

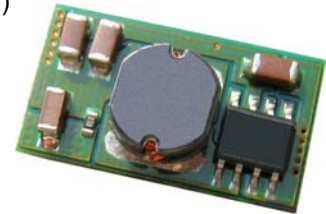
NON-ISOLATED DC/DC CONVERTERS

8.3 V-14 V Input 0.75 V-5.0 V/3 A Output



SRBA-03A1Ax Series RoHS Compliant

- Non-Isolated
- Fixed Frequency
- High Efficiency
- High Power Density
- Active Low/High (option)
- Under-Voltage Lockout (UVLO)
- OCP/SCP
- Remote On/Off
- Wide Trim Range
- Wide Input Range



Description

The Bel SRBA-03A1Ax modules are a series of non-isolated dc/dc converters that deliver up to 3 A of output current with full load efficiency of 93% at 5.0 V output. These modules provide precisely regulated voltage programmable via external resistor from 0.75 V to 5.5 V over a wide range of input voltage. 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, over-temperature protection, over current protection, short circuit protection, and under-voltage lockout.

Part Selection

| Output Voltage | Input Voltage | Max. Output Current | Max. Output Power | Typical Efficiency at 5.0V | Model Number Active High | Model Number Active Low |
|----------------|---------------|---------------------|-------------------|----------------------------|--------------------------|-------------------------|
| 0.75 V - 5.0 V | 8.3 V - 14 V | 3 A | 15 W | 93% | SRBA-03A1A0 | SRBA-03A1AL |

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 | |
| Ambient Temperature | -40 °C | - | 85 °C | |
| Storage Temperature | -55 °C | - | 125 °C | |

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

Input Specifications

| Parameter | Min | Typ | Max | Notes |
|---------------------------|-------|--------|--------|-------|
| Input Voltage | 8.3 V | 12 V | 14 V | |
| Input Current (full load) | | | | |
| Vo=5.0 V | - | 1.35 A | 2.00 A | |
| Vo=3.3 V | - | 0.90 A | 1.30 A | |
| Vo=0.75 V | - | 0.24 A | 0.35 A | |
| Input Current (no load) | | | | |
| Vo=5.0 V | - | 55 mA | 65 mA | |
| Vo=3.3 V | - | 40 mA | 50 mA | |
| Vo=0.75 V | - | 15 mA | 20 mA | |

NON-ISOLATED DC/DC CONVERTERS

8.3 V-14 V Input 0.75 V-5.0 V/3 A Output



Input Specifications (continued)

| Parameter | Min | Typ | Max | Notes |
|---|-------------|-------------------------|--------------------------|---|
| Remote Off Input Current | - | 3 mA | 6 mA | |
| Input Reflected Ripple Current (pk-pk) Vo=5.0 V Vo=3.3 V Vo=0.75 V | - - - | 75 mA 50 mA 20 mA | 120 mA 90 mA 35 mA | Tested with two 100 uF/25 V tantalum input capacitors & simulated source impedance of 1 uH, 5 Hz to 20 MHz. |
| Input Reflected Ripple Current (rms) Vo=5.0 V Vo=3.3 V Vo=0.75 V | - - - | 20 mA 15 mA 5 mA | 60 mA 30 mA 15 mA | |
| I ² t Inrush Current Transient | - | 0.01 A ² s | 0.02 A ² s | |
| Turn-on Voltage Threshold | 7.6V | 7.9 V | 8.2 V | |
| Turn-off Voltage Threshold | 7.0V | 7.8 V | 8.1 V | |

