LM317

1.5A, ADJUSTABLE OUTPUT, VOLTAGE REGULATOR

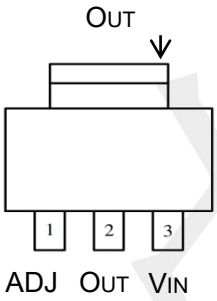
Features

- Output Adjustable between 1.2V and 37V
- Output current up to 1.5A
- Internal Thermal Overload Protection
- internal thermal Overload protection
- Output transistor safe area compensation

Applications

- HVAC Systems
- SMPS Post Regulation
- Test and Measurement Equipment
- Industrial Power Supplies

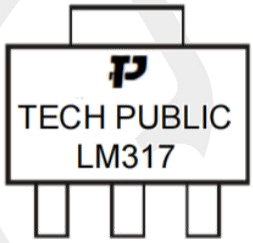
PIN CONFIGURATION



SOT-223-3

(TOP VIEW)

Marking:



Pin Number	Pin Name	Pin Function
SOT-223-3		
1	ADJ	Adjust pin
2	VOUT	Output of the Regulator
3	VIN	Input of Supply Voltage

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Absolute Maximum Ratings

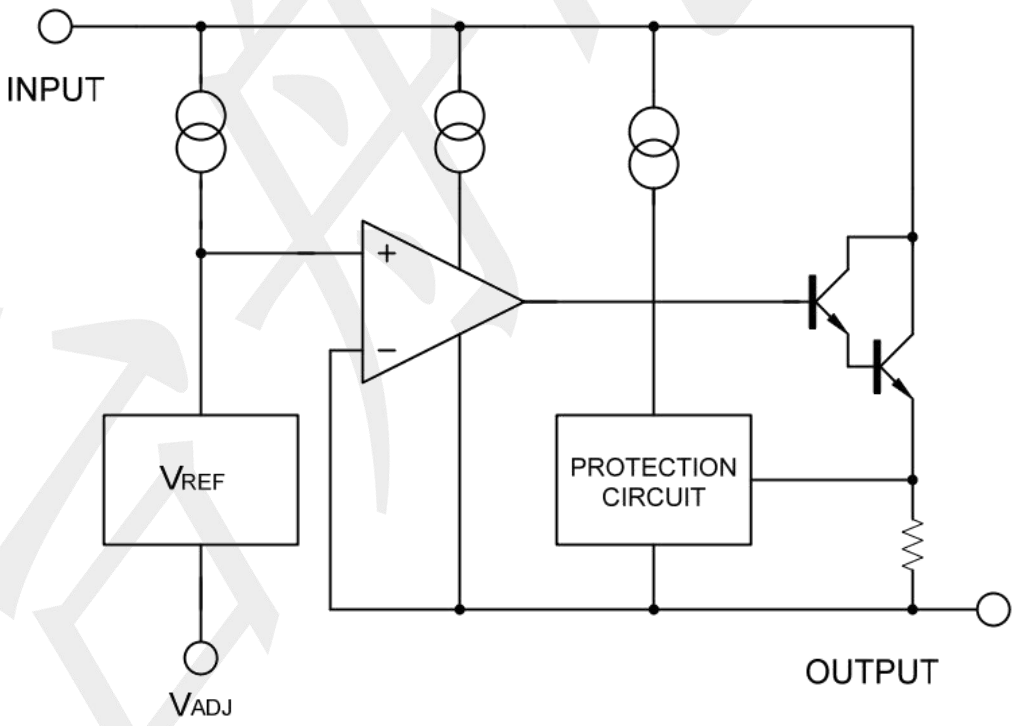
over operating free-air temperature range (unless otherwise noted)

SYMBOL	PARAMETER	RATINGS	UNIT
V_I - V_O	Input-Output Voltage Differential	40	V
P_D	Power Dissipation	Internally Limited	W
T_J	Operating Junction Temperature Range	+125	℃
T_{stg}	Storage temperature range	-65~ +150	℃
T_{OPR}	Operating Temperature	-40 ~ +85	℃

THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	SOT-223-3	θ_{JA}	140	℃/W
Junction to Case	SOT-223-3	θ_{JC}	23.5	℃/W

BLOCK DIAGRAM



Electrical Characteristics (TA=25℃, unless otherwise specified)

