FEATURES
► 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
► Short Circuit Protection
► Conducted EMI meets EN55022 Class A & FCC Level A
► UL/cUL/IEC/EN 60950-1 Safety Approval

PRODUCT OVERVIEW
The MINMAX MDW1000 series is a range of isolated 2W DC-DC converter modules featuring fully regulated output voltages and wide 2:1 input voltage ranges. The products come in a compact DIP-16 package with a low height of just 8.0 mm (0.31 inch). An excellent efficiency allows an operating temperature range of -40°C to +80°C. These DC-DC converters offer an ideal solution for many space critical applications in battery-powered equipment and instrumentation.

Model Selection Guide

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Input Voltage (Range)</th>
<th>Output Voltage</th>
<th>Output Current</th>
<th>Input Current</th>
<th>Reflected Ripple Current</th>
<th>Max. capacitive Load</th>
<th>Efficiency (typ.) @Max. Load</th>
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<tbody>
<tr>
<td>MDW1011</td>
<td>5 (4.5 ~ 9)</td>
<td>VDC</td>
<td>mA</td>
<td>mA</td>
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<td>%</td>
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# For each output
# Input Specifications

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<th>Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
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<td>VDC</td>
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<td>---</td>
<td>1500</td>
<td>mW</td>
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<td>Input Filter</td>
<td>All Models</td>
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## Output Specifications

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<th>Max.</th>
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<td>Output Voltage Balance</td>
<td>Dual Output, Balanced Loads</td>
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<td>±1.0</td>
<td>±2.0</td>
<td>%</td>
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<tr>
<td>Line Regulation</td>
<td>Vin=Min. to Max. @ Full Load</td>
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<td>±0.3</td>
<td>±0.5</td>
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<td>Load Regulation</td>
<td>Io=25% to 100%</td>
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<td>±0.5</td>
<td>±0.75</td>
<td>%</td>
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<tr>
<td>Ripple &amp; Noise</td>
<td>0-20 MHz Bandwidth</td>
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<td>30</td>
<td>50</td>
<td>mVpp</td>
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<td>Transient Recovery Time</td>
<td>25% Load Step Change</td>
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<td>100</td>
<td>300</td>
<td>μsec</td>
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<td>Transient Response Deviation</td>
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<td>±3</td>
<td>±5</td>
<td>%</td>
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<td>Temperature Coefficient</td>
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<td>Short Circuit Protection</td>
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## General Specifications

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<th>Unit</th>
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<td>1 Second</td>
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<td>VDC</td>
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<td>IV/O Isolation Capacitance</td>
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<td>1800</td>
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<td>MΩ</td>
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<td>IV/O Switching Frequency</td>
<td>100kHz, 1V</td>
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<td>250</td>
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<td>MTBF (calculated)</td>
<td>MIL-HDBK-217F@25°C, Ground Benign</td>
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## Environmental Specifications

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<td>Operating Ambient Temperature Range (See Power Derating Curve)</td>
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<td>+80</td>
<td>°C</td>
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<tr>
<td>Storage Temperature Range</td>
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<td>°C</td>
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<td>Humidity (non condensing)</td>
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<td>95</td>
<td>% rel. H</td>
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<td>Lead Temperature (1.5mm from case for 10Sec.)</td>
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<td>260</td>
<td>°C</td>
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Power Derating Curve

Notes
1. Specifications typical at Ta=+25°C, resistive load, nominal input voltage and rated output current unless otherwise noted.
2. Transient recovery time is measured to within 1% error band for a step change in output load of 75% to 100%.
3. These power converters require a minimum output loading to maintain specified regulation, operation under no-load conditions will not damage these modules; however, they may not meet all specifications listed.
4. We recommend to protect the converter by a slow blow fuse in the input supply line.
5. Other input and output voltage may be available, please contact factory.
6. Specifications are subject to change without notice.

Package Specifications

Mechanical Dimensions

Pin Connections

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<th>Single Output</th>
<th>Dual Output</th>
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<td>NC</td>
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<td>9</td>
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<td>+Vout</td>
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<td>10</td>
<td>-Vout</td>
<td>-Vout</td>
</tr>
<tr>
<td>16</td>
<td>+Vin</td>
<td>+Vin</td>
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</table>

NC: No Connection

All dimensions in mm (inches)
Tolerance: X.X±0.01 (X.XX±0.005)
Pin diameter ø 0.5 ±0.05 (0.02±0.002)

Physical Characteristics

Case Size : 23.8x13.7x6.0 mm (0.94x0.54x0.24 inches)
Case Material : Non-Conductive Black Plastic (flammability to UL 94V-0 rated)
Pin Material : Phosphor bronze
Weight : 5.1g
Air Flow

Load

Lin

50mm / 2in

Probe and thermocouple

Position of air velocity

DC Power

Source

+Vin

-Vin

Single Output
DC / DC
Converter

Vin

-Out

Cout

Scope

Copper Strip

Resistive
Load

To Oscilloscope

Peak-to-Peak Output Noise Measurement Test

Use a C output 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

Maximum Capacitive Load

The MDW1000 series has limitation of maximum connected capacitance on the output. The power module may operate 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.

Overcurrent 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 on the input to ensure startup. By using a good quality low Equivalent Series Resistance (ESR < 1.0Ω at 100 KHz) capacitor of a 8.2uF for the 5V input devices, a 3.3μF for the 12V input devices and a 1.5μF for the 24V and 48V devices, capacitor mounted close to the power module helps ensure stability of the unit.

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.

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 90°C. The derating curves are determined from measurements obtained in a test setup.

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