GENERAL DESCRIPTION

The EC50117E series of high performance low dropout voltage regulators are designed for applications that require efficient conversion and fast transient response. In addition, EC50117E is designed to be stable under conditions where Cin and Cout are not present. However, it is recommended to include Cin and Cout in the system design as this will speed up the transient response and increase the PSRR rating. EC50117E is characterized under Junction Temperature from -40℃ to +125℃.

Applications

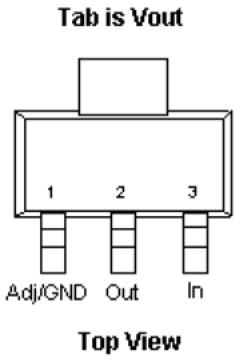
- Active SCSI Terminators.
- High Efficiency Linear Regulators.
- 5V to 3.3V Linear Regulators
- Motherboard Clock Supplies.

FEATURES

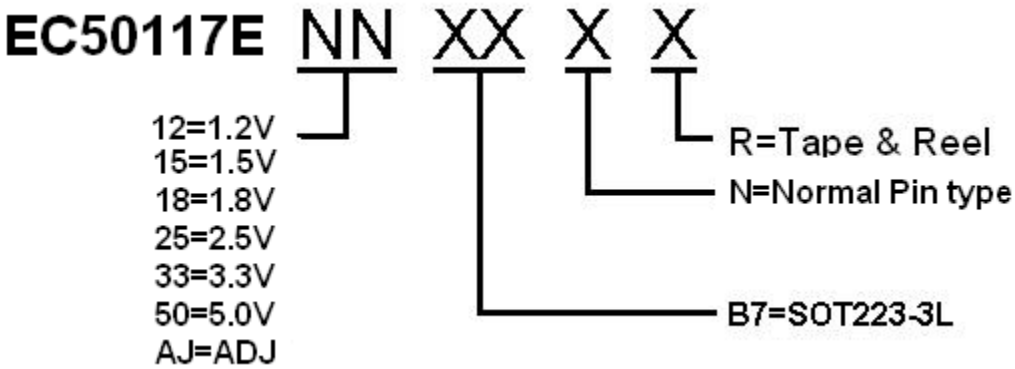
- Low Dropout Performance.
- Low Quiescent Current：2.7mA（Typ.）
- Guaranteed 1A Output Current.
- Wide Input Supply Voltage Range.
- Stable operation without Cin and Cout.
- Over-temperature and Over-current Protection.
- Fixed or Adjustable Output Voltage.
- Available in SOT-223 and TO252 Packages.
- RoHS Compliant

PIN ASSIGNMENT

Package: SOT223-3L



Ordering Information



Part Number	Package	Marking	Marking Information
EC50117EXXB7NR	SOT223-3L	117E-XX YWLLLLL	1. 117E：Product Code 2. XX：is the output voltage code 12=1.2V;15=1.5V;18=1.8V 25=2.5V;33=3.3V;50=5.0V; AJ=ADJ 3. YW：Manufacturing Date Code 4. LLLLL：Lot No

=

Absolute Maximum Rating

Symbol	Parameter	Maximum	Units
V_{IN}	Input Supply Voltage	18	V
θ_{JA}	Thermal Resistance Junction to Ambient (SOT223)	120	℃/W
T_J	Operating Junction Temperature Range	-40 to 125	℃
T_{STG}	Storage Temperature Range	-40 to 150	℃
T_{LEAD}	Lead Temperature (Soldering 10 Sec)	260	℃
T_{MJ}	Maximum Junction Temperature	150	℃

CAUTION: Stresses above those listed in “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

ELECTRICAL CHARACTERISTICS

$V_{IN,MAX} \leq 9V$, $V_{IN,MIN} - V_{OUT} = 2V$, $I_{OUT} = 10mA$, $C_{IN} = 10\mu F$, $C_{OUT} = 22\mu F$, $T_A = 25℃$, unless otherwise specified.

