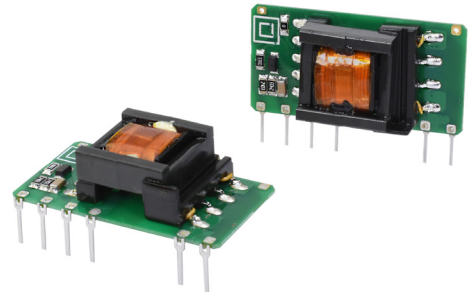


SERIES: PBO-15C | **DESCRIPTION:** INTERNAL AC-DC POWER SUPPLY

FEATURES

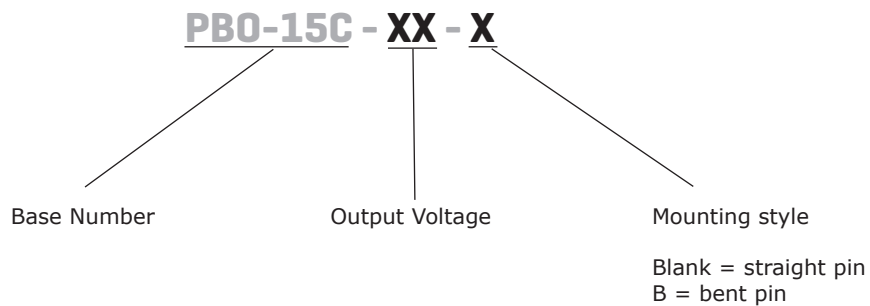
- wide input range (85~305 VAC or 100 – 430 VDC)
- available in straight-pin and bent-pin configurations
- wide operating temperature range (-40 to +85 C)
- over-voltage, over-current, short-circuit protection
- IEC/EN/UL 62368 certified
- designed to meet IEC/EN/UL 60335 requirements
- safety class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



MODEL	output voltage	output current	output power	ripple and noise ¹	efficiency ²
	(Vdc)	max (A)	max (W)	typ (mVp-p)	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



INPUT

parameter	conditions/description	min	typ	max	units
voltage	AC input	85		305	Vac
	DC input	100		430	Vdc
frequency		47		63	Hz
current	at 115 Vac			0.4	A
	at 230 Vac			0.25	A
inrush current	at 115 Vac		18		A
	at 230 Vac		35		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			20,000	μF
	5 Vdc output models			15,000	μF
	9 Vdc output models			5,000	μF
	12 Vdc output models			4,000	μF
	15 Vdc output models			2,000	μF
	24 Vdc output models			1,000	μF
initial set point accuracy	3.3 Vdc output		±3		%
	other outputs		±2		%
line regulation	at full load		±0.5		%
load regulation	0% ~ 100% load, 3.3 Vdc output		±2		%
	0% ~ 100% load, 5 Vdc output		±1.5		%
	0% ~ 100% load, other outputs		±1		%
hold-up time	at 115 Vac		10		ms
	at 230 Vac		40		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			9.0	Vdc
	9 Vdc output models			12.0	Vdc
	12 Vdc output models			16.0	Vdc
	15 Vdc output models			20.0	Vdc
	24 Vdc output models			30.0	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				

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				

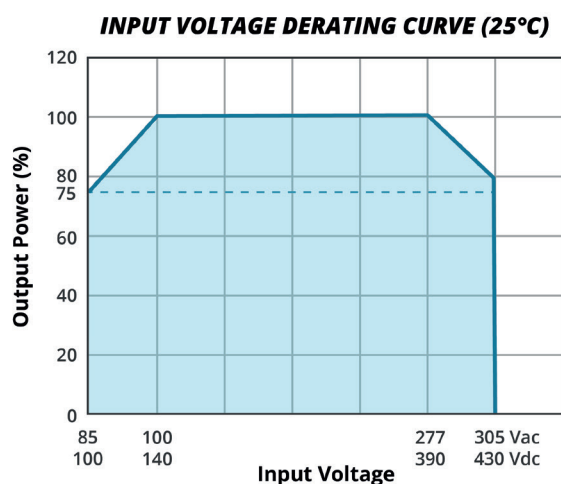
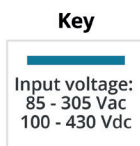
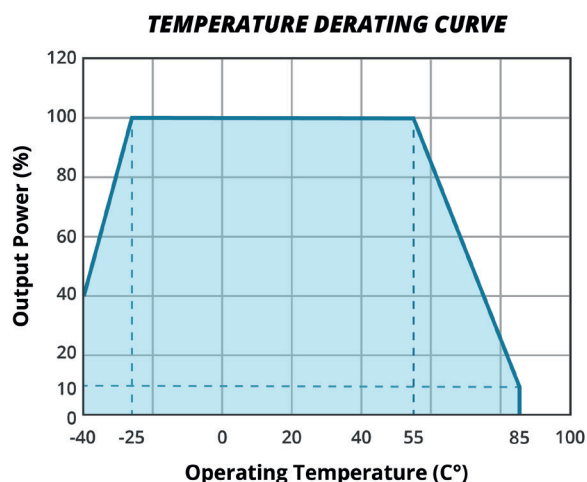
ENVIRONMENTAL

