# KA317M

## 3-Terminal 0.5A Positive Adjustable Regulator

### Features

- Output Current in Excess of 0.5A
- Output Adjustable Between 1.2V and 37V
- Internal Thermal Overload Protection
- Internal Short Circuit Current Limiting
- Output Transistor Safe Area Compensation
- Floating Operation for High Voltage Applications



### Description

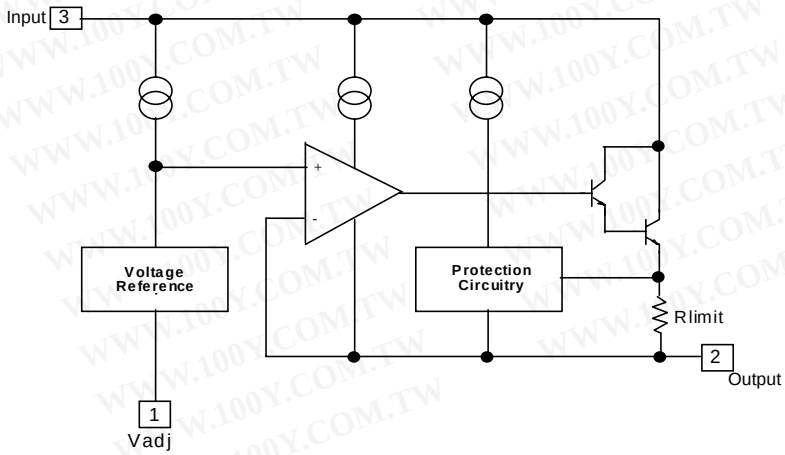
The KA317M is a 3-Terminal adjustable positive voltage regulator capable of supplying in excess of 500mA over an output voltage range of 1.2V to 37V. This voltage regulator is exceptionally easy to use and requires only two external resistors to set the output voltage.

**D-PAK**


1. Adj 2. Output 3. Input

**TO-220**


### Internal Block Diagram



## Absolute Maximum Ratings

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Input Output Voltage Differential | $V_I$ - $V_O$ | 40 | V |
| Power Dissipation | $P_D$ | Internally limited | W |
| Thermal Resistance Junction-Air D-PAK (Note1,2) | $R_{\theta JA}$ | 100 | °C/W |
| Operating Junction Temperature Range | $T_j$ | 0 ~ +125 | °C |
| Storage Temperature Range | $T_{STG}$ | -65 ~+125 | °C |

## Electrical Characteristics

($V_I$-$V_O$=5V, $I_O$= 0.1A, 0°C ≤ $T_J$ ≤ + 125°C, $P_{DMAX}$ = 7.5W, unless otherwise specified)

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Line Regulation (Note3) | Rline | $T_A$ = +25°C, 3V ≤ $V_I$ –$V_O$ ≤ 40V | - | 0.01 | 0.04 | %/ V |
| | | 3V ≤ $V_I$ –$V_O$ ≤ 40V | - | 0.02 | 0.07 | |
| Load Regulation (Note3) | Rload | $T_A$ =+ 25°C, 10mA ≤ $I_O$ ≤ 0.5A<br>$V_O$ ≤ 5V<br>$V_O$ ≥ 5V | - | 5<br>0.1 | 25<br>0.5 | mV<br>%/ $V_O$ |
| | | 10mA ≤ $I_O$ ≤ 0.5A<br>$V_O$ ≤ 5V<br>$V_O$ ≥ 5V | - | 20<br>0.3 | 70<br>1.5 | mV<br>%/ $V_O$ |
| Adjustment Pin Current | $I_{ADJ}$ | - | - | 50 | 100 | uA |
| Adjustment Pin Current Change | $\Delta I_{ADJ}$ | 3V ≤ $V_I$ - $V_O$ ≤ 40V<br>10mA ≤ $I_O$ ≤ 0.5A, $P_D$ < $P_{DMAX}$ | - | 0.2 | 5 | uA |
| Reference Voltage | $V_{REF}$ | 3V < $V_I$ - $V_O$ < 40V<br>10mA ≤ $I_O$ ≤ 0.5A, $P_D$ < $P_{DMAX}$ | 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 | 10 | mA |
| Maximum Output Current | $I_{O(MAX)}$ | $V_I$ - $V_O$ ≤15V, $P_D$ < $P_{DMAX}$ | 0.5 | 0.9 | - | A |
| | | $V_I$ - $V_O$ = 40V<br>$P_D$ < $P_{DMAX}$, $T_A$ =+ 25°C | 0.15 | 0.25 | - | |
| RMS Noise, % of $V_{OUT}$ | $e_N$ | $T_A$ = +25°C, 10Hz < f < 10KHz | - | 0.003 | - | %/ $V_O$ |
| Ripple Rejection | RR | $V_O$ = 10V, f = 120Hz<br>without $C_{ADJ}$<br>$C_{ADJ}$ = 10uF (Note4) | <br><br>66 | 65<br>80 | - | dB |
| Long-Term Stability | ST | $T_J$ =+ 125°C, 1000Hours | - | 0.3 | 1 | %/1000Hrs |

