



# LM317

## LINEAR INTEGRATED CIRCUIT

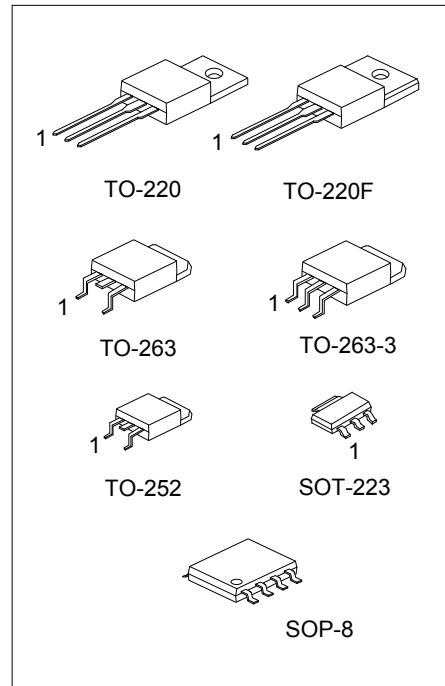
**HIGH CURRENT 1.3V TO 37V  
ADJUSTABLE VOLTAGE  
REGULATOR**

■ 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



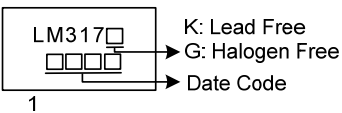
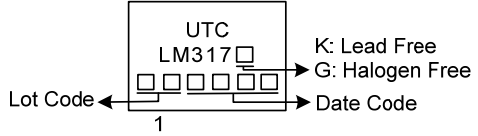
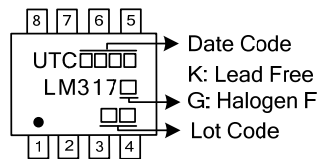
■ ORDERING INFORMATION

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	O	NC	Tape Reel

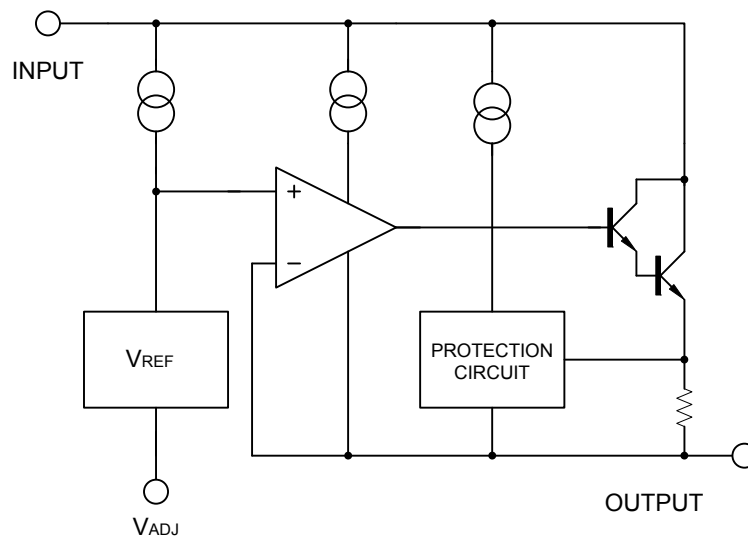
Note: Pin Assignment: I:  $V_{IN}$  O:  $V_{OUT}$

<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>
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### MARKING

PACKAGE	MARKING
SOT-223	 <p>K: Lead Free G: Halogen Free Date Code</p>
TO-220 TO-220F TO-252 TO-263 TO-263-3	 <p>UTC LM317 K: Lead Free G: Halogen Free Date Code</p> <p>Lot Code</p>
SOP-8	 <p>Date Code K: Lead Free G: Halogen F Lot Code</p>

### BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS ( $T_A=25^\circ\text{C}$ , unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Input - Output Voltage Difference	$V_{IN}-V_{OUT}$	40	V
Power Dissipation	$P_D$	Internal limited	
Junction Temperature	$T_J$	+150	$^\circ\text{C}$
Operating Temperature	$T_{OPR}$	-40 ~ +125	$^\circ\text{C}$
Storage Temperature	$T_{STG}$	-40 ~ +150	$^\circ\text{C}$

