1A Positive Voltage Regulators

Introduction

The EC50117 series of high performance low dropout voltage regulators are designed for applications that require efficient conversion and fast transient response.

Features

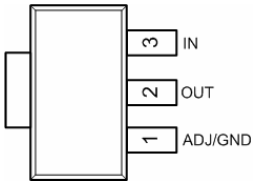
- Low Dropout Performance
- Guaranteed 1A Output Current
- Wide Input Supply Voltage Range
- Over-temperature and Over-current Protection
- Fixed or Adjustable Output Voltage
- Rugged 2KV ESD withstand capability
- Available in SOT-223 & TO-252 & SOT-89 Packages

Applications

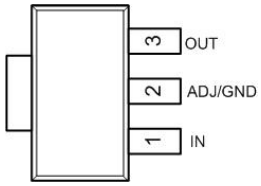
- Active SCSI Terminators
- High Efficiency Linear Regulators
- 5V to 3.3V Linear Regulators
- Motherboard Clock Supplies

Pin Configuration (TOP-VIEW)

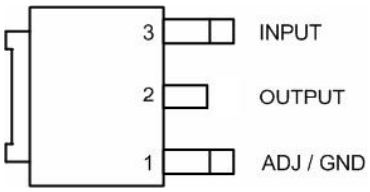
Package: SOT-223



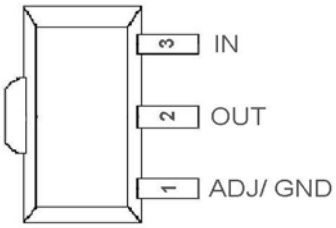
Package: SOT-223 (B1)



Package: TO-252



Package: SOT-89



Ordering Information

EC50117 X X X

- F: Lead-Free , G: Green Mode
- Package Type: B= SOT-223
  B1= SOT-223
  A= TO-252
  H= SOT-89
- Output Voltage: A = V_{OUT}= 1.5V
  B = V_{OUT}= 1.8V
  C = V_{OUT}= 2.5V
  E = V_{OUT}= 2.7V
  H = V_{OUT}= 3.0V
  K = V_{OUT}= 3.3V
  ADJ=V_{OUT}= Adjustable

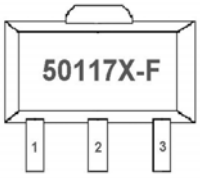
Part Number	Marking ID	Package	VOUT Voltage
EC50117KBF	50117K-F	SOT-223	output voltages; B Type ,voltage options (3.3V). Lead Free
EC50117KB1F	50117K1-F	SOT-223	output voltages; B1 Type, voltage options (3.3V). Lead Free
EC50117KBG	50117K-G	SOT-223	output voltages; B Type, voltage options (3.3V). Green Package
EC50117KB1G	50117K1-G	SOT-223	output voltages; B1 Type, voltage options (3.3V). Green Package
EC50117KAF	50117 K-F #####	TO-252	output voltages; A Type, voltage options (3.3V). Lead Free
EC50117KAG	50117 K-G #####	TO-252	output voltages; A Type, voltage options (3.3V). Green Package
EC50117KHF	50117K-F	SOT-89	output voltages; H Type, voltage options (3.3V). Lead Free
EC50117EBG	50117E-G	SOT-223	output voltages; B Type, voltage options (2.7V). Green Package
EC50117CAG	50117 C-G #####	TO-252	output voltages; A Type, voltage options (2.5V). Green Package
EC50117CBG	50117C-G	SOT-223	output voltages; B Type, voltage options (2.5V). Green Package
EC50117CB1G	50117C1G	SOT-223	output voltages; B1 Type, voltage options (2.5V). Green Package
EC50117CHF	117C-F	SOT-89	output voltages; H Type, voltage options (2.5V). Lead Free
EC50117CHG	117C-G	SOT-89	output voltages; H Type, voltage options (2.5V). Green Package
EC50117BAG	50117 B-G #####	TO-252	output voltages; A Type, voltage options (1.8V). Green Package
EC50117BBG	50117B-G	SOT-223	output voltages; B Type, voltage options (1.8V). Green Package
EC50117BB1G	50117B1G	SOT-223	output voltages; B1 Type, voltage options (1.8V). Green Package
EC50117ABG	50117A-G	SOT-223	output voltages; B Type, voltage options (1.5V). Green Package

