Size: 2.0in x 1.6in x 0.4in (50.8mm x 0.40mm x 10.2mm)

OPTIONS

- Heatsink ("HS" Suffix)
- Negative Remote ON/OFF ("R" Suffix)
- Special Electrical Screening ("ES" Suffix)
- Case connected to -Vout pin for improved shielding ("-C Suffix)

FEATURES

- High Efficiency up to 88%
- Fixed Switching Frequency
- Six-Sided Continuous Shield
- 4:1 Wide Input Voltage Range
- Single and Dual Outputs Available
- Standard 2.0" x 1.6" x 0.4" Package
- PCB Mountable
- Heatsink Available
- ISO9001 Certified Manufacturing Facilities
- RoHS II & REACH Compliant
- UL60950-1, EN60950-1, and IEC60950-1 Safety Approvals
- CE Marked
- Over Voltage, Over Load, Over Temperature and Short Circuit Protection
- Negative Remote ON/OFF available
- Electrical Screening available

APPLICATIONS

- Wireless Network
- Telecom/Datacom
- Industry Control System
- Measurement Equipment
- Semiconductor Equipment

DESCRIPTION

The ZFW series of high efficiency DC/DC converters provide up to 30 watts of output power. This series has single and dual output models available. These converters are ideal for telecom and networking applications. The ZFW series is designed for a 4:1 input range, either nominal 24VDC (10VDC-40VDC), or nominal 48VDC (18VDC-75VDC). These units are also PCB mountable, with a package size of 2" x 1.6" x 0.4". Standard specifications include L-C type input filter, external trim of ±10%, excellent load regulation, and short-circuit protection. The isolation voltage meets standard telecom requirements of >1600VDC. Special electrical screening ("ES" suffix) is also available please call factory for more details.

MODEL SELECTION TABLE

Single Output

Model Number	Input Voltage Range	Output Voltage	Output Current		Ripple & Noise(1)	Input Current		Output Power	Maximum Capacitive Load(4)	Efficiency(1)	UL Approval(11)
			Min Load	Max Load		No Load(2)	Full Load(3)				
ZFW24S1.5-8000	24VDC (10~40VDC)	1.5VDC	0mA	8000mA	60mVp-p	35mA	658mA	30W	65,000µF	80%	-
ZFW24S1.8-8000		1.8VDC	0mA	8000mA	60mVp-p	35mA	759mA		65,000µF	83%	UL60950-1
ZFW24S2.5-8000		2.5VDC	0mA	8000mA	60mVp-p	40mA	1029mA		33,000µF	85%	UL60950-1
ZFW24S3.3-6000		3.3VDC	0mA	6000mA	60mVp-p	50mA	994mA		19,500µF	87%	UL60950-1
ZFW24S5-6000		5VDC	0mA	6000mA	75mVp-p	65mA	1506mA		10,200µF	87%	UL60950-1
ZFW24S12-2500		12VDC	0mA	2500mA	100mVp-p	65mA	1506mA		3,300µF	87%	UL60950-1
ZFW24S15-2000		15VDC	0mA	2000mA	100mVp-p	70mA	1488mA		1,100µF	88%	UL60950-1
ZFW48S1.5-8000	48VDC (18~75VDC)	1.5VDC	0mA	8000mA	60mVp-p	20mA	329mA	30W	65,000µF	80%	-
ZFW48S1.8-8000		1.8VDC	0mA	8000mA	60mVp-p	20mA	380mA		65,000µF	83%	UL60950-1
ZFW48S2.5-8000		2.5VDC	0mA	8000mA	60mVp-p	25mA	508mA		33,000µF	86%	UL60950-1
ZFW48S3.3-6000		3.3VDC	0mA	6000mA	60mVp-p	30mA	497mA		19,500µF	87%	UL60950-1
ZFW48S5-6000		5VDC	0mA	6000mA	75mVp-p	30mA	744mA		10,200µF	88%	UL60950-1
ZFW48S12-2500		12VDC	0mA	2500mA	100mVp-p	35mA	753mA		3,300µF	87%	UL60950-1
ZFW48S15-2000		15VDC	0mA	2000mA	100mVp-p	45mA	744mA		1,100µF	88%	UL60950-1