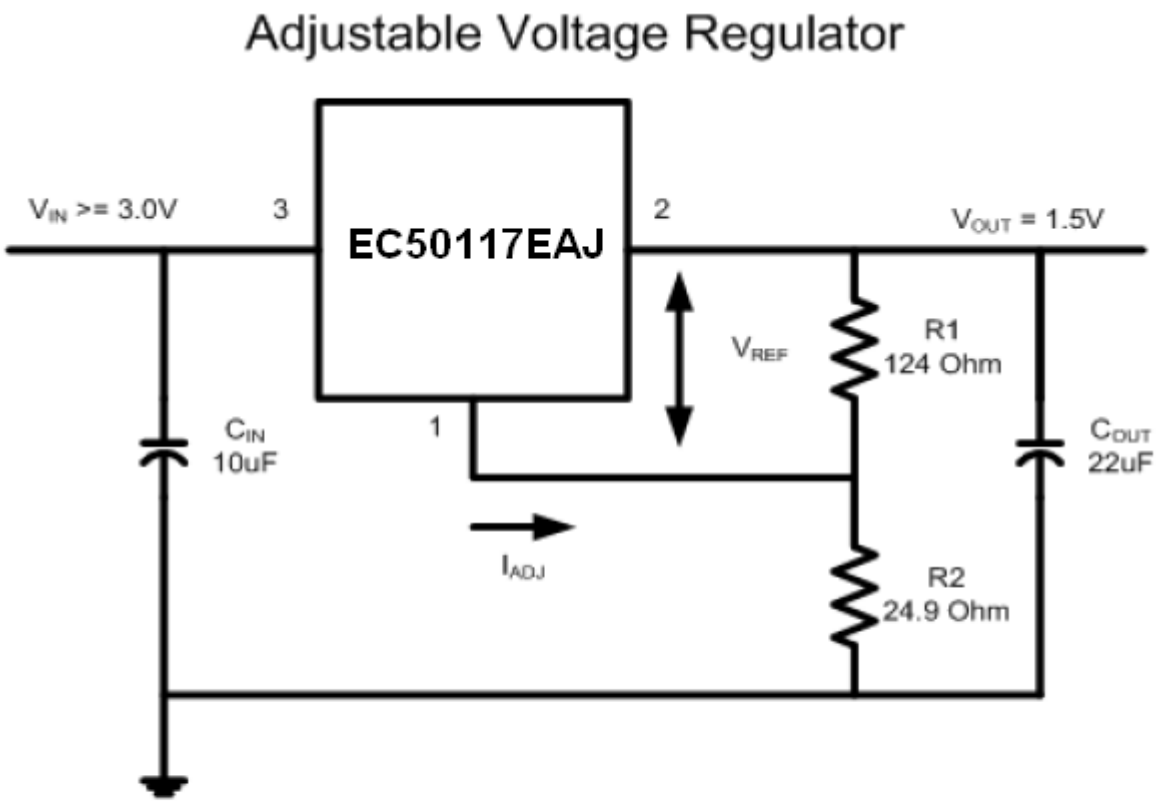
Symbol	Parameter	Test Condition	Min	Typ	Max	Units
V_O	Output Voltage	EC50117E12 EC50117E15 EC50117E18 EC50117E25 EC50117E33 EC50117E50	1.176 1.470 1.764 2.450 3.234 4.900	1.2 1.5 1.8 2.5 3.3 5.0	1.224 1.530 1.836 2.550 3.366 5.100	V
V_{REF}	Reference Voltage (Adj. Voltage Version)	$(V_{IN} - V_{OUT}) = 1.5V$ $I_{OUT} = 10mA$	(-2%)	1.250	(+2%)	V
V_{SR}	Line Regulation	$V_{OUT} + 1.5V < V_{IN} < 9V$ $I_{OUT} = 10mA$	--	0.3	--	%/V
V_{LR}	Load Regulation(1)	$(V_{IN} - V_{OUT}) = 2.0V$ $10mA \leq I_{OUT} \leq 1A$	--	0.0001	--	%/mA
I_Q	Quiescent Current	Fixed Output Version	--	2.7	5	mA
I_{ADJ} (I_{GND})	Adjust Pin Current （GND Current）		--	50	120	μA
ΔI_{ADJ}	Adjust Pin Current Change	$V_{OUT} + 1.5V < V_{IN} < 9V$	--	0.2	5	μA
V_D	Dropout Voltage (1) (2)	$I_{OUT} = 1A$	--	1.38	1.49	V
I_O	Minimum Load Current		--	0.4	5	mA
I_{CL}	Current Limit (1)		1	1.35	--	A

ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Test Condition	Min	Typ	Max	Units
T_C	Temperature Coefficient		--	30	--	ppm/℃ /V
OTP	Thermal Protection	V_{IN}=9V, I_{OUT}=10mA	--	175	--	℃
V_N	RMS Output Noise	T_A= 25℃, 10Hz ≤ f ≤ 10kHz	--	0.003	--	%V_O
R_A	Ripple Rejection Ratio	f = 120Hz, C_{OUT} = 22μF (Tantalum), (V_{IN} - V_{OUT}) = 3V, I_{OUT} = 10mA	--	60	--	dB

