TAIWAN SEMICONDUCTOR

RoHS COMPLIANCE

TS1117

1A Low Dropout Positive Voltage Regulator

TO-220



TO-263



TO-252



SOT-223



Pin Definition:
1. Fixed / Adj
2. Output
3. Input

Pin 2 connect to heat sink

General Description

The TS1117 Series are high performance positive voltage regulators are designed for use in applications requiring low dropout performance at full rated current, Additionally, the TS1117 Series provides excellent regulation over variations due to changes in line, load and temperature. Outstanding features include low dropout performance at rated current, fast transient response, internal current limiting and thermal shutdown protection of the output device. The TS1117 Series are three terminal regulators with fixed and adjustable voltage options available in popular packages.

Features

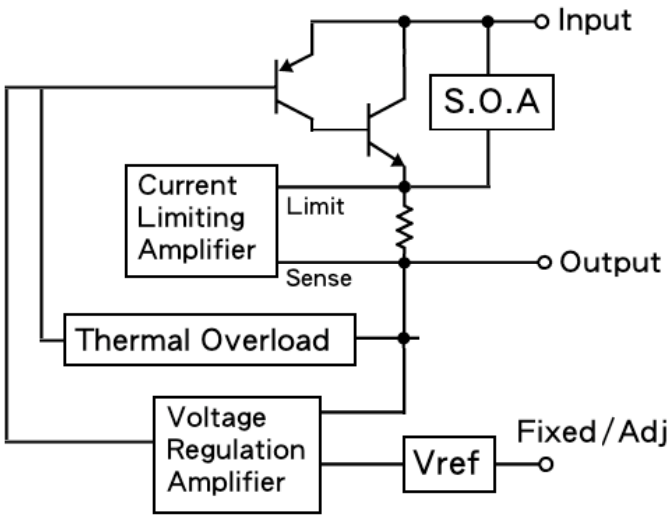
- Low Dropout Performance 1.5V max.
- Fill Current Rating Over Line and Temperature
- Fast Transient Response
- ±2% Total Output Regulation Over Line, Load and Temperature
- Adjust Pin Current max 90uA Over Temperature
- Line Regulation Typical 0.015%
- Load Regulation Typical 0.05%
- Fixed / Adjustable Output Voltage
- TO-220, TO-263, TO-252 and SOT-223 Package

Ordering Information

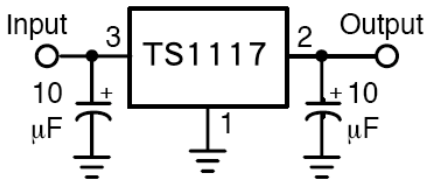
Part No.	Package	Packing
TS1117CZ**xx** C0	TO-220	50pcs / Tube
TS1117CM**xx** RN	TO-263	800pcs / 13” Reel
TS1117CP**xx** RO	TO-252	2.5Kpcs / 13” Reel
TS1117CW**xx** RP	SOT-223	2.5Kpcs / 13” Reel

Note: Where **xx** denotes voltage option, available are 5.0V, 3.3V, 2.5V,1.8V and 1.5V. Leave blank for adjustable version. Contact factory for additional voltage options.

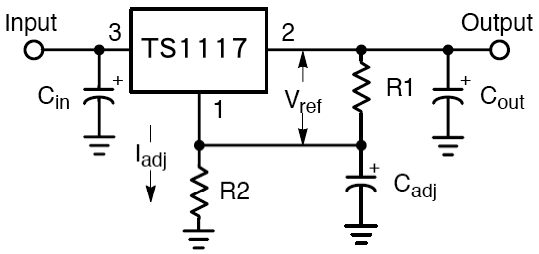
Block Diagram



Typical Application Circuit



Fixed Output Voltage Version



$V_{OUT} = V_{REF}(1+R2/R1) + I_{adj} R2$

Adjustable Output Voltage Version

TS1117

1A Low Dropout Positive Voltage Regulator

Absolute Maximum Rating (Note 1)

