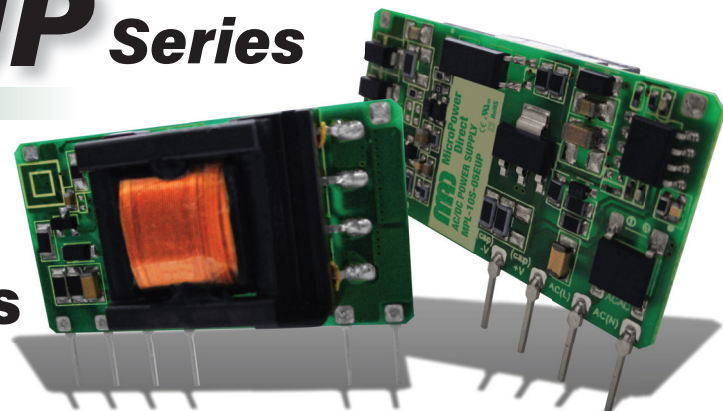


MPL-10SEUP Series

Ultra-Miniature SIP Single Output, 10W AC/DC Power Supplies



Key Features:

- 10W Output Power
- Open, Ultra-Miniature SIP
- Universal 85-305 VAC Input
- EN 62368 Approved
- Meets EN 60335
- Meets IEC Safety Class II
- Reinforced Insulation
- Meets EN 55032
- >300 kHour MTBF
- Avail. With Right Angle Pins

Electrical Specifications

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

Parameter	Conditions	Min.	Typ.	Max.	Units
Input Voltage Range		85		305	VAC
		100		430	VDC
Input Frequency		47		63	Hz
Input Current	See Model Selection Guide				
Inrush Current	115 VAC		15.0		A Pk
	230 VAC		30.0		

Output

Parameter	Conditions	Min.	Typ.	Max.	Units
Output Voltage Accuracy, See Note 2	3.3 V _{OUT}		±1.5	±3.0	%
	All Other Outputs		±1.0	±2.0	
Line Regulation	See Note 3		±0.5	±1.0	%
Load Regulation	I _{OUT} = 0% to 100%		±1.0	±1.5	%
Ripple & Noise (20 MHz)	See Note 4		80	150	mV P-P
Hold-Up Time	115 VAC		15		msec
	230 VAC		80		
Temperature Coefficient			±0.02		%/°C
Over Current Protection	Autorecovery	110			%I _{OUT}
Over Voltage Protection	See Model Selection Guide				
Short Circuit Protection, See Note 5	Continuous (Autorecovery)				

General

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation Voltage	Input to Output, 60 Sec	3,000			VAC
Isolation Resistance	500 VDC	50			MΩ
Switching Frequency			65		kHz

Environmental

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

Physical	See Mechanical Drawings (Page 6)				
Case Size					
Case Material	UL94-V0				
Weight	0.24 Oz (6g)				

Reliability Specifications

Parameter	Conditions	Min.	Typ.	Max.	Units
MTBF	MIL HDBK 217F, 25°C, Gnd Benign	300			kHours
Lead Temperature, See Note 6	Wave Solder			260	°C
	Hand Solder			360	
Safety Standards	UL/cUL 62368 recognition (UL certificate)				
Safety Class	Class II (Reinforced Insulation)				



