

1W, AC/DC (High Voltage DC/DC) converter



## FEATURES

- Ultra wide input voltage rang: 85 - 264VAC/70 - 400VDC
- AC and DC dual-use(input from the same terminal)
- Compact size, high power density
- Output short circuit, over-current protection
- UL60950, EN60950 approval

*LS01-15BxxS (-F) series* ——a compact size 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. Meets UL60950/EN60950 standards. All models are particularly suitable for the applications demanding on the volume, need to meet UL/CE standard, less demanding on EMC like industrial, electric power, instrumentation, smart home. For harsh EMC environment, this series of products must use the refered application circuit.

## Selection Guide

Certification	Part No. *	Output Power	Nominal Output Voltage and Current(Vo/Io)	Efficiency (230VAC, %/Typ.)	Max. Capacitive Load(μF)
UL/CE	LS01-15B05S (-F)	1W	5V/200mA	62	470
	LS01-15B09S (-F)		9V/111mA	67	150
	LS01-15B12S (-F)		12V/83mA	68	100
	LS01-15B15S (-F)		15V/67mA	68	100
	LS01-15B24S (-F)		24V/42mA	70	100

Note: \*The model of 90 degrees of corner is with -F. For example the LS01-15B12S of 90 degrees of corner product is LS01-15B12S-F.

## Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Voltage Range	AC input	85	--	264	VAC
	DC input	70	--	400	VDC
Input Frequency		47	--	63	Hz
Input current	115VAC	--	--	0.12	A
	230VAC	--	--	0.06	
Inrush current	115VAC	--	10	--	A
	230VAC	--	20	--	
Recommended External Input Fuse		1A/250V, slow fusing			
Hot Plug		Unavailable			

## Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy	LS01-15B05S (-F)	--	±10	--	%
	Others	--	±5	--	
Line Regulation	Full load	--	±1.5	±2	%
Load Regulation	10%-100% load	--	±2.5	±3	
Ripple & Noise*	20MHz bandwidth	--	70	150	mV
Stand-by Power Consumption		--	--	0.5	W
Temperature Coefficient		--	±0.1	--	%/°C
Over-current Protection		≥120%Io, self-recovery			
Short Circuit Protection		Hiccup, Continuous, self-recovery			
Min. Load		10	--	--	%
Hold-up Time	115VAC input	80	--	--	ms
	230VAC input	300	--	--	

Note: ① When the LS01-15B05S (-F) model operating in -25°C to 0°C or +55°C to +85°C, C2 need to use 270μF/16V solid capacitance;  
 ② Parallel line test method is adopted to test the ripple and noise, please see *AC-DC Converter Application Notes* for specific operation methods.  
 ③ All tests are performed in CR mode.

General Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Isolation Voltage	Input-output	Test time: 1min	3000	--	--	VAC
Operating Temperature			-25	--	+85	°C
Storage Temperature			-25	--	+105	°C
Storage Humidity			--	--	95	%RH
Welding Temperature	Wave-soldering	260 ±5 °C; time: 5 - 10s				
	Manual-welding	360 ± 10°C; time: 3 - 5s				
Switching Frequency			--	--	50	kHz
Safety Certification			UL60950/EN60950			
Safety Class			CLASS II			
Safety Standard			UL60950/EN60950			
MTBF			MIL-HDBK-217F@25°C ≥300,000 h			

Physical Specifications

Package Dimensions	Refer to the Dimensions
Weight	8g(Typ.)
Cooling method	Free air convection

