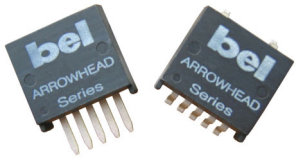
NON-ISOLATED DC/DC CONVERTERS

4.5V-32V Input 1.2V-5.0V/1A Output

x7AH-01Hxx0 Series

- Non-Isolated
- Remote On/Off
- Input Under Voltage Lockout (UVLO)
- OCP/SCP
- Trim Function
- Low profile package (7.82mm)



Description

The Bel x7AH-01Hxx0 series are part of the low cost non-isolated DC/DC converter series. These modules use a SMD or vertical mount package for ease of layout and space savings. The output is closely regulated and the efficiency of 5V output is typically 90% 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
5.0V	8.0 – 32V	1A	5.0W	90%	S7AH-01H500	V7AH-01H500
3.3V	4.5 – 32V	1A	3.3W	86%	S7AH-01H330	V7AH-01H330
2.5V	4.5 –32V	1A	2.5W	83%	S7AH-01H250	V7AH-01H250
1.8V	4.5 – 32V	1A	1.8W	79%	S7AH-01H180	V7AH-01H180
1.5V	4.5 – 32V	1A	1.5W	76%	S7AH-01H150	V7AH-01H150
1.2V	4.5 – 32V	1A	1.2W	73%	S7AH-01H120	V7AH-01H120

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	-	34V	
Output Enable Terminal Voltage	-0.3V	-	12V	
Ambient Temperature	-40°C	-	85°C	
Storage Temperature	-40°C	-	125°C	

Input Specifications

Parameter	Min	Typ	Max	Notes
Input Voltage				
V_O=5.0V	8.0V	20V	32V	
V_O=1.2V-3.3V	4.5V	20V	32V	
Input Current (no load)	-	5mA	8mA	
Input Current (full load)				
V_O=5.0V	-	-	0.30A	
V_O=3.3V	-	-	0.20A	
V_O=2.5V	-	-	0.16A	
V_O=1.8V	-	-	0.12A	
V_O=1.5V	-	-	0.11A	
V_O=1.2V	-	-	0.09A	
Remote Off Input Current	-	2mA	5mA	

Input Specifications (continued)

Parameter	Min	Typ	Max	Notes
Input Reflected Ripple Current (pk-pk)	-	300mA	420mA	Tested with simulated source impedance of 500nH, 5Hz to 20MHz and one 100uF/50V electrolytic capacitor and a 3.3uF/50V ceramic capacitor at the input
Input Reflected Ripple Current (RMS)	-	100mA	160mA	
I^2t Inrush Current Transient	-	$0.02A^2s$	$0.1A^2s$	
Turn on Voltage Threshold				
Vo=5.0V	-	5.0V	7.0V	
Vo=1.2V-3.3V	-	4.1V	4.5V	
Turn off Voltage Threshold				
Vo=5.0V	-	3.6V	5.0V	
Vo=1.2V-3.3V	-	3.3V	4.0V	

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

Output Specifications

Parameter	Min	Typ	Max	Notes
Output Voltage Set Point				
Vo=5.0V	4.90V	5.0V	5.10V	Test conditions: Vin=20V, Io=50% full load
Vo=3.3V	3.234V	3.3V	3.366V	
Vo=2.5V	2.450V	2.5V	2.550V	
Vo=1.8V	1.764V	1.8V	1.836V	
Vo=1.5V	1.470V	1.5V	1.530V	
Vo=1.2V	1.176V	1.2V	1.224V	
Line Regulation				
Vo=5.0V	-	±5mV	±10mV	
Vo=3.3V	-	±3mV	±6mV	
Vo=2.5V	-	±2mV	±5mV	
Vo=1.8V	-	±2mV	±4mV	
Vo=1.5V	-	±1mV	±3mV	
Vo=1.2V	-	±1mV	±2mV	
Load Regulation				
Vo=5.0V	-	±5mV	±10mV	
Vo=3.3V	-	±3mV	±6mV	
Vo=2.5V	-	±2mV	±5mV	
Vo=1.8V	-	±2mV	±4mV	
Vo=1.5V	-	±1mV	±3mV	
Vo=1.2V	-	±1mV	±2mV	
Regulation Over Temperature (-40°C to +85°C)	-	±10mV	±20mV	
Output Current	0A	-	1A	
Current Limit Threshold	2A	-	3A	
Short Circuit Surge Transient	-	$0.02A^2s$	$0.1A^2s$	
Ripple and Noise (RMS)	-	6mV	10mV	Test condition: 0-20MHz BW
Ripple and Noise (pk-pk)	-	60mV	100mV	
Turn on Time	-	6mS	30mS	
Overshoot at Turn on	-	2%	5%	
Output Capacitance	0uF	-	400uF	

