

3 AMP POSITIVE ADJUSTABLE REGULATORS

IP150, IP150A, IP350A, IP350, LM150

DESCRIPTION

The IP150A series are 3-terminal positive adjustable voltage regulators capable of supplying in excess of 3.0A over a 1.25V to 35V 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.

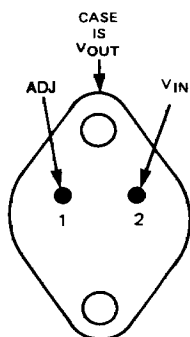
FEATURES

- Available in military TO-257
- 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 35V

4

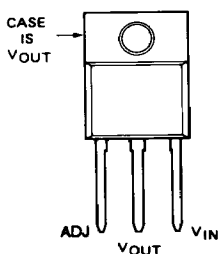
CONNECTIONS

(Bottom View)



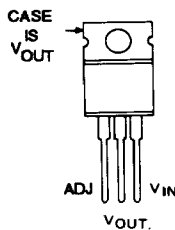
TO-3

(Top View)



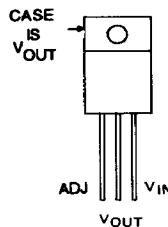
TO-218

(Top View)



TO-220

(Top View)



TO-257



3 AMP POSITIVE ADJUSTABLE REGULATORS

ABSOLUTE MAXIMUM RATINGS

Power Dissipation	Internally Limited	Storage Temperature Range	-65°C to +150°C
Input to Output Voltage Differential	35V	Lead Temperature (Soldering, 10 sec.)	300°C
Operating Junction Temperature Range			
IP150, IP150A, LM150	-55°C to +150°C		
IP350A	0°C to +125°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 (NOTE 1)

Parameter	Test Conditions	IP150A			LM150 IP150			Units
		Min	Typ	Max	Min	Typ	Max	
Reference Voltage, V_{REF}	$I_{OUT} = 10 \text{ mA}$	1.238	1.250	1.262				V
	$3\text{V} \leq (V_{IN} - V_{OUT}) \leq 35\text{V}$ $10\text{mA} \leq I_{OUT} \leq 3\text{A}$, $P \leq 30\text{W}$	1.225	1.250	1.270	1.20	1.25	1.30	V
Line Regulation, $\frac{\Delta V_{OUT}}{\Delta V_{IN}}$	$3\text{V} \leq (V_{IN} - V_{OUT}) \leq 35\text{V}$ (See Note 2)		0.005	0.01		0.005	0.01	%/V
			0.02	0.05		0.020	0.05	%/V
Load Regulation, $\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	$10 \text{ mA} \leq I_{OUT} \leq 3\text{A}$ (See Note 2)		5	15		5	15	mV
	$V_O \leq 5\text{V}$		0.1	0.3		0.1	0.3	%
	$V_O \leq 5\text{V}$		15	50		20	50	mV
	$V_O \geq 5\text{V}$		0.3	1.0		0.3	1.0	%
Thermal Regulation	$T_A = 25^\circ\text{C}$, 20 msec Pulse		0.002	0.01		0.002	0.01	%/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	86		66	86		dB
Adjust Pin Current, I_{ADJ}			50	100		50	100	μA
Adjust Pin Current Change, ΔI_{ADJ}	$10 \text{ mA} \leq I_{OUT} \leq 3\text{A}$ $3\text{V} \leq (V_{IN} - V_{OUT}) \leq 35\text{V}$		0.2	5		0.2	5	μA
Minimum Load Current, I_{MIN}	$(V_{IN} - V_{OUT}) = 35\text{V}$		3.5	5		3.5	5	mA
Current Limit, I_{CL}	$(V_{IN} - V_{OUT}) \leq 10\text{V}$	3	4.5		3	4.5		A
	$(V_{IN} - V_{OUT}) = 30\text{V}$	0.3	1		0.3	1		A
Temperature Stability, $\frac{\Delta V_{OUT}}{\Delta T_{EMP}}$			1	2		1		%
Long Term Stability, $\frac{\Delta V_{OUT}}{\Delta T_{IME}}$	$T_A = 125^\circ\text{C}$, 1000 Hrs		0.3	1		0.3	1	%
RMS Output Noise (% of V_{OUT}), e_n	$T_A = 25^\circ\text{C}$, $10\text{Hz} \leq f \leq 10\text{kHz}$		0.001			0.001		%
Thermal Resistance Junction to Case, θ_{JC}	K Package		1.5			1.5		$^\circ\text{C/W}$
	G Package		3	4		3	4	



