

15W, AC-DC converter



## FEATURES

- Universal 85-264VAC or 100-370VDC input voltage
- Operating ambient temperature range -40°C to +70°C
- High I/O isolation test voltage up to 4000VAC
- Regulated output, low output ripple & noise
- Output short circuit, over-current, over-voltage protection
- High efficiency, high reliability
- Plastic case meets UL94V-0 flammability
- EMI performance meets CISPR32 / EN55032 CLASS B

LHE15-20A/C/Dxx series is one of Mornsun's compact size multi-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, office and civil applications. For extremely harsh EMC environment, we recommend using the application circuit show in Design Reference of this datasheet.

## Selection Guide

Part No.*	Output Power	Nominal Output Voltage and Current		Efficiency at 230VAC (%) Typ.	Capacitive Load (μF) Max.	
		(Vo1/Io1)	(Vo2/Io2)		Vo1	Vo2
LHE15-20A05**	15W	+5V/1500mA	-5V/1500mA	76	12800	12800
LHE15-20A12**		+12V/650mA	-12V/650mA	80	2600	2600
LHE15-20A15**		+15V/500mA	-15V/500mA	81	2400	2400
LHE15-20C0505-05		5V/2000mA	±5V/500mA	75	11000	2200
LHE15-20C0512-02		5V/2000mA	±12V/200mA	77	11000	800
LHE15-20C0515-02		5V/1800mA	±15V/200mA	78	6000	370
LHE15-20D0505-08		5V/2000mA	5V/800mA	76	15000	3000
LHE15-20D0512-04		5V/2000mA	12V/400mA	78	12000	1800
LHE15-20D0524-02		5V/2000mA	24V/200mA	78	13000	800
LHE15-20D0524-04		5V/1000mA	24V/400mA	80	3000	1600

Note: \* Use suffix "A2" for chassis mounting and suffix "A4" for DIN-Rail mounting.

\*\* Only LHE15-20Axx series use both outputs(positive and negative) as sampling feedback, the others use Vo1 and defined as first 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	--	--	0.37	A
	230VAC	--	--	0.22	
Inrush Current	115VAC	--	20	--	
	230VAC	--	30	--	
Recommended External Input Fuse		2A/250V, slow-blow, required			
Hot Plug		Unavailable			

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit	
Output Voltage Accuracy	Vo1		--	±2	--		
	Vo2	LHE15-20Axx	--	±2	--		
		LHE15-20C/Dxx	--	±10	--		
Line Regulation	Full load	Vo1	--	±0.5	--	%	
		Vo2	LHE15-20Axx	--	±0.5		--
			LHE15-20C/Dxx	--	±1.5		--
Load Regulation	10%-100% load (balanced load)	Vo1	--	±2	--		
		Vo2	LHE15-20Axx	--	±2		--
			LHE15-20C/Dxx	--	±5		--
Ripple & Noise*	20MHz bandwidth (peak-to-peak value)	Vo1	--	50	100	mV	
		Vo2	LHE15-20Axx	--	--		100
			LHE15-20C/Dxx	--	--		200
Temperature Coefficient	Vo1		--	±0.02	--	%/°C	
Short Circuit Protection			Continuous, self-recovery				
Over-current Protection			150% - 300% I <sub>o</sub> , self-recovery				
Over-voltage Protection	Vo1	5VDC Output	≤7.5VDC				
		12VDC Output	≤20VDC				
		15VDC Output	≤22VDC				
Minimum Load			10	--	--	%	
Hold-up Time	115VAC input		--	8	--	ms	
	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	Input-output	LHE15-20A/C/Dxx	Electric Strength Test for 1min., leakage current <5mA	4000	--	--	VAC
	Input- 	LHE15-20A/C/Dxx		2000	--	--	
	Vo1-Vo2	LHE15-20C/Dxx		500	--	--	VDC
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			--	65	--	kHz	
Power Derating	-40°C to -25°C		2.67	--	--	%/°C	
	+50°C to +70°C	LHE15-20C/Dxx	2.5	--	--		
	+55°C to +70°C	LHE15-20Axx	3.33	--	--		
	85VAC-100VAC	LHE15-20A/C/Dxx	1.0	--	--	%/VAC	
	240VAC-264VAC	LHE15-20A/Cxx	0.83	--	--		
Safety Standard			IEC62368/EN62368/UL62368				
Safety Class			CLASS I				
MTBF			MIL-HDBK-217F@25°C > 300,000 h				

