

2W, Ultra small size AC/DC converter



cULus CE CB RoHS

## FEATURES

- Wide Input voltage Range: 85 - 305VAC/120 - 430VDC
- AC and DC dual-use(input from the same terminal)
- High I/O isolation test voltage up to 4000VAC
- Operating ambient temperature range: -40°C to +70°C
- High power density, high efficiency, green power
- Output short circuit, over-current protection
- Meets CISPR32/EN55032 CLASS B
- IEC62368, UL62368, EN62368 safety approval
- Mounting options available for PCB mounting, chassis mounting and Din-Rail mounting

LDE02-23Bxx series is one of Mornsun's compact size power converters. It features 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, and meets the international UL62368 and EN62368 standards, and they are widely used in industrial, power, 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 (μF) Max.
UL/CE/CB	LDE02-23B03	2W	3.3V/600mA	65	4000
	LDE02-23B05		5V/400mA	70	4000
	LDE02-23B09		9V/222mA	72	2200
	LDE02-23B12		12V/167mA	76	2200
	LDE02-23B15		15V/133mA	76	1000
	LDE02-23B24		24V/83mA	78	680

## 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	--	--	0.11	A
	230VAC	--	--	0.031	
Inrush Current	115VAC	--	7	--	
	230VAC	--	14	--	
Leakage Current		--	--	0.25	mA
Recommended External Input Fuse		1A/300V slow-blow required			
Hot Plug		Unavailable			

## Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy	3.3V output	--	±6	--	%
	Other output	--	±5	--	
Line Regulation	Full load	--	±2	--	
Load Regulation	10%-100% load	--	±5	--	
Ripple & Noise*	20MHz bandwidth (peak-to-peak value)	--	100	200	mV
Temperature Coefficient		--	±0.04	--	%/°C

Stand-by Power Consumption		--	--	0.2	W
Short Circuit Protection		Hiccup, continuous, self-recovery			
Over-current Protection		≥ 120%Io, self-recovery			
Minimum Load		10	--	--	%
Hold-up Time	230VAC input	--	50	--	ms

Note: \* The "parallel cable" method is used for ripple and noise test, please refer to AC-DC Converter Application Notes for specific information.

### General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage	Input-output Electric Strength Test for 1min., leakage current <5mA	4000	--	--	VAC
Operating Temperature		-40	--	+70	°C
Storage Temperature		-40	--	+105	
Storage Humidity		--	--	95	%RH
Power Derating	-40°C to -25°C	3.3	--	--	% / °C
	+55°C to +70°C	3.3	--	--	
	85VAC - 100VAC	1.33	--	--	%/VAC
Safety Standard		IEC62368/EN62368/UL62368			
Safety Certification		IEC62368/EN62368/UL62368			
Safety Class		CLASS II			
MTBF		MIL-HDBK-217F@25°C > 300,000 h			

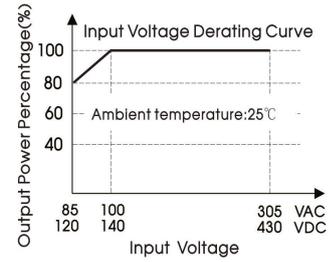
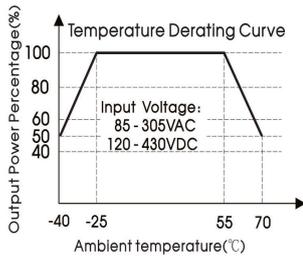
### Mechanical Specifications

Case Material	Black plastic, flame-retardant and heat-resistant (UL94V-0)	
Dimension	Horizontal package	33.70 x 22.20 x 18.00mm
	A2S chassis mounting	76.00 x 31.50 x 26.80mm
	A4S Din-Rail mounting	76.00 x 31.50 x 31.40mm
Weight	Horizontal package	20g (Typ.)
	A2S chassis mounting	40g (Typ.)
	A4S Din-Rail mounting	60g (Typ.)
Cooling Method	Free air convection	

