

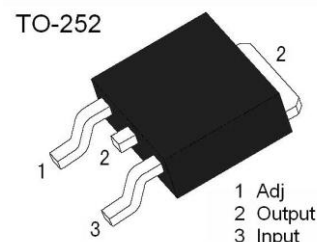
3-Terminal 1.5A Positive Adjustable Regulator

The LM317 are monolithic integrated circuit in TO-252 package sintered for use as positive adjustable voltage regulators. They are designed to supply more than 1.5A of load current with an output voltage adjustable over a 1.2 to 37V range.

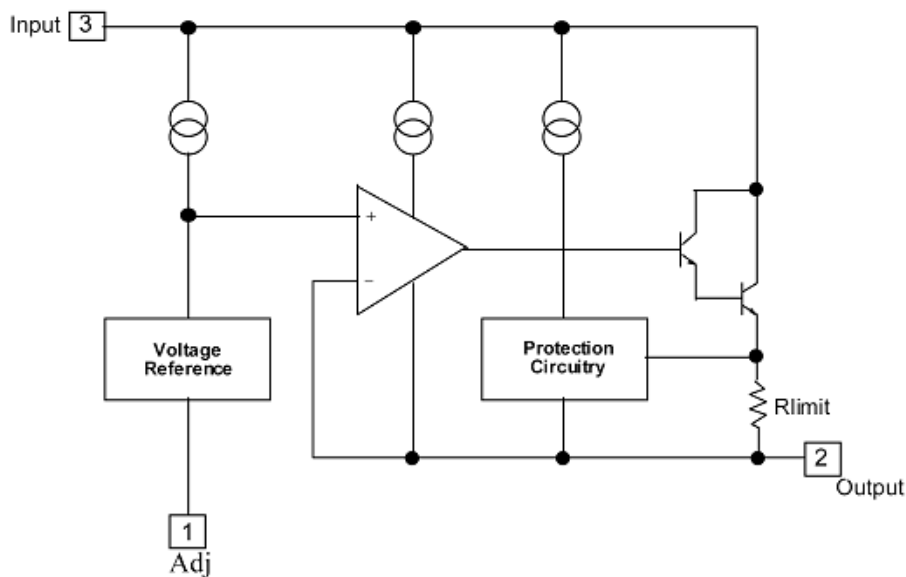
The nominal output voltage is selected by means of only a resistive divider, making the device exceptionally easy to use and eliminating the stocking of many fixed regulators

Features

- Output Voltage Range : 1.2V to 37V
- Output Current in excess of 1.5A
- Internal Thermal Overload Protection
- Internal Short Circuit Current Limiting
- Output Transistor Safe Operating Area Compensation



Internal Block Diagram



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	T_j	0 ~ +125	°C
Storage Temperature	T_{STG}	-60 ~ +150	°C
Temperature Coefficient of Output Voltage	$\Delta V_o / \Delta T$	±0.02	% / °C

Note 1: Absolute Maximum Ratings: are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the Electrical Characteristics tables are not guaranteed at the absolute maximum ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

Electrical Characteristics

($V_i - V_o = 5\text{ V}$, $I_o = 0.5\text{ A}$, $T_A = 25^\circ\text{C}$, unless otherwise specified)

Parameter	Symbol	Conditions	Value			Unit
			Min	Typ	Max	
Line Regulation (Note2)	$\Delta V_{OUT}/V_{OUT}$	$3\text{V} \leq V_i - V_o \leq 40\text{V}$, $T_A = 25^\circ\text{C}$		0.01	0.04	%V
		$3\text{V} \leq V_i - V_o \leq 40\text{V}$		0.002	0.07	
Load Regulation(Note2)	ΔV_{OUT}	$10\text{mA} \leq I_o \leq 1.5\text{A}$	$V_o < 5\text{V}$	18	25	mV%/V _O
			$V_o \geq 5\text{V}$	0.4	0.5	
		$10\text{mA} \leq I_o \leq 1.5\text{A}$	$V_o < 5\text{V}$	40	70	mV%/V _O
			$V_o \geq 5\text{V}$	0.8	1.5	
Adjustment Pin Current	I_{ADJ}	$T_j = 25^\circ\text{C}$		50	100	μA
Adjustment Pin Current	ΔI_{ADJ}	$3\text{V} \leq V_i - V_o \leq 40\text{V}$ $10\text{mA} \leq I_o \leq 1.5\text{A}$ $P_D \leq 20\text{W}$		2.0	5.0	μA
Reference Voltage	V_{REF}	$3\text{V} \leq V_i - V_o \leq 40\text{V}$ $10\text{mA} \leq I_o \leq 1.5\text{A}$, $P_D \leq 20\text{W}$	1.20	1.25	1.30	V
Minimum Load Current	$I_{L(\text{Min})}$	$V_i - V_o = 40\text{V}$		3.5	10	mA
Maximum Output Current	$I_{O(\text{Max})}$	$V_i - V_o = 40$, $P_D \leq 20\text{W}$	0.2	0.3		A
Maximum Load Current	eN	$10\text{Hz} \leq f \leq 10\text{kHz}$		0.003	0.01	% / V _O
RMS Noise,% of V _{OUT}	RR	$V_o = 10\text{V}$, $f = 120\text{Hz}$ (Note3)	C_{ADJ}		65	dB
			$C_{ADJ} = 10\mu\text{F}$	66	80	

