

NON-ISOLATED DC/DC CONVERTERS

2.4 V-5.5 V Input

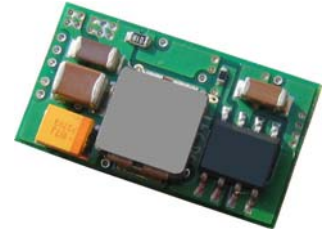
0.75 V-3.63 V/6 A Output

bel
POWER PRODUCTS

SRBA-06F2Ax Series

RoHS Compliant

- Non-Isolated
- High Efficiency
- High Power Density
- Excellent Thermal Performance
- Low Cost
- Remote On/Off
- Flexible Output Voltage Sequencing
- Under-voltage Lockout (UVLO)
- OCP/SCP
- Wide Input
- Wide Trim Range
- Active Low/High (option)
- Able to Sink & Source Current
- Fixed Frequency (300 kHz)



Description

The Bel SRBA-06F2Ax modules are a series of non-isolated dc-dc converters that deliver up to 6 A of output current with full load efficiency of 93% 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 V-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, over current protection, short circuit 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
0.75 V - 3.63 V ¹	2.4 V - 5.5 V	6 A	21.8 W	93%	SRBA-06F2AL	SRBA-06F2A0

- Notes:** 1. These modules use a buck topology, so the output voltages must be 0.5 V less than the input voltage.
2. 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	-	5.5 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. SRBA-06F2Ax 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	2.4 V	-	5.5 V	$V_{o, set} \leq V_{in} - 0.5 V$
Input Current (full load)				
$V_o = 3.3 V$	-	-	4.73 A	
$V_o = 2.5 V$	-	-	5.49 A	
$V_o = 1.8 V$	-	-	5.11 A	
$V_o = 1.5 V$	-	-	4.31 A	
$V_o = 1.2 V$	-	-	3.57 A	
$V_o = 0.75 V$	-	-	2.40 A	
Input Current (no load)				
$V_o = 3.3 V$	-	50 mA	-	
$V_o = 0.75 V$	-	25 mA	-	
Remote Off Input Current	-	0.6 mA	-	
Input Reflected Ripple Current (pk-pk)	-	120 mA	-	Tested with simulated source impedance of 1uH, 5 Hz to 20 MHz.
Input Reflected Ripple Current (rms)	-	35 mA	-	
I^2t Inrush Current Transient	-	-	0.04A ² s	
Turn-on Voltage Threshold	-	2.05 V	2.4V	
Turn-off Voltage Threshold	1.8 V	2.0 V	-	

