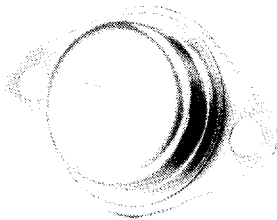


1.5 AMP NEGATIVE VOLTAGE REGULATORS

LAS 1800



FEATURES

- Guaranteed input-output differential: -2.1 Volts
- Low noise, band gap reference
- Remote sense capability
- Sample power cycled burn-in
- Guaranteed thermal resistance junction to case: 3°C/W

DESCRIPTION

The LAS 1800 Series voltage regulators are monolithic integrated circuits designed for use in applications requiring a well regulated negative output voltage. Outstanding features include full power usage up to 1.5 amperes of load current, internal current limiting, thermal shutdown, and safe area protection on the chip, providing protection of the series pass Darlington, under most operating conditions. Hermetically sealed steel TO-3 packages are utilized for high reliability and low thermal resistance. A low-noise, temperature stable band gap reference is the key design factor insuring excellent temperature regulation of the LAS 1800 Series. This coupled to a very low output impedance insures superior performance and load regulation.

The LAS 18U, a four-terminal adjustable regulator, is available with an output range from -2.6 to -30 Volts, adjustable with a single potentiometer.

ABSOLUTE MAXIMUM RATINGS

| PARAMETER | SYMBOL | MINIMUM | MAXIMUM | UNITS |
|---|---------------|---------|-----------------------------------|---------|
| Input Voltage | V_{IN} | | -35 (-40) ⁽¹⁾ (2) | Volts |
| Power Dissipation | P_D | | Internally Limited ⁽³⁾ | Watts |
| Thermal Resistance Junction to Case | θ_{JC} | | 3 | °C/Watt |
| Operating Junction Temperature Range | T_J | -55 | 150 | °C |
| Storage Temperature Range | T_{STG} | -65 | 150 | °C |
| Lead Temperature (Soldering, 60 Seconds Time Limit) | T_{LEAD} | | 300 | °C |

⁽¹⁾ Short circuit is only assured to V_{IN} max. Value of -35V applies to V_O of -5V to -12V. Value of -40V applies to V_O of -15V to -24V and LAS 18U.

⁽²⁾ In case of short circuit with input-output voltages approaching V_{IN} max, regulator may require the removal of the input voltage to restart.

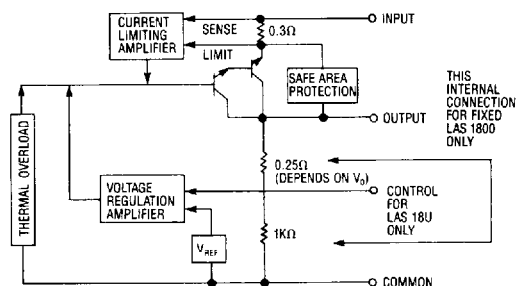
⁽³⁾ For operation above 105°C T_{CASE} , derate @ 333 mW/°C.

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DEVICE SELECTION GUIDE

| V_{OUT} | V_{OUT} TOLERANCE | |
|-------------|-----------------------------------|-------------|
| | ± 5% | ± 2% |
| -2 | LAS 1802 | LAS 18A02 |
| -5 | LAS 1805 | LAS 18A05 |
| -5.2 | LAS 1805.2 | LAS 18A05.2 |
| -8 | LAS 1808 | LAS 18A08 |
| -10 | LAS 1810 | LAS 18A10 |
| -12 | LAS 1812 | LAS 18A12 |
| -15 | LAS 1815 | LAS 18A15 |
| -18 | LAS 1818 | LAS 18A18 |
| -20 | LAS 1820 | LAS 18A20 |
| -24 | LAS 1824 | LAS 18A24 |
| -2.6 to -30 | LAS 18U (Adjustable/Remote Sense) | |

BLOCK DIAGRAM



LAS 1800

1.5 AMP NEGATIVE VOLTAGE REGULATORS

ELECTRICAL CHARACTERISTICS

Input voltage test conditions are as follows: $V_1 = V_0 - 5$ Volts, $V_2 = V_0 - 10$ Volts, $V_3 = V_0 - 15$ Volts, or the maximum input, whichever is less.

