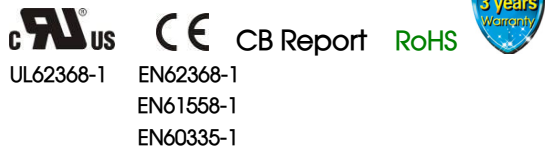


30W, AC-DC converter



## FEATURES

- Input voltage range: 85 - 305VAC and 120 - 430VDC (48V output) and 100 - 430VDC (others)
- Operating ambient temperature range: -40°C to +85°C
- Up to 90% efficiency
- No-load power consumption as low as 0.1W
- 5000m altitude application
- EMI performance meets CISPR32/EN55032 CLASS B, EN55014
- Meets surge ±2KV without additional circuits
- Over-voltage category OVC III (meet EN61558-1)

LD30-23BxxR2 series AC-DC converters is one of Mornsun's new generation compact size power converter. 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 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.
UL/EN/IEC	LD30-23B03R2	19.8	3.3V/6000mA	85	6600
	LD30-23B05R2	30	5V/6000mA	86	6600
	LD30-23B09R2	30.6	9V/3400mA	88	4400
	LD30-23B12R2	30	12V/2500mA	90	4400
	LD30-23B15R2	30	15V/2000mA	90	3300
	LD30-23B24R2	31.2	24V/1300mA	88	1000
	LD30-23B48R2	30.2	48V/630mA	90	470

Note: \* Use suffix "A2S" for chassis and suffix "A4S" for DIN-Rail mounting.

## Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Input Voltage Range	AC input	85	--	305	VAC	
	DC input	3.3V/5V/9V/12V/15V/24V	100	--	430	VDC
		48V	120	--	430	VDC
Input Frequency		47	--	63	Hz	
Input Current	115VAC	--	--	0.75	A	
	230VAC	--	--	0.5		
Inrush Current	115VAC	--	25	--		
	230VAC	--	50	--		
Leakage Current	277VAC/50Hz	0.1mA RMS Max.				
Built In Fuse		2A/300V, slow-blow				
Hot Plug		Unavailable				

## Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy	3.3V	--	±3	--	%
	5V/9V/12V/15V/24V/48V	--	±2	--	

Line Regulation	Full load	--	±0.5	--		
Load Regulation	0%-100% load	3.3V	--	±2	--	
		5V	--	±1.5	--	
		9V/12V/15V/24V/48V	--	±1	--	
Ripple & Noise*	20MHz bandwidth (peak-to-peak value)	3.3V/5V/9V/12V/15V	--	--	100	mV
		24V/48V	--	100	150	
Stand-by Power Consumption	230VAC	3.3V/5V/9V/12V/15V/24V	--	0.1	0.12	W
		48V	--	0.15	0.2	
Temperature Coefficient		--	±0.02	--	%/°C	
Short Circuit Protection		Hiccup, continuous, self-recovery				
Over-current Protection		≥110%Io, self-recovery				
Over-voltage Protection	3.3VDC Output	≤6.3VDC (Output voltage hiccup)				
	5VDC Output	≤16VDC (Output voltage hiccup)				
	9VDC Output	≤16VDC (Output voltage hiccup)				
	12VDC Output	≤16VDC (Output voltage hiccup)				
	15VDC Output	≤25VDC (Output voltage hiccup)				
	24VDC Output	≤35VDC (Output voltage hiccup)				
	48VDC Output	≤60VDC (Output voltage hiccup)				
Minimum Load		0	--	--	%	
Hold-up Time	115VAC input	--	10	--	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	4200	--	--	VAC
Insulation Resistance	Input - output	At 500VDC	100	--	--	MΩ
Operating Temperature		-40	--	85	°C	
Storage Temperature		-40	--	85		
Storage Humidity		--	--	95	%RH	
Soldering Temperature	Wave-soldering	260 ± 5°C; time: 5 - 10s				
	Manual-welding	360 ± 10°C; time: 3 - 5s				
Switching Frequency		--	65	--	kHz	
Power Derating	-40°C to -25°C (<115VAC)	5V	2.67	--	--	%/°C
	-40°C to -25°C (<115VAC)	3.3V/9V/12V/15V/24V/48V	1.33	--	--	
	+50°C to +70°C		2.5	--	--	
	+70°C to +85°C		0.67	--	--	
	85VAC - 100VAC		1.33	--	--	%/VAC
	277VAC - 305VAC		0.72	--	--	
	2000m - 5000m		6.7	--	--	%/Km
Safety Standard		IEC/UL62368-1, EN61558-1, EN60335-1 Safety Approval & EN62368-1 (Report)				
Safety Class		CLASS II				
Vibration		10 ~ 500Hz, 5G 10min./1cycle, period for 60min. Each along X, Y, Z axes				
MTBF		MIL-HDBK-217F@25°C > 500,000 h				