Output Specifications

Parameter	Min	Typ	Max	Notes	
Output Voltage Set Point	-2% $V_{o, set}$	-	2% $V_{o, set}$	$V_{in} = 5 V$, 50% full load	
Output Voltage Set Point	-3% $V_{o, set}$	-	3% $V_{o, set}$	Over all operating input voltages, resistive loads and temperature conditions	
Adjustment Range Selected by External Resistor or Voltage	0.7525 V	-	3.63 V		
Load Regulation	-	0.4% $V_{o, set}$	-	$I_o = 0\% \sim 50\%$ full load; $I_o = 50\% \sim 100\%$ full load	
Line Regulation	-	0.3% $V_{o, set}$	-	$V_{in} = V_{in, min}$ to $V_{in, max}$	
Regulation Over Temperature (-40 °C to +85 °C)	-	0.4% $V_{o, set}$	-	$T_{ref} = T_a$, min to T_a , max	
Output Current	0A	-	6 A		
Current Limit Threshold	9A	-	18 A	Hiccup mode	
Short Circuit Surge Transient	-	0.32 A ² s	-		
Ripple and Noise (pk-pk)	-	40 mV	70 mV	Tested with 0-20 MHz, with 10 uF tantalum capacitor & 1uF/10 V ceramic capacitor at output	
Ripple and Noise (rms)	-	10 mV	30 mV		
Turn on Time	-	6 mS	10 mS		
Overshoot at Turn on	-	0%	3%		
Output Capacitance					
ESR ≥ 1 mohm	0 uF	-	1000 uF		
ESR ≥ 10 mohm	0 uF	-	3000 uF		
Transient Response					
50% ~ 100% Max Load	$V_o = 0.75 V - 3.63 V$	-	130 mV	-	$di/dt = 2.5 A/uS$; $V_{in} = 5 V$; and with 10 uF tantalum capacitor & 1 uF/10 V TDK ceramic capacitor at output
Settling Time		-	25 uS	-	
100% ~ 50% Max Load		-	130 mV	-	
Settling Time		-	25 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				Measured at Vin=5 V, full load
Vo=3.3 V	-	93%	-	
Vo=2.5 V	-	91%	-	
Vo=1.8 V	-	88%	-	
Vo=1.5 V	-	87%	-	
Vo=1.2 V	-	84%	-	
Vo=0.75 V	-	78%	-	
Switching Frequency	250 kHz	300 kHz	350 kHz	
Over Temperature Shutdown	-	135 °C	-	
Output Voltage Trim Range	0.7525 V	-	3.63 V	
MTBF	6,954,974 hours			Calculated Per Bell Core SR-332 (Io = Nominal; Ta = 25 °C)
Dimensions				
Inches (L x W x H)	0.8 x 0.45 x 0.25			
Millimeters (L x W x H)	20.32 x 11.42 x 6.36			
Weight	-	5 g	-	

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

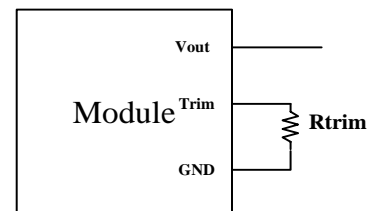
Control Specifications

Parameter	Min	Typ	Max	Notes
Remote On/Off				
Signal Low (Unit Off)	-0.2 V	-	0.3 V	Active High: SRBA-06F2A0; Remote On/Off pin open, Unit on.
Signal High (Unit On)	-	-	Vin, max	
Signal Low (Unit On)	-0.2 V	-	0.3 V	Active Low: SRBA-06F2AL; Remote On/Off pin open, Unit on.
Signal High (Unit Off)	1.5 V	-	Vin, max	
Sequencing Voltage	0 V	-	Vin	Sequencing Voltage applied on SEQ pin 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

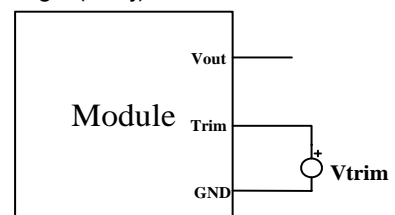
Equation for calculating the trim resistor (in kΩ) given the desired adjusted voltage (Vadj) is shown below. The Trim Up resistor should be connected between the Trim pin and Ground.

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



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.

