

NON-ISOLATED DC/DC CONVERTERS

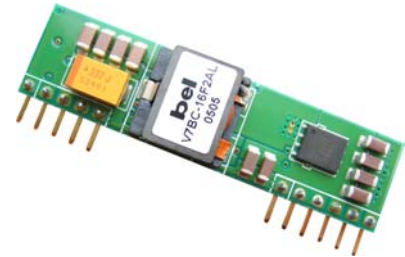
2.4V-5.5V Input

0.75V-3.63V/16A Output

bel
POWER PRODUCTS

V7BC-16F2Ax Series

- Non-Isolated
- High Efficiency
- High Power Density
- OCP/SCP
- Fixed Frequency (300kHz)
- Flexible Output Voltage Sequencing
- Remote On/Off
- Under-voltage Lockout (UVLO)
- Over Temperature Protection
- Remote Sense
- Wide Input
- Wide Trim
- Converter can sink and source Current
- Active Low/High (option)



Description

The Bel V7BC-16F2Ax modules are a series of non-isolated DC/DC converters that can deliver up to 16A of output current with full load efficiency of 94% at 3.3V output. These modules provide precisely regulated voltage programmable via external resistor from 0.75Vdc to 3.63Vdc over a wide range of input voltage(2.4V-5.5V). These modules have a sequencing feature that enables designers to implement various types of output voltage sequencing when powering multiple voltages on a board. Their open-frame construction and small footprint enable designers to develop cost and space-efficient solutions. Standard features include remote ON/OFF, programmable output voltage and over current protection.

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– 3.63V	2.4V – 5.5V	16A	58.1W	94%	V7BC-16F2AL	V7BC-16F2A0

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)	-0.3V	-	5.8V	
Output Enable Terminal Voltage	-0.3V	-	5.8V	
Sequencing Voltage ¹	-0.3V	-	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-16F2Ax 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 the sequencing feature is not used, tie the SEQ pin to V_{in}.

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Input Specifications

Parameter	Min	Typ	Max	Notes
Input Voltage				
Vo=3.3V	4.5V	-	5.5V	
Vo=1.8V-2.5V	3.0V	-	5.5V	
Vo ≤ 1.5V	2.4V	-	5.5V	
Input Current (full load)				
Vo=3.3V	-	11.23A	12.89A	
Vo=1.8V	-	6.47A	13.55A	
Vo=0.75V	-	3.08A	6.67A	
Input Current (no load)	-	80mA	-	
Remote Off Input Current	-	10mA	22mA	
Input Reflected Ripple Current (pk-pk)	-	100mA	-	Tested with two 100uF/10V tantalum input capacitors (P/N: TPSC107K010R0075 AVX) & simulated source impedance of 1uH, 5Hz to 20MHz.
Input Reflected Ripple Current (RMS)	-	40mA	-	
I ² t Inrush Current Transient	-	0.15A ² s	0.3A ² s	
Turn-on Voltage Threshold	-	2.2V	-	
Turn-off Voltage Threshold	-	2.0V	-	

Output Specifications

Parameter	Min	Typ	Max	Notes
Output Voltage Set Point	-2%Vo,set	-	2%Vo,set	Vin=5V, Io=Io,max full load
Output Voltage Set Point	-3%Vo,set	-	3%Vo,set	Over all operating input voltages, resistive loads and temperature conditions
Load Regulation	-	0.4%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)	-	0.5%Vo,set	-	Tref=Ta, min to Ta, max
Output Current	0A	-	16A	
Current Limit Threshold	19A	-	35A	
Short Circuit Surge Transient	-	1.6A ² s	2A ² s	
Ripple and Noise (pk-pk)	-	25mV	50mV	Tested with 0-20MHz, 10uF/16V tantalum capacitor & 1uF/10V TDK ceramic capacitor at output
Ripple and Noise (RMS)	-	8mV	15mV	
Turn on Time	-	4mS	8mS	
Overshoot at Turn on	-	0%Vo,set	3%Vo,set	
Output Capacitance				
ESR ≥ 1mohm	0uF	-	1000uF	
ESR ≥ 10mohm	0uF	-	5000uF	
Transient Response¹				
50% ~ 100% Max Load	Vo=0.75V - 3.3V	-	300mV	di/dt=2.5A/uS; Vin=5V; and with 10uF/16V tantalum capacitor & 1uF/10V ceramic capacitor at output
Settling Time		-	50uS	
100% ~ 50% Max Load		-	300mV	
Settling Time		-	50uS	
Transient Response²				
50% ~ 100% Max Load	Vo=0.75V - 3.3V	-	150mV	di/dt=2.5A/uS; Vin=5V; and with two 150uF/10V tantalum capacitors & 1uF/10V ceramic capacitor at output
Settling Time		-	100uS	
100% ~ 50% Max Load		-	150mV	
Settling Time		-	100uS	