3 AMP POSITIVE ADJUSTABLE REGULATORS

ELECTRICAL CHARACTERISTICS (SEE NOTE 1)

Parameter	Test Conditions	IP350A			IP350			Units
		Min	Typ	Max	Min	Typ	Max	
Reference Voltage, V_{REF}	$I_{OUT} = 10 \text{ mA}$	1.238	1.250	1.262				V
	$3\text{V} \leq (V_{IN} - V_{OUT}) \leq 35\text{V}$ $10\text{mA} \leq I_{OUT} \leq 3\text{A}$, $P \leq 30\text{W}$	• 1.225	1.250	1.270	1.200	1.250	1.300	V
Line Regulation, $\frac{\Delta V_{OUT}}{\Delta V_{IN}}$	$3\text{V} \leq (V_{IN} - V_{OUT}) \leq 35\text{V}$ (See Note 2)		0.005	0.01		0.005	0.03	%/V
		•	0.02	0.05		0.02	0.07	%/V
Load Regulation, $\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	$10 \text{ mA} \leq I_{OUT} \leq 3\text{A}$ (See Note 2)		5	15		5	25	mV
	$V_O \geq 5\text{V}$		0.1	0.3		0.1	0.5	%
	$V_O \leq 5\text{V}$	•	15	50		20	70	mV
	$V_O \geq 5\text{V}$	•	0.3	1		0.3	1.5	%
Thermal Regulation	$T_A = 25^\circ\text{C}$, 20 msec Pulse		0.002	0.01		0.002	0.03	%/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	86		66	86		dB
Adjust Pin Current, I_{ADJ}		•	50	100		50	100	μA
Adjust Pin Current Change, ΔI_{ADJ}	$10 \text{ mA} \leq I_{OUT} \leq 3\text{A}$, $3\text{V} \leq (V_{IN} - V_{OUT}) \leq 35\text{V}$	•	0.2	5		0.2	5	μA
Minimum Load Current, I_{MIN}	$(V_{IN} - V_{OUT}) = 35\text{V}$	•	3.5	10		3.5	10	mA
Current Limit, I_{CL}	$(V_{IN} - V_{OUT}) \leq 10\text{V}$	• 3	4.5		3	4.5		A
	$(V_{IN} - V_{OUT}) = 30\text{V}$	0.25	1		0.25	1		A
Temperature Stability, $\frac{\Delta V_{OUT}}{\Delta T_{EMP}}$		•	1	2		1		%
Long Term Stability, $\frac{\Delta V_{OUT}}{\Delta T_{IME}}$	$T_A = 125^\circ\text{C}$, 1000 hrs		0.3	1		0.3	1	%
RMS Output Noise (% of V_{OUT}), e_n	$T_A = 25^\circ\text{C}$, $10\text{Hz} \leq f \leq 10\text{kHz}$		0.001			0.001		%
Thermal Resistance Junction to Case, θ_{JC}	K Package		1.5			1.5		$^\circ\text{C/W}$
	T Package		3	4		3	4	$^\circ\text{C/W}$
	V Package		1.5			1.5		$^\circ\text{C/W}$

