

1.5 AMP POSITIVE ADJUSTABLE REGULATORS

IP117A, IP117, LM117, IP117AHV, IP317AHV, IP117HV, LM117HV, IP317HV

DESCRIPTION

The IP117A Series are three terminal positive adjustable voltage regulators capable of supplying in excess of 1.5A over a 1.25V to 60V output range. These regulators are exceptionally easy to use and require only two external resistors to set the output voltage. In addition to improved line and load regulation, a major feature of the "A" series is the initial output voltage tolerance, which is guaranteed to be less than 1%. Over full operating conditions, including load, line, and power dissipation, the reference voltage is guaranteed not to vary more than 2%. These devices exhibit current limit, thermal overload protection, and improved power device safe operating area protection, making them essentially indestructible.

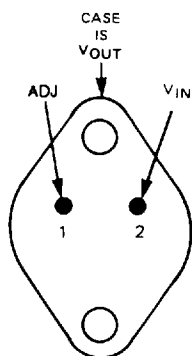
FEATURES

- Guaranteed 1% output voltage tolerance
- Guaranteed 0.3% load regulation
- Guaranteed 0.01%/V line regulation
- Internal current limiting constant with temperature
- Internal thermal overload protection
- Improved output transistor safe operating area compensation
- Output adjustable between 1.25V and 60V

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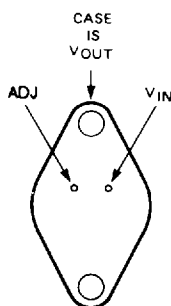
CONNECTIONS

(Bottom View)



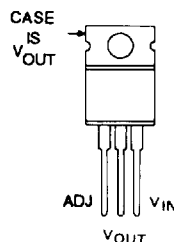
TO-3

(Bottom View)



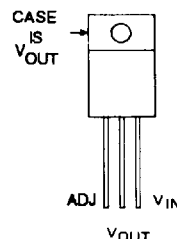
TO-66

(Top View)



TO-220

(Top View)



TO-257



IP117A, IP117, LM117, IP117AHV, IP317AHV, IP117HV, LM117HV, IP317HV

1.5 AMP POSITIVE ADJUSTABLE REGULATORS**ABSOLUTE MAXIMUM RATINGS****Power Dissipation**

Internally Limited

Input to Output Voltage Differential

Non-HV

40V

HV Series

60V

Operating Junction Temperature Range

117AHV/117A/117HV/117 -55°C to +150°C

317AHV/317HV 0°C to +125°C

Storage Temperature Range -65°C to +150°C**Lead Temperature (Soldering, 10 sec.)** +300°C

Absolute maximum ratings are those values beyond which the safety of the device cannot be guaranteed. They are not meant to imply that the device should be operated at these limits. The electrical characteristics provide conditions for actual device operation.

ELECTRICAL CHARACTERISTICS (NOTES 1 and 3)

