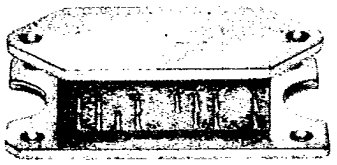
LAS 2200 SERIES

5 AMP, 85 WATT POSITIVE HYBRID VOLTAGE REGULATORS



FEATURES

- 0.1% line regulation
- 0.2% load regulation
- 0.015% temperature coefficient
- Low noise
- Remote programming and remote sense
- Electrically isolated case

DESCRIPTION

The LAS 2200 Series of Power Hybrid Voltage Regulators is designed for applications requiring a well regulated, low noise, output voltage for load current variations up to 5.0 amperes. A key feature of the Power Hybrid Voltage Regulator is its construction. A high degree of thermal isolation between the heat generating power elements and the heat sensitive control and reference elements is achieved by placing the power section on the heat-dissipating base of the unit and the control state on the upper surface. This thermal isolation results in extremely low thermal drift characteristics for changes in power levels.

ABSOLUTE MAXIMUM RATINGS

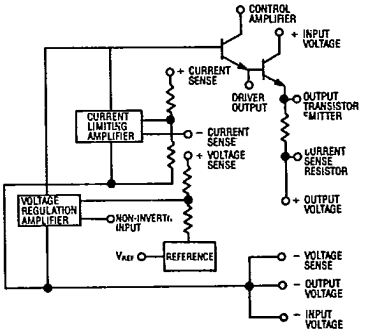
PARAMETER	SYMBOL	MAXIMUM	UNITS
Input Voltage	V_{IN}	40	Volts
Input-Output Voltage Differential	V_{IN}-V_O	37.5	Volts
Power Dissipation[1]	P_D	85	Watts
Thermal Resistance Junction to Case[2]	θ_{JC}	2.0	°C/Watt
Thermal Resistance Junction to Ambient	θ_{JA}	15.0	°C/Watt
Operating Junction Temperature Range[3]	T_J	0 to 200	°C
Storage Temperature Range	T_S	−55 to 125	°C
Lead Temperature (Soldering, 10 seconds)	T_{LEAD}	215	°C

(1)Output current vs. input-output voltage differential must be maintained per the Safe Operating Area curves.
(2)Case 1, heat-dissipating base.
(3)Darlington transistor, power section.

DEVICE SELECTION GUIDE

DEVICE	OUTPUT VOLTAGE (VOLTS)	OUTPUT CURRENT (AMPS)
LAS 2205	5	5
LAS 2206	6	5
LAS 2212	12	5
LAS 2215	15	5
LAS 2224	24	3

BLOCK DIAGRAM



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ELECTRICAL CHARACTERISTICS

Input voltage test conditions are as follows: $V_1 = V_O + 4.6$ Volts, $V_2 = V_1 + 10$ Volts, or the maximum input, whichever is less.

Parameter	Symbol	Test Conditions			Test Limits			Units
		V_{IN}	I_O	T_J	Minimum	Typical	Maximum	
Output Voltage[1,2] LAS 2205	V_O	V_1 to V_2	0A to I_{RATED}	25°C	$0.93\|V_o\|$	5[3]	$0.95\|V_o\|$	Volts
Voltage Differential[4] + Input (Pin 1) Control Amplifier (Pin 20)	V_{IN}-V_O V_{CNT}-V_O		$\leq I_{RATED}$	25-125°C	2.5 4.6		37.5 37.5	Volts
Line Regulation	$REG_{(LINE)}$	V_1 to V_2	0A	25°C			0.1	% V_O
Load Regulation	$REG_{(LOAD)}$	V_1	0A to I_{RATED}	25°C			0.2	% V_O
Quiescent Current Pin 1 Pin 20	I_Q	V_1	0A	25°C			10.0 7.0	mA
Temperature Coefficient	T_C	V_1	0.5 I_{RATED}	0 – 125°C			0.015	%/°C
Programming Resistance	R_{SENSE}					1000		Ω/Volt
Ripple Attenuation[5]	R_A	V_O + 10V	0.5 I_{RATED}	25-125°C	60			dB
Reference Voltage LAS 2205 & 2206 All other models	V_{REF}			25°C		2.4 7.1		Volts

(1) Nominal output voltages and rated currents are specified under Device Selection Guide.
(2) The output voltage tolerance is adjustable; precise output voltage is set by external programming resistor.
(3) Measured with $R_{SENSE} = 2400\Omega$
(4) Power dissipation must be maintained per the Power Derating curve.
Output current vs. input-output voltage differential must be maintained per the Safe Operating Area curves.
(5) Ripple attenuation is specified for a 1Vrms, 120Hz input ripple. Ripple attenuation is 54dB minimum for 24V and 28V models.

