

# NON-ISOLATED DC/DC CONVERTERS

## 3.3V Input / 5V Output / 4A



BP06VRPC-04C

### VRPC-04C Series

### RoHS Compliant

- Nonisolated
- Industry standard pinout
- Fixed frequency
- High efficiency means less power dissipation
- Optimized for cost
- Remote on/off
- Undervoltage lockout
- Over current and short circuit protection
- Industrial temperature range



## Description

The Bel VRPC-04C series modules are non-isolated, boost DC/DC power converters that operate from a nominal 3.3V source. These converters provide an output voltage of 5V and are packaged in an industry standard single-in-line footprint with 4A maximum output. Standard features include remote on/off, over current and short circuit protection. A version of this converter is also available without remote on/off. These products may be used almost anywhere 5V is required and a 3.3V source is available. Typical applications include file servers, routers, line cards and other computing and communications equipment.

## Applications

- Telecommunications
- Networking
- Computers and peripherals

## Part Number Selection

Output Voltage	Input Voltage	Max. Output Current	Max. Output Power	Typical Efficiency	Part Number with Remote On/Off	Part Number without Remote On/Off
5.0V	3.3V	4A	20W	90%	VRPC-04C500	VRPC-04C50N

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### Absolute Maximum Ratings

Parameter	Symbol	Min	Typical	Max	Unit
Continuous Input Voltage	V <sub>in</sub>	-0.3		5	V
Output Enable Terminal Voltage	V <sub>outen</sub>	-0.3		5	V
Ambient Temperature	T <sub>amb</sub>	-40		+85	°C
Storage Temperature	T <sub>stor</sub>	-55		+100	°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	Symbol	Min	Typical	Max	Units
Operating Input Voltage	V <sub>in</sub>	3		4	V
Input Current	I <sub>in</sub>			8	A
No Load Input Current				400	mA
Remote Off Input Current			90	150	mA
Input Reflected Ripple Current <sup>1</sup>			25	50	mA <sub>rms</sub>
Input Reflected Ripple Current (P-P) <sup>1</sup>			120	200	mApk
I <sup>2</sup> t Inrush Current Transient			0.01	0.02	A <sup>2</sup> s
Turn On Voltage Threshold			2.8	2.9	V
Turn Off Voltage Threshold		1.5	2	2.7	V

Note: Input capacitance 270µF/10V, ESR = 0.03 Ω max at 100kHz @ 25° C.  
 1. With simulated source impedance of 500nH, 5Hz to 20MHz.

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### Output Specifications

Parameter	Symbol	Min	Typical	Max	Units
Output Voltage Set Point <sup>1</sup>	Vout	4.85	5	5.15	V
Load Regulation			10	25	mV
Line Regulation			5	15	mV
Regulation Over Temperature 0° - 70° C			15	45	mV
Total Output Voltage Regulation		4.75		5.25	mV
Output Ripple and Noise <sup>2</sup>			40	100	mVp-p
Output Ripple and Noise <sup>2</sup>			8	25	mVrms
Output Current Range	Iout	0		4	A
Output DC Current Limit	Ioutlim	4.8	6	7	A
Short Circuit Surge	Ioutsurge		0.12	0.2	A <sup>2</sup> s
Turn on Time	Ton		50	150	ms
Overshoot at Turn On			0	3	%
Output Capacitance	Cout	0		1600	μF
<b>Transient Response<sup>3</sup></b>					
ΔV 50% to 100% of Max Load			125	250	mV
Settling Time	Ts		200	500	μs
ΔV 100% to 50% of Max Load			125	250	mV
Settling Time	Ts		200	500	μs

Note: All specifications are typical at nominal input, full load at 25° C unless otherwise stated.

1. Vin = 3.3V, Iout = full load, Ta = 25° C.

2. 0 - 20MHz BW, 0.1μF ceramic cap on output.

3. di/dt = 0.5A/μS, Vin = 3.3VDC, Ta = 25° C, and with a 470μF aluminum cap on output.

