# 45 WATTS

## GRN-45 MULTI OUTPUT AC-DC

### FEATURES:

- **RoHS Compliant**
- **2 Year Warranty**
- **Advanced SMT Design**
- **<1W No Load Input Power**
- **86% Peak Efficiency**
- **85% Average Efficiency**
- **Excellent Light Load Efficiency**
- **Dual, Triple & Quad Outputs**
- **Compact 2.5" x 4.25" 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<br>Overvoltage Category: II<br>Pollution Degree: 2 |
| cULus | Underwriters Laboratories<br>File E137708/E140259 | UL 60950-1 Second Edition, 2007<br>UL 60601-1 First Edition, 2006<br>AAMI/ANSI ES6060-1, 2005 |
| IECEE CB SCHEME | | CB Reports/Certificates (including all National and Group Deviations)<br>IEC 60950-1/A1:2009, Second Edition<br>IEC 60601-1:1988 +A1:1991 +A2:1995<br>IEC 60601-1:2005 Third Edition |
| cULus | UL Recognition<br>Mark for Canada<br>File E137708/E140259 | CAN/CSA-C22.2 No. 60950-1-07, Second Edition<br>CAN/CSA-C22.2 No. 601-1-M90, 2005<br>CAN/CSA-C22.2 No. 60601-1:2008 |
| TUV | TUV | EN 60950-1/A1:2010<br>EN 60601-1/A2:1995<br>EN 60601-1:2006 |
| CE | Low Voltage Directive<br>RoHS Directive (Recast) | (2006/95/EC of December 2006)<br>(2011/65/EU of June 2011) |

## MODEL LISTING

| MODEL | OUTPUT 1 | OUTPUT 2 | OUTPUT 3 | OUTPUT 4 |
|---|---|---|---|---|
| GRN-45-4001 | +3.3V/5.0A | +5.0V/5.0A | +12V/1.0A | -12V/1.0A |
| GRN-45-4002 | +5.0V/5.0A | -5.0V/5.0A | +12V/1.0A | -12V/1.0A |
| GRN-45-4003 | +5.0V/5.0A | +24V/1.0A | +12V/1.0A | -12V/1.0A |
| GRN-45-4004 | +5.0V/5.0A | +24V/1.0A | +15V/1.0A | -15V/1.0A |
| GRN-45-3001 | +5.0V/5.0A | | +12V/1.0A | -12V/1.0A |
| GRN-45-3002 | +5.0V/5.0A | | +15V/1.0A | -15V/1.0A |
| GRN-45-2001 | +5.0V/5.0A | +24V/1.0A | | |
| GRN-45-2002 | +5.0V/5.0A | +12V/2.0A | | |
| GRN-45-2003 | +12V/2.0A | -12V/2.0A | | |
| GRN-45-2004 | +15V/2.0A | -15V/2.0A | | |

## 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 (consult factory)

All specifications are maximum at 25°C, 45W unless otherwise stated, may vary by model and are subject to change without notice.

# GREEN MODE

## OUTPUT SPECIFICATIONS

| | | | |
|---|---|---|---|
| Output Power at 50°C | 45W | 85-264 $V_{IN}$ (see derating chart) | |
| Voltage Centering | Output 1:<br>Outputs 2 - 4: | ±0.5%<br>±5.0% | (All outputs at 50% load) |
| Voltage Adjust Range | Output 1: | 95-105% | |
| Load Regulation | Output 1:<br>Outputs 2 - 4: | ±0.5%<br>±5.0% | (0-100% load change)<br>(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%-160% 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 2A time delay fuse, 1500A breaking capacity |
| Peak Inrush Current | 50A max. at 230 V |
| Peak Efficiency | 86% |
| 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<br>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<br>40,000 ft. ASL | Operating<br>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

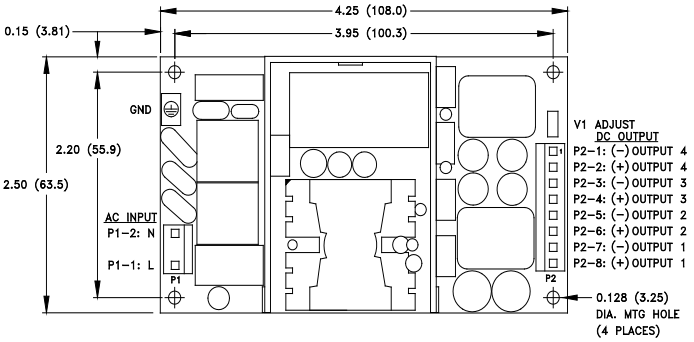
| | |
|---|---|
| Means of Protection | |
| Primary to Secondary | 2MOPP (Means of Patient Protection) |
| Primary to Ground | 1MOPP (Means or Patient Protection) |
| Secondary to Ground | Operational Insulation(Consult factory for 1MOOP or 1MOPP) |
| Dielectric Strength(8,9) | |
| Reinforced Insulation | 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 | >400,000 hours, MIL-HDBK-217F, 25° C, GB |
| Weight | 0.48 lbs. Open frame / 0.62 lbs. Chassis and cover |

