

60 WATTS

GRN-60 SINGLE OUTPUT AC-DC

FEATURES:

- RoHS Compliant
- Advanced SMT Design
- <0.3W No Load Input Power
- 90% Peak Efficiency
- 87% Average Efficiency
- Excellent Light Load Efficiency
- 2-Year Warranty
- Compact 2.0" x 3.0" x 1.0" Size
- EN 60950-1 ITE Certification
- EN 60601-1 Medical Certification
- EN 61000-6-2 & EN 60601-1-2 EMC
- Optional Chassis/Cover








OPEN FRAME



CHASSIS/COVER

SAFETY SPECIFICATIONS

| | | |
|-------------------------------------------------------------------------------------|-----------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| General | Protection Class: I | |
| | Overvoltage Category: II | |
| | Pollution Degree: 2 | |
|  | Underwriters Laboratories File E137708/E140259 | UL 60950-1 Second Edition, 2007 UL 60601-1 First Edition, 2006 AAMI/ANSI ES 60601-1, 2005 |
|  | | CB Reports/Certificates (including all National and Group Deviations) IEC 60950-1/A1:2009, Second Edition IEC 60601-1:1988 +A1:1991 +A2:1995 IEC 60601-1:2005 Third Edition |
|  | UL Recognition Mark for Canada File E137708/E140259 | CAN/CSA-C22.2 No. 60950-1-07, Second Edition CAN/CSA-C22.2 No. 601-1-M90, 2005 CAN/CSA-C22.2 No. 60601-1:2008 |
|  | TUV | EN 60950-1/A12:2011 EN 60601-1/A2:1995 EN 60601-1:2006 |
|  | Low Voltage Directive RoHS Directive (Recast) | (2006/95/EC of December 2006) (2011/65/EU of June 2011) |

MODEL LISTING

| MODEL | OUTPUT | P _{OUT} |
|-------------|-----------|------------------|
| GRN-60-1001 | 3.3V/9.0A | 30W |
| GRN-60-1002 | 5.0V/9.0A | 45W |
| GRN-60-1003 | 12V/5.0A | 60W |
| GRN-60-1004 | 15V/4.0A | 60W |
| GRN-60-1005 | 24V/2.5A | 60W |
| GRN-60-1006 | 28V/2.2A | 60W |
| GRN-60-1007 | 48V/1.3A | 60W |
| GRN-60-1008 | 19V/3.1A | 60W |

ORDERING INFORMATION

Please specify the following optional features when ordering:

CH - Chassis
CO - Cover
OVP - Overvoltage protection
DF - Dual Fuse

All specifications are maximum at 25°C, 60W unless otherwise stated, may vary by model and are subject to change without notice.

GREEN MODE

OUTPUT SPECIFICATIONS

| | | |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|
| Output Power at 50°C | 60W | 85-264 V _{IN} (see derating chart) |
| Voltage Centering | ±0.5% | (Output at 50% load) |
| Voltage Adjust Range | 95-105% | |
| Load Regulation | ±0.5% | (0-100% load change) |
| Source Regulation | 0.5% | |
| Ripple & Noise | 1.0% | <150mV (1001,1002) |
| Turn-On Overshoot | None | |
| Transient Response | Output recovers to within 1% of initial set point due to a 50% step load change, 500µs maximum, 5% maximum deviation (maximum deviation on 1001: 8%, 1002: 6%). | |
| Overvoltage Protection | Latching, between 110% and 150% of rated output voltage (optional). | |
| Overpower Protection | 110-160% rated P _{OUT} min., cycle on/off, auto recovery | |
| Hold-Up Time | 10 ms typical, full power, 115V input | |
| Start-Up Time | 1 sec., 115/230V input | |
| Output Rise Time | 27 ms typical | |
| Minimum Load | No minimum load required | |

INPUT SPECIFICATIONS

| | | |
|-----------------------|------------------------------------------------------------------|--|
| Source Voltage | 85 – 264 VAC (see derating chart) | |
| Frequency Range | 47 – 63 Hz | |
| Input Protection(s) | Internal 2A time-delay fuse, 1500A breaking capacity | |
| Peak Inrush Current | 50A max. at 230 V | |
| Peak Efficiency | 90% | |
| Average Efficiency | 87% (1003-1008), 85% (1002), 80% (1001) | |
| Light Load Efficiency | 85%, 115/230 V _{IN} , 33% power, 81% (1001), 84% (1002) | |
| No Load Input Power | <0.3W, 115/230 V _{IN} , no load | |

ENVIRONMENTAL SPECIFICATIONS

| | | |
|-----------------------------------|---------------------------------------------------------------|---------------|
| Cooling | Free air convection | |
| Ambient Operating | 0° to + 70° C | |
| Temperature Range | Derating: see power rating chart | |
| Ambient Storage Temp. Range | - 40° to + 85° C | |
| Operating Relative Humidity Range | 20-90% non-condensing | |
| Altitude | 10,000 ft. ASL | Operating |
| | 40,000 ft. ASL | Non-operating |
| Temperature Coefficient | 0.02%/°C | |
| Vibration | 2.5G swept sine, 7-2000Hz, 1 octave/min, 3 axis, 1 hour each. | |
| Shock | 20G, 11ms, 3 axis, 3 each direction. | |

