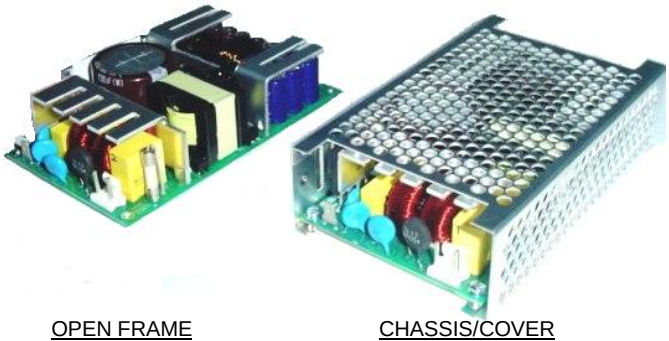
110 WATTS

GRN-110 MULTI OUTPUT AC-DC

GREEN MODE

FEATURES:

- **RoHS Compliant**
- **2 Year Warranty**
- **Advanced SMT Design**
- **<1W No Load Input Power**
- **87% Peak Efficiency**
- **85% Average Efficiency**
- **Excellent Light Load Efficiency**
- **Dual, Triple & Quad Outputs**
- **Compact 3.0" x 5.0" x 1.25" 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 ES6060-1, 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 1	OUTPUT 2	OUTPUT 3	OUTPUT 4
GRN-110-4001	+3.3V/10A	+5V/5A	+12V/2A	-12V/2A
GRN-110-4002	+5V/10A	-5V/5A	+12V/2A	-12V/2A
GRN-110-4003	+5V/10A	+24V/2A	+12V/2A	-12V/2A
GRN-110-4004	+5V/10A	+24V/2A	+15V/2A	-15V/2A
GRN-110-3001	+5V/12A		+12V/3A	-12V/3A
GRN-110-3002	+5V/12A		+15V/3A	-15V/3A
GRN-110-2001	+5V/12A	+24V/3A		
GRN-110-2002	+5V/12A	+12V/5A		
GRN-110-2003	+12V/5A	-12V/5A		
GRN-110-2004	+15V/4A	-15V/4A		

ORDERING INFORMATION

Other output configurations available (consult factory) (15)

Please specify the following optional features when ordering:

CH - Chassis
CO - Cover
OVP - Overvoltage protection
I/O - Isolated outputs

All specifications are maximum at 25°C, 110W unless otherwise stated, may vary by model and are subject to change without notice.

OUTPUT SPECIFICATIONS

Output Power at 50°C	110W	85-264 V_{IN} (see derating chart)
Voltage Centering	Output 1: Outputs 2 - 4:	±0.5% ±5.0% (All outputs at 50% load)
Voltage Adjust Range	Output 1:	95-105%
Load Regulation	Output 1: Outputs 2 - 4:	±0.5% (0-100% load change) ±5.0% (10-100% load change)
Source Regulation	Outputs 1 - 4:	0.5%
Cross Regulation	Outputs 2 - 4:	5.0%
Ripple & Noise	Outputs 1 - 4	1.0%
Turn On Overshoot	<1%	
Transient Response	Output recovers to within 1% of initial set point due to a 50% step load change, 500µS maximum, 4% maximum deviation.	
Overvoltage Protection	Latching, Output 1 between 110% and 150% of rated output voltage (optional)	
Overpower Protection	110%-150% rated P_{OUT}, cycle on/off, auto recovery	
Hold-Up Time	16 ms typical, full power, 115V input	
Start-Up Time	1 sec., 115/230V input	
Output Rise Time	25 ms typical	
Minimum Load(2)	No minimum load required	

INPUT SPECIFICATIONS

Source Voltage	85 – 264 VAC (see derating chart)
Frequency Range	47 – 63 Hz
Input Protection(6)	Internal 4A time delay fuse, 1500A breaking capacity
Peak Inrush Current	40A max at 230 V
Peak Efficiency	87%
Average Efficiency	85% (Avg. of 25%, 50%, 75% and 100% rated load)
Light Load Efficiency	85%, 115/230 V_{IN}, 33% power
No Load Input Power	<1W, 115/230 V_{IN}, no load

ENVIRONMENTAL SPECIFICATIONS

Cooling	Free air convection
Ambient Operating Temperature Range	0° C to + 70° C Derating: see power rating chart
Ambient Storage Temp. Range	- 40° C 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, 11 ms, 3 axis, 3 each direction.

