

# 300/500mA Low Dropout Linear Voltage Regulator

## General Description

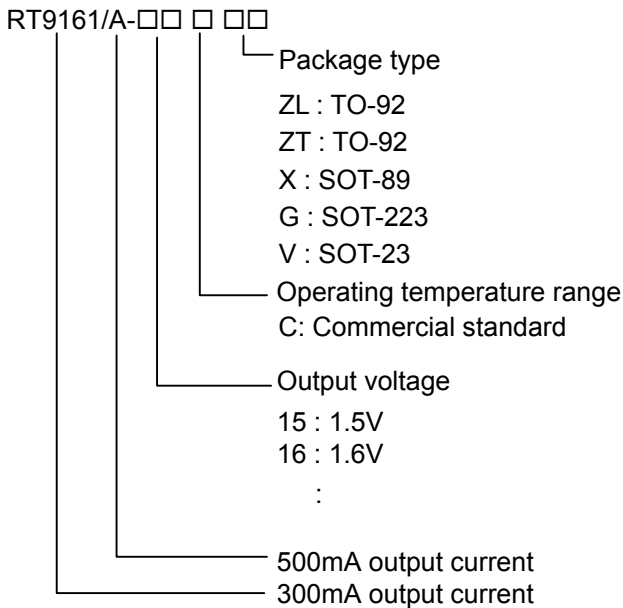
The RT9161/A is a 300/500mA fixed output voltage low dropout linear regulator. Typical ground current is approximately 110 $\mu$ A, from zero to maximum loading conditions. Wide range of available output voltage fits most of applications. Built-in output current-limiting most thermal-limiting provide maximal protection against any fault conditions.

For ease of application, the RT9161/A comes in the popular 3-pin SOT-89 (300mA), SOT-223 (500mA), or TO-92 packages.

## Applications

- Voltage Regulator for LAN Card, CD-ROM, and DVD
- Wireless Communication Systems
- Battery Powered Systems

## Ordering Information



## Marking Information

For marking information, contact our sales representative directly or through a RichTek distributor located in your area, otherwise visit our website for detail.

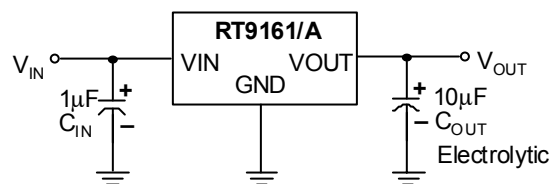
## Features

- Low Dropout Voltage of 200mV at Output Current 100mA, 450mV at Output Current 300mA, and 750mV at 500mA Output Current
- Guaranteed 300/500mA Output Current
- Internal 1.5 $\Omega$  P-MOSFET Draws No Base Current
- Low Ground Current 110 $\mu$ A
- 2% Accuracy Output Voltage
- Input Voltage Range up to 12V
- Extremely Tight Load Regulation
- Fast Transient Response
- Current-limiting and Thermal-limiting

## Pin Configurations

Part Number	Pin Configurations
RT9161/A-□□CZL/T (Plastic TO-92)	<p>TOP VIEW</p> <p>ZL      ZT</p> <p>1. VIN    1. GND</p> <p>2. GND    2. VIN</p> <p>3. VOUT   3. VOUT</p>
RT9161-□□CV (Plastic SOT-23)	<p>TOP VIEW</p> <p>1. GND</p> <p>2. VOUT</p> <p>3. VIN</p>
RT9161/A-□□CX (Plastic SOT-89)	<p>TOP VIEW</p> <p>1. GND</p> <p>2. VIN (TAB)</p> <p>3. VOUT</p>
RT9161A-□□CG (Plastic SOT-223)	<p>TOP VIEW</p> <p>1. GND</p> <p>2. VIN (TAB)</p> <p>3. VOUT</p>

## Typical Application Circuit



## Absolute Maximum Ratings

- Input Voltage ..... -0.3 ~ 14V
- Operating Junction Temperature Range ..... -40°C ~ 125°C
- Storage Temperature Range ..... -65°C ~ 150°C
- Power Dissipation, P<sub>D</sub> @ T<sub>A</sub> = 25°C
  - SOT-89 ..... 0.5W
  - TO-92 ..... 0.6W
  - SOT-23 ..... 0.15W
- Package Thermal Resistance
  - SOT-89, θ<sub>JC</sub> ..... 100°C/W
  - SOT-89, θ<sub>JA</sub> ..... 300°C/W
  - SOT-223, θ<sub>JC</sub> ..... 15°C/W
  - SOT-223, θ<sub>JA</sub> ..... 60°C/W
  - TO-92, θ<sub>JA</sub> ..... 160°C/W
  - SOT-23, θ<sub>JA</sub> ..... 250°C/W

