

3W, AC/DC (High Voltage DC/DC) converter



## FEATURES

- Ultra wide input voltage rang: 85 - 264VAC/70 - 400VDC
- Output short circuit, over-current protection
- High efficiency, high power density
- Low power consumption, green power
- 90 degree pin-outs design minimizing the product height
- Industrial-grade design
- UL60950, EN60950 approval

LS03-15BxxSR2(-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 <sup>①</sup>	Part No. <sup>②</sup>	Output Power	Nominal Output Voltage and Current(Vo/Io)	Efficiency (230VAC, %/Typ.)	Max. Capacitive Load(μF)
--	LS03-15B03SR2(-F)	1.65W	3.3V/500mA	66	2300
UL/CE	LS03-15B05SR2(-F)	2.5W	5V/500mA	65	470
	LS03-15B09SR2(-F)	3W	9V/333mA	72	150
	LS03-15B12SR2(-F)		12V/250mA	74	100
	LS03-15B15SR2(-F)		15V/200mA	74	100
	LS03-15B24SR2(-F)		24V/125mA	74	100

Note: ①LS03-15B03SR2(-F) don't meet UL/CE standards;

②The model of 90 degrees of corner is with -F. For example the LS03-15B12SR2 of 90 degrees of corner product is LS03-15B12SR2-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	--	440	Hz
Input current	115VAC	--	--	0.12	A
	230VAC	--	--	0.06	
Inrush current	115VAC	--	20	--	
	230VAC	--	40	--	
Recommended External Input Fuse		1A/250V, slow fusing			
Hot Plug		Unavailable			

## Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy	LS03-15B03SR2(-F)	--	--	±3	%
	Other models	--	--	±5	
Line Regulation	Full load	--	±0.5	--	
	Other models		±1.5	--	
Load Regulation	10%-100% load	--	±1.5	--	%
			±2.5	--	
Ripple & Noise*	20MHz bandwidth (peak-peak value)	--	70	150	mV
			50	120	
Temperature Coefficient		--	±0.15	--	%/℃
Over-current Protection		self-recovery			

Short Circuit Protection		Hiccup, Continuous, self-recovery			
Min. Load		10	--	--	%
Note: ① When the LS03-15B05SR2(-F) model operating in -20℃ to 0℃ or +55℃ to +85℃, C2 need to use 270μF/16V solid capacitance; ② Parallel line test method is adopted to test the ripple and noise, please see <i>AC-DC Converter Application Notes</i> 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		LS03-15B03SR2(-F)		-40	--	+85	℃
		Other models		-25	--	+85	
Storage Temperature		LS03-15B03SR2(-F)		-40	--	+105	
		Other models		-25	--	+105	
Storage Humidity				--	--	85	%RH
Welding Temperature		Wave-soldering		260 ±5 ℃; time: 5 - 10s			
		Manual-welding		360 ± 10℃; time: 3 - 5s			
Switching Frequency		LS03-15B03SR2(-F)		--	100	--	kHz
		Other models		--	--	50	
Power Derating		-40℃ to -20℃	LS03-15B03SR2(-F)	2.0	--	--	%/℃
		+55℃ to +85℃		1.33	--	--	
Safety Certification				UL60950/EN60950			
Safety Class				CLASS II			
Safety Standard				UL60950/EN60950			
MTBF				MIL-HDBK-217F@25℃ ≥300,000 h			

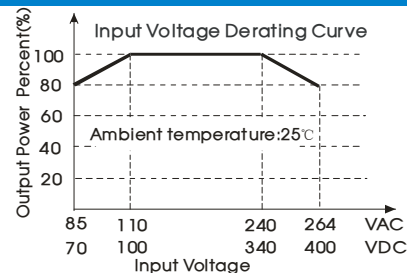
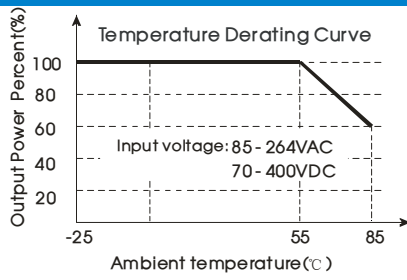
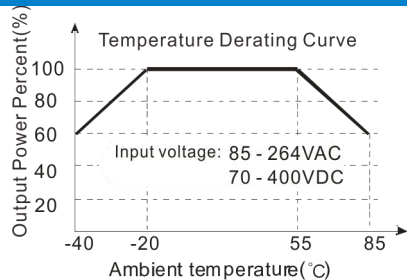
### Physical Specifications

