

# KA317

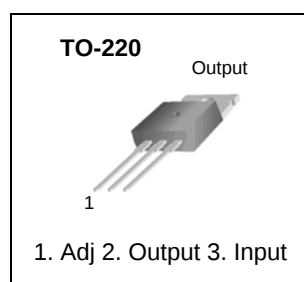
## 3-Terminal Positive Adjustable Regulator

### Features

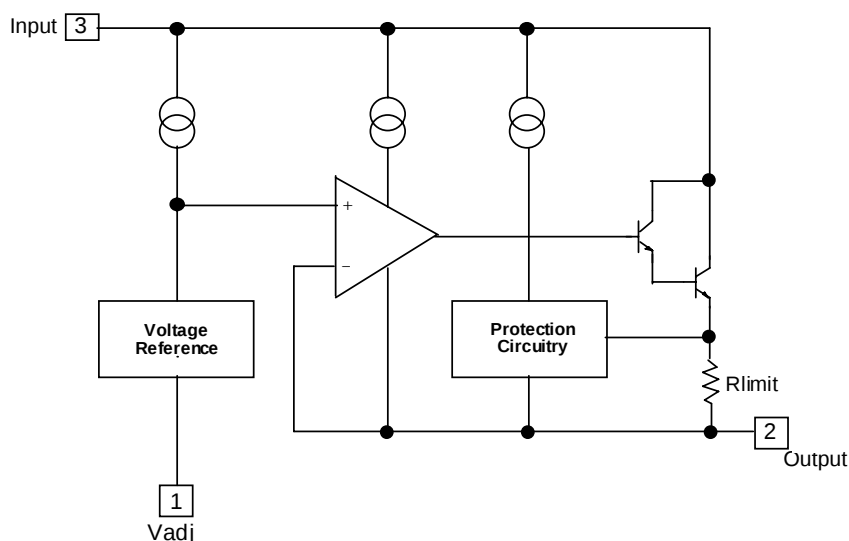
- Output Current in Excess of 1.5A
- Output Adjustable Between 1.2V and 37V
- Internal Thermal Overload Protection
- Internal Short Circuit Current Limiting
- Output Transistor Safe Area Compensation
- TO-220 Package

### 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 1.2V to 37V. It employs internal current limiting, thermal shut down and safe area compensation.



### Internal Block Diagram



## Absolute Maximum Ratings

| Parameter                                 | Symbol                  | Value              | Unit |
|-------------------------------------------|-------------------------|--------------------|------|
| Input-Output Voltage Differential         | $V_I - V_O$             | 40                 | V    |
| Lead Temperature                          | $T_{LEAD}$              | 230                | °C   |
| Power Dissipation                         | $P_D$                   | Internally limited | W    |
| Operating Junction Temperature Range      | $T_J$                   | 0 ~ +125           | °C   |
| Storage Temperature Range                 | $T_{STG}$               | -65 ~ +125         | °C   |
| Temperature Coefficient of Output Voltage | $\Delta V_O / \Delta T$ | ±0.02              | %/°C |

## Electrical Characteristics

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

| Parameter                                   | Symbol              | Conditions                                                                               | Min  | Typ.      | Max.      | Unit                   |
|---------------------------------------------|---------------------|------------------------------------------------------------------------------------------|------|-----------|-----------|------------------------|
| Line Regulation (Note1)                     | Rline               | $T_A = +25^\circ C$<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      | %/V                    |
| Load Regulation (Note1)                     | Rload               | $T_A = +25^\circ C$ , $10mA \leq I_O \leq I_{MAX}$<br>$V_O < 5V$<br>$V_O \geq 5V$        | -    | 18<br>0.4 | 25<br>0.5 | mV<br>%/V <sub>O</sub> |
|                                             |                     | $10mA \leq I_O \leq I_{MAX}$<br>$V_O < 5V$<br>$V_O \geq 5V$                              | -    | 40<br>0.8 | 70<br>1.5 | mV<br>%/V <sub>O</sub> |
| Adjustable Pin Current                      | I <sub>ADJ</sub>    | -                                                                                        | -    | 46        | 100       | μA                     |
| Adjustable Pin Current Change               | ΔI <sub>ADJ</sub>   | $3V \leq V_I - V_O \leq 40V$<br>$10mA \leq I_O \leq I_{MAX}$<br>$P_D \leq P_{MAX}$       | -    | 2.0       | 5         | μA                     |
| Reference Voltage                           | V <sub>REF</sub>    | $3V \leq V_{IN} - V_O \leq 40V$<br>$10mA \leq I_O \leq I_{MAX}$<br>$P_D \leq P_{MAX}$    | 1.20 | 1.25      | 1.30      | V                      |
| Temperature Stability (Note3)               | ST <sub>T</sub>     | -                                                                                        | -    | 0.7       | -         | %/V <sub>O</sub>       |
| Minimum Load Current to Maintain Regulation | I <sub>L(MIN)</sub> | $V_I - V_O = 40V$                                                                        | -    | 3.5       | 12        | mA                     |
| Maximum Output Current                      | I <sub>O(MAX)</sub> | $V_I - V_O \leq 15V$ , $P_D \leq P_{MAX}$                                                | 1.5  | 2.2       | -         | A                      |
|                                             |                     | $V_I - V_O \leq 40V$ , $P_D \leq P_{MAX}$<br>$T_A = 25^\circ C$                          | -    | 0.3       | -         |                        |
| RMS Noise, % of V <sub>OUT</sub> (Note3)    | e <sub>N</sub>      | $T_A = +25^\circ C$ , $10Hz \leq f \leq 10kHz$                                           | -    | 0.003     | 0.01      | %/V <sub>O</sub>       |
| Ripple Rejection (Note3)                    | RR                  | $V_O = 10V$ , $f = 120Hz$<br>without C <sub>ADJ</sub><br>C <sub>ADJ</sub> = 10μF (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 <sub>θJC</sub>    | -                                                                                        | -    | 5         | -         | °C/W                   |

