

# P R B X

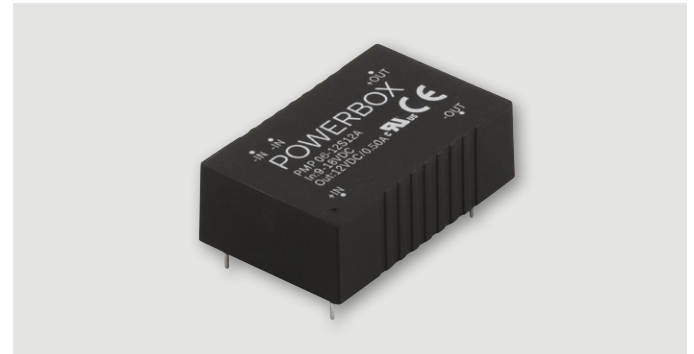
POWERBOX **Medline**  
PMP06 Series  
6W  
2:1 & 4:1 Single and Dual Output  
Medical DC/DC Converter

## Features

Reinforced insulation for 300VAC working voltage  
Clearance and creepage distance: 6.6mm/2MOOP  
3000VAC input to output 2MOOP isolation  
Built-in EMI Class A filter  
2 $\mu$ A patient leakage current  
ANSI/AAMI ES60601-1, EN60601-1, IEC60601-1, UL60950-1,  
EN60950-1, IEC60950-1 safety approvals  
CE mark  
Compliant to RoHs & REACH

## Input

Operating voltage range	2:1	5Vin(nom.)	4.5~9VDC	
		12Vin(nom.)	9~18VDC	
		24Vin(nom.)	18~36VDC	
		48Vin(nom.)	36~75VDC	
4:1 (W)	24V(nom.)	9~36VDC		
	48V(nom.)	18~75VDC		
Start-up voltage	2:1	5Vin(nom.)	4.5VDC max.	
		12Vin(nom.)	9VDC max.	
		24Vin(nom.)	18VDC max.	
	4:1 (W)	48Vin(nom.)	36VDC max.	
		24V(nom.)	9VDC max.	
		48V(nom.)	18VDC max.	
Shutdown voltage	2:1	5Vin(nom.)	4VDC typ.	
		12Vin(nom.)	8VDC typ.	
		24Vin(nom.)	16VDC typ.	
	4:1 (W)	48Vin(nom.)	33VDC typ.	
		24V(nom.)	8VDC typ.	
		48V(nom.)	16VDC typ.	
Start up time	Power up	30ms max.		
	Remote on/off	30ms max.		
	Constant resistive load			
Input surge voltage	3s max.	2:1	5Vin(nom.)	16VDC max.
			12Vin(nom.)	25VDC max.
			24Vin(nom.)	50VDC max.
		4:1 (W)	48Vin(nom.)	100VDC max.
			24V(nom.)	50VDC max.
			48V(nom.)	100VDC max.
Input filter	Pi type			
Remote On/Off	Referenced to -INPUT pin			
	(only for B-type pin connection option)			
	DC-DC ON	Open or 0~1.2VDC		
	DC-DC OFF	2.2~12VDC		
	Input current of CTRL pin -0.5 min, 1mA max.			
Remote off input current 2.5mA typ.				



## Output

Voltage accuracy	$\pm 1\%$		
Line regulation	Single $\pm 0.2\%$ . Dual $\pm 0.5\%$		
	Low line to high line at full load		
Load regulation	Single $\pm 0.2\%$ . Dual $\pm 1.0\%$		
	No load to full load		
Cross regulation (dual)	$\pm 5.0\%$ , assymetrical load 25%/100% FL		
Voltage adjustability	(only for B-type pin connection option)		
	Single: 3.3, 5, 12Vout	$\pm 10\%$	
	15, 24Vout	-10/+20%	
	Dual: $\pm 5, \pm 12, \pm 15$ Vout	$\pm 10\%$	
Ripple and noise	Measured with a 10 $\mu$ F/25V X7R MLCC:		
20Mhz bandwidth	3.3, 5Vout	30mV p-p	
	12, 15Vout	40mV p-p	
	Measured with a 47 $\mu$ F/50V X7R MLCC:		
	24Vout	50mV p-p	
Temperature coefficient	$\pm 0.02\%/^{\circ}\text{C}$		
Transient response	250 $\mu$ s recovery time at 25% load step change		
Over voltage protection	Single:	3.3Vout	3.7~5 VDC
		5Vout	5.6~7.0 VDC
		12Vout	13.5~16 VDC
	Dual:	15Vout	18.3~22.0 VDC
		24Vout	29.1~34.5 VDC
		5Vout	5.6~7.0 VDC
	12Vout	13.5~18.2 VDC	
	15Vout	17.0~22.0 VDC	
Over load protection	150% of Iout rated; hiccup mode		
Short circuit protection	Continuous, automatics recovery		

