TC1262

500mA Fixed Output CMOS LDO

Features

- Very Low Dropout Voltage
- 500mA Output Current
- High Output Voltage Accuracy
- Standard or Custom Output Voltages
- Over Current and Over Temperature Protection

Applications

- Battery Operated Systems
- Portable Computers
- Medical Instruments
- Instrumentation
- Cellular/GSM/PHS Phones
- Linear Post-Regulators for SMPS
- Pagers

Device Selection Table

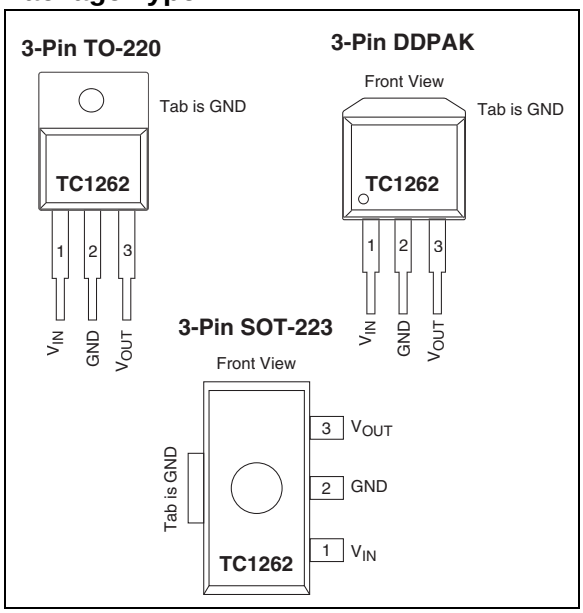
Part Number	Package	Junction Temp. Range
TC1262-xxVDB	3-Pin SOT-223	-40°C to +125°C
TC1262-xxVAB	3-Pin TO-220	-40°C to +125°C
TC1262-xxVEB	3-Pin DDPAK	-40°C to +125°C

NOTE: xx indicates output voltages.

Available Output Voltages: 2.5, 2.8, 3.0, 3.3, 5.0.

Other output voltages are available. Please contact Microchip Technology Inc. for details.

Package Type



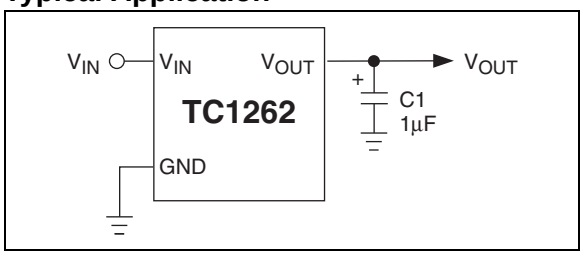
General Description

The TC1262 is a fixed output, high accuracy (typically ±0.5%) CMOS low dropout regulator. Designed specifically for battery-operated systems, the TC1262's CMOS construction eliminates wasted ground current, significantly extending battery life. Total supply current is typically 80μA at full load (20 to 60 times lower than in bipolar regulators).

TC1262 key features include ultra low noise operation, very low dropout voltage (typically 350mV at full load), and fast response to step changes in load.

The TC1262 incorporates both over temperature and over current protection. The TC1262 is stable with an output capacitor of only 1μF and has a maximum output current of 500mA. It is available in 3-Pin SOT-223, 3-Pin TO-220 and 3-Pin DDPAK packages.

Typical Application



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1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings*

Input Voltage 6.5V
Output Voltage.....(V_{SS} – 0.3V) to (V_{IN} + 0.3V)
Power Dissipation.....Internally Limited **(Note 6)**
Maximum Voltage on Any Pin .....V_{IN} +0.3V to -0.3V
Operating Temperature Range.....-40°C < T_J < 125°C
Storage Temperature.....-65°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.

TC1262 ELECTRICAL SPECIFICATIONS

Electrical Characteristics: V_{IN} = V_{OUT} + 1V, I_L = 100µA, C_L = 3.3µF, T_A = 25°C, unless otherwise noted. **Boldface** type specifications apply for junction temperatures of -40°C to +125°C.

