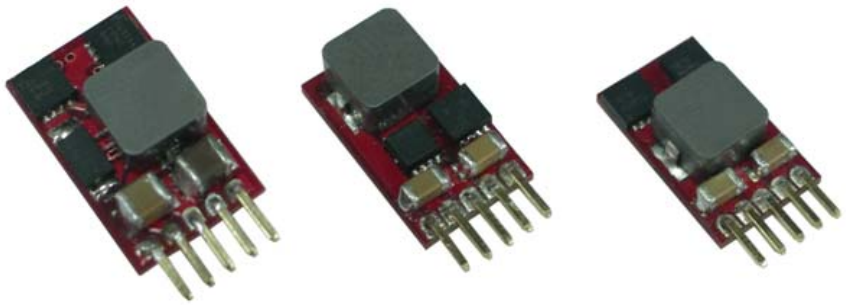
Wall Industries, Inc.

**DATASHEET**
**Rev. B**

# CV SERIES

**1.8 to 45 Watts**
**2.5-5.5VDC, 4.5-14VDC, 10-30VDC Input Ranges**
**Adjustable Output Voltage**
**Non-Isolated DC/DC Converters**



## FEATURES

- Output Current up to 3A
- 1.8 to 45 Watts Output Power Range
- 2.5-5.5VDC, 4.5-14VDC, and 10-30VDC Input Voltage Ranges
- Adjustable Output Voltage
- High Efficiency - 95% at 12VDC and Full Load
- SIP Open Frame Packages
- Small Size and Profile
- Fixed Switching Frequency
- Remote ON/OFF
- Short Circuit, Over Current, and Over Temperature Protection
- Compliant to RoHS EU Directive 2002/95/EC
- Design Meets UL60950-1, EN60950-1, and IEC60950-1
- Vertical Mounting and Horizontal Mounting Types Available

## APPLICATIONS

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

## DESCRIPTION

The CV series consists of non-isolated DC/DC converters that can deliver up to 3A of output current in a small open frame package. This series features remote ON/OFF, adjustable output voltage, and efficiency up to 95% at 12VDC and full load. This series also has over current, over temperature, and short circuit protection. The CV series is RoHS compliant and has UL60950-1, EN60950-1, and IEC60950-1 safety approvals. Both vertical (standard) and horizontal ("A" suffix) SIP mounting types are available.

