

NON-ISOLATED DC/DC CONVERTERS

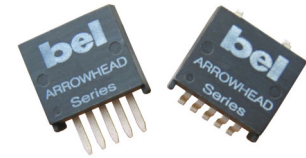
4.5V-32V Input

1.2V-5.0V/1A Output

bel
POWER PRODUCTS

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	

NON-ISOLATED DC/DC CONVERTERS

4.5V-32V Input

1.2V-5.0V/1A Output



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 ² t Inrush Current Transient	-	0.02A ² s	0.1A ² s	
Turn on Voltage Threshold				
V _O =5.0V	-	5.0V	7.0V	
V _O =1.2V-3.3V	-	4.1V	4.5V	
Turn off Voltage Threshold				
V _O =5.0V	-	3.6V	5.0V	
V _O =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				Test conditions: V _{in} =20V, I _o =50% full load
V _O =5.0V	4.90V	5.0V	5.10V	
V _O =3.3V	3.234V	3.3V	3.366V	
V _O =2.5V	2.450V	2.5V	2.550V	
V _O =1.8V	1.764V	1.8V	1.836V	
V _O =1.5V	1.470V	1.5V	1.530V	
V _O =1.2V	1.176V	1.2V	1.224V	
Line Regulation				
V _O =5.0V	-	±5mV	±10mV	
V _O =3.3V	-	±3mV	±6mV	
V _O =2.5V	-	±2mV	±5mV	
V _O =1.8V	-	±2mV	±4mV	
V _O =1.5V	-	±1mV	±3mV	
V _O =1.2V	-	±1mV	±2mV	
Load Regulation				
V _O =5.0V	-	±5mV	±10mV	
V _O =3.3V	-	±3mV	±6mV	
V _O =2.5V	-	±2mV	±5mV	
V _O =1.8V	-	±2mV	±4mV	
V _O =1.5V	-	±1mV	±3mV	
V _O =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 ² s	0.1A ² s	
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	

NON-ISOLATED DC/DC CONVERTERS

4.5V-32V Input

1.2V-5.0V/1A Output



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 x W x H)	0.78 x 0.70 x 0.32			
	Millimeters (L x W x H)	19.81 x 17.78 x 8.13			
Dimensions (vertical)	Inches (L x W x H)	0.70 x 0.308 x 0.65			
	Millimeters (L x W x H)	17.78 x 7.82 x 16.51			
Weight	-	5.1g	-		

NON-ISOLATED DC/DC CONVERTERS

4.5V-32V Input

1.2V-5.0V/1A Output



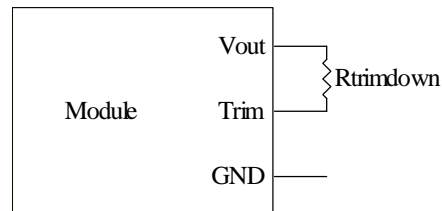
Control Specifications

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	

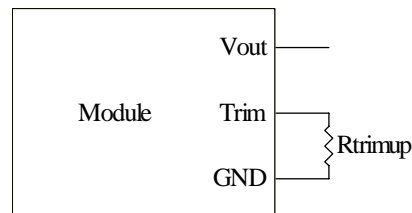
Output Trim Equations

Equations for calculating the trim resistor (in kΩ) given the desired adjusted voltage (V_{adj}) and the nominal output voltage of the converter (V_o) 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.

