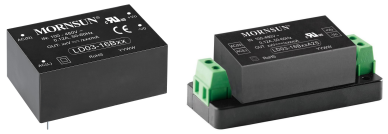
3W, AC/DC converter



FEATURES

- Ultra-wide 90 - 528V AC or 100 - 745V DC input voltage range
- Accepts AC and/or DC input (dual-use of same terminal)
- Operating ambient temperature range: -40℃ to +70℃
- Compact size, high power density
- I/O isolation test voltage 3000 VAC
- Used in electricity, instrumentation area
- Output short circuit, over-current protection
- UL/IEC/EN62368 safety approved

LD03-16Bxx Series is one of Mornsun's compact size power converters. It features ultra-wide input voltages, taking both DC and AC input, low power consumption, high efficiency, high reliability, reinforced insulation. The converters meet IEC/ UL/EN62368 and FCC part 15 standards. The converters are widely used in industrial control, instrumentation and electric power applications, requiring extremely wide input voltage range and meeting UL and CE and EMC certification. 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	Output Voltage and Current (Vo/Io) Nominal	Efficiency at 230VAC (%) Typ.	Capacitive Load (μF) Max.
UL/CE/CB	LD03-16B03	1.65W	3.3V/500mA	63	6000
	LD03-16B05	2.5W	5V/500mA	70	5000
	LD03-16B09	3W	9V/333mA	73	5000
	LD03-16B12		12V/250mA	76	3000
	LD03-16B15		15V/200mA	76	1500
	LD03-16B24		24V/125mA	76	1000

Note: * Part No. with suffix of "A2S" means chassis mounting and suffix of "A4S" means DIN-Rail mounting.

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Voltage Range	AC input	90	--	528	VAC
	DC input	100	--	745	VDC
Input Frequency		47	--	63	Hz
Input Current	115VAC	--	--	0.12	A
	230VAC	--	--	0.06	
	480 VAC	--	--	0.04	
Inrush Current	115VAC	--	9	--	
	230VAC	--	15	--	
	480 VAC	--	27	--	
Leakage Current	230VAC/50Hz	0.25mA RMS typ.			
Recommended External Input Fuse		2.0A slow-blow required			
Hot Plug		Unavailable			

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy	LD03-16B03		--	±6	--	%
	Others		--	±5	--	
Line Regulation	Full load	LD03-16B03	--	±2.5	--	
		Others	--	±1.5	--	
Load Regulation	10% - 100% load		--	±2.5	--	
Ripple & Noise*	20MHz bandwidth (peak-to-peak value)		--	--	180	mV
Temperature Coefficient			--	±0.15	--	%/℃
Stand-by Power Consumption	230VAC Input		--	--	0.3	W
	528VAC Input		--	--	0.5	
Short Circuit Protection			Hiccup, continuous, self-recovery			
Over-current Protection			150 - 300%Io, self-recovery			
Minimum Load			10			%
Hold-up Time	230VAC input		--	40	--	ms

Note: *The "parallel cable" method is used for ripple and noise test, please refer to AC-DC Converter Application Notes for specific information. See also output capacitor connection in Fig.1.

General Specifications

Item		Operating Conditions	Min.	Typ.	Max.	Unit
Isolation Test	Input-output	Electric Strength Test for 1min.	3000	--	--	VAC
Operating Temperature		See temperature derating curve	-40	--	+70	℃
Storage Temperature			-40	--	+105	
Storage Humidity			--	--	85	%RH
Soldering Temperature		Wave-soldering	260 ± 5℃; time: 5 - 10s			
		Manual-welding	360 ±10℃; time: 3 - 5s			
Power Derating		+55℃ ~ +70℃	2.0	--	--	%/℃
		-40℃ ~ -20℃ (90-165VAC)	3.0	--	--	
Safety Standard			IEC62368/UL62368/EN62368			
Safety Certification			IEC62368/UL62368/EN62368			
Safety Class			CLASS I I			
MTBF			MIL-HDBK-217F@25℃ ≥ 300,000 h			

