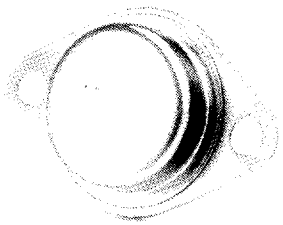
3 AMP POSITIVE VOLTAGE REGULATORS

LAS 1400



FEATURES

- Guaranteed Power Dissipation 30 Watts @ 57.5°C case
- Guaranteed input-output differential: +2.5 Volts
- Low noise, band gap reference
- Remote sense capability
- Sample power cycled burn-in
- Guaranteed thermal resistance junction to case: 2.25° C/W

DESCRIPTION

The LAS1400 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 3.0 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 LAS1400 Series. This coupled to a very low output impedance insures superior load regulation.

The LAS14AU, 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

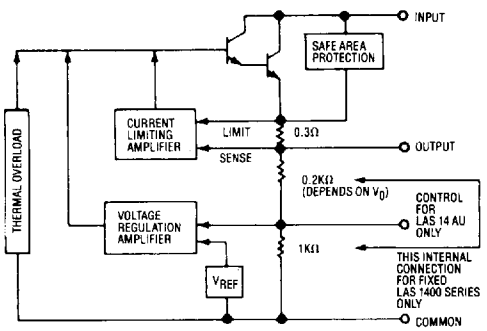
PARAMETER	SYMBOL	MINIMUM	MAXIMUM	UNITS
Input Voltage	V_{IN}		30 (35)(1)(2)	Volts
Power Dissipation	P_D		Internally Limited(3)	
Thermal Resistance Junction To Case	θ_{JC}		2.25(4)	°C/Watt
Operating Junction Temperature Range	T_J	−55	150	°C
Storage Temperature Range	T_{STG}	−65	150	°C
Lead Temperature (Soldering, 60 Seconds Time Limit)	T_{LEAD}		300	°C

(1) Short circuit protection is only assured to V_{IN} max. Value of 30V applies to V_O of +5V to +12V. Value of 35V applies to V_O of 15V and LAS14AU.
(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 LAS 1400 operation above 57.5°C T_{CASE} derate @ 444mW/°C. For LAS14AU operation above 42.5°C T_{CASE} derate @ 364mW/°C.
(4) Thermal resistance of LAS14AU is 2.75°C/W.

DEVICE SELECTION GUIDE

V_{OUT}	V_{OUT} TOLERANCE		
	±5%	+5%, −3%	±2%
5	LAS 1405	LAS 1405B	LAS 14A05
12	LAS 1412	LAS 1412B	LAS 14A12
15	LAS 1415	LAS 1415B	LAS 14A15
4 to 30	LAS 14AU	(Adjustable / Remote Sense)	

BLOCK DIAGRAM



3 AMP POSITIVE VOLTAGE REGULATORS

ELECTRICAL CHARACTERISTICS

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

		Test Conditions			Test Limits		
Parameter	**Symbol**	**V_{IN}**	**I_O**	**T_J**	**Min**	**Max**	**Units**
Output Voltage[2] LAS 1400[1] LAS 1400B[1] LAS 14A00[1] LAS 14AU[5]	V_O	V_1 to V_2	10mA to 3.0A	25°C	 $0.95\|V_O\|$ $0.97\|V_O\|$ $0.98\|V_O\|$ 4.0	 $1.05\|V_O\|$ $1.05\|V_O\|$ $1.02\|V_O\|$ 30.0	Volts
Input-Output Differential	V_{IN}-V_O		3A	0-125°C	2.5		Volts
Line Regulation[2]	$REG_{(LINE)}$	V_1 to V_3	2A	25°C		1.0	% V_O
Load Regulation[2]	$REG_{(LOAD)}$	V_O + 5V	10mA to 3.0A	25°C		0.6	% V_O
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 3.0A	25°C		5.0	mA
Current Limit[2]	I_{LIM}	V_O + 5V		25°C		6.5	Amps
Temperature Coefficient	T_C	V_1	0.1A	0-125°C		0.02	% V_O/°C
Output Noise[3] Voltage	V_N	V_1	0.1A	0-125°C		10	$\mu V_{rms}/V$
Ripple Attenuation[4]	R_A	V_O + 5V	2.0A	0-125°C	60		dB
Control Voltage LAS 14AU	V_C	V_1 to V_2	10mA	25°C	3.6	4.0	Volts
Power Dissipation	P_D	V_{IN}-V_{OUT} 2.5V to 10.0V	10mA to 3A	0-125°C		30	Watts

