

FEATURES

- ▶ **DIP-24 Metal Package**
31.8 x 20.3 x 10.2 mm (1.25 x 0.8 x 0.4 inches)
- ▶ **Ultra-wide 4:1 Input Range**
- ▶ **Excellent Load and Line Regulation**
- ▶ **Operating Temp. Range -40°C to +85°C**
- ▶ **Short Circuit Protection**
- ▶ **I/O-isolation 1500VDC**
- ▶ **Input Filter meets EN55022,class A and FCC, level A**
- ▶ **3 Years Product Warranty**



PRODUCT OVERVIEW

The MINMAX MIW4100 series is a range of isolated DC/DC converter modules with 5-6W output power featuring fully regulated output voltages and ultra-wide 4:1 input voltage ranges. The product comes in a shielded metal DIP-24 package with standard pinout. A high 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.

Typical applications for these converters are in battery operated equipment and instrumentation, distributed power systems, data communication and general industrial electronics.

Model Selection Guide

| Model Number | Input Voltage (Range) VDC | Output Voltage VDC | Output Current | | Input Current | | Reflected Ripple Current mA(typ.) | Max. capacitive Load uF | Efficiency (typ.) @Max. Load % | |
|----------------|------------------------------|-----------------------|----------------|------|---------------|----------|--------------------------------------|----------------------------|--------------------------------------|----|
| | | | Max. | Min. | @Max. Load | @No Load | | | | |
| | | | mA | mA | mA(typ.) | mA(typ.) | | | | |
| MIW4121 | 24 (9 ~ 36) | 3.3 | 1200 | 120 | 220 | 20 | 20 | 470 | 75 | |
| MIW4122 | | 5 | 1000 | 100 | 267 | | | | 78 | |
| MIW4123 | | 12 | 500 | 50 | 301 | | | | 83 | |
| MIW4124 | | 15 | 400 | 40 | 305 | | | 100# | 82 | |
| MIW4125 | | ±5 | ±500 | ±50 | 267 | | | | 78 | |
| MIW4126 | | ±12 | ±250 | ±25 | 301 | | | | 83 | |
| MIW4127 | | ±15 | ±200 | ±20 | 305 | | | | 82 | |
| MIW4131 | 48 (18 ~ 75.) | 3.3 | 1200 | 120 | 110 | 10 | 15 | 470 | 75 | |
| MIW4132 | | 5 | 1000 | 100 | 134 | | | | 78 | |
| MIW4133 | | 12 | 500 | 50 | 151 | | | | 100 | 83 |
| MIW4134 | | 15 | 400 | 40 | 152 | | | 82 | | |
| MIW4135 | | ±5 | ±500 | ±50 | 134 | | | 100# | | 78 |
| MIW4136 | | ±12 | ±250 | ±25 | 151 | | | | | 83 |
| MIW4137 | | ±15 | ±200 | ±20 | 152 | | | | 82 | |

For each output

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 Voltage | 24V Input Models | 7 | 8 | 9 | |
| | 48V Input Models | 14 | 16 | 18 | |
| Under Voltage Shutdown | 24V Input Models | --- | --- | 8.5 | |
| | 48V Input Models | --- | --- | 16 | |
| Reverse Polarity Input Current | All Models | --- | --- | 1 | A |
| Short Circuit Input Power | | --- | --- | 3000 | mW |
| Internal Power Dissipation | | --- | --- | 2500 | mW |
| Conducted EMI | | Compliance to EN 55022,class A and FCC part 15,class A | | | |

Output Specifications

| Parameter | Conditions | Min. | Typ. | Max. | Unit |
|------------------------------|---------------------------------|------|-------|-------|-------------------|
| Output Voltage Accuracy | | --- | ±1.0 | ±2.0 | % |
| Output Voltage Balance | Dual Output, Balanced Loads | --- | ±1.0 | ±2.0 | % |
| Line Regulation | Vin=Min. to Max. | --- | ±0.1 | ±0.5 | % |
| Load Regulation | Io=10% to 100% | --- | ±0.5 | ±1.0 | % |
| Cross Regulation (Dual) | Asymmetrical load 25% / 100% FL | --- | --- | ±5.0 | % |
| Ripple & Noise (20MHz) | | --- | 50 | 80 | mV _{P-P} |
| Ripple & Noise (20MHz) | Over Line, Load & Temp. | --- | --- | 100 | mV _{P-P} |
| Ripple & Noise (20MHz) | | --- | --- | 15 | mV _{rms} |
| Transient Recovery Time | 25% Load Step Change | --- | 300 | 500 | uS |
| Transient Response Deviation | | --- | ±3 | --- | % |
| Temperature Coefficient | | --- | ±0.01 | ±0.02 | %/°C |
| Over Load Protection | Foldback | 110 | 250 | 350 | % |
| Short Circuit Protection | Continuous | | | | |

