



# BD10014

## 10W HIGH-VOLTAGE DC/DC CONVERTER

Bipolar 100V<sub>OUT</sub>

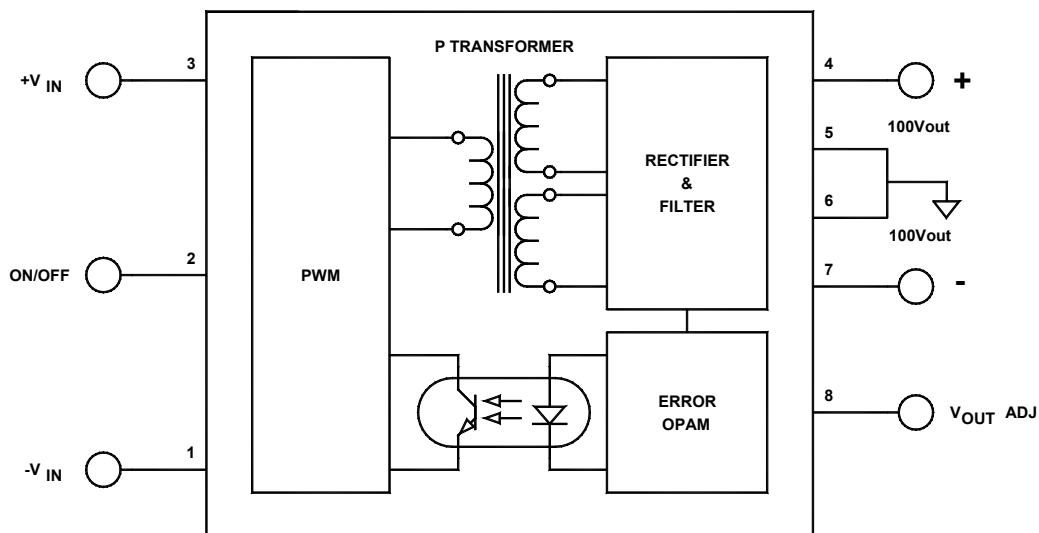
### Key Features

- 81% efficiency
- Input-to-output isolation
- Soft start
- Hot pluggable
- Short circuit and thermal protection
- Adjustable outputs
- 50μA off state current
- Wide input voltage range (36–75Vdc)



### Functional Description

The BD10014 is a 10W dual DC/DC converter designed for Mirco-Mirror Drivers. Input voltage range is 36V<sub>IN</sub> to 75V<sub>IN</sub>. Output can be adjusted from ±90V<sub>OUT</sub> to ±110V<sub>OUT</sub>.



Typical Block Diagram

## Electrical Specifications

### ABSOLUTE MAXIMUM RATINGS

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                 | 175% of Nominal input line |     |     |     |      |
| Output Short Circuit Duration | Continuous                 |     |     |     |      |
| Internal Power Dissipation    |                            |     |     | 3.4 | W    |

### INPUT SPECIFICATIONS

| PARAMETER                             | CONDITION / NOTE              | MIN | TYP | MAX | UNIT             |
|---------------------------------------|-------------------------------|-----|-----|-----|------------------|
| Input Voltage Range (2:1)             |                               | 36  | 48  | 75  | Vdc              |
| Input Filter <sup>1</sup>             | RC                            |     |     |     |                  |
| Reflected Ripple Current <sup>2</sup> |                               |     | 90  |     | mA <sub>PP</sub> |
| Reverse Voltage Protection            | Parallel Diode                |     | 5   |     | A                |
| On/Off                                | Reference to -V <sub>IN</sub> |     |     |     |                  |
| Voltage                               | Open                          |     | 10  |     | Vdc              |
| 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          | 7   | 10  | 15  | mS               |
| Startup Input Voltage                 |                               | 11  | 16  |     | Vdc              |

### OUTPUT SPECIFICATIONS

| PARAMETER                                              | CONDITION / NOTE            | MIN | TYP  | MAX   | UNIT |
|--------------------------------------------------------|-----------------------------|-----|------|-------|------|
| Voltage                                                |                             |     | ±100 |       | Vdc  |
| Current                                                |                             |     | 50   |       | mA   |
| Output Voltage Accuracy                                |                             |     | ±1   |       | %    |
| Voltage Balance (Dual Outputs)                         | Equally loaded outputs      |     | ±1   |       | %    |
| Ripple & Noise (20MHz BW)                              |                             |     | ±1   |       | %    |
| Line Regulation                                        |                             |     | ±1   |       | %    |
| Load Regulation                                        |                             |     | ±1   |       | %    |
| Temperature Coefficient @ FL                           |                             |     |      | ±0.02 | %/°C |
| Short Circuit Protection                               | Continuous, Current Limit   |     |      |       |      |
| Short Circuit Restart                                  | Automatic                   |     |      |       |      |
| Transient Response (to within 1% of V <sub>OUT</sub> ) | 50% FL to 100% FL to 50% FL |     | 100  |       | μS   |

