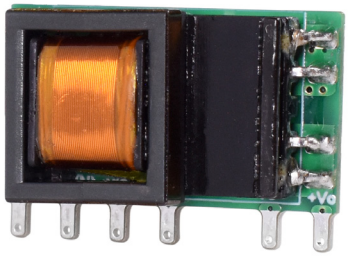
SERIES: PBO-3E | **DESCRIPTION:** AC-DC POWER SUPPLY

FEATURES

- small size, industrial design
- PCB SIP mounting
- universal input voltage range 85~305 Vac / 100~430 Vdc
- IEC/EN/UL 62368-1 certified
- designed to meet IEC/EN 61558 and IEC/EN 60335
- operating temperature -40°C ~ 85°C
- short-circuit, over current, and over voltage protection
- isolation voltage 4,000 Vac



MODEL

MODEL	output voltage (Vdc)	output current max (mA)	output power max (W)	ripple and noise[1] max (mVp-p)	efficiency typ (%)
PBO-3E-3	3.3	600	1.98	150	68
PBO-3E-5	5	600	3.0	150	73
PBO-3E-12	12	250	3.0	150	77
PBO-3E-15	15	200	3.0	150	78
PBO-3E-24	24	125	3.0	150	81

Notes: 1. 20 MHz bandwidth oscilloscope, 10% to full load.
2. All specifications are measured at Ta=25°C, humidity <75%, 115 or 230 Vac input voltage, and rated output load unless otherwise specified.

PART NUMBER KEY

INPUT

parameter	conditions/description	min	typ	max	units
voltage	ac input dc input	85 100		305 430	Vac Vdc
frequency		47	50~60	63	Hz
current	at 110 Vac at 230 Vac			0.12 0.07	A A
fuse	1A, slow-blow, required				
no load power consumption	at 230 Vac		0.10	0.15	W

OUTPUT

parameter	conditions/description	min	typ	max	units
capacitive load[3]	3.3 Vdc output model 5 Vdc output model 12 Vdc output model 15 Vdc output model 24 Vdc output model			820 680 470 330 220	µF µF µF µF µF
initial set point accuracy	from 10~100% load		±5		%
line regulation	at rated load 3.3 Vdc output model all other models		 ±2.5 ±1.5		 % %
load regulation	from 10~100% load		±3		%
temperature coefficient			±0.15		%/°C

Notes: 3. The maximum capacitive load is tested within the input voltage range and under full load conditions.

PROTECTIONS

parameter	conditions/description	min	typ	max	units
over current protection		110			%
short circuit protection	continuous, auto recovery				

SAFETY & COMPLIANCE

parameter	conditions/description	min	typ	max	units
isolation voltage	input to output for 1 minute, 5mA max	4,000			Vac
safety approvals	certified to 62368: IEC, EN, UL designed to meet 61558: IEC, EN designed to meet 60335: IEC, EN				
safety class	Class II				
conducted emissions	CISPR32/EN55032 Class A (see Recommended Circuit 1 & 4) CISPR32/EN55032 Class B (see Recommended Circuit 2 & 3)				
radiated emissions	CISPR32/EN55032 Class A (see Recommended Circuit 1 & 4) CISPR32/EN55032 Class B (see Recommended Circuit 2 & 3)				
ESD	IEC/EN61000-4-3 10 V/m, perf. Criteria A				
radiated immunity	IEC/EN61000-4-4 ±2 kV (see Recommended Circuit 1 & 2), perf. Criteria B IEC/EN61000-4-4 ±4 kV (see Recommended Circuit 3 & 4), perf. Criteria B				
EFT/burst	IEC/EN61000-4-5 line to line ±1 kV (see Recommended Circuit 1 & 2), perf. Criteria B IEC/EN61000-4-5 line to line ±2 kV (see Recommended Circuit 3 & 4), perf. Criteria B				
surge	IEC/EN61000-4-6 10 Vrms, perf. Criteria A				
conducted immunity	IEC/EN61000-4-2 Contact ±6 kV, perf. Criteria B				
MTBF	as per MIL-HDBK-217F at 25 °C	1,000,000			hours
RoHS	yes				

