AC/DC 225W Open Frame Power Supply

LOF225-20Bxx Series

MORNSUN®

UL62368-1
ES60601-1

Report
EN62368-1
EN60335-1
EN61558-1
EN60601-1

GB4943.1

CB
IEC62368-1
IEC60950-1
IEC60335-1

RoHS

5 years Warranty

FEATURES

- Input voltage range: 85 - 264VAC/120 - 370VDC
- Compact size: 4" x 2" x 1"
- Operating ambient temperature range: -40℃ to +70℃
- Active PFC
- High I/O isolation test voltage up to 4000VAC
- Operating altitude up to 5000m
- Very low leakage current ＜0.1mA
- Stand-by power consumption 0.5W Typ.
- The base plate with conformal coating
- Output short circuit, over-current, over-voltage, over-temperature protection
- Suitable for BF application
- Installing in system of Safety Class I/II is available

LOF225-20Bxx 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, high efficiency, high reliability and double or reinforced insulation. These converters offer excellent EMC and safety performance, which meet IEC/EN/UL62368, GB4943, IEC/EN60335, IEC/EN61558, IEC/EN/ES60601, IEC60950 standards and they are widely used in areas of industrial, LED, street light control, electricity, security, telecommunications, smart home, medical, etc.

Selection Guide

Certification	Part No.*	Cool Mode	Output Power (W)	Nominal Output Voltage and Current (Vo/Io)	Output adj. Range (V)	Efficiency at 230VAC (%) Typ.	Max. Capacitive Load (μF)
UL/EN/CCC/IEC	LOF225-20B12	Air cooling	140	12V/11.67A	11.8-12.6	93	6000
		13CFM	225	12V/18.75A			
IEC/UL/EN	LOF225-20B15	Air cooling	140	15V/9.33A	14.7-15.8		5000
		13CFM	225	15V/15A			
--	LOF225-20B18	Air cooling	140	18V/7.78A	17.6-18.79		3200
		13CFM	225	18V/12.5A			
	LOF225-20B19	Air cooling	140	19V/7.37A	18.80-20.0		3200
		13CFM	225	19V/11.84A			
IEC/UL/EN	LOF225-20B24	Air cooling	140	24V/5.83A	23.5-25.2	94	3200
		13CFM	225	24V/9.4A			
	LOF225-20B27	Air cooling	130	27V/4.81A	26.5-28.4		2400
		13CFM	225	27V/8.35A			
	LOF225-20B36	Air cooling	140	36V/3.88A	35.28 - 37.8		2000
		13CFM	225	36V/6.25A			
	LOF225-20B48	Air cooling	140	48V/2.91A	47.1-50.4		1600
		13CFM	225	48V/4.7A			
	LOF225-20B54	Air cooling	140	54V/2.59A	52.5-55.5		1000
		13CFM	225	54V/4.17A			

Notes: 1.*Under any conditions, the total power of the product should not exceed the rated power of 225w and the output current should not exceed the rated output current;
2.*LOF products with shell is also available, named LOF225-20Bxx-C.

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Voltage Range	AC input	85	--	264	VAC
	DC input	120	--	370	VDC
Input Frequency		47	--	63	Hz

Input Current	115VAC		--	--	3	A
	230VAC		--	--	2	
Inrush Current	115VAC	Cold start	--	40	--	
	230VAC		--	75	--	
Power Factor	115VAC	Full load	0.99	--	--	--
	230VAC		0.95	--	--	
Leakage Current	240VAC		<0.1mA; single failure<0.5mA			
Hot Plug			Unavailable			

