

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 ¹	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 ² t Inrush Current Transient	-	0.09A ² s	0.2A ² 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 ² s	0.6A ² 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	
Transient Response				
50% ~ 100% Max Load	Overshoot	All	-	Test conditions: di/dt=0.5A/us, Vin=5V, with 330uF external load capacitance.
	Settling Time		-	
100% ~ 50% Max Load	Overshoot		-	
	Settling Time		-	
			110mV	150mV
			40uS	80uS
			110mV	150mV
			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%		
	Vo=0.9V	75%	78%		
Efficiency	Vo=1.8V	85%	88%	-	Vin=3.3V, full load
	Vo=1.5V	81%	84%		
	Vo=1.2V	79%	82%		
	Vo=1.0V	78%	81%		
	Vo=0.9V	76%	79%		
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 19.81 x 17.78 x 8.128			
Inches (L x W x H)					
Millimeters (L x W x H)					
Dimensions (vertical)		0.70 x 0.308 x 0.65 17.78 x 7.82 x 16.51			
Inches (L x W x H)					
Millimeters (L x W x H)					
Weight		-	5.1g	-	

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Control Specifications

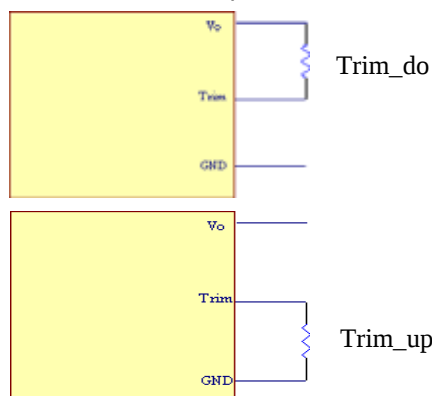
Parameter	Min	Typ	Max	Notes
Remote On/Off				
Signal Low (Unit Off)	-0.3V	-	0.8V	Remote on/off pin open, unit on.
Signal High (Unit On)	2.4V	-	V _{in,max}	

Output Trim Equations

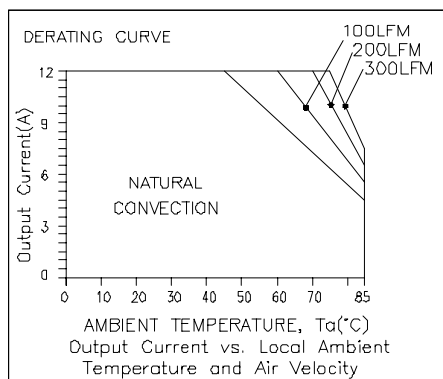
Equations for calculating the trim resistor (in kΩ) given the desired adjusted voltage (V_{adj}) and the nominal output voltage of the converter (V_{nom}) are shown below. The Trim Down resistor should be connected between the Trim pin and V_{out}. The Trim Up resistor should be connected between the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

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

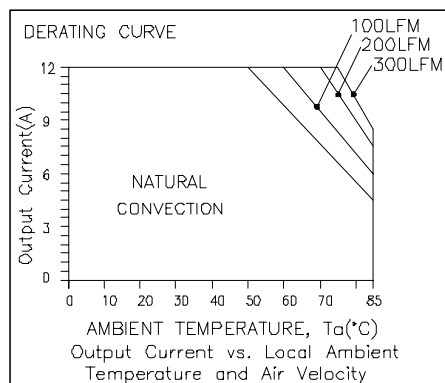
$$R_{TrimUp} = \frac{7.0}{V_{adj} - 0.9} - 0.187$$



