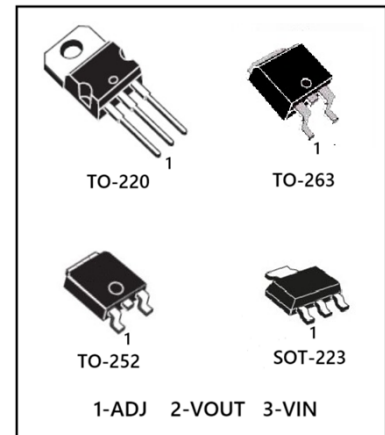


LM317

Description

The LM317 is adjustable 3-terminal positive voltage regulator capable of supplying in excess of 1.5 A over an output voltage range of 1.2 V to 37 V. These voltage regulator is exceptionally easy to use and require only two external resistors to set the output voltage. Further, it employ internal current limiting, thermal shutdown and safe area compensation, making them essentially blow-out proof.

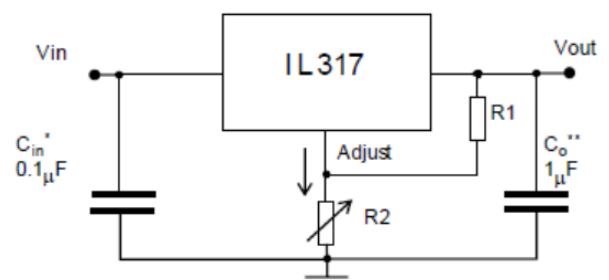
The LM317 serve a wide variety of applications to make a programmable output regulator, or by connecting a fixed resistor between the adjustment and output, the LM317 series can be used as a precision current regulator.



Features

- Output Voltage Range Adjustable from 1.2V to 37V
- Output Current Capability of 1.5A Max
- Internal Thermal Overload Protection
- Internal Short - Circuit Current Limiting Constant with Temperature
- Output Transistor Safe-Area Compensation
- Floating Operation for High Voltage Applications
- Eliminates Stocking Many Fixed
- Popular 3-Lead TO-220、TO-263、TO-252 and SOT-223Package

Standard application



$$V_{out} = 1.25V \left(1 + \frac{R_2}{R_1}\right) + I_{ADJ} * R_2$$

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Input-output differential voltage	$V_I - V_O$	40	V
Power dissipation	P_D	Internally Limited	W
Operating junction temperature range	T_j	-40 ~ +150	°C
Storage temperature range	T_{STG}	-65 ~ +150	°C

Thermal Data

Parameter	Symbol	TO-220	TO-263	TO-252	SOT-223	UNIT
Thermal resistance junction-case	R_{thJC}	5.5	5.5	14.5	27	°C/W
Thermal resistance junction-ambient	R_{thJA}	67	62.5	80	100	°C/W

Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Input-to-output voltage differential	$V_I - V_O$	3	37	V
Output current	I_O	10	1.5	A
Operating virtual junction temperature	T_J	0	125	°C

Electrical characteristics

($V_I - V_O = 5V$, $I_O = 500mA$, $T_J = T_{low}$ to T_{high} ⁽¹⁾; $I_{max} = 1.5 A$ and $P_{max} = 20 W$ unless otherwise noted)

Parameter	Symbol	Test conditions		Min	Typ	Max	Unit
Reference Voltage ⁽⁴⁾	V_{REF}	$3.0V \leq V_I - V_O \leq 40V$ $10mA \leq I_O \leq 1.5A$, $PD \leq P_{max}$		1.2	1.25	1.3	V
Line Regulation	Regline	$3.0V \leq V_I - V_O \leq 40V$		$T_A = 25^\circ C$	0.01	0.04	% / V
		$3.0V \leq V_I - V_O \leq 40V$, $I_O = 10mA$ to $1.5A$		(3)	0.02	0.07	
Load Regulation	Regload	$10mA \leq I_O \leq 1.5A$ ⁽³⁾	$V_O \leq 5.0V$	$T_A = 25^\circ C$	5.0	25	mV
			$V_O \geq 5.0V$		0.1	0.5	% / V
			$V_O \leq 5.0V$	(3)	20	70	mV
			$V_O \geq 5.0V$		0.3	1.5	% / V
Adjustment Pin Current	I_{Adj}				50	100	μA
Adjustment Pin Current Change	ΔI_{Adj}	$2.5V \leq V_I - V_O \leq 40V$ $10mA \leq I_O \leq 1.5A$, $PD \leq P_{max}$			0.2	5.0	μA
Maximum Output Current	$I_{O\ MAX}$	$V_I - V_O \leq 15 V$, $PD \leq 20W$			1.5	2.2	A
		$V_I - V_O \leq 40 V$, $PD \leq 20W$		$T_A = 25^\circ C$	0.15	0.4	
Minimum Load Current to Maintain Regulation	$I_{L\ MIN}$	$V_I - V_O = 40V$			3.5	10	mA
RMS Noise, % of V_O	N	$T_A = 25^\circ C$, $10\ Hz \leq f \leq 10\ kHz$			0.003		% V
Output voltage long-term drift ⁽⁶⁾	ST	After 1000 h at $T_J = MAX$ and $V_I - V_O = 40V$			0.3	1	%
Ripple Rejection ⁽⁵⁾	RR	$V_O = 10V$, $f = 120Hz$	$C_{Adj} = 0\mu F$		65		dB
			$C_{Adj} = 10\mu F$	66	80		

NOTES:

(1) $T_{low} = 0^\circ C$, $T_{high} = +125^\circ C$

(2) $I_{max} = 0.5 A$, P_{max}

(3) Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

(4) Selected devices with tightened tolerance reference voltage available.

(5) C_{adj} , when used, connected between the adjustment pin and ground.

(6) 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.