PBT01F series

1W

DC-DC converters

The PBT01F series of single and dual output 1W DC-DC converters are an ideal solution for isolating voltage rails in a distributed power supply architecture such as analog, digital, data and relay circuits.

The PBT01F offers high efficiency, ITE safety approvals, short circuit protection and a wide operating temperature range in a compact SMD8/10 DIP design, allowing easy integration into industrial, instrumentation and technology applications.

Features

- Single & dual unregulated outputs 3.3V to 15VDC
- ±10% input range
- Nominal inputs 3.3V to 24VDC
- SMD8 single output & SMD10 dual output
- 1kVDC isolation, 2kVDC & 3kVDC options
- UL62368-1 & IEC62368-1 safety approvals
- Continuous short circuit protection
- Tape & reel option
- -40°C to +105°C operating temperature
- 3 year warranty

Applications

Robotics, Instrumentation, Technology, Industrial, Process control

Dimensions

Single:
12.75 x 10.7 x 7.0 mm (0.5" x 0.42" x 0.28")
Dual:
15.24 x 10.7 x 7.0 mm (0.6" x 0.42" x 0.28")

Models & ratings

Model number[1]	Input voltage	Output voltage	Output current	Maximum capacitive load	Efficiency[2]
PBT01F03S3V3	3.3V (3.0-3.6V)	3.3V	303mA	470uF	73%
PBT01F03S05		5.0V	200mA	470uF	75.9%
PBT01F03S12		12.0V	84mA	100uF	79.5%
PBT01F03S15		15.0V	67mA	100uF	80%
PBT01F03D3V3		±3.3V	±152mA	±150uF	74%
PBT01F03D05		±5V	±100mA	±150uF	76%
PBT01F03D09		±9V	±56mA	±100uF	76%
PBT01F03D12		±12V	±42mA	±47uF	76%
PBT01F03D15		±15V	±34mA	±47uF	76%

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Notes:

1. Optional 2kVDC isolation add suffix '-H2' and 3kVDC isolation add suffix '-H3'.
2. Typical value at nominal input voltage and full load.
3. For tape & reel option add suffix -TR. Reel quantity = 500

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Models & ratings

Model number[1]	Input voltage	Output voltage	Output current	Maximum capacitive load	Efficiency[2]
PBT01F05S3V3	5V (4.5-5.5V)	3.3V	303mA	470uF	74%
PBT01F05S05		5.0V	200mA	470uF	74.8%
PBT01F05S09		9.0V	112mA	220uF	75.5%
PBT01F05S12		12.0V	84mA	100uF	75.5%
PBT01F05S15		15.0V	67mA	100uF	76.5%
PBT01F05D3V3		±3.3V	±152mA	±150uF	74%
PBT01F05D05		±5V	±100mA	±150uF	75%
PBT01F05D09		±9V	±56mA	±100uF	75%
PBT01F05D12		±12V	±42mA	±47uF	76%
PBT01F05D15		±15V	±34mA	±47uF	74%
PBT01F12S3V3	12V (10.8-13.2V)	3.3V	303mA	470uF	74%
PBT01F12S05		5.0V	200mA	470uF	80%
PBT01F12S09		9.0V	112mA	220uF	75.5%
PBT01F12S12		12.0V	84mA	100uF	77%
PBT01F12S15		15.0V	67mA	100uF	80%
PBT01F12D3V3		±3.3V	±152mA	±150uF	71%
PBT01F12D05		±5V	+/100mA	±150uF	72%
PBT01F12D09		±9V	±56mA	±100uF	77%
PBT01F12D12		±12V	±42mA	±47uF	81%
PBT01F12D15		±15V	±34mA	±47uF	77%
PBT01F15S05	15V (13.5-16.5V)	5.0V	200mA	470uF	71.1%
PBT01F15S12		12.0V	84mA	100uF	78%
PBT01F24S05	24V (21.6-26.4)	5.0V	200mA	470uF	71%
PBT01F24S12		12.0V	84mA	100uF	77%
PBT01F24S15		15.0V	67mA	100uF	78.5%
PBT01F24D3V3		±3.3V	±152mA	±150uF	76%
PBT01F24D05		±5V	±100mA	±150uF	71%
PBT01F24D09		±9V	±56mA	±100uF	76%
PBT01F24D12		±12V	±42mA	±47uF	79%
PBT01F24D15		±15V	±34mA	±47uF	79%

