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POWERBOX Industrial Line T20 Series 20W 2:1 and 4:1 Single, Dual and Triple Output High Performance DC/DC Converter

Features

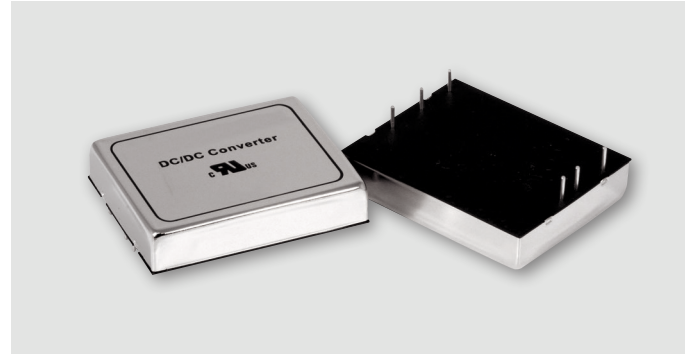
Output current up to 4A
Standard 2" x 1.6" x 0.4" package
High efficiency up to 87%
2:1 and 4:1 wide input voltage range
Six-sided continuous shield
Fixed switching frequency
International safety standards
RoHS compliant

Input

Input voltage range	12V nominal	9 – 18V
	24V nominal	18 – 36V
	48V nominal	36 – 75V
"W" model	24V nominal	9 – 36V
	48V nominal	18 – 75V
Filter	PI-type.	
Input surge voltage 100mS max	12V input	36VDC
	24V input	50VDC
	48V input	100VDC
Reflected ripple current	25mA _{p-p} , nominal Vin and full load.	
Start up time	Power up 20mS typ, nominal Vin and constant resistive load.	
Remote ON/OFF ⁸	DC/DC ON	Open or 3.5V < Vr < 12V (Positive logic)
	DC/DC OFF	Short or 0V < Vr < 1.2V
	Input current of remote control pin: -0.5-.0mA, nominal Vin.	
	Remote off state input current: 20mA, nominal Vin.	

Output

Power	20W max.	
Voltage accuracy	Single & dual	±1%
	Triple 3.3V/5V	±1%
	Auxiliary	±5%
	Full load and nominal Vin.	
Minimum load ⁶	See table.	
Voltage adjustability	±10%.	
Line regulation	Single (W)	±0.2%
LL to HL at full load	Dual (W)	±0.5%
	Triple 3.3V/5V	±1%
	Auxiliary	±5%
Load regulation	Single	±0.5%
Min load to full load	Dual	±3%
	Triple 3.3V/5V	±2%
	Auxiliary	±5%
Cross regulation ⁷	Dual	±5%
	Triple 3.3V/5V	±2%
	Auxiliary	±5%
Ripple and noise	20MHz bandwidth, see table.	
Temperature coefficient	±0.02%/°C.	



Transient response recovery time	Single	250uS
	Dual	250uS
	Triple	500uS
	25% load step change.	
Overvoltage protection zener diode clamp	3.3V output:	3.9V
	5V output:	6.2V
	12V output:	15V
	15V output:	18V
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 max.	
Storage temperature	-55°C to +105°C.	
Thermal impedance ⁹	10°C/watt, nature convection	
	8.24°C/watt, nature convection with heatsink.	
Thermal shock	MIL-STD-810F.	
Vibration	10-55Hz, 10G, 30 minutes along x, y, z.	
Relative humidity	5-95% RH.	
Cooling	Free air Convection.	

General

Efficiency	See table.	
Isolation voltage	1600VDC min.	
Isolation resistance	10 ⁹ Ohms, min.	
Isolation capacitance	300pF max.	
Switching frequency	300kHz typ.	
Case material	Nickel-coated copper.	
Base material	Non-conductive black plastic.	
Potting material	Epoxy (UL94-V0).	
Dimensions	50.8 x 40.6 x 10.2 mm.	
Weight	48g.	
MTBF ¹	1.928 x 10 ⁶ hrs BELLCORE TR-NWT-000332.	
	7.650 x 10 ⁵ hrs MIL-HDBK-217F.	

