AC/DC Converter

LD03-23BxxR2 Series

MORNSUN®

3W, AC-DC converter

CE Report
EN62368-1
EN61558-2-16
EN60335-1

UKCA Report
BS EN 62368-1

RoHS

FEATURES

- Ultra-wide 85 - 305VAC and 100 - 430VDC input voltage range
- 1 x 1 inch compact size
- Operating ambient temperature range: -40℃ to +85℃
- Efficiency up to 78%
- No-load power consumption 0.1W
- 5000m altitude application
- Plastic case meets UL94V-0 flammability
- EMI performance meets CISPR32/EN55032 CLASS B, EN55014

LD03-23BxxR2 series AC-DC converter is one of Mornsun's compact size power converters. It features ultra-wide 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 UL/EN/IEC62368, EN60335, EN61558 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.
EN/BS EN	LD03-23B03R2	3W	3.3V/900mA	71	4000
	LD03-23B05R2		5V/600mA	75	3000
	LD03-23B09R2		9V/333mA	77	1200
	LD03-23B12R2		12V/250mA	77	1200
	LD03-23B15R2		15V/200mA	78	680
	LD03-23B24R2		24V/125mA	78	220

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	--	--	0.08	A
	230VAC	--	--	0.06	
Inrush Current	115VAC	--	15	--	
	230VAC	--	25	--	
Leakage Current	277VAC/50Hz	0.25mA RMS Max.			
Recommended External Input Fuse		1A, slow-blow, required (The actual use needs to be selected according to the application environment)			
Hot Plug		Unavailable			

Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy	3.3V output	--	±3	--	%
	others	--	±2	--	
Line Regulation	Full load	--	±0.5	--	
Load Regulation	0%-100% load	--	±1	--	
Ripple & Noise*	20MHz bandwidth (peak-to-peak value)	--	50	100	mV

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Stand-by Power Consumption	230VAC	--	0.10	--	W
Temperature Coefficient		--	±0.02	--	%/℃
Short Circuit Protection		Hiccup, continuous, self-recover			
Over-current Protection		≥200%Io, self-recover			
Over-voltage Protection	3.3/5VDC output	≤7.5VDC			
	9VDC output	≤15VDC			
	12VDC output	≤16VDC			
	15VDC output	≤20VDC			
	24VDC output	≤30VDC			
Minimum Load		0	--	--	%
Hold-up Time	115VAC input	--	5	--	ms
	230VAC input	--	50	--	

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		4000	--	--	VAC
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		+70℃ to +85℃	3.3V	2.33	--	--	%/℃
			Others	1.33	--	--	
		85VAC - 100VAC		1.33	--	--	%/VAC
Altitude				--	--	5000	m
Safety Standard				EN61558-2-16, EN60335-1 safety approval & EN/BS EN62368-1(report); Design refer to UL/IEC62368-1			
Safety Class				CLASS Ⅱ			
MTBF		MIL-HDBK-217F@25℃		≥2799,000 h			
Designed Life		230VAC	Ta: 25℃ 100% load	>150x10³ h			
			Ta: 70℃ 100% load	>27x10³ h			

Mechanical Specifications

Case Material	Black plastic, flame-retardant and heat-resistant (UL94V-0)	
Dimension	Horizontal package	25.40 x 25.40 x 17.60 mm
	A2S mounting	76.00 x 31.50 x 26.40 mm
	A4S mounting	76.00 x 31.50 x 31.00 mm
Weight	Horizontal package	17.5g (Typ.)
	A2S mounting	38.0g (Typ.)
	A4S mounting	58.0g (Typ.)
Cooling method	Free air convection	

Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032 CLASS B
		EN55014-1
	RE	CISPR32/EN55032 CLASS B
		EN55014-1

