



LM317M

LINEAR INTEGRATED CIRCUIT

MEDIUM CURRENT 1.2V TO 37V ADJUSTABLE VOLTAGE REGULATOR

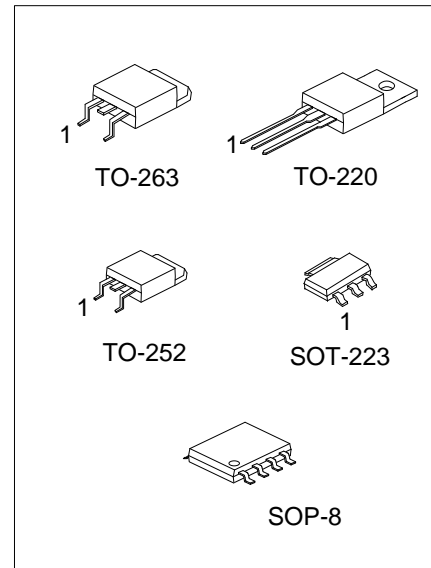
DESCRIPTION

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 |
|-----------------|---------------|---------|----------------|---|---|-----|---|---|---|---|-----------|
| Lead Free | Halogen Free | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | |
| LM317ML-AA3-R | LM317MG-AA3-R | SOT-223 | ADJ | O | I | - | - | - | - | - | Tape Reel |
| LM317ML-TA3-T | LM317MG-TA3-T | TO-220 | ADJ | O | I | - | - | - | - | - | Tube |
| LM317ML-TN3-R | LM317MG-TN3-R | TO-252 | ADJ | O | I | - | - | - | - | - | Tape Reel |
| LM317ML-TQ2-T | LM317MG-TQ2-T | TO-263 | ADJ | O | I | - | - | - | - | - | Tube |
| LM317ML-TQ2-R | LM317MG-TQ2-R | TO-263 | ADJ | O | I | - | - | - | - | - | Tape Reel |
| LM317ML-S08-R | LM317MG-S08-R | SOP-8 | I | O | O | ADJ | x | O | O | x | Tape Reel |

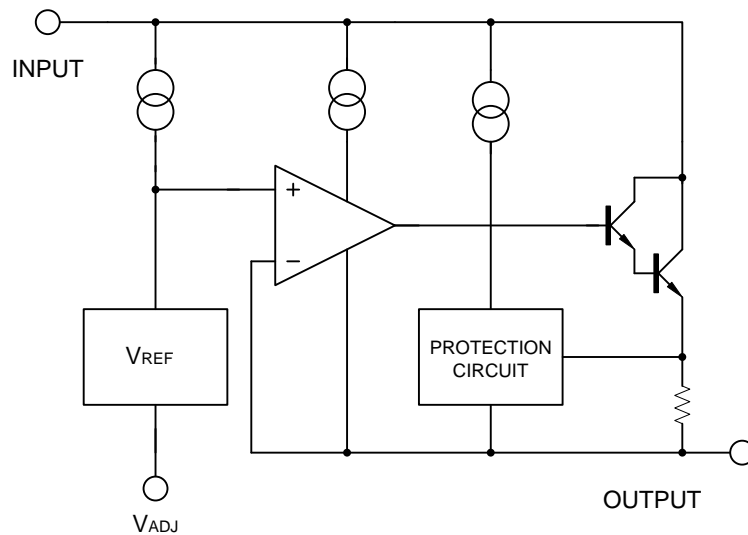
Note: Pin Assignment: I:V_{IN} O:V_{OUT} x: NC

| | |
|--|--|
| <p>LM317MG-AA3-R</p> <p>(1)Packing Type (2)Package Type (3)Green Package</p> | <p>(1) R: Tape Reel, T: Tube (2) AA3: SOT-223, TA3: TO-220, TN3: TO-252, TQ2: TO-263, S08: SOP-8 (3) G: Halogen Free and Lead Free, L: Lead Free</p> |
|--|--|

