

# PWR40XX

## SERIES DC/DC CONVERTER

**POWER: 4 Watt**

**LOW COST UNREGULATED**

**SIZE: 1.125" X 1.125" X 0.40"**

**CD TECHNOLOGIES**  
Power Solutions  
POWER ELECTRONICS DIVISION

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## PRODUCT DATA SHEET



## FEATURES

- LOW COST
- INDUSTRY-STANDARD PACKAGE
- SINGLE AND DUAL OUTPUTS
- INTERNAL INPUT AND OUTPUT FILTERING
- HIGH ISOLATION VOLTAGE OPTION AVAILABLE

## DESCRIPTION

The PWR40XX Series offers a low-cost alternative for some of the most popular DC/DC converters industry wide. Each model has a high-isolation version and an outstanding demonstrated MTTF of 5,000,000 hours at 25°C. The superior reliability and low cost make it an excellent choice for industry standard usages.

The series includes thirteen standard models (other input and output voltages are available upon request), all set in a flexible encapsulation material which has excellent thermal dissipation and low mechanical stress on internal components. The use of surface-mount devices and manufacturing processes, combined with the encapsulation process, provides the user a product that is environmentally rugged.

The PWR40XX has full isolation between input and output to give the designer maximum flexibility in grounding options and polarity configurations. The outputs are protected against momentary short circuits.

## MECHANICAL

### Notes:

All dimensions are in inches (millimeters).  
GRID: 0.100 inches (2.54 millimeters)

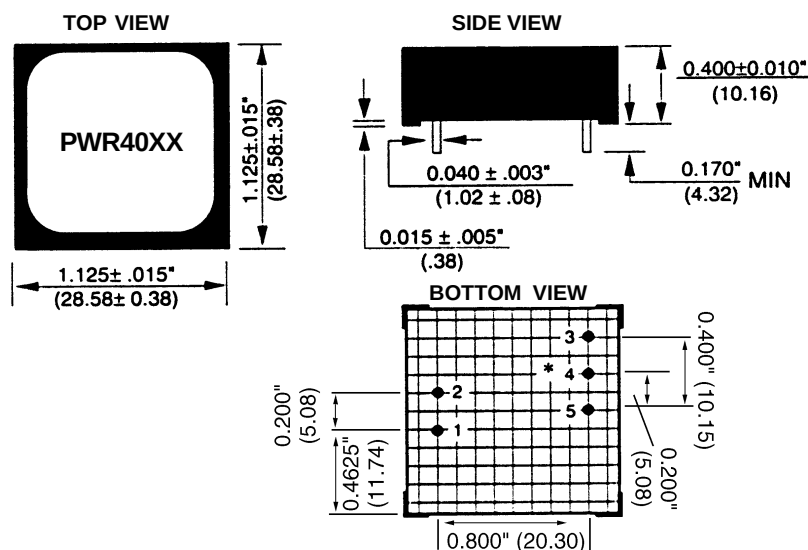
\*Common pins not present on single output models.

PIN PLACEMENT TOLERANCE:  $\pm 0.015$ "

Marked with: specific model ordered, date code, job code.

**MATERIAL:** Units are encapsulated in a low thermal resistance molding compound which has excellent chemical resistance, wide operating temperature range, and good electrical properties under high humidity environments. The encapsulant and outer shell of the unit have UL94V-0 ratings. Lead material is brass with a solder plated surface to allow ease of solderability.

| PIN # | FUNCTION          |
|-------|-------------------|
| 1     | +V <sub>IN</sub>  |
| 2     | -V <sub>IN</sub>  |
| 3     | +V <sub>OUT</sub> |
| 4     | * Common          |
| 5     | -V <sub>OUT</sub> |



# ELECTRICAL SPECIFICATIONS

Specifications typical at  $T_A = +25^{\circ}\text{C}$ , nominal input voltage and rated output current unless otherwise specified.

