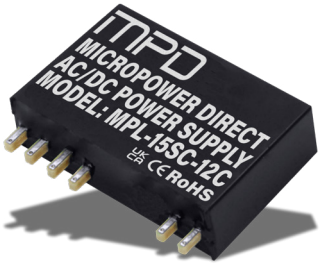
MPL-15SC-C

15W, Compact, High Isolation AC/DC Power Supplies



Key Features:

- 15W Output Power
- 85-305 VAC Input
- 4,000 VAC Isolation
- Compact Size
- Efficiency to 84%
- -40°C to +85°C Temp
- Meets EN 55032 B
- >1,000 kHour MBTF
- Reinforced Insulation

Electrical Specifications

Specifications typical @ +25°C, nominal input voltage & rated output current, unless otherwise noted. Specifications subject to change without notice.

Input

Parameter	Conditions	Min.	Typ.	Max.	Units
Input Voltage Range	AC Input	85		305	VAC
	DC Input	100		430	VDC
Input Frequency		47		63	Hz
Input Current	115 VAC			0.4	A
	230 VAC			0.25	
Inrush Current (Cold Start)	115 VAC		20		A
	230 VAC		35		
Recommended External Input Fuse	Select based on application		1A, Slow-Blow, Required		

Output

Parameter	Conditions		Min.	Typ.	Max.	Units
Output Voltage Accuracy	10 - 100% load			±5		%
Line Regulation	At rated load	3.3V Output		±2.5		%
		Other Outputs		±1.5		
Load Regulation	10 - 100% load			±3		%
Ripple & Noise (20 MHz) - See Note 1				80	150	mV P-P
Standby Power Consumption	230 VAC			0.10	0.25	W
Hold-Up Time	115 VAC			8		ms
	230 VAC			40		
Temperature Coefficient				±0.15		%/°C
Power Derating	+55°C to +85°C	3.3/5/9/24V	1.67			%/°C
	+55°C to +85°C	12V	2.0			
	+50°C to +85°C	15V	1.72			
Over Load Protection					110	%Io
Short Circuit Protection	Hiccup Mode (Autorecovery)					

General

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation Voltage	See Note 3	4,000			VAC
Isolation Resistance	500VDC	100			MΩ

EMI Characteristics

Parameter	Standard	Criteria	Level
Radiated Emissions, See Page 4	CISPR32/EN 55032		Class B
Conducted Emissions	CISPR32/EN 55032		Class B

Environmental

Parameter	Conditions	Min.	Typ.	Max.	Units
Operating Temperature Range	Ambient	-40		+85	°C
Storage Temperature Range		-40		+105	°C
Cooling	Free Air Convection				
Storage Humidity	Non-condensing			95	%RH

Physical

Case Size	1.31 x 0.85 x 0.38 in. (See Mechanical Drawing on Page 8)
Case Material	Flame Retardent, Non-Conductive, Black Plastic (UL94-V0)
Weight	0.49 oz (14g) (See Mechanical Drawing on Page 8)

Reliability Specifications

Parameter	Conditions	Min.	Typ.	Max.	Units
MTBF	MIL HDBK 217F, 25°C, Gnd Benign		1.0		MHours
Lead Temperature	Wave, 5 - 10s			260	°C
	Manual, 3 - 5s			360	

