

NON-ISOLATED DC/DC CONVERTERS

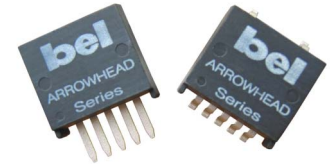
5 V-24 V Input

0.9 V-3.3 V/3 A Output

bel
POWER PRODUCTS

x7AH-03L1A0

- Non-Isolated
- High Efficiency
- High Power Density
- Low Cost
- Remote On/Off
- Fixed Frequency
- OCP/SCP



Description

The Bel x7AH-03L1A0 modules are a series of non-isolated, step down dc/dc converters that operate from a nominal 12 V source. These converters are available in an output voltage range from 0.9 V to 3.3 V. It is packaged in a compact, overmolded package rated at 3 A. Optional lead forming provides a vertical mount product for minimal footprint or a surface mount option for a very low profile. The output is closely regulated and the efficiency for 3.3 V output is typically 88% at full load. Typical features include remote on/off, over current protection and short circuit protection.

Part Selection

Output Voltage	Input Voltage	Max. Output Current	Max. Output Power	Typical Efficiency	Part Number Surface Mount	Part Number Vertical Mount
0.9 V - 3.3 V	5.0 V – 24 V	3 A	10 W	88%	S7AH-03L1A0	V7AH-03L1A0

Note: Add “0” suffix at the end of the model number to indicate “Tube Packaging”, and “R” for “Reel Packaging”, and “G” for “Tray Packaging”.

Absolute Maximum Ratings

Parameter	Min	Typ	Max	Notes
Input Voltage (continuous)	-0.3 V	-	25 V	
Output Enable Terminal Voltage	-0.3 V	-	24 V	
Ambient Temperature	-40 °C	-	85 °C	
Storage Temperature	-40 °C	-	125 °C	

Input Specifications

Parameter	Min	Typ	Max	Notes
Input Voltage	Vo=3.3 V	5 V	-	24 V
	Vo=2.5 V	5 V	-	24 V
	Vo=1.8 V	5 V	-	18 V
	Vo=1.5 V	5 V	-	15 V
	Vo=1.2 V	5 V	-	12 V
	Vo=0.9 V	5 V	-	9 V
Input Current (no load)	-	-	100 mA	
Input Current (full load)	-	-	3 A	
Remote Off Input Current	-	3 mA	10 mA	
Input Reflected Ripple Current (pk-pk)	-	200 mA	-	With simulated source impedance of 500 nH, 5 Hz to 20 MHz. Use one 100 uF/ 35 V Tantalum capacitor and one 3.3 uF/ 50 V ceramic capacitor at the input
Input Reflected Ripple Current (rms)	-	50 mA	-	
I ² t Inrush Current Transient	-	0.05 A ² s	0.1 A ² s	
Turn on Voltage Threshold	-	4.0 V	-	
Turn off Voltage Threshold	3.5 V	-	4.9 V	

