

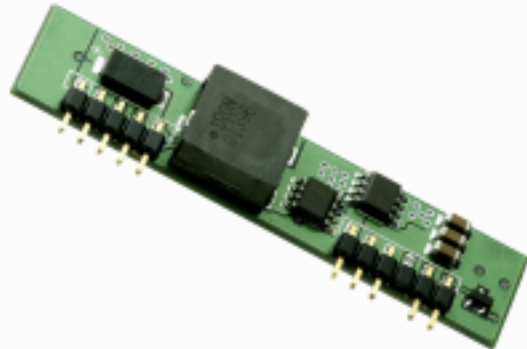
NON-ISOLATED DC/DC CONVERTERS

3.3V Input / 1.5 – 2.5V Output / 10A

VRPC-10C 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-10C series modules are non-isolated, DC/DC power converters that operate from a nominal 3.3V source. These converters are available in a range of output voltages from 1.5V to 2.5V. 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 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

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
2.5V	3.3V	10A	25W	92%	VRPC-10C250	VRPC-10C25S
1.8V	3.3V	10A	18W	87%	VRPC-10C180	VRPC-10C18S
1.5V	3.3V	10A	15W	86%	VRPC-10C150	VRPC-10C15S

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Absolute Maximum Ratings

Parameter	Symbol	Min	Typical	Max	Unit
Continuous Input Voltage	V _{in}	-0.3		4	V
Output Enable Terminal Voltage	V _{outen}	-0.3		4	V
Ambient Temperature	T _{amb}	0		70	°C
Storage Temperature	T _{stor}	-40		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	Symbol	Min	Typical	Max	Units
Operating Input Voltage	V _{in}	3	3.3	3.6	V
Input Current	I _{in}			9.2	A
No Load Input Current				100	mA
Remote Off Input Current			10	22	mA
Input Reflected Ripple Current ¹			20	40	mA _{rms}
Input Reflected Ripple Current (P-P) ¹			90	150	mApk
I ² t Inrush Current Transient			0.02	0.05	A ² s
Turn On Voltage Threshold			2.85		V
Turn Off Voltage Threshold			2.3		V

Note: Input capacitance 2 x 270µF/16V, 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	2.5V	Vout	2.45	2.5	2.55	V
	1.8V		1.76	1.8	1.84	
	1.5V		1.47	1.5	1.53	
Load Regulation	2.5V			7.5	12.5	mV
	1.8V		5.4	9.0		
	1.5V		4.5	7.5		
Line Regulation	2.5V			3	7.5	mV
	1.8V		2.5	5.4		
	1.5V		2	4.5		
Regulation Over Temperature 0° - 70° C	2.5V			12	30	mV
	1.8V		10	20		
	1.5V		7	15		
Total Output Voltage Regulation	2.5V				50	mV
	1.8V		34.4			
	1.5V		27			
Output Ripple and Noise ²	All			70	100	mVp-p
Output Ripple and Noise ²	All			18	25	mVrms
Output Current Range	All	Iout	0		10	A
Output DC Current Limit	All	Ioutlim	13		25	A
Short Circuit Surge	2.5V	Ioutsurge		0.15	0.2	A ² s
	1.8V		0.27	0.5		
	1.5V		0.27	0.5		
Turn on Time	All	Ton		10	20	ms
Overshoot at Turn On	All				3	%
Output Capacitance	All	Cout	0		4000	μF

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.

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Output Specifications

Parameter	Module	Symbol	Min	Typical	Max	Units
Transient Response ³						
ΔV 50% to 100% of Max Load	2.5V			100	150	mV
Settling Time		Ts		35	50	μs
ΔV 100% to 50% of Max Load				100	150	mV
Settling Time		Ts		35	50	μs
Transient Response ³						
ΔV 50% to 100% of Max Load	1.8V			100	150	mV
Settling Time		Ts		35	50	μs
ΔV 100% to 50% of Max Load				100	150	mV
Settling Time		Ts		35	50	μs
Transient Response ³						
ΔV 50% to 100% of Max Load	1.5V			100	150	mV
Settling Time		Ts		35	50	μs
ΔV 100% to 50% of Max Load				100	150	mV
Settling Time		Ts		35	50	μs

Note: All specifications are typical at nominal input, full load at 25° C unless otherwise stated.
 $3. di/dt = 0.5A/\mu s$, $V_{in} = 3.3VDC$, $T_a = 25^\circ C$, and with a 470 μF aluminum cap on output.

