GSP500 series

500W Fan cooled **180W** Convection cooled

AC-DC power supplies

The GSP500 has been designed to offer a full 500W of output power in a very small mechanical footprint, whilst still providing peak power to 650W, a 5V standby output with 2 Amps of current capability and an input standby power draw of <1W when the inhibit is activated.

Approved for both IT and medical applications the series has output versions from 12V to 48VDC and can be supplied as a U channel for system cooling or with optional very quiet integral fans (-EF). These fans are intelligently controlled to provide the most optimised acoustic noise in the system and further more the GSP500 can provide up to 180W without fan cooling, thus allowing fans to be switched off during periods of lower system loading.



Features

- 500W fan cooled 180W convection cooled
- 650W peak power
- 152.4 x 101.6mm (6" x 4") footprint, 41.9mm profile
- Regulated single outputs 12V, 24V & 48VDC
- Input range 80 to 264VAC
- Medical & ITE safety approvals
- <0.5W standby power
- Remote On/Off
- 5VDC 2A standby
- -40°C to +70°C operation
- 3 year warranty

Applications

Healthcare

Industrial electronics

Instrumentation

Medical diagnostic

Technology

Dimensions

GSP500:
152.4 x 101.6 x 41.9 mm (6.00" x 4.00" x 1.65")

GSP500-EF:
170.4 x 101.6 x 41.9 mm (6.71" x 4.00" x 1.65")

Documentation

For further information click the link or scan the code

→ xppower.com

Models & ratings

Model number[1,3]	Output voltage V1	Output current V1		V standby output		Fan supply	Max output power	
		Convection	Fan	Convection	Fan		Nom	Peak[2]
GSP500PS12-EF	12.0VDC	15.00A	42.0A	5V/1A	5V/2A	12 V/0.3A	500W	650W
GSP500PS24-EF	24.0VDC	7.50A	21.0A	5V/1A	5V/2A	12 V/0.3A	500W	650W
GSP500PS48-EF	48.0VDC	3.75A	10.5A	5V/1A	5V/2A	12 V/0.3A	500W	650W

Notes:

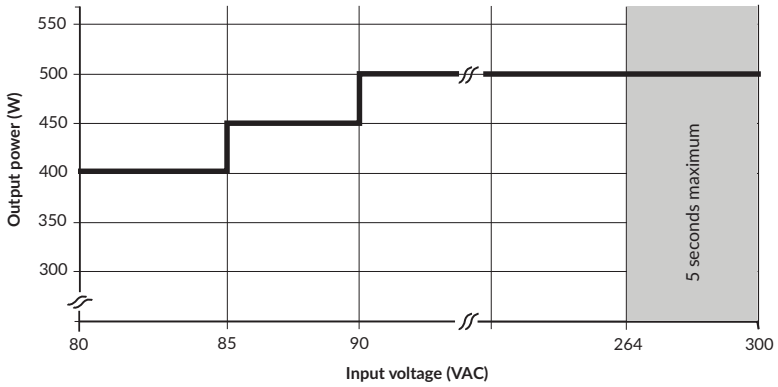
1. Remove suffix -EF (EndFan) for use with integral system cooling.
2. Peak power available for 100ms maximum with a 10% duty cycle. The average power in a period should be equal or less than the normal power.
3. For optional current share version, add suffix 'P', e.g. GSP500PS24P or GSP500PS24P-EF.

Input

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Input voltage - operating	80	115/230	264	VAC	Derate output power <90VAC. See fig 1
Input voltage - fault condition			300	VAC	5 seconds max
Input frequency	47	50/60	63	Hz	
Power factor		>0.9			230VAC, 100% load
Input current - full load		5.0/2.4		A	115/230 VAC
Inrush current		60		A	
Earth leakage current		80/220	250	µA	115/230VAC/50Hz Typ., 264VAC/60Hz Max
No load input power			0.5	W	All models, when inhibit activated
		3.0			GSP500PS12 - 115VAC
		1.3			GSP500PS12 - 230VAC
		3.0			GSP500PS24 - 115VAC
		1.2			GSP500PS24 - 230VAC
		4.8			GSP500PS48 - 115VAC
		2.3			GSP500PS48 - 230VAC
Input protection	F16A/250V internal fuse in both lines				