### Note :

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<sub>ADJ</sub>, when used, is connected between the adjustment pin and ground.
3. These parameters, although guaranteed, are not 100% tested in production.

## Typical Performance Characteristics

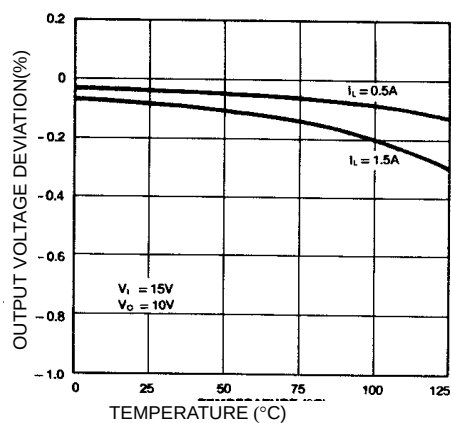


Figure 1. Load Regulation

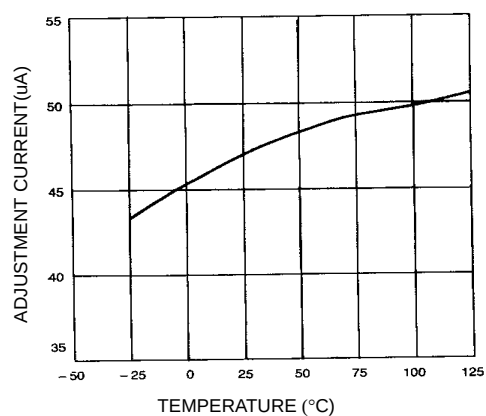


Figure 2. Adjustment Current

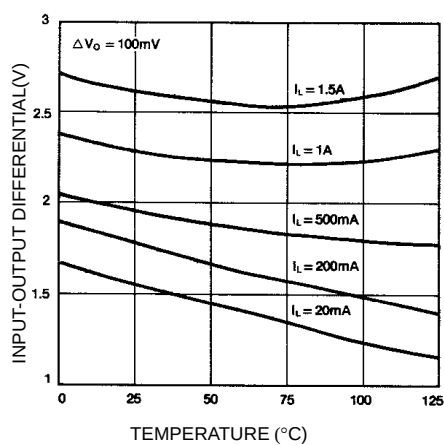


Figure 3. Dropout Voltage

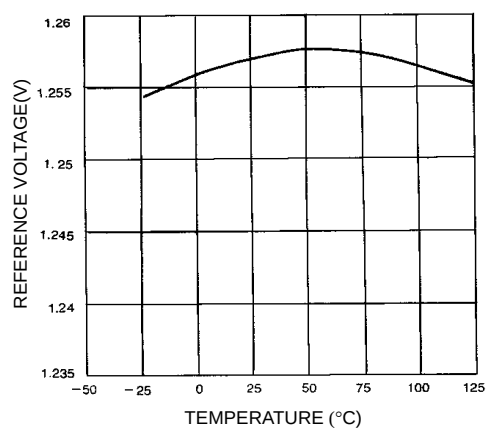
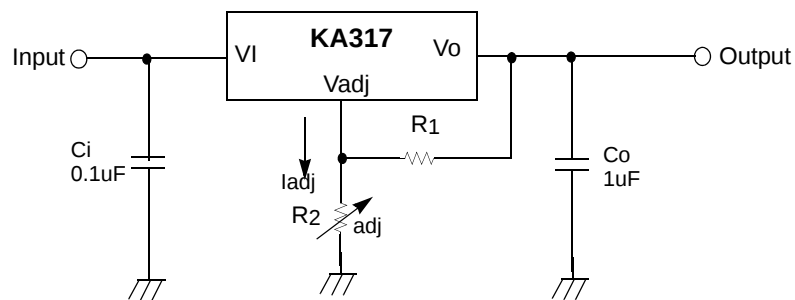


