1A Low Dropout Positive Voltage Regulator

DESCRIPTION

TS1117B are high performance positive voltage regulators are designed for use in applications requiring low dropout performance at full rated current. Additionally, TS1117B 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. TS1117B are three terminal regulators with fixed and adjustable voltage options available in popular packages.

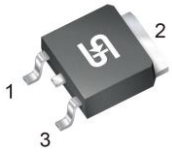
FEATURES

- Low dropout performance 1.5V max.
- Fast transient response
- Built-in thermal shutdown
- Output current limit
- Line regulation typical 0.2%
- Load regulation typical 0.05%
- Low-ESR ceramic capacitor (MLCC) required for Stability.
- Good ripple rejection
- RoHS Compliant
- Halogen-free

APPLICATION

- PC peripheral
- Communication
- Consumer equipment

TO-252 (DPAK)



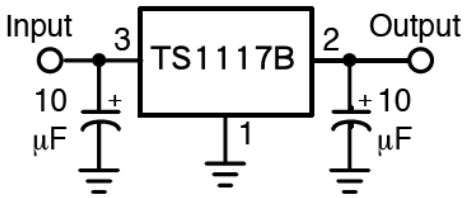
SOT-223



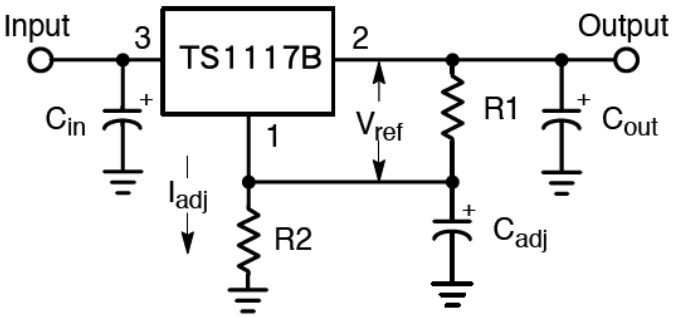
Pin Definition:
1. Fixed / Adj
2. Output (Tab)
3. Input

Notes: MSL 3 (Moisture Sensitivity Level) per J-STD-020

TYPICAL APPLICATION CIRCUIT



Fixed output voltage version



Adjustable output voltage version

ABSOLUTE MAXIMUM RATINGS				
PARAMETER		**SYMBOL**	**LIMIT**	**UNIT**
Input Supply Voltage		V_{IN}	15	V
Recommend Operation Input Supply Voltage		$V_{IN\ (Opr.\ Typ.)}$	12	V
Power Dissipation (Note 2)		P_D	Internal limited	
Operating Temperature Range		T_{OPER}	-40 ~ +125	°C
Junction Temperature Range		T_J	+150	°C
Storage Temperature Range		T_{STG}	-65 ~ +150	°C
Lead Soldering Temperature (260°C)	TO-252		5	s
	SOT-223			

THERMAL PERFORMANCE				
PARAMETER	**SYMBOL**	**LIMIT**		**UNIT**
		SOT-223	**TO-252**	
Junction to Ambient Thermal Resistance	$R_{\theta JA}$	130	105	°C/W

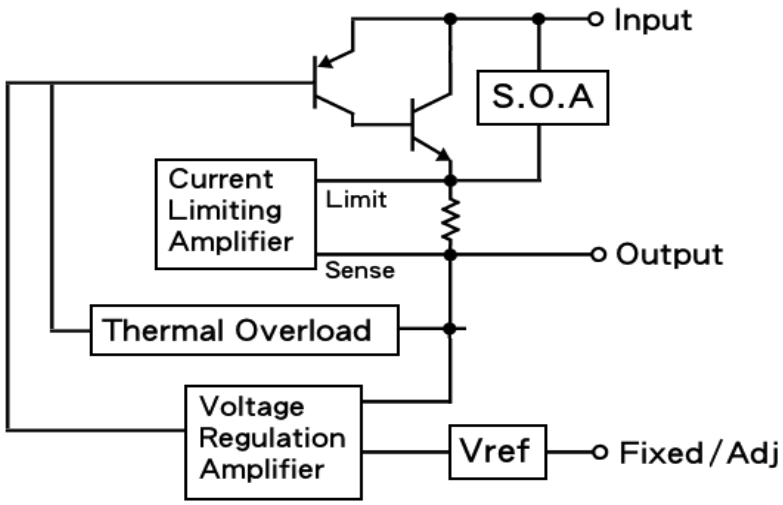
Notes: $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistances. The case thermal reference is defined at the solder mounting surface of the drain pins. $R_{\theta JA}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design. $R_{\theta JA}$ shown below for single device operation on FR-4 PCB in still air.

