

# 300/500mA Low Dropout Linear Voltage Regulator

## General Description

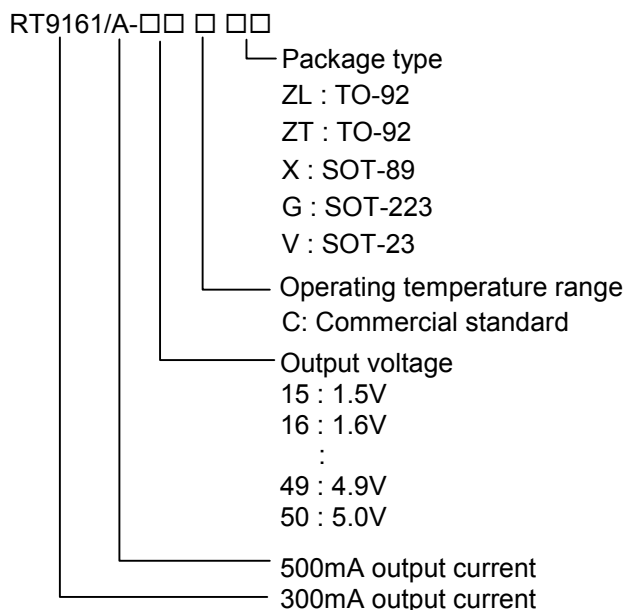
The RT9161/A is a 300/500mA fixed output voltage low dropout linear regulator. Typical ground current is approximately 110 $\mu$ A, from zero to maximum loading conditions. Wide range of available output voltage fits most of applications. Built-in output current-limiting most thermal-limiting provide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



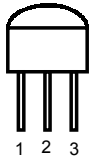
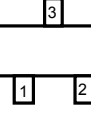
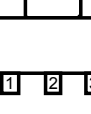
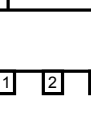
## Marking Information

See Appendix

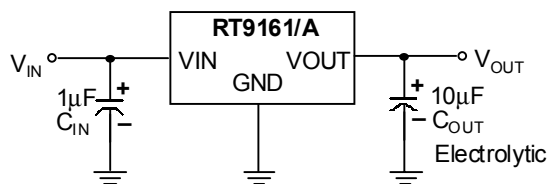
## Features

- 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)	TOP VIEW  ZL      ZT 1. VIN    1. GND 2. GND    2. VIN 3. VOUT    3. VOUT
RT9161-□□CV (Plastic SOT-23)	TOP VIEW  1. GND 2. VOUT 3. VIN
RT9161/A-□□CX (Plastic SOT-89)	TOP VIEW  1. GND 2. VIN (TAB) 3. VOUT
RT9161A-□□CG (Plastic SOT-223)	TOP VIEW  1. GND 2. VIN (TAB) 3. VOUT

## 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, $P_D$ @ $T_A = 25^\circ\text{C}$	
SOT-89 .....	0.5W
TO-92 .....	0.6W
SOT-23 .....	0.15W
• Package Thermal Resistance	
SOT-89, $\theta_{JC}$ .....	100°C/W
SOT-89, $\theta_{JA}$ .....	300°C/W
SOT-223, $\theta_{JC}$ .....	15°C/W
SOT-223, $\theta_{JA}$ .....	60°C/W
TO-92, $\theta_{JA}$ .....	160°C/W
SOT-23, $\theta_{JA}$ .....	250°C/W