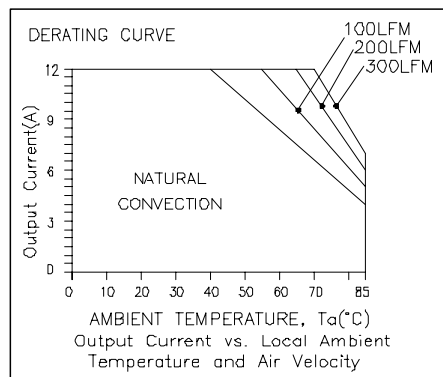
Thermal Derating Curves



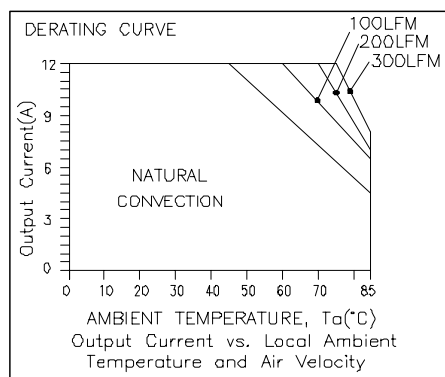
S7AH-12F330



V7AH-12F330



S7AH-12F250



V7AH-12F250

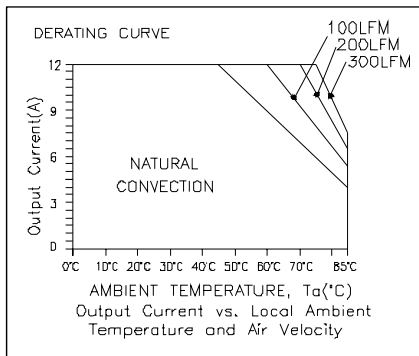
NON-ISOLATED DC/DC CONVERTERS

3.0V-5.5V Input

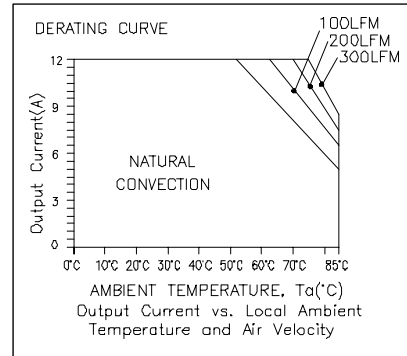
0.8V-3.3V/12A Output



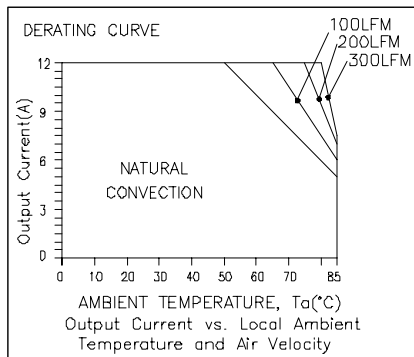
Thermal Derating Curves (continued)



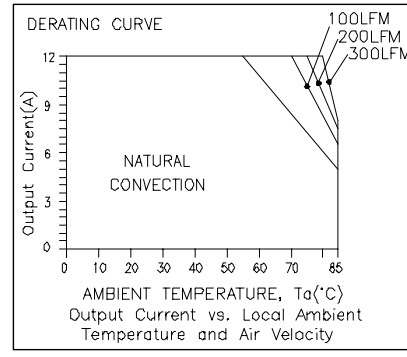
S7AH-12F180



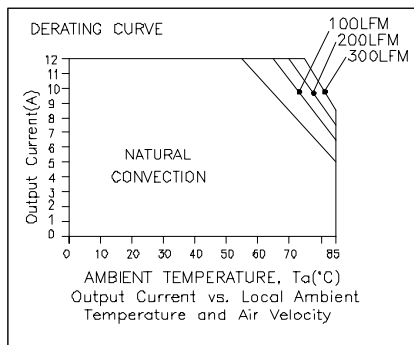
V7AH-12F180



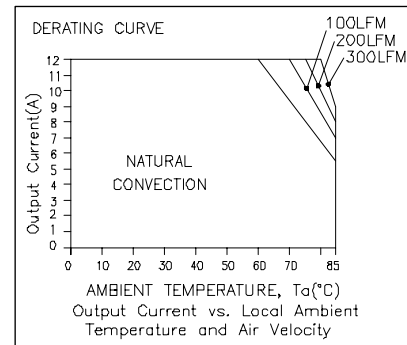
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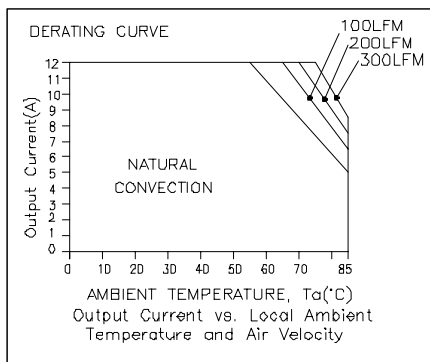
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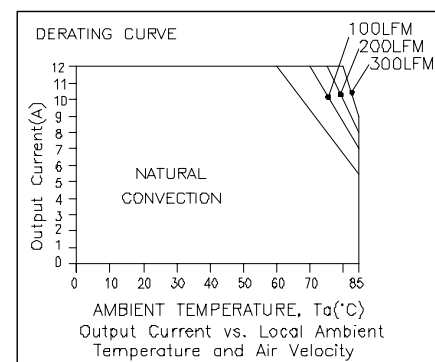
S7AH-12F120