STANDARDS

Safety standards	IEC60950-1, UL60950-1, EN60950-1.	
EMC Characteristics		
EMI	EN55022, Class A.	
ESD	EN61000-4-2 Criteria B, air ±8kV, contact ±6kV.	
Radiated immunity	EN61000-4-3 Criteria A, 10V/m.	
Fast transient	EN61000-4-4 Criteria B, ±2kV.	
Surge ¹¹	En61000-4-5 Criteria B, ±1kV.	
Conducted immunity	EN61000-4-6 Criteria A, 10 Vr.m.s.	

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T20 Series

20W 2:1 and 4:1 Single, Dual and Triple Output

High Performance

DC/DC Converter

Model Number	Input Range	Output Voltage	Output Current		Output ⁴ Ripple & Noise	Input Current		Eff ⁴ %	Capacitor ⁵ Load Max
			Min Load	Full Load		No Load ³	Full Load ²		
PME20-12S33	9-18 VDC	3.3 VDC	280mA	4000mA	75mVp-p	40mA	1507mA	77	13000uF
PME20-12S05	9-18 VDC	5 VDC	280mA	4000mA	75mVp-p	15mA	2193mA	80	6800uF
PME20-12S12	9-18 VDC	12 VDC	134mA	1670mA	75mVp-p	40mA	2110mA	83	2200uF
PME20-12S15	9-18 VDC	15 VDC	106mA	1330mA	75mVp-p	20mA	2083mA	84	755uF
PME20-12D05	9-18 VDC	±5 VDC	±140mA	±2000mA	100mVp-p	15mA	2136mA	82	±3400uF
PME20-12D12	9-18 VDC	±12 VDC	±67mA	±833mA	100mVp-p	35mA	2110mA	83	±680uF
PME20-12D15	9-18 VDC	±15 VDC	±53mA	±666mA	100mVp-p	35mA	2110mA	83	±450uF
PME20-12T3312	9-18 VDC	3.3/±12 VDC	300/±30mA	3000/±300mA	50/±120mVp-p	20mA 1	900mA	79	4700 / ±220uF
PME20-12T3315	9-18 VDC	3.3/±15 VDC	300/±25mA	3000/±250mA	50/±150mVp-p	35mA	1933mA	79	4700 / ±220uF
PME20-12T0512	9-18 VDC	5/±12 VDC	200/±30mA	2000/±300mA	50/±120mVp-p	20mA	1885mA	80	4700 / ±220uF
PME20-12T0515	9-18 VDC	5/±15 VDC	200/±25mA	2000/±250mA	50/±150mVp-p	40mA	1919mA	80	4700 / ±220uF
PME20-24S33 (W)	18-36 (9-36) VDC	3.3 VDC	280mA	4000mA	75mVp-p	10(20)mA	733 (764mA)	79 (76)	13000uF
PME20-24S05 (W)	18-36 (9-36) VDC	5 VDC	280mA	4000mA	75mVp-p	10(10)mA	1082 (1111mA)	81 (79)	6800uF
PME20-24S12 (W)	18-36 (9-36) VDC	12 VDC	134mA	1670mA	75mVp-p	10(20)mA	1018 (1082mA)	86 (81)	2200uF
PME20-24S15 (W)	18-36 (9-36) VDC	15 VDC	106mA	1330mA	75mVp-p	15(20)mA	1018 (1082mA)	86 (81)	755uF
PME20-24D05 (W)	18-36 (9-36) VDC	±5 VDC	±140mA	±2000mA	100mVp-p	20(15)mA	1028 (1111mA)	85 (79)	±3400uF
PME20-24D12 (W)	18-36 (9-36) VDC	±12 VDC	±67mA	±833mA	100mVp-p	25(20)mA	1016 (1068mA)	86 (82)	±680uF
PME20-24D15 (W)	18-36 (9-36) VDC	±15 VDC	±53mA	±666mA	100mVp-p	30(25)mA	1015 (1068mA)	86 (82)	±450uF
PME20-24T3312	18-36 VDC	3.3/±12 VDC	300/±30mA	3000/±300mA	50/±120mVp-p	20mA	914mA	82	4700 / ±220uF
PME20-24T3315	18-36 VDC	3.3/±15 VDC	300/±25mA	3000/±250mA	50/±150mVp-p	20mA	967mA	79	4700 / ±220uF
