

5W, AC-DC converter



FEATURES

- Universal 85 - 264V AC and wide 100 - 370V DC input voltage
- Operating ambient temperature range -30°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

LHE05-20Dxx 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 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 (uF) Max.	
		(Vo1/Io1)	(Vo2/Io2)		Vo1	Vo2
LHE05-20D0505-01	5W	5V/900mA	5V/100mA	74	3400	400
LHE05-20D0512-01		5V/750mA	12V/100mA	75	2500	220
LHE05-20D0515-01		5V/700mA	15V/100mA	75	2200	220
LHE05-20D0524-01	5.4W	5V/600mA	24V/100mA	75	3100	100

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

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	Primary output	--	±2	--	%
	Secondary output	--	±10	--	
Line Regulation	Full load	Primary output		±0.5	
		Secondary output		±3	
Load Regulation	10%-100% load (balanced load)	Primary output		±2	%
		Secondary output		±5	
Ripple & Noise*	20MHz bandwidth (peak-to-peak value)	Primary output		50	mV
		Secondary output		100	
Temperature Coefficient	Primary output	--	±0.02	--	%/°C
Short Circuit Protection		Continuous, self-recovery			
Over-current Protection		150% - 300% Io, self-recovery			

Over-voltage Protection	Primary output	5VDC Output	$\leq 7.5\text{VDC}$			
Minimum Load			10	--	--	%
Hold-up Time	115VAC input		10	15	--	ms
	230VAC input		65	80	--	
Start-up Delay Time			--	--	2	s

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	Electric Strength Test for 1min., leakage current <5mA	4000	--	--	VAC
	Input- 		2500	--	--	
	Vo1- Vo2		500	--	--	VDC
Operating Temperature			-30	--	+70	℃
Storage Temperature			-40	--	+85	
Storage Humidity			--	--	95	%RH
Soldering Temperature		Wave-soldering	260 ± 5℃; time: 5 - 10s			
		Manual-welding	360 ± 10℃; time: 3 - 5s			
Power Derating		-30℃ to -25℃	2.0	--	--	% /℃
		+55℃ to +70℃	2.5	--	--	
		85VAC - 100VAC	1.33	--	--	% /VAC
		240VAC - 264VAC	0.83	--	--	
Safety Standard			Design refer to IEC/UL/EN62368-1			
Safety Class			CLASS I			
MTBF			MIL-HDBK-217F@25℃ > 300,000 h			

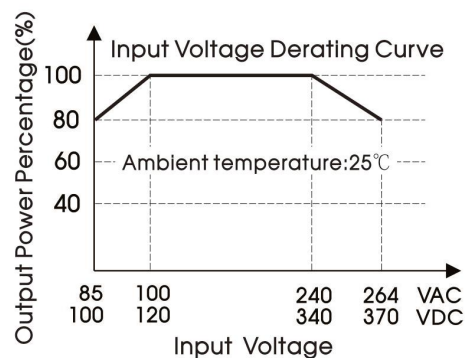
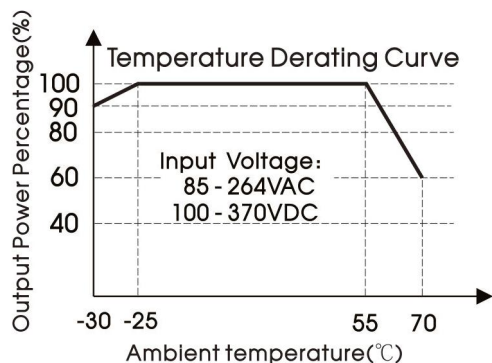
Mechanical Specifications

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

Electromagnetic Compatibility (EMC)

