Description

The SE8117 series of high performance low dropout voltage regulators are designed for applications that require efficient conversion and fast transient response.

In addition, SE8117 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. SE8117 is characterized under Junction Temperature from -40°C to +125°C.

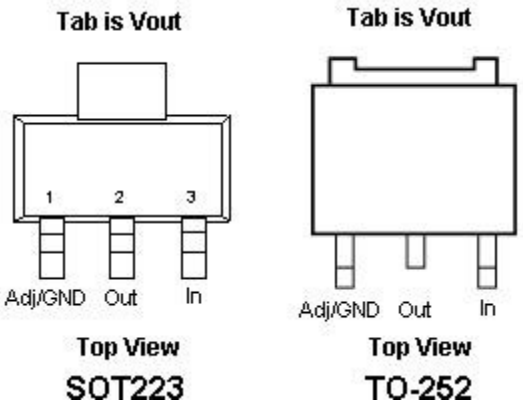
Application

- 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

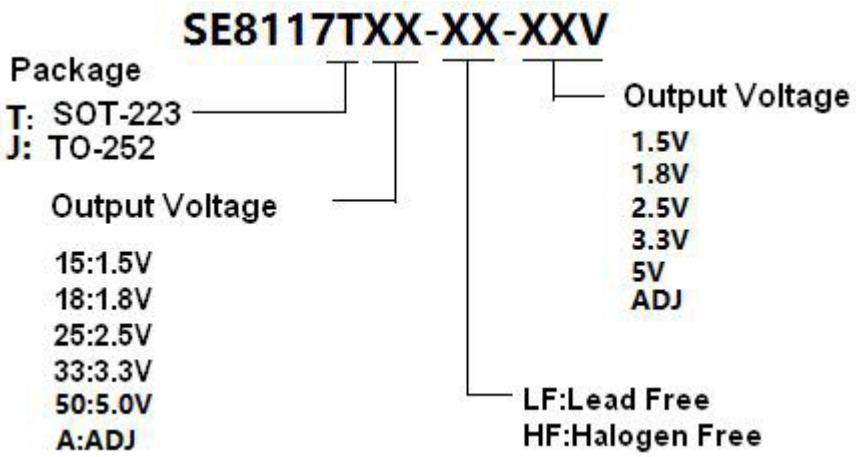
Pin Configuration



Pin Description

NO.	Pin Name	Pin Function Description
1	ADJ/GND	A resistor divider from this pin to the VOUT pin and ground sets the output voltage (Ground only for Fixed-Mode).
2	OUT	The output of the regulator. A minimum of 4.7μF capacitor (0.15Ω ≤ ESR ≤ 0.5Ω) must be connected from this pin to ground to insure stability.
3	IN	The input pin of regulator. Typically a large storage capacitor is connected from this pin to ground to insure that the input voltage does not sag below the minimum dropout voltage during the load transient response. This pin must always be 1.3V higher than VOUT in order for the device to regulate properly. A minimum of 4.7μF capacitor (0.15Ω ≤ ESR ≤0.5Ω) must be connected from this pin to ground to insure stability.

Ordering Information



Ordering No.	Package	Marking	Shipping
SE8117T15-HF-1.5V	SOT-223	SE8117T15 YYWW-HF	Tape and Reel 1000/2500
SE8117T18-HF-1.8V	SOT-223	SE8117T18 YYWW-HF	Tape and Reel 1000/2500
SE8117T25-HF-2.5V	SOT-223	SE8117T25 YYWW-HF	Tape and Reel 1000/2500
SE8117T33-HF-3.3V	SOT-223	SE8117T33 YYWW-HF	Tape and Reel 1000/2500
SE8117T50-HF-5.0V	SOT-223	SE8117T50 YYWW-HF	Tape and Reel 1000/2500
SE8117TA-HF-ADJ	SOT-223	SE8117TA YYWW-HF	Tape and Reel 1000/2500
SE8117J33-LF-3.3V	TO-252	SE8117J33 YYWW-HF	Tape and Reel 2500
SE8117JA-LF-ADJ	TO-252	SE8117JA YYWW-HF	Tape and Reel 2500

