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

FEATURES

- Six-Sided Shielding
- High Efficiency up to 91%
- Fixed Switching Frequency
- 1600VDC Input to Output Isolation
- 4:1 Ultra Wide Input Voltage Range
- ISO90001 Certified Manufacturing Facilities
- Compliant to RoHS II & Reach
- Small Size and Low Profile: 1” x 1” x 0.39”
- UL60950-1, EN60950-1, and IEC60950-1 Safety Approvals
- CE Marked
- Input Under Voltage, Over Current, Short Circuit, and Over Voltage Protection
- Single and Dual Outputs Available
- Negative logic remote On/Off Optional
- Input Voltage of 9~36VDC or 18~75VDC

APPLICATIONS

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

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 trimmable output voltage. All models are protected against over current, over voltage, input under voltage, and short circuit conditions.

MODEL SELECTION TABLE

Single Output Models

Model Number	Input Voltage Range	Output Voltage	Output Current	Ripple & Noise	No Load Input Current[1]	Output Power	Maximum Capacitive Load[2]	Efficiency[3]
JFCW24S3.3-4000	9~36 (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	18~75 (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%

Dual Output Models

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 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						
Operating Input Voltage Range	24Vin(nom)		9	24	36	VDC
	48Vin(nom)		18	48	75	
Input Reflected Ripple Current	Nominal Input and Full Load			30		mAp-p
Start-Up Voltage	24Vin(nom)				9	VDC
	48Vin(nom)				18	
Shutdown Voltage	24Vin(nom)			8		VDC
	48Vin(nom)			12		
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[4]	Single Output	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	
		12Vout	13.5		19.6	
		15Vout	16.8		20.5	
		24Vout	29.1		32.1	
ENVIRONMENTAL SPECIFICATIONS						
Operating Ambient Temperature	Without Derating		-40		+60	ºC
	With Derating		+60		+105	
Maximum Case Temperature					105	ºC
Storage Temperature Range			-55		+125	ºC
Relative Humidity			5		95	%RH
Thermal Shock			MIL-STD-810F			
Thermal Impedance[5]	Natural Convention (20LFM)	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)			
SAFETY & EMC CHARACTERISTICS						
Safety Approvals	Pending: JFCWxxS24-xxxx, JFCWxxD24-xxxx		UL60950-1 EN60950-1 IEC60950-1			
EMI(6)	EN55022		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(7)	EN61000-4-4	±2kV	Perf. Criteria A			
Surge(7)	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

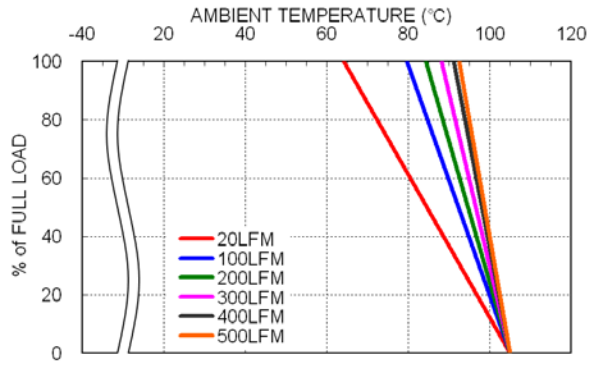
(1) Typical value at nominal input voltage and no load.
(2) Test by minimum input and constant resistive load.
(3) Typical value at nominal input voltage and full load.
(4) Trimming allows the user to increase or decrease the output voltage set point of the module. This is accomplished by connecting an external resistor between the Trim pin and either +Vout pin or –Vout pin.
(5) For Heat Sink option add the suffix “HS” to part number (Ex: JFCW48S5-3000HS) (P/N: 7G-0047C-F). See attached drawings for more details (pg 5-7).
(6) The standard module meets EN55022 Class A and Class B with external capacitors connected in parallel to the input pins.
Recommended: 24Vin: 6.8µF/50V * 2 pcs 1812 MLCC
48Vin: 2.2µF/100 * 2 pcs 1812 MLCC
(7) 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

