

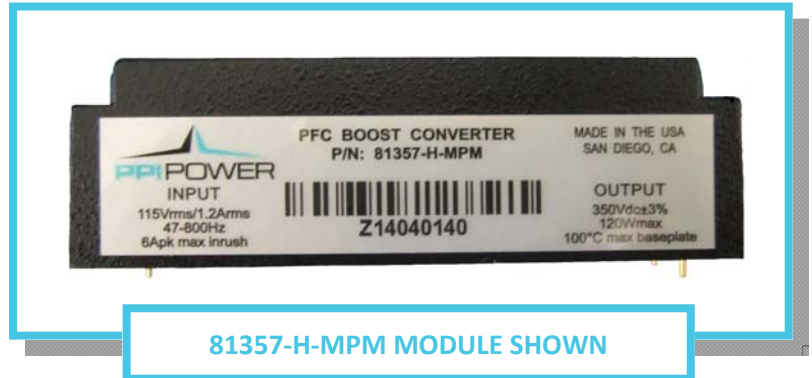
# 81357-X-LPM-PBF

PFC BOOST CONVERTER MODULE (47—800Hz)



The **81357-X-LPM-PbF** PFC boost converter module contains all the necessary circuitry for complete power line compliance with aeronautics specification RTCA/DO-160E/F and Boeing's D6-36440(C). Housed in an all aluminum enclosure, with silicon-based encapsulant, the **81357-X-LPM-PbF** 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-LPM-PbF** is ideal for avionics applications where power demands are in the 30W-75W range.

The **81357-X-LPM-PbF** 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.



81357-H-MPM MODULE SHOWN

## FEATURES

	EXCEEDS BOEING'S RTCA/DO-160E/F, CATEGORY A(WF) FOR INPUT CURRENT HARMONIC DISTORTION LEVELS @ 360-800Hz
	EFFICIENCY: 85% TYPICAL
	WIDE INPUT RANGE: 90 - 134Vrms, 47 - 800Hz
	STANDARD 350Vdc OUTPUT COMPATIBLE WITH BROAD RANGE OF <i>OFF-THE-SHELF</i> DC/DC CONVERTER MODULES
	COMPLIES WITH RTCA/DO-160E/F, CATEGORY M, EMISSIONS & SUSCEPTIBILITY
	VL94V-0 FLAMMABILITY CLASSIFICATION
	RUGGEDIZED SILICON-BASED ENCAPSULATED CONSTRUCTION WITH INTEGRAL HEATSINK OR FLAT TOP
	SIZE: FINNED VERSION: 4.0" x 2.3" x 1.25", WEIGHT = 15oz, FLAT TOP VERSION: 4.0" x 2.3" x 0.99", WEIGHT = 14oz
	ACTIVE INRUSH CURRENT LIMITING
	MTBF (RIAC 217Plus, Aic, 50°C OPERATING TEMPERATURE, 65% DC, 2190 Cycles/ yr.) 1.39 MILLION HOURS

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## OVERVIEW

PARAMETER	81357-X-LPM-PbF
OUTPUT POWER RANGE (1,2)	30-75W
OUTPUT VOLTAGE (3)	350Vdc
EFFICIENCY (4)	85%
SWITCHING FREQUENCY	125kHz
MINIMUM OUTPUT CAPACITANCE (5)	100uF
INPUT LINE TO NEUTRAL CAPACITANCE (6)	0.082uF
TOTAL LINE/NEUTRAL TO CHASSIS CAPACITANCE (6)	8600pF

NOTES:

1. Output power range in which module complies with RTCA/DO-160E/F, Cat A(WF).
2. Module is power limited at upper output limit, (Pmax).
3. DC output voltage  $\pm 3\%$  when operating within 20-75W output power range. The DC output voltage tolerance is  $\pm 5\%$  when operating at no load through 20W output power.
4. Minimum efficiency at Pmax.
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/O FINS)
Air velocity through cross-sectional area of fins or across flat top		
0 LFM	3.3	4.3
250 LFM	1.1	2.3
500 LFM	0.6	1.6
750 LFM	0.4	1.1