## SPECIFICATIONS: *CV 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 *(See Notes 7 & 11)* | | 5VDC input models (Vin>Vo+0.5V) | | 2.5 | 5 | 5.5 | VDC |
| | | 12VDC input models (Vin>Vo+2.0V) | | 4.5 | 12 | 14 | VDC |
| | | 24VDC input models (Vin>Vo+2.5V) | | 10 | 24 | 30 | VDC |
| No Load Input Current | | | | | See Table | | |
| Maximum Input Current | | Vin=Vin(min); Io=Io(max) | | | See Table | | |
| Input Filter | | | | | C filter | | |
| Input Reflected Ripple Current *(See Note 8)* | | | | | 30 | | mA |
| **OUTPUT SPECIFICATIONS** | | | | | | | |
| Output Voltage (Voltage Adjustability) | | ***See Figure 1 and Note 6*** | | | See Table | | |
| Line Regulation | | Vo ≥ 2.5VDC | | -0.2 | | +0.2 | % Vo |
| | | Vo < 2.5VDC | | | 5 | | mV |
| Load Regulation | | Vo ≥ 2.5VDC | 0% to 100% of full load | -0.8 | | +0.8 | % Vo |
| | | Vo < 2.5VDC | | | 20 | | mV |
| | | Vo ≥ 2.5VDC | 10% to 90% of full load | -0.6 | | +0.6 | % Vo |
| | | Vo < 2.5VDC | | | 15 | | mV |
| Voltage Accuracy (max.) | | Full load | | -2 | | +2 | % Vo set |
| Output Power | | | | | 1.8 – 45 Watts | | |
| Output Current | | | | | | 3 | A |
| Ripple & Noise | | 20MHz Bandwidth | | | See Table | | |
| Output Voltage Overshoot -Startup | | full load | | | | 1 | % Vo |
| Minimum Load | | | | | 0 | | % |
| External Load Capacitance | CV24S12-3000 | ESR ≥ 1mΩ | | | | 500 | µF |
| | | ESR ≥ 10mΩ | | | | 1200 | µF |
| | Others | ESR ≥ 1mΩ | | | | 1000 | µF |
| | | ESR ≥ 10mΩ | | | | 3000 | µF |
| Output Current Limit | | 5VDC input models | | | 280 | | % |
| | | 12VDC input models | | | 220 | | % |
| | | 24VDC input models | | | 220 | | % |
| Rise Time | 5V &12V input models | Time for Vo to rise from 10% to 90% Vo | | | | 6 | ms |
| | 24V input models | | | | | 10 | ms |
| Temperature Coefficient (max) | | | | -1 | | +1 | %/°C |
| **REMOTE ON/OFF** ***(See Note 9)*** | | | | | | | |
| CV5S2.5-3000 (positive logic) | ON | | | Open or Vin (max) | | | |
| | OFF | | | 0V < Vr < 0.3V | | | |
| Others (positive logic) | ON | | | 1V < Vr < 12V | | | |
| | OFF | | | 0V < Vr < 0.3V | | | |
| **DYNAMIC LOAD RESPONSE** | | | | | | | |
| Peak Deviation | CV24S12-3000 | Load step change 50% to 100% and 100% to 50% of full load | | | 250 | | mV |
| | Others | | | | 150 | | mV |
| Recovery Time | | Load step change 50% to 100% and 100% to 50% of full load | | | 120 | | µs |
| **PROTECTION** | | | | | | | |
| Short Circuit Protection | | | | | Hiccup, automatic recovery | | |
| Over Current Protection | | | | | yes | | |
| Over Temperature Protection | | Internal IC Junction | | | 150 | | °C |
| **GENERAL SPECIFICATIONS** | | | | | | | |
| Efficiency | | Nominal input voltage and full load | | | See Table | | |
| Switching Frequency | | CV5S2.5-3000 & CV12S3.3-3000 Models | | | 600 | | KHz |
| | | CV24S5-3000 & CV24S12-3000 Models | | | 300 | | KHz |
| Isolation Voltage | | | | | none | | |
| **ENVIRONMENTAL SPECIFICATIONS** | | | | | | | |
| Operating Temperature | | With derating | | -40 | | +85 | °C |
| Storage Temperature | | | | -55 | | +125 | °C |
| Thermal Shock | | | | | MIL-STD-810F | | |
| MTBF *(See Note 1)* | | BELLCORE TR-NWT-000332 | | | 6,250,000 hours | | |
| | | MIL-HDBK-217F | | | 1,638,000 hours | | |
| **PHYSICAL SPECIFICATIONS** | | | | | | | |
| Weight | | 5VDC & 12VDC input models | | | 0.06oz (1.7g) | | |
| | | 24VDC input models | | | 0.074oz (2.1g) | | |
| Dimensions (L x W x H) | | 5VDC & 12VDC input models | | | 0.37 x 0.24 x 0.61 inches (9.4 x 6.0 x 15.5 mm) | | |
| | | 24VDC input models | | | 0.41 x 0.24 x 0.65 inches (10.4 x 6.0 x 16.5 mm) | | |
| **SAFETY** | | | | | | | |
| Safety Approvals | | | | | IEC60950-1, UL60950-1, EN60950-1 | | |

| MODEL SELECTION TABLE | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Model Number | Input Voltage Range (7, 11) | Nominal Input Voltage | Output (6) Voltage | Output Current | | Max Input Current (4) | No Load Current (2) | Ripple & Noise (5) | Output Power | Efficiency (3) |
| | | | | Min Load | Max Load | | | | | |
| CV5S2.5-3000 | 2.5 - 5.5VDC | 5VDC | 0.6 - 3.3 VDC | 0A | 3A | 3.0A | 20mA | 30mVp-p | 1.8W – 9.9W | 95% @ 2.5Vo |
| CV12S3.3-3000 | 4.5 - 14VDC | 12VDC | 0.59 - 6.0 VDC | 0A | 3A | 2.6A | 25mA | 60mVp-p | 7.1W – 18W | 93% @ 3.3Vo |
| CV24S5-3000 | 10 - 30VDC | 24VDC | 3.0 - 6.0 VDC | 0A | 3A | 1.3A | 25mA | 75mVp-p | 9W – 18W | 91% @ 5.0Vo |
| CV24S12-3000 | 10 - 30VDC | 24VDC | 5.0 - 15.0 VDC | 0A | 3A | 3.0A | 30mA | 150mVp-p | 15W – 45W | 95% @ 12Vo |