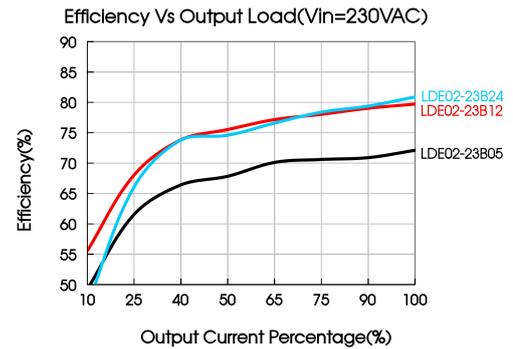
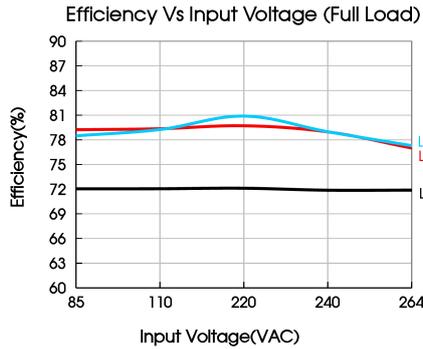
### Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032	CLASS B
	RE	CISPR32/EN55032	CLASS B
Immunity	ESD	IEC/EN 61000-4-2	Contact ±6KV/Air ±8KV perf. Criteria B
	RS	IEC/EN 61000-4-3	10V/m perf. Criteria A
	EFT	IEC/EN 61000-4-4	±2KV (See Fig. 2 for recommended circuit) perf. Criteria B
	Surge	IEC/EN 61000-4-5	line to line ±1KV/line to ground ±2KV (See Fig. 2 for recommended circuit) perf. Criteria B
	CS	IEC/EN61000-4-6	10Vr.m.s perf. Criteria A
	Voltage dips, short interruptions and voltage variations immunity	IEC/EN61000-4-11	0%, 70% perf. Criteria B

### 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 factory or one of our FAE.



### Design Reference

#### 1. Typical application

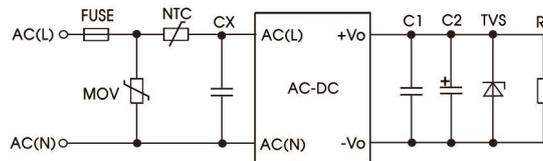


Fig. 1: Typical circuit diagram

Part No.	FUSE	MOV	NTC	CX	C1(μF)	C2(μF)	TVS
LDE02-23B03	1A/300V, slow-blow required	S14K350	10D-11	0.47μF/30 5VAC	1	330	SMBJ7.0A
LDE02-23B05						220	SMBJ7.0A
LDE02-23B09						100	SMBJ12A
LDE02-23B12						100	SMBJ20A
LDE02-23B15						100	SMBJ20A
LDE02-23B24						100	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

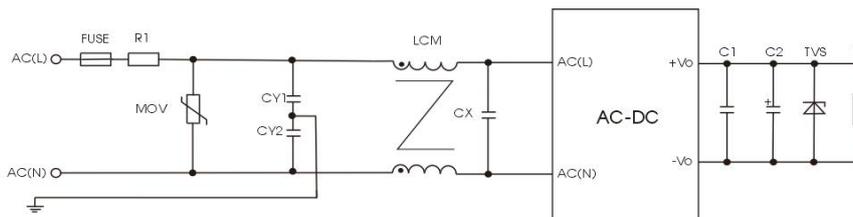
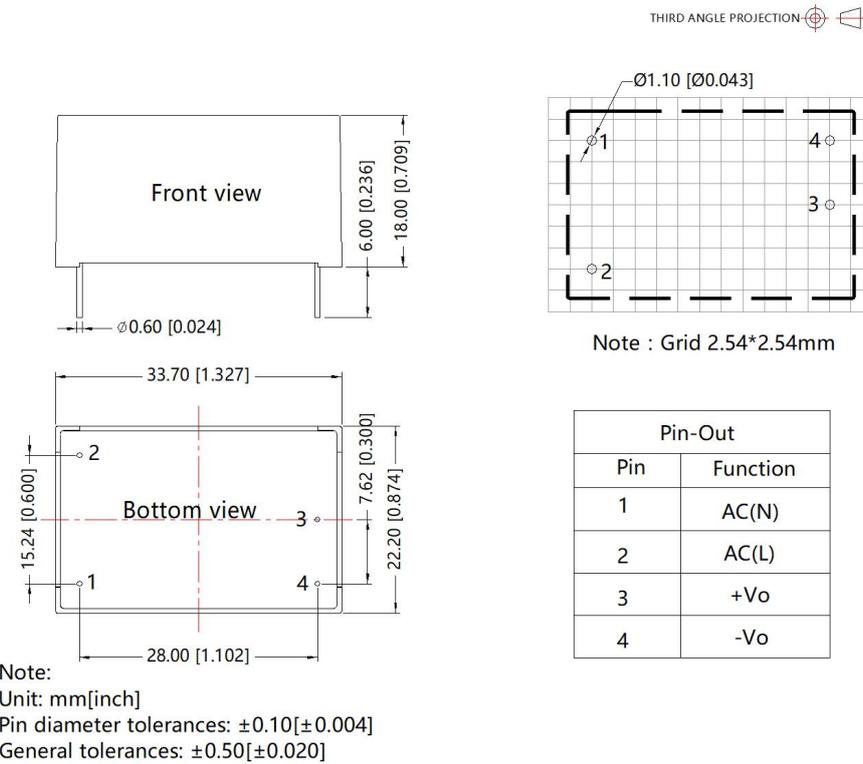