| MODEL   | MINIMUM<br>INPUT<br>VOLTAGE<br>(V <sub>bc</sub> ) | NOMINAL<br>INPUT<br>VOLTAGE<br>(V <sub>bc</sub> ) | MAXIMUM<br>INPUT<br>VOLTAGE<br>(V <sub>bc</sub> ) | RATED<br>OUTPUT<br>VOLTAGE<br>(V <sub>bc</sub> ) | RATED<br>OUTPUT<br>CURRENT<br>(mA) | INPUT CURRENT      |                       | REFLECTED<br>RIPPLE<br>CURRENT<br>(mA <sub>p-p</sub> ) |
|---------|---------------------------------------------------|---------------------------------------------------|---------------------------------------------------|--------------------------------------------------|------------------------------------|--------------------|-----------------------|--------------------------------------------------------|
|         |                                                   |                                                   |                                                   |                                                  |                                    | NO<br>LOAD<br>(mA) | RATED<br>LOAD<br>(mA) |                                                        |
| PWR4000 | 4.5                                               | 5                                                 | 5.5                                               | 5                                                | 800                                | 50                 | 950                   | 20                                                     |
| PWR4004 | 4.5                                               | 5                                                 | 5.5                                               | ±12                                              | ±170                               | 50                 | 950                   | 20                                                     |
| PWR4005 | 4.5                                               | 5                                                 | 5.5                                               | ±15                                              | ±135                               | 50                 | 950                   | 20                                                     |
| PWR4006 | 10.2                                              | 12                                                | 13.8                                              | 5                                                | 800                                | 35                 | 400                   | 30                                                     |
| PWR4007 | 10.2                                              | 12                                                | 13.8                                              | 12                                               | 340                                | 35                 | 400                   | 30                                                     |
| PWR4010 | 10.2                                              | 12                                                | 13.8                                              | ±12                                              | ±170                               | 35                 | 400                   | 30                                                     |
| PWR4011 | 10.2                                              | 12                                                | 13.8                                              | ±15                                              | ±135                               | 35                 | 400                   | 40                                                     |
| PWR4012 | 12.75                                             | 15                                                | 17.25                                             | 5                                                | 800                                | 30                 | 300                   | 40                                                     |
| PWR4016 | 12.75                                             | 15                                                | 17.25                                             | ±12                                              | ±170                               | 30                 | 300                   | 40                                                     |
| PWR4017 | 12.75                                             | 15                                                | 17.25                                             | ±15                                              | ±135                               | 30                 | 300                   | 40                                                     |
| PWR4018 | 20.40                                             | 24                                                | 27.6                                              | 5                                                | 800                                | 30                 | 180                   | 40                                                     |
| PWR4022 | 20.40                                             | 24                                                | 27.6                                              | ±12                                              | ±170                               | 30                 | 180                   | 40                                                     |
| PWR4023 | 20.40                                             | 24                                                | 27.6                                              | ±15                                              | ±135                               | 30                 | 180                   | 40                                                     |

Other input and output voltage options may be available. Please contact factory.

## COMMON SPECIFICATIONS

Specifications typical at  $T_A = +25^{\circ}\text{C}$ , nominal input voltage and rated output current unless otherwise specified.

