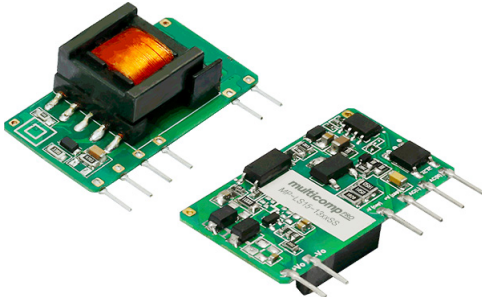


# 15W AC to DC Converter - PCB Mount

**multicomp** PRO

15W, AC-DC converter

**RoHS  
Compliant**



## Features

- Universal 85-305VAC or 100-430VDC input voltage
- Accepts AC or DC input(dual-use of same terminal)
- Operating ambient temperature range: -40°C to +85°C
- Small size, high power density
- Low power consumption, green power
- Output short circuit, over-current, over-voltage protection
- Regulated output, low ripple & noise
- Design to meet IEC/EN60335 standards
- IEC/EN/UL62368 safety approval



## Description

MP-LS15-13BxxSS series is one of highly efficient green power AC-DC Converter series. They feature ultra-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-LS15-13B03SS	9.9W	3.3V/3000mA	75	2000
MP-LS15-13B05SS	14W	5V/2800mA	77	15000
MP-LS15-13B09SS	15W	9V/1670mA	82	5000
MP-LS15-13B12SS		12V/1250mA	82	4000
MP-LS15-13B24SS		24V/625mA	85	1000

Note: 1 \*Due to different rectification methods, the layout of 3.3V/5V/9V and 12V/24V output terminals is different.  
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	100		430	V DC	
Input Frequency		47			63	Hz
Input Current	115V AC	-		0.2	A	
	230V AC			0.1		
Inrush Current	115V AC			20		--
	230V AC			40		--
Leakage Current	277VAC/50Hz	0.25mA RMS Max.				
Recommended External Input Fuse		1A/300V, slow-blow, required				
Hot Plug		Unavailable				

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Output Specifications					
Item	Operating Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy	3.3V output	--	±3	-	%
	Other output	--	±2	-	
Linear Regulation	Full load	--	±0.5	-	
Load Regulation	0%-100% load	3.3VDC output	--	±2	-
		5VDC output		±1.5	
		Other output		±1	
Ripple & Noise*	20MHz bandwidth (peak-to-peak value)	--	80	150	mV
Stand-by Power Consumption	230V AC	--	0.1	0.25	W
Temperature Coefficient		--	±0.02	-	%/°C
Short-circuit Protection		Hiccup, continuous, self-recovery			
Over-current Protection		≥110%Io, self-recovery			
Over-voltage Protection	3.3/5V DC output	≤9VDC (Output voltage hiccup or clamp)			
	9V DC output	≤12VDC (Output voltage hiccup or clamp)			
	12V DC output	≤16VDC (Output voltage hiccup or clamp)			
	24V DC output	≤30VDC (Output voltage hiccup or clamp)			
Minimum Load		0	-	-	%
Hold-up Time	115V AC input	-	5	-	ms
	230V AC input	-	50	-	

**Notes:** \*The "Tip and barrel method" is used for ripple and noise test, output parallel 10uF electrolytic capacitor and 1uF ceramic capacitor, please refer to AC-DC Converter Application Notes for specific information.