Fig 2: EMC circuit for harsh requirements

Components	Recommended value
MOV	S14K350
CY1、CY2	2.2nF/400VAC
CX	0.47μF/305VAC
LCM	10mH, we recommend using part no. FL2D-Z5-103 (MORNSUN)
R1	47Ω/3w
FUSE	1A/300V, slow-blow required

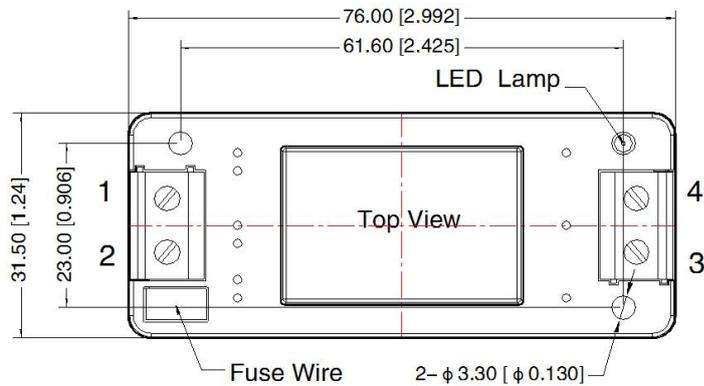
3. For more information about Mornsun EMC Filter products, please visit [www.mornsun-power.com](http://www.mornsun-power.com) to download the Selection Guide of EMC Filter.

LDE02-23Bxx Dimensions and Recommended Layout

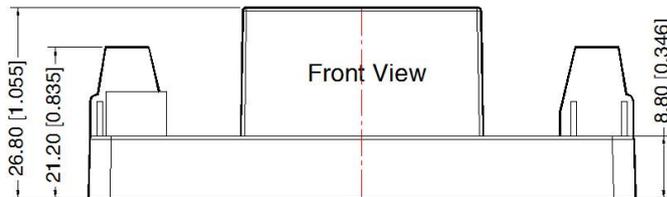


### LDE02-23BxxA2S Chassis mounting Dimensions

THIRD ANGLE PROJECTION 



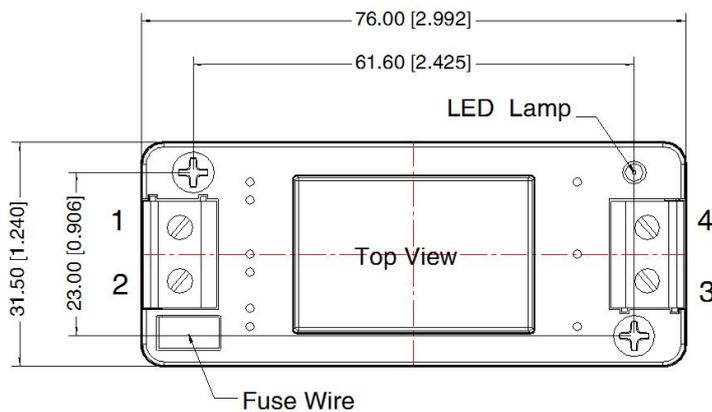
Pin-Out	
Pin	Function
1	AC(N)
2	AC(L)
3	-Vo
4	+Vo



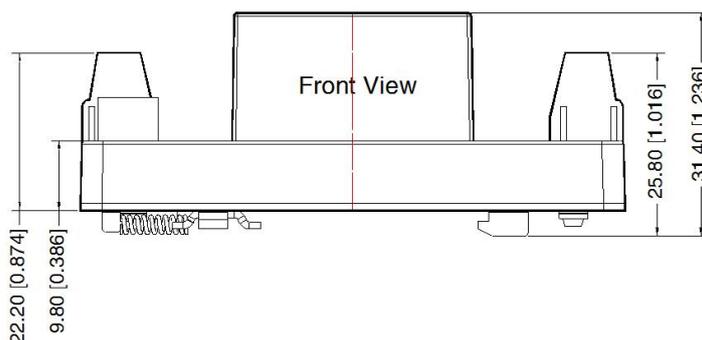
Note:  
 Unit: mm[inch]  
 Wire range: 24-12 AWG  
 Tightening torque: Max 0.4 N·m  
 General tolerances:  $\pm 0.50$  [ $\pm 0.020$ ]

### LDE02-23BxxA4S Din-Rail mounting 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:  $\pm 1.0$  [ $\pm 0.039$ ]

Note:

1. For additional information on Product Packaging please refer to [www.mornsun-power.com](http://www.mornsun-power.com). Packaging bag number: 58220014 (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  $T_a=25^{\circ}\text{C}$ , 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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