

# 150 WATTS

## SINGLE/MULTI OUTPUT AC-DC

### 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 3<sup>rd</sup> ed. Medical Cert.
- IEC 62368-1 2<sup>nd</sup> ed. Certification
- IEC 60601-1-2 4<sup>th</sup> ed. EMC
- Class B Emissions per EN55011/32
- RoHS Compliant
- Optional Remote Inhibit/Enable
- Optional Chassis/Cover



### CHASSIS/COVER      OPEN FRAME

### SAFETY SPECIFICATIONS



Underwriters Laboratories  
File E137708/E140259

UL 62368-1:2014, 2<sup>nd</sup> Edition  
CAN/CSA-C22.2 No. 62368-1-14  
AAMI/ANSI ES60601-1:2005/(R) 2012  
CAN/CSA-C22.2 No. 60601-1:2014



CB Reports/Certificates (including all National and Group Deviations)

IEC 62368-1:2014, 2<sup>nd</sup> Edition  
IEC 60601-1:2005/A1:2012



TUV SUD America

EN 62368-1:2014, 2<sup>nd</sup> Edition  
EN 60601-1:2006/A1:2013



Low Voltage Directive (2014/35/EU of February 2014)  
RoHS Directive (Recast) (2015/863/EU of March 2015)



Electrical Equipment (Safety) Regulations 2016 SI No. 1101  
Restriction of the Use of Certain Hazardous Substances in EEE Regulations 2012 SI No. 3032 + 2019 SI No.492

### MODEL LISTING

| MODEL        | OUTPUT 1 <sup>(19)</sup>  | OUTPUT 2 <sup>(19)</sup> | OUTPUT 3 <sup>(18)</sup> | OUTPUT 4 <sup>(18)</sup> |
|--------------|---------------------------|--------------------------|--------------------------|--------------------------|
| REL-150-4001 | +3.3V/15A <sup>(20)</sup> | +5V/8A                   | +12V/2A                  | -12V/2A                  |
| REL-150-4002 | +5V/15A <sup>(20)</sup>   | +3.3V/8A                 | +12V/2A                  | -12V/2A                  |
| REL-150-4003 | +5V/15A <sup>(20)</sup>   | +3.3V/8A                 | +15V/2A                  | -15V/2A                  |
| REL-150-4004 | +5V/15A <sup>(20)</sup>   | -5V/8A                   | +12V/2A                  | -12V/2A                  |
| REL-150-4005 | +5V/15A <sup>(20)</sup>   | -5V/8A                   | +15V/2A                  | -15V/2A                  |
| REL-150-4006 | +5V/15A <sup>(20)</sup>   | +24V/3A                  | +12V/2A                  | -12V/2A                  |
| REL-150-4007 | +5V/15A <sup>(20)</sup>   | +24V/3A                  | +15V/2A                  | -15V/2A                  |
| REL-150-4009 | +24V/2.3A                 | +10V/1A                  | +6V/1.6A                 | -6V/1.31A                |
| REL-150-4010 | 5V/15A <sup>(20)</sup>    | 12V/5A                   | 24V/1A                   | 24V/1A                   |
| REL-150-3001 | +5V/15A <sup>(20)</sup>   | +12V/4A                  |                          | -12V/3A                  |
| REL-150-3002 | +5V/15A <sup>(20)</sup>   | +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 <sup>(20)</sup> | +15.5V/3A                |                          | -15.5V/2A                |
| REL-150-2001 | +3.3V/15A <sup>(20)</sup> | +5V/8A                   |                          |                          |
| REL-150-2002 | +5V/15A <sup>(20)</sup>   | +12V/5A                  |                          |                          |
| REL-150-2003 | +5V/15A <sup>(20)</sup>   | +24V/3A                  |                          |                          |
| REL-150-2004 | +12V/7.5A                 | -12V/5A                  |                          |                          |
| REL-150-2005 | +15V/5A                   | -15V/5A                  |                          |                          |
| REL-150-1001 | 2.5V/30A <sup>(21)</sup>  |                          |                          |                          |
| REL-150-1002 | 3.3V/30A <sup>(21)</sup>  |                          |                          |                          |
| REL-150-1003 | 5V/30A <sup>(21)</sup>    |                          |                          |                          |
| 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.

# REL-150

## OUTPUT SPECIFICATIONS

|   |   |  |
|---|---|--|
| Total Output Power at 50°C <sub>(1)</sub><br>(See Derating Chart) | 100W<br>150W  | Convection Cooled <sup>(16)(17)</sup><br>Forced-Air Cooled <sup>(15)(16)(17)</sup>   |
| Output Voltage Centering  | Output 1:<br>Output 2:<br>Output 3:<br>Output 4:                                    | ± 0.5% (All outputs at 50% load)<br>± 5.0%<br>± 5.0%<br>± 5.0%   |
| Output Voltage Adjust Range                                       | Output 1:   | 95-105%  |
| Load Regulation   | Output 1:<br>Output 2:<br>(4001-5 Models)<br>(2001 Model)<br>Output 3:<br>Output 4: | 0.5% (10-100% load change)<br>5.0% (10-100% load change)<br>8.0% (20-100% load change)<br>6.0% (20-100% load change)<br>5.0% (10-100% load change)<br>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           | 0°C to + 70°C                    |
| Temperature Range           | 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 <sup>(8, 9)</sup> |  |
| 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 <sup>(14)</sup>     | 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 <sup>(10)</sup>          | 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, 4<sup>TH</sup> 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 <sub>T</sub> , 0.5 cycles, 0-315°   | 100/240V A/A |
|                                   |               | 0% U <sub>T</sub> , 1 cycles, 0°         | 100/240V A/A |
|                                   |               | 40% U <sub>T</sub> , 10/12 cycles, 0°    | 100/240V B/A |
|                                   |               | 70% U <sub>T</sub> , 25/30 cycles, 0°    | 100/240V B/A |
| Voltage Interruptions             | EN 61000-4-11 | 0% U <sub>T</sub> , 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

