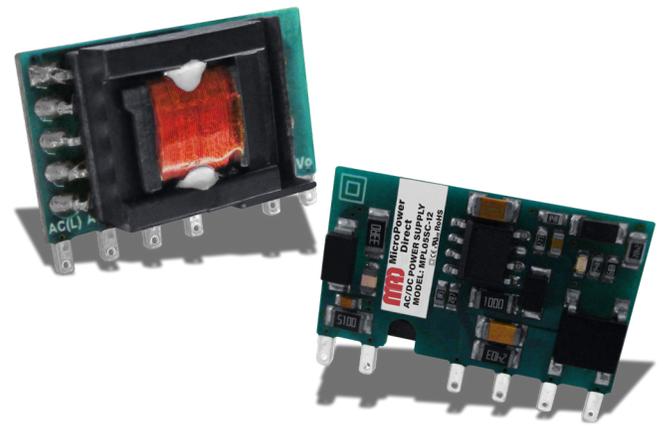


MPL-05SC

5W, Compact, High Isolation AC/DC Power Supplies

Key Features:

- 5W Output Power
- 85-305 VAC Input
- 3,600 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 Start Voltage	--	85	--	305	VAC	
	--	70	--	430	VDC	
Input Frequency		47	--	63	Hz	
Input Current	115VAC	--	--	0.2	A	
	230 VAC	--	--	0.1		
Inrush Current (Cold start)	115 VAC	--	20	--		
	230 VAC	--	49	--		

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 4	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	3600	--	--	VAC	
		5000	--	--	VDC	
Power Derating	+55°C to +85°C	1.67	--	--	%/ °C	
	85VAC - 100VAC	1.33	--	--	%/VAC	
	277VAC to 305VAC	0.72	--	--		

Environmental						
Parameter	Conditions	Min.	Typ.	Max.	Units	
Operating Temperature Range, See Fig. 1	Ambient	-40	--	+85	°C	
Storage Temperature Range	--	-40	--	+105	°C	
Cooling, See Note 7	Free air convection					
Storage Humidity, See Note 10	Non condensing	--	--	95	%RH	

Physical						
Parameter	Conditions	Min.	Typ.	Max.	Units	
Case Size	MPL-05SC-xx	1.04 x 0.58 x 0.43 in (See mechanical diagrams on page 6)				
	MPL-05SC-xx-F	1.1 x 0.69 x 0.46 in (See mechanical diagrams on page 6)				
Weight	MPL-05SC-xx	0.18 oz (5.1g) Typ.				
	MPL-05SC-xx-F	0.20 oz (5.67g) Typ.				

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)					



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www.micropowerdirect.com

UL	Model Number	Input		Output			Capacitive Load (μF, Max)	Efficiency (230 VAC, %, Typ.)	Fuse Rating Slow-Blow
		Current (mA Max)		Voltage (VDC)	Current (mA, Max)	Power (W)			
		115 VAC	230 VAC						
▪	MPL-05SC-03	200	100	3.3	1000	3.3	2200	69	1A
▪	MPL-05SC-05	200	100	5	1000	5	1500	76	1A
	MPL-05SC-09	200	100	9	560	5	680	77	1A
▪	MPL-05SC-12	200	100	12	420	5	470	79	1A
	MPL-05SC-15	200	100	15	340	5	330	79	1A
▪	MPL-05SC-24	200	100	24	210	5	100	81	1A
* MPL-05SC-03, -05, -12, -24 have UL/cUL 62368 recognition (UL certificate). Please contact factory for UL status of other models.									

Notes:

- The nominal output voltage refers to the voltage applied to the load terminal after adding external circuits.
- If the product is used in a severe vibration application, it must be glued and fixed.
- *An "-F" suffix designates horizontal package vs. Standard vertical mounting.
- The "parallel cable" method is used for ripple and noise test.
- The product is able to work with 0-100% load.
- 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 input voltage derating curves.
- This product is suitable for applications using natural air cooling.
- External electrolytic capacitors are required to modules, more details refer to typical applications.
- 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.
- 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.
- All index testing methods in this datasheet are based on our company corporate standards.
- We can provide product customization service, please contact our technicians directly for specific information. Products are related to laws and regulations: see "Features" and "EMC".

