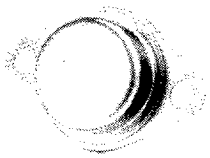
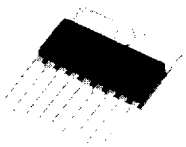
8 AMP DC-TO-DC MICROCONVERTER

LSH-6389
LSH-6489





FEATURES

- Military temperature range
- Complete DC-to-DC converter
- 70% minimum efficiency
- 80kHz switching frequency
- Programmable output voltage from 5 to 31 Volts
- Preset output voltage of 5.05 Volts ±1.5%
- Current limit and thermal shutdown

DESCRIPTION

The LSH-6389/LSH-6489 switching regulator is a micro-hybrid circuit designed for use in step-down applications requiring accurate output voltages over combined variations of line, load and temperature. This unique product greatly simplifies switching power supply design. The LSH-6389/LSH-6489 microconverter includes a switching regulator, catch diode and compensation network within a 9 pin SIP package. Just add a choke and two capacitors to obtain an efficient DC-to-DC converter for 5 Volts at 8 Amps. To increase the output voltage, simply add a programming resistor. The current limit and thermal shutdown features of the LSH-6389/ LSH-6489 fully protect the device against overstress conditions.

In order to accommodate various mounting and operating temperature requirements, the LSH-6489 is available in 2 package options, 9 Pin SIP and full Military Temperature Range Hermetic TO-3. Inhibit/Enable control pin functions are also provided with the LSH-6489 TO-3.

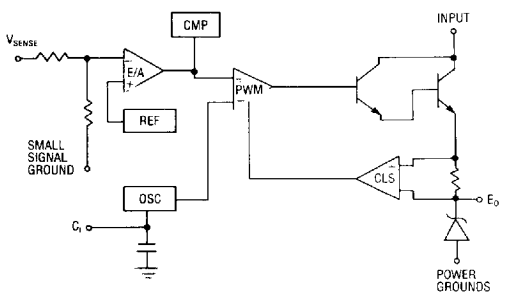
ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MAXIMUM	UNITS
Input Voltage LSH-6389 LSH-6489	V_{IN}	 35 40	Volts
Power Dissipation	P_D	Internally Limited	Watts
Thermal Resistance Junction to Case	θ_{JC}	2.5	°C/W
Operating Junction Temperature Range SIP TO-3	T_J	 −25 to 125 −55 to 150	°C
Storage Temperature Range TO-3 SIP	T_{STG}	−65 to 150 −25 to 125	°C
Lead Temperature (Soldering) 10 Sec. for SIP 60 Sec. for TO-3	T_{LEAD}	260 300	°C

DEVICE SELECTION GUIDE

DEVICE	V_{IN} MAX	V_{OUT} MAX	LEADS
LSH-6389P	35	27	Straight in-line
LSH-6489P	40	31	Straight in-line
LSH-6489	40	31	TO-3
LSH-6489M	40	31	TO-3 MIL screened

BLOCK DIAGRAM



LSH-6389
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ELECTRICAL CHARACTERISTICS

Input test conditions are as follows: V_{IN} = 24VDC, V_O = 5VDC, I_O = 8A, T_J = 25°C, unless otherwise specified.

Parameter	Symbol	Test Conditions			Test Limits			Units
		V_{IN}	I_O	T_J[5]	Minimum	Typical	Maximum	
Output Voltage[1]	V_O	12V to $V_{IN(MAX)}$	5mA 0.8A to 8A	Over Temp	4.97 4.80	5.05	5.13 5.30	Volts
Line Regulation[1]	$REG_{(LINE)}$	12V to $V_{IN(MAX)}$				20		mV
Load Regulation[1]	$REG_{(LOAD)}$		0.8A to 8A			10		mV
System Efficiency	η			Over Temp	70	75		%
Switching Frequency	f_{SX}		50mA		60	80	100	kHz
Quiescent Current	I_Q	$V_{IN(MAX)}$	0A			18	35	mA
Peak Current Limit Knee	I_{CL}			Over Temp	8.8			Amps
Short Circuit Current Limit	I_{SC}					14		Amps
Output Noise and Ripple[4] LSH-6389 LSH-6489	V_N	 30V + $5V_{pk-pk}$ 35V + $5V_{pk-pk}$				50		mV_{pk-pk}
Turn On Overshoot			0.8A to 8A			0		mV
Unit Step Load Change[2]			5mA to 8A 8A to 0.05A			0 250		mV mV_{pk}
Programming Resistance[3]		12V to $V_{IN(MAX)}$		Over Temp		0.2		Volts/kΩ

