

FEATURES AND APPLICATIONS

- 2:1 and 4:1 Input Range
- High Efficiency up to 89%
- 2" x 1" Package
- Low Ripple & Noise
- UL60950-1 certified
- RoHS ✓



GENERAL DESCRIPTION

The VT20C and VTW20C series is a family of 20 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 1.5, 1.8, 2.5, 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]
VT20C-xx1R5S	12 24 48	1.5	6000	70/35/15	1014/493/247	60	78/80/80	65000
VT20C-xx1R8S		1.8	6000	75/45/20	1200/584/288	60	79/81/82	65000
VT20C-xx2R5S		2.5	6000	80/40/30	1582/781/391	60	83/84/84	33000
VT20C-xx3R3S		3.3	5000	115/30/15	1698/838/414	60	85/86/87	13000
VT20C-xx05S		5.1	4000	75/35/20	2008/980/490	75	87/89/89	6800
VT20C-xx12S		12.0	1670	90/55/35	2037/1006/497	75	86/87/88	2200
VT20C-xx15S		15.0	1330	35/40/50	2037/1002/501	75	86/87/87	755
VT20C-xx12D		± 12.0	± 833	45/30/20	2032/1004/496	100	86/87/88	± 680
VT20C-xx15D		± 15.0	± 667	50/30/20	2034/993/496	100	86/88/88	± 450

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]
VTW20C-xx3R3S	24 48	3.3	5500	50/35	934/467	60	85/85	18000
VTW20C-xx05S		5.1	4000	65/35	992/496	75	88/88	9600
VTW20C-xx12S		12.0	1670	22/15	1018/503	75	86/87	1650
VTW20C-xx15S		15.0	1330	22/15	1014/501	75	86/87	1050
VTW20C-xx05D		± 5.0	± 2000	55/35	992/490	100	88/89	± 4800
VTW20C-xx12D		± 12.0	± 833	30/17	1004/496	100	87/88	± 825
VTW20C-xx15D		± 15.0	± 667	30/17	1005/496	100	87/88	± 525

xx ... nominal Input voltage:

VT20C-Series: 12 (9 – 18 Vdc)
24 (18 – 36 Vdc)
48 (36 – 75 Vdc)

VTW20C-Series: 24 (9 – 36 Vdc)
48 (18 – 75 Vdc)

Options:

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 (VT20C-Series)	4:1 input (VTW20C-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	VT-Series: L-C type VTW-Series: 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)	10 mS (20 mS, VTW20C-Series)

Output Specifications

Output Power	20 Watts, max.
Output Voltage Accuracy	±1.0%
Output Voltage Trim	±10% (Single Output only)
	The Output Voltage could be trimmed by using external Components (see Page 4)
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)
	Dual, VTW-Series: ±0.5% (LL to HL at full load)
Load Voltage Regulation	±0.5% (No load to full load)
	Dual, VTW-Series: ±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 (1.5, 1.8 and 2.5 Vout also) 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	VT-Series: 500 kHz, ±10% VTW-Series: 400 kHz, ±10%
Isolation Voltage	1500 Vdc, min. (1 minute)
Isolation Resistance	10 ⁹ Ohms, min.
Isolation Capacitance	VT-Series: 1000 pF, max. VTW-Series: 1500 pF, max.
Approvals	UL60950-1 certified (E352836) IEC/EN60950-1 (designed to meet)

Remote ON/OFF Control

Control Voltage referenced to negative (-) input	
Positive Logic (Standard):	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 +0.5 mA, max.
Remote off input current	2.5 mA

Environmental Specification

Operating Temperature	-40°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: 1.791 x 10 ⁶ Hrs / 1.620 x 10 ⁶ Hrs *
	MIL-HDBK-217F: 6.842 x 10 ⁵ Hrs / 6.590 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

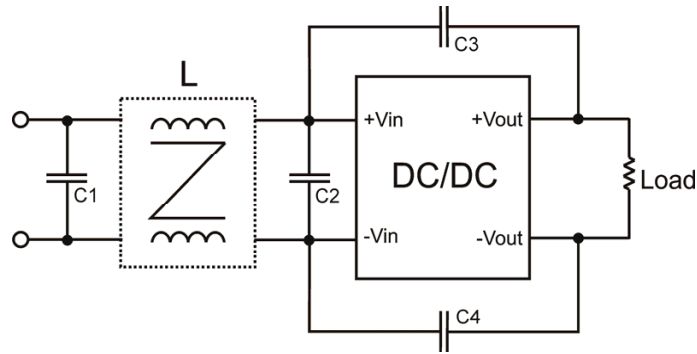
Dimensions	50.8 x 25.4 x 10.2 mm 2.00 x 1.00 x 0.40 inches
Case Material	Nickel-coated copper
Base Material	Non-conductive black plastic
Potting Material	Epoxy (UL94-V0)
Weight	27 g

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 A for VT-Series (±2 kV) Perf. Criteria B for VTW-Series (± 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!

