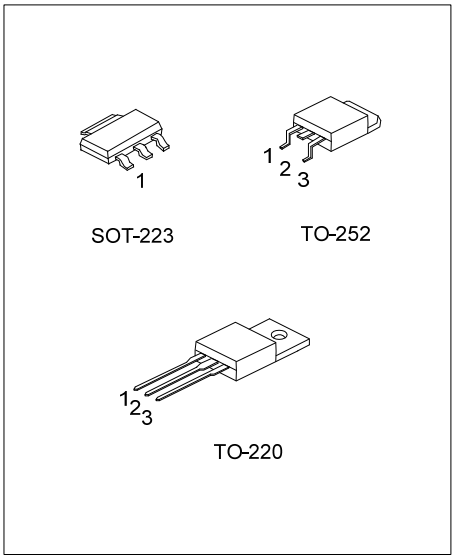
# LM317M

**LINEAR INTEGRATED CIRCUIT**

# MEDIUM CURRENT 1.2V TO 37V ADJUSTABLE VOLTAGE REGULATOR




Lead-free: LM317ML
Halogen-free: LM317MG

## ■ 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 | Halogen Free | | 1 | 2 | 3 | |
| LM317M-AA3-R | LM317ML-AA3-R | LM317MG-AA3-R | SOT-223 | ADJ | O | I | Tape Reel |
| LM317M-TA3-T | LM317ML-TA3-T | LM317MG-TA3-T | TO-220 | ADJ | O | I | Tube |
| LM317M-TN3-R | LM317ML-TN3-R | LM317MG-TN3-R | TO-252 | ADJ | O | I | Tape Reel |
| LM317M-TN3-T | LM317ML-TN3-T | LM317MG-TN3-T | TO-252 | ADJ | O | I | Tube |

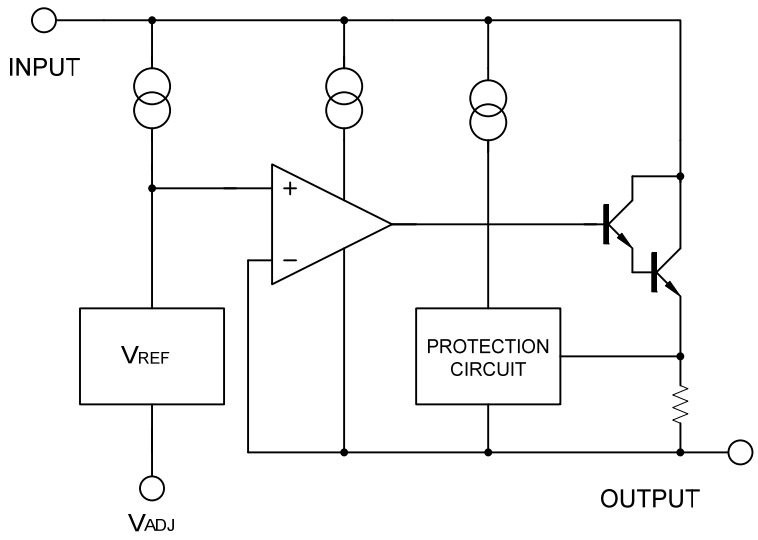
Note: Pin Assignment: I:$V_{IN}$ O:$V_{OUT}$

LM317ML-AA3-R

(1)Packing Type
(2)Package Type
(3)Lead Plating

(1) R: Tape Reel, T: Tube
(2) AA3: SOT-223, TA3: TO-220, TN3: TO-252
(3) L: Halogen Free, K: Lead Free, Blank: Pb/Sn

## ■ 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 | $T_J$ | +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.

