

FEATURES AND APPLICATIONS

- 2:1 and 4:1 Input Range
- High Efficiency up to 90%
- 2" x 1.6" Package
- Low Ripple & Noise
- UL60950-1 certified
- RoHS ✓



GENERAL DESCRIPTION

The VT30 and VTW30 series is a family of 30 Watt single and dual output DC-DC converters. These converters combine five side shielded nickel-coated copper package in a compatible case (2" x 1.6") 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, ± 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 Full load [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]
VT30-xx1R5S	12 24 48	1.5	6000	100/50/20	1014/493/244	50	78/80/81	85800
VT30-xx1R8S		1.8	6000	100/35/20	1169/580/290	50	81/82/83	65000
VT30-xx2R5S		2.5	6000	110/45/25	1582/780/390	50	83/84/85	33000
VT30-xx3R3S		3.3	6000	115/50/30	2037/1010/500	50	85/86/87	19500
VT30-xx05S		5.0	6000	95/50/35	3012/1490/740	50	87/88/89	10200
VT30-xx12S		12.0	2500	170/80/35	2976/1470/730	75	88/89/90	3240
VT30-xx15S		15.0	2000	210/90/55	2976/1470/730	75	88/89/90	1100
VT30-xx12D		± 12.0	± 1250	60/30/20	3012/1488/744	100	87/88/88	± 1020
VT30-xx15D		± 15.0	± 1000	40/30/20	3012/1488/744	100	87/88/88	± 675

4:1 Input – Single and Dual Outputs

Type Number	Input Voltage [Vdc]	Output Voltage [Vdc]	Output Current Full load [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]
VTW30-xx1R5S	24 48	1.5	8000	35/20	658/329	60	80/80	65000
VTW30-xx1R8S		1.8	8000	35/20	759/380	60	83/83	65000
VTW30-xx2R5S		2.5	8000	40/25	1029/508	60	85/86	33000
VTW30-xx3R3S		3.3	6000	50/30	994/497	60	87/87	19500
VTW30-xx05S		5.0	6000	65/30	1506/744	75	87/88	10200
VTW30-xx12S		12.0	2500	65/35	1506/753	100	87/87	3300
VTW30-xx15S		15.0	2000	70/45	1488/744	100	88/88	1100
VTW30-xx12D		± 12.0	± 1250	30/25	1563/772	100	84/85	± 1000
VTW30-xx15D		± 15.0	± 1000	35/25	1543/762	100	85/86	± 680

xx ... nominal input voltage:

VT30-Series: 12 (9 – 18 Vdc)
24 (18 – 36 Vdc)
48 (36 – 75 Vdc)

VTW30-Series: 24 (10 – 40 Vdc)
48 (18 – 75 Vdc)

Options:

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

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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 (VT30-Series)	4:1 input (VTW30-Series)
12V: 9 to 18 Vdc	24V: 10 to 40 Vdc
24V: 18 to 36 Vdc	48V: 18 to 75 Vdc
48V: 36 to 75 Vdc	
Input Filter	L-C 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 (20 mApp, VTW-Series)
Start Up time (nom. input, const. res. load)	25 mS (10 mS, VTW-Series)

Output Specifications

Output Power	30 Watts, max.
Output Voltage Accuracy	±1.0%
Output Voltage Trim	±10% (Single and Dual Output)
<small>The Output Voltage could be trimmed by using external Components (see Page 4)</small>	
Min. Load for specified regulation	0%
Ripple and Noise (20 MHz BW)	see table
Line Voltage Regulation	
VT-Series, Single:	±0.2% (LL to HL at full load)
VT-Series, Dual:	±0.5% (LL to HL at full load)
VTW-Series:	±0.5% (LL to HL at full load)
Load Voltage Regulation	Single: ±0.5% (No load to full load)
	Dual: ±1.0% (Min. load to full load)
Cross Regulation (Dual)	±5.0% (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	
VT-Series:	300 µsec (25% load step change)
VTW-Series:	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	1000 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 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 open
(VTW-Series only)	OFF-Control: 3 to 12 V or short
Input current of remote control pin	-0.5 mA to +0.5 mA, max.
Remote off input current	2.5 mA (3 mA, VTW-Series)

