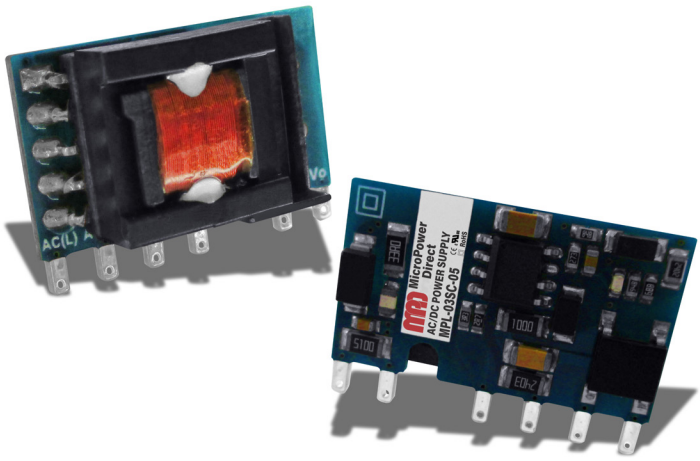
MPL-03SC

3W, Compact, Open Frame AC/DC Power Supplies



Key Features:

- 3W Output Power
- 85-305 VAC Input
- 3,000 VAC Isolation
- Compact Size
- Accepts AC or DC input
- -40°C to +85°C Temp Range
- Meets EN 55032 B
- >1000 kHour MTBF
- 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		85		305	VAC
		70		430	VDC
Input Frequency		47		63	Hz
Input Current	115VAC			0.12	A
	230 VAC			0.06	
Inrush Current (Cold start)	115 VAC		12		
	230 VAC		23		

Output

Parameter	Conditions	Min.	Typ.	Max.	Units
Output Voltage Accuracy	10% - 100% Load		±5.0		%
Line Regulation	Rated Load		±1.5		%
Load Regulation	10 to 100%		±3		%
Ripple & Noise, See note 3	20MHz, 10-100% Load		80	150	mVP-P
Temperature Coefficient			±0.15		%/°C
Over Current Protection	Autorecovery	110			%Iout
Standby Power Consumption	230 VAC		0.1	0.15	W
Short Circuit Protection	Continuous (Autorecovery)				

General

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation Voltage	60 seconds, leakage current <5mA	3000			VAC
Power Derating	+65°C to +85°C	2.5			%/°C
	85VAC – 100VAC	1.33			%/VAC
	277VAC to 305VAC	1			

Environmental

Parameter	Conditions	Min.	Typ	Max.	Units
Operating Temperature Range, Note 5	Ambient	-40		+85	°C
Storage Temperature Range		-40		+105	°C
Cooling, See note 6	Free Air Convection				
Storage Humidity, See note 9	Non condensing			95	%RH

Physical

Case Size	1.04 x 0.50 x 0.43 in (See mechanical diagrams on page 5)
Weight	0.12 oz (3.4g)

Reliability Specifications

Parameter	Conditions	Min.	Typ.	Max.	Units
MTBF	MIL-HDBK-217F@25°C	1.0			MHours
Lead Temperature	Wave Solder, 5-10 seconds			260 ±5	°C
	Hand Solder, 3-5 seconds			360 ±10	
Safety Standards	See Model Selection Guide				
Safety Class	Class II (Reinforced insulation)				

Absolute Maximum Ratings

Caution: Exceeding Absolute Maximum Ratings may damage the module. These are not continuous operating ratings.

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Model Selection Guide

UL	Model Number	Input		Output			Capacitive Load (µF Max)	Efficiency (230 VAC, %, Typ.)	Fuse Rating Slow-Blow (mA)
		Current (mA Max)		Voltage (VDC)	Current (mA, Max)	Power (W)			
		115 VAC	230 VAC						
	MPL-03SC-03	120	60	3.3	600	1.98	820	67	1000
▪	MPL-03SC-05	120	60	5	600	3	680	72	1000
	MPL-03SC-09	120	60	9	333	3	470	76	1000
	MPL-03SC-12	120	60	12	250	3	470	77	1000
	MPL-03SC-15	120	60	15	200	3	330	78	1000
	MPL-03SC-24	120	60	24	125	3	200	80	1000

* MPL-03SC-05 has UL/cUL 62368 recognition (UL certificate). Please contact factory for UL status of other models.

