

SERIES: PBK-1 | **DESCRIPTION:** AC-DC POWER SUPPLY

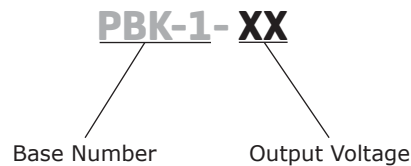
FEATURES

- up to 1 W continuous output
- compact SIP package
- single regulated outputs from 5~24 V
- 3,000 Vac isolation
- over current and short circuit protections
- CE, UL60950-1 safety approval
- wide input voltage: 100~400 Vdc (85~264 Vac)
- efficiency up to 70%



MODEL	output voltage	output current max	output power max	ripple and noise ¹ max	efficiency typ
	(Vdc)	(mA)	(W)	(mVp-p)	(%)
PBK-1-5	5	200	1	120	66
PBK-1-9	9	111	1	120	67
PBK-1-12	12	83	1	120	70
PBK-1-15	15	67	1	120	69
PBK-1-24	24	42	1	120	68

Note: 1. Measured at 20 MHz bandwidth, see Test Configuration section.

PART NUMBER KEY


INPUT

parameter	conditions/description	min	typ	max	units
voltage		85 100		264 400	Vac Vdc
frequency		47		63	Hz
current	at 115 Vac at 230 Vac			120 40	mA mA
inrush current	at 115 Vac at 230 Vac		10 20		A A
no load power consumption				0.5	W
input fuse	1 A/250 V, slow-blow type (external, recommended)				

OUTPUT

parameter	conditions/description	min	typ	max	units
line regulation	at full load		±1.5		%
load regulation	at 5%~100% load		±2.5		%
voltage set accuracy	PBK-1-5			±8	%
	all other models			±5	%
switching frequency				50	kHz
temperature coefficient			±0.1		%/°C

PROTECTIONS

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

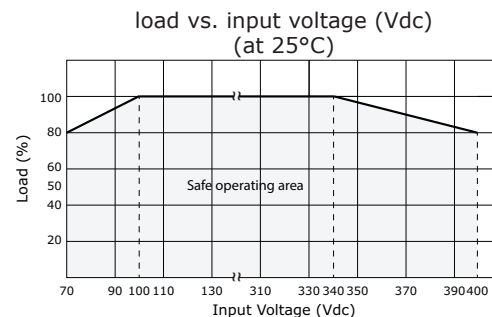
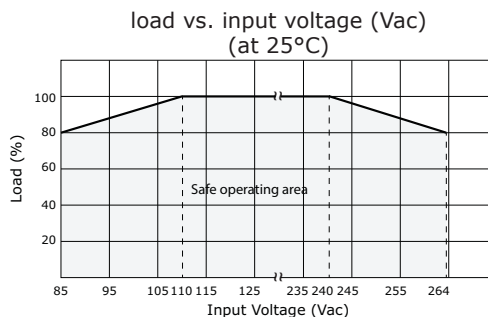
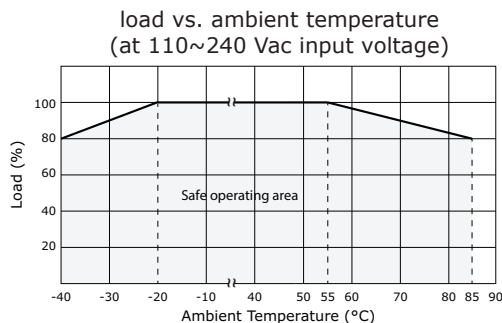
SAFETY & COMPLIANCE

parameter	conditions/description	min	typ	max	units
isolation voltage	input to output, for 1 minute	3,000			Vac
isolation resistance		100			MΩ
safety approvals	UL60950-1, EN60950, CE				
conducted emissions	CISPR22/EN55022 external circuit required, Class A (see figure 2); Class B (see figure 3)				
radiated emissions	CISPR22/EN55022 external circuit required, Class A (see figure 2); Class B (see figure 3)				
ESD	IEC/EN61000-4-2 Class B, contact ±4 kV				
radiated immunity	IEC/EN61000-4-3 Class A, 10V/m (external circuit required, see figure 3)				
EFT/burst	IEC/EN61000-4-4 Class B, ±2 kV (external circuit required, see figure 2)				
	IEC/EN61000-4-4 Class B, ±4 kV (external circuit required, see figure 3)				
surge	IEC/EN61000-4-5 Class B, ±2 kV/±4 kV (external circuit required, see figure 3)				
conducted immunity	IEC/EN61000-4-6 Class A, 3 Vr.m.s (external circuit required, see figure 3)				
PFM	IEC/EN61000-4-8 Class A, 10 A/m				
voltage dips & interruptions	IEC/EN61000-4-11 Class B, 0%-70%				
MTBF	at 25°C, max. load	300,000			hours
RoHS compliant	yes				

