

## NON-ISOLATED DC/DC CONVERTERS

12 Vdc Input

1.05 Vdc - 1.825 Vdc/18 A Output

**bel**  
POWER PRODUCTS

**VRXE-18AS10**

**RoHS Compliant**

**Rev.A**

- Non-Isolated
- High Efficiency
- High Power Density
- Per Intel VRM8.5 VID code
- Power Good Signal
- Remote On/Off
- OCP/SCP



### Description

The Bel VRXE-18AS10 is a part of the non-isolated dc/dc converter Power Module series. The modules use a SIP package for ease of layout and space savings. The efficiency is typically 84% at full load.

### Part Selection

| Output Voltage  | Input Voltage | Max. Output Current | Max. Output Power | Typical Efficiency | Model Number |
|-----------------|---------------|---------------------|-------------------|--------------------|--------------|
| 1.05 V -1.825 V | 12 V          | 18 A                | 33 W              | 84%                | VRXE-18AS10  |

**Notes:** 1. All part numbers above indicate RoHS 6. Change the second letter "R" to "7" for RoHS 5 part numbers.  
2. Add "G" suffix at the end of the model numbers listed above to indicate "Tray Packaging".

### Absolute Maximum Ratings

| Parameter                      | Min    | Typ | Max    | Notes |
|--------------------------------|--------|-----|--------|-------|
| Input Voltage (continuous)     | -0.3 V | -   | 16 V   |       |
| Output Enable Terminal Voltage | -0.3 V | -   | 16 V   |       |
| Input Signal Voltage           | -0.3 V | -   | 7.3 V  |       |
| Ambient Temperature            | 0 °C   | -   | 55 °C  |       |
| Storage Temperature            | -40 °C | -   | 125 °C |       |

### Input Specifications

| Parameter                              | Min    | Typ   | Max    | Notes                                  |
|----------------------------------------|--------|-------|--------|----------------------------------------|
| Input Voltage                          | 10.8 V | -     | 13.2 V |                                        |
| Input Current (full load)              | -      | -     | 4 A    |                                        |
| Input Current (no load)                | -      | -     | 100 mA |                                        |
| Remote Off Input Current               | -      | 3 mA  | 30 mA  |                                        |
| Input Reflected Ripple Current (pk-pk) | -      | -     | 150 mA | Tested with a 10 nF ceramic capacitor. |
| Input Reflected Ripple Current (rms)   | -      | -     | 25 mA  |                                        |
| Turn-on Voltage Threshold              | -      | 5.3 V | -      |                                        |
| Turn-off Voltage Threshold             | -      | 5.5 V | -      |                                        |

**Note:** All specifications are typical at 12 V input, full load at 25 °C unless otherwise stated.

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### Output Specifications

| Parameter                 | Min     | Typ     | Max     | Notes                                                                                                             |
|---------------------------|---------|---------|---------|-------------------------------------------------------------------------------------------------------------------|
| Output Voltage Range      | 1.050 V | -       | 1.825 V | Per Intel VRM8.5 VID code                                                                                         |
| DC load-line slope        | -       | -4 mV/A | -       |                                                                                                                   |
| Output Current            | 0 A     | -       | 18 A    |                                                                                                                   |
| Current Limit Threshold   | 13 A    | -       | 35 A    |                                                                                                                   |
| Ripple and Noise (rms)    | -       | 2 mV    | -       | Tested with 0-20 MHz BW, 12x22 uF ceramic capacitors at the output.                                               |
| Ripple and Noise (pk-pk)  | -       | 15 mV   | -       |                                                                                                                   |
| Turn on Time              | -       | -       | 200 mS  |                                                                                                                   |
| Overshoot at Turn on      | -       | 0%      | 5%      |                                                                                                                   |
| Output Capacitance        | 0 uF    | -       | 1000 uF |                                                                                                                   |
| <b>Transient Response</b> |         |         |         |                                                                                                                   |
| 50% ~ 100% Max Load       | All     | -       | 70 mV   | Test conditions:<br>di/dt=9 A/us, Vin=12 V, and with 12x<br>22 uF X5R or X7R ceramic<br>capacitors at the output. |
| Settling Time             |         | -       | 30 uS   |                                                                                                                   |
| 100% ~ 50% Max Load       |         | -       | 60 mV   |                                                                                                                   |
| Settling Time             |         | -       | 70 uS   |                                                                                                                   |

