



# LM317

## LINEAR INTEGRATED CIRCUIT

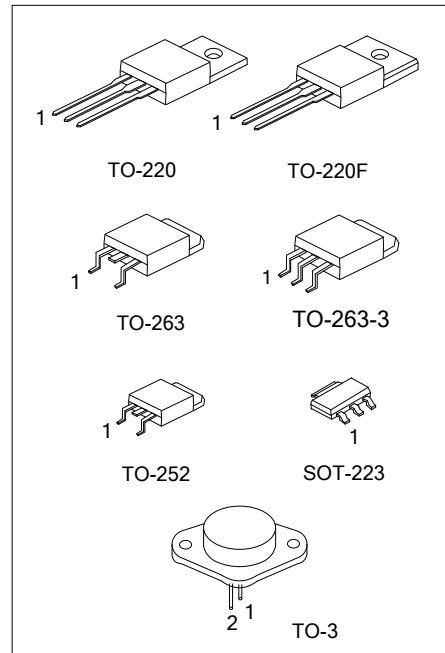
**HIGH CURRENT 1.3V TO 37V  
ADJUSTABLE VOLTAGE  
REGULATOR**

■ **DESCRIPTION**

The UTC **LM317** is an adjustable 3-terminal positive voltage regulator, designed to supply 1A of output current with voltage adjustable from 1.3V ~ 37V.

■ **FEATURES**

- \*Output voltage adjustable from 1.3V ~ 37V
- \*Output current in excess of 1A
- \*Internal short circuit protection.
- \*Internal over temperature protection.
- \*Output transistor safe area compensation



■ **ORDERING INFORMATION**

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
LM317K-AA3-R	LM317G-AA3-R	SOT-223	ADJ	O	I	Tape Reel
LM317K-TA3-T	LM317G-TA3-T	TO-220	ADJ	O	I	Tube
LM317K-TF3-T	LM317G-TF3-T	TO-220F	ADJ	O	I	Tube
LM317K-TN3-R	LM317G-TN3-R	TO-252	ADJ	O	I	Tape Reel
LM317K-TQ2-R	LM317G-TQ2-R	TO-263	ADJ	O	I	Tape Reel
LM317K-TQ2-T	LM317G-TQ2-T	TO-263	ADJ	O	I	Tube
LM317K-TQ3-R	LM317G-TQ3-R	TO-263-3	ADJ	O	I	Tape Reel
LM317K-TQ3-T	LM317G-TQ3-T	TO-263-3	ADJ	O	I	Tube
LM317K-T30-Y	LM317G-T30-Y	TO-3	I	ADJ	O	Tray

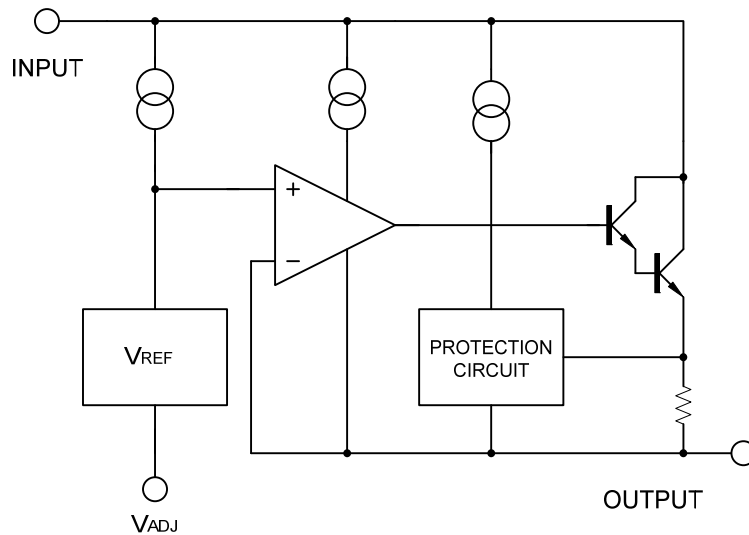
Note: 1. Pin Assignment: I:V<sub>IN</sub> O:V<sub>OUT</sub>  
2. Pin 3 on TO-3 is case

<p>LM317K-AA3-R</p> <p>(1)Packing Type (2)Package Type (3)Lead Plating</p>	<p>(1) R: Tape Reel, T: Tube, Y: Tray (2) AA3: SOT-223, TA3: TO-220, TF3: TO-220F, TN3: TO-252, TQ2: TO-263, TQ3: TO-263-3 T30: TO-3 (3) G: Halogen Free, K: Lead Free</p>
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### MARKING INFORMATION

PACKAGE	MARKING
SOT-223	<p>LM317 □ □□□ 1</p> <p>K: Lead Free G: Halogen Free Data Code</p>
TO-220 TO-220F TO-252 TO-263 TO-263-3	<p>UTC LM317 □ □□□□□ 1</p> <p>Lot Code ←</p> <p>K: Lead Free G: Halogen Free Data Code</p>
TO-3	<p>UTC LM317 □ □□□</p> <p>K: Lead Free G: Halogen Free Data Code</p>

### BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub>=25°C, unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Input - Output Voltage Difference	V <sub>IN</sub> -V <sub>OUT</sub>	40	V
Power Dissipation	P <sub>D</sub>	Internal limited	
Junction Temperature	T <sub>J</sub>	+125	°C
Operating Temperature	T <sub>OPR</sub>	-40 ~ +85	°C
Storage Temperature	T <sub>STG</sub>	-40 ~ +150	°C

Note:1. Absolute maximum ratings are stress ratings only and functional device operation is not implied. The device could be damaged beyond Absolute maximum ratings.

