

## FEATURES

- ▶ Smallest Encapsulated 8W Converter
- ▶ Industrial Standard DIP-16 Package
- ▶ Ultra-wide 4:1 Input Voltage Range
- ▶ Fully Regulated Output Voltage
- ▶ I/O Isolation 1500VDC
- ▶ Operating Ambient Temp. Range -40°C to +80°C
- ▶ Low No Load Power Consumption
- ▶ No Min. Load Requirement
- ▶ Under-voltage, Overload and Short Circuit Protection
- ▶ Shielded Metal Case with Insulated Baseplate
- ▶ Conducted EMI EN 55032 Class A & FCC Level A Approved
- ▶ UL/cUL/IEC/EN 62368-1 (60950-1) Safety Approval & CE Marking




## PRODUCT OVERVIEW

The MINMAX MDWI08 Series is the latest generation of high performance DC-DC converter modules setting a new standard concerning power density. The product offers a full 8W isolated DC-DC converter within an encapsulated DIP-16 package which occupied only 0.5in<sup>2</sup> of PCB space. There are 14 models available for 24 & 48VDC with ultra-wide 4:1 input voltage range. Further features included under-voltage protection, short circuit protection, low no load power consumption and no min. load requirement as well. An high efficiency allows operating temperatures range of -40°C to 80°C. These DC-DC Converters offer a superior solution for many space-critical application in battery-powered equipment, instrumentation, distributed power architectures in communication, industrial electronics, energy facilities and many other critical applications where PCB space is limited.

### Model Selection Guide

| Model Number  | Input Voltage (Range) | Output Voltage  | Output Current | Input Current |            | Max. capacitive Load | Efficiency (typ.) |
|---------------|-----------------------|-----------------|----------------|---------------|------------|----------------------|-------------------|
|               |                       |                 |                | Max.          | @Max. Load |                      |                   |
|               |                       |                 | VDC            | VDC           | mA         |                      | mA(typ.)          |
| MDWI08-24S033 | 24<br>(9 - 36)        | 3.3             | 2000           | 353           | 10         | 680                  | 78                |
| MDWI08-24S05  |                       | 5               | 1600           | 407           |            | 680                  | 82                |
| MDWI08-24S12  |                       | 12              | 665            | 391           |            | 330                  | 85                |
| MDWI08-24S15  |                       | 15              | 535            | 393           |            | 330                  | 85                |
| MDWI08-24S24  |                       | 24              | 335            | 390           |            | 150                  | 86                |
| MDWI08-24D12  |                       | ±12             | ±335           | 394           |            | 150#                 | 85                |
| MDWI08-24D15  |                       | ±15             | ±265           | 385           |            | 150#                 | 86                |
| MDWI08-48S033 |                       | 48<br>(18 - 75) | 3.3            | 2000          |            | 176                  | 8                 |
| MDWI08-48S05  | 5                     |                 | 1600           | 206           | 680        | 81                   |                   |
| MDWI08-48S12  | 12                    |                 | 665            | 196           | 330        | 85                   |                   |
| MDWI08-48S15  | 15                    |                 | 535            | 197           | 330        | 85                   |                   |
| MDWI08-48S24  | 24                    |                 | 335            | 195           | 150        | 86                   |                   |
| MDWI08-48D12  | ±12                   |                 | ±335           | 195           | 150#       | 86                   |                   |
| MDWI08-48D15  | ±15                   |                 | ±265           | 193           | 150#       | 86                   |                   |

# For each output

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## Input Specifications

| Parameter                         | Model            | Min.             | Typ. | Max. | Unit |
|-----------------------------------|------------------|------------------|------|------|------|
| Input Surge Voltage (1 sec. max.) | 24V Input Models | -0.7             | ---  | 50   | VDC  |
|                                   | 48V Input Models | -0.7             | ---  | 100  |      |
| Start-Up Threshold Voltage        | 24V Input Models | ---              | ---  | 9    |      |
|                                   | 48V Input Models | ---              | ---  | 18   |      |
| Under Voltage Shutdown            | 24V Input Models | ---              | 8    | ---  |      |
|                                   | 48V Input Models | ---              | 16   | ---  |      |
| Input Filter                      | All Models       | Internal Pi Type |      |      |      |

## Output Specifications

| Parameter                       | Conditions                                  | Min. | Typ.  | Max.  | Unit              |
|---------------------------------|---|------|-------|-------|-------------------|
| Output Voltage Setting Accuracy |   | ---  | ---   | ±2.0  | %Vnom.            |
| Output Voltage Balance          | Dual Output, Balanced Loads                 | ---  | ±1.0  | ±2.0  | %                 |
| Line Regulation                 | Vin=Min. to Max. @Full Load                 | ---  | ±0.2  | ±0.8  | %                 |
| Load Regulation                 | Io=0% to 100%                               | ---  | ±0.5  | ±1.0  | %                 |
| Minimum Load                    | No minimum Load Requirement                 |      |       |       |                   |
| Ripple & Noise                  | 0-20 MHz Bandwidth                          | ---  | ---   | 55    | mV <sub>P-P</sub> |
| Transient Recovery Time         | 25% Load Step Change                        | ---  | ---   | 500   | µsec              |
| Transient Response Deviation    |   | ---  | ±3    | ±5    | %                 |
| Temperature Coefficient         |   | ---  | ±0.01 | ±0.02 | %/°C              |
| Over Load Protection            | Hiccup                                      | ---  | 150   | ---   | %                 |
| Short Circuit Protection        | Hiccup Mode 0.3 Hz typ., Automatic Recovery |      |       |       |                   |

