

20W, 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, over-current and over-voltage protection
- High efficiency, high reliability
- Plastic case meets flammability per UL94V-0
- EMC compliant to CISPR32/ EN55032 CLASS B
- IEC/EN/UL62368 safety approval

LDE20-20Bxx series is one of Mornsun's compact size, ultra-slim power converters. It features universal AC input and at the same time accepts DC input voltage, low power consumption, low ripple & noise, high efficiency, high reliability and double or reinforced insulation with an input to output isolation test voltage of 4000VAC. It offers excellent EMC performance and for extremely harsh EMC environment, we recommend using the application circuit show in this datasheet. The converters meet IEC/EN61000-4, CISPR32/EN55032, UL62368 and EN62368 standards, and are widely used in industrial, electricity, instrumentation and 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	LDE20-20B03	11.8W	3.3V/3600mA	74	10000
	LDE20-20B05	18W	5V/3600mA	78	6600
	LDE20-20B09	20W	9V/2200mA	79	4400
	LDE20-20B12		12V/1660mA	82	3000
	LDE20-20B15		15V/1330mA	83	2000
	LDE20-20B24		24V/833mA	83	800

Note: * Use suffix "A2S" for chassis mounting 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	115VAC	--	0.37	0.44	A
	230VAC	--	0.24	0.26	
Inrush Current	115VAC	--	12	--	
	230VAC	--	36	--	
Recommended External Input Fuse		3.15A/250V, slow-blow, required			
Hot Plug		Unavailable			

Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy	0%-100%	3.3V output	--	±3	--
		Other models	--	±2	--
Line Regulation	Full load	--	±0.5	--	%
Load Regulation	0%-100% load	--	±1	--	
Ripple & Noise*	20MHz bandwidth (peak-to-peak value)	--	50	120	
Temperature Coefficient		--	±0.02	--	%/°C
Short Circuit Protection		Hiccup, continuous, self-recovery			

Over-current Protection		≥110% Io, self-recovery			
Over-voltage Protection	3.3/5V output	≤7.5V			
	9V output	≤15V			
	12/15V output	≤20V			
	24V output	≤30V			
Minimum Load		0	--	--	%
Hold-up Time	115VAC input	5	10	--	ms
	230VAC input	44	55	--	

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	--	+85			
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		-40°C to 0°C	1.67	--	--	% / °C		
		+40°C to +70°C	3.3/5V	2.66	--		--	
			Others	2.33	--		--	
		85 - 130VAC	5V	-25°C to +70°C	0.66	--	--	% / VAC
				-40°C to -25°C	1.33	--	--	
		85 - 100VAC	Others	-25°C to +70°C	2.0	--	--	
-40°C to -25°C	4.0			--	--			
240 - 264VAC			0.83	--	--			
Safety Standard			IEC62368/EN62368/UL62368					
Safety Certification			IEC62368/EN62368/UL62368					
Safety Class			CLASS II					
MTBF			MIL-HDBK-217F@25°C > 300,000 h					

