Heatsink with Clamp Option

Size: 1.0in x 1.0in x 0.39in (25.4mm x 25.4mm x 9.9mm)

OPTIONS

- Negative Logic Remote On/Off
- Without Trim
- Without On/Off Pin
- Input Voltage
- Output Voltage
- Heatsink

APPLICATIONS

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

FEATURES

- Input Voltage of 9~36VDC or 18~75VDC
- Six-Sided Shielding
- High Efficiency up to 91%
- 1600VDC Input to Output Isolation
- 4:1 Ultra Wide Input Voltage Range
- Compliant to RoHS & Reach
- No Min. Load Required
- Small Size and Low Profile: 1” x 1” x 0.39”
- IEC/UL/EN 60950-1. 62368-1 Safety Approvals
- CE Marked
- Over Current, Short Circuit, and Over Voltage Protection
- Single and Dual Outputs Available
- Negative Logic Remote On/Off Optional

DESCRIPTION

The JFCW series of single and dual output DC DC converters provide up to 15 watts output power in an industry standard package and footprint. These units are specifically designed to meet power needs in a low profile package. All models feature a 4:1 wide input voltage range of 9~36VDC or 18~75VDC. Some features include positive or negative remote on/off, 1600VDC I/O isolation, and no minimum load requirement. All models are protected against over current, over voltage, and short circuit conditions and have IEC/UL/EN 60950-1, 62368-1 safety approvals.

MODEL SELECTION TABLE

Single Output Models

Model Number(1)	Input Voltage Range	Output Voltage	Output Current	Ripple & Noise	No Load Input Current	Output Power	Maximum Capacitive Load	Efficiency
JFCW24S3.3-4000	9~36VDC (24VDC)	3.3VDC	4000mA	75mVp-p	45mA	Up to 15W	12000µF	86%
JFCW24S5-3000		5VDC	3000mA	75mVp-p	70mA		6000µF	86%
JFCW24S12-1300		12VDC	1300mA	100mVp-p	20mA		1000µF	87%
JFCW24S15-1000		15VDC	1000mA	100mVp-p	20mA		660µF	87%
JFCW24S24-625		24VDC	625mA	100mVp-p	12mA		200µF	90%
JFCW48S3.3-4000	18~75VDC (48VDC)	3.3VDC	4000mA	75mVp-p	25mA	Up to 15W	12000µF	86%
JFCW48S5-3000		5VDC	3000mA	75mVp-p	35mA		6000µF	87%
JFCW48S12-1300		12VDC	1300mA	100mVp-p	12mA		1000µF	87%
JFCW48S15-1000		15VDC	1000mA	100mVp-p	12mA		660µF	87%
JFCW48S24-625		24VDC	625mA	100mVp-p	10mA		200µF	91%

MODEL SELECTION TABLE

Dual Output Models

Model Number(1)	Input Voltage Range	Output Voltage	Output Current @Full Load	Ripple & Noise	No Load Input Current	Output Power	Maximum Capacitive Load	Efficiency
JFCW24D5-1500	9~36 (24VDC)	±5VDC	±1500mA	100mVp-p	20mA	Up to 15W	±3000µF	85%
JFCW24D12-625		±12VDC	±625mA	100mVp-p	20mA		±520µF	87%
JFCW24D15-500		±15VDC	±500mA	100mVp-p	20mA		±330µF	88%
JFCW24D24-315		±24VDC	±315mA	100mVp-p	15mA		±100µF	91%
JFCW48D5-1500	18~75 (48VDC)	±5VDC	±1500mA	100mVp-p	12mA	Up to 15W	±3000µF	85%
JFCW48D12-625		±12VDC	±625mA	100mVp-p	15mA		±520µF	86%
JFCW48D15-500		±15VDC	±500mA	100mVp-p	20mA		±330µF	87%
JFCW48D24-315		±24VDC	±315mA	100mVp-p	10mA		±100µF	91%

SPECIFICATIONS

All specifications are typical at 25°C, Nominal Input, and Full Load unless otherwise noted.
We reserve the right to change specifications based on technological advances.

