

### 3-TERMINAL 1.5A POSITIVE ADJUSTABLE VOLTAGE REGULATOR

#### DESCRIPTION

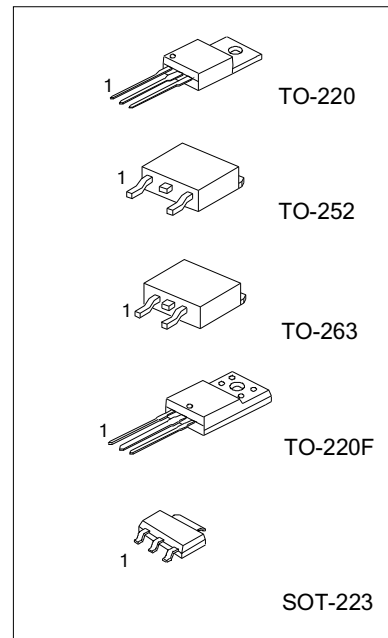
The UTC317/B/TB is an adjustable 3-terminal positive voltage regulator designed to supply more than 1.5A of output current with voltage adjustable from 1.3V to 37V.

#### FEATURES

- \*Output current up to 1.5A
- \*Output voltage adjustable from 1.3V to 37V
- \*Internal short circuit protection
- \*Internal over temperature protection
- \* Safe-Area compensation for output transistor

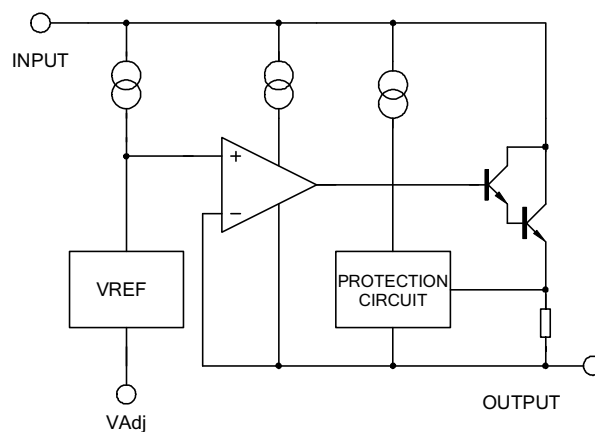
#### ORDERING INFORMATION

| Device   | Package         |
|----------|-----------------|
| UTC317   | TO-220/ TO-220F |
| UTC317B  | TO-252          |
| UTC317TB | TO-263-2L       |
| UTC317Y  | SOT-223         |



1:ADJ; 2: OUTPUT; 3: INPUT

#### BLOCK DIAGRAM



## ABSOLUTE MAXIMUM RATINGS (Ta=25°C, UNLESS OTHERWISE SPECIFIED)

| PARAMETERS                        | SYMBOL            | RATING           | UNITS |
|-----------------------------------|-------------------|------------------|-------|
| Input - Output Voltage Difference | $V_I - V_O$       | 40               | V     |
| Lead Temperature                  | T <sub>LEAD</sub> | 260              | °C    |
| Power Dissipation                 | P <sub>D</sub>    | Internal limited | —     |
| Operating Temperature Range       | T <sub>OPR</sub>  | 0~+125           | °C    |
| Storage Temperature Range         | T <sub>STG</sub>  | -65~+150         | °C    |

## ELECTRICAL CHARACTERISTICS

(V<sub>I</sub>-V<sub>O</sub>=5V, 0°C < T<sub>j</sub> < 125°C, I<sub>O</sub>=500mA, I<sub>MAX</sub>=1.5A, P<sub>MAX</sub>=20W, unless otherwise specified)

