

## NON-ISOLATED DC/DC CONVERTERS

12 Vdc Input Vref/2 / 10 A Output

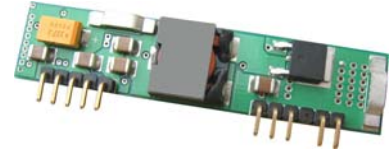
**bel**  
POWER PRODUCTS

VRPC-10AT5x

RoHS Compliant

Rev.A

- Non-Isolated
- High Efficiency
- High Power Density
- Low Cost
- Remote On/Off
- Under-voltage Lockout (UVLO)
- OCP/SCP
- Remote Sense



### Description

The VRPC-10AT5x is a non-isolated step down dc/dc converter that operates from a nominal 12 V source. This converter is designed specifically to provide bus termination voltages in applications such as DDR (double data rate) memory where the bus termination voltage must closely track the I/O bus voltage. The converter accepts a reference input and uses this to program its output voltage to 50% of the reference. The unit is packaged in an industry-standard single-in-line footprint and provides a maximum 10 A output. Standard features include remote on/off, input under-voltage lockout, over current protection and remote sense. Replace "x" in the part number with "S" or "A" depending on your specific application and specific external capacitor bank.

### Part Selection

Output Voltage	Input Voltage	Max. Output Current	Max. Output Power	Typical Efficiency	Model Number
Vref/2	12 V	10 A	25 W	82%	VRPC-10AT5S
Vref/2	12 V	10 A	25 W	82%	VRPC-10AT5A

- Notes:** 1. All part numbers above indicate RoHS 6. Change the second letter "R" to "7" for RoHS 5 part numbers.  
2. Add "G" suffix at the end of the model number to indicate "Tray Packaging". See page 5 for model number differences.

### Absolute Maximum Ratings

Parameter	Min	Typ	Max	Notes
Input Voltage (continuous)	-0.3 V	-	15 V	
Output Enable Terminal Voltage	-0.3 V	-	15 V	
Ambient Temperature	0 °C	-	70 °C	
Storage Temperature	-40 °C	-	100 °C	

### Input Specifications

Parameter	Min	Typ	Max	Notes
Input Voltage	10.8 V	-	13.2 V	
Input Current (full load)	-	-	2.1 A	
Input Current (no load)	-	-	50 mA	
Remote Off Input Current	-	3	15 mA	
Input Reflected Ripple Current (pk-pk)	-	-	180 mA	Tested with a 470 uF/16 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)	-	-	50 mA	
I <sup>2</sup> t Inrush Current Transient	-	0.08 A <sup>2</sup> s	0.16 A <sup>2</sup> s	
Turn-on Voltage Threshold	-	9.7 V	-	
Turn-off Voltage Threshold	8.0 V	8.8 V	10 V	

**Note:** All specifications are tested at Vref =2.5 V.

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### Output Specifications

Parameter	Min	Typ	Max	Notes	
Output Voltage Set Point	0.98 (Vref/2) V	Vref/2 V	1.02 (Vref/2) V	Vin=12 V, Iout= full load	
Load Regulation	-	3 mV	10 mV		
Line Regulation	-	3 mV	10 mV		
Regulation Over Temperature (0 °C to 70 °C)	-	5 mV	20 mV		
Output Current	0 A	-	10 A		
Current Limit Threshold	13 A	-	25 A		
Short Circuit Surge Transient	-	0.35 A <sup>2</sup> s	0.7 A <sup>2</sup> s		
Output Ripple and Noise (pk-pk)	-	45 mV	100 mV	Test conditions: 0-20 MHz BW, 0.1 uF ceramic capacitor at the output	
Output Ripple and Noise (rms)	-	11 mV	25 mV		
Turn on Time	-	50 mS	80 mS		
Overshoot at Turn on	-	0%	3%		
Output Capacitance	470 uF	-	5600 uF		
<b>Transient Response</b>					
-50% ~ 50% Max Load	Vo= Vref/2 V	-	100 mV	150 mV	Test conditions: di/dt = 0.1 A/uS; Vin = 12 V; with a 470 uF electrolytic capacitor at the output
Settling Time		-	40 uS	70 uS	
50% ~ -50% Max Load		-	100 mV	150 mV	
Settling Time		-	40 uS	70 uS	

- Notes:** 1. All specifications are typical at nominal input, full load at 25 °C unless otherwise stated.  
2. All specifications are tested at Vref=2.5 V.

