


Size:
0.74 x 0.54 x 0.33 inches
(4.5g)
18.9 x 13.7 x 8.45 mm

Weight:
0.16oz

## FEATURES

- 1 Watt Output Power
- 1500VDC I/O Isolation
- Low Ripple & Noise
- Remote ON/OFF Control
- Fully Regulated Single & Dual Outputs
- MTBF > 2,800,000 Hours
- 2:1 Wide Input Voltage Range
- -40°C to +85°C Operating Temperature
- Continuous Short Circuit Protection
- Ultra Compact SMT Package
- Qualified for Lead-free Reflow Process
- CSA/UL/IEC/EN 60950-1 Safety Approvals (Pending)

## DESCRIPTION

The DCMSW1 series of DC/DC converters provides 1 Watt of output power in an ultra compact SMT package. These converters operate over 2:1 input voltage ranges of 4.5-9VDC, 9-18VDC, 18-36VDC, and 36-75VDC. This series also has fully regulated single and dual output voltages of 5V, 12V, 15V, ±12V, and ±15V. The DCMSW1 series' impressive efficiencies enable these modules to deliver their fully rated output power from –40°C to +75°C without derating. Other features include remote on/off control, low ripple and noise, 1500VDC I/O isolation, and continuous short circuit protection. The very small footprint of these converters makes them an ideal solution for space critical applications in communication equipment, instrumentation, and many other battery operated applications.

## MODEL SELECTION TABLE

### SINGLE OUTPUT MODELS

| Model Number | Input Voltage | Output Voltage | Output Current | | Input Current | | Reflected Ripple Current | Output Power | Efficiency | Maximum Capacitive Load |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Max | No Load | Max Load | | | | |
| DCMSW1-05S05 | 5 VDC (4.5 - 9 VDC) | 5 VDC | 0mA | 200mA | 40mA | 256mA | 80mA | 1W | 78% | 1680µF |
| DCMSW1-05S12 | | 12 VDC | 0mA | 83mA | | 252mA | | 1W | 79% | 820µF |
| DCMSW1-05S15 | | 15 VDC | 0mA | 67mA | | 248mA | | 1W | 81% | 680µF |
| DCMSW1-12S05 | 12 VDC (9 - 18 VDC) | 5 VDC | 0mA | 200mA | 20mA | 105mA | 40mA | 1W | 79% | 1680µF |
| DCMSW1-12S12 | | 12 VDC | 0mA | 83mA | | 105mA | | 1W | 79% | 820µF |
| DCMSW1-12S15 | | 15 VDC | 0mA | 67mA | | 102mA | | 1W | 82% | 680µF |
| DCMSW1-24S05 | 24 VDC (18 - 36 VDC) | 5 VDC | 0mA | 200mA | 10mA | 53mA | 30mA | 1W | 79% | 1680µF |
| DCMSW1-24S12 | | 12 VDC | 0mA | 83mA | | 51mA | | 1W | 82% | 820µF |
| DCMSW1-24S15 | | 15 VDC | 0mA | 67mA | | 51mA | | 1W | 82% | 680µF |
| DCMSW1-48S05 | 48 VDC (36 - 75 VDC) | 5 VDC | 0mA | 200mA | 7mA | 26mA | 20mA | 1W | 79% | 1680µF |
| DCMSW1-48S12 | | 12 VDC | 0mA | 83mA | | 26mA | | 1W | 80% | 820µF |
| DCMSW1-48S15 | | 15 VDC | 0mA | 67mA | | 26mA | | 1W | 80% | 680µF |

