VT10
VTW10 SERIES

10 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 87%
- 2" x 1" Package
- Low Ripple & Noise
- UL60950-1 certifed
- RoHS ✓

GENERAL DESCRIPTION

The VT10 and VTW10 series is a family of 10 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 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	Input Current full load [mA] 12/24/48	Output Ripple & Noise [mVpp]	Efficiency [%] 12/24/48	max. Cap. Load [µF]
VT10-xx3R3S	12 24 48	3.3	2000	17/15/11	724/362/181	50	80/80/80	6800
VT10-xx05S		5.1	2000	21/22/14	1082/534/260	50	81/82/84	4700
VT10-xx12S		12.0	830	38/18/14	1037/519/253	50	84/84/86	690
VT10-xx15S		15.0	670	36/36/10	1046/523/252	50	84/84/87	470
VT10-xx05D		± 5.0	± 1000	39/28/16	1042/527/260	75	84/83/84	± 680
VT10-xx12D		± 12.0	± 416	47/24/19	1053/513/254	75	83/85/86	± 330
VT10-xx15D		± 15.0	± 333	45/31/16	1041/520/256	75	84/84/85	± 110

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 [µF]
VTW10-xx3R3S	24 48	3.3	2500	13/10	465/239	50	78/76	6800
VTW10-xx05S		5.1	2000	11/9	548/270	50	80/81	4700
VTW10-xx12S		12.0	830	16/9	519/259	50	84/84	690
VTW10-xx15S		15.0	670	26/11	544/262	50	81/84	470
VTW10-xx05D		± 5.0	± 1000	15/12	534/267	75	82/82	± 680
VTW10-xx12D		± 12.0	± 416	15/20	547/281	75	80/78	± 330
VTW10-xx15D		± 15.0	± 333	22/20	548/270	75	80/81	± 110

xx … nominal Input voltage:

VT10-Series:	12	(9 – 18 Vdc)
	24	(18 – 36 Vdc)
	48	(36 – 75 Vdc)
VTW10-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 I	Extended Temperature Range VT10-Series
Suffix E	Extended Temperature Range VTW10-Series
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 (VT10-Series)	4:1 input (VTW10-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		30 mApp
Start Up time (nom. input, const. res. load)		20 mS, max.

Output Specifications

Output Power		10 Watts, max.
Output Voltage Accuracy		±1.0%
Min. Load for specified regulation		0%
Ripple and Noise (20 MHz BW)		see table
Line Voltage Regulation		±0.2% (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	300 kHz, ±10%
Isolation Voltage	1500 Vdc, min. (1 minute)
Isolation Resistance	10^9 Ohms, min.
Isolation Capacitance	300 pF, max.
Approvals	UL60950-1certified (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:	3.0 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:	3.0 to 12 V or open

Input current of remote control pin -0.5 mA to +1mA, max.

Remote off input current 20 mA

Environmental Specification

Operating Temperature		-25°C to +85°C with Derating
"I" Option (VT-Series):		-40°C to +85°C without Derating
"E" Option (VTW-Series):		-40°C to +85°C with Derating
Storage Temperature		-55°C to +105°C
Max. Case Temperature		+100°C
Thermal Impedance		12°C/Watt (Natural Convection)
		10°C/Watt (with Heat Sink)
Cooling		Free-air Convection
MTBF	MIL-HDBK-217F:	1.976×10^6 Hrs *
	Bellcore TR-NWT-000332:	1.416×10^5 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	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

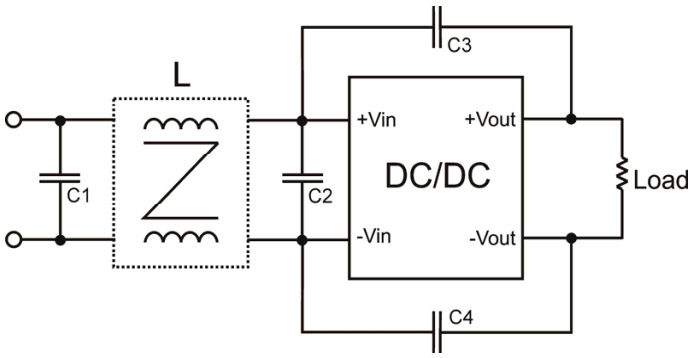
ESD	EN61000-4-2	Perf. Criteria B (Air ±8 kV; Contact ±6 kV)
Radiated Im.	EN61000-4-3	Perf. Criteria A (10 V/m)
F. Transients.	EN61000-4-4	Perf. Criteria B (±2 kV)
Surge	EN61000-4-5	Perf. Criteria B (± 1 kV)

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!

