



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
- On/Off Pin
- Input Ranges
- Output Voltages

FEATURES

- Six-Sided Shielding
- High Efficiency up to 91%
- Fixed Switching Frequency
- 2:1 Wide Input Voltage Range
- 1600VDC Input to Output Isolation
- Compliant to RoHS II & Reach
- CE Marked
- Useful in a variety of applications
- Small Size and Low Profile: 1.0" x 1.0" x 0.39 inches
- Industry Standard Pin-Out DM Series Compatible
- Over Voltage, Over Load, and Short Circuit Protection
- UL60950-1, EN60950-1, & IEC60950-1 Safety Approvals
- CE Marked
- Positive/Negative Logic Remote On/Off, Without Trim, Without On/Off Pin options
- 9~18VDC, 18~36VDC, and 36~75VDC input ranges available

APPLICATIONS

- Measurement
- Telecom/Datacom
- Industry Control Systems
- Semiconductor Equipment
- Distributed Power Architects

DESCRIPTION

The JFC series of single and dual output DC/DC converters provide up to 15 watts of 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 2:1 wide input voltage range of 9~18VDC, 18~36VDC, or 36~75VDC. Some features include positive or negative remote on/off, 1600VDC I/O isolation, and trimmable output voltage. All models are protected against over current, input under voltage, over 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	Output Power	Maximum Capacitive Load	Efficiency
JFC12S3.3-4000	12VDC (9~18VDC)	3.3VDC	4000mA	75mVp-p	120mA	Up to 15W	12000µF	84%
JFC12S5-3000		5VDC	3000mA	75mVp-p	90mA		6000µF	88%
JFC12S12-1300		12VDC	1300mA	100mVp-p	30mA		1000µF	86%
JFC12S15-1000		15VDC	1000mA	100mVp-p	30mA		660µF	88%
JFC12S24-625		24VDC	625mA	100mVp-p	12mA		200µF	90%
JFC24S3.3-4000	24VDC (18~36VDC)	3.3VDC	4000mA	75mVp-p	50mA	Up to 15W	12000µF	86%
JFC24S5-3000		5VDC	3000mA	75mVp-p	65mA		6000µF	88%
JFC24S12-1300		12VDC	1300mA	100mVp-p	20mA		1000µF	87%
JFC24S15-1000		15VDC	1000mA	100mVp-p	20mA		660µF	88%
JFC24S24-625		24VDC	625mA	100mVp-p	10mA		200µF	90%
JFC48S3.3-4000	48VDC (36~75VDC)	3.3VDC	4000mA	75mVp-p	25mA	Up to 15W	12000µF	86%
JFC48S5-3000		5VDC	3000mA	75mVp-p	35mA		6000µF	88%
JFC48S12-1300		12VDC	1300mA	100mVp-p	12mA		1000µF	88%
JFC48S15-1000		15VDC	1000mA	100mVp-p	12mA		660µF	88%
JFC48S24-625		24VDC	625mA	100mVp-p	10mA		200µF	91%

MODEL SELECTION TABLE

Dual 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⁾
JFC12D5-1500	12VDC (9~18VDC)	±5VDC	±1500mA	100mVp-p	30mA	Up to 15W	±3000µF	85%
JFC12D12-625		±12VDC	±625mA	100mVp-p	30mA		±520µF	87%
JFC12D15-500		±15VDC	±500mA	100mVp-p	30mA		±330µF	88%
JFC12D24-315		±24VDC	±315mA	100mVp-p	17mA		±100µF	90%
JFC24D5-1500	24VDC (18~36)	±5VDC	±1500mA	100mVp-p	15mA	Up to 15W	±3000µF	85%
JFC24D12-625		±12VDC	±625mA	100mVp-p	15mA		±520µF	88%
JFC24D15-500		±15VDC	±500mA	100mVp-p	25mA		±330µF	88%
JFC24D24-315		±24VDC	±315mA	100mVp-p	12mA		±100µF	90%
JFC48D5-1500	48VDC (36~75VDC)	±5VDC	±1500mA	100mVp-p	12mA	Up to 15W	±3000µF	85%
JFC48D12-625		±12VDC	±625mA	100mVp-p	15mA		±520µF	89%
JFC48D15-500		±15VDC	±500mA	100mVp-p	20mA		±330µF	88%
JFC48D24-315		±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	12Vin(nom)		9	12	18	VDC
	24Vin(nom)		18	24	36	
	48Vin(nom)		36	48	75	
Start-Up Voltage	12Vin(nom)				9	VDC
	24Vin(nom)				18	
	48Vin(nom)				36	
Shutdown Voltage	12Vin(nom)			8		VDC
	24Vin(nom)			14.5		
	48Vin(nom)			30.5		
Input Surge Voltage	100ms, max.		12Vin(nom)		36	VDC
			24Vin(nom)		50	
			48Vin(nom)		100	
Input Reflected Ripple Current	Nominal Input and Full Load			30		mAp-p
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	%
		Others	-10		+10	%
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	%/°C