Figure 4. Reference Voltage

## Typical Application



$$V_O = 1.25V (1+R_2/R_1) + I_{adj}R_2$$

**Figure 5. Programmable Regulator**

$C_i$  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.

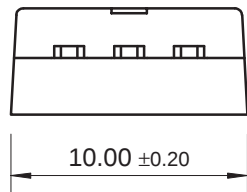
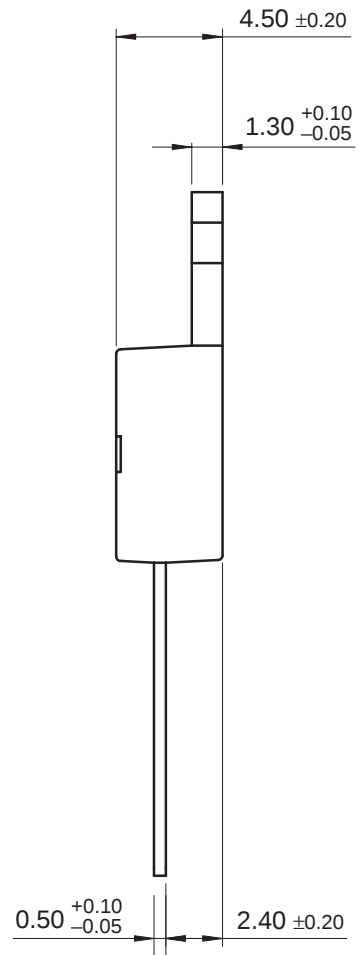
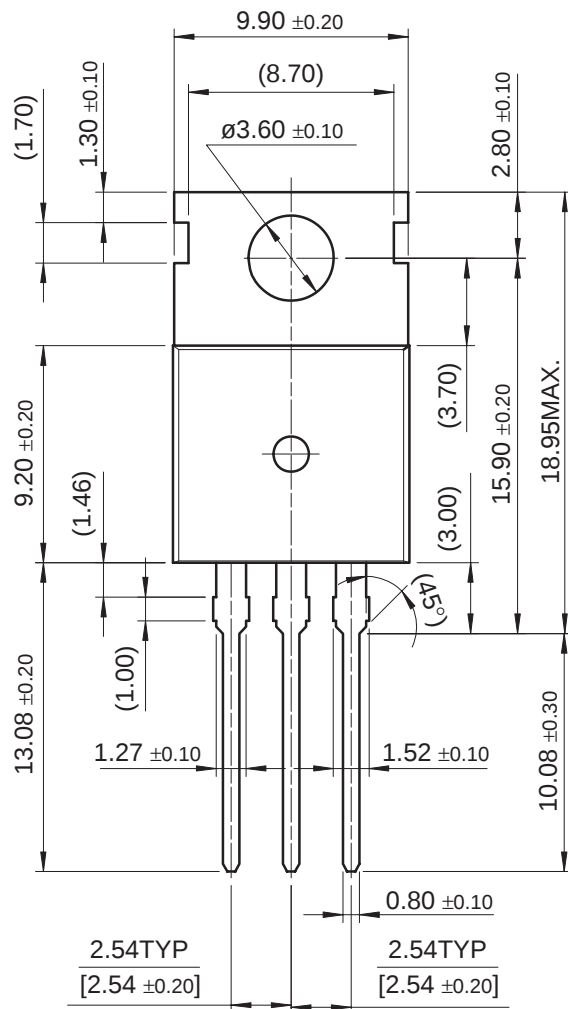
Since  $I_{ADJ}$  is controlled to less than  $100\mu A$ , the error associated with this term is negligible in most applications.

## Mechanical Dimensions

### Package

Dimensions in millimeters

### TO-220



## Ordering Information

| Product Number | Package | Operating Temperature |
|----------------|---------|-----------------------|
| KA317          | TO-220  | 0°C to +125°C         |

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