**Note:** All specifications are typical at 12 V input, full load at 25 °C unless otherwise stated.

### General Specifications

| Parameter                                                   | Min                                     | Typ               | Max         | Notes                                                                                 |
|-------------------------------------------------------------|-----------------------------------------|-------------------|-------------|---------------------------------------------------------------------------------------|
| Efficiency<br>Vo=1.825 V<br>Vo=1.325 V<br>Vo=1.050 V        | 82%<br>77%<br>73%                       | 84%<br>79%<br>75% | -<br>-<br>- | Measured at Vin=12 V, full load                                                       |
| Switching Frequency                                         | 450 kHz                                 | 500 kHz           | 550 kHz     |                                                                                       |
| MTBF                                                        | 4,023,814 hours                         |                   |             | Calculated Per Bell Core SR-332<br>(Vin=12 V; Vo=1.825 V, Io=80% load;<br>Ta = 25 °C) |
| Dimensions<br>Inches (L × W × H)<br>Millimeters (L × W × H) | 2.5 x 1.0 x 0.41<br>63.50 x 25.4 x 10.4 |                   |             |                                                                                       |
| Weight                                                      | -                                       | 18 g              | -           |                                                                                       |

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

### Control Specifications

| Parameter             | Min    | Typ | Max    | Notes                            |
|-----------------------|--------|-----|--------|----------------------------------|
| Signal Low (Unit Off) | -0.3 V | -   | 0.3 V  | Remote on/off pin open, unit on. |
| Signal High (Unit On) | 1.5 V  | -   | 13.2 V |                                  |
| Signal Low            | -      | -   | 0.5 V  |                                  |
| Current Sink          | -      | -   | 6 mA   |                                  |
| Signal High           | -      | -   | 5.5 V  |                                  |

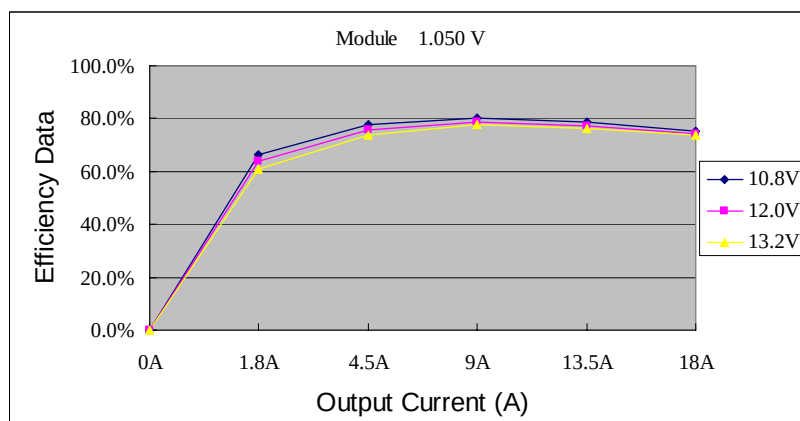
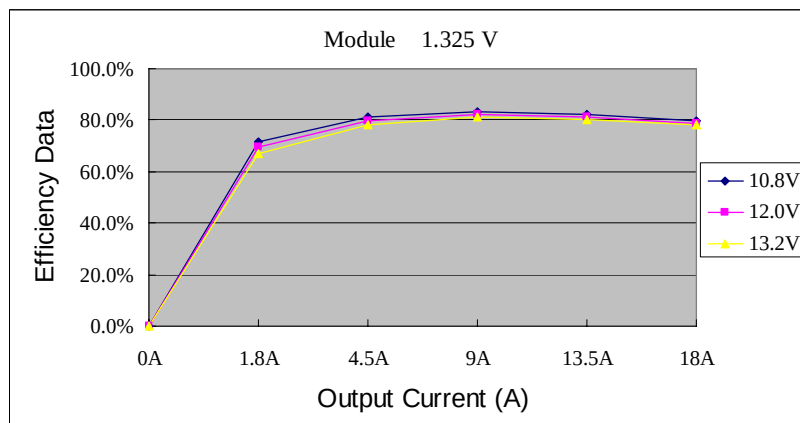
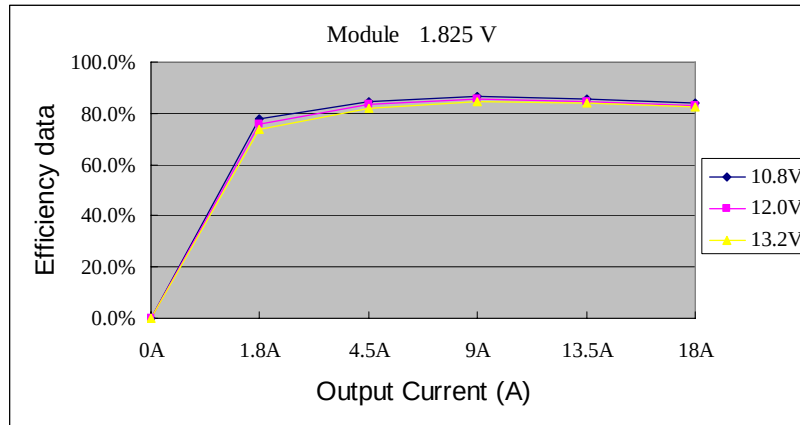
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### Efficiency Data



