

# P R B X

POWERBOX **Medline**  
PMM03 Series  
3.3W  
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 $\mu$ 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	
		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		
		Constant resistive load		
Input surge voltage	3 seconds max.	2:1	5Vin(nom)	16VDC max
			12Vin(nom)	25VDC max
			24Vin(nom)	50VDC max
			48Vin(nom)	100VDC max
4:1 (W)	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
	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, automatic recovery.	

## Environmental

Operating ambient temp.	-40 $^{\circ}\text{C}$ to +94 $^{\circ}\text{C}$ without derating.	
	+94 $^{\circ}\text{C}$ 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.	

**General**

Isolation voltage	Input to output 5000VAC, 1 minute.
Isolation capacitance	12pF typ.
Leakage current	2µA max at 240VAC, 60Hz.
Switching frequency	150KHz 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	6.444 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		
EMI <sup>1</sup>	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 <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

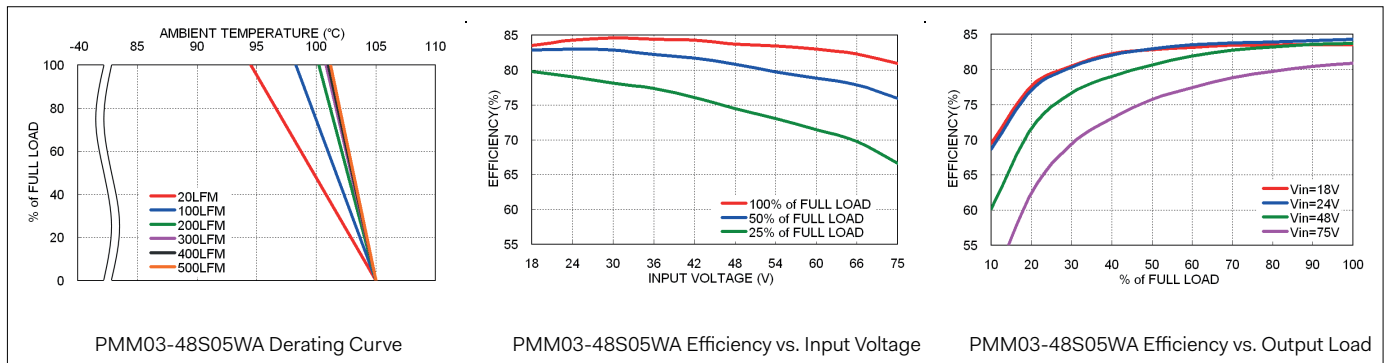
Part Number Structure

PMM03	-	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

PMM03	-	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

PMM03 Series

3.3W

2:1 & 4:1 Single and Dual Output

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Model Number	Input Range	Output Voltage	Output Current @ Full Load	Input Current @ No Load	Efficiency	Max Capacitor Load
PMM03-05S3P3A/B	4.5 ~9 VDC	3.3 VDC	1000 mA	10 mA	81%	1050 µF
PMM03-05S05A/B	4.5 ~9 VDC	5 VDC	600 mA	10 mA	84.5%	750 µF
PMM03-05S12A/B	4.5 ~9 VDC	12 VDC	250 mA	15 mA	85.5%	130 µF
PMM03-05S15A/B	4.5 ~9 VDC	15 VDC	200 mA	15 mA	87.5%	100 µF
PMM03-05S24A/B	4.5 ~9 VDC	24 VDC	125 mA	20 mA	85.5%	39 µF
PMM03-05D05A/B	4.5 ~9 VDC	±5 VDC	±300 mA	25 mA	83%	± 430 µF
PMM03-05D12A/B	4.5 ~9 VDC	±12 VDC	±125 mA	25 mA	86%	± 75 µF
PMM03-05D15A/B	4.5 ~9 VDC	±15 VDC	±100 mA	25 mA	86%	± 56 µF
PMM03-12S3P3A/B	9 ~ 18 VDC	3.3 VDC	1000 mA	10 mA	82%	1050 µF
PMM03-12S05A/B	9 ~ 18 VDC	5 VDC	600 mA	10 mA	84.5%	750 µF
PMM03-12S12A/B	9 ~ 18 VDC	12 VDC	250 mA	10 mA	87%	130 µF
