

AC300W-28V-12V-PBF

(115Vac, 47-800Hz INPUT)

300W MULTIPLE OUTPUT,
AIRBORNE PFC POWER SUPPLY



Providing four isolated output voltages and up to 300W continuous output power, the **AC300W-28V-12V-PBF** is optimized for wide frequency RTCA/DO-160G airborne applications. Incorporating synchronous rectifiers and precision control, overall supply efficiency exceeds 81% at full rated output load. The **AC300W-28V-12V-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 **AC300W-28V-12V-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 **AC300W-28V-12V-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 overcurrent, overvoltage and overtemperature; safe and reliable operation is assured for each and every application.



FEATURES

	Four standard outputs: +28V, +12V, +5.7V, +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: >81% 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: 330,000 Hours, RIAC 217Plus, Aic category, 55°C case temperature, 65%DC, 2190 Cycles/ year

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STANDARD OUTPUTS

PARAMETER	OUTPUT VOLTAGE			
	+28V	+12V	+5.7V	+5Vstby
Voltage Regulation	± 2%	± 2%	± 3%	± 2%
Output Current	3A	9A	19A	250mA
Maximum Load	84W	108W	108W	2.5W
Minimum Load	0A	1A	0A	0A
Pk-pk Ripple + Noise (20MHz)	100mVpp	120mVpp	150mVpp	50mVpp
Overcurrent Trip-point	4.5A	11.25A	23.75A	700mA
Notes	1, 2	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. +5.7V output ripple can be reduced with additional low ESR capacitors installed on 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
Pin #	Samtec 3-pin p/n IPBT- 103-H1-T-S-K	Samtec 10-pin p/n IPBT- 105-H1-T-D-RA-K	Samtec 16-pin p/n IPBT- 108-H1-T-D-RA-K
1	115Vac LINE	+12VOUT	+5.7VOUT
2	CHASSIS	DCRTN	+5.7VOUT
3	115Vac NEUT	OUTPUT_5V7_ENAB-L	5Vsns
4	—	OUTPUT_12V_ENAB-L	DCRTN
5	—	OUTPUT_28V_ENAB-L	+28VOUT
6	—	+12VOUT	DCRTN
7	—	DCRTN	DCRTN
8	—	ACPF-L	NC
9	—	+5Vstby	+5.7VOUT
10	—	DCGOOD-L	+5.7VOUT
11	—	—	DCRTN
12	—	—	DCRTN
13	—	—	+28VOUT
14	—	—	DCRTN
15	—	—	DCRTN
16	—	—	NC