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

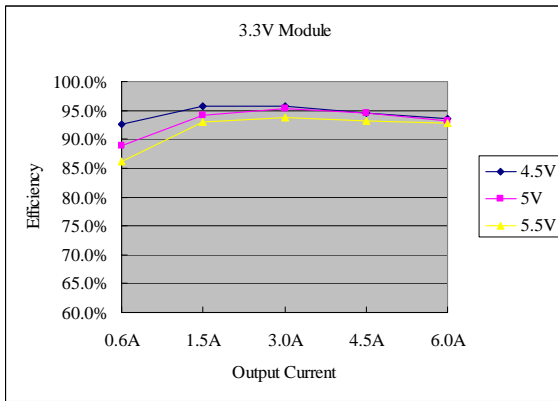


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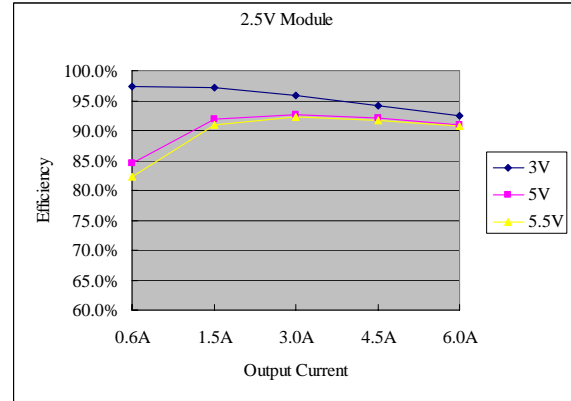
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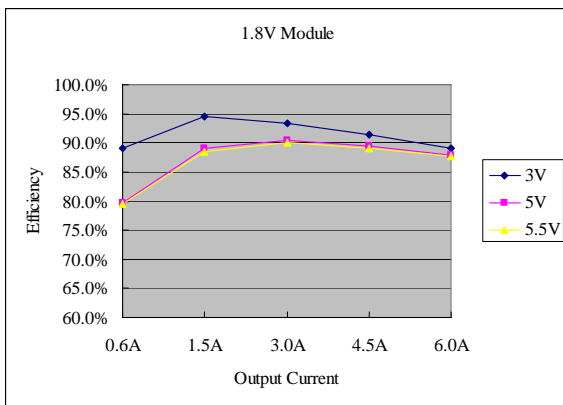
Efficiency Data



