

10W, AC-DC converter



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

LHE10-20A/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
LHE10-20A05**	10W	+5V/1000mA	-5V/1000mA	76	8800	8800
LHE10-20A12**		+12V/450mA	-12V/450mA	80	1970	1970
LHE10-20A15**		+15V/350mA	-15V/350mA	81	1970	1970
LHE10-20C0512-02		5V/1000mA	±12V/200mA	75	3200	260
LHE10-20C0515-02		5V/900mA	±15V/200mA	75	2160	80
LHE10-20D0505-02		5V/1800mA	5V/200mA	75	8000	540
LHE10-20D0512-02		5V/1500mA	12V/200mA	78	4400	260
LHE10-20D0515-02		5V/1400mA	15V/200mA	79	4400	170
LHE10-20D0524-02		5V/1000mA	24V/200mA	80	4000	170

Note:*Part No. with suffix of "A2" means chassis mounting and suffix of "A4" means DIN-Rail mounting (e.g. LHE10-20A05A2 means chassis mounting; LHE10-20A05A4 means DIN-Rail mounting)

**About LHE10-20Axx, 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	--	--	0.26	A
	230VAC	--	--	0.16	
Inrush current	115VAC	--	13	--	
	230VAC	--	23	--	
Recommended External Input Fuse		1A/250V, slow fusing, necessary			
Hot Plug		Unavailable			


Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Output Voltage Accuracy	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)	LHE10-20C/Dxx	Primary output	--	±3	%
			Secondary output	--	±5	
		LHE10-20Axx	--	±2	--	

Ripple & Noise*	Primary output, 20MHz bandwidth (peak-peak value)	LHE10-20C/Dxx/LHE10-20A05	--	--	100	mV
		LHE10-20A12/15	--	--	130	
Temperature Coefficient	Primary output		--	±0.02	--	%/°C
Short Circuit Protection			Continuous, self-recovery			
Over-current Protection	LHE10-20A/Dxx		≥150%Io self-recovery			
	LHE10-20Cxx		≥130%Io self-recovery			
Over-voltage Protection	Primary output	5VDC Output	≤7.5VDC(Output voltage clamp)			
		12/15VDC Output	≤20VDC(Output voltage clamp)			
Min. Load			10	--	--	%
Hold-up Time	115VAC input		--	8	--	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	LHE10-20A/C/Dxx	Test time: 1min (leakage current < 5mA)	4000	--	--	VAC
	Input - 			2500	--	--	
	Vo1-Vo2	LHE10-20C/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			--	100	--	kHz	
Power Derating	-40°C to -25°C		2.5	--	--	% / °C	
	+55°C to +70°C		3.3	--	--		
	85VAC-100VAC		1.0	--	--	%/VAC	
Safety Standard			IEC62368/EN62368/UL62368				
Safety Class			CLASS I				
MTBF			MIL-HDBK-217F@25°C > 300,000 h				

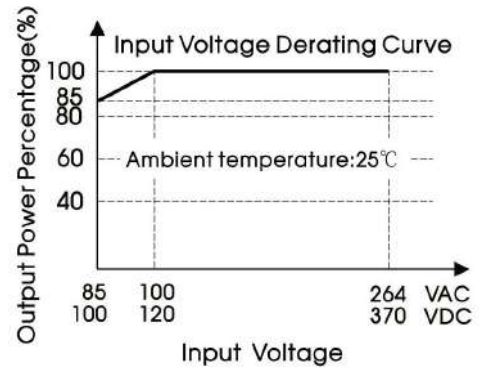
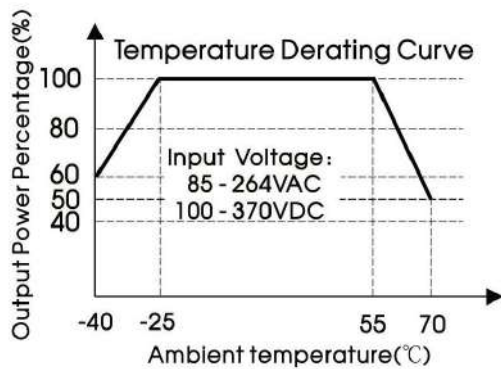
Physical Specifications

Casing Material	Black flame-retardant and heat-resistant plastic (UL94V-0)	
Dimension	Horizontal package	55.00*45.00*21.00 mm
	A2 chassis mounting	96.10*54.00*29.50 mm
	A4 Din-Rail mounting	96.10*54.00*34.10 mm
Weight	Horizontal package	75g (Typ.)
	A2 chassis mounting	130 g (Typ.)
	A4 Din-Rail mounting	170 g (Typ.)
Cooling method	Free air convection	

