20W, AC-DC converter



RoHS

FEATURES

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

LHE20-20A/C/Dxx series is one of Mornsun's compact size multiple output power converters. It features universal AC input and at the same time accepts DC input voltage, low power consumption, high efficiency, high reliability and reinforced isolation. It offers good EMC performance and is widely used in industrial 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		Efficiency at 230VAC (%) Typ.	Capacitive Load (uF) Max.	
			(Vo1/Io1)	(Vo2/Io2)		Vo1	Vo2
EN/BS EN	LHE20-20A12**	20W	+12V/830mA	-12V/830mA	82	1200	1200
	LHE20-20A15**		+15V/650mA	-15V/650mA	83	1000	1000
--	LHE20-20C0512-04		5V/2000mA	±12V/400mA	78	16000	1000
	LHE20-20C0515-03		5V/2000mA	±15V/300mA	79	16000	680
	LHE20-20D0512-06		5V/2500mA	12V/600mA	78	20000	2000
	LHE20-20D0515-05		5V/2500mA	15V/500mA	78	20000	1200
	LHE20-20D0524-03		5V/2500mA	24V/300mA	78	20000	500

Note:
① * Use suffix "A2" for chassis mounting mounting.
② ** LHE20-20Axx parts use both outputs (positive and negative) as sampling feedback and others models use output Vo1 as sampling feedback, also defined as the primary output;
③ The product picture is for reference only. For details, please refer to the actual product.

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	--	--	0.60	A
	230VAC	--	--	0.34	
Inrush Current	115VAC	--	25	--	
	230VAC	--	45	--	
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	LHE20-20Axx (balanced load)	Vo1	--	±3	--	%
		Vo2	--	±3	--	
	LHE20-20C/Dxx (balanced load)	Vo1	--	±2	--	
		Vo2	--	±10	--	
Line Regulation	Full load	Vo1	--	±0.5	--	
		Vo2	--	±1.5	--	

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Load Regulation	10%-100% load (balanced load)	LHE20-20Axx		--	±2	--	%
		LHE20-20C/Dxx	Vo1	--	±2	--	
			Vo2	--	±5	--	
Ripple & Noise*	20MHz bandwidth (peak-to-peak value)	Vo1		--	--	100	mV
		Vo2		--	--	200	
Temperature Coefficient	Vo1			--	±0.02	--	%/℃
Short Circuit Protection				Continuous, self-recover			
Over-current Protection				150%-300% Io self-recover			
Over-voltage Protection	Vo1	5VDC Output		≤7.5VDC			
		12VDC Output		≤20VDC			
		15VDC Output		≤20VDC			
Min. Load				10	--	--	%
Hold-up Time	115VAC input			--	10	--	ms
	230VAC input			--	60	--	

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	LHE20-20A/C/Dxx	Electric Strength Test for 1min., leakage current <5mA	4000	--	--	VAC
	Input -⏚	LHE20-20A/Dxx		2500	--	--	
		LHE20-20Cxx		2000	--	--	
	Vo1-Vo2	LHE20-20C/Dxx		500	--	--	VDC
Operating Temperature				-40	--	+70	℃
Storage Temperature				-40	--	+85	
Storage Humidity				--	--	95	%RH
Soldering Temperature		Wave-soldering, Max. 10 seconds		255	260	265	℃
		Manual-welding, Max. 5 seconds		350	360	370	
Switching Frequency				--	65	--	kHz
Power Derating		-40℃ to -25℃		2.67	--	--	%/℃
		+50℃ to +70℃		2.5	--	--	
		85VAC - 100VAC		1.0	--	--	%/VAC
		240VAC - 264VAC		0.83	--	--	
Safety Standard		LHE20-20A12		BS EN62368-1/EN62368-1(report) safety approved; Design refer to UL/IEC62368-1			
		LHE20-20A15		EN621558-1, BS EN62368-1/EN62368-1 (report) safety approved; Design refer to UL/IEC62368-1			
		LHE20-20C/Dxx		Design refer to UL/IEC/EN62368-1			
Safety Class				CLASS I			
MTBF		MIL-HDBK-217F@25℃		≥300,000 h			

Mechanical Specifications

Case Material	Black plastic, flame-retardant and heat-resistant (UL94V-0)	
Dimension	Horizontal package	70.0 x 48.0 x 23.5 mm
	A2 chassis mounting	96.1 x 54.0 x 32.0 mm
Weight	Horizontal package	120g (Typ.)
	A2 chassis mounting	170g (Typ.)
Cooling method	Free air convection	