Note: All specifications are typical at nominal input (Vin=5V), full load at 25°C unless otherwise stated.

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General Specifications

Parameter	Min	Typ	Max	Notes
Efficiency				Measured at Vin=5V, full load
Vo=3.3V	91%	94%	-	
Vo=1.8V	86%	89%	-	
Vo=0.75V	75%	78%	-	
Switching Frequency	250KHz	300KHz	350KHz	
Over Temperature Shutdown	-	125°C	-	
Output Trim Range (Wide Trim)	0.7525V	-	3.63V	
Remote Sense Compensation	-	-	5%	
MTBF	5,109,613 hours			Calculated Per Bell Core TR-332 (Io = Nominal; Ta = 25°C)
Dimensions				
Inches (L x W x H)	2.0 x 0.5 x 0.363			
Millimeters (L x W x H)	50.80 x 12.7 x 9.23			
Weight	-	8.3g	-	

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

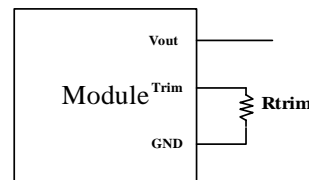
Control Specifications

Parameter	Min	Typ	Max	Notes
Signal Low (Unit Off)	-0.3V	-	0.3V	V7BC-16F2A0; Remote On/Off pin open, Unit on.
Signal High (Unit On)	1.5V	-	5.8V	
Signal Low (Unit On)	-0.3V	-	0.3V	V7BC-16F2AL; Remote On/Off pin open, Unit on.
Signal High (Unit Off)	1.5V	-	5.8V	
Sequencing Voltage	0.05V	-	Vin	Sequencing Voltage should be higher than output voltage.
Sequencing Slew Rate Capability	-	-	2V/mS	
Sequencing Delay Time	10mS	-	-	Delay from Vin, min to application of voltage on SEQ pin
Tracking Accuracy				
Power-Up	-	100mV	200mV	
Power-Down	-	200mV	400mV	

Output Trim Equations

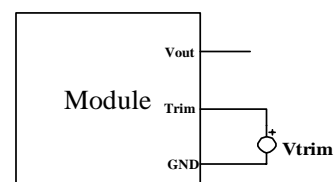
Equation for calculating the trim resistor (in kΩ) given the desired adjusted voltage (Vadj) is shown below. The Trim Up resistor should be connected between the Trim pin and Ground.

