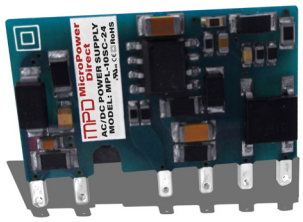
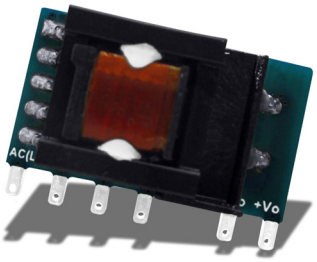
MPL-10SC

10W, Compact, High Isolation AC/DC Power Supplies





Key Features:

- 10W Output Power
- 85-528 VAC Input
- 4,000 VAC Isolation
- Compact Size
- Efficiency to 83%
- -40°C to +85°C Temp
- Meets EN 55032 B
- >500 kHour MBTF
- Reinforced Insulation

CE

UK CA

RoHS

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		528	VAC
	DC Input	100		745	VDC
Input Frequency		47		63	Hz
Input Current	115 VAC			0.3	A
	230 VAC			0.15	
	380 VAC			0.1	
Inrush Current (Cold Start)	115 VAC		15		A
	230 VAC		30		
	380 VAC		50		
Leakage Current	480 VAC/50 Hz			0.5	mA RMS
Recommended External Input Fuse	Select based on application		2A, Slow-Blow, Required		

Output

Parameter	Conditions		Min.	Typ.	Max.	Units
Output Voltage Accuracy	3.3V			±6		%
	5V	0-10% load		±5		
		10-100% load		±4		
	Other Outputs			±5		
Line Regulation	At rated load	3.3V Output		±2		%
		Other Outputs		±1.5		
Load Regulation	10 - 100% load			±3		%
Ripple & Noise (20 MHz) - See Note 1				100	180	mV P-P
Hold-Up Time	115 VAC			8		ms
	230 VAC			35		
	380 VAC			80		
Temperature Coefficient				±0.2		%/°C
Standby Power Consumption	230 VAC				0.3	W
	380 VAC				0.5	
Over Load Protection			110			%Io
Short Circuit Protection	Hiccup Mode (Autorecovery)					
Minimum Load			10			%

General

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation Voltage	See Note 3	4,000			VAC
Isolation Resistance	500 VDC	50			MΩ

EMI Characteristics

Parameter	Standard	Criteria	Level
Radiated Emissions, See Page 3	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
Power Derating	+50°C to +85°C	1.72			%/°C
	-40°C to -25°C	1.33			
	85 - 100 VAC	1.33			%/VAC
	480 - 528 VAC	0.42			
Cooling	Free Air Convection				
Storage Humidity	Non-condensing			95	%RH

Physical

Case Size	1.50 x 0.79 x 0.60 in (See Mechanical Drawing on Page 8)
Weight	0.35 oz (10g) (See Mechanical Drawing on Page 8)

Reliability Specifications

Parameter	Conditions	Min.	Typ.	Max.	Units
MTBF	MIL HDBK 217F, 25°C, Gnd Benign	0.5			MHours
Lead Temperature	Wave, 5 - 10s			260	°C
	Manual, 3 - 5s			360	

MicroPower Direct
46 Eastman Street
Unit 1
Easton, MA 02375
USA

T: (781) 344-8226
F: (781) 344-8481
E: sales@micropowerdirect.com
W: www.micropowerdirect.com