Input voltage derating curve

Figure 1

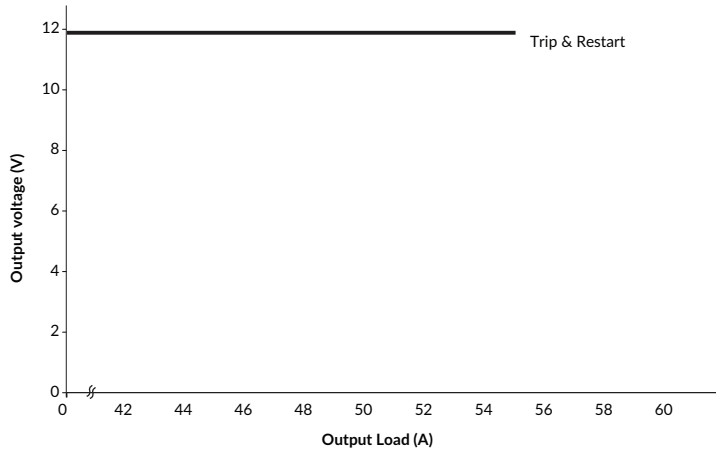


Output

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Output voltage - V1	12		48	VDC	See models and ratings table
Initial set accuracy			±1	%	50% load, 115/230VAC
Output voltage adjustment - V1			+1, -3	%	
Minimum load	No minimum load required				
Start up delay		0.5	2	s	115/230VAC, full load from input AC turn on
Hold up time	20			ms	
Drift			±0.02	A	After 20 min warm up
Line regulation		0.01	0.5	%	90-264VAC
Load regulation		0.2	1.0	%	0-100% load
Transient response			4	%	Recovery within 1% in less than 500µs for a 50-75% and 75-50% load step
Over/undershoot			0	%	
Ripple & noise		0.5	1.5	% pk-pk	20MHz bandwidth
Overvoltage protection	115		140	%	Vnom DC. Output 1, recycle input to reset
Overload protection	110		150	% I nom	See fig. 2. Trip and restart
Short circuit protection	Shutdown and autorecovery				
Temperature coefficient			0.05	%/°C	
Overtemperature protection	Shutdown and autorecovery				

Output overload characteristic

Figure 2
GSP500PS12 example (other similar)



General

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Efficiency		90		%	230VAC, full load (see fig. 3-5)
Isolation: input to output	4000			VAC	2 x MOPP
input to ground	1500			VAC	1 x MOPP
output to ground	500			VDC	
Switching frequency		65		kHz	PFC converter
	50	90	200		Main converter
		100			Standby converter
Power density			0.768 (12.6)	W/cm³ (W/in³)	Fan cooled
Mean time between failure		216		khrs	MIL-HDBK-217F, Notice 2 +25°C GB
Weight		0.85 (1.87)		kg (lb)	GSP500PSxx models
		0.90 (1.98)			GSP500PSxx-EF models

