

NON-ISOLATED DC/DC CONVERTER

5 Vdc Input Vref/2 / 5 A Output

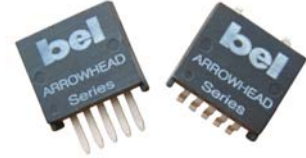
bel
POWER PRODUCTS

xRAH-05BT50

RoHS Compliant

Rev.A

- Non-Isolated
- Fixed frequency (300 kHz)
- Under-voltage lockout (UVLO)
- Current Sink Capability
- Remote On/Off
- OCP/SCP
- Low Profile Package (7.82 mm)
- UL60950-1 Recognized (UL/cUL)



Description

The Bel xRAH-05BT50 is part of the low cost non-isolated dc/dc converter series. The converter is designed specifically to provide bus termination voltage in application such as DDR (double data rate) memory where the bus termination voltage must closely track the I/O bus voltage. The converter accepts a reference input and programs its output voltage to 50% of the reference. The modules use a SMD or vertical mount package for ease of layout and space savings.

Part Selection

| Output Voltage | Input Voltage | Max. Output Current | Max. Output Power | Typical Efficiency | Part Number Surface Mount | Part Number Vertical Mount |
|----------------|---------------|---------------------|-------------------|--------------------|---------------------------|----------------------------|
| Vref/2 | 5 V | 5 A | 6.25 W | 82% | SRAH-05BT50 | VR AH-05BT50 |

- Notes:** 1. Add "0" suffix at the end of the model number to indicate "Tube Packaging", and "R" for "Reel Packaging", and "G" for "Tray Packaging".
2. All part numbers above indicate RoHS 6. Change the second letter "R" to "7" for RoHS 5 part numbers.

Absolute Maximum Ratings

| Parameter | Min | Typ | Max | Notes |
|--------------------------------|--------|-----|--------|-------|
| Input Voltage (continuous) | -0.3 V | - | 6 V | |
| Output Enable Terminal Voltage | -0.3 V | - | 6 V | |
| Ambient Temperature | -40 °C | - | 85 °C | |
| Storage Temperature | -55 °C | - | 125 °C | |

Input Specifications

| Parameter | Min | Typ | Max | Notes |
|---|--------|-----------------------|-----------------------|--|
| Input Voltage | 4.5 V | 5.0 V | 5.5 V | |
| Input Current (Source) | - | - | 2 A | |
| Input Current (Sink) | - | - | -1.5 A | |
| Input Current (No load) | - | - | 60 mA | |
| Remote Off Input Current | - | 9 mA | 15 mA | |
| Input Reflected Ripple Current (rms) | - | 30 mA | 50 mA | Measured with simulated source impedance of 500 nH, 5 Hz to 20 MHz; & one 270 uF/16 V capacitor with ESR = 0.018 ohm max. at 100 kHz |
| Input Reflected Ripple Current (pk-pk) | - | 110 mA | 140 mA | |
| I ² t Inrush Current Transient | - | 0.02 A ² s | 0.05 A ² s | |
| Vref Voltage | 0 V | 2.5 V | 4 V | |
| Turn-on Voltage Threshold | 4.19 V | 4.3 V | 4.5 V | |
| Turn Off Voltage threshold | - | 3.8 V | 4.49 V | |

- Notes:** 1. All tests are measured at Vref = 2.5 V.
2. All specifications are typical at 25 °C unless otherwise stated.

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Output Specifications

| Parameter | Min | Typ | Max | Notes |
|--|------------------|-----------------------|-----------------------|---|
| Output Voltage Set Point | 0.99* (Vref/2) V | Vref/2 | 1.01* (Vref/2) V | Vin=5 V, Iout=full load. |
| Load Regulation | - | 3 mV | 6 mV | |
| Line Regulation | - | 1 mV | 3 mV | |
| Regulation Over Temperature (-40 °C to +85 °C) | - | 15 mV | 20 mV | |
| Output Current | 0 A | - | 5 A | |
| Output Current Threshold | 6.5 A | - | 12.5 A | |
| Short Circuit Surge Transient | - | 0.04 A ² s | 0.08 A ² s | |
| Ripple and Noise (rms) | - | 12 mV | 20 mV | Tested at: 0-20 MHz BW; with 1 uF ceramic capacitor at the output |
| Ripple and Noise (pk-pk) | - | 45 mV | 90 mV | |
| Turn On Time | - | 12 mS | 20 mS | |
| Overshoot at Turn on | - | 0% | 3% | |
| Output Capacitance | - | - | 2200 uF | |

