NON-ISOLATED DC/DC CONVERTERS

2.4 V-5.5 V Input 0.75 V-3.63 V/16 A Output

SRBC-16F2Ax Series RoHS Compliant

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

Description

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

Part Selection

Output Voltage	Input Voltage	Max. Output Current	Max. Output Power	Typical Efficiency	Model Number Active Low	Model Number Active High	Model Number Active Low
0.75 V-3.63 V[1]	2.4 V-5.5 V	16 A	58.1 W	94%	SRBC-16F2AL	SRBC-16F2A0	SRBC-16F2AW[2]

Notes: 1. These modules use a buck topology, so the output voltages must be 0.8 V less than the input voltage.
2. "W" indicates special coating.
3. Add "G" to the end of the Model Number to indicate Tray Packaging.

Absolute Maximum Ratings

Parameter	Min	Typ	Max	Notes
Input Voltage (continuous)	-0.3 V	-	5.8 V	
Output Enable Terminal Voltage	-0.3 V	-	5.8 V	
Sequencing Voltage [1]	-0.3 V	-	Vin	
Ambient Temperature	-40 °C	-	85 °C	
Storage Temperature	-55 °C	-	125 °C	

Notes: All specifications are typical at 25 °C unless otherwise stated.
1. SRBC-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 Vin.

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Input Specifications

Parameter	Min	Typ	Max	Notes
Input Voltage	2.4 V	-	5.5 V	Vo, set ≤ Vin-0.8 V
Input Current (full load) Vo=3.3V Vo=2.5V Vo=1.8V Vo=1.5V Vo=1.2V Vo=0.75V	 - - - - - -	 11.23 A 8.70 A 6.40 A 5.45 A 4.52 A 3.05 A	 15.10 A 14.81 A 13.64 A 11.76 A 9.64 A 6.69 A	
Input Current (no load)	-	80 mA	-	
Remote Off Input Current	-	10 mA	22 mA	
Input Reflected Ripple Current (pk-pk)	-	100 mA	-	Tested with two 100uF/10V tantalum input capacitors (P/N: TPSC107K010R0075 AVX) & simulated source impedance of 1 uH, 5 Hz to 20 MHz.
Input Reflected Ripple Current (rms)	-	40 mA	-	
I^2t Inrush Current Transient	-	0.15 A^2s	0.3 A^2s	
Turn-on Voltage Threshold	-	2.2 V	-	
Turn-off Voltage Threshold	-	2.0 V	-	

Output Specifications

Parameter	Min	Typ	Max	Notes
Output Voltage Set Point	-2% Vo,set	-	2% Vo,set	Vin=5 V, Io=Iomax 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	0 A	-	16 A	
Current Limit Threshold	19 A	-	35 A	
Short Circuit Surge Transient	-	1.6A^2s	2 A^2s	
Ripple and Noise (pk-pk)	-	25 mV	50 mV	Tested with 0-20 MHz, 10 uF / 16 V tantalum capacitor & 1 uF /10 V TDK ceramic capacitor at the output
Ripple and Noise (rms)	-	8 mV	15 mV	
Turn on Time	-	4 mS	8 mS	
Overshoot at Turn on	-	0% Vo,set	3% Vo,set	
Output Capacitance ESR ≥ 1 mohm ESR ≥ 10 mohm	 0 uF 0 uF	 - -	 1000 uF 5000 uF	

Output Specifications (continued)

Parameter		Min	Typ	Max	Notes
Transient Response					
50% ~ 100% Max Load	All	-	300 mV	-	di/dt=2.5 A/uS; Vin=5 V; and with 10 uF/16 V tantalum capacitor & 1 uF/10 V ceramic capacitor at the output
Settling Time		-	50 uS	-	
100% ~ 50% Max Load		-	300 mV	-	
Settling Time		-	50 uS	-	
50% ~ 100% Max Load	All	-	150 mV	-	di/dt=2.5 A/us, Vin=5 V; and with two 150 uF/10 V tantalum capacitors & 1 uF/10 V ceramic capacitor at the output
Settling Time		-	100 uS	-	
100% ~ 50% Max Load		-	150 mV	-	
Settling Time		-	100 uS	-	