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

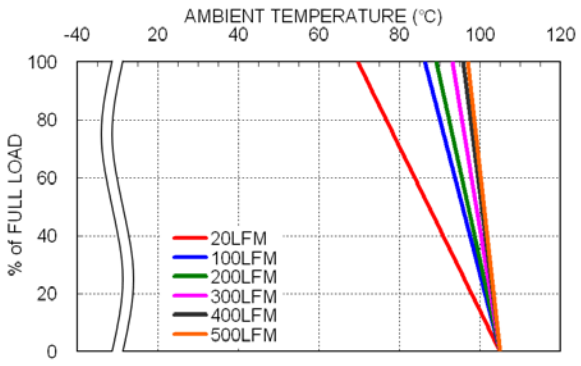
**Due to advances in technology, specifications subject to change without notice.*

DERATING CURVES

JFCW48S5-3000 Derating Curve

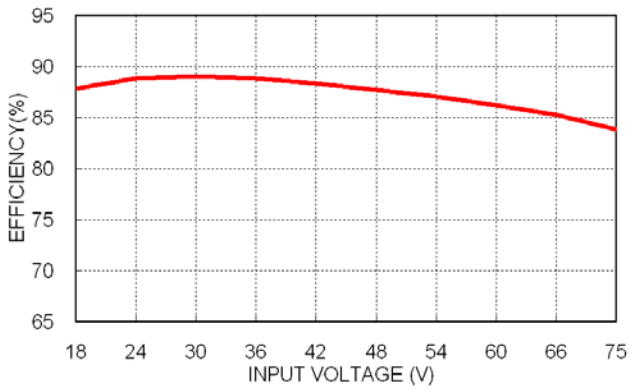


JFCW48S5-3000 Derating Curve with Heat-Sink

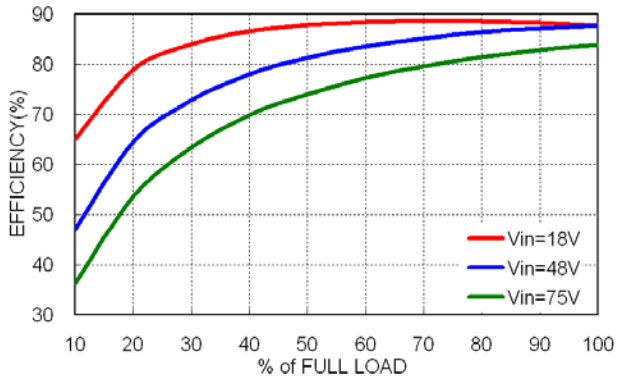


EFFICIENCY GRAPHS

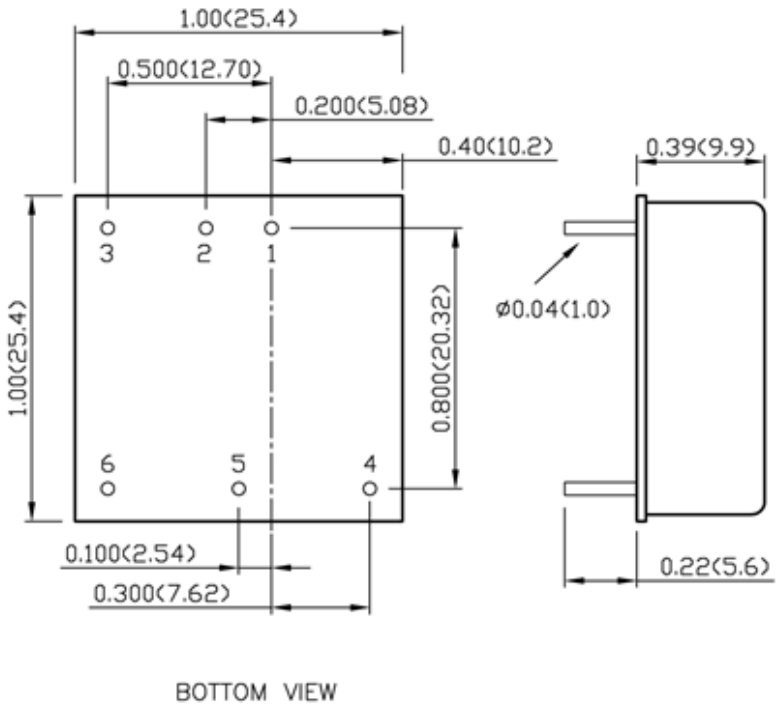
JFCW48S5-3000 Efficiency vs. Input Voltage



