鼎德丰
DING DE FENG

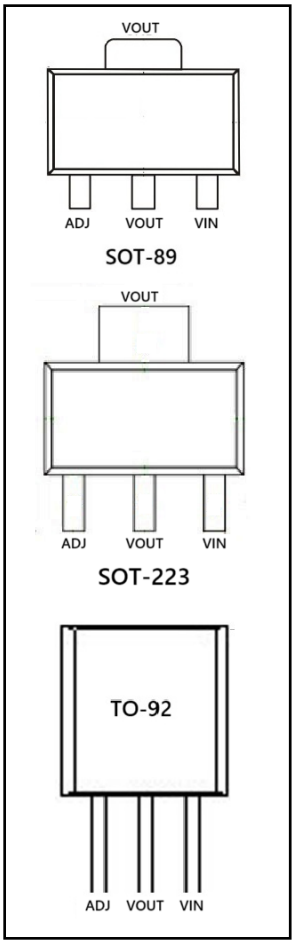
3-Terminal Positive
Adjustable Regulator

LM317L

DESCRIPTION

The LM317L is an adjustable 3–terminal positive voltage regulator capable of supplying in excess of 100 mA over an output voltage range of 1.2 V to 37 V. This voltage regulator is exceptionally easy to use and requires only two external resistors to set the output voltage. Further, it employs internal current limiting, thermal shutdown and safe area compensation, making them essentially blow–out proof.

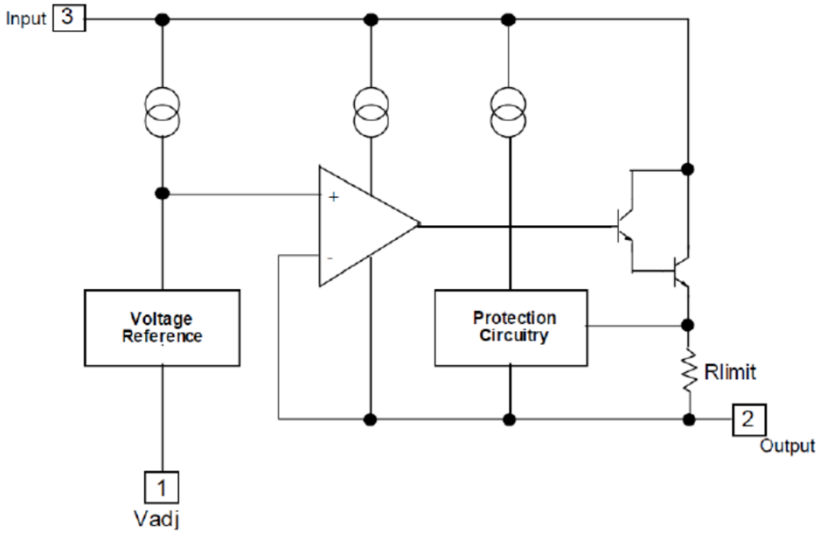
The LM317L serves a wide variety of applications including local, on card regulation. This device can also be used to make a programmable output regulator, or by connecting a fixed resistor between the adjustment and output, the LM317L can be used as a precision current regulator.



FEATURES

- Output Current in Excess of 100 mA
- Output Adjustable Between 1.2 V and 37 V
- Internal Thermal Overload Protection
- Internal Short Circuit Current Limiting
- Output Transistor Safe–Area Compensation
- Floating Operation for High Voltage Applications
- Standard 3–Lead Transistor Package
- Eliminates Stocking Many Fixed Voltages

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 range	T_j	0 ~ +125	℃
Storage temperature range	T_{STG}	-65 ~+125	℃

