

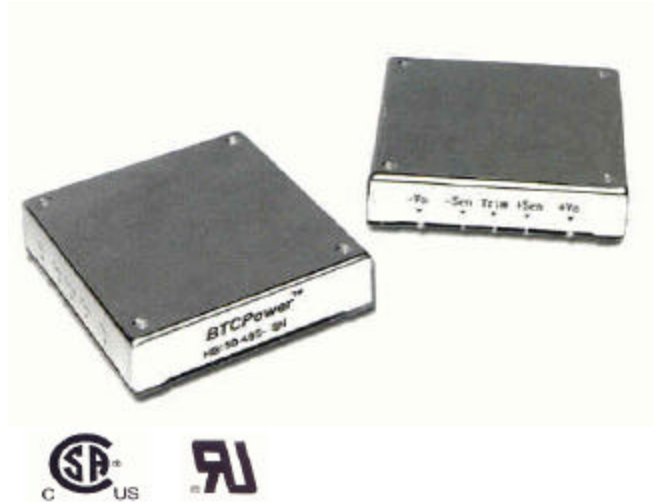
HB75D-24 Series

24Vin

Dual Output 15/15A Half Bricks

Description

The HB75D-24 series of low cost DC/DC converters offer the different current levels and are comparable to existing quarter-bricks. With a wide input voltage range of 18-36V they are available with Dual output voltages of either 5.0/3.3 or 5.0/2.5 Volts. All models feature an input filter, output overvoltage and overtemperature protection, output current limiting and short circuit protection. The unique frame construction with aluminum heat spreader design achieves efficient heat transfer with no hot spots. The use of patented Flat Matrix Transformer technology and other patent-pending design concepts facilitate maximum power delivered. The converters combine creative design concepts with highly derated power devices to achieve very high reliability, high performance and offer a low cost solution to systems designers that are challenged to maximize power and minimize board space.



Features

- Delivers up to 15/15A in Half Brick
- High efficiency patented topology
- Low profile of only 0.50 inch
- 5.0/3.3 and 5.0/2.5 output modules
- 100V/100ms Input transient capability
- -40°C to +85 °C ambient operation
- Meets Basic Insulation requirements of EN60950
- UL 1950 recognized, CAN / CSA C22.2 No. 950-95 Certified, and TUV EN60950 (pending)
- Meets conducted limits of FCC Class B and CEI IEC61204-3 Class B with external filter

Applications

- Telecommunications
- Data Communications
- Wireless Communications
- Networking Gear
- Servers, Switches and Data Storage
- Semiconductor Test Equipment
- Distributed Power Architecture

Specification Summary

- 5.0V/15A + 3.3V/15A, 5.0V/15A + 2.5V/15A
- Tight output regulation, typical $\pm 2\%$
- No minimum load required
- Ripple & Noise (20Mhz BW) 100 mV (pk-pk) or 2% (pk-pk)
- Wide input operating range 18-36V
- On/Off pin and remote sense
- Output adjustment +/-10% range
- 1500V, 10M input-to-output isolation
- Frame construction with heat spreader for low temperature rise
- Output overcurrent and overvoltage protection
- Over Temperature protection
- Input Under voltage protection
- MTBF of 1,600,000 hours @ 50°C (Bellcore)

Part Number and Selection Information

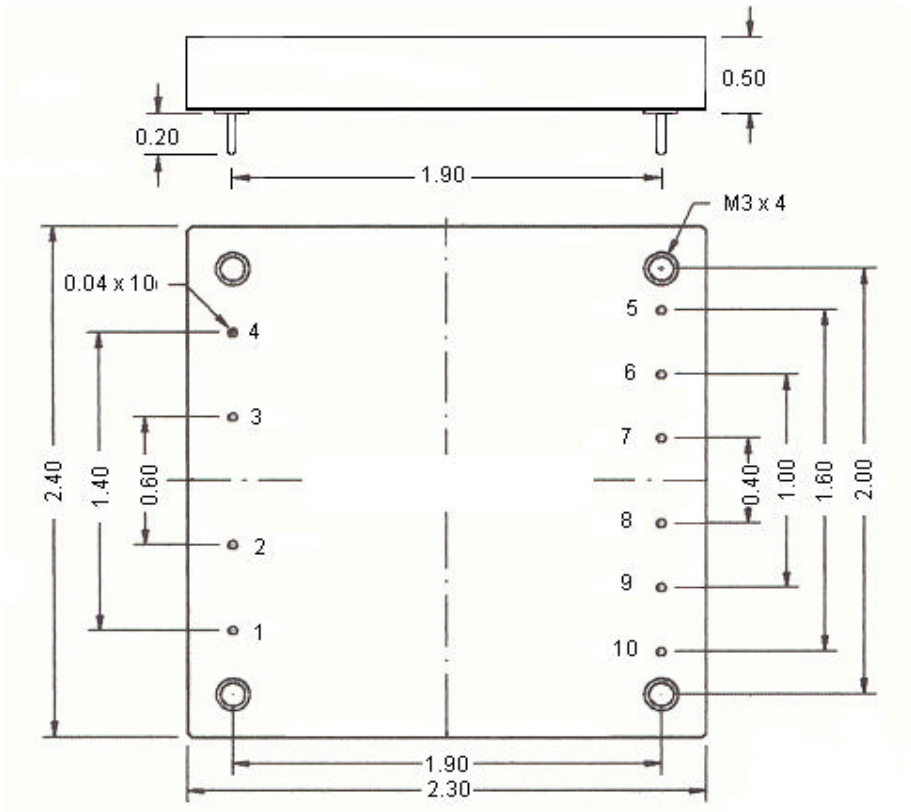
Model Part Number		Input				Output		Efficiency 75% Load (%)
		Voltage (Volts)		Current (A)		Voltage (Volts)	Current (Amps)	
Positive Logic	Negative Logic	Nominal	Range	No load	Full load			
HB75D-24-0533P	HB75D-24-0533N	24	18-36	0.1	3.76	5.0/3.3	15/15	83
HB75D-24-0525P	HB75D-24-0525N	24	18-36	0.1	3.76	5.0/2.5	15/15	83