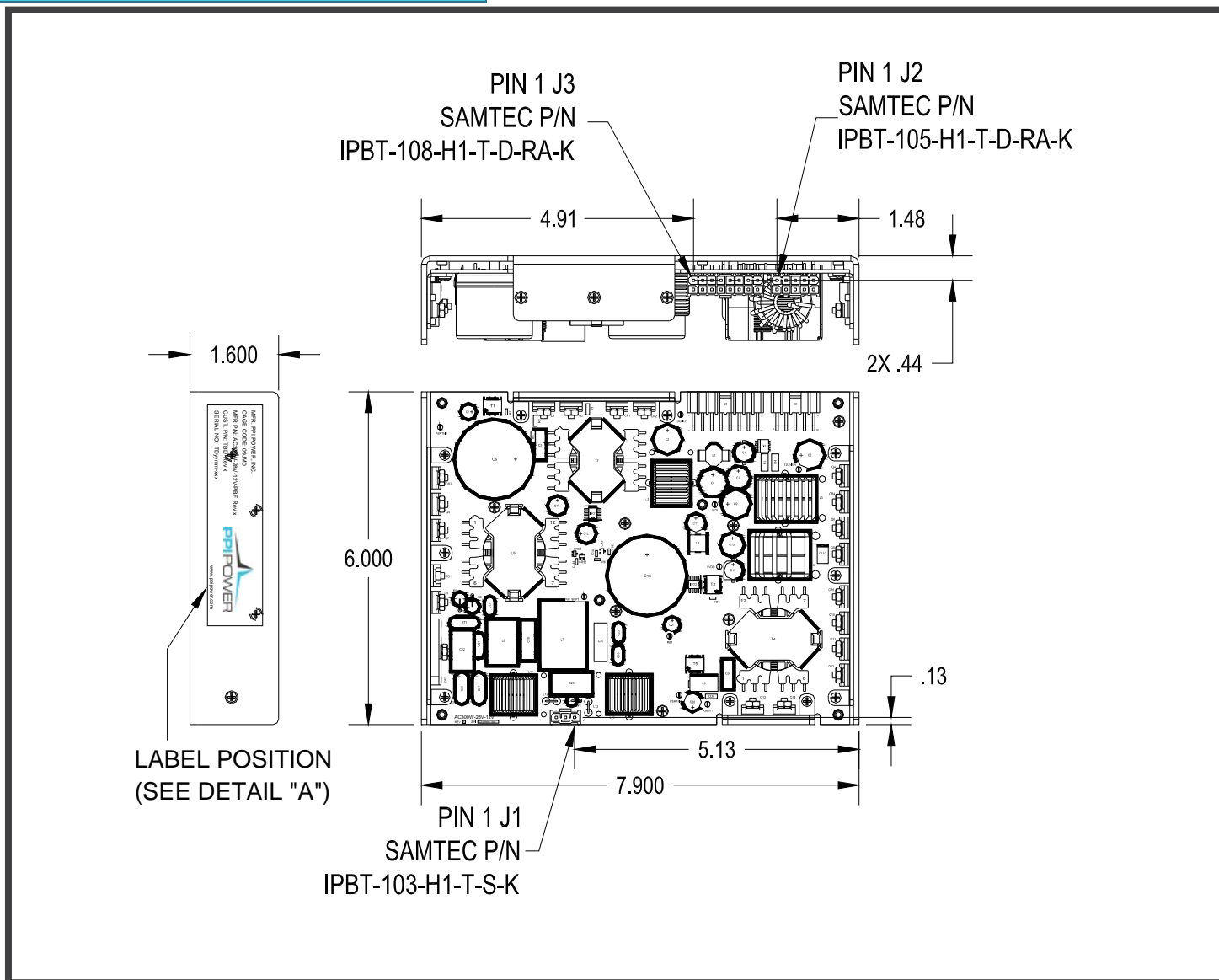
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MECHANICAL DIAGRAM