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

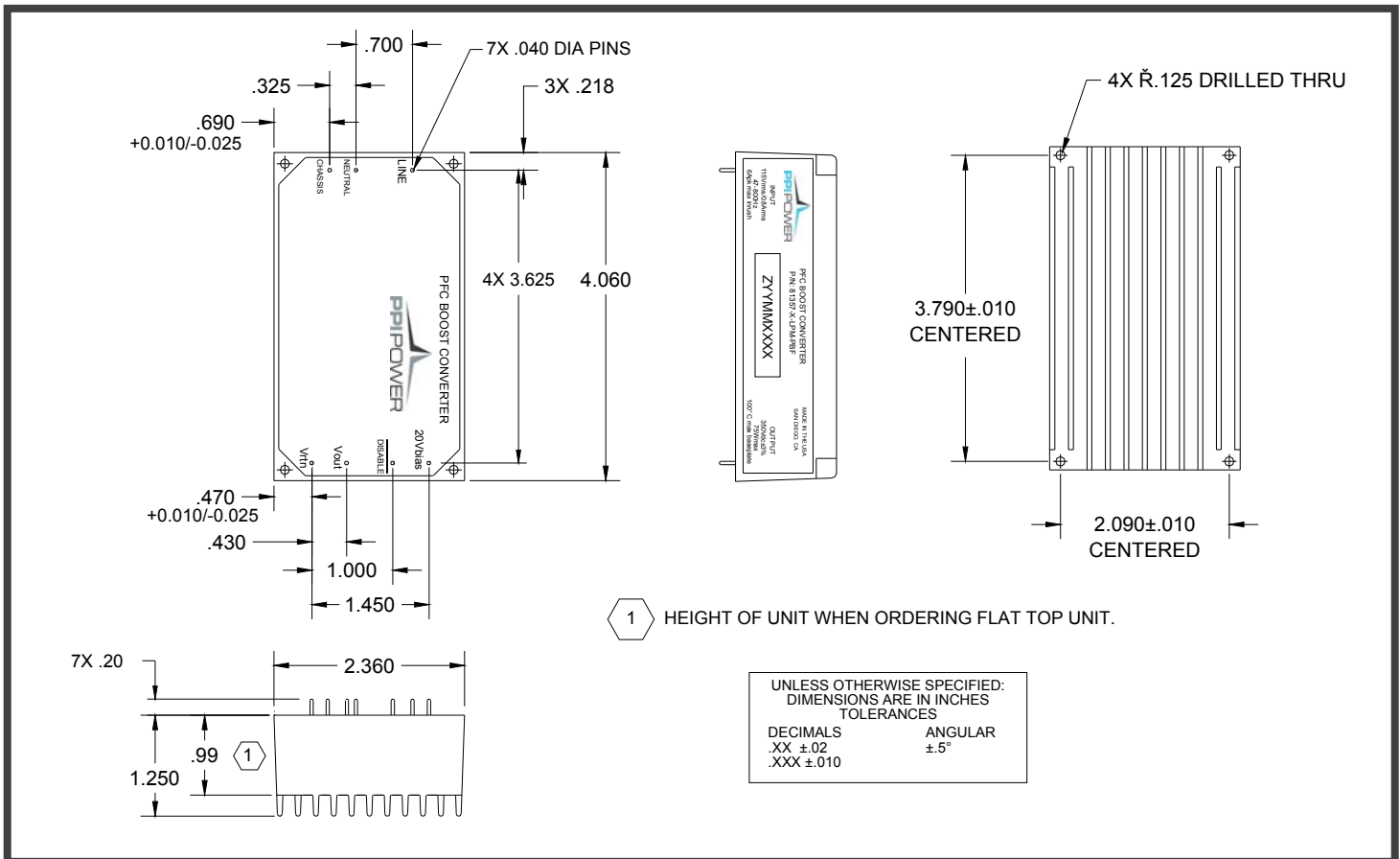


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## MECHANICAL DIAGRAM



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## ELECTRICAL SPECIFICATIONS

UNLESS OTHERWISE SPECIFIED THE FOLLOWING TEST CONDITIONS APPLY:  $T_A=25^{\circ}\text{C}$ . CONSTANT ACTIVE LOAD APPLIED TO OUTPUT IN PARALLEL WITH 470uF CAPACITOR.  $V_{IN}=115\text{Vrms}$ , 400Hz, < 1% THD SINUSOID.

