

225W Fan cooled

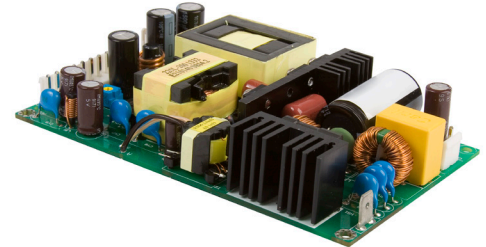
150W Convection cooled

AC-DC power supplies

The ECP225-A series is designed to minimize the no load power consumption and maximize efficiency to facilitate equipment design to meet the latest environmental legislation.

Approved for medical (2 x MOPP) industrial electronics & ITE applications, this range of single output AC-DC power supplies are packaged in a low profile 25.4mm height with a footprint of just 127.0 x 76.2mm (5.0" x 3.0").

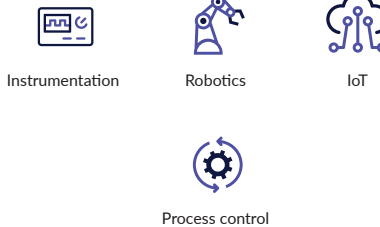
The ECP225-A provides up to 225W fan cooled or 150W convection cooled leading to very high power densities. A 5VDC 1A (convection) 5VDC 2A (fan) standby output and a 12VDC 500mA fan supply are included in the design. The power supply contains two fuses and has low leakage current as required for medical 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 to EN55011/32 level B allow the versatile ECP225-A series to be used in a vast range of applications.



Features

- ▶ 225W fan cooled 150W convection cooled
- ▶ 127.0 x 76.2mm (5" x 3") footprint, 25.4mm profile
- ▶ Regulated single outputs 12V to 48VDC
- ▶ Input range 85 to 264VAC
- ▶ High efficiency – up to 94%
- ▶ Medical (2 x MOPP) & ITE approvals
- ▶ 4.0kVAC input to output isolation
- ▶ <0.5W no load input power
- ▶ 12VDC 0.5A fan supply
- ▶ 5VDC 1A (convection) 5VDC 2A (fan) standby
- ▶ -20°C to +70°C operating temperature
- ▶ Full load to +50°C
- ▶ 3 year warranty

Applications



Dimensions

127.0 x 76.2 x 25.4mm (5.00" x 3.00" x 1.00")

Models & ratings

Model number ⁽³⁾	Output current		Standby voltage		Fan output ^(3,4)	Efficiency ⁽²⁾
	Convection-cooled	Fan Cooled (10CFM)	Convection-cooled	Fan Cooled (10CFM)		
ECP225PS12-A	12.50A	18.75A	5V/1.0A	5V/2.0A	12V/0.5A	92%
ECP225PS15-A	10.00A	15.00A				
ECP225PS24-A	6.25A	9.38A				
ECP225PS28-A	5.36A	8.04A				
ECP225PS48-A	3.10A	4.69A				

Notes:

1. Measured with 20MHz bandwidth and 10µF electrolytic capacitor in parallel with 0.1µF ceramic capacitor
2. Minimum average efficiencies measured at 25%, 50%, 75% & 100% of 225W load and 230VAC input.
3. Typical voltage, actual regulated voltage will be in range of 10.5V to 11.1V
4. Regulation of the fan output requires a minimum load of 10W on the main output.

Input

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

Output - main 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	5			%	V1 only via potentiometer. See mech details, Vfan will track
Minimum Load	No minimum load required				
Start Up Delay			2	s	115/230VAC full load.
Hold Up Time	10	20/13		ms	Min at full load, 115VAC. Typical at 150W/ 225W
Drift			±0.02	%	After 20 min warm up
Line Regulation			±0.5	%	90-264VAC
Load Regulation			±0.5	%	0-100% load.
Transient Response			4	%	Recovery within 1% in less than 500μs for a 50-75% and 75-50% load step
Over/Undershoot			7	%	Full load
Ripple & Noise			1	% pk-pk	20MHz bandwidth and 10μF electrolytic capacitor in parallel with 0.1μF ceramic capacitor.
Overvoltage Protection	110		140	%	Vnom, recycle input to reset
Overload Protection	110		170	% I nom	
Short Circuit Protection					Trip & restart
Temperature Coefficient			0.02	%/°C	
Overtemperature Protection	Measured internally, Auto Resetting				
Remote On/Off	Connect pin 3 of CN2 to pin 1 to turn main output off. Connect to pin 2 or leave open to turn main output on.				

