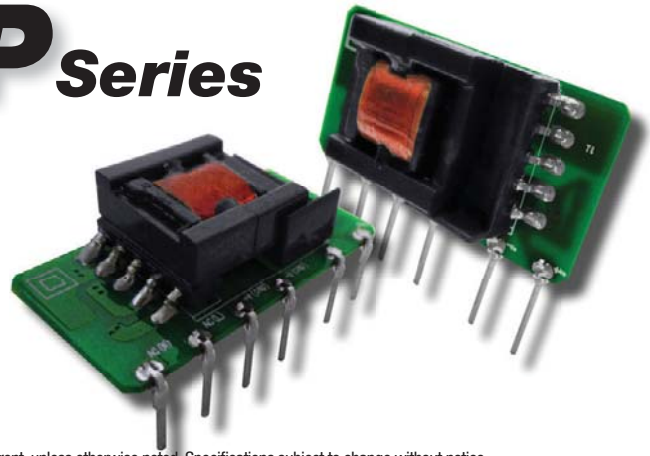


# MPL-01SEUP Series

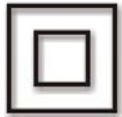
## Open, Single Output, Ultra-Miniature SIP, 1W AC/DC Power Supplies



### Key Features:

- 1W Output Power
- Open, Ultra-Miniature SIP
- Universal 85-305 VAC Input
- EN 60950 Approved
- Meets IEC Safety Class II
- Single Regulated Output
- Meets EN 55022
- >200 kHour MTBF
- Avail. With Right Angle Pins
- **Low, Low Cost!**

RoHS



MicroPower Direct



### Electrical Specifications

Specifications typical @ +25°C, 230 VAC input voltage & rated output current, unless otherwise noted. Specifications subject to change without notice.

Input					
Parameter	Conditions	Min.	Typ.	Max.	Units
Input Voltage Range, See Note 1		85		305	VAC
		70		430	VDC
Input Frequency		47		63	Hz
Input Current	See Model Selection Guide				
Inrush Current	115 VAC		9.0		A Pk
	277 VAC		15.0		

Output					
Parameter	Conditions	Min.	Typ.	Max.	Units
Output Voltage Accuracy	See Model Selection Guide				
Standby Power Consumption	24 VDC Output		0.20	0.30	W
	All Other Models		0.15	0.25	
Line Regulation	V <sub>IN</sub> = MIN to MAX		±1.5		%
Load Regulation	I <sub>OUT</sub> = 5% to 100%		±2.5		%
Ripple & Noise (20 MHz)			50	120	mV P-P
Hold-Up Time	230 VAC	150	180		msec
Temperature Coefficient			±0.15		%/°C
Over Current Protection	Autorecovery	110		500	%I <sub>OUT</sub>
Short Circuit Protection	Continuous (Autorecovery)				

General					
Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation Voltage	Input to Output, 60 Sec	3,000			VAC
Switching Frequency				100	kHz

EMI Characteristics			
Parameter	Standard	Criteria	Level
Radiated Emissions, See Note 3	EN 55022		Class B
Conducted Emissions, See Note 3	EN 55022		Class B
ESD	EN 61000-4-2	B	±4 kV Contact
RS, See Note 4	EN 61000-4-3	A	10V/m
EFT, See Note 5	EN 61000-4-4	B	±2 kV
	EN 61000-4-4	B	±4 kV
Surge, See Note 6	EN 61000-4-5	B	±1 kV / ±2 kV
CS, See Note 7	EN 61000-4-6	A	10 Vrms
Voltage Dips	EN 61000-4-11	B	0% - 70%

Environmental					
Parameter	Conditions	Min.	Typ.	Max.	Units
Operating Temp Range, See Note 1	Ambient	-40	+25	+85	°C
Storage Temperature Range		-40		+105	°C
Cooling	Free Air Convection (See Derating Curve)				
Humidity	RH, Non-condensing			85	%

