



# **FEATURES**

Rev B

- Industrial SMD Package
- I/O Isolation 1000VDC
- Water Washable Process Available
- Tape & Reel Package Available
- RoHS & REACH Available
- Up to 1 Watt Output Power

## DESCRIPTION

- Single or Dual Outputs Available
- High Efficiency
   Chart Circuit Destant
- Short Circuit Protection
- Qualified for Lead-Free Reflow Solder Process According to IPC/JEDEC J-STD-020D.1

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 &	Input Current		Output	Load Regulation	Efficiency
			Min Load	Max Load	Noise	No Load	Load Full Load	Power	Loud Regulation	Linciency
PF5S33-300		3.3VDC	6mA	300mA	120mVp-p	30mA	264mA	1W	10%	75%
PF5S5-200	5VDC (4.5~5.5VDC)	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		3.3VDC	6mA	300mA	120mVp-p		57mA	3mA 4mA 1W 3mA	8%	73%
PF24S5-200	24VDC (21.6~26.4VDC)	5VDC	4mA	200mA			53mA		8%	79%
PF24S9-110		9VDC	2mA	110mA		8mA	54mA		8%	77%
PF24S12-84	(21.0~20.4000)	12VDC	1.5mA	84mA			53mA		5%	80%
PF24S15-67		15VDC	1mA	67mA			52mA		5%	80%

MODEL SELECTION TABLE										
Dual Output										
Model Number	input reliage empti	Output	Output Current		Ripple &	Input Current		Output	Load Regulation	Efficiency
		No Load	Full Load	Power	Load Regulation	Linciency				
PF5D5-100		±5VDC	±2mA	±100mA			267mA	1W	10%	75%
PF5D9-55	5VDC	±9VDC	±1mA	±55mA	120m)/n n	30mA	260mA		10%	76%
PF5D12-42	(4.5~5.5VDC)	±12VDC	±0.8mA	±42mA	120mVp-p		255mA		8%	79%
PF5D15-33		±15VDC	±0.7mA	±33mA			251mA		7%	79%
PF12D5-100	12VDC	±5VDC	±2mA	±100mA	120m)/m m	15mA	111mA	1W	8%	75%
PF12D9-55		±9VDC	±1mA	±55mA			109mA		8%	76%
PF12D12-42	(10.8~13.2VDC)	±12VDC	±0.8mA	±42mA	120mVp-p		105mA		5%	80%
PF12D15-33		±15VDC	±0.7mA	±33mA			103mA		5%	80%
PF24D5-100		±5VDC	±2mA	±100mA	120mVp-p		56mA	1W	8%	74%
PF24D9-55	24VDC (21.6~26.4VDC)	±9VDC	±1mA	±55mA		0	55mA		8%	75%
PF24D12-42		±12VDC	±0.8mA	±42mA		9mA	53mA		5%	79%
PF24D15-33		±15VDC	±0.7mA	±33mA			52mA		5%	79%



