

## Wall Industries, Inc.

### JFC20 SERIES

**2:1 Wide Input Voltage Range  
Single and Dual Outputs  
Industry Standard Package and Footprint  
20 Watt DC/DC Power Converters**



#### FEATURES

- 20 Watts Maximum Output Power
- Single and Dual Outputs
- Industry Standard Pin-Out
- Small Size and Low Profile: 1.0" x 1.0" x 0.39"
- 2:1 Wide Input Voltage Range
- High Efficiency up to 92%
- 1600VDC I/O Isolation
- Ultra Low Quiescent Current
- Remote ON/OFF Control
- Fixed Switching Frequency
- Over Voltage, Over Load, and Short Circuit Protected
- Six-Sided Continuous Shield
- EMI Meets EN55022 Class A Without External Filter
- CE Mark Meets 2006/95/EC, 93/68/EEC, and 2004/108/EC
- UL60950-1, EN60950-1, and IEC60950-1 Safety Approvals
- Compliant to RoHS EU Directive 2002/95/EC

#### APPLICATIONS

- Wireless Networks
- Telecom / Datacom
- Industry Control Systems
- Measurement Equipment
- Semiconductor Equipment

#### OPTIONS

- Negative Remote ON/OFF
- Without Trim Pin
- Without ON/OFF Pin
- Heatsink

#### DESCRIPTION

The JFC20 series of DC/DC power converters provides 20 watts of output power in a 1.0 x 1.0 x 0.39 inch industry standard package and footprint. This series has single and dual output models with 2:1 wide input voltage ranges of 9-18VDC, 18-36VDC, and 36-75VDC. Some features include high efficiency, ultra low quiescent current, 1600VDC I/O isolation, remote ON/OFF, and trimmable output voltage. This series is also protected against over voltage, over current, input under voltage, and short circuit conditions. All models are RoHS compliant and have UL60950-1, EN60950-1, and IEC60950-1 safety approvals.

SPECIFICATIONS: JFC20 Series						
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	Nom	Max	Unit
<b>INPUT SPECIFICATIONS</b>						
Input Voltage Range	12VDC nominal input models		9	12	18	VDC
	24VDC nominal input models		18	24	36	
	48VDC nominal input models		36	48	75	
Input Surge Voltage (1 sec max)	12VDC nominal input models				25	VDC
	24VDC nominal input models				50	
	48VDC nominal input models				100	
Start-Up Voltage	12VDC nominal input models				9	VDC
	24VDC nominal input models				18	
	48VDC nominal input models				36	
Shutdown Voltage	12VDC nominal input models			8		VDC
	24VDC nominal input models			16		
	48VDC nominal input models			33		
Input Reflected Ripple Current	Nominal Vin and full load			30		mAp-p
Input Filter			Pi type			
<b>OUTPUT SPECIFICATIONS</b>						
Output Voltage			See Table			
Line Regulation	Low line to high line at full load	Single Output Models	-0.2		+0.2	%
		Dual Output Models	-0.5		+0.5	
Load Regulation	No load to full load	Single Output Models	-0.2		+0.2	%
		Dual Output Models	-1.0		+1.0	
	10% Load to 90% Load	Single Output Models	-0.1		+0.1	
		Dual Output Models	-0.8		+0.8	
Cross Regulation (Dual Output Models)	Asymmetrical load 25% to 100% full load		-5		+5	%
Voltage Adjustability ( <i>See Note 6</i> )	Single Output Models	24Vout	-10		+20	%
		Others	-10		+10	
Voltage Accuracy			-1		+1	%
Output Power					20	W
Output Current			See Table			
Ripple & Noise (20MHz Bandwidth)			See Table			
Transient Response Recovery Time	25% load step change			250		µs
Start-Up Time	Nominal Vin and constant resistive load	Power Up			30	ms
		Remote ON/OFF			30	
Minimum Load			0			%
Temperature Coefficient			-0.02		+0.02	%/°C
<b>PROTECTION</b>						
Over Voltage Protection	3.3V output models		3.7		5.4	VDC
	5V output models		5.6		7.0	
	12V output models		13.5		19.6	
	15V output models		16.8		20.5	
	24V output models		29.1		32.5	
Over Load Protection	% of full load at nominal input			150		%
Short Circuit Protection			Continuous, automatic recovery			
<b>GENERAL SPECIFICATIONS</b>						
Efficiency	Nominal Vin and full load		See Table			
Switching Frequency	3.3Vout, 5Vout		248	275	303	KHz
	Others		297	330	363	
Isolation Voltage (1 minute)	Input to Output		1600			VDC
	Input (Output) to Case		1000			
Isolation Resistance	500VDC		1			GΩ
Isolation Capacitance					1500	pF
<b>REMOTE ON/OFF (<i>See Note 7</i>)</b>						
Positive Logic (standard)	DC/DC ON		Open or 3V~ 15V			
	DC/DC OFF		Short or 0V ~ 1.2V			
Negative Logic (option)	DC/DC ON		Short or 0V ~ 1.2V			
	DC/DC OFF		Open or 3V ~ 15V			
Input Current of Remote Control Pin	Nominal Vin		-0.5		+1.0	mA
Remote Off State Input Current	Nominal Vin			2.0		mA

