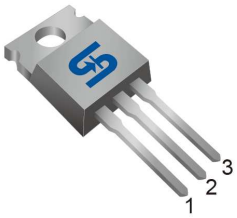
TAIWAN SEMICONDUCTOR

RoHS COMPLIANCE

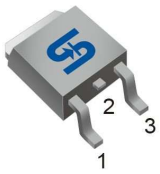
TS1117

1A Low Dropout Positive Voltage Regulator

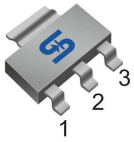
TO-220



TO-252 (DPAK)

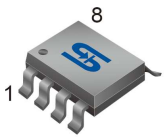


SOT-223



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

SOP-8



Pin Definition:

1. Fixed / Adj	8. N/C
2. Output	7. Output
3. Output	6. Output
4. Input	5. N/C

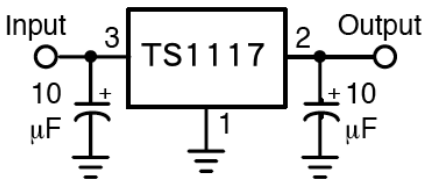
General Description

TS1117 are high performance positive voltage regulators are designed for use in applications requiring low dropout performance at full rated current, Additionally, TS1117 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. TS1117 are three terminal regulators with fixed and adjustable voltage options available in popular packages.

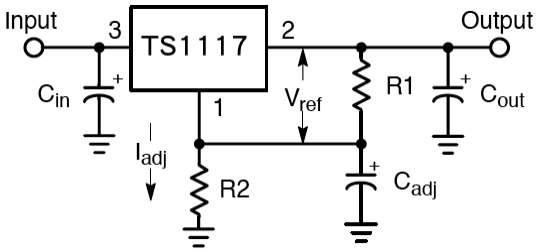
Features

- 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

Typical Application Circuit



Fixed Output Voltage Version



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

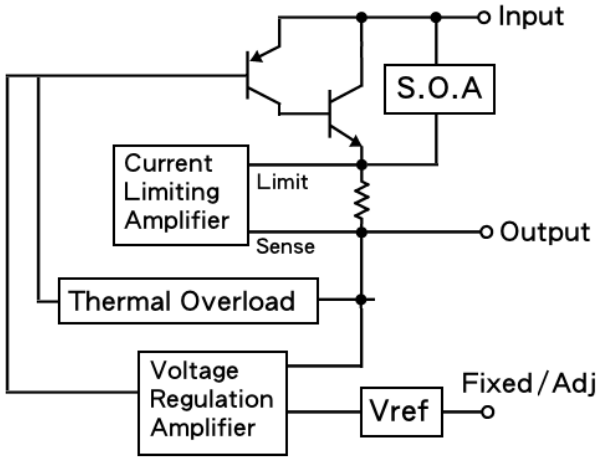
Adjustable Output Voltage Version

Ordering Information

Part No.	Package	Packing
TS1117CZ**xx** C0	TO-220	50pcs / Tube
TS1117CP**xx** RO	TO-252	2.5Kpcs / 13” Reel
TS1117CW**xx** RP	SOT-223	2.5Kpcs / 13” Reel
TS1117CS**xx** RL	SOP-8	2.5Kpcs / 13” Reel
TS1117CZ**xx** C0G	TO-220	50pcs / Tube
TS1117CP**xx** ROG	TO-252	2.5Kpcs / 13” Reel
TS1117CW**xx** RPG	SOT-223	2.5Kpcs / 13” Reel
TS1117CS**xx** RLG	SOP-8	2.5Kpcs / 13” Reel

Note: Where **xx** denotes voltage option, available are 5.0V, 3.3V, 2.5V, 1.8V and 1.2V. Leave blank for adjustable version.
“G” denotes Halogen Free Products

Block Diagram



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-252		105	
	SOT-223		130	
	SOP-8		160	
Operating Junction Temperature Range		T_J	0 ~ +125	°C
Storage Temperature Range		T_{STG}	-65 ~ +150	°C
Lead Soldering Temperature (260°C)	TO-220		10	S
	TO-252 / SOT-223 / SOP-8		5	