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy*	Full load range		--	±1	--	%
Line Regulation	Rated load		--	±0.5	--	
Load Regulation	0%-100% load		--	±0.5	--	
Ripple & Noise*	20MHz bandwidth (peak-to-peak value)	12V	--	--	60	mV
		15V/18V/19V/24V/27V/36V/48V	--	--	100	
		54V	--	--	200	
Temperature Coefficient			--	±0.03	--	%/℃
Minimum Load			0	--	--	%
Hold-up Time	230VAC, 25℃	Air cooling	--	16	--	ms
		13CFM	--	12	--	
Stand-by Power Consumption			--	0.5	--	W
Short Circuit Protection	Recovery time <3s after the short circuit disappear		Hiccup, continuous, self-recovery			
Over-current Protection			≥110%Io, hiccup, self-recovery			
Over-voltage Protection	12V		≤16VDC (Output voltage turn off, re-power on for recover)			
	15V		≤20VDC (Output voltage turn off, re-power on for recover)			
	18V/19V		≤25VDC (Output voltage turn off, re-power on for recover)			
	24V		≤32VDC (Output voltage turn off, re-power on for recover)			
	27V		≤35VDC (Output voltage turn off, re-power on for recover)			
	36V		≤50VDC (Output voltage turn off, re-power on for recover)			
	48V/54V		≤60VDC (Output voltage turn off, re-power on for recover)			
Over-temperature Protection			Output voltage turn off, re-power on to recovery after abnormal removed			
Fan power	15V		Offer output power of 24V/0.25A with output voltage accuracy ±15%			
	12V/18V/19V/24V/27V/36V/48V/54V		Offer output power of 12V/0.5A with output voltage accuracy ±15%			

Notes: 1. *Output voltage accuracy: including the setting error, line regulation, load regulation.
2. *The "Tip and barrel method" is used for ripple and noise test, output parallel 10uF electrolytic capacitor and 0.1uF ceramic capacitor, please refer to AC-DC Converter Application Notes for specific information.
3. *When the product works at light load (≤15% IO), in order to improve the efficiency to reach at green working mode, the value of ripple and noise will be double.
4. *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 <10mA	4000	--	--	VAC
	Input - ⏚		1500	--	--	

	Output - ⏚			1500	--	--	
Insulation Resistance	Input - ⏚	Ambient temperature: 25 ± 5℃ Relative humidity: < 95%RH, no condensation Test voltage: 500VDC		50	--	--	MΩ
	Input - output			50	--	--	
	Output - ⏚			50	--	--	
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		No condensation		10	--	95	%RH
Operating Humidity				20	--	90	
Power Derating		Operating temperature derating	Air cooling	+45℃ to +70℃	2.0	--	--	%/℃
			13CFM	+50℃ to +70℃	2.5	--	--	
				-40℃ to -30℃	2.0	--	--	
		Input voltage derating		85VAC-115VAC	1.0	--	--	%/VAC
Safety Standard		12V			IEC/UL62368-1, GB4943.1, ES60601-1, IEC60335-1, IEC60950-1 safety approved & EN62368-1, EN60335-1, EN61558-1, EN60601-1 (Report) Design refer to IEC61558-1, ES60601-1(3.1 version), EN60601-1-2 Edition4, CAN/CSA-C22.2 No.60601-1:14-Edition 3		
		15V/24V/27V/36V/48V			IEC/UL62368-1, ES60601-1, IEC60335-1 safety approved & EN62368-1, EN60335-1, EN61558-1, EN60601-1 (Report) Design refer to IEC61558-1, GB4943.1, ES60601-1(3.1 version), CAN/CSA-C22.2 No.60601-1:14-Edition 3, EN60601-1-2 Edition 4		
		54V			UL62368-1, IEC60335-1 safety approved & EN62368-1, EN61558-1, EN60335-1 (Report) Design refer to IEC62368-1, IEC61558-1, GB4943.1, IEC/EN60601-1, ES60601-1(3.1 version), CAN/CSA-C22.2 No.60601-1:14-Edition 3, EN60601-1-2 Edition 4		
		18V/19V			Design refer to IEC/EN/UL62368-1, EN60335-1, IEC/EN61558-1, GB4943.1, IEC/EN60601-1, ES60601-1(3.1 version), CAN/CSA-C22.2 No.60601-1:14-Edition 3, EN60601-1-2 Edition 4		
Safety Class					CLASS I (with PE and must be connected)/ CLASS II (without PE)		
MTBF		MIL-HDBK-217F@25℃			⩾300,000 h		
Warranty		Ambient temperature: <50℃			5 years		

