



## LM317M

## LINEAR INTEGRATED CIRCUIT

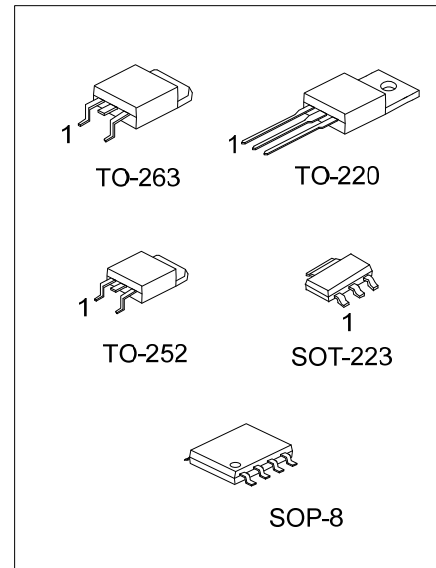
### MEDIUM CURRENT 1.2V TO 37V ADJUSTABLE VOLTAGE REGULATOR

#### 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	
-	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
-	LM317MG-S08-R	SOP-8	I	O	O	ADJ	x	O	O	x	Tape Reel

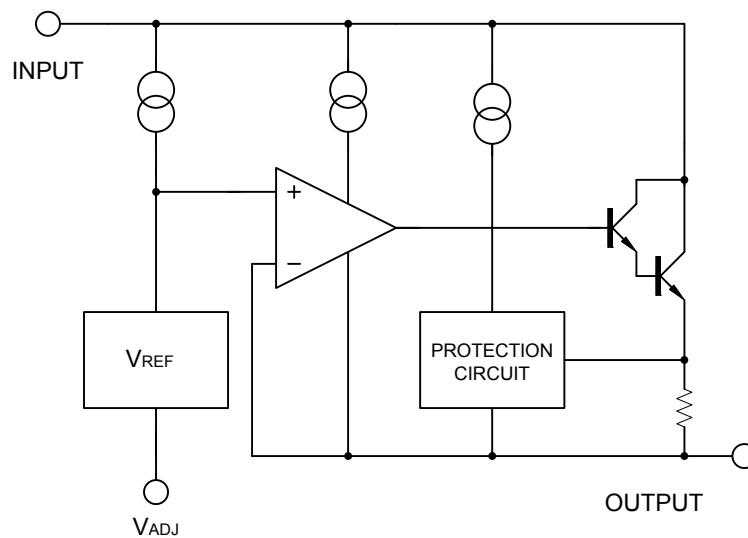
Note: Pin Assignment: I:V<sub>IN</sub> O:V<sub>OUT</sub> x: NC

<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>
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## MARKING

PACKAGE	MARKING
SOT-223	
TO-220 TO-252 TO-263	
SOP-8	

## 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	°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	$\theta_{JA}$	SOT-223	165	°C/W
		SOP-8	175	
		TO-220/TO-263	65	
		TO-252	112	
Junction to Case	$\theta_{JC}$	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	$\Delta V_{OUT}$	$10mA \leq I_{OUT} \leq 0.5A$		$V_{OUT} \leq 5V$	5	25	mV
				$V_{OUT} \geq 5V$	0.1	0.5	%
Adjustable Pin Current	$I_{ADJ}$			50	100	$\mu A$	
Adjustable Pin Current Change	$\Delta I_{ADJ}$	$3V \leq V_{IN}-V_{OUT} \leq 40V$ , $10mA \leq I_{OUT} \leq 0.5A$ , $P_D < 7.5W$		0.2	5	$\mu A$	
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 <sub>OUT</sub>	
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 <sub>OUT</sub>	
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

