



Polytron Power Supplies

DABURN

DC-DC CONVERTERS

4:1 WIDE INPUT RANGE UP TO 3 WATTS, MINIATURE SIP PACKAGE

RAILWAY APPLICATIONS
SWBR3 SERIES



FEATURES

- 4:1 Ultra Wide Input Range
- Miniature SIP Package: 0.86" × 0.36" × 0.44"
- High Efficiency: Up to 83%
- Low Ripple and Noise: 50mV p-p Typ.
- Input to Output Isolation: 3000Vdc
- Remote ON/Off Control
- Continuous Short Circuit and Over Current Protection
- Low Standby Power
- No Min. Load Required
- EN50155, EN45545-2
- UL, CB, CE Marked

SELECTION GUIDE 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 A	Input Current at No Load mA	Efficiency %	Model Number	Maximum Capacitor Load µF
9 - 36	3.3	700	4	76	SWBR3-24S33	1100
9 - 36	5	600	4	81	SWBR3-24S5	550
9 - 36	9	333	4	81	SWBR3-24S9	340
9 - 36	12	250	4	83	SWBR3-24S12	240
9 - 36	15	200	4	83	SWBR3-24S15	240
9 - 36	24	125	4	82	SWBR3-24S24	90
18 - 75	3.3	700	4	75	SWBR3-48S33	1100
18 - 75	5	600	4	81	SWBR3-48S5	550
18 - 75	9	333	4	81	SWBR3-48S9	340
18 - 75	12	250	4	82	SWBR3-48S12	240
18 - 75	15	200	4	82	SWBR3-48S15	240
18 - 75	24	125	4	82	SWBR3-48S24	90
43 - 160	3.3	700	2	76	SWBR3-110S33	1100
43 - 160	5	600	2	80	SWBR3-110S5	550
43 - 160	9	333	2	81	SWBR3-110S9	340
43 - 160	12	250	2	82	SWBR3-110S12	240
43 - 160	15	200	2	83	SWBR3-110S15	240
43 - 160	24	125	2	83	SWBR3-110S24	90
9 - 36	±5	±300	6	80	SWBR3-24-5	±340
9 - 36	±12	±125	6	82	SWBR3-24-12	±170
9 - 36	±15	±100	8	82	SWBR3-24-15	±90
18 - 75	±5	±300	6	80	SWBR3-48-5	±340
18 - 75	±12	±125	6	82	SWBR3-48-12	±170
18 - 75	±15	±100	8	82	SWBR3-48-15	±90
43 - 160	±5	±300	2	80	SWBR3-110-5	±340
43 - 160	±12	±125	2	83	SWBR3-110-12	±170
43 - 160	±15	±100	2	81	SWBR3-110-15	±90

*For wide input range of -55 to +100 °C, use suffix "W3"

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Ver 1.0

**SWBR3 SERIES**

Input Specifications			Output Specifications		
Operating input voltage range, Vdc	9 Min., 24 Typ., 36 Max.	24Vin(nom)	Voltage accuracy, %	-1 Min., +1 Max.	
	18 Min., 48 Typ., 75 Max.	48Vin(nom)	Line regulation, %	-0.2 Min., +0.2 Max.	Low Line to High Line at Full Load
	43 Min., 110 Typ., 160 Max.	110Vin(nom)	Load regulation, %	-0.5 Min., +0.5 Max.	No Load to Full Load, Single
Start up time, ms	50 Typ., 75 Max.	Constant resistive load, Power up		-1 Min., +1 Max.	Dual
	50 Typ., 75 Max.	Constant resistive load, Remote ON/OFF	Cross regulation, %	-5 Min., +5 Max.	Asymmetrical load 25%/100% FL, Dual
Input surge voltage, Vdc	50 Max.	1 second, Max., 24Vin(nom)	Ripple and noise, mVp-p	50 Typ., 75 Max.	Measured by 20MHz bandwidth with a 1µF/50V X7R MLCC
	100 Max.	1 second, Max., 48Vin(nom)	Temperature coefficient, %/°C	-0.02 Min., +0.02 Max.	
	85 Max.	1 second, Max., 110Vin(nom)	Transient response recovery time, µs	250 Typ.	25% load step change
Input filter	Capacitor type		Over load protection, %	180 Typ.	% of Iout rated; Hiccup mode
Remote ON/OFF, mA	Open or 0 - 0.5 Vdc	Referred to -Vin pin, DC-DC ON	Short circuit protection	Continuous, automatic recovery	
	3 - 12 Vdc	DC-DC OFF			
	2 Min., 4 Max.	Input current of Ctrl pin			
	2.5 Typ.	Remote off input current			

General Specifications					
Isolation voltage, Vdc	1 minute	Input to Output	3000 Min.		
		Input (Output) to Case	1500 Min.		
Isolation resistance, GΩ	500Vdc		1 Min.		
Isolation capacitance, pF					100 Max.
Switching frequency, kHz		110Vin	270 Min.	300 Typ.	330 Max.
		Others	360 Min.	400 Typ.	440 Max.