Parameter		Symbol	Limit	Unit
Input Supply Voltage		V_{IN}	12	V
Operation Input Supply Voltage		V_{IN} (Opr. Typ.)	7	V
Power Dissipation (Note 2)		P_D	Internal limited	
Thermal Resistance Junction to Ambient	TO-220	Θ_{JA}	80	°C/W
	TO-263		85	
	TO-252		105	
	SOT-223		130	
Operating Junction Temperature Range		T_J	0 ~ +125	°C
Storage Temperature Range		T_{STG}	-65 ~ +150	°C
Lead Soldering Temperature (260°C)	TO-220 / TO-263		10	S
	TO-252 / SOT-223		5	

Electrical Specification (Ta = 25°C, unless otherwise specified.)

Parameter	Conditions	Min	Typ	Max	Unit
Reference Voltage	V_{IN}= 2.75, Io=1A	1.225	1.25	1.275	V
Output Voltage	V_{IN} = 3.3V~7V, Io=1A	1.470	1.5	1.530	V
	V_{IN} = 4V~7V, Io=1A	1.764	1.8	1.836	V
	V_{IN} = 4.8V~7V, Io=1A	2.450	2.5	2.550	V
	V_{IN} = 6.5V~7V, Io=1A	3.235	3.3	3.366	V
	Vo+1.5V ≤ V_{IN} ≤ 7V, Io= 10mA	4.900	5.0	5.100	V
Line Regulation	V_{IN} = V_{OUT} +1.5V Io= 10mA ~ 1A	--	0.015	0.2	%
Load Regulation (Note 1,2)	Io=1A, Δ V_{OUT} = 1% V_{OUT}	--	0.05	1.0	%
Dropout Voltage	V_{IN} = 5V	--	1.3	1.5	V
Quiescent Current		--	8	10	mA
Adjustable Pin Current	V_{IN} - V_{OUT} = 3V	--	90	--	uA
Output Current Limit	Io=10mA,	1.1	--	--	A
Temperature Stability	F= 120Hz, Io= 1A, C_{OUT} = 25uF, V_{IN} = Vout+3V	--	0.5	--	%
Ripple Rejection	V_{IN}= 2.75, Io=1A	--	60	70	dB

Note 1: See thermal regulation specification for changes in output voltage due to heating effects. Line and load regulation are measured at a constant junction temperature by low duty cycle pulse testing. Load regulation is measured at the output lead = 1/18" from the package.

Note 2: Line and load regulation are guaranteed up to the maximum power dissipation of 15W. Power dissipation is determined by the input / output voltage difference and the output current. Guaranteed maximum power dissipation will not be available over the full input / output voltage range.

Note 3: Quiescent current is defined as the minimum output current required to maintain the regulation.

