



**PRODUCT OVERVIEW**

The HPR4XXC Series uses advanced circuit design and packaging technology to realize superior reliability and performance. A 170kHz push-pull oscillator is used in the input stage. The HPR4XXC Series reduces beat-frequency oscillation problems when used with high frequency isolation amplifiers. Reduced parts count and high efficiency add to the reliability of the HPR4XXC Series.

degradation of reliable operation. In addition, the high efficiency of the HPR4XXC Series means the series is able to offer greater than 10 W/inch<sup>3</sup> of output power density. Operation down to no load will not impact the reliability of the series, although this product has a >1 mA minimum load for specifications purposes.

The high efficiency of the HPR4XXC Series means less internal power dissipation, as low as 190mW. With less heat to dissipate the HPR4XXC Series can operate at higher temperatures with no

The HPR4XXC Series provides high isolation in a very small package. The use of surface mounted devices and manufacturing technologies makes it possible to offer premium performance and low cost.

**FEATURES**

- High Isolation Voltage: 3000 VPK Test
- Single-In-Line Package (SIP)
- Internal Input and Output
- Low Cost
- Non-Conductive Case
- High Output Power Density: 10 Watts/Inch<sup>3</sup>
- Extended Temperature Range: -25°C to +85°C
- High Efficiency to 79%
- RoHS Compliant

**PRODUCT SELECTION CHART**

| Model                           | Nominal Input Voltage | Rated Output Voltage | Rated Output Current | Input Current |            |      | Reflected Ripple Current | Efficiency | Recommended Alternatives |                          |
|---------------------------------|-----------------------|----------------------|----------------------|---------------|------------|------|--------------------------|------------|--------------------------|--------------------------|
|                                 |                       |                      |                      | No Load       | Rated Load |      |                          |            |                          |                          |
|                                 |                       |                      |                      |               | Typ.       | Max. |                          |            |                          |                          |
|                                 | V <sub>dc</sub>       | V <sub>dc</sub>      | mA                   |               | mA         |      | mAp-p                    | %          |                          |                          |
| NOT RECOMMENDED FOR NEW DESIGNS | HPR400C               | 5                    | 5                    | 150           | 20         | 216  | 235                      | 10         | 69                       | NMV0505SAC / MEV1S0505SC |
|                                 | HPR402C               | 5                    | 15                   | 50            | 20         | 212  | 235                      | 5          | 71                       | NMV0515SAC / MEV1S0515SC |
|                                 | HPR403C               | 5                    | ±5                   | ±75           | 20         | 218  | 245                      | 5          | 68                       | NMV0505SC                |
|                                 | HPR404C               | 5                    | ±12                  | ±30           | 20         | 212  | 235                      | 5          | 68                       | NMV0512SC                |
|                                 | HPR405C               | 5                    | ±15                  | ±25           | 20         | 220  | 220                      | 5          | 75                       | NMV0515SC                |
|                                 | HPR407C               | 12                   | 12                   | 62            | 10         | 81   | 90                       | 5          | 77                       | NMV1212SAC / MEV1S1212SC |
|                                 | HPR410C               | 12                   | ±12                  | ±30           | 10         | 81   | 90                       | 5          | 74                       | NMV1212SC                |
|                                 | HPR411C               | 12                   | ±15                  | ±25           | 10         | 81   | 90                       | 5          | 77                       | NMV1215SC                |
|                                 | HPR414C               | 15                   | 15                   | 50            | 8          | 72   | 80                       | 5          | 69                       | NMV1515SAC / MEV1S1515SC |
|                                 | HPR417C               | 15                   | ±15                  | ±25           | 8          | 63   | 66                       | 5          | 79                       | NMV1515SC                |
|                                 | HPR418C               | 24                   | 5                    | 150           | 8          | 48   | 53                       | 15         | 65                       | NMV2405SAC / MEV1S2405SC |
|                                 | HPR422C               | 24                   | ±12                  | ±30           | 8          | 45   | 50                       | 15         | 67                       | NMV2412SC                |
| HPR423C                         | 24                    | ±15                  | ±25                  | 8             | 45         | 50   | 15                       | 69         | NMV2415SC                |                          |
| OBSOLETE                        | HPR401C               | 5                    | 12                   | 62            | 20         | 212  | 235                      | 5          | 70                       | NMV0512SAC / MEV1S0512SC |
|                                 | HPR406C               | 12                   | 5                    | 150           | 10         | 90   | 100                      | 5          | 69                       | NMV1205SAC / MEV1S1205SC |
|                                 | HPR408C               | 12                   | 15                   | 50            | 10         | 81   | 90                       | 5          | 77                       | NMV1215SAC / MEV1S1215SC |
|                                 | HPR409C               | 12                   | ±5                   | ±75           | 10         | 88   | 98                       | 5          | 71                       | NMV1205SC                |
|                                 | HPR412C               | 15                   | 5                    | 150           | 8          | 72   | 80                       | 5          | 69                       | NMV1505SAC / MEV1S1505SC |
|                                 | HPR413C               | 15                   | 12                   | 62            | 8          | 72   | 80                       | 5          | 69                       | NMV1512SAC / MEV1S1512SC |
|                                 | HPR415C               | 15                   | ±5                   | ±75           | 8          | 72   | 80                       | 5          | 69                       | NMV1505SC                |
|                                 | HPR416C               | 15                   | ±12                  | ±30           | 8          | 63   | 70                       | 5          | 76                       | NMV1512SC                |
|                                 | HPR419C               | 24                   | 12                   | 62            | 8          | 48   | 53                       | 15         | 65                       | MEV1S2412SC              |
|                                 | HPR420C               | 24                   | 15                   | 50            | 8          | 45   | 50                       | 15         | 69                       | MEV1S2415SC              |
| HPR421C                         | 24                    | ±5                   | ±75                  | 8             | 45         | 50   | 15                       | 69         | NMV2405SC                |                          |