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### General Specifications

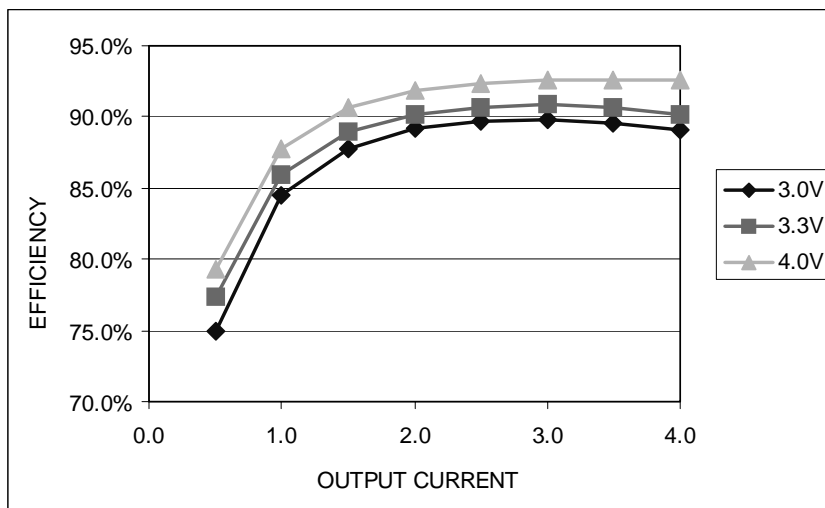
Parameter	Symbol	Min	Typical	Max	Units
Efficiency <sup>1</sup>	$\eta$	87	90		%
Switching Frequency	Fsw	180	200	220	kHz
Weight			9.3		g

1. Vin=3.3V, full load and Ta=25° C.

### Control Specifications

Parameter	Symbol	Min	Typical	Max	Units
Remote On/Off	Vouten				V
Signal Low (Unit Off)		-0.3		0.3	V
Signal High (Unit On)		2.8		5	V

### Efficiency Data



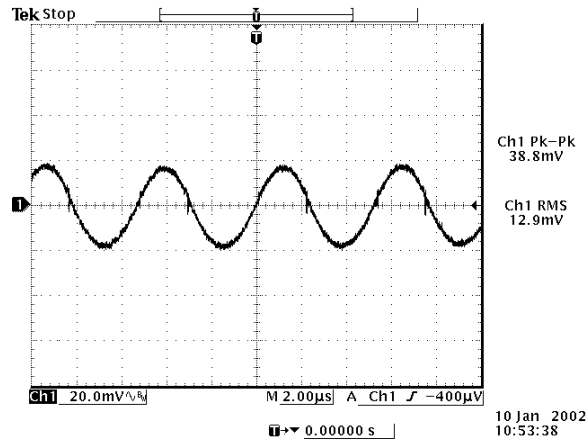
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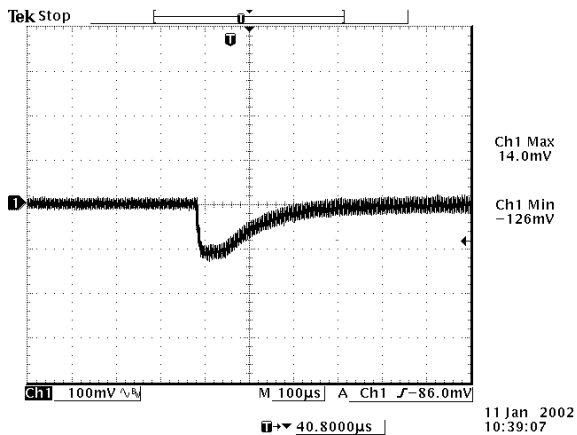
## Ripple and Noise



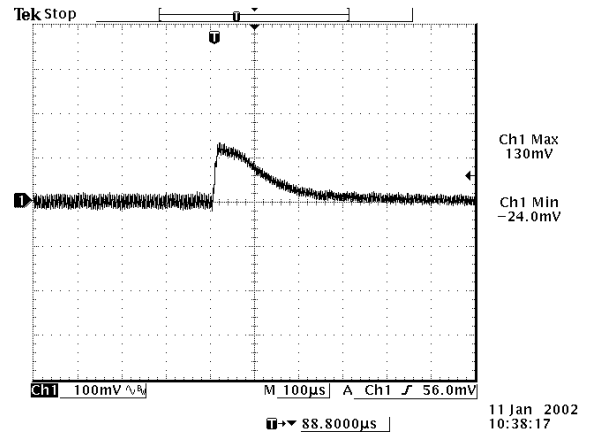
Ripple and noise at full load and 3.3Vdc input and  $T_a=25^\circ\text{C}$

## Transient Response

Transient response:  $di/dt = 0.5\text{A}/\mu\text{S}$ , external load capacitance  $C_o = 470\mu\text{F}$  (electrolytic)