Parameter	Test Conditions	IP117AHV IP117A			LM117HV IP117HV LM117 IP117			Units
		Min	Typ	Max	Min	Typ	Max	
Reference Voltage, V_{REF}	$I_{OUT} = 10 \text{ mA}$	-1.238	-1.250	-1.262				V
	$3\text{V} \leq (V_{IN} - V_{OUT}) \leq V_{MAX}$ $10 \text{ mA} \leq I_{OUT} \leq I_{MAX}$, $P \leq P_{MAX}$	• -1.225	-1.250	-1.270	-1.200	-1.250	-1.300	V
Line Regulation, $\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	$3\text{V} \leq (V_{IN} - V_{OUT}) \leq V_{MAX}$ (See Note 2)		0.005	0.010		0.010	0.020	%/V
		•	0.010	0.020		0.020	0.050	%/V
Load Regulation, $\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	$10 \text{ mA} \leq I_{OUT} \leq I_{MAX}$ ($V_{OUT} \leq 5\text{V}$) (See Note 2)		5	15		5	15	mV
			0.1	0.3		0.1	0.3	%
		•	15	50		20	50	mV
		•	0.3	1.0		0.3	1.0	%
Thermal Regulation	20 msec Pulse		0.002	0.020		0.030	0.070	%/W
Ripple Rejection	$V_{OUT} = -10\text{V}$, $f = 120\text{Hz}$		65			65		dB
	$C_{ADJ} = 0$ $C_{ADJ} = 10 \mu\text{F}$	• 66	80		66	80		dB
Adjust Pin Current, I_{ADJ}		•	50	100		50	100	μA
Adjust Pin Current Change, ΔI_{ADJ}	$10 \text{ mA} \leq I_{OUT} \leq I_{MAX}$ $2.5\text{V} \leq (V_{IN} - V_{OUT}) \leq V_{MAX}$	•	0.2	5		0.2	5	μA
Minimum Load Current, I_{MIN}	$(V_{IN} - V_{OUT}) = 40\text{V}$	•	3.5	5		3.5	5	mA
	$(V_{IN} - V_{OUT}) = 60\text{V}$, HV Series	•	3.5	7		3.5	7	mA
Current Limit, I_{CL}	$(V_{IN} - V_{OUT}) \leq 15\text{V}$	• 1.5	2.2		1.5	2.2		A
	$(V_{IN} - V_{OUT}) = 40\text{V}$		0.30	0.50		0.30	0.50	A
	$(V_{IN} - V_{OUT}) = 60\text{V}$ HV Series		0.10			0.10		A
Temperature Stability, $\frac{\Delta V_{OUT}}{\Delta TEMP}$		•	1	2		1		%
Long Term Stability, $\frac{\Delta V_{OUT}}{\Delta V_{TIME}}$	$T_A = 125^\circ\text{C}$, 1000 Hrs.		0.3	1		0.3	1	%
RMS Output Noise (% of V_{OUT}), e_n	$10\text{Hz} \leq f \leq 10\text{kHz}$		0.001			0.001		%
Thermal Resistance	K Package		2.3	3		2.3	3	$^\circ\text{C/W}$
	R Package		5	7		5	7	$^\circ\text{C/W}$
	G Package, T Package		3	5		3	5	$^\circ\text{C/W}$



IP117A, IP117, LM117, IP117AHV, IP317AHV, IP117HV, LM117HV, IP317HV

1.5 AMP POSITIVE ADJUSTABLE REGULATORS**ELECTRICAL CHARACTERISTICS**

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Parameter	Test Conditions	IP317AHV IP317A			IP317HV IP317			Units
		Min	Typ	Max	Min	Typ	Max	
Reference Voltage, V_{REF}	$I_{OUT} = 10 \text{ mA}$	1.238	1.250	1.262				V
	$3\text{V} \leq (V_{IN} - V_{OUT}) \leq V_{MAX}$ $10 \text{ mA} \leq I_{OUT} \leq I_{MAX}$, $P \leq P_{MAX}$	● 1.225	1.250	1.270	1.200	1.250	1.300	V
Line Regulation, $\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	$3\text{V} \leq (V_{IN} - V_{OUT}) \leq V_{MAX}$		0.005	0.010		0.010	0.040	%/V
	(See Note 2)	●	0.010	0.020		0.020	0.070	%/V
Load Regulation, $\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	$10 \text{ mA} \leq I_{OUT} \leq I_{MAX}$ (See Note 2)		5	25		5	25	mV
	$(V_{OUT}) \leq 5\text{V}$		0.1	0.5		0.1	0.5	%
	$(V_{OUT}) \leq 5\text{V}$	●	15	50		20	70	mV
	$(V_{OUT}) \leq 5\text{V}$	●	0.3	1.0		0.3	1.5	%
Thermal Regulation	20 msec Pulse		0.002	0.020		0.030	0.070	%/W
Ripple Rejection	$V_{OUT} = -10\text{V}$, $f = 120\text{Hz}$		65			65		dB
	$C_{ADJ} = 0$ $C_{ADJ} = 10 \mu\text{F}$	●	66	80	66	80		dB
Adjust Pin Current, I_{ADJ}		●	50	100		50	100	μA
Adjust Pin Current Change, ΔI_{ADJ}	$10 \text{ mA} \leq I_{OUT} \leq I_{MAX}$ $2.5\text{V} \leq (V_{IN} - V_{OUT}) \leq V_{MAX}$	●	0.2	5		0.2	5	μA
Minimum Load Current, I_{MIN}	$(V_{IN} - V_{OUT}) = 40\text{V}$	●	3.5	10		3.5	10	mA
	$(V_{IN} - V_{OUT}) = 60\text{V}$, HV Series	●	3.5	12		3.5	12	mA
Current Limit, I_{CL}	$(V_{IN} - V_{OUT}) \leq 15\text{V}$	●	1.5	2.2		1.5	2.2	A
	$(V_{IN} - V_{OUT}) = 40\text{V}$		0.15	0.40		0.15	0.40	A
	$(V_{IN} - V_{OUT}) = 60\text{V}$ HV Series		0.10			0.10		A
Temperature Stability, $\frac{\Delta V_{OUT}}{\Delta \text{TEMP}}$		●	1	2		1		%
Long Term Stability, $\frac{\Delta V_{OUT}}{\Delta \text{TIME}}$	1000 Hrs.		0.3	1		0.3	1	%
RMS Output Noise (% of V_{OUT}), e_n	$10\text{Hz} \leq f \leq 10\text{kHz}$		0.003			0.003		%
Thermal Resistance	K Package		2.3	3		2.3	3	$^{\circ}\text{C/W}$
Junction to Case, θ_{jc}	R Package		5	7		5	7	$^{\circ}\text{C/W}$
	T Package		4	5		4	5	$^{\circ}\text{C/W}$
	G Package		3	5		3	5	$^{\circ}\text{C/W}$