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



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



V_o	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

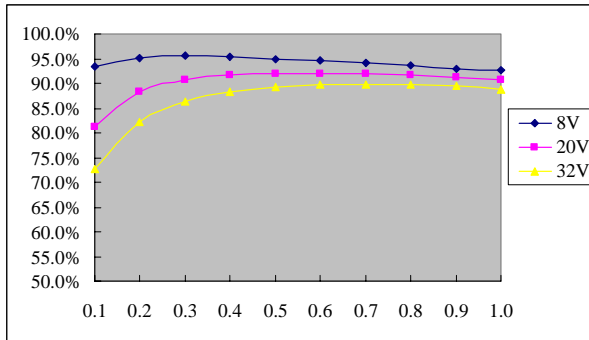
NON-ISOLATED DC/DC CONVERTERS

4.5V-32V Input

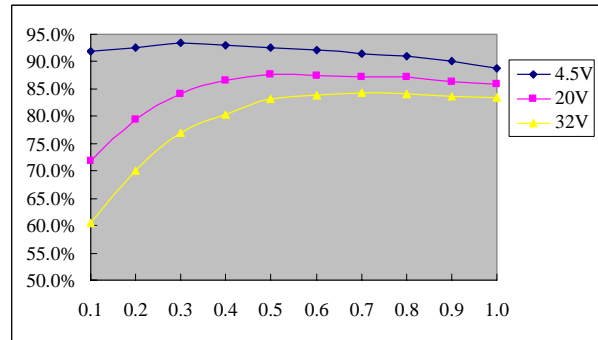
1.2V-5.0V/1A Output



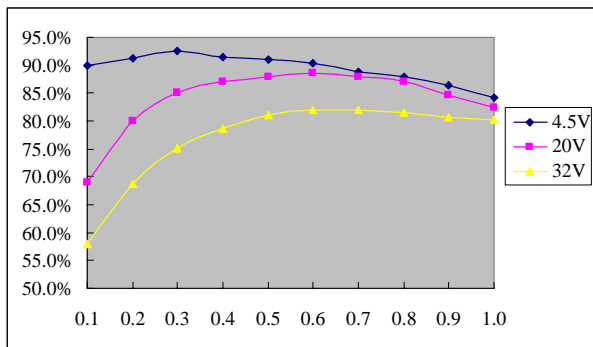
Efficiency Data



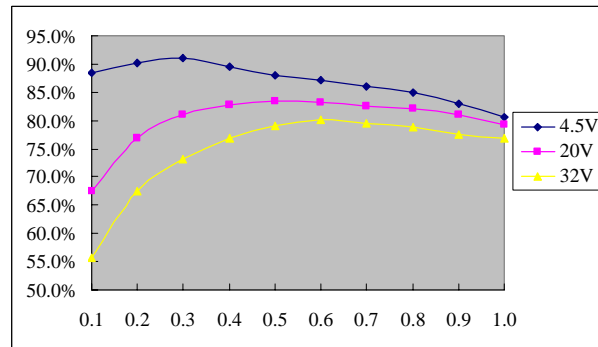
x7AH-01H500



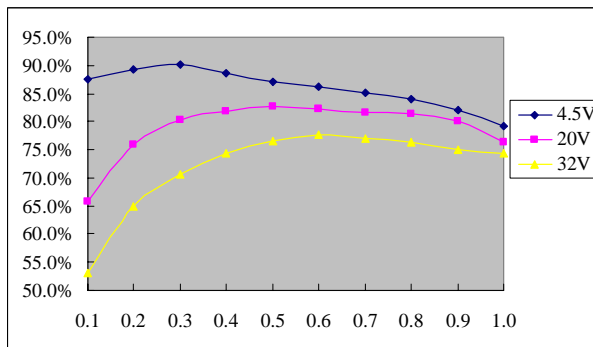
x7AH-01H330



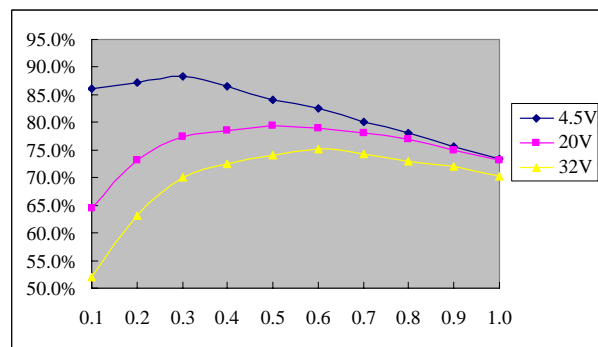
x7AH-01H250



x7AH-01H180



x7AH-01H150



x7AH-01H120

