AC/DC Converter

LHE20-20A/C/Dxx Series

20W, AC-DC converter

FEATURES

- Universal 85 - 264VAC and wide 100 - 370VDC Input
- Operating ambient temperature range -40℃ ~ +70℃
- High I/O isolation test voltage of 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 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
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: * Use suffix "A2" for chassis mounting and suffix "A4" for DIN-Rail mounting.
** 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.

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	--	

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	--	%/°C
Short Circuit Protection				Continuous, self-recovery			
Over-current Protection				150% - 300% Io self-recovery			
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 Test	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	°C
Storage Temperature				-40	--	+85	
Storage Humidity				--	--	95	%RH
Soldering Temperature		Wave-soldering		260 ± 5℃; time：5 - 10s			
		Manual-welding		360 ± 10℃; time：3 - 5s			
Switching Frequency				--	65	--	kHz
Power Derating		-40℃ ~ -25℃		2.67	--	--	%/°C
		+50℃ ~ +70℃		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			

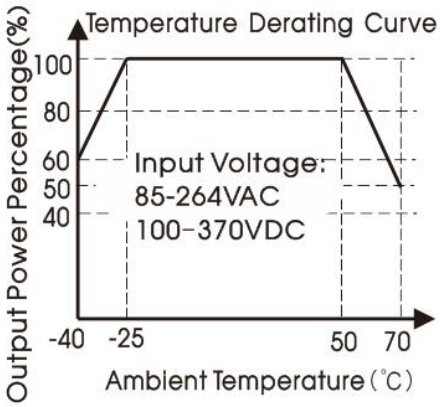
Mechanical Specifications

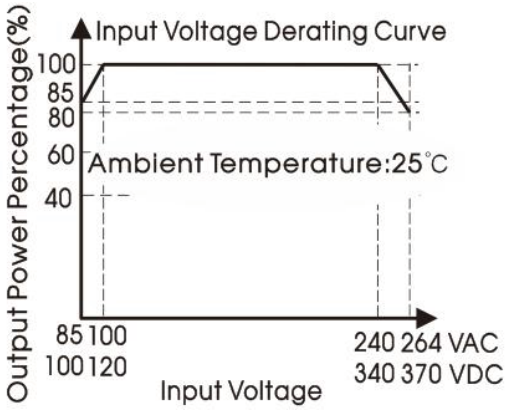
Case Material		Black plastic, flame-retardant and heat-resistant (UL94V-0)
Dimension	Horizontal package	70.0 x 48.0 x 23.5 mm
	A2 chassis mounting	96.1 x 54.0 x 32.0 mm
	A4 Din-Rail mounting	96.1 x 54.0 x 36.6 mm
Weight	Horizontal package	120g (Typ.)
	A2 chassis mounting	170g (Typ.)
	A4 Din-Rail mounting	210g (Typ.)
Cooling method		Free air convection

Electromagnetic Compatibility (EMC)

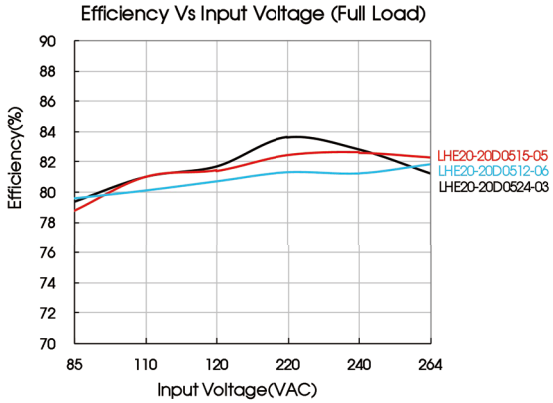
Emissions	CE	CISPR32/EN55032 CLASS B	
	RE	CISPR32/EN55032 CLASS B	
Immunity	ESD	IEC/EN 61000-4-2 Contact ±6KV / Air ±8KV	Perf. Criteria B
	RS	IEC/EN61000-4-3 10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4 ±2KV	perf. Criteria B
		IEC/EN61000-4-4 ±4KV (See Fig. 4 for recommended circuit)	perf. Criteria B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

