SHP650 series

XP Power

650W Fan cooled

AC-DC power supplies

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

The unit comprises of a main output with voltages from 12 to 48VDC and a 5VDC 0.2A standby supply which can be utilised with the signals and control features of the unit to provide detection of loss of AC input and remote On/Off control.

Forced air cooled, top fan (suffix -TF) & end fan (suffix -EF) models have integral dual voltage level fan, which is load dependent, the U channel version has a 12VDC 0.5A fan supply output and requires 5.5m/s minimum airflow.

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

Features

- 650W fan cooled
- 203.2 x 101.6mm (8” x 4”) footprint, 63.5mm profile
- Regulated single outputs 12 to 48VDC
- input range 80 to 264VAC
- Rugged construction
- Variable fan speed for noise reduction
- AC OK, remote On/Off and active current share
- Screw terminals
- 5V 0.2A standby
- 12V 0.5A fan supply
- -20°C to +70°C operation
- 3 year warranty

Applications

Analytical instrumentation

Industrial electronics

Laboratory

Semi-fab

Dimensions

203.2 x 101.6 x 63.5 mm (8.00” x 4.00” x 2.5”)

Documentation

For further information click the link or scan the code

→ xppower.com

Models & ratings

Model number[1]	Output voltage V1	Output current V1	Fan supply V2[4]	Standby supply V3	Output power[3]
SHP650PS12-EF	12V	50.0A	12V/0.5A	5V/0.2A	607W
SHP650PS15-EF	15V	40.0A	12V/0.5A	5V/0.2A	607W
SHP650PS24-EF	24V	27.0A	12V/0.5A	5V/0.2A	655W
SHP650PS28-EF	28V	23.0A	12V/0.5A	5V/0.2A	655W
SHP650PS36-EF	36V	18.0A	12V/0.5A	5V/0.2A	655W
SHP650PS48-EF	48V	13.5A	12V/0.5A	5V/0.2A	655W

Notes:

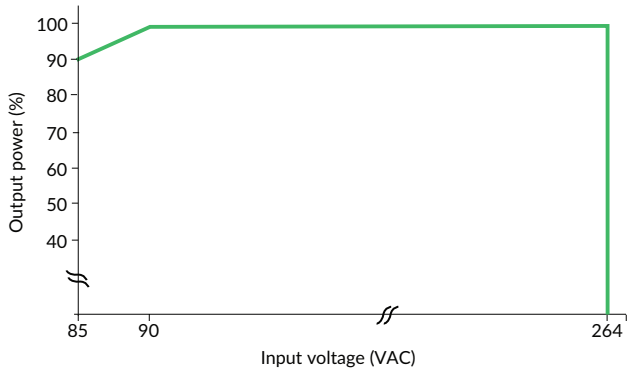
1. For top fan version replace suffix ‘-EF’ with ‘-TF’, e.g. SHP650PS12-TF.
2. For U Channel version remove suffix ‘-EF’ e.g. SHP650PS12.
3. U Channel models require a minimum of 5.5m/s airflow from the system.
4. Not available for ‘-TF’ and ‘-EF’ models as used by integral fan.

Input

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Input voltage	85	115/230	264	VAC	Derate output power 10% <90VAC, see Fig. 1
Input frequency	47	50/60	63	Hz	Agency approval, 47-63Hz
Power factor	0.9				
Input current - no load		0.15/0.3		A	115/230VAC
Input current - full load		6.5/3.2		A	115/230VAC
Inrush current			40	A	230VAC cold start, +25°C
Earth leakage current		0.3/0.5	0.75	mA	115/230VAC/50Hz (Typ.), 264VAC/60Hz (Max.)
Input protection	T16A / 250V internal in-line fuse				