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| Parameter | Symbol | Test Conditions | | | Test Limits | | Units |
|--|-----------------------|-----------------|--------------|---------|--|---|-----------------|
| | | V_{IN} | I_O | T_J | Min | Max | |
| Output Voltage ² LAS 1800 ¹ LAS 18A00 ¹ LAS 18U ⁵ | V_O | V_1 to V_2 | 10mA to 1.0A | 25°C | 0.95 V_O 0.98 V_O -2.6 | 1.05 V_O 1.02 V_O -30.0 | Volts |
| Input-Output Differential ⁶ | $V_{IN}-V_O$ | | 1.0A | 0-125°C | -2.1 | | Volts |
| Line Regulation ² | REG _(LINE) | V_1 to V_3 | 1.0A | 25°C | | 2.0 | % V_O |
| Load Regulation ² | REG _(LOAD) | V_1 | 10mA to 1.5A | 25°C | | 0.6 | % V_O |
| Quiescent Current | I_Q | V_1 | 10mA | 25°C | | 10.0 | mA |
| Quiescent Current Line | $I_{Q(LINE)}$ | V_1 to V_3 | 10mA | 25°C | | 1.3 | mA |
| Quiescent Current Load | $I_{Q(LOAD)}$ | V_1 | 10mA to 1.5A | 25°C | | 0.75 | mA |
| Current Limit ² | I_{LIM} | V_1 | | 25°C | | 3.5 | Amps |
| Temperature Coefficient | T_C | V_1 | 0.1A | 0-125°C | | 0.03 | % $V_O/°C$ |
| Output Noise ³ Voltage | V_N | V_1 | 0.1A | 0-125°C | | 25 | $\mu V_{rms}/V$ |
| Ripple Attenuation ⁴ | R_A | V_1 | 1.0A | 0-125°C | 54 | | dB |
| Control Voltage LAS 18U | V_C | V_1 to V_2 | 10mA | 25°C | -2.25 | -2.6 | Volts |

⁽¹⁾ Nominal output voltages are specified under Device Selection Guide.

⁽²⁾ Low duty cycle pulse testing with Kelvin connections required. Die temperature changes must be accounted for separately.

⁽³⁾ BW = 10Hz - 100KHz

⁽⁴⁾ Ripple attenuation is specified for a 1V_{rms}, 120Hz, input ripple.

Ripple attenuation is minimum of 54 dB at 5V output and is 1 dB less for each volt increase in the output voltage.

⁽⁵⁾ $V_O - V_C (1 + R1/R2)$

R1 = Resistance from output to control

R2 = Resistance from control to common

⁽⁶⁾ For V_O of -2V, the minimum input-output differential is -5.1V.

