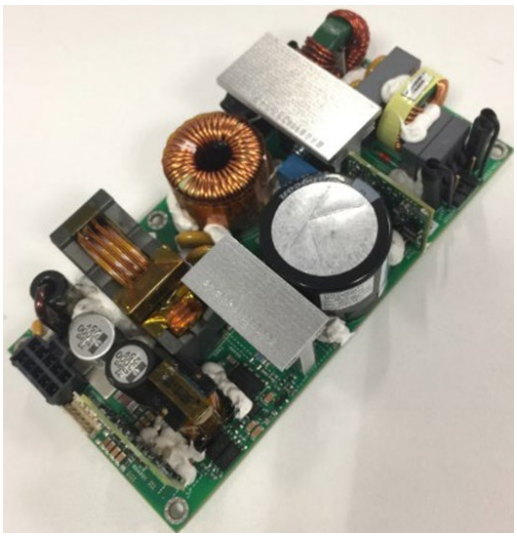
CLP0612 Open Frame Power Supply

90 – 265V_{AC} input; 12V_{DC} output; 600W Output Power, 5V Standby 5V@1A



In a small 3 x 6-inch footprint, the 12V_{DC} single-output CLP0612 open frame power supply delivers greater than 90 percent typical power efficiency and 450W capability at 45°C and 1m/s airflow with derating at higher temperatures or lower airflows. Protection features include output overcurrent (OCP), overvoltage (OVP), and overtemperature (OTP).

Applications

- Industrial equipment
- Telecommunications equipment
- Network Routers, Switches

Features

- Compact size 76.2 mm x 152.4 mm x 35 mm (3 in x 6 in x 1.38 in) with density of 24.1 W/in^3
- Universal AC Input Range (90 – 265V_{AC})
- Output voltage of 12V (adjustable ±5%)
- Standby output of 5V @ 1A
- Maximum output current of 50A@ 12Vout (600W)
- High efficiency (>90% at Full Load, 230V_{AC} in)
- 600W capability at 115Vin, 65°C ambient, 600 lfm airflow with derating at higher temperatures or lower airflows
- 420W Min output at 90Vin for sealed enclosure applications with enclosure outside surface temp at 55°C and enclosure inside ambient at 85°C
- Output overcurrent protection (non-latching)
- Overtemperature protection
- Output overvoltage protection
- Minimum of 11ms of holdup time at 550W out
- Parallelable with output current sharing
- Active power factor corrected input
- Conducted EMI - meets CISPR22 (EN55022) and FCC Class B requirements
- Meets IEC61000-4-5, Level 4 (2kV/4kV) and ANSI C62.41 (6kV)
- 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
- AC OK signal
- Dual Input Fusing Option – Line & Return
- Conformal coating

*UL is a registered trademark of Underwriters Laboratories, Inc.
†CSA is a registered trademark of Canadian Standards Association.
‡VDE is a registered trademark of Verband Deutscher Elektrotechniker e..V.
** ISO is a registered trademark of the International Organization of Standard

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	V_{AC}
For up to 10 seconds	All	90	275	V_{AC}
Operating Ambient Temperature (see Thermal Considerations section)	All	-40	85	°C
Storage Temperature	All	-40	85	°C
Humidity (non-condensing)	All	5	95	%
Altitude	All		5000	m
Isolation Voltage – Input to output Input to safety ground Outputs to safety ground	All All All		3000 1500 50	V_{AC} V_{AC} V_{AC}

Electrical Specifications

Parameter	Device	Min	Typ	Max	Unit
Operating Input Voltage	All	90	115/230	265	V_{AC}
Input Source Frequency	All	47	50/60	63	Hz
Input Current (V_{IN} = 90V_{AC})	All		7.5		ARMS
Input Power Factor (230V_{AC}, Full Load)	All	0.95			
Inrush Transient Current (V_{IN} = 265V_{AC}, T_{amb} = 25°C)	All			60	A Peak
Leakage Current to earth ground (V_{IN} = 265V_{AC})	All			3.5	mA
Output Voltage Setpoint	All		12		V_{DC}
Output Voltage Tolerance (due to set point, temperature variations, load and line regulation)	All	-2		2	%
Output Voltage Adjustment Range	All	11.4		12.6	V_{DC}
Output Remote Sense Range	All			250	mV_{DC}
Output Load Regulation	All			1	%Vout
Output Line Regulation	All			0.5	%Vout
Output Ripple and Noise – measured with 0.1µF ceramic capacitor in parallel with 10µF electrolytic capacitor Peak-to-peak (20MHz Bandwidth) Output ripple specification is met over 0 to 85°C	All			180	mV_{p-p}
Dynamic Load Response[2] – 50% to 100% load transient, 1A/µs slew rate Output voltage deviation Settling Time	All All			5% 500	% µs
Output Current	All	0		50	A_{DC}
Output Current Limit Inception	All	110		140	% $I_{O,max}$
Maximum Output Capacitance	All			10000	µF
Standby Output Voltage	All except		5		V_{DC}
Standby Output Current	All except			1	A_{DC}
Efficiency[1]: V_{IN} = 230V_{AC}, 20% load 50% load 100% load V_{IN} = 115V_{AC}, 20% load 50% load 100% load	All All All All All All		87 92 92.7 86 91 91		% % % % % %
Holdup Time[2] – V_{IN} = 115V_{AC} and 230V_{AC}, 550W load V_{IN} = 115V_{AC}, 600W load	All	11 10			ms ms

