AC/DC 450W Open Frame Power Supply

SLOF450-20Bxx Series

UL62368-1 ES60601-1 | Report EN62368-1 EN60601-1 | BS EN62368-1 BS EN60601-1 | CB IEC60601-1 | RoHS

FEATURES

- Universal 90 - 264VAC or 127 - 370VDC input voltage
- Compact size 5" x 3"
- Operating ambient temperature range: -40℃ to +70℃
- Built-in active PFC function
- Output short circuit, over-current, over-voltage protection, over-temperature protection
- 250W with air cooling, 450W with 25CFM
- 5VDC standby output, 12VDC fan supply
- PG signal and remote sensing function
- The base plate with conformal coating
- Safety according to medical certification, suitable for BF application
- Operating altitude up to 5000m

SLOF450-20Bxx series is one of SCHMID-M's AC-DC miniaturize open frame power supply and suitable for all kinds of BF type (be accessible to patients) medical system equipment. It features universal AC input and at the same time accepts DC input voltage, cost-effective, low no load power consumption, high efficiency, high reliability and double or reinforced insulation. These converters offer excellent EMC performance and meet IEC/EN/UL62368, GB4943, IEC/EN60335, IEC/EN61558, IEC/EN/ES60601 standards and they are widely used in areas of industrial, LED, street light control, electricity, security, telecommunications, smart home, etc.

Selection Guide

Certification	Part No.*	Cooling method	Output Power (W)*	Nominal Output Voltage and Current (Vo/Io)	Output Adjustable Range ADJ (V)	Efficiency at 230VAC (%) Typ. *	Capacitive Load (μF) Max.
UL/EN/IEC	SLOF450-20B12	Air cooling	250	12V/20.8A	11.4-12.6	91	6000
		25CFM	400	12V/33.3A			
	SLOF450-20B15	Air cooling	250	15V/16.7A	14.25-15.75	92	6000
		25CFM	400	15V/26.7A			
--	SLOF450-20B18	Air cooling	250.2	18V/13.9A	17.1 - 19.9	92.5	6000
		25CFM	399.6	18V/22.2A			
	SLOF450-20B19	Air cooling	250.8	19V/13.2A			
		25CFM	400.9	19V/21.1A			
UL/EN/IEC	SLOF450-20B24	Air cooling	250	24V/10.5A	22.8-25.2	93	6000
		25CFM	450	24V/18.75A			
UL/EN	SLOF450-20B27	Air cooling	250	27V/9.3A	25.65-28.35	93.5	4000
		25CFM	450	27V/16.7A			
	SLOF450-20B36	Air cooling	250	36V/6.95A	34.2 - 37.8	93	3000
		25CFM	450	36V/12.5A			
UL/EN/IEC	SLOF450-20B48	Air cooling	250	48V/5.3A	45.6-50.4	94	2000
		25CFM	450	48V/9.4A			
	SLOF450-20B54	Air cooling	250	54V/4.63A	51.3-56.7	94	2000
		25CFM	449.8	54V/8.33A			

Notes: 1.*Under any conditions, the total power of the product should not exceed the rated power. When the output voltage is increased, the total output power cannot exceed the rated output power, when the output voltage is decreased, the output current cannot exceed the rated output current;
2.*When measuring the full load efficiency, the fan should be connected to an external power supply. Fan loss is not included in the input power;
3.*SLOF Products with shell is also available, named SLOF450-20Bxx-C/CF.

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Voltage Range	AC input	90	--	264	VAC
	DC input	127	--	370	VDC
Input Frequency		47	--	63	Hz

AC/DC 450W Open Frame Power Supply

SLOF450-20Bxx Series

Input Current	90VAC/115VAC		--	--	5.2	A
	230VAC		--	--	2.6	
Inrush Current	115VAC	Cold start	--	40	--	
	230VAC		--	80	--	
Power Factor	115VAC	Full load	0.98	--	--	--
	230VAC		0.95	--	--	--
Leakage Current	264VAC, 50Hz	Contact leakage current	＜0.1mA			
		Earth leakage current	＜0.5mA			
Hot Plug			Unavailable			