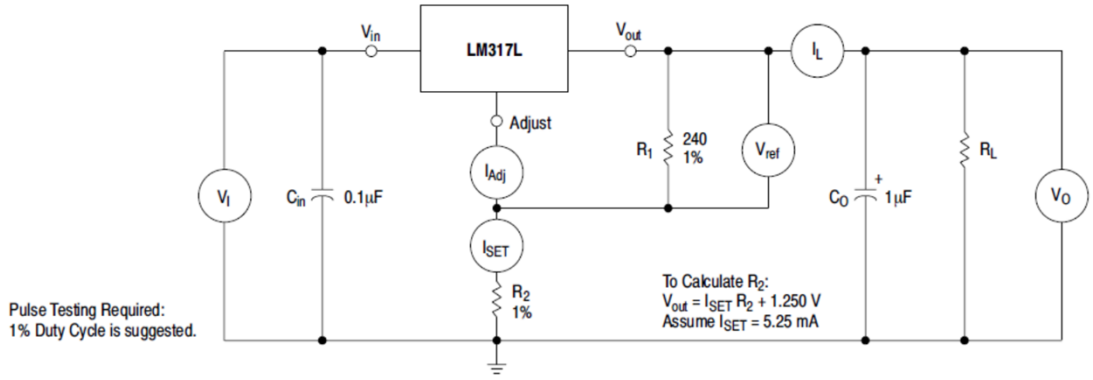
ELECTRICAL CHARACTERISTICS

(VI - VO = 5V, IO = 40mA, TJ = 0 to 125°C, unless otherwise specified)

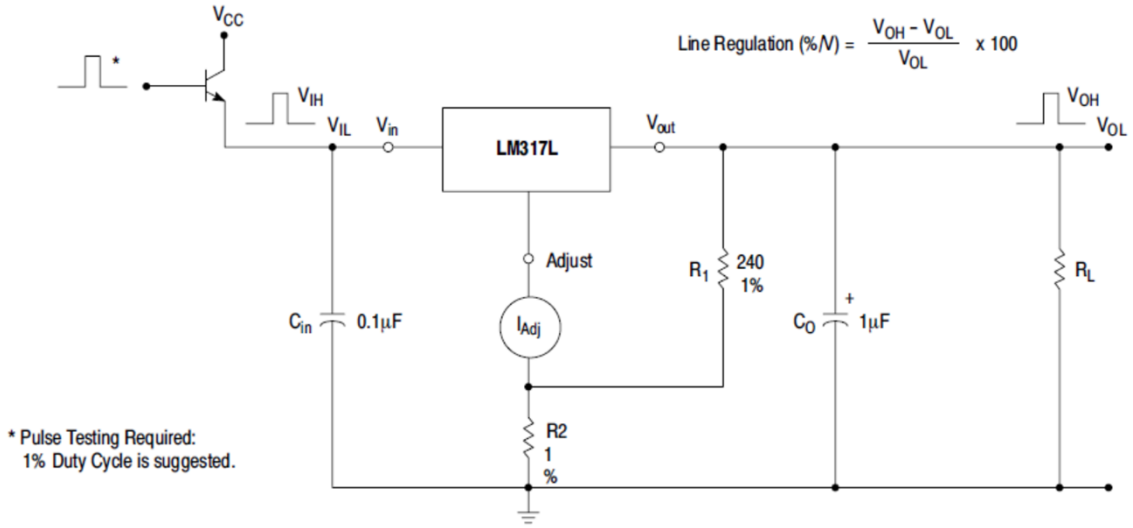
Parameter	Symbol	Test conditions			Min	Typ	Max	Unit
Reference Voltage	VREF	3.0V≤ VI-Vo ≤40V 10mA≤ Io ≤100mA, PD ≤ Pmax			1.2	1.25	1.3	V
Line Regulation	Regline	3.0V≤VI-Vo≤40V,IL≤10mA		TA=25°C		0.01	0.04	%/V
						0.02	0.07	
Load Regulation	Regload	10mA≤Io≤100mA	VO ≤ 5.0V	TA=25°C		5.0	25	mV
			VO≥ 5.0V			0.1	0.5	%/V
			VO ≤ 5.0V			20	70	mV
			VO≥ 5.0V			0.3	1.5	%/V
Adjustment Pin Current	IAdj					50	100	µA
Adjustment Pin Current Change	ΔIAdj	3.0V≤ VI-Vo ≤40V 10mA≤ Io ≤100mA, PD ≤Pmax				0.2	5.0	µA
Maximum Output Current	IO MAX	VI - VO ≤ 6.25 V, PD ≤ Pmax			100	200		mA
		VI - VO ≤ 40 V, PD ≤ Pmax		TA=25°C		20		
Minimum Load Current to Maintain Regulation	IL MIN	VI-Vo =40V				3.5	10	mA
RMS Noise, % of VO	N	TA = 25°C, 10 Hz 3 f 3 10 kHz				0.003		% V
Ripple Rejection	RR	Vo=1.2V, f=120Hz	CAdj=0mF		60	80		dB
			CAdj=10mF			80		

