

**40W** Conduction cooled

DC-DC converters 

The JCK40 series is housed in a 50.8 x 25.4 x 10.2 mm (2" x 1" x 0.4") PCB mount metal case. Featuring a 2:1 input voltage range of 9 to 18VDC, 18 to 36VDC or 36 to 75VDC with regulated single outputs of 3.3, 5, 12 & 15VDC and dual outputs  $\pm 12$  or  $\pm 15$ VDC. Single output models are adjustable  $\pm 10\%$  with a trim resistor.

The 40W JCK40 has 1.6kVDC isolation between input and output, over voltage, overload & short circuit protection is standard as is remote On/Off, an optional heatsink can be specified. The operating temperature range is from -40°C to +105°C, with derating above +40°C.



## Features

- ▶ Regulated single outputs 3.3, 5, 12 & 15VDC
- ▶ Regulated dual outputs  $\pm 12$  &  $\pm 15$ VDC
- ▶ 2:1 input range
- ▶ 50.8 x 25.4mm (2" x 1") footprint, 10.2mm profile
- ▶ 1.6kVDC isolation
- ▶ Single outputs trimmable  $\pm 10\%$
- ▶ Remote On/Off
- ▶ Continuous short circuit protection
- ▶ Optional heatsink
- ▶ -40°C to +105°C operating temperature
- ▶ Full power to +40°C
- ▶ 3 year warranty

## Applications



Autonomous equipment



Industrial electronics & robotics



Technology

## Dimensions

50.8 x 50.8 x 10.16mm (2.00" x 2.00" x 0.40")

## Models & ratings

| Model number | Input voltage | Output voltage | Output current | Efficiency | Input current <sup>(1)</sup> |           | Maximum capacitive load |
|--------------|---------------|----------------|----------------|------------|------------------------------|-----------|-------------------------|
|              |               |                |                |            | No load                      | Full load |                         |
| JCK4012S3V3  | 9-18VDC       | 3.3VDC         | 8.00A          | 90%        | 100mA                        | 2444mA    | 21000 $\mu$ F           |
| JCK4012S05   |               | 5.0VDC         | 8.00A          | 91%        | 150mA                        | 3663mA    | 13000 $\mu$ F           |
| JCK4012S12   |               | 12.0VDC        | 3.33A          | 91%        | 40mA                         | 3663mA    | 2000 $\mu$ F            |
| JCK4012S15   |               | 15.0VDC        | 2.67A          | 91%        | 50mA                         | 3663mA    | 1500 $\mu$ F            |
| JCK4012D12   |               | $\pm 12.0$ VDC | $\pm 1.67$ A   | 91%        | 30mA                         | 3663mA    | $\pm 1200$ $\mu$ F      |
| JCK4012D15   |               | $\pm 15.0$ VDC | $\pm 1.33$ A   | 92%        | 50mA                         | 3623mA    | $\pm 750$ $\mu$ F       |

Continued on page 2

### Notes:

1. Input current specified at nominal input.
2. Measured with 1 $\mu$ F ceramic capacitor in parallel with a 10 $\mu$ F electrolytic across output rails and 20MHz bandwidth.

3. For heatsink option, add '-HK' to the end of the part number

## Models & ratings

| Model number | Input voltage | Output voltage | Output current | Efficiency | Input current <sup>(1)</sup> |           | Maximum capacitive load |
|--------------|---------------|----------------|----------------|------------|------------------------------|-----------|-------------------------|
|              |               |                |                |            | No load                      | Full load |                         |
| JCK4024S3V3  | 18-36 VDC     | 3.3VDC         | 8.00A          | 91%        | 60mA                         | 1208mA    | 21000μF                 |
| JCK4024S05   |               | 5.0VDC         | 8.00A          | 92%        | 80mA                         | 1811mA    | 13000μF                 |
| JCK4024S12   |               | 12.0VDC        | 3.33A          | 91%        | 30mA                         | 1831mA    | 2000μF                  |
| JCK4024S15   |               | 15.0VDC        | 2.67A          | 92%        | 40mA                         | 1811mA    | 1500μF                  |
| JCK4024D12   |               | ±12.0VDC       | ±1.67A         | 91%        | 50mA                         | 1831mA    | ±1200μF                 |
| JCK4024D15   |               | ±15.0VDC       | ±1.33A         | 92%        | 40mA                         | 1811mA    | ±750μF                  |
| JCK4048S3V3  | 36-75 VDC     | 3.3VDC         | 8.00A          | 91%        | 40mA                         | 604mA     | 21000μF                 |
| JCK4048S05   |               | 5.0VDC         | 8.00A          | 92%        | 60mA                         | 905mA     | 13000μF                 |
| JCK4048S12   |               | 12.0VDC        | 3.33A          | 91%        | 20mA                         | 915mA     | 2000μF                  |
| JCK4048S15   |               | 15.0VDC        | 2.67A          | 92%        | 20mA                         | 905mA     | 1500μF                  |
| JCK4048D12   |               | ±12.0VDC       | ±1.67A         | 92%        | 30mA                         | 906mA     | ±1200μF                 |
| JCK4048D15   |               | ±15.0VDC       | ±1.33A         | 92%        | 40mA                         | 906mA     | ±750μF                  |