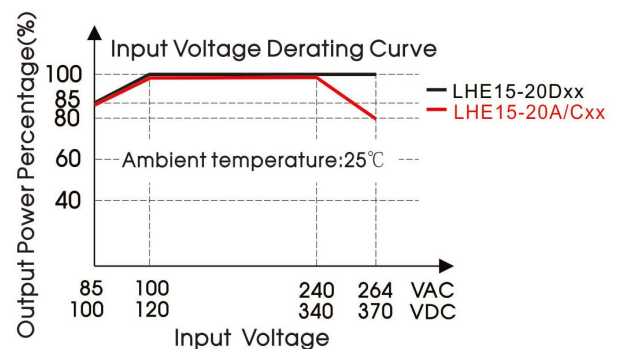
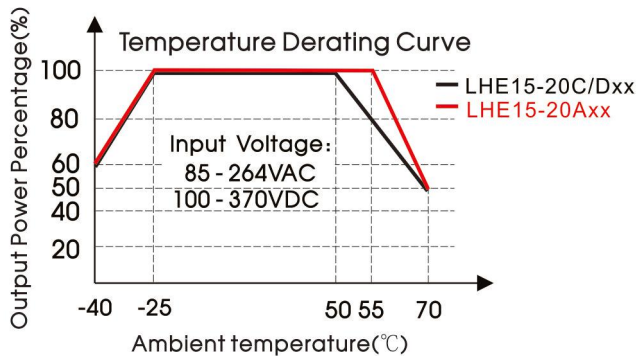
### Mechanical Specifications

Case Material	Black plastic, flame-retardant and heat-resistant (UL94V-0)	
Dimension	Horizontal package	62.00 x 45.00 x 22.50 mm
	A2 chassis mounting	96.10 x 54.00 x 31.00 mm
	A4 Din-Rail mounting	96.10 x 54.00 x 35.60 mm
Weight	Horizontal package	90g(Typ.)
	A2 chassis mounting	140g(Typ.)
	A4 Din-Rail mounting	180g(Typ.)
Cooling method	Free air convection	

### Electromagnetic Compatibility (EMC)

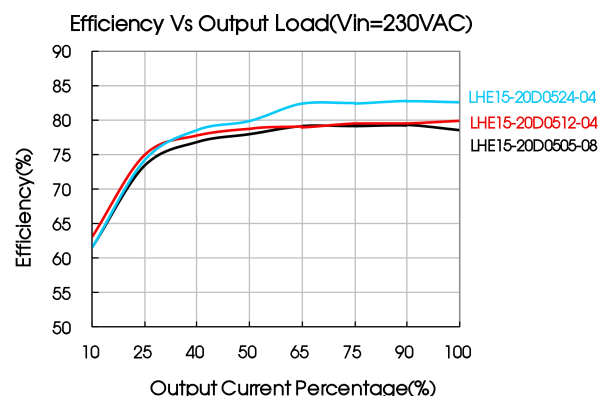
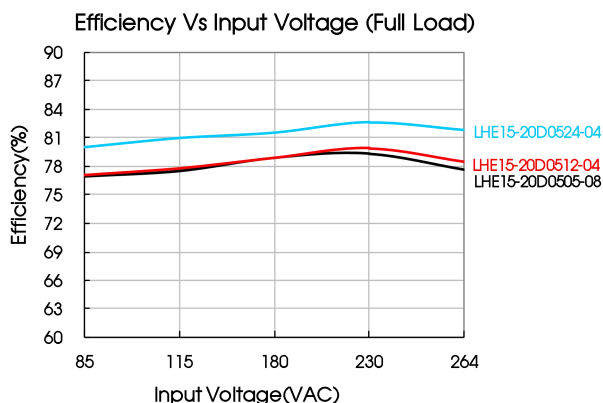
Emissions	CE	CISPR32/EN55032	CLASS B	
	RE	CISPR32/EN55032	CLASS B	
Immunity	ESD	IEC/EN 61000-4-2	Contact $\pm 6KV$ / Air $\pm 8KV$	Perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4	$\pm 2KV$	perf. Criteria B
		IEC/EN61000-4-4	$\pm 4KV$ (See Fig. 4 for recommended circuit)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

