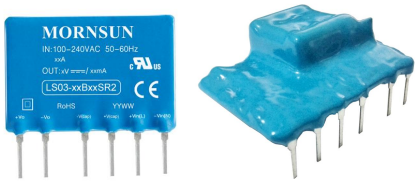
MORNSUN®

LS03-R2(-F) Series

3W, AC-DC(HIGH VOLTAGE DC-DC) CONVERTER



LS03-R2 Series ----- are high efficiency green power modules with miniature packaging provided by Mornsun. The features of this series are: wide input voltage, DC and AC all in one, high efficiency, high reliability, low loss, safety isolation etc, 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 refered application circuit.

RoHS

FEATURES

1. Wide input voltage:85 ~ 264VAC(100 ~ 400VDC)
2. Over current protection and short circuit protection
3. High efficiency, high density
4. Low loss, green power
5. Industrial design
6. Ultra-Miniature package
7. 90 degree curved series, minimizing product height
8. Certificate UL60950/EN60950 standards

PART NUMBER SYSTEM

LS03-15B15SR2

- Special Mark
- Output Voltage
- Output Style
- Input Voltage
- Isolation Voltage
- Output Power
- Package
- Product Series

SELECTION GUIDE

Approval	Model	Power	Output (Vo/Io)	Max. Capacitive Load (μF)	Ripple and Noise (Max.)	Efficiency (%) (230VAC,Typ.)	Standby Power(Max.)
--	LS03-15B03SR2(-F)*	1.65W	3.3V/500mA	2300	150mV	66	0.5W
UL/CE (beside "-F")	LS03-15B05SR2(-F)	2.5W	5V/500mA	470	150mV	69	
	LS03-15B09SR2(-F)	3W	9V/333mA	150	120mV	76	
	LS03-15B12SR2(-F)		12V/250mA	100	120mV	78	
	LS03-15B15SR2(-F)		15V/200mA	100	120mV	78	
	LS03-15B24SR2(-F)		24V/125mA	100	120mV	78	

Note: *The 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	Test Conditions	Min.	Typ.	Max.	Unit
Input Voltage Range	AC Input	85	--	264	V
	DC Input	100	--	400	
Input Frequency		47	--	440	Hz
Input Current	115VAC	--	--	0.12	A
	230VAC	--	--	0.06	
Inrush Current	115VAC	--	20	--	
	230VAC	--	40	--	

OUTPUT SPECIFICATIONS

Item	Test Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy	LS03-15B03SR2(-F)		--	--	±3.0	%
	LS03-15B05SR2(-F)*		--	--	±5.0	
	LS03-15B09SR2(-F)		--	--	±8.0	
	LS03-15B12SR2(-F)					
	LS03-15B15SR2(-F)		--	--	±5.0	
	LS03-15B24SR2(-F)					
Line Regulation	full load	LS03-15B03SR2(-F)	--	±0.5	--	
		Other model	--	±1.5	--	
Load Regulation	10% to 100%	LS03-15B03SR2(-F)	--	±1.5	--	
		Other model	--	±2.5	--	

Ripple& Noise(p-p) 20MHz bandwidth (measuring refer to "ripple and noise measure figure")	LS03-15B03SR2(-F)	--	70	--	mV
	LS03-15B05SR2(-F)				
	LS03-15B09SR2(-F)	--	50	--	
	LS03-15B12SR2(-F)				
	LS03-15B15SR2(-F)				
	LS03-15B24SR2(-F)				
Min Load		10	--	--	%
Hold-up Time	115VAC	60			ms
	230VAC	300			
Short Circuit Protection		Continuous, and auto recovery			
Over Current Protection		Auto recovery			
Note:LS03-15B05SR2(-F)* (-20℃~-40℃ and 55℃~85℃:Figure 1 Output sloid capacitance C2: 270μF/16V).					

COMMON SPECIFICATIONS

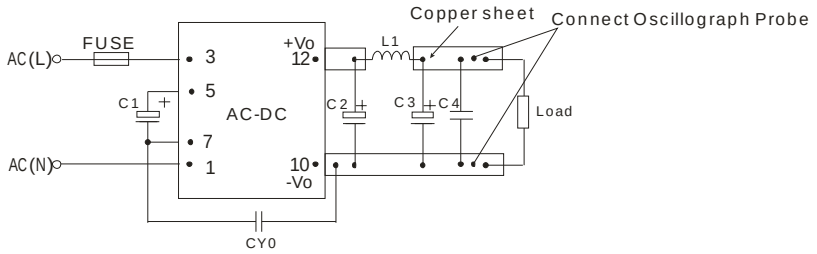
Item	Test Conditions	Min.	Typ.	Max.	Unit
Operating Temperature		-40	--	+85	℃
Storage Temperature		-40	--	+105	
Case temperature		--	--	+90	
Storage Humidity		--	--	85	%RH
Temperature coefficient		--	±0.15	--	%/℃
Power derating	-40℃～-20℃	2	--	--	
	+55℃~+85℃	1.33	--	--	
Isolation Resistance		100	--	--	MΩ
Isolation Voltage	input-output Tested for 1 minute	3000	--	--	VAC
Switching Frequency	LS03-15B03SR2(-F)	--	100	--	kHz
	Other model	--	--	50	
Weight		--	8	--	g
Welding Temperature	Wave-soldering	260± 5℃; time:5~10s			
	Manual-welding	360± 10℃; time:3~5s			
Safety approvals		UL60950/EN60950			
Safety Class		CLASS II			
Safety standards		UL60950/EN60950			
Hot swap		Forbid			
Case Material Grade		UL 94V-0			
Install		PCB			
Cooling		Free air convection			
MTBF		＞300,000 h @ 25℃			