V7AH-12F120



S7AH-12F100



V7AH-12F100

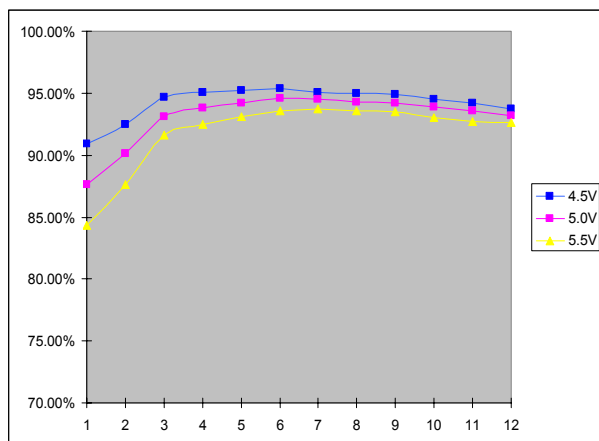
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3.0V-5.5V Input

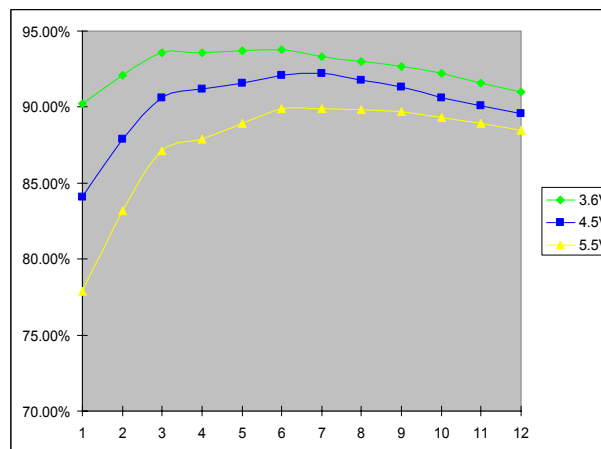
0.8V-3.3V/12A Output



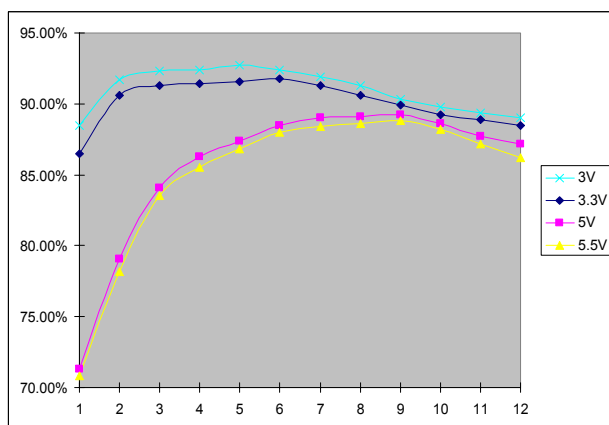
Efficiency Data



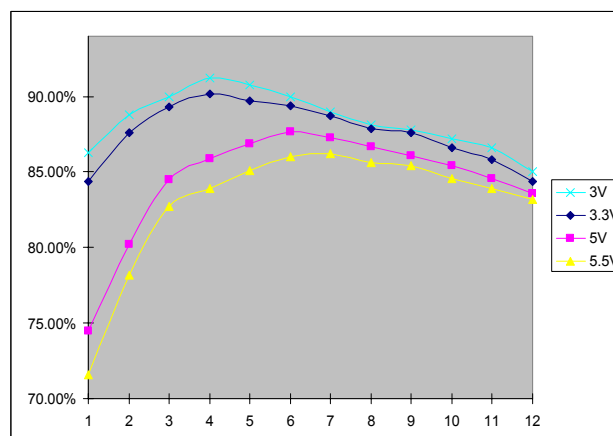
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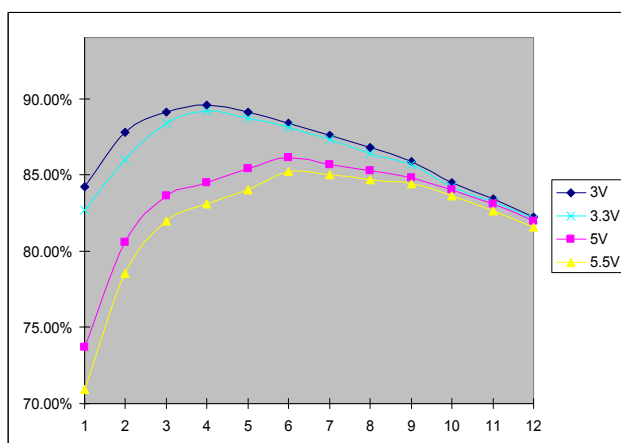
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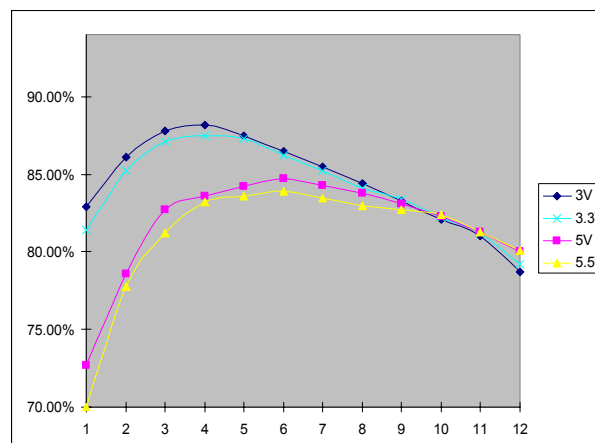