[1] Efficiency and Dynamic Load Response should be measured at 25°C.
[2] Holdup time may be lower at cold temperatures.

General Specifications

Parameter	Device	Symbol	Typ.	Unit
Calculated Reliability based on Telcordia SR-332 Issue 2: Method 1 Case 3 (V_{IN}=230V_{AC}, 80% full load, T_A = 40°C, airflow 200LFM, 90% confidence)	All	MTBF	>750,000	Hours
Weight	All		463 16.3	g oz.

Feature Specifications

Parameter	Device	Min	Typ	Max	Unit
On/Off Signal Interface – signal referenced to GND					
Logic Low (Power Supply ON)					
Input Low Current	All except			0.2	mA
Input Low Voltage	All except			0.5	V
Logic High (Power Supply OFF)					
Input High Current	All except			1.1	mA
Input Voltage	All except	2		5.5	V
Delay from ON/OFF being enabled to start of output voltage rise	All except			50	ms
Output Voltage Rise Time (from 10 to 90% of final value)	All		20		ms
Delay from Input being applied to all outputs being in regulation	All			800	ms
Output Overvoltage Protection	All	13.8		16	Vdc
Input Undervoltage lockout[3] Turn-on Threshold (100% load) Turn-off Threshold (100% load)	 All All		 86 81		 V_{AC} V_{AC}
DC OK – open collector, High when output available Sink Current Maximum Collector Voltage	 All except All except			 4 12	 mA V
AC OK – open collector, High when AC available and in range Sink Current Maximum Collector Voltage	 All except All except			 4 12	 mA V

[3]Undervoltage lockout threshold may vary with output load current level – decreasing as load goes lower.

Environmental Specifications

Parameter	Device	Specification/Test
Radiated Emissions[4]	All	CISPR22 Class B with 3dB margin
Conducted Emissions	All	CISPR22 Class B with 6dB margin
ESD	All	IEC61000-4-2, Level 3
Radiated Susceptibility[5]	All	IEC61000-4-3, Level 3
Electrical Fast Transient Common Mode	All	IEC61000-4-4, Level 3
Surge Immunity	All	IEC61000-4-5, Level 4 & ANSI C62.41 (6kV)
Conducted RF Immunity	All	IEC61000-4-6, Level 3
Input Voltage Dips	All	Output stays within regulation for either ½ cycle interruption or 25% dip from nominal line for 1 second
Input Harmonics	All	IEC61000-3-2
Shock and Vibration	All	Per IPC-9592B, Class II

[4,5]Shall meet when tested in a suitable enclosure.

Safety Specifications

Parameter	Device	Specification
Dielectric Withstand Voltage (between input and output)	All	Minimum of 4,250Vdc for 1 minute
Insulation Resistance (between input and output)	All	Minimum of 5 MΩ
Safety Standards	All	Class 1, IEC60950, EN60950, with the following deviations: Nemko, UL 60950 (Recognized Component), cUL (Canadian Approval by UL)

Characteristic Curves

The following figures provide typical characteristics for the CLP0612FP power supply.