## NOTES

1. BELLCORE TR-NWT-000332. Case 1: 50% Stress, Temperature at 40°C. (Ground, Benign, controlled environment) MIL-HDBK-217F Notice2 @Ta=25°C, Full load. (Ground, Benign, controlled environment)
2. Typical value at nominal input voltage and no load.
3. Typical value at nominal input voltage and full load.
4. Maximum value at minimum input voltage and full load.
5. CV24S5-3000 and CV24S12-3000: External with $C_{out}$ = 2.2µF ceramic.
6. Output voltage programmable from 0.6V to 3.3V, 0.59V to 6.0V, 3.0V to 6.0V, and 5.0V to 15V by connecting a single resistor between the TRIM and GND pins of the module. To calculate the value of the resistor (***$R_{trim}$***) for a particular output voltage (***Vo***), use the equations shown in **Table 1**.
7. CV12S3.3-3000: When Vo, set < 0.9VDC the input voltage range is 4.5 - 9 VDC.
8. CV24S5-3000 and CV24S12-3000: An external π filter on the input of the module is recommended to minimize input reflected ripple. The filter is shown in **Figure 2**.
9. The ON/OFF control pin voltage is referenced to GND.
10. Both vertical mounting and horizontal mounting SIP types are available. Add the suffix "A" to the model number for horizontal mounting SIP type.
11. The CV series is a BUCK type DC/DC converter; the input voltage must be ≥ Vout voltage by 2V; therefore, if the output voltage required is 11V then the input voltage must be at or above 13V (11V+2V).
12. CAUTION: This power module is not internally fused. An input line fuse must always be used.

| Table 1 | |
|---|---|
| Model Name | $R_{trim\_up}$ (KΩ) |
| CV5S2.5-3000 | $\frac{1.2}{Vo - 0.6} - 0.01$ |
| CV12S3.3-3000 | $\frac{1.18}{Vo - 0.59}$ |
| CV24S5-3000 | $\frac{11.2}{Vo - 3}$ |
| CV24S12-3000 | $\frac{8.4}{Vo - 5}$ |

**Figure 1**

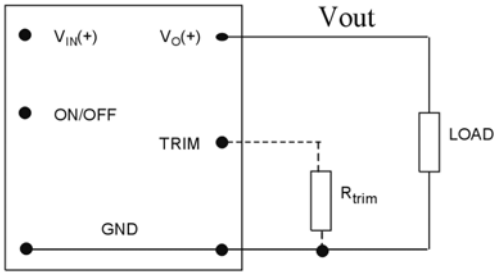
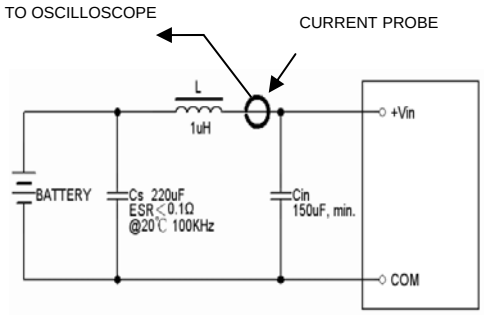
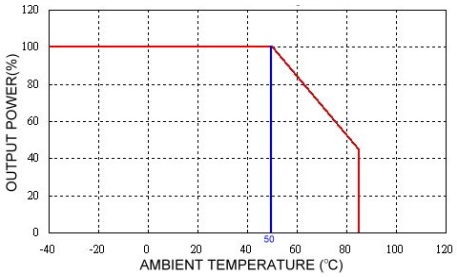



**Figure 2**

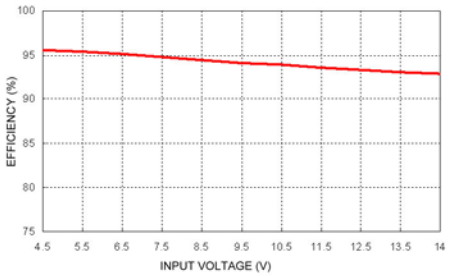


## CHARACTERISTICS

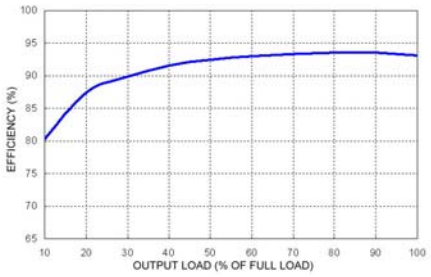
**CV12S3.3-3000 Derating Curve**




**CV12S3.3-3000 Efficiency vs Input Voltage**




**CV12S3.3-3000 Efficiency vs Output Load**

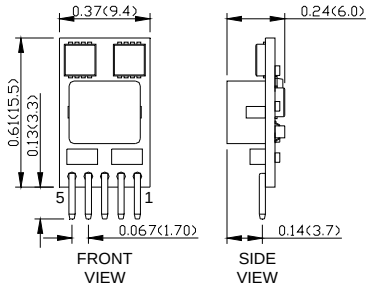



## MECHANICAL DRAWINGS

### VERTICAL MOUNTING SIP TYPE (Standard)

#### CV5S2.5-3000

Unit: inches (mm)

