

VT02B VTW02B SERIES

2 Watt DC/DC Converter
Single and Dual Output
1500 and 3000 Vdc Isolation

vitec
dc conversion

FEATURES AND APPLICATIONS

- 2:1 and 4:1 Input Range
- High Efficiency up to 84%
- SMD and DIL Package
- Low Ripple & Noise
- UL60950-1 certified
- RoHS ✓



GENERAL DESCRIPTION

The VT02B and VTW02B series is a family of 2 Watt single and dual output DC-DC converters. These converters combine a DIL or a SMD package with high performance features such as 1500 Vdc or 3000 Vdc input/output isolation voltage, continuous short circuit protection with automatic restart and tight line and load regulation.

Models operate from a 2:1 or 4:1 input bus voltage of 5, 12, 24 and 48 Vdc offering output voltage levels of 3.3, 5, 09, 12, 15, ± 5 , ± 12 and ± 15 Vdc. Cooling is by free-air convection.

2:1 Input – Single and Dual Outputs

Type Number	Input Voltage [Vdc]	Output Voltage [Vdc]	Output Current [mA]	Input Current no load [mA] 5/12/24/48	Input Current full load [mA] 5/12/24/48	Output Ripple & Noise [mVpp]	Efficiency [%] 5/12/24/48	Cap. Load [μ F]
VT02B-xx3R3S	5 12 24 48	3.3	500	35/20/10/7	471/196/98/49	30	74/74/74/74	3300
VT02B-xx05S		5.0	400	35/20/10/7	526/217/108/54	30	80/81/81/81	1680
VT02B-xx09S		9.0	222	35/20/10/7	533/222/111/56	30	79/79/79/79	1000
VT02B-xx12S		12.0	167	35/20/10/7	520/217/104/54	30	81/81/84/82	820
VT02B-xx15S		15.0	134	40/20/10/7	506/209/104/54	30	83/84/84/82	680
VT02B-xx05D		± 5.0	± 200	40/25/10/7	540/225/113/56	30	78/78/78/78	± 1000
VT02B-xx12D		± 12.0	± 83	40/25/10/7	520/211/104/53	30	81/83/84/83	± 470
VT02B-xx15D		± 15.0	± 67	40/25/10/7	513/214/104/53	30	82/82/84/83	± 330

4:1 Input – Single and Dual Outputs

Type Number	Input Voltage [Vdc]	Output Voltage [Vdc]	Output Current [mA]	Input Current no load [mA] 12/24/48	Input Current full load [mA] 12/24/48	Output Ripple & Noise [mVpp]	Efficiency [%] 12/24/48	Cap. Load [μ F]
VTW02B-xx3R3S	12 24 48	3.3	500	30/20/10	196/98/49	30	74/74/74	3300
VTW02B-xx05S		5.0	400	30/20/10	222/111/56	30	79/79/78	1680
VTW02B-xx09S		9.0	222	30/20/10	222/111/56	30	79/79/79	1000
VTW02B-xx12S		12.0	167	30/20/10	219/110/54	30	80/80/81	820
VTW02B-xx15S		15.0	134	35/20/10	216/107/53	30	81/82/82	680
VTW02B-xx05D		± 5.0	± 200	35/25/10	231/116/58	30	76/76/76	± 1000
VTW02B-xx12D		± 12.0	± 83	35/25/10	216/110/54	30	81/80/81	± 470
VTW02B-xx15D		± 15.0	± 67	35/25/10	216/108/54	30	81/81/81	± 330

xx ... nominal Input voltage:

VT02B-Series: 05 (4.5 – 9 Vdc)
12 (9 – 18 Vdc)
24 (18 – 36 Vdc)
48 (36 – 75 Vdc)

VTW02B-Series: 12 (4.5 – 18 Vdc)
24 (9 – 36 Vdc)
48 (18 – 75 Vdc)

Options : Suffix H 3 kVdc Isolation
Suffix -S SMD Package

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ELECTRICAL SPECIFICATIONS

Specifications typical at +25°C, nominal Input voltage, rated output current unless otherwise specified.

