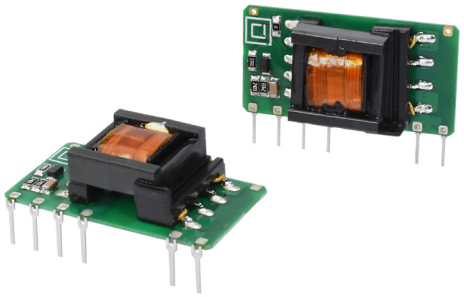
SERIES: PBO-15C | **DESCRIPTION:** INTERNAL AC-DC POWER SUPPLY

FEATURES

- wide input range (85~305 VAC or 100 – 430 VDC)
- available in straight-pin and bent-pin configurations
- wide operating temperature range (-40 to +85 C)
- over-voltage, over-current, short-circuit protection
- IEC/EN/UL 62368 certified
- designed to meet IEC/EN/UL 60335 requirements
- safety class II
- ideal for Industrial Control & Smart Home applications

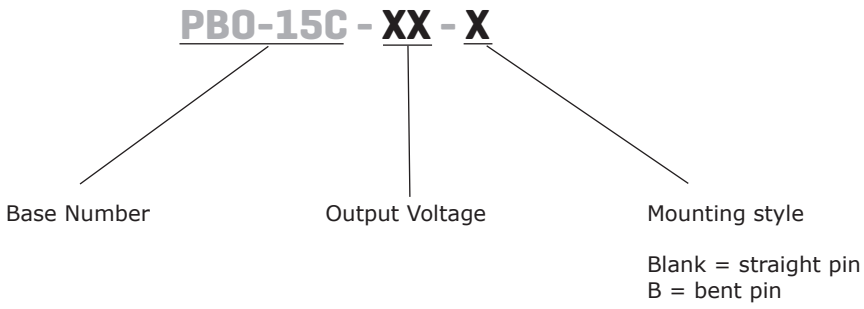


MODEL

MODEL	output voltage (Vdc)	output current max (A)	output power max (W)	ripple and noise[1] typ (mVp-p)	efficiency[2] typ (%)
PBO-15C-3	3.3	3.0	9.9	150	75.0
PBO-15C-5	5.0	2.8	14.0	150	77.0
PBO-15C-9	9.0	1.67	15.0	150	82.0
PBO-15C-12	12.0	1.25	15.0	150	82.0
PBO-15C-15	15.0	1.0	15.0	150	84.0
PBO-15C-24	24.0	0.625	15.0	150	85.0

Note: 1. At full load, nominal input, 20 MHz bandwidth oscilloscope, see Application Circuit.
2. At 230 Vac input.

PART NUMBER KEY



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INPUT

parameter	conditions/description	min	typ	max	units
voltage	AC input DC input	85 100		305 430	Vac Vdc
frequency		47		63	Hz
current	at 115 Vac at 230 Vac			0.4 0.25	A A
inrush current	at 115 Vac at 230 Vac		18 35		A A
no load power consumption	at 230 Vac			0.25	W

OUTPUT

parameter	conditions/description	min	typ	max	units
capacitive load	3.3 Vdc output models 5 Vdc output models 9 Vdc output models 12 Vdc output models 15 Vdc output models 24 Vdc output models			20,000 15,000 5,000 4,000 2,000 1,000	µF µF µF µF µF µF
initial set point accuracy	3.3 Vdc output other outputs		±3 ±2		% %
line regulation	at full load		±0.5		%
load regulation	0% ~ 100% load, 3.3 Vdc output 0% ~ 100% load, 5 Vdc output 0% ~ 100% load, other outputs		±2 ±1.5 ±1		% % %
hold-up time	at 115 Vac at 230 Vac		10 40		ms ms
switching frequency			65		kHz
temperature coefficient			±0.02		%/°C

PROTECTIONS

parameter	conditions/description	min	typ	max	units
over voltage protection	output voltage clamp 3.3 & 5 Vdc output models 9 Vdc output models 12 Vdc output models 15 Vdc output models 24 Vdc output models			 9.0 12.0 16.0 20.0 30.0	 Vdc Vdc Vdc Vdc Vdc
over current protection	auto recovery	110			%
short circuit protection	continuous, auto recovery				

