

TO-220-3L Plastic-Encapsulate Voltage Regulators

LM317 Three-terminal positive voltage regulator

DESCRIPTION

This monolithic integrated circuit is an adjustable 3-terminal positive voltage regulator designed to supply more than 1.3A of load current with an output voltage adjustable over a 1.2 to 37V. It employs internal current limiting, thermal shut-down and safe area compensation.

FEATURE

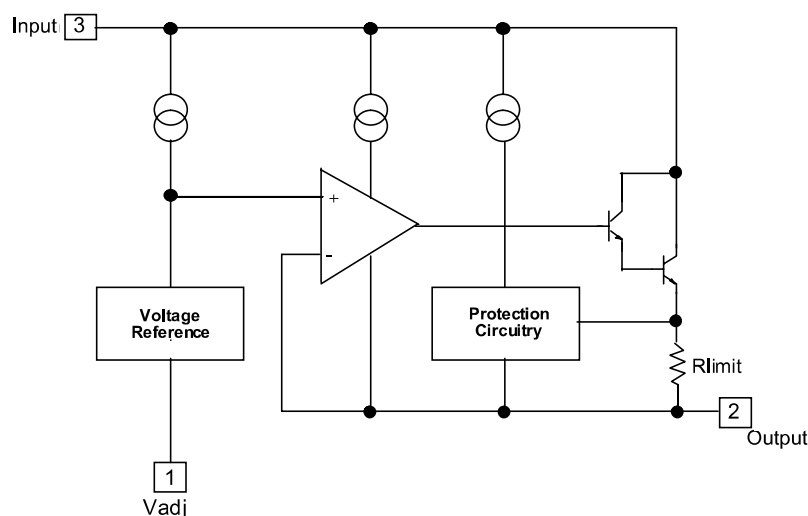
- Internal thermal overload protection
- Internal short circuit current limiting
- Output transistor safe operating area compensation

TO-220-3L

1. Adj
2. Output
3. Input



Internal Block Diagram



Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V_I-V_O	Input-Output Voltage Differential	40	V
T_{LEAD}	Lead Temperature	230	°C
P_D	Power Dissipation	Internally limited	W
T_J	Operating Junction Temperature Range	0~125	°C
T_{slg}	Storage Temperature Range	-55~125	
$\Delta V_O / \Delta T$	Temperature Coefficient of Output Voltage	±0.02	%/°C

ELECTRICAL CHARACTERISTICS

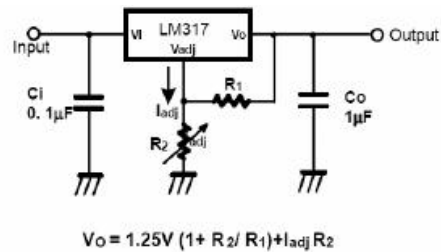
($V_O-V_I=5V, I_O=0.5A, 0^\circ C \leq T_J \leq +125^\circ C, I_{MAX}=1.5A, P_{DMAX}=20W$, unless otherwise specified)

Parameter	Symbol	Test conditions	MIN	TYP	MAX	UNIT
Line Regulation(note1)	R_{line}	$T_A=25^\circ C$ $3V \leq V_I-V_O \leq 40V$		0.01	0.04	% / V
		$3V \leq V_I-V_O \leq 40V$		0.02	0.07	
Load Regulation(note1)	R_{load}	$T_A=25^\circ C, 10mA \leq I_O \leq I_{MAX}$ $V_O < 5V$ $V_O \geq 5V$		18 0.4	25 0.5	mV% / V_O
		$10mA \leq I_O \leq I_{MAX}$ $V_O < 5V$ $V_O \geq 5V$		40 0.8	70 1.5	
Adjustable Pin Current	I_{ADJ}	-		46	100	μA
Adjustable Pin Current Change	ΔI_{ADJ}	$3V \leq V_I-V_O \leq 40V$ $10mA \leq I_O \leq I_{MAX}, P_D \leq P_{MAX}$		2.0	5	
Reference Voltage	V_{REF}	$3V \leq V_{IN}-V_O \leq 40V$ $10mA \leq I_O \leq I_{MAX}, P_D \leq P_{MAX}$	1.20	1.25	1.30	V
Temperature Stability	ST_T	-		0.7		% / V_O
Minimum Load Current to Maintain Regulation	$I_{L(MIN)}$	$V_I-V_O=40V$		3.5	12	mA
Maximum Output Current	$I_{O(MAX)}$	$V_I-V_O \leq 15V, P_D \leq P_{MAX}$ $V_I-V_O \leq 40V, P_D \leq P_{MAX}$ $T_A=25^\circ C$	1.0	2.2 0.3		A
RMS Noise,% of V_{OUT}	e_N	$T_A=25^\circ C, 10Hz \leq f \leq 10KHz$		0.003	0.01	% / V_O
Ripple Rejection	RR	$V_O=10V, f=120Hz$ without C_{ADJ} $C_{ADJ}=10\mu F$ (note2)	66	60 75		dB
Long-Term Stability, $T_J=T_{HIGH}$	ST	$T_A=25^\circ C$ for end point mesasurements,1000HR		0.3	1	%
Thermal Resistance Junction to case	$R_{\theta JC}$	-		5		°C/W

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.($P_{MAX}=20W$)
2. C_{ADJ} . when used, is connected between the adjustment pin and ground.

Typical Application



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 100µA, the error associated with this term is negligible in most applications.