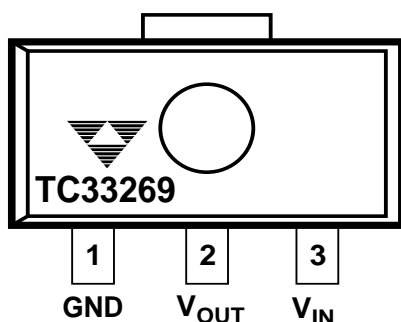
The regulator consists of a 1.0V dropout composite PNP-NPN pass transistor, current limiting, and thermal shutdown.

ORDERING INFORMATION*

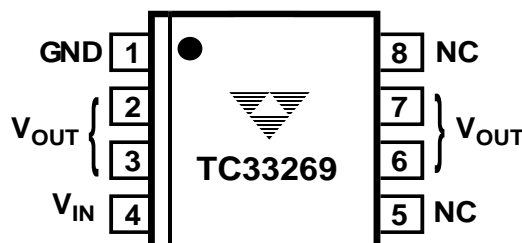
Part Number	(V)	Package	Operating Ambient Temp. Range
TC33269-3.3VOA	3.3V	8-Pin SOIC	—40°C to +85°C
TC33269-3.3VVB	3.3V	3-Pin DPAK	—40°C to +85°C
TC33269-3.3VDB	3.3V	3-Pin SOT-223	—40°C to +85°C

*Contact Factory for other voltage options

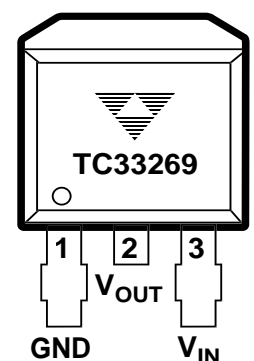
3-Pin SOT-223



8-Pin SOIC



3-Pin DPAK



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MAXIMUM RATINGS

Power Supply Input Voltage $V_{IN} = 20V$
 Power Dissipation
 3-Pin DPAK
 $T_A = 25^\circ C$ $P_D = \text{Internally Limited W}$
 Thermal Resistance, Junction-to-Ambient;
 $\theta_{JA} = 92^\circ C/W$
 Thermal Resistance, Junction-to-Case;
 $\theta_{JC} = 6.0^\circ C/W$
 8-Pin SOIC
 $T_A = 25^\circ C$ $P_D = \text{Internally Limited W}$
 Thermal Resistance, Junction-to-Ambient;
 $\theta_{JA} = 160^\circ C/W$
 Thermal Resistance, Junction-to-Case;
 $\theta_{JC} = 25^\circ C/W$

3-Pin SOT-223
 $T_A = 25^\circ C$ $P_D = \text{Internally Limited W}$
 Thermal Resistance, Junction-to-Ambient;
 $\theta_{JA} = 245^\circ C/W$
 Thermal Resistance, Junction-to-Case;
 $\theta_{JC} = 15^\circ C/W$
 Operating Junction Temperature Range $T_J = -40$ to $+150^\circ C$
 Storage Temperature Range $T_{STG} = -55$ to $+150^\circ C$
NOTE: ESD data available upon request.

