



BD15007

15W DUAL DC/DC CONVERTER
 3:1 Input Voltage Range, Dual Outputs
 2000Vdc Isolation

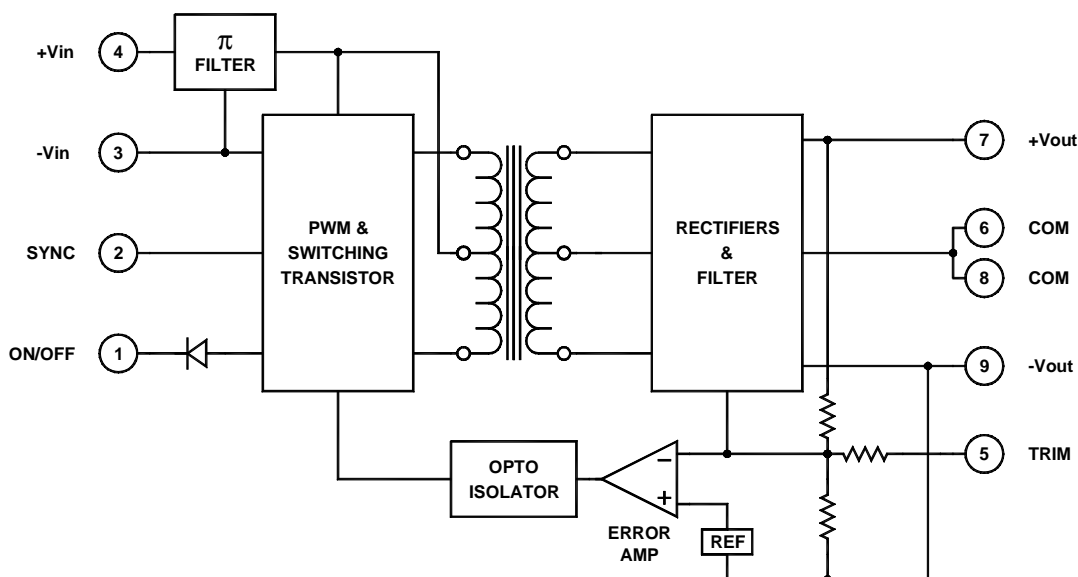
Key Features

- 3:1 input voltage range
- 80% efficiency
- Input-to-output isolation
- Soft start
- Short circuit protection
- 150 μ A off state current
- Multiple converter synchronization
- Dual isolated outputs
- Output overvoltage protection (OVP)



Functional Description

The BD15007 is a 15W dual DC/DC converter that accepts $24V_{IN}$ and produces $\pm 5V_{OUT}$. The converter offers 3:1 input voltage range, 400kHz switching frequency, forward topology and comes packaged in a 2x1x0.395-inch case. The converter is designed and tested for 2000Vdc input-to-output isolation.



Typical Block Diagram

Electrical Specifications

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

INPUT SPECIFICATIONS

| PARAMETER | CONDITION / NOTE | MIN | TYP | MAX | UNIT |
|----------------------------------|---|-----|-----|-----|-------------------|
| Input Voltage Range | | 10 | 24 | 30 | Vdc |
| No Load Input Current | | | 20 | | mA |
| Full Load Input Current | | | 780 | | mA |
| Input Startup Voltage | | 7 | | | Vdc |
| Undervoltage Shutdown | | | 8 | | Vdc |
| Input Filter | LC | | | | |
| Reflected Ripple | | | 120 | | mA |
| Reverse Polarity | External series-blocking diode | | | | |
| Input Surge Current (20µS Spike) | | | | 10 | A |
| Short Circuit Current Limit | | | 150 | | % I _{IN} |
| Off State Current | | | 150 | | µA |
| Remote ON/OFF Control | | | | | |
| Supply ON | Pin 1 Open (Open circuit voltage: 12V Max.) | | | | |
| Supply OFF | | 0 | | 0.8 | Vdc |
| Logic Input Reference | -Input for ON/OFF and SYNC | | | | |
| Logic Compatibility | TTL Open Collector or CMOS Open Drain | | | | |

