

# 81357-X-LP

350V<sub>DC</sub> / 50W OUTPUT

PFC BOOST CONVERTER MODULE (47—800Hz)



The **81357-X-LP** PFC boost converter module contains all the necessary circuitry for complete power line compliance with aeronautics specification RTCA/DO-160E and Boeing's D6-36440(C). Housed in an all aluminum enclosure, silicon-based encapsulant, the **81357-X-LP** module is compact and rugged. Providing line rectification, minimized input current harmonic distortion, active inrush current limiting and near unity power factor; the **81357-X-LP** is ideal for avionics applications where power demands are in the 20W-50W range.

The **81357-X-LP** provides a standard 350Vdc output compatible with a broad range of off-the-shelf DC/DC converter modules. Utilizing a modular approach, system power supplies are easily configured with a few individual components required. Tedious design and development cycles normally associated with custom power solutions are no longer necessary with this approach. Reliable, compliant power supplies can be configured in weeks, not months, without the need for specialized Power Supply Engineers.



## FEATURES

	EXCEEDS AERONAUTICS' SPECIFICATION RTCA/DO-160E FOR POWER FACTOR AND INPUT CURRENT HARMONIC DISTORTION LEVELS OVER THE WIDE FREQUENCY RANGE OF OPERATION (360 - 800Hz)
	EFFICIENCY: 87% TYPICAL AT FULL LOAD
	WIDE INPUT RANGE: 97 - 134Vrms, 47 - 800Hz
	STANDARD 350Vdc OUTPUT COMPATIBLE WITH BROAD RANGE OF OFF-THE-SHELF DC/DC CONVERTER MODULES
	COMPLIES WITH RTCA/DO-160E, CATEGORY M, EMI & SUSCEPTIBILITY
	VL94V-0 FLAMMABILITY CLASSIFICATION
	RUGGEDIZED SILICON-BASED ENCAPSULATED CONSTRUCTION WITH INTEGRAL HEATSINK
	SIZE: (FINNED) 4.06" x 2.36" x 1.25", WEIGHT = 15oz. (FLAT TOP) 4.06" x 2.36" x 0.99", WEIGHT = 13oz.
	ACTIVE INRUSH CURRENT LIMITING
	MTBF (RIAC 217Plus, Aic, 50°C OPERATING TEMPERATURE, 65% DC, 2190 Cycles/ yr.) 1.39 MILLION HOURS

**NOT RECOMMENDED FOR NEW DESIGN  
SUGGESTED ALTERNATIVE: 81357-x-LPM**

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## OVERVIEW

PARAMETER	81357-X-LP
OUTPUT POWER RANGE (1,2)	20-50W
OUTPUT VOLTAGE (3)	350Vdc
EFFICIENCY (4)	87%
SWITCHING FREQUENCY	100kHz
MINIMUM OUTPUT CAPACITANCE (5)	100uF
INPUT LINE TO NEUTRAL CAPACITANCE (6)	0.047F
TOTAL LINE/NEUTRAL TO CHASSIS CAPACITANCE (6)	8600pF

**Notes:**

1. Output power range in which module complies with RTCA/DO-160E for harmonic distortion (A(WF)).
2. Module output power is limited to approximately 55W; exceeding this level will cause the output to foldback.
3. DC output voltage  $\pm 3\%$  when operating within 20-50W output power range. The DC output voltage tolerance is  $\pm 5\%$  when operating at no load through 20W output power.
4. Typical efficiency at nominal line and maximum output power (50W).
5. Minimum output capacitance for proper boost module operation. Typical values will be larger to meet hold-up time requirements. Use polarized aluminum electrolytic type.
6. Capacitance tolerances are  $\pm 20\%$ .

## TEMPERATURE CHARACTERISTICS

*AIRFLOW (LFM)	THERMAL IMPEDANCE ( $\Theta_{s-a}$ ) ( $^{\circ}\text{C}/\text{W}$ )	
	INTEGRAL FINS	FLAT TOP (W/OUT FINS)
Airflow applied through cross sectional area of fins or across flat-top		
0 LFM	3.27	4.34
250 LFM	1.06	2.28
500 LFM	0.59	1.59

\* Air velocity measured using a digital anemometer positioned within an airflow duct 4" X 3" above top of module

