

CLP0112 Open Frame Power Supply

90 - 265Vac input; 12Vdc output; 150W Output Power



Applications

- Telecommunications equipment
- Embedded Computing
- Storage Systems
- Industrial equipment

Description

In a small 2 x 4 inch footprint, the 12Vdc single-output CLP0112 open frame power supply delivers greater than 90 percent typical power efficiency and full load output at 75°C. With its small size, the CLP series is specifically designed to handle power challenges associated with tight space and low airflow. The CLP series utilizes a unique design approach at this power level, leveraging zero voltage switching techniques in conjunction with quasi-resonant power factor correction (PFC) circuits. Protection features include overcurrent (OCP), overvoltage (OVP), and overtemperature (OTP).

Features

- Compact size 50.8 mm x 101.6 mm x 36.1 mm (2 in x 4 in x 1.4 in) with density of 13.4W/in³
- Universal AC Input Range (90 - 265VAC)
- Output voltage of 12V (adjustable -2.5/+5%)
- Maximum output current of 12.5A@ 12Vout (150W)
- High efficiency
- Full load capability at 75°C and 1m/s (200LFM) airflow with derating at higher temperatures or lower airflows
- Output overcurrent protection (non-latching)
- Overtemperature protection
- Output overvoltage protection
- Up to 11ms of holdup time
- Active power factor corrected input
- Conducted EMI - meets CISPR22 (EN55022) and FCC Class B requirements
- Meets IEC61000-4-5, Level 4 (2kV/4kV)
- Compliant to RoHS II EU "Directive 2011/65/EU"
- UL and cUL approved to UL/CSA60950-1, TUV (EN60950-1), CE Mark (for LVD) and CB Report available
- ISO** 9001 and ISO 14001 certified manufacturing facilities

* UL is a registered trademark of Underwriters Laboratories, Inc.

† CSA is a registered trademark of Canadian Standards Association.

‡ VDE is a trademark of Verband Deutscher Elektrotechniker e.V.

** ISO is a registered trademark of the International Organization of Standards

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Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only, functional operation of the device is not implied at these or any other conditions in excess of those given in the operations sections of the data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect the device reliability.

Parameter	Device	Min	Max	Unit
Input Voltage - Continuous	All	90	265	Vac
For up to 10 seconds max.	All	90	275	Vac
Operating Ambient Temperature (see Thermal Considerations section)	All	-40	85	°C
(in sealed enclosure applications with thermally conductive pad to enclosure, P _{O,max} = 130W)	All	-40	55	°C
Storage Temperature	All	-40	85	°C
Humidity (non-condensing)	All	5	95	%
Altitude	All		5000	m
Isolation Voltage - Input to output	All		3000	Vac
Input to safety ground	All		1500	Vac
Outputs to safety ground	All		50	Vac

† Ambient temperature outside the sealed enclosure containing the power supply.

Electrical Specifications

Parameter	Device	Min	Typ	Max	Unit
Operating Input Voltage	All	90	115/230	265	Vac
Input Source Frequency	All	47	50/60	63	Hz
Input Current (V _{IN} = 90Vac)	All			3	A _{RMS}
Input Power Factor (115VAC or 230VAC in at full load)	All	0.95			
Inrush Transient Current (V _{IN} = 265Vac, T _{amb} = 25°C)	All			100	A Peak
Leakage Current to earth ground (V _{IN} = 265Vac)	All			2	mA
Output Voltage Setpoint	All		12		Vdc
Output Voltage Tolerance (due to set point, temperature variations, load and line regulation)	All	-3		3	%
Output Voltage Adjustment Range	All	11.7		12.6	Vdc
Output Load Regulation	All			1	%V _{out}
Output Line Regulation	All			0.5	%V _{out}
Output Ripple and Noise – measured with 0.1µF ceramic capacitor in parallel with 10µF tantalum capacitor, at 25°C ¹ Peak-to-peak (20MHz Bandwidth)	All			180	mV p-p
Dynamic Load Response – 50% to 75% load transient, 0.1A/µs slew rate. Output voltage deviation	All			5%	%
Settling Time	All			500	µs
Output Current	All	0		12.5	Adc
Output Current Limit Inception	All	110		145	% I _{O,max}
Maximum Output Capacitance	All			5000	µF
Efficiency at 25°C:					
V _{IN} = 230Vac, 20% load	All		89.3		%
50% load	All		92.9		%
100% load	All		92.7		%
V _{IN} = 115Vac, 20% load	All		87.7		%
50% load	All		90.9		%
100% load	All		90.5		%
Holdup Time ² – V _{IN} = 115Vac or 230Vac, 100% load	All	11			ms

