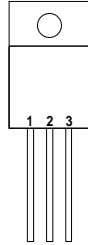


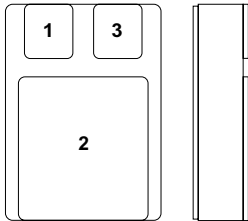
Pin 1 – ADJ.
Pin 2 – V_{OUT}
Pin 3 – V_{IN}
Case – V_{OUT}

G Package – TO257



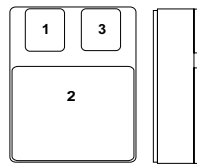
Pin 1 – ADJ.
Pin 2 – V_{OUT}
Pin 3 – V_{IN}
Case – Isolated

IG Package – TO257



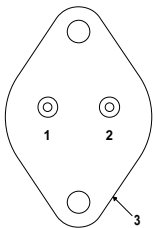
Pin 1 – ADJ.
Pin 2 – V_{OUT}
Pin 3 – V_{IN}

**SMD1
CERAMIC SURFACE
MOUNT**



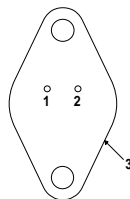
Pin 1 – ADJ.
Pin 2 – V_{OUT}
Pin 3 – V_{IN}

**SMD05
CERAMIC SURFACE
MOUNT**



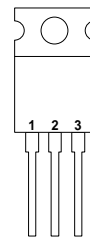
Pin 1 – ADJ.
Pin 2 – V_{IN}
Case – V_{OUT}

K Package – TO3



Pin 1 – ADJ.
Pin 2 – V_{IN}
Case – V_{OUT}

R Package – TO66



Pin 1 – ADJ.
Pin 2 – V_{OUT}
Pin 3 – V_{IN}

T Package – TO220 Plastic

1.5 AMP POSITIVE ADJUSTABLE VOLTAGE REGULATOR FOR HI-REL APPLICATIONS

FEATURES

- Output voltage range of:
 - 1.25 to 40V for standard version
 - 1.25 to 60V for HV version
- Output voltage tolerance 1%
- Load regulation 0.3%
- Line regulation 0.01%/V
- Complete series of protections:
 - current limiting
 - thermal shutdown
 - soa control
- Also available in TO220 metal isolated package (1mm pins)

ABSOLUTE MAXIMUM RATINGS ($T_{case} = 25^{\circ}C$ unless otherwise stated)

V_{I-O}	Input - Output Differential Voltage	– Standard – HV Series	40V 60V
I_O	Output Current		Internally limited
P_D	Power Dissipation		Internally limited
T_J	Operating Junction Temperature Range		See Table Above
T_{STG}	Storage Temperature		–65 to 150°C

Parameter	Test Conditions	IP117A, IP117AHV LM117A, LM117AHV			IP117, IP117HV LM117, LM117HV			Units
		Min.	Typ.	Max.	Min.	Typ.	Max.	
V_{REF} Reference Voltage	$I_{OUT} = 10\text{mA}$	1.238	1.25	1.262				V
	$I_{OUT} = 10\text{mA}$ to I_{MAX} $V_{IN} - V_{OUT} = 3\text{V}$ to V_{MAX} $P \leq P_{MAX}$ $T_J = -55$ to $+150^\circ\text{C}$	1.225	1.250	1.270	1.200	1.250	1.300	V
$\frac{\Delta V_{OUT}}{\Delta V_{IN}}$ Line Regulation 1	$V_{IN} - V_{OUT} = 3\text{V}$ to V_{MAX} $T_J = -55$ to $+150^\circ\text{C}$		0.005	0.010		0.010	0.020	% / V
			0.010	0.020		0.020	0.050	
$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$ Load Regulation 1	$I_{OUT} = 10\text{mA}$ to I_{MAX}	$V_{OUT} \leq 5\text{V}$	5	15		5	15	mV
		$V_{OUT} \geq 5\text{V}$	0.1	0.3		0.1	0.3	%
	$I_{OUT} = 10\text{mA}$ to I_{MAX} $T_J = -55$ to $+150^\circ\text{C}$	$V_{OUT} \leq 5\text{V}$	15	50		20	50	mV
		$V_{OUT} \geq 5\text{V}$	0.3	1		0.3	1	%
Thermal Regulation	$t_p = 20\text{ms}$		0.002	0.020		0.030	0.070	%/W
Ripple Rejection	$V_{OUT} = 10\text{V}$ $f = 120\text{Hz}$	$C_{ADJ} = 0$		65		65		dB
		$C_{ADJ} = 10\mu\text{F}$ $T_J = -55$ to $+150^\circ\text{C}$	66	80		66	80	dB
I_{ADJ} Adjust Pin Current	$T_J = -55$ to $+150^\circ\text{C}$		50	100		50	100	μA
ΔI_{ADJ} Adjust Pin Current Change	$I_{OUT} = 10\text{mA}$ to I_{MAX} $T_J = -55$ to $+150^\circ\text{C}$ $V_{IN} - V_{OUT} = 2.5\text{V}$ to V_{MAX}		0.2	5		0.2	5	μA
I_{MIN} Minimum Load Current	$V_{IN} - V_{OUT} = 40\text{V}$ $T_J = -55$ to $+150^\circ\text{C}$		3.5	5		3.5	5	mA
	$V_{IN} - V_{OUT} = 60\text{V}$ (HV SERIES) $T_J = -55$ to $+150^\circ\text{C}$		3.5	7		3.5	7	
I_{CL} Current Limit	$V_{IN} - V_{OUT} \leq 15\text{V}$ $T_J = -55$ to $+150^\circ\text{C}$		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		
$\frac{\Delta V_{OUT}}{\Delta \text{TEMP}}$ Temperature Stability	$T_J = -55$ to $+150^\circ\text{C}$		1	2		1		%
$\frac{\Delta V_{OUT}}{\Delta \text{TIME}}$ Long Term Stability	$T_A = +125^\circ\text{C}$ $t = 1000$ Hrs		0.3	1		0.3	1	%
e_n RMS Output Noise (% of V_{OUT})	$f = 10$ Hz to 10 kHz		0.001			0.001		%
$R_{\theta JC}$ Thermal Resistance Junction to Case	K Package		2.3	3		2.3	3	$^\circ\text{C}/\text{W}$
	R Package		5	7		5	7	
	G, IG Packages		3	5		3	5	