JFCW48S5-3000 Efficiency vs. Output Load



MECHANICAL DRAWINGS



BOTTOM VIEW

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)

PIN Connection

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

External Output Trimming

Output can be externally trimmed by using the method shown below

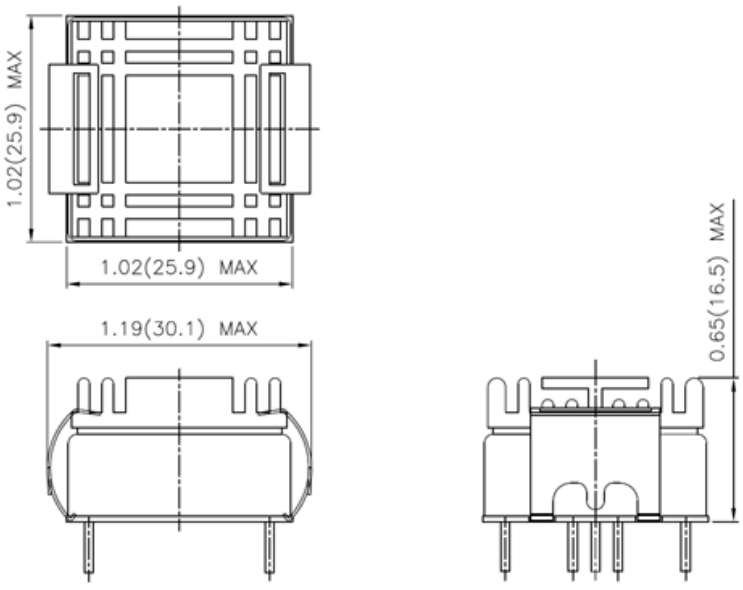
Product Standard Table

Option	Suffix
Negative Remote ON/OFF	R
Positive Remove ON/OFF	Blank
Without ON/OFF Pin	D
Without ON/OFF & Trim Pin	G
Negative Remote ON/OFF without TRIM pin	RE
Positive Remote ON/OFF without TRIM pin	F
Heatsink	HS

HEATSINK OPTIONS

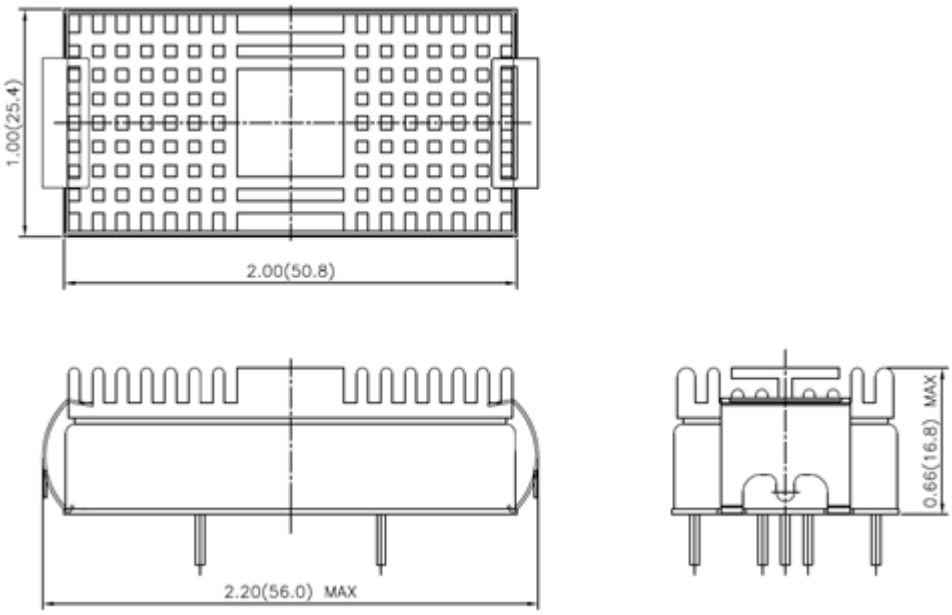
Equip heat-sink for lower temperature and higher reliability of the module. There are two types to choose from.