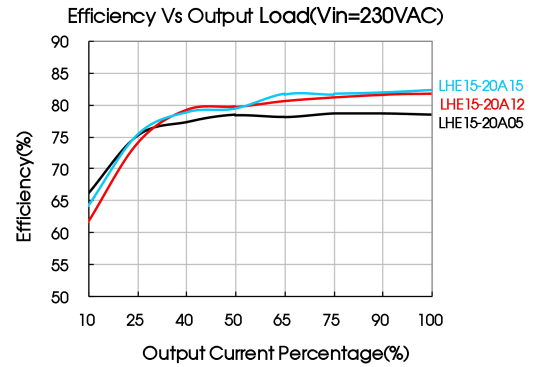
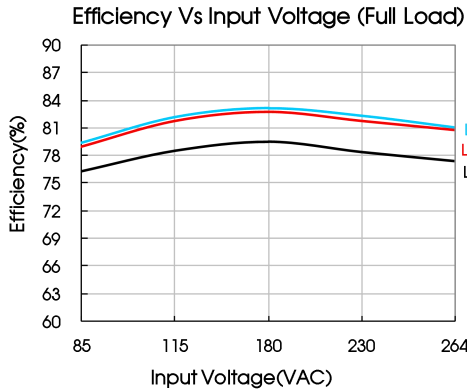
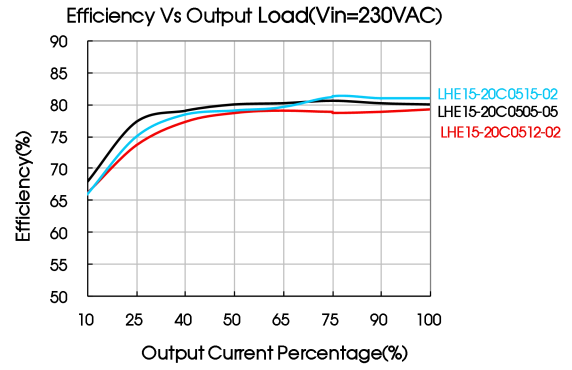
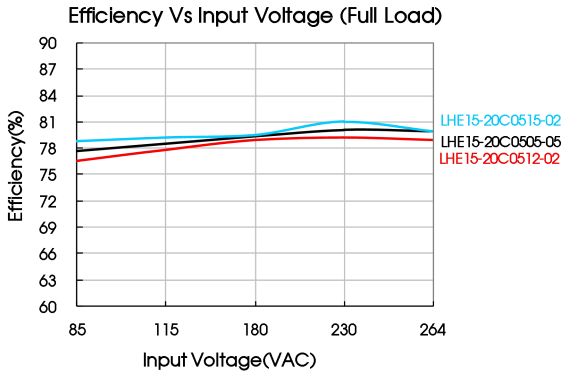
### Product Characteristic Curve



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 factory or one of our FAE.





