

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



FEATURES

- Ultra wide input range: 85~264VAC/70~400VDC
- Output short circuit, over-current protection
- High efficiency, high density
- Low power consumption, green power
- 90 degree curved series, minimizing product height
- Industrial level specifications
- Meet UL60950, EN60950 standards

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. meet 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 referred application circuit.

Selection Guide

Certification ^①	Part No. ^②	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)	3W	5V/500mA	69	470
	LS03-15B09SR2(-F)		9V/333mA	76	150
	LS03-15B12SR2(-F)		12V/250mA	78	100
	LS03-15B15SR2(-F)		15V/200mA	78	100
	LS03-15B24SR2(-F)		24V/125mA	78	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	—	
Hot Plug		Unavailable			

Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy	LS03-15B03SR2(-F)	—	—	±3	
	LS03-15B05SR2(-F)/ LS03-15B15SR2(-F)/ LS03-15B24SR2(-F)	—	—	±5	
	LS03-15B09SR2(-F)/ LS03-15B12SR2(-F)	—	—	±8	
Line Regulation	Full load	LS03-15B03SR2(-F)	—	±0.5	%
		Other models	—	±1.5	
Load Regulation	10%-100% load	LS03-15B03SR2(-F)	—	±1.5	
		Other models	—	±2.5	
Ripple & Noise*	20MHz bandwidth (peak-peak value)	3.3 / 5 VDC output	—	70	mV
		9/12/15/24VDC output	—	50	
Temperature Coefficient		—	±0.15	—	%/°C

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°C~40°C or 55°C~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.

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage	Input-output Test time: 1min	3000	–	–	VAC
Operating Temperature		-40	–	+85	°C
Storage Temperature		-40	–	+105	
Storage Humidity		–	–	85	%RH
Welding Temperature	Wave-soldering	260±5°C; time:5~10s			
	Manual-welding	360±10°C; time:3~5s			
Switching Frequency	LS03-15B03SR2(-F)	–	100	–	kHz
	Other models	–	–	50	
Power Derating	-40°C~-20°C	2	–	–	% / °C
	+55°C~+85°C	1.33	–	–	
Safety Certification		UL60950/EN60950			
Safety Class		CLASS II			
Safety Standard		UL60950/EN60950			
MTBF		MIL-HDBK-217F@25°C > 300,000 h			

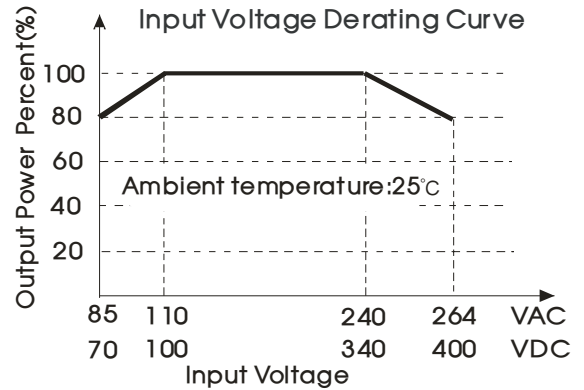
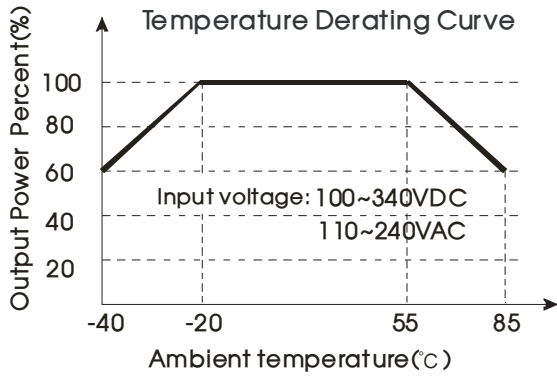
Physical Specifications