Efficiency graphs

Efficiency vs load

Figure 3
GSP500PS12

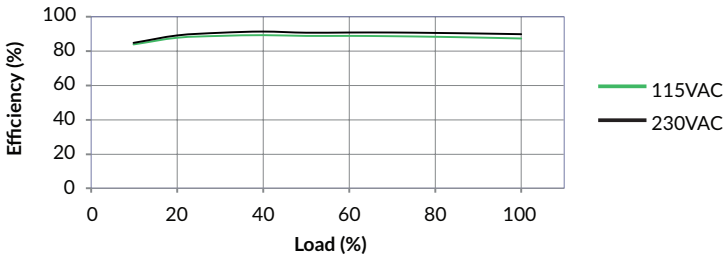


Figure 4
GSP500PS24

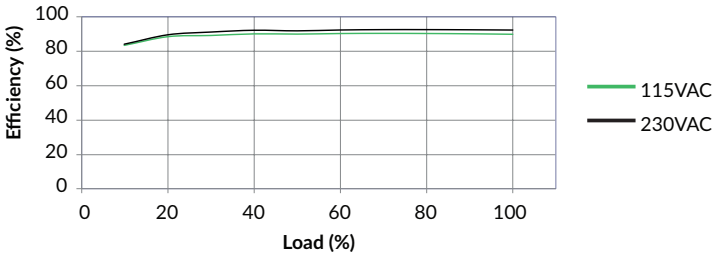
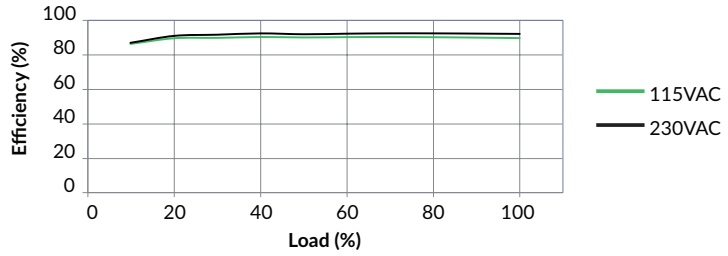


Figure 5
GSP500PS48

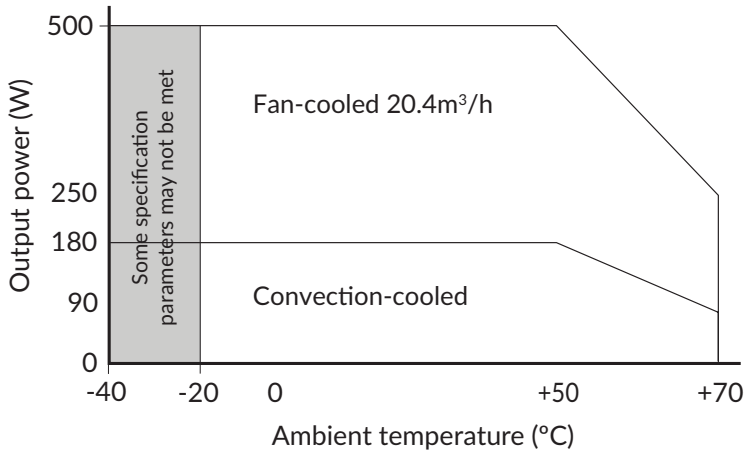


Environmental

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Operating temperature	-20		+70	°C	Start up at -40°C. See derating curve, fig. 6
Storage temperature	-40		+85	°C	
Cooling	20.4 (12)			m^3/h (CFM)	GSP500PSxx models
Humidity	5		95	%RH	Non-condensing
Operating altitude			5000	m	
Acoustic fan noise GSP500PSxx models		59.9		Lw dB (A)	Full speed
		52.1			Mid speed
		36.6			Low speed
Shock	3 x 30g shocks in each plane, total 18 shocks. 30g = 11ms (±0.5msec), half sine. Conforms to EN60068-2-27 & EN60068-2-47				
Vibration	Single axis 10-500 Hz at 2g sweep and endurance at resonance in all 3 planes. Conforms to EN60068-2-6				

Temperature derating curve

Figure 6



EMC: emissions

Phenomenon	Standard	Test level	Notes & conditions
Conducted	EN55011/32	Class B	
Radiated	EN55011/32	Class A	
		Class B	With 1 Turn Wurth 742 712 22 core or similar on output lead
Harmonic 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		All models
		Class C		>50W
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	EN55035 (100VAC)	Dip >95% (0VAC), 8.3ms	A	
		Dip 30% (70VAC), 416ms	A	
		Dip >95% (0VAC), 4160ms	B	
	EN55035 (240VAC)	Dip >95% (0VAC), 10ms	A	
		Dip 30% (168VAC), 500ms	A	
		Dip >95% (96VAC), 5000ms	B	
	EN60601-1-2 (100VAC)	Dip >95% (0VAC), 10ms	A	
		Dip 60% (40VAC), 100ms	A	Derate Output Power to 250W
		Dip 30% (70VAC), 500ms	A	
		Dip >95% (0VAC), 5000ms	B	
	EN60601-1-2 (240VAC)	Dip 100% (0VAC), 10ms	A	
		Dip 60% (96VAC), 100ms	A	
		Dip 30% (168VAC), 500ms	A	
		Dip >95% (0VAC), 5000ms	B	

