**FEATURES**

- Industrial Standard DIP-24 Package
- Wide 2:1 & 3:1 Input Voltage Range
- Fully Regulated Output Voltage
- I/O Isolation 1500 VDC
- Operating Ambient Temp. Range -40°C to +85°C
- Overload and Short Circuit Protection
- Conducted EMI meets EN55022 Class A & FCC Level A
- UL/cUL/IEC/EN 60950-1 Safety Approval

**PRODUCT OVERVIEW**

The MINMAX MIW1100 series is a range of isolated 3W DC/DC converter modules featuring fully regulated output voltages and wide input voltage ranges. The product comes in a DIP-24 plastic package with standard pinout. An excellent efficiency allows an operating temperature range of -40°C to +85°C. The product features an input filter meeting EN 55022, class A and FCC, level A.

These DC/DC converters offer an economical solution for many cost critical applications in battery-powered equipment and instrumentation.

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**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.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIW1111</td>
<td>5 (4.5 ~ 9)</td>
<td>VDC</td>
<td>mA</td>
<td>mA (typ.)</td>
<td>mA (typ.)</td>
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# For each output
## Input Specifications

<table>
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<tr>
<th>Parameter</th>
<th>Model</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
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<tbody>
<tr>
<td><strong>Input Surge Voltage (1 sec. max.)</strong></td>
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<td>5V Input Models</td>
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<td>24V Input Models</td>
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<td>48V Input Models</td>
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<td><strong>Start-Up Voltage</strong></td>
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<td>5V Input Models</td>
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<td>4.5</td>
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<td>12V Input Models</td>
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<td>20V Input Models</td>
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<td>48V Input Models</td>
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<td>24</td>
<td>36</td>
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<td><strong>Under Voltage Shutdown</strong></td>
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<tr>
<td>5V Input Models</td>
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<tr>
<td>12V Input Models</td>
<td>---</td>
<td>6.5</td>
<td>8.5</td>
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<tr>
<td>20V Input Models</td>
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<td>6.5</td>
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<td>24V Input Models</td>
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<td>48V Input Models</td>
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<td>22</td>
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<td><strong>Reverse Polarity Input Current</strong></td>
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<td></td>
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<td>A</td>
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<td>Short Circuit Input Power</td>
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<tr>
<td>Internal Power Dissipation</td>
<td>All Models</td>
<td>---</td>
<td>1000</td>
<td>1500</td>
<td>mW</td>
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<tr>
<td>Input Filter</td>
<td>Internal Pi Type</td>
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<tr>
<td>Conducted EMI</td>
<td>Compliance to EN 55022 class A and FCC part 15, class A</td>
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## Output Specifications

<table>
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<tr>
<th>Parameter</th>
<th>Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
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<tbody>
<tr>
<td><strong>Output Voltage Setting Accuracy</strong></td>
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<td>±0.5</td>
<td>±2.0</td>
<td>±2.0</td>
<td>%Vnom.</td>
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<tr>
<td><strong>Output Voltage Balance</strong></td>
<td>Dual Output, Balanced Loads</td>
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<td>±0.5</td>
<td>±2.0</td>
<td>%</td>
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<tr>
<td><strong>Line Regulation</strong></td>
<td>Vin=Min. to Max., @Full Load</td>
<td>---</td>
<td>±0.2</td>
<td>±0.5</td>
<td>%</td>
</tr>
<tr>
<td><strong>Load Regulation</strong></td>
<td>Io=10% to 100%</td>
<td>---</td>
<td>±0.2</td>
<td>±0.5</td>
<td>%</td>
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<tr>
<td><strong>Ripple &amp; Noise</strong></td>
<td>0-20 MHz Bandwidth</td>
<td>---</td>
<td>45</td>
<td>60</td>
<td>mV P-P</td>
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<tr>
<td><strong>Transient Recovery Time</strong></td>
<td>25% Load Step Change</td>
<td>---</td>
<td>300</td>
<td>500</td>
<td>uS</td>
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<tr>
<td><strong>Transient Response Deviation</strong></td>
<td></td>
<td>---</td>
<td>±3</td>
<td>±5</td>
<td>%</td>
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<tr>
<td><strong>Temperature Coefficient</strong></td>
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<td>---</td>
<td>±0.01</td>
<td>±0.02</td>
<td>%/°C</td>
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<tr>
<td><strong>Over Current Protection</strong></td>
<td>Foldback</td>
<td>120</td>
<td>---</td>
<td>---</td>
<td>%</td>
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<tr>
<td><strong>Short Circuit Protection</strong></td>
<td>Continuous, Automatic Recovery</td>
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</table>

