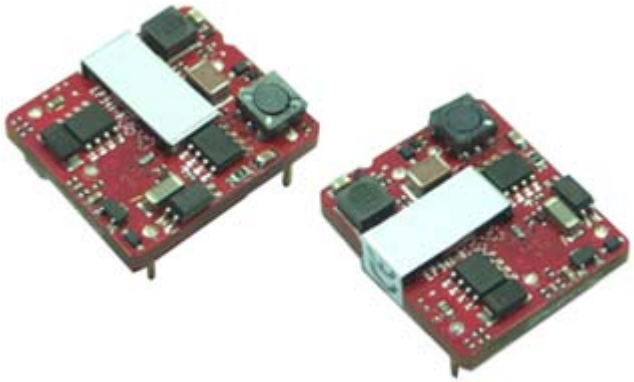
Wall Industries, Inc.

**DATASHEET**
**Rev. D**

# JFW SERIES

**4:1 Ultra Wide Input Voltage Range**
**DIP and SMT Type Packages**
**Single Outputs, RoHS Compliant**
**15W Open Frame DC/DC Power Converters**



## APPLICATIONS

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

## OPTIONS

- SMT Type
- Without Trim Pin
- Without ON/OFF Pin
- Negative Logic Remote ON/OFF

## FEATURES

- 15 Watts Maximum Output Power
- Single Output up to 4A
- Cost Efficient Open Frame Design
- Small Size and Low Profile: 1.10” x 0.94” x 0.34”
- High Efficiency up to 87%
- 4:1 Ultra Wide Input Voltage Range
- Fixed Switching Frequency
- Input to Output Isolation: 2250VDC
- No Minimum Load Requirement
- Output Voltage Adjustability
- Industry Standard Pin-out
- Negative or Positive Remote ON/OFF Control
- Over Current, Over Voltage, and Input Under Voltage Protection
- Surface Mount and Through Hole Types Available
- SMT Package Qualified for Lead-free Reflow Solder Process According to IPC J-STD-020D
- CE Mark Meets 2006/95/EC, 93/68/EEC, and 2004/108/EC
- UL60950-1, EN60950-1, and IEC60950-1 Licensed
- ISO9001 Certified Manufacturing Facilities

## DESCRIPTION

The JFW series of DC/DC power converters provides 15 Watts of output power in a low profile industry standard package and footprint. These converters have single outputs and operate over 4:1 input voltage ranges of 9-36VDC and 18-75VDC. These units are also protected against over current, over voltage, and input under voltage conditions. Some features include high efficiency up to 87%, adjustable output voltage, and positive or negative remote ON/OFF control. These converters are RoHS compliant and have UL60950-1, EN60950-1, and IEC60950-1 safety approvals. Both surface mount (“S” suffix) and DIP (standard) packages are available.