Output - 5V standby output

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Output Voltage - V1		5.0		VDC	
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	300			ms	Min at full load, 115VAC
Drift			±0.02	%	After 20 min warm up
Line Regulation			±0.5	%	90-264VAC
Load Regulation			±0.5	%	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			1	% pk-pk	20MHz bandwidth and 10µF electrolytic capacitor in parallel with 0.1µF ceramic capacitor.
Overload Protection		3.0	4.0	A	
Short Circuit Protection					Trip & Restart
Temperature Coefficient			0.02	%/°C	
Overtemperature Protection	Measured internally, Auto Resetting				

General

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Efficiency		94		%	230VAC (see efficiency vs load)
Isolation: Input to output	4000			VAC	2 x MOPP
Input to ground	1500			VAC	1 x MOPP
Output to ground	1500			VAC	1 x MOPP
Switching frequency	70		130	kHz	PFC
	50		80		Main converter
Power density			0.91 (15.0)	W/cm³ (W/in³)	Fan cooled
			0.61 (10.0)		Convection cooled
MTBF		300		khrs	MIL-HDBK-217F, Notice 2 +25°C GB
Weight		230 (0.51)		g (lbs)	

Environmental

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Operating temperature	-20		+70	°C	See derating curve, fig.3
Storage temperature	-40		+85	°C	
Cooling	10			CFM	Fan cooled >100W
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				

Emissions - EMC

Phenomenon	Standard	Test level	Notes & conditions
Conducted	EN55011/32	Class B	
Radiated	EN55011/32	Class A	Class B with King Core K5B RC 13*23*7 on input cable and K5B RC 25*12*15 on output cable.
Harmonic current	EN61000-3-2	Class A	Meet Class C for loads above 145W
Voltage flicker	EN61000-3-3		

Immunity - EMC

Phenomenon	Standard	Test Level	Criteria	Notes & conditions
Medical Device EMC	IEC60601-1-2	3	as below	
Low Voltage PSU EMC	EN61204-3	3	as below	
ESD	EN61000-4-2	3	A	±8kV contact, ±15kV air
Radiated	EN61000-4-3		A	
EFT	EN61000-4-4	3	A	
Surge	EN61000-4-5	30% for 10ms	A	
Conducted	EN61000-4-6	Conducted	A	
Magnetic Fields	EN61000-4-8	Magnetic Fields	A	
Dips and interruptions	EN55035 (100 VAC)	Dip >95% (0VAC), 8.3ms	A	
		Dip 30% (70VAC), 416ms	A	
		Dip >95% (0VAC), 4160ms	B	
	EN55035 (240 VAC)	Dip >95% (0VAC), 10.0ms	A	
		Dip 30% (168VAC), 500ms	A	
		Dip >95% (0VAC), 5000ms	B	
	EN60601-1-2 (100 VAC)	Dip 100% (0VAC), 10.0ms	A	
		Dip 100% (0VAC), 20ms	A	
		Dip 60% (40VAC), 100ms	A	Derate output power to 45W
		Dip 30% (40VAC), 500ms	A	
		Dip 100% (0VAC), 5000ms	B	
	EN60601-1-2 (240 VAC)	Dip 100% (0VAC), 10.0ms	A	
		Dip 100% (0VAC), 20ms	A	
Dip 60% (96VAC), 100ms		A		
Dip 30% (168VAC), 500ms		A		
Dip 100% (0VAC), 5000ms		B		

Safety approvals

Certification	Standard	Notes & Cnditions
CB	IEC62368-1:2014	Audio/Video, Information and Communication Technology Equipment
	IEC60601-1 Ed 3 Including Risk Management	Medical
UL	UL62368-1, CAN/CSA C22.2 No.62368-1-14	Audio/Video, Information and Communication Technology Equipment
	ANSI/AAMI ES60601-1: 2005 & CSA C22.2 No.6061-1:08	Medical
EN	EN62368-1:2014/A11:2017	Information Technology
	EN60601-1:2006	Audio/Video, Information and Communication Technology Equipment
CE	Meets all applicable directives	
UKCA	Meets all applicable legislation	

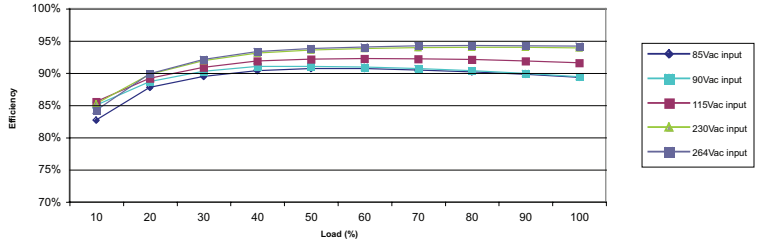
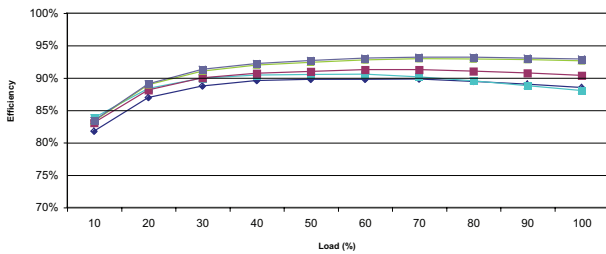
Isolation	Standard	Notes & Cnditions
Primary to Secondary	2 x MOPP (Means of Patient Protection)	IEC60601-1 Ed 3
Primary to Earth	1 x MOPP (Means of Patient Protection)	
Secondary to Earth	1 x MOPP (Means of Patient Protection)	

