



# LM317

## LINEAR INTEGRATED CIRCUIT

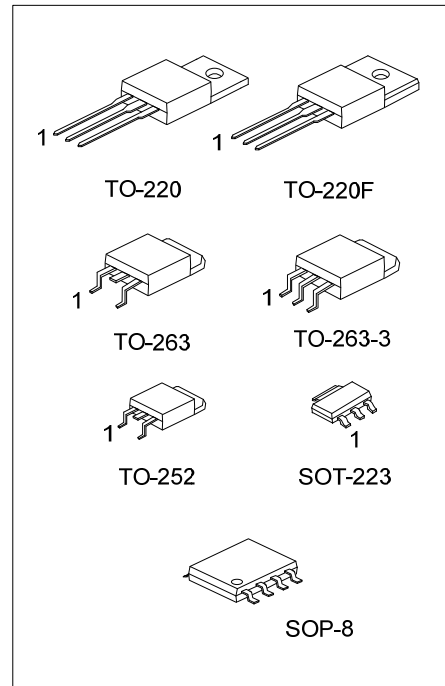
**HIGH CURRENT 1.3V TO 37V  
ADJUSTABLE VOLTAGE  
REGULATOR**

■ **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



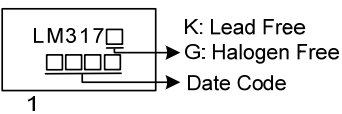
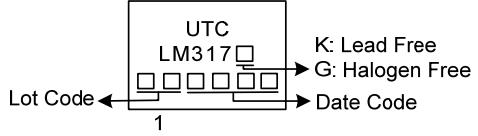
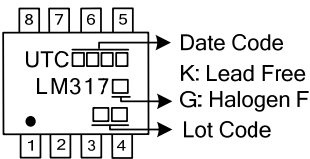
■ **ORDERING INFORMATION**

Ordering Number		Package	Pin Assignment								Packing	
Lead Free	Halogen Free		1	2	3	4	5	6	7	8		
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-T	LM317G-TQ2-T	TO-263	ADJ	O	I	-	-	-	-	-	-	Tube
LM317K-TQ2-R	LM317G-TQ2-R	TO-263	ADJ	O	I	-	-	-	-	-	-	Tape Reel
LM317K-TQ3-T	LM317G-TQ3-T	TO-263-3	ADJ	O	I	-	-	-	-	-	-	Tube
LM317K-TQ3-R	LM317G-TQ3-R	TO-263-3	ADJ	O	I	-	-	-	-	-	-	Tape Reel
LM317K-S08-R	LM317G-S08-R	SOP-8	I	O	O	ADJ	NC	O	O	NC	NC	Tape Reel

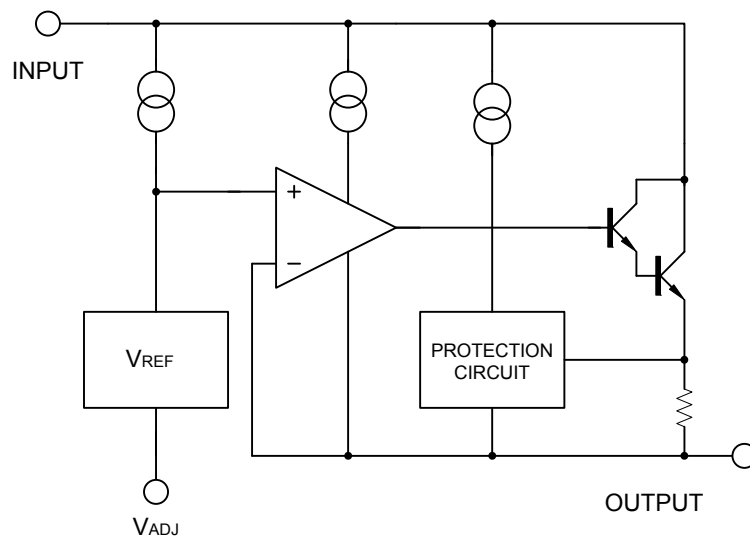
Note: Pin Assignment: I:  $V_{IN}$  O:  $V_{OUT}$

<p>LM317G-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, TF3: TO-220F, TN3: TO-252, TQ2: TO-263, TQ3: TO-263-3 S08: SOP-8 (3) G: Halogen Free and Lead Free, K: Lead Free</p>
--	--

### MARKING

PACKAGE	MARKING
SOT-223	
TO-220 TO-220F TO-252 TO-263 TO-263-3	
SOP-8	

### 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>	+150	°C
Operating Temperature	T <sub>OPR</sub>	-40 ~ +125	°C
Storage Temperature	T <sub>STG</sub>	-40 ~ +150	°C

Note: 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	°C/W
		TO-220/TO-220F	65	
		TO-263/TO-263-3		
		SOT-223	165	
	SOP-8	190		
Junction to Case	θ <sub>JC</sub>	TO-252	12	°C/W
		TO-220/TO-263	5	
		TO-263-3		
		TO-220F	7.8	
		SOT-223	23	
		SOP-8	45	