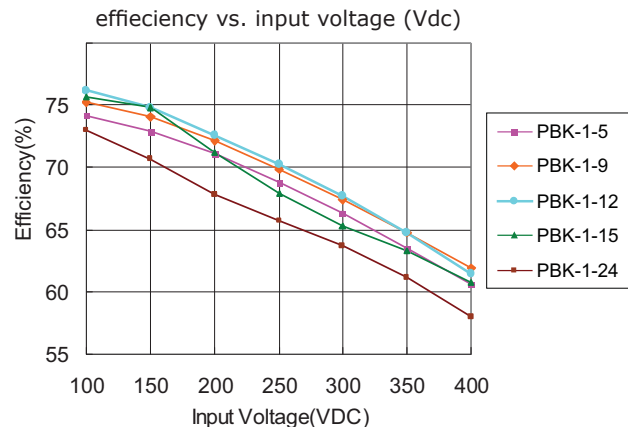
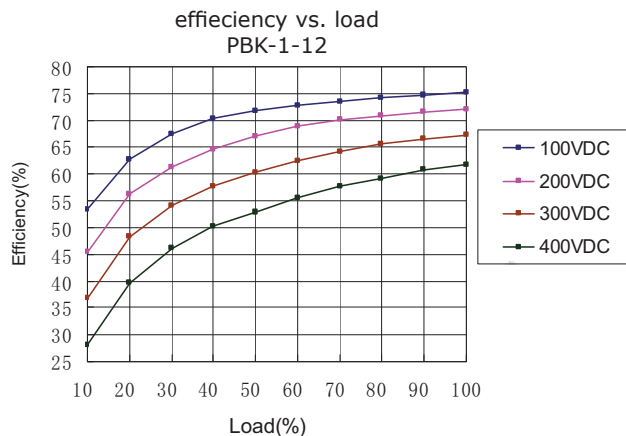
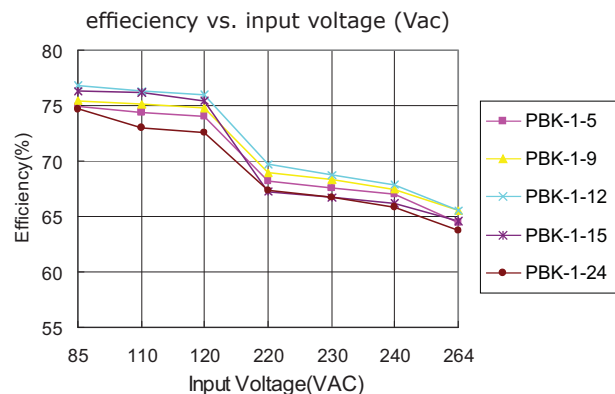
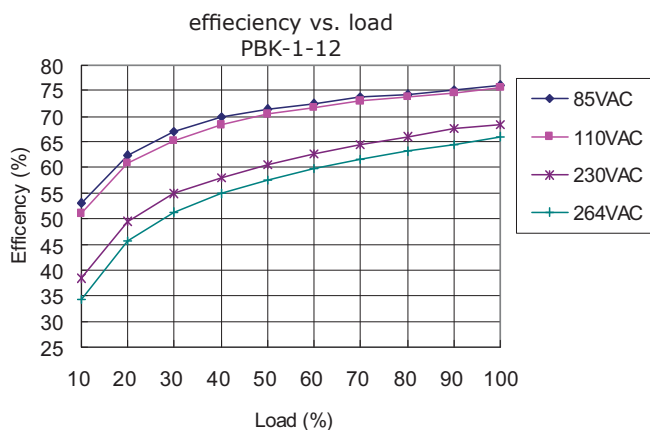
ENVIRONMENTAL

parameter	conditions/description	min	typ	max	units
operating temperature	see derating curves	-40		85	°C
storage temperature		-40		105	°C
case temperature				90	°C
humidity	non-condensing			85	%