Physical					
Parameter	Conditions	Min.	Typ.	Max.	Units
Case Size	See Mechanical Drawings (Page 3)				
Case Material	Conformal Coating (UL94-V0)				
Weight	0.24 Oz (9g)				
Solder Temperature	Wave Soldering (5 - 10s)	255	260	265	°C
	Manual Soldering (3 - 5s)	350	360	370	

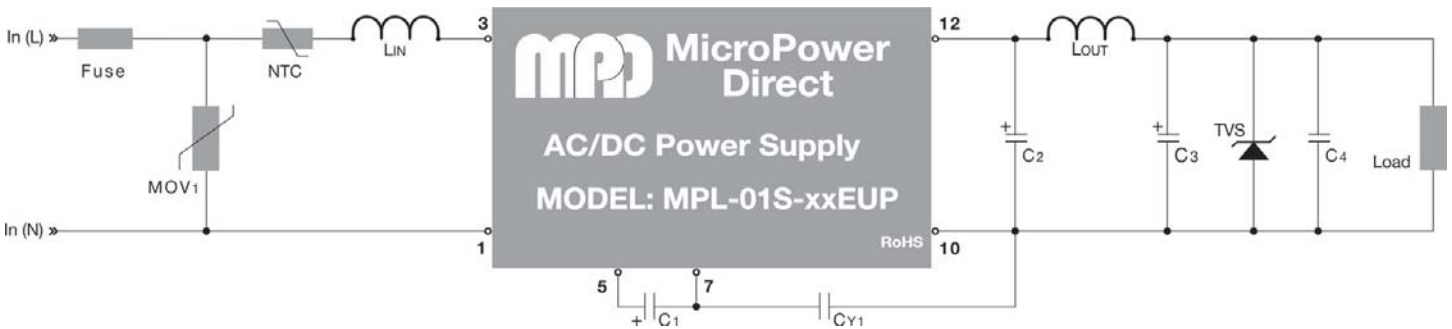
Reliability Specifications					
Parameter	Conditions	Min.	Typ.	Max.	Units
MTBF	MIL HDBK 217F, 25°C, Gnd Benign	200			kHours
Safety Standards	UL 60950, EN 60950				
Safety Class	IEC 61140 Class II				

# Model Selection Guide

Model Number	Input		Output			Maximum Output Power (W)	Output Voltage Accuracy (%)	Capacitive Load (µF, Max)	Efficiency (% Typ)	Fuse Rating Slow-Blow
	Current (A Max.)		Voltage (VDC)	Current (mA Max.)	Current (mA Min.)					
	115 VAC	277 VAC								
MPL-01S-05EUP(F)	0.120	0.060	5.0	200	0.0	1.0	±8.0	220	66	1.0A/300 VAC
MPL-01S-09EUP(F)	0.120	0.060	9.0	111	0.0	1.0	±5.0	100	67	1.0A/300 VAC
MPL-01S-12EUP(F)	0.120	0.060	12.0	83	0.0	1.0	±5.0	100	70	1.0A/300 VAC
MPL-01S-15EUP(F)	0.120	0.060	15.0	67	0.0	1.0	±5.0	100	69	1.0A/300 VAC
MPL-01S-24EUP(F)	0.120	0.060	24.0	42	0.0	1.0	±5.0	100	68	1.0A/300 VAC