### Notes:

- Input current specified at nominal input.
- Measured with 1μF ceramic capacitor in parallel with a 10μF electrolytic across output rails and 20MHz bandwidth.
- For heatsink option, add '-HK' to the end of the part number

## General

| Characteristic             | Minimum                    | Typical      | Maximum | Units                                  | Notes & conditions      |
|----------------------------|----------------------------|--------------|---------|----------------------------------------|-------------------------|
| Efficiency                 | See models & ratings table |              |         |                                        |                         |
| Isolation: input to output | 1600                       |              |         | VDC                                    |                         |
| Isolation: input to case   | 1600                       |              |         | VDC                                    |                         |
| Isolation: output to case  | 1600                       |              |         | VDC                                    |                         |
| Isolation capacitance      |                            | 1000         |         | pF                                     |                         |
| Switching frequency        |                            | 270          |         | kHz                                    |                         |
| Power density              |                            | 819.3 (50.0) |         | W/cm <sup>3</sup> (W/in <sup>3</sup> ) |                         |
| Mean time between failure  |                            | 330          |         | kHrs                                   | MIL-HDBK-217F, +25°C GB |

## Input

| Characteristic                 | Minimum                      | Typical | Maximum | Units    | Notes & conditions          |
|--------------------------------|------------------------------|---------|---------|----------|-----------------------------|
| Input voltage range            | 9                            |         | 18      | VDC      | 12VDC nominal               |
|                                | 18                           |         | 36      |          | 24VDC nominal               |
|                                | 36                           |         | 75      |          | 48VDC nominal               |
| Input current                  | See models & ratings table   |         |         |          |                             |
| Input reflected ripple current |                              | 20      |         | mA/pk-pk | 12μH inductor, 5Hz to 20MHz |
| Input surge                    |                              |         | 25      | VDC      | 12VDC models (for 1000ms)   |
|                                |                              |         | 50      |          | 24VDC models (for 1000ms)   |
|                                |                              |         | 100     |          | 48VDC models (for 1000ms)   |
| Undervoltage lockout           | On at 8.6VDC Off at 7.9VDC   |         |         |          | 12VDC models                |
|                                | On at 17.8VDC Off at 16VDC   |         |         |          | 24VDC models                |
|                                | On at 33.5VDC Off at 30.5VDC |         |         |          | 48VDC models                |

## Output

| Characteristic           | Minimum                                       | Typical | Maximum | Units | Notes & conditions                                               |
|--------------------------|-----------------------------------------------|---------|---------|-------|------------------------------------------------------------------|
| Output voltage           | See models & ratings table                    |         |         |       |                                                                  |
| Output voltage trim      |                                               | ±10     |         | %     | Single outputs models only                                       |
| Minimum load             | 0                                             |         |         | %     | No minimum load required                                         |
| Line regulation          |                                               |         | ±0.5    | %     |                                                                  |
| Load regulation          |                                               |         | ±0.5    | %     | Single output                                                    |
|                          |                                               |         | ±1      |       | Dual outputs                                                     |
| Setpoint accuracy        |                                               | ±1      |         | %     |                                                                  |
| Cross regulation         |                                               | ±5      |         | %     |                                                                  |
| Transient response       |                                               |         | 3       | %     | Deviation, recovery to within 1% in <250µs for a 25% load change |
| Start up time            |                                               | 30      |         | ms    |                                                                  |
| Ripple & noise           |                                               | 100     |         | mV    | For 3V3 & 5VDC models                                            |
|                          |                                               | 150     |         |       | Other models                                                     |
| Short circuit protection | Trip & restart (hiccup mode), auto recovery   |         |         |       |                                                                  |
| Temperature coefficient  |                                               | 0.02    |         | %/ °C |                                                                  |
| Overload protection      | 115                                           |         | 130     | %     |                                                                  |
| Remote on/off            | On = Logic High (>3.0VDC) or Open             |         |         |       |                                                                  |
|                          | Off = Logic Low (<1.2VDC) or short pin 2 to 3 |         |         |       |                                                                  |
| Overvoltage protection   |                                               | 3.9     |         | VDC   | 3.3VDC models                                                    |
|                          |                                               | 6.2     |         |       | 5VDC models                                                      |
|                          |                                               | 15      |         |       | 12VDC models                                                     |
|                          |                                               | 18      |         |       | 15VDC models                                                     |
|                          |                                               | ±15     |         |       | ±12VDC models                                                    |
|                          |                                               | ±18     |         |       | ±15VDC models                                                    |