DERATING CURVES



EFFICIENCY CURVES

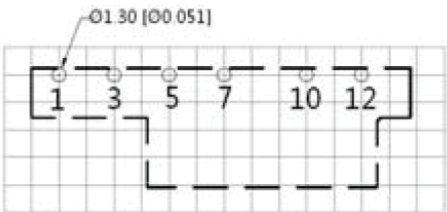
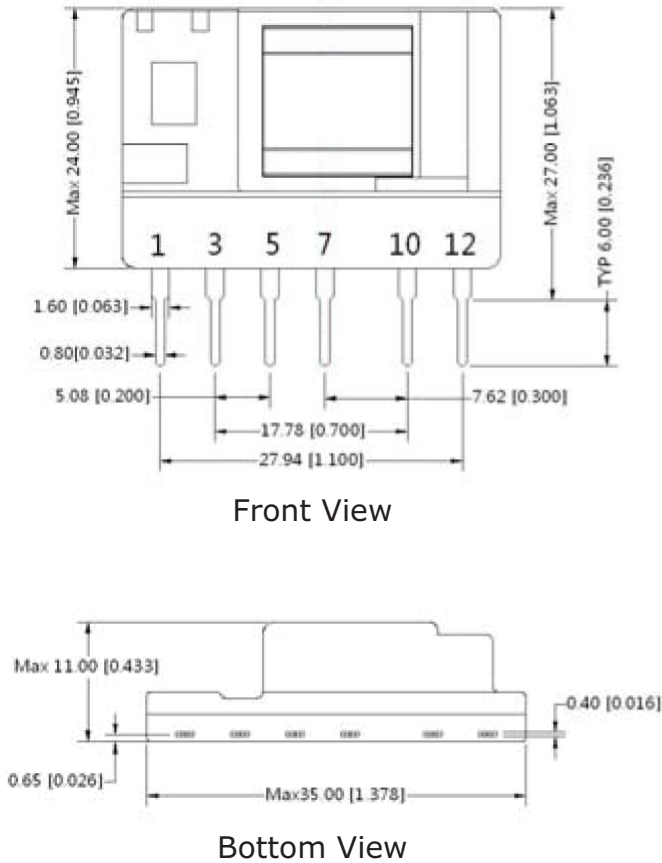


MECHANICAL

parameter	conditions/description	min	typ	max	units
dimensions	35 x 11 x 24 (1.378 x 0.433 x 0.945 inch)				mm
material	UL94V-0				
weight			8		g

MECHANICAL DRAWING

units: mm[inch]
tolerance: ±0.5[±0.020]
pin tolerance: ±0.1[±0.004]



Note: Grid 2.54*2.54mm
Top View
PCB Layout

PIN CONNECTIONS	
PIN	FUNCTION
1	-Vin (N)
3	+Vin (L)
5	+CAP
7	GND
10	-Vo
12	+Vo

TEST CONFIGURATION

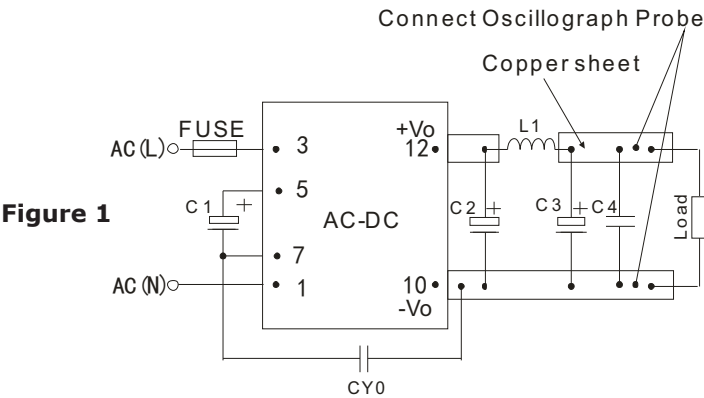


Table 1

Recommended External Circuit Components						
V _{OUT} (Vdc)	C1 ¹	C2 ¹	L1 ¹	C3 ¹	C4	CY0 (Y1 capacitor)
5	10µF/400V	150µF/35V	2.2µH	68µF/35V	0.1µF/50V	1nF/400Vac
9	10µF/400V	150µF/35V	2.2µH	68µF/35V	0.1µF/50V	1nF/400Vac
12	10µF/400V	100µF/35V	2.2µH	68µF/35V	0.1µF/50V	1nF/400Vac
15	10µF/400V	100µF/35V	2.2µH	68µF/35V	0.1µF/50V	1nF/400Vac
24	10µF/400V	100µF/35V	2.2µH	68µF/35V	0.1µF/50V	1nF/400Vac

Note: 1. Required components.
2. 1 A/250 V fuse recommended.