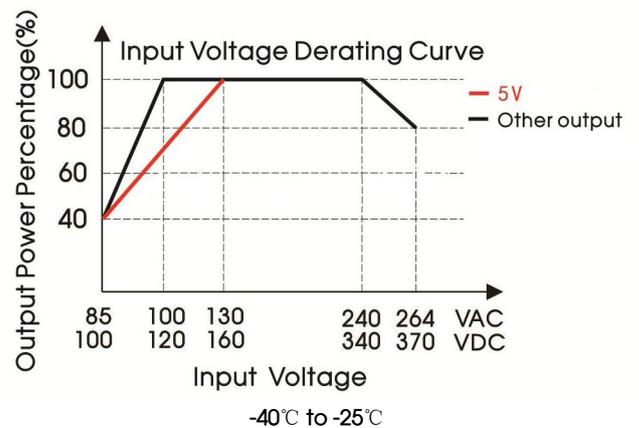
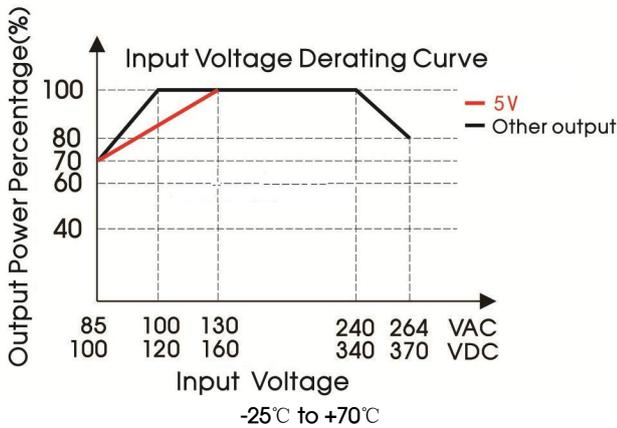
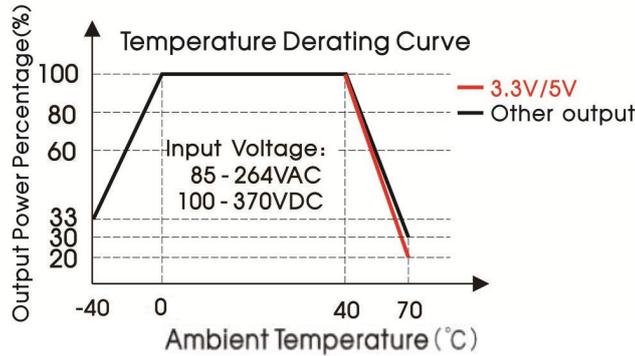
Mechanical Specifications

Case Material		Black plastic, flame-retardant and heat-resistant (UL94 V-0)
Package Dimensions	DIP	53.8 x 28.8 x 23.5 mm
	A2S chassis mounting	76.0 x 31.5 x 32.3 mm
	A4S Din-Rail mounting	76.0 x 31.5 x 36.9 mm
Weight	DIP	60g (Typ.)
	A2S chassis mounting	80g (Typ.)
	A4S Din-Rail mounting	100g (Typ.)
Cooling method		Free air convection

Electromagnetic Compatibility (EMC)

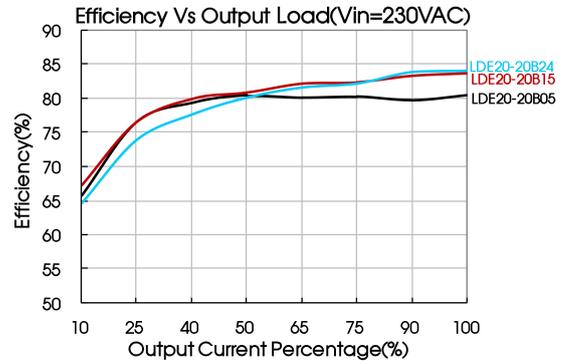
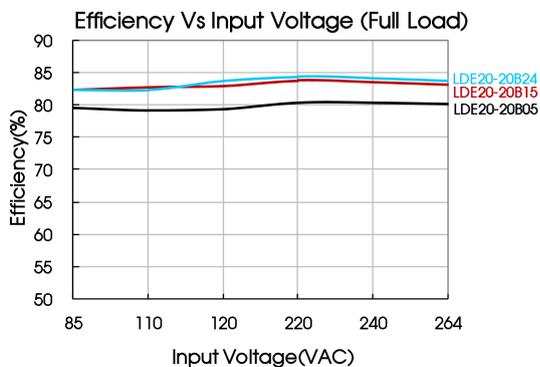
Emissions	CE	CISPR32/EN55032	CLASS B	
	RE	CISPR32/EN55032	CLASS B	
Immunity	ESD	IEC/EN61000-4-2	Contact ±6kV /Air ±8kV	Perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4	±4kV	perf. Criteria B
	Surge	IEC/EN61000-4-5	line to line ±2kV	perf. Criteria B
			line to line ±4kV/line to ground ±6kV (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 85-100V/240-264VAC and a DC input between 100-120V/340-370VDC, the output power must be derated as per temperature derating curves; (Values for LDE20-20B05 only: 85-130VAC/240-264VAC/100-160VDC/340-370VDC);

