

## 317

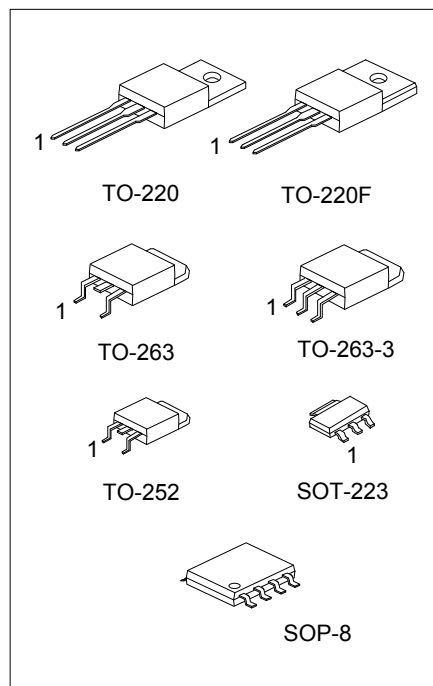
### HIGH CURRENT 1.3V TO 37V ADJUSTABLE VOLTAGE REGULATOR

#### DESCRIPTION

The **317** is an adjustable 3-terminal positive voltage regulator, designed to supply 1A of output current with voltage adjustable from 1.3V ~ 37V.

#### FEATURES

- \*Output voltage adjustable from 1.3V ~ 37V
- \*Output current in excess of 1A
- \*Internal short circuit protection
- \*Internal over temperature protection
- \*Output transistor safe area compensation



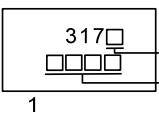
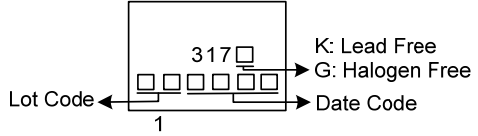
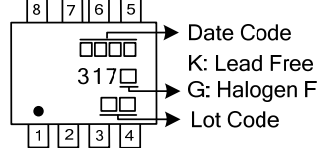
#### ORDERING INFORMATION

| Ordering Number |              | Package  | Pin Assignment |   |   |     |    |   |   |    | Packing   |
|-----------------|--------------|----------|----------------|---|---|-----|----|---|---|----|-----------|
| Lead Free       | Halogen Free |          | 1              | 2 | 3 | 4   | 5  | 6 | 7 | 8  |           |
| 317K-AA3-R      | 317G-AA3-R   | SOT-223  | ADJ            | O | I | -   | -  | - | - | -  | Tape Reel |
| 317K-TA3-T      | 317G-TA3-T   | TO-220   | ADJ            | O | I | -   | -  | - | - | -  | Tube      |
| 317K-TF3-T      | 317G-TF3-T   | TO-220F  | ADJ            | O | I | -   | -  | - | - | -  | Tube      |
| 317K-TN3-R      | 317G-TN3-R   | TO-252   | ADJ            | O | I | -   | -  | - | - | -  | Tape Reel |
| 317K-TQ2-T      | 317G-TQ2-T   | TO-263   | ADJ            | O | I | -   | -  | - | - | -  | Tube      |
| 317K-TQ2-R      | 317G-TQ2-R   | TO-263   | ADJ            | O | I | -   | -  | - | - | -  | Tape Reel |
| 317K-TQ3-T      | 317G-TQ3-T   | TO-263-3 | ADJ            | O | I | -   | -  | - | - | -  | Tube      |
| 317K-TQ3-R      | 317G-TQ3-R   | TO-263-3 | ADJ            | O | I | -   | -  | - | - | -  | Tape Reel |
| 317K-S08-R      | 317G-S08-R   | SOP-8    | I              | O | O | ADJ | NC | O | O | NC | Tape Reel |

