

MAIN FEATURES

- 90 – 305 V_{AC} Universal input voltage range
- 420 W rated power, 330 W natural convection
- High efficiency (94% typical)
- Low In-rush current (<25 A)
- 48-51 V_{DC} adjustable output voltage
- Active PFC, EN61000-3-2 compliant (Class C)
- Low earth leakage current (<250 μA)
- Over temperature protection
- OV, OC, and short circuit protections
- Low profile U-chassis (<38.5 mm)
- IEC/EN/UL 60950-1 and 62368-1 compliance
- UL8750 compliant
- RoHS-3 compliant (EU directive EU 2015/863)
- 4000 m altitude operation



DESCRIPTION

The SLP420-US48-OF is an AC-DC power supplies featuring a compact form factor, high conversion efficiency and high input-to-output isolation grade to SELV requirements.

The SLP420 provides a steady 420 W of regulated DC power through the full 100 to 277 V_{AC} nominal input voltage range, in an open frame 3.0 x 5.0 x 1.5" form factor.

By converting energy at 94% typical efficiency, the SLP420 generates less heat facilitating thermal management in space constrained systems with poor or without ventilation.

The SLP420 provides a nominal 48 V_{DC} regulated output voltage which can be manually adjustable up to 51 V_{DC}.

The SLP420 can provide steady 330 W power, in free air cooling, and 420 W, when 600 LFM forced air cooled. It can operate up to 80 °C de-rating the output power and is capable of start up from -30 °C.

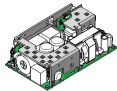
The SLP420-US48-OF complies with the IEC/UL 60950-1 and 62368-1 standards for Audio Video and IT equipment and UL8750 for LED lighting applications.

It complies with the EN55032 EMC limits of Class B for conducted emissions as well as the EN55024 for immunity. It complies also with the IEC/EN 61000-3-3 limits for voltage fluctuations/flickers and IEC/EN 61000-3-2 Class C for harmonic content.

MARKET SEGMENTS AND APPLICATIONS

- Video Wall Display and SSL Lighting
- Entertainment professional lighting
- LED moving heads, spot lights, strobes
- Architectural lighting
- Industrial / laser applications
- 3D printing and ATM

MODEL CODING AND OUTPUT RATINGS

Model and Output Power	Output Nominal Voltage	Package Option		
Small Form factor, Ac-dc, ITE, 400 W rated: SLP420-	48-51 V _{DC} : -US48	Open Frame: -OF		
				
Model Number	V1 Nominal [V]	I1 ¹ Convection [A]	I1 ¹ Forced air [A]	V1 ² Ripple [mV]
SLP420-US48-OF	48	6.87	8.75	480

¹ The output power of V1 must not exceed 420 W when cooled by 600 LFM air flow, and 330 W when natural convection cooled, at ≥ 180 V_{AC}, up to 40 °C. See de-rating curves below. In any case, the heat sinks maximum temperature should not exceed +110 °C at 50 °C ambient temperature.

² Peak-to-Peak measured at 20 MHz Bandwidth.

INPUT SPECIFICATIONS

Specification	Test Conditions / Notes	Min.	Nominal	Max.	Units
AC Input Voltage	PS starts and operates at 90 V _{AC} at all load conditions	90	100-277	305	V _{AC}
Input Frequency		47	50/60	63	Hz
Input Current	RMS at 180 V _{AC} , maximum load	-	-	2.6	A
	RMS at 90 V _{AC} , maximum load	-	-	5.2	A
Inrush Current (peak)	277 V _{AC} , 25 °C ambient, cold start.	-	-	25	A
Fusing	2X Time Lag 6.3 A, 250 V on both L and N	-	-	6.3	A
Efficiency	At 230 V _{AC} : 20% rated load	-	90	-	%
	50 – 100 % rated load	-	94	-	
	At 115 V _{AC} : 20% rated load	-	90	-	
	50 – 100 % rated load	-	92	-	
Input Power Consumption	Power on, 115-230 V _{RMS} , no load	-	-	5	W
Power Factor	From 25 to 100% rated load, 115 V _{AC} , 60 Hz and 230 V _{AC} , 50 Hz input voltages	0.92	-	-	-
Harmonic Current	Complies with EN-61000-3-2 Class C at 230 V _{AC} 50 Hz, load >100 W.				
Fluctuations and Flicker	Complies with EN-61000-3-3 at nominal voltages and full load.				
Earth Leakage Current	Normal conditions, 277 V _{RMS} , 60 Hz.	-	-	250	µA
	Single fault conditions, 277 V _{RMS} , 60 Hz.	-	-	500	