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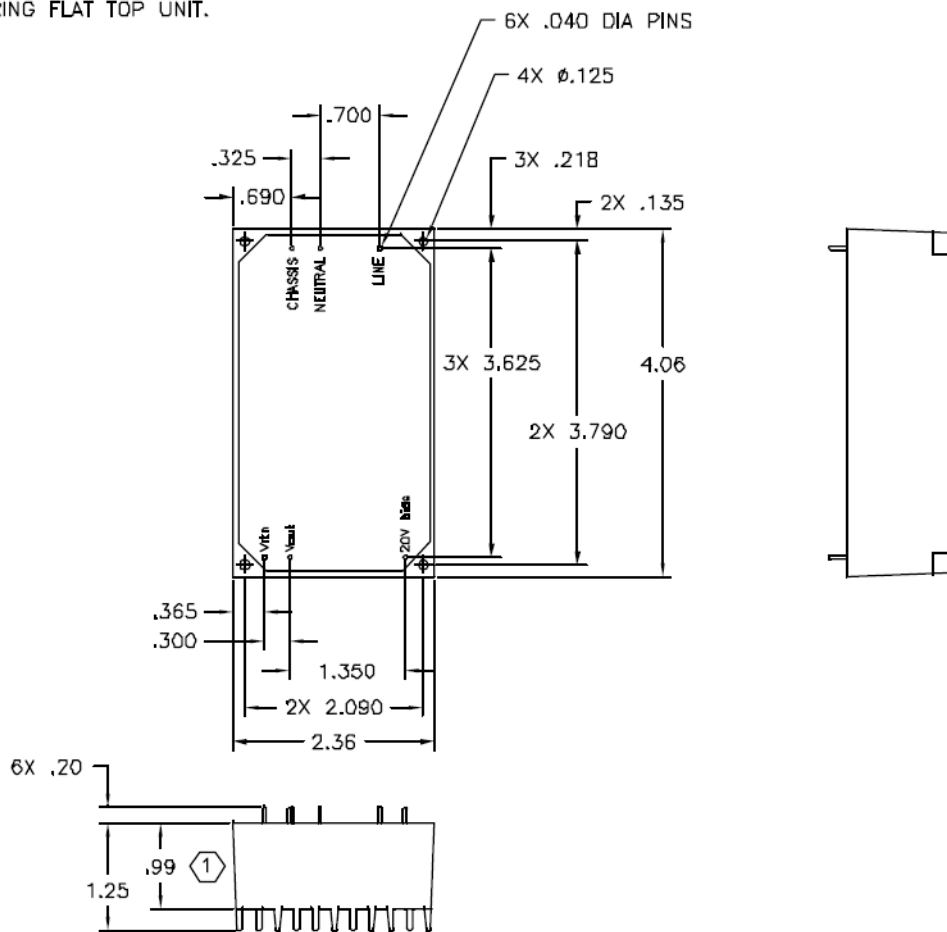
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## MECHANICAL DIAGRAM

1 HEIGHT OF UNIT WHEN ORDERING FLAT TOP UNIT.



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## ELECTRICAL SPECIFICATIONS

UNLESS OTHERWISE SPECIFIED THE FOLLOWING TEST CONDITIONS APPLY: T<sub>A</sub>=25°C. CONSTANT ACTIVE LOAD APPLIED TO OUTPUT IN PARALLEL WITH 220µF CAPACITOR. V<sub>in</sub> = 115V<sub>rms</sub>, 400Hz, < 1% THD SINUSOID.

## INPUT CHARACTERISTICS

PARAMETER	81357-X-LP	REMARKS	NOTES
INPUT VOLTAGE RANGE	97 - 134V <sub>rms</sub>	COMPLIES WITH NORMAL/ABNORMAL INPUT VOLTAGES PER RTCA/DO-160E, SECTION 16	2
INPUT FREQUENCY RANGE	47 - 800Hz	COMPLIES WITH DO-160E, SECTION 16, FOR A(WF) EQUIPMENT. OPERATES AT 47 - 360Hz WITH REDUCED DISTORTION PERFORMANCE	2
INPUT UNDER-VOLTAGE SHUTDOWN	90V <sub>rms</sub> +/- 5V <sub>rms</sub>	BOOST FUNCTION IS INHIBITED WHEN INPUT VOLTAGE IS DETECTED AT THIS LEVEL. DURING INHIBIT, MODULE OUTPUT OPERATES AT V <sub>in</sub> (rms) * √2	2
CONTINUOUS OUTPUT POWER	50W	OBSERVE 100°C MAXIMUM BASEPLATE TEMPERATURE	2
LEAKAGE CURRENT	< 5mA <sub>rms</sub>	AC LINE/NEUTRAL TO CHASSIS, V <sub>in</sub> @ 115V <sub>rms</sub> , 400Hz	1
INRUSH CURRENT	< 7.5A <sub>pk</sub>	COLD START, V <sub>out</sub> = 0V <sub>dc</sub>	2
TOTAL HARMONIC DISTORTION (INPUT CURRENT)	< 3.5%	P <sub>out</sub> > 20W	2
INDIVIDUAL HARMONICS - AC CLEAN	EVEN: < 1% I <sub>f</sub> / n, (n < 10) EVEN: < 0.1% I <sub>f</sub> (n ≥ 10) ODD: < 30% I <sub>f</sub> / n ODD TRIPLENS: < 15% I <sub>f</sub> / n	V <sub>in</sub> = 115V <sub>rms</sub> , 360 - 800Hz V <sub>thd</sub> ≤ 1.25% n = ORDER OF HARMONIC, 1 THRU 40, I <sub>f</sub> = FUNDAMENTAL CURRENT FOR ALL 20W ≤ P <sub>out</sub> ≤ 50W and INDIVIDUAL HARMONICS > 5mA <sub>rms</sub>	1
INDIVIDUAL HARMONICS - DISTORTED INPUT	EVEN: < 1% I <sub>f</sub> / n + V <sub>n</sub> (n < 10) EVEN: < 0.1% I <sub>f</sub> + V <sub>n</sub> (n ≥ 10) ODD: < 30% I <sub>f</sub> / n + V <sub>n</sub> ODD TRIPLENS: < 15% I <sub>f</sub> / n + V <sub>n</sub>	V <sub>in</sub> = 115V <sub>rms</sub> , 360 - 800Hz V <sub>thd</sub> ≥ 10%, V <sub>n</sub> = CORRESPONDING INPUT VOLTAGE HARMONIC n = ORDER OF HARMONIC, 1 THRU 40, I <sub>f</sub> = FUNDAMENTAL CURRENT FOR ALL 20W ≤ P <sub>out</sub> ≤ 50W and INDIVIDUAL HARMONICS > 5mA <sub>rms</sub>	1
POWER FACTOR	0.90 min	P <sub>out</sub> ≥ 20W	2
CREST FACTOR (CURRENT)	1.314 - 1.514	RATIO OF PEAK/RMS	1
START-UP TIME	< 750mSec	V <sub>out</sub> > 200V <sub>dc</sub>	2
CONDUCTED EMISSIONS	RTCA/DO-160E	CATEGORY M, IMPLEMENTATION OF SMALL EXTERNAL LINE FILTER IS RECOMMENDED. SEE APPLICATION NOTES FOR DETAILS	1
OPERATING TEMPERATURE RANGE	-40°C TO 100°C	BASEPLATE	1
STORAGE TEMPERATURE RANGE	-55°C TO 100°C	NON-OPERATING	1

