

# MIW1300 Series

3W, Wide Input Range DIP, Single & Dual Output DC/DC Converter



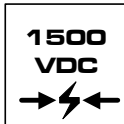
## Key Features



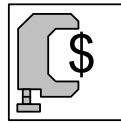
- Efficiency up to 80%
- 1500VDC Isolation
- MTBF > 1,000,000 Hours
- 3:1 Wide Input Range
- CSA60950-1 Safety Approval
- Short Circuit Protection
- Complies with EN55022 Class A
- Temperature Performance -25°C to +71°C
- UL 94V-0 Package Material
- Internal SMD Construction
- Industry Standard Pinout



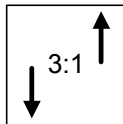
EN55022



I/O Isolation



Low Cost



Wide Range

Minmax's MIW1300-Series power modules operate over a 3:1 input voltage ranges of 10–30VDC which provide precisely regulated output voltages of 5V, 12V, 15V,  $\pm 12V$  and  $\pm 15VDC$ .

The -25°C to +71°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 3W and a typical full-load efficiency of 80%, continuous short circuit, 45mA output ripple, EN55022 Class A conducted noise compliance minimize design-in time, cost and eliminate the need for external filtering.

## Absolute Maximum Ratings

Parameter	Min.	Max.	Unit
Input Surge Voltage	-0.7	50	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.

## Environmental Specifications

Parameter	Conditions	Min.	Max.	Unit
Operating Temperature	Ambient	-25	+71	°C
Operating Temperature	Case	-25	+90	°C
Storage Temperature		-40	+125	°C
Humidity		---	95	%
Cooling	Free-Air Convection			
Conducted EMI	EN55022 Class A			

## 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.)
MIW1322	20 (10 ~ 30)	5	600	60	188	5	20	80
MIW1323		12	250	25	188			80
MIW1324		15	200	20	188			80
MIW1326		±12	±125	±12.5	188			80
MIW1327		±15	±100	±10	188			80

## Capacitive Load

Models by Vout	5V	12V	15V	±12V #	±15V #	Unit
Maximum Capacitive Load	4000	4000	4000	470	470	µF

# For each output

## Input Fuse Selection Guide

All Models
600mA Slow – Blow Type

## Input Specifications

Parameter	Model	Min.	Typ.	Max.	Unit
Start Voltage	All Models	4.5	7	9	VDC
Under Voltage Shutdown		---	6.5	8.5	
Reverse Polarity Input Current		---	---	1	A
Short Circuit Input Power		---	1000	1500	mW
Input Filter		Pi Filter			

## Output Specifications

Parameter	Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy		---	±0.5	±2.0	%
Output Voltage Balance	Dual Output, Balanced Loads	---	±0.5	±2.0	%
Line Regulation	Vin=Min. to Max.	---	±0.2	±0.5	%
Load Regulation	Io=10% to 100%	---	±0.2	±0.5	%
Ripple & Noise (20MHz)		---	45	60	mV P-P
Ripple & Noise (20MHz)	Over Line, Load & Temp.	---	---	80	mV P-P
Ripple & Noise (20MHz)		---	---	28	mV rms
Over Power Protection		120	---	---	%
Transient Recovery Time	25% Load Step Change	---	300	500	µS
Transient Response Deviation		---	±3	±5	%
Temperature Coefficient		---	±0.01	±0.05	%/°C
Output Short Circuit	Continuous				

# MIW1300 Series

## General Specifications

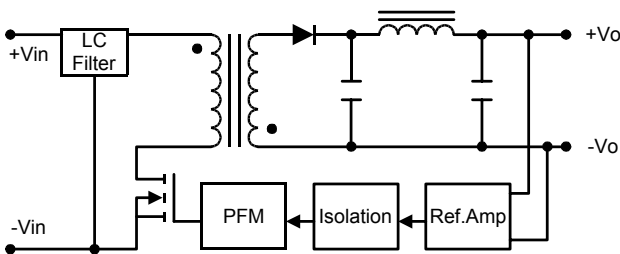
Parameter	Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage Rated	60 Seconds	1500	---	---	VDC
Isolation Voltage Test	Flash Tested for 1 Second	1650	---	---	VDC
Isolation Resistance	500VDC	1000	---	---	MΩ
Isolation Capacitance	100KHz, 1V	---	---	500	pF
Switching Frequency		---	300	---	KHz
MTBF	MIL-HDBK-217F @ 25°C, Ground Benign	1000	---	---	K Hours