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



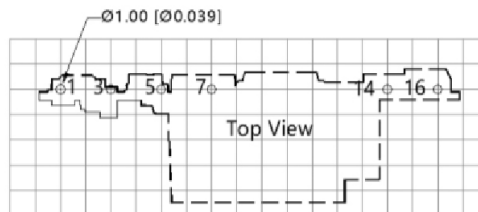
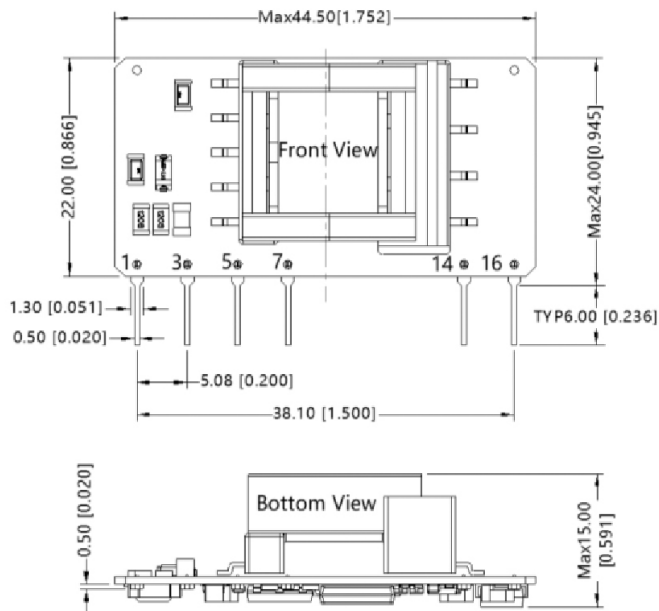
MECHANICAL

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				

MECHANICAL DRAWING

Straight-pin configuration

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



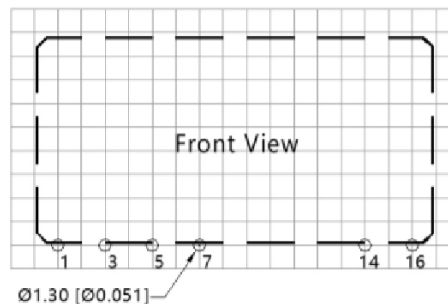
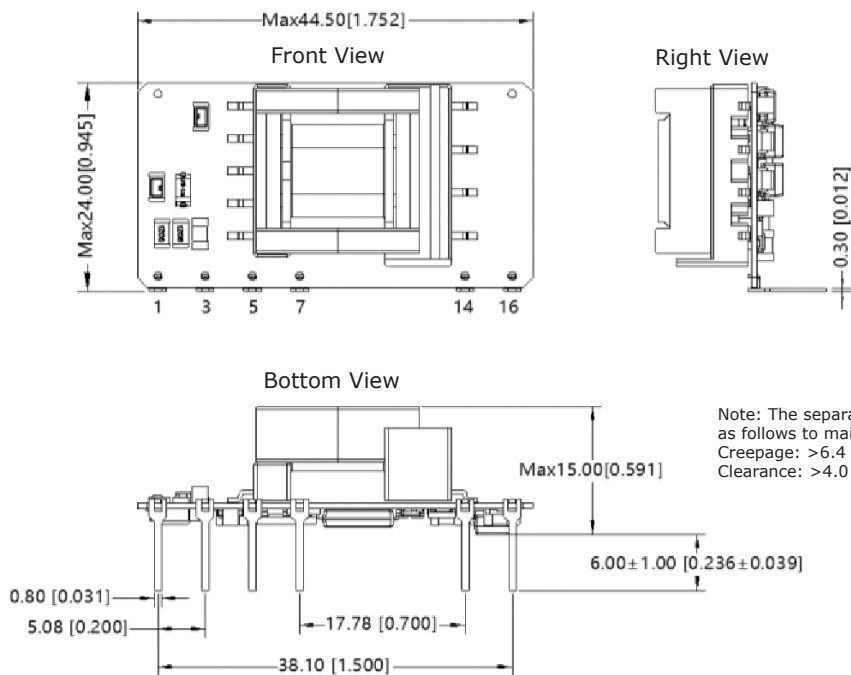
Note: Grid 2.54*2.54mm

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]

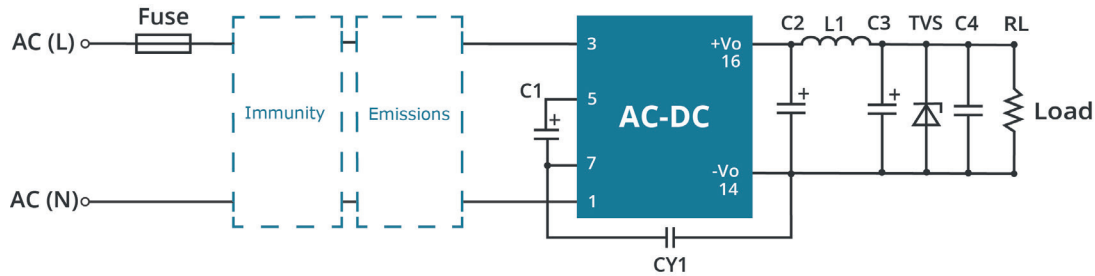


Note: Grid 2.54*2.54mm

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

APPLICATION DESIGN REFERENCE



Note: All applications must follow this minimum circuit implementation. Additional environmental 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			SMBJ20A					
PBO-15C-24			SMBJ30A					

