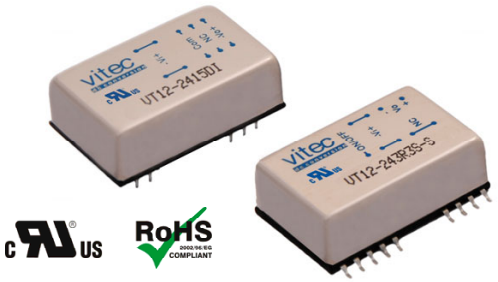
VT12
VTW12 SERIES

12 Watt DC/DC Converter
Single and Dual Output
1500 Vdc Isolation

vitec
dc conversion

FEATURES AND APPLICATIONS

- 2:1 and 4:1 Input Range
- High Efficiency up to 88%
- SMD and DIL Package
- Low Ripple & Noise
- UL60950-1 certifed
- RoHS ✓



GENERAL DESCRIPTION

The VT12 and VTW12 series is a family of 12 Watt single and dual output DC-DC converters. These converters combine five side shielded nickel-coated copper package for SMD or a 24-pin DIL compatible case with high performance features such as 1500 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 a 4:1 input bus voltage of 12, 24 and 48 Vdc offering output voltage levels of 2.5, 3.3, 5, 12, 15, ±5, ±12 and ±15 Vdc. Cooling is by free-air convention.

2:1 Input – Single and Dual Outputs

Type Number	Input Voltage [Vdc]	Output Voltage [Vdc]	Output Current [mA]	Input Current no load [mA] 12/24/48	Output Ripple & Noise [mVpp]	Efficiency [%] 12/24/48	max. Cap. Load [µF]
VT12-xx2R5S	12 24 48	2.5	3500	50/36/10	85	82/83/83	2000
VT12-xx3R3S		3.3	3500	60/36/14	85	84/85/85	2000
VT12-xx05S		5.1	2400	53/35/23	85	86/87/87	2000
VT12-xx12S		12.0	1000	15/16/11	85	86/87/87	430
VT12-xx15S		15.0	800	17/17/5	85	86/87/87	300
VT12-xx05D		± 5.0	± 1200	24/15/6	85	82/83/83	± 1250
VT12-xx12D		± 12.0	± 500	19/15/6	85	87/88/88	± 200
VT12-xx15D		± 15.0	± 400	24/18/6	85	87/88/88	± 120

4:1 Input – Single and Dual Outputs

Type Number	Input Voltage [Vdc]	Output Voltage [Vdc]	Output Current [mA]	Input Current no load [mA] 24/48	Output Ripple & Noise [mVpp]	Efficiency [%] 24/48	max. Cap. Load [µF]
VTW12-xx3R3S	24 48	3.3	3500	55/17	85	84/84	2000
VTW12-xx05S		5.1	2400	55/20	85	87/87	2000
VTW12-xx12S		12.0	1000	13/6	85	87/87	430
VTW12-xx15S		15.0	800	11/6	85	87/88	300
VTW12-xx05D		± 5.0	± 1200	15/7	85	84/85	± 1250
VTW12-xx12D		± 12.0	± 500	12/7	85	87/87	± 200
VTW12-xx15D		± 15.0	± 400	20/7	85	87/87	± 120

xx … nominal Input voltage:

VT12-Series: **12 (9 – 18 Vdc)**
24 (18 – 36 Vdc)
48 (36 – 75 Vdc)

VTW12-Series: **24 (9 – 36 Vdc)**
48 (18 – 75 Vdc)

Options: **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 (VT12-Series)	4:1 input (VTW12-Series)
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	Pi type
Input Surge Voltage	12V: 36 Vdc, 100 mS, max.
	24V: 50 Vdc, 100 mS, max.
	48V: 100 Vdc, 100 mS, max.
Input reflected ripple current	20 mApp
Start Up time (nom. input, const. res. load)	450 mS, max.

Output Specifications

Output Power	12 Watts, max.
Output Voltage Accuracy	±1.2%
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)
VTW-Series, Dual:	±0.5% (LL to HL at full load)
Load Voltage Regulation	
Single (DIL24):	±0.5% (No load to full load)
Single (SMD), Dual, 2.5 Vout only:	±1% (No load to full load)
Cross Regulation (Dual)	±5% (Asym. load 25%/100% FL)
Temperature Coefficient	±0.02%/°C, max.
Over Load Protection	150% (of FL at nominal input)
Short Circuit Protection	Continuous (Hiccup)
Over Voltage Protection (Zener diode clamp, Single only)	2.5 Vout: 3.9 Vdc
	3.3 Vout: 3.9 Vdc
	5.1 Vout: 6.2 Vdc
	12 Vout: 15 Vdc
	15 Vout: 18 Vdc
Transient response recovery time	250 µsec (25% load step change)

General Specifications

Efficiency	see table
Switching Frequency	400 kHz, ±10%
Isolation Voltage	1500 Vdc, min. (1 minute)
Isolation Resistance	10^9 Ohms, min.
Isolation Capacitance	1200 pF, max. (VT-Series)
	1500 pF, max. (VTW-Series)
Approvals	UL60950-1certified (E352836)
	IEC/EN60950-1 (designed to meet)

Remote ON/OFF Control

Control Voltage referenced to negative (-) input (Positive logic)

ON-Control:	3.0 to 12 V or open
OFF-Control:	0 to 1.2 V or short

Input current of remote control pin -0.5 mA to 0.5 mA, max.

