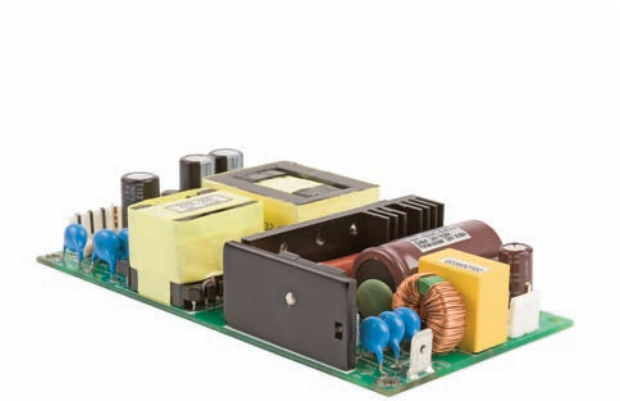
ECP225 Series



- Low 1” Profile
- High Power Density
- 2.5” by 5.0” Footprint
- 150W Convention Cooled Rating
- 225W Force Cooled Rating
- Medical & ITE Approvals
- High Efficiency, up to 94%
- Less than 0.5W No Load Input Power
- Built–In Fan Supply
- Low Earth Leakage Current
- 5000m Operating Altitude

The ECP225 series has been designed to minimise the no load power consumption and maximise efficiency in order to facilitate equipment design to meet the latest environmental legislation.

Approved for medical and ITE applications, this range of single output AC/DC power supplies are packaged in an ultra-low profile 1” height with a foot print of just 2.5” by 3.0”.

The ECP225 provides up to 225W force-cooled or 150W convection-cooled leading to very high power densities of 18W/in^3 or 12W/in^3 respectively. A 12V, 300mA fan supply is included in the design.

The power supply contains two fuses and low leakage currents as required by medical applications and is safety approved to operate in a 70 °C ambient.

The low profile and safety approvals covering ITE and medical standards along with conducted emissions meeting EN55011/22 level B allow the versatile ECP225 series to be used in a vast range of applications.

Models and Ratings

Output Voltage	Output Current		Ripple and Noise pk-pk[2]	Fan Output	Efficiency[3]	Model Number[4]
	Convection-cooled	Forced-cooled[1]				
12.0 V	12.50 A	18.75 A	120 mV	12 V/0.5 A	93%	ECP225PS12
15.0 V	10.00 A	15.00 A	150 mV	12 V/0.5 A	93%	ECP225PS15
24.0 V	6.25 A	9.38 A	240 mV	12 V/0.5 A	94%	ECP225PS24
28.0 V	5.36 A	8.04 A	280 mV	12 V/0.5 A	94%	ECP225PS28
48.0 V	3.10 A	4.69 A	480 mV	12 V/0.5 A	94%	ECP225PS48

Notes:
1. Requires 10 CFM.
2. Measured with 20 MHz bandwidth and 10 µF electrolytic capacitor in parallel with 0.1 µF ceramic capacitor
3. Minimum average efficiencies measured at 25%, 50%, 75% & 100% of 225 W load and 230 VAC input.
4. 3" x 5" Footprint available for OEM quantities, add suffix '-3x5' to part number eg. ECP225PS24-3x5

