Murata Power Solutions

HPR4XXC

0.75 Watt Miniature SIP DC/DC Converter

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.

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 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^3 of output power density. Operation down to no load will not impact the reliability of the series, although this product has a $\geq$1mA minimum load for specifications purposes.

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^3
- Extended Temperature Range: -25°C to +85°C
- High Efficiency to 79%
- RoHS Compliant

SPECIFICATIONS All specifications are typical at T_A = +25°C nominal input voltage unless otherwise specified.

PRODUCT SELECTION CHART

MODEL	NOMINAL INPUT VOLTAGE (VDC)	RATED OUTPUT VOLTAGE (VDC)	RATED OUTPUT CURRENT (mA)	INPUT CURRENT (mA)			REFLECTED RIPPLE CURRENT (mAp-p)	EFFICIENCY (%)
				NO LOAD (mA)	RATED LOAD TYP	RATED LOAD MAX		
HPR400C	5	5	150	20	216	235	10	69
~~HPR401C~~	~~5~~	~~12~~	~~62~~	~~20~~	~~212~~	~~235~~	~~5~~	~~70~~
HPR402C	5	15	50	20	212	235	5	71
HPR403C	5	±5	±75	20	218	245	5	68
HPR404C	5	±12	±30	20	212	235	5	68
HPR405C	5	±15	±25	20	220	220	5	75
~~HPR406C~~	~~12~~	~~5~~	~~150~~	~~10~~	~~90~~	~~100~~	~~5~~	~~69~~
HPR407C	12	12	62	10	81	90	5	77
~~HPR408C~~	~~12~~	~~15~~	~~50~~	~~10~~	~~81~~	~~90~~	~~5~~	~~77~~
~~HPR409C~~	~~12~~	~~±5~~	~~±75~~	~~10~~	~~88~~	~~98~~	~~5~~	~~71~~
HPR410C	12	±12	±30	10	81	90	5	74
HPR411C	12	±15	±25	10	81	90	5	77
~~HPR412C~~	~~15~~	~~5~~	~~150~~	~~8~~	~~72~~	~~80~~	~~5~~	~~69~~
~~HPR413C~~	~~15~~	~~12~~	~~62~~	~~8~~	~~72~~	~~80~~	~~5~~	~~69~~
HPR414C	15	15	50	8	72	80	5	69
~~HPR415C~~	~~15~~	~~±5~~	~~±75~~	~~8~~	~~72~~	~~80~~	~~5~~	~~69~~
~~HPR416C~~	~~15~~	~~±12~~	~~±30~~	~~8~~	~~63~~	~~70~~	~~5~~	~~76~~
HPR417C	15	±15	±25	8	63	66	5	79
HPR418C	24	5	150	8	48	53	15	65
~~HPR419C~~	~~24~~	~~12~~	~~62~~	~~8~~	~~48~~	~~53~~	~~15~~	~~65~~
~~HPR420C~~	~~24~~	~~15~~	~~50~~	~~8~~	~~45~~	~~50~~	~~15~~	~~69~~
~~HPR421C~~	~~24~~	~~±5~~	~~±75~~	~~8~~	~~45~~	~~50~~	~~15~~	~~69~~
HPR422C	24	±12	±30	8	45	50	15	67
HPR423C	24	±15	±25	8	45	50	15	69

Note: Other input to output voltages may be available. Please contact Murata Power Solutions.

RoHS COMPLIANT 2002/95/EC

For full details go to
www.murata-ps.com/rohs

SPECIFICATIONS, ALL MODELS

Specifications are at T_A = +25°C nominal input voltage unless otherwise specified.