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

Parameter	Conditions	Min	Typ	Max	Unit
Reference Voltage	V_{IN}= 5, Io=10mA	1.237	1.25	1.262	V
	V_{IN}= 2.75, Io=10mA~1A	1.225		1.275	
Output Voltage (Note 4)	V_{IN} = 3.5V, Io=10mA	1.485	1.5	1.515	V
	V_{IN} = 3V~7V, Io=10mA~1A	1.470		1.530	
	V_{IN} = 3.8V, Io=10mA	1.782	1.8	1.818	V
	V_{IN} = 3.3V~7V, Io=10mA~1A	1.764		1.836	
	V_{IN} = 4.5V, Io=10mA	2.475	2.5	2.525	V
	V_{IN} = 4V~7V, Io=1A	2.450		2.550	
	V_{IN} = 5.3V, Io=10mA	3.267	3.3	3.333	V
	V_{IN} = 4.8V~7V, Io=1A	3.235		3.366	
	V_{IN} = 7V, Io=10mA	4.950	5.0	5.050	V
	V_{IN} = 6.5V~7V, Io=1A	4.900		5.100	
Line Regulation	Vo+1.5V ≤ V_{IN} ≤ 7V, Io= 10mA	--	0.015	0.2	%
Load Regulation (Note 1,2)	V_{IN} = V_{OUT}+1.5V, Io = 10mA~1A	--	0.05	1.0	%
Dropout Voltage	Io=1A, ΔV_{OUT} = 1% V_{OUT}	--	1.3	1.5	V
Quiescent Current	V_{IN} = 5V	--	8	10	mA
Adjustable Pin Current		--	90	--	uA
Output Current Limit	V_{IN} - V_{OUT} = 3V	1.1	--	--	A
Temperature Stability	Io=10mA	--	0.5	--	%
Ripple Rejection	F= 120Hz, Io= 1A, C_{OUT} = 25uF, V_{IN} = V_{OUT} +3V	--	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.

Note 4: The Output Capacitor does not have a theoretical upper limit and increasing its value will increase stability C_{OUT}=100uF or more is typical for high current regulator design.

