

NON-ISOLATED DC/DC CONVERTERS

4.5 V-14 V Input

0.75 V-3.63 V/16 A Output

bel
POWER PRODUCTS

V7BC-16E2Ax Series

- Non-Isolated
- High Efficiency
- High Power Density
- Excellent Thermal Performance
- Low Cost
- Flexible Output Voltage Sequencing (option)
- Able to Sink & Source Current
- Industrial Temperature Range
- Under-voltage Lockout (UVLO)
- Over Temperature Protection
- OCP/SCP
- Wide Input
- Wide Trim
- Remote On/Off
- Active Low/High (option)
- Remote Sense



Description

The Bel V7BC-16E2Ax is part of the non-isolated dc/dc converter series. The modules use a SIP package. These converters are available in a range of output voltages from 0.75 V to 3.63 V over a wide range of input voltage ($V_{in} = 4.5 \text{ V} - 14 \text{ V}$). The Bel V7BC-16E2Ax has a sequencing feature that enables designers to implement various types of output voltage sequencing when powering. The efficiency is typically 93.5% at 3.3 V output and 5 V input at full load.

Part Selection

Output Voltage	Input Voltage	Max. Output Current	Max. Output Power	Typical Efficiency	Model Number Active Low	Model Number Active High
0.75 V – 3.63 V	4.5 V – 14 V	16 A	58 W	93.5%	V7BC-16E2AL	V7BC-16E2A0

Note: Add “G” suffix at the end of the model number to indicate Tray Packaging.

Absolute Maximum Ratings

Parameter	Min	Typ	Max	Notes
Input Voltage (continuous)	-0.3 V	-	15 V	
Output Enable Terminal Voltage	-0.3 V	-	15 V	
Sequencing Voltage ¹	-0.3 V	-	V_{in}	
Ambient Temperature	-40 °C	-	85 °C	
Storage Temperature	-55 °C	-	125 °C	

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

1. V7BC-16E2Ax series of modules include a sequencing feature that enables users to implement various types of output voltage sequencing in their applications. This is accomplished via an additional sequencing pin. When not using the sequencing feature, either, tie the SEQ pin to V_{in} or leave it unconnected.

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Input Specifications

Parameter	Min	Typ	Max	Notes
Input Voltage				
Vo,set < 3.0	4.5 V	-	14 V	
Vo,set ≥ 3.0	Vo,set+1.5 V	-	14 V	
Input Current (full load)	-	-	15 A	
Input Current (no load)	-	100 mA	-	
Remote Off Input Current	-	2 mA	-	
Input Reflected Ripple Current (pk-pk)	-	-	400 mA	Tested with one 1000 uF/25 V AL input capacitor with ESR=0.03 ohm max and 6 × 47uF/16 V tan capacitors with ESR=0.013 ohm max at 100 kHz, & simulated source impedance of 1000 nH, 5 Hz to 20 MHz.
Input Reflected Ripple Current (rms)	-	-	150 mA	
I ² t Inrush Current Transient	-	0.2 A ² s	0.4 A ² s	
Turn-on Voltage Threshold	-	4.3 V	-	
Turn-off Voltage Threshold	3.7 V	-	4.2 V	

Output Specifications

Parameter	Min	Typ	Max	Notes
Output Voltage Set Point	-2% Vo,set	-	2% Vo,set	Vin=12 V, full load
Load Regulation	-	0.2% Vo,set	-	Io=Io, min to Io, max
Line Regulation	-	0.3% Vo,set	-	Vin=Vin, min to Vin, max
Regulation Over Temperature (-40°C to +85°C)	-	0.3% Vo,set	-	Tref=Ta, min to Ta, max
Output Current	0 A	-	16 A	
Current Limit Threshold	-	180% Io,out	-	
Short Circuit Surge Transient	-	1 A ² s	3 A ² s	
Ripple and Noise (pk-pk)	-	30 mV	80 mV	Tested with 0-20 MHz, 10 uF Tantalum capacitor & 1 uF TDK ceramic capacitor at the output
Ripple and Noise (rms)	-	12 mV	35 mV	
Turn on Time	-	8 mS	20 mS	
Overshoot at Turn on	-	-	1% Vo,set	
Output Capacitance	0 uF	-	5600 uF	
Transient Response				
50% ~ 100% Max Load	All	-	100 mV	di/dt=2.5 A/uS; Vin=12 V; and Cext=0 uF.
Settling Time		-	80 uS	
100% ~ 50% Max Load		-	100 mV	
Settling Time		-	80 uS	

