

NON-ISOLATED DC/DC CONVERTERS

5V Input / 1.5 – 3.3V Output / 6A

bel
POWER PRODUCTS

BP06VRPB-06B

VRPB-06B Series

RoHS Compliant

- Nonisolated
- Industry standard pinout with shorter package length
- Fixed frequency
- High efficiency
- Excellent thermal performance
- Low cost
- Remote on/off
- Undervoltage lockout
- Over current and short circuit protection



Description

The Bel VRPB-06B series modules are non-isolated, step down 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 and provide a maximum 6A output. Standard features include remote on/off, over current protection and output voltage adjust. Optional features include remote sense and industrial temperature range. 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
- Industrial temperature range

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	6A	19.8W	94%	VRPB-06B330	VRPB-06B33S
2.5V	5V	6A	15.0W	91%	VRPB-06B250	VRPB-06B25S
1.5V	5V	6A	9.0W	87%	VRPB-06B150	VRPB-06B15S

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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	-40		105	°C

Use beyond the maximum ratings may cause a reliability degradation of the DC/DC converter or may permanently damage the device.

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Input Specifications

Parameter	Symbol	Min	Typical	Max	Units
Operating Input Voltage	Vin	4.5		5.5	V
Input Current	Iin			5.5	A
No Load Input Current				50	mA
Remote Off Input Current			3	10	mA
Input Reflected Ripple Current ¹				35	mA _{rms}
Input Reflected Ripple Current (P-P) ¹				120	mApk
I ² t Inrush Current Transient			0.01	0.02	A ² s
Turn On Voltage Threshold			4		V
Turn Off Voltage Threshold		3.45	3.9	4.45	V

Note: Input capacitance 330µF/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	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	2.5	2.550	
	1.5V		1.470	1.5	1.530	
Load Regulation	3.3V			7	16	mV
	2.5V			5	10	
	1.5V			3	10	
Line Regulation	All			3	10	mV
Regulation Over Temperature 0° - 70° C	3.3V			10	46	mV
	2.5V			10	35	
	1.5V			10	21	
Total Output Voltage Regulation	3.3V			20	72	mV
	2.5V			18	55	
	1.5V			16	40	
Output Ripple and Noise ²	All			60	100	mVp-p
Output Ripple and Noise ²	All			13	20	mVrms
Output Current Range	All	Iout	0		6	A
Output DC Current Limit	All	Ioutlim	7.8		15	A
Short Circuit Surge	3.3V	Ioutsurge		0.08	0.2	A ² s
	2.5V			0.03	0.1	
	1.5V			0.05	0.1	
Turn on Time	All	Ton		12	20	ms
Overshoot at Turn On	All			0	3	%
Output Capacitance	All	Cout	0		2200	μF
Transient Response ³						
ΔV 50% to 100% of Max Load	All			50	100	mV
Settling Time		Ts		20	40	μs
ΔV 100% to 50% of Max Load				50	100	mV
Settling Time		Ts		20	40	μs

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.

3. di/dt=0.5A/uS, Vin=5 VDC, Ta=25° C with a 47μF aluminum cap on output.

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General Specifications

Parameter	Module	Symbol	Min	Typical	Max	Units
Efficiency ¹	3.3V	η	91	94		%
	2.5V		88	91		
	1.5V		84	87		
Switching Frequency	All	F _{sw}	230	300	340	kHz
Output Voltage Trim Range	3.3V		70		110	%
	2.5V		70		110	
	1.5V		90		110	
Remote Sense Compensation	All			0.5	V	
Weight	All			6.1		g

1. Vin=5V, full load and Ta=25° C.

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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

Thermal Considerations

This product operates at maximum output current over the entire specified temperature range in a convection cooled environment. No thermal derating is necessary.

