

FEATURES

- ▶ Smallest Encapsulated 8W Converter
- ▶ Industrial Standard DIP-16 Package
- ▶ Wide 2:1 Input Voltage Range
- ▶ Fully Regulated Output Voltage
- ▶ I/O Isolation 1500 VDC
- ▶ 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 Approved
- ▶ UL/cUL/IEC/EN 62368-1(60950-1) Safety Approval & CE Marking


PRODUCT OVERVIEW

The MINMAX MDW08 series is a generation of high power density in DC-DC converter modules. The product offers a full 8W isolated DC-DC converter within an encapsulated DIP-16 package which occupies only 0.5 in² of PCB space. There are 21 models available for 12, 24, 48VDC with wide 2:1 input voltage range. Further features include under-voltage protection, overload protection, short circuit protection 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 better solution for critical space applications like battery-powered equipment, instrumentation, distributed power architectures in communication, industrial electronics, energy facilities and others.

Model Selection Guide

| Model Number | Input Voltage (Range) VDC | Output Voltage VDC | Output Current Max. mA | Input Current | | Max. capacitive Load μF | Efficiency (typ.) @Max. Load % |
|--------------|------------------------------|-----------------------|------------------------------|------------------------|----------------------|----------------------------|--------------------------------------|
| | | | | @Max. Load mA(typ.) | @No Load mA(typ.) | | |
| | | | MDW08-12S033 | 12 (9 ~ 18) | 3.3 | | 1600 |
| MDW08-12S05 | 5 | 1600 | 823 | | 680 | 81 | |
| MDW08-12S12 | 12 | 665 | 792 | | 330 | 84 | |
| MDW08-12S15 | 15 | 535 | 796 | | 330 | 84 | |
| MDW08-12S24 | 24 | 335 | 788 | | 150 | 85 | |
| MDW08-12D12 | ±12 | ±335 | 788 | | 150# | 85 | |
| MDW08-12D15 | ±15 | ±265 | 789 | | 150# | 84 | |
| MDW08-24S033 | 24 (18 ~ 36) | 3.3 | 1600 | 282 | 10 | 680 | 78 |
| MDW08-24S05 | | 5 | 1600 | 407 | | 680 | 82 |
| MDW08-24S12 | | 12 | 665 | 391 | | 330 | 85 |
| MDW08-24S15 | | 15 | 535 | 393 | | 330 | 85 |
| MDW08-24S24 | | 24 | 335 | 390 | | 150 | 86 |
| MDW08-24D12 | | ±12 | ±335 | 394 | | 150# | 85 |
| MDW08-24D15 | | ±15 | ±265 | 385 | | 150# | 86 |
| MDW08-48S033 | 48 (36 ~ 75) | 3.3 | 1600 | 141 | 8 | 680 | 78 |
| MDW08-48S05 | | 5 | 1600 | 206 | | 680 | 81 |
| MDW08-48S12 | | 12 | 665 | 196 | | 330 | 85 |
| MDW08-48S15 | | 15 | 535 | 197 | | 330 | 85 |
| MDW08-48S24 | | 24 | 335 | 195 | | 150 | 86 |
| MDW08-48D12 | | ±12 | ±335 | 195 | | 150# | 86 |
| MDW08-48D15 | | ±15 | ±265 | 193 | | 150# | 86 |

For each output

| Input Specifications | | | | | |
|-----------------------------------|------------------|------------------|------|------|------|
| Parameter | Model | Min. | Typ. | Max. | Unit |
| Input Surge Voltage (1 sec. max.) | 12V Input Models | -0.7 | --- | 25 | VDC |
| | 24V Input Models | -0.7 | --- | 50 | |
| | 48V Input Models | -0.7 | --- | 100 | |
| Start-Up Threshold Voltage | 12V Input Models | --- | --- | 9 | |
| | 24V Input Models | --- | --- | 18 | |
| | 48V Input Models | --- | --- | 36 | |
| Under Voltage Shutdown | 12V Input Models | --- | 8 | --- | |
| | 24V Input Models | --- | 16 | --- | |
| | 48V Input Models | --- | 34 | --- | |
| Input Filter | All Models | Internal Pi Type | | | |

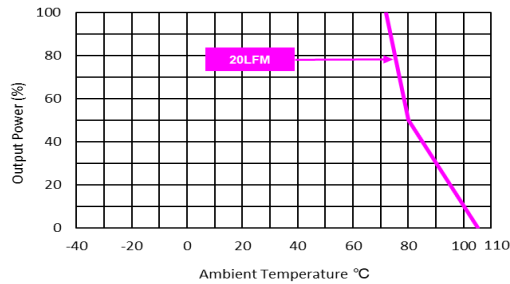
| Output Specifications | | | | | |
|---------------------------------|---|------|-------|-------|-------------------|
| Parameter | Conditions | Min. | Typ. | Max. | Unit |
| Output Voltage Setting Accuracy | | --- | --- | ±2.0 | %Vom. |
| Output Voltage Balance | Dual Output, Balanced Loads | --- | ±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 _{P-P} |
| 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 | Continuous, Automatic Recovery (Hiccup Mode 0.3Hz typ.) | | | | |

| 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 | 1,062,864 | --- | --- | 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) | | | | |