Ordering Information(Continued)

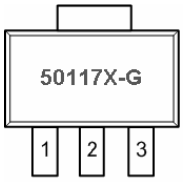
Part Number	Marking ID	Package	VOUT Voltage
EC50117ADJAG	50117 ADJ-G #####	TO-252	output voltages; A Type ,voltage options (ADJ). Green Package
EC50117ADJBF	50117ADJ-F	SOT-223	output voltages; B Type ,voltage options (ADJ). Lead Free
EC50117ADJBG	50117ADJ-G	SOT-223	output voltages; B Type ,voltage options (ADJ). Green Package

Marking Information

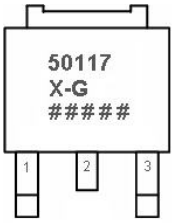
SOT-89



SOT-223



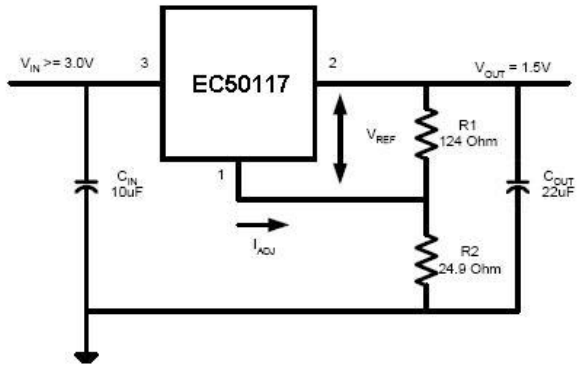
TO-252



Package	Part Number	Marking	Marking Information
SOT-89	EC50117XHF	50117X-F	1. X is the output voltage of production. A:1.5V B:1.8V C:2.5V E:2.7V H:3.0V K:3.3V ADJ: Adjustable 2. F is for Lead-free package. G is for Green package 1 is for SOT223 (B1) package. 3. #####: Lot Number of production.
	EC50117XHG	50117X-G	
	EC50117ADJHF	50117ADJ-F	
	EC50117ADJHG	50117ADJ-G	
SOT-223	EC50117XBF	50117X-F	
	EC50117XB1F	50117X1-F	
	EC50117XBG	50117X-G	
	EC50117XB1G	50117X1-G	
	EC50117ADJBF	50117ADJ-F	
	EC50117ADJB1F	50117ADJ1-F	
	EC50117ADJBG	50117ADJ-G	
	EC50117ADJB1G	50117ADJ1-G	
TO-252	EC50117XAF	50117 X-F #####	
	EC50117XAG	50117 X-G #####	
	EC50117ADJAF	50117 ADJ-F #####	
	EC50117ADJAG	50117 ADJ-G #####	

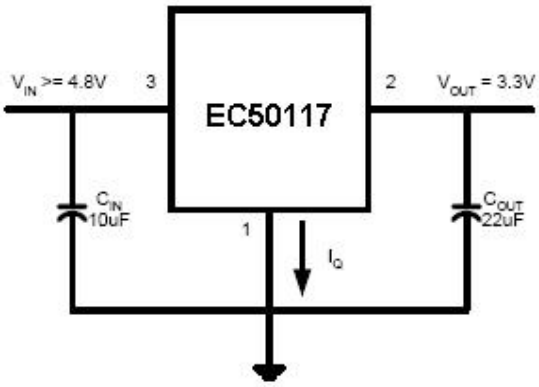
Typical Application

Adjustable Voltage Regulator



$$V_{OUT} = V_{REF}(1 + \frac{R_2}{R_1}) + I_{ADJ}R_2$$

Fixed Voltage Regulator



Application Hints

Like any linear voltage regulator, EC50117 requires external capacitors to ensure stability. The external capacitors must be carefully selected to ensure performance.