Safety approvals

Certification	Standard	Notes & conditions
CB report	IEC60950-1 & IEC62368-1	Information Technology
	IEC60601-1 Including Risk Management	Medical
UL	UL62368-1, CSA62368-1 via cUL	Information Technology
	ANSI/AAMI ES60601-1 & CSA C22.2, No.60601-1	Medical
TUV	EN62368-1	Information Technology
	EN60601-1	Medical
Equipment protection class	Class I	
CE	Meets all applicable directives	
UKCA	Meets all applicable legislation	

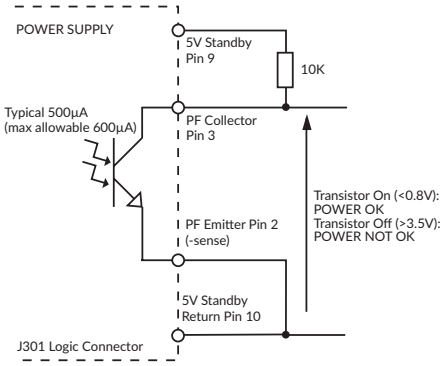
Isolation	Means of Protection	Category
Primary to Secondary	2 x MOPP (Means of Patient Protection)	IEC60601-1
Primary to Earth	1 x MOPP (Means of Patient Protection)	

Signal & controls

Certification	Notes & conditions
Power fail (PF)	Open collector referenced to negative sense, transistor normally on when power is good (see fig. 7); power is considered good when PFC bulk capacitor voltage is normal. PF: Provides ≥ 5ms warning of loss of output from power failure.
Inhibit	Uncommitted isolated optocoupler diode, powered diode inhibits both V1 and fan supply (see fig. 8). During inhibit the standby supply and current should be limited to 1A for thermal reasons.
Output good	LED Indicator
Fan speed control GSP500PSxx-EF Models	The fan speed is set to one of 4 states (high, mid, low or off) dependant on the internal power supply ambient temperature, input voltage and output load at any given time.
Standby supply	5V/2A Isolated supply present when AC applied.
Remote sense	Compensates for 0.5V total voltage drop.
Current share	Optional, on 'P' version only. Connecting pins 5 or 6 on one unit to pins 5 or 6 on another like voltage unit will force the current to be shared within 10% between the two outputs. Up to three units can share current. (see fig. 9)

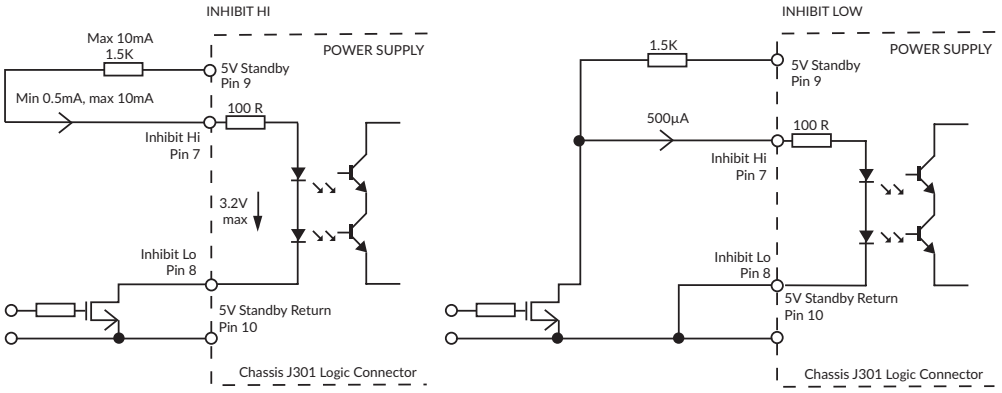
Power fail (PF)

