

# C4000ERW Series



## Compact, 2:1 Input 40W, Single Output DC/DC Converters

### Key Features:

- 40W Output Power
- 2:1 Input Voltage Range
- 1,500 VDC Isolation
- Compact 2 x 2 In. Case
- -40°C to +60°C Operation
- >1.0 MHour MTBF
- Remote ON/OFF
- Industry Standard Pin-Out



RoHS



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### Electrical Specifications

Specifications typical @ +25°C, nominal input voltage & rated output current, unless otherwise noted. Specifications subject to change without notice.

#### Input

| Parameter              | Conditions    | Min. | Typ. | Max. | Units |
|------------------------|---------------|------|------|------|-------|
| Input Voltage Range    | 12 VDC Input  | 9.0  | 12.0 | 18.0 | VDC   |
|                        | 24 VDC Input  | 18.0 | 24.0 | 36.0 |       |
|                        | 48 VDC Input  | 36.0 | 48.0 | 75.0 |       |
| Under Voltage Shutdown | 12 VDC Input  | 8.0  |      | 9.0  | VDC   |
|                        | 24 VDC Input  | 16.0 |      | 17.8 |       |
|                        | 48 VDC Input  | 33.0 |      | 36.0 |       |
| Input Filter           | π (Pi) Filter |      |      |      |       |
| Start Up Time          | See Note 1    |      |      | 2.0  | A     |

#### Output

| Parameter                        | Conditions                     | Min. | Typ.  | Max. | Units              |
|----------------------------------|--------------------------------|------|-------|------|--------------------|
| Output Voltage Accuracy          |                                |      | ±1.0  |      | %                  |
| Line Regulation                  | For Vin Min to Max             |      | ±0.2  |      | %                  |
| Load Regulation                  | I <sub>out</sub> = 10% to 100% |      | ±0.5  |      | %                  |
| Ripple & Noise (20 MHz) (Note 1) |                                |      | 75    | 150  | mV P - P           |
| Output Power Protection          |                                | 120  |       | 150  | %                  |
| Over Voltage Protection          |                                | 110  |       | 130  | % V <sub>out</sub> |
| Transient Recovery Time (Note 2) | 25% Load Step Change           |      | 200   | 500  | μSec               |
| Transient Response Deviation     |                                |      |       |      | ±5.0               |
| Temperature Coefficient          |                                |      | ±0.02 |      | %/°C               |
| Output Short Circuit             | Continuous (Autorecovery)      |      |       |      |                    |

#### General

| Parameter                   | Conditions       | Min.  | Typ.  | Max. | Units |
|-----------------------------|------------------|-------|-------|------|-------|
| Isolation Voltage           | 60 Seconds       | 1,500 |       |      | VDC   |
| Isolation Resistance        | 500 VDC          | 1,000 |       |      | MΩ    |
| Isolation Capacitance       | 100 kHz, 0.1V    |       | 2,000 |      | pF    |
| Switching Frequency         |                  |       | 300   |      | kHz   |
| Over Temperature Protection | Case Temperature |       | 115   |      | °C    |

#### Remote On/Off (Note 3)

| Parameter             | Conditions                           | Min. | Typ. | Max. | Units |
|-----------------------|--------------------------------------|------|------|------|-------|
| Supply On             |                                      | 3.5  |      | 12.0 | VDC   |
| Supply Off            |                                      | -0.0 |      | 1.2  | VDC   |
| Standby Input Current |                                      |      |      | 1    | mA    |
| Control Common        | Referenced to Negative Input (pin 2) |      |      |      |       |

#### Environmental

| Parameter                   | Conditions          | Min. | Typ. | Max. | Units |
|-----------------------------|---------------------|------|------|------|-------|
| Operating Temperature Range | Ambient             | -40  |      | +60  | °C    |
| Storage Temperature Range   |                     | -55  |      | +125 | °C    |
| Cooling                     | Free Air Convection |      |      |      |       |
| Humidity                    | RH, Non-condensing  |      |      | 95   | %     |

#### Physical

|               |   |  |  |  |  |
|---------------|---|--|--|--|--|
| Case Size     | 2.0 x 2.0 x 0.42 Inches (50.8 x 50.8 x 10.6 mm) |  |  |  |  |
| Case Material | Metal with Non-Conductive Base                  |  |  |  |  |
| Weight        | 2.19 Oz (60g)                                   |  |  |  |  |

#### Reliability Specifications

| Parameter | Conditions                      | Min.  | Typ. | Max. | Units  |
|-----------|---------------------------------|-------|------|------|--------|
| MTBF      | MIL HDBK 217F, 25°C, Gnd Benign | 1,000 |      |      | kHours |