## Electrical Characteristics

( $T_A = 25^\circ\text{C}$ ,  $C_{IN} = 1\mu\text{F}$ ,  $C_{OUT} = 10\mu\text{F}$ , unless otherwise specified.)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units	
Output Voltage Accuracy	$\Delta V_{OUT}$	$I_L = 1\text{mA}$ , $V_{IN} = 5\text{V}$	-2	--	+2	%	
Output Voltage Temperature Coefficient			--	50	150	PPM/°C	
Line Regulation	$\Delta V_{LINE}$	$I_L = 1\text{mA}$ , $V_{IN} = 4.5 \sim 12\text{V}$	--	2	3	% $V_{OUT}$	
Load Regulation (2)	$\Delta V_{LOAD}$	$I_L = 1\text{mA} \sim 300/500\text{mA}$ , $V_{IN} = 5\text{V}$	--	1	30/50	mV	
Current Limit (3)	RT9161	$I_{LIMIT}$	$V_{IN} = 5\text{V}$ , $V_{OUT} = 0\text{V}$	350	580	--	mA
	RT9161A			550	900	--	
Dropout Voltage (4) (5)	$V_{DROP}$	$I_L = 300/500\text{mA}$	--	450/750	600/1000	mV	
Standby Current	$I_{STANDBY}$	$I_L = 0$ , $V_{IN} = 12\text{V}$	--	110	180	$\mu\text{A}$	

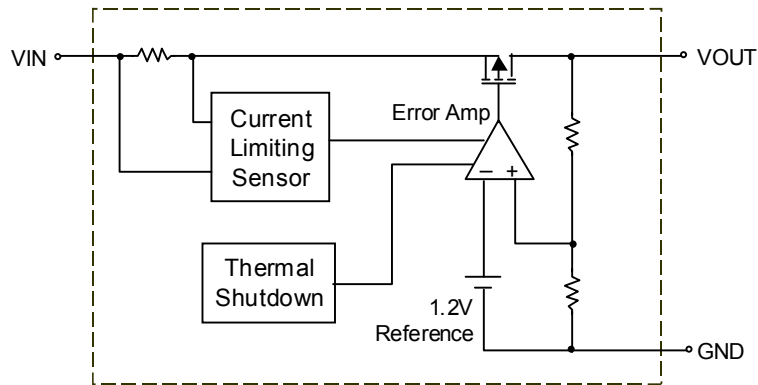
Note:

- (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  $V_{OUT}$  inside target value  $\pm 2\%$ .
- (5) Dropout test is skipped at the condition of  $V_{IN} < 3\text{V}$ .

**Pin Description**

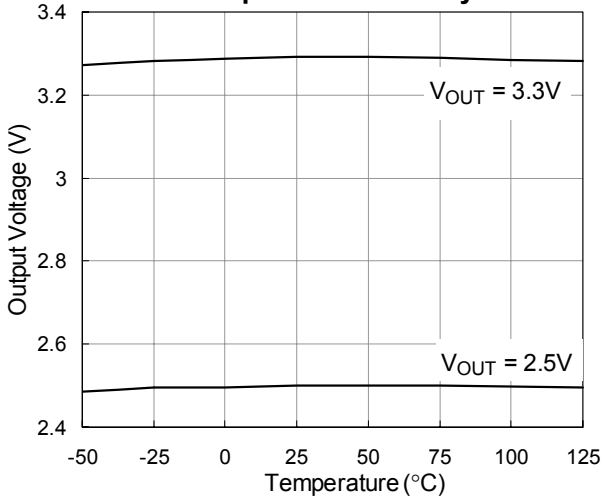
Pin Name	Pin Function
VOUT	Output Voltage
GND	Ground
VIN	Power Input

