

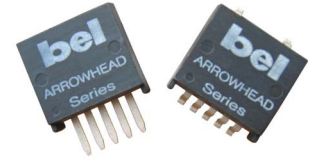
## NON-ISOLATED DC/DC CONVERTERS

3.0 V-5.5 V Input    12 V/0.8 A & 15 V/0.6 A Output

**bel**  
POWER PRODUCTS

### x7AH-01Fxx0 Series

- Non-Isolated
- Fixed Frequency (550 kHz)
- High Efficiency
- Low Profile Package
- Trim Function (option)
- Allows Burst Mode Operation at Low Load Currents



### Description

The Bel x7AH-01Fxx0 is part of the low cost non-isolated dc/dc converter series. The modules use a surface mount package or vertical package for ease of layout and space savings. The output is closely regulated and the efficiency of 12 V output module is typically 88% at full load. Typical features include burst mode operation at light load and trim function (option).

### Part Selection

Output Voltage	Input Voltage	Max. Output Current	Max. Output Power	Typical Efficiency	Part Number Surface Mount	Part Number Vertical Mount
12 V	3.0 V – 5.5 V	0.8 A	9.6 W	88%	S7AH-01FX20	V7AH-01FX20
15 V	3.0 V – 5.5 V	0.6 A	9.0 W	88%	S7AH-01FX50	V7AH-01FX50

**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	-	6 V	
Ambient Temperature	-40 °C	-	85 °C	
Storage Temperature	-40 °C	-	125 °C	

### Input Specifications

Parameter	Min	Typ	Max	Notes
Input Voltage	3 V	-	5.5 V	
Input Current (full load)				
Vo=12V	-	-	4.3 A	
Vo=15V	-	-	4.0 A	
Input Reflected Ripple Current (pk-pk)	-	100 mA	150 mA	With simulated source impedance of 500 nH, 5 Hz to 20 MHz; Use 270 uF/16 V Oscon capacitor with ESR = 0.018 ohm max. at 100 kHz
Input Reflected Ripple Current (rms)	-	30 mA	60 mA	
I <sup>2</sup> t 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:** All specifications are typical at 25 °C unless otherwise stated.

# NON-ISOLATED DC/DC CONVERTERS

3.0 V-5.5 V Input    12 V/0.8 A & 15 V/0.6 A Output



## Output Specifications

Parameter		Min	Typ	Max	Notes	
Output Voltage Set Point	V <sub>O</sub> =12 V	11.580 V	12 V	12.420 V	Test condition: V <sub>in</sub> =5 V, I <sub>out</sub> =full load	
	V <sub>O</sub> =15 V	14.475 V	15 V	15.525 V		
Line Regulation	V <sub>O</sub> =12 V	-	20 mV	40 mV		
	V <sub>O</sub> =15 V	-	20 mV	40 mV		
Load Regulation	V <sub>O</sub> =12 V	-	60 mV	120 mV		
	V <sub>O</sub> =15 V	-	75 mV	150 mV		
Regulation Over Temperature (-40 °C to +85 °C)	V <sub>O</sub> =12 V	-	45 mV	80 mV		
	V <sub>O</sub> =15 V	-	60 mV	100 mV		
Output Current	V <sub>O</sub> =12 V	0 A	-	0.8 A		
	V <sub>O</sub> =15 V	0 A	-	0.6 A		
Ripple and Noise (rms)	V <sub>O</sub> =12 V; I <sub>O</sub> =0 A	-	5 mV	10 mV	Test conditions: BW = 0-20 MHz; 1µF ceramic cap and 33 µF Tantalum capacitor at the output.	
	V <sub>O</sub> =15 V; I <sub>O</sub> =0 A	-	5 mV	10 mV		
	V <sub>O</sub> =12 V; I <sub>O</sub> =0.8 A	-	20 mV	40 mV		
	V <sub>O</sub> =15 V; I <sub>O</sub> =0.6 A	-	30 mV	50 mV		
Ripple and Noise (pk-pk)	V <sub>O</sub> =12 V; I <sub>O</sub> =0 A	-	20 mV	40 mV		
	V <sub>O</sub> =15 V; I <sub>O</sub> =0 A	-	20 mV	40 mV		
	V <sub>O</sub> =12 V; I <sub>O</sub> =0.8 A	-	60 mV	100 mV		
	V <sub>O</sub> =15 V; I <sub>O</sub> =0.6 A	-	80 mV	120 mV		
Rise Time		-	5 mS	-		
Overshoot at Turn on		-	0%	5%		
Output Capacitance		33 µF	-	330 µF	The min output capacitance is 33 µF Tantalum capacitor at the output	
<b>Transient Response</b>						
50% ~ 100% Max Load	Overshoot	All Outputs	-	130 mV	200 mV	di/dt = 0.1 A/µS; V <sub>in</sub> = 5 V; and with 33 µF Tantalum capacitor at the output.
	Settling Time		-	100 µS	200 µS	
100% ~ 50% Max Load	Overshoot		-	130 mV	200 mV	
	Settling Time		-	100 µS	200 µS	

