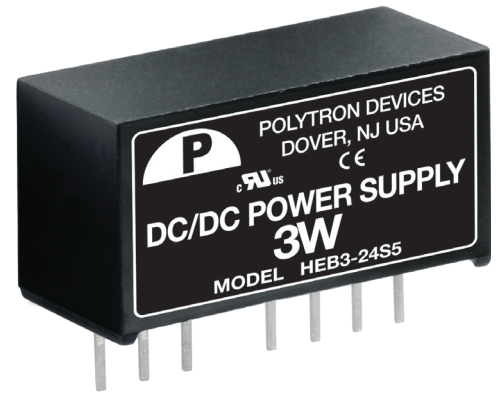


## DC-DC CONVERTERS

### 4:1 WIDE INPUT RANGE, UP TO 3 WATTS

#### INDUSTRIAL APPLICATIONS

#### HEB3 SERIES



#### FEATURES

- 4:1 Extra Wide Input Range
- Extra Wide Operating Temp. Range: -40 to +105°C
- 1600Vdc Isolation Voltage
- No Minimum Load Requirement
- High Efficiency Up to 83%
- Remote ON/OFF
- Short Circuit Protection
- Under Voltage Protection
- Meets IEC/UL/EN60950-1
- RoHS and REACH Compliant
- CE Marked

#### SELECTION GUIDE (SINGLE) All specifications are typical at nominal input, full load and 25°C, unless otherwise noted.

Input Voltage Range Vdc	Output Voltage Vdc	Output Current at Full Load mA	Input Current at No Load mA	Efficiency %	Model Number	Maximum Capacitor Load µF
4.5 - 18	3.3	700	35	75	HEB3-12S33	4400
4.5 - 18	5	600	40	79	HEB3-12S5	2200
4.5 - 18	9	333	40	81	HEB3-12S9	1300
4.5 - 18	12	250	40	82	HEB3-12S12	1000
4.5 - 18	15	200	40	83	HEB3-12S15	820
4.5 - 18	24	125	40	82	HEB3-12S24	470
9 - 36	3.3	700	20	76	HEB3-24S33	4400
9 - 36	5	600	20	80	HEB3-24S5	2200
9 - 36	9	333	20	81	HEB3-24S9	1300
9 - 36	12	250	25	83	HEB3-24S12	1000
9 - 36	15	200	25	83	HEB3-24S15	820
9 - 36	24	125	25	81	HEB3-24S24	470
18 - 75	3.3	700	13	74	HEB3-48S33	4400
18 - 75	5	600	13	80	HEB3-48S5	2200
18 - 75	9	333	13	81	HEB3-48S9	1300
18 - 75	12	250	13	82	HEB3-48S12	1000
18 - 75	15	200	13	83	HEB3-48S15	820
18 - 75	24	125	13	82	HEB3-48S24	470

**SELECTION GUIDE (DUAL)** All specifications are typical at nominal input, full load and 25°C, unless otherwise noted.

Input Voltage Range Vdc	Output Voltage Vdc	Output Current at Full Load mA	Input Current at No Load mA	Efficiency %	Model Number	Maximum Capacitor Load $\mu$ F
4.5 - 18	$\pm$ 5	$\pm$ 300	40	80	HEB3-12-5	$\pm$ 1200
4.5 - 18	$\pm$ 12	$\pm$ 125	40	82	HEB3-12-12	$\pm$ 520
4.5 - 18	$\pm$ 15	$\pm$ 100	50	81	HEB3-12-15	$\pm$ 440
9 - 36	$\pm$ 5	$\pm$ 300	20	79	HEB3-24-5	$\pm$ 1200
9 - 36	$\pm$ 12	$\pm$ 125	25	81	HEB3-24-12	$\pm$ 520
9 - 36	$\pm$ 15	$\pm$ 100	25	81	HEB3-24-15	$\pm$ 440
18 - 75	$\pm$ 5	$\pm$ 300	13	80	HEB3-48-5	$\pm$ 1200
18 - 75	$\pm$ 12	$\pm$ 125	13	82	HEB3-48-12	$\pm$ 520
18 - 75	$\pm$ 15	$\pm$ 100	13	82	HEB3-48-15	$\pm$ 440

