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NON-ISOLATED DC/DC CONVERTERS

3.0V-3.6V Input 12V/0.8A & 15V/0.6A Output



X7AH-01C Series PRELIMINARY

- Non-Isolated
- High Efficiency
- High Power Density
- Excellent Thermal Performance
- Low Cost
- Trim Function (option)
- Burst Mode Operation at Light Load

Description

The Bel X7AH-01CXX0 is part of the low cost non-isolated dc to dc converter Power Module series. The modules use a surface mount package or vertical package for ease of layout and space savings. The output is closely regulated and the efficiency of 12V output module is typically 86% at full load. Typical features include burst mode operation at light load and trim function (option).

Part Selection

| Output Voltage | Input Voltage | Max. Output Current | Max. Output Power | Typical Efficiency | Part Number Surface Mount | Part Number Vertical Mount |
|----------------|---------------|---------------------|-------------------|--------------------|---------------------------|----------------------------|
| 12V | 3.0 – 3.6V | 0.8A | 9.6W | 86% | S7AH-01CX20 | V7AH-01CX20 |
| 15V | 3.0 – 3.6V | 0.6A | 9.0W | 85% | S7AH-01CX50 | V7AH-01CX50 |

Absolute Maximum Ratings

| Parameter | Min | Typ | Max | Notes |
|----------------------------|-------|-----|-------|-------|
| Input Voltage (continuous) | 2.8V | - | 4V | |
| Output Power | - | - | 9.6W | |
| Ambient Temperature | -40°C | - | 85°C | |
| Storage Temperature | -40°C | - | 125°C | |

Input Specifications

| Parameter | Min | Typ | Max | Notes |
|---|--------|----------------------|----------------------|--|
| Input Voltage | 3V | - | 3.6V | |
| Input Current (no load) | - | 15mA | - | |
| Input Current (full load) | | | | |
| | Vo=12V | - | 4.3A | |
| | Vo=15V | - | 4A | |
| Input Reflected Ripple Current (pk-pk) | - | 100mA | 150mA | With simulated source impedance of 500nH, 5Hz to 20MHz; Use 270uF/16V cap. with ESR = 0.018 ohm max. at 100KHz at 25°C |
| Input Reflected Ripple Current (RMS) | - | 30mA | 60mA | |
| I ² t Inrush Current Transient | - | 0.02A ² s | 0.05A ² s | |
| Turn-on Voltage Threshold | - | 2.8V | 2.9V | |

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Output Specifications

| Parameter | | Min | Typ | Max | Notes | |
|--|-----------------|----------------|-------|---------|---|--|
| Output Voltage Set Point | Vo=12V | 11.58V | 12V | 12.42V | Test condition: Vin=3.3V, Iout=full load | |
| | Vo=15V | 14.475V | 15V | 15.525V | | |
| Line Regulation | Vo=12V | - | 20mV | 40mV | | |
| | Vo=15V | - | 20mV | 40mV | | |
| Load Regulation | Vo=12V | - | 60mV | 120mV | | |
| | Vo=15V | - | 75mV | 150mV | | |
| Regulation Over Temperature (-40°C to +85 °C) | Vo=12V | - | 45mV | 80mV | | |
| | Vo=15V | - | 60mV | 100mV | | |
| Output Current | Vo=12V | 0A | - | 0.8A | | |
| | Vo=15V | 0A | - | 0.6A | | |
| Ripple and Noise (RMS) | Vo=12V; Io=0A | - | 25mV | 50mV | Test conditions: BW = 0-20MHz; 1uF ceramic cap and 33uF tantalum cap at output | |
| | Vo=15V; Io=0A | - | 25mV | 50mV | | |
| | Vo=12V; Io=0.8A | - | 25mV | 50mV | | |
| | Vo=15V; Io=0.6A | - | 35mV | 60mV | | |
| Ripple and Noise (pk-pk) | Vo=12V; Io=0A | - | 85mV | 120mV | | |
| | Vo=15V; Io=0A | - | 100mV | 150mV | | |
| | Vo=12V; Io=0.8A | - | 60mV | 100mV | | |
| | Vo=15V; Io=0.6A | - | 100mV | 150mV | | |
| Rise Time | | - | 5mS | - | | |
| Overshoot at Turn on | | - | 0% | 5% | | |
| Output Capacitance | | 33uF | - | 330uF | Tan Cap. | |
| Transient Response | | | | | | |
| 50% ~ 100% Max Load | Overshoot | All Outputs | - | 130mV | 200mV | di/dt = 0.1A/uS; Vin = 3.3V; Ta = 25°C and with 33uF Tan. Cap. on output |
| | Settling Time | | - | 100uS | 200uS | |
| 100% ~ 50% Max Load | Overshoot | | - | 130mV | 200mV | |
| | Settling Time | | - | 100uS | 200uS | |