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MICROPOWER DIRECT

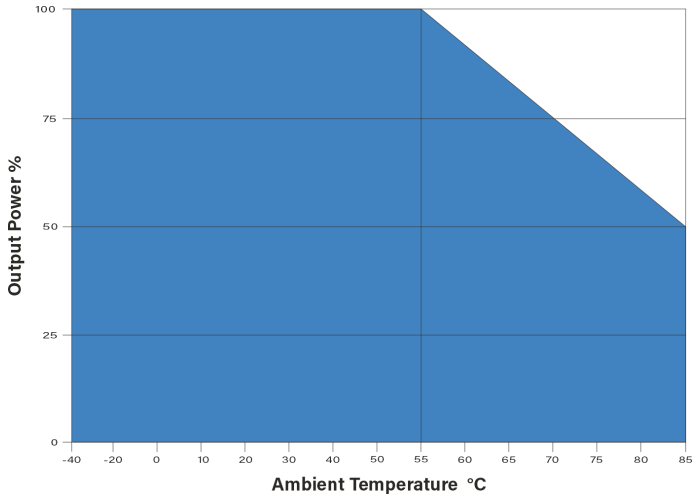
Model Selection Guide

Model Number	Input Current (mA)		Output Voltage (VDC)	Output Current (mA, Max)	Output Power (W)	Output Capacitive Load (μF Max)	Efficiency (%, Typ)
	115 VAC	230 VAC					
MPL-15SC-03C	400	250	3.3	3000	9.9	15000	78
MPL-15SC-05C	400	250	5	3000	15	15000	81
MPL-15SC-09C	400	250	9	1670	15	5000	84
MPL-15SC-12C	400	250	12	1250	15	4000	84
MPL-15SC-15C	400	250	15	1000	15	1500	84
MPL-15SC-24C	400	250	24	625	15	680	84

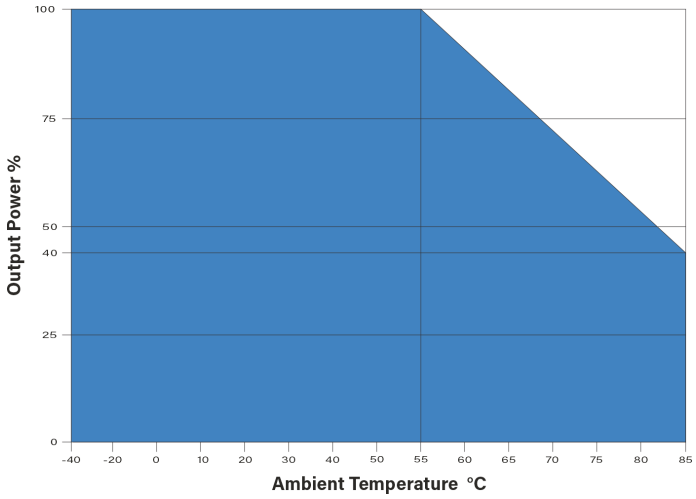
Notes:

1. The “parallel cable method” is used for ripple and noise test, output parallel 10uF electrolytic capacitor and 1uF ceramic capacitor.
2. Output short circuit protection is provided by a "hiccup mode" circuit. The unit recovers automatically when the fault condition is removed.
3. Input-output isolation is tested for 60 seconds with a leakage current of <5 mA.
4. Lead temperature is specified for 5 to 10 seconds for wave soldering with a tolerance of ±5 ºC. For manual soldering it is specified for 3 to 5 seconds with a tolerance of ±10 ºC.
5. For the **MPL-15SC-C** series, an external input fuse is required. A 1A slow blow is recommended, however, the actual application environment may require a different value. See the recommended values on pages 3-7.

