

450W Fan cooled

250W Convection cooled

AC-DC power supplies

Designed to minimize size and maximize efficiency to facilitate integration into ever more compact equipment, the chassis mount ECH450 is the ideal choice. The ECH450 range has medical approvals with 2 x MOPP (input to output), 1 x MOPP (input to ground) & 1 x MOPP (output to ground) making it suitable for BF applications, they also meet IEC/UL/EN62368-1 safety approval for information technology equipment.

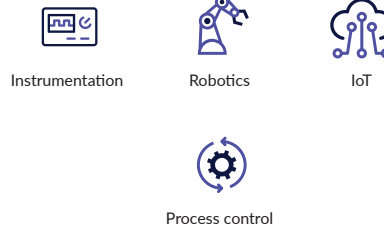
The full 450W is available when fan cooled with 250W available in convection cooled applications. The standard model is open frame, options are: supplied with a vented cover (model numbers with a -C suffix); encased with an end fan fitted (model numbers with a -EF suffix) or encased with a top fan fitted (model numbers with a -TF suffix).



Features

- ▶ 450W fan cooled 250W convection cooled
- ▶ 127.0 x 76.2mm (5" x 3") footprint 36.1mm profile
- ▶ Regulated single outputs 12V to 54VDC
- ▶ Input range 90 to 264VAC
- ▶ Medical 2 x MOPP (BF) & ITE approvals
- ▶ High efficiency, up to 94%
- ▶ 5VDC 1A standby
- ▶ 12VDC 0.6A fan supply
- ▶ Remote On/Off
- ▶ -20°C to +70°C operation
- ▶ 3 year warranty

Applications



Dimensions

ECH450:

127.0 x 76.2 x 36.1mm (5.00" x 3.00" x 1.42")

ECH450-TF, ECH450-C:

127.0 x 86.6 x 50.0mm (5.00" x 3.41" x 1.97")

ECH450-EF:

148.2 x 80.0 x 40.6mm (5.83" x 3.15" x 1.60")

Documentation

Click the link or scan the code

→ xppower.com



Models & ratings

Model number ⁽⁴⁾	Output voltage	Output Current		Standby output	Fan Output ⁽²⁾	Efficiency ⁽¹⁾
		Fan cooled	Convection cooled			
ECH450PS12	12.0V	37.5A	20.8A	5.0VDC/1.0A	12VDC/0.6A	93%
ECH450PS15	15.0V	30.0A	16.6A			93%
ECH450PS19	19.0V	23.7A	13.0A			93%
ECH450PS24	24.0V	18.8A	10.4A			94%
ECH450PS36	36.0V	12.5A	6.9A			94%
ECH450PS48	48.0V	9.4A	5.2A			94%
ECH450PS54	54.0V	8.33A	4.63A			94%

Notes:

1. Typical efficiencies measured at 100% load and 230 VAC input.
2. Typical voltage, actual regulated voltage will be in range of 11.4V to 12.6V.
3. Regulation of the fan output requires a minimum load of 10W on the main output.
4. Add suffix -C to part number for vented cover version, -TF for top fan version and -EF for end fan version.

Input

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Input voltage - operating	90	115/230	264	VAC	Derate output from 100% at 100 VAC to 90% at 90VAC
Input frequency	47	50/60	63	Hz	
Power factor		>0.9			230VAC, 100% load. EN61000-3-2 class A, class C >175W
Input current - full load		4.5/2.3		A	115/230VAC
Inrush current			120	A	230VAC cold start, +25°C
Earth leakage current		80/135	250	µA	115/230VAC/50Hz (Typ), 264VAC/60Hz (Max)
No load input power			0.21	W	When main output is Inhibited
Input protection	F8A/250VDC Internal fuse fitted in line and neutral.				

Output - main output

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Output voltage - V1	12		54	VDC	See models and ratings table
Initial set accuracy			±1	%	50% load, 115/230VAC
Minimum load	No minimum load required				
Start up delay			2	s	115/230VAC full load.
Hold up time	10			ms	Min at full load, 115VAC.
Drift			±0.02	%	After 20 min warm up
Line regulation			±0.5	%	90-264VAC
Load regulation			±1	%	0-100% load.
Transient response			4	%	Recovery within 1% in less than 500µs for a 50-75% and 75-50% load step
Over/undershoot		2	5	%	Full load
Ripple & noise			2	% pk-pk	20MHz bandwidth and 47µF electrolytic capacitor in parallel with 0.1µF ceramic capacitor.
Overvoltage protection	110		130	%	Vnom, recycle input to reset
Overload protection	110		130	% I nom	
Short circuit protection	Trip & restart				
Temperature coefficient			0.02	%/C	
Overtemperature protection	Measured internally, auto resetting				
Output leakage current			50	µA	264VAC/60Hz

Output - 5VDC standby output

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Output voltage - V standby		5.0		VDC	See models and ratings table
Initial set accuracy			±1	%	50% load, 115/230VAC
Minimum load	No minimum load required				
Start up delay			0.5	s	115/230VAC full load.
Hold up time	500			ms	Min at full load, 115VAC.
Drift			±0.02	%	After 20 min warm up
Line regulation			±0.5	%	90-264VAC
Load regulation			1.5	%	0-100% load.
Transient response			4	%	Recovery within 1% in less than 500µs for a 50-75% and 75-50% load step
Over/undershoot			5	%	Full load
Ripple & noise			2	% pk-pk	20MHz bandwidth and 47µF electrolytic capacitor in parallel with 0.1µF ceramic capacitor.
Overload protection			2	% I nom	
Short Circuit protection	Trip & restart				
Temperature coefficient			0.02	%/°C	
Remote on/off	See application note				

General

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Efficiency		93/94		%	230 VAC Full load (see fig. 1 to 4)
Isolation: Input to output Input to ground Output to ground	4000			VAC	2 x MOPP
	1500			VAC	1 x MOPP
	1500			VAC	1 x MOPP
Switching frequency		70		kHz	PFC, Fixed
	82		185		Main converter, Variable
	22		85		For 5VDC standby output, variable
Power density			1.28 (21)	W/cm ³ (W/in ³)	
MTBF		300		khrs	MIL-HDBK-217F, Notice 2 +25°C GB
Weight		390 (0.86)		g (lbs)	Open frame
		570 (1.26)			-C version
		585 (1.29)			-TF version
		660 (1.46)			-EF version