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X7AH-12F150



X7AH-12F120

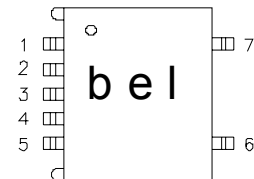
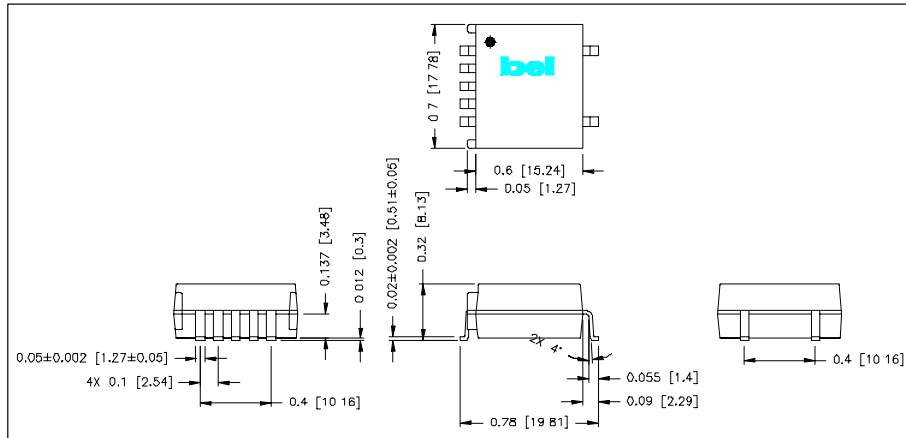


X7AH-12F100

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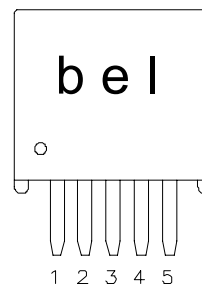
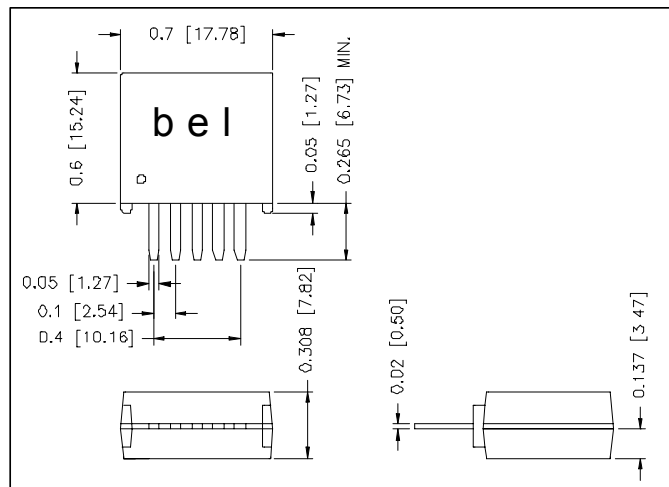
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0.8V-3.3V/12A Output



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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