

# VT-50W Series

50W 2:1 Regulated Single output



electronic powersolutions

## Features

- Wide 2:1 Input Range
- 1600 VDC Isolation
- Efficiency up to 92.5%
- Adjustable Output Voltage
- Remote On/Off Control (CTRL)
- Continuous Short Circuit Protection
- Over Current Protection
- Over Voltage Protection
- Over Temperature Protection
- Extended Operating Temperature Range -40 ~ 95°C max.
- Soft Start
- Built-in EMC filter meets EN55032 ClassA without external components



The VT-50W series is a family of cost effective 50W single DC-DC converters. These converters combine 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, 15Vdc . High performance features include high efficiency operation up to 92.5% .

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

OUTPUT SPECIFICATIONS	
Output Voltage Accuracy	±1%
Output Voltage Adjustability(Trim)	±10%, max.
Maximum Output Current	See table
Line Regulation	±0.5%, max.
Load Regulation( 0% to 100% )	±0.5%, max.
Ripple&Noise (1)	100mVpk-pk, max.
Over Voltage Protection ( Zener diode clamp)	3.3V output 3.9V 5V output 6.2V 12V output 15V 15V output 18V
Over Current Protection	120%~150% of Iout , typ.
Short Circuit Protection	Indefinite(hiccup) (Automatic Recovery)
Temperature Coefficient	±0.02%/°C
Capacitive Load (2)	See table
Transient Recovery Time (3)	250µs,typ.
Transient Response Deviation (3)	±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 34Vdc / 29Vdc, typ.
Start up Time (Nominal Vin and constant resistive load)	50mS, typ.
Input Filter	Pi Type
Input Current ( No-Load )	See table, max.
Input Current ( Full-Load )	See table, typ.
Input Reflected Ripple Current (4)	20mA <sub>p-p</sub> , typ.
Remote On/Off ( CTRL ) (5)	
ON:	3.0 ... 12Vdc or open circuit
OFF:	0 ... 1.2Vdc or Short circuit pin2 and pin 3
OFF idle current:	5 mA, typ

ENVIRONMENTAL SPECIFICATIONS	
Operating Ambient Temperature	-40°C ~ +95°C(See Derating Curve) -40°C ~ +50°C(For 100% load)
Maximum Case Temperature	110°C
Thermal Impedance (Mounting at FR4 (5.9*2.75 inch) PCB)	Without Heat-sink 9.5°C/W, min. With Heat-sink 8.5°C/W, min.
Storage Temperature	-40°C ~ +125°C
Over Temperature Protection (Case)	115°C, typ.
Cooling(6)	Nature Convection

GENERAL SPECIFICATIONS	
Efficiency	See table, typ.
I/O Isolation Voltage ( 60sec )	
Input/Output	1600Vdc
Case/Input & Output	1600Vdc
Isolation Resistance	1G Ohm, min.
Isolation Capacitance	2000 pF, typ.
Switching frequency	
12V Input Models	230kHz, typ.
24V & 48V Input Models	270kHz, typ.
Humidity	95% rel H
Reliability Calculated MTBF ( MIL-HDBK-217 F )	>200 khrs
Safety Standard	UL/cUL 60950-1, 62368-1 IEC/EN 60950-1, 62368-1
Safety Approvals	UL/cUL 60950-1, 62368-1 IEC/EN 60950-1, 62368-1