## SPECIFICATIONS: *JFW Series*

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 | 24VDC nominal input models | | 9 | 24 | 36 | VDC |
| | 48VDC nominal input models | | 18 | 48 | 75 | |
| Start-up Voltage | 24VDC nominal input models | | | | 9 | VDC |
| | 48VDC nominal input models | | | | 18 | |
| Shutdown Voltage | 24VDC nominal input models | | | 8 | | VDC |
| | 48VDC nominal input models | | | 16 | | |
| Input Surge Voltage (100ms) | 24VDC nominal input models | | | | 50 | VDC |
| | 48VDC nominal input models | | | | 100 | |
| Input Reflected Ripple Current | | | | 30 | | mAp-p |
| **OUTPUT SPECIFICATIONS** | | | | | | |
| Output Voltage | | | See Table | | | |
| Line Regulation | Low line to high line at full load | | -0.2 | | +0.2 | % |
| Load Regulation | No load to full load | | -0.2 | | +0.2 | % |
| Voltage Accuracy | Full load an nominal Vin | | -1 | | +1 | % |
| Voltage Adjustability *(See Note 6)* | | | -10 | | +10 | % |
| Output Power | | | | | 15 | W |
| Output Current | | | See Table | | | |
| Ripple & Noise (20Hz BW) | Measured with a 1µF M/C and a 10µF T/C | | | 100 | | mVp-p |
| Transient Response Recovery Time | 25% load step change | | | 250 | | µs |
| Start-Up Time | Nominal input and constant resistive load | Power Up | | | 30 | ms |
| | | Remote ON/OFF | | | 30 | |
| Minimum Load | | | 0 | | | % |
| Temperature Coefficient | | | -0.02 | | +0.02 | %/°C |
| **PROTECTION** | | | | | | |
| Over Voltage Protection | Voltage clamped | 3.3VDC Output Model | 3.7 | | 5.4 | VDC |
| | | 5VDC Output Model | 5.6 | | 7.0 | |
| | | 12VDC Output Model | 13.8 | | 17.5 | |
| | | 15VDCOutput Model | 16.8 | | 20.5 | |
| Over Load Protection | % of FL at nominal input | | | 150 | | % |
| Short Circuit Protection | | | Hiccup, automatic recovery | | | |
| **GENERAL SPECIFICATIONS** | | | | | | |
| Efficiency | Nominal input and full load | | See Table | | | |
| Switching Frequency | 3.3VDC & 5VDC Output Models | | 315 | 350 | 385 | KHz |
| | 12VDC & 15VDC Output Models | | 360 | 400 | 440 | |
| Isolation Voltage (Input to Output) | For 1 minute | | 2250 | | | VDC |
| Isolation Resistance | | | 10 | | | GΩ |
| Isolation Capacitance | | | | | 1500 | pF |
| **REMOTE ON/OFF** *(See Note 7)* | | | | | | |
| Positive Logic (standard) | DC/DC ON | | Open or 3V < Vr < 15V | | | |
| | DC/DC OFF | | Short or 0V < Vr < 1.2V | | | |
| Negative Logic (optional) | DC/DC ON | | Short or 0V < Vr < 1.2V | | | |
| | DC/DC OFF | | Open or 3V < Vr < 15V | | | |
| Input Current of Remote Control Pin | Nominal Input | | -0.5 | | 1 | mA |
| Remote Off Input Current | Nominal Input | | | 2.5 | | mA |
| **ENVIRONMENTAL SPECIFICATIONS** | | | | | | |
| Operating Ambient Temperature | With derating | | -40 | | +85 | °C |
| Storage Temperature | | | -55 | | +125 | °C |
| Relative Humidity | | | 5 | | 95 | % RH |
| Thermal Shock | | | MIL-STD-810F | | | |
| Vibration | | | MIL-STD-810F | | | |
| Lead-Free Reflow Solder Process | | | IPC J-STD-020D | | | |
| Moisture Sensitivity Level (MSL) | | | IPC J-STD-033B Level 2a | | | |
| MTBF *(See Note 1)* | BELLCORE TR-NWT-000332 | | 1,322,000 hours | | | |
| | MIL-HDBK-217F | | 514,700 hours | | | |
| **PHYSICAL SPECIFICATIONS** | | | | | | |
| Weight | | | 0.36oz (10.5g) | | | |
| Dimensions (L x W x H) | | | 1.10 x 0.94 x 0.34 inches (27.9 x 23.9 x 8.5 mm) | | | |
| **SAFETY & EMC CHARACTERISTICS** | | | | | | |
| Safety Approvals | | | IEC60950-1, UL60950-1, EN60950-1 | | | |
| EMI *(See Note 8)* | EN55022 | | Class A | | | |
| Radiated Immunity | EN61000-4-3 | 10 V/m | Perf. Criteria A | | | |
| Fast Transient *(See Note 9)* | EN61000-4-4 | ±2KV | Perf. Criteria A | | | |
| Surge *(See Note 9)* | EN61000-4-5 | ±1KV | Perf. Criteria A | | | |
| Conducted Immunity | EN61000-4-6 | 3 Vrms | Perf. Criteria A | | | |