Notes:

1. Optional 2kVDC isolation add suffix '-H2' and 3kVDC isolation add suffix '-H3'.
2. Typical value at nominal input voltage and full load.
3. For tape & reel option add suffix -TR. Reel quantity = 500

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Input

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Input voltage	3.0		26.4	VDC	See models and ratings table
Input reflected ripple			130	mA pk-pk	3.3V input with 10μF MLCC
			75		5.0V input with 10μF MLCC
			45		12.0V input with 10μF MLCC
			30		15.0V input with 10μF MLCC
			25		24.0V input with 10μF MLCC
Input filter	Integrated capacitor				

Output

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Output voltage	3V3		30	VDC	See models and ratings table
Initial set accuracy	-5		+5		Nominal input voltage and full load.
Minimum load					No minimum load required
Line regulation		±1.2	±1.4	%	Per 1% change of input value
Load regulation			15/10	%	3.3V & 5V / 9V, 12V & 15V output from 10% to full load
Ripple and noise			100	mV pk-pk	Measured with 20MHz bandwidth and 0.1μF ceramic capacitor at nominal input 25°C
Short circuit protection	Continuous, with auto recovery				
Maximum capacitive load	See Models and Ratings table				
Temperature coefficient		±0.02		%/°C	Full load

General

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Efficiency	See Models and Ratings table.				
Isolation: input to output	1000/ 2000/ 3000			VDC	Add suffix -H2 for 2kV and -H3 for 3kV isolation.
Switching frequency	20			kHz	
Isolation resistance	10^9			Ω	Input to output
Isolation capacitance		20/80		pF	Single/Dual. Input and output
Power density			14	W/in^3	
Mean time between failure		16		Mhrs	MIL-HDBK-217F, 25°C GB.
Weight		1.0/1.2 (0.002)		g(lb)	Single/Dual
Recommended solder profile	IPC/JEDEC J-STD-020D.1				
MSL	Level 1				
Case material	Black plastic, flame retardant UL94V-0				
Pin material	Phosphor bronze				
Water wash	Non-soaking water wash with de-ionised water. Dry thoroughly.				
Potting material	Epoxy UL94V-0 rated				

Environmental

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Operating temperature	-40		+105	°C	See derating graphs.
Storage temperature	-55		+125	°C	
Case temperature			+115	°C	
Operating humidity			95	%RH	Non-condensing
Cooling	Natural convection				

Safety approvals

Safety agency	Standard	Notes & conditions
UL/IEC/EN	UL62368-1 / IEC62368-1	
CE	Meets all applicable directives	
UKCA	Meets all applicable legislation	

EMC: Emissions

Phenomenon	Standard	Test level	Notes & conditions
Conducted	EN55032	Class B	See application notes
Radiated	EN55032	Class B	See application notes

EMC: Immunity

Phenomenon	Standard	Test level	Criteria	Notes & conditions
Immunity	EN55035			
ESD	EN61000-4-2	3	A	±6kV contact, ±8kV air discharge
Radiated	EN61000-4-3	3V/m	A	
EFT/burst	EN61000-4-4	2	A	±1kV (Line to line)
Surges	EN61000-4-5	1	A	±0.5kV (Line to line)
Conducted	EN61000-4-6	3V	A	
Magnetic field	EN61000-4-8	1A/m	A	

