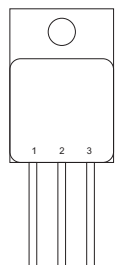
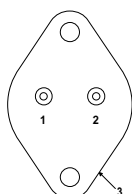


## 3 AMP POSITIVE ADJUSTABLE VOLTAGE REGULATOR



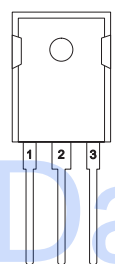
Pin 1 – ADJ.  
 Pin 2 –  $V_{OUT}$   
 Case –  $V_{IN}$

**Q Package – TO254**



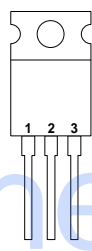
Pin 1 – ADJ.  
 Pin 2 –  $V_{IN}$   
 Case –  $V_{OUT}$

**K Package – TO-3**



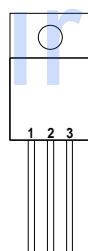
Pin 1 – ADJ.  
 Pin 2 –  $V_{OUT}$   
 Pin 3 –  $V_{IN}$   
 Case –  $V_{OUT}$

**V Package – TO-247AD**



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

**T Package – TO-220**



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

**G Package – TO-257**

**IG Package - TO-257**

\* Isolated case on IG Package

### FEATURES

- OUTPUT VOLTAGE RANGE OF 1.25 TO 35V
- 1% OUTPUT VOLTAGE TOLERANCE (–A VERSIONS)
- 0.3% LOAD REGULATION
- 0.01%/V LINE REGULATION
- COMPLETE SERIES OF PROTECTIONS:
  - CURRENT LIMITING
  - THERMAL SHUTDOWN
  - SOA CONTROL

### Order Information

Part Number	K-Pack (TO-3)	G/IG-Pack (TO-257)	T-Pack (TO-220)	V-Pack (TO-247AD)	Q-Pack (TO-254)	Temp. Range	Note:
IP150A	✓	✓			✓	-55 to +150°C	To order, add the package identifier to the part number. eg. IP150AQ
IP150	✓	✓			✓	"	
LM150	✓				✓	-55 to +150°C	
IP350A	✓		✓	✓		0 to 125°C	
IP350	✓		✓	✓		"	

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

$V_{I-O}$	Input - Output Differential Voltage	35V
$P_D$	Power Dissipation	Internally limited
$T_J$	Operating Junction Temperature Range	See Table Above
$T_{STG}$	Storage Temperature	–65 to 150°C
$T_L$	Lead Temperature (Soldering, 10 sec.)	300°C

Semelab Plc reserves the right to change test conditions, parameter limits and package dimensions without notice. Information furnished by Semelab is believed to be both accurate and reliable at the time of going to press. However Semelab assumes no responsibility for any errors or omissions discovered in its use. Semelab encourages customers to verify that datasheets are current before placing orders.

**Semelab plc.** Telephone +44(0)1455 556565. Fax +44(0)1455 552612.

E-mail: [sales@semelab.co.uk](mailto:sales@semelab.co.uk) Website: <http://www.semelab.co.uk>

