



# LM317A

## LINEAR INTEGRATED CIRCUIT

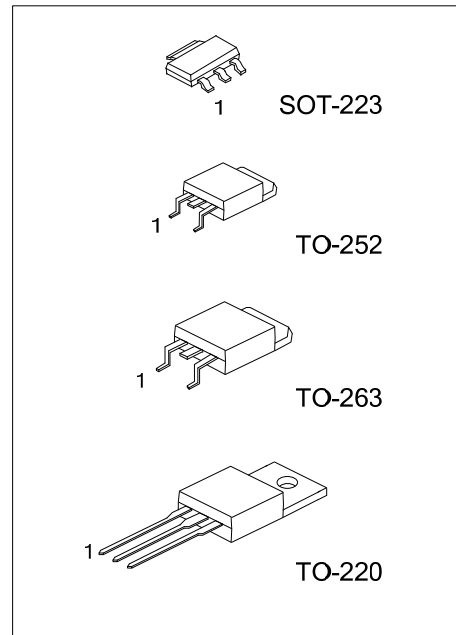
### MEDIUM CURRENT 1.2V TO 37V ADJUSTABLE VOLTAGE REGULATOR

#### DESCRIPTION

The UTC LM317A is an adjustable 3-terminal positive voltage regulator, designed to supply 1.5A of output current with voltage adjustable from 1.2V ~ 37V.

#### FEATURES

- \* Output voltage adjustable from 1.2V ~ 37V
- \* Output current in excess of 1.5A
- \* Internal thermal overload protection
- \* Internal short circuit current limiting
- \* Output transistor safe area compensation



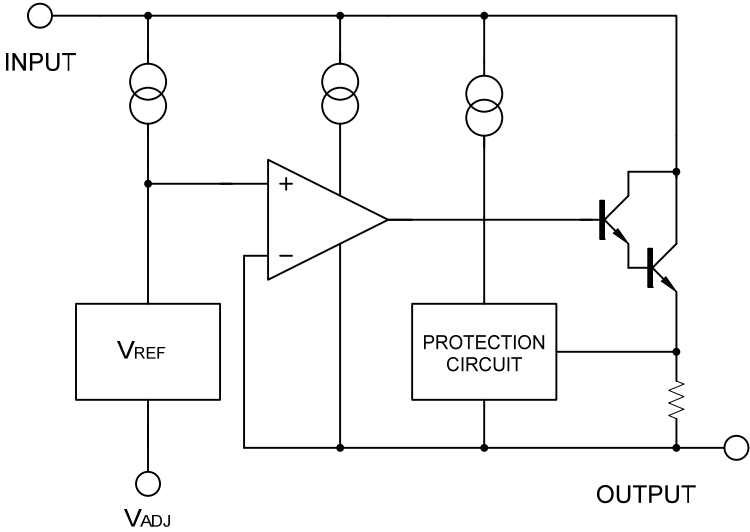
#### ORDERING INFORMATION

| Ordering Number |               | Package | Pin Assignment |   |   | Packing   |
|-----------------|---------------|---------|----------------|---|---|-----------|
| Lead Free       | Halogen Free  |         | 1              | 2 | 3 |           |
| LM317AL-AA3-R   | LM317AG-AA3-R | SOT-223 | ADJ            | O | I | Tape Reel |
| LM317AL-TA3-T   | LM317AG-TA3-T | TO-220  | ADJ            | O | I | Tube      |
| LM317AL-TN3-R   | LM317AG-TN3-R | TO-252  | ADJ            | O | I | Tape Reel |
| LM317AL-TQ2-R   | LM317AG-TQ2-R | TO-263  | ADJ            | O | I | Tape Reel |
| LM317AL-TQ2-T   | LM317AG-TQ2-T | TO-263  | ADJ            | O | I | Tube      |

