

5W, AC-DC converter



UL **CE** **CB** **RoHS**



FEATURES

- 85 - 264V Universal AC or wide 100 - 370V DC Input
- Operating ambient temperature range: -40°C to +85°C
- 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 UL94V-0 flammability
- EMI performance meets CISPR32 / EN55032 CLASS B
- IEC/EN/UL62368 safety approval

LHE05-20Bxx series is one of Mornsun's compact size power converter. It features universal AC input and at the same time accepts DC input voltage, low power consumption, high efficiency, high reliability, reinforced isolation. It offers good EMC performance compliant to IEC/EN61000-4 and CISPR32/EN55032 and meets IEC/EN/UL62368 standards. The converters are 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

Certification	Part No.*	Output Power	Nominal Output Voltage and Current	Efficiency at 230VAC (%) Typ.	Capacitive Load (μF) Max.
UL/CE/CB	LHE05-20B03	4W	3.3V/1250mA	70	8100
	LHE05-20B05	5W	5V/1000mA	75	6800
	LHE05-20B09		9V/550mA	77	1200
	LHE05-20B12		12V/420mA	79	1000
	LHE05-20B15		15V/330mA	80	680
	LHE05-20B24	5.5W	24V/230mA	82	270

Note: * Use suffix "A2" for chassis and suffix "A4" for DIN-Rail mounting (e.g. LHE05-20B03A2 is chassis mounting and LHE05-20B03A4 is DIN-Rail mounting version).

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	--	--	0.125	A
	230VAC	--	--	0.08	
Inrush Current	115VAC	--	10	--	
	230VAC	--	20	--	
Recommended External Input Fuse		1A/250V slow-blow required			
Hot Plug		Unavailable			

Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy		--	±2	--	%
Line Regulation	Full load	--	±0.5	--	
Load Regulation	0%-100% load	--	±1	--	
Ripple & Noise*	20MHz bandwidth (peak-to-peak value)	--	50	100	mV
Temperature Coefficient		--	±0.02	--	%/°C
Short Circuit Protection		Hiccup, continuous, self-recovery			
Over-current Protection		150% - 300%Io, self-recovery			

Over-voltage Protection	3.3 / 5VDC Output	≤7.5VDC			
	9VDC Output	≤13VDC			
	12 / 15VDC Output	≤20VDC			
	24VDC Output	≤30VDC			
Minimum Load		0	--	--	%
Hold-up Time	115VAC input	12	15	--	ms
	230VAC input	70	80	--	
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	4000	--	--	VAC
	Input-PE	2000	--	--	
Operating Temperature		-40	--	+85	°C
Storage Temperature		-40	--	+105	
Storage Humidity		--	--	95	%RH
Soldering Temperature	Wave-soldering	260 ± 5°C; time: 5 - 10s			
	Manual-welding	360 ± 10°C; time: 3 - 5s			
Power Derating	-40°C to -25°C	2.0	--	--	% / °C
	+55°C to +85°C	2.5	--	--	
	85VAC-100VAC	1.66	--	--	% / VAC
	240VAC-264VAC	0.83	--	--	
Safety Standard		IEC62368/EN62368/UL62368			
Safety Certification		IEC62368/EN62368/UL62368			
Safety Class		CLASS I			
MTBF		MIL-HDBK-217F@25°C > 300,000 h			

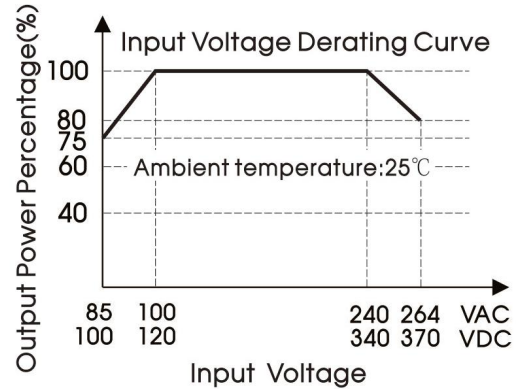
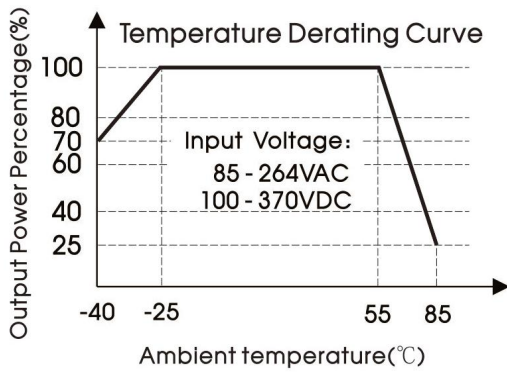
Mechanical Specifications