Mechanical Specifications

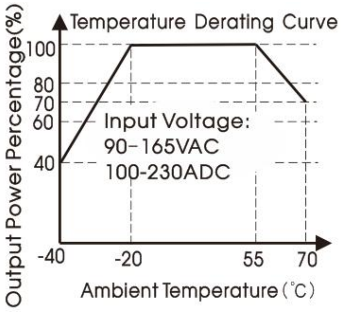
Case Material		Black plastic, flame-retardant and heat-resistant (UL94 V-0)
Dimension	DIP package	50.80 x 25.40 x 15.16 mm
	A2S chassis mounting	76.00 x 31.50 x 23.96 mm
	A4S Din-Rail mounting	76.00 x 31.50 x 28.56 mm
Weight	DIP package	30g (Typ.)
	A2S chassis mounting	50g (Typ.)
	A4S Din-Rail mounting	70g (Typ.)
Cooling Method		Free air convection

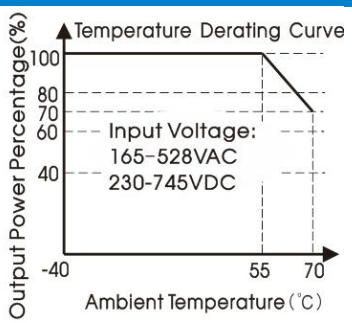
Electromagnetic Compatibility (EMC)

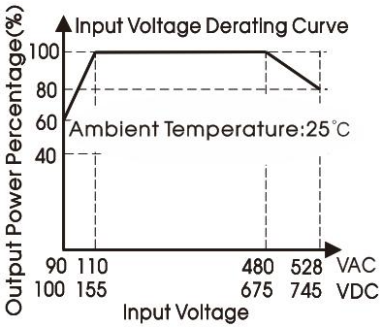
Emissions*	CE	CISPR32/EN55032/FCC part 15 CLASS A	
		CISPR32/EN55032/FCC part 15 CLASS B (See Fig. 2 for recommended circuit)	
	RE	CISPR32/EN55032/FCC part 15 CLASS A	
		CISPR32/EN55032/FCC part 15 CLASS B (See Fig. 2 for recommended circuit)	
Immunity	ESD	IEC/EN 61000-4-2 Contact ±6KV/Air ±8KV	Perf. Criteria B
	RS	IEC/EN 61000-4-3 10V/m (See Fig. 2 for recommended circuit)	perf. Criteria A
	EFT	IEC/EN 61000-4-4 ±2KV	perf. Criteria B
		IEC/EN 61000-4-4 ±4KV (See Fig. 2 for recommended circuit)	perf. Criteria B
	Surge	IEC/EN 61000-4-5 line to line ±1KV	perf. Criteria B
		IEC/EN 61000-4-5 line to line ±2KV/ line to ground ±4KV (See Fig. 2 for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6 3Vr.m.s (See Fig. 2 for recommended circuit)	perf. Criteria A
	Voltage dips, short interruptions and voltage variations immunity	IEC/EN61000-4-11 0%, 70% (See Fig. 2 for recommended circuit)	perf. Criteria B

*This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

Product Characteristic Curve







Note:
① With an AC input between 90 - 110V/480 - 528VAC and a DC input between 100 - 155V/675 - 745VDC, the output power has to be derated as per the 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

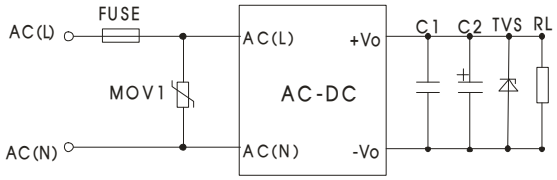


Fig. 1

Element model	MOV1	C1	C2 (required)	FUSE (required)	TVS
LD03-16B03	S14K550	0.1μF/50V	100μF/16V	2.0A	SMBJ7.0A
LD03-16B05			47μF/16V		
LD03-16B09			47μF/35V		SMBJ12A
LD03-16B12					SMBJ20A
LD03-16B15					SMBJ20A
LD03-16B24					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