RoHS



MicroPower Direct

292 Page Street
Suite D
Stoughton, MA 02072
USA

T: (781) 344-8226

F: (781) 344-8481

E: sales@micropowdirect.com

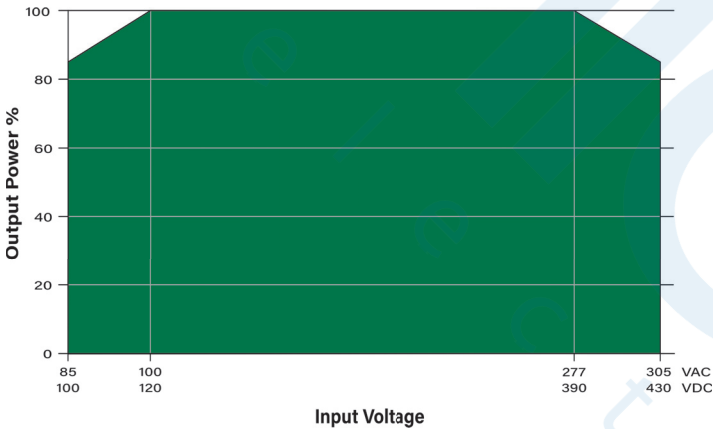
W: www.micropowdirect.com



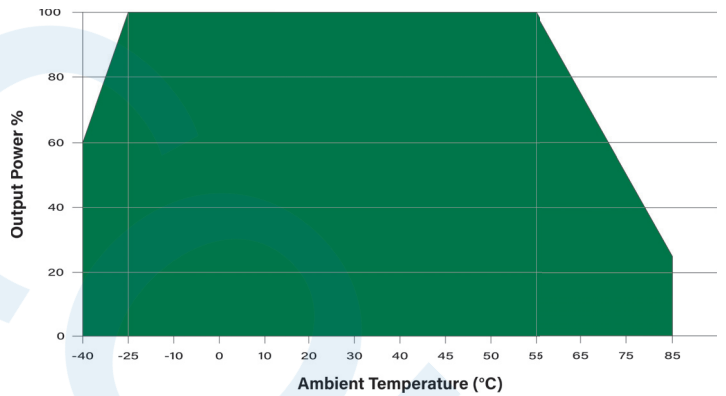
Model Number	Input		Output			Maximum Output Power (W)	Capacitive Load (µF, Max)	Efficiency (See Note 1)	Fuse Rating Slow-Blow
	Current (A Max.)		Voltage (VDC)	Current (A Max.)	Current (mA Min.)				
	115 VAC	277 VAC							
MPL-10S-03EUP(F)	0.30	0.15	3.3	2.000	0.0	6.60	1,500	70	1.0A/300 VAC
MPL-10S-05EUP(F)	0.30	0.15	5.0	2.000	0.0	10.0	1,500	76	1.0A/300 VAC
MPL-10S-09EUP(F)	0.30	0.15	9.0	1.100	0.0	10.0	1,000	78	1.0A/300 VAC
MPL-10S-12EUP(F)	0.30	0.15	12.0	0.830	0.0	10.0	680	80	1.0A/300 VAC
MPL-10S-15EUP(F)	0.30	0.15	15.0	0.670	0.0	10.0	470	81	1.0A/300 VAC
MPL-10S-24EUP(F)	0.30	0.15	24.0	0.420	0.0	10.0	330	82	1.0A/300 VAC

- Notes:**
- Efficiency is specified as typical with a 230 VAC input.
 - Output voltage accuracy is specified for a load range of 0% to 100%.
 - Line regulation is measured at full load for VIN = MIN to MAX.
 - When measuring output ripple, it is recommended that an external 0.1 µF high frequency ceramic capacitor be placed in parallel with a 47 µF high frequency electrolytic capacitor from the +VOUT pin to the -VOUT pin.
 - Output short circuit protection is provided by a "hiccup mode" circuit. The unit recovers automatically when the fault condition is removed.
 - Lead temperature is specified for 5 to 10 seconds for wave soldering with a tolerance of ±5 °C. For manual soldering it is specified for 3 to 5 seconds with a tolerance of ±10 °C.
 - External components are required to meet specifications. See notes on the typical connection diagrams for more information.
 - Operation at no load will not damage the units, however, they may not meet all specifications.
 - The MPL-10SEUP series may 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-10SEUP series, a 1.0A/300 VAC slow blow should be used.
 - If the unit is used in an application subject to high vibration levels, it should be glued down or otherwise fixed to the board.
 - The MPL-10SEUP 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-10S-12EUPF).