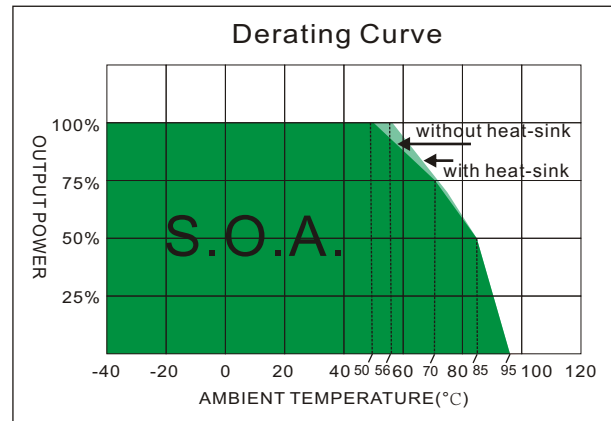
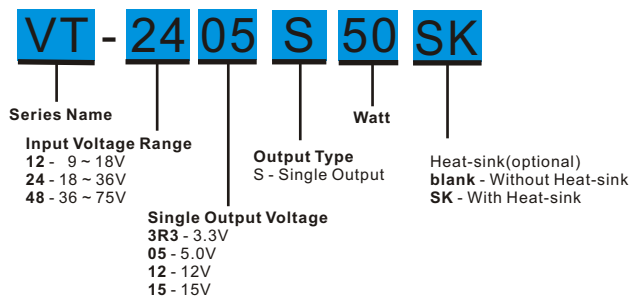
PHYSICAL SPECIFICATIONS	
Case Material	Copper
Base Material	Non-conductive Black Plastic(UL94V-0 rated)
Pin Material	Φ1.0mm Brass Solder-coated
Potting Material	Epoxy (UL94V-0 rated)
Weight	45.0g(Without Heat-sink) / 56.3g(With Heat-sink)
Dimensions	2.00"x1.00"x0.45"

ABSOLUTE SPECIFICATIONS (7)	
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.

EMC CHARACTERISTICS		
Radiated Emissions	EN55032	CLASS A
Conducted Emissions	EN55032	CLASS A
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

## VT - 50W 2:1 Regulated Single output

### PART NUMBER STRUCTURE



## MODEL SELECTION GUIDE

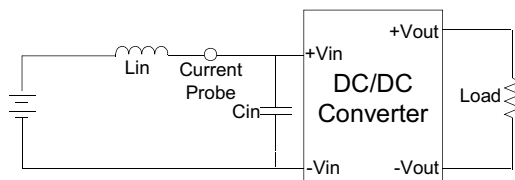
MODEL NUMBER	INPUT Voltage Range (Vdc)	INPUT Current		OUTPUT Voltage (Vdc)	OUTPUT Current		EFFICIENCY @FL (% , typ.)	Capacitor Load @FL (μF, max.)
		No-Load (mA, max.)	Full Load (mA, typ.)		Min. load (mA)	Full load (mA)		
VT-123R3S50	9-18, 12V Nominal	120	3022	3.3	0	10000	91	26000
VT-1205S50	9-18, 12V Nominal	170	4579	5	0	10000	91	17000
VT-1212S50	9-18, 12V Nominal	50	4682	12	0	4167	89	3300
VT-1215S50	9-18, 12V Nominal	50	4630	15	0	3333	90	2200
VT-243R3S50	18-36, 24V Nominal	70	1494	3.3	0	10000	92	26000
VT-2405S50	18-36, 24V Nominal	90	2252	5	0	10000	92.5	17000
VT-2412S50	18-36, 24V Nominal	40	2277	12	0	4167	91.5	3300
VT-2415S50	18-36, 24V Nominal	30	2277	15	0	3333	91.5	2200
VT-483R3S50	36-75, 48V Nominal	50	747	3.3	0	10000	92	26000
VT-4805S50	36-75, 48V Nominal	60	1126	5	0	10000	92.5	17000
VT-4812S50	36-75, 48V Nominal	30	1145	12	0	4167	91	3300
VT-4815S50	36-75, 48V Nominal	40	1138	15	0	3333	91.5	2200

### NOTE

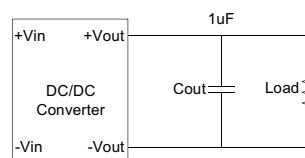
1. Measured with a 1.0μF ceramic capacitor.
2. Tested by minimal Vin and constant resistive load.
3. Tested by normal Vin and 25% load step change ( 75%-50%-25% of Io ).
4. Measured Input reflected ripple current with a simulated source inductance of 12μH and a source capacitor Cin(47μF, ESR<1.0Ω at 100KHz).
5. The remote on/off control pin is referenced to -Vin(pin2).
6. "Nature Convection" is usually about 30-65 LFM but is not equal to still air (0 LFM).
7. Exceeding the absolute ratings of the unit could cause damage.  
It is not allowed for continuous operating.
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, 220μF/100V.

