

FEATURES AND APPLICATIONS

- 2:1 and 4:1 Input Range
- High Efficiency up to 88%
- 2" x 1" Package
- Low Ripple & Noise
- UL60950-1 certified
- RoHS ✓



GENERAL DESCRIPTION

The VT15 and VTW15 series is a family of 15 Watt single and dual output DC-DC converters. These converters combine five side shielded nickel-coated copper package in a compatible case (2" x 1") 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 3.3, 5, 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] 12/24/48	Input Current full load [mA] 12/24/48	Output Ripple & Noise [mVpp]	Efficiency [%] 12/24/48	max. Cap. Load [μ F]
VT15-xx3R3S	12 24 48	3.3	4000	30/15/10	1467/724/357	50	79/80/81	10200
VT15-xx05S		5.1	3000	25/10/20	1603/781/396	50	82/84/83	7050
VT15-xx12S		12.0	1250	25/20/15	1524/772/377	50	86/85/87	1035
VT15-xx15S		15.0	1000	20/15/15	1524/772/381	50	86/85/86	705
VT15-xx05D		± 5.0	± 1500	20/15/10	1582/781/386	75	83/84/85	± 1020
VT15-xx12D		± 12.0	± 625	30/25/15	1524/762/372	75	86/86/88	± 495
VT15-xx15D		± 15.0	± 500	35/25/15	1563/762/377	75	84/86/87	± 165

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	Input Current full load [mA] 24/48	Output Ripple & Noise [mVpp]	Efficiency [%] 24/48	max. Cap. Load [μ F]
VTW15-xx3R3S	24 48	3.3	4500	50/35	755/377	50	86/86	14700
VTW15-xx05S		5.1	3000	65/35	753/372	50	87/88	7200
VTW15-xx5R1S		5.1	3000	65/35	768/379	50	87/88	7200
VTW15-xx12S		12.0	1250	22/15	753/377	75	87/87	1250
VTW15-xx15S		15.0	1000	22/15	753/377	75	87/87	800
VTW15-xx05D		± 5.0	± 1500	55/35	753/372	75	87/88	± 3600
VTW15-xx12D		± 12.0	± 625	30/17	744/372	75	88/88	± 625
VTW15-xx15D		± 15.0	± 500	30/17	744/372	75	88/88	± 400

xx ... nominal Input voltage:

VT15-Series: 12 (9 – 18 Vdc)
24 (18 – 36 Vdc)
48 (36 – 75 Vdc)

VTW15-Series: 24 (9 – 36 Vdc)
48 (18 – 75 Vdc)

Options:

Suffix P Remote ON/OFF Option, Positive Logic
Suffix N Remote ON/OFF Option, Negative Logic
Suffix -HS Heat Sink + Clamps
Suffix -HC Heat Sink only (no Clamps)

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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 (VT15-Series)	4:1 input (VTW15-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)	20 mS, max.

Output Specifications

Output Power	15 Watts, max.
Output Voltage Accuracy	±1.0%
Min. Load for specified regulation	0%
Ripple and Noise (20 MHz BW)	see table
Line Voltage Regulation	±0.5% (LL to HL at full load)
Load Voltage Regulation	Single: ±0.5% (No load to full load)
	Dual: ±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	3.3 Vout: 3.9 Vdc
	5 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	VT15 single: 500 kHz, ±10%
	VT15 dual: 300 kHz, ±10%
	VTW15 single & dual: 400 kHz, ±10%
Isolation Voltage	1500 Vdc, min. (1 minute)
Isolation Resistance	10 ⁹ Ohms, min.
Isolation Capacitance	VT15: 300 pF, max.
	VTW15: 1500 pF, max.
Approvals	UL60950-1 certified (E352836)
	IEC/EN60950-1 (designed to meet)

Remote ON/OFF Control (Option "P" or "N")

Control Voltage referenced to negative (-) input	
Positive Logic (Suffix P):	ON-Control: 3.5 to 12 V or open
	OFF-Control: 0 to 1.2 V or short
Negative Logic (Suffix N):	ON-Control: 0 to 1.2 V or short
	OFF-Control: 3.5 to 12 V or open
Input current of remote control pin	-0.5 mA to +1 mA, max.
Remote off input current	20 mA