Notes:

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 must be glued and fixed.
3. The "parallel cable" method is used for ripple and noise test.
4. The product is able to work with 0-10% load and with stable output.
5. With an AC input between 85 - 100VAC/277 - 305VAC and a DC input between 70 - 120VDC/390 - 430VDC, the output power must be derated as per temperature derating curves.
6. This product is suitable for applications using natural air cooling.
7. External electrolytic capacitors are required to modules, more details refer to typical applications.
8. This part is open frame, at least 6.4mm creepage distance between the primary and secondary external components of the module is needed to meet the safety requirement, refer to the recommended welding hole design in the external dimension drawing.
9. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25°C, humidity < 75%, Nominal input voltage (115V and 230V) and rated output load.
10. All index testing methods in this datasheet are based on our company corporate standards.
11. We can provide product customization service, please contact our technicians directly for specific information.
12. Products are related to laws and regulations: see "Features" and "EMC".

Typical Characteristic Curves

Temperature Derating Curve, 85 - 305 VAC, 70 - 430 VDC

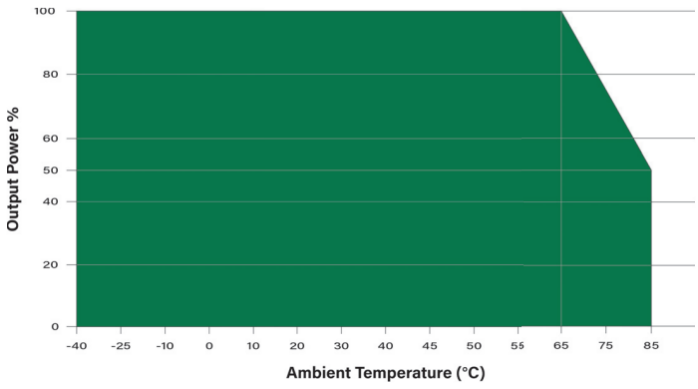

Fig. 1

Input Voltage Derating Curve

