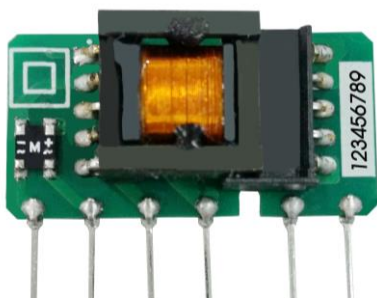


Datasheet

RS Pro LDE20-20Bxx AC/DC Converter

3W, AC-DC converter



Features

- Ultra-wide 85 - 305VAC and 70 - 430VDC input voltage range
- Output short circuit, overcurrent protection
- High efficiency, high power density
- Low power consumption, green power
- Industrial-grade design
- Compact size open frame
- Flexible design of peripheral circuit reduces layout problems
- IEC60950, UL60950, EN60950 safety approved

LS03-15BxxSR2S series has an ultra-wide wide input range accepting either AC or DC voltage, high efficiency, low power consumption and Class II reinforced insulation. All models are suitable for industrial control, electric power, instrumentation and smart home applications. We recommend using external components as shown in design reference for enhanced EMC performance in harsh environmental conditions.

Selection Guide

Certification	RS STOCK NO. (STANDARD PACK)	Part No. *	Output Power	Nominal Output Voltage and Current (Vo/Io)	Efficiency at 230VAC (%) Typ.	Capacitive Load (μ F) Max.
UL/CE/CB	1812108	LS03-15B03SR2S	1.98W	3.3V/600mA	65	820
	1812109	LS03-15B05SR2S	3W	5V/600mA	70	680
	1812110	LS03-15B09SR2S		9V/333mA	73	470
	1812111	LS03-15B12SR2S		12V/250mA	74	470
	1812112	LS03-15B24SR2S		24V/125mA	77	100

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Voltage Range	AC input	85	--	305	VAC
	DC input	70	--	430	VDC
Input frequency		47	--	63	Hz
Input current	115VAC	--	--	0.12	A
	277VAC	--	--	0.06	
Inrush current	115VAC	--	13	--	
	277VAC	--	23	--	
Required External Input Fuse		1A, slow fusing, required			
Hot Plug		Unavailable			

AC/DC Converter

LS03-15BxxSR2S Series

Output Specifications								
Item	Operating Conditions		Min.	Typ.	Max.	Unit		
Output Voltage Accuracy	LS03-15B03SR2S ^①		--	--	±6	%		
	LS03-15B05SR2S ^②		--	--	±5			
	LS03-15B09SR2S ^③		--	--				
	LS03-15B12SR2S ^④		--	--				
	LS03-15B15SR2S		--	--				
	LS03-15B24SR2S		--	--				
Line Regulation	Full load	3.3V	--	±2.5	--	%		
		5V/9V/12V/15V/24V	--	±1.5	--			
Load Regulation	10% - 100% load	3.3V/5V/9V/12V/15V	--	±3.0	--		%	
		24V	--	±6.0	--			
Ripple & Noise ^⑤	20MHz bandwidth (peak-to-peak value)		--	80	150			mV
Temperature Coefficient			--	±0.15	--			%/°C
Stand-by Power Consumption	230VAC input		--	0.15	0.25	W		
Short Circuit Protection	Continuous, self-recovery							
Overcurrent Protection	110 - 500% I _o , self-recovery							
Min. Load			10	--	--	%		

Note: ①②③④ Use solid-state 270μF/16V for output filter capacitor C2 when operating 3.3V/5V/9V/12V models, especially at temperatures in the -20°C to -40°C range.
 ⑤The "parallel cable" method is used for Ripple and noise test, please refer to AC-DC Converter Application Notes for specific information.

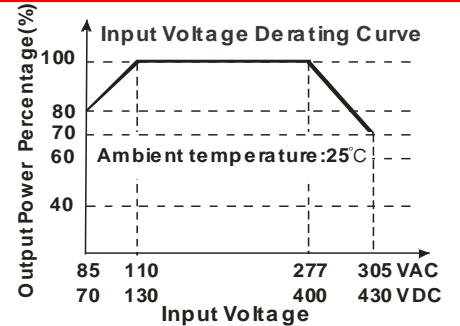
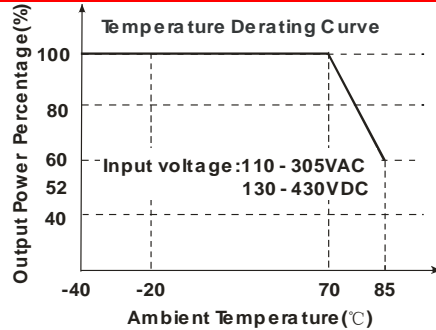
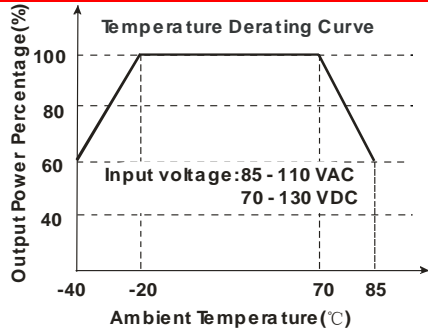
General Specifications						
Item	Operating Conditions		Min.	Typ.	Max.	Unit
Isolation Test	Input-output	Electric Strength Test for 1min.	3000	--	--	VAC
Operating Temperature			-40	--	+85	°C
Storage Temperature			-40	--	+105	
Storage Humidity			--	--	85	%RH
Switching Frequency			--	--	65	kHz
Power Derating	-40°C to -20°C (85 - 110VAC)		2.0	--	--	%/°C
	+70°C to +85°C		2.67	--	--	
Safety Standard			IEC60950/EN60950/UL60950			
Safety Certification			IEC60950/EN60950/UL60950			
Safety Class			CLASS II			
MTBF	MIL-HDBK-217F@25°C		>300,000 h			

