

LM317

3-Terminal Positive Adjustable Regulator

DRAWING

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-220AB Package

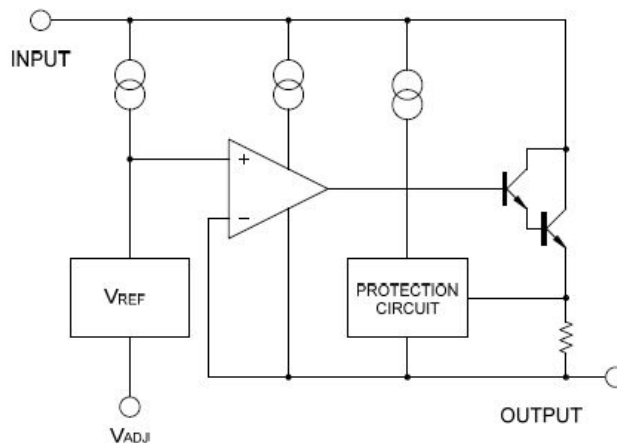


Adj Out In

General Description

This monolithic integrated circuit is an adjustable 3-terminal positive voltage regulator designed to supply more than 1.0A 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.

Block Diagram



Absolute Maximum Ratings

Parameter	Symbol	Value	Units
Input-Output Voltage Differential	VI-VO	40	V
Lead Temperature	TLEAD	230	°C
Power Dissipation	PD	Internally Limited	W
Operating Junction Temperature Range	Tj	0~+125	°C
Storage Temperature Range	TSTG	-65~+125	°C
Temperature Coefficient of Output Voltage	$\Delta V_o/\Delta T$	$\pm 0.02$	%/°C

**Electrical Characteristics**

(VI-VO=5V, Io=0.5A, 0°C ≤ TJ ≤ +125°C, IMAX=1.5A, PDMAX=20W, unless otherwise specified)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Line Regulation(Note1)	Rline	TA=+25°C 3V ≤ VI-VO ≤ 40V		0.01	0.04	% / V
		3V ≤ VI-VO ≤ 40V		0.02	0.07	% / V
Load Regulation(Note1)	Rload	TA=+25°C, 10mA ≤ IO ≤ IMAX				mV%/Vo
		VO < 5V		18	25	
		VO ≥ 5V		0.4	0.5	
		10mA ≤ IO ≤ IMAX				mV%/Vo
		VO < 5V		40	70	
VO ≥ 5V		0.8	1.5			
Adjustable Pin Current	IADJ			46	100	uA
Adjustable Pin Current change	△IADJ	3V ≤ VI-VO ≤ 40V 10mA ≤ IO ≤ IAMX PD ≤ PMAX		2	5	uA
Reference Voltage	VREF	3V ≤ VMIN-VO ≤ 40V 10mA ≤ IO ≤ IMAX PD ≤ PMAX	1.2	1.25	1.3	V
Temperature Stability	STT			0.7		% / Vo
Minimum Load Current to Maintain Regulation	IL(MIN)	VI-VO=40V		3.5	12	mA
Maximum Output Current	IO(MAX)	VI-VO ≤ 15V, PD ≤ PMAX	1.5	2.2		A
		VI-VO ≤ 40V, PD ≤ PMAX TA=25°C	0.15	0.4		
RMS Noise, % of Vout	en	TA=+25°C, 10HZ ≤ f ≤ 10KHZ		0.003	0.01	% / Vo
Ripple Rejection	RR	VO=10V, f=120HZ without CADJ CADJ=10uF(Note2)		60		DB
			66	75		
Long-Term Stability, TJ=THIGH	ST	TA=+25°C for end point measurements, 1000HR		0.3	1	%
Thermal Resistance Junction to Case	RJC			5		°C / W

Note:

- Load and line regulation are specified at constant junction temperature. change in VD due to heating Effects must be taken into account separately. Pulse testing with low duty os used. (PMAX=20W)
- CADJ, when used, is connected between the adjustment pin and ground.

