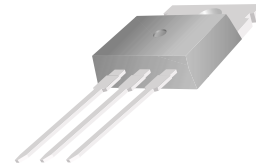


**LM317T (KA317)**  
**Adjustable Voltage**  
**Regulator (Positive)**



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.

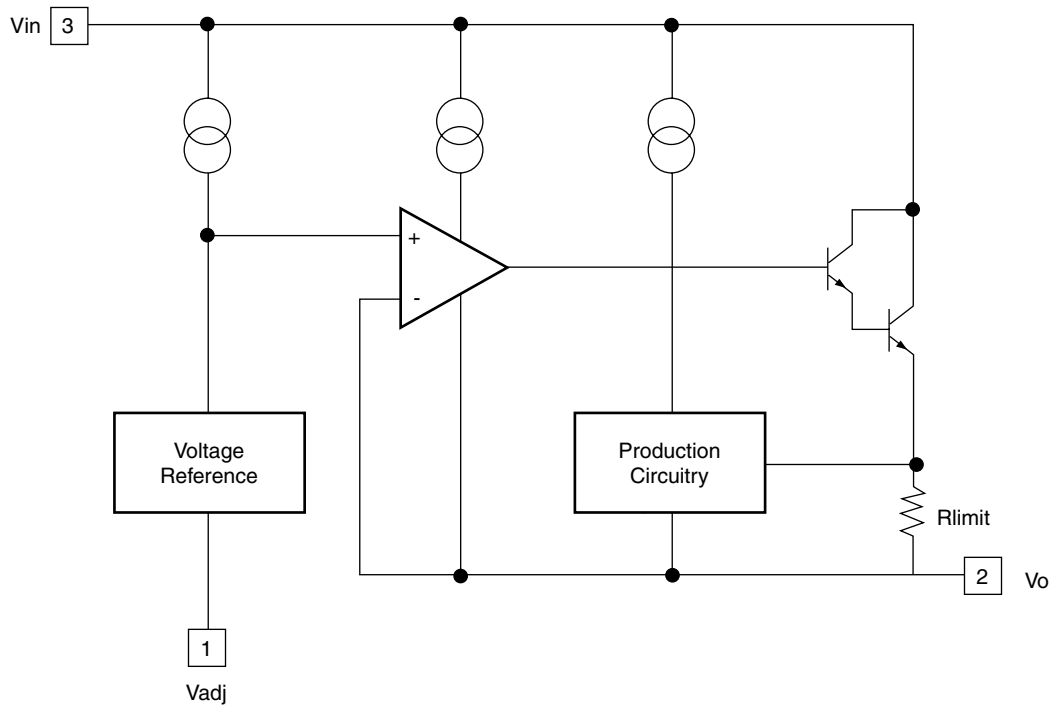
**FEATURES**

- 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	$T_{\text{LEAD}}$	230	$^\circ\text{C}$
Power Dissipation	$P_D$	Internally limited	W
Operating Temperature Range	$T_{\text{OPR}}$	0 ~ +125	$^\circ\text{C}$
Storage Temperature Range	$T_{\text{STG}}$	-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	$R_{\text{line}}$	$T_A = +25^\circ\text{C}$ $3\text{V} \leq V_I - V_O \leq 40\text{V}$		0.01	0.04	$\%/V$
			$3\text{V} \leq V_I - V_O \leq 40\text{V}$		0.02	0.07
Load Regulation	$R_{\text{load}}$	$T_A = +25^\circ\text{C}$ , $10\text{mA} \leq I_O \leq I_{\text{MAX}}$ $V_O < 5\text{V}$ $V_O \geq 5\text{V}$		18	25	mV
			$10\text{mA} \leq I_O \leq I_{\text{MAX}}$ $V_O < 5\text{V}$ $V_O \geq 5\text{V}$		0.4	0.5
Adjustable Pin Current	$I_{\text{ADJ}}$			46	100	$\mu\text{A}$
Adjustable Pin Current Change	$\Delta I_{\text{ADJ}}$	$3\text{V} \leq V_I - V_O \leq 40\text{V}$ $10\text{mA} \leq I_O \leq I_{\text{MAX}}$ $P \leq P_{\text{MAX}}$		2.0	5	$\mu\text{A}$
Reference Voltage	$V_{\text{REF}}$	$3\text{V} \leq V_{\text{IN}} - V_{\text{OUT}} \leq 40\text{V}$ $10\text{mA} \leq I_O \leq I_{\text{MAX}}$ $P_D \leq P_{\text{MAX}}$	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 $V_{\text{OUT}}$	$e_N$	$T_A = +25^\circ\text{C}$ , $10\text{Hz} \leq f \leq 10\text{KHz}$		0.003	0.01	$\%/V_O$
Ripple Rejection	RR	$V_O = 10\text{V}$ , $f = 120\text{Hz}$ without $C_{\text{ADJ}}$ $C_{\text{ADJ}} = 10\mu\text{F}$	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

