

TO-220-3L Plastic-Encapsulate Voltage Regulators

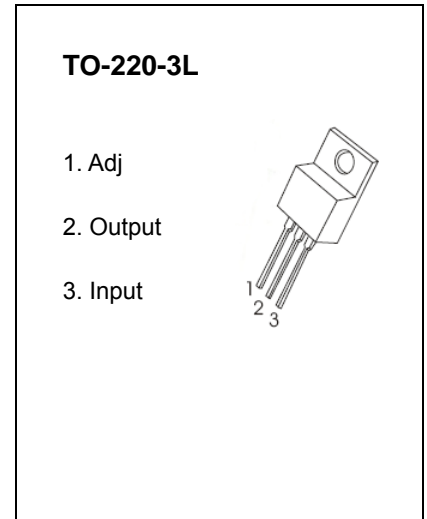
LM317 Three-terminal positive voltage regulator

DESCRIPTION

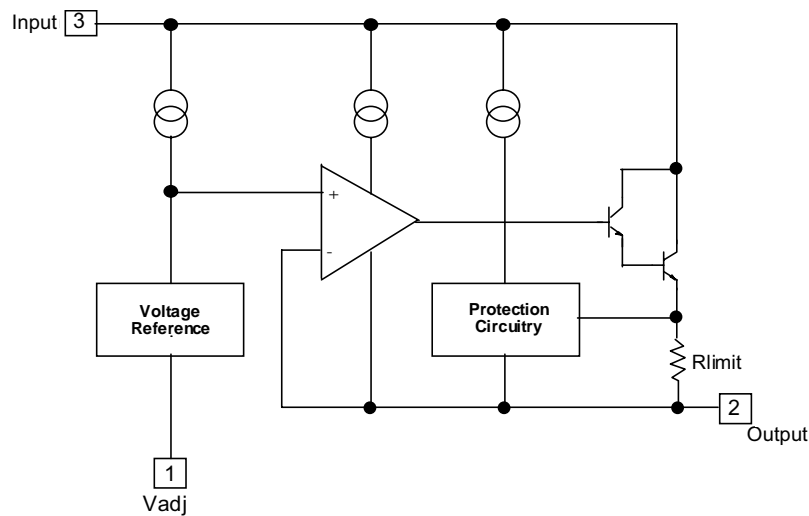
This monolithic integrated circuit is an adjustable 3-terminal positive voltage regulator designed to supply more than 1.5A of load current with an output voltage adjustable over a 1.2 to 37V. It employs internal current limiting, thermal shut-down and safe area compensation.

FEATURE

- Internal thermal overload protection
- Internal short circuit current limiting
- Output transistor safe operating area compensation



Internal Block Diagram



Absolute Maximum Ratings

| Symbol | Parameter | Value | Unit |
|-------------------------|---|--------------------|------|
| V_I-V_O | Input-Output Voltage Differential | 40 | V |
| T_{LEAD} | Lead Temperature | 230 | °C |
| P_D | Power Dissipation | Internally limited | W |
| T_J | Operating Junction Temperature Range | 0~125 | °C |
| T_{stg} | Storage Temperature Range | -55~125 | |
| $\Delta V_O / \Delta T$ | Temperature Coefficient of Output Voltage | ±0.02 | %/°C |

ELECTRICAL CHARACTERISTICS

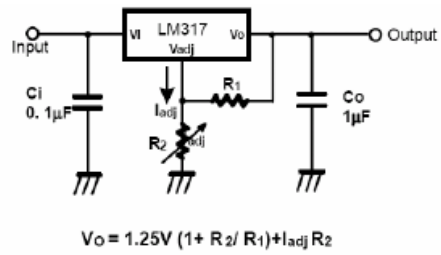
($V_O-V_I=5V, I_O=0.5A, 0^\circ C \leq T_J \leq +125^\circ C, I_{MAX}=1.5A, P_{DMAX}=20W$, unless otherwise specified)

| Parameter | Symbol | Test conditions | MIN | TYP | MAX | UNIT |
|---|------------------|--|------|------------|-----------|----------|
| Line Regulation(note1) | R_{line} | $T_A=25^\circ C$ $3V \leq V_I-V_O \leq 40V$ | | 0.01 | 0.04 | %V |
| | | $3V \leq V_I-V_O \leq 40V$ | | 0.02 | 0.07 | |
| Load Regulation(note1) | R_{load} | $T_A=25^\circ C, 10mA \leq I_O \leq I_{MAX}$ $V_O < 5V$ $V_O \geq 5V$ | | 18 0.4 | 25 0.5 | mV |
| | | $10mA \leq I_O \leq I_{MAX}$ $V_O < 5V$ $V_O \geq 5V$ | | 40 0.8 | 70 1.5 | % V_O |
| Adjustable Pin Current | I_{ADJ} | - | | 46 | 100 | μA |
| Adjustable Pin Current Change | ΔI_{ADJ} | $3V \leq V_I-V_O \leq 40V$ $10mA \leq I_O \leq I_{MAX}, P_D \leq P_{MAX}$ | | 2.0 | 5 | |
| Reference Voltage | V_{REF} | $3V \leq V_{IN}-V_O \leq 40V$ $10mA \leq I_O \leq I_{MAX}, P_D \leq P_{MAX}$ | 1.20 | 1.25 | 1.30 | V |
| Temperature Stability | ST_T | - | | 0.7 | | %/ V_O |
| Minimum Load Current to Maintain Regulation | $I_{L(MIN)}$ | $V_I-V_O=40V$ | | 3.5 | 12 | mA |
| Maximum Output Current | $I_{O(MAX)}$ | $V_I-V_O \leq 15V, P_D \leq P_{MAX}$ $V_I-V_O \leq 40V, P_D \leq P_{MAX}$ $T_A=25^\circ C$ | 1.0 | 2.2 0.3 | | A |
| RMS Noise,% of V_{OUT} | e_N | $T_A=25^\circ C, 10Hz \leq f \leq 10KHz$ | | 0.003 | 0.01 | %/ V_O |
| Ripple Rejection | RR | $V_O=10V, f=120Hz$ without C_{ADJ} $C_{ADJ}=10\mu F$ (note2) | 66 | 60 75 | | dB |
| Long-Term Stability, $T_J=T_{HIGH}$ | ST | $T_A=25^\circ C$ for end point measurements,1000HR | | 0.3 | 1 | % |
| Thermal Resistance Junction to case | $R_{\theta JC}$ | - | | 5 | | °C/W |