Input derating curve

Figure 1



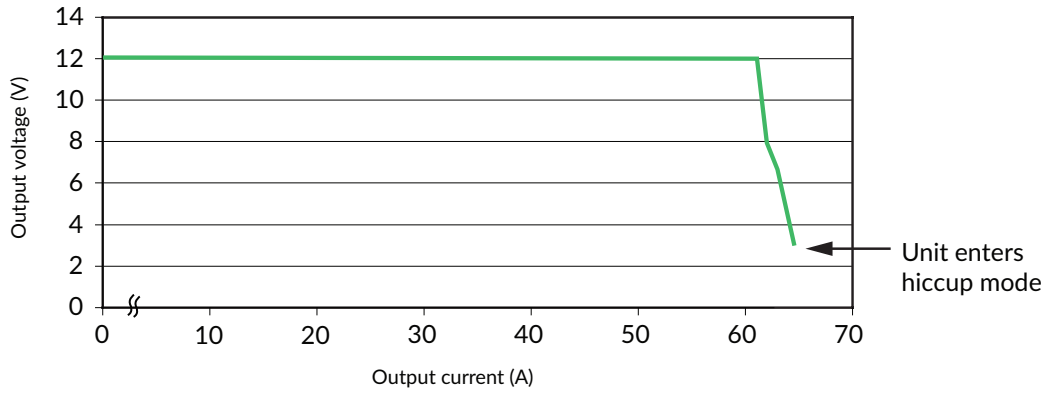
Output

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Output voltage - V1	12		48	VDC	See models and ratings table
Initial set accuracy		±1		%	V1, 50% load, 115/230VAC
		±5			V3, 50% load, 115/230VAC
Ouput voltage adjustment			±10	%	V1 only. See Mechanical Details
Minimum load	No minimum load required				
Start up delay		0.5		s	230VAC full load
Hold up time	20			ms	
Drift			±0.2	%	After 20 min warm up
Line regulation			±0.5	%	
Load regulation			±1	%	V1, 0-100% load
			±5		V3, 0-100% load
Transient response			4	%	Recovery within 1% in less than 500µs for a 50-75% and 75-50% load step
Ripple & noise			1	% pk-pk	V1, 20MHz bandwidth
Overvoltage protection	115		140	%	Vnom DC. Output 1 only, recycle input to reset
Overtemperature protection	Auto 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	

Output

Output overload characteristic

Figure 2
Typical V1 overload characteristic
(SHP650PS12 shown)



General

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		kHz	PFC converter
		200			Main converter
		130			Standby
Power density			0.5 (8.2)	W/cm³ (W/in³)	
Mean time between failure		260		khrs	MIL-HDBK-217F, +25°C GB.
Weight			1.25 (2.8)	kg (lb)	See Mechanical Details

Efficiency graphs

Efficiency vs load

Figure 3
SHP650PS12

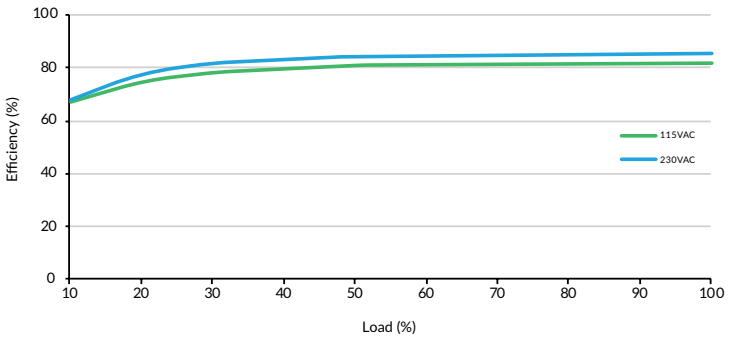
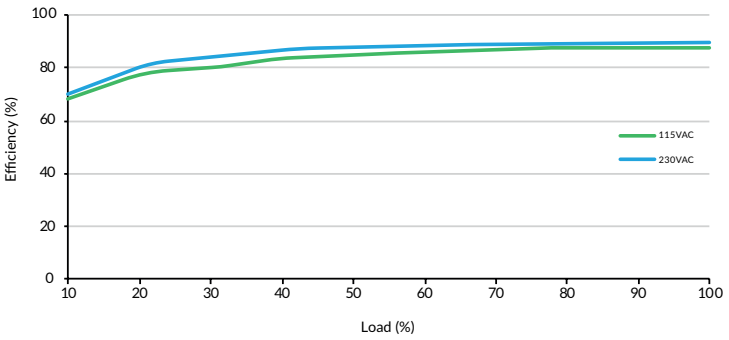