Mechanical Specifications

Case Material	Open frame
Dimension	101.6 x 50.8 x 25.4 mm
Weight	175g (Typ.)
Cooling Method*	Air cooling /13CFM

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

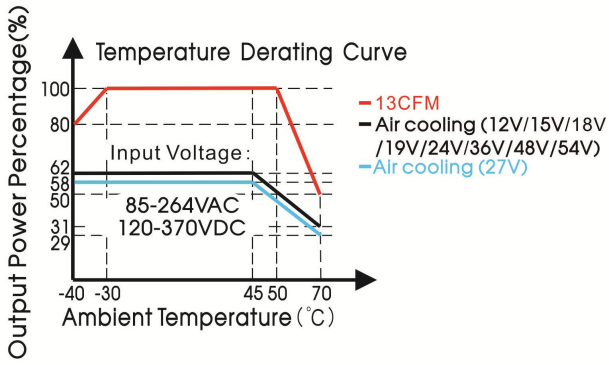
Electromagnetic Compatibility (EMC)

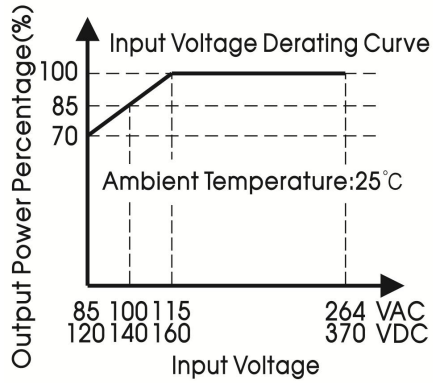
Emissions*	CE	CISPR32/EN55032 CLASS B	
	RE	CISPR32/EN55032 (Category I, CLASS B; Category II, CLASS A)	
	Harmonic current	IEC/EN61000-3-2 CLASS A and CLASS D	
Immunity	ESD	IEC/EN 61000-4-2 Contact ±8KV/Air ±15KV	perf. Criteria A

	RS	IEC/EN 61000-4-3 10V/m	perf. Criteria A
	EFT	IEC/EN 61000-4-4 ±4KV	perf. Criteria A
	Surge	IEC/EN 61000-4-5 ±2KV/±4KV	perf. Criteria A
	CS	IEC/EN61000-4-6 10 Vr.m.s	perf. Criteria A
	Voltage dips, short interruptions and voltage variations immunity	IEC/EN61000-4-11 0%, 70%	perf. Criteria B

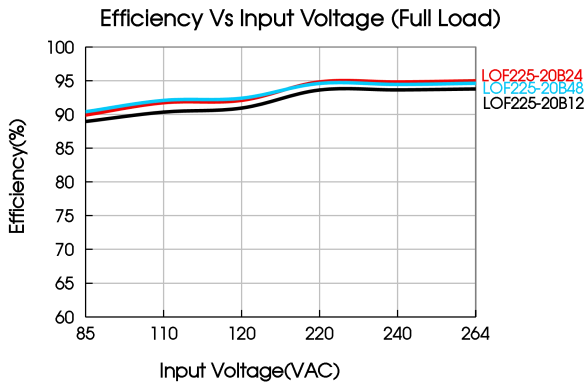
Note: 1.*The power supply should be considered as a part of the components in the system. All EMC performance are been tested on a metal plate with a thickness of 1mm and a length of 360mm x 360mm. The power supply must be combined with the terminal equipment for electromagnetic compatibility confirmation.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