Output Specifications

| Parameter | Min | Typ | Max | Notes | |
|---|--------------|-------------------------|--------------------------|---|--|
| Output Voltage Set Point | -2% Vo,set | - | 2% Vo,set | Vin=12 V, Io=Io,max, full load | |
| Output Voltage Set Point | -2.5% Vo,set | - | 3.5% Vo,set | Over all operating input voltages, resistive loads and temperature conditions | |
| Load Regulation | 0.5% Vo,set | 0.4% Vo,set | 0.5% Vo,set | Io=Io, min to Io, max | |
| Line Regulation | 0.4% Vo,set | 0.3% Vo,set | 0.4% Vo,set | Vin=Vin, min to Vin, max | |
| Regulation Over Temperature (-40 °C to +85 °C) | - | 0.5% Vo,set | 0.8% Vo,set | | |
| Output Current | 0 A | - | 3 A | | |
| Current Limit Threshold | 5 A | - | 12 A | | |
| Short Circuit Surge Transient | - | 0.15 A ² s | - | | |
| Ripple and Noise (pk-pk) Vo=5.0 V Vo=3.3 V Vo=0.75 V | - - - | 65 mV 45 mV 20 mV | 100 mV 80 mV 35 mV | Tested with 0-20 MHz, with 10 uF/10 V tantalum capacitor and 1uF/10 V ceramic capacitor at the output | |
| Ripple and Noise (rms) Vo=5.0 V Vo=3.3 V Vo=0.75 V | - - - | 20 mV 10 mV 5 mV | 40 mV 25 mV 15 mV | | |
| Turn on Time | - | 5 mS | 8 mS | | |
| Overshoot at Turn on | - | 0% | 3% | | |
| Output Capacitance | 0 uF | - | 1200 uF | | |
| Transient Response | | | | | |
| 50% ~ 100% Max Load | All | - | 200 mV | 300 mV | di/dt=2.5 A/uS; Vin=12 V; and with 10 uF/10 V tantalum capacitor and 1 uF/10 V ceramic capacitor at the output |
| Settling Time | | - | 50 uS | 80 uS | |
| 100% ~ 50% Max Load | | - | 200 mV | 300 mV | |
| Settling Time | | - | 50 uS | 80 uS | |

Note: All specifications are typical at nominal input (Vin=12 V), full load at 25 °C unless otherwise stated.

NON-ISOLATED DC/DC CONVERTERS

8.3 V-14 V Input 0.75 V-5.0 V/3 A Output



General Specifications

| Parameter | Min | Typ | Max | Notes |
|---|--|-------------------|-------------|--|
| Efficiency Vo=5.0 V Vo=3.3 V Vo=0.75 V | 90% 88% 76% | 93% 91% 80% | - - - | Measured at Vin=12 V, full load (Current Source) |
| Switching Frequency | - | 300 kHz | - | |
| Over Temperature Shutdown | - | 135 °C | - | |
| MTBF | 6,740,000 hours | | | Calculated Per Bell Core SR-332 (Io = Nominal; Ta = 25 °C) |
| Dimensions (Surface Mount) Inches (L x W x H) Millimeters (L x W x H) | 0.8 x 0.45 x 0.251 20.32 x 11.42 x 6.38 | | | |
| Weight | - | 3 g | - | |

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

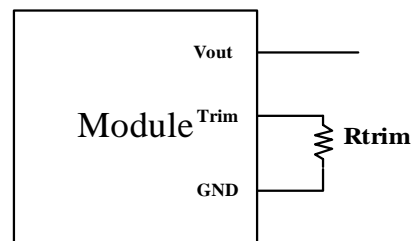
Control Specifications

| Parameter | Min | Typ | Max | Notes |
|---------------------------------------|----------|-----|-------|---|
| Remote On/Off | | | | |
| Signal Low (Unit Off) | -0.3 V | - | 0.4 V | SRBA-03A1A0; Remote On/Off pin open, Unit on. |
| Signal High (Unit On) | 2.5 V | - | 14 V | |
| Signal Low (Unit On) | -0.3 V | - | 0.4 V | SRBA-03A1AL; Remote On/Off pin open, Unit on. |
| Signal High (Unit Off) | 2.5 V | - | 14 V | |
| Output Voltage Trim Range (Wide Trim) | 0.7525 V | - | 5.0 V | |

Output Trim Equations

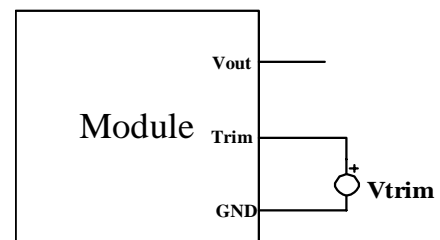
Equation for calculating the trim resistor (in kΩ) given the desired adjusted voltage (Vadj) is shown below. The Trim Up resistor should be connected between the Trim pin and Ground.

$$R_{trim} = \frac{10.507}{V_{adj} - 0.7525} - 1$$



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.

