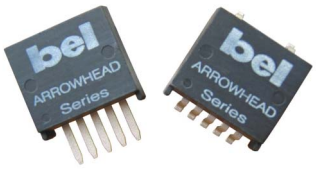
NON-ISOLATED DC/DC CONVERTERS

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

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^2t Inrush Current Transient	-	0.05 A^2s	0.1 A^2s	
Turn on Voltage Threshold	-	4.0 V	-	
Turn off Voltage Threshold	3.5 V	-	4.9 V	

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^2s	1.5 A^2s	
Ripple and Noise (rms)	-	30 mV	50 mV	Test conditions: 0-20 MHz BW, with 1 uF /16 V ceramic capacitor at the output.
Ripple and Noise (pk-pk)				
Vo=3.3 V	-	70 mV	130 mV	
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.
50% ~ 100% Max Load — Settling Time (3.3 V)	-	50 uS	100 uS	
100% ~ 50% Max Load — Overshoot (3.3 V)	-	150 mV	200 mV	
100% ~ 50% Max Load — Settling Time (3.3 V)	-	50 uS	100 uS	
50% ~ 100% Max Load — Overshoot (0.9 V-2.5 V)	-	100 mV	150 mV	
50% ~ 100% Max Load — Settling Time (0.9 V-2.5 V)	-	50 uS	100 uS	
100% ~ 50% Max Load — Overshoot (0.9 V-2.5 V)	-	100 mV	150 mV	
100% ~ 50% Max Load — Settling Time (0.9 V-2.5 V)	-	50 uS	100 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				
Vo=3.3 V	85%	88%	-	Vin=12.0V; Io=Io, max
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 × W × H)	0.78 x 0.7 x 0.32			
Millimeters (L × W × H)	19.81 x 17.78 x 8.13			
Dimensions (vertical)				
Inches (L × W × H)	0.7 x 0.308 x 0.65			
Millimeters (L × W × H)	17.78 x 7.82 x 16.51			
Weight	-	4.9 g	-	

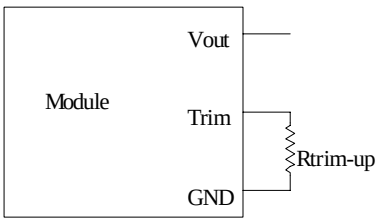
Control Specifications

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

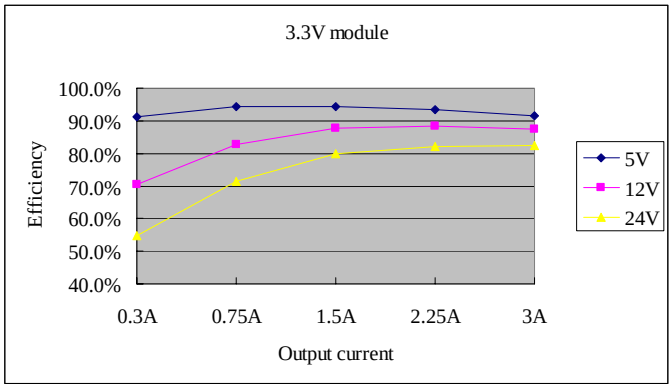
Equations for calculating the trim resistor (in kΩ) given the desired adjusted voltage (Vadj) and the nominal output voltage of the converter (Vo) are shown below. The Trim Up resistor should be connected between the Trim pin and Ground. Only one of the resistors should be used for any given application.

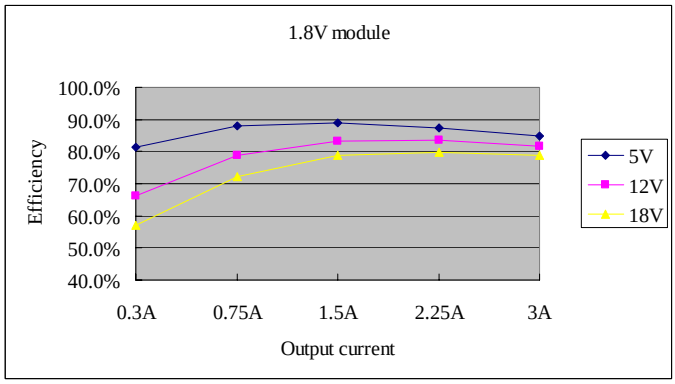
$$R_{trim-up} = \frac{6.928}{V_{adj} - V_o} - 1$$

