

NON-ISOLATED DC/DC CONVERTERS

5V Input / 1.5 – 3.3V Output / 10A

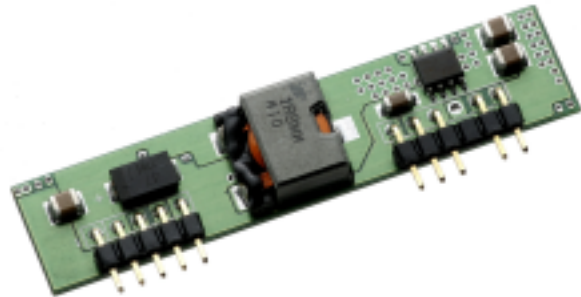


BP06VRPC-10B

VRPC-10B Series

RoHS Compliant

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



Description

The Bel VRPC-10B series modules are non-isolated DC/DC power converters that operate from a nominal 5V source. These converters are available in a range of output voltages from 1.5V to 3.3V. They are packaged in an industry standard single-in-line footprint with 10A maximum output. Standard features include remote on/off, over current and short circuit protection and output voltage adjust. Remote sense is an optional feature. These products may be used almost anywhere low voltage silicon is employed and a 5V source is available. Typical applications include file servers, routers, line cards and other computing and communications equipment.

Applications

- Telecommunications
- Networking
- Computers and peripherals

Options

- Remote sense

Part Number Selection

Output Voltage	Input Voltage	Max. Output Current	Max. Output Power	Typical Efficiency	Part Number	Part Number Remote Sense Option
3.3V	5V	10A	33W	94%	VRPC-10B330	VRPC-10B33S
2.5V	5V	10A	25W	92%	VRPC-10B250	VRPC-10B25S
1.5V	5V	10A	15W	87%	VRPC-10B150	VRPC-10B15S

BP06VRPC-10B

Absolute Maximum Ratings

Parameter	Symbol	Min	Typical	Max	Unit
Continuous Input Voltage	Vin	-0.3		6	V
Output Enable Terminal Voltage	Vouten	-0.3		6	V
Ambient Temperature	Tamb	0		70	°C
Storage Temperature	Tstor	-55		105	°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	Vin	4.5		5.5	V
Input Current	Iin			9.5	A
No Load Input Current			35	50	mA
Remote Off Input Current			3	10	mA
Input Reflected Ripple Current ¹			10	20	mA _{rms}
Input Reflected Ripple Current (P-P) ¹			40	80	mApk
I ² t Inrush Current Transient			0.05	0.07	A ² s
Turn On Voltage Threshold			4.25		V
Turn Off Voltage Threshold			3.85		V

Note: Input capacitance 1000µF/16V, ESR = 0.078 Ω max at 100kHz @ 25° C.
 1. With simulated source impedance of 500nH, 5Hz to 20MHz.

NON-ISOLATED DC/DC CONVERTERS

5V Input / 1.5 – 3.3V Output / 10A



BP06VRPC-10B

Output Specifications

Parameter	Module	Symbol	Min	Typical	Max	Units		
Output Voltage Set Point ¹	3.3V	Vout	3.234	3.3	3.366	V		
	2.5V						2.450	2.550
	1.5V						1.470	1.530
Load Regulation	3.3V			8	16	mV		
	2.5V			6	12			
	1.5V			5	10			
Line Regulation	All			5	10	mV		
Regulation Over Temperature 0° - 70° C	3.3V			20	40	mV		
	2.5V			17	30			
	1.5V			15	25			
Total Output Voltage Regulation	3.3V			33	66	mV		
	2.5V			28	52			
	1.5V			25	45			
Output Ripple and Noise ²	All			50	100	mVp-p		
Output Ripple and Noise ²	All			15	25	mVrms		
Output Current Range	All	Iout	0		10	A		
Output DC Current Limit	All	Ioutlim	13		25	A		
Short Circuit Surge	3.3V	Ioutsurge		0.25	0.3	A ² s		
	2.5V			0.2	0.25			
	1.5V			0.1	0.15			
Turn on Time	All	Ton		11	20	ms		
Overshoot at Turn On	All			0	3	%		
Output Capacitance	All	Cout	0		4700	μF		

