



Size: 2in x 1in x 0.4in  
(50.8mm x 25.4mm x 10.2mm)

#### OPTIONS

- Positive Remote ON/OFF (Suffix "P")
- Negative Remote ON/OFF (Suffix "R")

#### APPLICATIONS

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

#### FEATURES

- 10 Watts Maximum Output Power
- Single and Dual Outputs
- High Efficiency up to 87%
- No Minimum Load Requirement
- 1600VDC I/O Isolation
- Positive or Negative Remote ON/OFF Control Option
- Fixed Switching Frequency
- Over Voltage, Over Load, and Short Circuit Protection
- Extended Operating Temperature Range Available
- Six-Sided Continuous Shielding
- CE Marked
- RoHS & REACH compliant
- UL60950-1, EN60950-1, & IEC60950-1 Safety Approvals
- UL 94V-0 Compliant
- 2:1 Wide Input Voltage Ranges

#### DESCRIPTION

The JR series of DC/DC power converters provides 10 watts of output power in a 2.0" x 1.0" x 0.4" 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 up to 87%, 1600VDC I/O isolation, and six-sided shielding. All models are also protected against over voltage, over load, and short circuit conditions. This series is RoHS and UL94V-0 compliant and has UL60950-1, EN60950-1, and IEC60950-1 safety approvals. Please call factory for ordering details.

#### MODEL SELECTION TABLE

##### Single Output Models

| Model Number <sup>(1)</sup> | Input Voltage Range | Output Voltage | Output Current          |                         | Ripple & Noise <sup>(4)</sup> | Input Current |           | Output Power | Maximum Capacitive Load <sup>(5)</sup> | Efficiency <sup>(4)</sup> |
|-----------------------------|---------------------|----------------|-------------------------|-------------------------|-------------------------------|---------------|-----------|--------------|----------------------------------------|---------------------------|
|                             |                     |                | Min Load <sup>(2)</sup> | Max Load <sup>(3)</sup> |                               | No Load       | Full Load |              |                                        |                           |
| JR5S5-2000                  | 5VDC<br>(4.5-9VDC)  | 5VDC           | 0mA                     | 2000mA                  | 50mVp-p                       | -             | 2500mA    | 10W          | 7900µF                                 | 79%                       |
| JR5S12-830                  |                     | 12VDC          | 0mA                     | 830mA                   |                               | -             | 2350mA    | 10W          | 2200µF                                 | 82%                       |
| JR5S15-660                  |                     | 15VDC          | 0mA                     | 670mA                   |                               | -             | 2348mA    | 10W          | 1470µF                                 | 82%                       |
| JR12S33-2000                | 12VDC<br>(9-18VDC)  | 3.3VDC         | 0mA                     | 2000mA                  | 50mVp-p                       | 17mA          | 724mA     | 6.6W         | 6800µF                                 | 80%                       |
| JR12S5-2000                 |                     | 5VDC           | 0mA                     | 2000mA                  |                               | 21mA          | 1082mA    | 10W          | 4700µF                                 | 81%                       |
| JR12S12-830                 |                     | 12VDC          | 0mA                     | 830mA                   |                               | 38mA          | 1037mA    | 10W          | 690µF                                  | 84%                       |
| JR12S15-660                 | 24VDC<br>(18-36VDC) | 15VDC          | 0mA                     | 670mA                   | 50mVp-p                       | 36mA          | 1046mA    | 10W          | 470µF                                  | 84%                       |
| JR24S33-2000                |                     | 3.3VDC         | 0mA                     | 2000mA                  |                               | 15mA          | 362mA     | 6.6W         | 6800µF                                 | 80%                       |
| JR24S5-2000                 |                     | 5VDC           | 0mA                     | 2000mA                  |                               | 22mA          | 534mA     | 10W          | 4700µF                                 | 82%                       |
| JR24S12-830                 | 48VDC<br>(36-75VDC) | 12VDC          | 0mA                     | 830mA                   | 50mVp-p                       | 18mA          | 519mA     | 10W          | 690µF                                  | 84%                       |
| JR24S15-660                 |                     | 15VDC          | 0mA                     | 670mA                   |                               | 36mA          | 523mA     | 10W          | 470µF                                  | 84%                       |
| JR48S33-2000                |                     | 3.3VDC         | 0mA                     | 2000mA                  |                               | 11mA          | 181mA     | 6.6W         | 6800µF                                 | 80%                       |
| JR48S5-2000                 | 48VDC<br>(36-75VDC) | 5VDC           | 0mA                     | 2000mA                  | 50mVp-p                       | 14mA          | 260mA     | 10W          | 4700µF                                 | 84%                       |
| JR48S12-830                 |                     | 12VDC          | 0mA                     | 830mA                   |                               | 14mA          | 253mA     | 10W          | 690µF                                  | 86%                       |
| JR48S15-660                 |                     | 15VDC          | 0mA                     | 670mA                   |                               | 10mA          | 252mA     | 10W          | 470µF                                  | 87%                       |

