

# NON-ISOLATED DC/DC CONVERTERS

3.0V-5.5V Input

0.8V-3.3V/12A Output



## X7AH-12F1A0

## PRELIMINARY

- Non-Isolated
- High Efficiency
- Fixed Frequency
- Excellent Thermal Performance
- Low Cost
- OCP/SCP
- Input Under Voltage Lockout
- Remote On/Off
- Remote Sense (SMD module)
- Trim Function

### Description

The Bel X7AH-12F1A0 is part of the low cost non-isolated dc to dc converter series. This converter is available in a range of output voltages from 0.9V to 3.3V. It is packaged in a compact, overmolded package rated at 12A. The output is closely regulated and the efficiency of 3.3V output module is typically 93% 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
0.8V-3.3V	3.0V – 5.5V	12A	39.6W	93%	S7AH-12F1A0	V7AH-12F1A0

### Absolute Maximum Ratings

Parameter	Min	Typ	Max	Notes
Input Voltage (continuous)	-0.3V	-	6V	
Output Enable Terminal Voltage	-0.3V	-	7V	
Ambient Temperature	-40°C	-	85°C	
Storage Temperature	-55°C	-	125°C	

### Input Specifications

Parameter	Min	Typ	Max	Notes
Input Voltage <sup>1</sup>	3V	-	5.5V	
Input Current (no load)	-	120mA	200mA	
Input Current (full load)				
Vo=3.3V	-	-	11A	
Vo=2.5V	-	-	10.5A	
Vo=1.8V	-	-	9.0A	
Vo=1.5V	-	-	8.1A	
Vo=1.2V	-	-	6.5A	
Vo=1.0V	-	-	5.2A	
Vo=0.9V	-	-	3.2A	
Remote Off Input Current	-	2mA	5mA	
Input Reflected Ripple Current (pk-pk)	-	100mA	150mA	With simulated source impedance of 500nH, 5Hz to 20MHz; use a 270uF/16V cap with ESR=0.0018 ohm max at 100KHz
Input Reflected Ripple Current (RMS)	-	35mA	60mA	
I <sup>2</sup> t Inrush Current Transient	-	0.09A <sup>2</sup> s	0.2A <sup>2</sup> s	
Turn on Voltage Threshold		2.1V	-	
Turn off Voltage Threshold	-	2V	2.4V	

**Note:** 1. The input voltage range of 3.3V output module is 4.5V-5.5V and that of 2.5V module is 3.6V-5.5V.

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## Output Specifications

Parameter	Min	Typ	Max	Notes		
Output Voltage Set Point	-2%Vo,set	-	2%Vo,set	Vin=5V, Io= 50% load		
Line Regulation	-	-	10mV			
Load Regulation	-	-	15mV			
Regulation Over Temperature (-40°C to +85°C)	-	-	15mV			
Output Current	0A	-	12A			
Current Limit Threshold	20A	-	30A			
Short Circuit Surge Transient	-	0.3A <sup>2</sup> s	0.6A <sup>2</sup> s			
Ripple and Noise (RMS)	-	12mV	21mV	Test conditions: 0-20MHz BW; 1uF ceramic capacitor and 330uF tantalum capacitor at the output.		
Ripple and Noise (pk-pk)	-	50mV	100mV			
Turn on Time	-	5mS	10mS			
Overshoot at Turn on	-	0%	3%			
Output Capacitance	330uF	-	4800uF			
<b>Transient Response</b>						
50% ~ 100% Max Load	Overshoot	All	-	110mV	Test conditions: di/dt=0.5A/us, Vin=5V, with 330uF external load capacitance.	
	Settling Time		-	40uS		80uS
100% ~ 50% Max Load	Overshoot		-	110mV		150mV
	Settling Time		-	40uS		80uS

- Notes:** 1. All specifications are typical at 5V input, full load at 25°C unless otherwise stated.  
2. The input voltage range of 3.3V output module is 4.5V-5.5V and that of 2.5V module is 3.6V-5.5V.