Figure 4
SHP650PS48

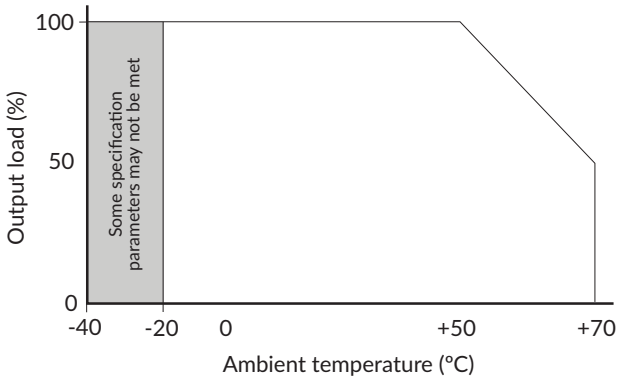


Environmental

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Operating temperature	-40		+70	°C	Derate linearly from +50°C at 2.5%/°C to 50% at +70°C, -40°C start up. See derating curve, fig. 5
Storage temperature	-40		+85	°C	Some specification parameters maybe exceeded until after 20 minute warm up period
Cooling	Integral variable speed fan load dependant. See fig 6				
Operating humidity			95	%RH	Non-condensing
Operating altitude			3000	m	
Shock	30g pk, half sine, 6 axes EN60068-2-27, -2-47				
Vibration	Single axis 10-500 Hz at 2g x 10 sweeps				

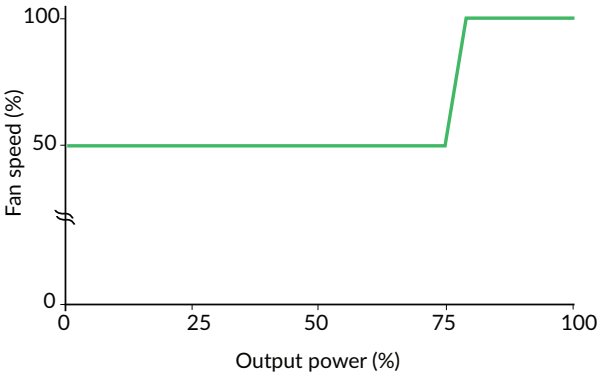
Temperature derating

Figure 5



Fan speed control

Figure 6



EMC: emissions

Phenomenon	Standard	Test level	Notes & conditions
Conducted	EN55032	Class B	
Radiated	EN55032	Class A	
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	
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/Burst	EN61000-4-4	3	A	
Surge	EN61000-4-5	Installation class 3	A	
Conducted	EN61000-4-6	3	A	
Dips and interruptions	EN61000-4-11	Dip 30% 10ms	A	
		Dip 60% 100ms	B	
		Dip 100% 5000ms	B	
	SEMI F47			Compliant

Safety approvals

Certification	Standard	Notes & conditions
CB	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, SEMI F47	Information technology
CE	Meets all applicable directives	
UKCA	Meets all applicable legislation	

Equipment protection class	Standard	Notes & conditions
Class I	IEC60950-1:2005 Ed 2 / IEC62368-1:2014	See safety agency conditions of acceptability for details

Thermal considerations (U channel)

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.

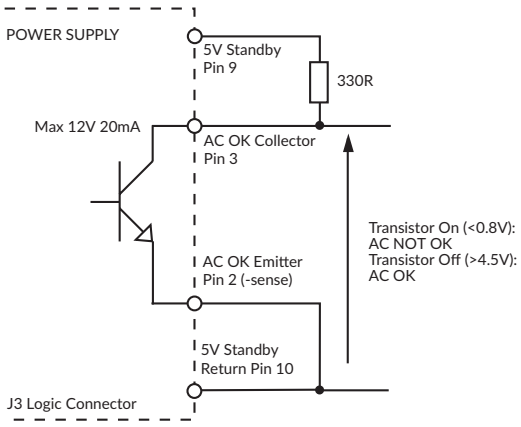
Temperature measurements (ambient ≤50°C)		
Component	**Recommended temperature °C**	**Max temperature °C**
T1 coil	70°C	105°C
L1, LF1, LF2 coil	90°C	120°C
EC1	70°C	105°C
EC8	100°C	120°C