- Notes:**
1. All specifications are typical at nominal input, full load at 25 °C unless otherwise stated.
 2. The modules track the transient response of the reference input. See the figure in TR data on Page 4.
 3. The turn-off undershoot of the module is below 100 mV if a 220 uF aluminum cap is added at the output.
 4. All tests are measured at Vref=2.5 V.

General Specifications

| Parameter | Min | Typ | Max | Notes |
|----------------------------|------------------------|---------|---------|---|
| Efficiency (source) | 79% | 82% | - | Measured at Vin=5V, Io=Io-max full load |
| Efficiency (sink) | 78% | 81% | - | Measured at Vin=5V, Io=Io-max full load |
| Switching Frequency | 250 kHz | 300 kHz | 340 kHz | |
| MTBF | 8,841,119 hours | | | Calculated Per Bell Core SR-332 (Io = 4 A, Vin=5 V, Vref=2.5 V; Ta = 25 °C) |
| Dimensions (surface mount) | | | | |
| Inches (L x W x H) | 0.78 x 0.7 x 0.32 | | | |
| Millimeters (L x W x H) | 19.812 x 17.78 x 8.128 | | | |
| Dimensions (vertical) | | | | |
| Inches (L x W x H) | 0.7 x 0.308 x 0.65 | | | |
| Millimeters (L x W x H) | 17.78 x 7.82 x 16.51 | | | |
| Weight | - | 4.7 g | - | |

Note: All specifications are typical at nominal input, full load at 25 °C unless otherwise stated. All tests are measured at Vref=2.5 V.

Control Specifications

| Parameter | Min | Typ | Max | Notes |
|-----------------------|------------------|-----|------------------|---------------------------------|
| Remote On/Off | | | | |
| Signal Low (Unit Off) | -0.3 V | - | 1.35V (Vin=4.5V) | Remote on/off pin open, unit on |
| | -0.3 V | - | 1.65V (Vin=5.5V) | |
| Signal High (Unit On) | 3.15 V(Vin=4.5V) | - | 5.5 V | |
| | 3.85 V(Vin=5.5V) | - | 5.5 V | |

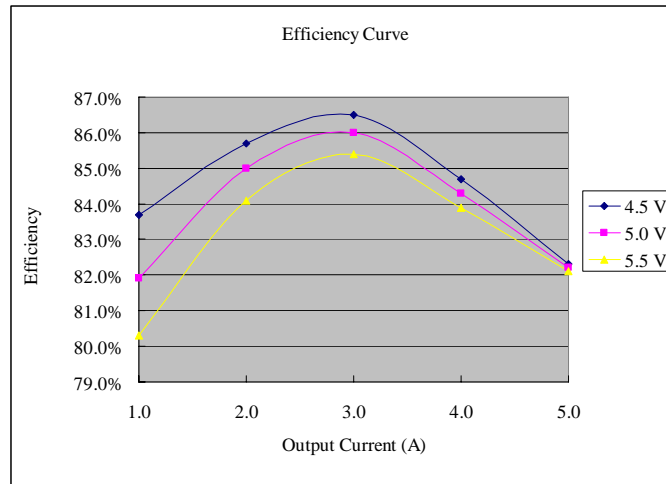
Note: All tests are measured at Vref=2.5 V.