## General Specifications

Parameter	Min	Typ	Max	Notes
Efficiency	Vo=3.3V	90%	93%	Vin=5V, full load
	Vo=2.5V	86%	89%	
	Vo=1.8V	84%	87%	
	Vo=1.5V	81%	84%	
	Vo=1.2V	79%	82%	
	Vo=1.0V	77%	80%	
Efficiency	Vo=0.9V	75%	78%	Vin=3.3V, full load
	Vo=1.8V	85%	88%	
	Vo=1.5V	81%	84%	
	Vo=1.2V	79%	82%	
	Vo=1.0V	78%	81%	
Switching Frequency	250KHz	300KHz	350KHz	
Output Trim Range	90%Vo	-	110%Vo	
Remote Sense Compensation	-	-	0.2V	SMD module
MTBF	TBD			Calculated Per Bell Core TR-332 (Io = 9.6A; Ta = 25°C)
Dimensions (surface mount)	0.78 x 0.70 x 0.32			
Inches (L x W x H)	19.81 x 17.78 x 8.128			
Dimensions (vertical)	0.70 x 0.308 x 0.65			
Inches (L x W x H)	17.78 x 7.82 x 16.51			
Weight	-	5.1g	-	

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## Control Specifications

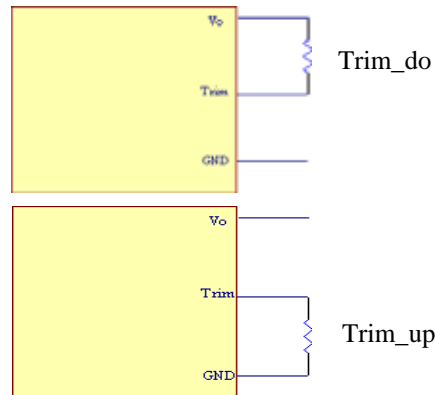
Parameter	Min	Typ	Max	Notes
<b>Remote On/Off</b>				
Signal Low (Unit Off)	-0.3V	-	0.8V	Remote on/off pin open, unit on.
Signal High (Unit On)	2.4V	-	V <sub>in,max</sub>	

## Output Trim Equations

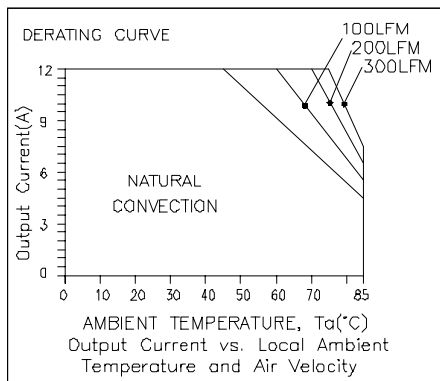
Equations for calculating the trim resistor (in kΩ) given the desired adjusted voltage (V<sub>adj</sub>) and the nominal output voltage of the converter (V<sub>nom</sub>) are shown below. The Trim Down resistor should be connected between the Trim pin and V<sub>out</sub>. The Trim Up resistor should be connected between the Trim pin and Ground. Only one of the resistors should be used for any given application.

$$R_{TrimDown} = \frac{2.0}{0.9 - V_{adj}} - 10.187$$

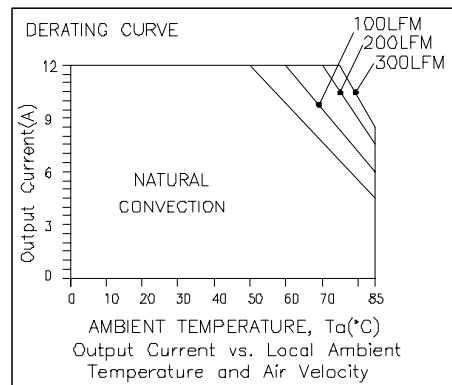
$$R_{TrimUp} = \frac{7.0}{V_{adj} - 0.9} - 0.187$$