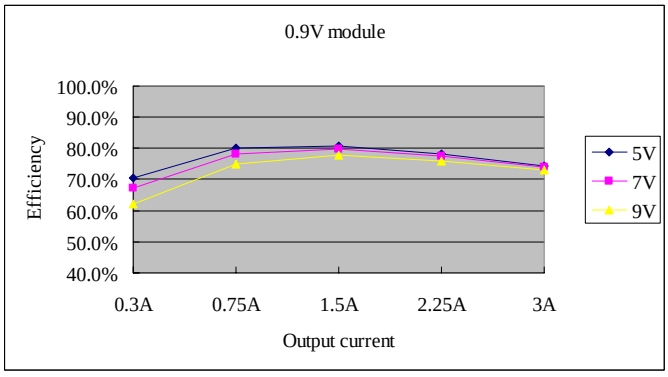


Note: Output voltage Vo=0.902 V when Rtrim_up is not connected.

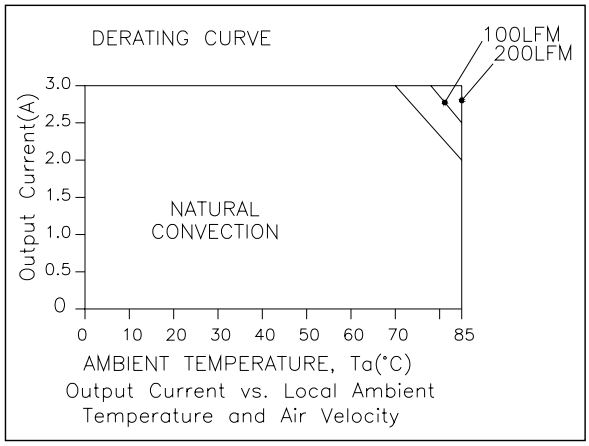
Efficiency Data







Thermal Derating Curve



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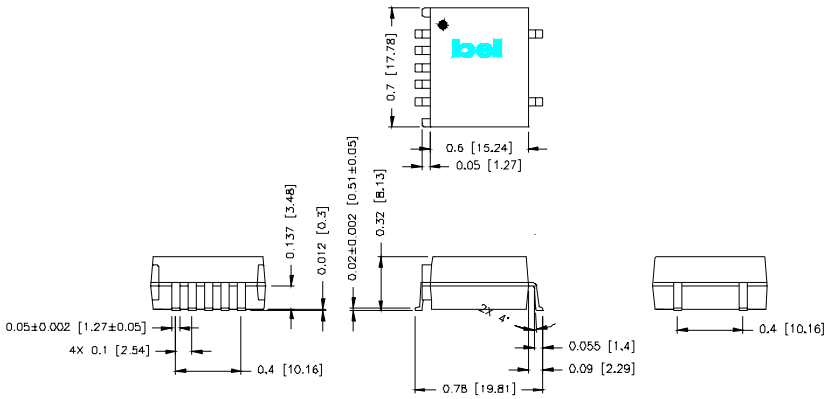
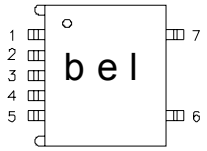
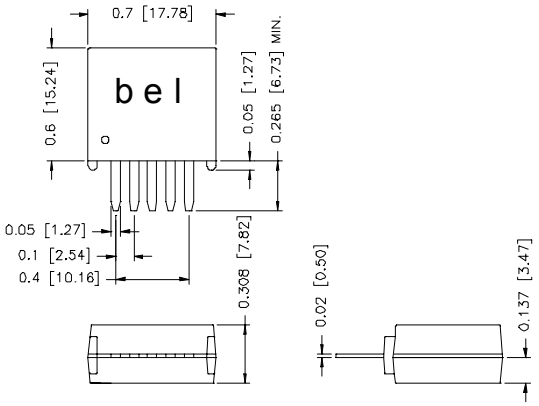


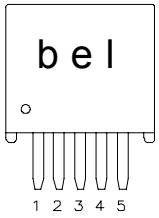


Pin Connections

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

V7AH-03L1A0





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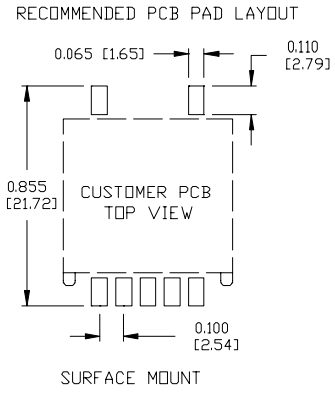

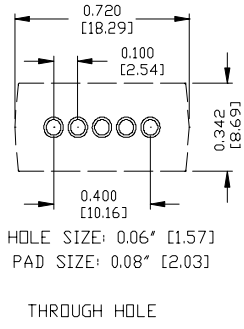

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