

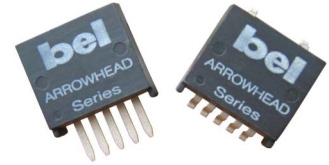
NON-ISOLATED DC/DC CONVERTERS

12 V Input 0.9 V-3.3 V/7 A Output

bel
POWER PRODUCTS

x7AH-07A1A0 Series

- Non-Isolated
- Fixed Frequency
- High Efficiency
- High Power Density
- Low Cost
- Remote On/Off
- Input Under Voltage Lockout
- OCP/SCP
- Wide Range Trim



Description

The Bel x7AH-07A1A0 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 a range of output voltages from 0.9 V to 3.3 V. It is packaged in a compact, overmolded package rated at 7 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 is typically 88% for 3.3 V output at full load. Typical features include remote on/off, input under voltage lockout, 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	12 V	7 A	23.1 W	88%	S7AH-07A1A0	V7AH-07A1A0

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	-	15 V	
Output Enable Terminal Voltage	-0.3 V	-	14 V	
Ambient Temperature	-40 °C	-	85 °C	
Storage Temperature	-55 °C	-	125 °C	

Input Specifications

Parameter	Min	Typ	Max	Notes
Input Voltage	10 V	-	14 V	
Input Current (no load)	-	-	100 mA	
Input Current (full load)				
Vo=3.3 V	-	-	3.0 A	
Vo=2.5 V	-	-	2.6 A	
Vo=1.8 V	-	-	1.9 A	
Vo=1.5 V	-	-	1.6 A	
Vo=1.2 V	-	-	1.3 A	
Vo=0.9 V	-	-	1.0 A	
Remote Off Input Current	-	3 mA	10 mA	

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Input Specifications (continued)

Parameter	Min	Typ	Max	Notes
Input Reflected Ripple Current (pk-pk)	-	180 mA	-	Tested with simulated source impedance of 500 nH, 5 Hz to 20 MHz and two 270 uF/16 V Oscon capacitors with ESR=0.018 ohm max. at 100 kHz
Input Reflected Ripple Current (rms)	-	50 mA	-	
I ² t Inrush Current Transient	-	0.01 A ² s	0.02 A ² s	
Turn on Voltage Threshold	-	9.5 V	-	
Turn off Voltage Threshold	-	9.0 V	9.5 V	

Output Specifications

Parameter		Min	Typ	Max	Notes	
Output Voltage Set Point					Test conditions: Vin=12 V, Io=50% full load	
	Vo=3.3 V	3.247 V	3.3 V	3.353 V		
	Vo=2.5 V	2.460 V	2.5 V	2.540 V		
	Vo=1.8 V	1.771 V	1.8V	1.829 V		
	Vo=1.5 V	1.476 V	1.5 V	1.524 V		
	Vo=1.2 V	1.181 V	1.2 V	1.219 V		
	Vo=0.9 V	0.886 V	0.9 V	0.914 V		
Line Regulation		-	±3mV	±6mV		
Load Regulation						
	Vo=3.3 V	-	±5 mV	±10 mV		
	Vo=2.5 V	-	±5 mV	±10 mV		
	Vo=1.8 V	-	±5 mV	±10 mV		
	Vo=1.5 V	-	±3 mV	±6 mV		
	Vo=1.2 V	-	±3 mV	±6 mV		
	Vo=0.9 V	-	±3 mV	±6 mV		
Regulation Over Temperature (-40 °C to +85 °C)		-	30 mV	50 mV		
Output Current		0 A	-	7 A		
Current Limit Threshold		10 A	-	20 A		
Short Circuit Surge Transient		-	0.02 A ² s	0.04 A ² s		
Ripple and Noise (rms)					Test condition: 0-20 MHz BW, with a 330 uF/10 V Tantalum capacitor at the output.	
	Vo=3.3 V	-	20 mV	50 mV		
	Vo=2.5 V	-	20 mV	50 mV		
	Vo=1.8 V	-	15 mV	40 mV		
	Vo=1.5 V	-	15 mV	40 mV		
	Vo=1.2 V	-	15 mV	30 mV		
	Vo=0.9 V	-	10 mV	30 mV		
Ripple and Noise (pk-pk)						
	Vo=3.3 V	-	70 mV	100 mV		
	Vo=2.5 V	-	70 mV	100 mV		
	Vo=1.8 V	-	60 mV	100 mV		
	Vo=1.5 V	-	60 mV	80 mV		
	Vo=1.2 V	-	60 mV	80 mV		
	Vo=0.9 V	-	50 mV	70 mV		
Turn on Time		-	8 mS	20 mS		
Overshoot at Turn on		-	0%	3%		
Output Capacitance		330 uF	-	2800 uF		
Transient Response						
50% ~ 100% Max Load	Overshoot	All	-	120 mV	180 mV	Test conditions: di/dt = 0.5 A/uS; Vin = 12 V; with a 330 uF/10 V Tantalum capacitor at the output.
	Settling Time		-	50 uS	80 uS	
100% ~ 50% Max Load	Overshoot		-	120 mV	180 mV	
	Settling Time		-	50 uS	80 uS	