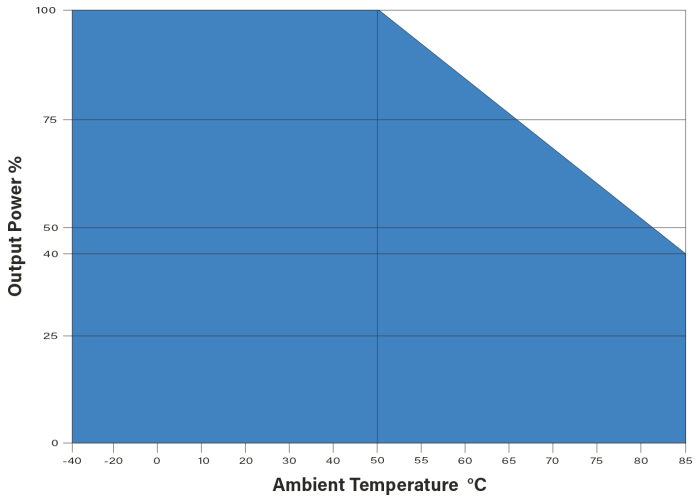
Temperature Derating: 3.3, 5, 9, 24V



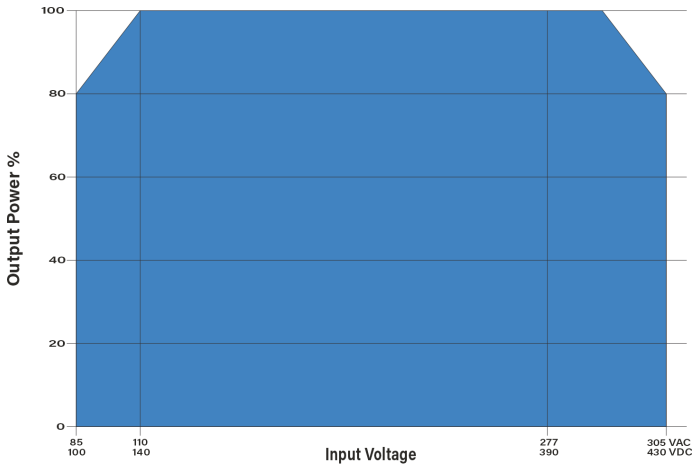
Temperature Derating: 12V



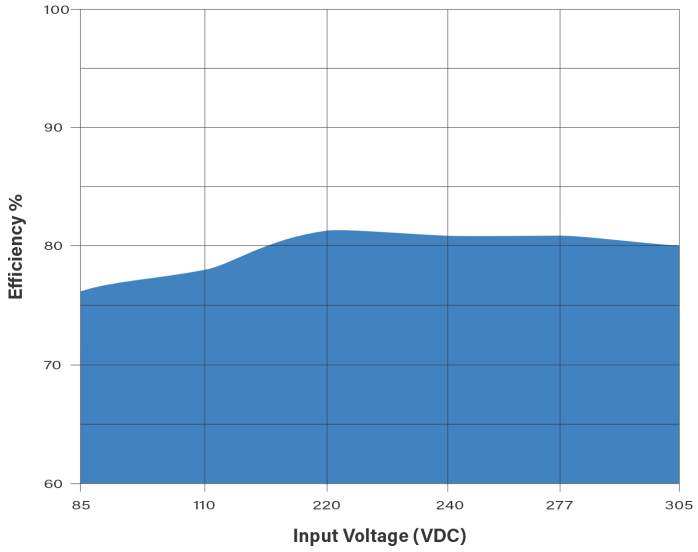
Temperature Derating: 15V



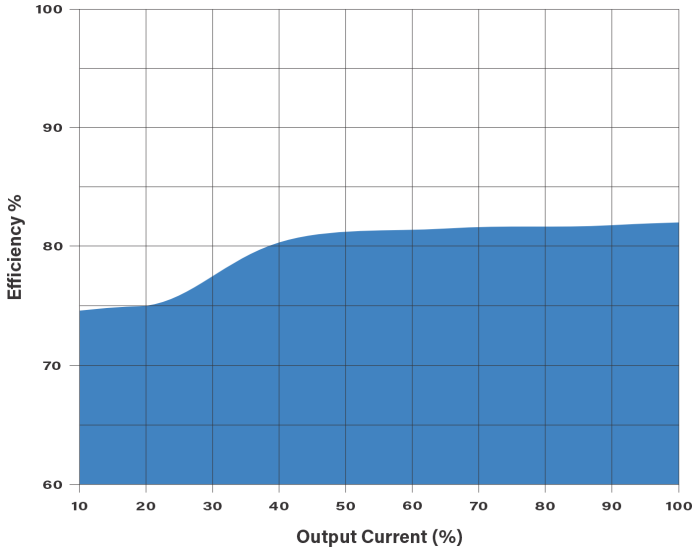
Input Voltage Derating



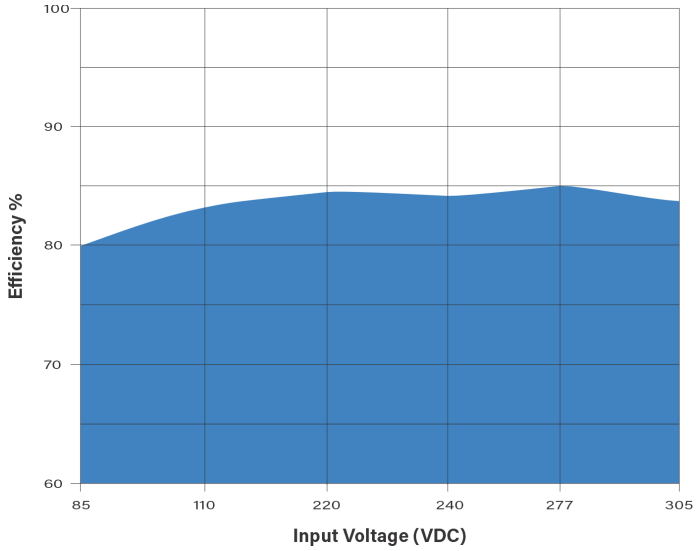
