



# BD15011B

## 20W SINGLE DC/DC CONVERTER

36–75V<sub>IN</sub> 12V<sub>OUT</sub>@1.7A

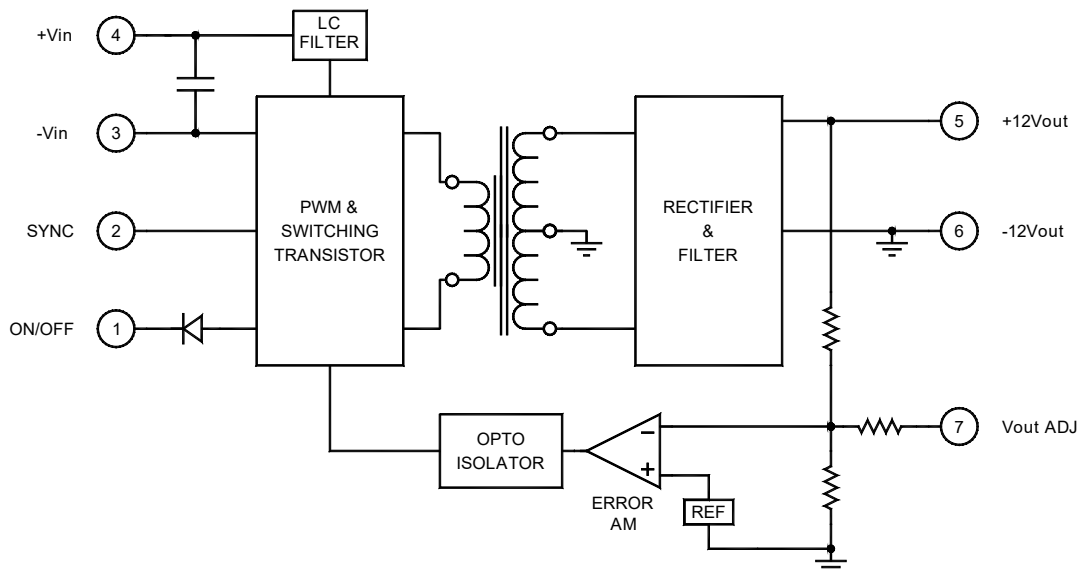
### Key Features

- 36–75Vdc input voltage range
- 85% efficiency
- Input-to-output isolation
- Soft start
- Short circuit protection
- 600μA off state current
- Multiple converter synchronization
- Input overvoltage protection (OVP)
- 300kHz switching frequency
- Six-sided shielding
- Adjustable output



### Functional Description

The BD15011B is a 20W single DC/DC converter that offers a 2:1 input voltage range and supplies 12V<sub>OUT</sub>@1.7A. Its switching frequency of 300kHz allows the converter to be synchronized to an external frequency of 310kHz or higher.



Typical Block Diagram

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

## Electrical Specifications

### INPUT SPECIFICATIONS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Input Voltage Range		36	48	75	Vdc
Input Startup Voltage	No Load	15			Vdc
Input Filter	LC				
Reverse Polarity	External series-blocking diode				
Reflected Ripple	$I_O = 1.25A, C_{IN} = 10\mu F$	80	100	200	$mA_{PP}$
No Load Input Current			10		mA
Full Load Input Current			495		mA
Input Surge Current (20 $\mu$ S Spike)				10	A
Short Circuit Current Limit			150		% $I_{IN}$
Off State Current			600		$\mu A$
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				
Sync, High	See External Synchronization	2		6	Vdc
Sync, Low	See External Synchronization	0		0.8	Vdc

### OUTPUT SPECIFICATIONS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Output Voltage		11.88	12.00	12.12	Vdc
Ripple & Noise			1	2	% $V_{PP}$ of $V_{OUT}$
Output Current			1.7		A
Line Regulation			$\pm 0.5$	$\pm 1$	%
Load Regulation			1	2	%
Temperature Coefficient @ FL			0.02		%/ $^{\circ}C$
Transient Response Time	50% FL to FL to 50% FL		100	150	$\mu S$
Short Circuit Protection	By input current limiting				
Turn On Delay with Soft Start			2	10	mS
Output Overvoltage Protection	Shunt zener	14	15	17	Vdc
Output Adjust Range		5			%

### GENERAL SPECIFICATIONS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Efficiency			85		%
Isolation Voltage (1 min.), Input to Output			1500		Vdc
Isolation Resistance			$10^9$		$\Omega$
Isolation Capacitance			500		pF
Switching Frequency			300		kHz

