# 150 WATTS

## SINGLE/MULTI OUTPUT AC-DC

# REL-150

### FEATURES:

- **Compact 3.8" x 6.0" x 1.3" Size**
- **2 Year Warranty**
- **Universal 85-264V Input**
- **One to Four Outputs**
- **High Efficiency**
- **0-70°C Operating Temperature**
- **IEC 60601-1 3rd ed. Medical Cert.**
- **IEC 60950-1 2nd ed. ITE Certification**
- **IEC 60601-1-2 4th ed. EMC**
- **Class B Emissions per EN55011/32**
- **RoHS Compliant**
- **Optional Remote Inhibit/Enable**
- **Optional Chassis/Cover**

CHASSIS/COVER

OPEN FRAME

## SAFETY SPECIFICATIONS

| | | |
|---|---|---|
| c UL us | Underwriters Laboratories<br>File E137708/E140259 | UL 60950-1:2007, 2nd Edition<br>AAMI/ANSI ES60601-1:2005/(R) 2012 |
| IECEE CB SCHEME | | CB Reports/Certificates (including all National and Group Deviations)<br>IEC 62368-1:2014, 2nd Edition<br>IEC 60601-1:2005/A1:2012 |
| c UL us | UL Recognition<br>Mark for Canada<br>File E137708/E140259 | CAN/CSA-C22.2 No. 60950-1-07, 2nd Edition<br>CAN/CSA-C22.2 No. 60601-1:2014 |
| TUV SUD | TUV | EN 62368-1:2014, 2nd Edition<br>EN 60601-1:2006/A1:2013 |
| CE | Low Voltage Directive<br>RoHS Directive (Recast) | (2014/35/EU of February 2014)<br>(2011/65/EU of June 2011) |

## MODEL LISTING

| MODEL | OUTPUT 1(19) | OUTPUT 2(19) | OUTPUT 3(18) | OUTPUT 4(18) |
|---|---|---|---|---|
| REL-150-4001 | +3.3V/15A(20) | +5V/8A | +12V/2A | -12V/2A |
| REL-150-4002 | +5V/15A(20) | +3.3V/8A | +12V/2A | -12V/2A |
| REL-150-4003 | +5V/15A(20) | +3.3V/8A | +15V/2A | -15V/2A |
| REL-150-4004 | +5V/15A(20) | -5V/8A | +12V/2A | -12V/2A |
| REL-150-4005 | +5V/15A(20) | -5V/8A | +15V/2A | -15V/2A |
| REL-150-4006 | +5V/15A(20) | +24V/3A | +12V/2A | -12V/2A |
| REL-150-4007 | +5V/15A(20) | +24V/3A | +15V/2A | -15V/2A |
| REL-150-4009 | +24V/2.3A | +10V/1A | +6V/1.6A | -6V/.31A |
| REL-150-4010 | 5V/15A(20) | 12V/5A | 24V/1A | 24V/1A |
| REL-150-3001 | +5V/15A(20) | +12V/4A | | -12V/3A |
| REL-150-3002 | +5V/15A(20) | +15V/3A | | -15V/2A |
| REL-150-3003 | +22V/3.5A | -22V/3.5A | +24V/1A | |
| REL-150-3004 | +5V/6A | +12V/7A | | -12V/3A |
| REL-150-3005 | +5.5V/15A(20) | +15.5V/3A | | -15.5V/2A |
| REL-150-2001 | +3.3V/15A(20) | +5V/8A | | |
| REL-150-2002 | +5V/15A(20) | +12V/5A | | |
| REL-150-2003 | +5V/15A(20) | +24V/3A | | |
| REL-150-2004 | +12V/7.5A | -12V/5A | | |
| REL-150-2005 | +15V/5A | -15V/5A | | |
| REL-150-1001 | 2.5V/30A(21) | | | |
| REL-150-1002 | 3.3V/30A(21) | | | |
| REL-150-1003 | 5V/30A(21) | | | |
| REL-150-1004 | 12V/12.5A | | | |
| REL-150-1005 | 15V/10.0A | | | |
| REL-150-1006 | 24V/6.3A | | | |
| REL-150-1007 | 28V/5.4A | | | |
| REL-150-1008 | 48V/3.1A | | | |
| REL-150-1009 | 20-31V/5.4A | | | |
| REL-150-1010 | 36V/4.16A | | | |

## ORDERING INFORMATION

Consult factory for alternate output configurations.
Consult factory for positive, negative or floating outputs.
REL-150-4010: TUV only.

All specifications are maximum at 25°C/150W unless otherwise stated, may vary by model and are subject to change without notice.