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

1. Vin = 5V, Iout = full load, Ta = 25° C.

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

BP06VRPC-10B

Output Specifications

Parameter	Module	Symbol	Min	Typical	Max	Units
Transient Response³						
ΔV 50% to 100% of Max Load	3.3V			90	150	mV
Settling Time		Ts		40	80	μs
ΔV 100% to 50% of Max Load				100	150	mV
Settling Time		Ts		40	80	μs
Transient Response³						
ΔV 50% to 100% of Max Load	2.5V			90	130	mV
Settling Time		Ts		40	80	μs
ΔV 100% to 50% of Max Load				90	130	mV
Settling Time		Ts		40	80	μs
Transient Response³						
ΔV 50% to 100% of Max Load	1.5V			70	120	mV
Settling Time		Ts		40	80	μs
ΔV 100% to 50% of Max Load				80	120	mV
Settling Time		Ts		40	80	μs

Note: All specifications are typical at nominal input, full load at 25° C unless otherwise stated.
 3. di/dt = 0.5A/ μs , Vin = 5VDC, Ta = 25° C, and with a 470 μF aluminum cap on output.

NON-ISOLATED DC/DC CONVERTERS

5V Input / 1.5 – 3.3V Output / 10A



BP06VRPC-10B

General Specifications

Parameter	Module	Symbol	Min	Typical	Max	Units
Efficiency ¹	3.3V	η	92	94		%
	2.5V		90	92		
	1.5V		85	87		
Switching Frequency	All	Fsw	230	300	340	kHz
Output Voltage Trim Range	3.3V		70		110	%
	2.5V		70		110	
	1.5V		90		120	
Remote Sense Compensation	All				10	%
Weight	All			9.2		g

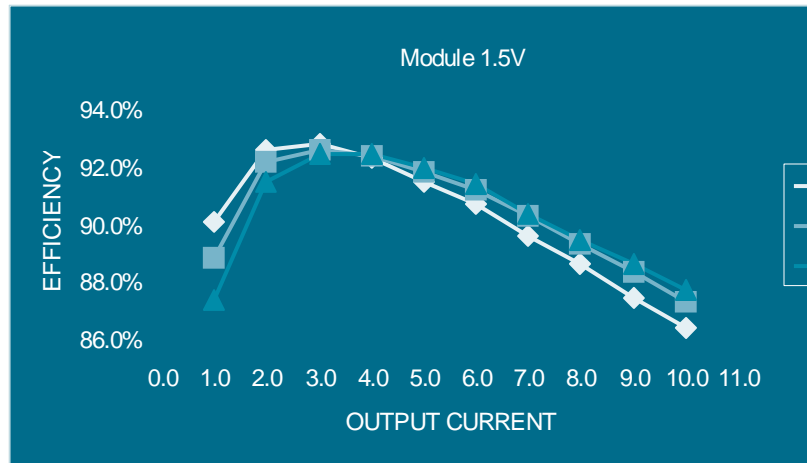
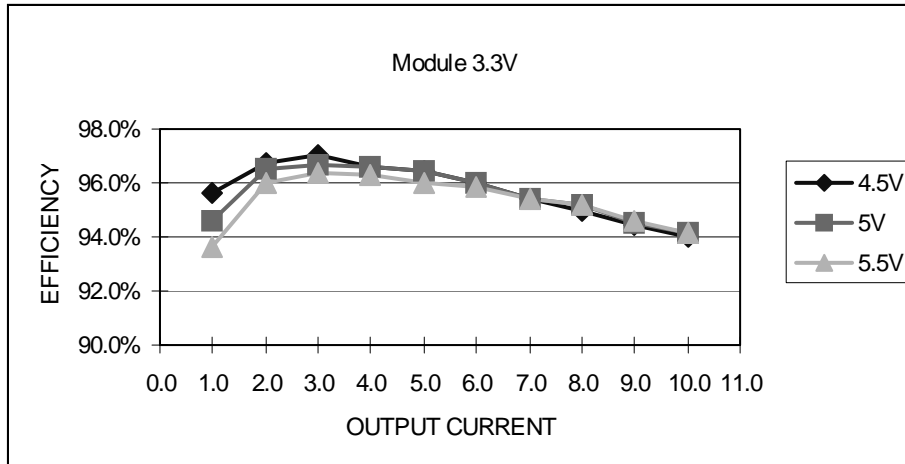
1. Vin=5V, full load and Ta=25° C.