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	$\theta_{JA}$	TO-252	112	$^\circ\text{C}/\text{W}$
		TO-220/TO-220F	65	
		TO-263/TO-263-3		
		SOT-223	165	
	SOP-8	190		
Junction to Case	$\theta_{JC}$	TO-252	12	$^\circ\text{C}/\text{W}$
		TO-220/TO-263	5	
		TO-263-3		
		TO-220F	7.8	
		SOT-223	23	
		SOP-8	45	

■ ELECTRICAL CHARACTERISTICS

( $V_{IN}-V_{OUT}=5\text{V}$ ,  $I_{OUT}=10\text{mA}$ ,  $T_A=25^\circ\text{C}$ , unless otherwise specified.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Line Regulation	$\Delta V_{OUT}/V_{OUT}$	$3\text{V} \leq V_{IN}-V_{OUT} \leq 40\text{V}$		0.01	0.04	%/V
Load Regulation	$\Delta V_{OUT}$	$10\text{mA} \leq I_{OUT} \leq 1\text{A}$	$V_{OUT} \leq 5\text{V}$	5	25	mV
			$V_{OUT} \geq 5\text{V}$	0.1	0.5	%
Adjustable Pin Current	$I_{ADJ}$			50	100	$\mu\text{A}$
Adjustable Pin Current Change	$\Delta I_{ADJ}$	$3\text{V} \leq V_{IN}-V_{OUT} \leq 40\text{V}$ , $10\text{mA} \leq I_{OUT} \leq 1\text{A}$ , $P_D \leq 20\text{W}$		0.2	5	$\mu\text{A}$
Reference Voltage	$V_{REF}$	$3\text{V} \leq V_{IN}-V_{OUT} \leq 40\text{V}$ , $10\text{mA} \leq I_{OUT} \leq 1\text{A}$ , $P_D \leq 20\text{W}$	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	$I_{L(MIN)}$	$V_{IN}-V_{OUT}=40\text{V}$		3.5	10	mA
Maximum Output Current	$I_{O(MAX)}$	$V_{IN}-V_{OUT}=40\text{V}$ , $P_D \leq 20\text{W}$	0.2	0.3		A
RMS Noise vs. % of $V_{OUT}$	eN	$10\text{Hz} \leq f \leq 10\text{KHz}$		0.003		%/ $V_{OUT}$
Ripple Rejection	RR	$V_{OUT}=10\text{V}$ , $f=120\text{Hz}$	$C_{ADJ}=0$	65		dB
			$C_{ADJ}=10\mu\text{F}$	66	80	