## OUTPUT SPECIFICATIONS

| | | | |
|---|---|---|---|
| Total Output Power at 50°C(1) | 100W | Convection Cooled(16)(17) | |
| (See Derating Chart) | 150W | Forced-Air Cooled(15)(16)(17) | |
| Output Voltage Centering | Output 1: | ± 0.5% | (All outputs at 50% load) |
| | Output 2: | ± 5.0% | |
| | Output 3: | ± 5.0% | |
| | Output 4: | ± 5.0% | |
| Output Voltage Adjust Range | Output 1: | 95-105% | |
| Load Regulation | Output 1: | 0.5% | (10-100% load change) |
| | Output 2: | 5.0% | (10-100% load change) |
| | (4001-5 Models) | 8.0% | (20-100% load change) |
| | (2001 Model) | 6.0% | (20-100% load change) |
| | Output 3: | 5.0% | (10-100% load change) |
| | Output 4: | 5.0% | (10-100% load change) |
| Source Regulation | Outputs 1 – 4: | 0.5% | |
| Cross Regulation | Outputs 2 – 4: | 5.0% | |
| Output Noise | Outputs 1 – 4: | 1.0% | |
| Turn on Overshoot | None | | |
| Transient Response | Outputs 1 – 4 | | |
| Voltage Deviation | 5.0% | | |
| Recovery Time | 500µS | | |
| Load Change | 50% to 100% | | |
| Output Overvoltage Protection | Output 1: | 110% to 150% | |
| Output Overpower Protection | 110-160% rated Pout, cycle on/off, auto recovery | | |
| Hold Up Time | 16mS min., Full Power, 85V Input | | |
| Start Up Time | 5 Seconds, 120V Input | | |

## INPUT SPECIFICATIONS

| | |
|---|---|
| Protection Class | I |
| Source Voltage | 85 – 264 Volts AC |
| Frequency Range | 47 – 63 Hz |
| Peak Inrush Current | 40A |
| Efficiency | 82% Typ., Full Power, 230V, varies by model |
| Power Factor | 0.95 (Full Power, 230V) |

## ENVIRONMENTAL SPECIFICATIONS

| | |
|---|---|
| Ambient Operating Temperature Range | 0°C to + 70°C<br>Derating: See Power Rating Chart |
| Ambient Storage Temp. Range | - 40°C to + 85°C |
| Temperature Coefficient | Outputs 1 – 4: 0.02%/°C |

## GENERAL SPECIFICATIONS

| | |
|---|---|
| Means of Protection | |
| Primary to Secondary | 2MOPP (Means of Patient Protection) |
| Primary to Ground | 1MOPP (Means of Patient Protection) |
| Secondary to Ground | Operational Insulation(Consult factory for 1MOPP) |
| Dielectric Strength(8, 9) | |
| Reinforced Insulation | 5656 VDC, Primary to Secondary |
| Basic Insulation | 2121 VDC, Primary to Ground |
| Operational Insulation | 707 VDC, Secondary to Ground |
| Leakage Current | |
| Earth Leakage | <300µA NC, <1000µA SFC |
| Touch Current | <100µA NC, <500µA SFC |
| Power Fail Signal(14) | Logic low with input power failure 10 ms minimum prior to Output 1 dropping 1% |
| Remote Inhibit (optional) | Contact closure inhibits all outputs |
| Remote Sense(10) | 250mV compensation of output cable losses |
| Mean-Time Between Failures | 100,000 Hours min., MIL-HDBK-217F, 25° C, GB |
| Weight | 1.15 Lbs. Open Frame/ 1.82 Lbs. Chassis and Cover |

## EMC SPECIFICATIONS (IEC 60601-1-2:2014, 4TH ed./IEC 61000-6-2:2005)

| | | | | |
|---|---|---|---|---|
| Electrostatic Discharge | EN 61000-4-2 | ±8KV contact / ±15KV air discharge | | A |
| Radiated Electromagnetic Field | EN 61000-4-3 | 80MHz-2.7GHz, 10V/m, 80% AM | | A |
| Electrical Fast Transients/Bursts | EN 61000-4-4 | ±2 KV, 5KHz/100KHz | | A |
| Surge Immunity | EN 61000-4-5 | ±2 KV line to earth / ±1 KV line to line | | A |
| Conducted Immunity | EN 61000-4-6 | 0.15 to 80MHz, 10V, 80% AM | | A |
| Magnetic Field Immunity | EN 61000-4-8 | 30A/m, 60 Hz. | | A |
| Voltage Dips | EN 61000-4-11 | 0% $U_T$, 0.5 cycles, 0-315° | 100/240V | A/A |
| | | 0% $U_T$, 1 cycles, 0° | 100/240V | A/A |
| | | 40% $U_T$, 10/12 cycles, 0° | 100/240V | B/A |
| | | 70% $U_T$, 25/30 cycles, 0° | 100/240V | B/A |
| Voltage Interruptions | EN 61000-4-11 | 0% $U_T$, 300 cycles, 0° | 100/240V | B/B |
| Radiated Emissions | EN 55011/32 | Class B | | |
| Conducted Emissions | EN 55011/32 | Class B | | |
| Harmonic Current Emissions | EN 61000-3-2 | Class A | | |
| Voltage Fluctuations/Flicker | EN 61000-3-3 | Compliant | | |