PARAMETER	SYMBOL	TEST Conditions		MIN	TYP	MAX	UNIT
Line Regulation (Note 1)	$\Delta V_{OUT} / V_{OUT}$	T_A = +25°C, 3.0V ≤ |V_I−V_O|≤ 40V		--	0.01	0.04	%/V
Load Regulation (Note 1)	ΔV_{OUT}	TA= +25°C, 10mA ≤ IO ≤ 1.5A	|V_O| ≤ 5.0V	--	5	25	mV
			|V_O| ≥5.0V	--	0.1	0.5	%
Adjustment Pin Current	I_{ADJ}			--	50	100	μA
Adjustment Pin Current Change	ΔI_{ADJ}	3.0V ≤ |VI-VO|≤ 40V, 10mA≤ IL ≤ 1.5A, PD ≤PMAX, TA = +25°C		--	2.0	5.0	μA
Reference Voltage	V_{REF}	T_A = +25°C, 3.0V ≤ |V_I-V_O| ≤ 40V		1.215	1.250	1.285	V
		10mA ≤ I_O ≤ 1.5A, P_D ≤ P_{MAX}, T_J = T_{LOW} to T_{HIGH}		1.20	1.25	1.30	V
Temperature Stability	T_S	T_{LOW} ≤T_J ≤ T_{HIGH}		--	0.7	--	%V_O
Minimum Load Current to Maintain Regulation	I_{LMIN}	|V_I-V_O| ≤ 10V		--	1.5	6.0	mA
		|V_I-V_O| ≤ 40V		--	2.5	10	mA
Maximum Output Current	I_{MAX}	|V_I-V_O| ≤ 15V, P_D ≤ P_{MAX}		1.5	2.2	--	A
		|V_I-V_O| ≤40V, P_D ≤ P_{MAX}, T_J =+25°C		0.3	0.4	--	A
RMS Noise	N	% of V_O, T_A = +25°C, 10Hz ≤ f ≤ 10kHz		--	0.003	--	%V_O
Ripple Rejection	RR	V_O = -10V, f = 120Hz (Note 2)	Without C_{ADJ}	--	65	--	dB
			C_{ADJ}=10μF	66	80	--	dB
Long-Term Stability	S	T_J = T_{HIGH} (Note 4), T_A = +25°C for Endpoint Measurements			0.3	1.0	%/1.0k Hrs.
Thermal Regulation		T_A = +25°C (Note 3), 10ms Pulse			0.003	0.4	%VO/W

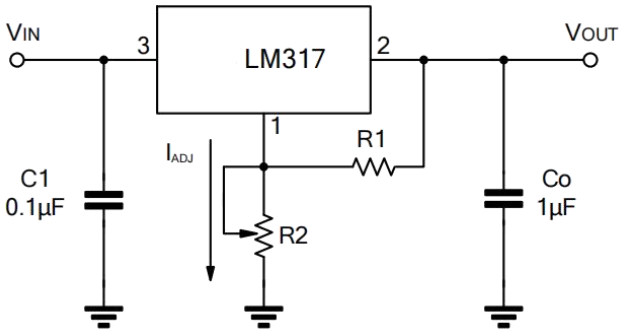
Notes: 1. Load and line regulation are specified at constant junction temperature. Change in V_O because of heating effects is covered under the Thermal Regulation specification. Pulse testing with a low duty cycle is used.

2. C_{ADJ}, when used, is connected between the adjustment pin and ground.

3. Power dissipation within an IC voltage regulator produces a temperature gradient on the die, affecting individual IC components on the die. These effects can be minimized by proper integrated circuit design and layout techniques. Thermal Regulation is the effect of these temperature gradients on the output voltage and is expressed in percentage of output change per watt of power change in a specified time.

4. Since Long Term Stability cannot be measured on each device before shipment, this specification is an engineering estimate of average stability from lot to lot.