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

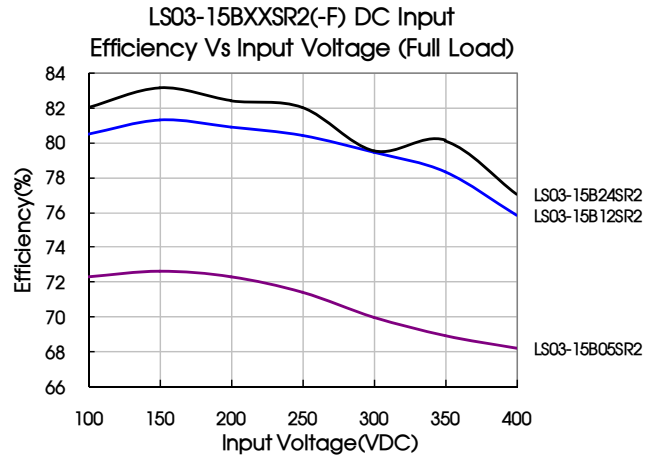
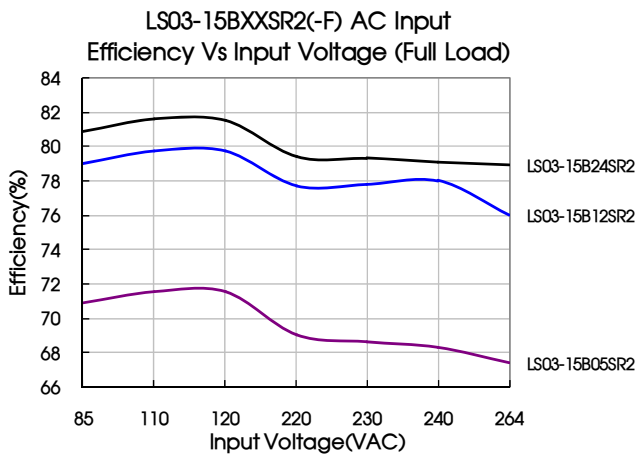
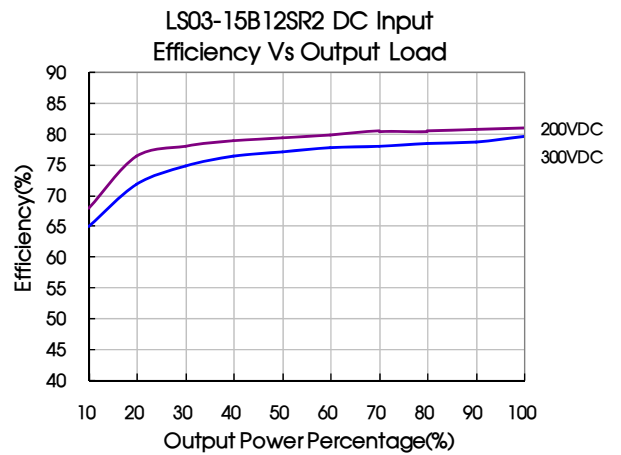
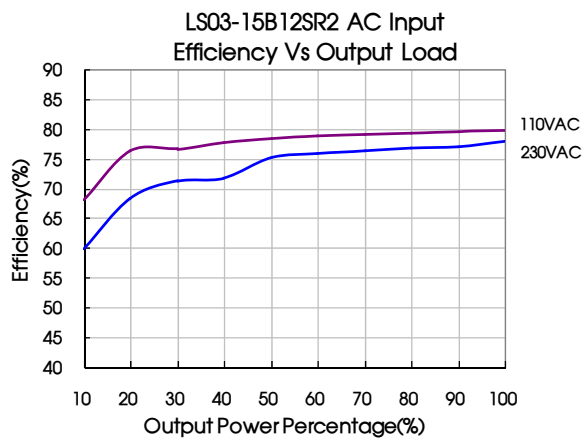
EMC Specifications

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	±1KV/±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

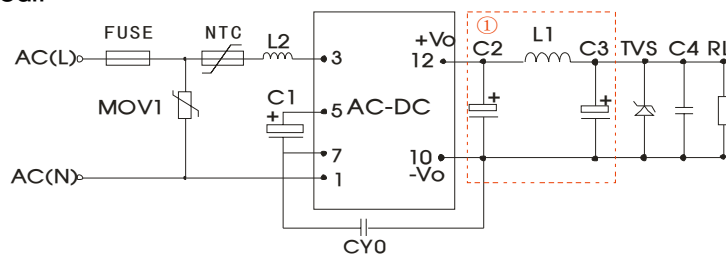


Fig. 1

Note: ① is Pi filter circuit

Model	C1 (Required)	L2	C2 (Required)	L1 (Required)	C3 (Required)	C4	CY0	FUSE (Required)	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)			150μF/35V		SMBJ20A				
LS03-15B24SR2(-F)			100μF/35V		SMBJ30A				

Note:
 1. C1: AC input, is filtering electrolytic capacitor (which is required), and the value of C1 is 22μF/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.
 2. C2 and C3 are output filter capacitors(which is required), they are recommended to be high frequency and low impedance electrolytic capacitors. Capacitance and rated ripple current of capacitors refer to the datasheets provided by the manufactures. Voltage derating of capacitors should be 80% c above. 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 th datasheets provided by the manufactures, current derating should be 80% or above. TVS is a recommended component to protect post-circuits (if convert fails). External input NTC is recommended to use 5D-9.External input MOV1 is recommended to use S14K350.