Input Specifications

Input Voltage Range

2:1 input (VT02B-Series)	4:1 input (VTW02B-Series)
5V: 4.5 to 9 Vdc	12V: 4.5 to 18 Vdc
12V: 9 to 18 Vdc	24V: 9 to 36 Vdc
24V: 18 to 36 Vdc	48V: 18 to 75 Vdc
48V: 36 to 75 Vdc	

Input Filter

Capacitor type

Input Surge Voltage

5V: 15 Vdc, 1sec, max.	12V: 25 Vdc, 1sec, max.
24V: 50 Vdc, 1sec, max.	48V: 100 Vdc, 1sec, max.

Input reflected ripple current

2:1 input	4:1 input
5V: 80 mApp	12V: 80 mApp
12V: 40 mApp	24V: 40 mApp
24V: 30 mApp	48V: 30 mApp
48V: 20 mApp	

Start Up time

5 mS, max.

Output Specifications

Output Power

2 Watts, max.

Output Voltage Accuracy

±1%

Min. Load for specified regulation

0%

Ripple and Noise (20 MHz BW)

see table

Line Voltage Regulation

±0.2% (LL to HL at full load)

Load Voltage Regulation

Single:	±1% (No load to full load)
Dual:	±1% (No load to full load)
Single:	±0.5% (10% to 90% load)
Dual:	±0.8% (10% to 90% load)

Cross Regulation (Dual)

±5%

(Asymmetrical load 25%/100% FL)

Temperature Coefficient

±0.02%/°C, max.

Short Circuit Protection

Continuous (Hiccup)

Transient response recovery time

250 µsec (25% load step change)

General Specifications

Efficiency

see table

Switching Frequency

100 kHz, min.

Isolation Voltage

Standard:	1500 Vdc, min. (1 minute)
H-Option:	3000 Vdc, min. (1 minute)

Isolation Resistance

10⁹ Ohms, min.

Isolation Capacitance

50 pF, max.

Approvals

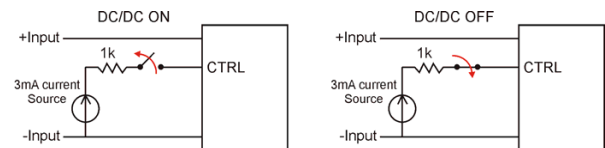
UL60950-1 certified (E352836)
IEC/EN60950-1 (designed to meet)

Remote ON/OFF Control

Control Voltage referenced to negative (-) input

DC/DC ON	Open or high impedance
DC/DC OFF	Control pin applied current
	2~4 mA max. (via 1kΩ)

Remote off input current 2.5 mA



Environmental Specification

Operating Temperature -40°C to +85°C without Derating

Storage Temperature -55°C to +125°C

Cooling

Free-air Convection

MTBF

2:1 input / 4:1 input

Bellcore TR-NWT-000332: 5.107 x 10⁶ Hrs / 4.615 x 10⁶ Hrs
Case1, 50% Stress, 40°C

MIL-HDBK-217F: 2.886 x 10⁶ Hrs / 2.052 x 10⁶ Hrs
Notice2 @25°C, FL, Ground, Benign, controlled environment

Thermal Shock

MIL-STD-810F

Vibration

MIL-STD-810F

Relative Humidity

5% to 90% RH

Lead-free reflow solder process: IPC J-STD-020D

Moisture sensitivity level (MSL): IPC J-STD-033B (Level 2a)

Physical Characteristics

Dimensions

18.9 x 12.8 x 8.4 mm

0.74 x 0.50 x 0.33 inches

Package Materials

UL94-V0

Weight

4.5 g

EMC Characteristics

EMI

EN55022 Class A

with an External Filter – see Recommended EMI Filter

ESD

EN61000-4-2 Perf. Criteria A (Air ±8 kV; Contact ±6 kV)

Radiated Im.

