

10W, AC-DC converter



RoHS



FEATURES

- Universal Input: 85 - 264VAC/100 - 370VDC
- Operating ambient temperature range: -40°C to +70°C
- High I/O isolation test voltage 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 performance meets CISPR32/EN55032 CLASS B

LHE10-20A/C/Dxx series is one of Mornsun's 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

certification	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
EN	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: 1. * Use suffix "A2" for chassis mounting and suffix "A4" for DIN-Rail mounting.
 2. ** LHE10-20Axx series use both outputs(positive and negative) as sampling feedback, the others use Vo1 and defined as first output.
 3. The product picture is for reference only. For details, please refer to the actual product.

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			

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	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	℃
Storage Temperature				-40	--	+85	
Storage Humidity				--	--	95	%RH
Soldering Temperature		Wave-soldering, Max. 10 seconds		255	260	265	℃
		Manual-welding, Max. 5 seconds		350	360	370	
Switching Frequency				--	100	--	kHz
Power Derating		-40℃ to -25℃		2.5	--	--	% /℃
		+55℃ to +70℃		3.3	--	--	
		85VAC -100VAC		1.0	--	--	%/VAC
Safety Standard		LHE10-20A12		EN/BS EN 62368-1(Report) safety approved; Design refer to IEC/UL62368-1			
		The others		Design refer to IEC/EN/UL62368-1			
Safety Class				CLASS I			
MTBF				MIL-HDBK-217F@25℃ > 300,000 h			

Mechanical Specifications

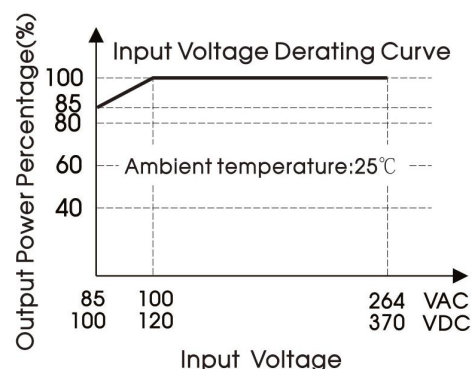
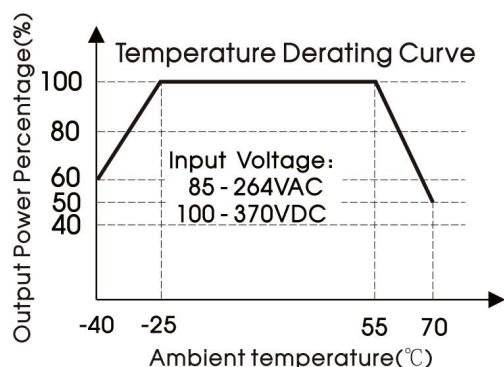
Case Material	Black plastic, flame-retardant and heat-resistant (UL94V-0)		
Dimension	Horizontal package		55.0 x 45.0 x 21.0 mm
	A2 chassis mounting		96.1 x 54.0 x 29.5 mm
	A4 Din-Rail mounting		96.1 x 54.0 x 34.1 mm
Weight	Horizontal package		75g (Typ.)
	A2 chassis mounting		130 g (Typ.)
	A4 Din-Rail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

Electromagnetic Compatibility (EMC)

