SHP350 Series

- 420 W High Line Output Power
- Rugged Industrial Construction
- Variable Speed Fan for Noise Reduction
- –40 °C to +70 °C Operation
- 5 V Standby
- AC OK, Remote On/Off and Active Current Share
- Screw Terminals
- SEMI F47 Compliant
- 3 Year Warranty

The SHP350 AC-DC power supply provides upto 420 W of output power in a compact rugged mechanical package, suitable for a range of industrial applications.

The unit comprises of a main output with voltages from 12-48 VDC and a 5 VDC standby supply which can be utilitsed with the signals and control features of the unit to provide detection of loss of AC input and remote on/off control.

Multiple units can be used in parallel via the current share facility, providing higher power solutions. Inherently low earth leakage current, and conducted EMC compliance to Class B also simplify higher power system design.

Packaged in a compact 7” (178 mm) x 3.6” (91 mm) x 2.1” (53 mm) and carrying IEC60950 family safety approvals, the SHP350 has a load dependant variable speed fan, is fully protected with overtemperature shutdown and provides -40 ºC start up and full power from -20 ºC to 50 ºC and 50% power at +70 ºC.

Models and Ratings

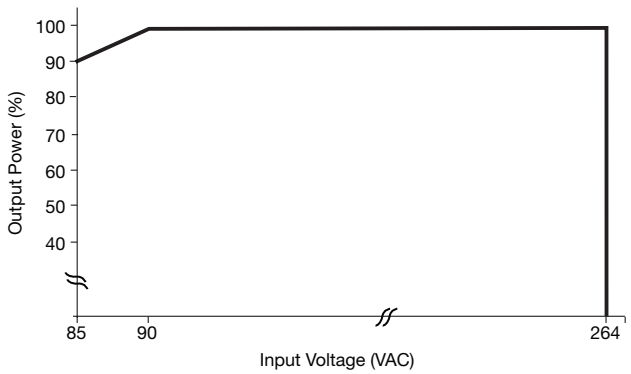
Output Voltage V1	Output Current V1	Standby Supply V2	Output Power		Model Number
			Continuous	Peak	
12 V	26.5 A	5 V / 0.2 A	318 W		SHP350PS12
15 V	22.0 A	5 V / 0.2 A	330 W		SHP350PS15
24 V	14.5 A	5 V / 0.2 A	348 W	417 W	SHP350PS24
28 V	12.5 A	5 V / 0.2 A	350 W	420 W	SHP350PS28
36 V	9.7 A	5 V / 0.2 A	350 W	420 W	SHP350PS36
48 V	7.3 A	5 V / 0.2 A	350 W	420 W	SHP350PS48

Input Characteristics

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Input Voltage - Operating	85	115/230	264	VAC	Derate output power < 90 VAC. See fig. 1.
Input Frequency	47	50/60	63	Hz	
Power Factor		>0.9			EN61000-3-2 class A compliant, Class C compliant ≥10% load
Input Current - No Load		0.15		A	
Input Current - Full Load (350 W)		3.8/2.1		A	115/230 VAC
Inrush Current			60	A	230 VAC cold start, 25 °C
Earth Leakage Current		150/260	500	µA	115/230 VAC/50 Hz (Typ.), 264 VAC/60 Hz (Max.)
Input Protection	T10 A/250 V internal fuse in both lines				

Input Derating Curve

Figure 1



Output Characteristics

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Output Voltage - V1	12		48	VDC	See Models and Ratings table
Initial Set Accuracy			±1 (V1), ±5 (V2)	%	50% load, 115/230 VAC
Output Voltage Adjustment			±10	%	V1 only. See mechanical details.
Minimum Load	0			A	
Start Up Delay		0.5		s	230 VAC full load
Hold Up Time	20			ms	
Drift			±0.2	%	After 20 min warm up
Line Regulation			±0.5	%	90-264 VAC
Load Regulation			±1 (V1), ±5 (V2)	%	0-100% load.
Transient Response - V1			4	%	Recovery within 1% in less than 500 µs for a 50-75% and 75-50% load step
Ripple & Noise		1%		% pk-pk	V1: 20 MHz bandwidth
Overvoltage Protection	115		145	%	Vnom DC. Output 1 only, recycle input to reset
Overload Protection	110		140	% I nom	Output 1 only, auto reset. See fig 2.
Short Circuit Protection					Auto Recovery, hiccup mode
Temperature Coefficient			0.02	%/°C	
Overtemperature Protection				°C	Protects unit from overtemperature. Auto reset.

Output Overload Characteristic

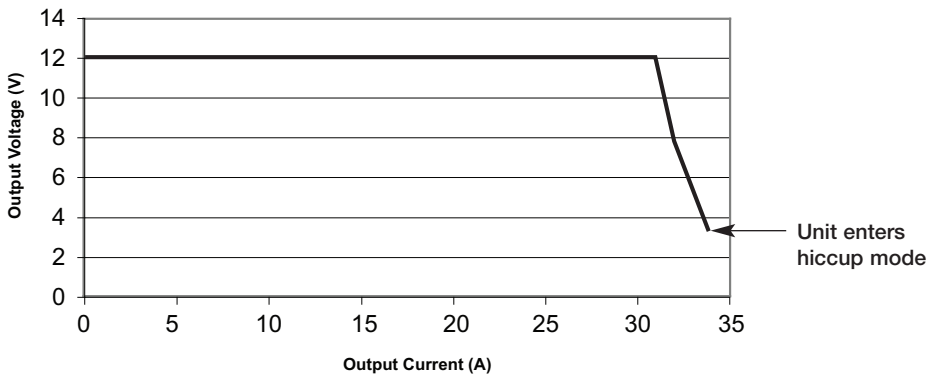


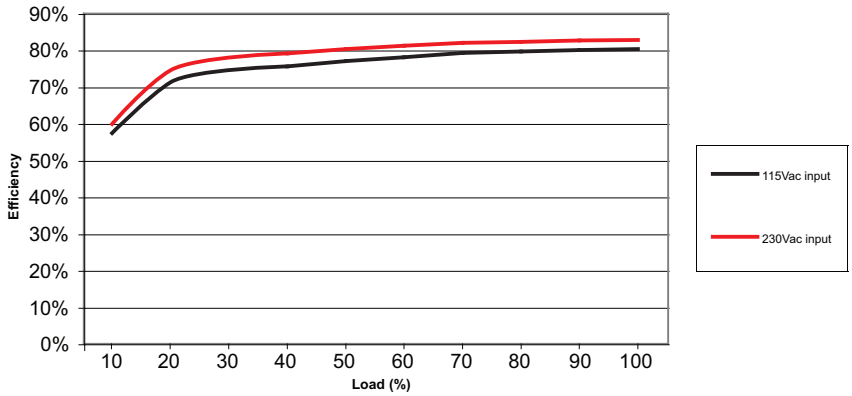
Figure 2
Typical V1 Overload Characteristic (SHP350PS12 shown)

General Specifications

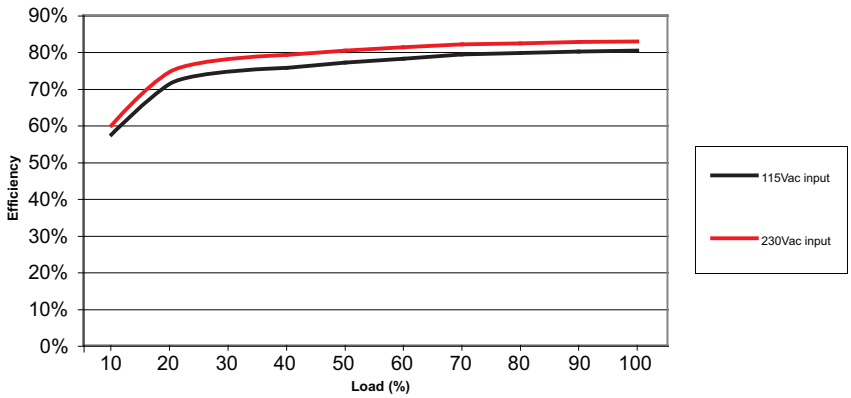
Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Efficiency		85		%	See fig 3 & 4
Isolation: Input to Output	3000			VAC	
Input to Ground	1500			VAC	
Output to Ground	500			VDC	
Switching Frequency		70/200/130		kHz	PFC converter / Main converter / Standby
Power Density			6.6	W/in^3	
Mean Time Between Failure		216		kHrs	MIL-HDBK-217F at 25 °C GB
Weight		2.1 (940)		lb (g)	See mechanical details

Efficiency vs Load

SHP350PS12
Figure 3



SHP350PS48
Figure 4



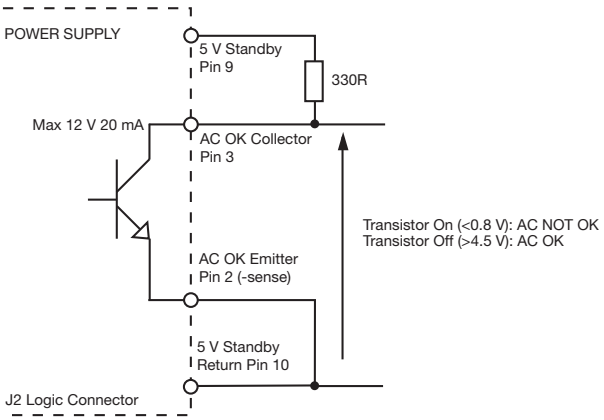
Signals & Control

Characteristic	Notes & Conditions
Signals & Control	
Remote Sense	Compensates for 0.5 V total voltage drop
AC OK / Power Fail	Open collector referenced to negative sense, transistor normally off when AC is good (see fig. 5 & 8) AC OK: Provides ≥ 5 ms warning of loss of output from AC failure
Remote On/Off (Inhibit/Enable)	Uncommited isolated optocoupler diode, powered diode inhibits both V1 & V2 (fan supply) (see fig.6 & 9)
Current Share	When more than one unit (with the same output voltage) is used in parallel to increase output current, the current share pins 5/6 of one unit should be connected to pins 5/6 of the other unit(s). This will force the current to share between the outputs. Similarly pins 2/4 of each unit should also be connected as a ground reference. Units share current within 10% of each other at full load. See fig 7.
Standby Supply V2	Isolated 5 V/0.2 A supply, always present when AC supplied.