Environmental Specification

Operating Temperature	-40°C to +85°C with Derating
Storage Temperature	-55°C to +105°C
Max. Case Temperature	+100°C
Over Temp. Protection	+115°C
Thermal Impedance	10°C/Watt (Natural Convection)
	8.24°C/Watt (with Heat Sink)
Cooling	Free-air Convection
MTBF	MIL-HDBK-217F: 3.465 x 10 ⁵ Hrs *
	Bellcore TR-NWT-000332: 1.315 x 10 ⁶ 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

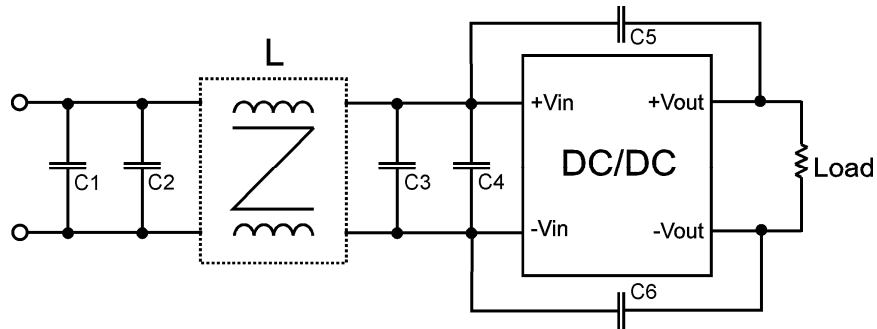
Dimensions	50.8 x 40.6 x 10.2 mm
	2.00 x 1.60 x 0.40 inches
Case Material	Nickel-coated copper
Base Material	FR4 PCB
Potting Material	Epoxy (UL94-V0)
Weight	48 g

EMC Characteristics

EMI	EN55022	Class A
<small>With an external capacitor parallel to the input pins: see EMI Filter on Page 3</small>		
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) for VT-Series
		Perf. Criteria A (±2 kV) for VTW-Series
Surge	EN61000-4-5	Perf. Criteria B (±1 kV)
<small>An external filter capacitor is required if the module has to meet EN61000-4-4 and EN61000-4-5. Recommended: 220 µF/100 V, ESR 48 mΩ</small>		
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!

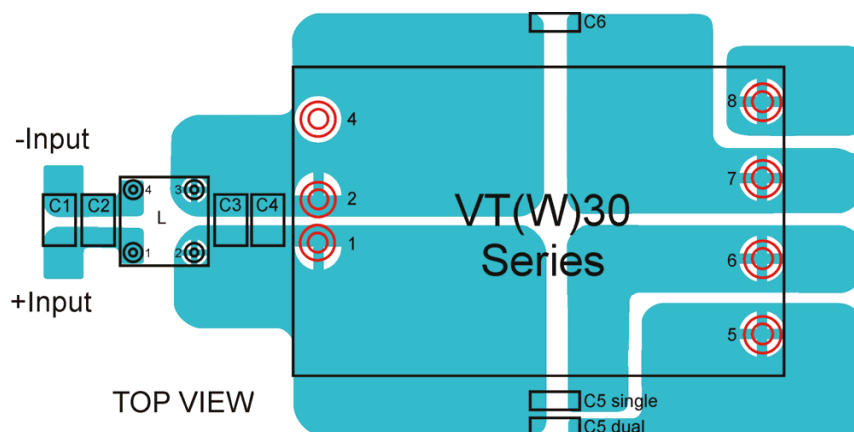
Recommended Filter for EN55022 Class A or Class B Compliance



Recommended Components as follows:

	Class A Compliance		Class B Compliance					
	C4	C1, C3, C4 C5, C6, L	C1	C2	C3	C4	C5,C6	L
VT30-12xxx	6.8 μ F / 50V 1812 MLCC	-	4.7 μ F / 50V 1812 MLCC	-	4.7 μ F / 50V 1812 MLCC	-	1000 pF / 2kV MLCC	450 μ H Common Choke PMT-048
VT30-24xxx	6.8 μ F / 50V 1812 MLCC	-	6.8 μ F / 50V 1812 MLCC	-	6.8 μ F / 50V 1812 MLCC	-	1000 pF / 2kV MLCC	450 μ H Common Choke PMT-048
VT30-24xxx	2.2 μ F / 100V 1812 MLCC	-	2.2 μ F / 100V 1812 MLCC	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	450 μ H Common Choke PMT-048
VTW30-24xxx	6.8 μ F / 50V 1812 MLCC	-	6.8 μ F / 50V 1812 MLCC	-	6.8 μ F / 50V 1812 MLCC	-	1000 pF / 2kV MLCC	450 μ H Common Choke PMT-048
VTW30-48xxx	2 x 2.2 μ F / 100V 1812 MLCC	-	2.2 μ F / 100V 1812 MLCC	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	450 μ H Common Choke PMT-048

