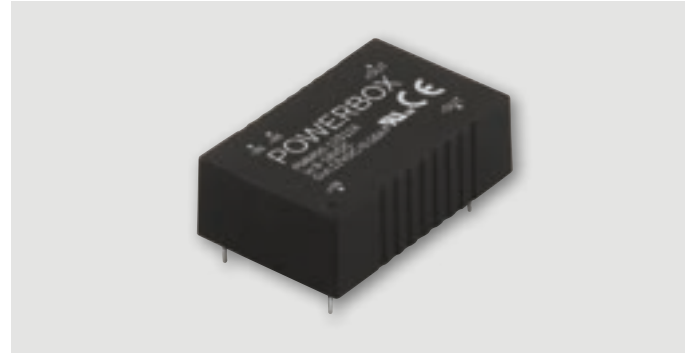


P R B X

POWERBOX **Medline**
PMM06 Series
6W
2:1 & 4:1 Single and Dual Output
Medical DC/DC Converter



Features

Reinforced insulation for 250VAC working voltage
Clearance and creepage distance: 8.0mm/2MOPP
5000VAC input to output 2MOPP isolation
Built-in EMI Class A filter
2 μ 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	
		48Vin(nom)	36VDC max	
		4:1 (W)	24V(nom)	9VDC max
		48V(nom)	18VDC max	
Shutdown voltage	2:1	5Vin(nom)	4VDC typ	
		12Vin(nom)	8VDC typ	
		24Vin(nom)	16VDC typ	
		48Vin(nom)	33VDC typ	
		4:1 (W)	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
			48Vin(nom)	100VDC max
			4:1 (W)	24V(nom)
		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 μ F/25V X7R MLCC:	
20Mhz bandwidth	3.3, 5Vout	30mV p-p
	12, 15Vout	40mV p-p
	Measured with a 47 μ F/50V X7R MLCC:	
	24Vout	50mV p-p
Temperature coefficient	$\pm 0.02\%/^{\circ}\text{C}$	
Transient response	250 μ 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
	15Vout	18.3~22.0 VDC
	24Vout	29.1~34.5 VDC
	Dual: 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-810.
Relative humidity	5-95% RH

General

Isolation voltage	Input to output 5000VAC, 1 min
Isolation capacitance	12pF typ.
Leakage current	2µA max at 240VAC, 60Hz
Switching frequency	250KHz typ.
Clearance/creepage	8mm
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 ⁶ 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		
EMI ¹	EN55011, EN55022 and FCC Part 18 Class A, Class B.	
ESD	EN61000-4-2 Air ±8kV Contact ±6kV Criteria A	
Radiated immunity	EN61000-4-3 10V/m	Criteria A
Fast transient ²	EN61000-4-4 ±2KV	Criteria A
Surge ²	EN61000-4-5 ±2KV	Criteria A
Conducted immunity	EN61000-4-6 10Vrms	Criteria A

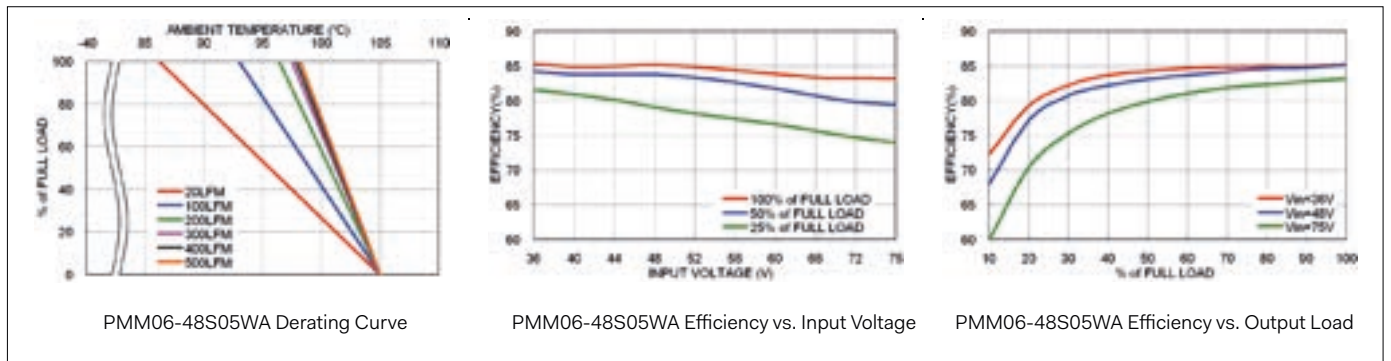
Part Number Structure

PMM06	-	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>	□ 2:1 W: 4:1	A: A type (standard) B: B type	□ No On/Off control P: Remote On/Off (Only for B type Pin connection)	□: No Trim T: Trim (Only for B type Pin connection)		
		D: Dual	05: ±5 12: ±12 15: ±15						

Part Number Structure

PMM06	-	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>	□ 2:1 W: 4:1	A: A type (standard) B: B type	□ No On/Off control P: Remote On/Off (Only for B type Pin connection)	□: No Trim T: Trim (Only for B type Pin connection)		
		D: Dual	05: ±5 12: ±12 15: ±15						