### SPECIFICATIONS, ALL MODELS

Specifications are at  $T_A = +25^\circ\text{C}$  nominal input voltage unless otherwise specified.

|                                    | PARAMETER                              | CONDITIONS                   | MIN  | TYP  | MAX              | UNITS |
|------------------------------------|--|------------------------------|------|------|------------------|-------|
| OUTPUT                             | <b>INPUT</b>                           |                              |      |      |                  |       |
|                                    | 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   |
|                                    | <b>OUTPUT</b>                          |                              |      |      |                  |       |
|                                    | Rated Power                            |                              |      |      | 750              | mW    |
|                                    | Voltage Setpoint Accuracy              | Rated Load, Nominal $V_{IN}$ |      |      | $\pm 5$          | %     |
|                                    | Ripple & Noise                         | BW = DC to 10MHz             |      | 150  | 200              | mVp-p |
|                                    |  | BW = 10Hz to 2MHz            |      | 30   | 40               | mVrms |
| Voltage (Over Input Voltage Range) | 1mA to Rated Current, $V_{OUT} = 5V$   | 4.75                         |      | 7    | VDC              |       |
|                                    | 1mA to Rated Current, $V_{OUT} = 12V$  | 11.40                        |      | 15   | VDC              |       |
|                                    | 1mA to Rated Current, $V_{OUT} = 15V$  | 14.25                        |      | 18   | VDC              |       |
| Temperature Coefficient            |  |                              | .01  | .05  | %/°C             |       |
| <b>REGULATION</b>                  |  |                              |      |      |                  |       |
| Load Regulation (All other modes)  | Rated Load to 1mA Load                 |                              | 3    |      | %                |       |
| <b>GENERAL</b>                     |  |                              |      |      |                  |       |
| <b>ISOLATION</b>                   |  |                              |      |      |                  |       |
| Rated Voltage                      |  | 1000                         |      |      | VDC              |       |
| Test Voltage                       | 60 Hz, 60 Seconds                      | 3000                         |      |      | Vpk              |       |
| Resistance                         |  | 10                           |      |      | $\text{G}\Omega$ |       |
| Capacitance                        |  |                              | 25   | 100  | pF               |       |
| Leakage Current                    | $V_{ISO} = 240\text{VAC}, 60\text{Hz}$ |                              | 2    | 7    | $\mu\text{Arms}$ |       |
| Switching Frequency                |  |                              | 170  |      | kHz              |       |
| Frequency Change                   | Over Line and Load                     |                              | 24   |      | %                |       |
| Package Weight                     |  |                              |      | 3    | g                |       |
| MTTF per MIL-HDBK-217, Rev. F*     | Circuit Stress Method                  |                              |      |      |                  |       |
| Ground Benign                      | $T_A = +25^\circ\text{C}$              | 7.9                          |      |      | MHr              |       |
| <b>TEMPERATURE</b>                 |  |                              |      |      |                  |       |
| Specification                      |  | -25                          | +25  | +85  | °C               |       |
| Operation                          |  | -40                          |      | +100 | °C               |       |
| Storage                            |  | -40                          |      | +110 | °C               |       |