Input Characteristics

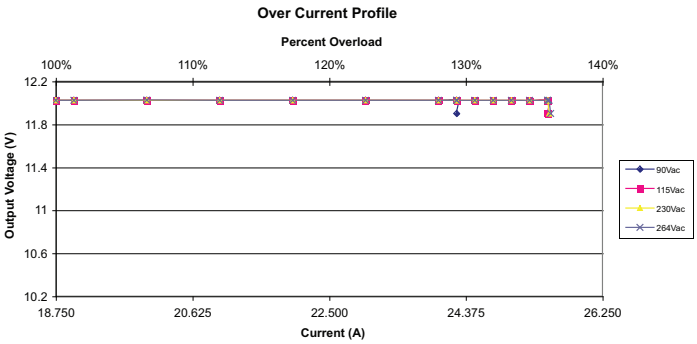
Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Input Voltage - Operating	85	115/230	264	VAC	Derate output from 100% at 90 VAC to 90% at 85 VAC
Input Frequency	47	50/60	63	Hz	Agency approval 47-63 Hz
Power Factor		>0.9			230 VAC, 100% load EN61000-3-2 class A EN6100-2-2 class C > 145W
Input Current - Full Load		2.2/1.1		A	115/230 VAC
Inrush Current		120		A	230 VAC cold start, 25 ℃
Earth Leakage Current		80/140	230	µA	115/230 VAC/50 Hz (Typ.), 264 VAC/60 Hz (Max.)
No Load Input Power			0.5	W	
Input Protection	F3.15 A/250 V Internal fuse fitted in line and neutral.				

Output Characteristics

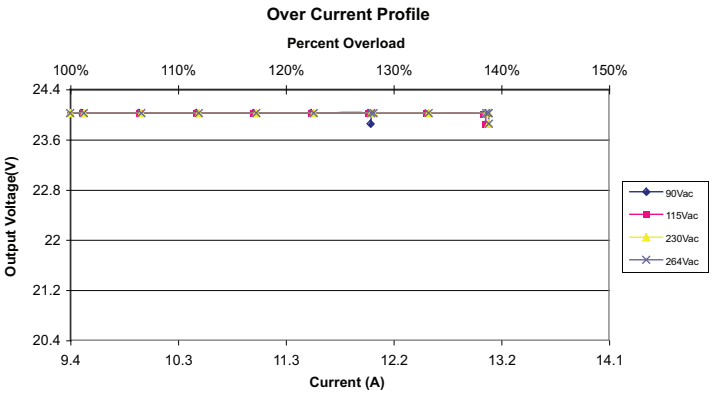
Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Output Voltage - V1	12		48	VDC	See Models and Ratings table
Initial Set Accuracy			±1	%	50% load, 115/230 VAC
Output Voltage Adjustment - V1	5			%	V1 only via potentiometer. See mech. details, Vfan will track
Minimum Load	0			A	
Start Up Delay			2	s	115/230 VAC full load. See fig. 3 & 4.
Hold Up Time	10	20/13		ms	Min at full load, 115 VAC. Typical at 150W/225W
Drift			±0.02	%	After 20 min warm up
Line Regulation			±0.5	%	90-264 VAC
Load Regulation			±0.5	%	0-100% load
Transient Response			4	%	Recovery within 1% in less than 500 µs for a 50-75% and 75-50% load step
Over/Undershoot		4		%	Full Load
Ripple & Noise			1	% pk-pk	20 MHz bandwidth & 10 µF electrolytic capacitor in parallel with 0.1 µF ceramic capacitor, See fig. 6.
Overvoltage Protection	110		140	%	Vnom, recycle input to reset
Overload Protection	110		170	% I nom	See fig. 1.
Short Circuit Protection					Trip and Restart See fig. 2.
Temperature Coefficient			0.02	%/ °C	
Overtemperature Protection				°C	Measured Internally, Auto Resetting