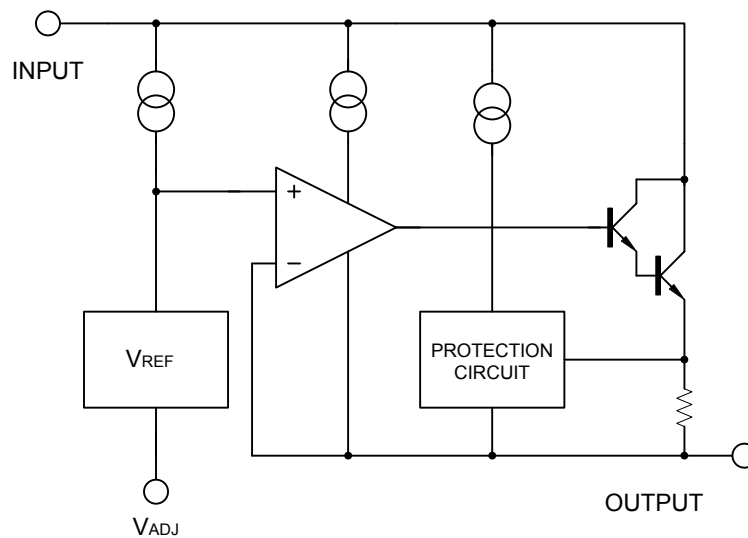
Note: Pin Assignment: I:  $V_{IN}$  O:  $V_{OUT}$

|                                                                                         |                                                                                                                                                                                                |
|-----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>317G-AA3-R</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Green Package</p> | <p>(1) R: Tape Reel, T: Tube</p> <p>(2) AA3: SOT-223, TA3: TO-220, TF3: TO-220F, TN3: TO-252, TQ2: TO-263, TQ3: TO-263-3 S08: SOP-8</p> <p>(3) G: Halogen Free and Lead Free, K: Lead Free</p> |
|-----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

■ **MARKING**

| PACKAGE                                           | MARKING                                                                                                                                                           |
|---------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SOT-223                                           |  <p>K: Lead Free<br/>G: Halogen Free<br/>Date Code</p> <p>1</p>                  |
| TO-220<br>TO-220F<br>TO-252<br>TO-263<br>TO-263-3 |  <p>K: Lead Free<br/>G: Halogen Free<br/>Date Code</p> <p>Lot Code</p> <p>1</p> |
| SOP-8                                             |  <p>Date Code<br/>K: Lead Free<br/>G: Halogen F<br/>Lot Code</p>                |

■ **BLOCK DIAGRAM**



# ■ **ABSOLUTE MAXIMUM RATINGS** ( $T_A=25^{\circ}\text{C}$ , unless otherwise specified)

| PARAMETER                         | SYMBOL           | RATINGS          | UNIT               |
|-----------------------------------|------------------|------------------|--------------------|
| Input - Output Voltage Difference | $V_{IN}-V_{OUT}$ | 40               | V                  |
| Power Dissipation                 | $P_D$            | Internal limited |                    |
| Junction Temperature              | $T_J$            | +150             | $^{\circ}\text{C}$ |
| Operating Temperature             | $T_{OPR}$        | -40 ~ +125       | $^{\circ}\text{C}$ |
| Storage Temperature               | $T_{STG}$        | -40 ~ +150       | $^{\circ}\text{C}$ |

Note: Absolute maximum ratings are stress ratings only and functional device operation is not implied. The device could be damaged beyond Absolute maximum ratings.

# ■ **THERMAL DATA**

| PARAMETER           |                 | SYMBOL        | RATINGS | UNIT                 |
|---------------------|-----------------|---------------|---------|----------------------|
| Junction to Ambient | TO-252          | $\theta_{JA}$ | 112     | $^{\circ}\text{C/W}$ |
|                     | TO-220/TO-220F  |               | 65      |                      |
|                     | TO-263/TO-263-3 |               | 165     |                      |
|                     | SOT-223         |               | 190     |                      |
|                     | SOP-8           |               |         |                      |
| Junction to Case    | TO-252          | $\theta_{JC}$ | 12      | $^{\circ}\text{C/W}$ |
|                     | TO-220/TO-263   |               | 5       |                      |
|                     | TO-263-3        |               | 7.8     |                      |
|                     | TO-220F         |               | 23      |                      |
|                     | SOT-223         |               | 45      |                      |
|                     | SOP-8           |               |         |                      |

