LAS 1500, 15U, 15A00, SERIES

1.5 AMP POSITIVE REGULATORS

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 when used with an appropriate heat sink. A low-noise temperature stable diode 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-1500 series of three-terminal regulators are available in fixed output voltage tolerances of ±5% with nominal output voltages ranging from +5 to +28 volts. The LAS-15A00 three-terminal regulators are available in fixed output voltage tolerances of ±2% with nominal output voltages available of +5, +12, and +15 volts. The LAS-15U, a four-terminal adjustable regulator, is available with an output range from +4 to +30 volts, adjustable with a single potentiometer.

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MINIMUM	MAXIMUM	UNITS
INPUT VOLTAGE	V_{IN}	0	35 (40)[1]	VOLTS
INPUT/OUTPUT DIFFERENTIAL	$V_{IN}-V_{OUT}$	0	30[1]	VOLTS
POWER DISSIPATION @ $T_C \leq 105°C$	P_D		15[1,2]	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}	-6E	150	°C
LEAD TEMPERATURE (SOLDERING, 60 SECONDS TIME LIMIT)	T_{LEAD}		300	°C

(1) The maximum input voltage of the LAS-1500 Series is limited by the maximum input-output differential, maximum power dissipation, or the maximum current limit-safe operating area, whichever is less. Values of 35 volts apply to V_0 of +4V to +12V. Values of +40V apply to V_0 of 13.8V to +28V.

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

REGULATOR PERFORMANCE SPECIFICATIONS

INPUT VOLTAGE TEST CONDITIONS ARE AS FOLLOWS: V_1 = Vo + 5 VOLTS, V_2 = Vo + 15 VOLTS, V_3 = Vo + 20 VOLTS, OR THE MAXIMUM INPUT WHICHEVER IS LESS.

		TEST CONDITIONS			LAS 1500 TEST LIMITS		LAS 15U TEST LIMITS		
PARAMETER	SYMBOL	V_{IN}	I_o	T_J	MIN	MAX	MIN	MAX	UNITS
Input Voltage	V_{IN}		5mA	0-125°C	V_O + 2.4	(5)	V_O + 2.4	(5)	volts
Output Voltage	V_O	V_1 to V_2	10mA to 1.0A	25°C	0.95|V_O|[1]	1.05V_O	4.0[6]	30	volts
Input-Output Differential	$V_{IN}-V_O$		1.0A	0-125°C	2.4		2.4		volts
Output Current	I_O	V_1		25°C	0	1.5	0	1.5	amps
Line Regulation[2]	$REG_{(LINE)}$	V_1 to V_3	0.1A	25°C		1.0		1.0	% V_O
		V_1 to V_3	0.5A	25°C		2.0		2.0	% V_O
		V_1 to V_2	1.0A	25°C		2.0		2.0	% V_O
Load Regulation[2]	$REG_{(LOAD)}$	V_1	5mA to 1.5A	25°C		0.6		0.6	% V_O
Quiescent Current	I_Q	V_1	Output/Open	25°C		10		10.	mA
Quiescent Current Line	$I_{Q(LINE)}$	V_1 to V_3	5mA	25°C		1.3		1.3	mA
Quiescent Current Load	$I_{Q(LOAD)}$	V_1	5mA to 1.5A	25°C		0.75		0.75	mA
Current Limit	I_{LIM}	V_1		25°C		3.5		3.5	amps
Short Circuit Current	I_S	V_1		25°C		3.5		3.5	amps
Temperature Coefficient	T_C	V_1	0.1A	0-125°C		0.03		0.03	% V_O/°C
Output Noise Voltage	V_N	V_1	0.1A	0-125°C		10[3]		10[3]	µVrms/V
Ripple Attenuation	R_A	V_1	1.0A	0-125°C	58[4]		58[4]		dB
Control Voltage	V_C	V_1 to V_2	5mA	25°C			3.5	4.0	volts

(1) Nominal output voltages are specified under ordering information.

(2) Instantaneous regulation, average chip temperature changes must be accounted for separately.

(3) BW = 10 HZ — 100 KHz.

(4) Ripple attenuation is specified for a 1 Vrms, 120 Hz input ripple. Ripple attenuation is a minimum of 58 dB at a 5 volt output, and is 1 dB less for each volt increase in the output voltage.

(5) The maximum input voltage of the LAS-1500 series is limited by maximum input-output differential voltage, maximum power dissipation, or the current limit-SOA, whichever is less.

(6) $V_O = V_C \left(1 + \frac{R1}{R2}\right)$ R1 = Resistance from output to control.
R2 = Resistance from control to common.

