# HPR1XX

## SERIES DC/DC CONVERTER

**POWER: 0.75 Watt**
**OUTPUT: Single Output**
**SIZE: Multiple Package Styles**

C&D TECHNOLOGIES
Power Solutions
POWER ELECTRONICS DIVISION

Product Site: www.cdpowerelectronics.com
Corporate Site: www.cdtechno.com

PRODUCT DATA SHEET

## FEATURES

- Low Cost
- Multiple Package Styles
- Internal Input and Output
- Filtering
- Non-Conductive Case
- High Output Power Density: 10 Watts/Inch$^3$
- Extended Temperature Range: -25°C to +85°C
- Efficiencies to 79%

The HPR1XX Series uses advanced circuit design and packaging technology to deliver superior reliability and performance. A 170kHz push-pull oscillator is used in the input stage. Beat-frequency oscillation problems are reduced when using the HPR1XX Series with high frequency isolation amplifiers.

Reduced parts count and high efficiency add to the reliability of the HPR1XX Series. The high efficiency of the HPR1XX Series means less internal power dissipation, as low as 190mW. With reduced heat dissipation the HPR1XX Series can operate at higher temperatures with no degradation. In addition, the high efficiency of the HPR1XX Series means the series is able to offer greater than 10 W/inch$^3$ of output power density. Operation down to no load will not impact the reliability of the series, although a $\geq$1mA minimum load is needed to realize published specifications.

The HPR1XX Series provides the user a low cost converter without sacrificing reliability. The use of surface mounted devices and advanced manufacturing technologies make it possible to offer premium performance and low cost.

## Absolute Maximum Ratings

| | |
|---|---|
| Internal Power Dissipation | 450mW |
| ShortCircuitDuration | Momentary |
| Lead Temperature (soldering, 10 seconds max | .+300°C * |

* NOTE: Refer to Reflow Profile for SMD Models.

## Ordering Information

HPR 1XX V/W

Device Family
HPR Indicates DC/DC Converter
Model Number
Selected from Table of Electrical Characteristics
Package Option
There is "no" package designator for the SIP package
V = DIP Package
W = SMD Package

**C&D Technologies (Power Electronics) Ltd.**
Shannon, Co. Clare, Ireland
Tel: +353.61.474.133 Fax:+353.61.474.141

**Power Electronics Division, United States**
3400 E Britannia Drive, Tucson, Arizona 85706
Tel: 800.547.2537 Fax: 520.770.9369

**C&D Technologies, (NCL)**
Milton Keynes MK14 5BU UK
Tel: +44 (0)1908 615232 Fax: +44 (0)1908 617545

# ELECTRICAL SPECIFICATIONS

Specifications typical at $T_A$ = +25°C, nominal input voltage, rated output current unless otherwise specified.