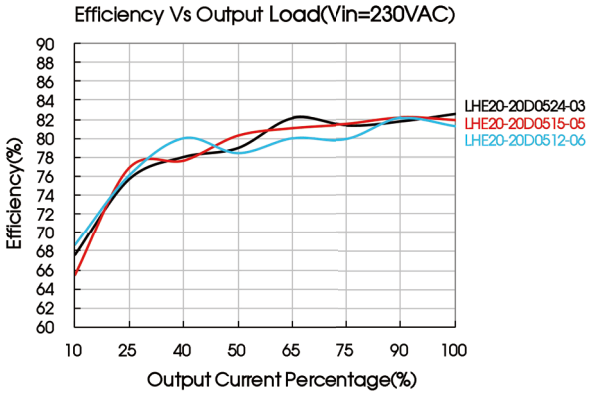
Product Characteristic Curve

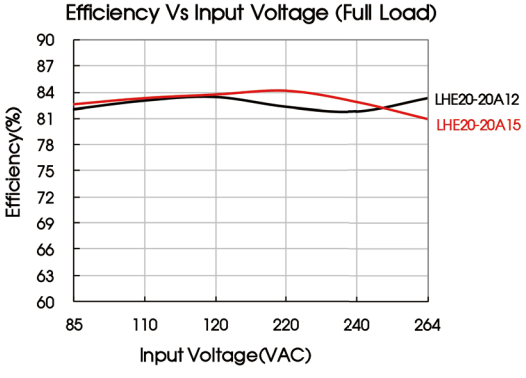


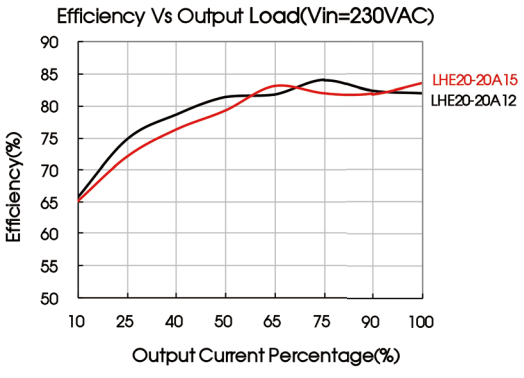


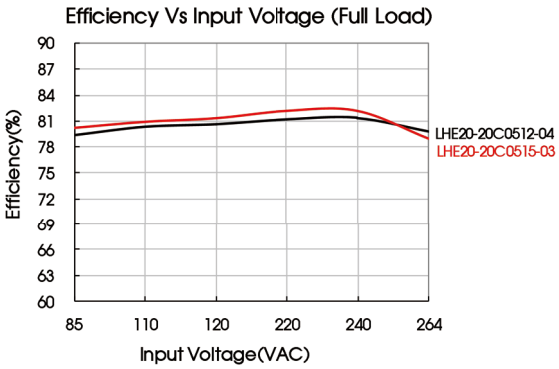
Note: ① With an AC input between 85-100V/240-264VAC and a DC input between 100-120V/340-370VDC, the output power must be derated as per temperature derating curves;
② This product is suitable for applications using natural air cooling; for applications in closed environment please consult factory or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

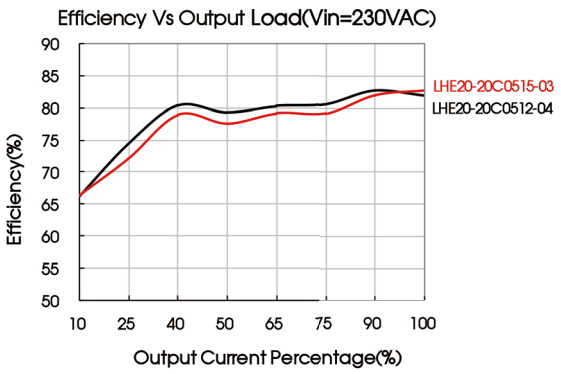












Design Reference

1. Typical application

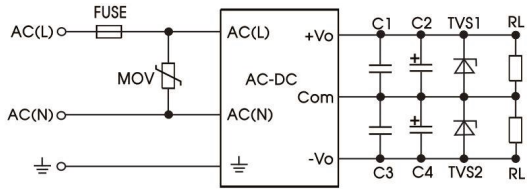


Fig. 1 LHE20-20Axx series, typical circuit diagram

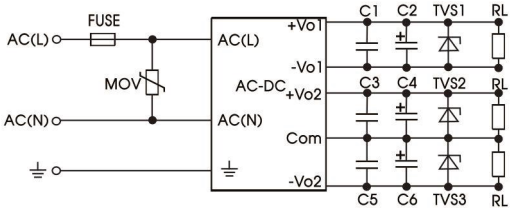


Fig. 2 LHE20-20Cxx series, typical circuit diagram

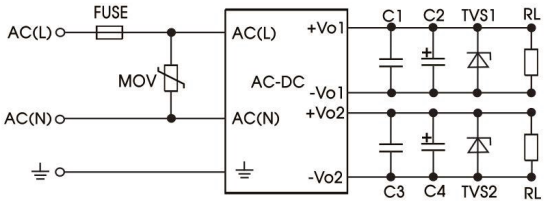


Fig. 3 LHE20-20Dxx series, typical circuit diagram

Model	FUSE	MOV	C1/C3/C5	C2(μF)	C4(μF)	C6(μF)	TVS1	TVS2	TVS3
LHE20-20A12	3.15A/250V slow-blow, required	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	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