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General Specifications

Parameter	Module	Symbol	Min	Typical	Max	Units
Efficiency ¹	2.5V	η	88	92		%
	1.8V		84	87		
	1.5V		82	86		
Switching Frequency	All	Fsw	250	300	340	kHz
Output Voltage Trim Range ²	2.5V		90		105	%
	1.8V		90		110	
	1.5V		90		110	
Remote Sense Compensation	2.5V				5	%
	1.8V				10	
	1.5V				10	
Weight	All			8.3		g

1. Vin=3.3V, full load and Ta=25° C.

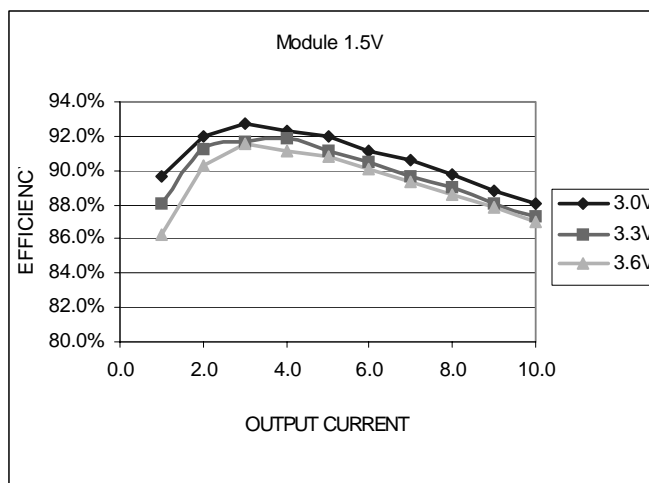
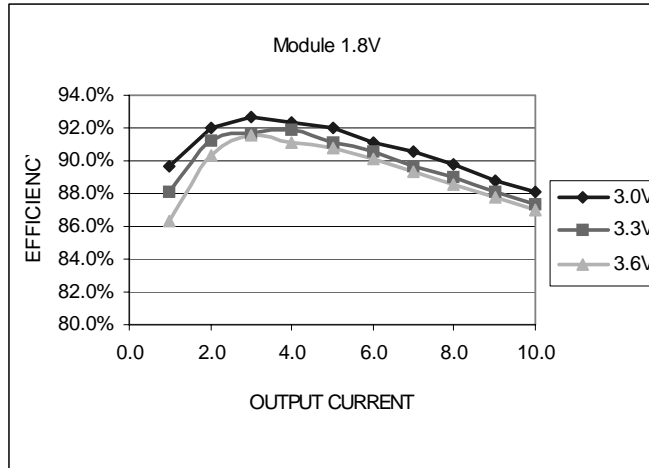
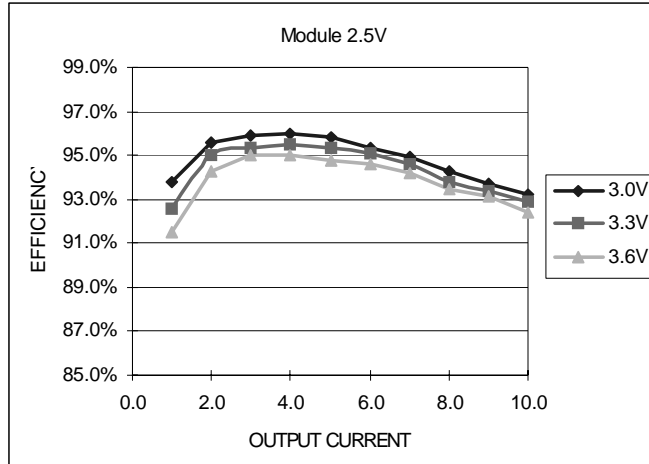
2. Total adjustment of trim, setpoint and remote sense combined should not exceed 5% @nominal Vin, 25° C ambient for the 2.5V output module.

Control Specifications

Parameter	Module	Symbol	Min	Typical	Max	Units
Remote On/Off	All	Vouten				V
Signal Low (Unit Off)	All		-0.3		0.3	V
Signal High (Unit On)	All		2.8		4	V

