

# AC280W-12V-12VF-PBF

(115Vac, 47-800Hz INPUT)

280W MULTIPLE OUTPUT,  
AIRBORNE PFC POWER SUPPLY



Providing three isolated output voltages and up to 280W continuous output power, the **AC280W-12V-12VF-PBF** is optimized for wide frequency RTCA/DO-160G airborne applications. Incorporating synchronous rectifiers and precision control, overall supply efficiency exceeds 84% at full rated output load. The **AC280W-12V-12VF-PBF** is capable of providing up to 26.4J of energy during momentary input AC interrupts lasting 200mSec or more.

Weighing less than 42 ounces, the **AC280W-12V-12VF-PBF** is housed within a sheetmetal U-chassis enclosure suitable for flush mounting within an upper unit level chassis. Outline dimensions are 7.9" x 6.0" and supply height is 1.6". Interconnection is accomplished using three Samtec power connectors.

The **AC280W-12V-12VF-PBF** is designed and manufactured to stand-up to the harsh operating environments encountered in today's aircraft installations. Incorporating multiple layers of built-in protection features; including over-current, overvoltage and overtemperature; safe and reliable operation is assured for each and every application.



## FEATURES

	Four standard outputs: +12V, +12VF, +5Vstby
	Meets both RTCA/DO-160G, section 16, and Airbus ABD0100.1.8 issue D for power factor and input current harmonic distortion levels over the wide frequency operating range (360Hz – 800Hz)
	Complies with RTCA/DO-160G for conducted emissions, susceptibility and power input (sect 16), see note 3
	Efficiency: >84% at full rated load
	Wide input range: 97 – 134Vac, 47-800Hz
	Active inrush current limiting: 12.8Apk
	Size: 7.9" x 6.0" x 1.6"; Weight: less than 42 ounces
	Independent over-current and over-voltage protection on each output
	Input AC valid status line (TTL) and DC output valid status line (TTL)
	PFC output overvoltage protection with automatic restart (internal 360Vdc PFC output)
	Over-temperature protection with auto restart
	MTBF: 800,000 Hours, RIAC 217Plus, Aic category, 30°C ambient temperature, 65%DC, 2190 Cycles/ year

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## STANDARD OUTPUTS

PARAMETER	OUTPUT VOLTAGE		
	+12V	+12VF	+5Vstby
Voltage Regulation	± 2%	± 2%	± 2%
Output Current	17.1A	6.2A	250mA
Maximum Load	205W	75W	1.25W
Minimum Load	0A	0A	0A
Pk-pk Ripple + Noise (20MHz)	120mVpp	120mVpp	50mVpp
Overcurrent Trip-point	21A	8.5A	700mA
Notes	1, 2	1, 2	1, 2

**Notes:**

1. Constant current limited, voltage fold back current limited
2. Maximum ripple + noise is specified with 1000uF low ESR capacitors installed external on each output.
3. Requires external filter installed on power lines for full compliance; see application section for details.

## APPLICABLE SPECIFICATIONS

	RTCA/DO-160G, section 4, altitude/ temperature (operating) to 15,000 feet, category A1 equipment
	RTCA/DO-160G, section 6, humidity (operating) category A
	RTCA/DO-160G, section 7, shock (operating) category S, curve C
	RTCA/DO-160G, section 8, vibration (operating) category S, curve C
	RTCA/DO-160G, section 15, magnetic effect, category B
	RTCA/DO-160G, section 16, power input requirements for 115V - AC input, category A(WF) equipment
	RTCA/DO-160G, section 17, voltage spike, category B equipment
	RTCA/DO-160G, section 18, conducted susceptibility, category Z equipment
	RTCA/DO-160G, section 19, induced signal susceptibility, category Z equipment
	RTCA/DO-160G, section 20, conducted and radiated susceptibility, category T equipment
	RTCA/DO-160G, section 21, conducted and radiated emissions, category M equipment, with external power line EMI filter
	Operating temperature: -25°C to +70°C, forced air and/ or external heatsinking may be required
	Storage temperature: -55°C to +100°C