SPECIFICATION	TEST CONDITIONS			Min	Typ	Max	Unit
INPUT SPECIFICATIONS							
Operating Input Voltage Range	24Vin(nom)			9	24	36	VDC
	48Vin(nom)			18	48	75	
Start-Up Voltage	24Vin(nom)					9	VDC
	48Vin(nom)					18	
Shutdown Voltage	24Vin(nom)			7	8	8.8	VDC
	48Vin(nom)			14.5	15.5	17.5	
Input Surge Voltage	100ms, max.		24Vin(nom)			50	VDC
			48Vin(nom)			100	
Input Filter				Pi Type			
OUTPUT SPECIFICATIONS							
Output Voltage				See Table			
Voltage Accuracy				-1.0		+1.0	%
Line Regulation	Low Line to High Line at Full Load		Single	-0.2		+0.2	%
			Dual	-0.5		+0.5	
Load Regulation	No Load to Full Load		Single	-0.2		+0.2	%
			Dual	-1.0		+1.0	
Voltage Adjustability	Single Output		5Vout with "V' Suffix	-10		+20	%
			24Vout	-10		+20	
			All Others	-10		+10	
Cross Regulation	Asymmetrical load 25%/100% FL, Dual			-5.0		+5.0	%
Output Power				See Table			
Output Current				See Table			
Maximum Capacitive Load				See Table			
Ripple & Noise (20MHz bandwidth)			Single				mVp-p
	With a 1µF M/C X7R and a 10µF T/C		3.3Vout, 5Vout		75		
	With a 1µF M/C X7R and a 10µF T/C		12Vout, 15Vout		100		
	With a 6.8µF/50V X7R MLCC		24Vout		100		
			Dual				
	With a 4.7µF/50V X7R MLCC for each output		24Vout		100		
	With a 1µF M/C X7R and a 10µF T/C for each output		Others		100		
Transient Response Recovery Time	25% Load Step Change				250		µS
Start-Up Time	Constant Resistive Load		Power Up			30	ms
			Remote On/Off			30	
Temperature Coefficient				-0.02		+0.02	%/ºC
REMOTE ON/OFF CONTROL							
Positive Logic (Standard)	Referred to –Vin pin	DC-DC On		Open or 3~15VDC			
		DC-DC Off		Short or 0~1.2VDC			
Negative Logic (Option)	Referred to –Vin pin	DC-DC On		Short or 0~1.2VDC			
		DC-DC Off		Open or 3~15VDC			
Input Current of CTRL Pin				-0.5		1.0	mA
Remote OFF Input Current					2.5		mA
PROTECTION							
Short Circuit Protection				Continuous, Automatic Recovery			
Over Load Protection	% of Iout rated; Hiccup mode				150		%
Over Voltage Protection	3.3Vout			3.7		5.4	VDC
	5Vout			5.6		7.0	
	5Vout with "V' Suffix			6.3		7.4	
	12Vout			13.5		19.6	
	15Vout			16.8		20.5	
	24Vout			29.1		32.1	
ENVIRONMENTAL SPECIFICATIONS							
Operating Ambient Temperature	Without Derating			-40		+105	ºC
Maximum Case Temperature						105	ºC
Storage Temperature Range				-55		+125	ºC
Relative Humidity				5		95	%RH
Thermal Shock				MIL-STD-810F			
Thermal Impedance	Without Heat-Sink				18.2		ºC/W
	With Heat-Sink				15.8		
Vibration				MIL-STD-810F			
MTBF	MIL-HDBK-217F, Full Load			1.459 x 10^6 hrs			

