


Size:
2.00 x 1.00 x 0.40 inches
(50.8 x 25.4 x 10.2 mm)

Applications:
- Wireless Networks
- Telecom/Datacom
- Industry Control Systems
- Distributed Power Architectures
- Semiconductor Equipment

## FEATURES

- Input Under Voltage Protection
- High Efficiency up to 92%
- Remote ON/OFF Control
- 2:1 Wide Input Voltage Ranges
- Six-Sided Continuous Shielding
- Low Stand-by Power Consumption
- No Minimum Load Required
- Single and Dual Outputs
- 60 Watts Maximum Output Power
- 1600VDC I/O Isolation
- Short Circuit, Over Voltage, Over Load, & Over Temp. Protection
- Wide Operating Temperature Range: -40°C to +85°C
- CE Mark Meets 2006/95/EC, 2011/95/EC, & 2004/108/EC
- Compliant to RoHS EU Directive 2011/65/EU
- UL60950-1, EN60950-1, & IEC60950-1 Safety Approvals
- Optional Heatsink Available (Suffix "HS")

## DESCRIPTION

The CRW60 series of DC/DC power converters provides 60 Watts of output power in an industry standard 2.00" x 1.00" x 0.40" package and footprint. This series has single and dual output models with 4:1 ultra wide input voltage ranges of 9-36VDC and 18-75VDC. Some features include high efficiency up to 92%, 1600VDC I/O isolation, six-sided shielding, and remote ON/OFF control. These converters are also protected against short circuit, over voltage, over load, and over temperature conditions. All models are RoHS compliant and have UL60950-1, EN60950-1, and IEC60950-1 safety approvals. This series is best suited for use in wireless networks, telecom/datacom, industry control systems, semiconductor equipment, and distributed power architectures.

## MODEL SELECTION TABLE

### SINGLE OUTPUT MODELS

| Model Number | Input Voltage Range | Output Voltage | Output Current | | Output Ripple & Noise | No Load Input Current | Output Power | Efficiency | Maximum Capacitive Load |
|---|---|---|---|---|---|---|---|---|---|
| | | | Min Load | Max Load | | | | | |
| CRW24S33-60 | 24 VDC (9 - 36 VDC) | 3.3 VDC | 0mA | 12A | 75mVp-p | 10mA | 39.6W | 90% | 32,000µF |
| CRW24S05-60 | | 5 VDC | 0mA | 12A | 75mVp-p | 10mA | 60W | 92% | 30,000µF |
| CRW24S12-60 | | 12 VDC | 0mA | 5A | 100mVp-p | 10mA | 60W | 92% | 5850µF |
| CRW24S15-60 | | 15 VDC | 0mA | 4A | 100mVp-p | 10mA | 60W | 92% | 3900µF |
| CRW24S24-60 | | 24 VDC | 0mA | 2.5A | 150mVp-p | 10mA | 60W | 92% | 2000µF |
| CRW48S33-60 | 48 VDC (18 - 75 VDC) | 3.3 VDC | 0mA | 12A | 75mVp-p | 10mA | 39.6W | 90% | 32,000µF |
| CRW48S05-60 | | 5 VDC | 0mA | 12A | 75mVp-p | 10mA | 60W | 92% | 30,000µF |
| CRW48S12-60 | | 12 VDC | 0mA | 5A | 100mVp-p | 10mA | 60W | 92% | 5850µF |
| CRW48S15-60 | | 15 VDC | 0mA | 4A | 100mVp-p | 10mA | 60W | 92% | 3900µF |
| CRW48S24-60 | | 24 VDC | 0mA | 2.5A | 150mVp-p | 10mA | 60W | 92% | 2000µF |