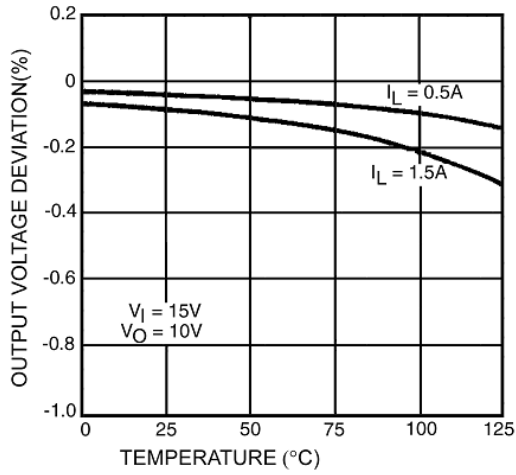
Note 2: Load and line regulation are specified at constant junction temperature. Change in V_o due to heating effects must be taken into account separately. Pulse testing with low duty is used. ($P_{MAX} = 20\text{S}$)

Note 3: C_{ADJ} , when used, is connected between the adjustment pin and ground.

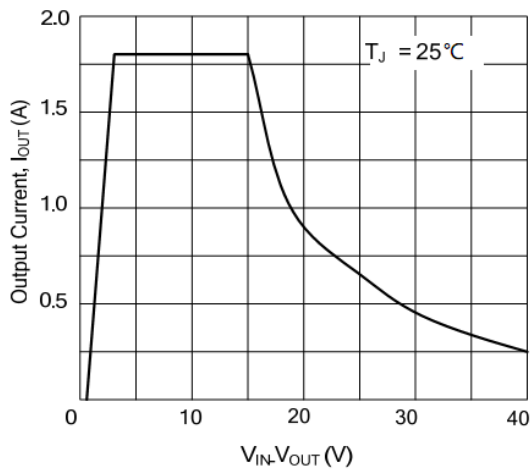
Thermal resistances

Parameter	Symbol	Conditions	Value	Unit
Junction to ambient	θ_{JA}		112	$^\circ\text{C/W}$
Junction to case	θ_{JC}		12	$^\circ\text{C/W}$

