

NON-ISOLATED DC/DC CONVERTERS

9.0 Vdc - 18 Vdc Input -12 Vdc/1 A -15 Vdc/0.8 A Output

bel
POWER PRODUCTS

xRAH-01KXxN Series

RoHS Compliant

Rev.A

- Non-Isolated
- High Efficiency
- Fixed Frequency (400 kHz)
- Low Profile Package
- Remote On/Off
- Active Low



Description

The Bel xRAH-01KXxN is part of the low cost non-isolated dc/dc converter series. The modules use a SMD or SIP package for ease of layout and space savings. The output is closely regulated and the efficiency is typically 87% at full load.

Part Selection

Output Voltage	Input Voltage	Max. Output Current	Max. Output Power	Typical Efficiency	Part Number Surface Mount	Part Number Vertical Mount
-12 Vdc	9 Vdc - 18 Vdc	1.0 A	12 W	87%	SRAH-01KX2N	VRAH-01KX2N
-15 Vdc	9 Vdc - 18 Vdc	0.8 A	12 W	87%	SRAH-01KX5N	VRAH-01KX5N

- Notes:** 1. Add "0" suffix at the end of the model number to indicate "Tube Packaging", and "R" for "Reel Packaging", and "G" for "Tray Packaging".
2. All part numbers above indicate RoHS 6. Change the second letter "R" to "7" for RoHS 5 part numbers.

Absolute Maximum Ratings

Parameter	Min	Typ	Max	Notes
Input Voltage (continuous)	-0.3 V	-	20 V	
Remote On/Off (Active Low)	-0.3 V	-	20 V	
Ambient Temperature	-40 °C	-	85 °C	
Storage Temperature	-55 °C	-	125 °C	

Input Specifications

Parameter	Min	Typ	Max	Notes
Input Voltage	9 V	-	18 V	
Input Current (no load)	-	40 mA	55 mA	
Input Current (full load)	-	-	1.6 A	
Remoted Off Input Current	-	18 mA	25 mA	
Input Reflected Ripple Current (pk-pk)	-	95 mA	130 mA	With simulated source impedance of 500 nH, 5 Hz to 20 MHz; Use one 100 uF/25 V tantalum capacitor and one 470 uF/35 V electrolytic capacitor at the input.
Input Reflected Ripple Current (rms)	-	30 mA	40 mA	
I ² t Inrush Current Transient	-	0.003 A ² s	0.01 A ² s	
Turn-on Voltage Threshold	8.0 V	8.5 V	8.8 V	
Turn-off Voltage Threshold	7.2 V	7.6 V	8.2 V	

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

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Output Specifications

Parameter	Min	Typ	Max	Notes		
Output Voltage Set Point Vo=-12 V Vo=-15 V	-11.7 V -14.7 V	-12 V -15 V	-12.3 V -15.3 V	Test condition: Vin=12 V, Iout=full load		
Line Regulation	-	20 mV	35 mV			
Load Regulation	-	25 mV	45 mV			
Regulation Over Temperature (-40°C to +85 °C)	-	90 mV	140 mV			
Output Current Vo=-12 V Vo=-15 V	0.030 A 0.030 A	- -	1.0 A 0.8 A			
Output DC Current Limit Vo=-12 V Vo=-15 V	1.5 A 1.5 A	- -	2.5 A 2.5 A			
Ripple and Noise (rms)	-	35 mV	50 mV	Test conditions: BW = 0-20MHz; with one 68 uF tantalum capacitor and one 0.1 uF ceramic capacitor at the output		
Ripple and Noise (pk-pk)	-	100 mV	150 mV			
Turn On Time Vo=-12 V Vo=-15 V	- -	30 mS 200 mS	45 mS 300 mS			
Overshoot at Turn on	-	0%	5%			
Output Capacitance	68 uF	-	100 uF			
Transient Response						
50% ~ 75% Max Load	Overshoot	Vo=-12 V	-	240mV	320 mV	di/dt = 0.5 A/ uS; Vin = 12 V; and with one 68 uF tantalum capacitor at the output
	Settling Time		-	150 uS	200 uS	
75% ~ 50% Max Load	Overshoot	Vo=-12 V	-	240 mV	320 mV	
	Settling Time		-	150 uS	200 uS	
50% ~ 75% Max Load	Overshoot	Vo=-15 V	-	300mV	400 mV	
	Settling Time		-	150 uS	200 uS	
75% ~ 50% Max Load	Overshoot	Vo=-15 V	-	300 mV	400 mV	
	Settling Time		-	150 uS	200 uS	

