AC/DC Converter
LH10-23BxxR2 Series

MORNSUN®

10W, AC-DC converter

cULus CE CB Report RoHS 3 years Warranty

UL62368-1 EN62368-1

FEATURES

- Universal 85-305VAC or 100-430VDC input voltage
- Operating ambient temperature range: -40℃ to +85℃
- High I/O isolation test voltage up to 4200VAC
- Up to 82% efficiency
- Output short circuit, over-current, over-voltage protection
- 5000m altitude application
- Plastic case meets UL94V-0 flammability
- Meets Emissions CLASS B and surge ±2KV/±4KV without additional circuits
- Over-voltage category OVC III (meet IEC62477-1) (2000m altitude)

LH10-23BxxR2 series AC-DC converters are highly efficient, environmental-friendly 10W power modules. It features universal 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 standards. The converters are widely used in industrial, power and office 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	LH10-23B03R2	6.6W	3.3V/2000mA	70	26000
	LH10-23B05R2	10W	5V/2000mA	76	9800
EN	LH10-23B09R2		9V/1100mA	78	3600
UL/EN/IEC	LH10-23B12R2		12V/900mA	80	2400
	LH10-23B15R2		15V/700mA	81	1200
	LH10-23B24R2		24V/450mA	82	400

Note: * Use suffix "A2" for chassis mounting and suffix "A4" for Din-Rail mounting.

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	--	--	0.26	A
	230VAC	--	--	0.16	
Inrush Current	115VAC	--	13	--	
	230VAC	--	23	--	
Leakage Current	270VAC/50Hz	0.25mA RMS Max.			
Recommended External Input Fuse		2A/300V, slow-blow, required			
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
Temperature Coefficient		--	±0.02	--	%/°C
Stand-by Power Consumption	230VAC	--	--	0.3	W
Short Circuit Protection		Hiccup, continuous, self-recovery			
Over-current Protection		≥150%Io, self-recovery			
Over-voltage Protection	3.3/5V output	≤7.5VDC (Hiccup)			
	9V output	≤15VDC (Hiccup)			
	12/15V output	≤20VDC (Hiccup)			
	24V output	≤30VDC (Hiccup)			
Minimum Load		0	--	--	%
Hold-up Time	115VAC input	--	8	--	ms
	230VAC input	--	65	--	

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	Input - output	Electric Strength Test for 1min., leakage current <5mA	4200	--	--	VAC
	Input - PE		2500	--	--	
	Output - PE		1250	--	--	
Impulse Withstand Voltage	Input - output	1.2/50 μs impulse waveform, three positive/ negative pulses, interval >= 5s. There is no breakdown discharge during the test.	6000	--	--	VDC
	Input - PE		6000	--	--	
	Output - PE		6000	--	--	
Insulation Resistance	Input - output	At 500VDC	100	--	--	MΩ
	Input - PE		100	--	--	
	Output - PE		100	--	--	
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°C to -25°C	2.67	--	--	%/°C
		+55°C to +70°C	2.67	--	--	
		+70℃ to +85℃	1.33	--	--	
		85VAC - 100VAC	1.67	--	--	%/VAC
		277VAC - 305VAC	0.71	--	--	
		2000m - 5000m	6.67	--	--	%/Km
Safety Standard		9V output	EN62368-1 (Report); Design refer to IEC/UL62368-1, IEC62477-1			
		Others	IEC/UL62368-1 & EN62368-1 (Report); Design refer to IEC62477-1			
Safety Class			CLASS I			
MTBF			MIL-HDBK-217F@25℃ >500,000 h			

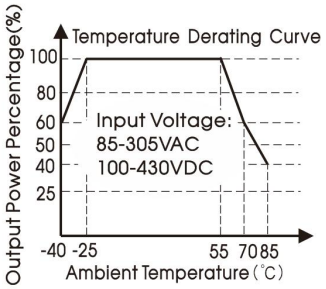
Mechanical Specifications

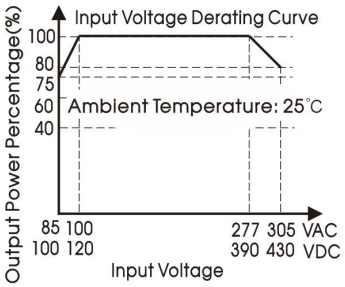
Case Material		Black plastic, flame-retardant and heat-resistant (UL94V-0)
Dimension	Horizontal package	55.00 x 45.00 x 21.00 mm
	A2 chassis mounting	96.10 x 54.00 x 29.50 mm
	A4 Din-Rail mounting	96.10 x 54.00 x 34.10 mm
Weight	Horizontal package/A2 chassis package/A4 DIN-rail package	75g (Typ.)/125g (Typ.)/165g (Typ.)
Cooling method		Free air convection