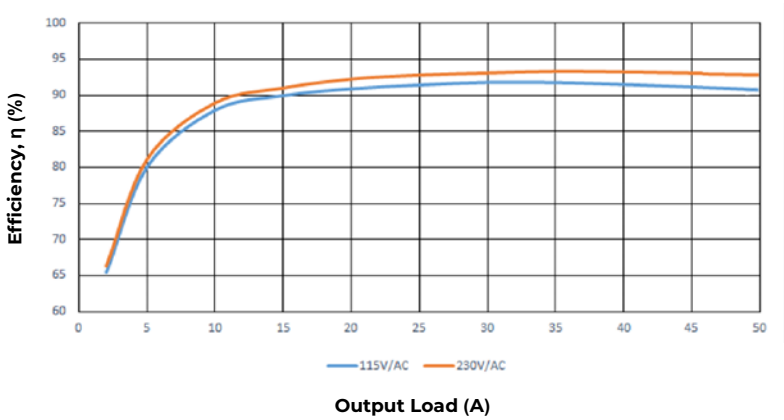


Figure 1. Power Supply Efficiency versus Output Current

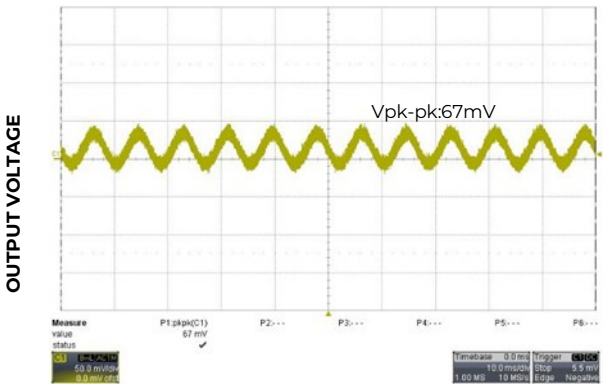


Figure 2. Typical output ripple and noise (V_{IN} = 230V_{AC}, load)

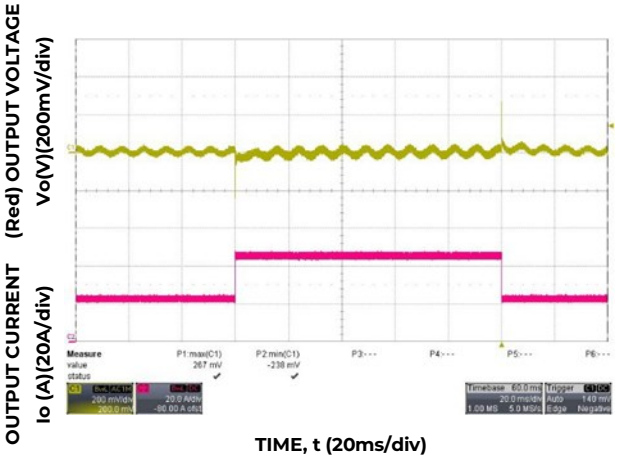


Figure 3. Transient Response to Dynamic Load change 100% from 50% to 100% at V_{IN} = 230V_{AC}

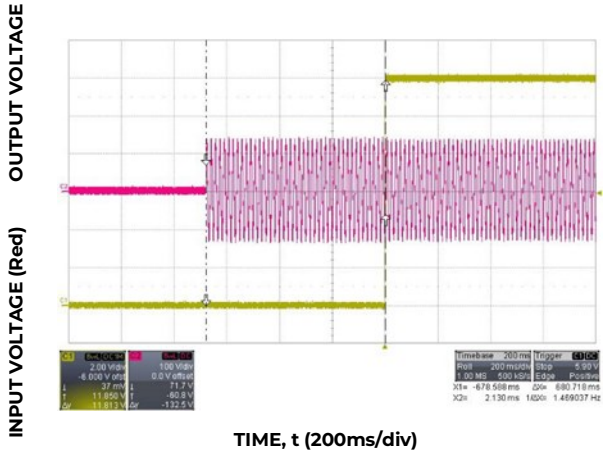


Figure 4. Typical Start-up (V_{IN} = 90V_{AC}, Full Load)

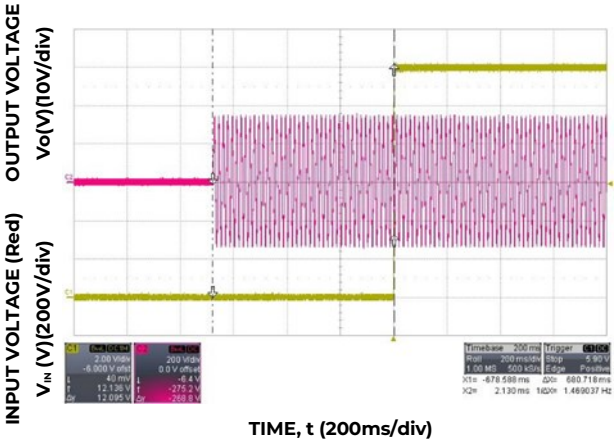


Figure 5. Typical Start-up (V_{IN} = 230V_{AC}, Full load)