TYPICAL APPLICATION CIRCUIT

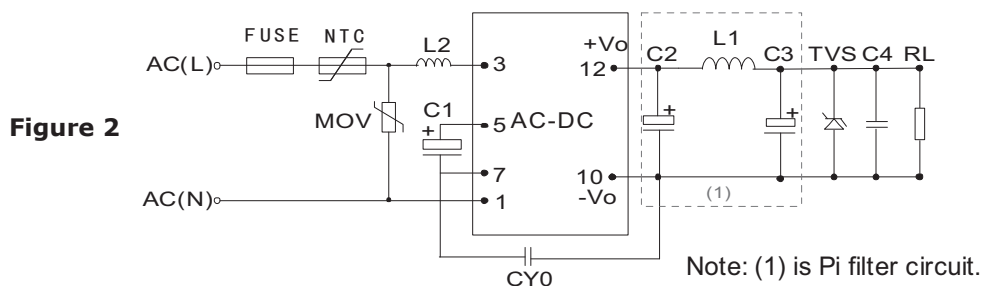


Table 2

Recommended External Circuit Components											
V_{OUT} (Vdc)	C1 ¹	L2	C2 ¹	L1 ¹	C3 ¹	C4	CY0	FUSE ¹	TVS	NTC	MOV
5	10 μ F/400V	1mH	150 μ F/35V	2.2 μ H	68 μ F/35V	0.1 μ F/50V	1nF/400Vac	1A/250V	SMBJ7.0A	5D-9	S14K350
9	10 μ F/400V	1mH	150 μ F/35V	2.2 μ H	68 μ F/35V	0.1 μ F/50V	1nF/400Vac	1A/250V	SMBJ12A	5D-9	S14K350
12	10 μ F/400V	1mH	100 μ F/35V	2.2 μ H	68 μ F/35V	0.1 μ F/50V	1nF/400Vac	1A/250V	SMBJ20A	5D-9	S14K350
15	10 μ F/400V	1mH	100 μ F/35V	2.2 μ H	68 μ F/35V	0.1 μ F/50V	1nF/400Vac	1A/250V	SMBJ20A	5D-9	S14K350
24	10 μ F/400V	1mH	100 μ F/35V	2.2 μ H	68 μ F/35V	0.1 μ F/50V	1nF/400Vac	1A/250V	SMBJ30A	5D-9	S14K350

Note: 1. Required components.

EMC RECOMMENDED CIRCUIT

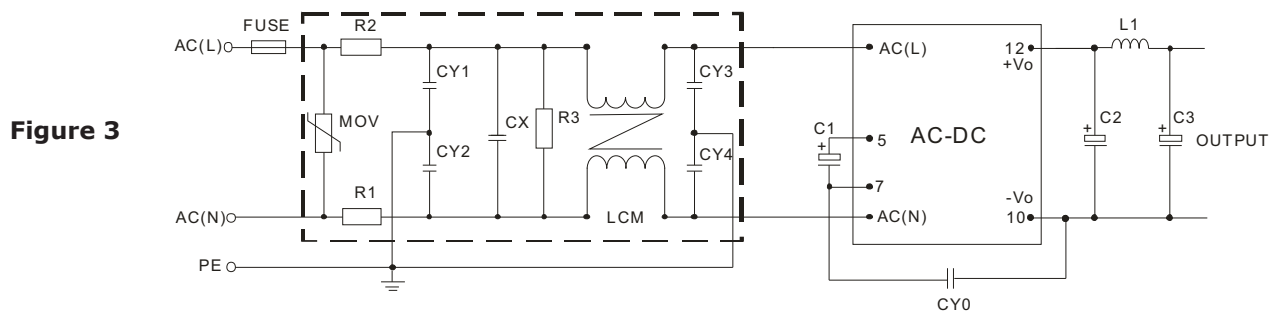


Table 3

Recommended External Circuit Components	
MOV	S14K350
R1, R2	2 Ω /3W winding resistor
R3	1M Ω /2W
CY1, CY2, CY3, CY4	1nF/400Vac
CX	0.22 μ F/275Vac
LCM	10mH
FUSE	1A/250V, slow blow

Note: Also refer to Table 2.

- Notes:
- C1 and C3 are electrolytic capacitors. They are required for both AC input and DC input.
 - For AC input, C1 is used as a filter capacitor. The recommended C1 value is 10 μ F/400 V.
 - For DC input, C1 is used as an EMC filter capacitor. The recommended C1 value is 10 μ F/450V. When the input voltage is above 370VDC, we recommend a 10 μ F/450V capacitor.
 - C2 and C3 are output filter capacitors, we recommend high frequency and low impedance electrolytic capacitors. For capacitance and rated ripple current of capacitors refer to the datasheets provided by the manufacturers, voltage derating of capacitors should be 80% or above.
 - C4 is a ceramic capacitor which is used to filter high frequency noise. C2, C3 and L1 form a pi-type filter circuit. For current of L1 and L2 refer to the datasheets provided by the manufacturers, current derating should be 80% or above. TVS is a recommended component to protect post-circuits (if converter fails). We recommend using a 5D-9 external input NTC.
 - For standard EMC requirements, please refer to figure 2. If a higher EMC is required, please refer to figure 3. Recommended parameters are shown in table 3.
 - All specifications measured at Ta=25C, humidity <75%, 115 Vac & 230 Vac input voltage, and rated output load, unless otherwise specified.

REVISION HISTORY

rev.	description	date
1.0	initial release	08/09/2013

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

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