

P R B X

POWERBOX Industrial Line 150

PAF(D)150 Series

150W 4:1 Single Output

DC/DC Converter

Features

No minimum load required
2250VDC input to output insulation
CV+CC mode
Built-in EN55011 and EN55022 Class A filter
Six-sided continuous shield
Wall mount application
Top side and bottom side heat dissipation
Adjustable output voltage
Input reverse protection
UL60950-1, EN60950-1, IEC60950-1 and EN50155 safety approvals
CE marked
Compliant to RoHS and REACH

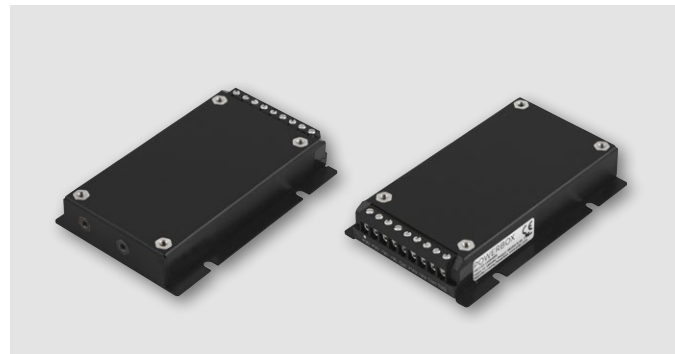
Input

Voltage range	24Vin(nom)	9-36VDC
	48Vin(nom)	18-75VDC
	110Vin(nom)	43-160VDC
Start-up voltage	24Vin(nom)	9VDC max
	48Vin(nom)	18VDC max
	110Vin(nom)	43VDC max
Shutdown voltage	24Vin(nom)	7.9-8.5VDC<
	48Vin(nom)	15.6-16.8VDC
	110Vin(nom)	33.0-36.0VDC
Start up time	Power up	35ms typ
	Remote ON/OFF	35ms typ
Input surge voltage	24Vin(nom)	50VDC, 1s max
	48Vin(nom)	100VDC, 1s max
	110Vin(nom)	185VDC, 1s max
Input filter	PI type	
Remote ON/OFF	Referred to -Vin pin Positive logic DC-DC ON Open or 3~12V (Standard) DC-DC OFF Short or 0~1.2V Negative logic DC-DC ON Short or 0~1.2V (Option) DC-DC OFF Open or 3~12V Input current of Ctrl pin 0.5mA ~ 1mA Remote off input current 3.5mA typ	

Output

Voltage accuracy	±1%	
Line regulation	±0.2, LL to HL at full load	
Load regulation	±0.4, no load to full load	
Voltage adjustability	+20% max. Use a resistor across on the Trim1 and Trim2 to adjust the output voltage	
Ripple and noise	Measured by 20MHz bandwidth	
	12Vout, 15Vout	100mV p-p typ
	24Vout, 28Vout	200mV p-p typ
	48Vout	350mV p-p typ
Temperature coefficient	±0.02%/°C	
Transient response	200μs typ, 25% load step change	
Over voltage protection	125~140% of Vout (nom); hiccup mode	
Over current protection	105~120% of Iout rated; CC mode	
Short circuit protection	Continuous, automatic recovery	

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Environmental

Operating case temp.	-40°C ~ +100°C
Max case temperature	+100°C
Over temp protection	+110°C
Storage temperature	-55°C to +125°C
Thermal impedance ¹⁾	Vertical direction by natural convection (20LFM) Only mount on the iron base-plate 2.55°C/W Mount on the iron base-plate and top side with 7G-0058A heat-sink 4.6°C/W
Thermal shock	MIL-STD-810F
Shock	EN61373, MIL-STD-810F
Vibration	EN61373, MIL-STD-810F
Relative humidity	5-95% RH

