

20W, AC/DC 模块电源



FEATURES

- Universal 85-305VAC or 100-430VDC input voltage
- Operating ambient temperature range: -40℃ to +85℃
- High I/O isolation test voltage up to 4200VAC
- Up to 87% efficiency
- Output short circuit/over-current/over-voltage protection
- 5000m altitude application
- Plastic case meets UL94V-0 flammability
- Meets Emissions CLASS B and surge LEVEL 4 without additional circuits
- OVC III (meet IEC62477-1, 2000m altitude)

LHE20-23BxxR2 series AC-DC converters are highly efficient, environmental-friendly 20W power modules. It features universal AC input and at the same time accepts DC input voltage, low power consumption, high efficiency, high reliability, reinforced isolation. It offers good EMC performance compliant to IEC/EN61000-4 and CISPR32/EN55032 and meets IEC62477, UL/EN/IEC62368 standards. The converters are widely used in industrial, power and office applications. For extremely harsh EMC environment, we recommend using the application circuit show in Design Reference of this datasheet.

Selection Guide

Certification	Part No.*	Output Power(W)	Nominal Output Voltage and Current(Vo/Io)	Efficiency at 230VAC (%) Typ.	Capacitive Load (uF) Max.
EN	LHE20-23B03R2	11.55	3.3V/3500mA	80	36000
	LHE20-23B05R2	15.5	5V/3100mA	82	12240
	LHE20-23B09R2	18.9	9V/2100mA	85	5600
	LHE20-23B12R2	19.2	12V/1600mA	86	5000
	LHE20-23B15R2	19.5	15V/1300mA	87	3000
	LHE20-23B24R2	20.4	24V/850mA	85	1200
	LHE20-23B48R2	19.68	48V/410mA	87	500

Note: *1. Use suffix "A2" for chassis mounting and suffix "A4" for Din-Rail mounting;
2. The product picture is for reference only. For details, please refer to the actual product.

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Voltage Range	AC input	85	--	305	VAC
	DC input	100	--	430	VDC
Input Frequency		47	--	63	Hz
Input Current	115VAC	--	--	0.6	A
	230VAC	--	--	0.34	
Inrush Current	115VAC	--	35	--	
	230VAC	--	70	--	
Leakage Current	277VAC/50Hz	0.25mA RMS Max.			
Recommended External Input Fuse		3.15A/300V, slow-blow, required			
Hot Plug		Unavailable			

Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy	All load range	3.3V output	--	±3	%
		others	--	±2	
Linear Regulation	Full load	--	±0.5	--	
Load Regulation	0% - 100% load	--	±1	--	

Ripple & Noise*	20MHz bandwidth (peak-to-peak value)		--	--	100	mV
Temperature Coefficient			--	±0.02	--	%/°C
Stand-by Power Consumption	230VAC	3.3V/5V/9V/12V/15V/24V	--	0.15	0.3	W
		48V	--	0.3	0.5	
Short Circuit Protection			Hiccup, continuous, self-recovery			
Over-current Protection			≥130% Io, self-recovery			
Over-voltage Protection	3.3/5V		≤7.5VDC (Output voltage Hiccup)			
	9V		≤15VDC (Output voltage Hiccup)			
	12/15V		≤20VDC (Output voltage Hiccup)			
	24V		≤30VDC (Output voltage Hiccup)			
	48V		≤60VDC (Output voltage Hiccup)			
Minimum Load			0	--	--	%
Hold-up Time	115VAC		--	15	--	ms
	230VAC		--	80	--	
Note: * The “parallel cable” method is used for ripple and noise test, please refer to AC-DC Converter Application Notes for specific information.						

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General Specifications

Item		Operating Conditions	Min.	Typ.	Max.	Unit
Isolation	Input - output	Electric Strength Test for 1min., leakage current <5mA	4200	--	--	VAC
Impulse Withstand Voltage	Input - output	1.2/50us impulse waveform, three positive/negative pulses, interval ≥5s. There is no breakdown discharge during the test.	6000	--	--	VDC
Insulation Resistance	Input - output	At 500VDC	100	--	--	MΩ
Operating Temperature			-40	--	+85	°C
Storage Temperature			-40	--	+105	
Storage Humidity			--	--	95	%RH
Soldering Temperature	Wave-soldering, Max. 10 seconds		255	260	265	°C
	Manual-welding, Max. 5 seconds		350	360	370	
Switching Frequency			--	65	--	KHz
Power Derating	-40°C to -25°C		4.00	--	--	% / °C
	+50°C to +70°C (3.3V/5V)		2.50	--	--	
	+55°C to +70°C (9V/12V/15V/24V/48V)		3.33	--	--	
	+70°C to +85°C		0.67	--	--	
	85VAC - 100VAC		1.67	--	--	% / VAC
	277VAC - 305VAC		0.72	--	--	
	2000m - 5000m		6.67	--	--	% / Km
Safety Standard		BS EN/EN62368-1(report) safety approved; Design refer to UL/IEC62368-1, IEC62477-1				
Safety Class		CLASS II				
MTBF		MIL-HDBK-217F@25°C	≥300,000 h			

