

# MIW4100 Series

5-6W, Ultra-Wide Input Range DIP, Single & Dual Output DC/DC Converters

## Key Features

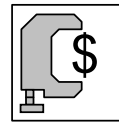
- Efficiency up to 83%
- 1500VDC Isolation
- MTBF > 1,000,000 Hours
- 4:1 Wide Input Range
- Low Cost
- Complies with EN55022 Class A
- Temperature Performance  $-40^{\circ}\text{C}$  to  $+71^{\circ}\text{C}$
- Industry Standard Pinout
- UL 94V-0 Package Material
- Internal SMD Construction



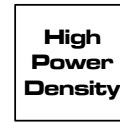
Minmax's MIW4100-Series power modules operate over input voltage ranges of 9–36VDC and 18–75VDC which provide precisely regulated output voltages of 3.3V, 5V, 12V, 15V,  $\pm 5\text{V}$ ,  $\pm 12\text{V}$  and  $\pm 15\text{VDC}$ .

The  $-40^{\circ}\text{C}$  to  $+71^{\circ}\text{C}$  operating temperature range makes it ideal for data communication equipments, mobile battery driven equipments, distributed power systems, telecommunication equipments, mixed analog/digital subsystems, process/machine control equipments, computer peripheral systems and industrial robot systems.

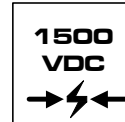
The modules have a maximum power rating of 6W and a typical full-load efficiency of 83%, continuous short circuit, EN55022 Class A conducted noise compliance minimize design-in time, cost and eliminate the need for external filtering.



Low Cost



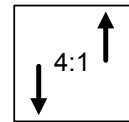
More Power



I/O Isolation



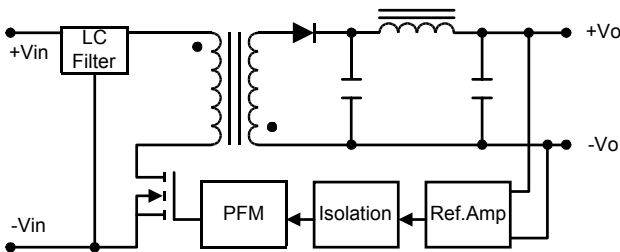
EN55022



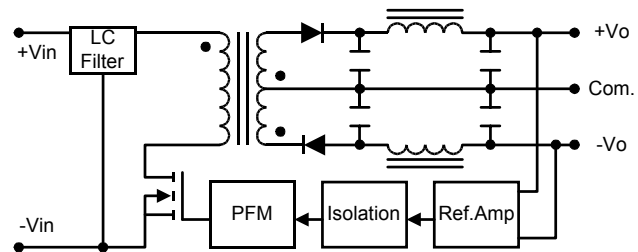
Wide Range

## Block Diagram

### Single Output



### Dual Output



## Model Selection Guide

Model Number	Input Voltage	Output Voltage	Output Current		Input Current		Reflected Ripple Current	Efficiency
			Max.	Min.	@Max. Load	@No Load		@Max. Load
	VDC	VDC	mA	mA	mA (Typ.)	mA (Typ.)	mA (Typ.)	% (Typ.)
MIW4121	24 (9 ~ 36)	3.3	1200	120	220	20	20	75
MIW4122		5	1000	100	267			78
MIW4123		12	500	50	301			83
MIW4124		15	400	40	305			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	75
MIW4132		5	1000	100	134			78
MIW4133		12	500	50	151			83
MIW4134		15	400	40	152			82
MIW4135		±5	±500	±50	134			78
MIW4136		±12	±250	±25	151			83
MIW4137		±15	±200	±20	152			82

## Absolute Maximum Ratings

Parameter	Min.	Max.	Unit	
Input Surge Voltage (1000 mS)	24VDC Input Models	-0.7	50	VDC
	48VDC Input Models	-0.7	100	VDC
Lead Temperature (1.5mm from case for 10 Sec.)	---	260	°C	
Internal Power Dissipation	---	2,500	mW	

Exceeding the absolute maximum ratings of the unit could cause damage. These are not continuous operating ratings.

## Notes :

- Specifications typical at  $T_a = +25^\circ\text{C}$ , resistive load, nominal input voltage, 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%.
- Ripple & Noise measurement bandwidth is 0–20 MHz.
- 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.
- All DC/DC converters should be externally fused at the front end for protection.
- Other input and output voltage may be available, please contact factory.
- Specifications subject to change without notice.