# ■ **ELECTRICAL CHARACTERISTICS**

( $V_{IN}-V_{OUT}=5\text{V}$ ,  $I_{OUT}=10\text{mA}$ ,  $T_A=25^{\circ}\text{C}$ , unless otherwise specified.)

| PARAMETER                           | SYMBOL                   | TEST CONDITIONS                                                                                                        | MIN  | TYP   | MAX  | UNIT          |
|-------------------------------------|--------------------------|------------------------------------------------------------------------------------------------------------------------|------|-------|------|---------------|
| Line Regulation                     | $\Delta V_{OUT}/V_{OUT}$ | $3\text{V} \leq V_{IN}-V_{OUT} \leq 40\text{V}$                                                                        |      | 0.01  | 0.04 | %/V           |
| Load Regulation                     | $\Delta V_{OUT}$         | $10\text{mA} \leq I_{OUT} \leq 1\text{A}$                                                                              |      |       |      |               |
|                                     |                          | $V_{OUT} \leq 5\text{V}$                                                                                               |      | 5     | 25   | mV            |
|                                     |                          | $V_{OUT} \geq 5\text{V}$                                                                                               |      | 0.1   | 0.5  | %             |
| Adjustable Pin Current              | $I_{ADJ}$                |                                                                                                                        |      | 50    | 100  | $\mu\text{A}$ |
| Adjustable Pin Current Change       | $\Delta I_{ADJ}$         | $3\text{V} \leq V_{IN}-V_{OUT} \leq 40\text{V}$ ,<br>$10\text{mA} \leq I_{OUT} \leq 1\text{A}$ , $P_D \leq 20\text{W}$ |      | 0.2   | 5    | $\mu\text{A}$ |
| Reference Voltage                   | $V_{REF}$                | $3\text{V} \leq V_{IN}-V_{OUT} \leq 40\text{V}$ ,<br>$10\text{mA} \leq I_{OUT} \leq 1\text{A}$ , $P_D \leq 20\text{W}$ | 1.20 | 1.25  | 1.30 | V             |
| Temperature Stability               |                          | $T_{MIN} \leq T_J \leq T_{MAX}$                                                                                        |      | 0.7   |      | %/ $V_{OUT}$  |
| Minimum Load Current for Regulation | $I_{L(MIN)}$             | $V_{IN}-V_{OUT}=40\text{V}$                                                                                            |      | 3.5   | 10   | mA            |
| Maximum Output Current              | $I_{O(MAX)}$             | $V_{IN}-V_{OUT}=40\text{V}$ , $P_D \leq 20\text{W}$                                                                    | 0.2  | 0.3   |      | A             |
| RMS Noise vs. %of $V_{OUT}$         | eN                       | $10\text{Hz} \leq f \leq 10\text{KHz}$                                                                                 |      | 0.003 |      | %/ $V_{OUT}$  |
| Ripple Rejection                    | RR                       | $V_{OUT}=10\text{V}$ , $f=120\text{Hz}$                                                                                |      |       |      |               |
|                                     |                          | $C_{ADJ}=0$                                                                                                            |      | 65    |      | dB            |
|                                     |                          | $C_{ADJ}=10\mu\text{F}$                                                                                                | 66   | 80    |      |               |

Note:  $C_{ADJ}$  is connected between Adjust pin and Ground.

## ■ APPLICATION CIRCUITS

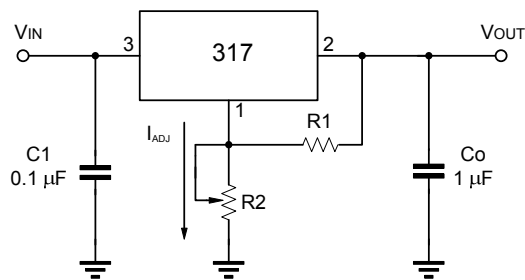


Fig.1 Programmable voltage regulator

$$V_{OUT} = 1.25V \cdot (1 + R2/R1) + I_{ADJ} \cdot R2$$

C1 is required when regulator is located an appreciated distance from power supply. Co is needed to improve transient response.