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

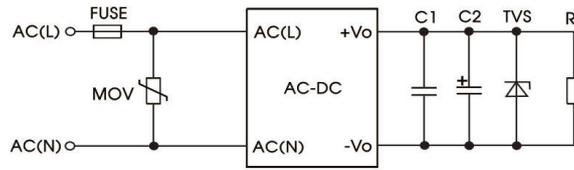


Fig. 1: Typical circuit diagram

Part No.	FUSE	MOV	C1	C2	TVS
LDE20-20B03	3.15A/250V, slow-blow required	S20K300	1μF/50V	220μF/16V	SMBJ7.0A
LDE20-20B05				220μF/16V	SMBJ7.0A
LDE20-20B09				120μF/25V	SMBJ12A
LDE20-20B12				120μF/25V	SMBJ20A
LDE20-20B15				120μF/25V	SMBJ20A
LDE20-20B24				68μF/35V	SMBJ30A

- Note:
- ① Output filtering capacitor C2 is electrolytic capacitor, it is recommended to apply electrolytic capacitor with high frequency and low resistance. For capacitance and current of capacitor please refer to manufacture's datasheet. Capacitor voltage reduced to at least 80%. C1 is ceramic capacitor, which is used to filter high-frequency noise. TVS is a recommended component to protect post-circuits if converter fails.
 - ② The product in the application must connect external electrolytic capacitors C2, to achieve lower ripple noise and better dynamic load performance.
 - ③ When the product's output terminal is connected to high frequency switch type load, electrolytic capacitor C2's selection is as following:

Part No.	C2
LDE20-20B03	470μF/16V (Solid capacitor)
LDE20-20B05	470μF/16V (Solid capacitor)
LDE20-20B09	470μF/16V (Solid capacitor)
LDE20-20B12	390μF/25V
LDE20-20B15	390μF/25V
LDE20-20B24	220μF/35V