The ● denotes the specifications which apply over the full operating temperature range, all others apply at $T_j = 25^{\circ}\text{C}$ unless otherwise specified.

Note 1: Unless otherwise specified, $(V_{IN} - V_{OUT}) = 5\text{V}$, $I_{OUT} = 0.5\text{A}$ for the TO-3 (K), TO-257 (G), TO-66 (R) and TO-220 (T) Packages. Although power dissipation is internally limited, these specifications apply for dissipations up to 20W for the TO-3, TO-257, TO-66 and TO-220. $I_{MAX} = 1.5\text{A}$ for the TO-3, TO-66, TO-220 and TO-257.

Note 2: Regulation is measured at constant junction temperature, using pulse testing at a low duty cycle. Changes in output voltage due to heating effects are covered under thermal regulation specifications. Load regulation is measured from the bottom of the package for the TO-3, and TO-66, and at the junction of the wide and narrow portion of the output lead for the TO-220, and $\frac{1}{8}$ " below the base of the package on the output pin of the TO-257.

Note 3: $V_{MAX} = 40\text{V}$ for IP117A, IP117, LM117.
 $V_{MAX} = 60\text{V}$ for IP117AHV, IP117HV, LM117HV, IP317AHV, IP317HV.



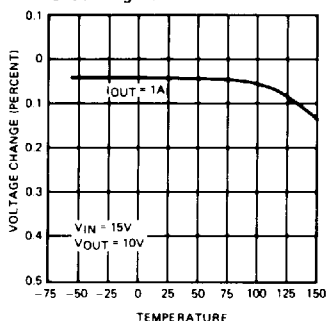
IP117A, IP117, LM117, IP117AHV, IP317AHV, IP117HV, LM117HV, IP317HV

