# 110 WATTS

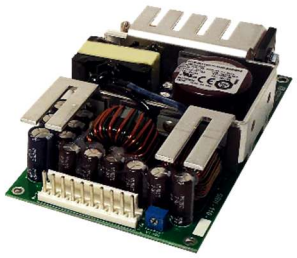
## MULTI OUTPUT AC-DC

# GRN-110

### FEATURES:

- **Compact 3.0" x 5.0" x 1.25" Size**
- **3 Year Warranty**
- **Universal 85-264V Input**
- **Dual, Triple or Quad Outputs**
- **87% Peak Efficiency**
- **85% Average Efficiency**
- **<1W No Load Input Power**
- **IEC 60601-1 3rd ed. Medical Cert.**
- **IEC 62368-1 2nd ed. Certification**
- **IEC 60601-1-2 4th ed. EMC**
- **Class B Emissions per EN55011/32**
- **0-70°C Operating Temperature**
- **RoHS Compliant**
- **Optional Chassis/Cover**

CHASSIS/COVER



OPEN FRAME

## SAFETY SPECIFICATIONS

| | | |
|---|---|---|
| c UL us | Underwriters Laboratories File E137708/E140259 | UL 62368-1:2014, 2nd Edition<br>CAN/CSA-C22.2 No. 62368-1-14, 2nd Edition<br>AAMI/ANSI ES60601-1:2005/(R) 2012(R)2021<br>CAN/CSA-C22.2 No. 60601-1:2014:2022 |
| IECEE CB SCHEME | CB Reports/Certificates (including all National and Group Deviations) | IEC 62368-1:2014, 2nd Edition<br>IEC 60601-1:2005/A1:2012/A2:2020 |
| TUV SUD | TUV SUD America | EN 62368-1:2014, 2nd Edition<br>EN 60601-1:2006/A1:2013/A2:2021 |
| CE | Low Voltage Directive<br>RoHS Directive (Recast) | (2014/35/EU of February 2014)<br>(2015/863/EU of March 2015) |
| UK CA | Electrical Equipment (Safety) Regulations 2016 SI No. 1101<br>Restriction of the Use of Certain Hazardous Substances in EEE Regulations 2012 SI No. 3032 + 2019 SI No.492 | |

## 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

Consult factory for alternate output configurations.
Consult factory for positive, negative or floating outputs.(13)
Please specify the following optional features when ordering:

CH - Chassis
CO - Cover
WT – Low Temperature Turn On
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(1) (See Derating Chart) | 110W | 85-264 VIN | |
| 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%-150% rated POUT, cycle on/off, auto recovery | | |
| Hold-Up Time | 16ms typical, full power, 115V input | | |
| Start-Up Time | 1 sec., 115/230V input | | |
| Output Rise Time | 25ms typical | | |
| Minimum Load(5) | No minimum load required | | |

## INPUT SPECIFICATIONS

| | |
|---|---|
| Protection Class | I |
| 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 VIN, 33% power |
| No Load Input Power | <1W, 115/230 VIN, 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 | 3,000m ASL<br>12,192m 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. | |