SAFETY & COMPLIANCE

parameter	conditions/description	min	typ	max	units
isolation voltage	input to output for 1 minute, leakage current <5mA	3,000			Vac
safety approvals	certified to 62368: IEC, EN, UL designed to meet 60335: IEC, EN, UL				
safety class	class II				
EMI/EMC	CISPR32/EN55032 CLASS A (Recommended circuit 1, 4) CISPR32/EN55032 CLASS B (Recommended circuit 2, 3)				
ESD	IEC/EN 61000-4-2 Contact ±6kV perf. criteria B				
radiated immunity	IEC/EN61000-4-3 10V/m perf. criteria A				

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SAFETY & COMPLIANCE (CONTINUED)

parameter	conditions/description	min	typ	max	units
EFT/burst	IEC/EN61000-4-4 ±2KV (Recommended circuit 1, 2) perf. criteria B IEC/EN61000-4-4 ±4KV (Recommended circuit 3, 4) perf. criteria B				
surge	IEC/EN61000-4-5 line to line ±1KV (Recommended circuit 1, 2) perf. criteria B IEC/EN61000-4-5 line to line±2KV (Recommended circuit 3, 4) perf. criteria B				
conducted immunity	IEC/EN61000-4-6 10Vr.m.s perf. criteria A				
voltage dips and interruptions	IEC/EN61000-4-11 0%, 70% perf. criteria B				
MTBF	as per MIL-HDBK-217F at 25 °C	1,000,000			hours
RoHS	yes				

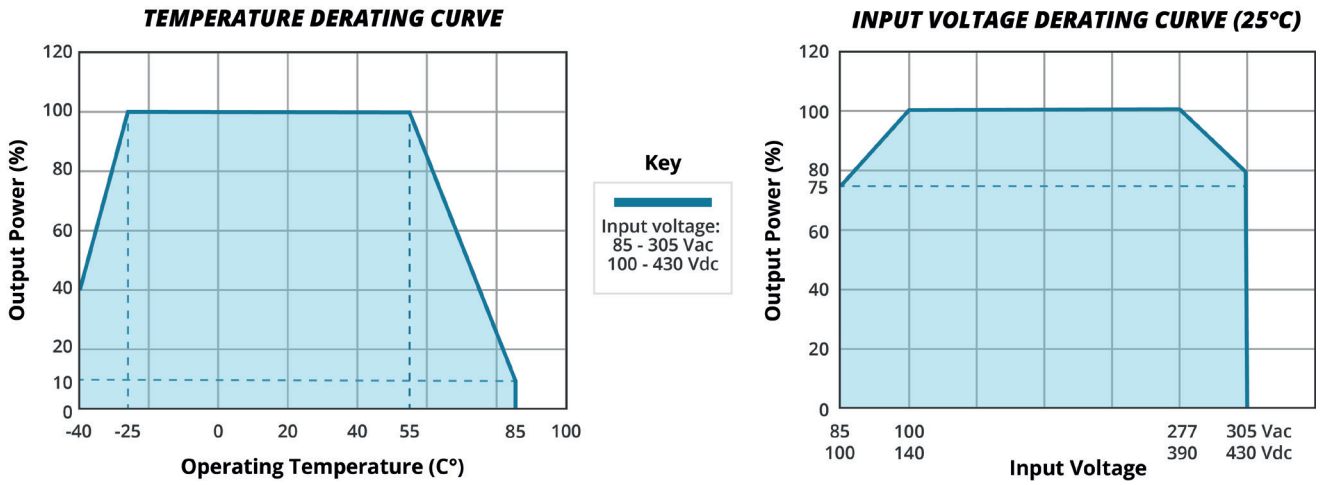
ENVIRONMENTAL

parameter	conditions/description	min	typ	max	units
operating temperature		-40		85	°C
storage temperature		-40		105	°C
storage humidity				95	%

SOLDERABILITY

parameter	conditions/description	min	typ	max	units
wave soldering	for 5~10 seconds	255	260	265	°C
manual welding	for 3~5 seconds	350	360	370	°C