TEST CIRCUIT

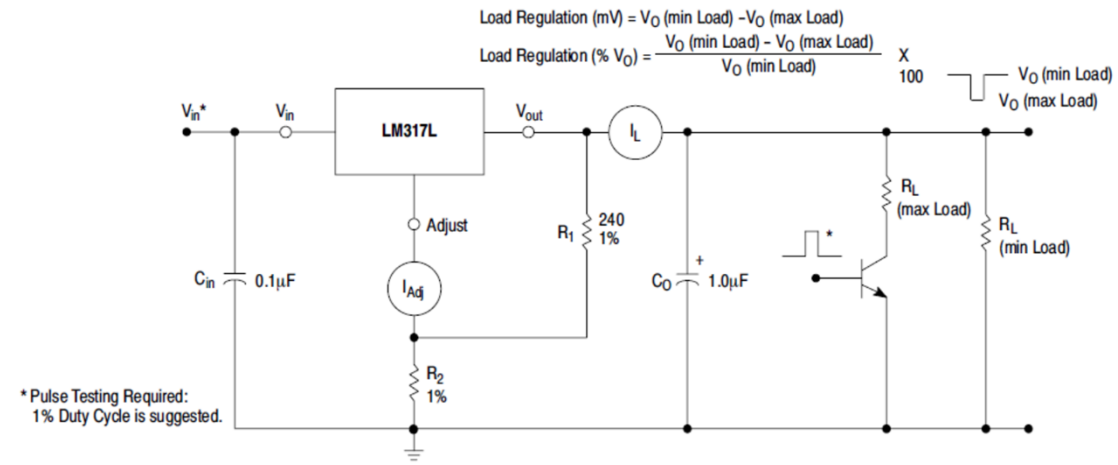
Standard Test Circuit



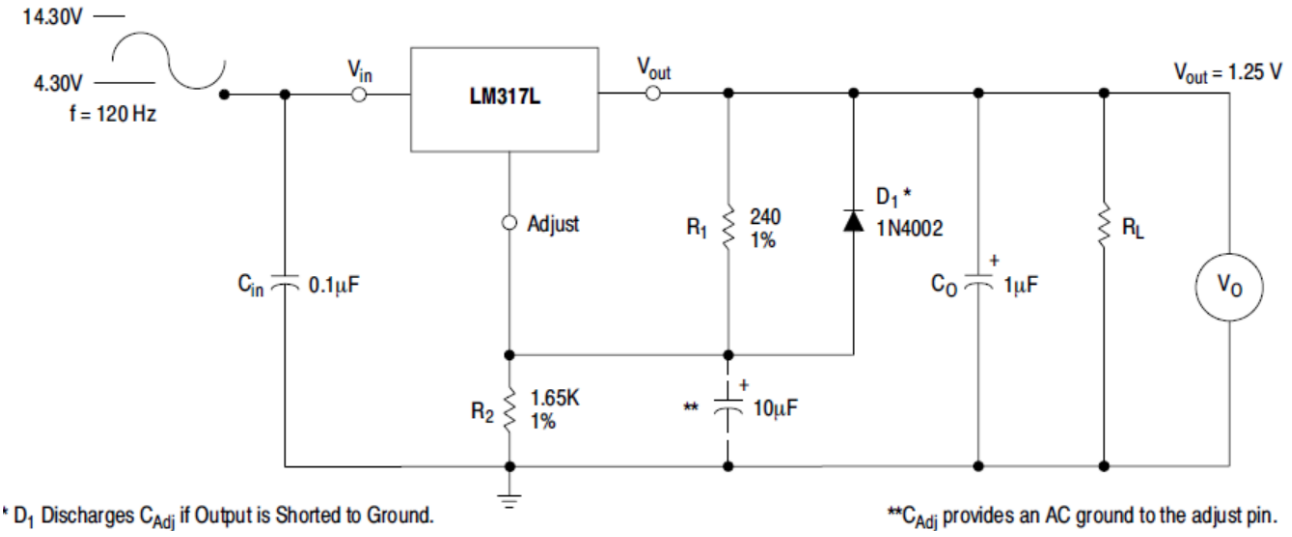
Line Regulation and _IAdj/Line Test Circuit



