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

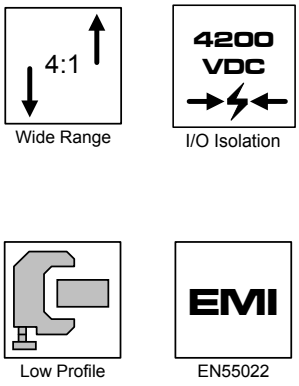
Key Features

- *Efficiency up to 83%*
- *4200VDC Isolation*
- *MTBF > 1,000,000 Hours*
- *4:1 Wide Input Range*
- *Complies With EN55022 Class B*
- *All I/O Clearance and Creepage Distance 2.0 mm Min.*
- *Temperature Performance −40℃ to +75℃*
- *Low Leakage Current*
- *Low Isolation Capacitance*
- *Meets UL1950/EN60950*

MIW2100−Series power modules are specially designed to provide ultra−high levels of isolation 4200VDC in a low profile 24−pin DIP package. Operating input voltage ranges of 9−40VDC, 18−80VDC and 36−160VDC which provide precisely regulated output voltages of 5V, 12V, ±12V and ±15VDC.

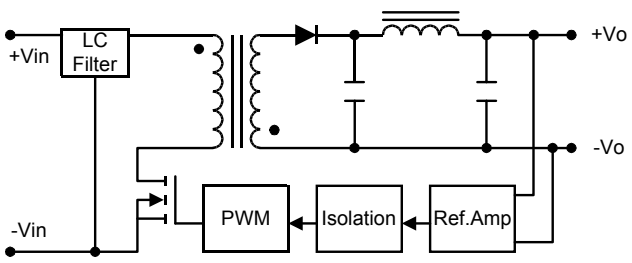
The −40℃ to +75℃ operating temperature range makes it ideal for data communication equipments, mobile battery driven equipments, distributed power systems, telecommunication equipments, mixed analog/digital subsystems, process/machine control equipments, computer peripheral systems and industrial robot systems.

The modules have a maximum power rating of 3W and a typical full−load efficiency of 83%, continuous short circuit, EN55022 Class B conducted noise compliance minimize design−in time, cost and eliminate the need for external filtering.

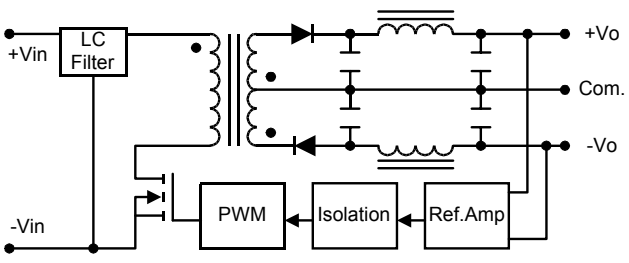


Block Diagram

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.)
MIW2122	24 (9 ~ 40)	5	600	90	160	20	15	78
MIW2123		12	250	37.5	151			83
MIW2126		±12	±125	±18.8	151			83
MIW2127		±15	±100	±15	151			83
MIW2132	48 (18 ~ 80)	5	600	90	80	10	8	78
MIW2133		12	250	37.5	75			83
MIW2136		±12	±125	±18.8	75			83
MIW2137		±15	±100	±15	75			83
MIW2142	110 (36 ~ 160)	5	600	90	35	5	3	78
MIW2143		12	250	37.5	33			83
MIW2146		±12	±125	±18.8	33			83
MIW2147		±15	±100	±15	33			83

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
	110VDC Input Models	−0.7	180	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	+75	℃
Operating Temperature	Case	−40	+95	℃
Storage Temperature		−40	+125	℃
Humidity		−−−	95	%
Cooling	Free−Air Convection			
Conducted EMI	EN55022 Class B			

Notes :

1. Specifications typical at Ta=+25℃, 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.

Input Specifications

Parameter	Model	Min.	Typ.	Max.	Unit
Start Voltage	24V Input Models	8	8.5	9	VDC
	48V Input Models	13	15	17	
	110V Input Models	26	30	34	
Under Voltage Shutdown	24V Input Models	---	---	8.5	
	48V Input Models	---	---	16	
	110V Input Models	---	---	32	
Reverse Polarity Input Current	All Models	---	---	0.3	A
Short Circuit Input Power		---	---	2000	mW
Input Filter		Pi Filter			