| MODEL | NOMINAL INPUT VOLTAGE (VDC) | RATED OUTPUT VOLTAGE (VDC) | RATED OUTPUT CURRENT (mA) | INPUT CURRENT | | REFLECTED RIPPLE CURRENT (mAp-p) | EFFICIENCY (%) |
|---|---|---|---|---|---|---|---|
| | | | | NO LOAD (mA) | RATED LOAD (mA) | | |
| HPR100 | 5 | 5 | 150 | 20 | 216 | 10 | 69 |
| HPR101 | 5 | 12 | 62 | 20 | 212 | 5 | 70 |
| HPR102 | 5 | 15 | 50 | 20 | 212 | 5 | 71 |
| HPR103 | 5 | ±5 | ±75 | 20 | 218 | 5 | 68 |
| HPR104 | 5 | ±12 | ±30 | 20 | 212 | 5 | 68 |
| HPR105 | 5 | ±15 | ±25 | 20 | 200 | 5 | 75 |
| HPR106 | 12 | 5 | 150 | 10 | 90 | 5 | 69 |
| HPR107 | 12 | 12 | 62 | 10 | 81 | 5 | 77 |
| HPR108 | 12 | 15 | 50 | 10 | 81 | 5 | 77 |
| HPR109 | 12 | ±5 | ±75 | 10 | 88 | 5 | 71 |
| HPR110 | 12 | ±12 | ±30 | 10 | 81 | 5 | 74 |
| HPR111 | 12 | ±15 | ±25 | 10 | 81 | 5 | 77 |
| HPR112 | 15 | 5 | 150 | 8 | 72 | 5 | 69 |
| HPR113 | 15 | 12 | 62 | 8 | 72 | 5 | 69 |
| HPR114 | 15 | 15 | 50 | 8 | 72 | 5 | 69 |
| HPR115 | 15 | ±5 | ±75 | 8 | 72 | 5 | 69 |
| HPR116 | 15 | ±12 | ±30 | 8 | 63 | 5 | 76 |
| HPR117 | 15 | ±15 | ±25 | 8 | 63 | 5 | 79 |
| HPR118 | 24 | 5 | 150 | 8 | 48 | 15 | 65 |
| HPR119 | 24 | 12 | 62 | 8 | 48 | 15 | 65 |
| HPR120 | 24 | 15 | 50 | 8 | 45 | 15 | 69 |
| HPR121 | 24 | ±5 | ±75 | 8 | 45 | 15 | 69 |
| HPR122 | 24 | ±12 | ±30 | 8 | 45 | 15 | 67 |
| HPR123 | 24 | ±15 | ±25 | 8 | 45 | 15 | 69 |

Note: Other input to output voltages may be available. Please contact factory.

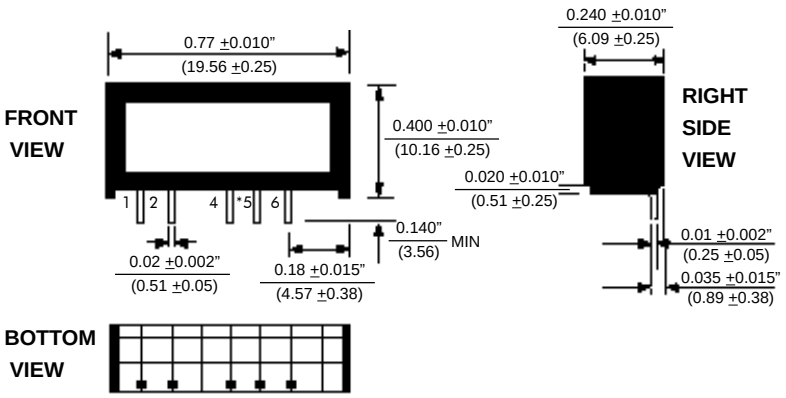
# COMMON SPECIFICATIONS

Specifications typical at $T_A$ = +25°C, nominal input voltage, rated output current unless otherwise specified.