## Electrical Characteristics

(T<sub>A</sub> = 25°C, C<sub>IN</sub> = 1μF, C<sub>OUT</sub> = 10μF, unless otherwise specified.)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Output Voltage Accuracy	ΔV <sub>OUT</sub>	I <sub>L</sub> = 1mA, V <sub>IN</sub> = 5V	-2	--	+2	%
Output Voltage Temperature Coefficient			--	50	150	PPM/°C
Line Regulation	ΔV <sub>LINE</sub>	I <sub>L</sub> = 1mA, V <sub>IN</sub> = 4.5 ~ 12V	--	2	3	%V <sub>OUT</sub>
Load Regulation (2)	ΔV <sub>LOAD</sub>	I <sub>L</sub> = 1mA ~ 300/500mA, V <sub>IN</sub> = 5V	--	1	30/50	mV
Current Limit (3)	RT9161	I <sub>LIMIT</sub> V <sub>IN</sub> = 5V, V <sub>OUT</sub> = 0V	350	580	--	mA
	RT9161A		500	900	--	
Dropout Voltage (4) (5)	V <sub>DROP</sub>	I <sub>L</sub> = 300/500mA	--	450/750	600/1000	mV
Standby Current	I <sub>STANDBY</sub>	I <sub>L</sub> = 0, V <sub>IN</sub> = 12V	--	110	180	μA

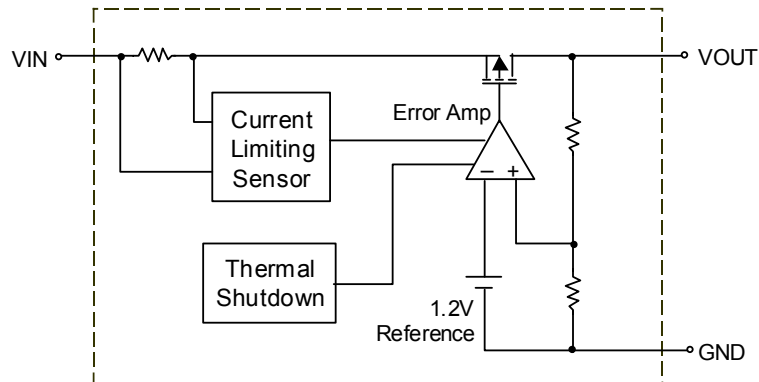
Note:

- (1) Guaranteed by design.
- (2) Regulation is measured at constant junction temperature, using pulsed ON time.
- (3) Current Limit is measured at constant junction temperature, using pulsed ON time.
- (4) Dropout is measured at constant junction temperature, using pulsed ON time, and the criterion is V<sub>OUT</sub> inside target value ± 2%.
- (5) Dropout test is skipped at the condition of V<sub>IN</sub> < 3V.

**Pin Description**

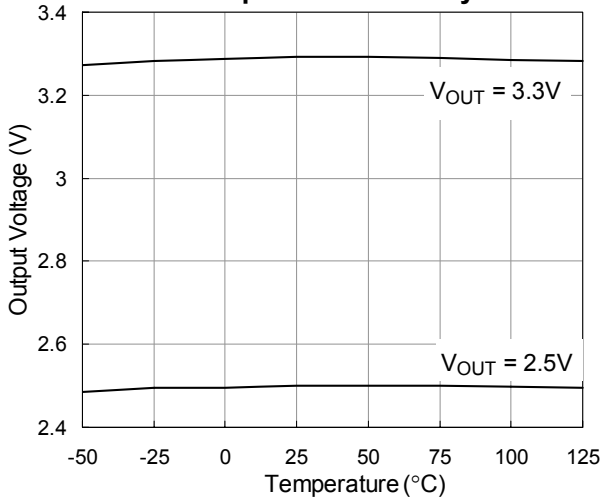
Pin Name	Pin Function
VOUT	Output Voltage
GND	Ground
VIN	Power Input

