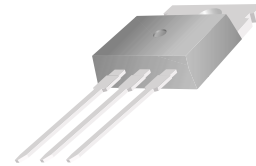


LM317T (KA317)
Adjustable Voltage
Regulator (Positive)



TO-220

3-TERMINAL POSITIVE ADJUSTABLE
REGULATOR

This monolithic integrated circuit is an adjustable 3-terminal positive voltage regulator designed to supply 2.2A typical of load current with an output voltage adjustable over a 1.2 to 37V. It employs internal current limiting, thermal shut-down and safe area compensation.

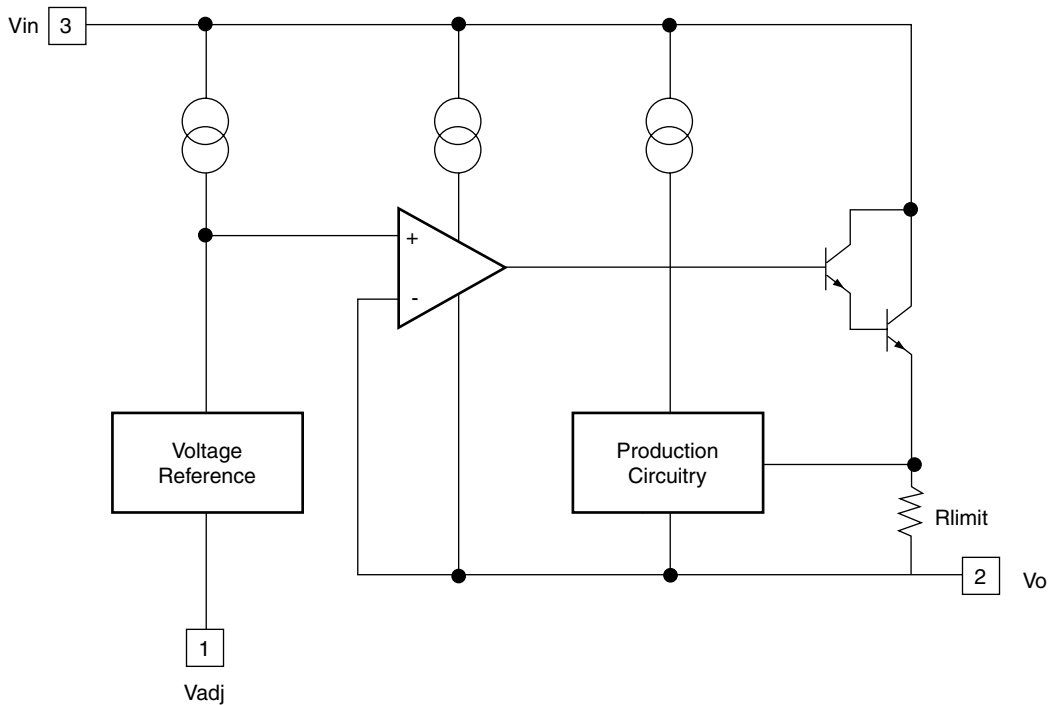
FEATURES

- Output Current 2.2A Typical
- Output Adjustable Between 1.2V and 37V
- Internal Thermal-Overload Protection
- Internal Short-Circuit Current-Limiting
- Output Transistor Safe-Area Compensation
- TO-220 Package

ORDERING INFORMATION

Device	Package	Operating Temperature
LM317T (KA317)	TO-220	0°C ~ +125°C

BLOCK DIAGRAM



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

Characteristic	Symbol	Value	Unit
Input-Output Voltage Differential	$V_I - V_O$	40	V
Lead Temperature	T_{LEAD}	230	$^\circ\text{C}$
Power Dissipation	P_D	Internally limited	W
Operating Temperature Range	T_{OPR}	0 ~ +125	$^\circ\text{C}$
Storage Temperature Range	T_{STG}	-65 ~ +125	$^\circ\text{C}$
Temperature Coefficient of Output Voltage	V_O/T	0.02	$\%/^\circ\text{C}$

