



LM317

LINEAR INTEGRATED CIRCUIT

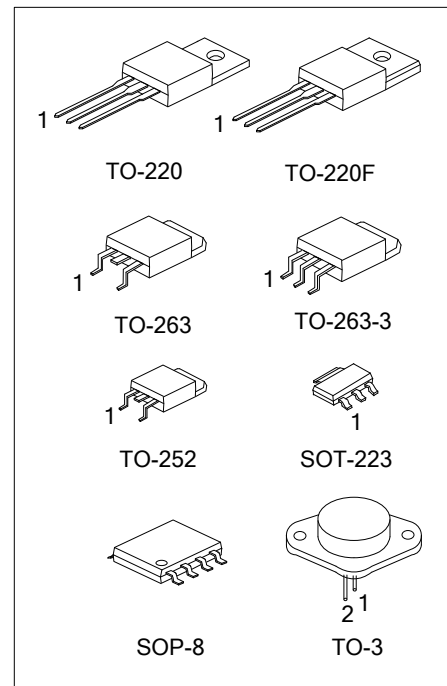
HIGH CURRENT 1.3V TO 37V ADJUSTABLE VOLTAGE REGULATOR

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



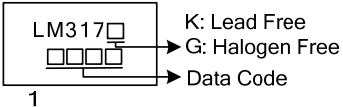
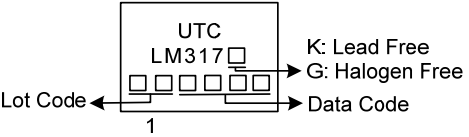
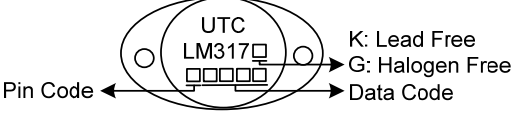
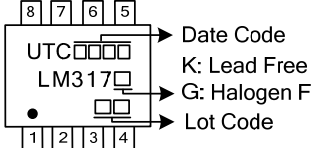
ORDERING INFORMATION

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-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
LM317K-T30-A-Y	LM317G-T30-A-Y	TO-3	ADJ	I	O	-	-	-	-	-	Tray
LM317K-S08-R	LM317G-S08-R	SOP-8	I	O	O	ADJ	NC	O	O	NC	Tape Reel

Note: 1. Pin Assignment: I: V_{IN} O: V_{OUT}
2. Pin 3 on TO-3 is case

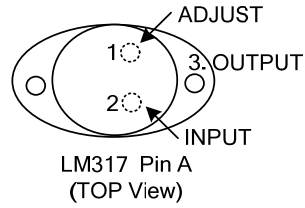
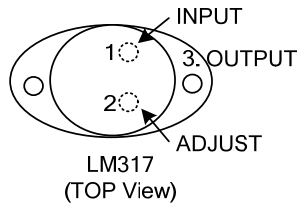
<p>LM317G-T30-Y-R</p>	<p>(1) R: Tape Reel, T: Tube, Y: Tray (2) refer to Pin Assignment (3) AA3: SOT-223, TA3: TO-220, TF3: TO-220F, TN3: TO-252, TQ2: TO-263, TQ3: TO-263-3 T30: TO-3, S08: SOP-8 (4) G: Halogen Free and Lead Free, K: Lead Free</p>
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MARKING

