

## NON-ISOLATED DC/DC CONVERTERS

3.3 Vdc Input    5.0 Vdc / 4 A Output

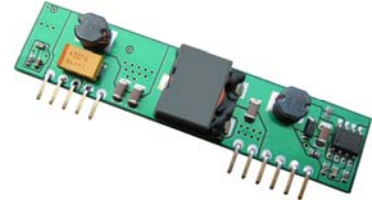
**bel**  
POWER PRODUCTS

xRPC-04C50x

RoHS Compliant

Rev.A

- Non-Isolated
- High Efficiency
- Fixed Frequency
- Low Cost
- High Power Density
- Industry Standard Footprint



### Description

The xRPC-04C50x series are part of low-cost non-isolated boost dc/dc converters that operate from a nominal 3.3 Vdc source. The modules use a SIP package for ease of layout and space savings. The output is closely regulated and the efficiency for 5.0 Vdc output is typically 92.5% at full load. Standard features include high efficiency, fixed frequency, industry standard footprint and high power density.

### Part Selection

Output Voltage	Input Voltage	Max. Output Current	Max. Output Power	Typical Efficiency	Model Number Without Coating	Model Number With Coating
5.0 Vdc	3.3 Vdc	4 A	20 W	92.5%	VRPC-04C50A	VRPC-04C50W <sup>1</sup>

- Notes:**
1. "W" indicates special coating.
  2. Replace the first letter of the model number with "0" for horizontal mount package.
  3. Add "G" suffix at the end of the model numbers listed above to indicate "Tray Packaging".
  4. All part numbers above indicate RoHS 6. Change the second letter "R" to "7" for RoHS 5 part numbers.

### Absolute Maximum Ratings

Parameter	Min	Typ	Max	Notes
Input Voltage (continuous)	-0.3 V	-	5 V	
Ambient Temperature	-40 °C	-	85 °C	
Storage Temperature	-40 °C	-	125 °C	

**Note:** Use beyond the maximum ratings may cause a reliability degradation of the dc/dc converter or may permanently damage the device.

### Input Specifications

Parameter	Min	Typ	Max	Notes
Operating Input Voltage	3 V	-	4 V	
Input Current (full load)	-	-	8 A	
Input Current (no load)	-	-	400 mA	
Input Reflected Ripple Current (pk-pk)	-	120 mA	200 mA	Tested with a 270 uF/10 V input capacitor with ESR=0.03 ohm max at 100 kHz & simulated source impedance of 500 nH, 5 Hz to 20 MHz.
Input Reflected Ripple Current (rms)	-	25 mA	50 mA	
I <sup>2</sup> t Inrush Current Transient	-	0.01 A <sup>2</sup> s	0.02 A <sup>2</sup> s	

**Note:** All specifications are typical at 25 °C unless otherwise stated.

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### Output Specifications

Parameter	Min	Typ	Max	Notes	
Output Voltage Set Point	4.9 V	5.0 V	5.1 V		
Load Regulation	-	10 mV	25 mV		
Line Regulation	-	5 mV	15 mV		
Regulation Over Temperature (-40 °C to 85 °C)	-	15 mV	45 mV		
Output Current	0 A	-	4 A		
Output Ripple and Noise (pk-pk)	-	50 mV	100 mV	Test conditions: 0-20 MHz BW, with external 1 uF / 10 V ceramic capacitor at the output	
Output Ripple and Noise (rms)	-	15 mV	30 mV		
Turn on Time	-	10 mS	-		
Overshoot at Turn on	-	0%	3%		
Output Capacitance	0 uF	-	1600 uF		
<b>Transient Response</b>					
50% ~ 100% Max Load	Vo = 5.0 V	-	100 mV	di/dt=0.1 A/uS; Vin=3.3 V; and with external 220 uF Tantalum capacitor & 1 uF / 10 V ceramic capacitor at the output.	
Settling Time		-	200 uS		500 uS
100% ~ 50% Max Load		-	100 mV		200 mV
Settling Time		-	200 uS		500 uS

- Notes:** 1. This module has no internal OVP. An external OVP protection is always employed.  
2. All specifications are typical at nominal input, full load at 25 °C unless otherwise stated.