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



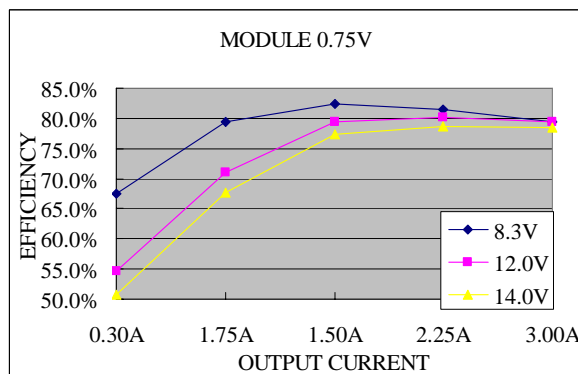
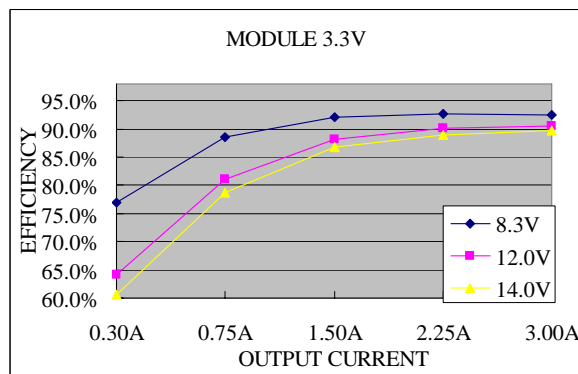
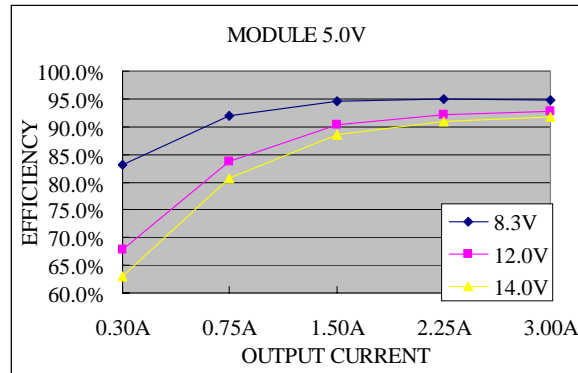
NON-ISOLATED DC/DC CONVERTERS