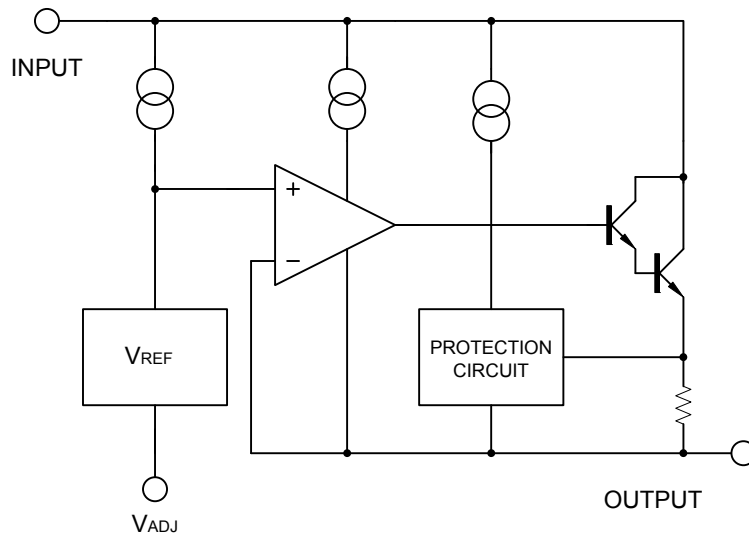
PACKAGE	MARKING
SOT-223	 <p>LM317 □ → K: Lead Free □ □ □ □ → G: Halogen Free □ □ □ □ → Data Code</p>
TO-220 TO-220F TO-252 TO-263 TO-263-3	 <p>UTC LM317 □ → K: Lead Free □ □ □ □ → G: Halogen Free Lot Code ← □ □ □ □ → Data Code</p>
TO-3	 <p>UTC LM317 □ → K: Lead Free □ □ □ □ → G: Halogen Free Pin Code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

PIN CONFIGURATION

For TO-3



BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS (T_A=25°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	+125	°C
Operating Temperature	T _{OPR}	-40 ~ +85	°C
Storage Temperature	T _{STG}	-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 _{JA}	TO-252	112	°C/W
		TO-220/TO-220F	65	
		TO-263/TO-263-3		
		SOT-223	165	
		TO-3	35	
		SOP-8	190	
Junction-to-Case	θ _{JC}	TO-252	12	°C/W
		TO-220/TO-263	5	
		TO-263-3		
		TO-220F	7.8	
		SOT-223	23	
		TO-3	3	
		SOP-8	45	

■ ELECTRICAL CHARACTERISTICS

(V_{IN}-V_{OUT}=5V, I_{OUT}=10mA, T_A=25°C, unless otherwise specified.)

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

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

APPLICATION CIRCUITS

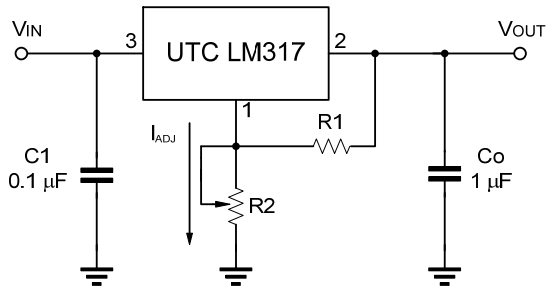


Fig.1 Programmable voltage regulator

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

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

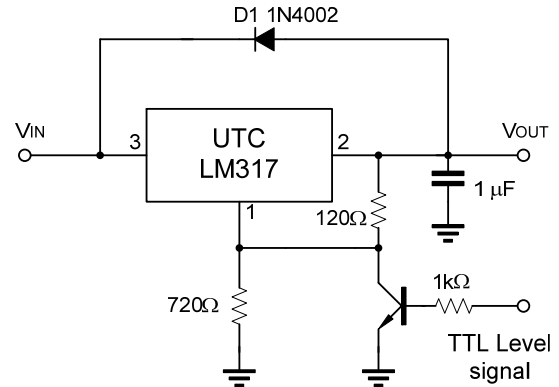


Fig.2 Regulator with On-off control

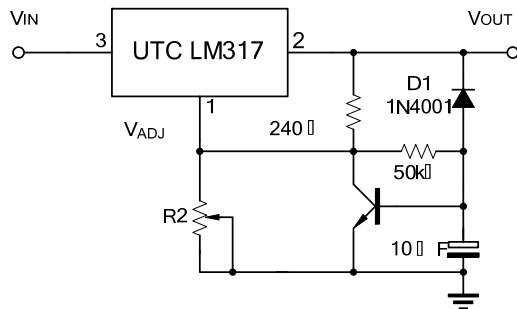
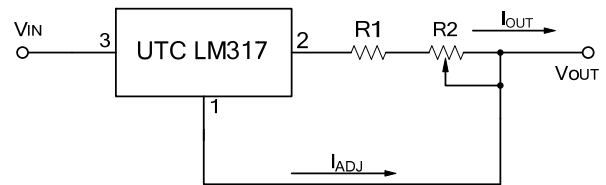