¹ Below -25°C, ripple may exceed the specified level. Specification will be met after warm up period of 15s.

² Holdup time may be lower at cold temperatures

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General Specifications

Parameter	Device	Symbol	Typ.	Unit
Calculated Reliability based on Telcordia SR-332 Issue 2: Method 1 Case 3 (V _{IN} =230Vac, I _o = 12.5A, T _A = 40°C, airflow 200LFM, 90% confidence)	All	FIT	201.6	10 ⁹ /Hours
		MTBF	4,960,060	Hours
Weight	All		184	g
			6.5	oz.

Feature Specifications

Parameter	Device	Min	Typ	Max	Unit
Output Voltage Rise Time (from 10 to 90% of final value)	All		4.2		ms
Delay from Input being applied to all outputs being in regulation ³	All			1000	ms
Output Overvoltage Protection (for main output currents above 0.1A)	All	13.8		17	Vdc
Input Undervoltage lockout ⁴					
Turn-on Threshold (100% load)	All		83	90	Vac
Turn-off Threshold (100% load)	All		72	88	Vac

Environmental Specifications

Parameter	Device	Specification
Conducted Emissions	All	CISPR22 (EN55022) Class B with 3dB margin
Radiated Emissions ⁵	All	CISPR22 (EN55022) Class B with 3dB margin
Input Harmonics	All	EN61000-3-2
ESD	All	IEC 61000-4-2, Level 3
Radiated Immunity ⁶	All	IEC 61000-4-3, Level 2
Electrical Fast Transient Common Mode	All	IEC 61000-4-4, Level 3
Surge Immunity	All	IEC 61000-4-5, Level 4
Conducted RF Immunity	All	IEC 61000-4-6, Level 3
Voltage Dips	All	EN61000 4.11, Level 3, Class B, C
Shock and Vibration	All	IPC-9592B

³ Met when temperature is above -25°C and restart duration is ≤ 20s.

⁴ Undervoltage lockout threshold may vary with output load current level – decreasing as load goes lower

⁵ Shall be met when tested in a suitable enclosure

⁶ Shall be met when tested in a suitable enclosure

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Characteristic Curves

The following figures provide typical characteristics for the CLP0112 power supply

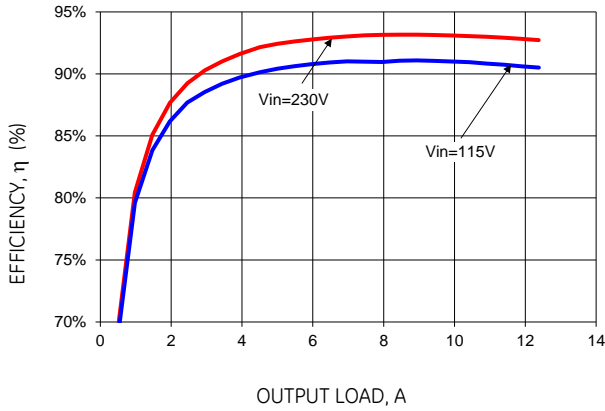


Figure 1. Power Supply Efficiency versus Output Current.