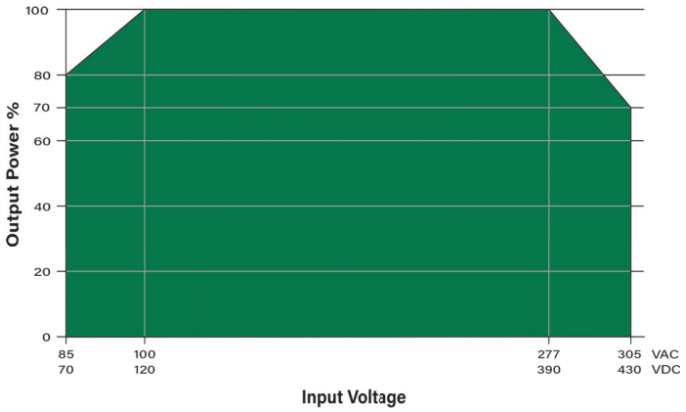

Fig. 2

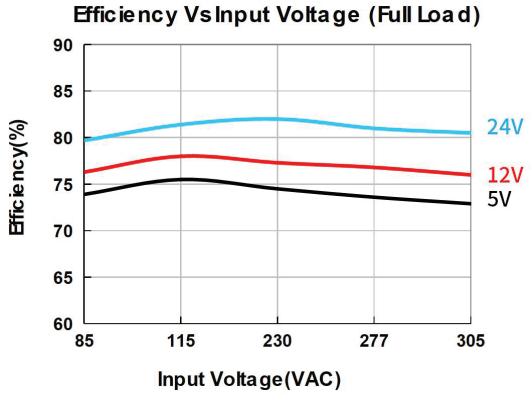

Fig. 3

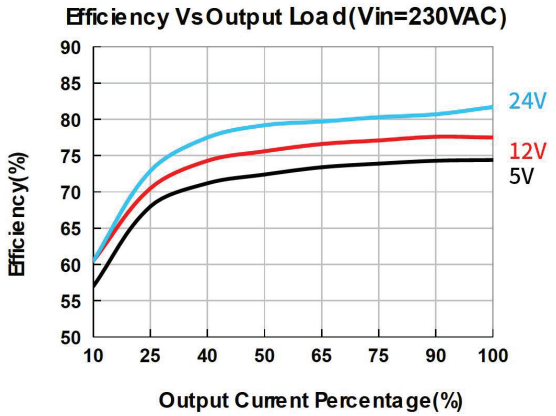

Fig. 4

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Application Circuits

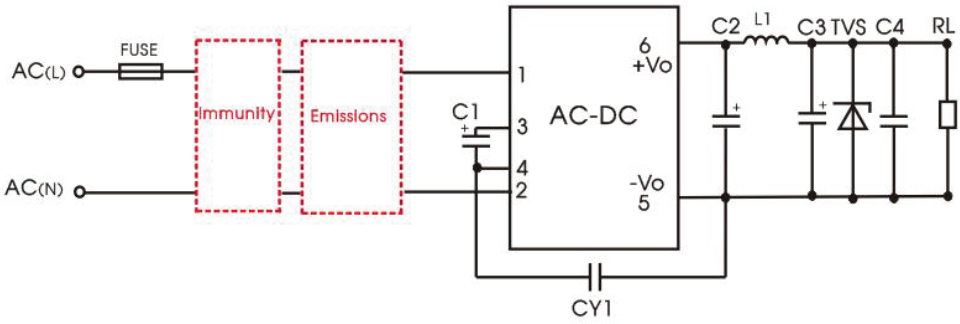


Fig. 5

MPL-03SC series additional components selection guide (No EMC devices)							
Part No.	C1(Required)	C2 (Required)	L1(Required)	C3 (Required)	C4	CY1 (Required)	TVS
MPL-03SC-03	10uF/450V (-25℃ TO +85℃, 85-305VAC input; -40℃ TO +85℃, 165-305VAC input)	470uF/6.3V (solid-state capacitor)	4.7uH/60MΩ /2.2A	150uF/35V	0.1uF/ 50V	1.0nF/ 400VAC	SMBJ7.0A
MPL-03SC-05							
MPL-03SC-09		270uF/16V (solid-state capacitor)					
MPL-03SC-12				47uF/35V			SMBJ12A
MPL-03SC-15		220uF/35V					SMBJ20A
MPL-03SC-24	22uF/450V (-40℃ TO +85℃, 85-305VAC input)						SMBJ30A

Notes:

1. 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.
2. 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 (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.
3. 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.

Immunity Design Circuits

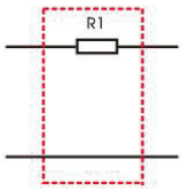
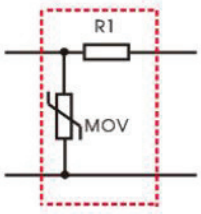
Immunity design circuits for reference	
Level 3	Level 4
	

Fig. 6

Emission Design Circuits

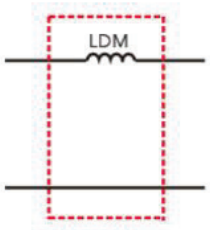
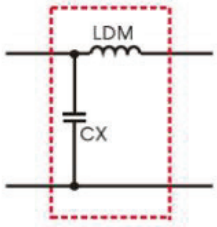
Emissions design circuits for reference	
Class A	Class B
	