Note: Pin Assignment: I: V<sub>IN</sub> O: V<sub>OUT</sub>

|   |  |
|---|--|
| <p>LM317AL-AA3-R</p> <p>(1)Packing Type<br/>(2)Package Type<br/>(3)Lead Plating</p> | <p>(1) R: Tape Reel, T: Tube<br/>(2) SOT-223: AA3, TA3: TO-220, TN3: TO-252, TQ2: TO-263<br/>(3) G: Halogen Free, L: Lead Free</p> |
|---|--|

■ BLOCK DIAGRAM



### ■ ABSOLUTE MAXIMUM RATINGS

| PARAMETER                         | SYMBOL           | RATINGS            | UNIT |
|-----------------------------------|------------------|--------------------|------|
| Input-Output Voltage Differential | $V_{IN}-V_{OUT}$ | 40                 | V    |
| Power Dissipation                 | $P_D$            | Internally limited |      |
| Junction Temperature              | $T_J$            | +125               | °C   |
| Operating Temperature             | $T_{OPR}$        | -40 ~ +85          | °C   |
| Storage Temperature               | $T_{STG}$        | -65 ~ +150         | °C   |

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

### ■ THERMAL DATA

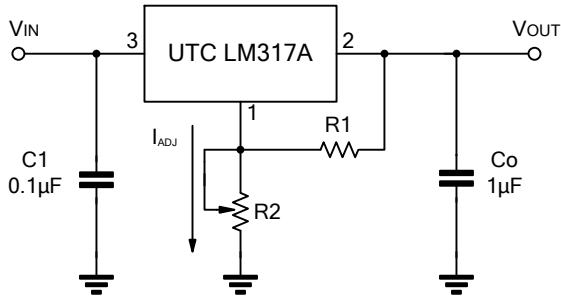
| PARAMETER           | SYMBOL  | RATINGS | UNIT |
|---------------------|---------|---------|------|
| Junction to Ambient | SOT-223 | 140     | °C/W |
|                     | TO-220  | 50      | °C/W |
|                     | TO-252  | 103     | °C/W |
|                     | TO-263  | 62.5    | °C/W |
| Junction to Case    | SOT-223 | 23.5    | °C/W |
|                     | TO-220  | 3       | °C/W |
|                     | TO-252  | 12      | °C/W |
|                     | TO-263  | 3       | °C/W |

### ■ ELECTRICAL CHARACTERISTICS

( $V_{IN}-V_{OUT}=5V$ ,  $I_{OUT}=0.5A$ ,  $P_{MAX}=20W$ ,  $T_a=25^{\circ}C$ , unless otherwise specified.)