Derating Curve



POWERBOX Medline

PMM06 Series

6W

2:1 & 4:1 Single and Dual Output

Medical DC/DC Converter

Model Number	Input Range	Output Voltage	Output Current @ Full Load	Input Current @ No Load	Efficiency	Max Capacitor Load
PMM06-05S3P3A/B	4.5 ~9 VDC	3.3 VDC	1800 mA	10 mA	81.5%	2100 µF
PMM06-05S05A/B	4.5 ~9 VDC	5 VDC	1200 mA	10 mA	86%	1500 µF
PMM06-05S12A/B	4.5 ~9 VDC	12 VDC	500 mA	15 mA	86%	260 µF
PMM06-05S15A/B	4.5 ~9 VDC	15 VDC	400 mA	15 mA	87.5%	210 µF
PMM06-05S24A/B	4.5 ~9 VDC	24 VDC	250 mA	20 mA	87%	75 µF
PMM06-05D05A/B	4.5 ~9 VDC	±5 VDC	±600 mA	25 mA	84%	± 860 µF
PMM06-05D12A/B	4.5 ~9 VDC	±12 VDC	±250 mA	25 mA	86.5%	± 150 µF
PMM06-05D15A/B	4.5 ~9 VDC	±15 VDC	±200 mA	25 mA	87.5%	± 110 µF
PMM06-12S3P3A/B	9 ~ 18 VDC	3.3 VDC	1800 mA	10 mA	83.5%	2100 µF
PMM06-12S05A/B	9 ~ 18 VDC	5 VDC	1200 mA	10 mA	86%	1500 µF
PMM06-12S12A/B	9 ~ 18 VDC	12 VDC	500 mA	10 mA	89%	260 µF
PMM06-12S15A/B	9 ~ 18 VDC	15 VDC	400 mA	10 mA	88.5%	210 µF
PMM06-12S24A/B	9 ~ 18 VDC	24 VDC	250 mA	10 mA	88.5%	75 µF
PMM06-12D05A/B	9 ~ 18 VDC	±5 VDC	±600 mA	10 mA	85%	± 860 µF
PMM06-12D12A/B	9 ~ 18 VDC	±12 VDC	±250 mA	10 mA	89%	± 150 µF
PMM06-12D15A/B	9 ~ 18 VDC	±15 VDC	±200 mA	10 mA	88%	± 110 µF
PMM06-24S3P3A/B	18 ~ 36 VDC	3.3 VDC	1800 mA	6 mA	83%	2100 µF
PMM06-24S05A/B	18 ~ 36 VDC	5 VDC	1200 mA	6 mA	86.0%	1500 µF
PMM06-24S12A/B	18 ~ 36 VDC	12 VDC	500 mA	6 mA	89%	260 µF
PMM06-24S15A/B	18 ~ 36 VDC	15 VDC	400 mA	6 mA	89%	210 µF
PMM06-24S24A/B	18 ~ 36 VDC	24 VDC	250 mA	6 mA	88.5%	75 µF
PMM06-24D05A/B	18 ~ 36 VDC	±5 VDC	±600 mA	6 mA	85%	± 860 µF
PMM06-24D12A/B	18 ~ 36 VDC	±12 VDC	±250 mA	6 mA	88.5%	± 150 µF
PMM06-24D15A/B	18 ~ 36 VDC	±15 VDC	±200 mA	6 mA	88.5%	± 110 µF
PMM06-48S3P3A/B	36 ~ 75 VDC	3.3 VDC	1800 mA	4 mA	82.5%	2100 µF
PMM06-48S05A/B	36 ~ 75 VDC	5 VDC	1200 mA	4 mA	86.5%	1500 µF
PMM06-48S12A/B	36 ~ 75 VDC	12 VDC	500 mA	4 mA	88%	260 µF
PMM06-48S15A/B	36 ~ 75 VDC	15 VDC	400 mA	4 mA	88.5%	210 µF
PMM06-48S24A/B	36 ~ 75 VDC	24 VDC	250 mA	4 mA	88%	75 µF
PMM06-48D05A/B	36 ~ 75 VDC	±5 VDC	±600 mA	4 mA	85%	± 860 µF
PMM06-48D12A/B	36 ~ 75 VDC	±12 VDC	±250 mA	4 mA	88%	± 150 µF
PMM06-48D15A/B	36 ~ 75 VDC	±15 VDC	±200 mA	4 mA	87%	± 110 µF
PMM06-24S3P3WA/B	9 ~ 36 VDC	3.3 VDC	1800 mA	6 mA	83%	2100 µF
PMM06-24S05WA/B	9 ~ 36 VDC	5 VDC	1200 mA	6 mA	86.0%	1500 µF
PMM06-24S12WA/B	9 ~ 36 VDC	12 VDC	500 mA	6 mA	89%	260 µF
PMM06-24S15WA/B	9 ~ 36 VDC	15 VDC	400 mA	6 mA	89%	210 µF
PMM06-24S24WA/B	9 ~ 36 VDC	24 VDC	250 mA	6 mA	88.5%	75 µF
PMM06-24D05WA/B	9 ~ 36 VDC	±5 VDC	±600 mA	6 mA	85%	± 860 µF
PMM06-24D12WA/B	9 ~ 36 VDC	±12 VDC	±250 mA	6 mA	88.5%	± 150 µF
PMM06-24D15WA/B	9 ~ 36 VDC	±15 VDC	±200 mA	6 mA	88.5%	± 110 µF
PMM06-48S3P3WA/B	18 ~ 75 VDC	3.3 VDC	1800 mA	4 mA	82.5%	2100 µF
PMM06-48S05WA/B	18 ~ 75 VDC	5 VDC	1200 mA	4 mA	86.5%	1500 µF
PMM06-48S12WA/B	18 ~ 75 VDC	12 VDC	500 mA	4 mA	88%	260 µF
PMM06-48S15WA/B	18 ~ 75 VDC	15 VDC	400 mA	4 mA	88.5%	210 µF
PMM06-48S24WA/B	18 ~ 75 VDC	24 VDC	250 mA	4 mA	88%	75 µF
PMM06-48D05WA/B	18 ~ 75 VDC	±5 VDC	±600 mA	4 mA	85%	± 860 µF
PMM06-48D12WA/B	18 ~ 75 VDC	±12 VDC	±250 mA	4 mA	88%	± 150 µF
PMM06-48D15WA/B	18 ~ 75 VDC	±15 VDC	±200 mA	4 mA	87%	± 110 µF