Output Specifications*

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy*	Full load	12V/15V/18V/19V/24V	--	±2	--	%
		27V/36V/48V/54V	--	±1	--	
Line Regulation	Rated load		--	±0.5	--	
Load Regulation	0%-100% load		--	±1	--	
Ripple & Noise*	20MHz band width (peak-to-peak value)		--	--	200	mV
Temperature Coefficient			--	±0.03	--	%/℃
Minimum Load			0	--	--	%
Hold-up Time	25℃, 115VAC input		12	--	--	ms
	25℃, 230VAC input		16	--	--	
Stand-by Power Consumption	Room temperature, 230VAC input (PS_ON low potential)	15V/18V/19V/27V/36V/54V	--	--	0.5	W
		12V/24V/48V	--	--	0.6	
Short Circuit Protection	Recovery time <5s after the short circuit disappear	15V/18V/19V/27V/36V/54V	Hiccup, continuous, self-recover			
	Recovery time <10s after the short circuit disappear	12V/24V/48V	Hiccup mode, constant current works 1s, turn off 10s, continuous, self-recover			
Over-current Protection			⩾105%Io, hiccup, self-recover			
Over-voltage Protection	12V		⩽15.6V	Output voltage turn off, re-power on for recover		
	15V		⩽19.5V			
	18V		⩽23.4V			
	19V					
	24V		⩽31.2V			
	27V		⩽35.1V			
	36V		⩽46.8V			
	48V		⩽60.0V			
	54V		⩽63.0V			
Over-temperature Protection			Protection when over-temperature, recover automatically after the temperature drops.			
Fan Power*			Offer output power of 12V/0.5A			
PS_ON Input Signal*	Power on	PS_ON high	2	--	5	V
	Power off	PS_ON how	0	--	0.5	
PG Signal*	Power on	The PG signal goes high with 10ms to 500ms delay after power set up	10	--	500	ms
	Power off/Power fail	The TTL signal goes low at least 1ms before output below 90% of rated value	1	--	--	
	High level	High	2	--	6	V
	Low level	Low	0	--	0.6	
Remote Sense*	When RS+ and RS- are connected to the system, with function of remote voltage compensation, if not					

AC/DC 450W Open Frame Power Supply

SLOF450-20Bxx Series

	needed, left RS+ and RS- open
5V Standby	5Vsb: The load capacity is 0.6A without fan; the load capacity is 1A with fan 25CFM, tolerance 2%, ripple: 120mVp-p(max.)

Note: 1.*Output Voltage Accuracy: including setting error, line regulation, load regulation;
2.*The "Tip and barrel method" is used for ripple and noise test, output parallel 47uF electrolytic capacitor (Low ESR) and 0.1uF ceramic capacitor, please refer to AC-DC Converter Application Notes for specific information;
3.*For fan power connection method, please refer to 5, 6 in the external dimension drawing;
4.*For PS_ON, 5V standby connection method, please refer to CN6 in the external dimension drawing;
5.*For PG standby connection method, please refer to CN2 in the external dimension drawing;
6.*For all the above test items, please refer to our company standard "AC-DC Black Box Test Specification" for specific test specifications and methods;

General Specifications

Item		Operating Conditions				Min.	Typ.	Max.	Unit
Isolation Test	Input - output	Electric strength test for 1min., leakage current <5mA				4000	--	--	VAC
	Input - ⏚					2000	--	--	
	Output - ⏚					1500	--	--	
Insulation Resistance	Input - output	Environment temperature: 25±5℃, Relative humidity: <95%RH, non-condensing Testing voltage: 500VDC				100	--	--	MΩ
	Input - ⏚					100	--	--	
	Output - ⏚					100	--	--	
Isolation level	Input - output					2 x MOPP			
	Input - ⏚					1 x MOPP			
	Output - ⏚					1 x MOPP			
Operating Temperature						-40	--	+70	℃
Storage Temperature						-40	--	+85	
Storage Humidity		Non-condensing				10	--	95	%RH
Operating Humidity						20	--	90	
Power Derating		Operating temperature derating	Air cooling (250W)	115VAC	+40℃ to +60℃	4.5	--	--	W/℃
				230VAC	+45℃ to +60℃	4.0	--	--	
			25CFM	+50℃ to +70℃		2.0	--	--	%/℃
		Input voltage derating		90VAC - 115VAC		1.0	--	--	%/VAC
Safety Standard		12V/15V/24V/48V/54V				UL62368-1, IEC60601-1 safety approved & EN/BS EN62368-1, EN/BS EN60601-1(Report) Design refer to IEC62368-1, ES60601-1, GB4943.1, EN60335-1			
		18V/19V				Design refer to EN/UL/IEC62368-1, GB4943.1, IEC/ES/EN60601-1, EN60335-1			
		27V/36V				UL62368-1, ES60601-1 safety approved & EN/BS EN62368-1, EN/BS EN60601-1(Report) Design refer to IEC62368-1, GB4943.1, IEC60601-1, EN60335-1			
Safety Class						CLASS I			
MTBF		MIL-HDBK-217F@25℃				>200,000 h			

Mechanical Specifications

Case Material	Open frame
Dimension	127.00mm x 76.20mm x 38.50mm
Weight	400g (Typ.)
Cooling Method*	Air cooling (250W) / 25CFM (400W/450W)

Note: *Cooling method and power derating refer to typical characteristic curves.