Signals & controls

	Function
Remote sense	Compensates for 0.5V total voltage drop
AC OK/Power fail	Open collector referenced to negative sense, transistor normally off when AC is good (see fig. 7 & 10) AC OK: Provides ≥5ms warning of loss of output from AC failure
Remote On/Off (Inhibit/Enable)	Uncommitted isolated optocoupler diode, powered diode inhibits both V1 & V2 (fan supply) (see fig.8 & 11)
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 9
Standby supply V3	Isolated 5V/0.2A supply, always present when AC supplied

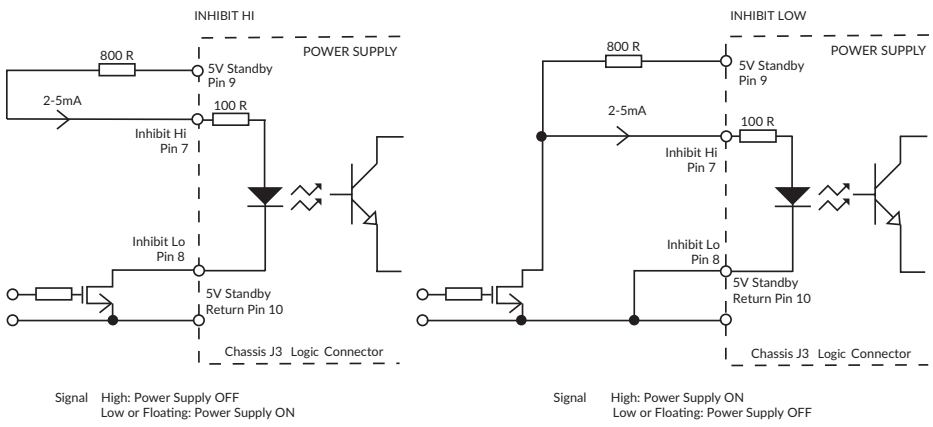
AC OK/Power fail

Figure 7



Remote On/Off (Inhibit)