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

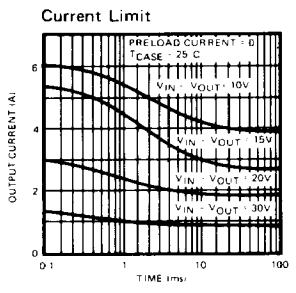
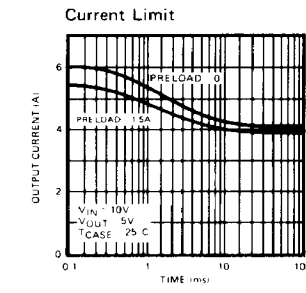
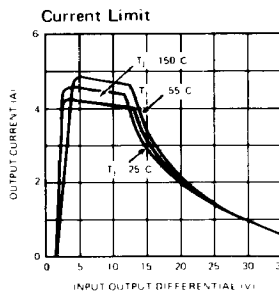
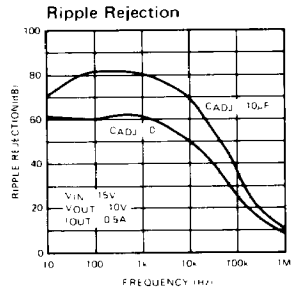
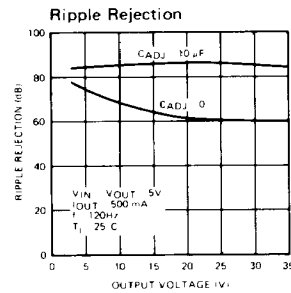
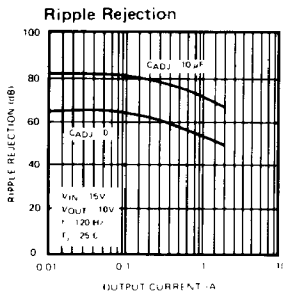
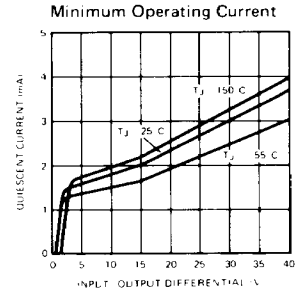
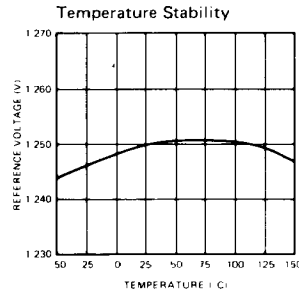
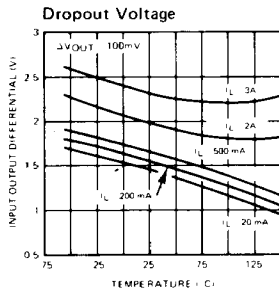
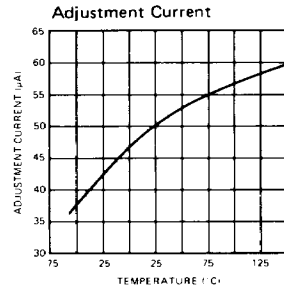
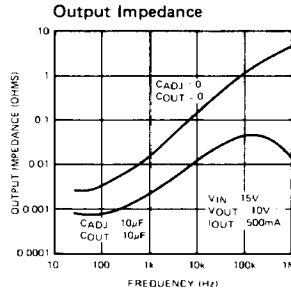
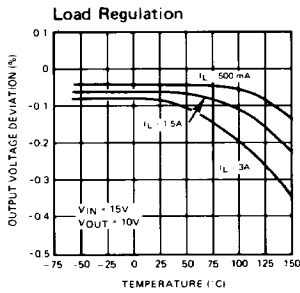
Note 1: Unless otherwise specified, these specifications apply for $V_{IN} - V_{OUT} = 5\text{V}$, $I_{OUT} = 1.5\text{A}$. Although power dissipation is internally limited, these specifications apply for dissipations of 30W for the TO-3, TO-218 and TO-257, and 25W for the TO-220; $I_{MAX} = 3\text{A}$.