## Environmental Specifications

Parameter	Conditions	Min.	Max.	Unit
Operating Temperature	Ambient	-40	+71	°C
Operating Temperature	Case	-40	+95	°C
Storage Temperature		-40	+125	°C
Humidity		---	95	%
Cooling	Free-Air Convection			
Conducted EMI	EN55022 Class A			

# MIW4100 Series

## Input Specifications

Parameter	Model	Min.	Typ.	Max.	Unit
Start Voltage	24V Input Models	7	8	9	VDC
	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
Input Filter		Pi Filter			

## Output Specifications

Parameter	Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy		---	$\pm 0.5$	$\pm 2.0$	%
Output Voltage Balance	Dual Output, Balanced Loads	---	$\pm 0.5$	$\pm 2.0$	%
Line Regulation	$V_{in} = \text{Min. to Max.}$	---	$\pm 0.1$	$\pm 0.5$	%
Load Regulation	$I_o = 10\% \text{ to } 100\%$	---	$\pm 0.5$	$\pm 1.0$	%
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
Over Power Protection		110	250	350	%
Transient Recovery Time	25% Load Step Change	---	300	500	$\mu\text{s}$
Transient Response Deviation		---	$\pm 3$	---	%
Temperature Coefficient		---	$\pm 0.01$	$\pm 0.02$	%/°C
Output Short Circuit	Continuous				

## General Specifications

Parameter	Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage	60 Seconds	1500	---	---	VDC
Isolation Voltage Test	Flash Tested for 1 Second	1650	---	---	VDC
Isolation Resistance	500VDC	1000	---	---	M $\Omega$
Isolation Capacitance	100KHz, 1V	---	350	550	pF
Switching Frequency		---	450	---	KHz
MTBF	MIL-HDBK-217F @ 25°C, Ground Benign	1000	---	---	K Hours

## Capacitive Load

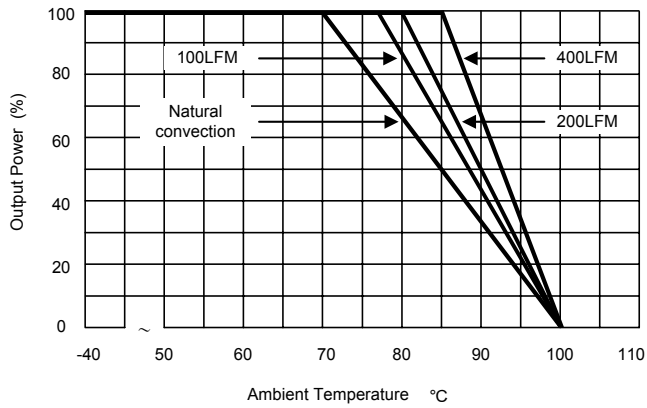
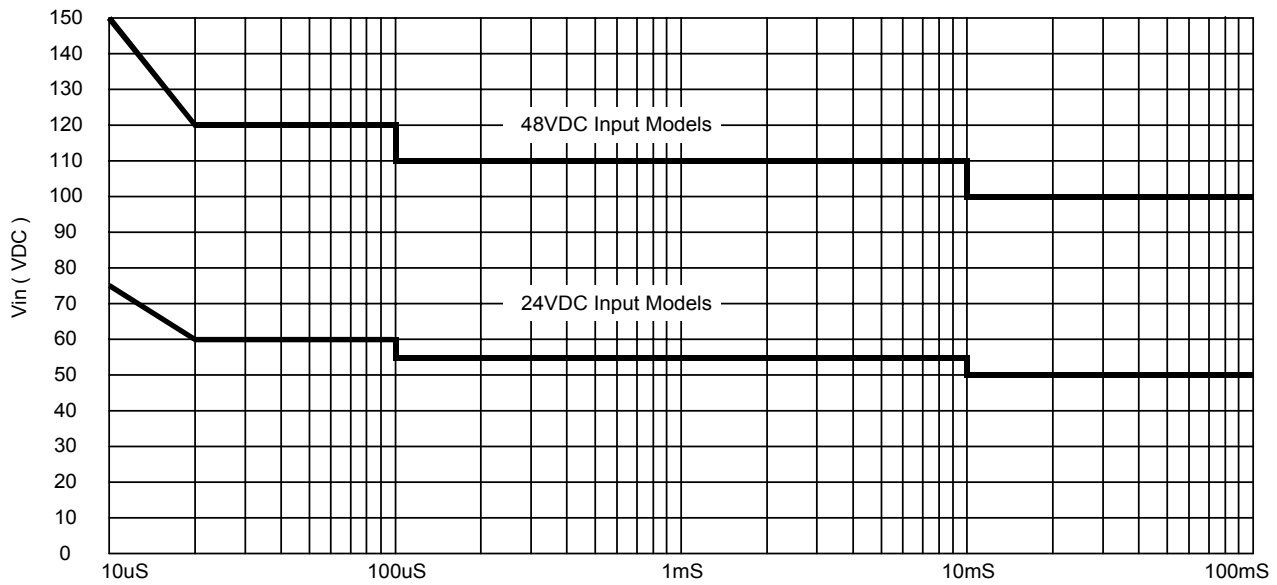
Models by Vout	3.3V	5V	12V	15V	$\pm 5V$ #	$\pm 12V$ #	$\pm 15V$ #	Unit
Maximum Capacitive Load	470	470	100	100	100	100	100	$\mu\text{F}$

