LAMBDA SEMICONDUCTORS

LSH 6355, LSH 6455, LSH 6555
5 AMP DC-TO-DC MICROCONVERTERS

FEATURES

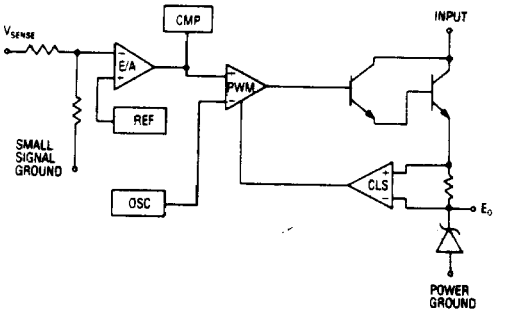
- o Complete DC-to-DC converter
- o 70% minimum efficiency
- o 70kHz switching frequency
- o Programmable output voltage from 5 to 35 volts
- o Preset output voltage of 5.05 Volts ± 1.5%
- o Current limit and thermal shutdown

DESCRIPTION

The LSH 6355/6455/6555 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 6355/6455/6555 microconverter includes a switching regulator, catch diode and compensation network within a TO-220 style package. Just add a choke and two capacitors to obtain an efficient DC-to-DC converter for 5 Volts at 5 Amps. To increase the output voltage, simply add a programming resistor. The current limit and thermal shutdown features of the LSH 6355/6455/6555 fully protect the device against overstress conditions.

The LSH 6355/6455/6555 TO-220 style plastic package is available in three options to accommodate various mounting requirements. Available lead formations are straight in-line, staggered for vertical mount and staggered for horizontal mount.

BLOCK DIAGRAM



PRELIMINARY
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ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MAXIMUM	UNITS
Input Voltage LSH 6355 LSH 6455 LSH 6555	V_{IN}	 35 40 45	Volts
Power Dissipation	P_D	Internally Limited	Watts
Thermal Resistance Junction to Case	θ_{JC}	4.5	°C/W
Operating Junction Temperature Range	T_J	-25 to 125	°C
Storage Temperature Range	T_{STG}	-65 to 150	
Lead Temperature (Soldering, 10 Seconds)	T_{LEAD}	260	°C

DEVICE SELECTION GUIDE

DEVICE	V_{IN} MAX	V_{OUT} MAX	LEADS
LSH 6355P	35	27	Straight in-line
LSH 6355PV	35	27	Vertical staggered
LSH 6355PH	35	27	Horizontal staggered
LSH 6455P	40	31	Straight in-line
LSH 6455PV	40	31	Vertical staggered
LSH 6455PH	40	31	Horizontal staggered
LSH 6555P	45	35	Straight in-line
LSH 6555PV	45	35	Vertical staggered
LSH 6555PH	45	35	Horizontal staggered

ELECTRICAL CHARACTERISTICS

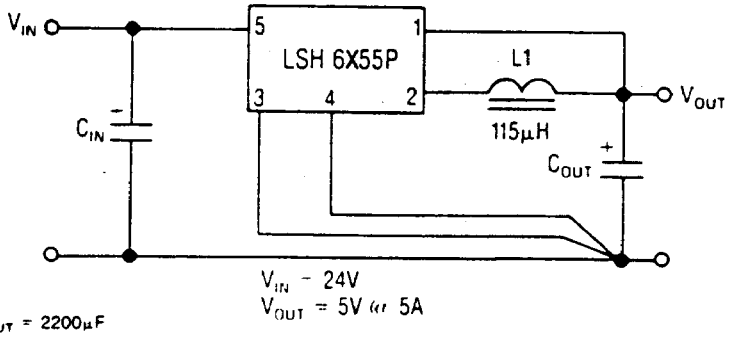
Input test conditions are as follows: V_{IN} = 24VDC, V_O = 5VDC, I_O = 5A, T_J = 25°C, unless otherwise specified.