Efficiency vs Input Voltage: 5V



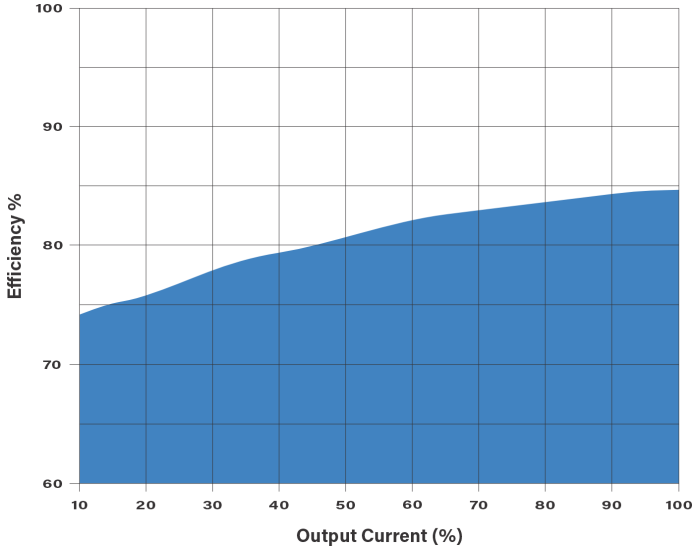
Efficiency vs Output Load: 5V (230VAC)



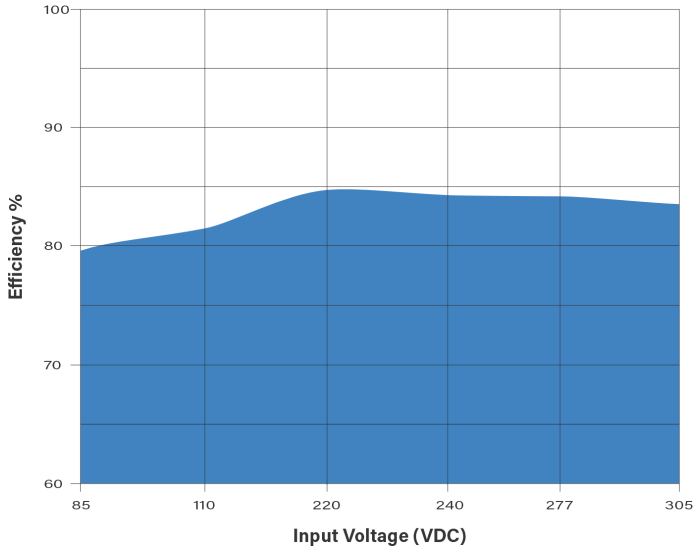
Efficiency vs Input Voltage: 12V



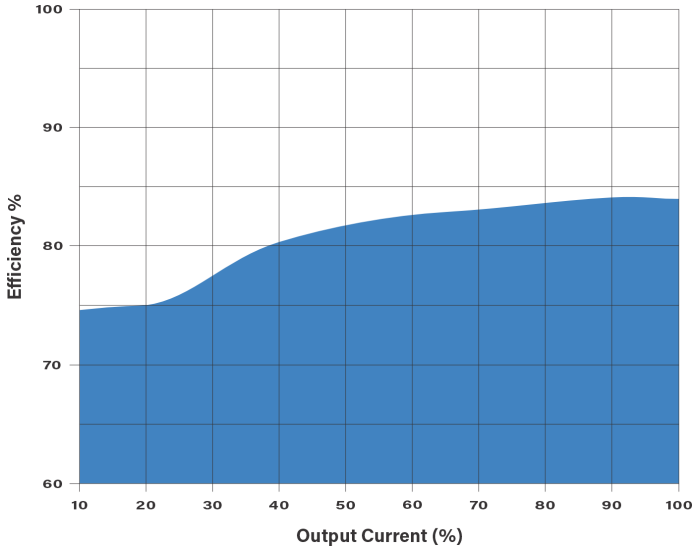
Efficiency vs Output Load: 12V (230VAC)



Efficiency vs Input Voltage: 24V



Efficiency vs Output Load: 24V (230VAC)



