

# 110 WATTS

## SINGLE OUTPUT AC-DC

### FEATURES:

- Compact 3.0" x 5.0" x 1.25" Size
- 3 Year Warranty
- Universal 85-264V Input
- Single Output
- 90% Peak Efficiency
- 87% Average Efficiency
- <300mW No Load Input Power
- IEC 60601-1 3<sup>rd</sup> ed. Medical Cert.
- IEC 62368-1 2<sup>nd</sup> ed. Certification
- IEC 60601-1-2 4<sup>th</sup> ed. EMC
- Class B Emissions per EN55011/32
- 0-70°C Operating Temperature
- RoHS Compliant
- Optional Chassis/Cover



CHASSIS/COVER



OPEN FRAME

### SAFETY SPECIFICATIONS



Underwriters Laboratories  
File E137708/E140259

UL 62368-1:2014, 2<sup>nd</sup> Edition  
CAN/CSA-C22.2 No. 62368-1-14  
AAMI/ANSI ES60601-1:2005/(R) 2012  
CAN/CSA-C22.2 No. 60601-1:2014



CB Reports/Certificates (including all  
National and Group Deviations)

IEC 62368-1:2014, 2<sup>nd</sup> Edition  
IEC 60601-1:2005/A1:2012



TUV SUD America

EN 62368-1:2014, 2<sup>nd</sup> Edition  
EN 60601-1:2006/A1:2013



Low Voltage Directive (2014/35/EU of February 2014)  
RoHS Directive (Recast) (2015/863/EU of March 2015)



Electrical Equipment (Safety) Regulations 2016 SI No. 1101  
Restriction of the Use of Certain Hazardous Substances in EEE Regulations  
2012 SI No. 3032 + 2019 SI No.492

### MODEL LISTING

MODEL	OUTPUT	P <sub>OUT</sub>
GRN-110-1001	3.3V/22A	73W
GRN-110-1002	5.0V/22A	110W
GRN-110-1003	12V/9.2A	110W
GRN-110-1004	15V/7.3A	110W
GRN-110-1005	24V/4.6A	110W
GRN-110-1006	28V/3.9A	110W
GRN-110-1007	48V/2.3A	110W

### ORDERING INFORMATION

Consult factory for alternate output configurations.  
Please specify the following optional features when ordering:

CH - Chassis  
CO - Cover

OVP - Overvoltage Protection

# GRN-110

## OUTPUT SPECIFICATIONS

Output Power at 50°C <sub>T1</sub>	110W	85-264 V <sub>IN</sub>
(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%	(1001, 1002 < 3%)
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% rated P <sub>OUT</sub> min, 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	50ms typical	
Minimum Load	No minimum load required	

## INPUT SPECIFICATIONS

Protection Class	I
Source Voltage	85-264 VAC (see derating chart)
Frequency Range	47-63 Hz
Input Protection(s)	Internal 4A time delay fuse, 1500A breaking capacity
Peak Inrush Current	50A max. at 230 V
Peak Efficiency	90%
Average Efficiency	87% (1003-1007), 86% (1002), 82% (1001)
Light Load Efficiency	85%, 115/230 V <sub>IN</sub> , 33% power (1001 > 81%)
No Load Input Power	<0.3W, 115/230 V <sub>IN</sub> , no load (1001<0.5W)

## ENVIRONMENTAL SPECIFICATIONS

Cooling	Free air convection
Ambient Operating Temperature Range	0°C to + 70 °C
Derating	see derating 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.