ELECTRICAL SPECIFICATIONS (T_A=25°C, unless otherwise noted)						
PARAMETER	**CONDITIONS**	**SYMBOL**	**MIN**	**TYP**	**MAX**	**UNIT**
Reference Voltage	V_{IN} = 2.75, I_O=1A	V_{REF}	1.225	1.25	1.275	V
Output Voltage (Note 4)	V_{IN} = 2.7V~12V, I_O=1A	V_{OUT}	1.176	1.2	1.224	V
	V_{IN} = 3V~12V, I_O=1A		1.470	1.5	1.530	
	V_{IN} = 4V~12V, I_O=1A		2.450	2.5	2.550	
	V_{IN} = 4.8V~12V, I_O=1A		3.235	3.3	3.366	
	V_{IN} = 6.5V~12V, I_O=1A		4.900	5.0	5.100	
Line Regulation	V_O +1.5V ≤ V_{IN} ≤ 12V, I_O = 10mA	REG_{LINE}	--	0.2	0.5	%
Load Regulation (Note 1,2)	V_{IN} = V_{OUT}+1.5V, I_O = 10mA~1A	REG_{LOAD}	--	0.05	1.0	%
Dropout Voltage	I_O =1A, ΔV_{OUT} = 1% V_{OUT}	V_{DROP}	--	1.3	1.5	V
Quiescent Current	V_{IN} = 5V	I_Q	--	5	10	mA
Adjustable Pin Current		I_{ADJ}	--	90	--	µA
Output Current Limit	V_{IN} - V_{OUT} = 1.5V	I_{LIMIT}	1.1	--	--	A
Temperature Stability	I_O =10mA,		--	0.5	--	%
Ripple Rejection	f= 120Hz, I_O= 1A, C_{OUT} =25µF, V_{IN} = V_{OUT}+3V	RR	--	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.
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.
3. Quiescent current is defined as the minimum output current required to maintain the regulation.
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.

FUNCTION BLOCK



ORDERING INFORMATION

OUTPUT VOLTAGE	PART NO.	PACKAGE	PACKING	DEVICE MARKING
ADJ	TS1117BCP ROG	TO-252 (DPAK)	2,500pcs / 13" Reel	TS1117B CP
	TS1117BCW RPG	SOT-223	2,500pcs / 13" Reel	TS1117B CW
1.2V	TS1117BCW12 RPG	SOT-223	2,500pcs / 13" Reel	TS1117B 12
2.5V	TS1117BCW25 RPG	SOT-223	2,500pcs / 13" Reel	TS1117B 25
3.3V	TS1117BCP33 ROG	TO-252 (DPAK)	2,500pcs / 13" Reel	TS1117B 33
	TS1117BCW33 RPG	SOT-223	2,500pcs / 13" Reel	TS1117B 33
5.0V	TS1117BCP50 ROG	TO-252 (DPAK)	2,500pcs / 13" Reel	TS1117B 50
	TS1117BCW50 RPG	SOT-223	2,500pcs / 13" Reel	TS1117B 50

