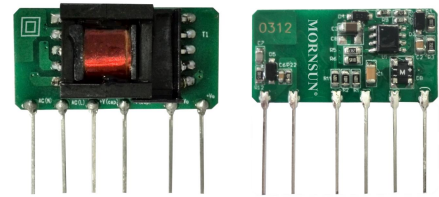


LS03-R2S Series 3W,AC-DC(HIGH VOLTAGE DC-DC) CONVERTER

----- are high efficiency green power modules provided by Mornsun. The features of this series are: wide input voltage, DC and AC all in one, high efficiency, low loss, safety isolation etc. All models are particularly suitable for the applications demanding on the volume, 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.

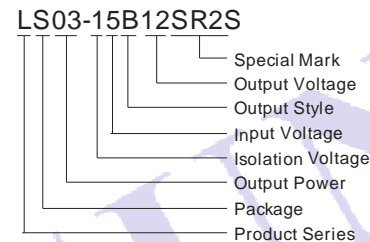


Marking model in digital products, such as "0312" said
"LS03-15B12SR2S"

FEATURES

1. Wide input voltage:85 ~ 264VAC(70 ~ 400VDC)
2. Over current protection and short circuit protection
3. Low loss, green power
4. High efficiency, high density
5. Industrial design
6. Ultra-Miniature package and Open frame type
7. Flexible design of peripheral circuit reduces layout problems

PART NUMBER SYSTEM



SELECTION GUIDE

Model	Power	Output (Vo/Io)	Max. Capacitive Load (μF)	Efficiency (%) (230VAC,Typ.)	Standby Power(Max.)
LS03-15B03SR2S	1.65W	3.3V/500mA	470	63	0.5W
LS03-15B05SR2S	2.5W	5V/500mA	470	68	
LS03-15B09SR2S	3W	9V/333mA	150	75	
LS03-15B12SR2S		12V/250mA	100	77	
LS03-15B15SR2S		15V/200mA	100	78	
LS03-15B24SR2S		24V/125mA	100	80	

INPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Input Voltage Range	AC Input	85	--	264	V
	DC Input	70	--	400	
Input Frequency		47	--	440	Hz
Input Current	115VAC	--	--	0.12	A
	230VAC	--	--	0.06	
Inrush Current	115VAC	--	13	--	
	230VAC	--	23	--	

OUTPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy	LS03-15B03SR2S*	--	--	±8	%
	LS03-15B05SR2S*	--	--	±5	
	LS03-15B09SR2S	--	--	±5	
	LS03-15B12SR2S	--	--		
	LS03-15B15SR2S	--	--	±5	
	LS03-15B24SR2S	--	--		
Line Regulation	full load	--	±1.5	--	
Load Regulation	10% to 100%	--	±2.5	--	

Ripple & Noise(p-p) (measuring refer to "ripple and noise measure figure")	20MHz bandwidth	LS03-15B03SR2S	--	70	150	mV
		LS03-15B05SR2S	--			
		LS03-15B09SR2S	--	50	150	
		LS03-15B12SR2S	--			
		LS03-15B15SR2S	--			
		LS03-15B24SR2S	--			
Min Load		10	--	--	%	
Hold-up Time	115VAC	20	--	--	ms	
	230VAC	80	--	--		
Short Circuit Protection	Continuous, and auto recovery					
Over Current Protection	Auto recovery					
Note:*When LS03-15B03SR2S and LS03-15B05SR2S working in -20°C~-40°C and 55°C~85°Ctemperature range output filter capacitor C2 need 270µF/16Vsolid-state capacitor.						