General

Isolation voltage	1 minute	
	Input to output	2250VDC min
	Input (output) to case	1600VDC min
Isolation resistance	500VDC	1GΩ
Isolation capacitance	3500pF, max.	
Switching frequency	24VDC and 48VDC input:	
	48Vout	275KHz typ
	Others	300KHz typ
	110VDC input: All	
		225KHz typ
Case material	Aluminum	
Base material	Aluminum	
Potting material	Silicon (UL94 V-0)	
Weight	PAF150	225g
	PAD150	220g
MTBF	MIL-STD-217F, full load	4.954 x 10 ⁵ h

Standards

Safety approvals	UL60950-1, EN60950-1, IEC60950-1, EN50155
EMI ⁽²⁾	EN55011, EN55022 DC/DC module Class A
ESD	EN61000-4-2, air ±8KV, contact ±6KV, Criteria A
Radiated immunity	EN61000-4-3, 10V/m, Criteria A
Fast transient ⁽³⁾	EN61000-4-4, ±2KV, Criteria A
Surge ⁽³⁾	EN61000-4-5, EN55024, ±1KV, Criteria A
	EN50155, ±2KV, Criteria A
Conducted immunity	EN61000-4-6, 10 Vr.m.s., Criteria A

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PAF(D)150 Series
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Model Number	Input Range	Output Voltage	Output Current @Full Load	Input Current @No Load	Efficiency	Max Capacitor Load
PAF(D)150-24S12W	9 ~ 36 VDC	12 VDC	12.5 A	70 mA	86%	40000 μ F
PAF(D)150-24S15W	9 ~ 36 VDC	15 VDC	10 A	80 mA	86%	26000 μ F
PAF(D)150-24S24W	9 ~ 36 VDC	24 VDC	6.3 A	95 mA	87%	10000 μ F
PAF(D)150-24S28W	9 ~ 36 VDC	28 VDC	5.4 A	120 mA	87%	7600 μ F
PAF(D)150-24S48W	9 ~ 36 VDC	48 VDC	3.2 A	130 mA	86%	2600 μ F
PAF(D)150-48S12W	18 ~ 75 VDC	12 VDC	12.5 A	50 mA	88%	40000 μ F
PAF(D)150-48S15W	18 ~ 75 VDC	15 VDC	10 A	60 mA	89%	26000 μ F
PAF(D)150-48S24W	18 ~ 75 VDC	24 VDC	6.3 A	60 mA	89%	10000 μ F
PAF(D)150-48S28W	18 ~ 75 VDC	28 VDC	5.4 A	70 mA	89%	7600 μ F
PAF(D)150-48S48W	18 ~ 75 VDC	48 VDC	3.2 A	70 mA	88%	2600 μ F
PAF(D)150-110S12W	43 ~ 160 VDC	12 VDC	12.5 A	25 mA	88%	40000 μ F
PAF(D)150-110S15W	43 ~ 160 VDC	15 VDC	10 A	25 mA	89%	26000 μ F
PAF(D)150-110S24W	43 ~ 160 VDC	24 VDC	6.3 A	25 mA	89%	10000 μ F
PAF(D)150-110S28W	43 ~ 160 VDC	28 VDC	5.4 A	25 mA	89%	7600 μ F
PAF(D)150-110S48W	43 ~ 160 VDC	48 VDC	3.2 A	35 mA	88%	2600 μ F

Notes:

- (1)The iron base-plate dimension is 19" * 3.5" * 0.063" (The height is EIA standard 2U).
- (2)The heat-sink is optional and P/N is 7G-0058A-F.
- The standard modules meet EMI Class A without external components.
- An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5. The filter capacitor Powerbox suggest: PAF(D)150-24SXXW : Nippon chemi-con KY series, 470 μ F/50V.

PAF(D)150-24SXXW :: Nippon chemi-con KY series, 220 μ F/100V.

PAF(D)150-110SXXW : Nippon chemi-con KXJ series, 150 μ F/200V.

CAUTION: This power module is not internally fused; an input line fuse must always be used. If the load was having sourcing capability (Ex: Battery or Super Capacitor), an output line fuse must always be used.