8.3 V-14 V Input

0.75 V-5.0 V/3 A Output



Efficiency Data



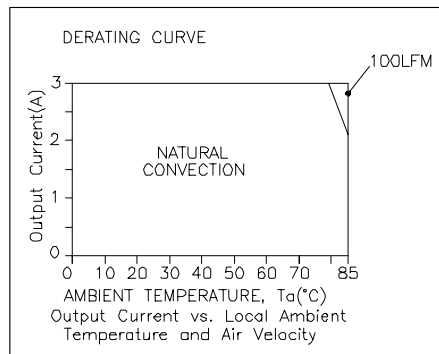
NON-ISOLATED DC/DC CONVERTERS

8.3 V-14 V Input

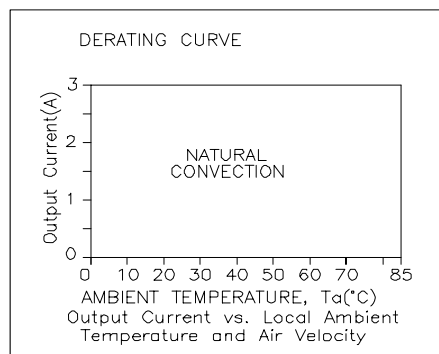
0.75 V-5.0 V/3 A Output



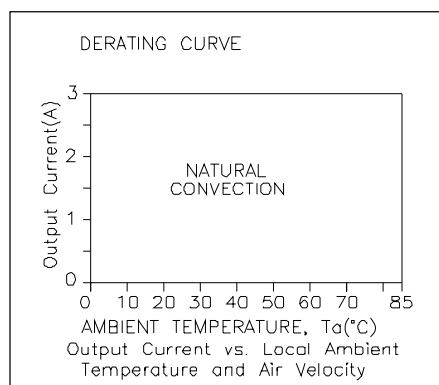
Thermal Derating Curves



Vin=12 V, Vo=5.0 V



Vin=12 V, Vo=3.3 V



Vin=12 V, Vo=0.75 V

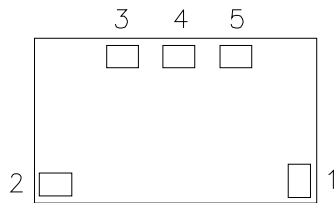
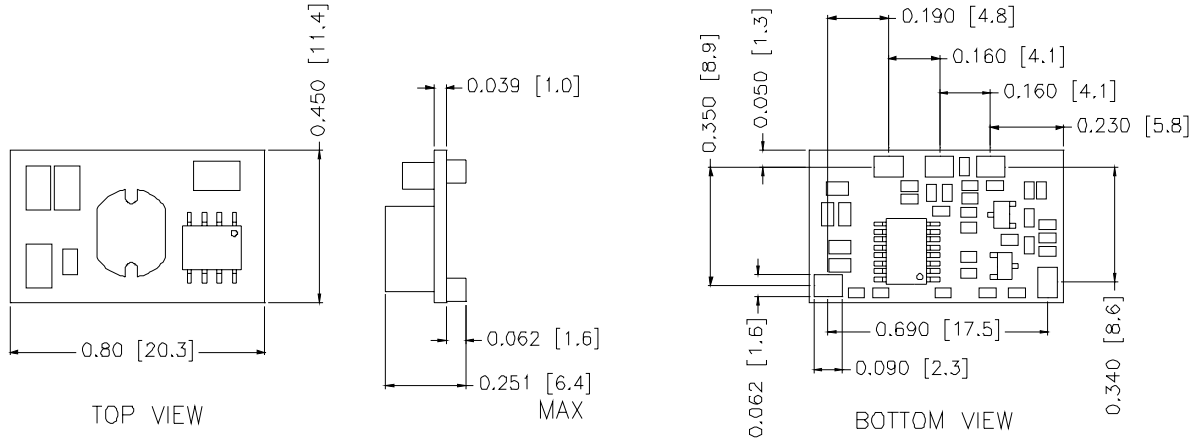
NON-ISOLATED DC/DC CONVERTERS

8.3 V-14 V Input

0.75 V-5.0 V/3 A Output



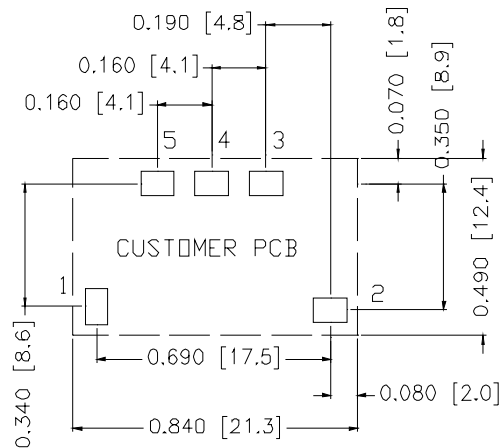
Mechanical Outline



Pin Connections

| Pin | Function |
|-----|---------------|
| 1 | Remote On/Off |
| 2 | Vin |
| 3 | Ground |
| 4 | Trim |
| 5 | Vout |

RECOMMENDED PAD LAYOUT



PAD SIZE:

MIN: 0.12" * 0.095" (3.05mm * 2.41mm)

MAX: 0.135" * 0.11" (3.43mm * 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.



©2005 Bel Fuse Inc. Specifications subject to change without notice. 120205

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