Signals & Control

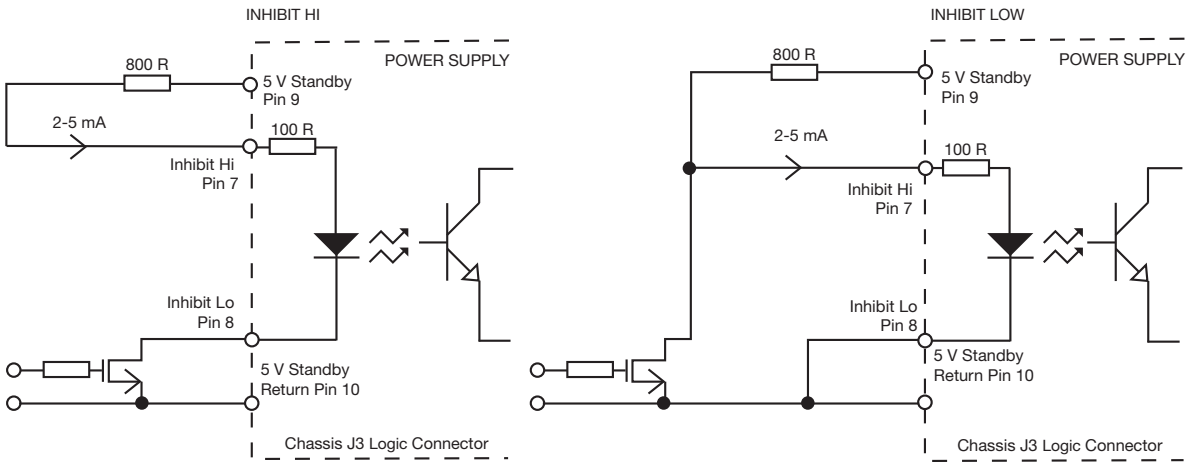
AC OK/Power Fail

Figure 5



Remote On/Off (Inhibit)

Figure 6

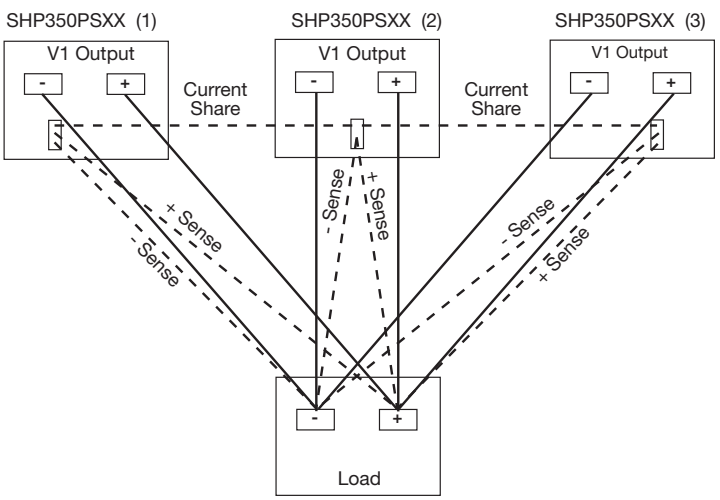


Signal High: Power Supply OFF
Low or Floating: Power Supply ON

Signal High: Power Supply ON
Low or Floating: Power Supply OFF

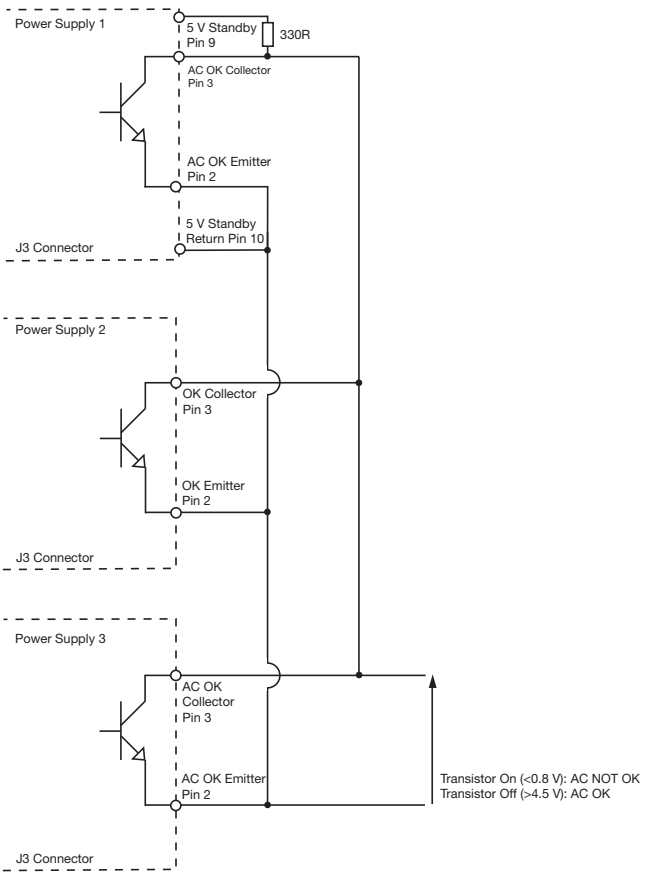
Signals - Parallel Load & Current Share Connection Example

Figure 7



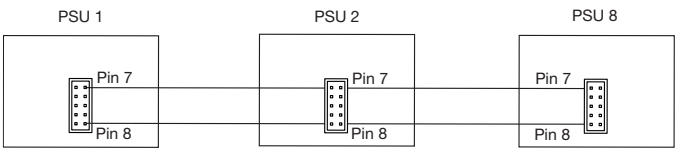
Parallel AC OK Connection

Figure 8



Parallel Remote Inhibit Connection

Figure 9



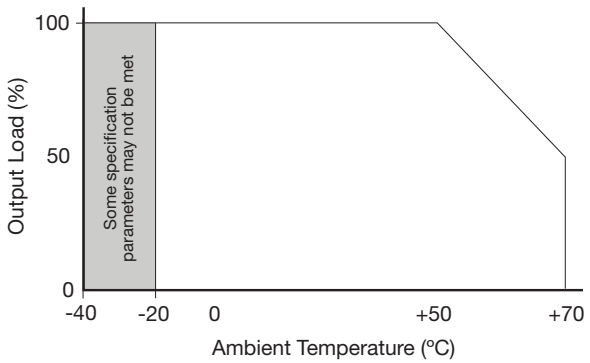
Please see figure 6.

Environmental

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Operating Temperature	-40		+70	°C	See derating curve, fig 10.
Storage Temperature	-40		+85	°C	
Cooling					Integral variable speed fan load dependant. See fig 11.
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. EN60068-2-27 & EN60068-2-47.
Vibration					Single axis 10-500 Hz at 2 g x 10 sweeps. EN60068-2-6.

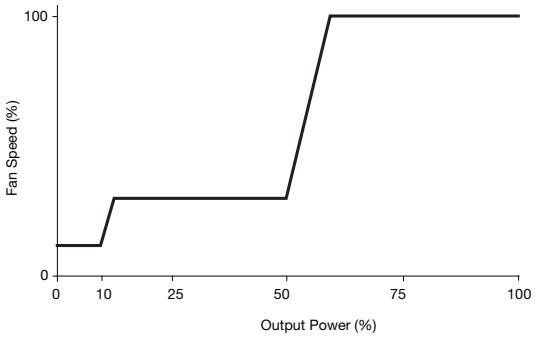
Temperature Derating Curve

Figure 10



Fan Speed Control

Figure 11



Electromagnetic Compatibility - Immunity

Phenomenon	Standard	Test Level	Criteria	Notes & Conditions
Low Voltage PSU EMC	EN61204-3	High severity level	as below	
Harmonic Current	EN61000-3-2	Class A		
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: 20% 5000 ms	A	
		Dip: 30% 500 ms	A	
		Dip: 60% 200 ms	B	
		Dip: 100% 5000 ms	B	
	SEMI F47			Compliant

Electromagnetic Compatibility - Emissions

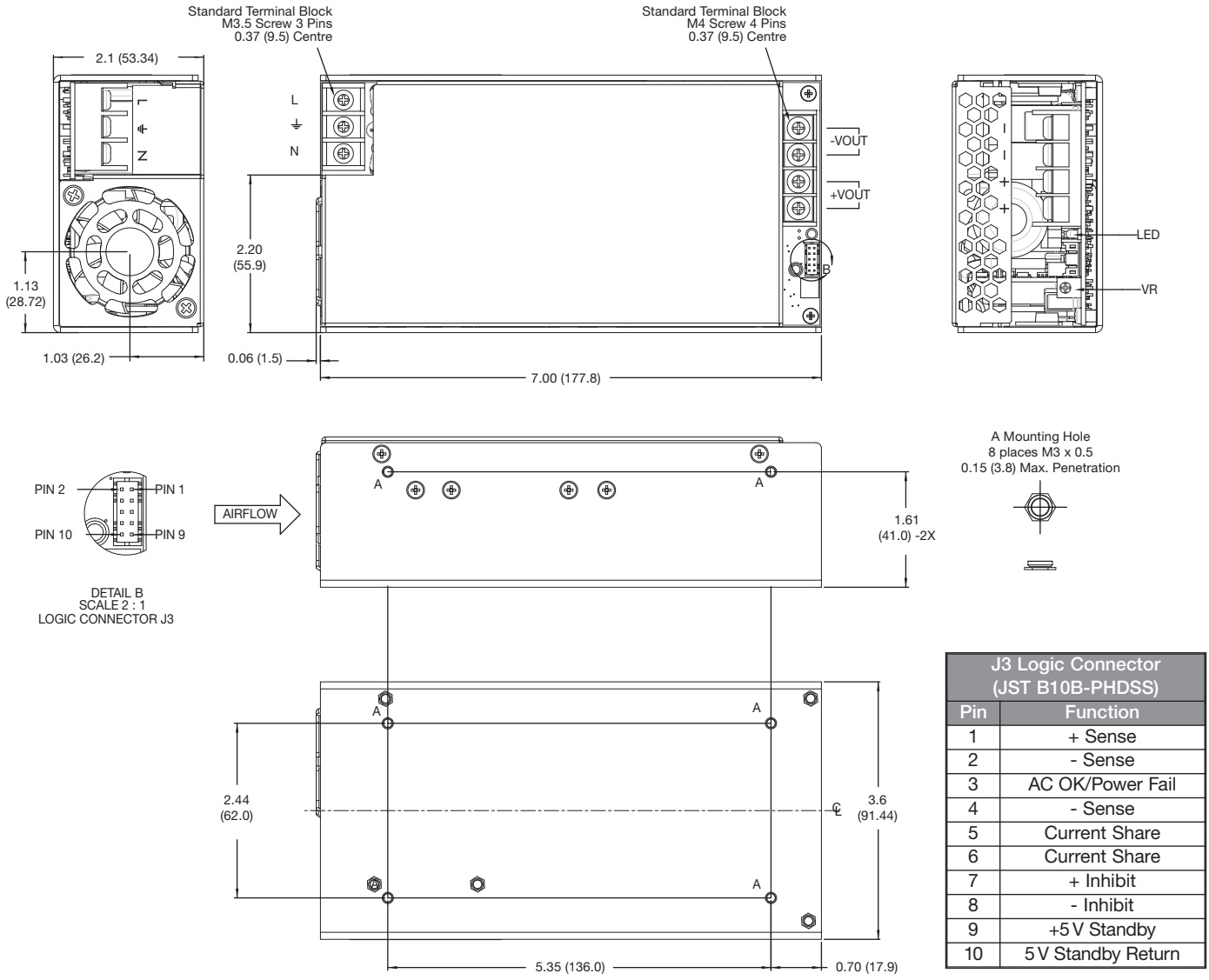
Phenomenon	Standard	Test Level	Criteria	Notes & Conditions
Conducted	EN55032	Class B		
Radiated	EN55032	Class A		
Voltage Fluctuations	EN61000-3-3			