Figure 7



Remote On/Off (Inhibit)

Figure 8

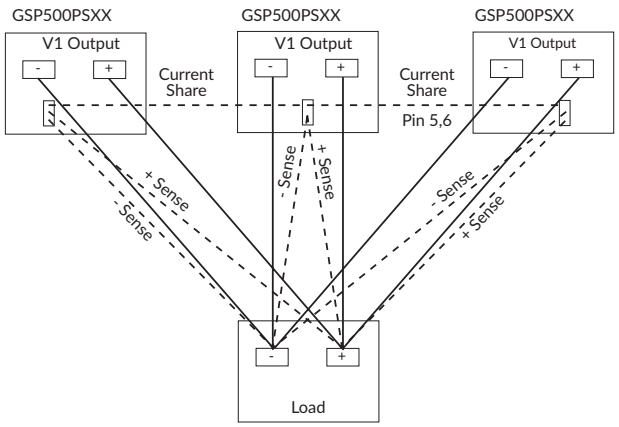


Signal High: Power Supply OFF
Low or Floating: Power Supply ON

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

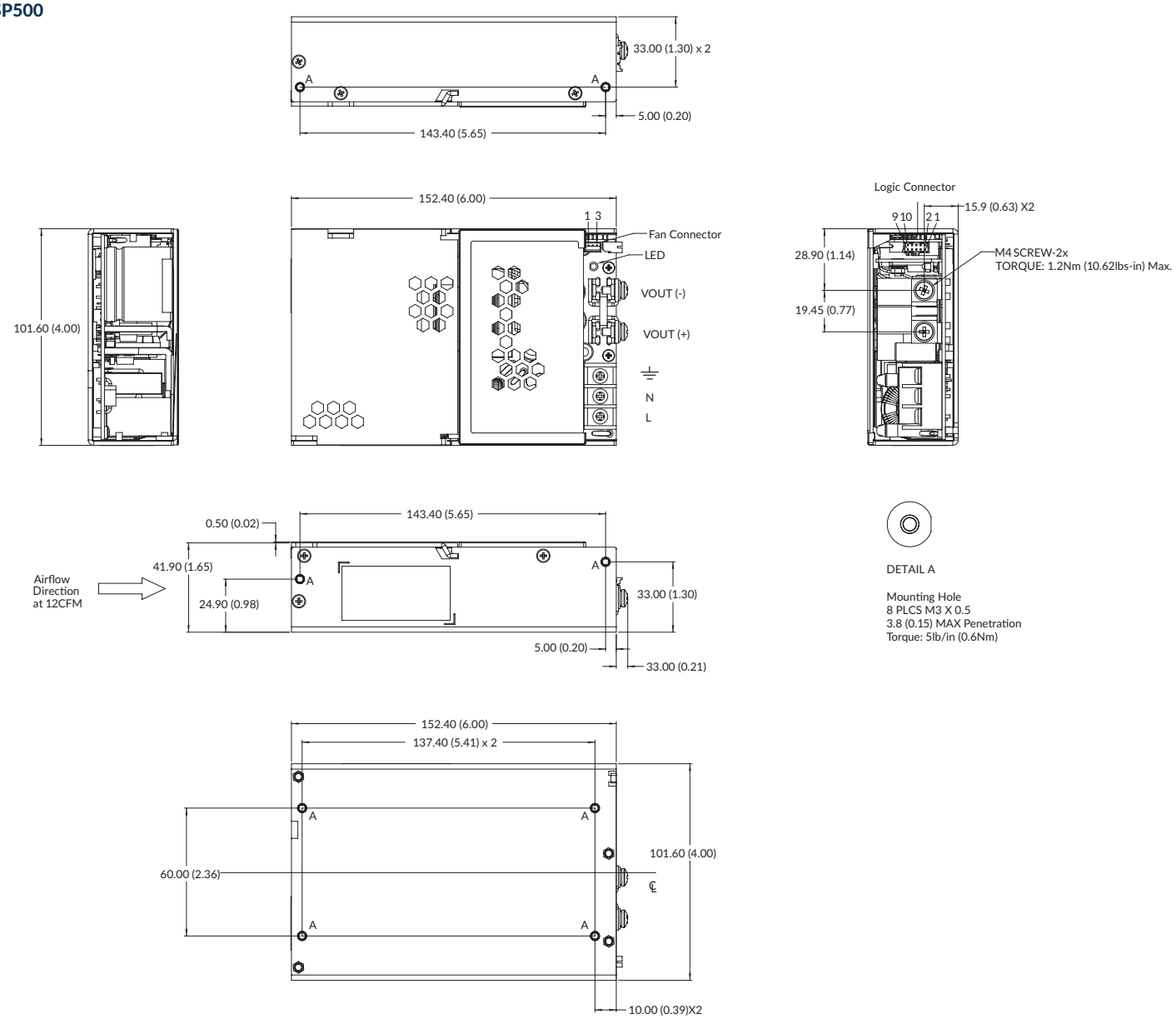
Current share

Figure 9



Mechanical details

GSP500



Fan connector[3] S3B-PH-KL (LF)	
Pin	**Function**
1	+12V
2	N/C
3	GND

Logic connector[3] for standard versions JST B10B-PHDSS			