Output Specifications (continued)

Parameter			Min	Typ	Max	Notes
Transient Response						
50% ~ 100% Max Load	Overshoot	Vo=5.0V	-	140mV	170mV	Test conditions: di/dt = 0.5A/uS; Vin = 20V
	Settling Time		-	100uS	130uS	
100% ~ 50% Max Load	Overshoot		-	140mV	170mV	
	Settling Time		-	100uS	130uS	
50% ~ 100% Max Load	Overshoot	Vo=3.3V	-	80mV	120mV	
	Settling Time		-	150uS	200uS	
100% ~ 50% Max Load	Overshoot		-	80mV	120mV	
	Settling Time		-	150uS	200uS	
50% ~ 100% Max Load	Overshoot	Vo=2.5V	-	70mV	110mV	
	Settling Time		-	120uS	160uS	
100% ~ 50% Max Load	Overshoot		-	70mV	110mV	
	Settling Time		-	120uS	160uS	
50% ~ 100% Max Load	Overshoot	Vo=1.2V - 1.8V	-	60mV	100mV	
	Settling Time		-	100uS	130uS	
100% ~ 50% Max Load	Overshoot		-	60mV	100mV	
	Settling Time		-	100uS	130uS	

Note: All specifications are typical at 20V input, full load at 25°C unless otherwise stated.

General Specifications

Parameter	Min	Typ	Max	Notes
Efficiency				
Vo=5.0V	87%	90%	-	Measured at Vin=20V, full load
Vo=3.3V	83%	86%	-	
Vo=2.5V	80%	83%	-	
Vo=1.8V	76%	79%	-	
Vo=1.5V	73%	76%	-	
Vo=1.2V	70%	73%	-	
Switching Frequency				
Vo=5.0V	130KHz	150KHz	170KHz	
Vo=3.3V	270KHz	290KHz	310KHz	
Vo=2.5V	190KHz	220KHz	250KHz	
Vo=1.8V	150KHz	170KHz	190KHz	
Vo=1.5V	130KHz	150KHz	170KHz	
Vo=1.2V	100KHz	120KHz	140KHz	
Output Trim Range	90%Vo	-	110%Vo	
MTBF	8,040,000 hours			Calculated Per Bell Core TR-332 (Io = 0.8A, Vin=20V; Ta = 25°C)
Dimensions (surface mount)				
Inches (L × W × H)	0.78 x 0.70 x 0.32			
Millimeters (L × W × H)	19.81 x 17.78 x 8.13			
Dimensions (vertical)				
Inches (L × W × H)	0.70 x 0.308 x 0.65			
Millimeters (L × W × H)	17.78 x 7.82 x 16.51			
Weight	-	5.1g	-	

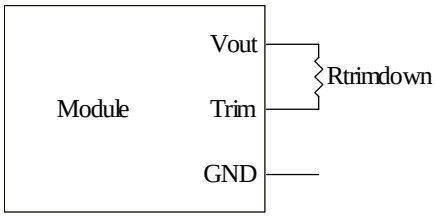
Control Specifications

Parameter	Min	Typ	Max	Notes
Remote On/Off				
Signal Low (Unit On)	-0.3V	-	1V	Remote on/off pin open, unit on.
Signal High (Unit Off)	2.8V	-	12V	

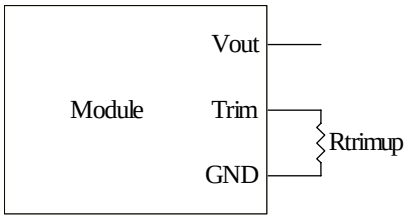
Output Trim Equations

Equations for calculating the trim resistor (in kΩ) given the desired adjusted voltage (Vadj) and the nominal output voltage of the converter (Vo) 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.