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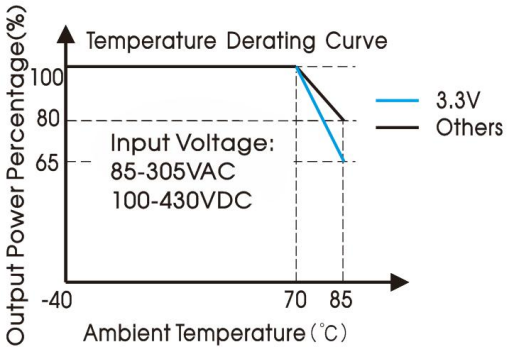
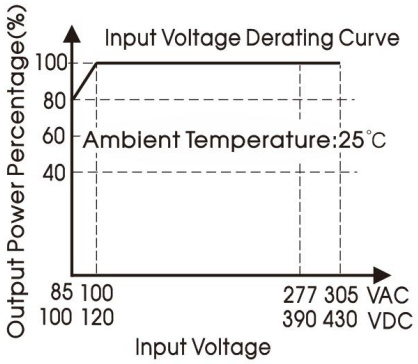
Immunity	ESD	IEC/EN61000-4-2	Contact ±6KV/Air ±8KV	perf. Criteria B
		EN55014-2		perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
		EN55014-2		perf. Criteria A
	EFT	IEC/EN61000-4-4	±2KV	perf. Criteria B
		IEC/EN61000-4-4	±4KV (See Fig. 2 for recommended circuit)	perf. Criteria B
		IEC/EN61000-4-4	±4KV (See Fig. 3 for recommended circuit)	perf. Criteria A
		EN55014-2		perf. Criteria B
	Surge	IEC/EN61000-4-5	line to line ±1KV (See Fig.1 for typical application circuit)	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

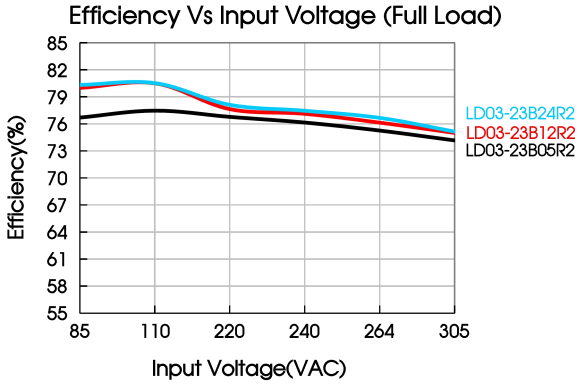
Note: ①When the output terminal of the product needs to be connected to PE through a Y capacitor, or close to the metal frame, please refer to the Fig. 3 for recommended circuit;
②Unless otherwise specified, EMC performance indicators are tested according to typical application circuits (Fig. 1).

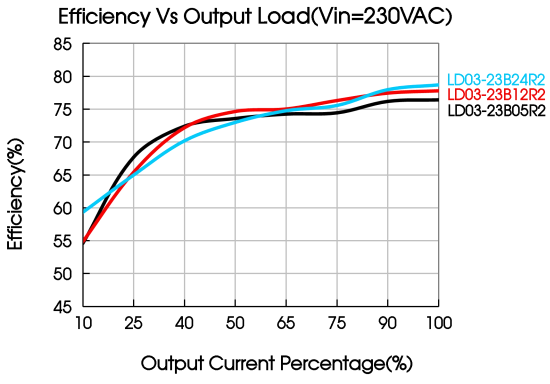
Product Characteristic Curve





Note: ① With an AC input between 85-100VAC and a DC input between 100-120VDC, 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.





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Design Reference

1. Typical application

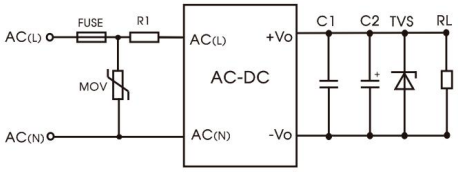

Fig. 1: Typical circuit diagram

Part No.	C1(uF)	C2(uF)	FUSE	R1	TVS	MOV
LD03-23B03R2	1	150	1A/300V, slow-blow, required	12Ω/3W (wire-wound resistor, required)	SMBJ7.0A	S10K350
LD03-23B05R2		150			SMBJ7.0A	
LD03-23B09R2		120			SMBJ12A	
LD03-23B12R2		120			SMBJ20A	
LD03-23B15R2		120			SMBJ20A	
LD03-23B24R2		68			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

