

10W, AC-DC converter



RoHS



FEATURES

- Ultra-wide 85-305VAC and 120-430VDC input voltage range
- Operating ambient temperature range: -40℃ to +85℃
- Up to 85% efficiency
- No-load power consumption < 0.1W
- High I/O isolation test voltage up to 4200VAC
- 5000m altitude application
- OVC III (meet EN61558, EN62368)
- EMI performance meets CISPR32/EN55032 CLASS B, EN55014

LD10-23BxxR2S series AC-DC converters is one of Mornsun's new generation compact size power converter. It features 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 offers good EMC performance compliant to IEC/EN61000-4 and CISPR32/EN55032 and meets IEC/EN/UL62368, EN60335, EN61558, EN62477 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 (W)	Nominal Output Voltage and Current (Vo/Io)	Efficiency at 230VAC (%) Typ.	Capacitive Load (uF) Max.
--	LD10-23B05R2S	10	5V/2000mA	80	6000
--	LD10-23B12R2S	10	12V/830mA	85	3000

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	--	63	Hz
Input Current	115VAC	--	--	0.23	A
	230VAC	--	--	0.15	
Inrush Current (cold start)	115VAC	--	25	--	
	230VAC	--	40	--	
Transient Overvoltage Protection	350VAC	1s, no damage			
Leakage Current	277VAC/50Hz	0.1mA RMS Max.			
Recommended External input Fuse		2A/300V, slow-blow, required			
Hot Plug		Unavailable			

Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy	Full load range	--	±2	--	%
Line Regulation	Rated load	--	±0.5	--	
Load Regulation	0%-100% load	--	±1	--	
Minimum Load		0	--	--	
Ripple & Noise*	20MHz bandwidth (peak-to-peak value)	--	50	100	mV
Temperature Coefficient		--	±0.02	--	%/℃
Stand-by Power Consumption	230VAC	--	0.08	0.1	W
Hold-up Time	115VAC	--	8	--	ms
	230VAC	--	40	--	

Short Circuit Protection		Hiccup, continuous, self-recover
Over-current Protection		≥ 140%Io, self-recover
Over-voltage Protection	5V	≤ 7.5VDC (Output voltage clamp)
	12V	≤ 20VDC (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			--	--	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 - 100VAC	2.2	--	--	% / ℃
	+50℃ to +70℃	5V	2.5	--	--	
	+55℃ to +70℃	12V	3.33	--	--	
	+70℃ to +85℃		0.66	--	--	
	85VAC - 100VAC		1.66	--	--	%/VAC
	2000m - 5000m		6.67	--	--	%/km
Safety Standard		Design refer to UL/IECEN/BS EN62368-1, EN61558-2-16, EN60335-1, EN62477-1				
Safety Class		CLASS II				
MTBF		MIL-HDBK-217F@25℃	≥ 3,200,000 h			
Designed life	230VAC	Ta: 25℃ 100% load	>130x10 ³ h			
		Ta: 55℃ 100% load	>20x10 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	40.00 x 25.40 x 21.00 mm
Weight	DIP mounting	35g (Typ.)
Cooling method	Free air convection	

