

VT-40W Series

40W 2:1 Regulated Single & Dual output



electronic powersolutions

Features

- Wide 2:1 Input Range
- 1600 VDC Isolation
- Efficiency up to 92%
- Extended Operating Temperature Range -40 ~ 71°C max.
- Adjustable Output Voltage
- Remote On/Off Control (CTRL)
- Continuous Short Circuit Protection
- Over Current Protection
- Over Voltage Protection
- Soft Start
- High Power Density:40W in 2"x1"x0.4" package
- No Minimum Load Required
- Optional Heat-sink



The VT-40W series is a family of cost effective 40W single & dual output DC-DC converters. These converters combine nickle-coated copper package in a 2"x1" case with high performance features such as Active Clamp Technology, continuous short circuit protection with automatic restart and tight line / load regulation. Devices are encapsulated using flame retardant resin. Input voltages of 12 and 24 and 48 with output voltage of 3.3, 5, 12, 15, ± 12 , ± 15 Vdc. High performance features include high efficiency operation up to 92%.

ALL SPECIFICATIONS ARE TYPICAL AT 25°C, NOMINAL INPUT AND FULL LOAD UNLESS OTHERWISE NOTED.

OUTPUT SPECIFICATIONS	
Output Voltage Accuracy	Single&Dual: $\pm 1\%$, max.
Output Voltage Adjustability (Single Output Only)	$\pm 10\%$, max.
Maximum Output Current	See table, max.
Line Regulation	Single&Dual: $\pm 0.5\%$, max.
Load Regulation	Single (0% to 100%): $\pm 0.5\%$, max. Dual (0% to 100%): $\pm 1\%$, max(balanced load), max.
Cross Regulation (1)	Dual: $\pm 5\%$, max.
Ripple&Noise (2)	3.3V&5.0V : 100mVpk-pk, max. other : 150mVpk-pk, max.
Over Voltage Protection (Zener diode clamp)	3.3V output 3.9V 5V output 6.2V 12V output 15V 15V output 18V ± 12 V output ± 15 V ± 15 V output ± 18 V
Over Current Protection	115%~140% of lout max.
Short Circuit Protection	Indefinite(hiccup) (Automatic Recovery)
Temperature Coefficient	$\pm 0.02\%/^{\circ}\text{C}$
Capacitive Load (3)	See table, max.
Transient Recovery Time (4)	250 μs , typ.
Transient Response Deviation (4)	$\pm 3\%$, max.

INPUT SPECIFICATIONS	
Input Voltage Range	See table
Under Voltage Lockout	
12V Models	Module ON / OFF 8.6Vdc / 7.9Vdc, typ.
24V Models	Module ON / OFF 17.8Vdc / 16Vdc, typ.
48V Models	Module ON / OFF 33.5Vdc / 30.5Vdc, typ.
Start up Time (Nominal Vin and constant resistive load)	30mS, typ.
Input Filter	Pi Type
Input Current (No-Load)	See table, max.
Input Current (Full-Load)	See table, typ.
Input Reflected Ripple Current (5)	20mApk-pk, typ.
Remote On/Off (CTRL) (6)	
	ON: 3.0 ... 12Vdc or open circuit
	OFF: 0 ... 1.2Vdc or Short circuit pin2 and pin 3
	OFF idle current: 5 mA, typ.