## General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation	Input-Output	Electric Strength Test for 1min, leakage current <5mA			V AC
Operating Temperature		-40	-	+85	°C
Storage Temperature			-	+105	
Storage Humidity		-	-	95	%RH
Soldering Temperature	Wave-soldering	260 ± 5°C; time: 5 - 10s			
	Manual-welding	360 ± 10°C; time: 3 - 5s			
Switching Frequency		--	65	--	kHz
Power Derating	40°C to -25°C	4			%/°C
	-55°C to +70°C	3.34	-	-	
	+70°C to +85°C	2.67			
	85V AC to 100V AC	1.67	-	-	
	277V AC to 305V AC	0.72	-	-	%/V AC
Safety Standard		IEC/EN/UL62368, IEC/EN60335			
Safety Certification		IEC/EN/UL62368			
Safety Class		CLASS II			
MTBF		MIL-HDBK-217F@25°C > 1000,000 h			

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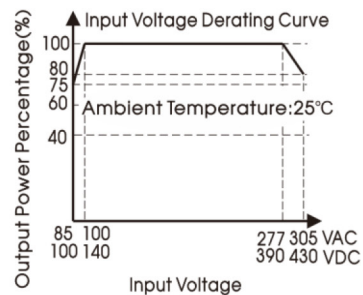
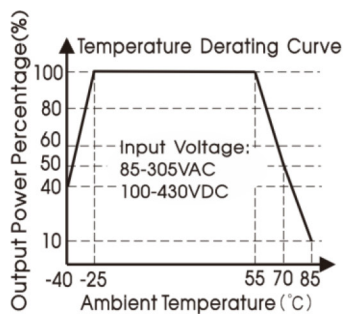
## Mechanical Specifications

Dimension	44.5mm × 24mm × 15mm
Weight	11g (Typ.)
Cooling Method	Free air convection

## Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032	CLASS A (Recommended circuit 1, 4)	
		CISPR32/EN55032	CLASS B (Recommended circuit 2, 3)	
	RE	CISPR32/EN55032	CLASS A (Recommended circuit 1, 4)	
		CISPR32/EN55032	CLASS B (Recommended circuit 2, 3)	
Immunity	ESD	IEC/EN61000-4-2	Contact ±6KV	perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4	±2KV (Recommended circuit 1, 2)	perf. Criteria B
		IEC/EN61000-4-4	±4KV (Recommended circuit 3, 4)	perf. Criteria B
	Surge	IEC/EN61000-4-5	line to line ±1KV (Recommended circuit 1, 2)	perf. Criteria B
		IEC/EN61000-4-5	line to line±2KV (Recommended 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



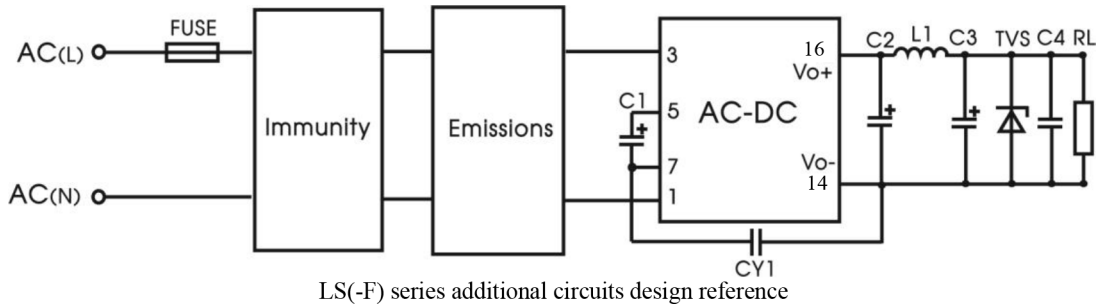
Note:1 With an AC input between 85-100V/277-305VAC and a DC input between 100-140V/390-430VDC, the output power must be derated as per temperature derating curves;

2 This product is suitable for applications using natural air cooling; for applications in closed environment please consult factory or one of our FAE.

