

3W/5W, AC-DC converter



## FEATURES

- Universal 85 - 264VAC and wide 100 - 370VDC Input
- Operating ambient temperature range -40°C to +70°C
- High I/O isolation test voltage up to 4000VAC
- Regulated output, Low ripple & noise
- Output short circuit, overcurrent, overvoltage protection
- High efficiency, high reliability
- Plastic case meets flammability per UL94V-0
- EMC compliant to CISPR32 / EN55032 CLASS B
- IEC/EN/UL62368 approval

LDE03/05-20BxxW 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 and double or reinforced insulation. For extremely harsh EMC environment, we recommend using the application circuit show in Design Reference of this datasheet.

## Selection Guide

Certification	Model	Output Power	Nominal Output Voltage and Current (Vo/Io)	Efficiency at 230VAC (%) Typ.	Capacitive Load (μF) Max.
UL/CE/CB	LDE03-20B03W	2.3W	3.3V/700mA	66	6000
	LDE03-20B05W		5V/600mA	74	6000
	LDE03-20B09W		9V/330mA	75	1500
	LDE03-20B12W		12V/250mA	77	1500
	LDE03-20B15W		15V/200mA	77	1000
	LDE03-20B24W		24V/125mA	78	330
	LDE05-20B03W	3.3W	3.3V/1000mA	68	5000
	LDE05-20B05W		5V/1000mA	75	5000
	LDE05-20B09W		9V/560mA	77	1200
	LDE05-20B12W		12V/420mA	79	1200
	LDE05-20B15W		15V/330mA	79	1000
	LDE05-20B24W		24V/210mA	81	330

## 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		0.1mA RMS typ. 230VAC/50Hz			
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			
Overcurrent Protection	LDE03		≥150% Io self-recovery			
	LDE05		≥120% Io self-recovery			
Overvoltage Protection	3.3/5VDC output		≤7.5VDC			
	9VDC output		≤15VDC			
	12/15VDC output		≤20VDC			
	24VDC output		≤30VDC			
Minimum Load			0	--	--	%
Power-off Holding 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 Test	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	--	--	%/VAC
	Safety Standard			IEC62368, EN62368, UL62368		
Safety Certification			IEC62368, EN62368, UL62368			
Safety Class			CLASS II			
MTBF			MIL-HDBK-217F@25° C > 300,000 h			

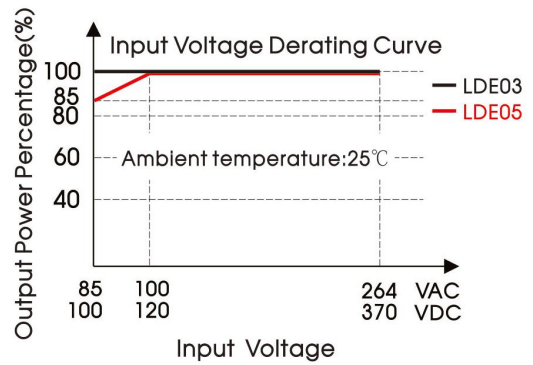
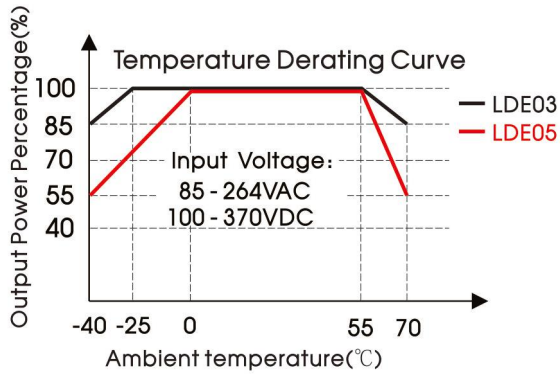
## Mechanical Specifications

Case Material	Black plastic, flame-retardant and heat-resistant (UL94V-0)
Package Dimensions	37.0 x 24.5 x 18.0 mm
Weight	30g(Typ.)
Cooling method	Free air convection