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

General Specifications

Parameter	Min	Typ	Max	Notes
Efficiency	85%	87%	-	Measured at Vin=12 V, full load
Switching Frequency	350 kHz	400 kHz	450 kHz	
MTBF	TBD			Calculated Per Bell Core SR-332 (Io = Nominal; Ta = 25 °C)
Dimensions (surface mount) Inches (L x W x H) Millimeters (L x W x H)	0.78 x 0.7 x 0.32 19.81 x 17.78 x 8.13			
Dimensions (vertical) Inches (L x W x H) Millimeters (L x W x H)	0.7 x 0.308 x 0.65 17.78 x 7.82 x 16.51			
Weight	-	5 g	-	

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

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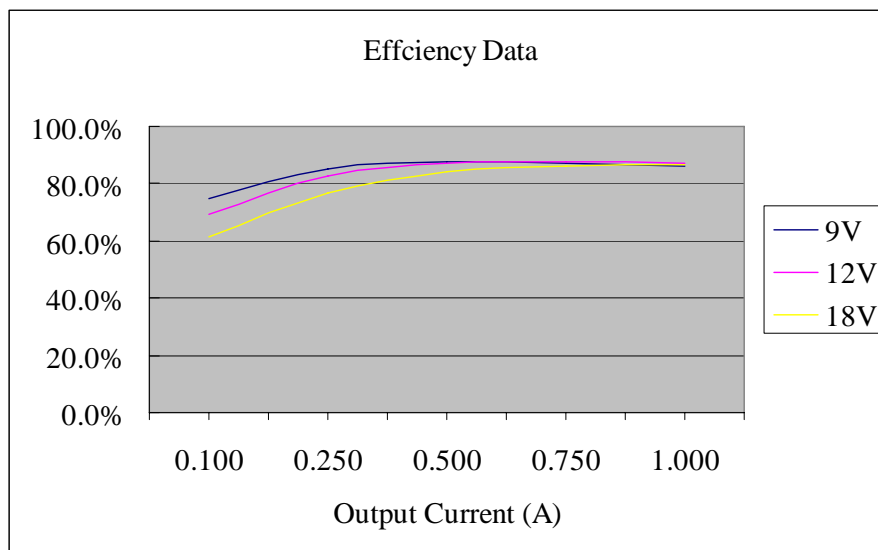


Control Specifications

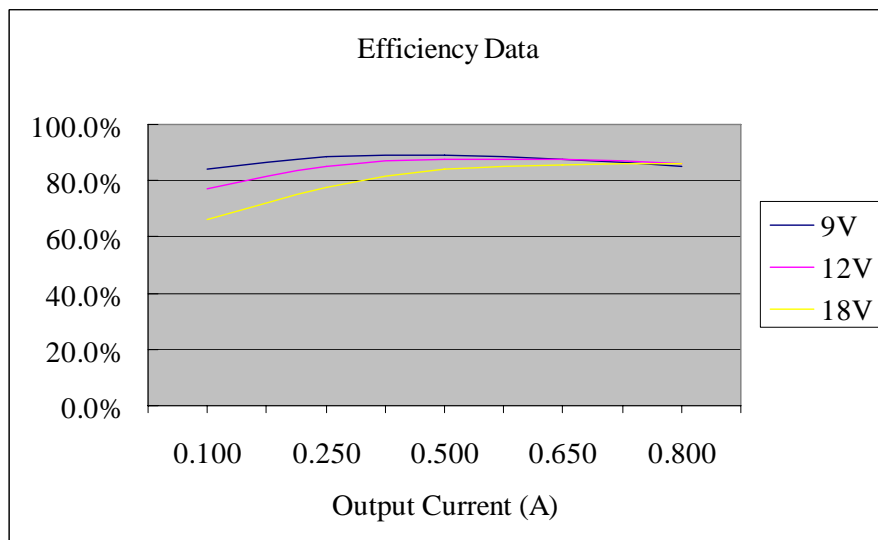
Parameter	Min	Typ	Max	Notes
Remote On/Off				
Signal Low (Unit On)	-0.3 V	-	0.3 V	xRAH-01KXxN Remote On/Off pin open, unit on.
Signal High (Unit Off)	2.8 V	-	V _{in}	

