

PBR500 Series



500W **FAN COOLED** | 400W **CONVECTION COOLED**

AC-DC POWER SUPPLIES

The PBR500 series of AC-DC switching power supplies, in a package of just 4 x 7 x 1.7 inches, deliver 450-500 watts of continuous power with forced air cooling or 350-400 watts with convection cooling. The units are constructed on a U-Channel for mechanical support and heat sinking. A cover and fan assembly can be added during manufacturing. They are designed for both ITE/Industrial and medical applications including those needing BF rated insulation with an operation altitude up to 5000 meters.



Features

- 450-500W forced cooled
- 350-400W convection cooled
- ITE and medical (BF) safety approvals
- U-channel 4" x 7" package
- 5V standby and 12V fan supply
- AC OK, inhibit and remote sense
- Class B conducted and radiated emissions
- 3 year warranty

Applications



Healthcare



Instrumentation



Medical
Diagnostic



Process Control



Technology

Dimensions

177.8 x 101.6 x 44.5mm (7.00" x 4.00" x 1.70")

Models & Ratings

Model Number ⁽¹⁾	Output Voltage	Output Current V1		Standby Output V2	Fan Supply V3	Output Power		Ripple & Noise ⁽³⁾
	V1	Convection	Forced			Convection	Forced ⁽²⁾	
PBR500PS12B	12V	29.17A	37.50A	5.0V/0.5A	12.0V/0.3A	350W	450W	120mV
PBR500PS15B	15V	23.34A	30.00A			350W	450W	150mV
PBR500PS18B	18V	22.23A	27.78A			400W	500W	180mV
PBR500PS24B	24V	16.67A	20.84A			400W	500W	240mV
PBR500PS28B	28V	14.29A	17.86A			400W	500W	280mV
PBR500PS36B	36V	11.12A	13.89A			400W	500W	360mV
PBR500PS48B	48V	8.34A	10.42A			400W	500W	480mV
PBR500PS57B	57V	7.02A	8.78A			400W	500W	570mV

Notes:

1. For covered version, replace B in the part number with C, e.g PBR500PS12C. V3 not available on covered version.
2. 350-400W without moving air or 450-500W with 30 CFM forced air provided by the user. 450-500W for '-C' version
3. Ripple and noise is the maximum peak-to-peak voltage value measured at the output with 20MHz bandwidth, at rated line voltage and output load, and with a 10μF tantalum capacitor in parallel with a 0.1μF ceramic capacitor.

Summary

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Input Voltage	80		264	VAC	Derate to 90% at 85VAC & 80% at 80VAC
Efficiency		90		%	230VAC Full load
Operating Temperature	-10		+70	°C	Derate Linearly from 100% load at +50°C to 50% load at +70°C
EMC	EN55011/32 Level B Conducted & Radiated				
Safety Approvals	IEC62368-1, IEC60601-1, UL62368-1, CSA C22.2 No. 62368-1, ES60601-1, CSA C22.2 No.60601-1, EN60601-1, EN62368-1				
Weight		2.23 (1011.5)		lb (g)	PBR500PSxx models
		2.52 (1143.0)			PBR500PSxx-C models

Input

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Input Voltage	80		264	VAC	Derate to 90% at 85VAC and 80% at 80VAC
Input Frequency	47		63	Hz	
Input Current - Full Load		5.2/2.6		A (rms)	115/230VAC, 60/50Hz
Earth Leakage Current		200	250	μA	264VAC, 63Hz

Output

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Output Voltage - V1	12		57	VDC	See Models & Ratings table
Tolerance			±2	%	Line and Load Regulation, 0.1% minimum load required to meet specification
Transient Response			4	%	Recovery within 1% in less than 500μs for a 25% step load change
Ripple & Noise			1	% pk-pk	20MHz bandwidth, see Models & Ratings notes
Overvoltage Protection	112		140	%	Latching
Overcurrent Protection	115		140	%	Trip and Restart characteristic
Thermal Shutdown	Protected for overtemperature conditions, latching				
Temperature Coefficient			±0.04	%/°C	
5V Standby Supply (V2)			5	V	At 500mA
Fan Supply (V3)			12	V	At 300mA
Patient Leakage Current		50	80	μA	264VAC, 63Hz

