

### 1500 Watts

- Wide Range Adjustable Output, 0 - 29 V
- Variable Fan Speed To Reduce Audible Noise
- -20 °C to +70 °C Operation
- AC OK, Inhibit & 5V Standby Supply
- Fault Signals
- SEMI F47 Compliant
- 3 Year Warranty



The HPD1K5 is a very low profile 1500 Watt AC - DC power supply with market leading power density that is designed for use in a wide range of industrial and medical applications. The HPD1K5 delivers 1200 Watts at Low Line and 1500 Watts at High Line with a wide output voltage range of adjustment.

#### Dimensions:

**HPD1K5:**  
12.75 x 4.00 x 1.70" (323.9 x 101.6 x 43.2 mm)

The HPD1K5 is supplied with a range of signals and controls, self cooling via integral fans and customer mounting options on three faces making it suitable for a variety of enclosures and applications where status reporting and control functions are increasingly required.

### Models & Ratings

Output Power <sup>(1,2)</sup>	Output Voltage V1	Output Current V1	Standby Supply V2	Model Number
1500 W	0-29VDC	62.5 A	5 V/ 1A	HPD1K5PS24

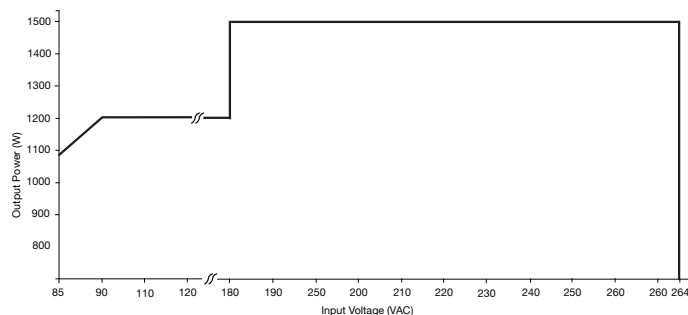
### Notes

1. See derating curves.
2. Power limited to 1500 W or 62.5 A.

### Input

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Input Voltage - Operating	85	115/230	264	VAC	Derate output power < 180 VAC. See fig. 1.
Input Frequency	47	50/60	63	Hz	
Power Factor		>0.9			EN61000-3-2 class A compliant. EN61000-3-2 class C for loads ≥10%
Input Current - Full Load		13/6.5		A	115/230 VAC
Inrush Current			35	A	230 VAC cold start, 25 °C
Earth Leakage Current		0.45/0.9	1.1	mA	115/230 VAC/50 Hz (Typ.), 264 VAC/60 Hz (Max.)
Input Protection	2 x F20 A/250 V internal fuse				

### Input Derating Curve



### Output

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Output Voltage - V1	0	24	29	VDC	See Models and Ratings table
Initial Set Accuracy			$\pm 1^{(V1)}$ , $\pm 5^{(V2)}$	%	50% load, 115/230 VAC
Minimum Load	0			A	
Start Up Delay		1		s	230 VAC full load, see fig.2
Hold Up Time	16			ms	
Drift			$\pm 0.2$	%	After 20 min warm up
Line Regulation			$\pm 0.5$	%	90-264 VAC
Load Regulation			$\pm 0.5^{(V1)}$ , $\pm 5^{(V2)}$	%	0-100% load.
Transient Response - V1			4	%	Recovery within 2% in less than 500 $\mu$ s for a 50-75% and 75-50% load step
Over/Undershoot - V1		0.5		%	See fig.3
Ripple & Noise			1	% pk-pk	V1: 20 MHz bandwidth, see fig.4
			3		V2: 5 V standby, 20 MHz bandwidth
Overvoltage Protection	125		140	%	Vnom DC. Output 1 only, recycle input to reset
Overload Protection	110		140	% I nom	Output 1 only, auto reset. See fig 5.
Short Circuit Protection					Continuous, trip & restart (hiccup mode) all outputs
Temperature Coefficient			0.02	%/°C	
Overtemperature Protection				°C	Protects unit from overtemperature. Auto restart.