MICROPOWER DIRECT

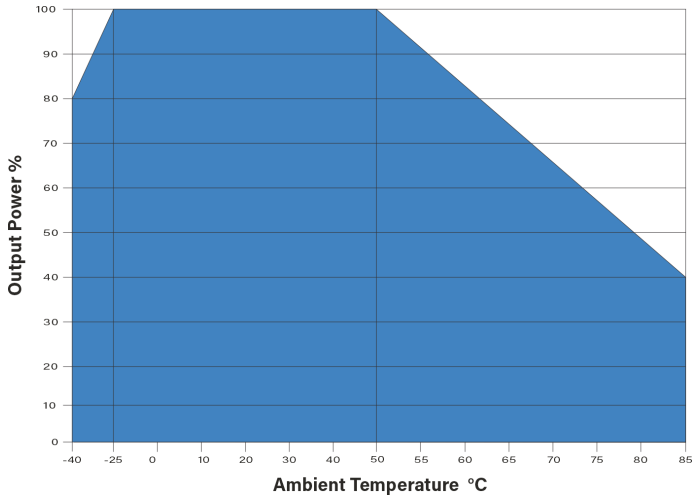
Model Selection Guide

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-10SC-03	300	150	3.3	2000	6.6	1500	70
MPL-10SC-05	300	150	5	2000	10	1500	77
MPL-10SC-09	300	150	9	1100	10	1000	80
MPL-10SC-12	300	150	12	830	10	680	82
MPL-10SC-15	300	150	15	670	10	470	82
MPL-10SC-24	300	150	24	420	10	330	83

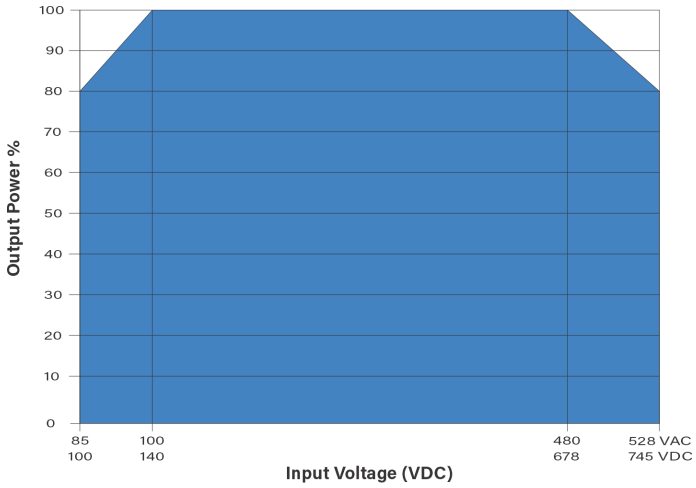
Notes:

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-10SC** series, an external input fuse is required. A 2A slow blow is recommended, however, the actual application environment may require a different value. See the recommended values on pages 5-7.