Characteristic Curves (Continued)

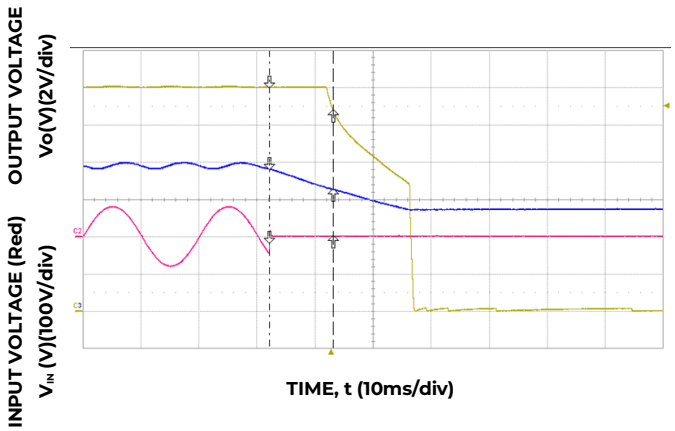


Figure 6. Typical Hold-up waveforms (V_{IN} = 115V, 100% Load)

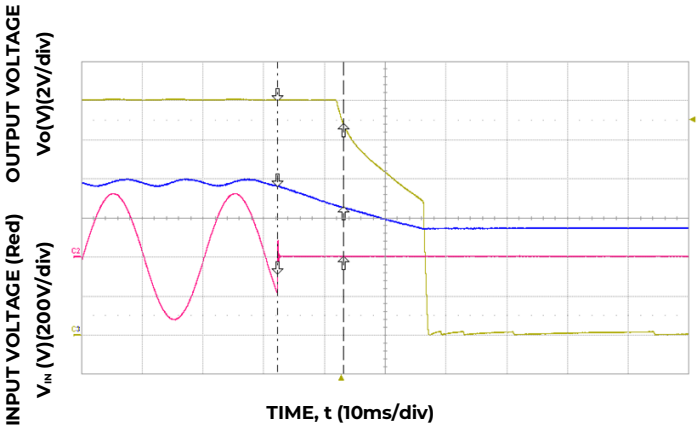
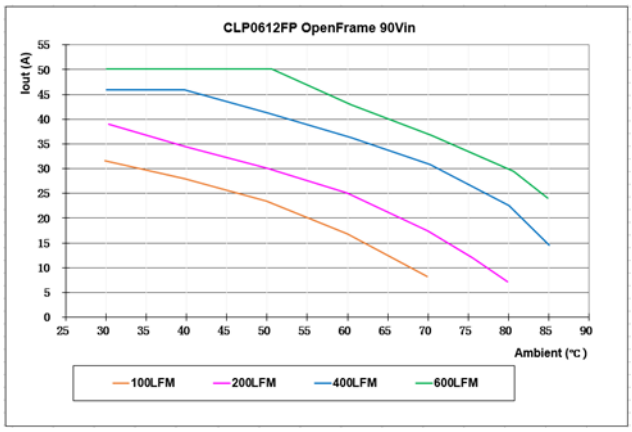
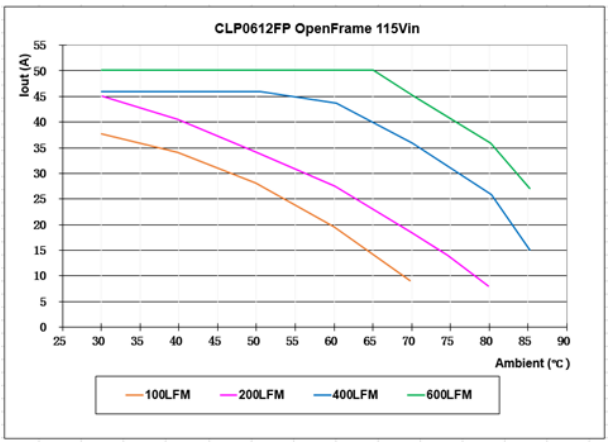