ENVIRONMENTAL

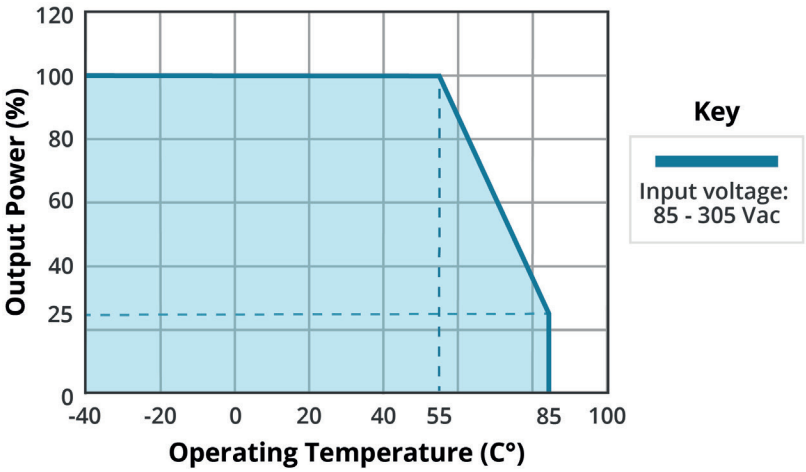
parameter	conditions/description	min	typ	max	units
operating temperature	see derating curves	-40		85	°C
storage temperature		-40		105	°C

SOLDERABILITY

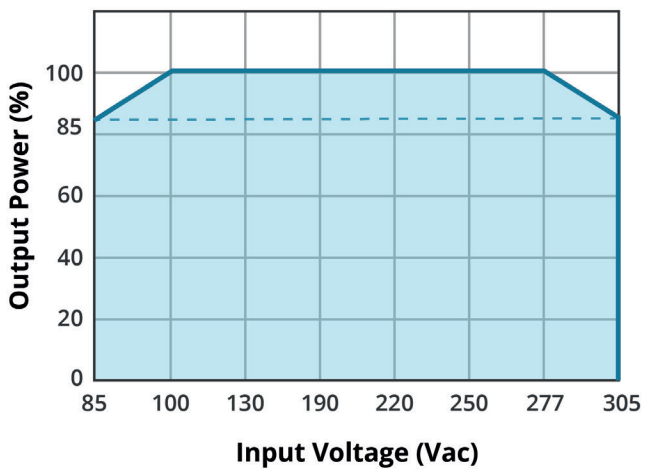
parameter	conditions/description	min	typ	max	units
wave soldering	for 5~10 seconds	255	260	265	°C
hand soldering	for 3~5 seconds	355	360	365	°C

DERATING CURVES

TEMPERATURE DERATING CURVE



INPUT VOLTAGE DERATING CURVE (25°C)