### Mechanical Specifications

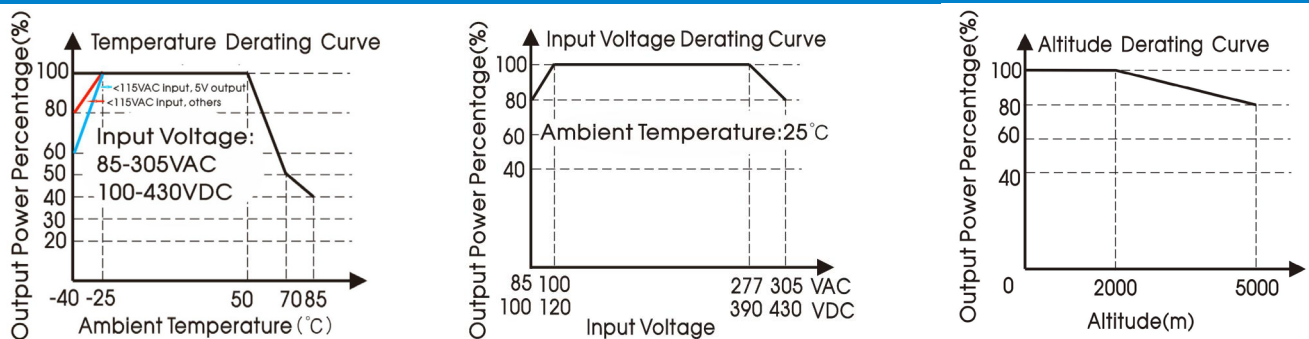
Case Material	Black plastic, flame-retardant and heat-resistant (UL94V-0)/Metal	
Dimension	DIP package	69.50 x 39.00 x 24.00 mm
	A2S chassis mounting	96.10 x 54.00 x 32.50 mm
	A4S Din-Rail mounting	96.10 x 54.00 x 37.10 mm
Weight	DIP package	100g (Typ.)
	A2S chassis mounting	147g (Typ.)
	A4S Din-Rail mounting	190g (Typ.)
Cooling method	Free air convection	

### Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032	CLASS B	
		CISPR32/EN55032	CLASS B (See Fig.3 for recommended circuit)	
		EN55014-1		
Emissions	RE	CISPR32/EN55032	CLASS B	
		CISPR32/EN55032	CLASS B (See Fig.3 for recommended circuit)	
		EN55014-1		
Immunity	ESD	IEC/EN 61000-4-2	Contact $\pm 8\text{KV}$ / Air $\pm 15\text{KV}$	Perf. Criteria A
		IEC/EN55014-2		Perf. Criteria A
	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
		IEC/EN55014-2		Perf. Criteria A
	EFT	IEC/EN61000-4-4	$\pm 2\text{KV}$	perf. Criteria A
		IEC/EN61000-4-4	$\pm 4\text{KV}$ (See Fig.2, Fig.3 for recommended circuit)	perf. Criteria A
		IEC/EN55014-2		perf. Criteria A
	Surge	IEC/EN61000-4-5	line to line $\pm 2\text{KV}$	perf. Criteria A
		IEC/EN61000-4-5	line to line $\pm 2\text{KV}$ /line to ground $\pm 4\text{KV}$ (See Fig.2, Fig.3 for recommended circuit)	perf. Criteria A
		IEC/EN55014-2		perf. Criteria A
	CS	IEC/EN61000-4-6	10Vr.m.s	perf. Criteria A
		IEC/EN55014-2		Perf. Criteria A
Voltage dip, short interruption and voltage variation	IEC/EN61000-4-11	0%, 70%	perf. Criteria B	
	IEC/EN55014-2		perf. Criteria B	