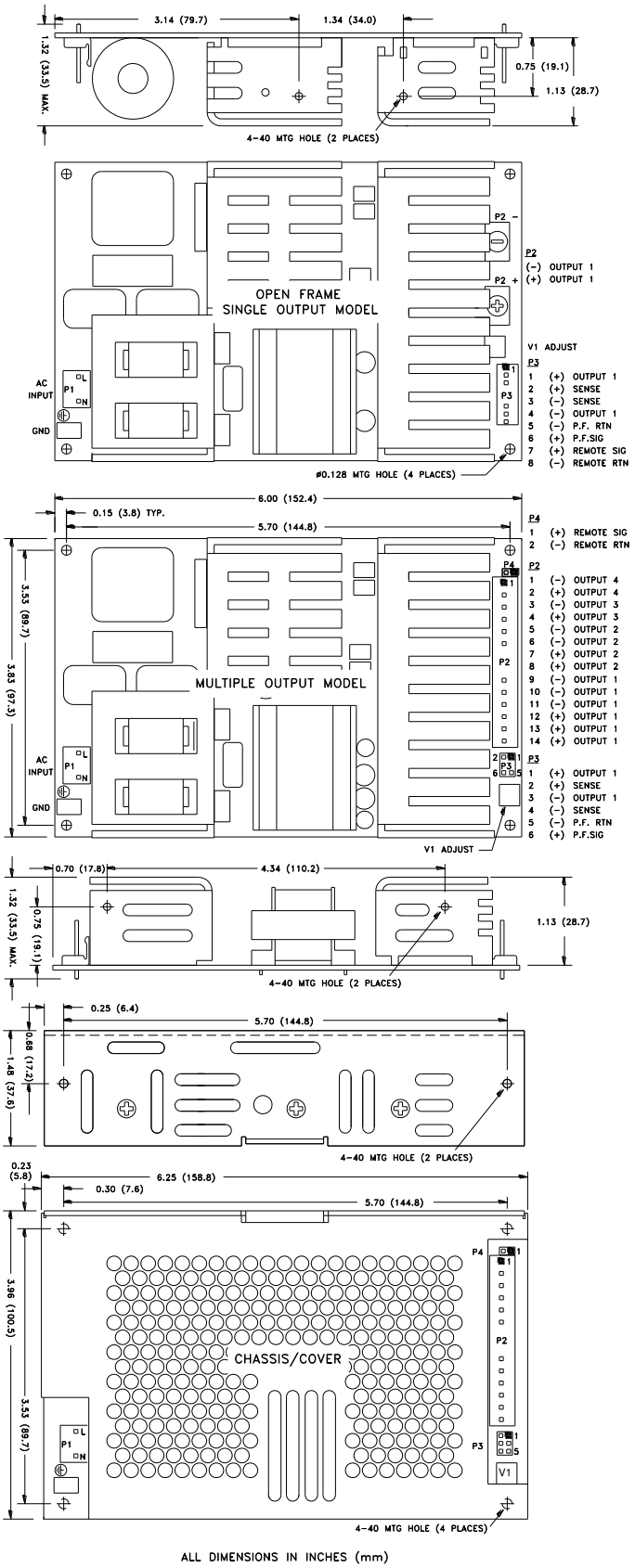
## ORDERING INFORMATION

Please specify the following optional features when ordering:

CH - Chassis
CO - Cover
TS - Terminal Strip
RE - Remote Inhibit
I/O - Isolated Outputs

INTEGRATED POWER DESIGNS 300 Stewart Road ■ Wilkes-Barre, PA 18706 ■ Phone: (570) 824-4666 ■ Fax: (570) 824-4843 ■ Email: sales@ipdpower.com ■ Web: www.ipdpower.com

## REL-150 SERIES MECHANICAL SPECIFICATIONS

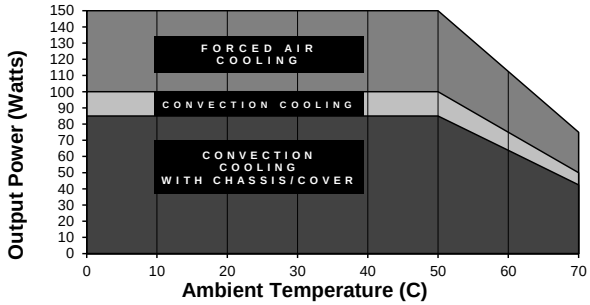



ALL DIMENSIONS IN INCHES (mm)