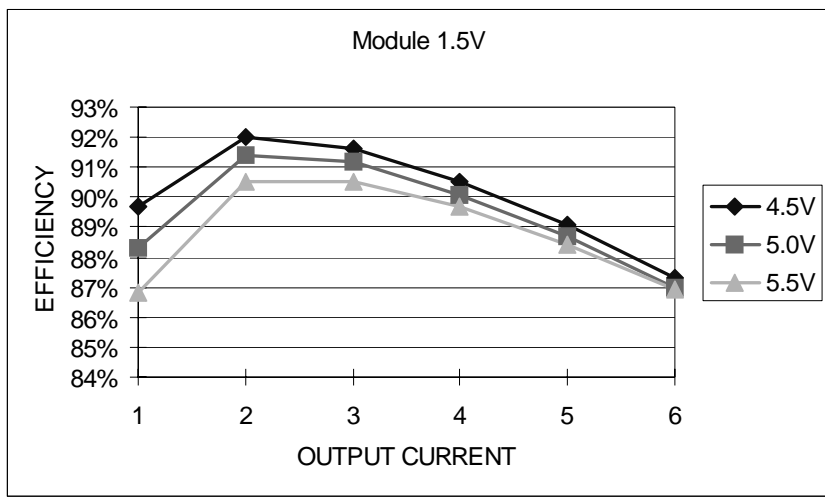
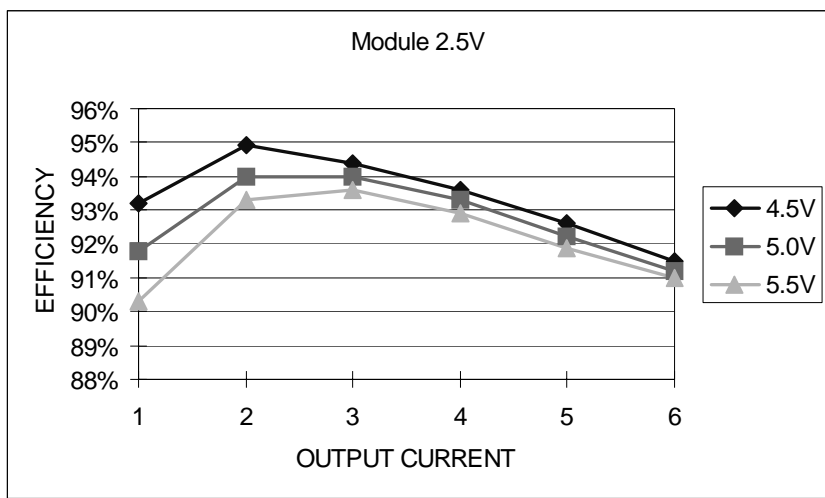
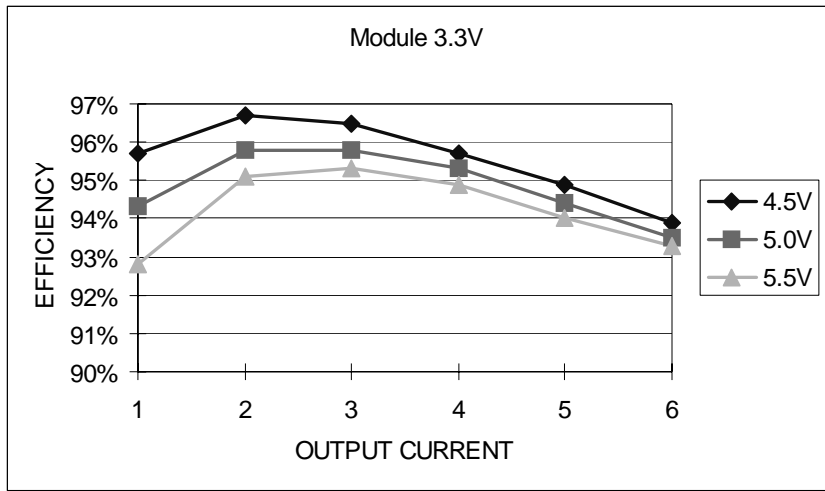
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Efficiency Data



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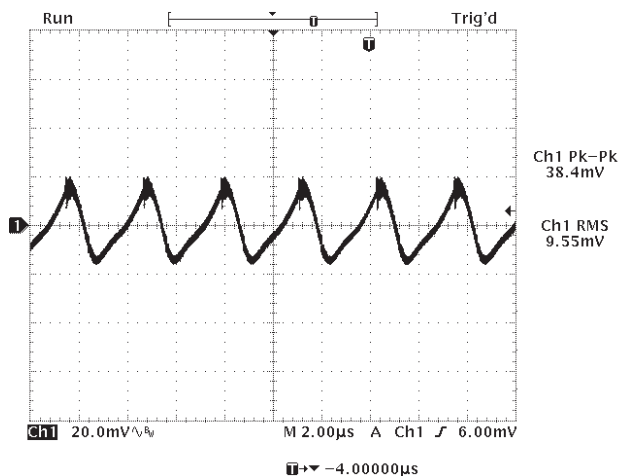
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Ripple and Noise