Symbol	Parameter	Min	Typ	Max	Units	Test Conditions
V_{IN}	Input Operating Voltage	**2.7**	—	**6.0**	V	**Note 7**
I_{OUTMAX}	Maximum Output Current	**500**	—	—	mA	
V_{OUT}	Output Voltage	— **V_R – 2.5%**	V_R ±0.5% —	— **V_R + 2.5%**	V	**Note 1**
$\Delta V_{OUT}/\Delta T$	V_{OUT} Temperature Coefficient	—	40	—	ppm/°C	**Note 2**
$\Delta V_{OUT}/\Delta V_{IN}$	Line Regulation	—	.003	**0.35**	%/V	(V_R + 1V) ≤ V_{IN} ≤ 6V
$\Delta V_{OUT}/V_{OUT}$	Load Regulation	—	0.002	**0.01**	%/mA	I_L = 0.1mA to I_{OUTMAX} **(Note 3)**
V_{IN}-V_{OUT}	Dropout Voltage	— — — 	20 60 200 350	**30** **130** **390** **650**	mV	I_L = 100µA I_L = 100mA I_L = 300mA I_L = 500mA **(Note 4)**
I_{DD}	Supply Current	—	80	**130**	µA	I_L = 0
PSRR	Power Supply Rejection Ratio	—	64	—	dB	F_{RE} ≤ 1kHz
I_{OUTSC}	Output Short Circuit Current	—	1200	—	mA	V_{OUT} = 0V
$\Delta V_{OUT}/\Delta P_D$	Thermal Regulation	—	0.04	—	V/W	**Note 5**
eN	Output Noise	—	260	—	nV/$\sqrt{Hz}$	I_L = I_{OUTMAX}, F_{RE} = 10kHz

Note 1: V_R is the regulator output voltage setting.

2: TC $V_{OUT} = \frac{(V_{OUTMAX} - V_{OUTMIN}) \times 10^6}{V_{OUT} \times \Delta T}$

3: Regulation is measured at a constant junction temperature using low duty cycle pulse testing. Load regulation is tested over a load range from 0.1mA to the maximum specified output current. Changes in output voltage due to heating effects are covered by the thermal regulation specification.

4: Dropout voltage is defined as the input to output differential at which the output voltage drops 2% below its nominal value measured at a 1V differential.

5: Thermal Regulation is defined as the change in output voltage at a time T after a change in power dissipation is applied, excluding load or line regulation effects. Specifications are for a current pulse equal to I_{LMAX} at V_{IN} = 6V for T = 10 msec.

6: The maximum allowable power dissipation is a function of ambient temperature, the maximum allowable junction temperature and the thermal resistance from junction-to-air (i.e., T_A, T_J, θ_{JA}). Exceeding the maximum allowable power dissipation causes the device to initiate thermal shutdown. Please see Section 4.0 Thermal Considerations for more details.

7: The minimum V_{IN} has to justify the conditions: $V_{IN} \geq V_R + V_{DROPOUT}$ and $V_{IN} \geq$ 2.7V for I_L = 0.1mA to I_{OUTMAX}.

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2.0 PIN DESCRIPTIONS

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

TABLE 2-1: PIN FUNCTION TABLE

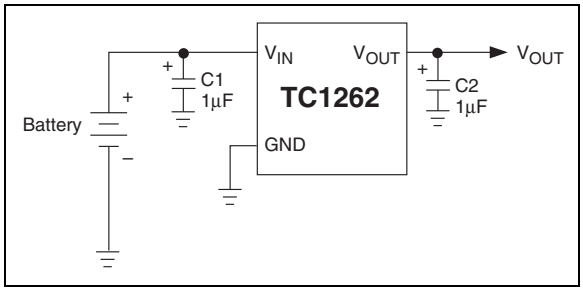
Pin No. (3-Pin SOT-223) (3-Pin TO-220) (3-Pin DDPAK)	Symbol	Description
1	V_{IN}	Unregulated supply input.
2	GND	Ground terminal.
3	V_{OUT}	Regulated voltage output.