#### MODEL SELECTION TABLE

##### Dual Output Models

| Model Number <sup>(1)</sup> | Input Voltage Range | Output Voltage | Output Current          |                         | Ripple & Noise <sup>(4)</sup> | Input Current |           | Output Power | Maximum Capacitive Load <sup>(5)</sup> | Efficiency <sup>(4)</sup> |
|-----------------------------|---------------------|----------------|-------------------------|-------------------------|-------------------------------|---------------|-----------|--------------|----------------------------------------|---------------------------|
|                             |                     |                | Min Load <sup>(2)</sup> | Max Load <sup>(3)</sup> |                               | No Load       | Full Load |              |                                        |                           |
| JR5D5-1000                  | 5VDC<br>(4.5-9VDC)  | ±5VDC          | 0mA                     | ±1000mA                 | 75mVp-p                       | -             | 2461mA    | 10W          | ±5060µF                                | 80%                       |
| JR5D12-420                  |                     | ±12VDC         | 0mA                     | ±416mA                  |                               | -             | 2503mA    |              | ±1034µF                                | 80%                       |
| JR5D15-330                  |                     | ±15VDC         | 0mA                     | ±333mA                  |                               | -             | 2393mA    |              | ±660µF                                 | 81%                       |
| JR12D5-1000                 | 12VDC<br>(9-18VDC)  | ±5VDC          | 0mA                     | ±1000mA                 | 75mVp-p                       | 39            | 1042mA    | 10W          | ±680µF                                 | 84%                       |
| JR12D12-420                 |                     | ±12VDC         | 0mA                     | ±416mA                  |                               | 47            | 1053mA    |              | ±330µF                                 | 83%                       |
| JR12D15-330                 |                     | ±15VDC         | 0mA                     | ±333mA                  |                               | 45            | 1041mA    |              | ±110µF                                 | 84%                       |
| JR24D5-1000                 | 24VDC<br>(18-36VDC) | ±5VDC          | 0mA                     | ±1000mA                 | 75mVp-p                       | 28            | 527mA     | 10W          | ±680µF                                 | 83%                       |
| JR24D12-420                 |                     | ±12VDC         | 0mA                     | ±416mA                  |                               | 24            | 513mA     |              | ±330µF                                 | 85%                       |
| JR24D15-330                 |                     | ±15VDC         | 0mA                     | ±333mA                  |                               | 31            | 520mA     |              | ±110µF                                 | 84%                       |
| JR48D5-1000                 | 48VDC<br>(36-75VDC) | ±5VDC          | 0mA                     | ±1000mA                 | 75mVp-p                       | 16            | 260mA     | 10W          | ±680µF                                 | 84%                       |
| JR48D12-420                 |                     | ±12VDC         | 0mA                     | ±416mA                  |                               | 19            | 254mA     |              | ±330µF                                 | 86%                       |
| JR48D15-330                 |                     | ±15VDC         | 0mA                     | ±333mA                  |                               | 16            | 256mA     |              | ±110µF                                 | 85%                       |