### General Specifications

Parameter	Min	Typ	Max	Notes
Efficiency (Vin=12 V, Io=Io-max )	80%	82%	-	
Switching Frequency	180 kHz	200 kHz	220 kHz	
MTBF	3,403,119 hours			Calculated Per Bell Core SR-332 (Io = 80% load; Vin=12 V; Ta = 25 °C)
Dimensions Inches (L x W x H) Millimeters (L x W x H)	2.5 x 0.55 x 0.37 63.5 x 13.97 x 9.4			
Remote sense compensation	-	-	0.5V	
Weight	-	9.5 g	-	

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

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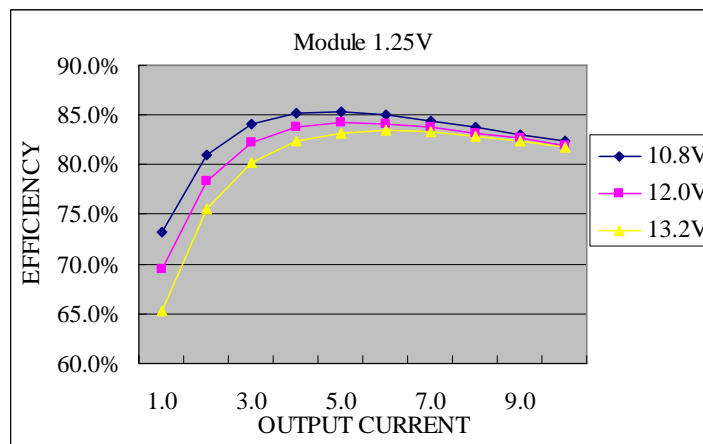
12 Vdc Input Vref/2 / 10 A Output



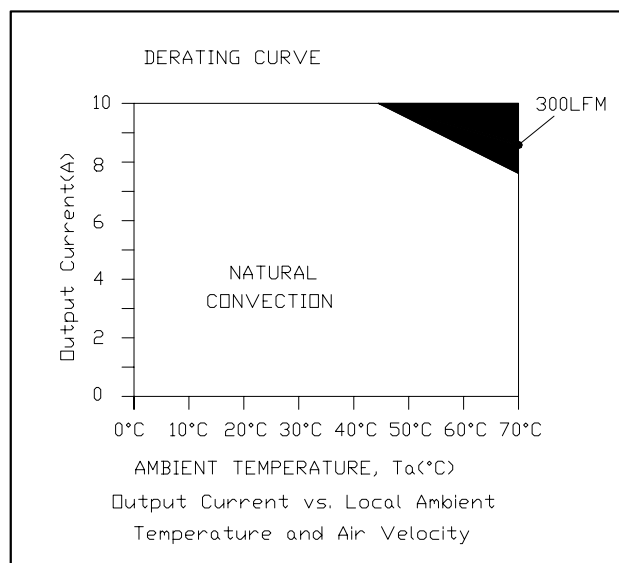
## Control Specifications

Parameter	Min	Typ	Max	Notes
<b>Remote On/Off</b>				
Signal Low (Unit Off)	-0.3 V	-	0.3 V	
Signal High (Unit On)	2.8 V	-	13.2 V	

