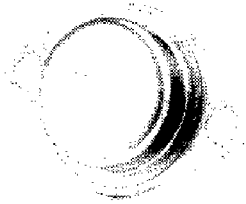
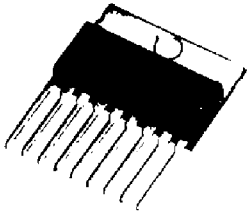


# 8 AMP SWITCHING REGULATORS

1



## FEATURES

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

## DESCRIPTION

The LAS-6380/LAS-6480 Series are monolithic integrated circuits designed for fixed frequency, pulse width modulated, switching converter applications such as step-down, step-up, flyback, forward, Cũk and voltage inverting DC-to-DC converters and motor controls. The LAS-6380/LAS-6480 Series includes 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 an 8 amp Darlington output transistor with internal current limit protection.

The LAS-6380/LAS-6480 can be used in step-down or step-up applications. The LAS-6381/LAS-6481 are for step-down applications where current limit adjustment is necessary. The LAS-6380/LAS-6480 Series is available in TO-3 steel packages for true hermetic seal and board insertable plastic SIP packages.

Full military temperature range is available for LAS-6480/LAS-6481 TO-3 models.

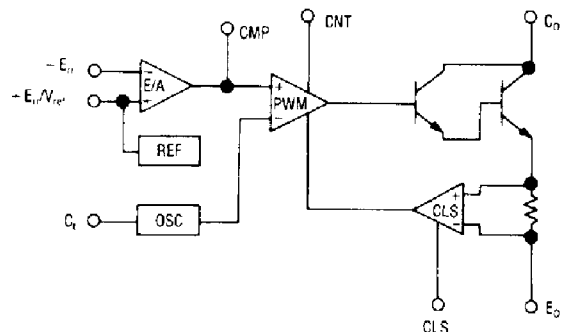
## ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MAXIMUM	UNITS
Control Circuit/ Output Collector Voltage LAS-6380/81 LAS-6480/81	$V_{CC}/C_O$ $C_O$	35 40	Volts
Power Dissipation	$P_D$	Internally Limited	Watts
Thermal Resistance Junction to Case TO-3 SIP	$\theta_{JC}$	1.5 0.8	$^{\circ}C/W$
Operating Junction Temperature Range TO-3 LAS-6480/81 SIP TO-3 LAS-6380/81	$T_J$	- 55 to 150 - 25 to 125 - 25 to 125	$^{\circ}C$
Storage Temperature Range	$T_{STG}$	- 65 to 150	$^{\circ}C$
Lead Temperature (Soldering) 60 sec for TO-3 10 sec for SIP	$T_{LEAD}$	300 260	$^{\circ}C$

## DEVICE SELECTION GUIDE

DEVICE	$V_{IN}$ MAX	$V_{OUT}$ MAX	CURRENT LIMIT	PACKAGE
LAS-6380	35	27	Fixed	TO-3
LAS-6380P <sub>1</sub>	35	27	Fixed	Plastic SIP
LAS-6381	35	27	Adjustable	TO-3
LAS-6381P <sub>1</sub>	35	27	Adjustable	Plastic SIP
LAS-6480	40	31	Fixed	TO-3
LAS-6480P	40	31	Fixed	Plastic SIP
LAS-6481	40	31	Adjustable	TO-3
LAS-6481P	40	31	Adjustable	Plastic SIP

## BLOCK DIAGRAM



## ELECTRICAL CHARACTERISTICS<sup>1</sup>

Test conditions are as follows:  $V_{CC} = 24V$ ,  $V_O = 5V$ ,  $I_O = 8A$ ,  $C_t = 0.0056\mu F$ ,  
 $T_J = 25^\circ C$ , unless otherwise specified.  $F_{SX} = 55KHz$ .