	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
OUTPUT	**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
	OUTPUT					
	Rated Power				750	mW
	Voltage Setpoint Accuracy	Rated Load, Nominal V_{IN}			±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 Coefficent			.01	.05	%/°C
	REGULATION					
	Load Regulation (All other modes)	Rated Load to 1mA Load		3		%
GENERAL	**GENERAL**					
	ISOLATION					
	Rated Voltage		1000			VDC
	Test Voltage	60 Hz, 60 Seconds	3000			Vpk
	Resistance		10			GΩ
	Capacitance			25	100	pF
	Leakage Current	V_{ISO}= 240VAC, 60Hz		2	7	µArms
	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°C	7.9			MHr
	Moisture Sensitivity Level (MSL)	IPC/JEDEC J-STD-20		2		
	TEMPERATURE					
	Specification		-25	+25	+85	°C
	Operation		-40		+100	°C
	Storage		-40		+110	°C

SOLDERING INFORMATION

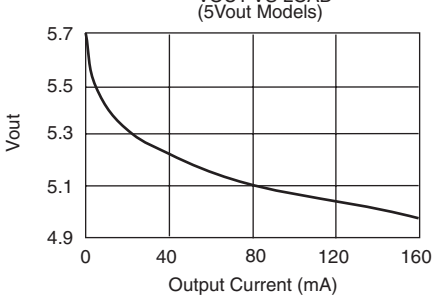
The HPR4XXC devices are intended for wave soldering or manual soldering.
They are not intended to be subject to surface mount processes under any circumstances.

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.

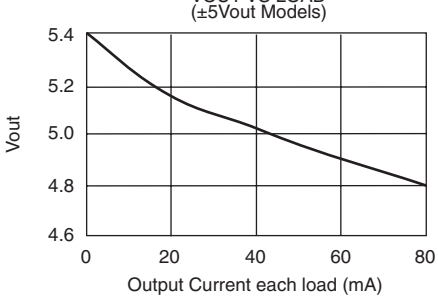
TYPICAL PERFORMANCE CURVES

Specifications are at T_A = +25°C nominal input voltage and nominal load.

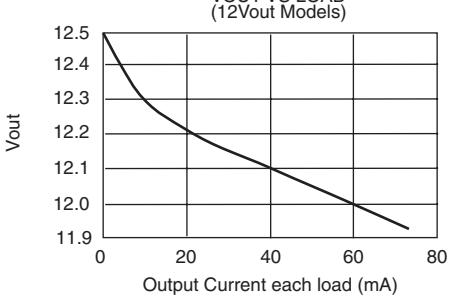
VOUT VS LOAD (5Vout Models)



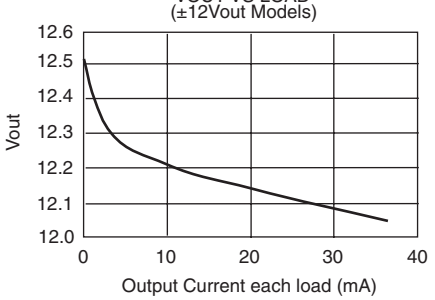
VOUT VS LOAD (±5Vout Models)



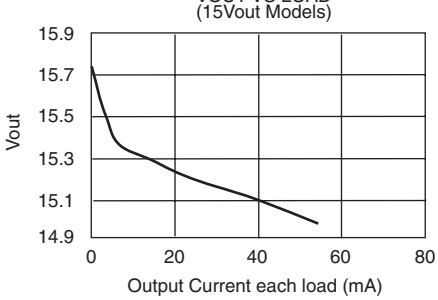
VOUT VS LOAD (12Vout Models)



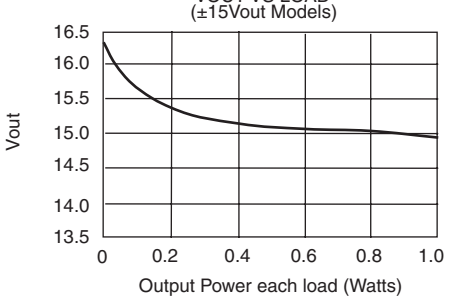
VOUT VS LOAD (±12Vout Models)



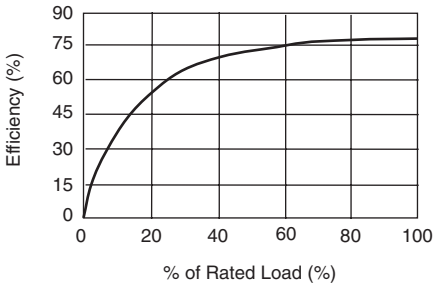
VOUT VS LOAD (15Vout Models)