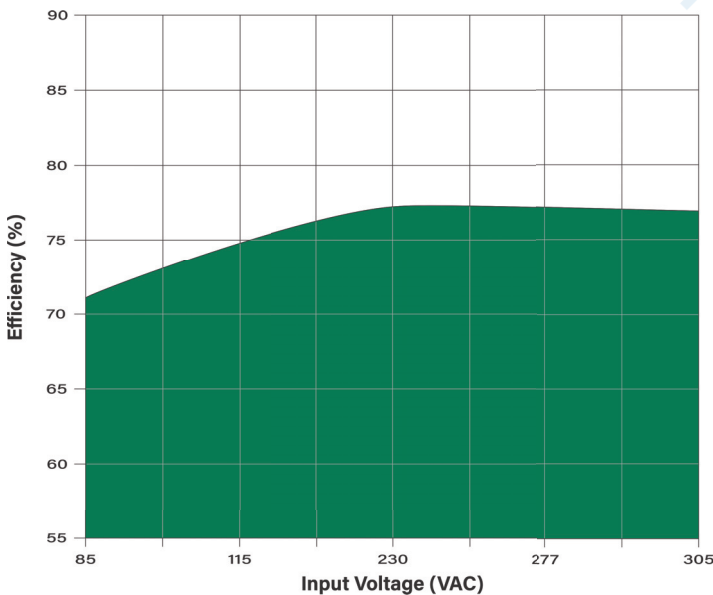
Input Voltage Derating Curve



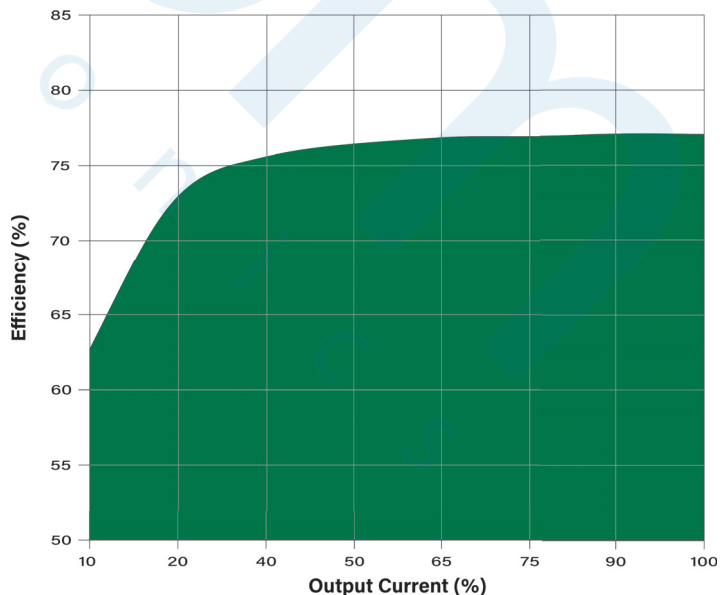
Temperature Derating Curve, 85 - 305 VAC, 70 - 430 VDC



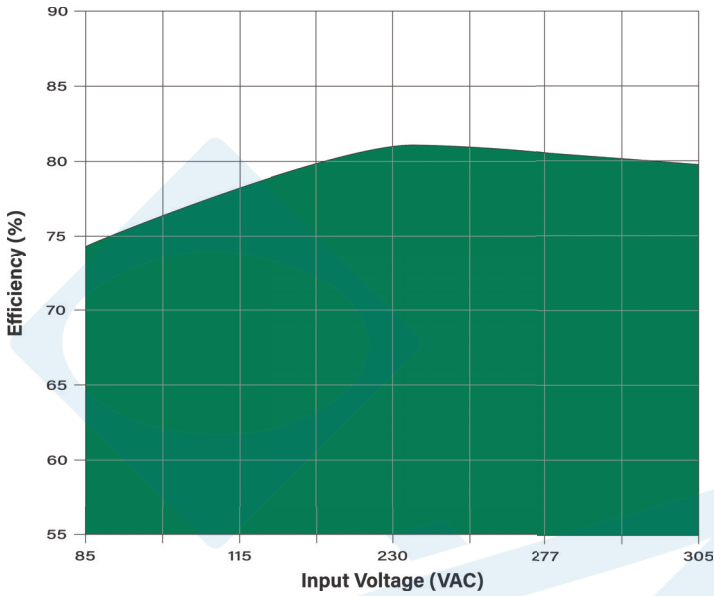
Efficiency vs Input Voltage: MPL-10S-05SEUP



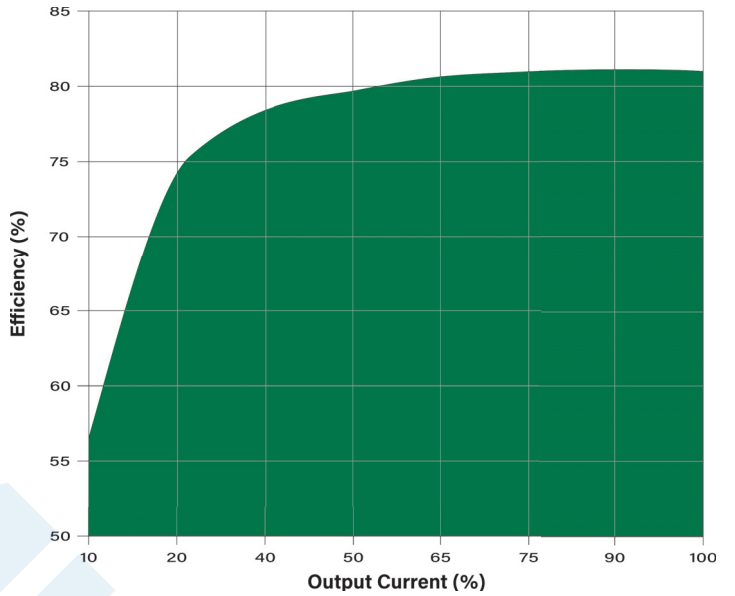
Efficiency vs Output Current: MPL-10S-05SEUP