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Efficiency Data



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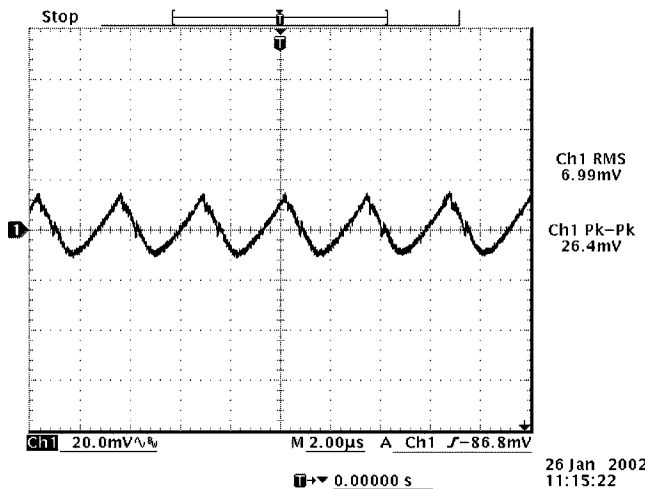
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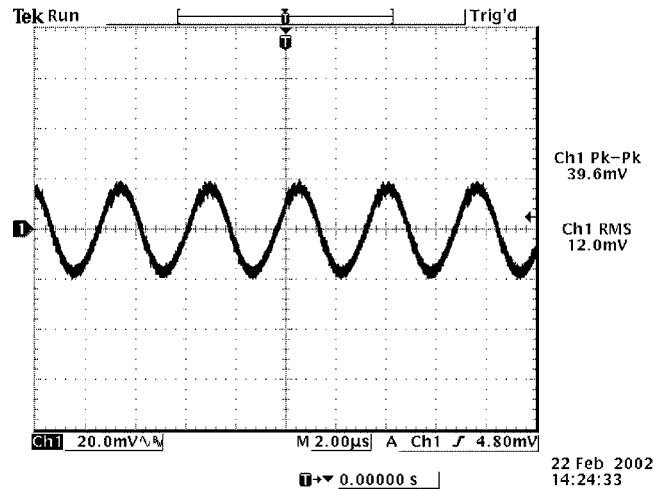
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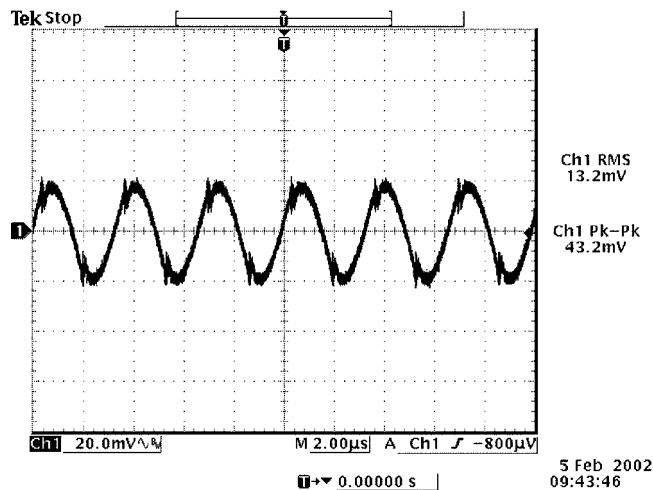
Ripple and Noise



Ripple and noise at full load and 3.3Vdc input, 2.5V output and $T_a=25^\circ\text{C}$



Ripple and noise at full load and 3.3Vdc input, 1.8V output and $T_a=25^\circ\text{C}$

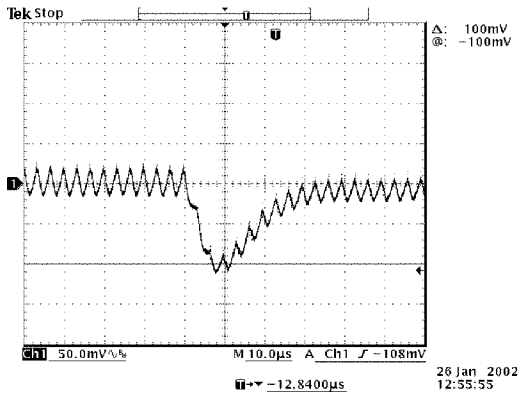


Ripple and noise at full load and 3.3Vdc input, 1.5V output and $T_a=25^\circ\text{C}$

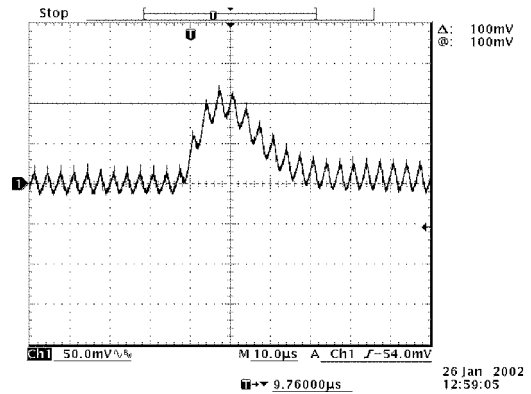
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Transient Response