Electromagnetic Compatibility (EMC)*

Emissions	CE	EN55032(CISPR32)/EN55011(CISPR11) CLASS B
	RE	EN55032(CISPR32)/EN55011(CISPR11) CLASS B
	Harmonic current	IEC/EN61000-3-2 CLASS A and CLASS D

AC/DC 450W Open Frame Power Supply

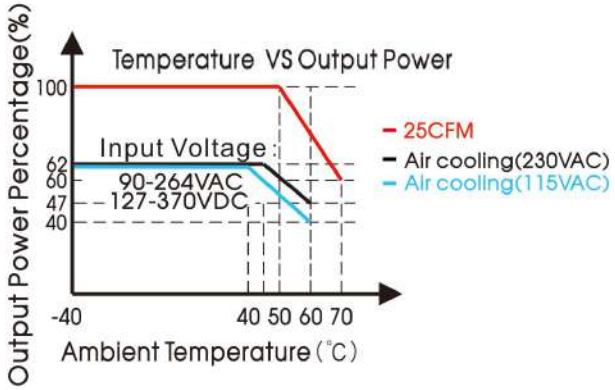
SLOF450-20Bxx Series

	Flicker	IEC/EN61000-3-3	
Immunity	ESD	IEC/EN61000-4-2 Contact ±8KV/Air ±15KV	perf. Criteria A
	RS	IEC/EN61000-4-3 10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4 ±2KV	perf. Criteria A
	Surge	IEC/EN61000-4-5 line to line ±2KV, line to ground ±4KV	perf. Criteria A
	CS	IEC/EN61000-4-6 10Vr.m.s	perf. Criteria A
	Voltage dips, short interruptions and voltage variations immunity	IEC/EN61000-4-11 0%, 70%	perf. Criteria B

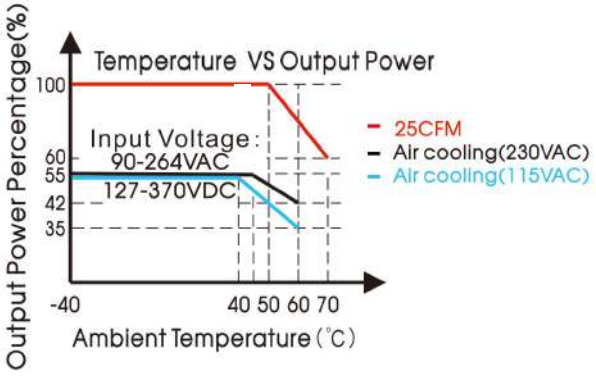
Note: *The power supply should be considered as a part of the components in the system. All EMC performance are been tested on a metal plate with a thickness of 1mm and a length of 360mm x 360mm. The power supply must be combined with the terminal equipment for electromagnetic compatibility confirmation.

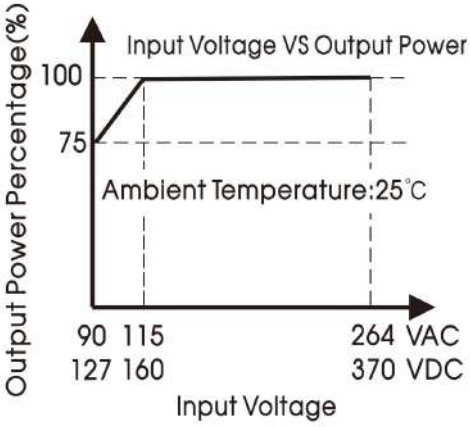
Product Characteristic Curve

SLOF450-20B12/15/18/19
(full load 400W with 25CFM)