2. EMC solution-recommended circuit

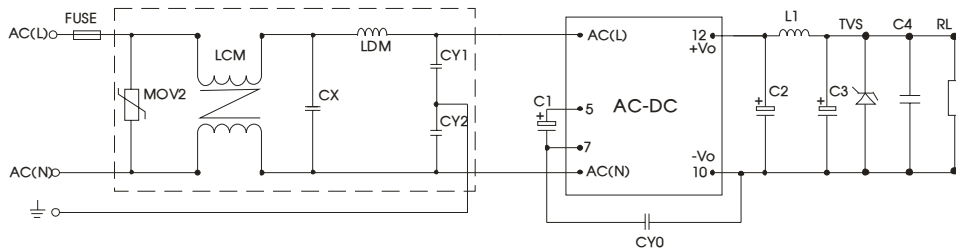


Fig 2

EMC solution-recommended circuit PCB layout

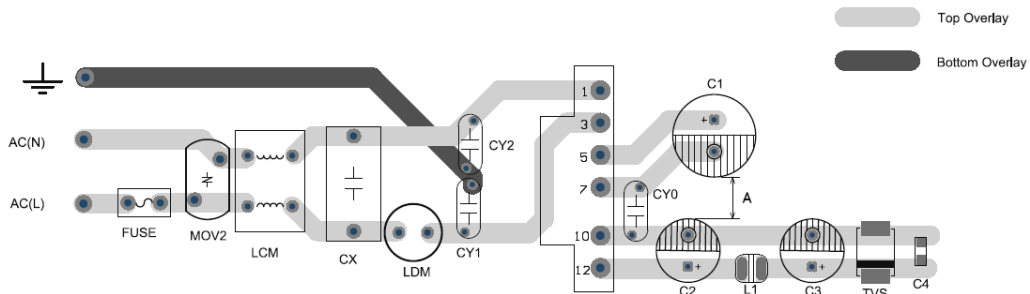


Fig 3

Suggestions for safety regulation and wiring width: wire width ≥3mm, distance between wires ≥6mm, and distance between wire and ground ≥6mm, external components between primary circuit and secondary circuit ≥6.4mm.

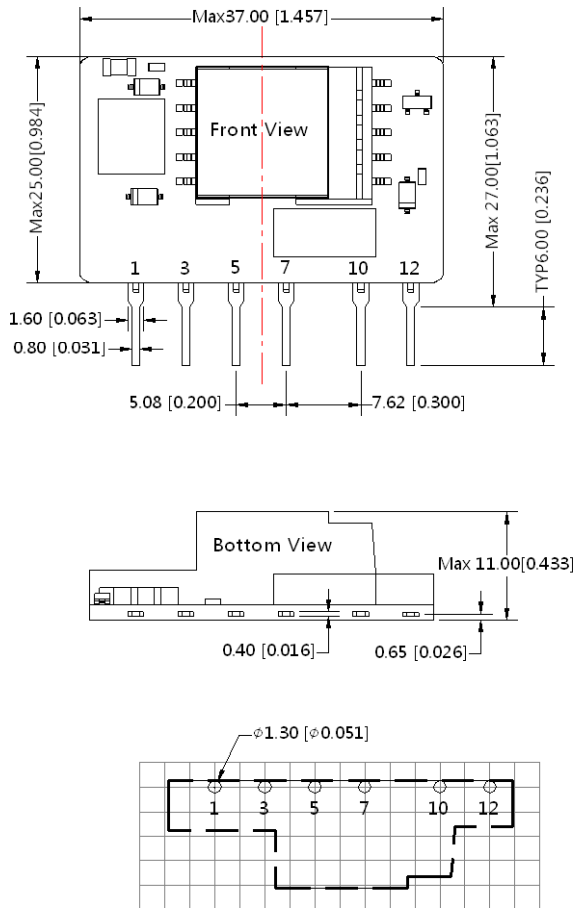
Element model	Recommended value
MOV2	S14K350
CY1 , CY2	1nF/400VAC
CX	0.1μF/275VAC
LCM	3.5mH
LDM	4.7mH
FUSE	1A/250V, slow blow, it must be connected to FUSE
Can use MORNSUN's FC-L01DV1 EMC model	

3. For more information about Mornsun EMC Filter products, please visit www.mornsun-power.com to download the Selection Guide of EMC Filter