$$R_{TrimDown} = \frac{A}{V_o - V_{adj}} - B$$

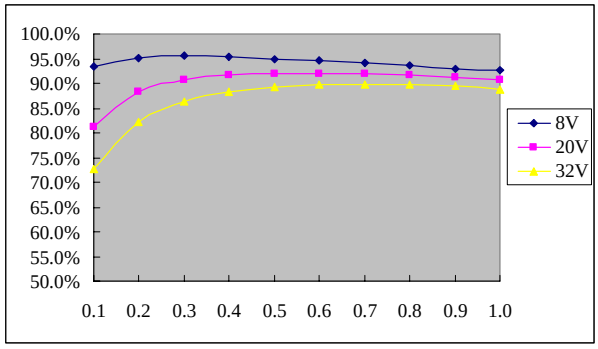


$$R_{TrimUp} = \frac{C}{V_{adj} - V_o} - D$$

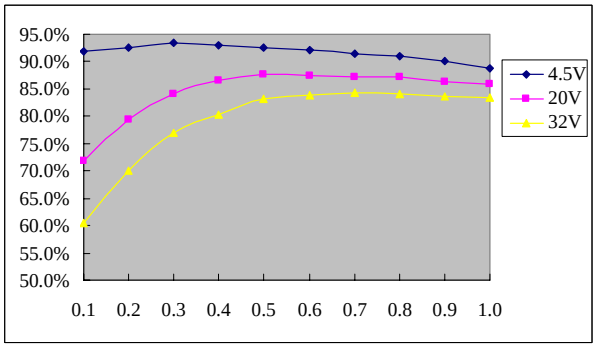


Vo	A	B	C	D
5.0	153.56	85.20	29.20	48.70
3.3	53.80	21.50	17.20	X
2.5	36.70	21.50	17.20	X
1.8	21.70	21.50	17.20	X
1.5	15.20	21.50	17.20	X
1.2	8.70	21.50	17.20	X

