

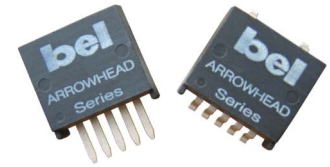
NON-ISOLATED DC/DC CONVERTERS

3.0 V-5.5 V Input 0.9 V-3.3 V/3 A Output

bel
POWER PRODUCTS

x7AH-03F1A0

- Non-Isolated
- High Efficiency
- Fixed Frequency (300 kHz)
- Low Cost
- Remote On/Off
- Input Under Voltage Lockout
- OCP/SCP
- Wide Range Trim



Description

The Bel x7AH-03F1A0 module is a non-isolated, step down dc/dc converter that operates from 3.0 V to 5.5 V source. This converter is 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 3 A. Optional lead forming provides a vertical mount product for minimal footprint or a surface mount option for a very low profile. The efficiency of 3.3 V module is typically 92% at 5 V input 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	3.0 V - 5.5 V	3 A	10 W	92%	S7AH-03F1A0	V7AH-03F1A0

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	-	6 V	
Output Enable Terminal Voltage	-0.3 V	-	6 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	4.5 V	-	5.5 V	
Vo=2.5 V	3.6 V	-	5.5 V	
Vo=0.9 V-1.8 V	3.0 V	-	5.5 V	
Input Current (no load)	-	-	70 mA	
Input Current (full load)				
Vo=3.3 V	-	-	2.5 A	
Vo=2.5 V	-	-	2.4 A	
Vo=1.8 V	-	-	2.2 A	
Vo=1.5 V	-	-	1.9 A	
Vo=1.2 V	-	-	1.6 A	
Vo=0.9 V	-	-	1.3 A	
Remote Off Input Current	-	5 mA	10 mA	
Input Reflected Ripple Current (pk-pk)	-	75 mA	-	Tested with simulated source impedance of 500 nH, 5 Hz to 20 MHz and two 270 uF/16 V Oscon caps with ESR=0.018 ohm max at 100 kHz
Input Reflected Ripple Current (rms)	-	25 mA	-	

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Input Specifications (continued)

Parameter	Min	Typ	Max	Notes
I ² t Inrush Current Transient	-	0.004 A ² s	0.008 A ² s	
Turn on Voltage Threshold	-	-	2.9 V	Only for 0.9 V-1.8 V output modules.
Turn off Voltage Threshold	2.2 V	2.4 V	-	

Note: All specifications are typical at nominal input (5 V), full load at 25 °C unless otherwise stated.

Output Specifications

Parameter	Min	Typ	Max	Notes
Output Voltage Set Point				Test conditions: Vin=5 V, Io=50% full load
Vo=3.3 V	3.217 V	3.3 V	3.383 V	
Vo=2.5 V	2.437 V	2.5 V	2.563 V	
Vo=1.8 V	1.755 V	1.8 V	1.845 V	
Vo=1.5 V	1.462 V	1.5 V	1.538 V	
Vo=1.2 V	1.170 V	1.2 V	1.230 V	
Vo=0.9 V	0.877 V	0.9 V	0.923 V	
Line Regulation				
Vo=3.3 V	-	10 mV	20 mV	
Vo=2.5 V	-	8 mV	16 mV	
Vo=1.8 V	-	6 mV	12 mV	
Vo=1.5 V	-	5 mV	10 mV	
Vo=1.2 V	-	4 mV	8 mV	
Vo=0.9 V	-	3 mV	6 mV	
Load Regulation				
Vo=3.3 V	-	17 mV	33 mV	
Vo=2.5 V	-	13 mV	25 mV	
Vo=1.8 V	-	9 mV	18 mV	
Vo=1.5 V	-	8 mV	15 mV	
Vo=1.2 V	-	6 mV	12 mV	
Vo=0.9 V	-	5 mV	9 mV	
Regulation Over Temperature(-40 °C to +85 °C)				
Vo=3.3 V	-	72 mV	97 mV	
Vo=2.5 V	-	54 mV	72 mV	
Vo=1.8 V	-	39 mV	52 mV	
Vo=1.5 V	-	32 mV	43 mV	
Vo=1.2 V	-	26 mV	40 mV	
Vo=0.9 V	-	19 mV	40 mV	
Output Current	0 A	-	3 A	
Current Limit Threshold	5 A	-	12 A	
Short Circuit Surge Transient	-	0.022 A ² s	0.044 A ² s	
Ripple and Noise (rms)				Test condition: 0-20 MHz BW
Vo=1.2 V-3.3 V	-	15 mV	25 mV	
Vo=0.9 V	-	10 mV	20 mV	
Ripple and Noise (pk-pk)				
Vo=1.2 V-3.3 V	-	50 mV	70 mV	
Vo=0.9 V	-	40 mV	60 mV	
Turn on Time	-	7 mS	12 mS	
Overshoot at Turn on	-	0%	3%	
Output Capacitance	0 uF	-	1200 uF	
Transient Response				
50% ~ 100% Max Load	Overshoot	-	150 mV	Test conditions: di/dt = 0.5 A/uS; Vin = 5 V
	Settling Time	-	20 uS	
100% ~ 50% Max Load	Overshoot	-	150 mV	
	Settling Time	-	20 uS	

