SERIES: PVB3-D | **DESCRIPTION:** DC-DC CONVERTER

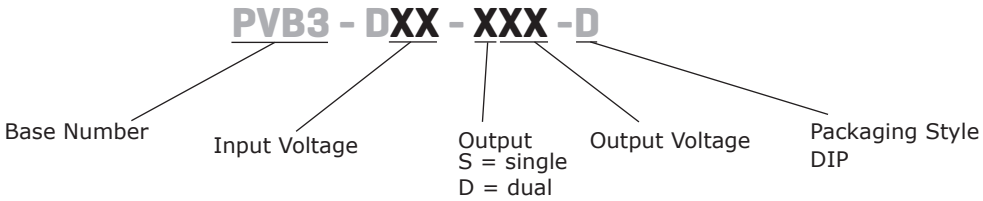
FEATURES

- 3 W isolated output
- smaller package
- single/dual regulated output
- 3,000 Vdc isolation
- continuous short circuit, over current protection
- temperature range (-40~105°C)
- high efficiency at light load
- efficiency up to 86%

MODEL	input voltage		output voltage	output current		output power	ripple and noise[1]	efficiency
	typ (Vdc)	range (Vdc)	(Vdc)	min (mA)	max (mA)	max (W)	max (mVp-p)	typ (%)
PVB3-D5-S5-D	5	4.5~9	5	30	600	3	80	73
PVB3-D5-S12-D	5	4.5~9	12	13	250	3	80	76
PVB3-D5-S15-D	5	4.5~9	15	10	200	3	80	76
PVB3-D5-D5-D	5	4.5~9	±5	±15	±300	3	80	75
PVB3-D5-D12-D	5	4.5~9	±12	±6	±125	3	80	76
PVB3-D5-D15-D	5	4.5~9	±15	±5	±100	3	80	76
PVB3-D12-S5-D	12	9~18	5	30	600	3	80	80
PVB3-D12-S12-D	12	9~18	12	13	250	3	80	81
PVB3-D12-S15-D	12	9~18	15	10	200	3	80	82
PVB3-D12-S24-D	12	9~18	24	7	125	3	80	83
PVB3-D12-D5-D	12	9~18	±5	±15	±300	3	80	80
PVB3-D12-D12-D	12	9~18	±12	±6	±125	3	80	81
PVB3-D12-D15-D	12	9~18	±15	±5	±100	3	80	82
PVB3-D24-S5-D	24	18~36	5	30	600	3	80	81
PVB3-D24-S12-D	24	18~36	12	13	250	3	80	82
PVB3-D24-S15-D	24	18~36	15	10	200	3	80	84
PVB3-D24-D5-D	24	18~36	±5	±15	±300	3	80	81
PVB3-D24-D12-D	24	18~36	±12	±6	±125	3	80	82
PVB3-D24-D15-D	24	18~36	±15	±5	±100	3	80	84
PVB3-D48-S5-D	48	36~75	5	30	600	3	80	82
PVB3-D48-S12-D	48	36~75	12	13	250	3	80	83
PVB3-D48-S15-D	48	36~75	15	10	200	3	80	86
PVB3-D48-D5-D	48	36~75	±5	±15	±300	3	80	82
PVB3-D48-D12-D	48	36~75	±12	±6	±125	3	80	83
PVB3-D48-D15-D	48	36~75	±15	±5	±100	3	80	84

Notes: 1. ripple and noise are measured at 20 MHz BW by "parallel cable" method

PART NUMBER KEY



INPUT

parameter	conditions/description	min	typ	max	units
operating input voltage	5 V input models	4.5	5	9	Vdc
	12 V input models	9	12	18	Vdc
	24 V input models	18	24	36	Vdc
	48 V input models	36	48	75	Vdc
start-up voltage	5 V input models	3.5	4	4.5	Vdc
	12 V input models	4.5	8	9	Vdc
	24 V input models	11	16	18	Vdc
	48 V input models	24	33	36	Vdc
surge voltage	for maximum of 1 second				
	5 V input models	-0.7		12	Vdc
	12 V input models	-0.7		25	Vdc
	24 V input models	-0.7		50	Vdc
	48 V input models	-0.7		100	Vdc
filter	pi filter				

OUTPUT

parameter	conditions/description	min	typ	max	units
line regulation	full load, input voltage from low to high		±0.2	±0.5	%
load regulation	5% to 100% load		±0.2	±0.5	%
voltage accuracy	5% to 100% load		±1	±3	%
no-load voltage accuracy	input voltage range		±1.5	±5	%
voltage balance	dual output, balanced loads		±0.5	±1	%
	dual output, unbalanced loads			±5	%
switching frequency	100% load, nominal input voltage		200		KHz
transient recovery time	25% load step change		0.5	2	ms
transient response deviation	25% load step change		±2	±5	%
temperature coefficient	100% load		±0.02	±0.03	%/°C