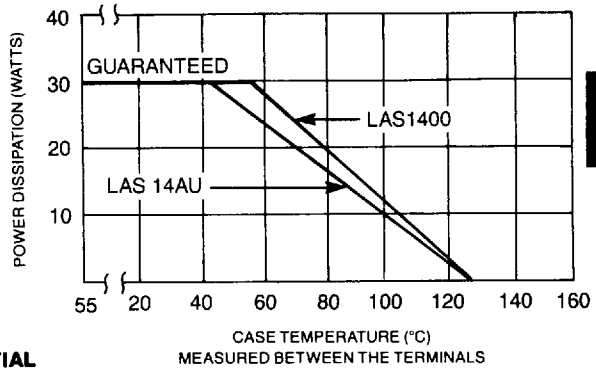
(1) Nominal output voltages are specified under Device Selection Guide.
(2) Low duty cycle pulse testing with Kelvin connections required. Die temperature changes must be accounted for separately.
(3) BW = 10Hz - 100KHz
(4) Ripple attenuation is specified for a 1Vrms, 120Hz, input ripple.
Ripple attenuation is minimum of 60dB 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

3 AMP POSITIVE VOLTAGE REGULATORS

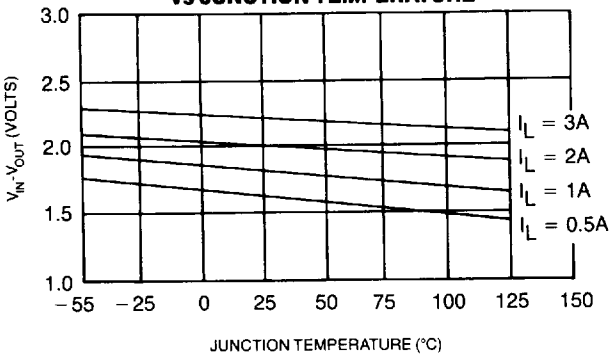