Note: 1. External electrolytic capacitors are required to modules, more details refer to typical applications.
2. Ripple and Noise measuring refer to "ripple and noise measure figure".
3. All specifications were measured at Ta=25°C, humidity<75%, nominal input voltage (115VAC or 230VAC)and rated output load unless otherwise specified.
4. In this datasheet, all the test methods of indications are based on corporate standards.

EMC SPECIFICATIONS

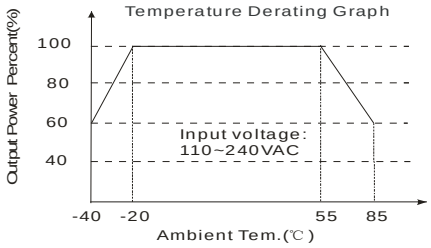
EMI	CE	CISPR22/EN55022, CLASS A (Typical Application Circuit Refer to Figure 1)	
		CISPR22/EN55022, CLASS B (Recommended Circuit Refer to Figure 3)	
	RE	CISPR22/EN55022, CLASS A (Typical Application Circuit Refer to Figure 1)	
		CISPR22/EN55022, CLASS B (Recommended Circuit Refer to Figure 3)	
EMS	ESD	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 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

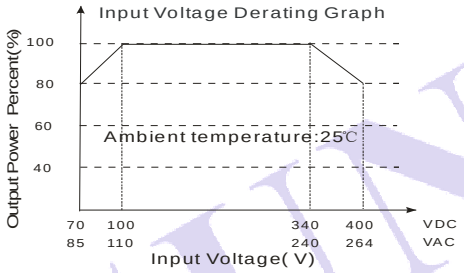


Note：CY0 is 1nF/400VAC Y1 capacitor, C1,C2,L1,C3,C4 refer to" EXTERNAL CIRCUIT PARAMETERS"

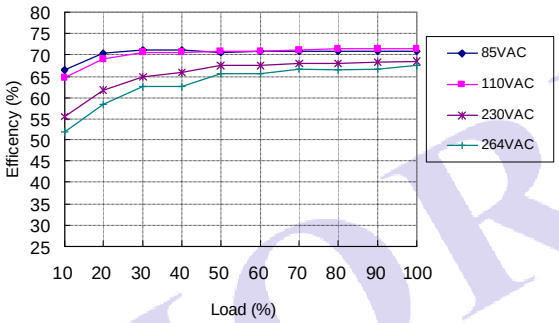
PRODUCT TYPICAL CURVE



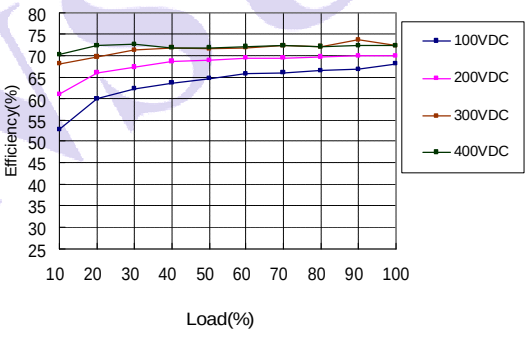
Note: When input 85~110VAC /240~264VAC/70~100VDC/340~400VDC, it need to be voltage derated on basis of temperature derating.