CHARACTERISTICS CURVES

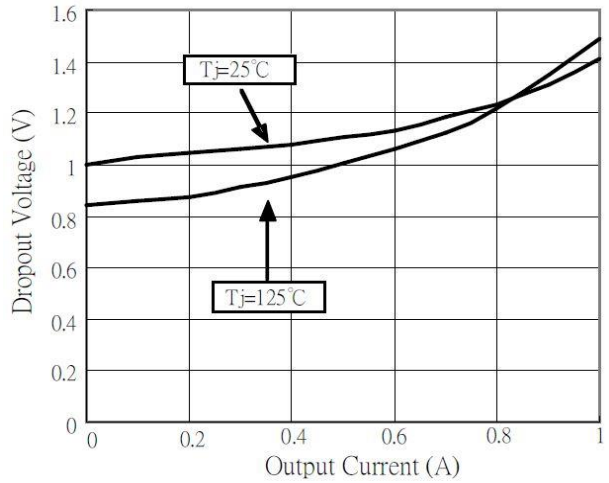


Figure 1. V_{DROP} vs. Output Current

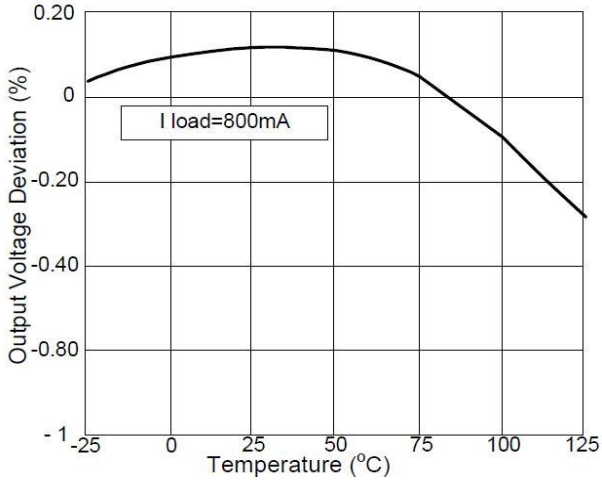


Figure 2. Load Regulation vs. Temperature

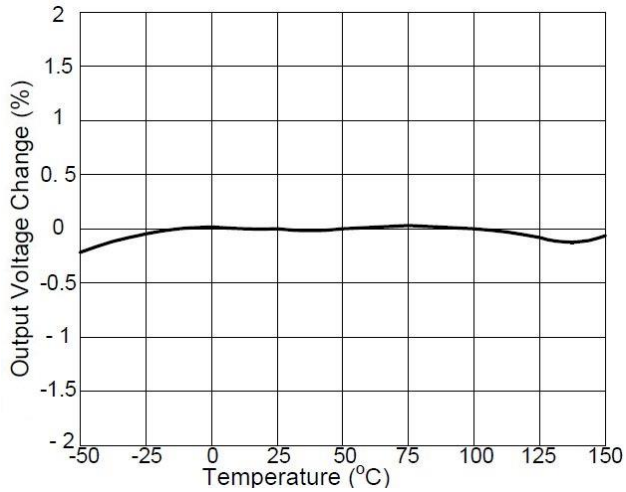


Figure 3. V_{OUT} Change vs. Temperature

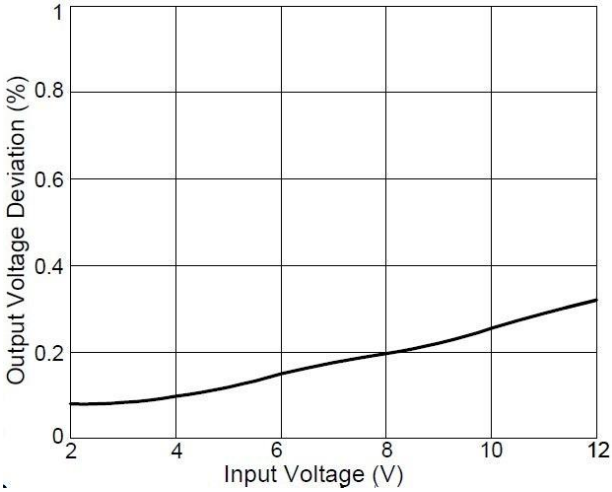


Figure 4. V_{OUT} Deviation vs. Temperature

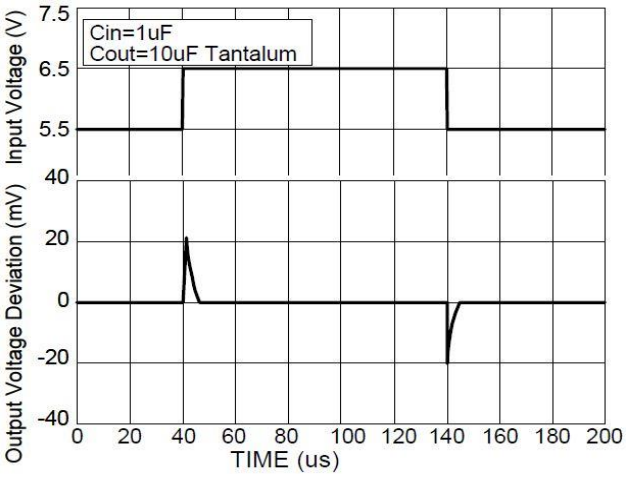


