CLP0312FP Open Frame Power Supply

90-264V_{AC} Input; 12V_{DC} Output; 300W Output Power

In a small 2 x 4 -inch footprint, the 12V_{DC} single-output CLP0312 open frame power supply delivers 300W at greater than 90% efficiency. With its small size, the CLP series is specifically designed to handle power challenges associated with tight space and low airflow. Offering a leading 25W/in^3 power density in a 1U high, fan- less form factor, the CLP series addresses a broad range of applications such as communications, computing, and data storage from original equipment manufacturers (OEMs).

It delivers greater than 90 percent typical power efficiency and full load output at +65°C (137°F) with higher temperature operation possible at derated output power. Protection features include overcurrent (OCP), overvoltage (OVP), and overtemperature (OTP).

Applications

- Telecommunications Equipment
- Embedded Computing
- Storage Systems
- Industrial Equipment

Features

- Compact size 50.8 mm x 101.6 mm x 36.9 mm (2 in x 4 in x 1.45 in) with density of 25 W/in^3
- Universal AC input range (90 – 264V_{AC})
- Output voltage of 12V
- Maximum output current of 25A@ 12Vout (300W)
- Full load capability at 65°C and 600LFM airflow with derating at higher temperatures or lower airflows
- Output overcurrent protection (non-latching)
- Overtemperature protection (auto restart)
- Output overvoltage protection (auto restart)
- Up to 11ms of holdup time
- Active power factor corrected input
- Conducted EMI - meets CISPR32 (EN55032) and FCC Class B requirements
- Compliant to RoHS II EU “Directive 2011/65/EU” and amended Directive (EU) 2015/863.
- Compliant to REACH Directive (EC) No 1907/2006
- UL and cUL approved to UL/CSA62368-1, TUV (EN62368- 1), CE mark (for LVD) and CB report available*†
- ISO** 9001 and ISO 14001 certified manufacturing facilities
- Conformal coated

*UL is a registered trademark of Underwriters Laboratories, Inc.
†CSA is a registered trademark of Canadian Standards Association.
** ISO is a registered trademark of the International Organization of Standard.

Technical Specifications

Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. Functional operation of the device is not implied at these or any other conditions over 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	264	V_{AC}
For up to 10 seconds max.	All	90	275	V_{AC}
Operating Ambient Temperature	All	-40	85	°C
Storage Temperature	All	-40	85	°C
Humidity (non-condensing)	All	5	95	%
Altitude	All		5000	m

‡ Multi-attempts restart in extreme condition such as $90V_{AC}$/-40°C/full load.

Electrical Specifications

Parameter	Device	Min	Typ	Max	Unit
Operating Input Voltage	All	90	115/230	264	V_{AC}
Input Source Frequency	All	47	50/60	63	Hz
Input Current (V_{IN} = $90V_{AC}$)	All		3.8		ARMS
Input Power Factor	All	0.95			
Inrush Transient Current (V_{IN} = $264V_{AC}$, T_{amb} = 25°C)	All		200		A Peak
Leakage Current to Earth Ground (V_{IN} = $264V_{AC}$)	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 Load Regulation	All			2	%Vout
Output Line Regulation	All			0.5	%Vout
Output Ripple and Noise – measured with 0.1µF ceramic capacitor in parallel with 10µF electrolytic capacitor, at 25°C Peak-to-peak (20MHz Bandwidth)	All			180	mVp-p
Dynamic Load Response – 50% to 100% load transient, 1A/µs slew rate Output voltage deviation Settling Time	All All			5% 500	% µs
Output Current	All	0		25	A_{DC}
Output Current Limit Inception	All		120		% Io,max
Maximum Output Capacitance	All			5000	µF
Efficiency: 100% load	All	90			%
Holdup Time – V_{IN} = $115V_{AC}$, 100% load[2]	All	11			ms

[2] Holdup time is reduced at cold temperatures.