Start Up Delay from AC Turn On

Overshoot

Output Ripple & Noise

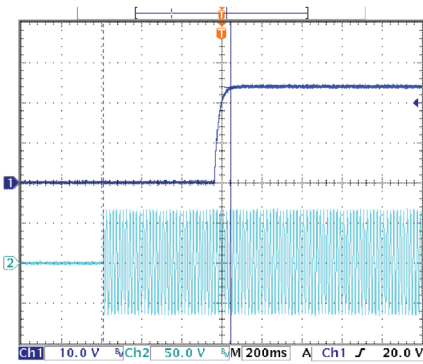


Figure 2 - V1 Start up examples from AC turn on (650ms)

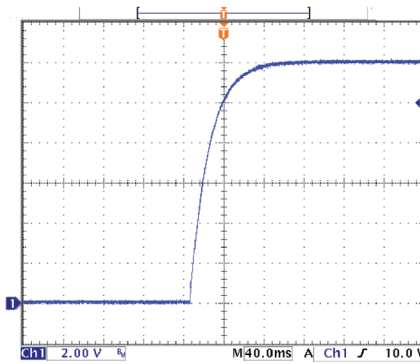


Figure 3 - V1 Typical overshoot at start up.

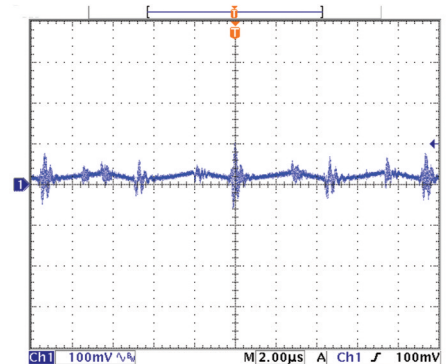


Figure 4 - V1 HPD1K5PS24 (Full load) 160mV pk-pk ripple and noise 20 MHz bandwidth

### Output Overload Characteristics

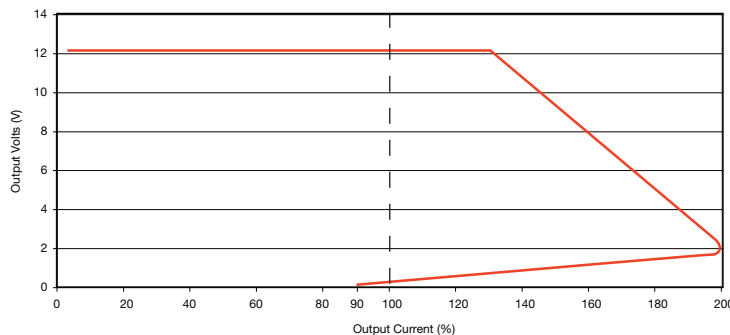


Figure 5

### General

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Efficiency		90		%	
Isolation: Input to Output Input to Ground Output to Ground <sup>(1)</sup>	3000			VAC	
	1500			VAC	
	500			VDC	
Switching Frequency		70/130		kHz	PFC converter / Main converter
Power Density			18	W/in <sup>3</sup>	
Mean Time Between Failure		470		kHrs	Telecordia SR-332, 25 °C
Weight			5.2 (2.35)	lb (kg)	

### Signals & Controls

Characteristic	Notes & Conditions
<b>Signals &amp; Control</b>	
Remote Sense	Compensates for 0.5 V total voltage drop
AC OK	AC OK is an optocoupler transistor, referenced to logic ground, providing a minimum of 3 ms warning of loss of output regulation. The signal is fully isolated and the collector and emitter must be connected externally. The transistor is normally on when AC is healthy. See fig. 6 & 13.
DC OK	DC OK is an optocoupler transistor, referenced to logic ground, providing warning of loss of output. The signal is fully isolated and the collector and emitter must be connected externally. The transistor is normally on when output DC is healthy. See fig. 7 & 13.
Inhibit	Floating isolated optocoupler diode referenced to logic ground. Powered diode inhibits the supply. See fig. 8 & 14.
Fault	Fault is an optocoupler transistor, referenced to logic ground, providing warning of either power fail, DC fail or overtemperature. The signal is fully isolated and the collector and emitter must be connected externally. The transistor is normally off when there is no fault. See fig. 9.
Current Share	Connecting pins 3/4 and 5/6 of like voltage units (8 maximum) will force the current to share between the outputs. Units share current within 10% of each other at full load. See fig. 11 & 12.
V Program	The voltage program function allows 0 V to 29 V remote adjustment of V1 via 0-4V signal. See fig. 10. If V program is open circuit, output voltage is 0 V.
5V Standby (V2)	5 V/1 A supply, always present when AC supplied

### AC OK/Power Fail

AC OK is an isolated signal providing a minimum of 3 ms warning of loss of output regulation. The signal is fully isolated and the collector and emitter must be connected externally.