Electrical Characteristics Curve

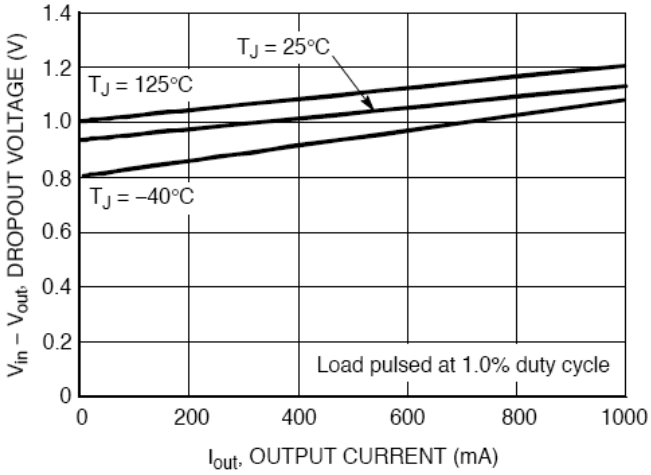


Figure 1. Vdrop vs. Output Current

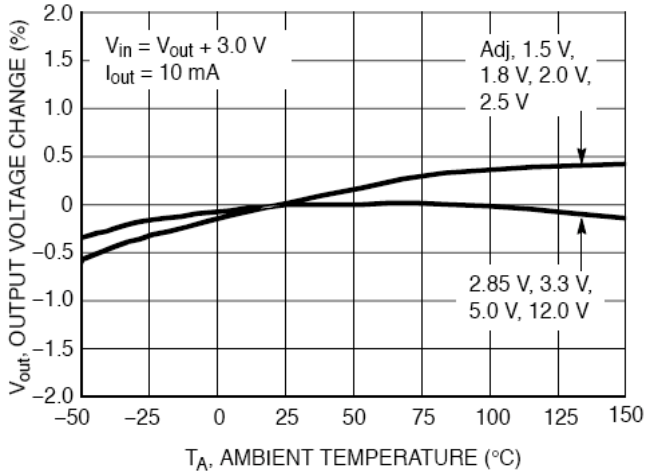


Figure 2. Vout Change vs. Temperature

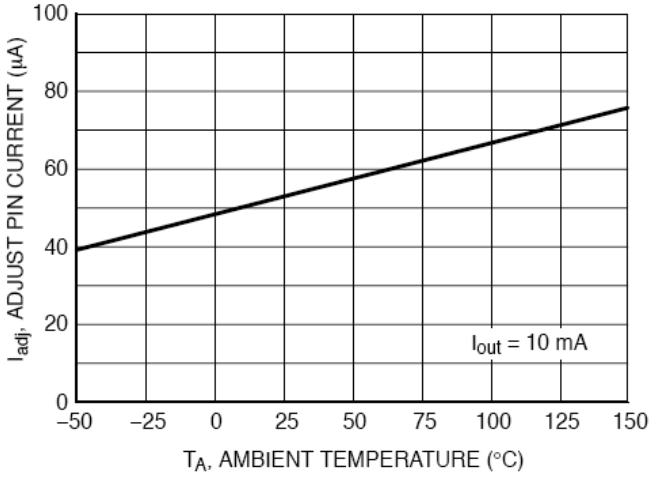


Figure 3. Adjust Pin Current vs. Temperature

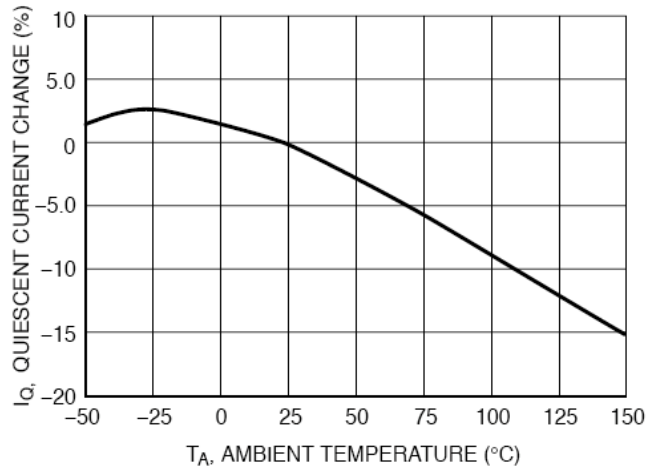


Figure 4. Iq Change vs. Temperature

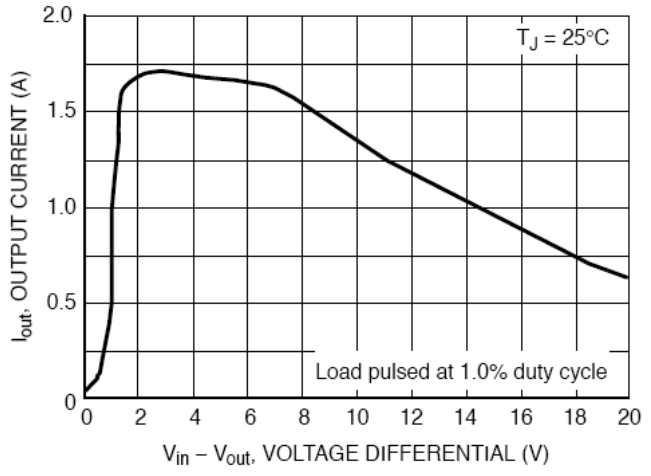


Figure 5. Output Short Circuit Current vs. Differential Voltage

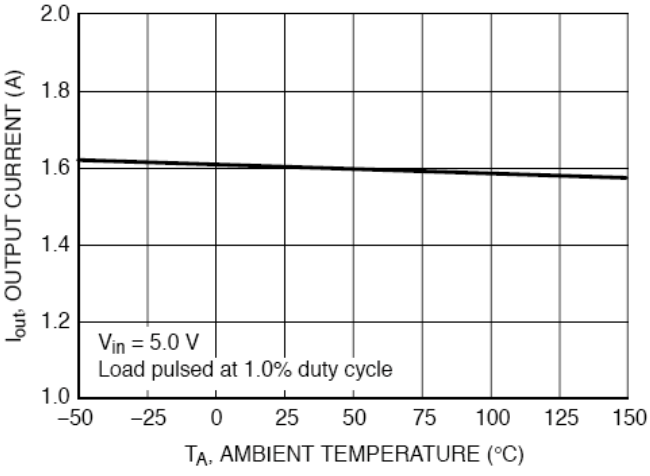
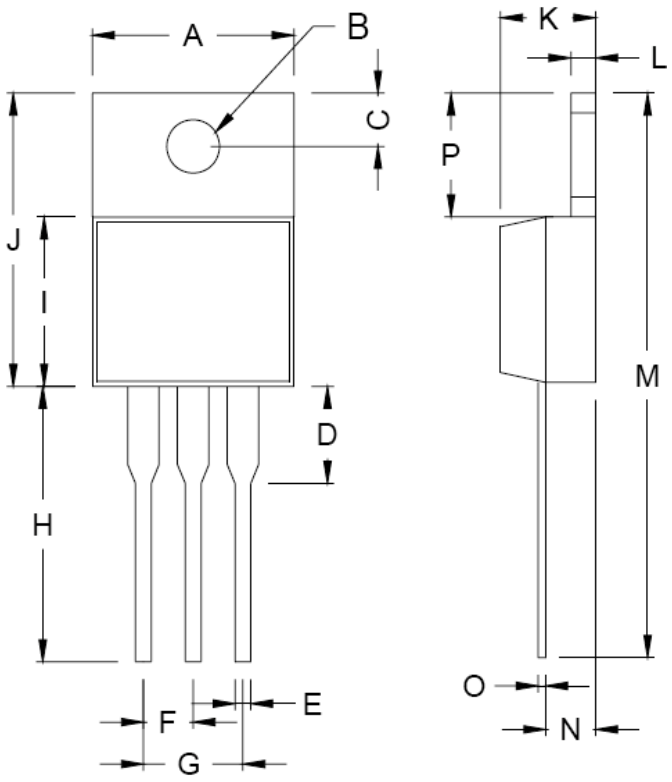


Figure 6. Output Short Circuit Current vs. Temperature

TS1117

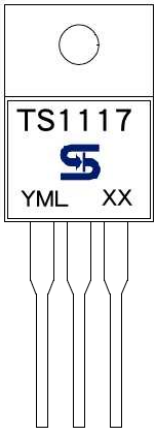
1A Low Dropout Positive Voltage Regulator