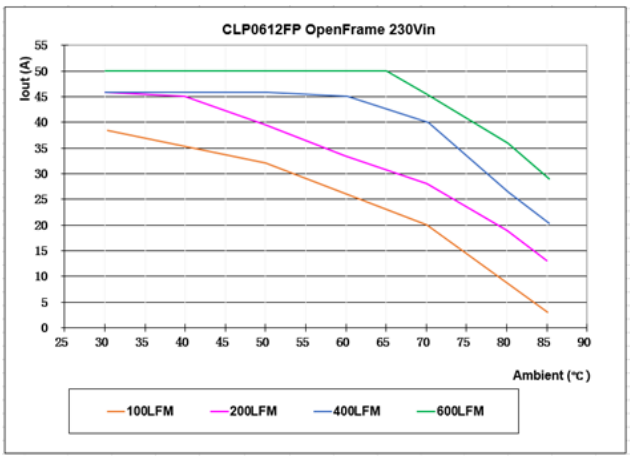
Figure 7. Typical Hold-up waveforms (V_{IN} = 230V, 100% Load)

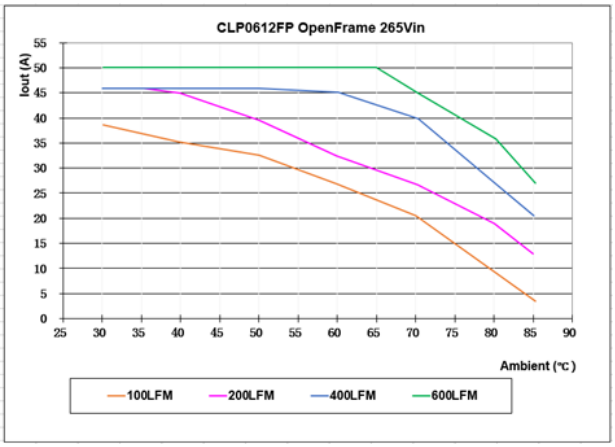
Power Derating for Forced Air Flow Application

(Air flow Direction**: Long Side**, Refer Fig.2. **Preferred Airflow Direction for Cooling.**)



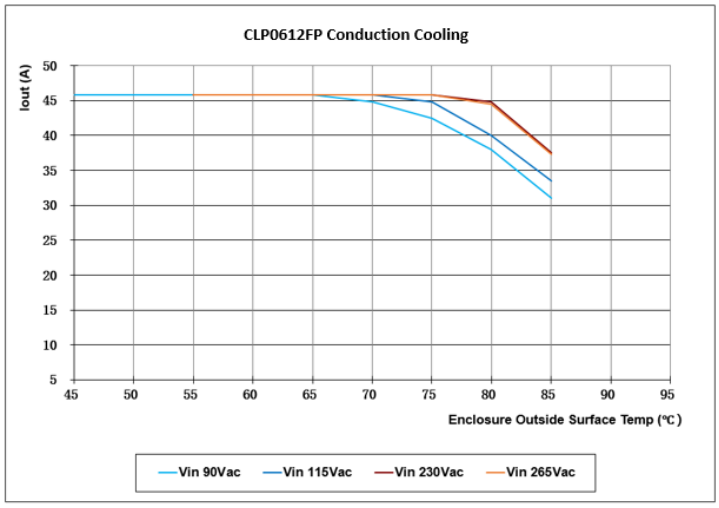






Power Derating for Conduction Cooling

(Enclosure Application; **No load inside enclosure)**



(Enclosure Application; With **420W resistive load inside enclosure)**

Enclosure Outside Surface (°C)	**Enclosure Inside Ambient (°C)**	**Resistive Load (W)** on CLP0612
55	85	420

Safety Considerations

The CLP0612 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 can meet Class 1, IEC60950, EN60950, with the following deviations: Nemko. UL 60950 (Recognized Component) C-UL (Canadian Approval by UL).

Feature Descriptions

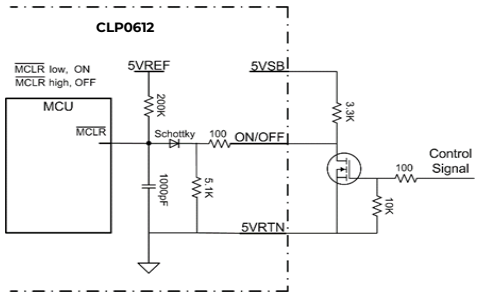
Standby Power Supply

A standby output of 5V in the CLP0612 power supply come on when AC input in the operating range is applied. 5V standby power is not isolated with main output.

Remote On/Off

The CLP0612 power supply feature a TTL-compatible On/Off control input. The power supply turns ON when the On/Off input goes low, and turns OFF when the input goes high.