Recommended EN55022 Class A or Class B Filter Circuit Layout:

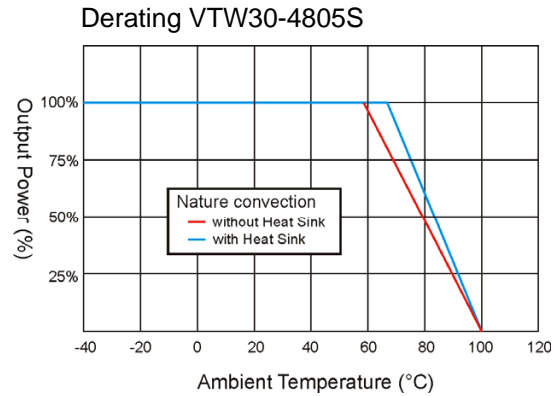
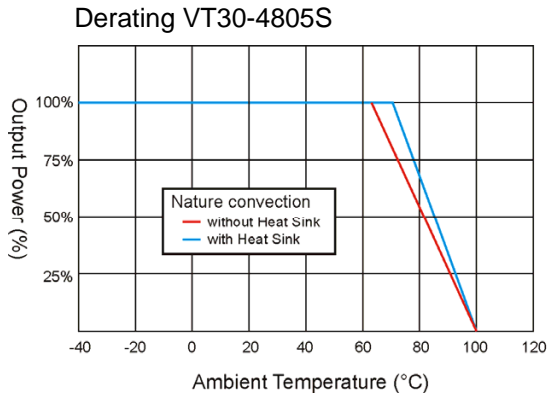


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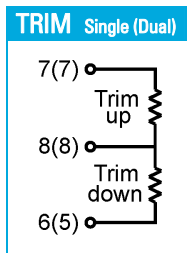
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Derating

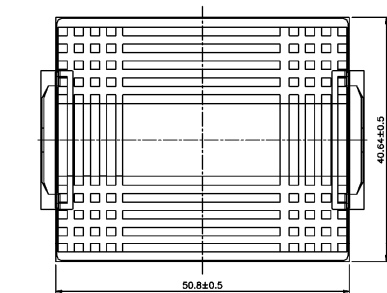
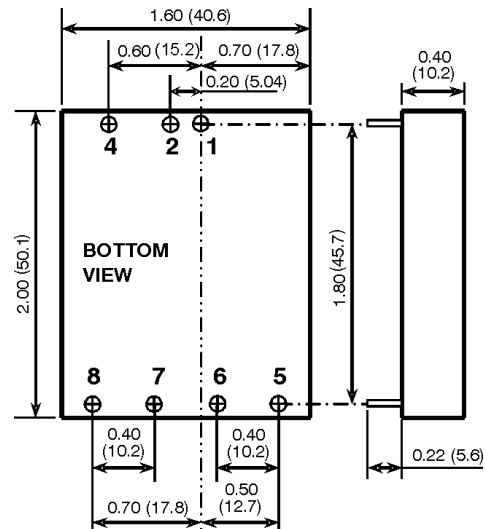


PIN Connections

Standard PIN Connections		
Pin	Single	Dual
1	+V Input	+V Input
2	-V Input	-V Input
4	Ctrl	Ctrl
5	NP	+V Output
6	+V Output	Common
7	-V Output	-V Output
8	TRIM	TRIM



NP ... No Pin



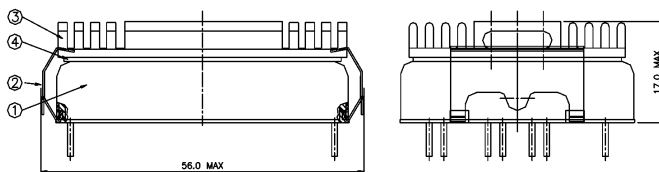
ITEM	Description	Part's NO.	Q'ty
1	F2 Productor	--	1
2	F2 Clamper	HS-Cl.02	2
3	HeatSink	HS-0011A	1
4	Thermal Pad	5T-S0091	1

Heat Sink

To order the VT30/VTW30-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. VTW30-2405S-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.