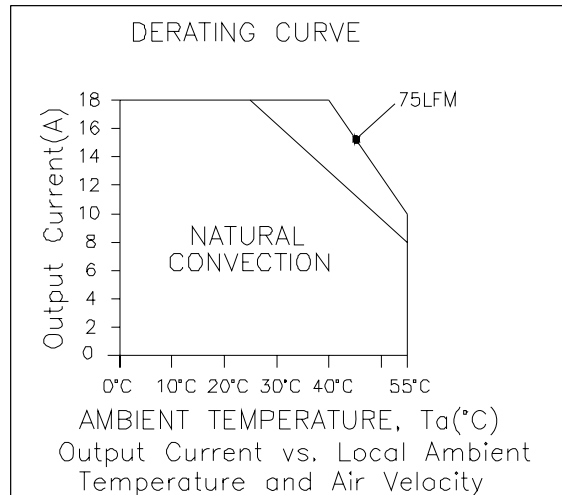
## NON-ISOLATED DC/DC CONVERTERS

12 Vdc Input

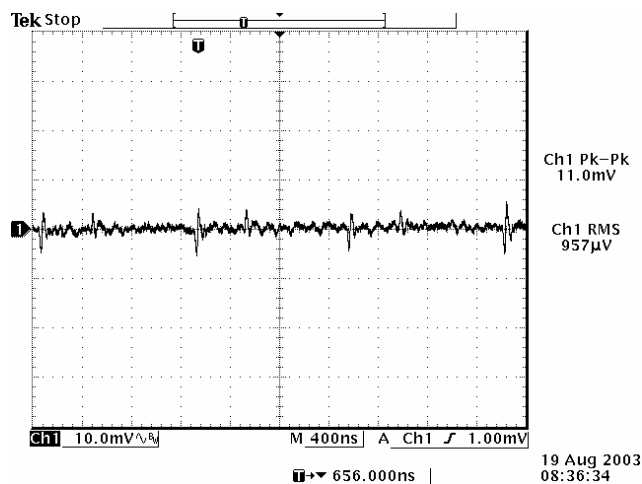
1.05 Vdc - 1.825 Vdc/18 A Output

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### Thermal Derating Curve



### Ripple and Noise Waveform



12 Vdc input, 1.825 V output

**Note:** Output ripple and noise at full load with an external 12x22 uF ceramic cap at the output and  $T_a=25^{\circ}\text{C}$ .

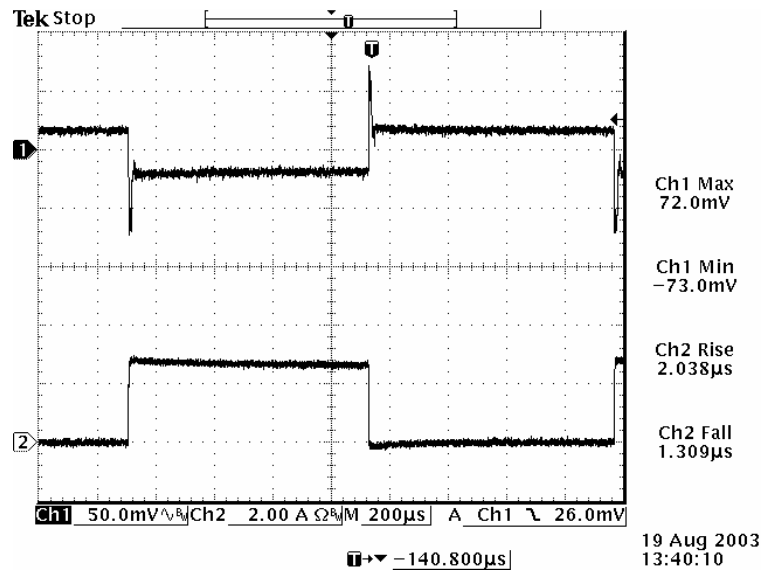
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### Transient Response Waveform



9 A to 18 A load and 18 A to 9 A transient at 12 V input/1.825 V output

**Note:** Transient Response at  $di/dt=9 \text{ A}/\mu\text{S}$ , with external load capacitance  $C_o=264 \text{ }\mu\text{F}$  ( 12x22  $\mu\text{F}$  ceramic cap ) and  $T_a=25^\circ\text{C}$ .