## INPUT CHARACTERISTICS

PARAMETER	81357-X-LPM-PbF	REMARKS	NOTES
INPUT VOLTAGE RANGE	90 - 134Vrms	COMPLIES WITH NORMAL/ ABNORMAL INPUT VOLTAGES PER RTCA/DO-160E/F, SECTION 16	2, 4
INPUT FREQUENCY RANGE	47 - 800Hz	COMPLIES WITH DO-160E/F, SECTION 16, FOR A(WF) EQUIPMENT. OPERATES AT 47 - 360Hz WITH REDUCED DISTORTION PERFORMANCE	2
CONTINUOUS OUTPUT POWER	75W	OBSERVE MAXIMUM BASEPLATE TEMPERATURE of 100°C	2
LEAKAGE CURRENT	< 5mA <sub>rms</sub>	AC LINE/NEUTRAL TO CHASSIS, $V_{in}$ @ 115Vrms, 400Hz	1
BOOST INHIBIT	DISABLE PIN PULLED TO < 1V WITH RESPECT TO Vrtn	BOOST FUNCTION DISABLED. $V_{out}$ WILL OPERATE AT $\sqrt{2} * V_{in}(\text{rms})$ DEPENDING ON OUTPUT LOADING	2
INRUSH CURRENT	< 3.3A <sub>pk</sub> typical < 6.0A <sub>pk</sub> maximum	COLD START; INITIAL $V_{out} = 0\text{Vdc}$	2
TOTAL HARMONIC DISTORTION (INPUT CURRENT)	< 6.5%	$30\text{W} \leq P_{out} \leq 75\text{W}$	2
INDIVIDUAL HARMONICS - AC CLEAN	EVEN: < 1% $I_f / n$ , ( $n < 10$ ) EVEN: < 0.1% $I_f$ ( $n \geq 10$ ) ODD: < 30% $I_f / n$ ODD TRIPLENS: < 15% $I_f / n$	$V_{in} = 115\text{Vrms}$ , 360 - 800Hz $V_{thd} \leq 1\%$ $n = \text{ORDER OF HARMONIC, 1 THRU 40,}$ $I_f = \text{FUNDAMENTAL CURRENT}$ FOR $30\text{W} \leq P_{out} \leq 75\text{W}$ and INDIVIDUAL HARMONICS > 5mA <sub>rms</sub>	1, 5
INDIVIDUAL HARMONICS - DISTORTED INPUT	EVEN: < 1% $I_f / n + V_n$ ( $n < 10$ ) EVEN: < 0.1% $I_f + V_n$ ( $n \geq 10$ ) ODD: < 30% $I_f / n + V_n$ ODD TRIPLENS: < 15% $I_f / n + V_n$	$V_{in} = 115\text{Vrms}$ , 360 - 800Hz $V_{thd} \geq 10\%$ , $V_n = \text{CORR. INPUT VOLTAGE HARMONIC}$ $n = \text{ORDER OF HARMONIC, 1 THRU 40,}$ $I_f = \text{FUNDAMENTAL CURRENT}$ FOR $30\text{W} \leq P_{out} \leq 75\text{W}$ and INDIVIDUAL HARMONICS > 5mA <sub>rms</sub>	1, 5
POWER FACTOR	0.98 minimum	$P_{out} \geq 30\text{W}$ , 360-800Hz	2
CREST FACTOR (CURRENT)	1.314 - 1.514	RATIO OF PEAK/RMS	1



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## INPUT CHARACTERISTICS—CONTINUED

PARAMETER	81357-X-LPM-PbF	REMARKS	NOTES
START-UP TIME	< 1 SECOND	Vout > 200Vdc	2
CONDUCTED EMISSIONS	RTCA/DO-160E/F	CATEGORY M	1, 3
OPERATING TEMP RANGE	-40°C TO 100°C	BASEPLATE	1
STORAGE TEMP RANGE	-55°C TO 100°C	NON-OPERATING	1
OVERTEMPERATURE PROTECTION	105°C +10°C / -5°C	BOOST INHIBITED WHEN OVERTEMPERATURE FAULT IS DETECTED. DURING INHIBIT, MODULE OUTPUT OPERATES AT $\sqrt{2} \cdot V_{in}(rms)$ . AUTO RESET WITH $\sim 15^\circ\text{C}$ HYSTERESIS	1

### Notes:

1. Ensured by design, not 100% tested in production.
2. 100% tested for specification compliance in production.
3. May require small external inductor, common-mode inductor or X capacitor installed on power lines for full compliance when installed in upper level assembly, see PFC boost module application notes for details.
4. Requires start-up assist circuit if using more than 470uF output capacitance and starting at 90-97Vrms low line voltage. See 81357 series application notes for details.
5. May require 1mH choke in input line in order to comply with distortion requirements at low output power (30W-35Wout).



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## OUTPUT CHARACTERISTICS

PARAMETER	81357-X-LPM-PbF	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, Cout = 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	1
MAXIMUM OUTPUT CAPACITANCE	1,200uF	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, 7mA <sub>rms</sub> MAXIMUM LEAKAGE CURRENT	2
SHORT-CIRCUIT PROTECTION	NONE	FUSE INPUT WITH 2A FAST BLOW FUSE	1
OVERVOLTAGE PROTECTION	OVP SET-POINT: 406V $\pm$ 5%	OUTPUT VOLTAGE LIMITED, AUTO RECOVERY	1
20V <sub>bias</sub> OUTPUT	17.8 $\pm$ 1.8V <sub>dc</sub>	REFERENCED TO Vrtn, 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 16.0V WHEN BOOST MODULE IS DISABLED OR LIGHTLY LOADED ON THE OUTPUT. 20V <sub>bias</sub> OUTPUT IS INTERNALLY OVER-CURRENT PROTECTED.	2

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To inquire about price and delivery please contact PPI's sales department at:  
[info@ppipower.com](mailto:info@ppipower.com)

ORDERING INFORMATION		
PPI PART NUMBER: 81357 - <span style="background-color: #00AEEF; color: white; padding: 2px 5px;"> </span> - LPM-PBF		
INSERT FOR FIN CONFIG.:	"H"	"F"
	INTEGRAL FIN	FLAT TOP

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