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)
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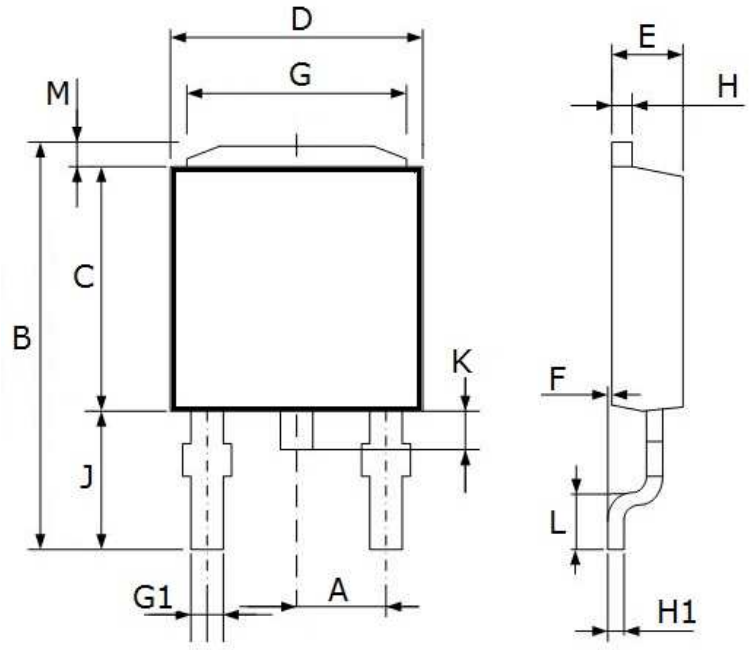
L = Lot Code

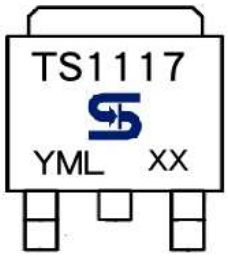
XX = Voltage Code
(**1.5**=1.5V, **1.8**=1.8V, **2.5**=2.5V, **3.3**=3.3V, **5.0**=5V)
= Package Code for Adjustable type
(CZ = TO-220)

TO-252 Mechanical Drawing



TO-252 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.30 BSC		0.090 BSC	
B	10.20	10.80	0.402	0.425
C	5.30	5.70	0.209	0.224
D	6.30	6.70	0.248	0.264
E	2.10	2.50	0.083	0.098
F	0.00	0.20	0.000	0.008
G	4.80	5.20	0.189	0.205
G1	0.40	0.80	0.016	0.031
H	0.40	0.60	0.016	0.024
H1	0.35	0.65	0.014	0.026
J	3.35	3.65	0.132	0.144
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	0.067