### DUAL OUTPUT MODELS

| Model Number | Input Voltage Range | Output Voltage | Output Current | | Output Ripple & Noise | No Load Input Current | Output Power | Efficiency | Maximum Capacitive Load |
|---|---|---|---|---|---|---|---|---|---|
| | | | Min Load | Max Load | | | | | |
| CRW24D12-60 | 24 VDC (9 - 36 VDC) | ±12 VDC | 0mA | ±2.5A | 100mVp-p | 10mA | 60W | 91% | ±3900µF |
| CRW24D15-60 | | ±15 VDC | 0mA | ±2A | 100mVp-p | 10mA | 60W | 91% | ±2400µF |
| CRW24D24-60 | | ±24 VDC | 0mA | ±1.25A | 150mVp-p | 10mA | 60W | 91% | ±1000µF |
| CRW48D12-60 | 48 VDC (18 - 75 VDC) | ±12 VDC | 0mA | ±2.5A | 100mVp-p | 10mA | 60W | 91% | ±3900µF |
| CRW48D15-60 | | ±15 VDC | 0mA | ±2A | 100mVp-p | 10mA | 60W | 91% | ±2400µF |
| CRW48D24-60 | | ±24 VDC | 0mA | ±1.25A | 150mVp-p | 10mA | 60W | 91% | ±1000µF |

NOTES

1. The CRW60 series can only meet EMI Class A or Class B with external components added. Please contact factory for more information.
2. An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5.
   - For 24VDC nominal input models we recommend connecting an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220µF/100V) and a TVS (SMDJ58A, 58V, 3000 Watt peak pulse power) diode in parallel.
   - For 48VDC nominal input models we recommend connecting an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220µF/100V) and a TVS (SMDJ120A, 120V, 3000 Watt peak pulse power) diode connected in parallel.
3. Both positive logic and negative logic remote ON/OFF control is available. Positive logic remote ON/OFF comes standard; for negative logic remote ON/OFF add the suffix "R" to the model number (Ex: CRW48S12-60R).
4. Optional heatsink is available. Please call factory for ordering details.

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


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## SPECIFICATIONS: CRW60 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 (1sec, max.) | 24VDC nominal input models | | | | 50 | VDC |
| | 48VDC nominal input models | | | | 100 | |
| Input Current | No Load | | See Table | | | |
| 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 Output Models | -0.5 | | +0.5 | % |
| | | Dual Output Models | -1.0 | | +1.0 | |
| Cross Regulation (Dual Output Models) | Asymmetrical load 25% / 100% FL | | -5.0 | | +5.0 | % |
| Voltage Adjustability | Single Output Models | 3.3V, 5V, & 12V Output Models | -10 | | +10 | % |
| | | 15V & 24V Outputs Models | -10 | | +20 | |
| Output Power | | | See Table | | | |
| Output Current | | | See Table | | | |
| Minimum Load | | | 0 | | | % |
| Maximum Capacitive Load | Minimum input and constant resistive load | | See Table | | | |
| Ripple & Noise (20MHz BW) | Measured with a 10µF/25V X7R MLCC | 3.3V & 5V Output Models | | 75 | 100 | mVp-p |
| | Measured with a 10µF/25V X7R MLCC | 12V & 15V Output Models | | 100 | 125 | |
| | Measured with a 4.7µF/50V X7R MLCC | 24V Output Models | | 150 | 200 | |
| Transient Response Recovery Time | 25% load step change | | | 250 | | µs |
| Start-Up Time | Constant resistive load | Power Up | | 60 | | ms |
| | | Remote On/Off | | 60 | | |
| Temperature Coefficient | | | -0.02 | | +0.02 | %/°C |
| **PROTECTION** | | | | | | |
| Short Circuit Protection | | | Continuous, automatic recovery | | | |
| Over Load Protection | % of rated Iout; hiccup mode | | | 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 | | 20 | | |
| | | 24 V Output Models | | 30 | | |
| Over Temperature Protection | | | | +115 | | °C |
| **GENERAL SPECIFICATIONS** | | | | | | |
| Efficiency | Nominal input voltage and full load | | See Table | | | |
| Switching Frequency | | | 225 | 250 | 275 | kHz |
| Isolation Voltage | 1 minute | Input to Output | 1600 | | | VDC |
| | | Input (Output) to Case | 1600 | | | |
| Isolation Resistance | 500VDC | | 1 | | | GΩ |
| Isolation Capacitance | | | | | 2200 | pF |