MODEL SELECTION TABLE

Dual Output

Model Number	Input Voltage Range	Output Voltage	Output Current		Ripple & Noise(1)	Input Current		Output Power	Maximum Capacitive Load(4)	Efficiency(1)	UL Approval(11)
			Min Load	Max Load		No Load(2)	Full Load(3)				
ZFW24D12-1250	24VDC (10~40VDC)	±12VDC	0mA	±1250mA	100mVp-p	30mA	1563mA	30W	±1000μF	84%	-
ZFW24D15-1000		±15VDC	0mA	±1000mA	100mVp-p	35mA	1543mA		±680μF	85%	-
ZFW48D12-1250	48VDC (18~75VDC)	±12VDC	0mA	±1250mA	100mVp-p	30mA	772mA	30W	±1000μF	85%	-
ZFW48D15-1000		±15VDC	0mA	±1000mA	100mVp-p	35mA	762mA		±680μF	86%	-

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	24V Nominal input		10	24	40	VDC
	48V Nominal input		18	48	75	
Start-Up Voltage	24V Nominal input				10	VDC
	48V Nominal input				18	
Shutdown Voltage	24V Nominal input			8		VDC
	48V Nominal input			16		
Input Surge Voltage (100ms Max.)	24V nominal input				50	VDC
	48V nominal input				100	
Input Reflected Ripple Current				20		mAp-p
Input Filter				L-C type		
OUTPUT SPECIFICATIONS						
Output Voltage				See Table		
Voltage Accuracy			-1.0		+1.0	%
Line Regulation	Low Line to High Line at Full Load		-0.5		+0.5	%
Load Regulation	No Load to Full Load	Single Output	-0.5		+0.5	%
		Dual Output	-1.0		+1.0	
Voltage Adjustability			-10		+10	%
Cross Regulation	Asymmetrical load 25%/100% FL	Dual Output	-5.0		+5.0	%
Output Power				See Table		
Output Current				See Table		
Minimum Load			0			A
Maximum Capacitive Load				See Table		
Ripple & Noise	20MHz bandwidth with a 0.1μF/50V MLCC	1.5V, 1.8V, 2.5V, 3.3V Models		60		mVp-p
		5V Models		75		
		12V, 15V Models		100		
Transient Response Recovery Time	25% load step change		-0.02		+0.02	%/ºC
Start-Up Time	Constant Resistive Load	Power up		10		ms
		Remote ON/OFF		10		
Temperature Coefficient			-0.02		+0.02	%/ºC
REMOTE ON/OFF CONTROL(5)						
Positive Logic (Standard)	DC-DC ON			Open 3~12VDC		
	DC-DC OFF			Short or 0~1.2VDC		
Negative Logic (Option)	DC-DC ON			Short or 0~1.2VDC		
	DC-DC OFF			Open or 3~12VDC		
Input Current of CTRL Pin			-0.5		+0.5	mA
Remote OFF Input Current				3.0		mA
PROTECTION						
Short Circuit Protection				Continuous, Automatic Recovery		
Over Load Protection	% of Iout rated				150	%
Over Voltage Protection	Zener Diode Clamp	1.5V, 1.8V, 2.5V, 3.3V Models		3.9		VDC
		5V Models		6.2		
		12V Models		15		
		15V Models		18		
Over Temperature Protection				+155		ºC

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
ENVIRONMENTAL SPECIFICATIONS					
Operating Ambient Temperature	With Derating	-40		+85	ºC
Storage Temperature		-55		+125	ºC
Maximum Case Temperature				+100	ºC
Thermal Impedance(7)	Natural Convection		10		ºC/W
	Natural Convection with Heatsink		8.24		
Relative Humidity		5		95	% RH
Thermal Shock		MIL-STD-810F			
Vibration		MIL-STD-810F			
MTBF	MIL-HDBK-217F, Full Load		759,800		hours
GENERAL SPECIFICATIONS					
Efficiency		See Table			
Switching Frequency		270	300	330	KHz
Isolation Voltage (1 minute)	Input to Output	1600			VDC
	Input to Case	1600			
	Output to Case	1600			
Isolation Resistance	500VDC	1			GΩ
Isolation Capacitance				1000	pF
PHYSICAL SPECIFICATIONS					
Weight		1.69oz (48g)			
Dimensions (L x W x H)		2.00in x 1.60in x 0.40in (50.8mm x 40.6mm x 10.2mm)			
Case Material		Nickel-Coated Copper			
Base Material		FR4 PCB			
Potting Material		Epoxy (UL94 V-0)			
Shielding		Six-Sided			
SAFETY & EMC CHARACTERISTICS					
Safety Approvals	UL60950-1(11) EN60950-1 IEC60950-1				
EMI(6)	EN55022				Class A Class B
ESD	EN61000-4-2	Air ±8kV Contact ±6kV			Perf. Criteria B
Radiated Immunity	EN61000-4-3	10 V/m			Perf. Criteria A
Fast Transient(8)	EN61000-4-4	±2KV			Perf. Criteria A
Surge(8)	EN61000-4-5	±1kV			Perf. Criteria B
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

