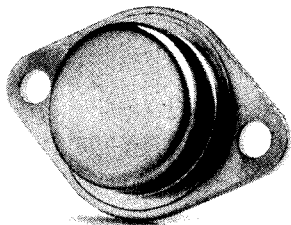


# LAMBDA LINEAR REGULATORS

## LAS 1500 SERIES

### 1.5 AMP POSITIVE VOLTAGE REGULATORS



#### FEATURES

- Guaranteed Power Dissipation 15 Watts @ 87.5° Case
- Guaranteed input-output differential: + 2.4 Volts
- Low noise, band gap reference
- Remote sense capability
- Sample power cycled burn-in
- Guaranteed thermal resistance junction to case: 2.5° C/W

#### DESCRIPTION

The LAS 1500 Series voltage regulators are monolithic integrated circuits designed for use in applications requiring a well regulated positive 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 1500 Series. This, coupled to a very low output impedance, insures superior performance and load regulation.

The LAS 15U, a four-terminal, adjustable regulator is available with an output range from + 4 to + 30 Volts providing remote sense capability with a single potentiometer.

#### ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MINIMUM	MAXIMUM	UNITS
Input Voltage	$V_{IN}$		35(40) <sup>(1)</sup> (2)	Volts
Power Dissipation	$P_D$		Internally Limited <sup>(3)</sup>	
Thermal Resistance Junction to Case	$\theta_{JC}$		2.5	°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

<sup>(1)</sup> Short circuit protection 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 13.8V to 24V and LAS 15U.

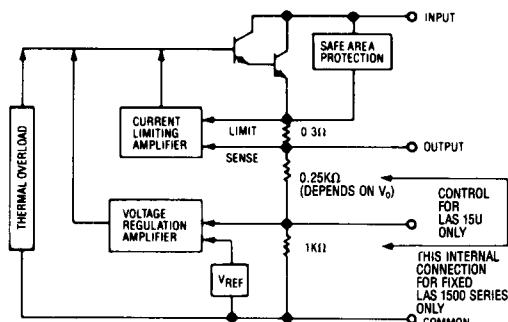
<sup>(2)</sup> In case of short circuit with input-output voltages approaching  $V_{IN}$  max, regulator may require the removal of the input voltage to restart.

<sup>(3)</sup> For operation above 87.5°C  $T_{CASE}$ , derate @ 400 mW/°C.

#### DEVICE SELECTION GUIDE

$V_{OUT}$	$V_{OUT}$ TOLERANCE	
	± 5%	± 2%
5	LAS 1505	LAS 15A05
6	LAS 1506	LAS 15A06
8	LAS 1508	LAS 15A08
10	LAS 1510	LAS 15A10
12	LAS 1512	LAS 15A12
13.8	LAS 15CB	—
15	LAS 1515	LAS 15A15
18	LAS 1518	LAS 15A18
20	LAS 1520	LAS 15A20
24	LAS 1524	LAS 15A24
4 to 30	LAS 15U (Adjustable/Remote Sense)	

#### BLOCK DIAGRAM



# LAS 1500 SERIES

## ELECTRICAL CHARACTERISTICS

Input voltage test conditions are as follows:  $V_1 = V_0 + 3$  Volts,  $V_2 = V_0 + 10$  Volts,  $V_3 = V_0 + 15$  Volts, or the maximum input, whichever is less.

Parameter	Symbol	Test Conditions			Test Limits		Units
		$V_{IN}$	$I_O$	$T_J$	Min	Max	
Output Voltage <sup>2</sup> LAS 1500 <sup>1</sup> LAS 15A00 <sup>1</sup> LAS 15U <sup>5</sup>	$V_0$	$V_1$ to $V_2$	10mA to 1.5A	25°C	0.95  $V_0$   0.98  $V_0$   4.0	1.05  $V_0$   1.02  $V_0$   30.0	Volts
Input-Output Differential	$V_{IN}-V_0$		1.5A	0-125°C	2.4		Volts
Line Regulation <sup>2</sup>	REG <sub>(LINE)</sub>	$V_1$ to $V_3$	1.5A	25°C		1.5	% $V_0$
Load Regulation <sup>2</sup>	REG <sub>(LOAD)</sub>	$V_0 + 5V$	10mA to 1.5A	25°C		0.6	% $V_0$
Quiescent Current	$I_Q$	$V_1$	10mA	25°C		18.0	mA
Quiescent Current Line	$I_Q$ (LINE)	$V_1$ to $V_2$	10mA	25°C		5.0	mA
Quiescent Current Load	$I_Q$ (LOAD)	$V_1$	10mA to 1.5A	25°C		5.0	mA
Current Limit <sup>2</sup>	$I_{LIM}$	$V_0 + 5V$		25°C		5.2	Amps
Temperature Coefficient	$T_C$	$V_1$	0.1A	0-125°C		0.02	% $V_0$ /°C
Output Noise <sup>3</sup> Voltage	$V_N$	$V_1$	0.1A	0-125°C		10	$\mu V_{rms}/V$
Ripple Attenuation <sup>4</sup>	$R_A$	$V_0 + 5V$	1.0A	0-125°C	60		dB
Control Voltage LAS 15U	$V_C$	$V_1$ to $V_2$	10mA	25°C	3.6	4.0	Volts
Power Dissipation	$P_D$	$V_{IN}-V_{OUT}$ 2.4V to 10.0V	10mA to 1.5A	0-125°C		15	Watts