## Environmental

Operating ambient temp.	-40 $^{\circ}\text{C}$ to +88 $^{\circ}\text{C}$ without derating	
	+88 $^{\circ}\text{C}$ to +105 $^{\circ}\text{C}$ with derating	
Storage temperature	-55 $^{\circ}\text{C}$ to +125 $^{\circ}\text{C}$	
Thermal impedance	18 $^{\circ}\text{C}/\text{W}$ natural convection (20LFM)	
Thermal shock	MIL-STD-810F	
Vibration	MIL-STD-810F	
Relative humidity	5-95% RH	

POWERBOX Medline

PMP06 Series

6W

2:1 & 4:1 Single and Dual Output

Medical DC/DC Converter

**General**

Isolation voltage	Input to output 3000VAC, 1 min
Isolation capacitance	12pF typ.
Leakage current	2µA max at 240VAC, 60Hz
Switching frequency	250KHz typ.
Clearance/creepage	6.6mm
Case material	Non-conductive black plastic
Base material	Non-conductive black plastic
Potting material	Silicon (UL94-V0)
Dimensions	See drawing mm
Weight	14g
MTBF	4.718 x 10 <sup>6</sup> hrs, MIL-HDBK-217F, 25°C, full load

**Standards**

Safety standards	ANSI/AAMI ES60601-1, EN60601-1, IEC60601-1, UL60950-1, EN60950-1, IEC60950-1	
EMC	EN55011, EN55022 and FCC Part 18 Class A, Class B.	
EMI <sup>1</sup>	EN61000-4-2 Air ±8kV	
ESD	Contact ±6kV	Criteria A
Radiated immunity	EN61000-4-3 10V/m	Criteria A
Fast transient <sup>2</sup>	EN61000-4-4 ±2KV	Criteria A
Surge <sup>2</sup>	EN61000-4-5 ±2KV	Criteria A
Conducted immunity	EN61000-4-6 10Vrms	Criteria A

