## Typical Features

- ◆Ultra Wide Input Voltage Range ( 4:1), Output Power 1W
- ◆High Efficiency up to 82%
- ◆With remote control Switch-off function
- ◆Continuous Short Circuit protection, Self-recovery
- ◆Input under voltage, output over current protection
- ◆Isolation Voltage 3000VDC
- ◆Operating Temperature: -40℃～+85℃
- ◆Plastic Case, meet UL94 V-0 standard


**Test Condition:** Unless otherwise specified, data in the datasheet should be tested under the conditions of inputting nominal voltage, pure resistance rated load and Ta=25℃

## Application Field

***It could be widely used for instrument, communication, pure digital circuit, general low frequency analog circuit, relay drive circuit, data exchange circuit, etc.***

## Typical Product List

| Part No. | Input Voltage Range (VDC) | | Output Voltage/Current (Vo/Io) | | Input Current(mA) Nominal Voltage | | Max. Capacitive Load | Ripple & Noise (Max.) | Efficiency (%)@output full load, input nominal voltage | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Nominal | Range | Voltage (VDC) | Current(mA) MAX. | Full load Typ. | No Load Typ. | uF | mVp-p | Min. | Typ. |
| KW1-24S3V3E3R3 | 24 | 9 - 36 | 3.3 | 303 | 56 | 3 | 2200 | 100 | 73 | 75 |
| KW1-24S05E3R3 | | | 5 | 200 | 53 | 3 | 2200 | 100 | 77 | 79 |
| KW1-24S09E3R3 | | | 9 | 111 | 50 | 4 | 1000 | 100 | 78 | 80 |
| KW1-24S12E3R3 | | | 12 | 83 | 50 | 4 | 680 | 100 | 80 | 82 |
| KW1-24S15E3R3 | | | 15 | 67 | 51 | 5 | 470 | 100 | 78 | 80 |
| KW1-24S24E3R3 | | | 24 | 42 | 49 | 5 | 100 | 100 | 80 | 82 |
| KW1-24D05E3R3 | 24 | 9 - 36 | ±5 | ±200 | 53 | 3 | 1000 | 100 | 77 | 79 |
| KW1-24D09E3R3 | | | ±9 | ±56 | 50 | 3 | 680 | 100 | 78 | 80 |
| KW1-24D12E3R3 | | | ±12 | ±42 | 50 | 4 | 470 | 100 | 80 | 82 |
| KW1-24D15E3R3 | | | ±15 | ±33 | 51 | 5 | 330 | 100 | 78 | 80 |

1. The capacitive load of positive and negative output is same.

## Input Specifications

| Item | Test Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Max Input Overshoot Voltage | 9-36V Input | -0.7 | - | 50 | VDC |
| Turn-on Voltage | 9-36V Input | 7 | 8.3 | 9 | VDC |
| Control Pin (Ctrl) | High level or floating enable, with output | 3.5 | - | 50 | VDC |
| | Low level or connected to input | 0 | - | 1.2 | |

| | | | | | |
|---|---|---|---|---|---|
| | ground, no output | | | | |
| Stand-by Power Consumption | 0.5W (Max.) | | | | |
| Input Filter | Capacitor Filter | | | | |
| Note: Voltage of control pin(Ctrl) is related to input GND. | | | | | |