Pin	**Single**	**Pin**	**Single**
1	+Sense	6	No connection
2	-Sense	7	+Inhibit
3	Power fail	8	-Inhibit
4	No connection	9	+5V standby
5	No connection	10	-5V standby

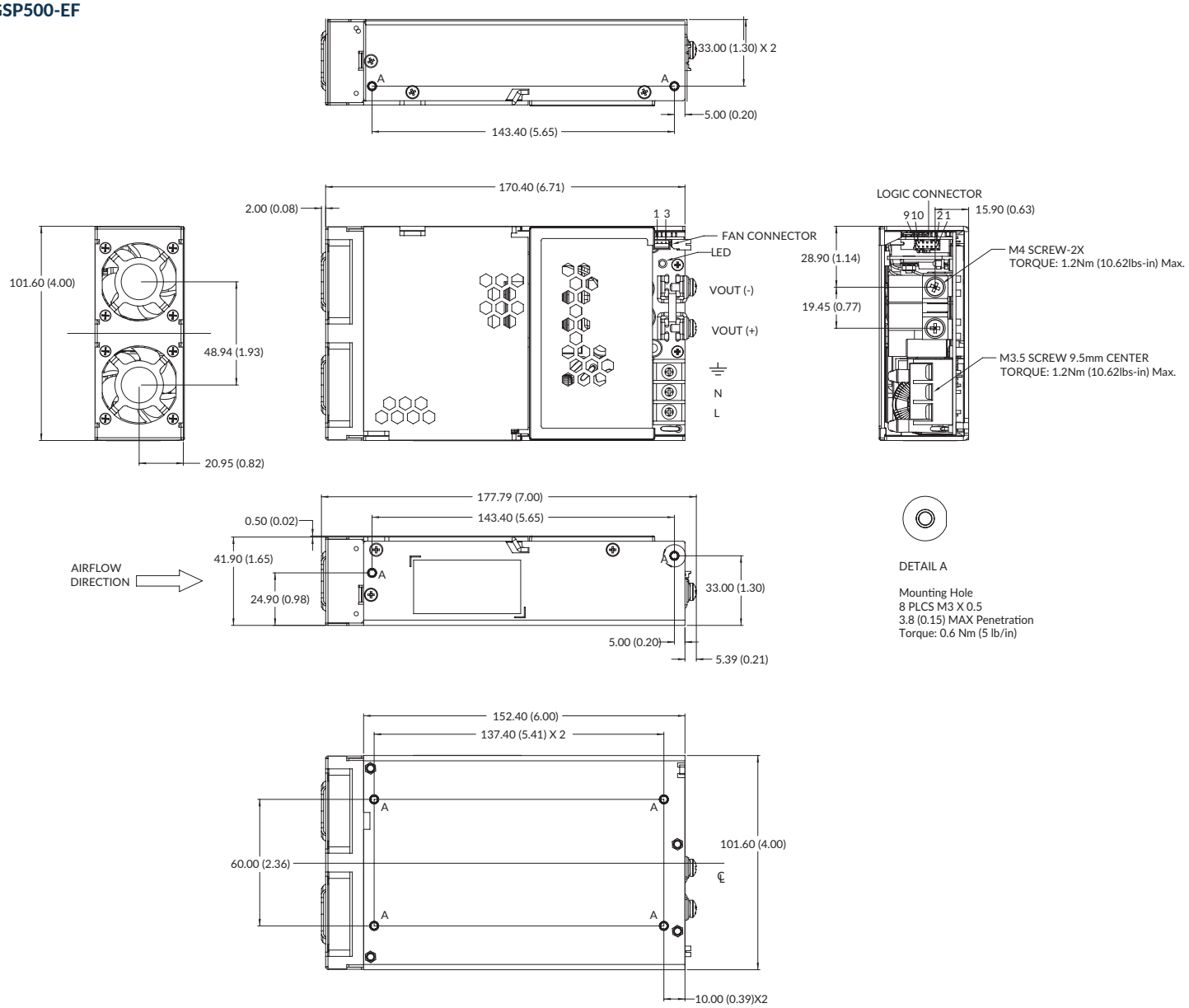
Logic connector[3] for Current Share versions -P JST B10B-PHDSS			
Pin	**Single**	**Pin**	**Single**
1	+Sense	6	Current share
2	-Sense	7	+Inhibit
3	Power fail	8	-Inhibit
4	No connection	9	+5V standby
5	Current share	10	-5V standby