### Notes :

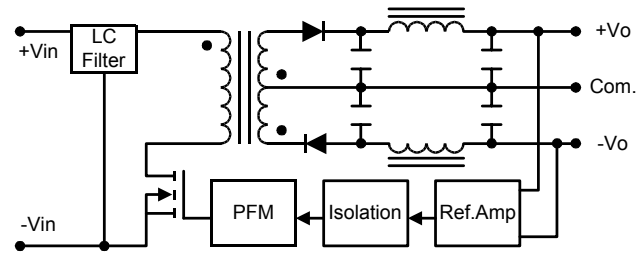
1. Specifications typical at  $T_a=+25^{\circ}\text{C}$ , resistive load, nominal input voltage, rated output current unless otherwise noted.
2. Transient recovery time is measured to within 1% error band for a step change in output load of 75% to 100%.
3. Ripple & Noise measurement bandwidth is 0–20 MHz.
4. These power converters require a minimum output loading to maintain specified regulation.
5. Operation under no-load conditions will not damage these modules; however, they may not meet all specifications listed.
6. All DC/DC converters should be externally fused at the front end for protection.
7. Other input and output voltage may be available, please contact factory.
8. Specifications subject to change without notice.

## Block Diagram

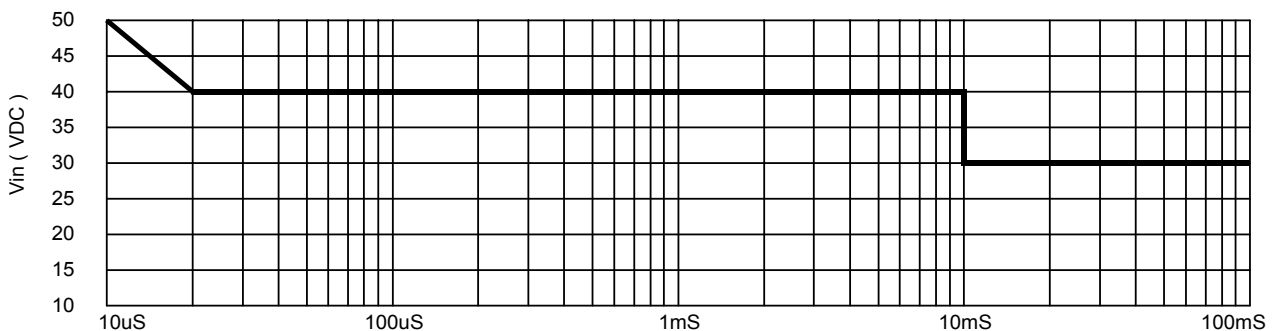