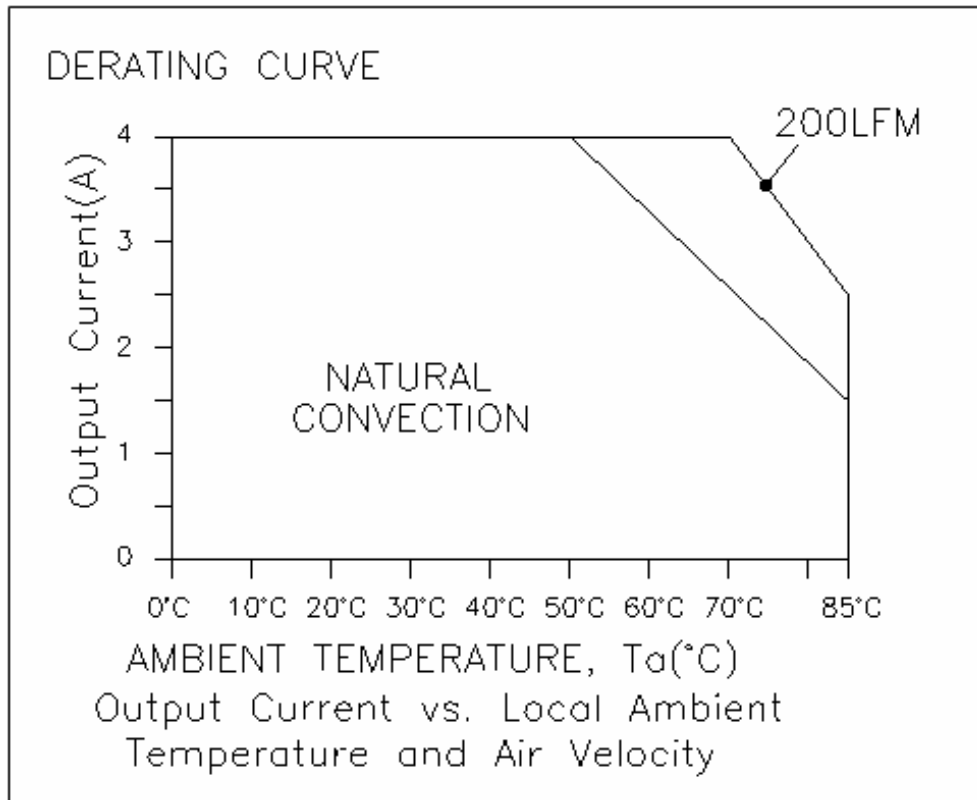
50% to 100% load transients at 3.3V input and  $T_a=25^\circ\text{C}$



100% to 50% load transients at 3.3V input and  $T_a=25^\circ\text{C}$

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**Thermal Considerations**



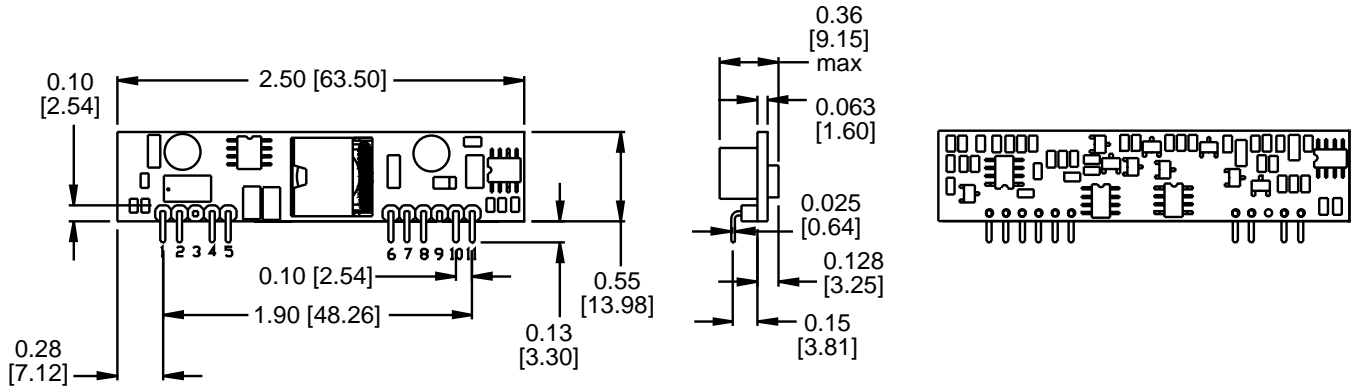
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### Mechanical



Dimensions are in inches [millimeters].  
Standard dimension tolerance is  $\pm 0.005$  [0.13] unless otherwise noted.

Pin	Function
1	+Vo
2	+Vo
3	No Pin
4	-Vo
5	-Vo
6	-Vin
7	-Vin
8	+Vin
9*	No Pin
10	+Vin
11	+Vin

\*Pin 9 used for remote on/off.

### 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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