

# VK-1.5W Series



1.5W 4:1 Regulated Single & Dual output

## Features

- Wide 4:1 Input Range
- Full SMD Technology
- 1500 VDC Isolation, Up to 3500 VDC
- Continuous Short Circuit Protection
- Efficiency up to 78%
- -40 ~ 85°C Operation Temperature Range
- Metal Case Standard, Optional Plastic Case
- EMI Complies With EN55022 Class A



The VK series is a family of cost effective 1.5W single & dual output DC-DC converters. These converters are consisted with Nickel-coated copper in a 24-pin DIL package with high performance features such as 1500 VDC ~ 3500VDC input/output isolation voltage, continuous short circuit protection with automatic restart and tight line / load regulation. Devices are encapsulated using flame retardant resin. Input voltages of 24 and 48 with output voltage of 3.3, 5, 7.2, 9, 12, 15, 18, 24, ±3.3, ±5, ±7.2, ±9, ±12, ±15, ±18 and ±24 Vdc. High performance features include high efficiency operation up to 78% and output voltage accuracy of ±1% maximum.

All specifications typical at Ta=25°C, nominal input voltage and full load unless otherwise specified

| OUTPUT SPECIFICATIONS               |                                   |
|-------------------------------------|-----------------------------------|
| Voltage accuracy                    | ±1%                               |
| Line regulation                     | ±0.5%                             |
| Load regulation                     | ±0.5%                             |
|                                     | (Output 3.3V / ±3.3V Model) ±1.5% |
| Ripple & noise(20 MHz bandwidth)(1) | 60mV pk-pk                        |
| Short circuit protection            | Indefinite(Automatic Recovery)    |
| Temperature coefficient             | ±0.02%/°C                         |
| Capacitor load(2)                   | See table                         |

| INPUT SPECIFICATIONS              |            |
|-----------------------------------|------------|
| Voltage Range                     | See table  |
| Max. Input Current                | See table  |
| No-Load Input Current             | See table  |
| Input Filter                      | PI Type    |
| Input Reflected Ripple Current(3) | 35mA pk-pk |

| GENERAL SPECIFICATIONS                      |                |
|---|----------------|
| Efficiency                                  | See table, typ |
| I/O Isolation Voltage(3 sec)                |                |
| Input/Output                                | 1500~3500Vdc   |
| Metal Case/Input & Output                   | 1000Vdc        |
| I/O Isolation Capacitance                   | 500 pF Typ.    |
| I/O Isolation Resistance                    | 1000M Ohm      |
| Switching Frequency                         | Typical 266kHz |
| Humidity                                    | 95% rel H      |
| Reliability Calculated MTBF(MIL-HDBK-217 F) | >1.121 Mhrs    |
| Safety Standard : (designed to meet)        | IEC 60950-1    |

| EMC SPECIFICATIONS      |               |                  |
|-------------------------|---------------|------------------|
| Radiated Emissions      | EN55022       | CLASS A          |
| Conducted Emissions (4) | EN55022       | CLASS A          |
| ESD                     | IEC 61000-4-2 | Perf. Criteria A |
| RS                      | IEC 61000-4-3 | Perf. Criteria A |
| EFT                     | IEC 61000-4-4 | Perf. Criteria A |
| Surge (5)               | IEC 61000-4-5 | Perf. Criteria A |
| CS                      | IEC 61000-4-6 | Perf. Criteria A |
| PFMF                    | IEC 61000-4-8 | Perf. Criteria A |

| PHYSICAL SPECIFICATIONS |   |
|-------------------------|---|
| Case Material           | Nickel-coated Copper                        |
|                         | Non-conductive Black Plastic(UL94V-0 rated) |
| Base Material           | Non-conductive Black Plastic(UL94V-0 rated) |
| Pin Material            | Ø0.5mm Brass Solder-coated                  |
| Potting Material        | Epoxy (UL94V-0 rated)                       |
| Weight                  | 17.0g(Metal Case)/13.5g(Plastic Case)       |
| Dimensions              | 1.25"x0.8"x0.4"                             |