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
REMOTE ON/OFF CONTROL⁽⁵⁾						
Positive Logic (standard)	DC-DC ON		Open or 3~15VDC			
	DC-DC OFF		Short or 0~1.2VDC			
Negative Logic (option)	DC-DC ON		Short or 0~1.2VDC			
	DC-DC OFF		Open or 3~15VDC			
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 Lout 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		32.5	
ENVIRONMENTAL SPECIFICATIONS						
Operating Ambient Temperature	Without Derating		-40		+60	°C
	With Derating		+60		+105	
Maximum Case Temperature					105	°C
Storage Temperature Range			-55		+125	°C
Thermal Impedance ⁽⁶⁾	Natural Convection (20LFM)	Without Heat-Sink		18.2		°C/W
		With Heat-Sink		15.8		
Thermal Shock			MIL-STD-810F			
Relative Humidity			5		95	%RH
Vibration			MIL-STD-810F			
MTBF	MIL-HDBK-217F, Full Load		1.600 x 10 ⁶ hrs			
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)			1.0in x 1.0in 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: JFCxxS24-xxxx, JFCxxD24-xxxx				UL60950-1 EN60950-1 IEC60950-1	
EMI ⁽⁷⁾	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 ⁽⁸⁾	EN61000-4-4	±2kV			Perf. Criteria A	
Surge ⁽⁹⁾	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	