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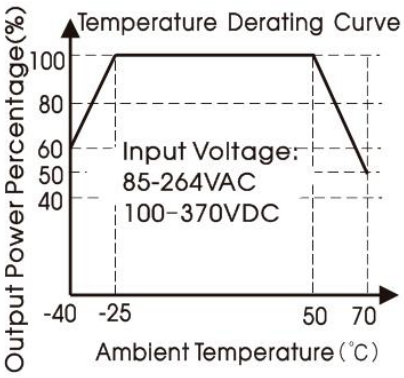
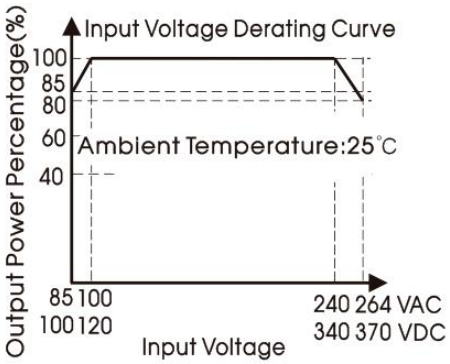
Electromagnetic Compatibility (EMC)

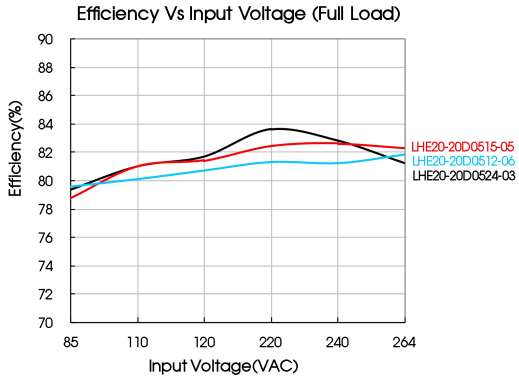
Emissions	CE	CISPR32/EN55032 CLASS B	
	RE	CISPR32/EN55032 CLASS B	
Immunity	ESD	IEC/EN 61000-4-2 Contact ±6KV/Air ±8KV	perf. Criteria B
	RS	IEC/EN61000-4-3 10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4 ±2KV	perf. Criteria B
		IEC/EN61000-4-4 ±4KV (See Fig. 4 for recommended circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5 line to line ±1KV/line to PE ±2KV	perf. Criteria B
		IEC/EN61000-4-5 line to line ±2KV/line to PE ±4KV (See Fig. 4 for recommended circuit)	perf. Criteria B
	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

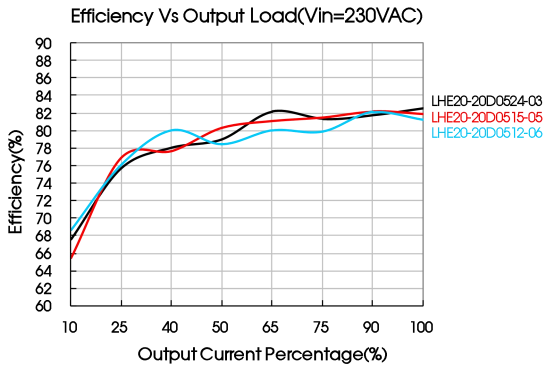
Product Characteristic Curve

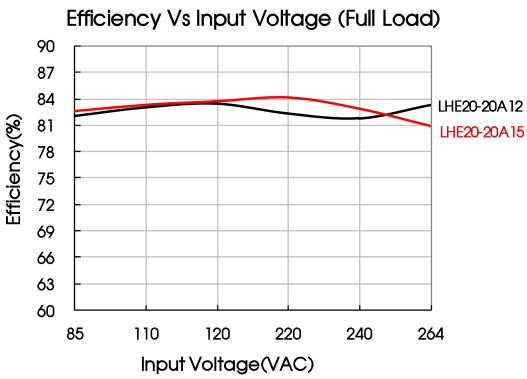


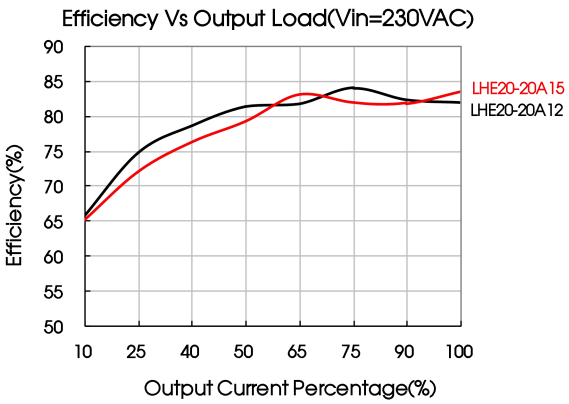


Note: ① With an AC input between 85-100V/240-264VAC and a DC input between 100-120V/340-370VDC, the output power must be derated as per temperature derating curves;
② This product is suitable for applications using natural air cooling; for applications in closed environment please consult Mornsun FAE.