| MODEL SELECTION TABLE | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Model Number | Input Range | Output Voltage | Output Current | | Output [4] Ripple & Noise | Input Current | | Output Power | Efficiency [4] | Capacitor[5] Load max |
| | | | Min. load | Full load | | No load [3] | Full load [2] | | | |
| JFW24S3.3-4000 | 24 VDC (9 - 36 VDC) | 3.3 VDC | 0mA | 4000mA | 100mVp-p | 60mA | 680mA | 13W | 85% | 12000µF |
| JFW24S5-3000 | | 5 VDC | 0mA | 3000mA | 100mVp-p | 70mA | 754mA | 15W | 87% | 6000µF |
| JFW24S12-1300 | | 12 VDC | 0mA | 1300mA | 100mVp-p | 10mA | 793mA | 15W | 86% | 1000µF |
| JFW24S15-1000 | | 15 VDC | 0mA | 1000mA | 100mVp-p | 10mA | 763mA | 15W | 86% | 660µF |
| JFW48S3.3-4000 | 48 VDC (18 - 75 VDC) | 3.3 VDC | 0mA | 4000mA | 100mVp-p | 40mA | 340mA | 13W | 85% | 12000µF |
| JFW48S5-3000 | | 5 VDC | 0mA | 3000mA | 100mVp-p | 40mA | 377mA | 15W | 87% | 6000µF |
| JFW48S12-1300 | | 12 VDC | 0mA | 1300mA | 100mVp-p | 10mA | 392mA | 15W | 86% | 1000µF |
| JFW48S15-1000 | | 15 VDC | 0mA | 1000mA | 100mVp-p | 10mA | 382mA | 15W | 86% | 660µF |

*****See Product Options table on page 5*****

## NOTES

1. BELLCORE TR-NWT-000332. Case 1: 50% Stress, Temperature at 40ºC.
   MIL-HDBK-217F Notice2 @ Ta=25°C, Full load (Ground, benign, controlled environment).
2. Maximum value at nominal input voltage and full load.
3. Typical value at nominal input voltage and no load.
4. Typical value at nominal input voltage and full load.
5. Test by minimum input and constant resistive load.
6. 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 the +OUTPUT pin or the –OUTPUT pin.
7. The CTRL pin voltage is referenced to -INPUT. (See the "Product Options" table on page 5 for suffix options).
8. The JFW Series meets EN55022 Class A and Class B only with external components connected to the input pins of the converter.
9. 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 chemi-con KY Series, 220µF/100V, ESR 48mΩ.

**CAUTION:** These power modules are not internally fused. An input line fuse must always be used.

## OUTPUT ADJUSTABILITY

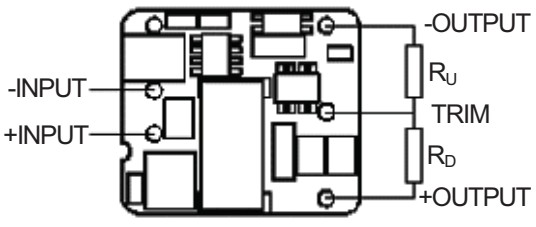
Output voltage adjustment allows the user to increase or decrease the output voltage set point of a module. This is accomplished by connecting an external resistor between the TRIM pin and either the +OUTPUT or -OUTPUT pins. With an external resistor between the TRIM and -OUTPUT pin, the output voltage 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.

**Trim Up Equation**

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

**Trim Down Equation**

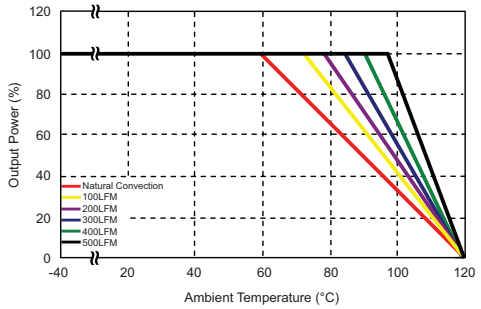
$$R_D = \left[ \frac{\left(V_{O,down} - L\right) \times G}{\left(V_O - V_{O,down}\right)} - H \right] \Omega$$



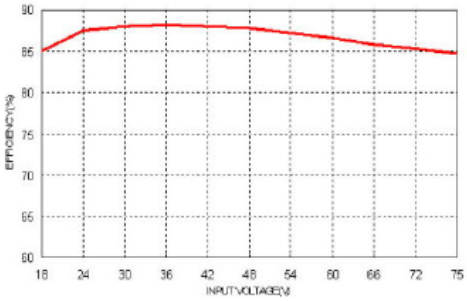

| Model | G | H | K | L |
|---|---|---|---|---|
| JFWXXS3.3-4000 | 5110 | 2050 | 0.8 | 2.5 |
| JFWXXS5-3000 | 5110 | 2050 | 2.5 | 2.5 |
| JFWXXS12-1300 | 10000 | 5110 | 9.5 | 2.5 |
| JFWXXS15-1000 | 10000 | 5110 | 12.5 | 2.5 |