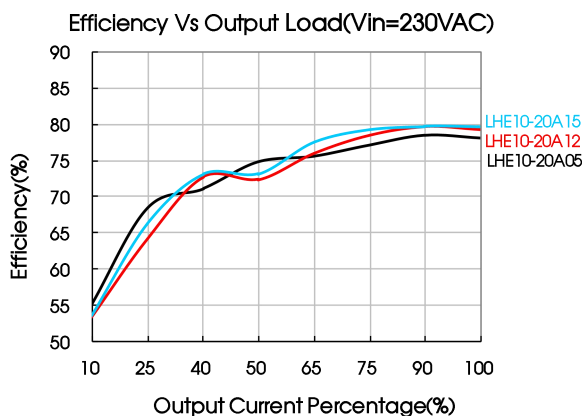
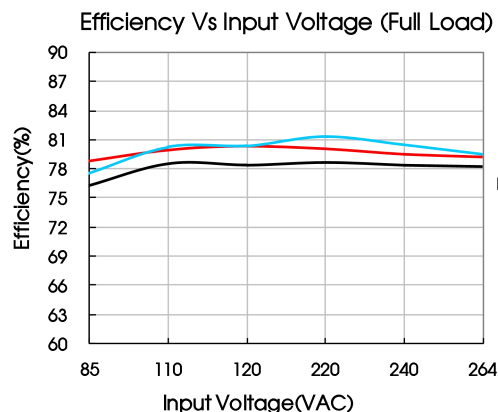
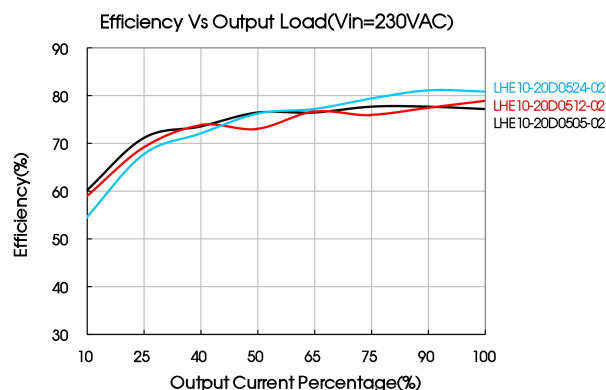
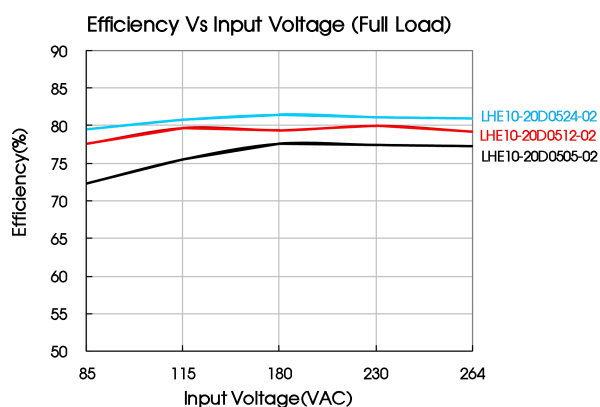
Emissions	CE	CISPR32/EN55032 CLASS B
	RE	CISPR32/EN55032 CLASS B

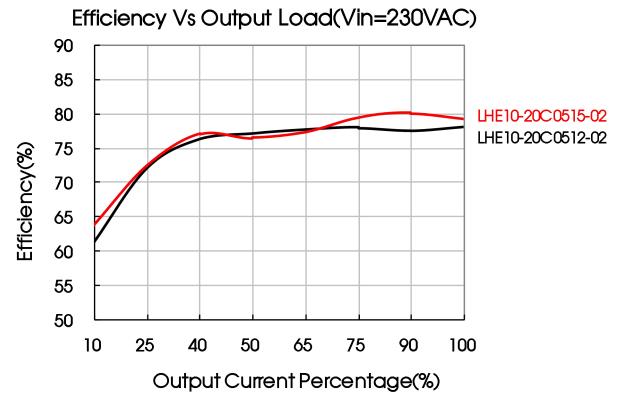
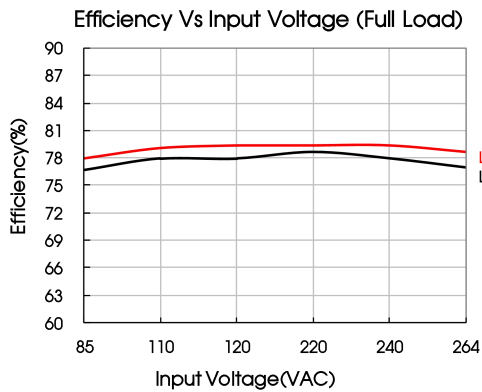
Immunity	ESD	IEC/EN 61000-4-2	Contact $\pm 6\text{KV}$ / Air $\pm 8\text{KV}$	perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4	$\pm 2\text{KV}$	perf. Criteria B
		IEC/EN61000-4-4	$\pm 4\text{KV}$ (See Fig. 4 for recommended circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5	line to line $\pm 1\text{KV}$ /line to PE $\pm 2\text{KV}$	perf. Criteria B
		IEC/EN61000-4-5	line to line $\pm 2\text{KV}$ /line to PE $\pm 4\text{KV}$ (See Fig. 4 for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6	10Vr.m.s	perf. Criteria A
	Voltage dip, short interruption and voltage variation	IEC/EN61000-4-11	0%, 70%	perf. Criteria B

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 Mornsun FAE.