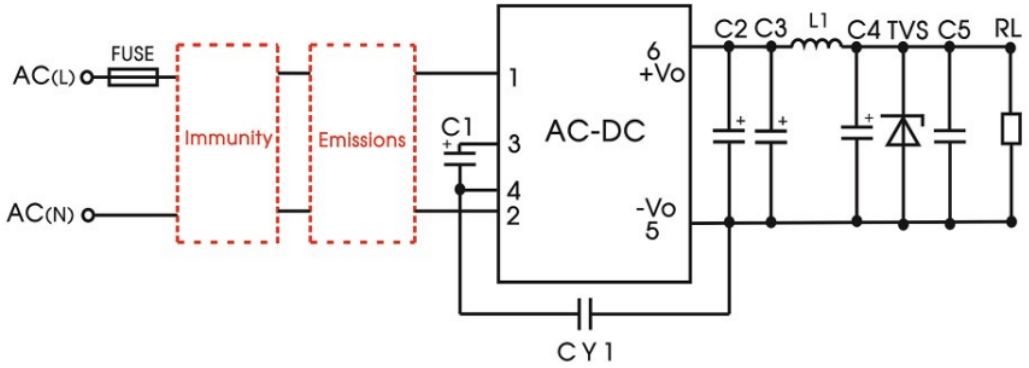
MPD: Eastman Street, Unit 1, Easton, MA 02375 • Tel: (781)-344-8226) • Fax: (781)-344-8481 • E-Mail: sales@micropowerdirect.com

EMI Characteristics

Parameter	Standard	Criteria	Level
Radiated Emissions (RE)	CISPR32/EN55032		A
	CISPR32/EN55032		B
Conducted Emissions (CE)	CISPR32/EN55032		A
	CISPR32/EN55032		B
ESD	IEC/EN61000-4-2	A	Contact ±6KV/Air ±8KV
RS	IEC/EN61000-4-3	A	10V/m
EFT	IEC/EN61000-4-4	B	±2KV
	IEC/EN61000-4-4	B	±4KV
Surge	IEC/EN61000-4-5	A	line to line ±1KV
	IEC/EN61000-4-5	A	line to line ±2KV
	IEC/EN61000-4-5	A	line to line ±2KV/line to PE ±4KV
CS	IEC/EN61000-4-6	A	10 Vr.m.s
Voltage dips, Shorts, Interruptions	IEC/EN61000-4-11	B	0%, 70%

Application Circuits

Additional Circuit Diagram



MPL-15SC-C Series Additional Components Selection Guide (No EMC Devices)

Model No.	C1 (Required)	C3 (Required)	C3 (Required)	L1 (Required)	C4 (Required)	C5	CY1 (Required)	TVS
MPL-15SC-03C	33uF/450V (-25°C to +85°C, 85-305 VAC input; -40°C to +85°C, 165-305VAC input) 47uF/450V (-40°C to +85°C, 85-305 VAC input)	1500uF/6.3V (solid-state capacitor)	-	2.0uH/15mΩMax/6.5A	470uF/16V	0.1uF/50V	1nF/400VAC (2.2nF for 5V/9V in application circuit 3/5)	SMBJ7.0A
MPL-15SC-05C		1000uF/16V (solid-state capacitor)	-					
MPL-15SC-09C		470uF/16V (solid-state capacitor)	-		220uF/16V			SMBJ12A
MPL-15SC-12C			470uF/25V		220uF/16V			SMBJ20A
MPL-15SC-15C		470uF/25V	-		220uF/25V			
MPL-15SC-24C		470uF/35V	-		100uF/35V			SMBJ30A

Notes:

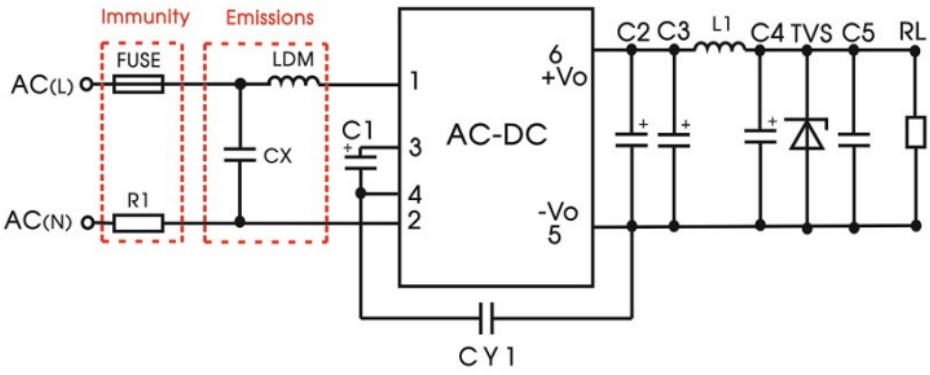
1. C1 is used as a filter capacitor with AC input (must be connected externally) and as an EMC filter capacitor with DC input (must be connected). It is recommended to use the capacitor with a ripple current >400mA at 100kHz.
2. We recommend using an electrolytic capacitor with a high frequency and low ESR rating for C4. Electrolytic capacitor can be used for C2 and C3 when applied in normal and high temperature environments. Combined with C2, C3, and L1, they form a pi-type filter circuit. Choose a capacitor voltage rating with at least 20% margin. C5 is a ceramic capacitor is used for filtering high frequency noise.
3. A suppressor diode (TVS) is recommended to protect the application in case of converter failture and specification should be 1.2 times the output voltage.