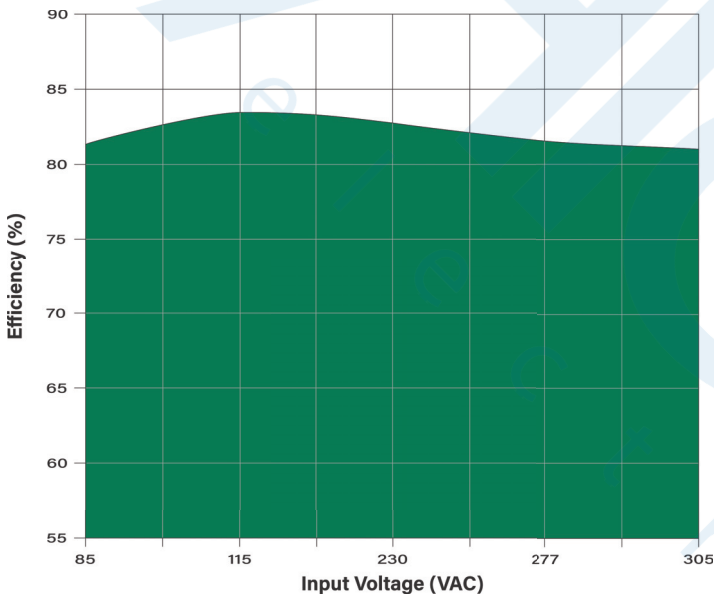
Efficiency vs Input Voltage: MPL-10S-12SEUP



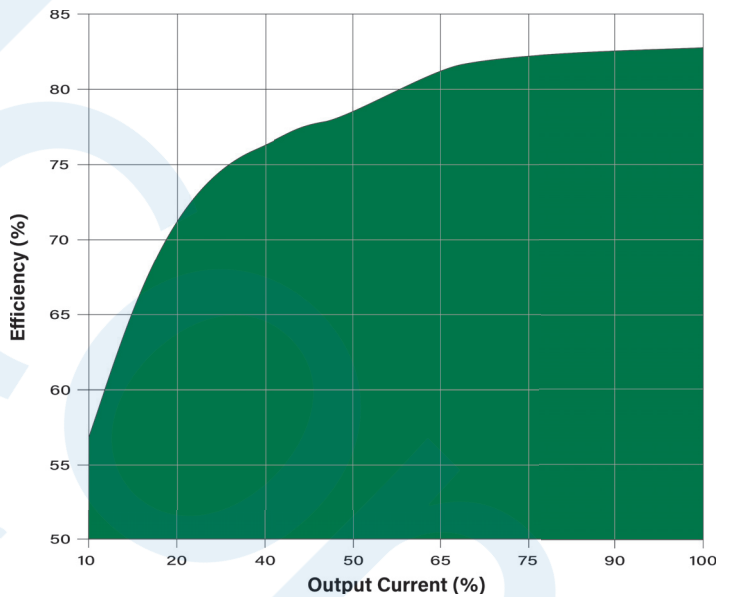
Efficiency vs Output Voltage: MPL-10S-12SEUP



Efficiency vs Input Voltage: MPL-10S-24SEUP



Efficiency vs Output Voltage: MPL-10S-24SEUP



EMI Characteristics

Parameter	Standard	Criteria	Level
Radiated Emissions, See Note 1	EN 55032		Class B
Conducted Emissions, See Note 1	EN 55032		Class B
ESD	EN 61000-4-2	B	±6 kV Contact
RS, See Note 2	EN 61000-4-3	A	10V/m
EFT, See Note 3	EN 61000-4-4	B	±2 kV
		B	±4 kV
Surge, See Note 4	EN 61000-4-5	B	±1 kV L-L
		B	±2 kV L-L
		B	±4 kV L-L
CS, See Note 5	EN 61000-4-6	A	10 Vrms
Voltage Dips, See Note 5	EN 61000-4-11	B	0% - 70%

