

5W, AC-DC converter



FEATURES

- Universal Input : 85 - 264VAC/100 - 370VDC
- Operating temperature range: -30°C to +70°C
- High isolation voltage up to 4K VAC
- Regulated output, Low ripple & noise
- Output short circuit, over-current, over-voltage protection
- High efficiency, high reliability
- Plastic case, meets UL94V-0
- EMI performance meets CISPR32 / EN55032 CLASS B

LHE05-20A/C/Dxx series —a compact size multipath output power converter offered by Mornsun. It features universal input voltage, taking both DC and AC input voltage, low power consumption, high efficiency, high reliability, safer isolation. It offers good EMC performance, and it's widely used in industrial, office and civil applications. For harsh EMC environment, the application circuit in the datasheet is strongly recommended.

Selection Guide

Part No.*	Output Power	Nominal Output Voltage and Current		Efficiency (230VAC, %/Typ.)	Max. Capacitive Load(μF)	
		(Vo1/Io1)	(Vo2/Io2)		Vo1	Vo2
LHE05-20A05**	5W	+5V/500mA	-5V/500mA	73	1500	1500
LHE05-20A12**		+12V/210mA	-12V/210mA	77	220	220
LHE05-20A15**		+15V/160mA	-15V/160mA	77	220	220
LHE05-20C0505-01	5.4W	5V/800mA	±5V/100mA	70	2400	370
LHE05-20C0512-01		5V/600mA	±12V/100mA	73	1600	170
LHE05-20C0515-01		5V/600mA	±15V/80mA	74	1760	80
LHE05-20D0505-01	5W	5V/900mA	5V/100mA	70	3400	400
LHE05-20D0512-01		5V/750mA	12V/100mA	72	2500	220
LHE05-20D0515-01		5V/700mA	15V/100mA	72	2200	220
LHE05-20D0524-01	5.4W	5V/600mA	24V/100mA	74	3100	100

Note:*Part No. with suffix of "A2" means chassis mounting and suffix of "A4" means DIN-Rail mounting (e.g. LHE05-20D0505-01A2 means chassis mounting; LHE05-20D0505-01A4 means DIN-Rail mounting)

**About LHE05-20Axx, we use Vo2 as sampling feedback; and all others use Vo1 as sampling feedback and define 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	--	--	0.125	A
	230VAC	--	--	0.08	
Inrush current	115VAC	--	10	--	A
	230VAC	--	20	--	
Recommended External Input Fuse		1A/250V, slow fusing, necessary			
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	--	±1.5	
Load Regulation	10%-100% load (balanced load)	Primary output	--	±2	%
		Secondary output	--	±5	
Ripple & Noise*	20MHz bandwidth (peak-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	LHE05-20Axx	≥ 130%Io self-recovery			
	LHE05-20C/Dxx	≥ 150%Io self-recovery			
Over-voltage Protection	Primary output	5VDC Output	≤ 7.5VDC		
		12VDC Output	≤ 20VDC		
		15VDC Output	≤ 22VDC		
Min. Load		10	--	--	%
Hold-up Time	115VAC input	10	15	--	ms
	230VAC input	65	80	--	

Note: * Ripple and noise are measured by "parallel cable" method, please see AC-DC Converter Application Notes for specific operation.

General Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit	
Isolation Voltage	Input-output	LHE05-20A/C/Dxx	Test time: 1min (leakage current < 5mA)	4000	--	--	VAC
	Input-			2500	--	--	
	Vo1- Vo2	LHE05-20C/Dxx		500	--	--	VDC
Operating Temperature			-30	--	+70	°C	
Storage Temperature			-40	--	+85		
Storage Humidity			--	--	95	%RH	
Welding Temperature	Wave-soldering	260 ± 5°C; time: 5 - 10s					
	Manual-welding	360 ± 10°C; time: 3 - 5s					
Power Derating	-30°C to -25°C		2.0	--	--	% / °C	
	+55°C to +70°C		2.5	--	--		
	85VAC-100VAC		1.33	--	--	% / VAC	
	240VAC-264VAC		0.83	--	--		
Safety Standard			IEC62368/EN62368/UL62368				
Safety Class			CLASS I				
MTBF			MIL-HDBK-217F@25°C > 300,000 h				