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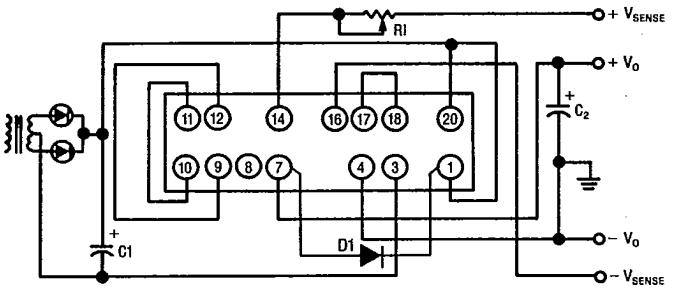
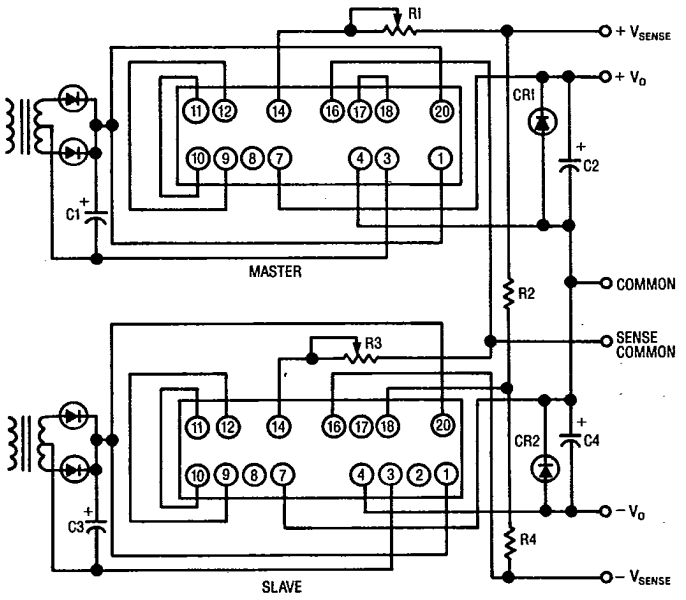
TYPICAL APPLICATIONS

POSITIVE VOLTAGE REGULATOR[1,2,5]



DUAL TRACKING VOLTAGE REGULATOR[1,2,3,4]



[1] Minimum value of input filter capacitors:
C1, C3 = I_O X 1000µF/Amp

[2] Minimum value of output capacitors:
C2, C4 = I_O X 100µF/Amp

[3] Values of tracking reference voltage divider resistors R2 and R4
LAS 2205: R2 = 7.50K ± 1%, ½ W film
R4 = 2.43K ± 1%, ½ W film
LAS 2206: R2 = 8.06K ± 1%, ½ W film
R4 = 4.02K ± 1%, ½ W film
12V and above models:
R2 = (2000 V_O - 7150) Ω ± 1%, ½ W film
R4 = 7.15K ± 1%, ½ W film

[4] Rectifiers CR1 and CR2 should be rated at peak inverse voltage of 50V and forward current minimum equal to maximum rated output current.

[5] External diode D1 provides reverse bias protection.

