

NON-ISOLATED DC/DC CONVERTERS

12 Vdc Input Vref/2 / 10 A Output

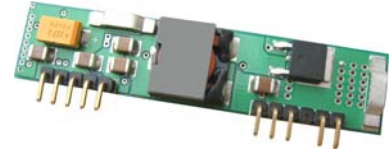
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POWER PRODUCTS

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 ² t Inrush Current Transient	-	0.08 A ² s	0.16 A ² 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 ² s	0.7 A ² 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		
Transient Response					
-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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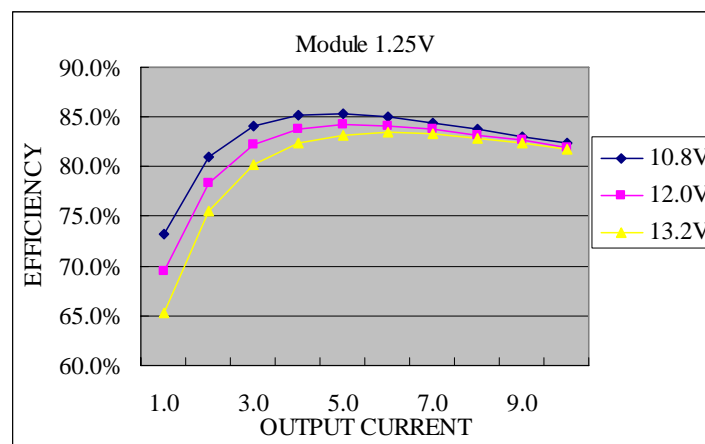
12 Vdc Input Vref/2 / 10 A Output



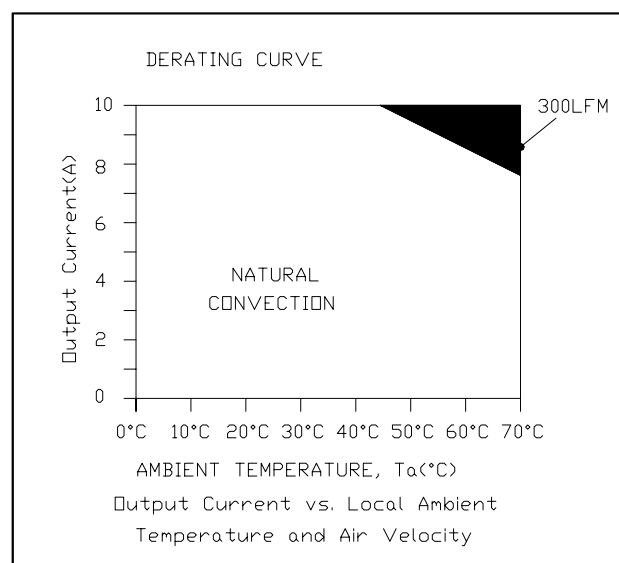
Control Specifications

Parameter	Min	Typ	Max	Notes
Remote On/Off				
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