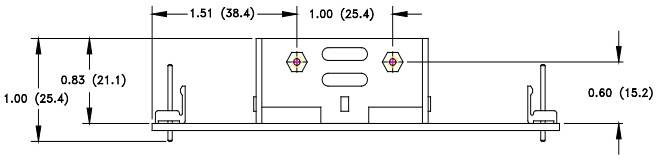
## ELECTROMAGNETIC COMPATIBILITY SPECIFICATIONS

| | | |
|---|---|---|
| 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<br>30% dip, 100ms<br>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 Emissions | EN 61000-3-2 | Class A |
| Voltage Fluctuations and Flicker | EN 61000-3-3 | Compliance |

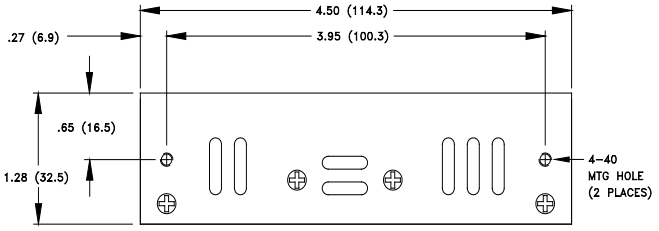
## GRN-45 MULTI MECHANICAL SPECIFICATIONS

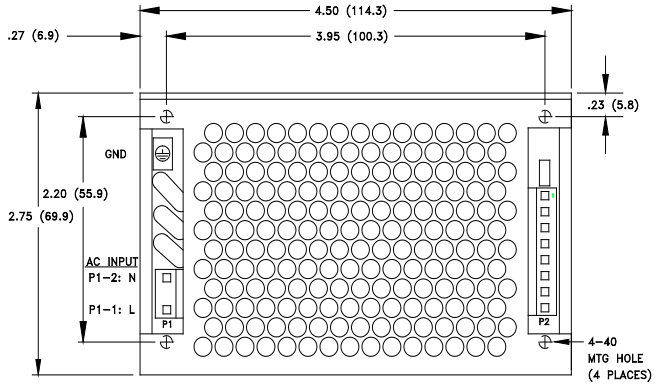
OPEN FRAME



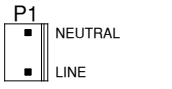

OPTIONAL CHASSIS/COVER



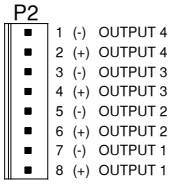

ALL DIMENSIONS IN INCHES (MM)

## 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 770849-8 or equivalent crimp terminal housing with Tyco 3-640707-1 or equivalent crimp terminal.

Ground

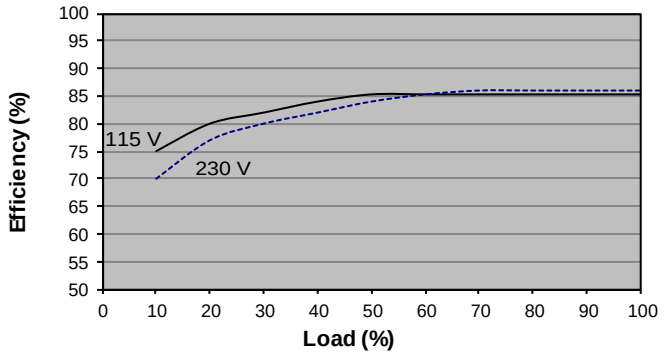
.187 quick disconnect terminal

## APPLICATIONS INFORMATION

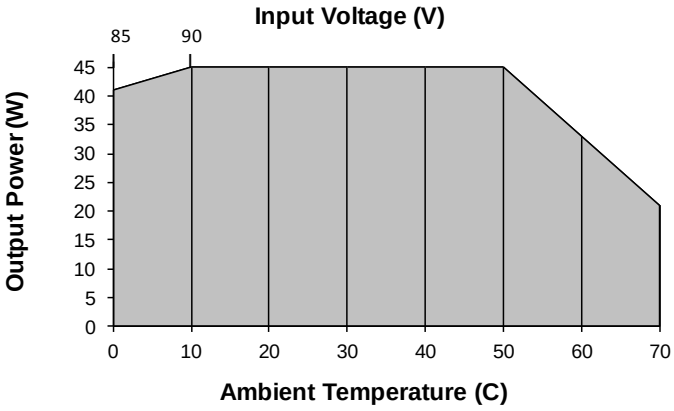
1. Each output can deliver its rated current but total continuous output power must not exceed 45 Watts.
2. Minimum load is not required for reliable operation however a light load is required on output 1 when loading outputs 2, 3 or 4.
3. Sufficient area must be provided around power supply to allow 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 and must share a common return with V4
    - V4 can be configured negative or floating with respect to V1 and must share a common return with V3

## TYPICAL EFFICIENCY vs. LOAD

(Model GRN-45-3001 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 $V_{IN}$.

REV.J 07/08/13