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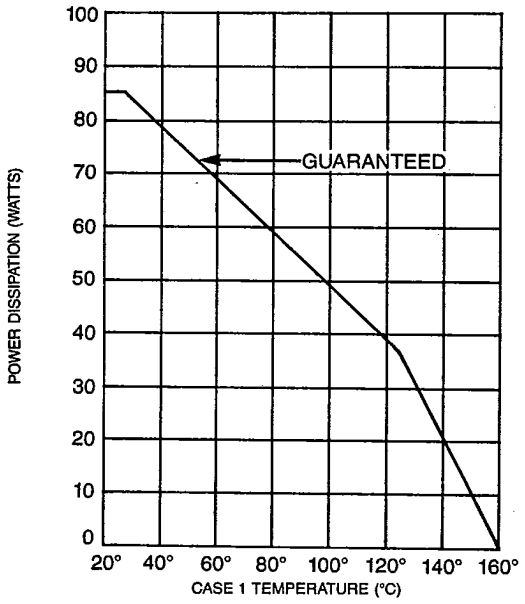
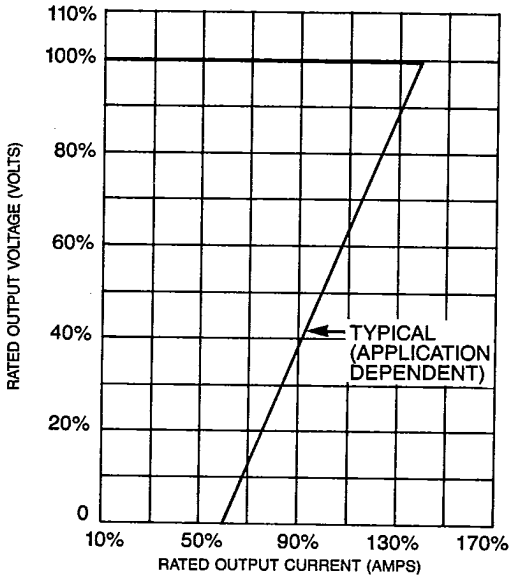
OPERATIONAL DATA