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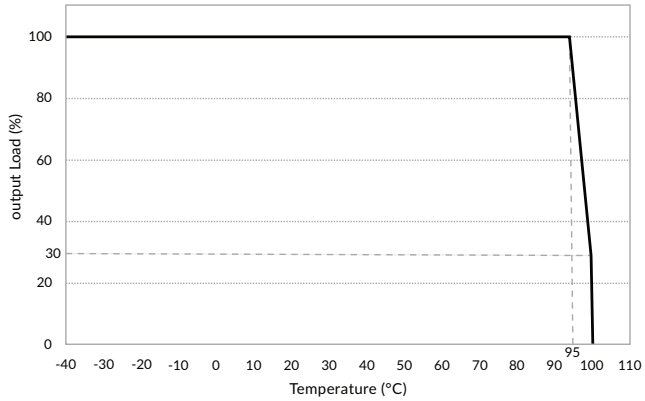
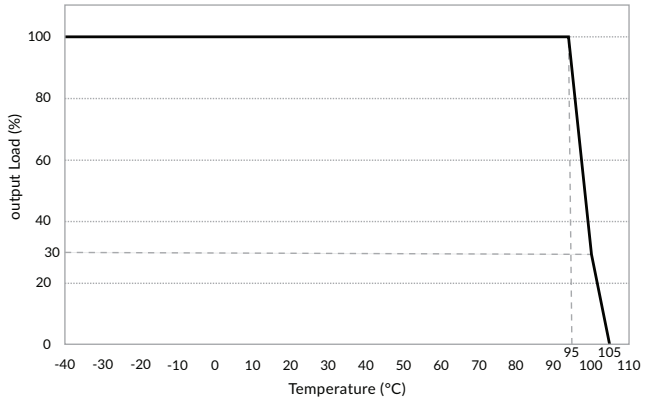
Application notes

Derating curves (Nominal input value)

3.3VDC input (12V & 15V outputs)
12VDC input (15V single & dual outputs)
15VDC & 24VDC input

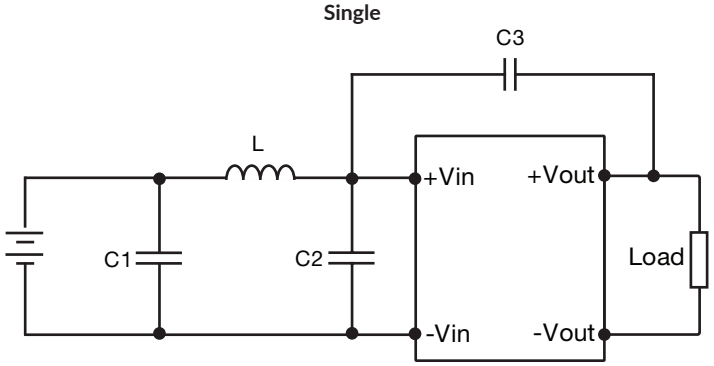


3.3VDC, 5VDC & 12VDC input

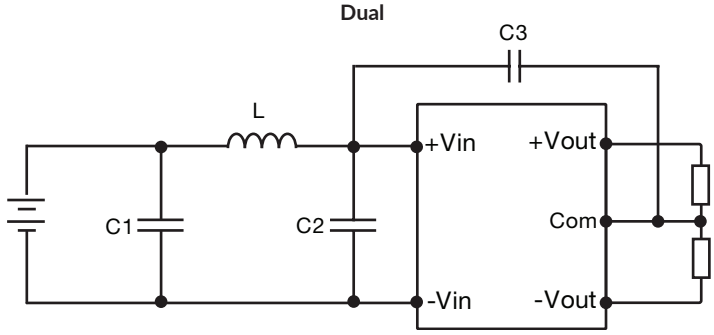


EMI filter

Single



Dual



EMI	Input voltage	C1	C2	C3	L
Class A	3.3VDC	4.7μF / 50V	-	-	22μH
	Others	4.7μF / 50V	-	220pF / 4kVDC	22μH
Class B	3.3VDC	4.7μF / 50V	4.7μF / 50V	-	22μH
	Others	4.7μF / 50V	4.7μF / 50V	220pF / 4kVDC	22μH