Electrical Characteristics Curve

FIGURE 1 – Dropout Voltage vs. Output Current

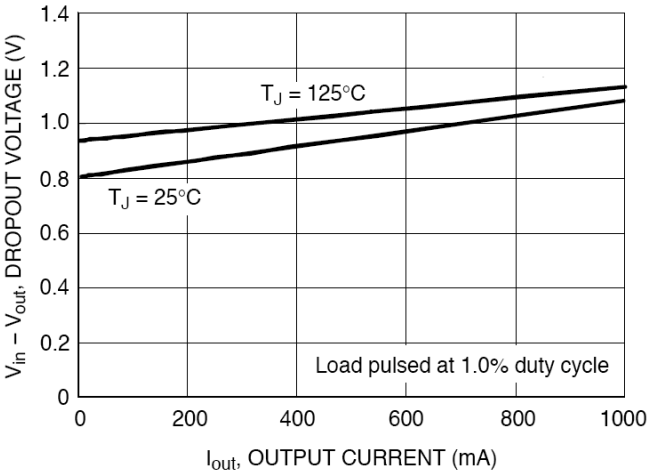


FIGURE 2 – Vout Change vs. Temperature

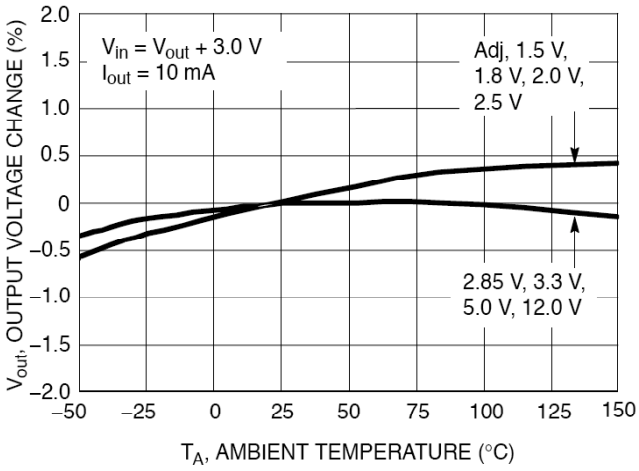


FIGURE 3 – Output Short Circuit Current vs. Differential Voltage

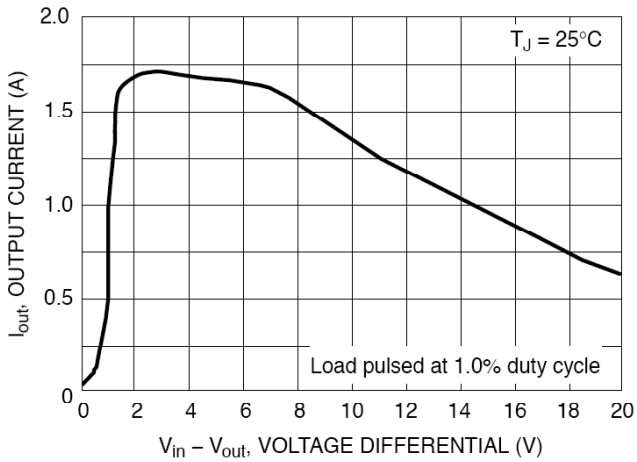


FIGURE 4 – Output Short Circuit Current vs. Temperature

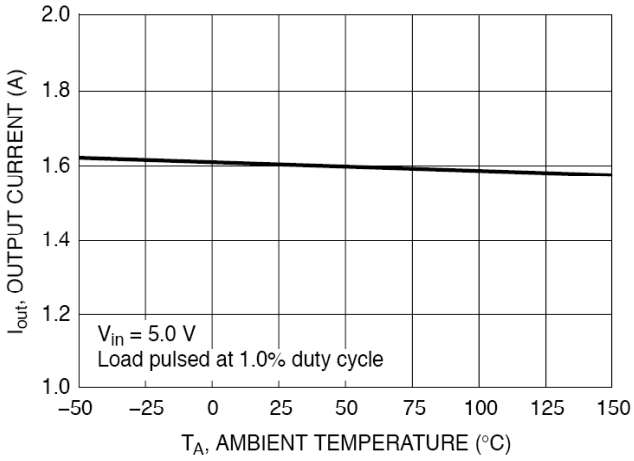


FIGURE 5 – Adjust Pin Current vs. Temperature

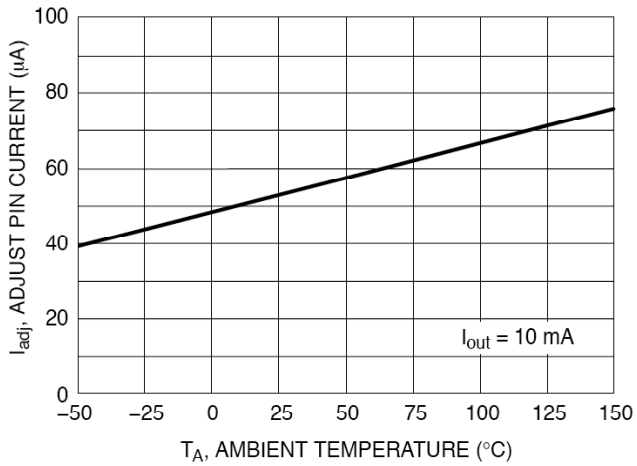
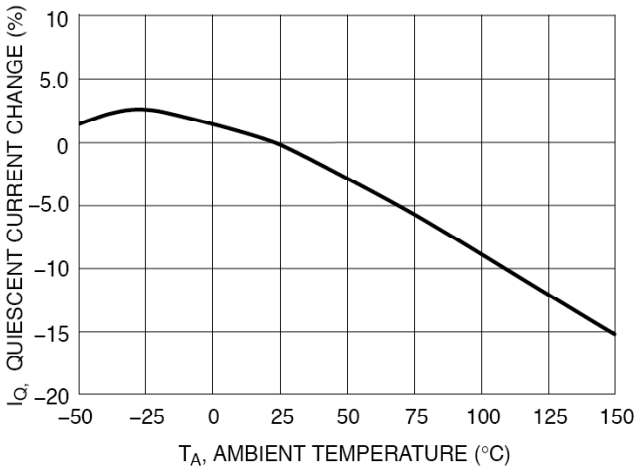