Output Overload Characteristic

Figure. 1
ECP225PS12

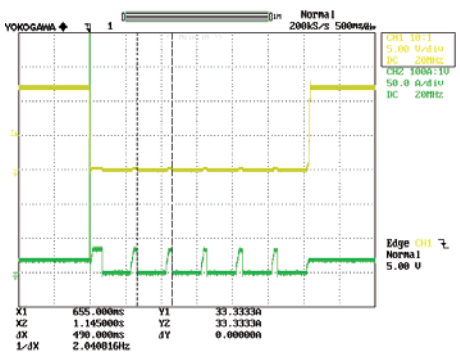


ECP225PS24

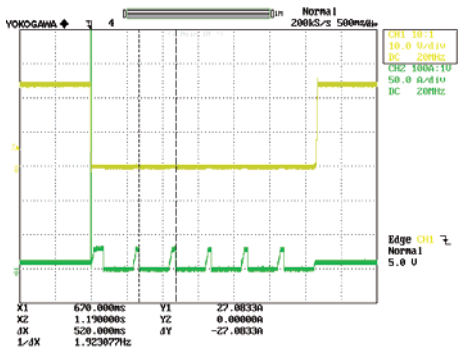


Output Short Circuit Profile

Figure 2
ECP225PS12

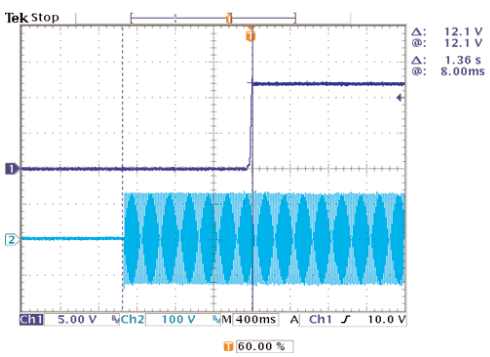


ECP225PS24



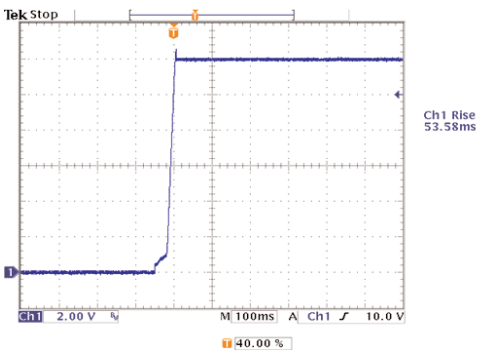
Output Start Up Time

Figure 3
ECP225PS12 90VAC full load



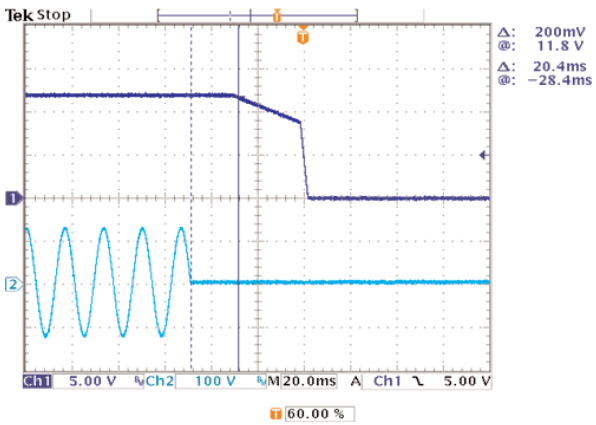
Output Rise Time

Figure 4
ECP225PS12 90 VAC full load

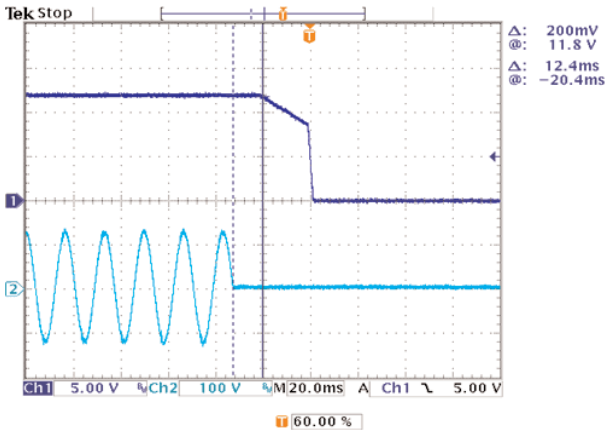


Output Hold Up Time

Figure 5
ECP225PS12 90VAC 150W load



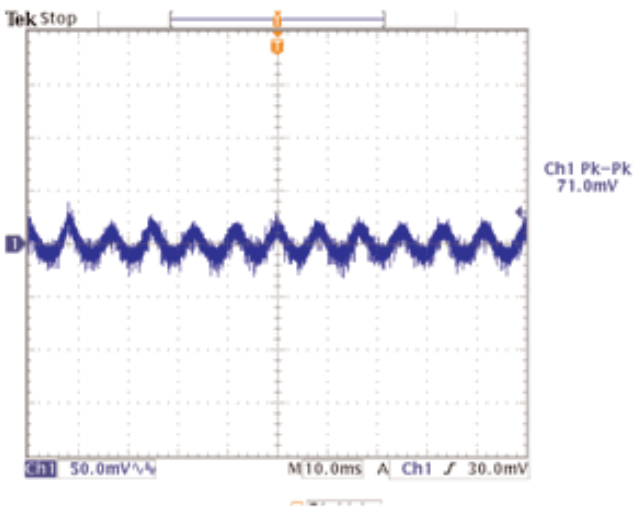