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction-to-Ambient	θ <sub>JA</sub>	TO-252	112
		TO-220/TO-220F	65
		TO-263/TO-263-3	
		SOT-223	165
	TO-3	35	
Junction-to-Case	θ <sub>JC</sub>	TO-252	12
		TO-220/TO-263	5
		TO-263-3	
		TO-220F	7.8
		SOT-223	23
		TO-3	3

■ ELECTRICAL CHARACTERISTICS

(V<sub>IN</sub>-V<sub>OUT</sub>=5V, I<sub>OUT</sub>=10mA, T<sub>A</sub>=25°C, unless otherwise specified.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Line Regulation	ΔV <sub>OUT</sub> /V <sub>OUT</sub>	3V ≅ V <sub>IN</sub> -V <sub>OUT</sub> ≅ 40V		0.01	0.04	%/V
Load Regulation	ΔV <sub>OUT</sub>	10mA ≅ I <sub>OUT</sub> ≅ 1A	V <sub>OUT</sub> ≅ 5V	5	25	mV
			V <sub>OUT</sub> ≅ 5V	0.1	0.5	%
Adjustable Pin Current	I <sub>ADJ</sub>			50	100	μA
Adjustable Pin Current Change	ΔI <sub>ADJ</sub>	3V ≅ V <sub>IN</sub> -V <sub>OUT</sub> ≅ 40V, 10mA ≅ I <sub>OUT</sub> ≅ 1A, P <sub>D</sub> ≅ 20W		0.2	5	μA
Reference Voltage	V <sub>REF</sub>	3V ≅ V <sub>IN</sub> -V <sub>OUT</sub> ≅ 40V, 10mA ≅ I <sub>OUT</sub> ≅ 1A, P <sub>D</sub> ≅ 20W	1.20	1.25	1.30	V
Temperature Stability		T <sub>MIN</sub> ≅ T <sub>J</sub> ≅ T <sub>MAX</sub>		0.7		%/V <sub>OUT</sub>
Minimum Load Current for Regulation	I <sub>L(MIN)</sub>	V <sub>IN</sub> -V <sub>OUT</sub> =40V		3.5	10	mA
Maximum Output Current	I <sub>O(MAX)</sub>	V <sub>IN</sub> -V <sub>OUT</sub> =40V, P <sub>D</sub> ≅ 20W	0.2	0.3		A
RMS Noise vs. % of V <sub>OUT</sub>	eN	10Hz ≅ f ≅ 10KHz		0.003		%/V <sub>OUT</sub>
Ripple Rejection	RR	V <sub>OUT</sub> =10V, f=120Hz	C <sub>ADJ</sub> =0	65		dB
			C <sub>ADJ</sub> =10μF	66	80	

Note: C<sub>ADJ</sub> is connected between Adjust pin and Ground.

## APPLICATION CIRCUITS

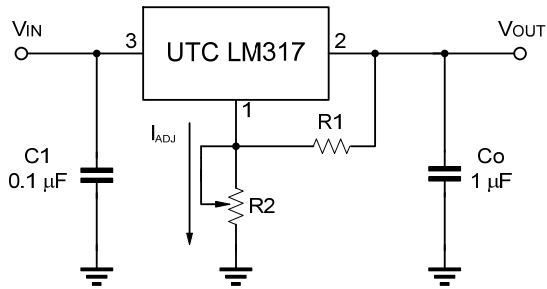


Fig.1 Programmable voltage regulator

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

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

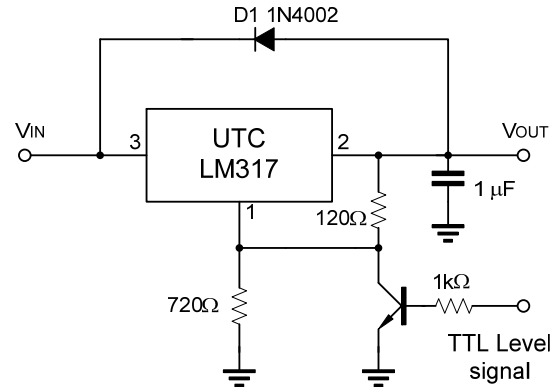


Fig.2 Regulator with On-off control

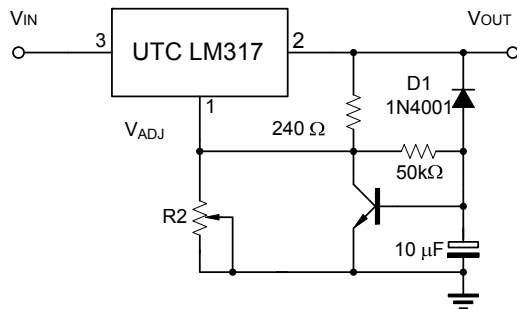
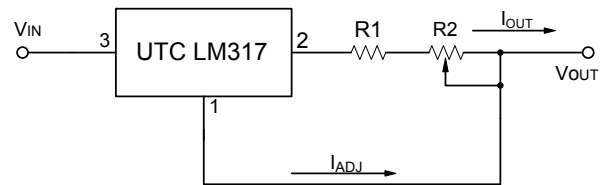