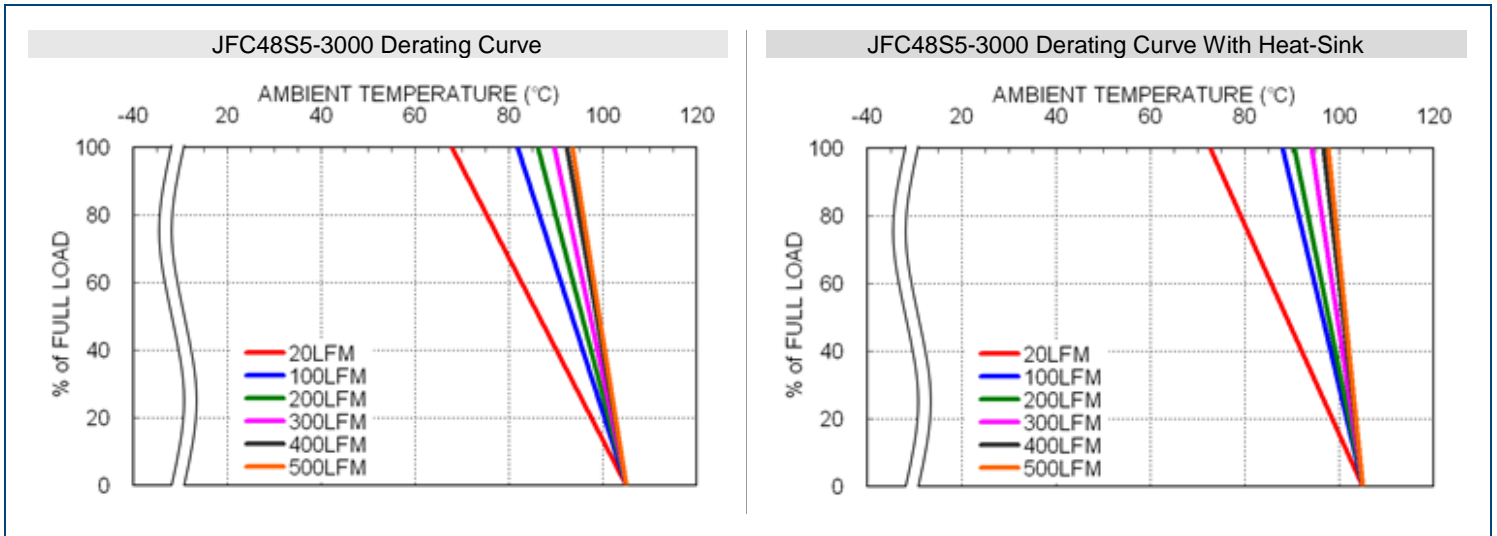
NOTES

- (1) Typical Value at Nominal Input Voltage and No Load.
- (2) Test by Minimum Vin 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) The ON/OFF Control pin voltage is referenced to -Vin. (See the "Product Standard Table" below for suffix options)
- (6) For Heat Sink option add the suffix "HS" to the part number (Ex: JFC48S5-3000HS)(P/N: 7G-0047C-F). See attached for more details.
- (7) The JFC series can meet EN55022 Class A and Class B with external capacitors connected in parallel to the input pins. See attached for more details.
- (8) An external filter capacitor is required if the module has to meet EN61000-4-4 and EN61000-4-5. The filter capacitor suggested is Nippon chemicon KY series, 220µF/100V.

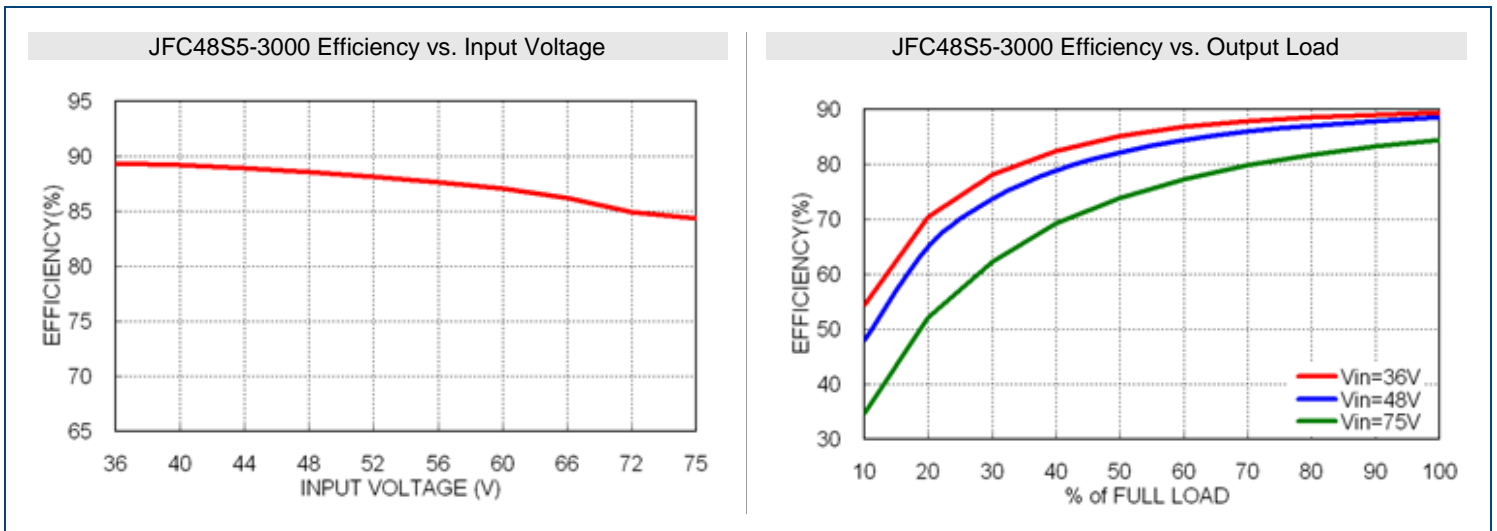
Caution: This power module is not internally fused. An input line fuse must always be used.