PMM03-12S15A/B	9 ~ 18 VDC	15 VDC	200 mA	10 mA	87%	100 µF
PMM03-12S24A/B	9 ~ 18 VDC	24 VDC	125 mA	10 mA	87%	39 µF
PMM03-12D05A/B	9 ~ 18 VDC	±5 VDC	±300 mA	10 mA	83.5%	± 430 µF
PMM03-12D12A/B	9 ~ 18 VDC	±12 VDC	±125 mA	10 mA	87.5%	± 75 µF
PMM03-12D15A/B	9 ~ 18 VDC	±15 VDC	±100 mA	10 mA	86.5%	± 56 µF
PMM03-24S3P3A/B	18 ~ 36 VDC	3.3 VDC	1000 mA	6 mA	82%	1050 µF
PMM03-24S05A/B	18 ~ 36 VDC	5 VDC	600 mA	6 mA	84.5%	750 µF
PMM03-24S12A/B	18 ~ 36 VDC	12 VDC	250 mA	6 mA	87%	130 µF
PMM03-24S15A/B	18 ~ 36 VDC	15 VDC	200 mA	6 mA	87%	100 µF
PMM03-24S24A/B	18 ~ 36 VDC	24 VDC	125 mA	6 mA	87%	39 µF
PMM03-24D05A/B	18 ~ 36 VDC	±5 VDC	±300 mA	6 mA	83%	± 430 µF
PMM03-24D12A/B	18 ~ 36 VDC	±12 VDC	±125 mA	6 mA	87%	± 75 µF
PMM03-24D15A/B	18 ~ 36 VDC	±15 VDC	±100 mA	6 mA	86%	± 56 µF
PMM03-48S3P3A/B	36 ~ 75 VDC	3.3 VDC	1000 mA	4 mA	81%	1050 µF
PMM03-48S05A/B	36 ~ 75 VDC	5 VDC	600 mA	4 mA	84%	750 µF
PMM03-48S12A/B	36 ~ 75 VDC	12 VDC	250 mA	4 mA	87%	130 µF
PMM03-48S15A/B	36 ~ 75 VDC	15 VDC	200 mA	4 mA	86.5%	100 µF
PMM03-48S24A/B	36 ~ 75 VDC	24 VDC	125 mA	4 mA	86.5%	39 µF
PMM03-48D05A/B	36 ~ 75 VDC	±5 VDC	±300 mA	4 mA	83%	± 430 µF
PMM03-48D12A/B	36 ~ 75 VDC	±12 VDC	±125 mA	4 mA	86%	± 75 µF
PMM03-48D15A/B	36 ~ 75 VDC	±15 VDC	±100 mA	4 mA	86%	± 56 µF
PMM03-24S3P3WA/B	9 ~ 36 VDC	3.3 VDC	1000 mA	6 mA	82%	1050 µF
PMM03-24S05WA/B	9 ~ 36 VDC	5 VDC	600 mA	6 mA	84.5%	750 µF
PMM03-24S12WA/B	9 ~ 36 VDC	12 VDC	250 mA	6 mA	87%	130 µF
PMM03-24S15WA/B	9 ~ 36 VDC	15 VDC	200 mA	6 mA	87%	100 µF
PMM03-24S24WA/B	9 ~ 36 VDC	24 VDC	125 mA	6 mA	87%	39 µF
PMM03-24D05WA/B	9 ~ 36 VDC	±5 VDC	±300 mA	6 mA	83%	± 430 µF
PMM03-24D12WA/B	9 ~ 36 VDC	±12 VDC	±125 mA	6 mA	87%	± 75 µF
PMM03-24D15WA/B	9 ~ 36 VDC	±15 VDC	±100 mA	6 mA	86%	± 56 µF
PMM03-48S3P3WA/B	18 ~ 75 VDC	3.3 VDC	1000 mA	4 mA	81%	1050 µF
PMM03-48S05WA/B	18 ~ 75 VDC	5 VDC	600 mA	4 mA	84%	750 µF
PMM03-48S12WA/B	18 ~ 75 VDC	12 VDC	250 mA	4 mA	87%	130 µF
PMM03-48S15WA/B	18 ~ 75 VDC	15 VDC	200 mA	4 mA	86.5%	100 µF
PMM03-48S24WA/B	18 ~ 75 VDC	24 VDC	125 mA	4 mA	86.5%	39 µF
PMM03-48D05WA/B	18 ~ 75 VDC	±5 VDC	±300 mA	4 mA	83%	± 430 µF
PMM03-48D12WA/B	18 ~ 75 VDC	±12 VDC	±125 mA	4 mA	86%	± 75 µF
PMM03-48D15WA/B	18 ~ 75 VDC	±15 VDC	±100 mA	4 mA	86%	± 56 µF