| PARAMETER                      | CONDITIONS                      | MIN  | TYP        | MAX  | UNITS              |
|--------------------------------|---------------------------------|------|------------|------|--------------------|
| <b>ISOLATION (Standard)</b>    |                                 |      |            |      |                    |
| Rated Voltage                  |                                 | 500  |            |      | V <sub>bc</sub>    |
| Test Voltage                   | 60Hz, 10 seconds                | 500  |            |      | V <sub>pk</sub>    |
| Resistance                     |                                 |      | 10         |      | GW                 |
| Capacitance                    |                                 |      | 50         |      | pF                 |
| Leakage Current                | V <sub>ISO</sub> = 240VAC, 60Hz |      | 5          |      | μArms              |
| <b>ISOLATION (-HV Option)</b>  |                                 |      |            |      |                    |
| Rated Voltage                  |                                 | 1000 |            |      | V <sub>bc</sub>    |
| Test Voltage                   | 60Hz, 60 seconds                | 3000 |            |      | V <sub>pk</sub>    |
| Resistance                     |                                 |      | 10         |      | GΩ                 |
| Capacitance                    |                                 |      | 50         |      | pF                 |
| Leakage Current                | V <sub>ISO</sub> = 240VAC, 60Hz |      | 5          | 15   | μArms              |
| <b>OUTPUT</b>                  |                                 |      |            |      |                    |
| Rated Power                    |                                 |      | 4.0        |      | W                  |
| Voltage Setpoint Accuracy      |                                 |      | ±3         |      | %                  |
| Temperature Coefficient        |                                 |      | ±0.02      |      | %/°C               |
| Ripple & Noise                 |                                 |      | 140        |      | mV <sub>p-p</sub>  |
|                                |                                 |      | 10         |      | mV <sub>rms</sub>  |
| Voltage                        |                                 |      |            | 7    | V <sub>bc</sub>    |
|                                |                                 |      |            | ±15  | V <sub>bc</sub>    |
|                                |                                 |      |            | ±18  | V <sub>bc</sub>    |
| Line Regulation                |                                 |      | 1.0        |      | %/%V <sub>IN</sub> |
| Load Regulation                |                                 |      | See Curves |      |                    |
| <b>GENERAL</b>                 |                                 |      |            |      |                    |
| Switching Frequency            |                                 |      | 170        |      | kHz                |
| Package Weight                 |                                 |      | 16         |      | g                  |
| MTTF per MIL-HDBK-217 Rev. E * |                                 |      | 5,000,000  |      | Hr                 |
| Efficiency                     |                                 |      | 80         |      | %                  |
| <b>TEMPERATURE</b>             |                                 |      |            |      |                    |
| Specification                  |                                 | 0    | +25        | +70  | °C                 |
| Operation                      |                                 | -25  |            | +85  | °C                 |
| Storage                        |                                 | -40  |            | +100 | °C                 |

## ABSOLUTE MAXIMUM RATINGS

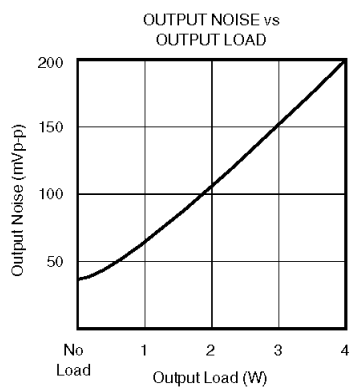
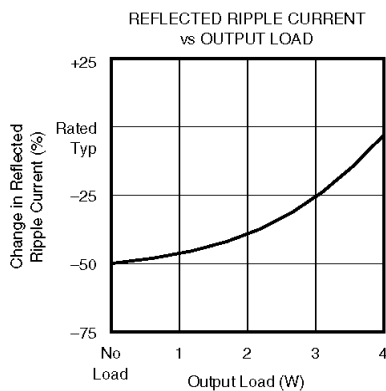
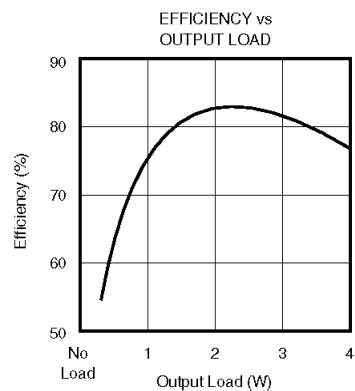
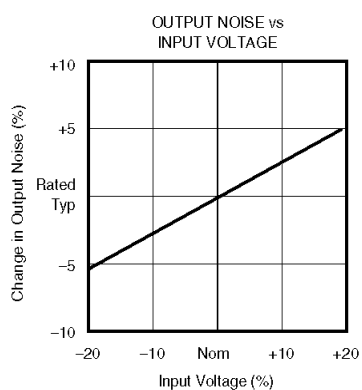
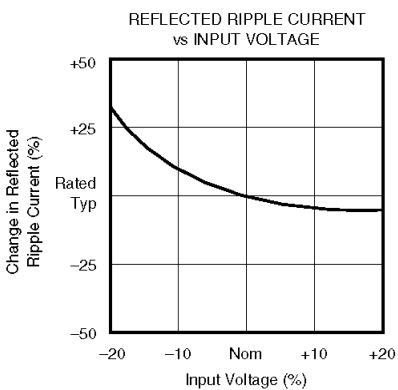
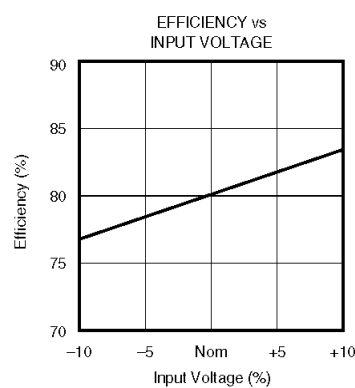
Output Short-Circuit Duration ..... 1 second  
 Internal Power Dissipation ..... 850mW  
 Lead Temperature (soldering, 10 seconds max) ..... +300°C

