

# VT-40W Series

## 40W 2:1 Regulated Single & Dual output

### 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 Load 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,  $\pm 12$ ,  $\pm 15$ Vdc. High performance features include high efficiency operation up to 92%.

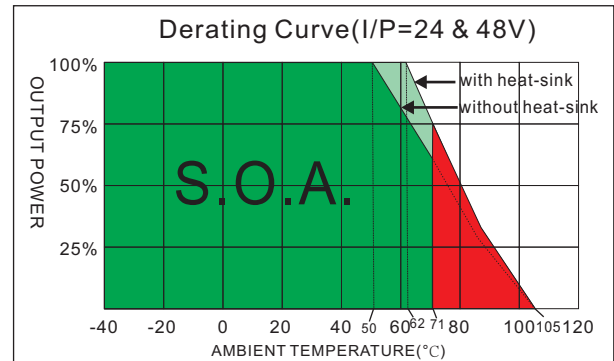
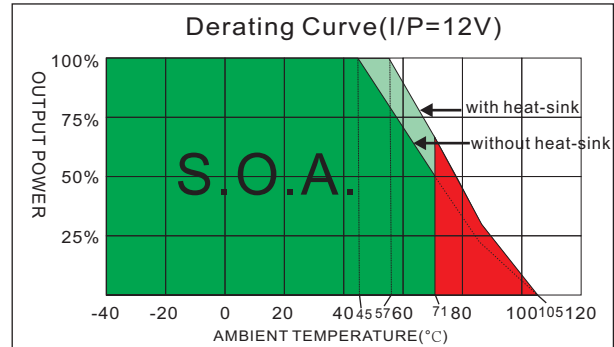
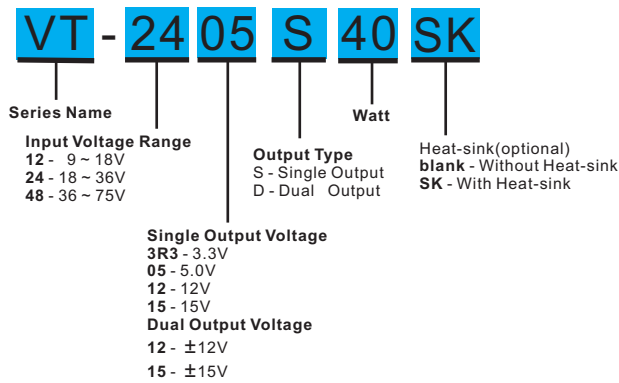


ALL SPECIFICATIONS ARE TYPICAL AT 25°C, NOMINAL INPUT AND FULL LOAD UNLESS OTHERWISE NOTED.