Absolute Maximum Rating

Symbol	Parameter	Maximum	Units
V_{IN}	Input Supply Voltage	18	V
θ_{JA}	Thermal Resistance Junction to Ambient (SOT-223)	120	°C/W
T_J	Operating Junction Temperature Range	-40 to 125	°C
T_{STG}	Storage Temperature Range	-40 to 150	°C
T_{LEAD}	Lead Temperature (Soldering 10 Sec)	260	°C
T_{MJ}	Maximum Junction Temperature	150	°C

Electrical Characteristic

$V_{IN,MAX}$ ≤ 9V, $V_{IN,MIN}$ – V_{OUT} = 2V, I_{OUT} = 10mA, C_{IN} = 10μF, C_{OUT} = 22μF, T_A = 25°C, unless otherwise specified.

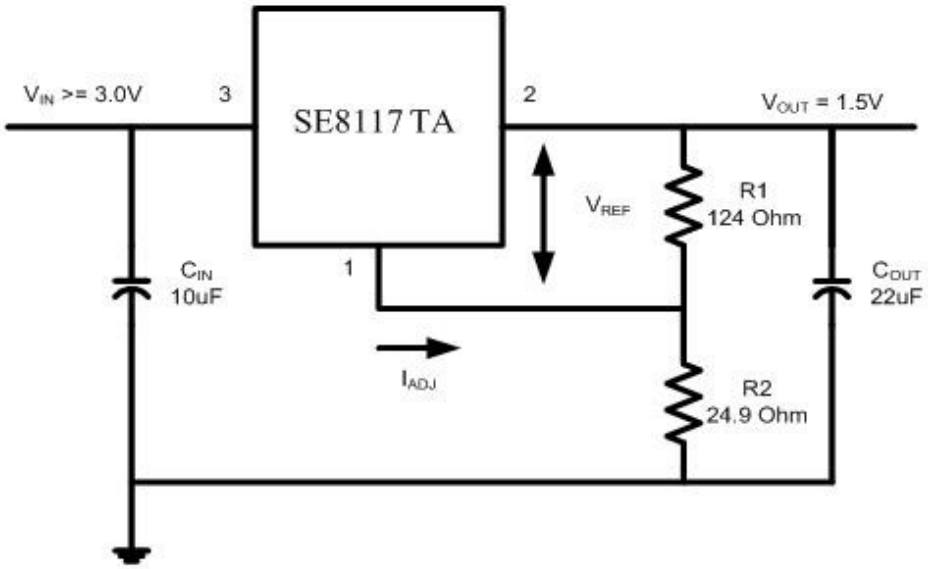
Symbol	Parameter	Test Condition	Min	Typ	Max	Units
V_O	Output Voltage	SE8117T-15	1.470	1.5	1.530	V
		SE8117T-18	1.764	1.8	1.836	
		SE8117T-25	2.450	2.5	2.550	
		SE8117T-33	3.234	3.3	3.366	
		SE8117T-50	4.900	5.0	5.100	
V_{REF}	Reference Voltage (Adj. Voltage Version)	(V_{IN} - V_{OUT}) = 1.5V, I_{OUT} = 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 ≤ I_{OUT} ≤ 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} = 0.5A	--	1.2	1.25	V
I_O	Minimum Load Current		--	0.4	5	mA
I_{CL}	Current Limit (1)		1	1.35	--	A
T_C	Temperature Coefficient		--	30	--	ppm/℃ /V
OTP	Thermal Protection	V_{IN}=9V, I_{OUT}=10mA	--	175	--	°C
V_N	RMS Output Noise	T_A = 25°C, 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 T_J 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.