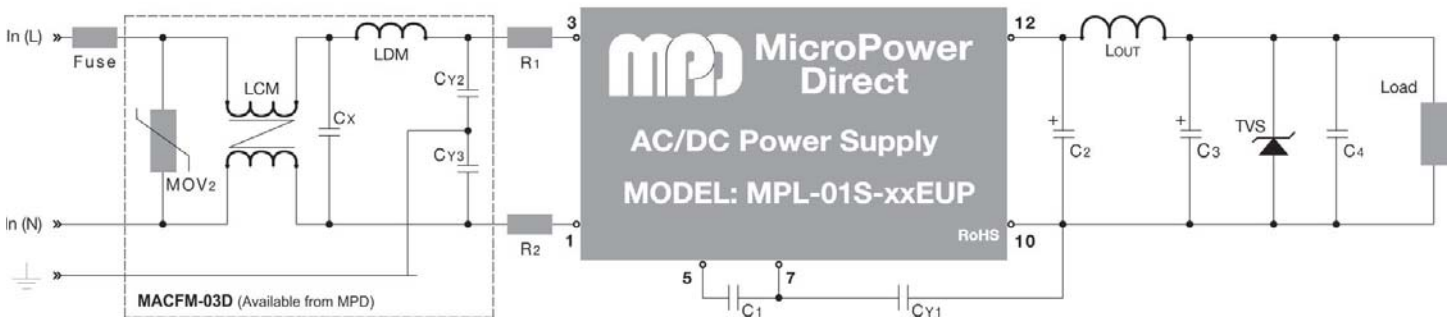
- Notes:**
- All units operate over the full input voltage range and the specified operating temperature range with no derating.
  - The external filter components (C1, C2, C3 and Lout) shown in the typical connection diagrams below are required to meet specified operation.
  - All units will meet EN 55022 (CE/RE) class A with the input circuit shown in the "Typical Connection 1" diagram below. The **MPL01SEUP** will meet class B with the additional filtering shown in the "Typical Connection 2" diagram below. **MPD** offers filter modules that will save on board space and make the input filter design easier. The model **MACFM-03D** is recommended. Contact the factory for more information.
  - To meet the requirements of EN 61000-4-3, (10V/m) external filtering (as shown in the "Typical Connection 2" diagram below) is required. This filtering may be added discretely, or by using a filter module from **MPD**. The model **MACFM-03D** is recommended. Contact the factory for more information.
  - All units will meet EN 61000-4-4 (±2 kV) with the input circuit shown in the "Typical Connection 1" diagram below. To meet the requirements of EN 61000-4-4 (±4 kV), external components (as shown in the "Typical Connection 2" diagram below) are required. This filtering may be added discretely, or by using a filter module from **MPD**. The model **MACFM-03D** is recommended. Contact the factory for more information.
  - All units will meet the requirements of EN 61000-4-5 (±1 kV/±2 kV), with the input circuit shown in the "Typical Connection 1, 2" diagrams below. This filtering may be added discretely, or by using a filter module (**MACFM-03D**) from **MPD**. Contact the factory for more information.
  - All units will meet the requirements of EN 61000-4-6 (10V rms), with the input circuit shown in the "Typical Connection 2" diagram below. This filtering may be added discretely, or by using a filter module (**MACFM-03D**) from **MPD**. Contact the factory for more information.
  - Operation at no load will not damage the units, however, they may not meet all specifications.
  - The **MPL-01SEUP** series will make an audible noise when operated under light load conditions. This does not affect the product operation or reliability.
  - It is always recommended that a fuse be used on the input of a power supply for protection. For the **MPL-01SEUP** series, a 1.0A/300 VAC slow blow should be used.
  - The **MPL-01SEUP** series is available with the pins factory set to a 90° angle (see mechanical diagrams on page 3). To order units with the modified pins, just add an "F" to the product model number (i.e. **MPL-01S-12EUPF**).

## Typical Connection 1



The diagram above illustrates a typical connection of the **MPL-01SEUP** series. With this connection, the unit will meet EN 55022 class A, EN 61000-4-2 (±4kV), EN61000-4-4 (±2kV), and EN 61000-4-11. Components C1 and C3 are required to meet specified operation limits. The recommended input components are a 15D-5 (NTC), S14k350 (MOV1) and 1 mH (Lin). The recommended output component values are given in the table below.

## Typical Connection 2: With External EMC Components



For applications that require meeting higher EMC standards, the circuit shown above is recommended. Some notes on this diagram (starting with the input circuit) are:

- It is recommended that an external fuse be used. The recommended fuse is 1A/300V.
- The capacitors Cx and Cyx are "safety" capacitors.
- Capacitor C1 is a filter component. This capacitor is required to meet specified operation. It should be a high frequency, low ESR electrolytic capacitor. The recommended value is given in the table below.
- Capacitors C2 and C3 and inductor Lout are output filter components. They are required to meet specified