Input Specifications			Output Specifications		
Operating input voltage range, Vdc	4.5 Min., 12 Typ., 18 Max.	12Vin(nom)	Voltage accuracy, %	$\pm$ 1	
	9 Min., 24 Typ., 36 Max.	24Vin(nom)			
	18 Min., 48 Typ., 75 Max.	48Vin(nom)			
Start up voltage, Vdc	4.5 Max.	12Vin(nom)	Line regulation, %	$\pm$ 0.2	Low Line to High Line at Full Load
	9 Max.	24Vin(nom)			
	18 Max.	48Vin(nom)			
Shutdown voltage, Vdc	2 Min., 3 Typ., 4 Max.	12Vin(nom)	Load regulation, %	$\pm$ 1	No Load to Full Load, Single
	6 Min., 7 Typ., 8 Max.	24Vin(nom)			
	13 Min., 15 Typ., 17 Max.	48Vin(nom)			
Start up time, ms		Constant resistive load		$\pm$ 0.5	10% load to 90% load, Single
	10 Typ., 20 Max.	Power up			
	10 Typ., 20 Max.	Remote ON/OFF			
Input surge voltage, Vdc		1 second, Max.	Cross regulation, %	$\pm$ 5	Asymmetrical load 25%/100%FL, Dual
	25 Max.	12Vin(nom)			
	50 Max.	24Vin(nom)			
Input filter		Capacitor type	Ripple and noise, mVp-p	75 Typ.	Measured by 20MHz bandwidth
		DC-DC ON			
		DC-DC OFF, Ctrl pin applied current via 1k $\Omega$			
Remote ON/OFF	Open or high impedance	DC-DC ON	Temperature coefficient, %/°C	$\pm$ 0.02	
	2 Min., 3 Typ., 4 Max.	DC-DC OFF, Ctrl pin applied current via 1k $\Omega$			
	2.5 Typ.	Remote off input current			
			Transient response recovery time, $\mu$ s	500 Typ.	25% load step change
			Over load protection, %	130 Min., 170 Typ., 230 Max.	% of lout rated; Hiccup mode
			Short circuit protection	Continuous, automatic recovery	

### General Specifications

Isolation voltage, Vdc	1 minute	Input to Output	1600 Min.
Isolation resistance, GΩ	500Vdc		1 Min.
Isolation capacitance, pF			50 Max.
Switching frequency, kHz	Full load to minimum load		100 Min.

### Environmental Specifications

Operating ambient temperature, °C	With derating	-40 Min.	105 Max.
Maximum case temperature, °C			105 Max.
Storage Temperature Range, °C		-55 Min.	125 Max.
Thermal shock		MIL-STD-810F	
Vibration		MIL-STD-810F	
Relative humidity		5% to 95% RH	

### Physical Specifications

Design meet safety standard	IEC/UL/EN60950-1
Case material	Non-conductive black plastic
Potting material	Silicone (UL94 V-0)
Weight	4.5g (0.16oz)
Dimensions	0.86" × 0.44" × 0.36" (21.8 × 11.2 × 9.1 mm)
MTBF	5.124 × 10 <sup>6</sup> hrs, MIL-HDBK-217F

### EMC Specifications

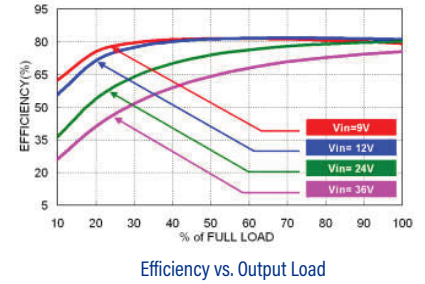
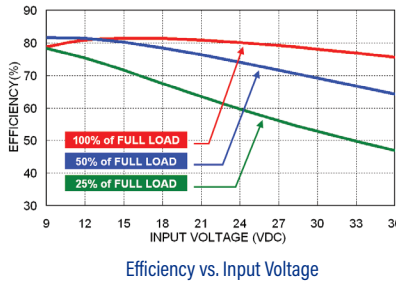
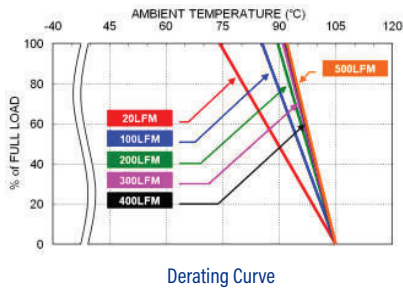
Specifications	Conditions	Level
EMI	EN55032 With external components	Class A, Class B
ESD	EN61000-4-2 Air ±8kV and Contact ±6kV	Perf. Criteria A
Radiated immunity	EN61000-4-3 10V/m	Perf. Criteria A
Fast transient <sup>(1)</sup>	EN61000-4-4 ±2kV	Perf. Criteria A
Surge <sup>(1)</sup>	EN61000-4-5 ±1kV	Perf. Criteria A
Conducted immunity	EN61000-4-6 10Vr.m.s	Perf. Criteria A
Power frequency magnetic field	EN61000-4-8 100A/m continuous; 1000A/m 1 second	Perf. Criteria A