## ■ THERMAL DATA

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|---|---|---|---|---|
| Junction-to-Ambient | SOT-223 | $\theta_{JA}$ | 245 | ℃/W |
| | TO-220 | | 70 | |
| | TO-252 | | 92 | |
| Junction-to-Case | SOT-223 | $\theta_{JC}$ | 15 | ℃/W |
| | TO-220 | | 5 | |
| | TO-252 | | 5 | |

## ■ ELECTRICAL CHARACTERISTICS

($V_{IN}$-$V_{OUT}$=5V, $I_{OUT}$=0.1A, Ta=25℃, unless otherwise specified.)

| PARAMETER | SYMBOL | TEST CONDITIONS | | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| Line Regulation | $\Delta V_{OUT}/V_{OUT}$ | $3V \leqq V_{IN}$-$V_{OUT} \leqq 40V$ | | | 0.01 | 0.04 | %/V |
| Load Regulation | $\Delta V_{OUT}$ | $10mA \leqq I_{OUT} \leqq 0.5A$ | $V_{OUT} \leqq 5V$ | | 5 | 25 | mV |
| | | | $V_{OUT} \geqq 5V$ | | 0.1 | 0.5 | % |
| Adjustable Pin Current | $I_{ADJ}$ | | | | 50 | 100 | μA |
| Adjustable Pin Current Change | $\Delta I_{ADJ}$ | $3V \leqq V_{IN}$-$V_{OUT} \leqq 40V$, $10mA \leqq I_{OUT} \leqq 0.5A$, $P_D < 7.5W$ | | | 0.2 | 5 | μA |
| Reference Voltage | $V_{REF}$ | $3V \leqq V_{IN}$-$V_{OUT} \leqq 40V$, $10mA \leqq I_{OUT} \leqq 0.5A$, $P_D < 7.5W$ | | 1.20 | 1.25 | 1.30 | V |
| Temperature Stability | | $T_{MIN} \leqq T_J \leqq T_{MAX}$ | | | 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, $P_D \leqq 7.5W$ | | 0.1 | 0.2 | | A |
| RMS Noise vs. %of $V_{OUT}$ | eN | $10H_Z \leqq f \leqq 10KH_Z$ | | | 0.003 | | $\%/V_{OUT}$ |
| Ripple Rejection | RR | $V_{OUT}$=10V,f=120$H_Z$ | $C_{ADJ}$=0 | | 65 | | dB |
| | | | $C_{ADJ}$=10μF | 66 | 80 | | |

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

## ■ APPLICATION CIRCUITS

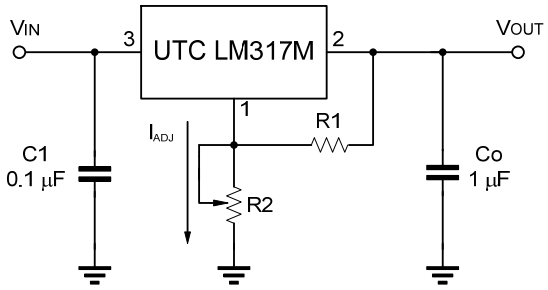



Fig.1 Programmable voltage regulator

$V_{OUT}$= 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.

