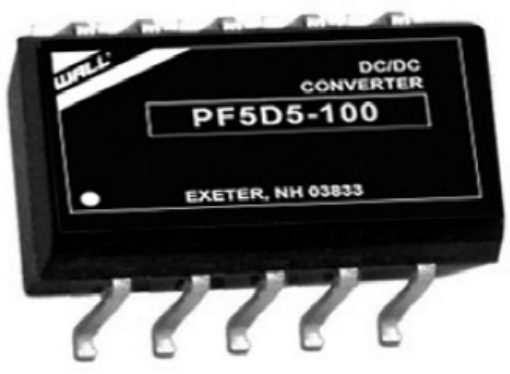


FEATURES

- Industrial SMD Package
- I/O Isolation 1000VDC
- Water Washable Process Available
- Tape & Reel Package Available
- RoHS & REACH Available
- Up to 1 Watt Output Power
- Single or Dual Outputs Available
- High Efficiency
- Short Circuit Protection
- Qualified for Lead-Free Reflow Solder Process According to IPC/JEDEC J-STD-020D.1

DESCRIPTION

The PF series of DC DC converters offers up to 1 watt of output power in a compact SMD package. This series has I/O isolation of 1000VDC and offers single or dual outputs. The PF series is RoHS compliant, has high efficiency, and short circuit protection. This series has water washable process and tape & reel packages available, and it is qualified for lead-free reflow solder process according to IPC/JEDEC J-STD-020D.1

MODEL SELECTION TABLE

Single Output

Model Number	Input Voltage Range	Output Voltage	Output Current		Ripple & Noise	Input Current		Output Power	Load Regulation	Efficiency
			Min Load	Max Load		No Load	Full Load			
PF5S33-300	5VDC (4.5~5.5VDC)	3.3VDC	6mA	300mA	120mVp-p	30mA	264mA	1W	10%	75%
PF5S5-200		5VDC	4mA	200mA			250mA		10%	80%
PF5S9-110		9VDC	2mA	110mA			254mA		10%	78%
PF5S12-84		12VDC	1.5mA	84mA			252mA		8%	80%
PF5S15-67		15VDC	1mA	67mA			248mA		7%	81%
PF12S33-300	12VDC (10.8~13.2VDC)	3.3VDC	6mA	300mA	120mVp-p	15mA	110mA	1W	8%	75%
PF12S5-200		5VDC	4mA	200mA			103mA		8%	81%
PF12S9-110		9VDC	2mA	110mA			106mA		8%	78%
PF12S12-84		12VDC	1.5mA	84mA			104mA		5%	81%
PF12S15-67		15VDC	1mA	67mA			102mA		5%	82%
PF24S33-300	24VDC (21.6~26.4VDC)	3.3VDC	6mA	300mA	120mVp-p	8mA	57mA	1W	8%	73%
PF24S5-200		5VDC	4mA	200mA			53mA		8%	79%
PF24S9-110		9VDC	2mA	110mA			54mA		8%	77%
PF24S12-84		12VDC	1.5mA	84mA			53mA		5%	80%
PF24S15-67		15VDC	1mA	67mA			52mA		5%	80%

MODEL SELECTION TABLE

Dual Output

Model Number	Input Voltage Range	Output Voltage	Output Current		Ripple & Noise	Input Current		Output Power	Load Regulation	Efficiency
			Min Load	Max Load		No Load	Full Load			
PF5D5-100	5VDC (4.5~5.5VDC)	±5VDC	±2mA	±100mA	120mVp-p	30mA	267mA	1W	10%	75%
PF5D9-55		±9VDC	±1mA	±55mA			260mA		10%	76%
PF5D12-42		±12VDC	±0.8mA	±42mA			255mA		8%	79%
PF5D15-33		±15VDC	±0.7mA	±33mA			251mA		7%	79%
PF12D5-100	12VDC (10.8~13.2VDC)	±5VDC	±2mA	±100mA	120mVp-p	15mA	111mA	1W	8%	75%
PF12D9-55		±9VDC	±1mA	±55mA			109mA		8%	76%
PF12D12-42		±12VDC	±0.8mA	±42mA			105mA		5%	80%
PF12D15-33		±15VDC	±0.7mA	±33mA			103mA		5%	80%
PF24D5-100	24VDC (21.6~26.4VDC)	±5VDC	±2mA	±100mA	120mVp-p	9mA	56mA	1W	8%	74%
PF24D9-55		±9VDC	±1mA	±55mA			55mA		8%	75%
PF24D12-42		±12VDC	±0.8mA	±42mA			53mA		5%	79%
PF24D15-33		±15VDC	±0.7mA	±33mA			52mA		5%	79%