ECP225PS12 90VAC full load



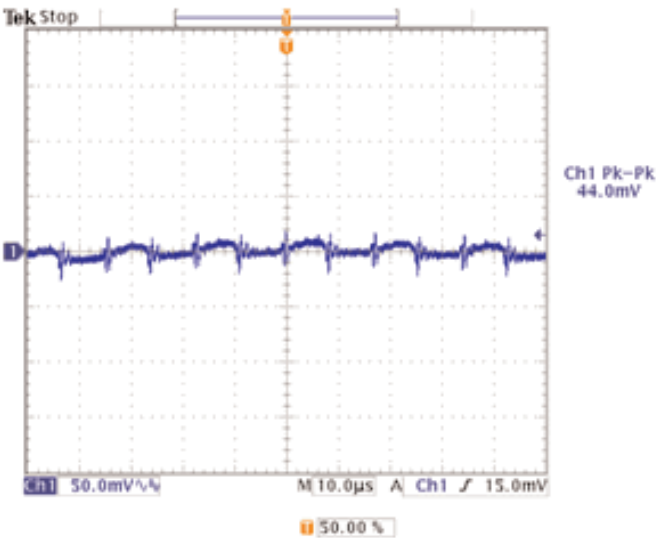
Output Noise & Ripple

Figure 6
ECP225PS12 at 264VAC & full load

Low Frequency



High Frequecy



General Specifications

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Efficiency		94		%	230 VAC Full load (see fig. 7 & 8)
Isolation: Input to Output	4000			VAC	2 MOPP
Input to Ground	1500			VAC	1 MOPP
Output to Ground	1500			VAC	1 MOPP
Switching Frequency	70		130	kHz	PFC
	50		80	kHz	Main Converters
Power Density			18/12	W/in^3	Forced / Convection-cooled
Mean Time Between Failure		300		kHrs	MIL-HDBK-217F, Notice 2 +25 °C GB
Weight		0.51(230)		lb(g)	