Technical Specifications (continued)

Isolation Specifications

Parameter	Device	Min	Max	Unit
Isolation Voltage – Input to output	All		3000	V_{AC}
Input to safety ground	All		1500	V_{AC}
Outputs to safety ground	All		50	V_{AC}

General Specifications

Parameter	Device	Symbol	Typ	Unit
Calculated Reliability based on Telcordia SR-332 Issue 2: Method 1 Case 3 (V_{IN}=230V_{AC}, Io = 80% full load, TA = 40°C, airflow 600LFM, 90% confidence)	All	MTBF	988,276	Hours
Weight	All		400 14.1	g (oz.)

Feature Specifications

Parameter	Device	Min	Typ	Max	Unit
Delay from input being applied to all outputs being in regulation	All		1		s
Output Overvoltage Protection (for main output currents above 0.1A)	All	13.8		16	V_{DC}
Input Undervoltage Lockout[3]					
Turn-on Threshold (100% load)	All		86		V_{AC}
Turn-off Threshold (100% load)	All		81		V_{AC}
DC OK – open collector, high when output available					
Sink Current	All			4	mA
Maximum Collector Voltage	All			12	V

[3] The undervoltage lockout threshold varies with the output load current level – decreasing as the load goes down.

Environmental Specifications

Parameter	Device	Specification/Test
Conducted Emissions	All	CISPR32 (EN55032) Class B with 6dB margin
Radiated Emissions	All	CISPR32 (EN55032) Class B with 3dB margin to comply with system enclosure
ESD	All	IEC61000-4-2, Level 4
Radiated Susceptibility	All	IEC61000-4-3, Level 3 (to comply with system enclosure)
Electrical Fast Transient Common Mode	All	IEC61000-4-4, Level 3
Surge Immunity	All	IEC61000-4-5, Level 4 (±4/2kV common mode and differential mode)
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	IPC-9592B, Class II

* Radiated immunity is met when the power supply is tested in a suitable enclosure.

Technical Specifications (continued)

Characteristic Curves

The following figures provide typical characteristics for CLP0312FP power supply.

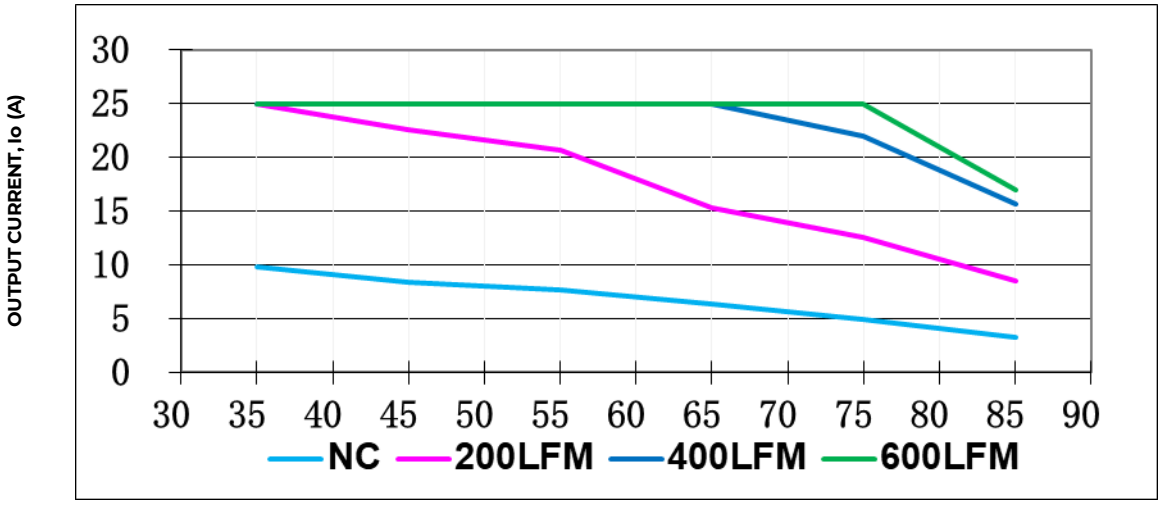


Figure 1. Derated Output Current versus Ambient Temperature and Airflow. Data shown is for 115V_{AC} in. At 230V_{AC} in, the derating is the same or better. For derating at other input voltages, consult the OmniOn technical representative.

