

# TO-252-2L Plastic-Encapsulate Voltage Regulators

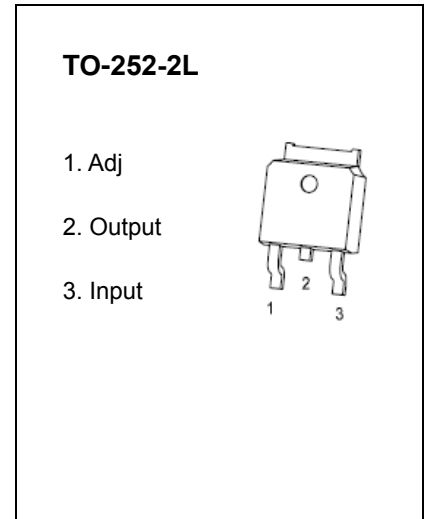
## LM317 Three-terminal positive voltage regulator

### DESCRIPTION

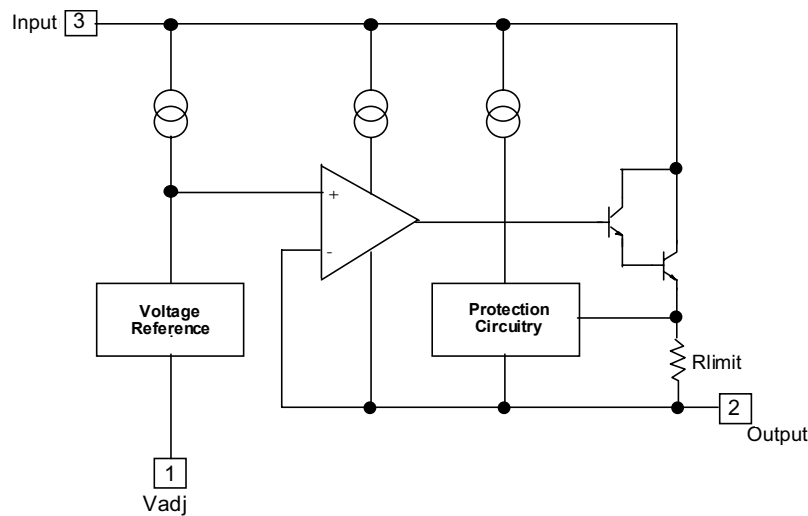
This monolithic integrated circuit is an adjustable 3-terminal positive voltage regulator designed to supply more than 1.5A of load current with an output voltage adjustable over a 1.2 to 37V. It employs internal current limiting, thermal shut-down and safe area compensation.

### FEATURE

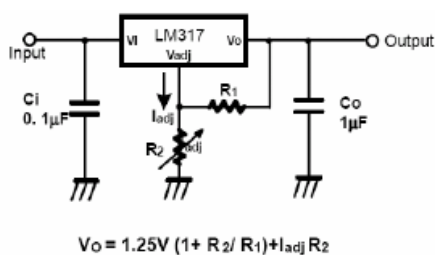
- Internal thermal overload protection
- Internal short circuit current limiting
- Output transistor safe operating area compensation



### Internal Block Diagram



### 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 100µA, the error associated with this term is negligible in most applications.

## Absolute Maximum Ratings

| Symbol                  | Parameter                                 | Value              | Units |
|-------------------------|---|--------------------|-------|
| $V_I-V_O$               | 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

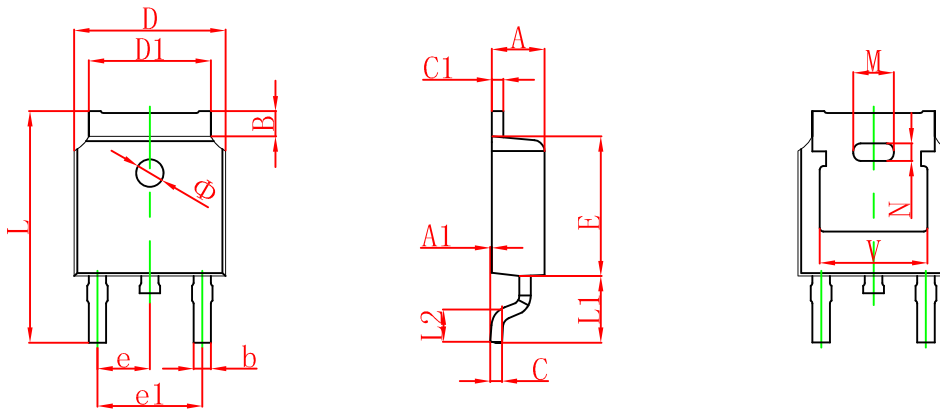
( $V_O-V_I=5V, I_O=0.5A, 0^\circ C \leq T_J \leq +125^\circ C, I_{MAX}=1.5A, P_{DMAX}=20W$ , unless otherwise specified)