Efficiency Versus Load

Figure 7
ECP225PS12

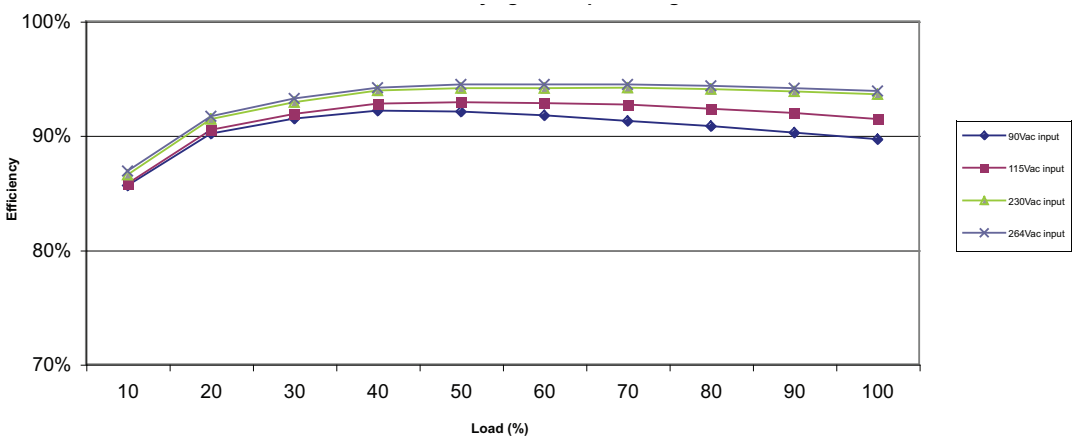
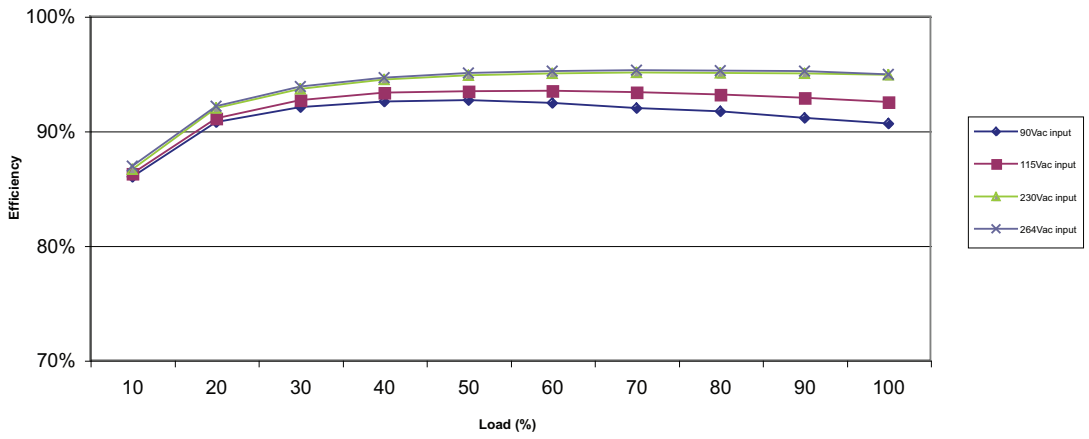


Figure 8
ECP225PS24

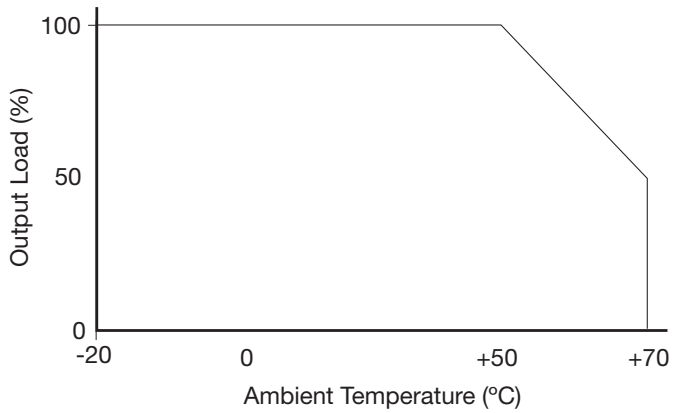


Environmental

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Operating Temperature	-20		+70	℃	See derating curve, fig.9
Storage Temperature	-40		+85	℃	
Cooling	10			CFM	Forced Cooled > 150W
Humidity	5		95	%RH	Non-condensing
Operating Altitude			5000	m	
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

Thermal Derating Curve

Figure 9



Electromagnetic Compatibility - Emissions

Phenomenon	Standard	Test Level	Criteria	Notes & Conditions
Conducted	EN55011/22	Class B		
Radiated	EN55011/22	Class A		
Harmonic Current	EN61000-3-2	Class A		Meet Class C for loads above 145W
Voltage Fluctuations	EN61000-3-3			