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

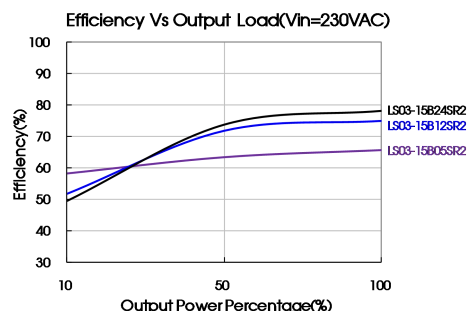
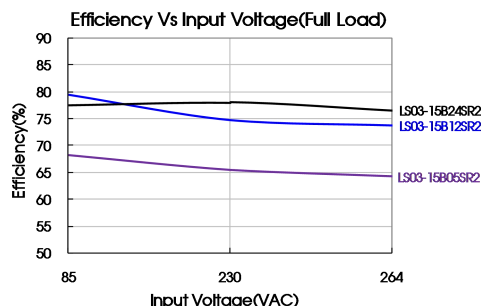
### EMC Specifications

EMI	CE	CISPR22/EN55022	CLASS A (See Fig. 1 for typical application circuit)		
		CISPR22/EN55022	CLASS B (See Fig. 2 for recommended circuit)		
	RE	CISPR22/EN55022	CLASS A (See Fig. 1 for typical application circuit)		
		CISPR22/EN55022	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	
	PFM	IEC/EN61000-4-8	10A/m (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	

## Product Characteristic Curve



Note: ① Input voltage should be derated based on temperature derating when it is 85-110VAC/240-264VAC/70-100VDC/340-400VDC;  
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

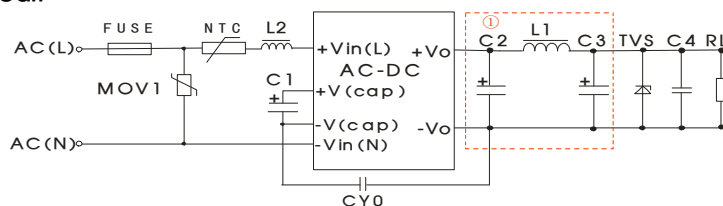


Fig. 1

Note: ① is Pi filter circuit

Model	C1 (necessary)	L2	C2 (necessary)	L1 (necessary)	C3 (necessary)	C4	CY0	FUSE (necessary)	TVS
LS03-15B03SR2(-F)	22μF/400V	4.7 mH	330μF/25V	2.2μH	120μF/25V	0.1μF/ 50V	1nF/400 VAC	1A/250V	SMBJ7.0A
LS03-15B05SR2(-F)					68μF/35V				SMBJ7.0A
LS03-15B09SR2(-F)									SMBJ12A
LS03-15B12SR2(-F)			SMBJ20A						
LS03-15B15SR2(-F)			SMBJ20A						
LS03-15B24SR2(-F)			SMBJ30A						

Note:

- C1: AC input, is filtering electrolytic capacitor (which is required), and the value of C1 is 22 μF/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 a 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

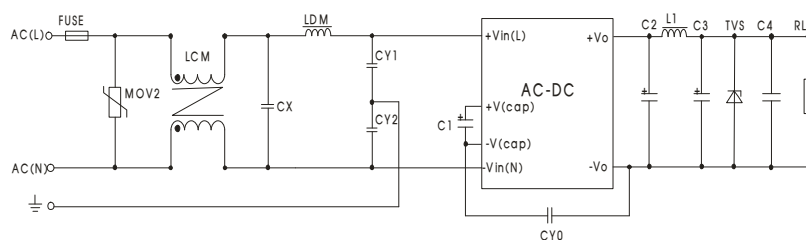


Fig 2

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

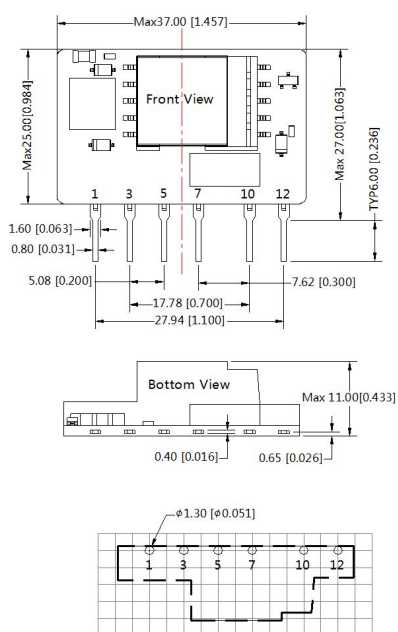
3. For more information Please find the application note on [www.mornsun-power.com](http://www.mornsun-power.com)