1.5 AMP POSITIVE ADJUSTABLE REGULATORS

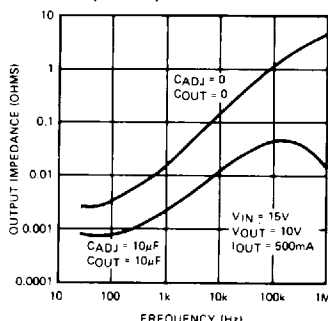
TYPICAL PERFORMANCE CHARACTERISTICS

T-58-11-23

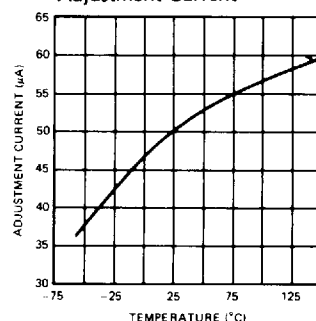
Load Regulation



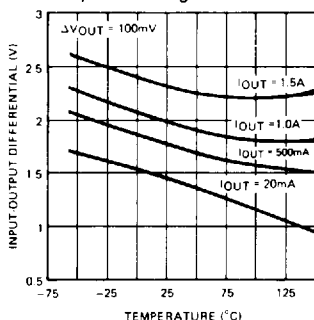
Output Impedance



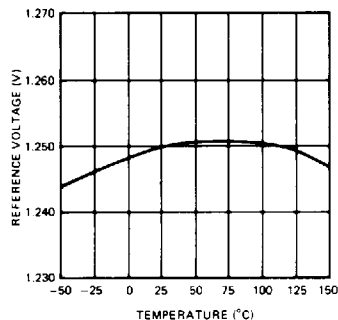
Adjustment Current



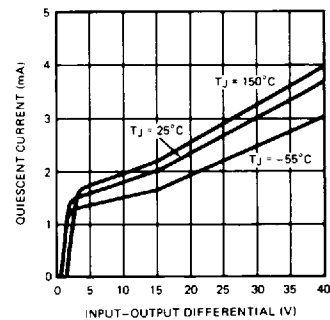
Dropout Voltage



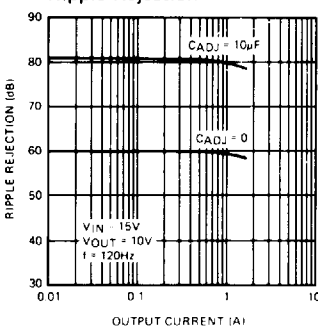
Temperature Stability



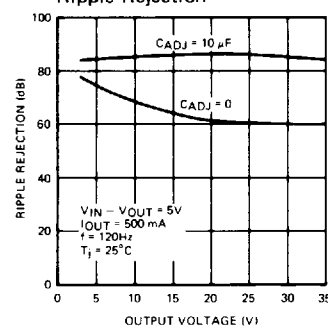
Minimum Operating Current



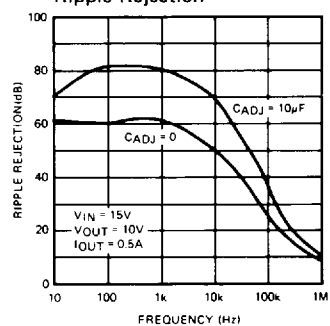
Ripple Rejection



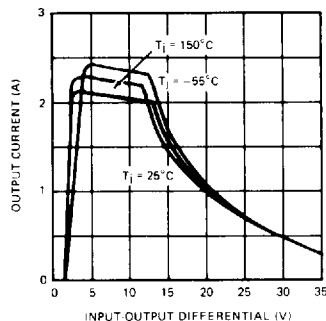
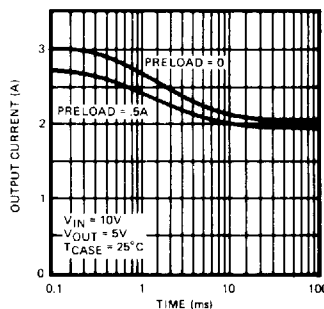
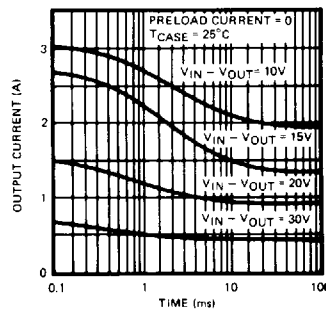
Ripple Rejection



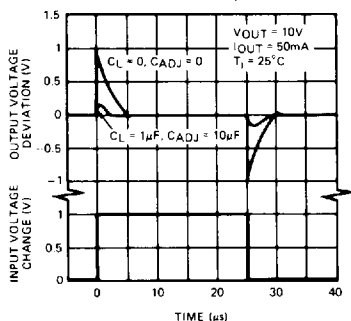
Ripple Rejection



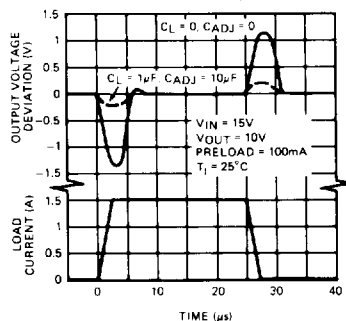
IP117A, IP117, LM117, IP117AHV, IP317AHV, IP117HV, LM117HV, IP317HV