Parameter	Symbol	Test Conditions			Test Limits			Units
		$V_{CC}$	$I_O$	$T_J^2$	Minimum	Typical	Maximum	
<b>REFERENCE SECTION</b>								
Reference Voltage <sup>1</sup>	$V_{REF}$				2.137	2.25	2.363	Volts
LAS-6300		12 to $V_{IN}$ (max)	0.8A to 8A	Over Temp	2.10		2.43	Volts
LAS-6400					2.08		2.45	
Load Regulation <sup>1</sup>	$REG_{(LOAD)}$		0.8A to 8A			0.4	1.0	% $V_{REF}$
Line Regulation <sup>1</sup>	$REG_{(LINE)}$	12V to $V_{IN}$ (max)				0.9	1.0	% $V_{REF}$
Temperature Coefficient	$T_C$			Over Temp		0.01		%/ $^\circ C$
<b>OSCILLATOR SECTION</b>								
Initial Frequency Accuracy	$F_{SX}$				-33	$\pm 10$	+33	%
Line Regulation of Frequency <sup>1</sup>	$REG_{(LINE)}$	12 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		%
<b>ERROR AMPLIFIER SECTION</b>								
Input Offset						$\pm 5$		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
<b>OUTPUT SECTION</b>								
Peak Current Limit Knee	$I_P$			Over Temp	8.8			Amps
Short Circuit Current Limit	$I_{SC}$					14		Amps
Output Saturation Voltage	$V_O$ (sat)	$C_O = V_{CC}$	4A			1.6		Volts
		$C_O = V_{CC}$	8A			2.1	2.3	Volts
		$E_O = GND$	4A			0.9		Volts
		$E_O = GND$	8A			1.4	1.8	Volts
Efficiency <sup>3</sup>	$\eta$				70	79		%
				Over Temp	65			%
Current Rise Time <sup>3</sup>	$t_R$	Inductive Load				50	100	nS
Current Fall Time <sup>3</sup>	$t_F$	Inductive Load				700	900	nS
<b>CONTROL PIN</b>								
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

<sup>1</sup> Low Duty cycle Pulse Testing with Kelvin Connections required.  
 Die temperature changes must be accounted for separately.

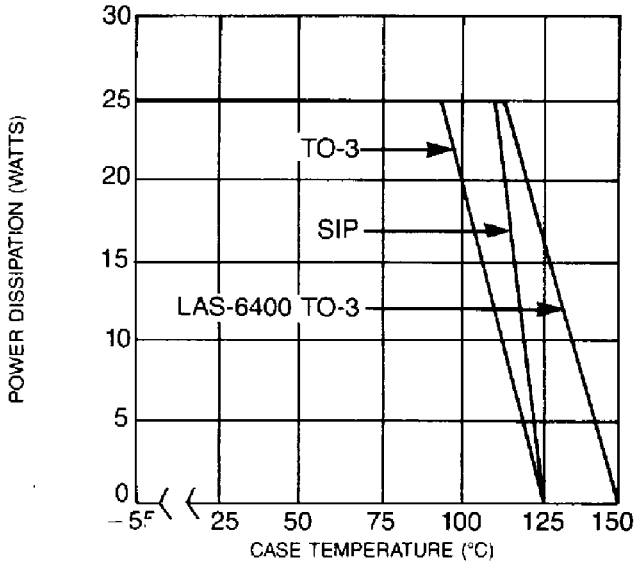
<sup>2</sup> Over Temperature,  $T_J = -25^\circ C$  to  $125^\circ C$  for LAS-6300  
 TO-3, SIP; LAS-6400 SIP, and  $-55^\circ C$  to  $150^\circ C$  for LAS-6400 TO-3