General

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Efficiency		90		%	230VAC Full load
Isolation: Input to Output	4000			VAC	2 x MOPP
Input to Ground	1500			VAC	1 x MOPP
Output to Ground	1500			VAC	1 x MOPP
Switching Frequency	55	65	75	kHz	PFC converter, fixed
	90		300		Main converter, variable
	80		120		Standby converter, variable
Hold Up Time	20			ms	At 110VAC & 500W
Inrush Current		30/60		A	115VAC/230VAC at 25°C, cold start
Mean Time Between Failure		100		khls	MIL-HDBK-217F, Full load at 25°C GB
Weight		1011.5 (2.23)		g (lb)	PBR500PSxx models
		1143.0 (2.52)			PBR500PSxx-C models

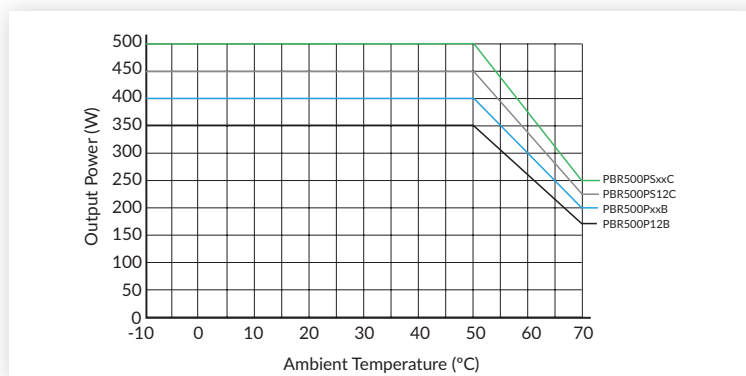
Signals & Controls

Characteristic	Notes & Conditions
Remote Sense	Compensates for 0.5V total voltage drop.
Inhibit	To inhibit, apply TTL high signal.
AC OK	TTL high for normal operation, low upon loss of input power, turn-on delay time 100-1000ms, turn-off delay time 1ms minimum

Environmental

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Operating Temperature	-10		+70	°C	Derate Linearly from 100% load at +50°C to 50% load at +70°C
Storage Temperature	-40		+85	°C	
Cooling				CFM	Integral temperature controlled fan. Fan speed based on temperature of transformer T1, internally monitored. Fan will not rotate until T1 temperature reaches approx. 30°C and reaches full speed when T1 temperature reaches approx. 60°C
Humidity	5		95	%RH	Non-condensing

Temperature Derating Curve



EMC: Emissions

Phenomenon	Standard	Test Level	Notes & Conditions
Conducted	EN55011/32	Class B	
Radiated	EN55011/32	Class B	
Harmonic Current	EN61000-3-2	Class A	
Voltage Fluctuations	EN61000-3-3		