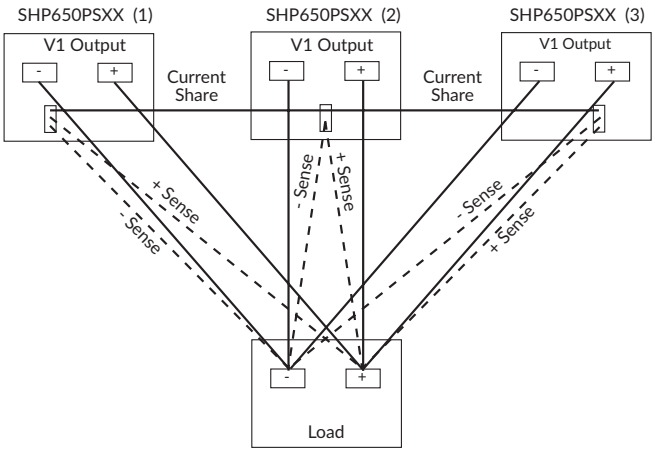
Figure 8



Signals & controls

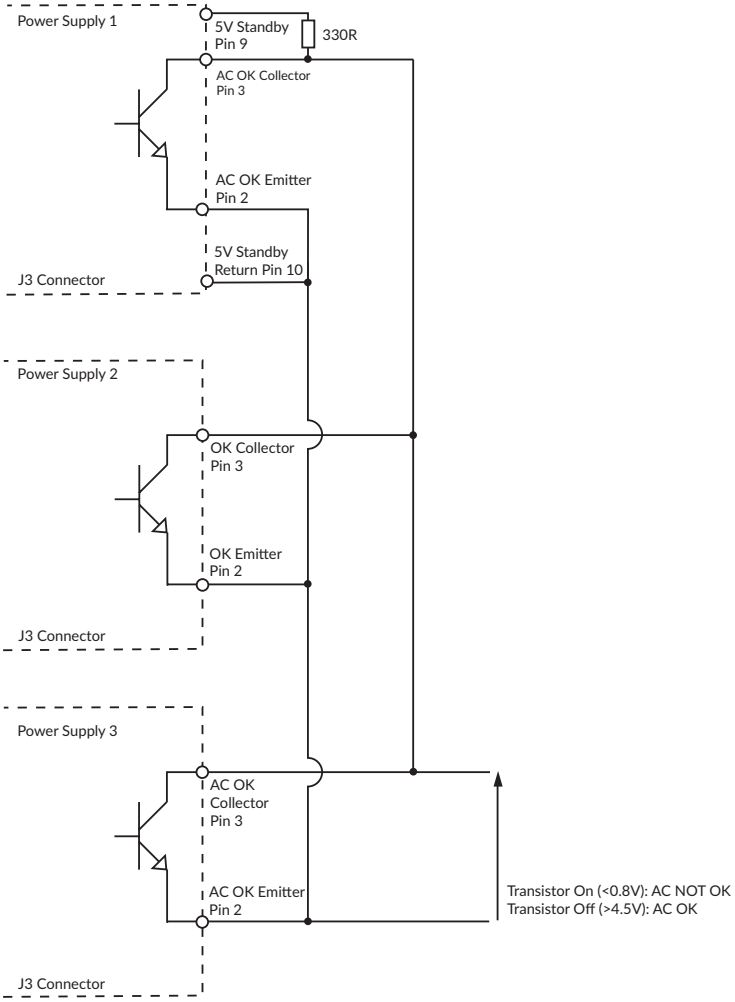
Parallel load & current share connection example