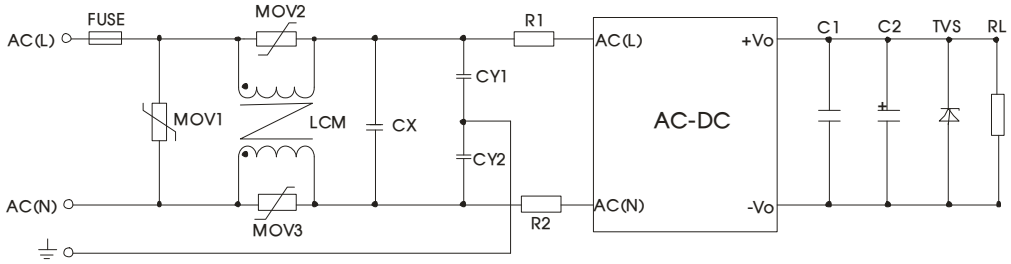
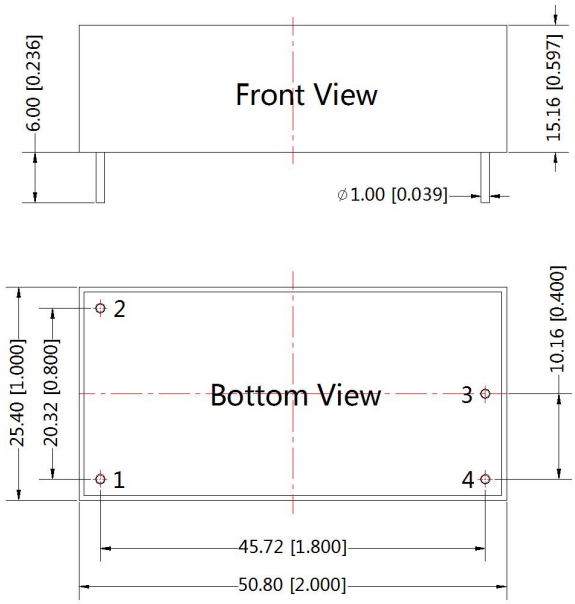


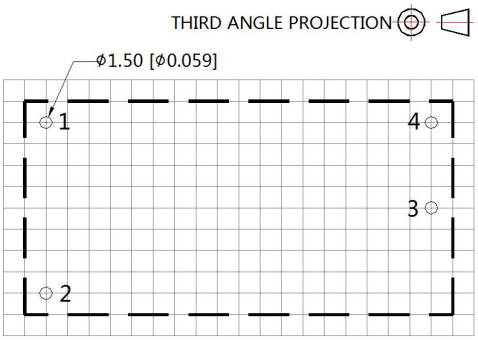
Fig. 2

Element model	Component values
MOV1	S14K550
MOV2, MOV3	S07K300
LCM	10mH
CX	0.22μF/530VAC
CY1, CY2	470pF/500VAC
R1, R2	12Ω/2W
FUSE	2.0A slow-blow required