NON-ISOLATED DC/DC CONVERTERS

5 V-24 V Input

0.9 V-3.3 V/3 A Output



Output Specifications

Parameter		Min	Typ	Max	Notes	
Output Voltage Set Point	Vo=3.3 V	3.200 V	3.3 V	3.400 V	Test conditions: Io=50% full load.	
	Vo=2.5 V	2.425 V	2.5 V	2.575 V		
	Vo=1.8 V	1.746 V	1.8 V	1.854 V		
	Vo=1.5 V	1.470 V	1.5V	1.530 V		
	Vo=1.2 V	1.176 V	1.2 V	1.224 V		
	Vo=0.9 V	0.882 V	0.9 V	0.918 V		
Line Regulation	Vo=3.3 V	-	±10 mV	±20 mV		
	Vo=2.5 V	-	±10 mV	±15 mV		
	Vo=1.8 V	-	±5 mV	±10 mV		
	Vo=1.5 V	-	±5 mV	±10 mV		
	Vo=1.2 V	-	±5 mV	±10 mV		
	Vo=0.9 V	-	±3 mV	±7.5 mV		
Load Regulation	Vo=3.3 V	-	±25 mV	±45 mV		
	Vo=2.5 V	-	±15 mV	±35 mV		
	Vo=1.8 V	-	±10 mV	±25 mV		
	Vo=1.5 V	-	±10 mV	±20 mV		
	Vo=1.2 V	-	±8 mV	±15 mV		
	Vo=0.9 V	-	±5 mV	±13 mV		
Regulation Over Temperature (-40 °C to +85 °C)	Vo=3.3 V	-	±30 mV	±60 mV		
	Vo=2.5 V	-	±25 mV	±45 mV		
	Vo=1.8 V	-	±20 mV	±33 mV		
	Vo=1.5 V	-	±15 mV	±27 mV		
	Vo=1.2 V	-	±10 mV	±22 mV		
	Vo=0.9 V	-	±8 mV	±16 mV		
Output Current Range		0 A	-	3 A		
Output DC Current Limit		4 A	-	8 A		
Short Circuit Surge Transient		-	0.8 A ² s	1.5 A ² s		
Ripple and Noise (rms)		-	30 mV	50 mV		
Ripple and Noise (pk-pk)	Vo=3.3 V	-	70 mV	130 mV	Test conditions: 0-20 MHz BW, with 1 uF /16 V ceramic capacitor at the output.	
	Vo=2.5 V	-	70 mV	100 mV		
	Vo=1.8 V	-	60 mV	100 mV		
	Vo=1.5 V	-	60 mV	100 mV		
	Vo=1.2 V	-	50 mV	100 mV		
	Vo=0.9 V	-	50 mV	100 mV		
Turn on Time		-	7 mS	10 mS		
Overshoot at Turn on		-	0%	3%		
Output Capacitance		0 uF	-	1200 uF		
Transient Response						
50% ~ 100% Max Load	Overshoot	3.3 V	-	150 mV	200 mV	Test conditions: di/dt = 0.5 A/us, with 220 uF external capacitor at the output.
	Settling Time		-	50 uS	100 uS	
100% ~ 50% Max Load	Overshoot	3.3 V	-	150 mV	200 mV	
	Settling Time		-	50 uS	100 uS	
50% ~ 100% Max Load	Overshoot	0.9 V-2.5 V	-	100 mV	150 mV	
	Settling Time		-	50 uS	100 uS	
100% ~ 50% Max Load	Overshoot		-	100 mV	150 mV	
	Settling Time		-	50 uS	100 uS	

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

NON-ISOLATED DC/DC CONVERTERS

5 V-24 V Input 0.9 V-3.3 V/3 A Output



General Specifications

Parameter	Min	Typ	Max	Notes
Efficiency				Vin=12.0V; Io=Io, max
Vo=3.3 V	85%	88%	-	
Vo=2.5 V	82%	85%	-	
Vo=1.8 V	79%	82%	-	
Vo=1.5 V	77%	80%	-	
Vo=1.2 V	74%	77%	-	
Vo=0.9 V	72%	75%	-	
Switching Frequency	250 kHz	300 kHz	360 kHz	
MTBF	9,900,543 hours			Calculated Per Bell Core TR-332 (Vin=12 V; Vo=3.3 V; Io =2.4 A; Ta = 25 °C)
Dimensions (surface mount)				
Inches (L x W x H)	0.78 x 0.7 x 0.32			
Millimeters (L x W x H)	19.81 x 17.78 x 8.13			
Dimensions (vertical)				
Inches (L x W x H)	0.7 x 0.308 x 0.65			
Millimeters (L x W x H)	17.78 x 7.82 x 16.51			
Weight	-	4.9 g	-	

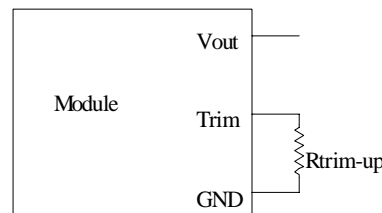
Control Specifications

Parameter	Min	Typ	Max	Notes
Remote On/Off				
Signal Low (Unit Off)	-0.3 V	-	1 V	Remote on/off pin open, Unit On
Signal High (Unit On)	2.8 V	-	24 V	

Output Trim Equations

Equations for calculating the trim resistor (in kΩ) given the desired adjusted voltage (Vadj) and the nominal output voltage of the converter (Vo) are shown below. The Trim Up resistor should be connected between the Trim pin and Ground. Only one of the resistors should be used for any given application.

$$R_{trim-up} = \frac{6.928}{V_{adj} - V_o} - 1$$



Note: Output voltage Vo=0.902 V when Rtrim_up is not connected.