Fig.3 Soft Start Application



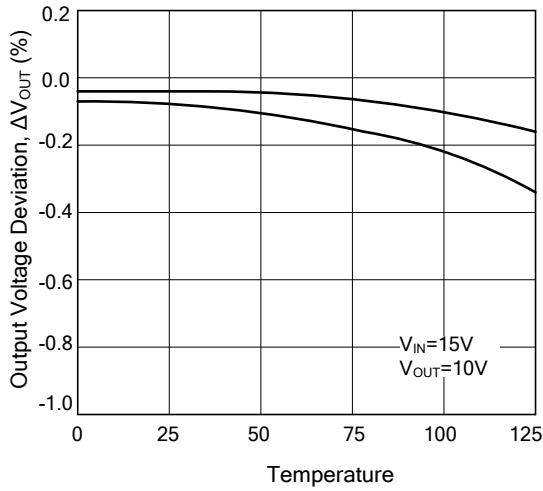
$$I_{O(MAX)} = \left(\frac{V_{REF}}{R1} \right) + I_{ADJ} = \frac{1.25V}{R1}$$

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

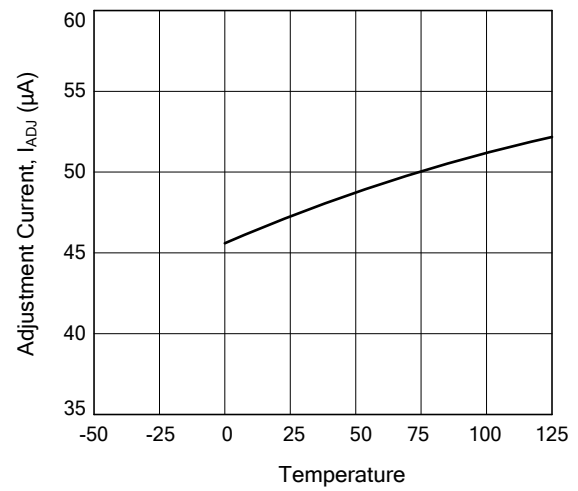
Fig.4 Constant Current Application

TYPICAL CHARACTERISTICS

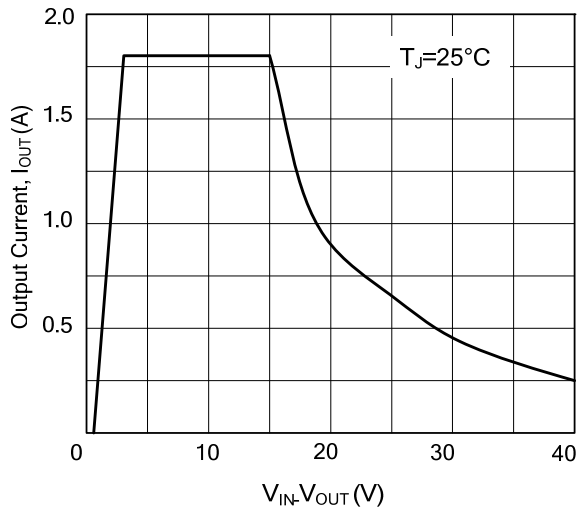
Load Regulation vs. temperature



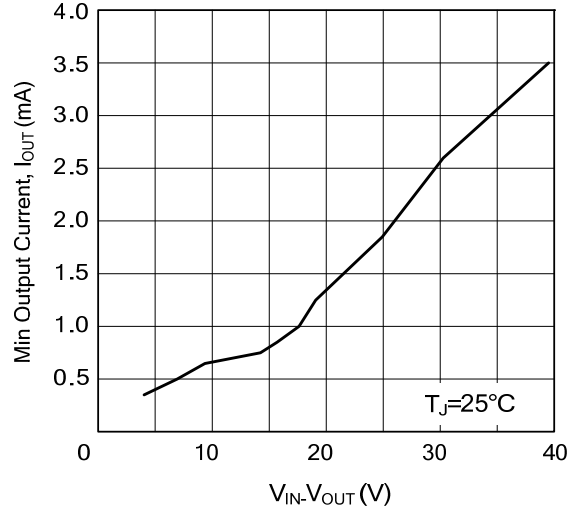
Adjustment Current vs. Temperature



Current Limit



Minimum Operating Current



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