DERATING CURVE



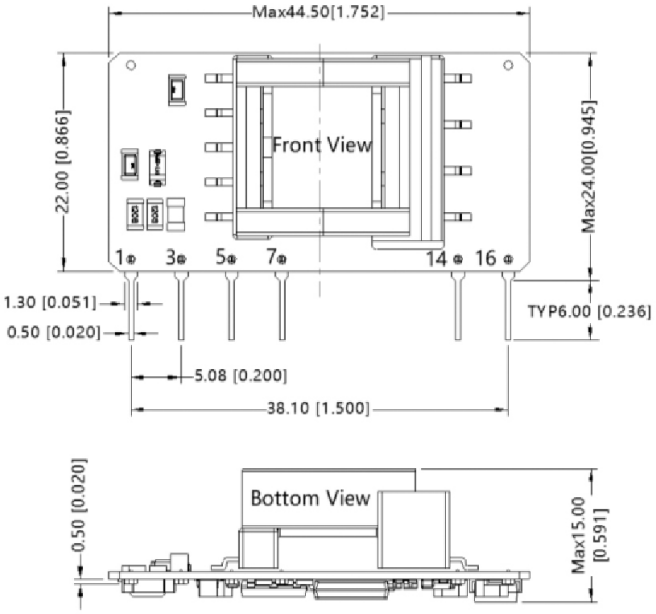
MECHANICAL

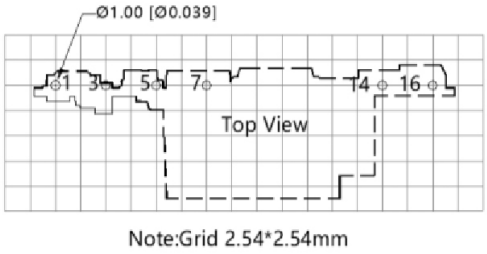
parameter	conditions/description	min	typ	max	units
dimensions	44.50 x 24.00 x 15.00 mm (1.751 x 0.944 x 0.590 inches)				inch
weight			11		g
cooling	free air convection				

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MECHANICAL DRAWING

Straight-pin configuration
units: mm [inch]
pin section tolerance: ±0.10 [±0.004]
general tolerance: ±0.50 [±0.020]

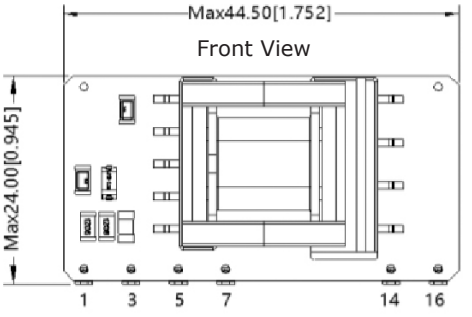


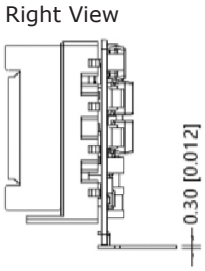


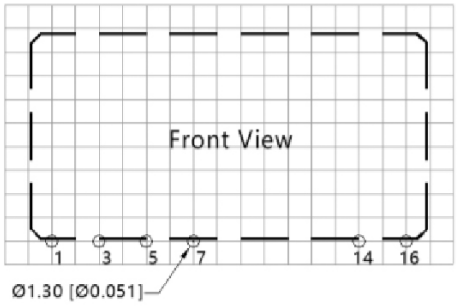
Note: The separation between all primary and secondary circuits must be maintained as follows to maintain the safety requirements:
Creepage: >6.4 mm
Clearance: >4.0 mm

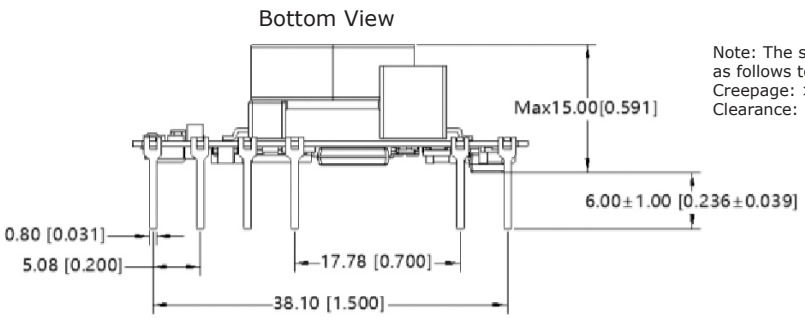
PIN CONNECTIONS	
PIN	Function
1	AC (N)
3	AC (L)
5	+V (cap)
7	-V (cap)
14	-Vo
16	+Vo

Bent-pin configuration
units: mm [inch]
pin section tolerance: ±0.10 [±0.004]
general tolerance: ±0.50 [±0.020]