## CHARACTERISTIC CURVES

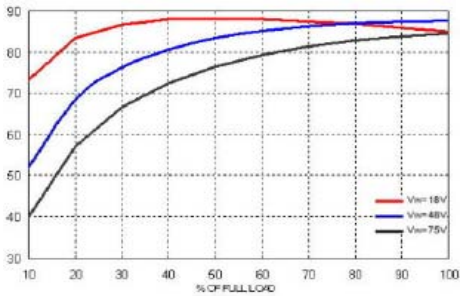
**JFW48S5-3000 Derating Curve**




**JFW48S5-3000 Efficiency vs Input Voltage**

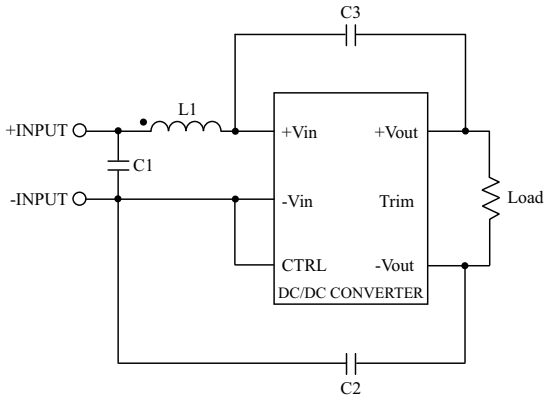



**JFW48S5-3000 Efficiency vs Output Current**




## RECOMMENDED EMI FILTERS

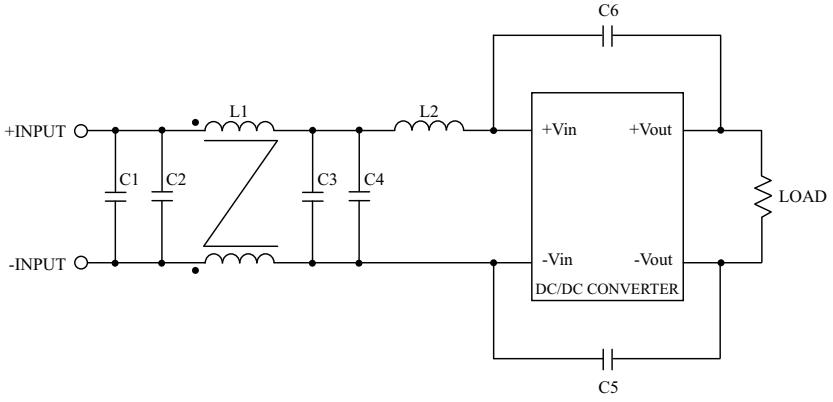
**Recommended Filter for EN55022 Class A Compliance**




The components used in the figure above are as follows:

| MODEL | C1 | C2, C3 | L1 |
|---|---|---|---|
| JFW24 | 6.8µF/50V 1812 MLCC | 470pF/3KV 1808 MLCC | 10µF SMT Inductor PMT-070 |
| JFW48 | 2.2µF/100V 1812 MLCC | 470pF/3KV 1808 MLCC | 18µF SMT Inductor PMT-071 |

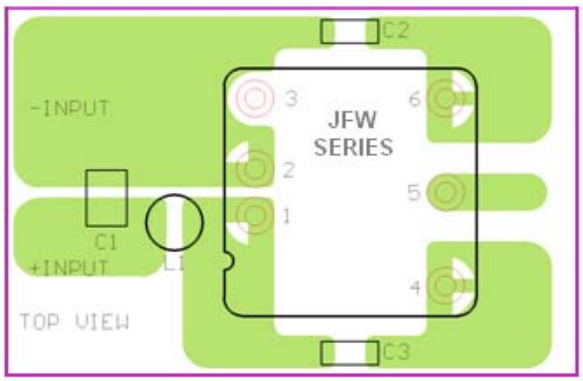
**Recommended Filter for EN55022 Class B Compliance**