NOTES

(1) Typical value at nominal input voltage and full load.
(2) Typical value at nominal input voltage and no load.
(3) Maximum value at nominal input voltage and full load
(4) Test by minimum Vin and constant resistive load.
(5) ON/OFF control function: The pin voltage is referenced to negative input. To order negative logic ON/OFF control add the suffix “R”.
(6) The ZFW series can meet EN55022 Class A with an external capacitor in parallel with the input pins.
Recommended: 24Vin: 6.8µF/50V 1812 MLCC
48Vin: 2.2µF/100V * 2PCS 1812 MLCC
(7) Heatsink is optional. Please call factory for ordering details.
(8) An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5.
Suggested filter capacitor: Nippon chemi-con KY series, 220µF/100V, ESR 48mΩ.
(9) Option to have case connected to -Vout pin for improved shielding, add the suffix “-C” to the part number and consult factory.
(10) For special electrical screening add the suffix “ES” to the part number (see Appendix I on the bottom of page 5). Please call factory for more details.
(11) UL approval can be added to any products not currently listed if required.
Due to advances in technology, specifications subject to change without notice.

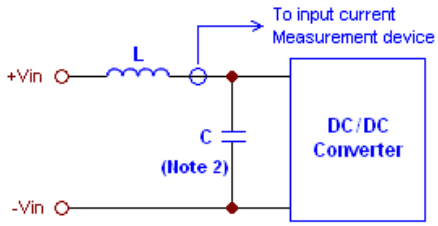
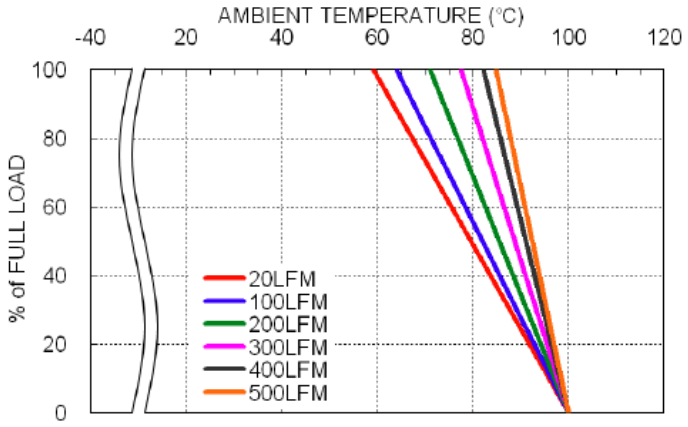


