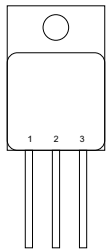
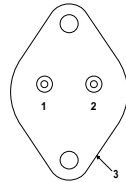


3 AMP POSITIVE ADJUSTABLE VOLTAGE REGULATOR



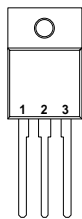
Pin 1 – ADJ.
 Pin 2 – V_{OUT}
 Case – V_{IN}

Q Package – TO254



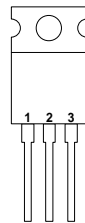
Pin 1 – ADJ.
 Pin 2 – V_{IN}
 Case – V_{OUT}

K Package – TO-3



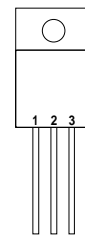
Pin 1 – ADJ.
 Pin 2 – V_{OUT}
 Pin 3 – V_{IN}
 Case – V_{OUT}

V Package – TO-218



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-218) | 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 |

| Parameter | Test Conditions | IP150A | | | LM150 IP150 | | | 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 3A V _{IN} - V _{OUT} = 3V to 35V P ≤ 30W T _J = -55 to +150°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} = 3V to 35V T _J = -55 to +150°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} = 10mA to 3A V _{OUT} ≤ 5V T _J = -55 to +150°C | | 5 | 15 | | 5 | 15 | mV |
| | I _{OUT} = 10mA to 3A V _{OUT} ≥ 5V T _J = -55 to +150°C | | 0.1 | 0.3 | | 0.1 | 0.3 | % |
| | | | 0.3 | 1 | | 0.3 | 1 | |
| Thermal Regulation | t _p = 20ms T _A = 25°C | | 0.002 | 0.010 | | 0.002 | 0.010 | %/W |
| Ripple Rejection | V _{OUT} = 10V f = 120Hz C _{ADJ} = 0 | | 65 | | | 65 | | dB |
| | C _{ADJ} = 10μF T _J = -55 to +150°C | 66 | 86 | | 66 | 86 | | dB |
| I _{ADJ} Adjust Pin Current | T _J = -55 to +150°C | | 50 | 100 | | 50 | 100 | μA |
| ΔI _{ADJ} Adjust Pin Current Change | I _{OUT} = 10mA to 3A V _{IN} - V _{OUT} = 3V to 35V T _J = -55 to +150°C | | 0.2 | 5 | | 0.2 | 5 | μA |
| I _{MIN} Minimum Load Current | V _{IN} - V _{OUT} = 35V T _J = -55 to +150°C | | 3.5 | 5 | | 3.5 | 5 | mA |
| I _{CL} Current Limit | V _{IN} - V _{OUT} ≤ 10V T _J = -55 to +150°C | 3 | 4.5 | | 3 | 4.5 | | A |
| | V _{IN} - V _{OUT} = 30V | 0.3 | 1 | | 0.3 | 1 | | A |
| $\frac{\Delta V_{OUT}}{\Delta TEMP}$ Temperature Stability | T _J = -55 to +150°C | | 1 | 2 | | 1 | | % |
| $\frac{\Delta V_{OUT}}{\Delta TIME}$ Long Term Stability | T _A = 125°C t = 1000 Hrs | | 0.3 | 1 | | 0.3 | 1 | % |
| e _n RMS Output Noise (% of V _{OUT}) | f = 10 Hz to 10 kHz T _A = 25°C | | 0.001 | | | 0.001 | | % |
| R _{θJC} Thermal Resistance Junction to Case | K Package (TO-3) | | 1.5 | | | 1.5 | | °C/W |
| | G Package (TO-257) | | 3 | 4 | | 3 | 4 | |