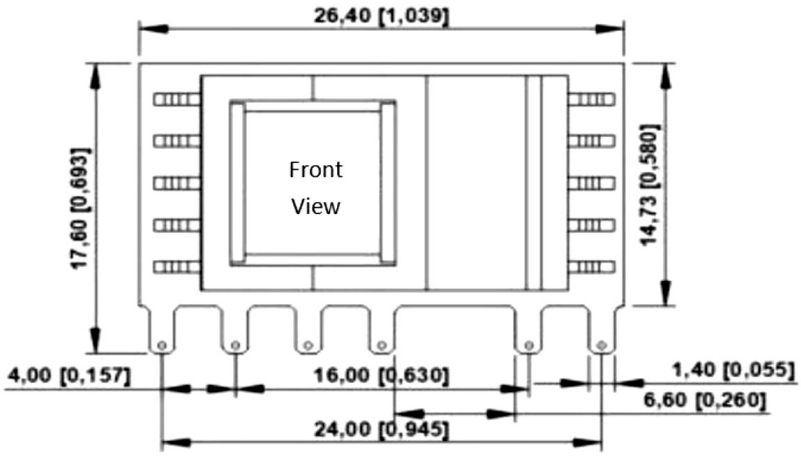


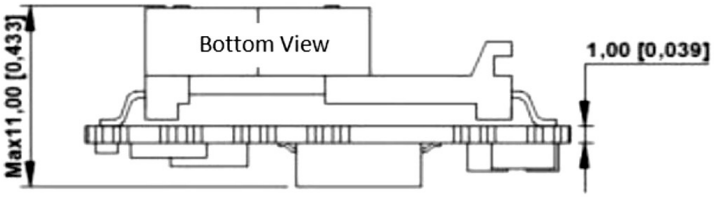
MECHANICAL

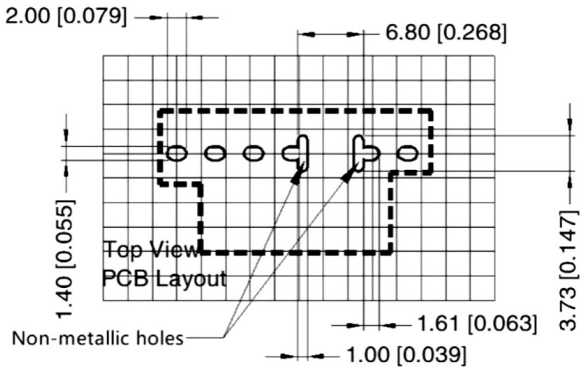
parameter	conditions/description	min	typ	max	units
dimensions	26.40 x 17.60 x 11.00 [1.039 x 0.623 x 0.433 inch]				mm
weight			5.9		g

MECHANICAL DRAWING

units: mm [inch]
pin section tolerance: ±0.10[±0.004]
tolerance: ±0.50[±0.020]







Grid size：2.54 x 2.54mm

PIN CONNECTIONS	
PIN	Function
1	AC (L)
2	AC (N)
3	+V(CAP)
4	-V(CAP)
5	-Vo
6	+Vo

APPLICATION DESIGN REFERENCE

Figure 1

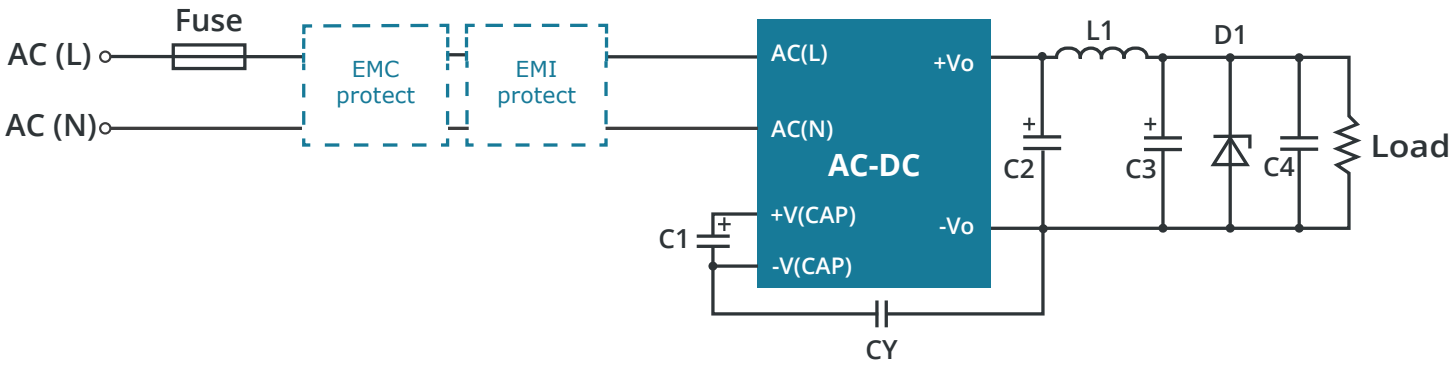


Table 1

Additional component selection guide							
Vout	C1 (required)	C2 (required)	L1 (required)	C3 (required)	C4	CY (required)	D1
3.3, 5	10μF/450V	470μF/16V (solid-state capacitor)	2.2μH 3A 15 mΩ max	150μF/16V	0.1μF/50V	1nF/400V	D1 is a TVS transistor that can protect the downstream circuit in case of module abnormalities. It is recommended to choose a model that is 1.2 times the output voltage
12		270μF/16V (solid-state capacitor)		150μF/25V			
15, 24		470μF/35V	3.3μH 3A 25 mΩ max	100μF/35V			