Note that if the On/Off pin is left unconnected, the power supply main output remain ON. A proposed peripheral circuit is shown as below



Output Voltage Adjustment

The output voltage can be capable of being adjusted between 11.4V and 12.6V using a potentiometer on the power supply.

Remote Sense

The power supply has both positive and negative remote sense connections that can be connected to the positive and negative rails of the main output near the load. The power supply can operate without the remote sense connections being made.

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 CLP0612 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 until the overvoltage condition is removed. It is necessary to recycle the input to restart the power supply when this protection is activated.

Overtemperature Protection

The CLP0612 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

Input Under voltage Lockout

At input voltages below the input under voltage lockout limit, power supply operation will be disabled. The power supply will begin to operate at an input voltage above the under voltage lockout turn-on threshold

DC OK

The CLP0612 provide a DC OK signal that indicates when the output has come up and is in regulation. This is an open- collector type signal that goes high when the output is available and within regulation.

AC OK

The CLP0612 provide a AC OK signal that indicates when the Input Vin is in operational range. This is an open- collector type signal that goes High when the Input Voltage is within Range. This Signal is isolated from Vin and referenced to Vout return. AC OK function needs outside pull-up.

Power Good LED

A green LED on board the power supply will illuminate when the main output voltage is above 10V.

Paralleling with Active Output Current Sharing (option)

The CLP0612 is capable of being employed in a paralleling scheme, following are some design attributes that need to be carefully considered prior to attempting a parallel operation with multiple CLP0612's. With the following design criteria the CLP0612 will load share at an accuracy of +/-5%, when the total current draw is at levels above 20% of max overall loading. Current share signals of each power supply to be connected. An external Oring function needs to be employed at the Vout(+) signal. An oring diode or a Mosfet & controller scheme can be used. The 5V Standby Return SHOULD NEVER be connected with the VOUT-(RETURN). 5V stby returns will need to be connected together, the 5V stby Vout(+) leg remain separate. The 5V stby output is not designed to be paralleled, if there is a desire for these to be paralleled for load sharing, then other considerations need to be included as well. Contact your local OmniOn sales rep for FAE involvement.

In the parallel scheme the remote sense function needs to be unused and remote sense signals left floating.

Assembling

- Please use metal screw to mount the unit and make sure 4 mounting holes connected to Earth well.
- In Applications were the power supply is enclosed, special attention to clearances between the supply and the enclosure should be a min. 3.5mm on all sides for improved safety. For additional protection a layer of Kapton tape, 3 mil in thickness covering the whole surface under the supply is recommend. If a cover is used a 3 mil Kapton Tape covering the whole cover is also recommended. Please contact your local OmniOn FAE if further information is need.

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 power supply can deliver 600W capability at 115Vin, 65°C ambient and 600lfm airflow with derating at higher temperatures or lower airflows

Operation in a Sealed Enclosure

The CLP0612 power supply can also be operated in a sealed enclosure or in an environment where cooling is primarily via conduction. Figure 1 shows an arrangement where thermally conductive pads are used to transfer heat from the top and bottom of the power supply into the enclosure. Under such conditions, the power supply is capable of reduced power operation as shown in Power Derating Curves (Enclosure Application).

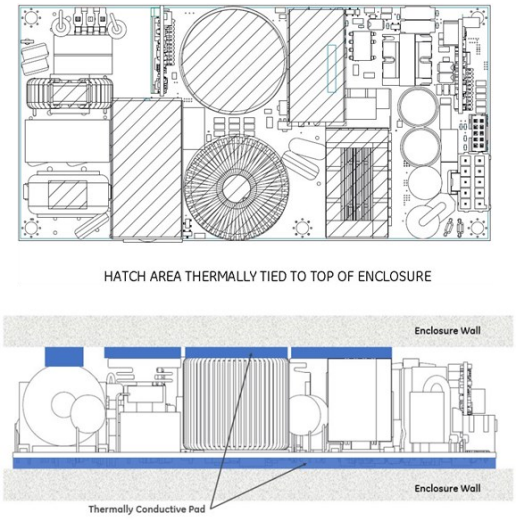


Fig. 1. Example arrangement of the CLP0612 for sealed enclosure applications.