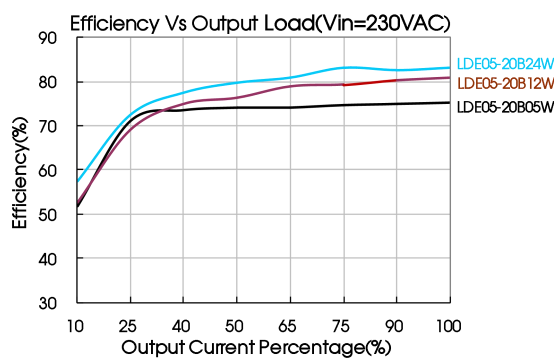
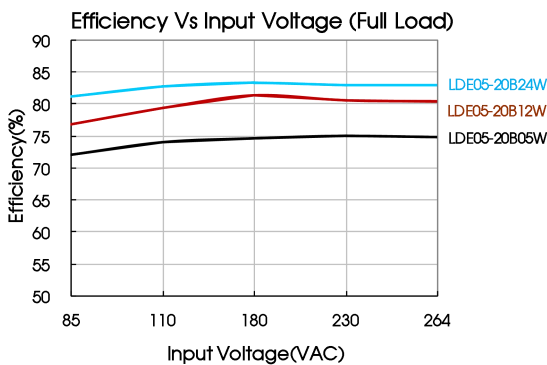
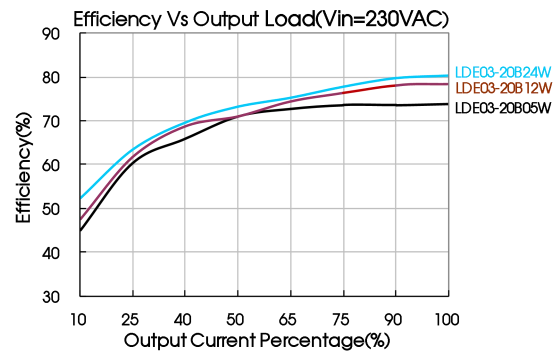
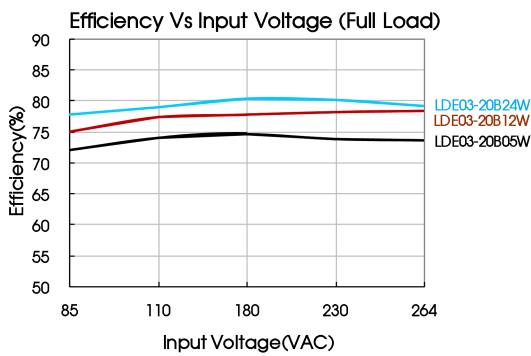
Electromagnetic Compatibility (EMC)

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 dip, 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

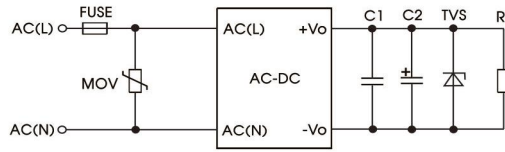


Fig. 1: Typical circuit diagram

Model	C1 (μF)	C2 (μF)	FUSE	MOV	TVS
LDE03/05-20B03W	1	150	1A/250V, slow-blow required	S14K350	SMBJ7.0A
LDE03/05-20B05W		150			SMBJ7.0A
LDE03/05-20B09W		120			SMBJ12A
LDE03/05-20B12W		120			SMBJ20A
LDE03/05-20B15W		120			SMBJ20A
LDE03/05-20B24W		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. For additional protection an external input MOV, i.e. S14K350 is also recommended.

2. EMC compliance recommended circuit

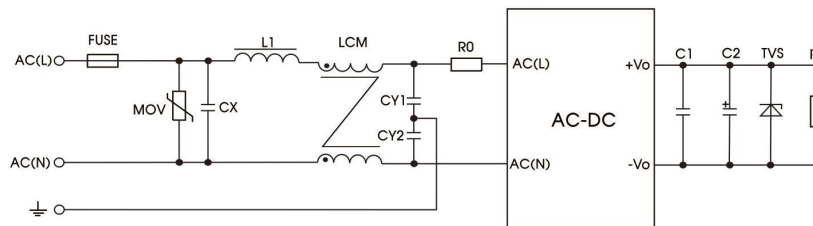


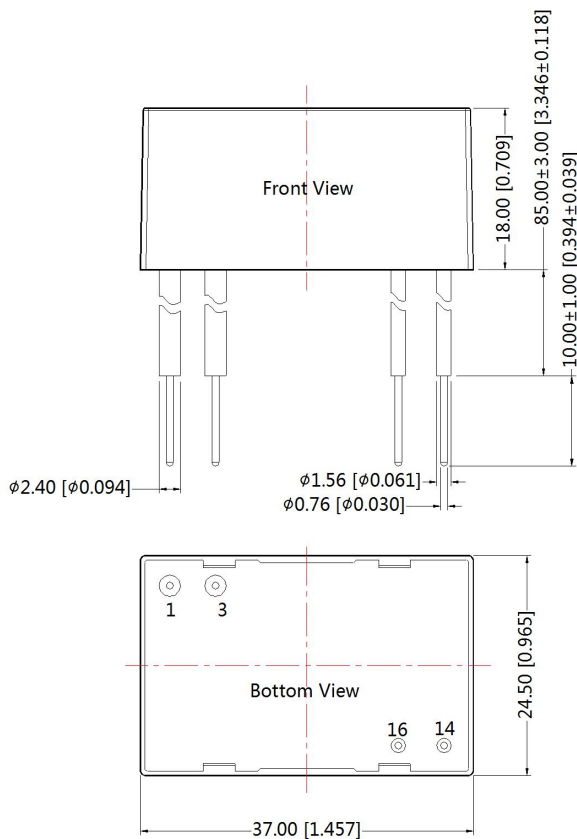
Fig 2: EMC circuit for harsh requirements

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 



Pin-Out		
Pin	Wire Type	Function
1 brown	UL-1015 AWG22	AC(L)
3 blue	UL-1015 AWG22	AC(N)
14 black	UL-1430 AWG22	-Vo
16 red	UL-1430 AWG22	+Vo

Note:  
Unit :mm[inch]  
Wire diameter tolerances :±0.30[±0.012]  
General tolerances:±0.50[±0.020]

Note:

1. For additional information on Product Packaging please refer to [www.mornsun-power.com](http://www.mornsun-power.com). Packaging bag number: 58220051;
2. 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;
3. All index testing methods in this datasheet are based on our Company's 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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