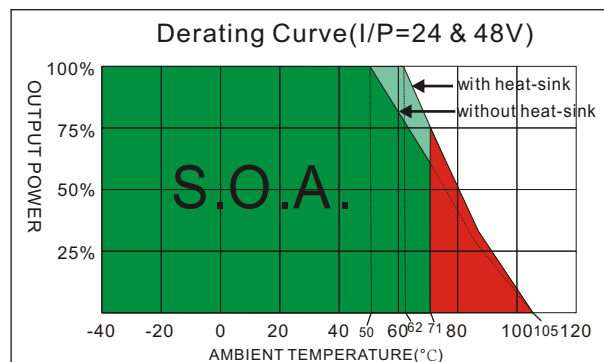
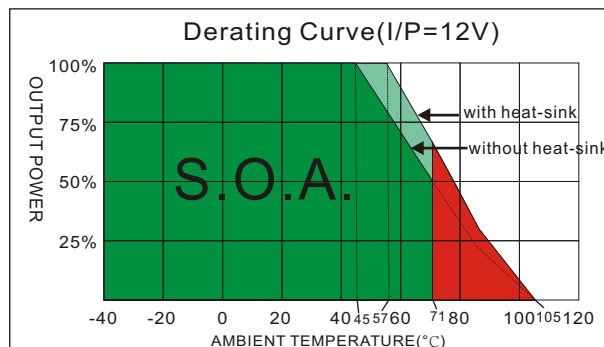
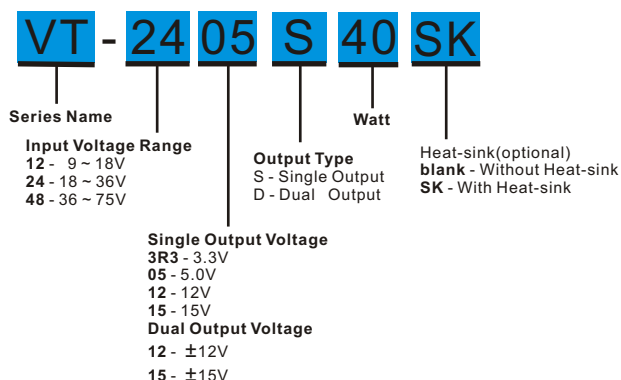
GENERAL SPECIFICATIONS	
Efficiency	See table, typ.
I/O Isolation Voltage (60sec)	
Input/Output	1600Vdc
Case/Input & Output	1600Vdc
Isolation Resistance	1000 M Ω , min.
Isolation Capacitance	1000 pF, typ.
Switching frequency	270kHz, typ.
Humidity	95% rel H
Reliability Calculated MTBF (MIL-HDBK-217 F)	Single&Dual: >328 khrs
Safety Standard	IEC/EN 60950-1 , 62368-1
Safety Approvals	IEC/EN 60950-1 , 62368-1

EMC CHARACTERISTICS	
Radiated Emissions(7)	EN55032 CLASS B
Conducted Emissions(7)	EN55032 CLASS B
ESD	IEC61000-4-2 Perf. Criteria A
RS	IEC61000-4-3 Perf. Criteria A
EFT(8)	IEC61000-4-4 Perf. Criteria A
Surge (8)	IEC61000-4-5 Perf. Criteria A
CS	IEC61000-4-6 Perf. Criteria A
PFMF	IEC61000-4-8 Perf. Criteria A

PHYSICAL SPECIFICATIONS	
Case Material	Nickel-coated Copper
Base Material	Non-conductive Black Plastic(UL94V-0 rated)
Pin Material	$\Phi 1.0\text{mm}$ Brass Solder-coated
Potting Material	Epoxy (UL94V-0 rated)
Weight	35.0g(Without Heat-sink) / 46.3g(With Heat-sink)
Dimensions	2.00"x1.00"x0.40"

ABSOLUTE SPECIFICATIONS (9)	
These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.	
Input Surge Voltage (100mS)	
12 Models	25 Vdc, max.
24 Models	50 Vdc, max.
48 Models	100 Vdc, max.
Soldering Temperature (1.5mm from case 10sec Max.)	260°C, max.

ENVIRONMENTAL SPECIFICATIONS	
Operating Ambient Temperature	-40°C ~ +71°C(See Derating Curve)
12 Models	-40°C ~ +45°C(For 100% load)
24 / 48 Models	-40°C ~ +50°C(For 100% load)
Maximum Case Temperature	105°C
Thermal Impedance (Nature Convection)	Without Heat-sink 12°C/W With Heat-sink 10°C/W
Storage Temperature	-55°C ~ +125°C
Cooling(10)	Nature Convection