SPECIFICATIONS: JFC20 Series						
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	Nom	Max	Unit
<b>ENVIRONMENTAL SPECIFICATIONS</b>						
Operating Ambient Temperature	Without derating		-40		+60	°C
	With derating		+60		+101	
Maximum Case Temperature					+105	°C
Storage Temperature			-55		+125	°C
Thermal Impedance <i>(See Note 8)</i>	Natural convection			17.6		°C/Watt
	Natural convection with heatsink			14.8		
Relative Humidity (non-condensing)			5		95	% RH
Thermal Shock			MIL-STD-810F			
Vibration			MIL-STD-810F			
MTBF <i>(See Note 1)</i>	MIL-HDBK-217F, Full Load		1, 477, 000 Hours			
<b>PHYSICAL SPECIFICATIONS</b>						
Weight			0.53oz (15g)			
Case Material			Nickel-coated copper			
Base Material			FR4 PCB			
Potting Material			Silicon (UL94-V0)			
Dimensions (L x W x H)			1.0 x 1.0 x 0.39 inches (25.4 x 25.4 x 9.9 mm)			
<b>SAFETY &amp; EMC CHARACTERISTICS</b>						
Safety Approvals			IEC60950-1, UL60950-1 <sup>(12)</sup> , EN60950-1			
EMI <i>(See Note 9)</i>	EN55022		Class A, Class B			
ESD	EN61000-4-2		Air Contact	±8KV ±6KV		Perf. Criteria A
Radiated Immunity	EN61000-4-3		10 V/m		Perf. Criteria A	
Fast Transient <i>(See Note 10)</i>	EN61000-4-4		±2KV		Perf. Criteria A	
Surge <i>(See Note 10)</i>	EN61000-4-5		±2KV		Perf. Criteria A	
Conducted Immunity	EN61000-4-6		10 Vrms		Perf. Criteria A	
Power Frequency Magnetic Field	EN61000-4-8		100A/m continuous; 100A/m 1 second		Perf. Criteria A	

**MODEL SELECTION TABLES**

SINGLE OUTPUT MODELS										
Model Number	Input Voltage Range	Output Voltage	Output Current		Input Current		Output <sup>(4)</sup> Ripple & Noise	Output Power	Efficiency <sup>(4)</sup>	Maximum <sup>(5)</sup> Capacitive Load
			Min. Load	Full Load	No Load <sup>(3)</sup>	Full Load <sup>(2)</sup>				
JFC12S3.3-20	12 VDC (9 – 18 VDC)	3.3 VDC	0mA	4500mA	10mA	1510mA	75mVp-p	14.85W	89%	7000µF
JFC12S5-20		5 VDC	0mA	4000mA	10mA	1960mA	75mVp-p	20W	89%	5000µF
JFC12S12-20		12 VDC	0mA	1670mA	10mA	1960mA	100mVp-p	20W	89%	850µF
JFC12S15-20		15 VDC	0mA	1330mA	10mA	1960mA	100mVp-p	20W	89%	700µF
JFC12S24-20		24 VDC	0mA	833mA	12mA	-	75mVp-p	20W	90%	220µF
JFC24S3.3-20	24 VDC (18 – 36 VDC)	3.3 VDC	0mA	4500mA	10mA	746mA	75mVp-p	14.85W	90%	7000µF
JFC24S5-20		5 VDC	0mA	4000mA	10mA	969mA	75mVp-p	20W	91%	5000µF
JFC24S12-20		12 VDC	0mA	1670mA	6mA	969mA	100mVp-p	20W	90%	850µF
JFC24S15-20		15 VDC	0mA	1330mA	6mA	958mA	100mVp-p	20W	91%	700µF
JFC24S24-20		24 VDC	0mA	833mA	10mA	-	75mVp-p	20W	92%	220µF
JFC48S3.3-20	48 VDC (36 – 75 VDC)	3.3 VDC	0mA	4500mA	10mA	373mA	75mVp-p	14.85W	90%	7000µF
JFC48S5-20		5 VDC	0mA	4000mA	10mA	490mA	75mVp-p	20W	90%	5000µF
JFC48S12-20		12 VDC	0mA	1670mA	4mA	484mA	100mVp-p	20W	90%	850µF
JFC48S15-20		15 VDC	0mA	1330mA	4mA	484mA	100mVp-p	20W	90%	700µF
JFC48S24-20		24 VDC	0mA	833mA	8mA	-	75mVp-p	20W	91%	220µF