Maximum sink current 2 mA, maximum voltage 20 V.

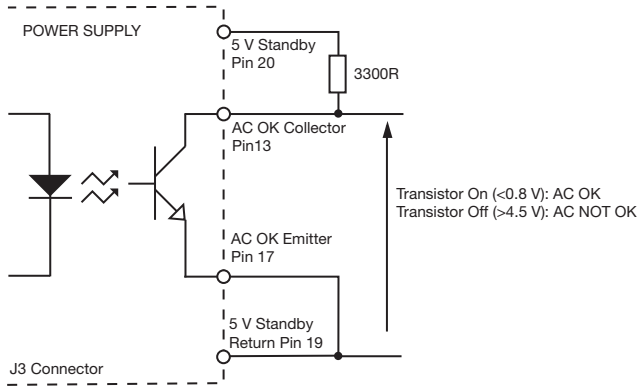


Figure 6

### DC OK

DC OK is an isolated signal providing warning that the output voltage has fallen below 90% of nominal. The signal is fully isolated and the collector and emitter must be connected externally.

Maximum sink current 2 mA, maximum voltage 20 V.

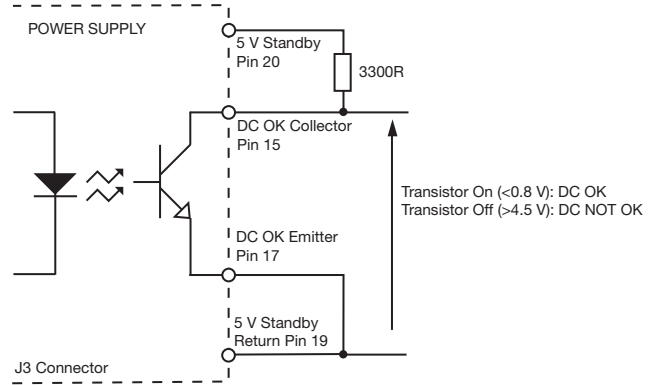


Figure 7

### Inhibit

Inhibit is an isolated control signal which can turn the power supply and fans off by supplying 2 to 5mA into the pin.

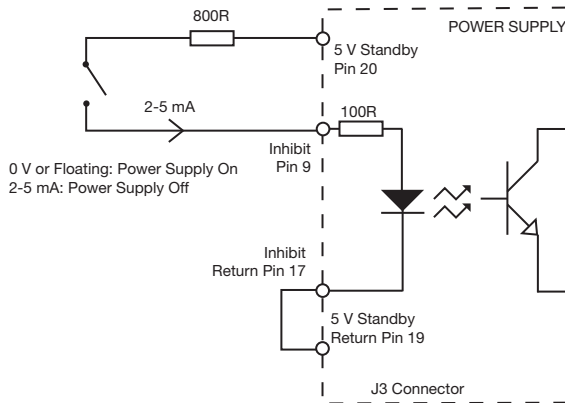


Figure 8

### Fault

Fault is an isolated signal providing warning of either Power Fail, DC Fault or Overtemperature. The signal is fully isolated and the collector and emitter must be connected externally.

Maximum sink current 2 mA, maximum voltage 20 V.

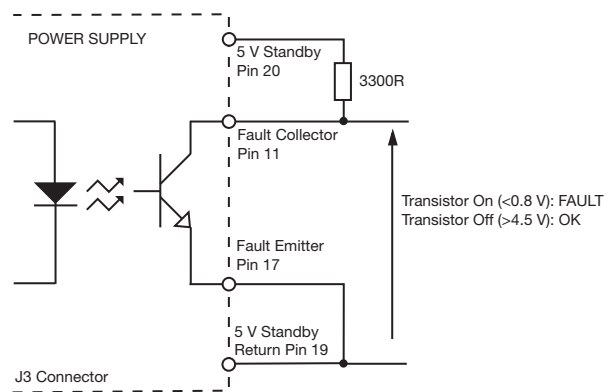
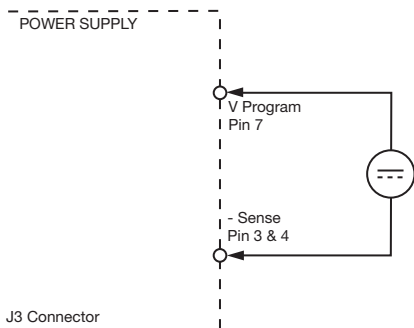


