

**SERIES:** PBK-5 | **DESCRIPTION:** AC-DC POWER SUPPLY

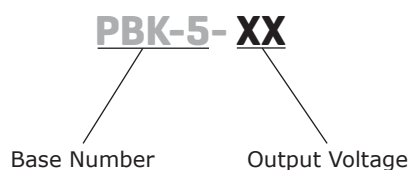
**FEATURES**

- up to 5 W continuous output
- compact SIP package
- single regulated outputs from 3.3~24 Vdc
- 3,000 Vac isolation
- over current and short circuit protection
- CE, UL60950-1 safety approval
- wide input voltage: 100~400 Vdc (85~264 Vac)
- efficiency up to 75%



MODEL	output voltage	output current max	output power max	ripple and noise <sup>1</sup> max	efficiency typ
	(Vdc)	(A)	(W)	(mVp-p)	(%)
PBK-5-3	3.3	1	3.3	150	65
PBK-5-5	5	1	5	120	70
PBK-5-9	9	0.56	5	120	72
PBK-5-12	12	0.42	5	120	74
PBK-5-15	15	0.34	5	120	75
PBK-5-24	24	0.21	5	150	75

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
current	at 115 Vac at 230 Vac			200 100	mA mA
inrush current	at 115 Vac at 230 Vac			20 30	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		±0.5		%
load regulation	at 10%~100% load		±1.5		%
voltage set accuracy	PBK-5-3			±3	%
	all other models			±2	%
switching frequency			100		kHz
temperature coefficient			±0.15		%/°C

## PROTECTIONS

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

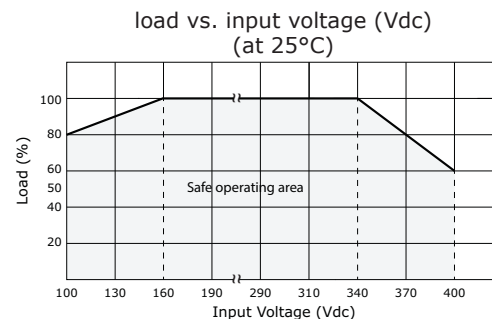
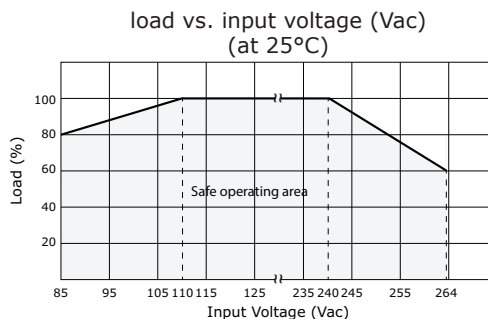
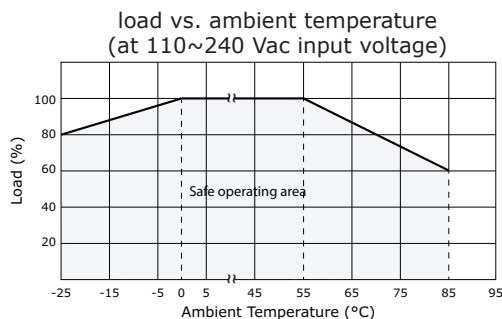
## SAFETY & COMPLIANCE

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 B (see figure 2)				
ESD	IEC/EN61000-4-2 Class B, contact ±4 kV				
radiated immunity	IEC/EN61000-4-3 Class A, 10V/m				
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				
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	300,000			hours
RoHS compliant	yes				