**Note :**

1. Thermal resistance test board
   Size: 76.2mm * 114.3mm * 1.6mm(1S0P)
   JEDEC standard: JESD51-3, JESD51-7
2. Assume no ambient airflow.
3. 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.
4. $C_{ADJ}$, when used, is connected between the adjustment pin and ground.

## Typical Performance Characteristics

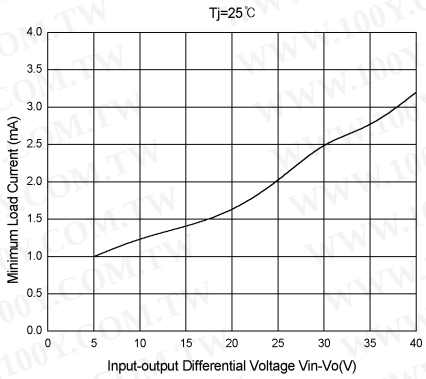



**Figure 1. Minimum Load Current**

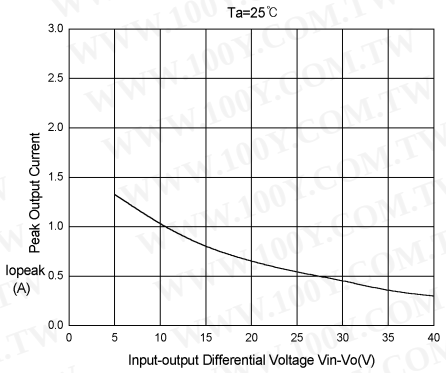



**Figure 2. Peak Output Current vs. Input-Output Differential Voltage**

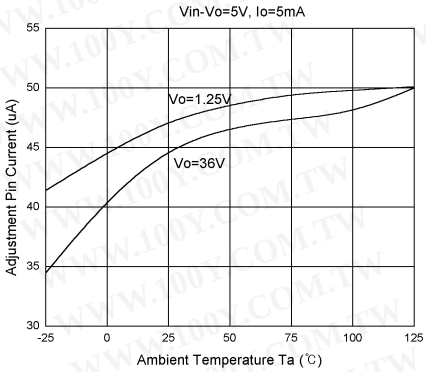



**Figure 3. Adjustment Pin Current vs. Temperature**

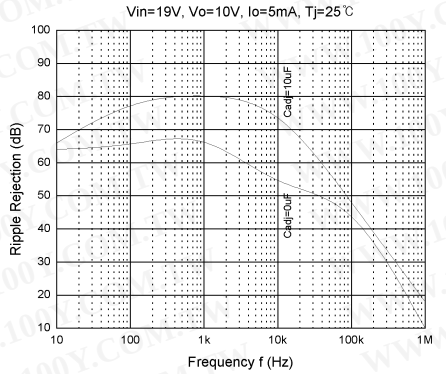