Document Number 6235

Issue 1

Parameter	Test Conditions	IP150A			LM150 IP150			Units
		Min.	Typ.	Max.	Min.	Typ.	Max.	
$V_{REF}$ Reference Voltage	$I_{OUT} = 10\text{mA}$	1.238	1.25	1.262				V
	$I_{OUT} = 10\text{mA to } 3\text{A}$ $V_{IN} - V_{OUT} = 3\text{V to } 35\text{V}$ $P \leq 30\text{W}$ $T_J = -55 \text{ to } +150^\circ\text{C}$	1.225	1.250	1.270	1.200	1.250	1.300	V
$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$ Line Regulation 1	$V_{IN} - V_{OUT} = 3\text{V to } 35\text{V}$ $T_J = -55 \text{ to } +150^\circ\text{C}$		0.005	0.010		0.005	0.010	% / V
			0.020	0.050		0.020	0.050	
$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$ Load Regulation 1	$I_{OUT} = 10\text{mA to } 3\text{A}$ $V_{OUT} \leq 5\text{V}$ $T_J = -55 \text{ to } +150^\circ\text{C}$		5	15		5	15	mV
			15	50		20	50	
	$I_{OUT} = 10\text{mA to } 3\text{A}$ $V_{OUT} \geq 5\text{V}$ $T_J = -55 \text{ to } +150^\circ\text{C}$		0.1	0.3		0.1	0.3	%
			0.3	1		0.3	1	
Thermal Regulation	$t_p = 20\text{ms}$ $T_A = 25^\circ\text{C}$		0.002	0.010		0.002	0.010	%/W
Ripple Rejection	$V_{OUT} = 10\text{V}$ $f = 120\text{Hz}$	$C_{ADJ} = 0$		65		65		dB
		$C_{ADJ} = 10\mu\text{F}$ $T_J = -55 \text{ to } +150^\circ\text{C}$	66	86		66	86	dB
$I_{ADJ}$ Adjust Pin Current	$T_J = -55 \text{ to } +150^\circ\text{C}$		50	100		50	100	$\mu\text{A}$
$\Delta I_{ADJ}$ Adjust Pin Current Change	$I_{OUT} = 10\text{mA to } 3\text{A}$ $V_{IN} - V_{OUT} = 3\text{V to } 35\text{V}$ $T_J = -55 \text{ to } +150^\circ\text{C}$		0.2	5		0.2	5	$\mu\text{A}$
$I_{MIN}$ Minimum Load Current	$V_{IN} - V_{OUT} = 35\text{V}$ $T_J = -55 \text{ to } +150^\circ\text{C}$		3.5	5		3.5	5	mA
$I_{CL}$ Current Limit	$V_{IN} - V_{OUT} \leq 10\text{V}$ $T_J = -55 \text{ to } +150^\circ\text{C}$	3	4.5		3	4.5		A
	$V_{IN} - V_{OUT} = 30\text{V}$	0.3	1		0.3	1		A
$\frac{\Delta V_{OUT}}{\Delta \text{TEMP}}$ Temperature Stability	$T_J = -55 \text{ to } +150^\circ\text{C}$		1	2		1		%
$\frac{\Delta V_{OUT}}{\Delta \text{TIME}}$ Long Term Stability	$T_A = 125^\circ\text{C}$ $t = 1000 \text{ Hrs}$		0.3	1		0.3	1	%
$e_n$ RMS Output Noise (% of $V_{OUT}$ )	$f = 10 \text{ Hz to } 10 \text{ kHz}$ $T_A = 25^\circ\text{C}$		0.001			0.001		%
$R_{\theta JC}$ Thermal Resistance Junction to Case	K Package (TO-3)		1.5			1.5		$^\circ\text{C/W}$
	G Package (TO-257)		3	4		3	4	

- 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 package and on the back of the heat tab for the TO-247AD, TO-220 and TO-257 packages.
- 2) Test Conditions unless otherwise stated:  $V_{IN} - V_{OUT} = 5\text{V}$ ,  $T_J = 25^\circ\text{C}$ ,  $I_{OUT} = 1.5\text{A}$ .  
Although power dissipation is internally limited, these specifications apply for dissipations of 30W for the TO-3, TO-247AD and TO-257 packages, and 25W for the TO-220 package;  $I_{MAX} = 3\text{A}$ .