1” x 1” Heat-Sink



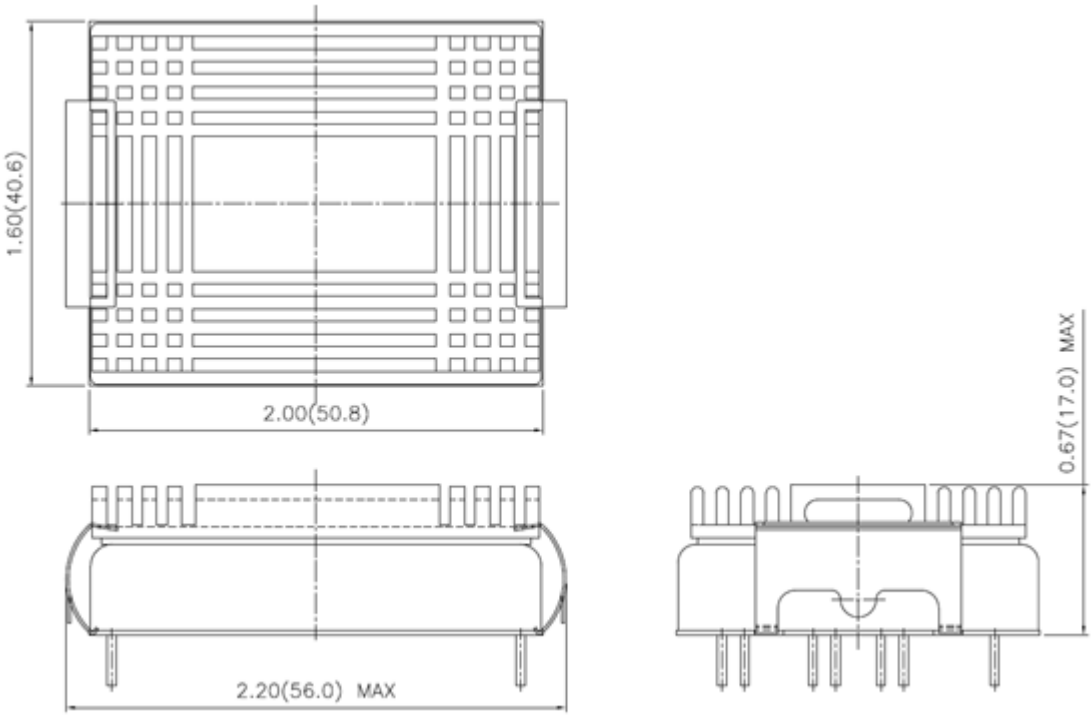
Dimensions in inch (mm)