<sup>3</sup> Per Test Circuit

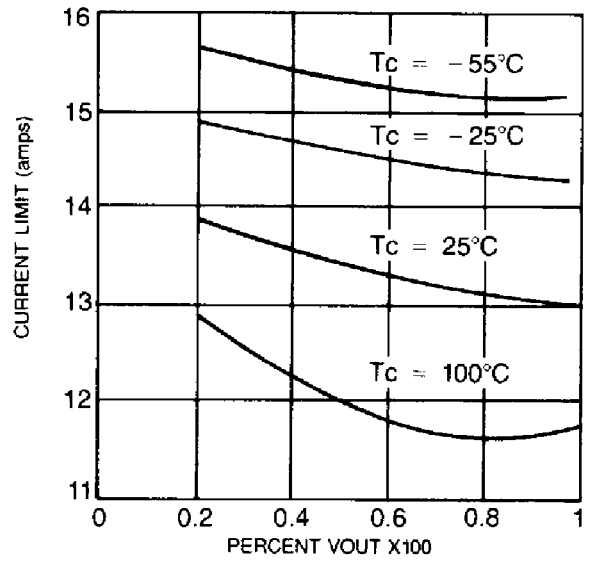
# 8 AMP SWITCHING REGULATORS

## OPERATIONAL DATA

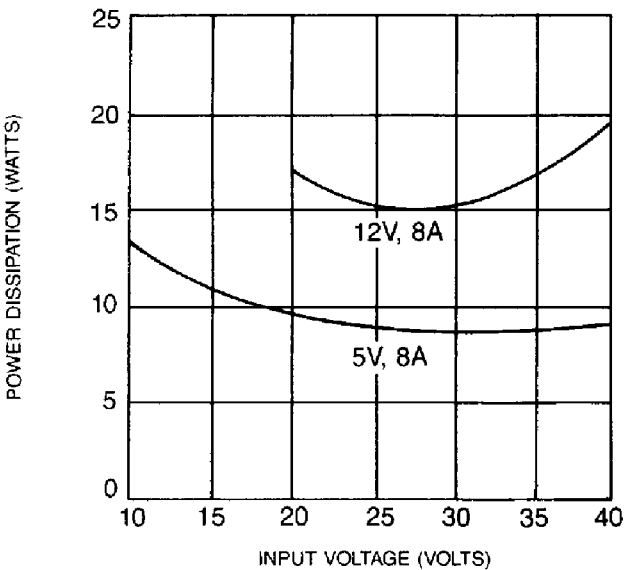
**POWER DERATING**



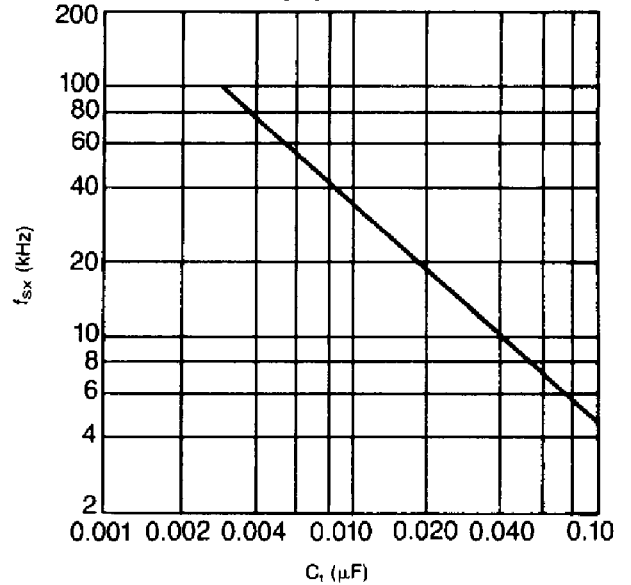
**PERCENT  $V_{OUT}$  VS OUTPUT CURRENT LIMIT**