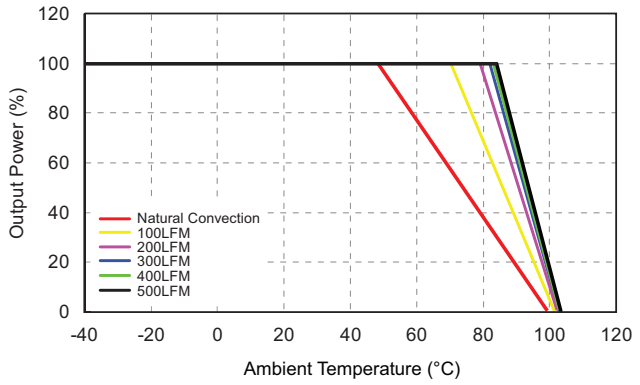
## SPECIFICATIONS: CRW60 SERIES

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.

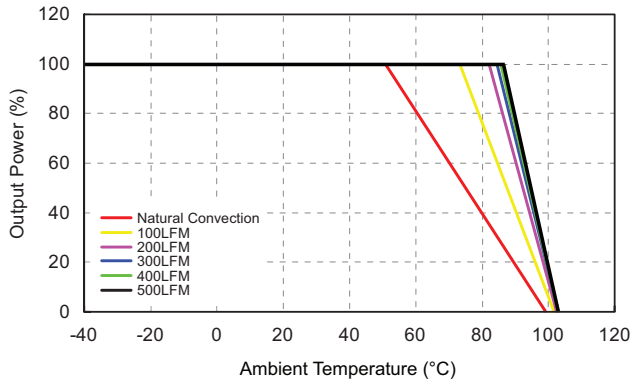
| SPECIFICATION | TEST CONDITIONS | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **REMOTE ON/OFF** (See Note 3) | | | | | | |
| Positive Logic (standard) | Referenced to –Input pin | DC/DC ON | | Open or 3V ~ 12 VDC | | |
| | | DC/DC OFF | | Short or 0 ~ 1.2 VDC | | |
| Negative Logic (optional) | Referenced to –Input pin | DC/DC ON | | Short or 0 ~ 1.2 VDC | | |
| | | DC/DC OFF | | Open or 3V ~ 12 VDC | | |
| Input Current of Remote Control Pin | Nominal Vin | | -0.5 | | +0.5 | mA |
| Remote OFF State Input Current | Nominal Vin | | | 3 | | mA |
| **ENVIRONMENTAL SPECIFICATIONS** | | | | | | |
| Operating Ambient Temperature | See derating curves | | -40 | | +85 | °C |
| Maximum Case Temperature | | | | | +105 | °C |
| Storage Temperature | | | -55 | | +125 | °C |
| Thermal Impedance (See Note 4) | Natural Convection (20LFM) | Without Heatsink<br>With Heatsink | | 10.8<br>10.3 | | °C/W |
| Relative Humidity | | | 5 | | 95 | % RH |
| Thermal Shock | | | | MIL-STD-810F | | |
| Vibration | | | | MIL-STD-810F | | |
| MTBF | BELLCORE TR-NWT-000332 Case 1: 50% Stress, Ta=40°C<br>MIL-HDBK-217F Ta=25°C, full load (G/B, controlled environment) | | 2,661,000<br>98,650 | | | hours |
| **PHYSICAL SPECIFICATIONS** | | | | | | |
| Weight | | | | 1.16oz (33g) | | |
| Dimensions (L x W x H) | | | | 2.00x1.00x0.40 inch (50.8x25.4x10.2 mm) | | |
| Case Material | | | | copper | | |
| Base Material | | | | FR4 PCB | | |
| Potting Material | | | | Silicon (UL94-V0) | | |
| Shielding | | | | Six-sided | | |
| **SAFETY & EMC CHARACTERISTICS** | | | | | | |
| Safety Approvals | | | | IEC60950-1, UL60950-1, EN60950-1 | | |
| EMI (See Note 1) | EN55022 | | | | | Class A |
| ESD | EN61000-4-2 | Air ±8kV<br>Contact ±6kV | | | | Perf. Criteria A |
| Radiated Immunity | EN61000-4-3 | 20 V/m | | | | Perf. Criteria A |
| Fast Transient (See Note 2) | EN61000-4-4 | ±2kV | | | | Perf. Criteria A |
| Surge (See Note 2) | EN61000-4-5 | ±2kV | | | | Perf. Criteria A |
| Conducted Immunity | EN61000-4-6 | 10 Vrms | | | | Perf. Criteria A |