An "-F" suffix designates horizontal package vs. standard vertical mounting.
(Ex. MPL-05SC-03-F)

Typical Characteristic Curves

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

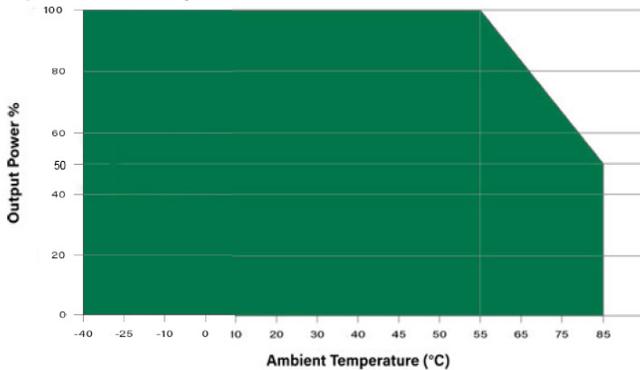


Fig. 1

Input Voltage Derating Curve

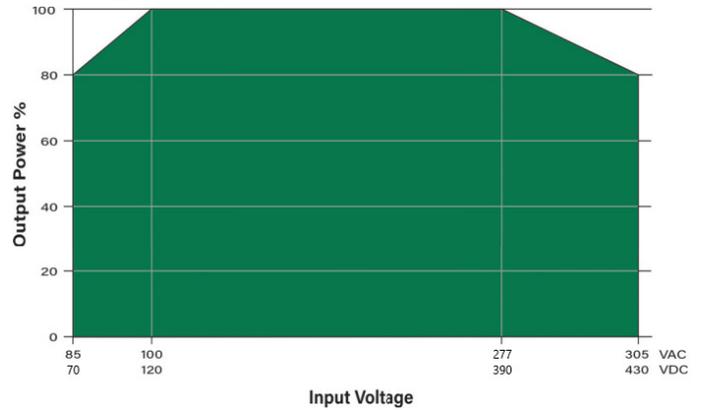


Fig. 2

Efficiency Vs Input Voltage (Full Load), 5V

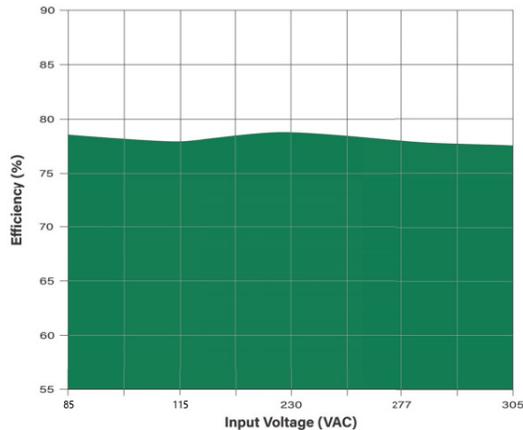


Fig. 3

Efficiency Vs Output Load (Vin=230VAC), 5V

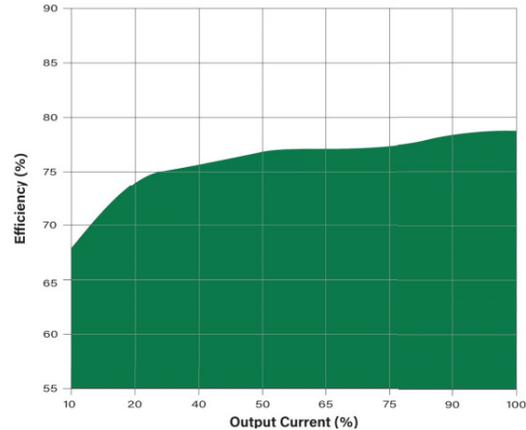


Fig. 4

Typical Characteristic Curves

Efficiency Vs Input Voltage (Full Load), 12V

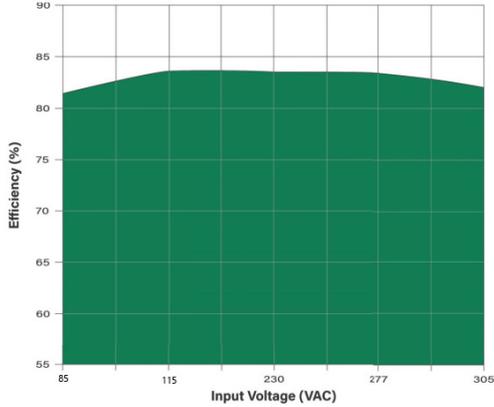


Fig. 5

Efficiency Vs Output Load (Vin=230VAC), 12V

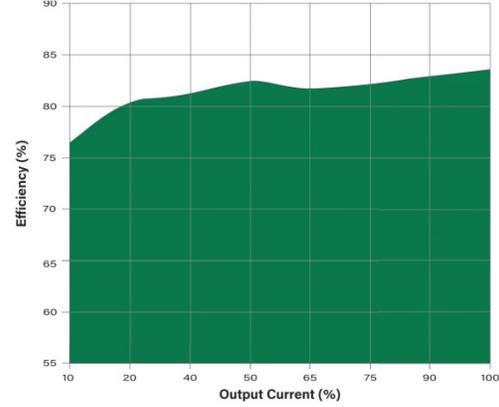


Fig. 6

Efficiency Vs Input Voltage (Full Load), 24V

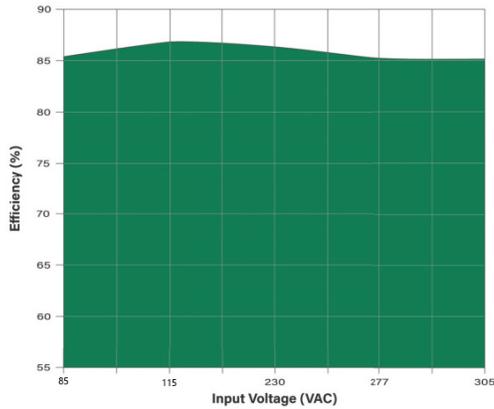


Fig. 7

Efficiency Vs Output Load (Vin=230VAC), 24V

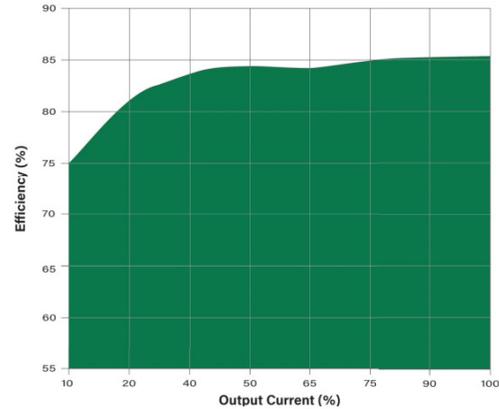
