10W, AC-DC converter

Report EN62368-1 EN61558-1 EN60335-1 CB IEC62368-1 UKCA BS EN 62368-1 RoHS

FEATURES

- Ultra-wide 85 - 305VAC and 100 - 430VDC input voltage range
- Operating ambient temperature range: -40℃ to +85℃
- Up to 85% efficiency
- No-load power consumption < 0.1W
- 5000m altitude application
- OVC Ⅲ (meet EN61558-1)
- EMI performance meets CISPR32/EN55032 CLASS B, EN55014

LD10-23BxxR2 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 standards. The converters are widely used in industrial, power, 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.
EN/IEC	LD10-23B03R2	8.6W	3.3V/2600mA	74	6600
	LD10-23B05R2	10W	5V/2000mA	79	5000
	LD10-23B09R2		9V/1100mA	81	3600
	LD10-23B12R2		12V/830mA	84	2000
	LD10-23B15R2		15V/660mA	84	820
	LD10-23B24R2		24V/410mA	85	470

Note: *①Use suffix "A2S" for chassis and suffix "A4S" for DIN-Rail mounting;
②The 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	--	--	0.23	A
	230VAC	--	--	0.15	
Inrush Current	115VAC	--	25	--	
	230VAC	--	40	--	
Leakage Current	277VAC/50Hz	0.1mA RMS Max.			
Fuse (A2S/A4S package series include fuse)		2A/300V, slow-blow, required			
Hot Plug		Unavailable			

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy			--	±2	--	%
Line Regulation	Full load		--	±0.5	--	
Load Regulation	0%-100% load		--	±1	--	
Ripple & Noise*	20MHz bandwidth (peak-to-peak value)		--	50	100	mV
Stand-by Power Consumption	230VAC	3.3/5/9/12/15V	--	0.10	--	W
		24V	--	0.12	--	
Temperature Coefficient			--	±0.02	--	%/℃

Short Circuit Protection		Hiccup, continuous, self-recover				
Over-current Protection		≥110%Io, self-recover				
Over-voltage Protection	3.3/5V	≤7.5VDC (Output voltage clamp or hiccup)				
	9V	≤15VDC (Output voltage clamp or hiccup)				
	12/15V	≤20VDC (Output voltage clamp or hiccup)				
	24V	≤30VDC (Output voltage clamp or hiccup)				
Minimum Load		0	--	--	%	
Hold-up Time	115VAC	--	8	--	ms	
	230VAC	--	40	--		

Note: *The "Tip and barrel method" is used for ripple and noise test, output parallel 10uF electrolytic capacitor and 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				--	65	--	kHz
Power Derating		-40℃ to -25℃	85VAC - 115VAC	2.2	--	--	%/℃
		+50℃ to +70℃	3.3/5V	2.5	--	--	
		+55℃ to +70℃	9/12/15/24V	3.33	--	--	
		+70℃ to +85℃		0.66	--	--	
		85VAC - 100VAC		0.83	--	--	%/VAC
		2000m - 5000m		6.7	--	--	%/Km
Safety Standard				IEC/EN/BS EN62368-1, EN61558-1, EN60335-1 safety approval and design refer to UL62368-1			
Safety Class				CLASS I I			
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

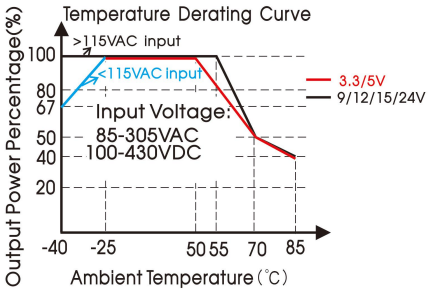
Case Material		Black plastic, flame-retardant and heat-resistant (UL94V-0)
Dimension	DIP package	40.00 x 25.40 x 21.00 mm
	A2S chassis mounting	76.00 x 31.50 x 29.80 mm
	A4S Din-Rail mounting	76.00 x 31.50 x 34.40 mm
Weight	DIP mounting	34g (Typ.)
	A2S chassis mounting	54g (Typ.)
	A4S Din-Rail mounting	74g (Typ.)
Cooling method		Free air convection