Thermal conductivity should be 3.0 W/m-K for thermal pad application, 3.0mm thickness and 1kV+ isolation, example:

Thermal gap pad: http://www.bergquistcompany.com/pdfs/dataSheets/PDS_GP_HC3_0714%20v7.pdf

Thermal gap pad: https://www.lairdtech.com/products/tputty-502

Heat Transfer Via Convection

Increased airflow through the power supply enhances the heat transfer via convection. Fig 2 shows the preferred airflow direction. Contact your technical representative for derating information in other airflow

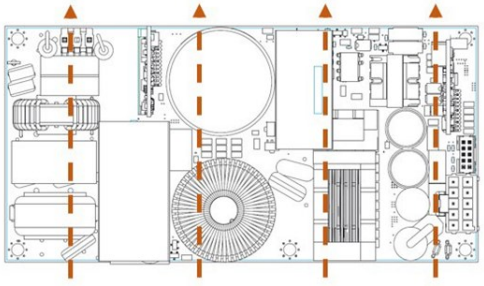
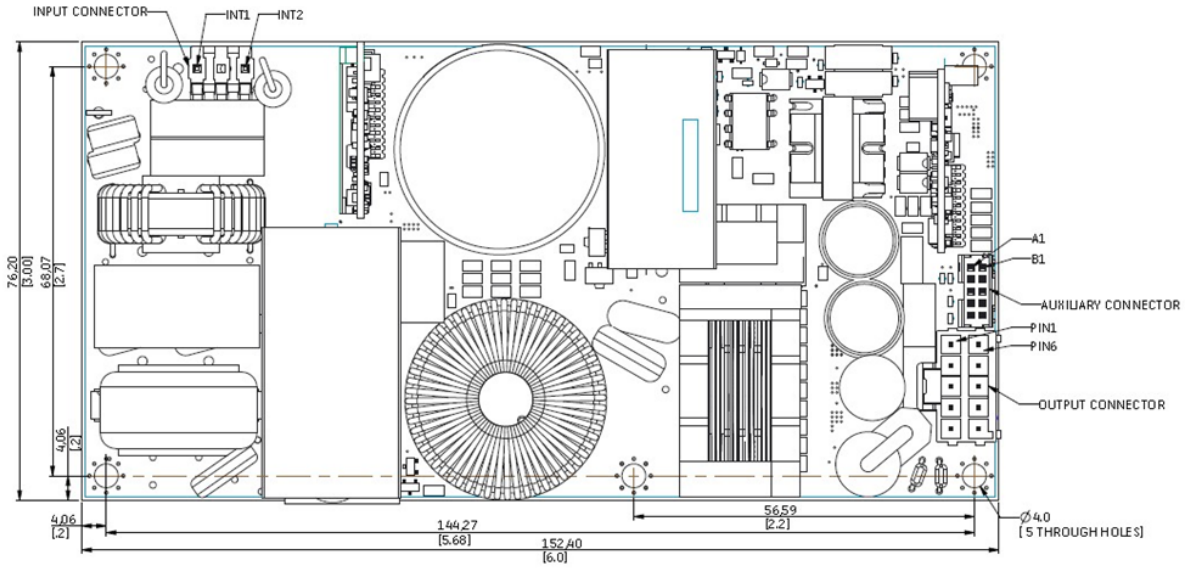


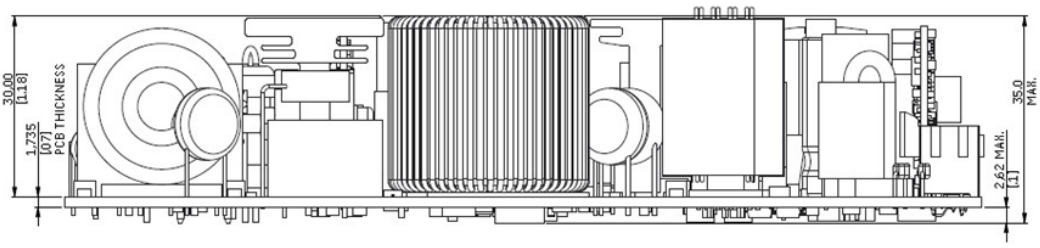
Fig. 2. Preferred Airflow Direction for Cooling.