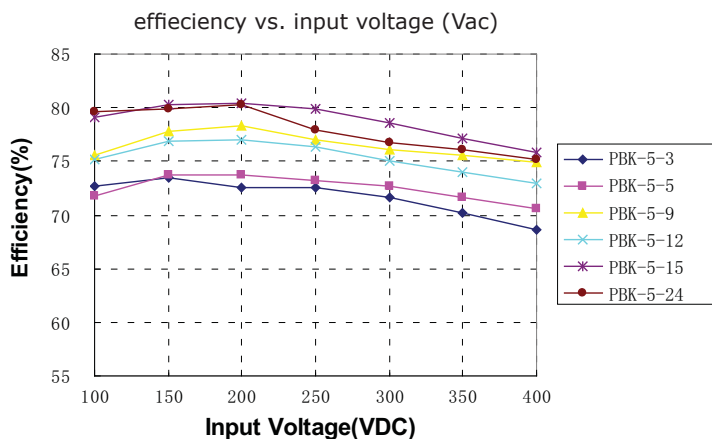
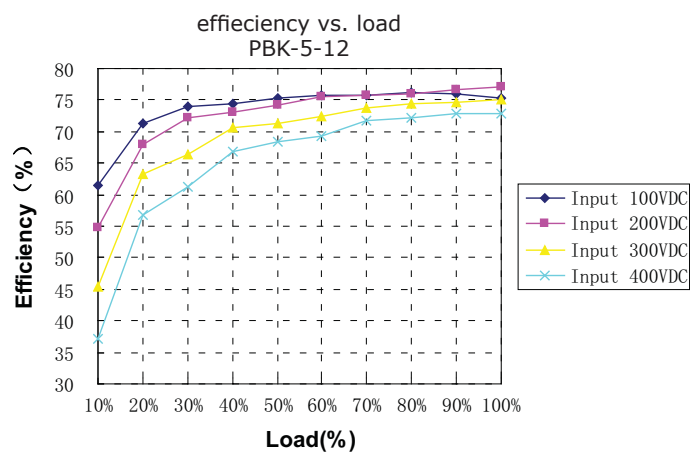
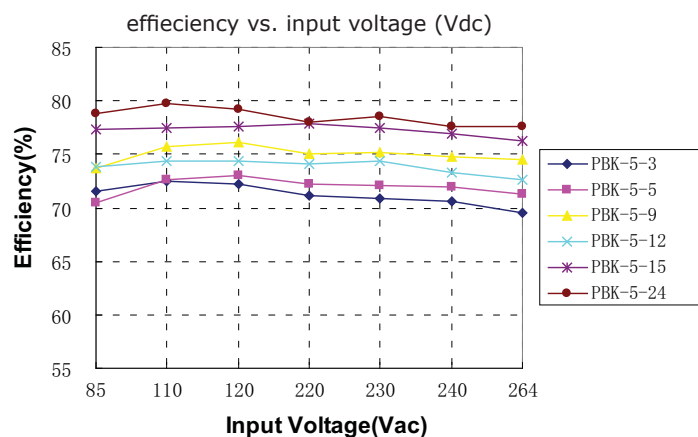
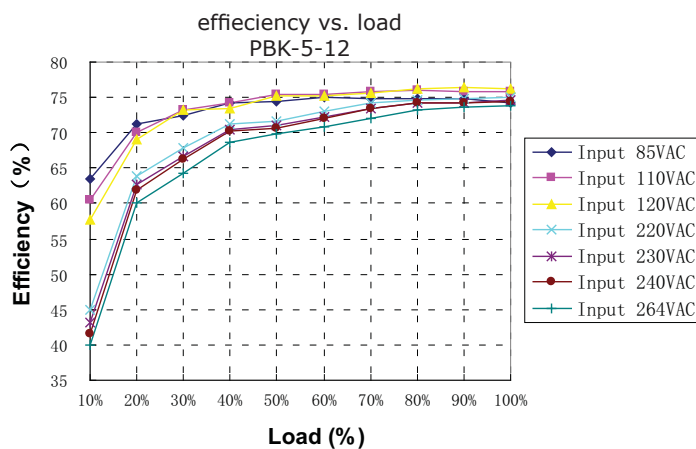
## ENVIRONMENTAL

parameter	conditions/description	min	typ	max	units
operating temperature	see derating curves	-25		85	°C
storage temperature		-40		105	°C
case temperature				100	°C
humidity	non-condensing			85	%

