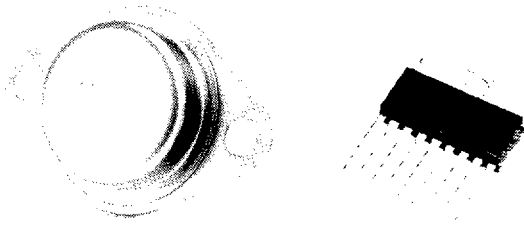


LAS-6330
LAS-6430

3 AMP SWITCHING REGULATORS

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FEATURES

- DC to 100 kHz operation
- Adjustable output voltage
- Cycle-by-cycle current limit
- Internal thermal shutdown
- Inhibit/enable control pin

DESCRIPTION

The LAS-6330/LAS-6430 Series are monolithic integrated circuits designed for fixed frequency, pulse width modulated, switching converter applications such as step-down, step-up, flyback, forward, C_{uk} and voltage inverting DC-to-DC converters and motor controls. The LAS-6330/LAS-6400 Series include a temperature compensated voltage reference, sawtooth oscillator with over-current frequency shift, linear trailing edge pulse width modulator with double pulse suppression logic, transconductance error amplifier, and a 3 amp Darlingon output transistor with internal current limit protection.

The LAS-6330/LAS-6430 can be used in step-down or step-up applications. The LAS-6331/LAS-6431 are for step-down applications where current limit adjustment is necessary. The LAS-6330/LAS-6430 Series are available in TO-3 steel packages for true hermetic seal and board insertable plastic SIP packages. Full military temperature range is also available for LAS-6430 TO-3 models.

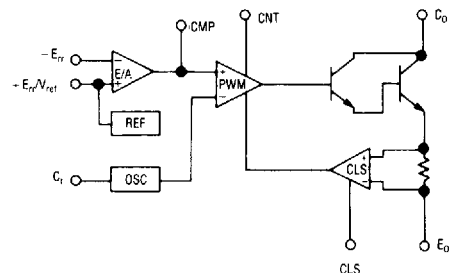
ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MAXIMUM	UNITS
Control Circuit/ Output Collector Voltage LAS-6330/31 LAS-6430/31	V_{CC}/C_O	35 40	Volts
Power Dissipation	P_D	Internally Limited	Watts
Thermal Resistance Junction to Case TO-3 SIP	θ_{JC}	3.0 1.9	°C/W
Operating Junction Temperature Range TO-3 LAS-6430/31 SIP TO-3 LAS-6330A/31A	T_J	-55 to 150 -25 to 125 -25 to 125	°C
Storage Temperature Range	T_{STG}	-65 to 150	°C
Lead Temperature (Soldering) 60 sec for TO-3 10 sec for SIP	T_{LEAD}	300 260	°C

DEVICE SELECTION GUIDE

DEVICE	V_{IN} MAX	V_{OUT} MAX	CURRENT LIMIT	PACKAGE
LAS-6330A	35	27	Fixed	TO-3
LAS-6330P1	35	27	Fixed	Plastic SIP
LAS-6331A	35	27	Adjustable	TO-3
LAS-6331P1	35	27	Adjustable	Plastic SIP
LAS-6430	40	31	Fixed	TO-3
LAS-6430P	40	31	Fixed	Plastic SIP
LAS-6431	40	31	Adjustable	TO-3
LAS-6431P	40	31	Adjustable	Plastic SIP

BLOCK DIAGRAM



3 AMP SWITCHING REGULATORS

ELECTRICAL CHARACTERISTICS

Test conditions are as follows: $V_{CC} = 24V$, $V_O = 5V$, $I_O = 3A$, $C_t = 0.0056\mu F$,
 $T_J = 25^\circ C$, $F_{SX} = 55KHz$, unless otherwise specified.