### GENERAL SPECIFICATIONS

| PARAMETER                  | CONDITION / NOTE | MIN | TYP             | MAX | UNIT |
|----------------------------|------------------|-----|-----------------|-----|------|
| Efficiency                 |                  |     | 81              |     | %    |
| 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) | (For -55°C to +85°C, please contact factory) | -40 |                     | +75  | °C    |
| Storage Temperature Range             |                                              | -60 |                     | +105 | °C    |
| Derating                              | None required                                |     |                     |      |       |
| Humidity                              | Up to 95% non-condensing                     |     |                     |      |       |
| Cooling                               | Free-air convection                          |     |                     |      |       |
| MTBF                                  | per MIL-HNBK-217F (Ground benign, +25°C)     |     | 1.1×10 <sup>6</sup> |      | 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                                        |     |     |     |      |

<sup>1</sup> The RC input filter utilizes the  $R_{ON}$  of the series MOSFET transistor which is part of the hot pluggable circuit. The benefits of this RC filters are the reduction of inrush current by approximately 27dB and reflected ripple attenuation by 8dB. The penalty for the hot pluggability and the RC filter is 1% to 2% reduction of the converter's efficiency. See Figures 2 and 3.

<sup>2</sup> The maximum input current at any given input range measured at minimum input voltage is given as  $1.6 \cdot I_{NOMINAL}$ . Nominal input current is the typical value measured at the input of the converter under full-load room temperature and nominal input voltage (48Vdc).

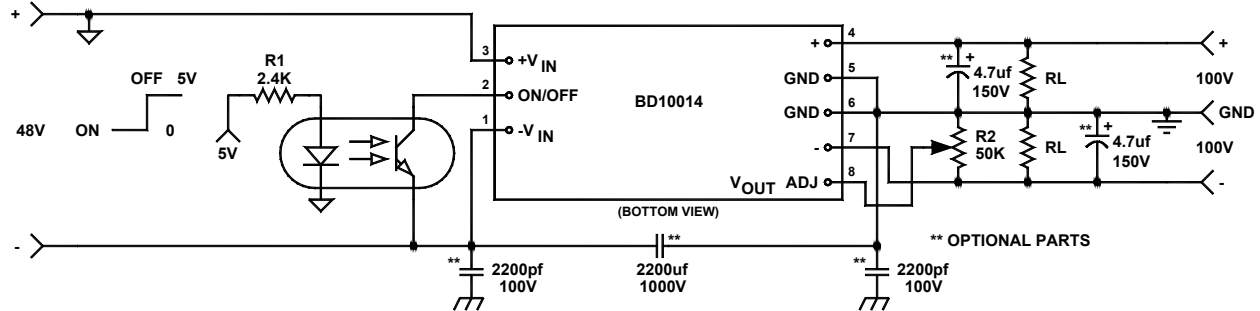
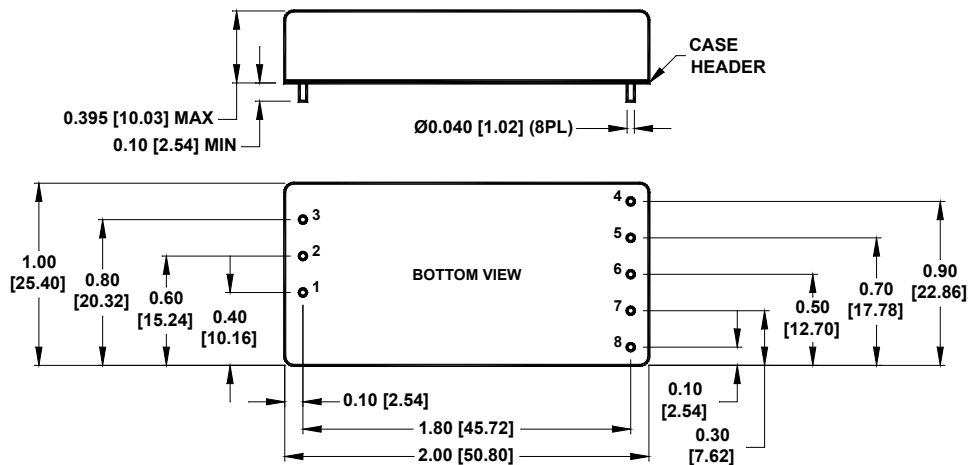