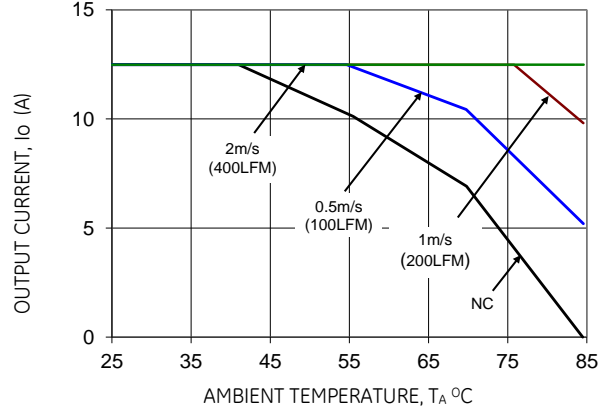


Figure 2. Derating Output Current versus Ambient Temperature and Airflow. Data shown for 115VAC in, at 230VAC in derating is the same or better. For derating at other input voltages, consult the GE Technical representative.

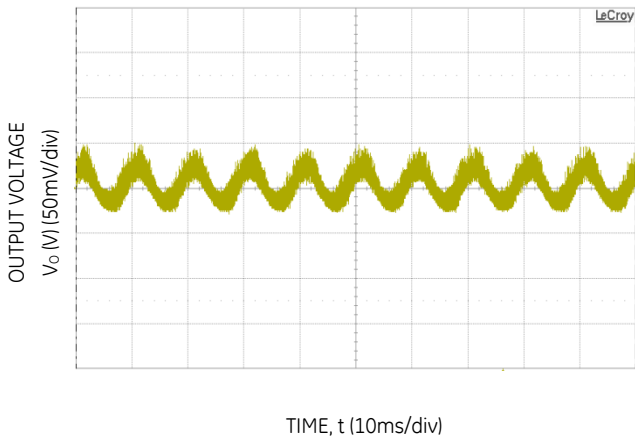


Figure 3. Typical output ripple and noise ($V_{IN} = 230\text{Vac}$, 100% load).

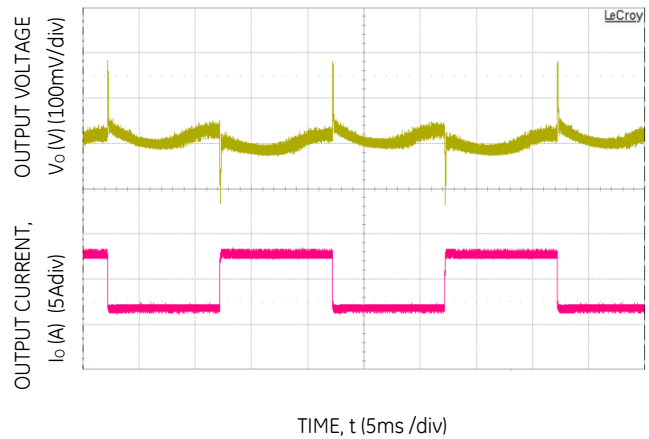


Figure 4. Transient Response to Dynamic Load Change from 50% to 100% at $V_{IN} = 230\text{Vac}$.

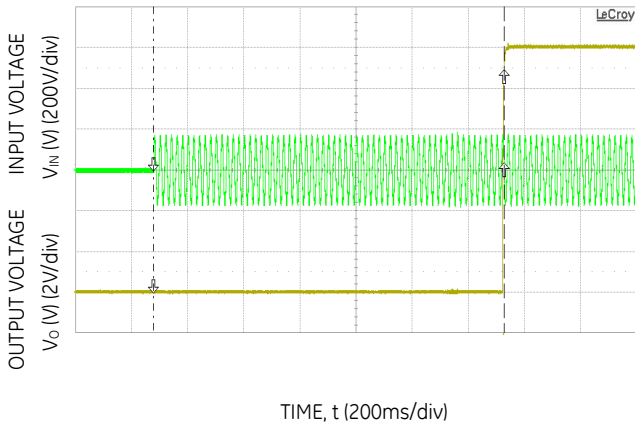


Figure 5. Typical Start-up ($V_{IN} = 115\text{Vac}$).