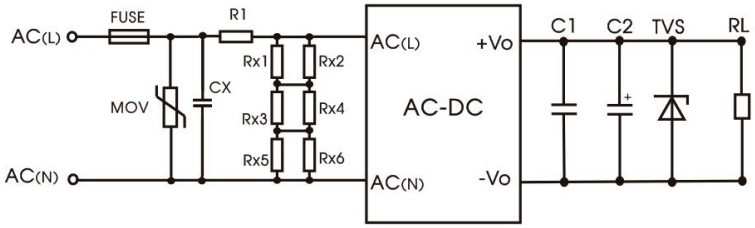

Fig. 2: EMC application circuit with higher requirements

Component	Recommended value
MOV	S14K350
R1	33Ω/3W (wire-wound resistor, required)
FUSE	2A/300V, slow-blow, required
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 1.5MΩ/150VDC.
3. The external circuit component parameters are the same as those of the above typical circuit diagram.

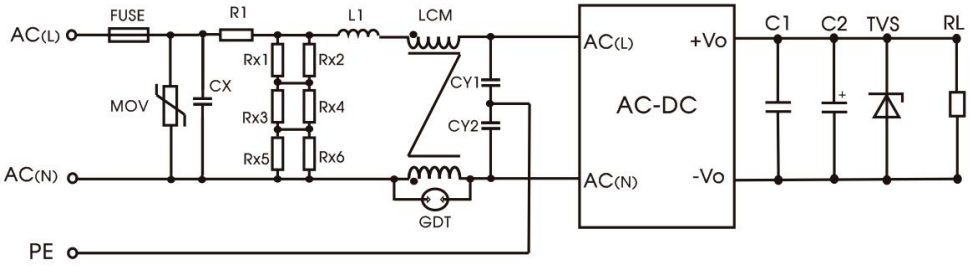

Fig. 3: Recommended circuit for class Ⅰ equipment

(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	33Ω/3W (wire-wound resistor, required)
L1	1.2mH/0.3A

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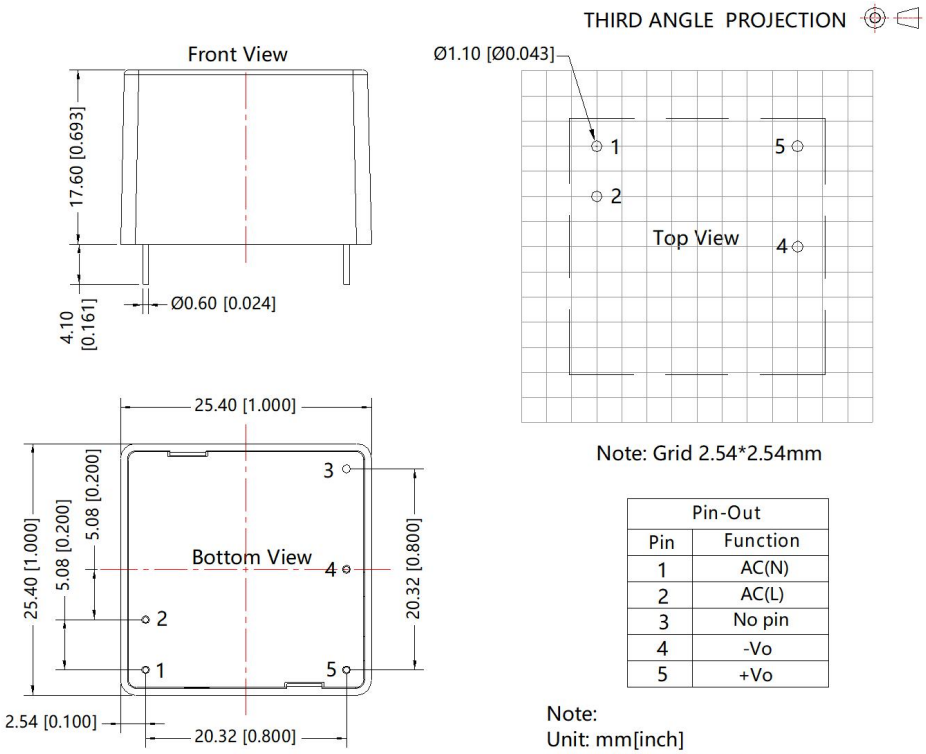
CY1/CY2	1nF/400VAC
GDT	300V/1KA
LCM	20 mH, P/N: FL2D-10-203 (MORNSUN) is recommended
Note: 1. Rx1/Rx2/Rx3/Rx4/Rx5/Rx6 is the bleeder resistance of CX, and the recommended resistance value is 1.5MΩ/150VDC. 2. The external circuit component parameters are the same as those of the above typical circuit diagram.	