| PARAMETER | CONDITIONS | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|
| **INPUT** | | | | | |
| Voltage Range | | 4.5 | 5 | 5.5 | VDC |
| | | 10.8 | 12 | 13.2 | VDC |
| | | 13.5 | 15 | 16.5 | VDC |
| | | 21.6 | 24 | 26.4 | VDC |
| Voltage Rise Time | See Typical Performance Curves & Application Notes: "Capacitive Loading Effects on Start-Up of DC/DC Converters" | | | | |
| **ISOLATION** | | | | | |
| Rated Voltage | | 750 | | | VDC |
| Test Voltage | 60 Hz, 10 Seconds | 750 | | | Vrms (1060pk) |
| Resistance | | | 10 | | GΩ |
| Capacitance | | | 25 | 100 | pF |
| Leakage Current | $V_{ISO}$ = 240VAC, 60Hz | | 2 | 8.5 | µArms |
| **OUTPUT** | | | | | |
| Rated Power | | | 750 | | mW |
| Voltage Setpoint Accuracy | Rated Load, Nominal $V_{IN}$ | | | ±5 | % |
| Ripple & Noise | BW = DC to 10MHz | | 45 | | mVp-p |
| | BW =10Hz to 2MHz | | 30 | | mVrms |
| HPR103 | BW = DC to 10MHz | | 90 | | mVp-p |
| Voltage (Over Input Voltage Range) | 1mA Load, $V_{OUT}$ = 5V | | | 7 | VDC |
| | 1mA Load, $V_{OUT}$ = 12V | | | 15 | VDC |
| | 1mA Load, $V_{OUT}$ = 15V | | | 18 | VDC |
| Temperature Coefficent | | | .01 | | %/°C |
| **REGULATION** | | | | | |
| Line Regulation | High Line to Low Line | | 1 | | %/%Vin |
| **GENERAL** | | | | | |
| Switching Frequency | | | 170 | | kHz |
| Frequency Change | Over Line and Load | | 24 | | % |
| Package Weight | | | 2 | | g |
| MTTF per MIL-HDBK-217, Rev. E* | Circuit Stress Method | | | | |
| Ground Benign | $T_A$ = +25°C | | 7.9 | | MHr |
| Fixed Ground | $T_A$ = +35°C | | 1.9 | | MHr |
| Naval Sheltered | $T_A$ = +35°C | | 1.2 | | MHr |
| Airborne Uninhabited Fighter | $T_A$ = +35°C | | 300 | | kHr |
| **TEMPERATURE** | | | | | |
| Specification | | -25 | +25 | +85 | °C |
| Operation | | -40 | | +100 | °C |
| Storage | | -40 | | +110 | °C |

*For demonstrated MTTF results reference Power Convertibles Reliability Report HPR105

# MECHANICAL "SIP" Package/Pinout



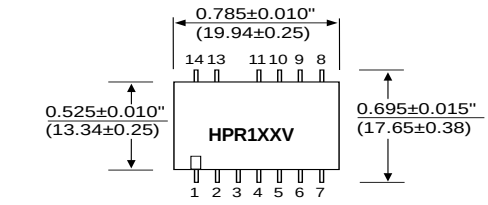

Notes:
All dimensions are in inches (millimeters).
GRID: 0.100 inches (2.54 millimeters)
PIN PLACEMENT TOLERANCE: ± 0.015"

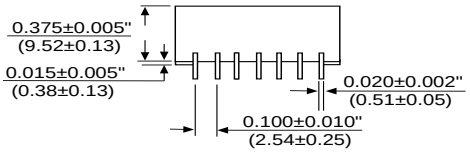
*Common pin not present on single output models.

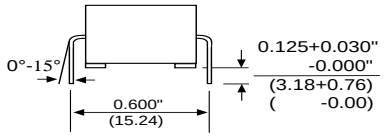
| PIN CONNECTIONS | |
|---|---|
| 1. +VIN | 2. -VIN |
| 4. -VOUT | 5. COM* |
| 6. +VOUT | |