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
GENERAL SPECIFICATIONS						
Efficiency				See Table		
Switching Frequency			360	400	440	kHz
Isolation Voltage	1 minute	Input to Output	1600			VDC
		Input (Output) to Case	1000			
Isolation Resistance	500VDC		1			GΩ
Isolation Capacitance					1000	pF
PHYSICAL SPECIFICATIONS						
Weight				0.53oz (15g)		
Dimensions (L x W x H)				1in x 1in x 0.39in (25.4mm x 25.4mm x 9.9mm)		
Case Material				Nickel-Coated Copper		
Base Material				FR4 PCB		
Potting Material				Epoxy (UL94 V-0)		
Pin Material				Copper		
Pin Foundation Plating/Thickness				Nickel/2-3µm		
Pin Surface/Thickness				Tin/3-5µm		
Pin Finishing				Matte		
SAFETY & EMC CHARACTERISTICS						
Safety Approvals		IEC/UL/EN60950-1, 62368-1(2)				CB: UL (Demko)
EMI		EN55032 with External Components				Class A, Class B
ESD	EN61000-4-2	Air ±8kV and Contact ±6kV				Perf. Criteria A
Radiated Immunity	EN61000-4-3	10 V/m				Perf. Criteria A
Fast Transient(3)	EN61000-4-4	±2kV				Perf. Criteria A
Surge(3)	EN61000-4-5	±1kV				Perf. Criteria A
Conducted Immunity	EN61000-4-6	3 Vr.m.s				Perf. Criteria A
Power Frequency Magnetic Field	EN61000-4-8	100A/m continuous; 1000A/m 1 second				Perf. Criteria A

NOTES

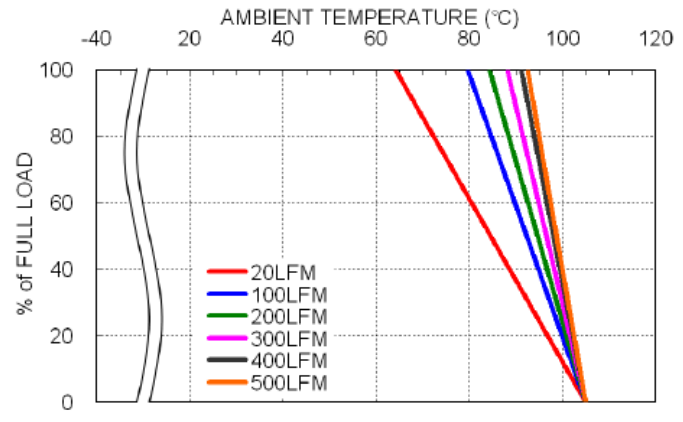
(1) Add "V" to end of 5V models for -10 ~ +20% adjustability.
(2) This product is Listed to applicable standards and requirements by UL.
(3) With an external input filter capacitor (Nippon chemi-con KY series, 220µF/100V)

CAUTION: This power module is not internally fused. An input line fuse must always be used.

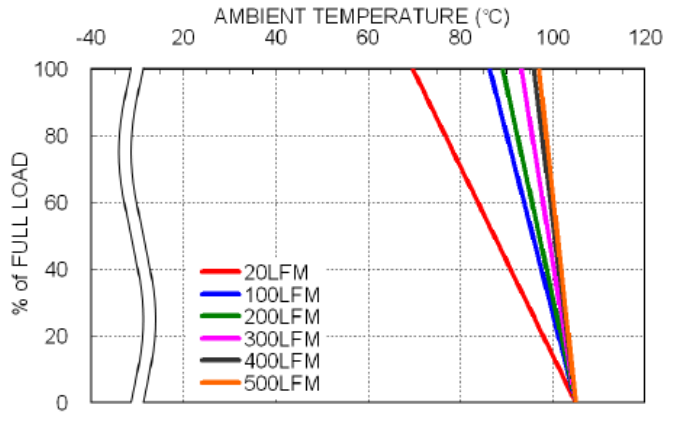
**Due to advances in technology, specifications subject to change without notice.*