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Parameter	Symbol	Test Conditions			Test Limits			Units
		V_{CC}	I_O	T_J^2	Minimum	Typical	Maximum	
REFERENCE SECTION								
Reference Voltage ¹	V_{REF}				2.137	2.25	2.363	Volts
LAS-6300 LAS-6400		12 to V_{IN} (max)	0.3A to 3A	Over Temp	2.10		2.43	Volts
Load Regulation ¹	$REG_{(LOAD)}$		0.3A to 3A			0.4	1.0	% V_{REF}
Line Regulation ¹	$REG_{(LINE)}$	12V to V_{IN} (max)				0.9	1.0	% V_{REF}
Temperature Coefficient	T_C			Over Temp		0.01		%/ $^\circ C$
OSCILLATOR SECTION								
Initial Frequency Accuracy	F_{SX}				-33	± 10	+33	%
Line Regulation of Frequency ¹	$REG_{(LINE)}$	12V to V_{IN} (max)				0.12	2.7	% F_{SX}
Frequency Temperature Coefficient	T_C			Over Temp		0.05		%/ $^\circ C$
Sawtooth Duty Cycle	d.c.					85		%
ERROR AMPLIFIER SECTION								
Input Offset Voltage						± 5		mV
Transconductance						2.7		mA/V
Output Sink/Source Current						0.26		mA
Input Common Mode Range					1.5		3.0	Volts
Open Loop Voltage Gain					50	60		dB
OUTPUT SECTION								
Peak Current Limit Knee	I_P			Over Temp	3.3			Amps
Short Circuit Current Limit	I_{SC}					7.5		Amps
Output Saturation Voltage	V_O (sat)	$C_O = V_{CC}$ $C_O = V_{CC}$ $E_O = GND$ $E_O = GND$	1A 3A 1A 3A			1.8 2.2 1.0 1.4	2.3	Volts Volts Volts Volts
Efficiency ³	η				70	79		%
				Over Temp	65			%
Current Rise Time ³	t_R		Inductive Load			50	100	nS
Current Fall Time ³	t_F		Inductive Load			700	900	nS
CONTROL PIN								
Output Inhibit					0.64	0.75	1.06	Volts
Quiescent Current	I_Q		Output E_O Off			18		mA
			Output E_O On				30	mA

1 Low duty cycle Pulse Testing with Kelvin Connections required. Die temperature changes must be accounted for separately.

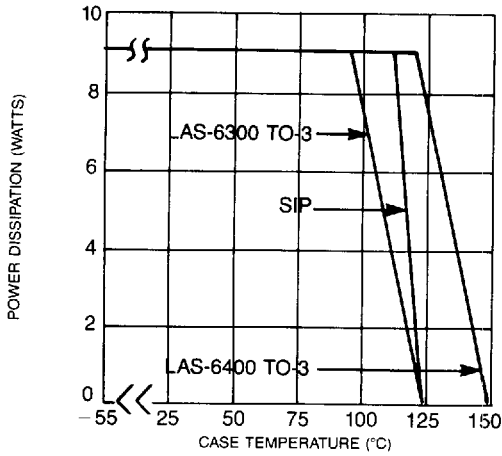
2 Over Temperature, $T_J = -25^\circ C$ to $125^\circ C$ for LAS-6300, TO-3, SIP; LAS-6400 SIP, and $-55^\circ C$ to $150^\circ C$ for LAS-6400 TO-3

