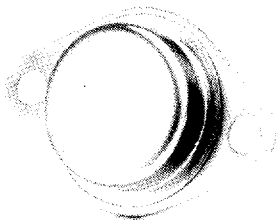


# 2 AMP POSITIVE VOLTAGE REGULATORS

LAS 1600



## FEATURES

- Guaranteed Power Dissipation 20 Watts @ 75°C Case
- Guaranteed input-output differential: + 2.6 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 1600 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 2.0 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 1600 Series. This, coupled to a very low output impedance, insures superior load regulation.

The LAS 16U, a four terminal, adjustable regulator is available with an output range from +4 to +30 Volts, providing remote sense capability with a single potentiometer.

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 and 15V, and LAS 16U.

<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.

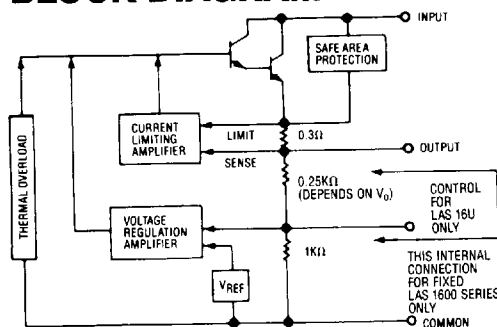
<sup>(3)</sup> For operation above 75°C  $T_{CASE}$ , derate @ 0.4 W/°C.

12

## DEVICE SELECTION GUIDE

$V_{OUT}$	$V_{OUT}$ TOLERANCE		
	± 5%	+5%, -3%	± 2%
5	LAS 1605	LAS 1605B	LAS 16A05
8	LAS 1608	—	LAS 16A08
12	LAS 1612	LAS 1612B	LAS 16A12
13.8	LAS 16CB	—	—
15	LAS 1615	LAS 1615B	LAS 16A15
4 to 30	LAS 16U (Adjustable/Remote Sense)		

## BLOCK DIAGRAM



LAS 1600

## 2 AMP POSITIVE VOLTAGE REGULATORS

### 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
		$V_{IN}$	$I_0$	$T_J$	Min	Max	
Output Voltage <sup>2</sup> LAS 1600 <sup>1</sup> LAS 1600B <sup>1</sup> LAS 16A00 <sup>1</sup> LAS 16U <sup>5</sup>	$V_0$	$V_1$ to $V_2$	10mA to 2.0A	25°C	0.95  $V_0$   0.97  $V_0$   0.98  $V_0$   4.0	1.05  $V_0$   1.05  $V_0$   1.02  $V_0$   30.0	Volts
Input-Output Differential	$V_{IN-V_0}$		2.0A	0-125°C	2.6		Volts
Line Regulation <sup>2</sup>	REG (LINE)	$V_1$ to $V_3$	1.0A	25°C		1.0	% $V_0$
Load Regulation <sup>2</sup>	REG (LOAD)	$V_0 + 5V$	10mA to 2.0A	25°C		0.6	% $V_0$
Quiescent Current	$I_Q$	$V_1$	10mA	25°C		20.0	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 2.0A	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 <sup>5</sup> LAS 16U	$V_C$	$V_1$ to $V_2$	10mA	25°C	3.6	4.0	Volts
Power Dissipation	$P_D$	$V_{IN-V_{OUT}}$ 2.6V to 10.0V	10mA to 2A	0-125°C		20	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