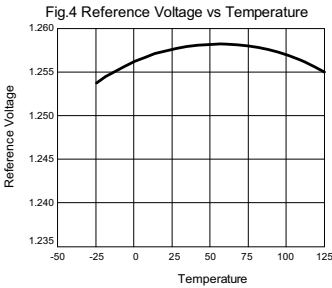
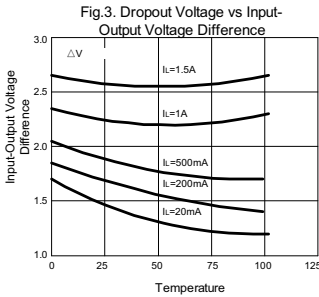
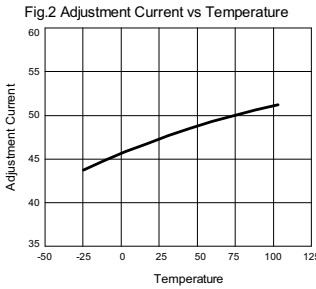
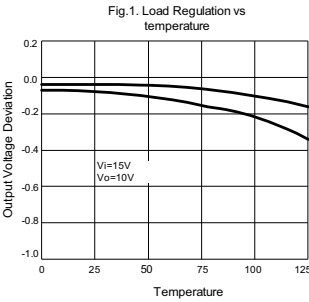
| Parameter                                              | Symbol              | Test conditions                                                                                                           | Min  | Typ   | Max  | Unit               |
|--------------------------------------------------------|---------------------|---------------------------------------------------------------------------------------------------------------------------|------|-------|------|--------------------|
| Line Regulation                                        | $\Delta V_O$        | T <sub>A</sub> =25°C, 3V ≤ V <sub>I</sub> -V <sub>O</sub> ≤ 40V                                                           |      | 0.01  | 0.04 | % / V              |
|                                                        |                     | T <sub>A</sub> =0 ~ 125°C, 3V ≤ V <sub>I</sub> -V <sub>O</sub> ≤ 40V                                                      |      | 0.02  | 0.07 |                    |
| Load Regulation                                        | $\Delta V_O$        | T <sub>A</sub> =25°C, V <sub>O</sub> ≤ 6V                                                                                 |      | 18    | 25   | mV                 |
|                                                        |                     | 10mA ≤ I <sub>O</sub> ≤ I <sub>MAX</sub> , V <sub>O</sub> ≤ 5V                                                            |      | 0.4   | 0.5  | % / V <sub>O</sub> |
|                                                        |                     | 10mA ≤ I <sub>O</sub> ≤ I <sub>MAX</sub> , V <sub>O</sub> ≤ 5V                                                            |      | 40    | 70   | mV                 |
|                                                        |                     | 10mA ≤ I <sub>O</sub> ≤ I <sub>MAX</sub> , V <sub>O</sub> ≤ 6V                                                            |      | 0.8   | 1.5  | % / V <sub>O</sub> |
| Adjustable Pin current                                 | I <sub>ADJ</sub>    |                                                                                                                           |      | 46    | 100  | μA                 |
| Adjustable Pin Current Change                          | ΔI <sub>ADJ</sub>   | 2.5V ≤ V <sub>I</sub> -V <sub>O</sub> ≤ 40V, 10mA ≤ I <sub>O</sub> ≤ I <sub>MAX</sub> , P <sub>D</sub> ≤ P <sub>MAX</sub> |      | 2.0   | 5    | μA                 |
| Reference Voltage                                      | V <sub>REF</sub>    | 3V ≤ V <sub>I</sub> -V <sub>O</sub> ≤ 40V, 10mA ≤ I <sub>O</sub> ≤ I <sub>MAX</sub> , P <sub>D</sub> ≤ P <sub>MAX</sub>   | 1.20 | 1.25  | 1.30 | V                  |
| Temperature Stability                                  | STT                 |                                                                                                                           |      | 0.7   |      | % / V <sub>O</sub> |
| Minimum Load Current for regulation                    | I <sub>L(MIN)</sub> | V <sub>I</sub> -V <sub>O</sub> =40V                                                                                       |      | 3.5   | 10   | mA                 |
| Maximum output Current                                 | I <sub>O(MAX)</sub> | V <sub>I</sub> -V <sub>O</sub> ≤ 15V, P <sub>D</sub> ≤ P <sub>MAX</sub>                                                   | 1.5  | 2.2   |      | A                  |
|                                                        |                     | V <sub>I</sub> -V <sub>O</sub> ≤ 15V, P <sub>D</sub> ≤ P <sub>MAX</sub> , T <sub>A</sub> =25°C                            | 0.15 | 0.4   |      |                    |
| RMS Noise v.s. % of V <sub>out</sub>                   | e <sub>N</sub>      | T <sub>A</sub> =25°C, 10Hz ≤ f ≤ 10KHz                                                                                    |      | 0.003 | 0.01 | % / V <sub>O</sub> |
| Ripple Rejection                                       | RR                  | V <sub>O</sub> =10V, f=120HZ, C <sub>ADJ</sub> =0                                                                         |      | 60    |      | dB                 |
|                                                        |                     | V <sub>O</sub> =10V, f=120HZ, C <sub>ADJ</sub> =10μF                                                                      | 66   | 75    |      |                    |
| Long-term Stability, T <sub>J</sub> =T <sub>HIGH</sub> | ST                  | T <sub>A</sub> =25°C, 1000 hr                                                                                             |      | 0.3   | 1    | %                  |

Note: Testing with low duty pulse should be used to avoid heating effect.