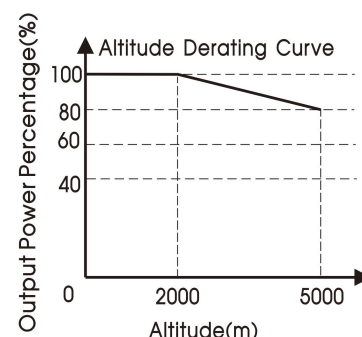
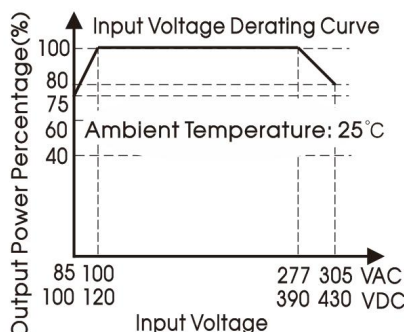
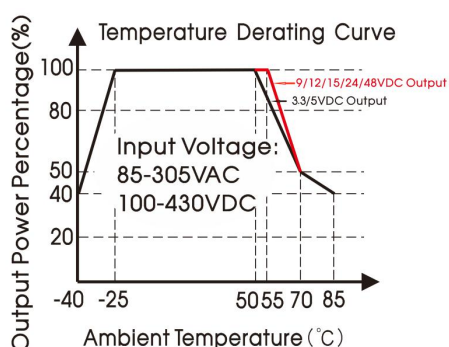
Mechanical Specifications

Case Material	Black plastic, flame-retardant and heat-resistant (UL94V-0)	
Dimension	Horizontal package	62.00 x 45.00 x 22.50 mm
	A2 chassis mounting	96.10 x 54.00 x 31.00mm
	A4 Din-Rail mounting	96.10 x 54.00 x 35.60mm
Weight	Horizontal package/A2 chassis mounting/A4 Din-Rail mounting	
		85g (Typ.)/130g (Typ.)/170g (Typ.)
Cooling Method	Free air convection	

Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032	CLASS B	
	RE	CISPR32/EN55032	CLASS B	
Immunity	ESD	IEC/EN61000-4-2	Contact $\pm 8\text{KV}$ /Air $\pm 15\text{KV}$	perf. Criteria A
	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4	$\pm 4\text{KV}$	perf. Criteria A
	Surge	IEC/EN61000-4-5	line to line $\pm 2\text{KV}$	perf. Criteria A
		IEC/EN61000-4-5	line to line $\pm 4\text{KV}$ / line to PE $\pm 6\text{KV}$ (See Fig. 2 for recommended circuit)	perf. Criteria A
	CS	IEC/EN61000-4-6	10Vr.m.s	perf. Criteria A
	PFMF	IEC/EN61000-4-8	30A/m	perf. Criteria A
	Voltage dip, short interruption and voltage variation	IEC/EN61000-4-11	0%, 70%	perf. Criteria B

Product Characteristic Curve



Note: ① With an AC input between 85-100VAC/277-305VAC and a DC input between 100-120VDC/390-430VDC, the output power must be derated as per temperature derating curves;
② This product is suitable for applications using natural air cooling; for applications in closed environment please consult Mornsun FAE.

Design Reference

1. Typical application

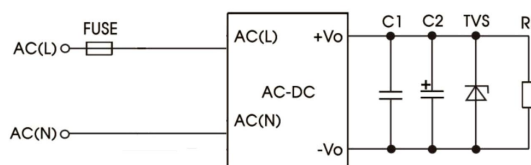


Fig. 1: Typical circuit diagram

Part No.	FUSE	C1	C2	TVS
LHE20-23B03R2	3.15A/300V, slow-blow, required	1uF	680uF/25V	SMBJ7.0A
LHE20-23B05R2			680uF/25V	SMBJ7.0A
LHE20-23B09R2			470uF/25V	SMBJ12A
LHE20-23B12R2			220uF/25V	SMBJ20A
LHE20-23B15R2			220uF/25V	SMBJ20A
LHE20-23B24R2			68uF/35V	SMBJ30A
LHE20-23B48R2			33uF/63V	SMBJ64A

Output Filter Components:

We recommend using an electrolytic capacitor with high frequency, and low ESR rating for C2 (refer to manufacture's datasheet). Choose a Capacitor voltage rating with at least 20% margin, in other words not exceeding 80%. C1 is a ceramic capacitor used for filtering high-frequency noise and TVS is a recommended suppressor diode to protect the application in case of a converter failure.