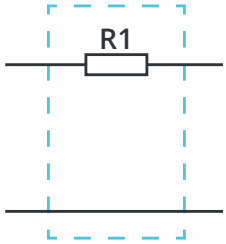
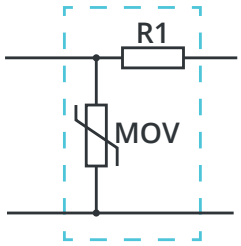
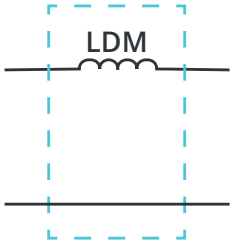
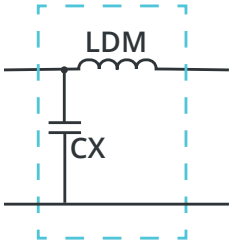
Note: 1. FUSE, EMC protection, and EMI protection are selected based on actual application needs.
2. C1 is a filtering electrolytic capacitor, which is a required component. It is recommended to use ripple current> 400mA at 100KHz electrolytic capacitors.
3. C2, C4, and L1 form a Pi type filtering circuit, and it is recommended to use high-frequency low resistance electrolytic capacitors or solidstate capacitors. When selecting L1, ripple requirements can be considered, while paying attention to current and internal resistance values.

Table 2

Enviromental and EMC selection guide						
Recommended circuit	Application enviromental	Typical industry	Input voltage range	Enviroment temperature	EMI	EMS
1	Basic application	None	85 ~ 305 Vac	-40° ~ 88°C	Class A	Class III
2	Indoor civil enviroment	Smart home / Home appliances		-25° ~ 55°C	Class B	Class III
	Indoor general enviroment	Intelligent building / Intelligent agriculture				
3	Indoor industrial enviroment	Manufacturing workshop		-25° ~ 55°C	Class B	Class IV
4	Oudoor general enviroment	Intelligent transportation / Charging point / Communication / Security		-40° ~ 85°C	Class A	Class IV

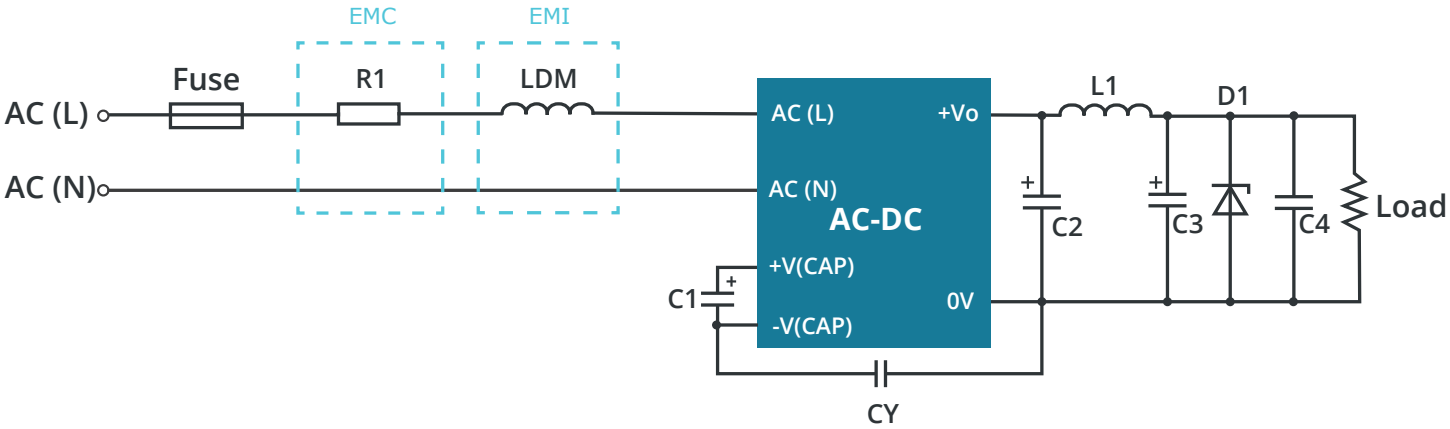
APPLICATION DESIGN REFERENCE (CONTINUED)

