UL62368-1
ES60601-1

EN62368-1
EN60335-1
EN61558-1

IEC62368-1

BS EN 62368-1
BS EN 60335-1

GB4943.1

FEATURES

- Universal 90 - 264VAC or 127 - 370VDC input voltage
- Compact size: 5" x 3" x 1"
- Accepts AC or DC input (dual-use of same terminal)
- Operating ambient temperature range: -40℃ to +70℃
- Built-in active PFC function
- High I/O isolation test voltage up to 4000VAC
- Extremely low leakage current＜0.1mA
- Stand-by power consumption＜1.0W
- The base plate with conformal coating
- Output short circuit, over-current, over-voltage protection, over-temperature protection
- Installing in system of Safety Class I/II is available
- Suitable for BF application
- 5 years warranty
- Operating altitude up to 5000m
- Comply with IEC61558, IEC/EN60601, GB4943

one of Mornsun's open frame AC-DC switching 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, built-in active PFC function, high efficiency and high reliability. These converters offer excellent EMC performance and meet IEC/EN/UL62368-1, GB4943.1, IEC/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, medical, etc.

Selection Guide

Certification	Part No.*	Cooling method	Output Power* (W)	Nominal Output Voltage and Current (Vo/Io)	Output adj. Range (V)	Efficiency at 230VAC (%) Typ.*	Max. Capacitive Load (μF)
UL/EN IEC/BS/CCC	2336888	Air cooling	180	12V/15A	11.4-12.6	92	6000
		20.5CFM	300	12V/25A			
UL/EN IEC/BS		Air cooling	180	15V/12A	14.25-15.75	92	5000
		20.5CFM	325	15V/21.67A			
BS		Air cooling	180	18V/10A	17.1-19.9	92.5	4000
		20.5CFM	324	18V/18A			
		Air cooling	180.5	19V/9.5A	17.1-19.9	92.5	4000
		20.5CFM	324.9	19V/17.1A			
UL/EN IEC/BS	2336891	Air cooling	199.9	24V/8.33A	22.8-25.2	93	3200
		20.5CFM	350.4	24V/14.6A			
		Air cooling	199.8	27V/7.4A	25.65-28.35	93	2600
		20.5CFM	351	27V/13A			
		Air cooling	200.16	36V/5.56A	34.2-37.8	93	2000
		20.5CFM	350.28	36V/9.73A			
	2336893	Air cooling	200.1	48V/4.17A	45.6-50.4	94	2000
		20.5CFM	350.4	48V/7.3A			
EN		Air cooling	199.8	54V/3.7A	51.3-56.7	94	2000
		20.5CFM	351	54V/6.5A			

Notes: 1.*LOF Products with shell is also available, named LOF350-20Bxx-C;
2.*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;
3.*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	AC input		90	--	264	VAC
	DC input		127	--	370	VDC
Input Voltage Frequency			47	--	63	Hz
Input Current	115VAC		--	--	4	A
	230VAC		--	--	2	
Inrush Current	115VAC	Cold start	--	50	--	
	230VAC		--	75	--	
Power Factor	115VAC	Full load	0.98	--	--	--
	230VAC		0.95	--	--	
Leakage Current	240VAC		<0.1mA; Single fault <0.5mA			
Hot Plug			Unavailable			