Safety Agency Approvals

Safety Agency	Safety Standard	Category
CB Report	IEC60950-1:2005 Ed 2 / IEC62368-1:2014	Information Technology
UL	UL 62368-1 & CAN/CSA C22.2 No. 62368-1-14	Information Technology
TUV	EN62368-1:2014/A11:2017	Information Technology
CE	LVD	

Equipment Protection Class	Safety Standard	Notes & Conditions
Class I	IEC60950-1:2005 Ed 2 / IEC62368-1:2014	See safety agency conditions of acceptibility for details

Mechanical Details



J3 Logic Connector (JST B10B-PHDSS)	
Pin	Function
1	+ Sense
2	- Sense
3	AC OK/Power Fail
4	- Sense
5	Current Share
6	Current Share
7	+ Inhibit
8	- Inhibit
9	+5 V Standby
10	5 V Standby Return

Notes:

1. Dimensions shown in inches (mm).
2. Weight: 1.73 lb (0.788 kg).
3. Logic connector J3 mates with JST housing PHDR-10VS and SPHD-001T-P0.5 Crimp Terminals

SHP650 Series

- Rugged Industrial Construction
- End Fan, Top Fan & U Channel Mechanical Options
- –40 °C to +70 °C Operation
- 5 V Standby
- AC OK, Remote On/Off and Active Current Share
- Load Dependant Variable Fan Speed
- Screw Terminals
- SEMI F47 Compliant
- 3 Year Warranty

The SHP650 AC-DC power supply provides upto 650 W of output power in three mechanical packages to provide installation flexibility in a range of industrial applications.

The unit comprises of a main output with voltages from 12-48 VDC and two peripheral outputs providing a 12 VDC fan supply and a 5 VDC standby supply which can be utilitsed with the signals and control features of the unit to provide detection of loss of AC input and remote on/off control.

Multiple units can used in parallel via the current share facility, providing higher power solutions. Inherently low earth leakage current, and conducted EMC compliance to Class B also simplify higher power system design.

Packaged in a compact 8” (203 mm) x 4” (102 mm) x 2.6” (65 mm) and carrying IEC60950 family safety approvals, the SHP650 has a load dependant variable speed fan is fully protected with overtemperature shutdown and provides full power from -20 ºC to 50 ºC and 50% power at +70 ºC.

Models and Ratings

End Fan Models (-EF)

Output Voltage V1	Max Output Current V1	Fan Supply V2	Standby Supply V3	Max Output Power	Model Number
12 V	50.0 A	Not Available	5 V / 0.2 A	607 W	SHP650PS12-EF
15 V	40.0 A	Not Available	5 V / 0.2 A	607 W	SHP650PS15-EF
24 V	27.0 A	Not Available	5 V / 0.2 A	657 W	SHP650PS24-EF
28 V	23.0 A	Not Available	5 V / 0.2 A	651 W	SHP650PS28-EF
36 V	18.0 A	Not Available	5 V / 0.2 A	657 W	SHP650PS36-EF
48 V	13.5 A	Not Available	5 V / 0.2 A	657 W	SHP650PS48-EF

Top Fan Models (-TF)

Output Voltage V1	Max Output Current V1	Fan Supply V2	Standby Supply V3	Max Output Power	Model Number
12 V	50.0 A	Not Available	5 V / 0.2 A	607 W	SHP650PS12-TF
15 V	40.0 A	Not Available	5 V / 0.2 A	607 W	SHP650PS15-TF
24 V	27.0 A	Not Available	5 V / 0.2 A	657 W	SHP650PS24-TF
28 V	23.0 A	Not Available	5 V / 0.2 A	651 W	SHP650PS28-TF
36 V	18.0 A	Not Available	5 V / 0.2 A	657 W	SHP650PS36-TF
48 V	13.5 A	Not Available	5 V / 0.2 A	657 W	SHP650PS48-TF

U Channel Models

Output Voltage V1	Max Output Current V1	Fan Supply V2	Standby Supply V3	Max Output Power[1]	Model Number
12 V	50.0 A	12 V / 0.5 A	5 V / 0.2 A	601 W	SHP650PS12
15 V	40.0 A	12 V / 0.5 A	5 V / 0.2 A	601 W	SHP650PS15
24 V	27.0 A	12 V / 0.5 A	5 V / 0.2 A	651 W	SHP650PS24
28 V	23.0 A	12 V / 0.5 A	5 V / 0.2 A	655 W	SHP650PS28
36 V	18.0 A	12 V / 0.5 A	5 V / 0.2 A	651 W	SHP650PS36
48 V	13.5 A	12 V / 0.5 A	5 V / 0.2 A	651 W	SHP650PS48

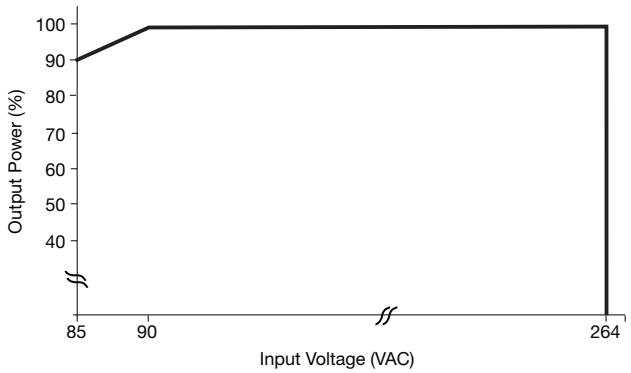
1. U Channel models require a minimum of 5.5 m/s airflow from the system for cooling

Input Characteristics

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Input Voltage - Operating	85	115/230	264	VAC	Derate output power < 90 VAC. See fig. 1.
Input Frequency	47	50/60	63	Hz	Agency approval, 47-63 Hz
Power Factor		>0.9			EN61000-3-2 class A compliant
					EN61000-3-2 class C for loads ≥10%
Input Current - No Load		0.15/0.3		A	115/230 VAC
Input Current - Full Load		6.5/3.2		A	115/230 VAC
Inrush Current			40	A	230 VAC cold start, 25 °C
Earth Leakage Current		0.3/0.5	0.75	mA	115/230 VAC/50 Hz (Typ.), 264 VAC/60 Hz (Max.)
Input Protection	T16 A / 250 V internal in-line fuse				

Input Derating Curve

Figure 1



Output Characteristics

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Output Voltage - V1	12		48	VDC	See Models and Ratings table
Initial Set Accuracy			±1 (V1), ±5 (V3)	%	50% load, 115/230 VAC
Output Voltage Adjustment			±10	%	V1 only. See mechanical details.
Minimum Load	0			A	
Start Up Delay		0.5		s	230 VAC full load
Hold Up Time	20			ms	
Drift			±0.2	%	After 20 min warm up
Line Regulation			±0.5	%	90-264 VAC
Load Regulation			±1 (V1), ±5 (V3)	%	0-100% load.
Transient Response - V1			4	%	Recovery within 1% in less than 500 µs for a 50-75% and 75-50% load step
Ripple & Noise			1	% pk-pk	V1: 20 MHz bandwidth
Overvoltage Protection	115		140	%	Vnom DC. Output 1 only, recycle input to reset
Overload Protection	110		145	% I nom	Output 1 only, auto reset. See fig 2.
Short Circuit Protection					Auto Recovery, hiccup mode
Temperature Coefficient			0.02	%/°C	
Overtemperature Protection				°C	Protects unit from overtemperature. Auto reset.