EMC Specifications

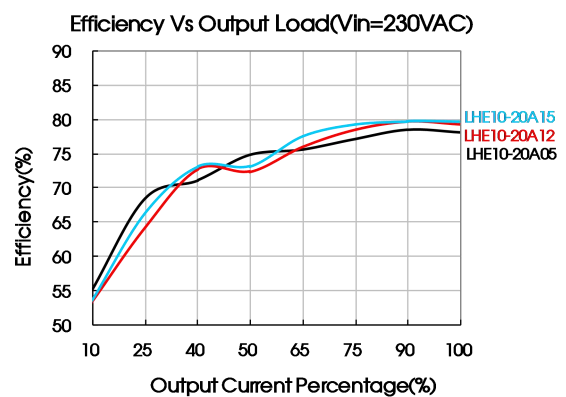
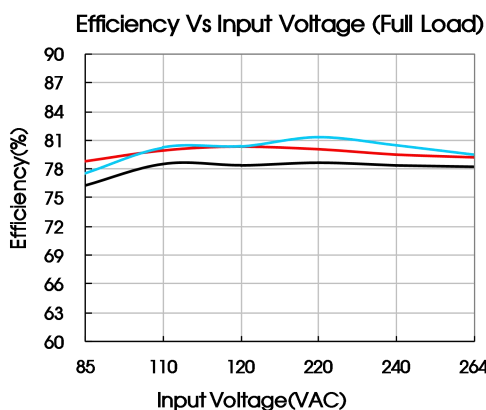
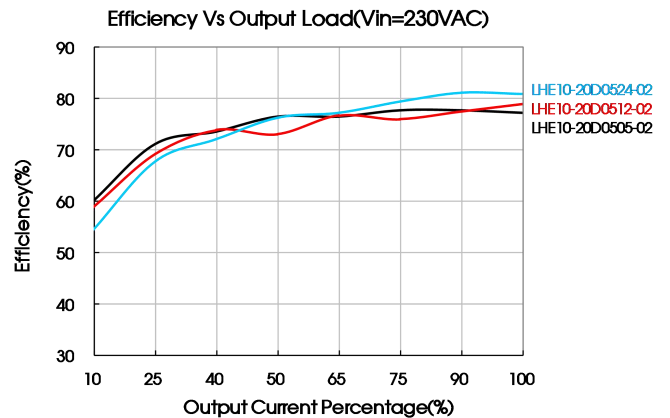
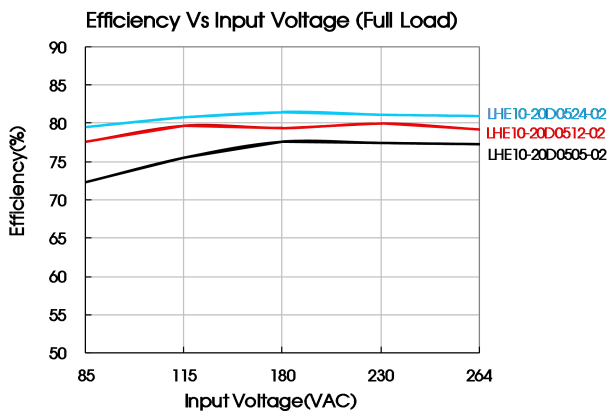
EMI	CE	CISPR32/EN55032	CLASS B	
	RE	CISPR32/EN55032	CLASS B	
EMS	ESD	IEC/EN 61000-4-2	Contact ±6KV / Air ±8KV	Perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4	±2KV	perf. Criteria B
		IEC/EN61000-4-4	±4KV (See Fig. 4 for recommended circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5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

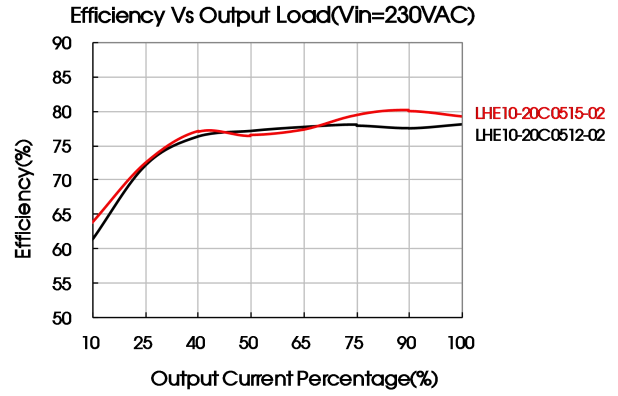
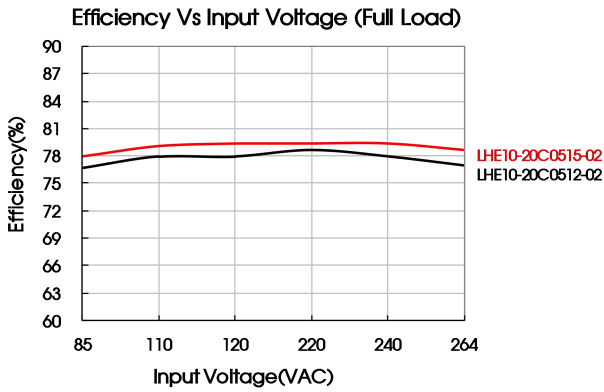
Product Characteristic Curve



Note: ① When input 85-100VAC/100-120VDC, 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.