**Note:**

- For the HEB3 Series, it is recommended to use an external filter capacitor (Nippon chemi-con KY series, 220 μF/100V). For further information, please contact Polytron Devices.

**CAUTION:** This power module is not internally fused. An input line fuse must always be used.

**Characteristic Curve**



**Fuse Consideration**

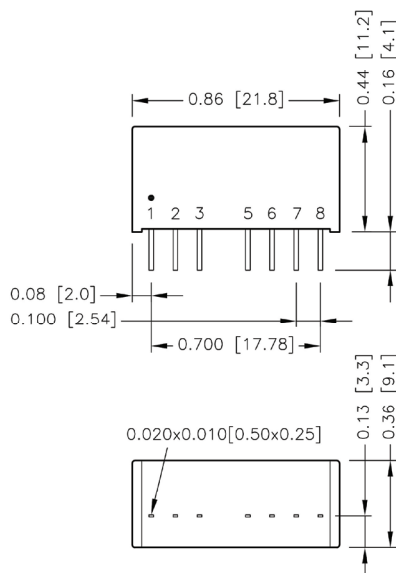
Model	Fuse Rating (A)	Fuse Type
HEB3-12SXX, HEB3-12-XX	1.6	Slow-Blow
HEB3-24SXX, HEB3-24-XX	0.8	Slow-Blow
HEB3-48SXX, HEB3-48-XX	0.5	Slow-Blow

This encapsulated power module can be used in a wide variety of applications, ranging from simple stand-alone operation to an integrated part of sophisticated power architecture.

For maximum flexibility, internal fusing is not included; however, to achieve maximum safety and system protection, always use an input line fuse.

**CAUTION:** This power module is not internally fused. An input line fuse must always be used.

**Mechanical Drawing**



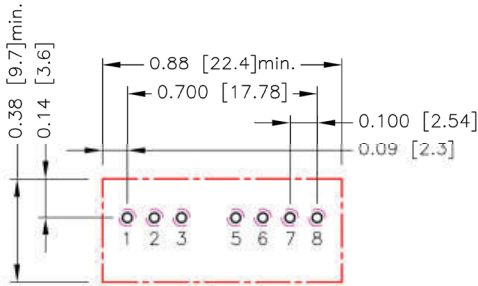
BOTTOM VIEW

**DIP PIN CONNECTION**

PIN	SINGLE	DUAL
1	-Vin	-Vin
2	+Vin	+Vin
3	Ctrl	Ctrl
5	NC	NC
6	+Vout	+Vout
7	-Vout	Common
8	NC	-Vout

- All dimensions in inches (mm)
- Tolerance:  $x.xx \pm 0.02$  ( $x.x \pm 0.5$ )  
 $x.xxx \pm 0.01$  ( $x.xx \pm 0.25$ )
- Pin pitch tolerance  $\pm 0.01$  (0.25)
- Pin dimension tolerance  $\pm 0.004$  (0.1)

**Recommended Pad Layout**



1. All dimensions in inches (mm)
2. Pad Size (lead free recommended)
3. Through hole 1, 2, 3, 5, 6, 7, 8:  $\phi 0.03(0.8)$
4. Top view pad 1, 2, 3, 5, 6, 7, 8:  $\phi 0.039(1)$
5. Bottom view pad 1, 2, 3, 5, 6, 7, 8:  $\phi 0.063(1.6)$

**Thermal Considerations**

The power module operates in a variety of thermal environments.

However, sufficient cooling should be provided to help ensure reliable operation of the unit.

Heat is removed by conduction, convection and radiation to the surrounding Environment.

Proper cooling can be verified by measuring the point in the figure below.

The temperature at this location should not exceed "Maximum case temperature".

When Operating, adequate cooling must be provided to maintain the test point temperature at or below "Maximum case temperature".

You can limit this Temperature to a lower value for extremely high reliability.

Thermal test condition with vertical direction by natural convection (20LFM)