Output Overload Characteristic

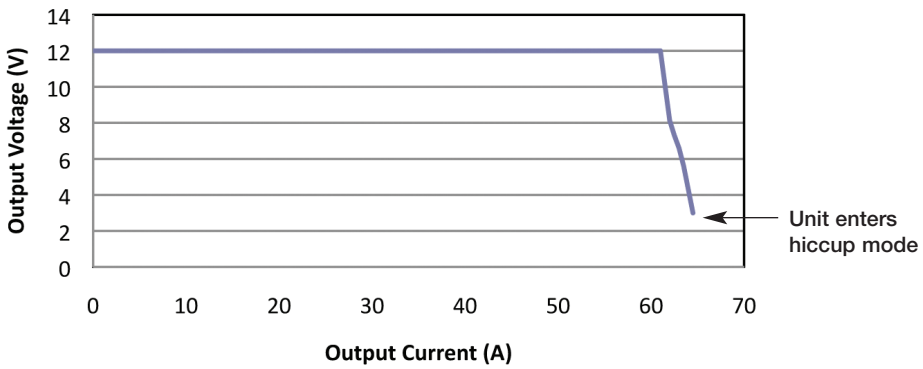


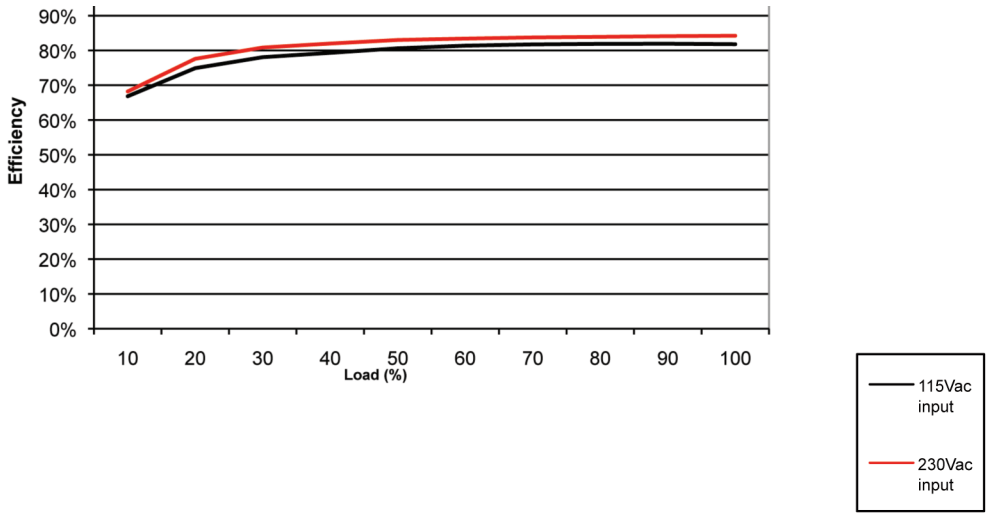
Figure 2
Typical V1 Overload Characteristic (SHP650PS12 shown)

General Specifications

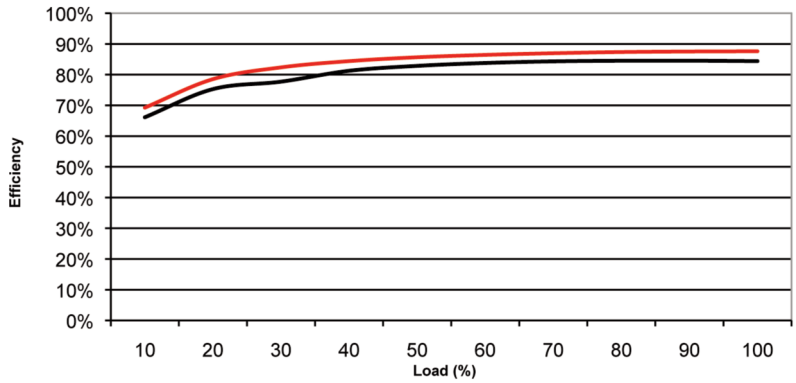
Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Efficiency		84		%	See fig 3 & 4
Isolation: Input to Output	3000			VAC	
Input to Ground	1500			VAC	
Output to Ground	500			VDC	
Switching Frequency		70/200		kHz	PFC converter / Main converter
Power Density			8.2	W/in^3	
Mean Time Between Failure		260		kHrs	MIL-HDBK-217F at 25 °C GB
Weight			2.8 (1.25)	lb (kg)	See mechanical details

Efficiency vs Load

SHP650PS12
Figure 3



SHP650PS48
Figure 4



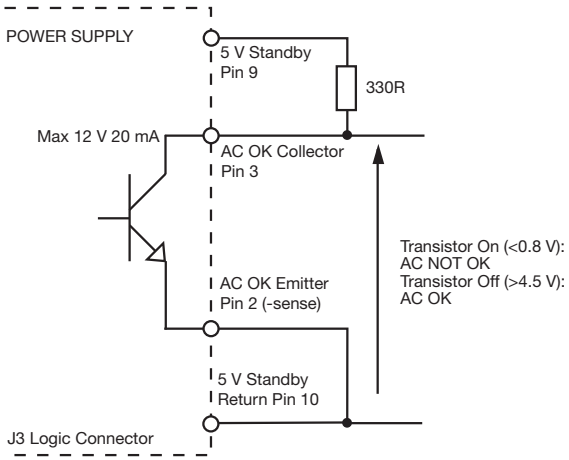
Signals & Control

Characteristic	Notes & Conditions
Signals & Control	
Remote Sense	Compensates for 0.5 V total voltage drop
AC OK / Power Fail	Open collector referenced to negative sense, transistor normally off when AC is good (see fig. 5 & 8) AC OK: Provides ≥ 5 ms warning of loss of output from AC failure
Remote On/Off (Inhibit/Enable)	Uncommited isolated optocoupler diode, powered diode inhibits both V1 & V2 (fan supply) (see fig.6 & 9)
Current Share	When more than one unit (with the same output voltage) is used in parallel to increase output current, the current share pins 5/6 of one unit should be connected to pins 5/6 of the other unit(s). This will force the current to share between the outputs. Similarly pins 2/4 of each unit should also be connected as a ground reference. Units share current within 10% of each other at full load. See fig 7.
Standby Supply V3	Isolated 5 V/0.2 A supply, always present when AC supplied.

Signals & Control

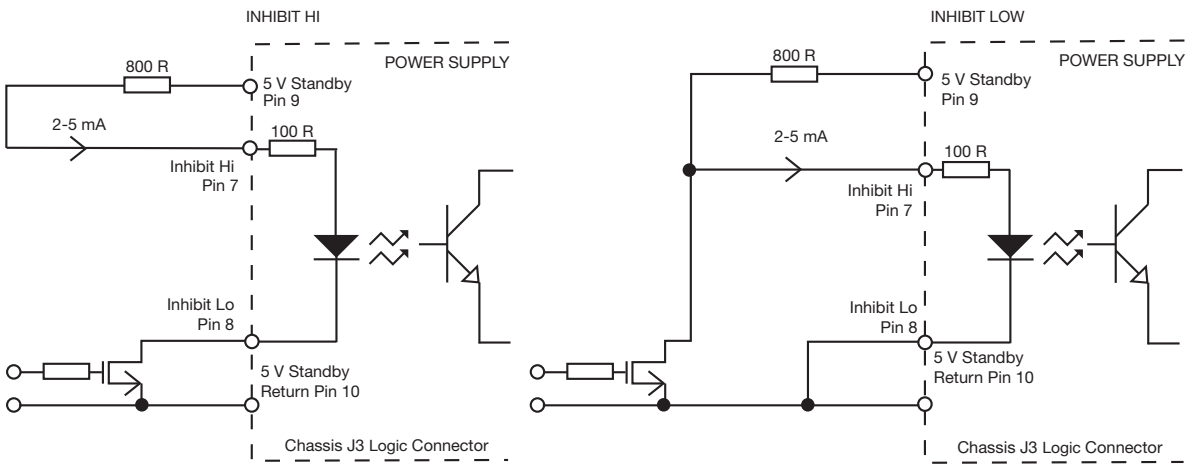
AC OK/Power Fail

Figure 5



Remote On/Off (Inhibit)

Figure 6

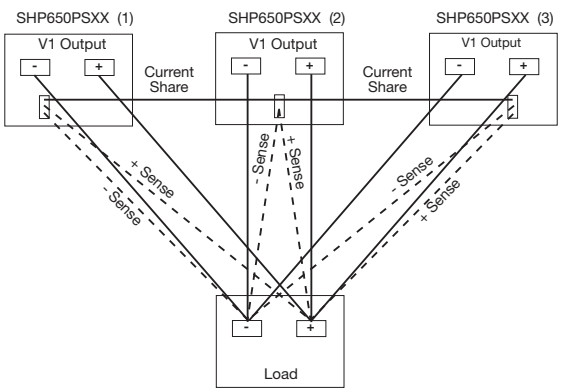


Signal High: Power Supply OFF
Low or Floating: Power Supply ON

Signal High: Power Supply ON
Low or Floating: Power Supply OFF

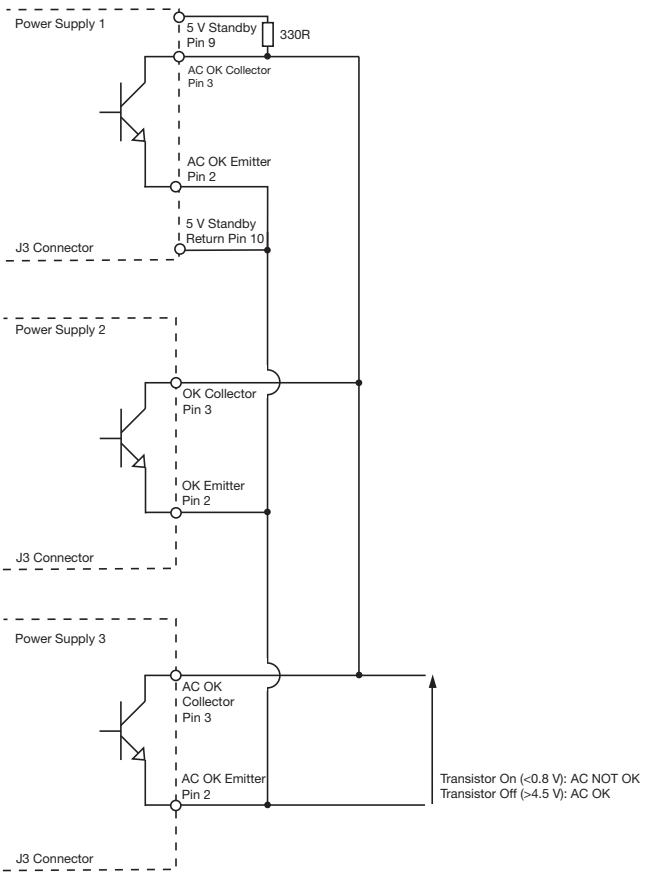
Signals - Parallel Load & Current Share Connection Example

Figure 7



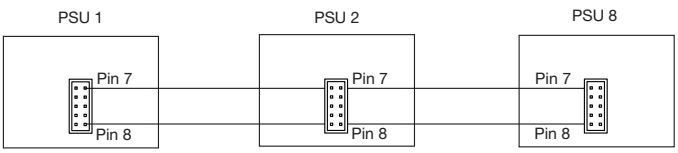
Parallel AC OK Connection

Figure 8



Parallel Remote Inhibit Connection

Figure 9



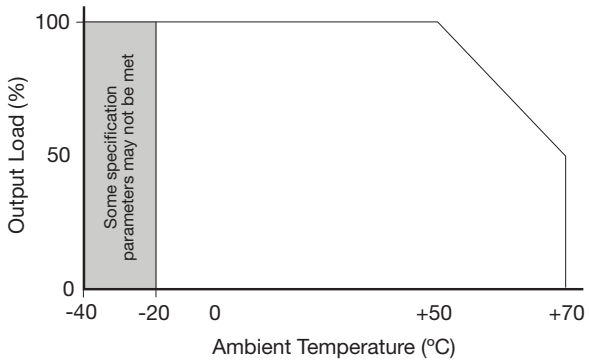
Please see figure 6.