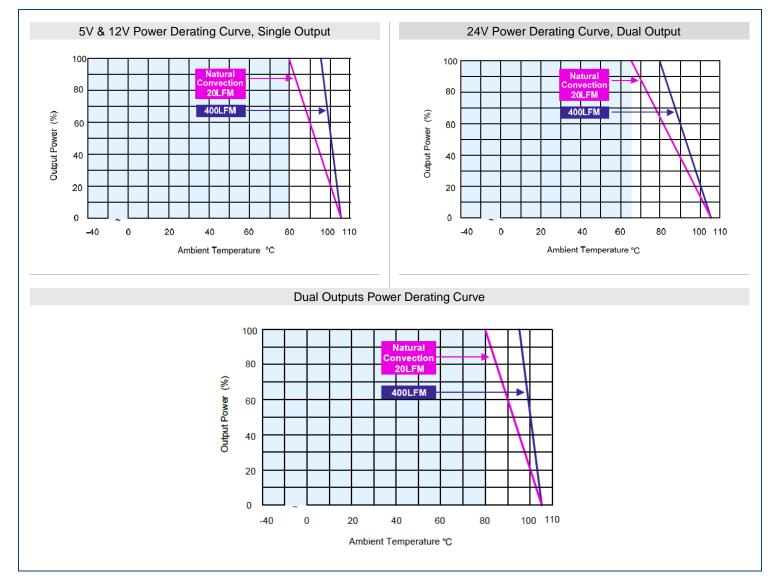
		nge specifications based on technolo						
SPECIFICATION	T	EST CONDITIONS	Min	Тур	Max	Unit		
NPUT SPECIFICATIONS				-		1		
	5V input models		4.5	5	5.5 13.2			
Input Voltage Range	12V input models					VDC		
	24V input models		21.6	24	26.4			
	5V input models		-0.7		9			
Input Surge Voltage (1 sec. max.)	12V input models		-0.7		18	VDC		
	24V input models		-0.7		30	]		
nput Filter				Internal (	Capacitor			
Reverse Polarity Input Current	Single Output Models				0.3	A		
nternal Power Dissipation					450	mW		
OUTPUT SPECIFICATIONS				1				
Output Voltage				See	Table			
Voltage Accuracy				±1.0	±3.0	%/Vno		
Line Regulation	For Vin Change of 1%			±1.2	±0.0	%		
Load Regulation	lo=20% to 100%		C	See Model Se	-			
Output Voltage Balance	Dual Outputs, Balanced	Loads	(	±0.1	±1.0	%		
Output Power	Dual Outputs, Dalariced	Ebads		-	Table	70		
Dutput Current					Table			
					lable			
Maximum Capacitive Load				33	400	μF		
Ripple & Noise	0-20MHz Bandwidth			0.04	120	mVp-		
Temperature Coefficient				±0.01	±0.02	%/ºC		
PROTECTION				1		-		
Short Circuit Protection	Automatic Recovery				0.5	Sec.		
ENVIRONMENTAL SPECIFICATION				1				
Operating Ambient Temperature	Natural Convection		-40		+85	°C		
Storage Temperature			-50		+125	°C		
Case Temperature					+90	°C		
Humidity	Non-Condensing				95	% R⊦		
Cooling					onvection			
Lead-free Reflow Solder Process				PC/JEDEC	JSTD-020D	.1		
MTBF (calculated)	MIL-HDBK-217F@25°C,	Ground Benign		2,000,000		hours		
GENERAL SPECIFICATIONS								
Efficiency				See	Table			
Switching Frequency			50	100	140	KHz		
	60 Seconds		1000					
Isolation Voltage	1 Seconds		1200			VDC		
solation Resistance	500VDC		1000			MΩ		
solation Capacitance	100KHz, 1V		40	100	pF			
Moisture Sensitivity Level (MSL)	IPC/JEDEC J-STD-020D	0.1		-	rel 3			
PHYSICAL SPECIFICATIONS		••			0.0			
		5V & 12V models		0.0530	z (1.5a)			
Weight	Single Output	24V models		0.053oz (1.5g) 0.063oz (1.8g)				
		5V & 12V models		0.06302 (1.8g)				
	Dual Output			0.06302 (1.8g) 0.0780z (2.2g)				
	-	24V models		0.0780z (2.2g) 0.50in x 0.31in x 0.27in				
	Single Output	5V & 12V models						
Dimensions (L x W x H)			(	(12.7mm x8.0mm x 6.8mm)				
		24V models		0.50in x 0.33in x 0.31in				
		2.11	(1	(12.7mm x 8.3mm x 7.8mm)				
	Dual Output	5V & 12V models		0.60in x 0.31in 0.27in				
			(1	(15.24mm x 8.0mm x 6.8mm)				
		24V models		0.60in x 0.33in x 0.31in				
		24V models	(1	(15.24mm x 8.3mm x 7.8mm)				
Case Material			F	Plastic UL94	/-0 Packagi	ng		
Flammability					4V-0			
SAFETY & EMC CHARACTERISTICS	3							
Compliance				RoHS	REACH			
		NOTES			_			
		naintain specified regulation, operation unc	ler no-load conditions	will not dama	ge these mod	lules;		
	specifications listed							
however they may not meet all								
<ul><li>however they may not meet all</li><li>(2) It is recommended to protect co</li></ul>	nverter by a slow blow fuse in the							
<ul><li>however they may not meet all</li><li>(2) It is recommended to protect co</li><li>(3) Other input and output voltages</li></ul>	nverter by a slow blow fuse in the may be available, please conta	ict factory.						
<ul> <li>however they may not meet all</li> <li>(2) It is recommended to protect co</li> <li>(3) Other input and output voltages</li> <li>(4) Operation under no-load conditi</li> </ul>	nverter by a slow blow fuse in the may be available, please contations will not damage these device	ict factory.						
<ul> <li>however they may not meet all</li> <li>(2) It is recommended to protect co</li> <li>(3) Other input and output voltages</li> <li>(4) Operation under no-load conditi</li> <li>(5) Specifications are subject to characterized</li> </ul>	nverter by a slow blow fuse in the may be available, please conta- ions will not damage these device ange without notice.	ict factory.		F07 0055				