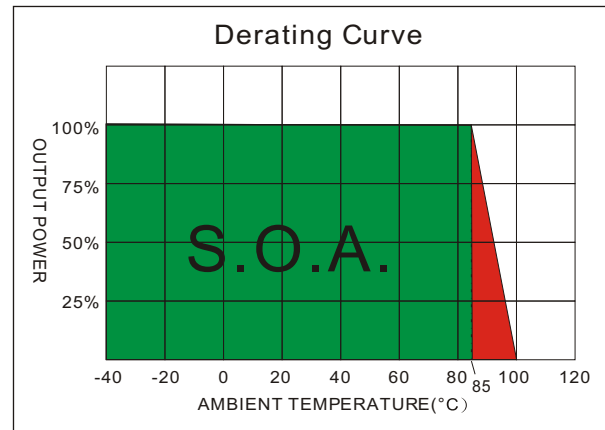
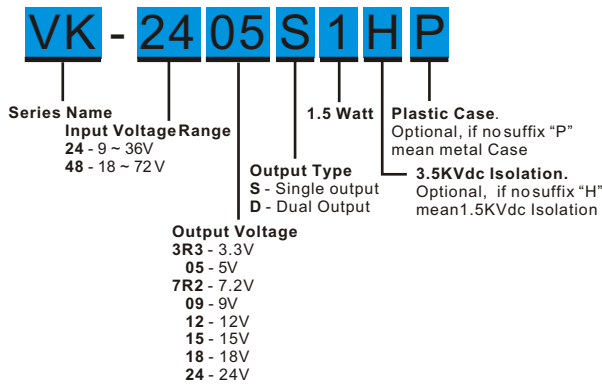
| ENVIRONMENT SPECIFICATIONS |                                |
|----------------------------|--------------------------------|
| Operating Temperature      | -40°C~85°C(See Derating Curve) |
| Maximum Case Temperature   | 100°C                          |
| Storage Temperature        | -40°C~125°C                    |
| Cooling                    | Nature Convection              |

| ABSOLUTE MAXIMUM RATINGS(6)  |             |
|--|-------------|
| These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability. |             |
| Input Surge Voltage(100mS)   |             |
| 24 Models  | 40 Vdc max. |
| 48 Models  | 80 Vdc max. |
| Soldering Temperature  | 260°C ,max. |
| (1.5mm from case 10sec. max.)  |             |