## ORDERING INFORMATION

Device Family \_\_\_\_\_ **PWR** **40XX** **-HV** **/H**  
 PWR indicates DC/DC converter  
 Model Number \_\_\_\_\_  
 Selected from Table of Electrical Characteristics  
 High Voltage Option \_\_\_\_\_  
 No Designator Indicates Standard Model  
 Optional Screening \_\_\_\_\_

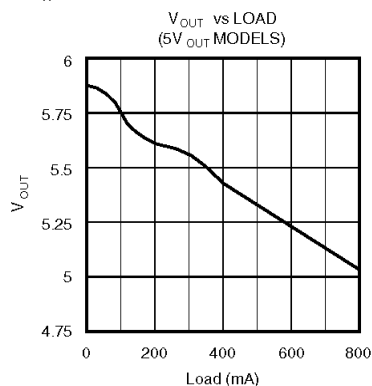
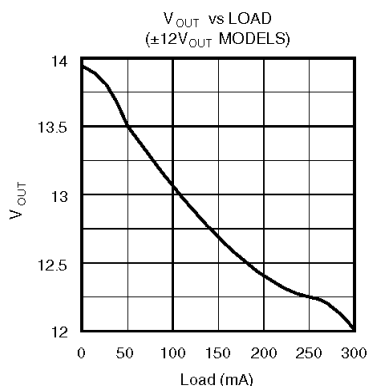
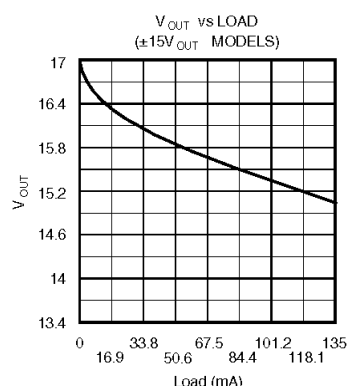
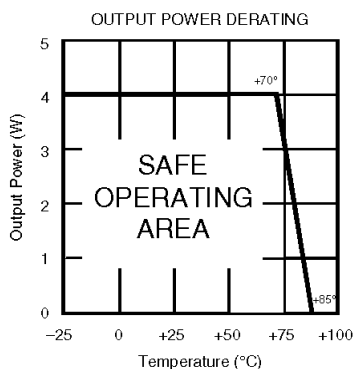
## TYPICAL PERFORMANCE CURVES

$T_A = +25^\circ\text{C}$ , Rated Input Voltage, rated Output Current unless otherwise noted.



# TYPICAL PERFORMANCE CURVES

T<sub>A</sub> = +25°C, rated input voltage, rated output current unless otherwise noted.



## APPLICATION NOTES

### SHORT CIRCUIT PROTECTION

To maintain low cost, the PWR40XX Series provides limited short-circuit protection. To protect against continuous short circuits, a fuse is required. It is recommended that the fuse be placed in series with the input of the converter. The required I<sup>2</sup>t will vary with input voltage.

| Input Voltage | Littlefuse® Part Number |
|---------------|-------------------------|
| 5V            | 229.015                 |
| 12V           | 229.500                 |
| 15V           | 229.375                 |
| 24V           | 229.250                 |

TABLE I. Recommended Fuses (or Equivalent).

### OUTPUT POWER

The PWR40XX series was designed to meet power requirements up to 4W. Due to the nature of unregulated power supplies, a higher-than-rated output voltage will result when less-than-rated power is used (see Typical Performance Curves). This series has been designed to run from no load to 4W without derating up to +70°C.

### UNBALANCED LOADS

Unbalanced loads may be used on dual output models with each side sourcing up to 200mA as long as the total power out is not more than 4W. With an unbalanced load, the output voltages will track within 5% of each other.

### OUTPUT NOISE

The output noise can be reduced to less than 50mVp-p by adding a low ESR 10μf tantalum capacitor across each output.

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