ELECTRICAL CHARACTERISTICS

($V_I - V_O = 5\text{V}$, $I_O = 0.5\text{A}$, $0^\circ\text{C} \leq T_J \leq +125^\circ\text{C}$, $I_{\text{MAX}} = 1.5\text{A}$, $P_{\text{MAX}} = 20\text{W}$, unless otherwise specified)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Line Regulation	Rline	$T_A = +25^\circ\text{C}$ $3\text{V} \leq V_I - V_O \leq 40\text{V}$		0.01	0.04	$\%/V$
				0.02	0.07	$\%/V$
Load Regulation	Rload	$T_A = +25^\circ\text{C}$, $10\text{mA} \leq I_O \leq I_{\text{MAX}}$ $V_O < 5\text{V}$ $V_O \geq 5\text{V}$		18 0.4	25 0.5	mV $\%/V_O$
				40 0.8	70 1.5	mV $\%/V_O$
Adjustable Pin Current	I_{ADJ}			46	100	μA
Adjustable Pin Current Change	ΔI_{ADJ}	$3\text{V} \leq V_I - V_O \leq 40\text{V}$ $10\text{mA} \leq I_O \leq I_{\text{MAX}}$ $P \leq P_{\text{MAX}}$		2.0	5	μA
Reference Voltage	V_{REF}	$3\text{V} \leq V_{\text{IN}} - V_{\text{OUT}} \leq 40\text{V}$ $10\text{mA} \leq I_O \leq I_{\text{MAX}}$ $P_D \leq P_{\text{MAX}}$	1.20	1.25	1.30	V
Temperature Stability	ST_t			0.7		$\%/V_O$
Minimum Load Current to Maintain Regulation	$L_{(\text{MIN})}$	$V_I - V_O = 40\text{V}$		3.5	12	mA
Maximum Output Current	$I_{O(\text{MAX})}$	$V_I - V_O \leq 15\text{V}$, $P_D \leq P_{\text{MAX}}$ $V_I - V_O \leq 40\text{V}$, $P_D \leq P_{\text{MAX}}$, $T_A = 25^\circ\text{C}$	1.0	2.2 0.3		A
RMS Noise, % of V_{OUT}	e_N	$T_A = +25^\circ\text{C}$, $10\text{Hz} \leq f \leq 10\text{KHz}$		0.003	0.01	$\%/V_O$
Ripple Rejection	RR	$V_O = 10\text{V}$, $f = 120\text{Hz}$ without C_{ADJ} $C_{\text{ADJ}} = 10\mu\text{F}$	66	60 75		dB
Long-Term Stability, $T_J = T_{\text{HIGH}}$	ST	$T_A = +25^\circ\text{C}$ for end point measurements, 1000HR		0.3	1	%
Thermal Resistance Junction to Case	$R_{\theta\text{JC}}$			5		$^\circ\text{C/W}$

* Load and line regulation are specified at constant junction temperature. Change in V_D due to heating effects must be taken into account separately. Pulse testing with low duty is used. ($P_{\text{MAX}} = 20\text{W}$)

TYPICAL PERFORMANCE CHARACTERISTICS

Fig. 1 Load Regulation

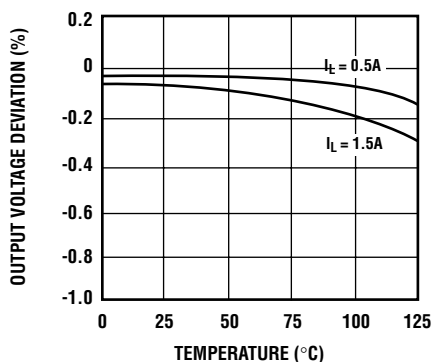


Fig. 2 Adjustment Current

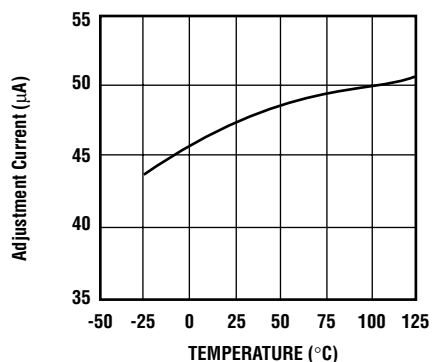


Fig. 3 Dropout Voltage

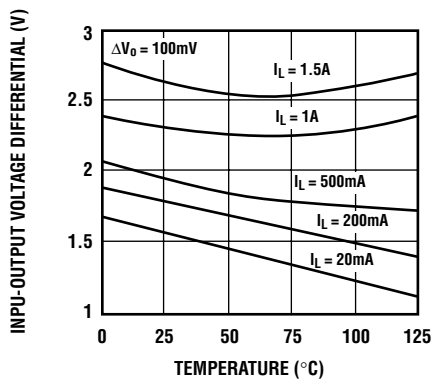
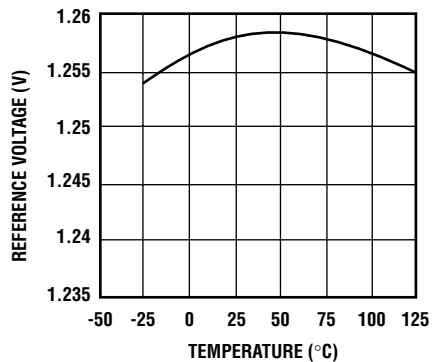
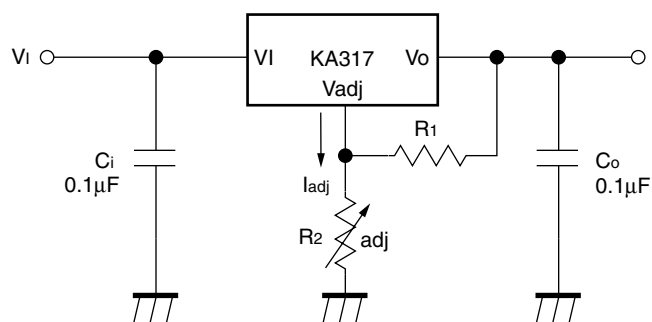


Fig. 4 Reference Voltage



Typical Application



$$V_o = 1.25V \left(1 + \frac{R_2}{R_1} \right) + I_{adj} R_2$$

Fig. 5 Programmable Regulator

C_i is required when regulator is located at an appreciable distance from the power supply filter.

