AC/DC Converter

LD20-23BxxR2-M Series

MORNSUN®

20W, AC-DC converter

RoHS

FEATURES

- Ultra-wide 85-305VAC and 100-430VDC input voltage range
- Operating ambient temperature range: -40℃ to +90℃
- High I/O isolation voltage up to 4000VAC
- High efficiency, high reliability, ultra low standby power consumption
- Regulated output, low ripple & noise
- Output short circuit, over-current, over-voltage protection
- Plastic case meets UL94V-0 flammability
- EMI performance meets CISPR32/EN55032 CLASS B

LD20-23BxxR2-M series AC-DC converters is one of Mornsun's new generation 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 and reinforced isolation. It offers good EMC performance compliant to IEC/EN61000-4 and CISPR32/EN55032 and meets UL/IEC/EN62368 standards. The converter is widely used in industrial, office, home appliances 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.
--	LD20-23B03R2-M	14.85	3.3V/4.5A	80	8000
	LD20-23B05R2-M	20	5V/4A	85	8000
	LD20-23B12R2-M	21.6	12V/1.8A	88	4000
	LD20-23B15R2-M	21	15V/1.4A	86	3000
	LD20-23B24R2-M	21.6	24V/0.9A	87	1000

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		--	--	0.6	A
	230VAC		--	--	0.4	
Inrush Current	115VAC	Cold start	--	20	--	
	230VAC		--	40	--	
Start-up Delay Time			--	--	3	s
Leakage Current	277VAC/50Hz		0.3mA RMS Max.			
Built In Fuse			2A/300V, slow-blow			
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	--	
Minimum Load		0	--	--	
Ripple & Noise*	20MHz bandwidth (peak-to-peak value)	--	100	150	mV
Stand-by Power Consumption	230VAC	--	0.12	0.15	W
Temperature Coefficient		--	±0.02	--	%/℃

Hold-up Time	115VAC input	--	8	--	ms
	230VAC input	--	40	--	
Short Circuit Protection	Recover time <3s after the short circuit disappear.	Hiccup, continuous, self-recover			
Over-current Protection		⩾120%Io, self-recover			
Over-voltage Protection	3.3V/5V output	⩽7.5VDC (Output voltage clamp or hiccup)			
	12V output	⩽16VDC (Output voltage clamp or hiccup)			
	15V output	⩽20VDC (Output voltage clamp or hiccup)			
	24V output	⩽30VDC (Output voltage clamp or hiccup)			
Note: *The "Tip and barrel method" is used for ripple and noise test, output parallel 47uF electrolytic capacitor and 0.1uF 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 <5 mA		4000	--	--	VAC
Insulation Resistance	Input - output	Ambient temperature: 25 ± 5℃ Relative humidity: < 95%RH, no condensation Test voltage: 500VDC		100	--	--	MΩ
Operating Temperature				-40	--	+90	℃
Storage Temperature				-40	--	+90	
Storage Humidity		Non-condensing		--	--	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℃	⩽165VAC input	2	--	--	%/℃
		+50℃ to +70℃		2.25	--	--	
		+70℃ to +90℃		2.25	--	--	
		85VAC - 100VAC		1.333	--	--	%/VAC
		277VAC- 305VAC		0.714	--	--	
		2000m - 5000m		6.67	--	--	%/Km
Safety Standard				Design refer to UL/EN/IEC62368-1, EN60335-1, EN61558-1, EN62477-1			
Safety Class				CLASS II			
MTBF		MIL-HDBK-217F@25℃		⩾1,000,000 h			

Mechanical Specifications

Case Material		Black plastic, flame-retardant and heat-resistant (UL94V-0)
Dimension	DIP package	52.40 x 27.20 x 24.00 mm
Weight	DIP package	55g (Typ.)
Cooling method		Free air convection

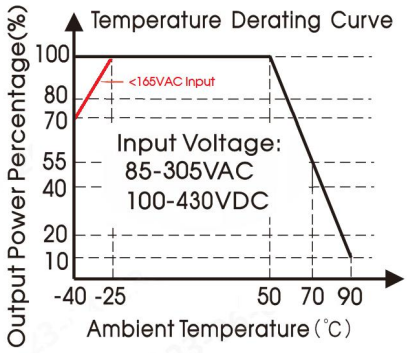
Electromagnetic Compatibility (EMC)