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

General Specifications

Parameter	Min	Typ	Max	Notes
Efficiency				
Vo=3.3 V	92%	94%	-	Measured at Vin=5 V, full load
Vo=2.5 V	90%	92%	-	
Vo=1.8 V	88%	90%	-	
Vo=1.5 V	85%	88%	-	
Vo=1.2 V	82%	85%	-	
Vo=0.75 V	76%	79%	-	
Switching Frequency	250 kHz	300 kHz	350 kHz	
Over Temperature Shutdown	-	125 °C	-	
Output Trim Range (Wide Trim)	0.7525 V	-	3.63 V	
Remote Sense Compensation	-	-	5%	
MTBF	5,438,000 hours			Calculated Per Bell Core SR-332 (I_O = Nominal; T_a = 25 °C)
Dimensions				
Inches (L × W × H)	1.30 x 0.53 x 0.315			
Millimeters (L × W × H)	33.02 x 13.46 x 8.00			
Weight	-	6.6 g	-	

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

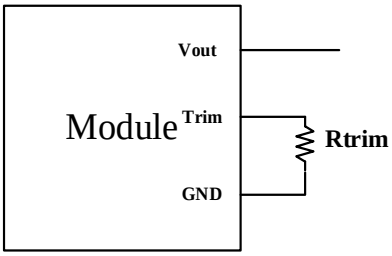
Control Specifications

Parameter	Min	Typ	Max	Notes
Remote On/Off				
Signal Low (Unit Off)	-0.3 V	-	0.3 V	SRBC-16F2A0; Remote On/Off pin open, Unit on.
Signal High (Unit On)	1.5 V	-	5.8 V	
Signal Low (Unit On)	-0.3 V	-	0.3 V	SRBC-16F2AL & SRBC-16F2AW; Remote On/Off pin open, Unit on.
Signal High (Unit Off)	1.5 V	-	5.8 V	
Sequencing Voltage	0.05V	-	Vin	Sequencing Voltage should be higher than output voltage.
Sequencing Slew Rate Capability	-	-	2 V/mS	
Sequencing Delay Time	10 mS	-	-	Delay from Vin, min to application of voltage on SEQ pin
Tracking Accuracy				
Power-Up	-	100 mV	200 mV	
Power-Down	-	200 mV	400 mV	

Output Trim Equations

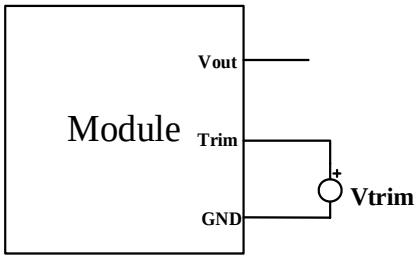
Equation for calculating the trim resistor (in kΩ) given the desired adjusted voltage (Vadj) is shown below. The Trim Up resistor should be connected between the Trim pin and Ground.

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

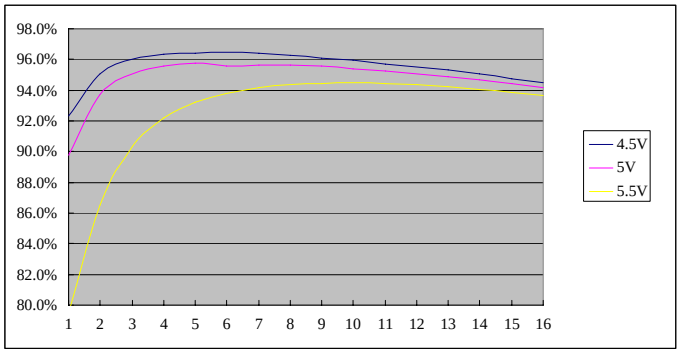


Equation for calculating the trim voltage (in V) given the desired adjusted voltage (Vadj) is shown below. The Trim Up voltage should be connected between the Trim pin and Ground.

