

3W/5W, AC-DC converter



UL US CE CB RoHS

### FEATURES

- Universal 85 - 264V AC and wide 100 - 370V DC Input
- Operating ambient temperature range -40°C to +70°C
- High I/O isolation test voltage up to 4000VAC
- Regulated output, Low output ripple & noise
- Output short circuit, over-current, over-voltage protection
- High efficiency, high reliability
- Plastic case meets UL94V-0 flammability
- EMI performance meets CISPR32 / EN55032 CLASS B
- IEC62368, UL62368, EN62368 approval

LDE03/05-20Bxx series is one of Mornsun's compact size power converters. It features universal AC input and at the same time accepts DC input voltage, low power consumption, high efficiency, high reliability and double or reinforced insulation. It offers excellent EMC performance and for extremely harsh EMC environment, we recommend using the application circuit show in Design Reference of this datasheet. The converters meet CISPR32/EN55032, UL62368, EN62368, IEC62368 standards and are widely used in industrial, medical, electricity, instrumentation, telecommunications applications.

### Selection Guide

Certification	Part No.*	Output Power	Nominal Output Voltage and Current (Vo/Io)	Efficiency at 230VAC (%) Typ.	Capacitive Load (μF)Max.
UL/CE/CB	LDE03-20B03	2.3W	3.3V/700mA	66	6000
	LDE03-20B05		5V/600mA	74	
	LDE03-20B09		9V/330mA	75	
	LDE03-20B12		12V/250mA	77	
	LDE03-20B15		15V/200mA	77	
	LDE03-20B24		24V/125mA	78	
	LDE05-20B03	3.3W	3.3V/1000mA	68	5000
	LDE05-20B05		5V/1000mA	75	
	LDE05-20B09		9V/560mA	77	
	LDE05-20B12		12V/420mA	79	
	LDE05-20B15		15V/330mA	79	
	LDE05-20B24		24V/210mA	81	
		5W			

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	--	264	VAC
	DC input	100	--	370	VDC
Input Frequency		47	--	63	Hz
Input Current	LDE03	115VAC	--	80	mA
		230VAC	--	45	
	LDE05	115VAC	--	130	
		230VAC	--	70	
Inrush Current	115VAC	--	10	--	A
	230VAC	--	20	--	
Leakage Current	230VAC/50Hz	0.1mA RMS Max.			
Recommended External Input Fuse		1A/250V 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 Drift Coefficient			--	±0.02	--	%/°C
Short Circuit Protection			Hiccup, continuous, self-recovery			
Over-current Protection	LDE03		≥150% Io, self-recovery			
	LDE05		≥120% Io, self-recovery			
Over-voltage Protection	3.3/5VDC output		≤7.5VDC			
	9VDC output		≤15VDC			
	12/15VDC output		≤20VDC			
	24VDC output		≤30VDC			
Minimum Load			0	--	--	%
Hold-up Time	LDE03	115VAC input	--	10	--	ms
		230VAC input	--	60	--	
	LDE05	115VAC input	--	5	--	
		230VAC input	--	50	--	

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)	4000	--	--	VAC
Operating Temperature			-40	--	+70	°C
Storage Temperature			-40	--	+105	
Storage Humidity			--	--	95	%RH
Soldering Temperature	Wave-soldering		260 ± 5°C; time: 5 - 10s			
	Manual-welding		360 ± 10°C; time: 3 - 5s			
Switching Frequency			--	100	--	kHz
Power Derating	LDE03	-40°C to -25°C	1.0	--	--	%/°C
		+55°C to +70°C	1.0	--	--	
	LDE05	-40°C to 0°C	1.13	--	--	
		+55°C to +70°C	3.0	--	--	
	LDE05	85 - 100VAC	1.0	--	--	
Safety Standard			IEC62368/EN62368/UL62368			
Safety Certification			IEC62368/EN62368/UL62368			
Safety Class			CLASS II			
MTBF			MIL-HDBK-217F@25°C > 300,000 h			