Figure 9



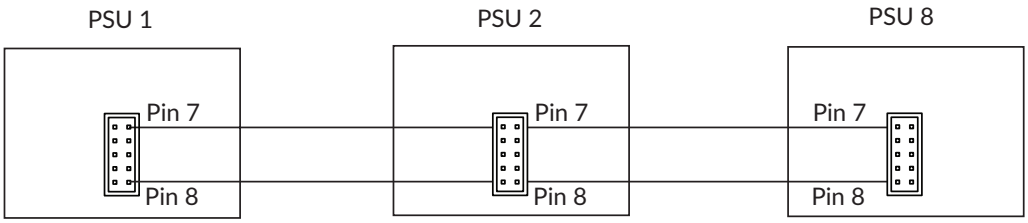
Parallel AC OK Connection

Figure 10



Parallel remote inhibit connection

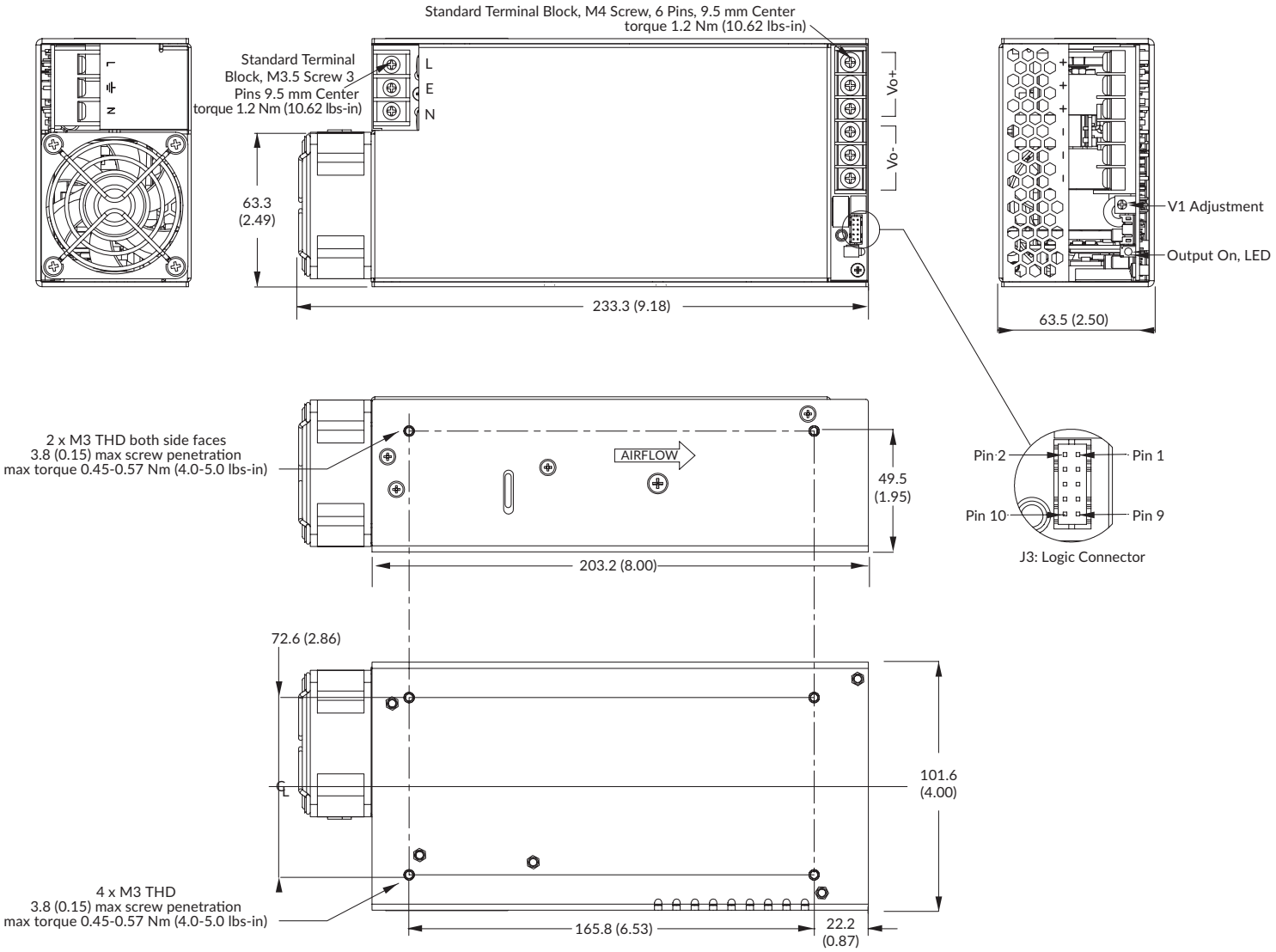
Figure 11



Open or TTL high = PSU On
Short circuit or TTL Low = PSU Off

Mechanical details

End fan (-EF)



