AC/DC 350W Open Frame Power Supply
LOF350-20Bxx Series

MORNSUN®

UL62368-1 EN62368-1 IEC62368-1
ES60601-1 EN60335-1
EN61558-1

BS EN 62368-1

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
- Operating altitude up to 5000m
- Design refer to IEC61558-1, IEC/EN60601-1, GB4943.1

LOF350-20Bxx series is 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, 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, 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	LOF350-20B12	Air cooling	180	12V/15A	11.4-12.6	92	6000
		20.5CFM	300	12V/25A			
	LOF350-20B15	Air cooling	180	15V/12A	14.25-15.75	92	5000
		20.5CFM	325	15V/21.67A			
BS	LOF350-20B18	Air cooling	180	18V/10A	17.1-19.9	92.5	4000
		20.5CFM	324	18V/18A			
	LOF350-20B19	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	LOF350-20B24	Air cooling	199.9	24V/8.33A	22.8-25.2	93	3200
		20.5CFM	350.4	24V/14.6A			
	LOF350-20B27	Air cooling	199.8	27V/7.4A	25.65-28.35	93	2600
		20.5CFM	351	27V/13A			
	LOF350-20B36	Air cooling	200.16	36V/5.56A	34.2-37.8	93	2000
		20.5CFM	350.28	36V/9.73A			
	LOF350-20B48	Air cooling	200.1	48V/4.17A	45.6-50.4	94	2000
		20.5CFM	350.4	48V/7.3A			
EN	LOF350-20B54	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/15V/24V/27V/48V		IEC/UL/EN62368-1, ES60601-1 safety qpproved & EN60335-1, EN61558-1, EN62368-1 , BS EN 62368-1(Report) Design refer to EN62368-1, 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 qpproved & 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 x 76.2 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)*

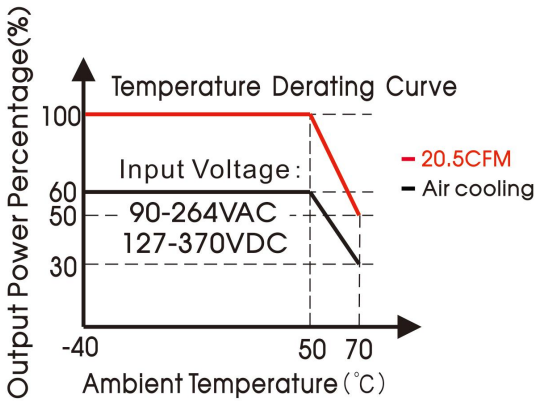
EMI*	CE	CISPR32/EN55032	CLASS B	
	RE	CISPR32/EN55032	CLASS B (Category I, CLASS B; Category II, CLASS A)	
	Harmonic current	IEC/EN61000-3-2	CLASS A and CLASS D	
	Flicker	IEC/EN61000-3-3		
EMS*	ESD	IEC/EN61000-4-2	Contact ±8KV/Air ±15KV	perf. Criteria A
	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4	±4KV	perf. Criteria A

	Surge	IEC/EN61000-4-5	line to line ±2KV, line to ground ±4KV	perf. Criteria A
	CS	IEC/EN61000-4-6	10 Vr.m.s	perf. Criteria A
	DIP	IEC/EN61000-4-11	0%, 70%	perf. Criteria B

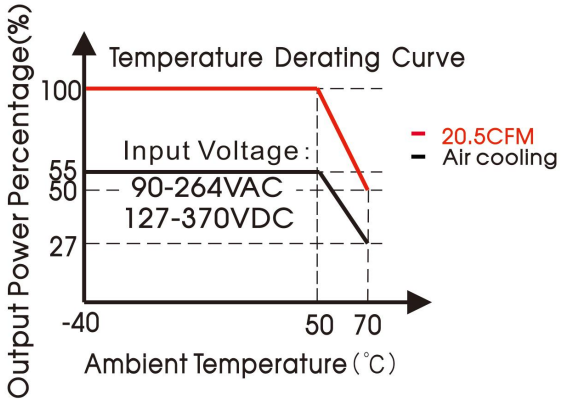
Notes: 1.*The power supply is considerated a component as part of system, all EMC items are tested on a metal plate (L x W x H, 360mm x 360mm x 1mm). Power supply should be combined with final equipment for EMC confirmation;
2.*Category I products with PE, category II products without PE;

Product Characteristic Curve

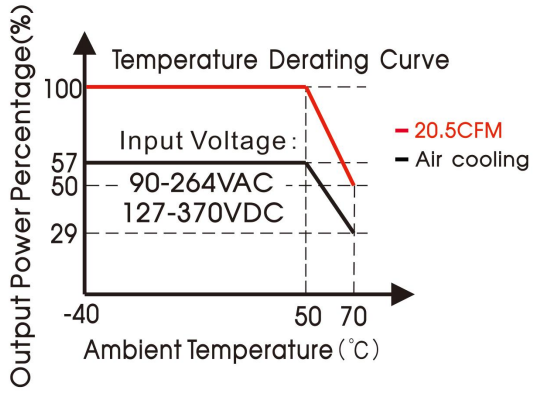
LOF350-20B12 (full load 300W with 20.5CFM)