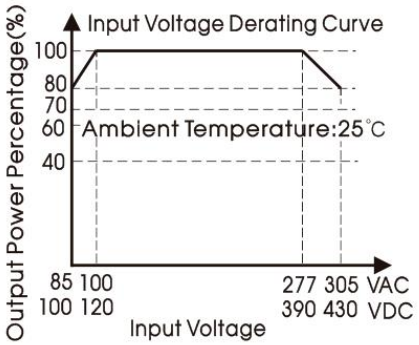
Emissions	CE	CISPR32/EN55032	CLASS B	
	RE	CISPR32/EN55032	CLASS B	
	Harmonic current	IEC/EN6100-3-2	CLASS A	
Immunity	ESD	IEC/EN61000-4-2	Contact ±6KV/Air ±8KV	perf. Criteria A
	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4	±2KV	perf. Criteria A
		IEC/EN61000-4-4	±4KV (See Fig. 2 for recommended circuit)	perf. Criteria A
	Surge	IEC/EN61000-4-5	Line to line ±2KV	perf. Criteria A
		IEC/EN61000-4-5	Line to line ±2KV/line to PE ±4KV (See Fig. 2 for recommended circuit)	perf. Criteria A

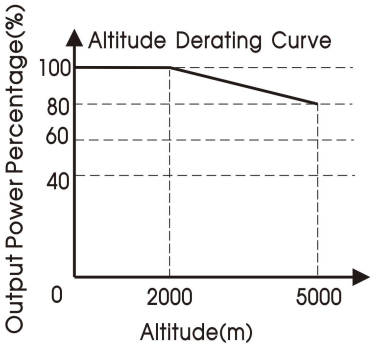
	CS	IEC/EN61000-4-6 10Vr.m.s		perf. Criteria A
	MS	IEC/EN6100-4-8 30A/m		perf. Criteria A
	Voltage variations *	IEC61000-6-2/IEC61000-4-11	70% Un, 25/30 cycle(50/60Hz) 40% Un, 10/12 cycle(50/60Hz) 0% Un, 1 cycle	perf. Criteria B
	Voltage interruptions *	IEC61000-6-2/IEC61000-4-11	0% Un, 250/300 cycle(50/60Hz)	perf. Criteria C

Note: ①*Un is the maximum input nominal voltage.
②Unless otherwise specified, EMC performance indicators are tested according to typical application circuits (Fig. 1).

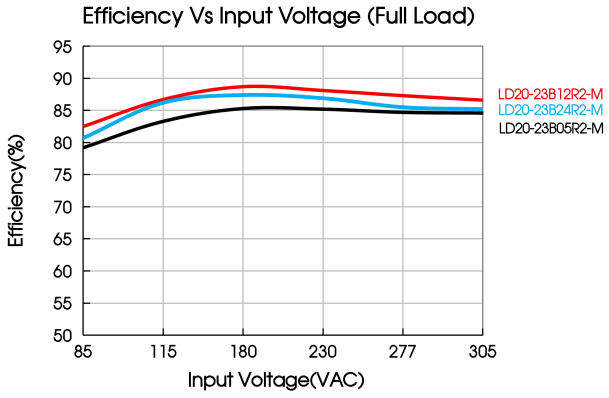
Product Characteristic Curve

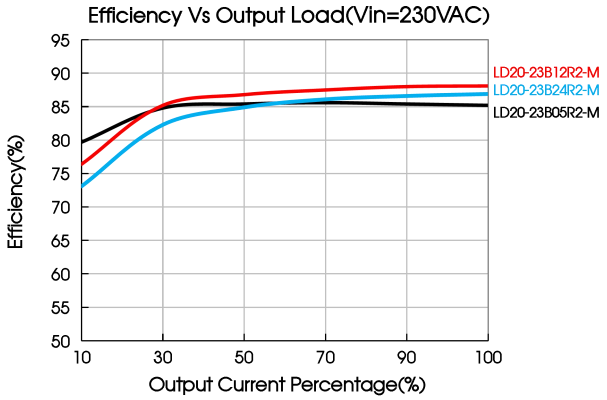






Note: ① With an AC input between 85-100V/277-305VAC and a DC input between 100-120V/390-430VDC, the output power must be derated as per temperature derating curves;
② This product is suitable for applications using natural air cooling; for applications in closed environment please consult Mornsun FAE.