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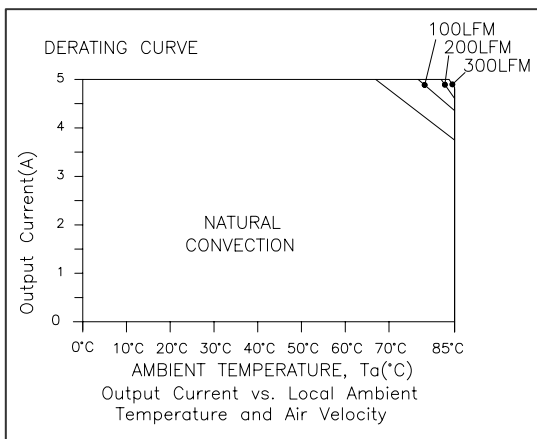


Efficiency Data

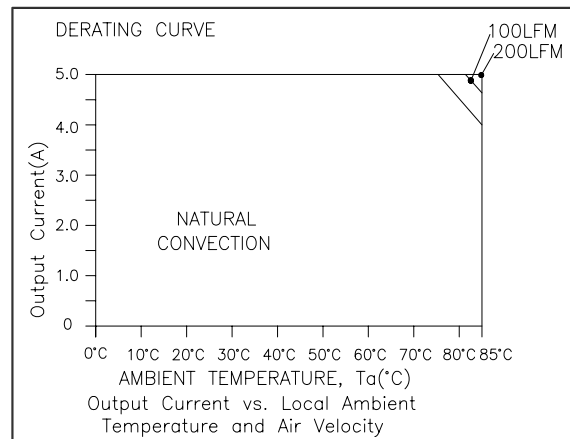


Efficiency is tested at Vref=2.5 V

Thermal Derating Curves



VRAH-05BT50



SRAH-05BT50

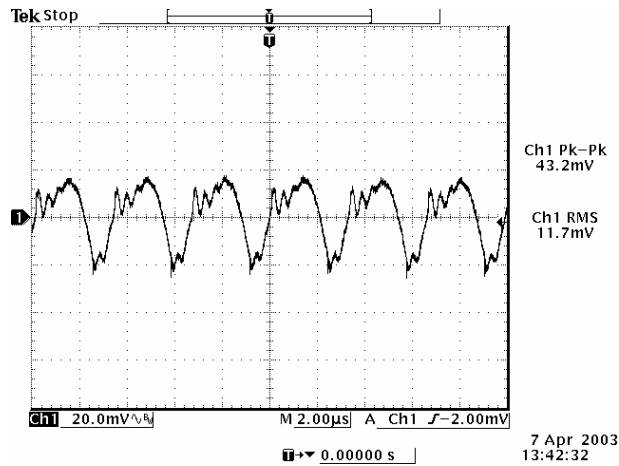
Test Condition: Derating curves are tested at nominal input voltage and Vref=2.5V.

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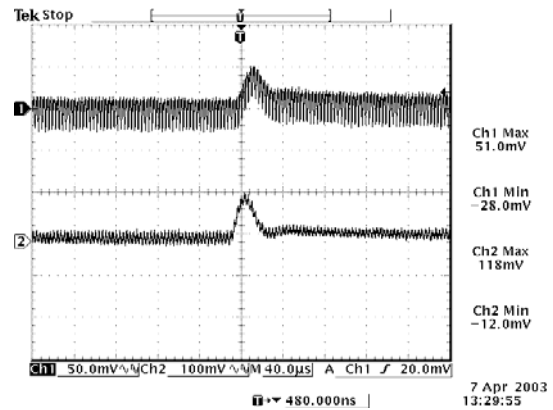
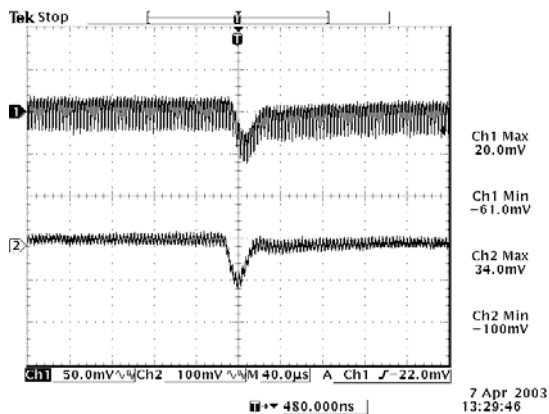
Ripple and Noise Waveform



5 Vdc Input, 1.25 Vdc Output

Note: Ripple and Noise at max load, with 1µF ceramic cap at the output, Ta=25 deg C.