Environmental Specifications					
Operating ambient temperature, °C		With derating	-40 Min.		+100 Max.
	M3 Version	With derating	-55 Min.		+100 Max.
Maximum case temperature, °C					+100 Max.
Storage temperature range, °C			-55 Min.		+125 Max.
Thermal shock			MIL-STD-810F		
Shock			EN61373, MIL-STD-810F		
Vibration			EN61373, MIL-STD-810F		
Relative humidity			5% to 95% RH		

**SWBR3 SERIES****Physical Specifications**

Design meet safety standard	IEC/UL/EN60950-1, UL:E193009, IEC/UL/EN62368-1, CB:UL(Demko), EN50155, EN45545-2	
Case material	Copper	
Base material	None	
Potting material	Silicone (UL94 V-0)	
Dimensions	0.86" × 0.36" × 0.44" (21.84 × 9.14 × 11.18mm)	
Weight	5.9g (0.21oz)	
MTBF	5.535 × 10 ⁶ hrs, MIL-HDBK-217F, Full load	

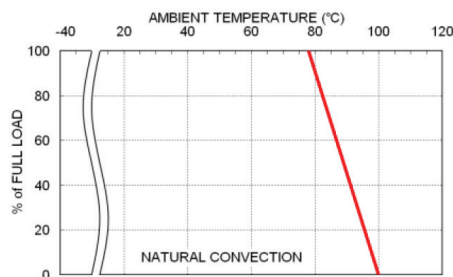
EMC Specifications

Specifications	Conditions		Level
EMI ⁽¹⁾	EN55011, 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	20 V/m	Perf. Criteria A
Fast transient ⁽²⁾	EN61000-4-4	±2kV	Perf. Criteria A
Surge ⁽²⁾	EN61000-4-5	±2kV	Perf. Criteria A
Conducted immunity	EN61000-4-6	10 Vr.m.s	Perf. Criteria A
Power frequency magnetic field	EN61000-4-8	100A/m continuous; 1000A/m 1 second	Perf. Criteria A

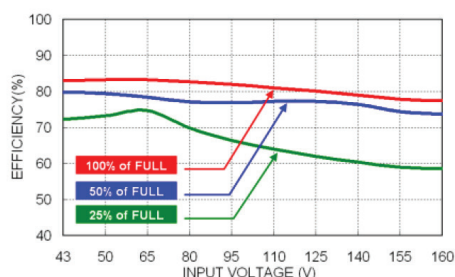
Note:

- The standard modules meet either EMI Class A or Class B with external components. For further information, please contact Polytron Devices.
- An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5. The filter suggested:
The SWBR3-12XX recommended an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220μF/100V) and a TVS (SMDJ70A, 70V, 3000Watt peak pulse power) to connect in parallel.
The SWBR3-48XX recommended an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220μF/ 100V) and a TVS (SMDJ120A, 120V, 3000Watt peak pulse power) to connect in parallel.
The SWBR3-110XX recommended an aluminum electrolytic capacitor (Nippon chemi-con KXJ series, 150μF/ 200V) and a TVS (SMB250A, 250V, 600Watt peak pulse power) to connect in parallel.

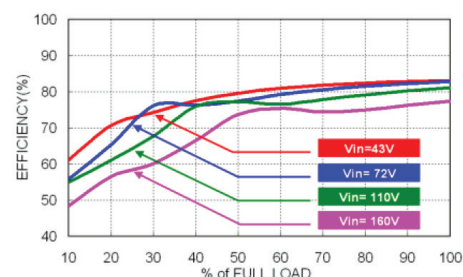
CAUTION: This power module is not internally fused. An input line fuse must always be used.

