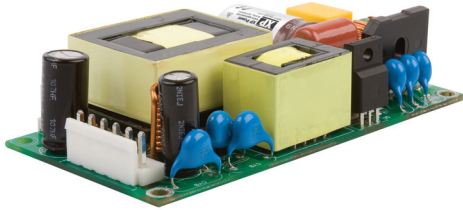


# ECP180 Series



- Low 1" Profile
- High Power Density
- 2.0" by 4.0" Footprint
- 120W Convection-cooled Rating
- 180W Force Cooled Rating
- Medical & ITE Approvals
- Class I and Class II Applications
- 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 ECP180 series has been designed to minimise no load power consumption and maximise efficiency facilitating equipment design to meet the latest environmental legislation and minimising power loss and heating within equipment enclosures.

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 2.0" by 4.0". The ECP180 series is suitable for use in both class I and class II applications.

The ECP180 provides up to 180W force-cooled or 120W convection-cooled leading to very high power densities of 22W/in<sup>3</sup> or 15W/in<sup>3</sup> respectively. A 12V, 500mA 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 for both class I and class II applications along with conducted emissions meeting EN55011/32 level B allow the versatile ECP180 series to be used in a vast range of applications.

## Models and Ratings

| Output Voltage | Output Current    |                              | Ripple and Noise<br>pk-pk <sup>(2)</sup> | Fan Output | Efficiency <sup>(3)</sup> | Model Number <sup>(4)</sup> |
|----------------|-------------------|------------------------------|------------------------------------------|------------|---------------------------|-----------------------------|
|                | Convection-cooled | Forced-cooled <sup>(1)</sup> |                                          |            |                           |                             |
| 12.0 V         | 10.00 A           | 15.00 A                      | 120 mV                                   | 12 V/0.5 A | 92%                       | ECP180PS12                  |
| 15.0 V         | 8.00 A            | 12.00 A                      | 150 mV                                   | 12 V/0.5 A | 92%                       | ECP180PS15                  |
| 24.0 V         | 5.00 A            | 7.50 A                       | 240 mV                                   | 12 V/0.5 A | 93%                       | ECP180PS24                  |
| 28.0 V         | 4.30 A            | 6.43 A                       | 280 mV                                   | 12 V/0.5 A | 93%                       | ECP180PS28                  |
| 36.0 V         | 3.33 A            | 5.00 A                       | 360 mV                                   | 12 V/0.5 A | 94%                       | ECP180PS36                  |
| 48.0 V         | 2.50 A            | 3.75 A                       | 480 mV                                   | 12 V/0.5 A | 94%                       | ECP180PS48                  |

### Notes:

1. Requires 10 CFM.

2. Measured with 20 MHz bandwidth and 10  $\mu$ F electrolytic capacitor in parallel with 0.1  $\mu$ F ceramic capacitor

3. Minimum average efficiencies measured at 25%, 50%, 75% & 100% of 180 W load and 230 VAC input.

## Input Characteristics

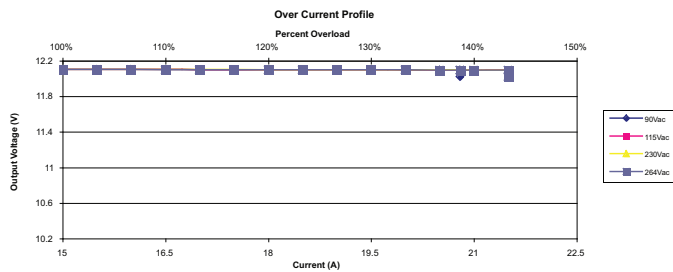
| Characteristic            | Minimum                                                 | Typical | Maximum | Units   | Notes & Conditions                                                       |
|---------------------------|---------------------------------------------------------|---------|---------|---------|--------------------------------------------------------------------------|
| Input Voltage - Operating | 85                                                      | 115/230 | 264     | VAC     | 100% power at 100-264VAC, linear derate to 90% at 90VAC and 85% at 85VAC |
| 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<br>EN61000-3-2 class C > 145W     |
| Input Current - Full Load |                                                         | 1.8/0.9 |         | A       | 115/230 VAC                                                              |
| Inrush Current            |                                                         | 80      |         | A       | 230 VAC cold start, 25 °C                                                |
| Earth Leakage Current     |                                                         | 85/150  | 230     | $\mu$ A | 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

