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July 2015

LM317AHV
3-Terminal Positive Adjustable Regulator

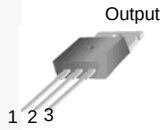
Features

- Output Current in Excess of 1.5 A
- Output Adjustable Between 1.2 V and 57 V
- Internal Thermal Overload Protection
- Internal Short-Circuit Current Limiting
- Output Transistor Safe Area Compensation
- TO-220 Package

Description

This monolithic integrated circuit is an adjustable 3-terminal positive voltage regulator designed to supply more than 1.5 A of load current with an output voltage adjustable over a 1.2 V to 57 V. It employs internal current limiting, thermal shut down and safe area compensation.

TO-220 (Single Gauge)



1. Adj 2. Output 3. Input

Ordering Information

Product Number	Marking	Package	Packing Method	Operating Temperature
LM317AHVT	LM317AHV	TO-220 3L (Single Gauge)	Rail	-40 to +125°C

Block Diagram

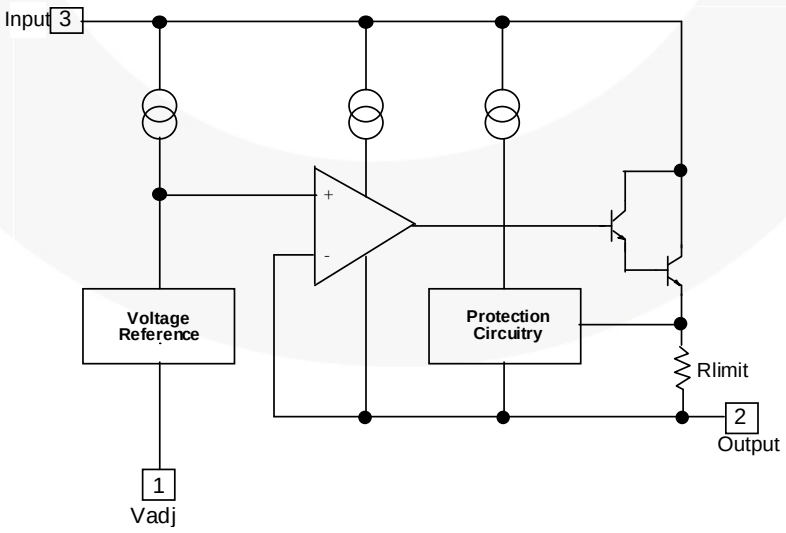


Figure 1. Block Diagram

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Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only. Values are at T_A = 25°C unless otherwise noted.

Symbol	Parameter	Value	Unit
V_I - V_O	Input-Output Voltage Differential	60	V
T_{LEAD}	Lead Temperature	230	°C
T_J	Operating Junction Temperature Range	-40 to +125	°C
T_{STG}	Storage Temperature Range	-65 to +125	°C
$\Delta V_O/\Delta T$	Temperature Coefficient of Output Voltage	±0.02	%/°C

Thermal Characteristics

Values are at T_A = 25°C unless otherwise noted.

Symbol	Parameter	Value	Unit
P_D	Power Dissipation	Internally Limited	W
$R_{\theta JC}$	Thermal Resistance, Junction to Case	5	°C/W