Typical at Ta= +25 °C under nominal line voltage and 75% load conditions, unless noted.

Consult factory for other output voltage configurations and optional accessories such as heatsinks and filters.

Outline Information and Pin-out

Pin Connection	
Pin#	Function
1	Vin +
2	On/Off
3	Case
4	Vin -
5	Vout 2 +
6	Vout 2 -
7	Vout 2 Trim
8	Vout 1 +
9	Vout 1 -
10	Vout 1 Trim



All dimensions are in inches [mm]
 All other pins are all dia. 0.040 [1.02]
 Pin material: Brass
 Pin finish: Tin/Lead plated
 Heat spreader (baseplate) material:
 Aluminum
 Weight: 60.5g

The information and specifications contained in this brief are believed to be accurate and reliable at the time of publication. Specifications are subject to change without notice. Refer to product specification sheet for performance characteristics and application guidelines.

Electrical Specification

Typical test data at Ta=25°C, Vin=24V unless otherwise noted.

PARAMETER	NOTES	MIN	TYP	MAX	UNIT
Absolute maximum rating					
Input voltage		0		40	V
Operating case temperature		-40		100	°C
Storage temperature		-40		105	°C
Humidity				95	%
Input characteristics					
Operating input voltage range		18		36	V
Turn on voltage threshold		17		17.5	V
Turn off voltage threshold		16		16.5	V
Off converter input current	24Vin		5		mA
Output characteristics					
Output voltage					
HB75D-24-0525P or HB75D-24-0525N	18-36Vin, no load to full load	2.47	2.50	2.53	V
		4.85	5.00	5.15	V
HB75D-24-0533P or HB75D-24-0533N	18-36Vin, no load to full load	3.27	3.30	3.33	V
		4.85	5.00	5.15	V
Output current					
HB75D-24-0525P or HB75D-24-0525N	2.5Vo	0		15	A
	5Vo	0		15	A
HB75D-24-0533P or HB75D-24-0533N	3.3Vo	0		15	A
	5Vo	0		15	A
Output voltage trim range	Percentage of normal output	-5		+5	%
Output voltage ripple and noise	20Mz bandwidth, 100% Load, 24Vin		100	150	mV(pk-pk)
Output over power protection		110	120	140	%
Over-voltage protection			130	150	%
Over-temperature protection			105	110	°C
Temperature coefficient				±0.05	%/°C
Output dynamic characteristics					
Startup time	5% to 95% of the output voltage			40	ms
Transient recovery time	25% load change (2.0A/us)			800	µs
Transient Peak	25% load change (2.0A/us)			400	mV
Efficiency					
HB75D-24-0525P or HB75D-24-0525N			83 (2)		%
HB75D-24-0533P or HB75D-24-0533N			83 (2)		%
Isolation characteristics					
Isolation voltage(primary to secondary)	1minute		1500		VDC
Isolation voltage (primary to case)	1minute		1000		VDC
Isolation voltage (secondary to case)	1minute		500		VDC
Isolation resistance	500VDC, Primary to secondary	10			MΩ

Basic operation and functions

The **HB75D family** uses planar transformer technology to achieve high output current. The whole unit switches at the fixed frequency for a predictable EMI performance. The **HB75D Brick** has many standard controls and protection functions.

Input Power (pin1, pin4)

Input power $V_{in}(+)$ must be connected to Positive input voltage pin1; Input power $V_{in}(-)$ must be connected to Negative input voltage pin4.

Output Power 1 (pin8, pin9)

Output power $V_{out} 1(+)$ must be connected to Positive output voltage pin8; Output power $V_{out} 1(-)$ must be connected to Negative output voltage pin9.

Output Power 2 (pin5, pin6)

Output power $V_{out} 2(+)$ must be connected to Positive output voltage pin5; Output power $V_{out} 2(-)$ must be connected to Negative output voltage pin6.

On/Off (pin 2)

Permits the user to maintain unit On/Off, in order to properly sequence different power supplies and reduce power consumption during the standby condition. There are two remote control options available, positive logic and negative logic is referenced to $V_{in}(-)$, and typical connections are shown in Fig 1.

