

20W, AC-DC converter



RoHS

FEATURES

- Universal Input : 85 - 264VAC/100 - 370VDC
- Operating temperature range: -40°C to +70°C
- High isolation voltage up to 4K VAC
- Regulated output, Low ripple & noise
- Output short circuit, over-current, over-voltage protection
- High efficiency, high reliability
- Plastic case, meets UL94V-0
- EMI performance meets CISPR32 / EN55032 CLASS B

LHE20-20A/C/Dxx series — a compact size multipath output power converter offered by Mornsun. It features universal input voltage, taking both DC and AC input voltage, low power consumption, high efficiency, high reliability, safer isolation. It offers good EMC performance, and it's widely used in industrial, office and civil applications. For harsh EMC environment, the application circuit in the datasheet is strongly recommended.

Selection Guide

Part No.*	Output Power	Nominal Output Voltage and Current		Efficiency (230VAC, %/Typ.)	Max. Capacitive Load(μF)	
		(Vo1/Io1)	(Vo2/Io2)		Vo1	Vo2
LHE20-20A12**	20W	+12V/830mA	-12V/830mA	82	1200	1200
LHE20-20A15**		+15/650mA	-15/650mA	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:*Part No. with suffix of "A2" means chassis mounting and suffix of "A4" means DIN-Rail mounting (e.g. LHE20-20D0512-06A2 means chassis mounting; LHE20-20D0512-06A4 means DIN-Rail mounting)

** About LHE20-20Axx, use both positive and negative output as sampling feedback; others use Vo1 as sampling feedback and defined the primary output.

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 fusing, necessary			
Hot Plug		Unavailable			

Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Output Voltage Accuracy	LHE20-20Axx (balanced load)	Primary output	--	±3	--	%
		Secondary output	--	±3	--	
	LHE20-20C/Dxx (balanced load)	Primary output	--	±2	--	
		Secondary output	--	±10	--	
Line Regulation	Full load	Primary output	--	±0.5	--	
		Secondary output	--	±1.5	--	

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

Note: * Ripple and noise are measured by "parallel cable" method, please see AC-DC Converter Application Notes for specific operation.

General Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Isolation Voltage	Input-output	LHE20-20A/C/Dxx	4000	--	--	VAC
	Input - \perp	LHE20-20A/Dxx	2500	--	--	
		LHE20-20Cxx	2000	--	--	
	Vo1-Vo2	LHE20-20C/Dxx	500	--	--	VDC
Operating Temperature			-40	--	+70	°C
Storage Temperature			-40	--	+85	
Storage Humidity			--	--	95	%RH
Welding Temperature	Wave-soldering		260 ± 5°C; time: 5 - 10s			
	Manual-welding		360 ± 10°C; time: 3 - 5s			
Switching Frequency			--	65	--	kHz
Power Derating	-40°C to -25°C		2.67	--	--	%/°C
	+50°C to +70°C		2.5	--	--	
	85VAC-100VAC		1.0	--	--	%/VAC
	240VAC-264VAC		0.83	--	--	
Safety Standard			IEC62368/EN62368/UL62368			
Safety Class			CLASS I			
MTBF			MIL-HDBK-217F@25°C > 300,000 h			

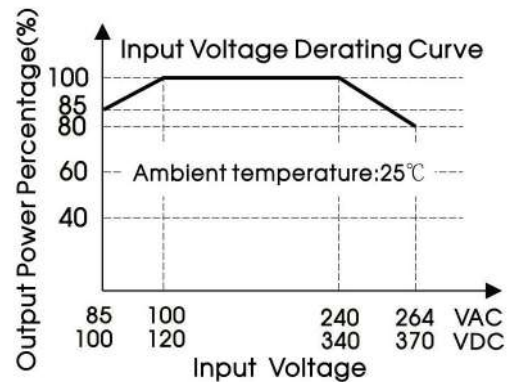
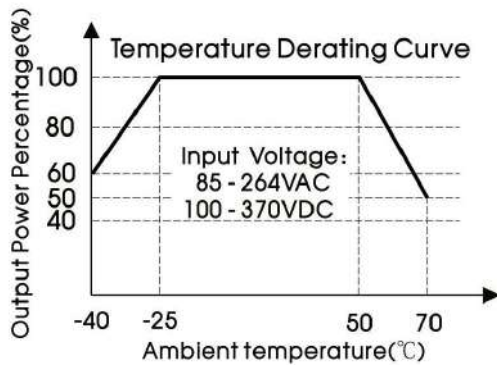
Physical Specifications