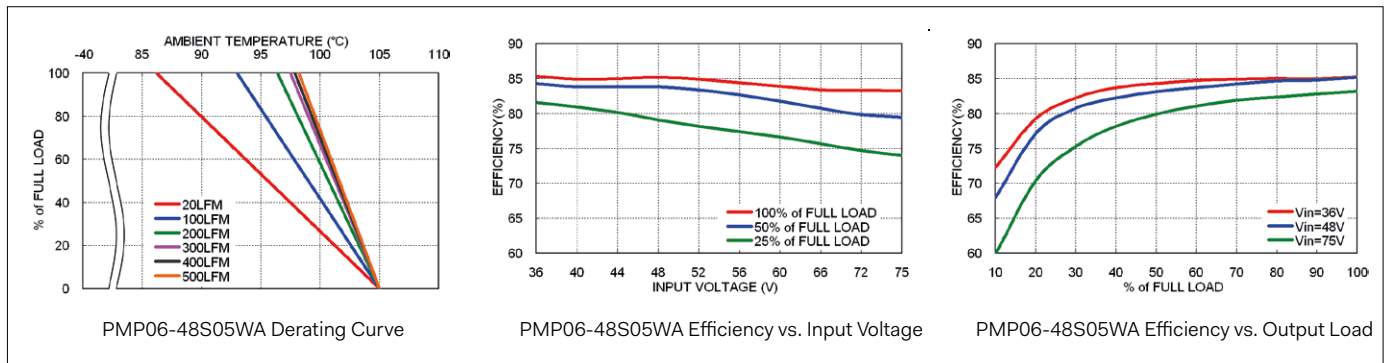
Part Number Structure

PMP06	-	48	S	05	A	-	P	T
Series Name	Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)	Input Range	Pin Connection Option	Remote On/Off Option	Trim Option	
	05: 4.5-9 12: 9-18 24: 18-36 48: 36-75	S: Single	3P3: 3.3 05: 5 12: 12 15: 15 <u>24: 24</u>	<input type="checkbox"/> 2:1 W: 4:1	A: A type (standard) B: B type	<input type="checkbox"/> No On/Off control P: Remote On/Off (Only for B type Pin connection)	<input type="checkbox"/> No Trim T: Trim (Only for B type Pin connection)	
		D: Dual	05: ±5 12: ±12 15: ±15					

Part Number Structure

PMP06	-	48	S	05	W	A	-	P	T
Series Name	Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)	Input Range	Pin Connection Option	Remote On/Off Option	Trim Option		
	24: 9-36 48: 18-75	S: Single	3P3: 3.3 05: 5 12: 12 15: 15 <u>24: 24</u>	<input type="checkbox"/> 2:1 W: 4:1	A: A type (standard) B: B type	<input type="checkbox"/> No On/Off control P: Remote On/Off (Only for B type Pin connection)	<input type="checkbox"/> No Trim T: Trim (Only for B type Pin connection)		
		D: Dual	05: ±5 12: ±12 15: ±15						