## THERMAL DATA

| Parameter           |         | Symbol        | RATING | UNITS                       |
|---------------------|---------|---------------|--------|-----------------------------|
| Junction-to-Ambient | TO-252  | $\theta_{JA}$ | 112    | $^{\circ}\text{C}/\text{W}$ |
|                     | TO-220  |               | 54     |                             |
|                     | TO-220F |               | 44     |                             |
|                     | TO-263  |               | 64     |                             |
|                     | SOT-223 |               | 165    |                             |
| Junction-to-Case    | TO-252  | $\theta_{JC}$ | 12     | $^{\circ}\text{C}/\text{W}$ |
|                     | TO-220  |               | 5      |                             |
|                     | TO-220F |               | 5      |                             |
|                     | TO-263  |               | 5      |                             |
|                     | SOT-223 |               | 23     |                             |

TYPICAL CHARACTERISTICS PERFORMANCE



## TYPICAL APPLICATION CIRCUITS

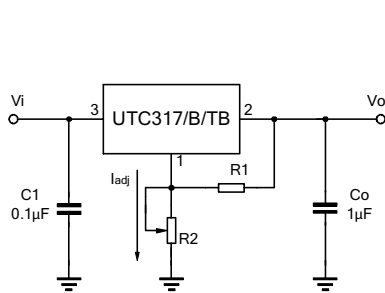


Fig.5 Programmable voltage regulator

$$V_o = 1.25V \cdot (1 + R_2/R_1) + I_{adj} \cdot R_2$$

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

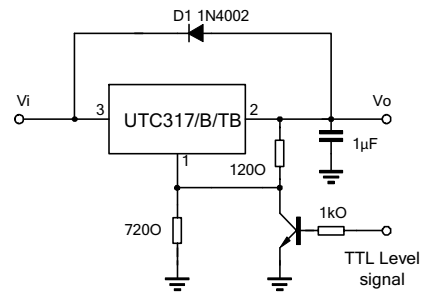


Fig.6 Regulator with On-off control

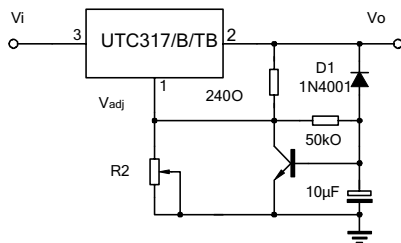


Fig.7 Soft start application

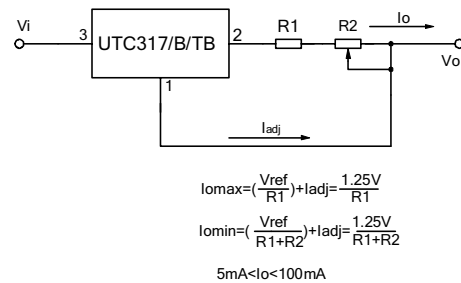
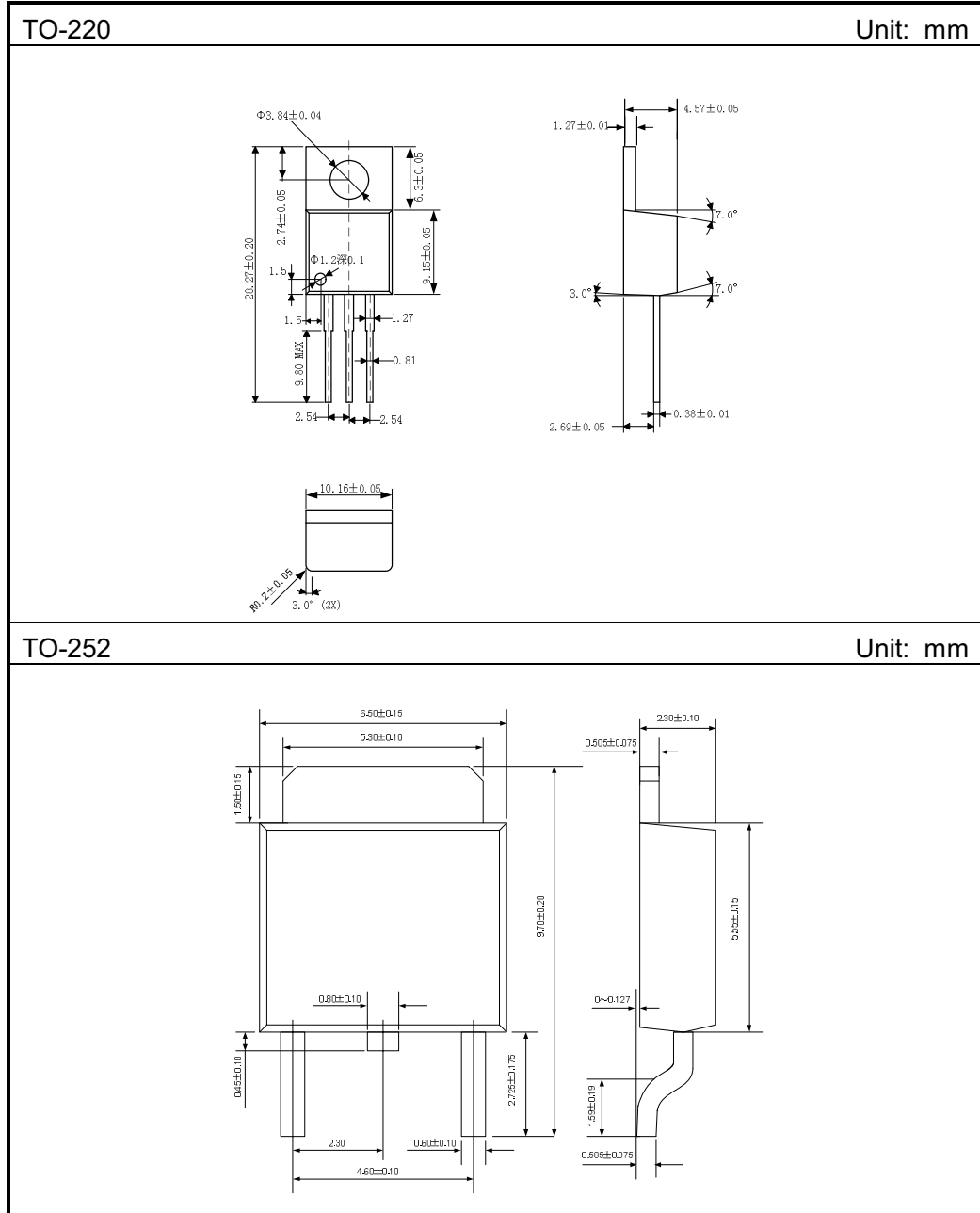


Fig.8 Constant current application

UTC317/B/TB

LINEAR INTEGRATED CIRCUIT

PACKAGE DIMENSIONS



PACKAGE DIMENSIONS

TO-263

Unit: mm

