



# LM317

## LINEAR INTEGRATED CIRCUIT

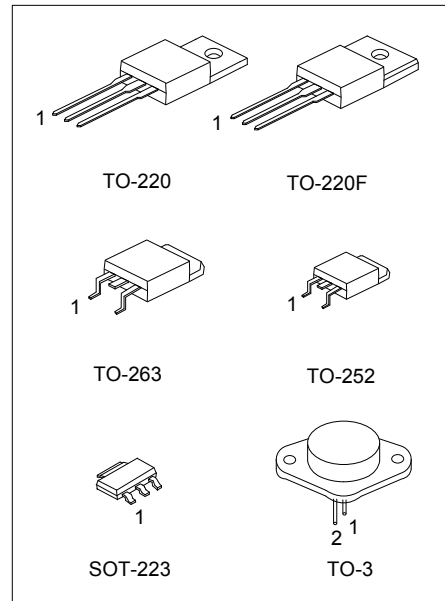
### HIGH CURRENT 1.3V TO 37V ADJUSTABLE VOLTAGE REGULATOR

#### 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



Lead-free: LM317K  
Halogen-free: LM317G

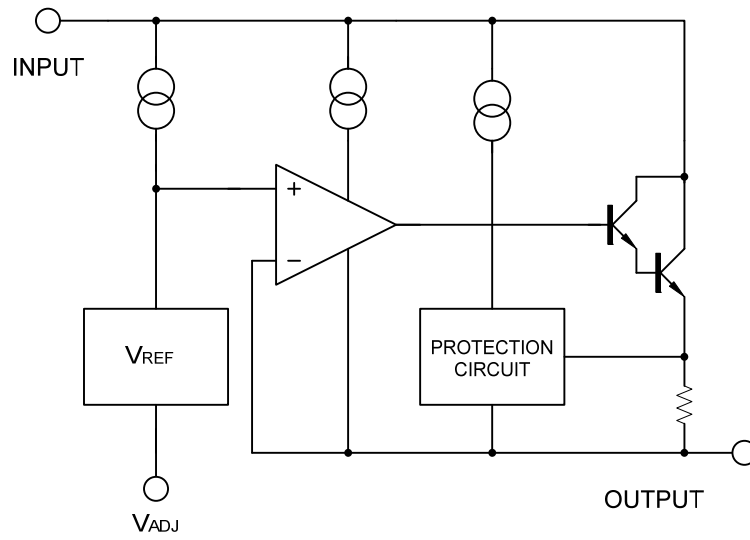
#### ORDERING INFORMATION

Ordering Number			Package	Pin Assignment			Packing
Normal	Lead Free	Halogen Free		1	2	3	
LM317-AA3-R	LM317K-AA3-R	LM317G-AA3-R	SOT-223	ADJ	O	I	Tape Reel
LM317-TA3-T	LM317K-TA3-T	LM317G-TA3-T	TO-220	ADJ	O	I	Tube
LM317-TF3-T	LM317K-TF3-T	LM317G-TF3-T	TO-220F	ADJ	O	I	Tube
LM317-TN3-R	LM317K-TN3-R	LM317G-TN3-R	TO-252	ADJ	O	I	Tape Reel
LM317-TN3-T	LM317K-TN3-T	LM317G-TN3-T	TO-252	ADJ	O	I	Tube
LM317-TQ2-R	LM317K-TQ2-R	LM317G-TQ2-R	TO-263	ADJ	O	I	Tape Reel
LM317-TQ2-T	LM317K-TQ2-T	LM317G-TQ2-T	TO-263	ADJ	O	I	Tube
LM317-T30-Y	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) R: Tape Reel, T: Tube, Y: Tray (2) AA3: SOT-223, TA3: TO-220, TF3: TO-220F, TN3: TO-252, TQ2: TO-263, T30: TO-3 (3) G: Halogen Free, K: Lead Free, Blank: Pb/Sn</p>
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■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C, unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Input - Output Voltage Difference	V <sub>IN-V<sub>OUT</sub></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	TO-252	112	°C/W
	TO-220/TO-220F	54	
	TO-263	64	
	SOT-223	165	
	TO-3	35	
Junction-to-Case	TO-252	12	°C/W
	TO-220/TO-220F	5	
	TO-263	5	
	SOT-223	23	
	TO-3	3	

