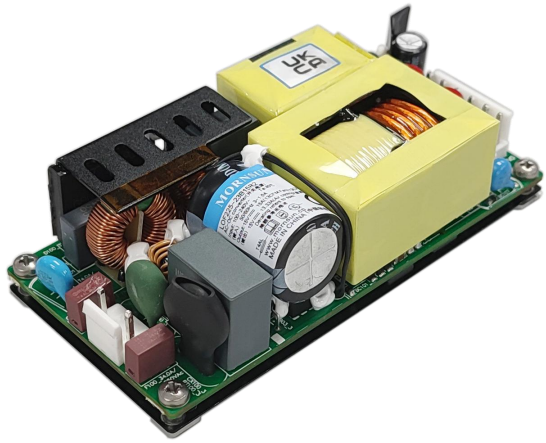
AC/DC 225W Open Frame Power Supply

LOF225-23BxxR2 Series

MORNSUN®



CE Report EN62368-1 UKCA BS EN 62368-1 RoHS

FEATURES

- Input voltage range: 85 - 277VAC/120 - 390VDC
- Compact size: 4" x 2" x 1.12"
- 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 ＜0.5mA
- Stand-by power consumption 0.75W Typ.
- The base plate with conformal coating
- Output short circuit, over-current, over-voltage, over-temperature protection
- Design to meet medical approvals and be suitable for BF type applications
- 5 years warranty
- Installing in system of Safety Class I/II is available
- Safety according to IEC/UL62368, GB4943, IEC/EN60335, IEC/EN61558, IEC/EN/ES60601, IEC60950

LOF225-23BxxR2 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 wastage, high efficiency, high reliability and double or reinforced insulation. These converters offer excellent EMC and safety performance, which meet IEC/EN/UL/BS EN62368, 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 Voltage Adjustable Range (V)	Efficiency at 230VAC (%) Typ.*	Max. Capacitive Load (μF)
EN	LOF225-23B12R2	Air cooling	200	12V/16.67A	11.8-12.6	94	30000
	LOF225-23B12R2	13CFM	225	12V/18.75A			
	LOF225-23B15R2	Air cooling	200	15V/13.33A	14.7-15.8	94	20000
	LOF225-23B15R2	13CFM	225	15V/15A			
	LOF225-23B18R2	Air cooling	200	18V/11.11A	17.6-18.79	94	16000
	LOF225-23B18R2	13CFM	225	18V/12.5A			
	LOF225-23B19R2	Air cooling	200	19V/10.53A	18.8-20	94	16000
	LOF225-23B19R2	13CFM	225	19V/11.84A			
	LOF225-23B24R2	Air cooling	200	24V/8.33A	23.5-25.2	95	16000
	LOF225-23B24R2	13CFM	225	24V/9.4A			
	LOF225-23B27R2	Air cooling	200	27V/7.41A	26.5-28.4	95	12000
	LOF225-23B27R2	13CFM	225	27V/8.35A			
	LOF225-23B36R2	Air cooling	200	36V/5.55A	35.28-37.8	95	10000
	LOF225-23B36R2	13CFM	225	36V/6.25A			
	LOF225-23B48R2	Air cooling	200	48V/4.16A	47.1-50.4	96	10000
	LOF225-23B48R2	13CFM	225	48V/4.7A			
	LOF225-23B54R2	Air cooling	200	54V/3.7A	52.5-55.5	96	5000
	LOF225-23B54R2	13CFM	225	54V/4.17A			

Note: 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.