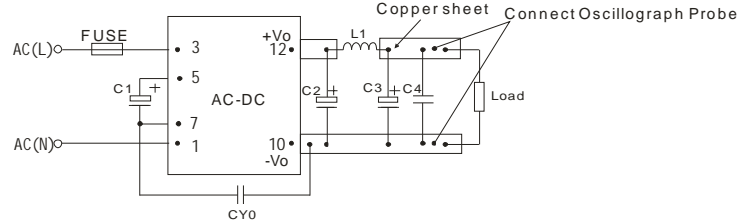
COMMON SPECIFICATIONS

Item	Test Conditions		Min.	Typ.	Max.	Unit
Operating Temperature			-40	--	+85	°C
Storage Temperature			-40	--	+105	
Max. Product Surface Temperature			--	--	+90	
Storage Humidity			--	--	85	%RH
Temperature coefficient			--	±0.15	--	% / °C
Power derating	-40°C ~ -20°C		2	--	--	
	+55°C ~ +85°C		1.33	--	--	
Isolation Resistance			100	--	--	MΩ
Isolation Voltage	input-output	Tested for 1 minute	3000	--	--	VAC
Switching Frequency			--	--	60	kHz
Weight			--	7	--	g
Safety Class	CLASS II					
Hot swap	Forbid					
Install	PCB					
Cooling	Free air convection					
MTBF	>300,000 h @ 25°C					
Note:						
1. External electrolytic capacitors are required to modules, more details refer to typical applications.						
2. This part is open frame, at least 6.4mm safety distance between the the primary and secondary external components of the module is needed to meet the safety requirement						
3. Ripple and Noise measuring refer to "ripple and noise measure figure".						
4. All specifications were measured at Ta=25°C, humidity<75%, nominal input voltage (115VAC or 230VAC)and rated output load unless otherwise specified.						
5. In order to increase the conversion efficiency of the product with light load in the design, the product will have slight audio noise when operating with load less than 30% of rated load, but it will not affect the product's reliability and performance.						
6. Module required dispensing fixed after assembled.						
7. In this datasheet, all the test methods of indications are based on corporate standards.						

EMC SPECIFICATIONS

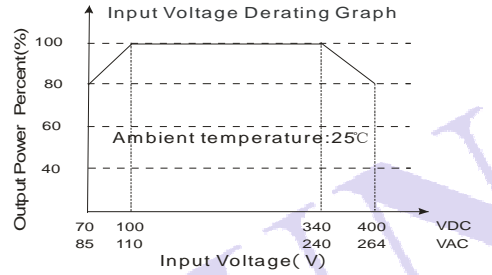
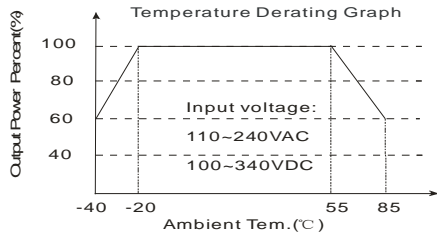
EMI	CE	CISPR22/EN55022, CLASS A (Typical Application Circuit Refer to Figure 1)			
		CISPR22/EN55022, CLASS B (Recommended Circuit Refer to Figure 3)			
	RE	CISPR22/EN55022, CLASS A (Typical Application Circuit Refer to Figure 1)			
		CISPR22/EN55022, CLASS B (Recommended Circuit Refer to Figure 3)			
EMS	ESD	IEC/EN61000-4-2	Contact ±4KV		perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m	(Recommended Circuit Refer to Figure 3)	perf. Criteria A
	EFT	IEC/EN61000-4-4	±2KV	(Typical Application Circuit Refer to Figure 1)	perf. Criteria B
		IEC/EN61000-4-4	±4KV	(Recommended Circuit Refer to Figure 3)	perf. Criteria B
	Surge	IEC/EN61000-4-5	±1KV/±2KV	(Recommended Circuit Refer to Figure 1 or Figure 3)	perf. Criteria B
	CS	IEC/EN61000-4-6	3 Vr.m.s	(Recommended Circuit Refer to Figure 3)	perf. Criteria A
	PFM	IEC/EN61000-4-8	10A/m		perf. Criteria A
Voltage dips, short and interruptions immunity	IEC/EN61000-4-11	0%-70%		perf. Criteria B	