### LS03-15BxxSR2 Dimensions and Recommended Layout

LS03-15B03SR2

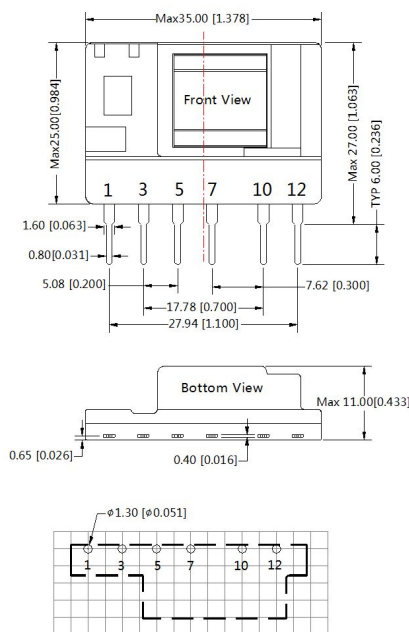
LS03-other model

THIRD ANGLE PROJECTION



Note: Grid 2.54\*2.54mm

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

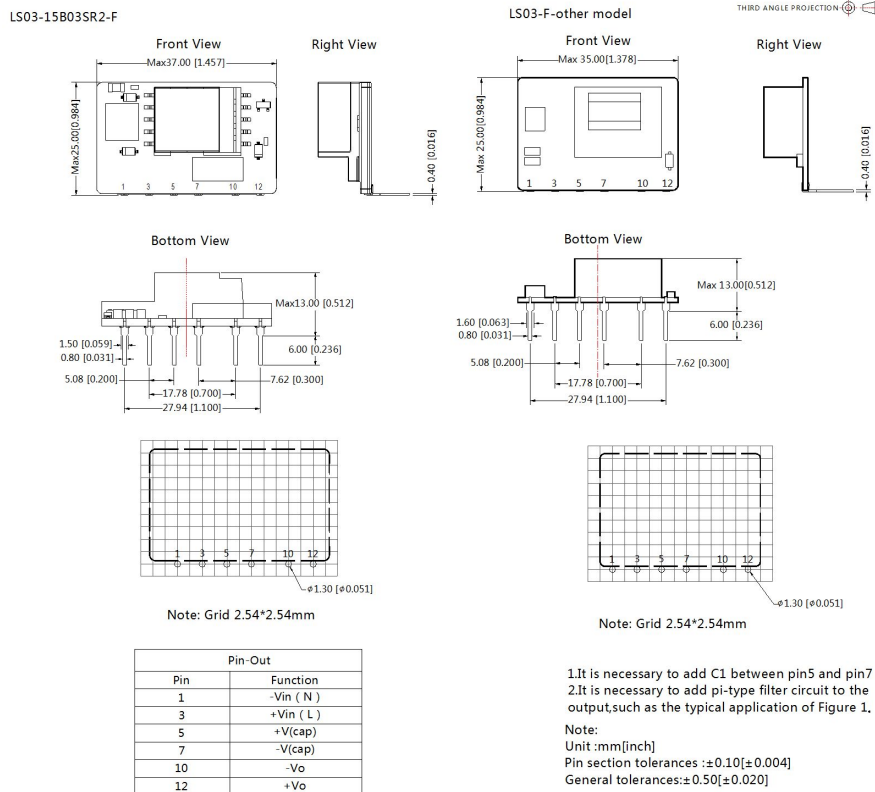


Note: Grid 2.54\*2.54mm

- 1.It is necessary to add C1 between pin5 and pin7 ;
- 2.It is necessary to add pi-type filter circuit to the output,such as the typical application of Figure 1.

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

### LS03-15BxxSR2-F Dimensions and Recommended Layout



#### Note:

1. Packing Information please refer to 'Product Packing Information'. The Packing bag number of LS03-15B03SR2 package : 58220023, LS03-15BxxSR2-F package : 58220025, LS03-15BxxSR2 other models' package : 58220018;
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. Specifications are subject to change without prior notice.

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