

5W, AC-DC converter



FEATURES

- Universal 85-264VAC or 100-370VDC input voltage
- Regulated output, low ripple & noise
- Output short circuit, over-current, over-voltage protection
- Plastic case meets UL94V-0 flammability
- UL60950, EN60950 safety approval
- 3 years product warranty
- Mounting: PCB mounting, chassis mounting, DIN-Rail mounting available

LH05 series is one of Mornsun's compact size 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 compliant to IEC/EN61000-4 and CISPR32/EN55032 and meets UL/EN60950 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.	
			(Vo1/Io1)	(Vo2/Io2)		Vo1	Vo2
UL/CE	LH05-10B03	4W	3.3V/1250mA	--	70	8100	--
	LH05-10B05		5V/1000mA	--	75	6800	--
	LH05-10B09		9V/550mA	--	77	1200	--
	LH05-10B12		12V/420mA	--	79	1000	--
	LH05-10B15		15V/330mA	--	80	680	--
	LH05-10B24		24V/230mA	--	82	270	--
--	LH05-10A05	5W	+5V/500mA	-5V/500mA	75	1480	1480
	LH05-10A12		+12V/210mA	-12V/210mA	79	130	130
	LH05-10A15		+15V/160mA	-15V/160mA	79	110	110
	LH05-10A24		+24V/100mA	-24V/100mA	80	16	16
	LH05-10C0505-01	5V/800mA	±5V/100mA	70	2400	370	
	LH05-10C0512-01	5V/600mA	±12V/100mA	73	1600	170	
	LH05-10C0515-01	5V/600mA	±15V/80mA	74	1760	80	
	LH05-10C0524-01	5V/600mA	±24V/50mA	75	1170	50	
	LH05-10D0505-01	5V/900mA	5V/100mA	71	3360	370	
	LH05-10D0512-01	5V/750mA	12V/100mA	73	2400	170	
	LH05-10D0515-01	5V/700mA	15V/100mA	73	2160	170	
	LH05-10D0524-01	5V/600mA	24V/100mA	75	3000	100	

Note: *About LH05-10AXX, we use Vo2 as sampling feedback; And all others use Vo1 as sampling feedback.

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	--	
Leakage Current	0.3mA RMS typ./230VAC/50Hz				
Recommended External Input Fuse(Special package series include fuse)	1A/250V, slow-blow				
Hot Plug	Unavailable				

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit	
Output Voltage Accuracy	Vo1		--	±2	--		
Line Regulation	Full load	Vo1	--	±0.5	--		
		Vo2	--	±1.5	--		
Load Regulation	10%-100% load	Single output	--	±1	--	%	
		Dual output(balanced load)	--	±2	--		
		Isolated triple output (balanced load)	Vo1	--	±3		--
			±Vo2	--	±5		--
		Isolated and separated twin output (balanced load)	Vo1	--	±3		--
			Vo2	--	±5		--
Ripple & Noise*	20MHz bandwidth (peak-to-peak value)		--	50	100	mV	
Temperature Coefficient	Vo1		--	±0.02	--	%/°C	
Short Circuit Protection	Continuous, self-recovery						
Over-current Protection	≥110%Io, self-recovery						
Over-voltage Protection	Vo1	3.3 / 5VDC output	≤7.5VDC				
		9VDC output	≤13VDC				
		12 / 15VDC output	≤20VDC				
		24VDC output	≤30VDC				
Minimum Load	Single output models		0	--	--	%	
	Dual output models (balanced load)		10	--	--		
	Isolated and separated twin output (balanced load)		10	--	--		
	Isolated triple output (balanced load)		10	--	--		
Hold-up Time	115VAC input		--	15	--	ms	
	230VAC input		--	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	Test time: 1min	3000	--	--	VAC
Operating Temperature			-25	--	+70	°C
Storage Temperature			-25	--	+105	
Storage Humidity			--	--	95	%RH
Soldering Temperature	Wave-soldering		260±5°C; time: 5-10s			
	Manual-welding		360±10°C; time: 3-5s			
Switching Frequency	LH05-10A24		--	65	--	kHz
	Others		--	--	140	
Power Derating	-25°C to -10°C		2.0	--	--	% / °C
	55°C to +70°C		4.0	--	--	
	85VAC - 100VAC		1.67	--	--	% / VAC
	240VAC - 264VAC		0.83	--	--	
Safety Standard	IEC60950/EN60950/UL60950					
Safety Certification	EN60950/UL60950					