Mechanical Specifications	
Casing Material	35.00 x 18.00 x 11.00 mm
Weight	6g (Typ.)
Cooling method	Free air convection

Electromagnetic Compatibility (EMC)

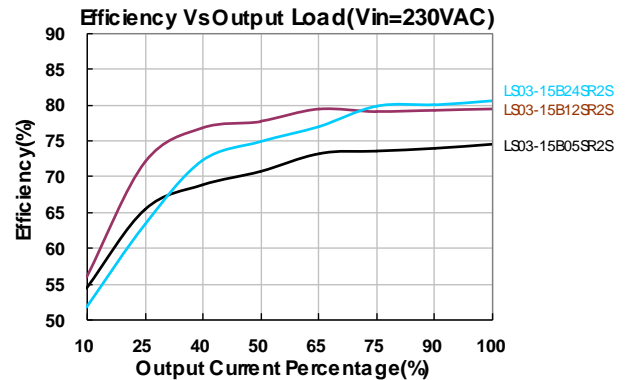
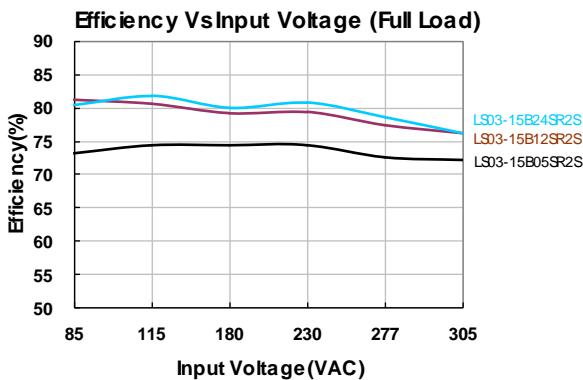
Emissions	CE	CISPR32/EN55032	CLASS A (See Fig. 1 for typical application)	
		CISPR32/EN55032	CLASS B (See Fig. 2 for recommended circuit)	
	RE	CISPR32/EN55032	CLASS A (See Fig. 1 for typical application)	
		CISPR32/EN55032	CLASS B (See Fig. 2 for recommended circuit)	
Immunity	ESD	IEC/EN61000-4-2	Contact $\pm 4\text{kV}$	Perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m (See Fig. 2 for recommended circuit)	perf. Criteria A
	EFT	IEC/EN61000-4-4	$\pm 2\text{kV}$ (See Fig. 1 for typical application)	perf. Criteria B
		IEC/EN61000-4-4	$\pm 4\text{kV}$ (See Fig. 2 for recommended circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5	line to line $\pm 1\text{kV}$ (See Fig. 1 for typical application)	perf. Criteria B
		IEC/EN61000-4-5	line to line $\pm 1\text{kV}$ /line to ground $\pm 2\text{kV}$ (See Fig. 2 for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6	10Vr.m.s (See Fig. 2 for recommended circuit)	perf. Criteria A
Voltage dips, short interruptions and voltage variations		IEC/EN61000-4-11	0%, 70% (See Fig. 2 for recommended circuit)	perf. Criteria B

Product Characteristic Curve



Note:

- ① With an AC input between 85 - 110VAC/277 - 305VAC and a DC input between 70 - 130VDC/400 - 430VDC, the output power must be derated as per temperature derating curves;
- ② This product is suitable for applications using natural air cooling.



Design Reference

1. Typical application circuit

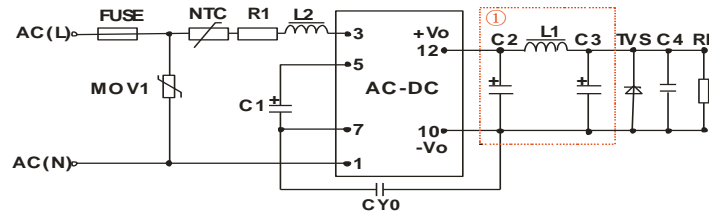


Fig. 1: Typical circuit diagram
Note: ① is a Pi filter circuit.