Casing Material	Black flame-retardant and heat-resistant plastic (UL94V-0)	
Dimension	Horizontal package	70.00*48.00*23.50mm
	A2 chassis mounting	96.10*54.00*32.00mm
	A4 Din-Rail mounting	96.10*54.00*36.60mm
Weight	Horizontal package	120g (Typ.)
	A2 chassis mounting	170g (Typ.)
	A4 Din-Rail mounting	210g (Typ.)
Cooling method	Free air convection	

EMC Specifications

EMI	CE	CISPR32/EN55032	CLASS B	
	RE	CISPR32/EN55032	CLASS B	
EMS	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 ground ±2KV	perf. Criteria B
IEC/EN61000-4-5		line to line ±2KV/line to ground ±4KV (See Fig. 4 for recommended circuit)	perf. Criteria B	
EMS	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

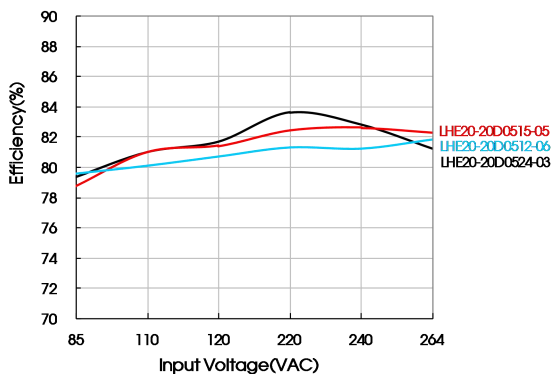
Product Characteristic Curve



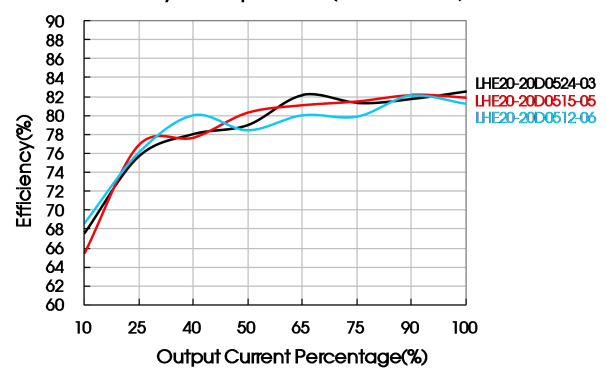
Note: ① When input 85-100VAC/240-264VAC/100-120VDC/340-370VDC, it need to be voltage derated on basis of temperature derating;

② This product is suitable for use in natural air cooling environments, if in a closed environment, please contact our company's FAE.

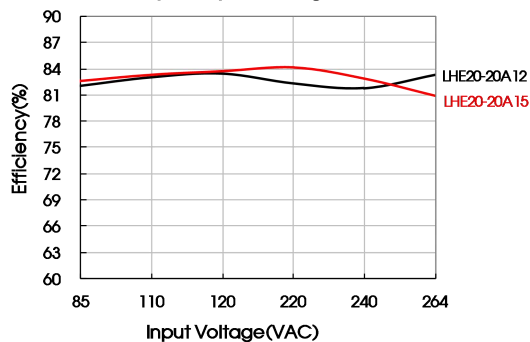
Efficiency Vs Input Voltage (Full Load)