1) 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 packages, at the junction of the wide and narrow portion of the output lead for the TO-220 package, and $\frac{1}{8}$ " below the base of the package on the output pin of the TO-257 package.

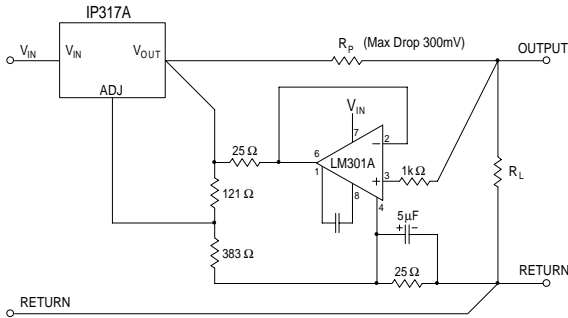
2) Test Conditions unless otherwise stated: $V_{IN} - V_{OUT} = 5\text{V}$, $T_J = 25^\circ\text{C}$, $I_{OUT} = 0.5\text{A}$, $I_{MAX} = 1.5\text{A}$.
 $P_{MAX} = 10\text{W}$ for SMD1, 20W for all other package styles.
 $V_{MAX} = 40\text{V}$ for standard series, 60V for HV series.

Parameter	Test Conditions	IP317A IP317AHV			IP317 IP317HV			Units	
		Min.	Typ.	Max.	Min.	Typ.	Max.		
V _{REF} Reference Voltage	I _{OUT} = 10mA	1.238	1.25	1.262				V	
	I _{OUT} = 10mA to I _{MAX} V _{IN} - V _{OUT} = 3V to V _{MAX} P ≤ P _{MAX} T _J = 0 to 125°C	1.225	1.25	1.270	1.200	1.250	1.300	V	
$\frac{\Delta V_{OUT}}{\Delta V_{IN}}$ Line Regulation 1	V _{IN} - V _{OUT} = 3V to V _{MAX} T _J = 0 to 125°C		0.005	0.010		0.010	0.040	% / V	
			0.010	0.020		0.020	0.070		
$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$ Load Regulation 1	I _{OUT} = 10mA to I _{MAX}	V _{OUT} ≤ 5V		5	25		5	25	mV
		V _{OUT} ≥ 5V		0.1	0.5		0.1	0.5	%
	I _{OUT} = 10mA to I _{MAX} T _J = -55 to +150°C	V _{OUT} ≤ 5V		15	50		20	70	mV
		V _{OUT} ≥ 5V		0.3	1		0.3	1.5	%
Thermal Regulation	t _p = 20ms		0.002	0.020		0.030	0.070	%/W	
Ripple Rejection	V _{OUT} = 10V f = 120Hz	C _{ADJ} = 0		65			65	dB	
		C _{ADJ} = 10μF T _J = 0 to 125°C	66	80		66	80	dB	
I _{ADJ} Adjust Pin Current	T _J = 0 to 125°C		50	100		50	100	μA	
ΔI _{ADJ} Adjust Pin Current Change	I _{OUT} = 10mA to I _{MAX} T _J = 0 to 125°C V _{IN} - V _{OUT} = 2.5V to V _{MAX}		0.2	5		0.2	5	μA	
I _{MIN} Minimum Load Current	V _{IN} - V _{OUT} = 40V T _J = 0 to 125°C		3.5	10		3.5	10	mA	
	V _{IN} - V _{OUT} = 60V (HV SERIES) T _J = 0 to 125°C		3.5	12		3.5	12		
I _{CL} Current Limit	V _{IN} - V _{OUT} ≤ 15V T _J = 0 to 125°C		1.5	2.2		1.5	2.2	A	
	V _{IN} - V _{OUT} = 40V		0.15	0.40		0.15	0.40	A	
	V _{IN} - V _{OUT} = 60V (HV SERIES)			0.10			0.10		
$\frac{\Delta V_{OUT}}{\Delta T_{TEMP}}$ Temperature Stability	T _J = 0 to 125°C		1	2		1		%	
$\frac{\Delta V_{OUT}}{\Delta TIME}$ Long Term Stability	t = 1000 Hrs		0.3	1		0.3	1	%	
e _n RMS Output Noise (% of V _{OUT})	f = 10 Hz to 10 kHz		0.003			0.003		%	
R _{θJC} Thermal Resistance Junction to Case	K Package		2.3	3		2.3	3	°C/W	
	T Package		4	5		5	7		