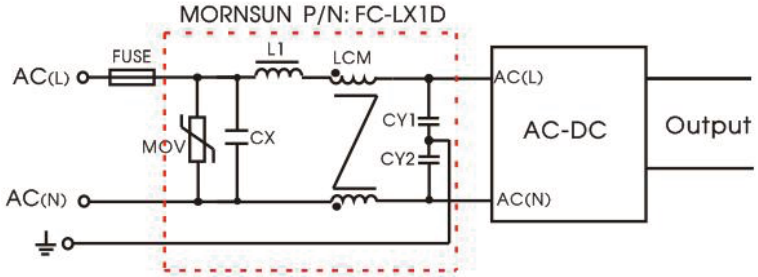
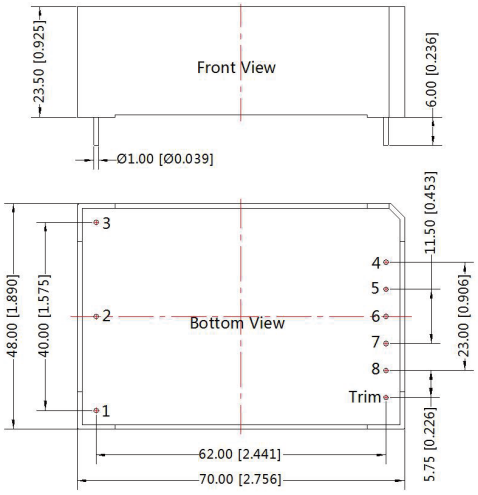
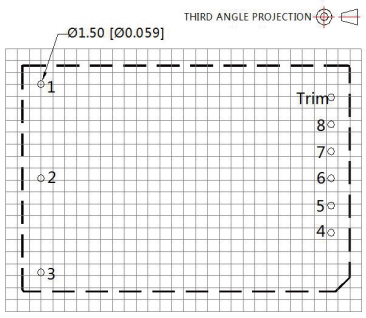


Fig 4

Element model	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	3.15A/250V, slow-blow, required

Dimensions and Recommended Layout



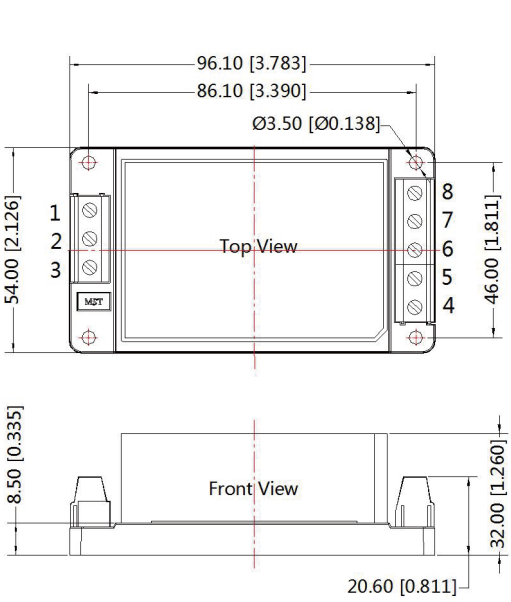


Note: Grid 2.54*2.54mm

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

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

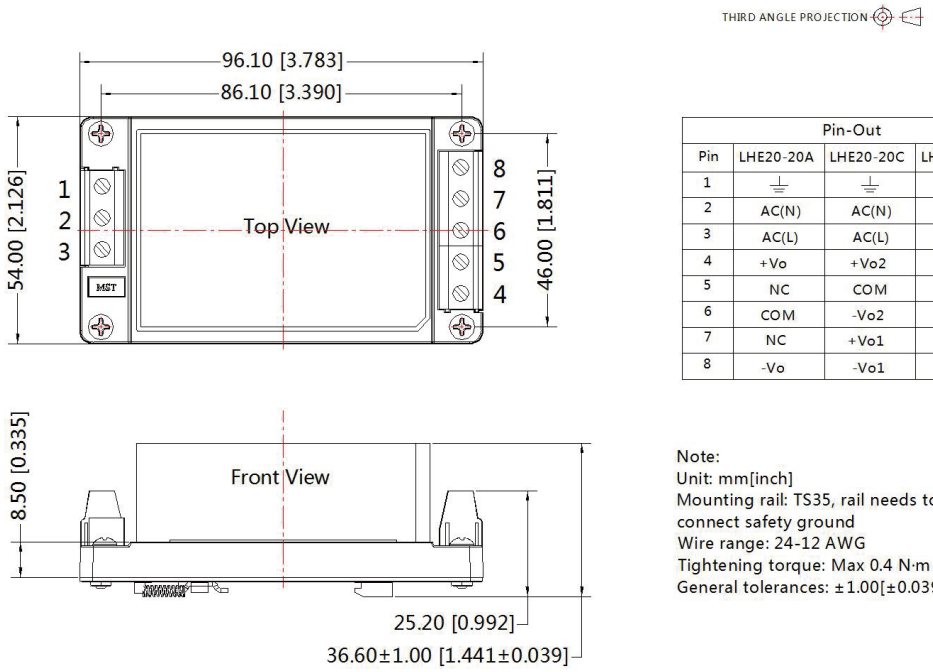
A2S Dimensions



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]

A4S 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]
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. For additional information on Product Packaging please refer to 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 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. 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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