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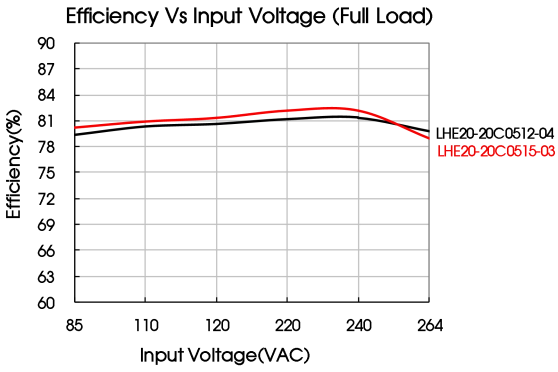

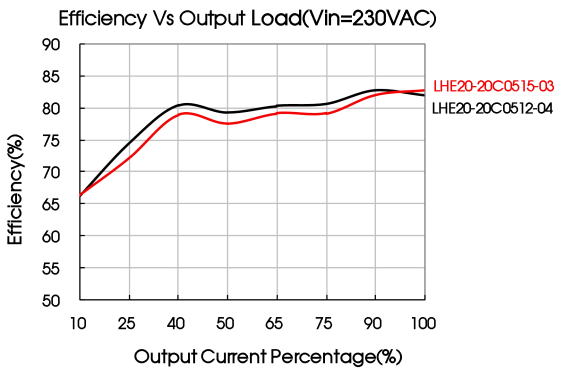

Design Reference

1. Typical application

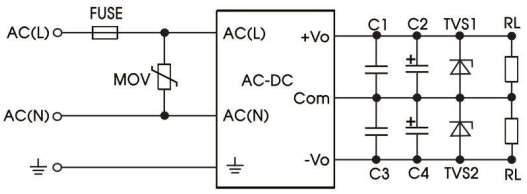

Fig. 1: LHE20-20Axx series, typical circuit diagram

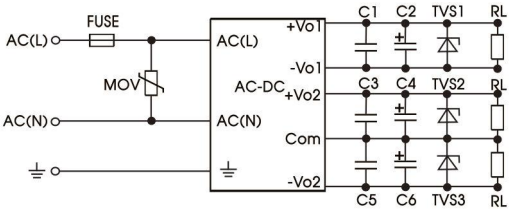

Fig. 2: LHE20-20Cxx series, typical circuit diagram

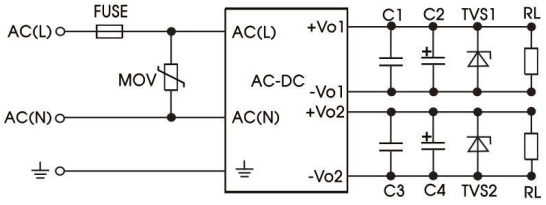

Fig. 3: LHE20-20Dxx series, typical circuit diagram

Model	FUSE	MOV	C1/C3/C5	C2(uF)	C4(uF)	C6(uF)	TVS1	TVS2	TVS3
LHE20-20A12	3.15A/250V slow-blow, required	S14K300	0.1uF/50V	120	120	--	SMBJ20A	SMBJ20A	--
LHE20-20A15				68	68	--	SMBJ20A	SMBJ20A	--
LHE20-20C0512-04				330	120	120	SMBJ7.0A	SMBJ20A	SMBJ20A
LHE20-20C0515-03				330	120	120	SMBJ7.0A	SMBJ20A	SMBJ20A
LHE20-20D0512-06				470	470	--	SMBJ7.0A	SMBJ20A	--
LHE20-20D0515-05					220	--	SMBJ7.0A	SMBJ20A	--
LHE20-20D0524-03					47	--	SMBJ7.0A	SMBJ30A	--

Input and Output Components:
We recommend using electrolytic capacitors with high frequency and low ESR rating for C2, C4 and C6 (refer to manufacture's datasheet). Choose a capacitor voltage rating with at least 20% margin, in other words not exceeding 80%. C1, C3 and C5 are ceramic capacitors 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