# MECHANICAL Package/Pinout "V" and "W"

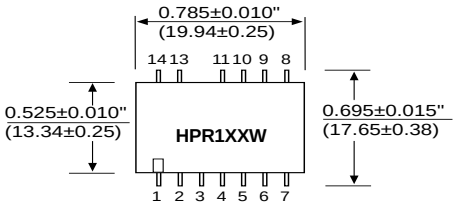
## DIP PACKAGE

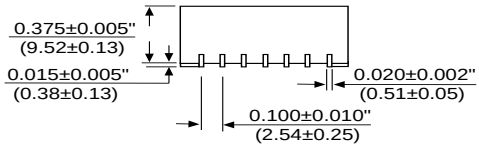


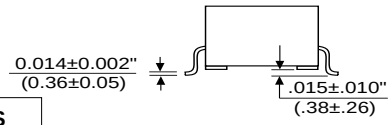




## SMD PACKAGE




TOP VIEWS

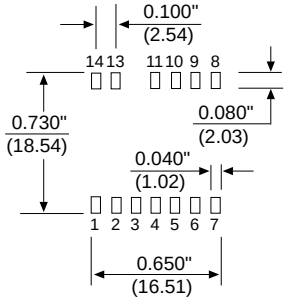
SIDE VIEWS

END VIEWS

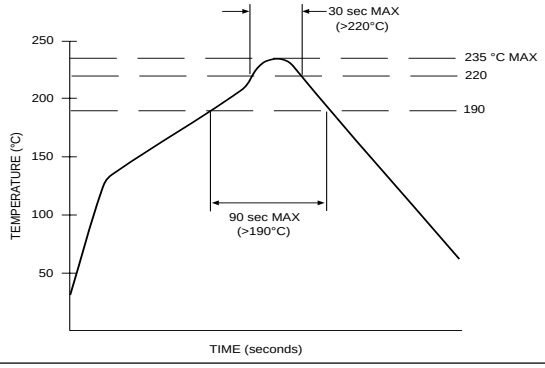
| PIN CONNECTIONS | | |
|---|---|---|
| PIN# | SINGLES | DUALS |
| 1 | +VIN | +VIN |
| 2 | -VIN | -VIN |
| 3 | NC | NC |
| 4 | NC | NC |
| 5 | -VOUT | -VOUT |
| 6 | NC | Common |
| 7 | +VOUT | +VOUT |
| 8 | NC | NC |
| 9 | NC | NC |
| 10 | NC | NC |
| 11 | NC | NC |
| 13 | NC | NC |
| 14 | NC | NC |

NOTES:
NC = Do Not Connect.
Duplicate pin functions are internally connected.
All dimensions are in inches (millimeters).
GRID: 0.100 inches (2.54 millimeters)

## RECOMMENDED LAND PATTERN



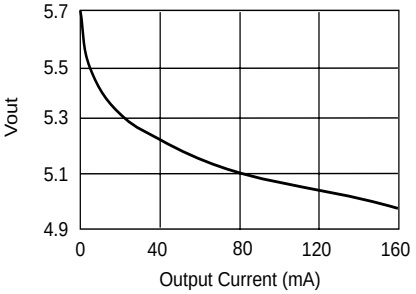

## RECOMMENDED REFLOW PROFILE



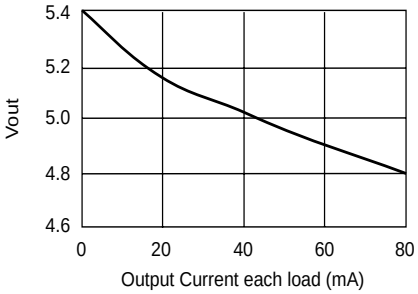
# TYPICAL PERFORMANCE CURVES

Specifications typical at $T_A$ = +25°C, nominal input voltage, rated output current unless otherwise specified.

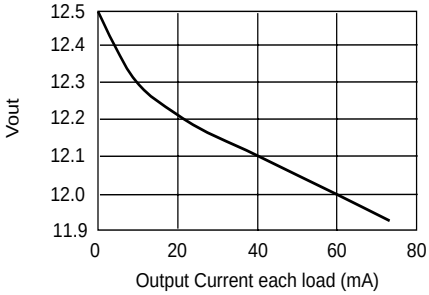
VOUT VS LOAD
(5Vout Models)



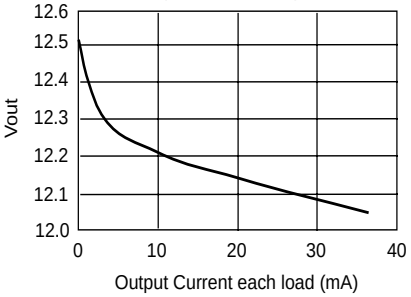

VOUT VS LOAD
(±5Vout Models)



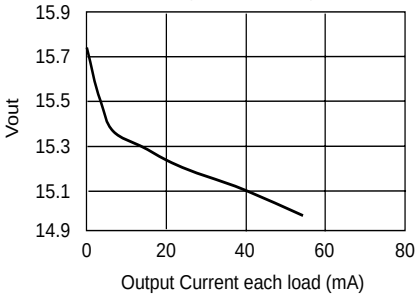

VOUT VS LOAD
(12Vout Models)