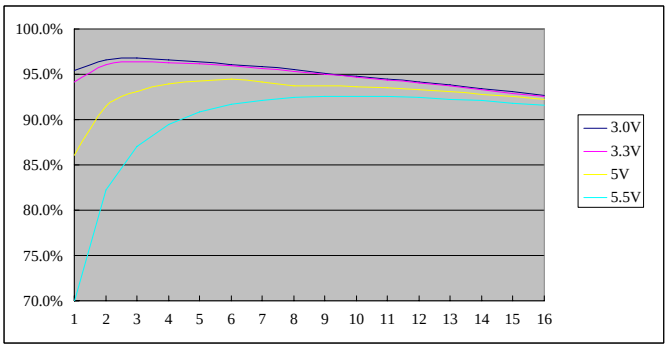
$$V_{trim} = 0.7 - 0.1698 \times (V_{adj} - 0.7525)$$



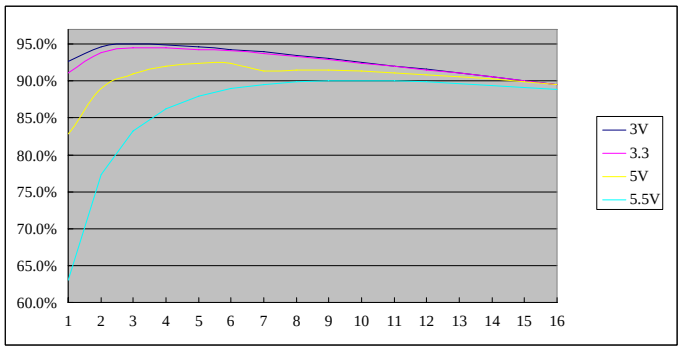
Efficiency Data



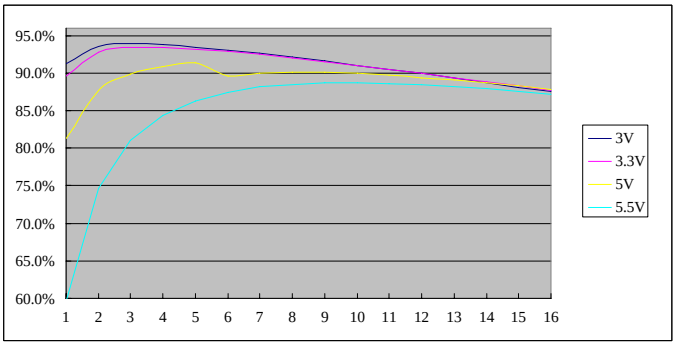
Vo=3.3 V



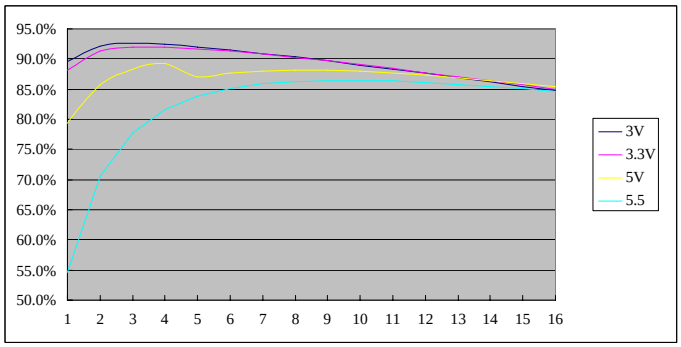
Vo=2.5 V



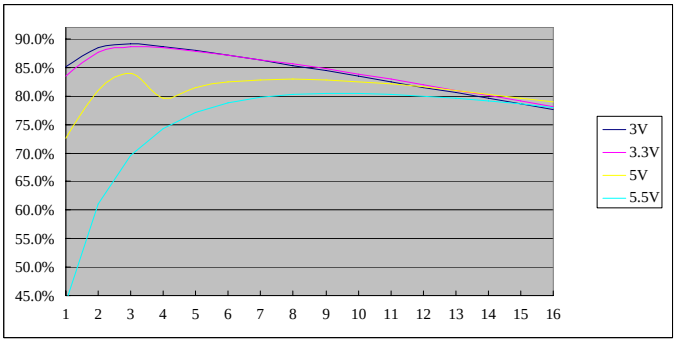
Vo=1.8 V



Vo=1.5 V

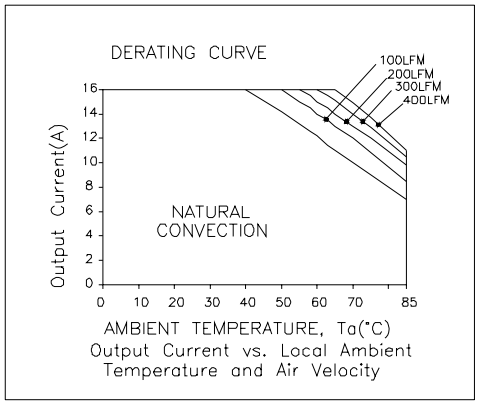


Vo=1.2 V

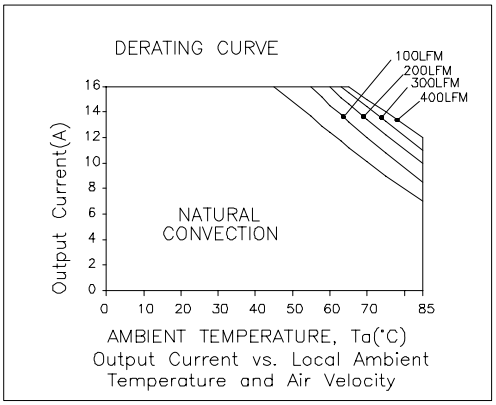


Vo=0.7525 V

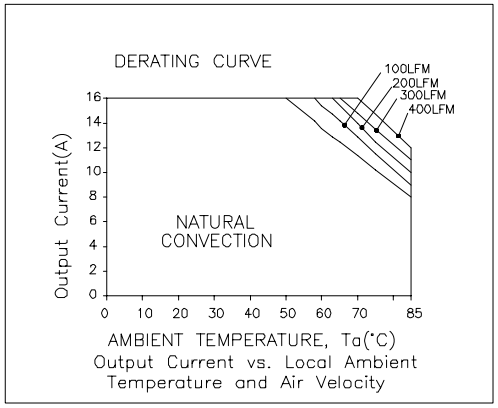