Figure 9

### V Program

V Program allows remote voltage adjustment within the range 0V to 29V



V Program	V Output
0V	0V
4V	29V
Open Circuit	0V

If V program pin 7 is left open circuit then output voltage is 0V.

Figure 10

### Current Share

Connecting pins 5 or 6 and 3 or 4 of like voltage units (8 maximum) will force the current to share between the outputs. Units share current within 10% of each other at full load. Derate output to 90% of total combined load.

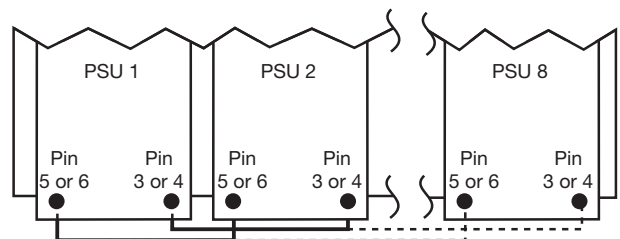
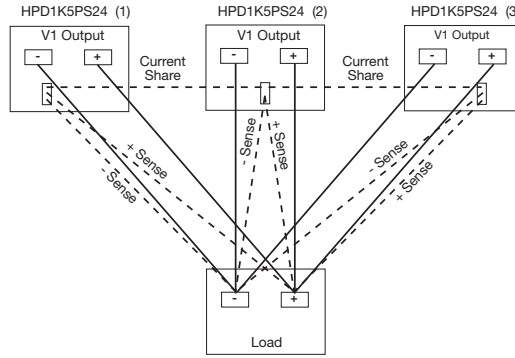


Figure 11

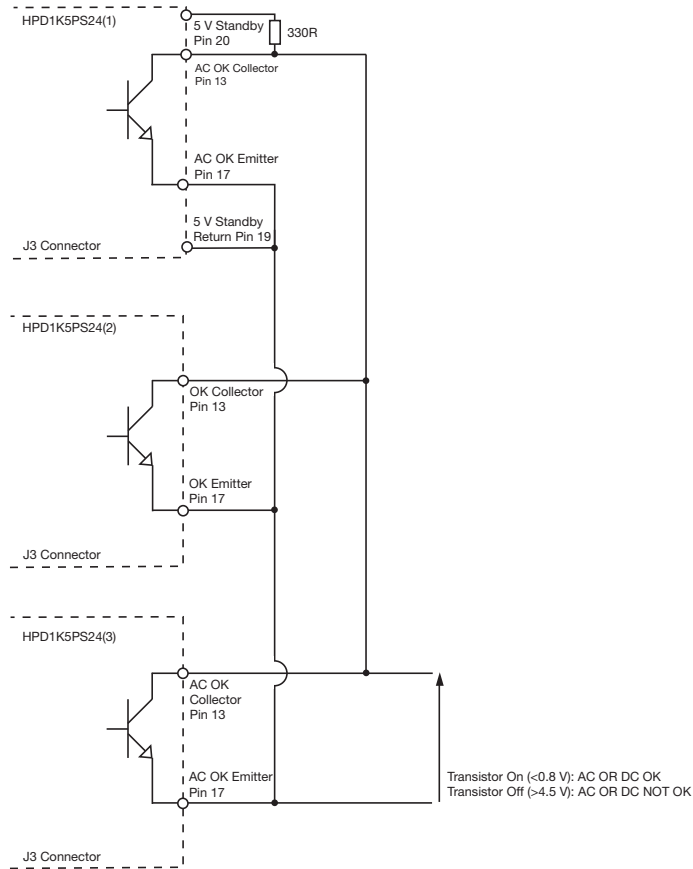
### Signals - Parallel Load & Current Share Connection Example

