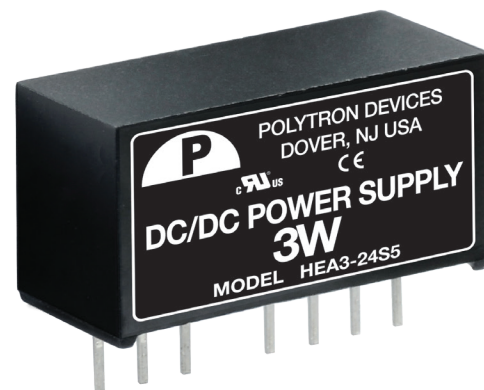


DC-DC CONVERTERS

2:1 WIDE INPUT RANGE, SIP 8 PACKAGE, SINGLE AND DUAL OUTPUT, UP TO 3 WATTS

INDUSTRIAL APPLICATIONS

HEA3 SERIES



FEATURES

- Extra Wide Input Range (4.5-13.2V, 9-18V, 18-36V, 36-75V)
- SIP 8 Package
- No Minimum Load Requirement
- High Efficiency Up to 86%
- Remote ON/OFF
- Wide Operating Temperature Range: -40 to +105°C
- Short Circuit Protection
- Under Voltage Protection
- Meets IEC/UL/EN60950-1
- 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 - 13.2	3.3	700	40	75	HEA3-5S33	4400
4.5 - 13.2	5	600	50	78	HEA3-5S5	2200
4.5 - 13.2	9	333	60	81	HEA3-5S9	1300
4.5 - 13.2	12	250	60	83	HEA3-5S12	1000
4.5 - 13.2	15	200	60	84	HEA3-5S15	820
4.5 - 13.2	24	125	50	82	HEA3-5S24	470
9 - 18	3.3	700	20	77	HEA3-12S33	4400
9 - 18	5	600	20	81	HEA3-12S5	2200
9 - 18	9	333	30	82	HEA3-12S9	1300
9 - 18	12	250	30	84	HEA3-12S12	1000
9 - 18	15	200	30	85	HEA3-12S15	820
9 - 18	24	125	30	85	HEA3-12S24	470
18 - 36	3.3	700	12	77	HEA3-24S33	4400
18 - 36	5	600	12	82	HEA3-24S5	2200
18 - 36	9	333	12	83	HEA3-24S9	1300
18 - 36	12	250	12	85	HEA3-24S12	1000
18 - 36	15	200	12	86	HEA3-24S15	820
18 - 36	24	125	12	84	HEA3-24S24	470
36 - 75	3.3	700	8	75	HEA3-48S33	4400
36 - 75	5	600	8	80	HEA3-48S5	2200
36 - 75	9	333	8	82	HEA3-48S9	1300
36 - 75	12	250	8	84	HEA3-48S12	1000
36 - 75	15	200	8	85	HEA3-48S15	820
36 - 75	24	125	8	86	HEA3-48S24	470

HEA3 SERIES

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 μ F
4.5 - 13.2	± 5	± 300	± 300	79	HEA3-5-5	± 1200
4.5 - 13.2	± 12	± 125	± 125	82	HEA3-5-12	± 520
4.5 - 13.2	± 15	± 100	± 100	82	HEA3-5-15	± 440
9 - 18	± 5	± 300	± 300	81	HEA3-12-5	± 1200
9 - 18	± 12	± 125	± 125	85	HEA3-12-12	± 520
9 - 18	± 15	± 100	± 100	83	HEA3-12-15	± 440
18 - 36	± 5	± 300	± 300	82	HEA3-24-5	± 1200
18 - 36	± 12	± 125	± 125	84	HEA3-24-12	± 520
18 - 36	± 15	± 100	± 100	85	HEA3-24-15	± 440
36 - 75	± 5	± 300	± 300	80	HEA3-48-5	± 1200
36 - 75	± 12	± 125	± 125	86	HEA3-48-12	± 520
36 - 75	± 15	± 100	± 100	83	HEA3-48-15	± 440