3.0 DETAILED DESCRIPTION

The TC1262 is a precision, fixed output LDO. Unlike bipolar regulators, the TC1262's supply current does not increase with load current. In addition, V_{OUT} remains stable and within regulation over the entire 0mA to $I_{LOADMAX}$ load current range (an important consideration in RTC and CMOS RAM battery back-up applications).

Figure 3-1 shows a typical application circuit.

FIGURE 3-1: TYPICAL APPLICATION CIRCUIT



3.1 Output Capacitor

A 1µF (min) capacitor from V_{OUT} to ground is required. The output capacitor should have an effective series resistance greater than 0.1Ω and less than 5Ω, and a resonant frequency above 1MHz. A 1µF capacitor should be connected from V_{IN} to GND if there is more than 10 inches of wire between the regulator and the AC filter capacitor, or if a battery is used as the power source. Aluminum electrolytic or tantalum capacitor types can be used. (Since many aluminum electrolytic capacitors freeze at approximately -30°C, solid tantalums are recommended for applications operating below -25°C.) When operating from sources other than batteries, supply-noise rejection and transient response can be improved by increasing the value of the input and output capacitors and employing passive filtering techniques.

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4.0 THERMAL CONSIDERATIONS

4.1 Thermal Shutdown

Integrated thermal protection circuitry shuts the regulator off when die temperature exceeds 160°C. The regulator remains off until the die temperature drops to approximately 150°C.

4.2 Power Dissipation

The amount of power the regulator dissipates is primarily a function of input and output voltage, and output current. The following equation is used to calculate worst case actual power dissipation:

EQUATION 4-1:

$$P_D \approx (V_{INMAX} - V_{OUTMIN})I_{LOADMAX}$$

Where:

P_D = Worst case actual power dissipation
V_{INMAX} = Maximum voltage on V_{IN}
V_{OUTMIN} = Minimum regulator output voltage
$I_{LOADMAX}$ = Maximum output (load) current

The maximum allowable power dissipation (Equation 4-2) is a function of the maximum ambient temperature (T_{AMAX}), the maximum allowable die temperature (TJ_{MAX}) and the thermal resistance from junction-to-air (θ_{JA}).

EQUATION 4-2:

$$P_{DMAX} = \frac{(T_{JMAX} - T_{AMAX})}{\theta_{JA}}$$

Where all terms are previously defined.

Table 4-1 and Table 4-2 show various values of θ_{JA} for the TC1262 packages.

TABLE 4-1: THERMAL RESISTANCE GUIDELINES FOR TC1262 IN SOT-223 PACKAGE

Copper Area (Topside)*	Copper Area (Backside)	Board Area	Thermal Resistance (θ_{JA})
2500 sq mm	2500 sq mm	2500 sq mm	45°C/W
1000 sq mm	2500 sq mm	2500 sq mm	45°C/W
225 sq mm	2500 sq mm	2500 sq mm	53°C/W
100 sq mm	2500 sq mm	2500 sq mm	59°C/W
1000 sq mm	1000 sq mm	1000 sq mm	52°C/W
1000 sq mm	0 sq mm	1000 sq mm	55°C/W

*Tab of device attached to topside copper

TABLE 4-2: THERMAL RESISTANCE GUIDELINES FOR TC1262 IN 3-PIN DDPAK/TO-220 PACKAGE

Copper Area (Topside)*	Copper Area (Backside)	Board Area	Thermal Resistance (θ_{JA})
2500 sq mm	2500 sq mm	2500 sq mm	25°C/W
1000 sq mm	2500 sq mm	2500 sq mm	27°C/W
125 sq mm	2500 sq mm	2500 sq mm	35°C/W