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

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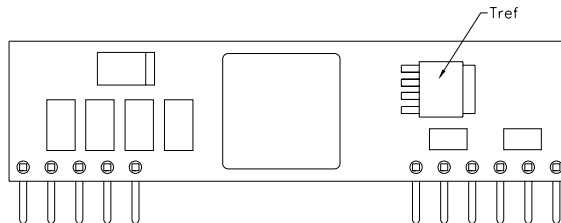


General Specifications

Parameter	Min	Typ	Max	Notes
Efficiency	Vo=3.3 V	-	91.7%	Measured at Vin=12 V, full load
	Vo=2.5 V	-	90.4%	
	Vo=1.8 V	-	87.5%	
	Vo=1.5 V	-	86%	
	Vo=1.2 V	-	85%	
	Vo=0.75 V	-	79%	
Efficiency	Vo=3.3 V	-	93.5%	Measured at Vin=5 V, full load
	Vo=2.5 V	-	91.5%	
	Vo=1.8 V	-	88.4%	
	Vo=1.5 V	-	87%	
	Vo=1.2 V	-	86%	
	Vo=0.75 V	-	80%	
Switching Frequency	250 kHz	280 kHz	310 kHz	
Over Temperature Shutdown ¹	-	130 °C	-	
Output Trim Range (Wide Trim)	0.7525 V	-	3.63 V	
Remote Sense Compensation	-	-	0.5 V	
MTBF	4,619,490 hours			Calculated Per Bell Core TR-332 (Io = 80% Io,max; Vin=12 V; Vo=3.3 V; Ta = 25 °C)
Dimensions	Inches (L × W × H)			
	2.0x 0.5 x 0.32			
	Millimeters (L × W × H)			
	50.8 x 12.7 x 8.13			
Weight	-	7.1 g	-	

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

1. The Tref temperature measurement location:



Control Specifications

Parameter	Min	Typ	Max	Notes
Remote On/Off				
Signal Low (Unit Off)	-0.2 V	-	0.3 V	V7BC-16E2A0; Remote On/Off pin open, Unit on.
Signal High (Unit On)	-	-	Vin, max	
Signal Low (Unit On)	-0.2 V	-	0.3 V	V7BC-16E2AL; Remote On/Off pin open, Unit on.
Signal High (Unit Off)	2.5 V	-	Vin, max	
Voltage Sequencing				
Sequencing Delay Time	25 mS	-	-	Delay from Vin, min to application of voltage on SEQ pin
Sequencing Slew Rate Capability	-	-	2 V/mS	
Tracking Accuracy	Power-Up	-	100 mV	Vin, min to Vin, max; Io, min to Io, max; Vseq<Vo
	Power-Down	-	200 mV	

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4.5 V-14 V Input

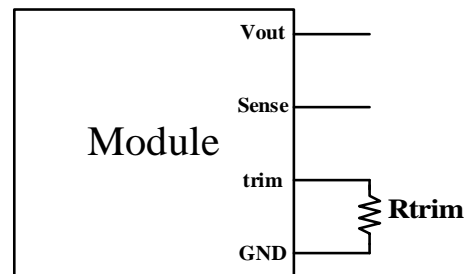
0.75 V-3.63 V/16 A Output

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POWER PRODUCTS

Output Trim Equations

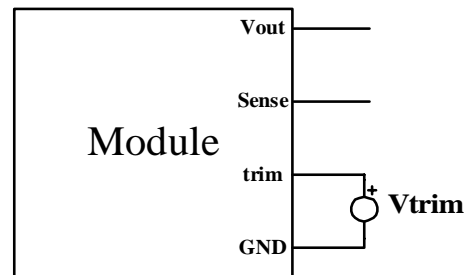
Equation for calculating the trim resistor (in Ω) given the desired output voltage (V_o) is shown below. The Trim Up resistor should be connected between the Trim pin and Ground.

$$R_{trim} = \frac{10500}{V_o - 0.7525} - 1000$$



Equation for calculating the trim voltage (in V) given the desired output voltage (V_o) is shown below. The Trim Up voltage should be connected between the Trim pin and Ground.