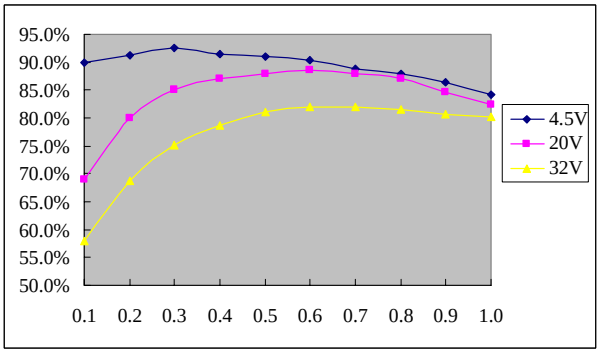
Efficiency Data



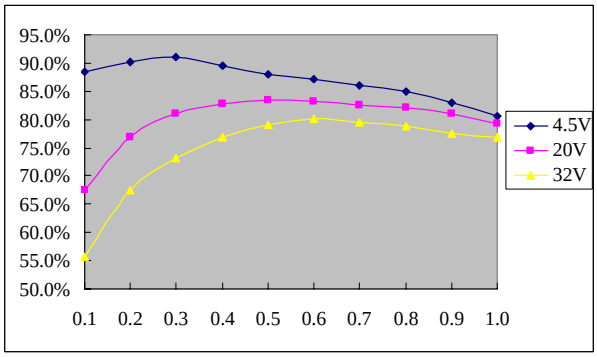
x7AH-01H500



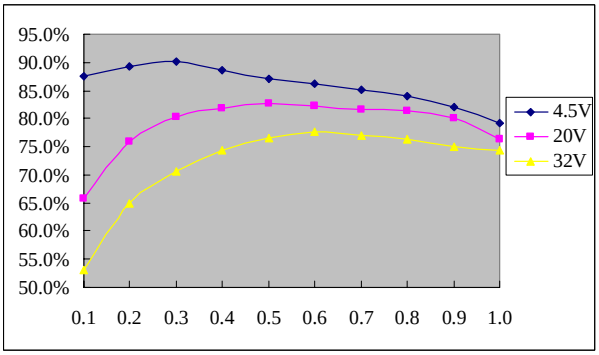
x7AH-01H330



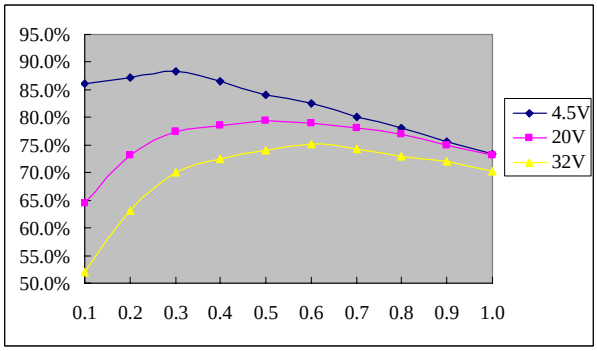
x7AH-01H250



x7AH-01H180

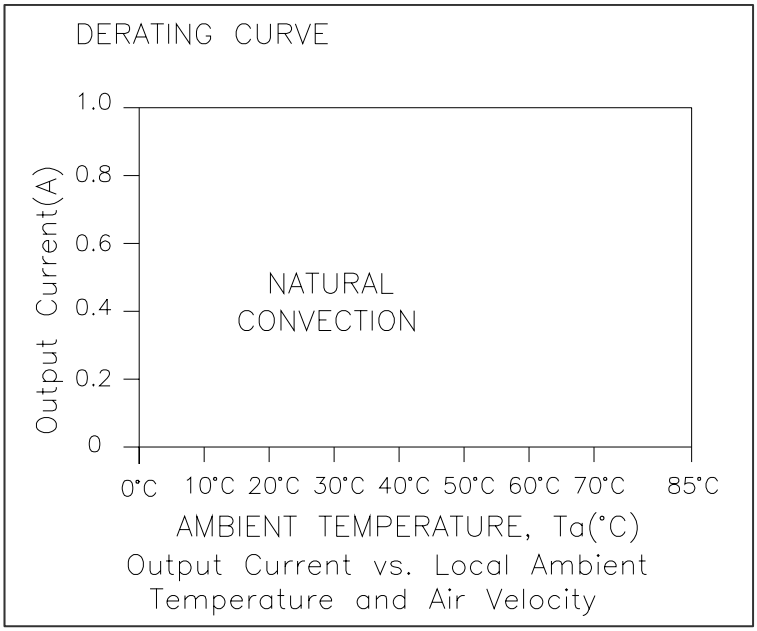


x7AH-01H150



x7AH-01H120

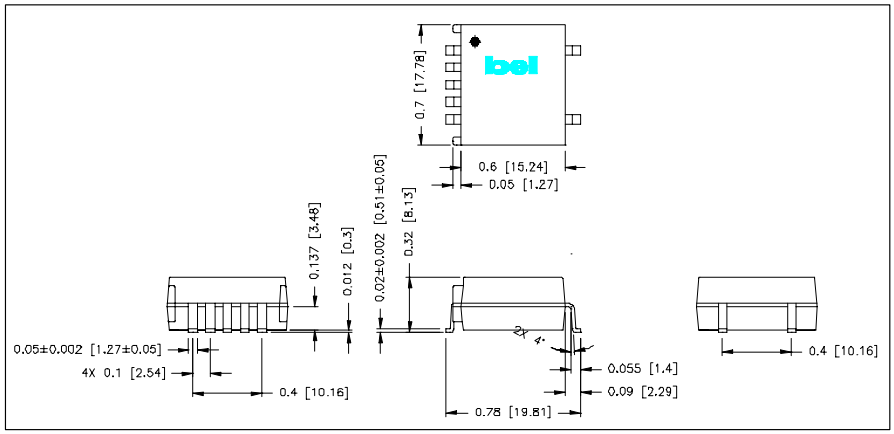
Thermal Derating Curve

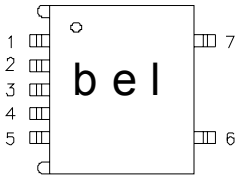


Test Condition: Derating curve is tested at nominal input voltage.

NON-ISOLATED DC/DC CONVERTERS

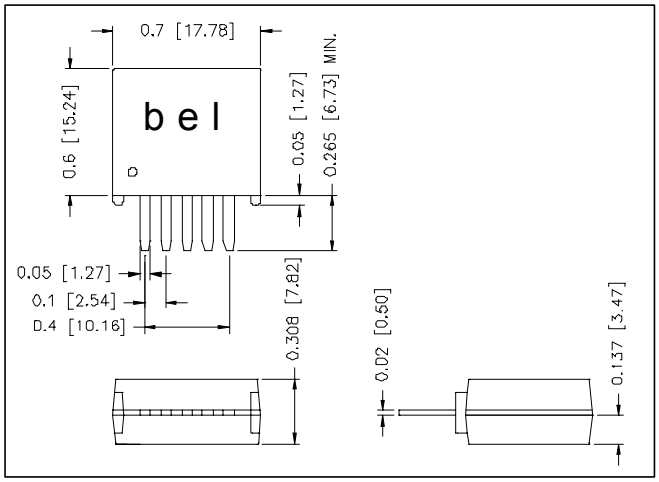
4.5V-32V Input 1.2V-5.0V/1A Output

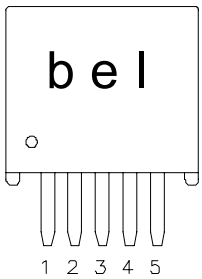




Pin Connections

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)

CORPORATE

Bel Fuse Inc.
206 Van Vorst Street
Jersey City, NJ 07302
Tel 201-432-0463
Fax 201-432-9542
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

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