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## INTERCONNECTION

Connector	J1	J2	J3	J4
Pin #	Samtec 3-pin p/n IPBT-103-H1-T-S-K	TE 4-pin p/n 2173132-1	Samtec 4-pin p/n IPBT-104-H1-T-S-K	Molex 8-pin p/n 53398-0871
1	115Vac LINE	DCRTN	+360V	NC
2	CHASSIS	DCRTN	NC	NC
3	115Vac NEUT	+12V_FAN	PSRTN	ACPF-L
4	—	+12VOUT	NC	DCRTN
5	—	—	—	OUTPUT_ENAB-L
6	—	—	—	DCRTN
7	—	—	—	+5VSTBY
8	—	—	—	DCRTN

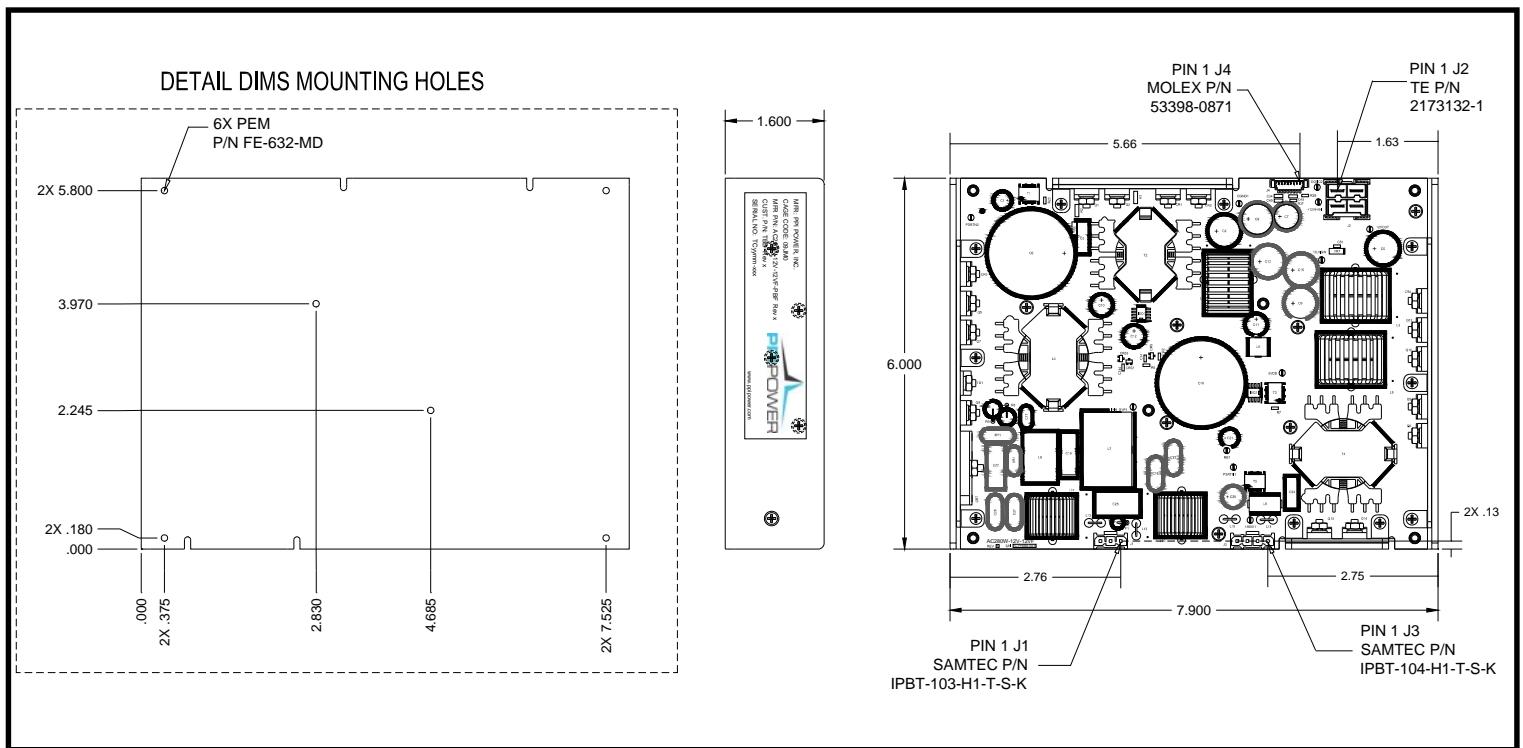
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## MECHANICAL DIAGRAM