General Specifications

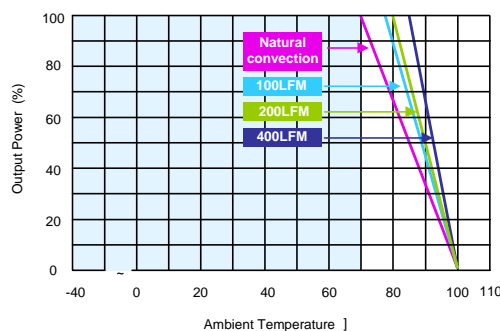
| Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-------------------------------|---|---------|------|------|-------|
| I/O Isolation Voltage (rated) | 60 Seconds | 1500 | --- | --- | VDC |
| I/O Isolation Resistance | 500 VDC | 1000 | --- | --- | MΩ |
| I/O Isolation Capacitance | 100KHz, 1V | --- | 1000 | 1200 | pF |
| Switching Frequency | | --- | 450 | --- | KHz |
| MTBF (calculated) | MIL-HDBK-217F@25°C, Ground Benign | 800,000 | --- | --- | Hours |
| Safety Approvals | UL/cUL 60950-1 recognition(CSA certificate), IEC/EN 60950-1 | | | | |

Input Fuse

| 24V Input Models | 48V Input Models |
|-----------------------|----------------------|
| 1200mA Slow-Blow Type | 750mA Slow-Blow Type |

Environmental Specifications

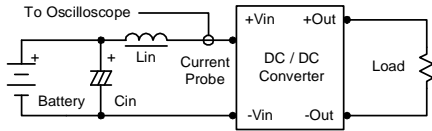
| Parameter | Conditions | Min. | Max. | Unit |
|---|---------------------|------|------|----------|
| Operating Temperature Range (with Derating) | Ambient | -40 | +85 | °C |
| Case Temperature | | --- | +100 | °C |
| Storage Temperature Range | | -50 | +125 | °C |
| Humidity (non condensing) | | --- | 95 | % rel. H |
| Cooling | Free-Air convection | | | |
| Lead Temperature (1.5mm from case for 10Sec.) | | --- | 260 | °C |

Power Derating Curve


Test Configurations

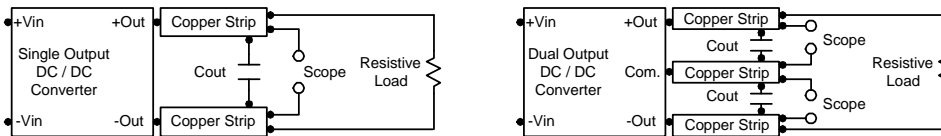
Input Reflected-Ripple Current Test Setup

Input reflected-ripple current is measured with an inductor L_{in} (4.7uH) and C_{in} (220uF, ESR < 1.0Ω at 100 KHz) to simulate source impedance. Capacitor C_{in} , 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 C_{out} 0.47uF 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.



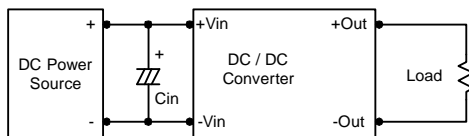
Design & Feature Considerations

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.

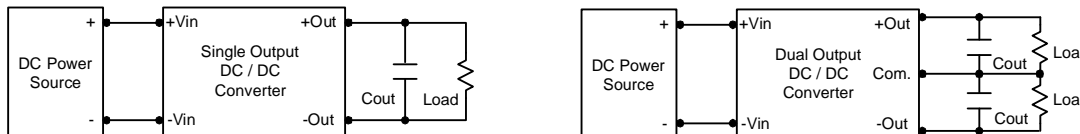
Input Source Impedance

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 4.7uF for the 24V input devices and a 2.2uF for the 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 3.3uF capacitors at the output.



Maximum Capacitive Load

The MIW4100 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 100°C.

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