Input Specifications			Output Specifications		
Operating input voltage range, Vdc	4.5 Min., 5 Typ., 13.2 Max.	5Vin(nom)	Voltage accuracy, %	± 1	
	9 Min., 12 Typ., 18 Max.	12Vin(nom)			
	18 Min., 24 Typ., 36 Max.	24Vin(nom)	Line regulation, %	± 0.2	Low Line to High Line at Full Load
	36 Min., 48 Typ., 75 Max.	48Vin(nom)			
Start up voltage, Vdc	4.5 Max.	5Vin(nom)	Load regulation, %	± 1	No Load to Full Load, Single
	9 Max.	12Vin(nom)			
	18 Max.	24Vin(nom)		± 1	No Load to Full Load, Dual
	36 Max.	48Vin(nom)			
Shutdown voltage, Vdc	2 Min., 3 Typ., 4 Max.	5Vin(nom)	Cross regulation, %	± 0.5	10% load to 90% load, Single
	6 Min., 7 Typ., 8 Max.	12Vin(nom)			
	13 Min., 15 Typ., 17 Max.	24Vin(nom)		± 0.8	10% load to 90% load, Dual
	29 Min., 32 Typ., 35 Max.	48Vin(nom)			
Start up time, ms		Constant resistive load	Asymmetrical load 25%/100%FL, Dual		
	10 Typ., 20 Max.	Power up			
Input surge voltage, Vdc		1 second, Max.	Ripple and noise, mVp-p	75 Typ.	Measured by 20MHz bandwidth
	15 Max.	5Vin(nom)			
	25 Max.	12Vin(nom)			
	50 Max.	24Vin(nom)			
Input filter		Capacitor type	Transient response recovery time, μ s	500 Typ.	25% load step change
		DC-DC ON			
Remote ON/OFF	Open or high impedance	DC-DC OFF, Ctrl pin applied current via 1k Ω	Over load protection, %	140 Min., 180 Typ., 240 Max.	% of lout rated; Hiccup mode
	2 Min., 3 Typ., 4 Max.	Remote off input current			
	2.5 Typ.		Short circuit protection	Continuous, automatic recovery	

HEA3 SERIES

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 ⁶ hrs, MIL-HDBK-217F

EMC Specifications

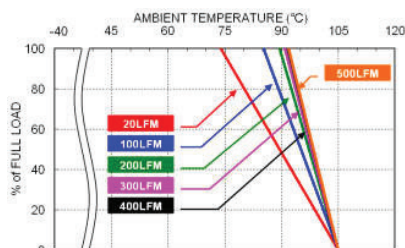
Specifications	Conditions	Level
EMI	EN55032 With external components	Class A, Class B
ESD	EN61000-4-2 Air ±8kV and Contact ±6kV	Perf. Criteria A
Radiated immunity	EN61000-4-3 10V/m	Perf. Criteria A
Fast transient ⁽¹⁾	EN61000-4-4 ±2kV	Perf. Criteria A
Surge ⁽¹⁾	EN61000-4-5 ±1kV	Perf. Criteria A
Conducted 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:

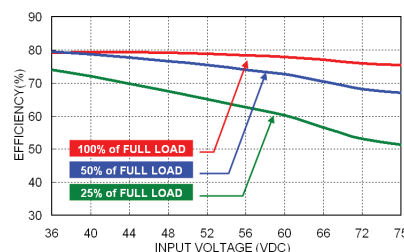
- For the HEA3 Series, it is recommended to use an external filter capacitor (Nippon chemi-con KY series, 220 μF/100V). For further information, please contact Polytron Devices.

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

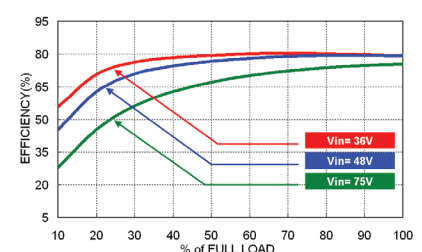
Characteristic Curve



Derating Curve



Efficiency vs. Input Voltage



Efficiency vs. Output Load

HEA3 SERIES

Fuse Consideration

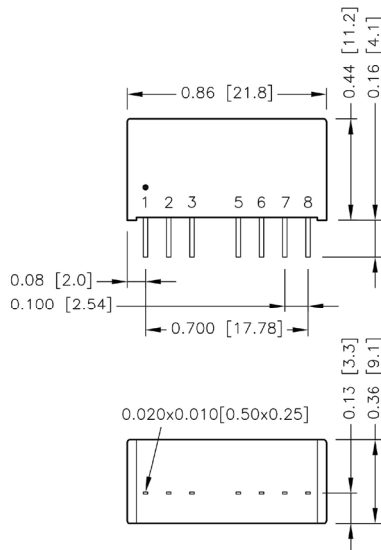
Model	Fuse Rating (A)	Fuse Type
HEA3-5SXX, HEA3-5-XX	1.6	Slow-Blow
HEA3-12SXX, HEA3-12-XX	0.8	Slow-Blow
HEA3-24SXX, HEA3-24-XX	0.5	Slow-Blow
HEA3-48SXX, HEA3-48-XX	0.315	Slow-Blow

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

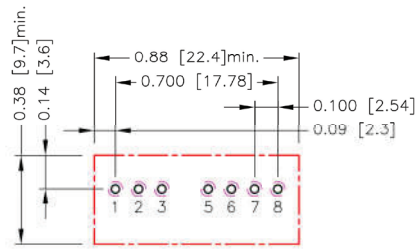
DIP PIN CONNECTION

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

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

HEA3 SERIES

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: $\varnothing 0.03(0.8)$
4. Top view pad 1, 2, 3, 5, 6, 7, 8: $\varnothing 0.039(1)$
5. Bottom view pad 1, 2, 3, 5, 6, 7, 8: $\varnothing 0.063(1.6)$

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)