VT - 40W 2:1 Regulated Single & Dual output
PART NUMBER STRUCTURE

MODEL SELECTION GUIDE

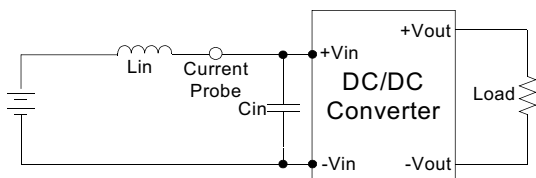
MODEL NUMBER	INPUT Voltage Range (Vdc)	INPUT Current		OUTPUT Voltage (Vdc)	OUTPUT Current		EFFICIENCY @FL (% , typ.)	Capacitor Load @FL (µF, max.)
		No-Load (mA, max.)	Full Load (mA, typ.)		Min. load (mA)	Full load (mA)		
VT-123R3S40	9-18	100	2444	3.3	0	8000	90	21800
VT-1205S40	9-18	160	3663	5	0	8000	91	13600
VT-1212S40	9-18	40	3663	12	0	3333	91	2300
VT-1215S40	9-18	50	3663	15	0	2666	91	1500
VT-243R3S40	18-36	60	1208	3.3	0	8000	91	21800
VT-2405S40	18-36	90	1811	5	0	8000	92	13600
VT-2412S40	18-36	30	1831	12	0	3333	91	2300
VT-2415S40	18-36	40	1811	15	0	2666	92	1500
VT-483R3S40	36-75	40	604	3.3	0	8000	91	21800
VT-4805S40	36-75	60	905	5	0	8000	92	13600
VT-4812S40	36-75	20	915	12	0	3333	91	2300
VT-4815S40	36-75	20	905	15	0	2666	92	1500
VT-1212D40	9-18	50	3663	±12	0	±1666	91	±1200
VT-1215D40	9-18	50	3623	±15	0	±1333	92	±750
VT-2412D40	18-36	50	1831	±12	0	±1666	91	±1200
VT-2415D40	18-36	40	1811	±15	0	±1333	92	±750
VT-4812D40	36-75	30	906	±12	0	±1666	92	±1200
VT-4815D40	36-75	40	906	±15	0	±1333	92	±750

NOTE

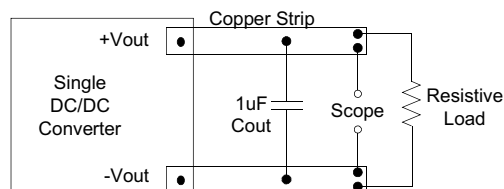
- Dual: One load is 25% to 100% load, the other load is 100% load, the output voltage variable rate is within ±5%.
- Measured with 20MHz bandwidth and 1.0µF ceramic capacitor.
- Tested by minimal Vin and constant resistive load.
- Tested by normal Vin and 25% load step change (75%-50%-25% of Io).
- Measured Input reflected ripple current with a simulated source inductance of 12µH and a source capacitor Cin(47µF, ESR<1.0Ω at 100KHz).
- The remote on/off control pin is referenced to -Vin(pin2).
- The VT-40W series can meet EN55022 Class B With an external filter in parallel with the input pins .
- An external filter capacitor is required if the module has to meet IEC61000-4-4 and IEC61000-4-5.
The filter capacitor Motien suggest: Nippon chemi-con KY series, 220µF/100V.
- Exceeding the absolute ratings of the unit could cause damage.
It is not allowed for continuous operating.
- Nature Convection" is usually about 30-65 LFM but is not equal to still air (0 LFM).

TEST CONFIGURATIONS
Input Reflected Ripple Current Test Step

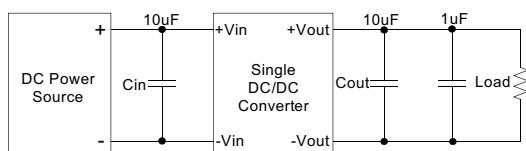
Input reflected ripple current is measured through a source inductor L_{in} (12 μ H) and a source capacitor C_{in} (47 μ F, ESR<1.0 Ω at 100KHz) at nominal input and full load.


Output Ripple & Noise Measurement Test

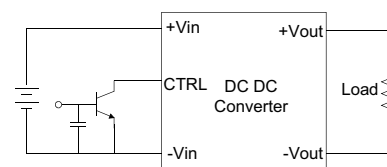
Use a capacitor C_{out} (1.0 μ F) measurement. The Scope measurement bandwidth is 0-20MHz.


DESIGN & FEATURE CONFIGURATIONS
Output Ripple & Noise Reduction

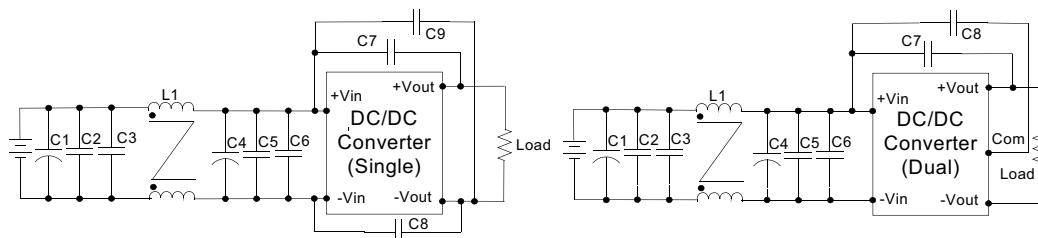
To reduce ripple and noise, it is recommended to use a 1 μ F ceramic disk capacitor and a 10 μ F electrolytic