Part Number Structure

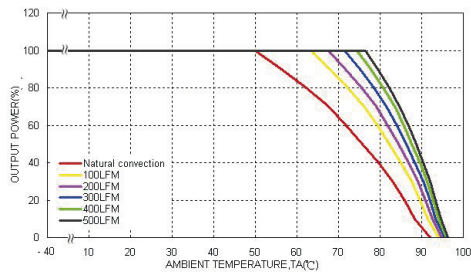
PAF(D)150	-	24	S	12	W	-	N	F	HC
Series Name		Input Voltage	Output Quantity	Output Voltage	Input Range		Remote Control Options	Filter Option	Heat-sink Option
		24: 9-36VDC	S: Single	12: 12VDC	4:1		☐ : Positive logic	☐ : Without filter	☐ : Without heat sink
		48: 16.5-75VDC		15: 15VDC			N: Negative logic	F: With EMI filter module	HC: H=0.670" Horizontal, 7G-0058A-F
		110: 43-160VDC		24: 24VDC					
				28: 28VDC					
				48: 40VDC					

1) EMI filter meet EN55022 Class B.

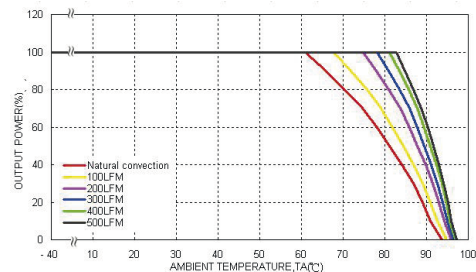
This EMI filter is used for PAD150-24SXXW and PAD150-48SXXW only, not for other items. (Ex: PAD150-24S24W-F)

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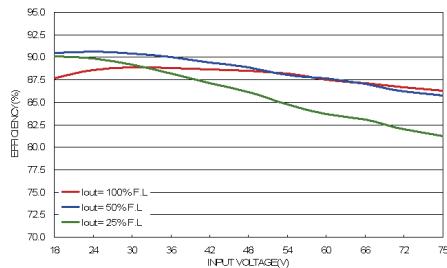
Derating Curve



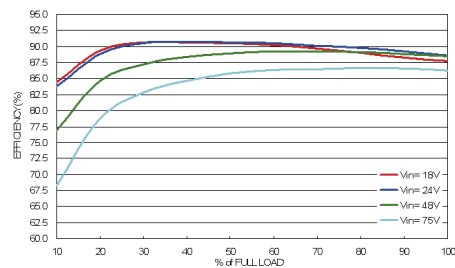
PAF(D)150-48S24W Derating Curve (Note 1)



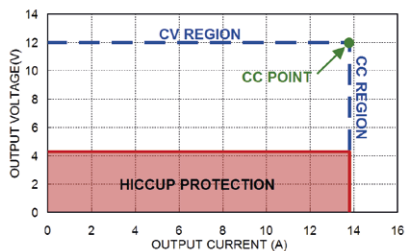
PAF(D)150-48S24W Derating Curve (Note 1)
With Heat-sink



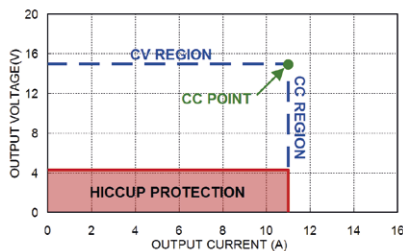
PAF(D)150-48S24W Efficiency vs. Input Voltage



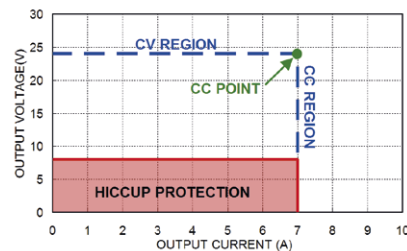
PAF(D)150-48S24W Efficiency vs. Output Load