EMC: Immunity

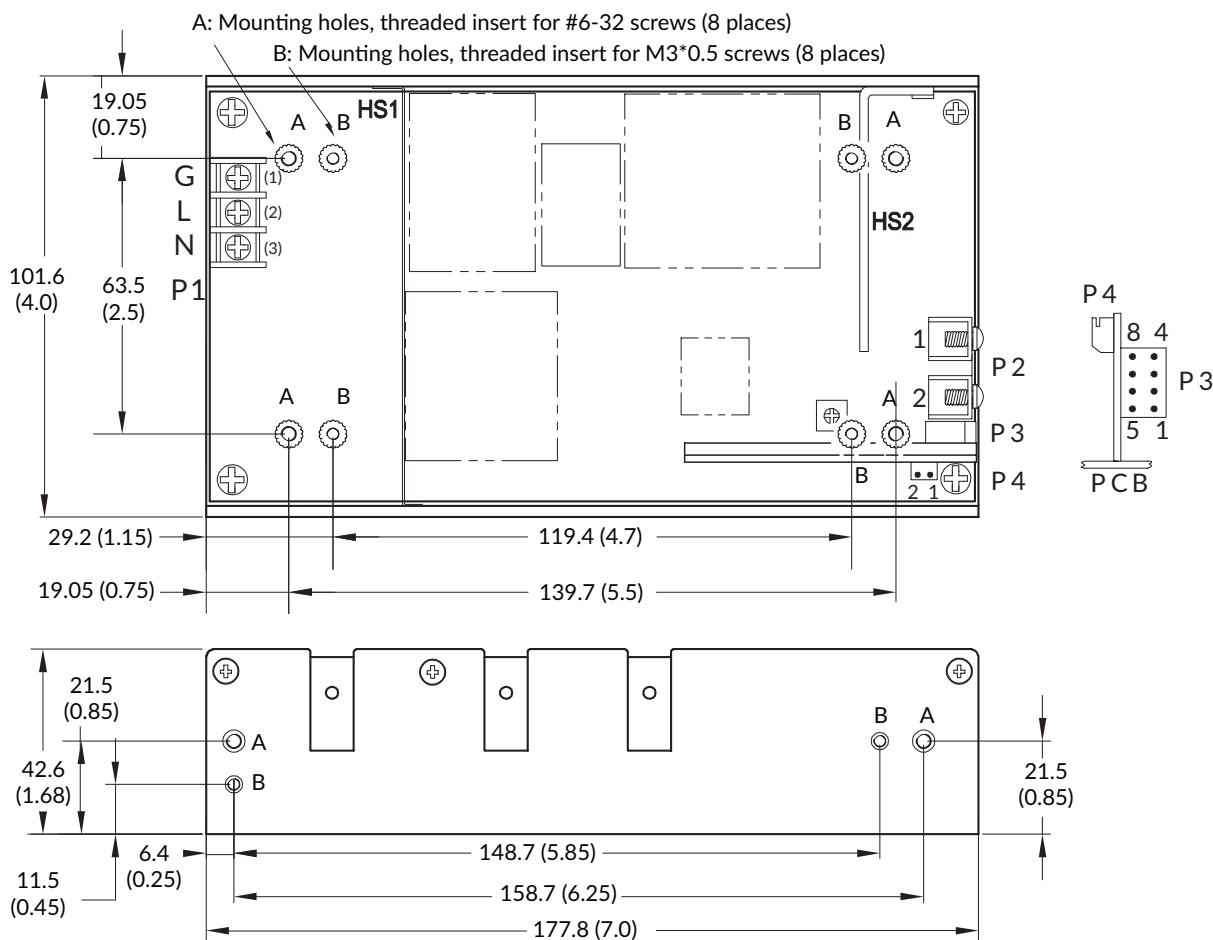
Phenomenon	Standard	Test Level	Criteria	Notes & Conditions
ESD	EN61000-4-2	4	A	±8kV contact, ±15kV air
Radiated	EN61000-4-3	10V/m	A	
EFT	EN61000-4-4	±2kV	A	
Surges	EN61000-4-5	Installation class 3	A	±1kV differential/±2kV common mode
Conducted	EN61000-4-6	10Vrms	A	
Magnetic Field	EN61000-4-8	30A/m	A	
Dips and Interruptions	400W (100VAC/60Hz)	Dip 30% (70VAC), 500ms	A	
		Dip 60% (40VAC), 100ms	B	
		Int >95% (0VAC), 10ms	A	
		Int 100% (0VAC), 20ms	A	
		Int 100% (0VAC), 5000ms	B	
	400W (230VAC/50Hz)	Dip 30% (161VAC), 500ms	A	
		Dip 60% (92VAC), 100ms	A	
		Int >95% (0VAC), 10ms	A	
		Int 100% (0VAC), 20ms	A	
		Int 100% (0VAC), 5000ms	B	
	500W (100VAC/60Hz)	Dip 30% (70VAC), 500ms	A	
		Dip 60% (40VAC), 100ms	B	
		Int >95% (0VAC), 10ms	A	
		Int 100% (0VAC), 20ms	A	
		Int 100% (0VAC), 5000ms	B	
	500W (230VAC/50Hz)	Dip 30% (161VAC), 500ms	A	
		Dip 60% (92VAC), 100ms	A	
		Int >95% (0VAC), 10ms	A	
		Int 100% (0VAC), 20ms	A	
		Int 100% (0VAC), 5000ms	B	

Safety Approvals

Certification	Standard	Notes & Conditions
CB	IEC62368-1	Information Technology
	IEC60601-1	Medical
UL	UL62368-1, CSA C22.2 No. 62368-1	Information Technology
	ES60601-1, CSA C22.2 No.60601-1	Medical
TUV	EN62368-1	Information Technology
	EN60601-1	Medical