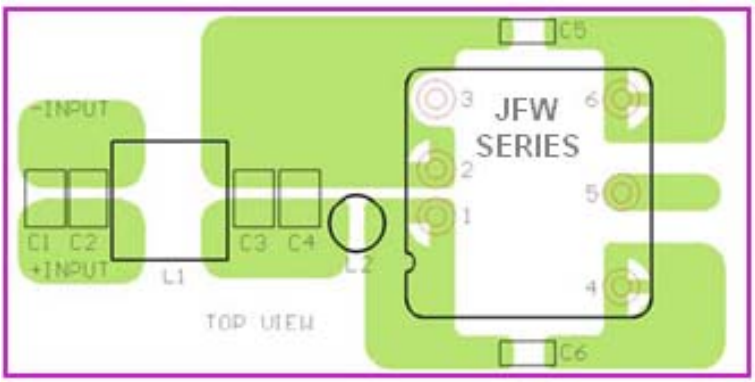

The components used in the figure above are as follows:

| MODEL | C1 | C2, C3, C4 | C5, C6 | L1 | L2 |
|---|---|---|---|---|---|
| JFW24 | N/A | 6.8µF/50V 1812 MLCC | 470pF/3KV 1808 MLCC | 145µH Common Choke PMT-051 | 10µF SMT Inductor PMT-070 |
| JFW48 | 2.2µF/100V 1812 MLCC | 2.2µF/100V 1812 MLCC | 470pF/3KV 1808 MLCC | 325µH Common Choke PMT-050 | 33µF SMT Inductor PMT-069 |

**Recommended EN55022 Class A Filter Circuit Layout**

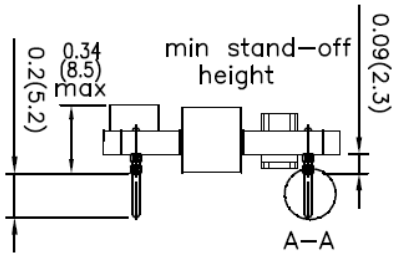



**Recommended EN55022 Class B Filter Circuit Layout**

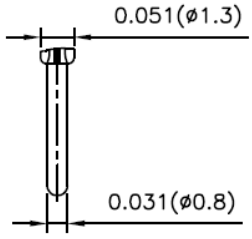


## MECHANICAL DRAWING

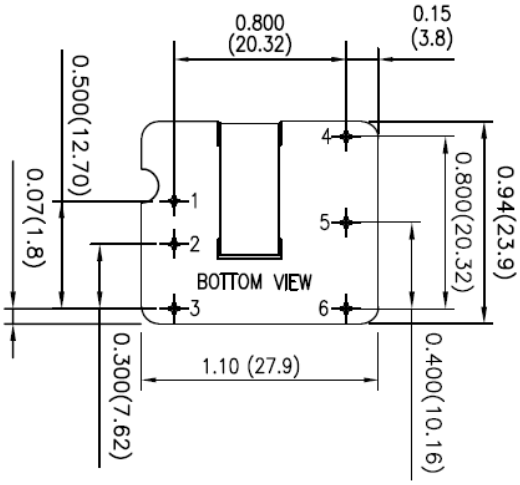
### DIP TYPE (Standard)

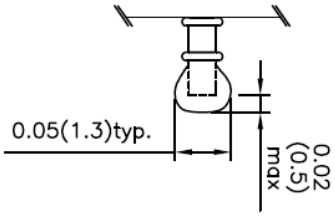



1. Unit: inches (mm)
2. Tolerance: X.XX±0.02 (X.X±0.5)
   X.XXX±0.01 (X.XX±0.25)
3. Pin pitch tolerance: ±0.01 (±0.25)
4. Pin dimension tolerance: ±0.004 (±0.1)