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

DERATING CURVES



EFFICIENCY GRAPHS



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

External Output Trimming
Output can be externally trimmed by using the method shown below

TRIM UP	TRIM DOWN

Product Standard Table

Option	Suffix
Negative Remote ON/OFF	R
Positive Remote ON/OFF	Blank
Without ON/OFF Pin	D
Without ON/OFF & TRIM Pin	G
Negative Remote ON/OFF without TRIM pin	RF
Positive Remote ON/OFF without TRIM pin	F

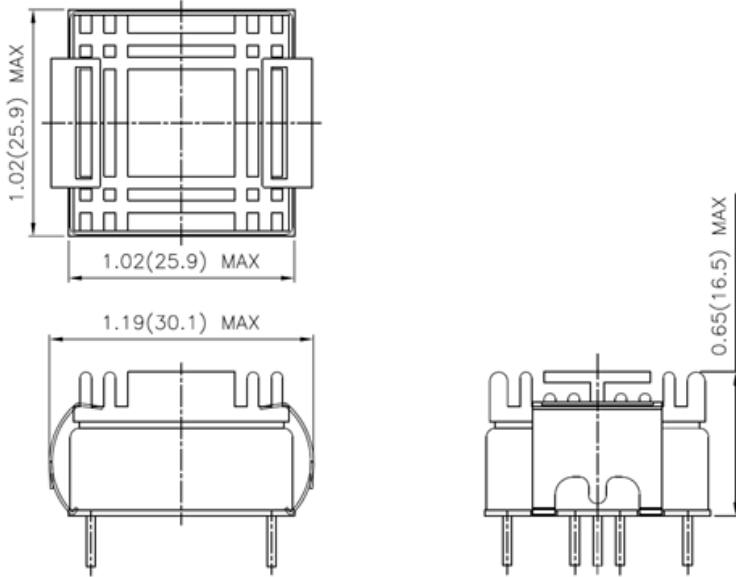
BOTTOM VIEW

- All dimensions in inch (mm)
- Tolerance: x.xx±0.02 (x.x±0.5)
x.xxx±0.01 (x.xx±0.25)
- Pin pitch tolerance ±0.01 (0.25)
- Pin dimension tolerance ±0.004 (0.1)

HEATSINK OPTIONS

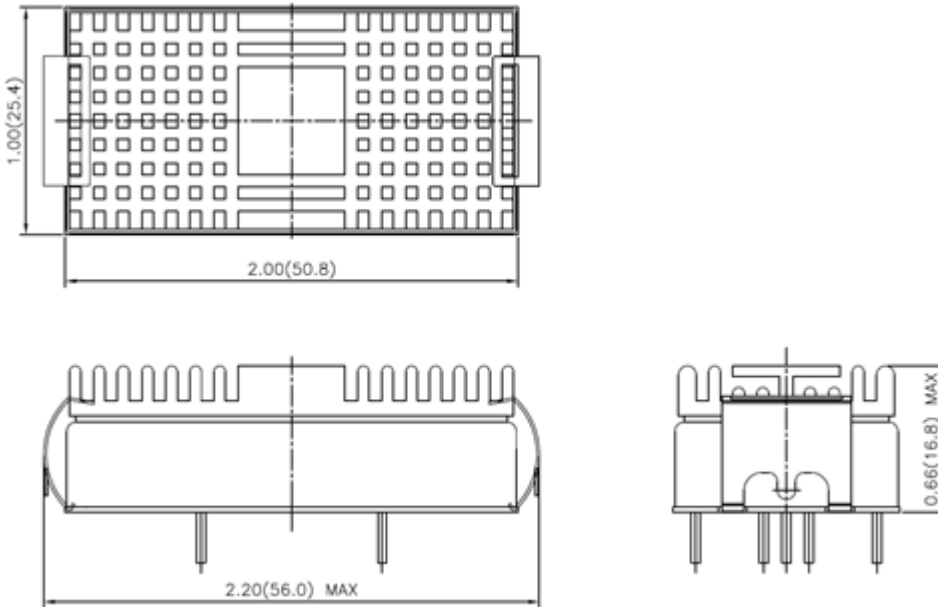
Equip heat-sink for lower temperature and higher reliability of the module. There are two types to choose from.