## DERATING CURVES



## EFFICIENCY CURVES



## MECHANICAL

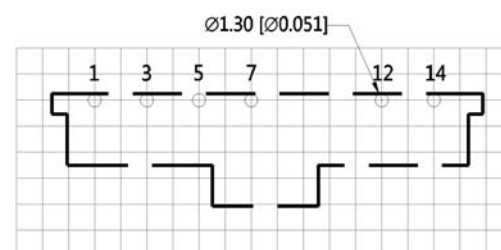
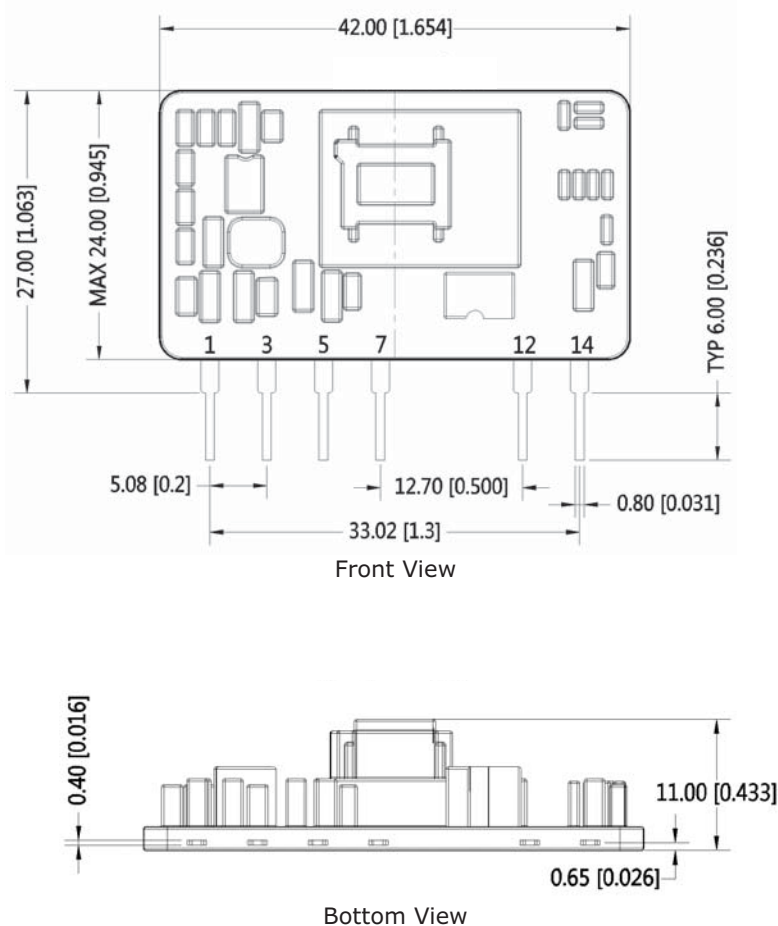
parameter	conditions/description	min	typ	max	units
dimensions	42 x 11 x 24 (1.654 x 0.433 x 0.945 inch)				mm
material	UL94V-0				
weight			10		g

## MECHANICAL DRAWING

units: mm[inch]

tolerance:  $\pm 0.5[\pm 0.020]$ 

pin tolerance:  $\pm 0.1 [\pm 0.004]$

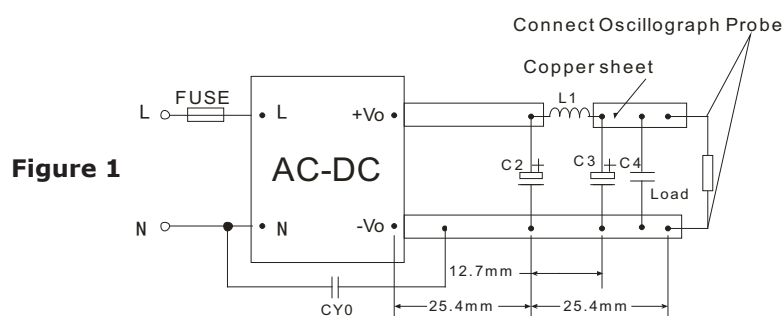


Grid Size: 2.54 mm x 2.54 mm

Top View  
PCB Layout

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

## TEST CONFIGURATION



### Figure 1

### Table 1

Capacitors				
V <sub>OUT</sub> (Vdc)	C2	L1	C3	CY0 (Y1 capacitor)
3.3	470μF/16V	0.47uH	150μF/35V	1nF/400Vac
5	470μF/16V	0.47uH	150μF/35V	1nF/400Vac
9	330μF/35V	1uH	150μF/35V	1nF/400Vac
12	330μF/35V	1uH	150μF/35V	1nF/400Vac
15	330μF/35V	1uH	150μF/35V	1nF/400Vac
24	100μF/35V	4.7uH	47μF/35V	1nF/400Vac