EN61000-4-3 Perf. Criteria A (10 V/m)

F. Transients.

EN61000-4-4 Perf. Criteria A (±2 kV)

Surge

EN61000-4-5 Perf. Criteria A (±1 kV)

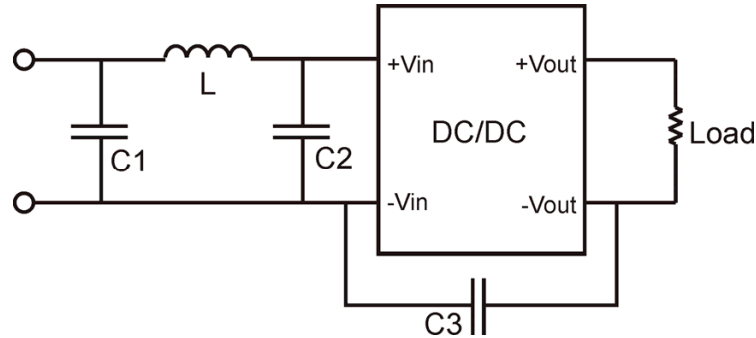
An external filter capacitor is required if the module has to meet EN61000-4-4 and EN61000-4-5. Recommended: 220 µF/100 V, low ERS

Conducted I.

EN61000-4-6 Perf. Criteria A (10 Vrms)

CAUTION: This power module is not internally fused. An input line fuse must always be used!

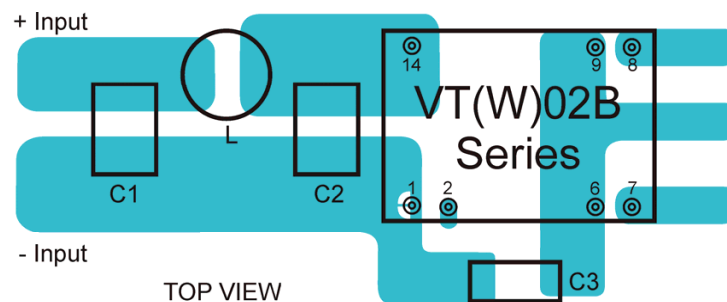
Recommended Filter for EN55022 Class A or Class B Compliance



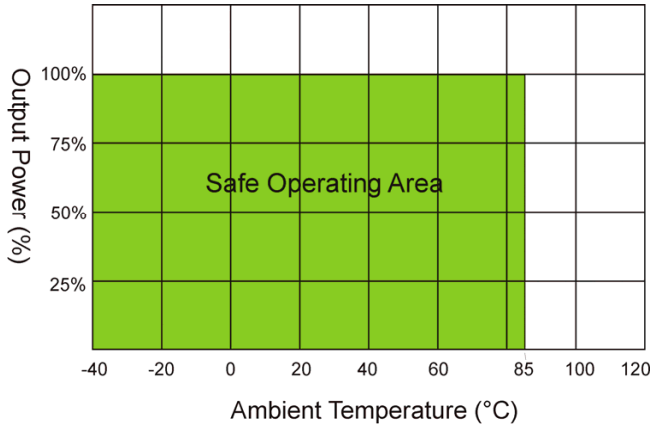
Recommended Components as follows:

	Class A Compliance				Class B Compliance			
	C1	C2	C3	L	C1	C2	C3	L
VT02B-05xxx	10 μ F / 25V 1812 MLCC	-	220 pF / 3kV 1808 MLCC	2.2 μ H 0504 SMD Inductor PMT-059	10 μ F / 25V 1812 MLCC	10 μ F / 25V 1812 MLCC	220 pF / 3kV 1808 MLCC	2.2 μ H 0504 SMD Inductor PMT-059
VT02B-12xxx	4.7 μ F / 50V 1812 MLCC	-	220 pF / 3kV 1808 MLCC	12 μ H 0504 SMD Inductor PMT-062	4.7 μ F / 25V 1812 MLCC	4.7 μ F / 25V 1812 MLCC	220 pF / 3kV 1808 MLCC	12 μ H 0504 SMD Inductor PMT-062
VT02B-24xxx	4.7 μ F / 100V 1812 MLCC	-	330 pF / 3kV 1808 MLCC	18 μ H 0504 SMD Inductor PMT-046	4.7 μ F / 50V 1812 MLCC	4.7 μ F / 50V 1812 MLCC	330 pF / 3kV 1808 MLCC	18 μ H 0504 SMD Inductor PMT-046
VT02B-48xxx	4.7 μ F / 100V 1812 MLCC	-	220 pF / 3kV 1808 MLCC	18 μ H 0504 SMD Inductor PMT-046	4.7 μ F / 100V 1812 MLCC	4.7 μ F / 100V 1812 MLCC	220 pF / 3kV 1808 MLCC	18 μ H 0504 SMD Inductor PMT-046
VTW02B-12xxx	10 μ F / 25V 1812 MLCC	-	220 pF / 3kV 1808 MLCC	2.2 μ H 0504 SMD Inductor PMT-059	10 μ F / 25V 1812 MLCC	10 μ F / 25V 1812 MLCC	220 pF / 3kV 1808 MLCC	2.2 μ H 0504 SMD Inductor PMT-059
VTW02B-24xxx	4.7 μ F / 50V 1812 MLCC	-	220 pF / 3kV 1808 MLCC	18 μ H 0504 SMD Inductor PMT-046	4.7 μ F / 50V 1812 MLCC	4.7 μ F / 50V 1812 MLCC	220 pF / 3kV 1808 MLCC	18 μ H 0504 SMD Inductor PMT-046
VTW02B-48xxx	4.7 μ F / 100V 1812 MLCC	-	330 pF / 3kV 1808 MLCC	18 μ H 0504 SMD Inductor PMT-046	4.7 μ F / 100V 1812 MLCC	4.7 μ F / 100V 1812 MLCC	330 pF / 3kV 1808 MLCC	18 μ H 0504 SMD Inductor PMT-046

Recommended EN55022 Class A or Class B Filter Circuit Layout:



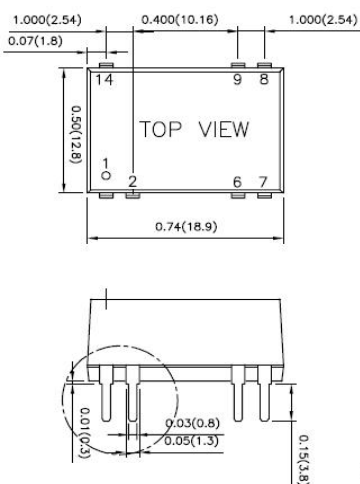
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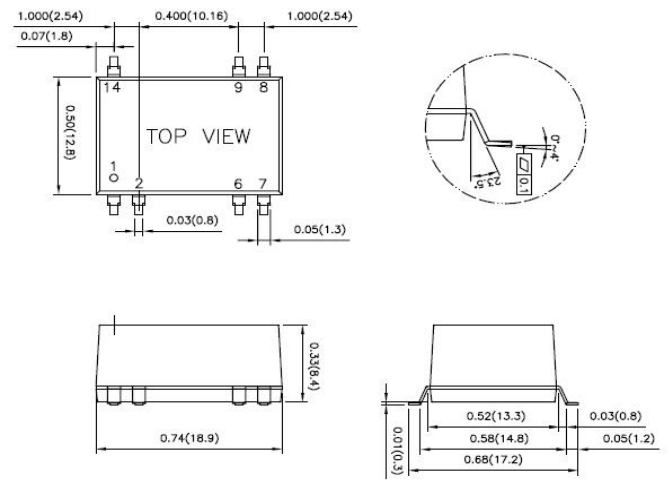
PIN Connections DIL and SMD Types

DIL and SMD Types		
Pin	Single Output	Dual Output
1	-V Input	-V Input
2	Ctrl	Ctrl
6	N.C.	Common
7	N.C.	-V Output
8	+V Output	+V Output
9	-V Output	Common
14	+V Input	+V Input

DIL Type (Standard Type)



SMD Type (Suffix -S)



Notes:

All dimensions in millimeters (inches). Tolerance $\pm 0.25\text{mm}$ (0.01).

Specifications can be changed without prior notice. Products are not intended for and must not be used in life support systems, human implantation, nuclear facilities or systems or any other application where product failure or malfunction of the component could lead to loss of life or catastrophic property damage.