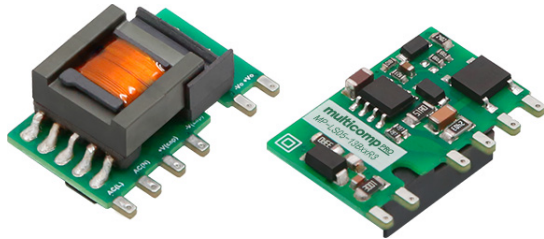


5W DIY AC to DC Converter - PCB Mount

multicomp PRO

5W, AC-DC converter



**RoHS
Compliant**

Features

- Ultra-wide 85 - 305VAC and 70 - 430VDC input voltage range
- Accepts AC or DC input (dual-use of same terminal)
- Operating ambient temperature range -40°C to +85°C
- Multi application, flexible layout
- Compact size, high power density, green power
- Controllable life and adjustable cost
- No-load power consumption 0.1W
- Output short circuit, over-current protection
- Designed to meet IEC/EN61558, IEC/EN60335 standards
- IEC/EN/UL62368 safety approval

Description

MP-LS05-13BxxR3 series is one of highly efficient green power AC-DC Converter series. They feature wide input range accepting either AC or DC voltage, high efficiency, low power consumption and reinforced isolation. All models are particularly suitable for industrial control, electric power, instrumentation and smart home applications which have high requirement for dimension and don't have high requirement on EMC. For extremely harsh EMC environment, we recommend using the application circuit show in Design Reference of this datasheet.

Selection Guide

Part Number	Output Power	Nominal Output Voltage and Current	Efficiency at 230V AC (%) Typ.	Capacitive Load (µF) Max.
MP-LS05-13B03R3	3.3W	3.3V/1000mA	69	2200
MP-LS05-13B05R3	5W	5V/1000mA	76	1500
MP-LS05-13B09R3		9V/560mA	77	680
MP-LS05-13B12R3		12V/420mA	79	470
MP-LS05-13B24R3		24V/210mA	81	100

Note: 1. The nominal output voltage refers to the voltage applied to the load terminal after adding external circuits.
2. If the product is used in a severe vibration application, it needs to be glued and fixed.

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Voltage Range	AC input	85	-	305	V AC
	DC input	70		430	V DC
Input Frequency		47			63
Input Current	115V AC	-		0.2	A
	230V AC			0.1	
Inrush Current	115V AC		20	--	
	230V AC		40	--	
Recommended External Input Fuse		1A, slow-blow, required (The actual use needs to be selected according to the application environment)			
Hot Plug		Unavailable			

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Output Specifications					
Item	Operating Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy	10% - 100% load	--	±5	-	%
Line Regulation	Rated load	--	±1.5	-	
Load Regulation	0%-100% load	--	±3	-	
Ripple & Noise*	20MHz bandwidth (peak-to-peak value) 10% - 100% load	--	80	150	mV
Temperature Coefficient		--	±0.15	--	%/°C
Stand-by Power Consumption	230V AC	--	0.1	0.15	W
Short-circuit Protection		Hiccup, continuous, self-recovery			
Over-current Protection		≥110%Io, self-recovery			
Minimum Load		10	-	-	%

Note: 1. * The "parallel cable" method is used for ripple and noise test, please refer to AC-DC Converter Application Notes for specific information;
2. The product is able to work with 0%-10% load and with stable output.

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Isolation	Input-Output	Electric Strength Test for 1min, leakage current <5mA	3000	-	-	V AC
Operating Temperature		-40	-	+85	°C	
Storage Temperature			-	+105		
Storage Humidity		-	-	95	%RH	
Power Derating	-55°C to +85°C	1.67	-	-	% / °C	
	85V AC to 100V AC	1.33	-	-		
	277V AC to 305V AC	0.72	-	-	% / V AC	
Safety Standard		IEC/EN/UL62368, IEC/EN60335, IEC/EN61558				
Safety Certification		IEC/EN/UL62368				
Safety Class		CLASS II				
MTBF		MIL-HDBK-217F@25°C 1000,000 h				