## DERATING CURVES

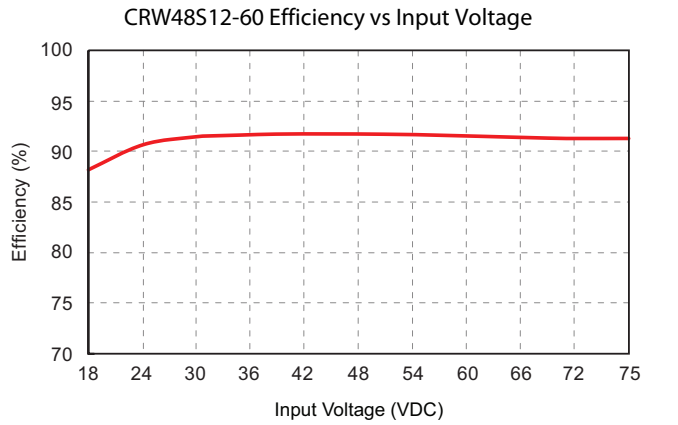
CRW48S12-60 Derating Curve

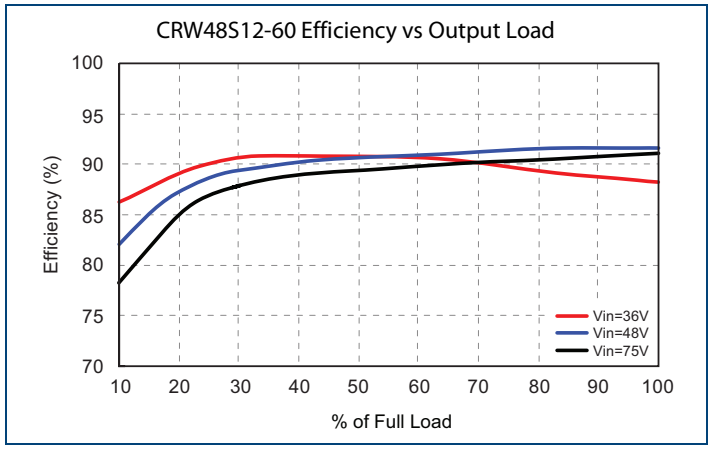



CRW48S12-60 Derating Curve with Heatsink



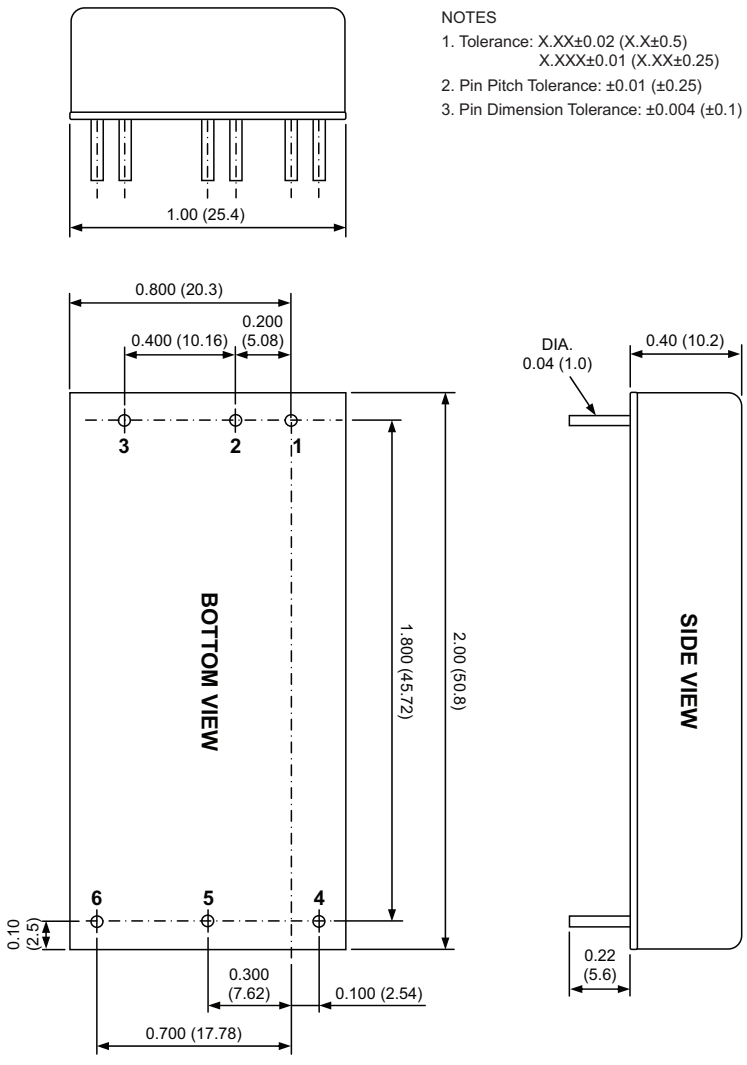
## EFFICIENCY CURVES




## MECHANICAL DRAWING

Unit: inches (mm)



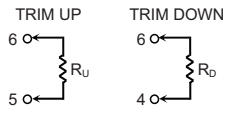

NOTES

1. Tolerance: X.XX±0.02 (X.X±0.5)
   X.XXX±0.01 (X.XX±0.25)
2. Pin Pitch Tolerance: ±0.01 (±0.25)
3. Pin Dimension Tolerance: ±0.004 (±0.1)

| PIN CONNECTIONS | | |
|---|---|---|
| PIN | SINGLE | DUAL |
| 1 | +INPUT | +INPUT |
| 2 | -INPUT | -INPUT |
| 3 | CTRL | CTRL |
| 4 | +OUTPUT | +OUTPUT |
| 5 | -OUTPUT | COMMON |
| 6 | TRIM | -OUTPUT |

**EXTERNAL OUTPUT TRIMMING**

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



## MODEL NUMBER SETUP

| CRW | 48 | S | 12 | - | 60 | R | H |
|---|---|---|---|---|---|---|---|
| Series Name | Input Voltage | Output Quantity | Ouptut Voltage | | Output Power | Remote ON/OFF | Heatsink |
| | **24:** 9-36 VDC<br>**48:** 18-75 VDC | **S:** Single Output | **33:** 3.3 VDC<br>**05:** 5 VDC<br>**12:** 12 VDC<br>**15:** 15 VDC<br>**24:** 24 VDC | | **60:** 60 Watts | **Blank:** Positive Logic<br>**R:** Negative Logic | **Blank:** No Heatsink<br>**H:** Heatsink<br>**HC:** Heatsink with clamp |
| | | **D:** Dual Output | **12:** ±12 VDC<br>**15:** ±15 VDC<br>**24:** ±24 VDC | | | | |

## 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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