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

Efficiency Data



xRAH-01KX2N



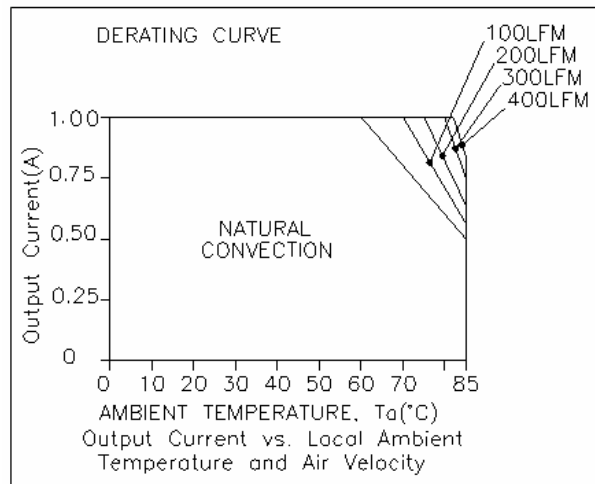
xRAH-01KX5N

NON-ISOLATED DC/DC CONVERTERS

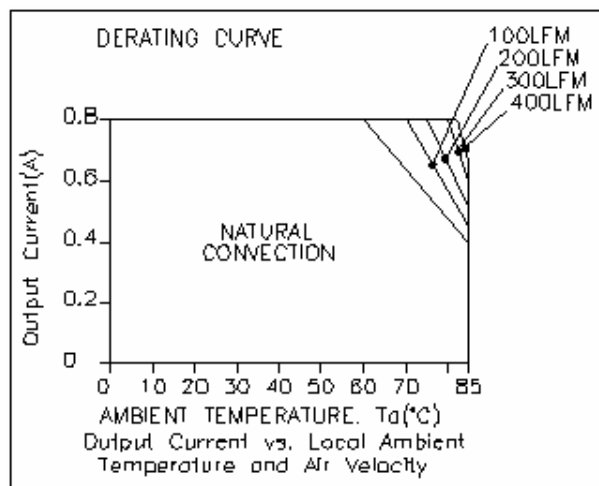
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Thermal Derating Curves