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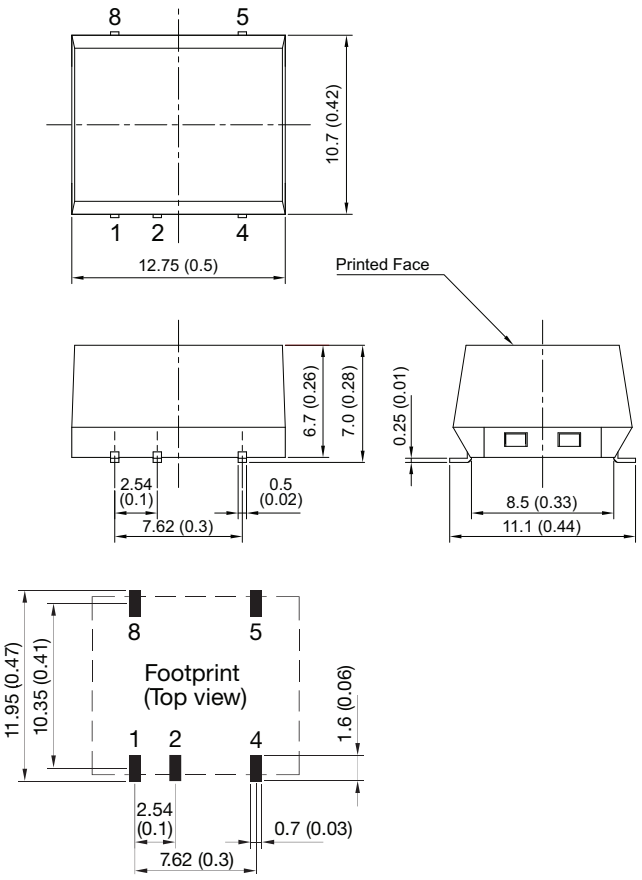
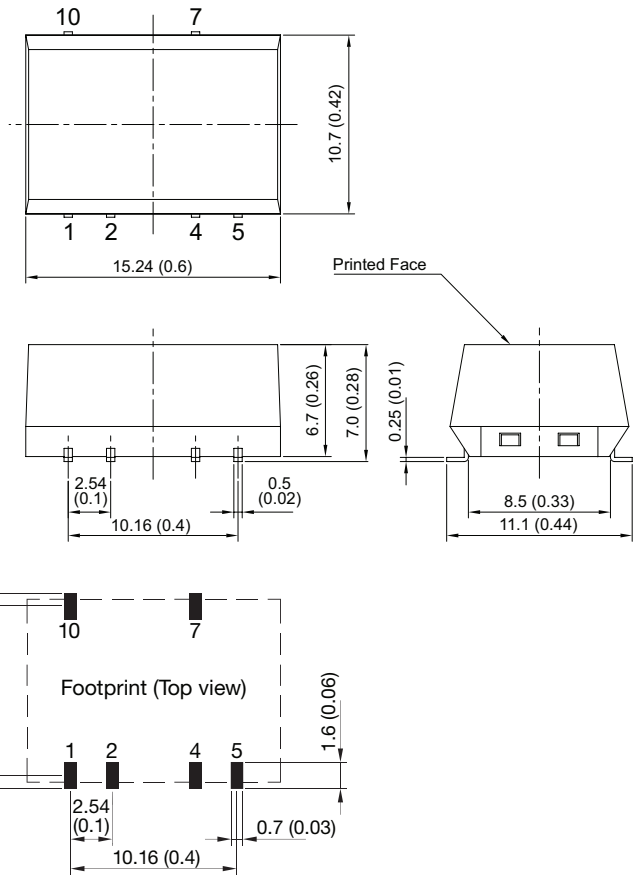
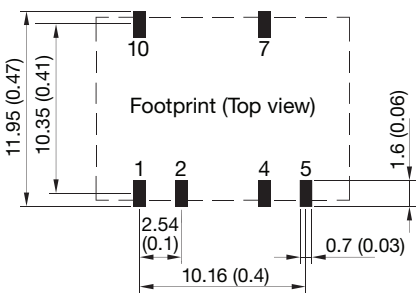
Mechanical details

Single



Dual





Pin connections		
Pin	**Single**	**Dual**
1	-Vin	-Vin
2	+Vin	+Vin
3	No pin	No pin
4	-Vout	Com
5	+Vout	-Vout
6	No pin	No pin
7	No pin	+Vout
8	Not connected	No pin
9	-	No pin
10	-	Not connected

Notes:

1. All dimensions are in mm (inches).
2. Weight: 1g (0.002lbs) for single, 1.2g (0.002lbs) for dual typical.
3. Pin diameter tolerance: ±0.1 (±0.004)
4. Pin pitch and length tolerance: ±0.25 (±0.01)
5. Case tolerance: ±0.5 (±0.02)