Design Reference

1. Typical application circuit

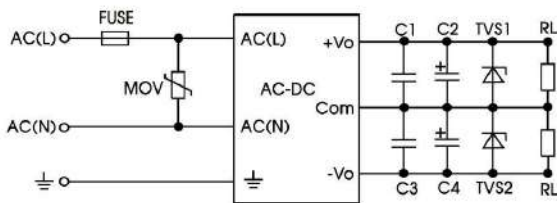


Fig. 1 LHE10-20Axx series

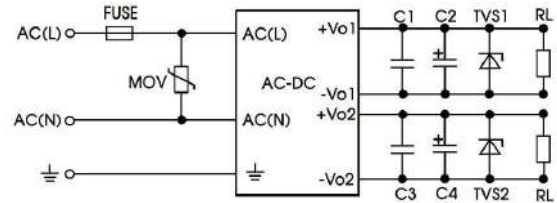


Fig. 2 LHE10-20Dxx series

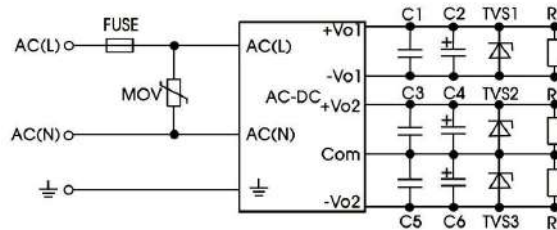


Fig. 3 LHE10-20Cxx series

Model	FUSE	MOV	C1/C3/C5	C2(μF)	C4(μF)	C6(μF)	TVS1	TVS2	TVS3
LHE10-20A05	1A/250V slow fusing, necessary	14D471K	0.1μF/50V	220	220	--	SMBJ7.0A	SMBJ7.0A	--
LHE10-20A12				120	120	--	SMBJ20A	SMBJ20A	--
LHE10-20A15				47	47	--	SMBJ20A	SMBJ20A	--
LHE10-20C0512-02				47	47	47	SMBJ7.0A	SMBJ20A	SMBJ20A
LHE10-20C0515-02				47	47	47	SMBJ7.0A	SMBJ20A	SMBJ20A
LHE10-20D0505-02				100	47	--	SMBJ7.0A	SMBJ7.0A	--
LHE10-20D0512-02				100	47	--	SMBJ7.0A	SMBJ20A	--
LHE10-20D0515-02				100	47	--	SMBJ7.0A	SMBJ20A	--
LHE10-20D0524-02	100	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

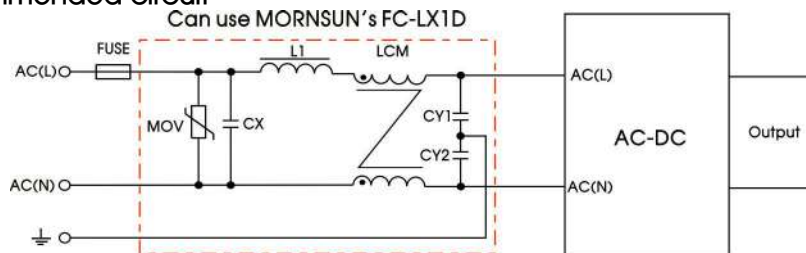
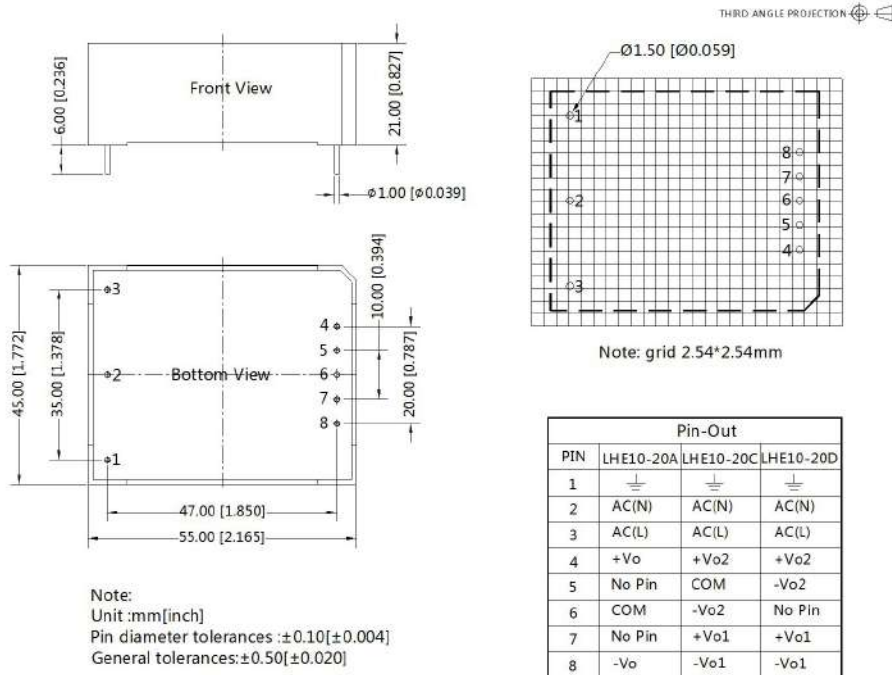