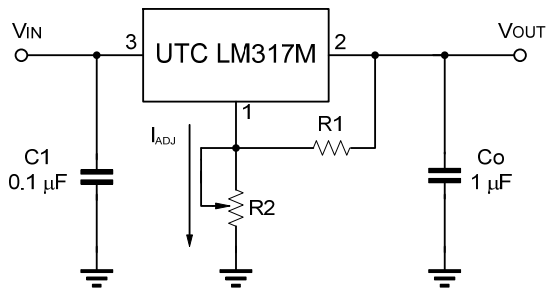


Fig.1 Programmable voltage regulator

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

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

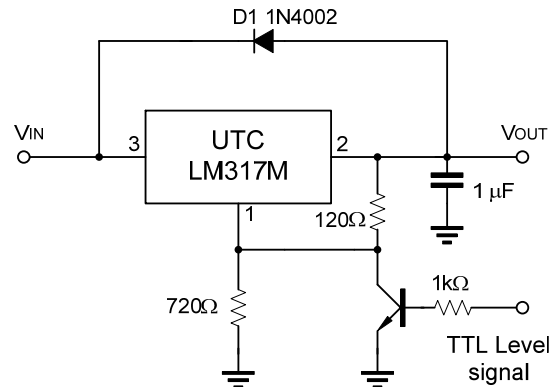


Fig.2 Regulator with On-off control

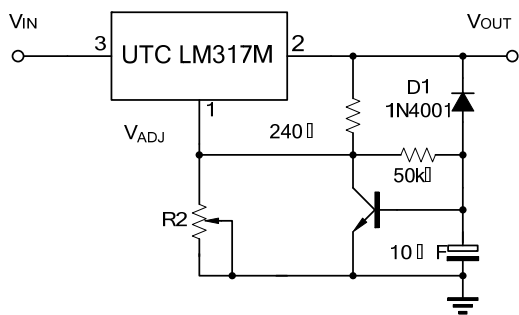
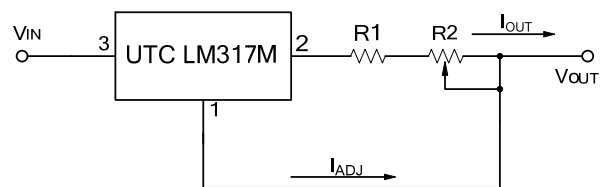


Fig.3 Soft Start Application



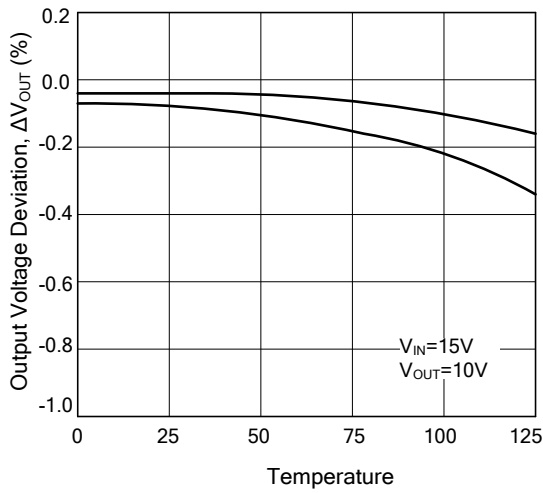
$$I_{O(MAX)} = \left( \frac{V_{REF}}{R1} \right) + I_{ADJ} = \frac{1.25V}{R1}$$

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

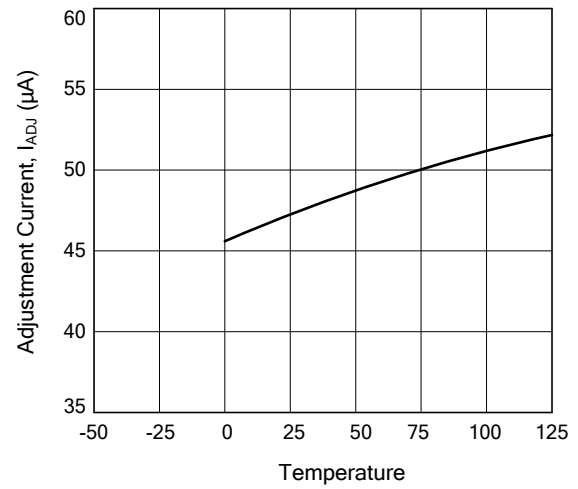
Fig.4 Constant Current Application

### TYPICAL CHARACTERISTICS

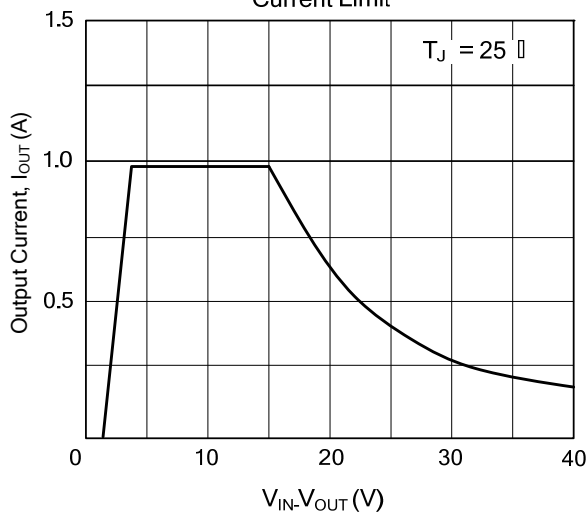
Load Regulation vs. temperature



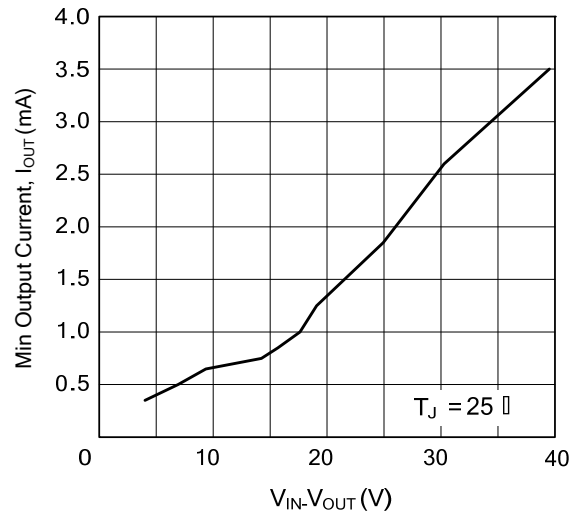
Adjustment Current vs. Temperature



Current Limit



Minimum Operating Current



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