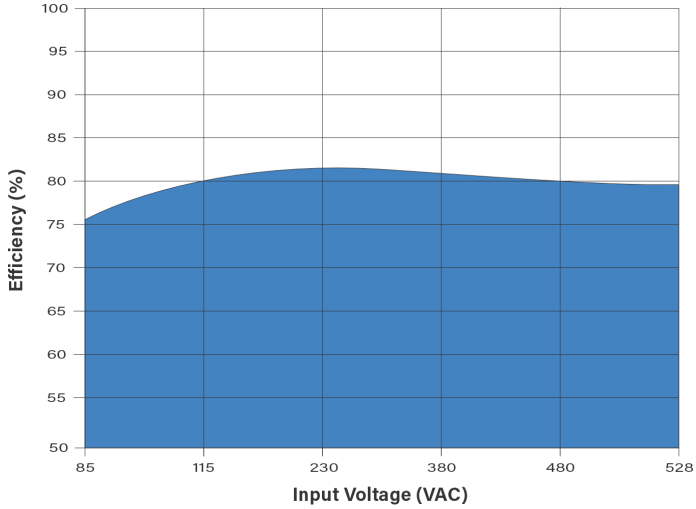
Temperature Derating



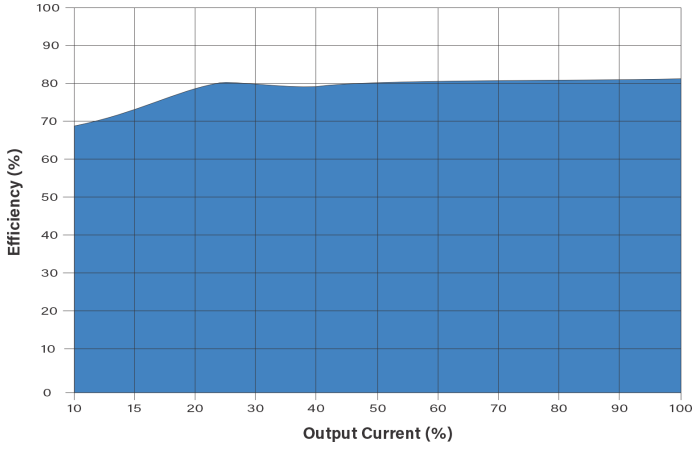
Input Voltage Derating



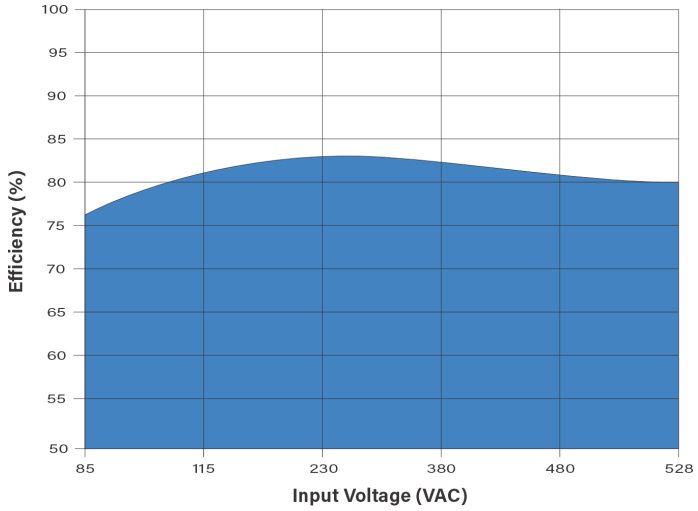
Efficiency vs Input Voltage: 5V (Full Load)



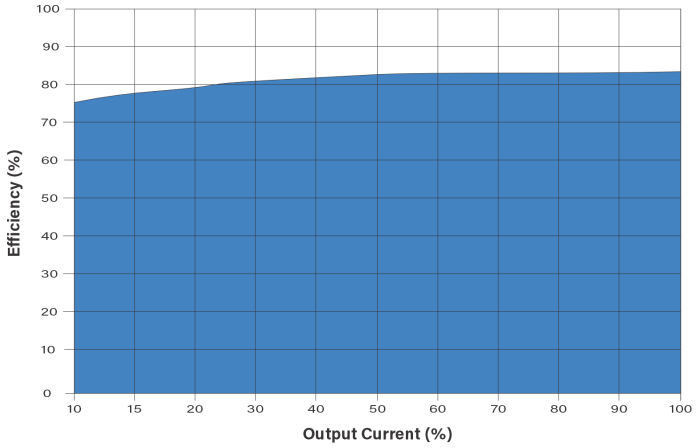
Efficiency vs Output Load: 5V (230VAC)



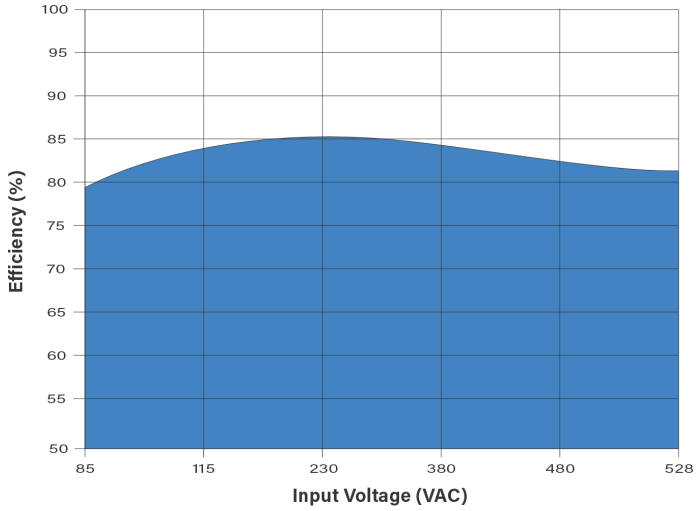
Efficiency vs Input Voltage: 12V (Full Load)



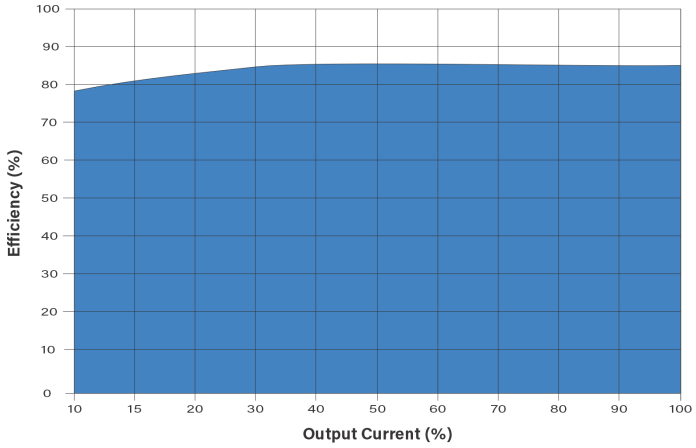
Efficiency vs Output Load: 12V (230VAC)