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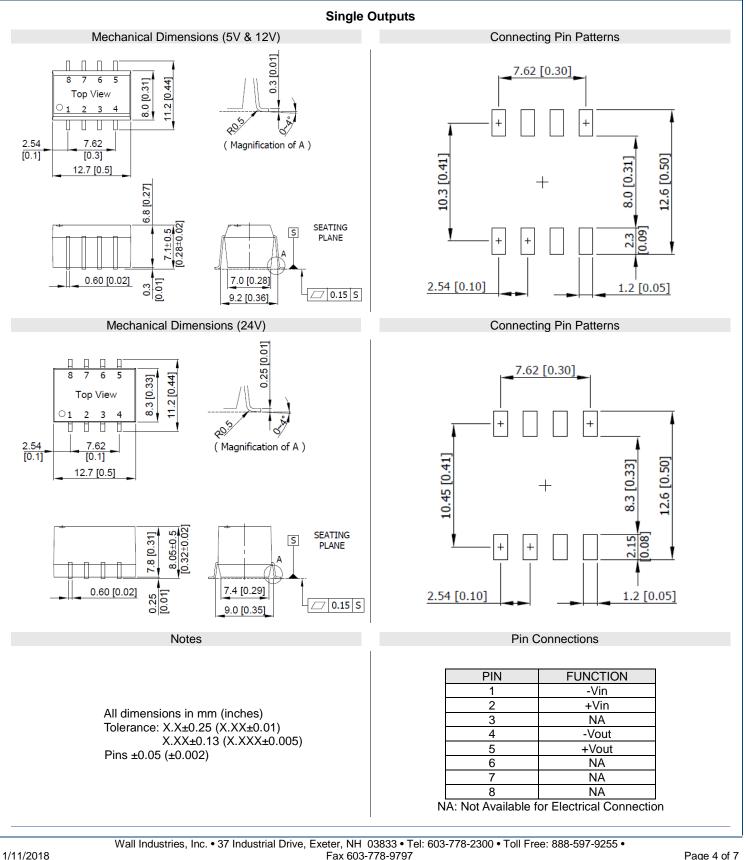
# DERATING CURVES



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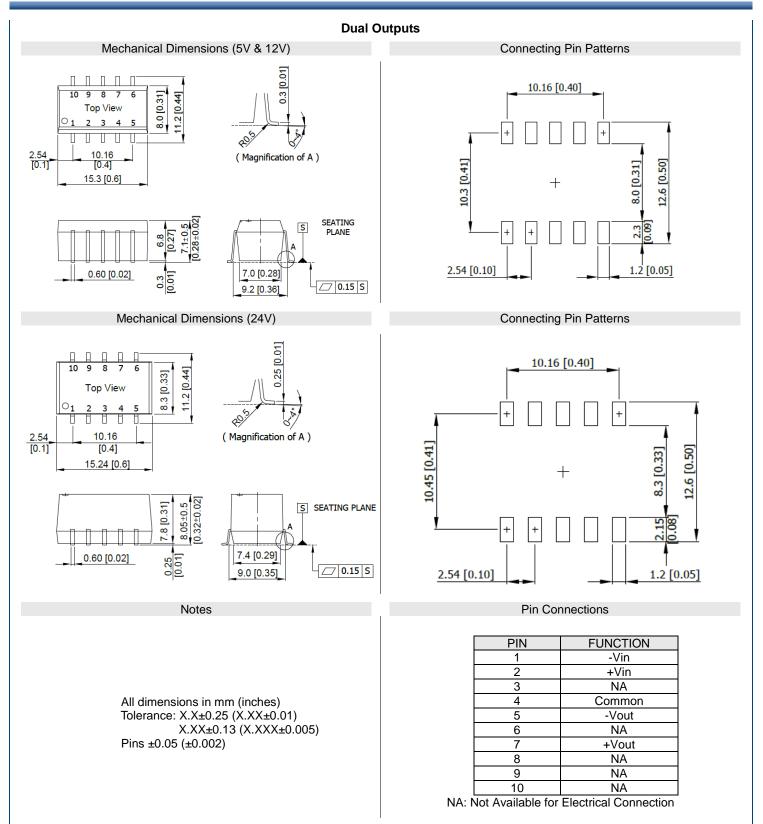
# MECHANICAL DRAWINGS



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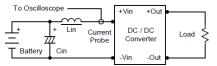
## TEST SETUP

### Input Reflected-Ripple Current Test Setup

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

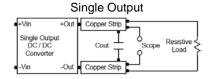
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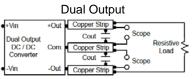
Current ripple is measured at the input terminals of the module, measurement bandwidth is 0-500 KHz.



### Peak-to-Peak Output Noise Measurement Test

Use a Cout  $0.33\mu$ F 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.





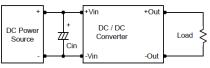
#### **TECHNICAL NOTES -**

### 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.

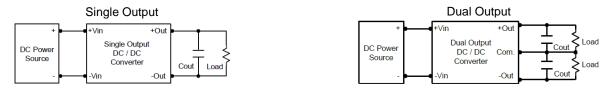
### Input Source Impedance

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 <1.0 $\Omega$  at 100KHz) capacitor of a 2.2 $\mu$ F for the 5V input devices, a 1.0 $\mu$ F for the 12V input devices and a 0.47 $\mu$ F for the 24V input devices.



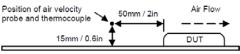
#### **Output Ripple Reduction**

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.



## 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 90°C. 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 ISO9001-2008 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.

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