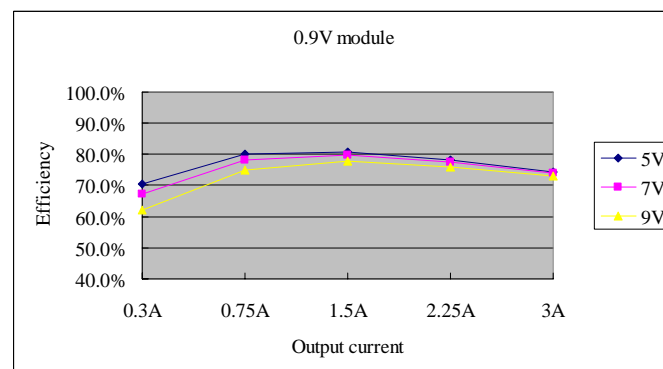
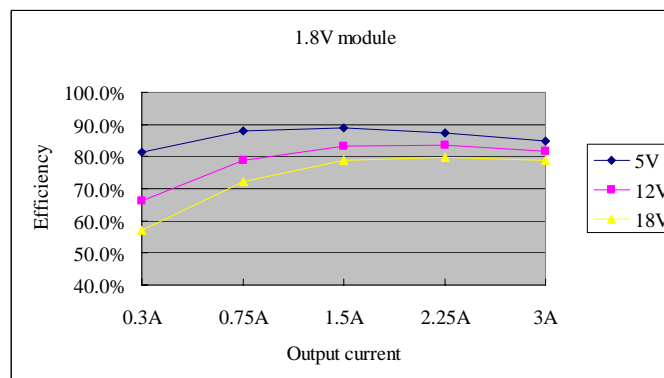
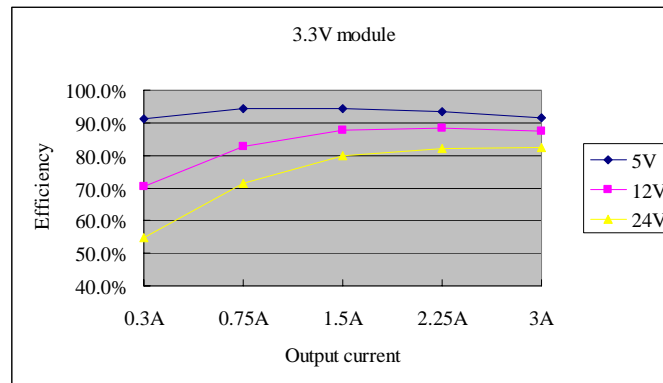
NON-ISOLATED DC/DC CONVERTERS