# For each output

## Input Fuse Selection Guide

24V Input Models	48V Input Models
1000mA Slow-Blow type	750mA Slow-Blow type

## Input Voltage Transient Rating



**Derating Curve**

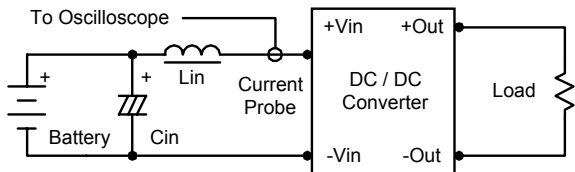
## Test Configurations

### Input Reflected-Ripple Current Test Setup

Input reflected-ripple current is measured with an inductor  $L_{in}$  (4.7 $\mu$ H) and  $C_{in}$  (220 $\mu$ F, ESR < 1.0 $\Omega$  at 100 KHz) to simulate source impedance.

Capacitor  $C_{in}$ , offsets possible battery impedance.

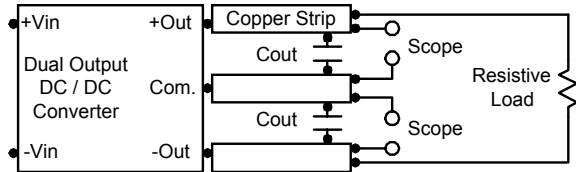
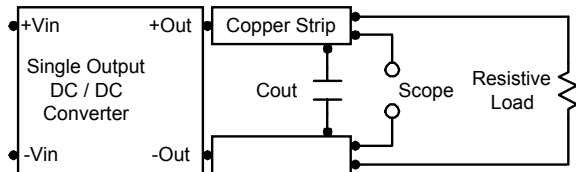
Current ripple is measured at the input terminals of the module, measurement bandwidth is 0–500 KHz.



### Peak-to-Peak Output Noise Measurement Test

Use a  $C_{out}$  0.47 $\mu$ 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.



## Design & Feature Considerations

### 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.

### Overcurrent Protection

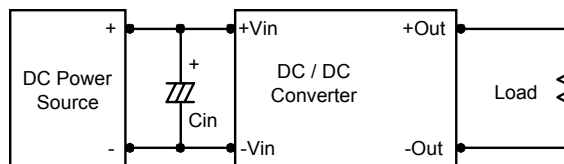
To provide protection in a fault (output overload) condition, the unit is equipped with internal current limiting circuitry and can endure current limiting for an unlimited duration. At the point of current-limit inception, the unit shifts from voltage control to current control. The unit operates normally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

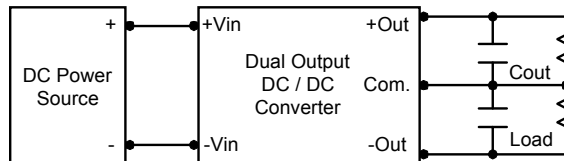
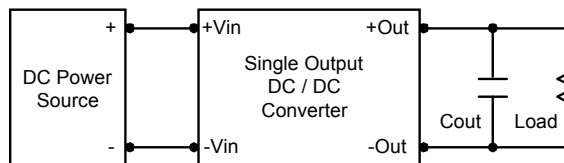
Capacitor mounted close to the power module helps ensure stability of the unit, it is recommended to use a good quality low Equivalent Series Resistance (ESR < 1.0 $\Omega$  at 100 KHz) capacitor of a 4.7 $\mu$ F for the 24V input devices and a 2.2 $\mu$ F for the 48V devices.



