

20W, AC-DC converter



RoHS



FEATURES

- Ultra-wide 85 - 305VAC and 100 - 430VDC input voltage range
- Operating ambient temperature range: -40°C to +85°C
- High I/O isolation voltage up to 4200VAC
- Output short circuit, over-current, over-voltage protection
- Plastic case meets UL94V-0 flammability
- OVC III (meet EN62477-1)
- EMI performance meets CISPR32/EN55032 CLASS B

LD20-23BxxR2-RC series is one of Mornsun's compact AC-DC power converters. It features ultra-wide AC input voltage ranges and compatible with DC input voltage, low power consumption, low ripple & noise, high efficiency, high reliability, reinforced insulation. It offers good EMC performance compliant to IEC/EN61000-4 and CISPR32/EN55032 and meets safety standard IEC/EN/UL62368, IEC/EN60335, EN62477. The converters are widely used in industrial, electric automation, home appliances and EV charging applications. For extremely harsh EMC environment, we recommend to use the application circuit shown 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 (Pending)	LD20-23B03R2-RC	13.2W	3.3V/4000mA	83	8000
	LD20-23B05R2-RC	20W	5V/4000mA	86	8000
	LD20-23B09R2-RC		9V/2222mA	86	5400
	LD20-23B12R2-RC		12V/1670mA	87	4000
	LD20-23B15R2-RC		15V/1333mA	88	3000
	LD20-23B24R2-RC		24V/830mA	87	1000
	LD20-23B48R2-RC		48V/410mA	89	330

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	--	--	0.5	A
	230VAC	--	--	0.3	
Inrush Current	115VAC	--	20	--	
	230VAC	--	40	--	
Leakage Current	277VAC/50Hz	0.1mA RMS Max.			
Recommended External Input Fuse		3.15A/300V, slow-blow, required			
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	--	
Ripple & Noise*	20MHz bandwidth (peak-to-peak value)	3.3V/5V/9V/12V/15V/ 24V output	--	100	mV
		48V output	--	100	
Stand-by Power Consumption	230VAC	3.3V/5V/9V/12V/15V/ 24V output	--	0.12	W
		48V output	--	0.2	

Temperature Coefficient		--	±0.02	--	%/°C
Short Circuit Protection		Hiccup, continuous, self-recovery			
Over-current Protection		≥ 120% I _o , self-recovery			
Over-voltage Protection	3.3V/5V output	≤ 7.5VDC (Output voltage clamp or hiccup)			
	9V/12V output	≤ 16VDC (Output voltage clamp or hiccup)			
	15V output	≤ 20VDC (Output voltage clamp or hiccup)			
	24V output	≤ 30VDC (Output voltage clamp or hiccup)			
	48V output	≤ 60VDC (Output voltage clamp or hiccup)			
Minimum Load		0	--	--	%
Hold-up Time	115VAC input	--	5	--	ms
	230VAC input	--	40	--	

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	Hipot test for 1min., leakage current <5 mA	4200	--	--	VAC	
Insulation Resistance	Input-output	At 500VDC	100	--	--	M Ω	
Operating Temperature			-40	--	+85	℃	
Storage Temperature			-40	--	+85		
Storage Humidity			--	--	95	%RH	
Soldering Temperature		Wave-soldering	260 ± 5℃; time: 5 - 10s				
		Manual-welding	360 ± 10℃; time: 3 - 5s				
Switching Frequency			--	70	--	kHz	
Power Derating		-40℃ to -25℃	85VAC - 165VAC	2	--	--	% /℃
		+55℃ to +85℃		1.67	--	--	
		85VAC - 100VAC		1.333	--	--	% /VAC
		277VAC - 305VAC		0.714	--	--	
Safety Standard			Design refer to IEC/EN/UL62368-1, IEC/EN60335-1, EN62477-1				
Safety Class			CLASS II				
MTBF			MIL-HDBK-217F@25℃ > 1,000,000 h				

Mechanical Specifications

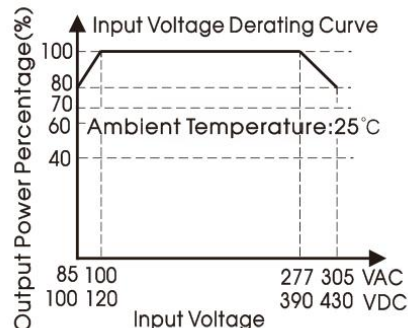
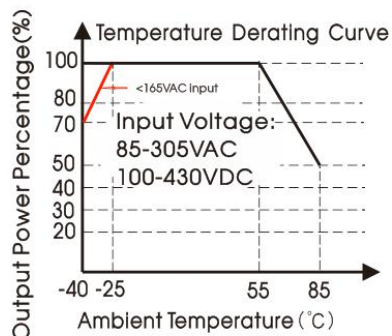
Case Material	Black plastic, flame-retardant and heat-resistant (UL94V-0)
Dimension	52.40 x 27.20 x 24.00 mm
Weight	55g (Typ.)
Cooling method	Free air convection

Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032	CLASS B	
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	Flicker	IEC/EN6100-3-3		
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, Fig. 3 for recommended circuit)	perf. Criteria A
	Surge	IEC/EN61000-4-5	line to line ±1KV	perf. Criteria A
		IEC/EN61000-4-5	line to line ±2KV/line to PE ±4KV (See Fig. 2, Fig. 3 for recommended circuit)	perf. Criteria A