Environmental

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Operating Temperature	-40		+70	°C	See derating curve, fig 10.
Storage Temperature	-40		+85	°C	Some specification parameters maybe exceeded until after 20 minutes warm up period.
Cooling					Integral variable speed fan load dependant. See fig 11.
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

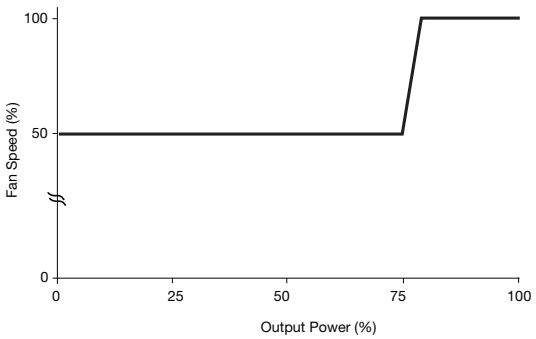
Temperature Derating Curve

Figure 10



Fan Speed Control

Figure 11



Electromagnetic Compatibility - Immunity

Phenomenon	Standard	Test Level	Criteria	Notes & Conditions
Low Voltage PSU EMC	EN61204-3	High severity level	as below	
Harmonic Current	EN61000-3-2	Class A		
		Class C		For loads ≥10%
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	
		Dip: 100% 5000 ms	B	
	SEMI F47			Compliant

Electromagnetic Compatibility - Emissions

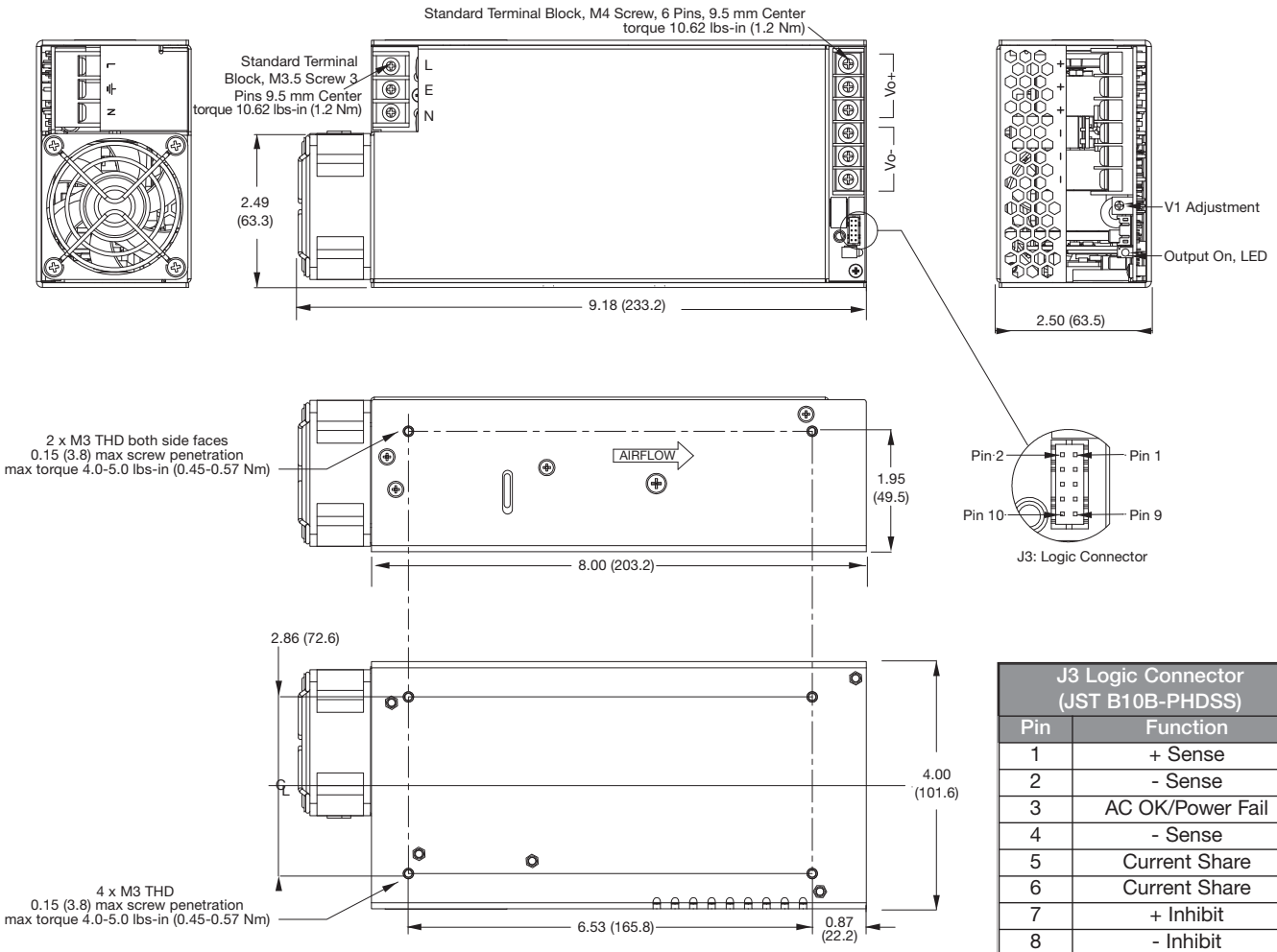
Phenomenon	Standard	Test Level	Criteria	Notes & Conditions
Conducted	EN55032	Class B		
Radiated	EN55032	Class A		
Voltage Fluctuations	EN61000-3-3			

Safety Agency Approvals

Safety Agency	Safety Standard	Category
CB Report	IEC60950-1:2005 Ed 2 / IEC62368-1:2014	Information Technology
UL	UL 62368-1 & CAN/CSA C22.2 No. 62368-1-14	Information Technology
TUV	EN62368-1:2014/A11:2017	Information Technology
CE	LVD	

Equipment Protection Class	Safety Standard	Notes & Conditions
Class I	IEC60950-1:2005 Ed 2 / IEC62368-1:2014	See safety agency conditions of acceptibility for details

Mechanical Details - End Fan (Suffix -EF)

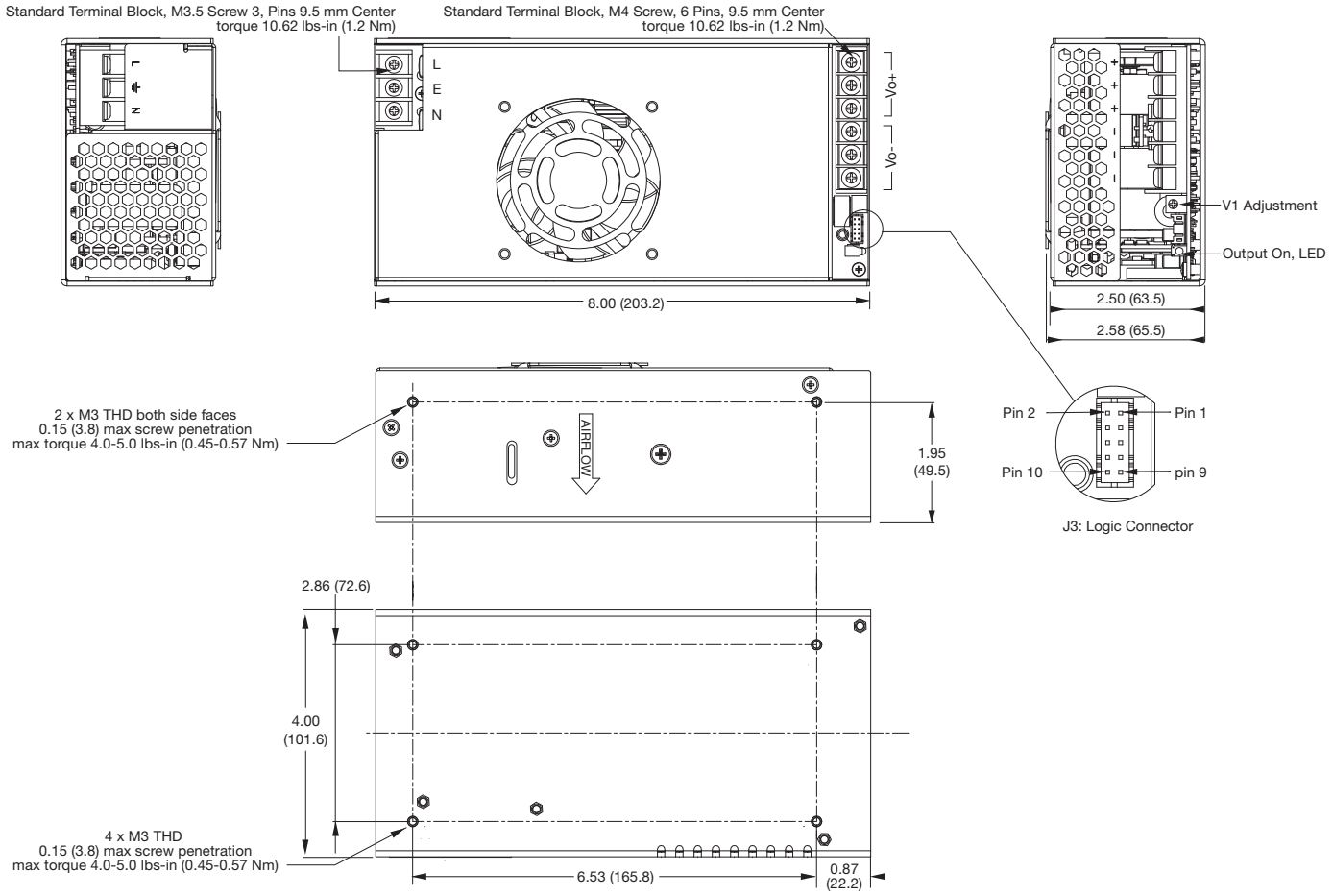


J3 Logic Connector (JST B10B-PHDSS)	
Pin	Function
1	+ Sense
2	- Sense
3	AC OK/Power Fail
4	- Sense
5	Current Share
6	Current Share
7	+ Inhibit
8	- Inhibit
9	+5 V Standby (V3)
10	5 V Standby Return (V3)

Notes:

1. Dimensions shown in inches (mm).
2. Weight: 2.8 lb (1.25 kg).
3. J3 Mating plug: JST part no. PHDR-10VS, contact: 26-22 AWG JST part no. SPHD-001T-P0.5.