*Tab of device attached to topside copper

Equation 4-1 can be used in conjunction with Equation 4-2 to ensure regulator thermal operation is within limits. For example:

Given:

V_{INMAX} = 3.3V ± 10%
V_{OUTMIN} = 2.7V ± 0.5%
$I_{LOADMAX}$ = 275mA
T_{JMAX} = 125°C
T_{AMAX} = 95°C
θ_{JA} = 59°C/W (SOT-223)

Find: 1. Actual power dissipation
2. Maximum allowable dissipation

Actual power dissipation:

$$P_D \approx (V_{INMAX} - V_{OUTMIN})I_{LOADMAX}$$
$$= [(3.3 \times 1.1) - (2.7 \times .995)]275 \times 10^{-3}$$
$$= 260mW$$

Maximum allowable power dissipation:

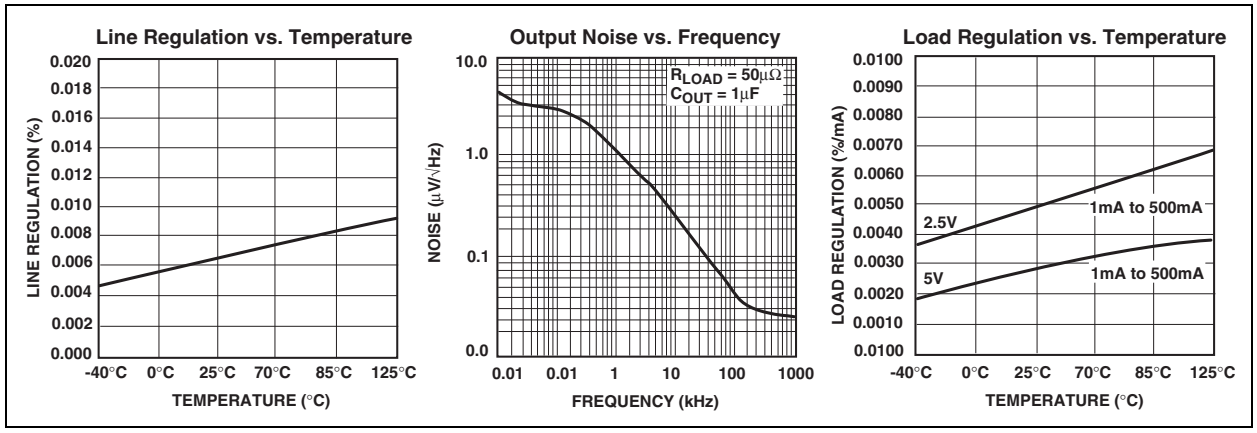
$$P_{DMAX} = \frac{(T_{JMAX} - T_{AMAX})}{\theta_{JA}}$$
$$= \frac{(125 - 95)}{59}$$
$$= 508mW$$