Efficiency vs Input Voltage: 24V (Full Load)



Efficiency vs Output Load: 24V (230VAC)

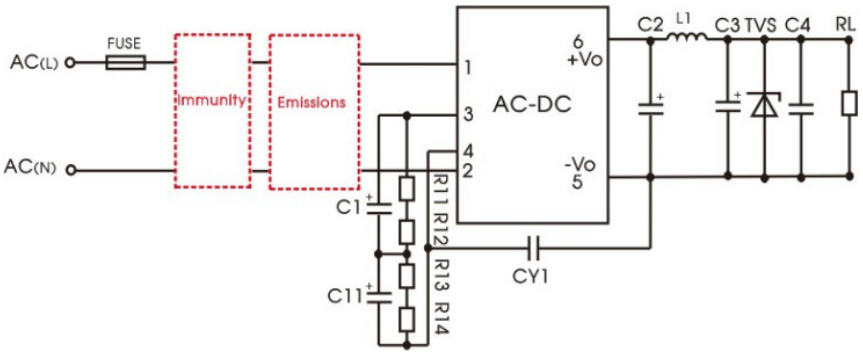


EMI Characteristics

Parameter	Standard	Criteria	Level
Radiated Emissions (RE)	CISPR32/EN55032		A (Circuit 1, 4, 5, 6)
	CISPR32/EN55032		B (Circuit 2, 3)
Conducted Emissions (CE)	CISPR32/EN55032		A (Circuit 1, 4, 5, 6)
	CISPR32/EN55032		B (Circuit 2, 3)
ESD	IEC/EN61000-4-2	B	Contact ±6KV/Air ±8KV
RS	IEC/EN61000-4-3	A	10V/m
EFT	IEC/EN61000-4-4	B	±2KV (Circuit 1, 4, 6)
	IEC/EN61000-4-4	B	±4KV (Circuit 2, 3, 5)
Surge	IEC/EN61000-4-5	B	line to line ±1KV (Circuit 1, 2)
	IEC/EN61000-4-5	B	line to line ±2KV (Circuit 3, 4)
	IEC/EN61000-4-5	B	line to line ±2KV/line to PE ±4KV (Circuit 5)
	IEC/EN61000-4-5	B	line to line ±4KV (Circuit 6)
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-10SC Series Additional Components Selection Guide (No EMC Devices)								
Model No.	**C1/C11 (Required)**	**R11/R12/R13/R14 (SMD resistor, required)**	**C2 (Required)**	**L1 (Required)**	**C3 (Required)**	**C4**	**CY1 (Required)**	**TVS**
MPL-10SC-03	47uF/400V	1MΩ/1206/(1/4W)	1500uF/6.3V (solid-state capacitor)	2.2uH/15mΩ Max/6.5A	680uF/25V	0.1uF/ 50V	1nF/ 400VAC	SMBJ7.0A
MPL-10SC-05			820uF/16V (solid-state capacitor)		330uF/25V			
MPL-10SC-09			470uF/16V (solid-state capacitor)		1000uF/16V			SMBJ12A
MPL-10SC-12					330uF/25V			SMBJ20A
MPL-10SC-15			470uF/25V (solid-state capacitor)		100uF/35V			
MPL-10SC-24			470uF/35V					SMBJ30A

Notes:

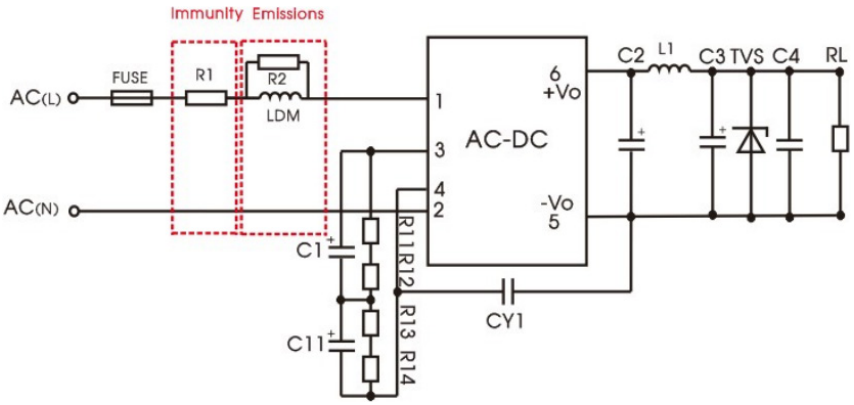
1. C1/C11 is used as a filter capacitor with AC input (must be connected externally) and as an EMC filter capacitor with DC input (must be connected). It is recommended to use the capacitor with a ripple current >200mA at 100kHz. It is recommended to use electrolytic capacitor C1/C11 with ESR≤100Ω at low temperature.
2. R11, R12, R13, R14 are the voltage equalizing resistors of C1, C11 electrolytic capacitors (must be conected), and SMD anodes can be used.
3. We recommend using an electrolytic capacitor with high frequency and low ESR (ESR of C3 at low temperature of -40°C≤1.1Ω) rating for C3. Electrolytic capacitor can be used for C2 when appied in normal and high temperature environments. Combined with C2, L1, they frm a pi-type filter circuit. Choose a capacitor voltage rating with at least 20% margin, or not exceeding 80%. C4 is a ceramic capacitor used for filtering high frequency noise.
4. 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	85-528 VAC	-40°C to +85°C	Class A	Level 3
2	Indoor General	Smart Building/ Smart Agriculture		-25°C to +55°C	Class B	Level 3
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 A	Level 4
6	Strong Lightning Surge	Electricity Dedicated		-40°C to +85°C	Class A	Level 4

EMC Application Recommended Circuits

Circuit 1 - Basic Application



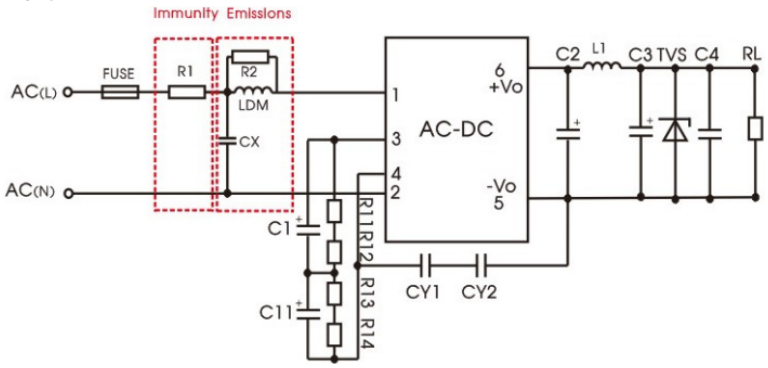
Application Environment	Ambient Temperature Range	Immunity Level	Emissions Class
Basic Application	-40°C to +85°C	Level 3	Class A

Component		Recommended Value
FUSE		2A/500V, slow-blow, required
R1		6.8Ω/3W (wire-wound resistor, required)
R2	MPL-10SC-03, -05, -12	10K/1206/(1/4W) (SMD resistor)
	MPL-10SC-09, -15, -24	4.7K/1206/(1/4W) (SMD resistor)
LDM		2.2mH/Max: 4.81Ω/Min: 0.31A

Notes:

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

Circuit 2 - Indoor General Environment



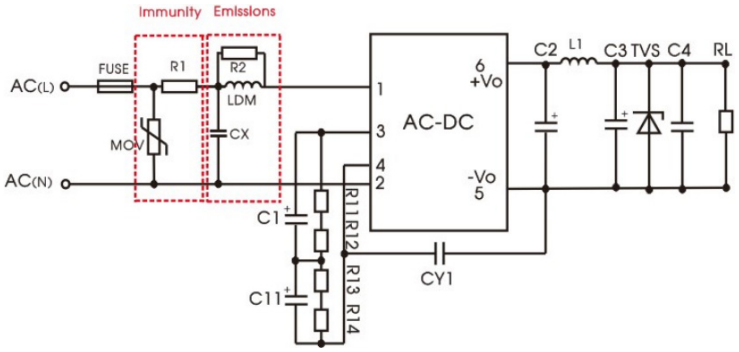
Application Environment	Ambient Temperature Range	Immunity Level	Emissions Class
Indoor Civil/General	-25°C to +55°C	Level 3	Class B