DERATING CURVES

JFCW48S5-3000 Derating Curve

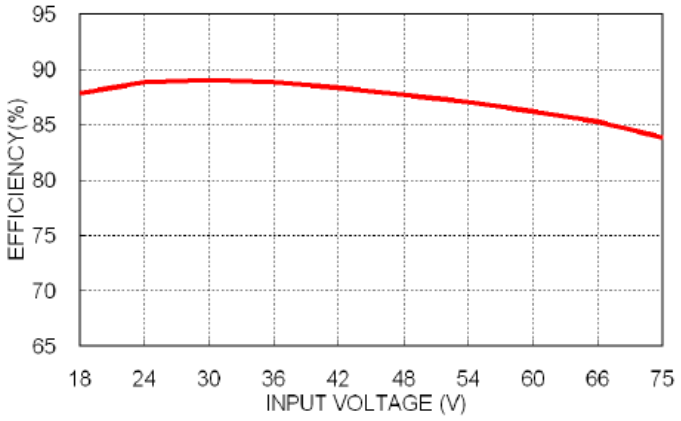


JFCW48S5-3000 Derating Curve with Heat-Sink

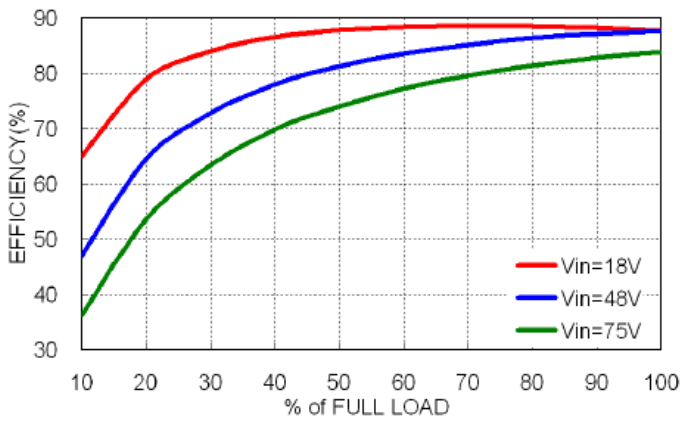


EFFICIENCY GRAPHS

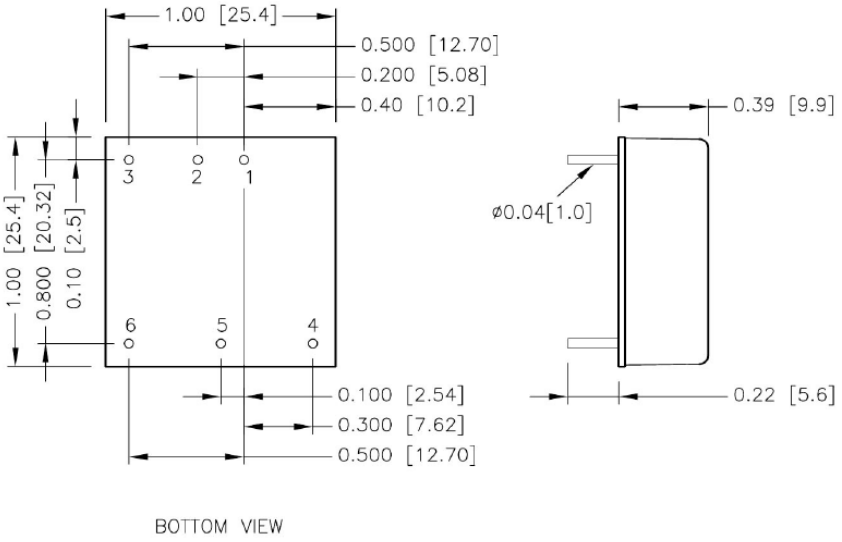
JFCW48S5-3000 Efficiency vs. Input Voltage



JFCW48S5-3000 Efficiency vs. Output Load



MECHANICAL DRAWINGS

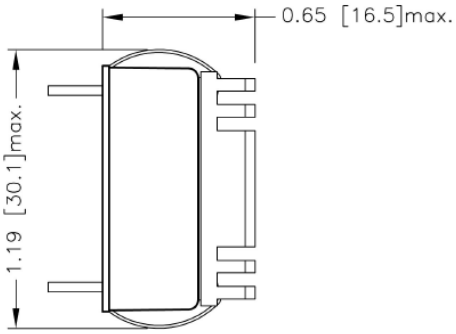


PIN Connection

PIN	SINGLE	DUAL
1	+Vin	+Vin
2	-Vin	-Vin
3	Ctrl	Ctrl
4	+Vout	+Vout
5	Trim	Common
6	-Vout	-Vout