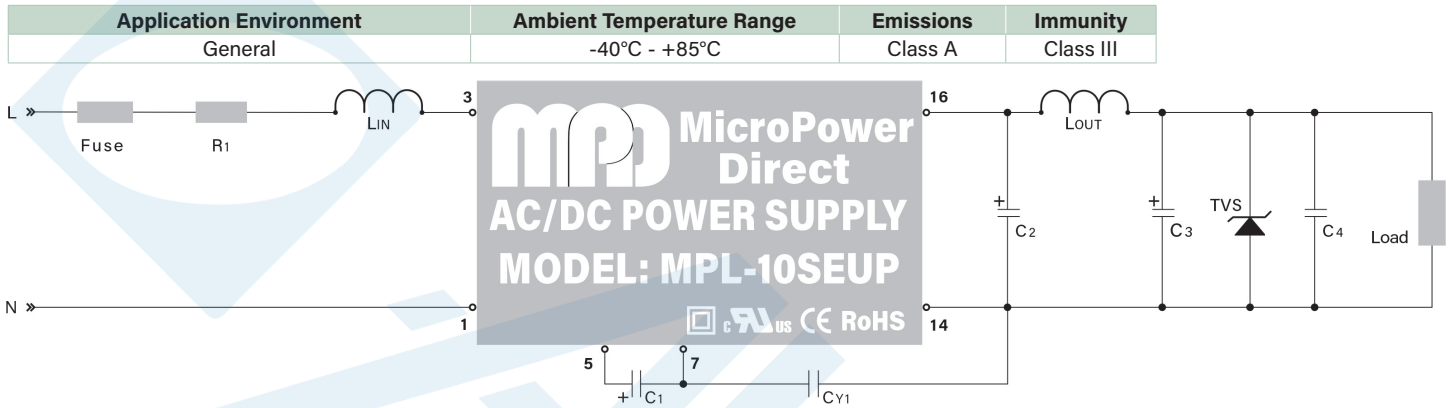
Notes:

- All units will meet EN 55032 (CE/RE) class A or class B with the input circuits shown in the "Typical Connection" diagrams on page 4 and page 5. MPD offers filter modules that will save on board space and make the input filter design easier. 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" diagrams on page 4 and page 5 is required. This filtering may be added discretely, or by using a filter module from MPD. Contact the factory for more information.
- All units will meet EN 61000-4-4 (±2 kV) with the input circuits No 1 (on page 4) and No 3 (on page 5). To meet the requirements of EN 61000-4-4 (±4 kV), external components as shown in the input circuits No 2 (on page 4) and No 4 (on page 5) is required. This filtering may be added discretely, or by using a filter module from MPD. Contact the factory for more information.
- All units will meet the requirements of EN 61000-4-5 (±1 kV line to line) with the input circuits No 1 (on page 4) and No 3 (on page 5). To meet the requirements of EN 61000-4-5 (±2 kV), external components as shown in the input circuits No 2 (on page 4) and No 4 (on page 5) is required. With the input circuit No 4, EN 61000-4-5 (±4 kV line to line) can be achieved. This filtering may be added discretely, or by using a filter module from MPD. Contact the factory for more information.
- All units will meet the requirements of EN 61000-4-6 (10V rms) and EN 61000-4-11 with the input circuits No 3 and No 4 on page 5. This filtering may be added discretely, or by using a filter module from MPD. Contact the factory for more information.

Typical Applications

Typical Connection	Environment	Industry	Input Voltage Range	Environment Temperature	Emissions	Immunity
No 1	General		85 ~ 305 VAC	-40°C - +85°C	Class A	Class III
No 2	Outdoor General	Video Monitoring, ITS, Charging Point, Communications, Security & Protection	85 ~ 305 VAC	-40°C - +85°C	Class A	Class IV
	Outdoor Harsh	Communication Base Station, On-Line Power Meter	85 ~ 305 VAC	-40°C - +85°C	Class A	Class IV (See Note Below)

Typical Connection 1: Basic Application



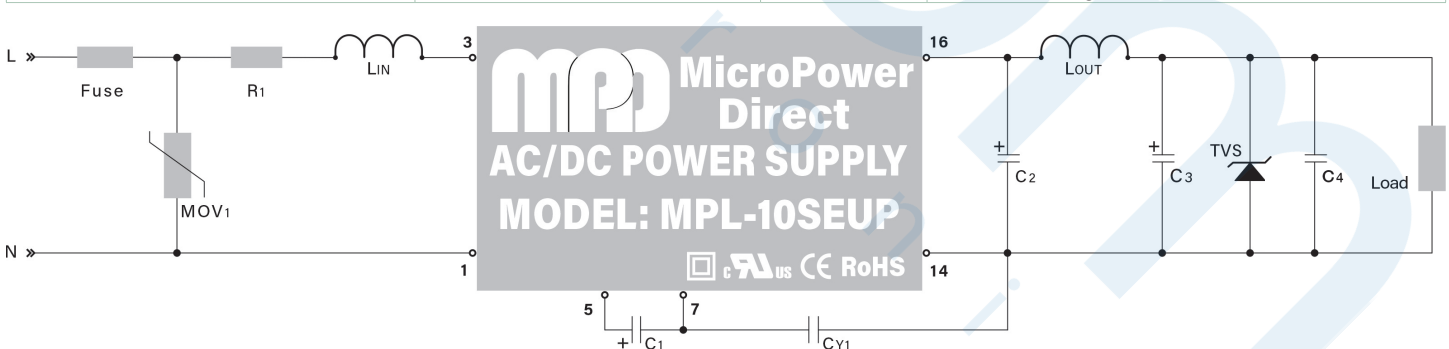
The diagram above illustrates a basic connection of the MPL-10SEUP series. The recommended components are given in the table below.