RIPPLE AND NOISE MEASURE FIGURE RIPPLE

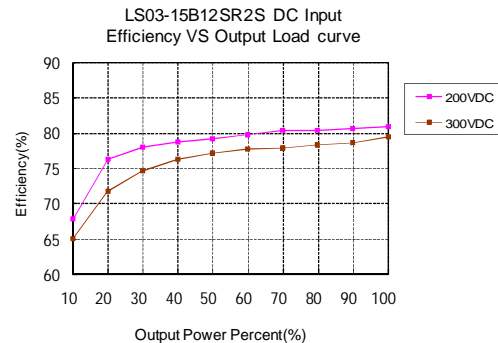
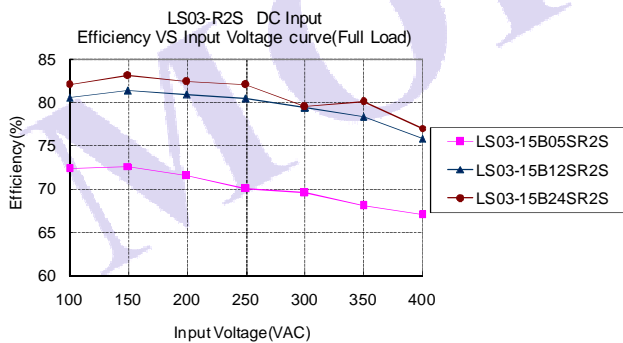
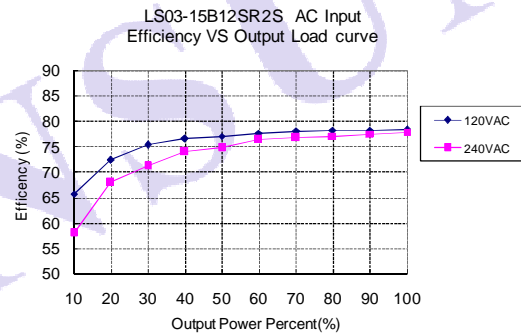
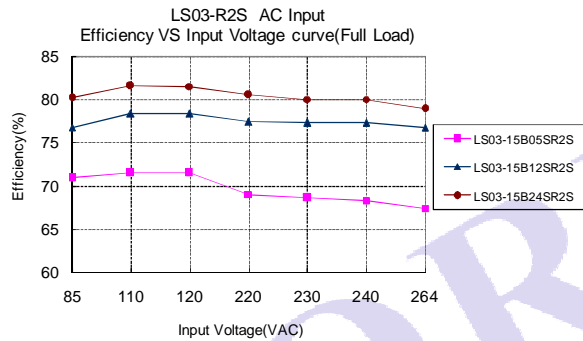


Note: CY0 is 1nF/400VAC Y1 capacitor, C1,C2,L1,C3,C4 refer to "EXTERNAL CIRCUIT PARAMETERS"

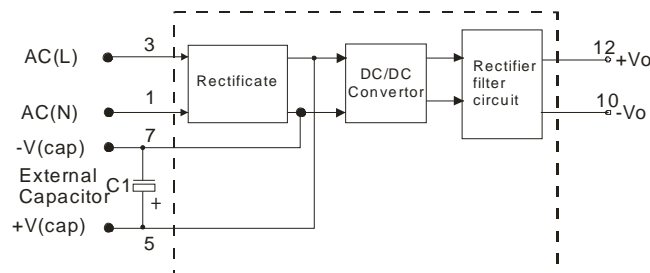
PRODUCT TYPICAL CURVE



Note: When input 85~110VAC /240~264VAC/70~100VDC/340~400VDC, it need to be voltage derated on basis of temperature derating.



STRUCTURE FIGURE



TYPICAL APPLICATIONS

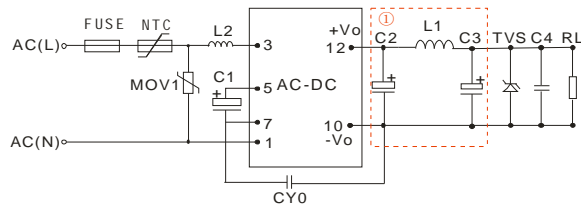
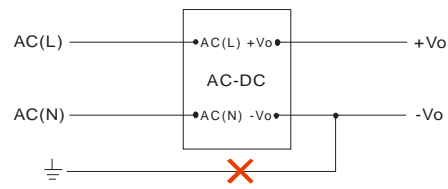


Figure 1: LS03-R2S Typical application circuit
Note: ① is Pi filter circuit.



(Figure 2): Because of the surge protection, this application is not available for this series.
Note: If you have such application, please consult to our FAE department.

EXTERNAL CIRCUIT PARAMETERS

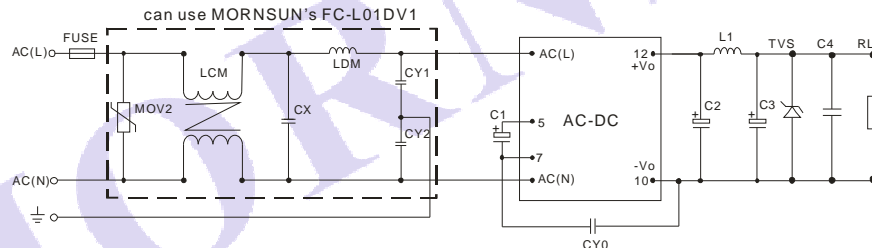
Model	FUSE (Required)	NTC	MOV1	C1 (Required)	L2	C2 (Required)	L1 (Required)	C3 (Required)	C4	CY0	TVS
LS03-15B03SR2S	1A/250V	5D-9	S10K300	10 μ F/400V	5mH	330 μ F/25V	2.2 μ H	120 μ F/25V	0.1 μ F/50V	1nF/400VAC	SMBJ7.0A
LS03-15B05SR2S								SMBJ12A			
LS03-15B09SR2S								SMBJ20A			
LS03-15B12SR2S								SMBJ20A			
LS03-15B15SR2S								SMBJ20A			
LS03-15B24SR2S								SMBJ30A			