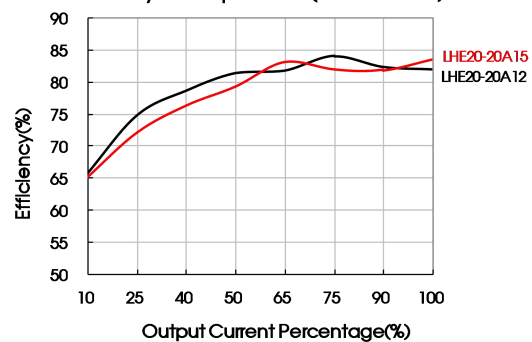
Efficiency Vs Output Load (Vin=230VAC)



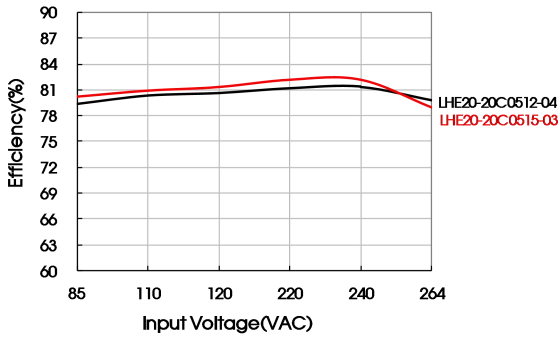
Efficiency Vs Input Voltage (Full Load)



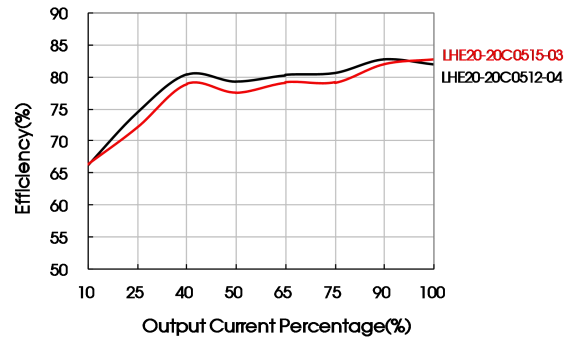
Efficiency Vs Output Load (Vin=230VAC)



Efficiency Vs Input Voltage (Full Load)



Efficiency Vs Output Load (Vin=230VAC)



Design Reference

1. Typical application circuit

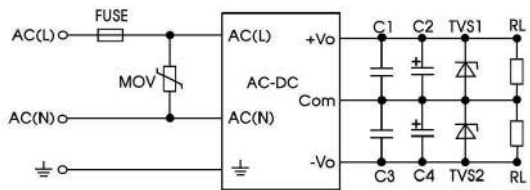


Fig. 1 LHE20-20Axx series

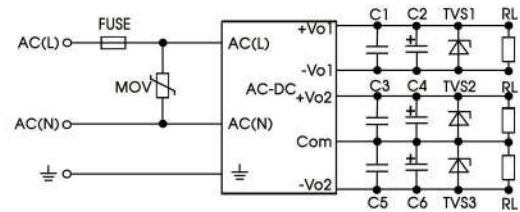


Fig. 2 LHE20-20Cxx series

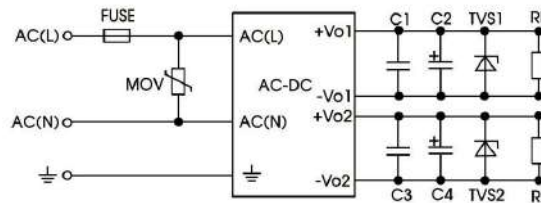


Fig. 3 LHE20-20Dxx series

Model	FUSE	MOV	C1/C3/C5	C2(μF)	C4(μF)	C6(μF)	TVS1	TVS2	TVS3
LHE20-20A12	3.15A/250V slow fusing, necessary	14D471K	0.1μF/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	--	--	SMBJ7.0A	SMBJ20A	--
LHE20-20D0515-05				220	--	--	SMBJ7.0A	SMBJ20A	--
LHE20-20D0524-03				47	--	--	SMBJ7.0A	SMBJ30A	--