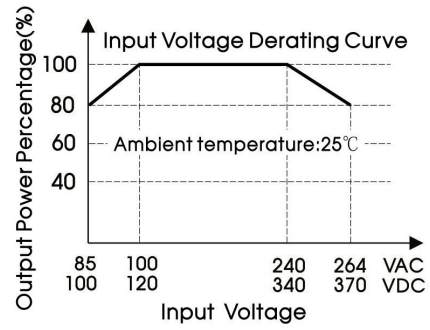
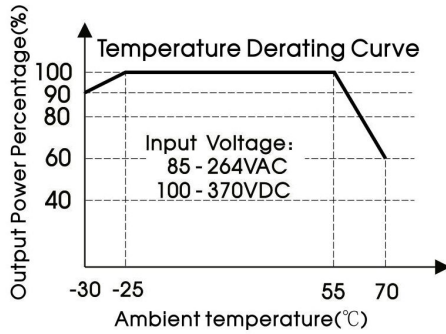
Physical Specifications

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

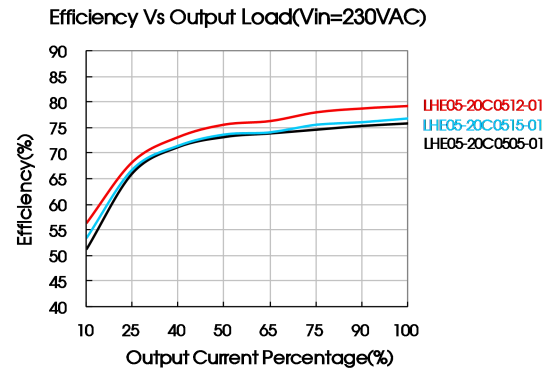
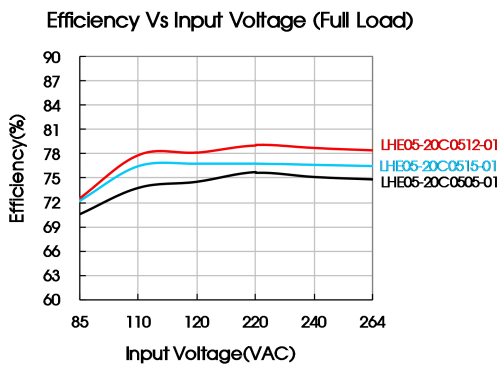
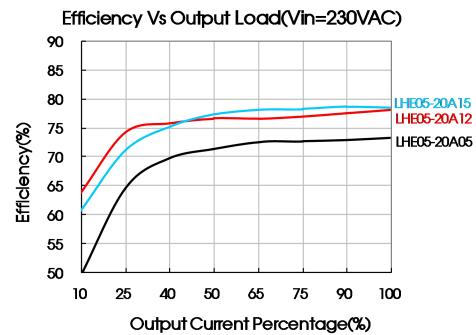
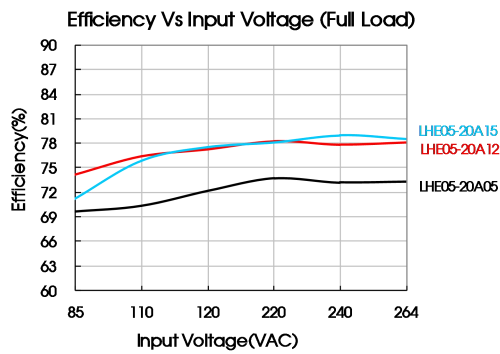
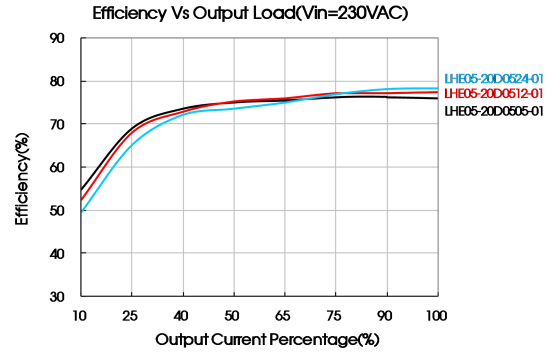
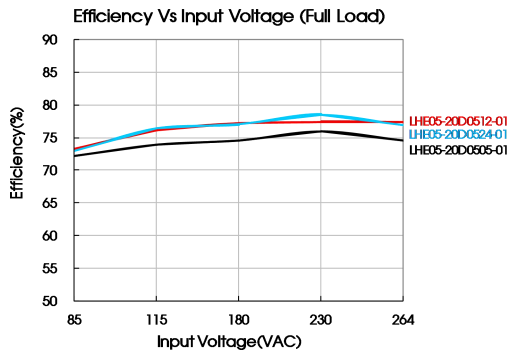
EMC Specifications

EMI	CE	CISPR32/EN55032	CLASS B
	RE	CISPR32/EN55032	CLASS B
EMS	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
EMS	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 When input 85-100VAC/240-264VAC/100-120VDC/340-370VDC, it need to be voltage derated on basis of temperature derating;
② This product is suitable for use in natural air cooling environments, if in a closed environment, please contact our company's FAE.