### General Specifications

Parameter	Min	Typ	Max	Notes
Efficiency	89%	92.5%	-	Vin=3.3 V, full load
Switching Frequency	200 kHz	250 kHz	300 kHz	
MTBF	8,754,928 hours			Calculated Per Bell Core SR-332 (Io = 80% load; Vin=3.3 V; Ta = 25 °C)
Dimensions Inches (L x W x H) Millimeters (L x W x H)	2.5 x 0.55 x 0.34 63.50 x 13.98 x 8.64			VRPC-04C50x
	2.5 x 0.55 x 0.375 63.50 x 13.98 x 9.53			0RPC-04C50x
Weight	-	9.2 g	-	

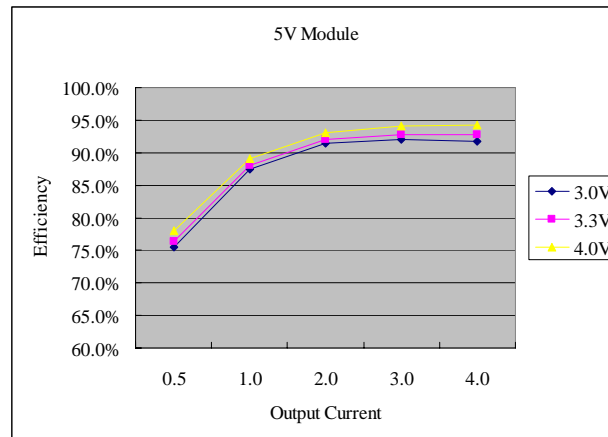
**Note:** All specifications are typical at 25 °C unless otherwise stated.

# NON-ISOLATED DC/DC CONVERTERS

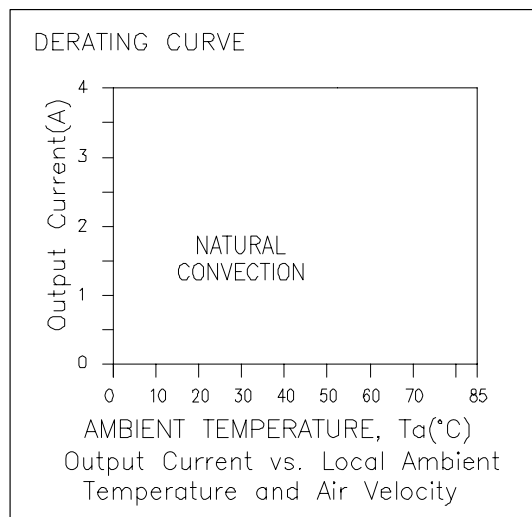
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## Efficiency Data



## Thermal Derating Curve

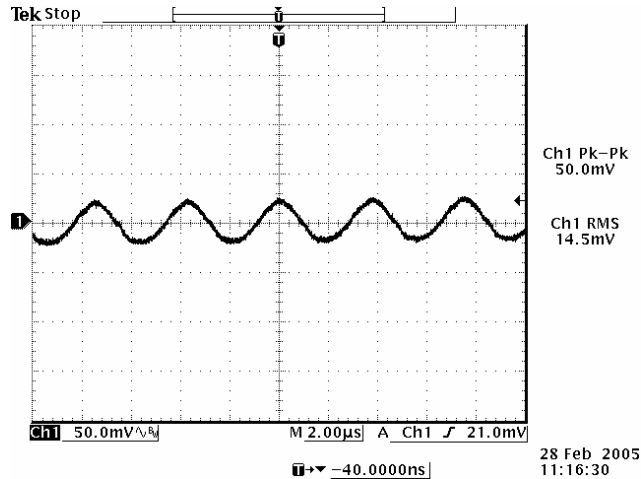


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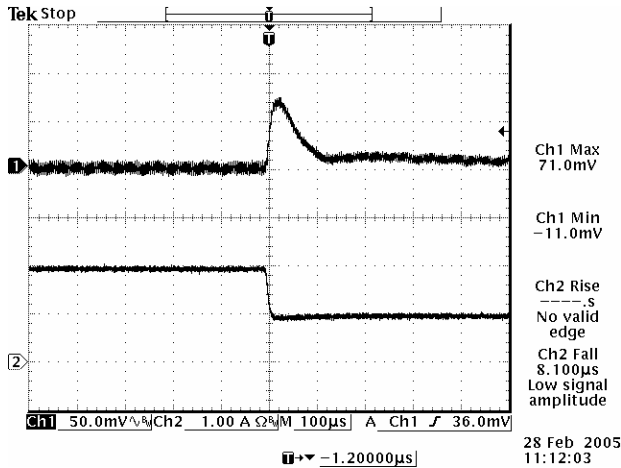