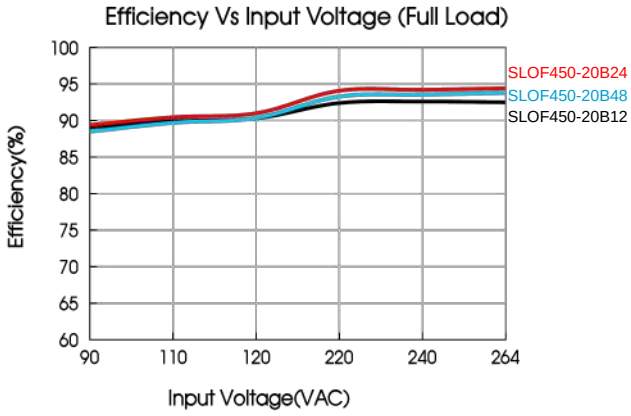


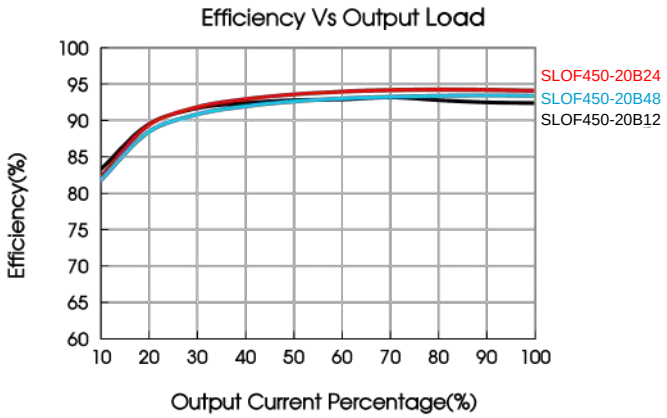
SLOF450-20B24/27/36/48/54
(full load 450W with 25CFM)





Note: With an AC input voltage between 90 - 115VAC and a DC input between 127 - 160VDC the output power must be derated as per the temperature derating curves