FIGURE 1. Dual connection diagram

## MECHANICAL SPECIFICATIONS

in inches [mm]



| Pin | Function                 |
|-----|--------------------------|
| 1   | $-V_{IN}$                |
| 2   | ON/OFF                   |
| 3   | $+V_{IN}$                |
| 4   | $+V_{OUT}$               |
| 5   | GND (CONNECT PIN 5 TO 6) |
| 6   | GND (CONNECT PIN 5 TO 6) |
| 7   | $-V_{OUT}$               |
| 8   | $V_{OUT\_ADJ}$           |

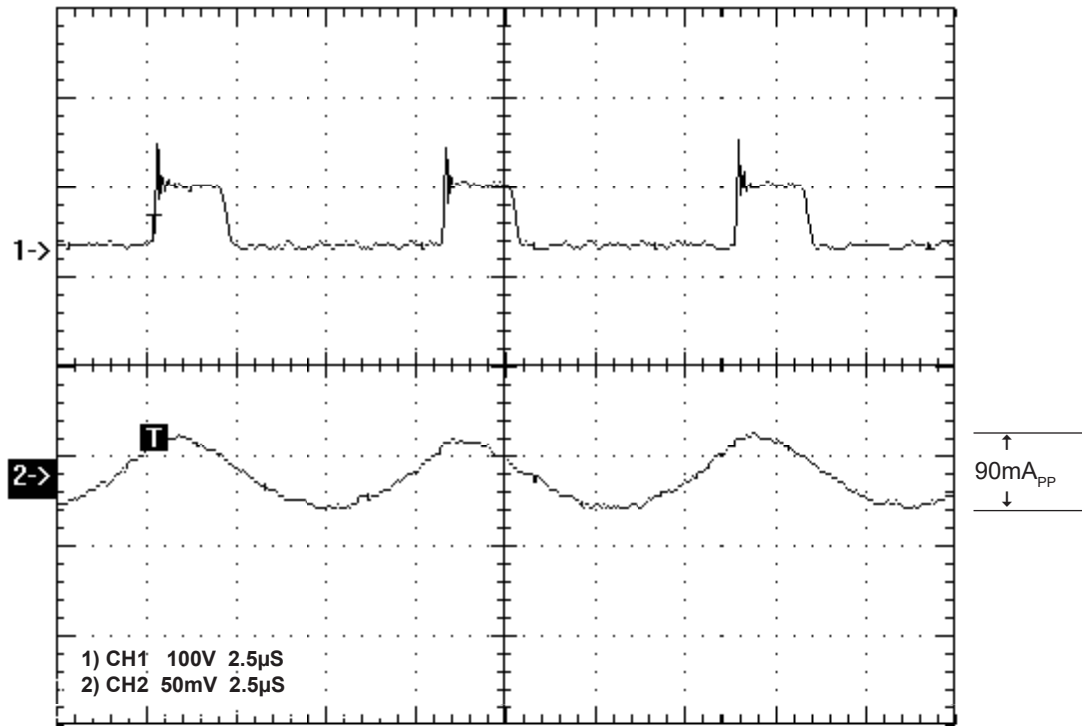


FIGURE 2A. (CH2) 10W reflected ripple *with* hot pluggable circuit,  $V_{IN}$  36V

