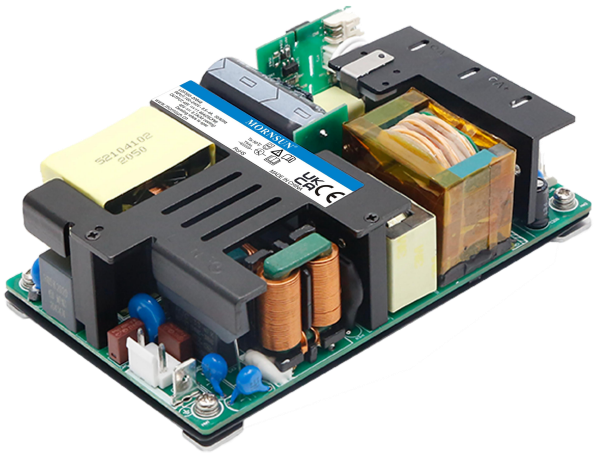
AC/DC 550W Open Frame Power Supply

LOF550-20Bxx Series

MORNSUN®



CE Report EN62368-1 EN60601-1 | UKCA BS EN62368-1 BS EN60601-1 | CB IEC60601-1 | RoHS | 3 years Warranty

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
- 320W with air cooling, 550W with 25CFM
- 5VDC standby output, 12VDC fan supply
- PG signal and remote sensing function
- Safety according to medical certification, suitable for BF application
- The base plate with conformal coating
- 3 years warranty
- Installing in system of Safety Class I/II is available
- Operating altitude up to 5000m
- Safety according to IEC62368, GB4943, IEC/EN60335, IEC/EN61558

LOF550-20Bxx series is one of Mornsun'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/EN61000-1, IEC/UL/EN62368-1, GB4943.1, EN60335-1, IEC/EN61558-1, IEC/EN/ES60601-1 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 Voltage Adjustable Range ADJ (V)	Efficiency at 230VAC (%) Typ. *	Capacitive Load (μF) Max.
EN/IEC	LOF550-20B12	Air cooling	320.4	12V/26.7A	11.4 -12.6	91	6000
		25CFM	499.2	12V/41.6A			
	LOF550-20B15	Air cooling	319.5	15V/21.3A	14.25 -15.75	92	6000
		25CFM	499.5	15V/33.3A			
--	LOF550-20B18	Air cooling	320.4	18V/17.8A	17.1-19.9	92.5	6000
		25CFM	500.4	18V/27.8A			
	LOF550-20B19	Air cooling	319.2	19V/16.8A			
		25CFM	499.7	19V/26.3A			
EN/IEC	LOF550-20B24	Air cooling	321.6	24V/13.4A	22.8 -25.2	93	6000
		25CFM	549.6	24V/22.9A			
EN	LOF550-20B27	Air cooling	321.3	27V/11.9A	25.65 - 28.35	93.5	4000
		25CFM	550.8	27V/20.4A			
	LOF550-20B36	Air cooling	320.4	36V/8.9A	34.2 - 37.8	94	3000
		25CFM	550.8	36V/15.3A			
EN/IEC	LOF550-20B48	Air cooling	321.6	48V/6.7A	45.6 - 50.4	94	2000
		25CFM	550	48V/11.46A			
	LOF550-20B54	Air cooling	310.5	54V/5.75A	51.3 - 56.7	94	1500
		25CFM	550.8	54V/10.2A			