### Single Output

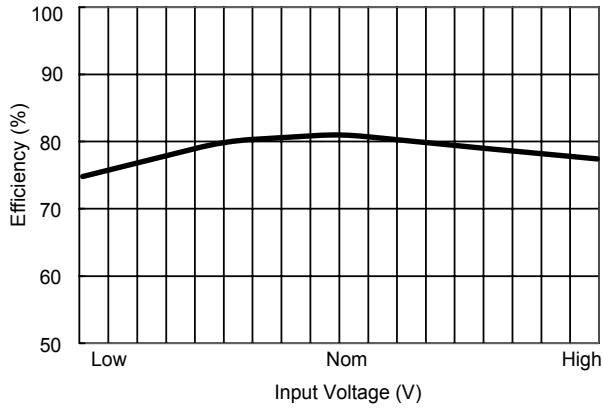


### Dual Output

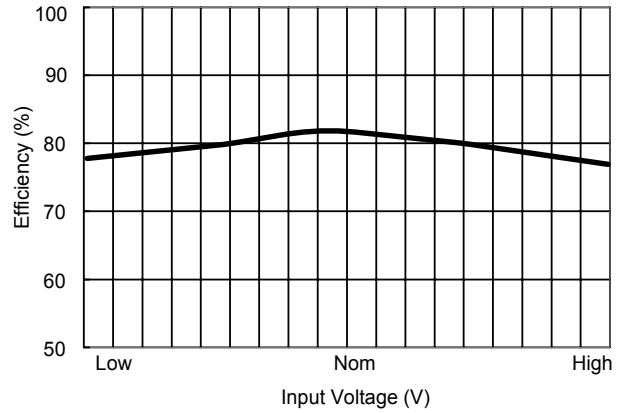


## Input Voltage Transient Rating

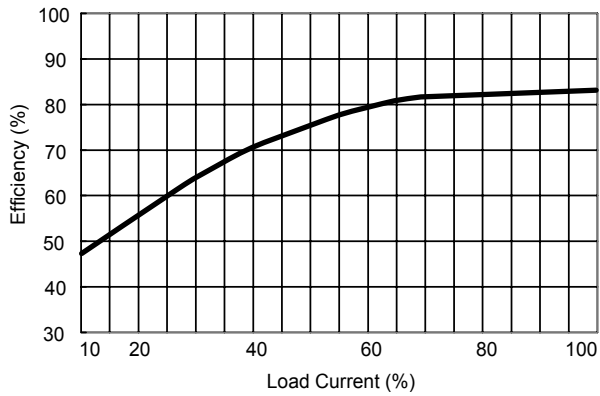




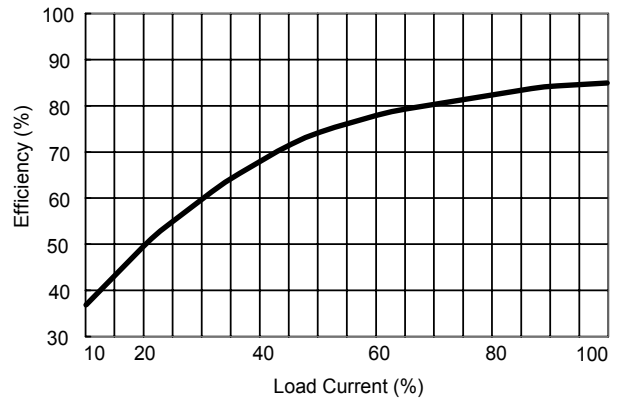
**Efficiency vs Input Voltage ( Single Output )**



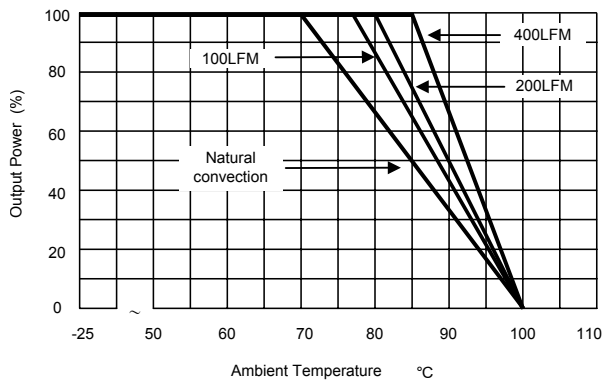
**Efficiency vs Input Voltage ( Dual Output )**



**Efficiency vs Output Load ( Single Output )**



**Efficiency vs Output Load ( Dual Output )**



**Derating Curve**

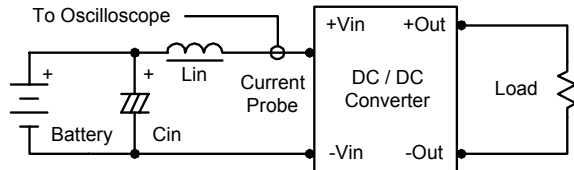
## Test Configurations

### 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.

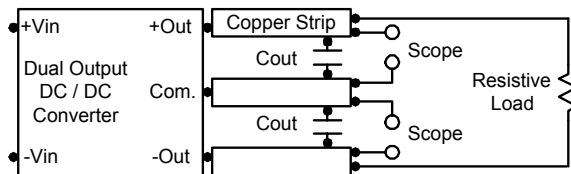
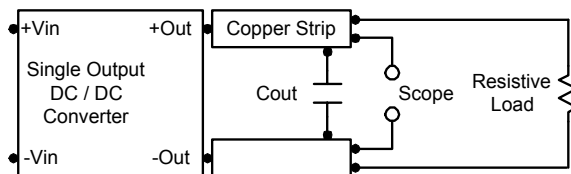
Current ripple is measured at the input terminals of the module, measurement bandwidth is 0–500 KHz.