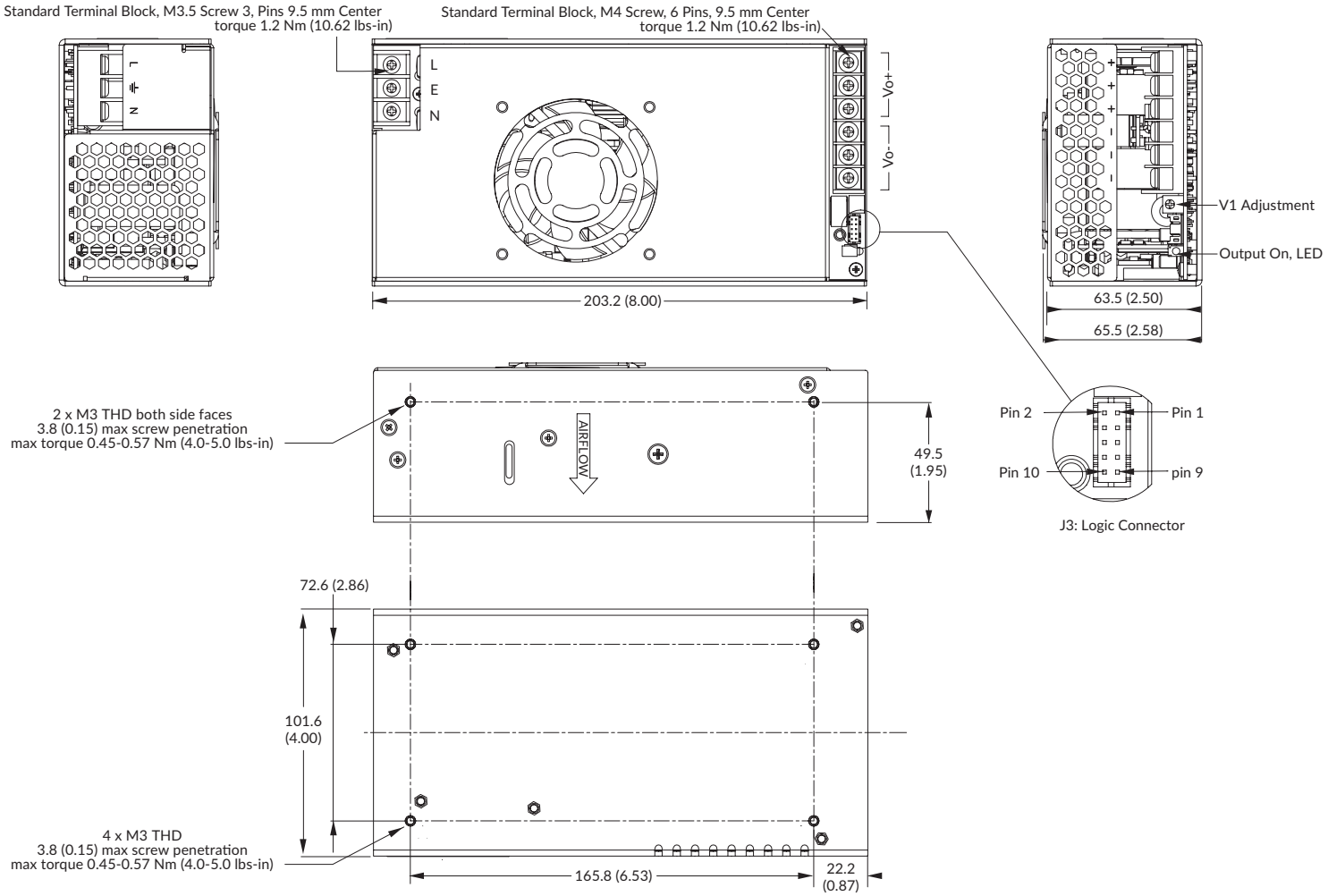
J3 logic connector (JST B10B-PHDSS)			
Pin	**Description**	**Pin**	**Description**
1	+ Sense	6	Current share
2	- Sense	7	+ Inhibit
3	AC OK/Power fail	8	- Inhibit
4	- Sense	9	+5V standby (V3)
5	Current share	10	5V standby return (V3)

Notes:

1. Dimensions shown in mm (inches).
2. Weight: 1.27kg (2.8lb).
3. J3 Mating plug: JST part no. PHDR-10VS, contact: 26-22 AWG JST part no. SPHD-001T-P0.5.

Mechanical details

Top fan (-TF)