1" x 1" Heat-Sink



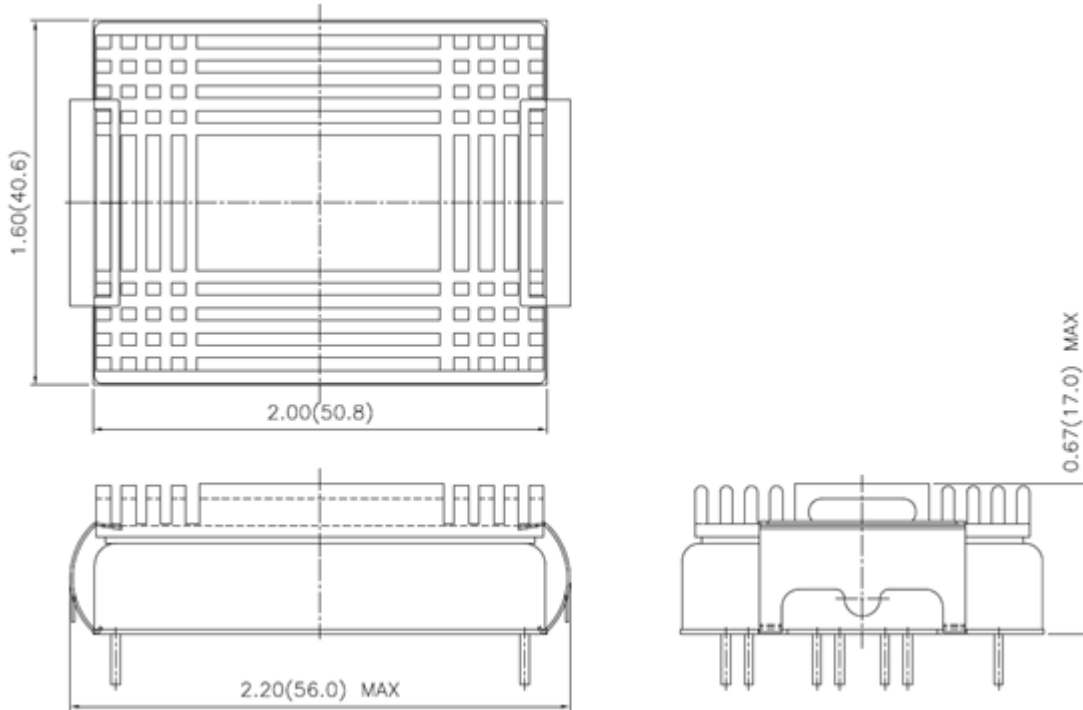
Dimensions in inch (mm)

2" x 1" Heat Sink



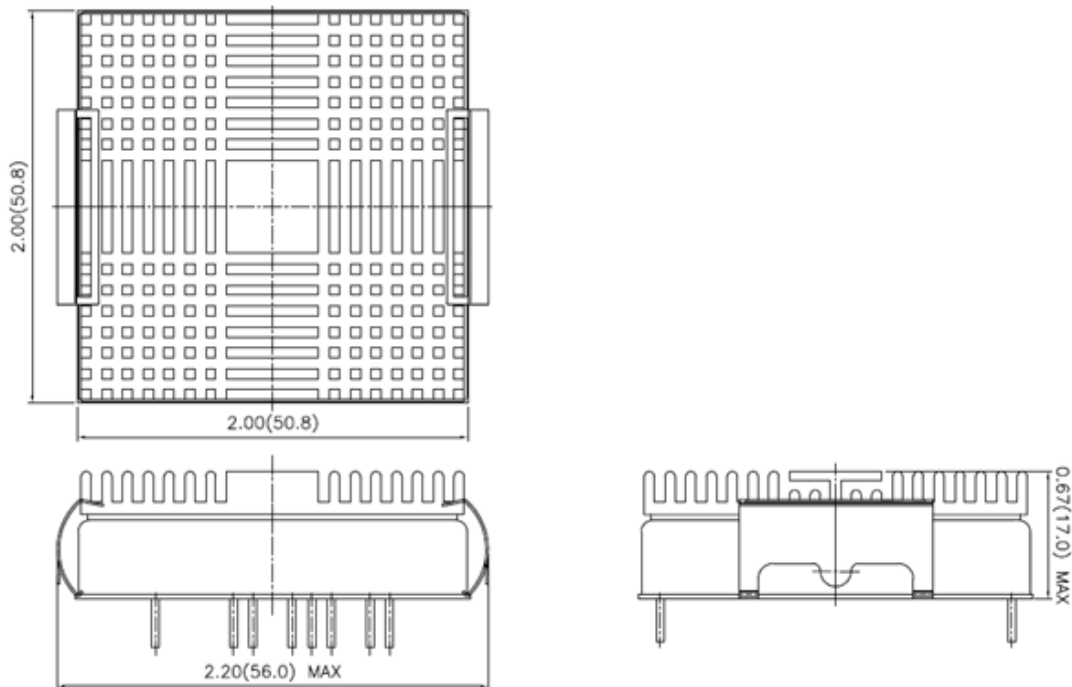
Dimensions in inch (mm)

