

**LOW COST, SINGLE-IN-LINE PACKAGE**

**DESCRIPTION**

The HPR10XX 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 HPR10XX Series with high frequency isolation amplifiers.

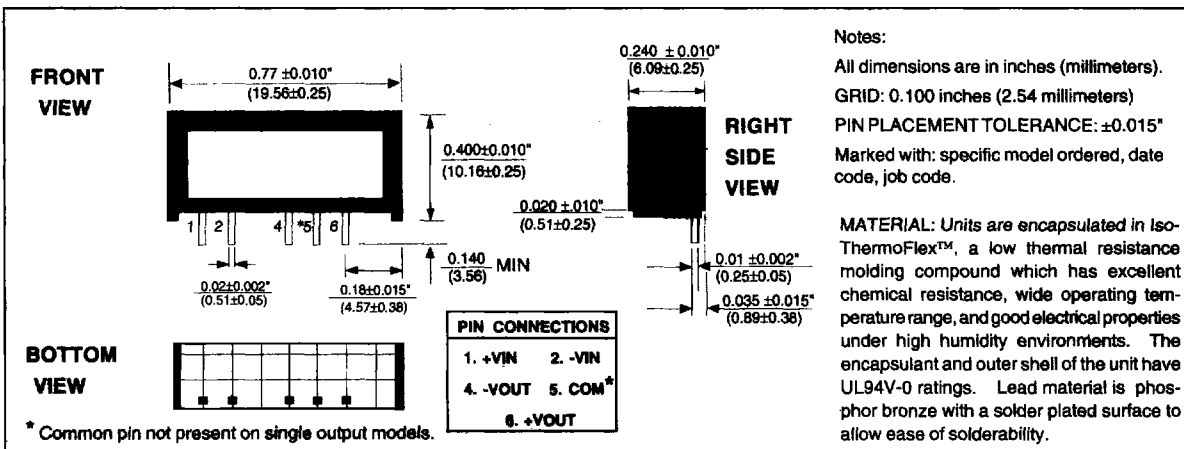
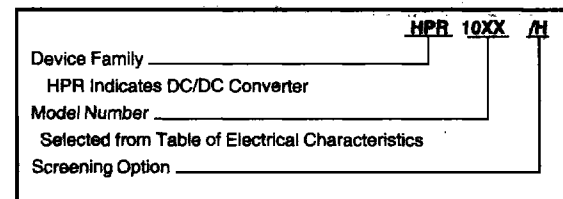
Reduced parts count and high efficiency add to the reliability of the HPR10XX Series. The high efficiency of the HPR10XX Series means less internal power dissipation, as low as 190mW. With reduced heat dissipation the HPR10XX Series can operate at higher temperatures with no degradation. In addition, the high efficiency of the HPR10XX Series means the series is able to offer greater than 13 W/inch<sup>3</sup> of output power density. Operation down to no load will not impact the reliability of the series, although a 1mA minimum load is needed to realize published specifications.

The HPR10XX Series provides the user low cost without sacrificing reliability. The use of surface mounted devices and advanced manufacturing technologies make it possible to offer premium performance and low cost.

**FEATURES**

- **LOW COST**
- **SINGLE-IN-LINE PACKAGE (SIP)**
- **INTERNAL INPUT AND OUTPUT FILTERING**
- **NON-CONDUCTIVE CASE**
- **HIGH OUTPUT POWER DENSITY: 13 WATTS/INCH<sup>3</sup>**
- **EXTENDED TEMPERATURE RANGE: -25°C to +65°C**
- **HIGH EFFICIENCY: to 72% Typical**