**NOTE: DETAILED MECHANICAL AND SOLID WORKS DRAWING AVAILABLE UPON REQUEST**

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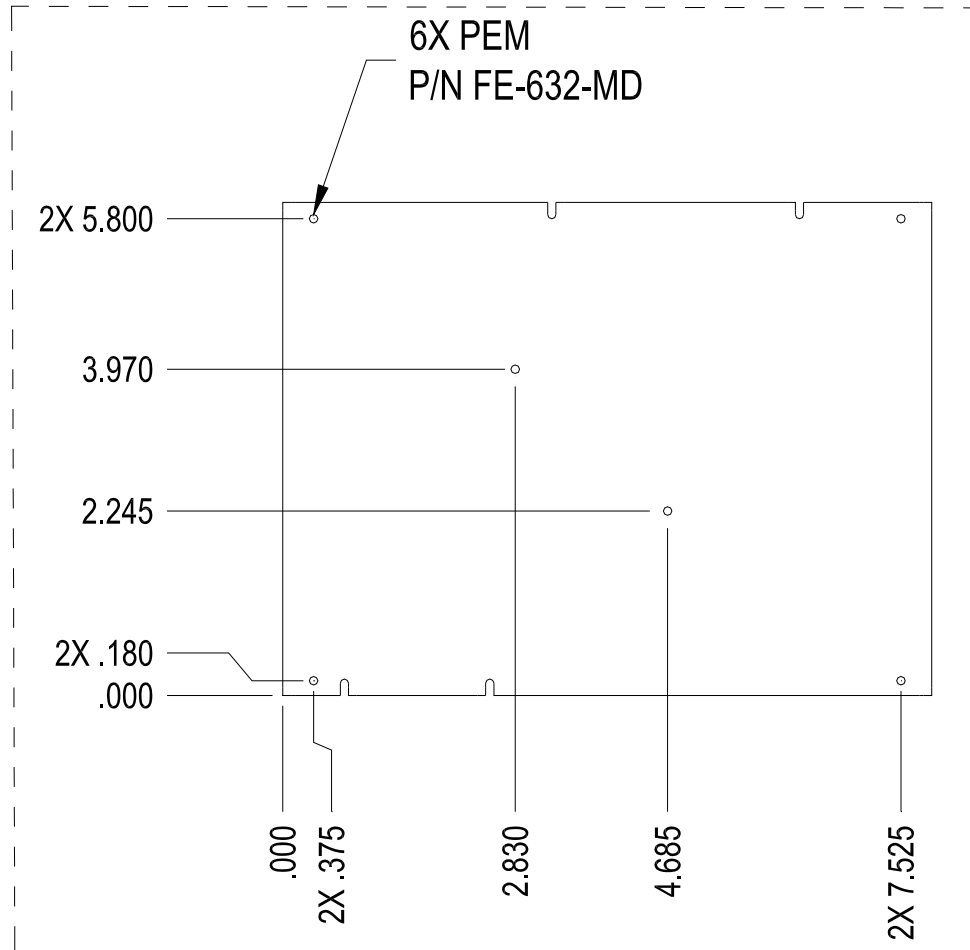
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## MECHANICAL DIAGRAM—CONTINUED

### DETAIL DIMS MOUNTING HOLES



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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 each output.  $V_{in} = 115\text{Vrms}$ , 360Hz–800Hz, <1.25% sinusoid.