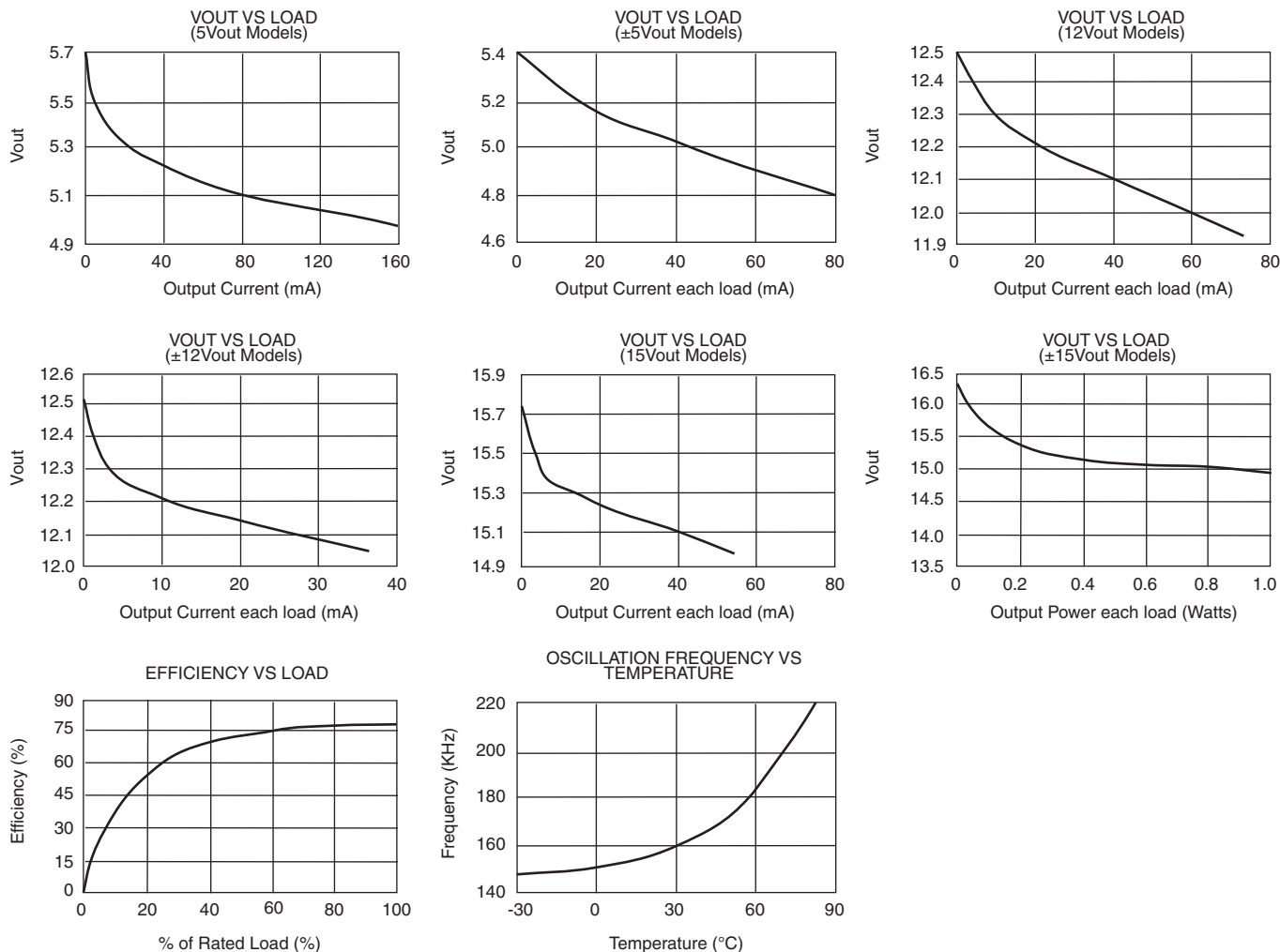
### SOLDERING INFORMATION

The HPR4XXC devices are intended for wave soldering or manual soldering.  
**They are not intended to be subject to surface mount processes under any circumstances.**