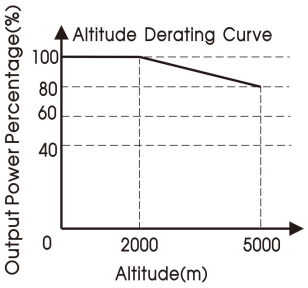
Electromagnetic Compatibility (EMC)

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

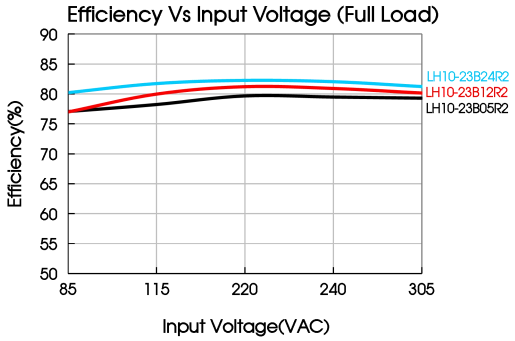
Product Characteristic Curve

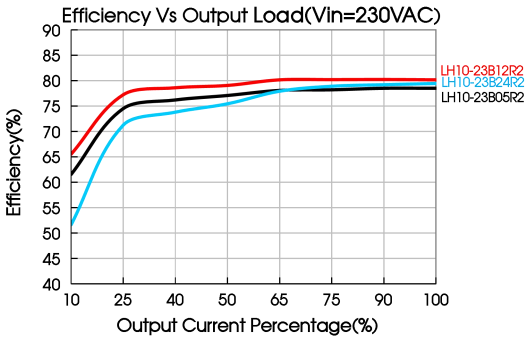






Note: ① With an AC input between 85-100VAC/277-305VAC and a DC input between 100-120VDC/390-430VDC, the output power must be derated as per temperature derating curves;
② This product is suitable for applications using natural air cooling; for applications in closed environment please consult factory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





Design Reference

1. Typical application

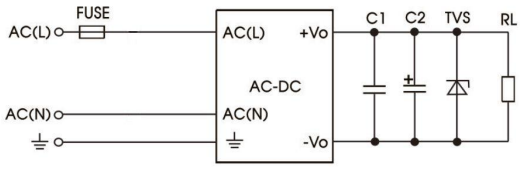


Fig. 1: Typical circuit diagram

Part No.	C1	C2	FUSE	TVS
LH10-23B03R2	1uF/50V	470uF/16V	2A/300V, slow-blow, required	SMBJ7.0A
LH10-23B05R2		330uF/16V		SMBJ7.0A
LH10-23B09R2		120uF/35V		SMBJ12A
LH10-23B12R2		120uF/35V		SMBJ20A
LH10-23B15R2		120uF/35V		SMBJ20A
LH10-23B24R2		68uF/35V		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

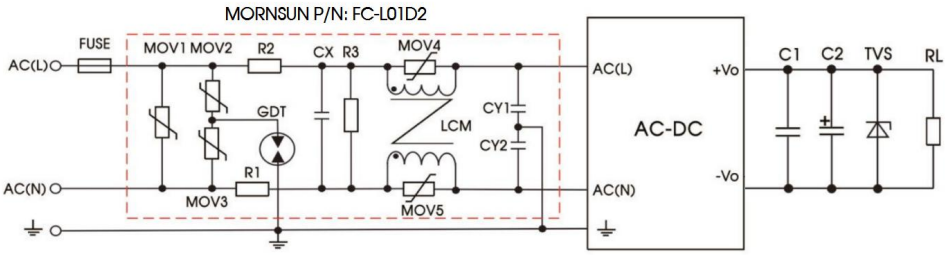
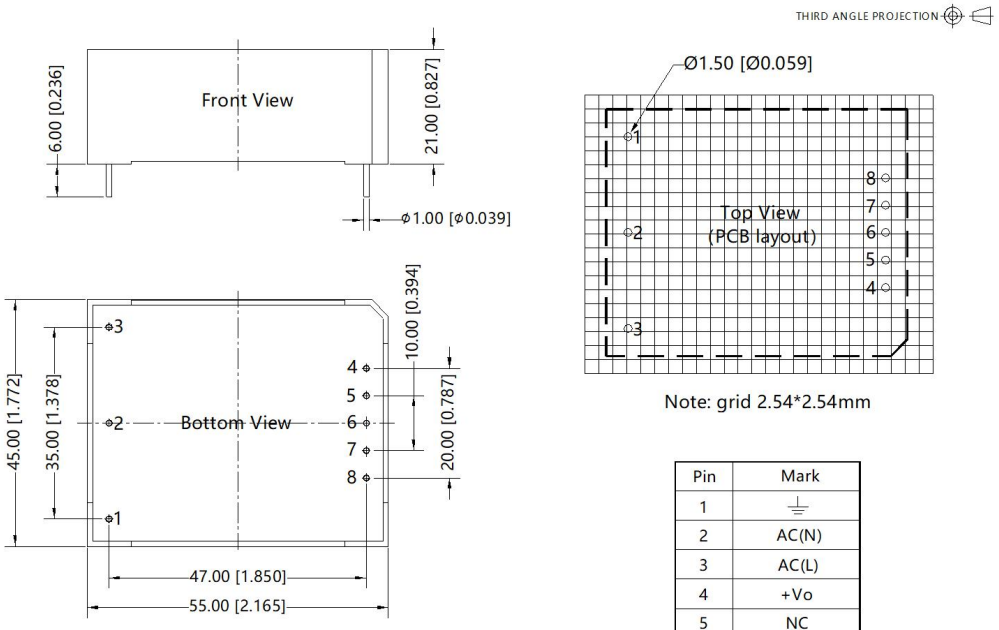