## INPUT CHARACTERISTICS

PARAMETER	AC280W-12V-12VF-PBF	REMARKS	NOTES
INPUT VOLTAGE RANGE	97-134Vrms	Complies with normal / abnormal input voltages per DO-160G, sect 16	2
MUST START VOLTAGE	97Vrms minimum	Supply will start and remained enabled for input voltage in the range of 97Vrms < $V_{in}$ < 134Vrms	2, 3
INPUT FREQUENCY RANGE	47 – 800Hz	Reduced distortion performance below 360Hz. $V_{in}$ range is 110Vrms to 134Vrms from 47Hz to 360Hz	2
EFFICIENCY (FULL LOAD)	84% typical at 115Vrms input 80% min at 115Vrms input	Full rated load (280W)	2
EFFICIENCY (50% LOAD)	81% typical at 115Vrms input 78% min at 115Vrms input	Half rated load (140W)	2
LEAKAGE CURRENT	< 5mA <sub>rms</sub>	AC line / neutral to chassis at 115Vrms / 400Hz.	1
INRUSH CURRENT	<7A <sub>pk</sub> typical, 12.8A <sub>pk</sub> max	Cold or warm start	2
START-UP TIME	<750mSec	Outputs within proper regulation	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% $I_f / n$	$I_f$ = fundamental current $V_{thd} < 1.25\%$ $n$ = order of harmonic (1 - 99) 60% - 100% output load (180W-280W). Harmonics < 10mA disregarded	1
INDIVIDUAL HARMONICS DISTORTED INPUT	EVEN: <1% $I_f / n + 1.25V_n$ ( $n < 10$ ) EVEN: <0.1% $I_f + 1.25V_n$ ( $n \geq 10$ ) ODD: <30% $I_f / n + 1.25V_n$ ODD TRIPLENS:<15% $I_f / n + 1.25V_n$	$I_f$ = fundamental current $V_{thd} > 10\%$ (clipped method), $n$ = order of harmonic (1 - 99) $V_n$ = corr input voltage harmonic. 60% - 100% output load (180W-280W). Harmonics < 10mA disregarded	1
POWER FACTOR	0.98 min	$P_{out} = 100\text{W}$ at 400Hz $P_{out} = 168\text{W}$ at 800Hz	2
CONDUCTED EMISSIONS	RTCA/DO-160G	Section 21, category M	1, 4

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## INPUT CHARACTERISTICS—CONTINUED

PARAMETER	AC280W-12V-12VF-PBF	REMARKS	NOTES
QUIESCENT POWER	14W typical	No load	2
STORAGE TEMPERATURE RANGE	-55°C TO +100°C	Non operational	1
OPERATING TEMPERATURE RANGE	-25°C TO +70°C	Requires external airflow or heatsink to assure case temperature does not exceed 100°C	1
OVERTEMPERATURE SHUTDOWN	100°C +/- 4°C	Supply is inhibited at or above 100°C, auto re-start at ~ 80°C case temperature	1
OUTPUT ENABLE SIGNAL (OUTPUT_ENAB-L)	Pull this signal low with respect to DCRTN (0.5V maximum) to enable +12V and +12VF outputs. This signal is pulled up internally to 9Vdd with 10k pull-up resistor.	Maximum delay from assertion of OUTPUT_ENAB-L signal until +12V output is in proper regulation is 100mSec. Maximum delay for +12V output to disable is 100mSec upon de-assertion of OUTPUT_ENAB-L signal.	2

### Notes:

1. Ensured by design, not 100% tested in production.
2. 100% tested for specification compliance in production.
3. OUTPUT\_ENAB-L signal is not asserted during start-up and is asserted at least 1 second after input AC is applied.
4. Requires external filter (differential and common mode) installed on power lines for full compliance, see application section for details.

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## OUTPUT CHARACTERISTICS

PARAMETER	AC280W-12V-12VF-PBF	REMARKS	NOTES
RATED OUTPUT POWER	280W	Continuous	2
OUTPUT VOLTAGE TOLERANCE	+12V $\pm$ 2.0%, +12VF $\pm$ 2.0%, 5Vstby $\pm$ 2.0%	No load to full load, See "STANDARD OUTPUTS" table	2
OUTPUT OVERCURRENT THRESHOLD	+12V output: 21A +12VF output: 8.5A 5Vstby output: 700mA	Output voltage will foldback and will auto-recover into full load once fault clears. No damage will occur to supply during indefinite output short circuit conditions	2
TEMPERATURE STABILITY COEFFICIENT	0.05% / °C, each output	Output voltage variation with temperature (500uV / °C)	1
OUTPUT RIPPLE + NOISE (pk-pk)	+12V output: 120mVpp +12VF output: 120mVpp 5Vstby output: 50mVpp	20MHz Bandwidth See "STANDARD OUTPUTS" table	2
MINIMUM OUTPUT LOAD	N/A	No load required	2
LINE REGULATION	<0.1%	Individual output deviation for $\pm$ 20% step change in input voltage	1
LOAD REGULATION (TRANSIENT LOAD RECOVERY)	12V and 12VF outputs remain within regulation limits	50% step change in output load. Full load to half load or half load to full load. 10uSec rise/fall time	1
HOLD-UP TIME	200mSec @ Pout = 154W min 33.9J hold-up energy min 200mSec @ Pout = 206W typ	+12V and 5Vstby remain in proper regulation for full output load combinations of 154Wout for 200mSec. +12VF converter is disabled internal to the supply upon ACPF-L asserting low (at Vin <92Vac)	2
ISOLATION VOLTAGE INPUT TO CHASSIS	1500Vac, 60Hz	No arcing or damage for 60-second test duration (10mArms max leakage)	2
ISOLATION VOLTAGE INPUT TO OUTPUT	1500Vac, 60Hz	No arcing or damage for 60-second test duration (10mArms max leakage)	2