**Function Block Diagram**

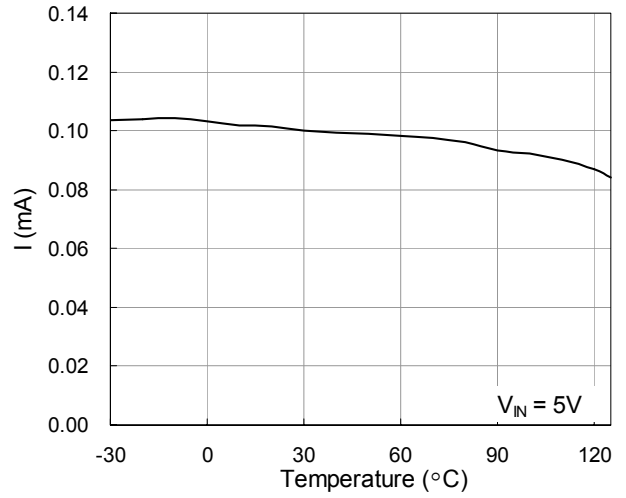


## Typical Operating Characteristics

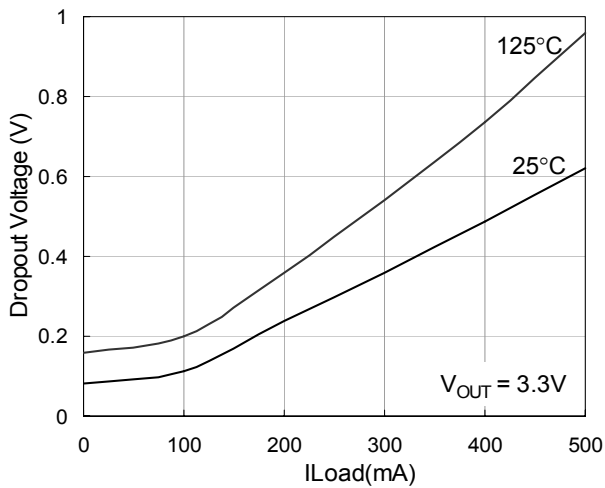
### Temperature Stability



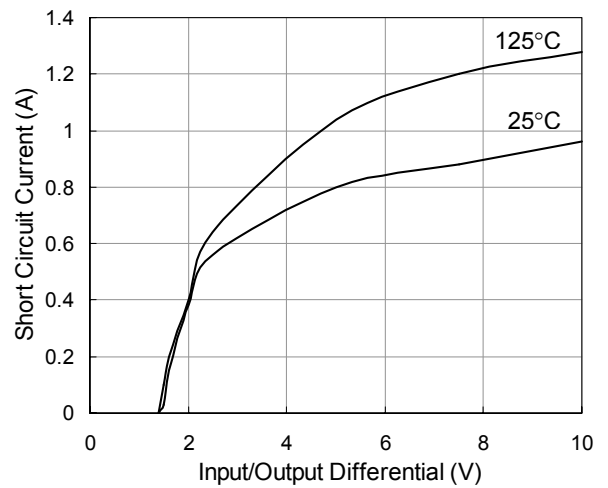
### Quiescent Current



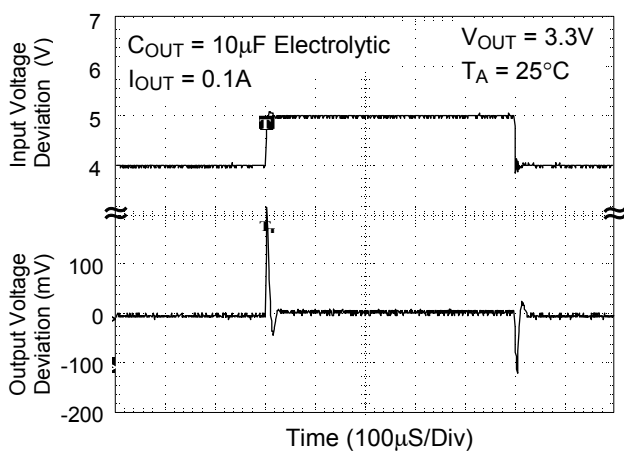
### Dropout Voltage (Vin-Vout)