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Electrical Characteristics

$V_I - V_O = 5$ V, $I_O = 0.5$ A, $-40°C \le T_J \le +125°C$, $I_{MAX} = 1.5$ A, $P_{DMAX} = 20$ W, unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Rline	Line Regulation(1)	$T_A = +25°C$, $3 V \le V_I - V_O \le 60 V$		0.01	0.04	%/V
		$3 V \le V_I - V_O \le 60 V$		0.02	0.07	
Rload	Load Regulation(1)	$T_A = +25°C$, $10 mA \le I_O \le I_{MAX}$, $V_O < 5 V$		18	25	mV
		$T_A = +25°C$, $10 mA \le I_O \le I_{MAX}$, $V_O \ge 5 V$		0.4	0.5	%/V_O
		$10 mA \le I_O \le I_{MAX}$, $V_O < 5 V$		40	70	mV
		$10 mA \le I_O \le I_{MAX}$, $V_O \ge 5 V$		0.8	1.5	%/V_O
I_{ADJ}	Adjustable Pin Current	-		46	100	µA
ΔI_{ADJ}	Adjustable Pin Current Change	$T_J = 0°C$ to $+125°C$, $3 V \le V_I - V_O \le 60 V$, $10 mA \le I_O \le I_{MAX}$, $P_D \le P_{MAX}$		2	5	µA
		$3 V \le V_I - V_O \le 60 V$, $10 mA \le I_O \le I_{MAX}$, $P_D \le P_{MAX}$			10	
V_{REF}	Reference Voltage	$T_J = 0°C$ to $+125°C$, $3 V \le V_I - V_O \le 60 V$, $10 mA \le I_O \le I_{MAX}$, $P_D \le P_{MAX}$	1.20	1.25	1.30	V
		$3 V \le V_I - V_O \le 60 V$, $10 mA \le I_O \le I_{MAX}$, $P_D \le P_{MAX}$	1.19		1.30	
ST_T	Temperature Stability	$T_J = -40°C$ to $+125°C$		0.7		%/V_O
$I_{L(MIN)}$	Minimum Load Current to Maintain Regulation	$V_I - V_O = 60 V$		3.5	12.0	mA
$I_{O(MAX)}$	Maximum Output Current	$V_I - V_O \le 15 V$, $P_D \le P_{MAX}$	1.0	2.2		A
		$V_I - V_O \le 60 V$, $P_D \le P_{MAX}$, $T_A = +25°C$		0.3		
e_N	RMS Noise, % of V_{OUT}	$T_A = +25°C$, $10 Hz \le f \le 10 kHz$		0.003	0.010	%/V_O
RR	Ripple Rejection	$V_O = 10 V$, f = 120 Hz, without C_{ADJ}		60		dB
		$V_O = 10 V$, f = 120 Hz, $C_{ADJ} = 10 µF$(2)	66	75		
ST	Long-Term Stability, $T_J = T_{HIGH}$	$T_A = +25°C$ for end point measurements, 1000HR		0.3	1.0	%

Notes:

1. Load and line regulation are specified at constant junction temperature. Change in V_D due to heating effects must be taken into account separately. Pulse testing with low duty is used. ($P_{MAX} = 20$ W)
2. C_{ADJ}, when used, is connected between the adjustment pin and ground.

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Typical Performance Characteristics

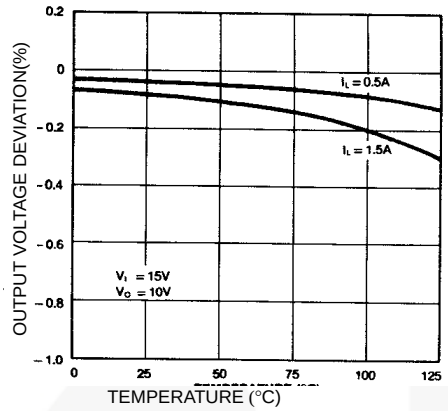

Figure 2. Load Regulation

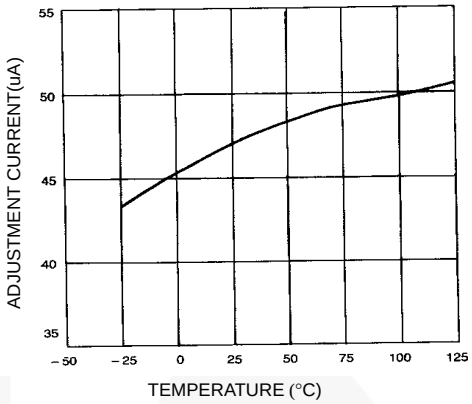

Figure 3. Adjustment Current

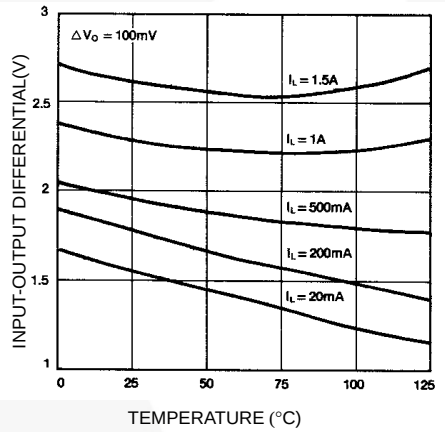

Figure 4. Dropout Voltage

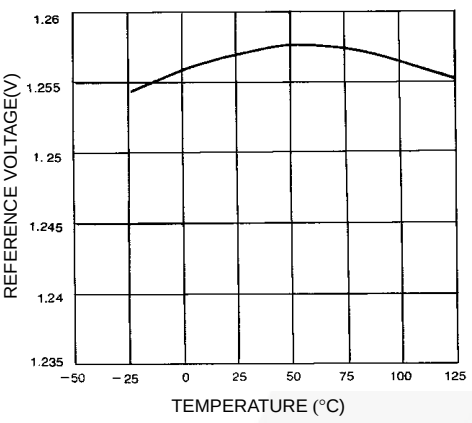

Figure 5. Reference Voltage

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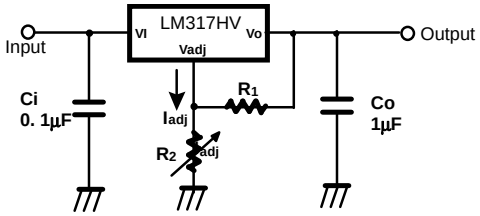
Typical Application(3)



$$V_O = 1.25V\ (1 + R_2/R_1) + I_{adj} R_2$$

Figure 6. Programmable Regulator

Note:

3. C_i is required when regulator is located an appreciable distance from power supply filter. C_o is not needed for stability, however, it does improve transient response. Since I_{ADJ} is controlled to less than 100 µA, the error associated with this term is negligible in most applications.