**TEST CONFIGURATIONS**
**Input Reflected Ripple Current Test Step**

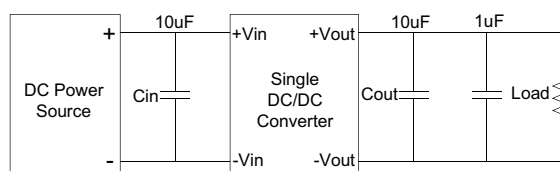
Input reflected ripple current is measured through a source inductor  $L_{in}$  ( $12\mu\text{H}$ ) and a source capacitor  $C_{in}$  ( $47\mu\text{F}$ ,  $\text{ESR} < 1.0\Omega$  at  $100\text{KHz}$ ) at nominal input and full load.


**Output Ripple & Noise Measurement Test**

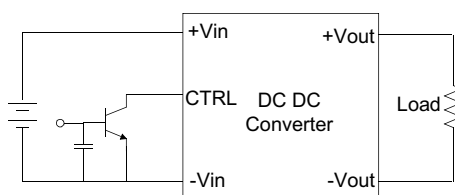
Use a  $1\mu\text{F}$  ceramic disk capacitor at the output.


**DESIGN & FEATURE CONFIGURATIONS**
**Output Ripple & Noise Reduction**

To reduce ripple and noise, it is recommended to use a  $1\mu\text{F}$  ceramic disk capacitor and a  $10\mu\text{F}$  electrolytic capacitor to at the output.


**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  $-V_{in}$  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.

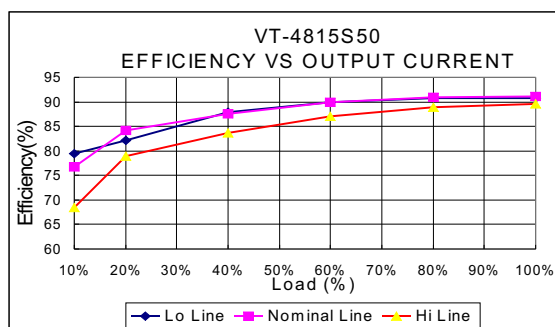
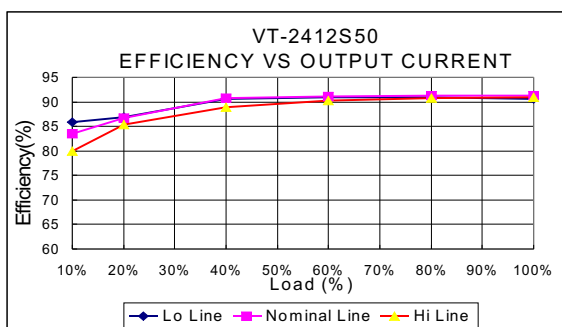
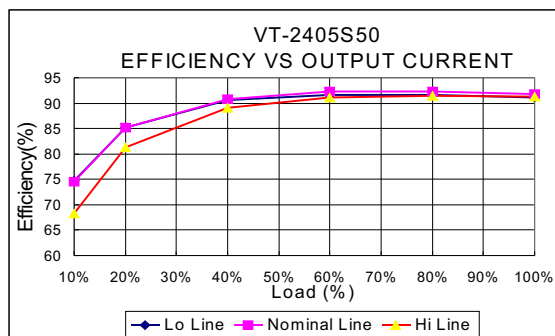
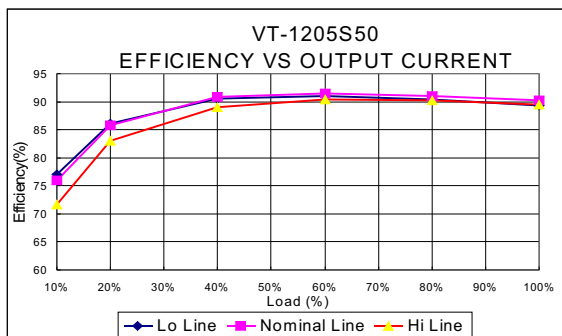
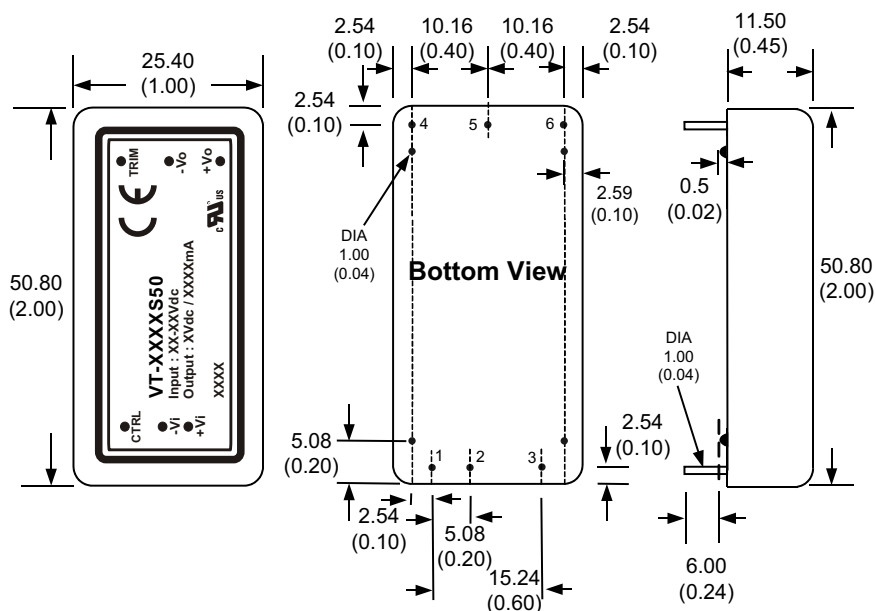