**Function Block Diagram**

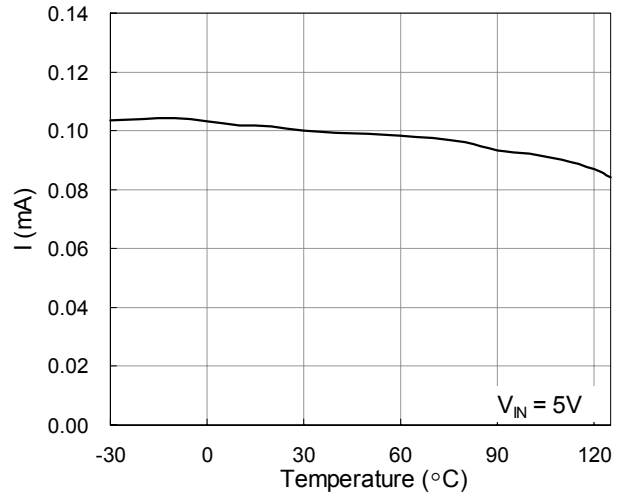


## Typical Operating Characteristics

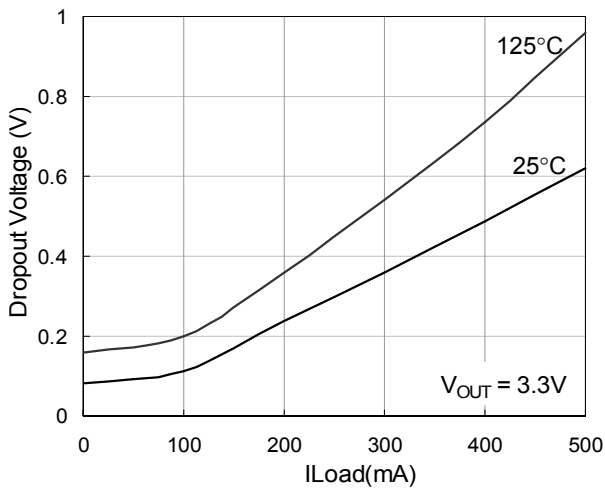
### Temperature Stability



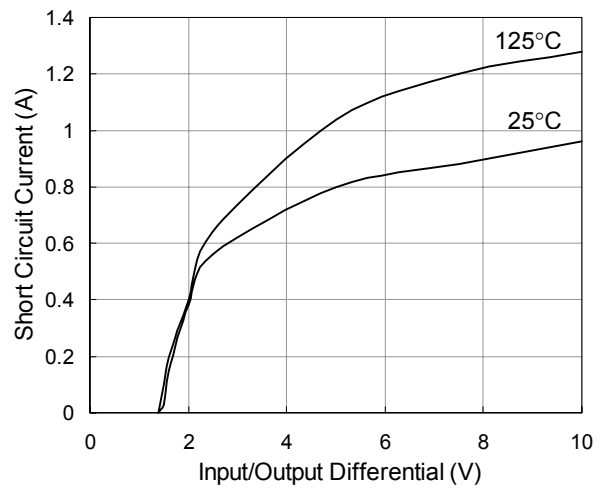
### Quiescent Current



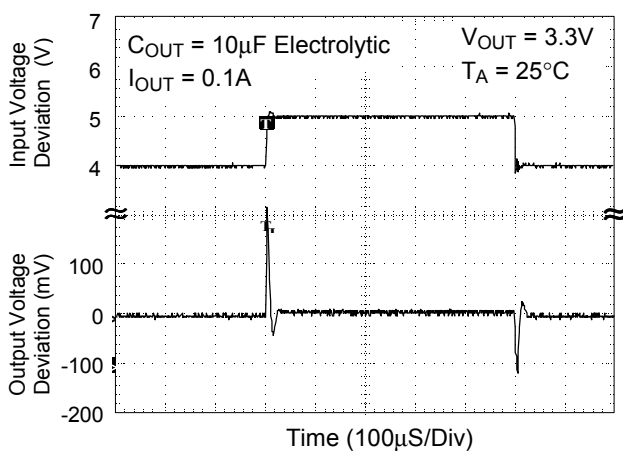
### Dropout Voltage ( $V_{in}-V_{out}$ )



