

82505-800

(47– 800Hz Input)

PFC Boost Converter Module



The **82505-800** PFC boost converter module contains all the necessary circuitry for complete power line compliance with aeronautics specification RTCA/DO-160D and Airbus' ABD0100.1.8 (issue D). Housed in an all aluminum silicon-based encapsulated enclosure, the PFC module is compact and rugged. Providing line rectification, minimized input current harmonic distortion, active inrush current limiting and near unity power factor; these chassis mount devices are ideal for avionics applications where power demands are in the 125W-250W range.

A tightly regulated 325Vdc output provides necessary input to a variety 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 RTCA/DO-160D CHANGE NOTICE #2, CATEGORY A (WF) AND AIRBUS ABD0100.1.8 (ISSUE D) FOR POWER FACTOR AND INPUT CURRENT HARMONIC DISTORTION LEVELS AT 360-800 Hz
	EFFICIENCY: 90% TYPICAL
	WIDE INPUT RANGE: 97 - 134Vrms, 47 - 800Hz
	STANDARD 325Vdc OUTPUT COMPATIBLE WITH BROAD RANGE OF OFF-THE-SHELF DC/DC CONVERTER MODULES
	COMPLIES WITH RTCA/DO-160D EMI & SUSCEPTIBILITY
	VL94V-0 FLAMMABILITY CLASSIFICATION (ENCAPSULANT)
	RUGGEDIZED SILICON BASED ENCAPSULANT AND INTEGRAL HEATSINK PROVIDES IMMUNITY FROM HARSH ENVIRONMENTS
	INPUT TRANSIENT SUPPRESSION - 30J/2mSecs
	DIMENSIONS: 5.19" X 2.98" X 1.68", WEIGHT = 29oz.
	ACTIVE INRUSH CURRENT LIMITING
	OVER TEMPERATURE PROTECTED
	OVER VOLTAGE PROTECTED (MODULE OUTPUT VOLTAGE)

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TEMPERATURE CHARACTERISTICS

*AIRFLOW (LFM)	THERMAL IMPEDANCE (Θ_{s-a}) (°C/W)
Air velocity through cross-sectional area of fins or across flat top	HORIZONTAL FINS
0 LFM	1.30
250 LFM	0.75
500 LFM	0.60
750 LFM	0.40

Notes:

1. Air velocity measured using a digital anemometer positioned within an airflow duct 1.0" X 3.0" above top of module.
2. Module flush mounted to a 10" x 7" x 0.06" aluminum plate.
3. Thermal impedance values provided are at module's rated output power (250W).

PERFORMANCE SUMMARY

PARAMETER	SPECIFICATIONS
OUTPUT POWER RANGE (1,2)	125 - 250W
OUTPUT VOLTAGE (3)	325Vdc
EFFICIENCY (4)	89%
SWITCHING FREQUENCY	100kHz
MINIMUM OUTPUT CAPACITANCE (5)	100uF
INPUT LINE TO NEUTRAL CAPACITANCE (6)	0.53uF
TOTAL LINE/NEUTRAL TO CHASSIS CAPACITANCE (6)	11.4nF
ISOLATION VOLTAGE, INPUT/ OUTPUT TO CHASSIS (7)	1500Vac
MTBF (Aic, 30°C case)	49,000 Hours

NOTES:

1. Output power range in which module complies with RTCA/DO-160D, Section 16, notice 2, Category A(WF).
2. Module is power limited at ~375W output power.
3. DC output voltage $\pm 3\%$ when operating from no load through 250Wout.
4. Minimum efficiency at Pmax. Efficiency is 90% typical.
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 $\pm 20\%$.
7. 1500Vac, 60Hz for 60 seconds without arc or damage; 8.0mA maximum leakage current (internal line-to-earth capacitors installed)