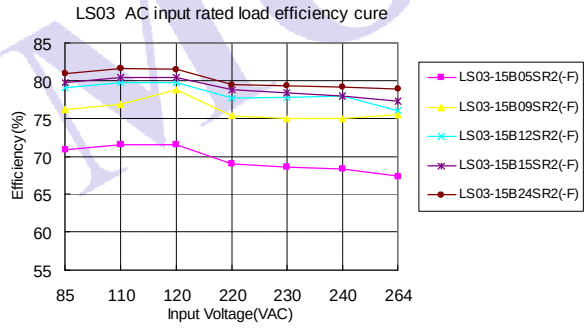
LS03-15B12SR2(-F) AC input efficiency cure



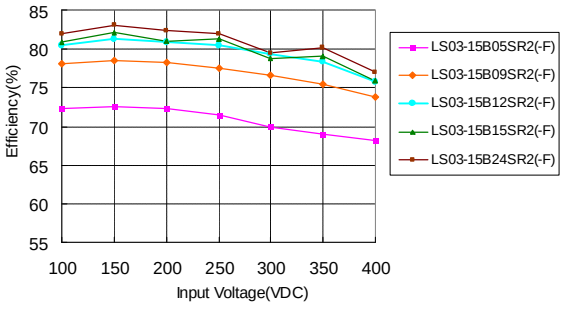
LS03-15B12SR2(-F) DC input efficiency cure



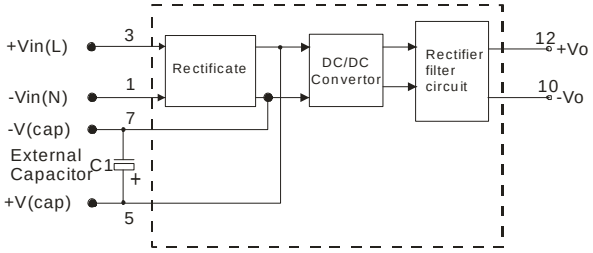
LS03 AC input rated load efficiency cure



LS03 DC input rated load efficiency cure



STRUCTURE FIGURE



TYPICAL APPLICATIONS

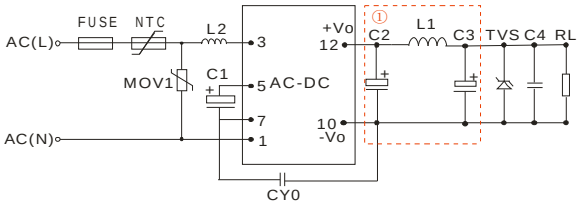
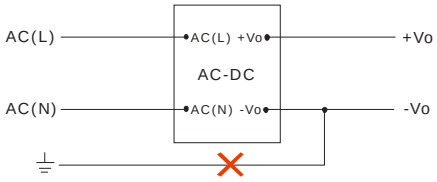


Figure 1: LS03-15BXXSR2(-F) Typical application circuit

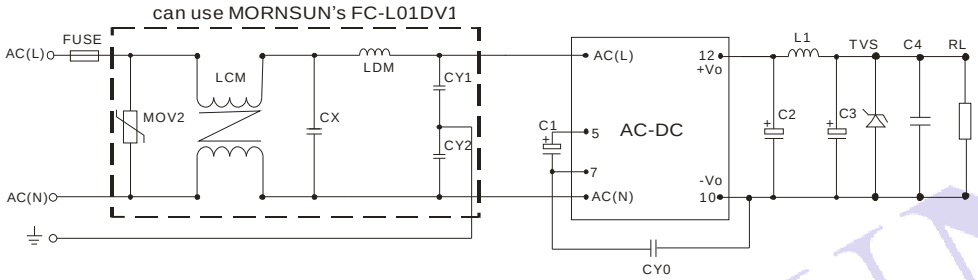
Note: ①is Pi filter circuit.



(Figure 2): This application is not available for this series.

Note: If you have such application, please consult to our FAE department.

EMC RECOMMENDED CIRCUIT



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

EMC RECOMMENDED CIRCUIT PCB LAYOUT

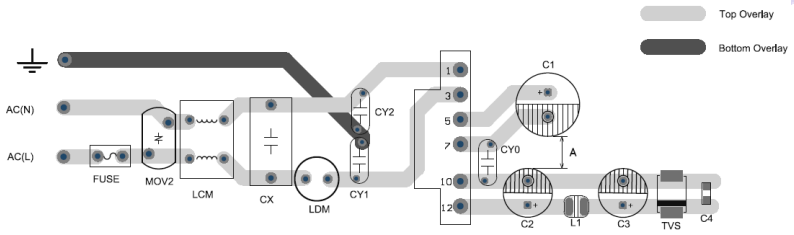


Figure 4: EMC application circuit PCB layout

Safety and recommend wiring: line width ≥3mm, line-line distance≥6mm, line- ground distance≥6mm,A≥6.4mm

EXTERNAL CIRCUIT PARAMETERS									
Model	C1 (Required)	L2	C2 (Required)	L1 (Required)	C3 (Required)	C4	CY0	FUSE (Required)	TVS
LS03-15B03SR2(-F)	22μF/400V	5mH	330μF/25V	2.2μH	120μF/25V	0.1μF/50V	1nF/400 VAC	1A/250V	SMBJ7.0A
LS03-15B05SR2(-F)					68μF/35V				
LS03-15B09SR2(-F)									SMBJ12A
LS03-15B12SR2(-F)			150μF/35V						SMBJ20A
LS03-15B15SR2(-F)									
LS03-15B24SR2(-F)			100μF/35V						SMBJ30A

Note:

1. C1and C3 are electrolytic capacitors. They are required both AC input and DC input.

When AC input,C1 is used as filter capacitor, the value of C1 is recommended to be 22μF /400V.When DC input, C1 is used as EMC filter capacitor, the value of C1 is recommended to be 10μF/400V(when the input voltage is above 370VDC, the recommended value of C1 is 10μF/450V).C2 and C3 are output filer 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 manufactures. 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 manufactures, current derating should be 80% or above. 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.