Output Specifications*

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy*	Full load range	12V/15V/18V/19V	--	±3.0	--	%
		24V/27V/36V/48V/54V	--	±2.0	--	
Line Regulation	Rated load		--	±0.5	--	
Load Regulation	0% - 100% load		--	±1.0	--	
Output Ripple & Noise*	20MHz bandwidth (peak-to-peak value)	12V/15V/18V/19V	--	--	120	mV
		24V	--	--	150	
		27V/36V	--	--	200	
		48V/54V	--	--	250	
Temperature Coefficient			--	±0.03	--	%/℃
Minimum Load			0.0	--	--	%
Hold-up Time	230VAC, full load	Air cooling	12.0	14.0	--	ms
		20.5CFM	6.0	8.0	--	
Stand-by Power Consumption	230VAC		--	--	1.0	W
Short Circuit Protection	recover time <5s after the short circuit disappear		Constant current, continuous, self-recover			
Over-current Protection			⩾110%, self-recover			
Over-voltage Protection	12V		⩽15.0V	Output voltage turn off, re-power on for recover		
	15V		⩽18.5V			
	18V		⩽ 23.7 V			
	19V		⩽ 23.7 V			
	24V		⩽30.0V			
	27V		⩽33.5V			
	36V		⩽45.0V			
	48V		⩽59.5V			
	54V		⩽63.0V			
Over-temperature Protection			Output voltage turn off, re-power on for recover after the temperature drops.			
Fan power*	12V/15V/24V/36V/48V/54V		Offer output power of 12V/0.5A with output voltage accuracy ±15%			
	18V/19V		Offer output power of 12V/0.5A with output voltage accuracy -15% - +25%			
	27V		Offer output power of 12V/0.5A with output voltage accuracy -25% - +15%			

Notes: 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 10uF electrolytic capacitor 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 pin 6, 7 of the dimension drawing.
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 - ⏚	Electric Strength Test for 1min., leakage current <10mA		2000	--	--	VAC
	Input- output			4000	--	--	
	Output - ⏚			1500	--	--	
Insulation Resistance	Input - ⏚	Environment temperature: 25±5℃, Relative humidity: <95%RH, non-condensing Testing voltage: 500VDC		100	--	--	MΩ
	Input - output			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	+50℃ to +70℃	2.5	--	--	%/℃
			-40℃ to +50℃	0	--	--	
		Input voltage derating	90VAC - 100VAC	1.00	--	--	%/VAC
			100VAC - 264VAC	0	--	--	
Safety Standard		12V		IEC/UL62368-1, ES60601-1, GB4943.1 safety approved & EN60335-1, EN61558-1, BS EN62368-1, EN 62368-1(Report) Design refer to IEC61558-1, IEC/EN60601-1			
		15V/24V/27V/48V		IEC/UL62368-1, ES60601-1 safety approved & EN60335-1, EN61558-1, EN62368-1 , BS EN 62368-1(Report) Design refer to IEC61558-1, GB4943.1, IEC/EN60601-1			
		18V/19V		BS EN 62368-1(Report) Design refer to IEC/EN/UL62368-1, EN60335-1, IEC/EN61558-1, GB494.1, IEC/EN/ES60601-1			
		36V		UL60601-1, ES60601-1 safety approved & EN60335-1, EN61558-1, BS EN 62368-1(Report) Design refer to IEC/EN/UL62368-1, EN60335-1, IEC/EN61558-1, GB4943.1, IEC/EN/ES60601-1			
		54V		EN61558-1, EN60335-1, BS EN 62368-1(Report) Design refer to IEC/EN/UL62368-1, EN60335-1, IEC/EN61558-1, GB4943.1, 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			

Mechanical Specifications

Case Material	Open frame
Dimensions	127.0mm x 76.2mm x 25.4 mm
Weight	295g (Typ.)
Cooling Method*	Air cooling (180W/200W) / 20.5CFM (300W/325W/350W)

Notes: *Please refer to the product characteristic curve for cooling method and power derating;

