FEATURES

- ▶ Industrial Standard DIP-24 Package
- ▶ Ultra-wide 4:1 Input Range
- ▶ Excellent Load and Line Regulation
- ▶ Wide Operating Ambient Temp. Range
- ▶ Under-voltage, Overload and Short Circuit Protection
- ▶ I/O-isolation 1500VDC
- ▶ Meets EMI EN 55022 Class A
- ▶ 3 Years Product Warranty

CSA 60950-1

PRODUCT OVERVIEW

The MIW2300 series is a high-reliability isolated DC-DC converter family designed in an industry-standard DIP-24 package. Featuring an ultra-wide 4:1 input voltage range and excellent load and line regulation, the series ensures stable and consistent performance across diverse operating conditions. With 1500 VDC I/O isolation, it provides robust system protection and enhanced operational safety.

Engineered for demanding industrial environments, the MIW2300 series supports a wide operating ambient temperature range and incorporates comprehensive protection functions, including under-voltage, overload, and short-circuit safeguards. Its conducted EMI performance meets EN 55022 Class A compliance without additional filtering, ensuring simplified system integration. Backed by a 3-year product warranty, the MIW2300 series delivers a dependable solution for applications requiring efficiency, durability, and long-term reliability.

Model Selection Guide

Model Number	Input Voltage (Range)	Output Voltage	Output Current		Input Current		Reflected Ripple Current	Max. capacitive Load	Efficiency (typ.)
			Max.	Min.	@Max. Load	@No Load			@Max. Load
	VDC	VDC	mA	mA	mA(typ.)	mA(typ.)	mA(typ.)	μF	%
MIW2321	24 (9 ~ 36)	3.3	750	93	138	20	15	680	75
MIW2322		5	600	75	158			470	79
MIW2323		12	250	32	154			330	81
MIW2324		15	200	25	152			220	82
MIW2326		±12	±125	±16	156			150#	80
MIW2327		±15	±100	±13	156			100#	80
MIW2331	48 (18 ~ 75)	3.3	750	93	68	10	10	680	76
MIW2332		5	600	75	78			470	80
MIW2333		12	250	32	75			330	83
MIW2334		15	200	25	74			220	84
MIW2336		±12	±125	±16	76			150#	82
MIW2337		±15	±100	±13	76			100#	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 Threshold Voltage	24V Input Models	6	7.5	9	
	48V Input Models	12	15	18	
Under Voltage Shutdown	24V Input Models	---	---	8.5	
	48V Input Models	---	---	16	
Short Circuit Input Power	All Models	---	---	2000	mW
Input Filter		Internal Pi Type			
Conducted EMI		Compliance to EN 55022, class A			

Output Specifications

Parameter	Conditions	Min.	Typ.	Max.	Unit
Output Voltage Setting Accuracy		---	---	±2.0	%Vnom.
Output Voltage Balance	Dual Output, Balanced Loads	---	±0.5	±3.0	%
Line Regulation	Vin=Min. to Max. @Full Load	---	±0.2	±1.0	%
Load Regulation	Io=Min. to Max.	---	±0.3	±1.0	%
Ripple & Noise	0-20 MHz Bandwidth	---	40	75	mV_{P-P}
Transient Recovery Time	25% Load Step Change(2)	---	150	500	μs
Transient Response Deviation		---	±3	---	%
Temperature Coefficient		---	±0.01	±0.02	%/℃
Over Load Protection	Foldback	110	300	---	%
Input Filter	All Models	Internal Pi Type			
Short Circuit Protection	Continuous, Automatic Recovery				

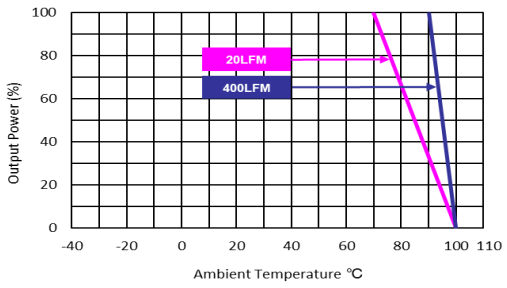
General Specifications

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	---	380	500	pF
Switching Frequency		250	---	350	kHz
MTBF (calculated)	MIL-HDBK-217F@25℃, Ground Benign	1,000,000			Hours
Safety Approvals	UL/cUL 60950-1 recognition (CSA certificate)				