2" x 1.6" Heat-Sink



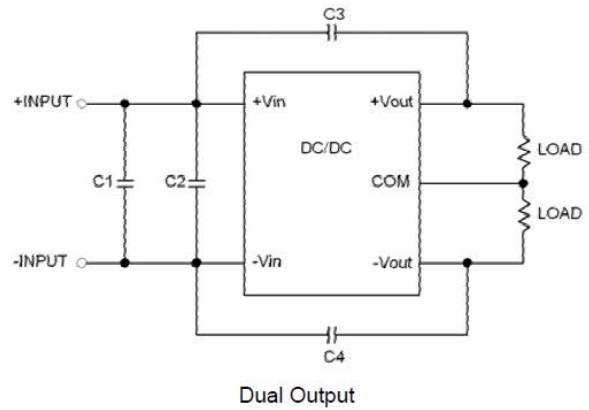
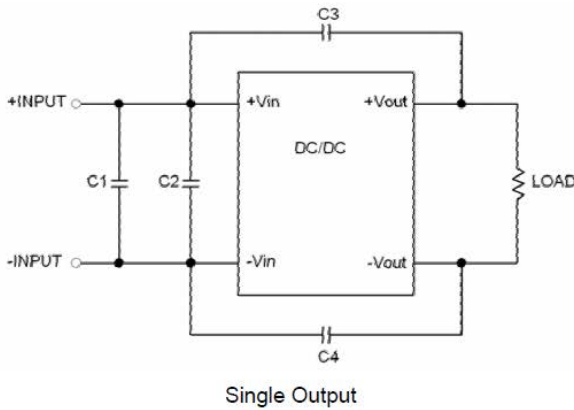
Dimensions in inch (mm)

2" x 2" Heat Sink



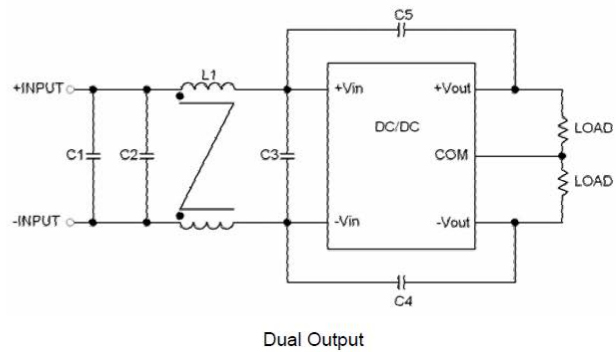
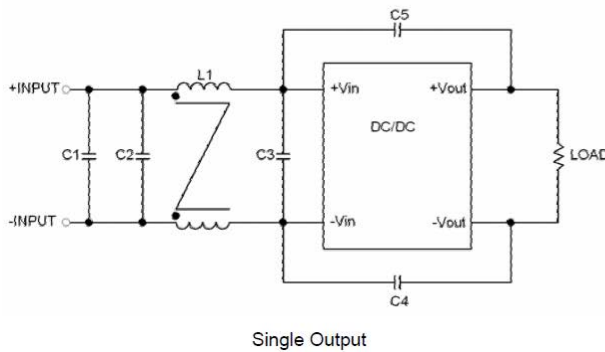
RECOMMENDED FILTERS

Recommended External Filter for EN55022 Class A



MODEL	C1	C2	C3	C4
JFC12xx-xxxx	10 μ F/25V 1812 MLCC	N/A	470pF/2kV 1808 MLCC	470pF/2kV 1808 MLCC
JFC24xx-xxxx	6.8 μ F/50V 1812 MLCC	6.8 μ F/50V 1812 MLCC	470pF/2kV 1808 MLCC	470pF/2kV 1808 MLCC
JFC48xx-xxxx	2.2 μ F/100V 1812 MLCC	2.2 μ F/100V 1812 MLCC	470pF/2kV 1808	470pF/2kV 1808 MLCC

