

20W, AC-DC converter



FEATURES

- Ultra-wide 85 - 305VAC and 120 - 430VDC input voltage range
- Operating ambient temperature range: -40°C to +85°C
- Up to 88% efficiency
- No-load power consumption 0.1W
- 5000m altitude application
- OVC III (meet EN61558, EN62368)
- Plastic case meets UL94V-0 flammability
- EMI performance meets CISPR32/EN55032 CLASS B, EN55014

LD20-23BxxR2S series AC-DC converter is one of Mornsun's new generation compact size power converters. They feature ultra-wide AC input and at the same time accepts DC input voltage, low power consumption, low ripple & noise, high efficiency, high reliability, reinforced isolation. It offer good EMC performance compliant to IEC/EN61000-4 and CISPR32/EN55032 and meet IEC/EN/UL62368, EN60335, EN61558, IEC/EN60601-1, ANSI/AAMI ES60601-1 standards. The converters are widely used in industrial, home appliances, instrumentation, communication and civil 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	Nominal Output Voltage and Current (Vo/Io)	Efficiency at 230VAC (%) Typ.	Capacitive Load (uF) Max.
--	LD20-23B12R2S	20	12V/1670mA	87	5000
--	LD20-23B24R2S	20	24V/830mA	88	2000

Note: 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	120	--	430	VDC
Input Frequency		47	--	440	Hz
Input Current	115VAC	--	--	0.5	A
	230VAC	--	--	0.3	
Inrush Current	115VAC	--	20	--	
	230VAC	--	45	--	
Transient Over-voltage Protection		1s, no damage			
Leakage Current	277VAC/50Hz	0.1mA RMS Max.			
Built In Fuse		3.15A/300V, slow-blow			
Hot Plug		Unavailable			

Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy	Full load range	--	±1.5	--	%
Line Regulation	Rated load	--	±0.5	--	
Load Regulation	0%-100% load	--	±1	--	
Minimum Load		0	--	--	
Ripple & Noise*	20MHz bandwidth (peak-to-peak value)	--	100	150	mV
Temperature Coefficient		--	±0.02	--	%/°C
Stand-by Power Consumption	230VAC	12V	--	0.1	W
		24V	--	0.12	
Hold-up Time	115VAC input	--	8	--	ms
	230VAC input	--	50	--	

Short Circuit Protection		Hiccup, continuous, self-recover
Over-current Protection		≥ 150%Io, self-recover
Over-voltage Protection	12V output	≤ 20VDC (Output voltage clamp)
	24V output	≤ 30VDC (Output voltage clamp)
Note: *The "parallel cable" 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;		

General Specifications

Item		Operating Conditions	Min.	Typ.	Max.	Unit
Isolation	Input-output	Electric Strength Test for 1min., leakage current <5mA	4200	--	--	VAC
Insulation Resistance	Input - output	At 500VDC	100	--	--	MΩ
Operating Temperature			-40	--	+85	℃
Storage Temperature			-40	--	+85	
Storage Humidity		Non-condensing	--	--	95	%RH
Soldering Temperature	Wave-soldering, Max. 10 seconds		255	260	265	℃
	Manual-welding, Max. 5 seconds		350	360	370	
Switching Frequency			--	80	--	kHz
Power Derating	-40℃ to -25℃	85VAC-165VAC	2	--	--	% /℃
	+55℃ to +70℃		3.33	--	--	
	+70℃ to +85℃		1.33	--	--	
	85VAC - 100VAC		2	--	--	% /VAC
	277VAC - 305VAC		0.71	--	--	
	2000m - 5000m		6.67	--	--	% /km
Safety Standard			Design refer to UL/IEC/EN/BS EN62368-1, GB4943.1, EN61558-2-16, EN60335-1, IEC/EN60601-1			
Safety Class			CLASS II			
MTBF		MIL-HDBK-217F@25℃	≥ 1,500,000 h			
Designed life	230VAC	Ta: 25℃ 100% load	>130x10 ³ h			
		Ta: 55℃ 100% load	>24x10 ³ h			
		Ta: 55℃ 80% load	>27x10 ³ h			

Mechanical Specifications

Case Material	Black plastic, flame-retardant and heat-resistant (UL94V-0)	
Dimension	DIP package	52.40 x 27.20 x 24.00 mm
Weight	DIP package	51g (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 ±8KV/Air ±15KV	perf. Criteria A
	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4	±2KV	perf. Criteria A
		IEC/EN61000-4-4	±4KV (See Fig. 2, Fig. 3 for recommended circuit)	perf. Criteria A
	Surge	IEC/EN61000-4-5	line to line ±1KV	perf. Criteria A
		IEC/EN61000-4-5	line to line ±2KV (See Fig. 2 for recommended circuit)	perf. Criteria A
		IEC/EN61000-4-5	line to line ±2KV/line to PE ±4KV (See Fig. 3 for recommended circuit)	perf. Criteria A
	CS	IEC/EN61000-4-6	10Vr.m.s	perf. Criteria A
	MS	IEC/EN6100-4-8	30A/m	perf. Criteria A