■ ELECTRICAL CHARACTERISTICS

(V<sub>IN-V<sub>OUT</sub></sub>=5V, I<sub>OUT</sub>=10mA, Ta=25°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	$\Delta V_{OUT}$	$10mA \leq I_{OUT} \leq 1A$	$V_{OUT} \leq 5V$	5	25	mV
			$V_{OUT} \geq 5V$	0.1	0.5	%
Adjustable Pin Current	I <sub>ADJ</sub>			50	100	μA
Adjustable Pin Current Change	$\Delta I_{ADJ}$	$3V \leq V_{IN-V_{OUT}} \leq 40V$ , $10mA \leq I_{OUT} \leq 1A$ , P <sub>D</sub> ≤ 20W		0.2	5	μA
Reference Voltage	V <sub>REF</sub>	$3V \leq V_{IN-V_{OUT}} \leq 40V$ , $10mA \leq I_{OUT} \leq 1A$ , 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-V<sub>OUT</sub></sub> =40V		3.5	10	mA
Maximum Output Current	I <sub>O(MAX)</sub>	V <sub>IN-V<sub>OUT</sub></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

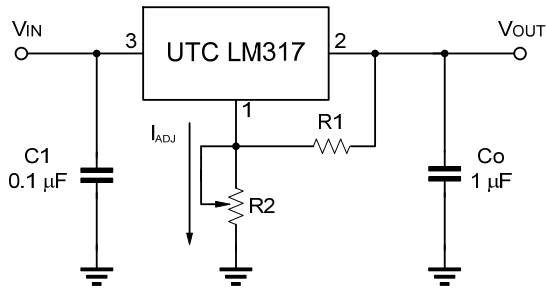


Fig.1 Programmable voltage regulator

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

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

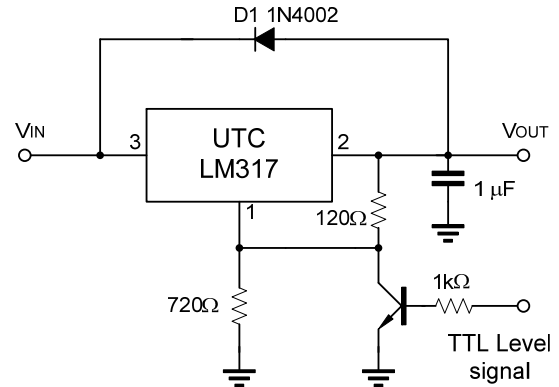


Fig.2 Regulator with On-off control

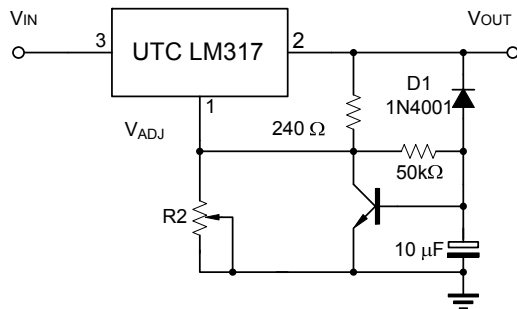
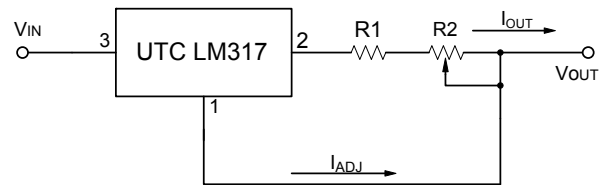