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

## APPLICATION CIRCUITS

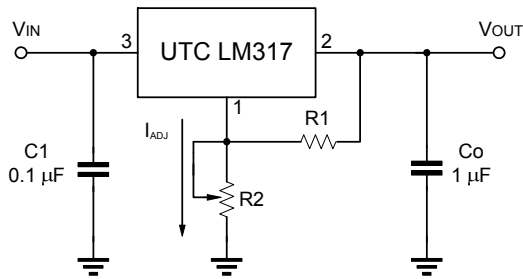


Fig.1 Programmable voltage regulator

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

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

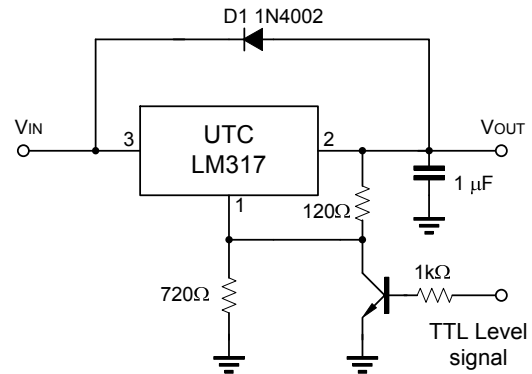


Fig.2 Regulator with On-off control

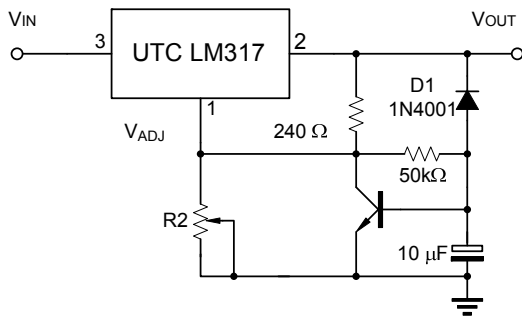
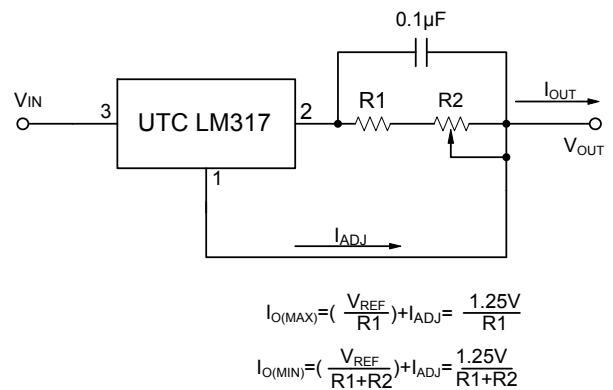


Fig.3 Soft Start Application



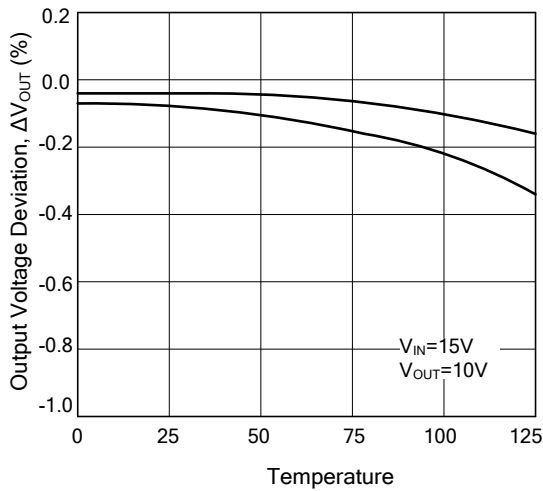
$$I_{O(MAX)} = \left( \frac{V_{REF}}{R1} \right) + I_{ADJ} = \frac{1.25V}{R1}$$

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

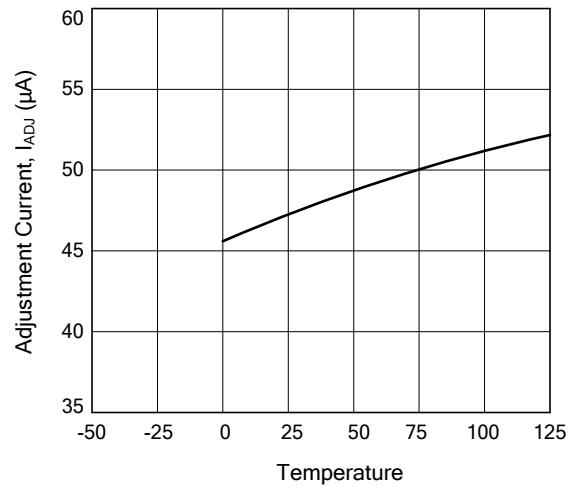
Fig.4 Constant Current Application

## TYPICAL CHARACTERISTICS

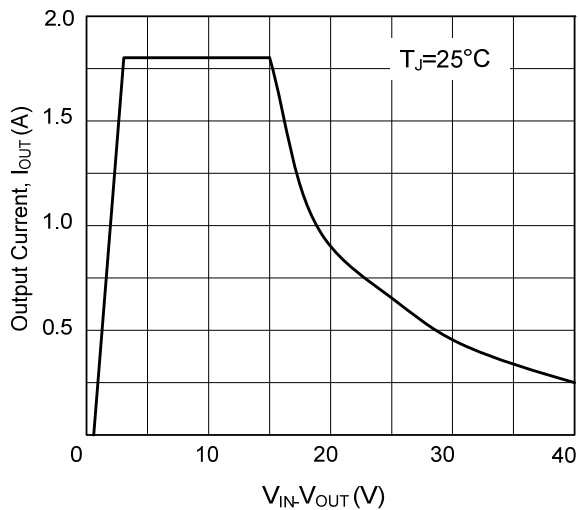
Load Regulation vs. temperature



Adjustment Current vs. Temperature



Current Limit



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