Note:
Output filtering capacitors C2, C4, C6 are electrolytic capacitors, it is recommended to use high frequency and low impedance electrolytic capacitor. For capacitance and current of capacitor please refer to manufacture's datasheet. Capacitor voltage reduced to at least 80%. C1, C3, C5 are ceramic capacitors, which is used to filter high-frequency noise. TVS is a recommended component to protect post-circuits if converter fails.

2. EMC solution-recommended circuit

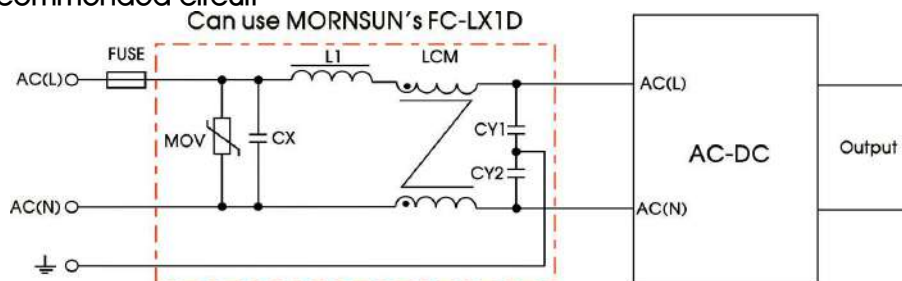
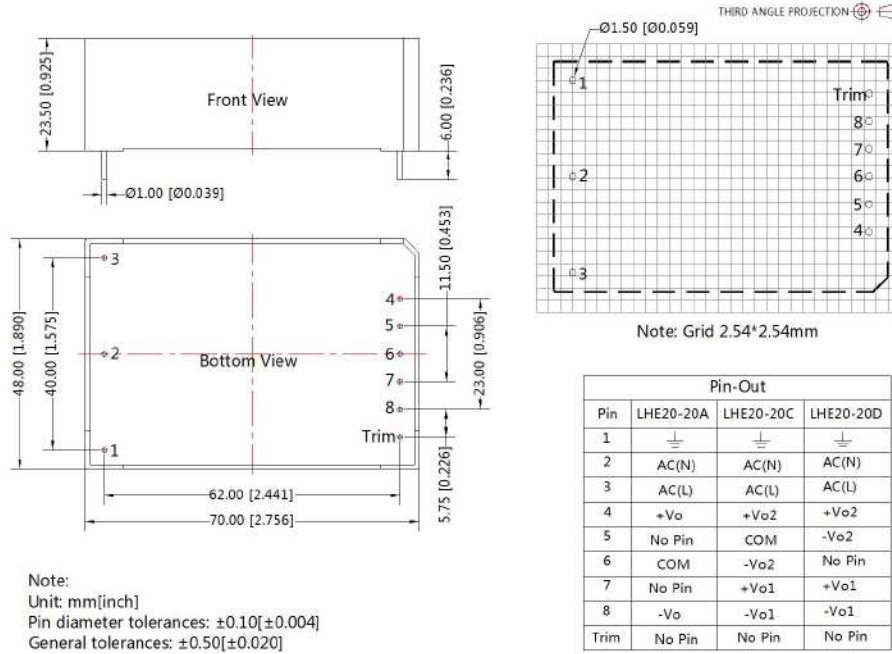