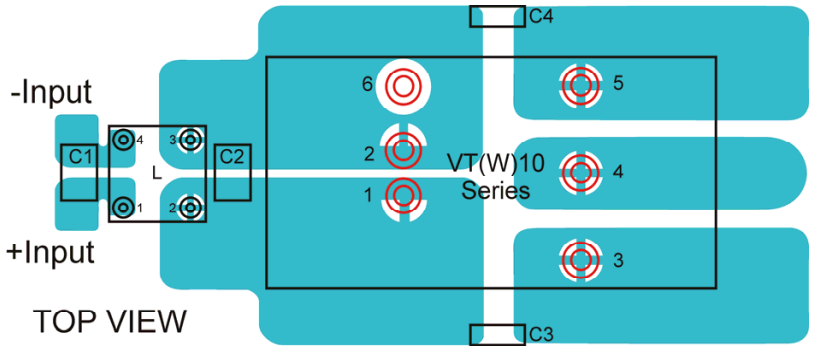
Recommended Filter for EN55022 Class A or Class B Compliance



Recommended Components as follows:

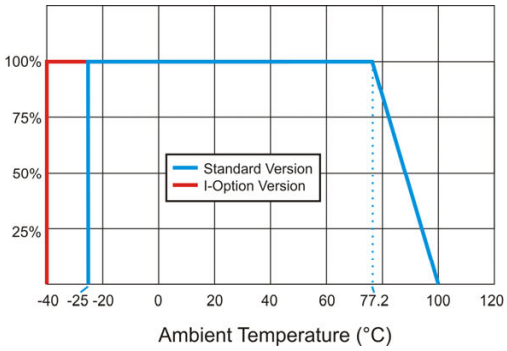
	Class A Compilance		Class B Compilance			
	C2	C1, C3, C4, L	C1	C2	C3, C4	L
VT10-12xxx	4.7 µF / 25V 1210 MLCC	-	3.3 µF / 50V 1812 MLCC	-	1000 pF / 2kV MLCC	325 µH Common Choke PMT-050
VT10-24xxx	2.2 µF / 50V 1812 MLCC	-	2.2 µF / 50V 1812 MLCC	-	1000 pF / 2kV MLCC	325 µH Common Choke PMT-050
VT10-48xxx	1.5 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
VTW10-24xxx	2.2 µF / 50V 1812 MLCC	-	2.2 µF / 50V 1812 MLCC	-	1000 pF / 2kV MLCC	325 µH Common Choke PMT-050
VTW10-48xxx	1.5 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

Recommended EN55022 Class A or Class B Filter Circuit Layout:

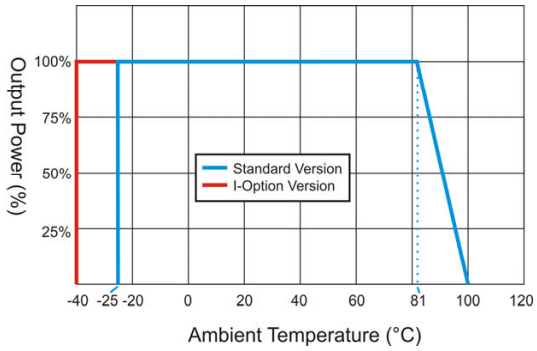


Derating

VT10-4805S without Heat Sink



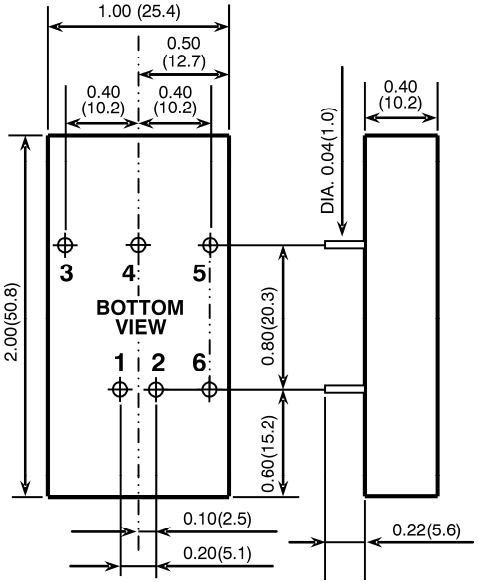
VT10-4805S with Heat Sink



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

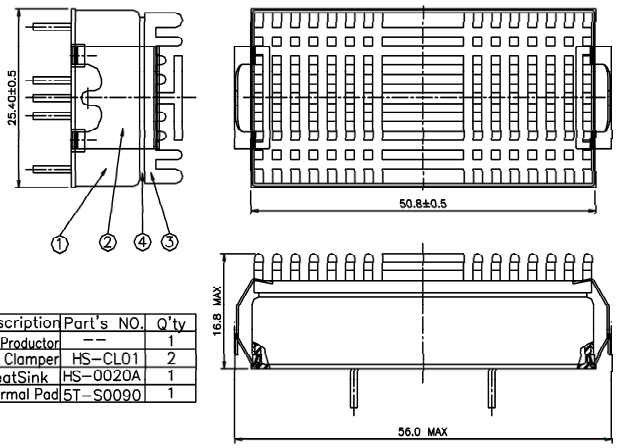


Heat Sink

To order the VT10/VTW10-Series assambled with heat sink, add following suffix to the part number:

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

e.g. VTW10-2405S-HC



ITEM	Description	Part's NO.	Q'ty
1	D2 Productor	--	1
2	D2 Clamper	HS-CL01	2
3	HeatSink	HS-0020A	1
4	Thermal Pad	5T-S0090	1

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

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