CTRL Module ON / OFF

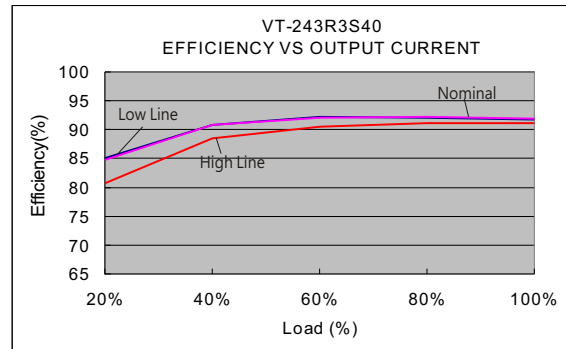
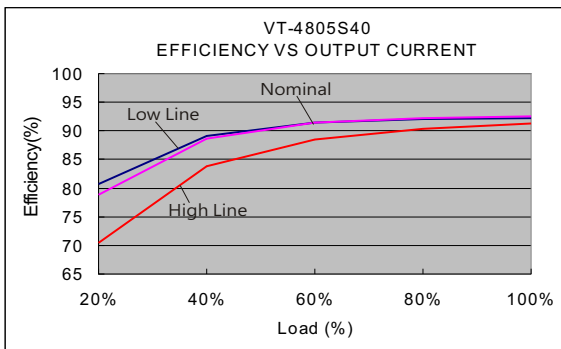
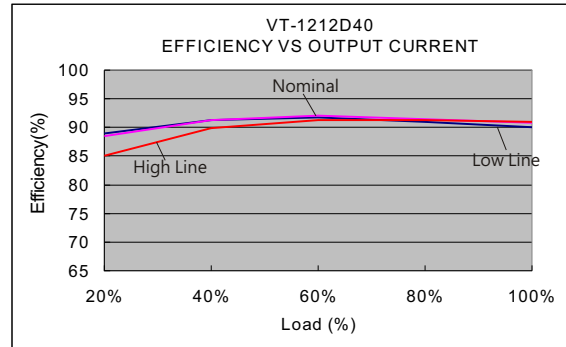
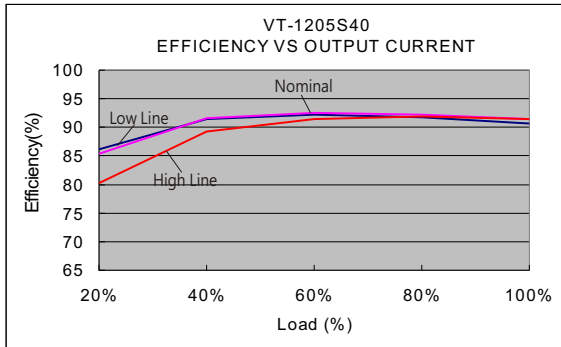
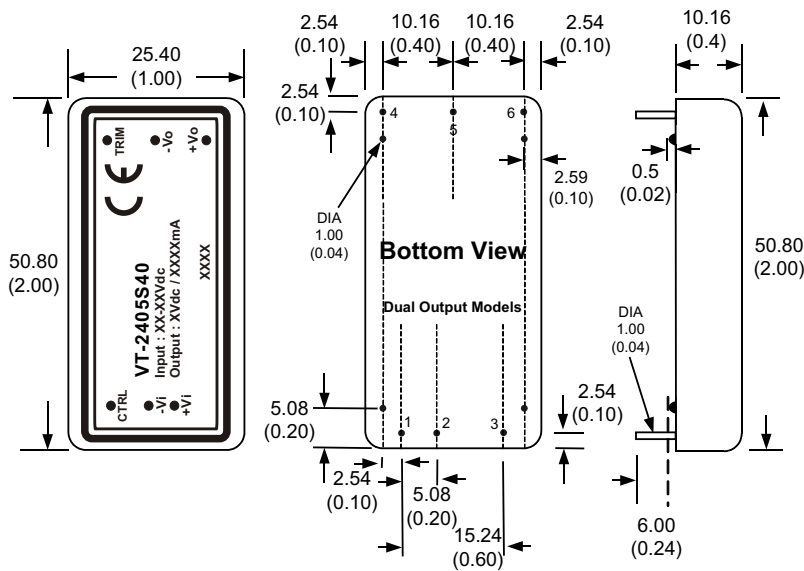
Positive logic turns on the module during high logic and Off during low logic. Ctrl module on/off can be controlled by an external switch between the ctrl terminal and -Vin terminal. the switch can be an open collector or open drain for positive logic if the ctrl feature is not used, please leave the ctrl pin floating.