SPECIFICATIONS

All specifications are based on 25°C, Nominal Input Voltage, and Maximum Output Current unless otherwise noted.
We reserve the right to change specifications based on technological advances.

SPECIFICATION	TEST CONDITIONS		Min	Typ	Max	Unit
INPUT SPECIFICATIONS						
Input Voltage Range	5V input models		4.5	5	5.5	VDC
	12V input models		10.8	12	13.2	
	24V input models		21.6	24	26.4	
Input Surge Voltage (1 sec. max.)	5V input models		-0.7		9	VDC
	12V input models		-0.7		18	
	24V input models		-0.7		30	
Input Filter			Internal Capacitor			
Reverse Polarity Input Current	Single Output Models				0.3	A
Internal Power Dissipation					450	mW
OUTPUT SPECIFICATIONS						
Output Voltage			See Table			
Voltage Accuracy				±1.0	±3.0	%/Vnom
Line Regulation	For Vin Change of 1%			±1.2	±1.5	%
Load Regulation	Io=20% to 100%		See Model Selection Guide			
Output Voltage Balance	Dual Outputs, Balanced Loads			±0.1	±1.0	%
Output Power			See Table			
Output Current			See Table			
Maximum Capacitive Load				33		µF
Ripple & Noise	0-20MHz Bandwidth				120	mVp-p
Temperature Coefficient				±0.01	±0.02	%/ºC
PROTECTION						
Short Circuit Protection	Automatic Recovery				0.5	Sec.
ENVIRONMENTAL SPECIFICATIONS						
Operating Ambient Temperature	Natural Convection		-40		+85	ºC
Storage Temperature			-50		+125	ºC
Case Temperature					+90	ºC
Humidity	Non-Condensing				95	% RH
Cooling			Natural Convection			
Lead-free Reflow Solder Process			IPC/JEDEC JSTD-020D.1			
MTBF (calculated)	MIL-HDBK-217F@25ºC, Ground Benign			2,000,000		hours
GENERAL SPECIFICATIONS						
Efficiency			See Table			
Switching Frequency			50	100	140	KHz
Isolation Voltage	60 Seconds		1000			VDC
	1 Seconds		1200			
Isolation Resistance	500VDC		1000			MΩ
Isolation Capacitance	100KHz, 1V			40	100	pF
Moisture Sensitivity Level (MSL)	IPC/JEDEC J-STD-020D.1		Level 3			
PHYSICAL SPECIFICATIONS						
Weight	Single Output	5V & 12V models	0.053oz (1.5g)			
		24V models	0.063oz (1.8g)			
	Dual Output	5V & 12V models	0.063oz (1.8g)			
		24V models	0.078oz (2.2g)			
Dimensions (L x W x H)	Single Output	5V & 12V models	0.50in x 0.31in x 0.27in (12.7mm x8.0mm x 6.8mm)			
		24V models	0.50in x 0.33in x 0.31in (12.7mm x 8.3mm x 7.8mm)			
	Dual Output	5V & 12V models	0.60in x 0.31in 0.27in (15.24mm x 8.0mm x 6.8mm)			
		24V models	0.60in x 0.33in x 0.31in (15.24mm x 8.3mm x 7.8mm)			
Case Material			Plastic UL94V-0 Packaging			
Flammability			UL94V-0			
SAFETY & EMC CHARACTERISTICS						
Compliance			RoHS, REACH			