Input Capacitor

An input capacitor of at least 10μF is required. Ceramic or Tantalum can be used. The value can be increase without upper limit.

Output Capacitor

An output capacitor is required for stability. It must be placed no more than 1 cm away from the VOUT pin, and connected directly between VOUT and GND pins. The minimum value is 22μF but may be increase without limit.

Thermal Considerations

It is important that the thermal limit of the package is not exceeded. The EC50117 has built-in thermal protection. When the thermal limit is exceeded, the IC will enter protection, and VOUT will be pulled to ground. The power dissipation for a given application can be calculated as following: PD = IOUT * [VIN – VOUT]

Absolute maximum ratings

Symbol	Parameter		Maximum	Units
VIN	Input Supply Voltage		9	V
θ_{JA}	Thermal Resistance Junction to Ambient	SOT-89	175	°C/W
		SOT-223	117	
		TO-252	98	
θ_{JC}	Thermal Resistance Junction to Case	SOT-89	58	°C/W
		SOT-223	15	
		TO-252	10	
T_J	Operating Junction Temperature Range		0 to 125	°C
T_{STG}	Storage Temperature Range		-40 to 150	°C
T_{LEAD}	Lead Temperature (Soldering 10 Sec)		260	°C

Electrical Characteristics

VIN, MAX ≤ 8V, VIN, MIN – VOUT = 1.5V, IOUT = 10mA, CIN = 10μF, COUT = 22μF, TA = 25°C, unless otherwise specified.

Limits appearing in **Boldface** type apply the maximum load, 1A.

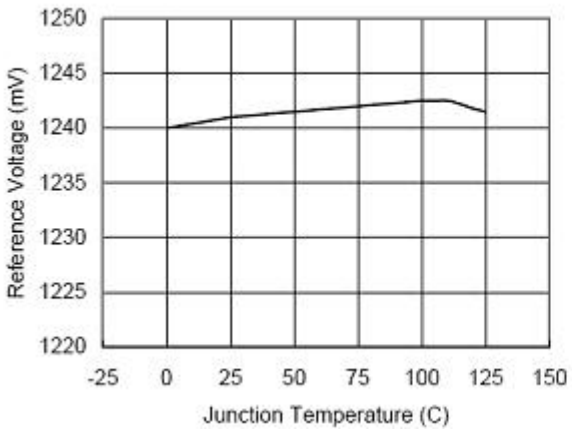
Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
VO	Output Voltage (1)	(VIN-VOUT)=1.5V, IOUT=10mA, T_A=25°C	(-2%)	—	(+2%)	V
		EC50117A , Io=10mA, T_A =25°C, 3.0V≤Vin≤8V 10mA≤Io≤1A, T_A =25°C, 3.0V≤Vin≤8V	1.470 **1.455**	1.5 1.5	1.530 **1.545**	
		EC50117B , Io=10mA, T_A =25°C, 3.3V≤Vin≤8V 10mA≤Io≤1A, T_A =25°C, 3.3V≤Vin≤8V	1.764 **1.746**	1.8 1.8	1.836 **1.854**	
		EC50117C , Io=10mA, T_A =25°C, 4.0V≤Vin≤8V 10mA≤Io≤1A, T_A =25°C, 4.0V≤Vin≤8V	2.450 **2.425**	2.5 2.5	2.550 **2.575**	
		EC50117E , Io=10mA, T_A =25°C, 4.2V≤Vin≤8V 10mA≤Io≤1A, T_A =25°C, 4.2V≤Vin≤8V	2.646 **2.619**	2.7 2.7	2.754 **2.781**	
		EC50117H , Io=10mA, T_A =25°C, 4.5V≤Vin≤8V 10mA≤Io≤1A, T_A =25°C, 4.5V≤Vin≤8V	2.940 **2.910**	3.0 3.0	3.060 **3.090**	
		EC50117K , Io=10mA, T_A =25°C, 4.75V≤Vin≤8V 10mA≤Io≤1A, T_A =25°C, 4.75V≤Vin≤8V	3.234 **3.201**	3.3 3.3	3.366 **3.399**	
VREF	Reference Voltage(1) (ADJ. Voltage Version)	EC50117ADJ, (VIN-VOUT)=1.5V, IOUT=10mA 10mA≤Io≤1A,1.8V≤ VIN≤8V,	1.225 **1.212**	1.250 1.250	1.275 **1.287**	V
I_O	Output Current	(VIN-VOUT)=1.5V	—	—	1	A
VSR	Line Regulation(1)	IOUT=10mA	—	0.3	—	%
VLR	Load Regulation(1)	(VIN-VOUT)=1.5V, 10mA ≤ IOUT ≤ 1A	—	0.5	—	%
IQ	Quiescent Current	Fixed Output Version	—	3.3	—	mA
IADJ	Adjust Pin Current	—	—	65	—	uA
△IADJ	Adjust Pin Current Change	10mA ≤ IOUT ≤ 1A	—	0.2	—	uA
VD	Dropout Voltage(2)	△VREF = 2%, IOUT =1A	—	1.2	—	V
ID	Minmum Load Curren	—	—	4	—	mA
ICL	Current Limit	—	—	1.8	—	A
TC	Temperature Coefficient	—	—	0.07	—	%/°C
OTP	Thermal Protection	—	—	175	—	°C
VN	RMS Output Noise	TA = 25°C, 10Hz ≤ f ≤ 10KHz	—	0.003	—	%VO
RA	Ripple Rejection Ratio	F=120Hz, COUT=22uF(Tantalum), (VIN-VOUT)=3V,IOUT=1A	—	35	—	dB