Recommended External Filter for EN55022 Class B



MODEL	C1	C2	C3	C4	C5	L1
JFC12xx-xxxx	10 μ F/25V 1812 MLCC	N/A	10 μ F/25V 1812 MLCC	470pF/2kV 1808 MLCC	470pF/2kV 1808 MLCC	145 μ H Common Choke PMT-051
JFC24xx-xxxx	6.8 μ F/50V 1812 MLCC	N/A	6.8 μ F/50V 1812 MLCC	470pF/2kV 1808 MLCC	470pF/2kV 1808 MLCC	325 μ H Common Choke PMT-050
JFC48xx-xxxx	2.2 μ F/100V 1812 MLCC	2.2 μ F/100V 1812 MLCC	2.2 μ F/100V 1812 MLCC	1000pF/2kV 1808 MLCC	1000pF/2kV 1808 MLCC	325 μ H Common Choke PMT-050

OUTPUT VOLTAGE ADJUSTMENT

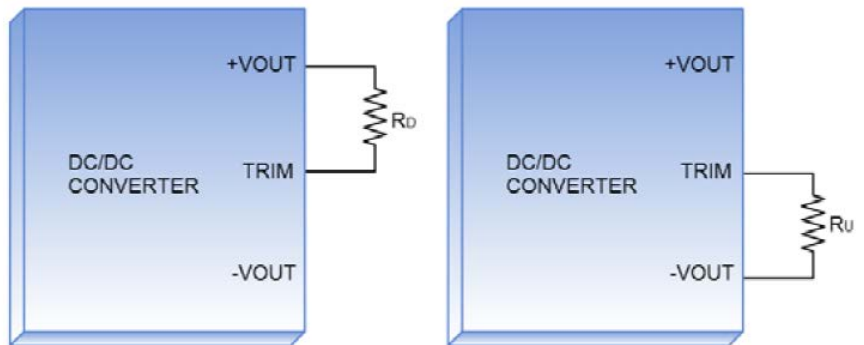
Output voltage set point adjustment allows the user to increase or decrease the output voltage set point of the module. This is accomplished by connecting an external resistor between the TRIM pin and either the +OUTPUT or -OUTPUT pins. With an external resistor between the TRIM and -OUTPUT pin, the 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 or 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
JFCxxS3.3-xxxx	5110	2050	0.8	2.5
JFCxxS5-xxxx	5110	2050	2.5	2.5
JFCxxS12-xxxx	10000	5110	9.5	2.5
JFCxxS15-xxxx	10000	5110	12.5	2.5
JFCxxS24-xxxx	56000	13000	21.5	2.5

Output Voltage Adjustment Configurations

JFCxxS3.3-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	46.340	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

JFCxxS5-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

JFCxxS12-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-Down (%)	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

JFCxxS15-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-Down (%)	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	193.223	151.557	103.938	89.057	77.483	68.223

JFCxxS24-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-Down (%)	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	423.667

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 simulate 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 be 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 as below:

Input reflected-ripple current measurement setup



JFCxxSxx-xxxx

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

MODEL NUMBER SETUP

JFC	24	S	12	-	1300	D
Series Name	Input Voltage	Output Quantity	Output Voltage		Ouptut Current	Suffix
	12: 9~18VDC 24: 18~36VDC 48: 36~75VDC	S: Single D: Dual	3.3: 3.3VDC 5: 5VDC/±5VDC 12: 12VDC/±12VDC 15: 15VDC/±15VDC 24: 24VDC/±24VDC		4000: 4000mA 3000: 3000mA 1500: ±1500mA 1300: 1300mA 1000: 1000mA 625: 625mA/±625mA 500: ±500mA 315: ±315mA	Blank: Pos. Remote ON/OFF R: Neg. Remote ON/OFF D: Without ON/OFF Pin G: Without ON/OFF & TRIM pin RF: Neg. Remote ON/OFF without TRIM pin F: Pos. Remote ON/OFF without TRIM pin

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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