Notes:

1. All dimensions in mm (inches).
2. Tolerance x.x (x.xx) = 0.50 (0.02); x.xx (x.xxx) = 0.25 (0.01)
3. Fan connector mates with JST housing PHR-3 and SPH-002T-P0.5S crimp terminals or equivalent. Logic connector J301 mates with JST housing PHDR-10VS and SPHD-001T-P0.5 crimp terminals.

Mechanical details

GSP500-EF



Fan connector[3] S3B-PH-KL (LF)	
Pin	**Function**
1	+12V
2	N/C
3	GND

Logic connector[3] for standard versions JST B10B-PHDSS			
Pin	**Single**	**Pin**	**Single**
1	+Sense	6	No connection
2	-Sense	7	+Inhibit
3	Power fail	8	-Inhibit
4	No connection	9	+5V standby
5	No connection	10	-5V standby

Logic connector[3] for Current Share versions -P JST B10B-PHDSS			
Pin	**Single**	**Pin**	**Single**
1	+Sense	6	Current share
2	-Sense	7	+Inhibit
3	Power fail	8	-Inhibit
4	No connection	9	+5V standby
5	Current share	10	-5V standby

Notes:

1. All dimensions in mm (inches).
2. Tolerance x.x (x.xx) = 0.50 (0.02); x.xx (x.xxx) = 0.25 (0.01)
3. Fan connector mates with JST housing PHR-3 and SPH-002T-P0.5S crimp terminals or equivalent. Logic connector J301 mates with JST housing PHDR-10VS and SPHD-001T-P0.5 crimp terminals.

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
L3 coil	+120°C
Q7 body	+120°C
Q102 body	+120°C
C20	+105°C
C102	+105°C

Service life

The estimated service life of the GSP500PSxx 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 a key capacitors with in the product when installed by the end application. The worst case of the two figures should be taken as the indicative service life in 24/7 operation.

The graph below expresses the estimated lifetime of a given component temperature and assumes continuous operation at this temperature.

Estimated service life vs component temperature