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

NON-ISOLATED DC/DC CONVERTERS

3.0V-3.6V Input 12V/0.8A & 15V/0.6A Output



General Specifications

| Parameter | Min | Typ | Max | Notes |
|----------------------------|------------------------|--------|--------------------|---|
| Efficiency | | | | |
| V _O =12V | 82% | 86% | - | Measured at V _{in} =3.3V, full load |
| V _O =15V | 81% | 85% | - | |
| Switching Frequency | 500KHz | 550KHz | 650KHz | |
| Output Trim Range | 90%V _O | - | 110%V _O | |
| MTBF | TBD | | | Calculated Per Bell Core TR-332 (I _o = Nominal; T _a = 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 | - | 5.2g | - | |

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

Output Trim Equations

Equations for calculating the trim resistor (in kΩ) given the desired adjusted voltage (V_{adj}) and the nominal output voltage of the converter (V_{nom}) are shown below. The Trim Down resistor should be connected between the Trim pin and V_{out}. The Trim Up resistor should be connected between the Trim pin and Ground. Only one of the resistors should be used for any given application.

$$R_{TrimDown} = \frac{A}{V_{nom} - V_{adj}} - B \qquad R_{TrimUp} = \frac{C}{V_{adj} - V_{nom}} - D$$

| V _{nom} | A | B | C | D |
|------------------|---------|--------|--------|-------|
| 12 | 164.640 | 21.850 | 11.760 | 7.150 |
| 15.055 | 209.542 | 20.600 | 11.760 | 5.900 |

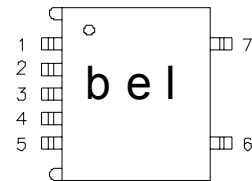
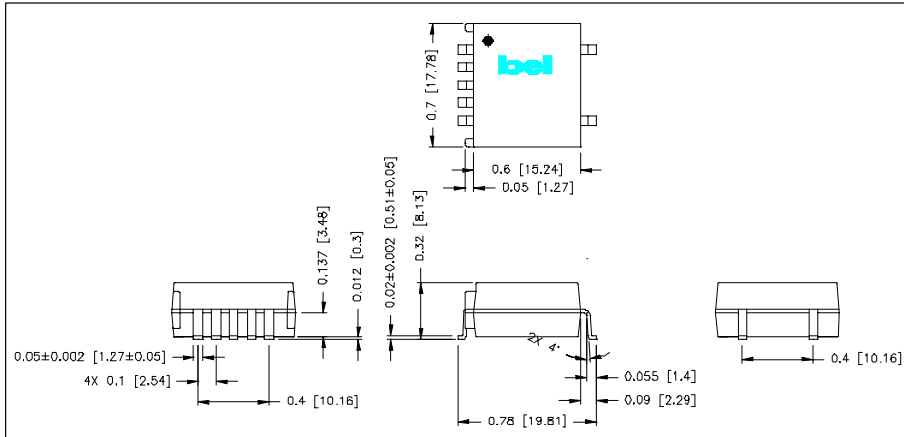
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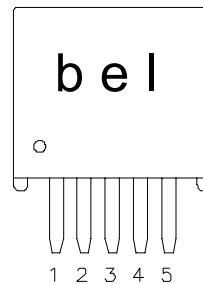
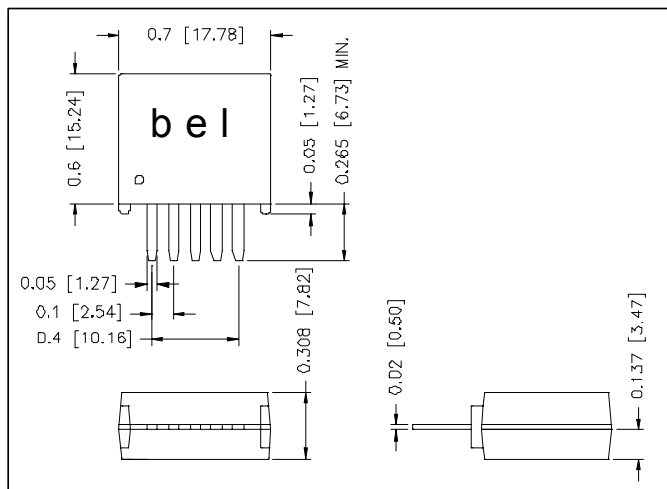
S7AH-01C



Pin Connections

| Pin | Function |
|-----|---------------|
| 1 | N/A |
| 2 | Vin (+) |
| 3 | Ground |
| 4 | Vout (+) |
| 5 | Trim (option) |
| 6 | N/A |
| 7 | N/A |

V7AH-01C



Pin Connections

| Pin | Function |
|-----|---------------|
| 1 | N/A |
| 2 | Vin (+) |
| 3 | Ground |
| 4 | Vout (-) |
| 5 | Trim (option) |

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