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

NON-ISOLATED DC/DC CONVERTERS

3.0 V-5.5 V Input 0.9 V-3.3 V/3 A Output



General Specifications

Parameter	Min	Typ	Max	Notes	
Efficiency	V _O =3.3 V	88%	92%	-	Measured at Vin=5 V, full load and Ta=25 °C
	V _O =2.5 V	86%	90%	-	
	V _O =1.8 V	83%	87%	-	
	V _O =1.5 V	80%	84%	-	
	V _O =1.2 V	77%	81%	-	
	V _O =0.9 V	75%	79%	-	
Switching Frequency	250 kHz	300 kHz	360 kHz		
Output Trim Range (wide trim)	-	-	403% V _O	V _O =0.9 V	
Output Trim Range (narrow trim)	V _O =1.2 V-3.3 V	90% V _O	-	110% V _O	
	V _O =0.9 V	-	-	110% V _O	
MTBF	7,800,000 hours			Calculated Per Bell Core TR-332 (Vin=5 V; V _O =3.3 V; I _O = 2.4 A; T _a = 25 °C)	
Dimensions (surface mount)	Inches (L × W × H)			0.78 × 0.70 × 0.32	
	Millimeters (L × W × H)			19.81 × 17.78 × 8.13	
	Dimensions (vertical)				
Dimensions (vertical)	Inches (L × W × H)			0.70 × 0.308 × 0.65	
	Millimeters (L × W × H)			17.78 × 7.82 × 16.51	
	Weight	-	5 g	-	

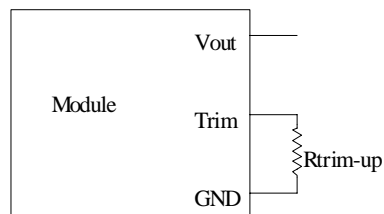
Control Specifications

Parameter	Min	Typ	Max	Notes
Remote On/Off				
Signal Low (Unit Off)	-0.3 V	-	0.8 V	Remote on/off pin open, unit on.
Signal High (Unit On)	2.8 V	-	6 V	

Output Trim Equations

Equations for calculating the trim resistor (in kΩ) given the desired adjusted voltage (V_{adj}) and the nominal output voltage of the converter (V_o) 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.

$$R_{trim-up} = \frac{3.712}{V_{adj} - V_o} - 1$$



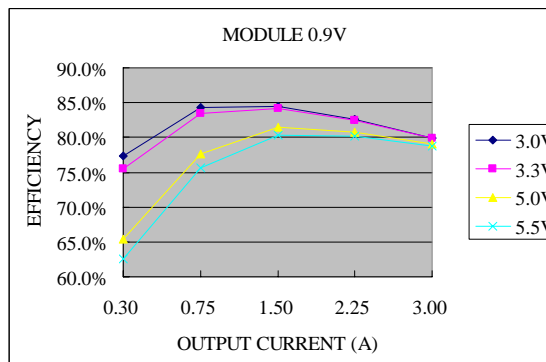
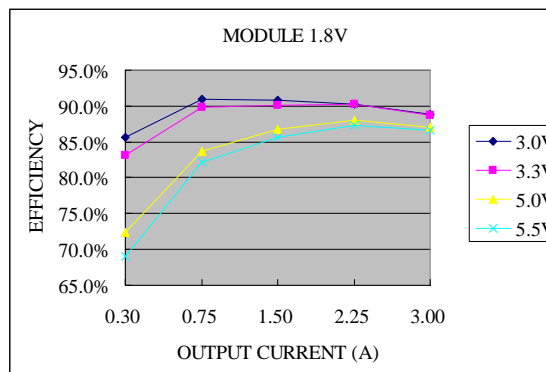
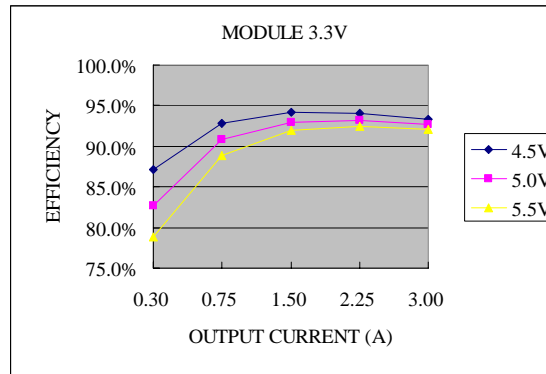
Note: Output voltage V_o=0.902V when Ttrim-up is not connected.