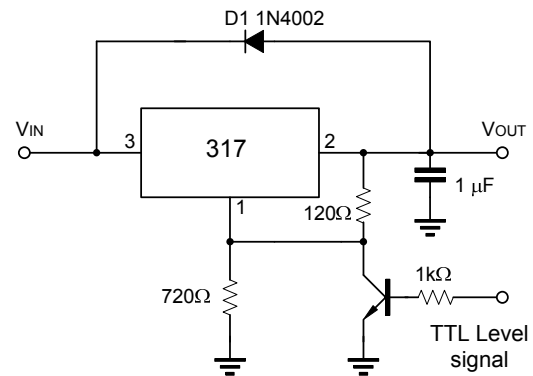


Fig.2 Regulator with On-off control

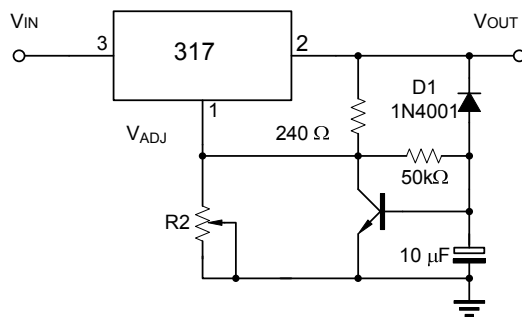
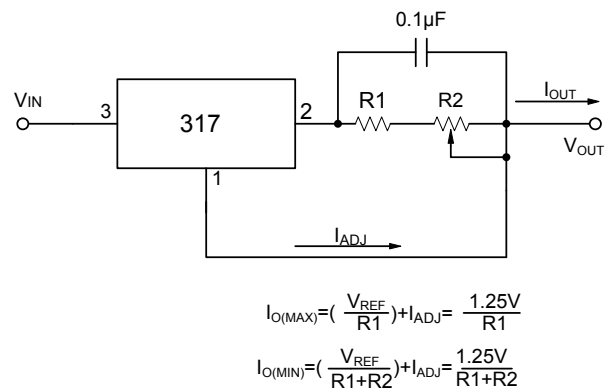


Fig.3 Soft Start Application



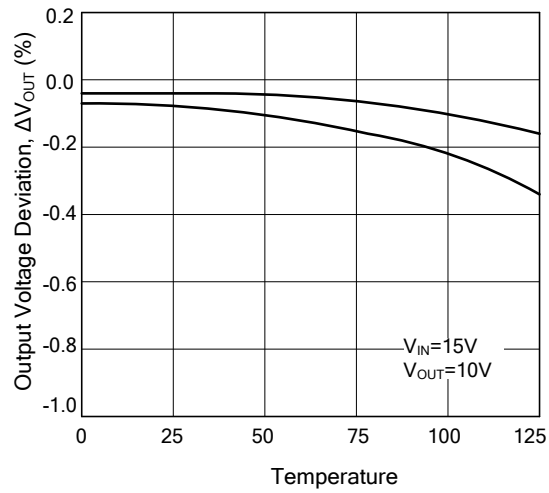
$$I_{O(MAX)} = \left( \frac{V_{REF}}{R1} \right) + I_{ADJ} = \frac{1.25V}{R1}$$

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

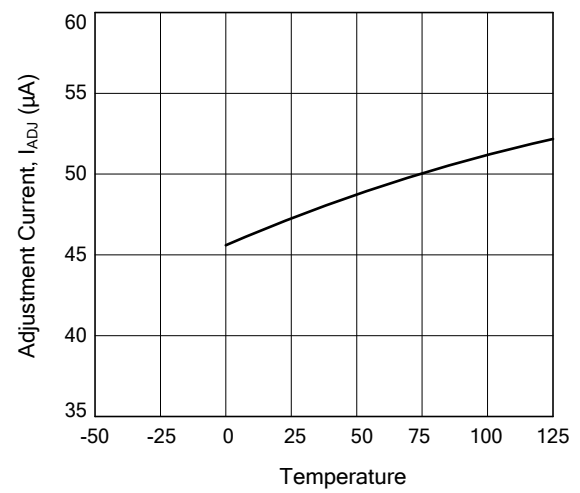
Fig.4 Constant Current Application

## ■ TYPICAL CHARACTERISTICS

Load Regulation vs. temperature



Adjustment Current vs. Temperature



Current Limit