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## VK - 1.5W 4:1 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(%) | Capacitor Load(uF) |
|--------------|---------------------------|---------------|----------------|----------------------|----------------|----------------|-------------------|--------------------|
|              |                           | No-Load (mA)  | Full Load (mA) |                      | Min. load (mA) | Full load (mA) |                   |                    |
| VK-243R3S1   | 9-36                      | 15            | 83.3           | 3.3                  | 0              | 454            | 75                | 330                |
| VK-2405S1    | 9-36                      | 15            | 82.2           | 5                    | 0              | 300            | 76                | 220                |
| VK-247R2S1   | 9-36                      | 15            | 80.1           | 7.2                  | 0              | 208            | 78                | 68                 |
| VK-2409S1    | 9-36                      | 15            | 80.1           | 9                    | 0              | 167            | 78                | 68                 |
| VK-2412S1    | 9-36                      | 15            | 80.1           | 12                   | 0              | 125            | 78                | 47                 |
| VK-2415S1    | 9-36                      | 15            | 80.1           | 15                   | 0              | 100            | 78                | 22                 |
| VK-2418S1    | 9-36                      | 15            | 80.1           | 18                   | 0              | 83             | 78                | 22                 |
| VK-2424S1    | 9-36                      | 15            | 80.1           | 24                   | 0              | 63             | 78                | 10                 |
| VK-243R3D1   | 9-36                      | 15            | 83.3           | ±3.3                 | 0              | ±227           | 75                | ±100               |
| VK-2405D1    | 9-36                      | 15            | 82.2           | ±5                   | 0              | ±150           | 76                | ±100               |
| VK-247R2D1   | 9-36                      | 15            | 80.1           | ±7.2                 | 0              | ±104           | 78                | ±33                |
| VK-2409D1    | 9-36                      | 15            | 80.1           | ±9                   | 0              | ±84            | 78                | ±33                |
| VK-2412D1    | 9-36                      | 15            | 80.1           | ±12                  | 0              | ±63            | 78                | ±22                |
| VK-2415D1    | 9-36                      | 15            | 80.1           | ±15                  | 0              | ±50            | 78                | ±10                |
| VK-2418D1    | 9-36                      | 15            | 80.1           | ±18                  | 0              | ±42            | 78                | ±10                |
| VK-2424D1    | 9-36                      | 15            | 80.1           | ±24                  | 0              | ±32            | 78                | ±10                |
| VK-483R3S1   | 18-72                     | 12            | 41.6           | 3.3                  | 0              | 454            | 75                | 330                |
| VK-4805S1    | 18-72                     | 12            | 41.1           | 5                    | 0              | 300            | 76                | 220                |
| VK-487R2S1   | 18-72                     | 12            | 40.1           | 7.2                  | 0              | 208            | 78                | 68                 |
| VK-4809S1    | 18-72                     | 12            | 40.1           | 9                    | 0              | 167            | 78                | 68                 |
| VK-4812S1    | 18-72                     | 12            | 40.1           | 12                   | 0              | 125            | 78                | 47                 |
| VK-4815S1    | 18-72                     | 12            | 40.1           | 15                   | 0              | 100            | 78                | 22                 |
| VK-4818S1    | 18-72                     | 12            | 40.1           | 18                   | 0              | 83             | 78                | 22                 |
| VK-4824S1    | 18-72                     | 12            | 40.1           | 24                   | 0              | 63             | 78                | 10                 |
| VK-483R3D1   | 18-72                     | 12            | 41.6           | ±3.3                 | 0              | ±227           | 75                | ±100               |
| VK-4805D1    | 18-72                     | 12            | 41.1           | ±5                   | 0              | ±150           | 76                | ±100               |
| VK-487R2D1   | 18-72                     | 12            | 40.1           | ±7.2                 | 0              | ±104           | 78                | ±33                |
| VK-4809D1    | 18-72                     | 12            | 40.1           | ±9                   | 0              | ±84            | 78                | ±33                |
| VK-4812D1    | 18-72                     | 12            | 40.1           | ±12                  | 0              | ±63            | 78                | ±22                |
| VK-4815D1    | 18-72                     | 12            | 40.1           | ±15                  | 0              | ±50            | 78                | ±10                |
| VK-4818D1    | 18-72                     | 12            | 40.1           | ±18                  | 0              | ±42            | 78                | ±10                |
| VK-4824D1    | 18-72                     | 12            | 40.1           | ±24                  | 0              | ±32            | 78                | ±10                |

Suffix "H" means 3.5KVdc isolation

Suffix "P" means Plastic case instead of standard Metal Case

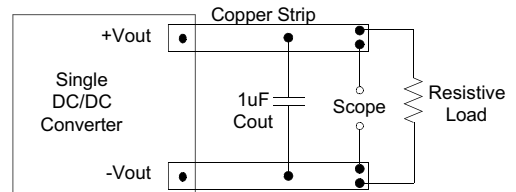
**NOTE**

1. Ripple/Noise measured with a 1uF ceramic capacitor.
2. Test by nominal input voltage and constant resistor load.
3. Measured Input reflected ripple current with a simulated source inductance of 12uH.
4. It's recommended to add (C1, C2, L) in input end to achieve EN55022 conducted Class A.
5. An external filter capacitor is required if the module has to meet IEC61000-4-5.  
The filter capacitor Motien suggest: Nippon - chemi - con KY series, 220uF/100V.
6. Exceeding the absolute ratings of the unit could cause damage. It is not allowed for continuous operating.