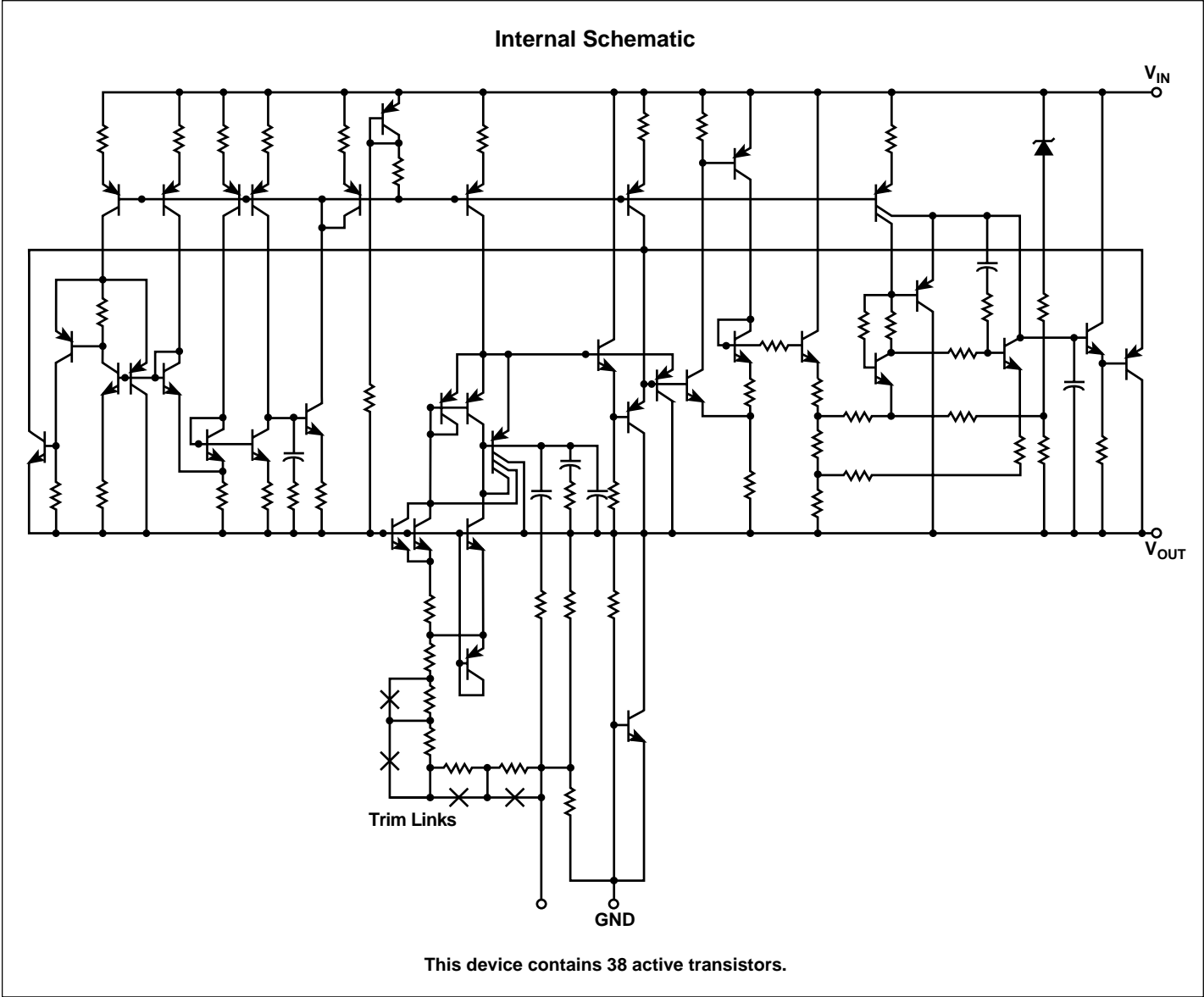
ELECTRICAL CHARACTERISTICS: $C_{OUT} = 10\mu F$, $T_A = 25^\circ C$, for min/max values $T_J = -40$ to $+125^\circ C$, unless otherwise noted.

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
V_{OUT}	Output Voltage	$I_{OUT} = 10mA$, $T_J = 25^\circ C$ 3.3 Suffix $V_{CC} = 5.3V$	3.27	3.3	3.33	V
V_{OUT}	Output Voltage (Line, Load and Temperature) [Note1]	$1.25V \leq V_{IN} - V_{OUT} \leq 15V$, $I_{OUT} = 500mA$ $1.35V \leq V_{IN} - V_{OUT} \leq 10V$, $I_{OUT} = 800mA$ 3.3 Suffix	3.23	3.3	3.37	V
REG_{LINE}	Line Regulation	$I_{OUT} = 10mA$, $V_{IN} = [V_{OUT} + 1.5V]$ to $V_{IN} = 20V$, $T_J = 25^\circ C$	—	—	0.3	%
REG_{LOAD}	Load Regulation	$V_{IN} = V_{OUT} + 3.0V$, $I_{OUT} = 10mA$ to $800mA$, $T_J = 25^\circ C$	—	—	0.5	%
$V_{IN} - V_{OUT}$	Dropout Voltage	$I_{OUT} = 500mA$ $I_{OUT} = 800mA$	— —	1.0 1.1	1.25 1.35	V
RR	Ripple Rejection	10V _{PP} , 120Hz Sinewave; $I_{OUT} = 500mA$	55	—	—	dB
I_{LIMIT}	Current Limit	$V_{IN} - V_{OUT} = 10V$	800	—	—	mA
I_Q	Quiescent Current (Fixed Output)	$V_{OUT} = 3.3V$	—	5.5	8.0	mA
I_{LOAD}	Minimum Required Load Current	Fixed Output Voltage	—	—	0	mA