Fig 4: EMC Recommended circuit with higher requirements

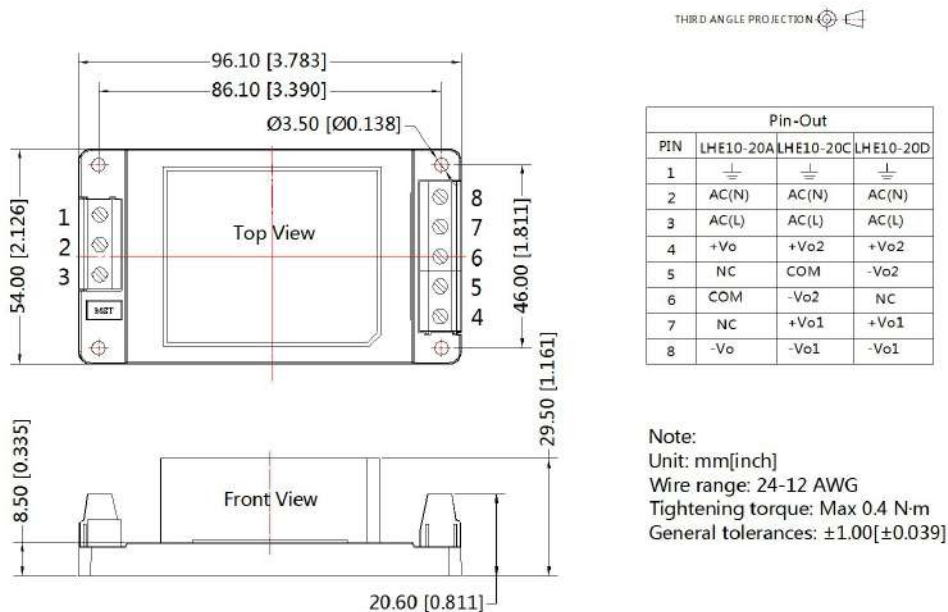
Element model	Recommended value
MOV	S14K300
CY1 , CY2	1000pF/400VAC
CX	0.1μF/275VAC
LCM	10mH, recommended to use MORNSUN's FL2D-Z5-103
L1	4.7μH/2A
FC-LX1D	2KV/4KV EMC filter
FUSE	2A/250V slow fusing, necessary

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

Dimensions and Recommended Layout

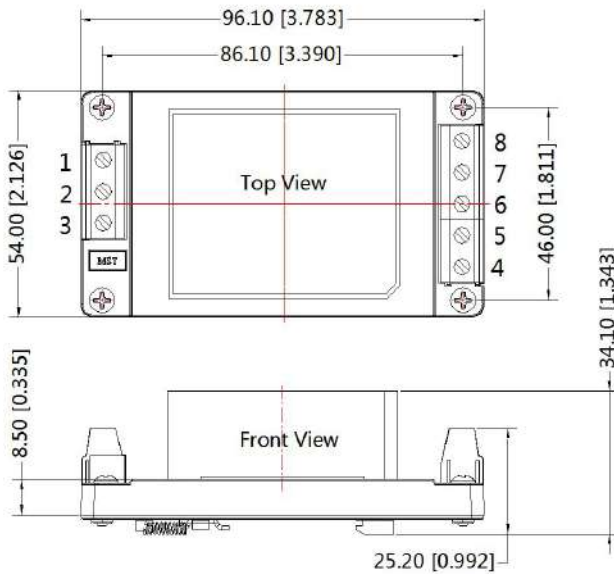


A2 Dimensions



A4 Dimensions

THIRD ANGLE PROJECTION



PIN	Pin-Out		
	LHE10-20A	LHE10-20C	LHE10-20D
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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