Application Circuits

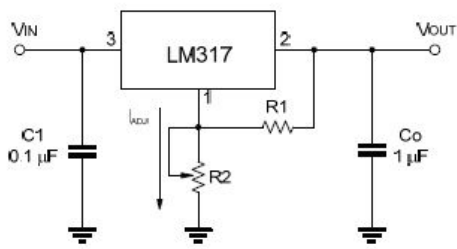


Fig.1 Programmable voltage regulator

$$V_{OUT} = 1.25V \cdot (1 + R2/R1) + I_{ADJ} \cdot R2$$

C1 is required when regulator is located an appreciated distance from power supply. Co is needed to improve transient response.

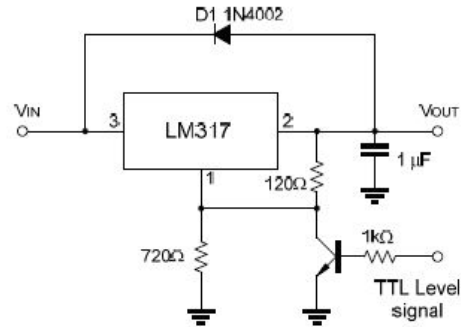


Fig.2 Regulator with On-off control

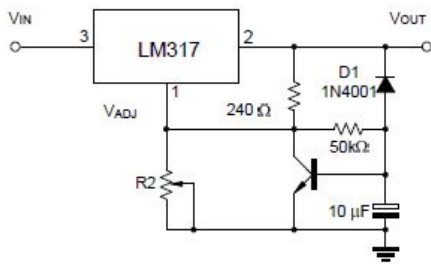
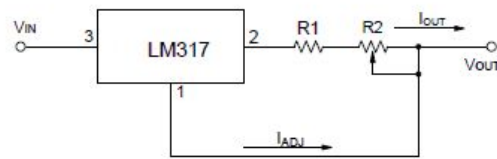


Fig.3 Soft Start Application



$$I_{O(MAX)} = ( \frac{V_{REF}}{R1} ) + I_{ADJ} = \frac{1.25V}{R1}$$

$$I_{O(MIN)} = ( \frac{V_{REF}}{R1+R2} ) + I_{ADJ} = \frac{1.25V}{R1+R2}$$

$$5mA < I_{OUT} < 100mA$$

Fig.4 Constant Current Application

Typical Characteristics

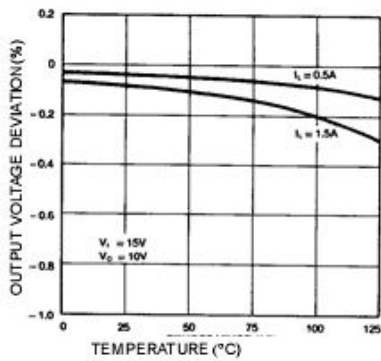


Figure 1. Load Regulation

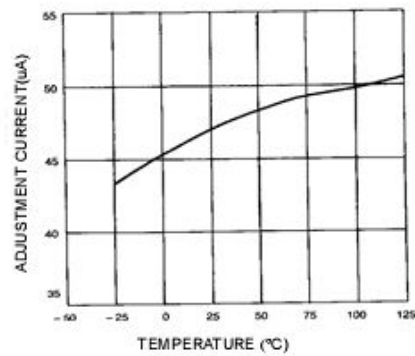


Figure 2. Adjustment Current

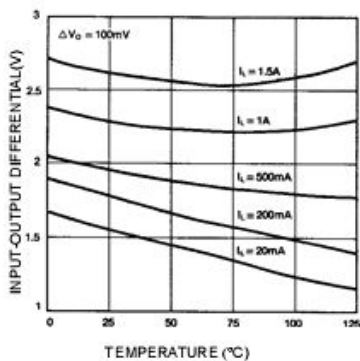


Figure 3. Dropout Voltage

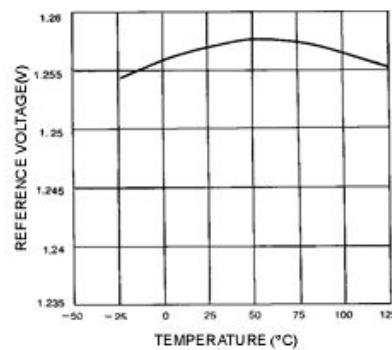


Figure 4. Reference Voltage

Mechanical Dimensions