**Figure 4. Ripple Rejection vs. Frequency**

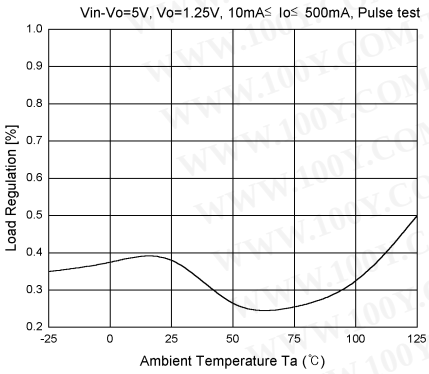



**Figure 5. Load Regulation vs. Temperature**

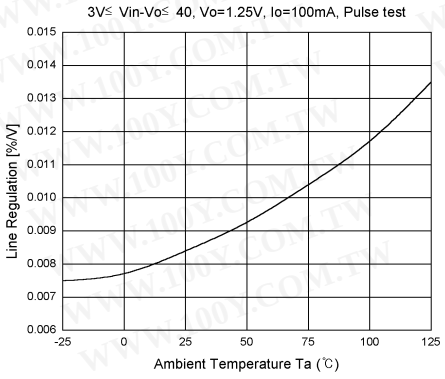



**Figure 6. Line Regulation vs. Temperature**

## Typical Performance Characteristics (Continued)

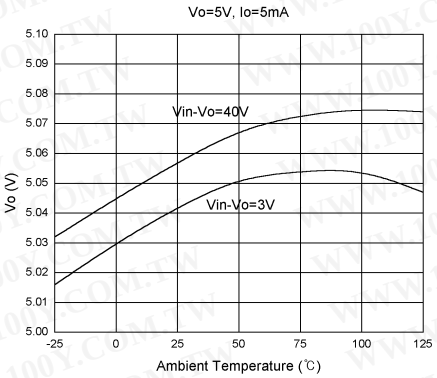



**Figure 7. Outputvoltage vs. Temperature**

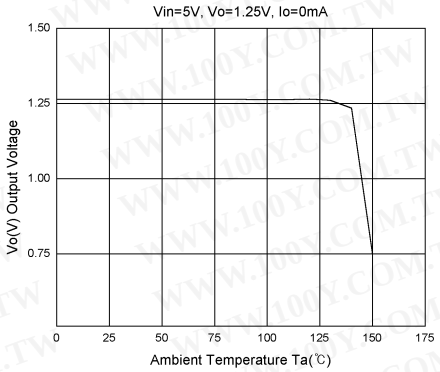



**Figure 8. Thermal Shutdown**

## Typical Application

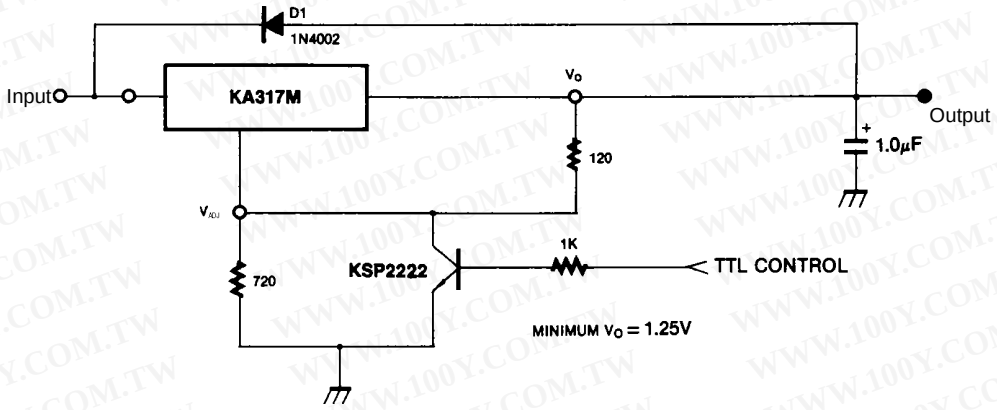



**Figure 1. 15V Electronic Shutdown Regulator**

D1 protects the device during an input short circuit.

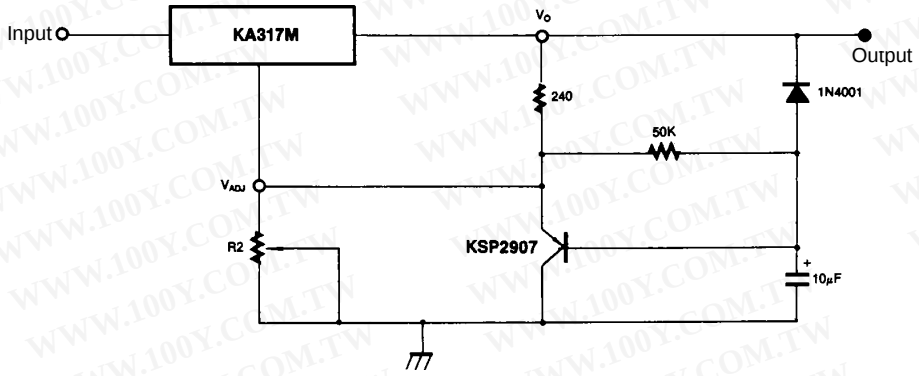
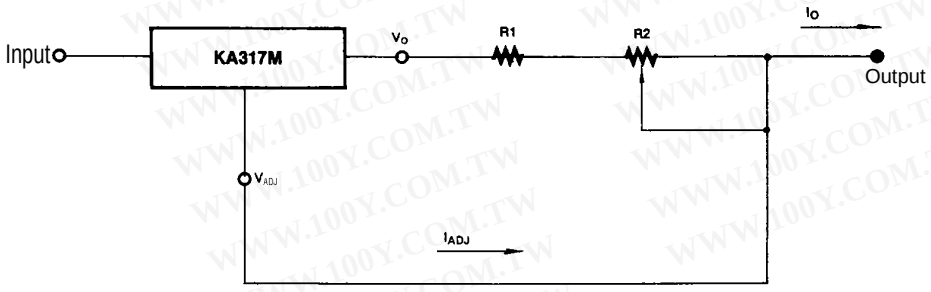