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FUNCTIONAL BLOCK DIAGRAM



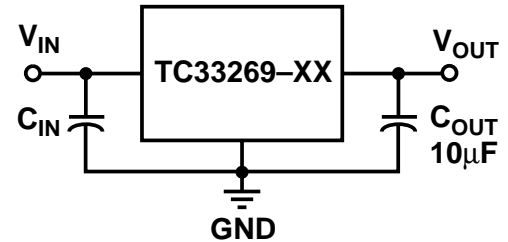
TC33269 Series

APPLICATIONS INFORMATION

Figure 1 is a typical application circuit. The output current capability of the regulator is in excess of 800mA, with a typical dropout voltage of less than 1.0V. Internal protective features include current and thermal limiting.

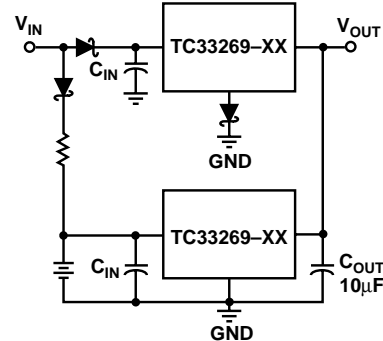
The TC33269 Series is not internally compensated and thus requires an external output capacitor for stability. The capacitor should be at least 10 μ F with an equivalent series resistance (ESR) of less than 10 Ω over the anticipated operating temperature range. With economical electrolytic capacitors, cold temperature operation can pose a problem. As temperature decreases, the capacitance also decreases and the ESR increases, which could cause the circuit to oscillate. Solid tantalum capacitors may be a better choice if small size is a requirement. Also capacitance and ESR of a solid tantalum capacitor is more stable over temperature. An input bypass capacitor is recommended to improve transient response or if the regulator is connected to the supply input filter with long wire lengths. This will reduce the circuit's sensitivity to the input line impedance at high frequencies. A 0.33 μ F or larger tantalum, mylar, ceramic, or other capacitor having low internal impedance at high frequencies should be chosen. The bypass capacitor should be mounted with shortest possible lead or track length directly across the regulator's input terminals. **Applications should be tested over all operating conditions to insure stability.**

Internal thermal limiting circuitry is provided to protect the integrated circuit in the event that the maximum junction temperature is exceeded. When activated, typically at 170°C, the output is disabled. There is no hysteresis built into the thermal limiting circuit. As a result, if the device is overheating, the output will appear to be oscillating. This feature is provided to prevent catastrophic failures from accidental device overheating. **It is not intended to be used as a substitute for proper heatsinking.**



An input capacitor is not necessary for stability, however it will improve the overall performance.

Figure 1. Typical Fixed Output Application



The Schottky diode in series with the ground leg of the upper regulator shifts its output voltage higher by the forward voltage drop of the diode. This will cause the lower device to remain off until the input voltage is removed.