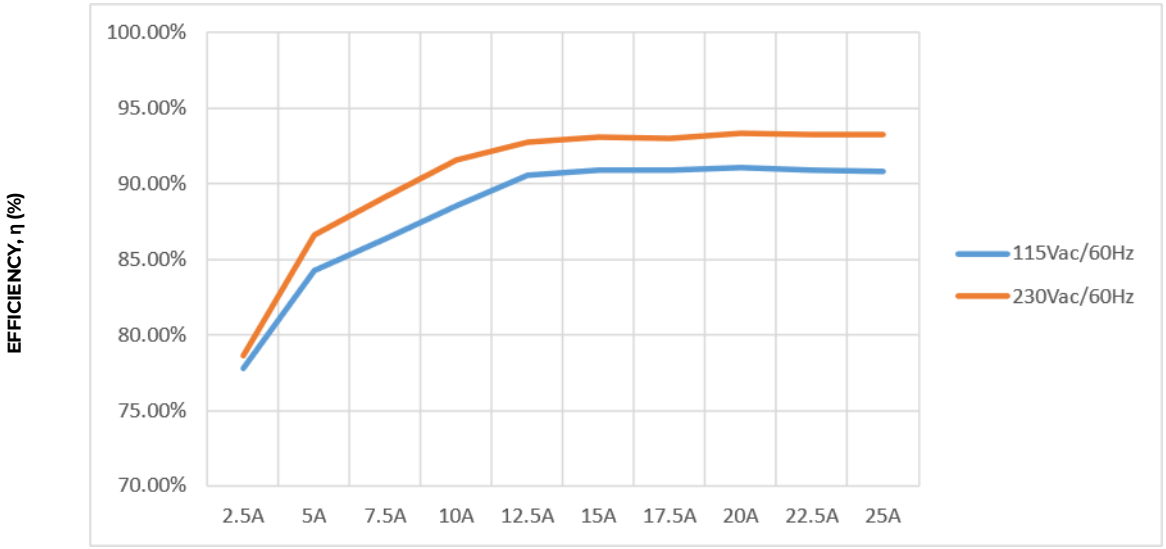


Figure 2. Power Supply Efficiency versus Output Current

Technical Specifications (continued)

Characteristic Curves (Continued)

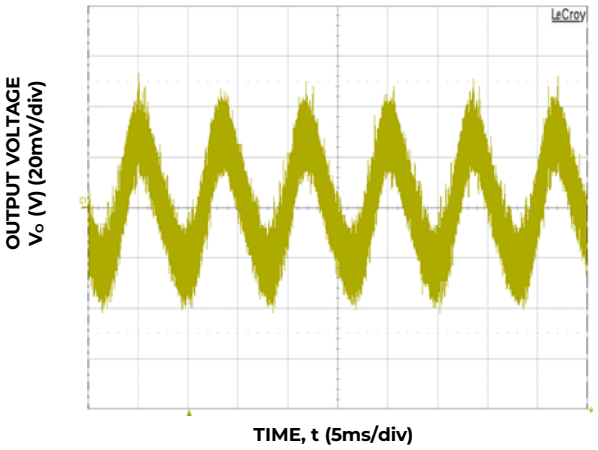


Figure 3. Typical Output Ripple and Noise (V_{IN} = 230V_{AC}, 100% load)

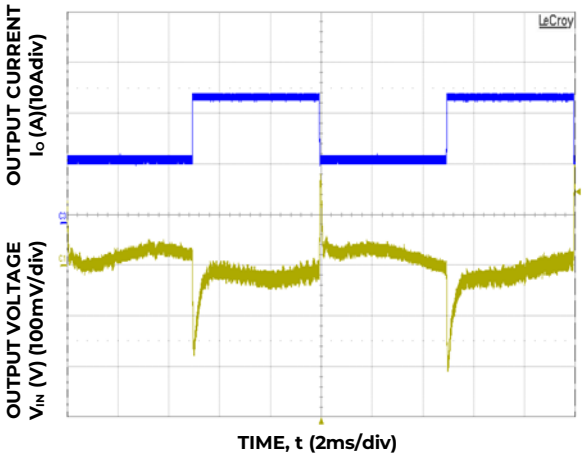


Figure 4. Transient Response to Dynamic Load Change from 50% to 100% at V_{IN} = 230V_{AC}