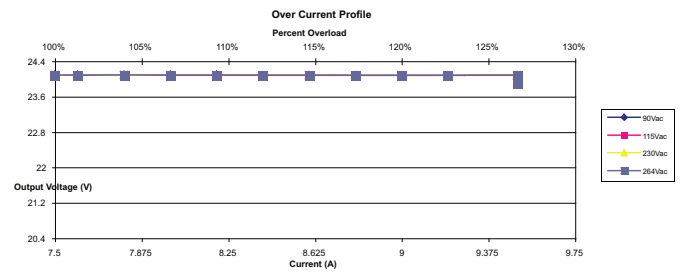
| Characteristic              | Minimum | Typical | Maximum    | Units   | Notes & Conditions                                                                                               |
|-----------------------------|---------|---------|------------|---------|------------------------------------------------------------------------------------------------------------------|
| Output Voltage - V1         | 12      |         | 48         | VDC     | See Models and Ratings table                                                                                     |
| Initial Set Accuracy        |         |         | $\pm 1$    | %       | 50% load, 115/230 VAC                                                                                            |
| Minimum Load                | 0       |         |            | A       |                                                                                                                  |
| Start Up Delay              |         |         | 2          | s       | 115/230 VAC full load. See fig. 3 & 4.                                                                           |
| Hold Up Time                | 10      | 17/11   |            | ms      | Min at full load, 115 VAC. Typical at 120W/180W                                                                  |
| Drift                       |         |         | $\pm 0.02$ | %       | After 20 min warm up                                                                                             |
| Line Regulation             |         |         | $\pm 0.5$  | %       | 90-264 VAC                                                                                                       |
| Load Regulation             |         |         | $\pm 0.5$  | %       | 0-100% load                                                                                                      |
| Transient Response          |         |         | 4          | %       | Recovery within 1% in less than 500 $\mu$ s for a 50-75% and 75-50% load step                                    |
| Over/Undershoot             |         | 4       |            | %       | Full Load                                                                                                        |
| Ripple & Noise              |         |         | 1          | % pk-pk | 20 MHz bandwidth & 10 $\mu$ F electrolytic capacitor in parallel with 0.1 $\mu$ F ceramic capacitor, See fig. 6. |
| Overvoltage Protection      | 110     |         | 140        | %       | Vnom, recycle input to reset                                                                                     |
| Overload Protection         | 110     |         | 160        | % I nom | See fig. 1.                                                                                                      |
| Short Circuit Protection    |         |         |            |         | Trip and Restart See fig. 2.                                                                                     |
| Temperature Coefficient     |         |         | 0.02       | %/ °C   |                                                                                                                  |
| Overttemperature Protection |         |         |            | °C      | Measured Internally, Auto Resetting                                                                              |