MARKING

| PACKAGE | MARKING |
|----------------------------|--|
| SOT-223 | <p>L: Lead Free G: Halogen Free Date Code</p> <p>1</p> |
| TO-220 TO-252 TO-263 | <p>UTC LM317M</p> <p>L: Lead Free G: Halogen Free Date Code</p> <p>Lot Code</p> <p>1</p> |
| SOP-8 | <p>8 7 6 5</p> <p>UTC LM317M</p> <p>Date Code L: Lead Free G: Halogen Free Lot Code</p> <p>1 2 3 4</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 | W |
| Junction Temperature | T_J | +150 | °C |
| Operating Temperature | T_{OPR} | -40 ~ +85 | °C |
| Storage Temperature | T_{STG} | -40 ~ +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 | θ_{JA} | SOT-223 | 165 | °C/W |
| | | SOP-8 | 175 | |
| | | TO-220/TO-263 | 65 | |
| | | TO-252 | 112 | |
| Junction to Case | θ_{JC} | SOT-223 | 24 | °C/W |
| | | SOP-8 | 27 | |
| | | TO-220/TO-263 | 5.5 | |
| | | TO-252 | 13 | |

■ 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 | $\Delta V_{OUT}/V_{OUT}$ | $3V \leq V_{IN}-V_{OUT} \leq 40V$ | | 0.01 | 0.04 | %/V | |
| Load Regulation | ΔV_{OUT} | $10mA \leq I_{OUT} \leq 0.5A$ | | $V_{OUT} \leq 5V$ | 5 | 25 | mV |
| | | | | $V_{OUT} \geq 5V$ | 0.1 | 0.5 | % |
| Adjustable Pin Current | I_{ADJ} | | | 50 | 100 | μA | |
| Adjustable Pin Current Change | ΔI_{ADJ} | $3V \leq V_{IN}-V_{OUT} \leq 40V$, $10mA \leq I_{OUT} \leq 0.5A$, $P_D < 7.5W$ | | 0.2 | 5 | μA | |
| Reference Voltage | V_{REF} | $3V \leq V_{IN}-V_{OUT} \leq 40V$, $10mA \leq I_{OUT} \leq 0.5A$, $P_D < 7.5W$ | 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 | $I_{L(MIN)}$ | $V_{IN}-V_{OUT}=40V$ | | 3.5 | 10 | mA | |
| Maximum Output Current | $I_{O(MAX)}$ | $V_{IN}-V_{OUT}=40V$, $P_D \leq 7.5W$ | 0.1 | 0.2 | | A | |
| RMS Noise vs. % of V_{OUT} | eN | $10Hz \leq f \leq 10KHz$ | | 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