Casing Material	Black plastic, flame-retardant and heat-resistant (UL94V-0)	
Dimension	Horizontal package	48.50 x 36.00 x 20.50mm
	A2 chassis mounting	96.10 x 54.00 x 29.00mm
	A4 Din-Rail mounting	96.10 x 54.00 x 33.60mm
Weight	Horizontal package	55g (Typ.)
	A2 chassis mounting	100g (Typ.)
	A4 Din-Rail mounting	140g (Typ.)
Cooling method	Free air convection	

Electromagnetic Compatibility (EMC)

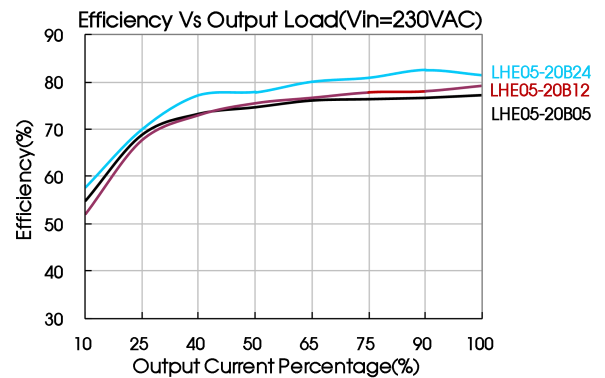
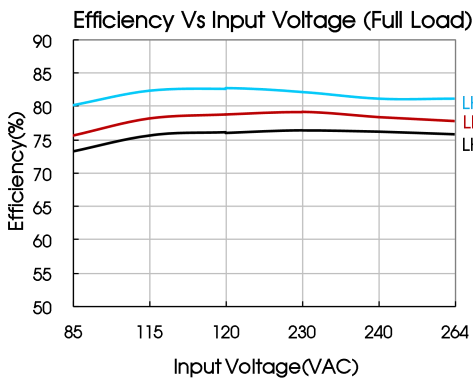
Emissions	CE	CISPR32/EN55032	CLASS B	
	RE	CISPR32/EN55032	CLASS B	
Immunity	ESD	IEC/EN 61000-4-2	Contact ±6KV / Air ±8KV	Perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4	±2KV	perf. Criteria B
		IEC/EN61000-4-4	±4KV (See Fig. 2 for recommended circuit)	perf. Criteria B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

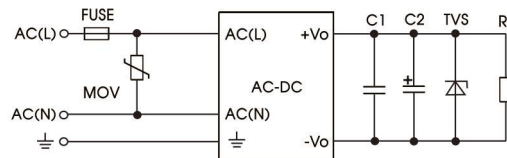


Fig. 1: Typical circuit diagram

Part no.	C2(μF)	FUSE	MOV	TVS
LHE05-20B03	330	1A/250V slow-blow required	S14K300	SMBJ7.0A
LHE05-20B05	330			SMBJ7.0A
LHE05-20B09	120			SMBJ12A
LHE05-20B12	120			SMBJ20A
LHE05-20B15	68			SMBJ20A
LHE05-20B24	68			SMBJ30A

Output Filter Components:

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

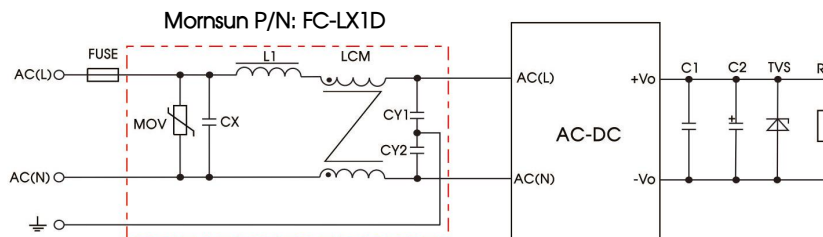
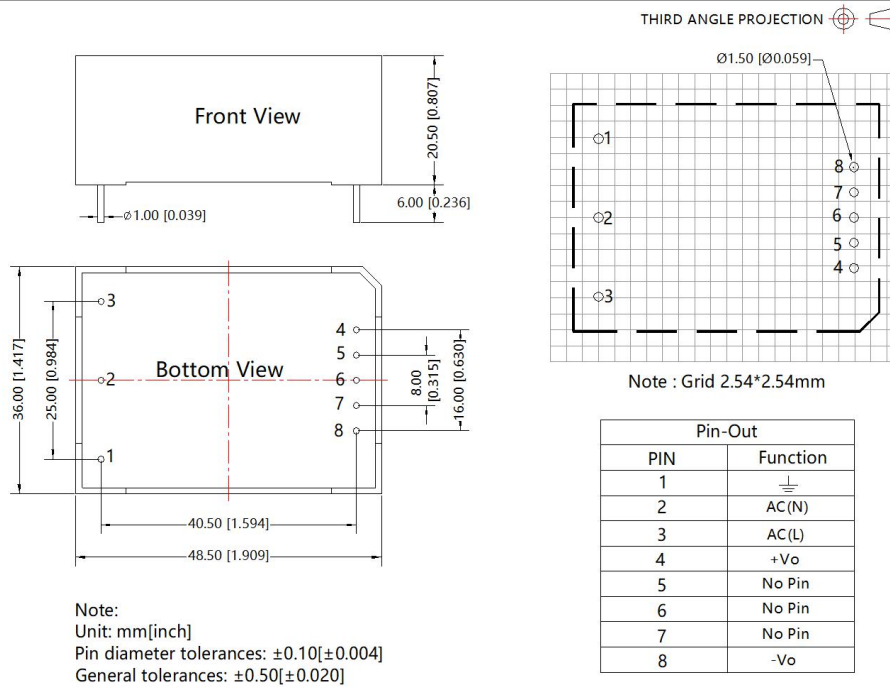