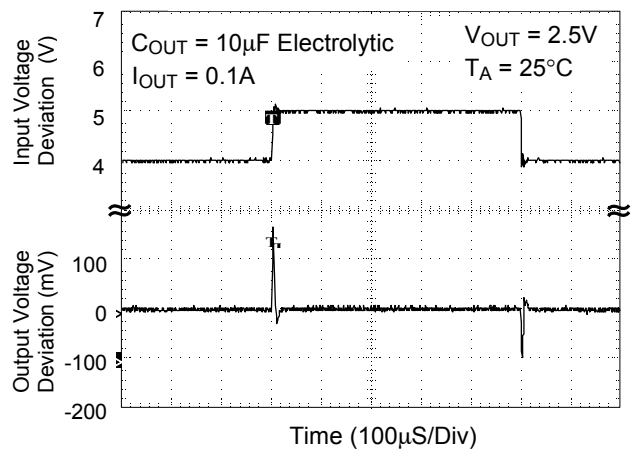
### Short Circuit Current



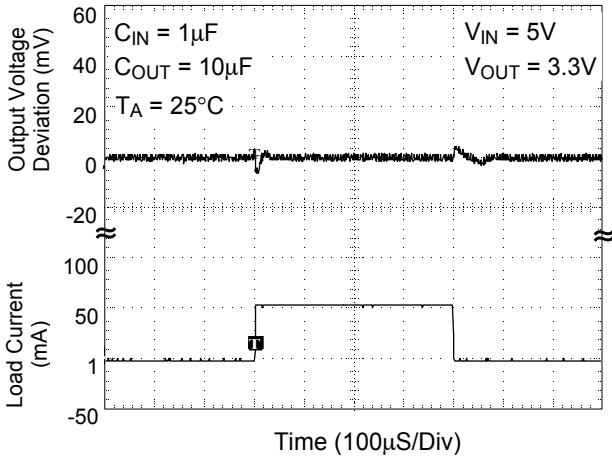
### Line Transient Response



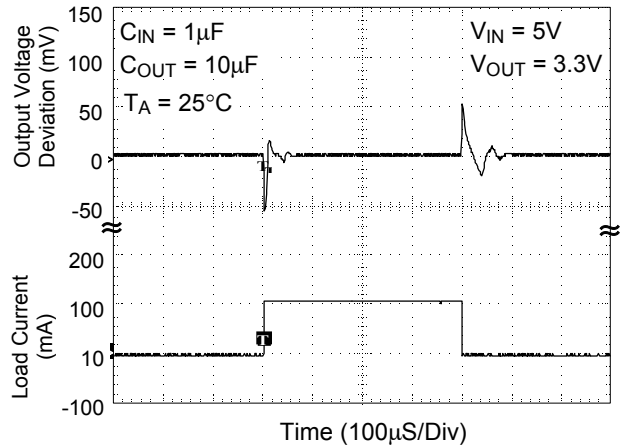
### Line Transient Response



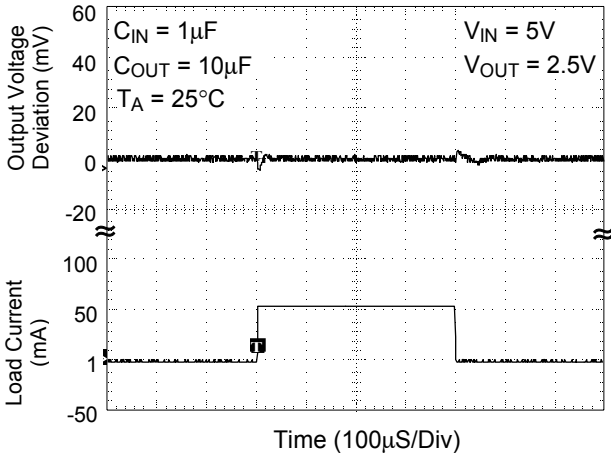
**Load Transient Response**



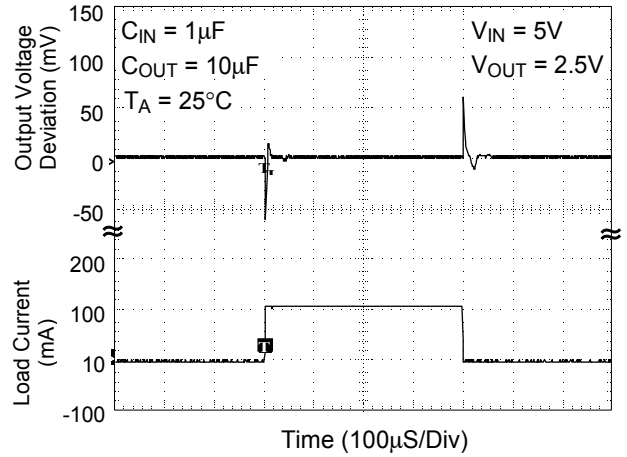
**Load Transient Response**



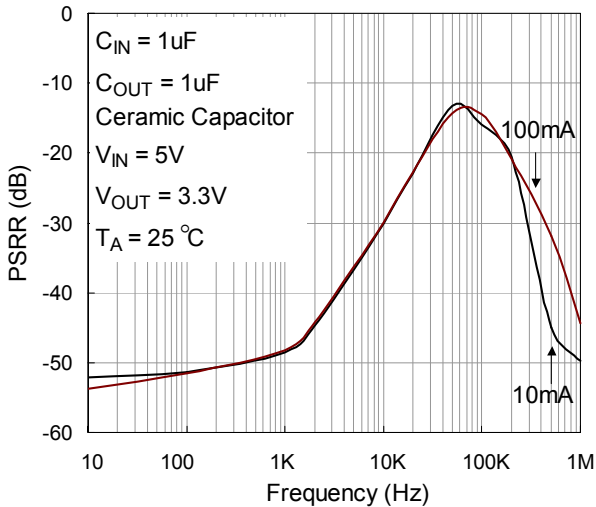