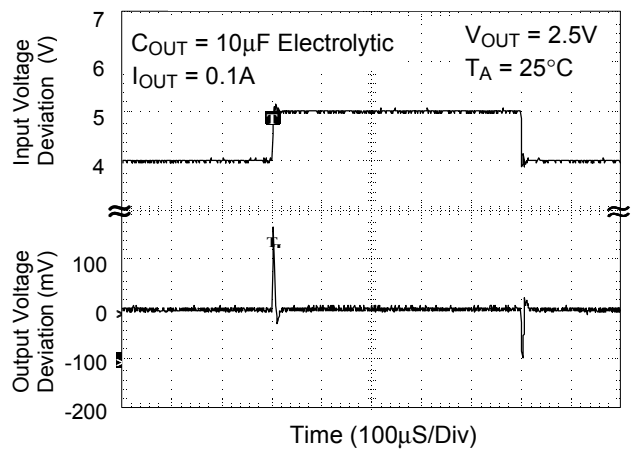
### Short Circuit Current



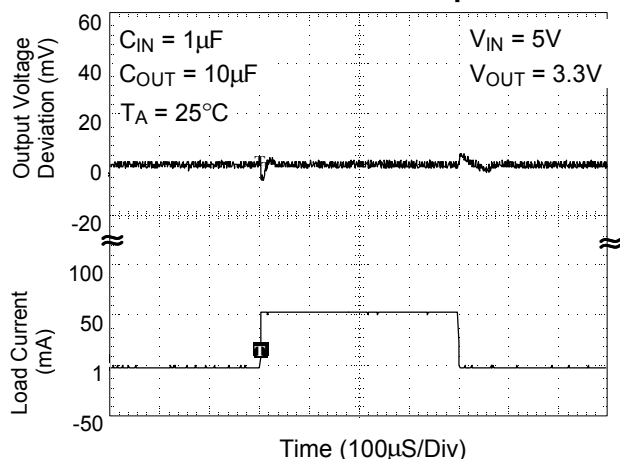
### Line Transient Response



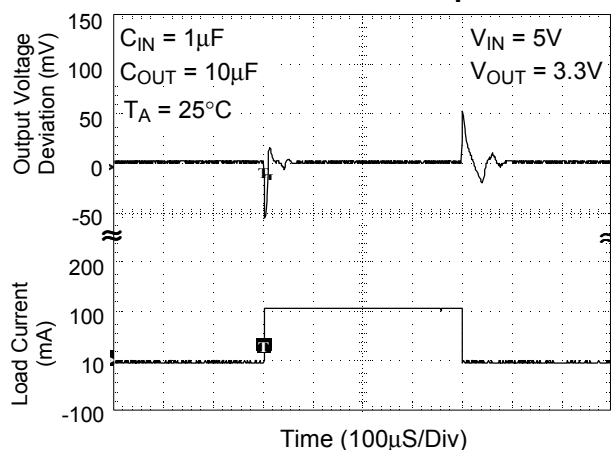
### Line Transient Response



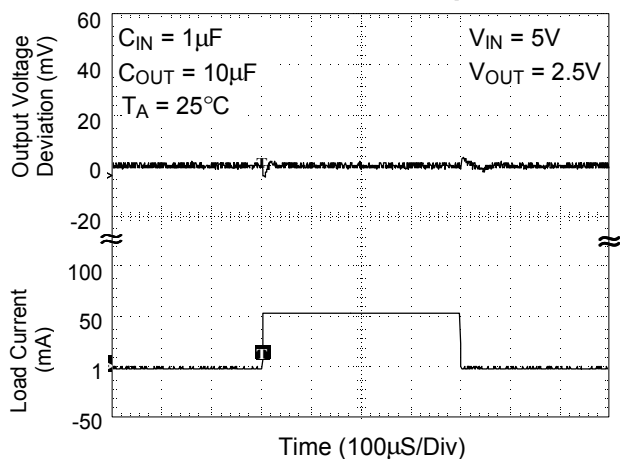
### Load Transient Response



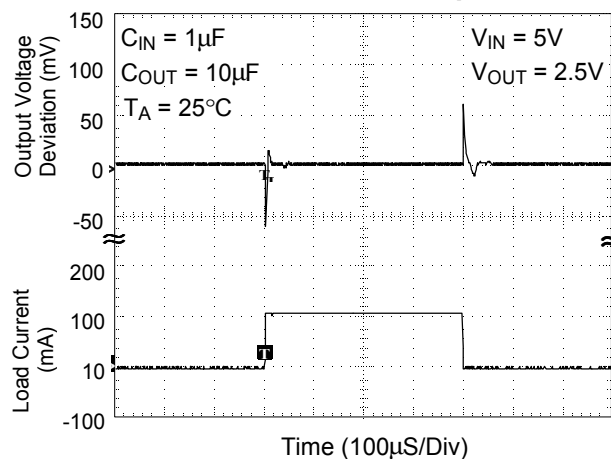
