NON-ISOLATED DC/DC CONVERTERS

2.5V Input 0.9V-1.65V/10A Output

x7AH-10J Series

- Non-Isolated
- Low profile package (7.82mm)
- Fixed frequency (300KHz)
- Under-voltage lockout (UVLO)
- Remote On/Off
- Short circuit protection
- Over current protection
- Trim Function

Description

The Bel x7AH-10Jxx0 is part of the low cost non-isolated DC/DC power 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 of 1.5V output is typically 88% 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
1.5V	2.5V	10A	15W	88%	S7AH-10J150	V7AH-10J150
1.2V	2.5V	10A	12W	83%	S7AH-10J120	V7AH-10J120
1.0V	2.5V	10A	10W	80%	S7AH-10J100	V7AH-10J100

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)	-0.3V	-	6V	
Output Enable Terminal Voltage	-0.3V	-	7V	
Ambient Temperature	-40°C	-	85°C	
Storage Temperature	-40°C	-	105°C	

Input Specifications

Parameter	Min	Typ	Max	Notes
Input Voltage	2.25V	2.5V	2.75V	
Input Current (no load)	-	75mA	-	
Input Current (full load) Vo=1.5V Vo=1.2V Vo=1.0V	 - - -	 6.8A 5.6A 4.9A	 - - -	
Remote Off Input Current	-	4mA	8mA	
Input Reflected Ripple Current (pk-pk)	-	80mA	150mA	Tested with simulated source impedance of 500nH, 5Hz to 20MHz; with a 270uF/16V with ESR=0.018 ohm max, at 100KHz at 25°C
Input Reflected Ripple Current (RMS)	-	25mA	50mA	
I^2t Inrush Current Transient	-	$0.04A^2s$	$0.10A^2s$	
Turn on Voltage Threshold	2V	2.1V	2.15V	
Turn off Voltage Threshold	1.8V	2V	2.15V	

Output Specifications

Parameter			Min	Typ	Max	Notes
Output Voltage Set Point						
	Vo=1.5V		1.470V	1.5V	1.530V	Test conditions: Vin=2.5V, Io=full load
	Vo=1.2V		1.176V	1.2V	1.224V	
	Vo=1.0V		0.980V	1.0V	1.020V	
Line Regulation						
	Vo=1.5V		-	2mV	5mV	
	Vo=1.2V		-	2mV	5mV	
	Vo=1.0V		-	2mV	5mV	
Load Regulation						
	Vo=1.5V		-	5mV	10mV	
	Vo=1.2V		-	5mV	10mV	
	Vo=1.0V		-	5mV	10mV	
Regulation Over Temperature (-40°C to +85°C)						
	Vo=1.5V		-	13mV	25mV	
	Vo=1.2V		-	10mV	20mV	
	Vo=1.0V		-	9mV	20mV	
Output Current			0A	-	10A	
Current Limit Threshold			13A	-	25A	
Short Circuit Surge Transient						
	Vo=1.5V		-	$0.5A^2s$	$1.5A^2s$	
	Vo=1.2V		-	$0.5A^2s$	$1.5A^2s$	
	Vo=1.0V		-	$0.5A^2s$	$1.5A^2s$	
Ripple and Noise (RMS)			-	15mV	25mV	Test conditions: 0-20MHz BW, with a 1uF ceramic capacitor at the output.
Ripple and Noise (pk-pk)			-	50mV	100mV	
Turn on Time			-	1mS	2mS	
Overshoot at Turn on			-	0%	3%	
Output Capacitance			220uF	-	4000uF	
Transient Response						
50% ~ 100% Max Load	Overshoot	Vo=1.5V	-	90mV	125mV	Test conditions: di/dt = 0.5A/uS; Vin = 2.5V; with a 220uF tantalum capacitor at the output.
	Settling Time		-	30uS	60uS	
100% ~ 50% Max Load	Overshoot		-	90mV	125mV	
	Settling Time		-	30uS	60uS	
50% ~ 100% Max Load	Overshoot	Vo=1.2V	-	80mV	120mV	
	Settling Time		-	30uS	60uS	
100% ~ 50% Max Load	Overshoot		-	80mV	120mV	
	Settling Time		-	30uS	60uS	
50% ~ 100% Max Load	Overshoot	Vo=1.0V	-	80mV	120mV	
	Settling Time		-	30uS	60uS	
100% ~ 50% Max Load	Overshoot		-	80mV	120mV	
	Settling Time		-	30uS	60uS	