xRAH-01KX2N



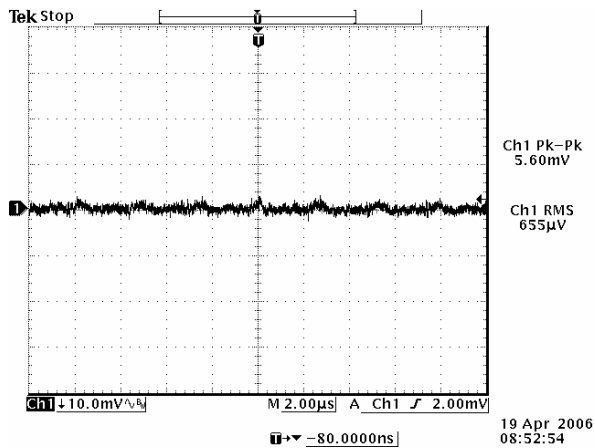
xRAH-01KX5N

NON-ISOLATED DC/DC CONVERTERS

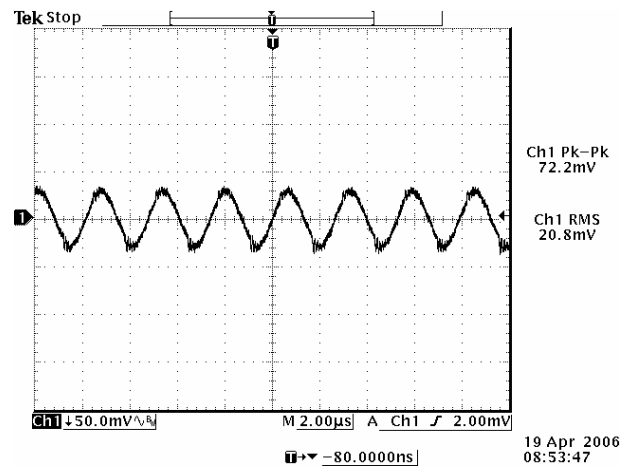
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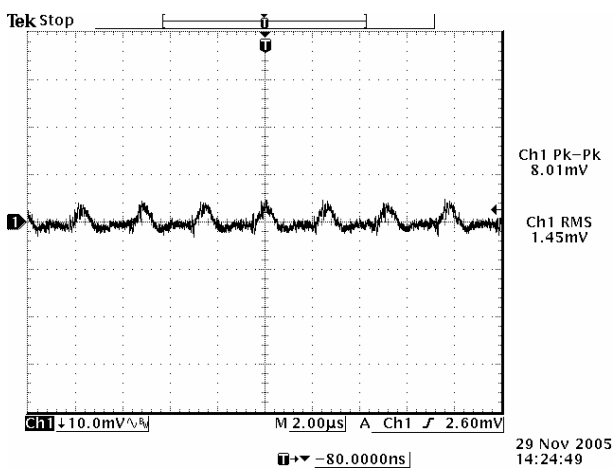
Ripple and Noise Waveforms



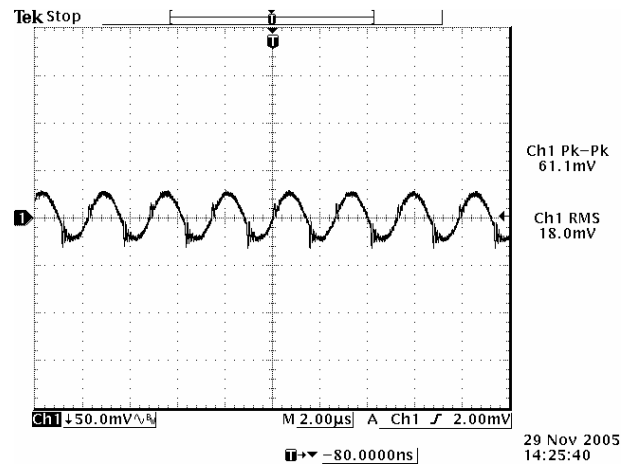
Ripple and noise at no load, $V_{in}=12$ Vdc, $V_o=-12$ Vdc



