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
c UL us	Underwriters Laboratories File E137708/E140259	UL 60950-1 Second Edition, 2007 UL 60601-1 First Edition, 2006 AAMI/ANSI ES 60601-1, 2005
IECEE CB SCHEME		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
c UL us	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 SUD	TUV	EN 60950-1/A12:2011 EN 60601-1/A2:1995 EN 60601-1:2006
CE	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(5)	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 Temperature Range	0° to + 70° C 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

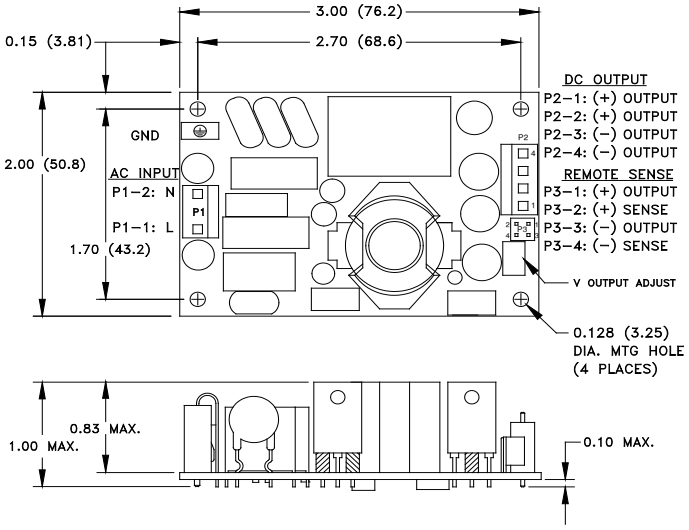
Means of Protection	
Primary to Secondary	2MOPP (Means of Patient Protection)
Primary to Ground	1MOPP (Means of Patient Protection)
Secondary to Ground	Operational Insulation(Consult factory for 1MOOP or 1MOPP)
Dielectric Strength(7,8)	
Reinforced Insulation	5656 VDC, primary to secondary, 1 sec.
Basic 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

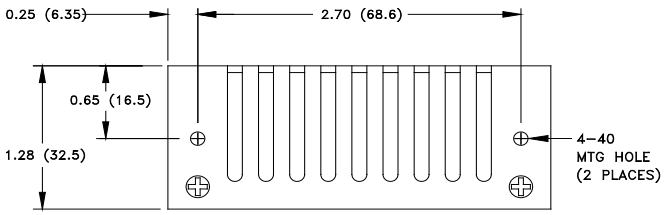
Electrostatic Discharge	EN 61000-4-2	± 6KV contact/± 8KV air discharge
Radiated Electromagnetic Field	EN 61000-4-3	80-1000MHz,1.0-2.7GHz 10V/m,80%AM
EFT/Bursts	EN 61000-4-4	± 2 KV
Surges	EN 61000-4-5	± 2 KV line to earth, ± 1 KV line to line
Conducted Immunity	EN 61000-4-6	0.15 to 80MHz, 10V, 80% AM
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, FCC Part 15	Class B
Conducted Emissions	EN 55011/22, FCC Part 15	Class B
Harmonic Current Emissions	EN 61000-3-2	Class A
Voltage Fluctuations and Flicker	EN 61000-3-3	Compliance

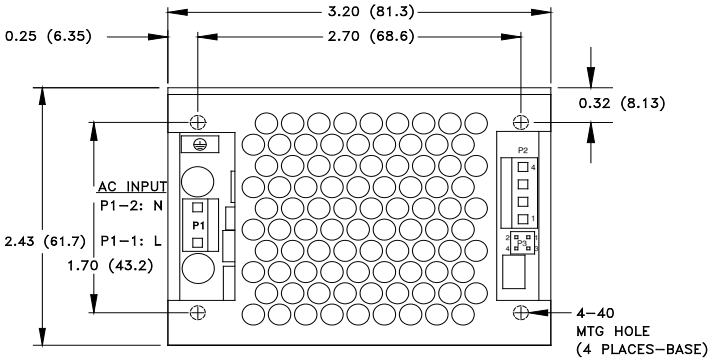
GRN-60 SINGLE MECHANICAL SPECIFICATIONS

OPEN FRAME



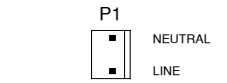
OPTIONAL CHASSIS/COVER





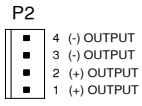
ALL DIMENSIONS IN INCHES (mm)

CONNECTOR SPECIFICATIONS



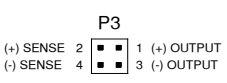
AC Input

0.156 friction lock header mates with Tyco 640250-3 or equivalent crimp terminal housing with Tyco 3-640706-1 or equivalent crimp terminal.



DC Output

0.156 friction lock header mates with Tyco 770849-4 or equivalent crimp terminal housing with Tyco 3-640707-1 equivalent crimp terminal.



DC Sense

0.100 breakaway header mates with Molex 22-55-2041 or equivalent crimp terminal housing with Molex 71851 or equivalent crimp terminal.

Ground

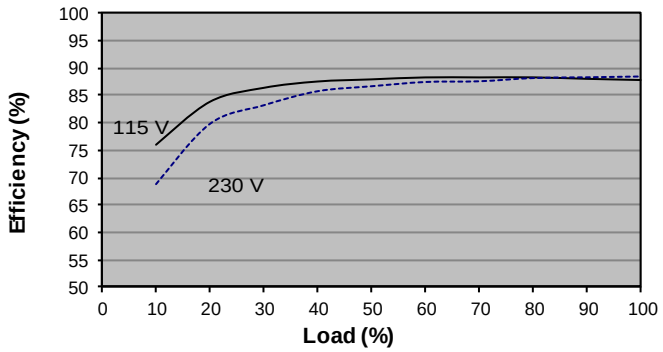
0.187 quick disconnect terminal

APPLICATIONS INFORMATION

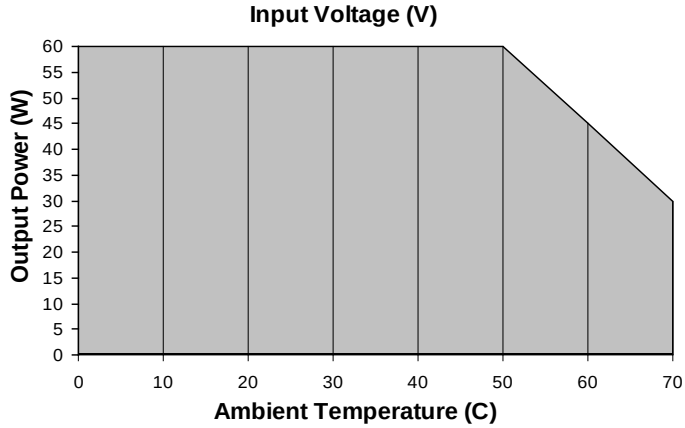
1. Continuous output power must not exceed 60W.
2. Sufficient area must be provided around power supply to allow natural movement of air to develop in convection cooled applications.
3. Generally, adequate cooling is provided when semiconductor case temperatures do not exceed 70° C rise and transformer 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 POUT VS. AMBIENT TEMPERATURE/INPUT VOLTAGE



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

REV.K 07/08/2013