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

Dimensions and Recommended Layout

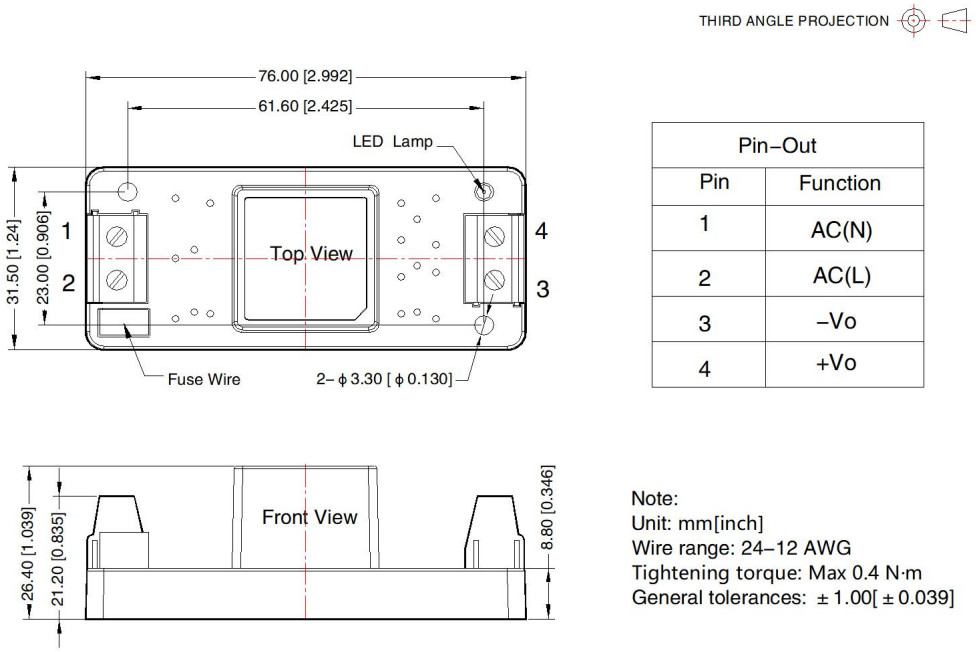


Note: Grid 2.54*2.54mm

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

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

A2S 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
General tolerances: ± 1.00[± 0.039]

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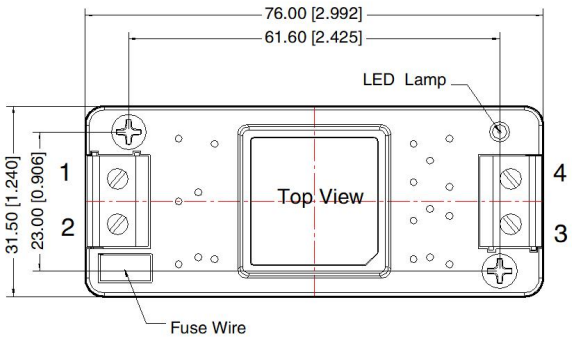
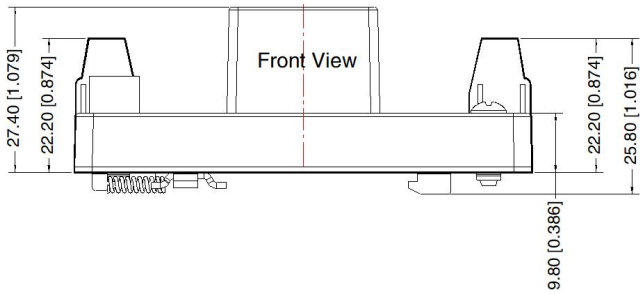
A4S Dimensions

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
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: 58220096 (Horizontal 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.

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