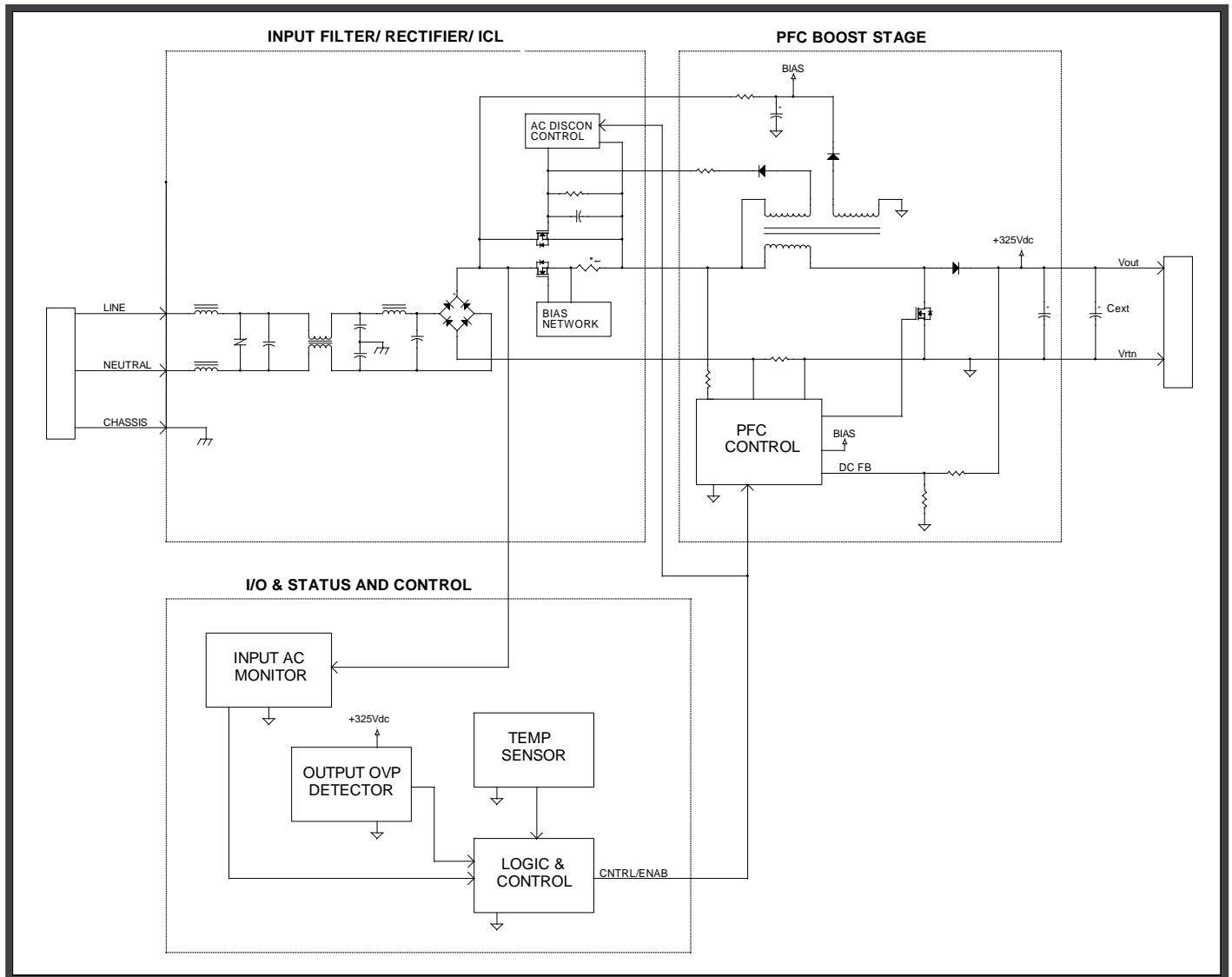
82505-800

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BLOCK DIAGRAM



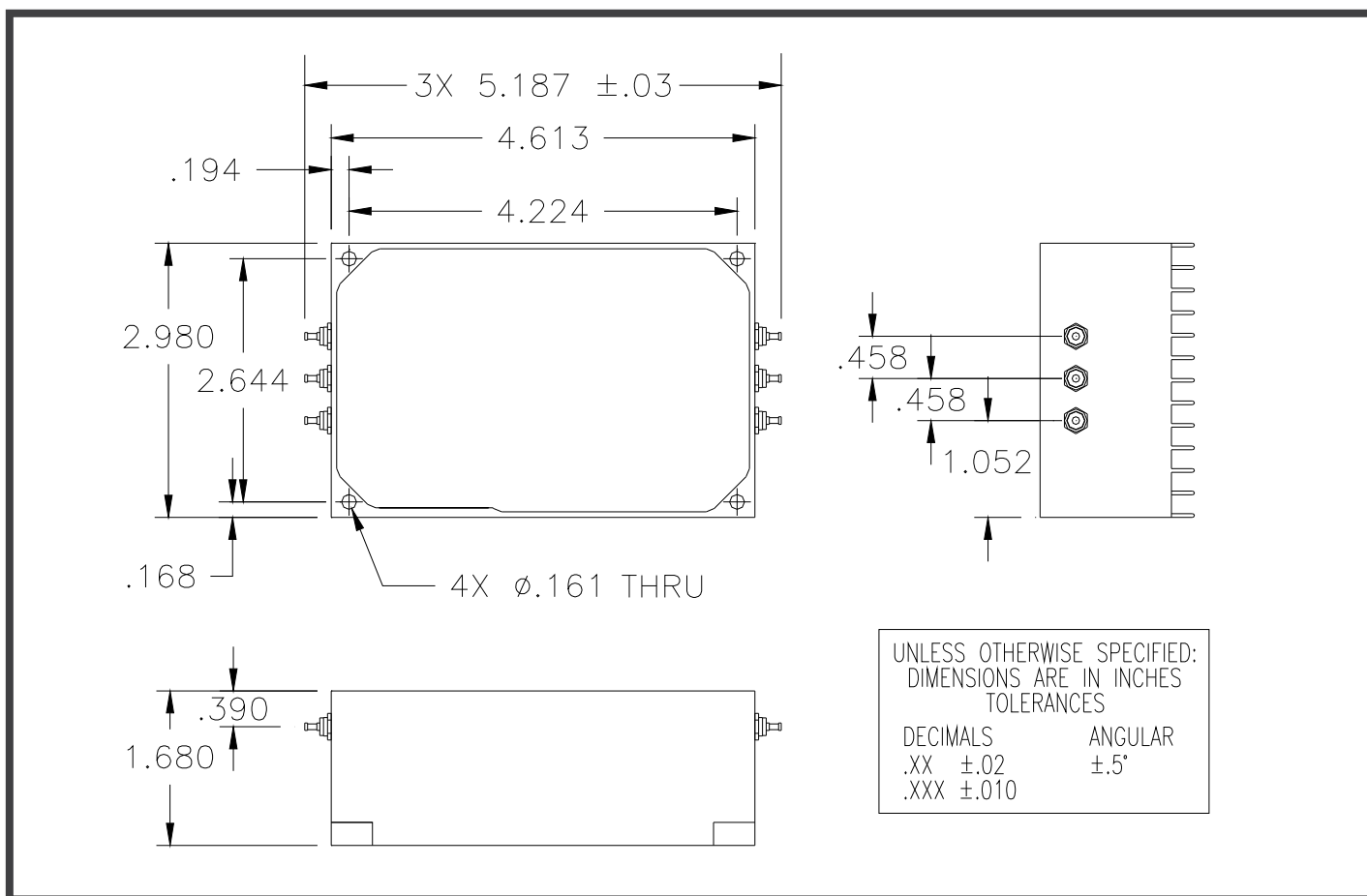
82505-800

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MECHANICAL DIAGRAM



A DETAILED OUTLINE DRAWING CAN BE FURNISHED UPON REQUEST.

82505-800

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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 & 470 μF CAPACITOR ACROSS OUTPUT, $V_{\text{IN}}=115\text{Vrms}$, 400Hz, < 1% THD SINUSOID, OUTPUT POWER = 250W.

INPUT CHARACTERISTICS

PARAMETER	82505-800	REMARKS	NOTES
INPUT VOLTAGE RANGE	97-134Vrms	COMPLIES WITH NORMAL/ABNORMAL INPUT VOLTAGES PER RTCA/DO-160D, SECTION 16	2
INPUT FREQUENCY RANGE	47-800Hz	COMPLIES WITH DO-160D, SECTION 16, CHANGE NUMBER 2 FOR A (WF) EQUIPMENT. COMPLIES WITH ABD0100.1.8 (REV D) FOR VF NETWORKS (SINGLE PHASE). OPERATES AT 47-360Hz WITH REDUCED DISTORTION PERFORMANCE	2
CONTINUOUS OUTPUT POWER	250W	OBSERVE MAXIMUM BASEPLATE TEMPERATURE	2
PEAK POWER RATING	375W	<5 SECOND DURATION	1
LEAKAGE CURRENT	<5mA	AC LINE/NEUTRAL TO CHASSIS, $V_{\text{in}}=115\text{Vrms}/400\text{Hz}$	1