Environmental Application EMC Recommendations

Recommended Circuit	Application Environment	Typical Industry	Input Voltage Range	Environment Temperature	Emissions	Immunity
1	Basic Application	None	85-305 VAC	-40°C to +85°C	Class A	Level 3
2	Indoor Civil	Smart Home/ Home Appliances (2Y)		-25°C to +55°C	Class B	Level 3
	Indoor General	Smart Building/ Smart Agriculture				
3	Indoor Industrial	Manufacturing		-25°C to +55°C	Class B	Level 4
4	Outdoor General	ITS/Video Monitoring/ Charging Point/ Communications/ Security		40°C to +85°C	Class A	Level 4
5	Outdoor industrial	Electricity/Grid		-40°C to +85°C	Class B	Level 4

EMC Application Recommended Circuits

Circuit 1 - Basic Application

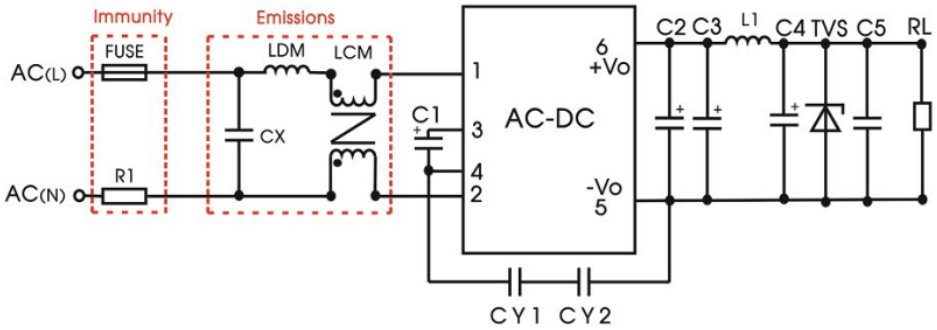


Application Environment	Ambient Temperature Range	Immunity Level	Emissions Class
Basic Application	-40°C to +85°C	Level 3	Class A

Component	Recommended Value
FUSE	1A/300V, slow-blow, required
R1	6.8Ω/3W (wire-wound resistor, required)
CX	0.1uF/310VAC
LDM	1.2mH/Max: 2.5Ω/Min: 0.4A

Notes:
1. R1 is the input plugi-in resistor. This resistor needs to be a wire-wound resistor (required). Please do not select SMD resistors or carbon film resistors.
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. Select according to the certification standard.

Circuit 2 - Indoor Civil/General Environment



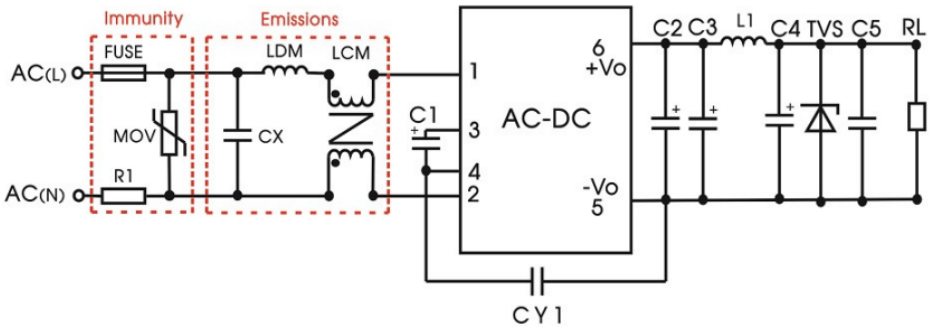
Application Environment	Ambient Temperature Range	Immunity Level	Emissions Class
Indoor Civil/General	-25°C to +55°C	Level 3	Class B

Component	Recommended Value
FUSE	1A/300V, slow-blow, required
R1	6.8Ω/3W (wire-wound resistor, required)
CX	0.2uF/310VAC
LDM	1.2mH/Max: 2.5Ω/Min: 0.4A
LCM	12.6mH/Min: 0.4A

Notes:

1. In the home 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.
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 2.5MΩ. Select according to the certification standard.
3. R1 is the input plug-in resistor. This resistor needs to be a wire-wound resistor (required). Please do not select SMD resistors or carbon film resistors.