Load Regulation and _IAdj/Load Test Circuit



Ripple Rejection Test Circuit

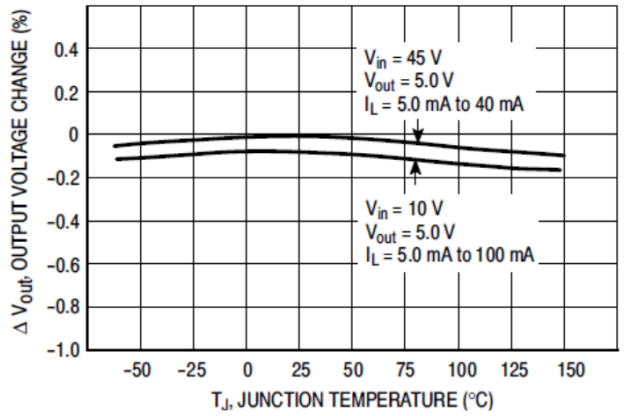


* D_1 Discharges C_{Adj} if Output is Shorted to Ground.

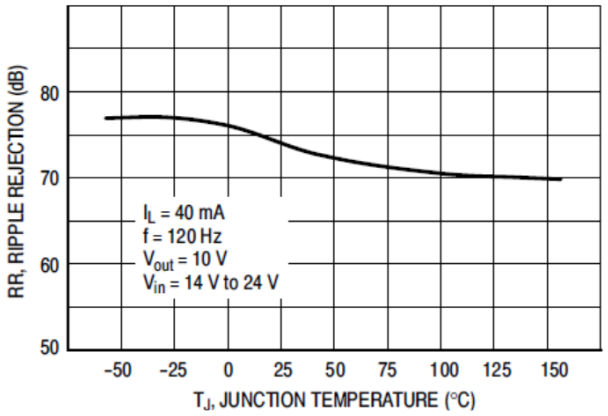
**C_{Adj} provides an AC ground to the adjust pin.