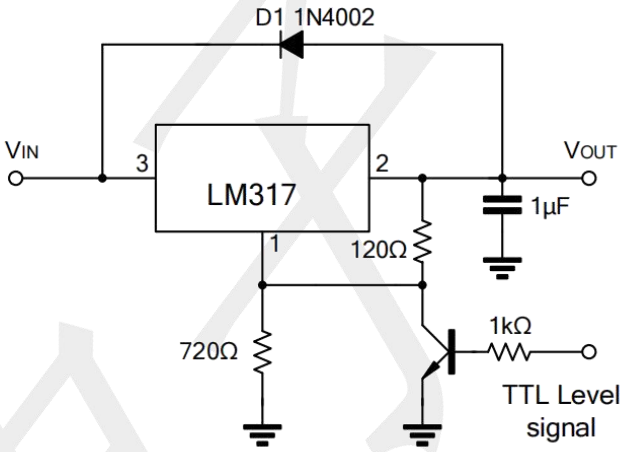
Typical Application Circuit



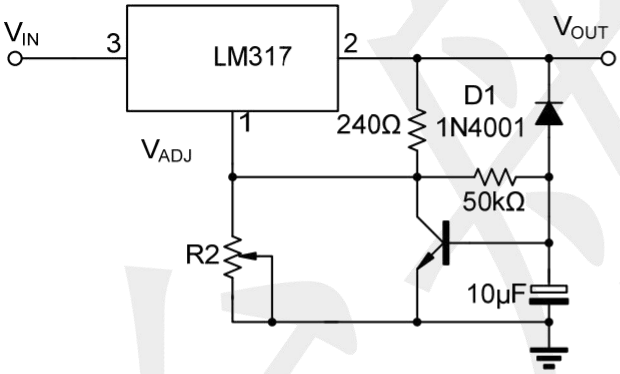
$V_{OUT}=1.25V\times(1+R2/R1)+I_{ADJ}\times R2$

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

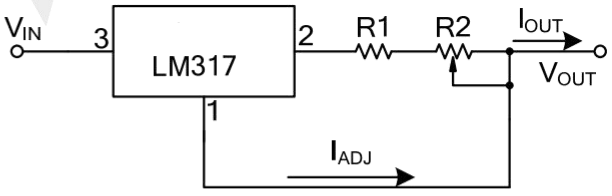
Programmable voltage regulator



Regulator with On-off control



Soft Start Application



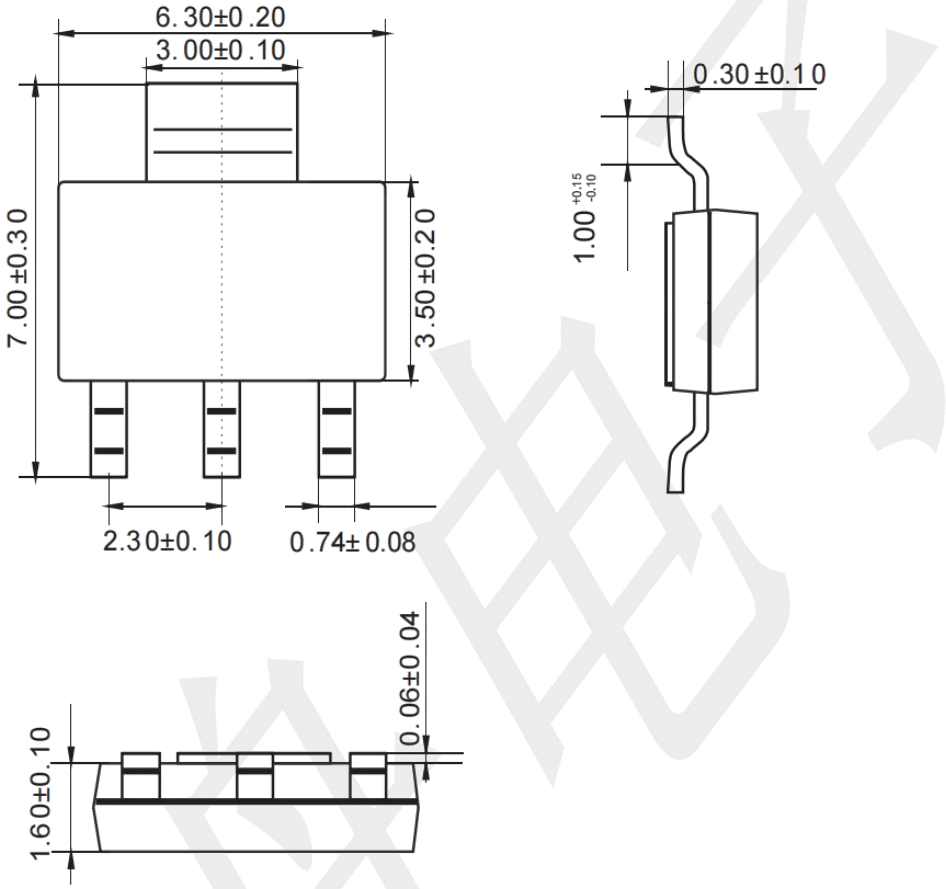
$$I_{O(MAX)} = \left(\frac{V_{REF}}{R1}\right) + I_{ADJ} = \frac{1.25V}{R1}$$

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

Constant Current Application

Package Outline Dimensions (unit: mm)

SOT-223-3



Mounting Pad Layout (unit: mm)