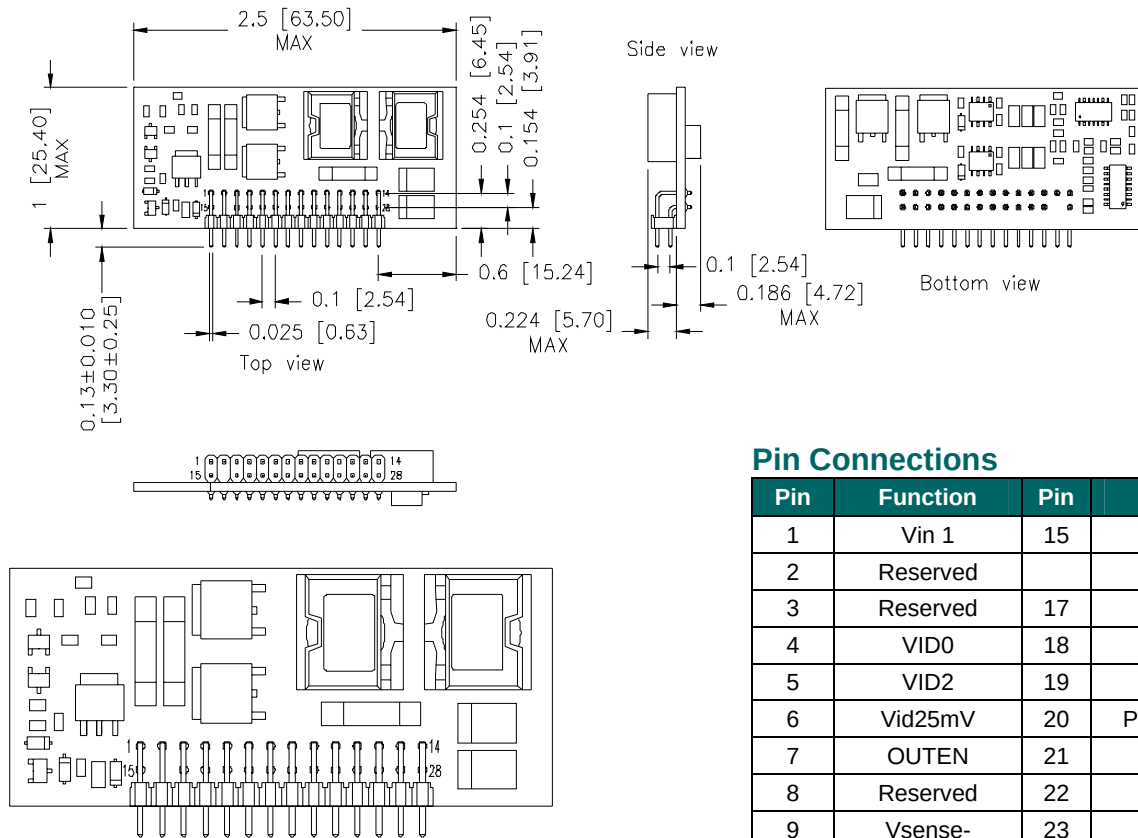
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### Mechanical Outline



Module leads, header, and any portion of the component that is exposed directly to molten solder will withstand a temperature of 260 degrees C for a minimum of 10 seconds. Component sections not exposed directly to the solder will withstand 150 degrees C. Lead solderability meets ANSI/J-STD-002.

### Pin Connections

| Pin | Function | Pin | Function           |
|-----|----------|-----|--------------------|
| 1   | Vin 1    | 15  | Vin 2              |
| 2   | Reserved |     | No pin             |
| 3   | Reserved | 17  | Reserved           |
| 4   | VID0     | 18  | VID1               |
| 5   | VID2     | 19  | VID3               |
| 6   | Vid25mV  | 20  | Power Good         |
| 7   | OUTEN    | 21  | I <sub>SHARE</sub> |
| 8   | Reserved | 22  | Reserved           |
| 9   | Vsense-  | 23  | Vsense+            |
| 10  | Ground   | 24  | Ground             |
| 11  | Ground   | 25  | Ground             |
| 12  | Ground   | 26  | Ground             |
| 13  | Vout     | 27  | Vout               |
| 14  | Vout     | 28  | Vout               |

**Note:** This product closely follows the Intel VRM8.5 specification.

### 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](http://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](http://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](http://www.belfuse.com)