Figure 12



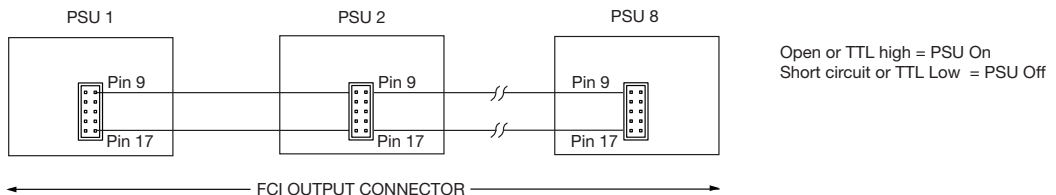
### Parallel AC OK Connection (DC OK follows the same format)

Figure 13



### Parallel Remote Inhibit Connection

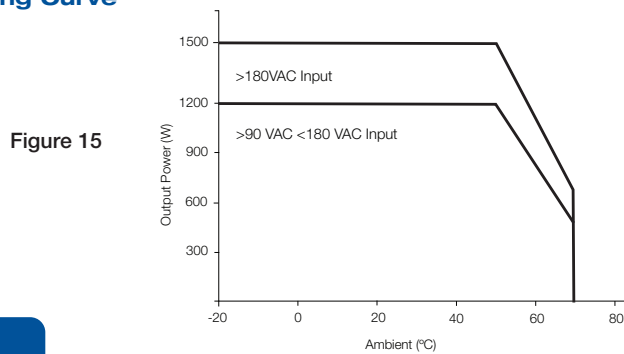
Figure 14



### Environmental

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Operating Temperature	-20		+70	°C	Derate linearly from +50 °C at 2.5%/°C to 50% at 70 °C. See fig. 15.
Warm up time		20		Minutes	
Storage Temperature	-40		+85	°C	
Cooling					2 x integral variable speed fans load dependant
Humidity	5		95	%RH	Non-condensing
Operating Altitude			3000	m	
Shock					3 x 30 g/11 ms shocks in both +ve & -ve directions along the 3 orthogonal axis, total 18 shocks.
Vibration					Single axis 10-500 Hz at 2 g x 10 sweeps

### Temperature Derating Curve



### EMC: Emissions

Phenomenon	Standard	Test Level	Notes & Conditions
Conducted	EN55022	Class A	
Radiated	EN55022	Class A	
Harmonic Current	EN61000-3-2	Class A	Class C for loads $\geq 10\%$
Voltage Fluctuations	EN61000-3-3		

### EMC: Immunity

Phenomenon	Standard	Test Level	Criteria	Notes & Conditions
Low Voltage PSU EMC	EN61204-3	High severity level	as below	
ESD	EN61000-4-2	3	A	
Radiated	EN61000-4-3	3	A	
EFT	EN61000-4-4	3	A	
Surges	EN61000-4-5	Installation class 3	A	
Conducted	EN61000-4-6	3	A	
Dips and Interruptions	EN61000-4-11	Dip: 30% 10 ms	A	
		Dip: 60% 100 ms	B	
		Int: 100% 5000 ms	B	
	SEMI F47			Compliant