Fig 2: EMC application circuit with higher requirements

Component	Recommended value	Component	Recommended value
MOV1	S20K350	CY1/CY2	2200pF/400VAC
MOV2/MOV3	S14K350	GDT	B 5G3600
MOV4/MOV5	S07K350	R3	1MΩ/2W (wire-wound resistor, required)
CX	0.15uF/310VAC	FUSE	2A/300V, slow-blow, required
R1/R2	2Ω/3W (wire-wound resistor, required)		
LCM	10mH, we recommended using part no. FL2D-Z5-153 (MORNSUN)		
Note: R3 (required) can also be replaced by 4 pieces of 1.5MΩ/1206 patch resistors in series and parallel.			

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

Dimensions and Recommended Layout

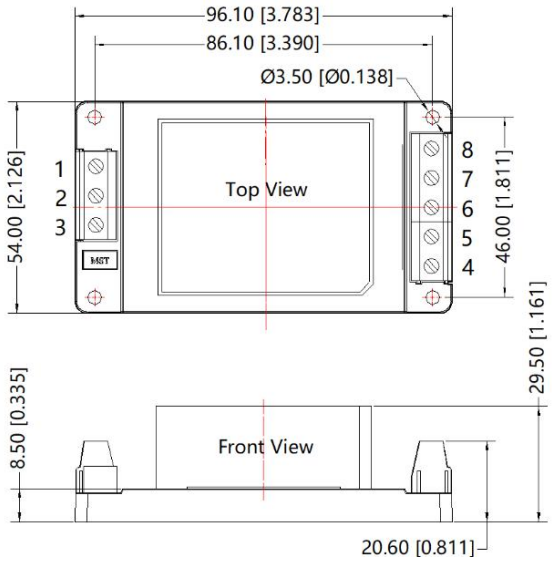


Note: grid 2.54*2.54mm

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

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

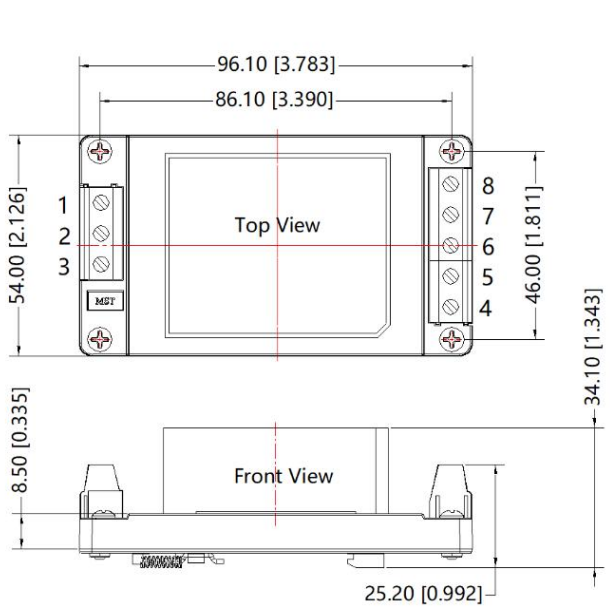
A2 Dimensions



Pin	Mark
1	⏚
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: ±1.00[±0.039]

A4 Dimensions



Pin	Mark
1	⏚
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: ±1.00[±0.039]

Note:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number : 58220006 (Horizontal package); 58220010 (A2/A4 package);
2. 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;
3. All index testing methods in this datasheet are based on our company corporate standards;
4. We can provide product customization service, please contact our technicians directly for specific information;
5. Products are related to laws and regulations: see "Features" and "EMC";
6. 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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