

5W, AC-DC converter



CE Report  
EN62368-1

CB  
IEC62368-1  
EN61558-1  
EN60335-1

UK  
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°C to +85°C
- Up to 81.5% efficiency
- No-load power consumption 0.1W
- 5000m altitude application
- Plastic case meets UL94V-0 flammability
- Wire package
- EMI performance meets CISPR32/EN55032 CLASS B, EN55014
- Design to meet UL62368

LD05-23BxxWR2 series AC-DC converters is one of Mornsun's compact size power converter. 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 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	Efficiency at 230VAC (%) Typ.	Capacitive Load (uF) Max.
EN/IEC	LD05-23B03WR2	5W	3.3V/1515mA	71.5	4000
	LD05-23B05WR2		5V/1000mA	77.5	3000
	LD05-23B09WR2		9V/555mA	80.5	1200
	LD05-23B12WR2		12V/416mA	80.5	1200
	LD05-23B15WR2		15V/333mA	81.5	680
	LD05-23B24WR2		24V/208mA	81.5	220

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	100	--	430	VDC
Input Frequency		47	--	63	Hz
Input Current	115VAC	--	--	0.13	A
	230VAC	--	--	0.07	
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

Stand-by Power Consumption	230VAC	--	0.10	--	W
Temperature Coefficient		--	±0.02	--	%/°C
Short Circuit Protection		Hiccup, continuous, self-recover			
Over-current Protection		≥130%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	°C
Storage Temperature				-40	--	+105	
Storage Humidity				--	--	+95	%RH
Soldering Temperature		Wave-soldering		260 ± 5℃; time: 5 - 10s			
		Manual-welding		360 ± 10℃; time: 3 - 5s			
Switching Frequency				--	65	--	kHz
Power Derating		-40℃ to -25℃		3.0	--	--	% / °C
		+50℃ to +70℃	3.3V	1.75	--	--	
		+55℃ to +70℃	5V/9V/12V	2.33	--	--	
		+60℃ to +70℃	15V/24V	3.5	--	--	
		+70℃ to +85℃	3.3V	1.67	--	--	
			Others	1.0	--	--	
		85VAC - 100VAC		1.0	--	--	% / VAC
		277VAC - 305VAC		0.54	--	--	
		2000m - 5000m		0.67	--	--	
Safety Standard				IEC/EN/BS EN62368-1, EN60335-1, EN61558-1safety approved; Design refer to UL62368-1			
Safety Class				CLASS II			
MTBF				MIL-HDBK-217F@25℃ > 2,602,000 h			
Designed Life		230VAC	Ta: 25℃ 100% load	> 130x10 <sup>3</sup> h			
			Ta: 55℃ 100% load	> 41x10 <sup>3</sup> h			

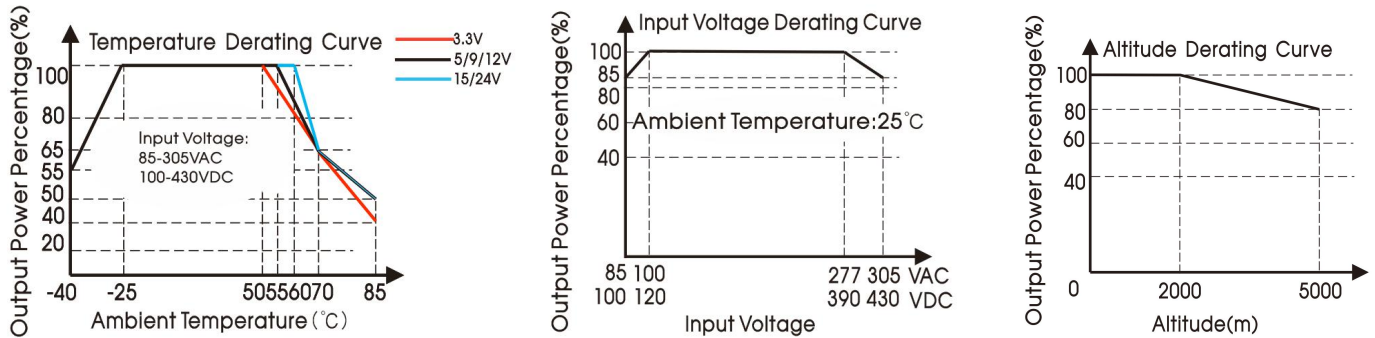
## Mechanical Specifications

Case Material		Black plastic, flame-retardant and heat-resistant (UL94V-0)	
Dimension		25.40 x 25.40 x 17.60 mm	
Weight	3.3V/5V/9V/12V	18.0g (Typ.)	
	15V/24V	18.3g (Typ.)	
Cooling method		Free air convection	