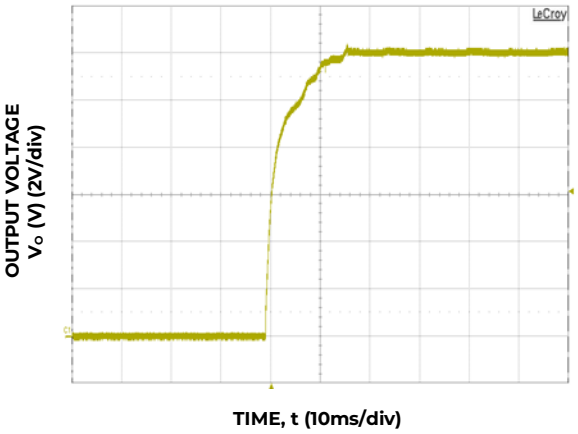


Figure 5. Typical Start-up (VIN = 115V_{AC})

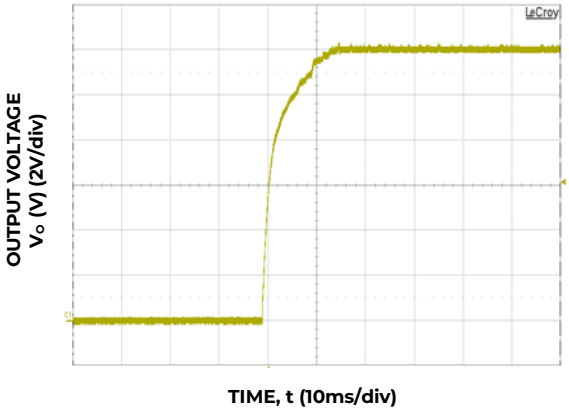


Figure 6. Typical Start-up (V_{IN} = 230V_{AC})

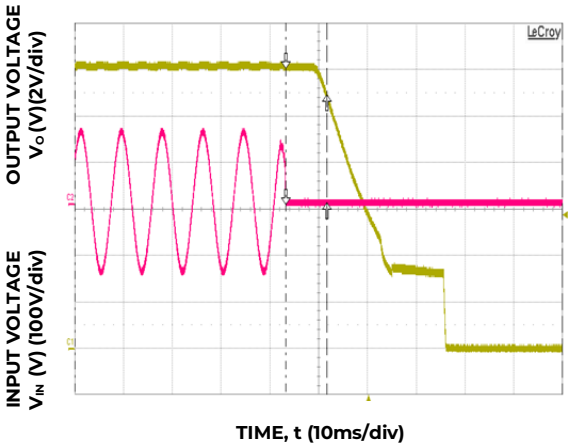


Figure 7. Typical Hold-up Waveforms (V_{IN} = 115V_{AC}, 100% load)

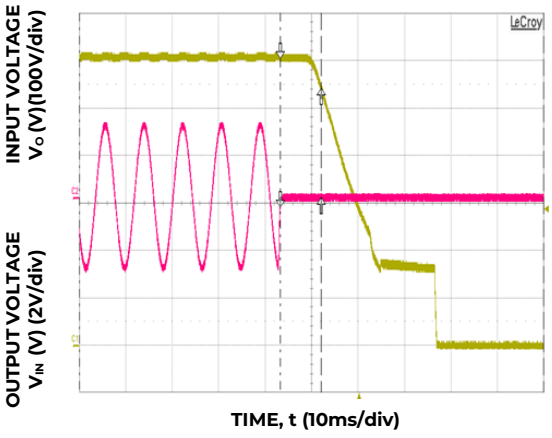


Figure 8. Typical Hold-up Waveforms (V_{IN} = 230V_{AC}, 100% load)

Technical Specifications (continued)

Safety Considerations

The CLP0312FP 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, IEC62368-1, EN62368-1, with the appliable national deviations which approved by TUV and UL (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 CLP0312FP 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 enters hiccup mode.