OUTPUT SPECIFICATIONS		GENERAL SPECIFICATIONS	
Output Voltage Accuracy	Single&Dual: $\pm 1\%$ , max.	Efficiency	See table, typ.
Output Voltage Adjustability ( Single Output Only )	$\pm 10\%$ , max.	I/O Isolation Voltage (60sec)	
Maximum Output Current	See table, max.	Input/Output	1600Vdc
Line Regulation	Single&Dual: $\pm 0.5\%$ , max.	Case/Input & Output	1600Vdc
Load Regulation	Single ( 0% to 100% ): $\pm 0.5\%$ , max. Dual ( 0% to 100% ): $\pm 1\%$ , max(balanced load), max.	Isolation Resistance	1000 M $\Omega$ , min.
Cross Regulation (1)	Dual: $\pm 5\%$ , max.	Isolation Capacitance	1000 pF, typ.
Ripple&Noise (2)	3.3V&5.0V : 100mVpk-pk, max. other : 150mVpk-pk, max.	Switching frequency	270kHz, typ.
Over Voltage Protection ( Zener diode clamp)	3.3V output 3.9V 5V output 6.2V 12V output 15V 15V output 18V $\pm 12$ V output $\pm 15$ V $\pm 15$ V output $\pm 18$ V	Humidity	95% rel H
Over Load Protection	115%~140% of lout max.	Reliability Calculated MTBF ( MIL-HDBK-217 F )	Single&Dual: >328 khrs
Short Circuit Protection	Indefinite(hiccup) (Automatic Recovery)	Safety Standard	IEC/EN 60950-1
Temperature Coefficient	$\pm 0.02\%/^{\circ}\text{C}$	EMC CHARACTERISTICS	
Capacitive Load (3)	See table, max.	Radiated Emissions(7)	EN55032 CLASS B
Transient Recovery Time (4)	250 $\mu$ s, typ.	Conducted Emissions(7)	EN55032 CLASS B
Transient Response Deviation (4)	$\pm 3\%$ , max.	ESD	IEC61000-4-2 Perf. Criteria A
INPUT SPECIFICATIONS		RS	IEC61000-4-3 Perf. Criteria A
Input Voltage Range	See table	EFT(8)	IEC61000-4-4 Perf. Criteria A
Under Voltage Lockout		Surge (8)	IEC61000-4-5 Perf. Criteria A
12V Models Module ON / OFF	8.6Vdc / 7.9Vdc, typ.	CS	IEC61000-4-6 Perf. Criteria A
24V Models Module ON / OFF	17.8Vdc / 16Vdc, typ.	PFMF	IEC61000-4-8 Perf. Criteria A
48V Models Module ON / OFF	33.5Vdc / 30.5Vdc, typ.	PHYSICAL SPECIFICATIONS	
Start up Time	30mS, typ.	Case Material	Nickel-coated Copper
(Nominal Vin and constant resistive load)		Base Material	Non-conductive Black Plastic(UL94V-0 rated)
Input Filter	Pi Type	Pin Material	$\Phi 1.0$ mm Brass Solder-coated
Input Current ( No-Load )	See table, max.	Potting Material	Epoxy (UL94V-0 rated)
Input Current ( Full-Load )	See table, typ.	Weight	31.0g
Input Reflected Ripple Current (5)	20mA <sub>p-p</sub> , typ.	Dimensions	2.00"x1.00"x0.40"
Remote On/Off ( CTRL ) (6)		ABSOLUTE SPECIFICATIONS (9)	
ON: 3.0 ... 12Vdc or open circuit		These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.	
OFF: 0 ... 1.2Vdc or Short circuit pin2 and pin 3		Input Surge Voltage (100mS)	
OFF idle current: 5 mA, typ.		12 Models	25 Vdc, max.
		24 Models	50 Vdc, max.
		48 Models	100 Vdc, max.
		Soldering Temperature	260°C, max.
		(1.5mm from case 10sec Max.)	
ENVIRONMENTAL SPECIFICATIONS		Operating Ambient Temperature	-40°C ~ +71°C(See Derating Curve)
Operating Ambient Temperature		12 Models	-40°C ~ +45°C(For 100% load)
24 / 48 Models		24 / 48 Models	-40°C ~ +50°C(For 100% load)
Maximum Case Temperature		Thermal Impedance (Nature Convection )	
Without Heat-sink	12°C/W	Without Heat-sink	12°C/W
With Heat-sink	10°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

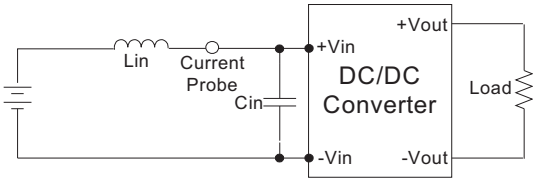
### NOTE

1. Dual: One load is 25% to 100% load, the other load is 100% load, the output voltage variable rate is within ±5%.
2. Measured with 20MHz bandwidth and 1.0uF ceramic capacitor.
3. Tested by minimal Vin and constant resistive load.
4. Tested by normal Vin and 25% load step change ( 75%-50%-25% of Io ).
5. Measured Input reflected ripple current with a simulated source inductance of 12uH.
6. The remote on/off control pin is referenced to -Vin(pin2).
7. The VT-40W series can meet EN55022 Class B With an external filter in parallel with the input pins .
8. 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, 220uF/100V.
9. Exceeding the absolute ratings of the unit could cause damage.  
It is not allowed for continuous operating.
10. "Nature Convection" is usually about 30-65 LFM but is not equal to still air (0 LFM).