**Over Voltage Protection**

The module includes an internal output over voltage protection circuit, which monitors the voltage on the output terminals. If this voltage exceeds the over voltage set point, the module will activate the control loop of internal circuit to clamp the output voltage.

**Over Current Protection**

The module includes an internal over current protection circuit, which will endure current limiting for an unlimited duration during output over load condition. If the output current exceeds the OCP set point, the module will shut down automatically (hiccup).

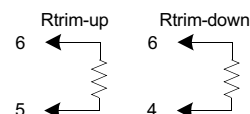
The module will try to restart after shut down. If the over load condition still exists, the module will shut down again.

**VT - 50W 2:1 Regulated Single output**
**ELECTRICAL CHARACTERISTIC CURVES**

**MECHANICAL SPECIFICATIONS**


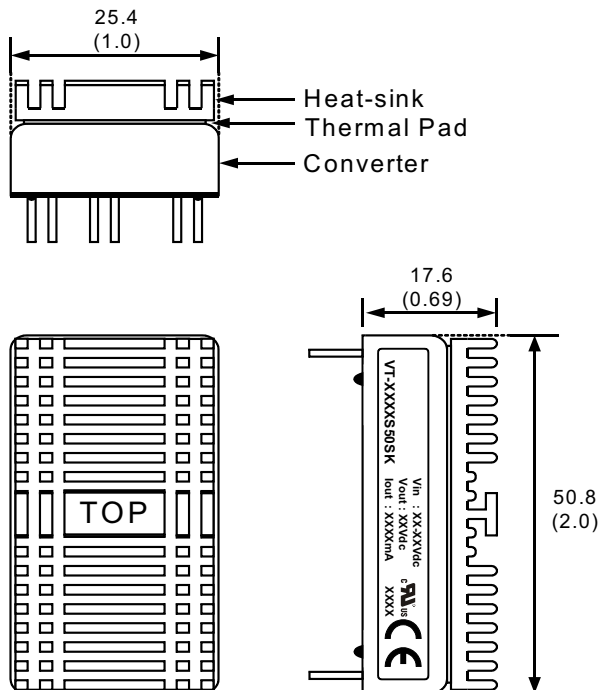
PIN CONNECTIONS	
PIN NUMBER	SINGLE
1	+Vin
2	-Vin
3	CTRL
4	+Vout
5	-Vout
6	Trim

**EXTERNAL OUTPUT TRIMMING**

Output can be externally trimmed by using  
The method as below.



- All dimensions are typical in millimeters ( inches ).
1. Pin diameter:  $1.0 \pm 0.05$  (  $0.04 \pm 0.002$  )
  2. Pin pitch and length tolerance:  $\pm 0.35$  (  $\pm 0.014$  )
  3. Case Tolerance:  $\pm 0.5$  (  $\pm 0.02$  )
  4. Stand-off Tolerance:  $\pm 0.1$  (  $\pm 0.004$  )

**MECHANICAL SPECIFICATIONS**
**With Heat-sink**


Order code: VT-XXXXS50SK(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.