

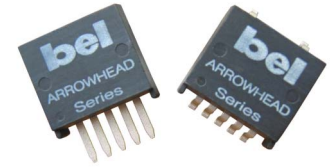
## NON-ISOLATED DC/DC CONVERTERS

3.0 V-3.6 V Input    5.0 V/3 A Output

**bel**  
POWER PRODUCTS

### x7AH-03C500

- Non-Isolated
- High Efficiency
- Fixed Frequency (530 kHz)
- Low Profile Package
- Allows Burst Mode Operation at Low Load Currents
- Trim Function (Option)



### Description

The Bel x7AH-03C500 is a 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 90% 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
5.0 V	3.0 V – 3.6 V	3 A	15 W	90%	S7AH-03C500	V7AH-03C500

**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)	2.8 V	-	4.0 V	
Ambient Temperature	0 °C	-	70 °C	
Storage Temperature	-40 °C	-	125 °C	

### Input Specifications

Parameter	Min	Typ	Max	Notes
Input Voltage	3.0 V	-	3.6 V	
Input Current	-	-	6.3 A	
Input Reflected Ripple Current (rms)	-	30 mA	60 mA	
Input Reflected Ripple Current (pk-pk)	-	100 mA	150 mA	
$I^2t$ Inrush Current Transient	-	0.02 A <sup>2</sup> s	0.05 A <sup>2</sup> s	
Turn-on Voltage Threshold	-	2.8 V	2.9 V	

**Note:** The input reflected ripple current is measured with simulated source impedance of 500 nH, 5 Hz to 20 MHz; Use one 270 uF/16 V capacitor with ESR = 0.018 ohm max. at 100KHz at 25°C.

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## Output Specifications

Parameter	Min	Typ	Max	Notes	
Output Voltage Set Point	4.875 V	5.0 V	5.125 V		
Load Regulation	-	25 mV	50 mV		
Line Regulation	-	20 mV	40 mV		
Regulation Over Temperature (0 °C to 70 °C)	-	20 mV	30 mV		
Output Current	0 A	-	3 A		
Ripple and Noise <sup>1</sup> (RMS)	-	15 mV	25 mV		
Ripple and Noise <sup>1</sup> (pk-pk)					
Burst Mode <sup>2</sup>	-	100 mV	-	Io = 0 A	
Fixed Frequency	-	70 mV	100 mV	Io = 3 A	
Rise Time	-	30 mS	50 mS		
Overshoot at Turn on	-	0%	5%		
Output Capacitance	0 uF	-	1500 uF		
<b>Transient Response</b>					
50% ~ 100% Max Load	Vo=5 V	-	100 mV	150 mV	di/dt = 0.5 A/uS; Vin = 3.3 V; Ta = 25 °C without external capacitor
Settling Time		-	50 uS	120 uS	
100% ~ 50% Max Load		-	100 mV	150 mV	
Settling Time		-	50 uS	120 uS	

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

1. Test condition of the output ripple and noise: 0-20 MHz BW.

2. Recommend a 220 uF capacitor at output if the module operates at burst mode (light load).

## General Specifications

Parameter	Min	Typ	Max	Notes
Efficiency Vo=5.0 V	87%	90%	-	
Switching Frequency	460 kHz	530 kHz	630 kHz	
Output Trim Range	90% Vo	-	110% Vo	
MTBF	8,100,000 hours			Calculated Per Bell Core TR-332 (Vin=3.3 V; Vo=5 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	-	5.2 g	-	

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

## NON-ISOLATED DC/DC CONVERTERS

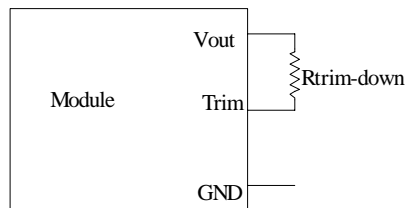
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POWER PRODUCTS

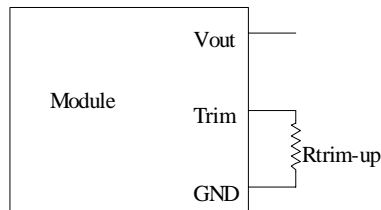
### Output Trim Equations

Equations for calculating the trim resistor (in k $\Omega$ ) given the desired adjusted voltage ( $V_{adj}$ ) and the nominal output voltage of the converter ( $V_{nom}$ ) are shown below. The Trim Down resistor should be connected between the Trim pin and Vout. 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.

