beta dyne

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
- 150µA off state current
- Multiple converter synchronization
- Dual isolated outputs
- Output overvoltage protection (OVP)

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BD15007
MADE IN USA

Functional Description

The BD15007 is a 15W dual DC/DC converter that accepts $24V_{IN}$ and produces $\pm5V_{OUT}$. The converter offers 3:1 input voltage range, 400kHz switching frequency, forward topology and comes packaged in a 2×1×0.395-inch case. The converter is designed and tested for 2000Vdc input-to-output isolation.
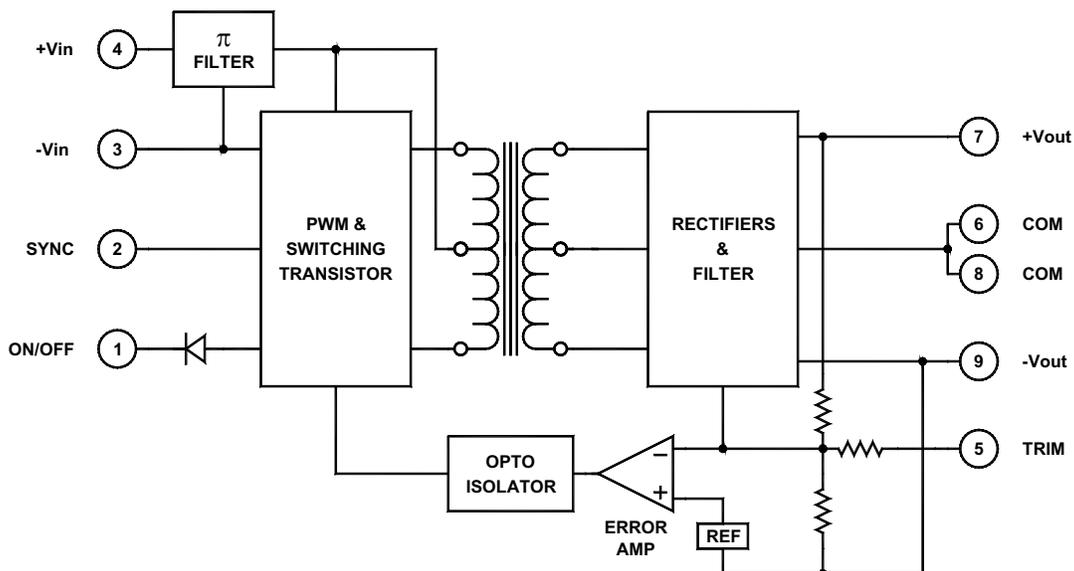
Typical Block Diagram

Electrical Specifications
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			700		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 Colllector 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			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)	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				
EMI/RFI	Six-sided continuous shielded metal case				
MTBF	per MIL-HNBK-217F (Ground benign, +25°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 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 convertor. 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
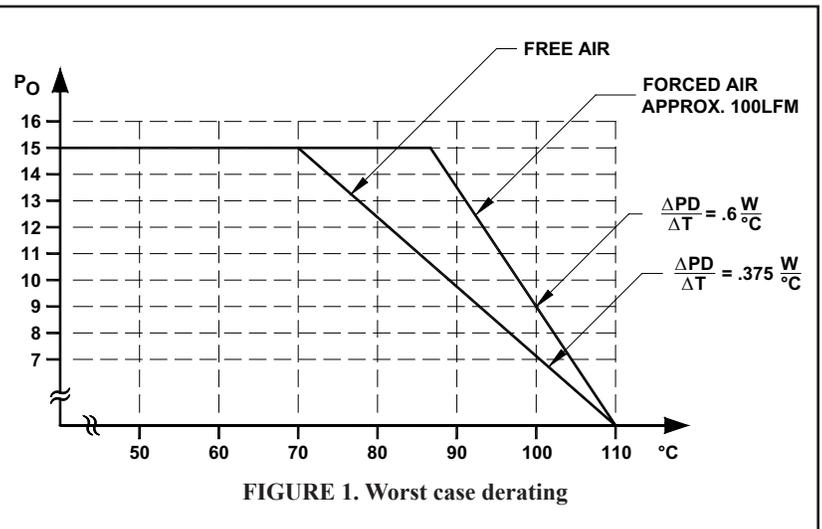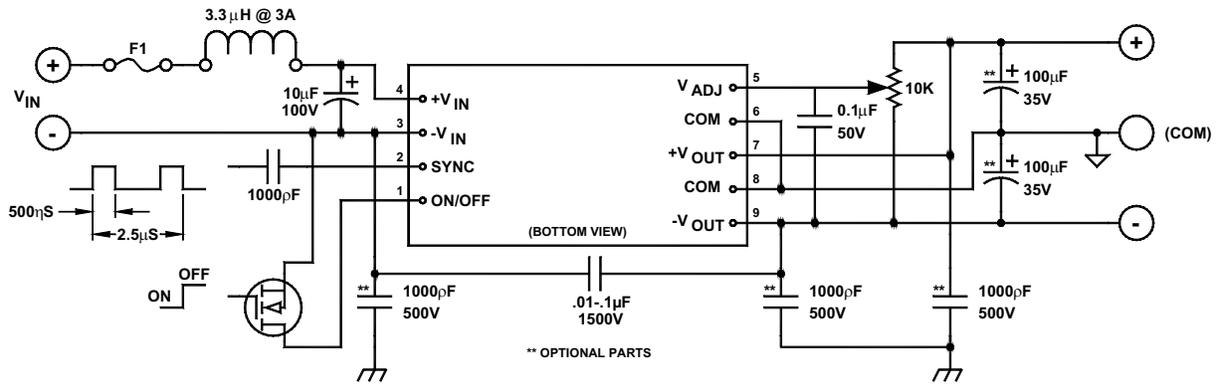
FIGURE 2. Typical connection diagram

MECHANICAL SPECIFICATIONS
in inches [mm]
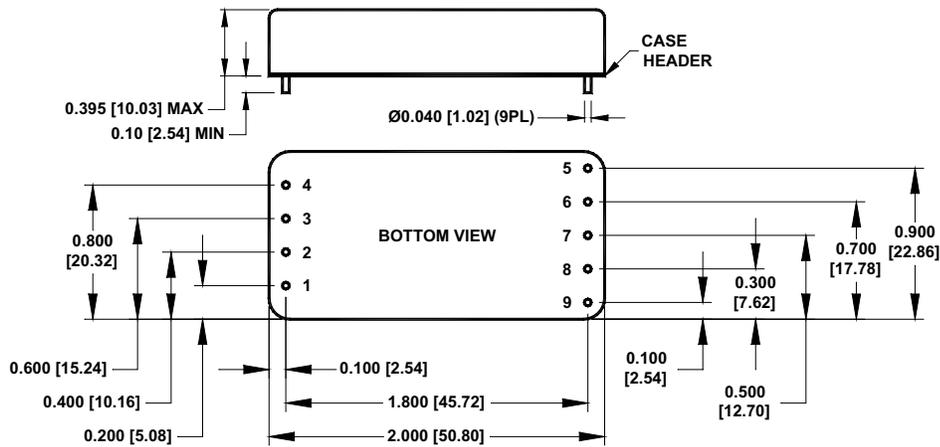
Pin	Function
1	ON/OFF
2	SYNC
3	$-V_{IN}$
4	$+V_{IN}$
5	V_{ADJ}
6	GND
7	+OUTPUT
8	GND
9	-OUTPUT