(1)Low duty cycle, pulse testing with Kelvin connections required.
(2)10mS duration.
(3)V_O programming above 5.05V.
(4)120 Hz input ripple.
(5)Over temperature −25°C to 125°C for SIP; −55°C to 150°C for TO-3.

MILITARY SCREENING

100% screened in accordance with MIL-STD-883, Method 5004 Class B

Screen	MIL-STD-883 Test Method
Internal Visual	2010
Temperature Cycling	1010
Constant Acceleration	2010
Hermeticity	1014
Electricals	Per Specifications
Burn-In	1015
External Visual	2009

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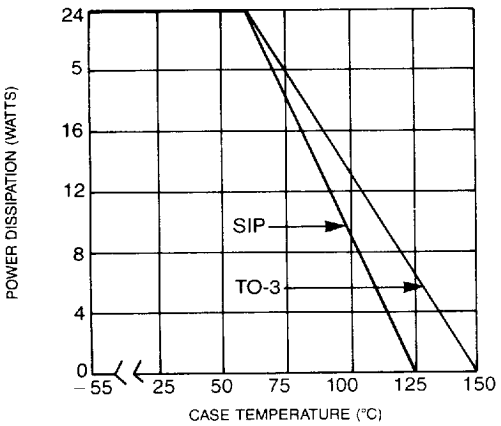
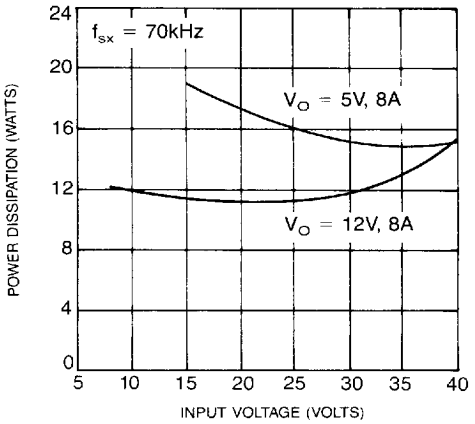
OPERATIONAL DATA