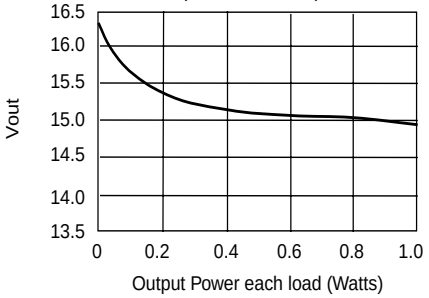

VOUT VS LOAD
(±12Vout Models)



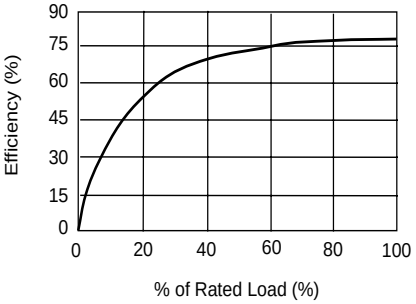

VOUT VS LOAD
(15Vout Models)



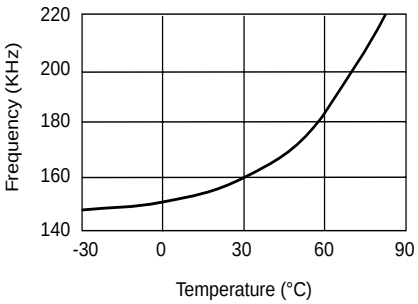

VOUT VS LOAD
(±15Vout Models)




EFFICIENCY VS LOAD

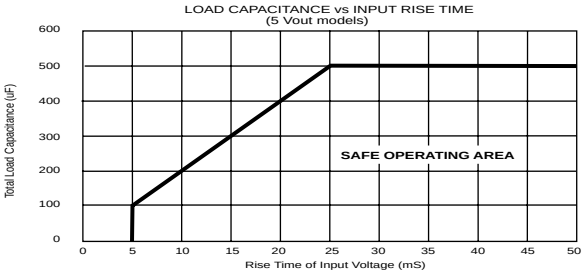



OSCILLATION FREQUENCY VS
TEMPERATURE

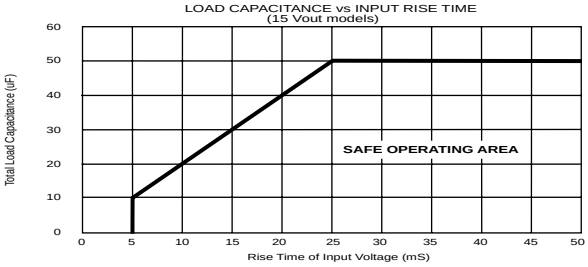



# SAFE OPERATING AREA

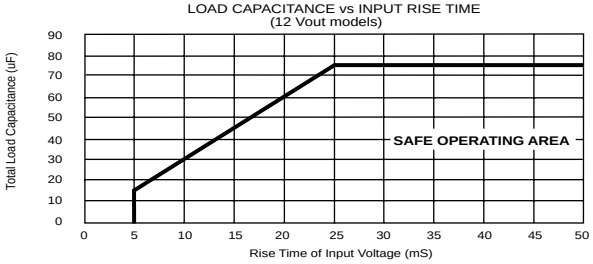
LOAD CAPACITANCE vs INPUT RISE TIME
(5 Vout models)




LOAD CAPACITANCE vs INPUT RISE TIME
(15 Vout models)




LOAD CAPACITANCE vs INPUT RISE TIME
(12 Vout models)




**NOTES:**

1.) When operated within the SAFE OPERATING AREA as defined by the above curves, the output voltage of HPR1XX devices is guaranteed to be within 95% of its steady-state value within 100 milliseconds after the input voltage has reached 95% of its steady-state value.

2.) For dual output models, total load capacitance is the sum of the capacitances on the plus and minus outputs.