### Load Transient Response



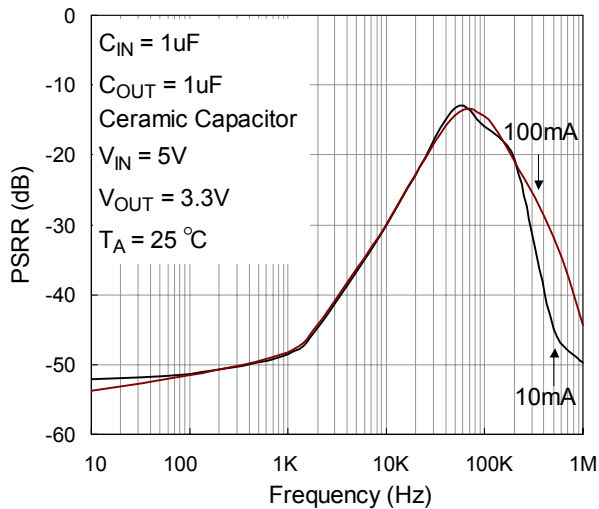
### Load Transient Response



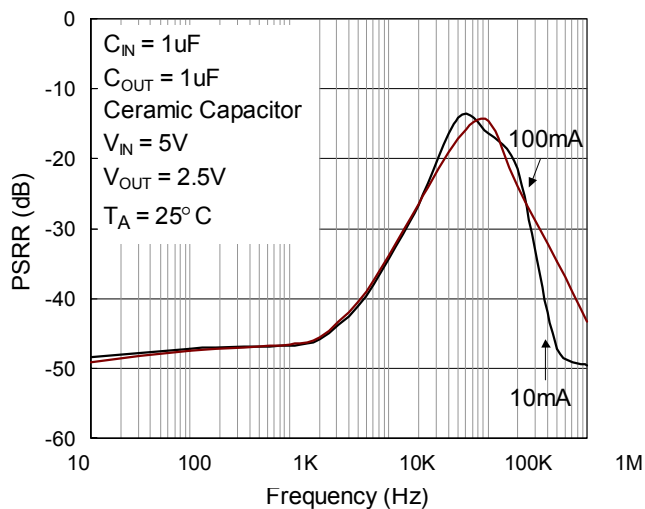
### Load Transient Response



### PSRR



### PSRR

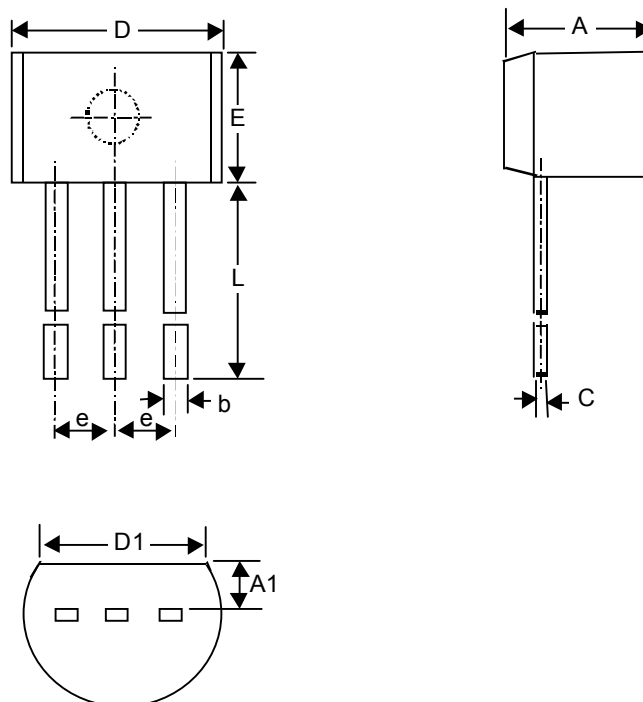


## Application Information

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.