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

Dimensions and Recommended Layout



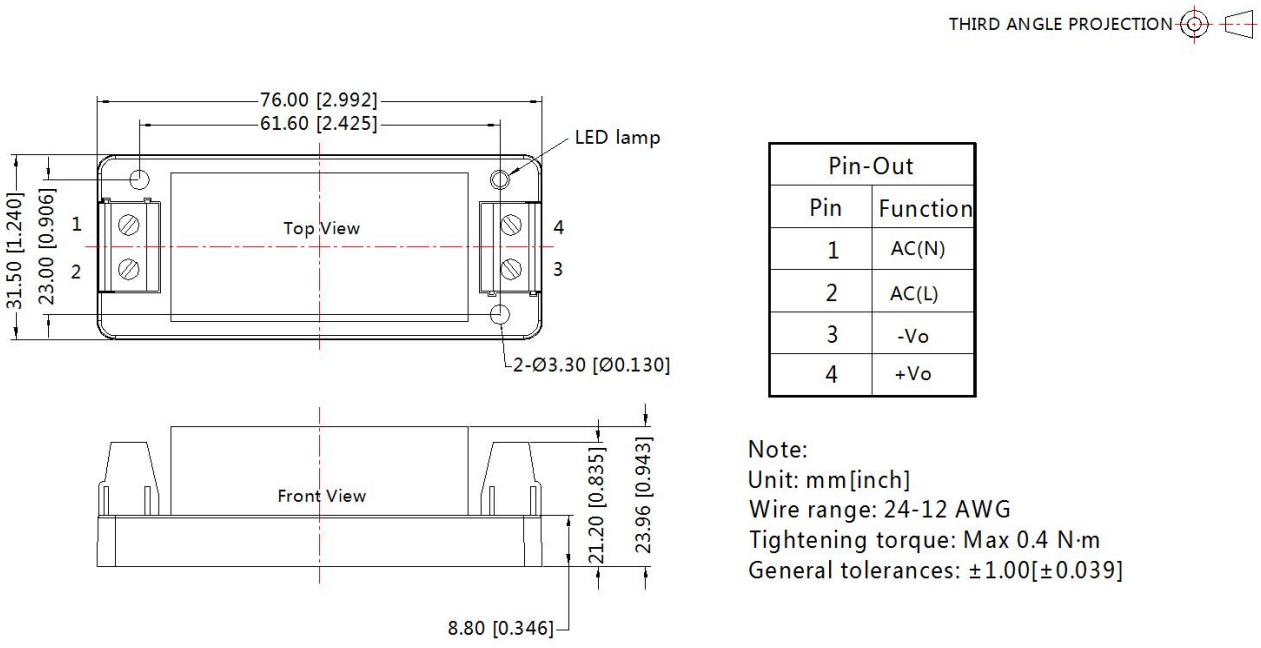


Note:Grid 2.54*2.54mm

Pin-Out	
Pin	Function
1	AC(N)
2	AC(L)
3	-Vo
4	+Vo

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

A2S Dimensions

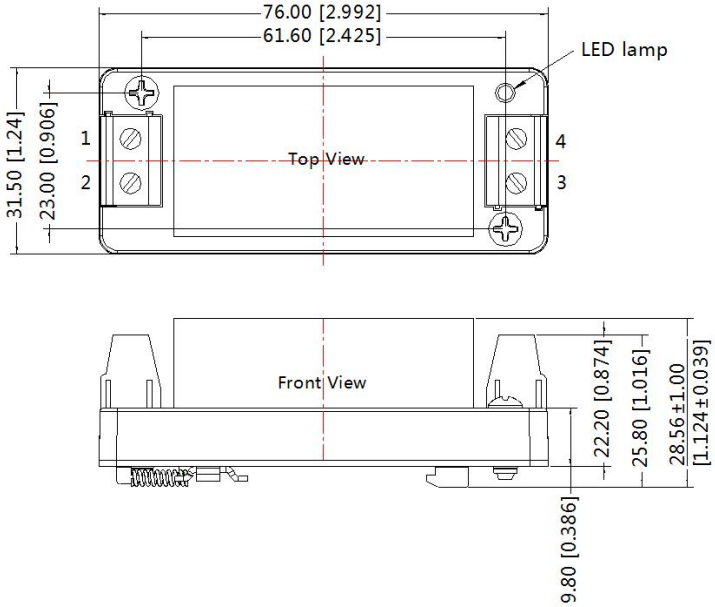


Pin-Out	
Pin	Function
1	AC(N)
2	AC(L)
3	-Vo
4	+Vo

Note:
Unit: mm[inch]
Wire range: 24-12 AWG
Tightening torque: Max 0.4 N·m
General tolerances: ±1.00[±0.039]

A4S Dimensions

THIRD ANGLE PROJECTION



Pin-Out	
Pin	Function
1	AC(N)
2	AC(L)
3	-Vo
4	+Vo

Note:
Unit: mm[inch]
Wire range: 24-12 AWG
Tightening torque: Max 0.4 N·m
Installed on DIN RAIL TS35
General tolerances: ±1.00[±0.039]

Notes:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58220003(DIP package); 58220022 (A2S/A4S package);
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. In order to improve the efficiency at light load, there will be audible noise generated, but it does not affect product performance and reliability;
5. All index testing methods in this datasheet are based on our company corporate standards;
6. We can provide product customization service, please contact our technicians directly for specific information;
7. Products are related to laws and regulations: see "Features" and "EMC";
8. 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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