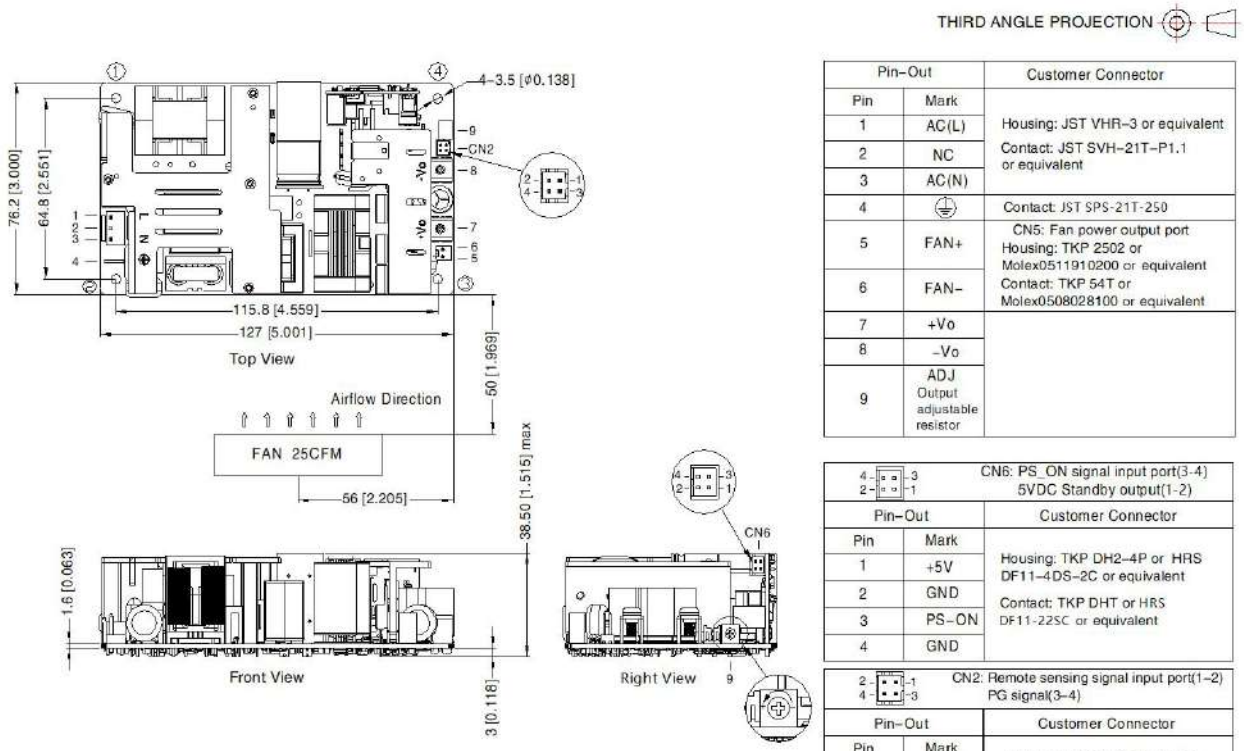




AC/DC 450W Open Frame Power Supply

SLOF450-20Bxx Series

Dimensions and Recommended Layout



Position	Screw Spec.	L(Recommend)	Torque(max)
①－④	M3	6mm	0.4N・m

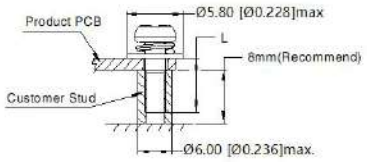
Pin-Out		Customer Connector
Pin	Mark	
1	AC(L)	Housing: JST VHR-3 or equivalent
2	NC	Contact: JST SVH-21T-P1.1 or equivalent
3	AC(N)	
4	⏚	Contact: JST SPS-21T-250
5	FAN+	CN5: Fan power output port Housing: TKP 2502 or Molex0511910200 or equivalent
6	FAN-	Contact: TKP 54T or Molex0508028100 or equivalent
7	+Vo	
8	-Vo	
9	ADJ Output adjustable resistor	

CN6: PS_ON signal input port(3-4) 5VDC Standby output(1-2)

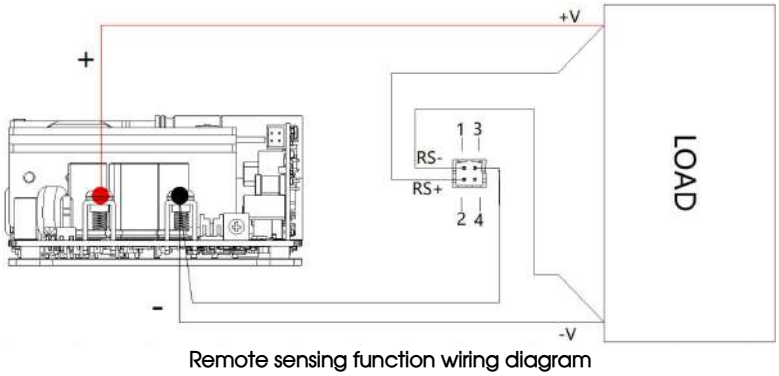
Pin-Out		Customer Connector
Pin	Mark	
1	+5V	Housing: TKP DH2-4P or HRS DF11-4DS-2C or equivalent
2	GND	Contact: TKP DHT or HRS DF11-22SC or equivalent
3	PS-ON	
4	GND	

CN2: Remote sensing signal input port(1-2) PG signal(3-4)

Pin-Out		Customer Connector
Pin	Mark	
1	RS-	Housing: TKP DH2-4P or HRS DF11-4DS-2C or equivalent
2	RS+	Contact: TKP DHT or HRS DF11-22SC or equivalent
3	GND	
4	PG	



Note:
1. Unit: mm[inch]
2. Pin 7, 8 connector tightening torque: M4, 1.2N・m(max)
3. General tolerances: ± 1.00[± 0.039]
4. The layout of the device is for reference only, please refer to the actual product
5. It is recommended 10mm distance between the PCB and other components for safety purpose
6. Class I system ① ② ③ positions must be connected to the earth (⏚)



Remote sensing function wiring diagram

Note:

1. RS- and RS+ cannot be shorted or reversed, otherwise the power module will be damaged;
2. The remote compensation function can compensate the voltage drop on the output cable, which includes the sum of the cable drop connected to the output positive terminal and the output negative terminal;
3. If you need to use remote compensation function, the signal pin needs to be connected with the load and with a twisted pair.

Note:

1. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25℃, humidity<75%RH with nominal input voltage and rated output load;
2. All index testing methods in this datasheet are based on our company corporate standards;
3. In order to improve the efficiency, there will be audible noise generated when work at light load, but it does not affect product performance and reliability;
4. We can provide product customization service, please contact our technicians directly for specific information;
5. Products are related to laws and regulations: see "Features" and "EMC";
6. The out case needs to be connected to PE (⏚) of system when the terminal equipment in operating;
7. CAUTION: Double pole, neutral fusing. Disconnect mains before servicing."/"ATTENTION: Double pôle/fusible sur le neutre. Débrancher lalimentation avant lentretien;
8. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units;
9. The power supply is considered a component which will be installed into a terminal equipment. All EMC tests should be confirmed with the final equipment. Please consult our FAE for EMC test operation instructions.