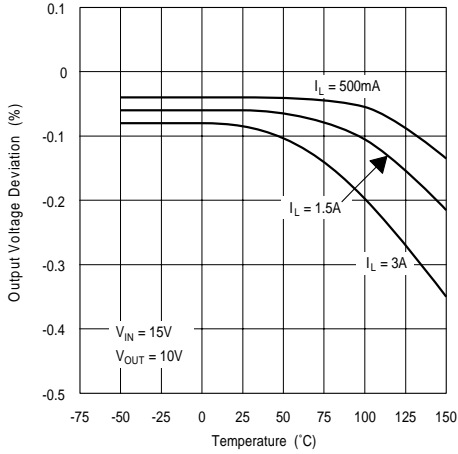
Parameter	Test Conditions	IP350A			IP350			Units
		Min.	Typ.	Max.	Min.	Typ.	Max.	
$V_{REF}$ Reference Voltage	$I_{OUT} = 10\text{mA}$	1.238	1.25	1.262				V
	$I_{OUT} = 10\text{mA to } 3\text{A}$ $V_{IN} - V_{OUT} = 3\text{V to } 35\text{V}$ $P \leq 30\text{W}$ $T_J = 0 \text{ to } +125^\circ\text{C}$	1.225	1.250	1.270	1.200	1.250	1.300	V
$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$ Line Regulation 1	$V_{IN} - V_{OUT} = 3\text{V to } 35\text{V}$ $T_J = 0 \text{ to } +125^\circ\text{C}$		0.005	0.010		0.005	0.030	% / V
			0.020	0.050		0.020	0.070	
$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$ Load Regulation 1	$I_{OUT} = 10\text{mA to } 3\text{A}$ $V_{OUT} \leq 5\text{V}$ $T_J = 0 \text{ to } +125^\circ\text{C}$		5	15		5	25	mV
			15	50		20	70	
	$I_{OUT} = 10\text{mA to } 3\text{A}$ $V_{OUT} \geq 5\text{V}$ $T_J = 0 \text{ to } +125^\circ\text{C}$		0.1	0.3		0.1	0.5	%
			0.3	1		0.3	1.5	
Thermal Regulation	$t_p = 20\text{ms}$ $T_A = 25^\circ\text{C}$		0.002	0.010		0.002	0.030	%/W
Ripple Rejection	$V_{OUT} = 10\text{V}$ $C_{ADJ} = 0$ $f = 120\text{Hz}$		65			65		dB
			66	86		66	86	dB
$I_{ADJ}$ Adjust Pin Current	$T_J = 0 \text{ to } +125^\circ\text{C}$		50	100		50	100	$\mu\text{A}$
$\Delta I_{ADJ}$ Adjust Pin Current Change	$I_{OUT} = 10\text{mA to } 3\text{A}$ $V_{IN} - V_{OUT} = 3\text{V to } 35\text{V}$ $T_J = 0 \text{ to } +125^\circ\text{C}$		0.2	5		0.2	5	$\mu\text{A}$
$I_{MIN}$ Minimum Load Current	$V_{IN} - V_{OUT} = 35\text{V}$ $T_J = 0 \text{ to } +125^\circ\text{C}$		3.5	5		3.5	10	mA
$I_{CL}$ Current Limit	$V_{IN} - V_{OUT} \leq 10\text{V}$ $T_J = 0 \text{ to } +125^\circ\text{C}$		3	4.5		3	4.5	A
	$V_{IN} - V_{OUT} = 30\text{V}$		0.25	1		0.25	1	A
$\frac{\Delta V_{OUT}}{\Delta \text{TEMP}}$ Temperature Stability	$T_J = 0 \text{ to } +125^\circ\text{C}$		1	2		1		%
$\frac{\Delta V_{OUT}}{\Delta \text{TIME}}$ Long Term Stability	$T_A = 125^\circ\text{C}$ $t = 1000 \text{ Hrs}$		0.3	1		0.3	1	%
$e_n$ RMS Output Noise (% of $V_{OUT}$ )	$f = 10 \text{ Hz to } 10 \text{ kHz}$ $T_A = 25^\circ\text{C}$		0.001			0.001		%
$R_{\theta JC}$ Thermal Resistance Junction to Case	K Package (TO-3)		1.5			1.5		$^\circ\text{C/W}$
	T Package (TO-220)		3	4		3	4	
	V Package (TO-247AD)		1.5			1.5		

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 package and on the back of the heat tab for the TO-247AD, TO-220 and TO-257 packages.