1. All dimensions in inch (mm)
2. Tolerance: x.xx±0.02 (x.xx±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 Option



Dimensions in inch (mm)

FUSE CONSIDERATION

This power module is not internally fused. An input line fuse must always be used.
This encapsulated power module can be used in a wide variety of applications, ranging from simple stand-alone operation to an integrated part of sophisticated power architecture.
To maximize flexibility, internal fusing is not included; however to achieve maximum safety and system protection, always use an input line fuse.

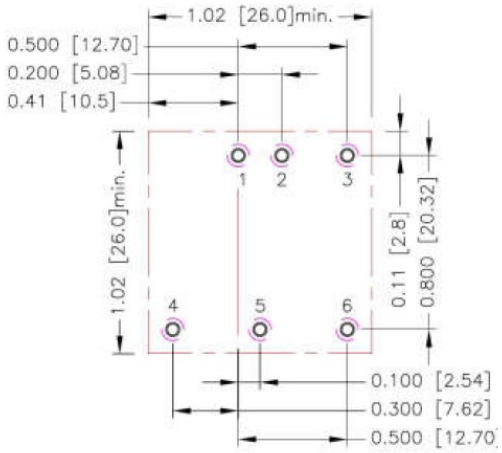
Suggested input line fuse is below:

Model	Fuse Rating (A)	Fuse Type
24Vin Nominal Input	3.15	Slow-Blow
48Vin Nominal Input	1.6	Slow-Blow

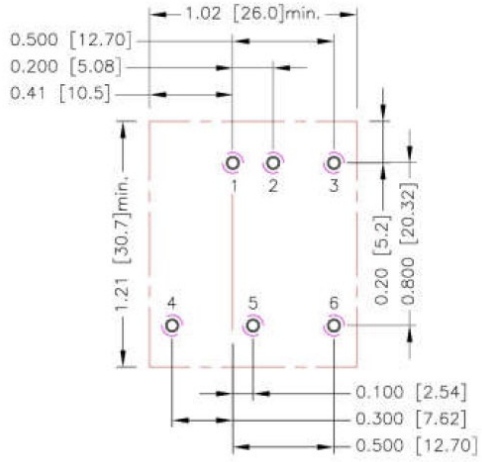
The table is based on the information provided in this data sheet on inrush energy and maximum DC input current at low Vin.

RECOMMENDED PAD LAYOUT

Standard



Heatsink

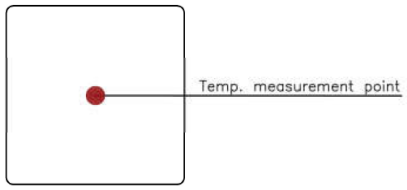


All dimensions in inch [mm]
Pad size (lead free recommended)
Through hole 1.2.3.4.5.6: ϕ0.051[1.30]
Top View Pad 1.2.3.4.5.6: ϕ0.064[1.63]
Bottom View Pad 1.2.3.4.5.6: ϕ0.102[2.60]

THERMAL CONSIDERATIONS

The power module operates in a variety of thermal environments.
However, sufficient cooling should be provided to ensure reliable operation of the unit.
Heat is removed by conduction, convection, and radiation to the surrounding environment.
Proper cooling can be verified by measuring the point in the figure below.
The temperature at this location should not exceed “Maximum Case Temperature.”
When operating, adequate cooling must be provided to maintain the test point temperature at or below “Maximum case temperature.”
You can limit this temperature to a lower value for extremely high reliability.

■ Thermal test condition with vertical direction by natural convection (20LFM)



TOP VIEW

OUTPUT VOLTAGE ADJUSTMENT

Output Voltage Adjustment

Output voltage set point adjustment 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 +OUTPUT or –OUTPUT pins. With an external resistor between the TRIM and –OUTPUT pin, the output voltage set point increases. With an external resistor between the TRIM and +OUTPUT pin, the output voltage set point decreases. The external TRIM resistor needs to be at least 1/16W of rated power.