## Output Overload Characteristic

Figure 1  
ECP180PS12

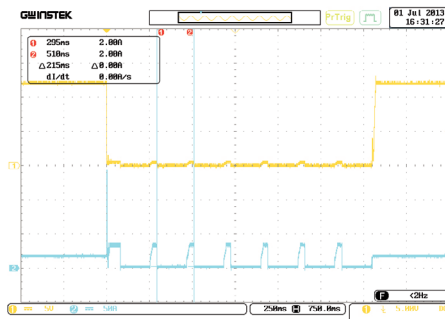


ECP180PS24



## Output Short Circuit Profile

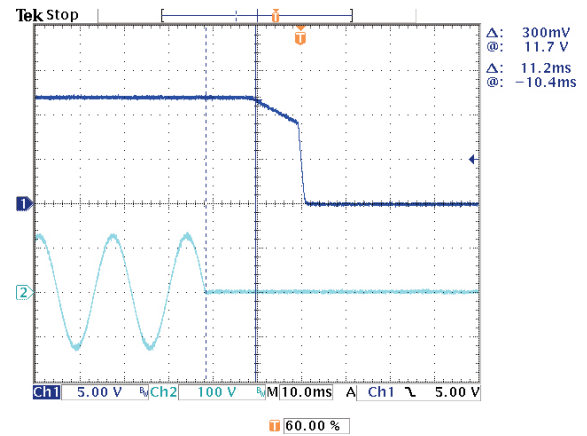
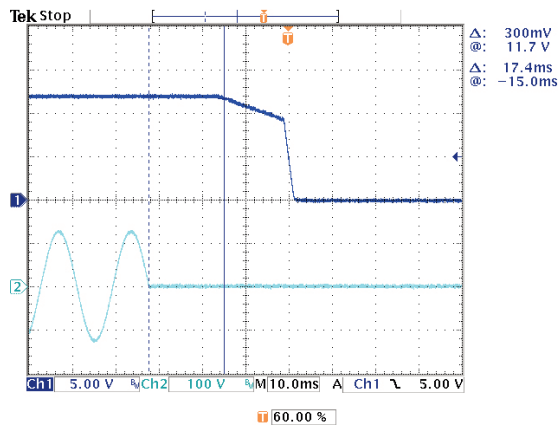
Figure 2  
ECP180PS12



## Output Hold Up Time

Figure 5  
ECP180PS12 90VAC 120W load

ECP180PS12 90VAC full load

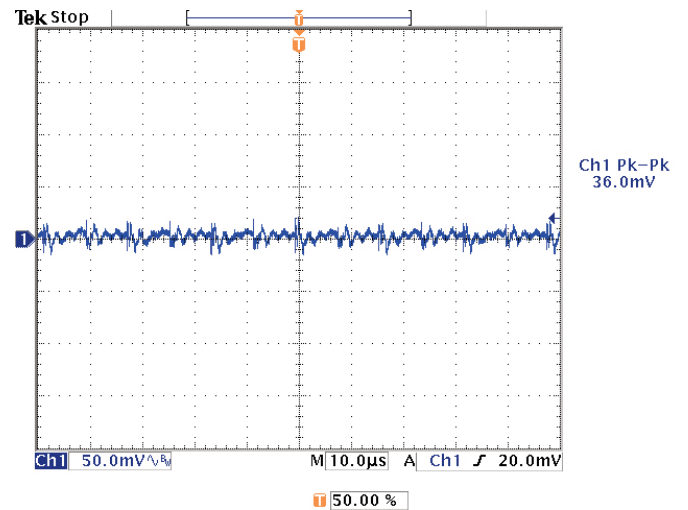
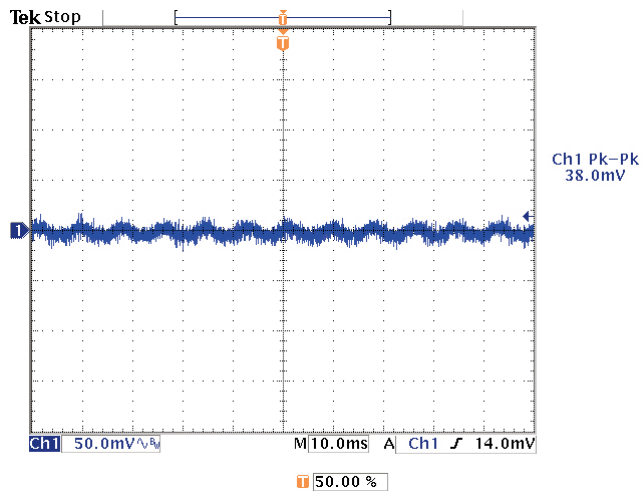


## Output Noise & Ripple

Figure 6  
ECP180PS12 at 264VAC & full load

Low Frequency

High Frequency



## General Specifications

| Characteristic                                                    | Minimum | Typical   | Maximum | Units             | Notes & Conditions                 |
|-------------------------------------------------------------------|---------|-----------|---------|-------------------|------------------------------------|
| Efficiency                                                        |         | 94        |         | %                 | 230 VAC Full load (see fig. 7 & 8) |
| Isolation: Input to Output<br>Input to Ground<br>Output to Ground | 4000    |           |         | VAC               | 2 MOPP                             |
|                                                                   | 1500    |           |         | VAC               | 1 MOPP                             |
|                                                                   | 1500    |           |         | VAC               | 1 MOPP                             |
| Switching Frequency                                               | 65      |           | 130     | kHz               | PFC                                |
|                                                                   | 60      |           | 90      | kHz               | Main Converter                     |
| Power Density                                                     |         |           | 22/15   | W/in <sup>3</sup> | 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  
ECP180PS12