## APPLICATIONS INFORMATION

1. Each output can deliver its rated current but Total Output Power must not exceed 150W, as determined by the cooling method.
2. Generally, adequate cooling is provided when semiconductor case temperatures do not exceed 70°C rise and transformer temperature does not exceed 60°C rise at any specified ambient temperature.
3. Sufficient area must be provided around power supply to allow natural movement of air to develop in convection-cooled applications.
4. This product is intended for use as a professionally-installed component within information technology, industrial, and medical equipment and is not intended for stand-alone operation.
5. A minimum load of 10% is required on Output 1 to ensure proper regulation of remaining outputs.
6. This product includes only one fuse in the input circuit. In consideration of Clause 8.11.5 of IEC 60601-1:2005, a second fuse may be required in neutral conductor of the end product.
7. Peak-to-Peak Output Ripple and Noise is measured directly at the output terminals of the power supply, without the use of the probe ground lead or retractable tip (tip-and-barrel method), 20 MHz bandwidth.
8. This product was type-tested and safety-certified using the dielectric strength test voltages listed in Table 6 of IEC 60601-1:2005. In consideration of Clause 8.8.3, care must be taken to insure that the voltage applied to a reinforced insulation does not overstress different types and levels of insulation. Primary and secondary-to-ground capacitors may need to be disconnected prior to performing a dielectric strength test on the power supply or the end product. It is highly recommended that the DC test voltages listed in DVB.1, Annex DVB of UL 60601-1 1st Edition are not exceeded during a production-line dielectric strength test of the assembled end product. Please consult factory for further information.
9. This power supply has been safety-approved and final-tested using a DC dielectric strength test. Please consult factory before performing an AC dielectric strength test.
10. Remote-Sense terminals may be used to compensate for cable losses up to 250mV. The use of a twisted pair, decoupling capacitors and an appropriately-rated low-impedance capacitor connected across the load will increase noise immunity.
11. Maximum screw penetration into bottom chassis mounting holes is 0.100 inches. Maximum screw penetration into side chassis mounting holes is 0.250 inches.
12. To comply with emissions specifications, all four mounting hole pads must be electrically connected to a common metal chassis. Chassis/Cover option is recommended. Refer to Operating Instructions for additional information.
13. Common RF shielding precautions may need to be taken to assure emissions compliance. Refer to Operating Instructions for additional information.
14. Power-Fail (AC-Good) feature provides a logic-low warning signal from an open collector transistor output 10ms prior to loss of output from AC failure, 5V/10mA.
15. 300LFM minimum of airflow must be maintained one inch above all points of top-side components or cover when forced-air cooling is required.
16. Total power must not exceed 100W with convection cooling or 150W with forced-air cooling on open frame models except where noted.
17. Total power must not exceed 85W with convection cooling or 150W with forced-air cooling and Chassis/Cover option.
18. Total current from Outputs 3 & 4 must not exceed 3A with convection cooling.
19. Total current from Outputs 1 & 2 must not exceed 15A with convection cooling.
20. Rated 12A maximum with convection cooling.
21. Rated 20A maximum with convection cooling.

## MAXIMUM OUTPUT POWER vs. AMBIENT TEMPERATURE




## CONNECTOR SPECIFICATIONS

| | | |
|---|---|---|
| P1 | AC Input | 0.156 friction lock header mates with Molex 09-50-3031 or equivalent crimp terminal housing with Molex 2478 or equivalent crimp terminal. |
| P2 | DC Output (Single) | 6-32 screw down terminal mates with #6 ring tongue terminal. (10 in-lb max) |
| P2 | DC Output (Multiple) | 0.156 friction lock header mates with Molex 09-50-3141 or equivalent crimp terminal housing with Molex 2478 or equivalent crimp terminal. |
| G | Ground | 0.187 quick disconnect terminal. |
| P3 | Remote/P.F./ Sense (Single) | 0.100 friction lock header mates with Molex 50-57-9008or equivalent crimp terminal housing with Molex type 71851 or equivalent crimp terminal. |
| P3 | P.F./Sense (Multiple) | 0.100 breakaway header mates with Molex 22-55-2061 or equivalent crimp terminal housing with Molex type 70058 or equivalent crimp terminal. |
| P4 | Remote (Multiple) | 0.100 breakaway header mates with Molex 50-57-9002 or equivalent crimp terminal housing with Molex type 71851 or equivalent crimp terminal. |



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