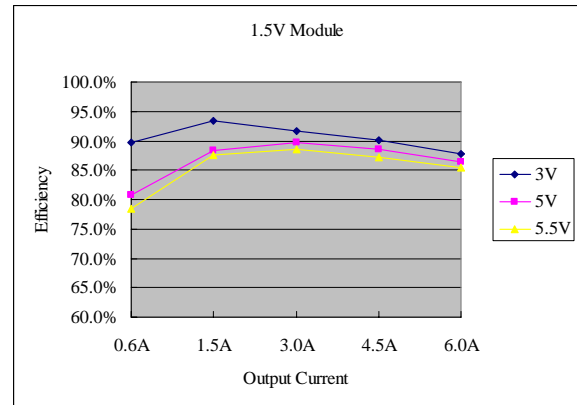
Vo=3.3 V



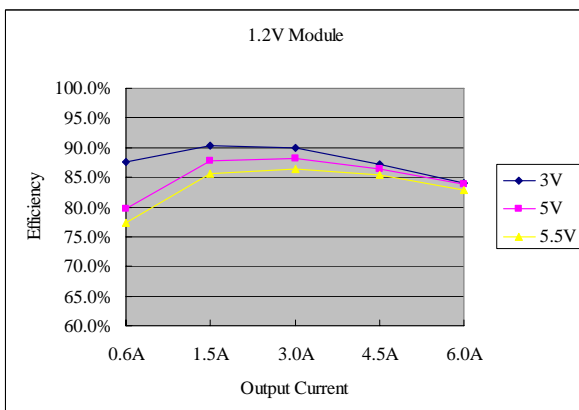
Vo=2.5 V



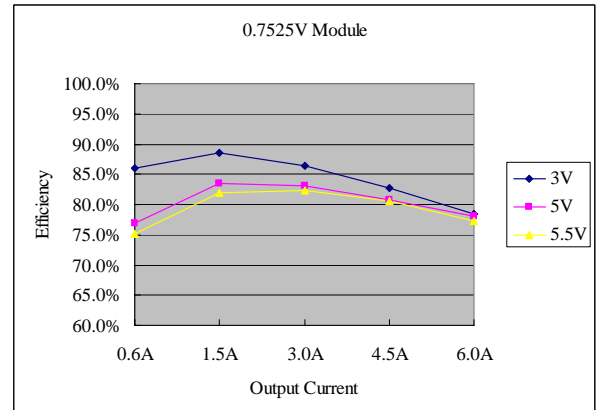
Vo=1.8 V



Vo=1.5 V



Vo=1.2 V



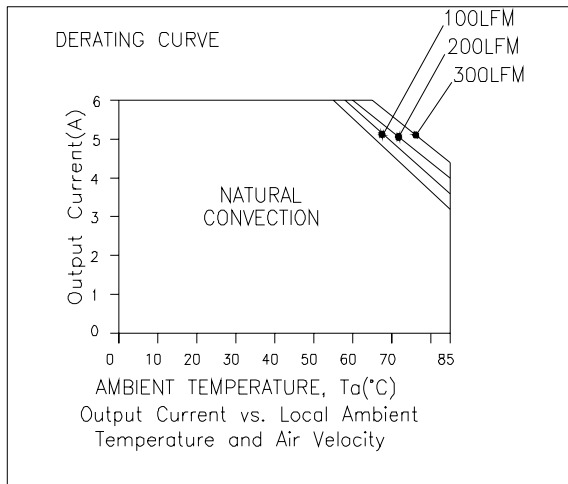
Vo=0.7525 V

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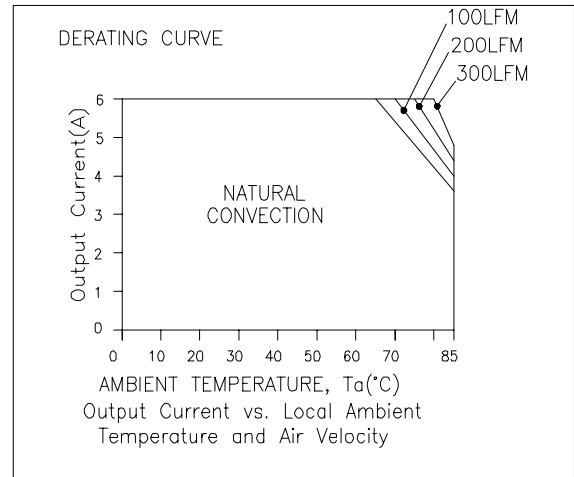
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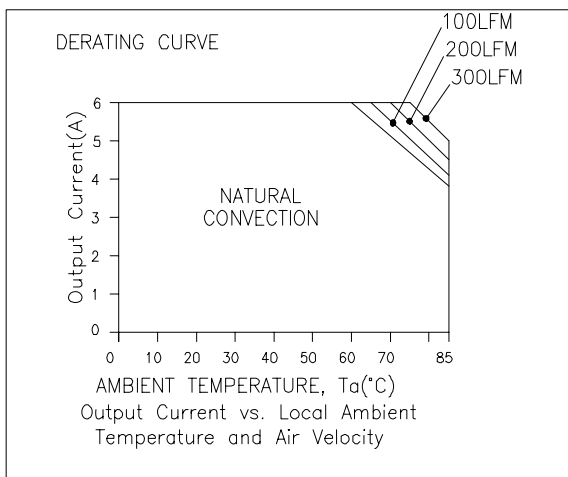
Thermal Derating Curves



