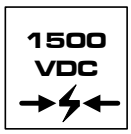
MIW2300 Series

2-3W, Ultra-Wide Input Range DIP, Single & Dual Output DC/DC Converters

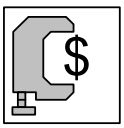
Key Features

- *Efficiency up to 84%*
- *1500VDC Isolation*
- *MTBF > 1,000,000 Hours*
- *4:1 Wide Input Range*
- *Low Cost*
- *CSA60950−1 Safety Approval*
- *Complies with EN55022 Class A*
- *Temperature Performance −40℃ to +71℃*
- *UL 94V−0 Package Material*
- *Internal SMD Construction*
- *Industry Standard Pinout*

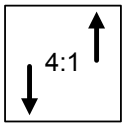
EN55022



I/O Isolation



Low Cost



Wide Range

Minmax's MIW2300−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, ±12V and ±15VDC.

The −40℃ to +71℃ 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 84%, continuous short circuit, 40mA 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 (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	℃
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	−40	+71	℃
Operating Temperature	Case	−40	+90	℃
Storage Temperature		−40	+125	℃
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.)
MIW2321	24 (9 ~ 36)	3.3	750	93	138	20	15	75
MIW2322		5	600	75	158			79
MIW2323		12	250	32	154			81
MIW2324		15	200	25	152			82
MIW2326		±12	±125	±16	156			80
MIW2327		±15	±100	±13	156			80
MIW2331	48 (18 ~ 75)	3.3	750	93	68	10	10	76
MIW2332		5	600	75	78			80
MIW2333		12	250	32	75			83
MIW2334		15	200	25	74			84
MIW2336		±12	±125	±16	76			82
MIW2337		±15	±100	±13	76			82

Capacitive Load

Models by Vout	3.3V	5V	12V	15V	±12V #	±15V #	Unit
Maximum Capacitive Load	680	470	330	220	150	100	uF

 # For each output

Input Fuse Selection Guide

24V Input Models	48V Input Models
1000mA Slow − Blow Type	500mA Slow − Blow Type

Input Specifications

Parameter	Model	Min.	Typ.	Max.	Unit
Start Voltage	24V Input Models	6	7.5	9	VDC
	48V Input Models	12	15	18	
Under Voltage Shutdown	24V Input Models	---	---	8.5	
	48V Input Models	---	---	16	
Reverse Polarity Input Current	All Models	---	---	0.5	A
Short Circuit Input Power		---	---	2000	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	±3.0	%
Line Regulation	Vin=Min. to Max.	---	±0.2	±1.0	%
Load Regulation	Io=Min. to Max.	---	±0.3	±1.0	%
Ripple & Noise (20MHz)		---	40	75	mV P-P
Ripple & Noise (20MHz)	Over Line, Load & Temp.	---	---	150	mV P-P
Ripple & Noise (20MHz)		---	---	15	mV rms
Over Power Protection	Vin=Min.	110	---	---	%
Transient Recovery Time	25% Load Step Change	---	150	500	uS
Transient Response Deviation		---	±2	---	%
Temperature Coefficient		---	±0.01	±0.02	%/°C
Output Short Circuit	Continuous				

General Specifications

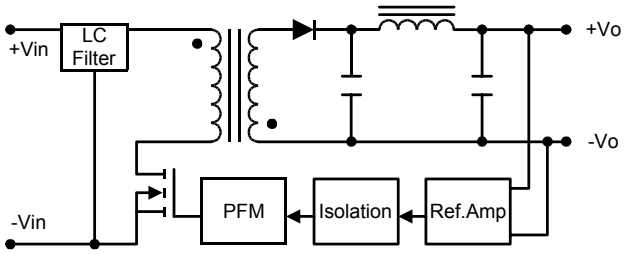
Parameter	Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage Rated	60 Seconds	1500	---	---	VDC
Isolation Voltage Test	Flash Tested for 1 Second	1650	---	---	VDC
Isolation Resistance	500VDC	1000	---	---	MΩ
Isolation Capacitance	100KHz,1V	---	380	500	pF
Switching Frequency		---	350	---	KHz
MTBF	MIL-HDBK-217F @ 25°C, Ground Benign	1000	---	---	K Hours

Notes :

