

FEATURES AND APPLICATIONS

- 2:1 Input Range
- High Efficiency up to 91%
- 2" x 1" Package
- Low Ripple & Noise
- UL60950-1 certified
- RoHS ✓



GENERAL DESCRIPTION

The VT30C 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") 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 input bus voltage of 12, 24 and 48 Vdc offering output voltage levels of 1.5, 2.5, 3.3, 5, 5.1, 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	Output Ripple & Noise [mVpp]	Efficiency [%] 12/24/48	max. Cap. Load [μ F]
VT30C-xx1R5S	12 24 48	1.5	8500	70/50/45	100	79/80/80	20000
VT30C-xx2R5S		2.5	8000	100/50/45	100	84/85/85	20000
VT30C-xx3R3S		3.3	7500	90/50/30	100	85/87/87	20000
VT30C-xx05S		5.0	6000	130/75/45	100	87/90/90	14400
VT30C-xx5R1S		5.1	6000	130/75/45	100	87/90/89	14400
VT30C-xx12S		12.0	2500	90/40/40	150	89/91/91	3000
VT30C-xx15S		15.0	2000	80/30/40	150	89/91/91	2000
VT30C-xx05D		± 5.0	± 3000	90/70/35	100	87/90/90	± 3000
VT30C-xx12D		± 12.0	± 1250	50/30/30	150	87/89/88	± 2000
VT30C-xx15D		± 15.0	± 1000	40/30/20	150	87/90/89	± 1300

xx ... nominal Input voltage:

VT30C-Series: 12 (9 – 18 Vdc)
24 (18 – 36 Vdc)
48 (36 – 75 Vdc)

Options:

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

ELECTRICAL SPECIFICATIONS

Specifications typical at +25°C, nominal Input voltage, rated output current unless otherwise specified.

Input Specifications

Input Voltage Range	12V: 9 to 18 Vdc
	24V: 18 to 36 Vdc
	48V: 36 to 75 Vdc
Input Filter	Pi type
Input Surge Voltage	12V: 25 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)	30 mS
Start-up Voltage	12V: 9 Vdc, max.
	24V: 18 Vdc, max.
	48V: 36 Vdc, max.
Shutdown Voltage	12V: 8 Vdc
	24V: 16 Vdc
	48V: 32 Vdc

Output Specifications

Output Power	30 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 6)	
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	1.5 Vout: 2.0 Vdc
	2.5 Vout: 3.3 Vdc
	3.3 Vout: 3.9 Vdc
	5.0, 5.1 & ±5 Vout: 6.2 Vdc
	12 & ±12 Vout: 15 Vdc
15 & ±15 Vout: 18 Vdc	
Transient response recovery time	250 µsec (25% load step change)

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	FR4 PCB
Potting Material	Epoxy (UL94-V0)
Weight	30.5 g

General Specifications

Efficiency	see table
Switching Frequency	430 kHz, ±10%
Isolation Voltage	1500 Vdc, min. (1 minute)
Isolation Resistance	10 ⁹ Ohms, min.
Isolation Capacitance	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	3 mA

Environmental Specification

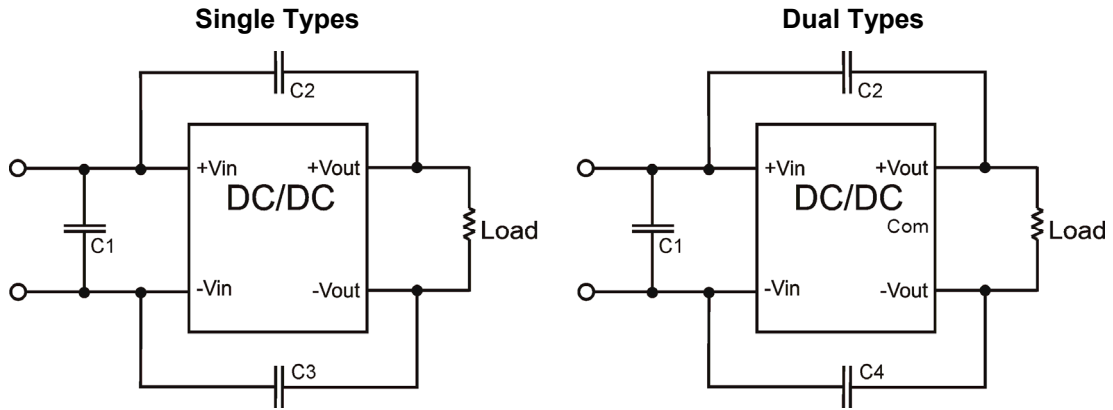
Operating Temperature	-40°C to +50°C without Derating
	+50°C to +85°C with Derating
Storage Temperature	-55°C to +125°C
Max. Case Temperature	+105°C
Thermal Impedance	12°C/Watt (Natural Convection)
	10°C/Watt (with Heat Sink)
Cooling	Free-air Convection
MTBF	MIL-HDBK-217F: 5.548 x 10 ⁵ Hrs *
	Bellcore TR-NWT-000332: 3.173 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