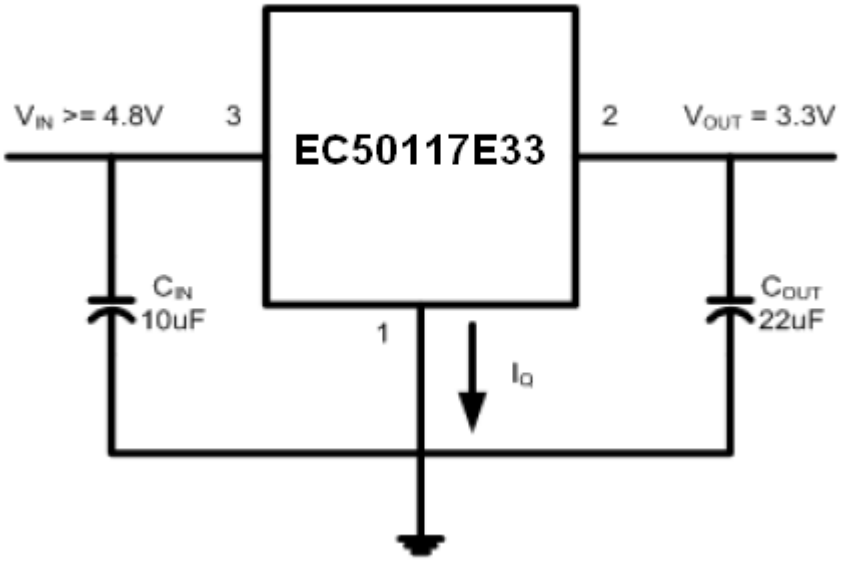
Notes:
1. Low duty cycle pulse testing with which TJ remains unchanged.
2. The dropout voltage is the input/output differential at which the circuit ceases to regulate against further reduction in input voltage. It is measured when the output voltage has dropped 98% from the nominal value obtained at V_{IN} = V_{OUT} +2V.

Typical Application



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

Fixed Voltage Regulator



Application Hints

The typical Linear regulator would require external capacitors to ensure stability. However, EC50117E is designed in such a way that these external capacitor can be omitted if the PCB layout is tight and system noise is not very high. For better transient and PSRR performance, the Input and Output capacitors are still recommended.

Input Capacitor

An input capacitor of 10μF is recommended. Ceramic or Tantalum can be used. The value can be increased without upper limit.

Output Capacitor

An output capacitor of 22uF is recommended for better transient and PSRR performance. It should be placed no more than 1 cm away from the V_{OUT} pin, and connected directly between V_{OUT} and GND pins. The value may be increased without upper limit.

Thermal Considerations

It is important that the thermal limit of the package is not exceeded. The EC50117E has built-in thermal protection. When the thermal limit is exceeded, the IC will enter protection, and V_{OUT} will be pulled to ground. The power dissipation for a given application can be calculated as following:

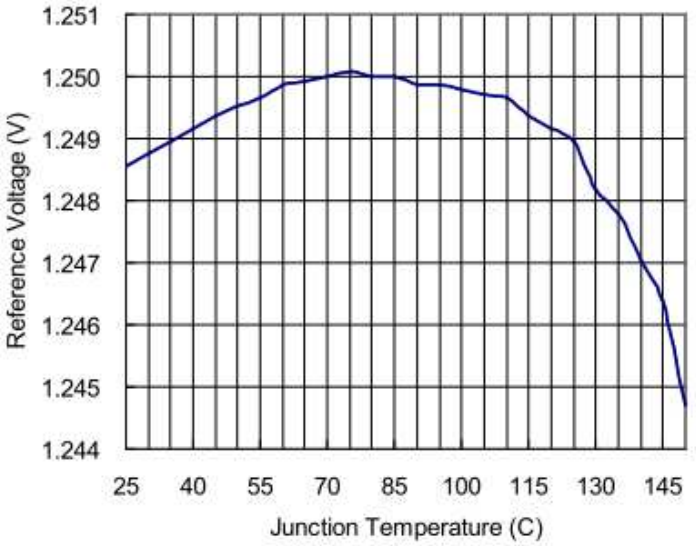
The power dissipation (P_D) is

$P_D = I_{OUT} * [V_{IN} – V_{OUT}]$

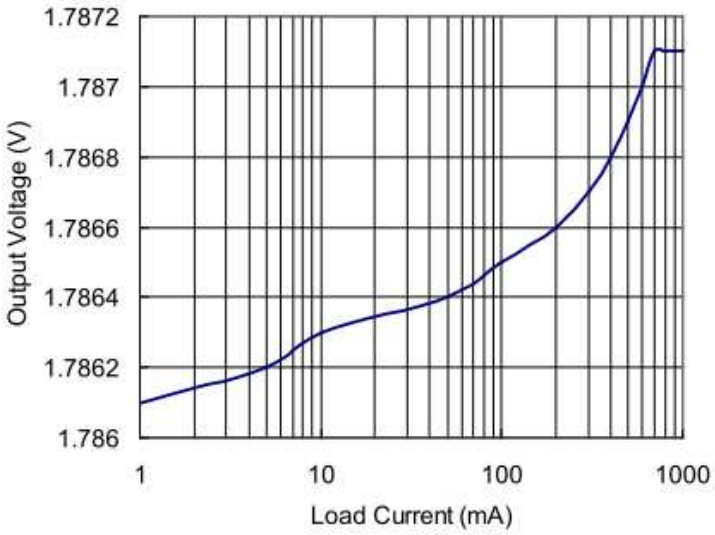
The thermal limit of the package is then limited to $P_{D(MAX)} = [T_J – T_A]/\Theta_{JA}$ where T_J is the junction temperature, TA is the ambient temperature, and Θ_{JA} is around 120℃/W for EC50117E.EC50117E is de signed to enter thermal protection at 125℃. For example, if T_A is 25℃ then the maximum P_D is limited to about 0.83W. In other words, if $I_{OUT(MAX)} = 500mA$, then $[V_{IN} – V_{OUT}]$ can not exceed 1.66V. (Ref. SOT223 without heat sink.)

Typical Performance Characteristics

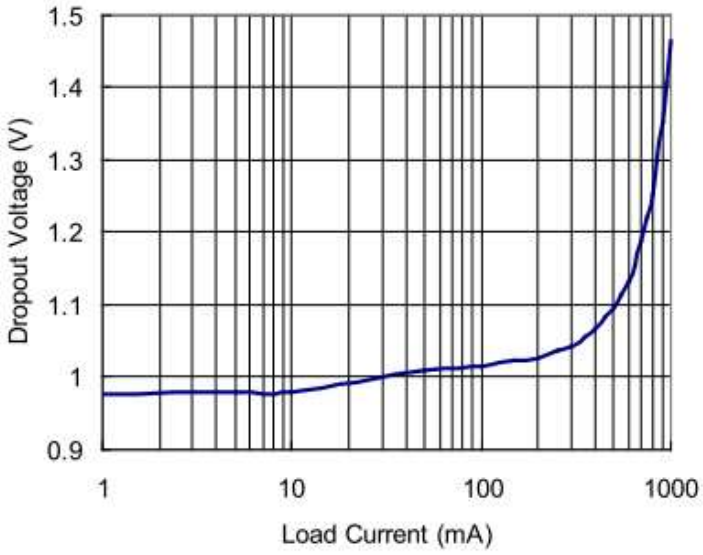
Reference Voltage vs Junction Temperature