GENERAL SPECIFICATIONS

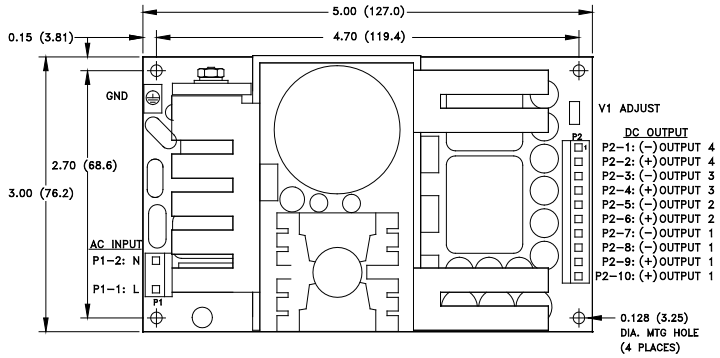
Means of Protection	
Primary to Secondary	2MOPP (Means of Patient Protection)
Primary to Ground	1MOPP (Means of Patient Protection)
Secondary to Ground	Operational Insulation(consult factory for 1MOOP or 1MOPP)
Dielectric Strength(8,9)	
Reinforced Insulation	5656 VDC, primary to secondary, 1 sec.
Basic Insulation	2545 VDC, primary to ground, 1 sec.
Operational Insulation	707 VDC, secondary to ground, 1 sec.
Leakage Current	
Earth Leakage	<300uA NC, <1000uA SFC
Touch Current	<100uA NC, <500uA SFC
Switching Frequency	100 KHz
Mean-Time Between Failures	>250,000 hours, MIL-HDBK-217F, 25° C, GB
Weight	0.79 lbs. Open frame / 1.00 lbs. Chassis and cover

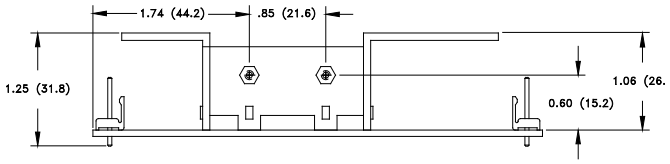
ELECTROMAGNETIC COMPATIBILITY SPECIFICATIONS

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	.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, 500 ms (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 Emmissions	EN 61000-3-2	Class A (<100W P_{IN})
Voltage Fluctuations and Flicker	EN 61000-3-3	Compliance

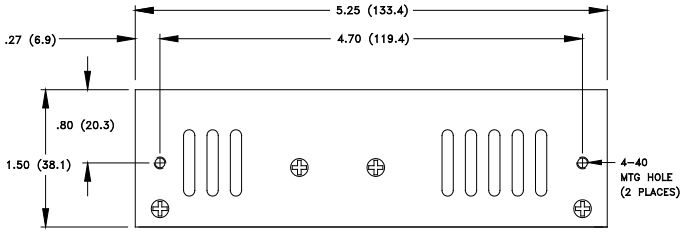
GRN-110 MULTI MECHANICAL SPECIFICATIONS

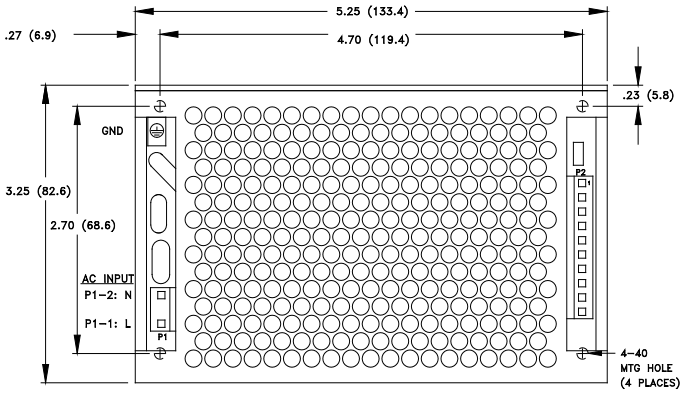
OPEN FRAME





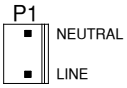
OPTIONAL CHASSIS/COVER



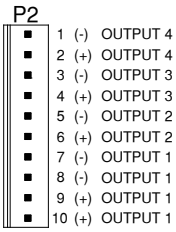


ALL DIMENSIONS IN INCHES (MM)