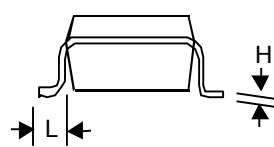
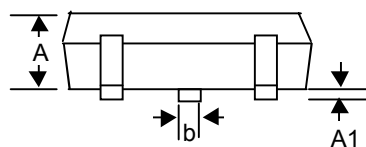
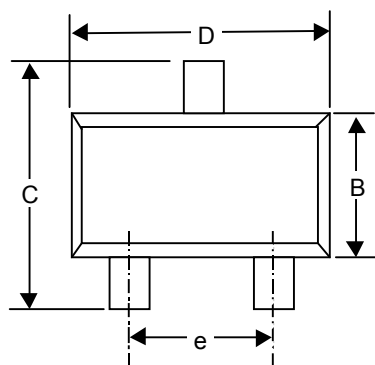
A 1 $\mu$ F capacitor (or larger) should be placed between VIN to GND.

## 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	--

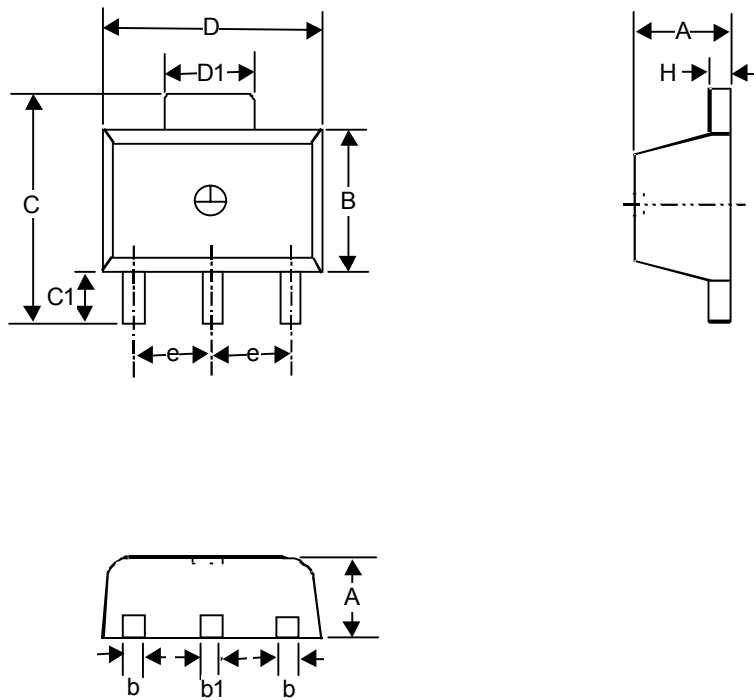
**3-Lead TO-92 Package**



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

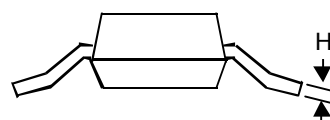
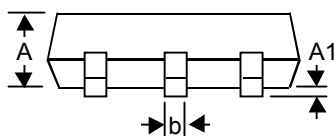
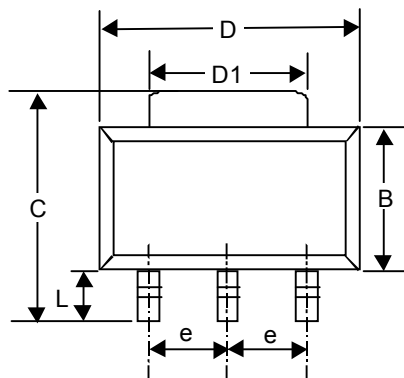
**SOT-23 Plastic Surface Mount**





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**

**Appendix**

Part Number	Marking
RT9161-17CX	AY
RT9161-18CX	CT
RT9161-21CX	C1
RT9161-25CX	A2
RT9161-26CX	AD
RT9161-27CX	AG
RT9161-28CX	AA
RT9161-29CX	AF
RT9161-30CX	AE
RT9161-31CX	AH
RT9161-32CX	AJ
RT9161-33CX	A3
RT9161-34CX	AK
RT9161-35CX	A4
RT9161-36CX	AL
RT9161-37CX	A5
RT9161-38CX	AB
RT9161-39CX	A6
RT9161-40CX	A7
RT9161-41CX	AM
RT9161-42CX	AC
RT9161-45CX	C7
RT9161-47CX	C8
RT9161-50CX	CU
RT9161-15CX	AP
RT9161-20CX	AQ
RT9161-22CX	AS
RT9161-43CX	C9
RT9161-19CX	CY
RT9161-25CZT	RTA6
RT9161-26CZT	RTAP
RT9161-27CZT	RTAQ
RT9161-28CZT	RTAL
RT9161-29CZT	RTAR
RT9161-30CZT	RTAS