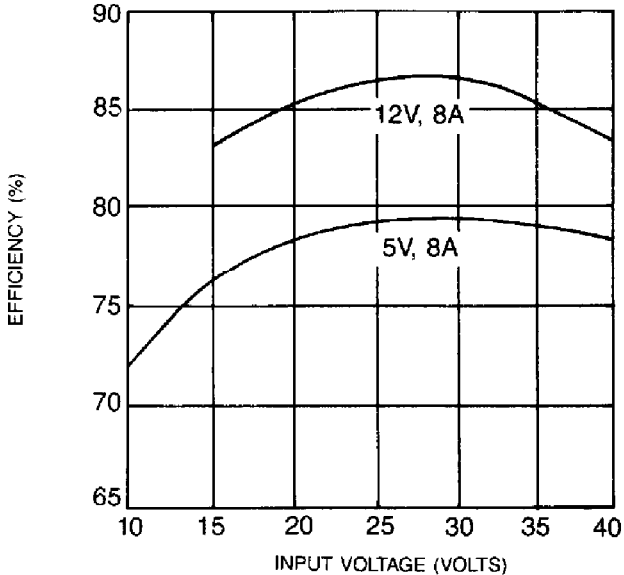
**POWER DISSIPATION VS INPUT VOLTAGE**



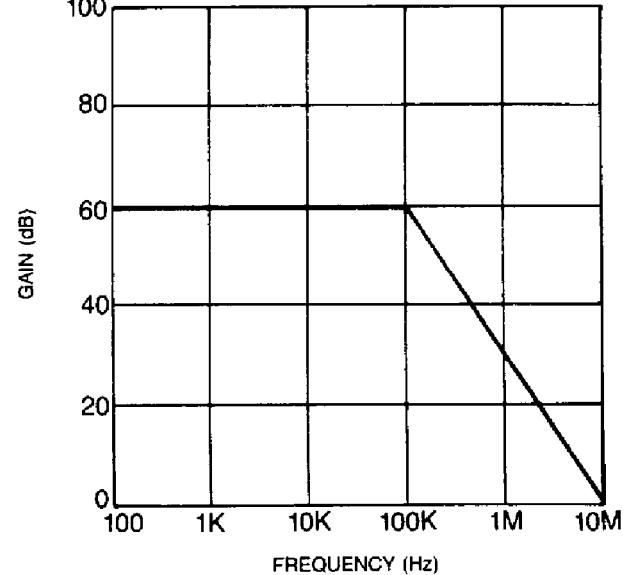
**FREQUENCY VS TIMING CAPACITANCE**



**EFFICIENCY VS INPUT VOLTAGE**



**ERROR AMPLIFIER OPEN LOOP GAIN**

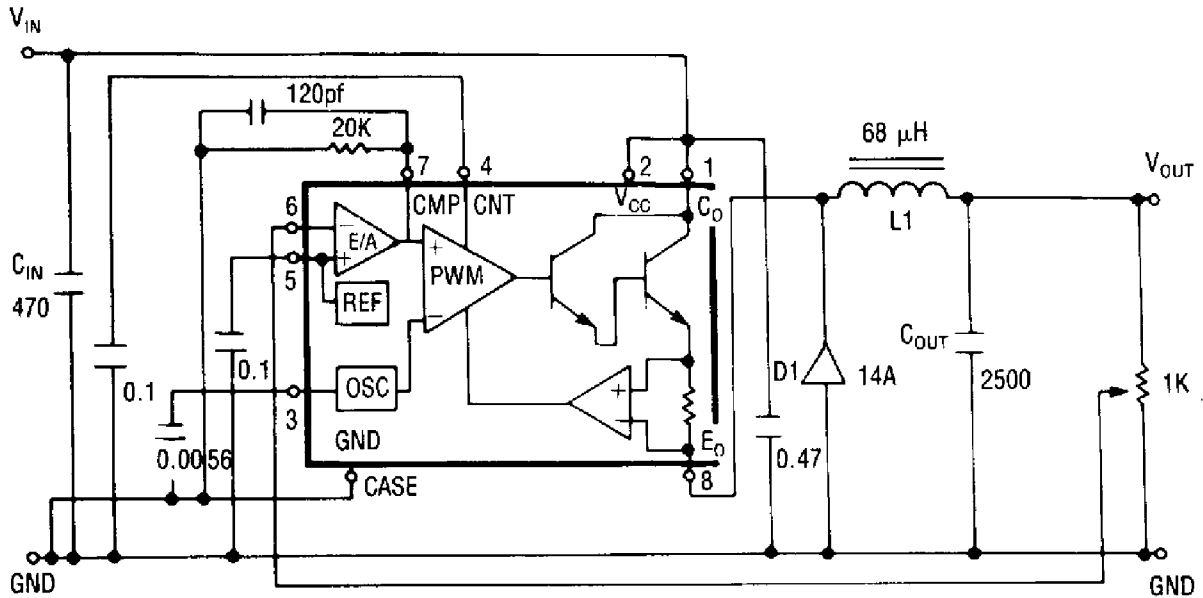


# 8 AMP SWITCHING REGULATORS

LAS-6380  
LAS-6480

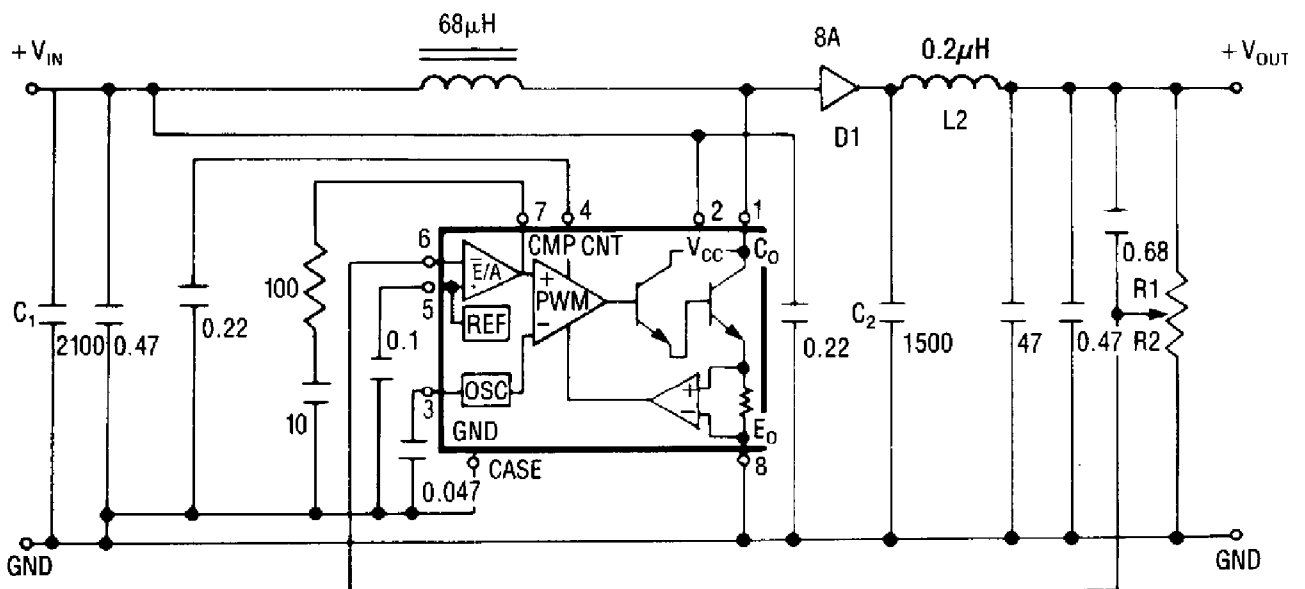
## TYPICAL APPLICATIONS

### DC-TO-DC STEP-DOWN CONVERTER



$V_{IN} = 24\text{V}$   
 $V_{OUT} = 5\text{V} @ 8\text{A}$