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Physical Dimensions

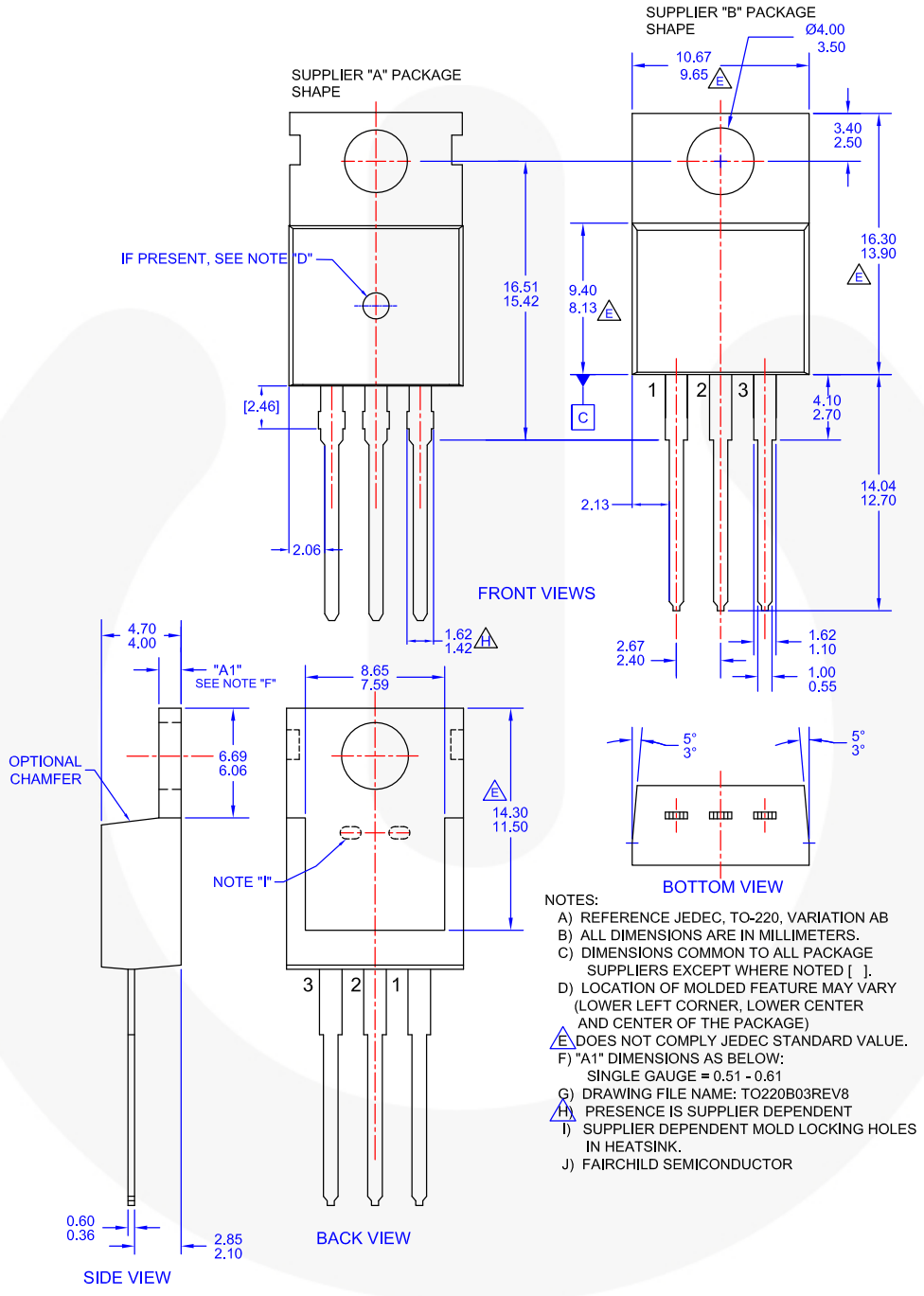

Figure 7. TO-220, MOLDED, 3LEAD, JEDEC VARIATION AB

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