## 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 <sup>(1)</sup>           | 5VDC nominal input models ( <i>minimum order quantities apply</i> ) |                    | 4.5                            | 5   | 9     | VDC   |
|                                              | 12VDC nominal input models                                          |                    | 9                              | 12  | 18    |       |
|                                              | 24VDC nominal input models                                          |                    | 18                             | 24  | 36    |       |
|                                              | 48VDC nominal input models                                          |                    | 36                             | 48  | 75    |       |
| Input Reflected Ripple Current               |                                                                     |                    |                                | 30  |       | mAp-p |
| Input Surge Voltage (100ms max)              | 5VDC nominal input models                                           |                    |                                |     | 15    | VDC   |
|                                              | 12VDC nominal input models                                          |                    |                                |     | 36    |       |
|                                              | 24VDC nominal input models                                          |                    |                                |     | 50    |       |
|                                              | 48VDC nominal input models                                          |                    |                                |     | 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                                  |                    | -0.2                           |     | +0.2  | %     |
| Load Regulation                              | No Load to Full Load                                                | Single             | -0.5                           |     | +0.5  | %     |
|                                              |                                                                     | Dual               | -1.0                           |     | +1.0  |       |
| Output Power                                 |                                                                     |                    | See Table                      |     |       |       |
| Output Current                               |                                                                     |                    | See Table                      |     |       |       |
| Minimum Load                                 |                                                                     |                    | 0                              |     |       | A     |
| Maximum Capacitive Load                      |                                                                     |                    | See Table                      |     |       |       |
| Ripple & Noise                               | Measured by 20MHz bandwidth                                         | Single             |                                | 50  |       | mVp-p |
|                                              |                                                                     | Dual               |                                | 75  |       |       |
| Transient Response Recovery Time             | 25% load step change                                                |                    |                                | 250 |       | μs    |
| Start-Up Time                                | Constant resistive load                                             | Power Up           |                                | 20  |       | ms    |
| Temperature Coefficient                      |                                                                     |                    | -0.02                          |     | +0.02 | %/°C  |
| REMOTE ON/OFF CONTROL <sup>(6)</sup>         |                                                                     |                    |                                |     |       |       |
| Positive Logic                               | DC-DC ON                                                            |                    | Open or 3.5~12VDC              |     |       |       |
|                                              | DC-DC OFF                                                           |                    | Short or 0~1.2VDC              |     |       |       |
| Negative Logic                               | DC-DC ON                                                            |                    | Short or 0~1.2VDC              |     |       |       |
|                                              | DC-DC OFF                                                           |                    | Open or 3.5~12VDC              |     |       |       |
| Input Current of CTRL Pin                    |                                                                     |                    | -0.5                           |     | +1.0  | mA    |
| Remote OFF Input Current                     |                                                                     |                    |                                | 20  |       | mA    |
| PROTECTION                                   |                                                                     |                    |                                |     |       |       |
| Short Circuit Protection                     |                                                                     |                    | Continuous, Automatic recovery |     |       |       |
| Over Load Protection                         | % of Lout Rated                                                     |                    |                                |     | 150   | %     |
| Over Voltage Protection                      | Zener diode clamp                                                   | 3.3V output models |                                | 3.9 |       | VDC   |
|                                              |                                                                     | 5V output models   |                                | 6.2 |       |       |
|                                              |                                                                     | 12V output models  |                                | 15  |       |       |
|                                              |                                                                     | 15V output models  |                                | 18  |       |       |
| ENVIRONMENTAL SPECIFICATIONS                 |                                                                     |                    |                                |     |       |       |
| Operating Ambient Temperature <sup>(7)</sup> | Standard                                                            | With derating      | -25                            |     | +85   | °C    |
|                                              | “T” Version (suffix –I)                                             | Without derating   | -40                            |     | +85   |       |
| Storage Temperature                          |                                                                     |                    | -55                            |     | +125  | °C    |
| Maximum Case Temperature                     |                                                                     |                    |                                |     | +105  | °C    |
| Thermal Impedance <sup>(8)</sup>             | Vertical direction by natural convection (20LFM)                    | Without heat-sink  |                                | 12  |       | °C/W  |
|                                              |                                                                     | With heat-sink     |                                | 10  |       |       |
| Relative Humidity                            |                                                                     |                    | 5                              |     | 95    | % RH  |
| Thermal Shock                                |                                                                     |                    | MIL-STD-810F                   |     |       |       |
| Vibration                                    |                                                                     |                    | MIL-STD-810F                   |     |       |       |
| MTBF                                         | MIL-HDBK-217F, Full Load                                            |                    | 3,342,000 hours                |     |       |       |