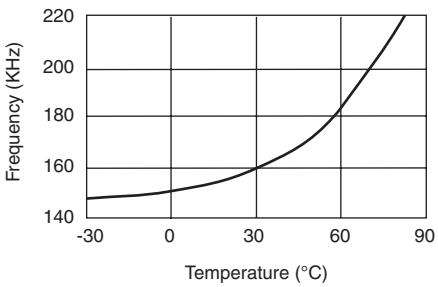
VOUT VS LOAD (±15Vout Models)



EFFICIENCY VS LOAD

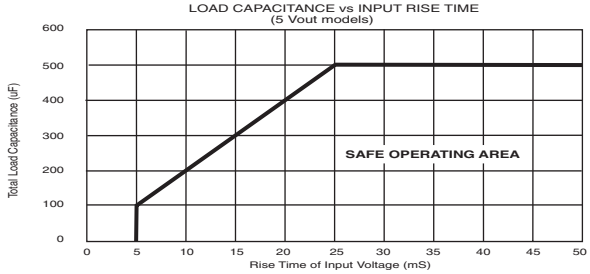


OSCILLATION FREQUENCY VS TEMPERATURE

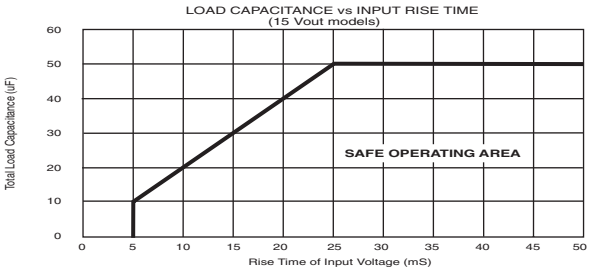


SAFE OPERATING AREA

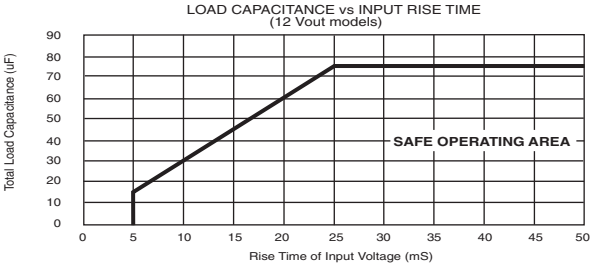
LOAD CAPACITANCE vs INPUT RISE TIME (5 Vout models)



LOAD CAPACITANCE vs INPUT RISE TIME (15 Vout models)



LOAD CAPACITANCE vs INPUT RISE TIME (12 Vout models)

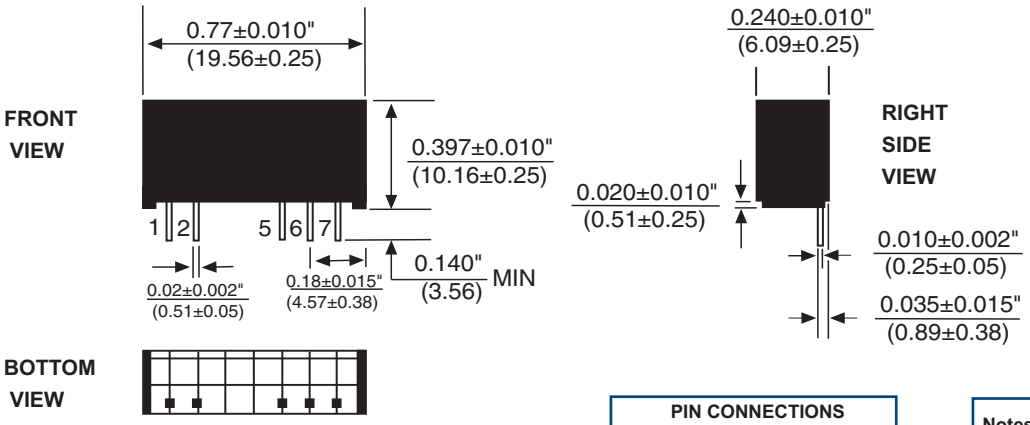


NOTES:

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

HPR 4XX C

Device Family
HPR Indicates DC/DC Converter
Model Number
Selected from Table of Electrical Characteristics
RoHS Compliant Version

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