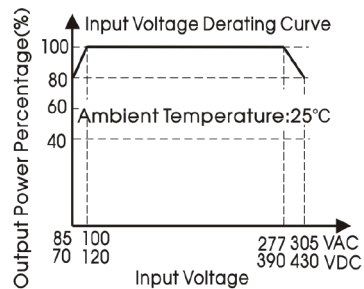
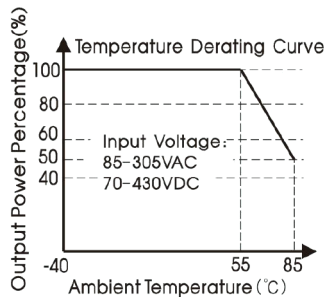
Mechanical Specifications	
Case Material	26.4mm × 14.73mm × 11mm
Weight	DIP package 5.2g (Typ.)
Cooling Method	Free air convection

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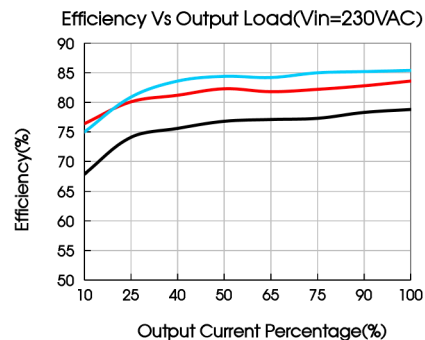
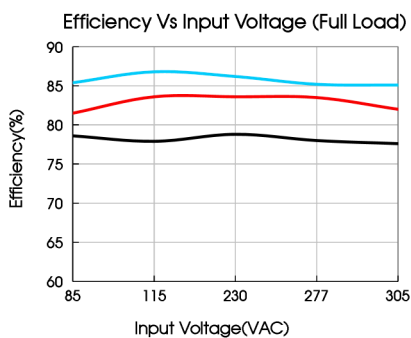
Electromagnetic Compatibility (EMC)				
Emissions	CE	CISPR32/EN55032	CLASS A (Application circuit 1, 4)	
		CISPR32/EN55032	CLASS B (Application circuit 2, 3)	
	RE	CISPR32/EN55032	CLASS A (Application circuit 1, 4)	
		CISPR32/EN55032	CLASS B (Application circuit 2, 3)	
Immunity	ESD	IEC/EN61000-4-2	Contact $\pm 6\text{KV}$ / Air $\pm 8\text{KV}$	perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4	$\pm 2\text{KV}$ (Application circuit 1, 2)	perf. Criteria B
		IEC/EN61000-4-4	$\pm 4\text{KV}$ (Application circuit 3, 4)	perf. Criteria B
	Surge	IEC/EN61000-4-5	line to line $\pm 1\text{KV}$ (Application circuit 1, 2)	perf. Criteria B
		IEC/EN61000-4-5	line to line $\pm 2\text{KV}$ (Application circuit 3, 4)	perf. Criteria B
	CS	IEC/EN61000-4-6	10Vr.m.s	perf. Criteria A
Voltage dip, short interruption and voltage variation	IEC/EN61000-4-11	0%, 70%	perf. Criteria B	

Product Characteristic Curve



Note:

- 1 With an AC input between 85 -100V AC/277- 305V AC and a DC input between 70 - 120V DC/390 - 430V DC, the output power must be derated as per temperature derating curves;
- 2 This product is suitable for applications using natural air cooling; for applications in closed environment please consult factory or one of our FAE.

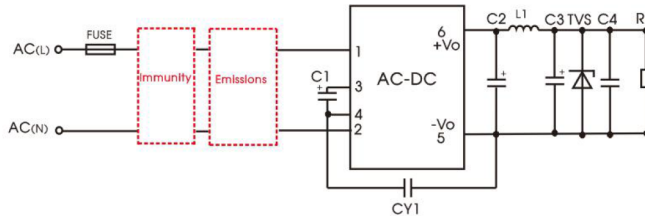


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Additional Circuits Design Reference



LS series additional circuits design reference

Part Number	C1(required)	C2 (required)	L1 (required)	C3 (required)	C4	CY1 (required)	TVS
MP-LS05-13B03R3	10 μ F/450V (-25°C to +85°C, 85-305VAC input; -40°C to +85°C, 165-305VAC input) 22 μ F/450V (-40°C to +85°C, 85-305VAC input)	820 μ F/6.3V (solid-state capacitor)	4.7uH/60m Ω /2.2A	100 μ F/35V	0.1 μ F/ 50V	1.0nF/ 400VAC	SMBJ7A
MP-LS05-13B05R3		470 μ F/16V (solid-state capacitor)					47 μ F/35V
MP-LS05-13B09R3				SMBJ20A			
MP-LS05-13B12R3		SMBJ30A					
MP-LS05-13B24R3							