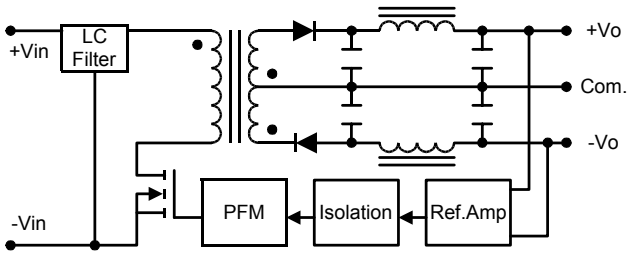
1. Specifications typical at Ta=+25°C, resistive load, nominal input voltage, rated output current unless otherwise noted.
2. Transient recovery time is measured to within 1% error band for a step change in output load of 75% to 100%.
3. Ripple & Noise measurement bandwidth is 0-20 MHz.
4. These power 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

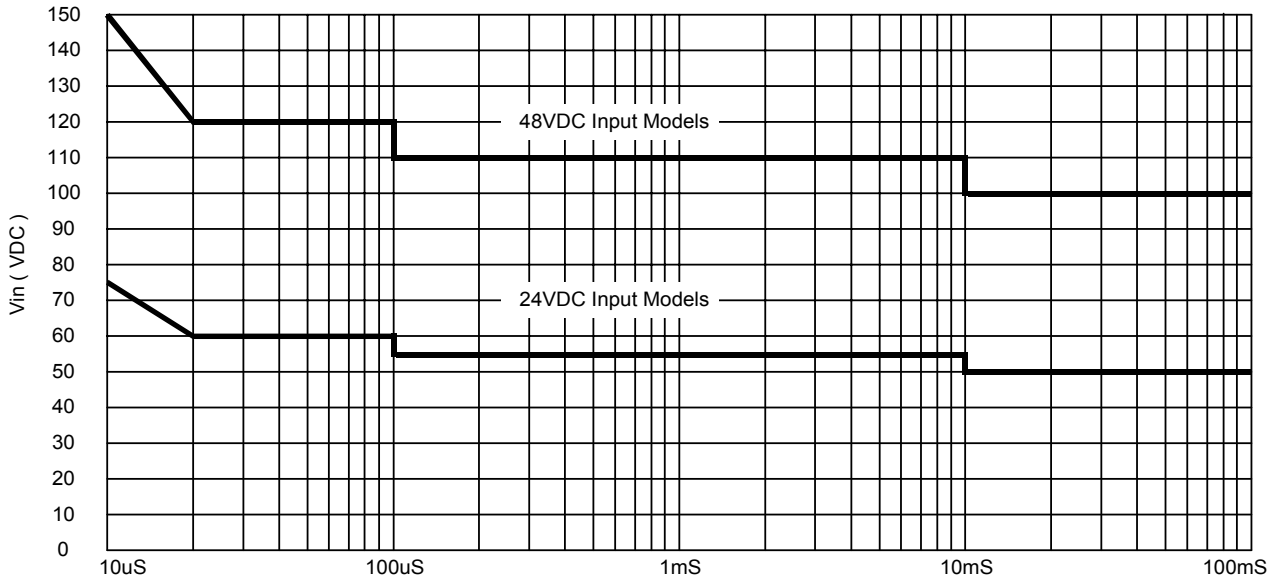
Single Output

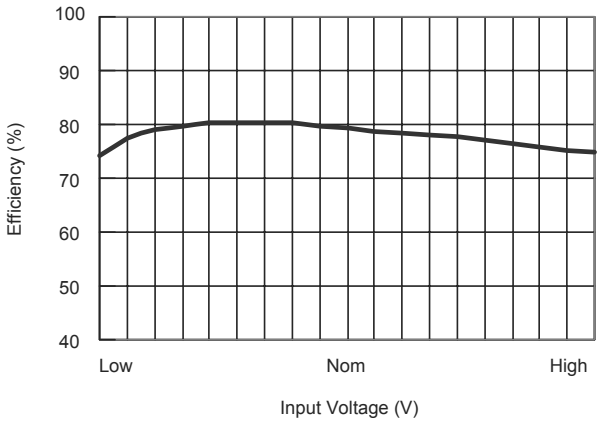


Dual Output

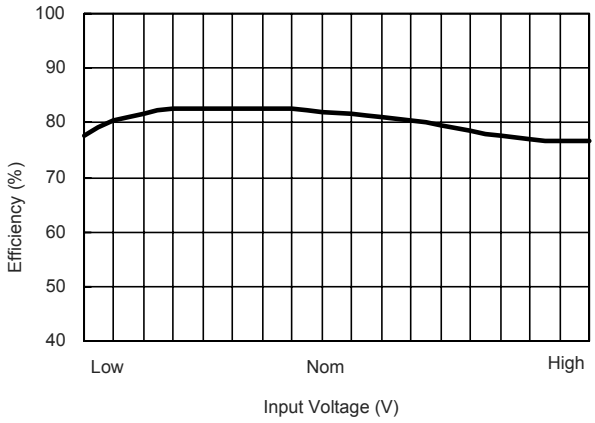


Input Voltage Transient Rating