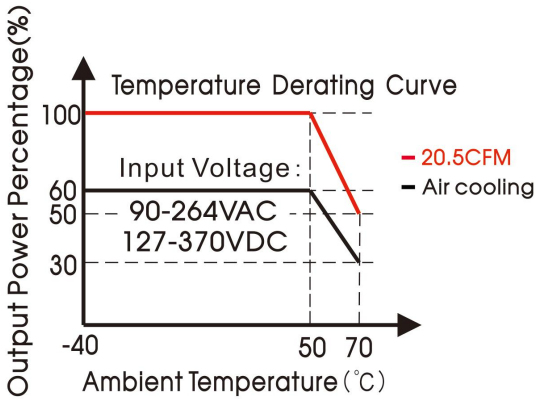
Electromagnetic Compatibility (EMC)*

EMI*	CE	CISPR32/EN55032	150kHz—30MHz	CLASS B
	RE	CISPR32/EN55032	30MHz—1GHz	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		
EMS*	ESD	IEC/EN61000-4-2	Contact ±8KV/Air ±15KV	Perf. Criteria A
	RS	IEC/EN61000-4-3	80MHz – 1GHz 10V/m	Perf. Criteria A
	EFT	IEC/EN61000-4-4	±4KV, (5 or 100)kHz	Perf. Criteria A
	Surge	IEC/EN61000-4-5	line to line ±2KV, line to ground ±4KV	Perf. Criteria A
	CS	IEC/EN61000-4-6	0.15MHz - 80MHz 10Vr.m.s	Perf. Criteria A
	DIP	IEC/EN61000-4-11	70% U_n* , 25/30 periods (50/60Hz) 40% U_n* ,10/12 periods (50/60Hz) 0% U_n*, 1 periods	Perf. Criteria B

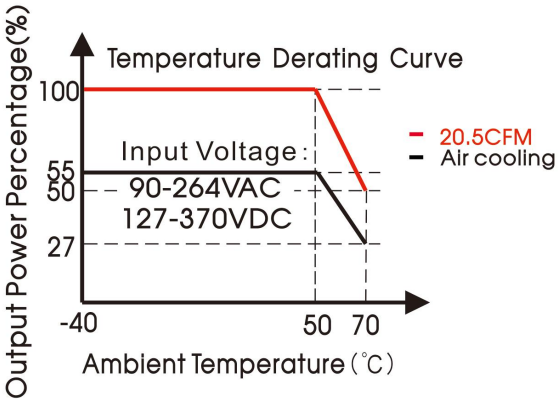
Notes: 1.*The power supply is considerated a component as part of system, all EMC items are tested on a metal plate (L x W x H, 360mm x 360mm x 1mm). Power supply should be combined with final equipment for EMC confirmation;
2.*Category I products with PE, category II products without PE;
3.*perf. Criteria:
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.
4. *U_n is the maximum input nominal voltage.

Product Characteristic Curve

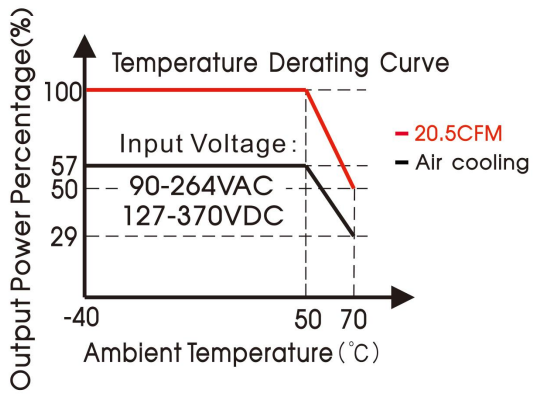
LOF350-20B12 (full load 300W with 20.5CFM)



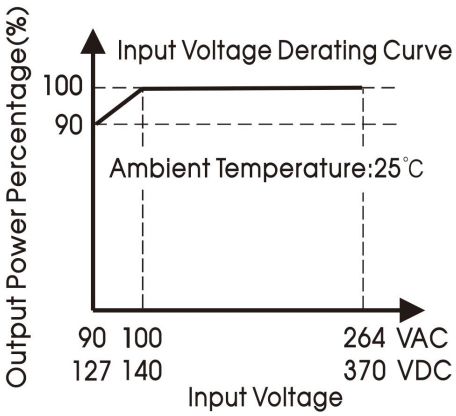
LOF350-20B15/18/19 (full load 325W with 20.5CFM)