Figure 2. Battery Backed-Up Power Supply

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TYPICAL CHARACTERISTICS

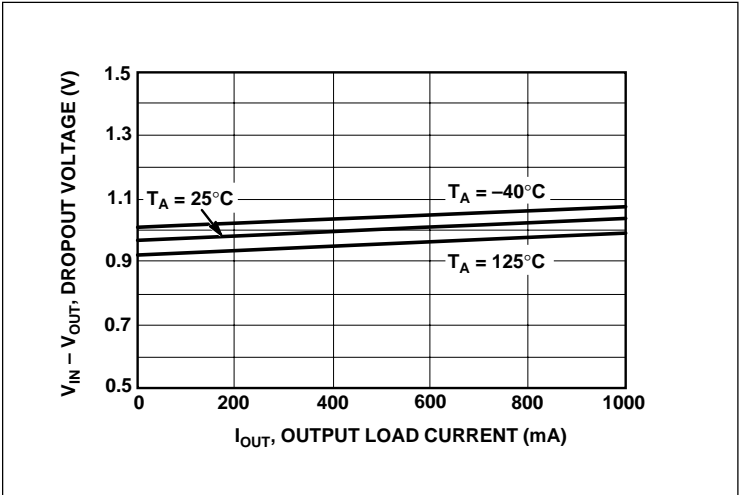


Figure 3. Dropout Voltage versus Output Load Current

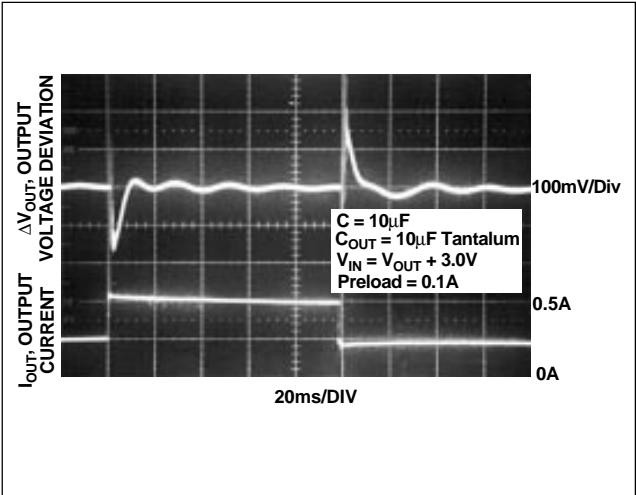


Figure 4. Transient Load Regulation

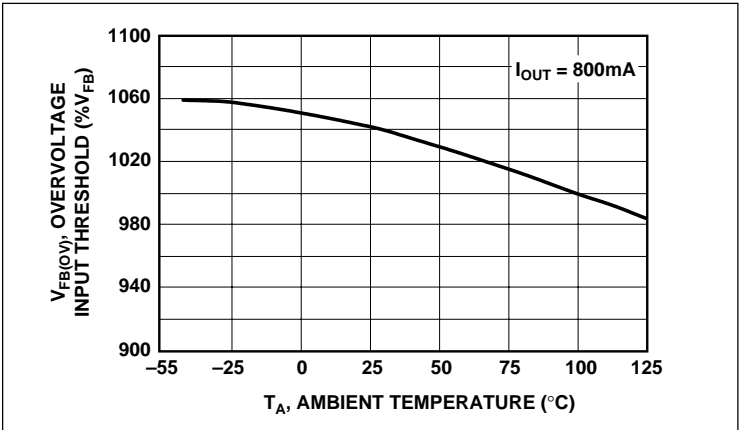


Figure 5. Dropout Voltage versus Temperature

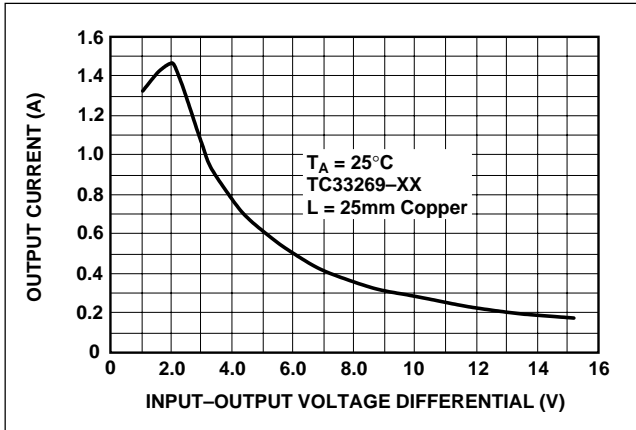


Figure 6. TC33269-XX Output DC Current versus Input-Output Differential Voltage