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Voltage Range	Rated input (Certified voltage)		100	--	240	VAC
	AC input		85	--	277	
	DC input		120	--	390	VDC
Input Voltage Frequency	AC input		47	--	63	Hz
Input Current	115VAC		--	--	3	A
	230VAC		--	--	2	
Inrush Current	115VAC	Cold start	--	30	--	
	230VAC		--	60	--	
Power Factor	115VAC		--	0.99	--	--
	230VAC		--	0.95	--	
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	--	
Minimum Load			0	--	--	
Stand-by Power Consumption			--	0.75	--	W
Ripple & Noise*	20MHz bandwidth (peak-peak value)	12V	--	--	60	mV
		15V/18V/19V/24V/27V/36V/48V	--	--	100	
		54V	--	--	200	
Hold-up Time	115VAC/230VAC, rated load, 25℃		--	12	--	ms
Short Circuit Protection	115VAC/230VAC		Hiccup, continuous, self-recover			
Over-current Protection	115VAC/230VAC		≥110%Io, hiccup, self-recover			
Over-voltage Protection	12V		≤16VDC (Hiccup, self-recover)			
	15V		≤20VDC (Hiccup, self-recover)			
	18V		≤25VDC (Hiccup, self-recover)			
	19V		≤25VDC (Hiccup, self-recover)			
	24V		≤32VDC (Hiccup, self-recover)			
	27V		≤35VDC (Hiccup, self-recover)			
	36V		≤50VDC (Hiccup, self-recover)			
	48V		≤60VDC (Hiccup, self-recover)			
	54V		≤60VDC (Hiccup, self-recover)			
Over-temperature Protection	230VAC, 100% load	Over-temperature protection start	--	70	--	℃
		Over-temperature protection release	--	55	--	
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 <5mA				4000	--	--	VAC
	Input - ⏚					1500	--	--	
	Output - ⏚					1500	--	--	
Insulation Resistance	Input - ⏚	Ambient temperature: 25 ± 5℃ Relative humidity: < 95%RH, no condensation Test voltage: 500VDC				100	--	--	MΩ
	Input - output					100	--	--	
	Output - ⏚					100	--	--	
Isolation level	Input - output					2×MOPP			
	Input - ⏚					1×MOPP			
	Output - ⏚					1×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	12V/15V/18V/19V	+40℃ to +70℃	1.67	--	--	%/℃
				24V/27V/36V/48V/54V	+45℃ to +70℃	2	--	--	
			13CFM		-40℃ to -30℃	2	--	--	
					+50℃ to +70℃	2.5	--	--	
		Input voltage derating	Air cooling/13CFM		85VAC-90VAC	3.78	--	--	%/VAC
			13CFM		90VAC-115VAC	0.45	--	--	
			Air cooling		90VAC-115VAC	0.36	--	--	
					115VAC-180VAC	--	--	170	W
					180VAC-277VAC	--	--	200	
Leakage Current		240VAC, 60Hz	Touch current			<0.1mA			
			Earth leakage current			<0.5mA			
Safety Standard		12V/24V/27V/48V				Design refer to IEC/UL/EN/BS EN62368-1, GB4943.1, IEC/EN60335-1, IEC/EN61558-1, IEC60950-1, IEC/EN/ES60601-1			
		15V/18V/19V/36V/54V				EN62368-1, BS EN62368-1(Report) Design refer to IEC/UL62368-1, GB4943.1, IEC/EN60335-1, IEC/EN61558-1, IEC60950-1, IEC/EN/ES60601-1			
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℃, 13CFM				5 years			

Environmental Characteristics

Item	Operating Conditions	Standard
High and Low Temperature Working	+70℃, -40℃	GB/T 2423.1, GB/T 2423.2, IEC60068-2-1
Sinusoidal Vibration	10 - 500Hz, 2g, three directions of X, Y, Z axis, 1H	GB/T 2423.10, IEC60068-2-6
Low Temperature Storage	-40℃	GB/T 2423.1, IEC60068-2-1
High Temperature Storage	+85℃	GB/T 2423.2, IEC60068-2-2
Normal Temperature Aging	+25℃	GB/T 2423.1, IEC60068-2-1
Temperature Shock	-40℃ to +70℃	GB/T 2423.22, IEC60068-2-14
Temperature Cycle	-25℃ to +50℃	GB/T 2423.22, IEC60068-2-14
Hot and Humid	+70℃, 85%RH	GB/T 2423.50, IEC60068-2-67
Constant Humid and Hot	+40℃, 95%RH	GB/T 2423.3, IEC60068-2-78
Packaging Drop	1m, one corner, three edges and six sides	GB/T 2423.8, IEC68-2-32