Model Number	Fuse	R1	LIN	External Components						
				C1 (Required)	CY1 (Required)	C2 (Required)	LOUT (Required)	C3 (Required)	TVS	C4
MPL-10S-03EUP(F)	1A/300V (Slow-Blow)	12Ω/3W	4.7 mH	22 μF/450V	1 nF/400 VAC	470 μF/16V (Solid Capacitor)	4.7 μH (Max 60 mA)	150 μF/35V	SMBJ7.0A	0.1 μF/50V
MPL-10S-05EUP(F)						220 μF/16V (Solid Capacitor)				
MPL-10S-09EUP(F)						470 μF/35V				
MPL-10S-12EUP(F)						220 μF/35V				
MPL-10S-15EUP(F)						47 μF/35V				
MPL-10S-24EUP(F)						47 μF/35V				

Notes: Capacitor C3 is a high frequency, low ESR electrolytic. Capacitor C4 is ceramic. The TVS should have a rating of at least 1.2 times the output voltage.

Typical Connection 2: For Outdoor/General Harsh Environment Applications

Application Environment	Ambient Temperature Range	Emissions	Immunity
Outdoor General	-40°C - +85°C	Class A	Class IV
Outdoor Harsh	-40°C - +85°C	Class A	Class IV: Surge (Line to Grnd) ±4K, EFT: Class IV



The diagram above illustrates a typical connection of the MPL-10SEUP series for outdoor environments. The recommended input components are given in the table below.

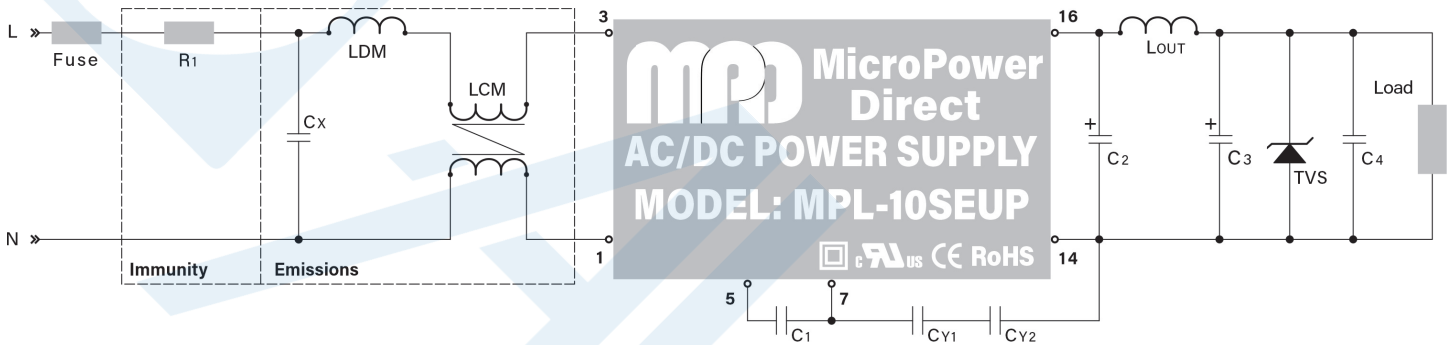
Outdoor General	External Components						Output Components
	Fuse	MOV1	R1	LIN	C1	CY1	
All Models	2A/300V (Slow-Blow)	S14K350	12Ω/3W	4.7 mH	22 μF/450V	1 nF/400 VAC	See Typical Connection 1 (Above)
Outdoor Harsh	External Components						Output Components
	Fuse	MOV1	R1	LIN	C1	CY1	
All Models	6.3A/300V (Slow-Blow)	S20K350	33Ω/5W	4.7 mH	33 μF/450V	1 nF/400 VAC	See Typical Connection 1 (Above)

Typical Applications

Typical Connection	Environment	Industry	Input Voltage Range	Environment Temperature	Emissions	Immunity
No 3	Indoor Civil	Smart Home/ Home Appliances	85 ~ 305 VAC	-25°C - +55°C	Class B	Class III
	Indoor General	Intelligent Building Intelligent Agriculture	85 ~ 305 VAC	-25°C - +55°C	Class B	Class III
No 4	Indoor Industrial	Manufacturing	85 ~ 305 VAC	-25°C - +55°C	Class B	Class IV

Typical Connection 3: For Indoor Civil Environment Applications

Application Environment	Ambient Temperature Range	Emissions	Immunity
Indoor General	-25°C - +55°C	Class B	Class III
Indoor Civil	-25°C - +55°C	Class B	Class III