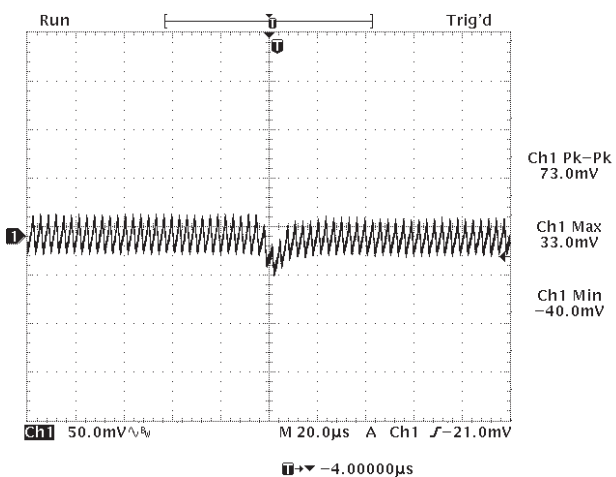


Ripple and noise at full load and 5Vdc input and Ta=25° C

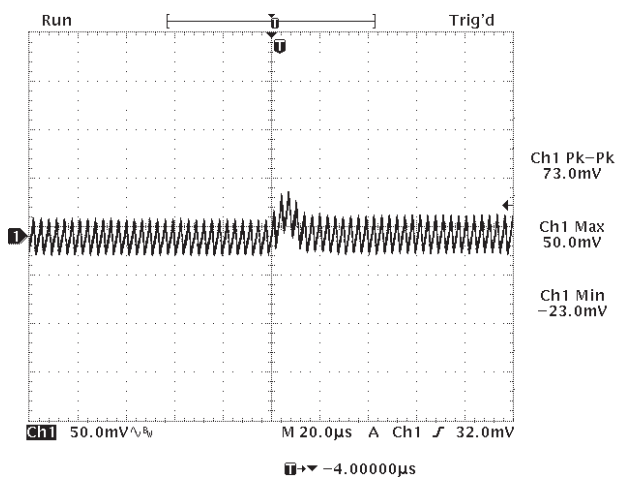
Transient Response

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Transient response: di/dt = 0.5A/µS, external load capacitance Co = 47µF (electrolytic)



50% to 100% load transients at 5V input and Ta=25° C



100% to 50% load transients at 5V input and Ta=25° C

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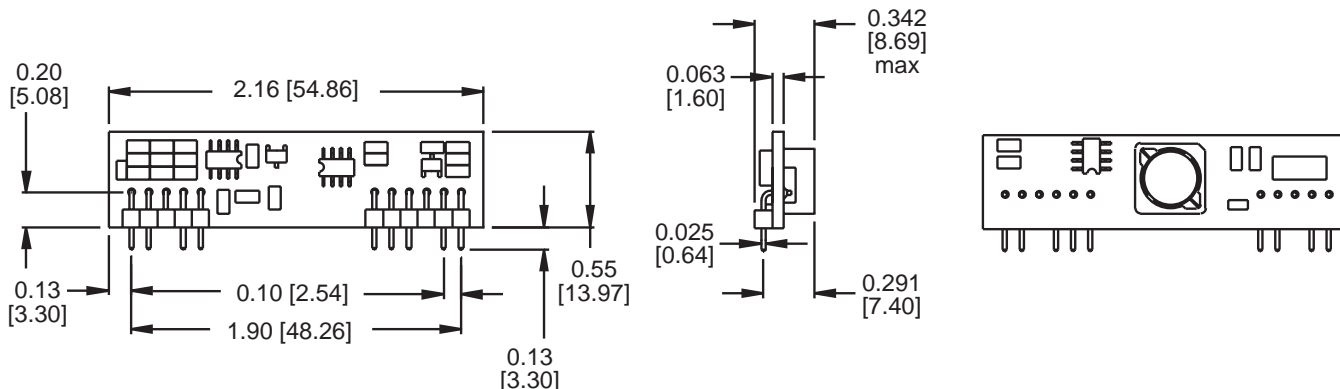
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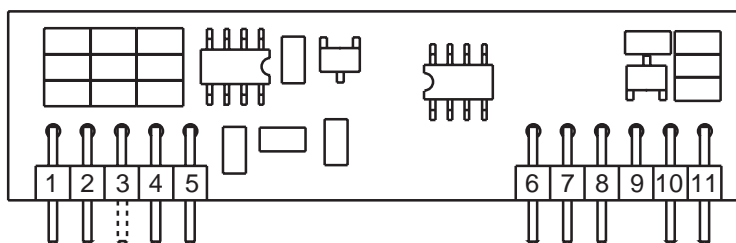
Mechanical



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

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*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.



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