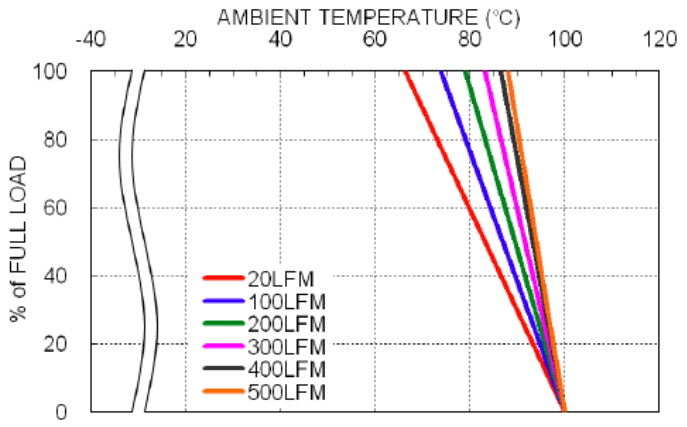
Figure 1

DERATING CURVES

ZFW48S5-6000 Derating Curve

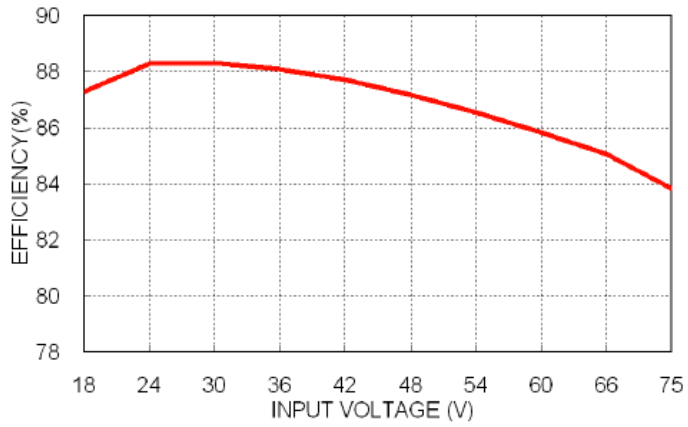


ZFW48S5-6000 Derating Curve with Heatsink

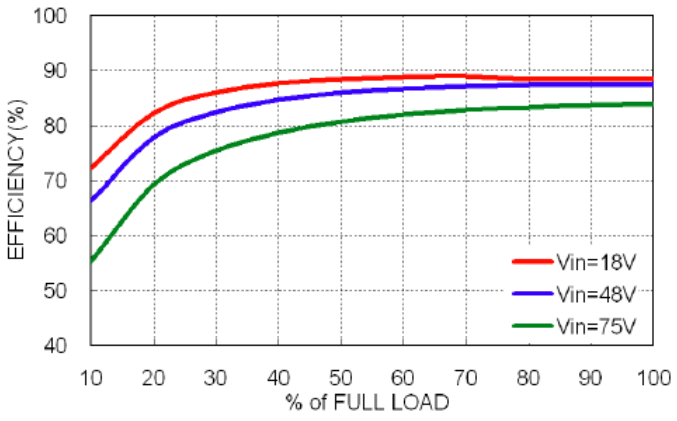


EFFICIENCY GRAPHS

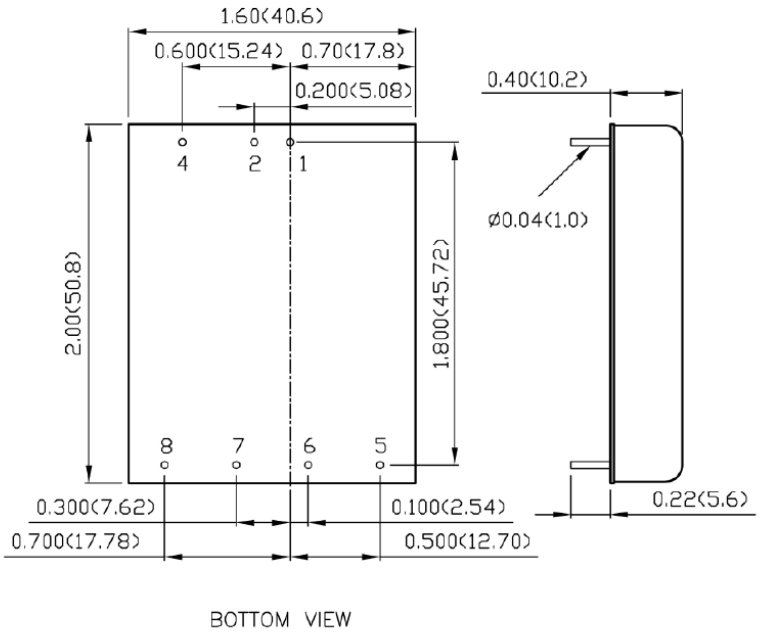
ZFW48S5-6000 Efficiency vs Input Voltage



ZFW48S5-6000 Efficiency vs Output Load



MECHANICAL DRAWINGS

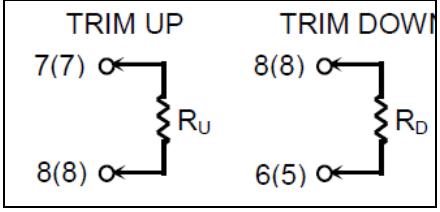


PIN CONNECTION

PIN	SINGLE	DUAL
1	+Vin	+Vin
2	-Vin	-Vin
4	Ctrl	Ctrl
5	No Pin	+Vout
6	+Vout	Common
7	-Vout	-Vout
8	Trim	Trim

EXTERNAL OUTPUT TRIMMING

Output can be externally trimmed by using the method shown below. ( ) for dual output trim.