## Ripple and Noise Waveform

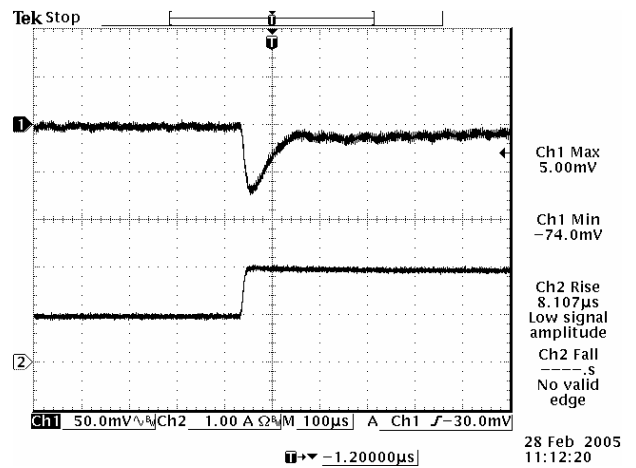


**Note:** Ripple and noise at max load, 3.3 Vdc input, 5 Vdc output, 0-20 MHz BW, with 1 uF/10 V ceramic capacitor, and Ta=25 deg C

## Transient Response Waveforms



25% to 50% load step at 3.3 Vdc input, 5 Vdc output



50% to 25% load step at 3.3 Vdc input, 5 Vdc output

**Note:** Transient response at di/dt=0.1 A/uS, with 220 uF/10 V tantalum capacitor at the output, and Ta=25 deg C.

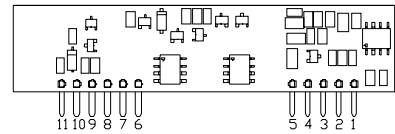
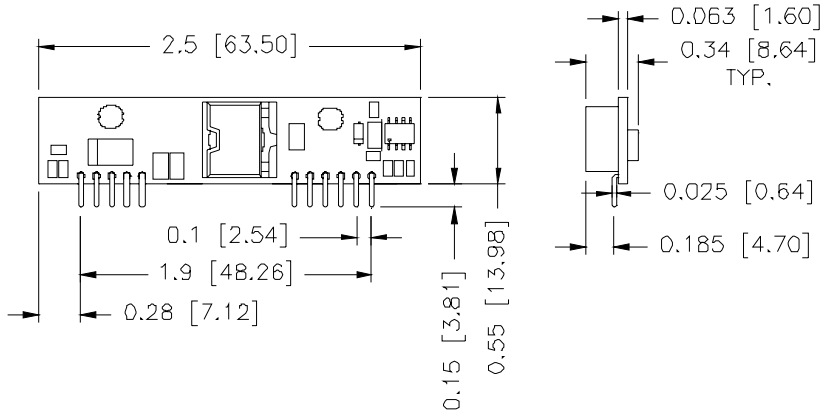
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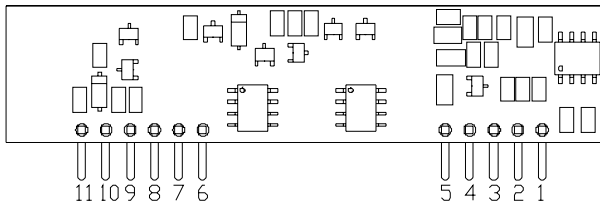


## Mechanical Outline

### VRPC-04C50x



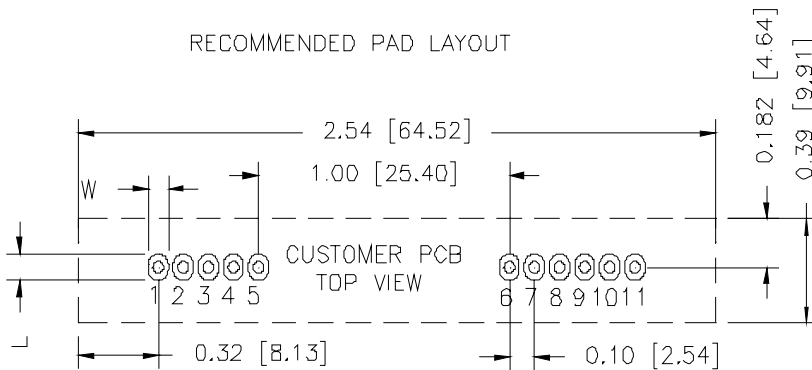
UNIT: INCH [MM]



