



## LM317M

## LINEAR INTEGRATED CIRCUIT

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

#### DESCRIPTION

The UTC **LM317M** is an adjustable 3-terminal positive voltage regulator, designed to supply 500mA of output current with voltage adjustable from 1.2V ~ 37V.

#### FEATURES

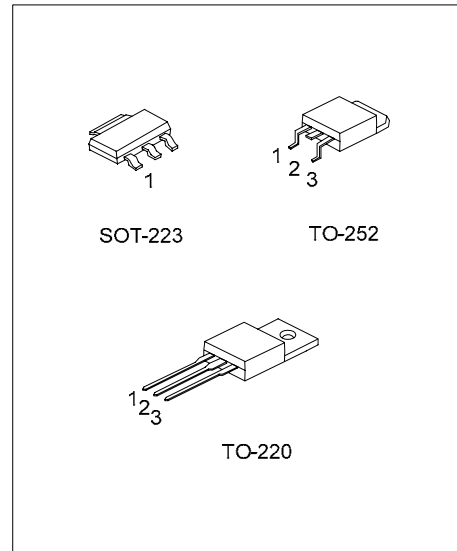
- \*Output voltage adjustable from 1.2V ~ 37V
- \*Output current in excess of 500mA
- \*Internal thermal overload protection
- \*Internal short circuit current limiting
- \*Output transistor safe area compensation

#### ORDERING INFORMATION

| Ordering Number |                   | Package | Pin Assignment |   |   | Packing   |
|-----------------|-------------------|---------|----------------|---|---|-----------|
| Normal          | Lead Free Plating |         | 1              | 2 | 3 |           |
| LM317M-AA3-R    | LM317ML-AA3-R     | SOT-223 | ADJ            | O | I | Tape Reel |
| LM317M-TA3-T    | LM317ML-TA3-T     | TO-220  | ADJ            | O | I | Tube      |
| LM317M-TN3-R    | LM317ML-TN3-R     | TO-252  | ADJ            | O | I | Tape Reel |
| LM317M-TN3-T    | LM317ML-TN3-T     | TO-252  | ADJ            | O | I | Tube      |

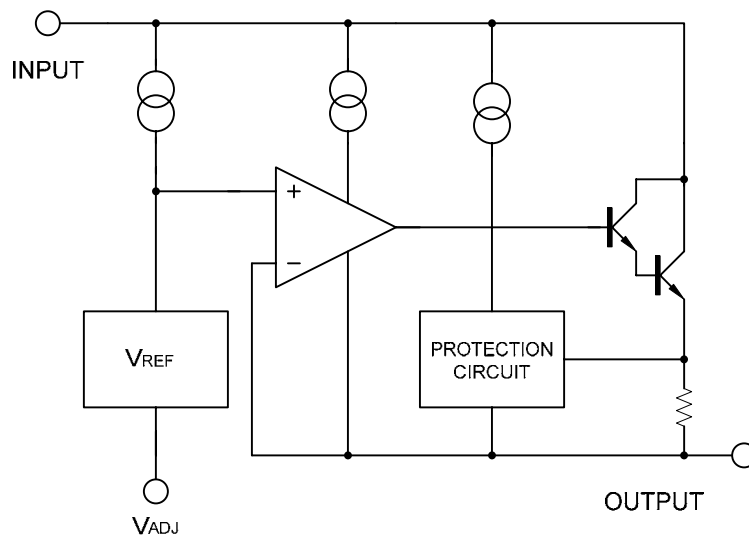
Note: Pin Assignment: I:V<sub>IN</sub> O:V<sub>OUT</sub>

|  |  |
|--|--|
| <p>LM317ML-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) AA3: SOT-223, TA3: TO-220, TN3: TO-252<br/>(3) L: Lead Free Plating, Blank: Pb/Sn</p> |
|--|--|



\*Pb-free plating product number: LM317ML

## ■ BLOCK DIAGRAM



### ■ ABSOLUTE MAXIMUM RATINGS

| PARAMETER                         |         | SYMBOL           | RATINGS    | UNIT |
|-----------------------------------|---------|------------------|------------|------|
| Input-Output Voltage Differential |         | $V_{IN}-V_{OUT}$ | 40         | V    |
| Power Dissipation                 | SOT-223 | $P_D$            | 1.8        | W    |
|                                   | TO-220  |                  | 2          | W    |
|                                   | TO-252  |                  | 3.3        | W    |
| Junction Temperature              |         | $T_J$            | +125       |      |
| Operating Temperature             |         | $T_{OPR}$        | 0 ~ +125   |      |
| Storage Temperature               |         | $T_{STG}$        | -40 ~ +150 |      |

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.