## Environmental

| Characteristic        | Minimum           | Typical | Maximum | Units | Notes & conditions                                  |
|-----------------------|-------------------|---------|---------|-------|-----------------------------------------------------|
| Operating temperature | -40               |         | +70     | °C    | Derate from 100% load at 55 °C to 60% load at 70 °C |
| Storage temperature   | -40               |         | +125    | °C    |                                                     |
| Case temperature      |                   |         | +105    | °C    |                                                     |
| Cooling               | Convection cooled |         |         |       |                                                     |
| Operating altitude    | 5                 |         | 95      | %     | RH, non condensing                                  |

## Safety approvals

| Safety agency | Standard                         | Notes & conditions |
|---------------|----------------------------------|--------------------|
| CE            | Meets all applicable directives  |                    |
| UKCA          | Meets all applicable legislation |                    |

## Emissions - EMC

| Phenomenon | Standard | Test level | Notes & conditions          |
|------------|----------|------------|-----------------------------|
| Conducted  | EN55022  | Class B    | With no external components |
| Radiated   | EN55022  | Class B    |                             |

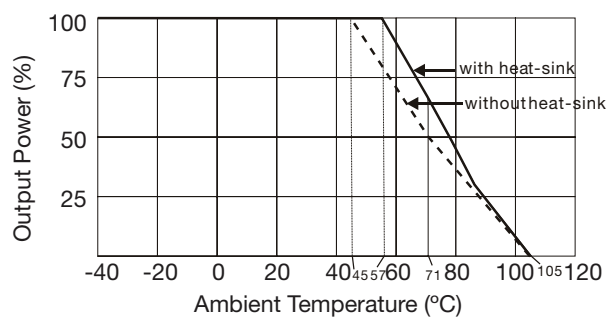
## Immunity - EMC

| Phenomenon         | Standard    | Test level | Criteria | Notes & conditions                                   |
|--------------------|-------------|------------|----------|------------------------------------------------------|
| ESD immunity       | EN61000-4-2 |            | B        | 4kV contact discharge                                |
| Radiated immunity  | EN61000-4-3 | 3V/m       | A        |                                                      |
| EFT/Burst          | EN61000-4-4 | 1          | A        | External input capacitor required, 220 $\mu$ F/100V. |
| Surge              | EN61000-4-5 | 1          | A        |                                                      |
| Conducted immunity | EN61000-4-6 | 3Vrms      | A        |                                                      |
| Magnetic fields    | EN61000-4-8 | 1A/m       | A        |                                                      |

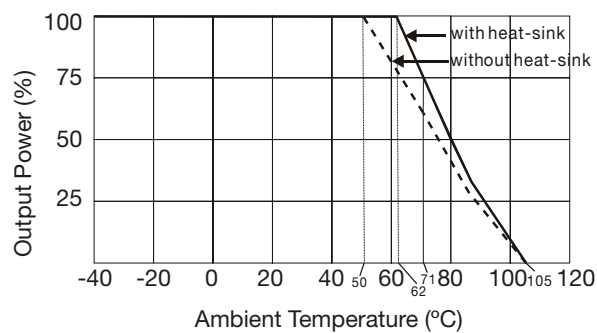
## Application notes

### Derating curve

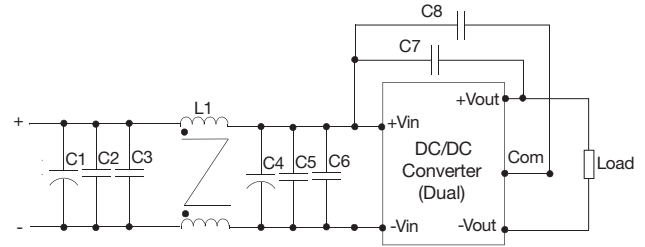
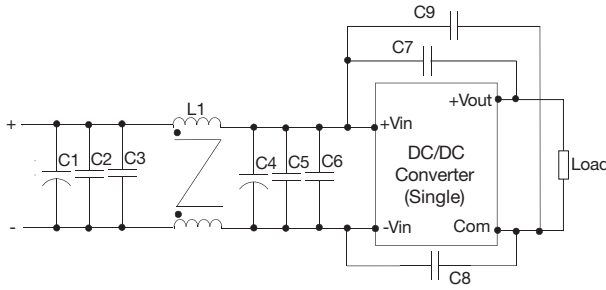
#### 12VDC input