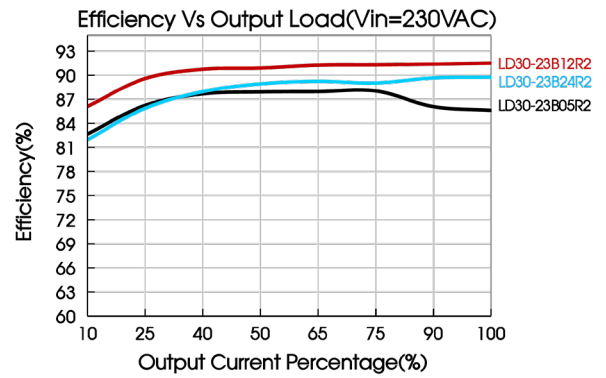
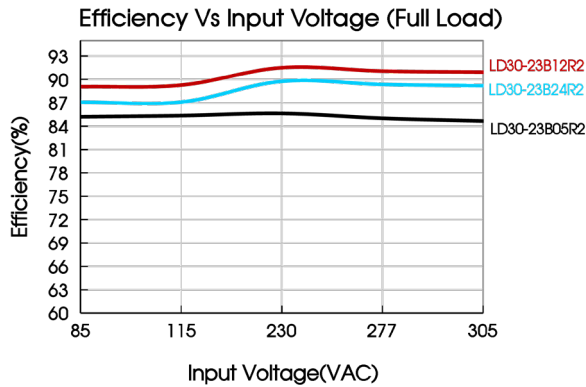
Note: When the output terminal of the product needs to be connected to PE through a Y capacitor, or close to the metal frame, please refer to the Fig.3 for recommended circuit.

### 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 factory or one of our FAE.



## Design Reference

### 1. Typical application

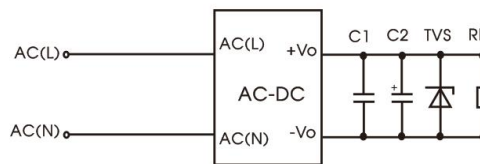


Fig. 1: Typical circuit diagram

Part No.	C1	C2	TVS
LD30-23B03R2	1uF/100V	10uF/50V	SMBJ7.0A
LD30-23B05R2		10uF/50V	SMBJ7.0A
LD30-23B09R2		10uF/50V	SMBJ12A
LD30-23B12R2		10uF/50V	SMBJ20A
LD30-23B15R2		10uF/50V	SMBJ20A
LD30-23B24R2		10uF/50V	SMBJ30A
LD30-23B48R2		10uF/63V	SMBJ64A

Output Filter Components:

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

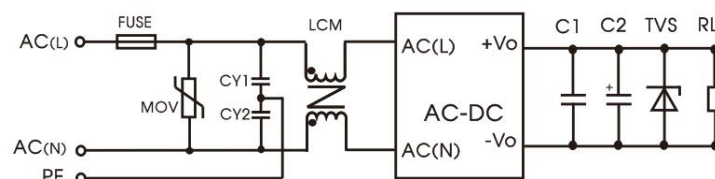


Fig 2: EMC application circuit with higher requirements

Component	Recommended value
FUSE	3.15A/300V, slow-blow, required
MOV	S14K350
CY1/CY2	1nF/400VAC
LCM	10mH, we recommended using part no. FL2D-Z5-103 (MORNSUN)