Safety Class		CLASS I
MTBF		MIL-HDBK-217F@25°C > 300,000 h

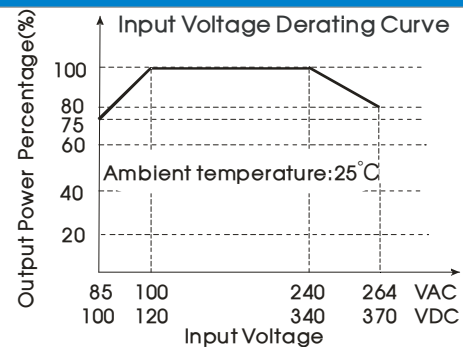
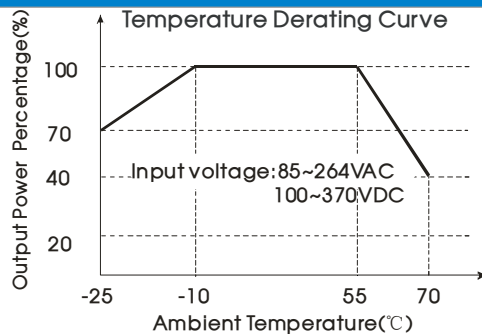
Mechanical Specifications

Case Material		Black plastic, flame-retardant and heat-resistant (UL94V-0)
Dimension	Horizontal package	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/A2 chassis mounting /A4 Din-Rail mounting	55g/100g/140g(Typ.)
Cooling method		Free air convection

Electromagnetic Compatibility (EMC)

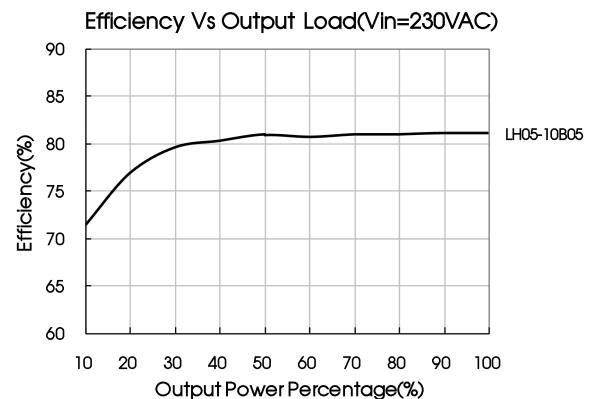
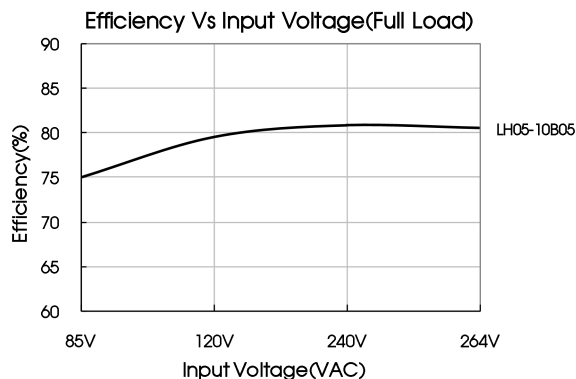
Emissions	CE	CISPR32/EN55032	CLASS B	
	RE	CISPR32/EN55032	CLASS B	
Immunity	ESD	IEC/EN61000-4-2	Contact ±6KV/Air ±8KV	Perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
		IEC/EN61000-4-4	±2KV	perf. Criteria B
	EFT	IEC/EN61000-4-4	±4KV (See Fig. 5 for recommended circuit)	perf. Criteria B
		IEC/EN61000-4-5	line to line ±1KV/line to ground ±2KV	perf. Criteria B
	Surge	IEC/EN61000-4-5	line to line ±2KV/line to ground 4KV (See Fig. 5 for recommended circuit)	perf. Criteria B
		CS	IEC/EN61000-4-6	10 Vr.m.s
	PFM	IEC/EN61000-4-8	10A/m	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 85-100VAC / 240-264VAC and a DC input between 100-120VDC/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