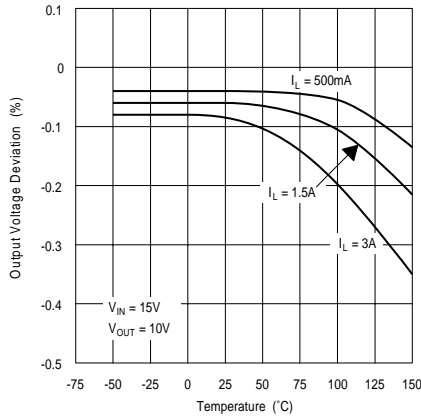
- 1) Regulation is measured at constant junction temperature, using pulse testing at a low duty cycle. Changes in output voltage due to heating effects are covered under thermal regulation specifications. Load regulation is measured from the bottom of the package for the TO-3 package and on the back of the heat tab for the TO-218, TO-220 and TO-257 packages.
- 2) Test Conditions unless otherwise stated: V_{IN} - V_{OUT} = 5V, T_J = 25°C, I_{OUT} = 1.5A.
Although power dissipation is internally limited, these specifications apply for dissipations of 30W for the TO-3, TO-218 and TO-257 packages, and 25W for the TO-220 package; I_{MAX} = 3A.

| 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 |
| | $I_{OUT} = 10\text{mA to } 3\text{A}$ $V_{OUT} \geq 5\text{V}$ $T_J = 0 \text{ to } +125^\circ\text{C}$ | | 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 | $V_{OUT} = 10\text{V}$ $f = 120\text{Hz}$ $C_{ADJ} = 0$ | | 65 | | | 65 | | dB |
| | | $C_{ADJ} = 10\mu\text{F}$ $T_J = 0 \text{ to } +125^\circ\text{C}$ | 66 | 86 | | 66 | 86 | dB |
| I_{ADJ} Adjust Pin Current | $T_J = 0 \text{ to } +125^\circ\text{C}$ | | 50 | 100 | | 50 | 100 | μA |
| ΔI_{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 | μA |
| 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-218) | | 1.5 | | | 1.5 | | |

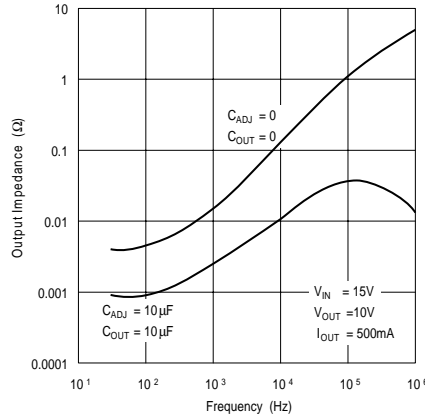
- Regulation is measured at constant junction temperature, using pulse testing at a low duty cycle. Changes in output voltage due to heating effects are covered under thermal regulation specifications. Load regulation is measured from the bottom of the package for the TO-3 package and on the back of the heat tab for the TO-218, TO-220 and TO-257 packages.
- 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-218 and TO-257 packages, and 25W for the TO-220 package; $I_{MAX} = 3\text{A}$.