5 V-24 V Input

0.9 V-3.3 V/3 A Output



Efficiency Data



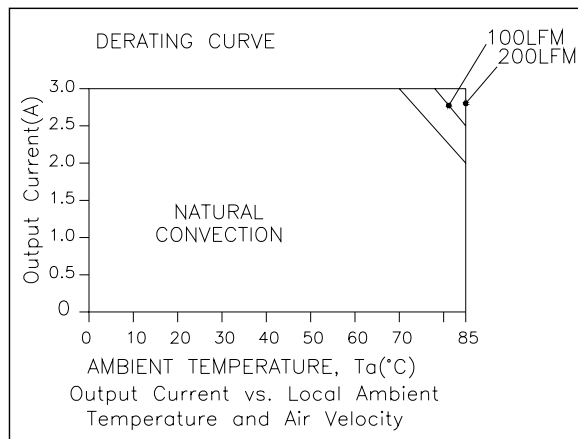
NON-ISOLATED DC/DC CONVERTERS

5 V-24 V Input

0.9 V-3.3 V/3 A Output



Thermal Derating Curve

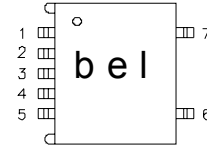
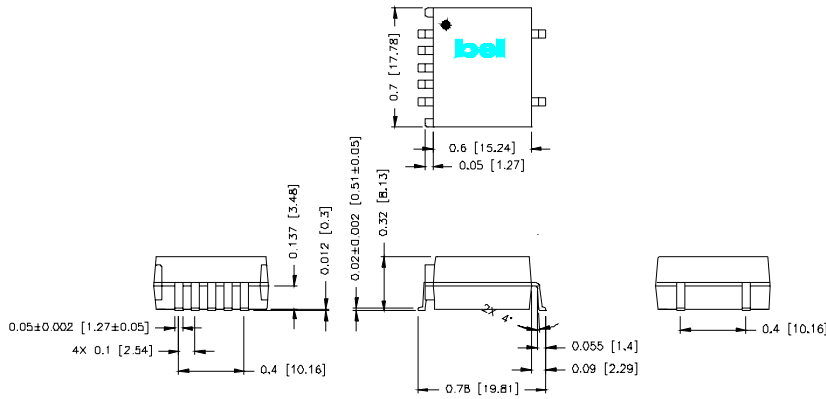


x7AH-03L1A0

NON-ISOLATED DC/DC CONVERTERS
5 V-24 V Input **0.9 V-3.3 V/3 A Output**



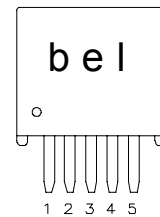
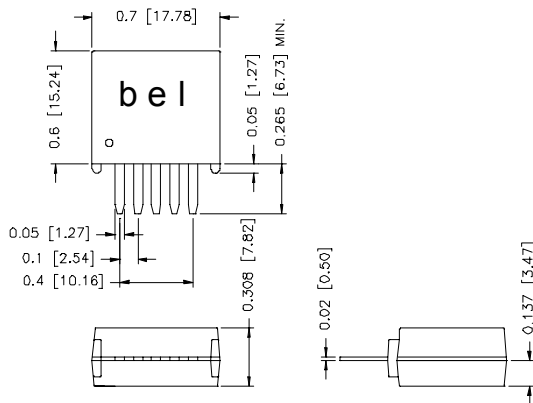
S7AH-03L1A0



Pin Connections

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

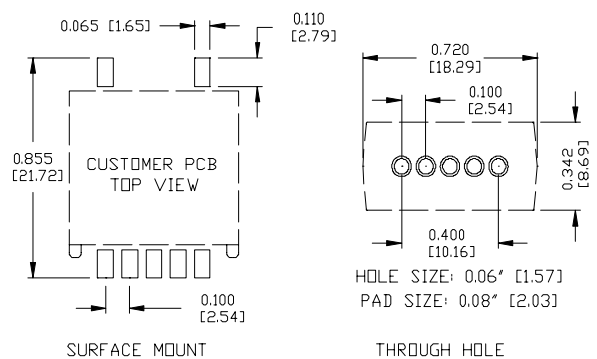
V7AH-03L1A0



Pin Connections

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

RECOMMENDED PCB PAD LAYOUT



©2005 Bel Fuse Inc. Specifications subject to change without notice. 040805

CORPORATE

Bel Fuse Inc.
 206 Van Vorst Street
 Jersey City, NJ 07302
 Tel 201-432-0463
 Fax 201-432-9542
www.belfuse.com

FAR EAST

Bel Fuse Ltd.
 8F/ 8 Luk Hop Street
 San Po Kong
 Kowloon, Hong Kong
 Tel 852-2328-5515
 Fax 852-2352-3706
www.belfuse.com

EUROPE

Bel Fuse Europe Ltd.
 Preston Technology Management Centre
 Marsh Lane, Suite G7, Preston
 Lancashire, PR1 8UD, U.K.
 Tel 44-1772-556601
 Fax 44-1772-888366
www.belfuse.com