Output Specifications

Parameter	Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy		---	±0.5	±1.0	%
Output Voltage Balance	Dual Output, Balanced Loads	---	±0.5	±2.0	%
Line Regulation	Vin=Min. to Max.	---	±0.3	±0.5	%
Load Regulation	Io=100% to 25%	---	±0.5	±1.0	%
Ripple & Noise (20MHz)	5V Output Models	---	75	100	mV P-P
	Other Output Models	---	100	150	mV P-P
Ripple & Noise (20MHz)	Over Line, Load & Temp.	---	---	180	mV P-P
Ripple & Noise (20MHz)		---	---	15	mV rms
Over Power Protection		120	---	---	%
Transient Recovery Time	25% Load Step Change	---	150	500	uS
Transient Response Deviation		---	±3	±6	%
Temperature Coefficient		---	±0.02	±0.05	%/°C
Output Short Circuit	Continuous				

General Specifications

Parameter	Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage Rated	60 Seconds	4200	---	---	VDC
Isolation Voltage Test	Flash Tested for 1 Second	5000	---	---	VDC
Leakage Current	240VAC, 60Hz	---	---	2	uA
Isolation Resistance	500VDC	1000	---	---	MΩ
Isolation Capacitance	100KHz,1V	---	7	13	pF
Switching Frequency		---	150	---	KHz
MTBF	MIL-HDBK-217F @ 25°C, Ground Benign	1000	---	---	K Hours

Capacitive Load

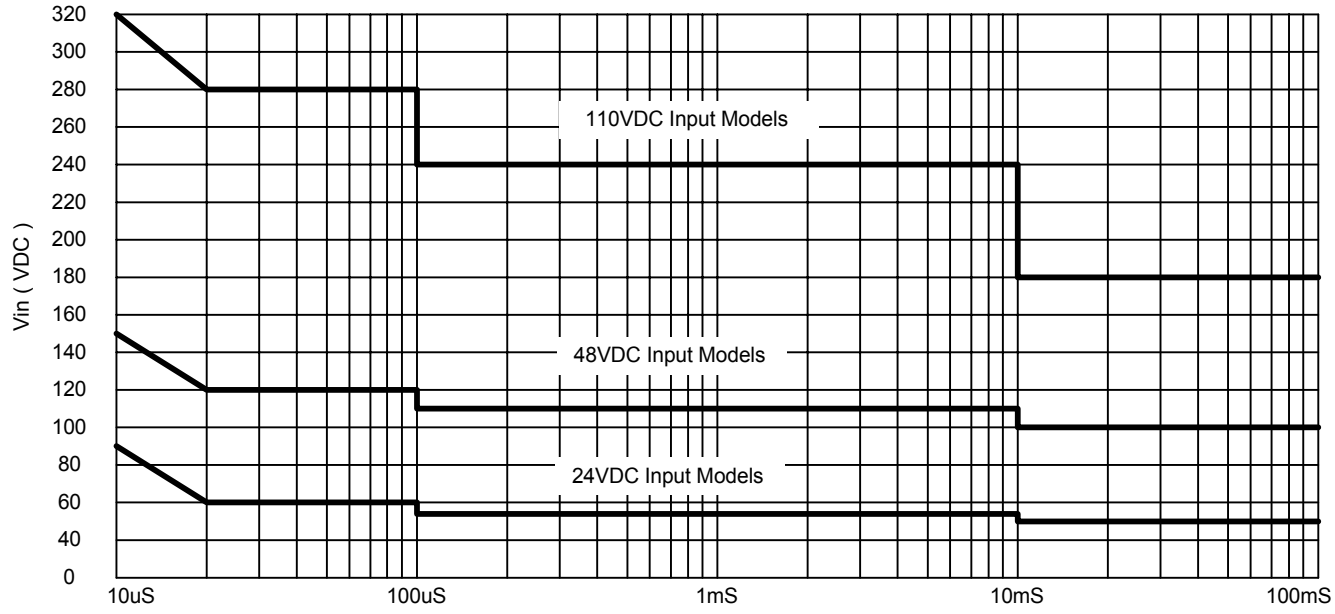
Models by Vout	5V	12V	±12V #	±15V #	Unit
Maximum Capacitive Load	1000	470	220	220	uF