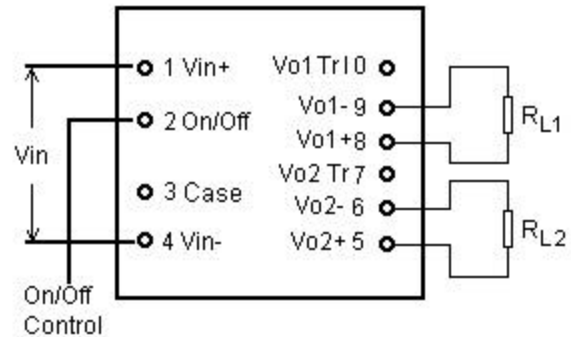


Fig. 1: Typical Circuit for On/Off Function

Pin 2 is the "Enable" pin, connecting a TTL compatible pin. A TTL control signal to this pin,

according to the specification, will turn the unit on or off.

The positive logic version turns on when pin 2 is at logic high, and turns off when pin 2 is at logic low. The unit is on when pin 2 is left open.

The negative logic version turns on when pin 2 is at logic low and turns off when pin 2 is at logic high. The pin 2 can be directed to $V_{in}(-)$, to enable automatic turn on to the unit without the need of an external control signal.

Output Voltage Trim (pin 7)

Permits the user to adjust the output voltage up or down to achieve the custom voltage or to make the output voltage margining. The adjustment range is from + 5% to -5%.

Output voltage can be adjusted up or down, by connecting the Rtrim-up or Rtrim-down resistor as shown. Rtrim-up makes the output voltage go up to 5%; and the Rtrim-down makes the output voltage go down to 5%.

Leave Trim pin (Pin7, 10) open for normal output voltage.

When trimming up, care must be taken, not to exceed the unit OVP threshold. A typical circuit is shown in Fig. 3.

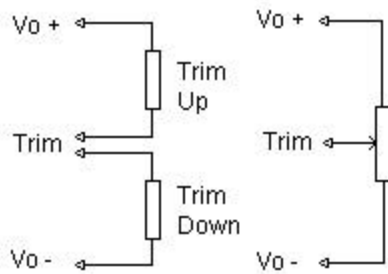


Fig 3. Trim Up / Down Output Voltage Circuit

Protection Features**Input Under-voltage lockout (IUV)**

Input under voltage (IUV) is standard with the HB unit. The unit will shut down when the input voltage drops below a threshold, and the unit will turn on when the input voltage goes to the upper threshold.

The hysteric voltage of the under voltage protection is 0.5V, normally from the 17V to 16.5V range.

Output Over-current Protection (OCP)

The unit will shut down when the over current or short circuit condition exists.

Once the OCP happens, the unit has shut down. The attempted restart will continue indefinitely

until the over current or short circuit condition is removed. When OCP happens, the output voltage drops below 1.1V.

Input voltage has almost no effect on the current limit point.

Output Over-voltage Protection (OVP)

The unit will shut down when the output voltage exceeds the over voltage threshold.

If the output voltage across Vout(+) (pin9) and Vout(-) (pin5) exceeds the threshold of the OVP circuitry, the unit has shut down which is caused by an OVP circuit, and the unit will never restart, and the output voltage is below 0.5V.

Over Temperature Protection (OTP)

The unit will shut down when the base plate temperature exceeds the protection threshold.

The unit will shut down under the base plate temperature over a 105°C condition to protect the unit from overheating. The OTP circuit will turn the unit off when OTP happens. Once the unit has shut down, it will restart at the cycle when the base plate temperature goes down.

Application information

Input Source Impedance

The unit has been designed to be stable with no external capacitors when used in a low inductance input and output circuit.

However in many applications, the inductance with the distribution from the power source to the input of the unit can affect the stability of the unit. The addition of 100uF electrolytic capacitor with an $Esr < 1\Omega$ (at 100kHz) across the input can ensure the stability of the unit. Also in many applications, the user has to use decoupling capacitors at the output load, to ensure the hold up time for the load.

Safety Requirements and Considerations

The unit meets the American and International safety regulatory requirement UL1950. Basic insulation is also provided between the input side and the output side.

To meet safety agencies requirements, an input line fuse must be used external to the unit. An 8A fuse or less with a normal blow rate must be used to meet the safety agencies requirements. A minimum 42LFM airflow should also be provided if the unit is intended to operate at full power without heatsink.

If the input source is non-SELV (ELV or a hazardous voltage greater than 60 Vdc and less than or equal to 75 Vdc), for the unit output to be considered meeting the requirements of safety extra low voltage (SELV), all of the following must be met:

- The input source is to be provided with reinforced insulation from any hazardous voltage, including the ac main.
- The input pins of the unit are not operator accessible.
- For whole system, for safety agencies requirements, and for the combination of the unit's input side (primary side) and the unit's output side (secondary side), verify that under a single fault, hazardous voltages do not appear at the unit's output side (secondary side).
- Never ground either of the input pins of the unit without grounding one of the output pins. This may allow a non-SELV voltage to appear between the output pin and ground.