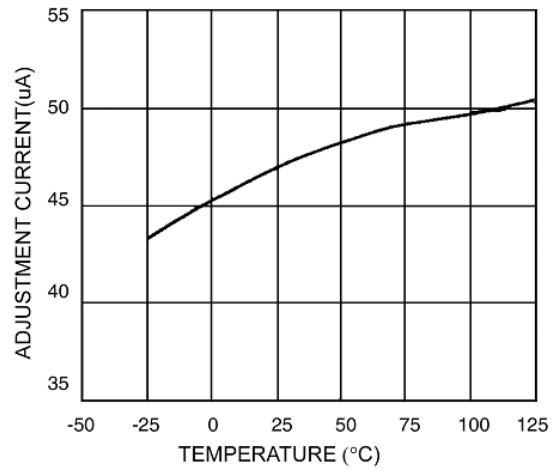
Typical Characteristics



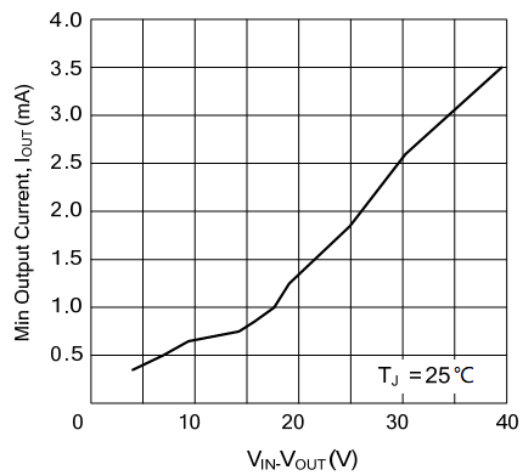
Load Regulation vs. temperature



Current limit

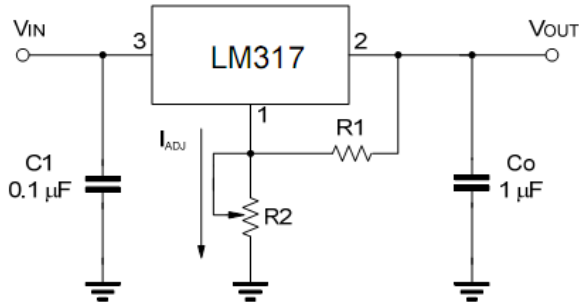


Adjustment Current vs. Temperature



Minimum Operating Current

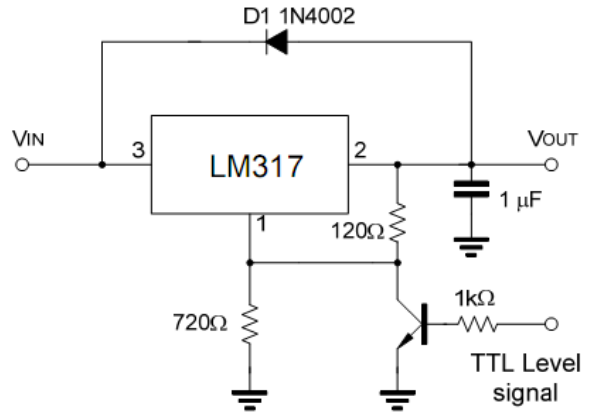
Typical Application



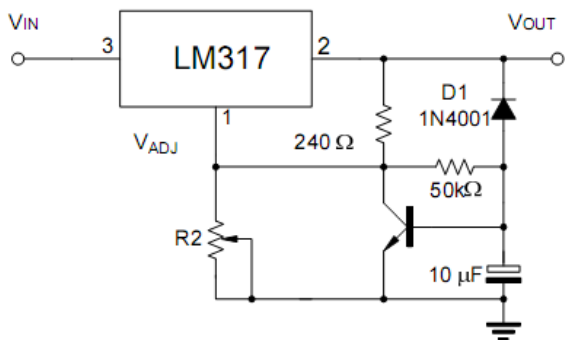
Programmable voltage regulator

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

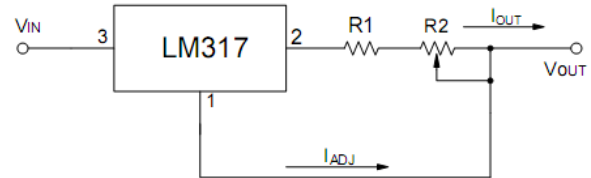
Ci is required when regulator is located an appreciable distance from power supply.
Co is needed to improve transient response.



Regulator with On-off control



Soft Start Application



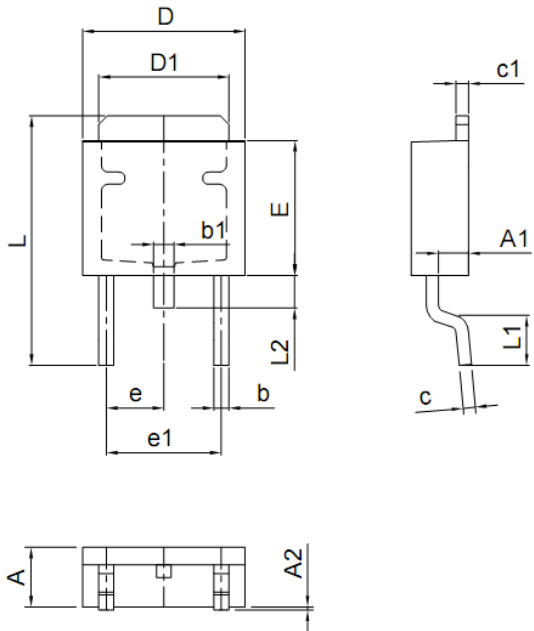
$$I_{O(MAX)} = \left(\frac{V_{REF}}{R1} \right) + I_{ADJ} = \frac{1.25V}{R1}$$

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

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

Constant Current Application

Package Dimensions



Dim	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	2.20	2.50	0.087	0.094
A1	1.00	1.40	0.039	0.055
A2	0.00	0.15	0.000	0.006
b	0.50	0.70	0.020	0.028
b1	0.70	0.90	0.028	0.035
c	0.40	0.60	0.016	0.024
c1	0.40	0.60	0.016	0.024
D	6.20	6.70	0.244	0.264
D1	5.10	5.50	0.201	0.217
E	5.50	6.00	0.217	0.236
e	2.20	2.40	0.087	0.094
e1	4.40	4.80	0.173	0.189
L	9.70	10.40	0.382	0.409
L1	1.40	1.70	0.055	0.063
L2	0.60	1.20	0.024	0.047