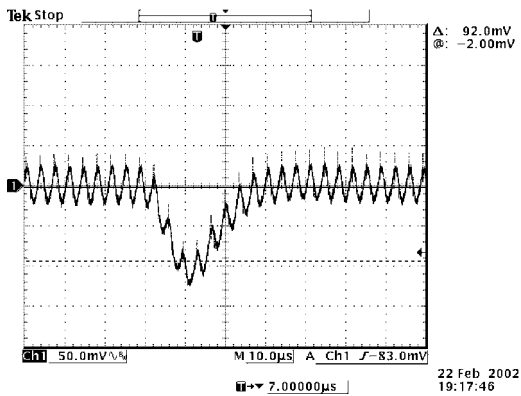
Transient response: $di/dt = 0.5A/\mu S$, external load capacitance $C_o = 470\mu F$ (electrolytic)



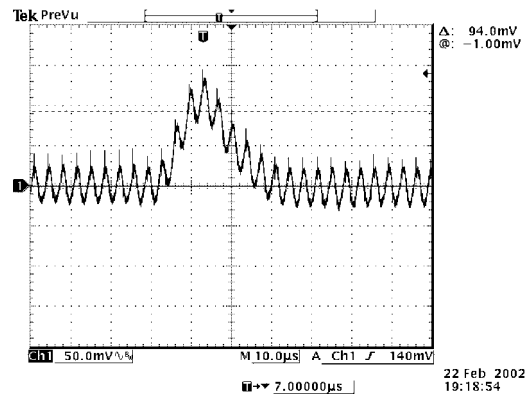
Vout=2.5V
50% to 100% load transients at 3.3V input and $T_a=25^\circ C$



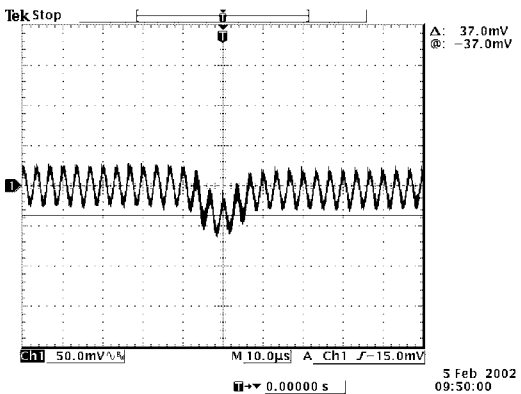
Vout=2.5V
100% to 50% load transients at 3.3V input and $T_a=25^\circ C$



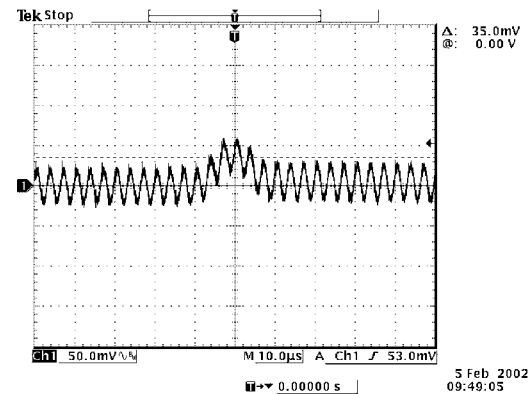
Vout=1.8V
50% to 100% load transients at 3.3V input and $T_a=25^\circ C$