(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 1Vrms, 120Hz, input ripple.

Ripple attenuation is minimum of 60 dB at 5V output and is 1 dB less for each volt increase in the output voltage.

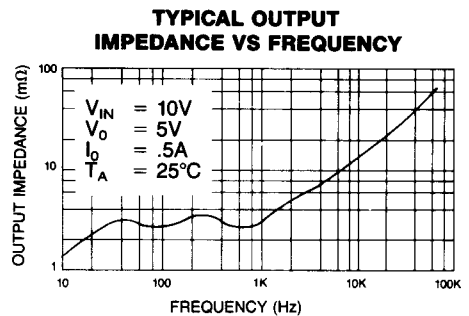
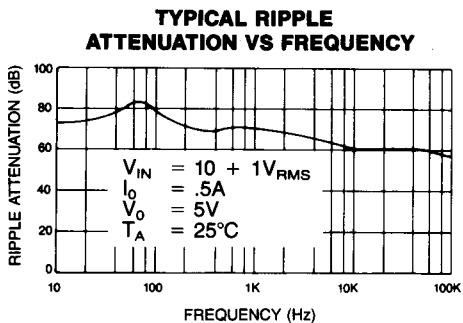
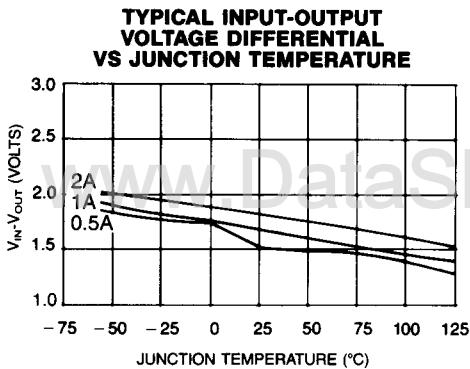
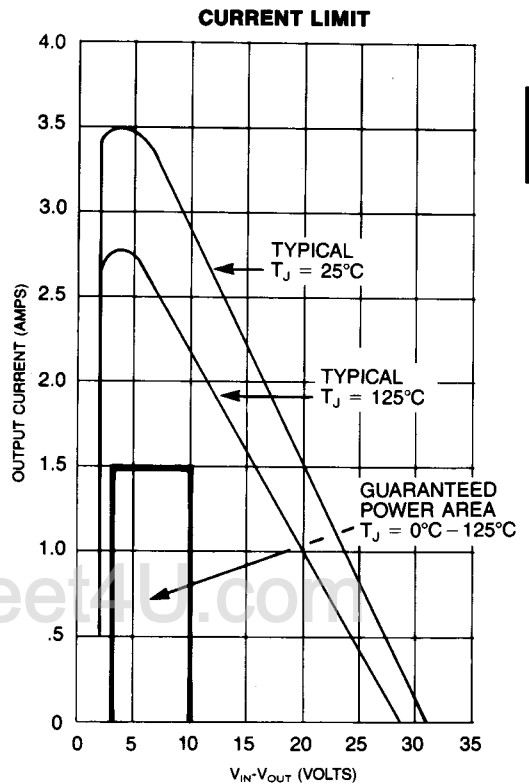
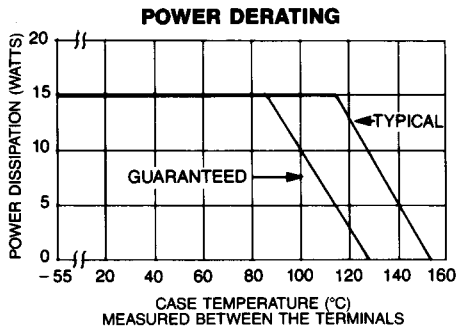
(5)  $V_0 = V_c (1 + R1/R2)$