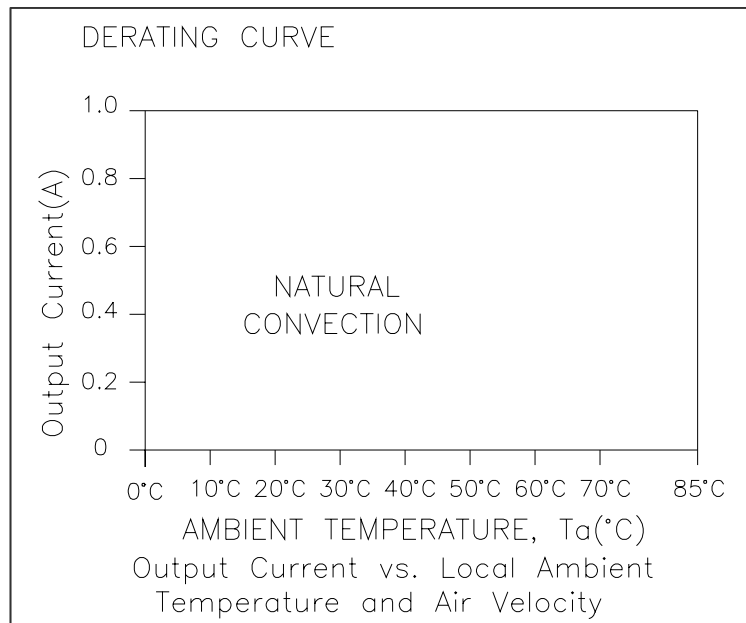
NON-ISOLATED DC/DC CONVERTERS

4.5V-32V Input

1.2V-5.0V/1A Output

bel
POWER PRODUCTS

Thermal Derating Curve

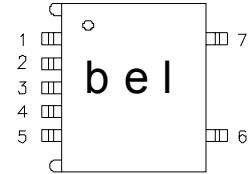
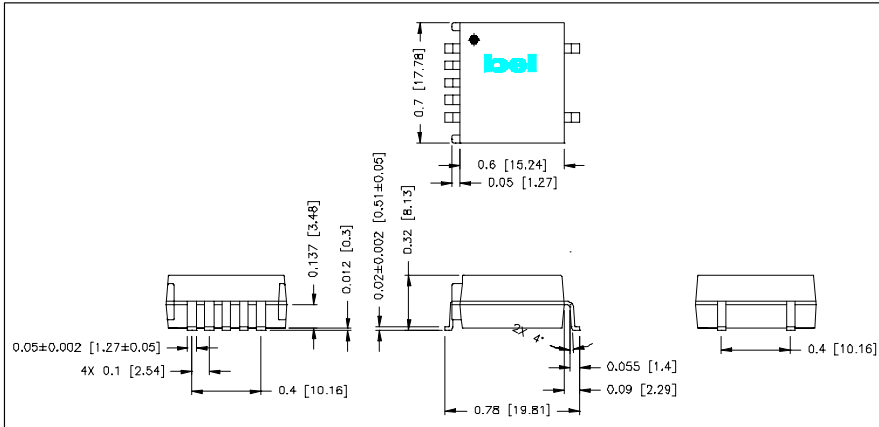


Test Condition: Derating curve is tested at nominal input voltage.

NON-ISOLATED DC/DC CONVERTERS

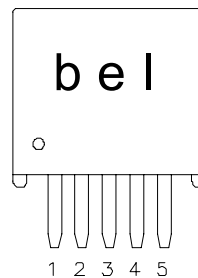
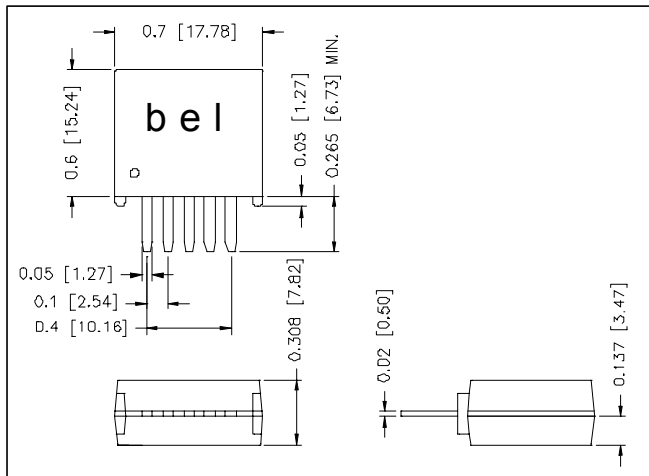
4.5V-32V Input

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)

©2004 Bel Fuse Inc. Specifications subject to change without notice. 112504

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