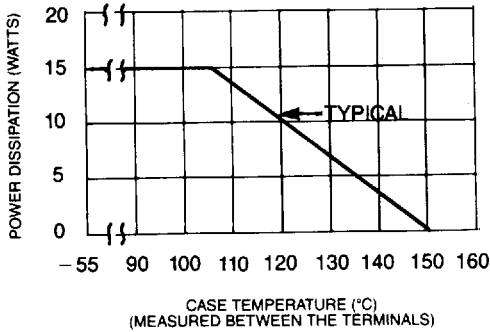
1.5 AMP NEGATIVE VOLTAGE REGULATORS

LAS 1800

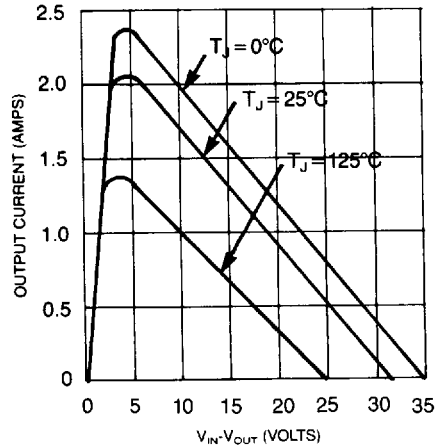
OPERATIONAL DATA

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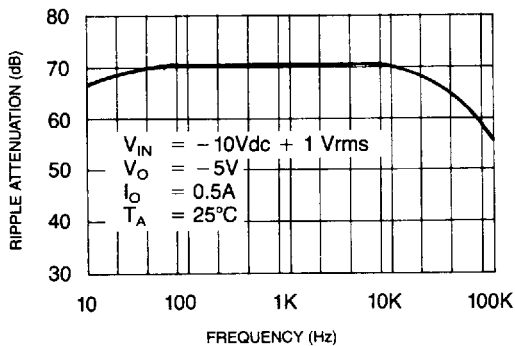
POWER DERATING



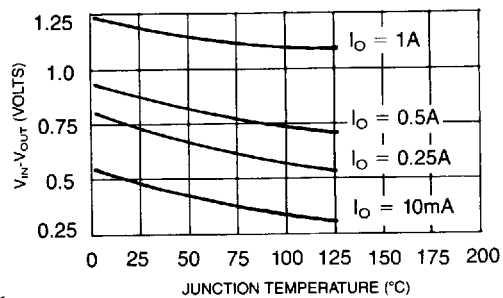
CURRENT LIMIT



TYPICAL RIPPLE ATTENUATION VS FREQUENCY



TYPICAL INPUT-OUTPUT VOLTAGE DIFFERENTIAL VS JUNCTION TEMPERATURE

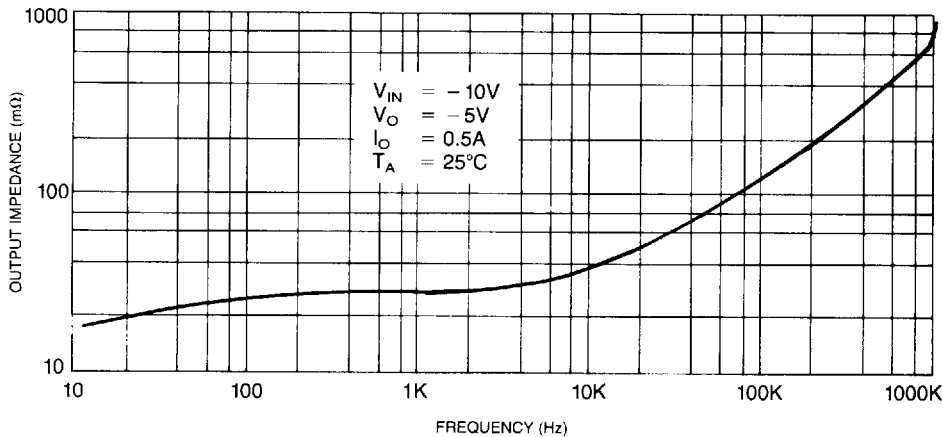


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1.5 AMP NEGATIVE VOLTAGE REGULATORS