| PARAMETER                           | SYMBOL                   | TEST CONDITIONS  | MIN               | TYP   | MAX  | UNIT               |    |
|-------------------------------------|--------------------------|--|-------------------|-------|------|--------------------|----|
| Line Regulation                     | $\Delta V_{OUT}/V_{OUT}$ | $3V \leq V_{IN}-V_{OUT} \leq 40V$ , $I_{OUT}=100mA$                                    |                   | 0.01  | 0.04 | %/V                |    |
| Load Regulation                     | $\Delta V_{OUT}$         | $10mA \leq I_{OUT} \leq 1.5A$  | $V_{OUT} \leq 5V$ | 5     | 25   | mV                 |    |
|                                     |                          |  | $V_{OUT} \geq 5V$ | 0.1   | 0.5  | %                  |    |
| Adjustable Pin Current              | $I_{ADJ}$                |  |                   | 50    | 100  | $\mu A$            |    |
| Adjustable Pin Current Change       | $\Delta I_{ADJ}$         | $3V \leq V_{IN}-V_{OUT} \leq 40V$ ,<br>$10mA \leq I_{OUT} \leq 500mA$                  |                   | 0.2   | 5    | $\mu A$            |    |
| Reference Voltage                   | $V_{REF}$                | $3V \leq V_{IN}-V_{OUT} \leq 40V$ ,<br>$10mA \leq I_{OUT} \leq 1.5A$ , $P_D < P_{MAX}$ | 1.20              | 1.25  | 1.30 | V                  |    |
| Temperature Stability               |                          | $T_{MIN} \leq T_J \leq T_{MAX}$  |                   | 0.7   |      | %/V <sub>OUT</sub> |    |
| Minimum Load Current for Regulation | $I_{L(MIN)}$             | $V_{IN}-V_{OUT}=40V$   |                   |       | 4.5  | mA                 |    |
| Maximum Output Current              | $I_{O(MAX)}$             | $V_{IN}-V_{OUT}=40V$ , $P_D \leq P_{MAX}$  | 0.3               | 0.4   |      | A                  |    |
|                                     |                          | $V_{IN}-V_{OUT}=15V$ , $P_D < P_{MAX}$   | 1.5               | 2.2   |      | A                  |    |
| RMS Noise vs. % of $V_{OUT}$        | eN                       | $10Hz \leq f \leq 10KHz$   |                   | 0.003 |      | %/V <sub>OUT</sub> |    |
| Ripple Rejection                    | RR                       | $V_{OUT}=10V$ , $f=120Hz$  | $C_{ADJ}=0$       |       | 65   |                    | dB |
|                                     |                          |  | $C_{ADJ}=10\mu F$ | 66    | 80   |                    | dB |

## APPLICATION CIRCUITS



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

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

Fig.1 Programmable voltage regulator

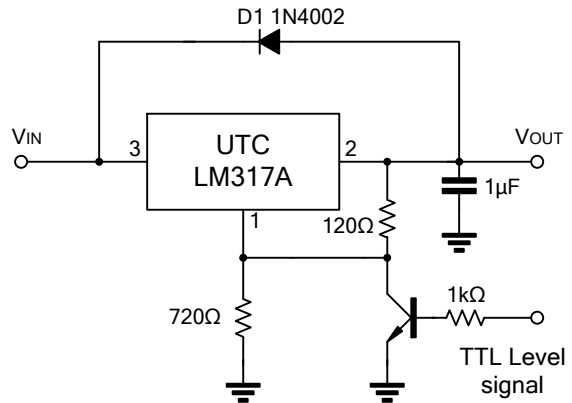


Fig.2 Regulator with On-off control

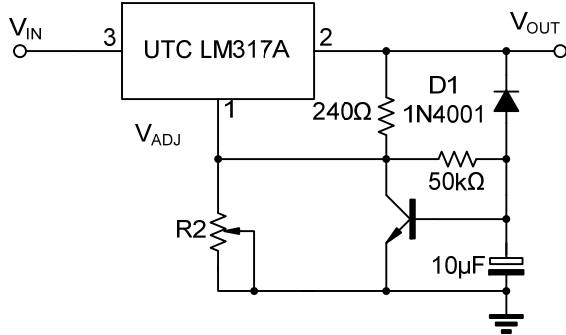
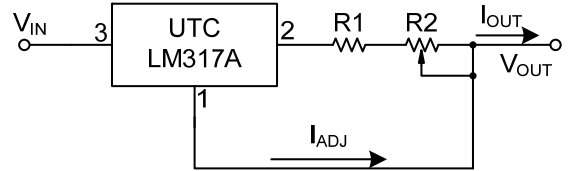