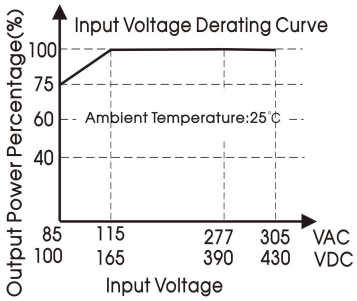
Electromagnetic Compatibility (EMC)

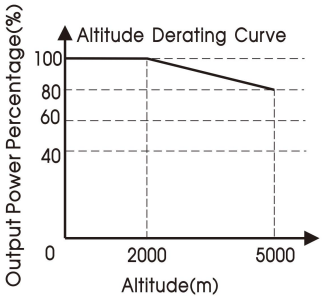
Emissions	CE	CISPR32/EN55032 CLASS B	
		EN55014-1	
	RE	CISPR32/EN55032 CLASS B	
		EN55014-1	
Immunity	ESD	IEC/EN61000-4-2 Contact ± 8KV/Air ±15KV	perf. Criteria B
		EN55014-2	perf. Criteria B
	RS	IEC/EN61000-4-3 10V/m	perf. Criteria A
		EN55014-2	perf. Criteria A
	EFT	IEC/EN61000-4-4 ±2KV	perf. Criteria 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
		EN55014-2	perf. Criteria B
	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
		EN55014-2	perf. Criteria B
	CS	IEC/EN61000-4-6 10Vr.m.s	perf. Criteria A
		EN55014-2	perf. Criteria A
	Voltage dip, short interruption and voltage variation	IEC/EN61000-4-11 0%, 70%	perf. Criteria B
		EN55014-2	perf. Criteria B

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

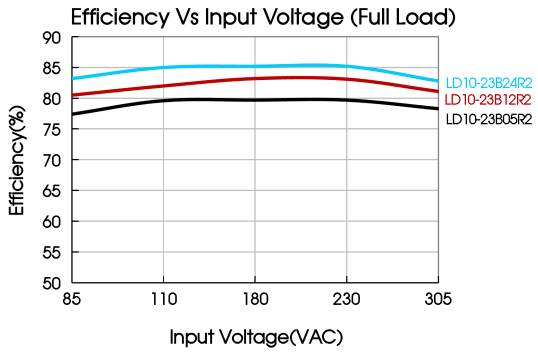
Product Characteristic Curve

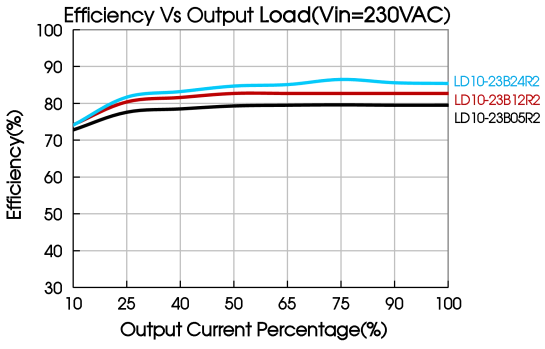






Note: ① With an AC input between 85-115VAC and a DC input between 100-165VDC, the output power must be derated as per temperature derating curves;
② This product is suitable for applications using natural air cooling; for applications in closed environment please consult Mornsun FAE.