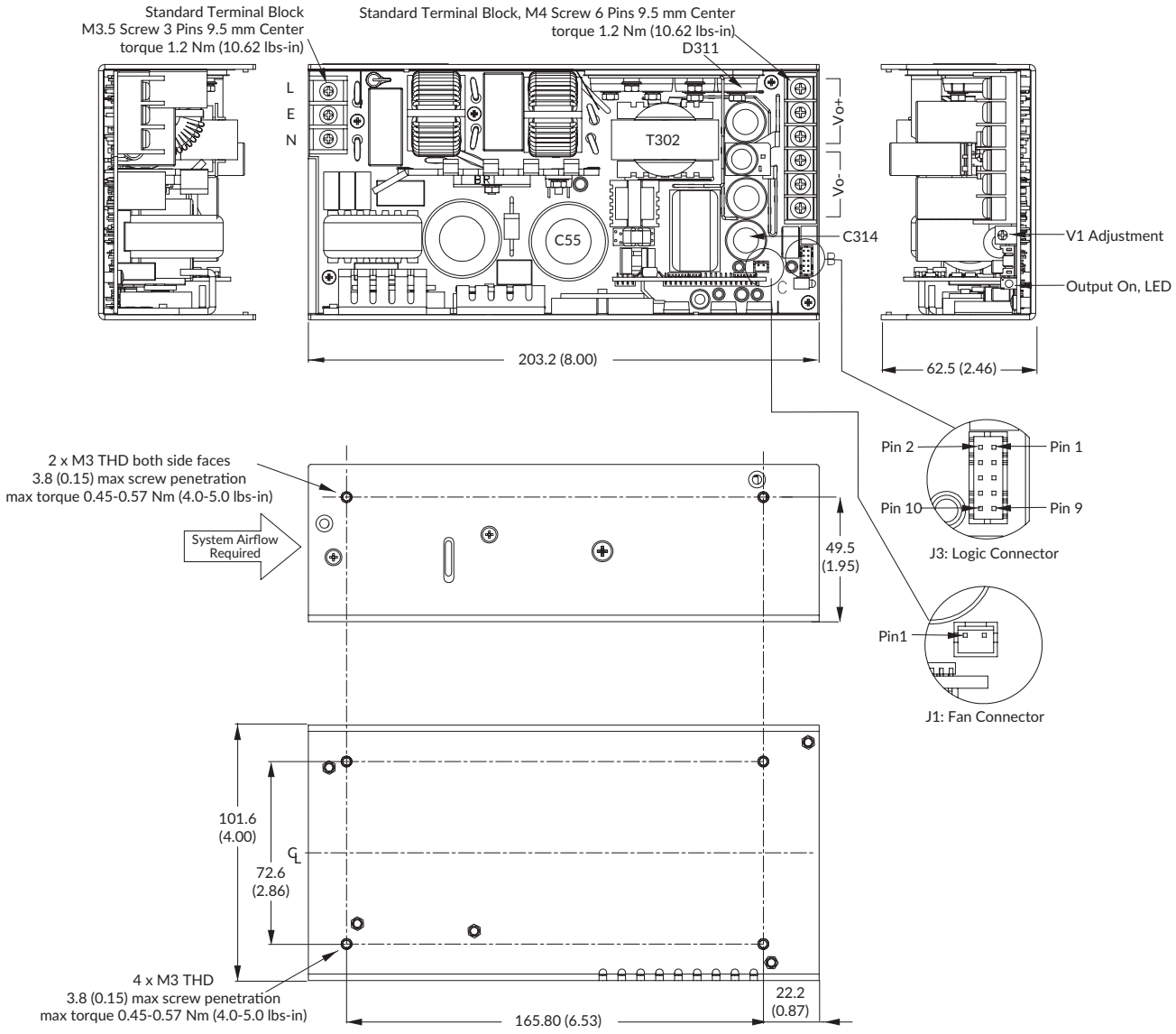
J3 logic connector (JST B10B-PHDSS)			
Pin	**Description**	**Pin**	**Description**
1	+ Sense	6	Current share
2	- Sense	7	+ Inhibit
3	AC OK/Power fail	8	- Inhibit
4	- Sense	9	+5V standby (V3)
5	Current share	10	5V standby return (V3)

Notes:

1. Dimensions shown in mm (inches).
2. Weight: 1.2kg (2.6lb).
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)



J1 fan connector JST B2B-PH-KL (LF) (SN)	
Pin	**Description**
1	+V
2	-V

J3 logic connector (JST B10B-PHDSS)			
Pin	**Description**	**Pin**	**Description**
1	+ Sense	6	Current share
2	- Sense	7	+ Inhibit
3	AC OK/Power fail	8	- Inhibit
4	- Sense	9	+5V standby (V3)
5	Current share	10	5V standby return (V3)

Notes:

1. Dimensions shown in mm (inches).
2. Weight: 1.1kg (2.4lb).
3. Requires system airflow, see thermal considerations.
4. J1 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.