C_o improves transient response by reducing AC noise which is present at the output.

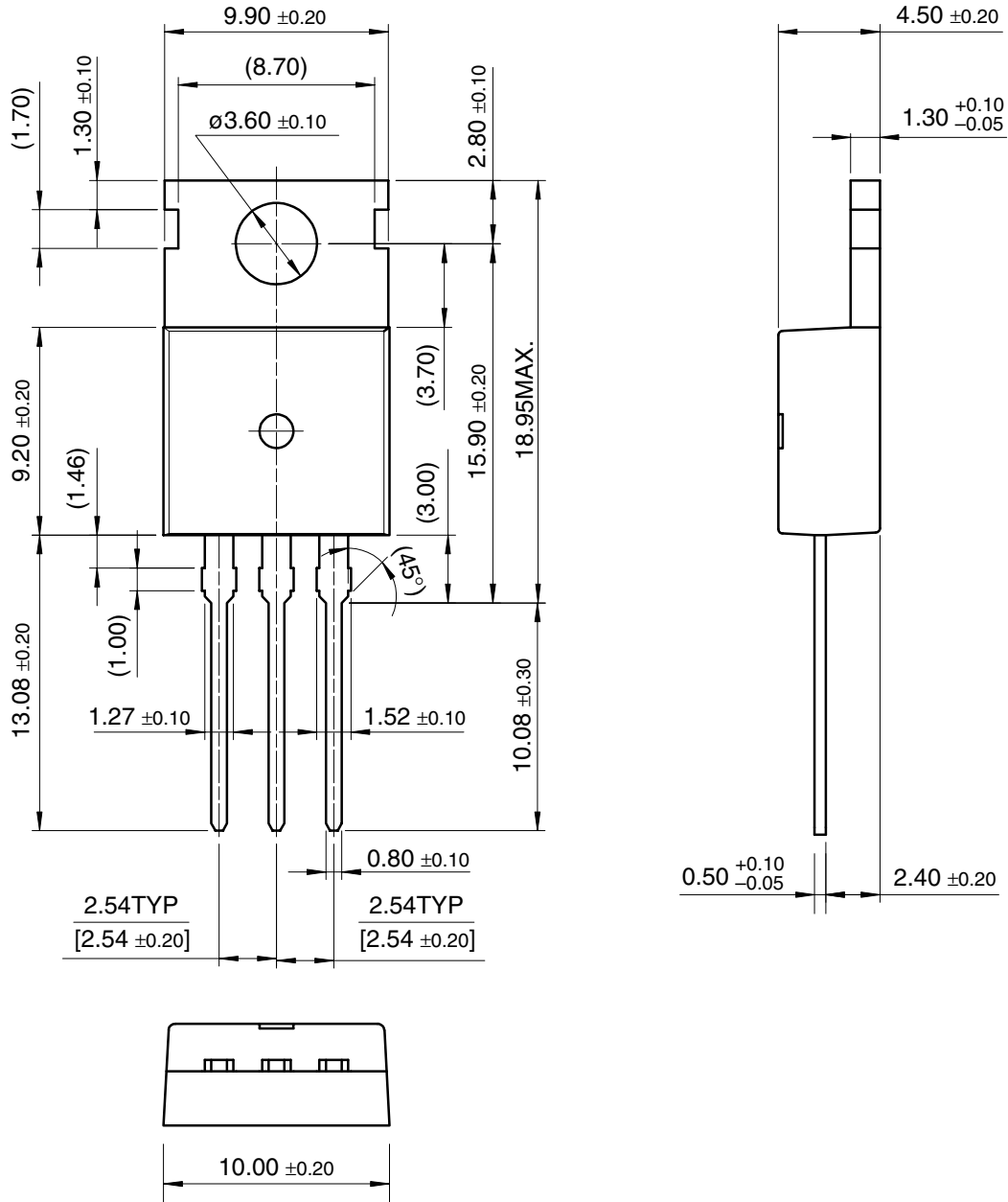
Since I_{ADJ} is controlled to less than $100\mu A$, the error associated with this term is negligible in most applications.

TO-220 Package Dimensions



TO-220 (FS PKG CODE AE)

LM317T (KA317)



Dimensions in Millimeters

August 1999, Rev B

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