

# AC/DC Converter

LHE10-20A/C/Dxx Series



10W, AC-DC converter



## FEATURES

- Universal Input: 85 - 264VAC/100 - 370VDC
- Operating ambient temperature range: -40℃ to +70℃
- High isolation voltage up to 4KVAC
- Regulated output, low ripple & noise
- Output short circuit, overcurrent, overvoltage protection
- High efficiency, high reliability
- Plastic case meets flammability per UL94V-0
- EMC performance meets CISPR32 / EN55032 CLASS B

LHE10-20A/C/Dxx series is one of 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 insulation. 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

Part No.*	Output Power	Nominal Output Voltage and Current		Efficiency at 230VAC(%) Typ.	Capacitive Load (μF) Max.	
		(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: \* Use suffix "A2" for chassis mounting and suffix "A4" for DIN-Rail mounting.

\*\* LHE10-20Axx 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	--	--	0.26	A
	230VAC	--	--	0.16	
Inrush Current	115VAC	--	13	--	
	230VAC	--	23	--	
Recommended External Input Fuse		1A/250V, slow-blow, required			
Hot Plug		Unavailable			

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LHE05-20A/C/Dxx Series



Output Specifications							
Item	Operating Conditions		Min.	Typ.	Max.	Unit	
Output Voltage Accuracy	Vo1		--	±2	--		
	Vo2		--	±10	--		
Line Regulation	Full load	Vo1	--	±0.5	--	%	
		Vo2	--	±1.5	--		
Load Regulation	10%-100% load (balanced load)	LHE10-20C/Dxx	Vo1	--	±3	--	
			Vo2	--	±5	--	
		LHE10-20Axx	--	±2	--	--	
Ripple & Noise*	Vo1, 20MHz bandwidth (peak-to-peak value)	LHE10-20C/Dxx/LHE10-20A05		--	--	100	mV
		LHE10-20A12/15		--	--	130	
Temperature Coefficient	Vo1		--	±0.02	--	%/°C	
Short Circuit Protection			Continuous, self-recovery				
Overcurrent Protection	LHE10-20A/Dxx		≥ 150%Io self-recovery				
	LHE10-20Cxx		≥ 130%Io self-recovery				
Overvoltage Protection	Vo1	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	--		

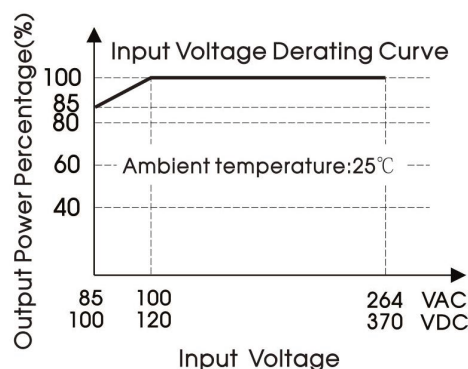
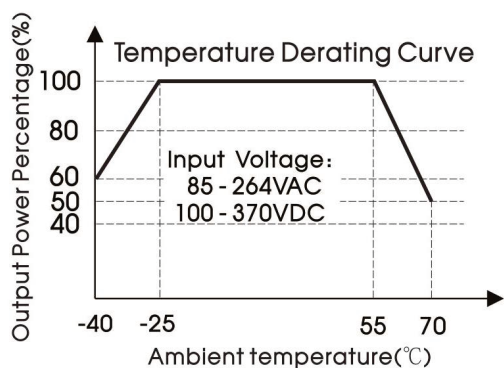
Note: \* The "parallel cable" method is used for Ripple and noise test, please refer to AC-DC Converter Application Notes for specific information.

General Specifications							
Item	Operating Conditions		Min.	Typ.	Max.	Unit	
Isolation Voltage	Input - output	LHE10-20A/C/Dxx	Electric Strength Test for 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	
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 -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				