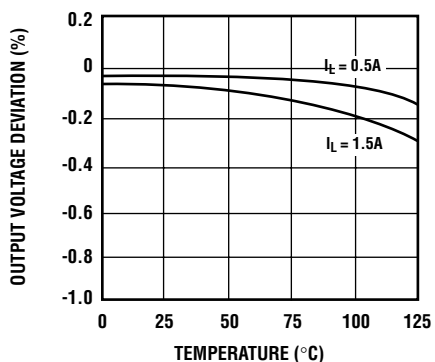


Fig. 2 Adjustment Current

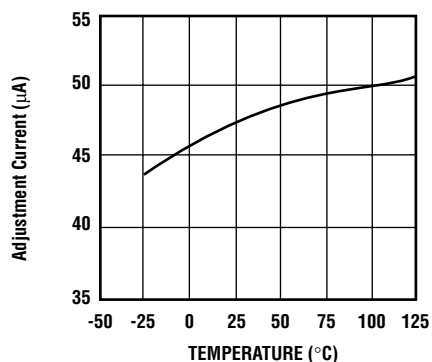


Fig. 3 Dropout Voltage

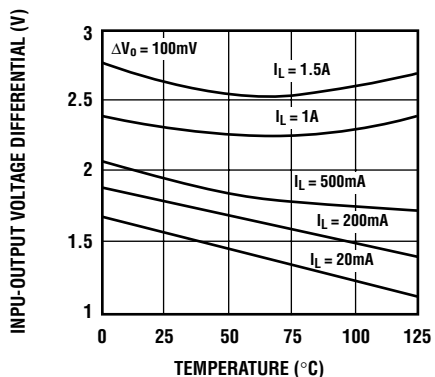
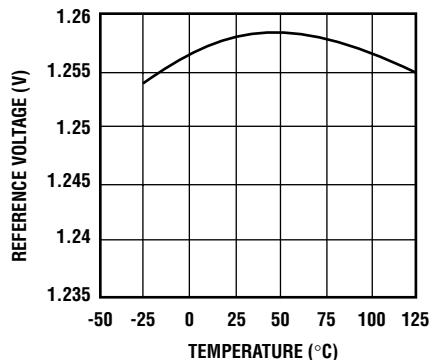
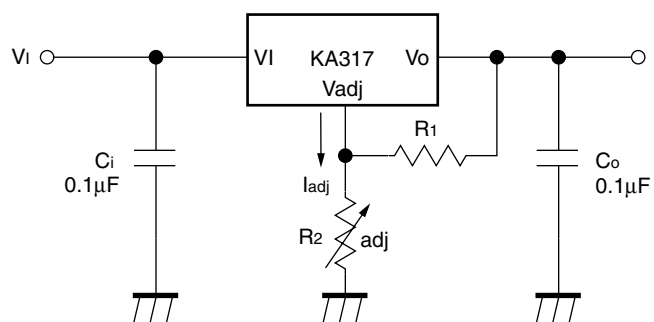