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

General Specifications

Parameter	Min	Typ	Max	Notes
Efficiency Vo=1.5V Vo=1.2V Vo=1.0V	 85% 83% 79%	 88% 86% 82%	 - - -	Measured at Vin=2.5V, full load and Ta=25°C.
Switching Frequency	250KHz	300KHz	350KHz	
Output Trim Range	90%Vo	-	110%Vo	
MTBF	4,447,157 hours			Calculated Per Bell Core TR-332 (Io = Nominal; Ta = 25°C)
Dimensions (surface mount) Inches (L × W × H) Millimeters (L × W × H)	 0.78 x 0.70 x 0.32 19.81 x 17.78 x 8.13			
Dimensions (vertical) Inches (L × W × H) Millimeters (L × W × H)	 0.70 x 0.308 x 0.65 17.78 x 7.82 x 16.51			
Weight	-	4.7g	-	

Control Specifications

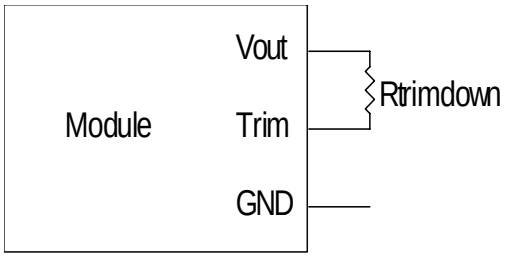
Parameter	Min	Typ	Max	Notes
Remote On/Off				
Signal Low (Unit Off)	0V	-	0.5V	Remote on/off pin open, the module is on.
Signal High (Unit On)	2V	-	5.5V	

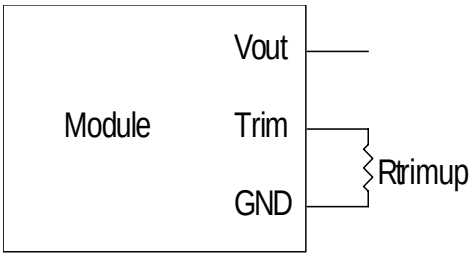
Output Trim Equations

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.

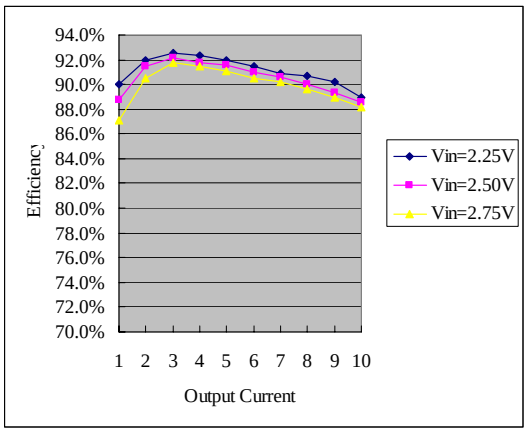
$$R_{TrimDown} = \frac{A}{V_{nom} - V_{adj}} - B \qquad R_{TrimUp} = \frac{C}{V_{adj} - V_{nom}} - D$$

Vnom	A	B	C	D
1.5V	49.788	287.900	43.330	226.000
1.2V	31.241	223.900	43.330	162.000
1.0V	11.029	92.800	25.550	56.200