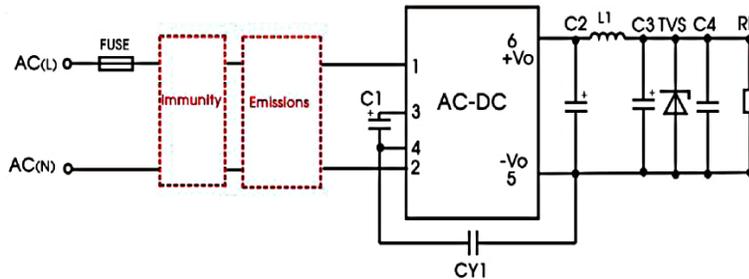


Fig. 8

Application Circuits



MPL-05SC Series Additional Circuits Design Reference

Fig. 9

Notes:

- 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.
- 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 manufacturer'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.

MPL-05SC Series Additional Components Selection Guide (No EMC Devices)

Part No.	C1 Required	C2 Required	L1 Required	C3 Required	C4	CY1 Required	TVS		
MPL-05SC-03	10uF/450V (-25°C to +85°C, 85-305VAC input; -40°C to +85°C, 165-305VAC input)	820uF/6.3V (solid-state capacitor)	4.7uH/60mΩ /2.2A	100uF/35V	0.1uF/ 50V	1.0nF/400VAC	SMBJ7.0A		
MPL-05SC-05		470uF/16V (solid-state capacitor)						47uF/35V	SMBJ12A
MPL-05SC-09		270uF/16V (solid-state capacitor)							
MPL-05SC-12		22uF/450V		SMBJ30A					
MPL-05SC-15		220uF/35V							
MPL-05SC-24									