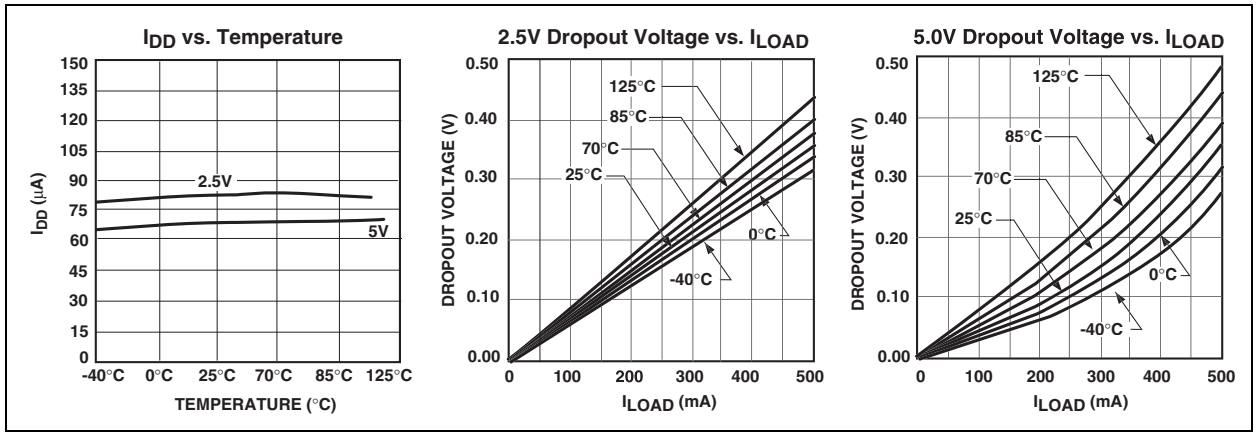
In this example, the TC1262 dissipates a maximum of 260mW; below the allowable limit of 508mW. In a similar manner, Equation 4-1 and Equation 4-2 can be used to calculate maximum current and/or input voltage limits. For example, the maximum allowable V_{IN}, is found by sustituting the maximum allowable power dissipation of 508mW into Equation 4-1, from which V_{INMAX} = 4.6V.

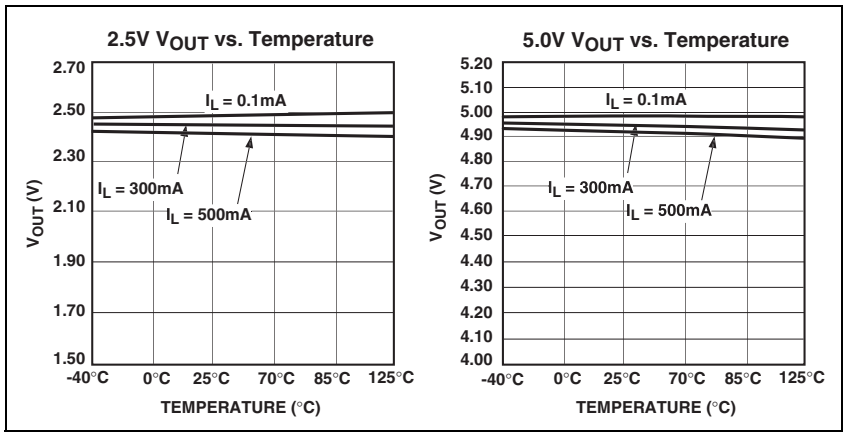
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5.0 TYPICAL CHARACTERISTICS

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.







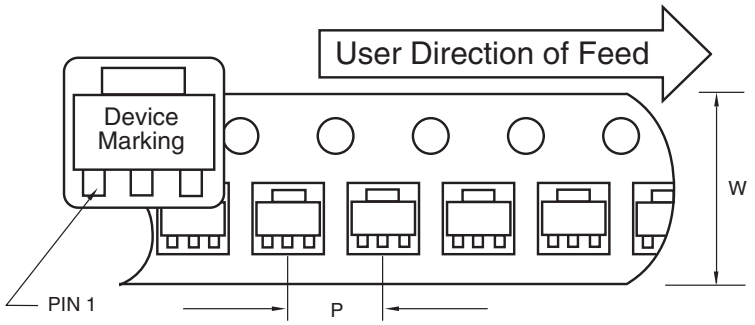
6.0 PACKAGING INFORMATION

6.1 Package Marking Information

Package marking data not available at this time.