Ripple and noise at full load, $V_{in}=12$ Vdc, $V_o=-12$ Vdc



Ripple and noise at no load, $V_{in}=12$ Vdc, $V_o=-15$ Vdc



Ripple and noise at full load, $V_{in}=12$ Vdc, $V_o=-15$ Vdc

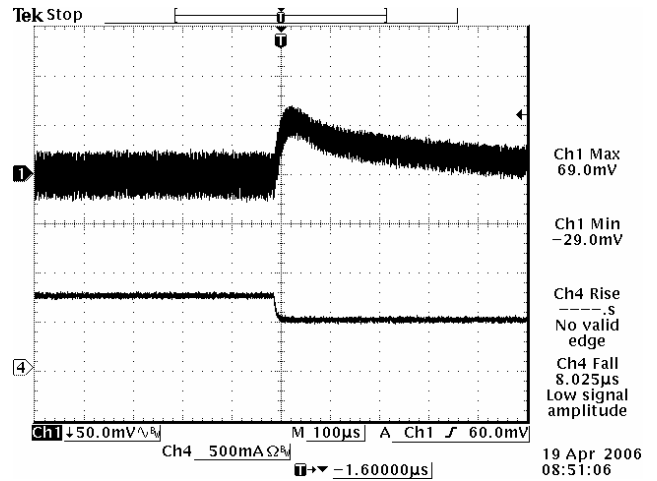
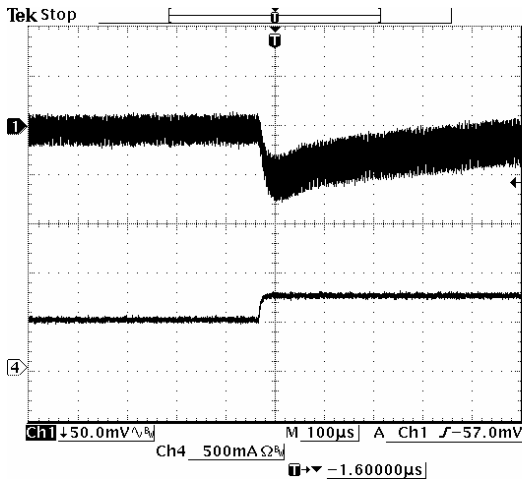
Note: Ripple and noise with one 68 μ F tantalum capacitor and one 0.1 μ F ceramic capacitor at the output, $T_a=25$ deg C.

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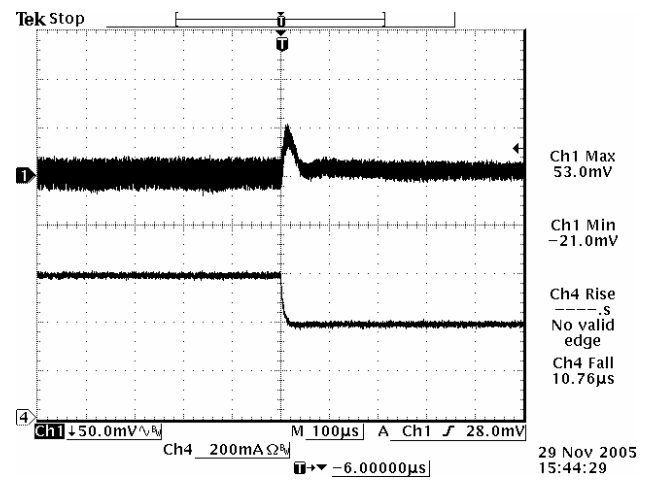
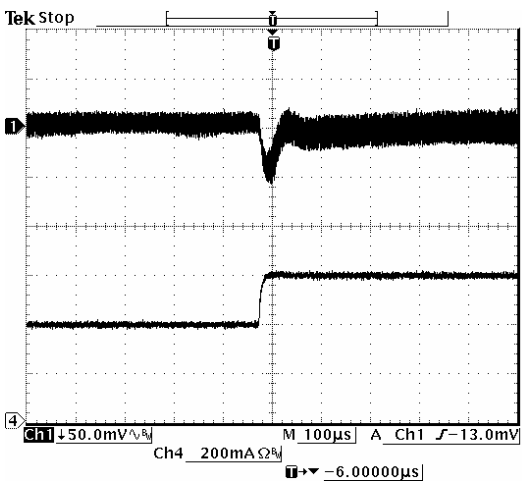


Transient Response Waveforms



50% to 75% load transient at $V_{in}=12$ Vdc, $V_o=-12$ Vdc

75% to 50% load transient at $V_{in}=12$ Vdc, $V_o=-12$ Vdc



50% to 75% load transient at $V_{in}=12$ Vdc, $V_o=-15$ Vdc

75% to 50% load transient at $V_{in}=12$ Vdc, $V_o=-15$ Vdc

Note: Transient response at $di/dt=0.5$ A/ μ S, with one 68 μ F tantalum capacitor at the output, and $T_a=25$ deg C.