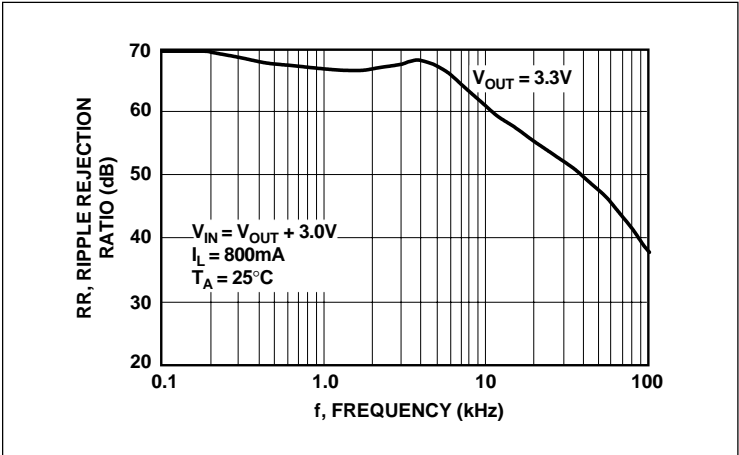


Figure 7. TC33269 Ripple Rejection versus Frequency

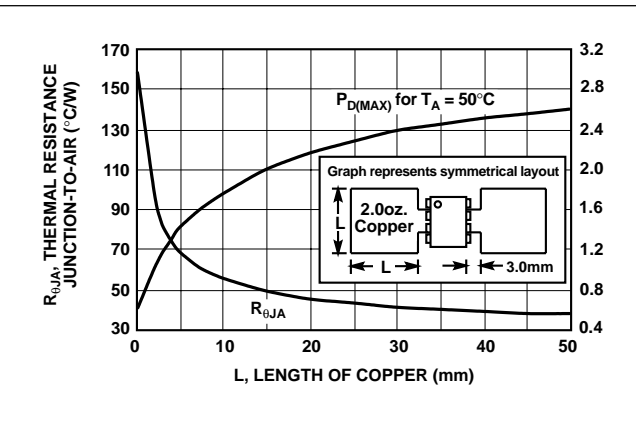


Figure 8. 8-Pin SOIC Thermal Resistance and Maximum Power Dissipation versus P.C.B. Copper Length

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TYPICAL CHARACTERISTICS

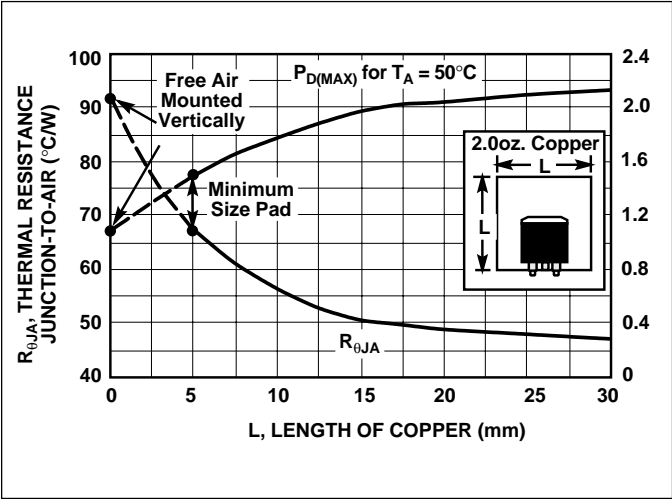


Figure 9. 3-Pin DPAK Thermal Resistance and Maximum Power Dissipation versus P.C.B. Copper Length