# 15W AC to DC Converter - PCB Mount



## Additional Circuits Design Reference



Part Number	FUSE(required)	C1 (required)	C2 (required)	L1 (required)	C3 (required)	C4	CY1 (required)	TVS
MP-LS15-13B03SS	1A/300V	33 $\mu$ F/450V	470 $\mu$ F/ 16V (solid-state capacitor)	2.2 $\mu$ H (Max 22m $\Omega$ )	220 $\mu$ F/16V	0.1 $\mu$ F/ 50V	2.2nF/ 400V AC	SMBJ7A
MP-LS15-13B05SS								SMBJ12A
MP-LS15-13B09SS								SMBJ20A
MP-LS15-13B12SS			SMBJ30A					
MP-LS15-13B24SS			470 $\mu$ F/35V		220 $\mu$ F/35V			

Note:

- 1.C1: input capacitors, C2: output storage capacitors, they must be connected externally.
2. We recommend using an electrolytic capacitor with high frequency and low ESR rating for C3 (refer to manufacture's datasheet). 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.
3. The distance of the original secondary side isolation belt is greater than 6.4mm to meet the safety requirements. In the layout of the periphery, it is also necessary to pay attention to the creepage distance greater than 6.4mm, and the electrical clearance greater than 4.0mm can meet the certification together with the periphery.

## 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				

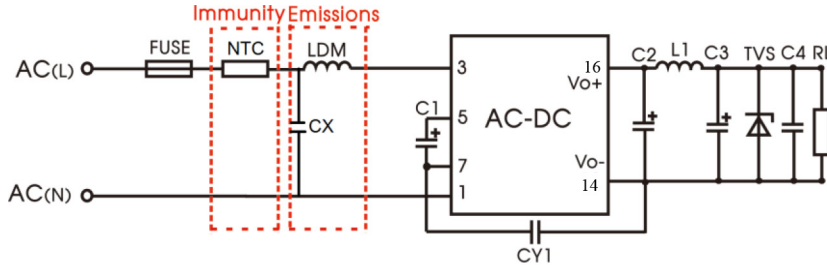
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# 15W AC to DC Converter - PCB Mount

## Electromagnetic Compatibility Solution--Recommended Circuit

### 1. Application circuit 1—Basic application

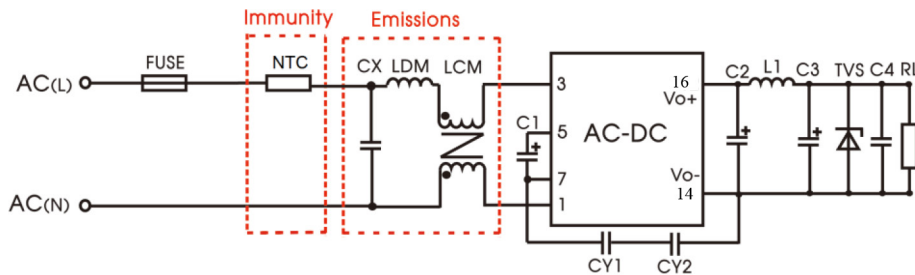


recommended circuit 1

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

Component	Recommended value
NTC	10D-10
LDM	1.2mH (MIN: 0.4A, MAX: 4Ω)
CX	0.1μF/310V AC
FUSE(required)	1A/300V, slow-blow

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



Recommended circuit 2

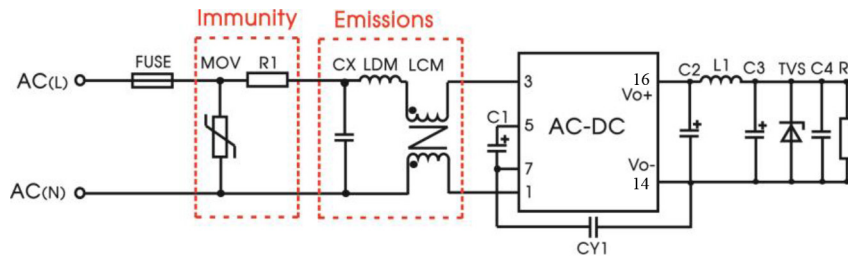
Application environmental	Ambient temperature range	Immunity CLASS	Emissions CLASS
Indoor civil /general	-25°C to +55°C	CLASS III	CLASS B

Component	Recommended value
NTC	10D-10
CY1(CY2)	2.2nF/400V AC
LCM	10mH (MIN: 0.4A, MAX: 600mΩ)
LDM	0.33mH (MIN: 0.4A, MAX: 1Ω)
CX	0.22μF/310V AC
FUSE(required)	1A/300V, slow-blow

Note: 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/400VAC), which can meet the EN60335 certification. In other industries, only one Y capacitor is needed.