Circuit 3 - Indoor Industrial Environment



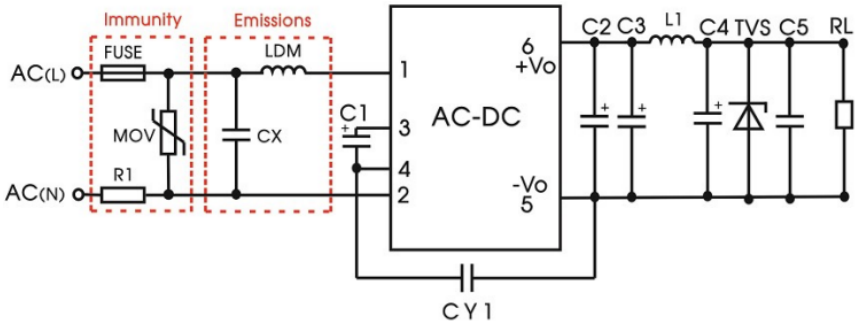
Application Environment	Ambient Temperature Range	Immunity Level	Emissions Class
Indoor Industrial	-25°C to +55°C	Level 4	Class B

Component	Recommended Value
FUSE	2A/300V, slow-blow, required
R1	6.8Ω/3W (wire-wound resistor, required)
MOV	S14K350
CX	0.2uF/310VAC
LDM	1.2mH/Max: 2.5Ω/Min: 0.4A
LCM	12.6mH/Min: 0.4A

Notes:

1. R1 is the input plug-in resistor. This resistor needs to be a wire-wound resistor (required). Please do not select SMD resistors or carbon film resistors.
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 2.5MΩ. Select according to the certification standard.

Circuit 4 - Outdoor General Environment



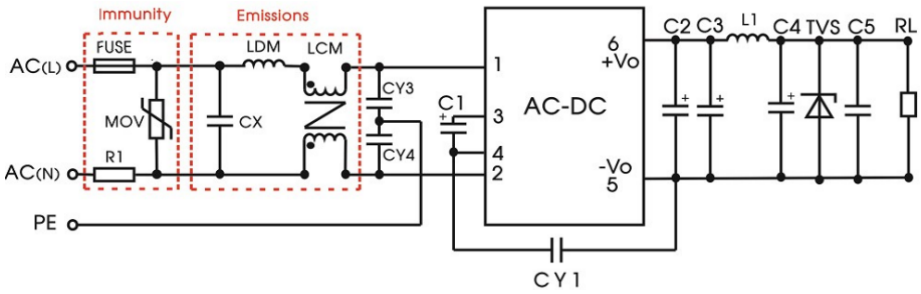
Application Environment	Ambient Temperature Range	Immunity Level	Emissions Class
Outdoor General	-40°C to +85°C	Level 4	Class A

Component	Recommended Value
FUSE	2A/300V, slow-blow, required
R1	6.8Ω/3W (wire-wound resistor, required)
MOV	S14K350
CX	0.1uF/310VAC
LDM	1.2mH/Max: 2.5Ω/Min: 0.4A

Notes:

1. R1 is the input plug-in resistor. This resistor needs to be a wire-wound resistor (required). Please do not select SMD resistors or carbon film resistors.
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. Select according to the certification standard.