**TEST CONFIGURATIONS**

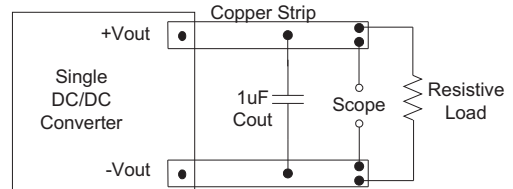
**Input Reflected Ripple Current Test Step**

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



**Output Ripple & Noise Measurement Test**

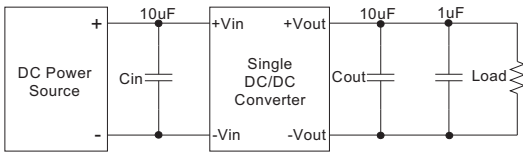
Use a capacitor  $C_{out}$  (1.0uF) measurement. The Scope measurement bandwidth is 0-20MHz.



**DESIGN & FEATURE CONFIGURATIONS**

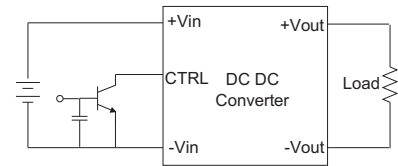
**Output Ripple & Noise Reduction**

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



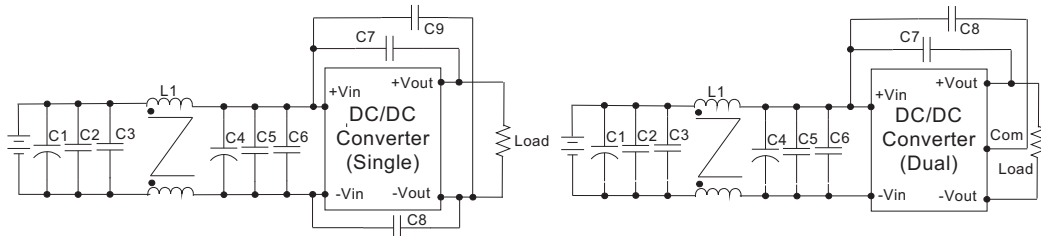
**CTRL Module ON / OFF**

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.



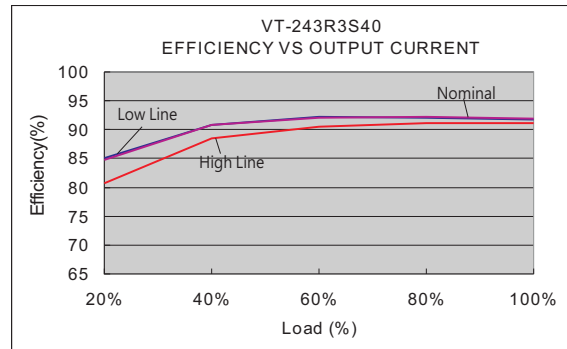
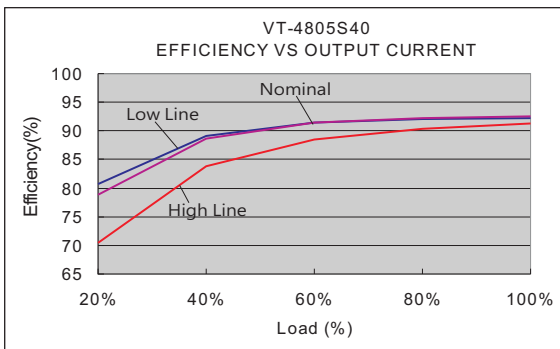
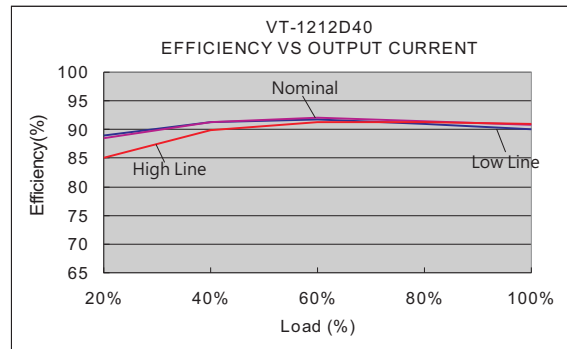
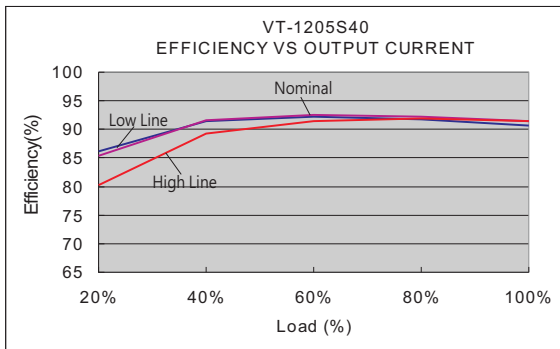
**EMI Filter**