2. EMC compliance recommended circuit

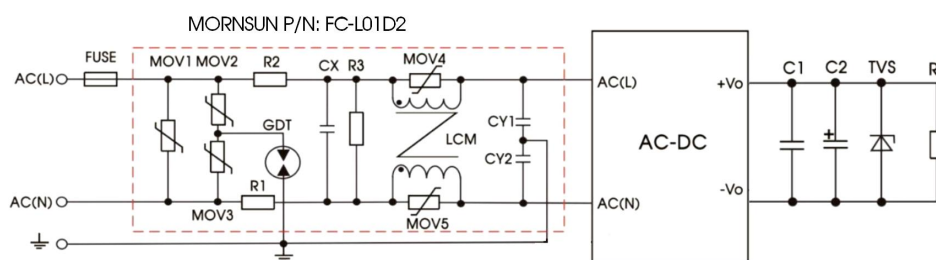


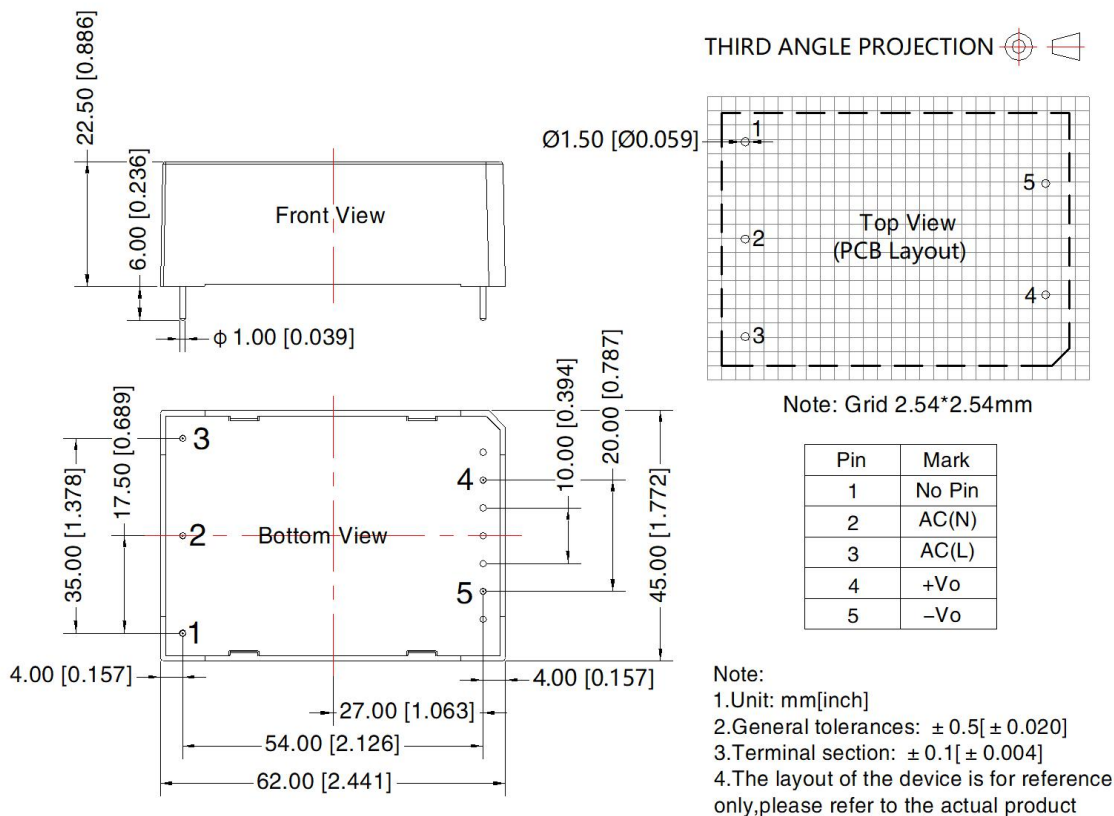
Fig. 2: EMC application circuit with higher requirements
(Output external circuit refer to the typical application)

Component	Recommended value	Component	Recommended value
MOV1	S20K350	FC-LO1D2	EMC Filter
MOV2/MOV3	S14K350	CY1/CY2	2200pF/400VAC
MOV4/MOV5	S07K350	GDT	B 5G3600
CX	0.15uF/310VAC	R3	1M Ω /2W (wire-wound resistor)
R1/R2	2 Ω /3W (wire-wound resistor)	FUSE	3.15A/300V, slow-blow, required
LCM	4.7mH, P/N: FL2D-10-472 (MORNSUN) is recommended		

Note: R3 can also be replaced by 4 pieces of 1.5M Ω /1206 SMD resistors in series and parallel.