OUTPUT SPECIFICATIONS

| PARAMETER | CONDITION / NOTE | MIN | TYP | MAX | UNIT |
|-------------------------------|--|-----|-------|-----|--------------------------------------|
| Output Voltage | | | ±5 | | Vdc |
| Output Voltage Accuracy | | | ±1 | | % |
| Output Voltage Adjustment | | | 5 | | % |
| Voltage Balance | Balanced loads | | | ±2 | % |
| Output Current | | | ±1500 | | mA |
| Minimum Load | 0% for Single output, 10% for all other models | | | | % of FL |
| Ripple & Noise | (See App. Note DC-003) | | 1 | 2 | %V _{PP} of V _{OUT} |
| Line Regulation | With balanced loads | | 3 | ±5 | % |
| Load Regulation* | | | ±1 | | % |
| Temperature Coefficient @ FL | | | 0.02 | | %/°C |
| Transient Response Time | 50% FL to FL to 50% FL | | 100 | 150 | µS |
| Short Circuit Protection | All outputs, by input current limiting | | | | |
| Turn On Delay with Soft Start | | | 2 | | mS |
| Output Overvoltage Protection | | | 130 | 150 | % of V _{OUT} |

* Maximum output current must not exceed 2 amps at either output.

GENERAL SPECIFICATIONS

| PARAMETER | CONDITION / NOTE | MIN | TYP | MAX | UNIT |
|---|---------------------------|------|-----------------|-----|------|
| Efficiency (at full power) | | | 80 | | % |
| Isolation Voltage (1 min.), Input to Output | 100% Tested in production | 2000 | | | Vdc |
| Isolation Resistance | | | 10 ⁹ | | Ω |
| Isolation Capacitance | | | 75 | | pF |
| Switching Frequency | | | 400 | | kHz |

ENVIRONMENTAL SPECIFICATIONS

| PARAMETER | CONDITION / NOTE | MIN | TYP | MAX | UNIT |
|--|--|-----|---------------------|------|----------------------|
| Operating Temperature, Industrial (Ambient) ² | See Figure 2 | -40 | | +71 | °C |
| Operating Temperature, Extended | | -55 | | +85 | °C |
| Storage Temperature Range | | -55 | | +125 | °C |
| Thermal Resistance | | | | 7.4 | °C/W _{DISS} |
| Maximum Operating Case Temperature | | | | 100 | °C |
| Derating | See Figure 2 | | | | |
| Humidity | Up to 95% non-condensing | | | | |
| Cooling | Free-air convection | | | | |
| EM/RFI | Six-sided continuous shielded metal case | | | | |
| MTBF | per MIL-HNBK-217F (Ground benign, +25°C) | | 1.1×10 ⁶ | | hours |

PHYSICAL CHARACTERISTICS

| PARAMETER | CONDITION / NOTE | MIN | TYP | MAX | UNIT |
|----------------------|---|-----|-----|-----|------|
| Dimensions (LxWxH) | 2.00x1.00x0.395 in. (50.80x25.40x10.03mm) | | | | |
| Weight | 1.06 oz. (30.3g) | | | | |
| Case Material | Coated metal | | | | |
| Shielding Connection | -Input Ground (Pin 3) | | | | |

EXTERNAL SYNCHRONIZATION

The converter can be synchronized to an external TTL or CMOS clock signal. Insert a 470pF to 1000pF ceramic capacitor between the driving clock signal and the SYNC pin (Pin 2) of the converter. The frequency of the signal must be between 390kHz

and 430kHz, with a duty cycle of 50% and an amplitude between 3Vdc minimum and 5Vdc typical. See Application Note DC-005: Synchronization.

EXTERNAL TRIMMING OF OUTPUT VOLTAGES

To trim the output voltage DOWN, connect a 1% 1/8W resistor between the + (plus) output and trim pin of the converter. To trim the output voltage UP, connect a 1% 1/8W resistor between the - (minus) output and trim pins of the converter. For UP/DOWN trimming capability, connect a 10kΩ potentiometer between the + and - output pins, with the wiper arm connected to the trim pin.

The trim resistors/potentiometer can be connected at the converter output pins or the load. However, if connected at the load,

the resistance of the runs becomes part of the feedback network which improves load regulation. If the load is some distance from the converter, the use of #20 gauge wire is recommended to avoid excessive voltage drop due to the resistance of the circuit paths.