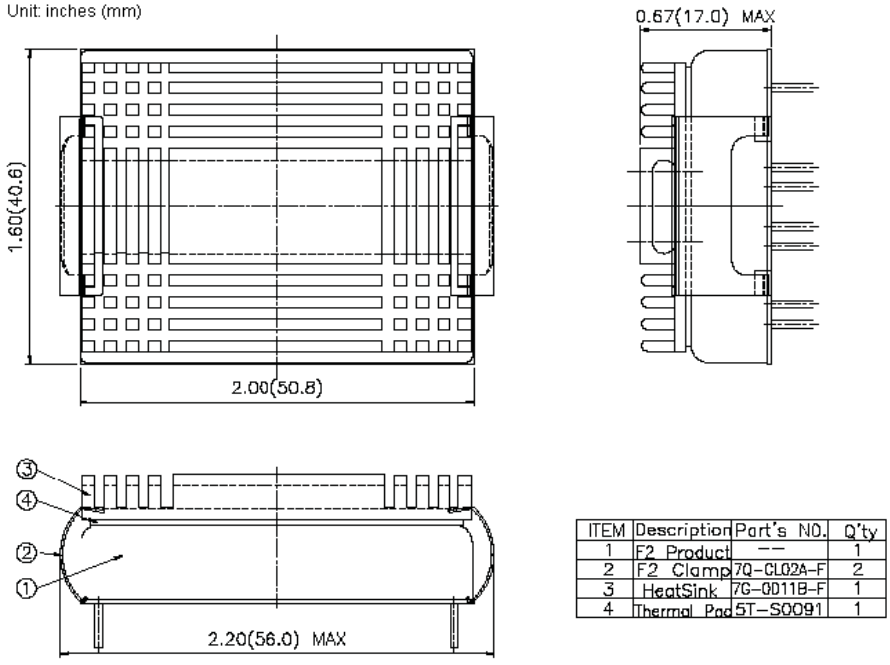


Notes:

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 pitch tolerance ±0.01 (0.25)
4. Pin dimension tolerance ±0.004 (0.1)

HEATSINK OPTIONS

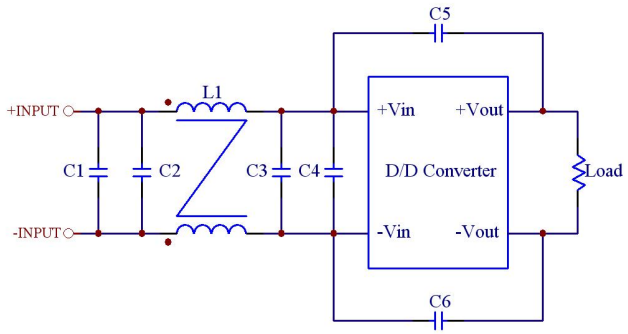
Suffix “HS”



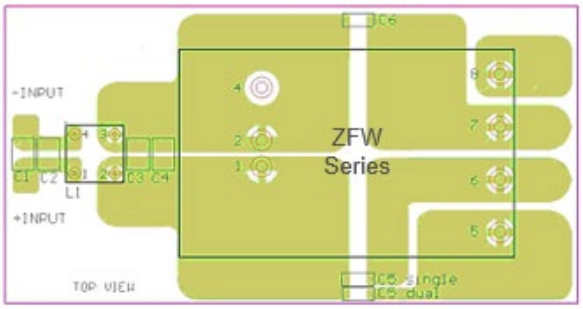
ITEM	Description	Part's NO.	Q'ty
1	F2 Product	--	1
2	F2 Clamp	7Q-CL02A-F	2
3	HeatSink	7G-0011B-F	1
4	Thermal Pad	5T-S0091	1

RECOMMENDED FILTERS

Recommended Filter for EN55022 Class B Compliance



Recommended EN55022 Class B Filter Circuit Layout



The components used in the figure above are as follows:

Model	C1	C2	C3	C4	C5 & C6	L1
ZFW24xxx-xxxx	6.8uF/50V	N/A	6.8uF/50V	N/A	1000pF/2KV	450uH Common Choke
ZFW48xxx-xxxx	2.2uF/100V	2.2uF/100V	2.2uF/100V	2.2uF/100V	1000pF/2KV	450uH Common Choke

APPENDIX I

1. Electrical Screening ("ES" suffix) All parts will be 100% screened by the supplier to the following requirements, in the sequence specified.

   1.1 Thermal Shock Thermal shock in accordance with MIL-STD-810, method 503.4, Procedure I, temperature extremes -46ºC (-50ºF) and +71ºC (+160ºF). Allow parts to stabilize to chamber temperature. Perform 30 thermal shock cycles.

   1.2 Functional Test Perform functional test with the part loaded to 50% minimum load capacity and input voltage set to 28VDC ±1V. After 5 minutes of applied power and load, measure and record input current, output voltage and output current. Verify that the results are within the allowable specification for each part.

   1.3 Burn-In Perform functional test in accordance with 1.2. Keep the part powered on for a period of (24) hours. After (24) hours, perform functional test in accordance with 1.2.

   1.4 Power Cycling Perform functional test in accordance with 1.2. Remove power from the converter for (15) minutes, then repeat functional test. Repeat this power cycling with functional testing every (15) minutes for a period of (3) hours.

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.

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