Notes:

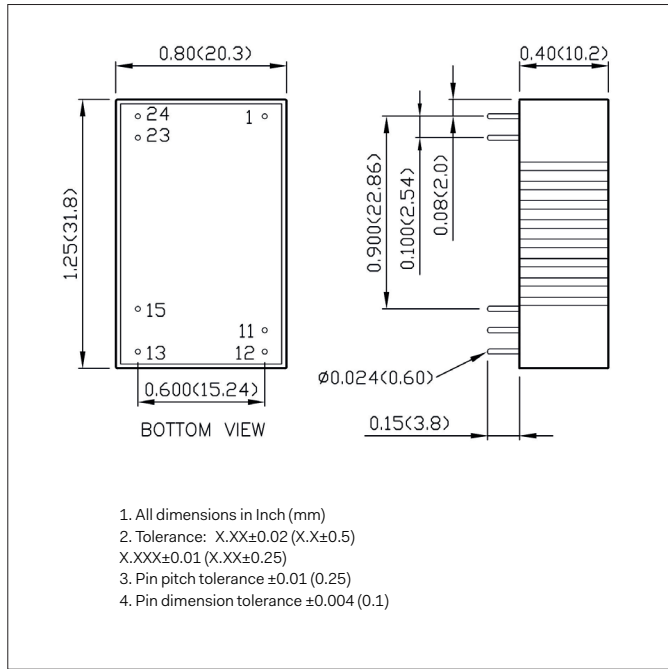
1. The PMM03 (W) series can meet EMI Class A with no external filter. And Class B only with external components. For further information, please contact with Powerbox.
2. An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5.  
The PMM03-05XXXXX recommended an aluminum electrolytic capacitor (Nippon Chemi-con KY series, 1000µF/25V).

And a reverse diode (Vishay V10P45) to connect in parallel.  
The PMM03-12&24XXXXX recommended an aluminum electrolytic capacitor (Nippon Chemi-con KY series, 470µF/50V).  
The PMM03-48XXXXX 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.

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3.3W  
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Mechanical

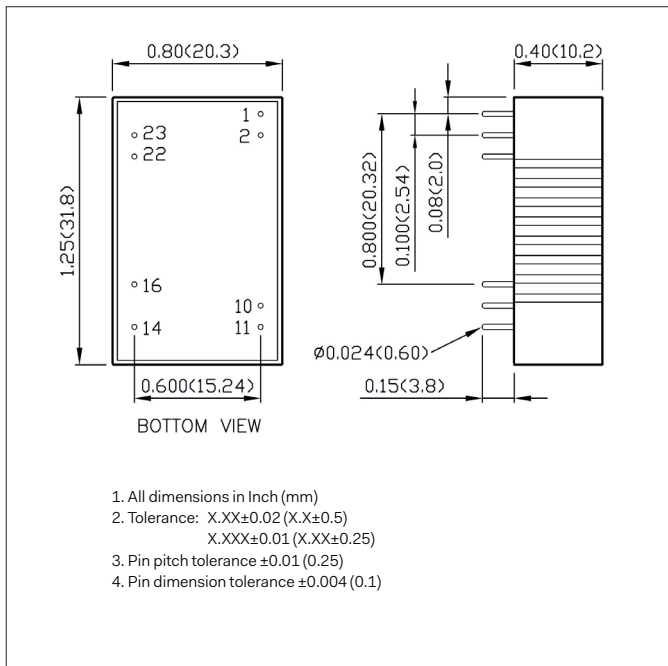
A Type



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

PMM03-□□S□□□B-T

PMM03-□□S□□□B-PT

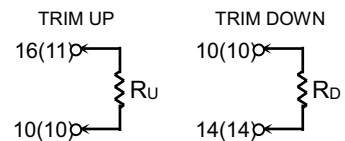
Pin 11 is "NC" for

PMM03-□□S□□□B

PMM03-□□S□□□B-P

External Output Trimming

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



Specifications are subject to change without notice.