$$R_{trim} = \frac{21.07}{V_{adj} - 0.7525} - 5.11$$



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

$$V_{trim} = 0.7 - 0.1698 \times (V_{adj} - 0.7525)$$



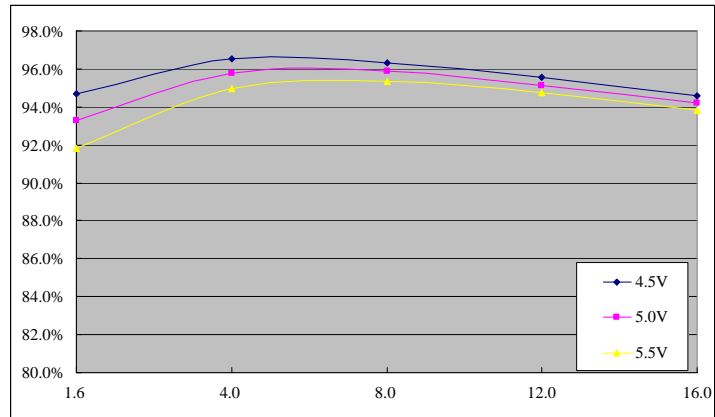
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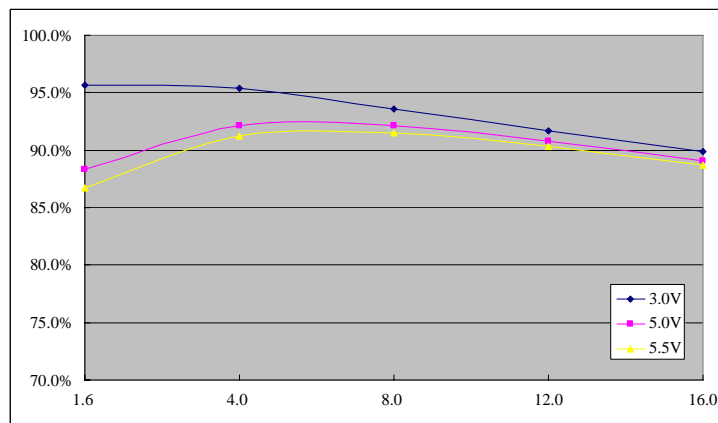
0.75V-3.63V/16A Output



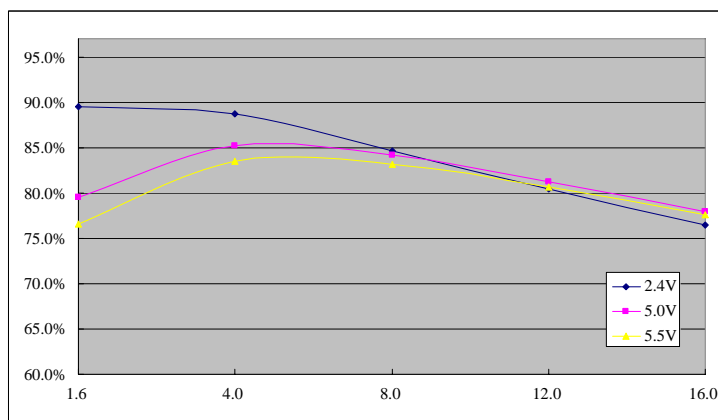
Efficiency Data



Vo=3.3V



Vo=1.8V



Vo=0.75V

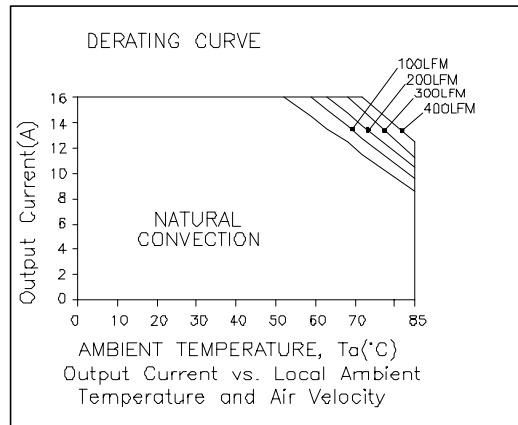
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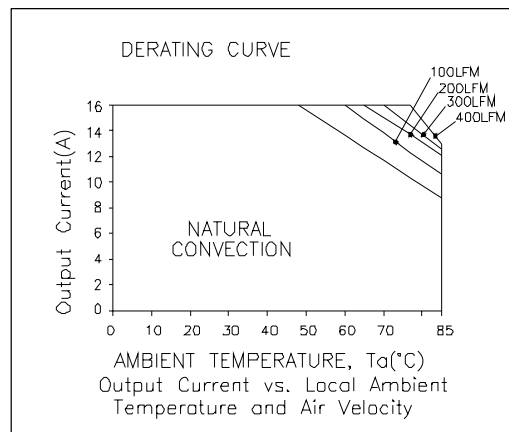
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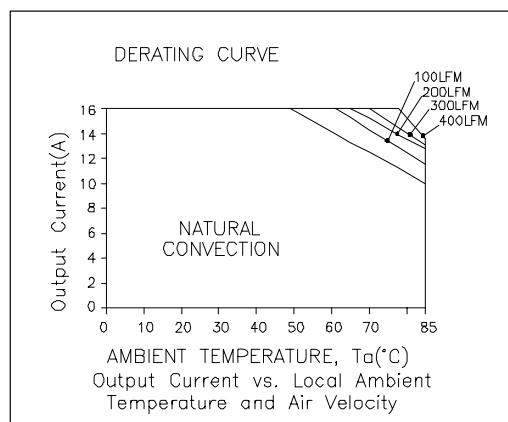
Thermal Derating Curves