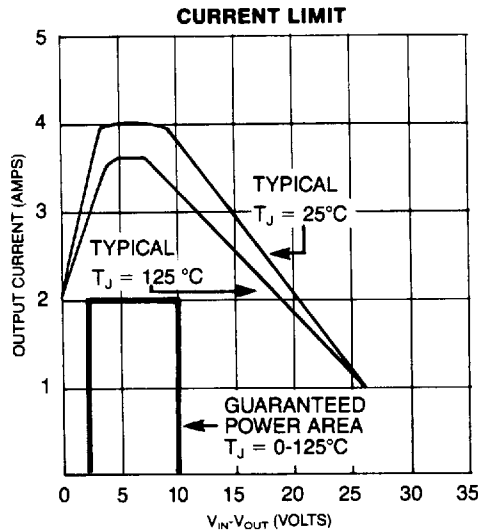
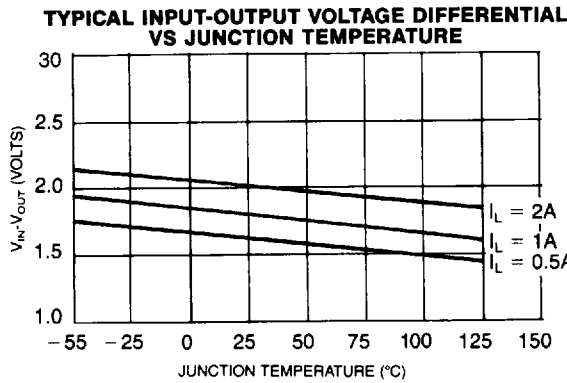
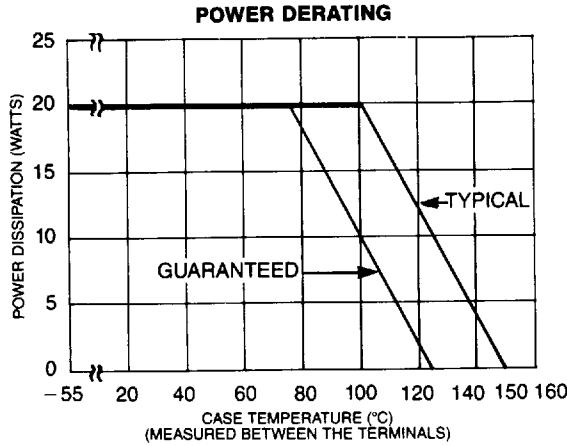
R2 = Resistance from control to common