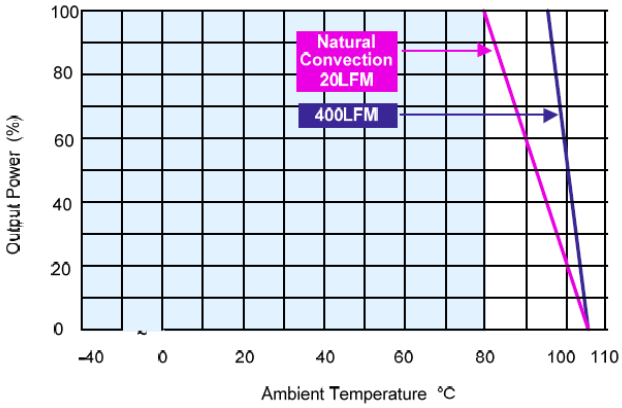
NOTES

(1) These power converters require a minimum output loading to maintain specified regulation, operation under no-load conditions will not damage these modules; however they may not meet all specifications listed.
(2) It is recommended to protect converter by a slow blow fuse in the input supply line.
(3) Other input and output voltages may be available, please contact factory.
(4) Operation under no-load conditions will not damage these devices.
(5) Specifications are subject to change without notice.

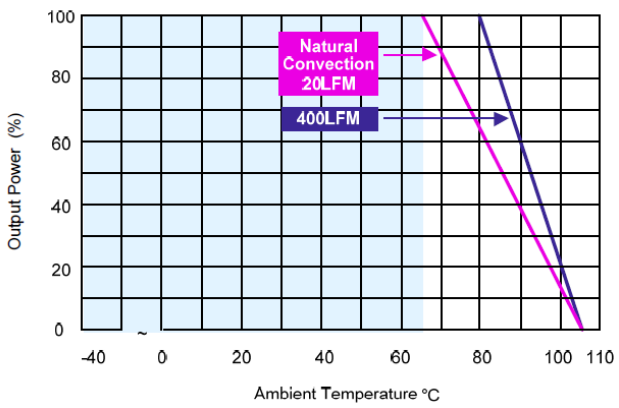
**Due to advances in technology, specifications subject to change without notice.*

DERATING CURVES

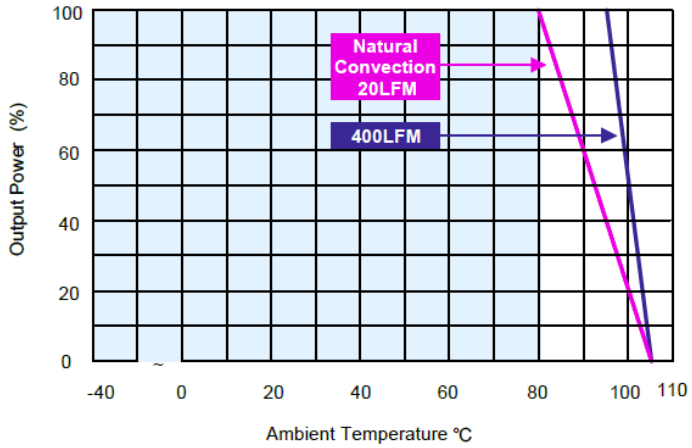
5V & 12V Power Derating Curve, Single Output