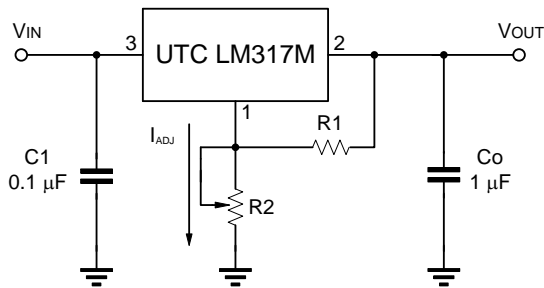


Fig.1 Programmable voltage regulator

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

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

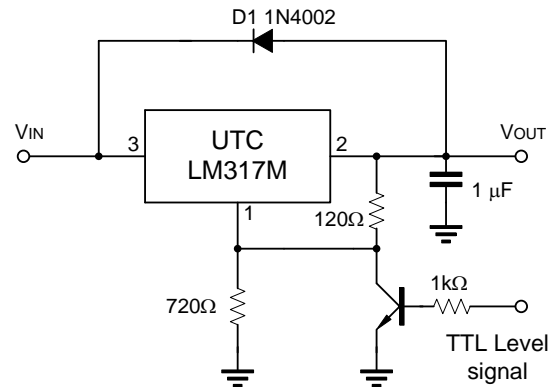


Fig.2 Regulator with On-off control

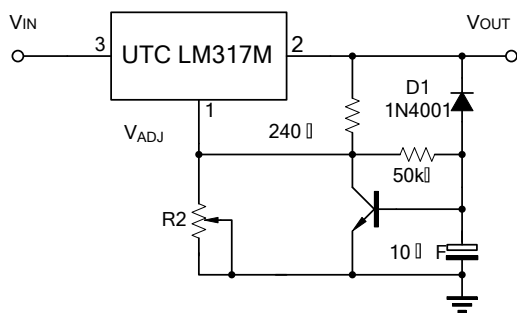
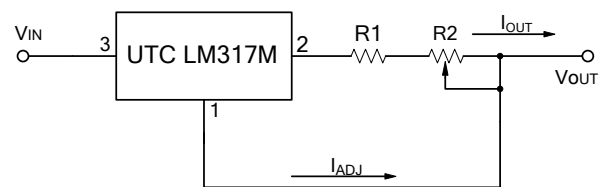


Fig.3 Soft Start Application



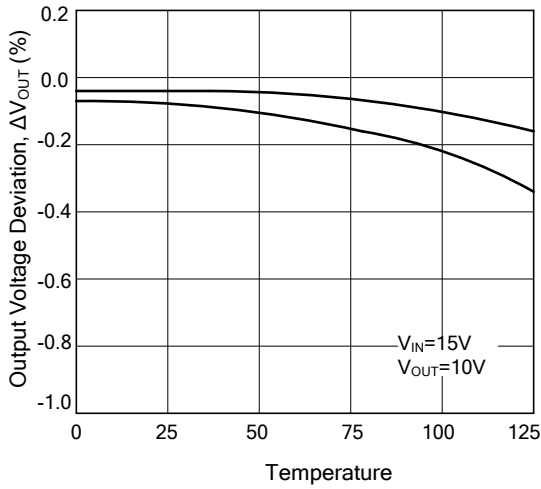
$$I_{O(MAX)} = \left(\frac{V_{REF}}{R1} \right) + I_{ADJ} = \frac{1.25V}{R1}$$

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

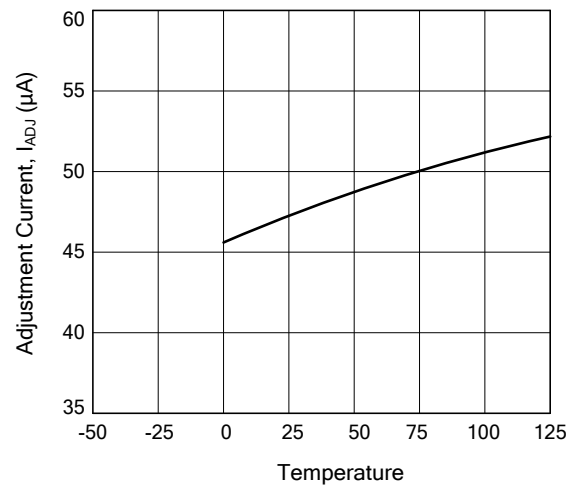
Fig.4 Constant Current Application

TYPICAL CHARACTERISTICS

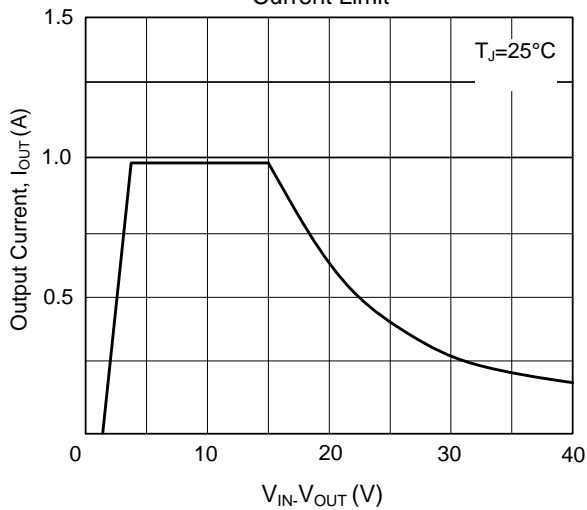
Load Regulation vs. temperature



Adjustment Current vs. Temperature



Current Limit



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