FIGURE 6 – Iq Change vs. Temperature



Application Information

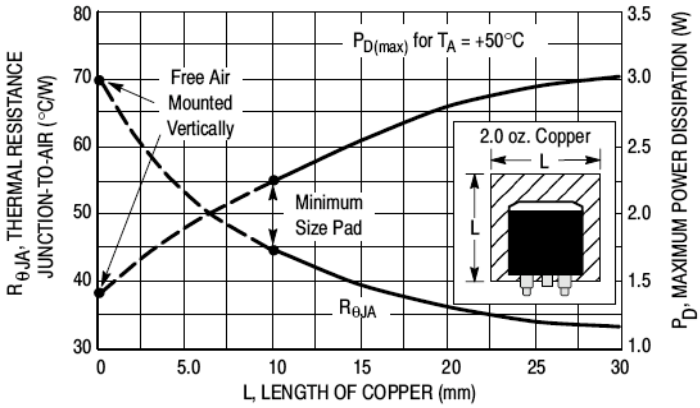


Figure 6 – D²PAK Thermal Resistance and Maximum Power Dissipation vs. P.C.B Copper Length

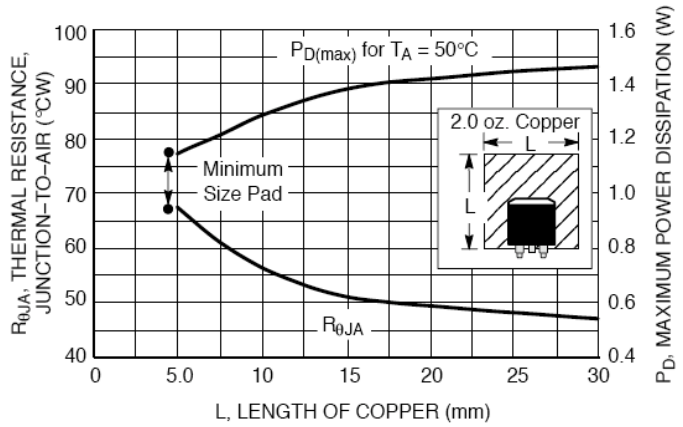


Figure 7 – DPAK Thermal Resistance and Maximum Power Dissipation vs. P.C.B Copper Length