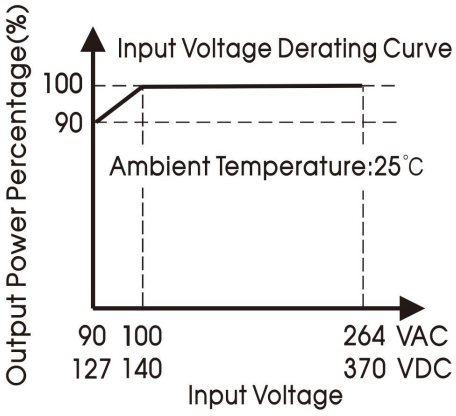
LOF350-20B15/18/19 (full load 325W with 20.5CFM)



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

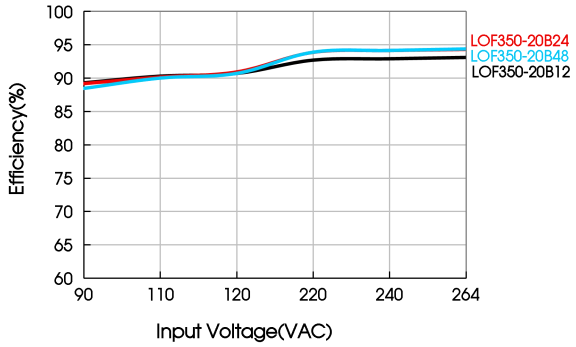


LOF350-20Bxx Input Voltage Dereting Curve

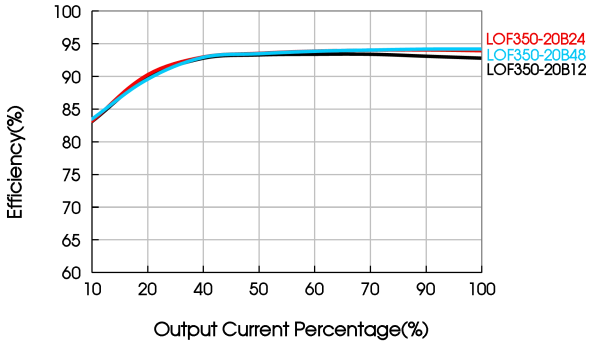


Note: With an AC input voltage between 90 - 100VAC and a DC input between 127 - 140VDC the output power must be derated as per the temperature derating curves;

Efficiency Vs Input Voltage (Full Load)

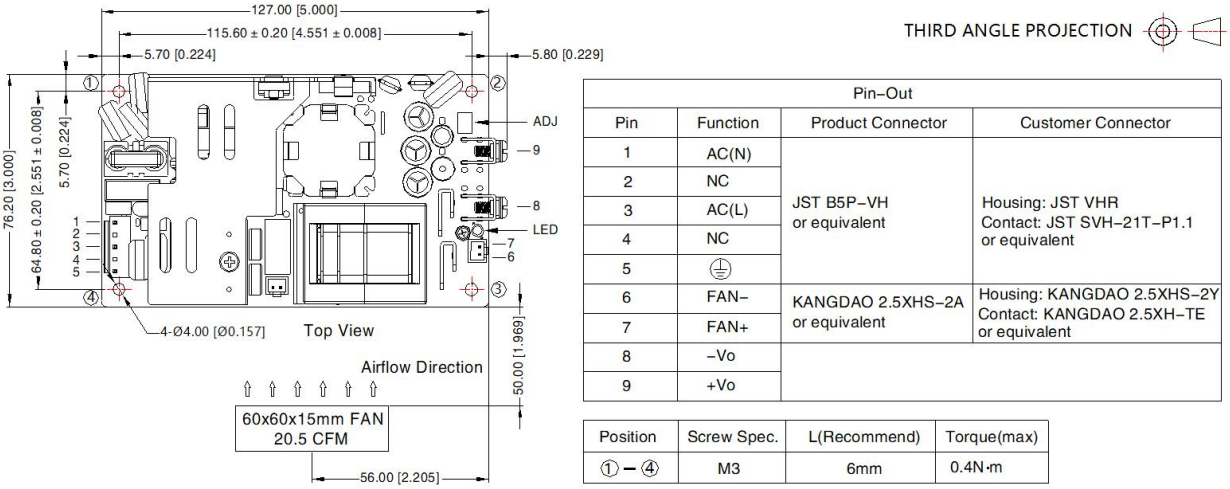


Efficiency Vs Output Load (Vin=230VAC)



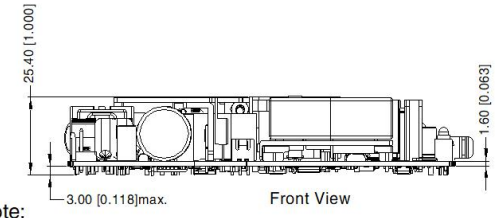
Dimensions and Recommended Layout

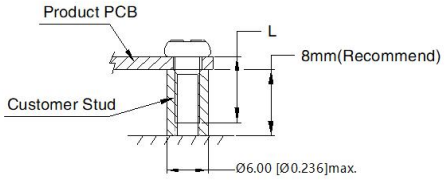
LOF350-20BXX



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 equivalent
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 equivalent
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]
4. Connector tightening torque: M3.5，0.8N·m
5. Wire range: 18-14AWG
6. The layout of the device is for reference only, please refer to the actual product
7. Reserved safety distance between PCB edge and customer components, recommended 10mm
8. Class Ⅰ system ①, ②, ④ positions must be connected to the earth(⏚)
9. Class Ⅱ system ①, ②, ④ positions must be connected together

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