



# BD10013

## 5W TRIPLE DC/DC CONVERTER

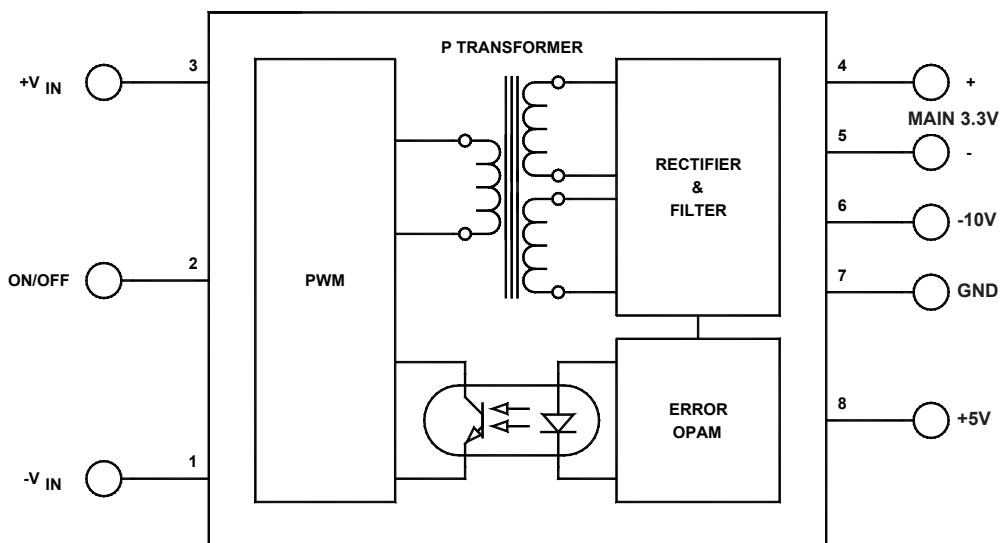
### Key Features

- Input-to-output isolation
- Soft start
- Hot pluggable
- Input Pi filter
- Short circuit and thermal protection
- 50 $\mu$ A off state current
- Wide input voltage range (24–48Vdc)
- EMI six-sided shielding



### Functional Description

The BD10013 is a 5W Triple DC/DC Converter in a 2×1×0.395-inch package that provides +3.3V<sub>OUT</sub>@1A, +5V<sub>OUT</sub>@200mA and -10V<sub>OUT</sub>@100mA with an operating temperature range from -55°C to +85°C. The 3.3V<sub>OUT</sub> is isolated from input to output and from the other two outputs.



Typical Block Diagram

## Electrical Specifications

### INPUT SPECIFICATIONS

Unless otherwise specified, all parameters are given under typical +25°C with nominal input voltage and under full output load conditions.

| PARAMETER                  | CONDITION / NOTE              | MIN | TYP | MAX | UNIT             |
|----------------------------|-------------------------------|-----|-----|-----|------------------|
| Input Voltage Range (2:1)  |                               | 24  | 34  | 48  | V                |
| Input Filter               | $\pi$ (Pi)                    |     |     |     |                  |
| Reflected Ripple Current   |                               |     | 100 |     | mA <sub>pp</sub> |
| Reverse Voltage Protection | Parallel diode                |     | 5   |     | A                |
| On/Off                     | Reference to -V <sub>IN</sub> |     |     |     |                  |
| Voltage                    | Open                          |     | 10  |     | V                |
| Unit On                    | Open                          |     |     |     |                  |
| Unit Off                   | Short to -V <sub>IN</sub>     |     |     |     |                  |
| Off State Current          | Pin 2 short to Pin 3          |     | 50  | 120 | μA               |
| Turn On Delay              | Including soft start          |     | 5   | 8   | mS               |
| Startup Input Voltage      |                               | 11  | 16  |     | V                |

### OUTPUT SPECIFICATIONS

| PARAMETER                              | CONDITION / NOTE            | MIN | TYP   | MAX | UNIT                    |
|----------------------------------------|-----------------------------|-----|-------|-----|-------------------------|
| Output Voltage Accuracy                |                             |     | 1     |     | %                       |
| Output Current                         |                             |     | 1     |     | A                       |
| Ripple & Noise (20MHz BW)              |                             |     | 1     | 3   | % of V <sub>OUTPP</sub> |
| Line Regulation                        | Outputs fully loaded        |     | 1     |     | %                       |
| Load Regulation                        | 0 FL to FL                  |     | 1     |     | %                       |
| OVP                                    |                             |     | 3.9   |     | V                       |
| Output Voltage Accuracy                |                             |     | 5     |     | %                       |
| Output Current                         |                             |     | 200   |     | mA                      |
| Ripple & Noise (20MHz BW)              |                             |     | 2     | 3   | % of V <sub>OUTPP</sub> |
| Line Regulation                        | Outputs fully loaded        |     | 2     |     | %                       |
| Load Regulation                        | 10% FL to FL                |     | 5     |     | %                       |
| OVP                                    |                             |     | 6.8   |     | V                       |
| Output Voltage Accuracy                |                             |     | 5     |     | %                       |
| Output Current                         |                             |     | 100   |     | mA                      |
| Ripple & Noise (20MHz BW)              |                             |     | 2     | 3   | % of V <sub>OUTPP</sub> |
| Line Regulation                        | Outputs fully loaded        |     | 2     |     | %                       |
| Load Regulation                        | 10% FL to FL                |     | 5     |     | %                       |
| OVP                                    |                             |     | 15    |     | V                       |
| Temperature Coefficient @ FL           |                             |     | ±0.02 |     | %/°C                    |
| Short Circuit Protection               | Continuous, Current limit   |     |       |     |                         |
| Short Circuit Restart                  | Automatic                   |     |       |     |                         |
| Transient Response (to within 1% of V) | 50% FL to 100% FL to 50% FL |     | 100   | 200 | μS                      |