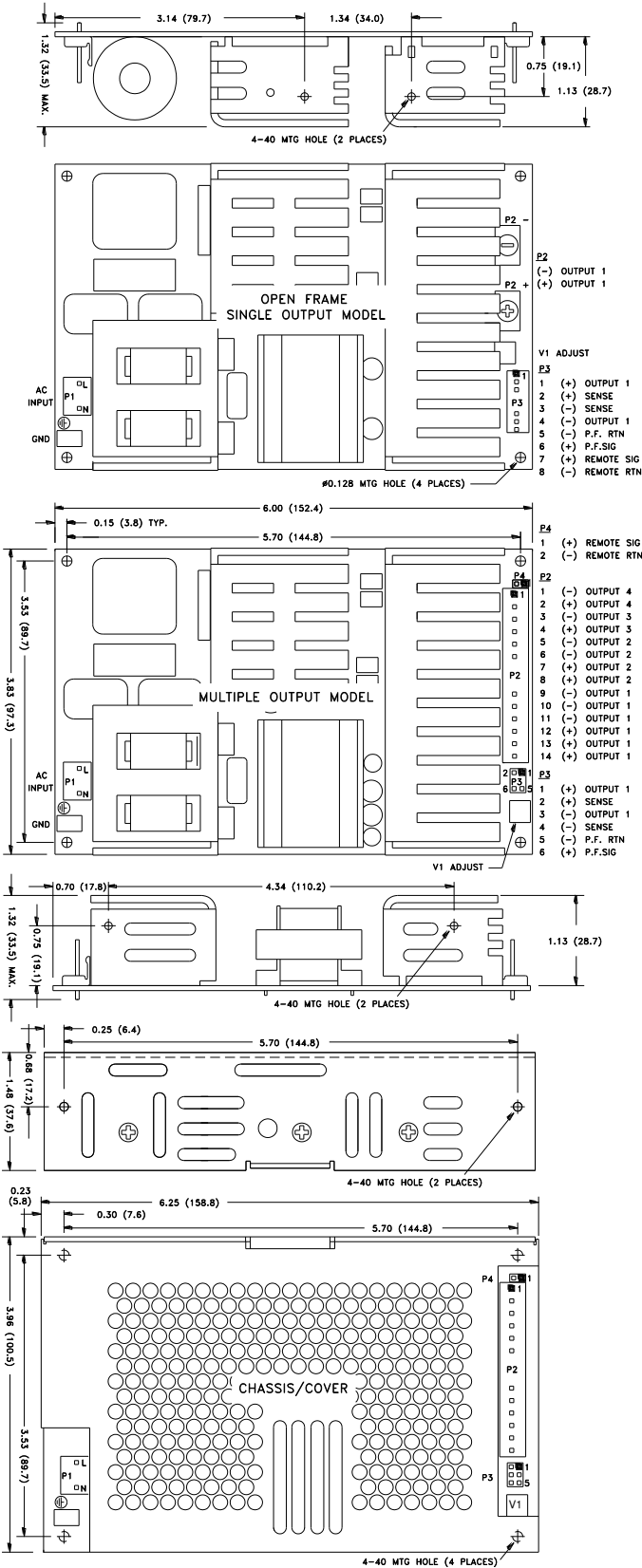
TS - Terminal Strip

RE - Remote Inhibit

I/O - Isolated Outputs



# REL-150 SERIES MECHANICAL SPECIFICATIONS

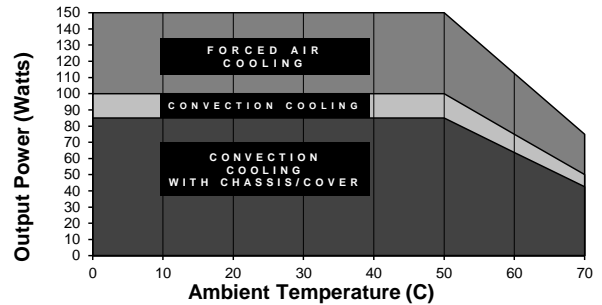


ALL DIMENSIONS IN INCHES (mm)

# APPLICATIONS INFORMATION

- Each output can deliver its rated current but Total Output Power must not exceed 150W, as determined by the cooling method.
- 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.
- Sufficient area must be provided around power supply to allow natural movement of air to develop in convection-cooled applications.
- 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.
- A minimum load of 10% is required on Output 1 to ensure proper regulation of remaining outputs.
- 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.
- 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.
- 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 1<sup>st</sup> Edition are not exceeded during a production-line dielectric strength test of the assembled end product. Please consult factory for further information.
- 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. 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.
- Maximum screw penetration into bottom chassis mounting holes is 0.100 inches. Maximum screw penetration into side chassis mounting holes is 0.250 inches.
- 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.
- Common RF shielding precautions may need to be taken to assure emissions compliance. Refer to Operating Instructions for additional information.
- 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.
- 300LFM minimum of airflow must be maintained one inch above all points of top-side components or cover when forced-air cooling is required.
- Total power must not exceed 100W with convection cooling or 150W with forced-air cooling on open frame models except where noted.
- Total power must not exceed 85W with convection cooling or 150W with forced-air cooling and Chassis/Cover option.
- Total current from Outputs 3 & 4 must not exceed 3A with convection cooling.
- Total current from Outputs 1 & 2 must not exceed 15A with convection cooling.
- Rated 12A maximum with convection cooling.
- 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 50-57-9008 or 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.     |