Component		Recommended Value
FUSE		2A/500V, slow-blow, required
R1		6.8Ω/3W (wire-wound resistor, required)
R2	MPL-10SC-03, -05, -12	10K/1206/(1/4W) (SMD resistor)
	MPL-10SC-09, -15, -24	4.7K/1206/(1/4W) (SMD resistor)
CX		0.1uF/480VAC
LDM		2.2mH/Max: 4.81Ω/Min: 0.31A

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 CX 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.
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



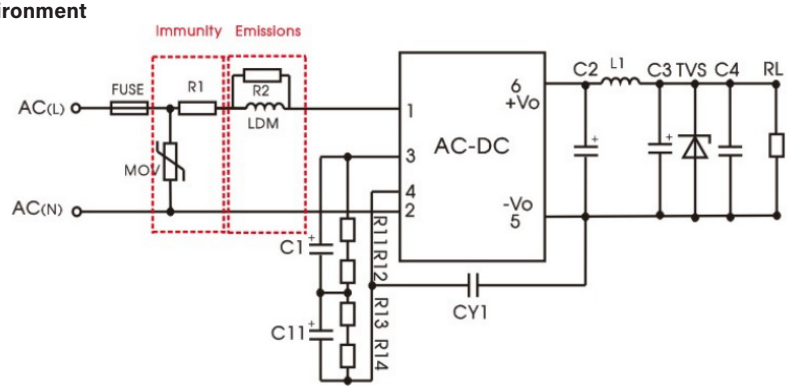
Application Environment	Ambient Temperature Range	Immunity Level	Emissions Class
Indoor Industrial	-25°C to +55°C	Level 4	Class B

Component		Recommended Value
FUSE		2A/500V, slow-blow, required
R1		6.8Ω/3W (wire-wound resistor, required)
R2	MPL-10SC-03, -05, -12	10K/1206/(1/4W) (SMD resistor)
	MPL-10SC-09, -15, -24	4.7K/1206/(1/4W) (SMD resistor)
MOV		S14K550
CX		0.1uF/480VAC
LDM		2.2mH/Max: 4.81Ω/Min: 0.31A

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 CX 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 4 - Outdoor General Environment



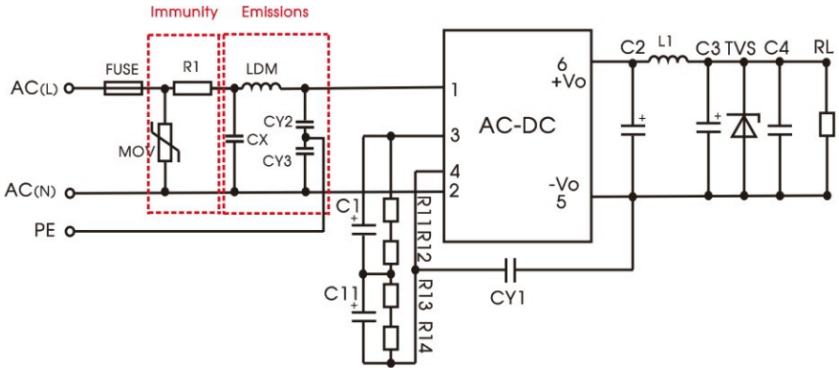
Application Environment	Ambient Temperature Range	Immunity Level	Emissions Class
Outdoor General	-40°C to +85°C	Level 4	Class A

Component		Recommended Value
FUSE		2A/500V, slow-blow, required
R1		6.8Ω/3W (wire-wound resistor, required)
R2	MPL-10SC-03, -05, -12	10K/1206/(1/4W) (SMD resistor)
	MPL-10SC-09, -15, -24	4.7K/1206/(1/4W) (SMD resistor)
MOV		S14K550
LDM		2.2mH/Max: 4.81Ω/Min: 0.31A

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.