#### Absolute Maximum Ratings

| Parameter                   | Conditions                  | Min. | Typ. | Max. | Units |
|-----------------------------|-----------------------------|------|------|------|-------|
| Input Voltage Surge (1 Sec) | 12 VDC Input                | -0.7 |      | 20.0 | VDC   |
|                             | 24 VDC Input                | -0.7 |      | 40.0 |       |
|                             | 48 VDC Input                | -0.7 |      | 80.0 |       |
| Lead Temperature            | 1.5 mm From Case For 10 Sec |      |      | 300  | °C    |

**Caution:** Exceeding Absolute Maximum Ratings may damage the module. These are not continuous operating ratings.

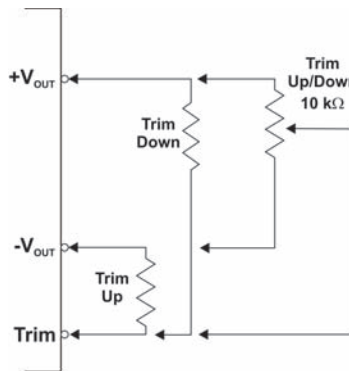
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| Model Number | Input         |             |              |         | Output        |                   |                   | Efficiency (% , Typ) | Capacitive Load (µF Max) | Fuse Rating Slow-Blow (mA) |
|--------------|---------------|-------------|--------------|---------|---------------|-------------------|-------------------|----------------------|--------------------------|----------------------------|
|              | Voltage (VDC) |             | Current (mA) |         | Voltage (VDC) | Current (mA, Max) | Current (mA, Min) |                      |                          |                            |
|              | Nominal       | Range       | Full-Load    | No-Load |               |                   |                   |                      |                          |                            |
| C4001ERW     | 12            | 9.0 - 18.0  | 2,558        | 20      | 3.3           | 8,000             | 400.0             | 86                   | 21,000                   | 5,000                      |
| C4002ERW     | 12            | 9.0 - 18.0  | 3,876        | 20      | 5.0           | 8,000             | 400.0             | 86                   | 13,600                   | 5,000                      |
| C4003ERW     | 12            | 9.0 - 18.0  | 3,876        | 20      | 12.0          | 3,300             | 165.0             | 86                   | 2,360                    | 5,000                      |
| C4004ERW     | 12            | 9.0 - 18.0  | 3,831        | 20      | 15.0          | 2,666             | 133.0             | 87                   | 1,510                    | 5,000                      |
| C4011ERW     | 24            | 18.0 - 36.0 | 1,264        | 15      | 3.3           | 8,000             | 400.0             | 87                   | 21,000                   | 3,000                      |
| C4012ERW     | 24            | 18.0 - 36.0 | 1,873        | 15      | 5.0           | 8,000             | 400.0             | 89                   | 13,600                   | 3,000                      |
| C4013ERW     | 24            | 18.0 - 36.0 | 1,894        | 15      | 12.0          | 3,300             | 165.0             | 88                   | 2,360                    | 3,000                      |
| C4014ERW     | 24            | 18.0 - 36.0 | 1,873        | 15      | 15.0          | 2,666             | 133.0             | 88                   | 1,510                    | 3,000                      |
| C4021ERW     | 48            | 36.0 - 75.0 | 625          | 10      | 3.3           | 8,000             | 400.0             | 88                   | 21,000                   | 1,500                      |
| C4022ERW     | 48            | 36.0 - 75.0 | 926          | 10      | 5.0           | 8,000             | 400.0             | 90                   | 13,600                   | 1,500                      |
| C4023ERW     | 48            | 36.0 - 75.0 | 926          | 10      | 12.0          | 3,300             | 165.0             | 90                   | 2,360                    | 1,500                      |
| C4024ERW     | 48            | 36.0 - 75.0 | 926          | 10      | 15.0          | 2,666             | 133.0             | 90                   | 1,510                    | 1,500                      |

**Notes:**

- When measuring output ripple, it is recommended that an external 10.0 µF ceramic capacitor be placed from the +Vout pin to the -Vout pin. For noise sensitive applications, the use of 47 µF capacitors will reduce the output ripple.
- Transient recovery is measured to within a 1% error band for a load step change of 75% to 100%.
- The Remote On/Off Control input (Pin 3) is referenced to -Vin (Pin 1). Connection to the pin should be made through a 1kΩ resistor and diode (1N4148). If it is not used, the control pin should be left open.
- Operation at no-load will not damage these units. However, they may not meet all specifications.
- The +sense and -sense connections will compensate for up to 5% of Vout. When not used, they should be connected directly to the appropriate output pin (+sense to +Vout and -sense to -Vout).
- To improve performance and stability, a simple external LC filter can be added to the unit input. Typical component values would be 1.0 µH/10A & 1,000 µF/25V for 12V input models; 2.2 µH/10A & 1,000 µF/50V for 24V input models; and 74.7 µH/5A & 1,000 µF/100V for 48V input models.
- It is recommended that a fuse be used on the input of a power supply for protection. See the table above for the correct rating.