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.

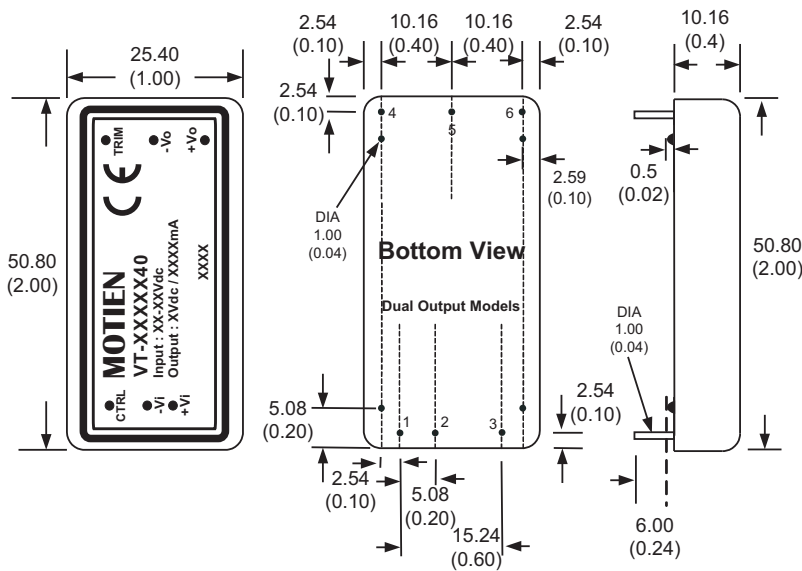


Single	C1	L1	C2/C3/C5/C6	C4	C7	C8	C9
VT-12XXXSXX	220uF, 100V	Common Choke 68uH	1812,6.8uF, 50V	330uF, 100V			1206,1000PF, 2KV
VT-24XXXSXX	220uF, 100V	Common Choke 68uH	1812,4.7uF, 50V	220uF, 100V	1206,1000PF, 2KV	1206,1000PF, 2KV	
VT-48XXXSXX	220uF, 100V	Common Choke 68uH	1812,1.5uF, 100V	220uF, 100V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

**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)

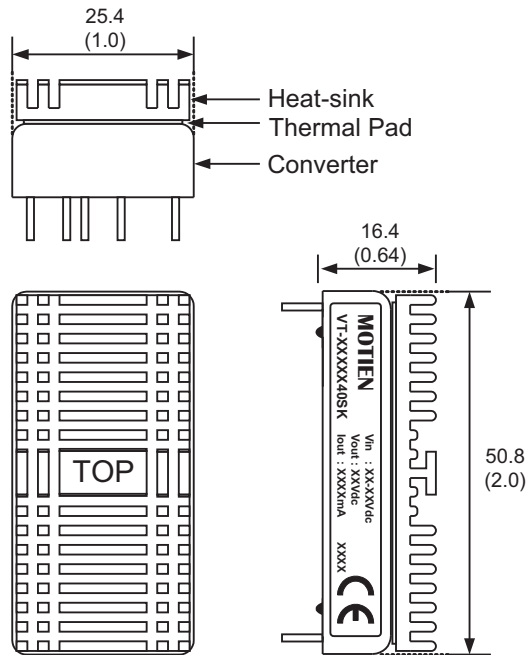
Rtrim-up

Rtrim-down

- 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: 11.2 g (0.39oz) (without converter)

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