Figure 2

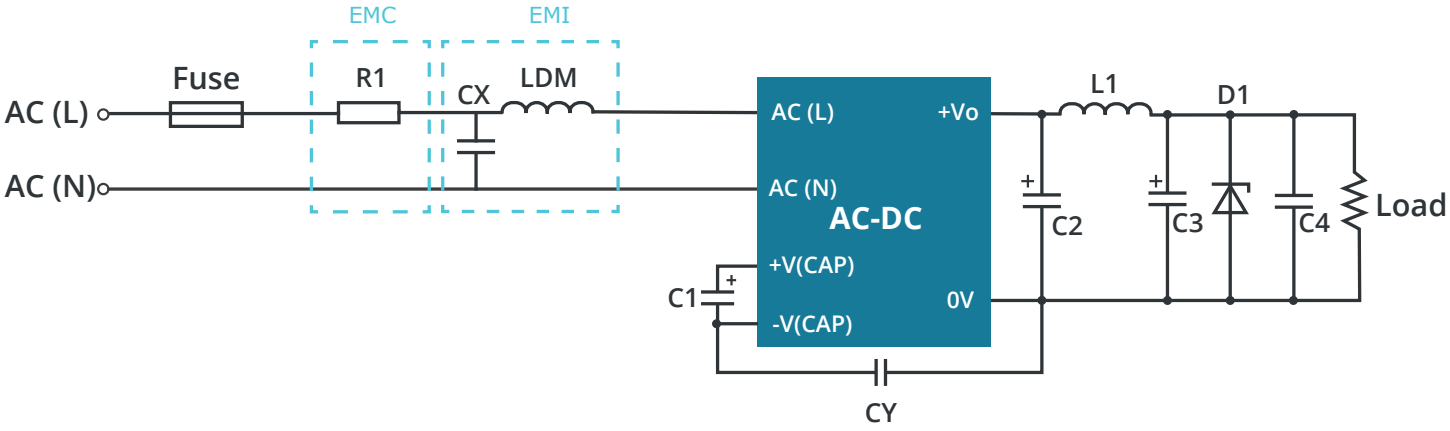
Additional circuits design reference			
Immunity design circuits for reference		Emissions design circuits for reference	
Class III	Class IV	Class A	Class B
			