## General Specifications

| Parameter                 | Conditions  | Min.      | Typ. | Max. | Unit  |
|---------------------------|---|-----------|------|------|-------|
| I/O Isolation Voltage     | 60 Seconds  | 1500      | ---  | ---  | VDC   |
|                           | 1 Second  | 1800      | ---  | ---  | VDC   |
| I/O Isolation Resistance  | 500 VDC   | 1000      | ---  | ---  | MΩ    |
| I/O Isolation Capacitance | 100KHz, 1V  | ---       | 500  | ---  | pF    |
| Switching Frequency       |   | ---       | 370  | ---  | kHz   |
| MTBF (calculated)         | MIL-HDBK-217F@25°C, Ground Benign                                       | 2,358,263 | ---  | ---  | Hours |
| Safety Approvals          | UL/cUL 60950-1 recognition (UL certificate), IEC/EN 60950-1 (CB-report) |           |      |      |       |
|                           | UL/cUL 62368-1 recognition (UL certificate), IEC/EN 62368-1 (CB-report) |           |      |      |       |

## Environmental Specifications

| Parameter   | Min. | Max. | Unit     |
|---|------|------|----------|
| Operating Ambient Temperature Range<br>(See Power Derating Curve) | -40  | +80  | °C       |
| Case Temperature  | ---  | +105 | °C       |
| Storage Temperature Range   | -50  | +125 | °C       |
| Humidity (non condensing)   | ---  | 95   | % rel. H |
| Lead Temperature (1.5mm from case for 10Sec.)                     | ---  | 260  | °C       |

## EMC Specifications

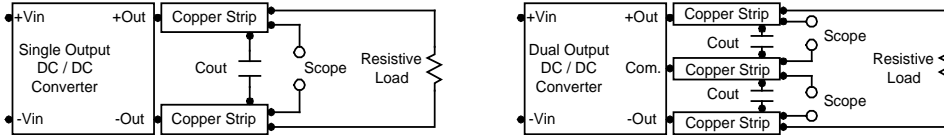
| Parameter | Standards & Level  |                                       | Performance |
|-----------|--------------------|---------------------------------------|-------------|
| EMI       | Conduction         | EN 55032, FCC part 15                 | Class A     |
| EMS       | EN 55024           |                                       |             |
|           | ESD                | EN 61000-4-2 Air ± 8kV, Contact ± 6kV | A           |
|           | Radiated immunity  | EN 61000-4-3 20V/m                    | A           |
|           | Fast transient (S) | EN 61000-4-4 ±2kV                     | A           |
|           | Surge (S)          | EN 61000-4-5 ±1kV                     | A           |
|           | Conducted immunity | EN 61000-4-6 10Vrms                   | A           |
|           | PFMF               | EN 61000-4-8 100A/m, 1000A/m(1sec.)   | A           |



**Test Setup**

**Peak-to-Peak Output Noise Measurement Test**

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



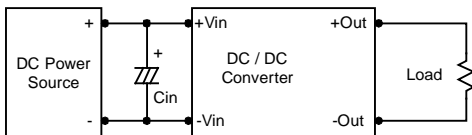
**Technical Notes**

**Overload Protection**

To provide protection in a fault (output overload) condition, the unit is equipped with internal current limiting circuitry and can endure current limiting 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.

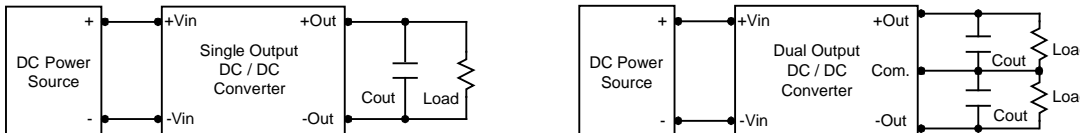
**Input Source Impedance**

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 a 2.2µF for the 24V and 48V devices.



**Output Ripple Reduction**

A good quality low ESR capacitor placed as close as practicable 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.



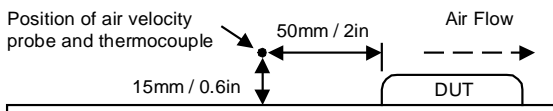
**Maximum Capacitive Load**

The MDWI08 series has limitation of maximum connected capacitance at the output. The power module may be operated in current limiting mode during start-up, affecting the ramp-up and the startup time. The maximum capacitance can be found in the data sheet.

**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 105°C.

The derating curves are determined from measurements obtained in a test setup.



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