### 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.

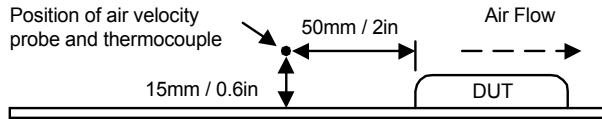
To reduce output ripple, it is recommended to use 3.3 $\mu$ F capacitors at the output.



## Thermal Considerations

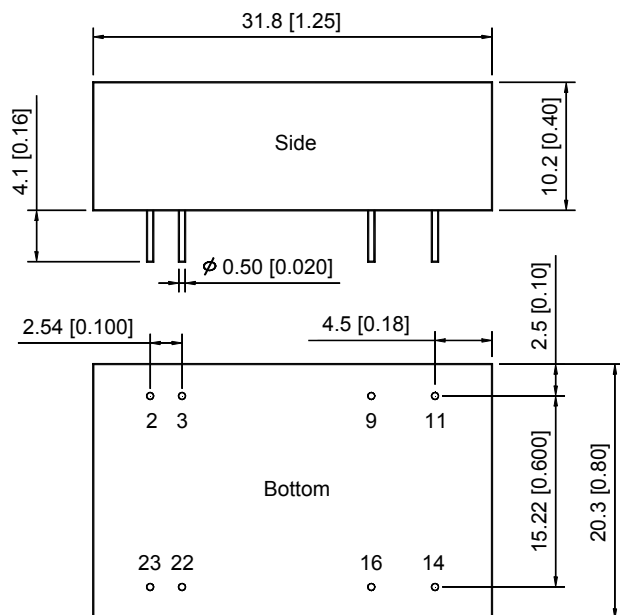
Many conditions affect the thermal performance of the power module, such as orientation, airflow over the module and board spacing. To avoid exceeding the maximum temperature rating of the components inside the power module, the case temperature must be kept below 90°C.

The derating curves are determined from measurements obtained in an experimental apparatus.



# MIW4100 Series

## Mechanical Dimensions

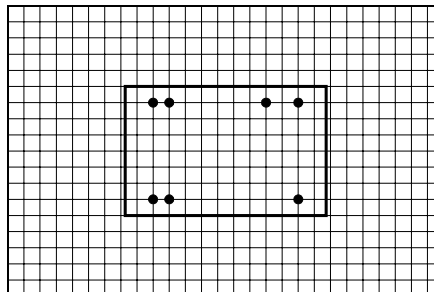


Tolerance	Millimeters	Inches
	X.X $\pm$ 0.25	X.XX $\pm$ 0.01
	X.XX $\pm$ 0.13	X.XXX $\pm$ 0.005
Pin	$\pm$ 0.05	$\pm$ 0.002

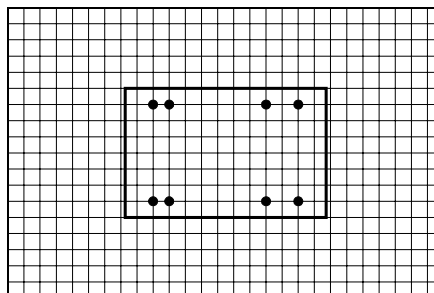
## Connecting Pin Patterns

Top View ( 2.54 mm / 0.1 inch grids )

### Single Output



### Dual Output



## 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

## Physical Characteristics

**Case Size** : 31.8x20.3x10.2 mm  
1.25x0.80x0.40 inches

**Case Material** : Metal With Non-Conductive Baseplate

**Weight** : 17.3g

**Flammability** : UL94V-0

The MIW4100 converter is encapsulated in a low thermal resistance molding compound that has excellent resistance/electrical characteristics over a wide temperature range or in high humidity environments. The encapsulant and unit case are both rated to UL 94V-0 flammability specifications. Leads are tin plated for improved solderability.