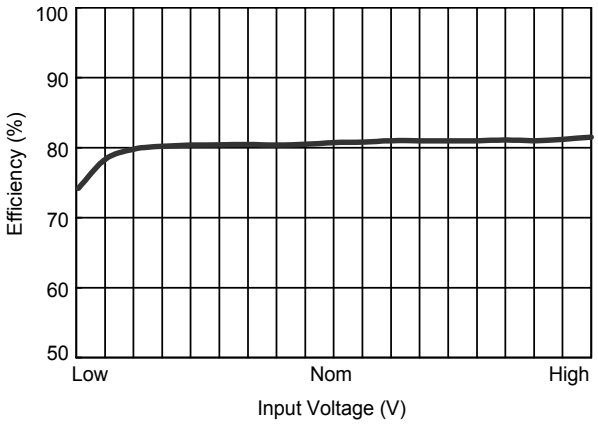
 # For each output

Input Fuse Selection Guide

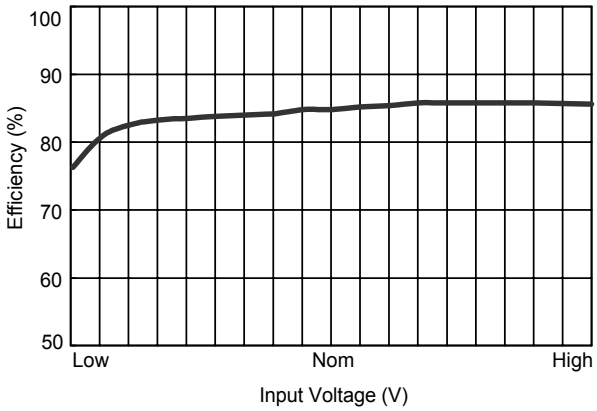
24V Input Models	48V Input Models	110V Input Models
1000mA Slow - Blow Type	500mA Slow - Blow Type	300mA Slow - Blow Type

Input Voltage Transient Rating

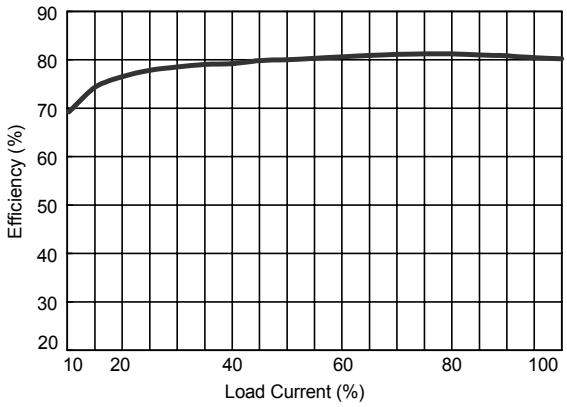




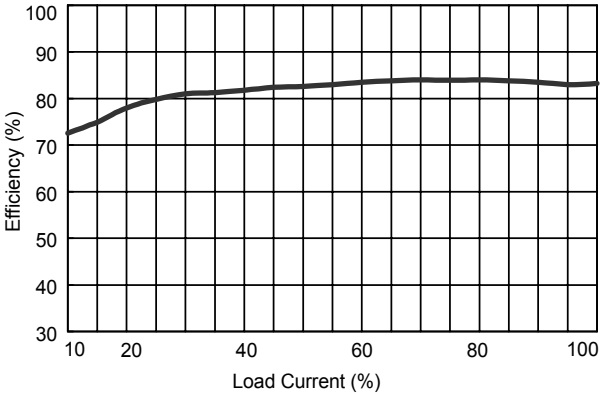
Efficiency vs Input Voltage (Single Output)