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

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General Specifications

Parameter	Min	Typ	Max	Notes
Efficiency				
Vo=3.3 V	85%	88%	-	Measured at Vin=12 V, full load and Ta=25 °C
Vo=2.5 V	83%	86%	-	
Vo=1.8 V	80%	83%	-	
Vo=1.5 V	78%	81%	-	
Vo=1.2 V	75%	78%	-	
Vo=0.9 V	71%	74%	-	
Switching Frequency	250 kHz	300 kHz	350 kHz	
Output Trim Range (wide trim)	-	-	403% Vo	Vo=0.9 V
Output Trim Range (narrow trim)				
Vo=1.2 V-3.3 V	90% Vo	-	110% Vo	
Vo=0.9 V	-	-	110% Vo	
MTBF	8,202,646 hours			Calculated Per Bell Core TR-332 (Vin=12 V; Vo=3.3 V; Io = 5.6 A; Ta = 25°C)
Dimensions (surface mount)				
Inches (L × W × H)	0.78 x 0.70 x 0.32			
Millimeters (L × W × H)	19.81 x 17.78 x 8.13			
Dimensions (vertical)				
Inches (L × W × H)	0.70 x 0.308 x 0.65			
Millimeters (L × W × H)	17.78 x 7.82 x 16.51			
Weight	-	5 g	-	

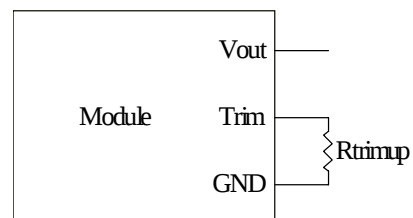
Control Specifications

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)	3.5 V	-	14 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 (Vnom) are shown below. The Trim Up resistor should be connected between the Trim pin and Ground.