OUTPUT SPECIFICATIONS

Specification	Test Conditions / Notes	Min.	Nom.	Max.	Units
V1 Output Voltage	0.5% set point accuracy at 1 A load	-	48	-	
V1 Output Power Rating	Convection cooling, ≥180 V _{AC} , ≤40 °C	-	-	330	W
	Forced air cooling, ≥180 V _{AC} , ≤50 °C	-	-	420	
	Peak power (≤ 5 s)	-	-	440	
V1 Voltage Adjustment Range		-	-	±5	%V1
V1 Load-Line-Cross Regulation	V _{AC} : 100 – 277 V _{RMS} V1 Load: 0 – 8.75 A	-	-	±2	%V1
V1 Line Regulation	V _{AC} : 100 – 277 V _{RMS}	-	-	±0.1	%V1
Transient Response	0 to 100% load changes at 1 A/µs	-	-	±8	%V1
(Voltage Deviation)	560 µF Load / I _{OUT} > 0.5 A	-	-	±8	%5V _{SB}
V1 Ripple and Noise	All models, Peak-to-peak, 20 MHz BW.	-	-	1	%V1
	100 nF ceramic and 10 µF tantalum caps at the load.	-	-	1	
Start-up Rise Time	90<V _{IN} <277, any load conditions.	5	-	85	ms
Start-up Delay	V1 in regulation after AC is applied	-	-	1	s
Turn-on Overshoot	At I1 = 500 mA, V1 in regulation within 50 ms	-	10	-	%V1
Hold-up Time	At nominal V _{IN} , 400 W	-	15	-	ms
	At nominal V _{IN} , 300 W	-	20	-	
Minimum Load		0	-	-	A
Maximum Load Capacitance	At nominal V _{IN} , 25 °C ambient	-	-	6000	µF
Temperature Drift		-1.2	-	+1.2	mV/°C

Those curves do result from measurements made in a static climatic chamber with a specific set-up, therefore, they represent the SLP420 performance approximation once installed into a system where variables are several and not always controllable. Although they are an effective reference, it is always a recommended practice to monitor SLP420 critical components temperature when operating into a system within its rated working conditions, considering also the SLP420 has been certified up to 70 °C ambient temperature.



PROTECTION FEATURES

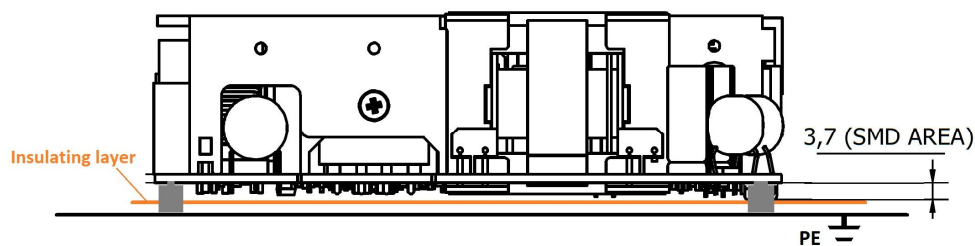
Specification	Test Conditions / Notes	Min.	Nominal	Max.	Units
Input Under Voltage Lockout	Auto recovery, Hiccup Mode	60	75	-	V _{AC}
Input Fuse	2x Time Lag 6.3 A, 250 V on L1 and L2	-	-	6.3	A
Over Current	At nominal input voltages. V1: Hiccup mode, auto-recovering.	110	-	150	%I _{MAX}
Short Circuit	At nominal input voltages. V1: Hiccup mode, auto-recovering.	-	-	-	
Over Voltage	Unit shut down and latch off	110	-	136	%V _{NOM}
Over Temperature (on secondary side)	Hiccup mode, auto-recovering.	-	-	-	
Isolation Primary-to- Secondary	Reinforced	4000	-	-	V _{AC}
Isolation Input-to-PE	Basic	1500	-	-	V _{AC}
Isolation Output-to-PE	Basic	1500	-	-	V _{AC}
Touch Current	Normal Condition (NC)	-	-	100	μA
	Single Fault Condition (SFC)	-	-	500	