2” x 1” Heat Sink



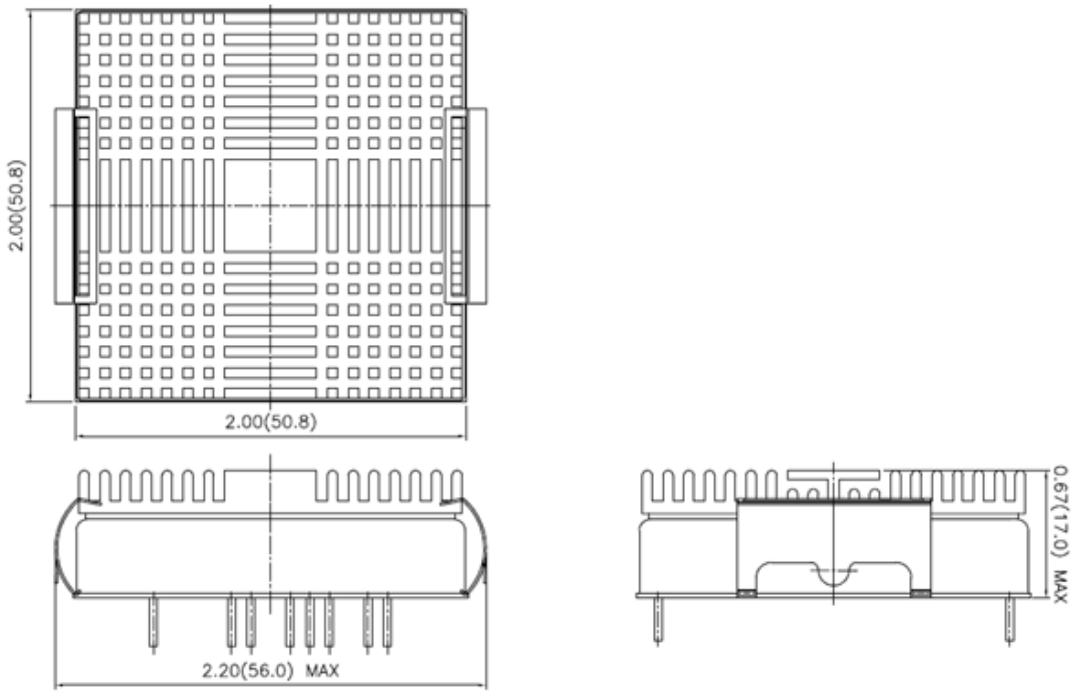
Dimensions in inch (mm)

2” x 1.6” Heat-Sink



Dimensions in inch (mm)

2" x 2" Heat Sink



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

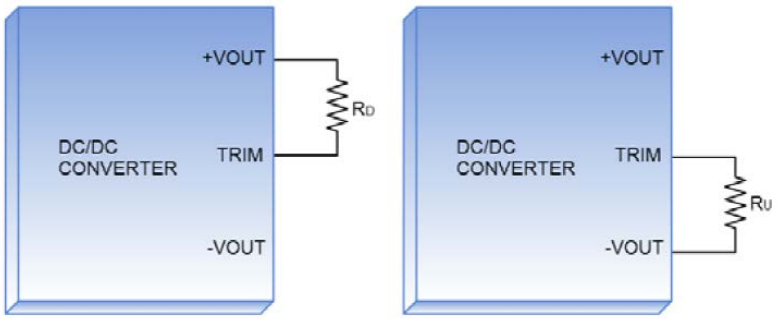
$$R_U = \left[\frac{G \times L}{(V_{O,up} - L - K)} - H\right]\Omega$$

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
JFCWxxS12-xxxx	10000	5110	9.5	2.5
JFCWxxS15-xxxx	10000	5110	12.5	2.5
JFCWxxS24-xxxx	56000	13000	21.5	2.5



Output Voltage Adjustment Configurations

Trim Table

JFCWxxS3.3-xxxx TRIM-UP

Trim-Up (%)	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

TRIM-DOWN

Trim-Down (%)	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 TRIM-UP

Trim-Up (%)	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

TRIM-DOWN

Trim-Down (%)	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-UP

Trim-Up (%)	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

TRIM-DOWN

Trim-Up (%)	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-UP

Trim-Up (%)	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

TRIM-DOWN

Trim-Up (%)	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-UP

Trim-Up (%)	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	13.667	84.222	70.333	59.917	51.815	45.333