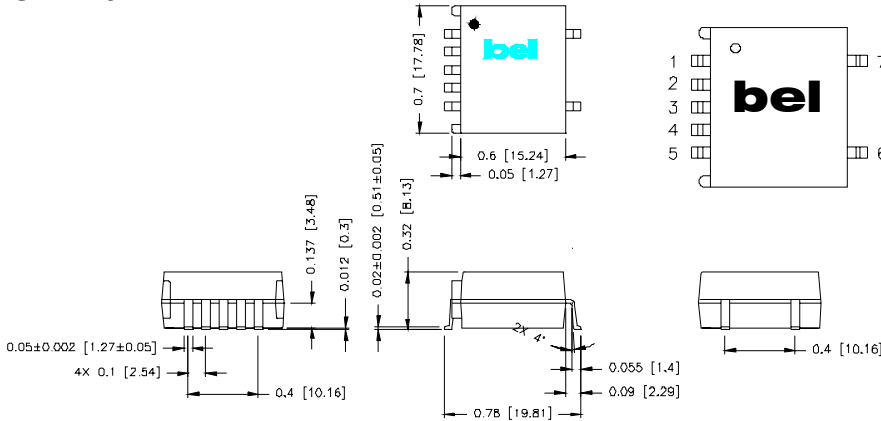
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Mechanical Outline

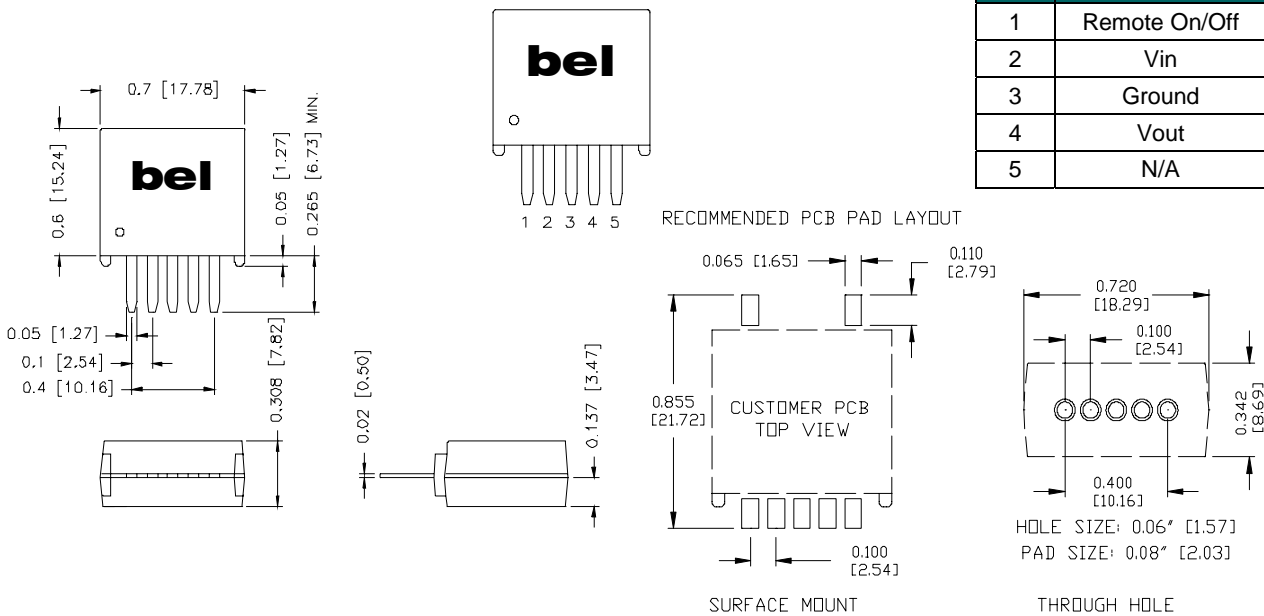
SRAH-01KXxN



Pin Connections

Pin	Function
1	Remote On/Off
2	Vin
3	Ground
4	Vout
5	N/A
6	N/A
7	N/A

VRAH-01KXxN



Pin Connections

Pin	Function
1	Remote On/Off
2	Vin
3	Ground
4	Vout
5	N/A

RoHS Compliance

Complies with the European Directive 2002/95/EC, calling for the elimination of lead and other hazardous substances from electronic products. These parts are not however compatible with the higher temperatures associated with lead free solder processes and must be soldered using a reflow profile with a peak temperature of no more than 240 °C.



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