Design Reference

1. Typical application circuit

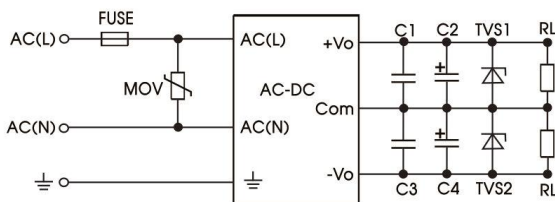


Fig. 1: Typical circuit diagram for LHE10-20Axx series

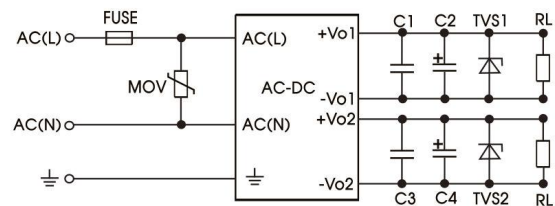


Fig. 2: Typical circuit diagram for LHE10-20Dxx series

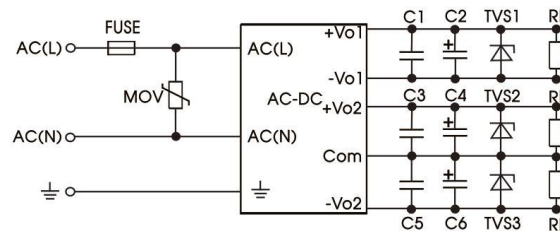


Fig. 3: Typical circuit diagram for LHE10-20Cxx series

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							SMBJ7.0A	SMBJ20A	--
LHE10-20D0515-02							SMBJ7.0A	SMBJ20A	--
LHE10-20D0524-02							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

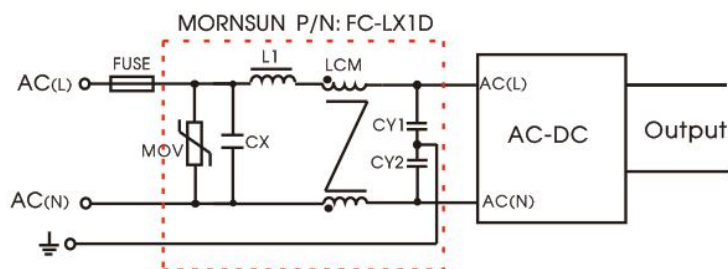
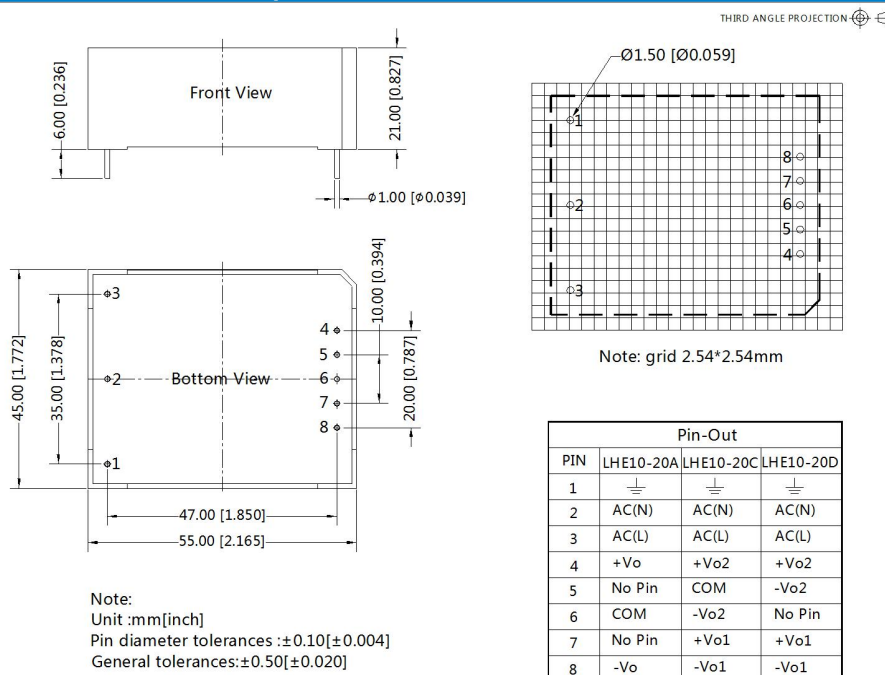