## Design Reference

### 1. Typical application

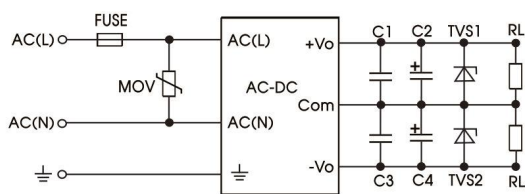


Fig. 1 LHE15-20Axx series, typical circuit diagram

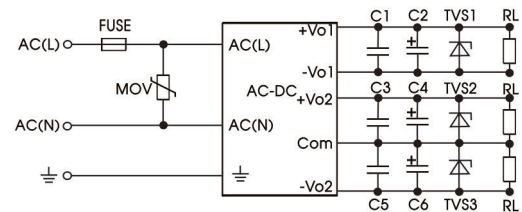


Fig. 2 LHE15-20Cxx series, typical circuit diagram

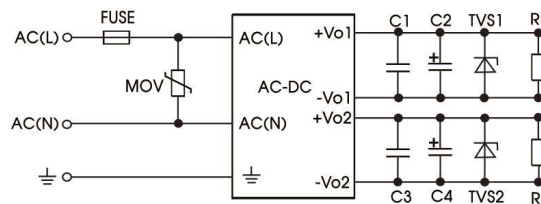


Fig. 3 LHE15-20Dxx series, typical circuit diagram

Part No.	FUSE	MOV	C1/C3/C5	C2(μF)	C4(μF)	C6(μF)	TVS1	TVS2	TVS3
LHE15-20A05	2A/250V slow-blow required	S14K300	1μF/50V	470	470	--	SMBJ7.0A	SMBJ7.0A	--
LHE15-20A12				220	220	--	SMBJ20A	SMBJ20A	--
LHE15-20A15				120	120	--	SMBJ20A	SMBJ20A	--
LHE15-20C0505-05				470	220	220	SMBJ7.0A	SMBJ7.0A	SMBJ7.0A
LHE15-20C0512-02				470	120	120	SMBJ7.0A	SMBJ20A	SMBJ20A
LHE15-20C0515-02				470	120	120	SMBJ7.0A	SMBJ20A	SMBJ20A
LHE15-20D0505-08				470	--	--	SMBJ7.0A	SMBJ20A	--
LHE15-20D0512-04				220	--	--	SMBJ7.0A	SMBJ7.0A	--
LHE15-20D0524-02				120	--	--	SMBJ7.0A	SMBJ20A	--
LHE15-20D0524-04				47	--	--	SMBJ7.0A	SMBJ30A	--

#### Output Filter Components:

We recommend using an electrolytic capacitor with high frequency, and low ESR rating for C2, C4 (refer to manufacture's datasheet). Choose a Capacitor voltage rating with at least 20% margin, in other words not exceeding 80%. C1, C3 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.

2. EMC compliance recommended circuit

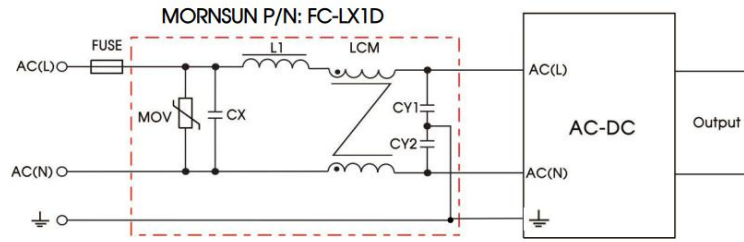
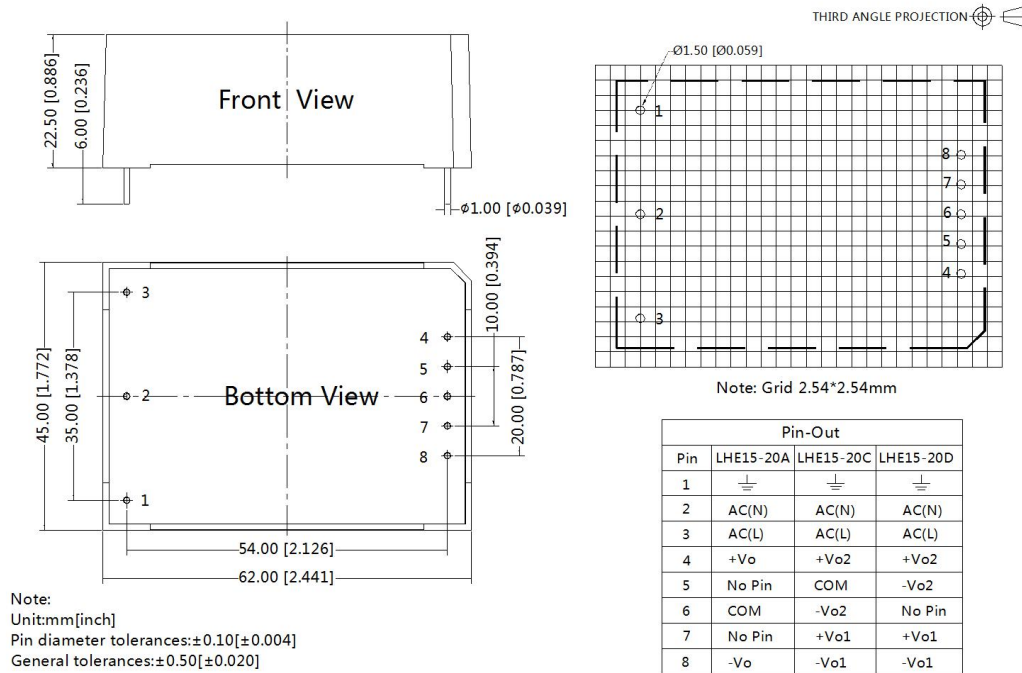