## Pin Connections

Pin	Function
1	Vo+
2	Vo+
3	Vo+
4	Vo -
5	Vo -
6	Vin -
7	Vin -
8	Vin+
9	Vin+
10	Vin+
11	Vin+

## RECOMMENDED PAD LAYOUT



HOLE SIZE:  $\varnothing 0.043 \pm 0.003$  [1.08  $\pm$  0.08]  
 PAD SIZE: W  $0.063 \pm 0.002$  [1.63  $\pm$  0.05]  
 L  $0.10 \pm 0.004$  [2.54  $\pm$  0.10] BOTH SIDE

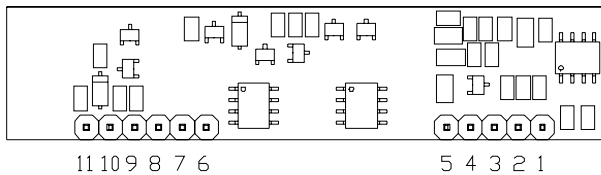
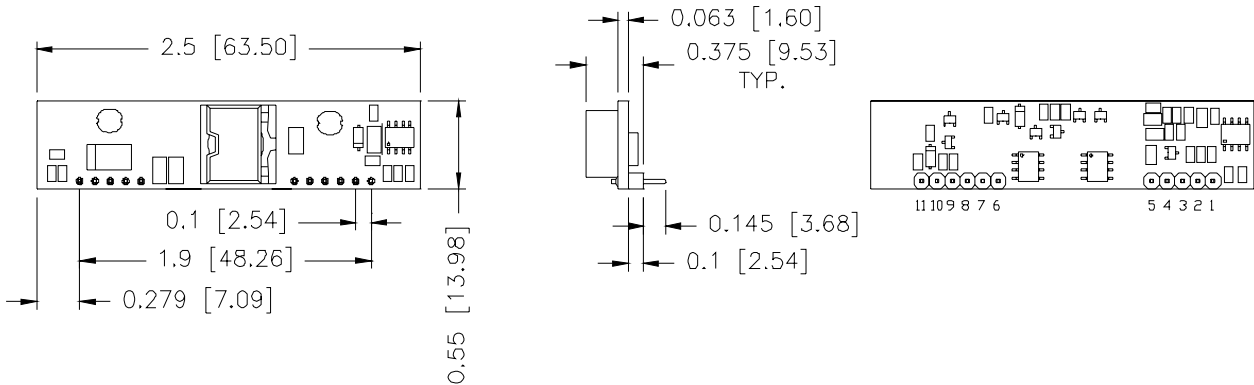
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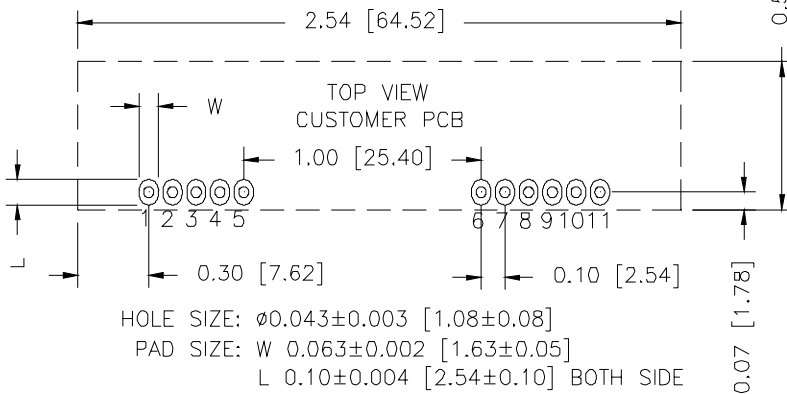


## Mechanical Outline (continued)

### 0RPC-04C50x



#### RECOMMENDED PAD LAYOUT



## Pin Connections

Pin	Function
1	Vo+
2	Vo+
3	Vo+
4	Vo+
5	Vo -
6	Vin -
7	Vin -
8	Vin+
9	Vin+
10	Vin+
11	Vin+

## RoHS Compliance

Complies with the European Directive 2002/95/EC, calling for the elimination of lead and other hazardous substances from electronic products.



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