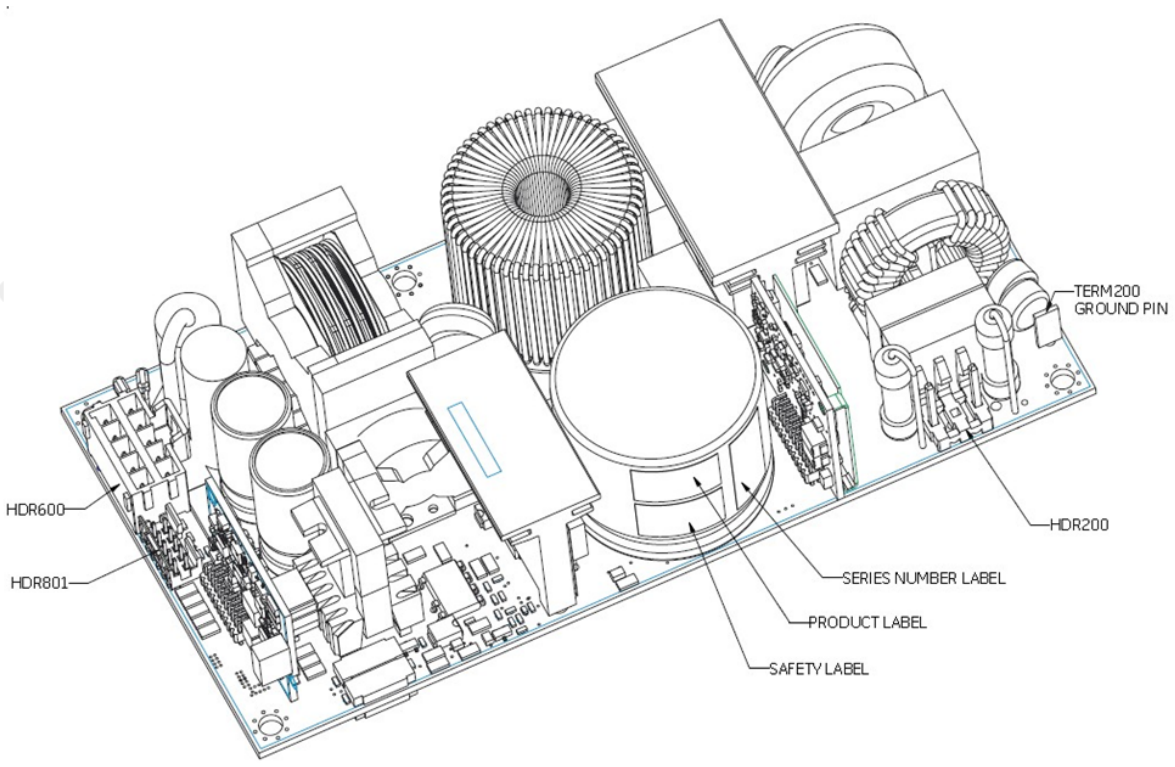
Mechanical Outline (preliminary and subject to change)

Top view



Side view





Connector Information

Connector	Connector on Power Supply	Mating Connector		
		Connector Housing	Crimp Terminal	TPA
AC Input Connector (HDR200)	Molex 41671-3473 or equivalent	Molex 09-50-3031 or equivalent	Molex 08-52-0071 or equivalent	\
DC Output Connector (HDR600)	Molex 172298-1210 or equivalent	Molex 172258-1110 or equivalent	Molex 172253-3023 or equivalent	Molex 172264-1008 or equivalent
Auxiliary Connector (HDR801)	FCI 98414-G04-10ULF or equivalent	FCI 90311-010LF or equivalent	FCI 10044403(22~24AWG) or equivalent	\
Ground Pin (TERM200)	TE P/N: 63756-1		TE 110series Receptacles (eg:63093-1 18~14AWG) or equivalent	

Pinout Information

AC Input Connector (HDR200)		DC Output Connector (HDR600)				Auxiliary Connector (HDR801)			
INT 1	L	P1	12VOUT	P6	12VRTN	A1	5VSB	B1	ISHARE
		P2	12VOUT	P7	12VRTN	A2	5VSB	B2	5VRTN
INT 2	N	P3	12VOUT	P8	12VRTN	A3	AC_OK	B3	5VRTN
		P4	12VOUT	P9	12VRTN	A4	RS+	B4	DC_OK
		P5	12VOUT	P10	12VRTN	A5	RS-	B5	On/OFF

Ordering Information

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

Device Code	Input Voltage Range	Output Voltage	Output Current	On/Off Control	Standby Supply	Temperature Range	Ordering code
CLP0612FPXXXZ01A	90 – 265Vac	12.0Vdc	50A	Negative Logic	5V @ 1A	-40 to 85°C	CLP0612FPXXXZ01A

Contact Us

For more information, call us at

1-877-546-3243 (US)

1-972-244-9288 (Int'l)

Change History (excludes grammar & clarifications)

Revision	Date	Description of the change
1.0	02/01/2024	Initial release

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