1.5 AMP POSITIVE ADJUSTABLE REGULATORS**TYPICAL PERFORMANCE CHARACTERISTICS (CONTINUED) T-58-11-23**Current Limit
TO-3, TO-66, TO-220 and TO-257Current Limit
TO-3, TO-66, TO-220 and TO-257Current Limit
TO-3, TO-66, TO-220 and TO-257

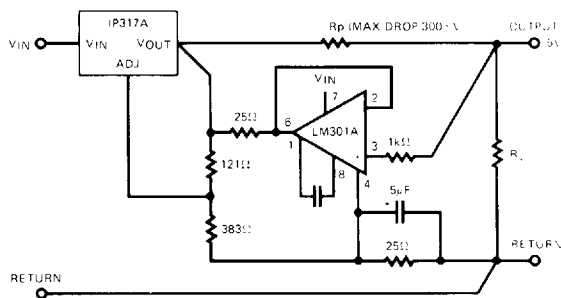
Line Transient Response



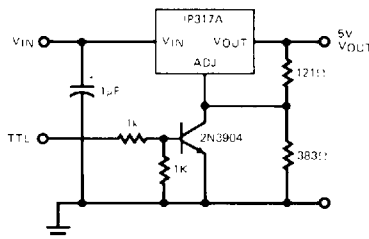
Load Transient Response



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APPLICATIONS INFORMATION

Remote Sensing



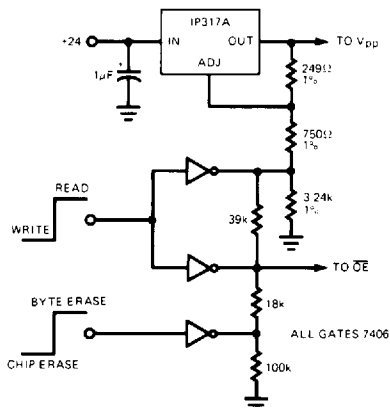
5V Regulator with Shut Down



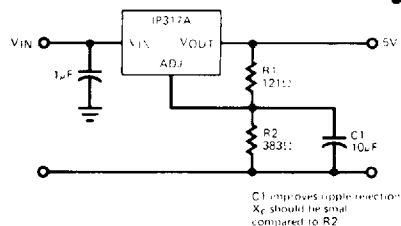
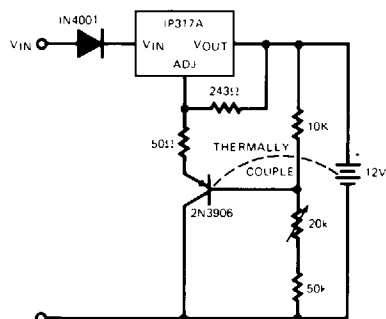
IP117A, IP117, LM117, IP117AHV, IP317AHV, IP117HV, LM117HV, IP317HV

1.5 AMP POSITIVE ADJUSTABLE REGULATORS**APPLICATIONS INFORMATION (CONTINUED)**

T-58-11-23



	OE	V _{pp}
READ	0V	5V
WRITE		
BYTE	5V	21V
CHIP ERASE	12V	21V

2816 EEPROM Supply Programmer for Read/Write Control**Improving Ripple Rejection****Temperature Compensated Lead Acid Battery Charger****ORDER INFORMATION****Part Number**

IP117K/IP117AK/IP117AHVK/IP117HVK
 LM117K/LM117HVK
 IP117AR/IP117AHVR/IP117R/IP117HVR
 IP117AG/IP117AHVG/IP117G/IP117HVG

IP317AHVK/IP317HVK
 IP317AHVT/IP317HVT

Temperature Range

-55°C to +150°C
 -55°C to +150°C
 -55°C to +150°C TO-257 (Hermetic TO-220 style)

0°C to +125°C
 0°C to +125°C

Package

TO-3
 TO-66
 TO-220