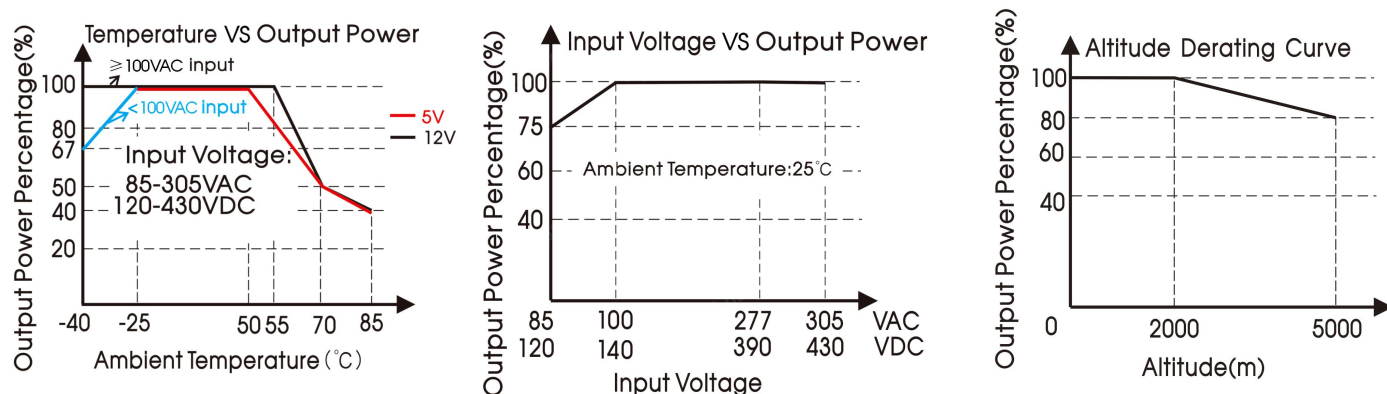
Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032	CLASS B	
	RE	CISPR32/EN55032	CLASS B	
Immunity	ESD	IEC/EN61000-4-2	Contact ± 8kV/Air ± 15kV	perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4	±2kV	perf. Criteria B
		IEC/EN61000-4-4	±4kV (See Fig. 2 for recommended circuit)	perf. Criteria B
		IEC/EN61000-4-4	±4kV (See Fig. 3 for recommended circuit)	perf. Criteria A
	Surge	IEC/EN61000-4-5	line to line ±1kV	perf. Criteria B
		IEC/EN61000-4-5	line to line ±2kV (See Fig. 2 for recommended circuit)	perf. Criteria B
		IEC/EN61000-4-5	line to line ±2kV/line to PE ±4kV (See Fig. 3 for recommended circuit)	perf. Criteria A

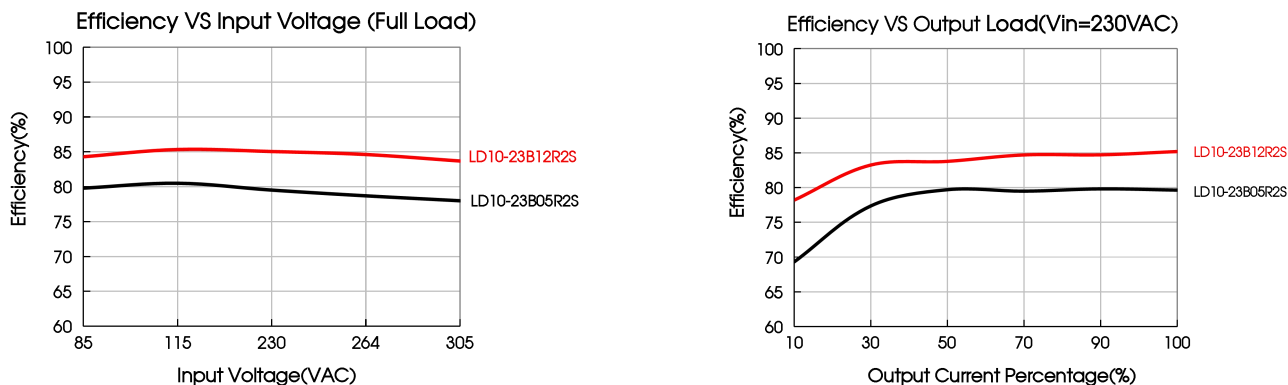
	CS	IEC/EN61000-4-6	10Vr.m.s	perf. Criteria A
	MS	IEC/EN61000-4-8	30A/m	perf. Criteria A
	Voltage variations	IEC/EN61000-4-11	70% Un, 25/30 cycle(50/60Hz) 40% Un, 10/12 cycle(50/60Hz) 0% Un, 1 cycle (Un is the maximum input nominal voltage.)	perf. Criteria B
	Voltage interruptions	IEC/EN61000-4-11	0% 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 85-100VAC and a DC input between 120-140VDC, 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