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.*LOF Products with shell is also available, named LOF550-20Bxx-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
Input Current	115VAC		--	--	6.5	A
	230VAC		--	--	4.0	
Inrush Current	115VAC	Cold start	--	50	--	
	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/27V	--	±2	--	%
		36V/48V/54V	--	±1	--	
Line Regulation	Rated load		--	±0.5	--	
Load Regulation	0%-100% load		--	±1	--	
Ripple & Noise*	20MHz bandwidth (peak-to-peak value)		--	--	200	mV
Temperature Coefficient			--	±0.03	--	%/℃
Minimum Load			0	--	--	%
Hold-up Time	115VAC input		10	--	--	ms
	230VAC input		10	--	--	
Stand-by Power Consumption	Room temperature, 230VAC input (PS_ON Low potential)	18V/19V/27V/36V	--	--	0.5	W
		12V/15V/24V/48V/54V	--	--	0.6	
Short Circuit Protection	Recovery time <5s after the short circuit disappear	18V/19V/27V/36V	Hiccup, continuous, self-recover			
	Recovery time <10s after the short circuit disappear	12V/15V/24V/48V/54V	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 low	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 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	
Switching Frequency				--	--	--	KHz
Power Derating	25CFM	Operating temperature derating	-40℃ to +50℃	0	--	--	%/℃
			+50℃ to +70℃	2.5	--	--	
	Air cooling	230V/ 320W	+45℃ to +50℃	4.0	--	--	W/℃
			+50℃ to +60℃	6.0	--	--	
		115V/310W	+30℃ to +40℃	1.0	--	--	
			+40℃ to +50℃	6.0	--	--	
			+50℃ to +60℃	4.0	--	--	
	Input voltage derating	90VAC -115VAC		1.0	--	--	%/VAC
		115VAC - 264VAC		0	--	--	
		127VDC -160VDC		0.76	--	--	%/VDC
		160VDC - 370VDC		0	--	--	
Safety Standard		12V/15V/24V/48V		Design refer to UL62368-1, ES60601-1, IEC60601-1 & EN/BS EN62368-1, EN/BS EN60601-1, 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		Design refer to UL62368-1, ES60601-1 & EN/BS EN62368-1, EN/BS EN60601-1, IEC62368-1, GB4943.1, IEC60601-1, EN60335-1			
		54V		Design refer to UL62368-1, IEC60601-1 & EN/BS EN62368-1, IEC62368-1, GB4943.1, EN60335-1, EN60601-1			
Safety Class				CLASS I (with PE and must be connected)/ CLASS II (without PE)			

MTBF	MIL-HDBK-217F@25℃	>200,000 h

Mechanical Specifications

Case Material	Open Frame
Dimension	127.00mm x 76.20mm x 40.50mm
Weight	490g (Typ.)
Cooling Method*	Air cooling (310W/320W) / 25CFM (500W/550W)
Notes: *Please refer to the product characteristic curve for cooling method and power derating.	

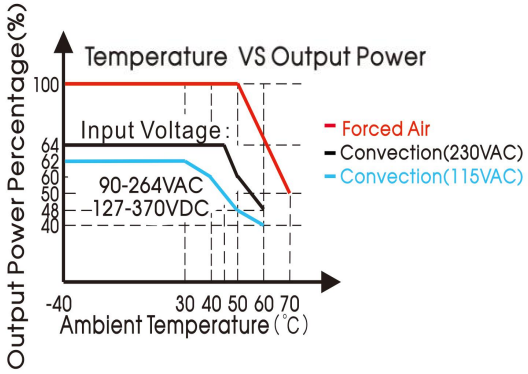
Electromagnetic Compatibility (EMC)*

Emissions *	CE	EN55032(CISPR32)/EN55011(CISPR11) CLASS B (Category I, CLASS B; Category II, CLASS A)	
	RE	EN55032(CISPR32)/EN55011(CISPR11) CLASS B (Category I, CLASS B; Category II, CLASS A)	
	Harmonic Current	IEC/EN61000-3-2 CLASS A and CLASS D	
	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
	DIP IEC/EN61000-4-11 0%, 70%	DIP IEC/EN61000-4-11 0%, 70%	Perf. Criteria B