Environmental

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Operating temperature	-20		+70	°C	See derating curve, figure 5. Safety approved to +50°C
Storage temperature	-40		+85	°C	
Cooling	22.08 (13.8)			m ³ /h (CFM)	Fan cooled >250W
Humidity	5		95	%RH	Non-condensing
Operating altitude			5000/4000	m	ITE/medical
Shock	±3 x 30g shocks in each plane, total 18 shocks. 30g = 11ms (+/- 0.5msecs), half sine. Conforms to EN60068-2-27				
Vibration	Single axis 10-500 Hz at 2g sweep and endurance at resonance in all 3 planes. Conforms to EN60068-2-6				

Emissions - EMC

Phenomenon	Standard	Test level	Notes & conditions
Conducted	EN55011/32	Class B	
Radiated	EN55011/32	Class B	
Harmonic current	EN61000-3-2	Class A	Class C for load >175W
Voltage flicker	EN61000-3-3		

Immunity - EMC

Phenomenon	Standard	Test Level	Criteria	Notes & conditions
Medical device EMC	IEC60601-1-2	Ed.4.0 : 2014	as below	
Low voltage PSU EMC	EN61204-3	High severity level	as below	
ESD	EN61000-4-2	±8kV contact, ±15kV air	A	±8kV contact, ±15kV air
Radiated	EN61000-4-3	3	A	
EFT	EN61000-4-4	3	A	
Surge	EN61000-4-5	Installation class 3	A	
Conducted	EN61000-4-6	3	A	
Magnetic fields	EN61000-4-8	4	A	
Dips and interruptions	EN55035 (100VAC)	Dip >95% (0VAC), 8.3ms	A	
		Dip 30% (70VAC), 416ms	B	
		Dip >95% (0VAC), 4160ms	B	
	EN55035 (240VAC)	Dip >95% (0VAC), 10.0ms	A	
		Dip 30% (168VAC), 500ms	A	
		Dip >95% (0VAC), 5000ms	B	
	EN60601-1-2 (100VAC)	Dip 100% (0VAC), 10.0ms	A	
		Dip 100% (0VAC), 20ms	B	
		Dip 60% (40VAC), 100ms	B	
		Dip 30% (70VAC), 500ms	B	
	EN60601-1-2 (240VAC)	Dip 100% (0VAC), 5000ms	B	
		Dip 100% (0VAC), 10.0ms	A	
		Dip 100% (0VAC), 20ms	B	
		Dip 60% (96VAC), 100ms	A	
		Dip 30% (168VAC), 500ms	A	
		Dip 100% (0VAC), 5000ms	B	

Safety approvals

Certification	Standard	Notes & Cnditions
CB	IEC62368	Information technology
	IEC60601-1 Ed 3.1 Including Risk Management	Medical
UL	UL62368-1	Information technology
	ANSI/AAMI ES60601-1 & CSA C22.2 No.60601-1:08	Medical
EN	EN62368-1	Information technology
	EN60601-1	Medical
CE	Meets all applicable directives	
UKCA	Meets all applicable legislation	

Isolation	Standard	Notes & Cnditions
Primary to Secondary	2 x MOPP (Means of Patient Protection)	IEC60601-1 Ed 3.1
Primary to Earth	1 x MOPP (Means of Patient Protection)	
Secondary to Earth	1 x MOPP (Means of Patient Protection)	

Application notes

Efficiency vs load

Figure 1 - ECH450PS12 (250W)

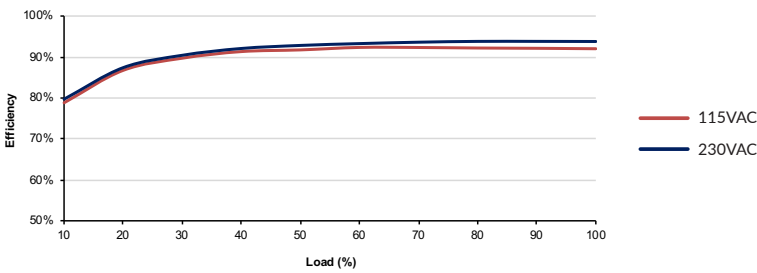


Figure 2 - ECH450PS12 (450W)

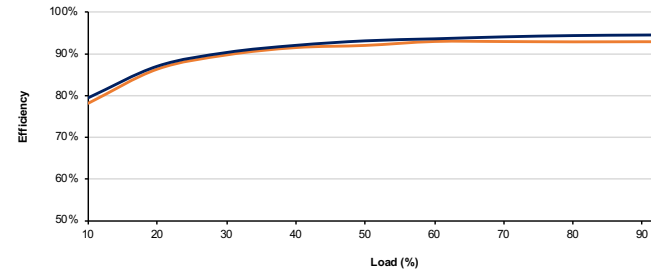


Figure 3 - ECH450PS24 (250W)

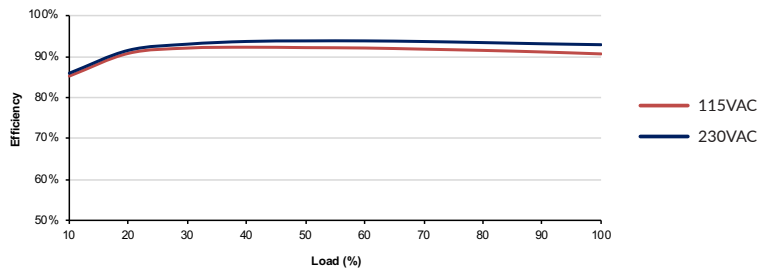
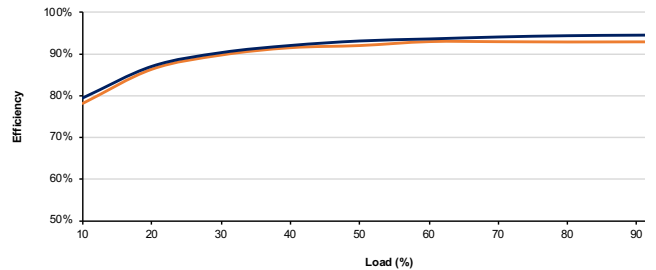


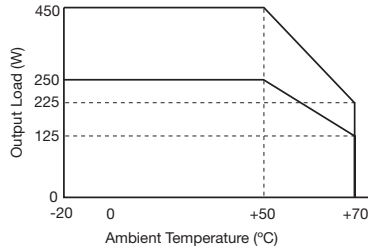
Figure 4 - ECH450PS24 (450W)



Application notes

Temperature Derating Curves

Figure 5



Remote on/off

To turn output off, connect Remote On/Off, Pin 3 to return, Pin 2.

Output is on if Remote On/Off, Pin 3 is floating or connected to 5VDC standby, Pin 1.