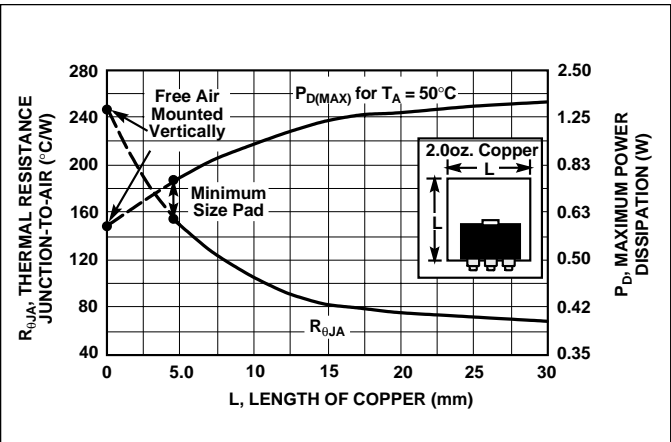
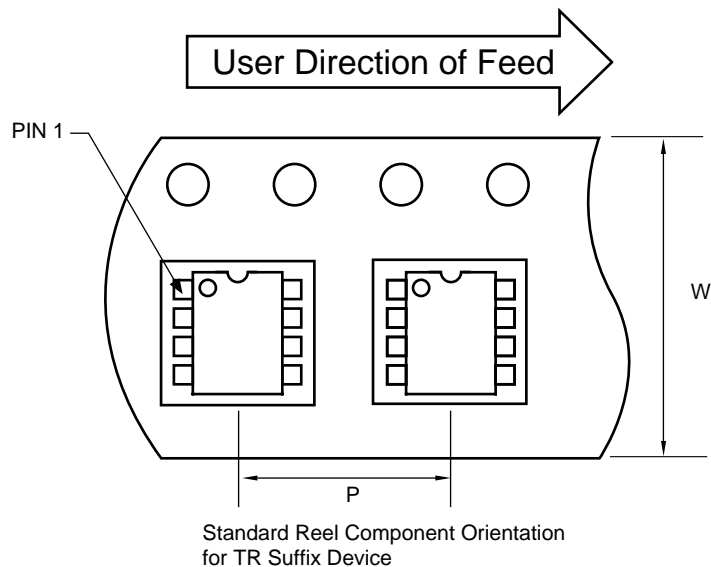


Figure 10. 3 Pin SOT-223 Thermal Resistance and Maximum Power Dissipation versus P.C.B. Copper Length

TAPE AND REEL INFORMATION

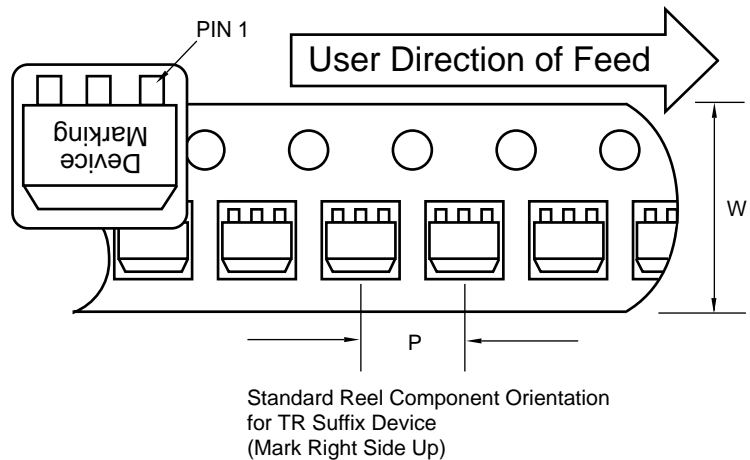
Component Taping Orientation for 8-Pin SOIC (Narrow) Devices



Carrier Tape, Number of Components Per Reel and Reel Size

Package	Carrier Width (W)	Pitch (P)	Part Per Full Reel	Reel Size
8-Pin SOIC (N)	12 mm	8 mm	2500	13 in

Component Taping Orientation for 3-Pin DPAK Devices



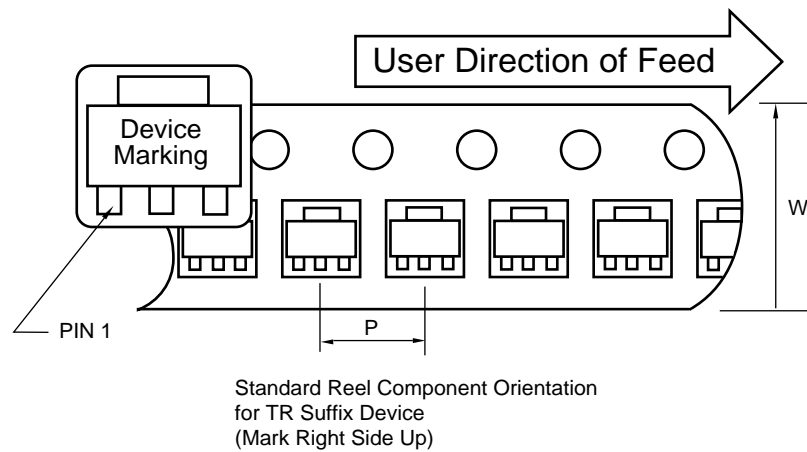
Carrier Tape, Number of Components Per Reel and Reel Size