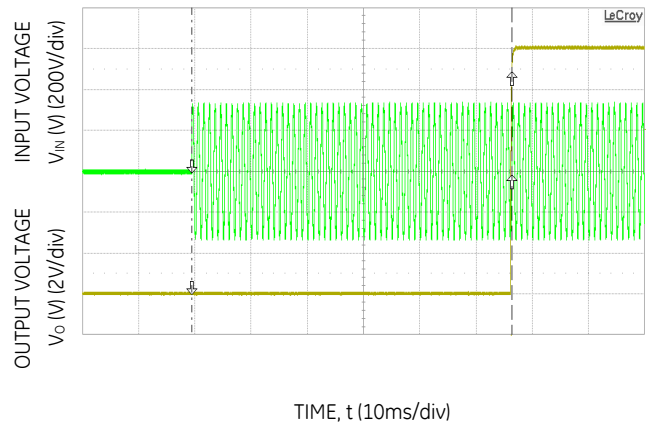


Figure 6. Typical Start-up ($V_{IN} = 230\text{Vac}$).

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Characteristic Curves (cont.)

The following figures provide typical characteristics for the CLP0112 power supply

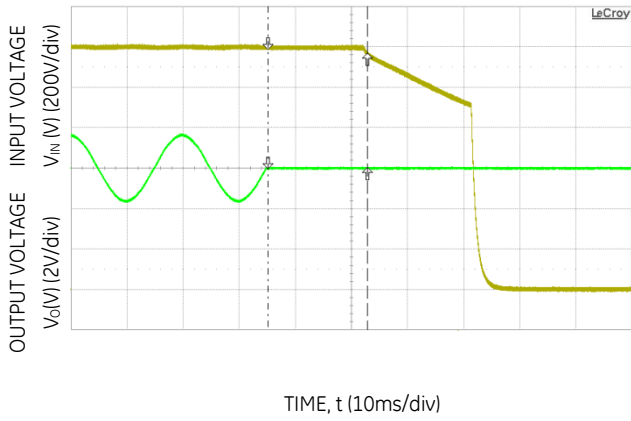


Figure 7. Typical Hold-up waveforms ($V_{IN} = 115V$, 100% load).

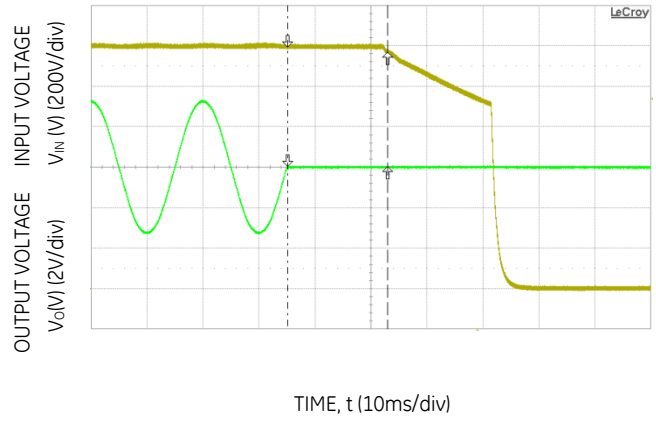


Figure 8. Typical Hold-up waveforms ($V_{IN} = 230V$, 100% load).

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Safety Considerations

The CLP0112 power supply is intended for inclusion in other equipment and the installer must ensure that it is in compliance with all the requirements of the end application. This product is only for inclusion by professional installers within other equipment and must not be operated as a stand-alone product. The power supply meets Class 1, IEC60950, EN60950, with the following deviations: Nemko. UL 60950 (Recognized Component) C-UL (Canadian Approval by UL).

Feature Descriptions

Overcurrent Protection

To provide protection in a fault condition (output overload), the power supply is equipped with internal current-limiting circuitry and can endure current limiting continuously. At the point of current-limit inception, the unit enters hiccup mode. The power supply operates normally once the output current is brought back into its specified range.

Overvoltage Protection

Overvoltage protection is a feature of the CLP0112 power supply that protects both the load and the power supply from an output overvoltage condition. When an overvoltage occurs, the power supply shuts down and latches off. It is then necessary to recycle the input to restart the power supply when this protection is activated.

Overtemperature Protection

The CLP0112 also features overtemperature protection in order to provide additional protection in a fault condition. The power supply is equipped with a thermal shutdown circuit which detects excessive internal temperatures and shuts the unit down. Once the power supply goes into overtemperature shutdown, it will cool before attempting to restart. The overtemperature protection circuit will typically activate when the unit is operated at 150W output with an ambient temperature of 80°C and 1m/s (200LFM) airflow. Please note that at ambient temperatures of 75°C or higher and very low airflow conditions, the unit may need to have input voltage recycled before it turns back on from an OTP fault.