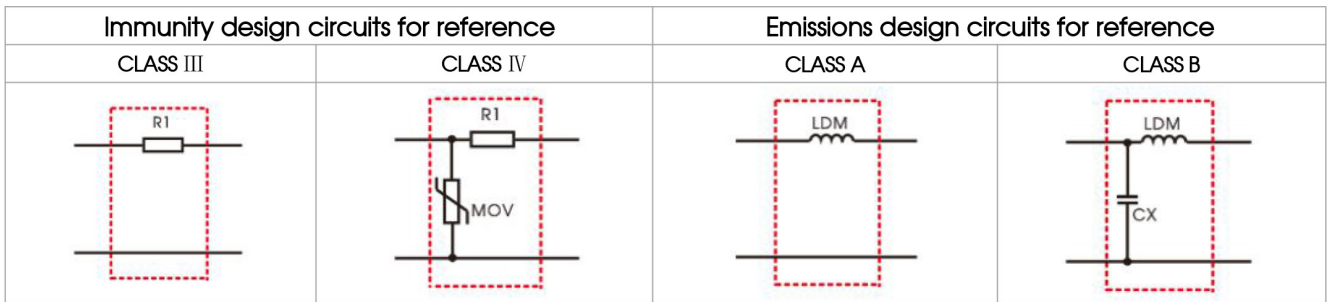
Note:

- C1 is used as filter capacitor with AC input (must be connected externally) and as EMC filter capacitor with DC input (must be connected), and it is recommended to use the capacitor with ripple current >200mA@100KHz. If C1 capacity is more than 22 μ F, can not connect current limiting resistor R1(R1 is EMS protective circuit device, see application circuit).
- We recommend using an electrolytic capacitor with high frequency and low ESR rating for C3 (refer to manufacture's datasheet), electrolytic capacitor can be used for C2 when applied in normal and high temperature environments. Combined with C2, 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 recommended to protect the application in case of converter failure and specification should be 1.2 times of the output voltage.

Environmental Application EMC Solution

LS series environmental application EMC solution selection table						
Recommended circuit	Application environmental	Typical industry	Input voltage range	Environment temperature	Emissions	Immunity
1	Basic application	None	85V AC to 305V AC	-40°C to +85°C	CLASS A	CLASS III
2	Indoor civil environment	Smart home/Home appliances (2Y)		-25°C to +55°C	CLASS B	CLASS III
	Indoor general environment	Intelligent building/Intelligent agriculture		-25°C to +55°C	CLASS B	CLASS IV
3	Indoor industrial environment	Manufacturing workshop		-40°C to +85°C	CLASS A	CLASS IV
4	Outdoor general environment	ITS/Video monitoring/Charging point/Communication/Security and protection				

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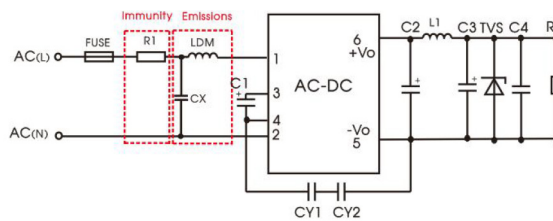
Electromagnetic Compatibility Solution--Recommended Circuit

1. Application circuit 1—Basic application

Application environmental	Ambient temperature range	Immunity CLASS	Emissions CLASS
Basic application	-40°C to +85°C	CLASS III	CLASS A

FUSE (required)	1A/300V, slow-blow
R1 (required)	12Ω/3W
LDM	4.7mH/Max: 15Ω/Min: 0.2A

2. Application circuit 2—Indoor civil /Universal system recommended circuits for general environment



Recommended circuit 2

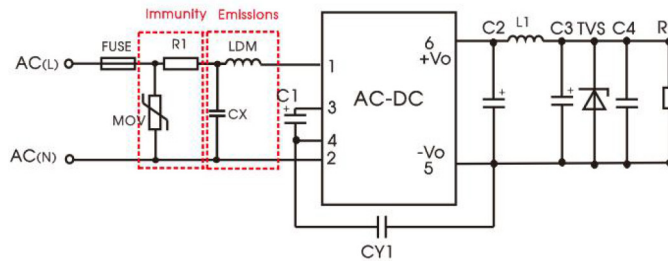
Application environmental	Ambient temperature range	Immunity CLASS	Emissions CLASS
Indoor civil /general	-25°C to +55°C	CLASS III	CLASS B

Component	Recommended value
R1 (required)	12Ω/3W
LDM	1.2mH/Max: 4.0Ω/Min: 0.2A
FUSE (required)	1A/300V, slow-blow

Note 1: In the home appliance application environment, the two Y capacitors of the primary and secondary need to be externally connected (CY1/CY2, value at 2.2nF/250VAC), which can meet the EN60335 certification.
 Note 2: According to the certification requirements, the X capacitor needs to be connected in parallel with the bleeder resistance, the recommended resistance value is less than 3.8MΩ, and the actual need to be selected according to the certification standard.

