

## 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 Ambient 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. mA	Min. mA	@Max. Load mA(typ.)	@No Load 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				100#	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				83	
MIW4134		15	400	40	152			100	82	
MIW4135		±5	±500	±50	134				78	
MIW4136		±12	±250	±25	151				100#	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	
Short Circuit Input Power		---	---	3000	mW
Input Filter	All Models	Internal Pi Type			
Conducted EMI		Compliance to EN 55022,class A and FCC part 15,class A			

**Output Specifications**

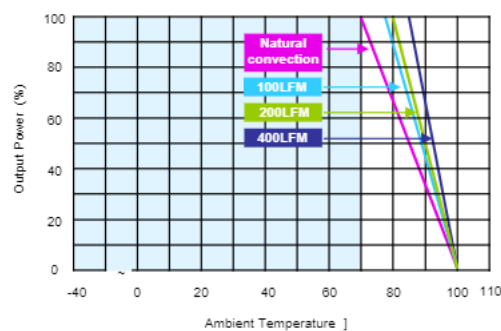
Parameter	Conditions	Min.	Typ.	Max.	Unit
Output Voltage Setting Accuracy		---	±1.0	±2.0	%Vnom.
Output Voltage Balance	Dual Output, Balanced Loads	---	±1.0	±2.0	%
Line Regulation	Vin=Min. to Max. @Full Load	---	±0.1	±0.5	%
Load Regulation	Io=10% to 100%	---	±0.5	±1.0	%
Cross Regulation (Dual)	Asymmetrical load 25% / 100% FL	---	---	±5.0	%
Ripple & Noise	0-20 MHz Bandwidth	---	50	80	mV <sub>rms</sub>
Transient Recovery Time	25% Load Step Change	---	300	500	μS
Transient Response Deviation		---	±3	---	%
Temperature Coefficient		---	±0.01	±0.02	%/°C
Over Load Protection	Foldback	110	250	350	%
Short Circuit Protection	Continuous, 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	---	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				

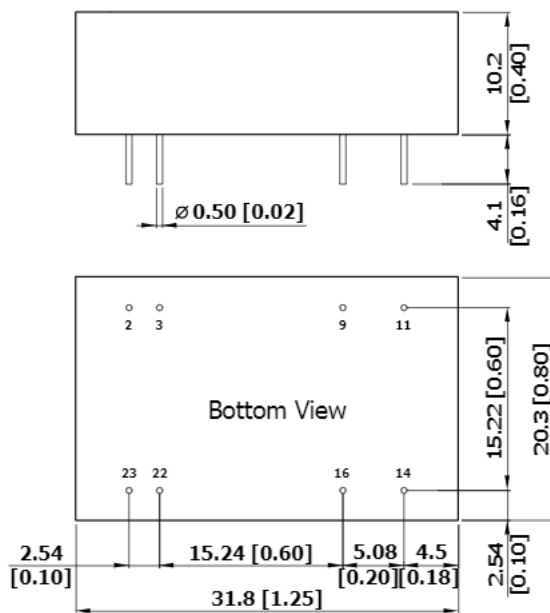
**Environmental Specifications**

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

**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**

Pin	Single Output	Dual Output
2	-Vin	-Vin
3	-Vin	-Vin
9	No Pin	Common
11	NC	-Vout
14	+Vout	+Vout
16	-Vout	Common
22	+Vin	+Vin
23	+Vin	+Vin

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  $\varnothing 0.5 \pm 0.05$  (0.02±0.002)

**Physical Characteristics**

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

Case Material : Aluminum Anodizing Treatment in Black

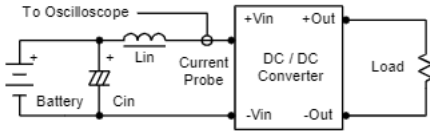
Pin Material : Copper Alloy with Gold Plate Over Nickel Subplate

Weight : 13.9g

## Test Configurations

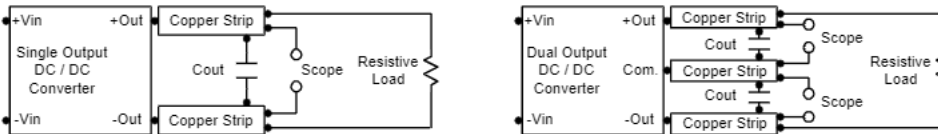
### Input Reflected-Ripple Current Test Setup

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.



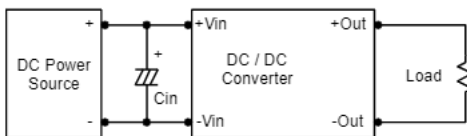
## Design & Feature Considerations

### 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.

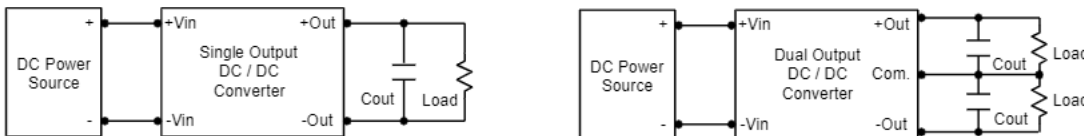
### Input Source Impedance

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.