Input Undervoltage Lockout

At input voltages below the input undervoltage lockout limit, power supply operation is disabled. The power supply will begin to operate at an input voltage above the undervoltage lockout turn-on threshold. Note that the undervoltage lockout limits are load dependent and the power supply turns ON and can operate at much lower input voltage levels when at light or no load.

Output Voltage Adjustment

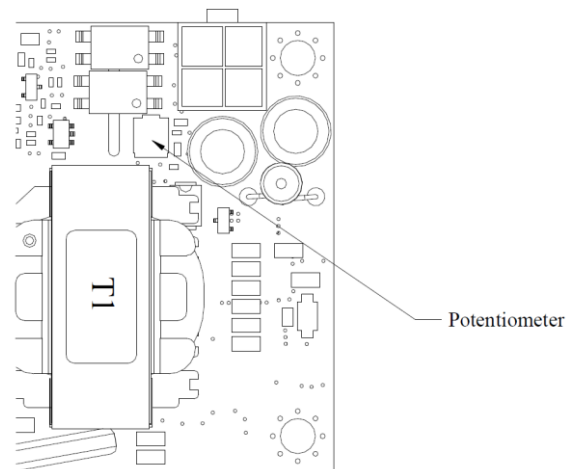


Fig. 9. Diagram showing location of the potentiometer used to adjust the power supply output voltage.

The output voltage can be adjusted between 11.7V and 12.6V using a potentiometer on the power supply. See Fig. 9 for a diagram showing location of the potentiometer.

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Thermal Considerations

The power supply can be operated in a variety of thermal environments; however sufficient cooling should be provided to ensure reliable operation.

Considerations include ambient temperature, airflow, power supply dissipation and the need for increased reliability. A reduction in the operating temperature of the power supply will result in increased reliability. The thermal data presented here is based on measurements taken in a wind tunnel.

Heat Transfer via Convection

Increased airflow through the power supply enhances the heat transfer via convection. Figure 10 shows the preferred airflow direction. Contact your GE technical representative for derating information in other airflow directions.

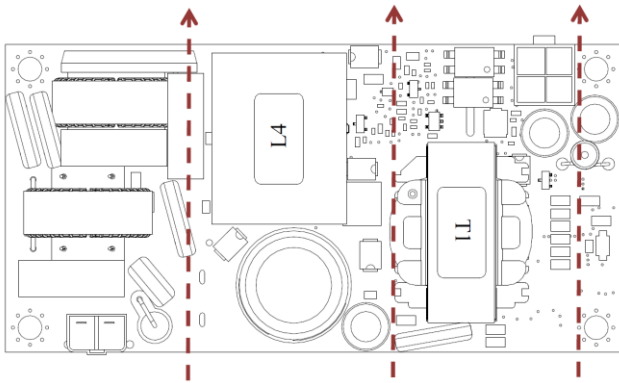


Fig. 10. Preferred airflow direction for cooling.

Operation In a Sealed Enclosure

The CLP0112 power supply can also be operated in a sealed enclosure provided proper means for removing heat from the power supply are used. Figure 11 shows an arrangement where a thermally conductive pad is used to transfer heat from the bottom of the power supply into the enclosure. Under such conditions, the power supply is capable of reduced power operation as shown in Table 1. Note that the Ambient Temperature shown in Table 1 is that outside the sealed enclosure, the CLP0112 may see higher ambient temperatures.

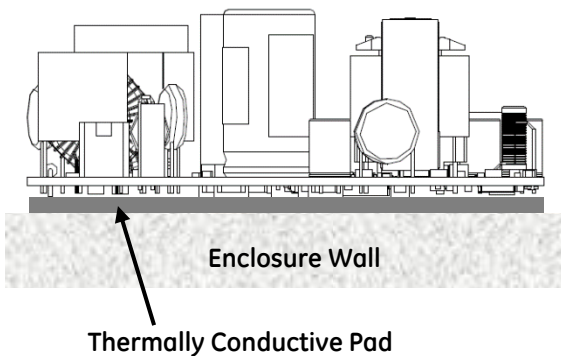


Fig. 11. Example arrangement of the CLP0112 for sealed enclosure applications.