INRUSH CURRENT	12Apk	COLD START, $V_{\text{out}} = 0\text{Vdc}$	2
TOTAL HARMONIC DISTORTION (INPUT CURRENT)	<3.5%	$P_{\text{out}} > 125\text{W}$, $V_{\text{in}} = 115\text{Vrms} / 400\text{Hz}$	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	$V_{\text{in}} = 115\text{Vrms}$, 360 - 800Hz $V_{\text{thd}} \leq 1.25\%$ $n = \text{ORDER OF HARMONIC}$, 1 THRU 99 $I_f = \text{FUNDAMENTAL CURRENT}$ $P_{\text{out}} \geq 125\text{W}$ FOR ALL HARMONICS GREATER THAN 5mA _{rms}	1
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% $I_f / n + V_n$	$V_{\text{in}} = 115\text{Vrms}$, 360 - 800Hz $V_{\text{thd}} \geq 5\%$, $V_n = \text{CORRESPONDING INPUT VOLTAGE HARMONIC}$ $n = \text{ORDER OF HARMONIC}$, 1 THRU 99 $I_f = \text{FUNDAMENTAL CURRENT}$ $P_{\text{out}} \geq 125\text{W}$ FOR ALL HARMONICS GREATER THAN 5mA _{rms}	1
POWER FACTOR	0.90 min	$P_{\text{out}} > 50\text{W}$	2
TRANSIENT SURGE WITHSTAND	30J / 2mSec	NORMAL MODE	1
CREST FACTOR (CURRENT)	1.314 - 1.514	RATIO OF PEAK/RMS	1
START-UP TIME	2.2 Sec	$V_{\text{out}} > 200\text{Vdc}$	2