### 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 MIW1300 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.

For optimum performance we recommend 470 $\mu$ F maximum capacitive load for dual outputs and 4000 $\mu$ F capacitive load for single outputs.

The maximum capacitance can be found in the data sheet.

### Overcurrent Protection

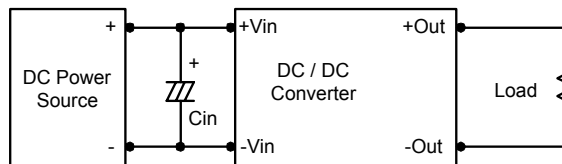
To provide protection in a fault (output overload) condition, the unit is equipped with internal current limiting circuitry and can endure current limiting for an unlimited duration. At the point of current-limit inception, the unit shifts from voltage control to current control. The unit operates normally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

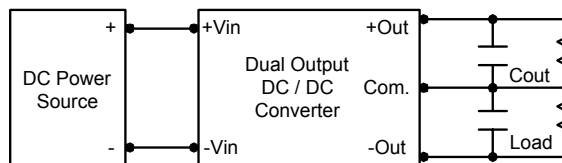
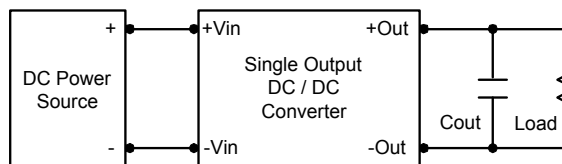
Capacitor mounted close to the power module helps ensure stability of the unit, it is recommended to use a good quality low Equivalent Series Resistance (ESR < 1.0 $\Omega$  at 100 KHz) capacitor of a 3.3 $\mu$ F for the devices.



### 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.

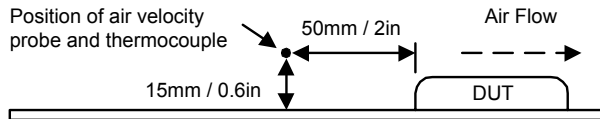
To reduce output ripple, it is recommended to use 3.3 $\mu$ F capacitors at the output.



## Thermal Considerations

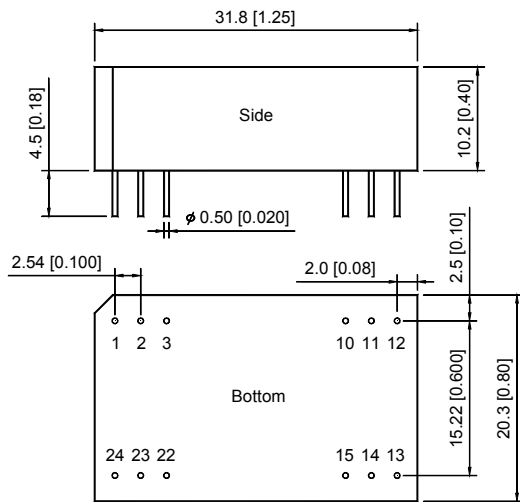
Many conditions affect the thermal performance of the power module, such as orientation, airflow over the module and board spacing. To avoid exceeding the maximum temperature rating of the components inside the power module, the case temperature must be kept below 90°C.

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



# MIW1300 Series

## Mechanical Dimensions



## Physical Characteristics

<b>Case Size</b>	:	31.8×20.3×10.2 mm 1.25×0.80×0.40 inches
<b>Case Material</b>	:	Non-Conductive Black Plastic
<b>Weight</b>	:	12.4g
<b>Flammability</b>	:	UL94V-0

<b>Tolerance</b>	<b>Millimeters</b>	<b>Inches</b>
	X.X±0.25	X.XX±0.01
	X.XX±0.13	X.XXX±0.005
<b>Pin</b>	±0.05	±0.002

## Pin Connections

Pin	Single Output	Dual Output
1	+Vin	+Vin
2	NC	-Vout
3	NC	Common
10	-Vout	Common
11	+Vout	+Vout
12	-Vin	-Vin
13	-Vin	-Vin
14	+Vout	+Vout
15	-Vout	Common
22	NC	Common
23	NC	-Vout
24	+Vin	+Vin

NC: No Connection