### DUAL OUTPUT MODELS

| Model Number | Input Voltage | Output Voltage | Output Current | | Input Current | | Reflected Ripple Current | Output Power | Efficiency | Maximum Capacitive Load |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Max | No Load | Max Load | | | | |
| DCMSW1-05D12 | 5 VDC (4.5 - 9 VDC) | ±12 VDC | 0mA | ±42mA | 40mA | 255mA | 80mA | 1W | 79% | ±470µF |
| DCMSW1-05D15 | | ±15 VDC | 0mA | ±33mA | | 248mA | | 1W | 80% | ±330µF |
| DCMSW1-12D12 | 12 VDC (9 - 18 VDC) | ±12 VDC | 0mA | ±42mA | 20mA | 104mA | 40mA | 1W | 81% | ±470µF |
| DCMSW1-12D15 | | ±15 VDC | 0mA | ±33mA | | 103mA | | 1W | 80% | ±330µF |
| DCMSW1-24D12 | 24 VDC (18 - 36 VDC) | ±12 VDC | 0mA | ±42mA | 10mA | 51mA | 30mA | 1W | 82% | ±470µF |
| DCMSW1-24D15 | | ±15 VDC | 0mA | ±33mA | | 50mA | | 1W | 82% | ±330µF |
| DCMSW1-48D12 | 48 VDC (36 - 75 VDC) | ±12 VDC | 0mA | ±42mA | 7mA | 26mA | 20mA | 1W | 81% | ±470µF |
| DCMSW1-48D15 | | ±15 VDC | 0mA | ±33mA | | 25mA | | 1W | 81% | ±330µF |

NOTES

1. All DC/DC converters should be externally fused at the front end for protection.
2. Other input and output voltages may be available, please contact factory.

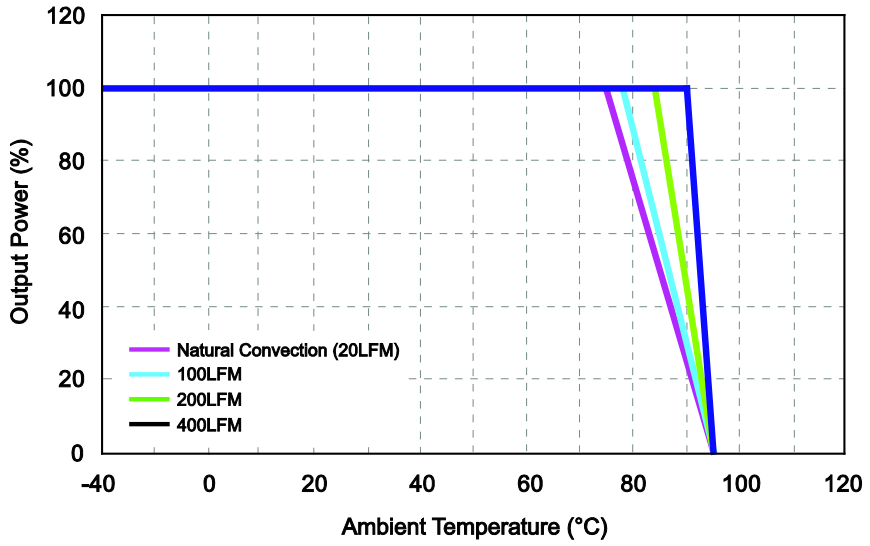
**Due to advances in technology, specifications are subject to change without notice.*