Marking Diagram



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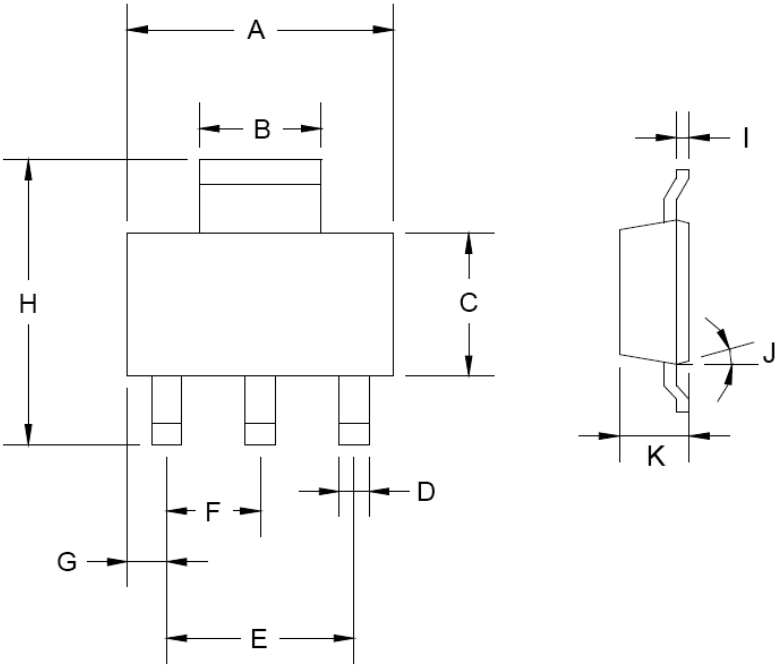
= Package Code for Adjustable type
(CP = TO-252)

TS1117

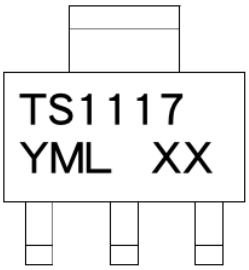
1A Low Dropout Positive Voltage Regulator

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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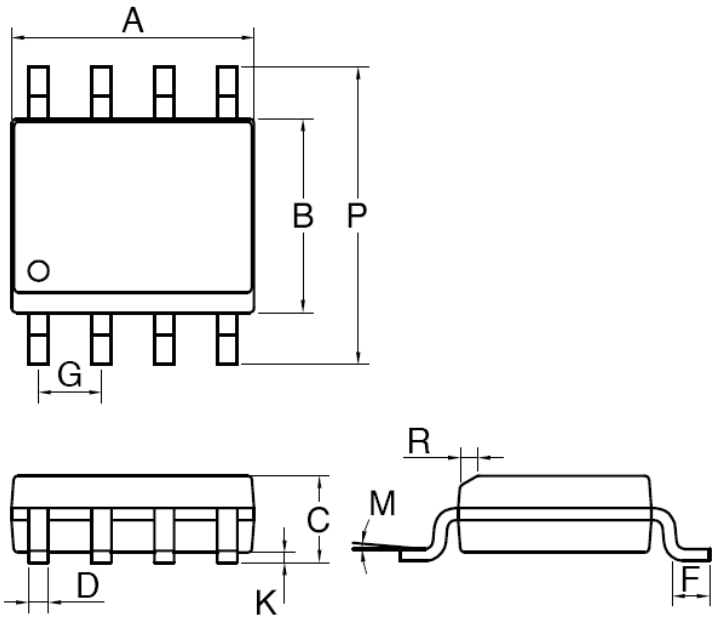
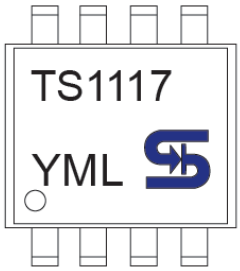
= Package Code for Adjustable type
(CW = SOT-223)

SOP-8 Mechanical Drawing



SOP-8 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX.
A	4.80	5.00	0.189	0.196
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27BSC		0.05BSC	
K	0.10	0.25	0.004	0.009
M	0º	7º	0º	7º
P	5.80	6.20	0.229	0.244
R	0.25	0.50	0.010	0.019

Marking Diagram



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= Package Code for Adjustable type
(CW = SOT-223)

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