TYPICAL PERFORMANCE CHARACTERISTICS

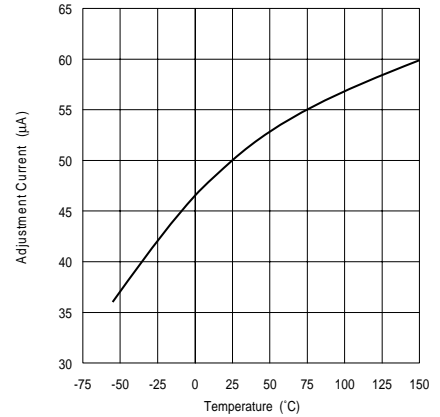
Load Regulation



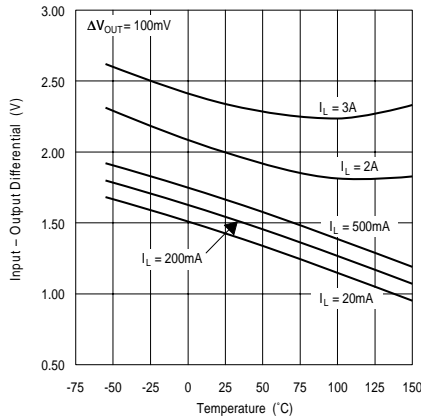
Output Impedance



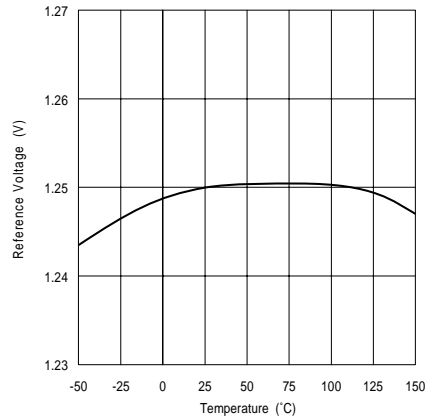
Adjustment Current



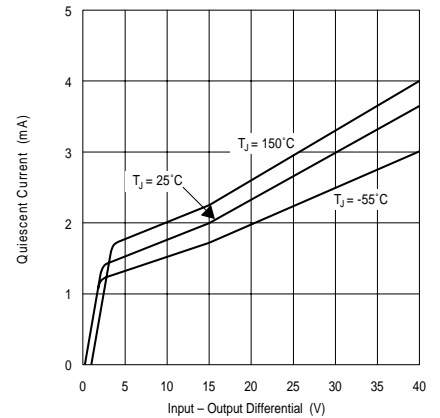
Dropout Voltage



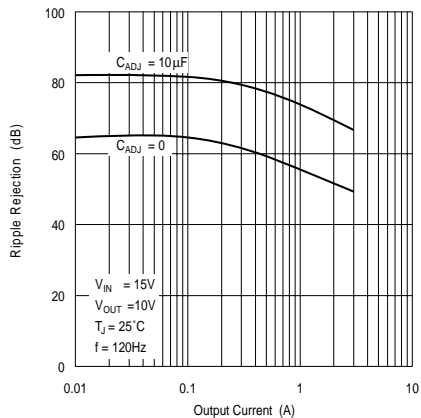
Temperature Stability



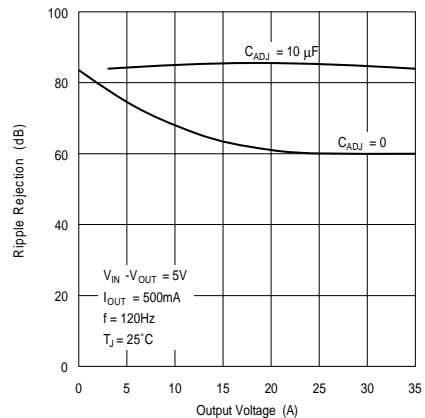
Minimum Operating Current



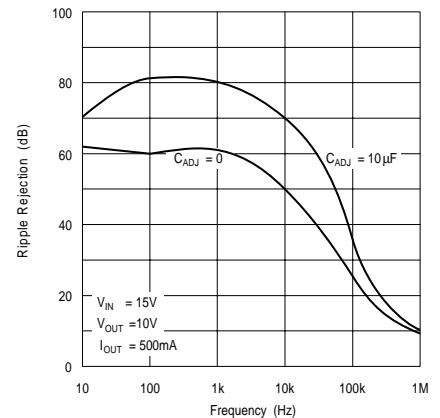
Ripple Rejection



Ripple Rejection

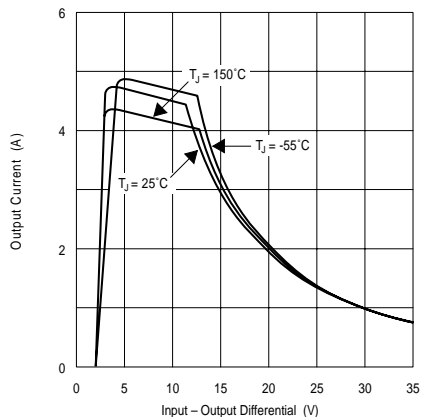


Ripple Rejection

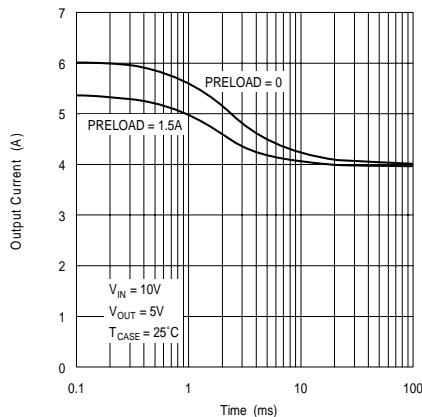


TYPICAL PERFORMANCE CHARACTERISTICS