### ENVIRONMENTAL SPECIFICATIONS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Operating Temperature, Industrial (Ambient)	Industrial, See Figure 1	-40		+71	$^{\circ}C$
Storage Temperature Range		-55		+125	$^{\circ}C$
Thermal Resistance	$^{\circ}C$ per watt internally dissipated			7.4	$^{\circ}C/W_{DISS}$
Maximum Operating Case Temperature				100	$^{\circ}C$
Derating	See Figure 1				
Humidity	Up to 95% non-condensing				
Cooling	Free-air convection				
EMI/RFI	Six-sided continuous shielded metal case				
MTBF	per MIL-HNBK-217F (Ground benign, +25 $^{\circ}C$ )		$1.1 \times 10^6$		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	1.06 oz. (30.3g)				
Case Material	Coated metal				
Shielding Connection	-Input Ground (Pin 3)				

**EXTERNAL TRIMMING OF OUTPUT VOLTAGES (SINGLE AND DUAL ONLY)**

To trim the output voltage DOWN, connect a 5% 1/4W resistor between the + (positive) output and trim pin of the converter. To trim the output voltage UP, connect a 5% 1/4W resistor between the - (negative) 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.

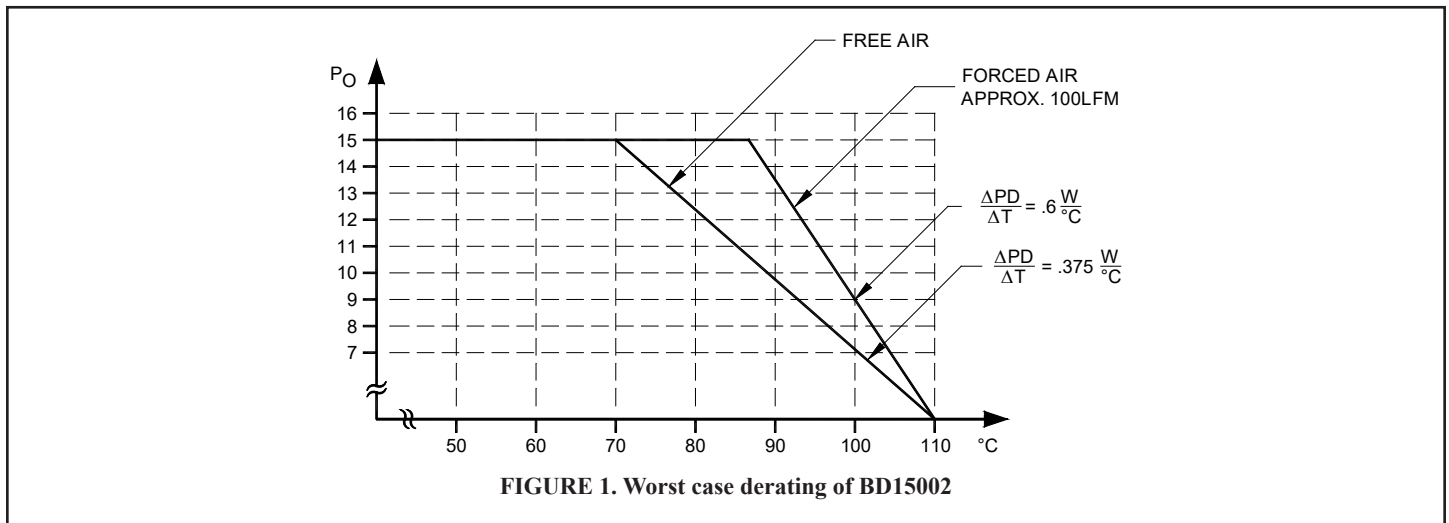
See our application notes:

- DC-001: Testing Transient Response in DC/DC Converters
- DC-004: Thermal Consideration for DC/DC Converters

**EXTERNAL SYNCHRONIZATION**

The converters can be synchronized to an external TTL or CMOS clock signal. Insert a 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 310kHz and 360kHz, with a duty cycle of 50% and an amplitude between 3Vdc minimum and 5Vdc typical. See Application Note DC-005: Synchronization.