EMC Specifications

EMI	CE	CISPR32/EN55032	CLASS A (See Fig. 1 for typical application circuit)	
		CISPR32/EN55032	CLASS B (See Fig. 2 for recommended circuit)	
	RE	CISPR32/EN55032	CLASS A (See Fig. 1 for typical application circuit)	
		CISPR32/EN55032	CLASS B (See Fig. 2 for recommended circuit)	
EMS	ESD	IEC/EN61000-4-2	Contact ±4KV	Perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m (See Fig. 2 for recommended circuit)	perf. Criteria A
	EFT	IEC/EN61000-4-4	±2KV (See Fig. 1 for typical application circuit)	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 (See Fig. 2 for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6	3Vr.m.s (See Fig.2 for recommended circuit)	perf. Criteria A
Voltage dips, short interruptions and voltage variations immunity		IEC/EN61000-4-11	0%.70% (See Fig.2 for recommended circuit)	perf. Criteria B

Design Reference

1. Typical application circuit

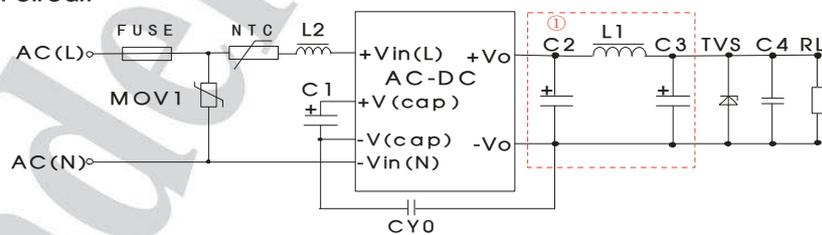


Fig. 1

Note: ① is Pi filter circuit

Model	C1 (necessary)	L2	C2 (necessary)	L1 (necessary)	C3 (necessary)	C4	CY0	FUSE (necessary)	TVS
LS01-15B05S (-F)	10μF/400V	4.7 mH	150μF/35V	2.2μH	68μF/35V	0.1μF/50V	1nF/400 VAC	1A/250V	SMBJ7.0A
LS01-15B09S (-F)									SMBJ12A
LS01-15B12S (-F)			SMBJ20A						
LS01-15B15S (-F)			SMBJ20A						
LS01-15B24S (-F)			SMBJ30A						

- Note:
- C1: AC input, is filtering electrolytic capacitor (which is required), and the value of C1 is 10 uF/400V.  
DC input, is a filtering capacitor in EMC Filter, the value of C1 is 10μF/400V (when input voltage is above 370VDC, and the value of C1 is 10μF/450V),  
If EMC performance is not required, C1 could not need.
  - C2 and C3 are output filter capacitors (which is required), they are recommended to be high frequency and low impedance electrolytic capacitor. Capacitance and rated ripple current of capacitors refer to the datasheets provided by the manufactures. Capacitor voltage reduced to at least 80%. C4 is ceramic capacitor, which is used to filter high frequency noise. C2, C3 and L1 form a pi-type filter circuit. Current of L1 and L2 refer to the datasheets provided by the manufactures, current derating to at least 80%. TVS is a recommended component to protect post-circuits (if converter fails). External input NTC is recommended to use 5D-9. External input MOV1 is recommended to use S14K350.

2. EMC solution-recommended circuit

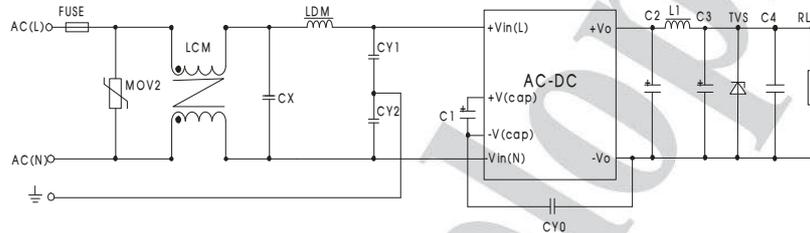
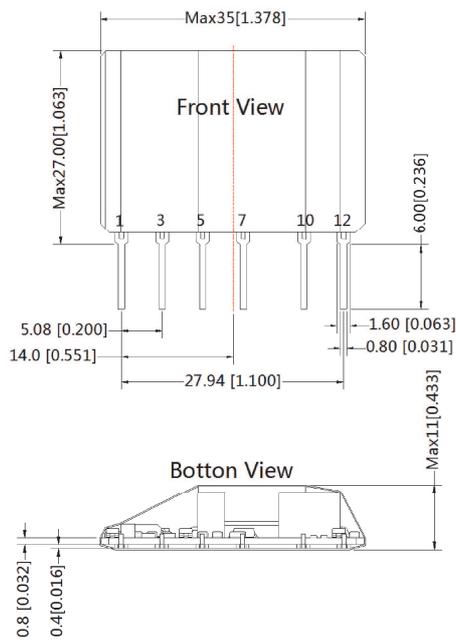