PROTECTIONS

parameter	conditions/description	min	typ	max	units
short circuit protection	continuous, automatic recovery				
over current protection		120			%

SAFETY AND COMPLIANCE

parameter	conditions/description	min	typ	max	units
isolation voltage	for 1 minute at 1 mA max.	3,000			Vdc
isolation resistance	at 500 Vdc	1,000			MΩ
conducted emissions	CISPR22/EN55022, class A, class B (external circuit required, see Figure 1-b)				
radiated emissions	CISPR22/EN55022, class A, class B (external circuit required, see Figure 1-b)				
ESD	IEC/EN61000-4-2, class B, contact ± 4kV/ air ± 8kV				
radiated immunity	IEC/EN61000-4-3, class A, 10V/m				
EFT/burst	IEC/EN61000-4-4, class B, ± 2kV (external circuit required, see Figure 1-a)				

SAFETY AND COMPLIANCE (CONTINUED)

parameter	conditions/description	min	typ	max	units
surge	IEC/EN61000-4-5, class B, ± 2kV (external circuit required, see Figure 1-b)				
conducted immunity	IEC/EN61000-4-6, class A, 3 Vr.m.s				
voltage dips & interruptions	IEC/EN61000-4-29, class B, 0%-70%				
MTBF	as per MIL-HDBK-217F @ 25°C	1,000,000			hours
RoHS compliant	yes				

ENVIRONMENTAL

parameter	conditions/description	min	typ	max	units
operating temperature	see derating curve	-40		105	°C
storage temperature		-55		125	°C
storage humidity	non-condensing			95	%
temperature rise	at full load, Ta=25°C		25		°C

SOLDERABILITY

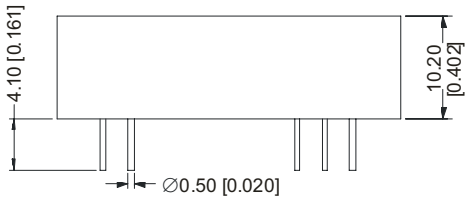
parameter	conditions/description	min	typ	max	units
hand soldering	1.5 mm from case for 10 seconds			300	°C
wave soldering	see wave soldering profile			260	°C

MECHANICAL

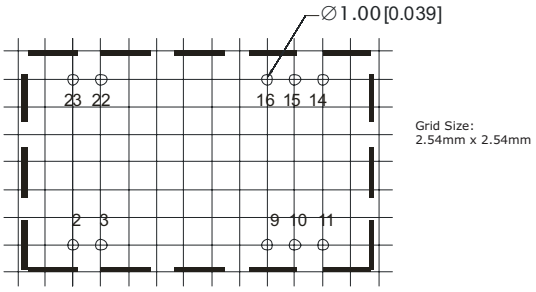
parameter	conditions/description	min	typ	max	units
dimensions	31.80 x 20.30 x 10.20 (1.252 x 0.80 x 0.402 inch)				mm
case material	plastic (UL94-V0)				
weight			14		g

MECHANICAL DRAWING

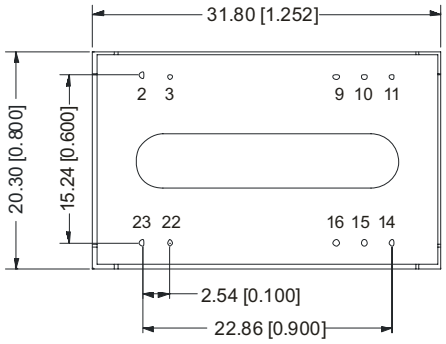
units: mm[inch]
tolerance: ±0.25[±0.010]
pin section tolerance: ±0.10[±0.004]



Front View



PCB Layout
Top View

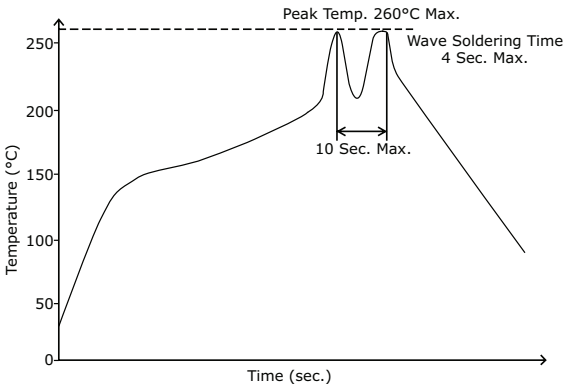


Bottom View

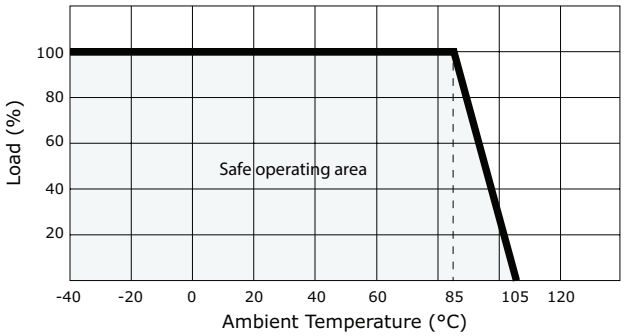
PIN CONNECTIONS		
PIN	Single Output	Dual Output
2, 3	GND	GND
9	NC	0V
10, 15	NC	NC
11	NC	-Vo
14	+Vo	+Vo
16	0V	0V
22, 23	Vin	Vin