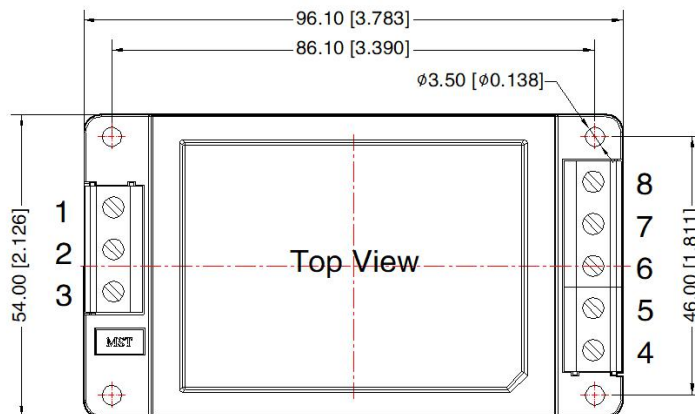
3. For additional information please refer to application notes on www.mornsun-power.com.

Dimensions and Recommended Layout

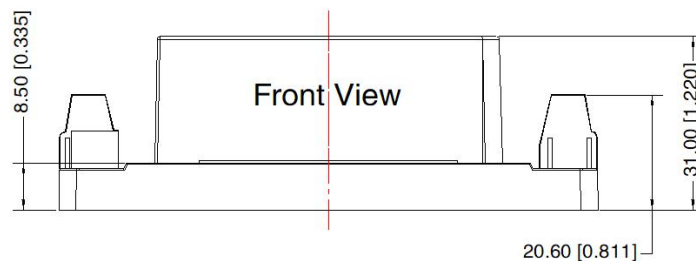


A2 Dimensions

THIRD ANGLE PROJECTION 



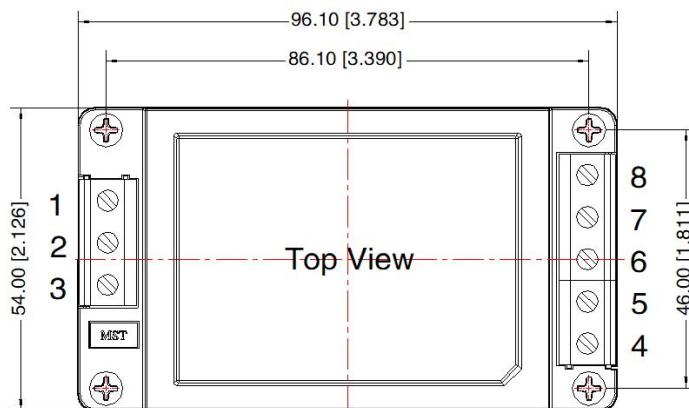
Pin-Out	
Pin	Mark
1	NC
2	AC(N)
3	AC(L)
4	+Vo
5	NC
6	NC
7	NC
8	-Vo



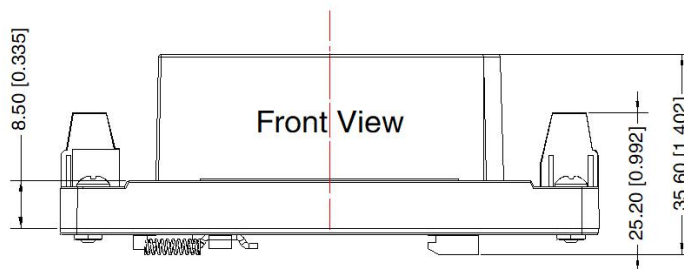
Note:
Unit: mm[inch]
Wire range: 24-12 AWG
Tightening torque: Max 0.4 N · m
General tolerances: ± 1.00 [± 0.039]

A4 Dimensions

THIRD ANGLE PROJECTION 



Pin-Out	
Pin	Mark
1	NC
2	AC(N)
3	AC(L)
4	+Vo
5	NC
6	NC
7	NC
8	-Vo



Note:
Unit: mm[inch]
Mounting rail: TS35, rail needs to connect safety ground
Wire range: 24-12 AWG
Tightening torque: Max 0.4 N · m
General tolerances: ± 1.00 [± 0.039]

Note:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58220006 (Horizontal package); 58220019 (A2/A4 package);
2. If the product is not operated within the required load range, the product performance cannot be guaranteed to comply with all parameters in the datasheet;
3. Unless otherwise specified, parameters in this datasheet were measured under the conditions of $T_a=25^{\circ}\text{C}$, humidity <75% with nominal input voltage and rated output load;
4. All index testing methods in this datasheet are based on our company corporate standards;
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.

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