**ORDERING INFORMATION**



# ELECTRICAL SPECIFICATIONS

Specifications typical at  $T_A = +25^\circ\text{C}$ , 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 (mA <sub>p-p</sub> )	EFFICIENCY (%)
				MIN LOAD (mA)	RATED LOAD (mA)		
HPR1000	5	5	200	33	290	8	68
HPR1001	5	12	83	33	290	8	69
HPR1002	5	15	67	33	285	8	70
HPR1003	5	±5	±100	33	285	8	70
HPR1004	5	±12	±42	33	285	8	70
HPR1005	5	±15	±34	33	285	8	70
HPR1006	12	5	200	18	110	10	70
HPR1007	12	12	83	18	107	10	71
HPR1008	12	15	67	18	107	10	71
HPR1009	12	±5	±100	18	107	10	71
HPR1010	12	±12	±42	18	107	10	71
HPR1011	12	±15	±34	18	107	10	71
HPR1012	15	5	200	15	96	10	70
HPR1013	15	12	83	15	94	10	70
HPR1014	15	15	67	15	94	10	71
HPR1016	15	±12	±42	15	94	10	71
HPR1017	15	±15	±34	15	94	10	71
HPR1018	24	5	200	12	60	15	71
HPR1019	24	12	83	12	60	15	71
HPR1020	24	15	67	12	58	15	72
HPR1021	24	±5	±100	12	58	15	72
HPR1022	24	±12	±42	12	58	15	72
HPR1023	24	±15	±34	12	58	15	72

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

# COMMON SPECIFICATIONS

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

Parameter	Conditions	Min	Typ	Max	Units
<b>INPUT</b>					
Voltage Range		4.5 10.8 13.5 21.6	5 12 15 24	5.5 13.2 16.5 26.4	VDC VDC VDC VDC
Voltage Rise Time	See Typical Performance Curves & Application Notes: "Capacitive Loading Effects on Start-Up of DC/DC Converters"				
<b>ISOLATION</b>					
Rated Voltage		1000			VDC
Test Voltage	60 Hz, 10 Seconds	1000			Vpk
Resistance			10		GΩ
Capacitance			25	100	pF
Leakage Current	$V_{BO} = 240\text{VAC}, 60\text{Hz}$		2	8.5	μArms
<b>OUTPUT</b>					
Rated Power			1.0		W
Voltage Setpoint Accuracy	Rated Load, Nominal $V_{IN}$			±5	%
Ripple & Noise	BW = DC to 10MHz BW = 10Hz to 2MHz		30	100	mVp-p mVrms
Voltage	1mA Load, $V_{OUT} = 5\text{V}$ 1mA Load, $V_{OUT} = 12\text{V}$ 1mA Load, $V_{OUT} = 15\text{V}$			7 15 18	VDC VDC VDC
Temperature Coefficient			.01		%/Deg C
<b>REGULATION</b>					
Line Regulation	High Line to Low Line		1		%/%Vin
Load Regulation (5V out only)	Rated Load to 1mA Load		10		%
Load Regulation (All other Models)	Rated Load to 1mA Load		3		%
<b>GENERAL</b>					
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	$T_A = +25^\circ\text{C}$		3.8		MHr
Fixed Ground	$T_A = +35^\circ\text{C}$		1.4		MHr
Naval Sheltered	$T_A = +36^\circ\text{C}$		685		kHr
Airborne Uninhabited Fighter	$T_A = +35^\circ\text{C}$		211		kHr
<b>TEMPERATURE</b>					
Specification		-25	+25	+65	°C
Storage		-50		+110	°C