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

PBO-15C Series Environmental and EMC selection guide					
Recommended circuit	Typical application	Input voltage range	Environment 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

Circuit 1

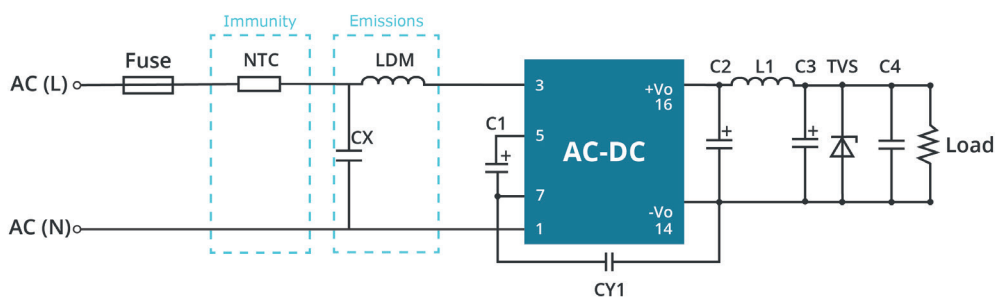


Table 1

Ambient temperature range	Immunity 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

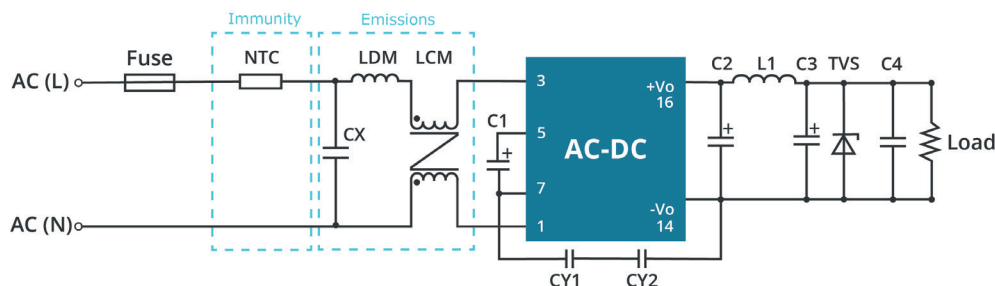


Table 2

Ambient temperature range	Immunity 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).

APPLICATION DESIGN REFERENCE (CONTINUED)

Circuit 3

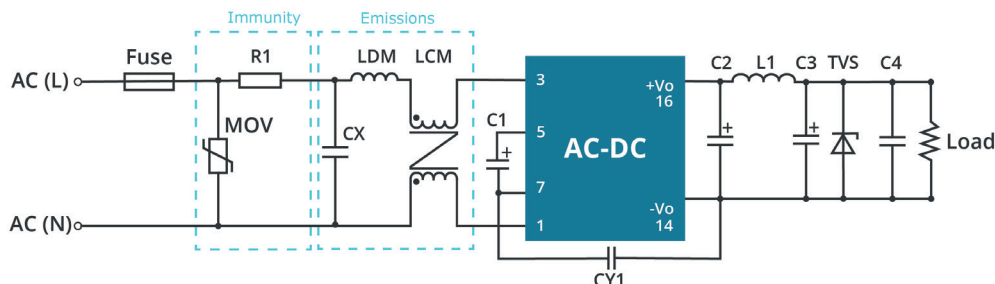


Table 3

Ambient temperature range	Immunity 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

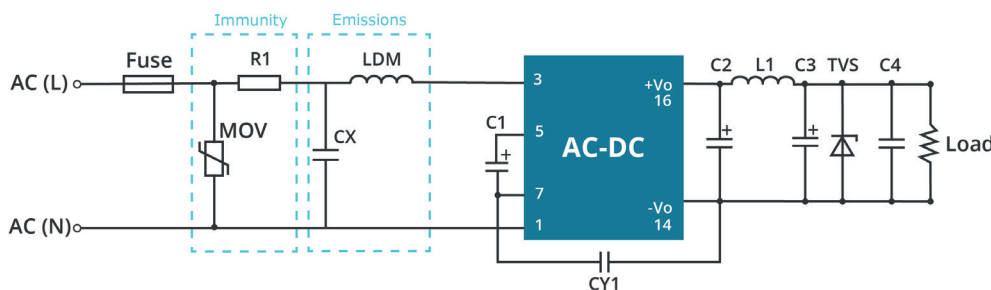


Table 4

Ambient temperature range	Immunity 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

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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