Figure 5. Line Transient Response

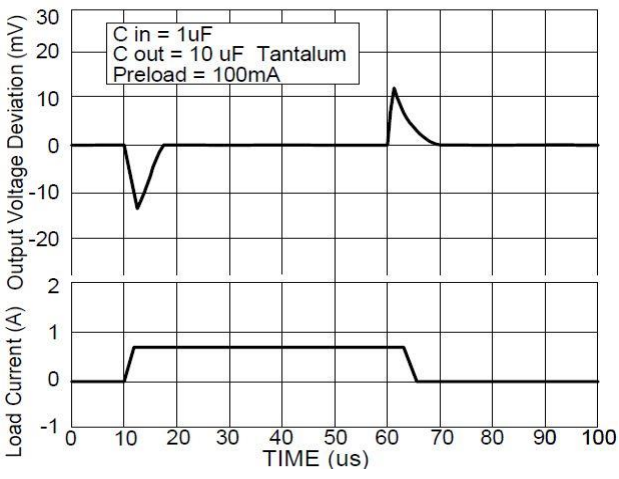
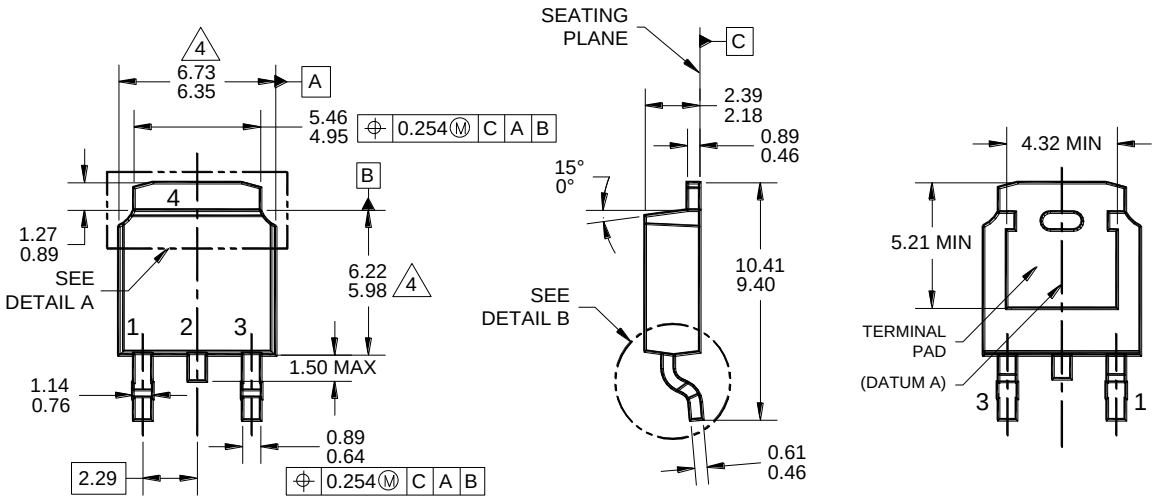
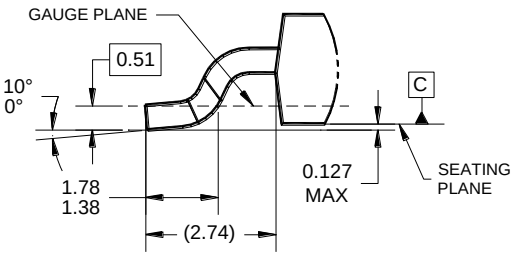


Figure 6. Load Transient Response

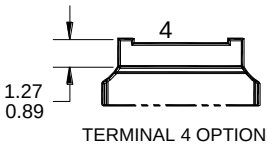
PACKAGE OUTLINE DIMENSIONS

TO-252

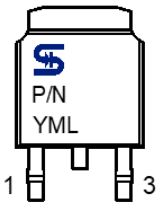




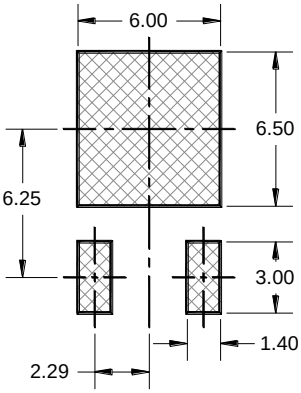
DETAIL B, ROTATED -90°
(SCALE 2:1)