Circuit 5 - Outdoor Industrial Environment



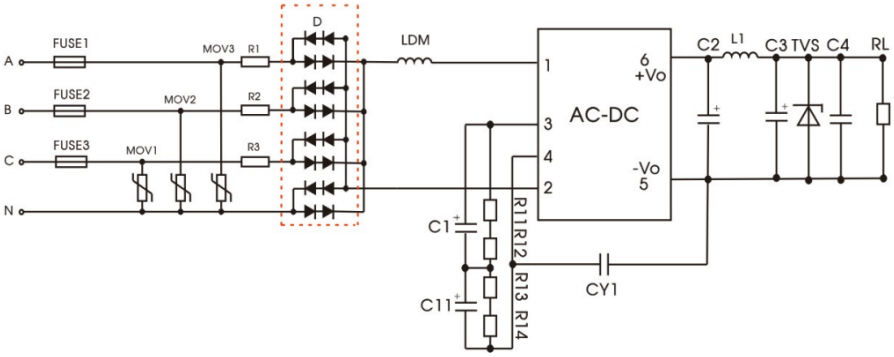
Application Environment	Ambient Temperature Range	Immunity Level	Emissions Class
Outdoor Industrial	-40°C to +85°C	Level 4	Class A

Component	Recommended Value
FUSE	2A/500V, slow-blow, required
R1	6.8Ω/3W (wire-wound resistor, required)
MOV	S14K550
CX	0.1uF/480VAC
LDM	2.2mH/Max: 4.81Ω/Min: 0.31A
CY2/CY3	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 CX 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 6.1 - Strong Lightning Surge 4KV Differential-Mode Surge Standard (Full-Wave Rectification)

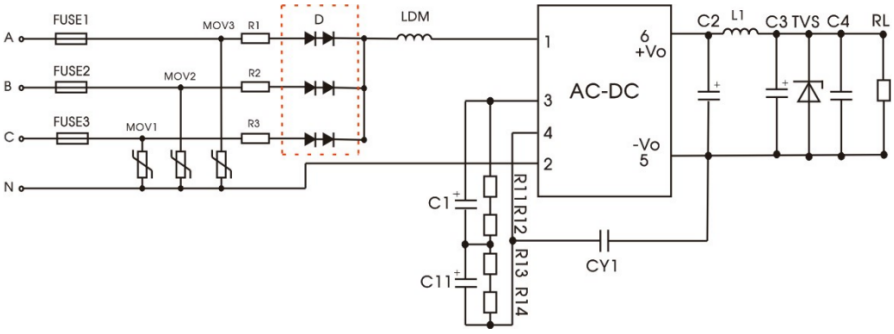


Component	Recommended Value
FUSE1/2/3	6.3A/500V, slow-blow, required
R1/2/3	12Ω/5W (wire-wound resistor, required)
MOV1/2/3	S14K550
D	2A/1000V
LDM	2.2mH/Max: 4.81Ω/Min: 0.31A

Notes:

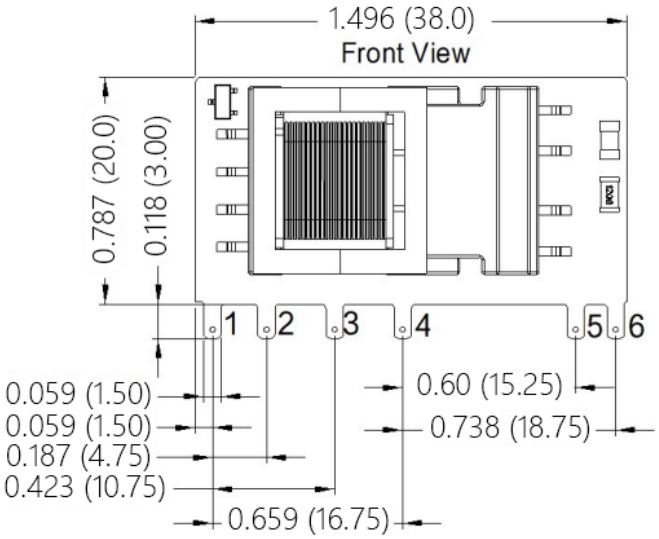
1. R1/R2/R3 is the input plug-in resistor. This resistor needs to be a wire-wound resistor (required). Please do not select SMD resistors or carbon film resistors.

