



TO-220 Plastic-Encapsulate Voltage Regulator

LM317T Three-terminal positive voltage regulator

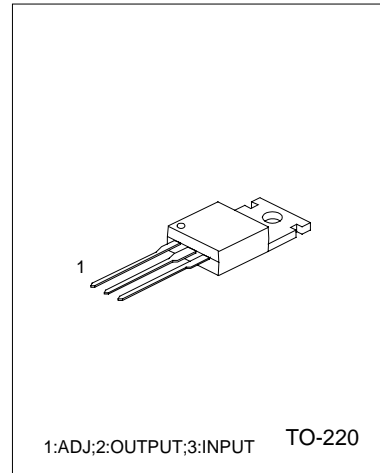
**3-TERMINAL 1A POSITIVE
ADJUSTABLE VOLTAGE
REGULATOR**

DESCRIPTION

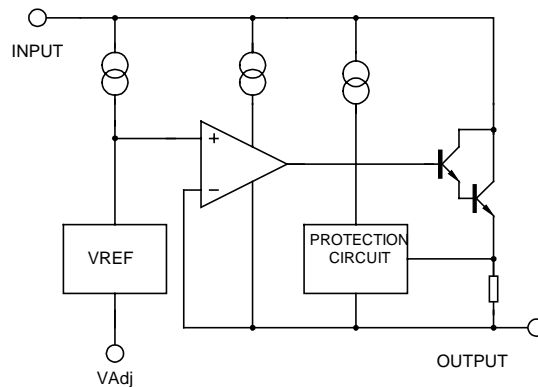
The LM317 is an adjustable 3-terminal positive voltage regulator designed to supply more than 1.5A of output current with voltage adjustable from 1.3V to 37V.

FEATURES

- *Output current up to 1.5A
- *Output voltage adjustable from 1.3V to 37V
- *Internal short circuit protection
- *Internal over temperature protection
- * Safe-Area compensation for output transistor



BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS (Ta=25°C, UNLESS OTHERWISE SPECIFIED)

PARAMETERS	SYMBOL	RATING	UNITS
Input - Output Voltage Difference	VI-VO	40	V
Lead Temperature	TLEAD	230	°C
Power Dissipation	PD	Internal limited	—
Operating Temperature Range	TOPR	0~+125	°C
Storage Temperature Range	TSTG	-65~+150	°C

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ELECTRICAL CHARACTERISTICS

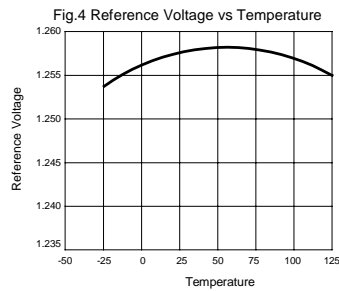
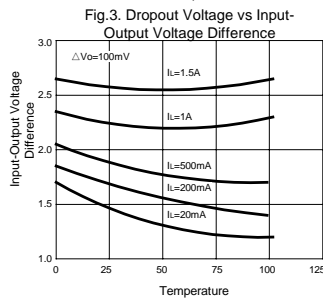
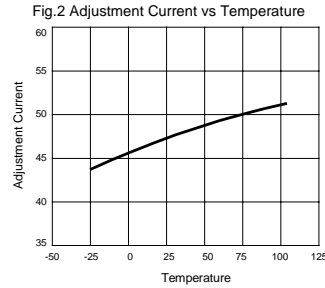
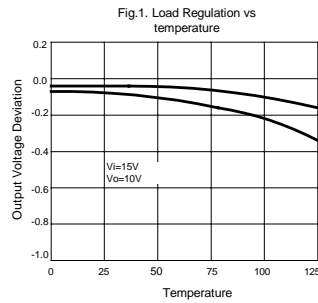
($V_I - V_O = 5V, 0^\circ C < T_J < 125^\circ C, I_O = 500mA, I_{MAX} = 1.5A, P_{MAX} = 20W$, unless otherwise specified)