PME20-24T0512	18-36 VDC	5/±12 VDC	200/±30mA	2000/±300mA	50/±120mVp-p	25mA	907mA	83	4700 / ±220uF
PME20-24T0515	18-36 VDC	5/±15 VDC	200/±25mA	2000/±250mA	50/±150mVp-p	10mA	922mA	83	4700 / ±220uF
PME20-48S33 (W)	36-75 (18-75) VDC	3.3 VDC	280mA	4000mA	75mVp-p	10(15)mA	367 (377mA)	79 (77)	13000uF
PME20-48S05 (W)	36-75 (18-75) VDC	5 VDC	280mA	4000mA	75mVp-p	10(10)mA	543 (548mA)	82 (80)	6800uF
PME20-48S12 (W)	36-75 (18-75) VDC	12 VDC	134mA	1670mA	75mVp-p	15(10)mA	509 (536mA)	86 (82)	2200uF
PME20-48S15 (W)	36-75 (18-75) VDC	15 VDC	106mA	1330mA	75mVp-p	25(10)mA	506 (532mA)	86 (82)	755uF
PME20-48D05 (W)	36-75 (18-75) VDC	±5 VDC	±140mA	±2000mA	100mVp-p	15(10)mA	514 (541mA)	85 (81)	±3400uF
PME20-48D12 (W)	36-75 (18-75) VDC	±12 VDC	±67mA	±833mA	100mVp-p	15(15)mA	502 (527mA)	87 (83)	±680uF
PME20-48D15 (W)	36-75 (18-75) VDC	±15 VDC	±53mA	±666mA	100mVp-p	20(20)mA	502 (527mA)	87 (83)	±450uF
PME20-48T3312	36-75 VDC	3.3/±12 VDC	300/±30mA	3000/±300mA	50/±120mVp-p	10mA	457mA	82	4700 / ±220uF
PME20-48T3315	36-75 VDC	3.3/±15 VDC	300/±25mA	3000/±250mA	50/±150mVp-p	10mA	464mA	82	4700 / ±220uF
PME20-48T0512	36-75 VDC	5/±12 VDC	200/±30mA	2000/±300mA	50/±120mVp-p	15mA	448mA	84	4700 / ±220uF
PME20-48T0515	36-75 VDC	5/±15 VDC	200/±25mA	2000/±250mA	50/±150mVp-p	15mA	456mA	84	4700 / ±220uF
PMAPO-24S15	21.6-26.4 VDC	15 VDC	6.7 mA	67 mA	100 mV p-p	10 mA	57 mA	78	330uF
PMAPO-24D05	21.6-26.4 VDC	±5 VDC	±10 mA	±100 mA	100 mV p-p	12 mA	59 mA	75	±150uF
PMAPO-24D12	21.6-26.4 VDC	±12 VDC	±4.2 mA	±42 mA	100 mV p-p	10 mA	57 mA	78	±150uF
PMAPO-24D15	21.6-26.4 VDC	±15 VDC	±3.3 mA	±33 mA	100 mV p-p	10 mA	55 mA	79	±150uF

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 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. Cross regulation : Dual output.Asymmetrical load 25% to 100% full load.

- Triple output . 3.3V / 5V 100% load and one of auxiliary 100% load, other auxiliary load change from 25% to 100% load
8. The ON/OFF control pin voltage is referenced to -Vin
9. Heat sink is optional and P/N: 7G-0011A and the operation temperature range please see curve.
10. The PME20 series can meet EN55022 Class A with parallel an external capacitor to the input pins. Recommend: 12Vin : 6.8µF/50V 1812 MLCC . 24Vin : N/A. 48Vin : 2.2µF/100V 1812 MLCC
11. An external filter capacitor is required if the module has to meet EN61000-4-5. The filter capacitor Powerbox suggest: Nippon chemi-con KY series, 220µF/100V, ESR 48mΩ.
12. The PME20-24D3305 and PME20-48D3305 are safety approval pending.