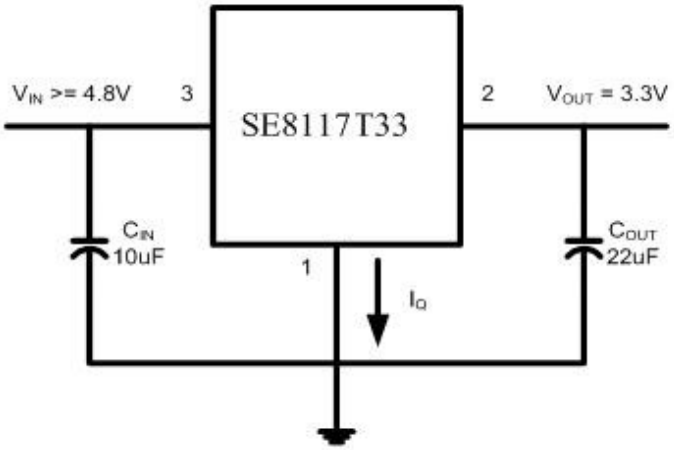
Typical Application

Adjustable Voltage Regulator



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

Fixed Voltage Regulator



Application Hints

The typical Linear regulator would require external capacitors to ensure stability. However, SE8117 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 SE8117 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:

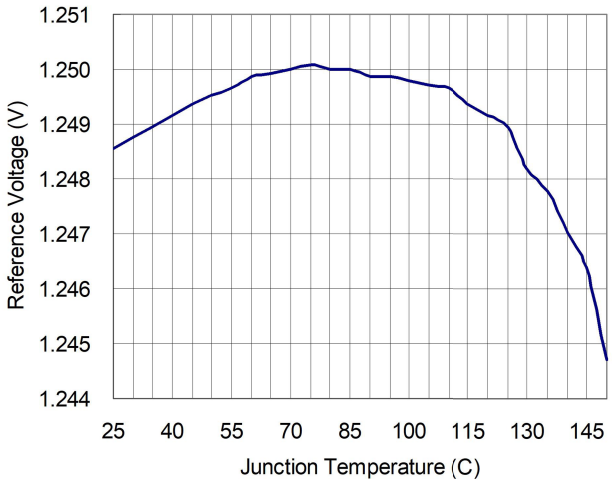
The power dissipation (P_D) is

$P_D = I_{OUT} * [V_{IN} - V_{OUT}]$

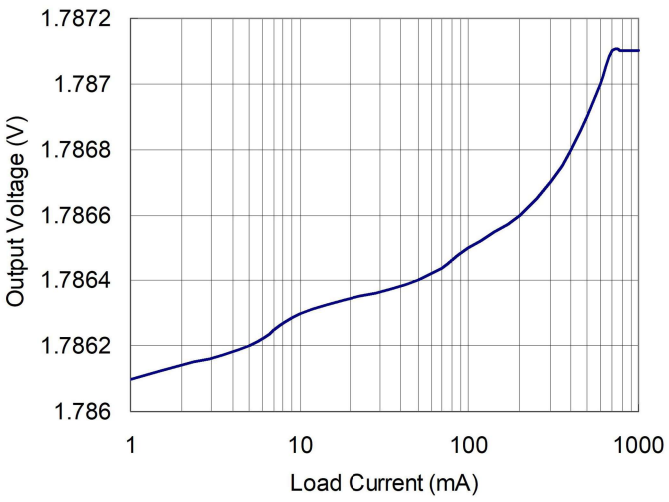
The thermal limit of the package is then limited to $P_{D(MAX)} = [T_J - T_A]/\Theta_{JA}$ where T_J is the junction temperature, TA is the ambient temperature, and Θ_{JA} is around 120°C/W for SE8117. SE8117 is designed to enter thermal protection at 125°C. For example, if T_A is 25°C then the maximum 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