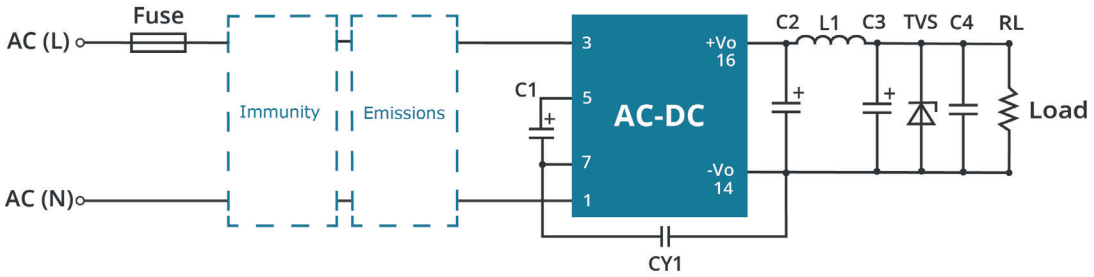


Note: The separation between all primary and secondary circuits must be maintained as follows to maintain the safety requirements:
Creepage: >6.4 mm
Clearance: >4.0 mm

PIN CONNECTIONS	
PIN	Function
1	AC (N)
3	AC (L)
5	+V (cap)
7	-V (cap)
14	-Vo
16	+Vo

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APPLICATION DESIGN REFERENCE



Note: All applications must follow this minimum circuit implementation. Additional enviromental and application-specific variations are listed in the following pages.

PBO-15C Series additional component selection guide								
Part no.	FUSE (required)	C1 (required)	C2 (required)	L1 (required)	C3[1] (required)	C4	CY1 (required)	TVS
PBO-15C-3	1A/300V	33μF/450V	470μF/16V (solid-state capacitor)	2.2μH (Max 22mΩ)	220μF/16V	0.1μF/50V	2.2nF/400Vac	SMBJ7.0A
PBO-15C-5								SMBJ7.0A
PBO-15C-9								SMBJ12A
PBO-15C-12								SMBJ20A
PBO-15C-15			680uF/25V		220μF/35V			SMBJ20A
PBO-15C-24			470uF/35V					SMBJ30A

Note: 1. C3 is recommended to be a high frequency electrolytic capacitor with low ESR.

PBO-15C Series Enviromental and EMC selection guide					
Recommended circuit	Typical application	Input voltage range	Enviroment temperature	Emissions	Immunity
1	General purpose	85~305Vac	-40°C to 85°C	Class A	Class III
2	Smart home, home appliances, intelligent building, intelligent agriculture		-25°C to 55°C	Class B	Class III
3	Indoor industrial		-25°C to 55°C	Class B	Class IV
4	Outdoor, video monitoring, charging point, communications, security		-40°C to 85°C	Class A	Class IV

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Circuit 1

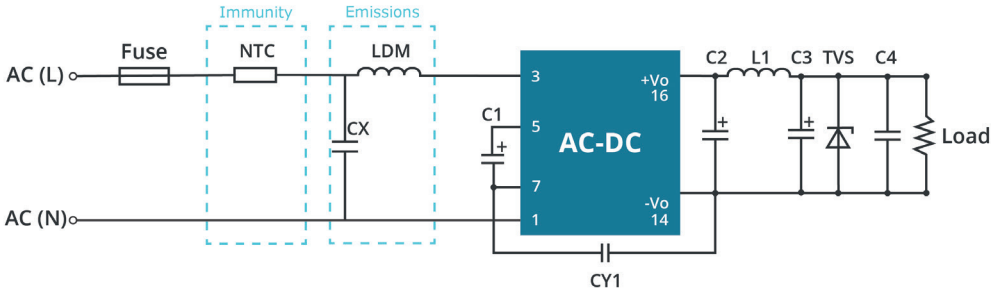


Table 1

Ambient temperature range	Imunity Class	Emissions Class
-40°C ~ 85°C	Class III	Class A

Component	Recommended value
NTC	10D - 10
LDM	1.2mH (min: 0.4A, max: 4Ω)
CX	0.1μF/310Vac
FUSE (required)	1A/300V, slow blow