Electromagnetic Compatibility - Immunity

- Phenomenon	Standard	Test Level	Criteria	Notes & Conditions
Low Voltage PSU EMC	EN61204-3	High severity level	as below	
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	EN55024 (100 VAC)	Dip > 95% (0 VAC), 8.3ms	A	
		Dip 30% (70 VAC), 416ms	A	
		Dip > 95% (0 VAC), 4160ms	B	
	EN55024 (240 VAC)	Dip > 95% (0 VAC), 10.0ms	A	
		Dip 30% (168 VAC), 500ms	A	
		Dip > 95% (0 VAC), 5000ms	B	
	EN60601-1-2 (100 VAC)	Dip > 95% (0 VAC), 10.0ms	A	
		Dip 60% (40 VAC), 100ms	A	Derate Output Power to 45W
		Dip 30% (70 VAC), 500ms	A	
		Dip > 95% (0 VAC), 5000ms	B	
	EN60601-1-2 (240 VAC)	Dip > 95% (0 VAC), 10.0ms	A	
		Dip 60% (96 VAC), 100ms	A	
		Dip 30% (168 VAC), 500ms	A	
		Dip > 95% (0 VAC), 5000ms	B	

Safety Agency Approvals

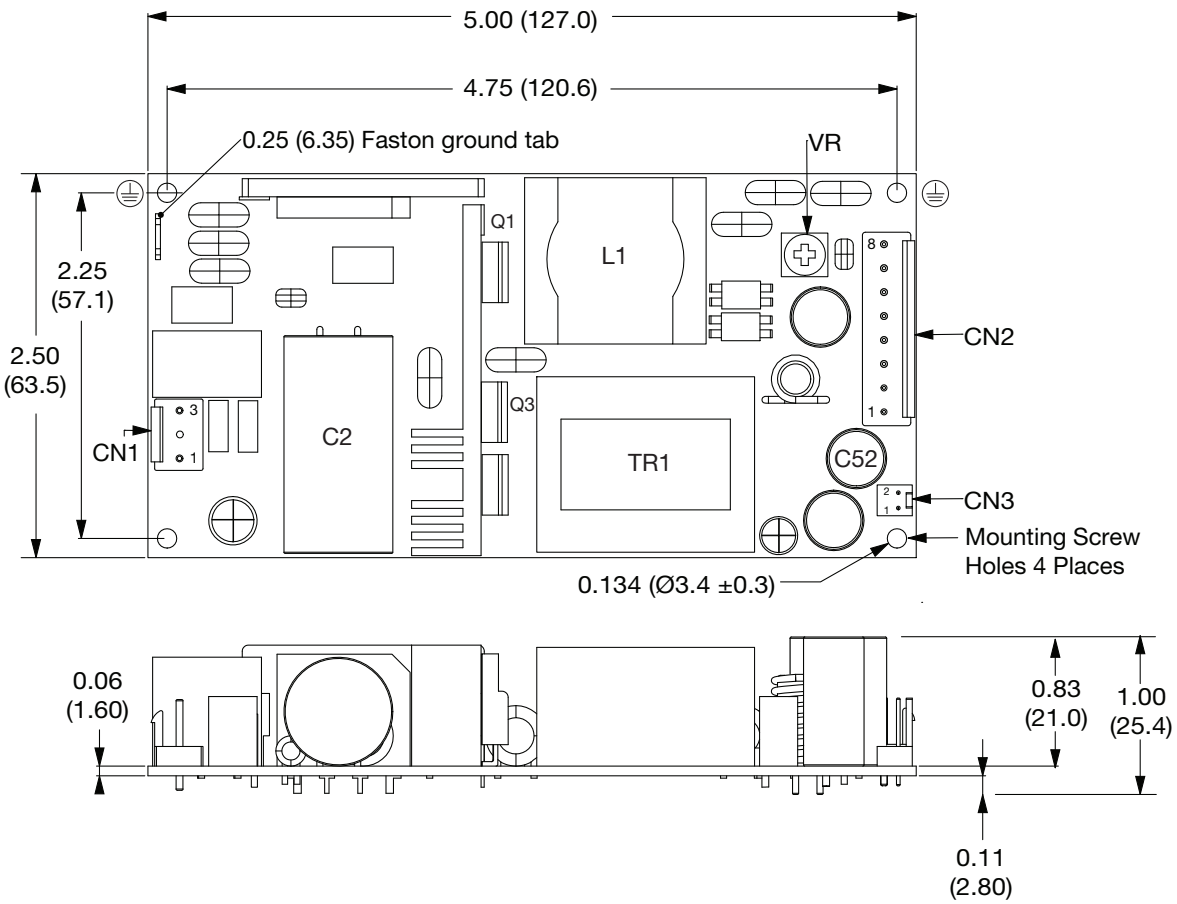
Safety Agency	Safety Standard	Category
CB Report	IEC60950-1:2005 + A1:2009	Information Technology
UL	UL60950-1 (2011), CSA 22.2 No.60950-1-11 Ed 2	Information Technology
TUV	EN60950-1:2006 + A11:2009 + A1:2010 + A12:2012	Information Technology
CE	LVD	