Fig. 7

EMC Recommended Circuit –Basic Application

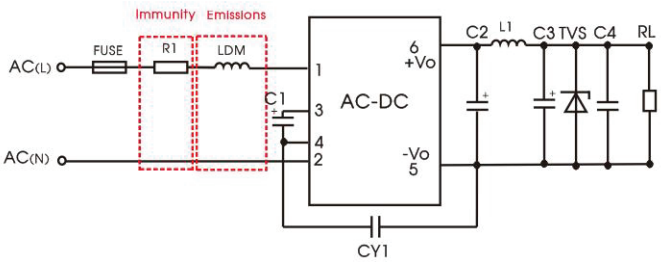
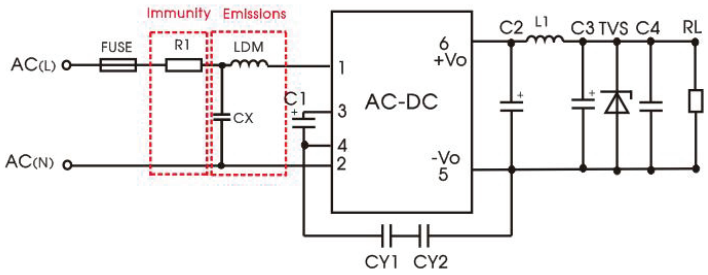


Fig. 8

Application Environment	Basic Application
Ambient temperature range	-40°C TO +85°C
Immunity Level	LEVEL 3
Emissions Class	CLASS A
FUSE (required)	1A/300V, SLOW-BLOW
R1 (wire-wound resistor, required)	12Ω/3W
LDM	1.2MH/MAX: 4Ω/MIN: 0.2A

Note: 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.

EMC Recommended Circuit –Indoor Civil Application

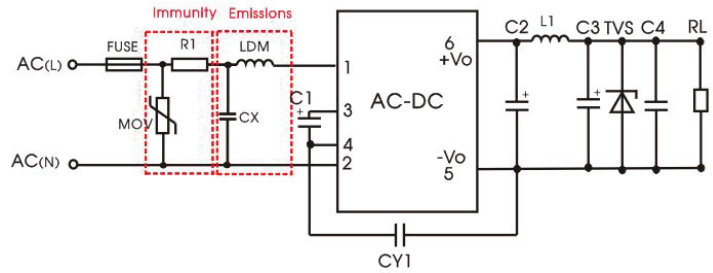


Application Environment	Indoor Civil Application
Ambient temperature range	-25°C TO +55°C
Immunity Level	LEVEL 3
Emissions Class	CLASS B
R1 (wire-wound resistor, required)	12Ω/3W
LDM	1.2MH/MAX: 4.0Ω/MIN: 0.2A
CX	0.1UF/310VAC
FUSE (required)	1A/300V, slow-blow

Fig. 9

Notes:
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.
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.
3. 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.

EMC Recommended Circuit –Universal System for Indoor Industrial environment

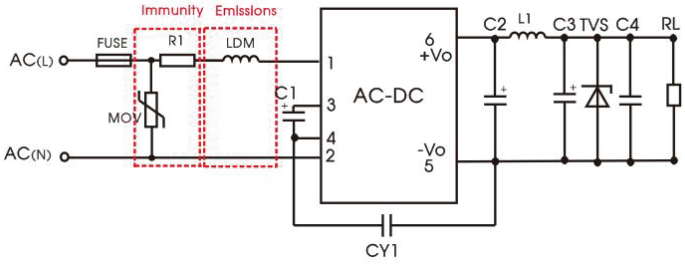


Application Environment	Indoor industrial
Ambient temperature range	-25°C TO +55°C
Immunity Level	Level 4
Emissions Class	Class B
MOV	S14K350
CX	0.1UF/310VAC
LDM	1.2mH/Max: 4.0Ω/Min: 0.2A
R1 (wire-wound resistor, required)	12Ω/2W
FUSE (required)	2A/300V, slow-blow

Fig. 10

Notes:
1. 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.
2. 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.