Immunity Design Circuits

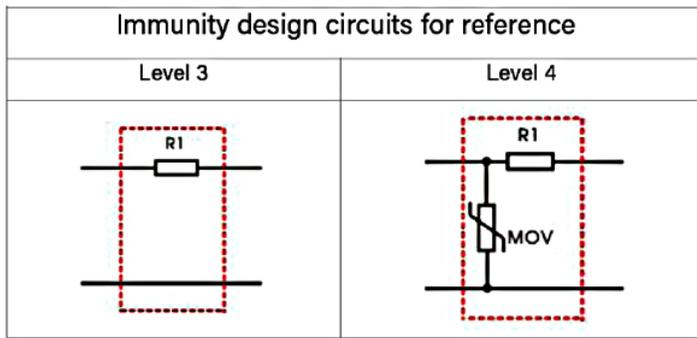


Fig. 10

Emissions Design Circuits

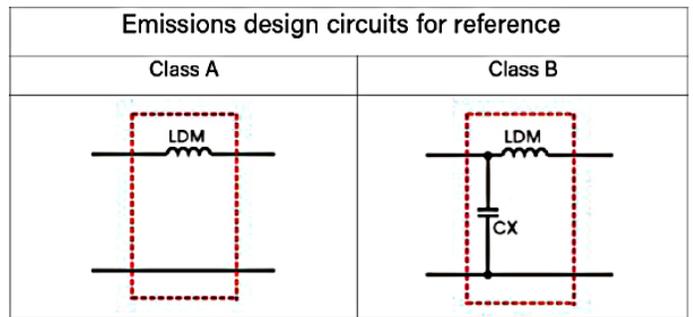


Fig. 11

Electromagnetic Compatibility Solution-Recommended Circuit

EMC Recommended Circuit - Basic Application

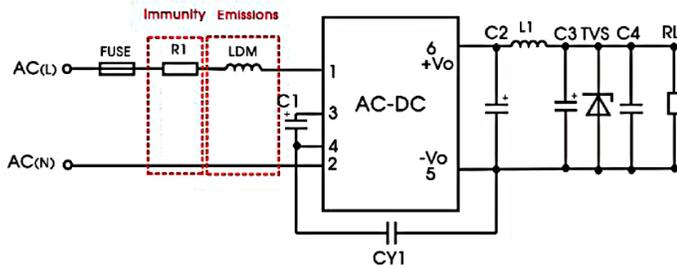


Fig. 12

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	4.7mH/Max: 15Ω/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

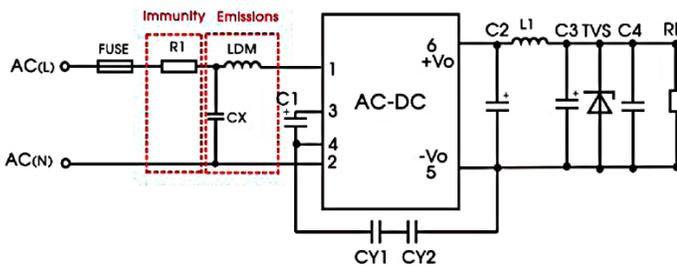


Fig. 13

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

Notes:

- 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).
- According to the certification requirements, the X capacitor needs to be connected in parallel with the bleeder resistance, the recom-

- mended resistance value is less than 3.8MΩ, and the actual need to be selected according to the certification standard.
- 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

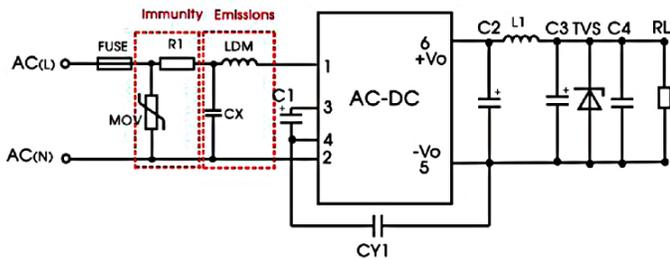


Fig. 14

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.

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/3W
FUSE (required)	2A/300V, slow-blow

EMC Recommended Circuit -Universal System for general outdoor Environment

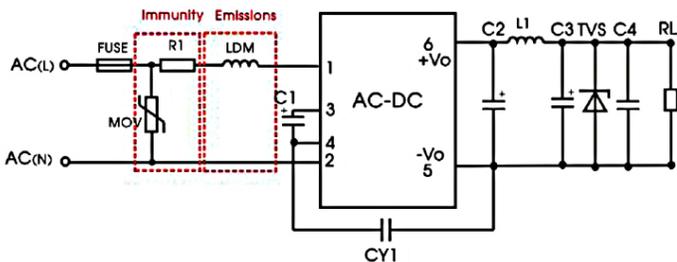


Fig. 15

Application Environment	General outdoor environment
Ambient temperature range	-40°C to +85°C
Immunity Level	Level 4
Emissions Class	Class A
MOV	S14K350
LDM	4.7mH/Max: 15Ω/Min: 0.2A
R1 (wire-wound resistor, required)	12Ω/2W
FUSE (required)	2A/300V, slow-blow