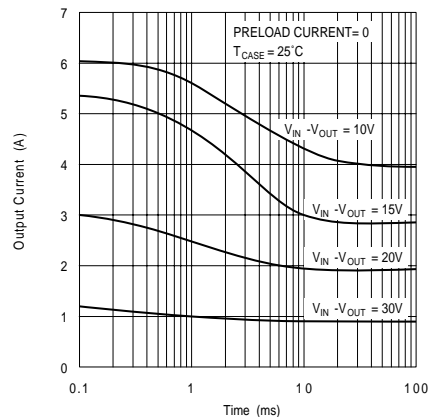
Current Limit



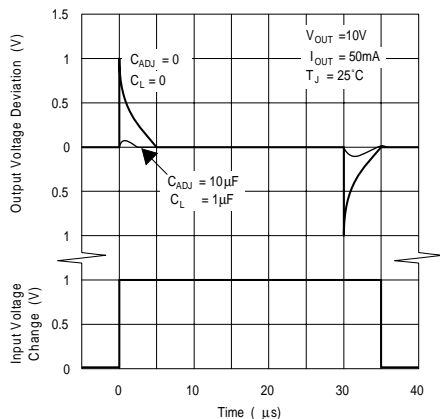
Current Limit



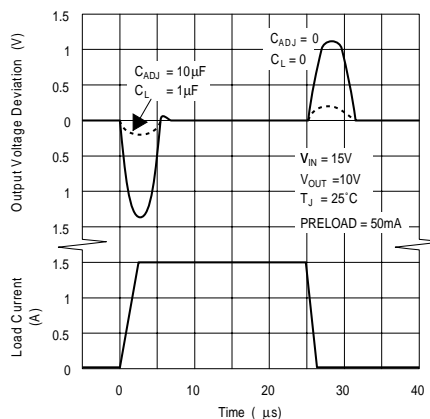
Current Limit



Line Transient Response

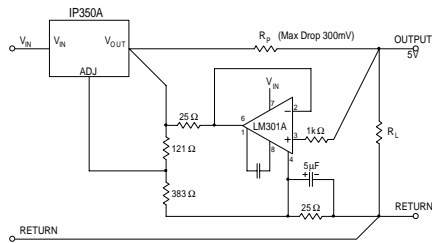


Load Transient Response

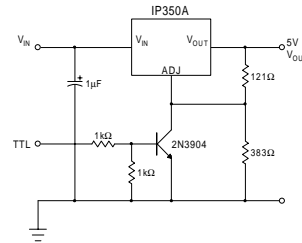


APPLICATIONS INFORMATION

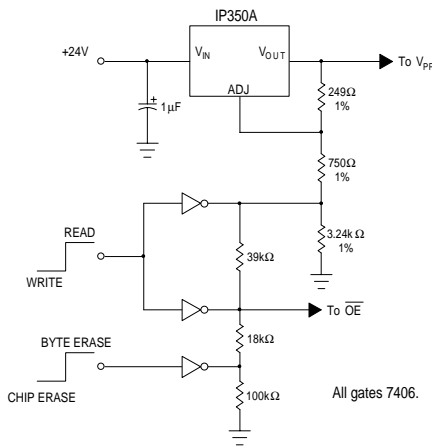
Remote Sensing



5V Regulator with Shut Down

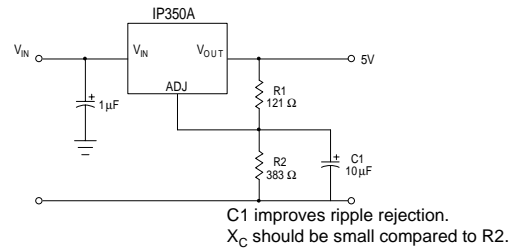


2816 EEPROM Supply Programmer for Read/Write Control



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

Improving Ripple Rejection



Temperature Compensated Lead-Acid Battery Charger