Part Number	Marking
RT9161-31CZT	RTAT
RT9161-32CZT	RTAU
RT9161-33CZT	RTA7
RT9161-34CZT	RTAV
RT9161-35CZT	RTA8
RT9161-36CZT	RTAW
RT9161-37CZT	RTA9
RT9161-38CZT	RTAM
RT9161-39CZT	RTAA
RT9161-40CZT	RTAB
RT9161-41CZT	RTAX
RT9161-42CZT	RTAN
RT9161-45CZT	RTBB
RT9161-47CZT	RTBD
RT9161-50CZT	RTBC
RT9161-25CZL	RTAC
RT9161-26CZL	RTB1
RT9161-27CZL	RTB2
RT9161-28CZL	RTAY
RT9161-29CZL	RTB3
RT9161-30CZL	RTB4
RT9161-31CZL	RTB5
RT9161-32CZL	RTB6
RT9161-33CZL	RTAD
RT9161-34CZL	RTB7
RT9161-35CZL	RTAE
RT9161-36CZL	RTB8
RT9161-37CZL	RTAF
RT9161-38CZL	RTAZ
RT9161-39CZL	RTAG
RT9161-40CZL	RTAH
RT9161-41CZL	RTB9
RT9161-42CZL	RTB0
RT9161-45CZL	RTBE
RT9161-47CZL	RTBF

Part Number	Marking
RT9161-50CZL	RTC0
RT9161-15CV	C3
RT9161-16CV	A0
RT9161-17CV	A1
RT9161-18CV	A2
RT9161-19CV	A3
RT9161-20CV	A4
RT9161-21CV	A5
RT9161-22CV	A6
RT9161-23CV	A7
RT9161-24CV	A8
RT9161-25CV	C1
RT9161-26CV	A9
RT9161-27CV	C2
RT9161-28CV	AA
RT9161-29CV	AB
RT9161-30CV	C4
RT9161-31CV	AC
RT9161-32CV	AD
RT9161-33CV	CV
RT9161-34CV	AE
RT9161-35CV	C5
RT9161-36CV	AG
RT9161-37CV	AH
RT9161-38CV	AJ
RT9161-39CV	AK
RT9161-40CV	AL
RT9161-41CV	AM
RT9161-42CV	AN
RT9161-43CV	AP
RT9161-44CV	AQ
RT9161-45CV	AR
RT9161-46CV	AS
RT9161-47CV	AT
RT9161-48CV	AU
RT9161-49CV	AV

Part Number	Marking
RT9161-50CV	AW
RT9161A-25CV	AY
RT9161A-15CX	G0
RT9161A-16CX	G1
RT9161A-17CX	G2
RT9161A-18CX	G3
RT9161A-19CX	G4
RT9161A-20CX	G5
RT9161A-21CX	G6
RT9161A-22CX	G7
RT9161A-23CX	G8
RT9161A-24CX	G9
RT9161A-25CX	GA
RT9161A-26CX	GB
RT9161A-27CX	GC
RT9161A-28CX	GD
RT9161A-29CX	GE
RT9161A-30CX	GH
RT9161A-31CX	GG
RT9161A-32CX	GF
RT9161A-33CX	GJ
RT9161A-34CX	GK
RT9161A-35CX	GL
RT9161A-36CX	GM
RT9161A-37CX	GN
RT9161A-38CX	GP
RT9161A-39CX	GQ
RT9161A-40CX	GR
RT9161A-41CX	GS
RT9161A-42CX	CF
RT9161A-43CX	GU
RT9161A-44CX	GV
RT9161A-45CX	GW
RT9161A-46CX	GX
RT9161A-47CX	GY
RT9161A-48CX	GZ

<b>Part Number</b>	<b>Marking</b>
RT9161A-49CX	GT
RT9161A-50CX	CG

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