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3. Application circuit 3—Universal system recommended circuits for indoor industrial environment



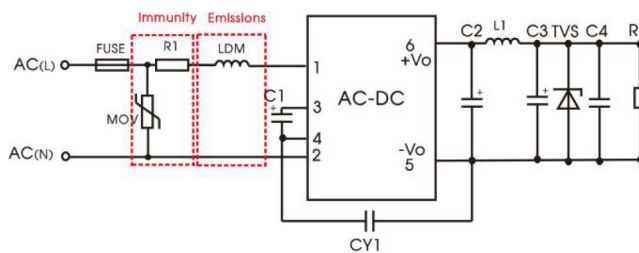
Recommended circuit 3

Application environmental	Ambient temperature range	Immunity CLASS	Emissions CLASS
Indoor industrial	-25°C to +55°C	CLASS IV	CLASS B

Component	Recommended value
MOV	S14K350
CX	0.1μF/310VAC
LDM	1.2mH/Max: 4.0Ω/Min: 0.2A
R1 (required)	12Ω/3W
FUSE (required)	2A/300V, slow-blow

Note: According to the certification requirements, the X capacitor needs to be connected in parallel with the bleeder resistance, the recommended resistance value is less than 3.8MΩ, and the actual need to be selected according to the certification standard.

4. Application circuit 4—Universal system recommended circuits for outdoor general environment



Recommended circuit 4

Application environmental	Ambient temperature range	Immunity CLASS	Emissions CLASS
Outdoor general environment	-40°C to +85°C	CLASS IV	CLASS A

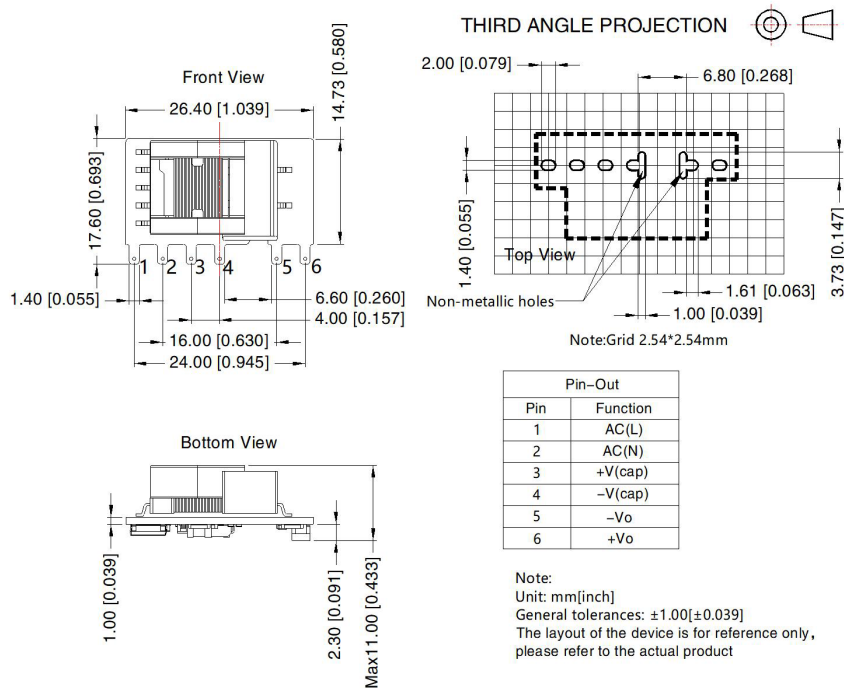
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Component	Recommended value
MOV	S14K350
LDM	4.7mH/Max: 15Ω/Min: 0.2A
R1 (required)	12Ω/2W
FUSE (required)	2A/300V, slow-blow

Dimensions and Recommended Layout

MP-LS05-13BxxR3 series dimensions



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