3 Per Test Circuit

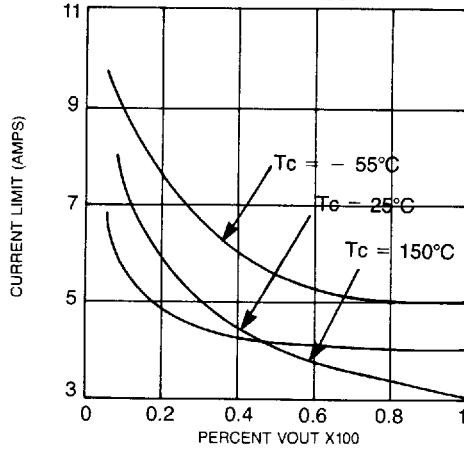
3 AMP SWITCHING REGULATORS

OPERATIONAL DATA

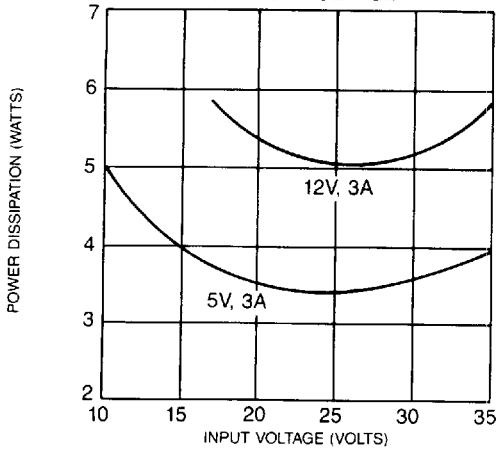
POWER DERATING



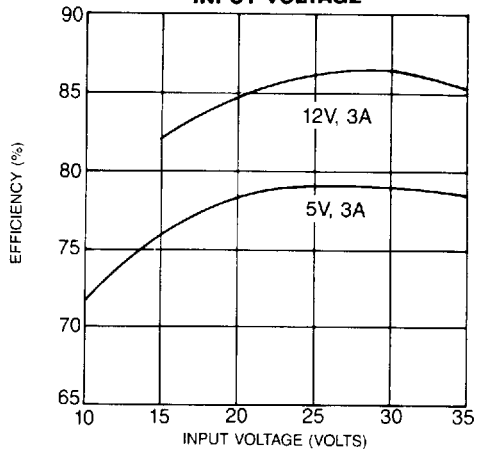
CURRENT LIMIT VS. PERCENT V_{OUT}



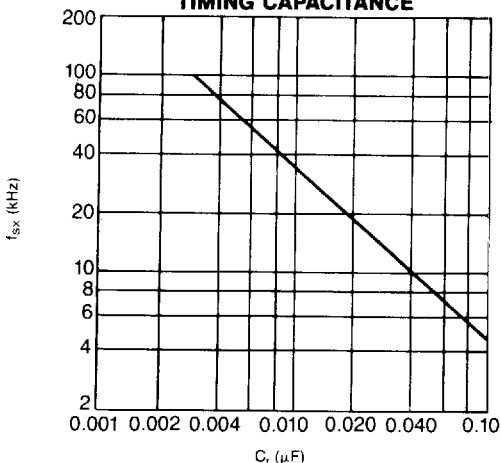
POWER DISSIPATION VS INPUT VOLTAGE



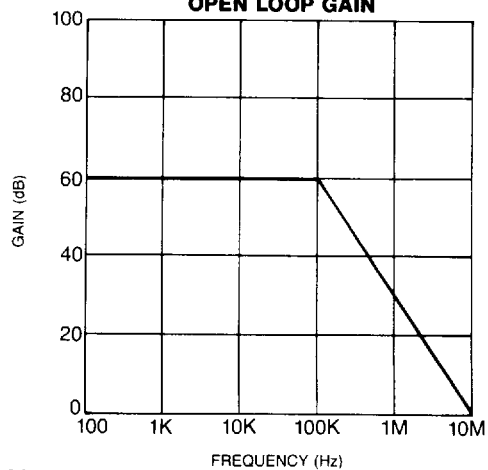
EFFICIENCY VS INPUT VOLTAGE



FREQUENCY VS TIMING CAPACITANCE



ERROR AMPLIFIER OPEN LOOP GAIN



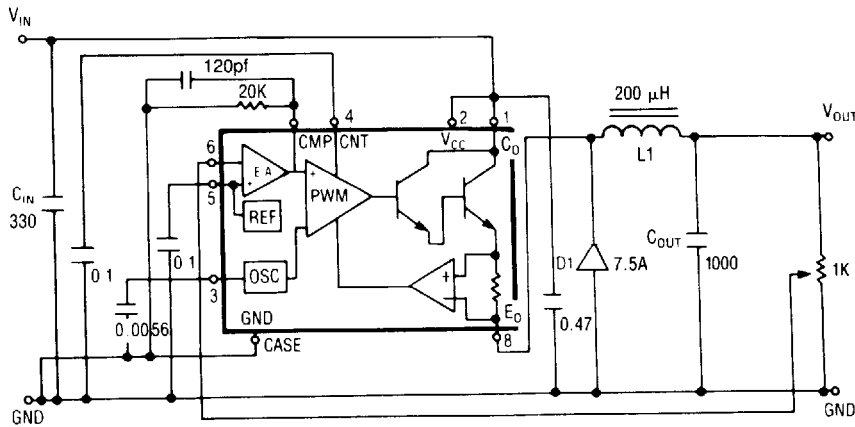
3 AMP SWITCHING REGULATORS

LAS-6330
LAS-6430

TYPICAL APPLICATIONS

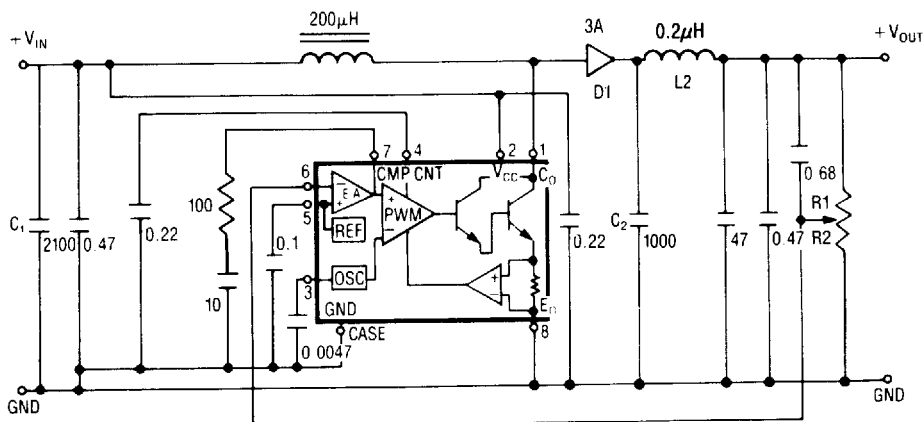
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DC-TO-DC STEP-DOWN CONVERTER



$V_{IN} = 24V$
 $V_{OUT} = 5V @ 3A$

DC-TO-DC STEP-UP CONVERTER



$V_{IN} = 12V$
 $V_{OUT} = 24V @ 1.0A$

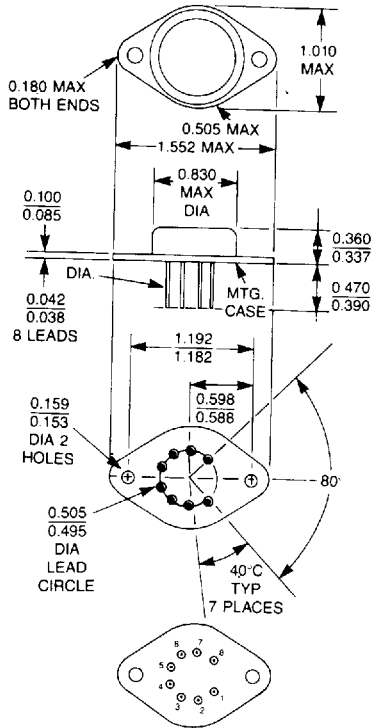
LAS-6330

LAS-6430

3 AMP SWITCHING REGULATORS