$$R_{trim-down} = \left( \frac{12.033}{V_o - V_{adj}} - 7.8 \right)$$

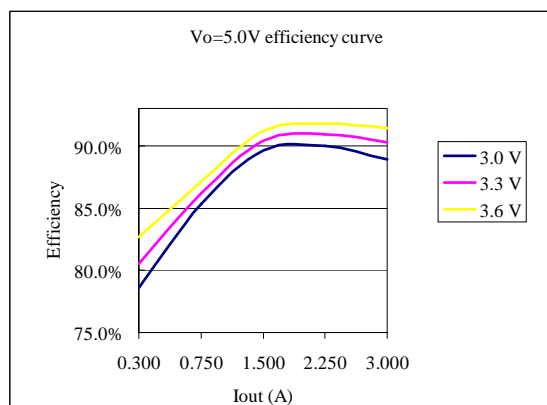


$$R_{trim-up} = \left( \frac{3.808}{V_{adj} - V_o} - 4.64 \right)$$



**Note:** Output voltage  $V_o=5.0128$  V when Rtrim is open.

### Efficiency Data

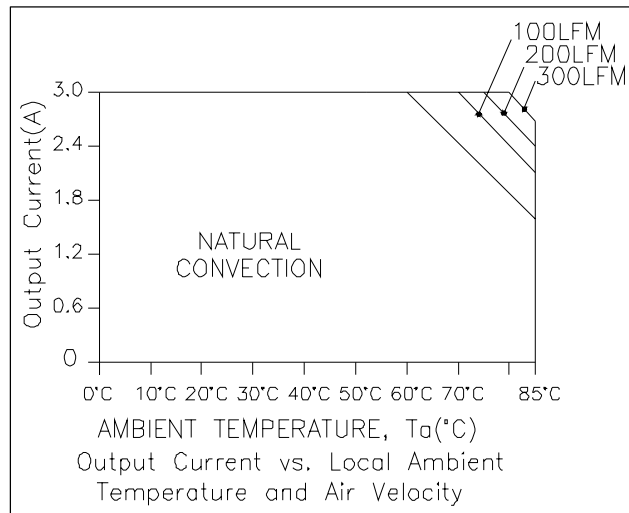


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## Thermal Derating Curve



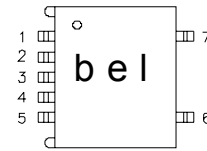
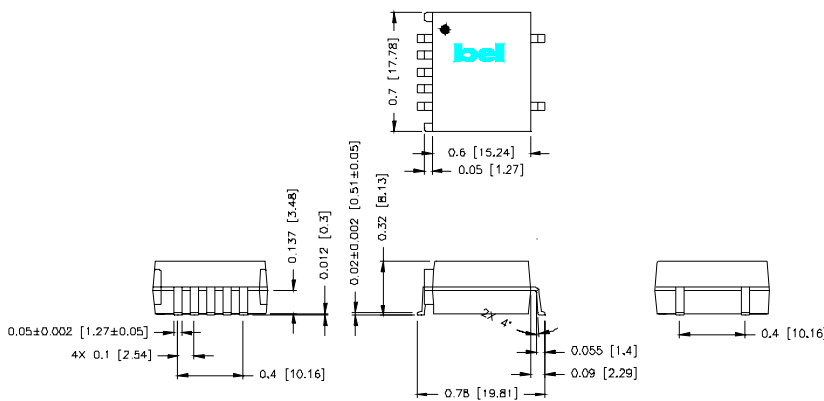
x7AH-03C500

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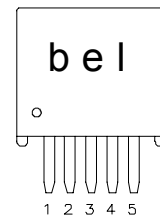
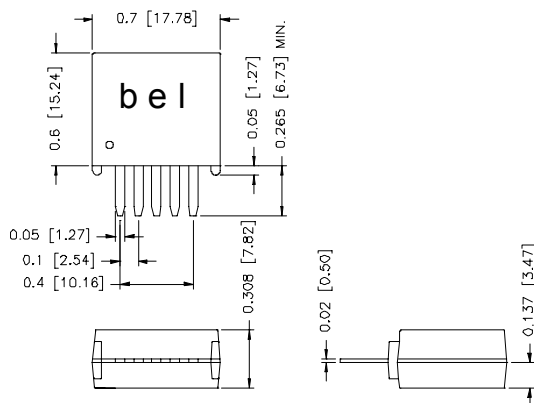
## S7AH-03C500



### Pin Connections

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

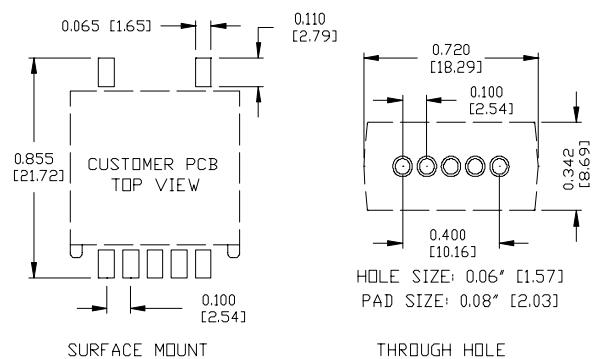
## V7AH-03C500



### Pin Connections

Pin	Function
1	N/A
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](http://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](http://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](http://www.belfuse.com)