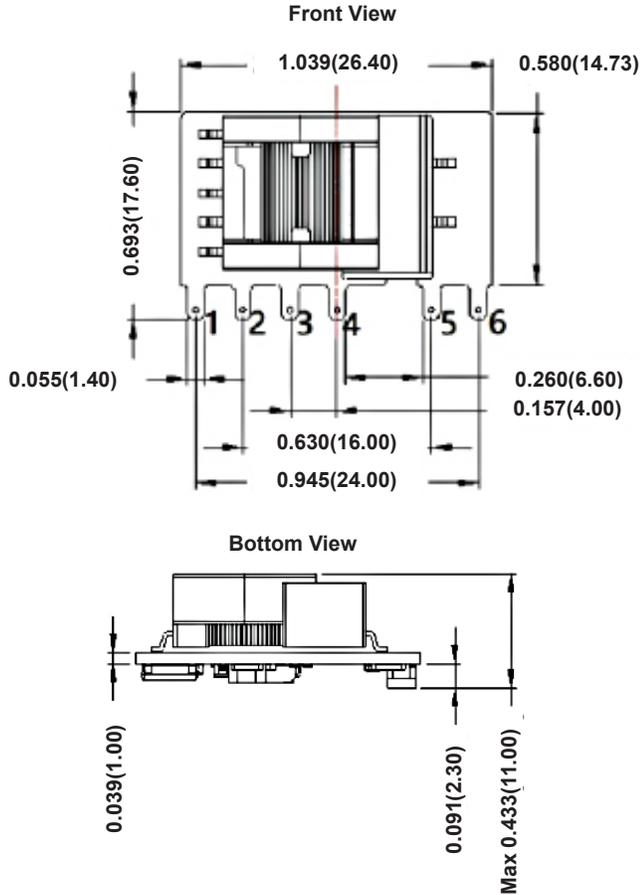
Note:

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.

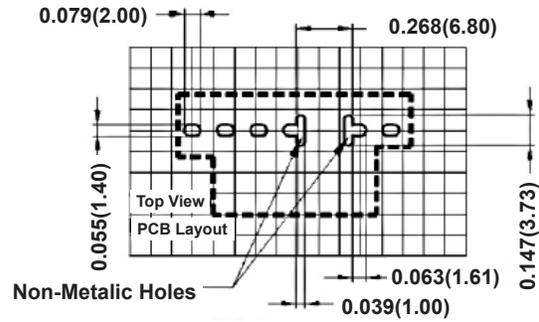
EMI/EMC Characteristics

Parameter	Standard	Criteria	Level	Application Circuit
Conducted Emissions	CISPR32/EN55032		CLASS A	Fig. 12 and Fig. 15
	CISPR32/EN55032		CLASS B	Fig. 13 and Fig. 14
Radiated Emissions	CISPR32/EN55032		CLASS A	Fig. 12 and Fig. 15
	CISPR32/EN55032		CLASS B	Fig. 13 and Fig. 14
ESD	IEC/EN61000-4-2	B	Contact ±6KV	
RS	EC/EN61000-4-3	A	10V/m	
EFT	IEC/EN61000-4-4	B	±2KV	Fig. 12 and Fig. 13
	IEC/EN61000-4-4	B	±4KV	Fig. 14 and Fig. 15
Surge	IEC/EN61000-4-5	B	Line to line ±1KV	Fig. 12 and Fig. 13
	IEC/EN61000-4-5	B	Line to line ±2KV	Fig. 14 and Fig. 15
CS	IEC/EN61000-4-6	A	10Vr.m.s	
Voltage dip, short interruption and voltage variation	IEC/EN61000-4-11	B	0%,70%	