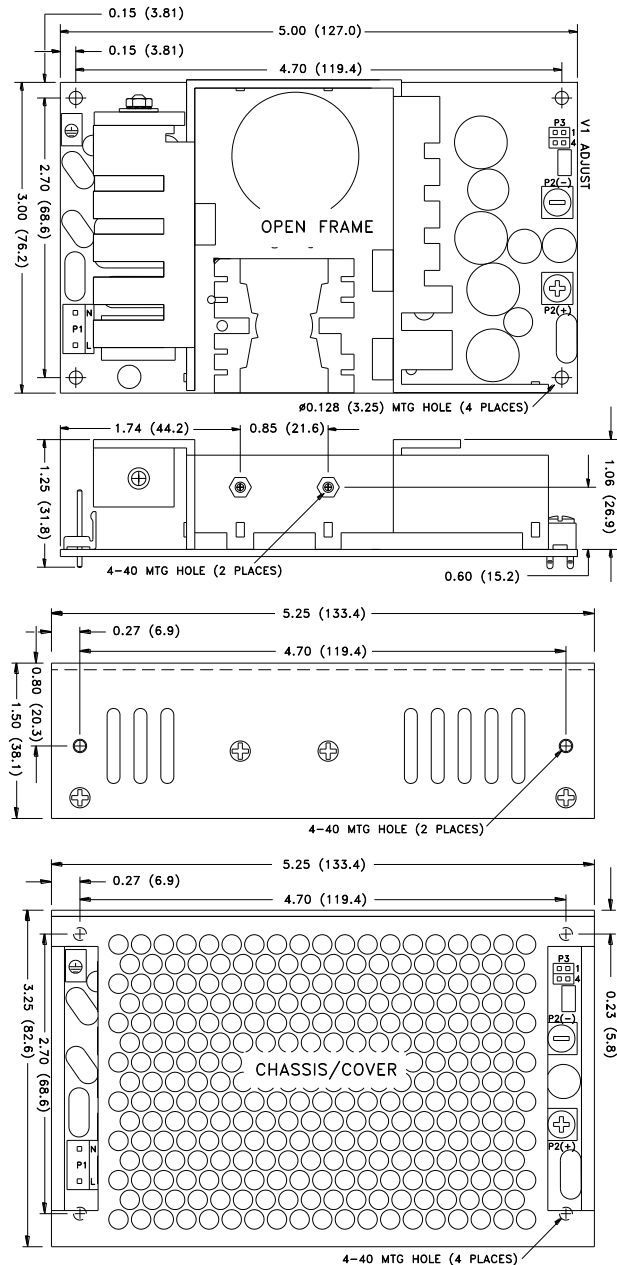
## GENERAL SPECIFICATIONS

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 1MOPP)
Dielectric Strength <sup>(7,8)</sup>	
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	65 KHz
Remote Sense <sup>(9)</sup>	400 mV compensation of output cable losses
Mean-Time Between Failures	>250,000 hours, MIL-HDBK-217F, 25° C, GB
Weight	0.65 lbs. Open frame / 0.85 lbs. Chassis and cover

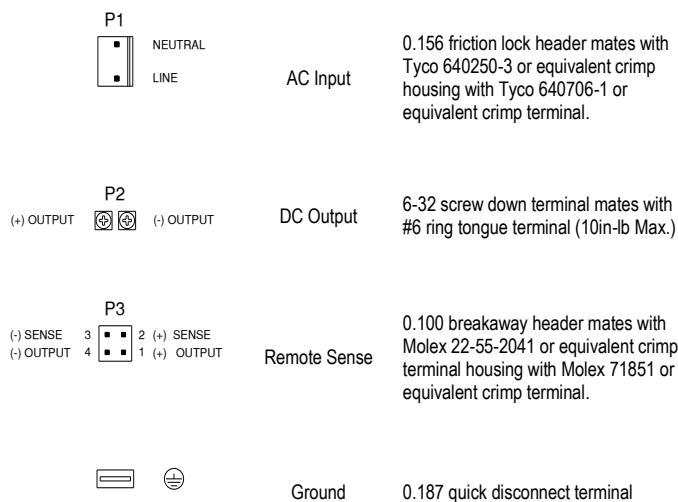
## EMC SPECIFICATIONS (IEC 60601-1-2:2014, 4<sup>TH</sup> ed./IEC 61000-6-2:2005)

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% U <sub>T</sub> , 0.5 cycles, 0-315° 100/240V A/A 0% U <sub>T</sub> , 1 cycles, 0° 100/240V A/A 40% U <sub>T</sub> , 10/12 cycles, 0° 100/240V B/A 70% U <sub>T</sub> , 25/30 cycles, 0° 100/240V B/A	
Voltage Interruptions	EN 61000-4-11	0% U <sub>T</sub> , 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 P <sub>IN</sub> )	
Voltage Fluctuations/Flicker	EN 61000-3-3	Compliant	

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



## CONNECTOR SPECIFICATIONS

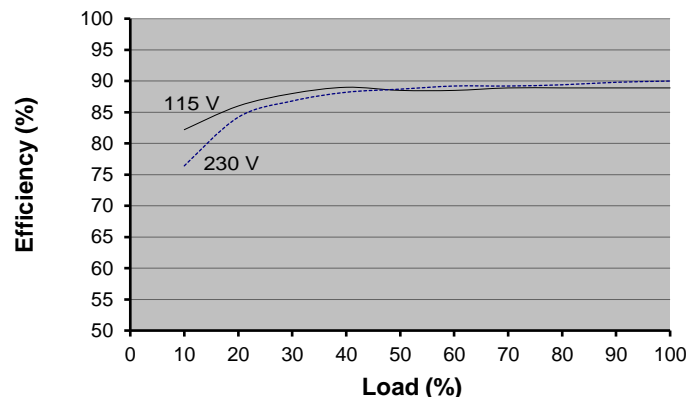


## APPLICATIONS INFORMATION

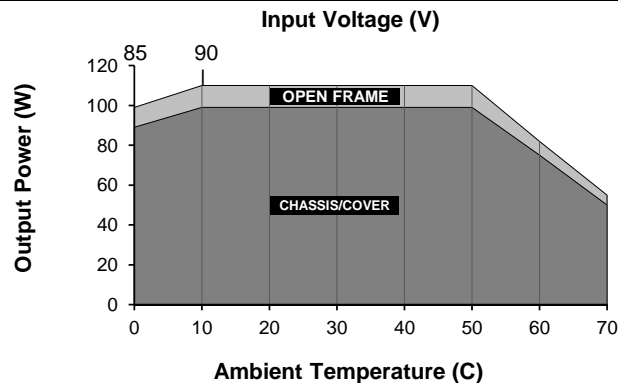
1. Continuous Output Power must not exceed 110W.
2. Generally, adequate cooling is provided when semiconductor case temperatures do not exceed 70°C rise and transformer temperature does not exceed 60°C rise at any specified ambient temperature.
3. Sufficient area must be provided around power supply 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. 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.
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 (tip-and-barrel method), 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 1<sup>ST</sup> 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. Remote-Sense terminals may be used to compensate for cable losses up to 400mV, depending on model. The use of a twisted pair, decoupling capacitors and an appropriately-rated low-impedance capacitor connected across the load will increase noise immunity.
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.

## TYPICAL EFFICIENCY vs. LOAD

(Model GRN-110-1004 Efficiency shown)



### MAX P<sub>OUT</sub> vs. AMBIENT TEMPERATURE/INPUT VOLTAGE



**Derating requirements** - Derate from 100% load at 50°C to 50% load at 70°C.  
 - Derate from 100% load at 90V<sub>IN</sub> to 90% load at 85V<sub>IN</sub>.  
 - Derate 10% with chassis and cover.