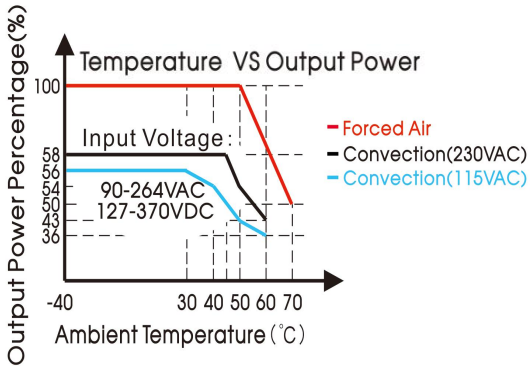
Note:1. *The power supply should be considered as a part of the components in the system. All EMC performance are been tested on a metal plate with a thickness of 1mm and a length of 360mm x 360mm. The power supply must be combined with the terminal equipment for electromagnetic compatibility confirmation.
2.*Category I products with PE, category II products without PE。

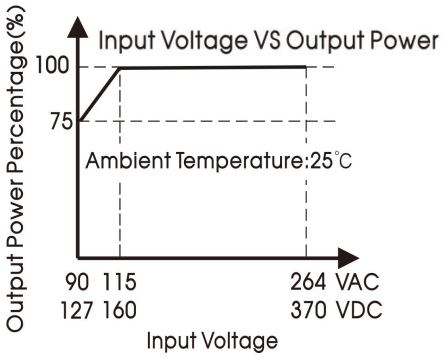
Product Characteristic Curve

LOF550-20B12/15/18/19
(full load 500W with Forced Air)

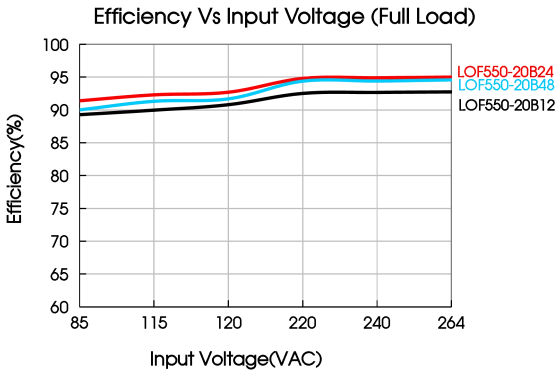


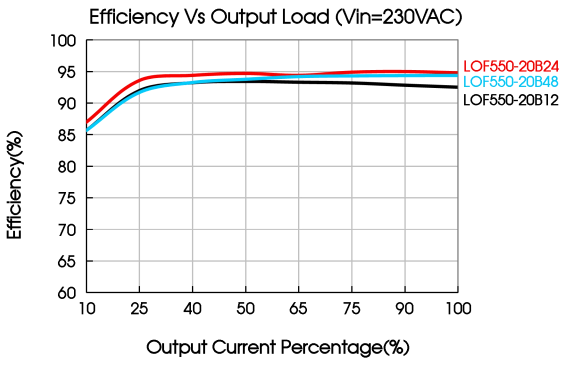
LOF550-20B24/27/36/48/54
(full load 550W with Forced Air)