EMC Characteristics

EMI	EN55022	Class A or Class B
To meet EN55022 Class A or Class B external components are needed; Find recommended circuits at next pages;		
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: 12V & 24V Input: 330 µF/50 V, ERS 55 mΩ		
48V Input: 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 Compliance

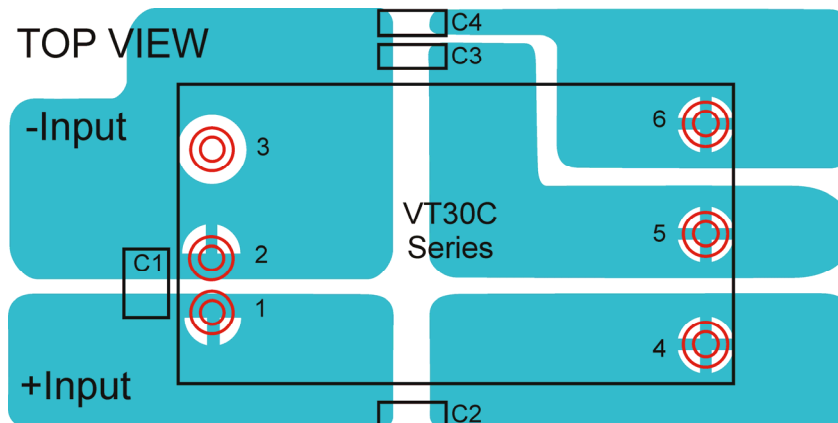


Recommended Components as follows:

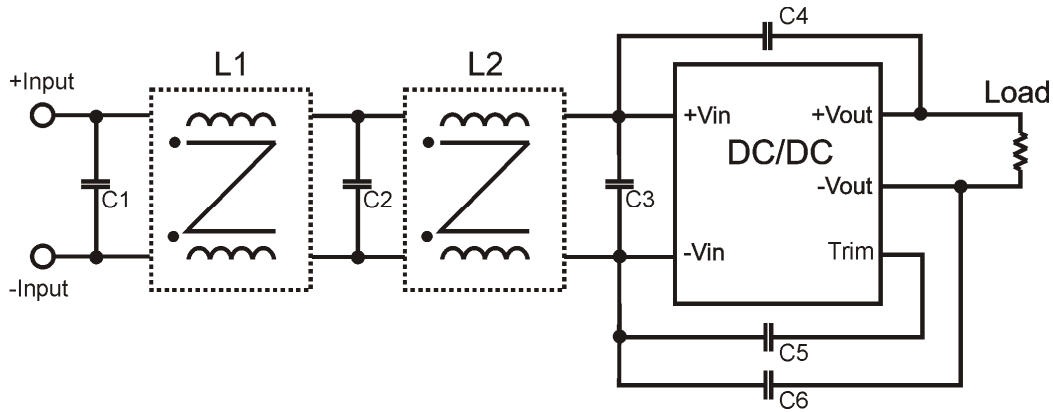
	Class A Compliance – Single Types	
	C1	C2, C3
VT30C-12xxS	10 μ F / 25V 1812 MLCC	1000 pF / 2kV 1808 MLCC
VT30C-24xxS	6.8 μ F / 50V 1812 MLCC	1000 pF / 2kV 1808 MLCC
VT30C-48xxS	2.2 μ F / 100V 1812 MLCC	1000 pF / 2kV 1808 MLCC

	Class A Compliance - Dual Types	
	C1	C2, C4
VT30C-12xxD	10 μ F / 25V 1812 MLCC	1000 pF / 2kV 1808 MLCC
VT30C-24xxD	6.8 μ F / 50V 1812 MLCC	1000 pF / 2kV 1808 MLCC
VT30C-48xxD	2.2 μ F / 100V 1812 MLCC	1000 pF / 2kV 1808 MLCC