**Load Transient Response**



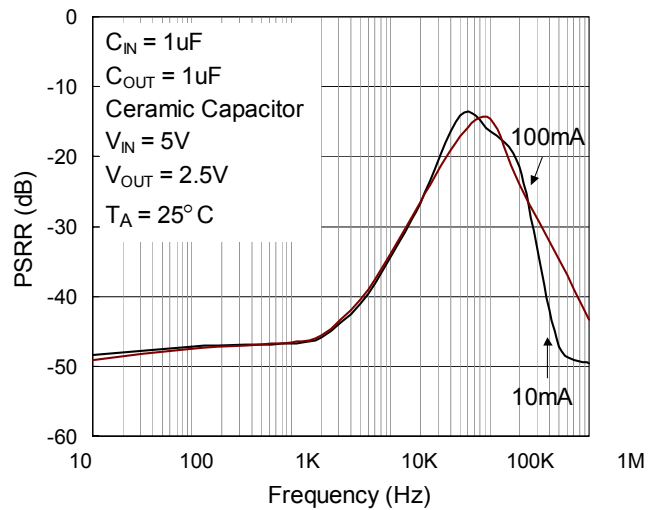
**Load Transient Response**



**PSRR**



**PSRR**

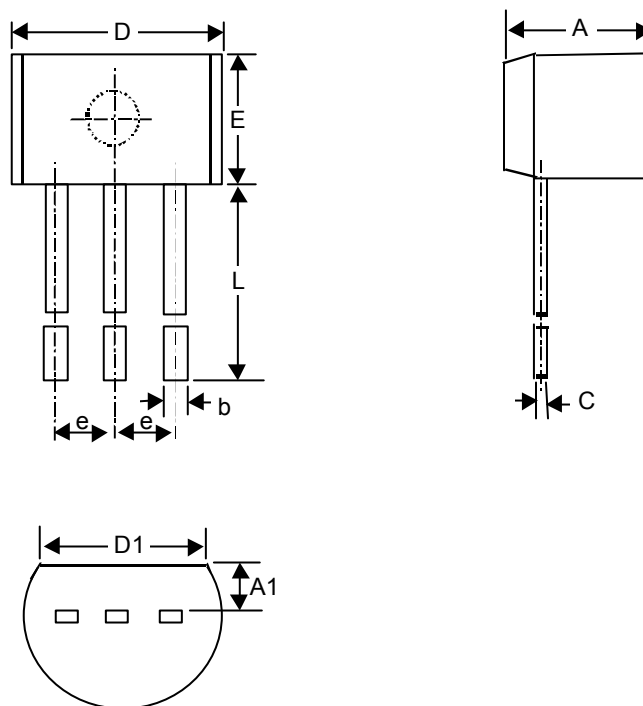


## Application Information

A 10 $\mu$ F (or larger) capacitor is recommended between VOUT and GND for stability. The part may oscillate without the capacitor. Any type of capacitor can be used, but not Aluminum electrolytics when operating below -25°C. The capacitance may be increased without limit.