Fig. 4 Reference Voltage



### 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.

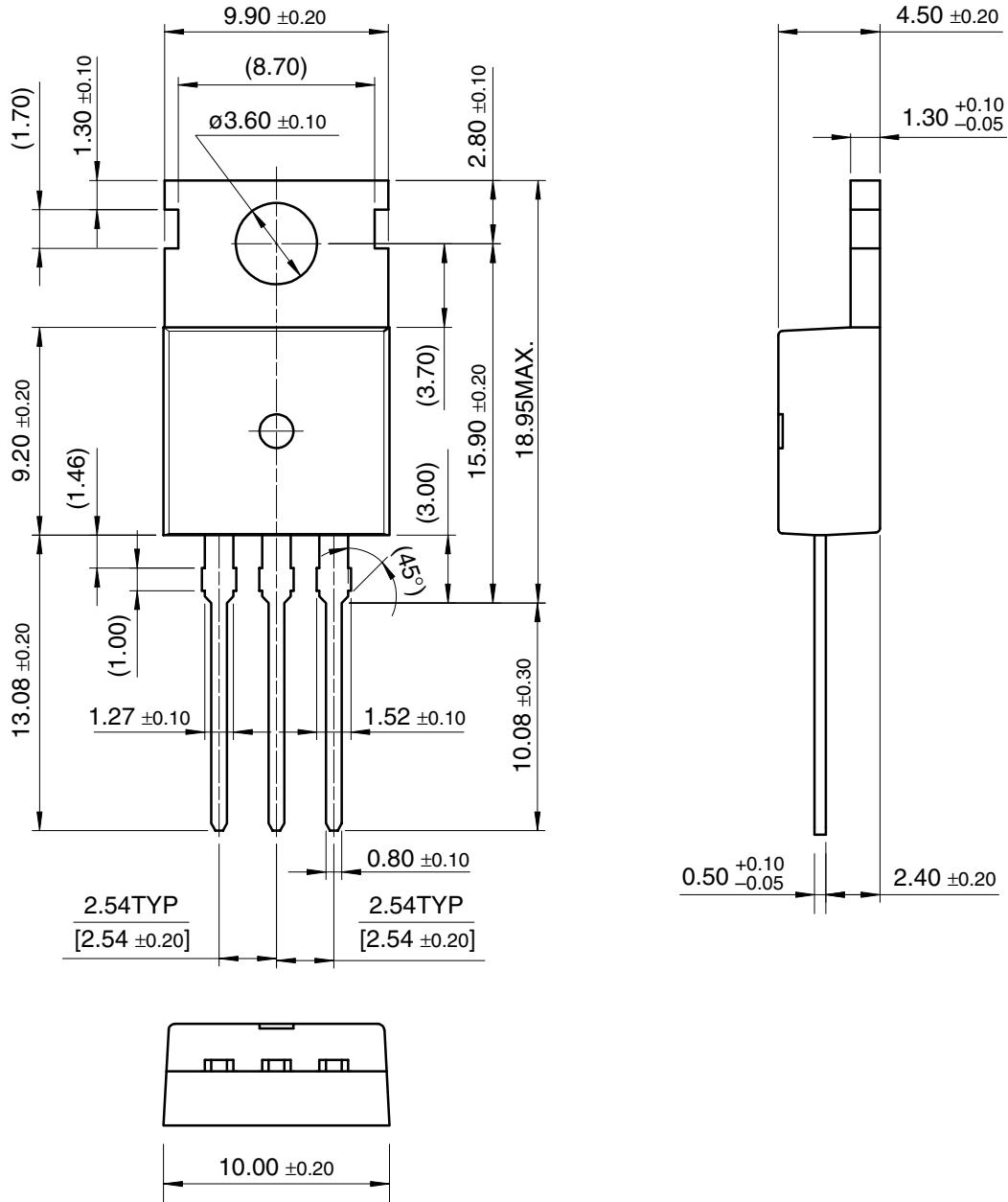
Since  $I_{ADJ}$  is controlled to less than  $100\mu A$ , the error associated with this term is negligible in most applications.

TO-220 Package Dimensions



TO-220 (FS PKG CODE AE)

LM317T (KA317)



Dimensions in Millimeters

August 1999, Rev B

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