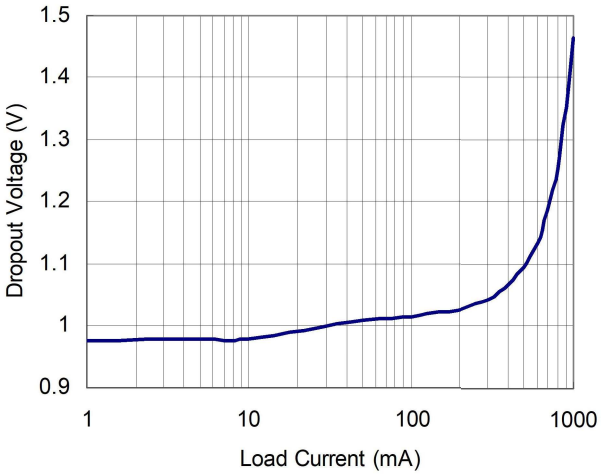
Reference Voltage vs Junction Temperature



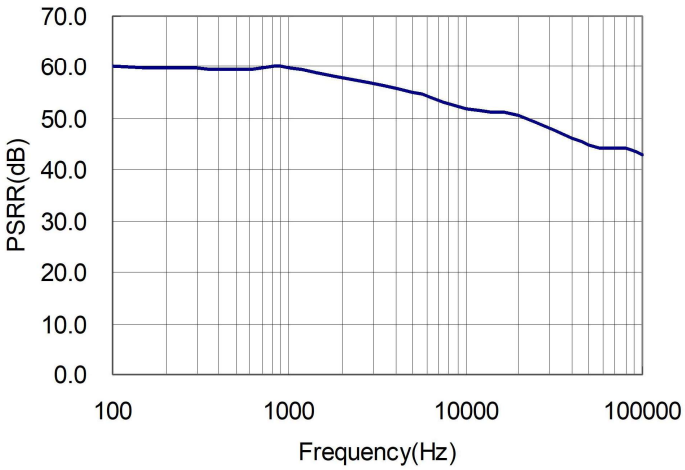
Output Voltage vs Load Current



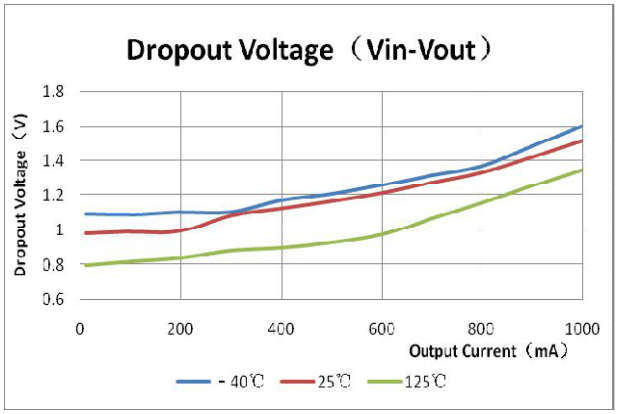
Dropout Voltage vs Load Current



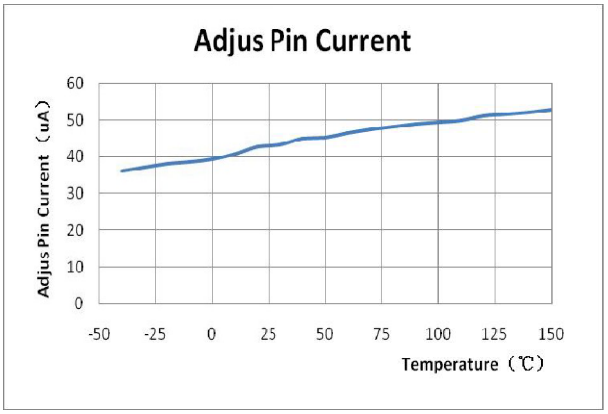
PSRR vs Frequency



Dropout Volatge VS Oueput Current