NOTE: DETAILED MECHANICAL AND SOLID WORKS DRAWING AVAILABLE UPON REQUEST

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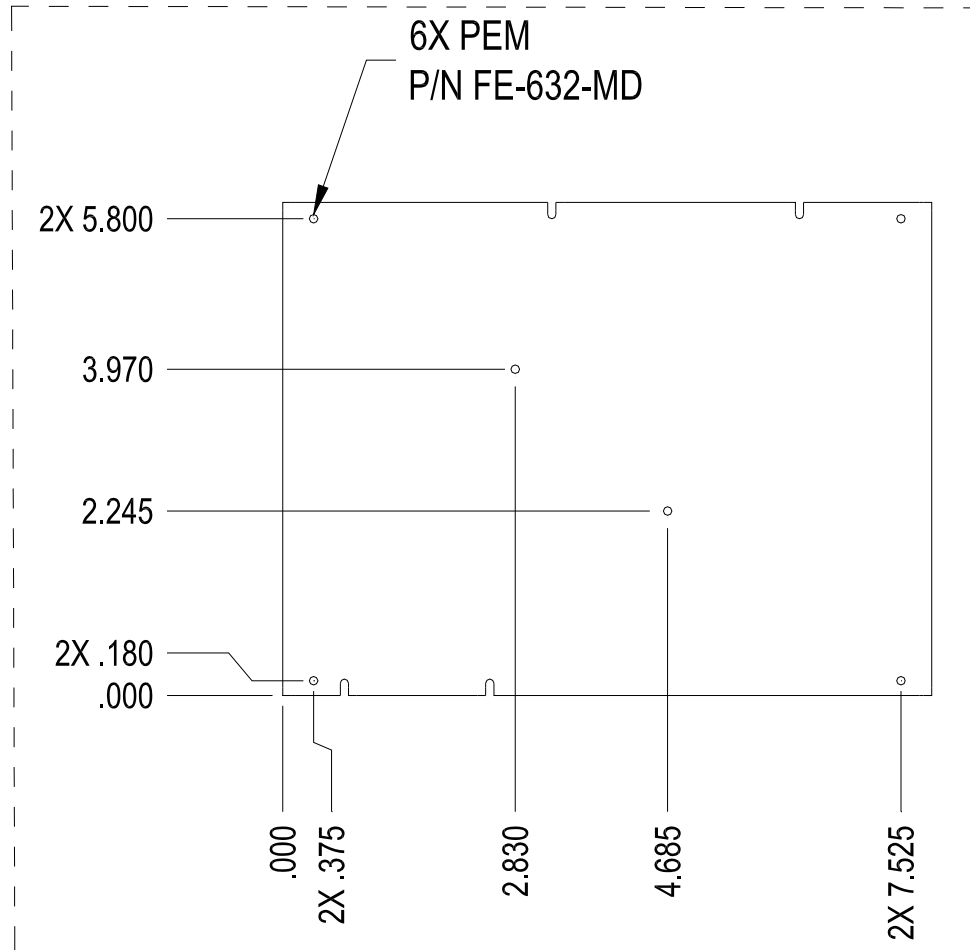
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MECHANICAL DIAGRAM—CONTINUED

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	AC300W-28V-12V-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 $97\text{Vrms} < V_{in} < 134\text{Vrms}$	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)	82% typical at 115Vrms input 80% min at 115Vrms input	Full rated load (300W)	2
EFFICIENCY (50% LOAD)	79% typical at 115Vrms input 78% min at 115Vrms input	Half rated load (150W)	2
LEAKAGE CURRENT	< 5mA _{rms}	AC line / neutral to chassis at 115Vrms / 400Hz.	1
INRUSH CURRENT	<7A _{pk} typical, 12.8A _{pk} 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-300W). 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-300W). Harmonics < 10mA disregarded	1
CONDUCTED EMISSIONS	RTCA/DO-160G	Section 21, category M	1, 4
QUIESCENT POWER	30W typical	$P_{out} = 12\text{W} / 12\text{V}_{out}$. No load remaining outputs	2
STORAGE TEMPERATURE RANGE	-55°C TO +100°C	Non operational	1

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INPUT CHARACTERISTICS—CONTINUED

PARAMETER	AC300W-28V-12V-PBF	REMARKS	NOTES
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
28V ENABLE SIGNAL (OUTPUT_28V_ENAB-L)	Pull this signal low with respect to DCRTN (0.5V maximum) to enable +28V output. This signal is pulled up internally to 5Vstby with 10k pull-up resistor.	Maximum delay from assertion of +28V_EN signal until +28V output is in proper regulation is 100mSec. Maximum delay for +28V output to disable is 100mSec upon de-assertion of +28V_EN signal.	2
5V7 ENABLE SIGNAL (OUTPUT_5V7_ENAB-L)	Pull this signal low with respect to DCRTN (0.5V maximum) to enable +5.7V output. This signal is pulled up internally to 5Vstby with 10k pull-up resistor.	Maximum delay from assertion of +5V7_EN signal until +5.7V output is in proper regulation is 100mSec. Maximum delay for +5.7V output to disable is 100mSec upon de-assertion of +5V7_EN signal.	2
12V ENABLE SIGNAL (OUTPUT_12V_ENAB-L)	Pull this signal low with respect to DCRTN (0.5V maximum) to enable +12V output. This signal is pulled up internally to 5Vstby with 10k pull-up resistor.	Maximum delay from assertion of +12V_EN signal until +12V output is in proper regulation is 100mSec. Maximum delay for +12V output to disable is 100mSec upon de-assertion of +12V_EN signal.	2