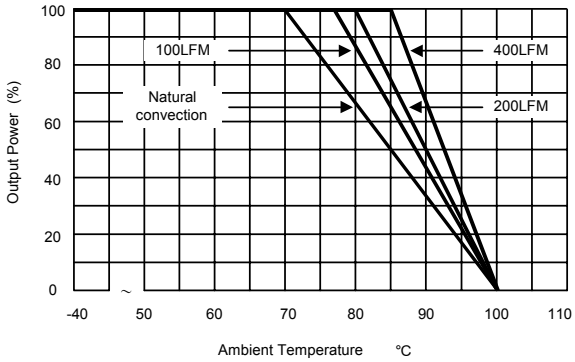
Efficiency vs Input Voltage (Dual Output)



Efficiency vs Output Load (Single Output)



Efficiency vs Output Load (Dual Output)



Derating Curve

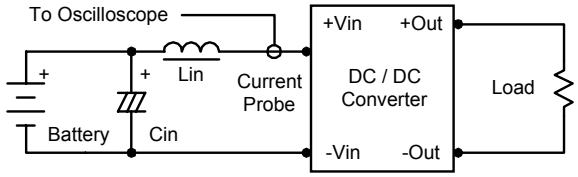
Test Configurations

Input Reflected-Ripple Current Test Setup

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

Capacitor Cin, offsets possible battery impedance.

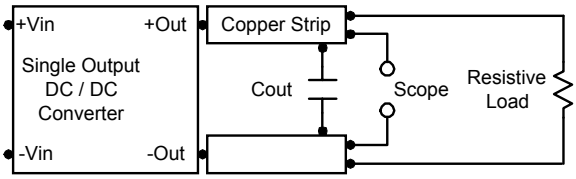
Current ripple is measured at the input terminals of the module, measurement bandwidth is 0−500KHz.

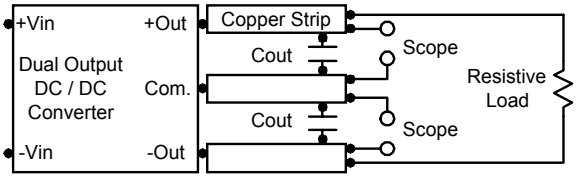


Peak-to-Peak Output Noise Measurement Test

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 MIW2100 series has limitation of maximum connected capacitance on the output.

The power module may operate in current limiting mode during start−up, affecting the ramp−up and the startup time.

Connect capacitors at the point of load for best performance.

The maximum capacitance can be found in the data sheet.

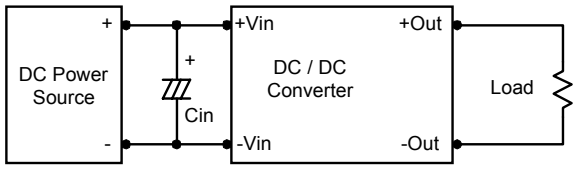
To provide protection in a fault (output overload) condition, the unit is equipped with internal current limiting circuitry and can endure current limiting for an unlimited duration. At the point of current−limit inception, the unit shifts from voltage control to current control. The unit operates normally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

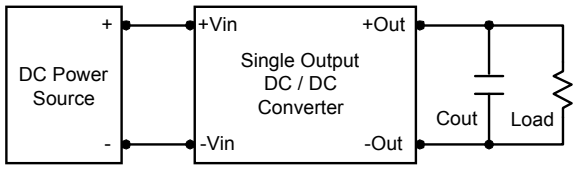
By using a good quality low Equivalent Series Resistance (ESR < 1.0Ω at 100 kHz) capacitor of a 4.7uF for the 24V input devices and a 2.2uF for the 48V devices, capacitor mounted close to the power module helps ensure stability of the unit.

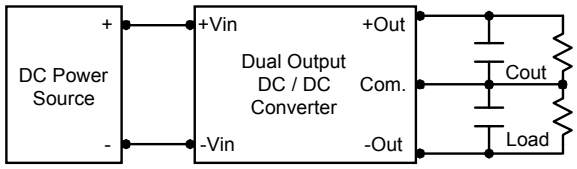


Output Ripple Reduction

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 that 3.3uF capacitors are used on output.



