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LM317L

3-Terminal 0.1A Positive Adjustable 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

Description

The LM317L is a 3-terminal, adjustable, 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 requires only two external resistors to set the output voltage.

TO-92



1. Adj 2. Output 3. Input

8-SOIC



1. Input 2.3.6.7. Output
4. Adj 5.8. NC

Ordering Information

Part Number	Operating Temperature Range	Top Mark	Package	Packing Method
LM317LM	0°C to +125°C	LM317LM	8-SOIC	Rail
LM317LMX	0°C to +125°C	LM317LM	8-SOIC	Tape and Reel
LM317LZ	0°C to +125°C	LM317LZ	TO-92	Bulk
LM317LZX	0°C to +125°C	LM317LZ	TO-92	Tape and Reel

Block Diagram

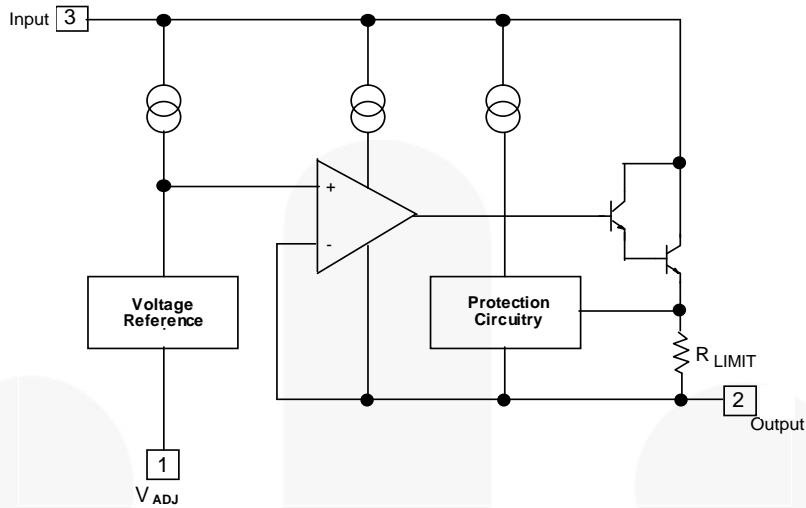


Figure 1. Block Diagram

Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only. Values are at $T_A = 25^\circ\text{C}$ unless otherwise noted.

Symbol	Parameter	Value	Unit
$V_I - V_O$	Input-Output Voltage Differential	40	V
P_D	Power Dissipation	Internally limited	W
T_J	Operating Junction Temperature Range	0 ~ +125	$^\circ\text{C}$
T_{STG}	Storage Temperature Range	-65 ~ +125	$^\circ\text{C}$