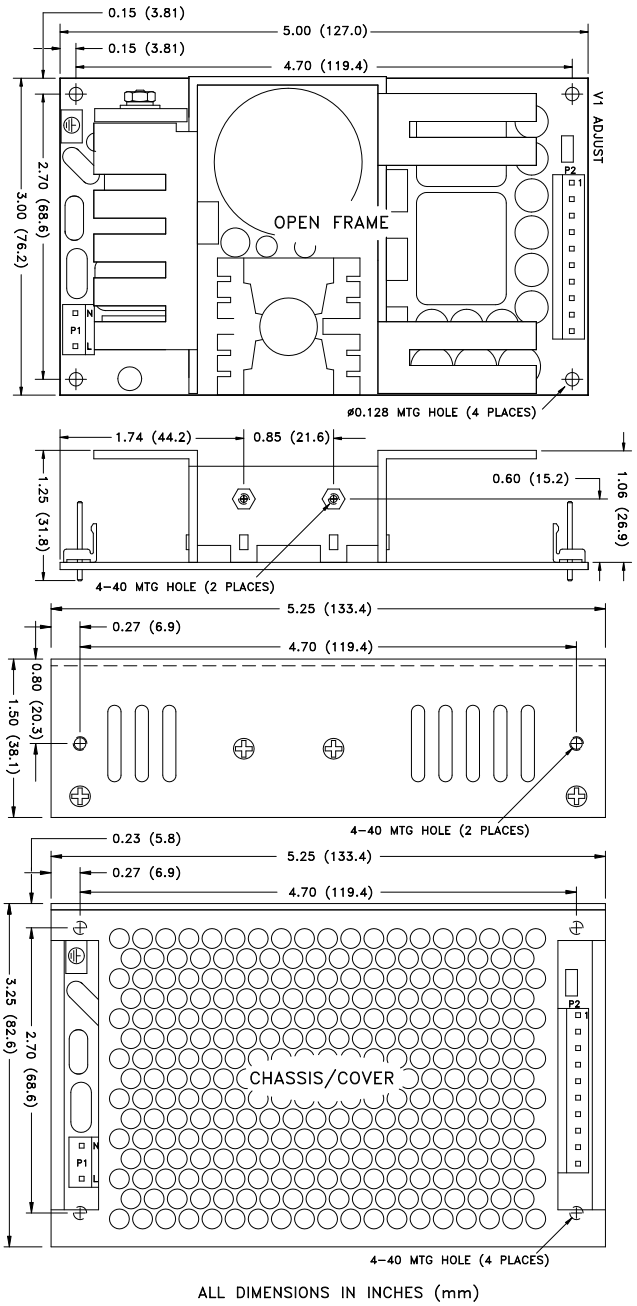
## GENERAL SPECIFICATIONS

| | |
|---|---|
| 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(8, 9) | |
| 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 |
| 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 |

## EMC SPECIFICATIONS (IEC 60601-1-2:2014, 4TH ed./IEC 61000-6-2:2005)

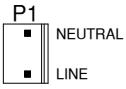
| | | | |
|---|---|---|---|
| Electrostatic Discharge | EN 61000-4-2 | ±8KV contact / ±15KV air discharge | A |
| Radiated Electromagnetic Field | EN 61000-4-3 | 80MHz-2.7GHz, 10V/m, 80% AM | A |
| Electrical Fast Transients/Bursts | EN 61000-4-4 | ±2 KV, 5KHz/100KHz | A |
| Surge Immunity | EN 61000-4-5 | ±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% UT, 0.5 cycles, 0-315° | 100/240V A/A |
| | | 0% UT, 1 cycles, 0° | 100/240V A/A |
| | | 40% UT, 10/12 cycles, 0° | 100/240V B/A |
| | | 70% UT, 25/30 cycles, 0° | 100/240V B/A |
| Voltage Interruptions | EN 61000-4-11 | 0% UT, 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 (<100W PIN) | |
| Voltage Fluctuations/Flicker | EN 61000-3-3 | Compliant | |

## GRN-110 MULTI MECHANICAL SPECIFICATIONS



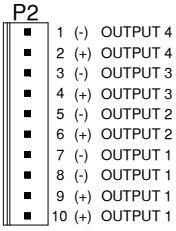

ALL DIMENSIONS IN INCHES (mm)

## 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 1-770849-0 or equivalent crimp terminal housing with Tyco 3-640707-1 or equivalent crimp terminal.

Ground

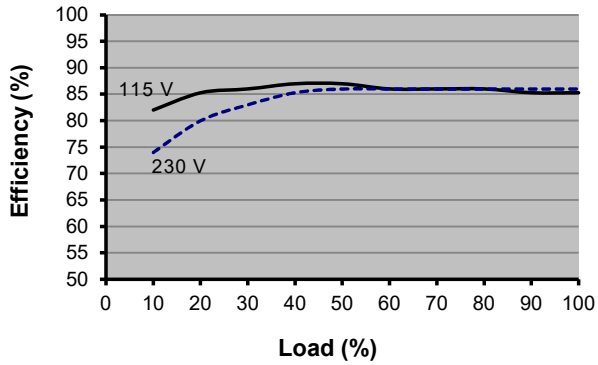
0.187 quick disconnect terminal

## APPLICATIONS INFORMATION

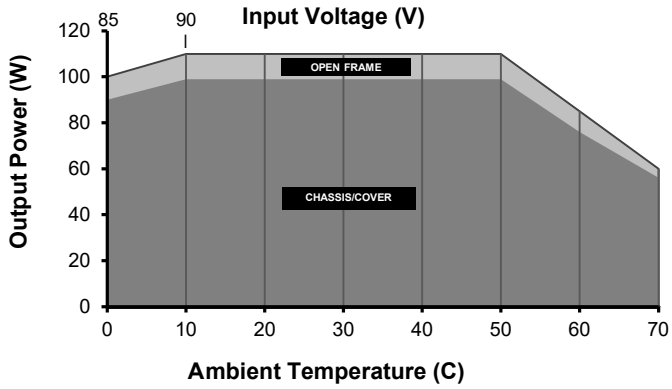
1. Each output can deliver its rated current but Total Output Power must not exceed 110W.
2. Generally, adequate cooling is provided when semiconductor case temperatures do not exceed 70°C rise and transformer temperature does not exceed 60°C rise at any specified ambient temperature.
3. Sufficient area must be provided around power supply to allow natural movement of air to develop in convection-cooled applications.
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. Minimum load is not required for reliable operation; however, a 10% load may be required on Output 1 when loading Outputs 2, 3 or 4.
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 (tip-and-barrel method), 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 0.100 inches. Maximum screw penetration into side chassis mounting holes is 0.188 inches.
11. 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.
12. Common RF shielding precautions may need to be taken to assure emissions compliance. Refer to Operating Instructions for additional information.
13. 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 $P_{OUT}$ vs. AMBIENT TEMPERATURE/INPUT VOLTAGE




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

REV: BB 3/20/2025