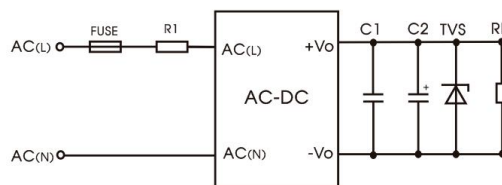


Fig. 1: Typical circuit diagram

Part No.	FUSE	R1	C1	C2	TVS
LD10-23B05R2S	2A/300V, slow-blow, required	6.8Ω/3W (wire-wound resistor, required)	1uF/50V	220uF/16V	SMBJ7.0A
LD10-23B12R2S				100uF/25V	SMBJ20A

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

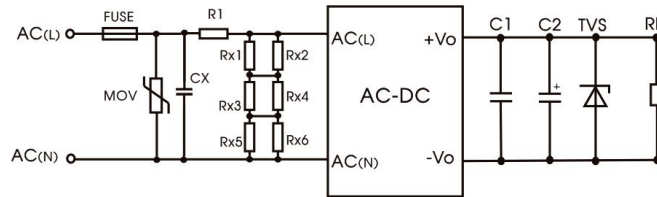


Fig. 2: EMC application circuit with higher requirements

Component	Recommended value
MOV	S14K350
CX	334K/305VAC, required

Note:

1. The function of CX is to filter out harmonic currents.
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.

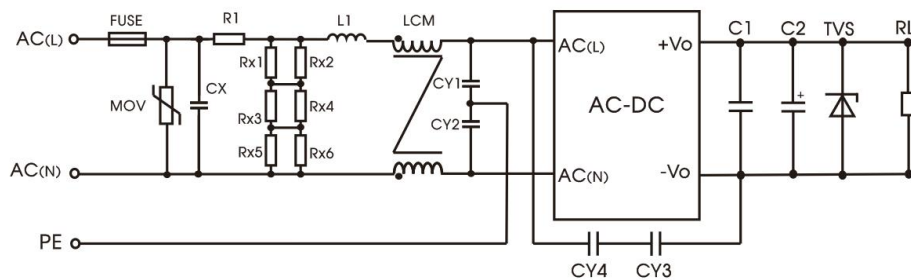


Fig. 3: Recommended circuit for class I equipment

(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	2A/300V, slow-blow, required
MOV	S14K350
CX	334K/305VAC
R1	12 Ω /5W (wire-wound resistor, required)
L1	1.2mH/0.5A
CY1/CY2	2.2nF/400VAC
CY3/CY4	1nF/400VAC
LCM	20mH, P/N: FL2D-10-203 (MORNSUN) is recommended

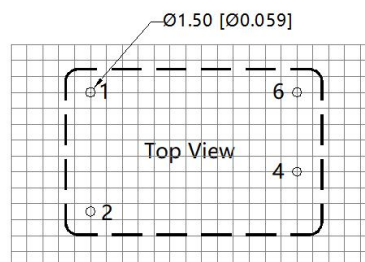
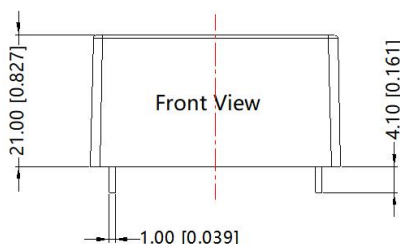
Note:

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.

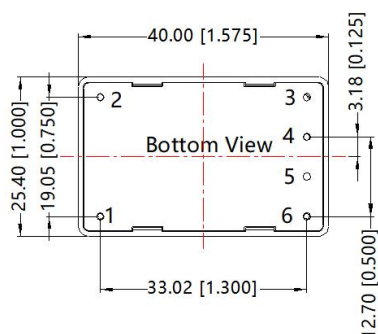
3. For additional information please refer to application notes on www.mornsun-power.com.

Dimensions and Recommended Layout

THIRD ANGLE PROJECTION



Note: Grid 2.54*2.54mm



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

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

Note:

- For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58220135;
- 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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