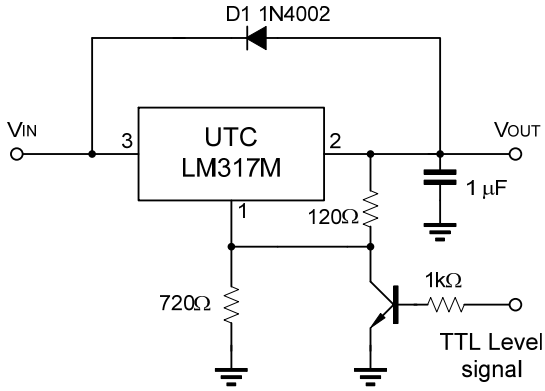



Fig.2 Regulator with On-off control

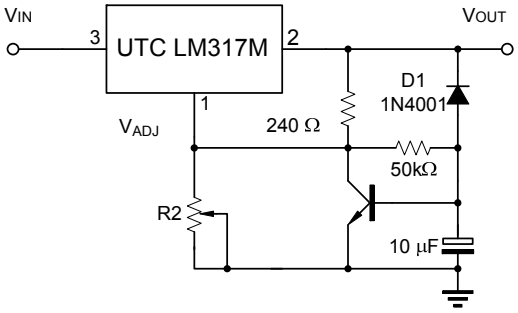
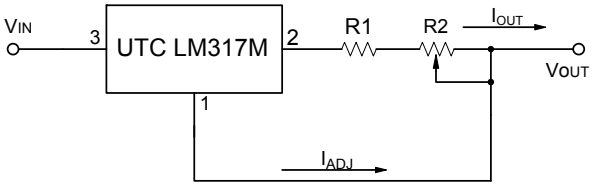



Fig.3 Soft Start Application




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

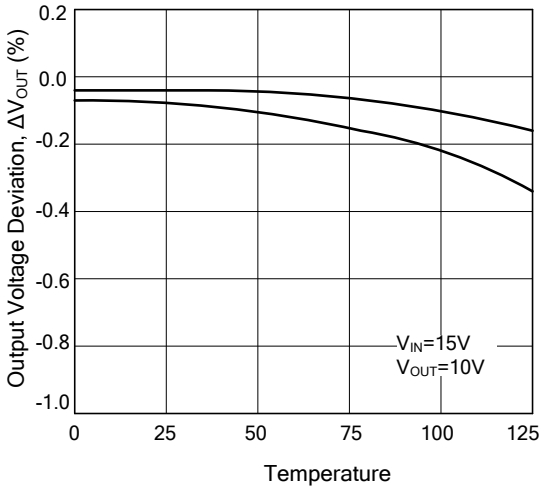
$I_{O(MIN)}=(\frac{V_{REF}}{R1+R2})+I_{ADJ}=\frac{1.25V}{R1+R2}$

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

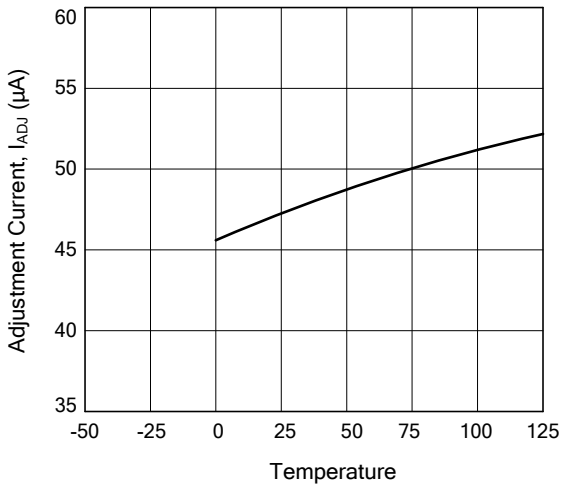
Fig.4 Constant Current Application

## ■ TYPICAL CHARACTERISTICS

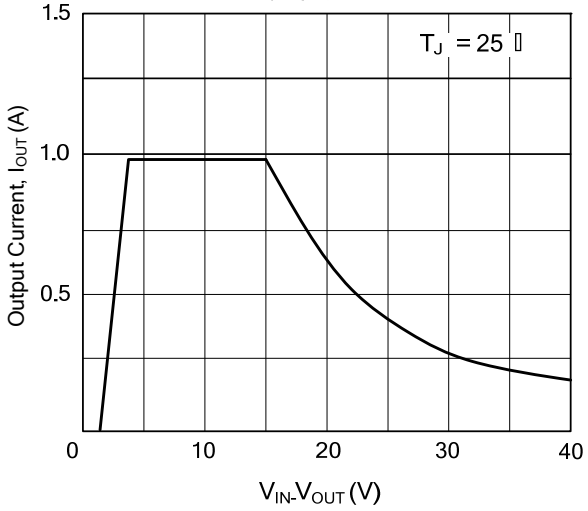
Load Regulation vs. temperature




Adjustment Current vs. Temperature




Current Limit




Minimum Operating Current