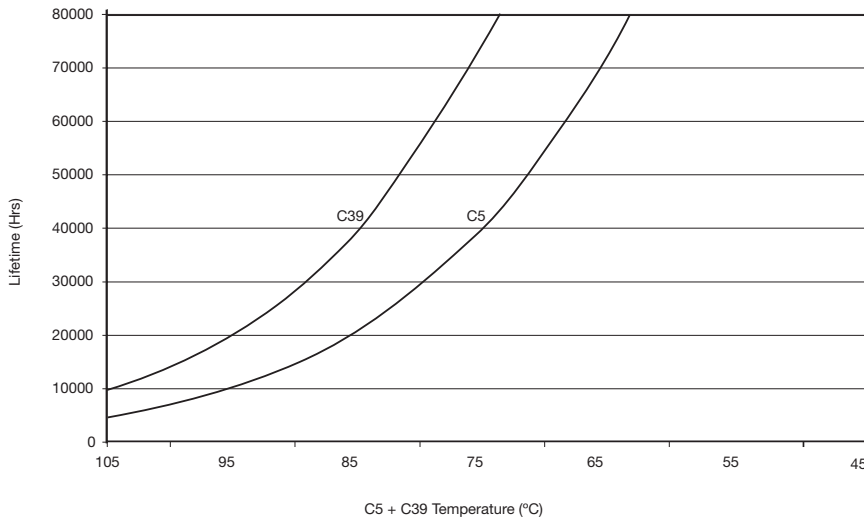
CN202 - Signal Connection	
Pin 1	+5VDC standby
Pin 2	Return
Pin 3	Remote On/Off

Service life

The estimated service life of the ECH450 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 capacitor 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.

Figure 6 - estimated service life vs component temperature



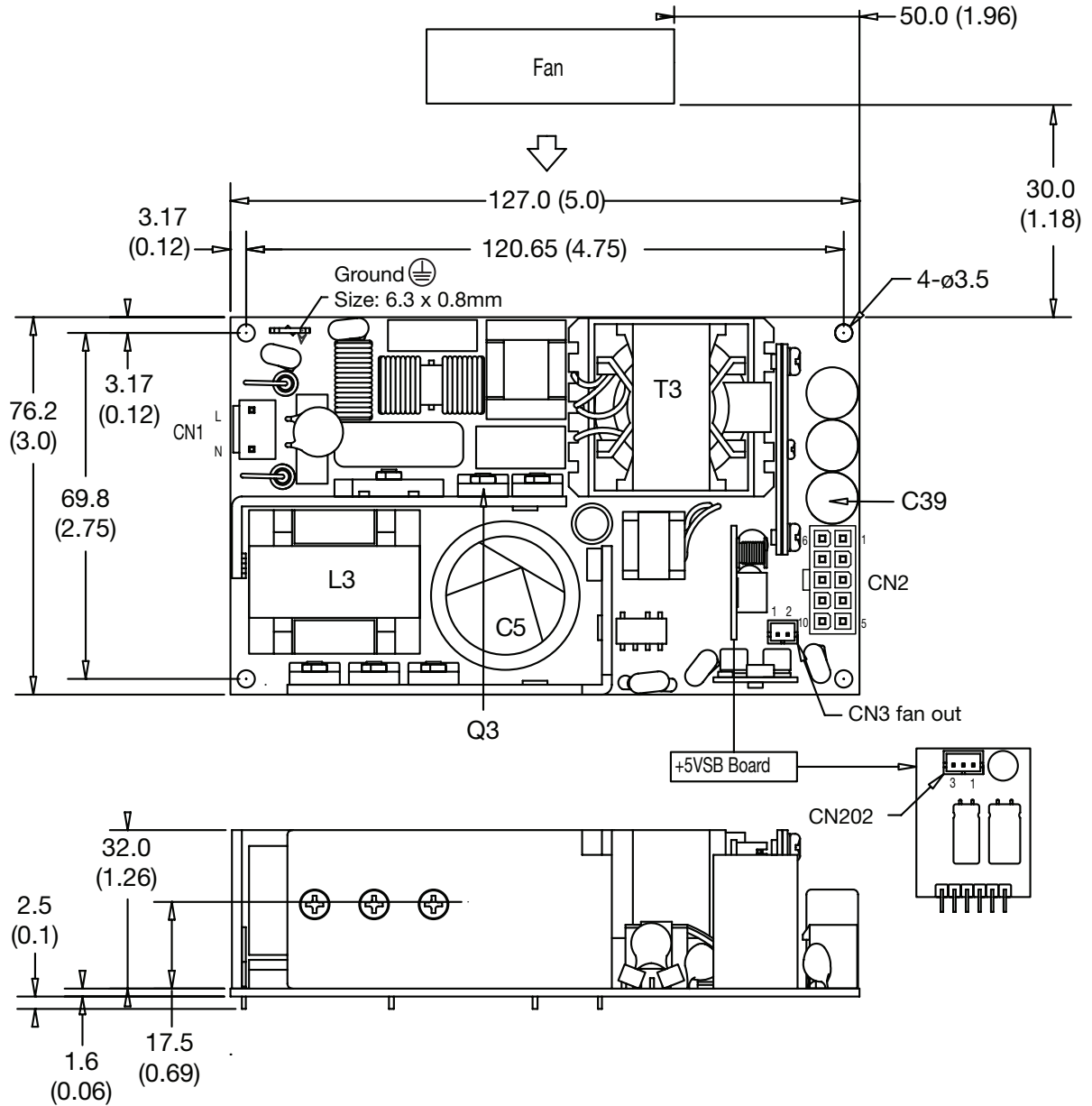
Thermal considerations

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 Standard Open Frame Mechanical Details on page 7 for component locations.