Derating Curve



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Model Number	Input Range	Output Voltage	Output Current @ Full Load	Input Current @ No Load	Efficiency	Max Capacitor Load
PMP06-05S3P3A/B	4.5 ~9 VDC	3.3 VDC	1800 mA	10 mA	81.5%	2100 µF
PMP06-05S05A/B	4.5 ~9 VDC	5 VDC	1200 mA	10 mA	86%	1500 µF
PMP06-05S12A/B	4.5 ~9 VDC	12 VDC	500 mA	15 mA	86%	260 µF
PMP06-05S15A/B	4.5 ~9 VDC	15 VDC	400 mA	15 mA	87.5%	210 µF
PMP06-05S24A/B	4.5 ~9 VDC	24 VDC	250 mA	20 mA	87%	75 µF
PMP06-05D05A/B	4.5 ~9 VDC	±5 VDC	±600 mA	25 mA	84%	± 860 µF
PMP06-05D12A/B	4.5 ~9 VDC	±12 VDC	±250 mA	25 mA	86.5%	± 150 µF
PMP06-05D15A/B	4.5 ~9 VDC	±15 VDC	±200 mA	25 mA	87.5%	± 110 µF
PMP06-12S3P3A/B	9 ~ 18 VDC	3.3 VDC	1800 mA	10 mA	83.5%	2100 µF
PMP06-12S05A/B	9 ~ 18 VDC	5 VDC	1200 mA	10 mA	86%	1500 µF
PMP06-12S12A/B	9 ~ 18 VDC	12 VDC	500 mA	10 mA	89%	260 µF
PMP06-12S15A/B	9 ~ 18 VDC	15 VDC	400 mA	10 mA	88.5%	210 µF
PMP06-12S24A/B	9 ~ 18 VDC	24 VDC	250 mA	10 mA	88.5%	75 µF
PMP06-12D05A/B	9 ~ 18 VDC	±5 VDC	±600 mA	10 mA	85%	± 860 µF
PMP06-12D12A/B	9 ~ 18 VDC	±12 VDC	±250 mA	10 mA	89%	± 150 µF
PMP06-12D15A/B	9 ~ 18 VDC	±15 VDC	±200 mA	10 mA	88%	± 110 µF
PMP06-24S3P3A/B	18 ~ 36 VDC	3.3 VDC	1800 mA	6 mA	83%	2100 µF
PMP06-24S05A/B	18 ~ 36 VDC	5 VDC	1200 mA	6 mA	86.0%	1500 µF
PMP06-24S12A/B	18 ~ 36 VDC	12 VDC	500 mA	6 mA	89%	260 µF
PMP06-24S15A/B	18 ~ 36 VDC	15 VDC	400 mA	6 mA	89%	210 µF
PMP06-24S24A/B	18 ~ 36 VDC	24 VDC	250 mA	6 mA	88.5%	75 µF
PMP06-24D05A/B	18 ~ 36 VDC	±5 VDC	±600 mA	6 mA	85%	± 860 µF
PMP06-24D12A/B	18 ~ 36 VDC	±12 VDC	±250 mA	6 mA	88.5%	± 150 µF
PMP06-24D15A/B	18 ~ 36 VDC	±15 VDC	±200 mA	6 mA	88.5%	± 110 µF
PMP06-48S3P3A/B	36 ~ 75 VDC	3.3 VDC	1800 mA	4 mA	82.5%	2100 µF
PMP06-48S05A/B	36 ~ 75 VDC	5 VDC	1200 mA	4 mA	86.5%	1500 µF
PMP06-48S12A/B	36 ~ 75 VDC	12 VDC	500 mA	4 mA	88%	260 µF
PMP06-48S15A/B	36 ~ 75 VDC	15 VDC	400 mA	4 mA	88.5%	210 µF
PMP06-48S24A/B	36 ~ 75 VDC	24 VDC	250 mA	4 mA	88%	75 µF
PMP06-48D05A/B	36 ~ 75 VDC	±5 VDC	±600 mA	4 mA	85%	± 860 µF
PMP06-48D12A/B	36 ~ 75 VDC	±12 VDC	±250 mA	4 mA	88%	± 150 µF
PMP06-48D15A/B	36 ~ 75 VDC	±15 VDC	±200 mA	4 mA	87%	± 110 µF
PMP06-24S3P3WA/B	9 ~ 36 VDC	3.3 VDC	1800 mA	6 mA	83%	2100 µF
PMP06-24S05WA/B	9 ~ 36 VDC	5 VDC	1200 mA	6 mA	86.0%	1500 µF
PMP06-24S12WA/B	9 ~ 36 VDC	12 VDC	500 mA	6 mA	89%	260 µF
PMP06-24S15WA/B	9 ~ 36 VDC	15 VDC	400 mA	6 mA	89%	210 µF
PMP06-24S24WA/B	9 ~ 36 VDC	24 VDC	250 mA	6 mA	88.5%	75 µF
PMP06-24D05WA/B	9 ~ 36 VDC	±5 VDC	±600 mA	6 mA	85%	± 860 µF
PMP06-24D12WA/B	9 ~ 36 VDC	±12 VDC	±250 mA	6 mA	88.5%	± 150 µF
PMP06-24D15WA/B	9 ~ 36 VDC	±15 VDC	±200 mA	6 mA	88.5%	± 110 µF
PMP06-48S3P3WA/B	18 ~ 75 VDC	3.3 VDC	1800 mA	4 mA	82.5%	2100 µF
PMP06-48S05WA/B	18 ~ 75 VDC	5 VDC	1200 mA	4 mA	86.5%	1500 µF
PMP06-48S12WA/B	18 ~ 75 VDC	12 VDC	500 mA	4 mA	88%	260 µF
PMP06-48S15WA/B	18 ~ 75 VDC	15 VDC	400 mA	4 mA	88.5%	210 µF
PMP06-48S24WA/B	18 ~ 75 VDC	24 VDC	250 mA	4 mA	88%	75 µF
PMP06-48D05WA/B	18 ~ 75 VDC	±5 VDC	±600 mA	4 mA	85%	± 860 µF
PMP06-48D12WA/B	18 ~ 75 VDC	±12 VDC	±250 mA	4 mA	88%	± 150 µF
PMP06-48D15WA/B	18 ~ 75 VDC	±15 VDC	±200 mA	4 mA	87%	± 110 µF