Trim Up Equation

$$R_U = \left[\frac{G \times L}{(V_{O,up} - L - K)} - H\right]\Omega$$

Trim Down Equation

$$R_D = \left[\frac{(V_{o,down} - L) \times G}{(V_o - V_{o,down})} - H\right]\Omega$$

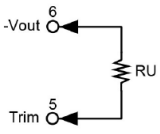
Trim Constants

Module	G	H	K	L
JFCWxxS3.3-xxxx	5110	2050	0.8	2.5
JFCWxxS5-xxxx	5110	2050	2.5	2.5
JFCWxxS5-xxxxV	5110	2050	2.5	2.5
JFCWxxS12-xxxx	10000	5110	9.5	2.5
JFCWxxS15-xxxx	10000	5110	12.5	2.5
JFCWxxS24-xxxx	56000	13000	21.5	2.5

External Output Trimming

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

Trim Up



JFCWxxS3.3-xxxx TRIM-UP

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	3.333	3.366	3.399	3.432	3.465	3.498	3.531	3.564	3.597	3.630
RU (kΩ)	385.071	191.511	126.990	94.730	75.374	62.470	53.253	46.963	40.963	36.662

JFCWxxS5-xxxx TRIM-UP

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	5.050	5.100	5.150	5.200	5.250	5.300	5.350	5.400	5.450	5.500
RU (kΩ)	253.450	125.700	83.117	61.825	49.050	40.533	34.450	29.888	26.339	23.500

JFCWxxS5-xxxxV TRIM-UP

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	5.050	5.100	5.150	5.200	5.250	5.300	5.350	5.400	5.450	5.500
RU (kΩ)	253.450	125.700	83.117	61.825	49.050	40.533	34.450	29.888	26.339	23.500

ΔV (%)	11	12	13	14	5	16	17	18	19	20
Vout (V)	5.550	5.600	5.650	5.700	5.750	5.800	5.850	5.900	5.950	6.000
RU (kΩ)	21.177	19.242	17.604	16.200	14.983	13.919	12.979	12.144	11.397	10.725

JFCWxxS12-xxxx TRIM-UP

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	12.120	12.240	12.360	12.480	12.600	12.720	12.840	12.960	13.080	13.200
RU (kΩ)	203.223	99.057	64.334	46.973	36.557	29.612	24.652	20.932	18.038	15.723

JFCWxxS15-xxxx TRIM-UP

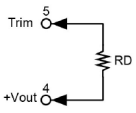
ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	15.150	15.300	15.450	15.600	15.750	15.900	16.050	16.200	16.350	16.500
RU (kΩ)	161.557	78.223	50.446	36.557	28.223	22.668	18.700	15.723	13.409	11.557

JFCWxxS24-xxxx TRIM-UP

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	24.240	24.480	24.720	24.960	25.200	25.440	25.680	25.920	26.160	26.400
RU (kΩ)	570.333	278.667	181.444	132.833	103.667	84.222	70.333	59.917	51.815	45.333

ΔV (%)	11	12	13	14	15	16	17	18	19	20
Vout (V)	26.640	26.880	27.120	27.360	27.600	27.840	28.080	28.320	28.560	28.800
RU (kΩ)	40.030	35.611	31.872	28.667	25.889	23.458	21.314	19.407	17.702	16.167

Trim Down



JFCWxxS3.3-xxxx TRIM-DOWN

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	3.267	3.234	3.201	3.168	3.135	3.102	3.069	3.036	3.003	2.970
RD (kΩ)	116.719	54.779	34.133	23.810	17.616	13.486	10.537	8.325	6.604	5.228

JFCWxxS5-xxxx & JFCWxxS5-xxxxV TRIM-DOWN

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	4.950	4.900	4.850	4.800	4.750	4.700	4.650	4.600	4.550	4.500
RD (kΩ)	248.340	120.590	78.007	56.715	43.940	35.423	29.340	24.778	21.229	18.390