R1 = Resistance from output to control

R2 = Resistance from control to common

# LAS 1500 SERIES

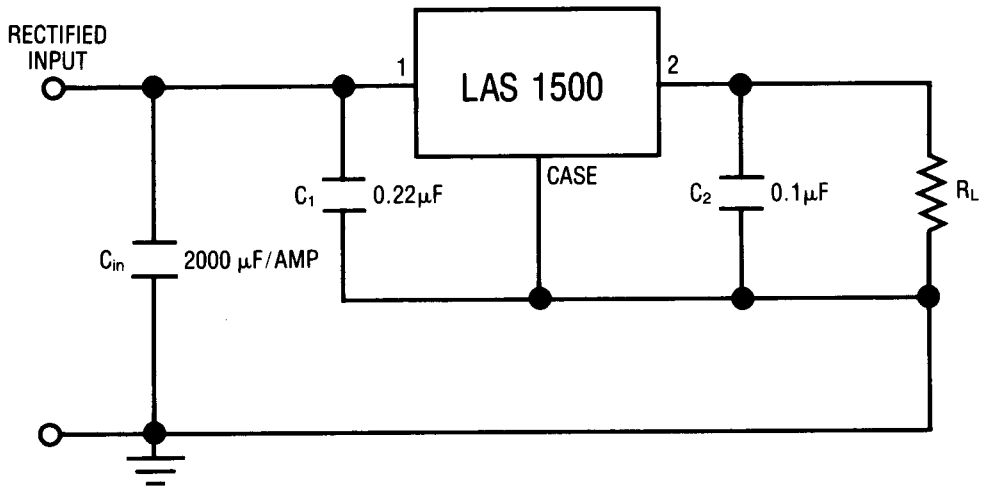
## OPERATIONAL DATA



# LAS 1500 SERIES

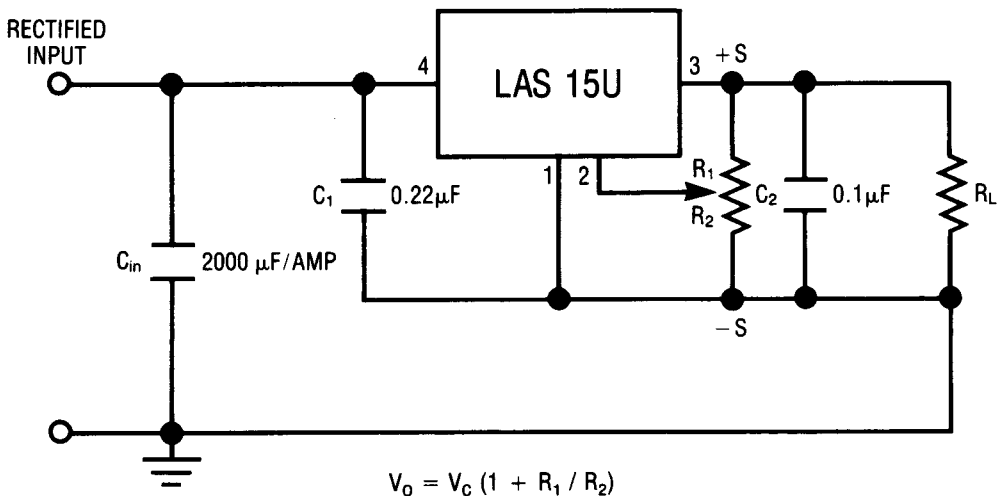
## TYPICAL APPLICATIONS

### FIXED VOLTAGE REGULATOR<sup>1</sup>



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### ADJUSTABLE VOLTAGE REGULATOR<sup>1,2</sup>



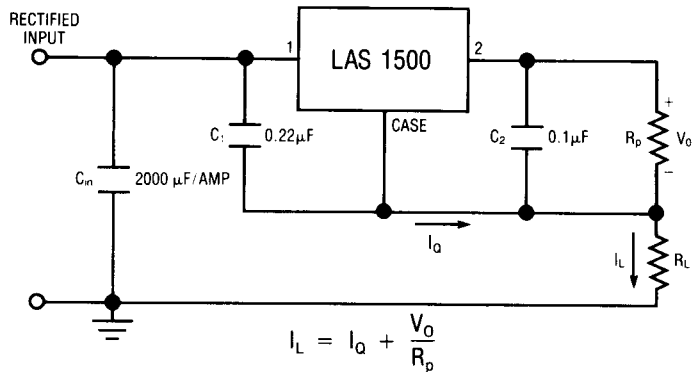
<sup>1</sup> C<sub>1</sub> and C<sub>2</sub> should be placed as close as possible to the regulator.