## Electromagnetic Compatibility (EMC)

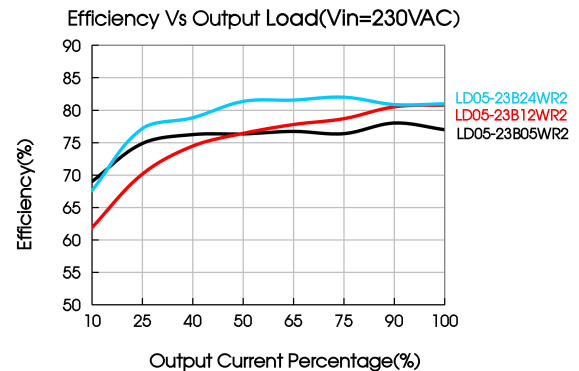
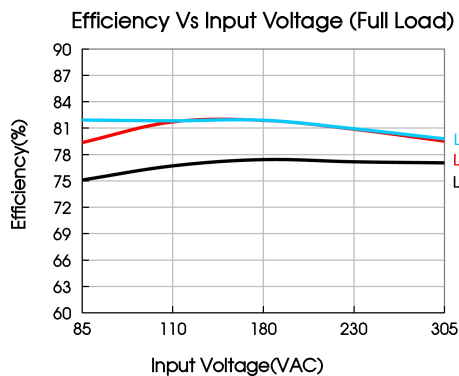
Emissions	CE	CISPR32/EN55032 CLASS B	
		EN55014-1	
	RE	CISPR32/EN55032 CLASS B	
		EN55014-1	
Immunity	ESD	IEC/EN 61000-4-2 Contact $\pm 6\text{KV}$ /Air $\pm 8\text{KV}$	perf. Criteria B
		EN55014-2	perf. Criteria B
	RS	IEC/EN61000-4-3 10V/m	perf. Criteria A
		EN55014-2	perf. Criteria A
	EFT	IEC/EN61000-4-4 $\pm 4\text{KV}$ (See Fig.2 for recommended circuit)	perf. Criteria B
		EN55014-2	perf. Criteria B
	Surge	IEC/EN61000-4-5 line to line $\pm 1\text{KV}$ (See Fig.1 for typical application circuit)	perf. Criteria B
		IEC/EN61000-4-5 line to line $\pm 2\text{KV}$ (See Fig.2 for recommended circuit)	perf. Criteria B
		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

## Product Characteristic Curve



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

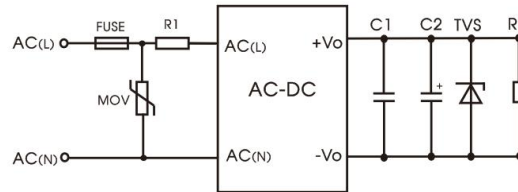


Fig. 1: Typical circuit diagram

Part No.	C1(uF)	C2(uF)	FUSE	R1 (wire-wound resistor, required)	TVS	MOV
LD05-23B03WR2	1	150	1A/300V, slow-blow, required	12Ω /3W	SMBJ7.0A	S10K350
LD05-23B05WR2		150			SMBJ7.0A	
LD05-23B09WR2		120			SMBJ12A	
LD05-23B12WR2		120			SMBJ20A	
LD05-23B15WR2		120			SMBJ20A	
LD05-23B24WR2		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

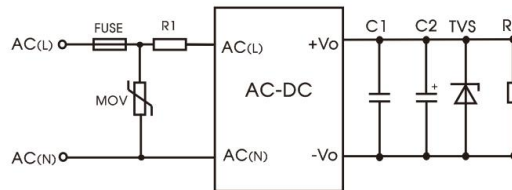


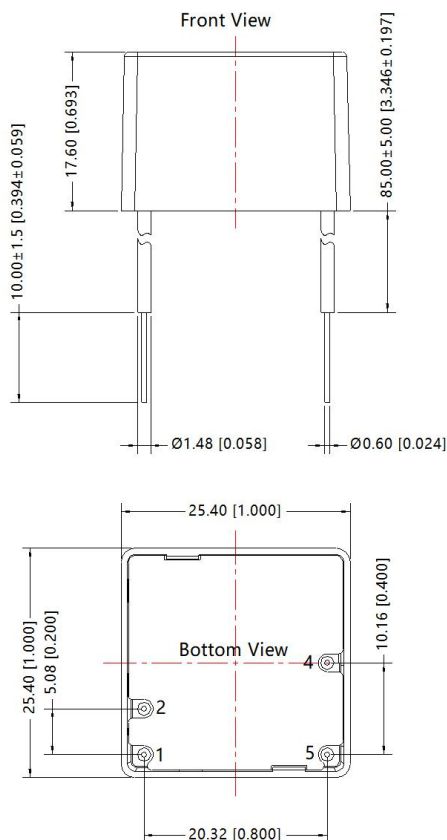
Fig. 2: EMC application circuit with higher requirements

Component	Recommended value
MOV	S14K350
R1	33Ω /3W (wire-wound resistor, required)
FUSE	2A/300V, slow-blow, required

3. For additional information please refer to application notes on [www.mornsun-power.com](http://www.mornsun-power.com).

Dimensions and Recommended Layout

THIRD ANGLE PROJECTION 



Pin-Out		
Pin	Wire Type	Function
1 blue	UL-1330 AWG26	AC(N)
2 brown	UL-1330 AWG26	AC(L)
4 black	UL-1330 AWG26	-Vo
5 red	UL-1330 AWG26	+Vo

Note:  
Unit: mm[inch]  
Wire diameter tolerances:  $\pm 0.30[\pm 0.012]$   
General tolerances:  $\pm 0.50[\pm 0.020]$   
About wire spacing tolerances:  $\pm 2.00[0.079]$

Note:

1. For additional information on Product Packaging please refer to [www.mornsun-power.com](http://www.mornsun-power.com). Packaging bag number: 58220051;
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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