V7BC-16F2A0, $V_o=3.3V$



V7BC-16F2A0, $V_o=1.8V$

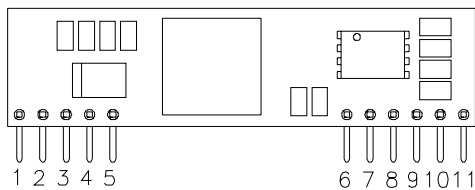
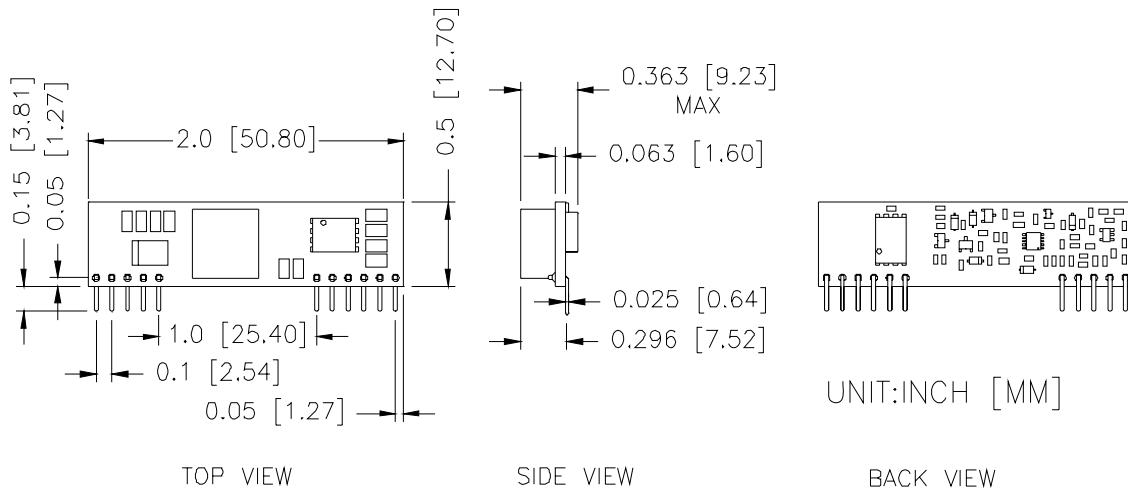


V7BC-16F2A0, $V_o=0.7525V$

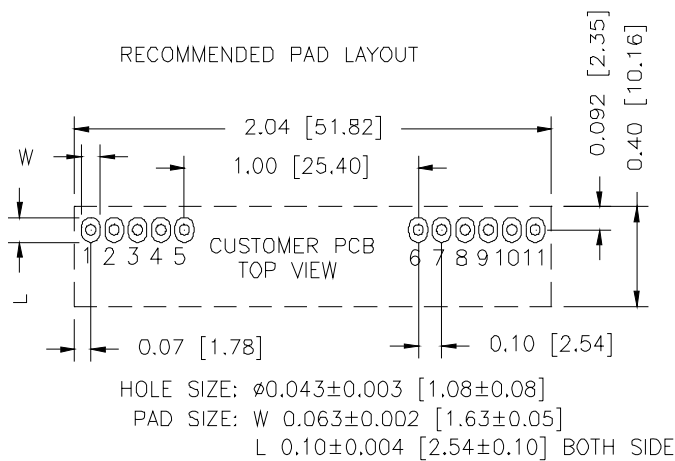
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RECOMMENDED PAD LAYOUT



Pin Connections

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

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