| Parameter                                   | Symbol           | Test conditions  | MIN  | TYP        | MAX       | UNIT     |
|---|------------------|--|------|------------|-----------|----------|
| Line Regulation(note1)                      | $R_{line}$       | $T_A=25^\circ C$<br>$3V \leq V_I-V_O \leq 40V$   |      | 0.01       | 0.04      | %V       |
|   |                  | $3V \leq V_I-V_O \leq 40V$   |      | 0.02       | 0.07      |          |
| Load Regulation(note1)                      | $R_{load}$       | $T_A=25^\circ C, 10mA \leq I_O \leq I_{MAX}$<br>$V_O < 5V$<br>$V_O \geq 5V$                      |      | 18<br>0.4  | 25<br>0.5 | mV       |
|   |                  | $10mA \leq I_O \leq I_{MAX}$<br>$V_O < 5V$<br>$V_O \geq 5V$                                      |      | 40<br>0.8  | 70<br>1.5 | % $V_O$  |
| Adjustable Pin Current                      | $I_{ADJ}$        | -  |      | 46         | 100       | $\mu A$  |
| Adjustable Pin Current Change               | $\Delta I_{ADJ}$ | $3V \leq V_I-V_O \leq 40V$<br>$10mA \leq I_O \leq I_{MAX}, P_D \leq P_{MAX}$                     |      | 2.0        | 5         |          |
| Reference Voltage                           | $V_{REF}$        | $3V \leq V_{IN}-V_O \leq 40V$<br>$10mA \leq I_O \leq I_{MAX}, P_D \leq P_{MAX}$                  | 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                      | $I_{O(MAX)}$     | $V_I-V_O \leq 15V, P_D \leq P_{MAX}$<br>$V_I-V_O \leq 40V, P_D \leq P_{MAX}$<br>$T_A=25^\circ C$ | 1.0  | 2.2<br>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               | $V_O=10V, f=120Hz$<br>without $C_{ADJ}$<br>$C_{ADJ}=10\mu F$ (note2)                             | 66   | 60<br>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:

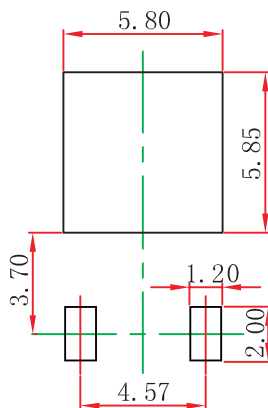
1. Load and line regulation are specified at constant junction temperature. Change in  $V_D$  due to heating effects must be taken into account separately. Pulse testing with low duty is used. ( $P_{MAX}=20W$ )
2.  $C_{ADJ}$ . when used, is connected between the adjustment pin and ground.

## TO-252(4R)-2L Package Outline Dimensions



| Symbol | Dimensions In Millimeters |        | Dimensions In Inches |       |
|--------|---------------------------|--------|----------------------|-------|
|        | Min.                      | Max.   | Min.                 | Max.  |
| A      | 2.200                     | 2.380  | 0.087                | 0.094 |
| A1     | 0.000                     | 0.100  | 0.000                | 0.004 |
| B      | 0.800                     | 1.400  | 0.031                | 0.055 |
| b      | 0.710                     | 0.810  | 0.028                | 0.032 |
| c      | 0.460                     | 0.560  | 0.018                | 0.022 |
| c1     | 0.460                     | 0.560  | 0.018                | 0.022 |
| D      | 6.500                     | 6.700  | 0.256                | 0.264 |
| D1     | 5.130                     | 5.460  | 0.202                | 0.215 |
| E      | 6.000                     | 6.200  | 0.236                | 0.244 |
| e      | 2.286 TYP.                |        | 0.090 TYP.           |       |
| e1     | 4.327                     | 4.727  | 0.170                | 0.186 |
| M      | 1.778REF.                 |        | 0.070REF.            |       |
| N      | 0.762REF.                 |        | 0.018REF.            |       |
| L      | 9.800                     | 10.400 | 0.386                | 0.409 |
| L1     | 2.9REF.                   |        | 0.114REF.            |       |
| L2     | 1.400                     | 1.700  | 0.055                | 0.067 |
| V      | 4.830 REF.                |        | 0.190 REF.           |       |
| Φ      | 1.100                     | 1.300  | 0.043                | 0.051 |

## TO-252(4R)-2L Suggested Pad Layout



### Note:

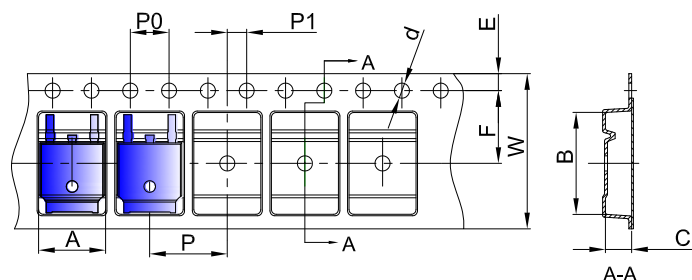
1. Controlling dimension: in millimeters.
2. General tolerance:  $\pm 0.05\text{mm}$ .
3. The pad layout is for reference purposes only.