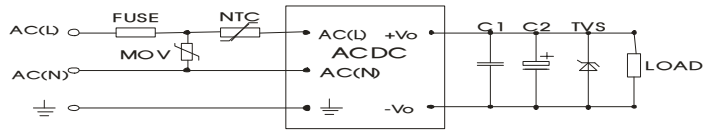


Fig. 1: Typical circuit diagram

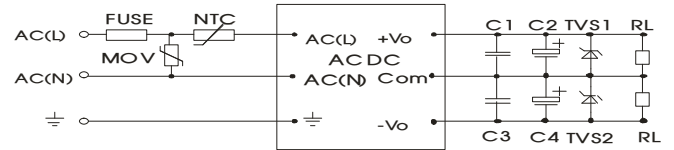


Fig. 2: LH05-10Axx (Dual Output) series typical circuit diagram

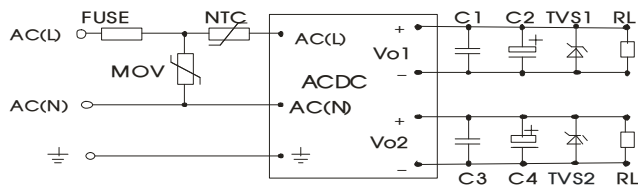


Fig. 3: LH05-10Dxx (Isolate Twin Output) series typical circuit diagram

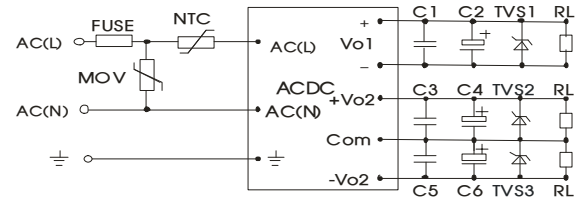


Fig. 4: LH05-10Cxx (Triple Output) series typical circuit diagram

Part No.	FUSE	MOV	NTC	C2(μF)	C4(μF)	C6(μF)	TVS1	TVS2	TVS3
LH05-10B03	1A/250V slow-blow	S14K300	5D-9	330	--	--	SMBJ7.0A	--	--
LH05-10B05				330	--	--	SMBJ7.0A	--	--
LH05-10B09				120	--	--	SMBJ12A	--	--
LH05-10B12				120	--	--	SMBJ20A	--	--
LH05-10B15				68	--	--	SMBJ20A	--	--
LH05-10B24				68	--	--	SMBJ30A	--	--
LH05-10A05				120	120	--	SMBJ7.0A	SMBJ7.0A	--
LH05-10A12				68	68	--	SMBJ20A	SMBJ20A	--
LH05-10A15				47	47	--	SMBJ20A	SMBJ20A	--
LH05-10A24				10	10	--	SMBJ30A	SMBJ30A	--
LH05-10C0505-01				220	22	22	SMBJ7.0A	SMBJ7.0A	SMBJ7.0A
LH05-10C0512-01				120	22	22	SMBJ7.0A	SMBJ20A	SMBJ20A
LH05-10C0515-01				120	22	22	SMBJ7.0A	SMBJ20A	SMBJ20A
LH05-10C0524-01				120	22	22	SMBJ7.0A	SMBJ30A	SMBJ30A
LH05-10D0505-01				220	22	--	SMBJ7.0A	SMBJ7.0A	--
LH05-10D0512-01				220	22	--	SMBJ7.0A	SMBJ20A	--
LH05-10D0515-01	120	22	--	SMBJ7.0A	SMBJ20A	--			
LH05-10D0524-01	120	22	--	SMBJ7.0A	SMBJ30A	--			

Output Filter Components:

We recommend using an electrolytic capacitor with high frequency, and low ESR rating for C2, C4, C6 (refer to manufacture's datasheet). Choose a capacitor voltage rating with at least 20% margin, in other words not exceeding 80%. C1, C3, C5 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

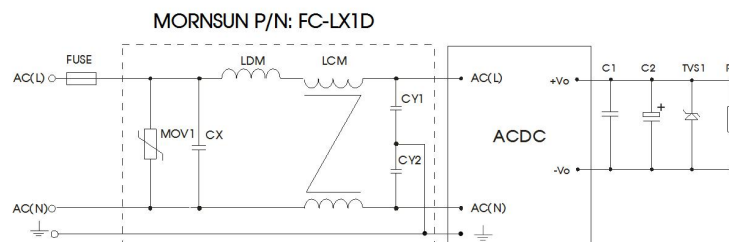
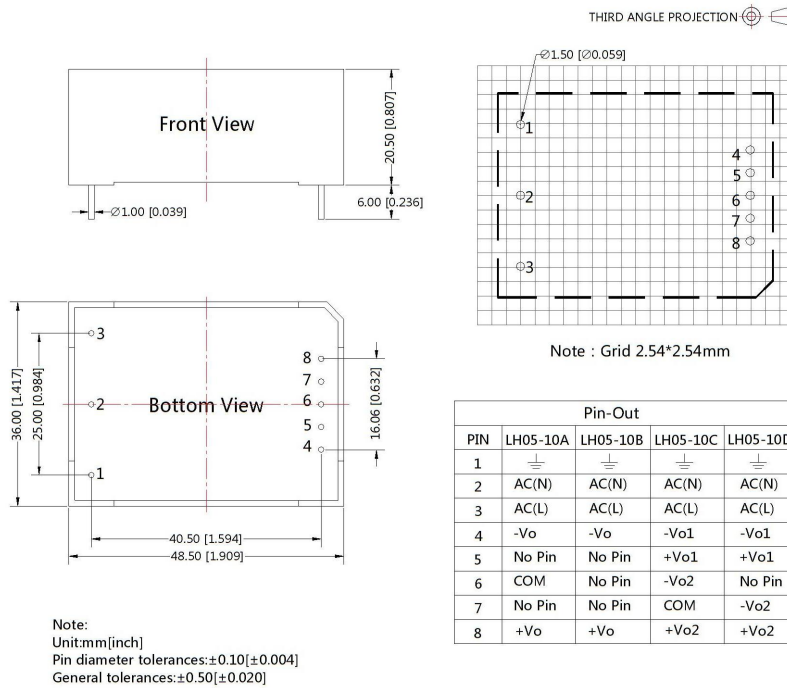