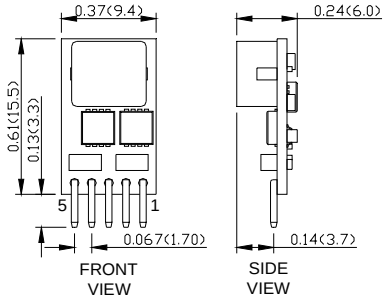



| PIN CONNECTIONS | |
|---|---|
| Pin | Assignment |
| 1 | CTRL |
| 2 | +Vin |
| 3 | GND |
| 4 | +Vout |
| 5 | Trim |

Tolerance: X.XX±0.02 (X.X±0.5)
X.XXX±0.01 (X.XX±0.25)
Pin Pitch Tolerance: ±0.01 (0.25)

#### CV12S3.3-3000

Unit: inches (mm)

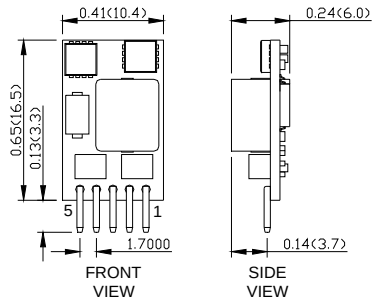



| PIN CONNECTIONS | |
|---|---|
| Pin | Assignment |
| 1 | CTRL |
| 2 | +Vin |
| 3 | GND |
| 4 | +Vout |
| 5 | Trim |

Tolerance: X.XX±0.02 (X.X±0.5)
X.XXX±0.01 (X.XX±0.25)
Pin Pitch Tolerance: ±0.01 (0.25)

#### CV24S5-3000 & CV24S12-3000

Unit: inches (mm)



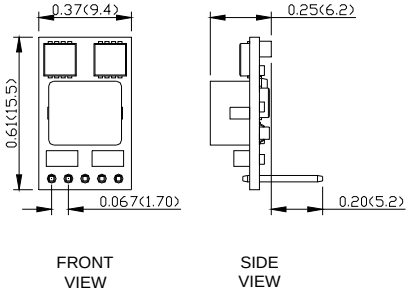

| PIN CONNECTIONS | |
|---|---|
| Pin | Assignment |
| 1 | CTRL |
| 2 | +Vin |
| 3 | GND |
| 4 | +Vout |
| 5 | Trim |

Tolerance: X.XX±0.02 (X.X±0.5)
X.XXX±0.01 (X.XX±0.25)
Pin Pitch Tolerance: ±0.01 (0.25)

### HORIZONTAL MOUNTING SIP TYPE ("A" Suffix)

#### CV5S2.5-3000A

Unit: inches (mm)

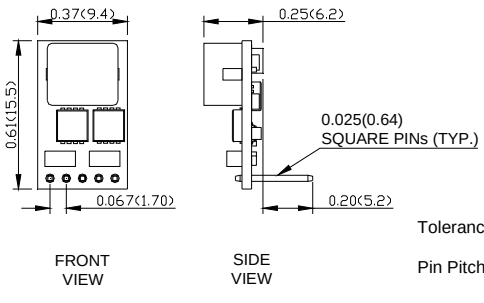



| PIN CONNECTIONS | |
|---|---|
| Pin | Assignment |
| 1 | CTRL |
| 2 | +Vin |
| 3 | GND |
| 4 | +Vout |
| 5 | Trim |

Tolerance: X.XX±0.02 (X.X±0.5)
X.XXX±0.01 (X.XX±0.25)
Pin Pitch Tolerance: ±0.01 (0.25)

#### CV12S3.3-3000A

Unit: inches (mm)

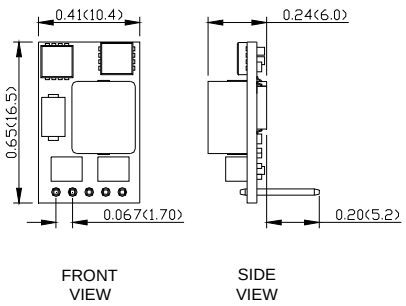



| PIN CONNECTIONS | |
|---|---|
| Pin | Assignment |
| 1 | CTRL |
| 2 | +Vin |
| 3 | GND |
| 4 | +Vout |
| 5 | Trim |

Tolerance: X.XX±0.02 (X.X±0.5)
X.XXX±0.01 (X.XX±0.25)
Pin Pitch Tolerance: ±0.01 (0.25)

#### CV24S5-3000A & CV24S12-3000A

Unit: inches (mm)




| PIN CONNECTIONS | |
|---|---|
| Pin | Assignment |
| 1 | CTRL |
| 2 | +Vin |
| 3 | GND |
| 4 | +Vout |
| 5 | Trim |

Tolerance: X.XX±0.02 (X.X±0.5)
X.XXX±0.01 (X.XX±0.25)
Pin Pitch Tolerance: ±0.01 (0.25)

## 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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