ENVIRONMENTAL SPECIFICATIONS

Specification	Test Conditions / Notes	Min	Nominal	Max	Units
Operating Temperature Range	See output power de-rating curves above PS starts up at -30 °C	-20	-	80	°C
De-rated Operating Temperature Range	Natural convection cooling: Linearly de-rate from 330W at 40 °C, to 90 W at 80 °C (≥180 V _{AC})	-	-	80	°C
	Forced air cooling: Linearly de-rate from 420 W at 50 °C, to 235 W at 80 °C (≥180 V _{AC}). See graphs above.	-	-	80	°C
Storage Temperature Range		-40	-	85	°C
Humidity	RH, Non-condensing Operating	-	-	95	%
	Non-operating	-	-	95	%
Operating Altitude		-	-	4000	m
Shock	EN 60068-2-27 Operating: Half sine, 30 g, 18 ms, 3 axes, 6x each (3 positive and 3 negative). Non-Operating: Half sine, 50 g, 11 ms, 3 axes, 6x each (3 positive and 3 negative).				
Vibration	EN 60068-2-64 Operating: Sine, 10 – 500 Hz, 1 g, 3 axes, 1 oct/min., 60 min. Random, 5 – 500 Hz, 0.02 g ² /Hz, 1 g _{RMS} , 3 axes, 30 min.				
	Non-Operating: 5 – 500 Hz, 2.46 g _{RMS} (0.0122 g ² /Hz), 3 axes, 30 min.				
MTBF	Full Load, 120 V _{AC} , 40 °C ambient 80% Duty cycle, Telcordia SR-332 Issue 2	400.000	-	-	Hours
Useful Life	Low line range, 300 W, 40 °C ambient, natural convention.	-	4	-	Years
Thermal Considerations	The output power de-rating curves are herein provided. These curves can be used as a guideline to assess the limit in performance of a power supply once installed in a system providing controlled air flow at a certain input voltage and ambient temperature.				

Installation Note:

The SLP420-US48-OF is an IEC Class I safety installation class power supply, therefore, care must be taken, when installing the SLP420 in a system earthed frame, to ensure the safe creepage and clearance distances between it and any face of the power supply, as prescribed by the safety standards IEC/EN60950-1, IEC/EN 62368-1 and UL8750. Where this wouldn't be feasible, an adequate insulation layer shall be placed between the power supply assembly and the system. Below depicted an example where the distance between power supply bottom face and earthed frame is not sufficient.



ELECTROMAGNETIC COMPATIBILITY (EMC) – EMISSIONS

Phenomenon	Conditions / Notes	Standard	Equipment Performance Class
Conducted Radiated	115 V _{RMS} , 230 V _{RMS} . Maximum load.	EN 55032 (ITE)	B
	Power supply performance to be evaluated when installed into a system.	EN 55032 (ITE)	
Line Voltage Fluctuation and Flicker	At 20%, 50% and 100% maximum load. Nominal input voltages.	EN 61000-3-3	
Harmonic Current Emission	Nominal input voltages. Output load > 100 W.	EN 61000-3-2	C