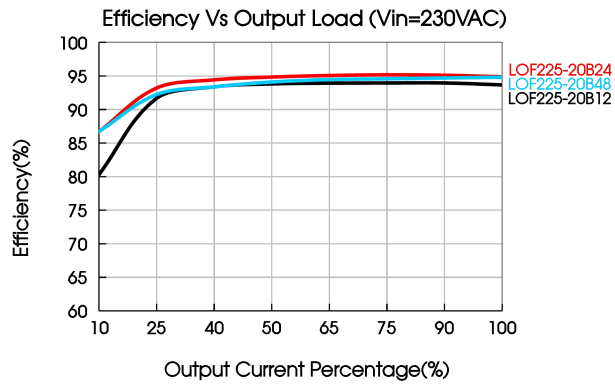
Product Characteristic Curve



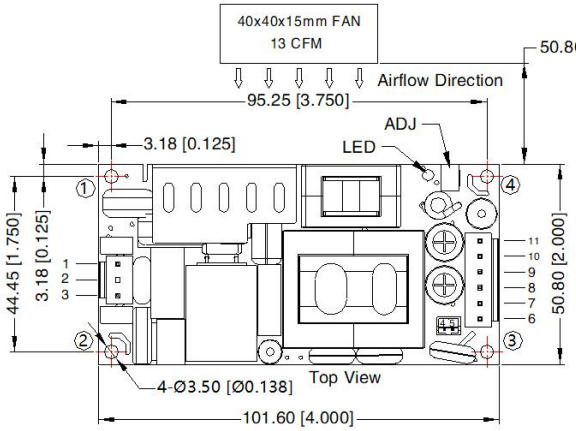


Note: With an AC input voltage between 85 -115VAC and a DC input between 120-160VDC the output power must be derated as per the temperature derating curves.





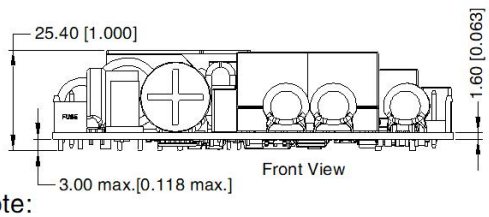
Dimensions and Recommended Layout

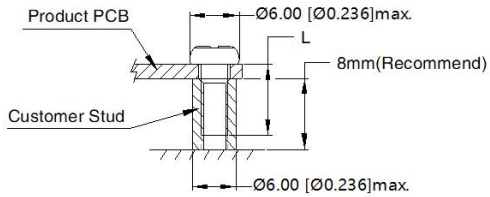


THIRD ANGLE PROJECTION

Pin-Out			
Pin	Function	Product Connector	Customer Connector
1	AC(N)/DC-	JST B3P-VH or equivalent	Housing: JST VHR Terminal: JST SVH-21T-P1.1 or equivalent
2	NC		
3	AC(L)/DC+		
4	Fan-	JST B2B-PH-K-S or equivalent	Housing: JST PHR-2 Terminal: JST SPH-002T-P0.5S or equivalent
5	Fan+		
6、7、8	-Vo	JST B6P-VH or equivalent	Housing: JST VHR Terminal: JST SVH-21T-P1.1 or equivalent
9、10、11	+Vo		

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





Note:
1. Unit: mm[inch]
2. ADJ: Output adjustable resistor
3. General tolerances: ± 1.00[± 0.039]
4. Do not use fan power to power other devices
5. The layout of the device is for reference only, please refer to the actual product
6. Reserved safety distance between PCB edge and customer components, recommended 10mm
7. Class Ⅰ system ①, ③ positions must be connected to the earth(⏚)
8. Class Ⅱ system ①, ③ positions must be connected together

Note:
1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58220192;
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 at high input voltage, there will be audible noise generated, 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. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units;
8. The output voltage can be adjusted by the ADJ, clockwise to decrease;
9. CAUTION: Double pole, neutral fusing. Disconnect mains before servicing."/"ATTENTION: Double pôle/fusible sur le neutre. Débrancher lalimentation avant lentretien;
10. 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.

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