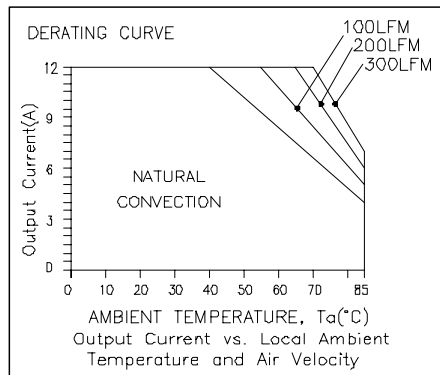
## Thermal Derating Curves



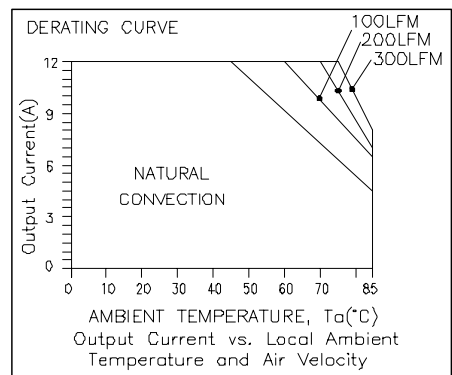
S7AH-12F330



V7AH-12F330



S7AH-12F250



V7AH-12F250

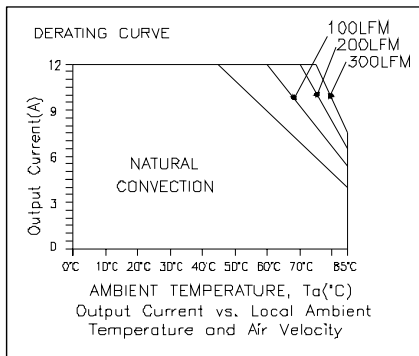
# NON-ISOLATED DC/DC CONVERTERS

3.0V-5.5V Input

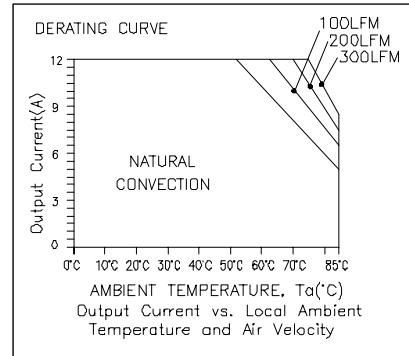
0.8V-3.3V/12A Output



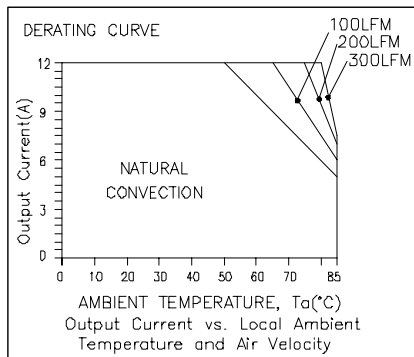
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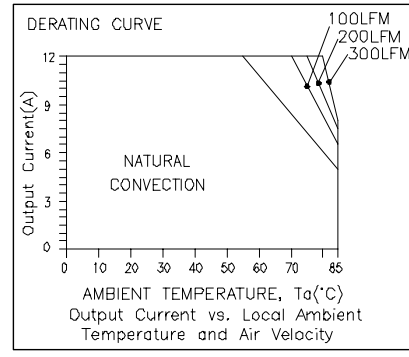
S7AH-12F180



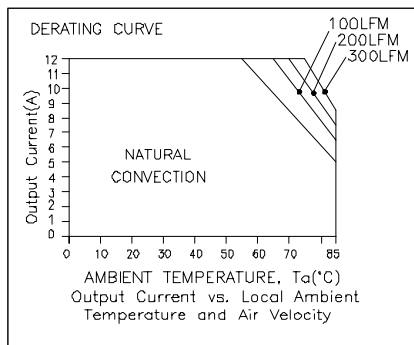
V7AH-12F180



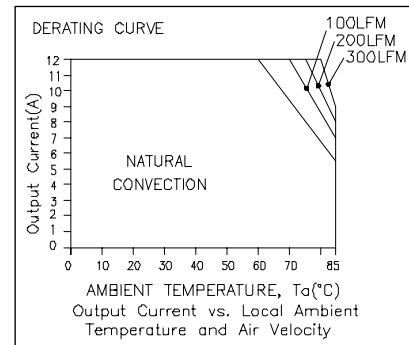
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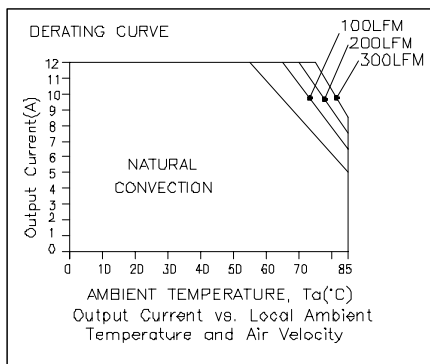
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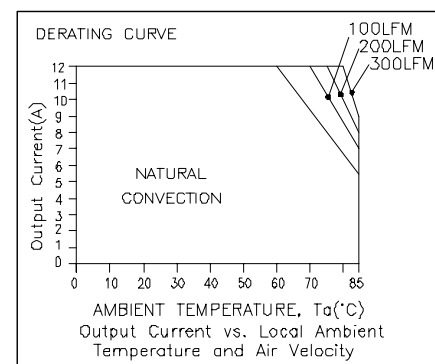
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V7AH-12F120