LAS 1400

OPERATIONAL DATA

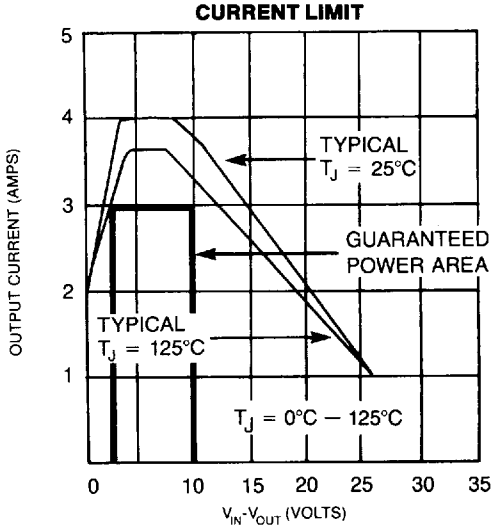
POWER DERATING



TYPICAL INPUT-OUTPUT VOLTAGE DIFFERENTIAL vs JUNCTION TEMPERATURE



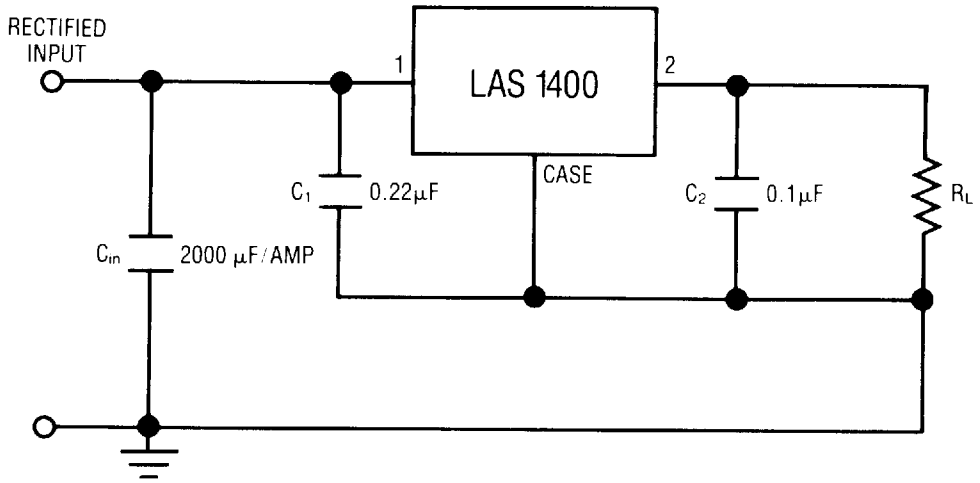
CURRENT LIMIT



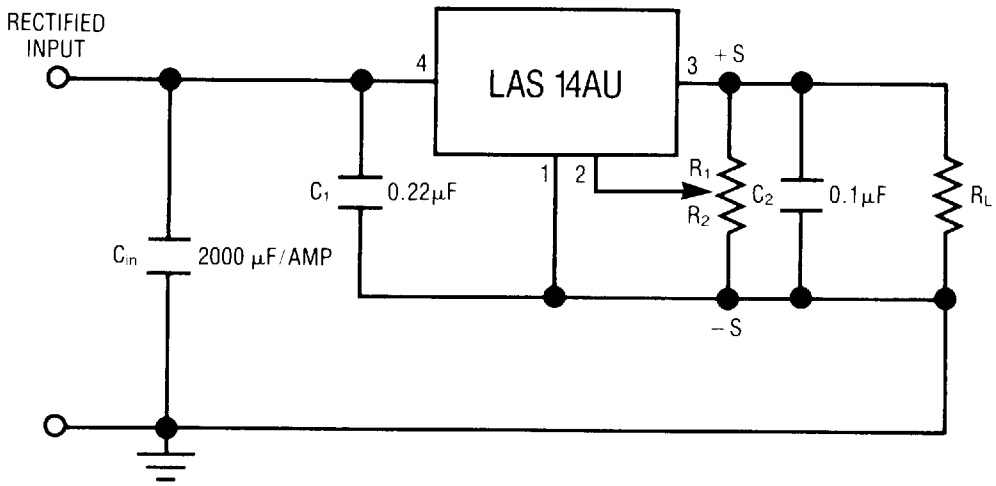
3 AMP POSITIVE VOLTAGE REGULATORS

TYPICAL APPLICATIONS

FIXED VOLTAGE REGULATOR [1]



ADJUSTABLE VOLTAGE REGULATOR [1,2]



$$V_0 = V_c (1 + R_1/R_2)$$

[1] C_1 and C_2 should be placed as close as possible to the regulator.