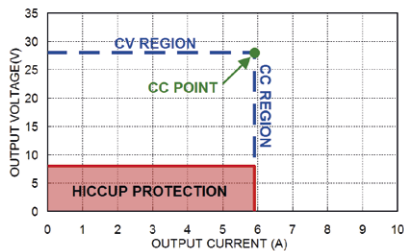
PAF(D)150-XXS12W
Vout vs. Iout



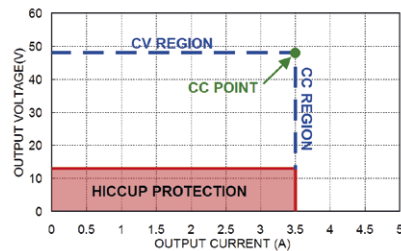
PAF(D)150-XXS15W
Vout vs. Iout



PAF(D)150-XXS24W
Vout vs. Iout



PAF(D)150-XXS28W
Vout vs. Iout



PAF(D)150-XXS48W
Vout vs. Iout

Mode	Description	Condition
CV Region	In normal operation. The output current in datasheet	Resistance Load > Vout / Iout (CC Point)
CC Region	If the output load current is over rating. The output current will keep in a constant value. And output voltage will fall.	Resistance Load < Vout / Iout (CC Point)
Hiccup Protection	If the output resistance is become short. It will operate in hiccup protection.	PAF(D)150-XXS12W, PAF(D)150-XXS15W: Vout < 4.3V (typ.) to Output Short. PAF(D)150-XXS24W, WAF(D)150-XXS28W: Vout < 8.0V (typ.) to Output Short. PAF(D)150-XXS48W: Vout < 13V (typ.) to Output Short.

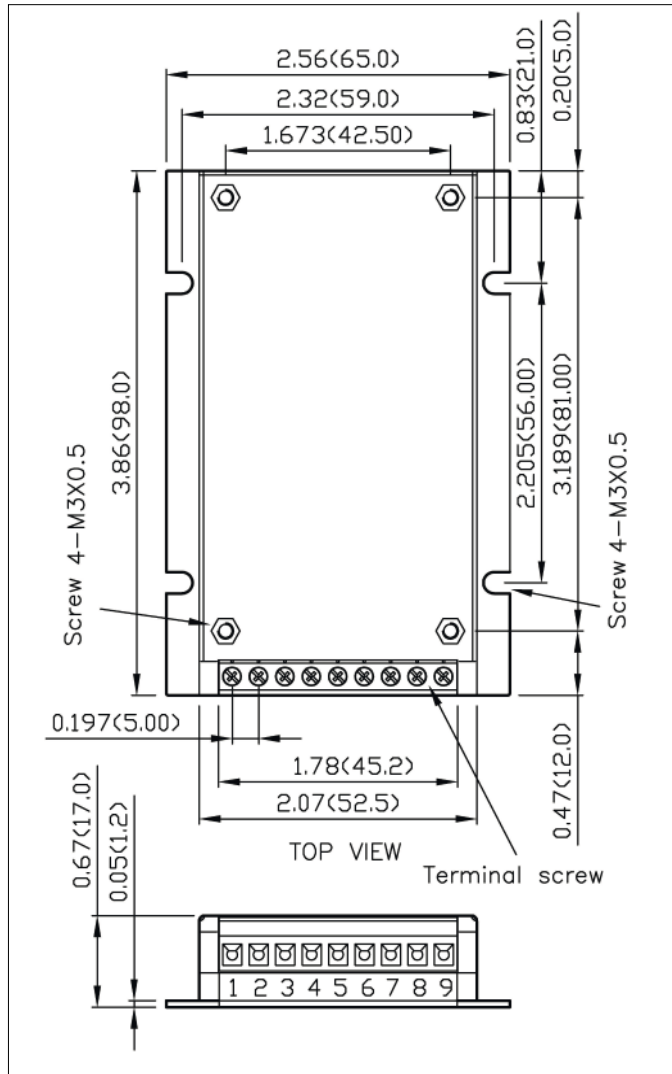
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PAF(D)150 Series