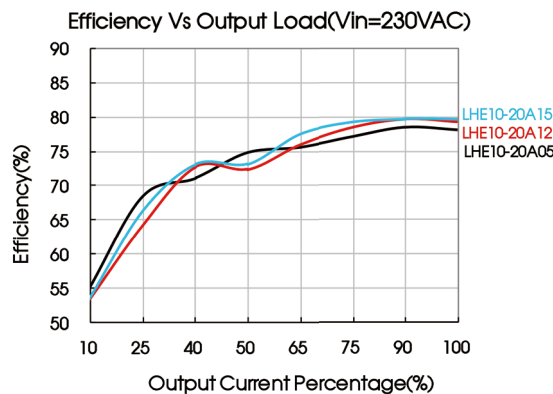
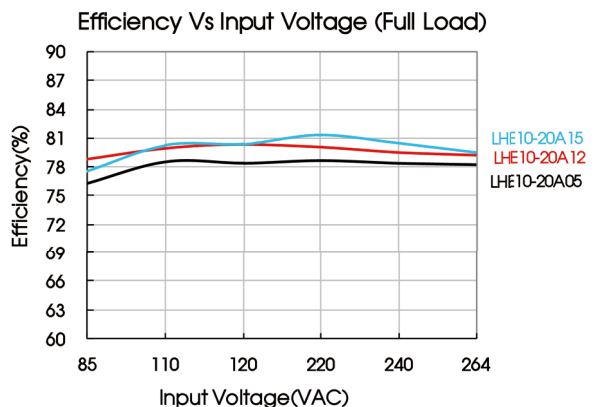
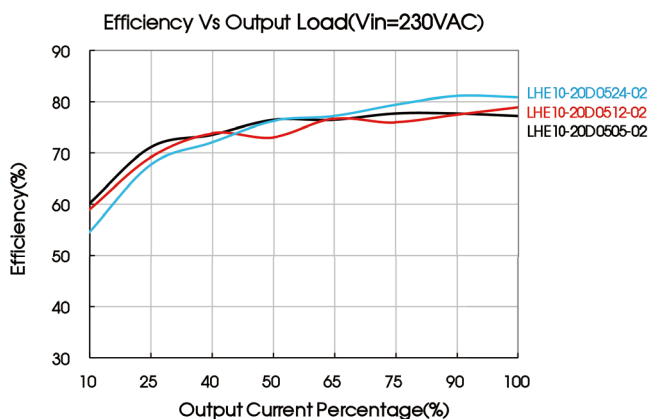
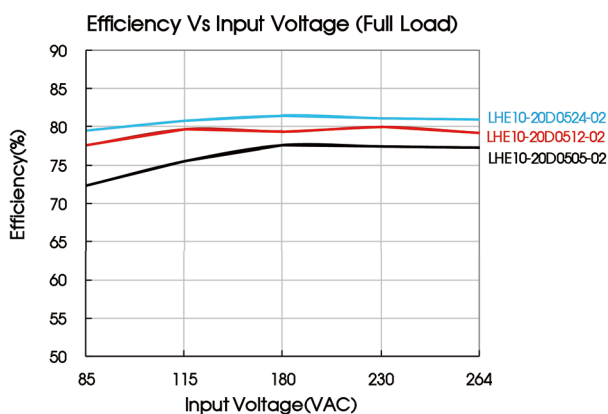
Mechanical Specifications		
Case Material	Black plastic, flame-retardant and heat-resistant (UL94V-0)	
Dimension	Horizontal package	55.0 x 45.0 x 21.0 mm
	A2 chassis mounting	96.1 x 54.0 x 29.5 mm
	A4 Din-Rail mounting	96.1 x 54.0 x 34.1 mm
Weight	Horizontal package	75g (Typ.)
	A2 chassis mounting	130 g (Typ.)
	A4 Din-Rail mounting	170 g (Typ.)
Cooling method	Free air convection	

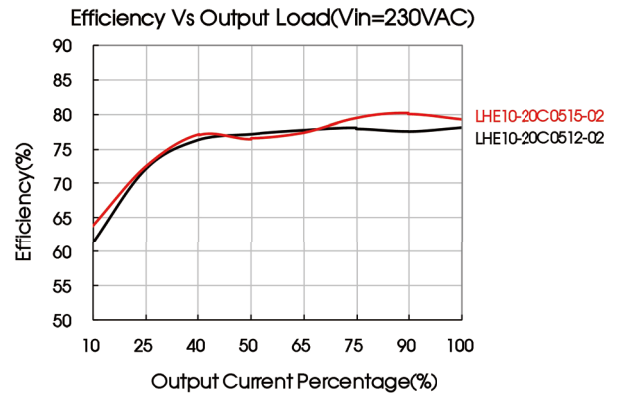
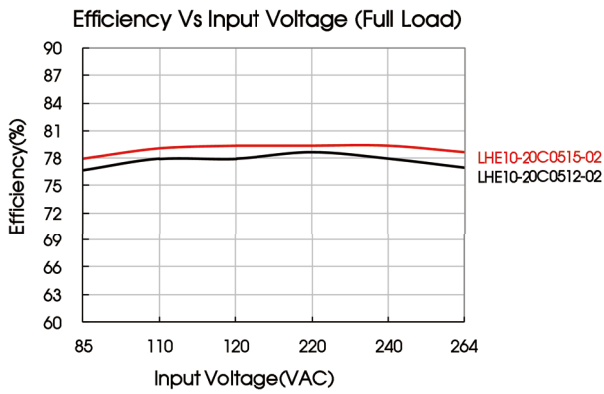
Electromagnetic Compatibility (EMC)				
Emissions	CE	CISPR32/EN55032	CLASS B	
	RE	CISPR32/EN55032	CLASS B	
Immunity	ESD	IEC/EN 61000-4-2	Contact $\pm 6\text{KV}$ / Air $\pm 8\text{KV}$ Perf. Criteria B	
	RS	IEC/EN61000-4-3	10V/m perf. Criteria A	
	EFT	IEC/EN61000-4-4	$\pm 2\text{KV}$	perf. Criteria B
		IEC/EN61000-4-4	$\pm 4\text{KV}$ (See Fig. 4 for recommended circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5	line to line $\pm 1\text{KV}$ /line to ground $\pm 2\text{KV}$	perf. Criteria B
		IEC/EN61000-4-5	line to line $\pm 2\text{KV}$ /line to ground $\pm 4\text{KV}$ (See Fig. 4 for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6	10Vr.m.s	perf. Criteria A
Voltage dips, short interruptions and voltage variations		IEC/EN61000-4-11	0%, 70%	