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

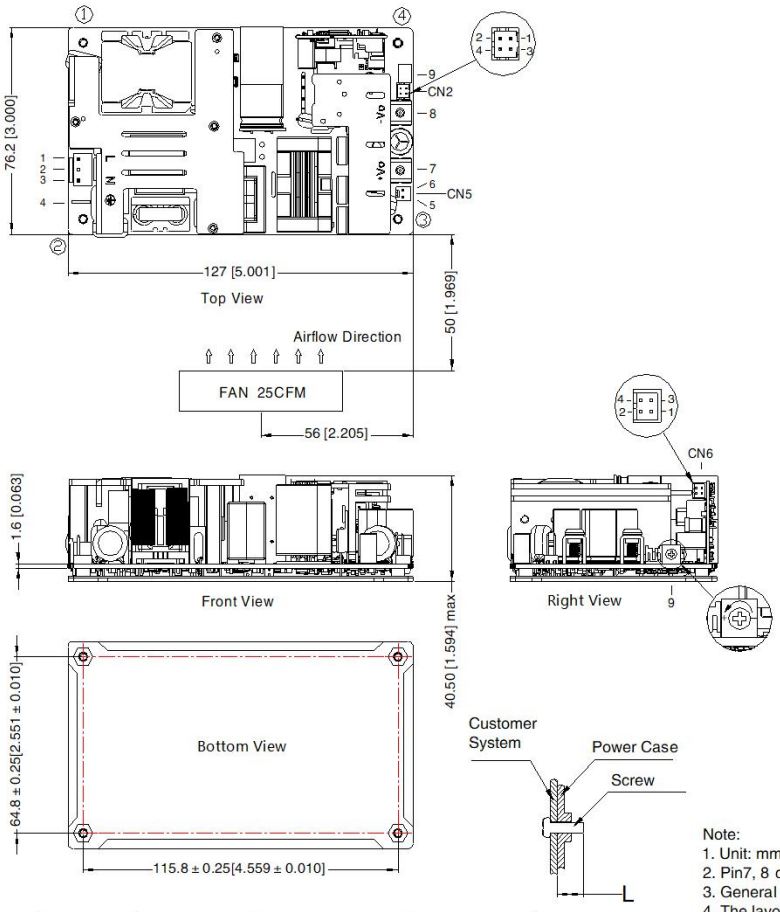




Dimensions and Recommended Layout

LOF550-20Bxx

THIRD ANGLE PROJECTION



Position	Screw Spec.	L(Recommend)	Torque(Max)
① – ④	M3	2.5mm	0.4N · m

Pin-Out		Customer Connector	
Pin	Mark	Housing: JST VHR-3 or equivalent Contact: JST SVH-21T-P1.1 or PJA-016(Mornsun Accessory)	
1	AC(L)		
2	NC		
3	AC(N)		
4	⏚	Contact: JST SPS-21T-250	
5	FAN+	CN5: Fan power output port Housing: TKP 2502 or Molex0511910200 or equivalent Contact: TKP 54T or Molex0508028100 or equivalent	
6	FAN-		
7	+Vo	Output connector (Mornsun Accessory)	PJA-021(Red wire)
8	-Vo		PJA-020(Black wire)
9	ADJ Output adjustable resistor		

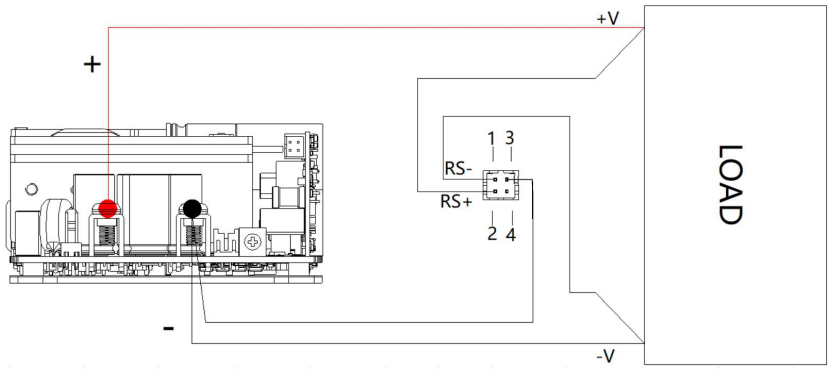
CN6: PS_ON signal input port(3-4)
5VDC Standby output(1-2)

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

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

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

Note:
1. Unit: mm[inch]
2. Pin7, 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 system①②③ positions must be connected to the earth (⏚)
7. Class II system①②③ positions must be connected together



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.
4. The PJA-XXX series is the accessories of products, quotation is available.

Note:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58220181;
2. 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;
3. All index testing methods in this datasheet are based on our company corporate standards;
4. 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;
5. We can provide product customization service, please contact our technicians directly for specific information;
6. Products are related to laws and regulations: see "Features" and "EMC";
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.
10. The surface of product should keep a safe distance from the customer system (recommended ⩾3mm), if not, please consult Mornsun FAE.

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