## SPECIFICATIONS: DCMSW1 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.

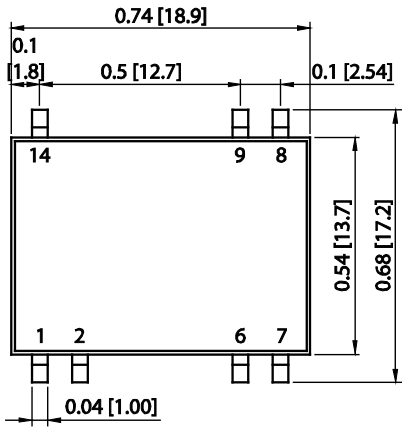
| SPECIFICATION | TEST CONDITIONS | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **INPUT SPECIFICATIONS** | | | | | | |
| Input Voltage Range | 5VDC nominal input models | | 4.5 | 5 | 9 | VDC |
| | 12VDC nominal input models | | 9 | 12 | 18 | |
| | 24 VDC nominal input models | | 18 | 24 | 36 | |
| | 48 VDC nominal input models | | 36 | 48 | 75 | |
| Input Surge Voltage (1sec, max.) | 5VDC nominal input models | | -0.7 | | 15 | VDC |
| | 12VDC nominal input models | | -0.7 | | 25 | |
| | 24 VDC nominal input models | | -0.7 | | 50 | |
| | 48 VDC nominal input models | | -0.7 | | 100 | |
| Start-Up Threshold Voltage | 5VDC nominal input models | | | | 4.5 | VDC |
| | 12VDC nominal input models | | | | 9 | |
| | 24 VDC nominal input models | | | | 18 | |
| | 48 VDC nominal input models | | | | 36 | |
| Input Current | | | See Table | | | |
| Input Filter | | | capacitor | | | |
| Input Fuse | 5VDC nominal input models | | 500mA slow-blow type | | | |
| | 12VDC nominal input models | | 250mA slow-blow type | | | |
| | 24 VDC nominal input models | | 120mA slow-blow type | | | |
| | 48 VDC nominal input models | | 60mA slow-blow type | | | |
| **OUTPUT SPECIFICATIONS** | | | | | | |
| Output Voltage | | | See Table | | | |
| Output Voltage Setting Accuracy | Nominal input and half load | | | | ±1.0 | %Vnom |
| Line Regulation | Low line to high line | | | | ±0.2 | % |
| Load Regulation | Min load to full load | Single Output Models | | | ±1.0 | % |
| | | Dual Output Models | | | ±1.0 | |
| | 10% load to 90% load | Single Output Models | | | ±0.5 | % |
| | | Dual Output Models | | | ±0.8 | |
| Minimum Load | | | 0 | | | mA |
| Output Power | | | | | 1 | W |
| Output Current | | | See Table | | | |
| Maximum Capacitive Load | | | See Table | | | |
| Ripple & Noise | Measurement bandwidth is 0-20MHz | | | 30 | | mVp-p |
| Transient Recovery Time | 25% load step change | | | 250 | | µs |
| Temperature Coefficient | | | | | ±0.02 | %/°C |
| **PROTECTION** | | | | | | |
| Short Circuit Protection | | | continuous | | | |
| **REMOTE ON/OFF CONTROL** | | | | | | |
| Converter ON | | | Open or high impedance | | | |
| Converter OFF | | | 2~4mA current applied via 1KΩ resistor | | | |
| Standby Input Current | Supply Off & Nominal Vin | | | 2.5 | | mA |
| **GENERAL SPECIFICATIONS** | | | | | | |
| Efficiency | Nominal input voltage and full load | | See Table | | | |
| Switching Frequency | | | | 220 | | KHz |
| Isolation Voltage (I/P to O/P) | 60 seconds | | 1500 | | | VDC |
| Isolation Resistance (I/P to O/P) | 500VDC | | 1000 | | | MΩ |
| Isolation Capacitance (I/P to O/P) | 100KHz, 1V | | | | 50 | pF |
| **ENVIRONMENTAL SPECIFICATIONS** | | | | | | |
| Operating Ambient Temperature | See derating curve | | -40 | | +85 | °C |
| Case Temperature | | | | | +95 | °C |
| Storage Temperature | | | -50 | | +125 | °C |
| Relative Humidity | Non-condensing | | | | 95 | % RH |
| Cooling | Natural convection is about 20LFM but is not equal to still air (0LFM) | | Free air convection (20LFM) | | | |
| Lead Temperature | 1.5mm from case for 10 sec. | | | | 260 | °C |
| MTBF | MIL-HDBK-217F at 25°C, ground benign | | 2,800,000 | | | hours |
| **PHYSICAL SPECIFICATIONS** | | | | | | |
| Weight | | | 0.16oz (4.5g) | | | |
| Dimensions (L x W x H) | | | 0.74 x 0.54 x 0.33 inch (18.9 x 13.7 x 8.45 mm) | | | |
| Case Material | Flammability to UL 94V-0 rated | | Non-conductive black plastic | | | |
| Pin Material | | | Phosphor bronze | | | |
| **SAFETY** | | | | | | |
| Safety Approvals | CSA 60950-1 recognition, IEC/EN 60950-1 (CB-scheme) pending | | | | | |