Vout=1.8V
100% to 50% load transients at 3.3V input and $T_a=25^\circ C$



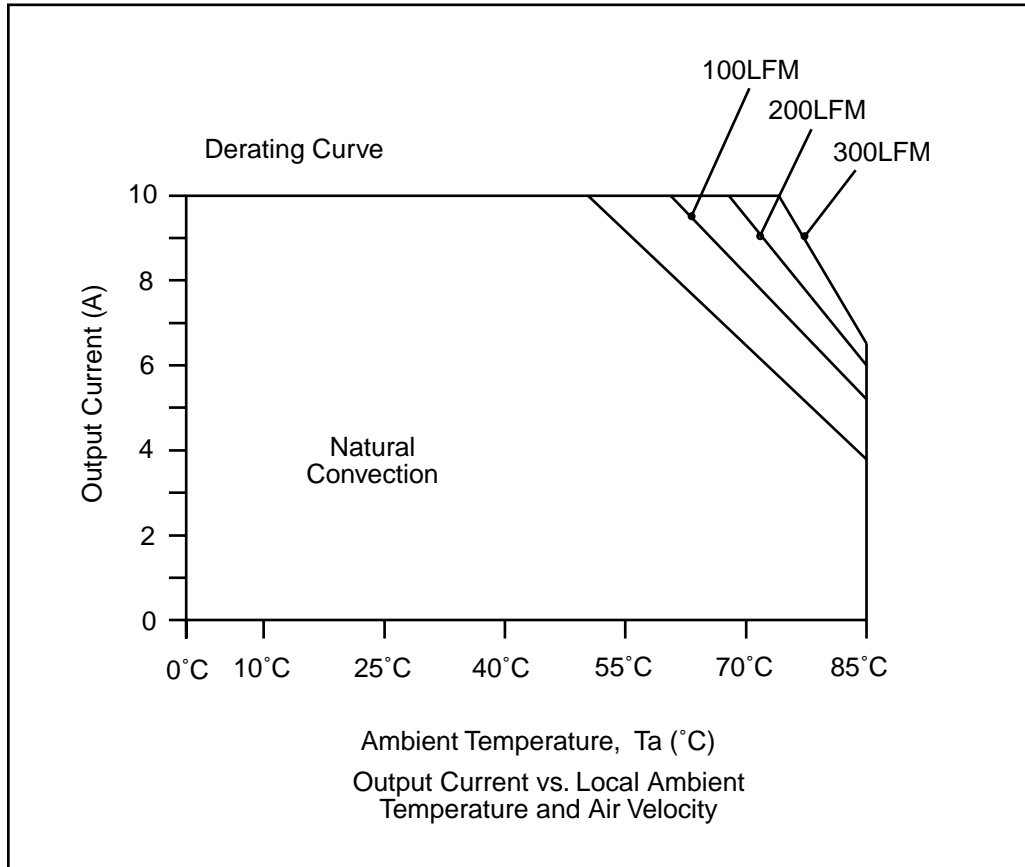
Vout=1.5V
50% to 100% load transients at 3.3V input and $T_a=25^\circ C$



Vout=1.5V
100% to 50% load transients at 3.3V input and $T_a=25^\circ C$

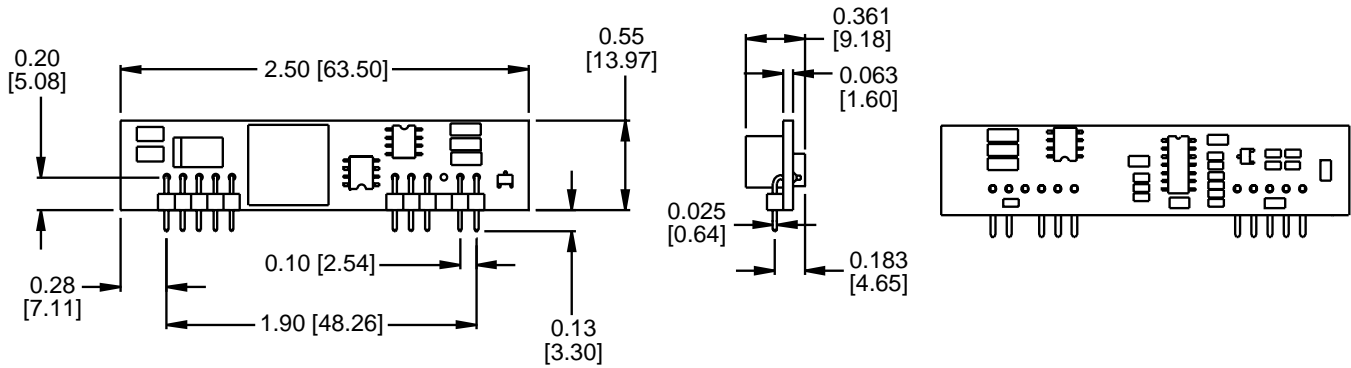
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Thermal Considerations

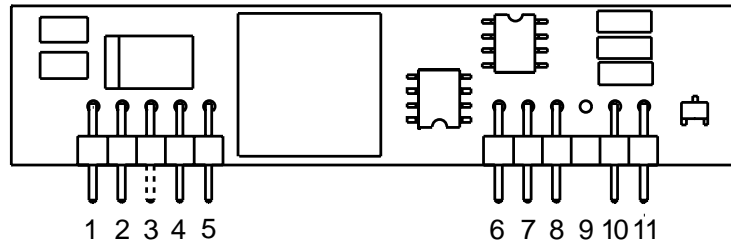


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Mechanical



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.



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