Parameter	Symbol	Test conditions	Min	Typ	Max	Unit
Line Regulation	ΔV_O	$T_A = 25^\circ C, 3V \leq V_I - V_O \leq 40V$		0.01	0.04	%V
		$T_A = 0 - 125^\circ C, 3V \leq V_I - V_O \leq 40V$		0.02	0.07	
Load Regulation	ΔV_O	$T_A = 25^\circ C$				
		$10mA \leq I_O \leq I_{MAX}$	$V_O \leq 6V$	18	25	mV
		$10mA \leq I_O \leq I_{MAX}$	$V_O \leq 5V$	0.4	0.5	%V _O
		$10mA \leq I_O \leq I_{MAX}$	$V_O \leq 6V$	40	70	mV
Adjustable Pin current	I_{ADJ}			46	100	μA
Adjustable Pin Current Change	ΔI_{ADJ}	$2.5V \leq V_I - V_O \leq 40V,$ $10mA \leq I_O \leq I_{MAX}, P_D \leq P_{MAX}$		2.0	5	μA
Reference Voltage	V_{REF}	$3V \leq V_I - V_O \leq 40V,$ $10mA \leq I_O \leq I_{MAX}, P_D \leq P_{MAX}$	1.20	1.25	1.30	V
Temperature Stability	STT			0.7		%V _O
Minimum Load Current for regulation	$I_{L(MIN)}$	$V_I - V_O = 40V$		3.5	10	mA
Maximum output Current	$I_{O(MAX)}$	$V_I - V_O \leq 15V, P_D \leq P_{MAX}$	1.5	2.2		A
		$V_I - V_O \leq 15V, P_D \leq P_{MAX}, T_A = 25^\circ C$	0.15	0.4		
RMS Noise v.s. % of V _{out}	eN	$T_A = 25^\circ C, 10Hz \leq f \leq 10KHz$		0.003	0.01	%V _O
Ripple Rejection	RR	$V_O = 10V, f = 120Hz, C_{ADJ} = 0$		60		dB
		$V_O = 10V, f = 120Hz, C_{ADJ} = 10\mu F$	66	75		
Long-term Stability, T _J = T _{HIGH}	ST	$T_A = 25^\circ C, 1000 \text{ hr}$		0.3	1	%
Junction to Case Thermal Resistance	R _{θJC}			5		$^\circ C / W$

Note: Testing with low duty pulse should be used to avoid heating effect.

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TYPICAL CHARACTERISTICS PERFORMANCE



TYPICAL APPLICATION CIRCUITS

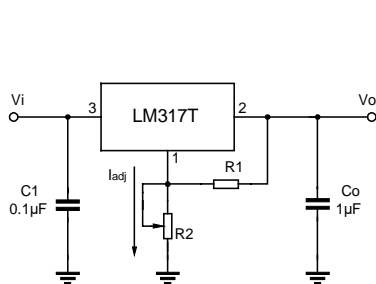


Fig.5 Programmable voltage regulator
 $V_o = 1.25V * (1 + R_2/R_1) + I_{adj} * R_2$
 C1 is required when regulator is located an appreciated distance from power supply. Co is needed to improve transient response.

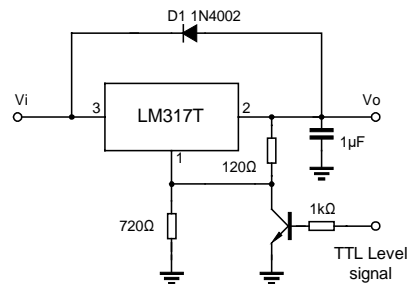


Fig.6 Regulator with On-off control

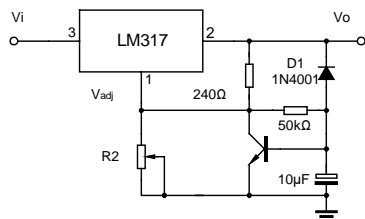
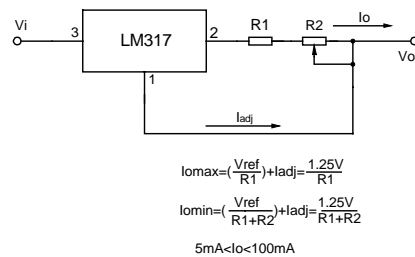


Fig.7 Soft start application



$$I_{o\max} = \left(\frac{V_{ref}}{R_1} \right) + I_{adj} = \frac{1.25V}{R_1}$$

$$I_{o\min} = \left(\frac{V_{ref}}{R_1 + R_2} \right) + I_{adj} = \frac{1.25V}{R_1 + R_2}$$

5mA < I_o < 100mA

Fig.8 Constant current application