Temperature Measurements (At Maximum Ambient)	
Component	Max Temperature °C
T3 Coil	+110°C
L3 Coil	+120°C
Q3 Body	+120°C
C5	+105°C
C39	+105°C

Mechanical details

Standard open frame, 12-24VDC



CN1 - Input Connector	
Pin 1	Neutral
Pin 2	No Pin
Pin 3	Live

Mates with JST housing VHR-3N

CN2 - Output Connector			
Pin 1	+Vout	Pin 6	+Vout
Pin 2	+Vout	Pin 7	+Vout
Pin 3	+Vout	Pin 8	-Vout
Pin 4	-Vout	Pin 9	-Vout
Pin 5	-Vout	Pin 10	-Vout

Mates with Molex 39-01-2100

CN3 - Fan Connector	
Pin 1	Fan+
Pin 2	Fan-

Mates with JST housing PHR-2

CN202 - Signal Connector	
Pin 1	+5V Standby
Pin 2	Return
Pin 3	Remote On/Off

Mates with JST housing PHR-2

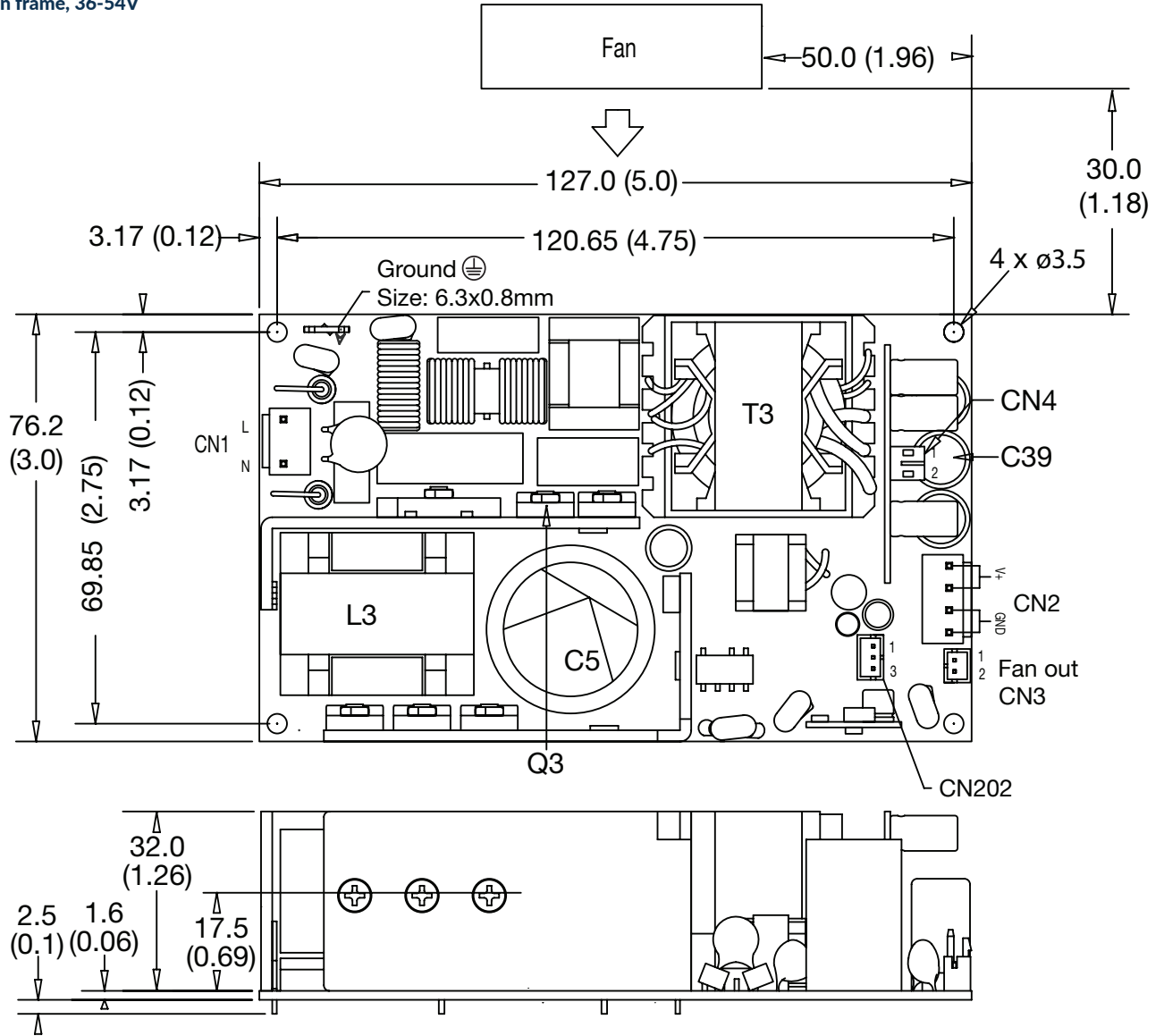
Notes:

1. All dimensions in mm (inches). Tolerance .xx = 0.50 (±0.02)

2. Weight: 390g (0.86lbs) approx.

Mechanical details

Standard open frame, 36-54V



CN1 - Input Connector	
Pin 1	Neutral
Pin 2	No Pin
Pin 3	Live

Mates with JST housing VHR-3N

CN2 - Output Connector	
Pin 1	+Vout
Pin 2	+Vout
Pin 3	-Vout
Pin 4	-Vout

Mates with JST housing VHR-4N

CN3 - Fan Connector	
Pin 1	Fan+
Pin 2	Fan-

Mates with JST housing PHR-2

CN202 - Signal Connector	
Pin 1	+5V Standby
Pin 2	Return
Pin 3	Remote On/Off

Mates with JST housing PHR-3

CN4 - Remote Sense	
Pin 1	+Sense
Pin 2	-Sense

Mates with JST housing PHR-2

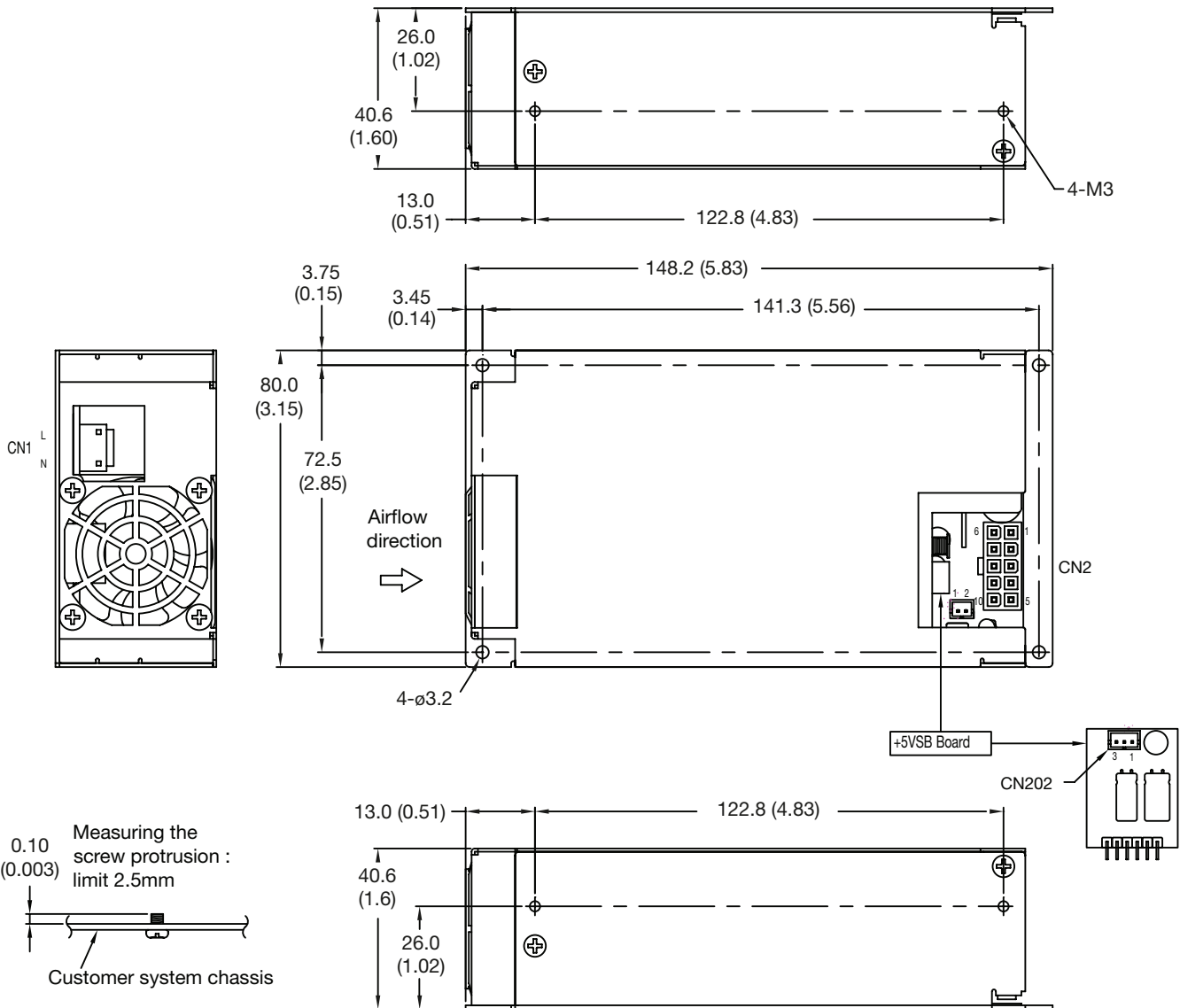
Notes:

1. All dimensions in mm (inches). Tolerance .xx = 0.50 (± 0.02)

2. Weight: 390g (0.86lbs) approx.

Mechanical details

End Fan Version (-EF) 12-24VDC



CN1 - Input Connector	
Pin 1	Neutral
Pin 2	No Pin
Pin 3	Live

Mates with JST housing VHR-3N

CN2 - Output Connector			
Pin 1	+Vout	Pin 6	+Vout
Pin 2	+Vout	Pin 7	+Vout
Pin 3	+Vout	Pin 8	-Vout
Pin 4	-Vout	Pin 9	-Vout
Pin 5	-Vout	Pin 10	-Vout

Mates with Molex 39.01-2100

CN202 - Signal Connector	
Pin 1	+5V Standby
Pin 2	Return
Pin 3	Remote On/Off

Mates with JST housing PHR-3

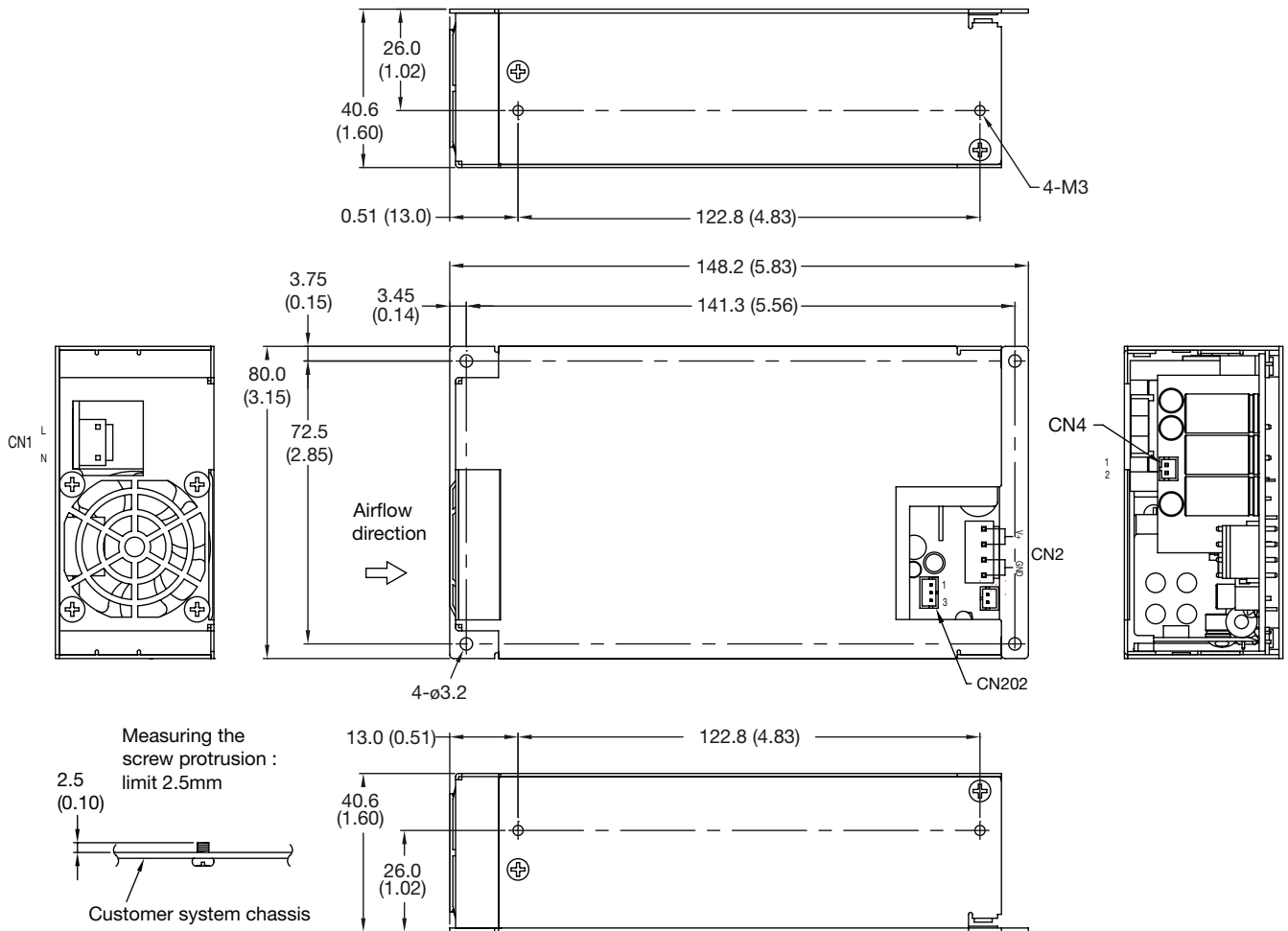
Notes:

1. All dimensions in mm (inches). Tolerance .xx = 0.50 (±0.02)

2. Weight: 660g (1.46lbs) approx.

Mechanical details

End Fan Version (-EF), 36-54VDC



CN1 - Input Connector	
Pin 1	Neutral
Pin 2	No Pin
Pin 3	Live

Mates with JST housing VHR-3N

CN2 - Output Connector	
Pin 1	+Vout
Pin 2	+Vout
Pin 3	-Vout
Pin 4	-Vout

Mates with JST housing VHR-4N

CN202 - Signal Connector	
Pin 1	+5V Standby
Pin 2	Return
Pin 3	Remote On/Off

Mates with JST housing PHR-3

CN4 - Remote Sense	
Pin 1	+Sense
Pin 2	-Sense

Mates with JST housing PHR-2

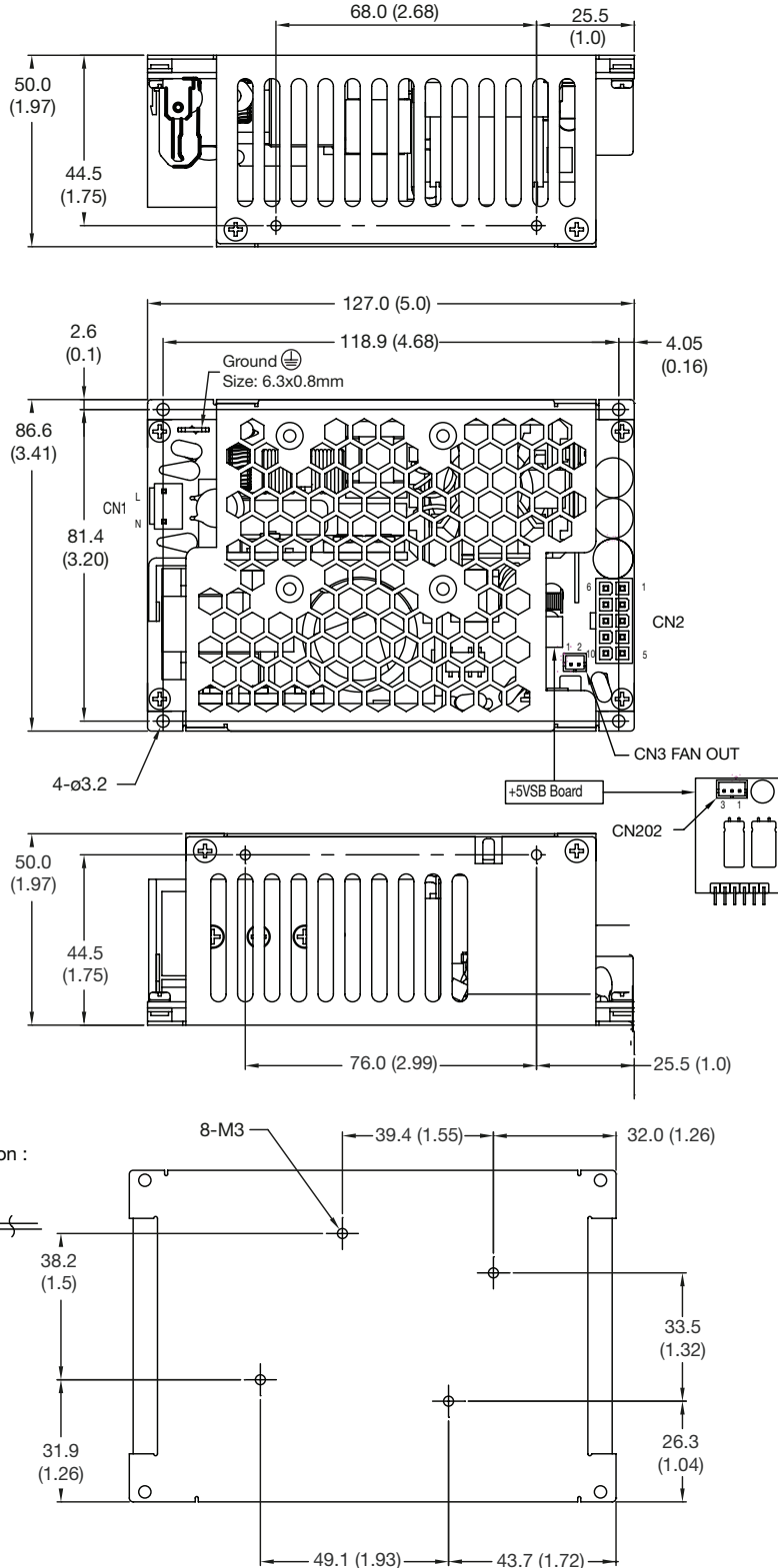
Notes:

1. All dimensions in mm (inches). Tolerance .xx = 0.50 (±0.02)

2. Weight: 660g (1.46lbs) approx.

Mechanical details

Covered Version (-C) 12-24VDC



CN1 - Input Connector

Pin 1	Neutral
Pin 2	No Pin
Pin 3	Live

Mates with JST housing VHR-3N

CN2 - Output Connector

Pin 1	+Vout
Pin 2	+Vout
Pin 3	+Vout
Pin 4	-Vout
Pin 5	-Vout
Pin 6	+Vout
Pin 7	+Vout
Pin 8	-Vout
Pin 9	-Vout
Pin 10	-Vout