Mechanical Specifications

Case Material	Open frame
Dimension	101.60mm x 50.80mm x 28.50mm
Weight	215g (Typ.)
Cooling Method*	Air cooling (200W) / 13CFM (225W)

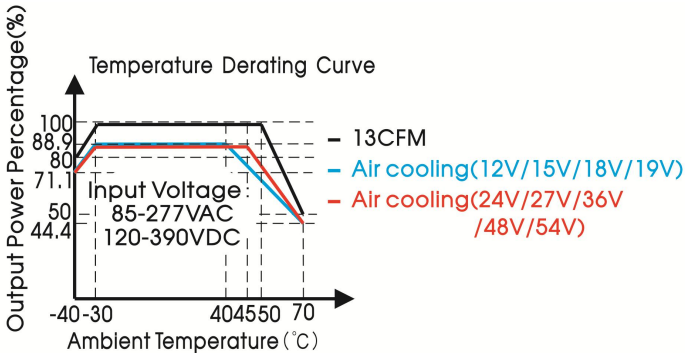
Notes: *Cooling method and power derating refer to typical characteristic curves.

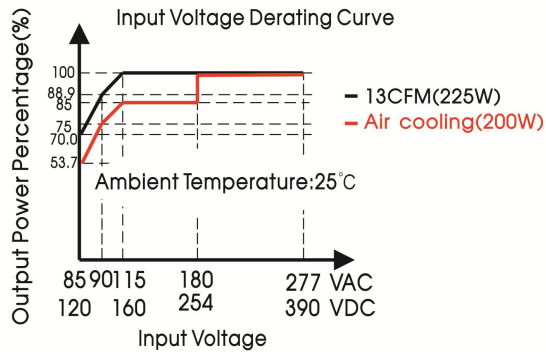
Electromagnetic Compatibility (EMC)

Emissions*	CE	CISPR32/EN55032, CISPR11/EN55011 CLASS B	
	RE	CISPR32/EN55032, CISPR11/EN55011 (CLASS I equipment, CLASS B; CLASS II equipment, CLASS A)	
	Harmonic current	IEC/EN61000-3-2 CLASS A and CLASS D	
	Voltage flicker	EN61000-3-3	
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
	MS	IEC/EN61000-4-8 30A/m	perf. Criteria A
	Voltage dips, short interruptions and voltage variations immunity	IEC/EN61000-4-11 0%, 70%	perf. Criteria B
	Intercom interference test	MS-SOP-DQC-007	perf. Criteria B

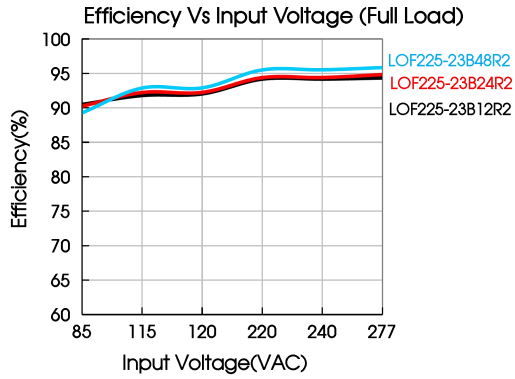
Note: 1. *The power supply should be considered as a part of the components in the system. All EMC performance are been tested on a metal plate with a thickness of 1mm and a length of 360mm x 360mm. The power supply must be combined with the terminal equipment for electromagnetic compatibility confirmation;
2. *Category I products with PE (which must be connected), category II products without PE;
3. *perf. Criteria:
A: The equipment shall continue to operate as intended without operator intervention;
B: After the test, the equipment shall continue to operate as intended without operator intervention;
C: Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions.