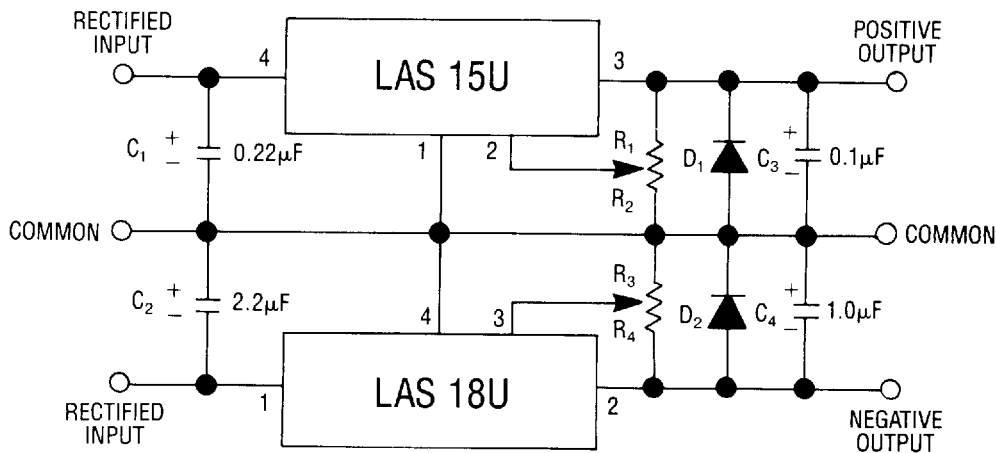
OPERATIONAL DATA

TYPICAL OUTPUT IMPEDANCE VS FREQUENCY



TYPICAL APPLICATIONS

1.5 AMP DUAL ADJUSTABLE REGULATOR^{1,2,3}



¹ Diodes D_1 & D_2 should be low V_F , high current diodes for optimum protection.

² C_1 , C_2 , C_3 and C_4 to be placed as close as possible to the regulator.

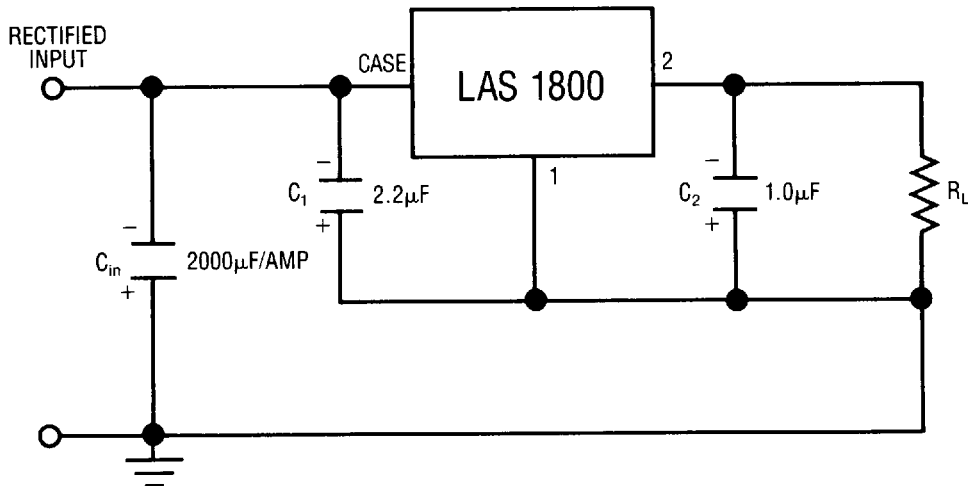
³ $V_o \geq 10 \text{ mA}$, where $R_{adj} = R_1 + R_2$ or $R_3 + R_4$
 R_{adj}