Design Reference

1. Typical application circuit

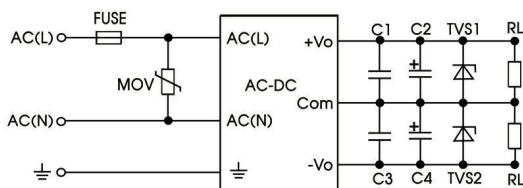


Fig. 1 LHE05-20Axx series

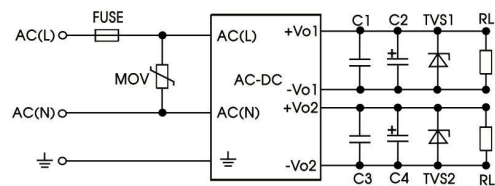


Fig. 2 LHE05-20Dxx series

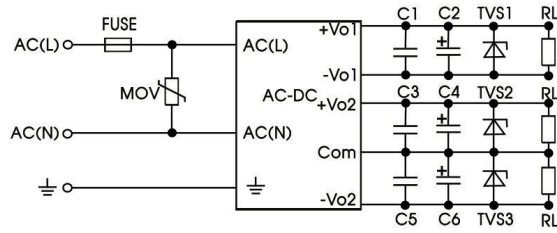


Fig. 3 LHE05-20Cxx series

Model	FUSE	MOV	C1/C3/C5	C2(μF)	C4(μF)	C6(μF)	TVS1	TVS2	TVS3
LHE05-20A05	1A/250V slow fusing, necessary	S14K300	0.1μF/50V	68	68	--	SMBJ7.0A	SMBJ7.0A	--
LHE05-20A12				47	47	--	SMBJ20A	SMBJ20A	--
LHE05-20A15				10	10	--	SMBJ20A	SMBJ20A	--
LHE05-20C0505-01				220	22	22	SMBJ7.0A	SMBJ7.0A	SMBJ7.0A
LHE05-20C0512-01				120	22	22	SMBJ7.0A	SMBJ20A	SMBJ20A
LHE05-20C0515-01				120	22	22	SMBJ7.0A	SMBJ20A	SMBJ20A
LHE05-20D0505-01				220	22	--	SMBJ7.0A	SMBJ7.0A	--
LHE05-20D0512-01						--	SMBJ7.0A	SMBJ20A	--
LHE05-20D0515-01						--	SMBJ7.0A	SMBJ20A	--
LHE05-20D0524-01						--	SMBJ7.0A	SMBJ30A	--

Note:
Output filtering capacitors C2, C4, C6 are electrolytic capacitors, it is recommended to use high frequency and low impedance electrolytic capacitor. For capacitance and current of capacitor please refer to manufacture's datasheet. Capacitor voltage reduced to at least 80%. C1, C3, C5 are ceramic capacitors, which is used to filter high-frequency noise. TVS is a recommended component to protect post-circuits if converter fails.

2. EMC solution-recommended circuit

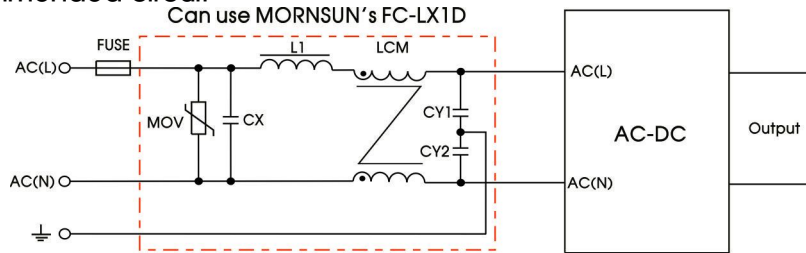


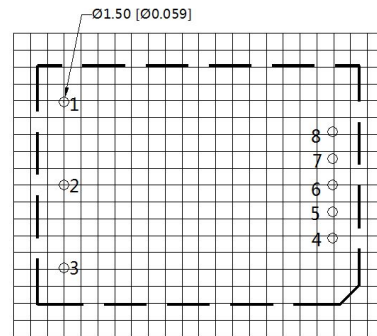
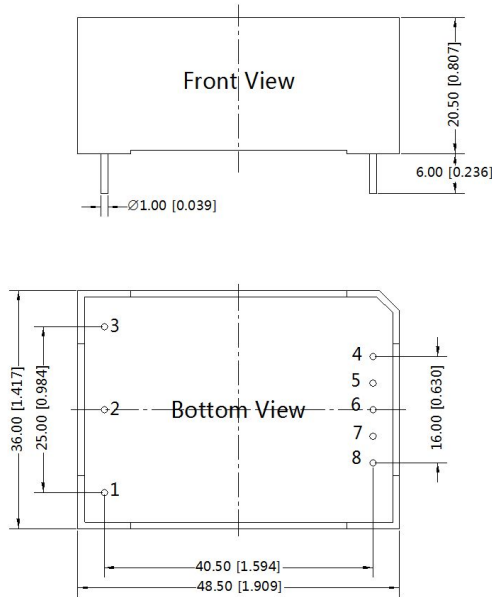
Fig 3: EMC Recommended circuit with higher requirements