DERATING CURVES

Wave Soldering Profile

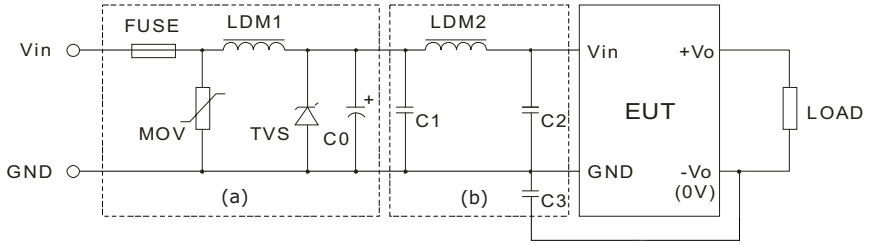


Temperature Derating Curve



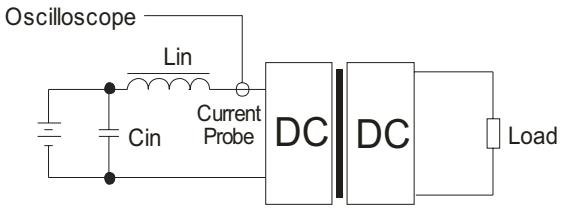
EMC RECOMMENDED CIRCUIT

Figure 1



Recommended external circuit components				
Vin (Vdc)	5	12	24	48
FUSE	choose according to practical input current			
MOV	--	--	10D560K	10D101K
LDM1	--	--	56µH	56µH
TVS	SMCJ13A	SMCJ28A	SMCJ48A	SMCJ90A
C0	680µF/16V	680µF/25V	120µF/50V	120µF/100V
C1	4.7µF/50V	4.7µF/50V	4.7µF/50V	4.7µF/100V
LDM2	12µH	12µH	12µH	12µH
C2	4.7µF/50V	4.7µF/50V	4.7µF/50V	4.7µF/100V
C3	1µF	1µF	1µF	1µF

TEST CONFIGURATION



External components	
Lin	4.7µH
Cin	220µF, ESR < 1.0Ω at 100 KHz

Note: Input reflected-ripple current is measured with an inductor Lin and Capacitor Cin to simulate source impedance.

APPLICATION NOTES

1. **Output load requirement**
   To ensure this module can operate efficiently and reliably, the minimum output load may not be less than 5% of the full load during operation. If the actual output power is low, connect a resistor at the output end in parallel to increase the load.

2. **Recommended circuit**
   This series has been tested according to the following recommended testing circuit before leaving the factory. This series should be tested under load (see Figure 2). If you want to further decrease the input/output ripple, you can increase the capacitance accordingly or choose capacitors with low ESR. However, the capacitance of the output filter capacitor must be appropriate. If the capacitance is too high, a startup problem might arise. For every channel of the output, to ensure safe and reliable operation, the maximum capacitance must be less than the maximum capacitive load (see Table 1).

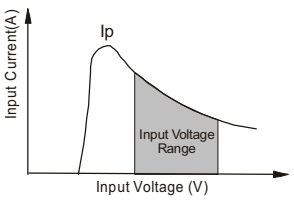
Figure 2

Table 1

Vin (Vdc)	Cin (μF)	Cout (μF/mA)
5	100	10/100
12	100	10/100
24	10~47	10/100
48	10~47	10/100

3. **Input Current**
   When it is used in an unregulated condition, make sure that the input fluctuations and ripple voltage do not exceed the module standard. Refer to Figure 3 for the startup current of this dc-dc module.

Figure 3



Vin (Vdc)	Ip (mA)
5	1400
12	620
24	300
48	150

Note: 1. Minimum load shouldn't be less than 5%, otherwise ripple may increase dramatically. Operation under minimum load will not damage the converter, however, they may not meet all specifications listed.
2. Maximum capacitive load is tested at input voltage range and full load.
3. All specifications are measured at Ta=25°C, humidity<75%, nominal input voltage and rated output load unless otherwise specified.

REVISION HISTORY

rev.	description	date
1.0	initial release	03/19/2013

The revision history provided is for informational purposes only and is believed to be accurate.

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