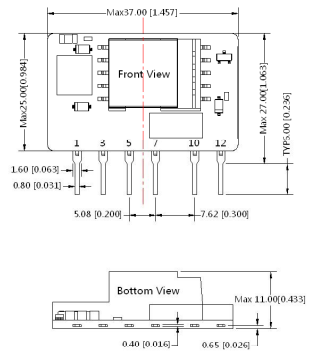
2. For standard EMC requirement, please refer to figure 1.If higher EMC requirement ,please refer to figure 3, recommended parameters are shown in the table below.

Recommend Parameter For Higher EMC Standard Circuit	
Components	Recommend Parameter
MOV2	S10K300
CY1, CY2	1nF/400VAC
CX	0.1μF/275VAC
LCM	3.5mH
LDM	5mH
FC-L01DV1	MORNSUN's 1KV/2KV Surge protector
FUSE	1A/250V, slow blow, it must be connected to FUSE

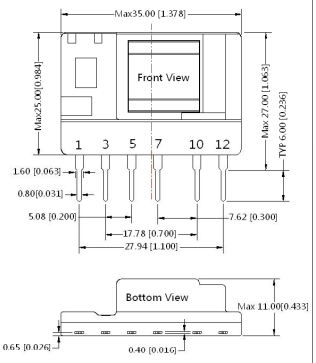
LS03-R2 DIMENSIONS, RECOMMENDED FOOTPRINT&PACKAGING

MECHANICAL DIMENSIONS

LS03-15B03SR2



LS03-other model



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

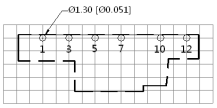
1.It is necessary to add C1 between pin5 and pin7 ;
2.It is necessary to add pi-type filter circuit to the output,such as the typical application of Figure 1.

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

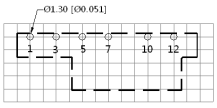
THIRD ANGLE PROJECTION

RECOMMENDED FOOTPRINT DETAILS

LS03-15B03SR2



LS03-other model



Note:Grid 2.54*2.54mm

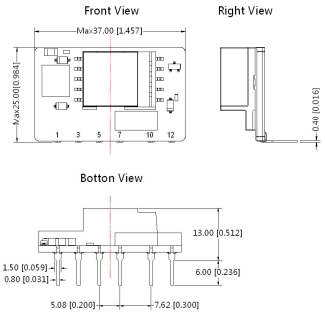
PACKAGE DIAGRAM

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

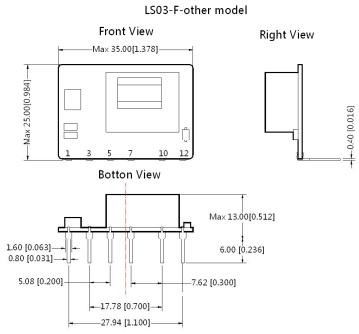
LS03-R2-F DIMENSIONS, RECOMMENDED FOOTPRINT&PACKAGING

MECHANICA DIMENSIONS

LS03-15B03SR2-F



LS03-F-other model



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

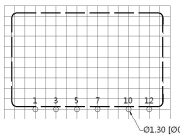
1.It is necessary to add C1 between pin5 and pin7 ;
2.It is necessary to add pi-type filter circuit to the output,such as the typical application of Figure 1.

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

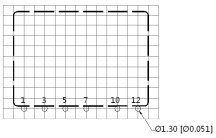
THIRD ANGLE PROJECTION

RECOMMENDED FOOTPRINT DETAILS

LS03-15B03SR2-F

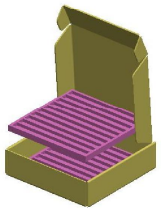


LS03-F-other model



Note:Grid 2.54*2.54mm

PACKAGE DIAGRAM



Note:
Unit :mm[inch]
Inner carton dimensions: L*W*H=365*350*105
Packaging quantity : 360pcs (LS03-15B03SR2-F Packaging quantity : 320pcs)
Outer carton dimensions : L*W*H=390*360*245
Packaging quantity: 720pcs (LS03-15B03SR2-F Packaging quantity : 640pcs)

MORNSUN 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
Fax:86-20-38601272
E-mail: info@mornsun.cn
Http://www.mornsun-power.com