Circuit 2

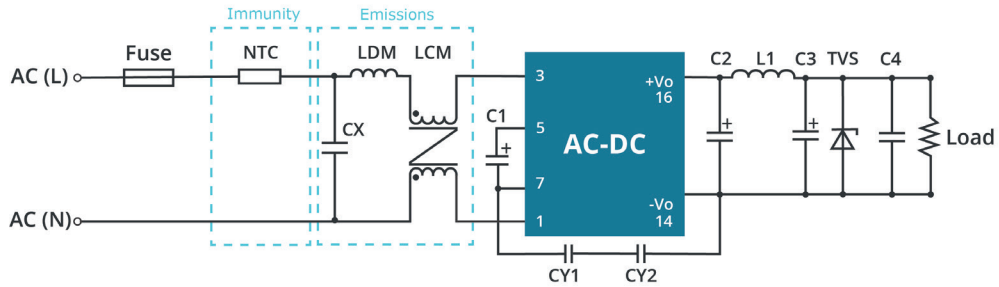


Table 2

Ambient temperature range	Imunity Class	Emissions Class
-25°C ~ 55°C	Class III	Class B

Component	Recommended value
NTC	10D - 10
CY1 (CY2)	2.2nF/400Vac
LCM	10mH (min: 0.4A, max: 600mΩ)
LDM	0.33mH (min: 0.4A, max: 1Ω)
CX	0.22μF/310Vac
FUSE (required)	1A/300V, slow blow

Note: When designing applications for household use (e.g. Smart Home or Home Appliance application), two Y-Caps (CY1 & CY2 valued at 2.2nF/400Vac each) are required in series to satisfy 60335 household safety requirements. Non-household applications can use one Y-Cap (CY1 valued at 2.2 nF/400Vac).

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APPLICATION DESIGN REFERENCE (CONTINUED)

Circuit 3

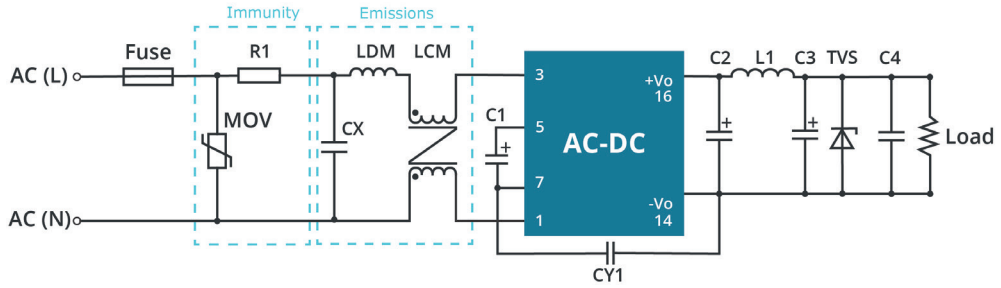


Table 3

Ambient temperature range	Imunity Class	Emissions Class
-25°C ~ 55°C	Class IV	Class B

Component	Recommended value
MOV	S14K350
CY1	2.2nF/400Vac
CX	0.22µF/310Vac
LCM	10mH (min: 0.4A, max: 600mΩ)
LDM	0.33mH (min: 0.4A, max: 1Ω)
R1	12Ω/3W
FUSE (required)	2A/300V, slow blow

Circuit 4

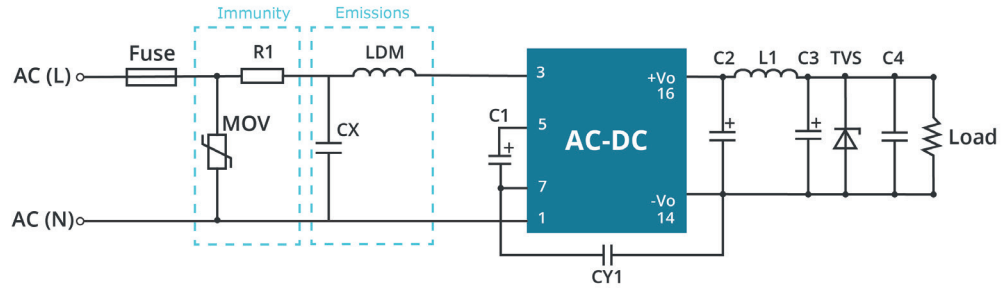


Table 4

Ambient temperature range	Imunity Class	Emissions Class
-40°C ~ 85°C	Class IV	Class A

Component	Recommended value
MOV	S14K350
LDM	1.2mH (min: 0.4A, max: 4Ω)
CX	0.1µF/310Vac
R1	12Ω/3W
FUSE (required)	2A/300V, slow blow

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REVISION HISTORY

rev.	description	date
1.0	initial release	08/25/2020
1.01	datasheet update	12/14/2020
1.02	derating curves and circuit figures updated	01/24/2022

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

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