TYPICAL PERFORMANCE CHARACTERISTICS

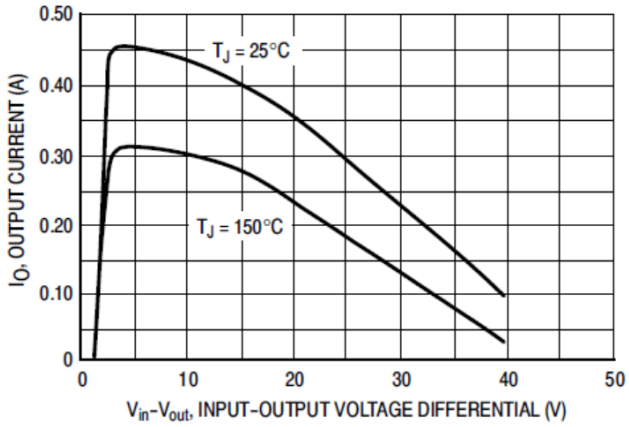
Load Regulation



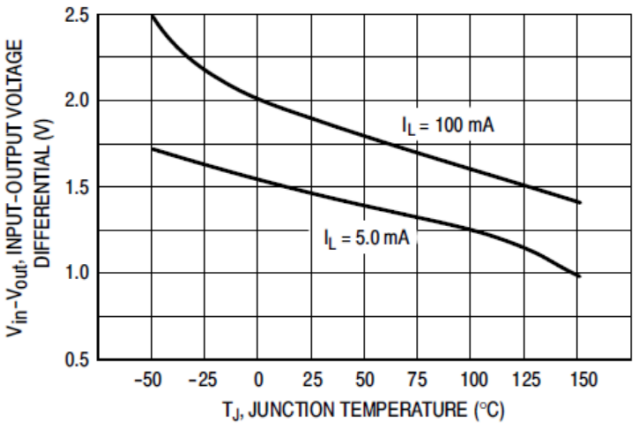
Ripple Rejection



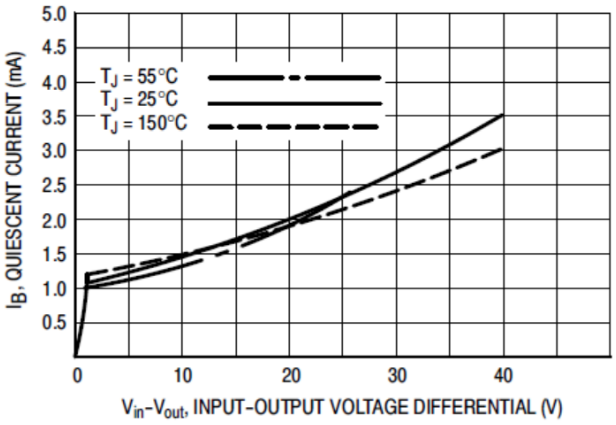
Current Limit



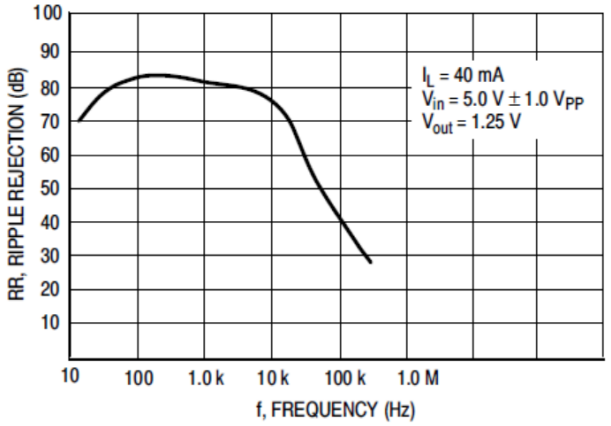
Dropout Voltage



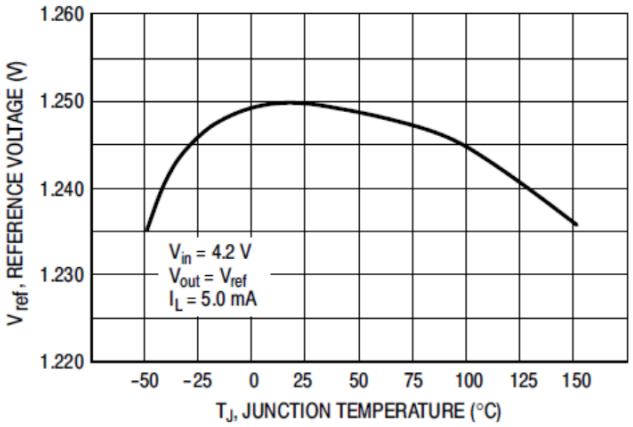
Minimum Operating Current



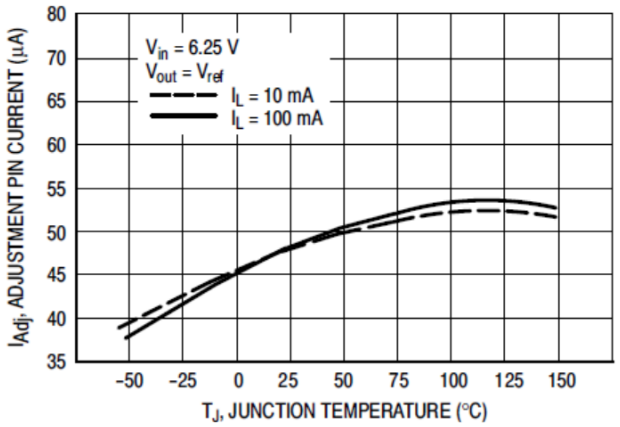
Ripple Rejection versus Frequency



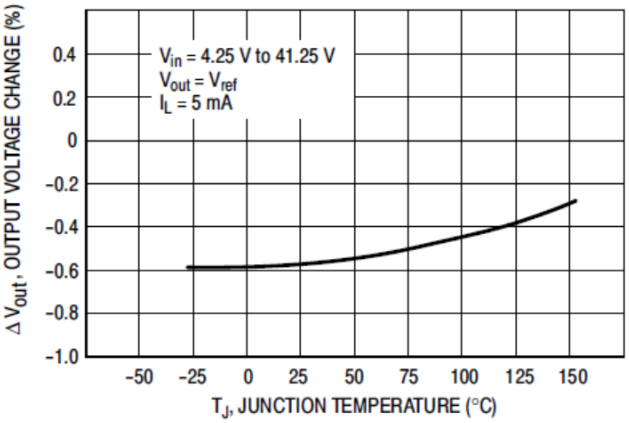
Temperature Stability



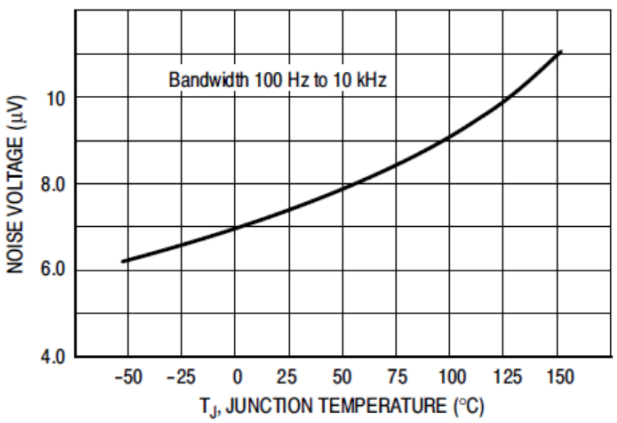
Adjustment Pin Current



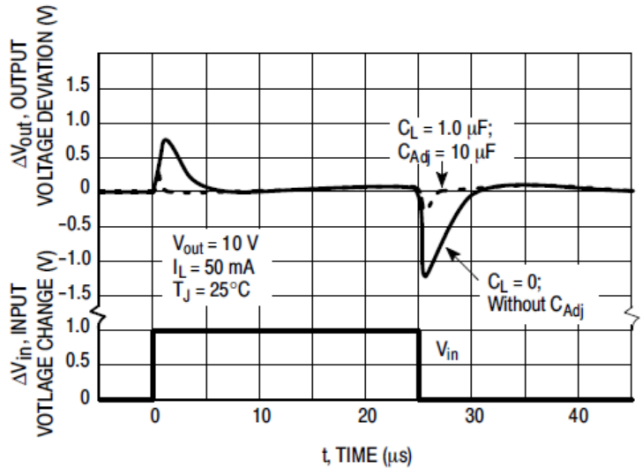