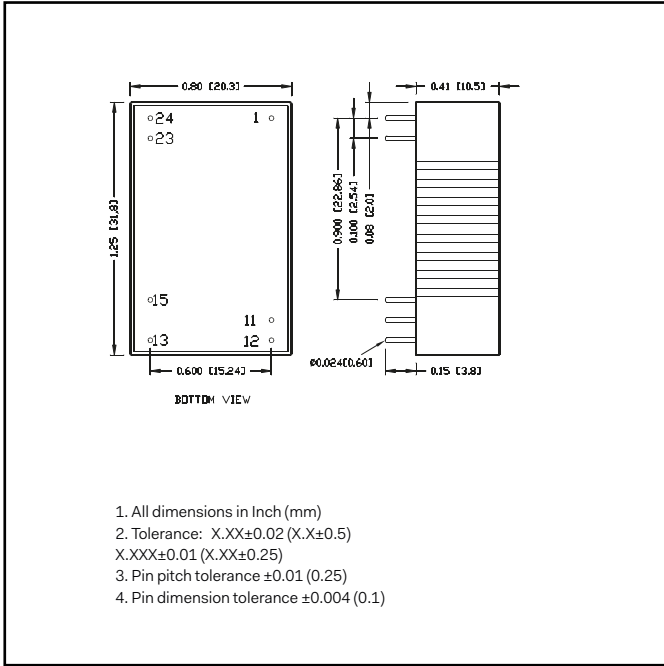
Notes:

1. The PMM06 (W) series can meet EMI Class A with no external filter. And Class B only with external components. For further information, please contact with Powerbox.
2. An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5.
The PMM06-05XXXXX recommended an aluminum electrolytic capacitor (Nippon Chemi-con KY series, 1000µF/25V).

And a reverse diode (Vishay V10P45) to connect in parallel.
The PMM06-12&24XXXXX recommended an aluminum electrolytic capacitor (Nippon Chemi-con KY series, 470µF/50V).
The PMM06-48XXXXX 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

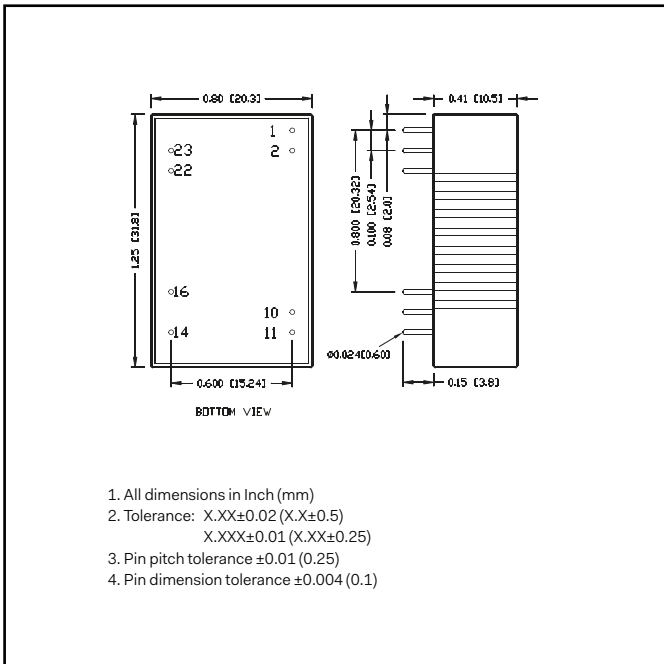
A Type



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	CtrlL (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

PMM06-□□□□□□-T

PMM06-□□□□□□-PT

Pin 11 is "NC" for

PMM06-□□□□□□

PMM06-□□□□□□-P

External Output Trimming

Output can be externally trimmed by using the method shown below. () for dual output trim.