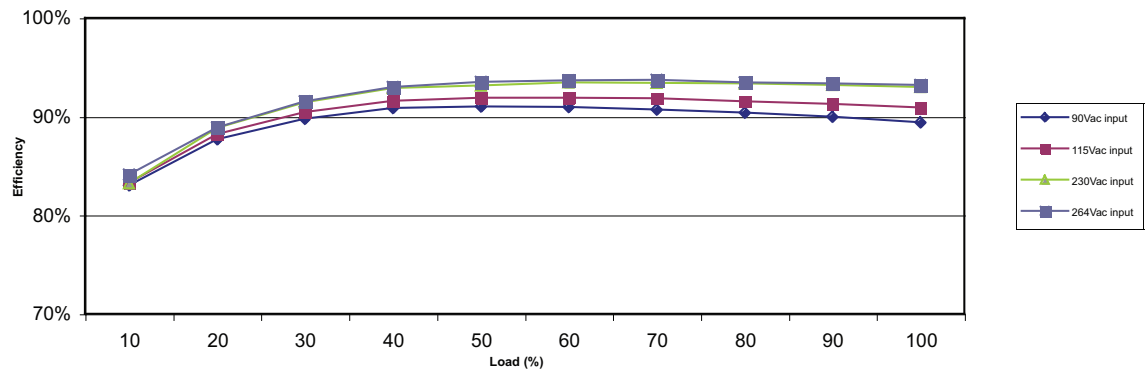
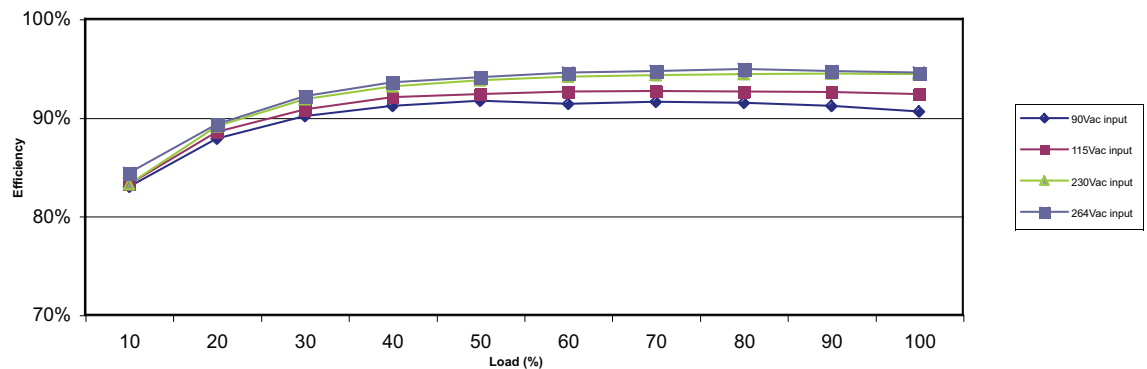