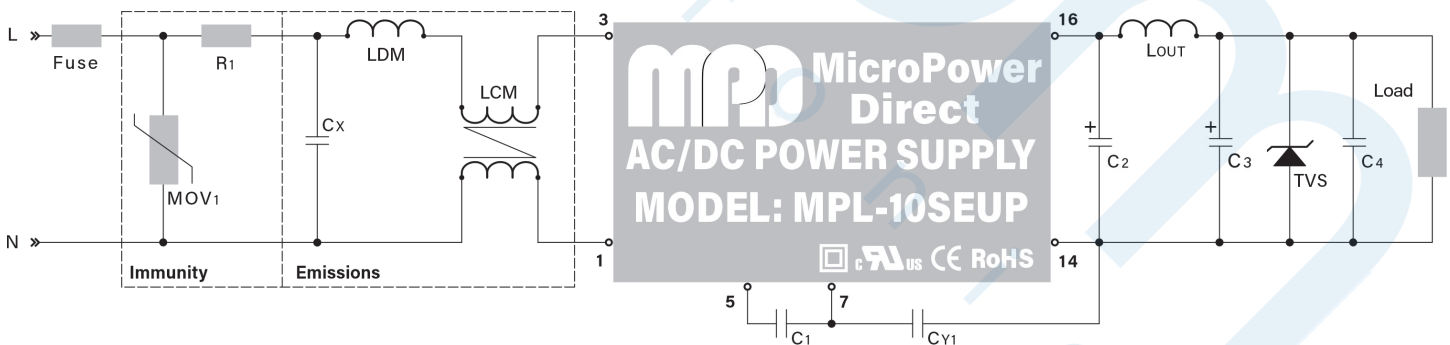


The diagram above illustrates a typical connection of the MPL-10SEUP series for general indoor environments. The recommended components are given in the table below. If the application does not require operation to EN 60335, Cy2 is not needed. For information on output components, see page 4.

External Components									
Indoor General	Fuse	R1	Cx	LDM	LCM	C1	Cy1	Cy2	Output Components
All Models	2A/300V (Slow-Blow)	12Ω/3W	0.1 μF/310 VAC	0.33 mH	3.5 mH	22 μF/450V	1.0 nF/400 VAC	---	See Typ Connection 1 (Page 4)
Indoor: EN 60335	Fuse	R1	Cx	LDM	LCM	C1	Cy1	Cy2	Output Components
All Models	2A/300V (Slow-Blow)	12Ω/3W	0.1 μF/310 VAC	0.33 mH	3.5 mH	22 μF/450V	2.2 nF/400 VAC	2.2 nF/400 VAC	See Typ Connection 1 (Page 4)

Typical Connection 4: For Indoor Industrial Environment Applications

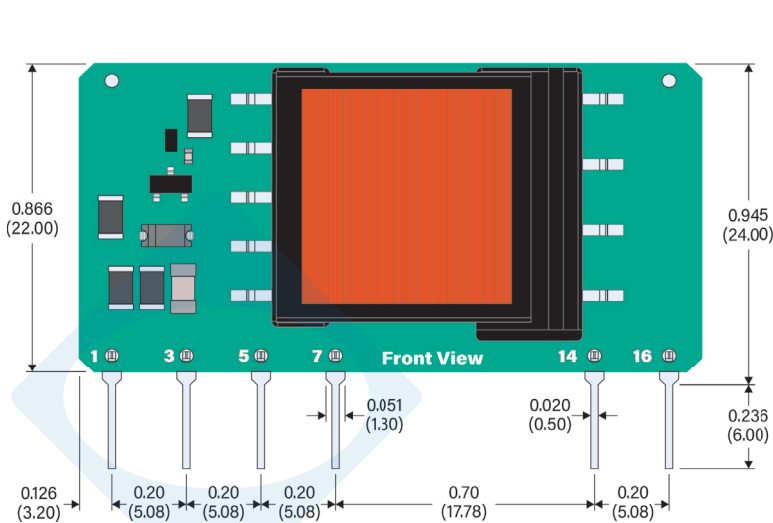
Application Environment	Ambient Temperature Range	Emissions	Immunity
Indoor Industrial	-25°C - +55°C	Class B	Class IV



The diagram above illustrates a typical connection of the MPL-10SEUP series for indoor industrial environments. The recommended input components are given in the table below. For information on output components, see page 4.