6.2 Taping Form

Component Taping Orientation for 3-Pin SOT-223 Devices

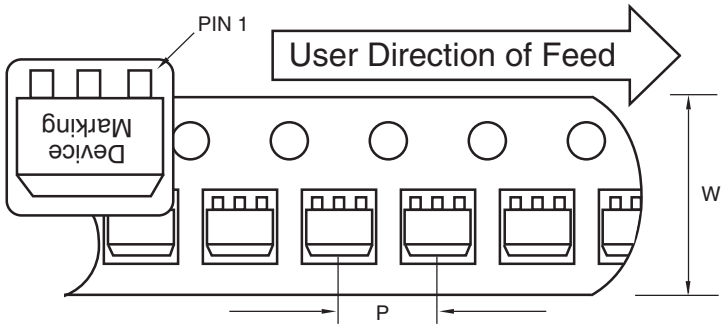


Standard Reel Component Orientation
for TR Suffix Device
(Mark Right Side Up)

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-223	12 mm	8 mm	4000	13 in

Component Taping Orientation for 3-Pin DDPAK Devices



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

Carrier Tape, Number of Components Per Reel and Reel Size

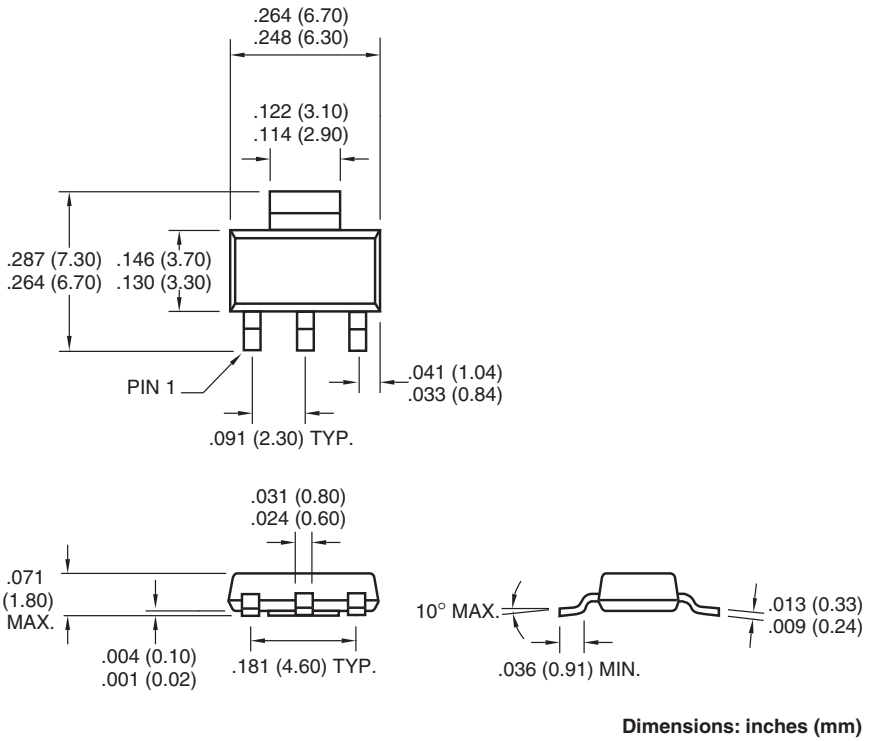
Package	Carrier Width (W)	Pitch (P)	Part Per Full Reel	Reel Size
3-Pin DDPAK	24 mm	16 mm	750	13 in

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6.3 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-223