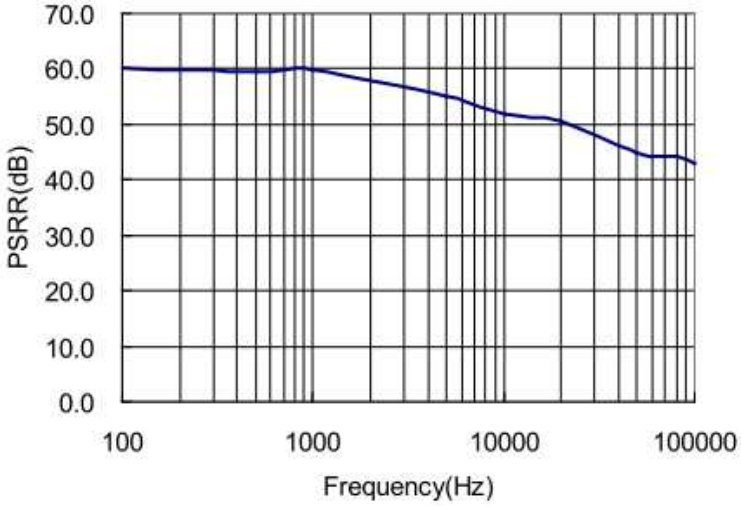
Output Voltage vs Load Current



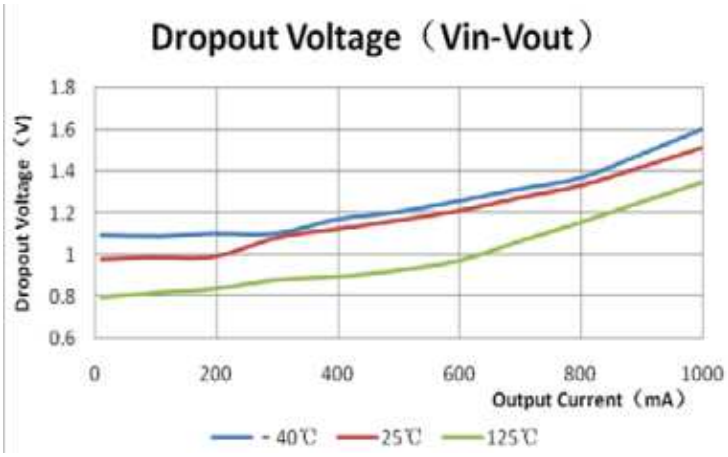
Dropout Voltage vs Load Current



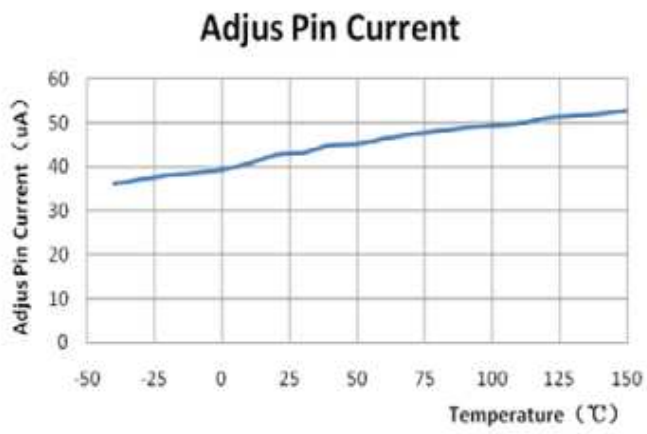
PSRR vs Frequency



Dropout Volatge VS Oueput Current

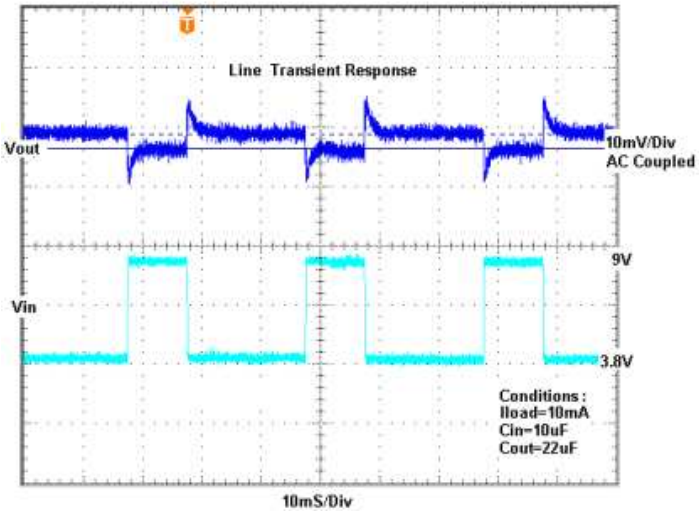


Adjus Pin Current VS Temperature

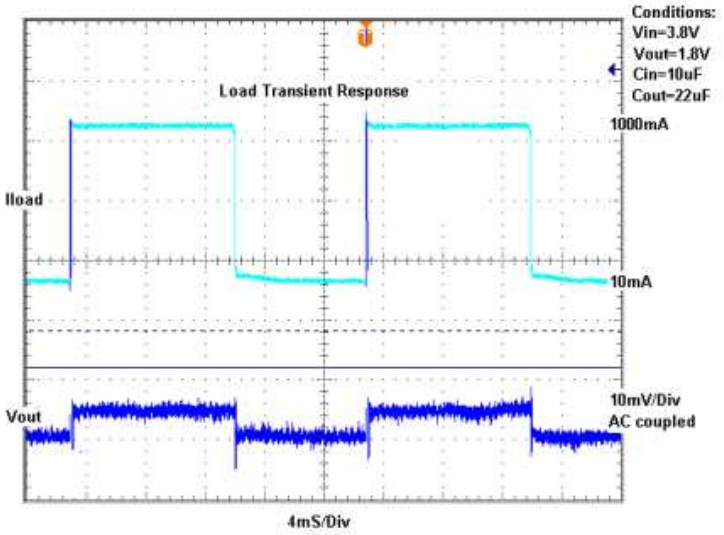


Typical Performance Characteristics

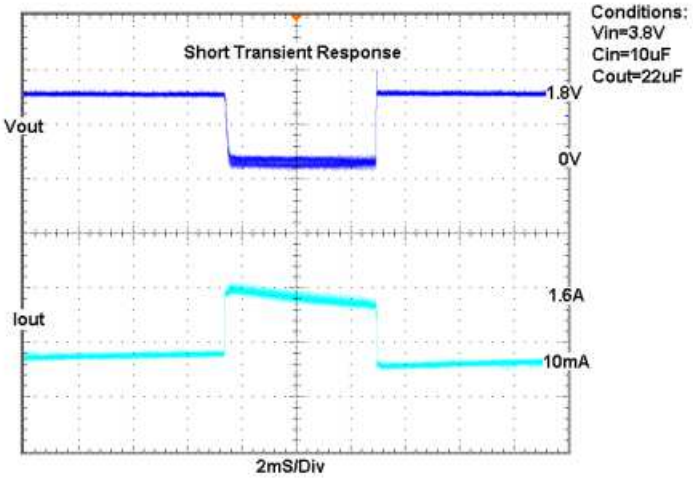
Line Transient Response



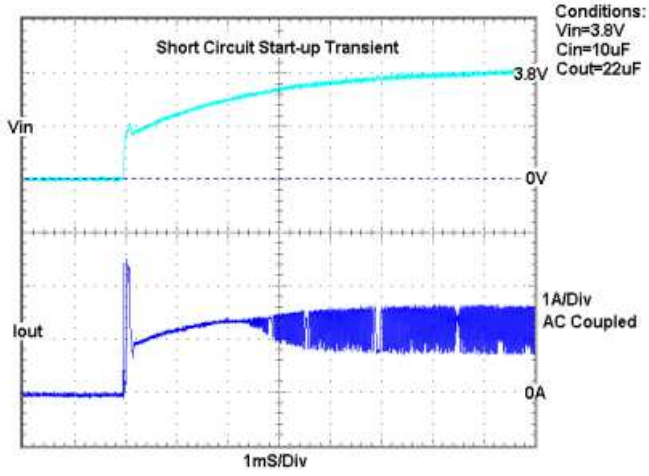