## Product Characteristic Curve



Note: ① With an input voltage between 8 - 100VAC or 100 - 120VDC the output power must be derated as per the 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 circuit

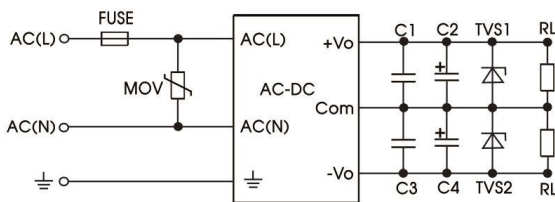


Fig. 1: Typical circuit diagram for LHE10-20Axx series

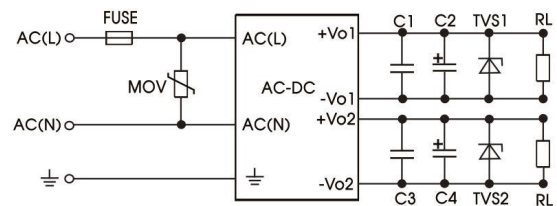


Fig. 2: Typical circuit diagram for LHE10-20Dxx series

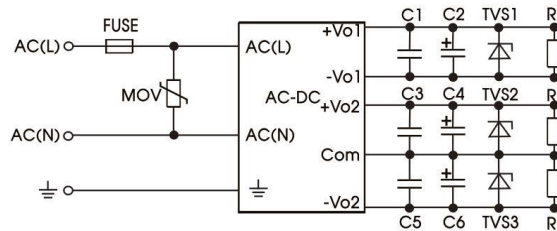


Fig. 3: Typical circuit diagram for LHE10-20Cxx series

Model	FUSE	MOV	C1/C3/C5	C2(μF)	C4(μF)	C6(μF)	TVS1	TVS2	TVS3
LHE10-20A05	1A/250V slow-blow, required	S14K300	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	--			