EMI Filter

Input filter components are used to help meet conducted emissions requirement for the module. These components should be mounted as close as possible to the module; and all leads should be minimized to decrease radiated noise.



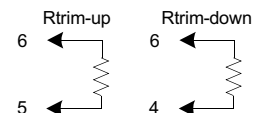
Single	C1	L1	C2/C3/C5/C6	C4	C7	C8	C9
VT-12XXXSXX	220uF, 100V	Common Choke 68uH	1812,6.8uF, 50V	330uF, 100V			1206,1000PF, 2KV
VT-24XXXSXX	220uF, 100V	Common Choke 68uH	1812,4.7uF, 50V	220uF, 100V	1206,1000PF, 2KV	1206,1000PF, 2KV	
VT-48XXXSXX	220uF, 100V	Common Choke 68uH	1812,1.5uF, 100V	220uF, 100V	1206,1000PF, 2KV	1206,1000PF, 2KV	
Dual	C1	L1	C2/C3/C5/C6	C4	C7	C8	
VT-12XXXDXX	220uF, 100V	Common Choke 68uH	1812,6.8uF, 50V	330uF, 100V	1206,1000PF, 2KV	1206,1000PF, 2KV	
VT-24XXXDXX	220uF, 100V	Common Choke 68uH	1812,4.7uF, 50V	220uF, 100V	1206,1000PF, 2KV	1206,1000PF, 2KV	
VT-48XXXDXX	220uF, 100V	Common Choke 68uH	1812,1.5uF, 100V	220uF, 100V	1206,1000PF, 2KV	1206,1000PF, 2KV	

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ELECTRICAL CHARACTERISTIC CURVES

MECHANICAL SPECIFICATIONS

PIN CONNECTIONS

PIN NUMBER	SINGLE	DUAL
1	+Vin	+Vin
2	-Vin	-Vin
3	CTRL	CTRL
4	+Vout	+Vout
5	-Vout	Com
6	Trim	-Vout

EXTERNAL OUTPUT TRIMMING

Output can be externally trimmed by using the method as below. (single output models only)

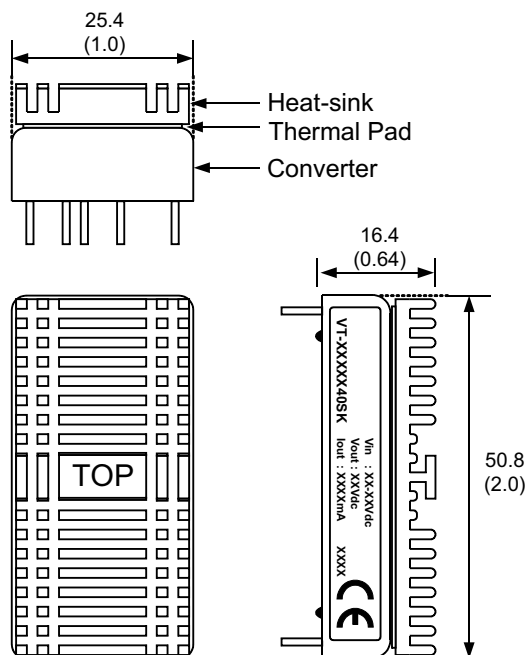


All dimensions are typical in millimeters (inches).

1. Pin diameter: 1.0 ± 0.05 (0.04 ± 0.002)
2. Pin pitch and length tolerance: ± 0.35 (± 0.014)
3. Case Tolerance: ± 0.5 (± 0.02)
4. Stand-off Tolerance: ± 0.1 (± 0.004)

MECHANICAL SPECIFICATIONS

With Heat-sink



Order code: VT-XXXXS40SK(contain: heat-sink, thermal pad)
 Material: Aluminum
 Finish: Anodic treatment (black)
 Weight: 11.3 g (0.40oz) (without converter)

Note:

1. Converters will be supplied with heat-sinks already mounted.
Please contact factory for quotation.