Electrical Characteristics

$V_I - V_O = 5\text{ V}$, $I_O = 40\text{ mA}$, $0^\circ\text{C} \leq T_J \leq +125^\circ\text{C}$, $P_{D\text{MAX}} = 625\text{ mW}$, unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
R_{LINE}	Line Regulation ⁽¹⁾	$T_A = +25^\circ\text{C}$, $3\text{ V} \leq V_I - V_O \leq 40\text{ V}$		0.01	0.04	% / V
		$3\text{ V} \leq V_I - V_O \leq 40\text{ V}$		0.02	0.07	% / V
R_{LOAD}	Load Regulation ⁽¹⁾	$T_A = +25^\circ\text{C}$, $10\text{ mA} \leq I_O \leq 100\text{ mA}$, $V_O \leq 5\text{ V}$		5	25	mV
		$T_A = +25^\circ\text{C}$, $10\text{ mA} \leq I_O \leq 100\text{ mA}$, $V_O \geq 5\text{ V}$		0.1	0.5	% / V_O
		$10\text{ mA} \leq I_O \leq 100\text{ mA}$, $V_O \leq 5\text{ V}$		20	70	mV
		$10\text{ mA} \leq I_O \leq 100\text{ mA}$, $V_O \geq 5\text{ V}$		0.3	1.5	% / V_O
I_{ADJ}	Adjustment Pin Current			50	100	μA
ΔI_{ADJ}	Adjustment Pin Current Change	$3\text{ V} \leq V_I - V_O \leq 40\text{ V}$, $10\text{ mA} \leq I_O \leq 100\text{ mA}$, $P_D < P_{D\text{MAX}}$		0.2	5	μA
V_{REF}	Reference Voltage	$3\text{ V} < V_I - V_O < 40\text{ V}$, $10\text{ mA} \leq I_O \leq 100\text{ mA}$, $P_D \leq P_{D\text{MAX}}$	1.20	1.25	1.30	V
ST_T	Temperature Stability			0.7		%
$I_{\text{L(MIN)}}$	Minimum Load Current to Maintain Regulation	$V_I - V_O = 40\text{ V}$		3.5	10	mA
$I_{\text{O(MAX)}}$	Maximum Output Current	$V_I - V_O \leq 15\text{ V}$, $P_D < P_{D\text{MAX}}$	100	200		mA
		$T_A = +25^\circ\text{C}$, $V_I - V_O \leq 40\text{ V}$, $P_D < P_{D\text{MAX}}$	25	50		mA
e_N	RMS Noise, % of V_{OUT}	$T_A = +25^\circ\text{C}$, $10\text{ Hz} < f < 10\text{ kHz}$		0.003		% / V_O
RR	Ripple Rejection	$V_O = 10\text{ V}$, $f = 120\text{ Hz}$, without C_{ADJ}		65		dB
		$V_O = 10\text{ V}$, $f = 120\text{ Hz}$, $C_{\text{ADJ}} = 10\text{ }\mu\text{F}$	66	80		dB
ST	Long-Term Stability	$T_J = +125^\circ\text{C}$, 1000 Hours		0.3		%

Notes:

1. 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 cycle is used.

Typical Application

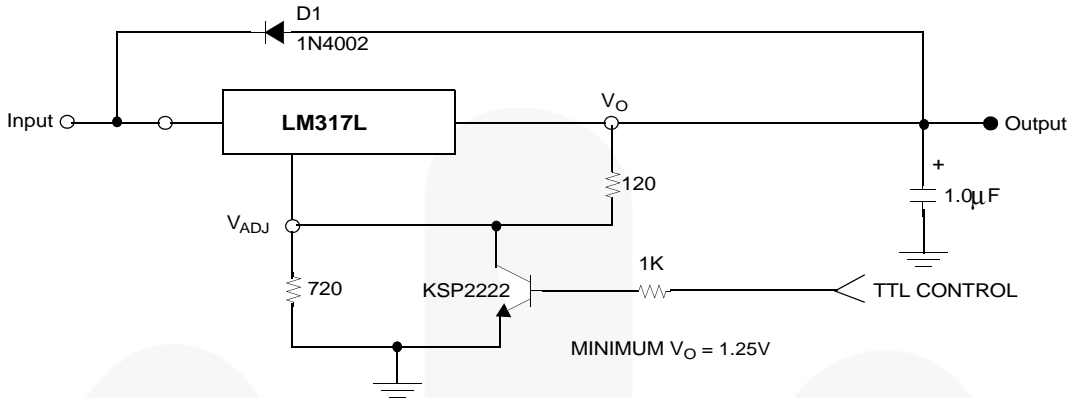


Figure 2. 5V Electronic Shutdown Regulator

D1 protects the device during an input short circuit.