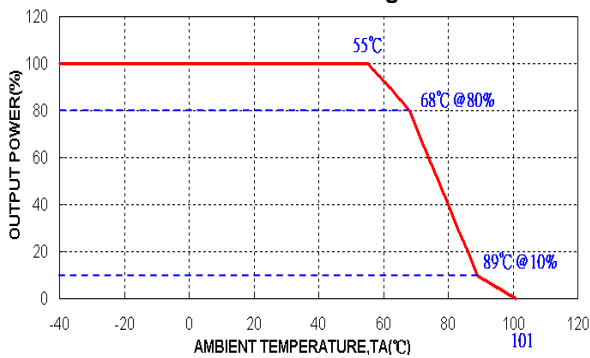
DUAL OUTPUT MODELS										
Model Number	Input Voltage Range	Output Voltage	Output Current		Input Current		Output <sup>(4)</sup> Ripple & Noise	Output Power	Efficiency <sup>(4)</sup>	Maximum <sup>(5)</sup> Capacitive Load
			Min. Load	Full Load	No Load <sup>(3)</sup>	Full Load <sup>(2)</sup>				
JFC12D12-20	12 VDC (9 – 18 VDC)	±12 VDC	0mA	±833mA	10mA	1960mA	100mVp-p	20W	89%	±500µF
JFC12D15-20		±15 VDC	0mA	±667mA	10mA	1938mA	100mVp-p	20W	90%	±350µF
JFC12D24-20		±24 VDC	0mA	±417mA	14mA	-	100mVp-p	20W	90%	±100µF
JFC24D12-20	24 VDC (18 – 36 VDC)	±12 VDC	0mA	±833mA	6mA	969mA	100mVp-p	20W	90%	±500µF
JFC24D15-20		±15 VDC	0mA	±667mA	6mA	969mA	100mVp-p	20W	90%	±350µF
JFC24D24-20		±24 VDC	0mA	±417mA	12mA	-	100mVp-p	20W	91%	±100µF
JFC48D12-20	48 VDC (36 – 75 VDC)	±12 VDC	0mA	±833mA	4mA	490mA	100mVp-p	20W	89%	±500µF
JFC48D15-20		±15 VDC	0mA	±667mA	4mA	484mA	100mVp-p	20W	90%	±350µF
JFC48D24-20		±24 VDC	0mA	±417mA	10mA	-	100mVp-p	20W	91%	±100µF