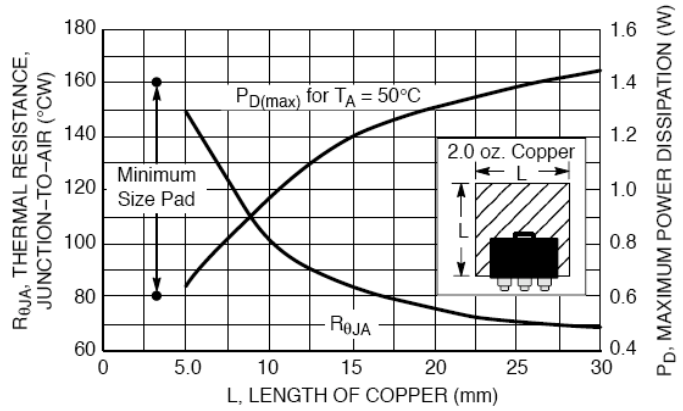
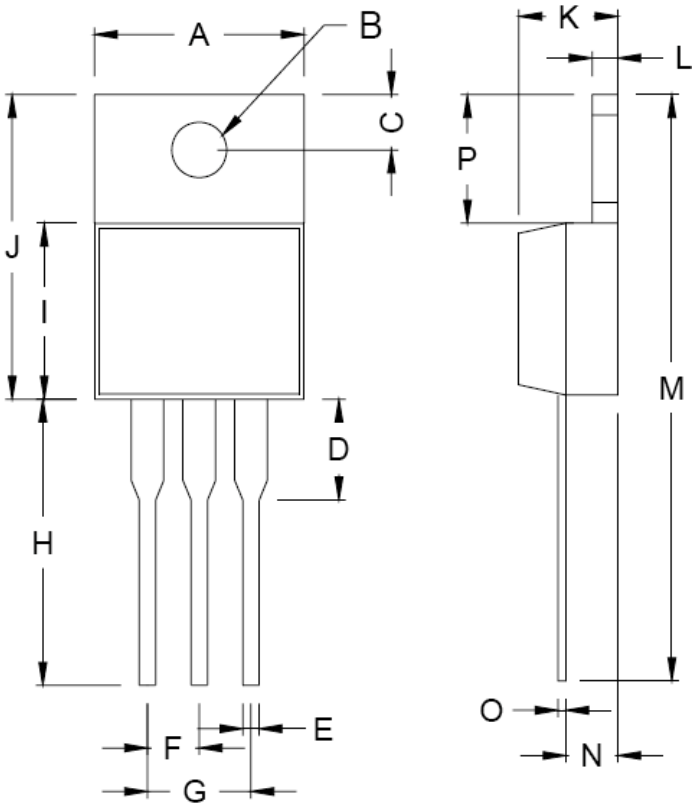


Figure 8 – SOT-223 Thermal Resistance and Maximum Power Dissipation vs. P.C.B Copper Length

TS1117

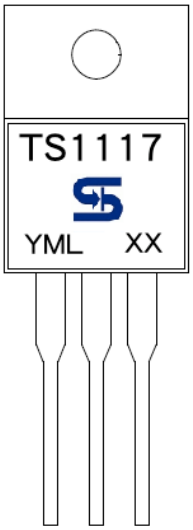
1A Low Dropout Positive Voltage Regulator

TO-220 Mechanical Drawing



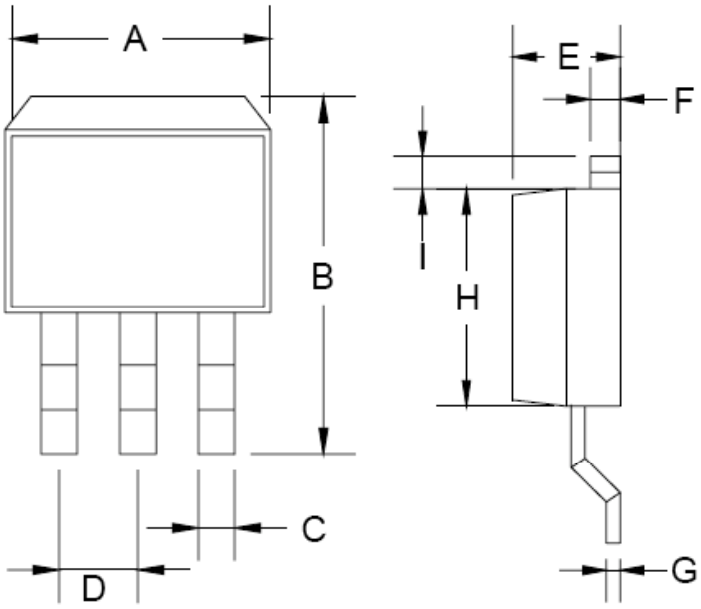
TO-220 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	10.000	10.500	0.394	0.413
B	3.740	3.910	0.147	0.154
C	2.440	2.940	0.096	0.116
D	-	6.350	-	0.250
E	0.381	1.106	0.015	0.040
F	2.345	2.715	0.092	0.058
G	4.690	5.430	0.092	0.107
H	12.700	14.732	0.500	0.581
I	8.382	9.017	0.330	0.355
J	14.224	16.510	0.560	0.650
K	3.556	4.826	0.140	0.190
L	0.508	1.397	0.020	0.055
M	27.700	29.620	1.060	1.230
N	2.032	2.921	0.080	0.115
O	0.255	0.610	0.010	0.024
P	5.842	6.858	0.230	0.270