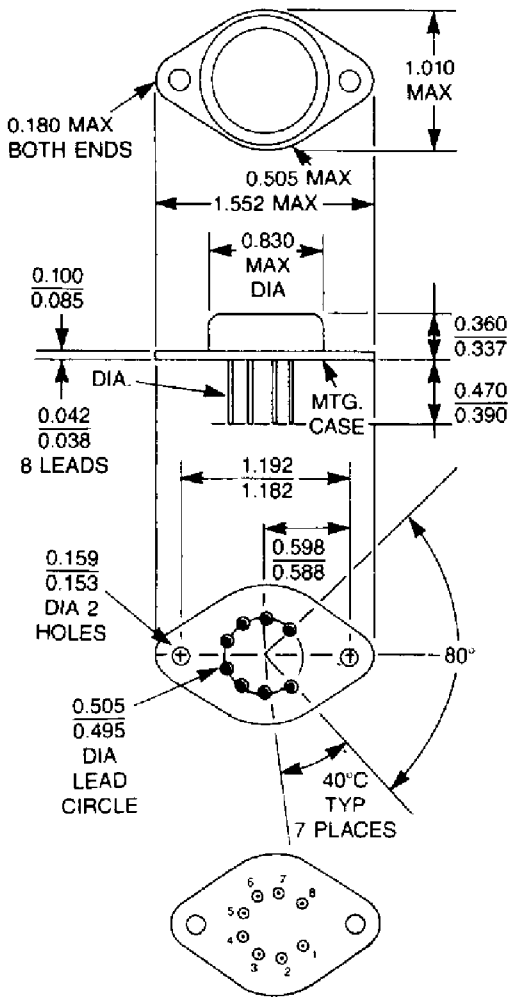
### DC-TO-DC STEP-UP CONVERTER



$V_{IN} = 12\text{V}$   
 $V_{OUT} = 24\text{V} @ 2.5\text{A}$

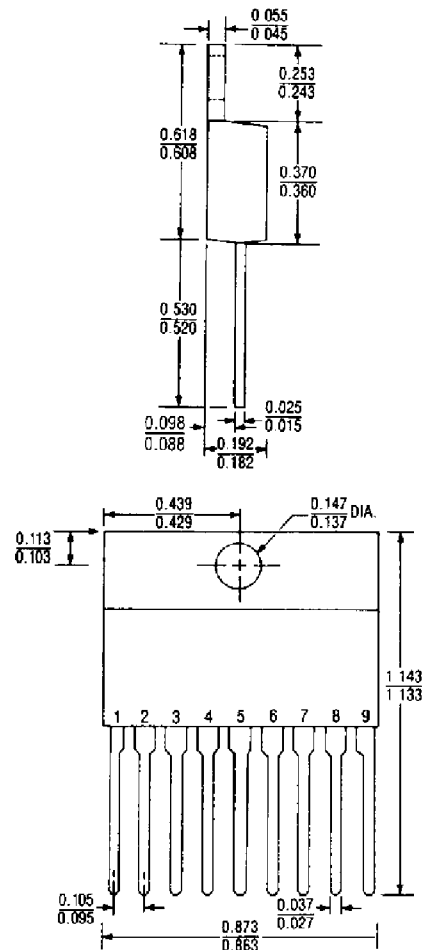
## DEVICE OUTLINE

LAS-6X80, 6X81



Bottom View

LAS-6X80P, 6X81P



Front View

LAS-6X80

1 - C <sub>O</sub>
2 - V <sub>CC</sub>
3 - C <sub>T</sub>
4 - CNT
5 - V <sub>REF</sub>
6 - E <sub>rr</sub> (-)
7 - CMP
8 - E <sub>O</sub>
Case is Ground

LAS-6X81

1 - C <sub>O</sub> /V <sub>CC</sub>
2 - C <sub>T</sub>
3 - CNT
4 - V <sub>REF</sub>
5 - E <sub>rr</sub> (-)
6 - CMP
7 - CLS
8 - E <sub>O</sub>
Case is Ground

LAS-6X80P

1 - C <sub>O</sub>
2 - V <sub>CC</sub>
3 - C <sub>T</sub>
4 - CNT
5 - GND
6 - V <sub>REF</sub>
7 - E <sub>rr</sub> (-)
8 - CMP
9 - E <sub>O</sub>
Tab is Ground

LAS-6X81P

1 - C <sub>O</sub> /V <sub>CC</sub>
2 - C <sub>T</sub>
3 - CNT
4 - V <sub>REF</sub>
5 - GND
6 - E <sub>rr</sub> (-)
7 - CMP
8 - CLS
9 - E <sub>O</sub>
Tab is Ground

NOTE: All dimensions are in inches.