<sup>2</sup>  $\frac{V_o}{R_1 + R_2} \geq 10 \text{ mA}$

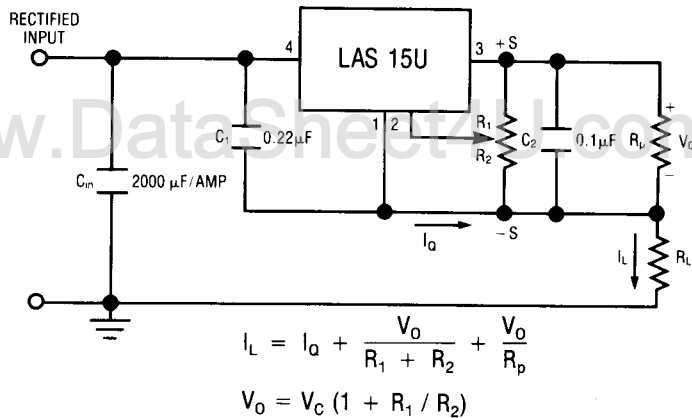
# LAS 1500 SERIES

## TYPICAL APPLICATIONS

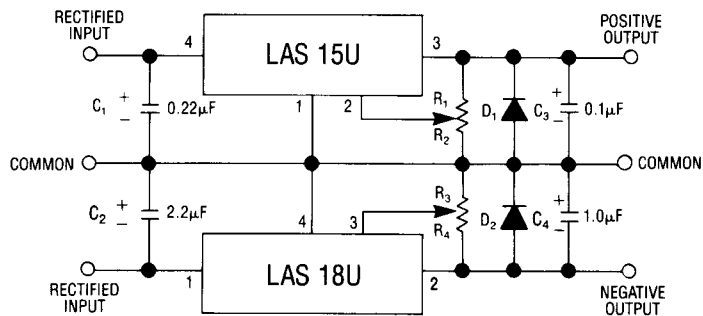
### FIXED CURRENT REGULATOR<sup>1</sup>



### ADJUSTABLE CURRENT REGULATOR<sup>1,2</sup>



### 1.5 AMP DUAL ADJUSTABLE REGULATOR<sup>1,2,3</sup>



<sup>1</sup>  $C_1$ ,  $C_2$ ,  $C_3$  and  $C_4$  to be placed as close as possible to the regulator.

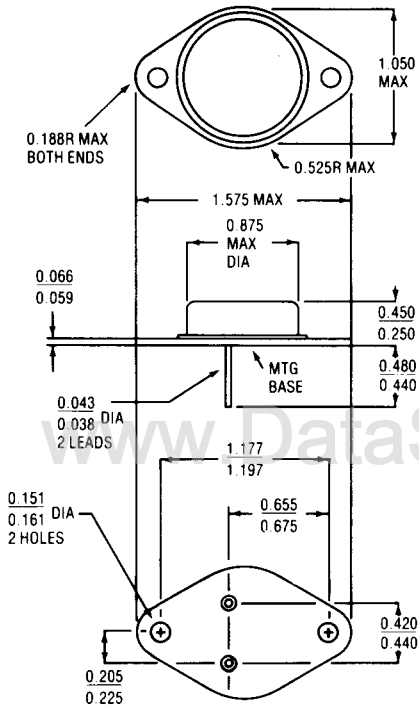
<sup>2</sup>  $V_o \geq 10$  mA, where  $R_{adj} = R_1 + R_2$  or  $R_3 + R_4$

$R_{adj}$

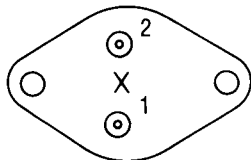
<sup>3</sup> Diodes  $D_1$  &  $D_2$  should be low  $V_F$ , high current diodes for optimum protection.

# LAS 1500 SERIES

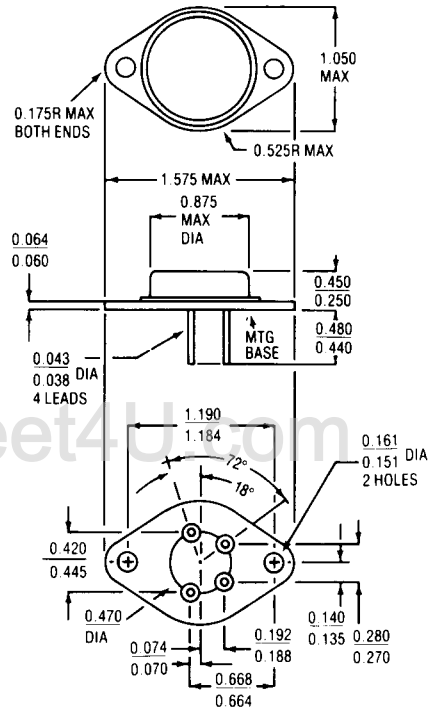
## DEVICE OUTLINE



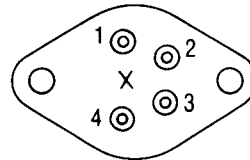
**Bottom View**



1-Input  
2-Output  
Case is common



**Bottom View**



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

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