See the following application notes:

DC-001: Testing Transient Response in DC/DC Converters

DC-004: Thermal Consideration for DC/DC Converters

TABLE 1. Minimum input operating voltage range

| % FL | Minimum Input Operating Voltage |
|------|---------------------------------|
| | 24V _{IN} |
| 10 | 7.0 |
| 25 | 8.5 |
| 50 | 8.8 |
| 75 | 9.0 |
| 100 | 9.5 |

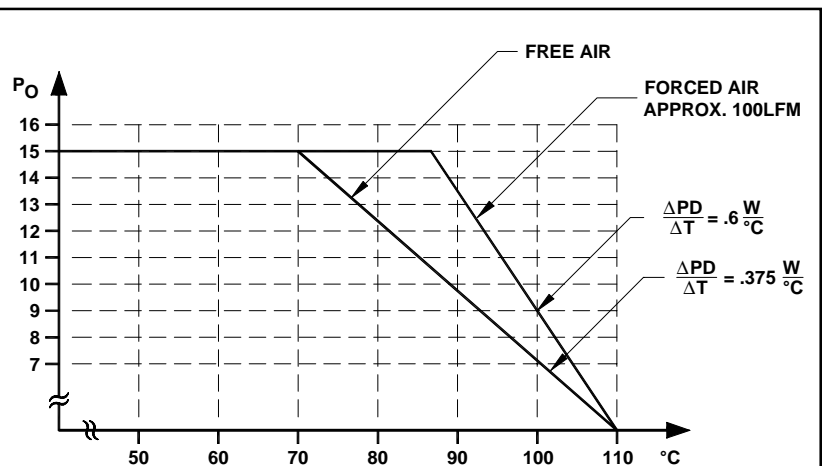


FIGURE 1. Worst case derating

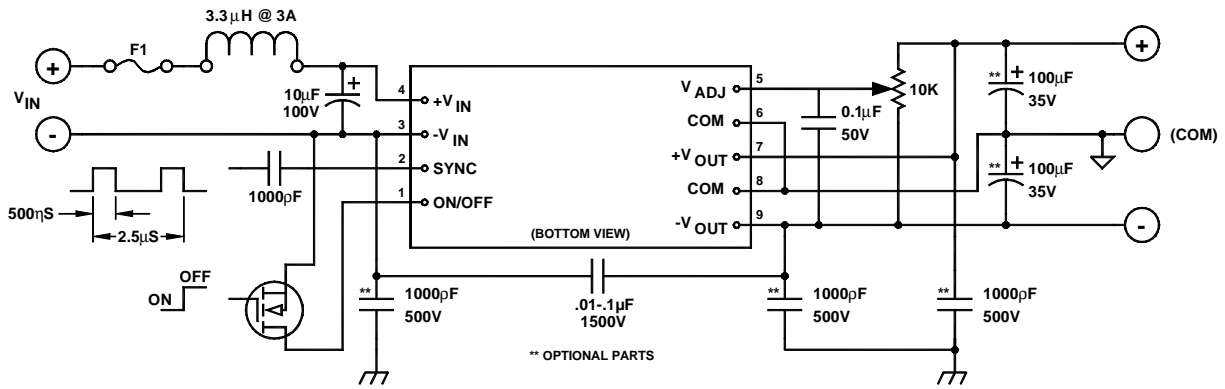
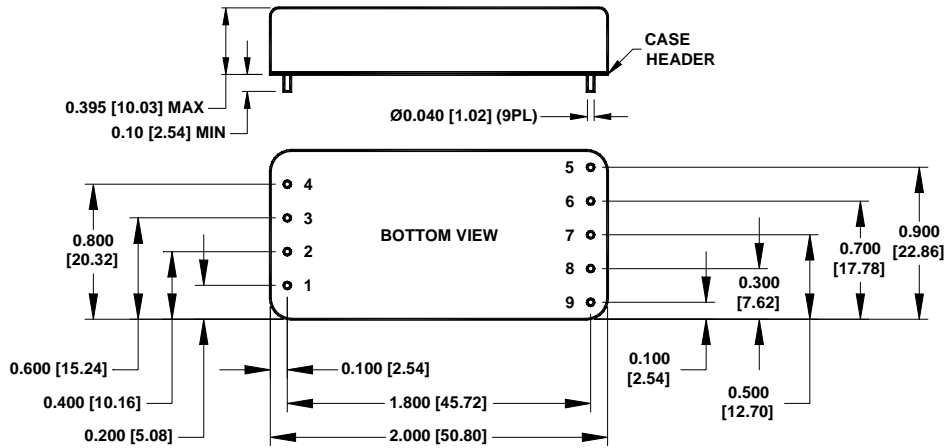


FIGURE 2. Typical connection diagram

MECHANICAL SPECIFICATIONS
in inches [mm]



| Pin | Function |
|-----|------------------|
| 1 | ON/OFF |
| 2 | SYNC |
| 3 | -V _{IN} |
| 4 | +V _{IN} |
| 5 | V _{ADJ} |
| 6 | GND |
| 7 | +OUTPUT |
| 8 | GND |
| 9 | -OUTPUT |