Fig.3 Soft Start Application



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

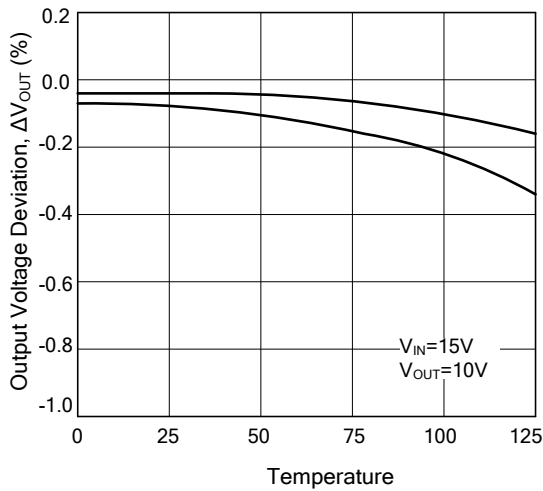
$$I_{O(MIN)} = \left( \frac{V_{REF}}{R1+R2} \right) + I_{ADJ} = \frac{1.25V}{R1+R2}$$

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

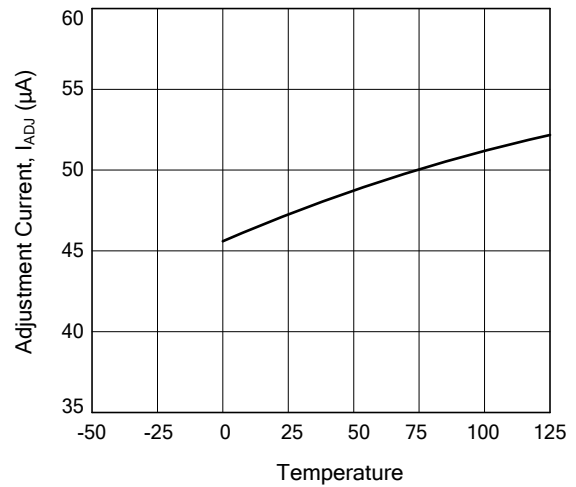
Fig.4 Constant Current Application

## TYPICAL CHARACTERISTICS

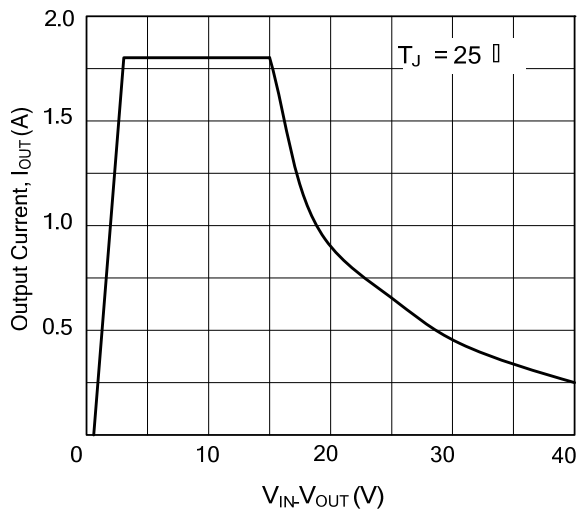
Load Regulation vs. temperature



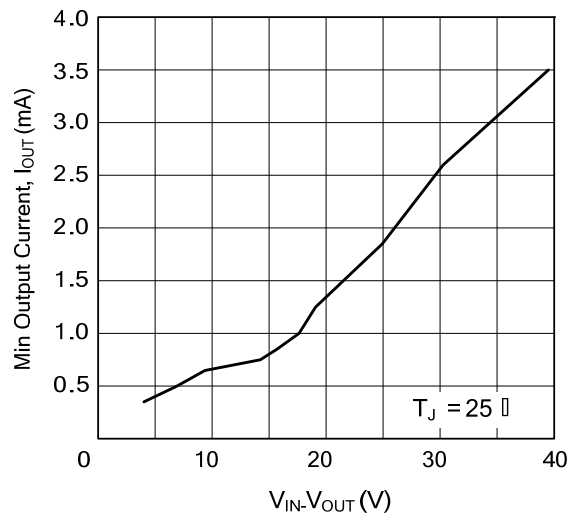
Adjustment Current vs. Temperature



Current Limit



Minimum Operating Current



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