GENERAL SPECIFICATIONS

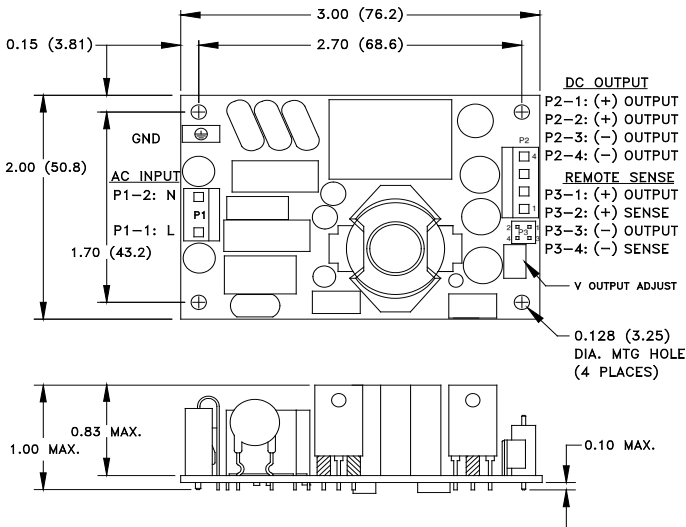
| | | |
|--------------------------------------|------------------------------------------------------------|--|
| Means of Protection | | |
| Primary to Secondary | 2MOPP (Means of Patient Protection) | |
| Primary to Ground | 1MOPP (Means of Patient Protection) | |
| Secondary to Ground | Operational Insulation(Consult factory for 1MOOP or 1MOPP) | |
| Dielectric Strength ^(7,8) | | |
| Reinforced Insulation | 5656 VDC, primary to secondary, 1 sec. | |
| Basic Insulation | 2545 VDC, primary to ground, 1 sec. | |
| Operational Insulation | 707 VDC, secondary to ground, 1 sec. | |
| Leakage Current | | |
| Earth Leakage | <300µA NC, <1000µA SFC | |
| Touch Current | <100µA NC, <500µA SFC | |
| Switching Frequency | 65 KHz | |
| Remote Sense | 400 mV compensation of output cable losses | |
| Mean-Time Between Failures | >250,000 hours, MIL-HDBK-217F, 25° C, GB | |
| Weight | 0.24 lbs. Open frame/0.34 lbs. Chassis and cover | |

ELECTROMAGNETIC COMPATIBILITY SPECIFICATIONS

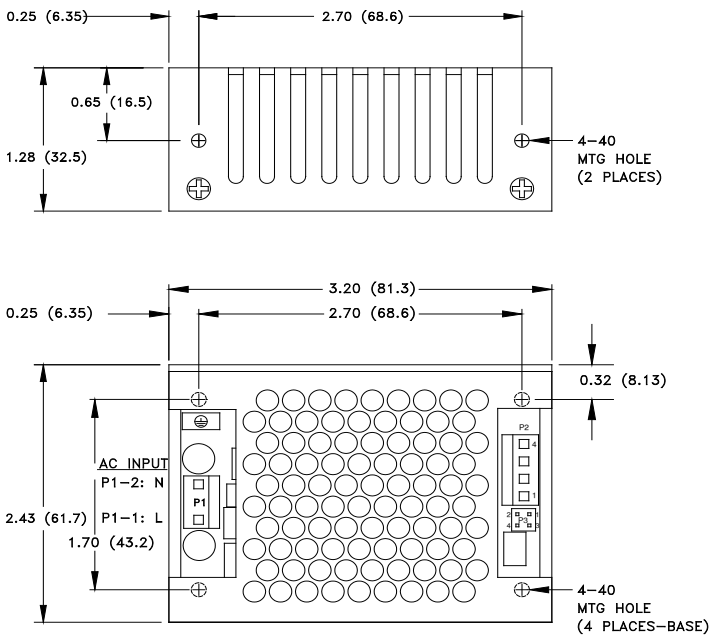
| | | |
|----------------------------------|---------------|----------------------------------------------------------------------|
| Electrostatic Discharge | EN 61000-4-2 | ± 6KV contact/± 8KV air discharge |
| Radiated Electromagnetic Field | EN 61000-4-3 | 80-1000MHz, 1.0-2.7GHz 10V/m, 80% AM |
| EFT/Bursts | EN 61000-4-4 | ± 2 KV |
| Surges | EN 61000-4-5 | ± 2 KV line to earth, ± 1 KV line to line |
| Conducted Immunity | EN 61000-4-6 | 0.15 to 80MHz, 10V, 80% AM |
| Magnetic Field Immunity | EN 61000-4-8 | 30A/m, 50/60 Hz |
| Voltage Dips | EN 61000-4-11 | 95% dip, 10ms 30% dip, 100ms 60% reduction, 500ms (Criteria B) |
| Voltage Interruptions | EN 61000-4-11 | 95% reduction, 5 sec. |
| Radiated Emissions | EN 55011/22, | Class B |
| | FCC Part 15 | |
| Conducted Emissions | EN 55011/22, | Class B |
| | FCC Part 15 | |
| Harmonic Current Emissions | EN 61000-3-2 | Class A |
| Voltage Fluctuations and Flicker | EN 61000-3-3 | Compliance |