Marking Diagram



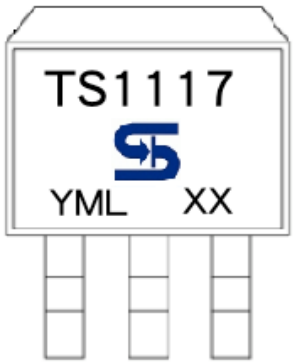
Y = Year Code
M = Month Code
(**A**=Jan, **B**=Feb, **C**=Mar, **D**=Apl, **E**=May, **F**=Jun, **G**=Jul, **H**=Aug, **I**=Sep, **J**=Oct, **K**=Nov, **L**=Dec)
L = Lot Code
XX = Voltage Code
(1.5=1.5V, 1.8=1.8V, 2.5=2.5V, 3.3=3.3V, 5.0=5V)
= Package Code for Adjustable type
(CZ = TO-220)

TO-263 Mechanical Drawing



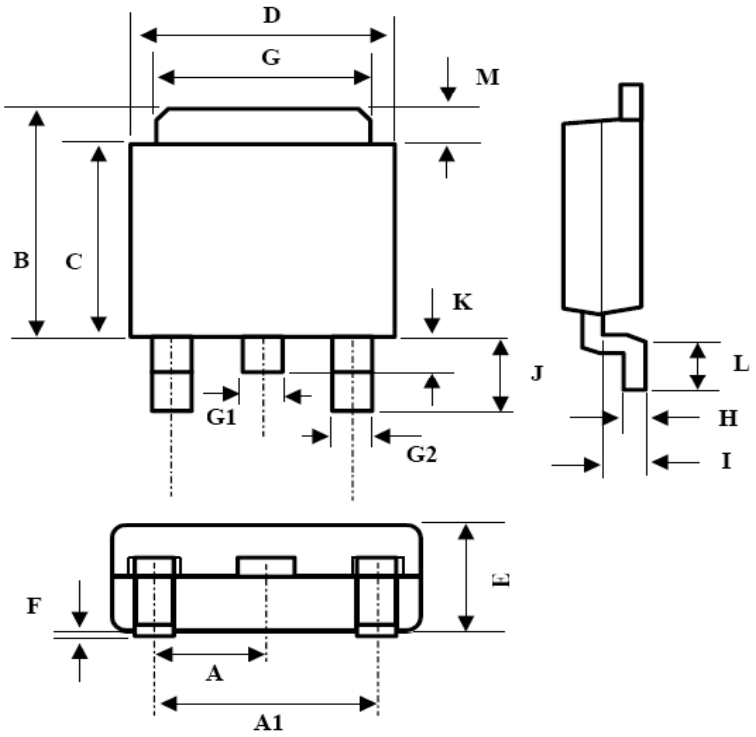
TO-263 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	10.000	10.500	0.394	0.413
B	14.605	15.875	0.575	0.625
C	0.508	0.991	0.020	0.039
D	2.420	2.660	0.095	0.105
E	4.064	4.830	0.160	0.190
F	1.118	1.400	0.045	0.055
G	0.450	0.730	0.018	0.029
H	8.280	8.800	0.325	0.346
I	1.140	1.400	0.044	0.055
J	1.480	1.520	0.058	0.060