$$R_{trimup} = \frac{6.06}{V_{adj} - V_{nom}} - 1.05$$



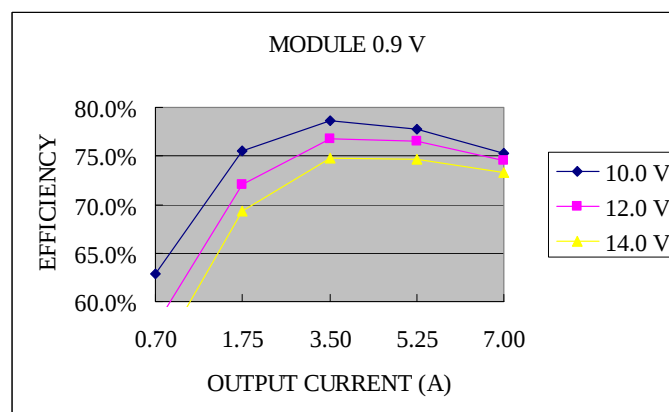
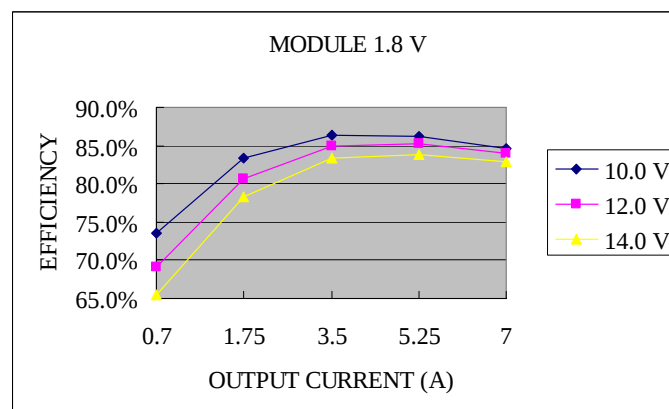
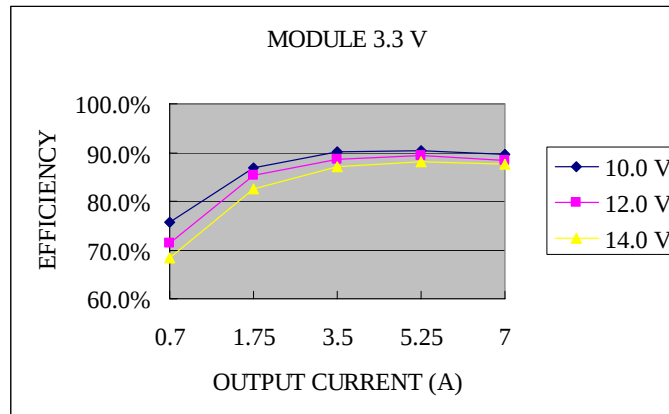
Note: Output voltage Vo=0.9 V when Rtrimup is not connected.

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Efficiency Data

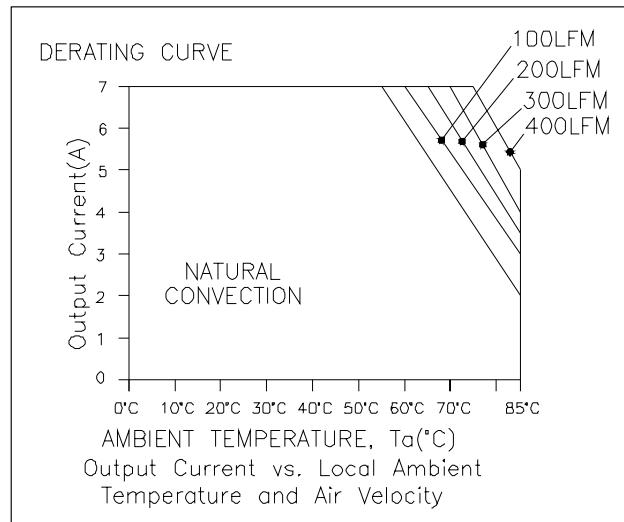


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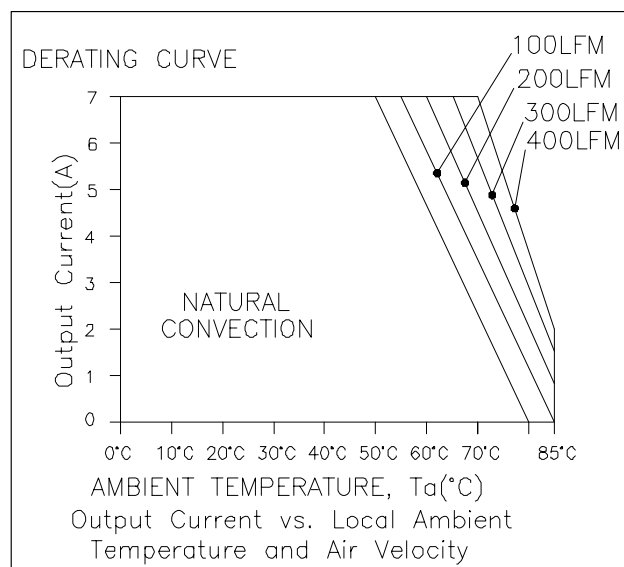
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Thermal Derating Curves