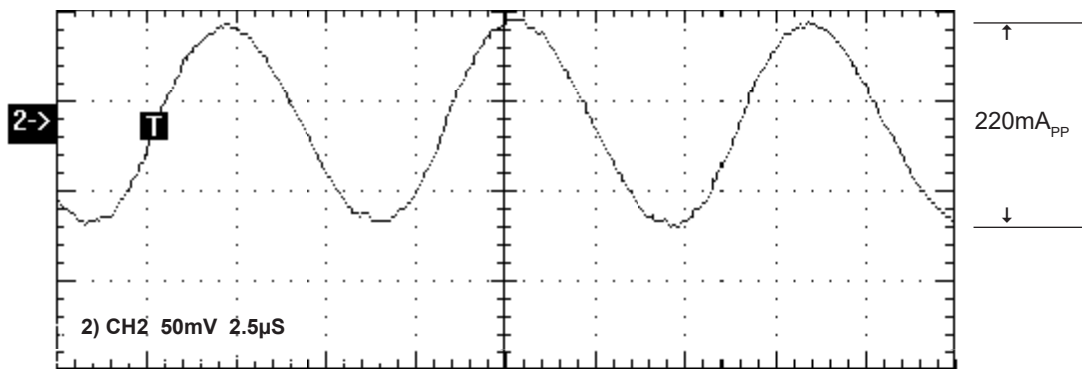


FIGURE 2B. (CH2) 10W reflected ripple *without* hot pluggable circuit

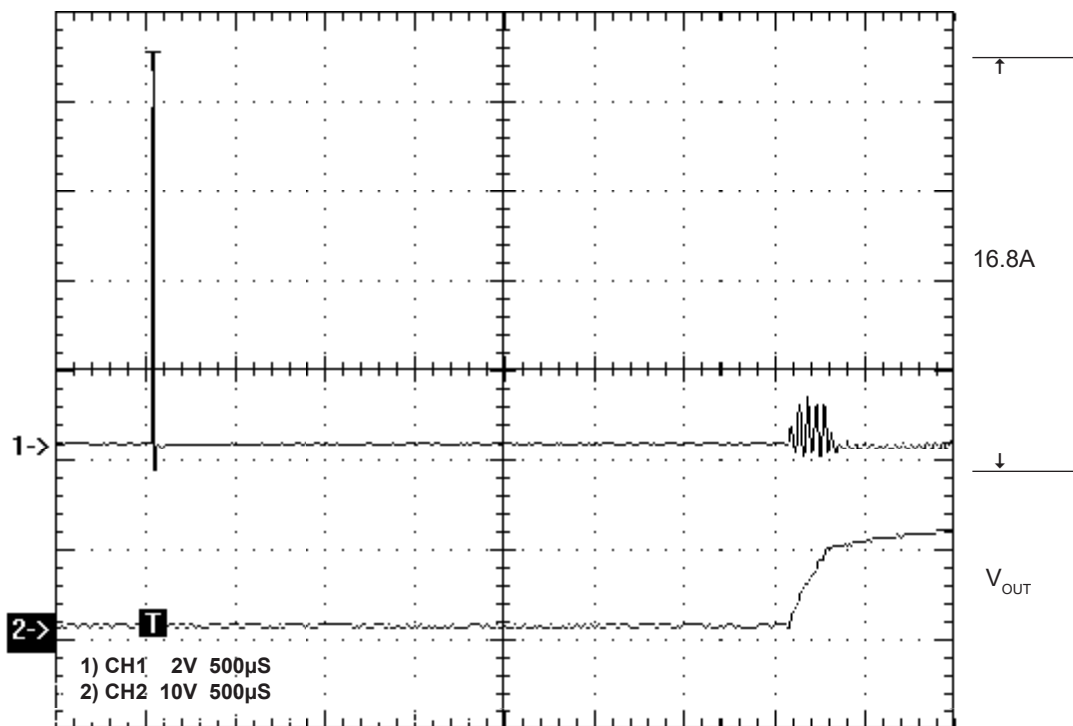


FIGURE 3A. (CH1) Inrush current *without* hot pluggable circuit ON  
 $V_{IN}$  48V, Current spike duration 5μS

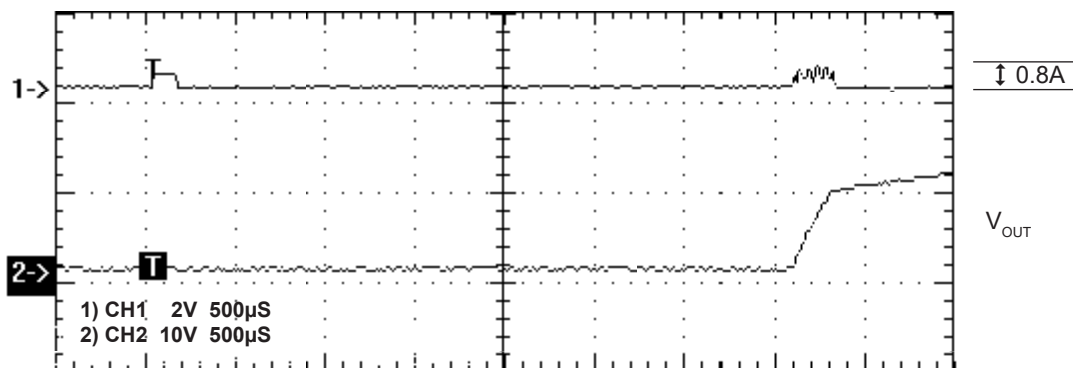


FIGURE 3B. (CH1) Inrush current *with* hot pluggable circuit ON