$$V_{trim} = 0.7 - 0.0667 \times (V_o - 0.7525)$$



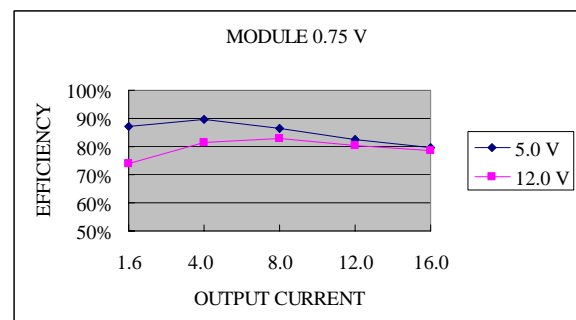
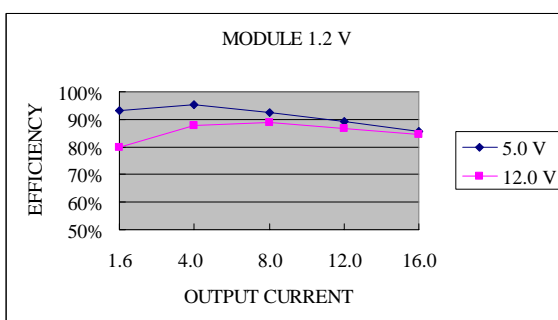
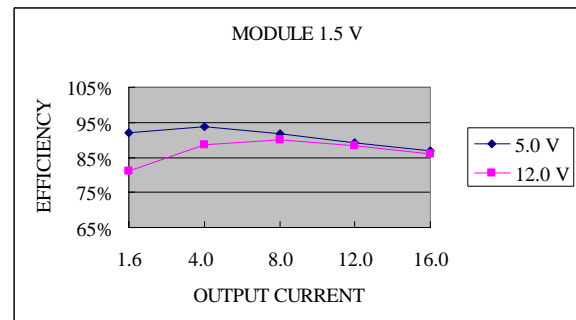
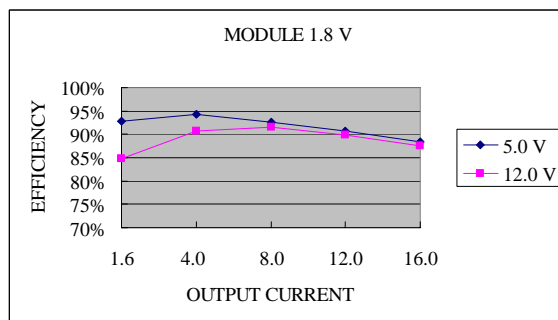
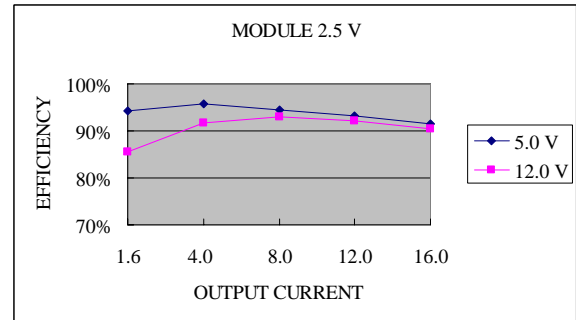
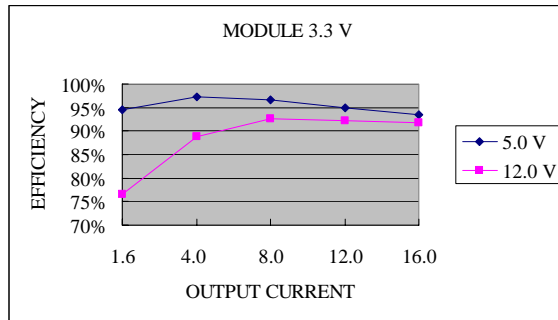
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Efficiency Data



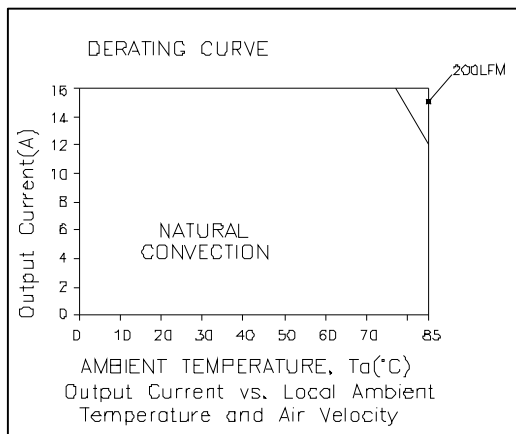
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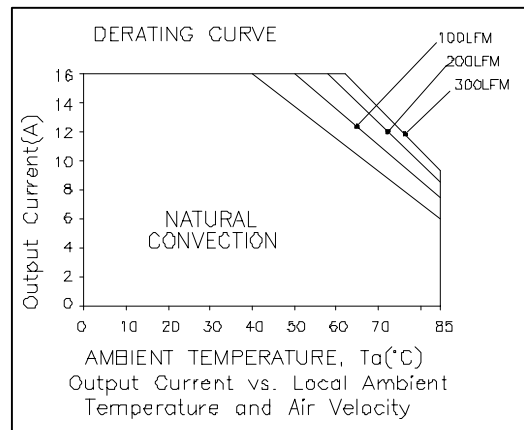
0.75 V-3.63 V/16 A Output