LS03-15BxxSR2 Dimensions and Recommended Layout

THIRD ANGLE PROJECTION 

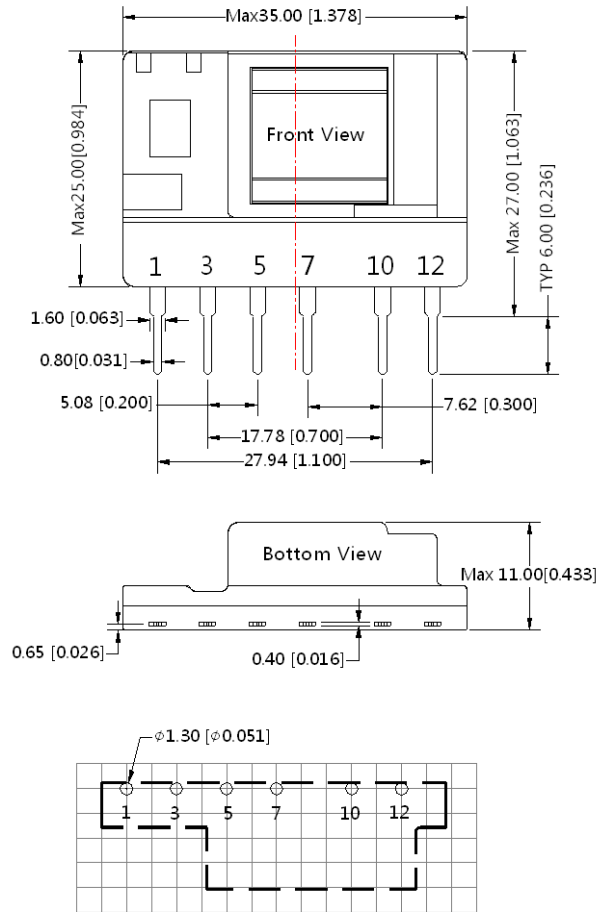
LS03-15B03SR2



Note: Grid 2.54*2.54mm

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

LS03-other model



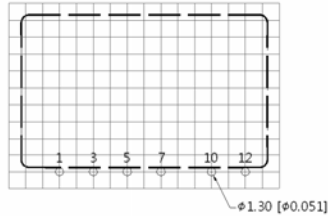
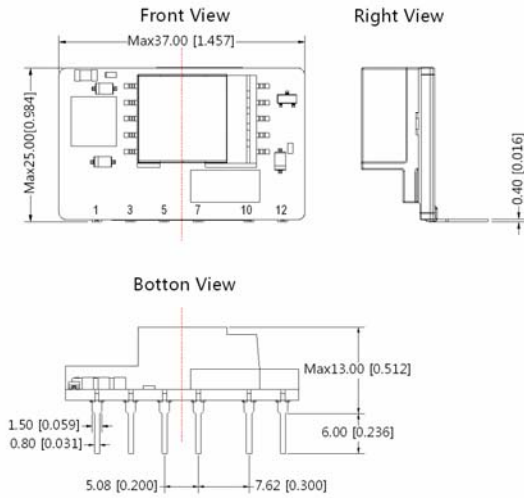
Note: Grid 2.54*2.54mm

- 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]

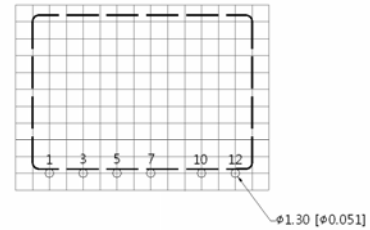
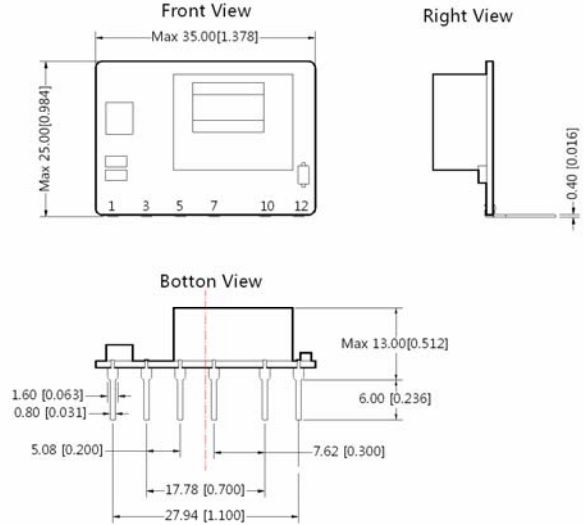
LS03-15BxxSR2-F Dimensions and Recommended Layout

LS03-15B03SR2-F



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

LS03-F-other model



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]

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, data in this datasheet should be tested under the conditions of Ta=25° C, humidity<75% when inputting nominal voltage and outputting rated 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. The performance indexes of the product models listed in this manual are as above, but some indexes of non-standard model products will exceed the above-mentioned requirements, and please directly contact our technician for specific information;
6. We can provide product customization service;
7. Specifications of this product are subject to changes without prior notice.

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