**NOTES**

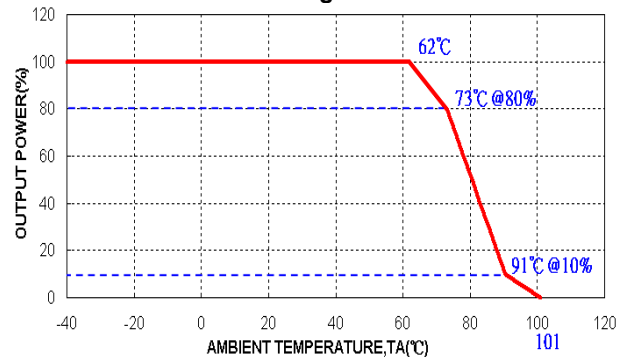
- BELLCORE TR-NWT-000332. Case 1: 50% Stress, Temperature at 40°C. MIL-HDBK-217F Notice2 @Ta=25°C, Full load (Ground, Benign, controlled environment).
- Maximum value at nominal input voltage and full load.
- Typical value at nominal input voltage and no load.
- Single Outputs: 3.3-15V measured with 1µF M/C X7R and a 10µF T/C, 24V measured with 2 pcs of 6.8µF/50V X7R MLCC  
Dual Outputs: 12, 15V measured with 1µF M/C X7R and a 10µF T/C for each output, 24V measured with a 4.7µF/50V X7R MLCC for each output
- Test by minimum Vin and constant resistive load.
- Trimming allows the user to increase or decrease the output voltage set point of the module. This is accomplished by connecting an external resistor between the TRIM pin and either the +Vout pin or the -Vout pin.
- The ON/OFF control pin is referenced to -Vin. To order Negative Logic Remote ON/OFF add the suffix "R" to the model number.
- Heatsink is optional and P/N: 7G-0047C-F. See "Product Standard Table" on page 5 for ordering information.
- EN55022
  - To meet Class A the module needs no external components
  - To meet Class B please refer to the filter suggestion on page 4.
- An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5. The filter capacitor suggested is Nippon chemi-con KY series, 220µF /100V, ESR 48mΩ.
- There are several different options available for this series. Please see the "Product Standard Table" on page 5 for all options and ordering information.
- This product is Listed to applicable standards and requirements by UL.  
CAUTION: This power module is not internally fused. An input line fuse must always be used.  
*Due to advances in technology, specifications subject to change without notice.*

**DERATING CURVES**

**JFC48S5-20 Derating Curve**

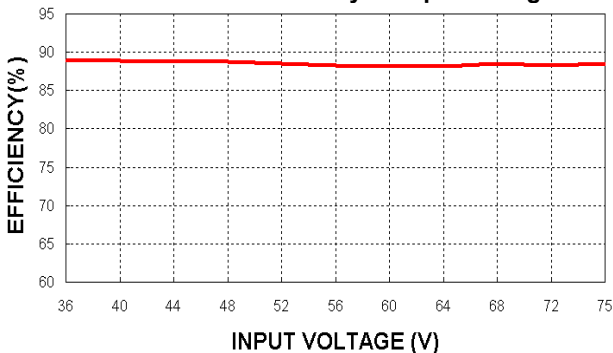


**JFC48S5-20 Derating Curve with Heatsink**

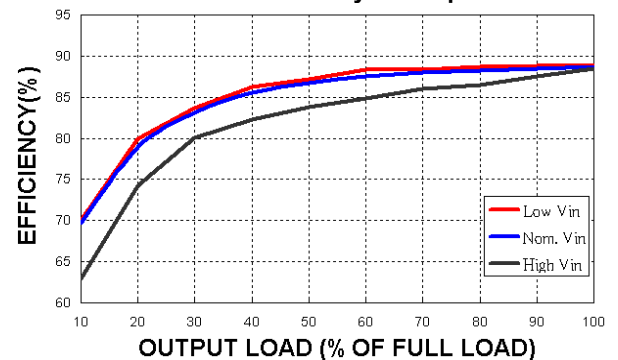


**CHARACTERISTICS**

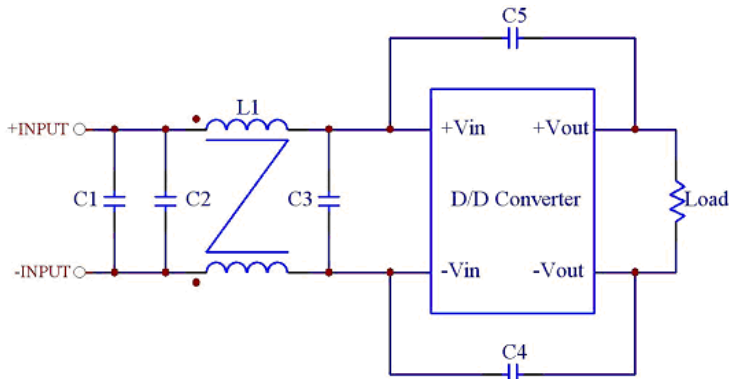
**JFC48S5-20 Efficiency vs Input Voltage**