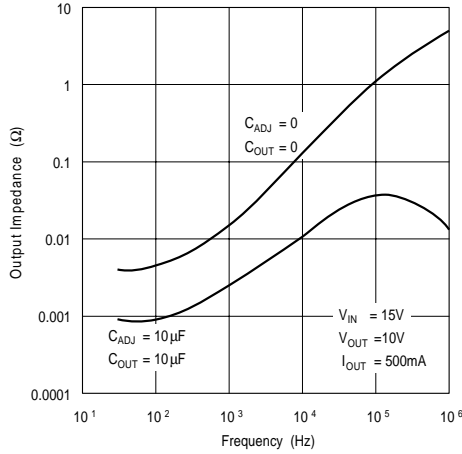
2) Test Conditions unless otherwise stated:  $V_{IN} - V_{OUT} = 5\text{V}$ ,  $T_J = 25^\circ\text{C}$ ,  $I_{OUT} = 1.5\text{A}$ .  
 Although power dissipation is internally limited, these specifications apply for dissipations of 30W for the TO-3, TO-247AD and TO-257 packages, and 25W for the TO-220 package;  $I_{MAX} = 3\text{A}$ .

**TYPICAL PERFORMANCE CHARACTERISTICS**

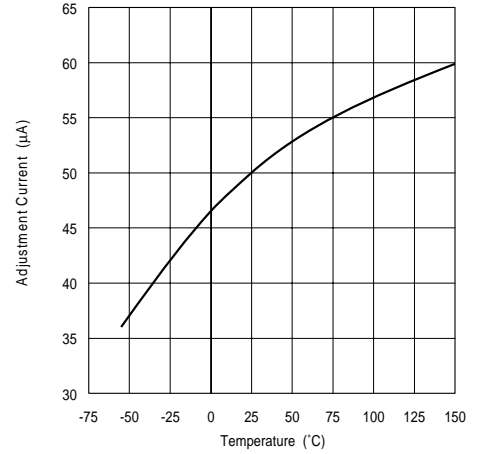
**Load Regulation**



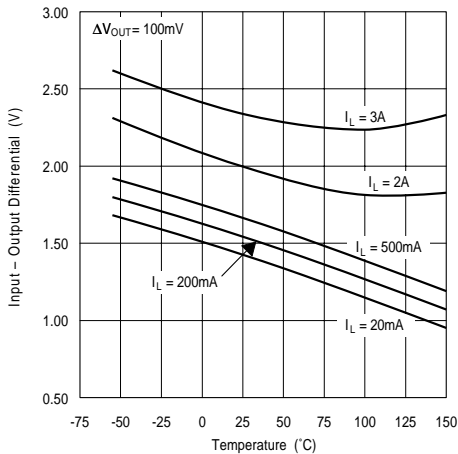
**Output Impedance**



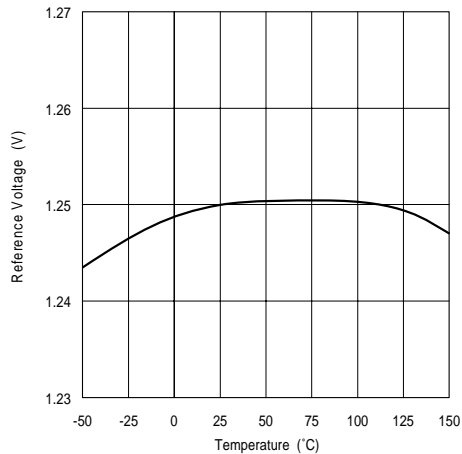
**Adjustment Current**



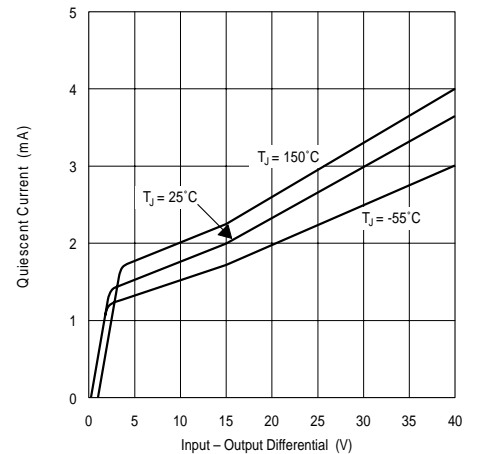
**Dropout Voltage**



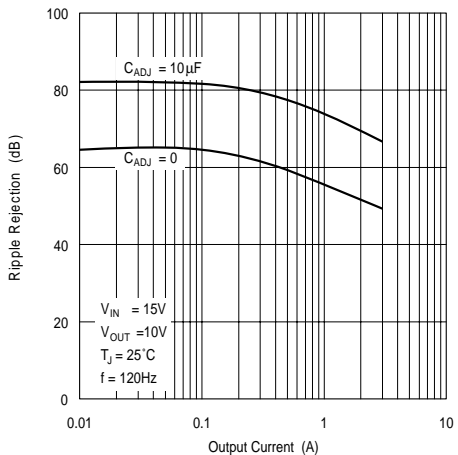