The diagram illustrates the TO-263 package with three views: top, side, and bottom. The top view shows a square base with dimensions D (width), E (height), and L (total height). It includes mounting holes with diameter b and distance e, and a central feature with diameter b1 and distance L3. The side view shows the package profile with dimensions A (width), A1 (height), c1 (height), L2 (height), and c (height). The bottom view shows the underside with dimension V (height).

| Symbol | Dimensions In Millimeters |        | Dimensions In Inches |       |
|--------|---------------------------|--------|----------------------|-------|
|        | Min                       | Max    | Min                  | Max   |
| A      | 4.470                     | 4.670  | 0.176                | 0.184 |
| A1     | 0.000                     | 0.150  | 0.000                | 0.006 |
| B      | 1.170                     | 1.370  | 0.046                | 0.054 |
| b      | 0.710                     | 0.910  | 0.028                | 0.036 |
| b1     | 1.170                     | 1.370  | 0.046                | 0.054 |
| c      | 0.310                     | 0.530  | 0.012                | 0.021 |
| c1     | 1.170                     | 1.370  | 0.046                | 0.054 |
| D      | 10.010                    | 10.310 | 0.394                | 0.406 |
| E      | 8.500                     | 8.900  | 0.335                | 0.350 |
| e      | 2.540 TYP                 |        | 0.100 TYP            |       |
| e1     | 4.980                     | 5.180  | 0.196                | 0.204 |
| L      | 15.050                    | 15.450 | 0.593                | 0.608 |
| L1     | 5.080                     | 5.480  | 0.200                | 0.216 |
| L2     | 2.340                     | 2.740  | 0.092                | 0.108 |
| L3     | 1.300                     | 1.700  | 0.051                | 0.067 |
| V      | 5.600 REF                 |        | 0.220 REF            |       |