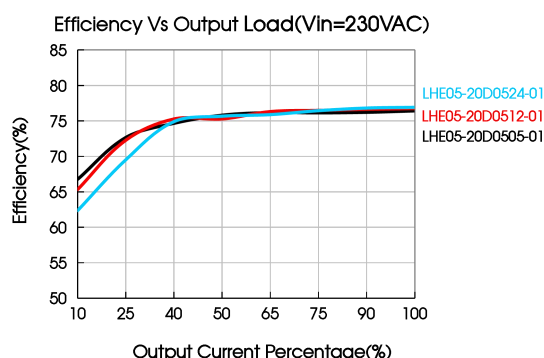
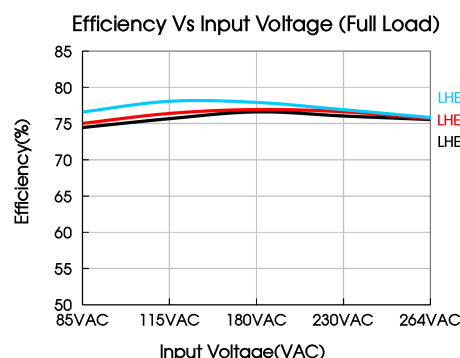
Emissions	CE	CISPR32/EN55032	CLASS B	
	RE	CISPR32/EN55032	CLASS B	
Immunity	ESD	IEC/EN61000-4-2	Contact ±6KV / Air ±8KV	perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4	±2KV	perf. Criteria B
		IEC/EN61000-4-4	±4KV (See Fig. 2 for recommended circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5	line to line ±1KV/line to PE ±2KV	perf. Criteria B
		IEC/EN61000-4-5	line to line ±2KV/line to PE ±4KV (See Fig. 2 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 Mornsun FAE.



Design Reference

1. Typical application

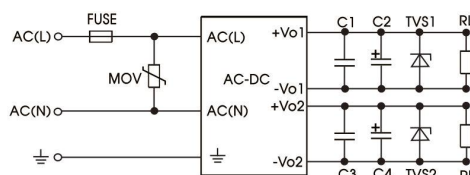


Fig. 1: LHE10-20Dxx (dual isolated dual output) series, typical circuit diagram

Part No.	FUSE	MOV	C1/C3	C2(uF)	C4(uF)	TVS1	TVS2
LHE05-20D0505-01	1A/250V, slow-blow, required	S14K300	0.1uF/50V	220	22	SMBJ7.0A	SMBJ7.0A
LHE05-20D0512-01						SMBJ7.0A	SMBJ20A
LHE05-20D0515-01						SMBJ7.0A	SMBJ20A
LHE05-20D0524-01						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