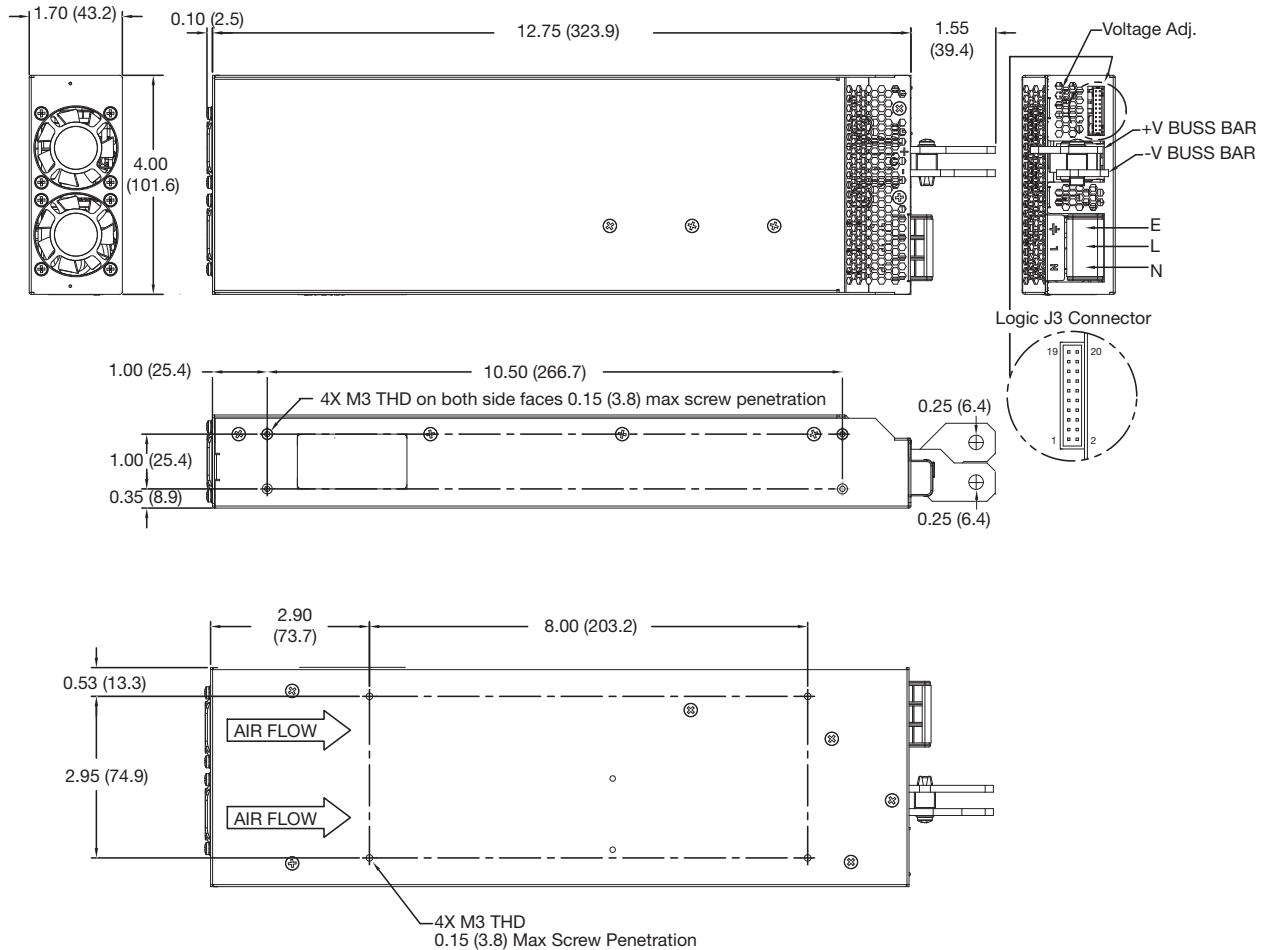
### Safety Approvals

Safety Agency	Safety Standard	Notes & Conditions
CB Report	IEC60950-1:2005 + A1:2009	Information Technology
UL	UL File #139109 UL60950-1 (2011), CSA 22.2 No.60950-1-07 Ed 2	Information Technology
TUV	TUV Certificate # B 09 06 57396 060 EN60950-1/A12:2011	Information Technology
CE	LVD, RoHS Directive	
Industrial	SEMI F47	

### Safety Approvals

Equipment Protection Class	Safety Standard	Notes & Conditions
Class I	IEC60950-1:2005+A1:2009 Ed 2	See safety agency conditions of acceptability for details

### Mechanical Details



Logic Connector: J3, JST, PN S20B-PHDSS (LF) SN					
Pin	Function	Pin	Function	Pin	Function
1	+ Sense	8	NC	15	DC OK
2	+ Sense	9	Inhibit	16	NC
3	- Sense	10	NC	17	Signal GND
4	- Sense	11	Fault	18	NC
5	Current Share	12	NC	19	5 V Standby Rtn (V2)
6	Current Share	13	AC OK	20	5 V Standby (V2)
7	V Program	14	NC		

Mates with JST PN PHDR-20VS, Crimp contacts JST PN SPHD-00IT-P0.5

#### Notes

- Dimensions shown in inches (mm).
- Weight: 5.2 lbs (2.35 kg)