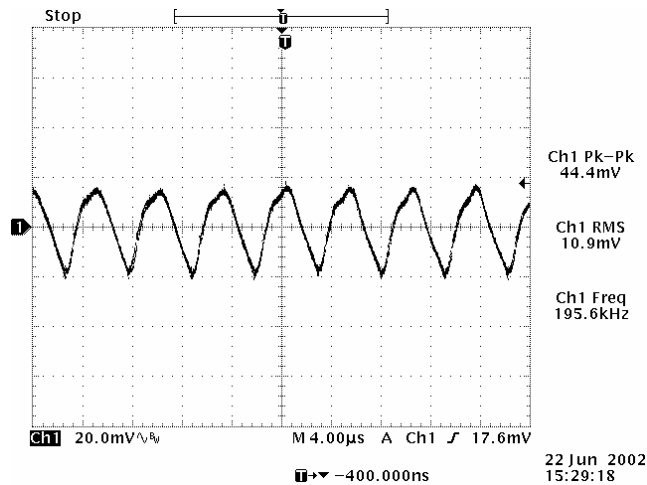


NON-ISOLATED DC/DC CONVERTERS

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

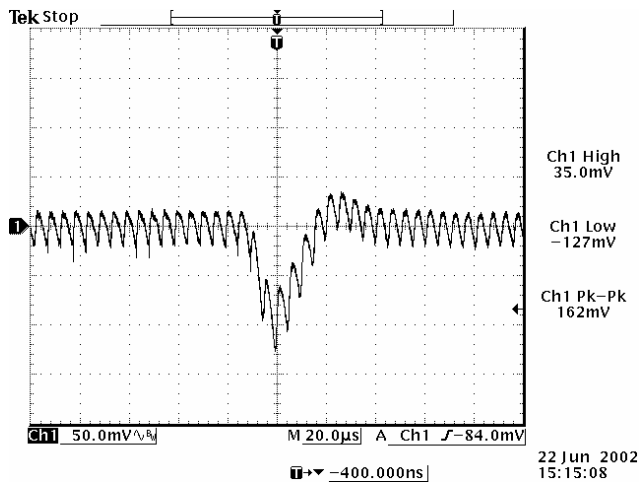


Ripple and Noise Waveform

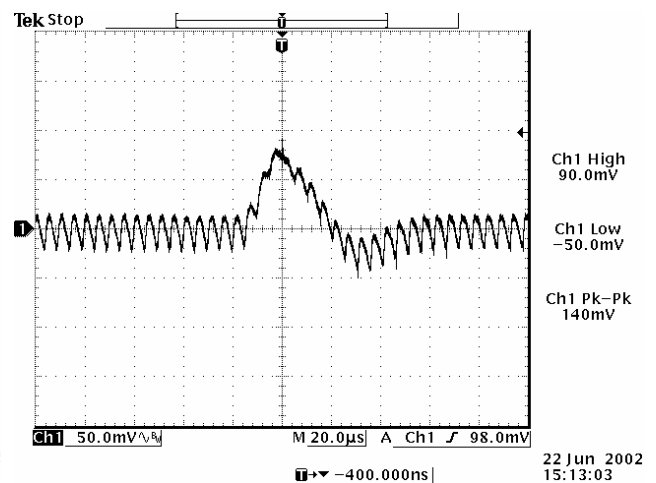


Note: Ripple and noise at full load, 12 Vdc input and $T_a=25$ deg C.

Transient Response Waveforms



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



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

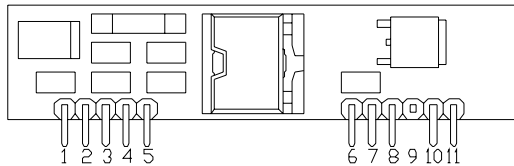
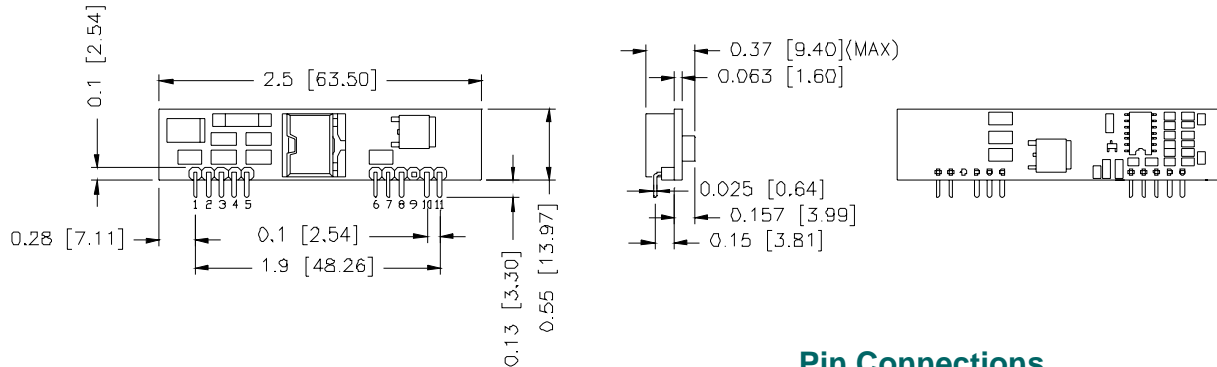
Note: Transient response at $di/dt=0.5$ A/ μ S, with external load capacitance $C_o=470$ μ F(electrolytic), and $T_a=25$ deg C.

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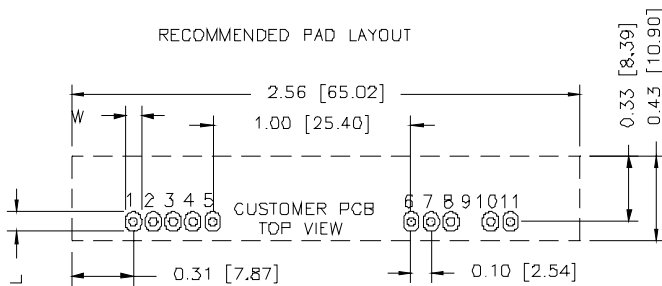
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Mechanical Outline



RECOMMENDED PAD LAYOUT



HOLE SIZE: $\varnothing 0.043 \pm 0.003$ [1.08 \pm 0.08]
 PAD SIZE: W 0.063 ± 0.002 [1.63 \pm 0.05]
 L 0.10 ± 0.004 [2.54 \pm 0.10] BOTH SIDE

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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