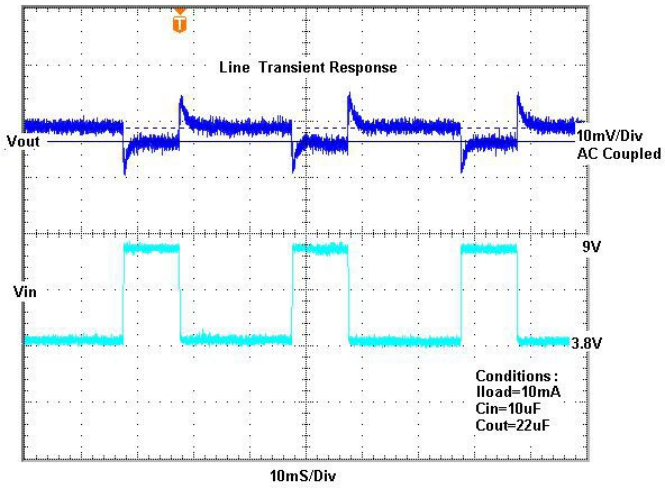


Adjus Pin Current VS Temperature

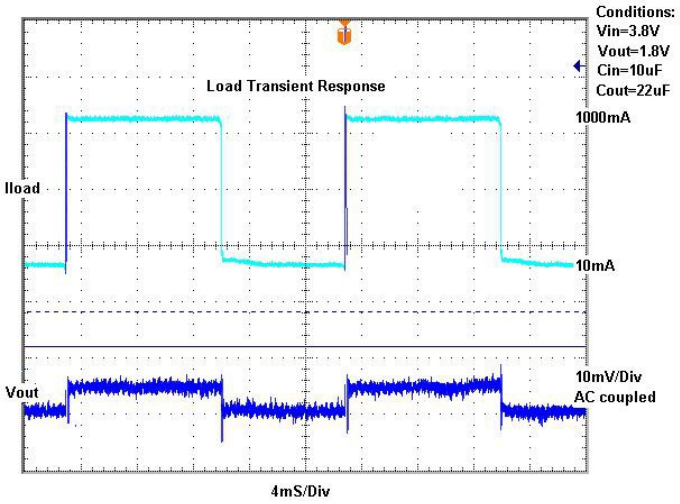


Typical Performance Characteristics

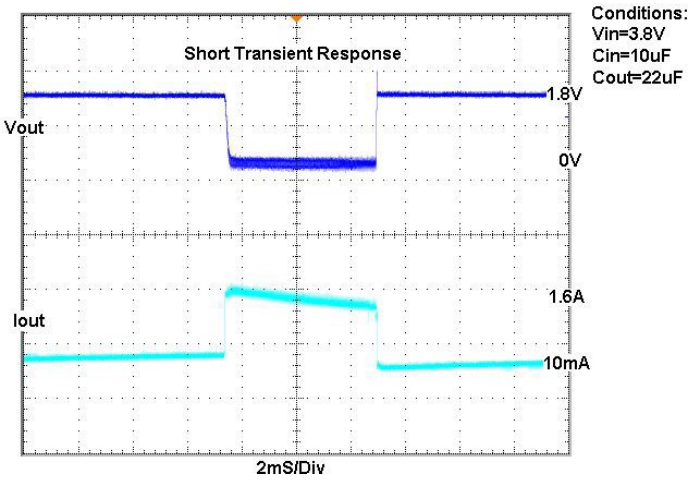
Line Transient Response



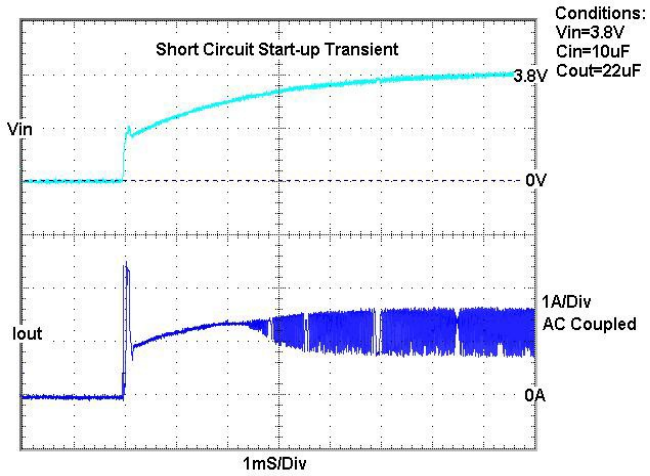
Load Transient Response



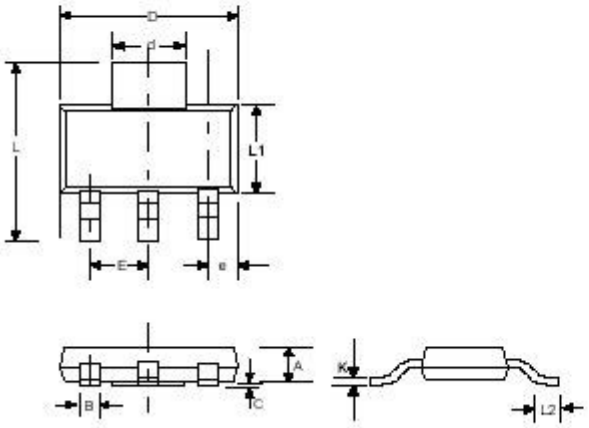