### ■ ELECTRICAL CHARACTERISTICS

( $V_{IN}-V_{OUT}=5V$ ,  $I_{OUT}=0.1A$ ,  $T_a=25^\circ C$ , unless otherwise specified.)

| PARAMETER                           | SYMBOL                   | TEST CONDITIONS   | MIN  | TYP               | MAX  | UNIT         |    |
|-------------------------------------|--------------------------|---|------|-------------------|------|--------------|----|
| Line Regulation                     | $\Delta V_{OUT}/V_{OUT}$ | 3V $V_{IN}-V_{OUT}$ 40V                                       |      | 0.01              | 0.04 | %/V          |    |
| Load Regulation                     | $\Delta V_{OUT}$         | 10mA $I_{OUT}$ 0.5A   |      | $V_{OUT}$ 5V      | 5    | 25           | mV |
|                                     |                          |   |      | $V_{OUT}$ 5V      | 0.1  | 0.5          | %  |
| Adjustable Pin Current              | $I_{ADJ}$                |   |      | 50                | 100  | $\mu A$      |    |
| Adjustable Pin Current Change       | $\Delta I_{ADJ}$         | 3V $V_{IN}-V_{OUT}$ 40V,<br>10mA $I_{OUT}$ 0.5A, $P_D < 7.5W$ |      | 0.2               | 5    | $\mu A$      |    |
| Reference Voltage                   | $V_{REF}$                | 3V $V_{IN}-V_{OUT}$ 40V,<br>10mA $I_{OUT}$ 0.5A, $P_D < 7.5W$ | 1.20 | 1.25              | 1.30 | V            |    |
| Temperature Stability               |                          | $T_{MIN}$ $T_J$ $T_{MAX}$                                     |      | 0.7               |      | %/ $V_{OUT}$ |    |
| Minimum Load Current for Regulation | $I_{L(MIN)}$             | $V_{IN}-V_{OUT}=40V$  |      | 3.5               | 10   | mA           |    |
| Maximum Output Current              | $I_{O(MAX)}$             | $V_{IN}-V_{OUT}=40V$ , $P_D < 7.5W$                           | 0.15 | 0.25              |      | A            |    |
| RMS Noise vs. % of $V_{OUT}$        | eN                       | 10Hz $f$ 10KHz  |      | 0.003             |      | %/ $V_{OUT}$ |    |
| Ripple Rejection                    | RR                       | $V_{OUT}=10V, f=120Hz$  |      | $C_{ADJ}=0$       | 65   |              | dB |
|                                     |                          |   |      | $C_{ADJ}=10\mu F$ | 66   | 80           |    |

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

## APPLICATION CIRCUITS

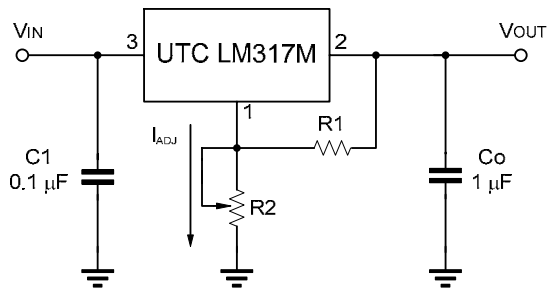


Fig.1 Programmable voltage regulator

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

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

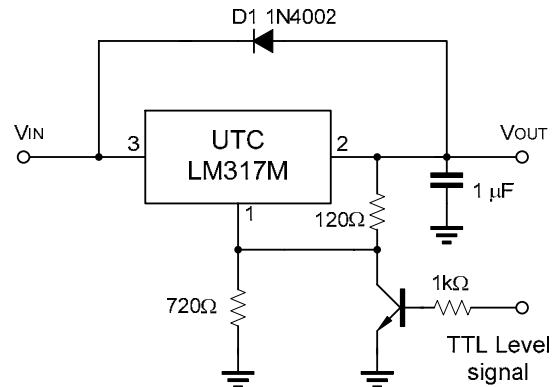


Fig.2 Regulator with On-off control

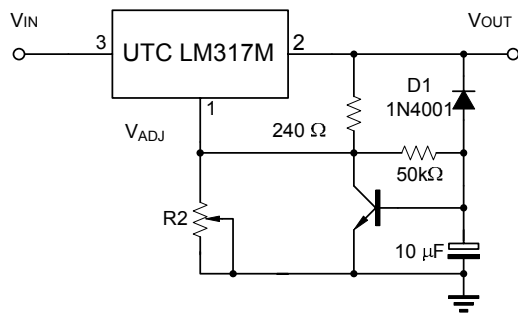
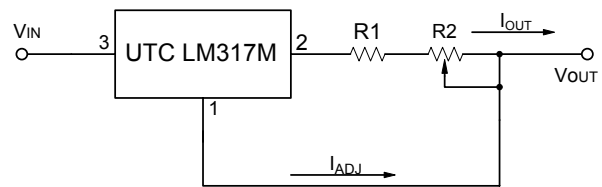