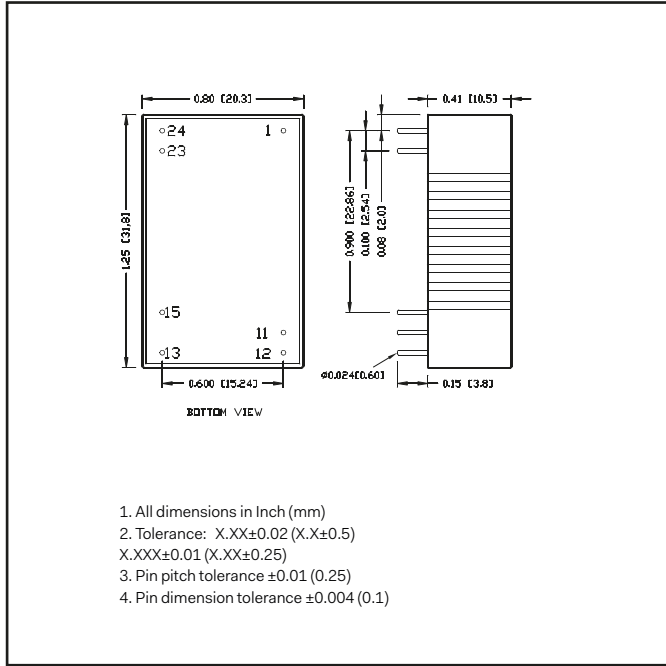
Notes:

1. The PMP06 (W) series can meet EMI Class A with no external filter. And Class B only with external components. For further information, please contact Powerbox.
2. An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5. The PMPP06-05XXXXX recommended an aluminum electrolytic capacitor (Nippon Chemi-con KY series, 1000µF/25V).

And a reverse diode (Vishay V10P45) to connect in parallel.  
 The PMP06-12&24XXXXXX recommended an aluminum electrolytic capacitor (Nippon Chemi-con KY series, 470µF/50V). The PMP06-48XXXXXX recommended an aluminum electrolytic capacitor (Nippon Chemi-con KY series, 330µF/100V).  
 CAUTION: This power module is not internally fused. An input line fuse must always be used.

Mechanical

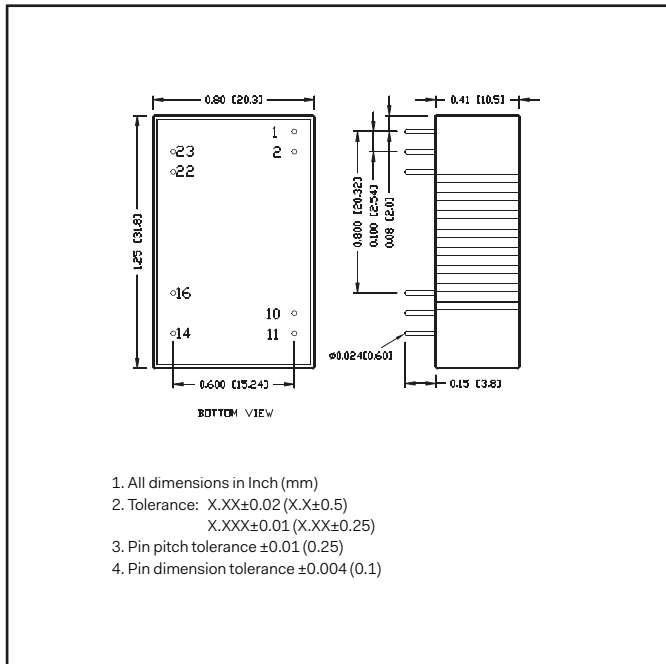
A Type



Pin Connection

Pin	Single	Dual
1	+ Vin	+ Vin
11	No pin	Common
12	-Vout	No pin
13	+Vout	-Vout
15	No pin	+Vout
23	- Vin	- Vin
24	- Vin	- Vin

B Type



Pin Connection

Pin	Single	Dual
1	Ctrl (Option) / No pin*	Ctrl (Option) / No pin*
2	- Vin	- Vin
10	Trim (Option) / No pin*	Trim (Option) / No pin*
11	No pin / NC **	-Vout
14	+Vout	+Vout
16	-Vout	Common
22	+Vin	+Vin
23	+Vin	+Vin

\* If don't choose Ctrl or Trim option, there is no pin on the corresponding pin number.

\*\* Pin 11 is "No pin" for

PMP06-□□□□□□□□-T

PMP06-□□□□□□□□-PT

Pin 11 is "NC" for

PMP06-□□□□□□□□

PMP06-□□□□□□□□-P

External Output Trimming