Fig. 4: EMC circuit for harsh requirements

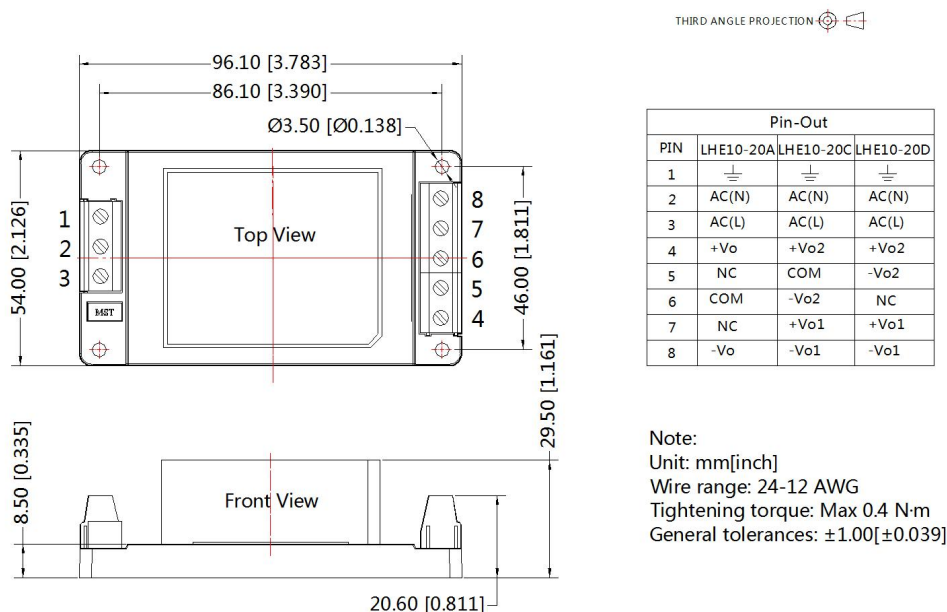
Component	Recommended value
MOV	S14K300
CY1, CY2	1000pF/400VAC
CX	0.1μF/275VAC
LCM	10mH, P/N: FL2D-Z5-103 (MORNSUN) is recommend
L1	4.7μH/2A
FC-LX1D	2kV/4kV EMC filter
FUSE	2A/250V, slow-blow, required

3. For additional information please refer to application notes on www.mornsun-power.com

Dimensions and Recommended Layout

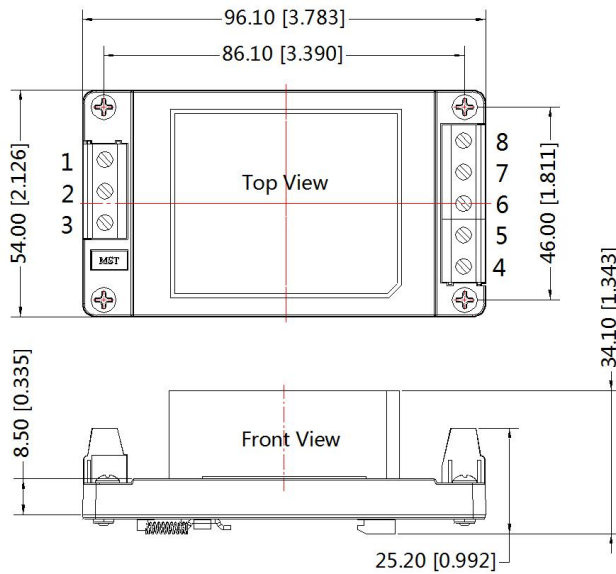


A2 Dimensions



A4 Dimensions

THIRD ANGLE PROJECTION



Pin-Out			
PIN	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: $\pm 1.00[\pm 0.039]$

Note:

- For additional information on Product Packaging please refer to 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's 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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