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## OUTPUT CHARACTERISTICS

PARAMETER	81357-X-LP	REMARKS	NOTES
RATED OUTPUT VOLTAGE	350Vdc $\pm$ 3%, Pout $\geq$ 20W 350Vdc $\pm$ 5%, Pout < 20W		2
MINIMUM OUTPUT CURRENT	0A <sub>dc</sub>		2
MAXIMUM BASEPLATE TEMPERATURE	100°C		1
TEMPERATURE STABILITY COEF.	0.02% / °C	OUTPUT VOLTAGE	1
OUTPUT RIPPLE + NOISE (pk - pk)	< 0.5%	20MHz BANDWIDTH, C <sub>out</sub> = 470uF	1
LINE REGULATION	< 1%	OUTPUT DEVIATION FOR $\pm$ 20%, STEP CHANGE IN LINE VOLTAGE	1
HOLD-UP TIME	0mSec	REQUIRES EXTERNAL HOLD-UP CAPACITOR. SEE APPLICATION NOTES FOR DETAILS	1
MINIMUM OUTPUT CAPACITANCE	100uF	OBSERVE RIPPLE CURRENT REQUIREMENTS @ 800Hz & 100kHz FOR EXTERNAL OUTPUT CAPACITORS. SEE APPLICATION NOTES FOR DETAILS	1
MAXIMUM OUTPUT CAPACITANCE	1,000uF	SPECIFIED IN ORDER NOT TO OVERSTRESS THE INTERNAL ACTIVE INRUSH CURRENT LIMITING CIRCUIT	1
ISOLATION VOLTAGE: INPUT TO OUTPUT	NONE	NON-ISOLATED DEVICE. ISOLATION VOLTAGE IS ACHIEVED IN DC/DC CONVERTERS	1
ISOLATION VOLTAGE: INPUT/OUTPUT TO CHASSIS	1500V <sub>rms</sub>	NO ARCING OR DAMAGE FOR 60 SECOND DURATION	2
SHORT-CIRCUIT PROTECTION	NONE	FUSE INPUT WITH 2A FAST BLOW FUSE	1
20V <sub>bias</sub> OUTPUT	17.8 $\pm$ 1.2V <sub>dc</sub>	REFERENCED TO V <sub>rtn</sub> , MAXIMUM SOURCE CURRENT IS 5mA AT MODULE START-UP AND 12mA THEREAFTER UNLESS INCORPORATING START-UP ASSIST CIRCUIT (SEE APP NOTES). VOLTAGE MAY DROP BELOW 16.6V WHEN BOOST MODULE IS DISABLED OR LIGHTLY LOADED ON THE OUTPUT.	2

Notes:

1. Ensured by design, not 100% tested in production.
2. 100% tested for specification compliance in production.

**\* OPTIONAL CROSS HATCH HEATSINK AVAILABLE FOR "F" VERSION**

To inquire about price and delivery please contact PPI sales department.

### ORDERING INFORMATION

PPI PART NUMBER: **81357 -**  **- LP**

INSERT FOR FIN CONFIG.:	"H"	"F"
	INTEGRAL FIN	FLAT TOP