Safety Agency	Safety Standard	Category
CB Report	IEC60601-1 Ed 3 Including Risk Management	Medical
UL	ANSI/AAMI ES60601-1:2005 & CSA C22.2, No.60601-1:08	Medical
TUV	EN60601-1:2006	Medical

Means of Protection		Catergory
Primary to Secondary	2 x MOPP (Means of Patient Protection)	IEC60601-1 Ed3
Primary to Earth	1 x MOPP (Means of Patient Protection)	
Secondary to Earth	1 x MOPP (Means of Patient Protection)	

Mechanical Details

Figure 10



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

Mates with JST housing
VHR-8N and JST Series
SVH-21T-P1.1 crimp terminals

CN1 - Input Connector	
Pin 1	Neutral
Pin 2	Not Fitted
Pin 3	Line

Mates with JST housing
VHR-3N and JST Series
SVH-21T-P1.1 crimp terminals

Mounting holes marked with
⏚ must be connected to safety earth

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

Mates with Molex housing
22-01-1022 and 2759 crimp terminals

Notes

1. All dimensions shown in inches (mm).
   Tolerance: ±0.02 (0.5)
2. Weight: 0.51 lbs (230 g) approx.

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 Mechanical Details for component locations.

Temperature Measurements (At Maximum Ambient)	
Component	**Max Temperature ℃**
TR1 Coil	110°C
L1 Coil	120°C
Q1 Body	120°C
Q3 Body	120°C
C2	105°C
C52	105°C

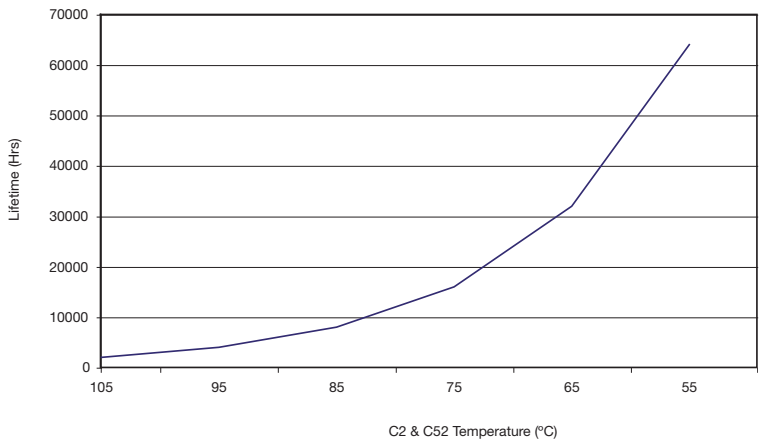
Service Life

The estimated service life of the ECP225 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.

Estimated Service Life vs Component Temperature

Figure 11



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