Parameter	Symbol	Test Conditions			Test Limits			Units
		V_{IN}	I_O	T_J	Minimum	Typical	Maximum	
Output Voltage[1]	V_O	12V to $V_{IN(MAX)}$	0A 0.5A to 5A	– 25 to 125°C	4.97 4.80	5.05	5.13 5.30	Volts
Line Regulation[1]	$REG_{(LINE)}$	12V to $V_{IN(MAX)}$				90		mV
Load Regulation[1]	$REG_{(LOAD)}$		0.5A to 5A			45		mV
System Efficiency	η			– 25 to 125°C	70	75		%
Switching Frequency	f_{SX}		50mA		58	70	86	kHz
Quiescent Current	I_Q	$V_{IN(MAX)}$	0A			18	30	mA
Peak Current Limit Threshold	I_{CL}			– 25 to 125°C	5.5		9	Amps
Output Noise and Ripple[4] LSH 6355 LSH 6455 LSH 6555	V_N	 30V + $5V_{pk-pk}$ 35V + $5V_{pk-pk}$ 40V + $5V_{pk-pk}$				50		mV_{pk-pk}
Turn On Overshoot			0.5A to 5A			0		mV
Unit Step Load Change			0A to 5A 5A to 0.05A			0 250[2]		mV mV_{pk}
Programming Resistance[3]		12V to $V_{IN(MAX)}$		– 25 to 125°C		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.

TYPICAL APPLICATION

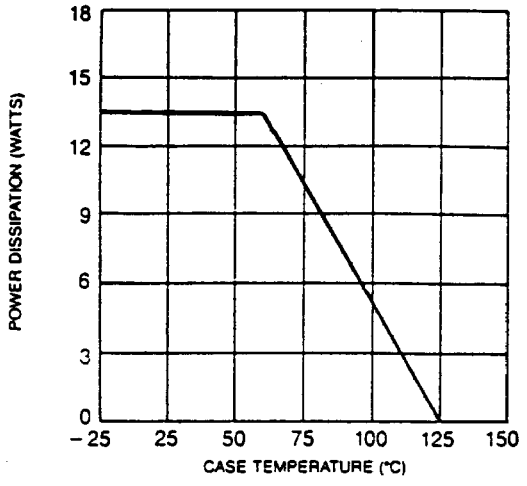
DC-TO-DC STEP-DOWN CONVERTER[1,2]



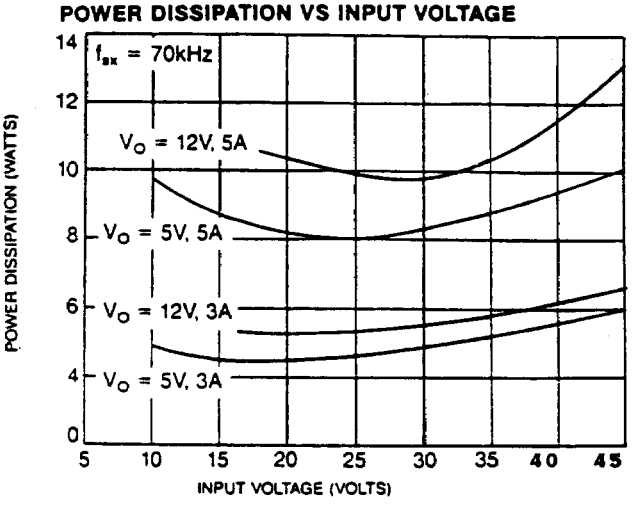
[1] C_{IN} = 470µF; C_{OUT} = 2200µF
[2] For output voltages above 5V, add programming resistor between Pin 1 and V_{OUT}.