Fig. 4: EMC Recommended circuit with higher requirements

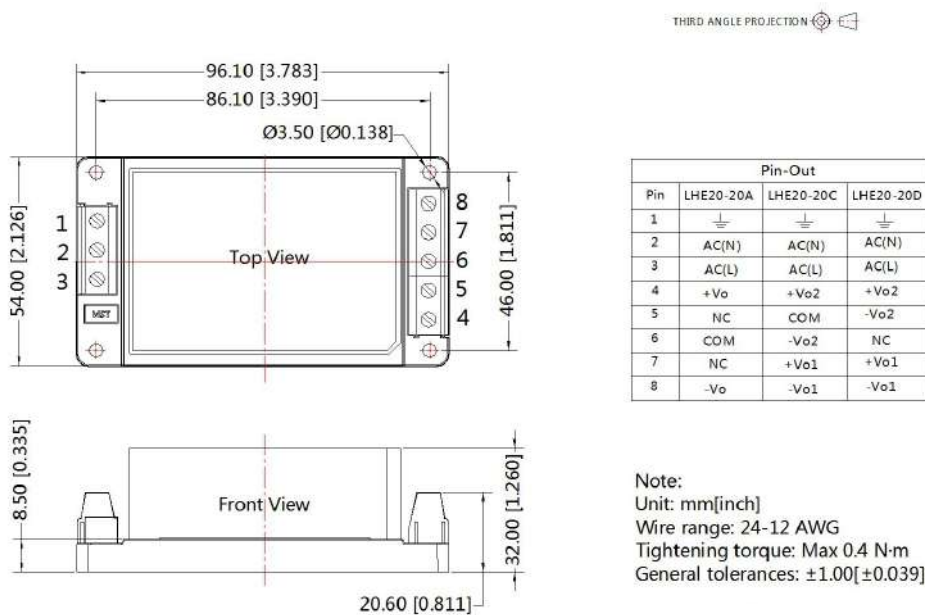
Element model	Recommended value
MOV	S14K300
CY1 , CY2	1000pF/400VAC
CX	0.1μF/275VAC
LCM	10mH, recommended to use MORNSUN's FL2D-Z5-103
L1	4.7μH/2A
FC-LX1D	2KV/4KV EMC filter
FUSE	3.15A/250V slow fusing, necessary

3. For more information Please find the application note on www.mornsun-power.com

Dimensions and Recommended Layout

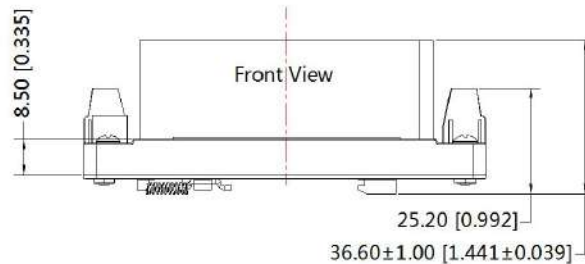
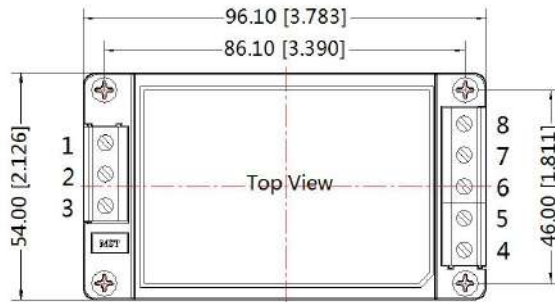


A2 Dimensions



A4 Dimensions

THIRD ANGLE PROJECTION



Pin	Pin-Out		
	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]
Mounting rail: TS35, rail needs to connect safety ground
Wire range: 24-12 AWG
Tightening torque: Max 0.4 N·m
General tolerances: ± 1.00[±0.039]

Note:

1. Packing information please refer to Product Packing Information which can be downloaded from www.mornsun-power.com. Packing bag number: 58220006(Horizontal package); 58220010 (A2/A4 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 $T_a=25^{\circ}\text{C}$, humidity<75% with nominal input voltage and rated output load;
4. All index testing methods in this datasheet are based on our Company's 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. 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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