Characteristic Curve

Derating Curve



Efficiency vs. Input Voltage



Efficiency vs. Output Load

SWBR3 SERIES

Fuse Consideration

Modules	Fuse Rating (A)	Fuse Type
SWBR3-24XX	0.8	Slow-Blow
SWBR3-48XX	0.5	Slow-Blow
SWBR3-110XX	0.16	Slow-Blow

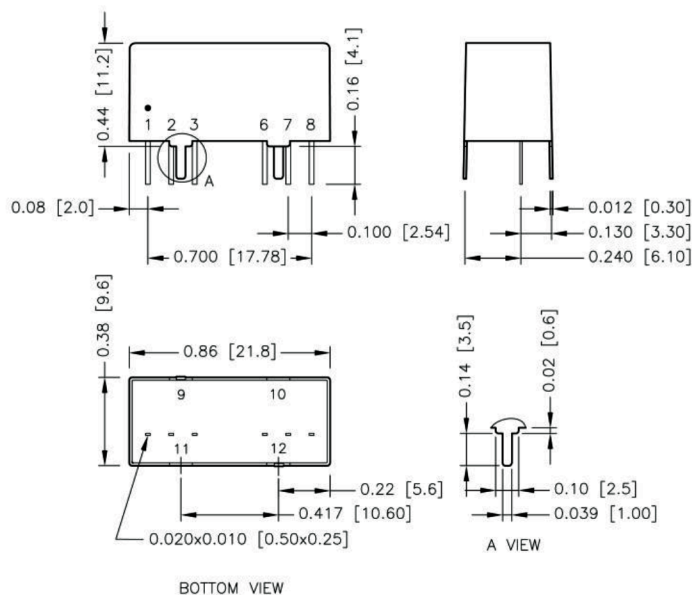
This power module is not internally fused. An input line fuse must always be used.

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.

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

The table based on the information provided in this data sheet on inrush energy and maximum DC input current at low Vin.

Mechanical Drawing



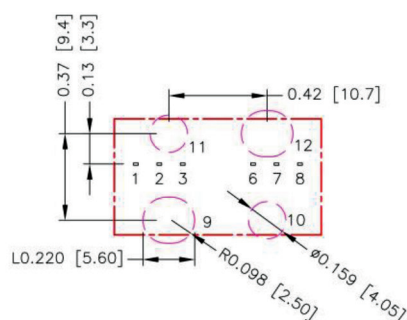
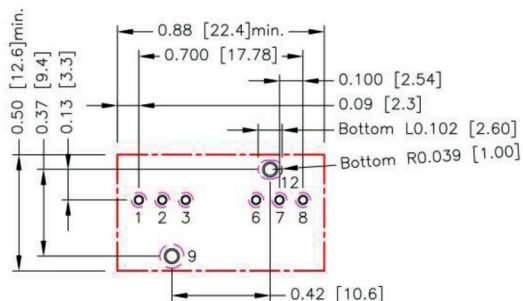
PIN CONNECTION

PIN	SINGLE	DUAL
1	-Vin	-Vin
2	+Vin	+Vin
3	Ctrl	Ctrl
6	+Vout	+Vout
7	-Vout	Common
8	NC	-Vout
9	Case	Case
10	Stand off	Stand off
11	Stand off	Stand off
12	Case	Case

1. All dimensions in inch (mm)
2. Tolerance :x.xx±0.02 (x.x±0.5)
x.xxx±0.01 (x.xx±0.25)
3. Pin dimension tolerance ±0.004(0.1)

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Recommended Pad Layout



1. All dimensions in inch (mm)
2. Pad size (lead free recommended)
3. Through hole 1.2.3.6.7.8: $\Phi 0.031(0.80)$
Through hole 9.12: $\Phi 0.051(1.30)$
4. Top view pad 1.2.3.6.7.8: $\Phi 0.039(1.00)$
Top view pad 9.12: $\Phi 0.064(1.63)$
5. Bottom view pad 1.2.3.6.7.8: $\Phi 0.063(1.60)$
Bottom view pad 9: $\Phi 0.201(2.60)$
Bottom view pad 12: Groove R0.039(1.00)
L0.102(2.60)
6. Area 9.10.11.12: Don't lay out
Area 10.11 size: $\Phi 0.159(4.05)$
Area 9.12 size: Groove R0.098(2.50)
L0.220(5.60)
7. The layout distance between Pin3 and Pin6 is at least 3mm

* We recommend putting PCB trace on bottom side.

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.

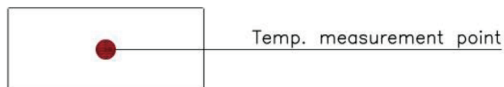
Proper cooling can be verified by measuring the point as the figure below.

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).



TOP VIEW