CONNECTOR SPECIFICATIONS



AC Input — .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 — .156 friction lock header mates with Tyco 1-770849-0 or equivalent crimp terminal housing with Tyco 3-640707-1 or equivalent crimp terminal.

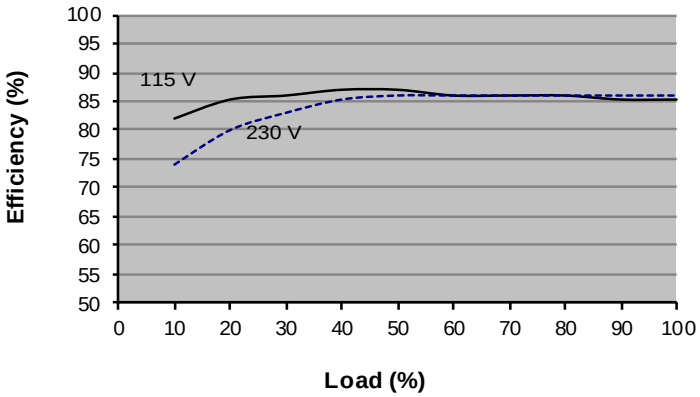
Ground — .187 quick disconnect terminal

APPLICATIONS INFORMATION

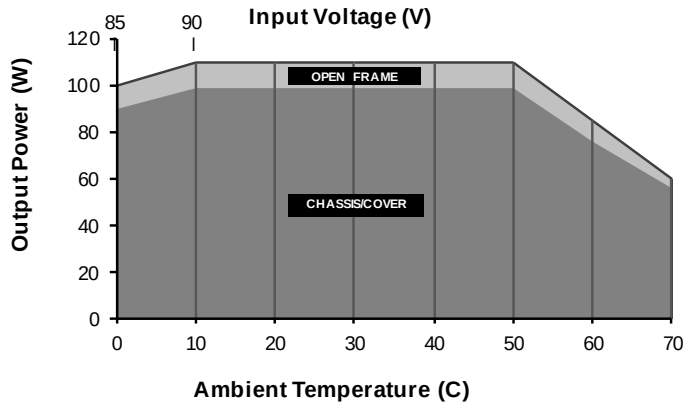
1. Each output can deliver its rated current but total continuous output power must not exceed 110 Watts.
2. Minimum load is not required for reliable operation however a light load is required on output 1 when loading outputs 2, 3 or 4.
3. Sufficient area must be provided around power supply to allow natural movement of air to develop in convection cooled applications.
4. 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.
5. 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.
6. This product includes 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.
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, 20 MHz bandwidth.
8. 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.
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. Maximum screw penetration into bottom chassis mounting holes is .100 inches.
11. Maximum screw penetration into side chassis mounting holes is .188 inches.
12. Common RF shielding precautions may need to be taken to assure emissions compliance. Refer to operating instructions for additional information.
13. To comply with emissions specifications, all four mounting hole pads must be electrically connected to a common metal chassis. Chassis/cover option is recommended.
14. Optional Output Configuration (Consult factory)
    - V2 can be configured positive, negative or floating with respect to V1.
    - V3 can be configured positive or floating with respect to V1.
    - V4 can be configured positive, negative or floating with respect to V1.

TYPICAL EFFICIENCY vs. LOAD

(Model GRN-110-3001 Efficiency shown)



MAX Pout vs. AMBIENT TEMPERATURE/INPUT VOLTAGE



Derating requirements - Derate from 100% load at 50º C to 50% load at 70º C.
- Derate from 100% load at 90 V_{IN} to 90% load at 85 V_{IN}.
- Derate 10% with Chassis/Cover option.

REV.3 07/08/13