## 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            |                 |                           | 270                                             | 300 | 330 | kHz  |
| Isolation Voltage              | 1 minute        | Input to Output           | 1600                                            |     |     | VDC  |
|                                |                 | Input (Output) to Case    | 1600                                            |     |     |      |
| Isolation Resistance           | 500VDC          |                           | 1                                               |     |     | GΩ   |
| Isolation Capacitance          |                 |                           |                                                 |     | 300 | pF   |
| PHYSICAL SPECIFICATIONS        |                 |                           |                                                 |     |     |      |
| Weight                         |                 |                           | 0.95oz (27g)                                    |     |     |      |
| Dimensions (L x W x H)         |                 |                           | 2in x 1in x 0.4in<br>(50.8mm x 25.4mm x 10.2mm) |     |     |      |
| Case Material                  |                 |                           | Nickel-Coated Copper                            |     |     |      |
| Base Material                  |                 |                           | Non-Conductive Black Plastic                    |     |     |      |
| Potting Material               |                 |                           | Epoxy (UL94 V-0)                                |     |     |      |
| SAFETY & EMC CHARACTERISTICS   |                 |                           |                                                 |     |     |      |
| Safety Approvals               |                 |                           | UL60950-1<br>EN60950-1<br>IEC60950-1            |     |     |      |
| EMI <sup>(9)</sup>             | EN55022         |                           | Class B                                         |     |     |      |
| ESD                            | EN6100-4-2      | Air ±8kV and Contact ±6kV | Perf. Criteria B                                |     |     |      |
| Radiated Immunity              | EN6100-4-3      | 10 V/m                    | Perf. Criteria A                                |     |     |      |
| Fast Transient <sup>(10)</sup> | EN61000-4-4     | ±2kV                      | Perf. Criteria B                                |     |     |      |
| Surge <sup>(10)</sup>          | EN61000-4-5     | ±2kV                      | Perf. Criteria B                                |     |     |      |
| Conducted Immunity             | EN61000-4-6     | 10 Vr.m.s                 | Perf. Criteria A                                |     |     |      |

## NOTES

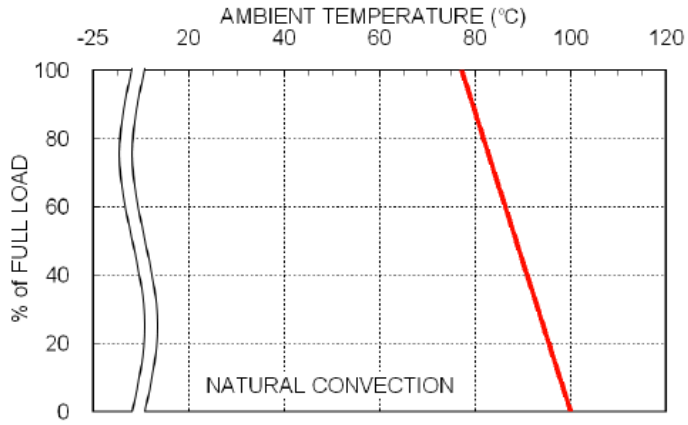
- (1) Models with a 4.5~9VDC input voltage range require a minimum order.
- (2) Typical value at nominal input voltage and full load.
- (3) Maximum value at nominal input voltage and full load
- (4) Typical value at nominal input voltage and no load
- (5) Test by minimum Vin and constant resistive load
- (6) The on/off control pin is referenced to -Vin.  
To order positive logic remote on/off, add the suffix "P" to the model number (Ex: JR24S15-660P)  
To order negative logic remote on/off, add the suffix "R" to the model number (Ex: JR24S15-660R)
- (7) "I" type models are more efficient; therefore they can be operated over a more extensive temperature range than the standard version. To order extended operating temperature range, add the suffix "-I" to the model number (EX: JR24S15-660-I)
- (8) Heatsink is optional and P/N: 7G-0020C-F.
- (9) The JR series can meet EN55022 Class A with external capacitors in parallel connected to the input pins.  
Recommended: 12Vin: 4.7µF/25V 1210 MLCC  
24Vin: 2.2µF/50V 1812 MLCC  
48Vin: 1.5µF/100V 1812 MLCC
- (10) 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.