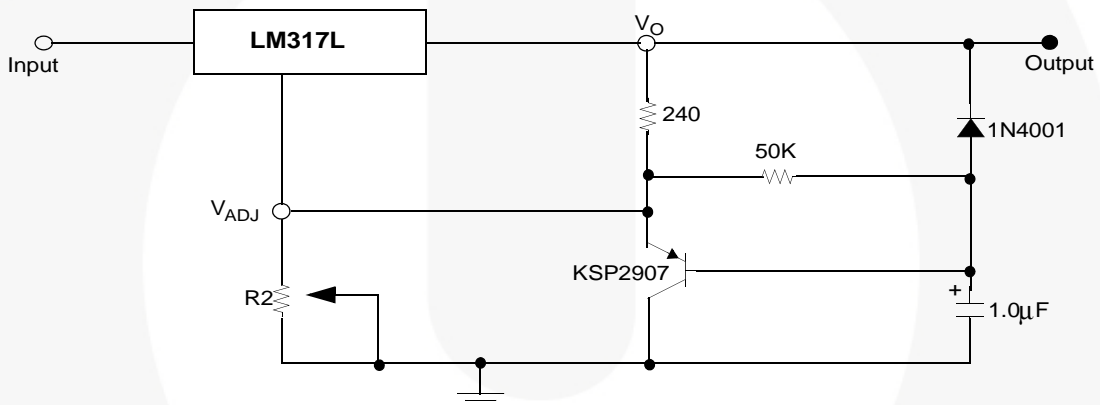


Figure 3. Slow Turn-On Regulator

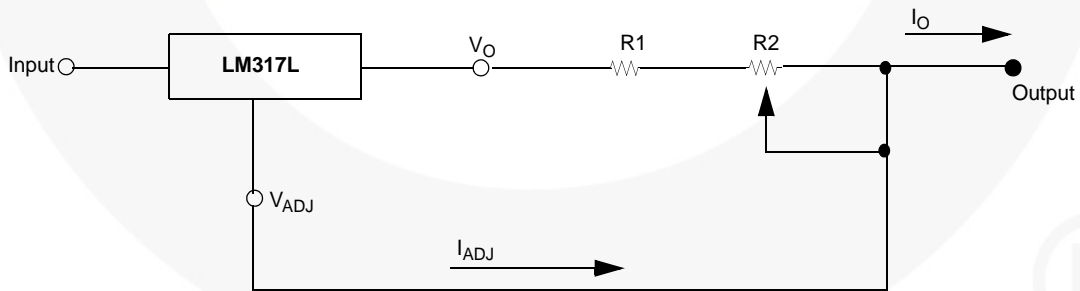


Figure 4. Current Regulator

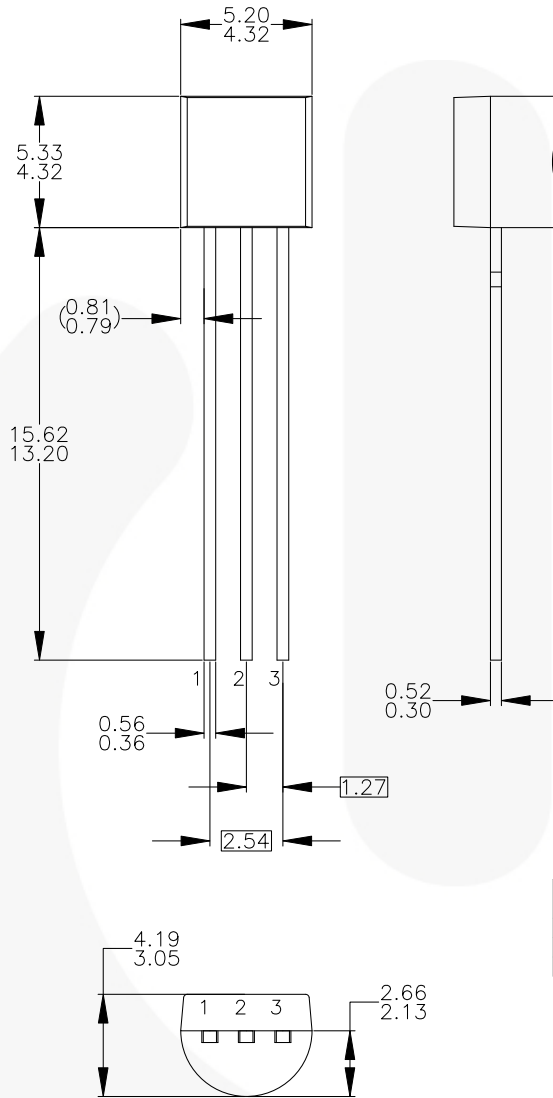
$$I_{O\text{MAX}} = \left(\frac{V_{\text{REF}}}{R1} \right) + I_{\text{ADJ}} @ \frac{1.25\text{V}}{R1}$$