Marking Diagram



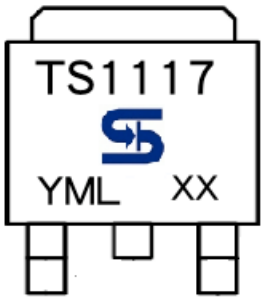
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L = Lot Code
XX = Voltage Code
(1.5=1.5V, 1.8=1.8V, 2.5=2.5V, 3.3=3.3V, 5.0=5V)
= Package Code for Adjustable type
(CM = TO-263)

TO-252 Mechanical Drawing



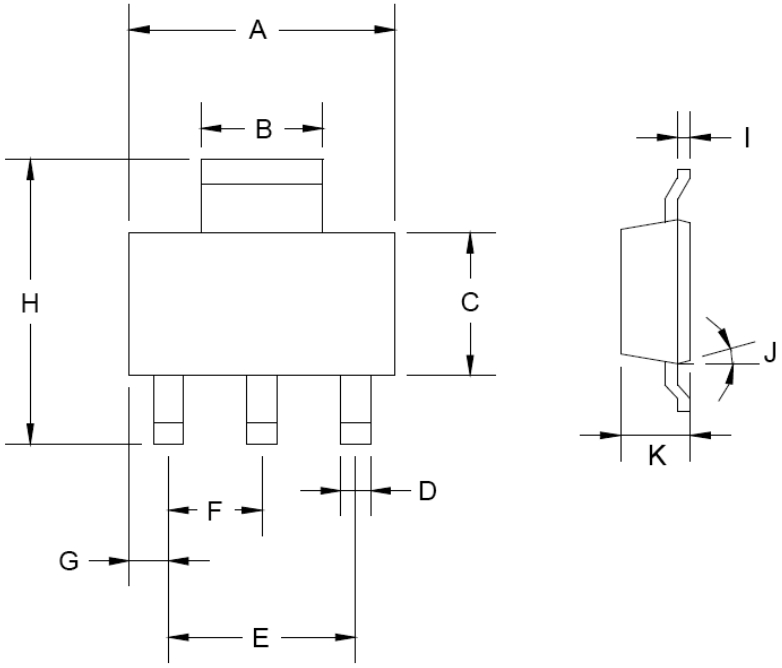
TO-252 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.3BSC		0.09BSC	
A1	4.6BSC		0.18BSC	
B	6.80	7.20	0.268	0.283
C	5.40	5.60	0.213	0.220
D	6.40	6.65	0.252	0.262
E	2.20	2.40	0.087	0.094
F	0.00	0.20	0.000	0.008
G	5.20	5.40	0.205	0.213
G1	0.75	0.85	0.030	0.033
G2	0.55	0.65	0.022	0.026
H	0.35	0.65	0.014	0.026
I	0.90	1.50	0.035	0.059
J	2.20	2.80	0.087	0.110
K	0.50	1.10	0.020	0.043
L	0.90	1.50	0.035	0.059
M	1.30	1.70	0.051	0.67

Marking Diagram



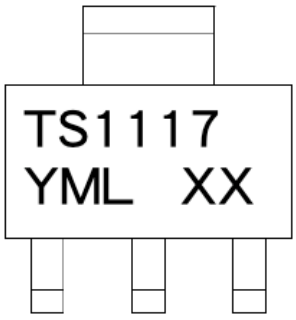
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XX = Voltage Code
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= Package Code for Adjustable type
(CP = TO-252)

SOT-223 Mechanical Drawing



SOT-223 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	6.350	6.850	0.250	0.270
B	2.900	3.100	0.114	0.122
C	3.450	3.750	0.136	0.148
D	0.595	0.635	0.023	0.025
E	4.550	4.650	0.179	0.183
F	2.250	2.350	0.088	0.093
G	0.835	1.035	0.032	0.041
H	6.700	7.300	0.263	0.287
I	0.250	0.355	0.010	0.014
J	10°	16°	10°	16°
K	1.550	1.800	0.061	0.071

Marking Diagram



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L = Lot Code
XX = Voltage Code
(1.5=1.5V, 1.8=1.8V, 2.5=2.5V, 3.3=3.3V, 5.0=5V)
= Package Code for Adjustable type
(CW = SOT-223)

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