Control Specifications

Parameter	Module	Symbol	Min	Typical	Max	Units
Remote On/Off	All	Vouten				V
Signal Low (Unit On)	All		-0.3		0.3	V
Signal High (Unit Off)	All		2.8		5.5	V

BP06VRPC-10B

Efficiency Data



©2006 Bel Fuse Inc. Specifications subject to change without notice. 06.06

CORPORATE

Bel Fuse Inc.
 206 Van Vorst Street
 Jersey City, NJ 07302
 Tel 201-432-0463
 Fax 201-432-9542
 www.belfuse.com

FAR EAST

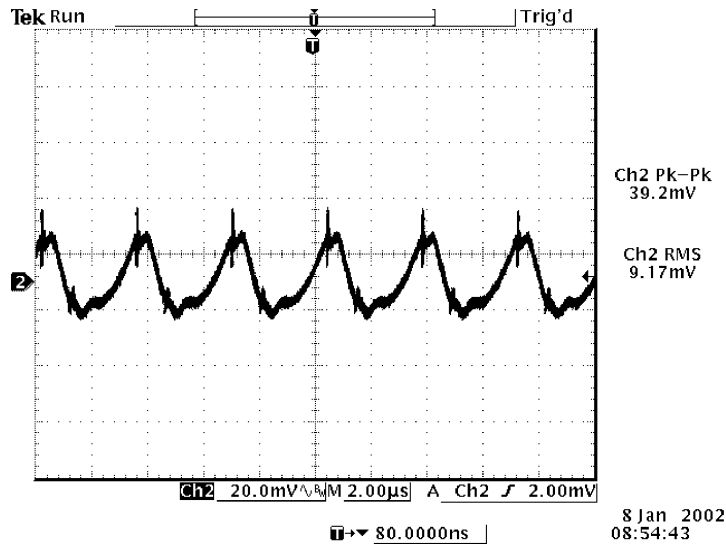
Bel Fuse Ltd.
 8F / 8 Luk Hop Street
 San Po Kong
 Kowloon, Hong Kong
 Tel 852-2328-5515
 Fax 852-2352-3706
 www.belfuse.com

EUROPE

Bel Fuse Europe Ltd.
 Preston Technology Management Centre
 Marsh Lane, Suite G7, Preston
 Lancashire, PR1 8UD, U.K.
 Tel 44-1772-556601
 Fax 44-1772-888366
 www.belfuse.com