Notes:

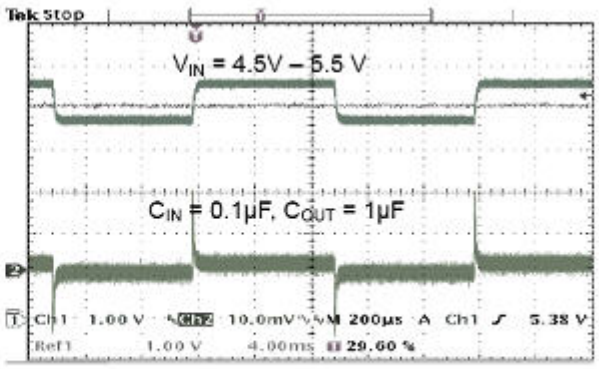
1. Low duty cycle pulse testing with which TJ remains unchanged.
2. ΔVOUT, ΔVREF = 2%.

Typical Performance Characteristics

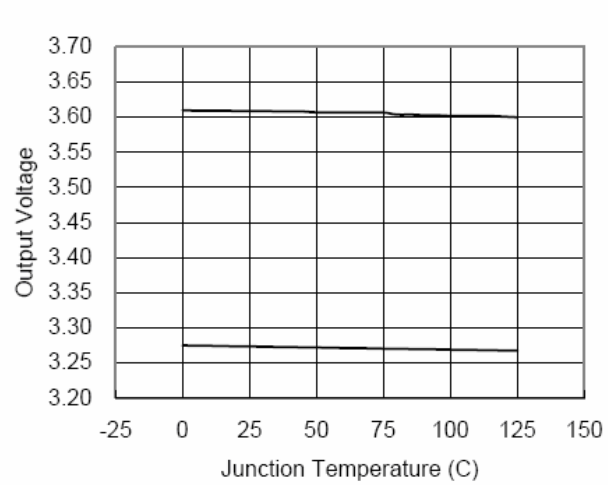
Reference Voltage VS Junction Temperature