Package	Carrier Width (W)	Pitch (P)	Part Per Full Reel	Reel Size
3-Pin DPAK	16 mm	8 mm	2500	13 in

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TAPE AND REEL INFORMATION

Component Taping Orientation for 3-Pin SOT-223 Devices



Carrier Tape, Number of Components Per Reel and Reel Size

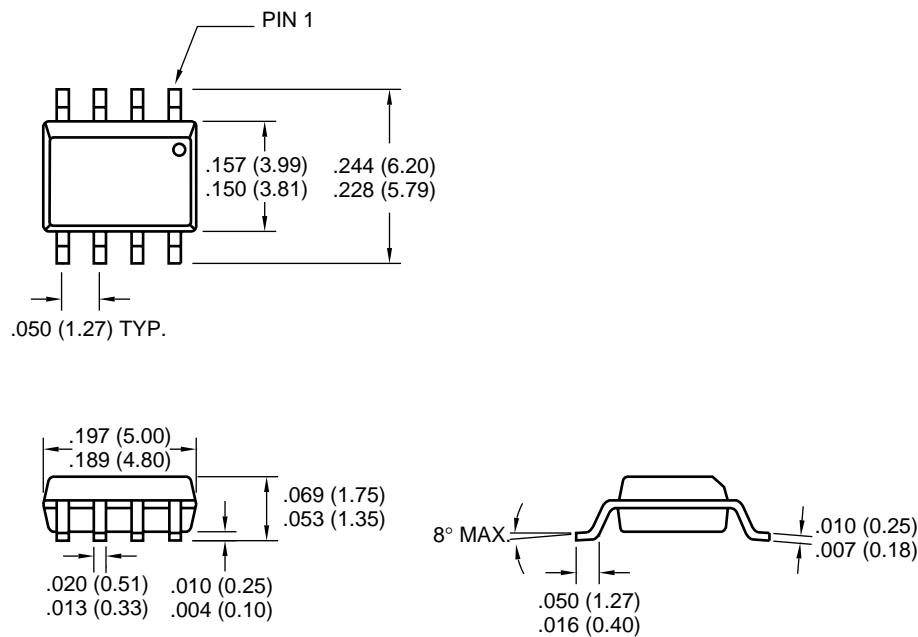
Package	Carrier Width (W)	Pitch (P)	Part Per Full Reel	Reel Size
3-Pin SOT-223	12 mm	8 mm	4000	13 in

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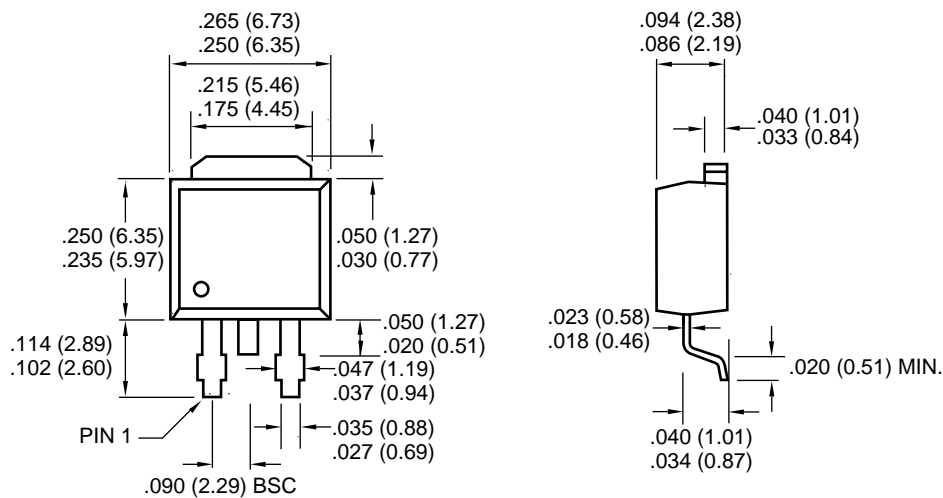
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PACKAGE DIMENSIONS