Table 1. Output Power Capability when the CLP0112 is operated in a sealed enclosure with thermal pad for conduction cooling.

Ambient Temperature (°C)	Max. Output Power (W)
25	150
40	150
55	130

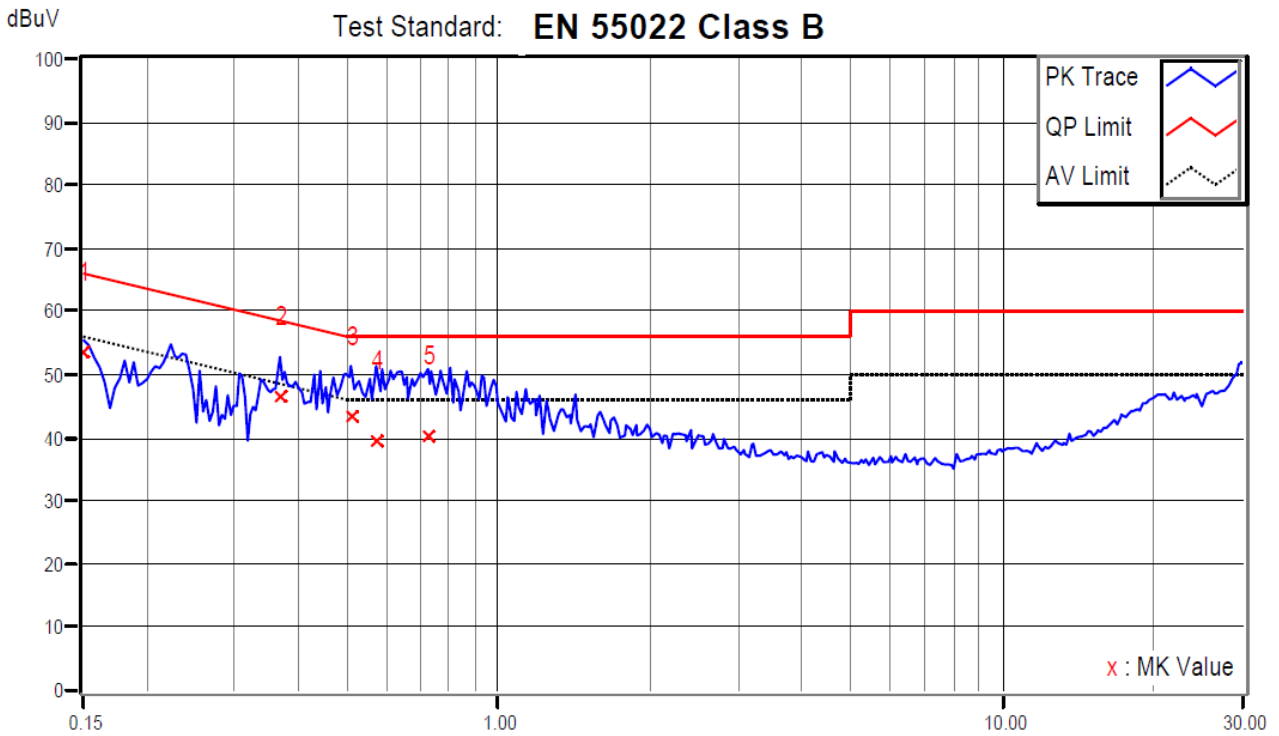
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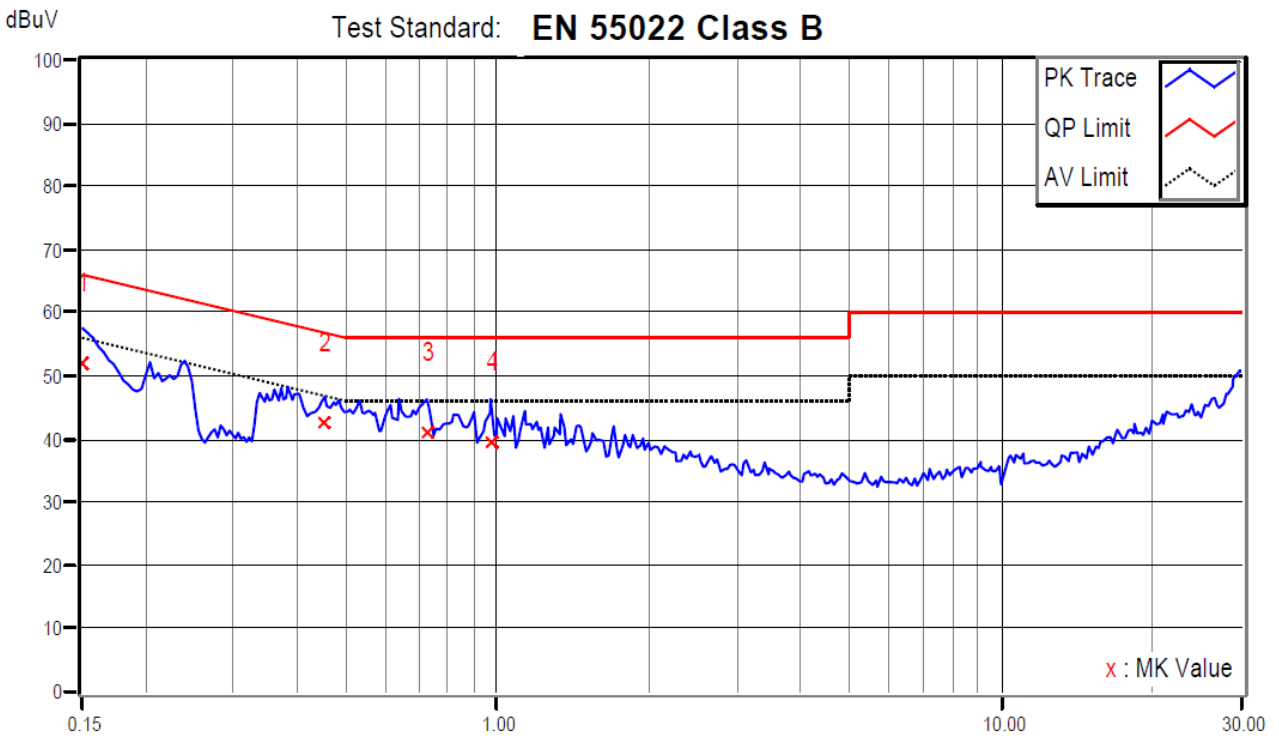
EMI performance