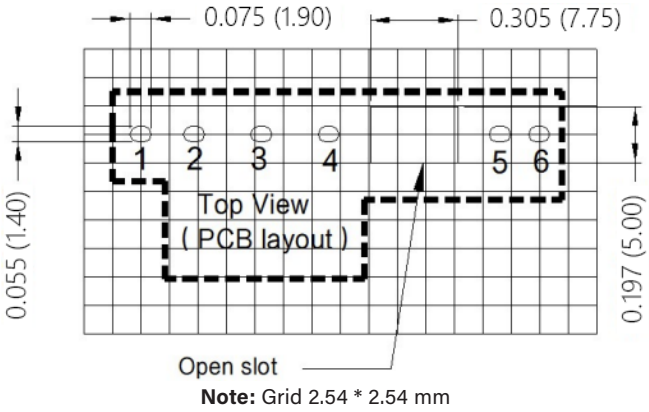
Circuit 6.2 - Strong Lightning Surge 4KV Differential-Mode Surge Standard (Half-Wave Rectification)



Application Environment	Ambient Temperature Range	Immunity Level	Emissions Class
Strong Lightning Surge	-40°C to +85°C	Level 4	Class A

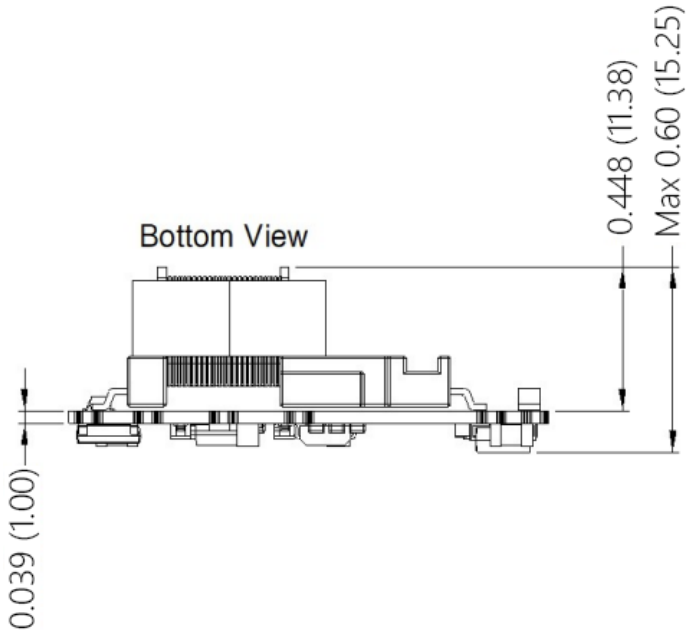
Mechanical Diagrams





Note: Grid 2.54 * 2.54 mm

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

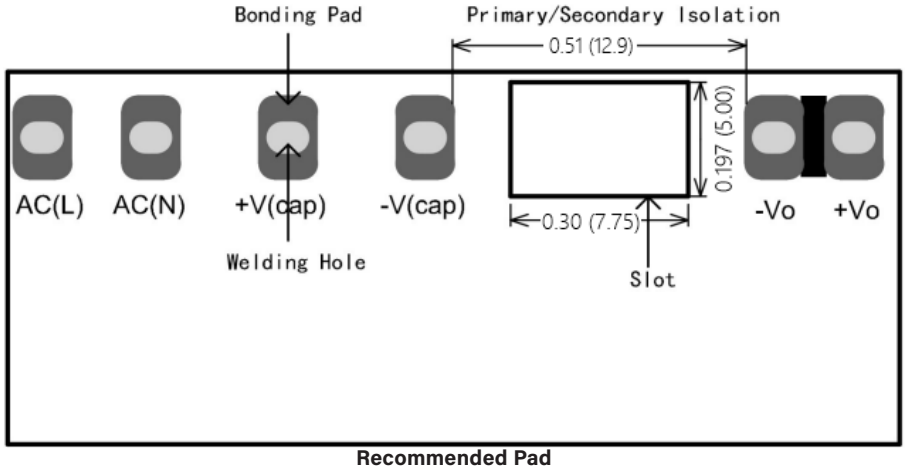


Notes:

- All dimensions are typical in inches (mm)
- Pin diameter tolerances: ±0.004 (±0.10)
- General tolerances: ±0.039 (±1.00)

Weight:

- 0.35 oz (10g)



Recommended Pad

Note: There is a slot (non-metallic hole) between pin 4/5. Please refer to the diagram above.