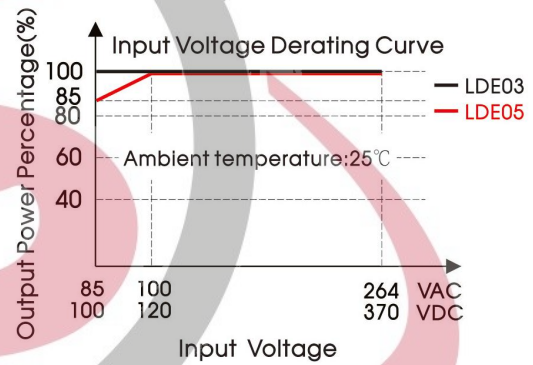
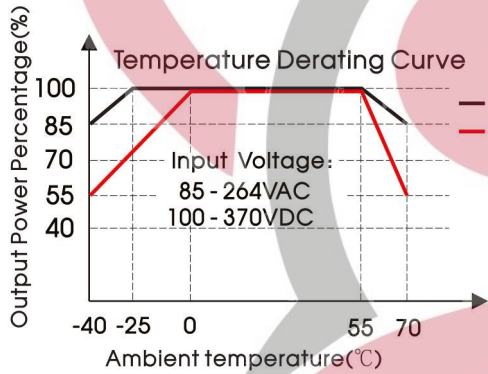
Mechanical Specifications

Case Material	Black plastic, flame-retardant and heat-resistant (UL94V-0)	
Dimensions	DIP	37.00 x 24.50 x 18.00 mm
	A2S chassis mounting	76.00 x 31.50 x 26.80 mm
	A4S Din-Rail mounting	76.00 x 31.50 x 31.40 mm
Weight	DIP	25g(Typ.)
	A2S chassis mounting	47g(Typ.)
	A4S Din-Rail mounting	69g(Typ.)
Cooling method	Free air convection	

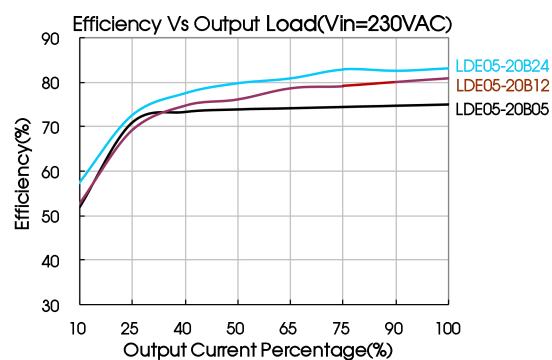
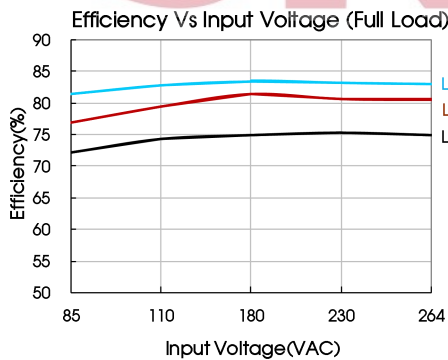
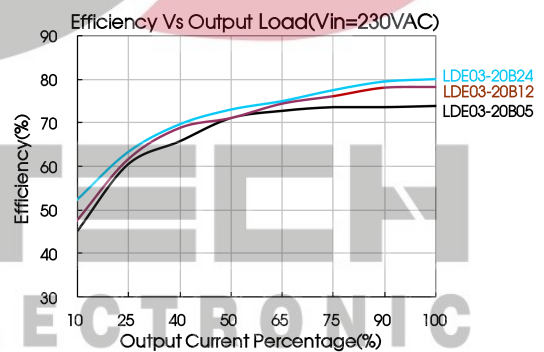
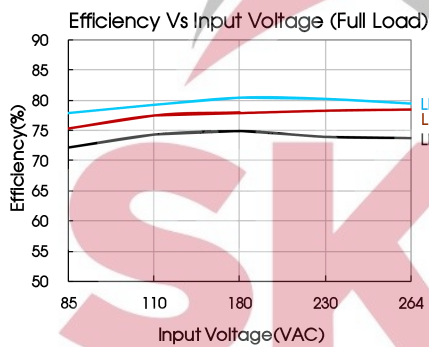
Electromagnetic Compatibility (EMC)