Mechanical Details

PBR500PSxxB



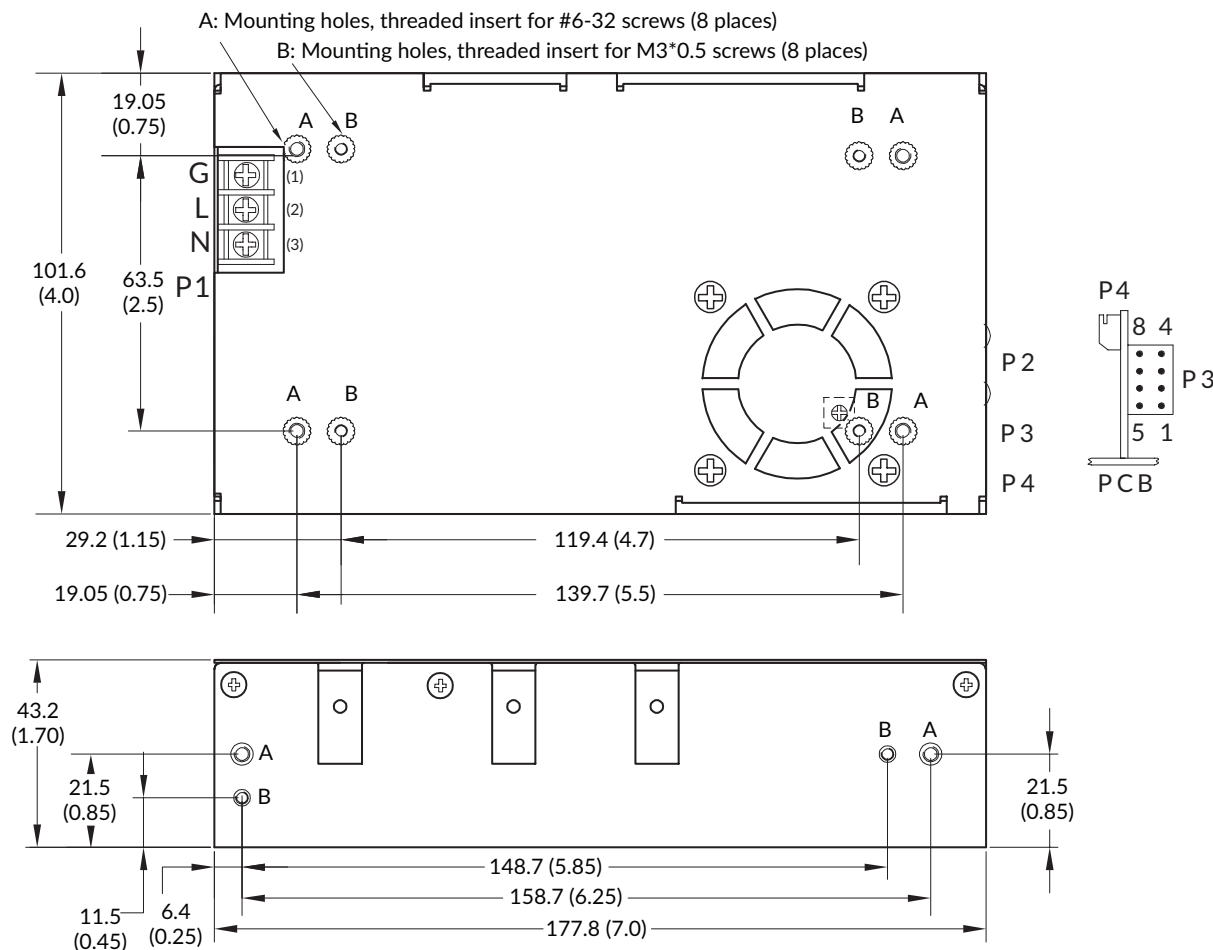
Input Connector - P1		Output Connector - P2		P3		Output Connector - P4	
Pin 1	G	Pin 1	V1+	Pin 1	Common Return	Pin 1	Common Return
Pin 2	L	Pin 2	V1 Return	Pin 2	+V1 Sense	Pin 2	+V3
Pin 3	N			Pin 3	-V1 Sense		
				Pin 4	AC OK		
				Pin 5	Inhibit		
				Pin 6	+5V Standby		
				Pin 7	N/C		
				Pin 8	N/C		

Notes:

- Dimensions shown in mm (inches).
- Tolerance 0.02 [0.5] maximum.
- Input connector P1 is Dinkle terminal P/N DT-35C-B01W-03, with nickel plated M3 screws.
- Output connector P2 is M4x0.7 screw connections.
- Connector P3 is Molex header 87833-08 or equivalent, mating with Molex housing 51110-0850 or equivalent.
- Fan connector P4 is JST header S2B-ZR-3.4 or equivalent, mating with JST housing ZHR-2 or equivalent.
- Weight: 1.0kg (2.23lbs) approx. for U-bracket form, 1.14kg (2.52lbs) approx. for enclosed form.
- Maximum penetration of fixing screws is 4 mm from the outer surface of chassis.