Fig.3 Soft Start Application



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

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

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

Fig.4 Constant Current Application

## TYPICAL CHARACTERISTICS

Fig.1 Load Regulation vs. temperature

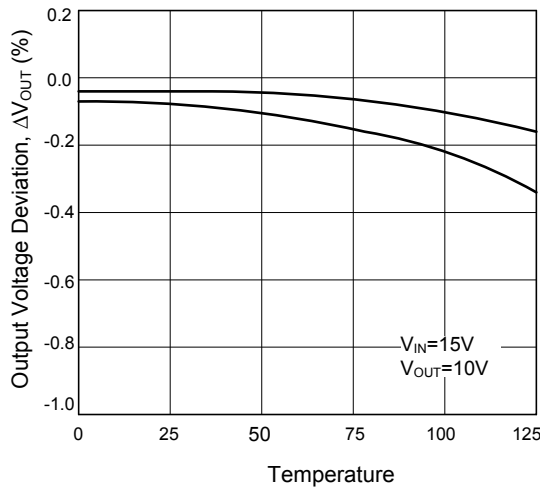


Fig.2 Adjustment Current vs. Temperature

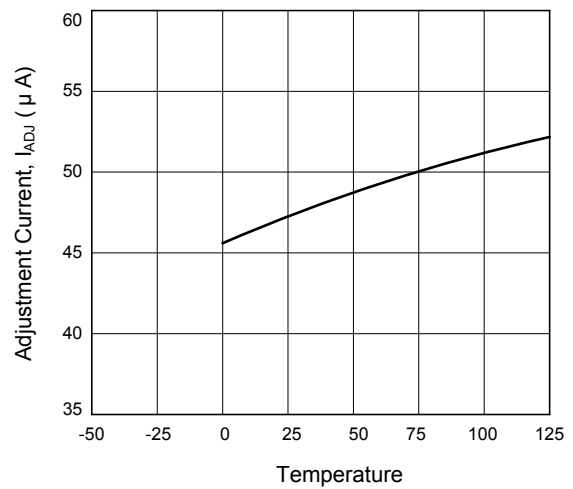


Fig. 3 Current Limit

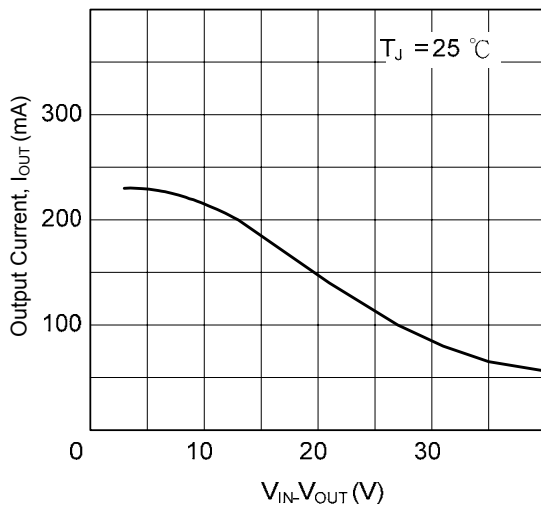
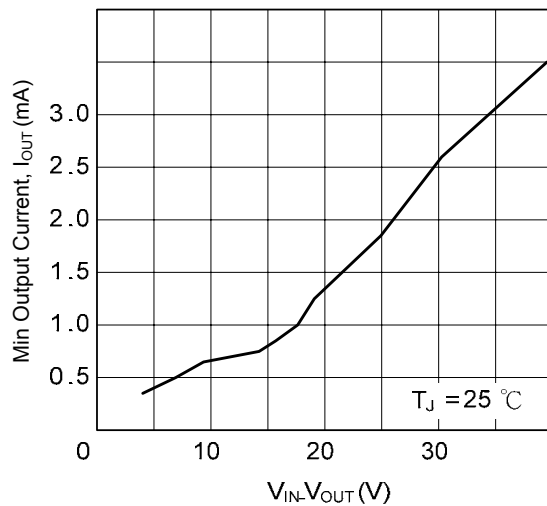


Fig. 4 Minimum Operating Current



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