Figure 8  
ECP180PS24

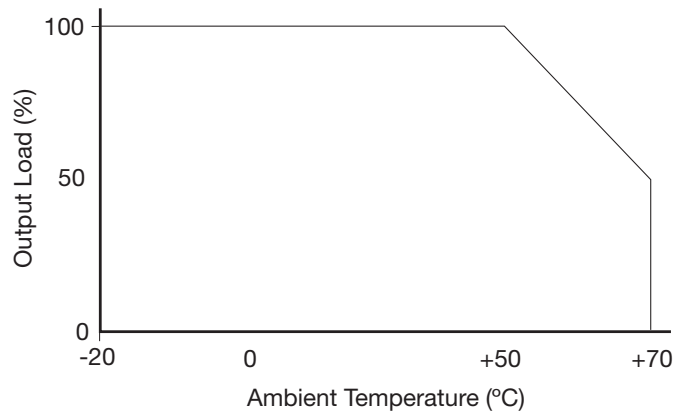


## Environmental

| Characteristic        | Minimum | Typical | Maximum | Units | Notes & Conditions                                                                                                |
|-----------------------|---------|---------|---------|-------|-------------------------------------------------------------------------------------------------------------------|
| Operating Temperature | -20     |         | +70     | °C    | See derating curve, fig.9                                                                                         |
| Storage Temperature   | -40     |         | +85     | °C    |                                                                                                                   |
| Cooling               | 10      |         |         | CFM   | Forced Cooled > 120W                                                                                              |
| Humidity              | 5       |         | 95      | %RH   | Non-condensing                                                                                                    |
| Operating Altitude    |         |         | 5000    | m     |                                                                                                                   |
| Shock                 |         |         |         |       | ±3 x 30g shocks in each plane, total 18 shocks.<br>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.<br>Conforms to EN60068-2-6        |

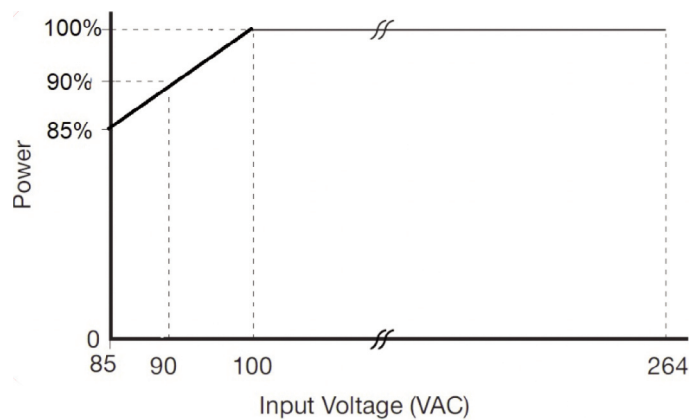
## Thermal Derating Curve

Figure 9



## Input Derating Curve

Figure 10



## Electromagnetic Compatibility - Emissions

| Phenomenon           | Standard    | Test Level | Criteria | Notes & Conditions                                                                            |
|----------------------|-------------|------------|----------|-----------------------------------------------------------------------------------------------|
| Conducted            | EN55011/32  | Class B    |          |                                                                                               |
| Radiated             | EN55011/32  | Class A    |          | Class B with King Core<br>K5B RC 13*23*7 on input cable and<br>K5B T 25*12*15 on output cable |
| 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 | EN55035<br>(100 VAC)     | Dip > 95% (0 VAC), 8.3ms  | A        |                                           |
|                        |                          | Dip 30% (70 VAC), 416ms   | A        |                                           |
|                        |                          | Dip > 95% (0 VAC), 4160ms | B        |                                           |
|                        | EN55035<br>(240 VAC)     | Dip > 95% (0 VAC), 10.0ms | A        |                                           |
|                        |                          | Dip 30% (168 VAC), 500ms  | A        |                                           |
|                        |                          | Dip > 95% (0 VAC), 5000ms | B        |                                           |
|                        | EN60601-1-2<br>(100 VAC) | Dip > 95% (0 VAC), 10.0ms | A        |                                           |
|                        |                          | Dip 60% (40 VAC), 100ms   | B        | Derate output power to 18W for criteria A |
|                        |                          | Dip 30% (70 VAC), 500ms   | A        |                                           |
|                        |                          | Dip > 95% (0 VAC), 5000ms | B        |                                           |
|                        | EN60601-1-2<br>(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        |                                           |