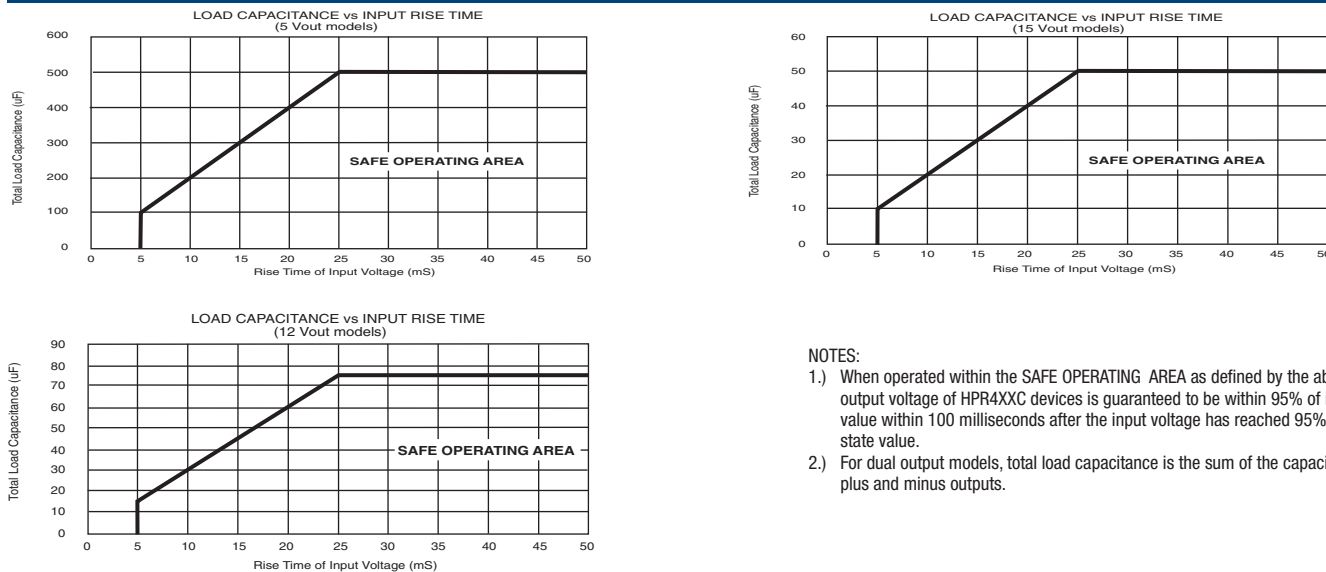
The normal wave soldering process can be used with these devices where the device is subjected to a maximum wave temperature of 260°C for a period of no more than 10 seconds. Within this time and temperature range, the integrity of the device's plastic body will not be compromised and internal temperatures within the converter will not exceed 175°C. Care should be taken to control manual soldering limits identical to that of wave soldering.

**TYPICAL PERFORMANCE CURVES**

Specifications are at  $T_A = +25^\circ\text{C}$  nominal input voltage and nominal load.



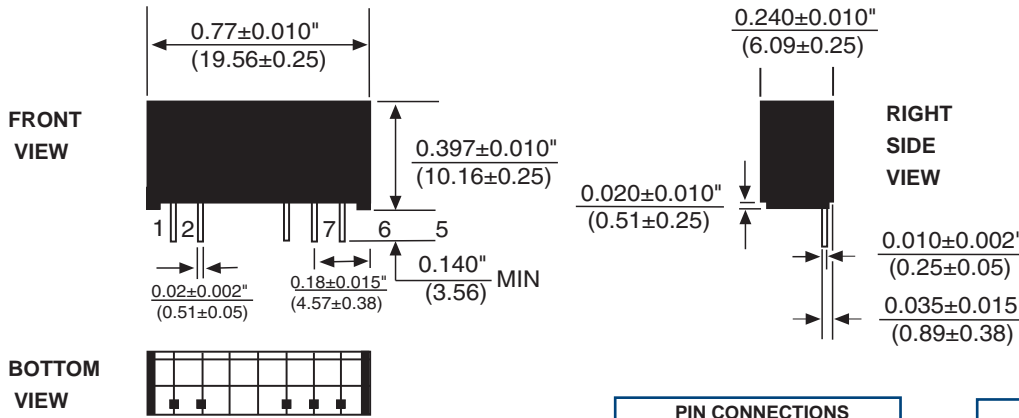
**SAFE OPERATING AREA**



**NOTES:**

- 1.) When operated within the SAFE OPERATING AREA as defined by the above curves, the output voltage of HPR4XXC 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.

**MECHANICAL**



| PIN CONNECTIONS                                  |       |
|--|-------|
| 1.   | +VIN  |
| 2.   | -VIN  |
| 5.   | -VOUT |
| 6.   | COM*  |
| 7.   | +VOUT |
| *Common pin not present on single output models. |       |

**Notes:**  
 All dimensions are in inches (millimeters).  
 GRID: 0.100 inches (2.54 millimeters)  
 PIN PLACEMENT TOLERANCE: ± 0.015"  
 MATERIAL: Lead material is phosphor bronze; lead finish is 100-300 microinches of matte tin over a barrier layer of 5-40 microinches of nickel.

**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**

Device Family \_\_\_\_\_ **HPR** **4XX** **C**  
 HPR Indicates DC/DC Converter  
 Model Number \_\_\_\_\_  
 Selected from Table of Electrical Characteristics  
 RoHS Compliant Version \_\_\_\_\_