Continued on next page

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REGULATOR PERFORMANCE SPECIFICATIONS

INPUT VOLTAGE TEST CONDITIONS ARE AS FOLLOWS: V_1 = Vo + 5 VOLTS, V_2 = Vo + 15 VOLTS, V_3 = Vo + 20 VOLTS, OR THE MAXIMUM INPUT WHICHEVER IS LESS.

PARAMETER	SYMBOL	TEST CONDITIONS V_{IN}	I_o	T_J	LAS 15A00 TEST LIMITS MIN	MAX	UNITS
Input Voltage	V_{IN}		5mA	0-125°C	V_O + 2.4	(5)	volts
Output Voltage	V_O	V_1 to V_2	10mA to 1.0A	25°C	0.98|V_O|(1)	1.02 V_O	volts
Input-Output Differential	V_{IN}-V_O		1.0A	0-125°C	2.4		volts
Output Current	I_O	V_1		25°C	0	1.5	amps
Line Regulation(2)	$REG_{(LINE)}$	V_1 to V_3	0.1A	25°C		1.0	% V_O
		V_1 to V_3	0.5A	25°C		1.0	% V_O
		V_1 to V_2	1.0A	25°C		1.0	% V_O
Load Regulation(2)	$REG_{(LOAD)}$	V_1	5mA to 1.5A	25°C		0.6	% V_O
Quiescent Current	I_Q	V_1	Output/Open	25°C		10	mA
Quiescent Current Line	$I_{Q(LINE)}$	V_1 to V_3	5mA	25°C		1.3	mA
Quiescent Current Load	$I_{Q(LOAD)}$	V_1	5mA to 1.5A	25°C		0.75	mA
Current Limit	I_{LIM}	V_1		25°C		3.5	amps
Short Circuit Current	I_S	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 Voltage	V_N	V_1	0.1A	0-125°C		10(3)	µVrms/V
Ripple Attenuation	R_A	V_1	1.0A	0-125°C	58(4)		dB

(1) Nominal output voltages are specified under ordering information.

(2) Instantaneous regulation, average chip temperature changes must be accounted for separately.

(3) BW = 10 Hz — 100 KHz.

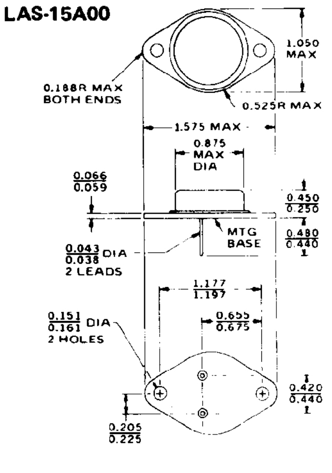
(4) Ripple attenuation is specified for a 1 Vrms, 120 Hz input ripple. Ripple attenuation is a minimum of 58 dB at a 5 volt output, and is 1 dB less for each volt increase in the output voltage.

(5) The maximum input voltage of the LAS-15A00 series is limited by maximum input-output differential voltage, maximum power dissipation, or the current limiting-SOA, whichever is less.

OUTLINE DRAWING

TO-3 3-TERMINAL (STEEL)

LAS-1500
LAS-15A00



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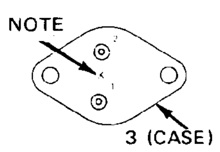
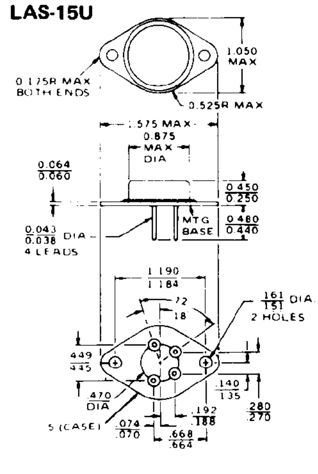


PIN	FUNCTION
1	INPUT
2	OUTPUT
3	COMMON

NOTE (X) = CASE TEMPERATURE MEASURED AT THIS POINT.

TO-3 4-TERMINAL (STEEL)

LAS-15U



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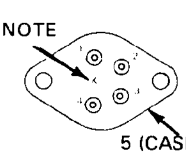

PIN	FUNCTION
1	COMMON (ELEC)
2	CONTROL
3	OUTPUT
4	INPUT
5	COMMON

NOTE (X) = CASE TEMPERATURE MEASURED AT THIS POINT.