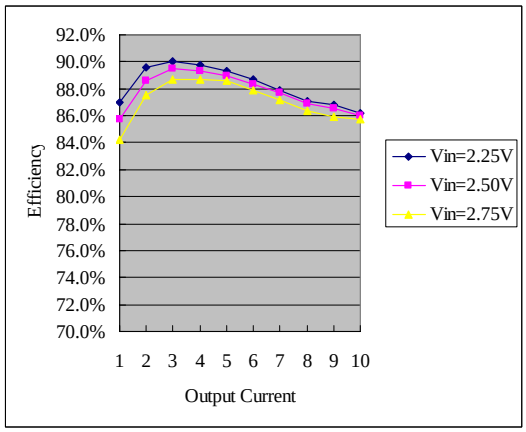




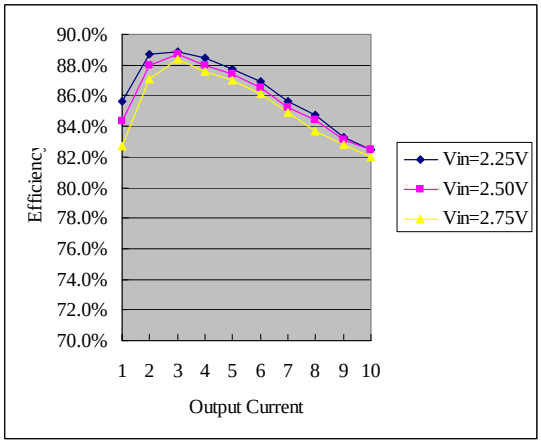
Efficiency Data



X7AH-10J150

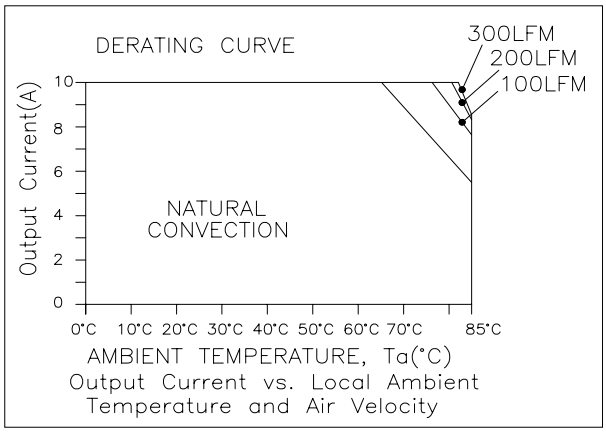


X7AH-10J120



X7AH-10J100

Thermal Derating Curve



Note: Derating curve is for 1.2V output and tested at nominal input voltage.

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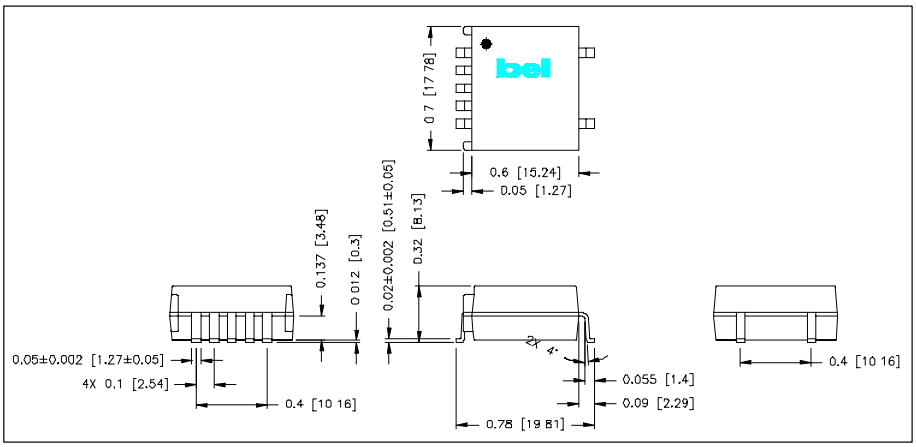
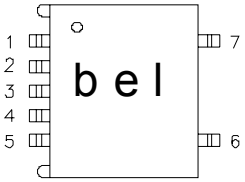
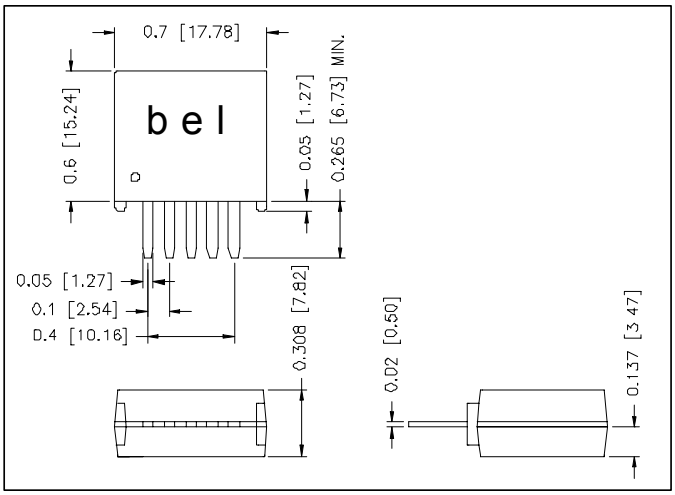
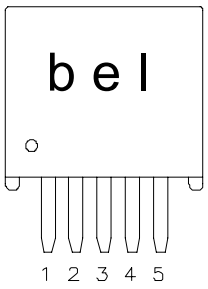




Pin Connections

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