S7AH-12F100



V7AH-12F100

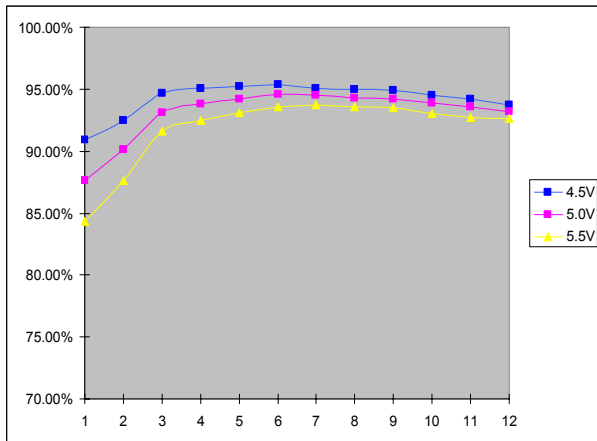
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3.0V-5.5V Input

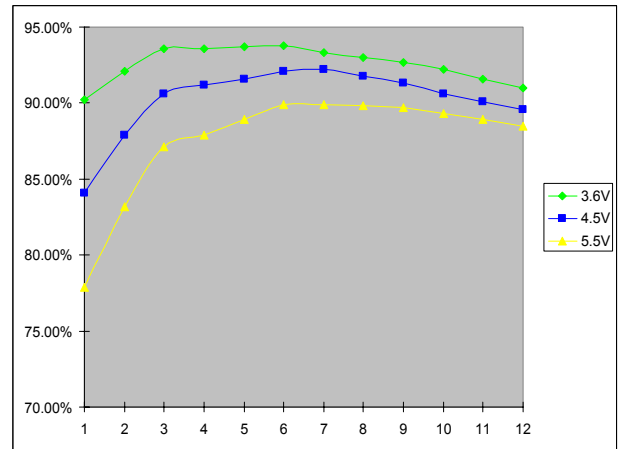
0.8V-3.3V/12A Output



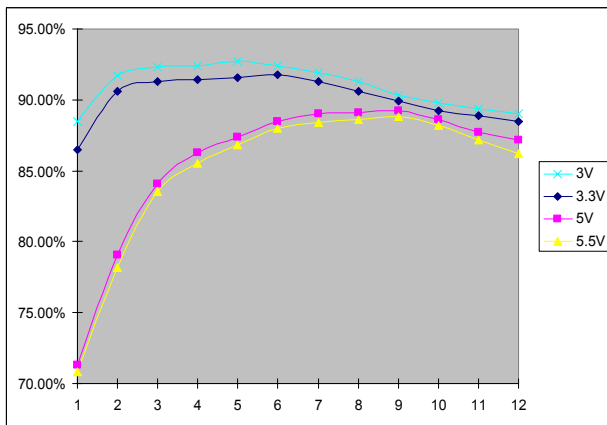
## Efficiency Data



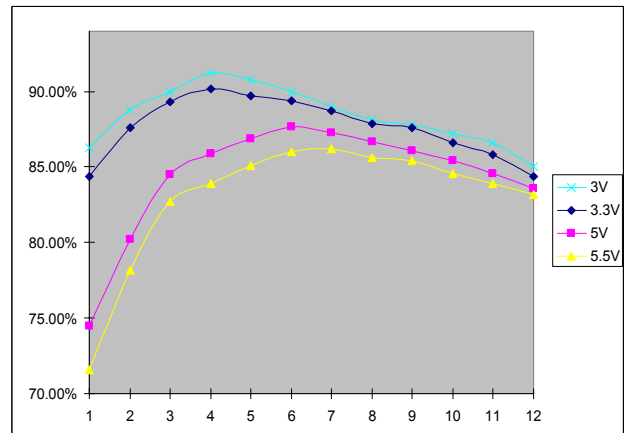
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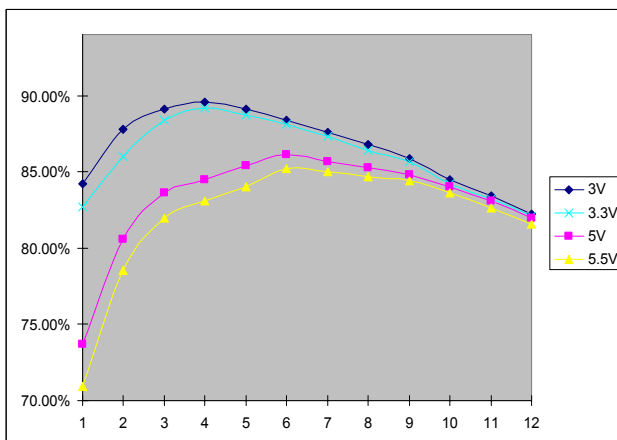
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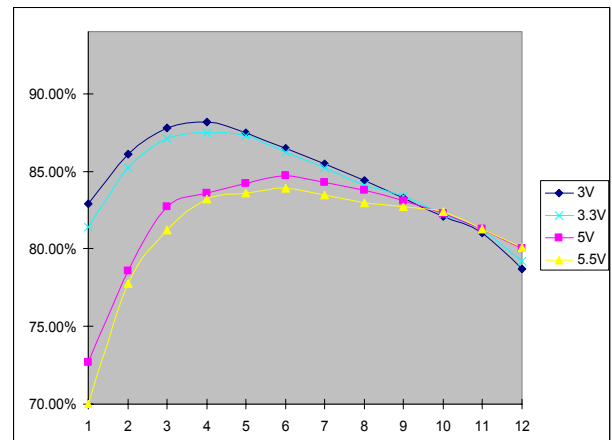