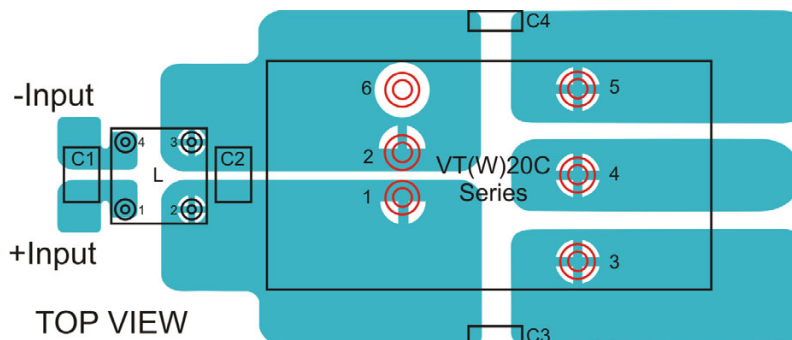
Recommended Filter for EN55022 Class A or Class B Compliance



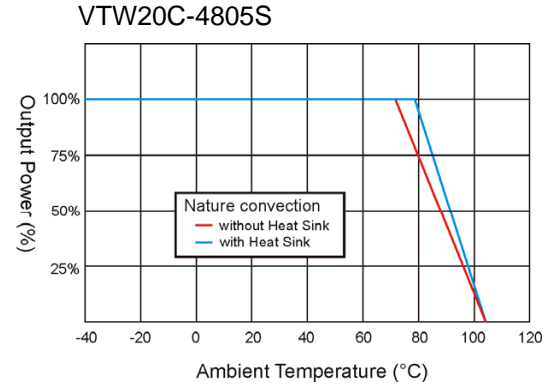
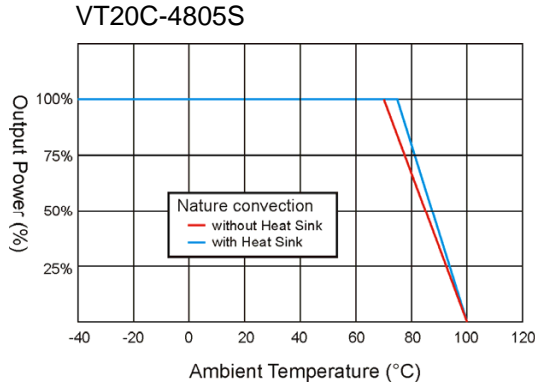
Recommended Components as follows:

	Class A Compliance		Class B Compliance			
	C2	C1, C3, C4, L	C1	C2	C3, C4	L
VT20C-12xxx	4.7 μ F / 50V 1812 MLCC	-	3.3 μ F / 50V 1812 MLCC	3.3 μ F / 50V 1812 MLCC	1000 pF / 2kV MLCC	450 μ H Common Choke PMT-048
VT20C-24xxx	2.2 μ F / 50V 1812 MLCC	-	4.7 μ F / 50V 1812 MLCC	-	1000 pF / 2kV MLCC	450 μ H Common Choke PMT-048
VT20C-48xxx	2.2 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
VTW20C-24xxx	-	-	4.7 μ F / 50V 1812 MLCC	-	1000 pF / 2kV MLCC	450 μ H Common Choke PMT-048
VTW20C-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:

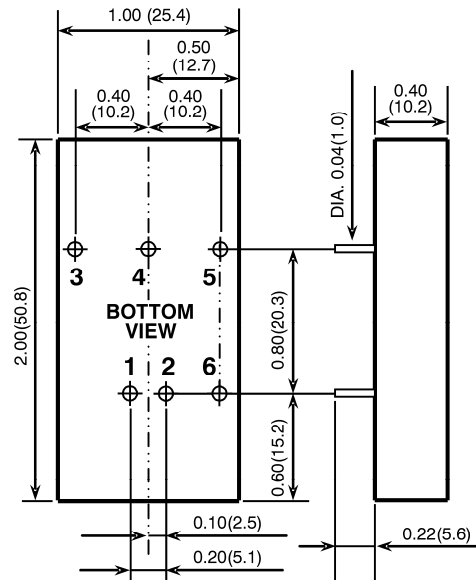
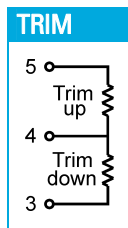


Derating



PIN Connections

Standard PIN Connections		
Pin	Single	Dual
1	+V Input	+V Input
2	-V Input	-V Input
3	+V Output	+V Output
4	Trim	Common
5	-V Output	-V Output
6	Ctrl	Ctrl

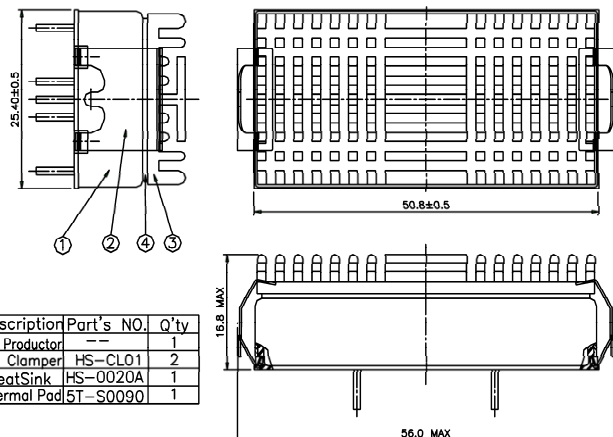


Heat Sink

To order the VT20C/VTW20C-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. VTW20C-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.