Mates with Molex 39.01-2100

CN3 - Fan Connector

Pin 1	Fan+
Pin 2	Fan-

Mates with JST housing PHR-2

CN202 - Signal Connector

Pin 1	+5V Standby
Pin 2	Return
Pin 3	Remote On/Off

Mates with JST housing PHR-3

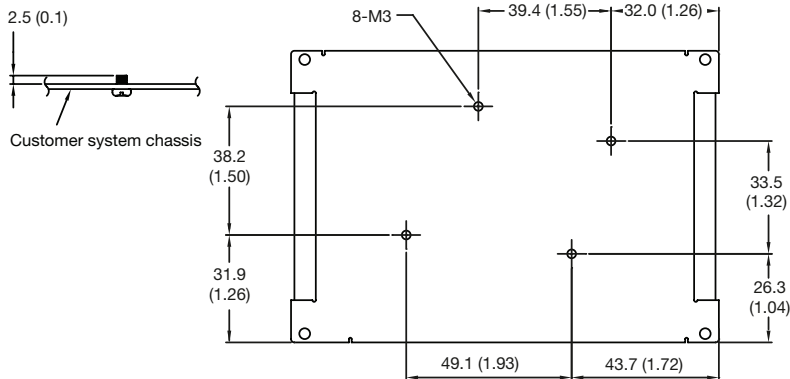
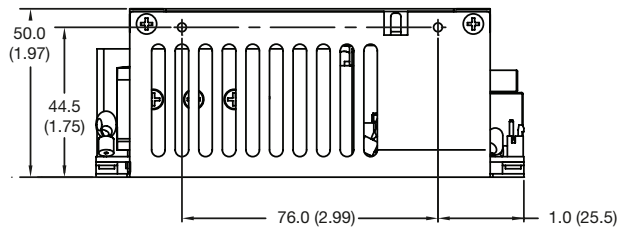
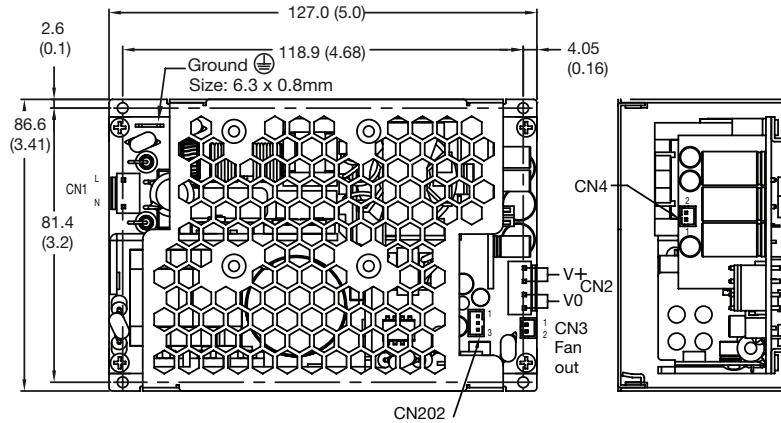
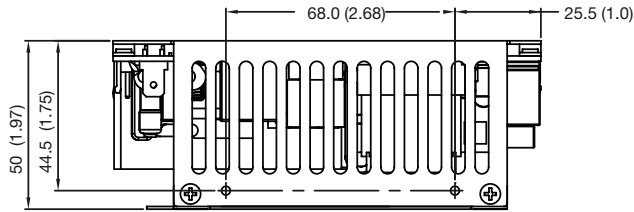
Notes:

1. All dimensions in mm (inches). Tolerance .xx = 0.50 (±0.02)

2. Weight: 570g (1.26lbs) approx.

Mechanical details

Covered Version (-C) 36-54VDC



CN1 - Input Connector	
Pin 1	Neutral
Pin 2	No Pin
Pin 3	Live

Mates with JST housing VHR-3N

CN2 - Output Connector	
Pin 1	+Vout
Pin 2	+Vout
Pin 3	+Vout
Pin 4	-Vout

Mates with JST housing VHR-4N

CN3 - Fan Connector	
Pin 1	Fan+
Pin 2	Fan-

Mates with JST housing PHR-2

CN202 - Signal Connector	
Pin 1	+5V Standby
Pin 2	Return
Pin 3	Remote On/Off

Mates with JST housing PHR-3

CN4 - Remote Sense	
Pin 1	+Sense
Pin 2	-Sense

Mates with JST housing PHR-2

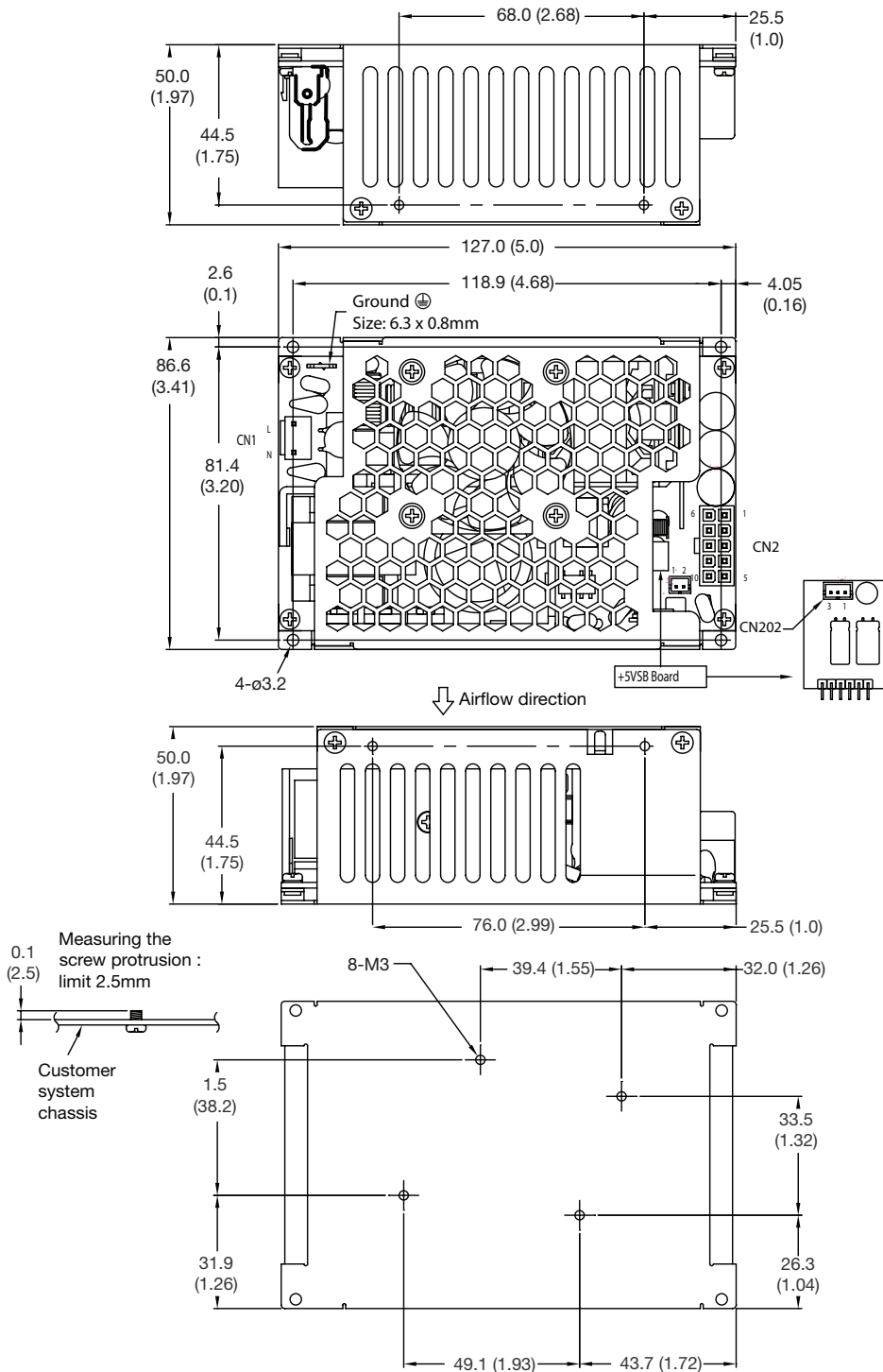
Notes:

1. All dimensions in mm (inches). Tolerance .xx = 0.50 (±0.02)

2. Weight: 570g (1.26lbs) approx.

Mechanical details

Top Fan Version (TF) 12-24VDC



CN1 - Input Connector	
Pin 1	Neutral
Pin 2	No Pin
Pin 3	Live

Mates with JST housing VHR-3N

CN2 - Output Connector	
Pin 1	+Vout
Pin 2	+Vout
Pin 3	+Vout
Pin 4	-Vout
Pin 5	-Vout
Pin 6	+Vout
Pin 7	+Vout
Pin 8	-Vout
Pin 9	-Vout
Pin 10	-Vout

Mates with Molex 39.01-2100

CN202 - Signal Connector	
Pin 1	+5V Standby
Pin 2	Return
Pin 3	Remote On/Off

Mates with JST housing PHR-3

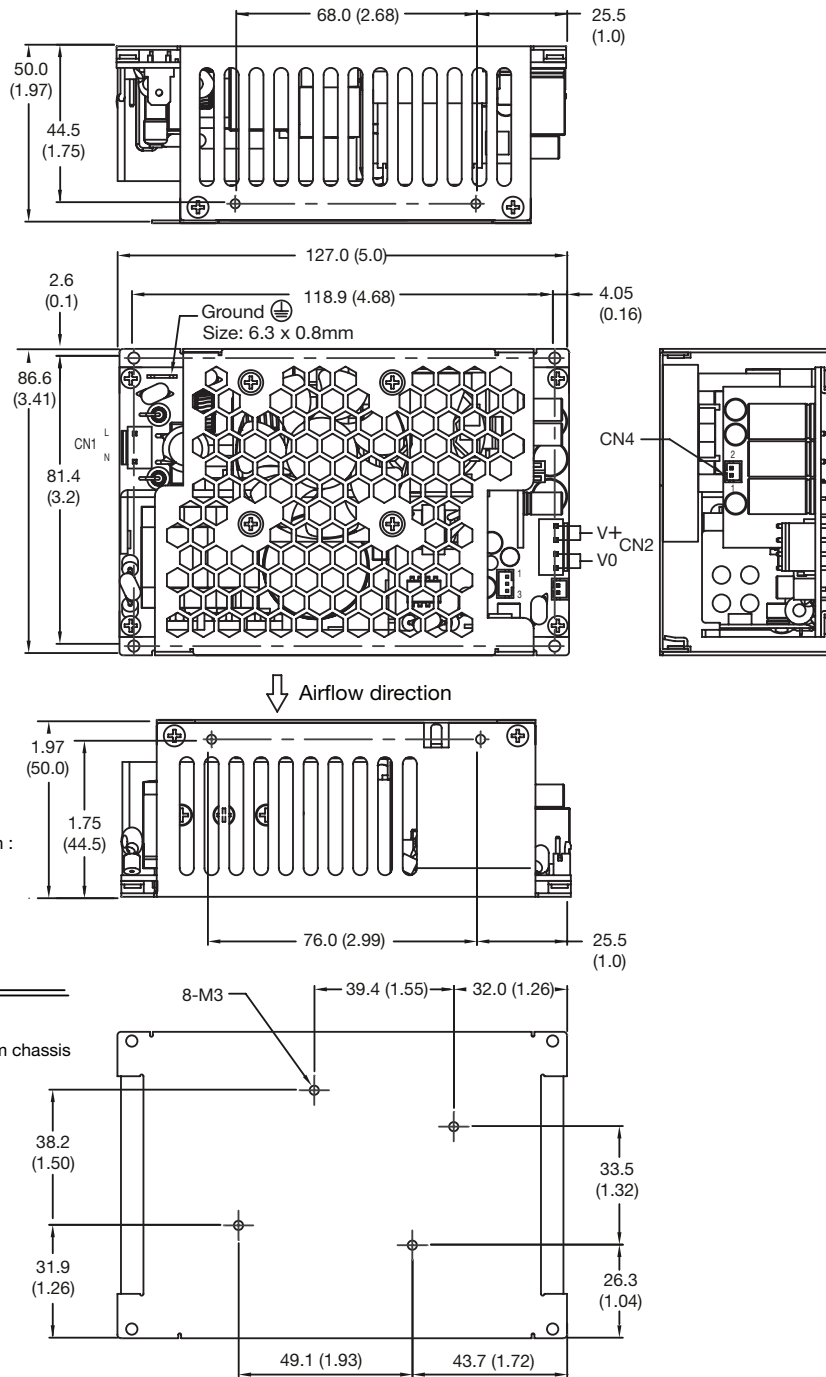
Notes:

1. All dimensions in mm (inches). Tolerance .xx = 0.50 (±0.02)

2. Weight: 585g (1.29lbs) approx.

Mechanical details

Top Fan Version (TF) 36-54VDC



CN1 - Input Connector	
Pin 1	Neutral
Pin 2	No Pin
Pin 3	Live

Mates with JST housing VHR-3N

CN2 - Output Connector	
Pin 1	+Vout
Pin 2	+Vout
Pin 3	+Vout
Pin 4	-Vout

Mates with JST housing VHR-4N

CN202 - Signal Connector	
Pin 1	+5V Standby
Pin 2	Return
Pin 3	Remote On/Off

Mates with JST housing PHR-3

CN4 - Remote Sense	
Pin 1	+Sense
Pin 2	-Sense

Mates with JST housing PHR-2

Notes:

1. All dimensions in mm (inches). Tolerance .xx = 0.50 (±0.02)

2. Weight: 585g (1.29lbs) approx.