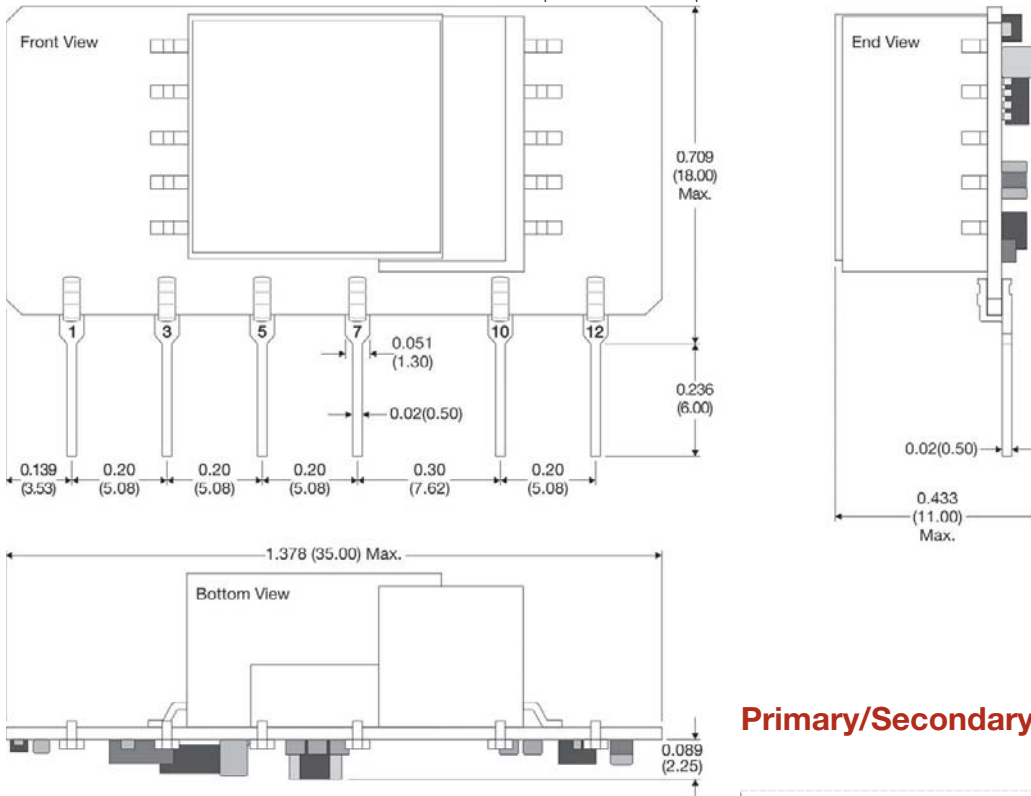
operation. Low ESR, high frequency electrolytic capacitors should be used. The recommended values are given in the table below.

- The output TVS will help protect system circuitry if power supply fails. A recommended value is given in the table below.
- Capacitor C4 is ceramic. This capacitor is used to filter high frequency noise. A recommended value is given in the table below.
- All of the components within the dotted lines of the input EMC circuit are included in the **MACFM-03D**, a filter module available from **MPD**. Please contact the factory for more information.

Recommended values for components are:

Model Number	External Components											
	MOV	LCM	Cx	LDM	Cy1/Cy2/Cy3	R1/R2	C1 (Required)	C2 (Required)	Lout (Required)	C3 (Required)	C4	TVS
MPL-01S-05EUP	S14k350	3.5 mH	0.1 µF/275 VAC	0.33 mH	1 nF/400 VAC	33Ω/3W	4.7 µF/400V	100 µF/16V	2.2 µH	68 µF/35V	0.1 µF/50V	SMBJ7.0A
MPL-01S-09EUP								150 µF/35V				SMBJ12A
MPL-01S-12EUP								100 µF/35V				SMBJ20A
MPL-01S-15EUP												SMBJ30A
MPL-01S-24EUP												