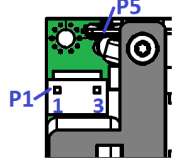
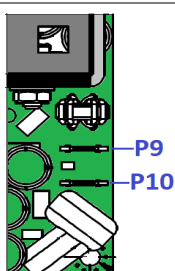
ELECTROMAGNETIC COMPATIBILITY (EMC) – IMMUNITY

Phenomenon	Conditions / Notes	Standard	Test Level	Performance criteria
	Reference std. for ITE	EN 55024		
	Reference std. for Industrial/IMS Equipment	EN 61000-6-2		
ESD	15 kV air discharge.	EN 61000-4-2	4	A
Radiated Field	10 V/m, 80-2700 MHz, 1 KHz 80% AM.	EN 61000-4-3	3	A
Electric Fast Transient Surge	±2 kV on AC power port for 1 minute	EN 61000-4-4	3	A
	± 1 kV line to line; ± 2 KV line to earth on AC power port.	EN 61000-4-5	3	A
Conducted RF Immunity Dips and Interruptions	10 V _{RMS} , 0,15-80 MHz, 1 KHz 80% AM.	EN 61000-4-6	3	A
	100 – 127 V_{AC}:			
	Drop-out to 0% for 10 ms	EN61000-4-11		A
	Drop-out to 0% 1 cycle (20 ms)	EN61000-4-11		B
	Dip to 40% for 200 ms	EN61000-4-11		B
	Dip to 70% for 25 cycles (500 ms)	EN61000-4-11		A
	Drop-out to 0% for 5 s	EN61000-4-11		B
	200 – 277 V_{AC}:			
	Drop-out to 0% for 10 ms	EN61000-4-11		A
	Drop-out to 0% 1 cycle (20 ms)	EN61000-4-11		B
	Dip to 40% for 200 ms	EN61000-4-11		A
	Dip to 70% for 25 cycles (500 ms)	EN61000-4-11		A
	Drop-out to 0% for 5 s	EN61000-4-11		B

SAFETY AGENCIES APPROVALS

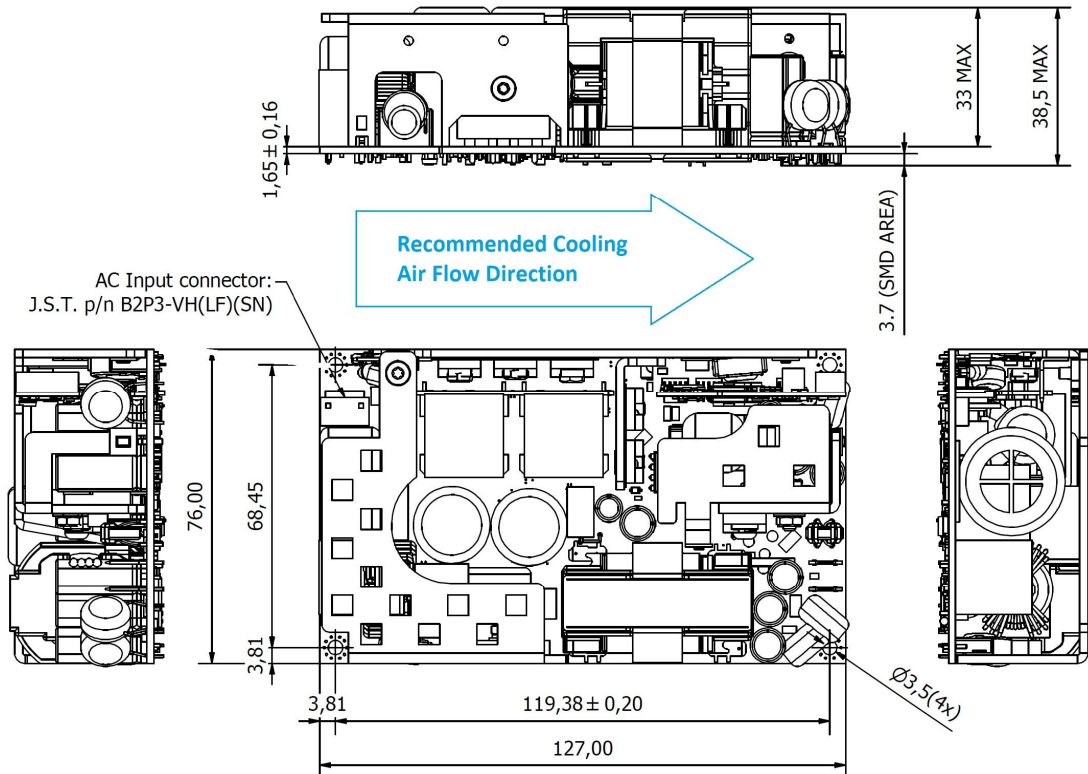
Certification Body	Safety Standards and file numbers	Category
CSA/UL	CSA C22.2 No. 60950-1, UL 60950-1 and UL 62368-1	Audio Video and Information Technology Equipment
	UL8750, CSA C22.2 No 250.13	Lighting
IEC IECEE CB Certification	IEC/EN 60950-1 and IEC/EN 62368-1	Audio Video and Information Technology Equipment
CE	Directive 2014/35/EU: Electrical Safety: Low Voltage electrical equipment (LVD)	Audio Video and Information Technology Equipment
	Directive 2014/30/EU: Electromagnetic Compatibility (EMC)	
	Directive EU 2015/863: RoHS 3	