24V Power Derating Curve, Dual Output



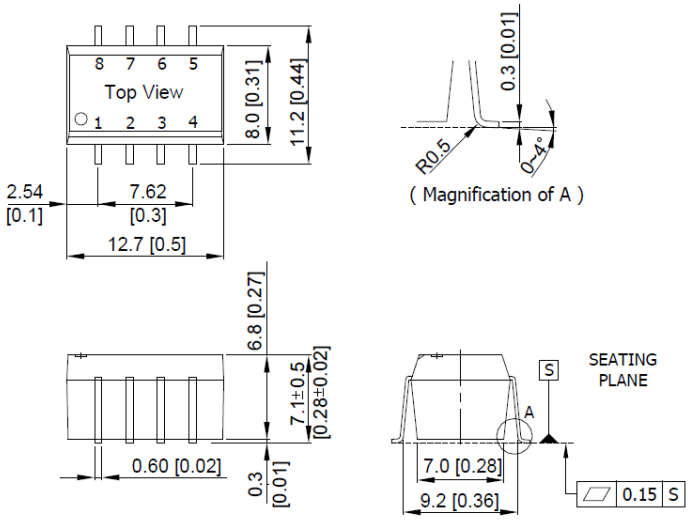
Dual Outputs Power Derating Curve



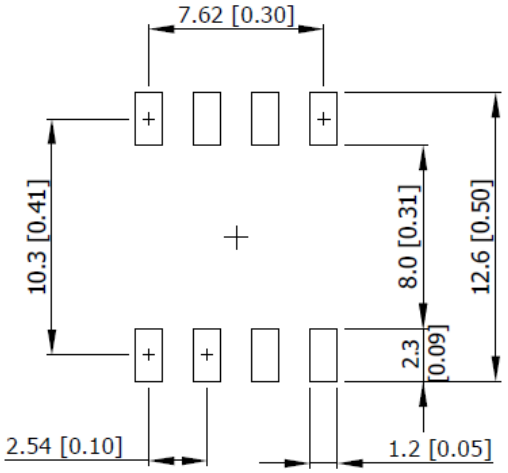
MECHANICAL DRAWINGS

Single Outputs

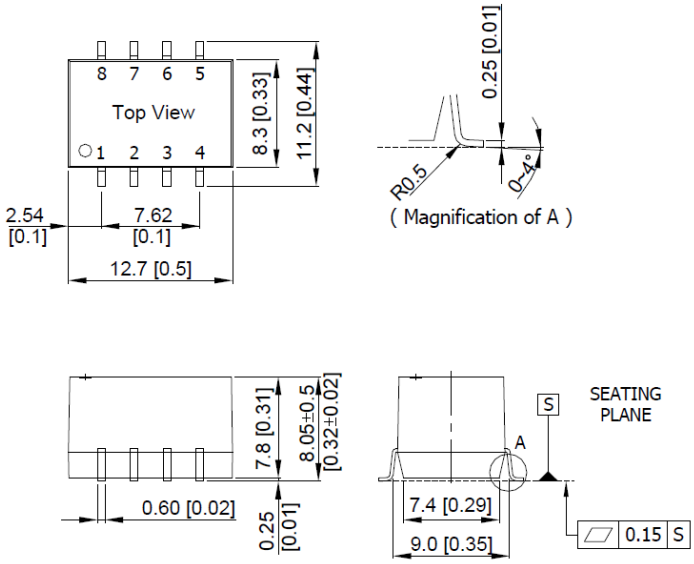
Mechanical Dimensions (5V & 12V)



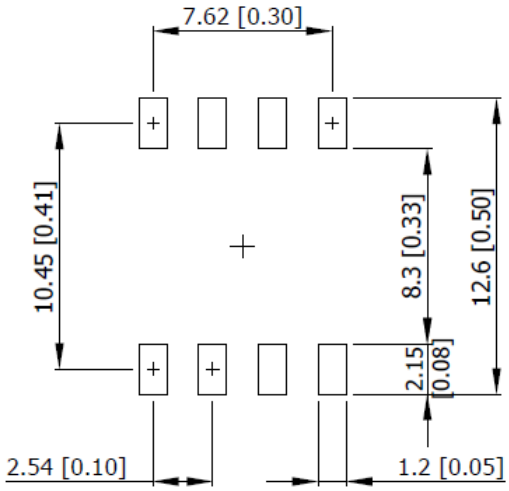
Connecting Pin Patterns



Mechanical Dimensions (24V)



Connecting Pin Patterns



Notes

All dimensions in mm (inches)
Tolerance: X.X±0.25 (X.XX±0.01)
X.XX±0.13 (X.XXX±0.005)
Pins ±0.05 (±0.002)