EMC RECOMMENDED CIRCUIT

Circuit 1

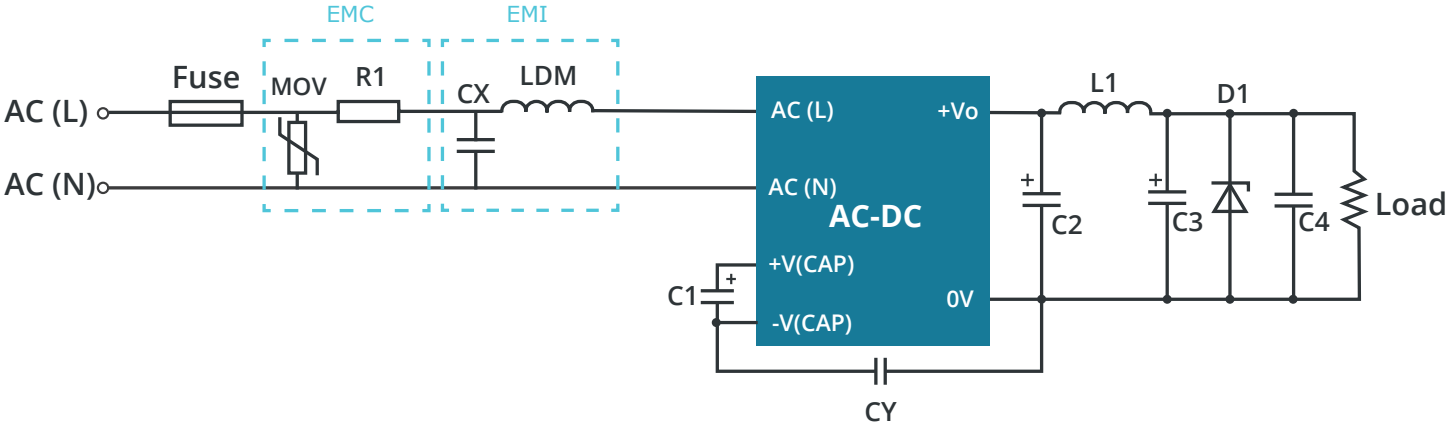


Circuit 2



EMC RECOMMENDED CIRCUIT (CONTINUED)

Circuit 3



Circuit 4

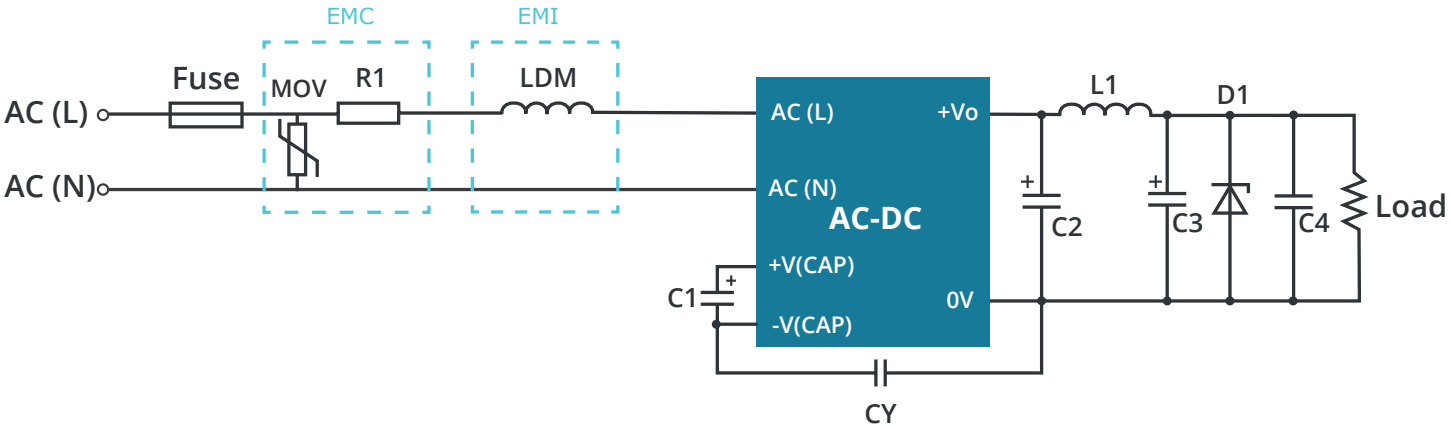


Table 3

Component	Recommended value			
	Circuit 1	Circuit 2	Circuit 3	Circuit 4
FUSE	1A/300V, slow-blow, required		2A/300V, slow-blow, required	
R1	12Ω/3W, winding resistance, required			
MOV	14D561			
LDM	2.2mH/max: 4Ω/min: 0.2A			
CX	0.1μF/310Vac			

Notes:
4. The input voltage must remain within the specified range to prevent potential permanent and irreparable damage.
5. It is recommended to use at a load of over 5%. If the load is below 5%, the ripple index of the product may exceed the specifications, but it does not affect the reliability of the product.
6. Recommended load imbalance for the dual output module: ≤ ±5%. Exceeding this threshold may result in the product failing to meet all performance specifications outlined in this manual.

REVISION HISTORY

rev.	description	date
1.0	initial release	02/17/2025

The revision history provided is for informational purposes only and is believed to be accurate.

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