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

Product Characteristic Curve



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

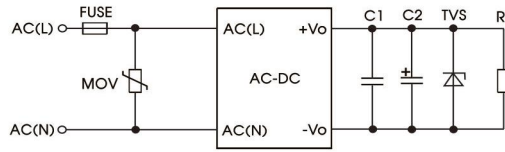


Fig. 1: Typical circuit diagram

Part No.	C1(μF)	C2(μF)	FUSE	MOV	TVS tube
LDE03/05-20B03	1	150	1A/250V slow-blow required	S14K350	SMBJ7.0A
LDE03/05-20B05		150			SMBJ7.0A
LDE03/05-20B09		120			SMBJ12A
LDE03/05-20B12		120			SMBJ20A
LDE03/05-20B15		120			SMBJ20A
LDE03/05-20B24		68			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

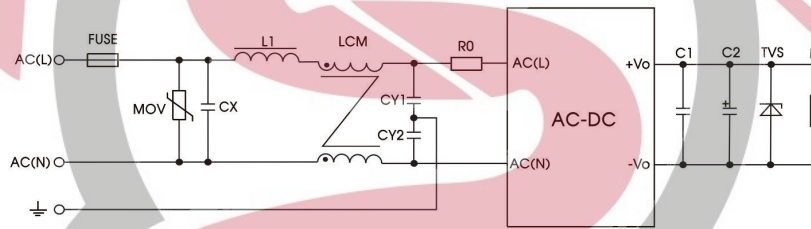


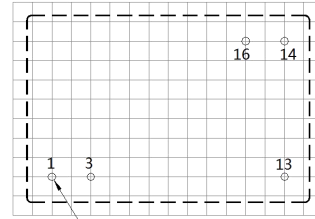
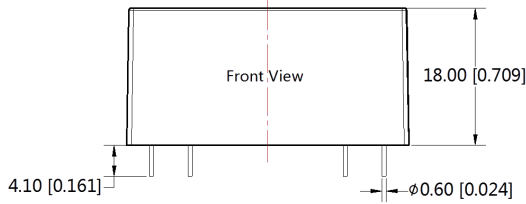
Fig 2: EMC circuit for harsh requirements

Component	Recommended value
MOV	S14K350
CX	0.1μF/275VAC
L1	330uH/2.0A
LCM	10mH - 30mH, recommended to use MORNSUN's FL2D-Z5-103
CY1	1nF/400VAC
CY2	1nF/400VAC
FUSE	2A/250V slow-blow required
R0	33 Ω /3W

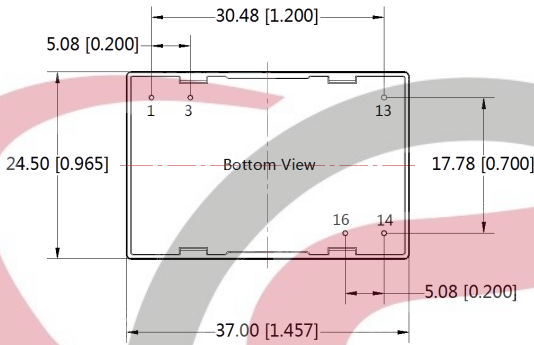
3. For additional information please refer to application notes on [www.mornsun-power.com](http://www.mornsun-power.com)