Trim-Up (%)	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

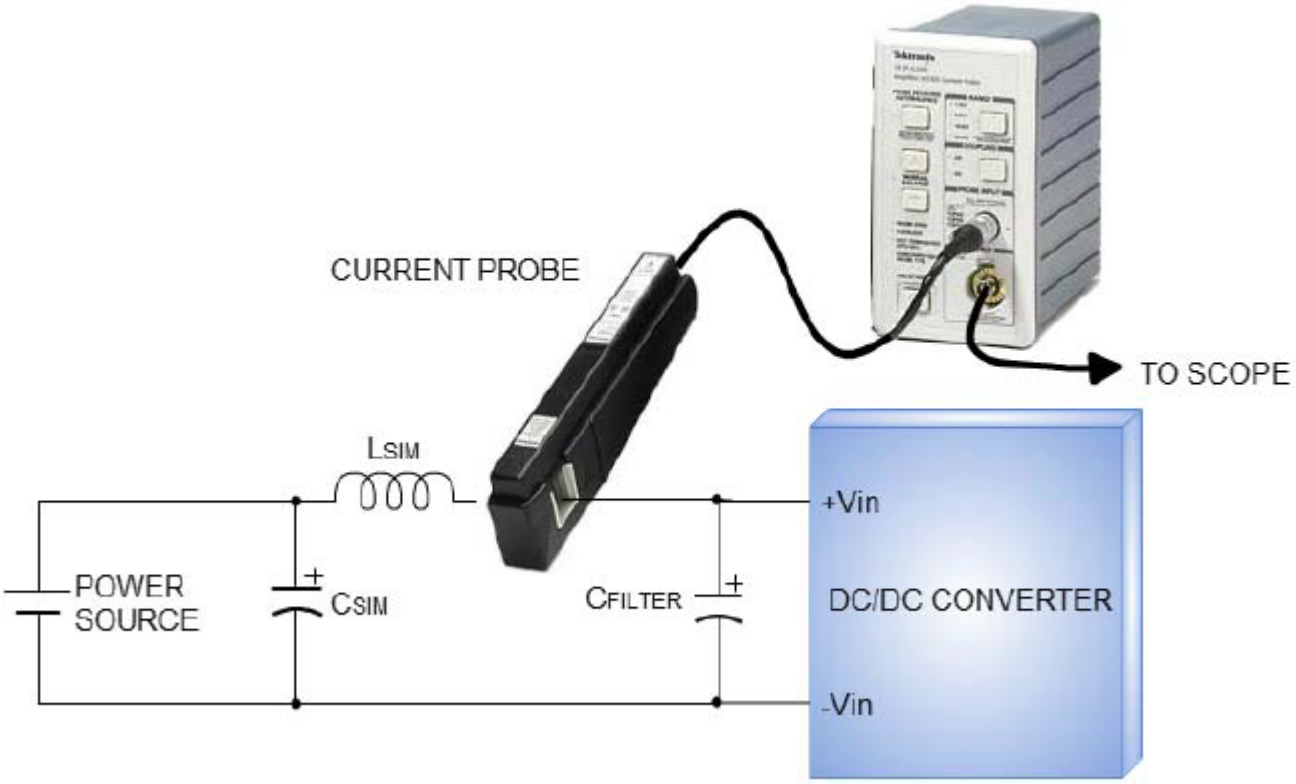
Trim-Up (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	23.760	23.520	23.280	23.040	22.800	22.560	22.320	22.080	21.840	21.600
RD (kΩ)	4947.667	2439.333	1603.222	1185.167	934.333	767.111	647.667	558.083	488.407	432.667