■ 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		

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

## APPLICATION CIRCUITS

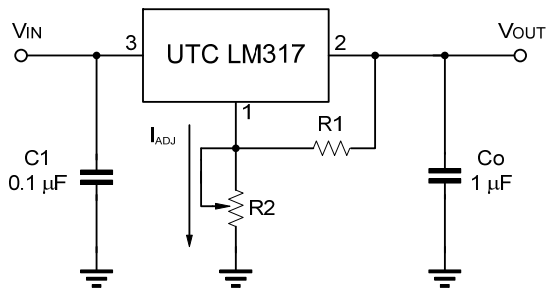


Fig.1 Programmable voltage regulator

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

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

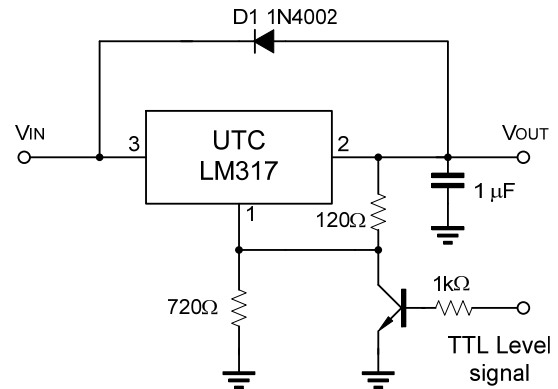


Fig.2 Regulator with On-off control

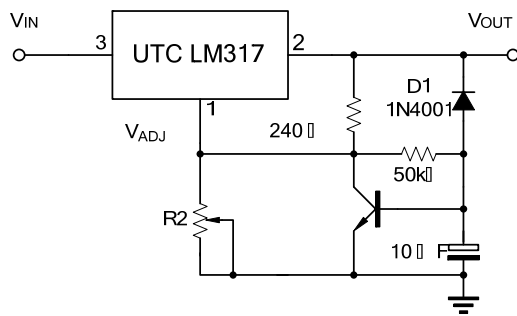
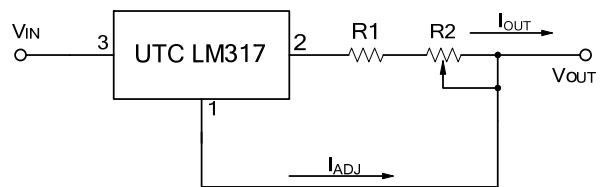


Fig.3 Soft Start Application



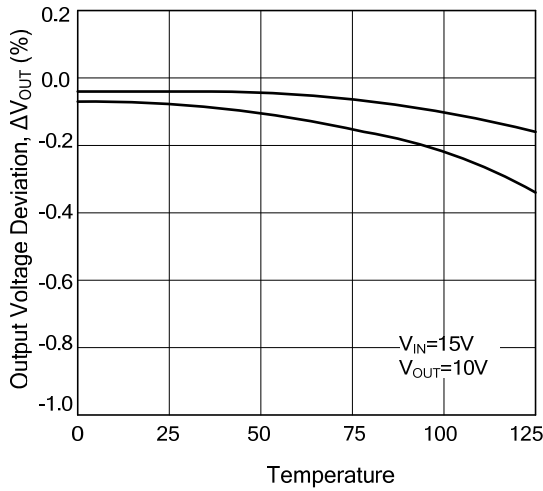
$$I_{O(MAX)} = \left( \frac{V_{REF}}{R1} \right) + I_{ADJ} = \frac{1.25V}{R1}$$

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

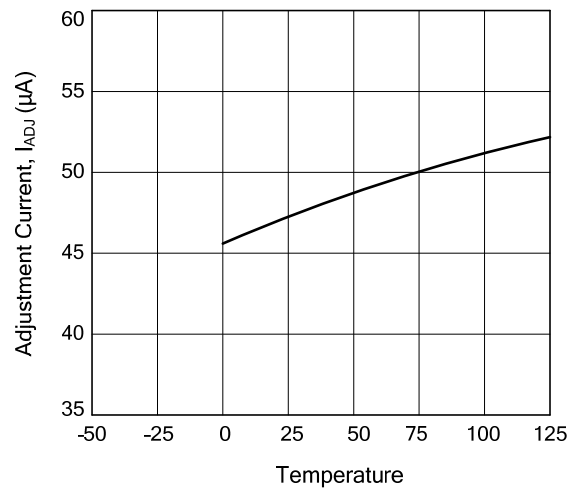
Fig.4 Constant Current Application

## TYPICAL CHARACTERISTICS

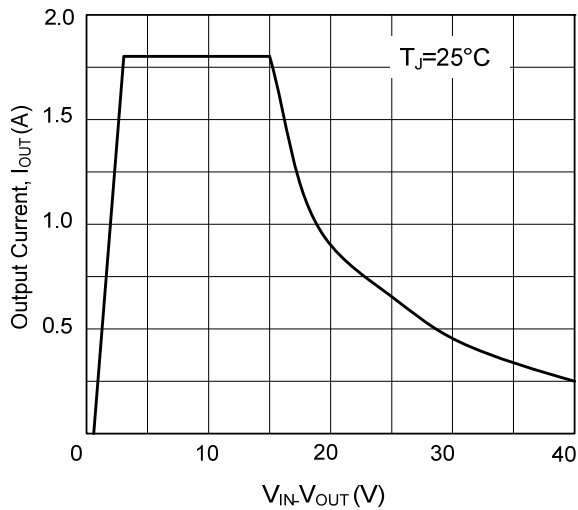
Load Regulation vs. temperature



Adjustment Current vs. Temperature



Current Limit



UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. UTC reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.