## DERATING CURVE



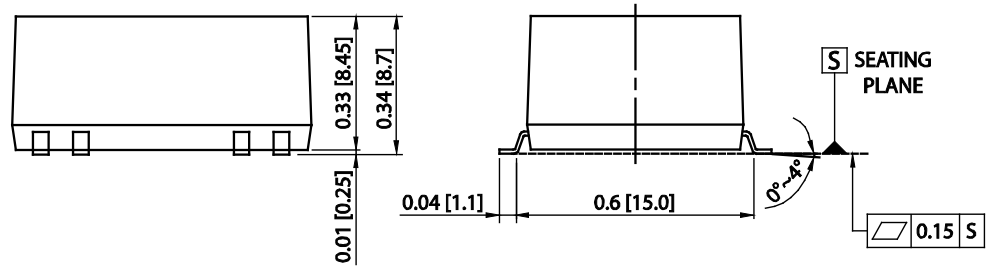

## MECHANICAL DRAWING

### Mechanical Dimensions




| PIN CONNECTIONS | | |
|---|---|---|
| PIN | SINGLE OUTPUT | DUAL OUTPUT |
| 1 | -Vin | -Vin |
| 2 | Remote On/Off | Remote On/Off |
| 6 | NC | Common |
| 7 | NC | -Vout |
| 8 | +Vout | +Vout |
| 9 | -Vout | Common |
| 14 | +Vin | +Vin |

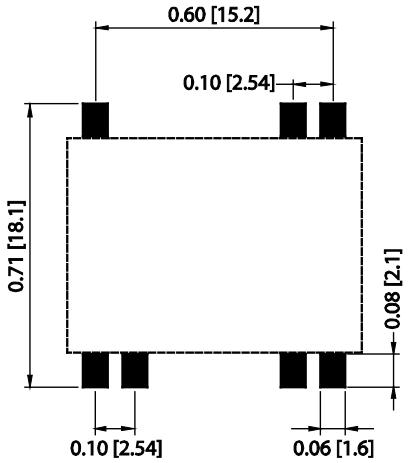
NC: No Connection




Notes:
Unit: inches [mm]
Tolerance: X.XX±0.02 [X.X±0.5]
X.XXX±0.01 [X.XX±0.25]
Pin Tolerance: ±0.002 [±0.05]

Physical Characteristics:
1. Weight: 0.16oz (4.5g)
2. Case Material: non-conductive black plastic (flammability to UL 94V-0 rated)
3. Pin Material: phosphor bronze
4. All dimensions are for reference only

### Connecting Pin Patterns

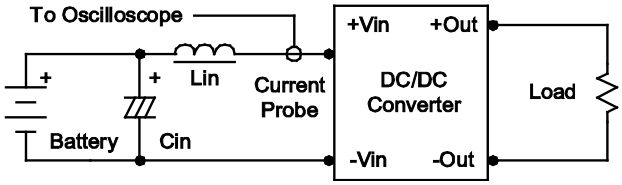



Notes:
Unit: inches [mm]
Tolerance: X.XX±0.02 [X.X±0.5]
X.XXX±0.01 [X.XX±0.25]
Pin Tolerance: ±0.002 [±0.05]

## TEST SETUP

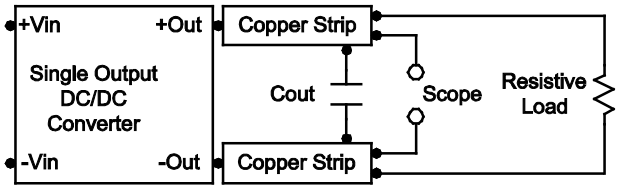
### Input Reflected-Ripple Current Test Setup

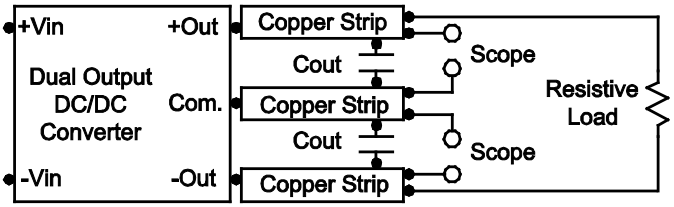
Input reflected-ripple current is measured with an inductor Lin (4.7µH) and Cin (220µF, ESR < 1.0Ω at 100 KHz) to simulate source impedance. Capacitor Cin offsets possible battery impedance. Current ripple is measured at the input terminals of the module. Measurement bandwidth is 0-500 KHz.