Fig 5: EMC application circuit with higher requirements

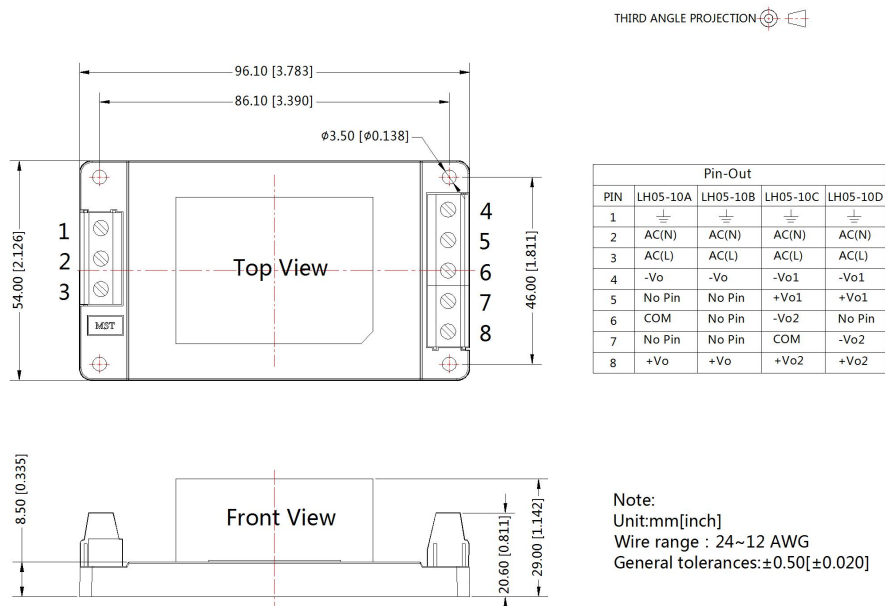
Component	Recommended value
MOV1	S14K300
CY1/CY2	1000pF/400VAC
CX	0.1μF/275VAC
LCM	10mH, we recommended using part no. FL2D-Z5-103 (MORNSUN)
LDM	4.7μH/2A
FC-LX1D	2KV/4KV EMC filter
FUSE	2A/250V, slow-blow, required

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

Dimensions and Recommended Layout

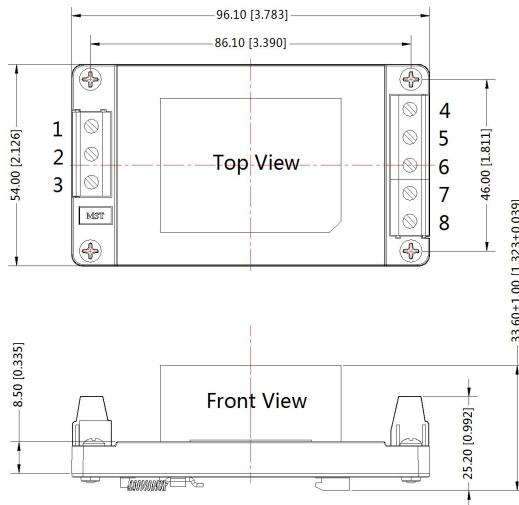


LHXXA2 Dimensions



LHXXA4 Dimensions

THIRD ANGLE PROJECTION



PIN	Pin-Out			
	LH05-10A	LH05-10B	LH05-10C	LH05-10D
1	⊥	⊥	⊥	⊥
2	AC(N)	AC(N)	AC(N)	AC(N)
3	AC(L)	AC(L)	AC(L)	AC(L)
4	-Vo	-Vo	-Vo1	-Vo1
5	No Pin	No Pin	+Vo1	+Vo1
6	COM	No Pin	-Vo2	No Pin
7	No Pin	No Pin	COM	-Vo2
8	+Vo	+Vo	+Vo2	+Vo2

Note:
Unit:mm[inch]
Installed on DIN rail TS35
Wire range : 24~12 AWG
General tolerances:±0.50[±0.020]

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 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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