#### 24 & 48VDC input



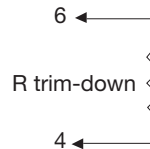
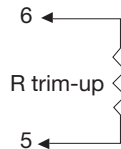
## Application notes



| Single | C1          | L1                     | C2/C3/C5/C6   | C4          |
|--------|-------------|------------------------|---------------|-------------|
| 12VDC  | 220μF, 100V | Common Mode Choke 68μH | 6.8μF, 50VDC  | 330μF, 100V |
| 24VDC  |             |                        | 4.7μF, 50VDC  | 220μF, 100V |
| 48VDC  |             |                        | 1.5μF, 100VDC | 220μF, 100V |
| Dual   | C1          | L1                     | C2/C3/C5/C6   | C4          |
| 12VDC  | 220μF, 100V | Common Mode Choke 68μH | 6.8μF, 50VDC  | 330μF, 100V |
| 24VDC  |             |                        | 4.7μF, 50VDC  | 220μF, 100V |
| 48VDC  |             |                        | 1.5μF, 100VDC | 220μF, 100V |

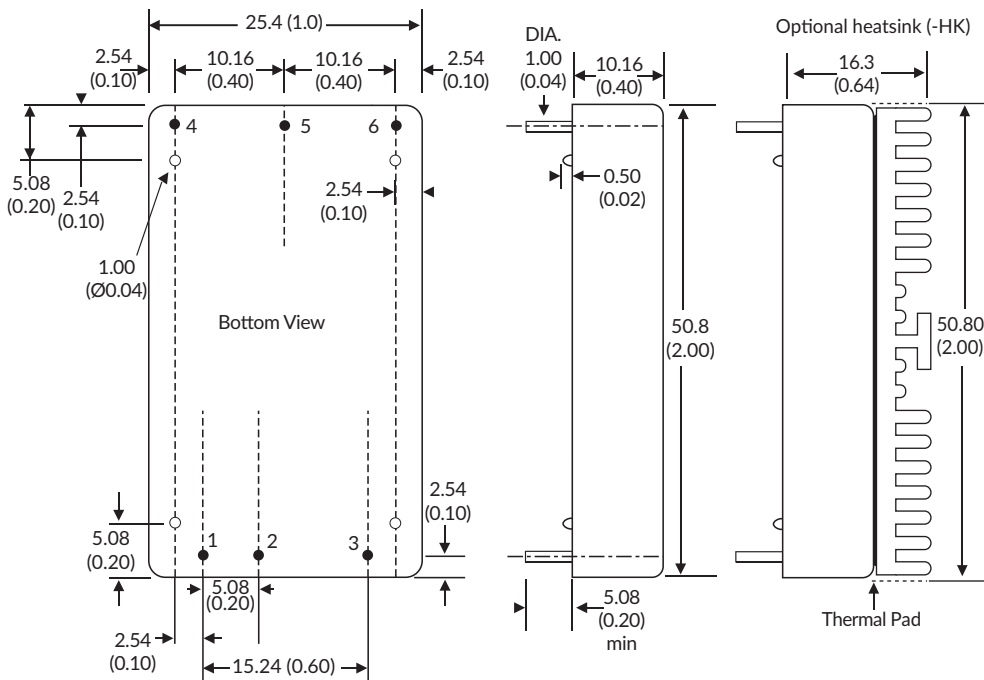
| Single | C7          | C8          | C9          |
|--------|-------------|-------------|-------------|
| 12VDC  |             |             | 1000pF, 2kV |
| 24VDC  | 1000pF, 2kV | 1000pF, 2kV |             |
| 48VDC  | 1000pF, 2kV | 1000pF, 2kV |             |
| Dual   | C7          | C8          | C9          |
| 12VDC  | 1000pF, 2kV | 1000pF, 2kV |             |
| 24VDC  | 1000pF, 2kV | 1000pF, 2kV |             |
| 48VDC  | 1000pF, 2kV | 1000pF, 2kV |             |

## External Output Trim



Output can be externally trimmed using this method.

## Mechanical details



| Pin connections |               |               |
|-----------------|---------------|---------------|
| Pin             | Single        | Dual          |
| 1               | +Vin          | +Vin          |
| 2               | -Vin          | -Vin          |
| 3               | Remote On/Off | Remote On/Off |
| 4               | +Vout         | +Vout         |
| 5               | Com           | Com           |
| 6               | Trim          | -Vout         |

## Notes:

- All dimensions are in (mm (inches)).
- Weight: 30g (0.07lbs) approx
- Pin diameter: 1.0 ±0.05 (0.04 ±0.002)

- Pin pitch tolerance: ±0.35 (±0.014)
- Case tolerance: ±0.5 (±0.02)

Specifications subject to change without notice.