GRN-60 SINGLE MECHANICAL SPECIFICATIONS

OPEN FRAME



OPTIONAL CHASSIS/COVER



ALL DIMENSIONS IN INCHES (mm)

CONNECTOR SPECIFICATIONS

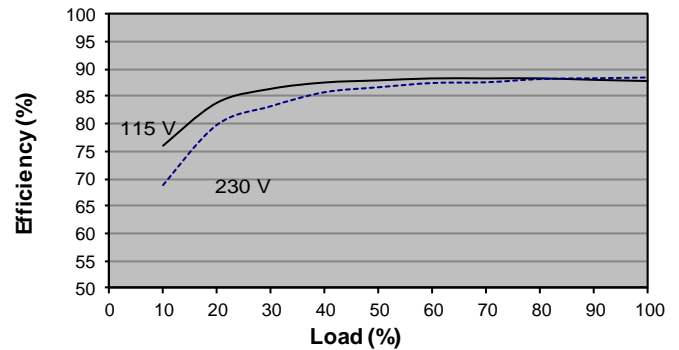
| | | |
|-----------------------------------------------------------------------------------------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>P1</p> <p>NEUTRAL LINE</p> | <p>AC Input</p> | <p>0.156 friction lock header mates with Tyco 640250-3 or equivalent crimp terminal housing with Tyco 3-640706-1 or equivalent crimp terminal.</p> |
| <p>P2</p> <p>4 (-) OUTPUT 3 (-) OUTPUT 2 (+) OUTPUT 1 (+) OUTPUT</p> | <p>DC Output</p> | <p>0.156 friction lock header mates with Tyco 770849-4 or equivalent crimp terminal housing with Tyco 3-640707-1 or equivalent crimp terminal.</p> |
| <p>P3</p> <p>(+) SENSE 2 1 (+) OUTPUT (-) SENSE 4 3 (-) OUTPUT</p> | <p>DC Sense</p> | <p>0.100 breakaway header mates with Molex 22-55-2041 or equivalent crimp terminal housing with Molex 71851 or equivalent crimp terminal.</p> |
| | <p>Ground</p> | <p>0.187 quick disconnect terminal</p> |

APPLICATIONS INFORMATION

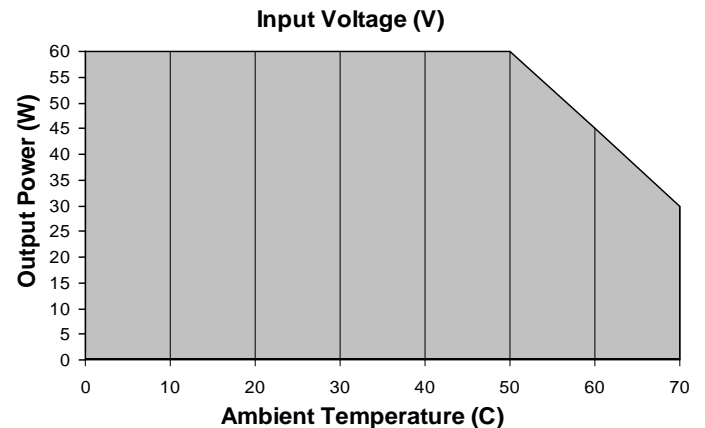
1. Continuous output power must not exceed 60W.
2. Sufficient area must be provided around power supply to allow natural movement of air to develop in convection cooled applications.
3. Generally, adequate cooling is provided when semiconductor case temperatures do not exceed 70° C rise and transformer temperature does not exceed 60° C rise at any specified ambient temperature.
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. Standard models include only one fuse in the input circuit. In consideration of clause 8.11.5 of IEC 60601-1-1:2005, a second fuse may be required in neutral conductor of the end product. Models with the suffix DF include a fuse in the line and neutral leads.
6. 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, 20 MHz bandwidth.
7. This product was type tested and safety certified using the dielectric strength test voltages listed in Table 6 of IEC60601-1:2005. 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 type test on the power supply or the end product. It is highly recommended that the DC test voltage listed in DVB.1, annex DVB of UL60601-1 1ST Edition are not exceeded during a production-line dielectric strength test of the assembled end product. Please consult factory for further information.
8. 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.
9. Maximum screw penetration into bottom chassis mounting holes is 0.100 inches.
10. Maximum screw penetration into side chassis mounting holes is 0.188 inches.
11. Common RF shielding precautions may need to be taken to assure emissions compliance. Refer to Operating Instructions for additional information.
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.

TYPICAL EFFICIENCY VS. LOAD

(Model GRN-60-1004 efficiency shown)



MAX P_{OUT} VS. AMBIENT TEMPERATURE/INPUT VOLTAGE



Derating requirements - Derate from 100% load at 50° C to 50% load at 70° C