Design Reference

1. Typical application

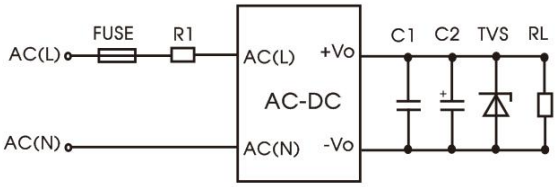


Fig. 1: Typical circuit diagram

Part No.	FUSE	R1	C1	C2	TVS
LD10-23B03R2	2A/300V, slow-blow, required	6.8Ω/3W (wire-wound resistor, required)	1uF/50V	220uF/16V	SMBJ7.0A
LD10-23B05R2				220uF/16V	SMBJ7.0A
LD10-23B09R2				100uF/25V	SMBJ12A
LD10-23B12R2				100uF/25V	SMBJ20A
LD10-23B15R2				100uF/25V	SMBJ20A
LD10-23B24R2				100uF/35V	SMBJ30A

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

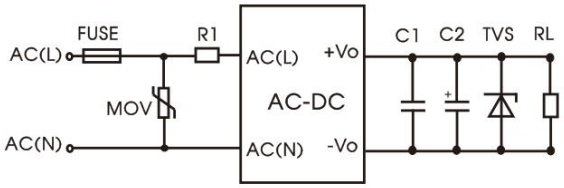


Fig. 2: EMC application circuit with higher requirements

Component	Recommended value
MOV	S14K350

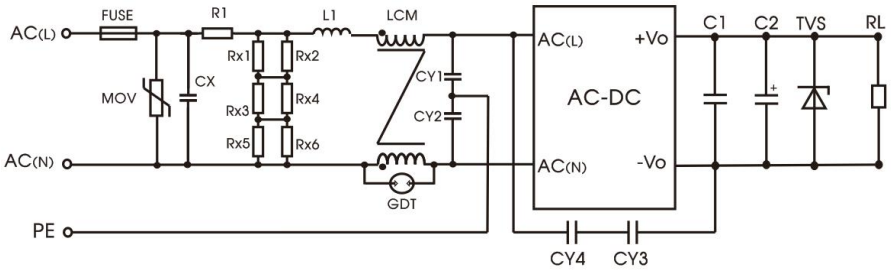


Fig. 3: Recommended circuit for class Ⅰ equipment

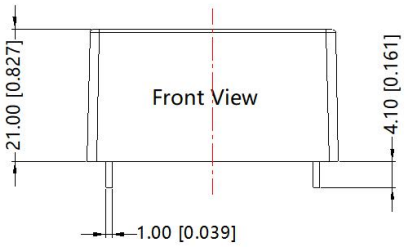
(Recommended when the output terminal of the product needs to be connected to PE or connected to PE through a Y capacitor)

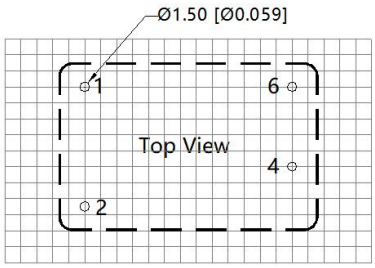
Component	Recommended value
FUSE	2A/300V, slow-blow, required
MOV	S14K350
CX	334K/305VAC
R1	12Ω/5W (wire-wound resistor, required)
L1	1.2mH/0.5A
CY1/CY2	2.2nF/400VAC
CY3/CY4	1nF/400VAC
GDT	300V/1KA
LCM	20 mH, P/N: FL2D-10-203 (MORNSUN) is recommended
Note: Rx1/Rx2/Rx3/Rx4/Rx5/Rx6 is the bleeder resistance of CX, and the recommended resistance value is 1.5MΩ/150VDC.	