**External Trim**



A simple external circuit may be used to adjust the converter output. To adjust the output DOWN, connect a 5%, 3W resistor between the plus output pin and the Vout trim pin. To adjust the output UP, connect a 5%, 3W resistor between the minus output pin and the Vout trim pin. To calculate the correct resistor value (in kΩ) use:

$$3.3 V_{OUT} \text{ UP } R_{ADJ} = \frac{(V_{OUT} - 1.24) \times (2.87)}{V_{ADJ} - V_{OUT}} - 10$$

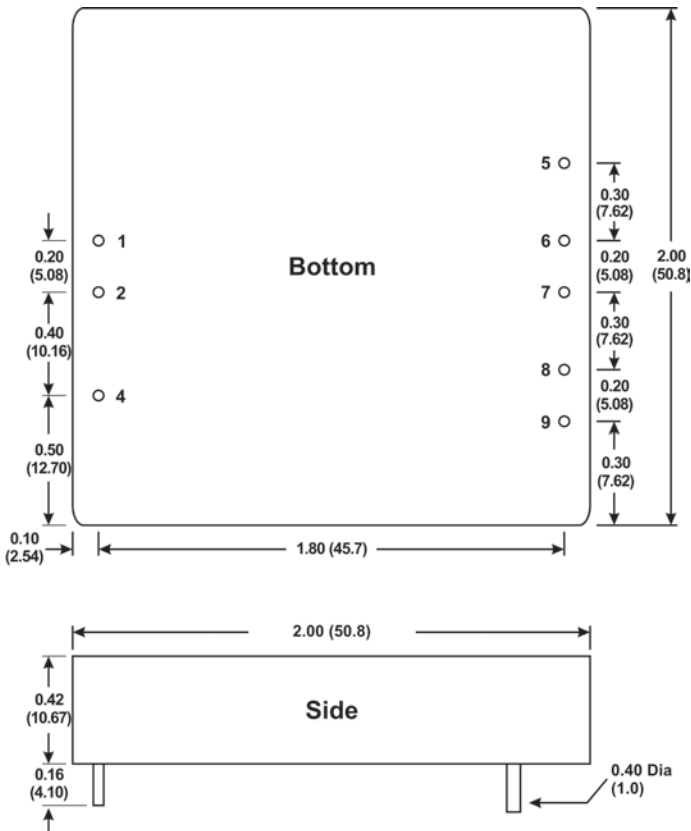
$$\text{Other } V_{OUT} \text{ UP } R_{ADJ} = \frac{(V_{OUT} - 2.5) \times (2.87)}{V_{ADJ} - V_{OUT}} - 10$$

$$3.3 V_{OUT} \text{ Down } R_{ADJ} = \frac{(V_{ADJ} - 1.24)(V_{OUT} - 1.24) \times 2.87}{V_{OUT} - V_{ADJ}} - 10$$

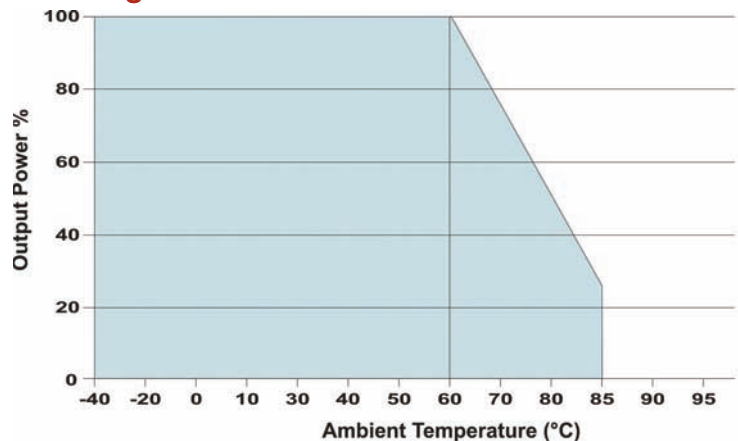
$$\text{Other } V_{OUT} \text{ Down } R_{ADJ} = \frac{(V_{ADJ} - 2.5)(V_{OUT} - 2.5) \times 2.87}{V_{OUT} - V_{ADJ}} - 10$$

For UP/Down trimming capability, connect a 10 kW potentiometer between the plus and minus outputs with the wiper arm connected to the Vout trim pin.

**Mechanical Dimensions**



**Derating Curves**



**Pin Connections**

| Pin | Single | Pin | Single |
|-----|--------|-----|--------|
| 1   | +Vin   | 6   | +Sense |
| 2   | -Vin   | 7   | +Vout  |
| 4   | ON/OFF | 8   | -Vout  |
| 5   | -Sense | 9   | Trim   |

**Mechanical Notes:**

- All dimensions are typical in inches (mm)
- Tolerance x.xx = ±0.01 (±0.25)



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