**Temperature Stability**



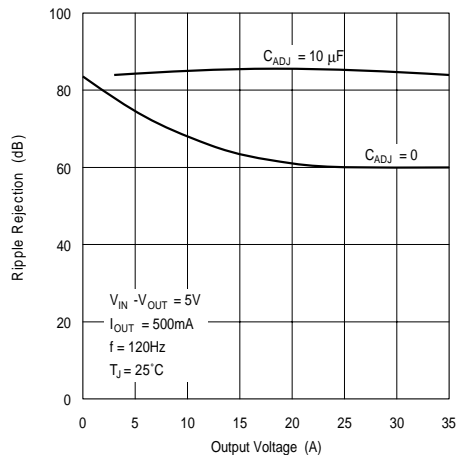
**Minimum Operating Current**



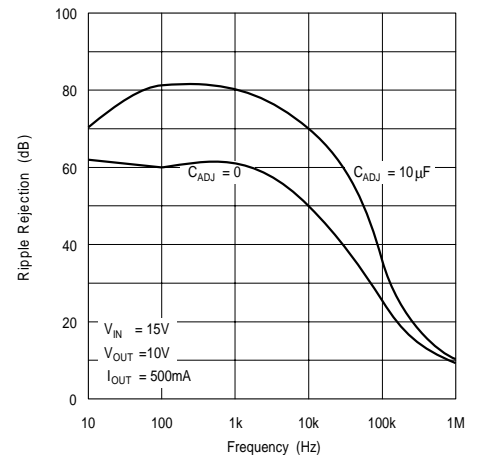
**Ripple Rejection**



**Ripple Rejection**



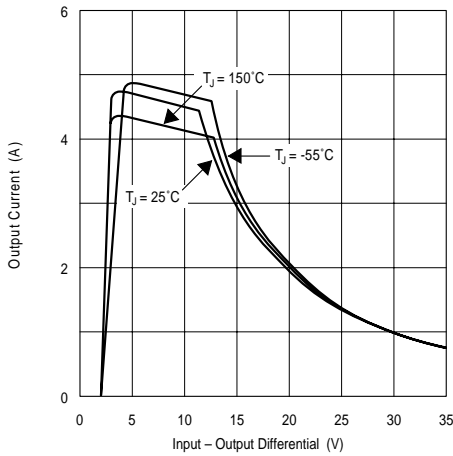
**Ripple Rejection**



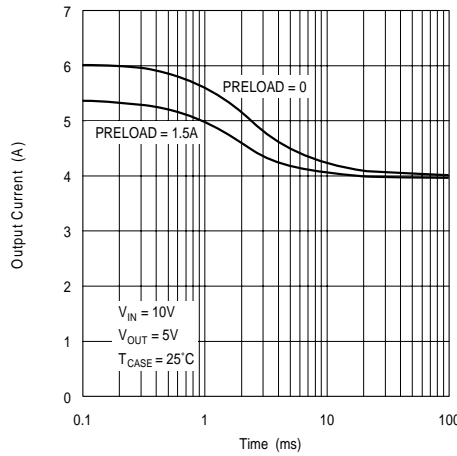
Semelab Plc reserves the right to change test conditions, parameter limits and package dimensions without notice. Information furnished by Semelab is believed to be both accurate and reliable at the time of going to press. However Semelab assumes no responsibility for any errors or omissions discovered in its use. Semelab encourages customers to verify that datasheets are current before placing orders.