OPERATIONAL DATA

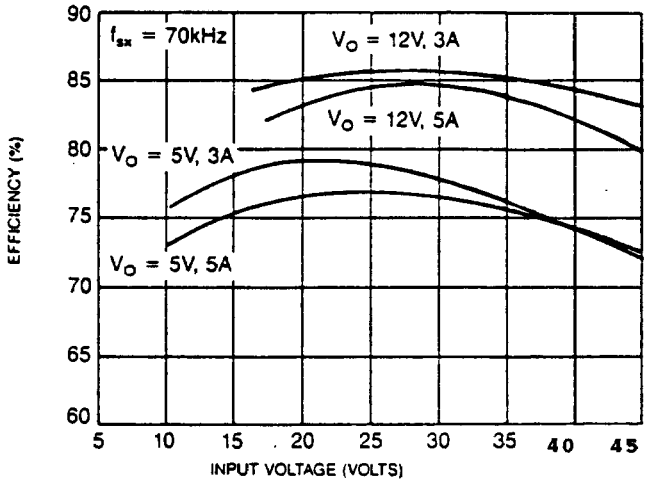
POWER DERATING



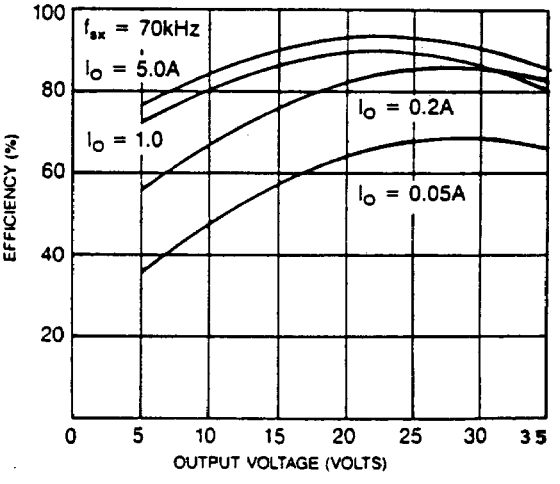
POWER DISSIPATION VS INPUT VOLTAGE



EFFICIENCY VS INPUT VOLTAGE



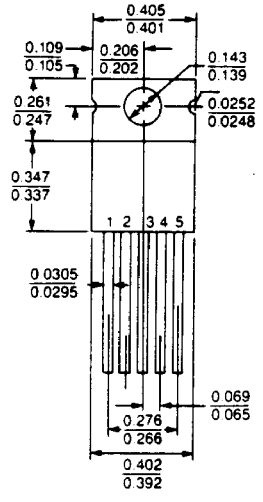
EFFICIENCY VS OUTPUT VOLTAGE



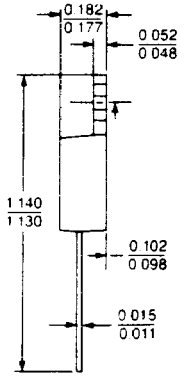
DEVICE OUTLINE

LSH 6X55P

(Front View)

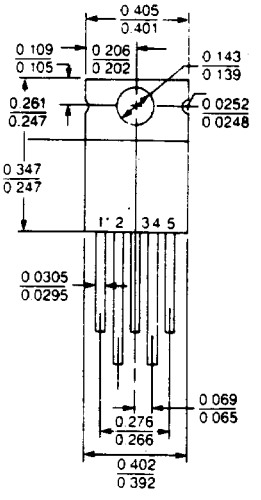


(Side View)

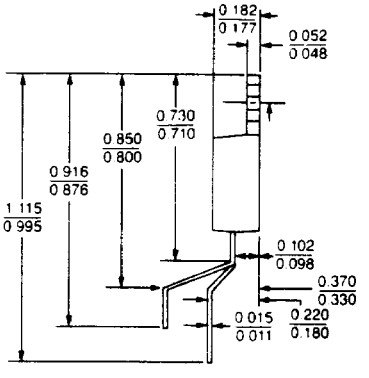


LSH 6X55PV

(Front View)

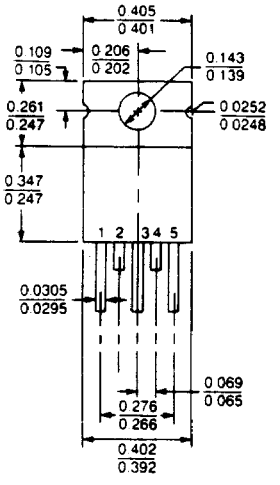


(Side View)

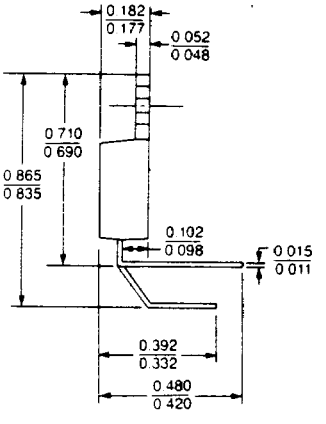


LSH 6X55PH

(Front View)



(Side View)



1 — V_{SENSE}
2 — E_O
3 — Small Signal Ground
4 — Power Ground
5 — Input
Tab is Small Signal Ground

NOTE: All dimensions are in inches.