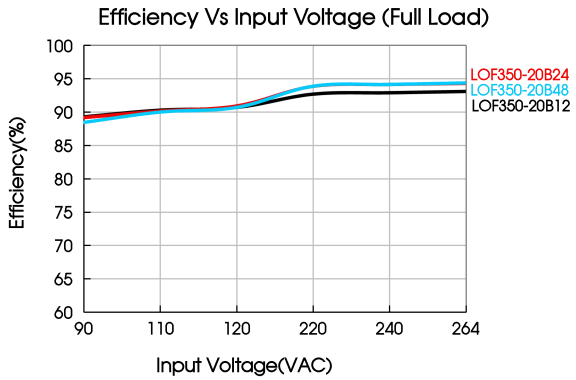
LOF350-20B24/27/36/48/54 (full load 350W with 20.5CFM)

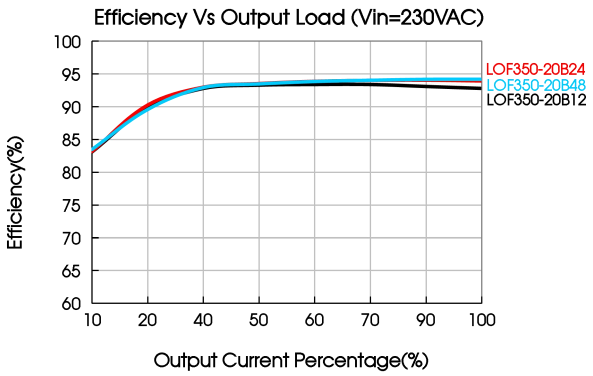


LOF350-20Bxx Input Voltage Dereting Curve

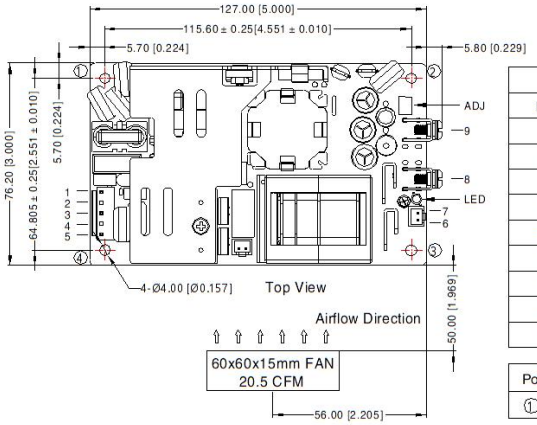


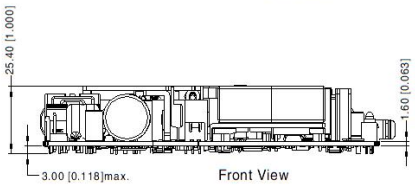
Note: 1.With an AC input voltage between 90 - 100VAC and a DC input between 127 - 140VDC the output power must be derated as per the temperature derating curves;
2. This product is suitable for applications using natural air cooling; for applications in closed environment please consult Mornsun FAE.





Dimensions and Recommended Layout

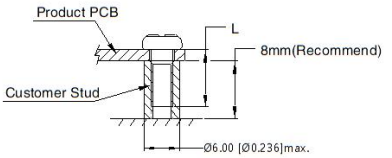




THIRD ANGLE PROJECTION

Pin-Out			
Pin	Function	Product Connector	Customer Connector
1	AC(N)	JST B5P-VH or equivalent	Housing:JST VHR Contact:JST SVH-21T-P1.1 or PJA-018(Mornsun Accessory)
2	NC		
3	AC(L)		
4	NC		
5	⏚		
6	FAN-	KANGDAO 2.5XHS-2A or equivalent	Housing:KANGDAO 2.5XHS-2Y Contact:KANGDAO 2.5XH-TE or PJA-008(Mornsun Accessory)
7	FAN+		
8	-Vo		
9	+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]
2. Connector tightening torque: M3.5, 0.8N・m(Max)
5.Wire range：18-14AWG
6. The layout of the device is for reference only, please refer to the actual product
7. It is recommended 10mm distance between the PCB and other components for safety purpose
8. Class I system①②④ positions must be connected to the earth (⏚)
9. Class II system①②④ positions must be connected together

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 at light load, there will be audible noise generated, 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 output voltage can be adjusted by the ADJ, clockwise to decrease;
7. Warning: Use double fuses, please disconnect the power before maintenance and replacement;
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 final 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.