Line Regulation



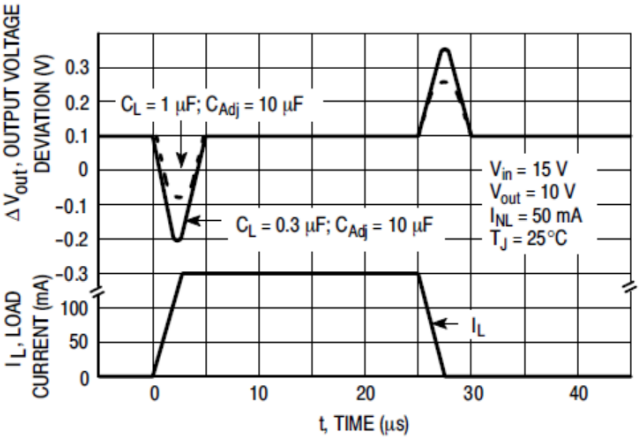
Output Noise



Line Transient Response

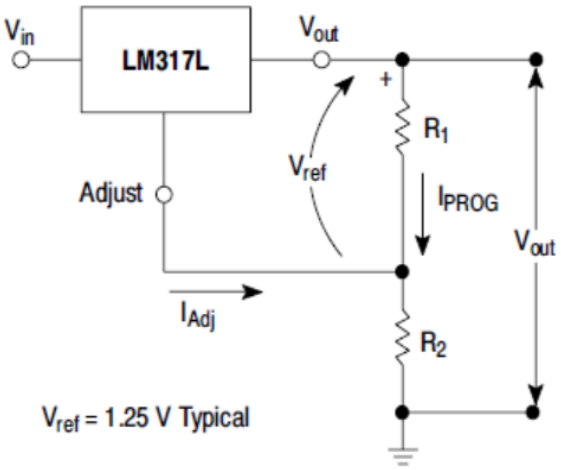


Load Transient Response

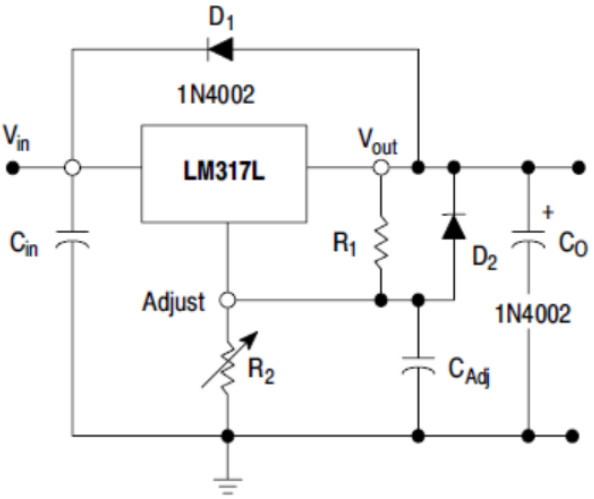


APPLICATION CIRCUIT

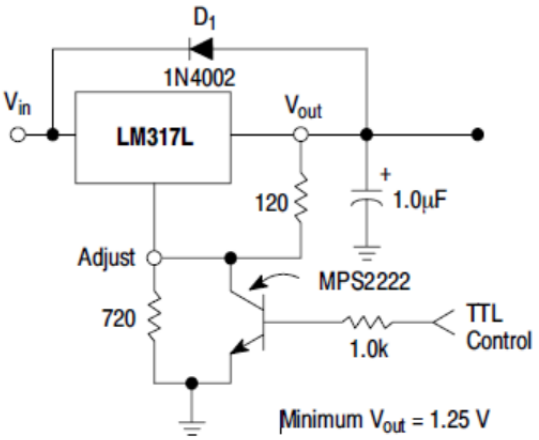
Basic Circuit Configuration



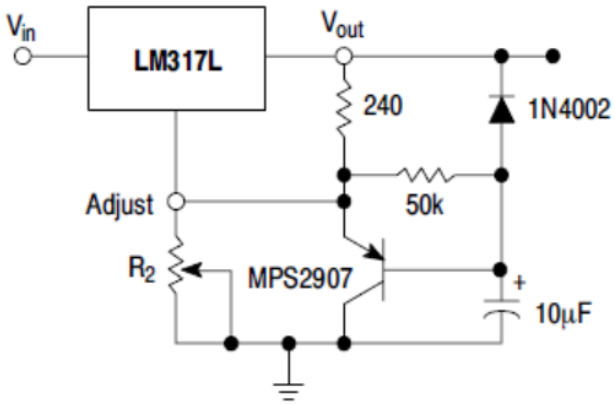
Voltage Regulator with Protection Diodes



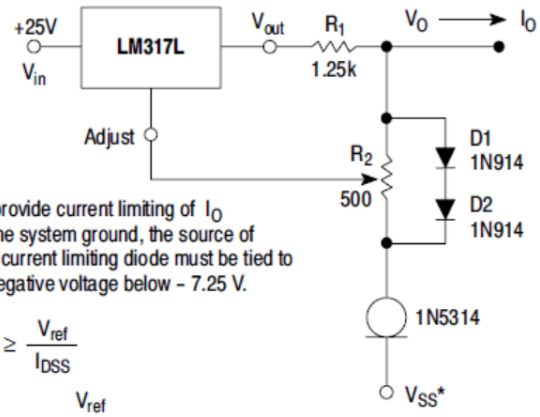
5.0 V Electronic Shutdown Regulator



Slow Turn−On Regulator



Adjustable Current Limiter



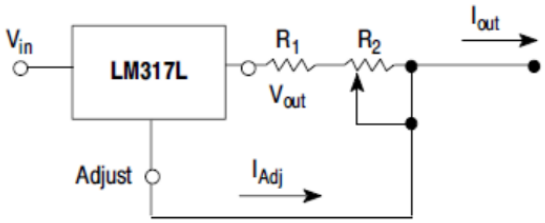
* To provide current limiting of I_O to the system ground, the source of the current limiting diode must be tied to a negative voltage below − 7.25 V.

$$R_2 \geq \frac{V_{ref}}{I_{DSS}}$$

$$R_1 = \frac{V_{ref}}{I_{Omax} + I_{DSS}}$$

$V_O < P_{OV} + 1.25\ V + V_{SS}$
$I_{Lmin} - I_P < I_O < 100\ mA - I_P$
As shown $O < I_O < 95\ mA$

Current Regulator



$$I_{outmax} = \left(\frac{V_{ref}}{R_1}\right) + I_{Adj} \cong \frac{1.25\ V}{R_1}$$

$$I_{outmax} = \left(\frac{V_{ref}}{R_1 + R_2}\right) + I_{Adj} \cong \frac{1.25\ V}{R_1 + R_2}$$

$5.0\ mA < I_{out} < 100\ mA$