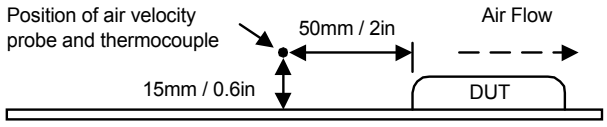


Overcurrent Protection

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 were determined from measurements obtained in an experimental apparatus.



Safety according to EN 60950 / UL 1950

Insulation between adjacent primary circuits or between primary & secondary circuits:

Operational−,Basic− and Supplementary insulation for working voltages up to 420 VDC /300 VAC.

Reinforced insulation for working voltages up to 210 VDC / 150 VAC.

Insulation between adjacent secondary circuits:

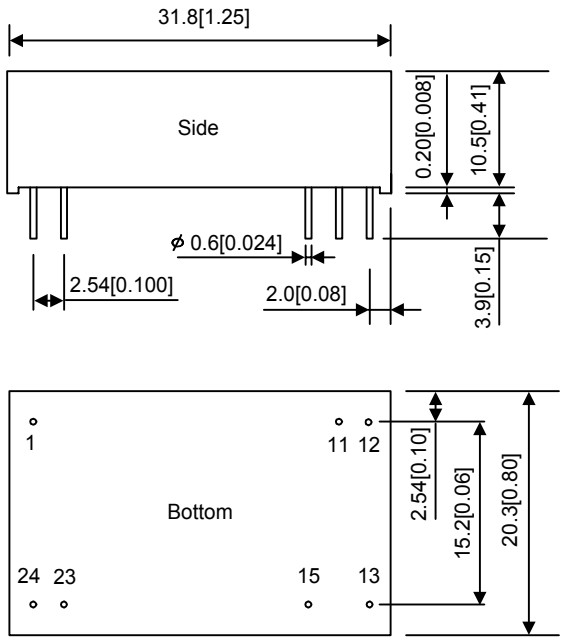
Operatonal−,Basic− Supplementary and Reinforced insulation for working voltages up to 420 VDC /300 VAC.

Electromagnetic emission EN 55022 < B

Conducted and radiated emissions

MIW214X−types EN 55022 < A ; with external coupling capacitor Cio=1 nF < B

Mechanical Dimensions

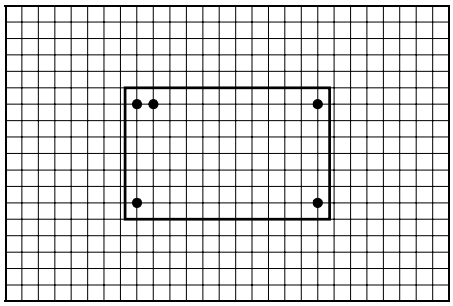


Tolerance	Millimeters	Inches
	X.X±0.25	X.XX±0.01
	X.XX±0.13	X.XXX±0.005
Pin	±0.05	±0.002

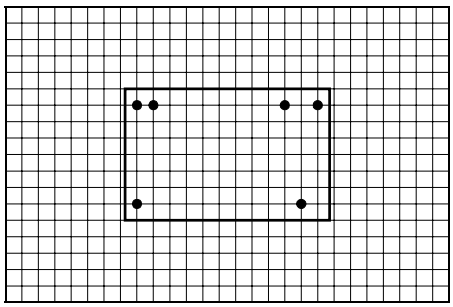
Connecting Pin Patterns

Top View (2.54 mm / 0.1 inch grids)

Single Output



Dual Output



Pin Connections

Pin	Single Output	Dual Output
1	+Vin	+Vin
11	No Pin	Common
12	−Vout	No Pin
13	+Vout	−Vout
15	No Pin	+Vout
23	−Vin	−Vin
24	−Vin	−Vin

Physical Characteristics

Case Size : 31.8×20.3×10.2 mm
1.25×0.8×0.40 inches

Case Material : Non−Conductive Black Plastic

Weight : 16.2g

Flammability : UL94V−0

The MIW2100 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.