2. EMC compliance recommended circuit

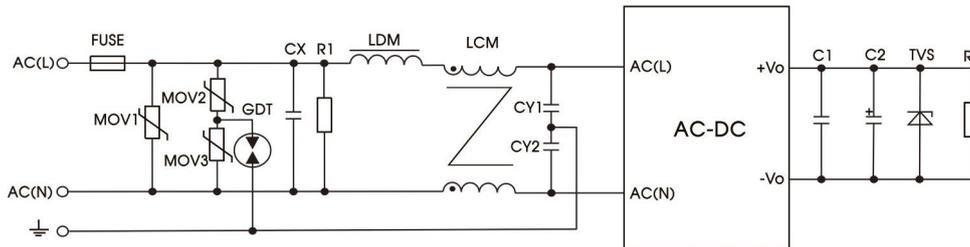


Fig 2. EMC circuit for harsh requirements

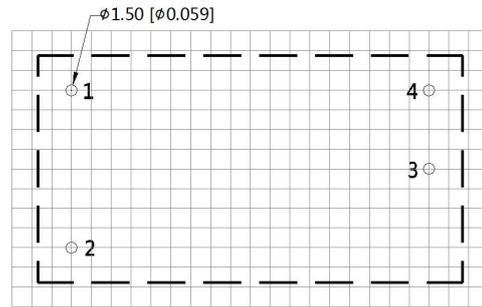
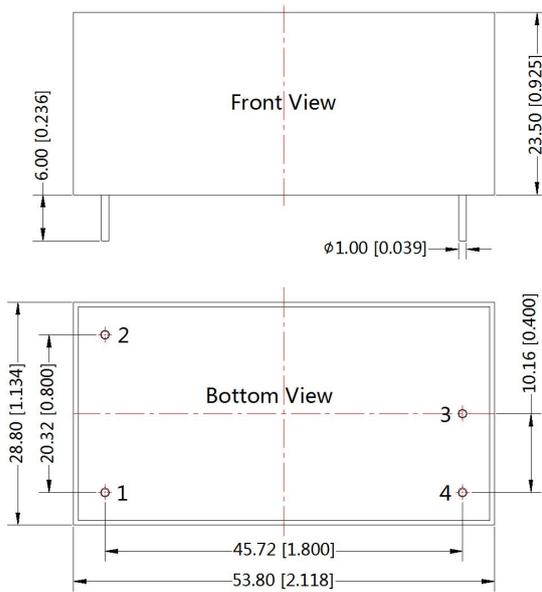
Note: For external output circuit components refer to typical application above.

Component	Recommended value
MOV1	S20K300
MOV2	S10K300
MOV3	S10K300
CX	0.22μF/275VAC
CY1, CY2	1nF/400VAC
R1	1MΩ/2W
LDM	4.7uH
LCM	2mH
GDT	EM3600XS
FUSE	6.3A/250V, slow-blow required

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

Dimensions and Recommended Layout

THIRD ANGLE PROJECTION



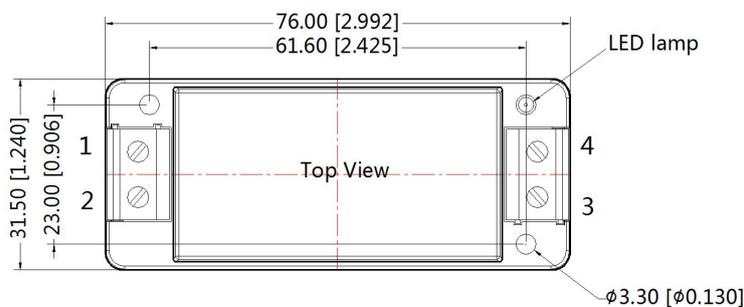
Note: Grid 2.54*2.54mm

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

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

A2S Dimensions

THIRD ANGLE PROJECTION

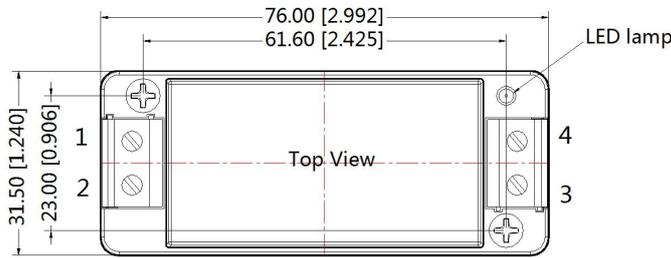


Pin-Out	
Pin	Function
1	AC(N)
2	AC(L)
3	-Vo
4	+Vo

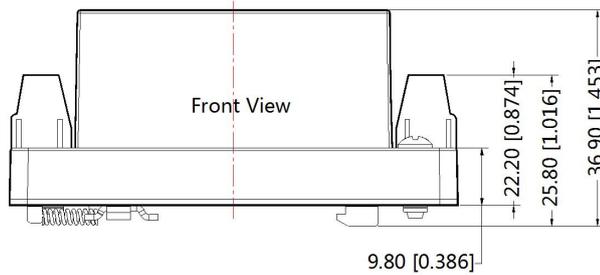
Note:
Unit: mm[inch]
Wire range: 24-12 AWG
Tightening torque: Max 0.4 N·m
General tolerances: ±1.00[±0.039]

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
Mounting rail: TS35, rail needs to connect safety ground
General tolerances: ±1.00[±0.039]

Note:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58220011 (DIP package); 58220022 (A2S/ A4S package);
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 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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