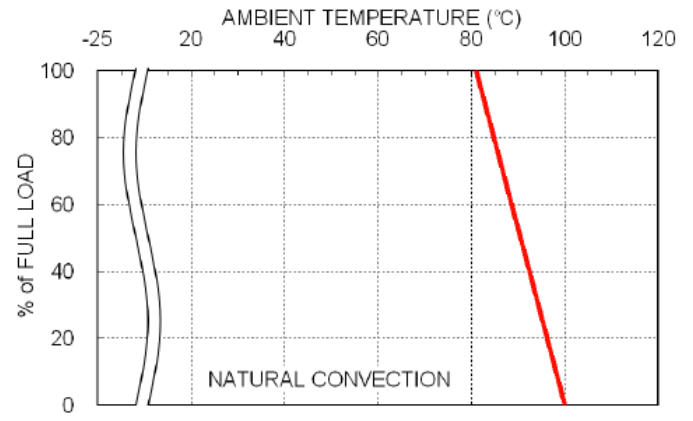
*\*Due to advances in technology, specifications subject to change without notice.*

## DERATING CURVES

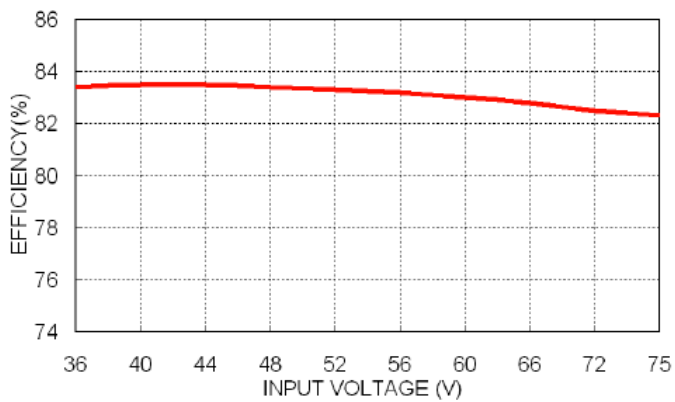
JR48S5-2000 Derating Curve



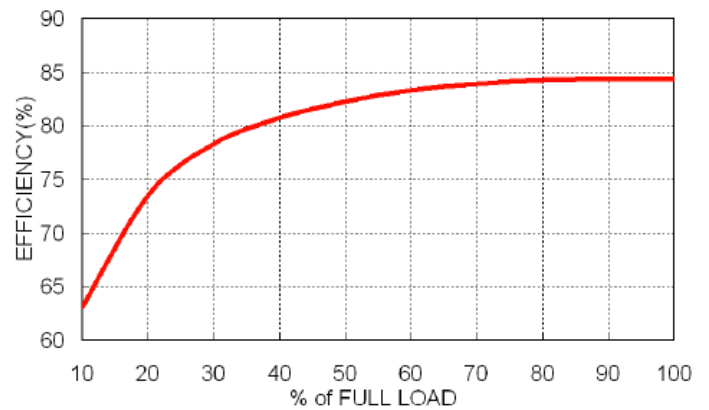
JR48S5-2000 Derating Curve With Heatsink



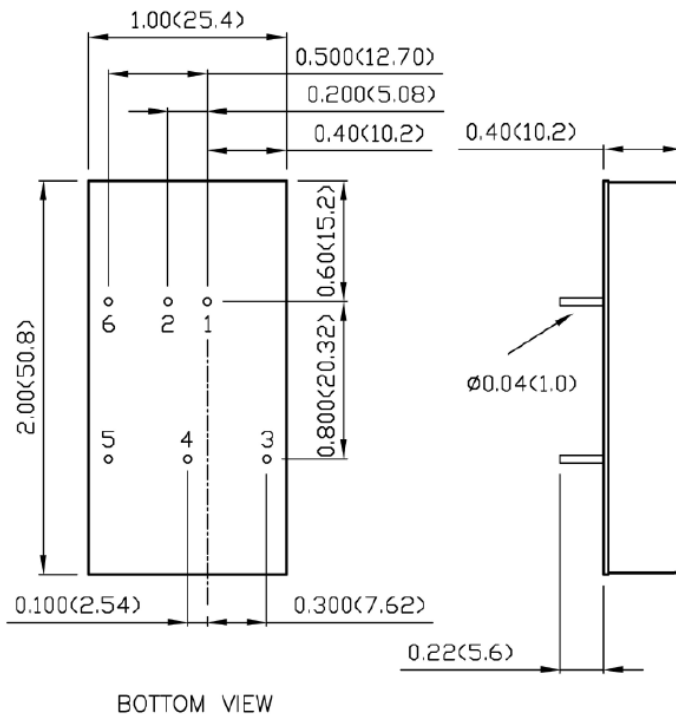
JR48S5-2000 Efficiency vs. Input Voltage