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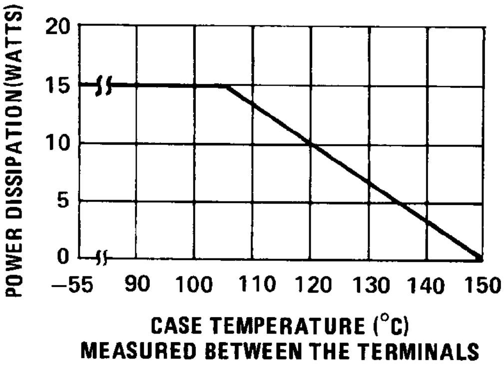
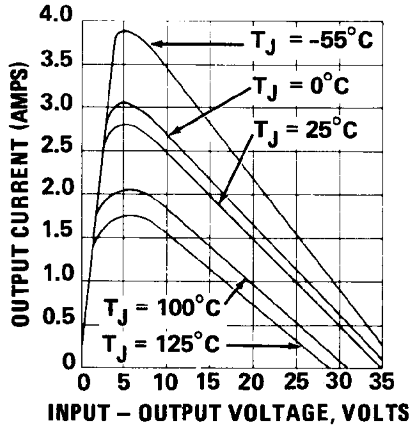
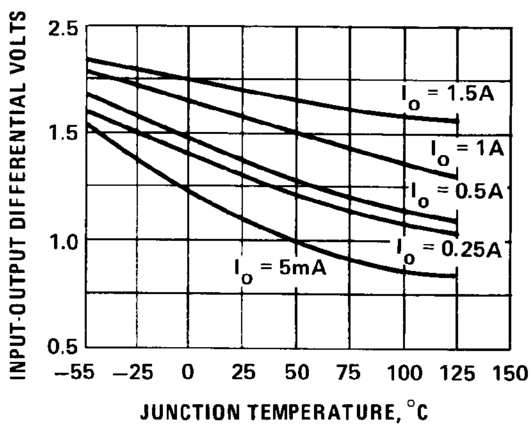
OPERATIONAL DATA



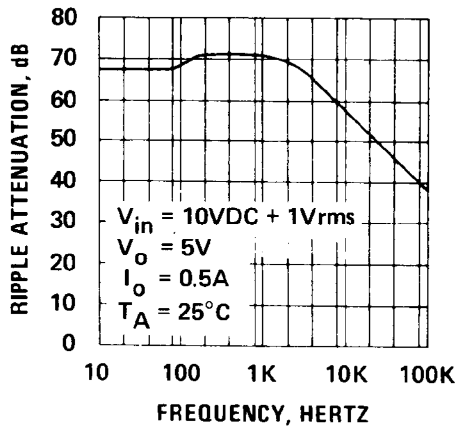
POWER DERATING



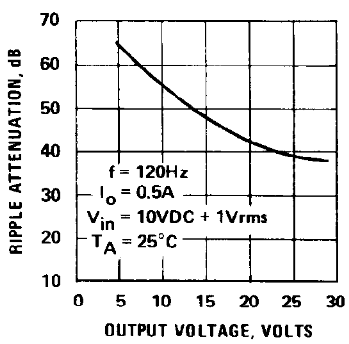
TYPICAL CURRENT LIMIT VS INPUT-OUTPUT VOLT. DIFF.



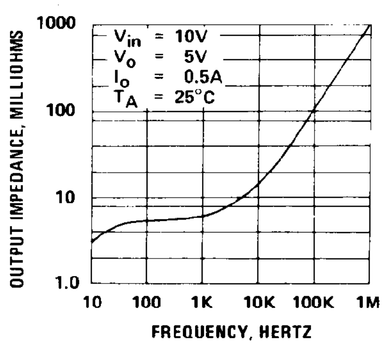
TYPICAL MINIMUM INPUT-OUTPUT DIFFERENTIAL VOLTAGE VS JUNCTION TEMPERATURE



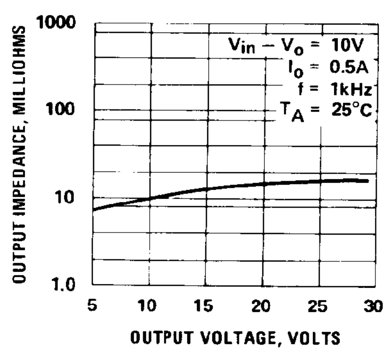
TYPICAL RIPPLE ATTENUATION VS FREQUENCY



TYPICAL RIPPLE ATTENUATION VS OUTPUT VOLTAGE



TYPICAL OUTPUT IMPEDANCE VS FREQUENCY



TYPICAL OUTPUT IMPEDANCE VS OUTPUT VOLTAGE