**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    12 V/0.8 A & 15 V/0.6 A Output



## General Specifications

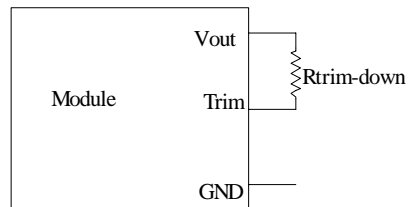
Parameter	Min	Typ	Max	Notes
Efficiency Vo=12 V Vo=15 V	84% 84%	88% 88%	- -	Measured at Vin=5 V, full load
Switching Frequency	500 kHz	550 kHz	650 kHz	
Output Trim Range	90% Vo	-	110% Vo	
MTBF	7,300,000 hours			Calculated Per Bell Core TR-332 (Vin=5 V; Vo=12 V; Io = 0.64 A; Ta = 25 °C)
Dimensions (surface mount) Inches (L x W x H) Millimeters (L x W x H)	0.78 x 0.7 x 0.32 19.81 x 17.78 x 8.13			
Dimensions (vertical) Inches (L x W x H) Millimeters (L x W x H)	0.7 x 0.308 x 0.65 17.78 x 7.82 x 16.51			
Weight	-	5.2 g	-	

**Note:** All specifications are typical at 25 °C unless otherwise stated.

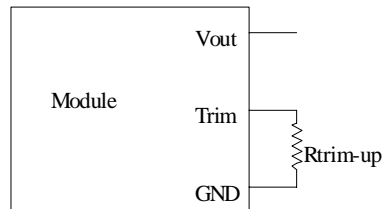
## Output Trim Equations

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 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.

$$R_{trim-down} = \frac{A}{V_{nom} - V_{adj}} - B$$



$$R_{trim-up} = \frac{C}{V_{adj} - V_{nom}} - D$$



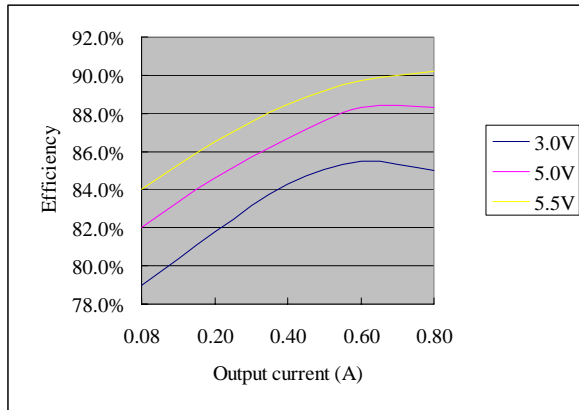
Vnom	A	B	C	D
12	164.640	21.850	11.760	7.150
15.055	209.542	20.600	11.760	5.900

# NON-ISOLATED DC/DC CONVERTERS

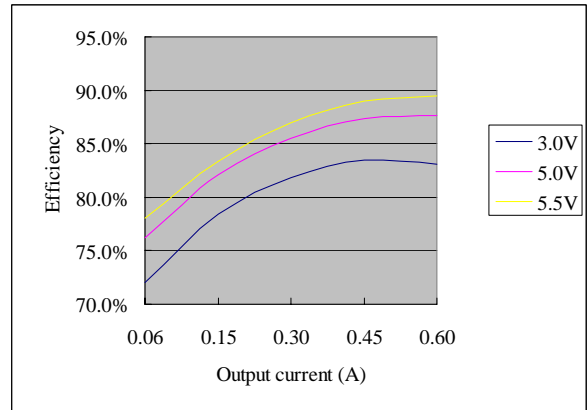
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## Efficiency Data