Overtemperature Protection

The CLP0312FP 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 300W output with an ambient temperature of 80°C and 3m/s (600LFM) airflow.

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.

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 9 shows the preferred airflow direction. Contact your OmniOn technical representative for derating information in other airflow directions.

Note: Under natural convection cooling conditions, the maximum load is restricted to 8W as OTP will be triggered at higher loads.

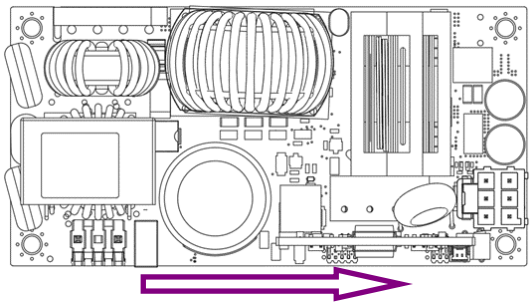


Figure. 9. Preferred airflow direction for cooling

Operation in a Sealed Enclosure

The CLP0312FP power supply can also be operated in a sealed enclosure provided proper means for removing heat from the power supply are used. Figure 10 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.

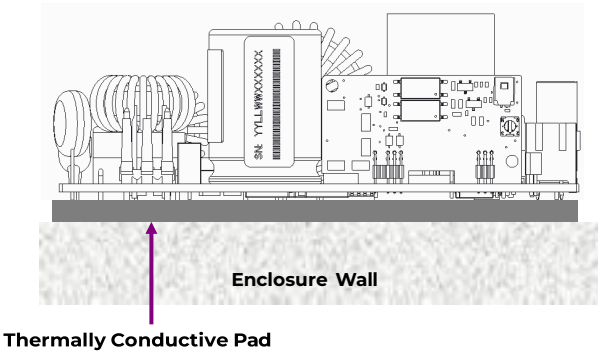


Figure. 10. Example arrangement of the CLP0312FP for sealed enclosure applications

Table 1 Output Power Capability when the CLP0312FP is operated in a sealed enclosure with thermal pad for conduction cooling.

Enclosure Inside Ambient (°C)	Enclosure Outside Surface (°C) Reference	Max. Output Power (W)
85	65	210W @ 90Vin

Note: The enclosure inside ambient is the air temperature near the hottest components.

The output power need derating when the temperature rise high degree.

Technical Specifications (continued)

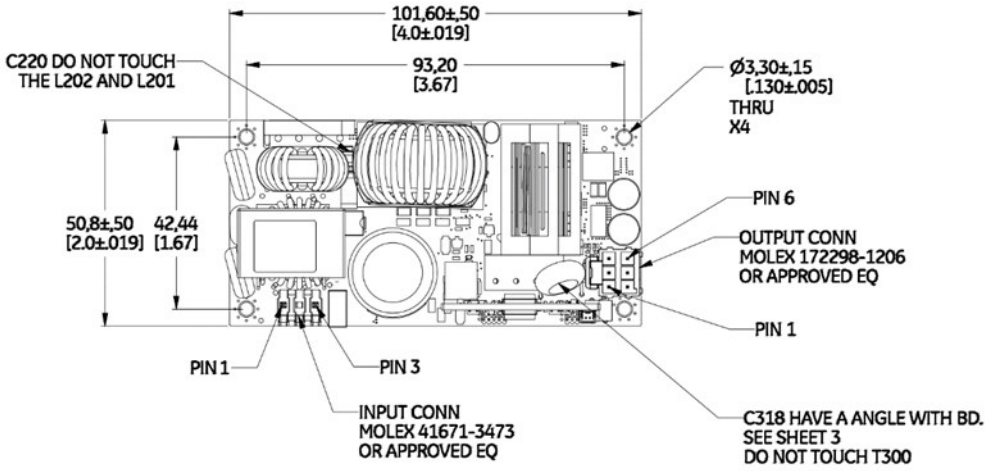
Mechanical Outline (CLP0312FPXXXZ01A)

Dimensions are in millimeters.