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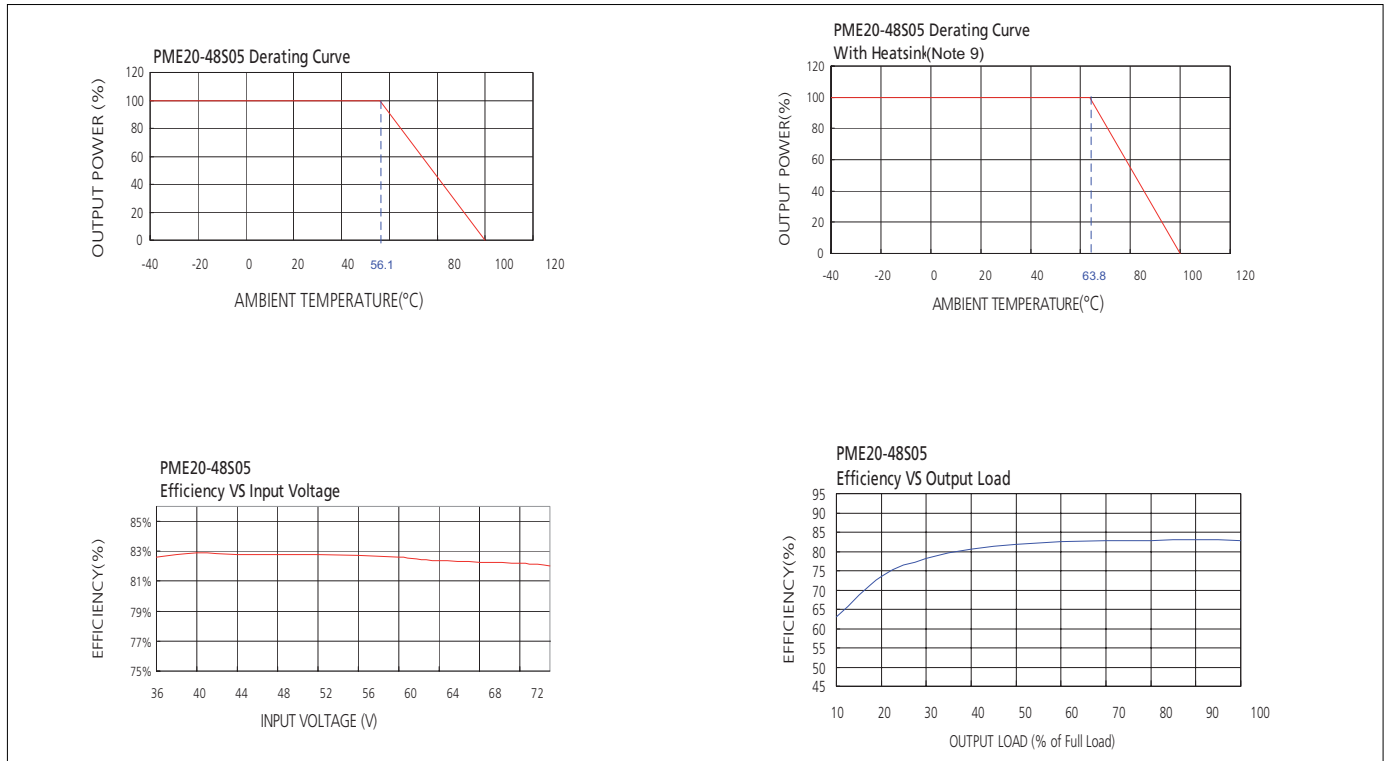
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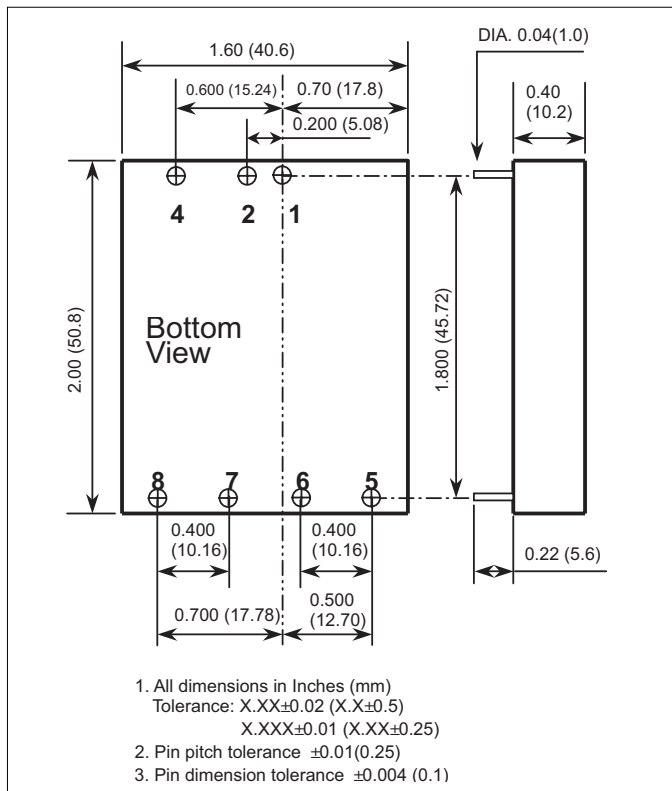
High Performance