**TYPICAL PERFORMANCE CHARACTERISTICS**

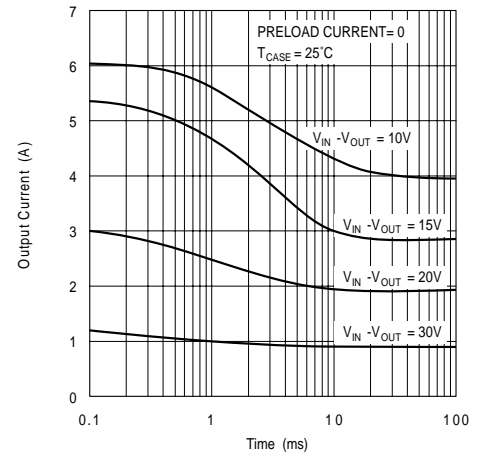
**Current Limit**



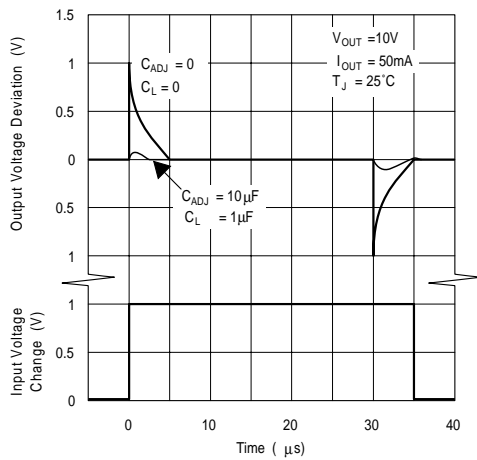
**Current Limit**



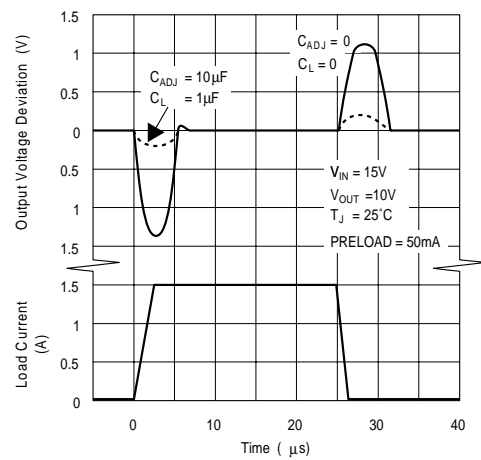
**Current Limit**



**Line Transient Response**



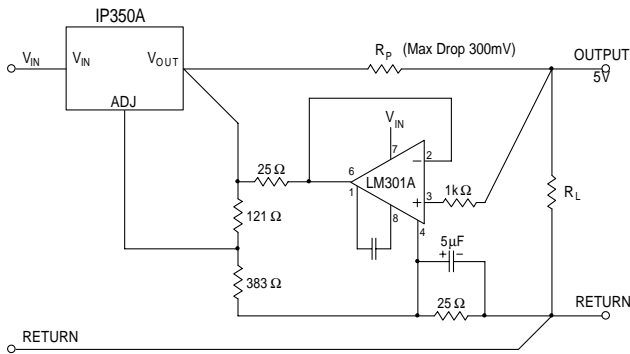
**Load Transient Response**



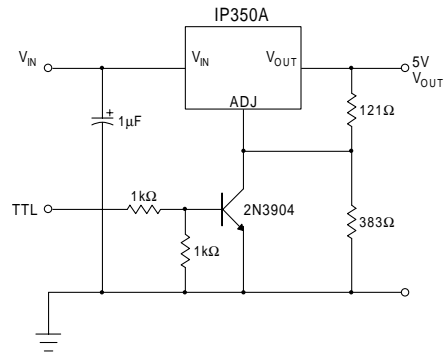
Semelab Plc reserves the right to change test conditions, parameter limits and package dimensions without notice. Information furnished by Semelab is believed to be both accurate and reliable at the time of going to press. However Semelab assumes no responsibility for any errors or omissions discovered in its use. Semelab encourages customers to verify that datasheets are current before placing orders.