All CLP0112 power supplies are specified to meet conducted Class B EMI requirements per CISPR 22 (EN55022) with at least 3dB of margin. Results of tests conducted without any external filtering are shown below.

CLP0112FPXXXZ01A (115VAC in, 12V @ 150W out, Negative of Output Grounded)



CLP0112FPXXXZ01A (230VAC in, 12V @ 150W out, Negative of Output Grounded)

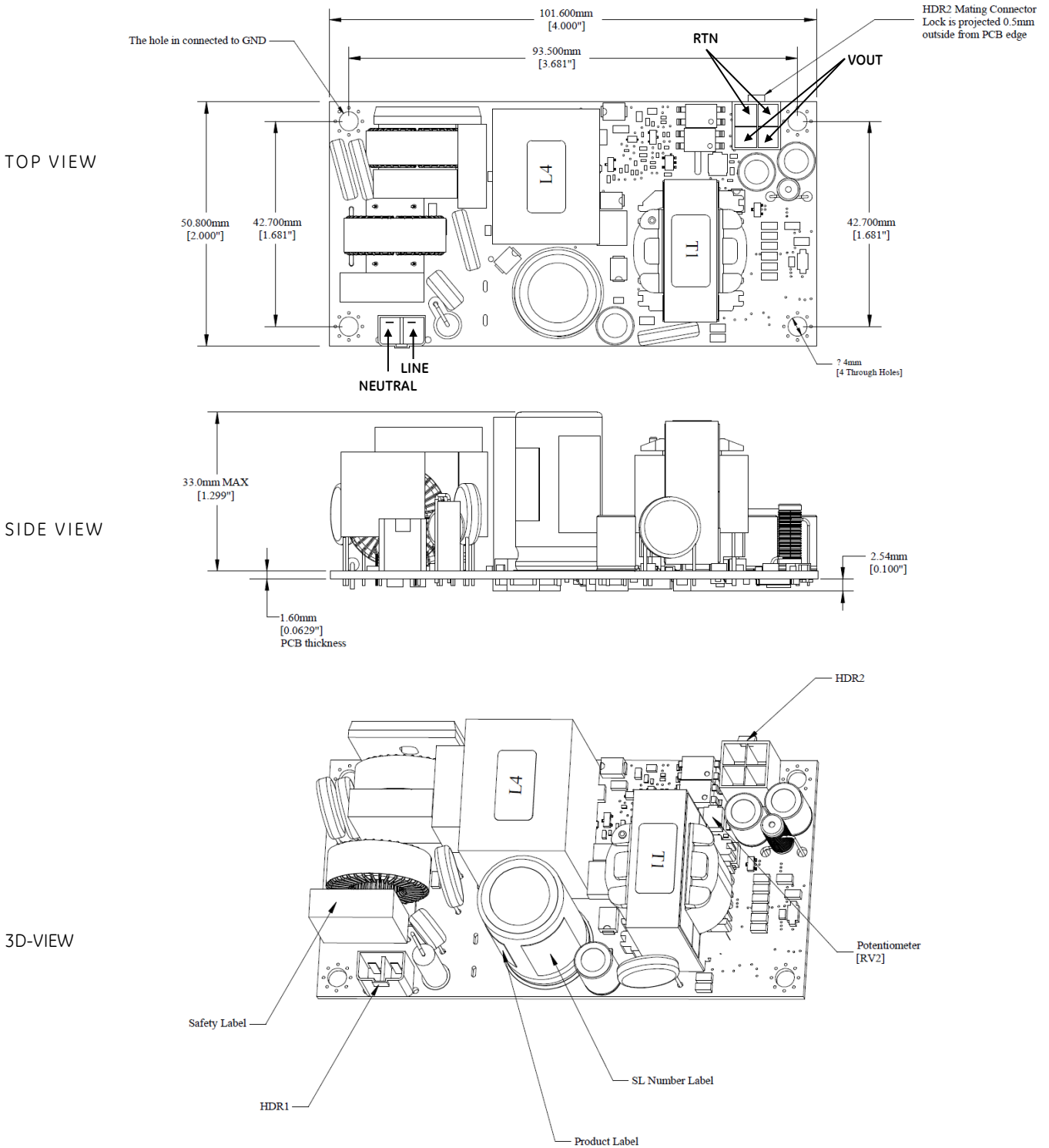


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Mechanical Outline

Dimensions are in millimeters.
 Tolerances: x.x mm ± 0.5mm [unless otherwise indicated]
 x.xx mm ± 0.25mm



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Connector Information

Connector	Connector on Power Supply	Mating Connector
AC Input Connector (HDR1)	5-1376382 from TE or equivalent	1376388-1 from Tyco or equivalent
DC Output Connector (HDR2)	39-28-8040 from Molex or equivalent	39-01-3048 from Molex or equivalent

Pinout Information

AC Input Connector (HDR1)		DC Output Connector (HDR2)	
Pin 1	Line	Pin 1	VO
Pin 2	Neutral	Pin 2	VO
		Pin 3	RTN
		Pin 4	RTN

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Ordering Information

Please contact your GE Sales Representative for pricing, availability and optional features.

Table 2. Device Codes

Device Code	Input Voltage Range	Output Voltage	Output Current	Temperature Range	Comcode
CLP0112FPXXXZ01A	90 – 265Vac	12.0Vdc	12.5A	-40 to 85°C	150039432
CLP0112FPXXXZ02A (conformal coated)	90 – 265Vac	12.0Vdc	12.5A	-40 to 85°C	CLP0112FPXXXZ02A



Contact Us

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