OUTLINE DRAWING AND CONNECTIONS – U-CHASSIS

Input Connector	Manufacturer and Part Number		AC Input P1										
AC Input Connector P1	JST B2P3-VH or equivalent		<table border="1"> <thead> <tr> <th>Pin</th> <th>Function</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Line 1</td> </tr> <tr> <td>2</td> <td>Not Present</td> </tr> <tr> <td>3</td> <td>Line 2</td> </tr> </tbody> </table>	Pin	Function	1	Line 1	2	Not Present	3	Line 2		
Pin	Function												
1	Line 1												
2	Not Present												
3	Line 2												
P1 Mating Connector	JST VHR-3N (Crimp Terminal Housing) JST SVH-41T-P1.1 (Receptacle Crimp Terminal, 20-16 AWG)												
Protection Earth Connector P5	OSTERRATH_61-1536-11-0031		Protection Earth P5										
P5 Mating Connector	Any tin finished 6.35 x 0.81 mm, not-insulated receptacle		<table border="1"> <thead> <tr> <th>GND</th> <th>AC Ground</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> </tr> </tbody> </table>		GND	AC Ground							
GND	AC Ground												
Output Connector	Manufacturer and Part Number												
P9 Connector	OSTERRATH_61-3162-11/0030												
P9, Mating Connectors	CEMBRE: RF-F408P Red AWG22-18 / BF-F408P Blue AWG16-14 TYCO: 2-520193-2 Red AWG22-18 / 3-520124-2 Blue AWG16-14												
P10 Connector	OSTERRATH_61-1536-11-0031												
P10 Mating Connectors	CEMBRE: RF-F608P Red AWG22-18 / BF-F608P Blu AWG16-14 TYCO: 2-520183-2 Red AWG22-18 / 3-350819-2 Blue AWG16-14												
				<table border="1"> <thead> <tr> <th colspan="2">Output Connectors</th> </tr> <tr> <th>Ref #</th> <th>Function</th> </tr> </thead> <tbody> <tr> <td>P9</td> <td>+V1</td> </tr> <tr> <td>P10</td> <td>V1RTN</td> </tr> </tbody> </table>	Output Connectors		Ref #	Function	P9	+V1	P10	V1RTN	
Output Connectors													
Ref #	Function												
P9	+V1												
P10	V1RTN												

Overall dimensions: 76.2 x 127.0 x 38.5 mm (3.00 x 5.00 x 1.51 in)

Weight: 380 g (0.84 lb)



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