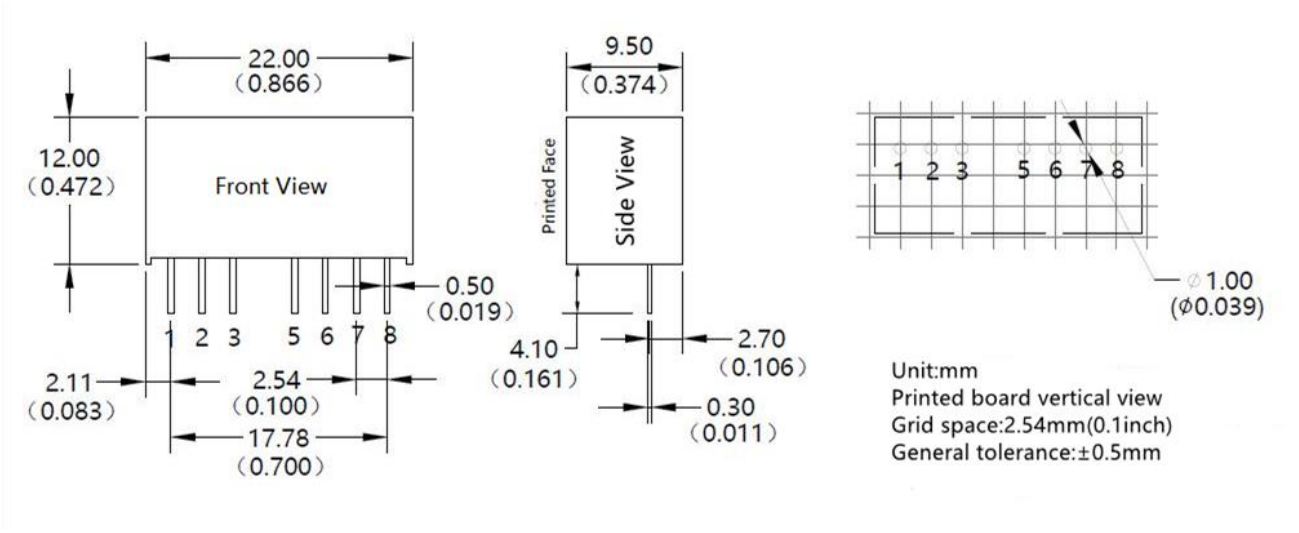
## Output Specifications

| | | | |
|---|---|---|---|
| Positive Output Voltage Accuracy | Full voltage full load | +Vo | ≤±2.0% |
| Negative Output Voltage Accuracy | | -Vo | ≤±3.0% |
| No Load Output Voltage Accuracy | | Vo | Primary Output:≤±3.0%, Secondary Output:≤±5.0% |
| Line Regulation | Nominal load, full voltage range | Vo | Primary Output:≤±0.2%, Secondary Output:≤±0.5% |
| Load Regulation | 10% ~ 100% nominal load | Vo | Primary Output:≤±0.5%, Secondary Output:≤±3% |
| Cross Regulation | Dual output, Primary output 50% load, secondary output 10%-100% load | | ≤±5.0% |
| Ripple & Noise | Nominal load, nominal voltage | | ≤100mVp-p （20MHz bandwidth） |
| Temperature Drift Coefficient | 100％ full load | | ±0.03%/℃ |
| Dynamic Response | 25% nominal load step change | △Vo/△t | ≤±5.0%/0.5ms(Typ.) |
| Output Short Circuit Protection | Continuous, Self-recovery | | |
| Note: 1. Un-balancing loads of dual output: ±5%;<br>2. Ripple & Noise Tested by twisted-pair method, for details please check Design and Application Circuit. | | | |

## General Specifications

| | | |
|---|---|---|
| Switching Frequency | typical | 330KHz (Typ.) |
| Operating Temperature | Refer to Temperature Derating | -40℃ ~ +85℃ |
| Storage Temperature | | -55℃ ~ +125℃ |
| Max Case Temperature | Within Temperature Derating | +105℃ |
| Relative Humidity | No condensing | 5%~95% |
| Case Material | | Black flame-retardant heat-resistant Plastic(UL94 V-0) |
| Pin withstand welding temp | Distance to case 1.5mm, 10s | 300℃ MAX |
| Isolation Voltage | Input to Output | 3000Vdc ≤ 0.5mA / 1min |
| MTBF | MIL-HDBK-217F@25℃ | $2X10^5$Hrs |
| Product Weight | | 4.5g(Typ.) |
| Package | Tube(225*20.5*12.5mm) | 9PCS |
| | Inner Box(245*155*85mm) | 432PCS(Total 48Tubes) |

## Packing Dimension




| Packing Code | L x W x H | |
|---|---|---|
| E | 22X9.5X12mm | 0.866X0.374X0.472inch |

## Pin Function

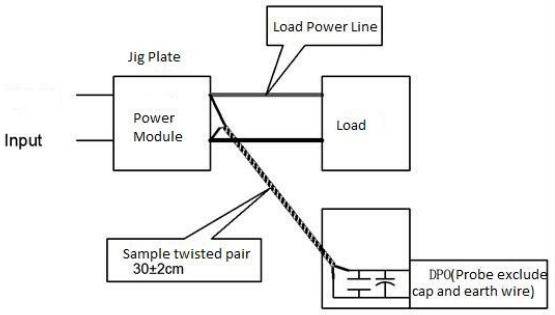
| Pin-Out | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Single(S) | GND | +Vin | Ctrl | NP | NC | +Vo | 0V | CS |
| Dual(D) | GND | +Vin | Ctrl | NP | NC | +Vo | 0V | -Vo |

Note: if the definition of pin is not in accordance with the model selection manual, please refer to the label on actual item.

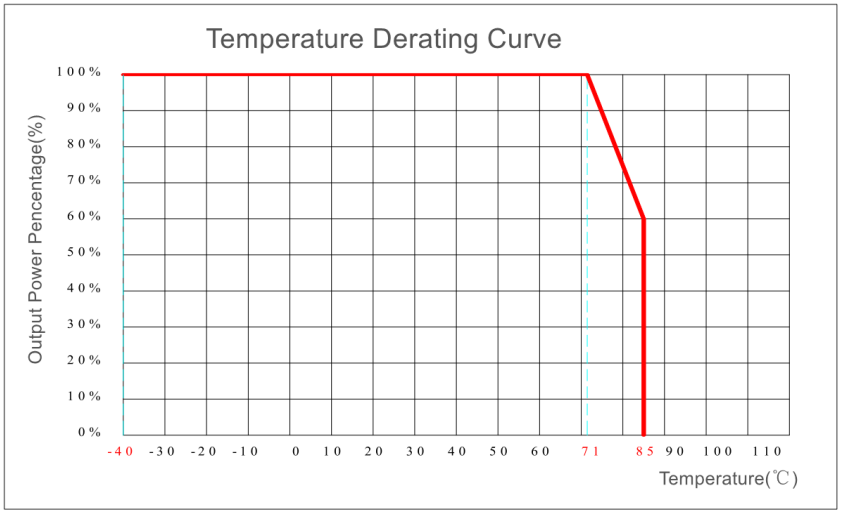
## Ripple& Noise Test: (Twisted Pair Method 20MHZ bandwidth)

