

P R B X

POWERBOX Industrial Line T15 Series 15W 2:1 Single and Dual Output High Performance DC/DC Converter

Features

Output current up to 4A
Standard 2" x 1" x 0.4" package
High efficiency up to 88%
2:1 wide input voltage range
Six-sided continuous shield
Fixed switching frequency
International safety standard approval
Compliant to RoHS EU Directive 2002/95/EC

Input

Voltage range	12V nominal input	9-18VDC
	24V nominal input	18-36VDC
	48V nominal input	36-75VDC
Input filter	Pi type.	
Input surge voltage	12V input	36VDC
100mS max	24V input	50VDC
	48V input	100VDC
Reflected ripple current	20mA p-p, nominal Vin and full load.	
Start up time	Power up 20mS typ.	
	Nominal Vin and constant resistive load.	
Remote ON/OFF ⁷	Positive logic:	
	DC/DC ON: Open or $3.5V < V_r < 12V$	
	DC/DC OFF: Short or $0V < V_r < 1.2V$	
	Negative logic:	
	DC/DC ON: Short or $0V < V_r < 1.2V$	
	DC/DC OFF: Open or $3.5V < V_r < 12V$	
	Input current of remote control pin:	
	-0.5mA to +1mA, nominal Vin.	
	Remote off state input current:	
	20mA, nominal Vin.	

Output

Power	15W max.	
Voltage accuracy	$\pm 1\%$, full load and nominal Vin.	
Min load ⁶	See table.	
Line regulation	$\pm 0.5\%$, LL to HL at full load.	
Load regulation	Single: $\pm 0.5\%$, min load to full load.	
	Dual: $\pm 1\%$, min load to full load.	
Cross regulation (dual)	$\pm 5\%$, asymmetrical load 25% / 100% FL.	
Ripple and noise	Single: 50mV p-p, 20MHz BW.	
	Dual: 75mV p-p, 20MHz BW.	
Temperature coefficient	$\pm 0.02\%/^{\circ}\text{C}$ max.	
Transient response	250uS, recovery time 25% load step change.	



Over voltage protection	3.3V output	3.9V
	5V output	6.2V
	12V output	15V
	15V output	18V

(zener diode clamp).
Overload protection 150% max, % of FL at nominal input.
Short circuit protection Hiccup, automatic recovery.

Environmental

Operating temperature	-40°C to +85°C (with derating).
Max case temperature	+100°C.
Storage temperature	-55°C to +105°C.
Thermal impedance	Nature convection: 12°C/W.
	Nature convection with heat-sink: 10°C/W.
Thermal shock	MIL-STD-810F.
Vibration	10-55Hz, 10G, 30 minutes along x, y and z.
Relative humidity	5-95% RH.

General

Efficiency	See table.
Isolation voltage	1600VDC min.
Isolation resistance	10 ⁹ ohms, min.
Isolation capacitance	300pF, max.
Switching frequency	Single output: 500KHz typ.
	Dual output: 300KHz typ.
Case material.	Nickel-coated copper.
Base material	Non-conductive black plastic.
Potting material	Epoxy (UL94-V0).
Dimensions	50.8 x 25.4 x 10.2 mm.
Weight	27g.
MTBF ¹	Bellcore TR-NWT-000332: 2.041 x 10 ⁶ hrs.
	MIL-HDBK-217F: 1.044 x 10 ⁶ hrs

Standards

Safety standards	IEC60950-1, UL60950-1, EN60950-1.
EMC	EN55022, EN61000-4-2, -3, -4, -5, -6.