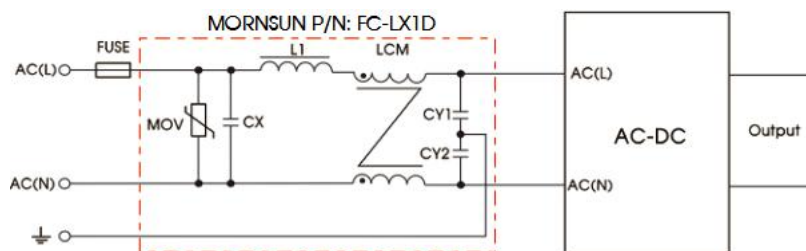
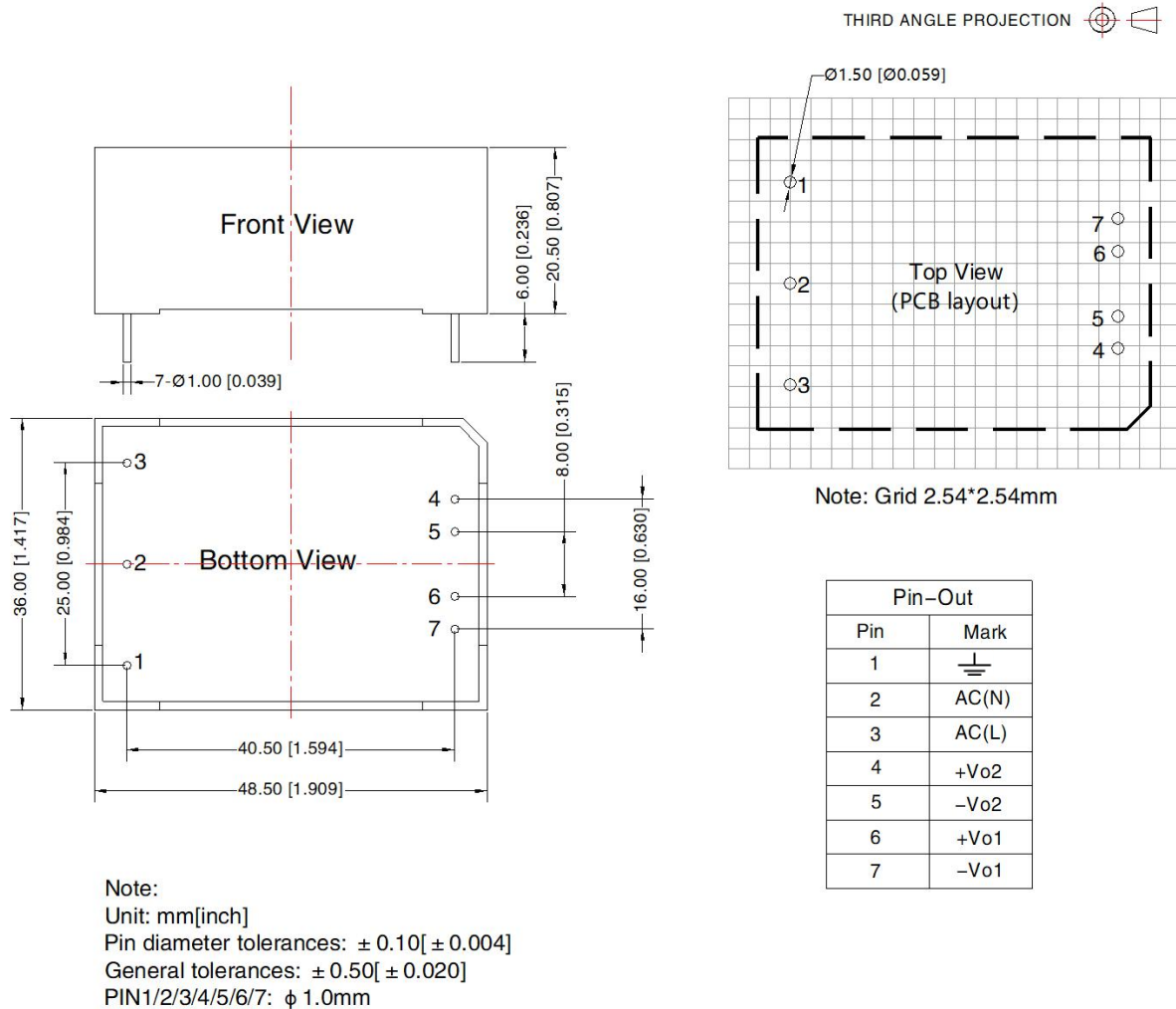


Fig. 2: EMC circuit for harsh requirements

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

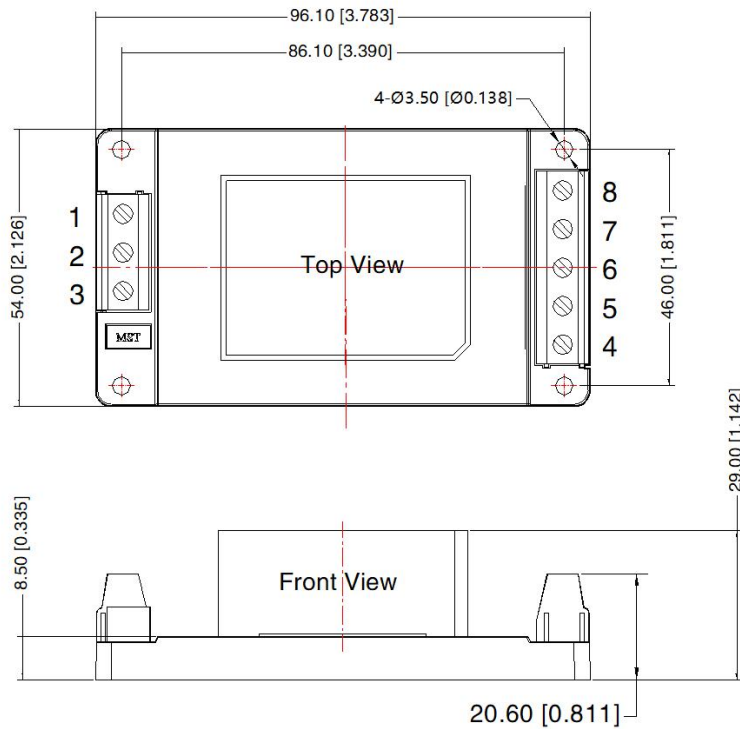
3. For additional information please refer to application notes on www.mornsun-power.com