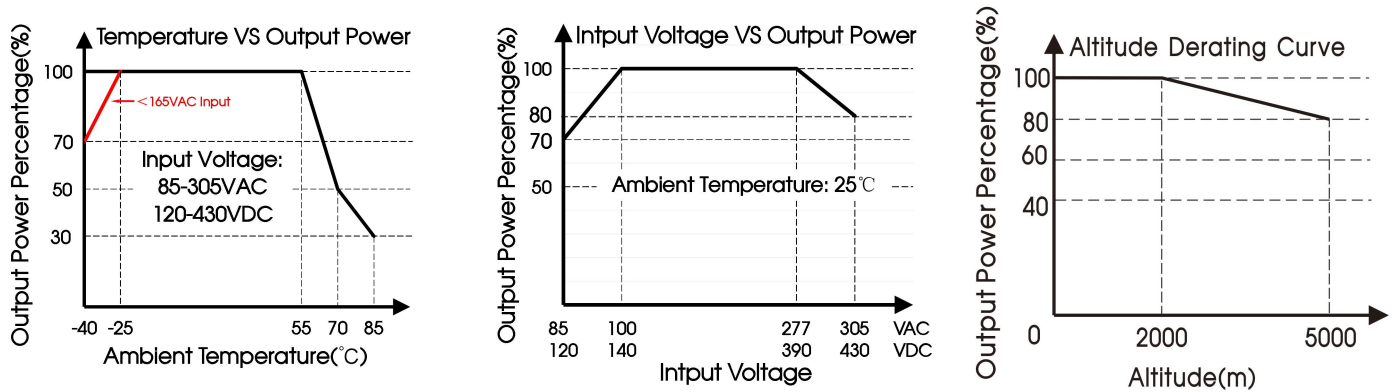
	Voltage variations	IEC/EN61000-4-11	70% Un, 25/30 cycle(50/60Hz) 40% Un, 10/12 cycle(50/60Hz) 0% Un, 1 cycle (Un is the maximum input nominal voltage.)	perf. Criteria B
	Voltage interruptions	IEC/EN61000-4-11	0% Un, 250/300 cycle(50/60Hz) (Un is the maximum input nominal voltage.)	perf. Criteria C

Note:

① When the output terminal of the product needs to be connected to PE through a Y capacitor, or close to the metal frame, please refer to the Fig. 3 for recommended circuit.

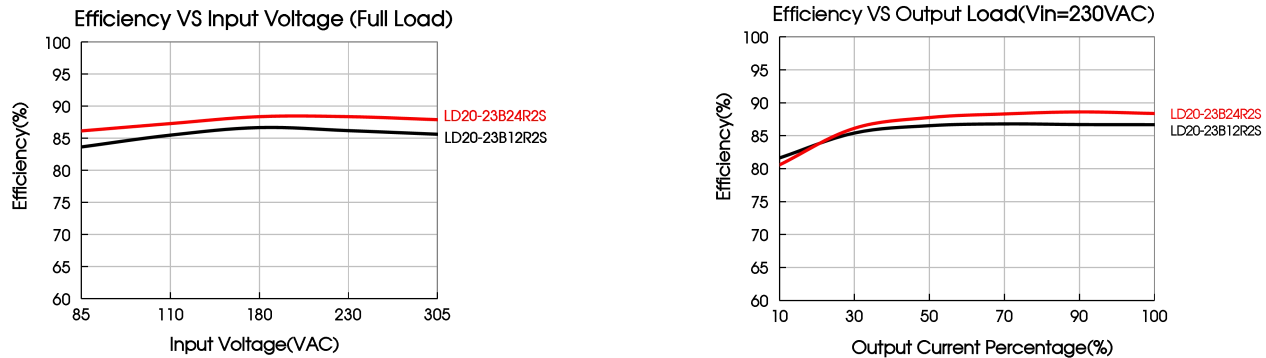
② Unless otherwise specified, EMC performance indicators are tested according to typical application circuits (Fig. 1).

Product Characteristic Curve



Note: ① With an AC input between 85-100V/277-305VAC and a DC input between 120-140V/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

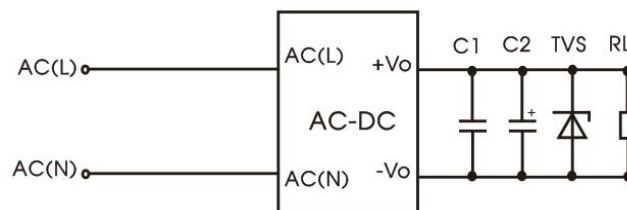


Fig. 1: Typical circuit diagram

Part No.	C1	C2	TVS
LD20-23B12R2S	1uF/50V	10uF/25V	SMBJ20A
LD20-23B24R2S		10uF/35V	SMBJ30A

Output Filter Components:

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

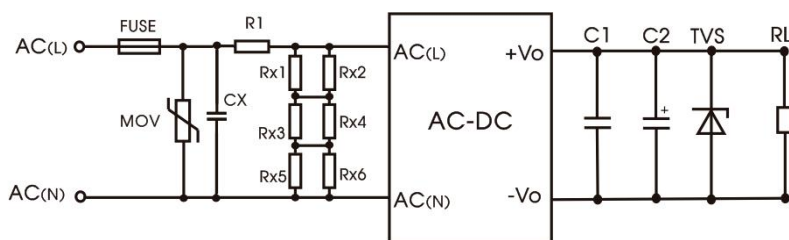


Fig. 2: EMC application circuit with higher requirements

Component	Recommended value
FUSE	3.15A/300V, slow-blow, required
MOV	S14K350
R1	3 Ω /3W (wire-wound resistor)
CX	334K/305VAC

Note:

1. The function of CX is to filter out harmonic currents. It must be connected when applied in the power industry.
2. Rx1/Rx2/Rx3/Rx4/Rx5/Rx6 is the bleeder resistance of CX, and the recommended resistance value is 1.5M Ω /150VDC.
3. The external circuit component parameters are the same as those of the above typical circuit diagram.

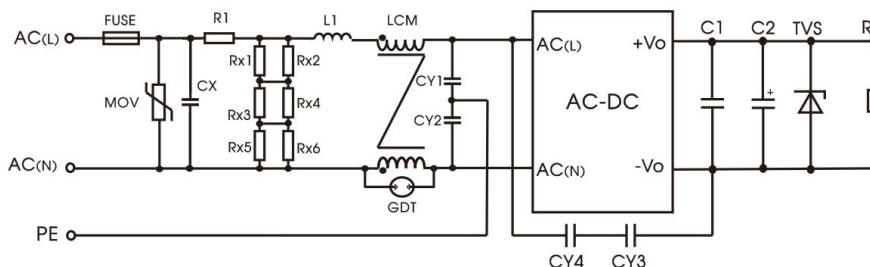


Fig. 3: Recommended circuit for class I equipment

(Recommended when the output terminal of the product needs to be connected to PE or connected to PE through a Y capacitor)

Component	Recommended value
FUSE	3.15A/300V, slow-blow, required
MOV	S14K350
CX	334K/305VAC
R1	6.8 Ω /5W (wire-wound resistor)
L1	1.2mH/0.5A
CY1/CY2	2.2nF/400VAC
CY3/CY4	1nF/400VAC
GDT	300V/1KA
LCM	20 mH, P/N: FL2D-10-203 (MORNSUN) is recommended

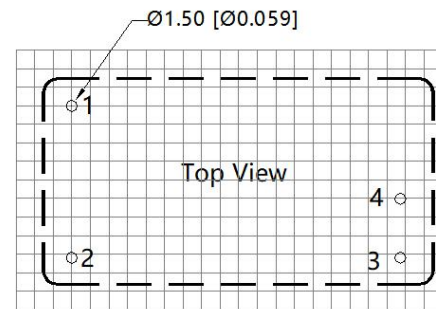
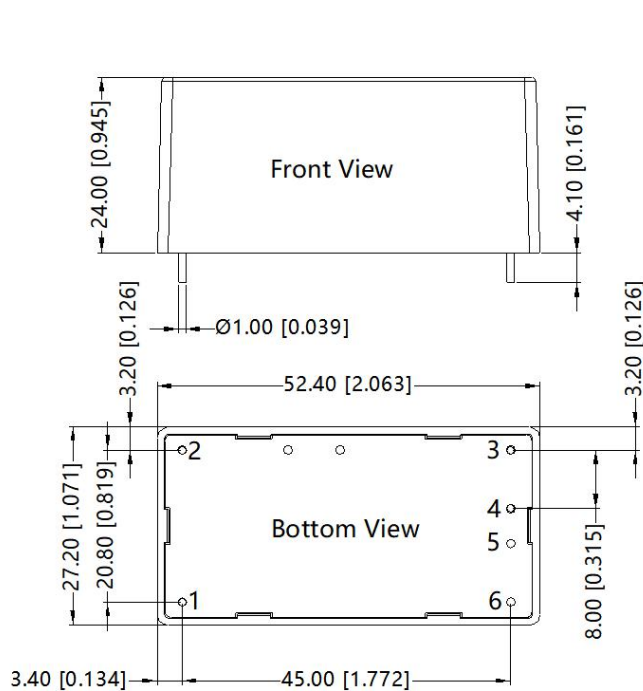
Note:

1. Rx1/Rx2/Rx3/Rx4/Rx5/Rx6 is the bleeder resistance of CX, and the recommended resistance value is 1.5M Ω /150VDC.
2. The external circuit component parameters are the same as those of the above typical circuit diagram.

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

Dimensions and Recommended Layout

THIRD ANGLE PROJECTION 



Note: Grid 2.54*2.54mm

Pin-Out	
Pin	Function
1	AC(L)
2	AC(N)
3	-Vo
4	+Vo
5	No Pin
6	No Pin

Note:
Unit: mm[inch]
Pin diameter tolerances: $\pm 0.10[\pm 0.004]$
General tolerances: $\pm 0.50[\pm 0.020]$

Note:

- For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58220011;
- 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;
- 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;
- All index testing methods in this datasheet are based on our company corporate standards;
- We can provide product customization service, please contact our technicians directly for specific information;
- Products are related to laws and regulations: see "Features" and "EMC";
- 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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