## Efficiency Data



## Thermal Derating Curve

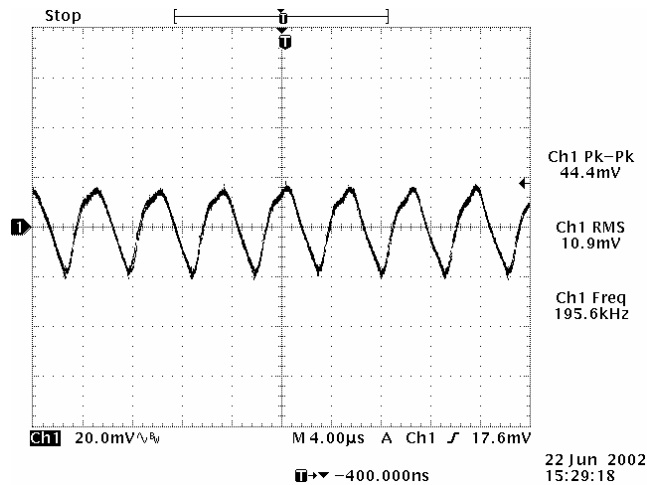


# NON-ISOLATED DC/DC CONVERTERS

12 Vdc Input  $V_{ref}/2$  / 10 A Output

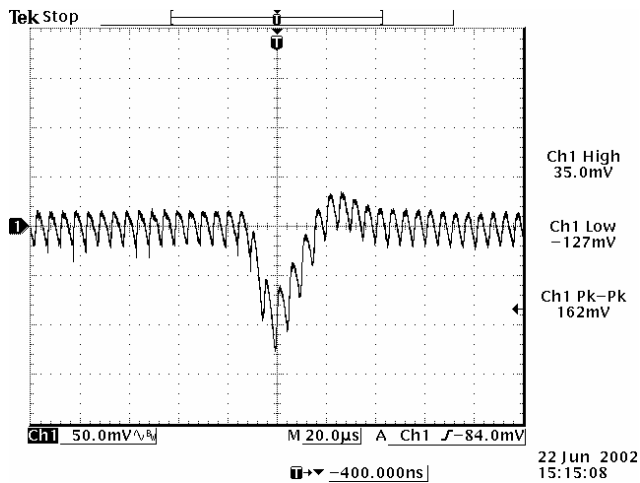


## Ripple and Noise Waveform

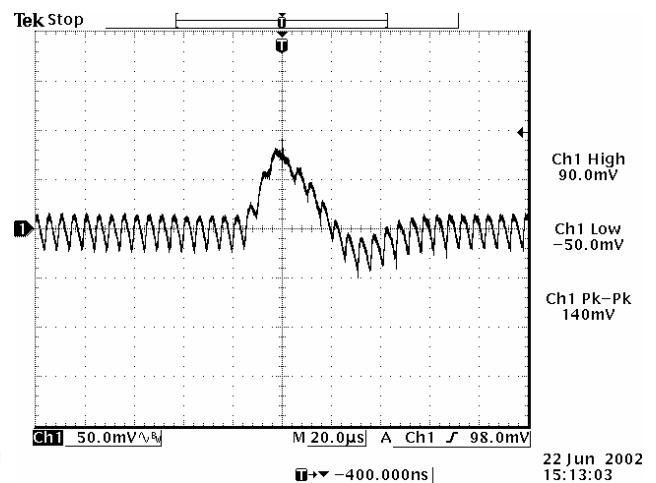


**Note:** Ripple and noise at full load, 12 Vdc input and  $T_a=25$  deg C.

## Transient Response Waveforms



-50% to 50% load Transient at 12V input



50% to -50% load Transient at 12V input

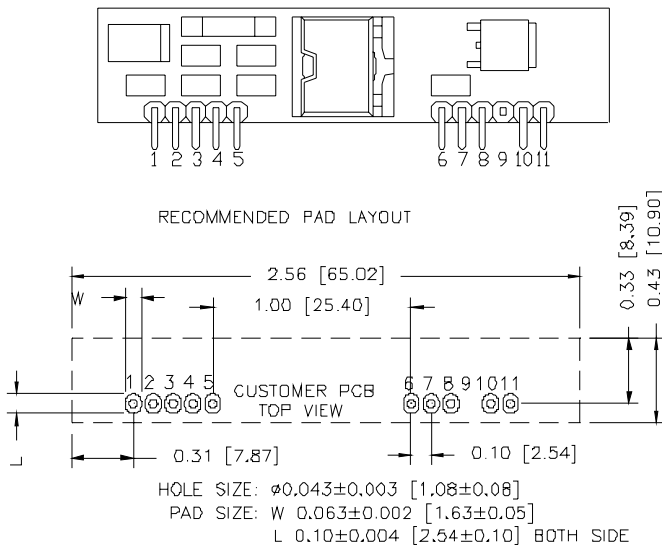
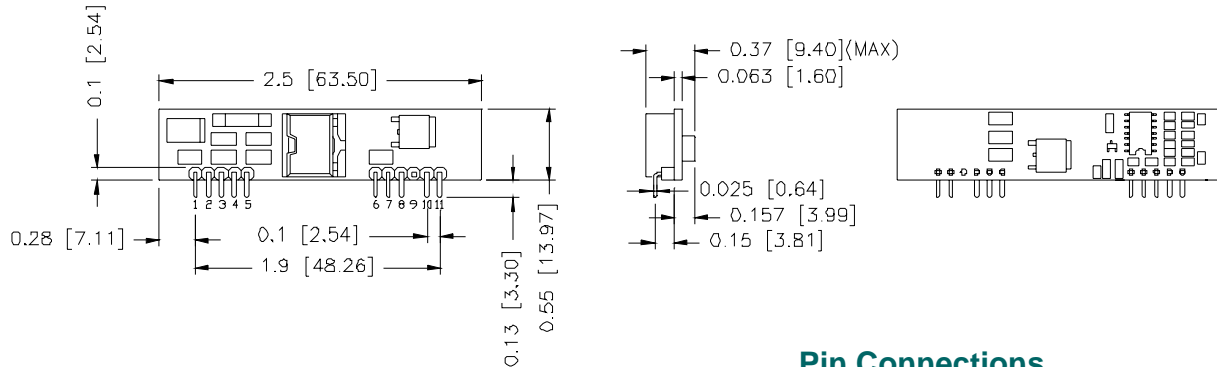
**Note:** Transient response at  $di/dt=0.5$  A/ $\mu$ S, with external load capacitance  $C_o=470$   $\mu$ F(electrolytic), and  $T_a=25$  deg C.

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## Mechanical Outline



## Pin Connections

Pin	Function
1	Vo+
2	Vo+
3	Opt. Remote Sense (+)
4	Vo+
5	Ground
6	Ground
7	Vin+
8	Vin+
9	Not used
10	Vref
11	Remote On/Off

## Model Number Description

**VRPC-10AT5S:** Designed to accept its reference input from a G7NB-81A180. For use with other reference inputs, consult factory. Compensated for 1 x 560 uF Oscon external capacitor.

**VRPC-10AT5A:** Designed to accept its reference input from a V7XE-20AS20. For use with other reference inputs, consult factory. Compensated for 12 x 100 uF ceramic in parallel with 2 X 820 uF Oscon in parallel with 16 X 4.7 uF ceramic.

## 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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