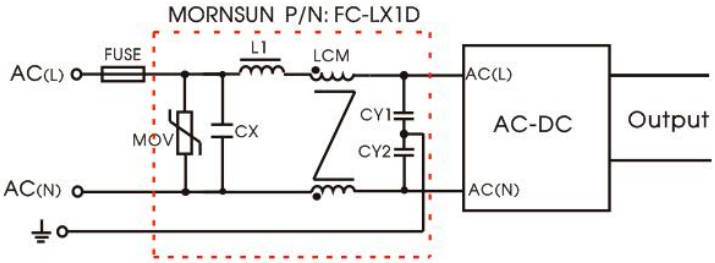

Fig. 4: recommended circuit 4

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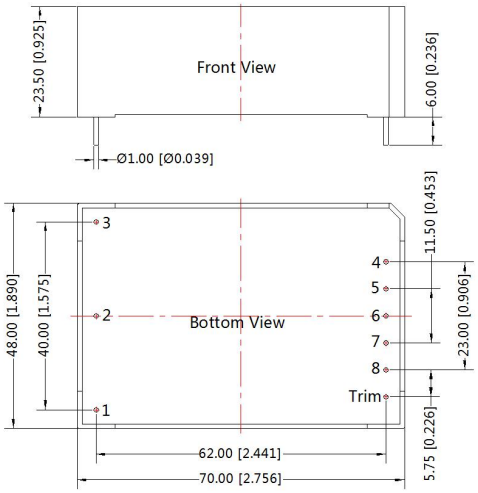
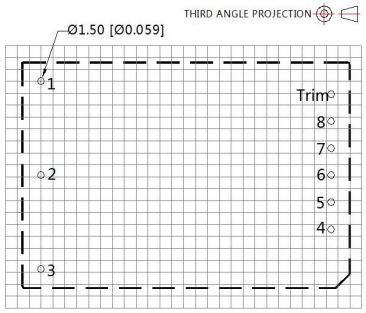
Element model	Recommended value
MOV	S14K300
CY1/CY2	1000pF/400VAC
CX	0.1uF/275VAC
LCM	10mH, P/N: FL2D-Z5-103 (MORNSUN) is recommended
L1	4.7uH/2A
FC-LX1D	2KV/4KV EMC filter
FUSE	3.15A/250V, slow-blow, required

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

Dimensions and Recommended Layout



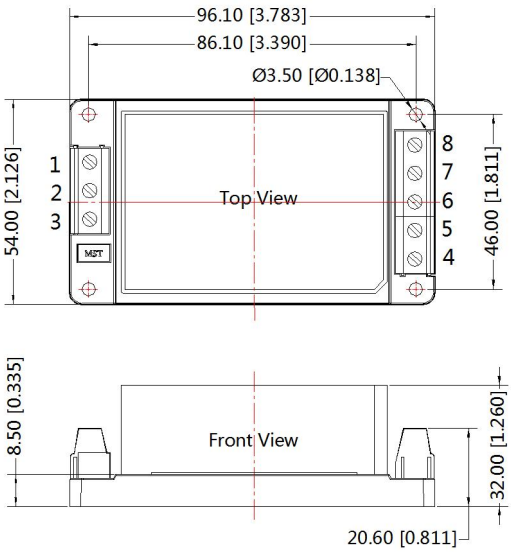


Note: Grid 2.54*2.54mm

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

Pin-Out			
Pin	LHE20-20A	LHE20-20C	LHE20-20D
1	⏚	⏚	⏚
2	AC(N)	AC(N)	AC(N)
3	AC(L)	AC(L)	AC(L)
4	+Vo	+Vo2	+Vo2
5	No Pin	COM	-Vo2
6	COM	-Vo2	No Pin
7	No Pin	+Vo1	+Vo1
8	-Vo	-Vo1	-Vo1
Trim	No Pin	No Pin	No Pin

A2 Dimensions



Pin-Out			
Pin	LHE20-20A	LHE20-20C	LHE20-20D
1	⏚	⏚	⏚
2	AC(N)	AC(N)	AC(N)
3	AC(L)	AC(L)	AC(L)
4	+Vo	+Vo2	+Vo2
5	NC	COM	-Vo2
6	COM	-Vo2	NC
7	NC	+Vo1	+Vo1
8	-Vo	-Vo1	-Vo1

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

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Note:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58220006;
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. All index testing methods in this datasheet are based on our company corporate standards;
5. We can provide product customization service, please contact our technicians directly for specific information;
6. Products are related to laws and regulations: see "Features" and "EMC";
7. If product involves multi-brand materials and there are differences in color etc, please refer to the standards of each manufacturer;
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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