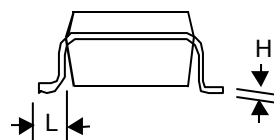
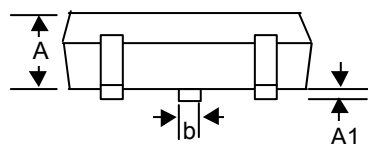
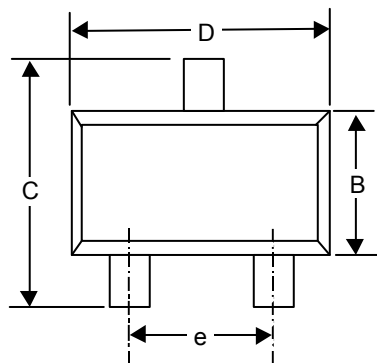
A 1 $\mu$ F capacitor (or larger) should be placed between VIN to GND.

**Package Information**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	3.175	4.191	0.125	0.165
A1	1.143	1.372	0.045	0.054
b	0.406	0.533	0.016	0.021
C	0.406	0.533	0.016	0.021
D	4.445	5.207	0.175	0.205
D1	3.429	--	0.135	--
E	4.318	5.334	0.170	0.210
e	1.143	1.397	0.045	0.055
L	12.700	--	0.500	--

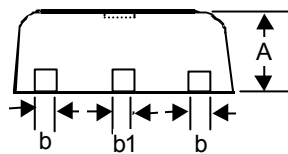
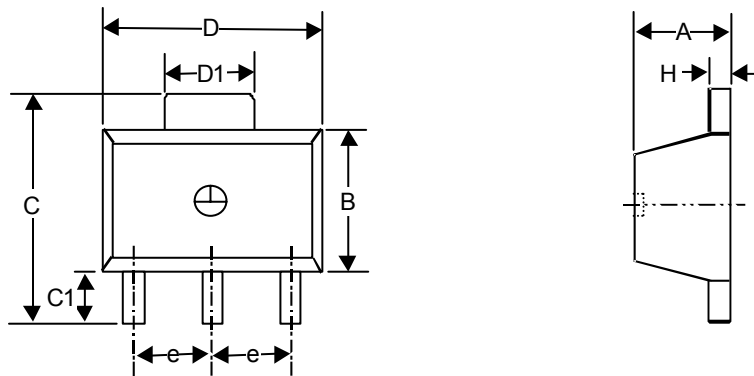
**3-Lead TO-92 Package**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.889	1.295	0.035	0.051
A1	--	0.152	--	0.006
B	1.397	1.803	0.055	0.071
b	0.356	0.508	0.014	0.020
C	2.591	2.997	0.102	0.118
D	2.692	3.099	0.106	0.122
e	1.803	2.007	0.071	0.079
H	0.102	0.254	0.004	0.010
L	0.356	0.610	0.014	0.024

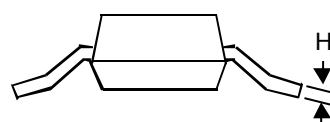
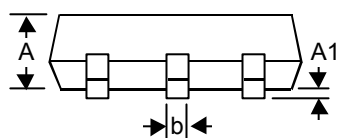
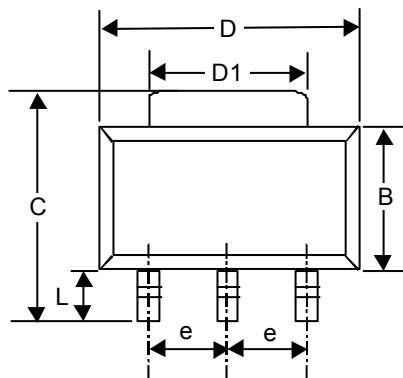
**SOT-23 Plastic Surface Mount**





Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.397	1.600	0.055	0.063
b	0.356	0.483	0.014	0.019
B	2.388	2.591	0.094	0.102
b1	0.406	0.533	0.016	0.021
C	--	4.242	--	0.167
C1	0.787	1.194	0.031	0.047
D	4.394	4.597	0.173	0.181
D1	1.397	1.753	0.055	0.069
e	1.448	1.549	0.057	0.061
H	0.355	0.432	0.014	0.017

**3-Lead SOT-89 Surface Mount**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	--	1.803	--	0.071
A1	0.020	0.100	0.0008	0.0047
b	0.610	0.787	0.024	0.031
B	3.302	3.708	0.130	0.146
C	6.706	7.290	0.264	0.287
D	6.299	6.706	0.248	0.264
D1	2.896	3.150	0.114	0.124
e	2.261	2.362	0.089	0.093
H	0.229	0.330	0.009	0.013
L	0.914	--	0.036	--

**3-Lead SOT-223 Plastic Surface Mount**



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