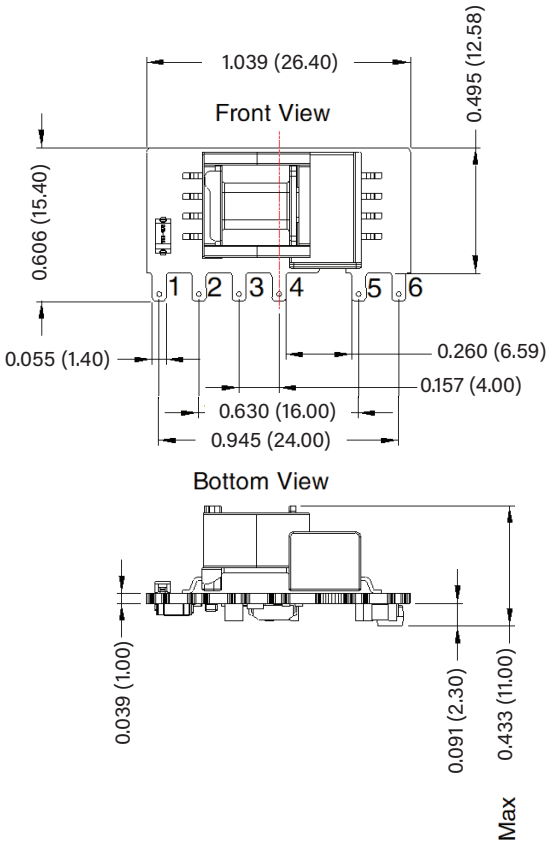
EMC Recommended Circuit –Universal System for general outdoor environment

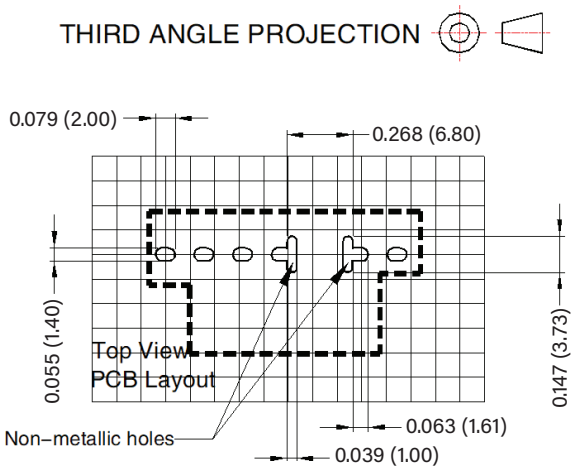


Application Environment	Outdoor general environment
Ambient temperature range	-40°C TO +85°C
Immunity Level	Level 4
Emissions Class	Class A
Component	Recommended value
MOV	S14K350
LDM	1.2mH/Max: 4Ω/Min: 0.2A
R1 (wire-wound resistor, required)	12Ω/2W
FUSE (required)	2A/300V, slow-blow

Note:
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.

Fig. 11





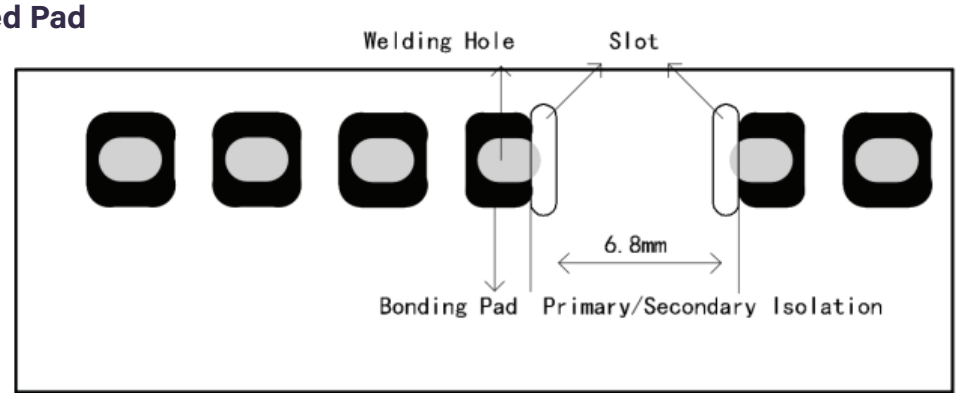
Pin Definition Table

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

Note:

Unit: inches(mm)
Pin section tolerances: ±0.004 (±0.10)
General tolerances: ±0.020 (±1.0)
The layout of the device is for reference only, please refer to the actual procuct

Recommended Pad



Note: There is a slot(non-metallic hole) between pin 4/5, which the side pad were being cut off. For details, please refer to the recommended dimensions or pad.