# 2 AMP POSITIVE VOLTAGE REGULATORS

LAS 1600

## OPERATIONAL DATA

12

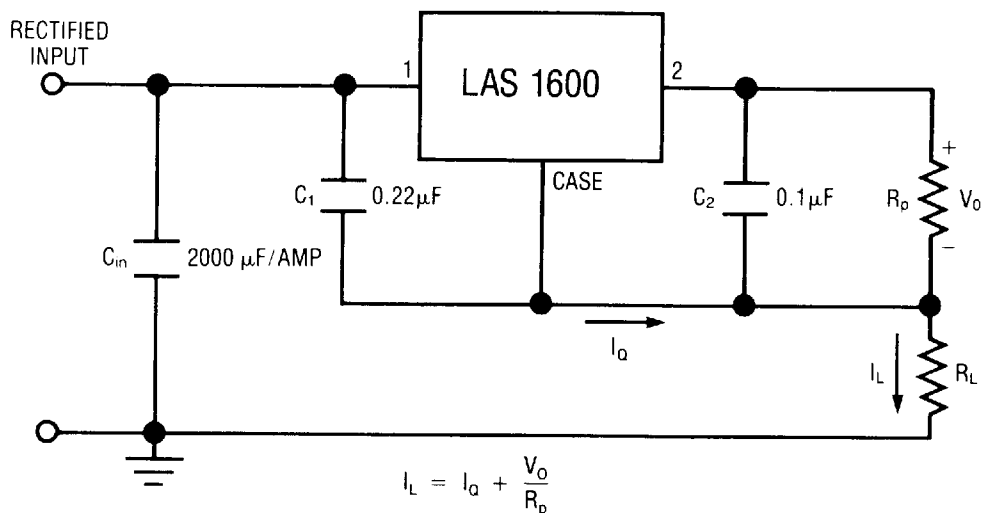


LAS 1600

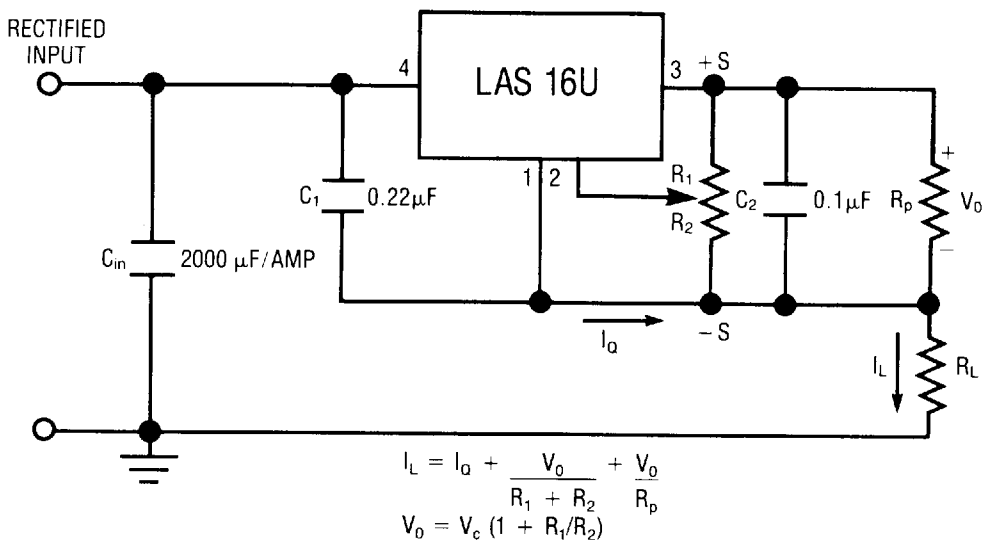
## 2 AMP POSITIVE VOLTAGE REGULATORS

### TYPICAL APPLICATIONS

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



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



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

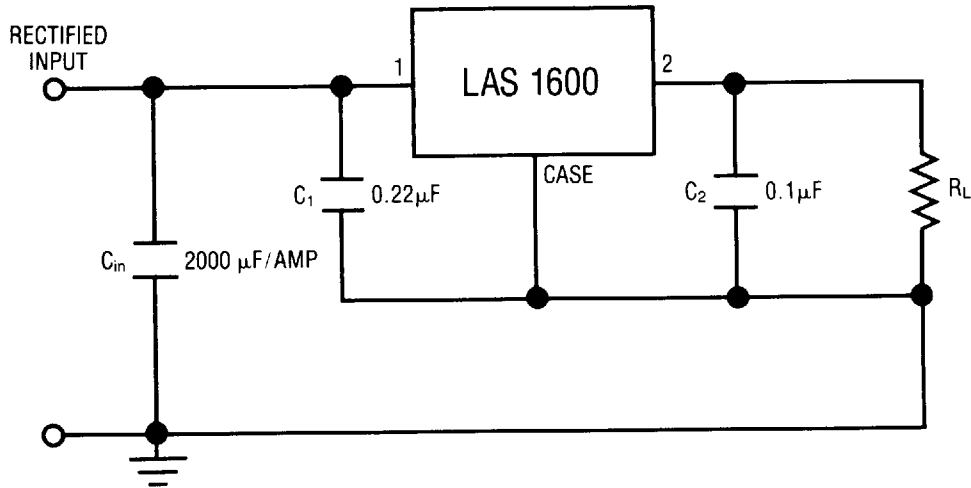
<sup>2</sup>  $\frac{V_o}{R_1 + R_2} \approx 10$  mA