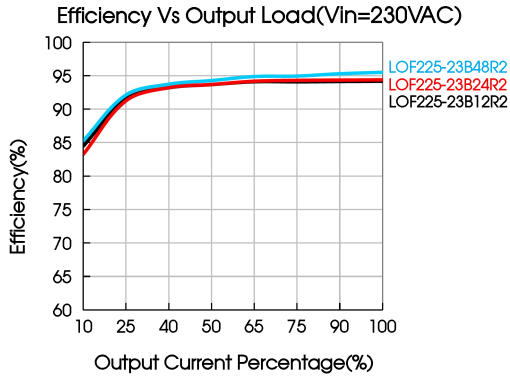
Product Characteristic Curve





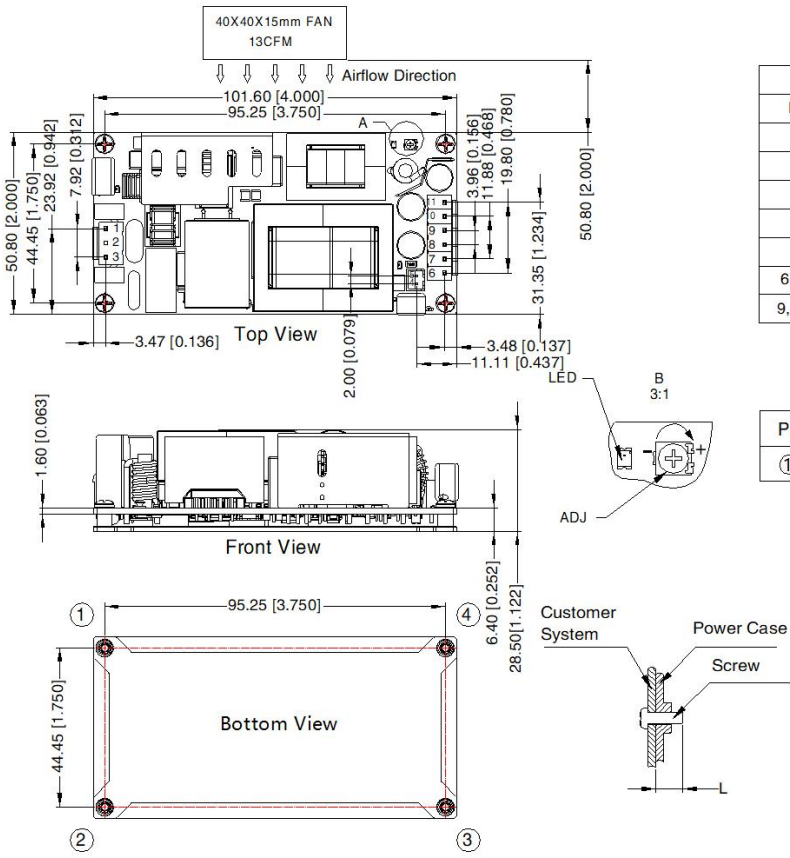
Note: 1. With an AC input voltage between 85 -277VAC and a DC input between 120-390VDC the output power must be derated as per the temperature derating curves.
2. This product is suitable for applications using natural air cooling; for applications in closed environment please consult Mornsun FAE.





Dimensions and Recommended Layout

THIRD ANGLE PROJECTION



Pin-Out			
Pin	Mark	Product Connector	Customer Connector
1	AC(N)	JST B3P-VH or equivalent	Housing: JST VHR Terminal: JST SVH-21T-P1.1 or PJA-016(Mornsun Accessory)
2	NC		
3	AC(L)		
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 PJA-019(Mornsun Accessory)
9, 10, 11	+Vo		

Position	Screw Spec	L(Recommend) (MAX)	Torque(max)
①－④	M3	2.0mm	0.4N・m

Note:
1. Unit: mm[inch]
2. General tolerances: ±1.00[±0.039]
3. ADJ: Output adjustable resistor
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 ②④ positions must be connected to the earth (⏚)
8. Class II system ②④ positions not must be connected to the earth (⏚)

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 increase;
9. CAUTION: Double pole, neutral fusing. Disconnect mains before servicing."/"ATTENTION: Double pôle/fusible sur le neutre. Débrancher lalimentation avant lentretien;
10. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units;
11. 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;
12. 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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