MPL-05SC Mechanical Dimensions



Third Angle Projection



Note: The grid distance is 2.54mm*2.54mm

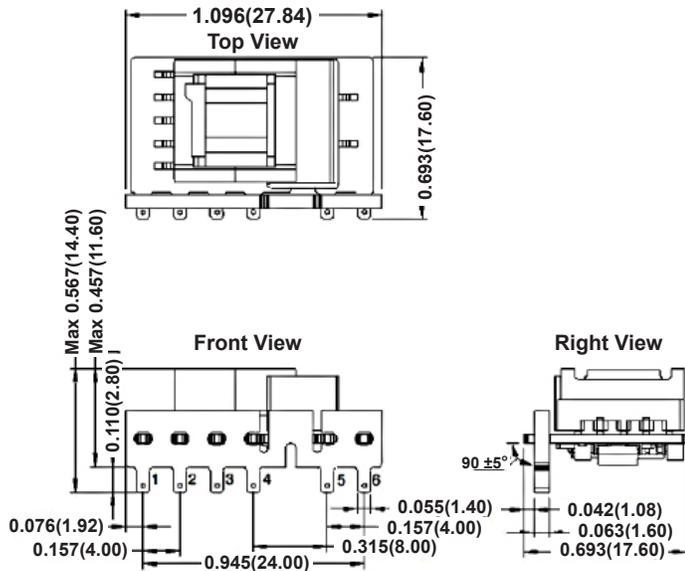
Pin-Out

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

Note:

Unit: inches(mm)
 Pin section tolerances: $\pm 0.004(\pm 0.10)$
 General tolerances: $\pm 0.039(\pm 1.00)$
 The layout of the device is for reference only, please refer to the actual product.

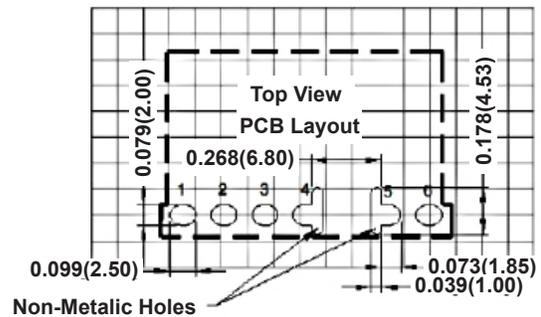
MPL-05SC-F Mechanical Dimensions



Note:

Unit: inches(mm)
 Pin section tolerances: $\pm 0.004(\pm 0.10)$
 General tolerances: $\pm 0.040(\pm 1.00)$
 The layout of the device is for reference only, please refer to the actual product.

Third Angle Projection



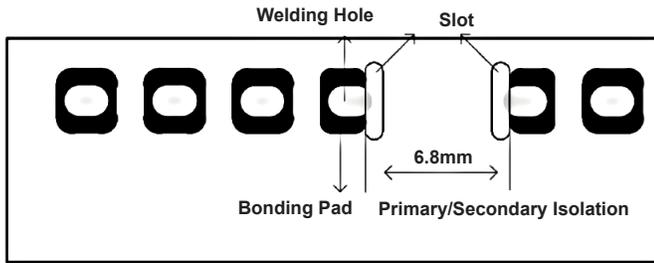
Note: The grid distance is 2.54mm*2.54mm

Pin-Out

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

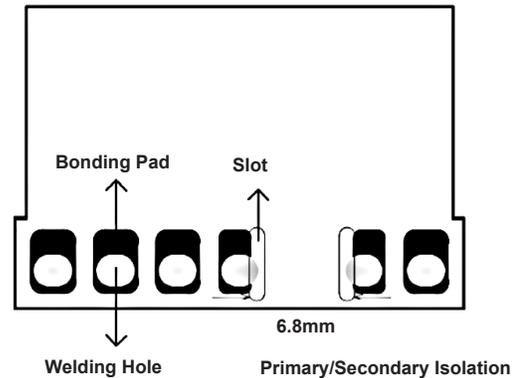
Recommended Pad

MPL-05SC Series 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.

MPL-05SC-F Series Recommended Pad



MPD has a very wide range of high performance AC/DC power supplies ranging from 600W UChannel units to 1W units in miniature Single-In-Line (SIP) packages. All are designed and certified to international safety and EMC/EMI standards.

We have AC/DC supplies approved for use in medical equipment, DIN rail supplies, "Green" energy supplies and constant power supplies.

We also offer a wide variety of DC/DC converters, LED Drivers, POL regulators and IGBT drivers. All products are available with short lead times. Call today for complete information or product samples. Or go to our website:

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