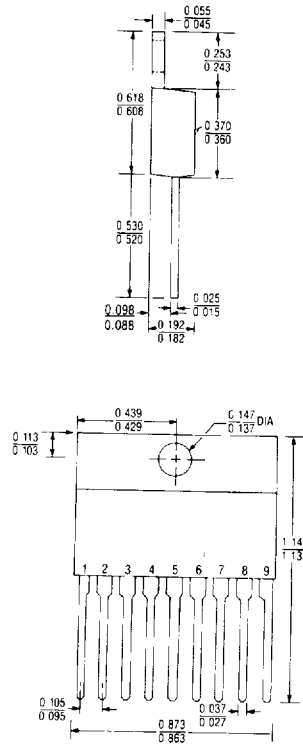
DEVICE OUTLINE

LAS-6X30, 6X31



Bottom View

LAS-6X30P, 6X31P



Front View

LAS-6X30

- | |
|-------------------------|
| 1 - C _O |
| 2 - V _{CC} |
| 3 - C _t |
| 4 - CNT |
| 5 - V _{REF} |
| 6 - E _{rr} (-) |
| 7 - CMP |
| 8 - E _O |
| Case is Ground |

LAS-6X31

- | |
|-------------------------------------|
| 1 - C _O /V _{CC} |
| 2 - C _t |
| 3 - CNT |
| 4 - V _{REF} |
| 5 - E _{rr} (-) |
| 6 - CMP |
| 7 - CLS |
| 8 - E _O |
| Case is Ground |

LAS-6X30P

- | |
|-------------------------|
| 1 - C _O |
| 2 - V _{CC} |
| 3 - C _t |
| 4 - CNT |
| 5 - GND |
| 6 - V _{REF} |
| 7 - E _{rr} (-) |
| 8 - CMP |
| 9 - E _O |
| Tab is Ground |

LAS-6X31P

- | |
|-------------------------------------|
| 1 - C _O /V _{CC} |
| 2 - C _t |
| 3 - CNT |
| 4 - V _{REF} |
| 5 - GND |
| 6 - E _{rr} (-) |
| 7 - CMP |
| 8 - CLS |
| 9 - E _O |
| Tab is Ground |

NOTE: All dimensions are in inches.