Model	FUSE (necessary)	C1 (necessary)	L2	NTC	C2 (necessary)	L1 (necessary)	C3 (necessary)	C4	CY0	TVS
LS03-15B03SR2S	1A/ 300V	10 μ F/450V (-20 $^{\circ}$ C to +85 $^{\circ}$ C) 22 μ F/450V (-40 $^{\circ}$ C to +85 $^{\circ}$ C)	4.7mH	13D-5	270 μ F/ 16V (Solid Capacitor)	4.7 μ H	120 μ F/25V	0.1 μ F/50V	1nF/400VAC	SMBJ7.0A
LS03-15B05SR2S							SMBJ12A			
LS03-15B09SR2S							SMBJ20A			
LS03-15B12SR2S							SMBJ30A			
LS03-15B24SR2S					220 μ F/ 35V					

Note:
 C1: C1 is used as filter capacitor with AC input and as EMC filter capacitor with DC input;
 R1: R1 is a 12 Ω /2W current limiting resistance;
 An external input NTC (13D-5) is recommended for inrush current limitation and an external MOV (S14K350) for transient suppression.
 Output filter: We recommend using an electrolytic capacitor with high frequency, high ripple current and low ESR rating for C2 and C3 (refer to manufacture's datasheet). Combined with L1, they form a pi-type filter circuit. Choose a **Capacitor voltage rating with at least 20% margin, in other words not exceeding 80%**. C4 is a ceramic capacitor, used for filtering high frequency noise. A suppressor diode (TVS) is a recommended to protect the application in case of a converter failure.

2. EMC solution-recommended circuit

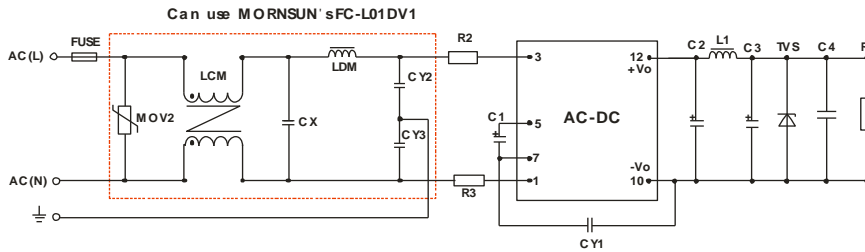


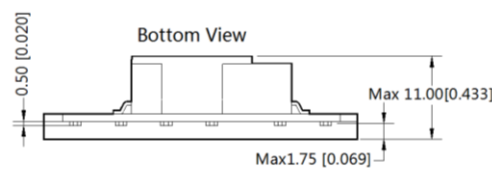
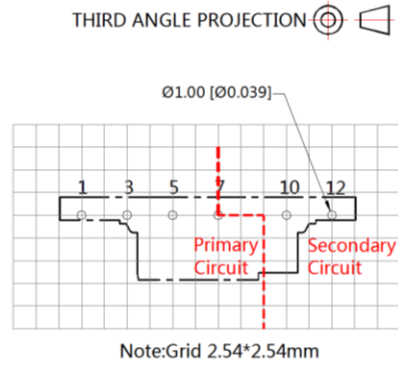
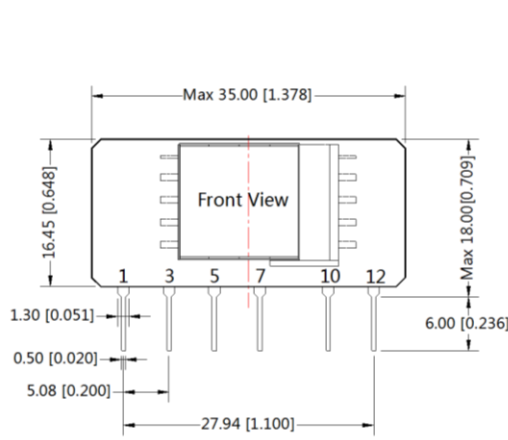
Fig 2

Components	Recommend Parameter
MOV2	S14K350
CY1	2.2nF/400VAC
CY2/CY3	1nF/400VAC
CX	0.1 μ F/310VAC
LCM	3.50mH
LDM	0.33mH
R2/R3	12 Ω /2W
FUSE (required)	1A/300V, slow-blow fuse
Can use MORNSUN's FC-L01DV1 EMC model	

AC/DC Converter

LS03-15BxxSR2S Series

LS03-15BxxSR2S Dimensions and Recommended Layout



Pin-Out	
Pin	Function
1	AC (N)
3	AC (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: $\pm 0.50[\pm 0.020]$
 The layout of the device is for reference only , please refer to the actual product

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 ≥ 6.4 mm for safety between external componets in primary circuit and secondary circuit.

- Note:
- External electrolytic capacitors are required to modules, more details refer to typical applications.
 - This part is open frame, at least 6.4mm safety distance between the primary and secondary external components of the module is needed to meet the safety requirement.
 - Unless otherwise specified, parameters in this datasheet were measured under the conditions of $T_a=25^\circ\text{C}$, humidity $<75\%$, nominal input voltage (115V and 230V) and rated output load;
 - Audio noise maybe heard when the unit is operating with light load, this does not affect the product's reliability or performance.
 - All index testing methods in this datasheet are based on our Company's corporate standards.
 - Products are related to laws and regulations: see "Features" and "EMC";
 - Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units;
 - It is only suitable for safe use in areas under 2000m above sea level.