**TEST CONFIGURATIONS**

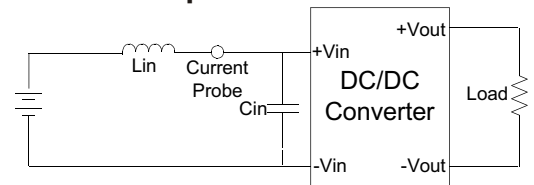
**Output Ripple & Noise Measurement Test**

Use a capacitor Cout(1.0uF) measurement.  
The Scope measurement bandwidth is 0-20MHz.



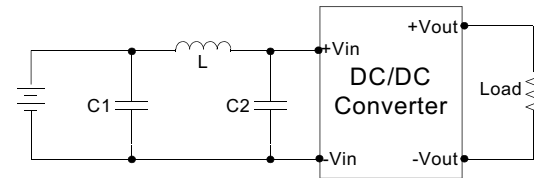
**Input Reflected Ripple Current Test Step**

Input reflected ripple current is measured through a source inductor Lin(12uH) and a source capacitor Cin(47uF, ESR<1.0Ω at 100KHz) at nominal input and full load.



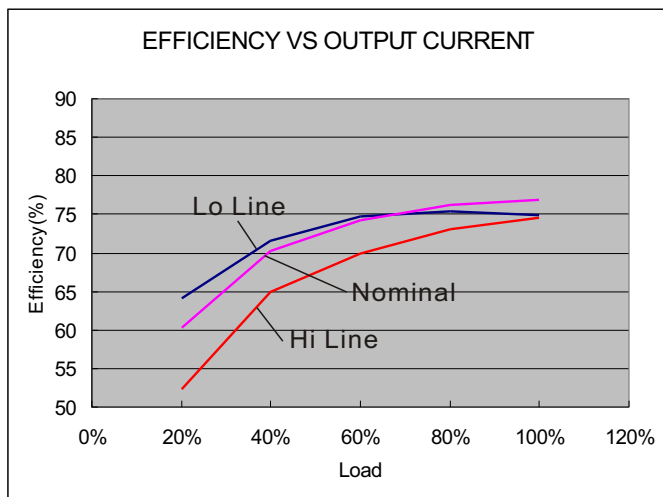
**EMI Filter**

Input filter components (C1,C2, L) 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.

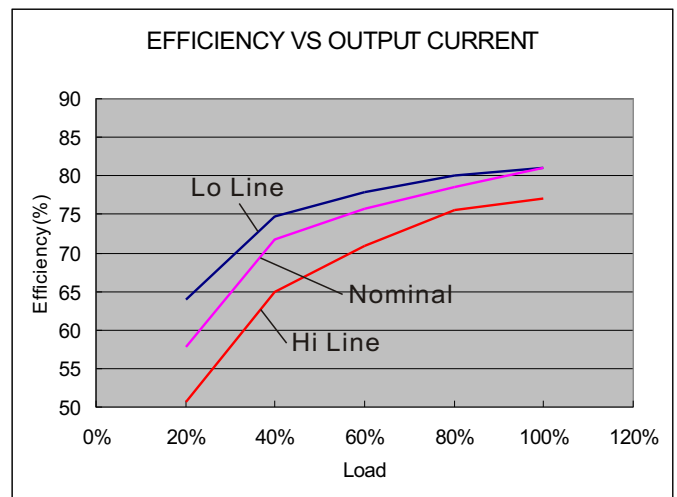


| C1         | L    | C2         |
|------------|------|------------|
| 68uF, 100V | 12uH | 33uF, 100V |