Mechanical Details

PBR500PSxxC



Input Connector - P1		Output Connector - P2		P3		Output Connector - P4	
Pin 1	G	Pin 1	V1+	Pin 1	Common Return	Pin 1	Common Return
Pin 2	L	Pin 2	V1 Return	Pin 2	+V1 Sense	Pin 2	+V3
Pin 3	N			Pin 3	-V1 Sense		
				Pin 4	AC OK		
				Pin 5	Inhibit		
				Pin 6	+5V Standby		
				Pin 7	N/C		
				Pin 8	N/C		

Notes:

- Dimensions shown in mm (inches).
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- Weight: 1.0kg (2.23lbs) approx. for U-bracket form, 1.14kg (2.52lbs) approx. for enclosed form.
- Maximum penetration of fixing screws is 4mm from the outer surface of chassis.

Thermal Considerations

In order to ensure safe operation of the PSU in the end-use equipment, the temperature of the components listed in the table below must not be exceeded. Temperature should be monitored using K type thermocouples placed on the hottest part of the component (out of direct air flow). See below for component locations.

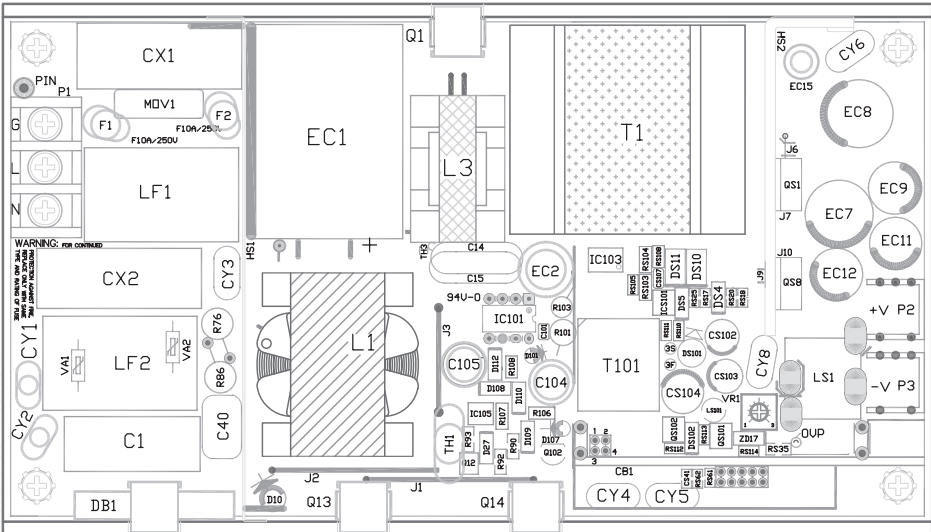
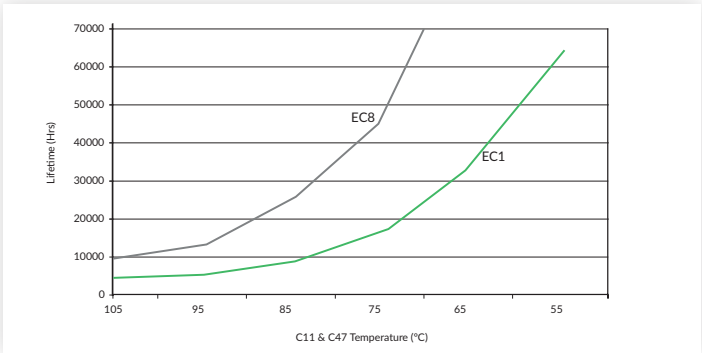
Temperature Measurements (at Maximum Ambient)	
Component	Max. Temperature °C
T1 Coil	120°C
L1, LF1, LF2 Coil	120°C
EC1	105°C
EC8	105°C

Service Life

The estimated service life of the PBR500PSxx Series is determined by the cooling arrangements and load conditions experienced in the end application. Due to the uncertain nature of the end application this estimated service life is based on the actual measured temperature of key capacitors with in the product when installed by the end application.

The graph below expresses the estimated lifetime of a given component temperature and assumes continuous operation at this temperature. The lower of the two lifetimes as indicated by the following graphs for EC1 and EC8 will be indicative of the service life for 24/7 operation.

Estimated Service Life vs Component Temperature



Specification subject to change without notice