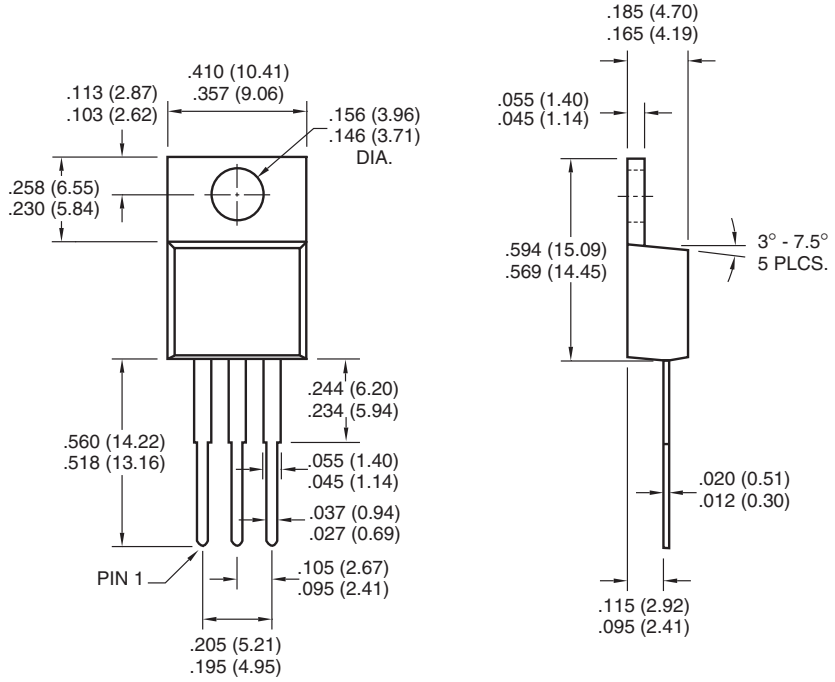


Dimensions: inches (mm)

Package Dimensions (Continued)

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

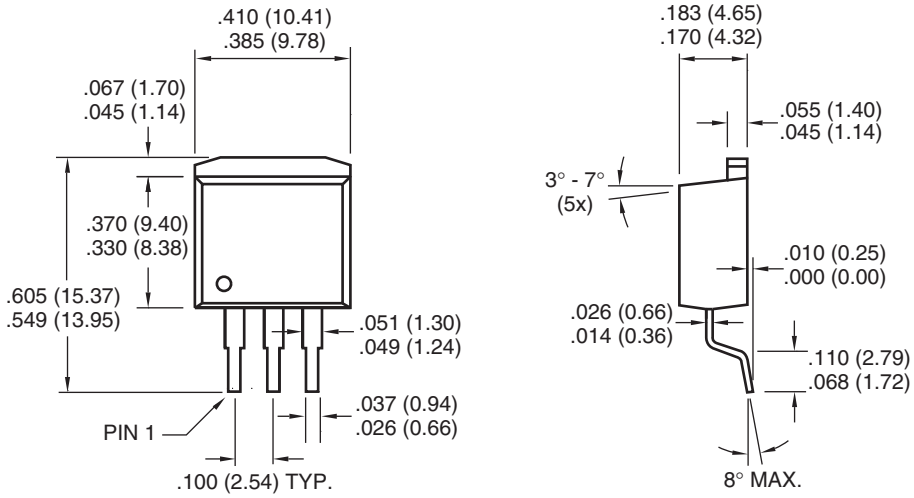
3-Pin TO-220



Dimensions: inches (mm)

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

3-Pin DDPAK



Dimensions: inches (mm)

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7.0 REVISION HISTORY

Revision C (November 2012)

Added a note to each package outline drawing.

NOTES:

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Entegreci, Eskişehir merkezli, Türkiye geneline satış yapan bir elektronik komponent mağazasıdır. Entegreler (IC), mikrodenetleyiciler, transistörler, diyotlar, pasif elemanlar, konnektörler, modüller ve geliştirme kartları tek adetten seri üretim adetlerine kadar satılır. Ürün sayfalarında güncel stok durumunu, fiyatı ve datasheet bağlantısını bulabilirsiniz.

Parça koduyla arama

Üretici parça numarasını yazın; stok ve fiyatı hemen görün.

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Ürün kategorileri

Entegreden kapasitöre tüm elektronik komponent kategorileri.

Kategorilere göz atın

Üreticiler

Aradığınız üreticinin ürünlerini tek sayfada inceleyin.

Üreticileri görün

Toplu alım ve teklif

Listede olmayan ya da yüksek adetli parçalar için teklif isteyin.

Teklif isteyin

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Entegreci is an online electronic components store based in Türkiye. Search by manufacturer part number to see stock, prices and datasheets for integrated circuits, microcontrollers, transistors, passive components and connectors, or request a quote for parts that are not listed.

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