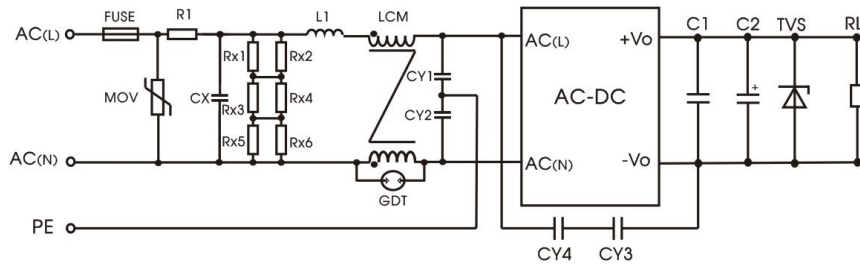


Fig 3: Recommended circuit for class I equipment

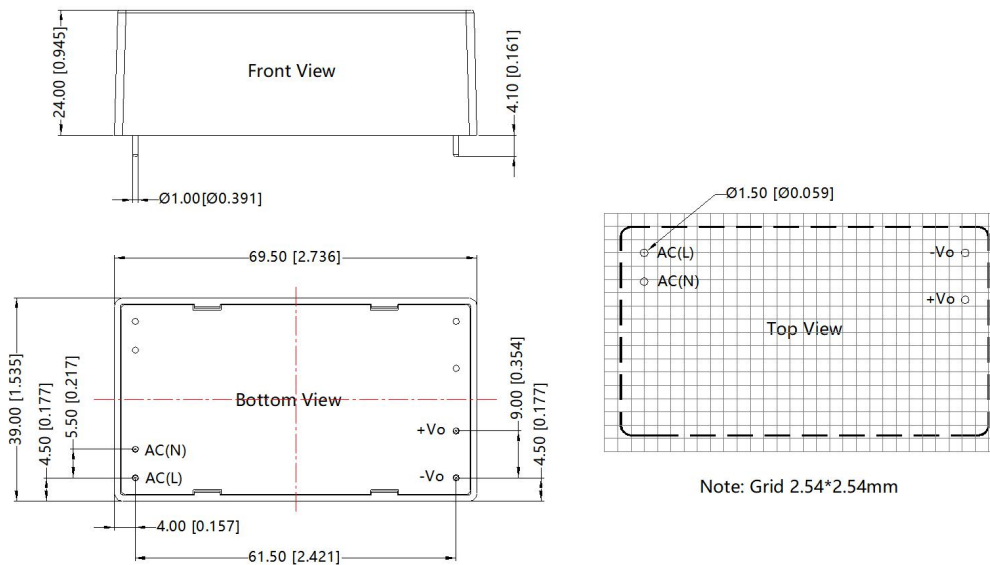
Component	Recommended value
FUSE	3.15A/300V, slow-blow, required
MOV	S14K350
CX	334K/305VAC
R1	6.8 Ω/5W (wire-wound resistor)
L1	1.2mH/0.5A
CY1/CY2	2.2nF/400VAC
CY3/CY4	1nF/400VAC
GDT	300V/1KA
LCM	20 mH, we recommended using part no. FL2D-10-203 (MORNSUN)

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](http://www.mornsun-power.com).

### Dimensions and Recommended Layout

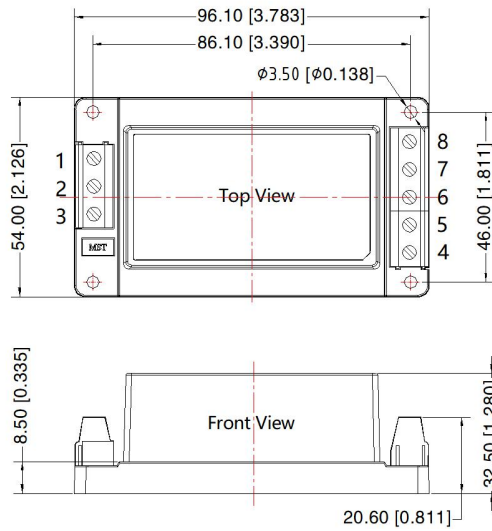
THIRD ANGLE PROJECTION



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

## A2S Dimensions

THIRD ANGLE PROJECTION

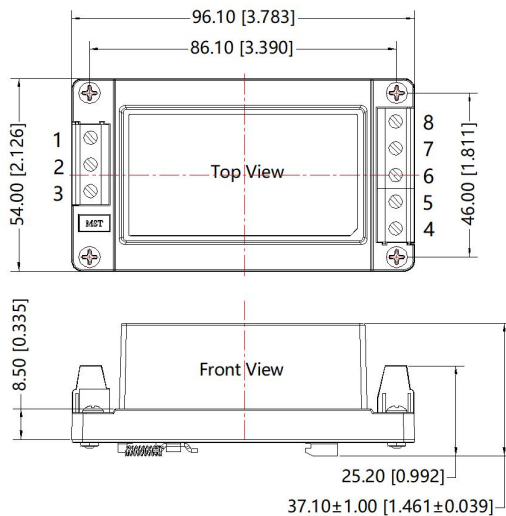


Pin-Out	
Pin	Mark
1	NC
2	AC(N)
3	AC(L)
4	+Vo
5	NC
6	NC
7	NC
8	-Vo

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

## A4S Dimensions

THIRD ANGLE PROJECTION



Pin-Out	
Pin	Mark
1	NC
2	AC(N)
3	AC(L)
4	+Vo
5	NC
6	NC
7	NC
8	-Vo

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