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Efficiency Data

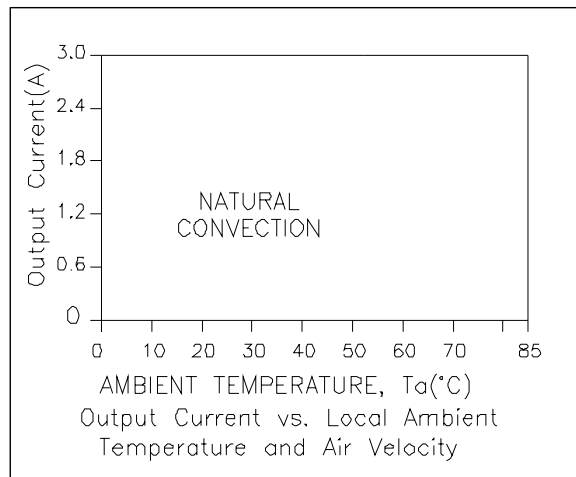


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POWER PRODUCTS

Thermal Derating Curve



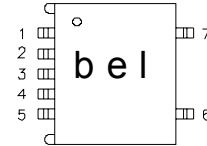
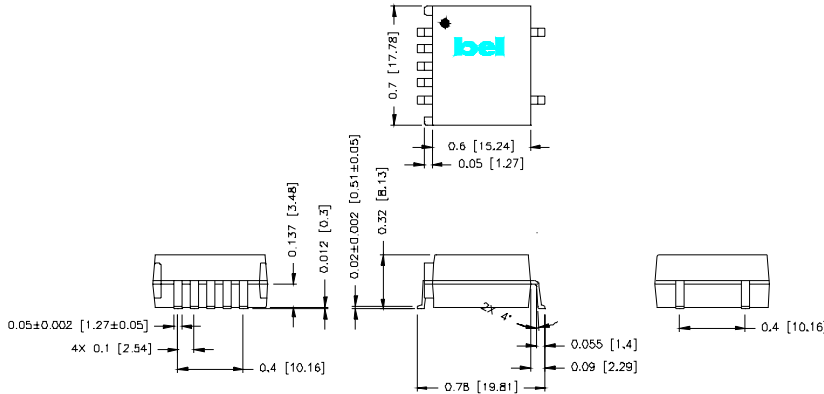
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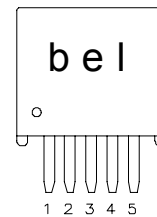
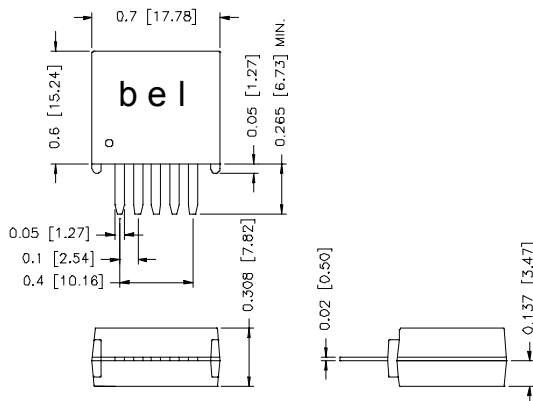
S7AH-03F1A0



Pin Connections

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

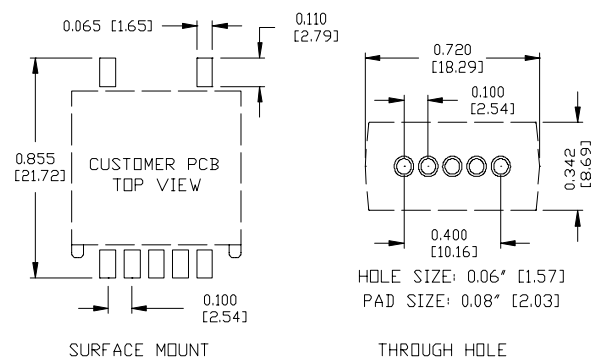
V7AH-03F1A0



Pin Connections

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

RECOMMENDED PCB PAD LAYOUT



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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