#### 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

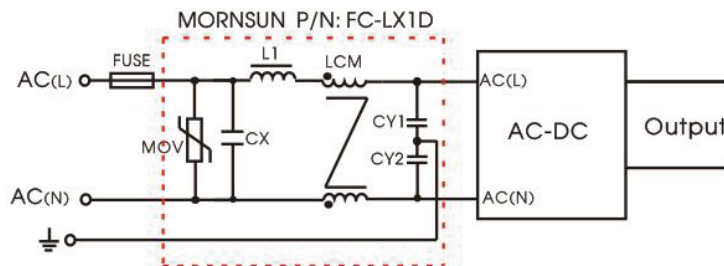


Fig 4: EMC circuit for harsh requirements

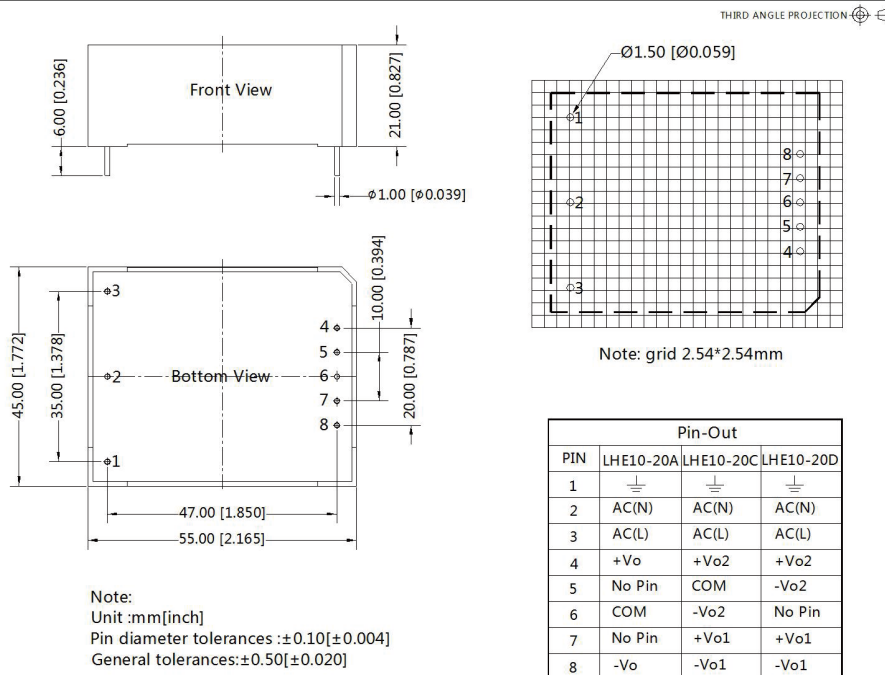
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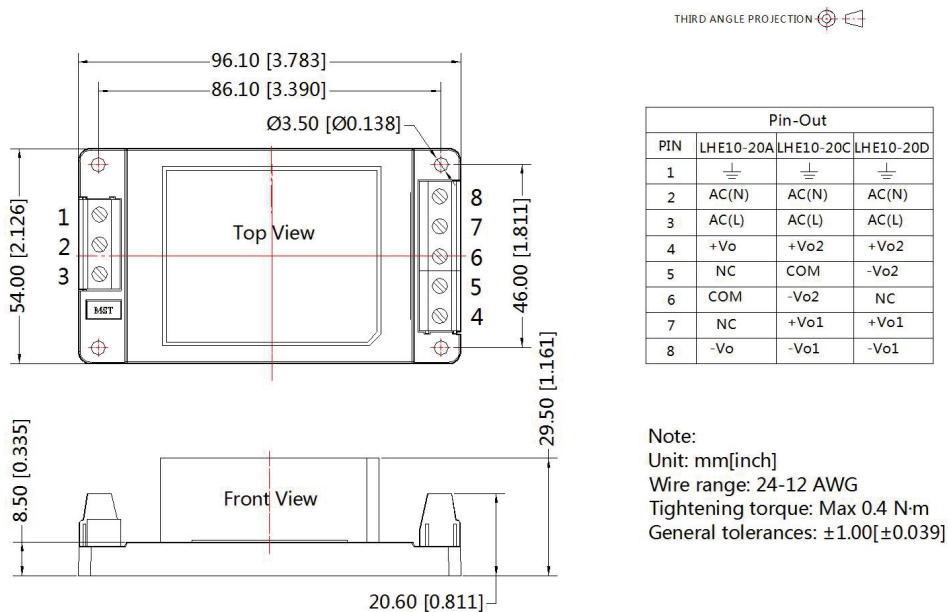


Component	Recommended value
MOV	S14K300
CY1 , CY2	1000pF/400VAC
CX	0.1μF/275VAC
LCM	10mH,we recommend using part no. FL2D-Z5-103 (MORNSUN)
L1	4.7μH/2A
FC-LX1D	2kV/4kV EMC filter
FUSE	2A/250V slow-blow required

## Dimensions and Recommended Layout



## A2S Dimensions



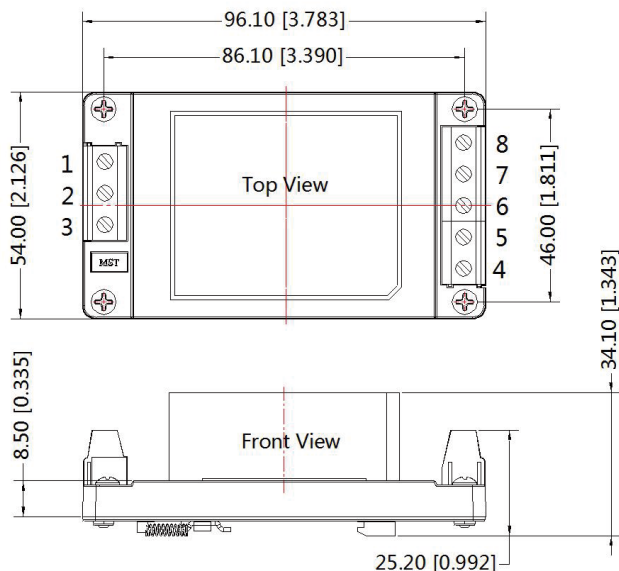
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## A4S Dimensions

THIRD ANGLE PROJECTION



Pin-Out			
PIN	LHE10-20A	LHE10-20C	LHE10-20D
1	$\perp$	$\perp$	$\perp$
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:  $\pm 1.00[\pm 0.039]$

### NOTE:

1. For additional information on Product Packaging please refer to [www.szhehuiyuan.com](http://www.szhehuiyuan.com).
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 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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