1.5 AMP NEGATIVE VOLTAGE REGULATORS

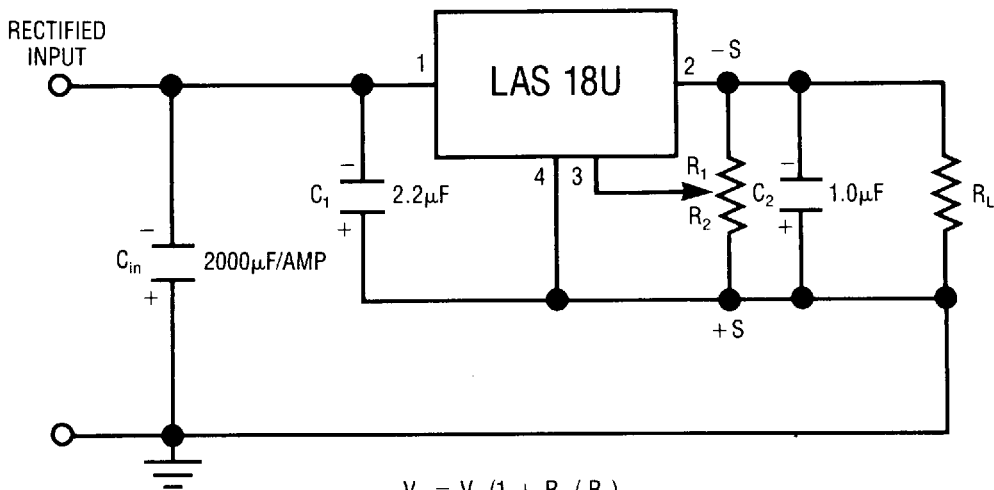
LAS 1800

TYPICAL APPLICATIONS

FIXED VOLTAGE REGULATOR¹



ADJUSTABLE VOLTAGE REGULATOR^{1,2}



$$V_o = V_c (1 + R_1 / R_2)$$

¹ C₁ and C₂ should be placed as close as possible to the regulator.

$$\text{}^2 \frac{V_o}{R_1 + R_2} \geq 10 \text{ mA}$$

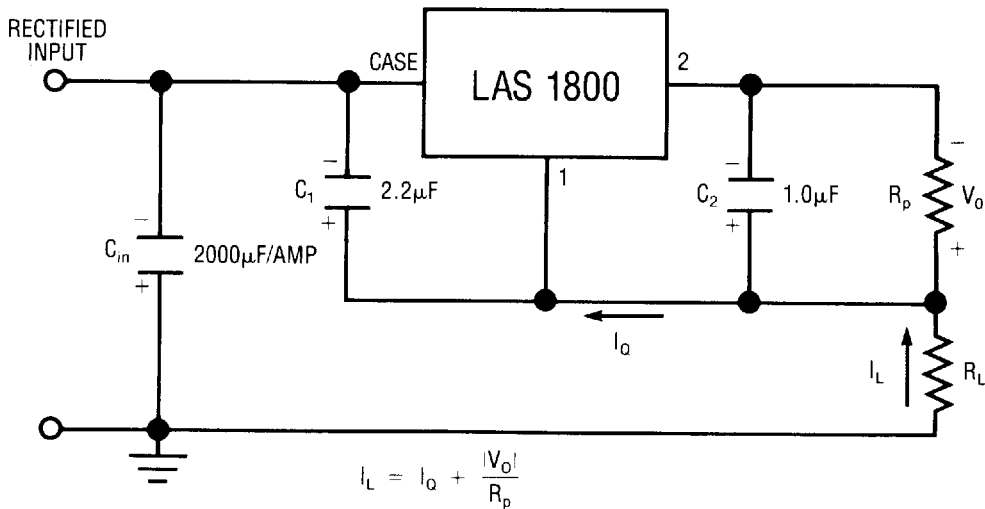
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LAS 1800