BP06VRPC-10B

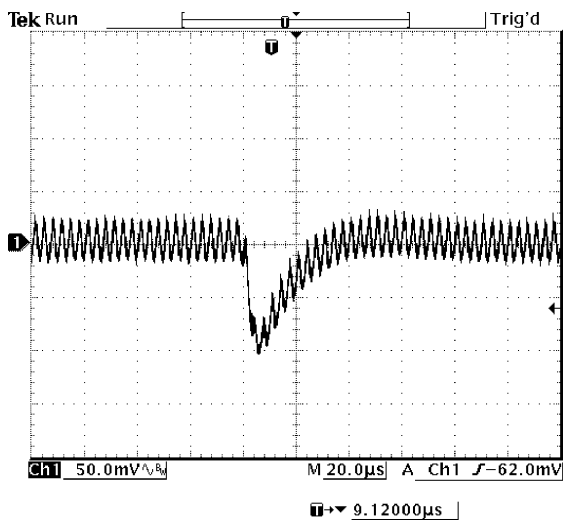
Ripple and Noise



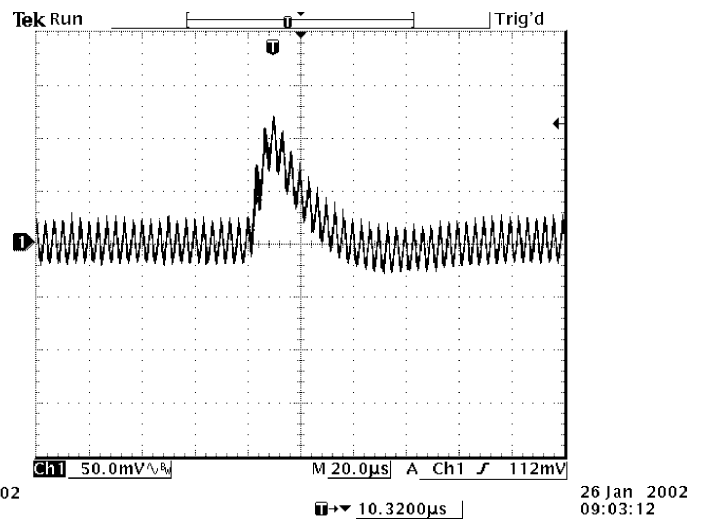
Ripple and noise at full load and 5Vdc input and $T_a=25^\circ\text{C}$

Transient Response

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



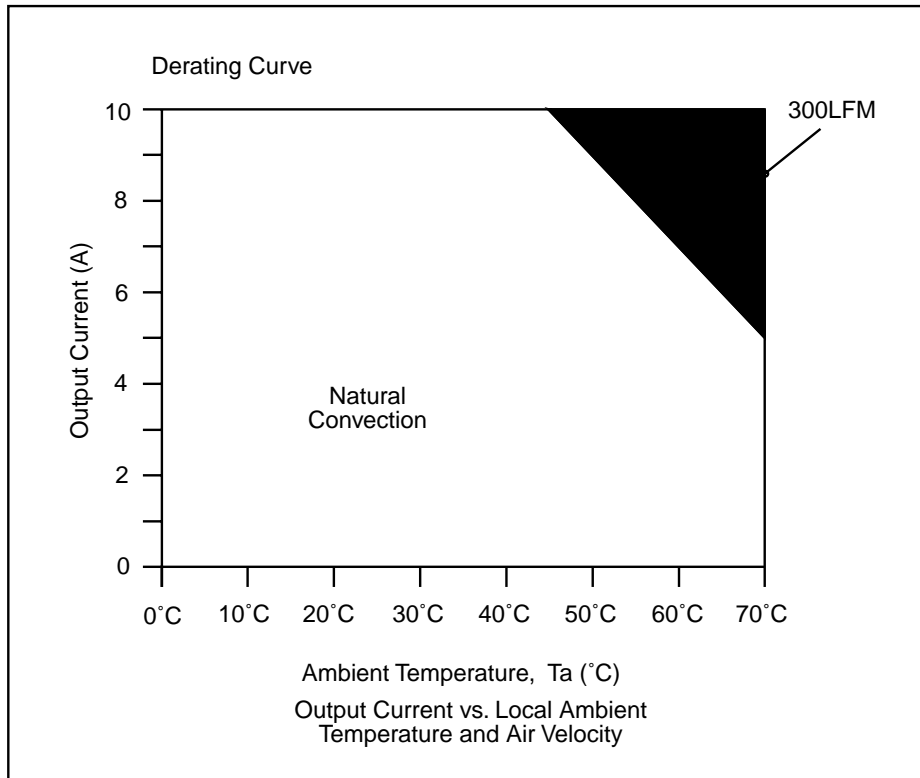
50% to 100% load transients at 5V input and $T_a=25^\circ\text{C}$