Note 2: Regulation is measured at constant junction temperature, using pulse testing techniques 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 on the back of the heat tab for the TO-218, TO-220 and TO-257.



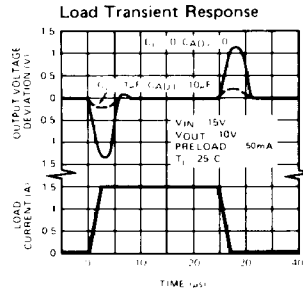
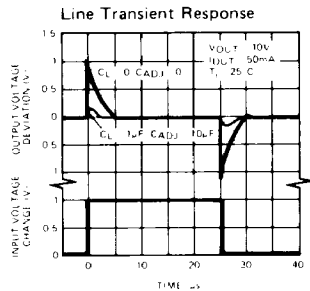
3 AMP POSITIVE ADJUSTABLE REGULATORS

TYPICAL PERFORMANCE CHARACTERISTICS

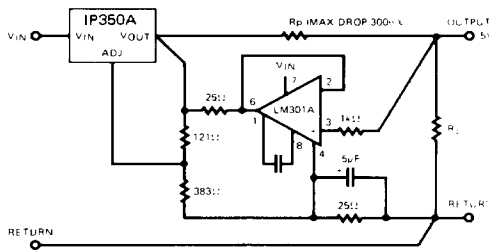


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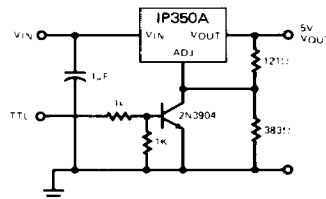
TYPICAL PERFORMANCE CHARACTERISTICS (CONTINUED)



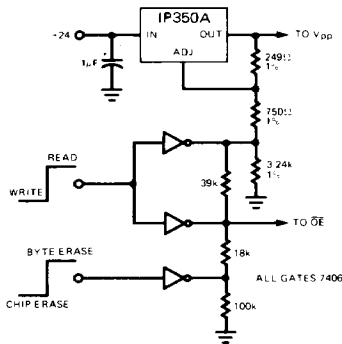
TYPICAL APPLICATIONS



Remote Sensing

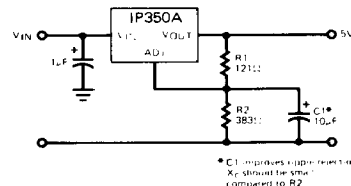


5V Regulator with Shut Down



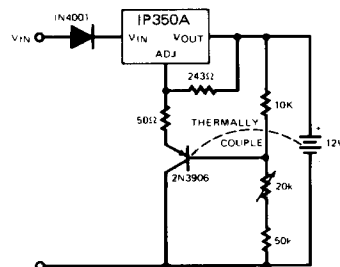
	OE	V _{IN}
READ	0V	5V
WRITE		
BYTE	5V	21V
CHIP ERASE	12V	21V

2816 EEPROM Supply Programmer for Read/Write Control



* C1 improves ripple rejection. Xp should be similar compared to R2

Improving Ripple Rejection



Temperature Compensated Lead Acid Battery Charger



IP150, IP150A, IP350A, IP350, LM150

3 AMP POSITIVE ADJUSTABLE REGULATORS

ORDER INFORMATION

Part Number	Temperature Range	Package
IP150AK	-55°C to +150°C	TO-3
IP150K	-55°C to +150°C	TO-3
IP150G	-55°C to +150°C	TO-257
IP150AG	-55°C to +150°C	TO-257
LM150K	-55°C to +150°C	TO-3
IP350AK	0°C to +125°C	TO-3
IP350K	0°C to +125°C	TO-3
IP350AT	0°C to +125°C	TO-220
IP350T	0°C to +125°C	TO-220
IP350AV	0°C to +125°C	TO-218
IP350V	0°C to +125°C	TO-218

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