JR48S5-2000 Derating Curve Efficiency vs. Output Load



## MECHANICAL DRAWINGS



BOTTOM VIEW

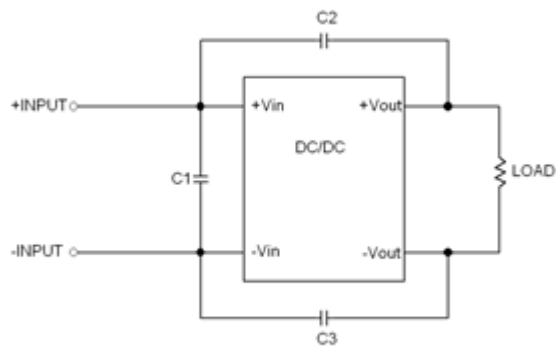
## PIN CONNECTION

| PIN | SINGLE        | DUAL          |
|-----|---------------|---------------|
| 1   | +Vin          | +Vin          |
| 2   | -Vin          | -Vin          |
| 3   | +Vout         | +Vout         |
| 4   | No Pin        | Common        |
| 5   | -Vout         | -Vout         |
| 6   | Ctrl (Option) | Ctrl (Option) |

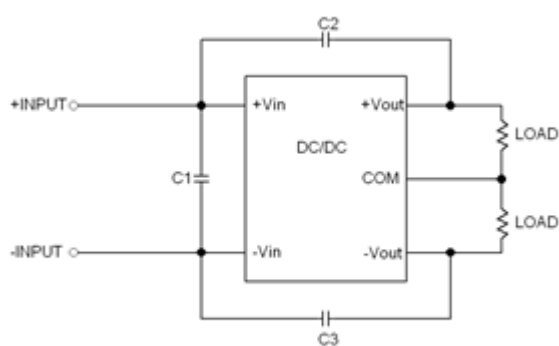
1. All dimensions in inch (mm)
2. Tolerance:  $x.xx \pm 0.02$  ( $x.x \pm 0.5$ )  
 $x.xxx \pm 0.01$  ( $x.xx \pm 0.25$ )
3. Pin pitch tolerance  $\pm 0.01$  (0.25)
4. Pin dimension tolerance  $\pm 0.004$  (0.1)