8-Pin SOIC (Narrow)



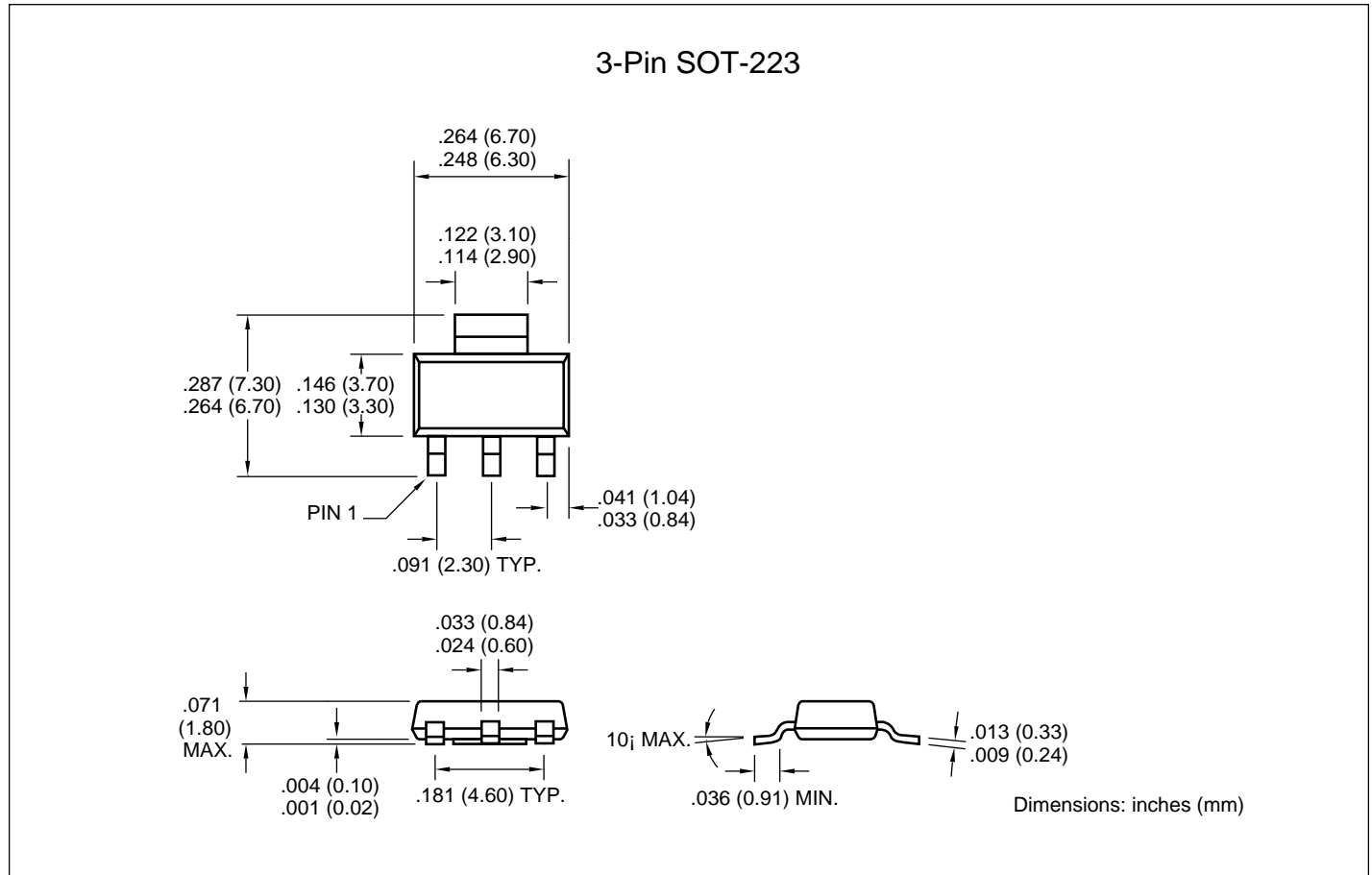
3-Pin DPAK



Dimensions: inches (mm)

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PACKAGE DIMENSIONS



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