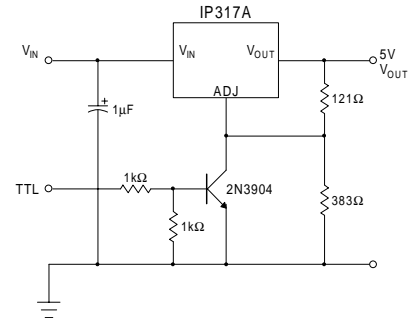
1) Regulation is measured at constant junction temperature, using pulse testing at a low duty cycle. Changes in output voltage due to heating effects are covered under thermal regulation specifications. Load regulation is measured from the bottom of the package for the TO-3 and TO-66 packages, at the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

2) Test Conditions unless otherwise stated: V_{IN} - V_{OUT} = 5V, T_J = 25°C, I_{OUT} = 0.5A, P_{MAX} = 20W, I_{MAX} = 1.5A
V_{MAX} = 40V for standard series, 60V for HV series.

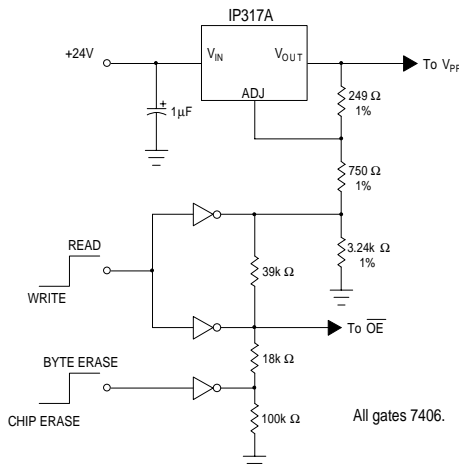
APPLICATIONS INFORMATION



Remote Sensing

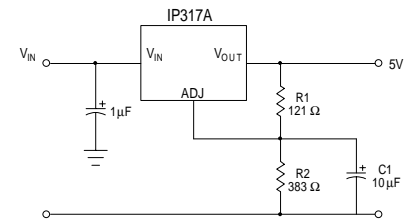


5V Regulator with Shut Down



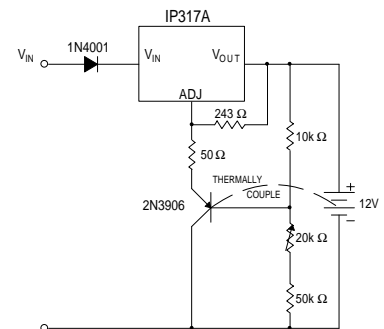
	OE	V _{PP}
READ	0V	5V
WRITE		
BYTE ERASE	5V	21V
CHIP ERASE	12V	21V

2816 EEPROM Supply Programmer for Read/Write Control



C1 improves ripple rejection.
X_C should be small compared to R2.

Improving Ripple Rejection



Temperature Compensated Lead-Acid Battery Charger

Order Information

Part Number	IG-Pack G-Pack (TO257)	SMD1	SMD05	K-Pack (TO3)	R-Pack (TO66)	T-Pack (TO220)	Temp. Range	Note: To order, add the package identifier to the part number. eg. IP117AHVK IP1175SMD05 IP317T
LM117	✓	✓	✓	✓	✓		-55 to +150°C	
LM117HV	✓	✓	✓	✓	✓		"	
LM117A	✓	✓	✓	✓	✓		"	
LM117AHV	✓	✓	✓	✓	✓		"	
IP117	✓	✓	✓	✓	✓		-55 to +150°C	
IP117HV	✓	✓	✓	✓	✓		"	
IP117A	✓	✓	✓	✓	✓		"	
IP117AHV	✓	✓	✓	✓	✓		"	
LM317				✓		✓	0 to 125°C	
LM317HV				✓		✓	"	
IP317				✓		✓	"	
IP317HV				✓		✓	"	
IP317A				✓		✓	"	
IP317AHV				✓		✓	"	