Dimensions and Recommended Layout

THIRD ANGLE PROJECTION



Note: Grid 2.54\*2.54mm

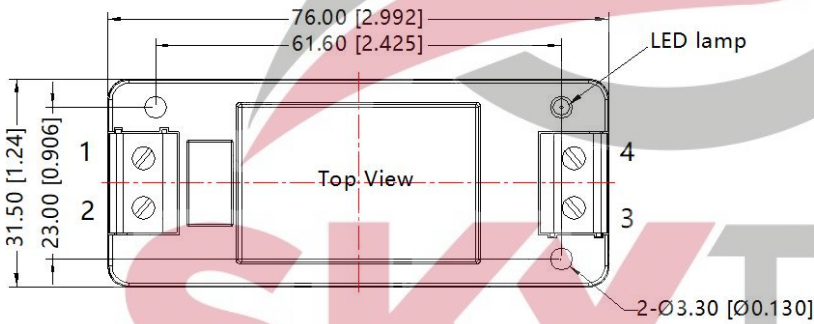


Pin-Out	
Pin	Function
1	AC(L)
3	AC(N)
13	NC
14	-Vo
16	+Vo

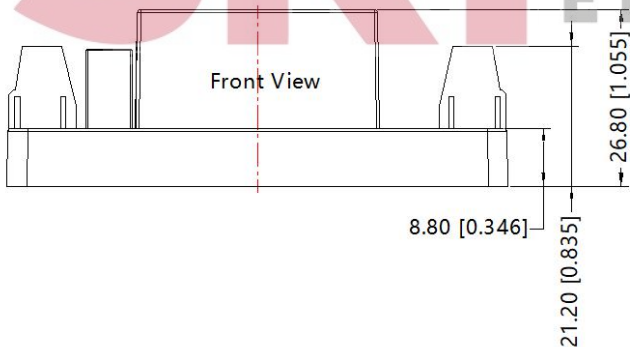
Note:  
Unit :mm[inch]  
Pin diameter tolerances :±0.10[±0.004]  
General tolerances:±0.50[±0.020]

A2S Dimensions

THIRD ANGLE PROJECTION




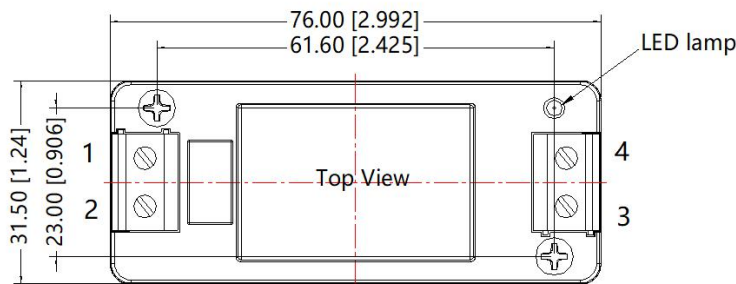
Pin-Out	
Pin	Function
1	AC(N)
2	AC(L)
3	-Vo
4	+Vo



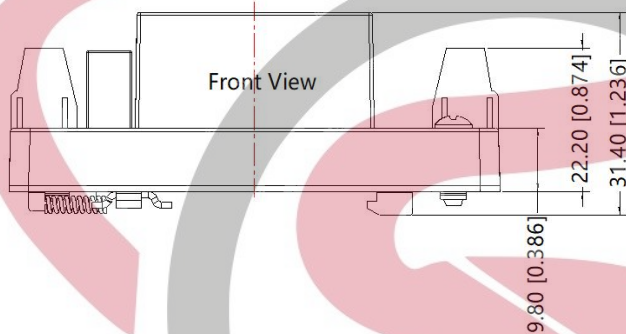
Note:  
Unit: mm[inch]  
Wire range: 24-12 AWG  
Tightening torque: Max 0.4 N·m  
General tolerances: ±0.50[±0.020]

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:  $\pm 1.00[\pm 0.039]$

Note:

- For additional information on Product Packaging please refer to [www.mornsun-power.com](http://www.mornsun-power.com). Packaging bag number: 58220005 (DIP package); 58220022 (A2S/A4S package);
- 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;
- All index testing methods in this datasheet are based on our Company's corporate standards;
- We can provide product customization service, please contact our technicians directly for specific information;
- Products are related to laws and regulations: see "Features" and "EMC";
- 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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