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

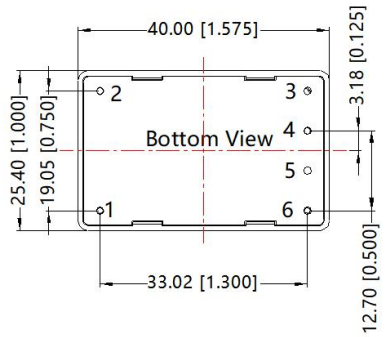
Dimensions and Recommended Layout

THIRD ANGLE PROJECTION





Note: Grid 2.54*2.54mm

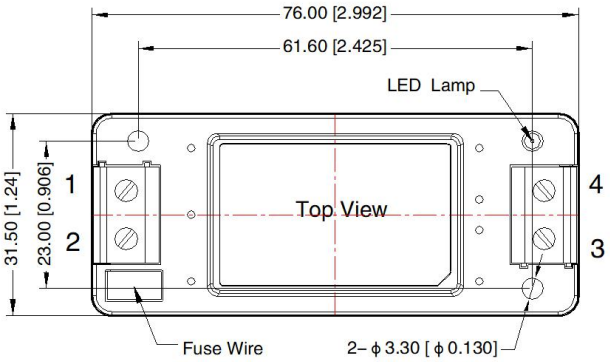


Pin-Out	
Pin	Function
1	AC(L)
2	AC(N)
3	No Pin
4	+Vo
5	No Pin
6	-Vo

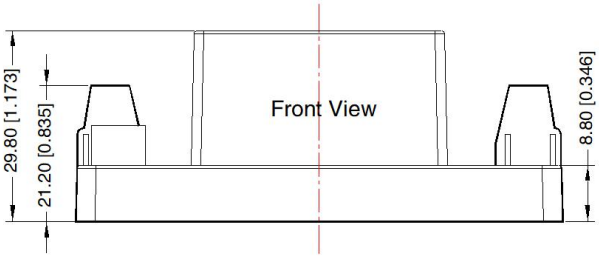
Note:
Unit: mm[inch]
Pin diameter tolerances: ±0.10[±0.004]
General tolerances: ±0.50[±0.020]

A2S Dimensions

THIRD ANGLE PROJECTION

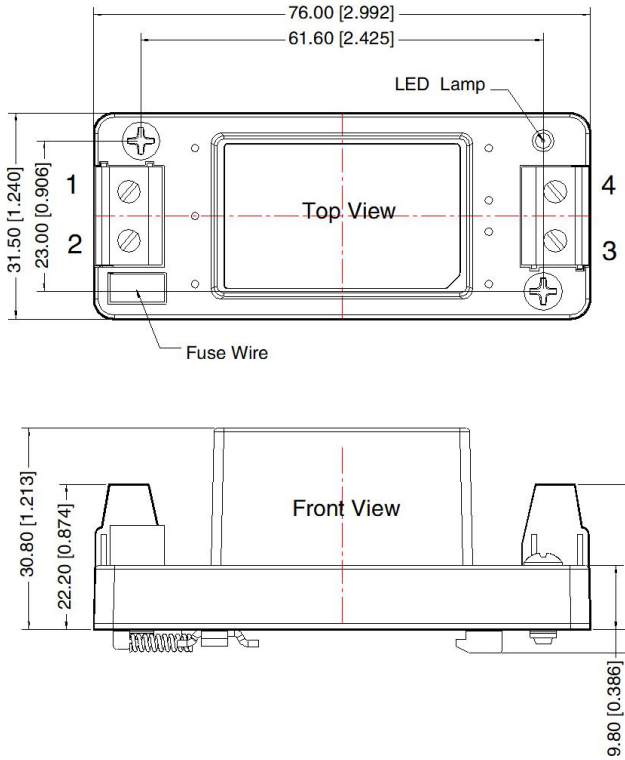


Pin–Out	
Pin	Function
1	AC(N)
2	AC(L)
3	–Vo
4	+Vo



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

A4S Dimensions



Pin–Out	
Pin	Function
1	AC(N)
2	AC(L)
3	–Vo
4	+Vo

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

Note:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58220135 (DIP package); 58220022 (A2S/A4S 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 Ta=25℃, 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.

Mornsun Guangzhou Science & Technology Co., Ltd.
Address: No. 8 Nanyun 4th Road, Huangpu District, Guangzhou, China
Tel: 86-20-38601850 Fax: 86-20-38601272 E-mail: info@mornsun.cn www.mornsun-power.com