## Mechanical Dimensions



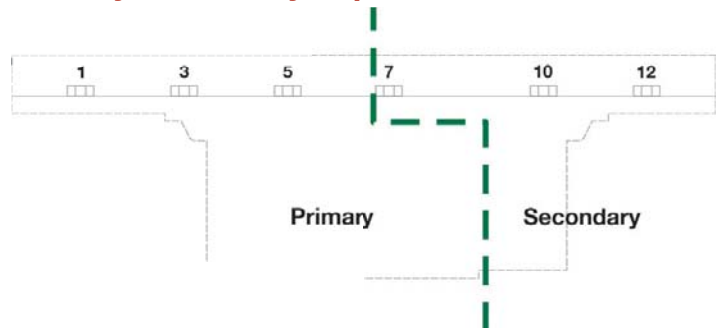
## Pin Connections

Pin	Function
1	AC-Neutral
3	AC-Line
5	+VCAP
7	-VCAP
10	-VOUT
12	+VOUT

### Notes:

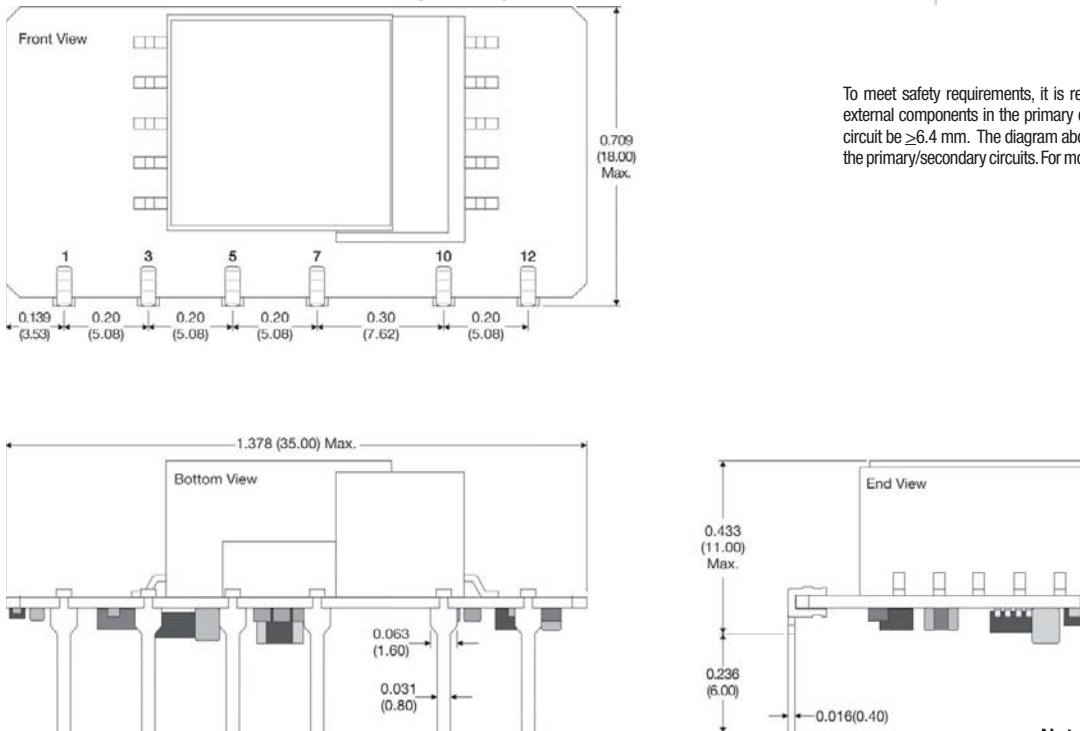
- All dimensions are typical in inches (mm)
- Tolerance x.xx = ±0.02 (±0.50)

## Primary/Secondary Separation



To meet safety requirements, it is required that the separation between any external components in the primary circuit and components in the secondary circuit be  $\geq 6.4$  mm. The diagram above shows the approximate positioning of the primary/secondary circuits. For more information, please contact the factory.

## Mechanical Dimensions: Right Angle (F) Models



## Pin Connections

Pin	Function
1	AC-Neutral
3	AC-Line
5	+VCAP
7	-VCAP
10	-VOUT
12	+VOUT

### Notes:

- All dimensions are typical in inches (mm)
- Tolerance x.xx = ±0.02 (±0.50)



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