JFCWxxS12-xxxx TRIM-DOWN

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	11.880	11.760	11.640	11.520	11.400	11.280	11.160	11.040	10.920	10.800
RD (kΩ)	776.557	308.723	248.779	182.807	143.223	116.834	97.985	83.848	72.853	64.057

JFCWxxS15-xxxx TRIM-DOWN

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	14.850	14.700	14.550	14.400	14.250	14.000	13.750	13.500	13.250	13.000
RD (kΩ)	818.223	401.557	262.668	193.223	151.557	123.779	103.938	89.057	77.483	68.223

JFCWxxS24-xxxx TRIM-DOWN

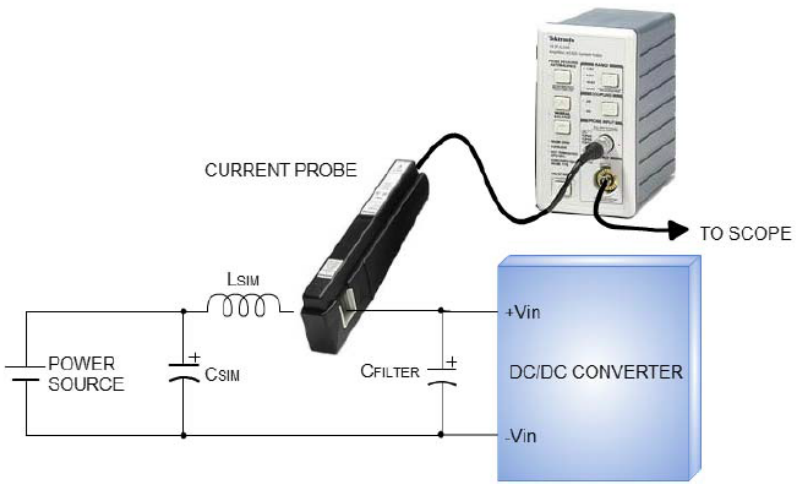
ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	23.760	23.520	23.280	23.040	22.800	22.560	22.320	22.080	21.840	21.600
RD (kΩ)	4947.667	2439.333	1603.222	1185.167	934.333	767.111	647.667	558.083	488.407	432.667

Input Source Impedance

The power module should be connected to a low impedance input source. Highly inductive source impedance can affect the stability of the power module.

Install C_{SIM} and L_{SIM} to stimulate the impedance of power source. External input capacitors C_{FILTER} serve primarily as energy-storage elements, minimizing line voltage variations caused by transient IR drops in conductors from backplane to the DC/DC. The capacitor must as close as possible to the input terminals of the power module for lower impedance. For the input reflected-ripple current measurement configuration is shown below:

Input reflected-ripple current measurement setup

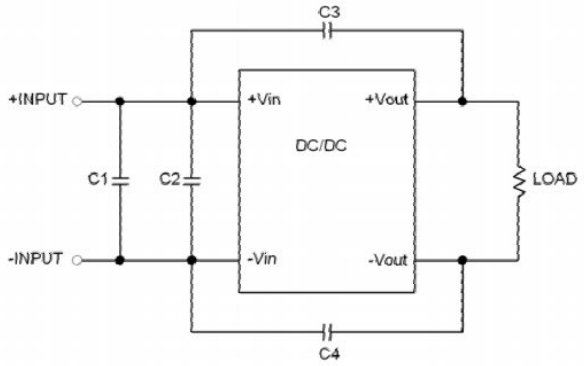


JFCWxxSxx-xxxx

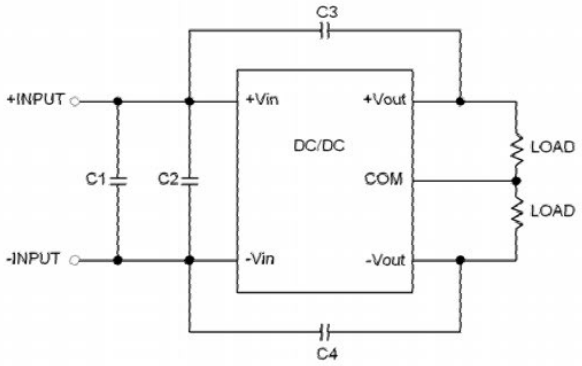
Component	Value	Voltage	Reference
L_{SIM}	12µH	----	Inductor
C_{SIM}~C_{FILTER}	10µF	100V	Nippon chemi-con KY-series