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

$$5\text{mA} < I_O < 500\text{mA}$$

Physical Dimensions

TO-92 Bulk Type



NOTES: UNLESS OTHERWISE SPECIFIED

- A) DRAWING WITH REFERENCE TO JEDEC TO-92 RECOMMENDATIONS.
- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DRAWING CONFORMS TO ASME Y14.5M-1994.
- D) TO-92 (92,94,96,97,98) PIN CONFIGURATION:

PIN	92			94			96			97			98		
	P	F	M	P	F	M	B	F	M	P	F	M	P	F	M
1	E	S	S	E	S	S	B	D	G	C	G	D	C	G	D
2	B	D	G	C	G	D	E	S	S	B	D	G	E	S	S
3	C	G	D	B	D	G	C	G	D	E	S	S	B	D	G

LEGEND:

- P - BIPOLAR
- F - JFET
- M - DMOS
- E - EMITTER
- B - BASE
- C - COLLECTOR
- D - DRAIN
- S - SOURCE

- E) FOR PACKAGE 92, 94, 96, 97 AND 98: PIN CONFIGURATION DRAIN "D" AND SOURCE "S" ARE INTERCHANGEABLE AT JFET "F" OPTION.
- F) DRAWING FILENAME: MKT-ZA03DREV3.

Figure 5. 3-Lead, TO-92, Molded, Standard Straight Lead

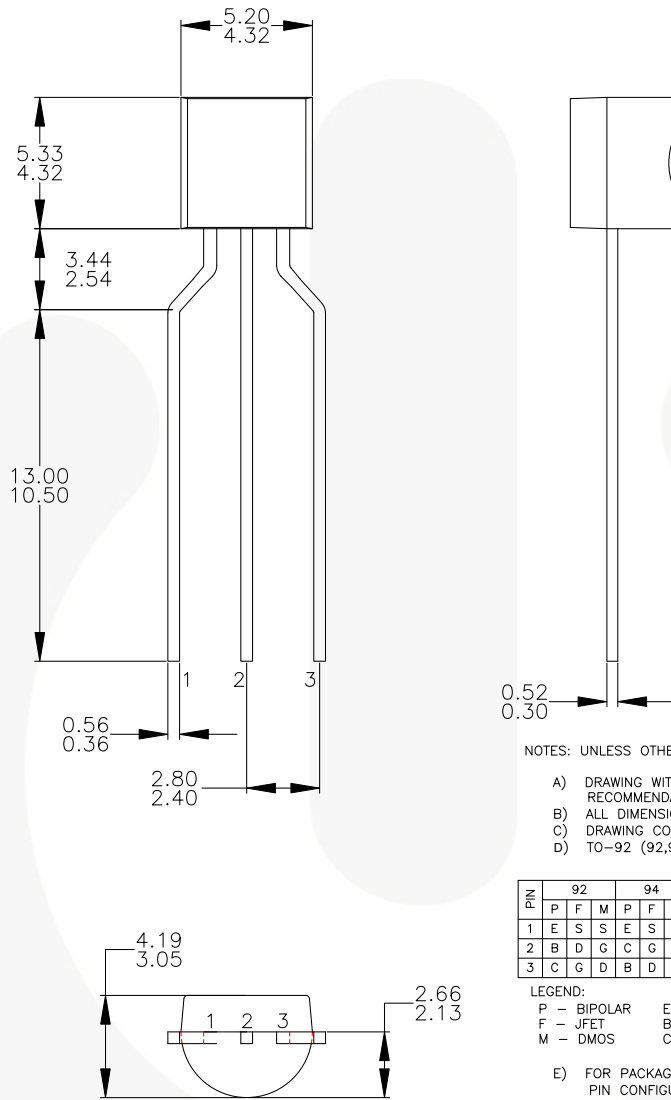
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Physical Dimensions

TO-92 Tape and Reel Type



NOTES: UNLESS OTHERWISE SPECIFIED

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- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DRAWING CONFORMS TO ASME Y14.5M-1994.
- D) TO-92 (92,94,96,97,98) PIN CONFIGURATION:

PIN	92			94			96			97			98		
	P	F	M	P	F	M	B	F	M	P	F	M	P	F	M
1	E	S	S	E	S	S	B	D	G	C	G	D	C	G	D
2	B	D	G	C	G	D	E	S	S	B	D	G	E	S	S
3	C	G	D	B	D	G	C	G	D	E	S	S	B	D	G

LEGEND:
 P - BIPOLAR E - EMITTER D - DRAIN
 F - JFET B - BASE S - SOURCE
 M - DMOS C - COLLECTOR G - GATE

- E) FOR PACKAGE 92, 94, 96, 97 AND 98: PIN CONFIGURATION DRAIN "D" AND SOURCE "S" ARE INTERCHANGEABLE AT JFET "F" OPTION.
- F) DRAWING FILENAME: MKT-ZA03FREV2.

Figure 6. 3-Lead, TO-92, Molded, 0.200 in Line Spacing Lead Form

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Physical Dimensions (Continued)

8-SOIC

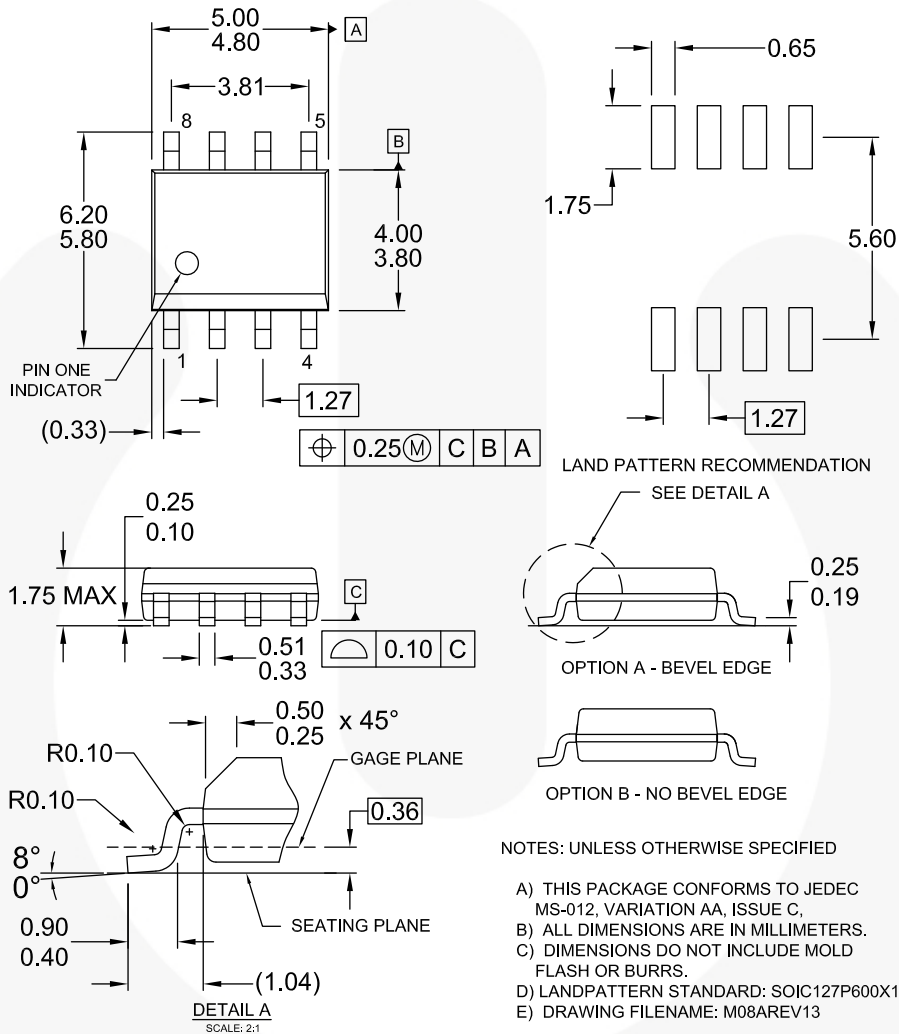


Figure 7. 8-Lead, SOIC, JEDEC MS 0-12, 0.150 inch Narrow Body

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