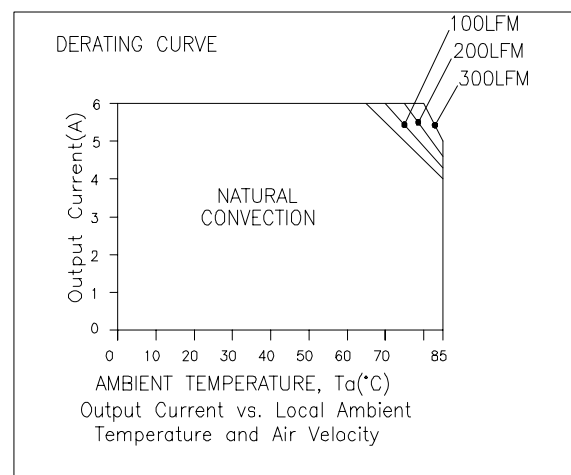
Vin=5.0 V, Vo=3.3 V



Vin=5.0 V, Vo=0.75 V



Vin=3.3 V, Vo=2.5 V



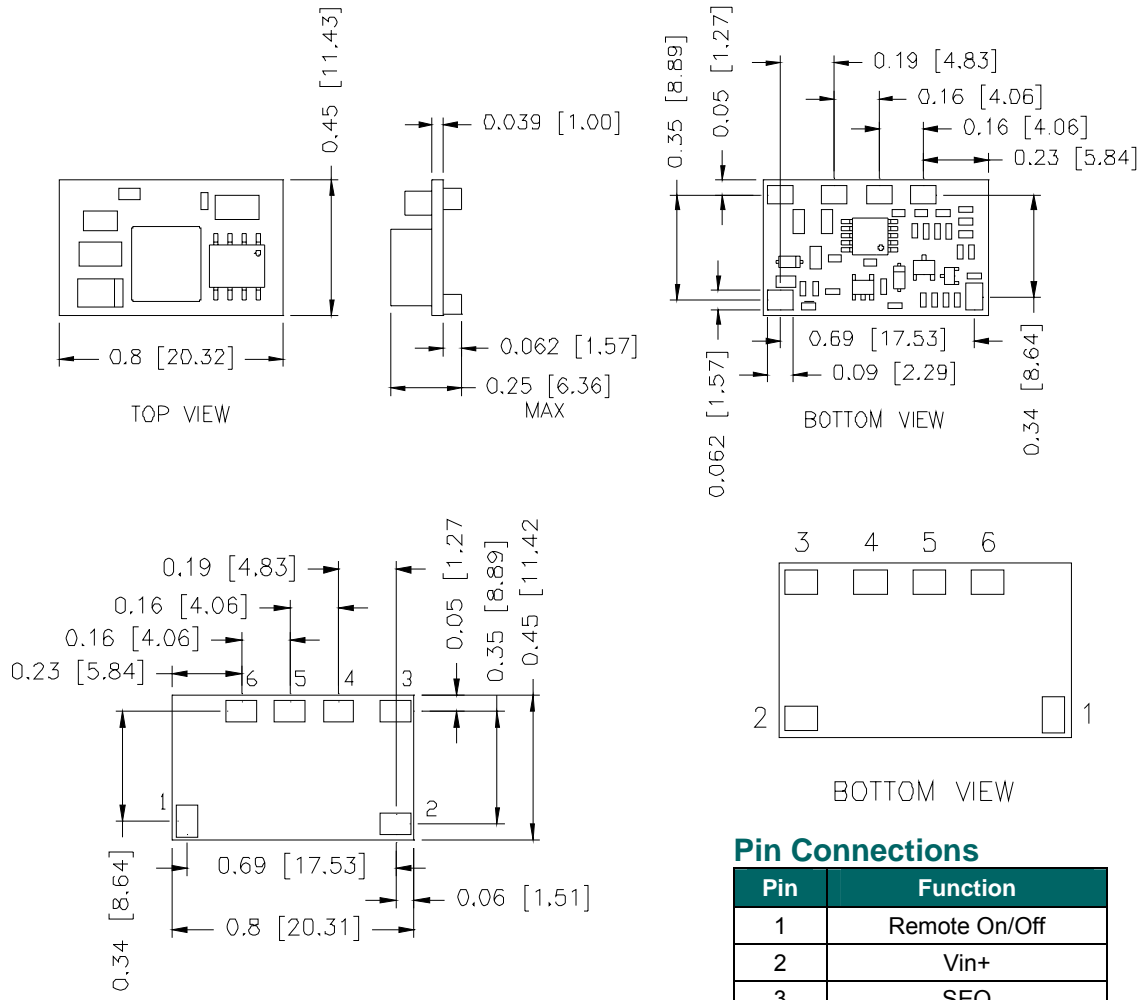
Vin=3.3 V, Vo=0.75 V

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Mechanical Outline



PAD SIZE:

MIN: 0.012" * 0.0095" (3.05mm * 2.41mm)
 MAX: 0.0135" * 0.011" (3.43mm * 2.79mm)

Pin Connections

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

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



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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