RECOMMENDED FILTERS

Recommended External Filter for EN55022 Class A



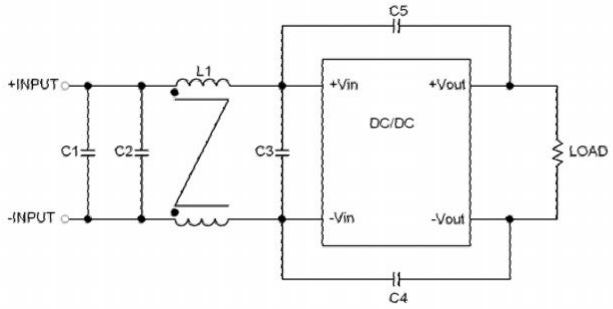
Single Output



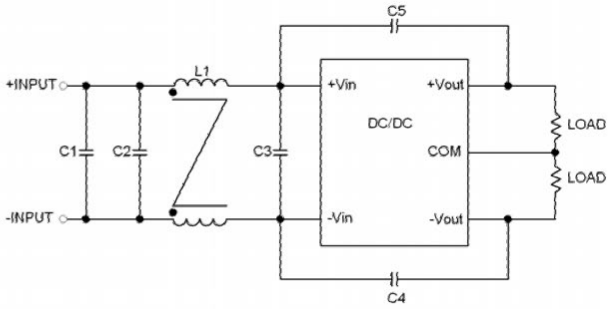
Dual Output

MODEL	C1	C2	C3	C4
JFCW24xx-xxx	6.8µF/50V 1812 MLCC	6.8µF/50V 1812 MLCC	470pF/2kV 1808 MLCC	470pF/2kV 1808 MLCC
JFCW48xx-xxx	2.2µF/100V 1812 MLCC	2.2µF/100V 1812 MLCC	470pF/2kV 1808 MLCC	470pF/2kV 1808 MLCC

Recommended External Filter for EN55022 Class B



Single Output



Dual Output

MODEL	C1	C2	C3	C4	C5	L1
JFCW24xx-xxxx	6.8µF/50V 1812 MLCC	N/A	6.8µF/50V 1812 MLCC	470pF/2kV 1808 MLCC	470pF/2kV 1808 MLCC	325µH Common Choke PMT-050
JFCW48xx-xxxx	2.2µF/100V 1812 MLCC	2.2µF/100V 1812 MLCC	2.2µF/100V 1812 MLCC	1000pF/2kV 1808 MLCC	1000pF/2kV 1808 MLCC	325µH Common Choke PMT-050

MODEL NUMBER SETUP

JFCW	24	S	12	-	1300	R
Series Name	Input Voltage Range	Output Quantity	Output Voltage		Ouptut Current	Suffix
	24: 9~36VDC	**S:** Single	**3.3:** 3.3VDC		**4000:** 4000mA	**Blank:** Pos. Remote ON/OFF
	48: 18~75VDC	**D:** Double	**5:** 5VDC/±5VDC		**3000:** 3000mA	**R:** Neg. Remote ON/OFF
			12: 12VDC/±12VDC		**1300:** 1300mA	**D:** Without ON/OFF Pin
			15: 15VDC/±15VDC		**1000:** 1000mA	**G:** Without ON/OFF & TRIM Pin
			24: 24VDC/±24VDC		**625:** 625mA/±625mA	**RE:** Neg. Remote ON/OFF without TRIM Pin
					1500: ±1500mA	**F:** Pos. Remote ON/OFF without TRIM Pin
					500: ±625mA	**HS:** Heatsink
					315: ±315mA	**V:**-10~+20% Vout Adjustability

*For 5Vout Models Only

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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