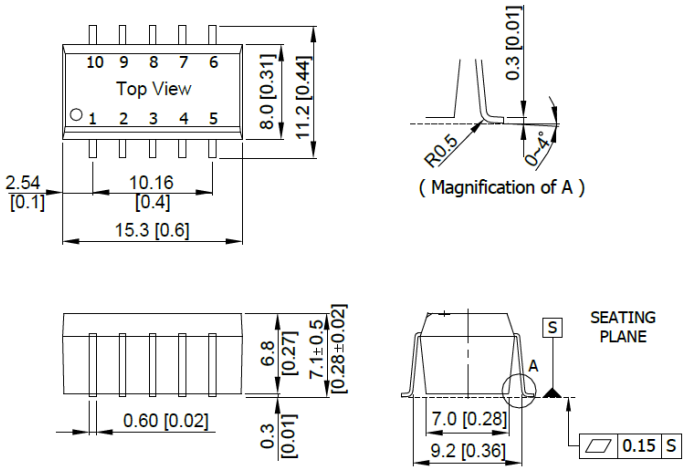
Pin Connections

PIN	FUNCTION
1	-Vin
2	+Vin
3	NA
4	-Vout
5	+Vout
6	NA
7	NA
8	NA

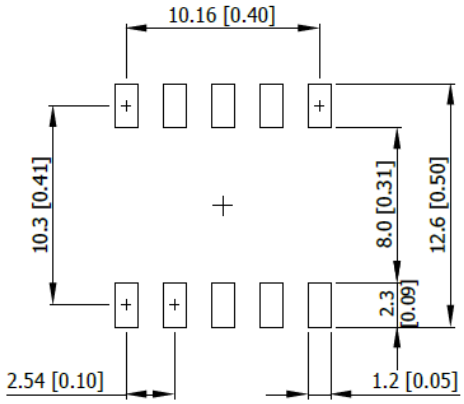
NA: Not Available for Electrical Connection

Dual Outputs

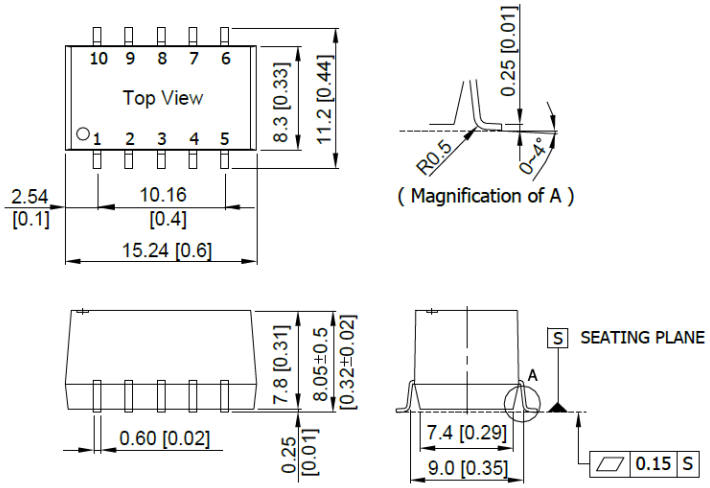
Mechanical Dimensions (5V & 12V)



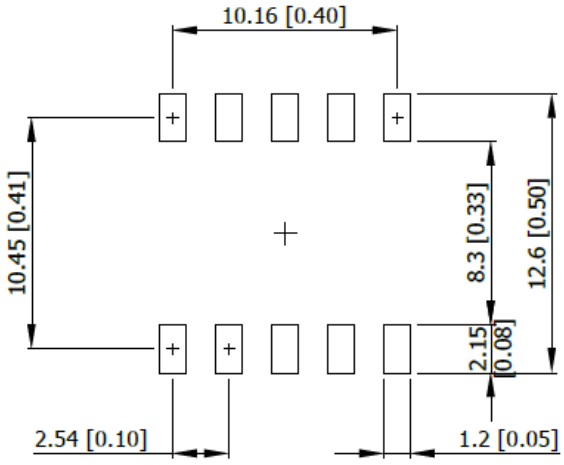
Connecting Pin Patterns



Mechanical Dimensions (24V)



Connecting Pin Patterns



Notes

All dimensions in mm (inches)
Tolerance: X.X±0.25 (X.XX±0.01)
X.XX±0.13 (X.XXX±0.005)
Pins ±0.05 (±0.002)

Pin Connections

PIN	FUNCTION
1	-Vin
2	+Vin
3	NA
4	Common
5	-Vout
6	NA
7	+Vout
8	NA
9	NA
10	NA

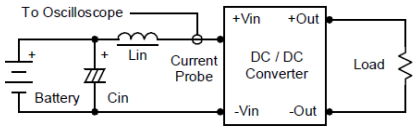
NA: Not Available for Electrical Connection

TEST SETUP

Input Reflected-Ripple Current Test Setup

Input reflected-ripple current is measured with a inductor Lin (4.7µF) and Cin (220µF, ESR <1.0Ω at 100KHz) to simulate source impedance. Capacitor Cin, offsets possible battery impedance.

