LM317

3-Terminal Positive Adjustable Regulator

Features

- Output Current In Excess of 1. 5A
- Output Adjustable Between 1. 2V and 37V
- Internal Thermal Overload Protection
- Internal Short Circuit Current Limiting
- Output Transistor Safe Operating Area Compensation
- TO-220 Package

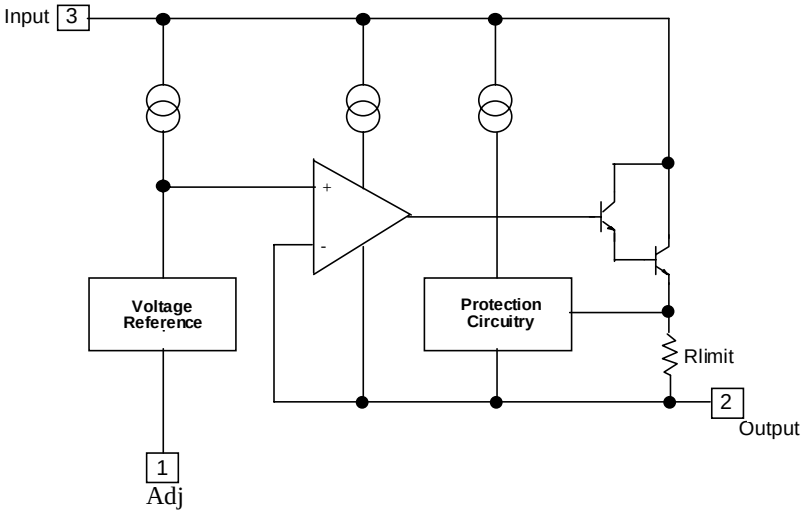
Description

This monolithic integrated circuit is an adjustable 3-terminal positive voltage regulator designed to supply more than 1.5A 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.

TO-220

1. Adj 2. Output 3. Input

Internal Block Diagram



Rev. 1.0.0

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Input-Output Voltage Differential	V_I - V_O	40	V
Lead Temperature	T_{LEAD}	230	°C
Power Dissipation	P_D	Internally limited	W
Operating Junction Temperature Range	T_j	0 ~ +125	°C
Storage Temperature Range	T_{STG}	-65 ~+125	°C
Temperature Coefficient of Output Voltage	$\Delta Vo/\Delta T$	±0.02	%/°C

Electrical Characteristics

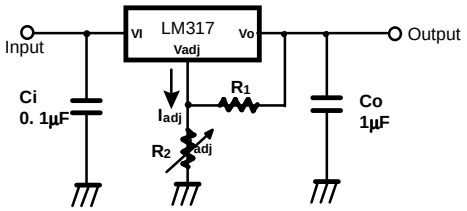
(V_I-V_O=5V, I_O= 0.5A, 0°C ≤ T_J ≤ + 125°C, I_{MAX} = 1.5A, P_{DMAX} = 20W, unless otherwise specified)

Parameter	Symbol	Conditions	Min	Typ.	Max.	Unit
Line Regulation (Note1)	Rline	T_A = +25°C 3V ≤ V_I - V_O ≤ 40V	-	0.01	0.04	% / V
		3V ≤ V_I - V_O ≤ 40V	-	0.02	0.07	% / V
Load Regulation (Note1)	Rload	T_A = +25°C, 10mA ≤ I_O ≤ I_{MAX} V_O< 5V V_O ≥ 5V	-	18 0.4	25 0.5	mV% / V_O
		10mA ≤ I_O ≤ I_{MAX} V_O < 5V V_O ≥ 5V	-	40 0.8	70 1.5	mV% / V_O
Adjustable Pin Current	I_{ADJ}	-	-	46	100	µA
Adjustable Pin Current Change	ΔI_{ADJ}	3V ≤ V_I - V_O ≤ 40V 10mA ≤ I_O ≤ I_{MAX} P_D ≤ P_{MAX}	-	2.0	5	µA
Reference Voltage	V_{REF}	3V ≤ V_{IN} - V_O ≤ 40V 10mA ≤ I_O ≤ I_{MAX} P_D ≤ 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 ≤ 15V, P_D ≤ P_{MAX} V_I - V_O ≤ 40V, P_D ≤ P_{MAX} T_A=25°C	1.0	2.2 0.3	-	A
RMS Noise, % of V_{OUT}	e_N	T_A= +25°C, 10Hz ≤ f ≤ 10KHz	-	0.003	0.01	% / V_O
Ripple Rejection	RR	V_O = 10V, f = 120Hz without C_{ADJ} C_{ADJ} = 10µF (Note2)	66	60 75	-	dB
Long-Term Stability, T_J = T_{HIGH}	ST	T_A = +25°C for end point measurements, 1000HR	-	0.3	1	%
Thermal Resistance Junction to Case	$R_{\theta JC}$	-	-	5	-	°C / W

Note:

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



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

Figure 5. Programmable Regulator

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.