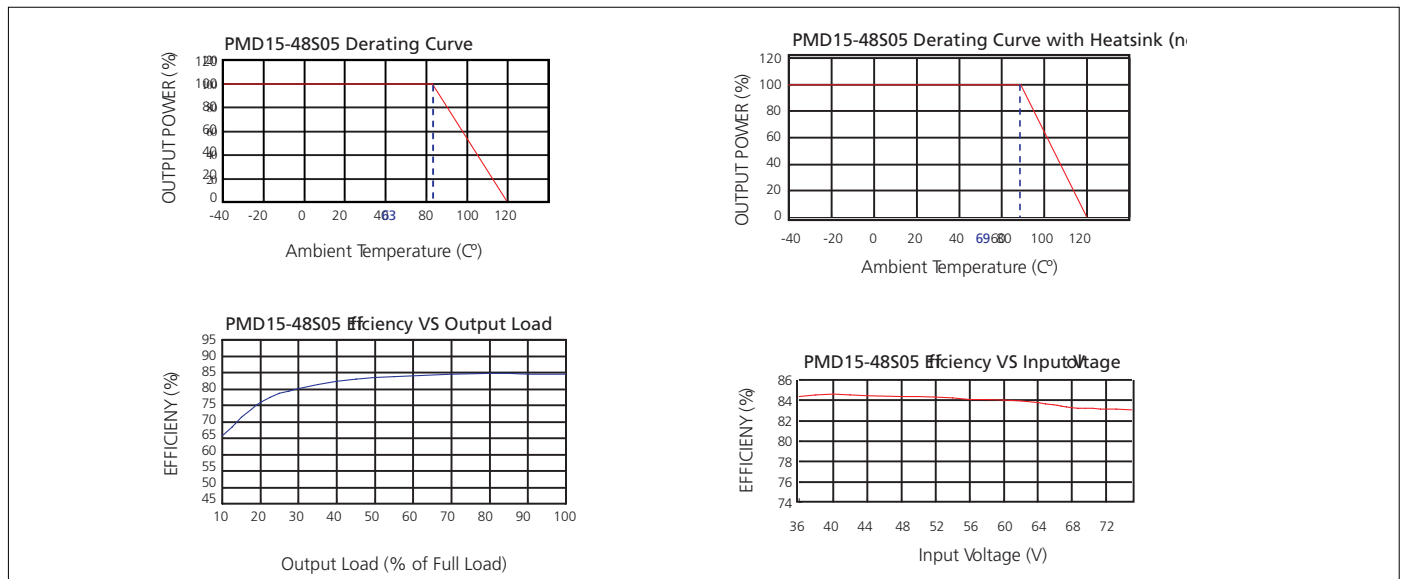
POWERBOX Industrial Line
T15 Series
15W 2:1 Single and Dual Output
High Performance
DC/DC Converter

Model Number	Input Range	Output Voltage	Output Min Load	Full Load	Output Ripple&Noise	Input No Load ³	Full Load ²	Eff ⁴	Cap. ⁵ Load Max
PMD15-12S33	9 - 18 VDC	3.3 VDC	0mA	4000mA	50mVp-p	30mA	1467mA	79%	10200uF
PMD15-12S05	9 - 18 VDC	5 VDC	15mA	3000mA	50mVp-p	25mA	1603mA	82%	7050uF
PMD15-12S12	9 - 18 VDC	12 VDC	0mA	1250mA	50mVp-p	25mA	1524mA	86%	1035uF
PMD15-12S15	9 - 18 VDC	15 VDC	0mA	1000mA	50mVp-p	20mA	1524mA	86%	705uF
PMD15-12D05	9 - 18 VDC	±5 VDC	0mA	±1500mA	75mVp-p	20mA	1582mA	83%	±1020uF
PMD15-12D12	9 - 18 VDC	±12 VDC	0mA	±625mA	75mVp-p	30mA	1524mA	86%	±495uF
PMD15-12D15	9 - 18 VDC	±15 VDC	±10mA	±500mA	75mVp-p	35mA	1563mA	84%	±165uF
PMD15-24S33	18 - 36 VDC	3.3 VDC	0mA	4000mA	50mVp-p	15mA	724mA	80%	10200uF
PMD15-24S05	18 - 36 VDC	5 VDC	15mA	3000mA	50mVp-p	10mA	781mA	84%	7050uF
PMD15-24S12	18 - 36 VDC	12 VDC	0mA	1250mA	50mVp-p	20mA	772mA	85%	1035uF
PMD15-24S15	18 - 36 VDC	15 VDC	10mA	1000mA	50mVp-p	15mA	772mA	85%	705uF
PMD15-24D05	18 - 36 VDC	±5 VDC	0mA	±1500mA	75mVp-p	15mA	781mA	84%	±1020uF
PMD15-24D12	18 - 36 VDC	±12 VDC	0mA	±625mA	75mVp-p	25mA	762mA	86%	±495uF
PMD15-24D15	18 - 36 VDC	±15 VDC	0mA	±500mA	75mVp-p	25mA	762mA	86%	±165uF
PMD15-48S33	36 - 75 VDC	3.3 VDC	0mA	4000mA	50mVp-p	10mA	357mA	81%	10200uF
PMD15-48S05	36 - 75 VDC	5 VDC	0mA	3000mA	50mVp-p	20mA	396mA	83%	7050uF
PMD15-48S12	36 - 75 VDC	12 VDC	10mA	1250mA	50mVp-p	15mA	377mA	87%	1035uF
PMD15-48S15	36 - 75 VDC	15 VDC	0mA	1000mA	50mVp-p	15mA	381mA	86%	705uF
PMD15-48D05	36 - 75 VDC	±5 VDC	0mA	±1500mA	75mVp-p	10mA	386mA	85%	±1020uF
PMD15-48D12	36 - 75 VDC	±12 VDC	0mA	±625mA	75mVp-p	15mA	372mA	88%	±495uF
PMD15-48D15	36 - 75 VDC	±15 VDC	0mA	±500mA	75mVp-p	15mA	377mA	87%	±165uF

Notes:

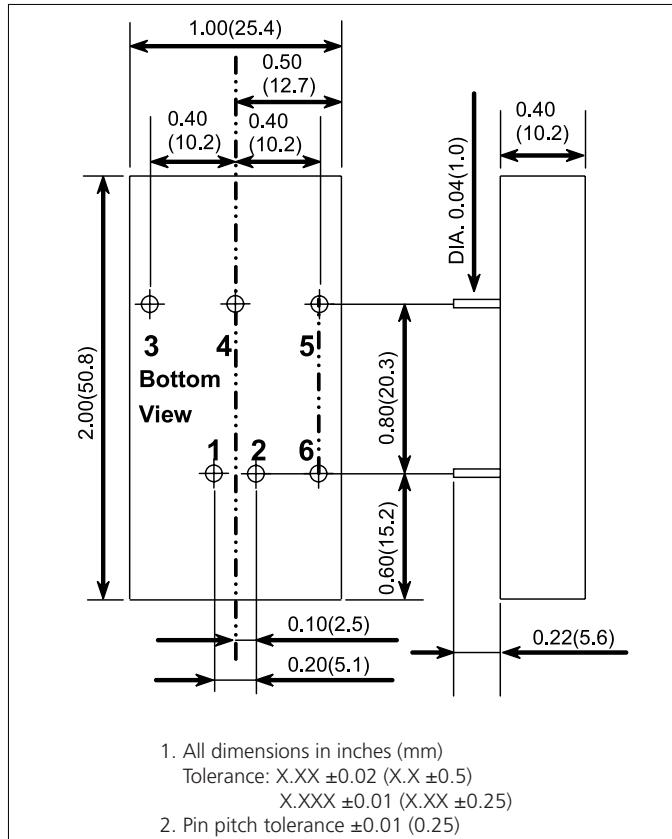
1. BELLCORE TR-NWT-000332. Case 1: 50% Stress, Temperature at 40°C. MIL-HDBK-217F Notice2 @Ta=25 °C, Full load(Ground, Benign, controlled environment).
2. Maximum value at nominal input voltage and full load
3. Typical value at nominal input voltage and no load.
4. Typical value at nominal input voltage and full load.
5. Test by minimum Vin and constant resistor load. minimum Vin and constant resistive load.
6. The output requires a minimum loading on the output to maintain specified regulation. Operation under no-load condition will not damage these devices, however they may not meet all listed specification.
7. The ON/OFF control pin voltage is referenced to -Vin.
To order positive logic ON-OFF control add the suffix-P (Ex: PMD15-24S05-P). To order negative logic ON-OFF control add the suffix-N (Ex:PMD15-24S05-N).
8. Heat sink is optional and P/N: 7G-0020A
9. The PMD15 series can meet EN55022 Class A with parallel an external capacitor to the input pins. Recommend: 12Vin : 6.8μF/50V 1812 MLCC. 24Vin : 2.2μF/50V 1812 MLCC. 48Vin : 1.5μF/100V 1812 MLCC.
10. An external filter capacitor is required if the module has to meet EN61000-4-5.
The filter capacitor Power Mate suggest: Nippon chemi-con KY series, 220μF/100V, ESR 48mΩ.

Derating Curve



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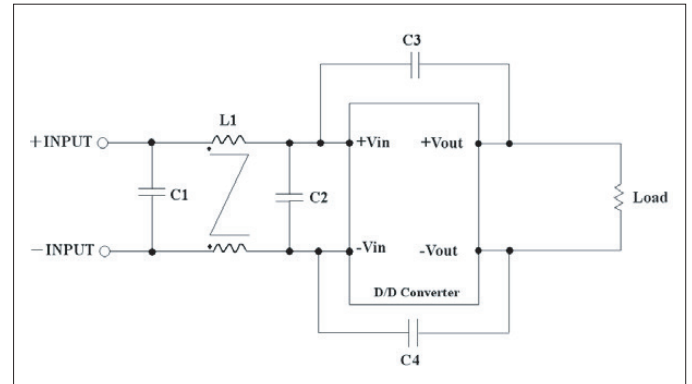
Mechanical



Pin Connection

Pin	Single	Dual
1	+INPUT	+INPUT
2	-INPUT	-INPUT
3	+OUTPUT	+OUTPUT
4	NO PIN	COMMON
5	-OUTPUT	-OUTPUT
6	CTRL (Option)	CTRL (Option)

Filter



Recommended filter for EN55022 Class B compliance

The components used in the above figure, together with the manufacturer's part numbers for these components, are as follows:

	C1	C2	C3	C4	L1
PMD15-12xxx	4.7uF/50V 1812 MLCC	N/A	1000pF/2KV MLCC	1000pF/2KV MLCC	325uH Common Choke PMT-050
PMD15-24xxx	3.3uF/50V 1812 MLCC	N/A	1000pF/2KV MLCC	1000pF/2KV MLCC	325uH Common Choke PMT-050
PMD15-48xxx	2.2uF/100V 1812 MLCC	2.2uF/100V 1812 MLCC	1000pF/2KV MLCC	1000pF/2KV MLCC	325uH Common Choke PMT-050