Thermal Derating Curves



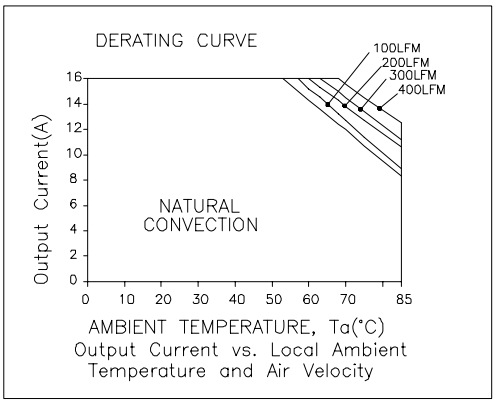
Vin=5.0 V, Vo=2.5 V or 3.3 V



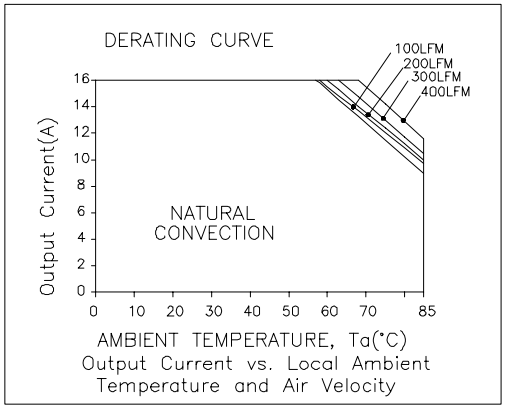
Vin=5.0 V, Vo=1.5 V or 1.8 V



Vin=5.0 V, Vo=0.7525 V or 1.2 V



Vin=3.3 V, Vo=1.5 V or 1.8 V



Vin=3.3 V, Vo=0.7525 V or 1.2 V

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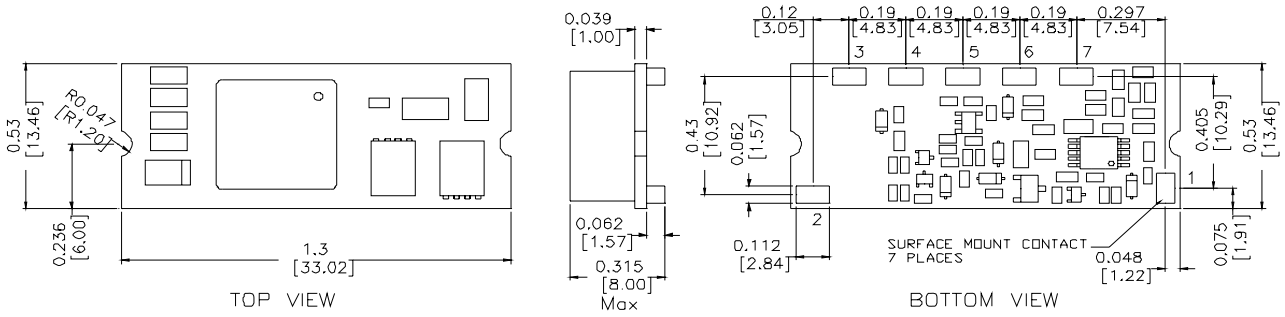
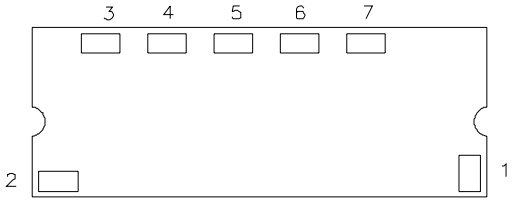
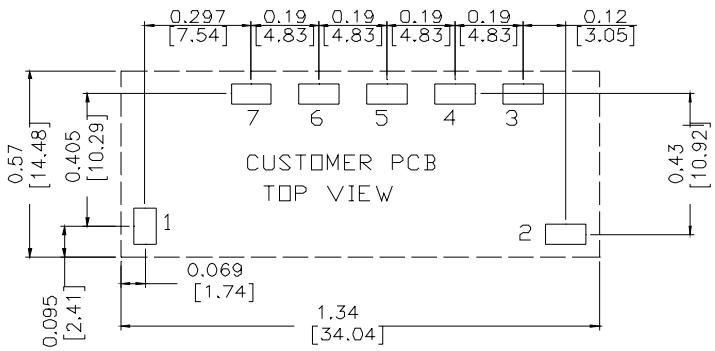
Mechanical Outline





BOTTOM VIEW

RECOMMENDED PAD LAYOUT



Pin Connections

Pin	Function
1	Remote On/Off
2	Vin
3	SEQ
4	Ground
5	Vout
6	Trim
7	Remote Sense

PAD SIZE:
MIN: 0.14"* 0.095" (3.56mm * 2.41mm)
MAX: 0.165"* 0.11" (4.19mm * 2.79mm)

RoHS Compliance

Complies with the European Directive 2002/95/EC, calling for the elimination of lead and other hazardous substances from electronic products.

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