Application notes

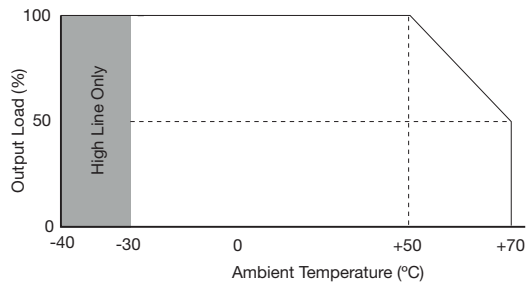
Efficiency vs load

ECP225PS12-A, 12V at 215W, 5V at 10W

ECP225PS24-A, 24V at 215W, 5V at 10W



Temperature derating curve



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.

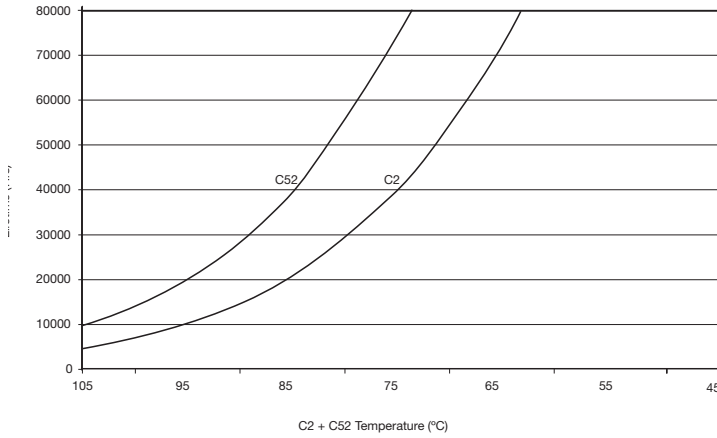
Temperature measurements (at maximum ambient)	
Component	Max temperature (°C)
TR1 Coil	110°C
L1 Coil	120°C
Q1 Body	120°C
C2	105°C
C52	105°C

Application notes

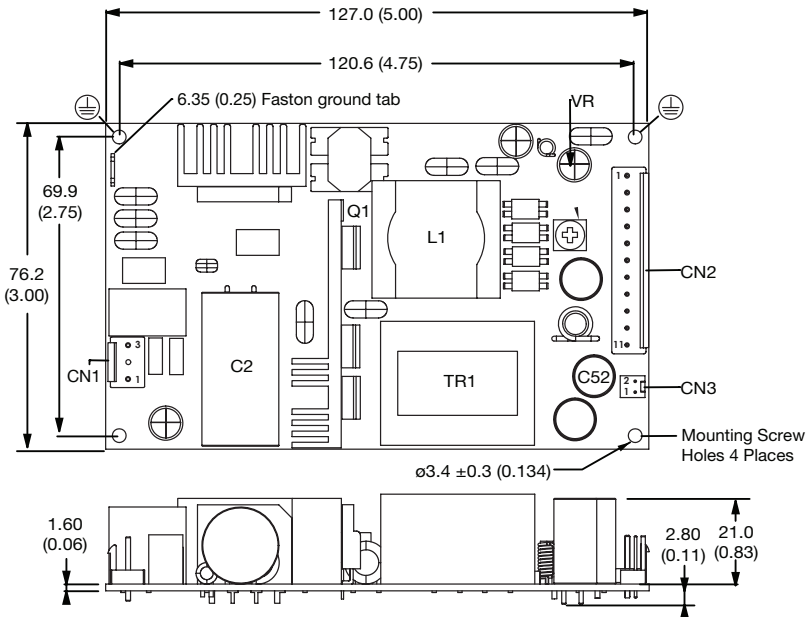
Service life

The estimated service life of the ECP225-A 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.

Estimate service life vs component temperature



Mechanical details



CN2 - Output Connector			
Pin 1	+5V Standby	Pin 7	+Vout
Pin 2	-Vout	Pin 8	-Vout
Pin 3	Remote On/Off	Pin 9	-Vout
Pin 4	+Vout	Pin 10	-Vout
Pin 5	+Vout	Pin 11	-Vout
Pin 6	+Vout		

Mates with JST housing, VHR-11N and JST Series, SVH-21T-P1.1 crimp terminals

CN1 - Output 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

CN3 - Output Connector	
Pin 1	Neutral
Pin 2	Not Fitted

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

Mounting hole marked with \oplus must be connected to safety earth for class I applications

Notes:

1. All dimensions in mm (inches). Tolerance .xx = 0.50 (±0.02); .xxx = 0.25 (±0.01)

2. Weight: 230g (0.51lbs)

Specifications subject to change without notice.