Efficiency vs Input Voltage (Single Output)



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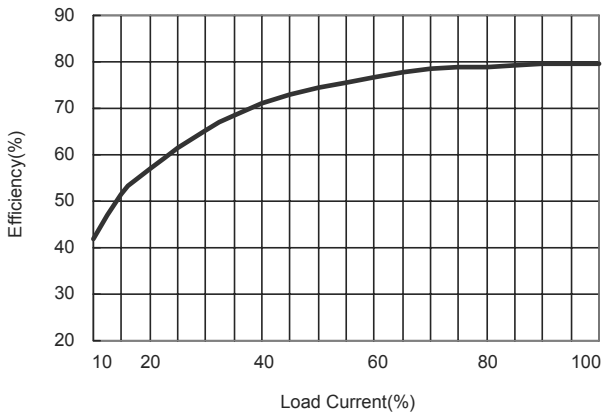
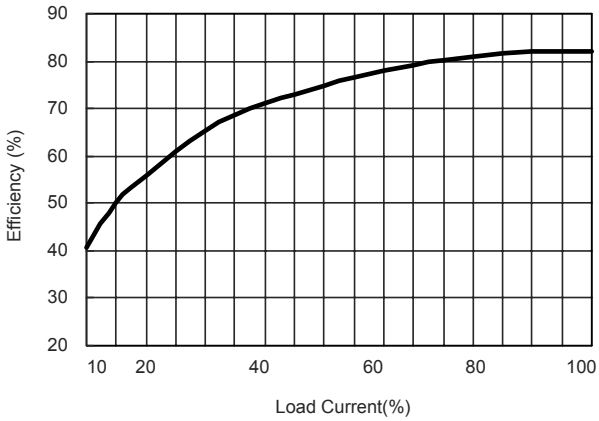
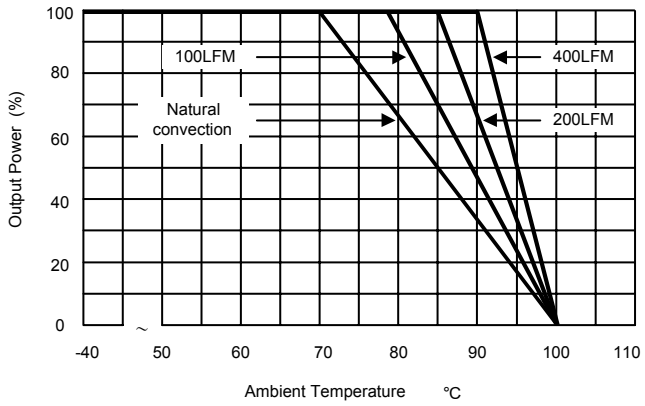


Efficiency vs Output Load (Single Output)



Efficiency vs Output Load (Dual Output)



Derating Curve

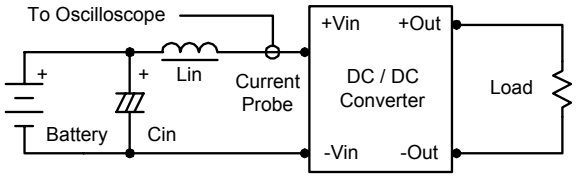
Test Configurations

Input Reflected-Ripple Current Test Setup

Input reflected−ripple current is measured with a inductor Lin (4.7uH) and Cin (220uF, ESR < 1.0Ω at 100 KHz) to simulate source impedance.

Capacitor Cin, offsets possible battery impedance.