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

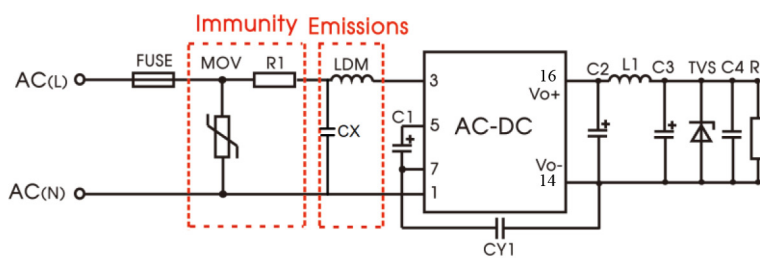


Recommended circuit 3

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
CY1	2.2nF/400V AC
CX	0.22µF/310V AC
LCM	10mH (MIN: 0.4A, MAX: 600mΩ)
LDM	0.33mH (MIN: 0.4A, MAX: 1Ω)
R1	12Ω/3W
FUSE (required)	2A/300V, slow-blow

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



Recommended circuit 4

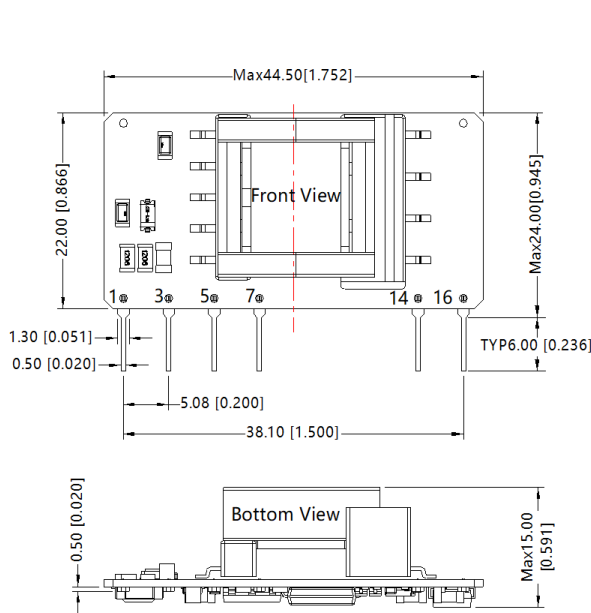
Application environmental	Ambient temperature range	Immunity CLASS	Emissions CLASS
Outdoor general environment	-40°C to +85°C	CLASS IV	CLASS A

# 15W AC to DC Converter - PCB Mount

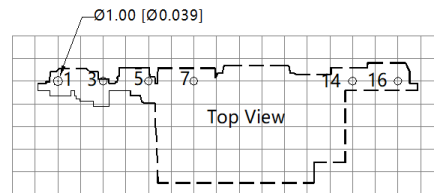


Component	Recommended value
MOV	S14K350
LDM	1.2mH (MIN: 0.4A, MAX: 4Ω)
CX	0.1μF/310V AC
R1	12Ω/3W
FUSE (required)	2A/300V, slow-blow

## Dimensions and Recommended Layout



THIRD ANGLE PROJECTION



Note: Grid 2.54\*2.54mm

Pin-Out	
Pin	Function
1	AC(N)
3	AC(L)
5	+V(cap)
7	-V(cap)
14	-Vo
16	+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 pin 5 and pin 7.
2. It is necessary to add Pi circuits to the output, such as the recommended circuit 1.
3. The distance of the primary and secondary isolation area > 6.4mm to meet the safety requirements. The whole layout including additional circuits meet safety requirements with conditions of the creepage distance > 6.4mm and the electrical clearance > 4mm.

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