## EMI CONSIDERATIONS

### Recommended external EMI filter for EN55022 Class A



Single Output

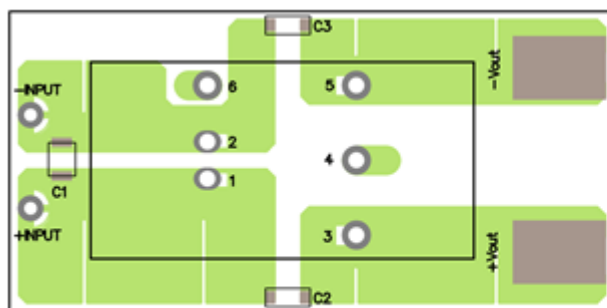


Dual Output

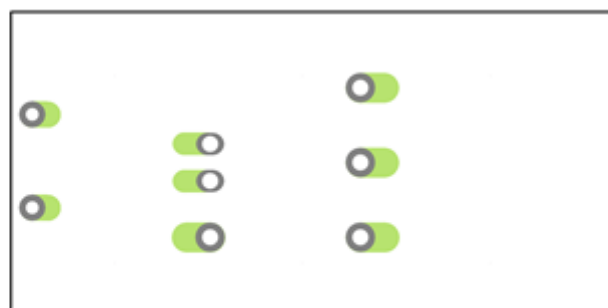
### B.O.M. of External EMI Filter

| MODEL                                  | Output        | C1  | C2`C3                   |
|----------------------------------------|---------------|-----|-------------------------|
| JR5S12-830<br>JR5S15-660<br>JR5S5-2000 | Single Output | N/A | 1000pF/2kV<br>1808 MLCC |
| JR5D12-420<br>JR5D15-330<br>JR5D5-1000 | Dual Output   | N/A | 1000pF/2kV<br>1808 MLCC |

### Recommended Layout Pattern for Single Output

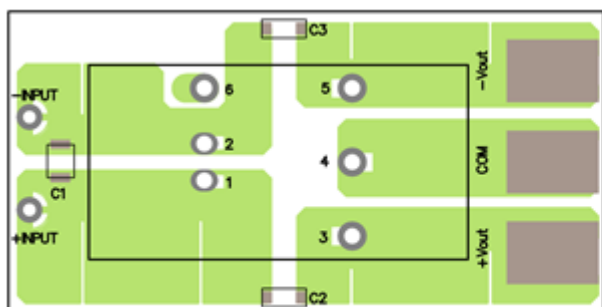


TOP VIEW

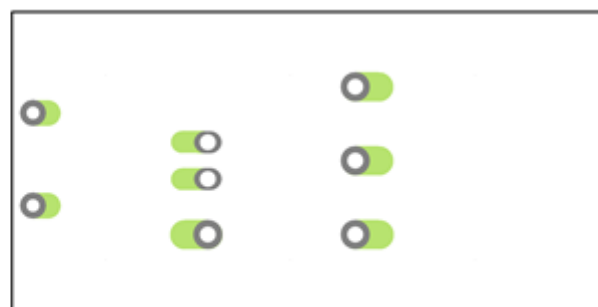


BOTTOM VIEW

### Recommended Layout Pattern for Dual Output

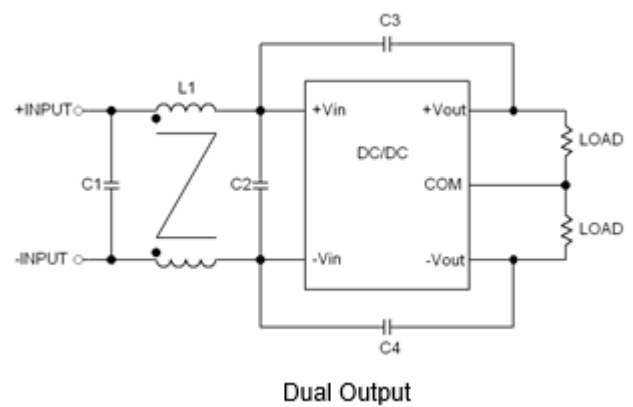
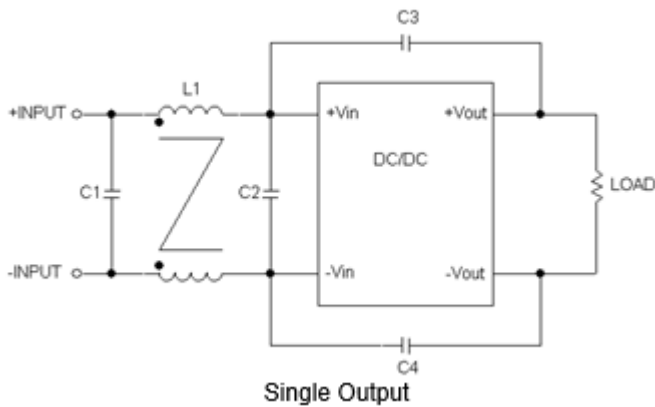