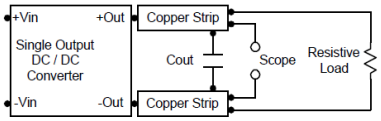
Current ripple is measured at the input terminals of the module, measurement bandwidth is 0-500 KHz.



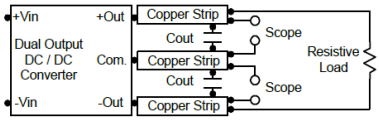
Peak-to-Peak Output Noise Measurement Test

Use a Cout 0.33µF ceramic capacitor. Scope measurement should be made by using a BNC socket, measured bandwidth is 0-20MHz. Position the load between 50mm and 75mm from the DC/DC converter.

Single Output



Dual Output



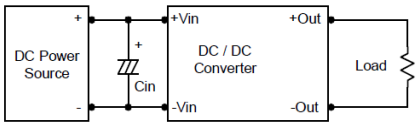
TECHNICAL NOTES

Maximum Capacitive Load

The PF series has limitation of maximum connected capacitance at the output. The power module may be operated in current limiting mode during start-up, affecting the ramp-up and the startup time. For optimum performance we recommend 33µF maximum capacitive load. The maximum capacitance can be found in the data sheet.

Input Source Impedance

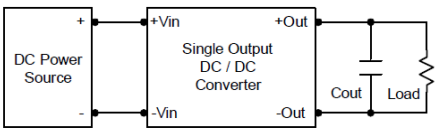
The power module should be connected to a low AC-Impedance input source. Highly inductive source impedances can affect the stability of the power module. In applications where power is supplied over long lines and output loading is high, it may be necessary to use a capacitor at the input to ensure a startup. Capacitor mounted close to the power module helps ensure stability of the unit, it is recommended to use a good quality, low Equivalent Series Resistance (ESR <1.0Ω at 100KHz) capacitor of a 2.2µF for the 5V input devices, a 1.0µF for the 12V input devices and a 0.47µF for the 24V input devices.



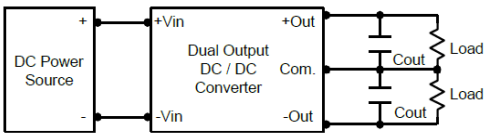
Output Ripple Reduction

A good quality low ESR capacitor placed as close as practicable across the load will give the best ripple and noise performance. To reduce output ripple, it is recommended to use 0.47µF capacitors at the output.

Single Output

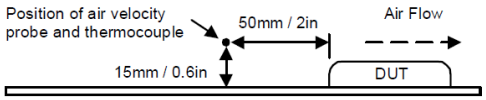


Dual Output



Thermal Considerations

Many conditions affect the thermal performance of the power module, such as orientation, airflow over the module and board spacing. To avoid exceeding the maximum temperature rating of the components inside the power module, the case temperature must be kept below 90ºC. The derating curves are determined from measurements obtained in a test setup.



COMPANY INFORMATION

Wall Industries, Inc. has created custom and modified units for over 50 years. Our in-house research and development engineers will provide a solution that exceeds your performance requirements on-time and on budget. Our ISO9001: 2015 certification is just one example of our commitment to producing a high quality, well-documented product for our customers.

Our past projects demonstrate our commitment to you, our customer. Wall Industries, Inc. has a reputation for working closely with its customers to ensure each solution meets or exceeds form, fit and function requirements. We will continue to provide ongoing support for your project above and beyond the design and production phases. Give us a call today to discuss your future projects.

Contact **Wall Industries** for further information:

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