a.12# twisted pair to connect, Oscilloscope bandwidth set as 20MHz, 100M bandwidth probe, terminated with 0.1uF polypropylene capacitor and 10uF high frequency low resistance electrolytic capacitor in parallel, oscilloscope set as Sample pattern.

b. Input terminal connect to power supply, output terminal connect to electronic load through jig plate, Use 30cm±2 cm sampling line, Power line selected from corresponding diameter wire with insulation according to the flow of output current.




## Product Temperature Curve



## Design and Application Circuit Recommended

**1.CS terminal**

This terminal provides a connection point to connect the inside main filter capacitor of output terminal for the DC/DC converter(capacitor positive) , and can further improve the output ripple and noise through connecting a low ESR capacitor(Normal CS≤47uF) between this terminal and the 7 pin (capacitor negative).

**2. Output Load Request**

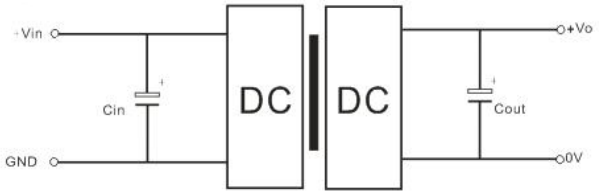
a. To ensure this module operate efficiently and reliably, the minimum load recommended not to be less than 10% of the nominal load. If the actual power is too small, please connect a resistor in parallel at output terminal, the resistance equal to 10% nominal load. If use positive negative dual output product, please try to avoid big unbalances between loads, or the original output voltage accuracy cannot be ensured.

b. The maximum capacitive load is tested under nominal input full load; if use it under no load condition, should try to decrease the output capacitive load or connect a resistor in parallel at output terminal, the resistance equal to 10% nominal load, otherwise it may cause the output voltage be un-stable or even exceed the original output voltage accuracy range

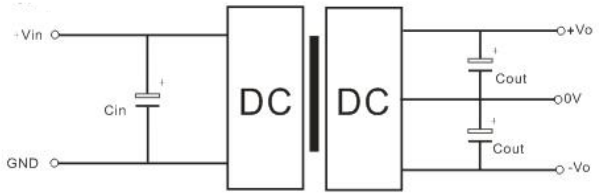
**3.Recommended Circuit**

DC/DC test circuit: If customers want to further decrease input& output ripple, the capacitance of external capacitor can be increased properly, but the maximum capacitance of the filter capacitor should be less than the maximum capacitive load, otherwise it will make it difficult to turn-on the module.

Single




Dual

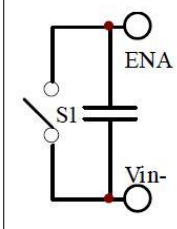
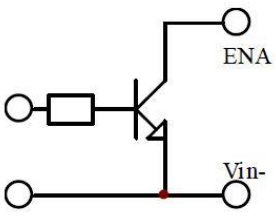
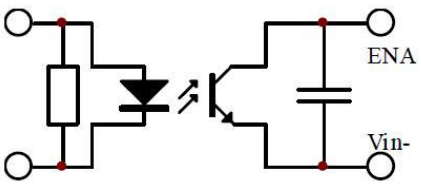
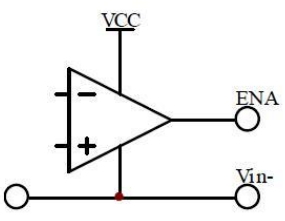



Recommended capacitive load value table (Photo 1)

| single Vout (Vdc) | Cin (μF) | Cout (μF) | Dual Vout (Vdc) | Cin (μF) | Cout (μF) |
|---|---|---|---|---|---|
| 3.3/5/9 | 100μF/50V | 10μF/16V | ±3.3/±5/±9 | 100μF/50V | 10μF/16V |
| 12/15 | | 10μF/25V | ±12/±15 | | 10μF/25V |
| 24 | | 10μF/50V | ±24 | | 10μF/50V |

**4.CTRL Terminal**

Positive logic is enabled, the module works normally when the control pin is connected to a high level or suspended, and is turned off when it is grounded or low.

| | | | |
|---|---|---|---|
|   |   |   |   |
| on-off mode | Triode control mode | Optical coupler isolation control mode | Logic gate control mode |

Note:

1.This product cannot be used in parallel, and do not support hot-plugging;

2. All index testing methods in this datasheet are based on our Company's corporate standards

3. The product specification may be changed at any time without prior notice.