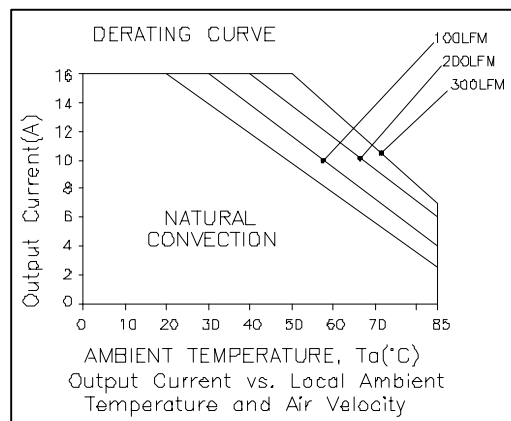
Thermal Derating Curves



Vo=0.75V; Vin=12.0V



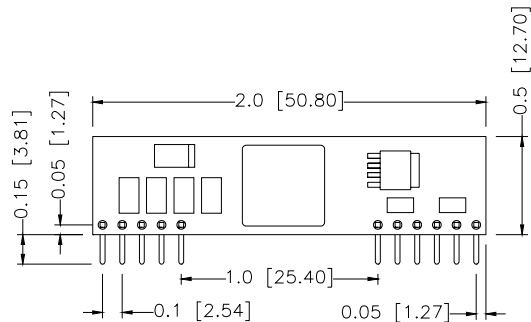
Vo=1.8V; Vin=12.0V



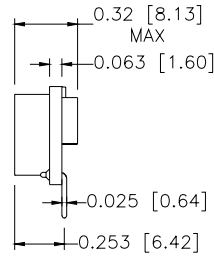
Vo=3.3V; Vin=12.0V

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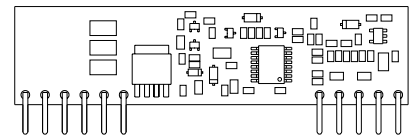
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TOP VIEW

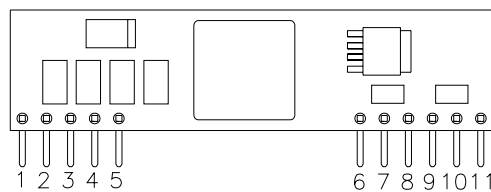


SIDE VIEW

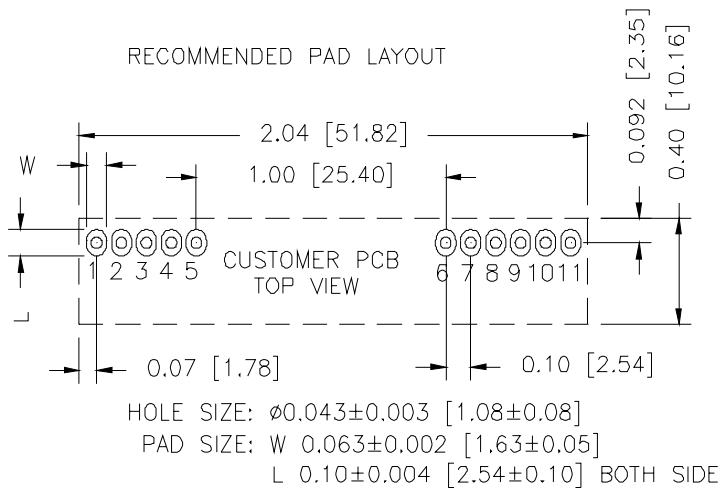


UNIT: INCH [MM]

BACK VIEW



RECOMMENDED PAD LAYOUT



Pin Connections

Pin	Function
1	Vo
2	Vo
3	Remote Sense
4	Vo
5	Ground
6	Ground
7	Vin
8	Vin
9	SEQ
10	Trim
11	Remote On/Off

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