**Figure 2. Slow Turn-On Regulator**




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

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

$5mA < I_O < 500mA$

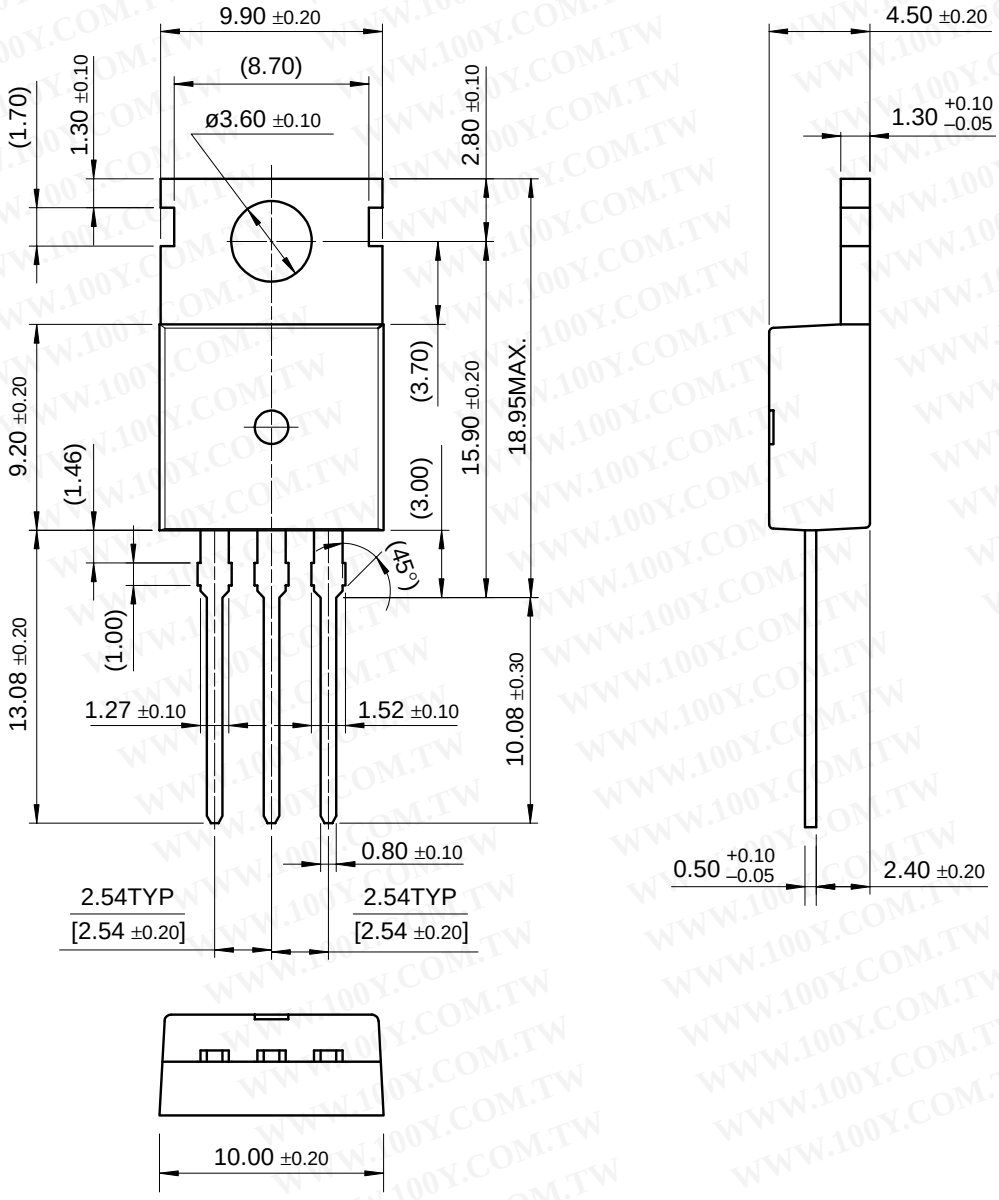
**Figure 3. Current Regulator**

## Mechanical Dimensions

### Package

Dimensions in millimeters