DC/DC Converter

Derating Curve



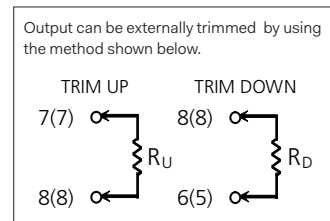
Mechanical



Pin Connection

Pin	Single	Dual	Triple
1	+INPUT	+INPUT	+INPUT
2	-INPUT	-INPUT	-INPUT
4	CTRL	CTRL	CTRL
5	NO PIN	+OUTPUT	+AUXILIARY
6	+OUTPUT	COMMON	+3.3V/+5V
7	-OUTPUT	-OUTPUT	COMMON
8	TRIM	TRIM	-AUXILIARY

External Output Trimming



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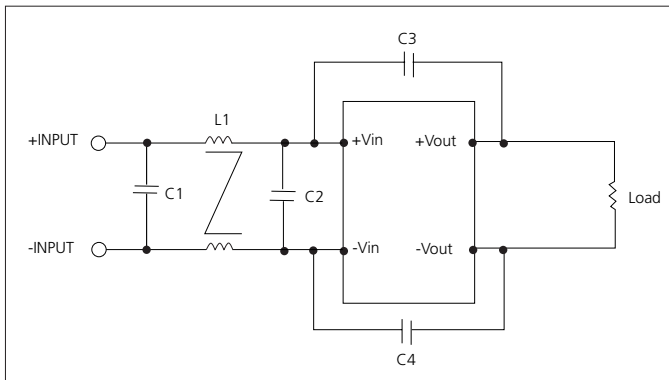
T20 Series

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High Performance

DC/DC Converter

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
PME20-12xxx	4.7uF/50V 1812 MLCC	N/A	1000pf/2KV MLCC	1000pF/2KV MLCC	450uH Common Choke PMT-048
PME20-24xxxW	2.2uF/100V 1812 MLCC	N/A	1000pf/2KV MLCC	1000pF/2KV MLCC	450uH Common Choke PMT-048
PME20-48xxxW	2.2uF/100V 1812 MLCC	2.2uF/100V 1812 MLCC	1000pf/2KV MLCC	1000pF/2KV MLCC	450uH Common Choke PMT-048



Recommended EN55022 Class B Filter Circuit Layout

Recommended EN55022 Class B Filter Circuit Layout