Fig.3 Soft Start Application



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

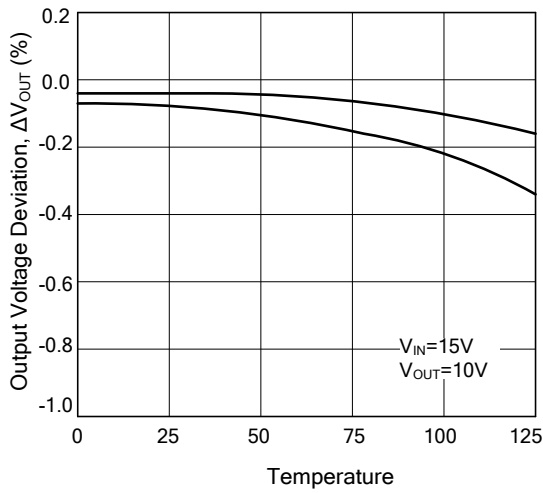
$$I_{O(MIN)} = \left( \frac{V_{REF}}{R1+R2} \right) + I_{ADJ} = \frac{1.25V}{R1+R2}$$

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

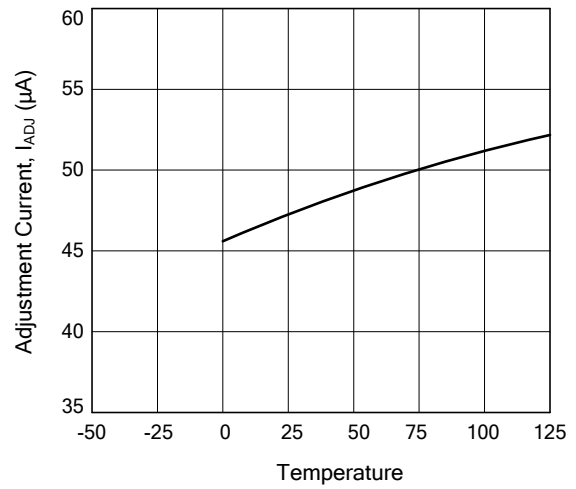
Fig.4 Constant Current Application

## TYPICAL CHARACTERISTICS

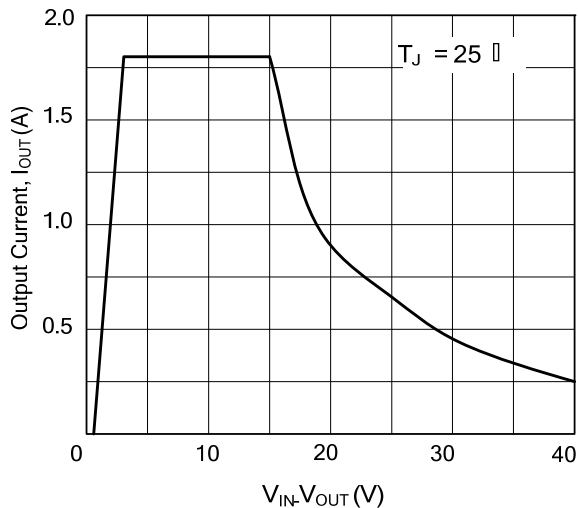
Load Regulation vs. temperature



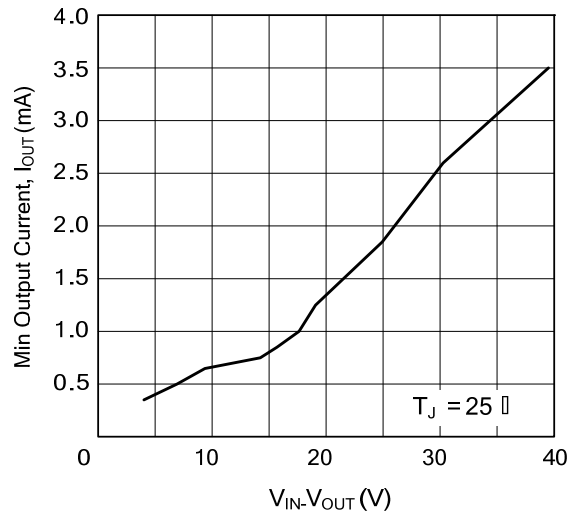
Adjustment Current vs. Temperature



Current Limit



Minimum Operating Current



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