Note: 1. 1 A/250 V fuse is recommended

TYPICAL APPLICATION CIRCUIT

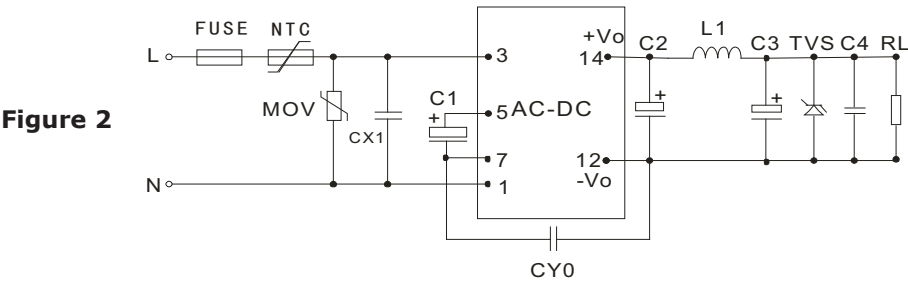


Table 2

Recommended external circuit components										
V <sub>OUT</sub> (Vdc)	C1	C2	C3	C4	L1	CY0	FUSE	TVS	NTC	MOV
3.3	33μF/400V	470μF/16V	150μF/35V	100nF/50V	0.47uH	1nF/400Vac	1A/250V	SMBJ7.0A	5D-9	561KD14
5	33μF/400V	470μF/16V	150μF/35V	100nF/50V	0.47uH	1nF/400Vac	1A/250V	SMBJ7.0A	5D-9	561KD14
9	33μF/400V	330μF/35V	150μF/35V	100nF/50V	1uH	1nF/400Vac	1A/250V	SMBJ12A	5D-9	561KD14
12	33μF/400V	330μF/35V	150μF/35V	100nF/50V	1uH	1nF/400Vac	1A/250V	SMBJ20A	5D-9	561KD14
15	33μF/400V	330μF/35V	150μF/35V	100nF/50V	1uH	1nF/400Vac	1A/250V	SMBJ20A	5D-9	561KD14
24	33μF/400V	100μF/35V	47μF/35V	100nF/50V	4.7uH	1nF/400Vac	1A/250V	SMBJ30A	5D-9	561KD14

EMC RECOMMENDED CIRCUIT

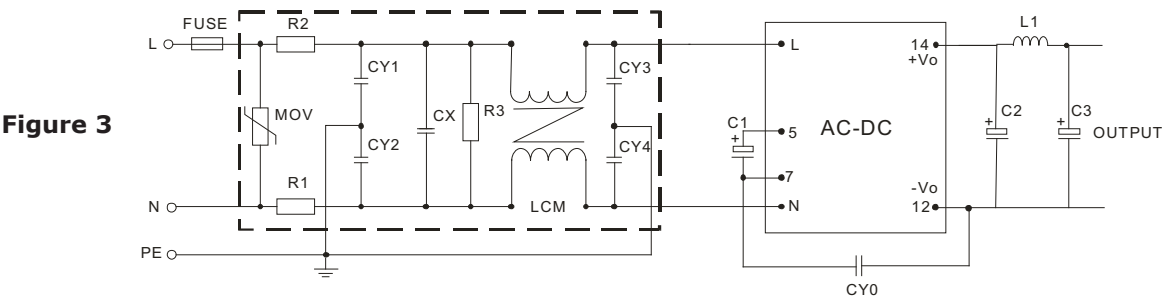


Table 3

Recommended External Circuit Components	
MOV	561KD14
R1, R2	2Ω/3W winding resistor
R3	1MΩ/2W
CY1, CY2, CY3, CY4	1nF/400Vac
CX	0.22μF/275Vac
LCM	10mH-30mH
FUSE	1A/250V

Note: 1. Also refer to Table 2.

- Notes:
1. C1 is a required electrolytic capacitor for AC input. We recommend a 33μF/400V capacitor for C1.
  2. C1 is a required EMC capacitor for DC input. We recommend a 33μF/400V for C1. When input voltage is above 370VDC, and the value of C1 should be 33μF/450V. If EMC performance is not required, C1 could be 10μF/400V.
  3. Output filtering capacitors C2 and C3 are electrolytic capacitors and are required for both AC or DC inputs. Together they make a pi capacitor circuit with L1. We recommend using high frequency and low impedance electrolytic capacitors. Voltage derating of capacitors should be 80% or above. C4 is ceramic capacitor, it is used to filter high frequency noise. For current of L1 please refer to manufacture's datasheet. Voltage derating of capacitors should be 80% or above. TVS is a recommended component to protect post-circuits if converter fails.
  4. All specifications measured at Ta=25C, humidity <75%, 115 Vac and 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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