Fig 2: EMC circuit for harsh requirements

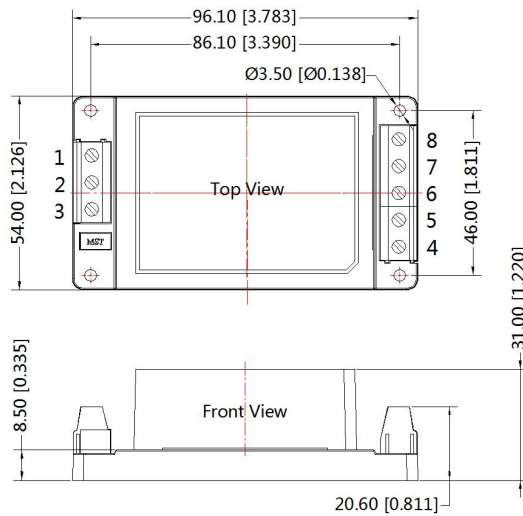
Component	Recommended value
MOV	S14K300
CY1 , CY2	1000pF/400VAC
CX	0.1μF/275VAC
LCM	10mH, we recommended using part no FL2D-Z5-103 (MORNSUN)
L1	4.7μH/2A
FC-LX1D	2KV/4KV EMC filter
FUSE	2A/250V, slow-blow, required

3. For additional information please refer to application notes on [www.mornsun-power.com](http://www.mornsun-power.com)

Dimensions and Recommended Layout



A2 Dimensions

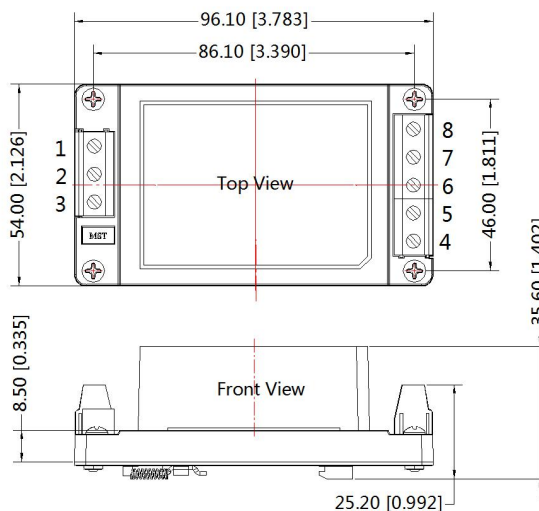


THIRD ANGLE PROJECTION

Pin-Out			
Pin	LHE15-20A	LHE15-20C	LHE15-20D
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]

A4 Dimensions



THIRD ANGLE PROJECTION

Pin-Out			
Pin	LHE15-20A	LHE15-20C	LHE15-20D
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:
- For additional information on Product Packaging please refer to [www.mornsun-power.com](http://www.mornsun-power.com). Packaging bag number: 58220006 (Horizontal package); 58220010 (A2/A4 package);
  - 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;
  - 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;
  - All index testing methods in this datasheet are based on our company corporate standards;
  - We can provide product customization service, please contact our technicians directly for specific information;
  - Products are related to laws and regulations: see "Features" and "EMC";
  - 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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