Load Transient Response



Short Transient Response

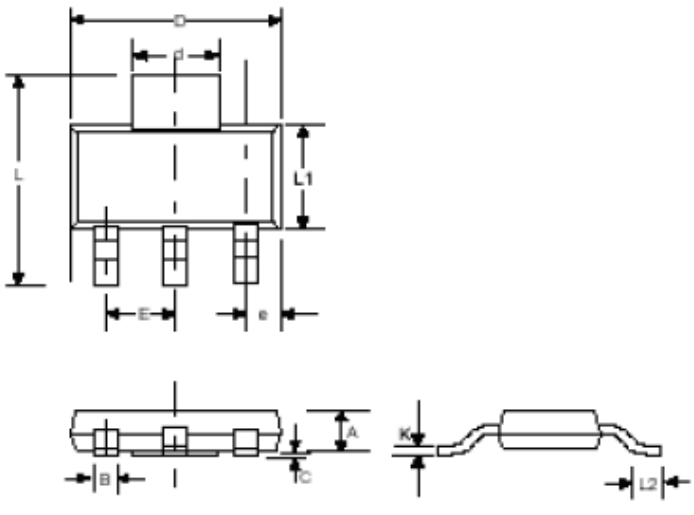


Short Circuit Start-up Transient



Mechanical Dimensions

OUTLINE DRAWING SOT223-3L



DIMENSIONS				
DIM[N]	INCHES		MM	
	MIN	MAX	MIN	MAX
A	—	0.071	—	1.80
B	0.025	0.033	0.640	0.840
C	0.012	—	0.31	—
D	0.248	0.264	6.30	6.71
d	0.115	0.124	2.95	3.15
E	—	0.090	—	2.29
e	0.033	0.041	0.840	1.04
L	0.264	0.287	6.71	7.29
L1	0.130	0.148	3.30	3.71
L2	0.012	—	0.310	—
K	0.010	0.014	0.250	0.360