External Components									
Indoor Industrial	Fuse	MOV1	R1	Cx	LDM	LCM	C1	Cy1	Output Components
All Models	2A/300V (Slow-Blow)	S14K350	12Ω/3W	0.1 μF/310 VAC	0.33 mH	3.5 mH	22 μF/450V	2.2 nF/400 VAC	See Typ Connection 1 (Page 4)

Mechanical Dimensions

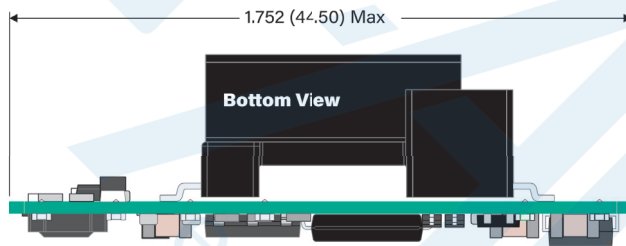


Pin Connections

Pin	Function
1	AC-Neutral
3	AC-Line
5	+VCAP
7	-VCAP
14	-VOUT
16	+VOUT

Notes:

- All dimensions are typical in inches (mm)
- General Tolerance x.xx = ±0.02 (±0.50)
- Pin Tolerance x.xxx = ±0.004 (±0.10)
- Recommended pin hole size (on the application PC Board) is Ø 0.039 (Ø1.00)

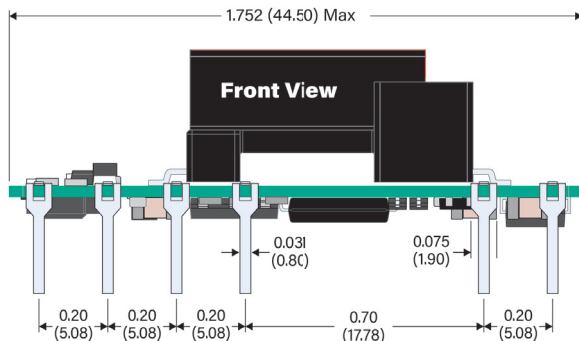
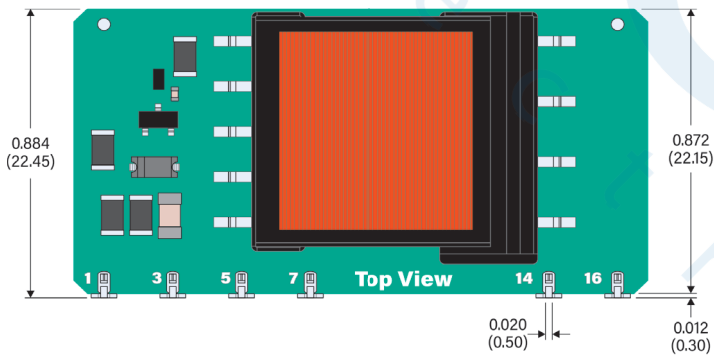


Primary/Secondary Separation

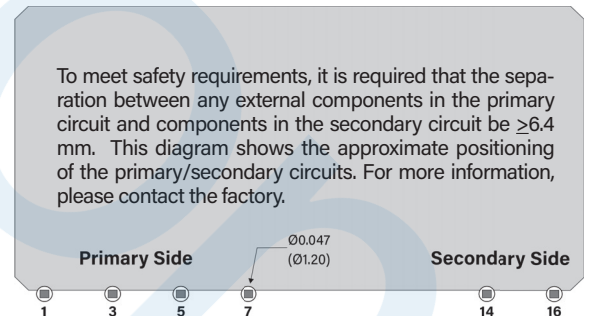


To meet safety requirements, it is required that the separation between any external components in the primary circuit and components in the secondary circuit be ≥6.4 mm. This diagram shows the approximate positioning of the primary/secondary circuits. For more information, please contact the factory.

Mechanical Dimensions: Right Angle (F) Models



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 ≥6.4 mm. This diagram shows the approximate positioning of the primary/secondary circuits. For more information, please contact the factory.

Pin Connections

Pin	Function
1	AC-Neutral
3	AC-Line
5	+VCAP
7	-VCAP
14	-VOUT
16	+VOUT

Notes:

- All dimensions are typical in inches (mm)
- General Tolerance x.xx = ±0.02 (±0.50)
- Pin Tolerance x.xxx = ±0.004 (±0.10)
- Recommended pin hole size (on the application PC Board) is Ø 0.047 (Ø1.20)



MicroPower Direct

We Power Your Success - For Less!

292 Page Street Ste D Stoughton, MA 02072 • TEL: (781) 344-8226 • FAX: (781) 344-8481 • E-Mail: sales@micropowerdirect.com



Singel 3 | B-2550 Kontich | Belgium | Tel. +32 (0)3 458 30 33 | info@alcom.be | www.alcom.be
Rivium 1e straat 52 | 2909 LE Capelle aan den IJssel | The Netherlands | Tel. +31 (0)10 288 25 00 | info@alcom.nl | www.alcom.nl