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X7AH-12F150



X7AH-12F120

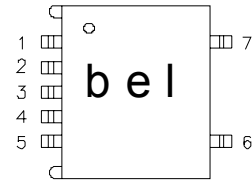
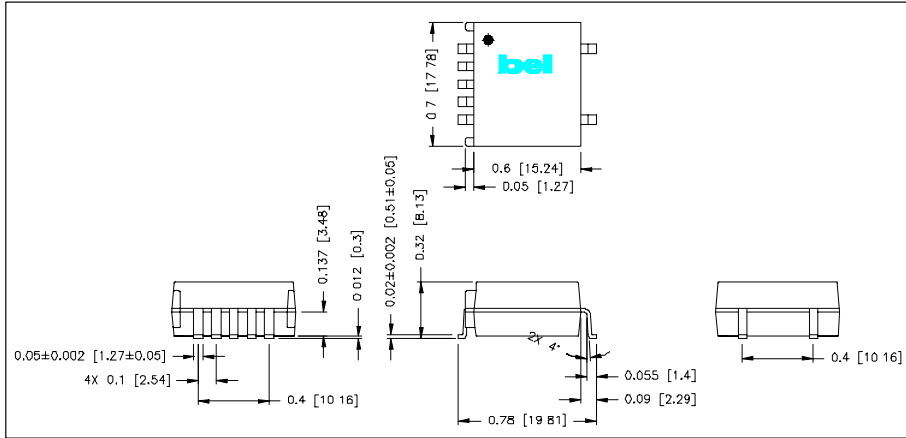


X7AH-12F100

# NON-ISOLATED DC/DC CONVERTERS

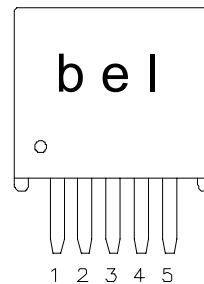
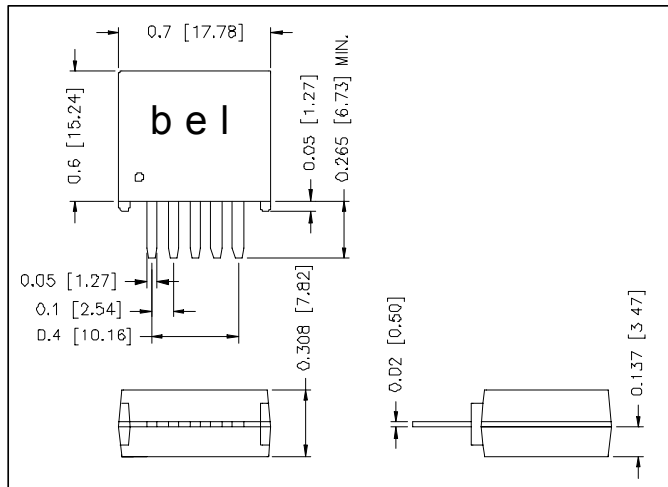
3.0V-5.5V Input

0.8V-3.3V/12A Output



## Pin Connections

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



## Pin Connections

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

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