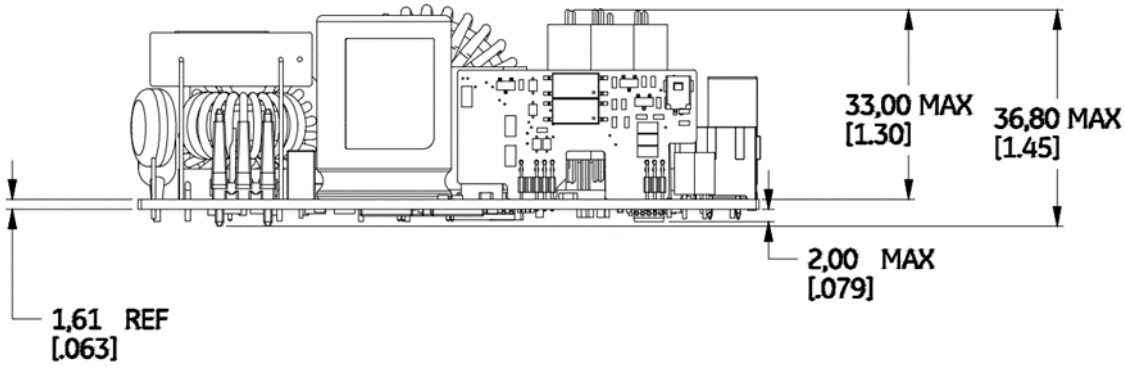
Tolerances: x.x mm ± 0.5mm [unless otherwise indicated]

x.xx mm ± 0.25mm

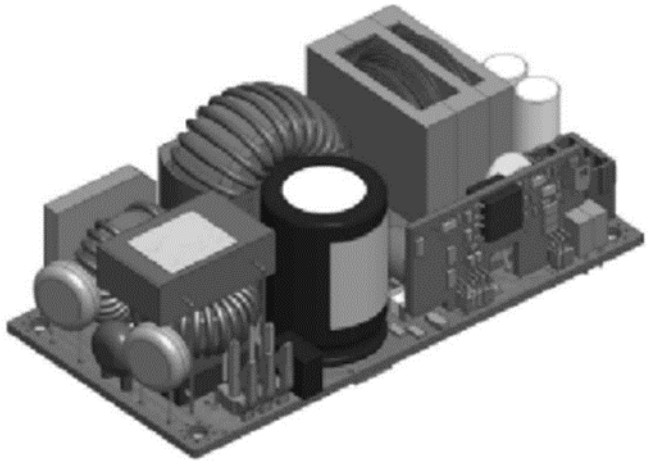
TOP VIEW



SIDE VIEW



3D VIEW



Technical Specifications (continued)

Connector Information

Connector	Connector on Power Supply	Mating Connector
AC Input Connector	Molex 41671-3473 or equivalent	Molex 09-50-8031 or equivalent
DC Output Connector	Molex 172298-1206 or equivalent	Molex 172258-3106 or equivalent
Auxiliary Input Connector	Molex 202396-0207 or equivalent	Molex 501330-0200 or equivalent

Pinout Information

AC Input Connector		DC Output Connector		Signal Connector	
Pin 1	Neutral	Pin 1	Vout -ve	Pin 1	Vout -ve
Pin 3	Line	Pin 2	Vout -ve	Pin 2	DC_OK
		Pin 3	Vout -ve		
		Pin 4	Vout +ve		
		Pin 5	Vout +ve		
		Pin 6	Vout +ve		

Ordering Information

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

Device Code	Input Voltage Range	Output Voltage	Output Current	Temperature Range	Ordering Code
100	90 – 264V_{AC}	12.0V_{DC}	25A	-40 to 85°C	CLP0312FPXXXZ01A

Contact Us

For more information, call us at

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

Change History (excludes grammar & clarifications)

Revision	Date	Description of the change
1.0	08/22/2023	Initial release
2.0	08/24/2023	Updated as per ABB template
2.1	01/29/2024	Updated as per OmniOn template

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