Transient Response Waveforms



Channel 1: Transient response tracking.

Channel 2: Transient response of the reference input.

Note: Track the transient response of the reference input. No External Load Capacitance.

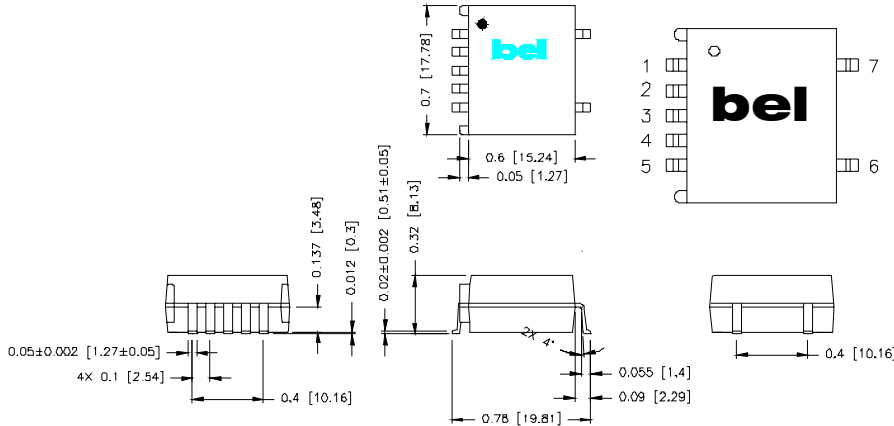
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Mechanical Outline

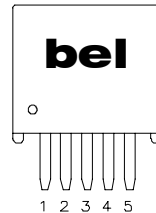
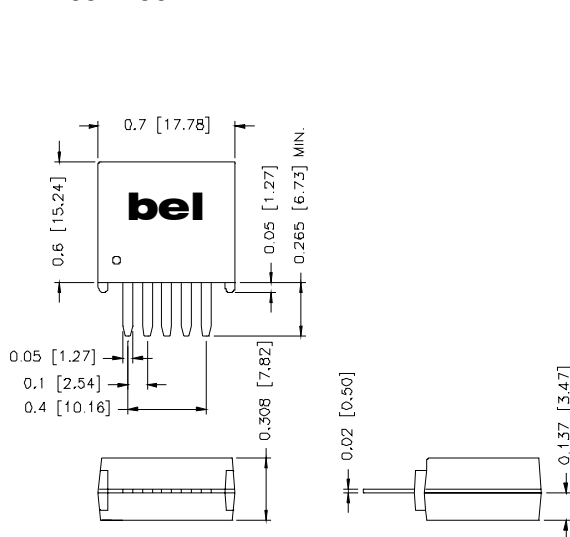
SRAH-05BT50



Pin Connections

| Pin | Function |
|-----|------------------------|
| 1 | Remote On/Off (option) |
| 2 | Vin |
| 3 | Ground |
| 4 | Vout |
| 5 | Vref (option) |
| 6 | N/A |
| 7 | N/A |

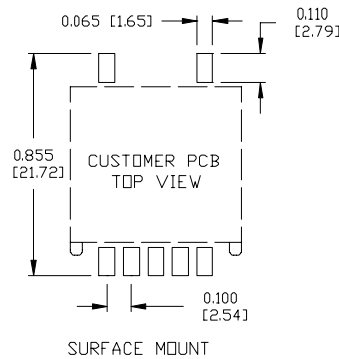
VRAH-05BT50



Pin Connections

| Pin | Function |
|-----|------------------------|
| 1 | Remote On/Off (option) |
| 2 | Vin |
| 3 | Ground |
| 4 | Vout |
| 5 | Vref (option) |

RECOMMENDED PCB PAD LAYOUT



RoHS Compliance

Complies with the European Directive 2002/95/EC, calling for the elimination of lead and other hazardous substances from electronic products. These parts are not however compatible with the higher temperatures associated with lead free solder processes and must be soldered using a reflow profile with a peak temperature of no more than 240 °C.



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