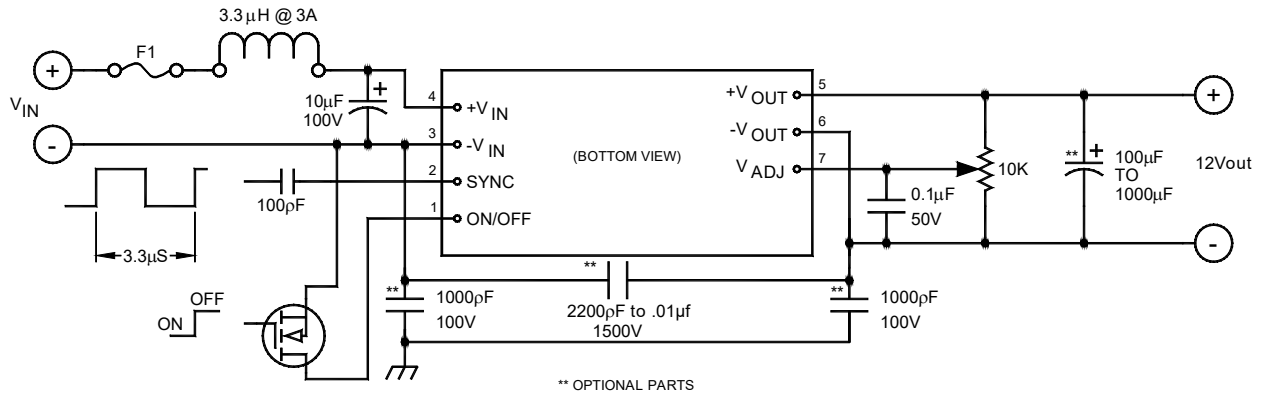


FIGURE 2. Typical connection diagram

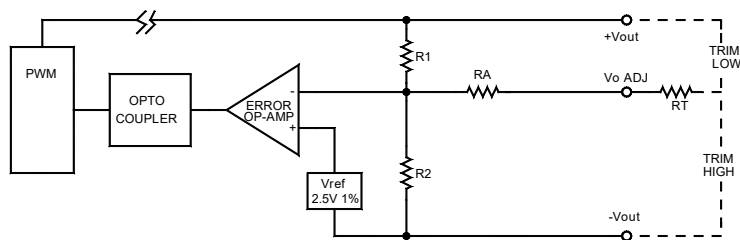


FIGURE 3. Output control circuit

To trim  $V_o$  higher to  $V_o'$ , where  $V_o$  is the actual measured value:

$$RT = \frac{R1 \cdot V_{REF}}{V_o - V_o'}$$

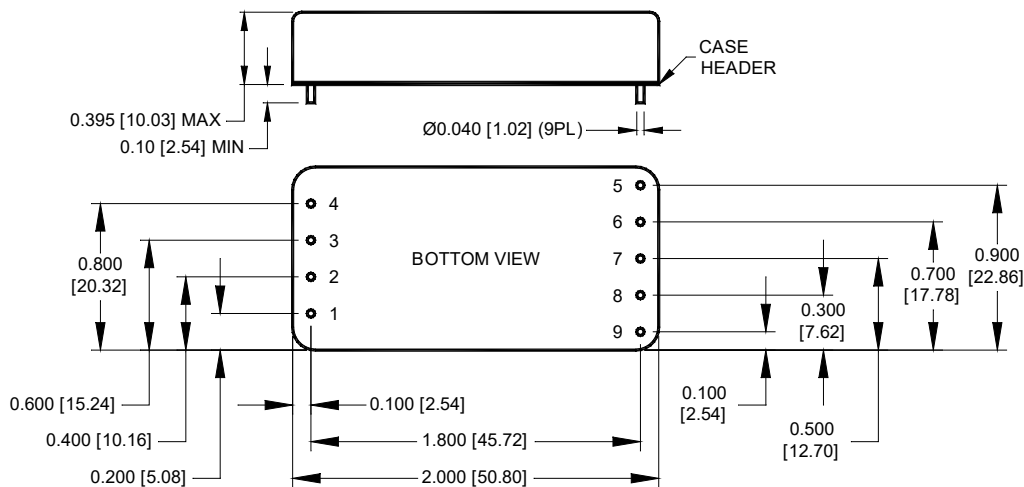
To trim  $V_o$  lower to  $V_o''$ , where  $V_o$  is the actual measured value:

$$RT = \left[ \left( \frac{R_1 \cdot V_{REF}}{R_2(V_o - V_o'')} - R1 \right) RA \right]$$

Resistor	Value (K)
R1	9.53
R2	2.49
RA	15

### MECHANICAL SPECIFICATIONS

in inches [mm]



Pin	Function
1	ON/OFF
2	SYNC
3	-V <sub>IN</sub>
4	+V <sub>IN</sub>
5	+OUTPUT
6	-OUTPUT
7	V <sub>ADJ</sub>
8	No Pin
9	No Pin