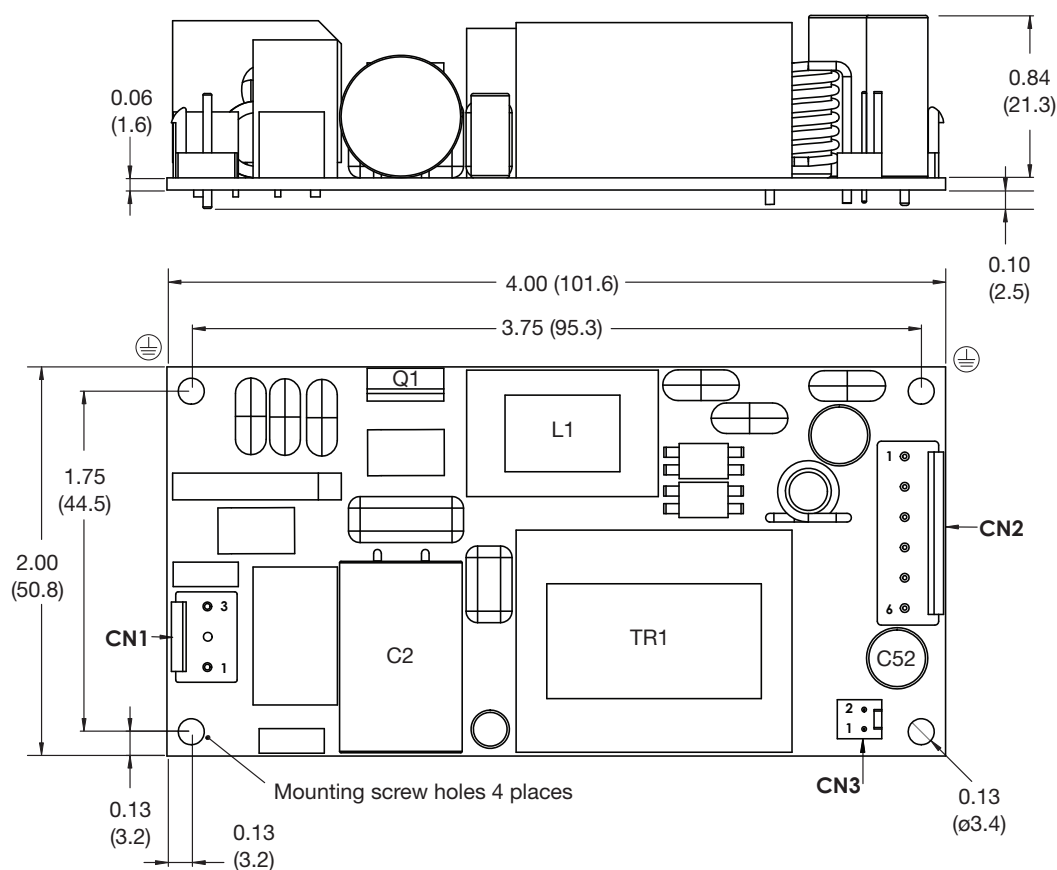
## Safety Agency Approvals

| Safety Agency | Safety Standard                                     | Category                                              |
|---------------|-----------------------------------------------------|-------------------------------------------------------|
| CB Report     | IEC62368-1: 2014                                    | Audio/Video, Information and Communication Technology |
|               | IEC60601-1 Ed 3 Including Risk Management           | Medical                                               |
| UL            | UL62368-1, CAN/CSA C22.2 No.62368-1-14 Ed 2         | Audio/Video, Information and Communication Technology |
|               | ANSI/AAMI ES60601-1:2005 & CSA C22.2, No.60601-1:08 | Medical                                               |
| EN            | EN62368-1: 2014/A11:2017                            | Audio/Video, Information and Communication Technology |
|               | EN60601-1:2006                                      | Medical                                               |
| CE            | Meets all applicable directives                     |                                                       |
| UKCA          | Meets all applicable legislation                    |                                                       |

| Means of Protection  |                                        | Category       |
|----------------------|----------------------------------------|----------------|
| 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



Mounting holes marked with  $\oplus$  must be connected to safety earth for class I applications and connected together for class II applications for optimum EMC performance

| CN2 - Output Connector |       |
|------------------------|-------|
| Pin 1                  | +Vout |
| Pin 2                  | +Vout |
| Pin 3                  | +Vout |
| Pin 4                  | -Vout |
| Pin 5                  | -Vout |
| Pin 6                  | -Vout |

Mates with JST housing  
VHR-6N and JST Series  
SVH-21T-P1.1 crimp terminals

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

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

| 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:  $\pm 0.02$  (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 °C |
| TR1 Coil                                      | 110°C              |
| L1 Coil                                       | 120°C              |
| Q1 Body                                       | 120°C              |
| C2                                            | 105°C              |
| C52                                           | 105°C              |

## Service Life

The estimated service life of the ECP180 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