Circuit 5 - Outdoor Industrial Environment



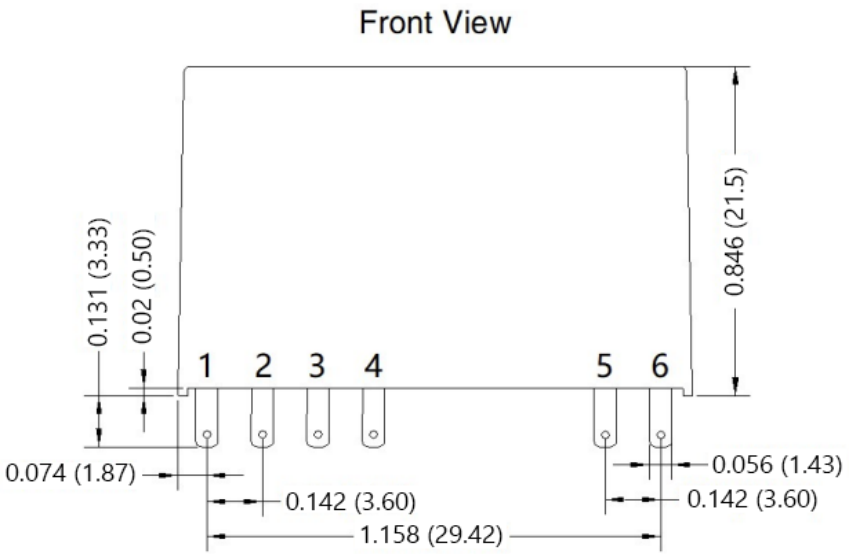
Application Environment	Ambient Temperature Range	Immunity Level	Emissions Class
Outdoor Industrial	-40°C to +85°C	Level 4	Class B

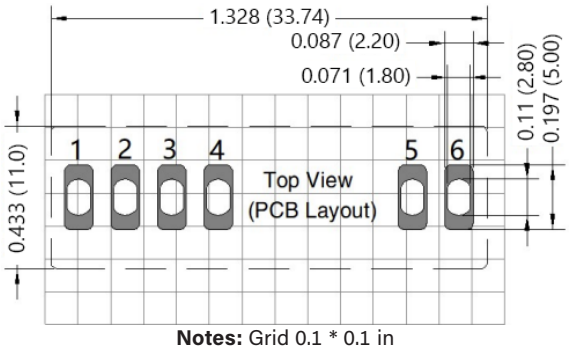
Component	Recommended Value
FUSE	2A/300V, slow-blow, required
R1	6.8Ω/3W (wire-wound resistor, required)
MOV	S14K350
CX	0.2uF/310VAC
LDM	1.2mH/Max: 2.5Ω/Min: 0.4A
LCM	12.6mH/Min: 0.4A
CY3/CY4	1nF/400VAC

Notes:

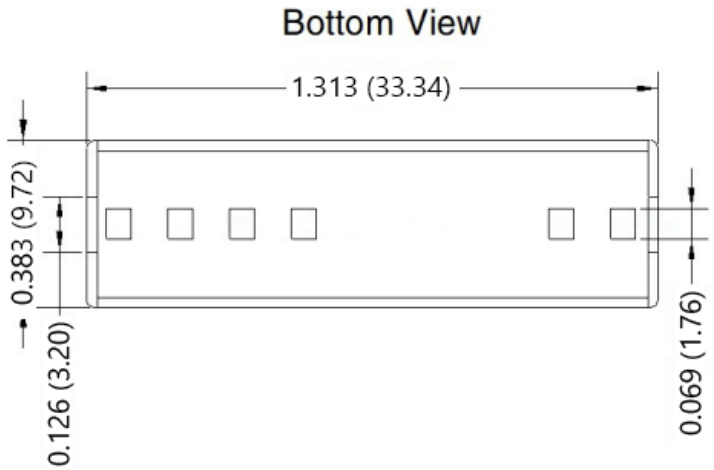
1. R1 is the input plug-in resistor. This resistor needs to be a wire-wound resistor (required). Please do not select SMD resistors or carbon film resistors.
2. According to the certification requirements, the X capacitor needs to be connected in parallel with the bleeder resistance. The recommended resistance value is less than 2.5MΩ. Select according to the certification standard.

Mechanical Diagrams





Notes: Grid 0.1 * 0.1 in



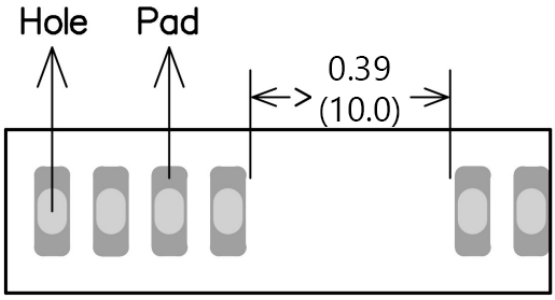
Pin	Function
1	AC(L)
2	AC(N)
3	+V(cap)
4	-V(cap)
5	-Vo
6	+Vo

Notes:

- All dimensions are typical in inches (mm)
- Pin diameter tolerances: ±0.004 (±0.10)
- General tolerances: ±0.020 (±0.50)

Weight:

- 0.49 oz (14g)



Recommended Pad