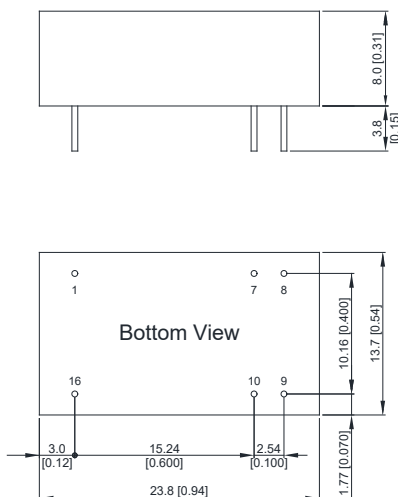
| EMC Specifications | | | | | |
|--------------------|--------------------|--|-----------------------------|-------------|---------|
| Parameter | Standards & Level | | | Performance | |
| EMI ₍₅₎ | Conduction | EN 55032 | Without external components | | Class A |
| | Radiation | | With external components | | |
| EMS ₍₅₎ | EN 55024 | | | | |
| | ESD | EN 61000-4-2 Air ± 8kV , Contact ± 6kV | | | A |
| | Radiated immunity | EN 61000-4-3 20V/m | | | A |
| | Fast transient | EN 61000-4-4 ±2kV | | | A |
| | Surge | EN 61000-4-5 ±1kV | | | A |
| | Conducted immunity | EN 61000-4-6 10Vrms | | | A |
| | PFMF | EN 61000-4-8 100A/m | | | A |

Environmental Specifications

| Parameter | Min. | Max. | Unit |
|--|------|------|----------|
| Operating Ambient Temperature Range (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 |

Power Derating Curve

Notes

- Specifications typical at Ta=+25°C, resistive load, nominal input voltage and rated output current unless otherwise noted.
- Transient recovery time is measured to within 1% error band for a step change in output load of 75% to 100%.
- We recommend to protect the converter by a slow blow fuse in the input supply line.
- Other input and output voltage may be available, please contact MINMAX.
- The external components might be required to meet EMI/EMS standard for some of test items. Please contact MINMAX for the solution in detail.
- Specifications are subject to change without notice.

Package Specifications
Mechanical Dimensions

Pin Connections

| Pin | Single Output | Dual Output | Diameter mm (inches) |
|-----|---------------|-------------|----------------------|
| 1 | -Vin | -Vin | ∅ 0.5 [0.02] |
| 7 | NC | NC | ∅ 0.5 [0.02] |
| 8 | NC | Common | ∅ 0.5 [0.02] |
| 9 | +Vout | +Vout | ∅ 0.5 [0.02] |
| 10 | -Vout | -Vout | ∅ 0.5 [0.02] |
| 16 | +Vin | +Vin | ∅ 0.5 [0.02] |

NC: No Connection

- ▶ All dimensions in mm (inches)
- ▶ Tolerance: X.X±0.5 (X.XX±0.02)
X.XX±0.25 (X.XXX±0.01)
- ▶ Pin diameter tolerance: X.X±0.05 (X.XX±0.002)

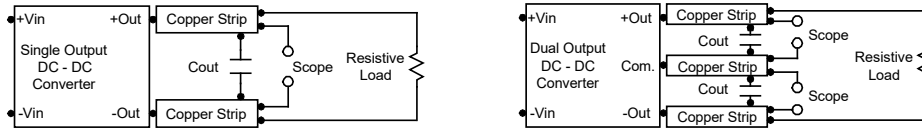
Physical Characteristics

| | |
|---------------|--|
| Case Size | : 23.8x13.7x8.0 mm (0.94x0.54x0.31 inches) |
| Case Material | : Metal With Non-Conductive Baseplate |
| Pin Material | : Copper Alloy |
| Weight | : 6.1g |

Test Setup

Peak-to-Peak Output Noise Measurement Test

Use a Cout 0.47 μ F 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

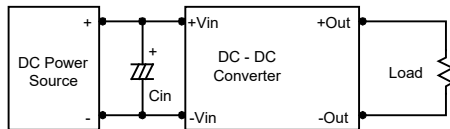
To provide protection in a fault (output overload) condition, the unit is equipped with internal current limiting circuitry and can endure current limiting for an unlimited duration. At the point of current-limit inception, the unit shifts from voltage control to current control. The unit operates normally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

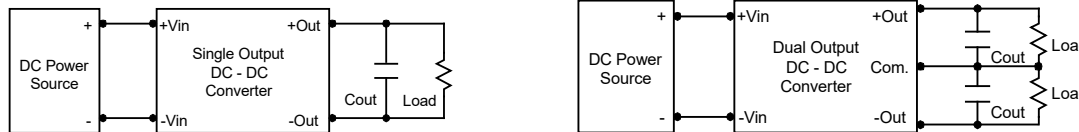
In applications where power is supplied over long lines and output loading is high, it may be necessary to use a capacitor at the input to ensure startup.

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 < 1.0 Ω at 100 kHz) capacitor of a 3.3 μ F for the 12V input devices and a 2.2 μ F 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 3.3 μ F capacitors at the output.



Maximum Capacitive Load

The MDW08 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 $^{\circ}$ C.

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