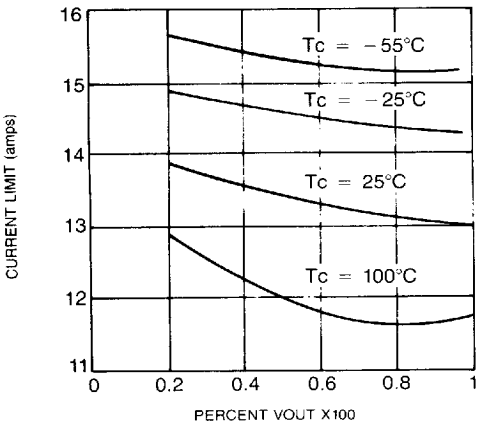
POWER DERATING



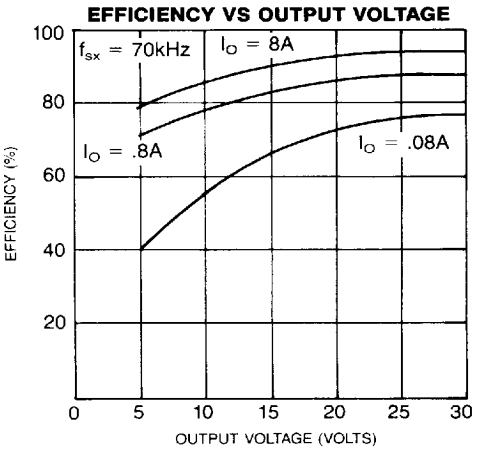
POWER DISSIPATION VS INPUT VOLTAGE



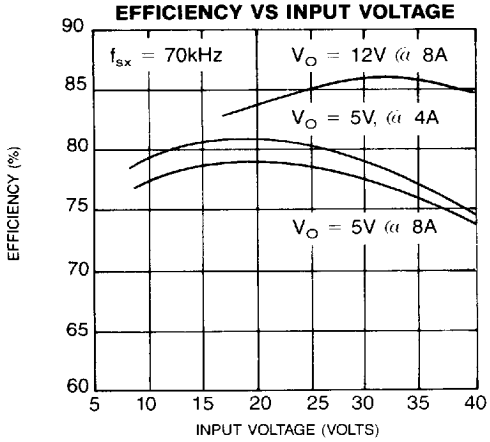
PERCENT V_{OUT} vs. OUTPUT CURRENT LIMIT



EFFICIENCY VS OUTPUT VOLTAGE

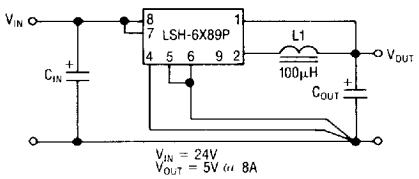


EFFICIENCY VS INPUT VOLTAGE



TYPICAL APPLICATION

DC-TO-DC STEP-DOWN CONVERTER[1,2]



[1] C_{IN} = 470µF; C_{OUT} = 2200µF.
[2] For output voltages above 5V, add programming resistor between Pin 1 and V_{OUT}.

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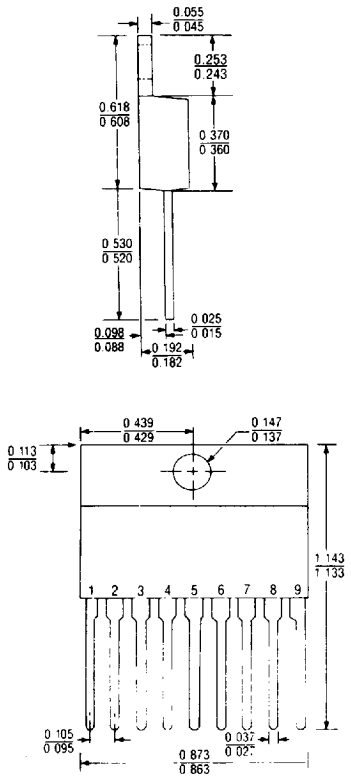
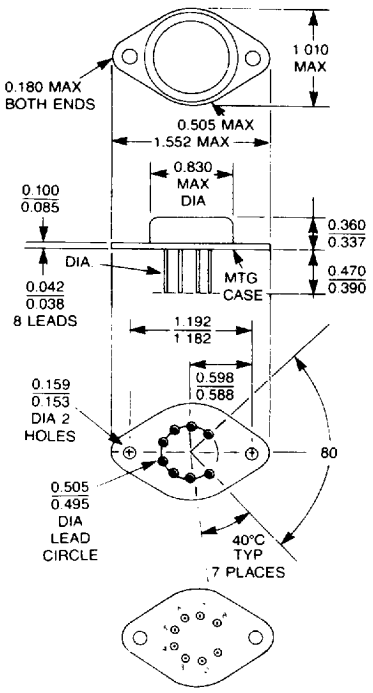
DEVICE OUTLINE

LSH-6X89P



1 – V_{SENSE}
2 – E_O
3 – N/C
4 – Power Ground
5 – Tab
6 – Small Signal Ground
7 – C_O
8 – V_{CC}
9 – C_t
Tab is connected to Pin 5. Pins 5 & 6 must be tied together.

LSH-6489



1 – Power Ground
2 – Small Signal Ground
3 – C_O
4 – V_{CC}
5 – C_t
6 – C_{NT}
7 – E_O
8 – V_S
Case is Small Signal Ground

NOTE: All dimensions are in inches.