Fig 2

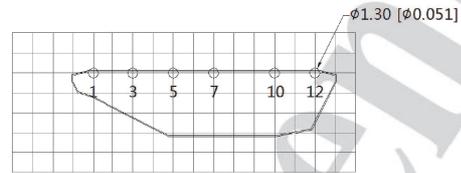
Element model	Recommended value
MOV2	S14K350
CY1, CY2	1nF/400VAC
CX	0.1μF/275VAC
LCM	3.5mH
LDM	4.7mH/0.2A
FUSE	1A/250V, slow fusing, necessary

3. For more information Please find the application note on [www.mornsun-power.com](http://www.mornsun-power.com)

LS01-15BxxS Dimensions and Recommended Layout



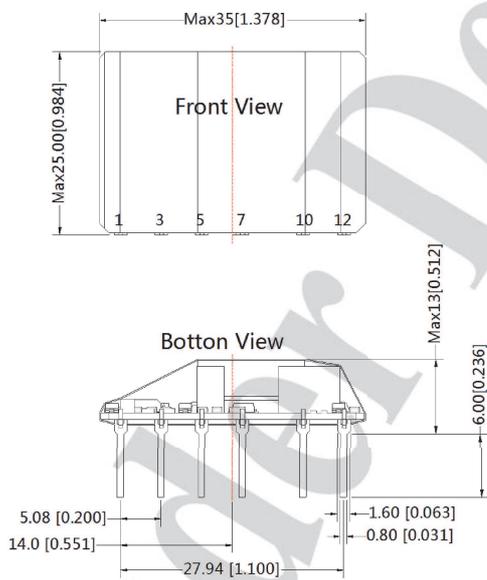
THIRD ANGLE PROJECTION



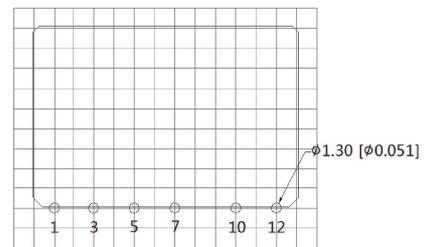
Pin	Function
1	-Vin(N)
3	+Vin(L)
5	+V(CAP)
7	-V(CAP)
10	-Vo
12	+Vo

Note:  
Unit :mm[inch]  
Pin section tolerances : $\pm 0.10[\pm 0.004]$   
General tolerances: $\pm 1.00[\pm 0.039]$

LS01-15BxxS-F Dimensions and Recommended Layout



THIRD ANGLE PROJECTION



Pin	Function
1	-Vin(N)
3	+Vin(L)
5	+V(CAP)
7	-V(CAP)
10	-Vo
12	+Vo

Note:  
Unit :mm[inch]  
Pin section tolerances : $\pm 0.10[\pm 0.004]$   
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](http://www.mornsun-power.com). The Packing bag number of LS01-15B03S package : 58220023, LS01-15BxxS-F package : 58220025;
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. In order to increase the conversion efficiency of the product with light load in the design, the product will have slight audio noise when it is operating, but it will not affect the product's reliability and performance;
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, Luogang District, Guangzhou, P. R. China  
Tel: 86-20-38601850-8801 Fax: 86-20-38601272 E-mail: info@mornsun.cn