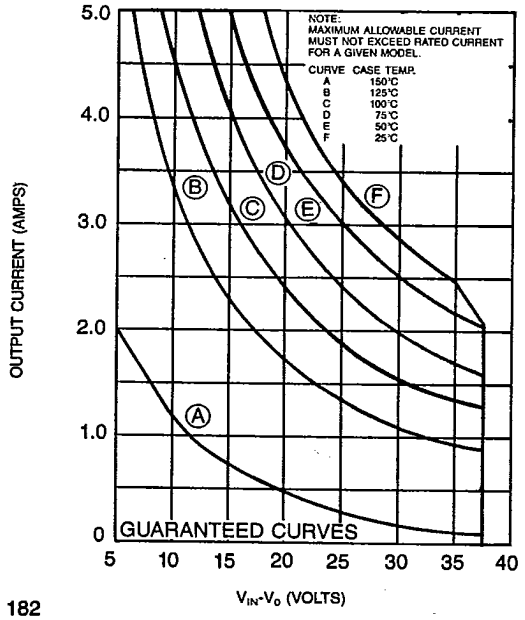
POWER DERATING



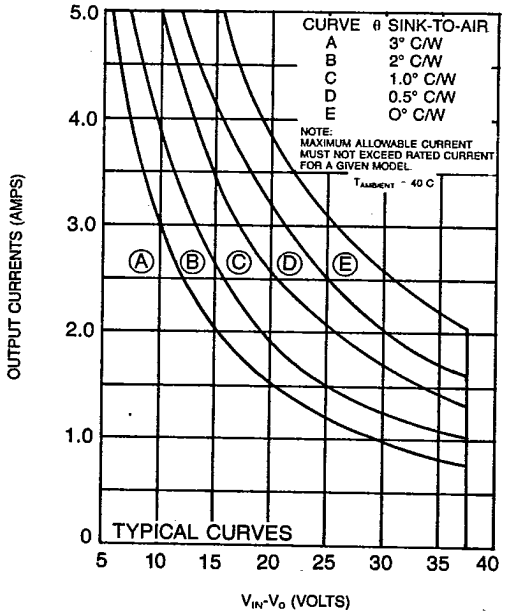
SHORT CIRCUIT PROTECTION



SAFE OPERATING AREA



SAFE OPERATING AREA



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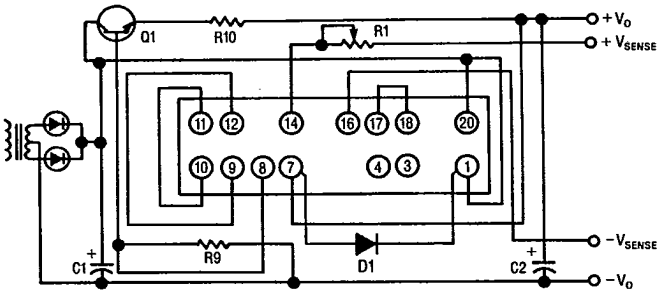
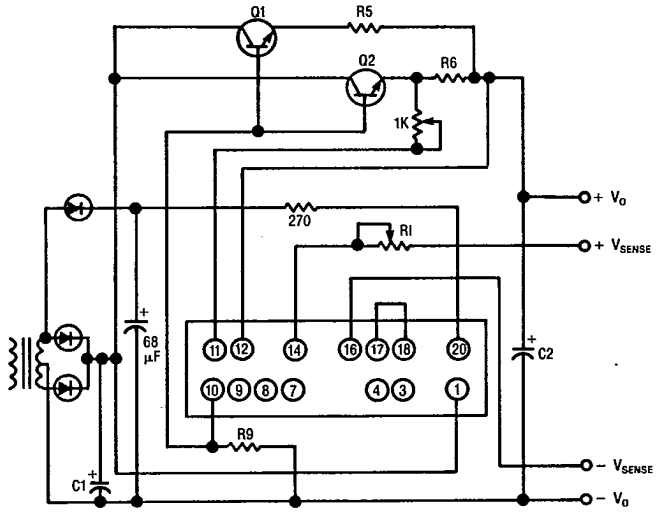
TYPICAL APPLICATIONS

VOLTAGE REGULATOR WITH PARALLEL PASS TRANSISTOR FOR HIGHER OUTPUT CURRENT[1,2,3,4,6]



VOLTAGE REGULATOR FOR HIGHER OUTPUT CURRENTS USING PEAK DETECTOR FOR CONTROL AMPLIFIER INPUT VOLTAGE[1,2,4,5]



[1] Minimum value of input filter capacitors:
C1, C3 = I_o X 1000µF/Amp

[2] Minimum value of output capacitors:
C2, C4 = I_o X 100µF/Amp

[3] Nominal value of current sharing resistor R10 =
0.10Ω; LAS 2205, 2206, 2212, 2215
0.20Ω; LAS 2224

[4] Value of I_{cbo} resistor:
R9 = V_o / (N × I_{cbo} max) Ω,
where N = number of external series pass transistors.

[5] Values of current sharing resistors:
R5, R6 = (N × 0.5) / I_o max Ω,
where N = number of emitter current sharing resistors required.

[6] External diode D1 provides reverse bias protection.

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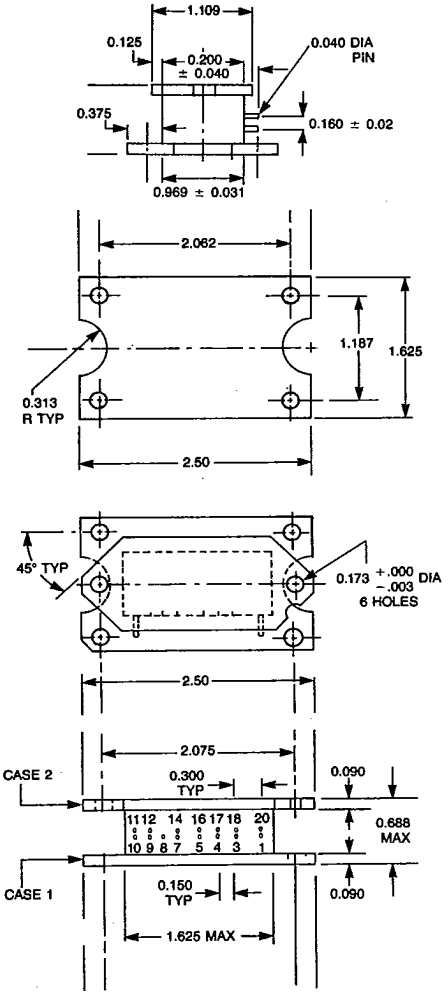
DEVICE OUTLINE



1 — (+) Input Voltage
3 — (−) Input Voltage
4 — (−) Output Voltage
7 — (+) Output Voltage
8 — Internal Driver Output
9 — Current Sense Resistor
10 — Output Transistor Emitter
11 — (+) Current Sense
12 — (−) Current Sense
14 — (+) Voltage Sense
16 — (−) Voltage Sense
17 — Reference Voltage
18 — Non-Inverting Input
20 — Control Amplifier

NOTE: All dimensions are in inches.