Mechanical Details - Top Fan (Suffix -TF)

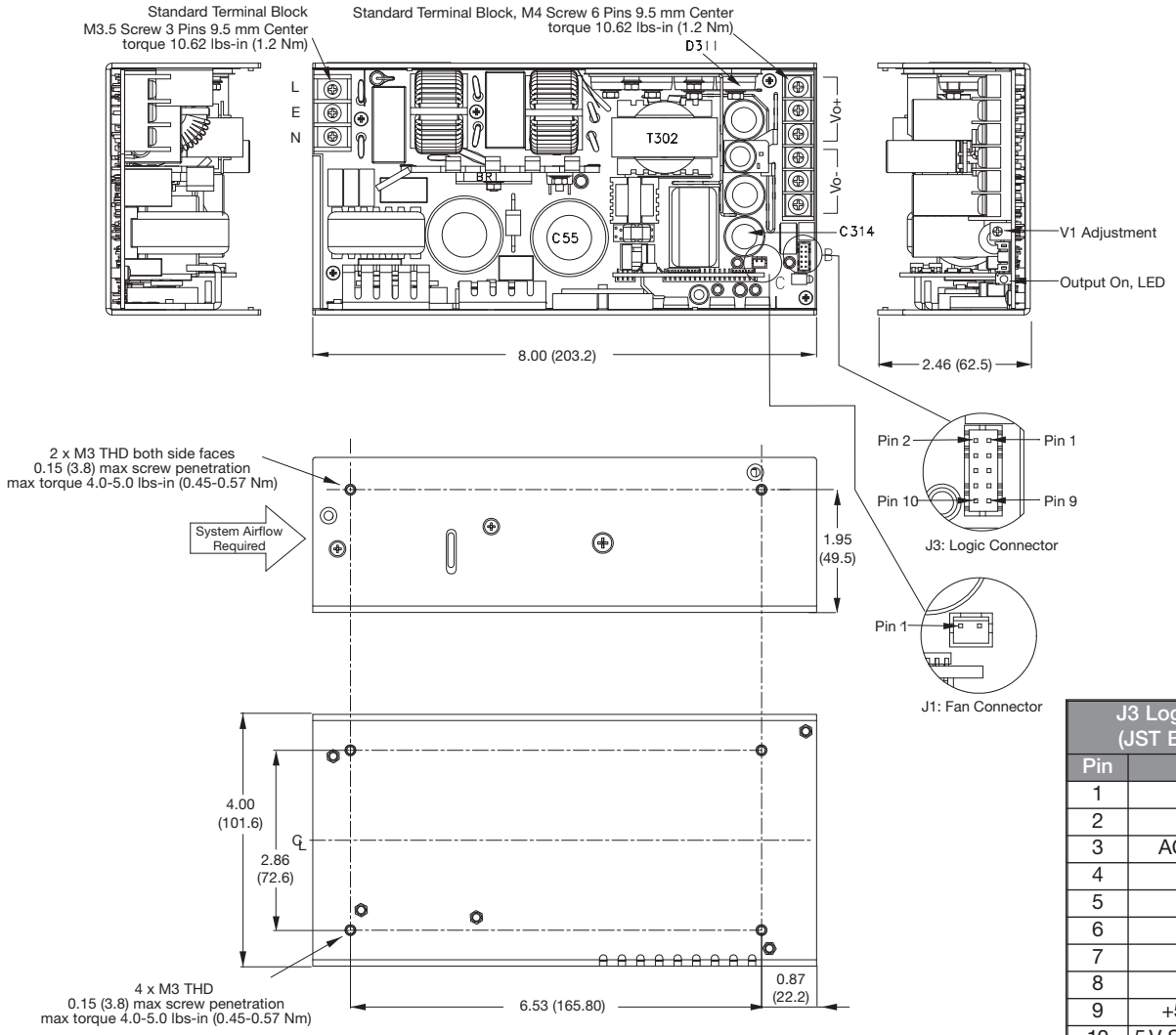


J3 Logic Connector (JST B10B-PHDSS)	
Pin	Function
1	+ Sense
2	- Sense
3	AC OK/Power Fail
4	- Sense
5	Current Share
6	Current Share
7	+ Inhibit
8	- Inhibit
9	+5 V Standby (V3)
10	5 V Standby Return (V3)

Notes:

1. Dimensions shown in inches (mm).
2. Weight: 2.6 lb (1.2 kg).
3. J3 Mating plug: JST part no. PHDR-10VS, contact: 26-22 AWG JST part no. SPHD-001T-P0.5.

Mechanical Details - U Channel (No Suffix)



J3 Logic Connector (JST B10B-PHDSS)	
Pin	Function
1	+ Sense
2	- Sense
3	AC OK/Power Fail
4	- Sense
5	Current Share
6	Current Share
7	+ Inhibit
8	- Inhibit
9	+5 V Standby (V3)
10	5 V Standby Return (V3)

J1 Fan Connector (JST B2B-PH-KL (LF) (SN)	
Pin	Function
1	+V
2	NC
3	-V

Notes:
1. Dimensions shown in inches (mm).
2. Weight: 2.4 lb (1.1 kg).
3. Requires system airflow, see thermal considerations.
4. J3 Mating plug: JST part no. PHR-2, contact: JST part no. SPH-002T-P0.5S.
5. J3 Mating plug: JST part no. PHDR-10VS, contact: 26-22 AWG JST part no. SPHD-001T-P0.5.

Thermal Considerations (U Channel)

Temperature Measurements (Ambient ≤50 °C)		
Component	Recommended Temperature °C	Maximum Temperature °C
C55 Capacitor	70	105
T302 Transformer	90	120
C314 Capacitor	70	105
D311 Diode	100	120

In order to ensure reliable operation in the end use application the recommended component temperatures listed should not be exceeded. Higher temperatures up to the maximum stated can be used but product lifetime may be reduced.

SHP1000 Series

- 1200 W High Line Output Power
- Rugged Industrial Construction
- Variable Speed Fan for Noise Reduction
- –40 °C to +70 °C Operation
- 5 V Standby
- AC OK, Remote On/Off and Active Current Share
- Screw Terminals
- 3 Year Warranty

The SHP1000 AC-DC power supply provides up to 1200 W of output power in a compact rugged mechanical package, suitable for a range of industrial applications.

The unit comprises of a main output with voltages from 12-48 VDC and a 5 VDC standby supply which can be utilitsed with the signals and control features of the unit to provide detection of loss of AC input and remote on/off control.

Multiple units can be used in parallel via the current share facility, providing higher power solutions. Inherently low earth leakage current, and conducted EMC compliance to Class B also simplify higher power system design.

Packaged in a compact 9.5” (241 mm) x 5.9” (150 mm) x 2.4” (61 mm) and carrying IEC60950 family safety approvals, the SHP1000 has a load dependant variable speed fan is fully protected with overtemperature shutdown and provides -40 ºC start up with full power from -20 ºC to 50 ºC and 50% power at +70 ºC.

Models and Ratings

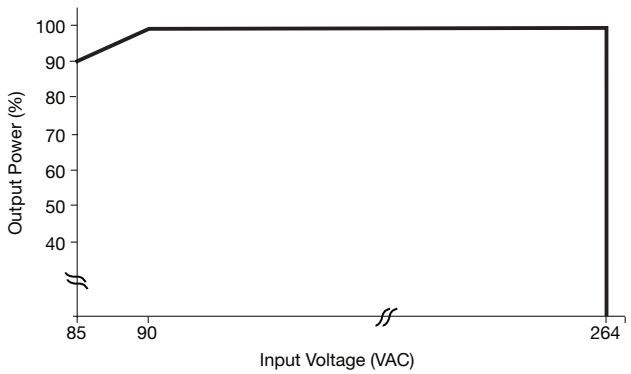
Output Voltage V1	Max Output Current V1		Standby Supply V2	Max Output Power		Model Number
	<180 VAC	>180 VAC		<180 VAC	>180 VAC	
12 V	83.0 A		5 V / 1.0 A	1001 W		SHP1000PS12
15 V	67.0 A		5 V / 1.0 A	1010 W		SHP1000PS15
24 V	42.0 A	50.0 A	5 V / 1.0 A	1013 W	1205 W	SHP1000PS24
28 V	36.0 A	42.9 A	5 V / 1.0 A	1013 W	1206 W	SHP1000PS28
36 V	28.0 A	33.3 A	5 V / 1.0 A	1013 W	1204 W	SHP1000PS36
48 V	21.0 A	25.0 A	5 V / 1.0 A	1013 W	1205 W	SHP1000PS48

Input Characteristics

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Input Voltage - Operating	85	115/230	264	VAC	Derate output power < 90 VAC. See fig. 1.
Input Frequency	47	50/60	63	Hz	
Power Factor		>0.9			EN61000-3-2 class A compliant
Input Current - No Load		0.35/0.5		A	115/230 VAC
Input Current - Full Load (1000 W)		10.9/5.3		A	115/230 VAC
Inrush Current			60	A	230 VAC cold start, 25 °C
Earth Leakage Current		75/140	250	µA	115/230 VAC/50 Hz (Typ.), 264 VAC/60 Hz (Max.)
Input Protection	T20 A/250 V internal fuse in both lines				

Input Derating Curve

Figure 1



Output Characteristics

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Output Voltage - V1	12		48	VDC	See Models and Ratings table
Initial Set Accuracy			±1 (V1), ±5 (V2)	%	50% load, 115/230 VAC
Output Voltage Adjustment			±10	%	V1 only. See mechanical details.
Minimum Load	0			A	
Start Up Delay		0.5		s	230 VAC full load
Hold Up Time	20			ms	
Drift			±0.2	%	After 20 min warm up
Line Regulation			±0.5	%	90-264 VAC
Load Regulation			±1 (V1), ±5 (V2)	%	0-100% load.
Transient Response - V1			4	%	Recovery within 1% in less than 500 µs for a 50-75% and 75-50% load step
Ripple & Noise			1	% pk-pk	V1: 20 MHz bandwidth
Overvoltage Protection	115		145	%	Vnom DC. Output 1 only, recycle input to reset
Overload Protection	110		140	% I nom	Output 1 only, auto reset. See fig 2.
Short Circuit Protection					Auto Recovery, hiccup mode
Temperature Coefficient			0.02	%/°C	
Overtemperature Protection				°C	Protects unit from overtemperature. Auto reset.