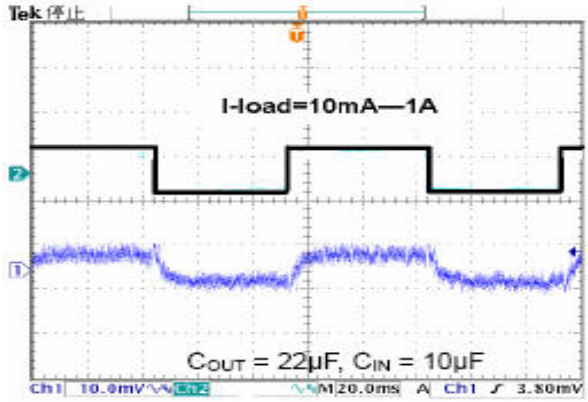
Line Transients



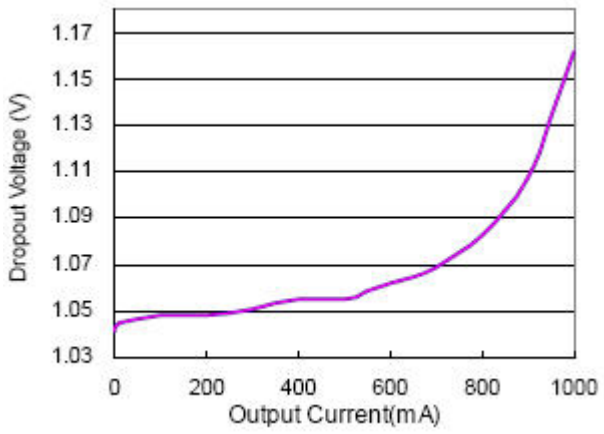
Output Voltage VS Junction Temperature



Load Transients

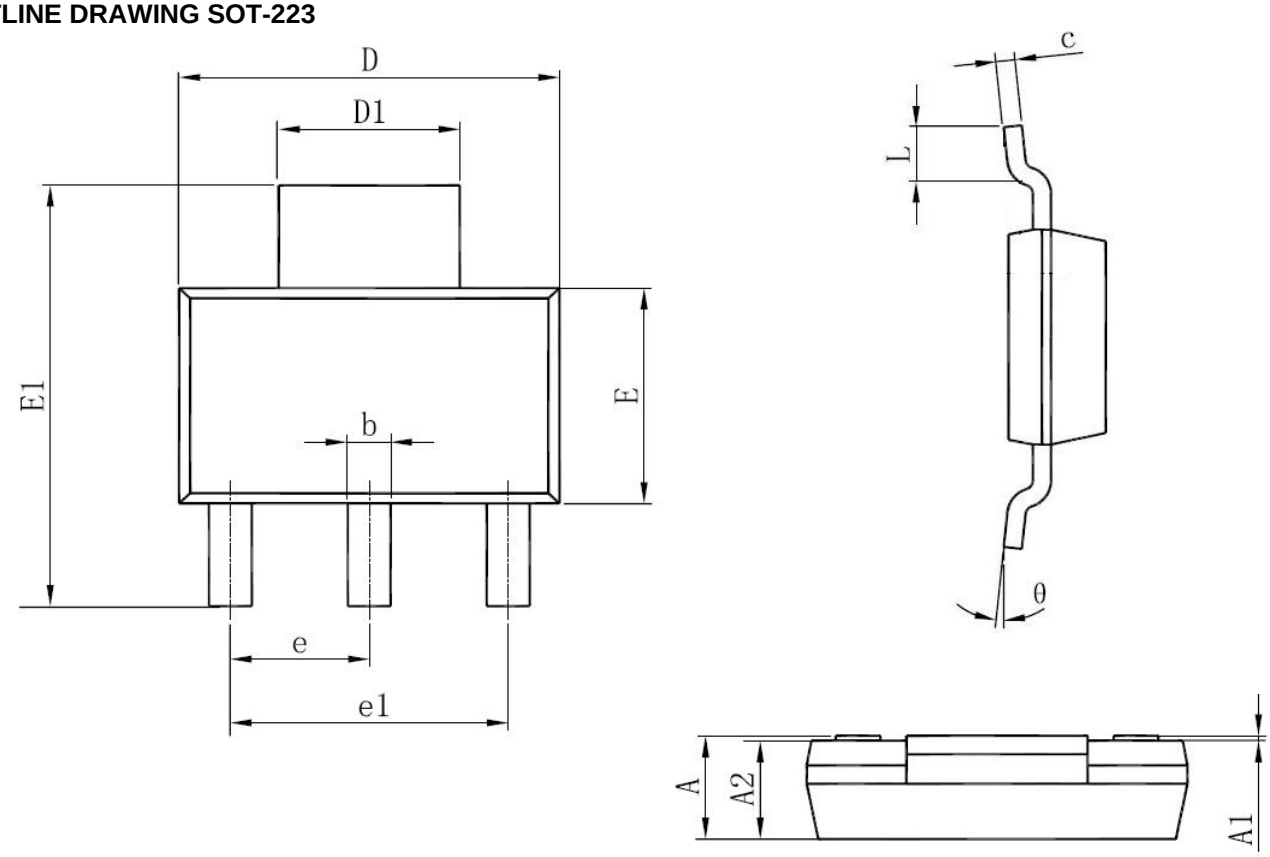


Dropout Voltage vs Output Current



Mechanical Dimensions

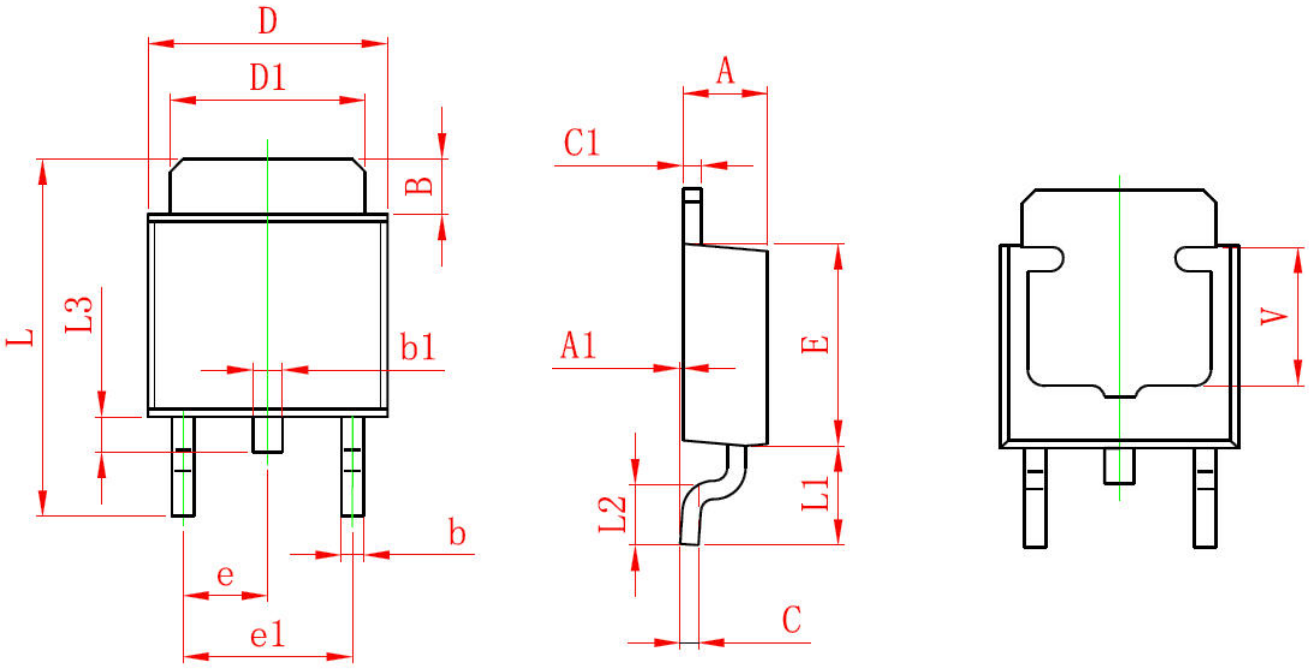
OUTLINE DRAWING SOT-223



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.450	1.800	0.0571	0.071
A1	0.020	0.100	0.0008	0.004
A2	1.430	1.700	0.056	0.067
b	0.610	0.820	0.024	0.032
c	0.230	0.350	0.009	0.014
D	6.300	6.710	0.248	0.264