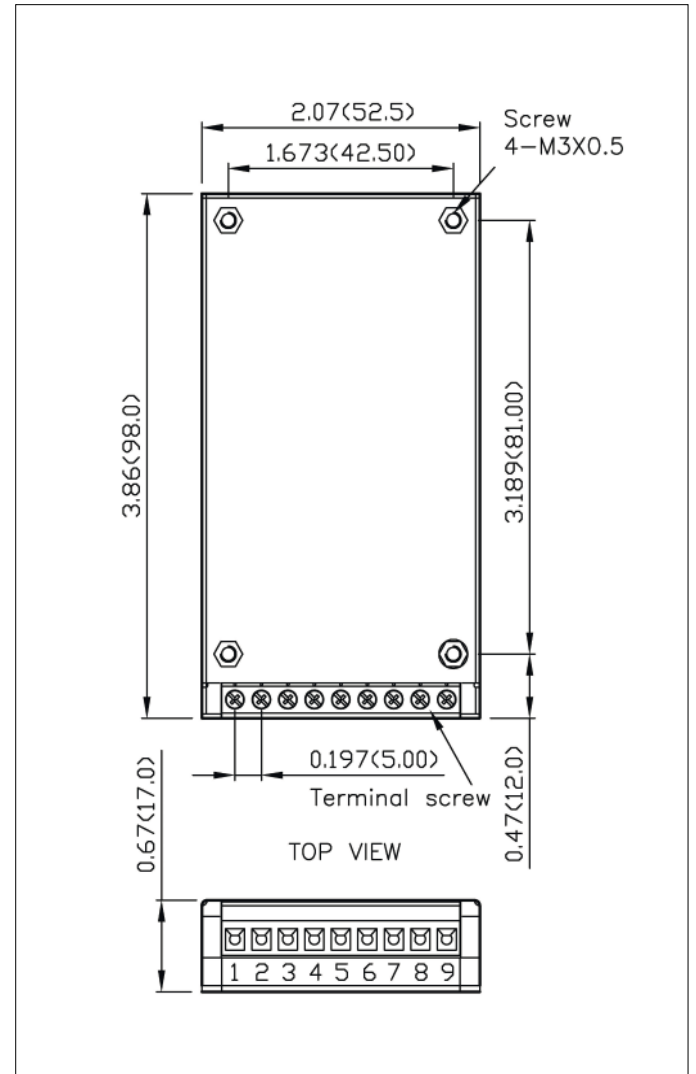
150W 4:1 Single Output

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Mechanical PAF



Mechanical PAD

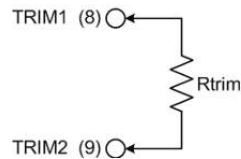


Pin Connection

Pin	Define	Wire Gauge Recommendations
1	+Vin	14~16AWG
2	+Vin	14~16AWG
3	-Vin	14~16AWG
4	-Vin	14~16AWG
5	Ctrl	14~24AWG
6	+Vout	14~16AWG
7	-Vout	14~16AWG
8	Trim 1	14~24AWG
9	Trim 2	14~24AWG