Fig 2: EMC application circuit with higher requirements

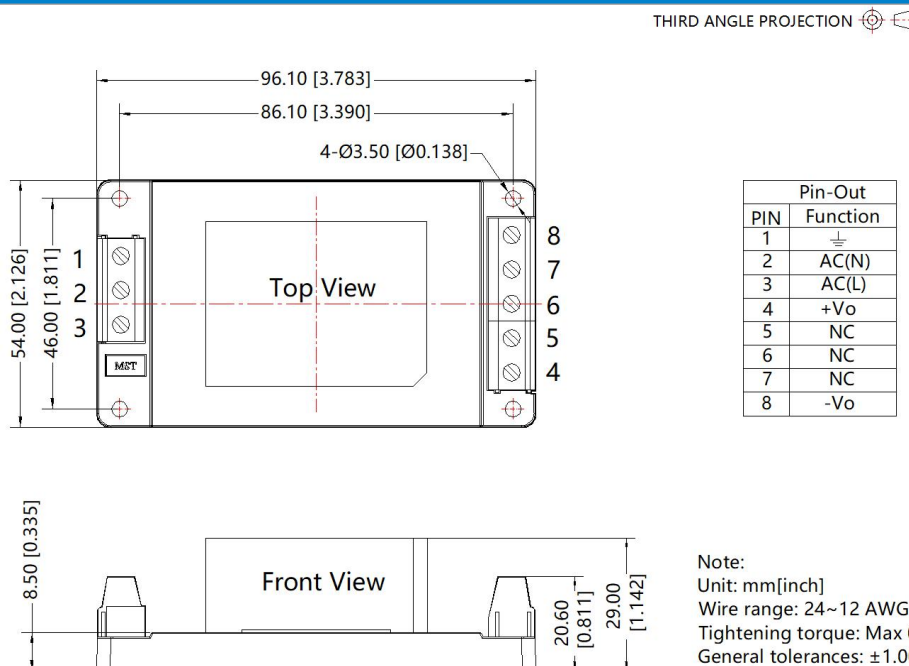
Component	Recommended value
MOV	S14K300
CY1 , CY2	1000pF/400VAC
CX	0.1μF/275VAC
LCM	10mH, we recommend using part no. FL2D-Z5-103 (MORNSUN)
L1	4.7μH/2A
FC-LX1D	2KV/4KV EMC filter
FUSE	2A/250V slow-blow required

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


Dimensions and Recommended Layout

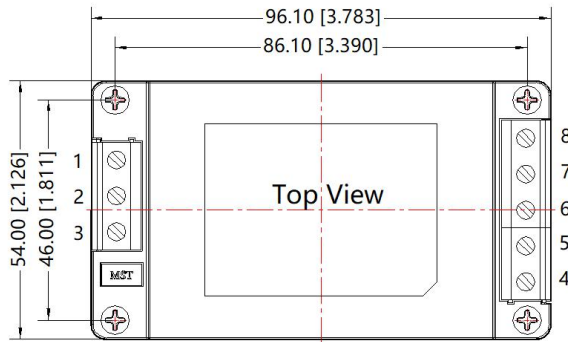


A2 Dimensions

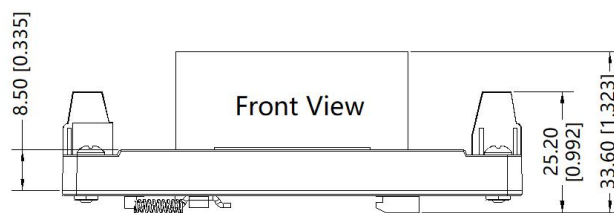


A4 Dimensions

THIRD ANGLE PROJECTION 



Pin-Out	
PIN	Function
1	⊥
2	AC(N)
3	AC(L)
4	+Vo
5	NC
6	NC
7	NC
8	-Vo



Note:
Unit: mm[inch]
Installed on DIN rail TS35
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. Packaging bag number: 58220007 (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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