D1	2.900	3.150	0.114	0.124
E	3.300	3.710	0.130	0.148
E1	6.710	7.290	0.264	0.287
e	2.150	2.450	0.085	0.097
e1	4.450	4.750	0.175	0.187
L	0.900	1.150	0.035	0.045
θ	0°	10°	0°	10°

Mechanical Dimensions (Continued)

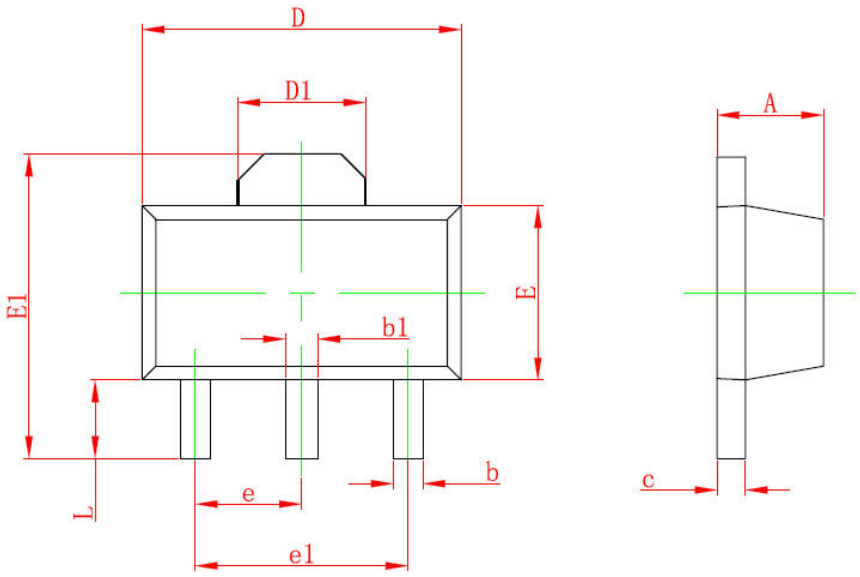
OUTLINE DRAWING TO-252



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
B	1.350	1.650	0.053	0.065
b	0.450	0.750	0.018	0.030
b1	0.600	1.000	0.024	0.040
c	0.430	0.580	0.017	0.023
c1	0.430	0.580	0.017	0.023
D	6.300	6.700	0.249	0.264
D1	5.100	5.500	0.201	0.217
E	5.400	5.700	0.213	0.224
e	2.150	2.450	0.085	0.097
e1	4.450	4.750	0.175	0.187
L	9.500	9.900	0.374	0.390
L1	2.550	2.900	0.100	0.114
L2	1.400	1.780	0.055	0.070
L3	0.600	1.000	0.024	0.040
V	3.400	3.800	0.134	0.150

Mechanical Dimensions (Continued)

OUTLINE DRAWING SOT-89



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.197
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.445	1.775	0.057	0.069
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.350	1.650	0.053	0.065
e1	2.850	3.150	0.112	0.124
L	0.900	1.200	0.035	0.047