Weiking Electronics Manufacturing (Xi' an) Co., Ltd

# WK3128***-02
# DC-DC Converters

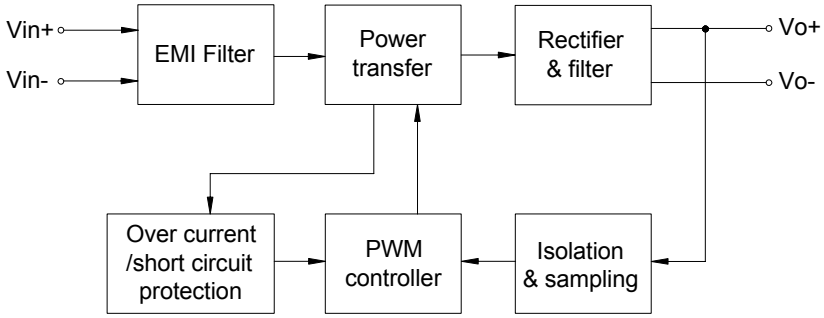
## FEATURES：


- **Soft start**
- **Permanent short circuit protection**
- **M class temperature range $T_C$: -55℃～+105℃**
- **Electric strength：1500 $V_{DC}$**

## DESCRIPTION：

The WK3128***-02 series is a full family of high performance DC-DC power modules designed for aerospace, military and high-end industrial applications. The modules are potted with a bi-component thermal conductive compound and packaged in a metallic case to ensure the module's integrity under high environmental conditions. Standard models are available with nominal input voltage of 28 volts in a voltage range of 16-40 volts. The series output voltage choices of 5, 12, 15 volts. No external heat sink is required for the WK3128***-02 series to supply 2W output power over the case temperature range of -55°C up to 105°C (M) or -40°C up to 85°C (I). These modules use a frequency fixed switching technical at 400 kHz providing excellent reliability, low noise characteristics and high-power density. All the modules are designed with LC network filters to minimize reflected input current ripple and output voltage ripple. The modules include a soft-start, a permanent short circuit protection to ensure efficient module protections. The soft-start allows current limitation and eliminates inrush current during start-up. The short circuit protection completely protects the modules against short-circuits of any duration by a shut-down and restores to normal when the overload is removed. The design has been carried out with surface mount components and is manufactured in a fully automated process to guarantee high quality. Each module is tested with NHR converter automated test equipment.

## BLOCK DIAGRAM:




## ABSOLUTE MAXIMUM RATINGS:

| | |
|---|---|
| Input Voltage: | 50$V_{DC}$/100ms |
| Operating Temperature($T_C$): | -55℃～105℃(M)/-40℃～85℃(I) |
| Storage Temperature range: | -55℃～125℃ |
| Pin-Solder Temperature (10s): | 300℃ |

## THE ELECTRICAL CHARACTERISTICS:

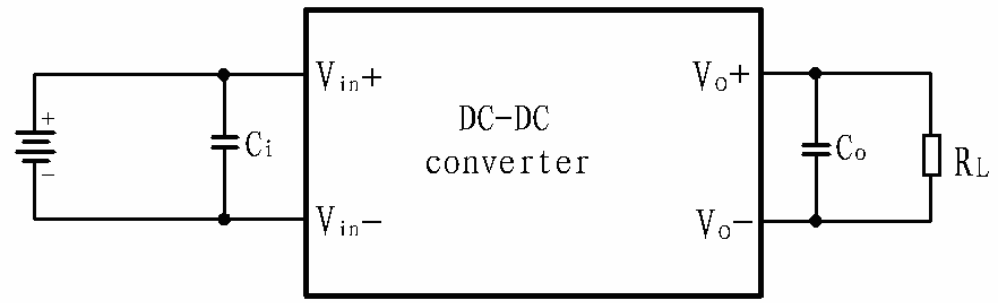
| Parameter | Conditions [4] | WK312805S-02 | | | WK312812S-02 | | | WK312815S-02 | | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MIN | TYP | MAX | MIN | TYP | MAX | MIN | TYP | MAX | |
| Output voltage | $V_{IN}$=(16～40)$V_{DC}$ No load～Full load | 4.9 | 5.00 | 5.1 | 11.76 | 12.00 | 12.24 | 14.70 | 15.00 | 15.30 | $V_{DC}$ |
| Output current | $V_{IN}$=(16～40)$V_{DC}$ | 0 | — | 400 | 0 | — | 160 | 0 | — | 130 | mA |
| Output power | $V_{IN}$=(16～40)$V_{DC}$ | 0 | — | 2 | 0 | — | 2 | 0 | — | 2 | W |
| Output ripple voltage [1] | 20MHz | — | 30 | 40 | — | 30 | 50 | — | 30 | 60 | $mV_{p-p}$ |
| Line regulation | $V_{IN}$=(16～40)$V_{DC}$ | — | 10 | 50 | — | 10 | 120 | — | 10 | 150 | mV |
| Load regulation | No load～Full load | — | 10 | 50 | — | 10 | 120 | — | 10 | 150 | mV |
| Input voltage | Range | 16 | 28 | 40 | 16 | 28 | 40 | 16 | 28 | 40 | V |
| | 50V/100ms | 0 | — | 50 | 0 | — | 50 | 0 | — | 50 | V |
| Input current | No load | — | 20 | 30 | — | 20 | 30 | — | 20 | 30 | mA |
| | short circuit | — | — | 40 | — | — | 40 | — | — | 40 | |
| Input ripple current [3] | 20MHz | — | 25 | 30 | — | 25 | 30 | — | 25 | 30 | $mA_{p-p}$ |
| Efficiency | $V_{IN}$=28$V_{DC}$ Full load | 60 | 66 | — | 60 | 69 | — | 60 | 69 | — | % |
| Capacity load | | — | — | 220 | — | — | 100 | — | — | 100 | μf |
| Step load response [2] | 50%～100%～ 50%load | — | ±100 | ±250 | — | ±100 | ±250 | — | ±100 | ±250 | mV |
| Step load recovery [2] | | — | 100 | 200 | — | 100 | 200 | — | 100 | 200 | μs |
| Step line response [3] | (16～40～16)$V_{DC}$ | — | ±50 | ±200 | — | ±100 | ±200 | — | ±100 | ±200 | mV |
| Step line recovery [3] | | — | 200 | 300 | — | 200 | 300 | — | 200 | 300 | μs |
| Start-up delay | $V_{IN}$=28$V_{DC}$ Full load | — | 5 | 30 | — | 6 | 30 | — | 6 | 30 | ms |
| Start-up overshoot | | — | 0 | 50 | — | 0 | 50 | — | 0 | 50 | $mV_{pk}$ |
| Short circuit protection | Protects the modules against short-circuits by shut-down, restores when the fault is removed | | | | | | | | | | |
| Insulation resistance | ≥100MΩ@500$V_{DC}$(input-output; input-case; output-case) | | | | | | | | | | |
| Electric strength | 1500$V_{DC}$， 1 min (input-output) | | | | | | | | | | |