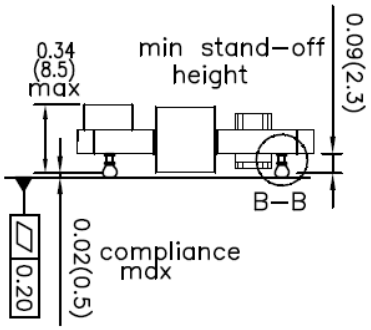

SECTION A–A

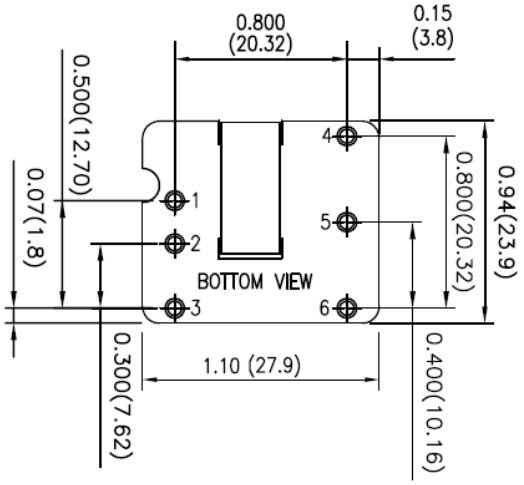



SECTION B–B

### SMT TYPE (Suffix "S")

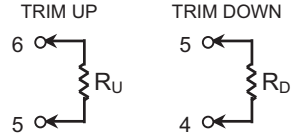



PAD LAYOUT 6 PADS ø2.8mm

| PIN CONNECTIONS | |
|---|---|
| **PIN** | **JFW SERIES** |
| 1 | +INPUT |
| 2 | -INPUT |
| 3 | CTRL |
| 4 | +OUTPUT |
| 5 | TRIM |
| 6 | -OUTPUT |

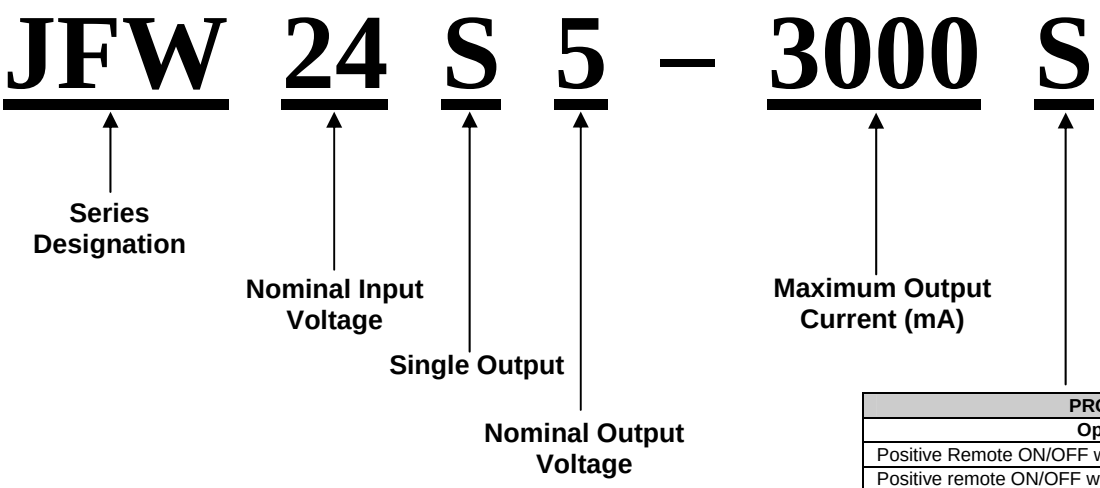
| ETERNAL OUTPUT TRIMMING |
|---|
| Output can be externally trimmed by using the method shown below. |




| PRODUCT OPTIONS | |
|---|---|
| **Option** | **Suffix** |
| Positive Remote ON/OFF with DIP (standard) | No Suffix |
| Positive remote ON/OFF with SMT | S |
| Negative Remote ON/OFF with DIP | R |
| Negative Remote ON/OFF with SMT | SR |
| DIP type without ON/OFF pin | D |
| SMT type without ON/OFF pin | SD |
| DIP type without ON/OFF & TRIM pin | G |
| SMT type without ON/OFF & TRIM pin | SG |
| DIP type, negative remote ON/OFF, without TRIM pin | F |
| SMT type, negative remote ON/OFF, without TRIM pin | SF |
| DIP type, positive remote ON/OFF, without TRIM pin | J |
| SMT type, positive remote ON/OFF, without TRIM pin | SJ |

## ORDERING INFORMATION

Part Number Example:




| PRODUCT OPTIONS | |
|---|---|
| **Option** | **Suffix** |
| Positive Remote ON/OFF with DIP (standard) | No Suffix |
| Positive remote ON/OFF with SMT | S |
| Negative Remote ON/OFF with DIP | R |
| Negative Remote ON/OFF with SMT | SR |
| DIP type without ON/OFF pin | D |
| SMT type without ON/OFF pin | SD |
| DIP type without ON/OFF & TRIM pin | G |
| SMT type without ON/OFF & TRIM pin | SG |
| DIP type, negative remote ON/OFF, without TRIM pin | F |
| SMT type, negative remote ON/OFF, without TRIM pin | SF |
| DIP type, positive remote ON/OFF, without TRIM pin | J |
| SMT type, positive remote ON/OFF, without TRIM pin | SJ |

## 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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