TERMINAL 4 OPTION
DETAIL A



MARKING DIAGRAM



SUGGESTED PAD
LAYOUT

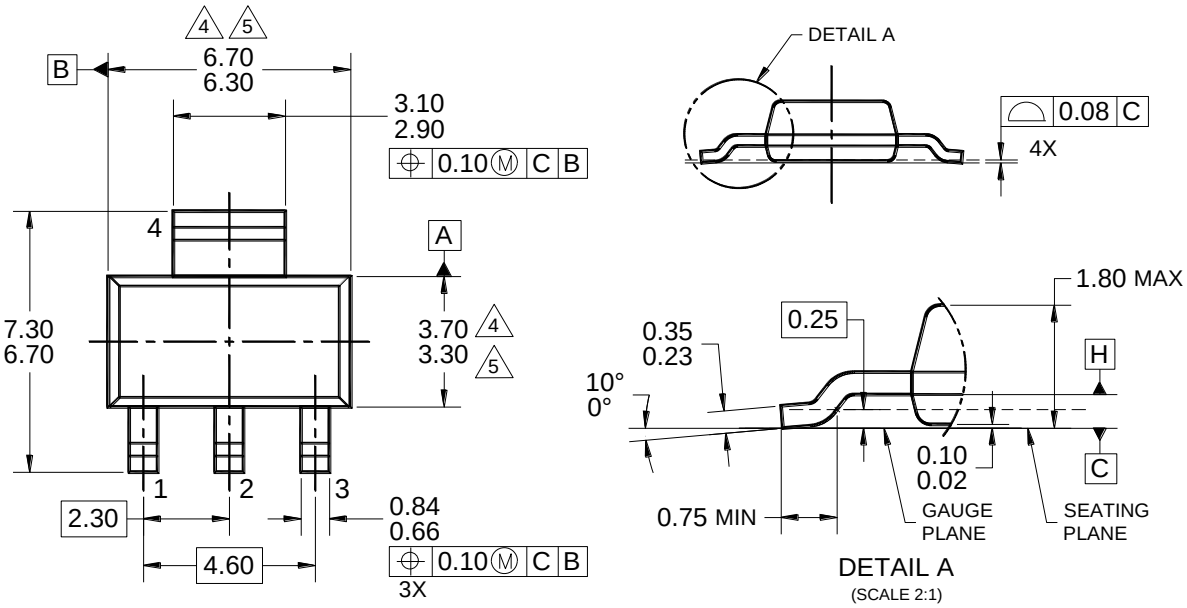
P/N = MARKING CODE
Y = YEAR CODE
M = MONTH CODE
O =JAN P =FEB Q =MAR R =APR
S =MAY T =JUN U =JUL V=AUG
W =SEP X =OCT Y =NOV Z =DEV
L = LOT CODE

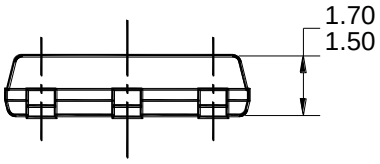
NOTES: UNLESS OTHERWISE SPECIFIED

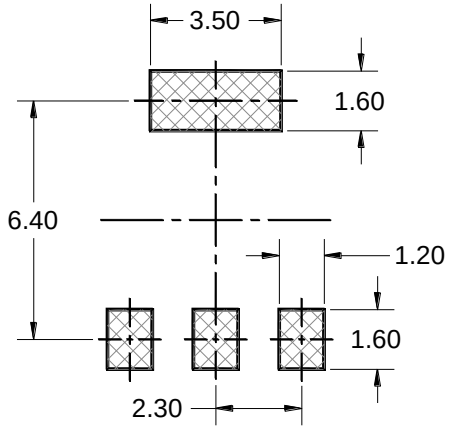
1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
3. PACKAGE OUTLINE REFERENCE: JEDEC TO-252, VARIATION AA, ISSUE F.
4. MOLDED PLASTIC BODY DIMENSIONS DO NOT INCLUDE MOLD FLASH, PROTRUSION, OR GATE BURRS.
5. DWG NO. REF: HQ2SD07-TO252AA-013 REV B.

PACKAGE OUTLINE DIMENSIONS

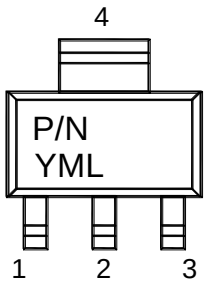
SOT-223







SUGGESTED PAD LAYOUT



MARKING DIAGRAM

P/N = MARKING CODE
Y = YEAR CODE
M = MONTH CODE
O =JAN P =FEB Q =MAR R =APR
S =MAY T =JUN U =JUL V=AUG
W =SEP X =OCT Y =NOV Z =DEV
L = LOT CODE

NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
3. PACKAGE OUTLINE REFERENCE:TO-261, VARIATION AA.
4. MOLDED PLASTIC BODY DIMENSIONS DO NOT INCLUDE MOLD FLASH.
5. MOLDED PLASTIC BODY LATERAL DIMENSIONS TO BE DETERMINED AT DATUM PLANE H.
6. DWG NO. REF: HQ2SD07-SOT223-001 REV A

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