Element model	Recommended value
MOV	S14K300
CY1 , CY2	1000pF/400VAC
CX	0.1μF/275VAC
LCM	10mH, recommended to use MORNSUN's FL2D-Z5-103
L1	4.7μH/2A
FC-LX1D	2KV/4KV EMC filter
FUSE	2A/250V slow fusing, necessary

3. For more information Please find the application note on www.mornsun-power.com

Dimensions and Recommended Layout

THIRD ANGLE PROJECTION



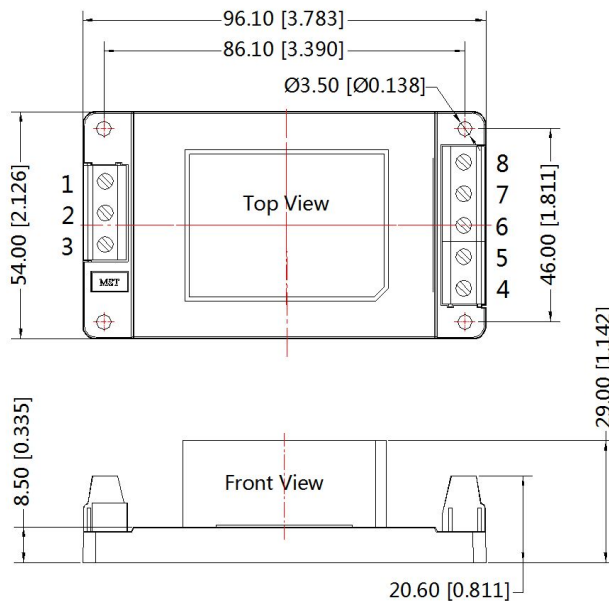
Note : Grid 2.54*2.54mm

Pin-Out			
PIN	LHE05-20A	LHE05-20C	LHE05-20D
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

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

A2 Dimensions

THIRD ANGLE PROJECTION

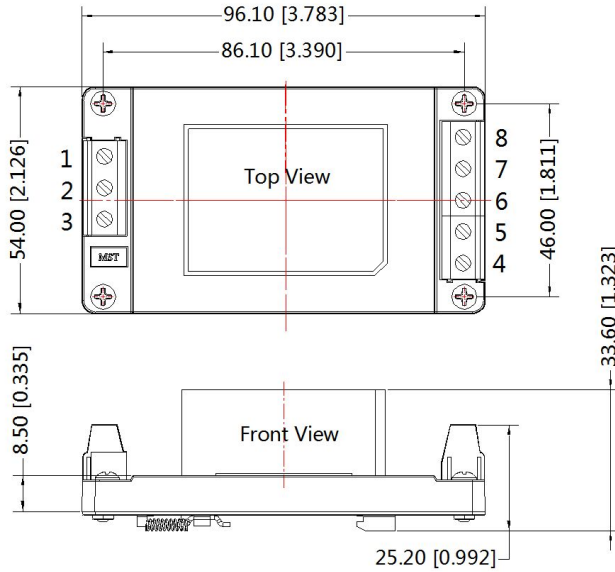


Pin-Out			
PIN	LHE05-20A	LHE05-20C	LHE05-20D
1	⏏	⏏	⏏
2	AC(N)	AC(N)	AC(N)
3	AC(L)	AC(L)	AC(L)
4	+Vo	+Vo2	+Vo2
5	No Pin	COM	-Vo2
6	COM	-Vo2	No Pin
7	No Pin	+Vo1	+Vo1
8	-Vo	-Vo1	-Vo1

Note:
Unit: mm[inch]
Wire range: 24-12 AWG
Tightening torque: Max 0.4 N-m
General tolerances: ±1.00[±0.039]

A4 Dimensions

THIRD ANGLE PROJECTION 



PIN	Pin-Out		
	LHE05-20A	LHE05-20C	LHE05-20D
1	\perp	\perp	\perp
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

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. Packing information please refer to Product Packing Information which can be downloaded from www.mornsun-power.com. Packing bag number: 58220007(Horizontal package); 58220010 (A2/A4 package);
2. 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;
3. All index testing methods in this datasheet are based on our Company's corporate standards;
4. We can provide product customization service, please contact our technicians directly for specific information;
5. Products are related to laws and regulations: see "Features" and "EMC";
6. 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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