Fig.3 Soft Start Application



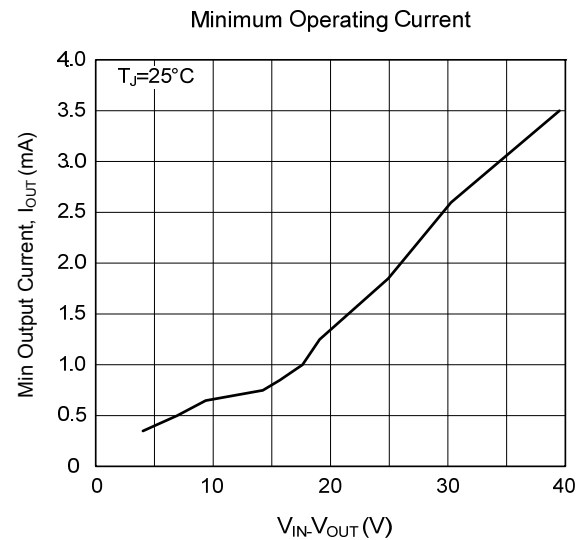
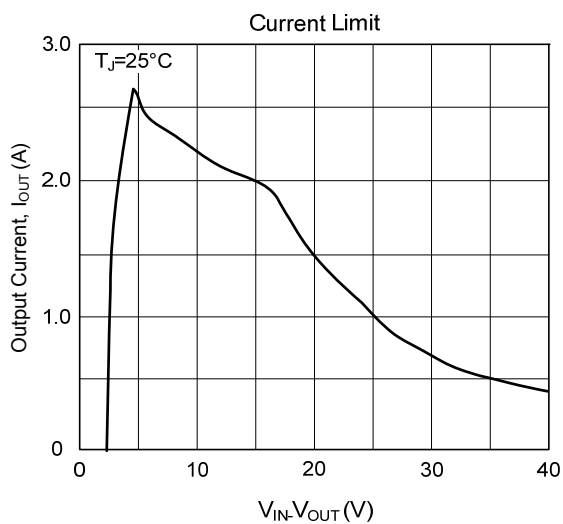
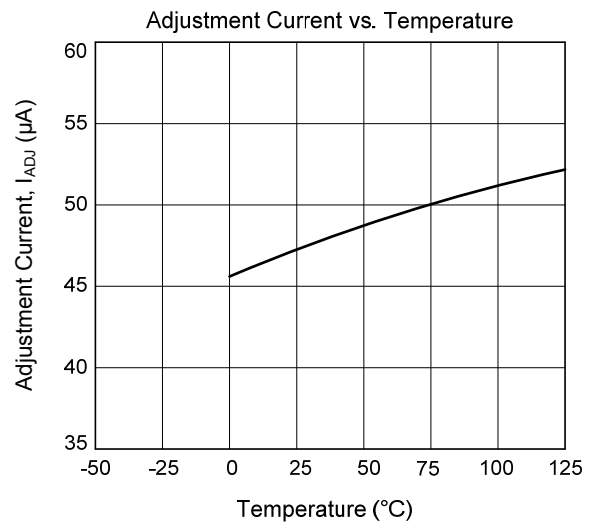
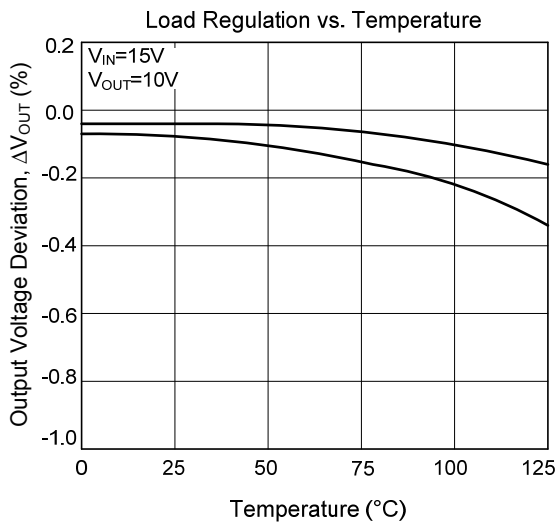
$$I_{O(MAX)} = \left( \frac{V_{REF}}{R1} \right) + I_{ADJ} = \frac{1.25V}{R1}$$

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

$$5mA < I_{OUT} < 100mA$$

Fig.4 Constant Current Application

### TYPICAL CHARACTERISTICS



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