## General Specifications

<table>
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<tr>
<th>Parameter</th>
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<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
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<tbody>
<tr>
<td><strong>I/O Isolation Voltage</strong></td>
<td>60 Seconds</td>
<td>1500</td>
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<td>---</td>
<td>VDC</td>
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<tr>
<td><strong>I/O Isolation Resistance</strong></td>
<td>1 Seconds</td>
<td>1800</td>
<td>---</td>
<td>---</td>
<td>VDC</td>
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<td><strong>I/O Isolation Capacitance</strong></td>
<td>500 VDC</td>
<td>1000</td>
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<td>nF</td>
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<td><strong>I/O Isolation Capacitance</strong></td>
<td>100KHz, 1V</td>
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<td>---</td>
<td>150</td>
<td>pF</td>
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<tr>
<td><strong>Switching Frequency</strong></td>
<td>MIW115X Models</td>
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<td>kHz</td>
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<td><strong>MTBF (calculated)</strong></td>
<td>MIL-HDBK-217F@25°C, Ground Benign</td>
<td>1,000,000</td>
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<td>Hours</td>
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<tr>
<td><strong>Safety Approvals</strong></td>
<td>UL/cUL 60950-1 recognition(CSA certificate), IEC/EN 60950-1(CB-report)</td>
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Environmental Specifications

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<th>Unit</th>
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<tbody>
<tr>
<td>Operating Temperature Range (See Power Derating Curve)</td>
<td>Natural Convection</td>
<td>-40</td>
<td>+85</td>
<td>℃</td>
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<td>Operating Temperature Range (MIW115X Models)</td>
<td>MIW115X Models</td>
<td>-25</td>
<td>+85</td>
<td>℃</td>
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<tr>
<td>Case Temperature</td>
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<td>+90</td>
<td>℃</td>
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<tr>
<td>Storage Temperature Range</td>
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<td>-50</td>
<td>+125</td>
<td>℃</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>Cooling</td>
<td>Natural Convection</td>
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<tr>
<td>Lead Temperature (1.5mm from case for 10Sec.)</td>
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<td>260</td>
<td>℃</td>
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Power Derating Curve

Notes

1. Specifications typical at Ta=+25℃, 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 fast blow fuse in the input supply line.
5. Other input and output voltage may be available, please contact factory.
6. That “natural convection” is about 20LFM but is not equal to still air (0 LFM).
7. Specifications are subject to change without notice.
Package Specifications

Mechanical Dimensions

<table>
<thead>
<tr>
<th>Pin</th>
<th>Single Output</th>
<th>Dual Output</th>
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<td>1</td>
<td>+Vin</td>
<td>+Vin</td>
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<tr>
<td>2</td>
<td>NC</td>
<td>-Vout</td>
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<tr>
<td>3</td>
<td>NC</td>
<td>Common</td>
</tr>
<tr>
<td>10</td>
<td>-Vout</td>
<td>Common</td>
</tr>
<tr>
<td>11</td>
<td>+Vout</td>
<td>+Vout</td>
</tr>
<tr>
<td>12</td>
<td>-Vin</td>
<td>-Vin</td>
</tr>
<tr>
<td>13</td>
<td>-Vin</td>
<td>-Vin</td>
</tr>
<tr>
<td>14</td>
<td>+Vout</td>
<td>+Vout</td>
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<tr>
<td>15</td>
<td>-Vout</td>
<td>Common</td>
</tr>
<tr>
<td>22</td>
<td>NC</td>
<td>Common</td>
</tr>
<tr>
<td>23</td>
<td>NC</td>
<td>-Vout</td>
</tr>
<tr>
<td>24</td>
<td>+Vin</td>
<td>+Vin</td>
</tr>
</tbody>
</table>

NC: No Connection

► All dimensions in mm (inches)
► Tolerance: X.X±0.25 (X.XX±0.01)
X.XX±0.13 ( X.XXX±0.005)
► Pin diameter ø 0.5 ±0.05 (0.02±0.002)

Physical Characteristics

Case Size : 31.8x20.3x10.2mm (1.25x0.80x0.40 Inches)

Case Material : Non-Conductive Black Plastic (flammability to UL 94V-0 rated)

Weight : 12.4g
**Test Configurations**

**Input Reflected-Ripple Current Test Setup**
Input reflected-ripple current is measured with an inductor Lin (4.7uH) and Cin (220uF, 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.

![Image of test setup](image)

**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.

![Image of noise measurement setup](image)

**Design & Feature Considerations**

**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 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 8.2μF for the 5V input devices, a 3.3μF for the 12V input devices and a 1.5μF for the 24V and 48V devices.

![Image of input source impedance](image)

**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.

![Image of output ripple reduction](image)

**Maximum Capacitive Load**
The MIW1100 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.

![Image of maximum capacitive load](image)

**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.

![Image of thermal considerations](image)