Environmental Specification

Operating Temperature	-25°C to +85°C with Derating
Storage Temperature	-55°C to +105°C (+125°C; VTW-Series)
Max. Case Temperature	+100°C (+105°C; VTW-Series)
Thermal Impedance	12°C/Watt (Natural Convection)
	10°C/Watt (with Heat Sink)
Cooling	Free-air Convection
MTBF	2:1 input / 4:1 input
	Bellcore TR-NWT-000332: 2.041 x 10 ⁶ Hrs / 1.819 x 10 ⁶ Hrs *
	MIL-HDBK-217F: 1.044 x 10 ⁶ Hrs / 9.205 x 10 ⁵ Hrs **
	* Case1, 50% Stress, 40°C
	** Notice2 @25°C, FL, Ground, Benign, controlled environment
Thermal Shock	MIL-STD-810F
Vibration	MIL-STD-810F
Relative Humidity	5% to 95% RH

Physical Characteristics

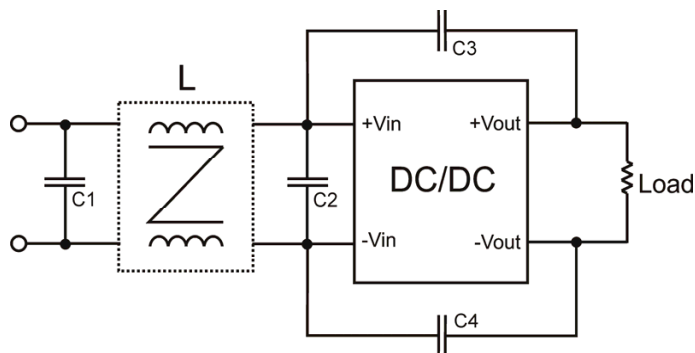
Dimensions	50.8 x 25.4 x 10.2 mm
	2.00 x 1.00 x 0.40 inches
Case Material	Nickel-coated copper
Base Material	Non-conductive black plastic
Potting Material	Epoxy (UL94-V0)
Weight	27 g

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

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

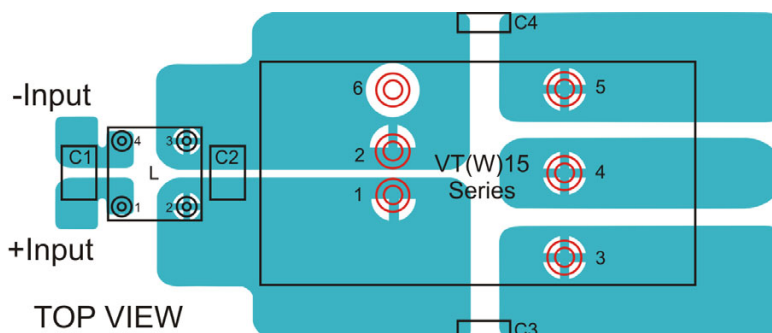
Recommended Filter for EN55022 Class A or Class B Compliance



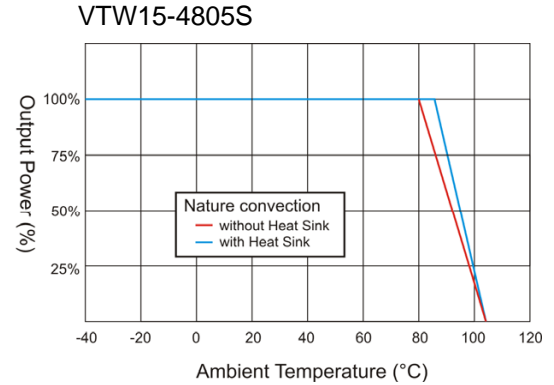
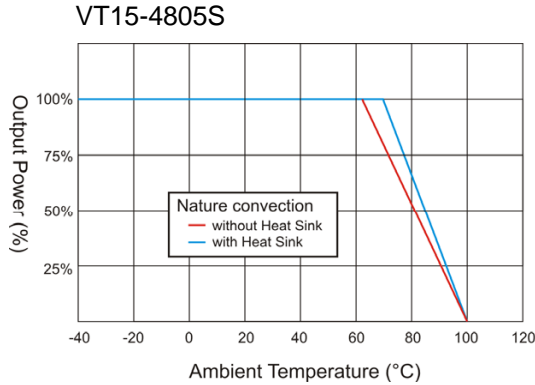
Recommended Components as follows:

	Class A Compliance		Class B Compliance			
	C2	C1, C3, C4, L	C1	C2	C3, C4	L
VT15-12xxx	6.8 μ F / 50V 1812 MLCC	-	4.7 μ F / 50V 1812 MLCC	-	1000 pF / 2kV MLCC	325 μ H Common Choke PMT-050
VT15-24xxx	2.2 μ F / 50V 1812 MLCC	-	3.3 μ F / 50V 1812 MLCC	-	1000 pF / 2kV MLCC	325 μ H Common Choke PMT-050
VT15-48xxx	1.5 μ F / 100V 1812 MLCC	-	2.2 μ F / 100V 1812 MLCC	2.2 μ F / 100V 1812 MLCC	1000 pF / 2kV MLCC	325 μ H Common Choke PMT-050
VTW15-24xxx	-	-	2.2 μ F / 50V 1812 MLCC	-	1000 pF / 2kV MLCC	450 μ H Common Choke PMT-048
VTW15-48xxx	1 μ F / 100V 1210 MLCC	-	2.2 μ F / 100V 1812 MLCC	2.2 μ F / 100V 1812 MLCC	1000 pF / 2kV MLCC	325 μ H Common Choke PMT-050

Recommended EN55022 Class A or Class B Filter Circuit Layout:



Derating

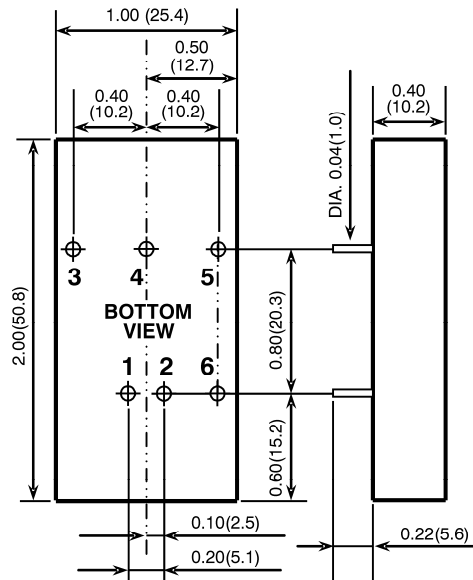


PIN Connections

Standard PIN Connections

Pin	Single	Dual
1	+V Input	+V Input
2	-V Input	-V Input
3	+V Output	+V Output
4	No Pin	Common
5	-V Output	-V Output
6	Ctrl / No Pin *	Ctrl / No Pin *

* Pin 6: On/Off Option, or no Pin

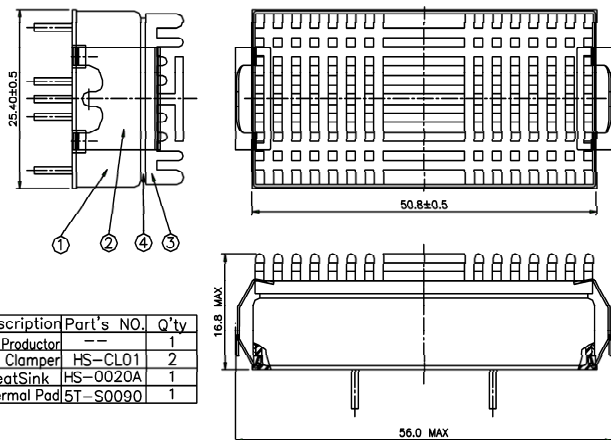


Heat Sink

To order the VT15/VTW15-Series assembled with heat sink, add following suffix to the part number:

- HS ... for Heat Sink only
- HC ... for Heat Sink + Clamps (recommended)

e.g. VTW15-2405S-HC



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.