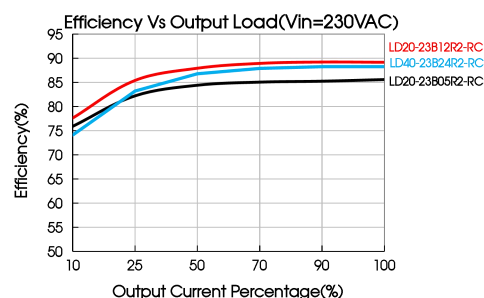
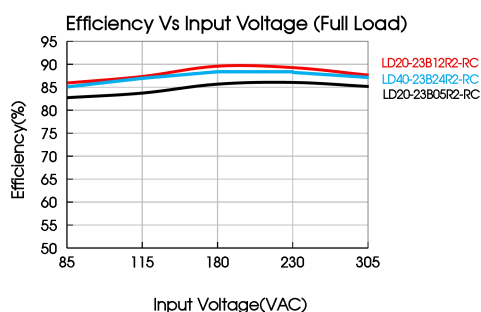
CS	IEC/EN61000-4-6	10Vr.m.s	perf. Criteria A
PFMF	IEC/EN6100-4-8	10A/m	perf. Criteria A
Voltage dip, short interruption and voltage variation	IEC/EN61000-4-11	0%, 70%	perf. Criteria B

Product Characteristic Curve



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

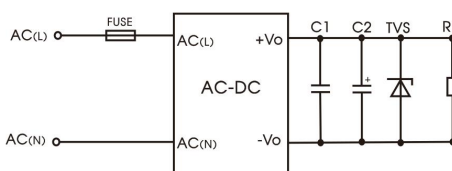


Fig.1: Typical circuit diagram

Part No.	FUSE	C1	C2	TVS
LD20-23B03R2-RC	3.15A/300V, slow-blow, required	1uF/50V	820uF/16V	SMBJ7.0A
LD20-23B05R2-RC			820uF/16V	SMBJ7.0A
LD20-23B09R2-RC			10uF/25V	SMBJ12A
LD20-23B12R2-RC			10uF/25V	SMBJ16A
LD20-23B15R2-RC			10uF/25V	SMBJ20A
LD20-23B24R2-RC			10uF/35V	SMBJ30A
LD20-23B48R2-RC		1uF/100V	10uF/63V	SMBJ60A

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

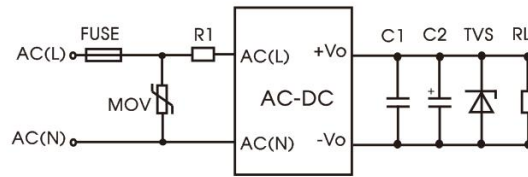


Fig. 2: EMC application circuit with higher requirements

Component	Recommended value
FUSE	3.15A/300V, slow-blow, required
MOV	S14K350
R1	12 Ω /5W(wire-wound resistor, required)

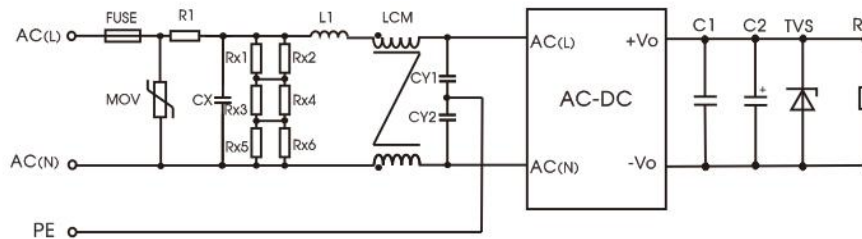


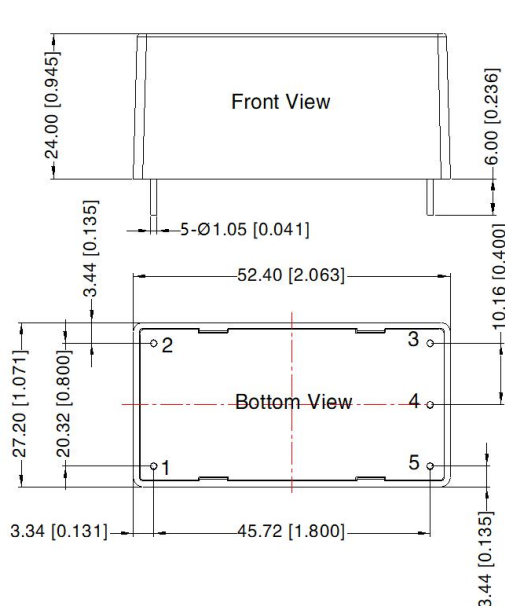
Fig. 3: EMC application circuit with higher requirements(Class I)

Component	Recommended value
FUSE	3.15A/300V, slow-blow, required
MOV	S14K350
R1	12 Ω /5W (wire-wound resistor, required)
CX	0.1 μ F/310VAC
L1	4.7 μ H/2A
LCM	10mH/0.6A
CY1, CY2	1000pF/400VAC
Note: Rx1/Rx2/Rx3/Rx4/Rx5/Rx6 is the bleeder resistance of CX, and the recommended resistance value is 1.5M Ω /150VDC.	

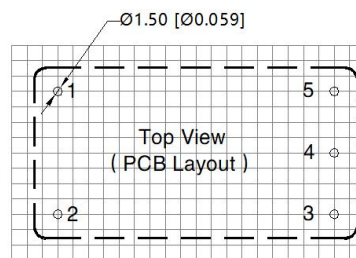
3. For additional information please refer to application notes on www.mornsun-power.com.

Dimensions and Recommended Layout

THIRD ANGLE PROJECTION



Note:
Unit: mm[inch]
PIN1/2/3/4/5: ϕ 1.0mm
Pin diameter tolerances: $\pm 0.10 [\pm 0.004]$
General tolerances: $\pm 0.50 [\pm 0.020]$



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

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 $T_a=25^{\circ}\text{C}$, 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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