Notes:

1. Ensured by design, not 100% tested in production.
2. 100% tested for specification compliance in production.
3. 28V_EN 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	AC300W-28V-12V-PBF	REMARKS	NOTES
RATED OUTPUT POWER	300W	Continuous	2
OUTPUT VOLTAGE TOLERANCE	+5.7V \pm 3.0%, +28V \pm 2.0%, +12V \pm 2.0%, 5Vstby \pm 2.0%	No load to full load, See "STANDARD OUTPUTS" table	2
5.7V REMOTE SENSE LINES (5VSNS)	Compensates for a maximum 250mV drop in 5.7V output line	Maximum allowable margin-up is 250mV for a \sim 5.95Vdc nominal output if output at supply output connector. If not used at point-of-load, sense lines should be looped back at connector output pins. No damage will occur if sense line is not connected.	1
OUTPUT OVERCURRENT THRESHOLD	+5.7V output: 23.75A +28V output: 4.5A +12V output: 11.25A 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)	+5.7V output: 150mVpp +28V output: 100mVpp +12V output: 120mVpp 5Vstby output: 50mVpp	20MHz Bandwidth See "STANDARD OUTPUTS" table	2
MINIMUM OUTPUT LOAD	1A, 12V output 0A, remaining outputs	No output load required for supply stability or proper output regulation. 12V minimum load is required if loading the 5.7V output.	2
LINE REGULATION	<0.1%	Individual output deviation for \pm 20% step change in input voltage	1
LOAD REGULATION (TRANSIENT LOAD RECOVERY)	28V and 12V outputs remain within regulation limits. 5.7V output deviates as much as \pm 12% during TLR	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 = 132W	All outputs will remain in proper regulation for output load combination of 132W for 200mSec, or 26.4J.	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	AC300W-28V-12V-PBF	REMARKS	NOTES
ISOLATION VOLTAGE OUTPUT TO CHASSIS	500Vdc	No arcing or damage for 60-second test duration (40Mohm 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 loss of input AC	5V logic level, +/-16mA max sink/source current, 10mSec maximum delay time to activate on loss of input AC	2
DC GOOD-L	DCGOOD-L signal transitions to 5V logic high (2.4Vmin) upon detection of +12V output level > 7.5% of maximum allowable regulation level	+/-16mA max sink/source current, 10mSec maximum delay time to activate on sensed OV fault	2
OUTPUT OVERVOLTAGE PROTECTION (non-latching)	+12V and +28V 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)	+5.7V output: 6.2V +28V output: 30.8V +12V output: 15V 5Vstby output: n/a	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 = 300W	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

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4. Requires external filter (differential and common mode) installed on power lines for full compliance, see application section for details.

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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 AC300W-28V-12V-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.

+5.7V REMOTE SENSE LINE

Remote sense capability is provided in order to “margin-up” the +5.7V output to overcome small system level voltage drops in traces and connectors. If using the remote sense line (5Vsns, J3-3), the maximum allowable system level voltage drop (between Vout and 5Vsns) is 250mV. Exceeding this amplitude may force the supply’s overvoltage protection circuit to activate (set point is 6.2V). If not using the remote sense line feature at a remote point-of-load, the 5Vsns line should be terminated at the appropriate output pins of the supply: 5Vsns to +5.7V (J3-3 to J3-1,2,9,10). To assure supply stability the remote sense line should be connected directly to the +5.7V power form prior to any additional inductive filter elements that may be included.

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 topside 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.