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INPUT CHARACTERISTICS—CONTINUED

PARAMETER	82505-800	REMARKS	NOTES
WARM START DELAY AC INTERRUPTS < 400mSec	120mSec TYPICAL	$V_{in} = 115V_{rms} \pm 1\%$	1, 3, 4
	150mSec MAXIMUM	$V_{in} = 115V_{rms} \pm 1\%$	1, 3, 4
	180mSec MAXIMUM	$V_{in} = 104V_{rms} \pm 1\%$	1, 3, 4
WARM START DELAY AC INTERRUPTS \geq 400mSec	1 SECOND TYPICAL	$V_{in} = 115V_{rms} \pm 1\%$ $V_o = 200V_{dc}$	1, 3
CONDUCTED EMISSIONS	RTCA/DO-160D, CATEGORY H		1
OPERATING TEMPERATURE RANGE	-25°C TO 85°C	BASEPLATE (HEATSINK)	1
STORAGE TEMPERATURE RANGE	-55°C TO 100°C	NON-OPERATIONAL	1
MODULE ENABLE SIGNAL	PULL "EN" PIN TO V_{rtn} TO DISABLE OUTPUT (2.5V _{max})	FLOAT "EN" PIN TO ENABLE OUTPUT	2
OVER-TEMPERATURE PROTECTION SET POINT	100°C \pm 5°C	MODULE OUTPUT IS DISABLED WHEN HEATSINK TEMPERATURE IS SENSED AT THIS LEVEL. AUTO-RESET WITH \sim 20°C HYSTERESIS	1

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OUTPUT CHARACTERISTICS

PARAMETER	82505-800	REMARKS	NOTES
RATED OUTPUT VOLTAGE	325Vdc \pm 3%	0W < Pout \leq 250W	2
MINIMUM OUTPUT CURRENT	0A _{dc}		2
MAXIMUM BASEPLATE TEMPERATURE	85°C		1
TEMPERATURE STABILITY COEF.	0.02% / °C	OUTPUT VOLTAGE	1
OUTPUT RIPPLE + NOISE (pk-Pk)	<0.5%	20MHz BANDWIDTH, C _{out} = 470uF	1
LINE REGULATION	< 1%	OUTPUT DEVIATION FOR \pm 20% STEP CHANGE IN LINE VOLTAGE	1
HOLD-UP TIME	10mSec (V _{out} > 100V)	REQUIRES EXTERNAL HOLD-UP CAPACITOR (SEE APPLICATION NOTES FOR DETAILS)	1
MINIMUM OUTPUT CAPACITANCE	100uF	OBSERVE RIPPLE CURRENT REQUIREMENTS AT 2 X LINE FREQUENCY & 100kHz FOR EXTERNAL OUTPUT CAPACITORS (SEE APPLICATION NOTES FOR DETAILS)	1
MAXIMUM OUTPUT CAPACITANCE	4,800uF	SPECIFIED IN ORDER NOT TO OVERSTRESS THE INTERNAL ACTIVE INRUSH CURRENT LIMITING CIRCUIT	1
ISOLATION VOLTAGE: INPUT TO OUTPUT	NONE		--
ISOLATION VOLTAGE: INPUT/OUTPUT TO CHASSIS	1500V _{rms} / 60Hz	NO ARCING OR DAMAGE FOR 60 SECOND DURATION. MAX LEAKAGE CURRENT = 8mA _{rms}	2
SHORT-CIRCUIT PROTECTION	NONE	FUSE INPUT WITH SUITABLE FAST-BLOW FUSE	--
OUTPUT VOLTAGE ADJUSTMENT	NONE		--
OUTPUT OVERVOLTAGE PROTECTION	396Vdc \pm 5%	BOOST INHIBIT, AUTO RESET	1

Notes:

1. Ensured by design, not 100% tested in production.
2. 100% tested for specification compliance in production.
3. Specifies the delay time from the time input AC is reapplied following an AC interrupt to the time the module's output begins to boost towards 325V. Module output rise time varies and is dependent on the amount of output capacitance present and output loading.
4. Warm-start delay is less than 20mSec for all modules produced after September 2006 with s/n T06090001 & up.