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## OUTPUT CHARACTERISTICS—CONTINUED

PARAMETER	AC280W-12V-12VF-PBF	REMARKS	NOTES
INSULATION RESISTANCE OUTPUT TO CHASSIS	500Vdc	No arcing or damage for 5-second test duration (40Mohm min)	1
INSULATION RESISTANCE INPUT TO CHASSIS	500Vdc	No arcing or damage for 5-second test duration (100Mohm min)	1
INSULATION RESISTANCE INPUT TO OUTPUT	500Vdc	No arcing or damage for 5-second test duration (100Mohm min)	1
AC POWER FAIL-L (ACPF-L)	2.4Vmin logic high. ACPF-L signal transitions to 5V logic low (0.5Vmax) upon detection of invalid input AC level (<96Vac)	5V logic level, +/-16mA max sink/source current, 20mSec maximum delay time to activate upon detection of invalid input AC level (<96Vac). Tested with Vin set to 115Vac and transitioned to 92Vac	2
OUTPUT OVERVOLTAGE PROTECTION (non-latching)	+12V and +12VF outputs limited to 120% of maximum output set point	Pulse-by-pulse protection, 4mSec fault to activation delay, auto-restart once fault condition clears	1
OUTPUT OVERVOLTAGE PROTECTION LEVELS (latching)	+12V output: 15V +12VF output: 15V 5Vstby output: 6.3V	Latching protection in the event "soft" OVP fails to operate. Supply will disable within 10mSec of OVP fault detection, requires AC power recycle to reset supply	1
PFC 360Vdc OUTPUT	360Vdc $\pm$ 3%	Pout = 280W	2
OUTPUT OVERVOLTAGE PROTECTION (PFC 360Vdc OUTPUT)	425V $\pm$ 5%	PFC converter is disabled upon detection of 360Vdc output measuring > 425Vdc. PFC converter will auto-recover if and when fault clears and output regains proper amplitude (auto reset)	1

### Notes:

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## APPLICATIONS INFORMATION

## OUTPUT RETURNS

Each DC output shares a common return: DCRTN. All logic input/ output signals are secondary side and are referenced to DCRTN. DCRTN is capacitively coupled to chassis ground with 4 x 0.15uF, 500V rated ceramic capacitors.

## EMI CONSIDERATIONS

Although the AC280W-12V-12VF-PBF power supply contains internal common-mode and differential mode input filtering the use of an external inductive based line filter is required for full DO160 EMI compliance. Proper filter configuration is mandatory in order to assure emissions requirements as well as DO160 harmonics requirements. Please contact PPI Engineering for further information including filter schematic & component part numbers.

## INPUT FUSING AND OVP

The supply contains a 5A, 125Vac slow blow fuse prior to the input EMI line filter. This fuse is not user serviceable and the supply must be returned to the factory for evaluation and repair in the event the fuse ever activates. The input OVP circuit consists of an across-the-line TVS/ Varistor that can withstand a maximum continuous AC voltage of 150Vac; above this level it will begin to clamp. If the input exceeds this level for a long enough time duration the device will fail short and blow the input 5A fuse protecting downstream components. The Varistor device p/n is ERZ-V10D241 and is located after the input EMI filter which provides additional source impedance which aids in the 600V spike testing.

## THERMAL CONSIDERATIONS AND FORCED AIRFLOW

Forced air cooling is necessary in order for the supply to provide greater than 50% of full rated output power (150W) . A minimum of 250LFM forced air must be directed across top side of supply for output loading >150Wout. Please contact PPI Engineering for additional information concerning forced air versus output power and operating/ frame temperature.

The supply contains over-temperature protection that will disable the supply if the housing temperature ever exceeds 100°C (+/-4°C). Recovery is automatic once the housing temperature cools to ~80°C.