Recommended EN55022 Class A Filter Circuit Layout:



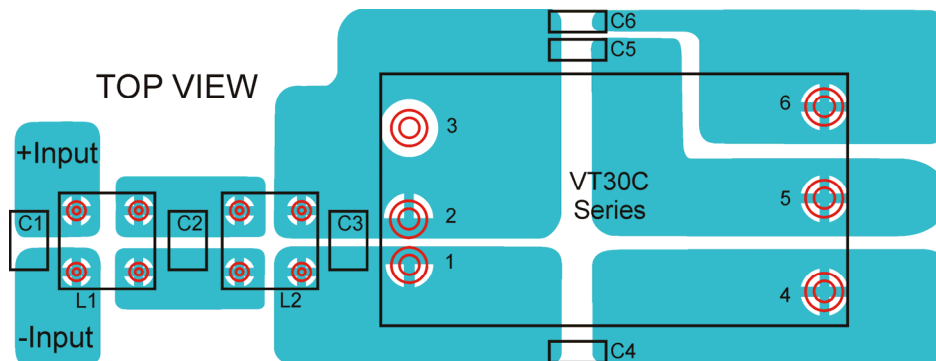
Recommended Filter for EN55022 Class B Compliance – Single Output



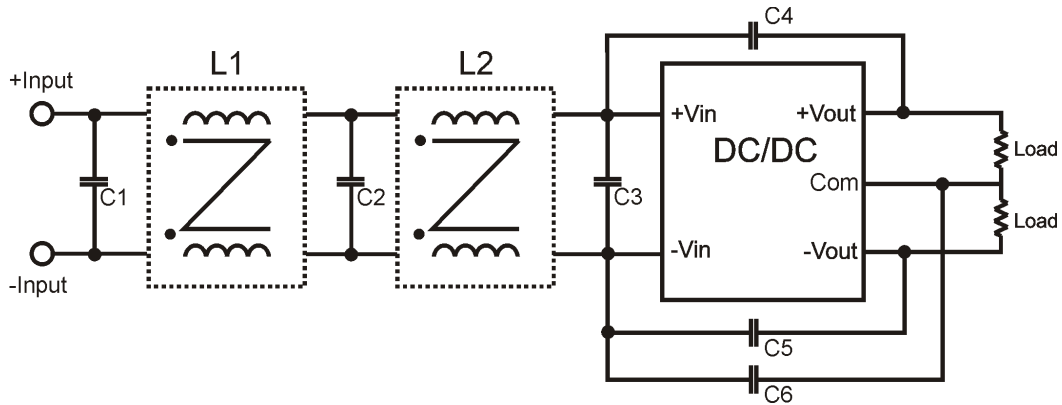
Recommended Components as follows:

	Class B Compliance			
	Component	Value	Voltage	Reference
VT30C-12xxS	C1	10 μ F	25 V	1812 MLCC
	C4, C5, C6	1000 pF	2 kV	1808 MLCC
	L1	33.3 μ H	-	Common Choke, P/N: PMT-075
	L2	55.2 μ H	-	Common Choke, P/N: PMT-076
VT30C-24xxS	C1, C2, C3	4.7 μ F	50 V	1812 MLCC
	C4, C5, C6	1000 pF	2 kV	1808 MLCC
	L1	33.3 μ H	-	Common Choke, P/N: PMT-075
	L2	55.2 μ H	-	Common Choke, P/N: PMT-076
VT30C-48xxS	C1, C2, C3	2.2 μ F	100 V	1812 MLCC
	C4, C5, C6	1000 pF	2 kV	1808 MLCC
	L1	33.3 μ H	-	Common Choke, P/N: PMT-075
	L2	55.2 μ H	-	Common Choke, P/N: PMT-076

Recommended EN55022 Class B Filter Circuit Layout:



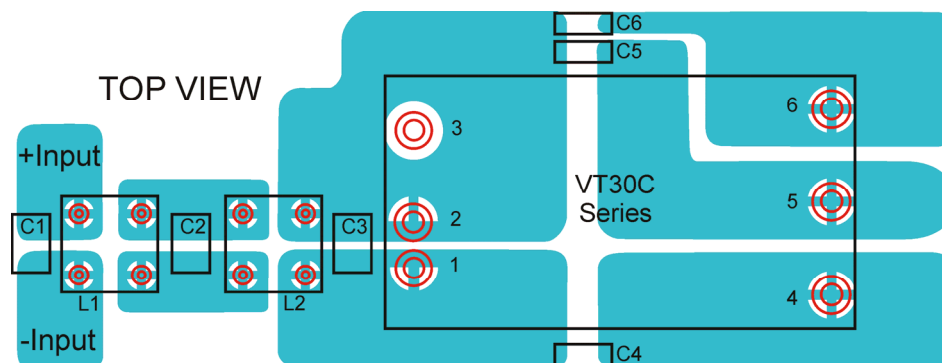
Recommended Filter for EN55022 Class B Compliance – Dual Output



Recommended Components as follows:

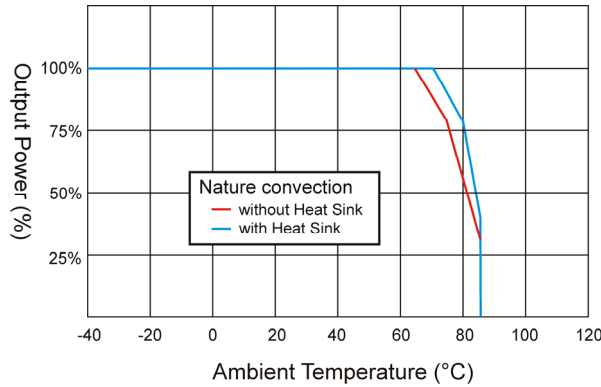
	Class B Compliance			
	Component	Value	Voltage	Reference
VT30C-12xxS	C1	10 μ F	25 V	1812 MLCC
	C4, C5, C6	1000 pF	2 kV	1808 MLCC
	L1	33.3 μ H	-	Common Choke, P/N: PMT-075
	L2	55.2 μ H	-	Common Choke, P/N: PMT-076
VT30C-24xxS	C1, C2, C3	4.7 μ F	50 V	1812 MLCC
	C4, C5, C6	1000 pF	2 kV	1808 MLCC
	L1	33.3 μ H	-	Common Choke, P/N: PMT-075
	L2	55.2 μ H	-	Common Choke, P/N: PMT-076
VT30C-48xxS	C1, C2, C3	2.2 μ F	100 V	1812 MLCC
	C4, C5, C6	1000 pF	2 kV	1808 MLCC
	L1	33.3 μ H	-	Common Choke, P/N: PMT-075
	L2	55.2 μ H	-	Common Choke, P/N: PMT-076

Recommended EN55022 Class B Filter Circuit Layout:



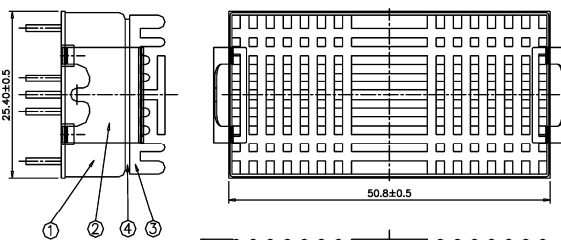
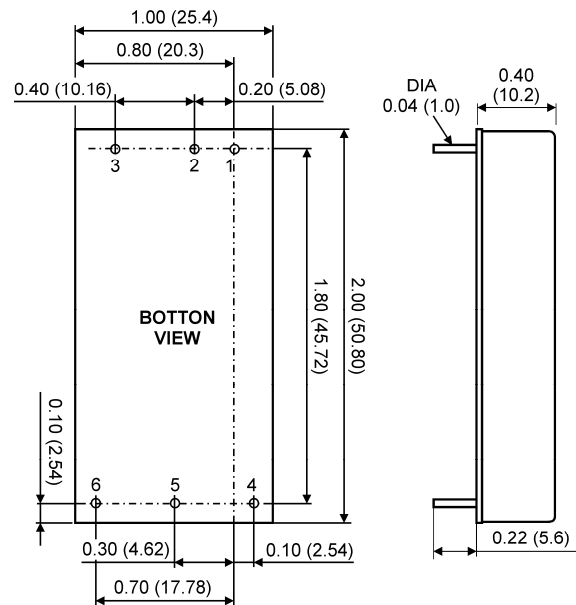
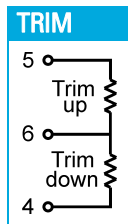
Derating

VT30C-4805S with and without Heat Sink



PIN Connections

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



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

Heat Sink

To order the VT30C-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. VT30C-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.