Short Transient Response



Short Circuit Start-up Transient

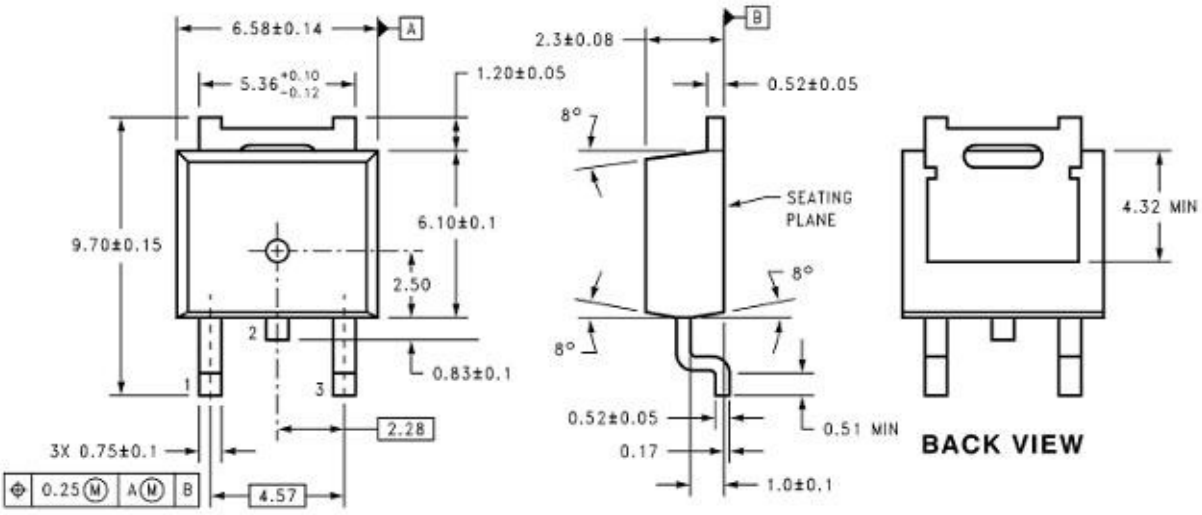


Outline Drawing for SOT-223



DIM^N	DIMENSIONS			
	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

Outline Drawing for TO252



DIMENSIONS ARE IN MILLIMETERS

3-Lead TO-252 Package

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