Dimensions and Recommended Layout



A2 Dimensions

THIRD ANGLE PROJECTION



Pin-Out	
Pin	Mark
1	
2	AC(N)
3	AC(L)
4	+Vo2
5	-Vo2
6	No Pin
7	+Vo1
8	-Vo1

Note:

Unit: mm[inch]

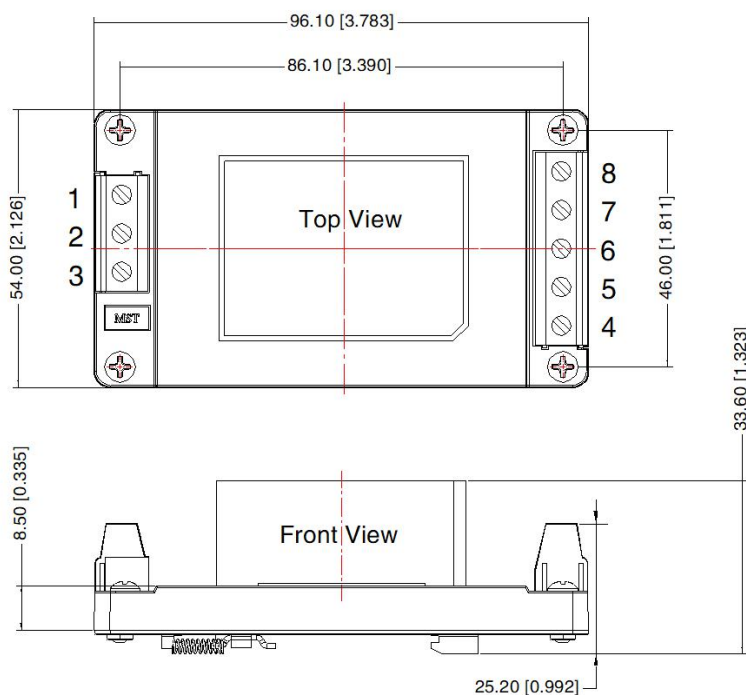
Wire range: 24-12 AWG

Tightening torque: Max 0.4 N · m

General tolerances: $\pm 1.00 [\pm 0.039]$

A4 Dimensions

THIRD ANGLE PROJECTION



Pin-Out	
Pin	Mark
1	
2	AC(N)
3	AC(L)
4	+Vo2
5	-Vo2
6	No Pin
7	+Vo1
8	-Vo1

Note:

Unit: mm[inch]

Mounting rail: TS35, rail needs to connect safety ground

Wire range: 24-12 AWG

Tightening torque: Max 0.4N · m

General tolerances: $\pm 1.00 [\pm 0.039]$

Note:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58220265 (Horizontal package); 58220010 (A2/A4 package);
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.

Mornsun Guangzhou Science & Technology Co., Ltd.

Address: No. 5, Kehui St. 1, Kehui Development Center, Science Ave., Guangzhou Science City, Huangpu District, Guangzhou, P. R. China
Tel: 86-20-38601850 Fax: 86-20-38601272 E-mail: info@mornsun.cn www.mornsun-power.com