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

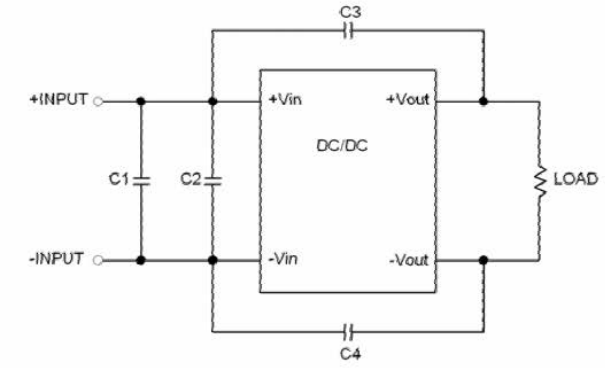


JFCWxxSxx-xxxx

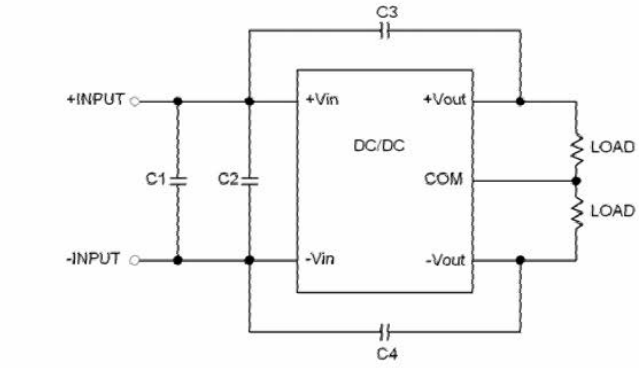
Component	Value	Voltage	Reference
L_{SIM}	12µH	----	Inductor
C_{SIM}-C_{FILTER}	10µF	100V	Nippon chemi-con KY-series

RECOMMENDED FILTERS

Recommended External Filter for EN55022 Class A



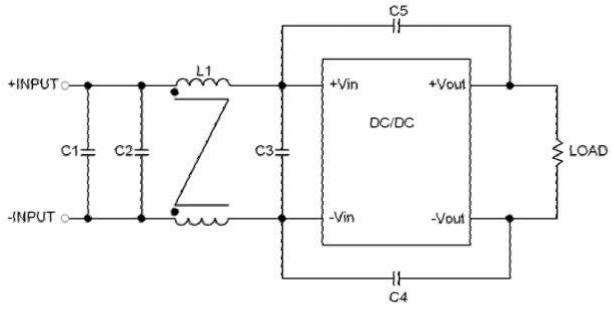
Single Output



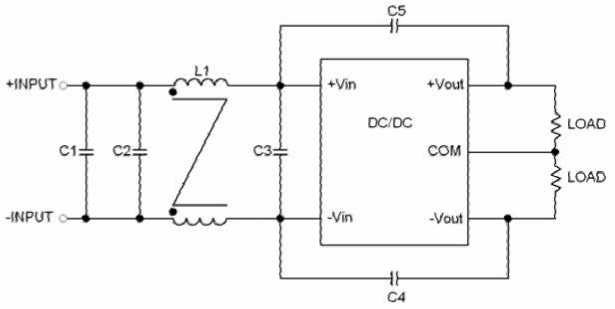
Dual Output

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 **48:** 18~75VDC	**S:** Single **D:** Double	**3.3:** 3.3VDC **5:** 5VDC/±5VDC **12:** 12VDC/±12VDC **15:** 15VDC/±15VDC **24:** 24VDC/±24VDC		**4000:** 4000mA **3000:** 3000mA **1300:** 1300mA **1000:** 1000mA **625:** 625mA/±625mA **1500:** ±1500mA **500:** ±625mA **315:** ±315mA	**Blank:** Pos. Remote ON/OFF **R:** Neg. Remote ON/OFF **D:** Without ON/OFF Pin **G:** Without ON/OFF & TRIM Pin **RE:** Neg. Remote ON/OFF without TRIM Pin **F:** Pos. Remote ON/OFF without TRIM Pin **HS:** Heatsink

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.

Contact **Wall Industries** for further information:

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