**APPLICATIONS INFORMATION**

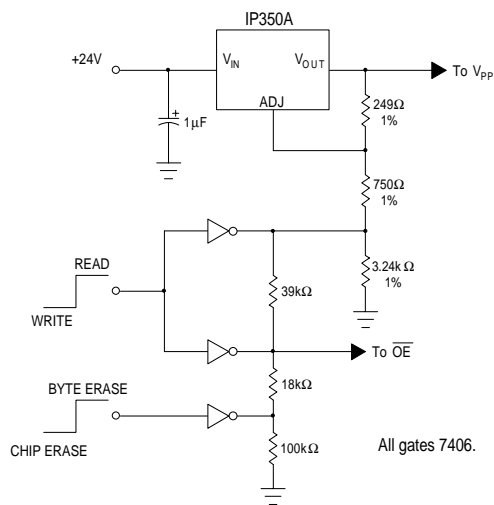
**Remote Sensing**



**5V Regulator with Shut Down**

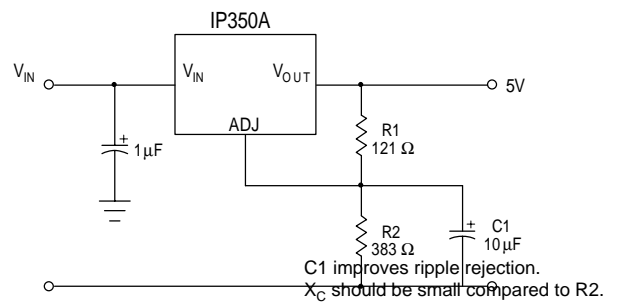


**2816 EEPROM Supply Programmer for Read/Write Control**

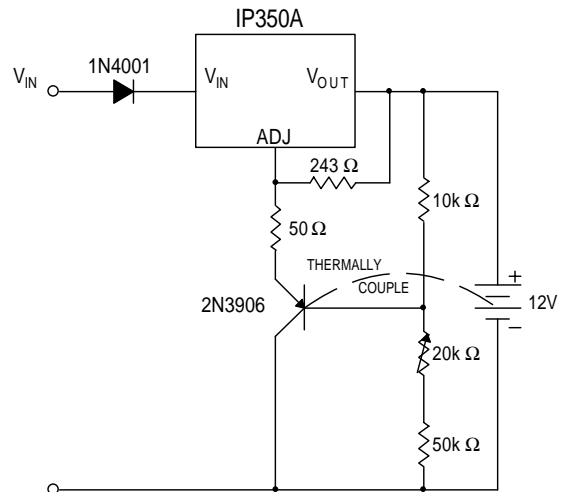


	OE	V <sub>PP</sub>
READ	0V	5V
WRITE		
BYTE ERASE	5V	21V
CHIP ERASE	12V	21V

**Improving Ripple Rejection**



**Temperature Compensated Lead-Acid Battery Charger**



Semelab Plc reserves the right to change test conditions, parameter limits and package dimensions without notice. Information furnished by Semelab is believed to be both accurate and reliable at the time of going to press. However Semelab assumes no responsibility for any errors or omissions discovered in its use. Semelab encourages customers to verify that datasheets are current before placing orders.