### NOTICE

JCET reserve the right to make modifications, enhancements, improvements, corrections or other changes without further notice to any product herein. JCET does not assume any liability arising out of the application or use of any product described herein.

# To-252(4R)-2L Tape and Reel

## TO-252 Embossed Carrier Tape

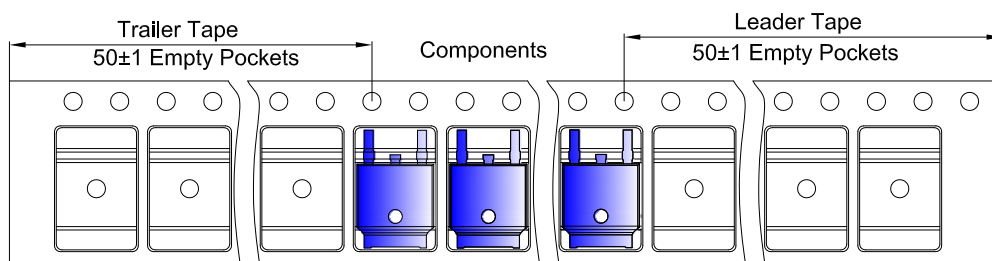


### Packaging Description:

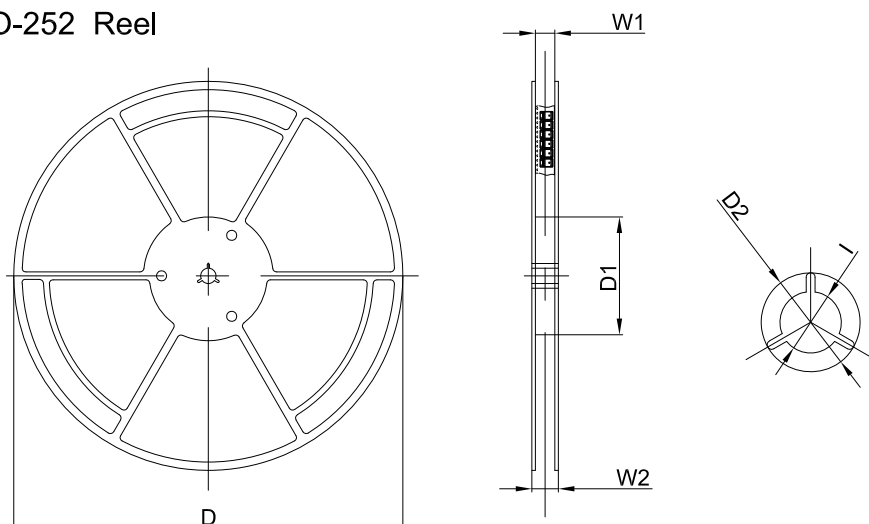
TO-252 parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 25,00 units per 13" or 33.0 cm diameter reel. The reels are clear in color and is made of polystyrene plastic (anti-static coated).

| Dimensions are in millimeter |      |       |      |       |      |      |      |      |      |       |
|------------------------------|------|-------|------|-------|------|------|------|------|------|-------|
| Pkg type                     | A    | B     | C    | d     | E    | F    | P0   | P    | P1   | W     |
| TO-252                       | 6.90 | 10.50 | 2.70 | Ø1.55 | 1.75 | 7.50 | 4.00 | 8.00 | 2.00 | 16.00 |

## TO-252 Tape Leader and Trailer



## TO-252 Reel



| Dimensions are in millimeter |        |        |        |       |       |        |
|------------------------------|--------|--------|--------|-------|-------|--------|
| Reel Option                  | D      | D1     | D2     | W1    | W2    | I      |
| 13" Dia                      | 330.00 | 100.00 | Ø21.00 | 16.40 | 21.00 | Ø13.00 |

| REEL      | Reel Size | Box       | Box Size(mm) | Carton     | Carton Size(mm) | G.W.(kg) |
|-----------|-----------|-----------|--------------|------------|-----------------|----------|
| 2,500 pcs | 13inch    | 2,500 pcs | 340×336×29   | 25,000 pcs | 353×346×365     |          |