TOP VIEW



BOTTOM VIEW

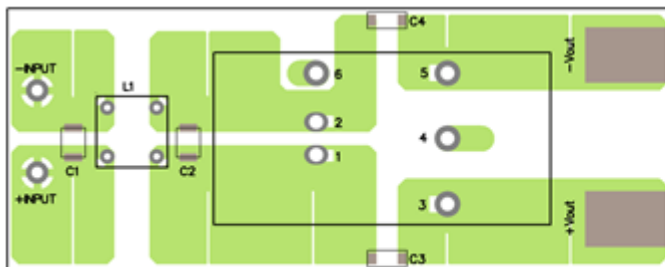
Recommended External EMI Filter for EN55022 Class B



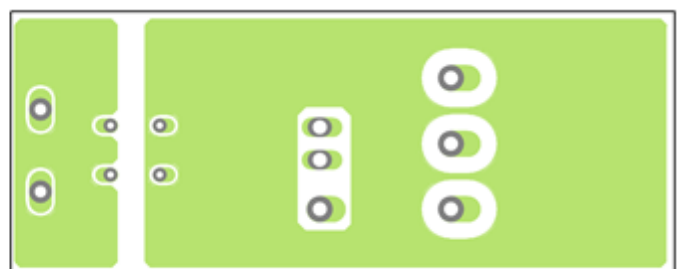
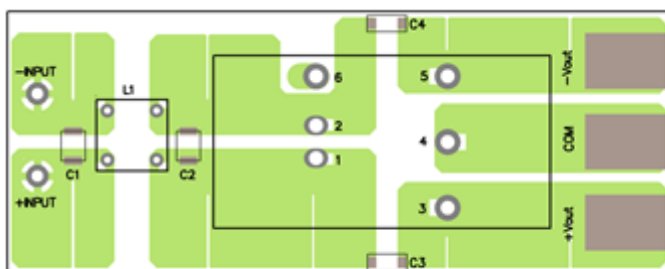
B.O.M of External EMI Filter

| MODEL                                  | Output        | C1                           | C2  | C3' C4                  | L1                                      |
|----------------------------------------|---------------|------------------------------|-----|-------------------------|-----------------------------------------|
| JR5S12-830<br>JR5S15-660<br>JR5S5-2000 | Single Output | 2.2 $\mu$ F/50V<br>1210 MLCC | N/A | 1000pF/2kV<br>1808 MLCC | 325 $\mu$ H<br>Common Choke,<br>PMT-050 |
| JR5D12-420<br>JR5D15-330<br>JR5D5-1000 | Dual Output   | 2.2 $\mu$ F/50V<br>1210 MLCC | N/A | 1000pF/2kV<br>1808 MLCC | 325 $\mu$ H<br>Common Choke,<br>PMT-050 |

Recommended Layout Pattern for Single Output

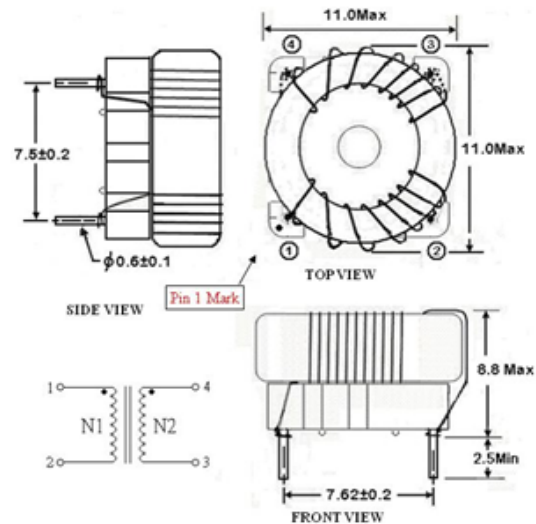


Recommended Layout Pattern for Dual Output



Specifications of Common Mode Choke and Differential Inductor

|                          |                                                  |
|--------------------------|--------------------------------------------------|
| Part Number              | JR5                                              |
| Inductance:              | Pin 1-2: 325 $\mu$ H $\pm$ 35%<br>(100kHz/100mV) |
|                          | Pin 3-4: 325 $\mu$ H $\pm$ 35%<br>(100kHz/100mV) |
| DCR:                     | 35m $\Omega$ , max.                              |
| Rated Current:           | 3.3A, max.                                       |
| Operating Temperature    | -40°C ~ +105°C                                   |
| Recommended Through Hole | $\phi$ 0.8mm                                     |



All dimensions in mm

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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