Design Reference

1. Typical application

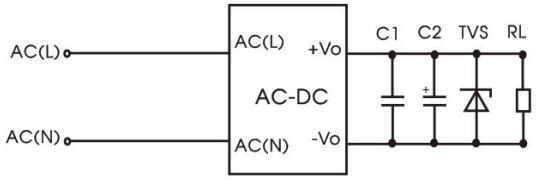


Fig. 1: Typical circuit diagram

Part No.	C1	C2	TVS
LD20-23B03R2-M	1uF/50V	820uF/16V	SMBJ7.0A
LD20-23B05R2-M		820uF/16V	SMBJ7.0A
LD20-23B12R2-M		47uF/25V	SMBJ20A
LD20-23B15R2-M		47uF/25V	SMBJ20A
LD20-23B24R2-M		47uF/35V	SMBJ35A

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

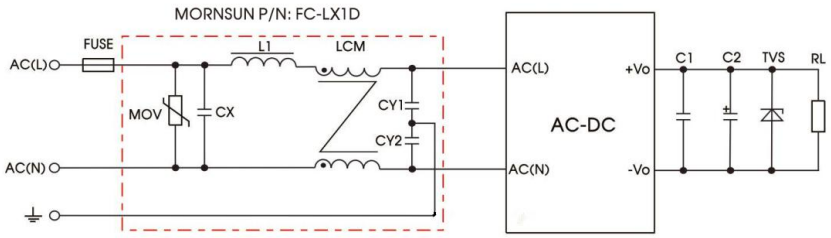


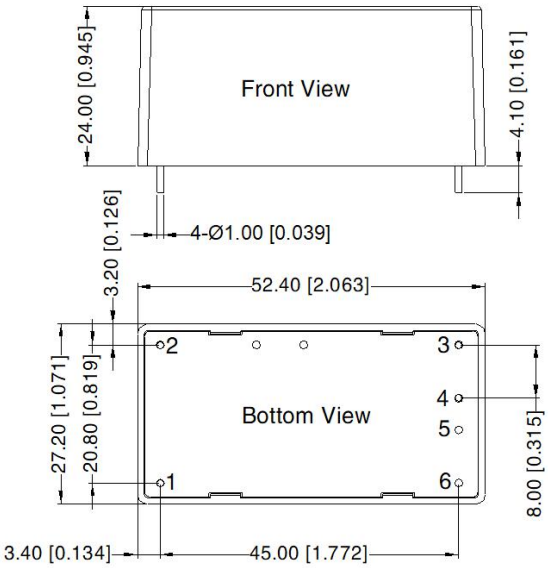
Fig. 2: Recommend circuit 2

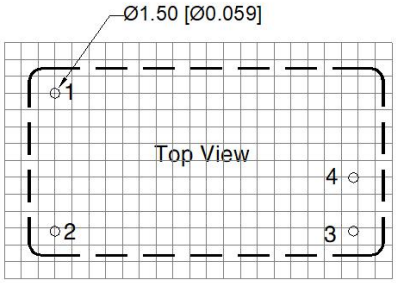
Component	Recommended value
FUSE	3.15A/300V, slow-blow, required
MOV	S14K350
CX	0.1uF/310VAC
L1	4.7uH/2A
LCM	10mH, P/N: FL2D-Z5-103 (MORNSUN) is recommended
CY1/CY2	1000pF/400VAC
FC-LX1D	2KV/4KV, EMC filter

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	Mark
1	AC(L)
2	AC(N)
3	–Vo
4	+Vo

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

Note:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58220011;
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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