$V_o=0.9\text{ V}-2.5\text{ V}$



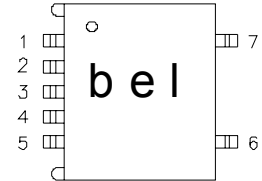
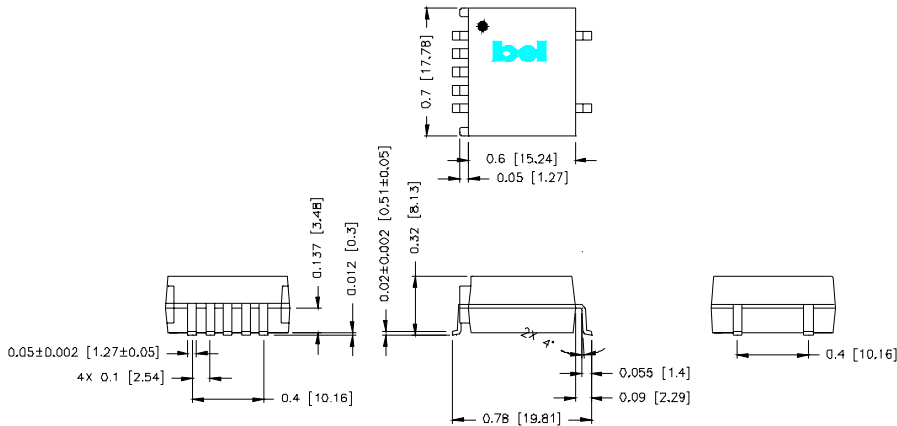
$V_o=3.3\text{ V}$

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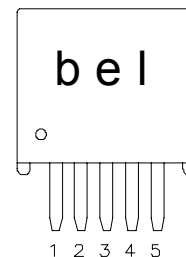
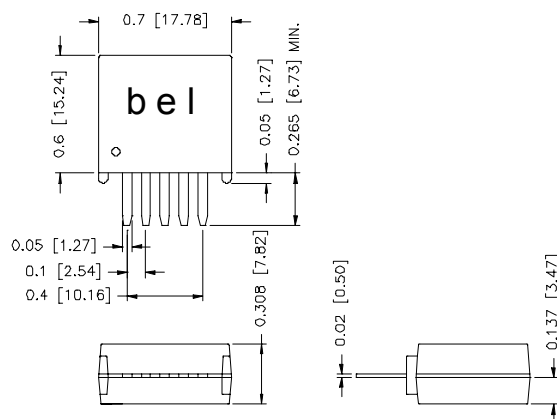
S7AH-07A1A0



Pin Connections

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

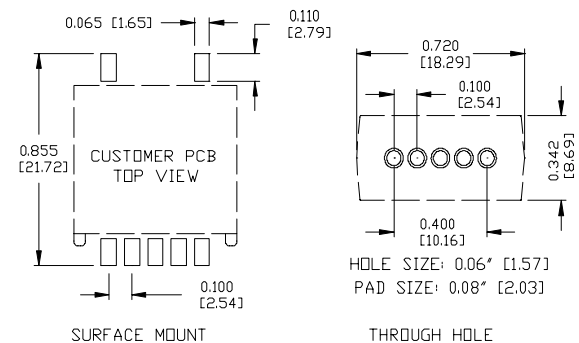
V7AH-07A1A0



Pin Connections

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

RECOMMENDED PCB PAD LAYOUT



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