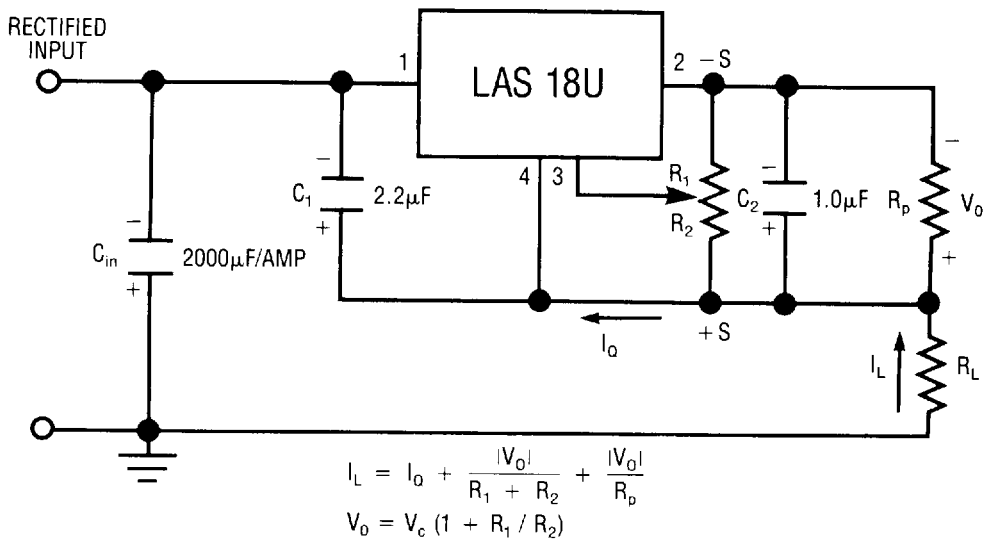
1.5 AMP NEGATIVE VOLTAGE REGULATORS

TYPICAL APPLICATIONS

FIXED CURRENT REGULATOR¹



ADJUSTABLE CURRENT REGULATOR^{1,2}



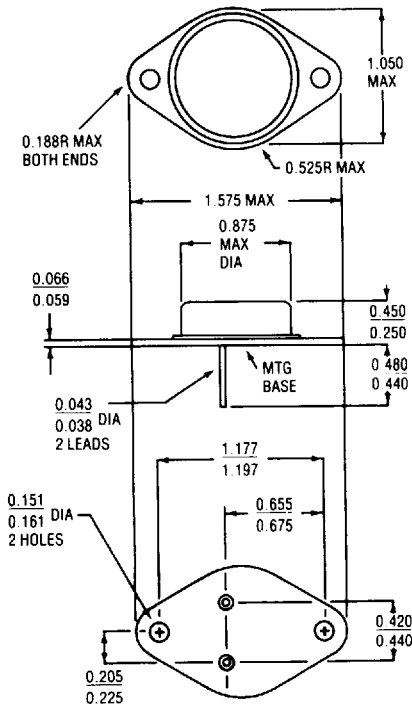
¹ C₁ and C₂ should be placed as close as possible to the regulator.

² $\frac{V_o}{R_1 + R_2} \geq 10 \text{ mA}$

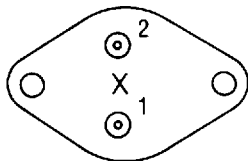
1.5 AMP NEGATIVE VOLTAGE REGULATORS

LAS 1800

DEVICE OUTLINE

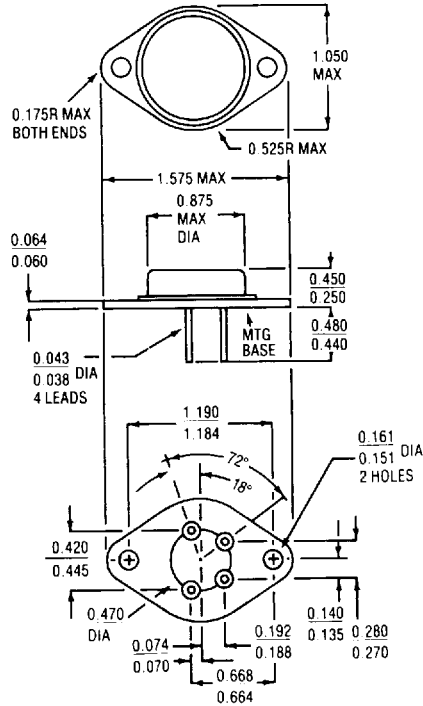


Bottom View

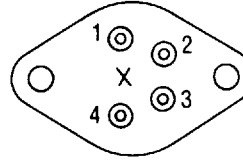


LAS 1800

1 - Common
2 - Output
Case is Input



Bottom View



LAS 18U

1 - Input
2 - Output
3 - Control
4 - Common
Case is Input

NOTE: Case temperature measured at point X.
All dimensions are in inches.