Output Overload Characteristic

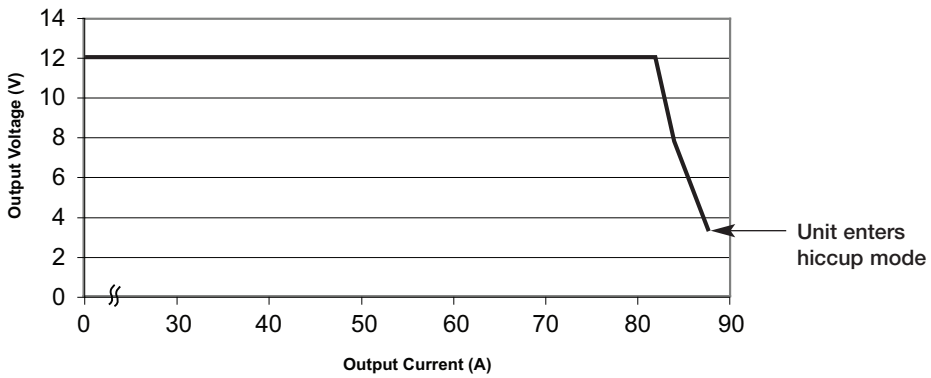


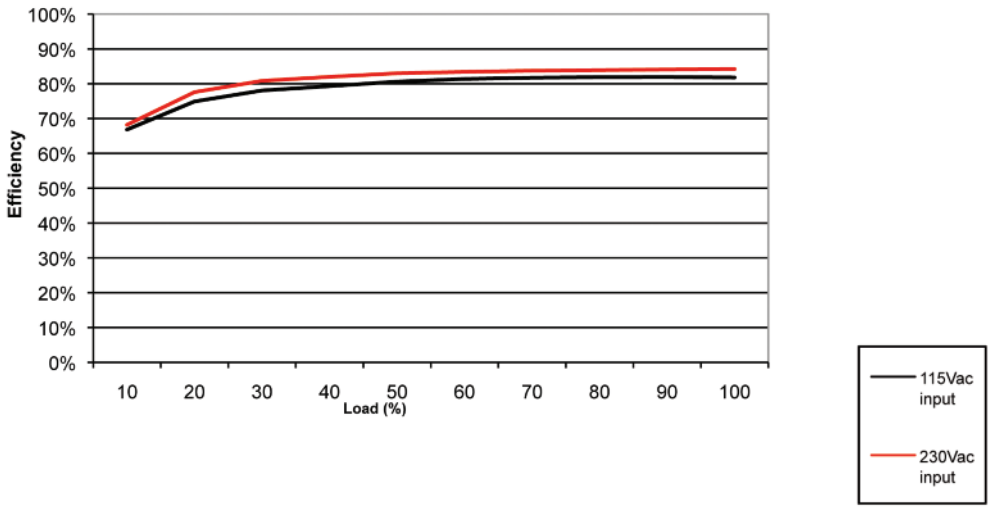
Figure 2
Typical V1 Overload Characteristic (SHP1000PS12 shown)

General Specifications

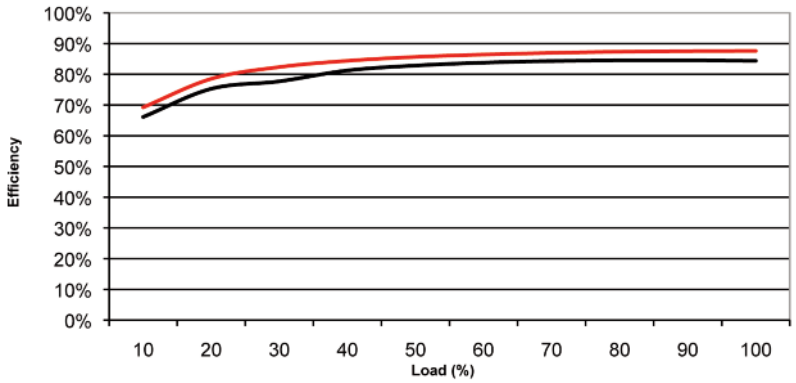
Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Efficiency		84		%	See fig 3 & 4
Isolation: Input to Output	3000			VAC	
Input to Ground	1500			VAC	
Output to Ground	500			VDC	
Switching Frequency		70/200/130		kHz	PFC converter / Main converter / Standby
Power Density			8.9	W/in^3	
Mean Time Between Failure		275		kHrs	MIL-HDBK-217F at 25 °C GB
Weight		2.1 (940)		lb (g)	See mechanical details

Efficiency vs Load

SHP1000PS12
Figure 3



SHP1000PS48
Figure 4



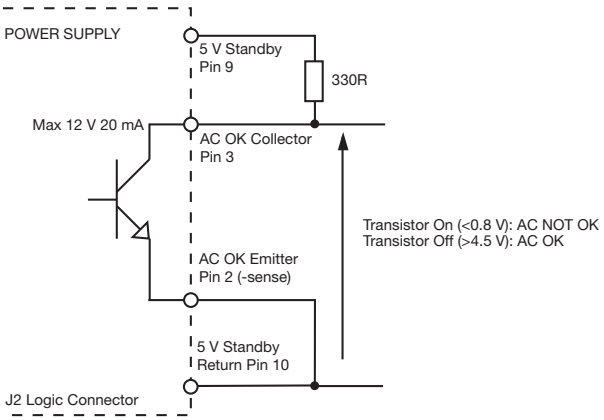
Signals & Control

Characteristic	Notes & Conditions
Signals & Control	
Remote Sense	Compensates for 0.5 V total voltage drop
AC OK / Power Fail	Open collector referenced to negative sense, transistor normally off when AC is good (see fig. 5 & 8) AC OK: Provides ≥ 5 ms warning of loss of output from AC failure
Remote On/Off (Inhibit/Enable)	Uncommited isolated optocoupler diode, powered diode inhibits both V1 & V2 (fan supply) (see fig.6 & 9)
Current Share	When more than one unit (with the same output voltage) is used in parallel to increase output current, the current share pins 5/6 of one unit should be connected to pins 5/6 of the other unit(s). This will force the current to share between the outputs. Similarly pins 2/4 of each unit should also be connected as a ground reference. Units share current within 10% of each other at full load. See fig 7.
Standby Supply V2	Isolated 5 V/1.0 A supply, always present when AC supplied.

Signals & Control

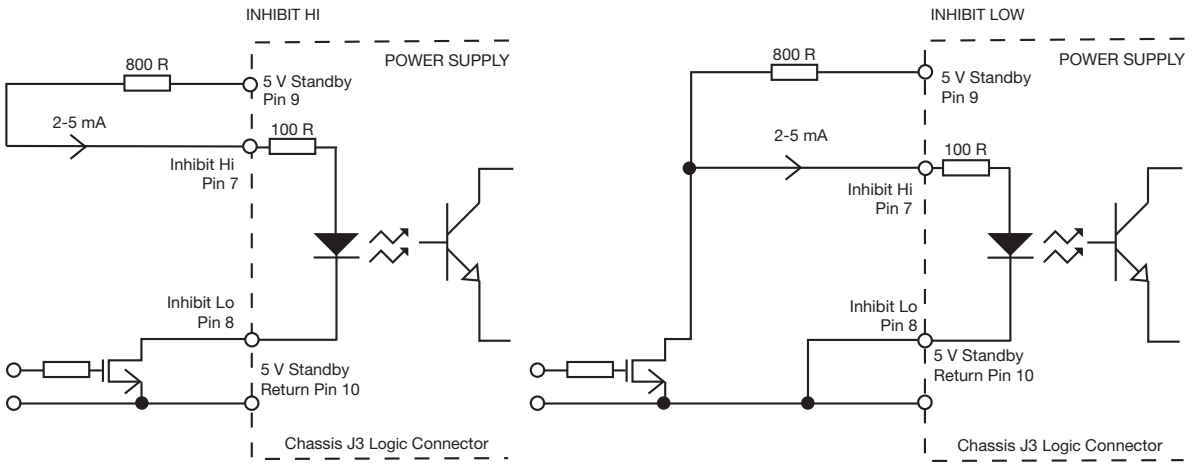
AC OK/Power Fail

Figure 5



Remote On/Off (Inhibit)