### Peak-to-Peak Output Noise Measurement Test

Use a 0.47µF ceramic capacitor. Scope measurement should be made by using a BNC socket, measurement bandwidth is 0-20MHz. Position the load between 50mm and 75mm from the DC/DC converter.




## DESIGN & FEATURE CONSIDERATIONS

### Remote On/Off

Negative logic remote on/off turns the module OFF during a logic high voltage on the remote on/off pin and ON during a logic low. To turn the module on and off, the user must supply a switch to control the voltage between the on/off terminal and the –Vin terminal. The switch can be an open collector or equivalent. A logic high is 2~4mA current applied via 1KΩ resistor. A logic low is open circuit or high impedance.

### Maximum Capacitive Load

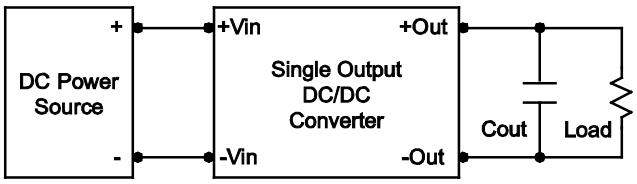
The DCMSW1 series has a limitation of maximum connected capacitance on the output. The power module may be operated in current limiting mode during start-up, affecting the ramp-up and the start-up time. The maximum capacitance can be found in the Model Selection Table.

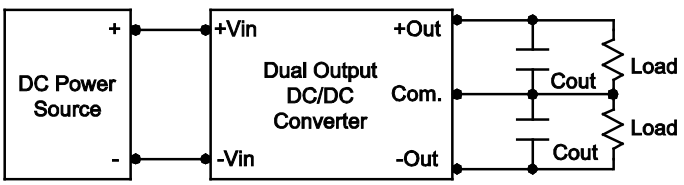
### Over Current Protection

To provide protection in a fault (output overload) condition, the unit is equipped with internal current limiting circuitry and can endure overload for an unlimited duration. At the point of current-limit inception, the unit shifts from voltage control to current control. The unit operates normally once the output current is brought back into its specified range.

### Output Ripple Reduction

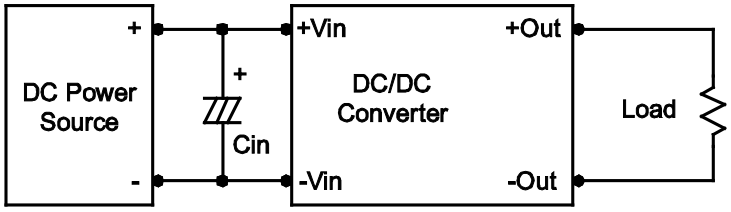
A good quality low ESR capacitor placed as close as possible across the load will give the best ripple and noise performance. To reduce output ripple, it is recommended to use 3.3µF capacitors at the output.



### Input Source Impedance

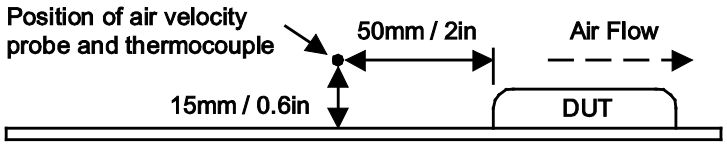
The power module should be connected to a low ac-impedance input source. Highly inductive source impedances can affect the stability of the power module. In applications where power is supplied over long lines and output loading is high, it may be necessary to use a capacitor at the input to ensure startup. Capacitor mounted close to the power module helps ensure stability of the unit, it is recommended to use a good quality low Equivalent Series Resistance (ESR < 1.0Ω at 100 KHz) capacitor of 8.2µF for 5VDC input models, 3.3µF for 12VDC input models, and 1.5µF for 24VDC and 48VDC input models.




## DESIGN & FEATURE CONSIDERATIONS

### Thermal Considerations

Many conditions affect the thermal performance of the power module, such as orientation, airflow over the module, and board spacing. To avoid exceeding the maximum temperature rating of the components inside the power module, the case temperature must be kept below 95°C. The derating curves are determined from measurements obtained in a test setup.




## 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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