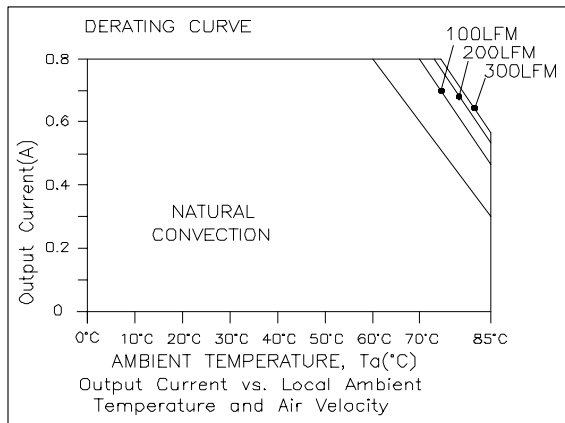


x7AH-01FX20

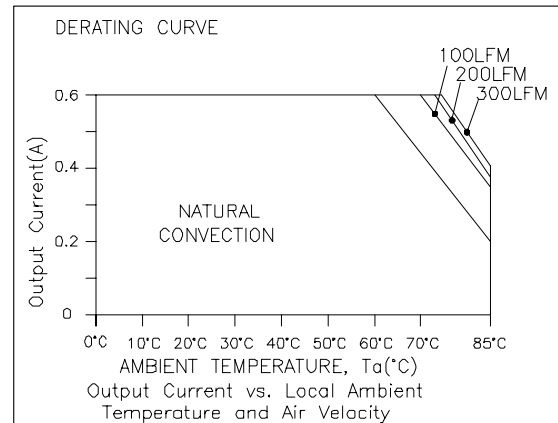


x7AH-01FX50

## Thermal Derating Curves



x7AH-01FX20



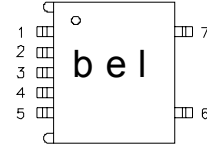
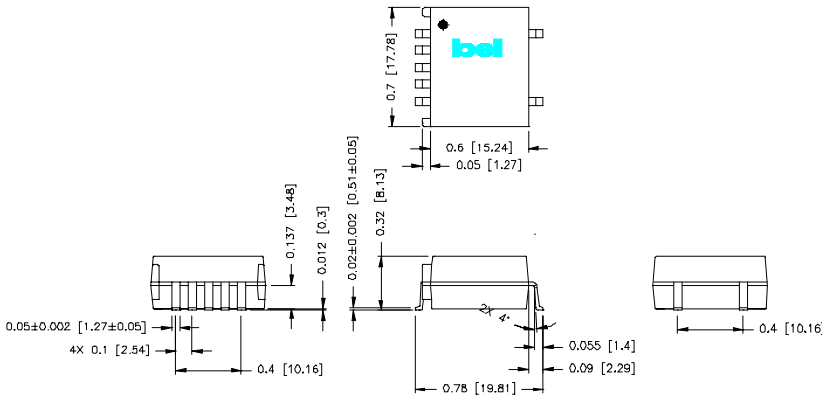
x7AH-01FX50

# NON-ISOLATED DC/DC CONVERTERS

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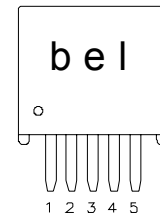
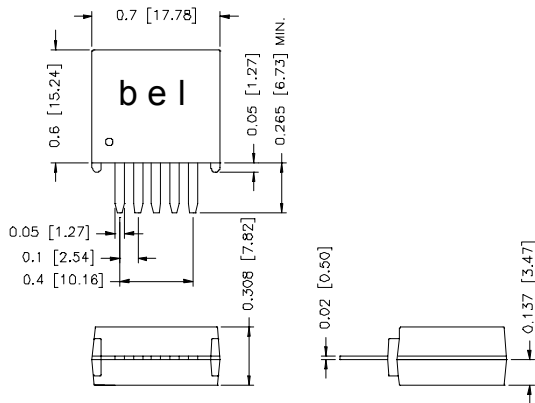
## S7AH-01F



### Pin Connections

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

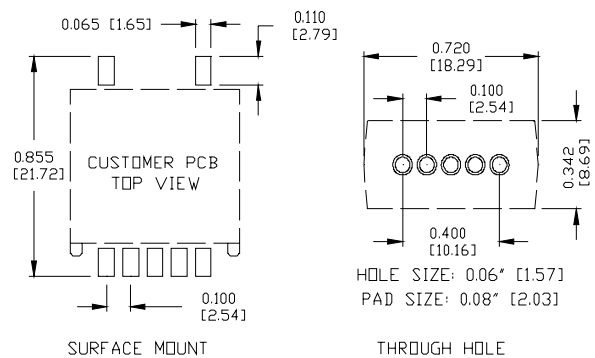
## V7AH-01F



### Pin Connections

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

### RECOMMENDED PCB PAD LAYOUT



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