# 2 AMP POSITIVE VOLTAGE REGULATORS

LAS 1600

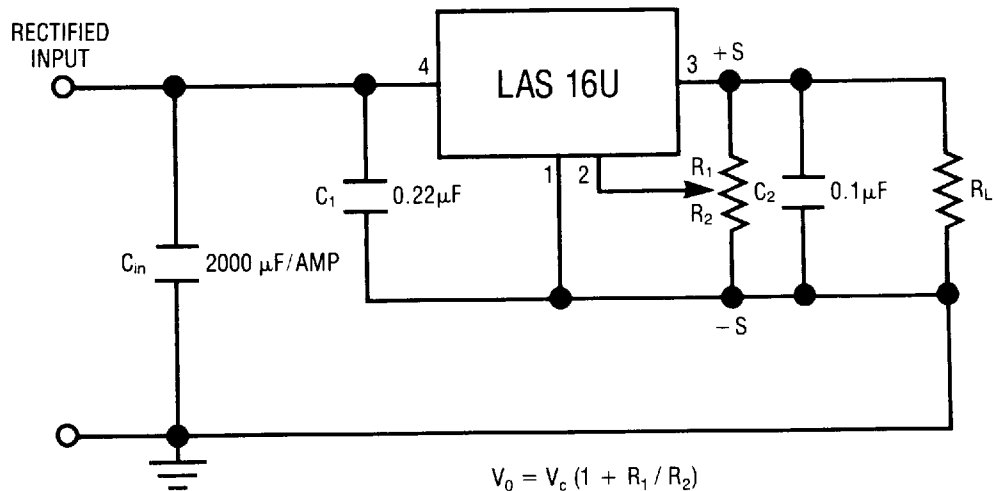
## TYPICAL APPLICATIONS

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



12

### 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.

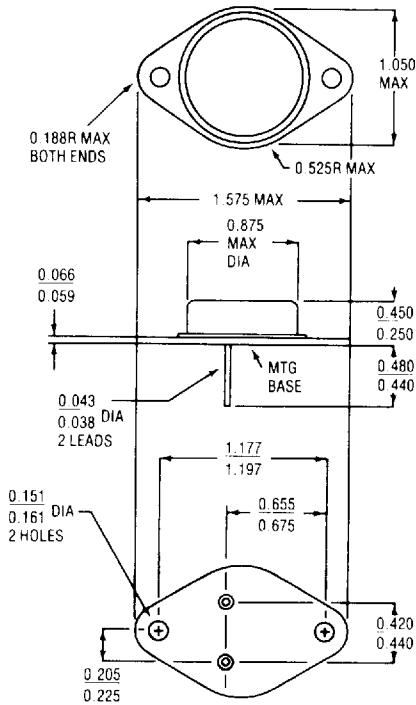
<sup>2</sup>  $\frac{V_o}{R_1 + R_2} \geq 10 \text{ mA}$

LAS 1600

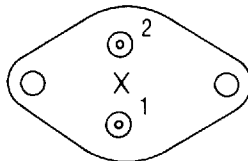
# 2 AMP POSITIVE VOLTAGE REGULATORS

## DEVICE OUTLINE

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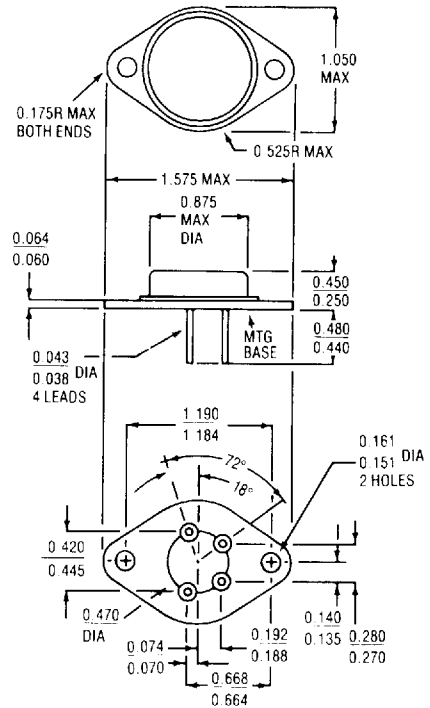


Bottom View

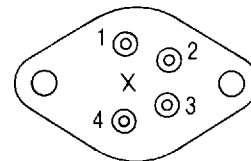


LAS 1600

- 1-Input
- 2-Output
- Case is common



Bottom View



LAS 16U

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

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