Note:

1) Ripple voltage measure: Using twisted-pair measurement.
2) Step Load measure: Using twisted-pair measurement.
3) Guaranteed by design.
4) Unless otherwise specified, $T_A$=25℃, $V_{IN}$ = 28$V_{DC}$, 100% load.

## APPLICATION NOTE:

- **DC-DC converter typical connection shown as below:**




- **Output Short Circuit Protection (SCP)**

The short circuit protection device protects the module against short circuit of any duration and restores the module to normal operation when the short circuit is removed. It operates in “hiccup”

mode by testing periodically if an overload is applied.

**WARNING:** Input can not be connected reverse, or destroy module.

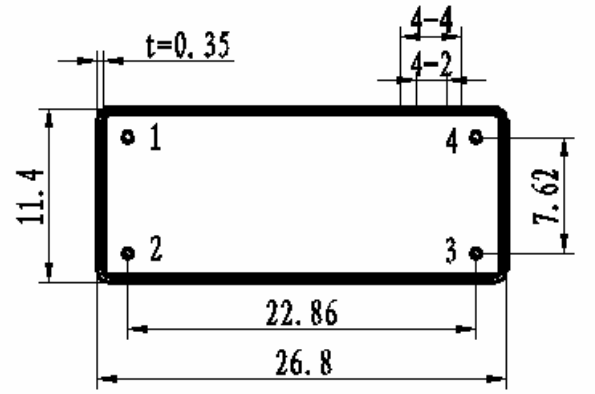
**NOTE:** Please weld four fixed pins prior to welding other pins.

## ENVIRONMENTAL SCREENING:

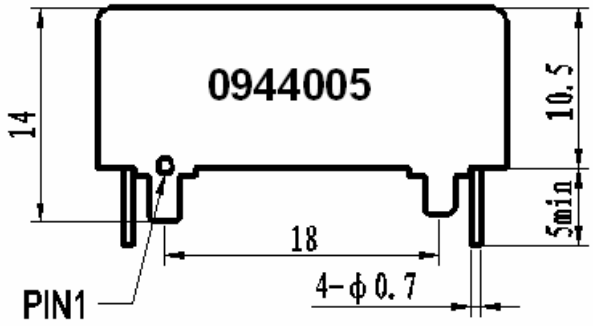
| Class | NO. | Test Items | Methods | Request | Condition |
|---|---|---|---|---|---|
| I | 1 | Burn-in | --- | 100% | $T_C$=85℃ 48h |
| M | 1 | Environmental Stress Screening (ESS) | MIL-STD-2164 | 100% | - |
| | 2 | Burn-in | --- | 100% | $T_C$=105℃ 168h |

## DIMENSIONS & CONNECTIONS:

Dimensions and connections (Eg. WK312805S-02M):



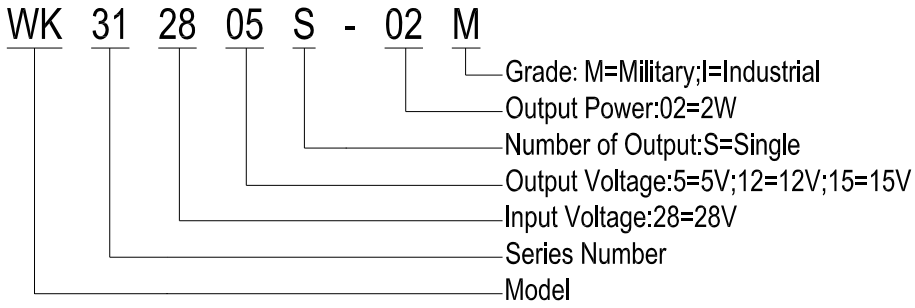

| PIN | PIN FUNCTIONS |
|---|---|
| 1 | +INTPUT Vin+ |
| 2 | -INTPUT Vin- |
| 3 | +OUTPUT Vo+ |
| 4 | -OUTPUT Vo- |





UNITS:mm
TOLERANCE: ±0.1mm

## ORDERING INFORMATION:




## MARK SPECIFICATION:

Series Number: 0944005, which indicates this product has been manufactured in the 44$^{th}$ week of 2009, and the sequence number is 005.