### GENERAL SPECIFICATIONS

| PARAMETER                  | CONDITION / NOTE | MIN | TYP             | MAX | UNIT |
|----------------------------|------------------|-----|-----------------|-----|------|
| Efficiency                 |                  |     | 74              |     | %    |
| Isolation Voltage (1 min.) |                  | 500 | 1000            |     | Vdc  |
| Isolation Resistance       |                  |     | 10 <sup>9</sup> |     | Ω    |
| Isolation Capacitance      |                  |     | 300             |     | pF   |
| Switching Frequency        |                  | 108 | 125             | 130 | kHz  |

## ENVIRONMENTAL SPECIFICATIONS

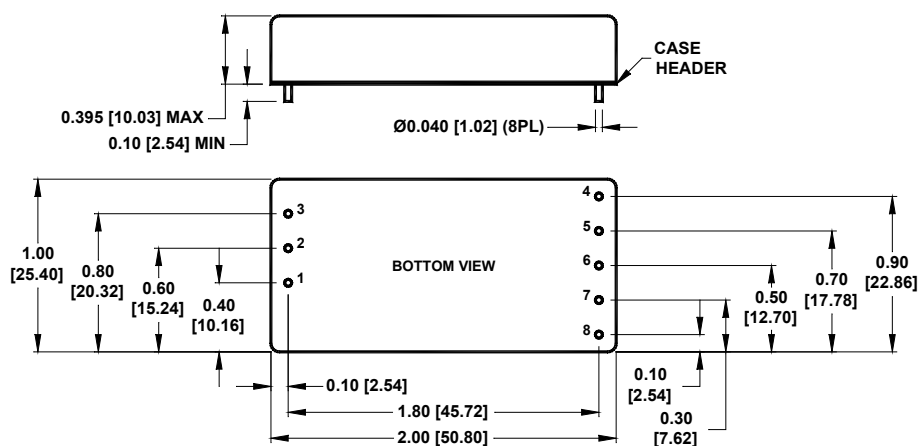
| PARAMETER                             | CONDITION / NOTE                         | MIN | TYP | MAX  | UNIT  |
|---------------------------------------|------------------------------------------|-----|-----|------|-------|
| Operating Temperature Range (Ambient) |                                          | -55 |     | +85  | °C    |
| Storage Temperature Range             |                                          | -60 |     | +125 | °C    |
| Derating                              | None required                            |     |     |      |       |
| Thermal Protection, Turn Off          | Junction temperature                     |     | 145 |      | °C    |
|                                       | Junction temperature                     |     | 115 |      | °C    |
| Thermal Hysteresis                    |                                          |     | 30  |      | °C    |
| Humidity                              | Up to 95% non-condensing                 |     |     |      |       |
| Cooling                               | Free air convection                      |     |     |      |       |
| MTBF                                  | per MIL-HNBK-217F (Ground benign, +25°C) |     | TBD |      | hours |

## PHYSICAL CHARACTERISTICS

| PARAMETER          | CONDITION / NOTE                          | MIN | TYP | MAX | UNIT |
|--------------------|-------------------------------------------|-----|-----|-----|------|
| Dimensions (L×W×H) | 2.00×1.00×0.395 in. (50.80×25.40×10.03mm) |     |     |     |      |
| Weight             | 1.04 oz. (30g)                            |     |     |     |      |
| Case Material      | Coated metal                              |     |     |     |      |
| Shielding          | Six-sided continuous                      |     |     |     |      |
| Case Connection    | IN                                        |     |     |     |      |

## MECHANICAL SPECIFICATIONS

in inches [mm]



| Pin | Function             |
|-----|----------------------|
| 1   | -V <sub>IN</sub>     |
| 2   | ON/OFF               |
| 3   | +V <sub>IN</sub>     |
| 4   | +3.3V <sub>OUT</sub> |
| 5   | -3.3V <sub>OUT</sub> |
| 6   | -10V <sub>OUT</sub>  |
| 7   |                      |
| 8   | +5V <sub>OUT</sub>   |