Remote off input current 2.5 mA

Environmental Specification

Operating Temperature	-40°C to +85°C with Derating (See Derating Curve on Page 4)
Storage Temperature	-55°C to +105°C (VT-Series)
	-55°C to +125°C (VTW-Series)
Max. Case Temperature	+100°C (VT-Series)
	+105°C (VTW-Series)
Thermal Impedance	20°C/Watt (Natural Convection)
Cooling	Free-air Convection
MTBF	VT-Series / VTW-Series
MIL-HDBK-217F:	2.750 x 10^6 Hrs / 2.350 x 10^6 Hrs *
Bellcore TR-NWT-000332:	7.575 x 10^5 Hrs / 8.745 x 10^5 Hrs **

* Notice2 @25°C, FL, Ground, Benign, controlled environment
** Case1, 50% Stress, 40°C

Thermal Shock	MIL-STD-810F
Vibration	MIL-STD-810F
Relative Humidity	5% to 95% RH

Physical Characteristics

Dimensions	31.8 x 20.3 x 10.2 mm
	1.25 x 0.80 x 0.40 inches
Case Material	Nickel-coated copper
Base Material	Non-conductive black plastic
Potting Material	Epoxy (UL94-V0)
Weight	18 g

EMC Characteristics

EMI	EN55022	Class A

With an external capacitor parallel to the input pins: see EMI Filter on Page 3

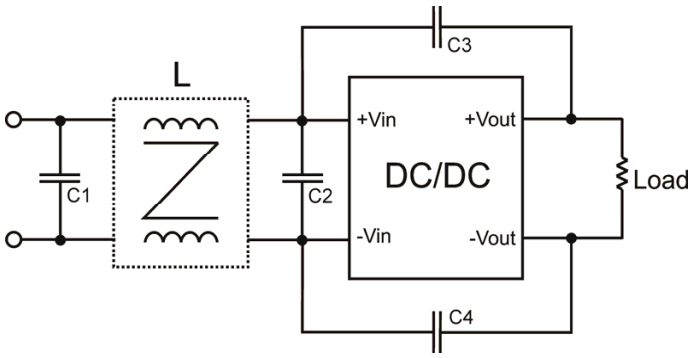
ESD	EN61000-4-2	Perf. Criteria A (Air ±8 kV; Contact ±6 kV)
Radiated Im.	EN61000-4-3	Perf. Criteria A (10 V/m)
F. Transients.	EN61000-4-4	Perf. Criteria A (±2 kV)
Surge	EN61000-4-5	Perf. Criteria A (± 1 kV)

An external filter capacitor is required if the module has to meet EN61000-4-4 and EN61000-4-5. Recommended: 220 µF/100 V, ERS 48 mΩ

Conducted I.	EN61000-6-6	Perf. Criteria A (10 Vrms)

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

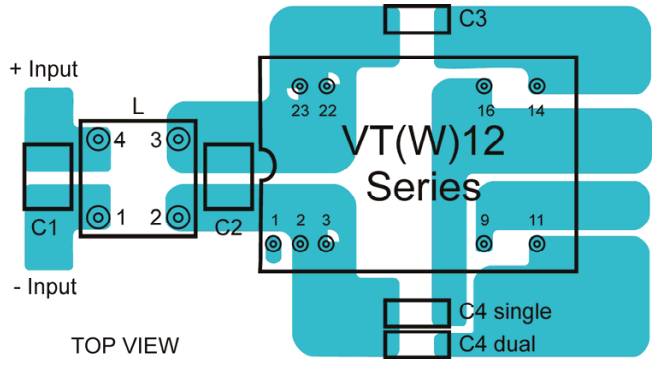
Recommended Filter for EN55022 Class A or Class B Compliance



Recommended Components as follows:

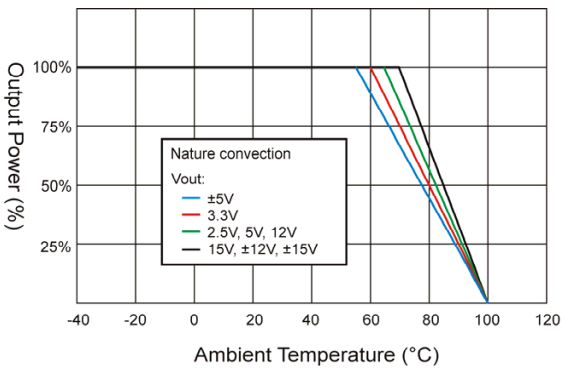
	Class A Compilance		Class B Compilance			
	C2	C1, C3, C4, L	C1	C2	C3, C4	L
VT12-12xxx	6.8 µF / 50V 1812 MLCC	-	3.3 µF / 50V 1812 MLCC	-	1000 pF / 2kV MLCC	325 µH Common Choke PMT-050
VT12-24xxx	4.7 µF / 50V 1812 MLCC	-	4.7 µF / 50V 1812 MLCC	-	1000 pF / 2kV MLCC	325 µH Common Choke PMT-050
VT12-48xxx	2.2 µF / 100V 1812 MLCC	-	2.2 µF / 100V 1812 MLCC	2.2 µF / 100V 1812 MLCC	1000 pF / 2kV MLCC	325 µH Common Choke PMT-050
VTW12-24xxx	3.3 µF / 50V 1812 MLCC	-	3.3 µF / 50V 1812 MLCC	-	1000 pF / 2kV MLCC	325 µH Common Choke PMT-050
VTW12-48xxx	1.5 µF / 100V 1812 MLCC	-	2.2 µF / 100V 1812 MLCC	2.2 µF / 100V 1812 MLCC	1000 pF / 2kV MLCC	145 µH Common Choke PMT-050

Recommended EN55022 Class A or Class B Filter Circuit Layout:

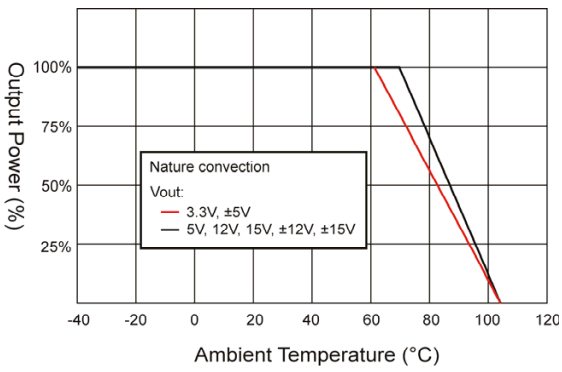


Derating

VT12-Series



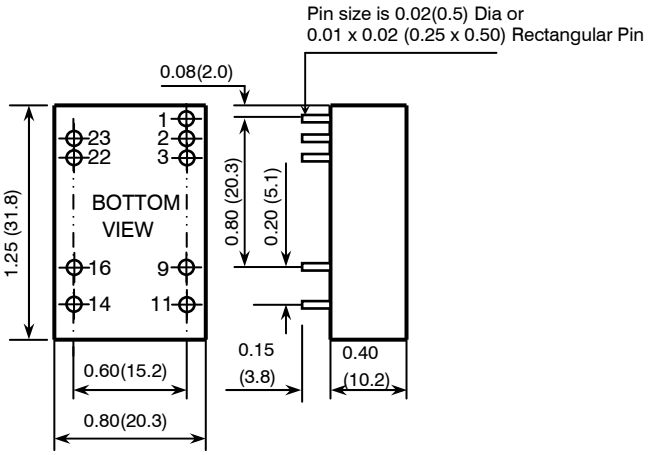
VTW12-Series



PIN Connections DIL 24 Package

Standard PIN Connections DIL24		
Pin	Single	Dual
1	ON/OFF	ON/OFF
2	-V Input	-V Input
3	-V Input	-V Input
9	NC	Common
11	NC	-V Output
14	+V Output	+V Output
16	-V Output	Common
22	+V Input	+V Input
23	+V Input	+V Input

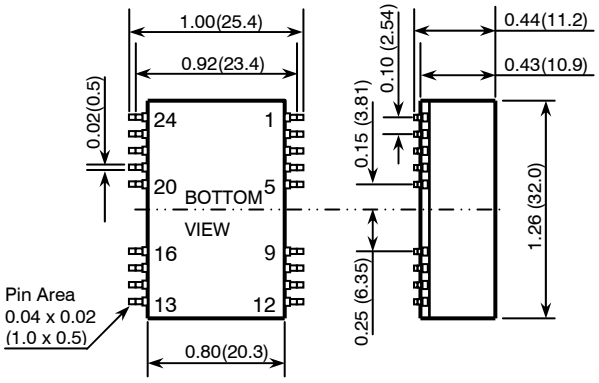
NC … not connected



PIN Connections SMD (Suffix –S)

Standard PIN Connections SMD		
Pin	Single Output	Dual Output
1	ON/OFF	ON/OFF
2	-V Input	-V Input
3	-V Input	-V Input
9	NC	Common
10	NC	NC
11	NC	-V Output
14	+V Output	+V Output
15	NC	NC
16	-V Output	Common
22	+V Input	+V Input
23	+V Input	+V Input

NC … not connected



Notes: All dimensions in millimeters (inches). Tolerance ±0.25mm (0.01).

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