# TO-220

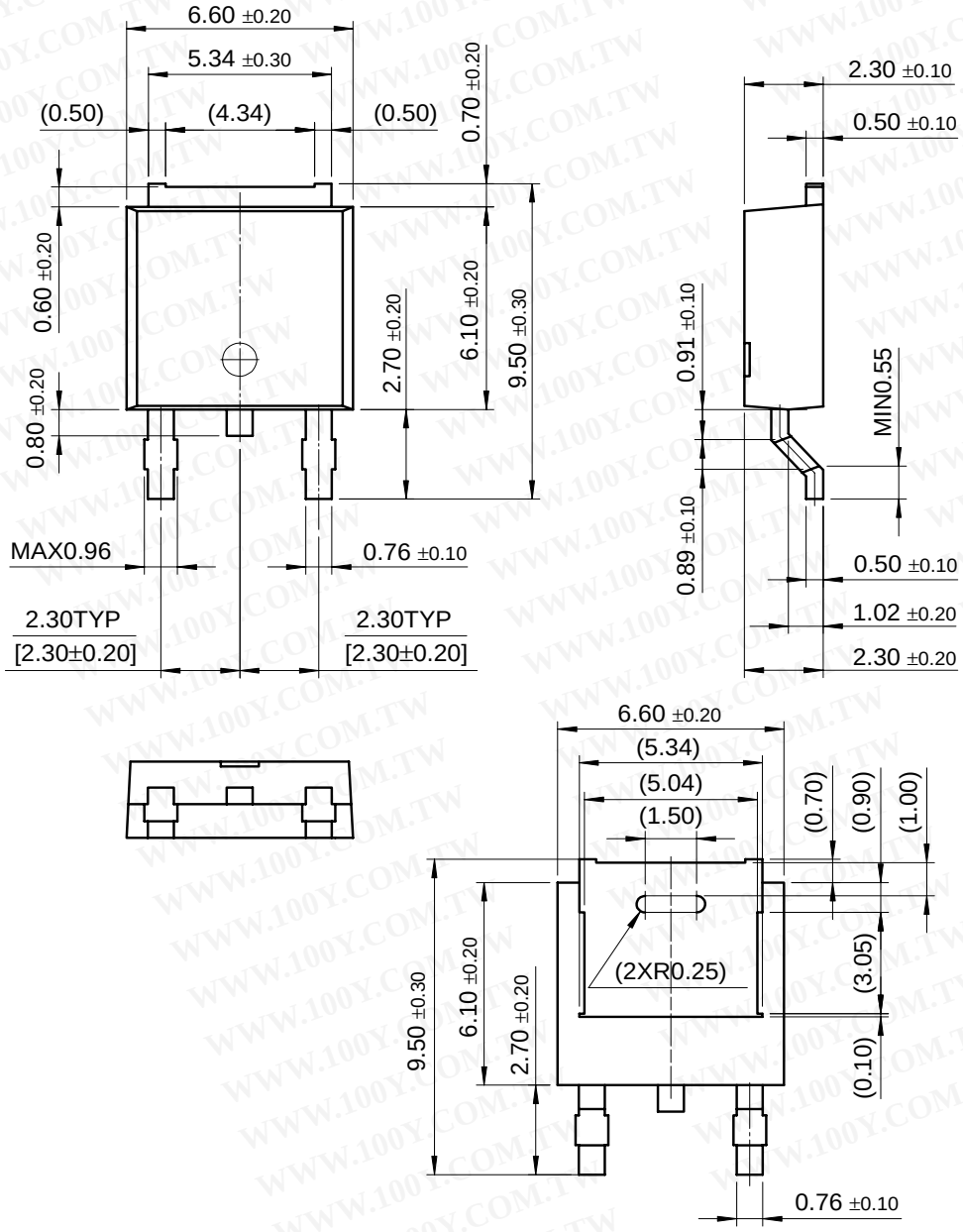


## Mechanical Dimensions (Continued)

### Package

**Dimensions in millimeters**

# D-PAK



## Ordering Information

| Product Number | Package | Operating Temperature |
|---|---|---|
| KA317M | TO-220 | 0 ~ 125 °C |
| KA317MR | D-PAK | |



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