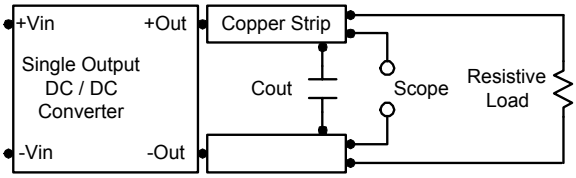
Current ripple is measured at the input terminals of the module, measurement bandwidth is 0−500 KHz.

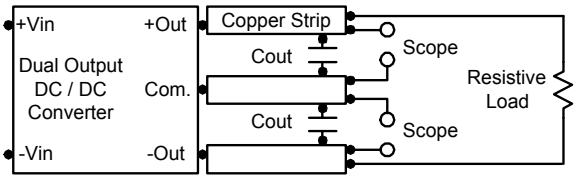


Peak-to-Peak Output Noise Measurement Test

Use a Cout 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

Maximum Capacitive Load

The MIW2300 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 680uF maximum capacitive load for 3.3V output, 470uF for 5V output, 330uF for 12V output, 220uF for 15V output, 150uF for ±12V output and 100uF for ±15V output.

The maximum capacitance can be found in the data sheet.

Overcurrent Protection

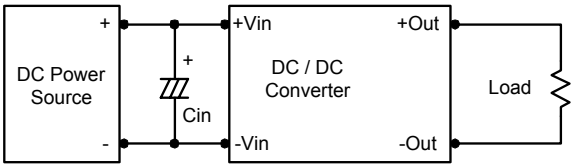
To provide protection in a fault (output overload) condition, the unit is equipped with internal current limiting circuitry and can endure current limiting for an unlimited duration. At the point of current−limit inception, the unit shifts from voltage control to current control. The unit operates normally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

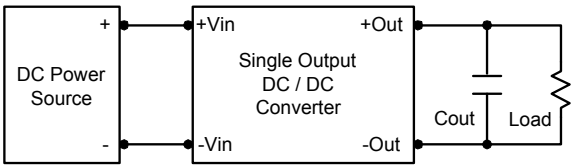
Capacitor mounted close to the power module helps ensure stability of the unit, it is recommended to use a good quality low Equivalent Series Resistance (ESR < 1.0Ω at 100 KHz) capacitor of a 4.7uF for the 24V input devices and a 2.2uF for the 48V devices.

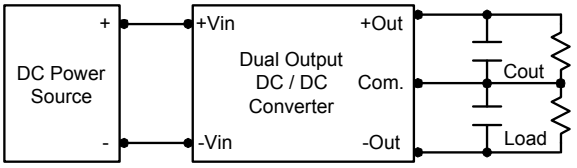


Output Ripple Reduction

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.

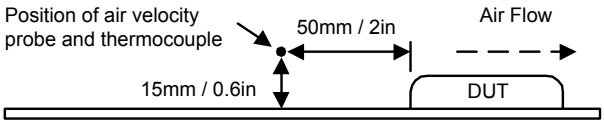




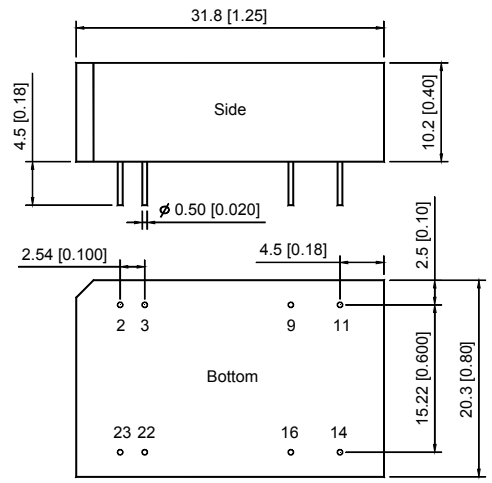
Thermal Considerations

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.



Mechanical Dimensions



Tolerance	Millimeters	Inches
	X.X±0.25	X.XX±0.01
	X.XX±0.13	X.XXX±0.005
Pin	±0.05	±0.002

Physical Characteristics

Case Size	:	31.8×20.3×10.2 mm 1.25×0.80×0.40 inches
Case Material	:	Non−Conductive Black Plastic
Weight	:	12.2g
Flammability	:	UL94V−0

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