Note:

1. C1, C2 and C3 are electrolytic capacitors. They are required both AC input and DC input.

The value of C1 is recommended to be 10 μ F / 400V . When the input voltage is above 370VDC, the recommended value of C1 is 10 μ F/450V). C2 and C3 are output filter capacitors, 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 manufacturers. Voltage derating of capacitors should be 80% or 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 the datasheets provided by the manufacturers, current derating should be 80% or above. TVS is a recommended component to protect post-circuits (if converter fails).

2. For standard EMC requirement, please refer to figure 1. If higher EMC requirement, please refer to figure 3.



(Figure 3): LS03-R2S series recommended circuit for applications which require higher EMC standard

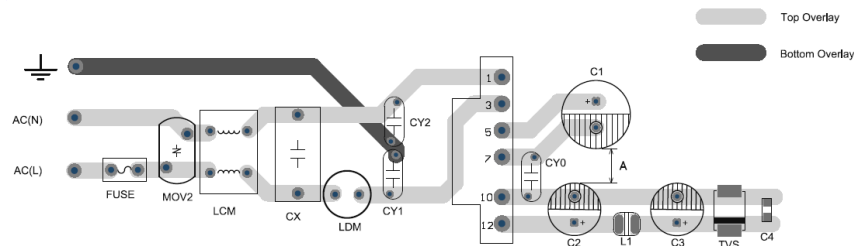


Figure 4: EMC application circuit PCB layout
Safety and recommend wiring: linewidth \geq 3mm, line-line distance \geq 6mm, line-ground distance \geq 6mm, A \geq 6.4mm

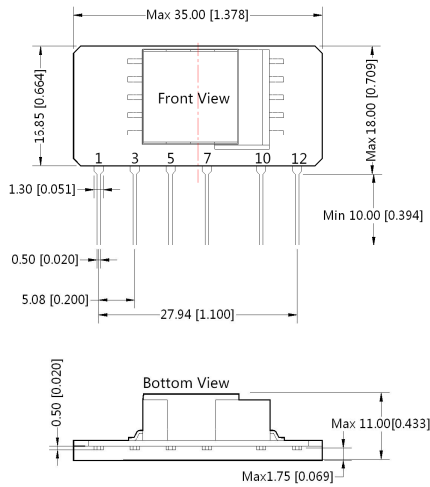
Recommend Parameter For Higher EMC Standard Circuit

Components	MOV2	CY1	CY2	CX	LCM	LDM	FC-L01DV1	FUSE(Required)
Recommend Parameter	S10K300	1nF/400VAC	1nF/400VAC	0.1 μ F/275VAC	3.5mH	5mH	MORNSUN's 1KV/2KV Surge protector	1A/250V, slow blow

Note: External circuit output is the same as figure 1.

DIMENSIONS, RECOMMENDED FOOTPRINT & PACKAGING

MECHANICAL DIMENSIONS



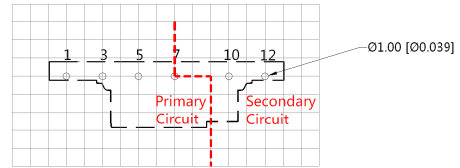
PIN CONNECTION	
Pin	Function
1	AC (N)
3	AC (L)
5	+V(cap)
7	-V(cap)
10	-Vo
12	+Vo

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;
3. It is needed to have distance $\geq 6.4\text{mm}$ for safety between external components in primary circuit and secondary circuit.

Note:
 Unit :mm[inch]
 Pin diameter tolerances : $\pm 0.10[\pm 0.004]$
 General tolerances : $\pm 0.50[\pm 0.020]$

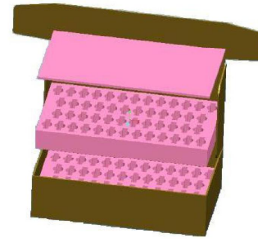


RECOMMENDED FOOTPRINT DETAILS



Note: Grid 2.54*2.54mm

PACKAGE DIAGRAM



Note:
 Unit :mm[inch]
 Inner carton dimensions: L*W*H=355*192*93
 Packaging quantity: 100pcs
 Outer carton dimensions: L*W*H=405*380*305
 Packaging quantity: 600pcs

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