Figure 6

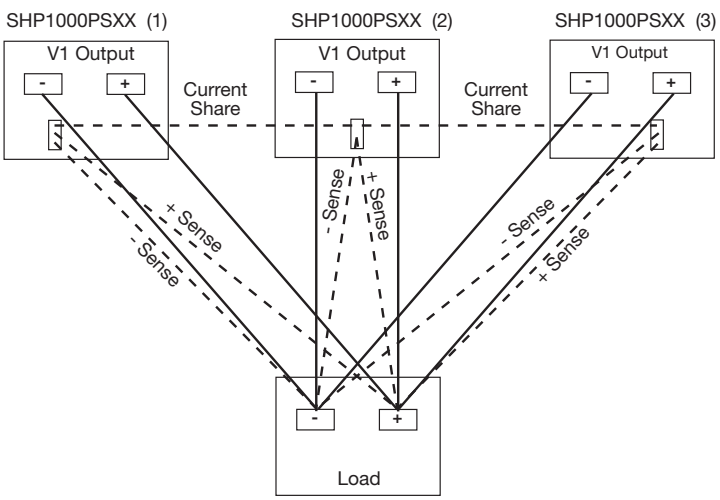


Signal High: Power Supply OFF
Low or Floating: Power Supply ON

Signal High: Power Supply ON
Low or Floating: Power Supply OFF

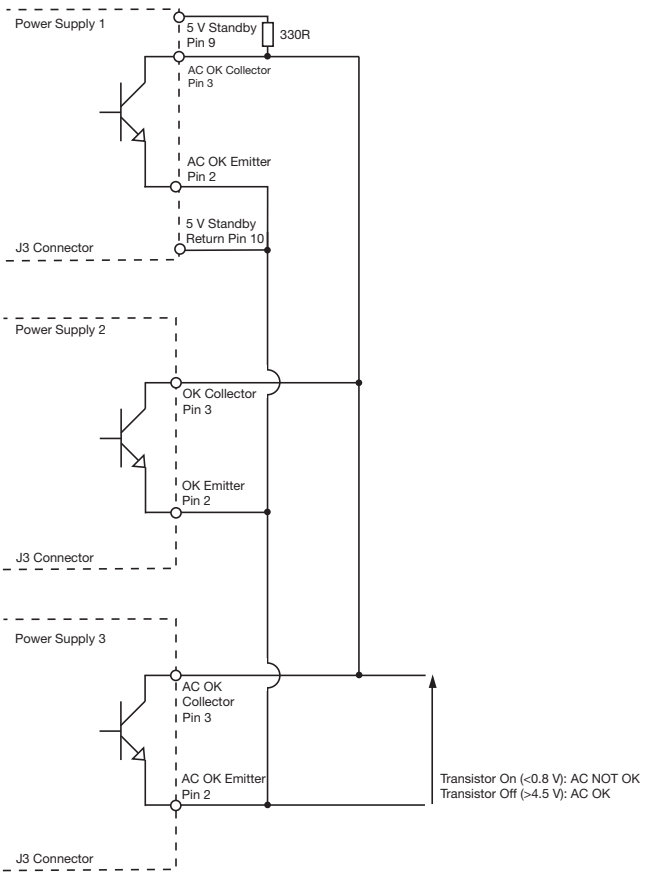
Signals - Parallel Load & Current Share Connection Example

Figure 7



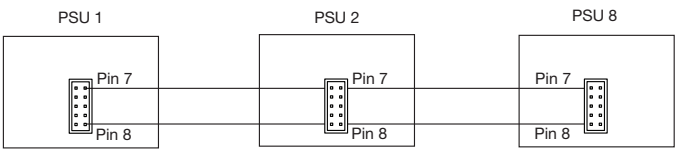
Parallel AC OK Connection

Figure 8



Parallel Remote Inhibit Connection

Figure 9



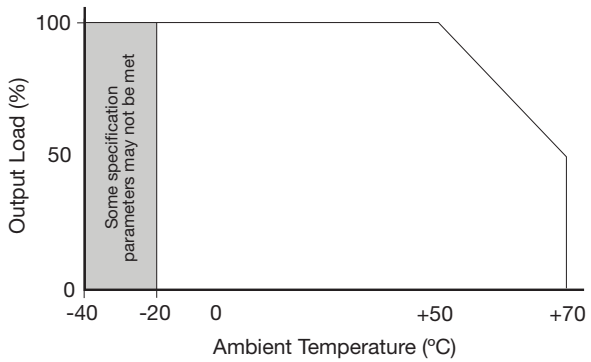
Please see figure 6.

Environmental

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Operating Temperature	-40		+70	°C	See derating curve, fig 10.
Storage Temperature	-40		+85	°C	
Cooling					2 x integral variable speed fans load dependant. See fig 11.
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

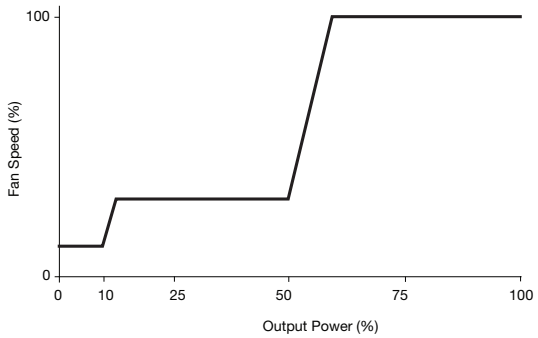
Temperature Derating Curve

Figure 10



Fan Speed Control

Figure 11



Electromagnetic Compatibility - Immunity

Phenomenon	Standard	Test Level	Criteria	Notes & Conditions
Low Voltage PSU EMC	EN61204-3	High severity level	as below	
Harmonic Current	EN61000-3-2	Class A		
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: 20% 5000 ms	A	
		Dip: 30% 500 ms	A	
		Dip: 60% 200 ms	B	
		Dip: 100% 5000 ms	B	
	SEMI F47			Compliant

Electromagnetic Compatibility - Emissions

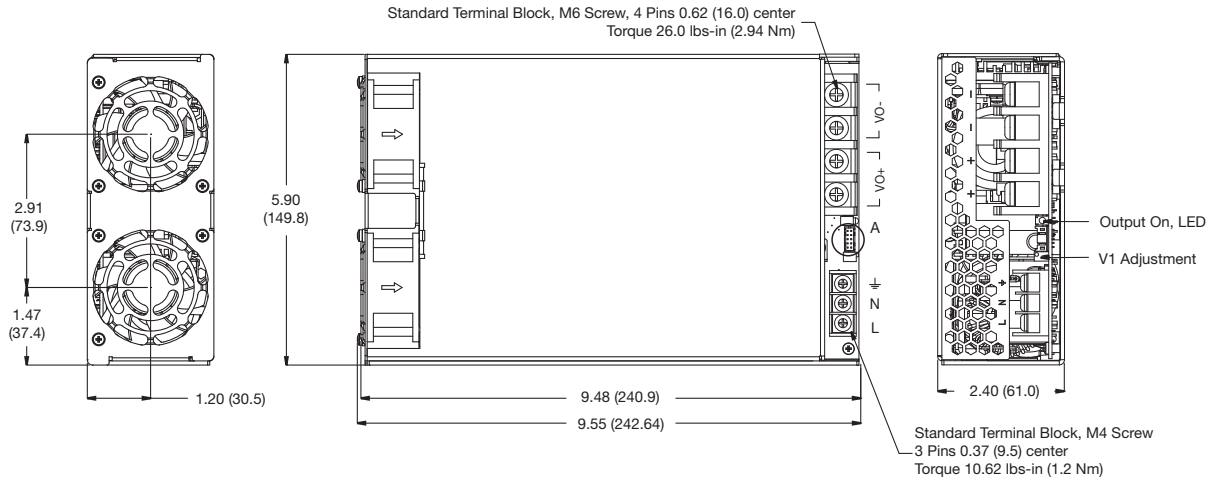
Phenomenon	Standard	Test Level	Criteria	Notes & Conditions
Conducted	EN55032	Class B		
Radiated	EN55032	Class A		
Voltage Fluctuations	EN61000-3-3			

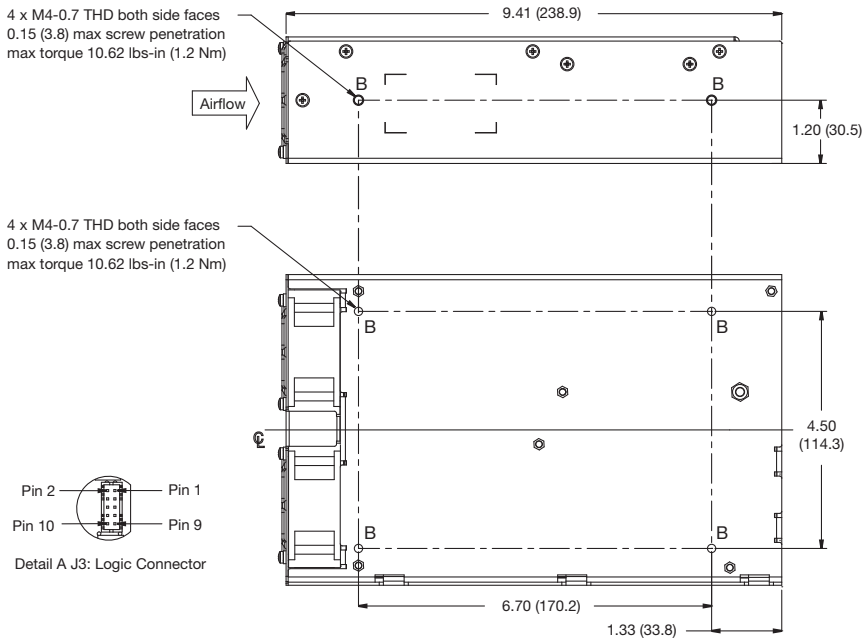
Safety Agency Approvals

Safety Agency	Safety Standard	Category
CB Report	IEC60950-1:2005 Ed 2 / IEC62368-1:2014	Information Technology
UL	UL 62368-1 & CAN/CSA C22.2 No. 62368-1-14	Information Technology
TUV	EN62368-1:2014/A11:2017	Information Technology
CE	LVD	

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

Mechanical Details





J3 Logic Connector (JST B10B-PHDSS)	
Pin	Function
1	+ Sense
2	- Sense
3	AC OK/Power Fail
4	- Sense
5	Current Share
6	Current Share
7	+ Inhibit
8	- Inhibit
9	+5 V Standby
10	-5 V Standby

Notes:
1. Dimensions shown in inches (mm).
2. Weight: 2.8 lb (1.25 kg).
3. J3 Mating plug: JST part no. PHDR-10VS, contact: 26-22 AWG JST part no. SPHD-001T-P0.5.