Notes:

1. Load and line regulation are specified at constant junction temperature. Change in V_D due to heating effects must be taken into account separately. Pulse testing with low duty is used.($P_{MAX}=20W$)
2. C_{ADJ} . when used, is connected between the adjustment pin and ground.

Typical Application

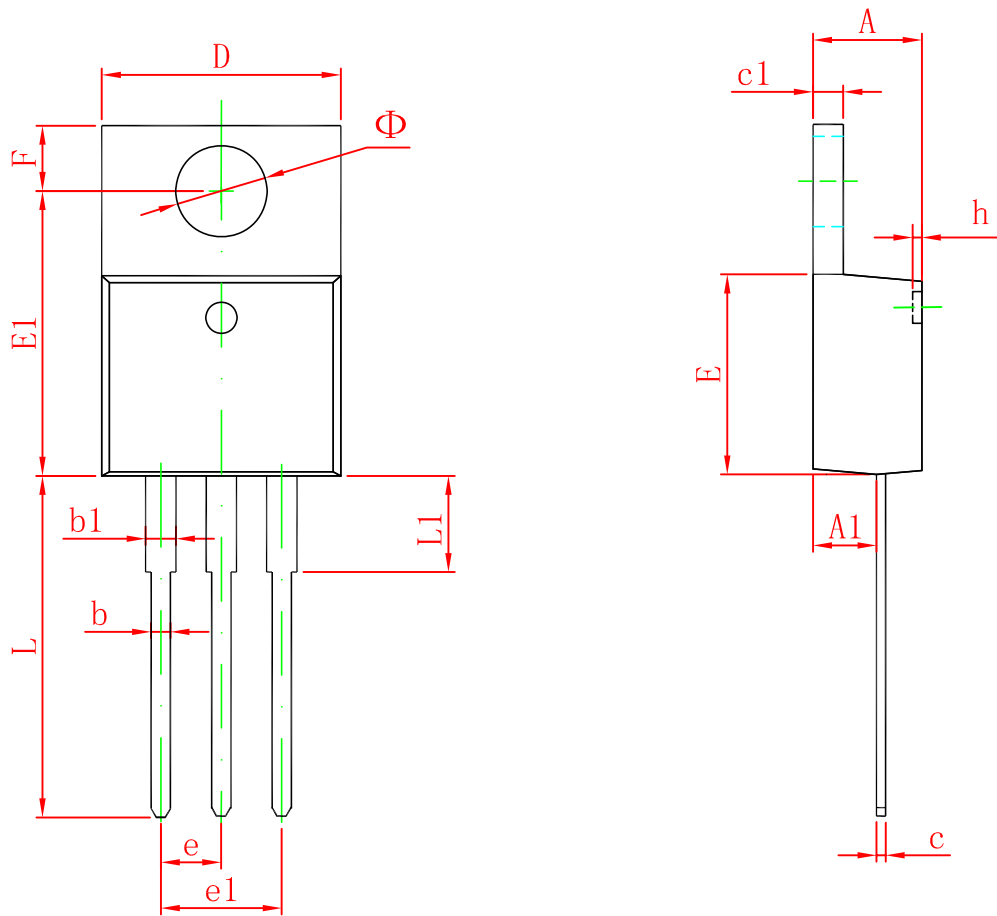


C_i is required when regulator is located an appreciable distance from power supply filter.

C_o is not needed for stability , however, it does improve transient response.

Since I_{ADJ} is controlled to less than $100\mu A$, the error associated with this term is negligible in most applications.

TO-220-3L Package Outline Dimensions



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|--------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 4.470 | 4.670 | 0.176 | 0.184 |
| A1 | 2.520 | 2.820 | 0.099 | 0.111 |
| b | 0.710 | 0.910 | 0.028 | 0.036 |
| b1 | 1.170 | 1.370 | 0.046 | 0.054 |
| c | 0.310 | 0.530 | 0.012 | 0.021 |
| c1 | 1.170 | 1.370 | 0.046 | 0.054 |
| D | 10.010 | 10.310 | 0.394 | 0.406 |
| E | 8.500 | 8.900 | 0.335 | 0.350 |
| E1 | 12.060 | 12.460 | 0.475 | 0.491 |
| e | 2.540 TYP | | 0.100 TYP | |
| e1 | 4.980 | 5.180 | 0.196 | 0.204 |
| F | 2.590 | 2.890 | 0.102 | 0.114 |
| h | 0.000 | 0.300 | 0.000 | 0.012 |
| L | 13.400 | 13.800 | 0.528 | 0.543 |
| L1 | 3.560 | 3.960 | 0.140 | 0.156 |
| Φ | 3.735 | 3.935 | 0.147 | 0.155 |

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