**JFC48S5-20 Efficiency vs Output Load**



**Recommended Filter for EN55022 Class B Compliance**

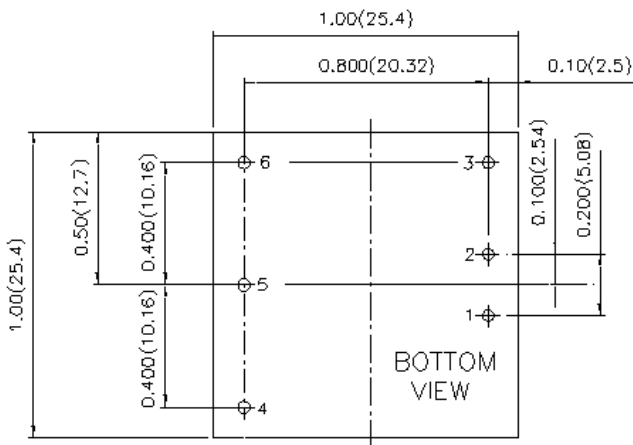
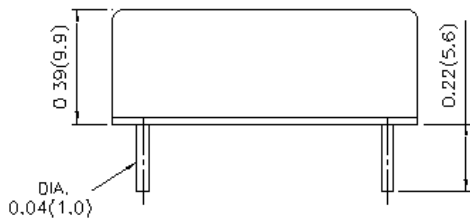


The components used in the figure above are as follows:

	C1, C2	C2	C3	C4 & C5	L1
JFC20-12xxxx	4.7µF/25V 1812 MLCC	N/A	N/A	470pF/2KV 1808 MLCC	325µH Common Choke PMT-050
JFC20-24xxxx	4.7µF/50V 1812 MLCC	N/A	N/A	470pF/2KV 1808 MLCC	325µH Common Choke PMT-050
JFC20-48xxxx	2.2µF/100V 1812 MLCC	2.2µF/100V 1812 MLCC	2.2µF/100V 1812 MLCC	1000pF/2KV 1808 MLCC	325µH Common Choke PMT-050

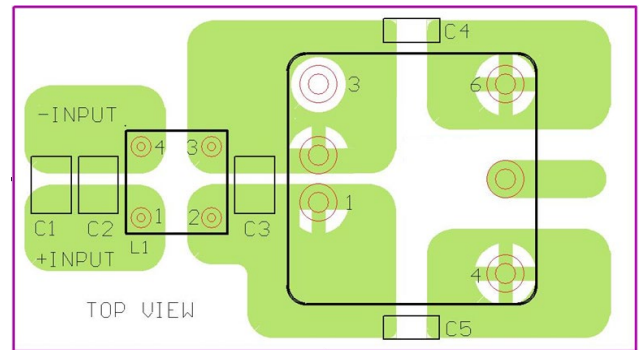
**MECHANICAL DRAWING**

Unit: inches (mm)



1. Tolerance: X.XX±0.02 (X.X±0.5)  
X.XXX±0.01 (X.XX±0.25)
2. Pin Pitch Tolerance: ±0.01 (0.25)

**Recommended EN55022 Class B Filter Circuit Layout**



PIN CONNECTIONS		
Pin	Single	Dual
1	+Input	+Input
2	-Input	-Input
3	ON/OFF	ON/OFF
4	+Vout	+Vout
5	Trim	Common
6	-Vout	-Vout

**EXTERNAL OUTPUT TRIMMING**

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

TRIM UP

TRIM DOWN

PRODUCT STANDARD TABLE	
Option	Suffix
Positive Remote ON/OFF (standard)	No Suffix
Negative Remote ON/OFF	R
Without ON/OFF Pin	D
Without ON/OFF & Trim Pin	G
Positive Remote ON/OFF without Trim Pin	F
Negative Remote ON/OFF without Trim Pin	RF

## 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:

Phone: ☎ (603)778-2300  
Toll Free: ☎ (888)597-9255  
Fax: ☎ (603)778-9797  
E-mail: [sales@wallindustries.com](mailto:sales@wallindustries.com)  
Web: [www.wallindustries.com](http://www.wallindustries.com)  
Address: 37 Industrial Drive  
Exeter, NH 03833

©2019 Wall Industries, Inc. Specifications subject to change without notice. Wall Industries is not responsible for typographical errors. The information contained herein is for informational purposes only. This information is provided by Wall Industries and we make no representations or warranties of any kind, express or implied, about the completeness, accuracy, reliability, suitability or availability with respect to the information contained in this document for any purpose. All product and manufacturer names are trademarks or registered trademarks of their respective companies.