Environmental Specifications

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

Power Derating Curve

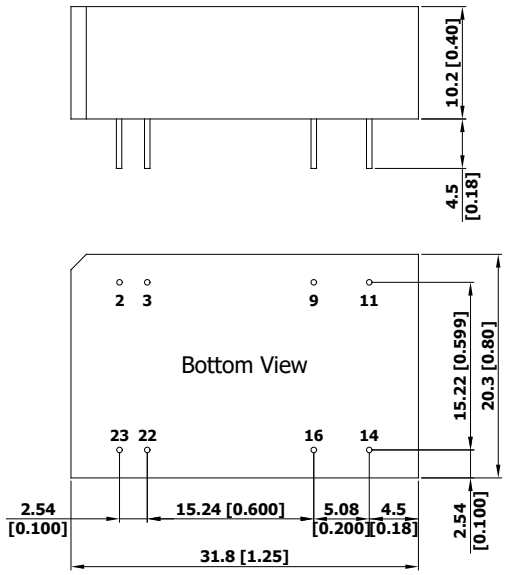


Notes

1 Specifications typical at Ta=+25℃, 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 Please do not operate the product without a minimum load condition.
4 We recommend to protect the converter by a fast blow fuse in the input supply line.
5 Other input and output voltage may be available, please contact MINMAX.
6 Specifications are subject to change without notice.
7 The repeated high voltage isolation testing of the converter can degrade isolation capability, to a lesser or greater degree depending on materials, construction, environment and reflow solder process. Any material is susceptible to eventual chemical degradation when subject to very high applied voltages thus implying that the number of tests should be strictly limited. We therefore strongly advise against repeated high voltage isolation testing, but if it is absolutely required, that the voltage be reduced by 20% from specified test voltage. Furthermore, the high voltage isolation capability after reflow solder process should be evaluated as it is applied on system.

Package Specifications

Mechanical Dimensions



Pin Connections

Pin	Single Output	Dual Output	Diameter mm (inches)
2	-Vin	-Vin	Ø 0.5 [0.02]
3	-Vin	-Vin	Ø 0.5 [0.02]
9	No Pin	Common	Ø 0.5 [0.02]
11	NC	-Vout	Ø 0.5 [0.02]
14	+Vout	+Vout	Ø 0.5 [0.02]
16	-Vout	Common	Ø 0.5 [0.02]
22	+Vin	+Vin	Ø 0.5 [0.02]
23	+Vin	+Vin	Ø 0.5 [0.02]

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 tolerance: X.X±0.05 (X.XX±0.002)

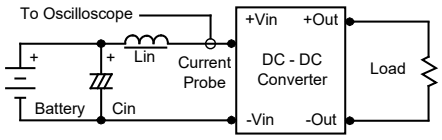
Physical Characteristics

Case Size	:	31.8x20.3x10.2mm (1.25x0.80x0.40 inches)
Case Material	:	Plastic resin (flammability to UL 94V-0 rated)
Pin Material	:	Phosphor Bronze
Weight	:	12.2g

Test Setup

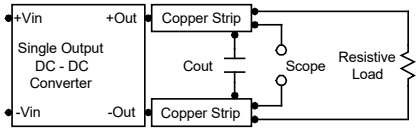
Input Reflected-Ripple Current Test Setup

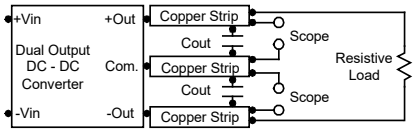
Input reflected-ripple current is measured with a inductor Lin (4.7μH) and Cin (220μF, ESR < 1.0Ω at 100 kHz) to simulate source impedance.
Capacitor Cin, offsets possible battery impedance. Current ripple is measured at the input terminals of the module, measurement bandwidth is 0-500 kHz.



Peak-to-Peak Output Noise Measurement Test

Use a Cout 0.47μF 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.





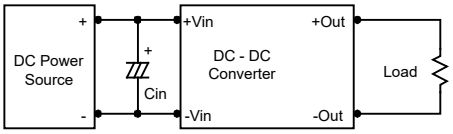
Technical Notes

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.

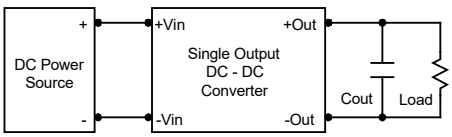
Input Source Impedance

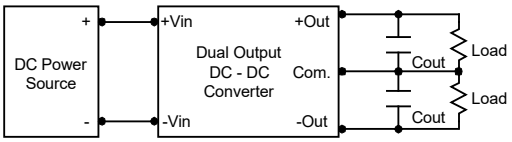
The power module should be connected to a low ac-impedance input source. Highly inductive source impedances can affect the stability of the power module.
In applications where power is supplied over long lines and output loading is high, it may be necessary to use a capacitor at the input to ensure startup.
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 4.7μF for the 24V input devices and a 2.2μF 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 3.3μF capacitors at the output.





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. 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.