**ELECTRICAL CHARACTERISTIC CURVES**



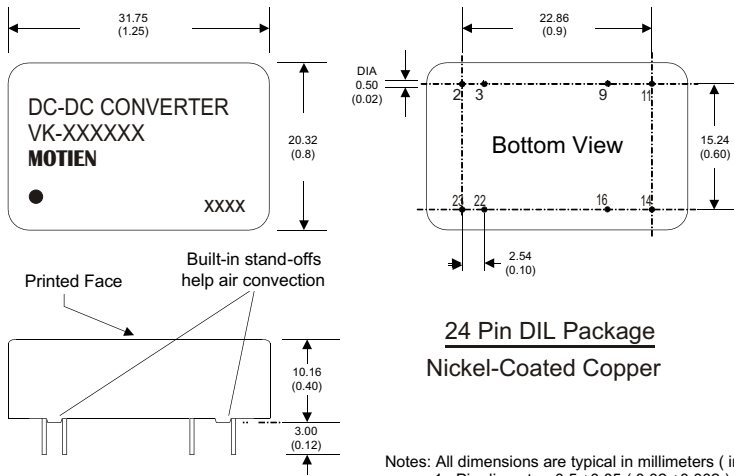
24 Models



48 Models

The models listed above is just for standard type. If you need the special specification product, please contact our service member by telephone presented in shortform cover or e-mail to : sales@motien.com.tw

**MECHANICAL SPECIFICATIONS**

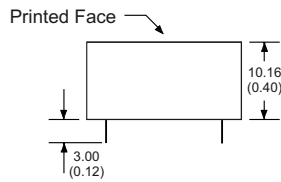
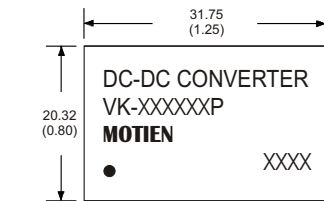


**24 Pin DIL Package**  
Nickel-Coated Copper

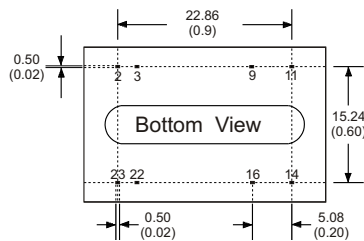
Notes: All dimensions are typical in millimeters ( inches ).  
 1. Pin diameter:  $0.5 \pm 0.05$  (  $0.02 \pm 0.002$  )  
 2. Pin pitch and length tolerance:  $\pm 0.35$  (  $\pm 0.014$  )  
 3. Case Tolerance:  $\pm 0.5$  (  $\pm 0.02$  )

| PIN CONNECTIONS |           |           |
|-----------------|-----------|-----------|
| PIN NUMBER      | SINGLE    | DUAL      |
| 2               | -V Input  | -V Input  |
| 3               | -V Input  | -V Input  |
| 9               | N.P.      | Common    |
| 11              | N.C.      | -V Output |
| 14              | +V Output | +V Output |
| 16              | -V Output | Common    |
| 22              | +V Input  | +V Input  |
| 23              | +V Input  | +V Input  |

(The Pin Connection of high isolation one is the same with normal one.)



**For "P" Case**



**24 Pin DIL Package**  
Non-Conductive Plastic

Notes: All dimensions are typical in millimeters ( inches ).  
 1. Pin diameter:  $0.5 \pm 0.05$  (  $0.02 \pm 0.002$  )  
 2. Pin pitch and length tolerance:  $\pm 0.35$  (  $\pm 0.014$  )  
 3. Case Tolerance:  $\pm 0.5$  (  $\pm 0.02$  )

| PIN CONNECTIONS |           |           |
|-----------------|-----------|-----------|
| PIN NUMBER      | SINGLE    | DUAL      |
| 2               | -V Input  | -V Input  |
| 3               | -V Input  | -V Input  |
| 9               | N.P.      | Common    |
| 11              | N.C.      | -V Output |
| 14              | +V Output | +V Output |
| 16              | -V Output | Common    |
| 22              | +V Input  | +V Input  |
| 23              | +V Input  | +V Input  |

(The Pin Connection of high isolation one is the same with normal one.)