100% to 50% load transients at 5V input and $T_a=25^\circ\text{C}$

BP06VRPC-10B

Thermal Considerations



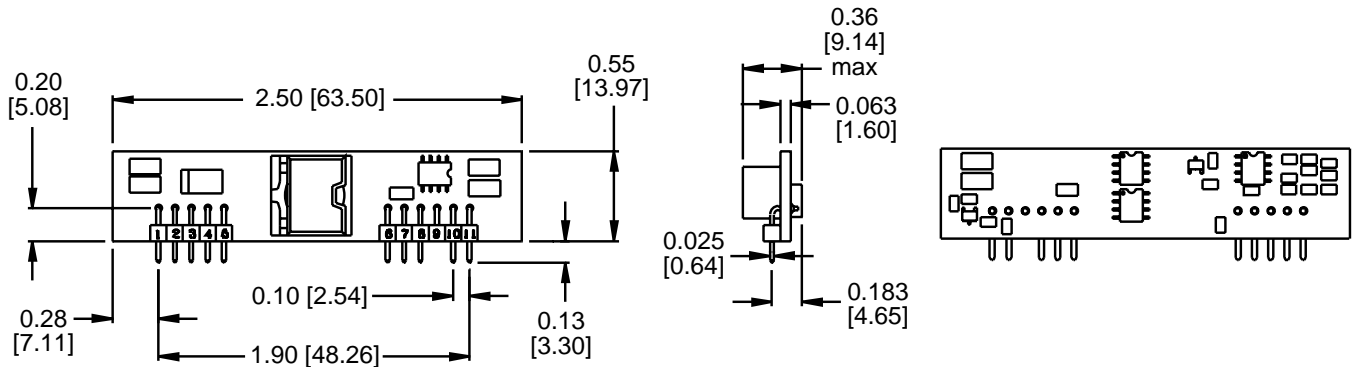
NON-ISOLATED DC/DC CONVERTERS

5V Input / 1.5 – 3.3V Output / 10A



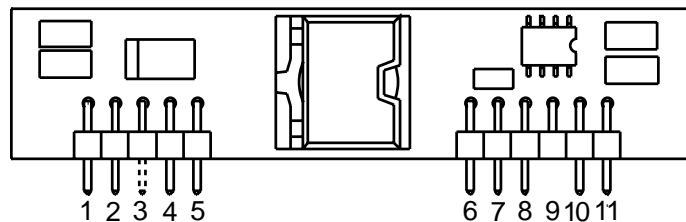
BP06VRPC-10B

Mechanical



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

Pin	Function
1	+Vo
2	+Vo
3*	No Pin
4	+Vo
5	Ground
6	Ground
7	+Vin
8	+Vin
9	No Pin
10	Trim
11	Remote On/Off



*Pin 3 used for remote sense option.

RoHS Compliance

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



©2006 Bel Fuse Inc. Specifications subject to change without notice. 06.06

CORPORATE

Bel Fuse Inc.
206 Van Vorst Street
Jersey City, NJ 07302
Tel 201-432-0463
Fax 201-432-9542
www.belfuse.com

FAR EAST

Bel Fuse Ltd.
8F / 8 Luk Hop Street
San Po Kong
Kowloon, Hong Kong
Tel 852-2328-5515
Fax 852-2352-3706
www.belfuse.com

EUROPE

Bel Fuse Europe Ltd.
Preston Technology Management Centre
Marsh Lane, Suite G7, Preston
Lancashire, PR1 8UD, U.K.
Tel 44-1772-556601
Fax 44-1772-888366
www.belfuse.com