External Output Trimming

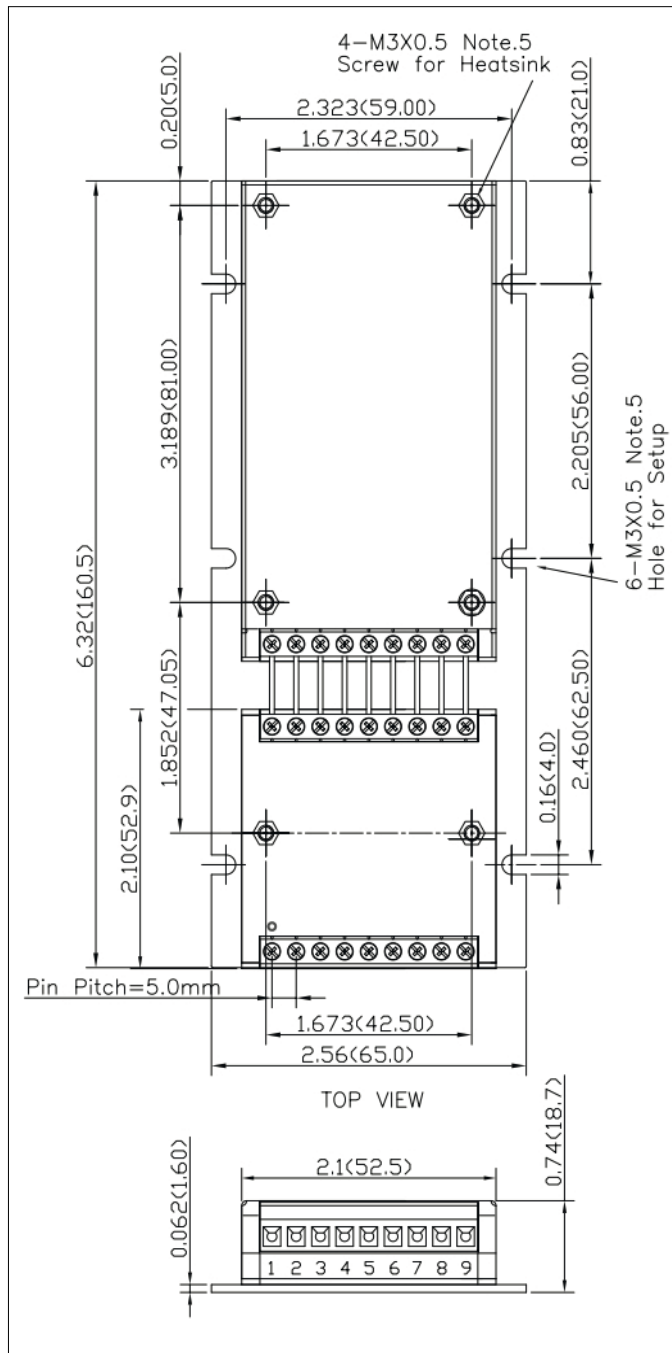
Output can be externally trimmed by using the method shown below.



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. Pole pitch tolerance ±0.01 (0.25)
4. Screw locked torque: MAX 5.0kgf-cm(0.49N-m)
5. Terminal screw locked torque:
MAX 2.5kgf-cm(0.25N-m)

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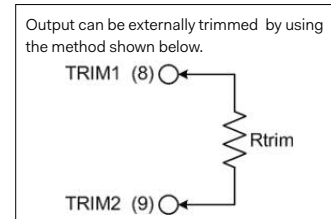
Mechanical PAD150-24SXXW-F, PAD150-48SXXW-F



Pin Connection

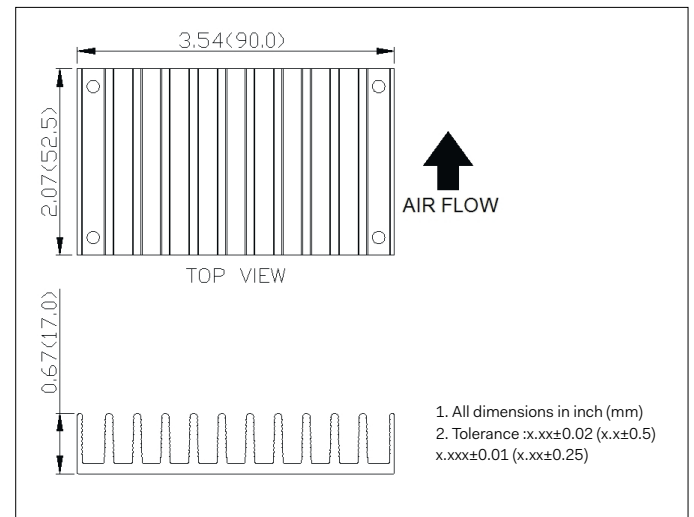
Pin	Define	Wire Gauge Recommendations
1	+Vin	14~16AWG
2	+Vin	14~16AWG
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4	-Vin	14~16AWG
5	Ctrl	14~24AWG
6	+Vout	14~16AWG
7	-Vout	14~16AWG
8	Trim 1	14~24AWG
9	Trim 2	14~24AWG

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MAX 2.5kgf-cm(0.25N-m)

Heat-Sink Option



Specifications are subject to change without notice.