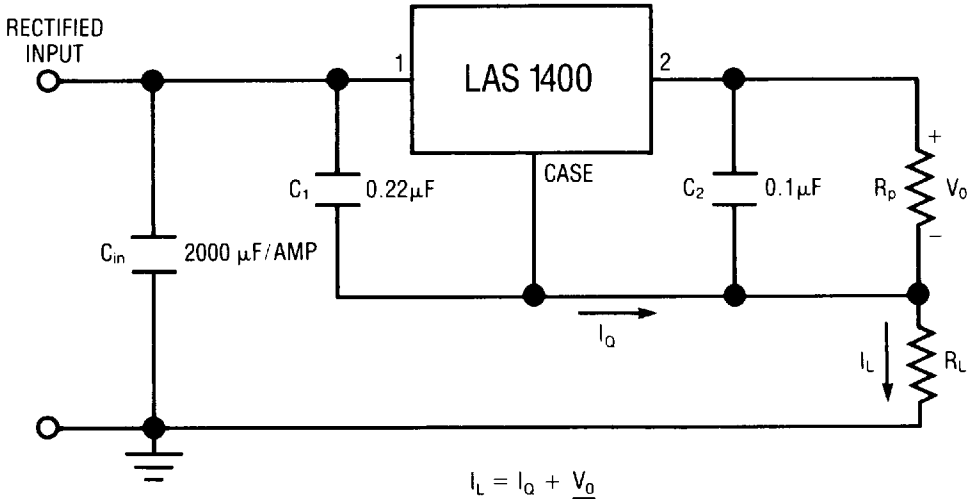
[2] $\frac{V_0}{R_1 + R_2} \geq 10\,mA$

3 AMP POSITIVE VOLTAGE REGULATORS

LAS 1400

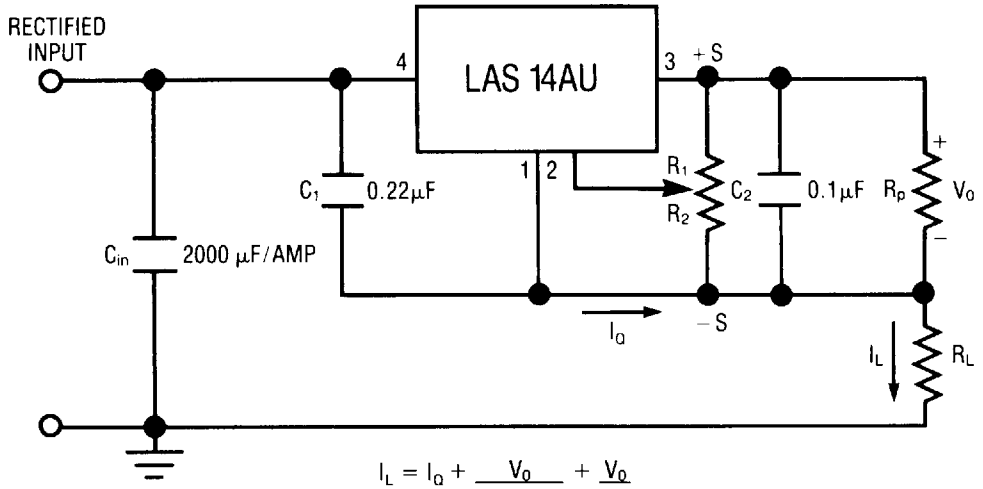
TYPICAL APPLICATIONS

FIXED CURRENT REGULATOR[1]



$$I_L = I_Q + \frac{V_o}{R_p}$$

ADJUSTABLE CURRENT REGULATOR[1,2]



$$I_L = I_Q + \frac{V_o}{R_1 + R_2} + \frac{V_o}{R_p}$$

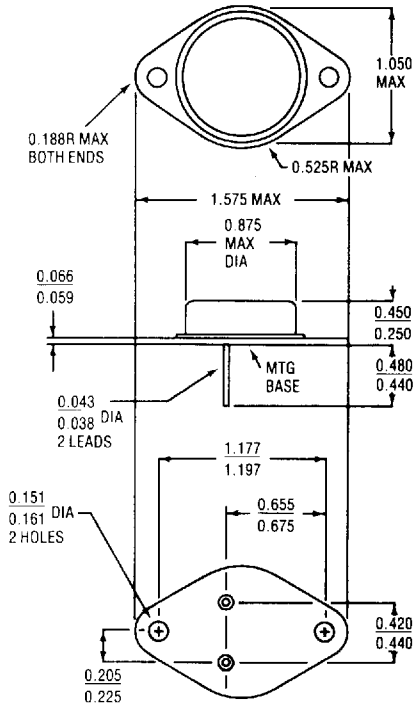
$$V_o = V_c (1 + R_1/R_2)$$

[1] C_1 and C_2 should be placed as close as possible to the regulator.

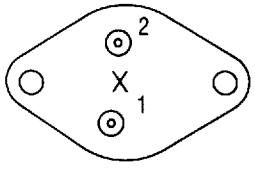
[2] $\frac{V_o}{R_1 + R_2} \geq 10$ mA

3 AMP POSITIVE VOLTAGE REGULATORS

DEVICE OUTLINE

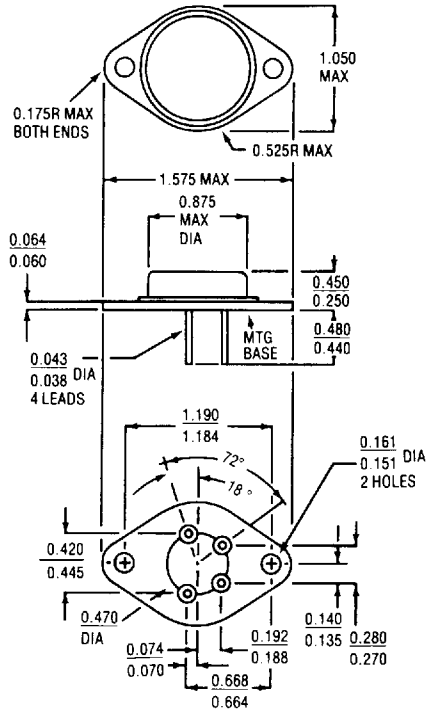


Bottom View

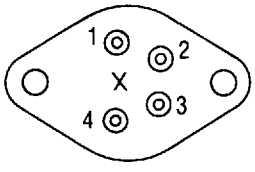


LAS 1400

1 – Input
2 – Output
Case is common



Bottom View



LAS 14AU

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

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