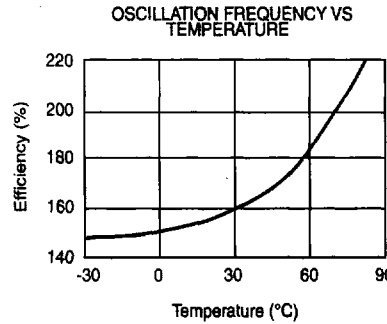
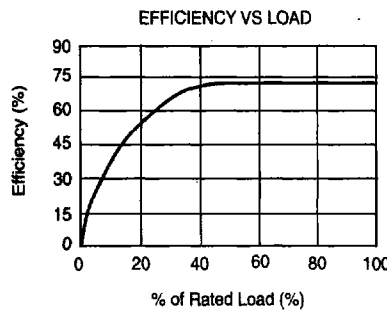
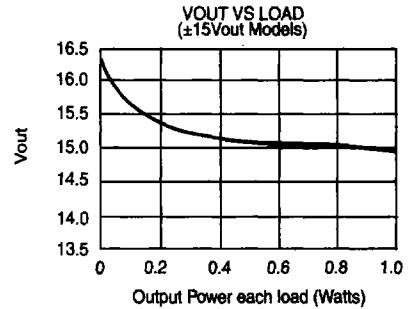
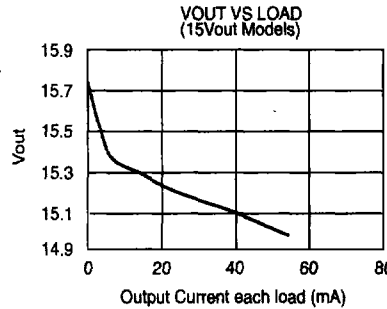
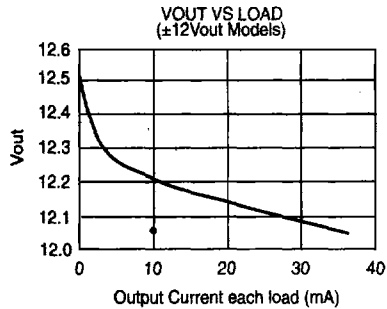
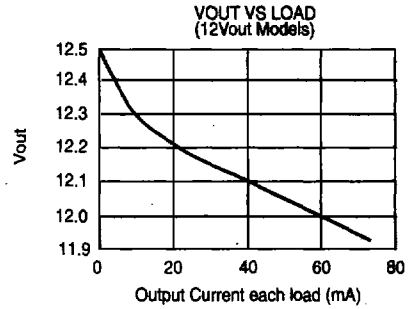
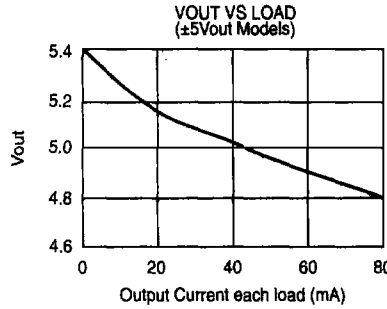
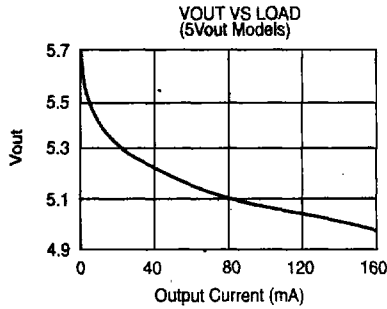
\* For demonstrated MTTF results reference Reliability Report HPR105

## ABSOLUTE MAXIMUM RATINGS

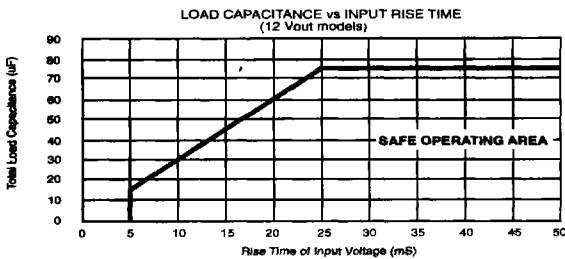
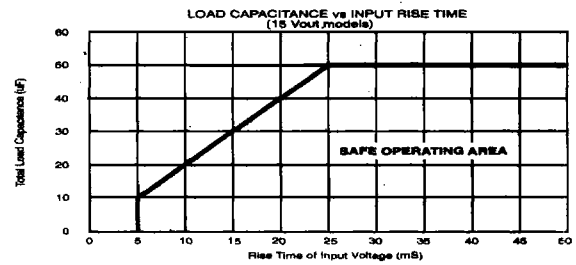
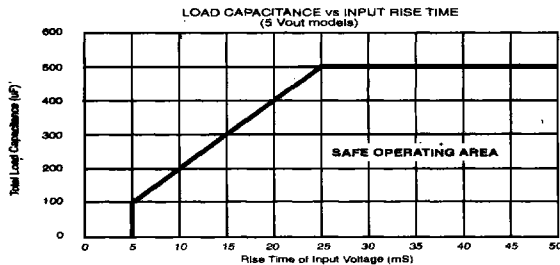
Internal Power Dissipation.....	490mW
Short Circuit Duration.....	Momentary
Lead Temperature (soldering, 10 seconds max).....	+300°C

# TYPICAL PERFORMANCE CURVES

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



## SAFE OPERATING AREA



### NOTES:

- 1.) When operated within the **SAFE OPERATING AREA** as defined by the above curves, the output voltage of HPR10XX 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.

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