FEATURES

- DIP-24 Plastic Package
- Ultra-wide 4:1 Input Range
- Operating Temp.Range -40 to +85°C
- Overload Protection
- No Minimum Load Requirement
- I/O-Isolation 1500VDC(opt.3000VDC)
- Input Filter meets EN55022,class A and FCC,level A
- Fully compatible with MIW2300 Series
- 3 Years Product Warranty

NEW

RoHS Compliant

3 year warranty

PRODUCT OVERVIEW

The MINMAX MIWI03 series is a range of high performance 3W dc-dc converter modules, designed as a cost optimized replacement for the highly popular MIW2300 series.The converter features ultrawide 4:1 input ranges and tight output voltage regulation.Excellent efficiency allows an operating temperature up to +70°C at full load.The product comes in a DIP-24 plastic package with industry standard footprint.
Typical applications for these economical priced dc-dc converters are industrial electronics,instrumentation or communication equipment.

Model Selection Guide

Model Number	Input Voltage (Range)	Output Voltage	Output Current	Input Current		Reflected Ripple Current	Max. capacitive Load	Efficiency (typ.)
			Max.	@Max. Load	@No Load			@Max. Load
	VDC	VDC	mA	mA(typ.)	mA(typ.)	mA(typ.)	μF	%
MIWI03-24S033	24 (9 ~ 36)	3.3	750	134	30	15	680	77
MIWI03-24S05		5	600	158			470	79
MIWI03-24S12		12	250	152			330	82
MIWI03-24S15		15	200	151			220	83
MIWI03-24S24		24	125	154			100	81
MIWI03-24D05		±5	±250	130			220#	80
MIWI03-24D12		±12	±125	152			150#	82
MIWI03-24D15		±15	±100	152			100#	82
MIWI03-48S033	48 (18 ~ 75)	3.3	750	67	20	10	680	77
MIWI03-48S05		5	600	78			470	80
MIWI03-48S12		12	250	75			330	83
MIWI03-48S15		15	200	74			220	84
MIWI03-48S24		24	125	76			100	82
MIWI03-48D05		±5	±250	65			220#	80
MIWI03-48D12		±12	±125	76			150#	82
MIWI03-48D15		±15	±100	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	---	---	9	
	48V Input Models	---	---	18	
Under Voltage Shutdown	24V Input Models	---	---	8.5	
	48V Input Models	---	---	17.5	
Internal Filter Type	All Models	Pi Filter			
Short Circuit Input Power		---	---	2000	mW
Internal Power Dissipation		---	---	1200	mW

Output Specifications

Parameter	Conditions	Min.	Typ.	Max.	Unit
Output Voltage Setting Accuracy		---	---	±2.0	%Vnom.
Output Voltage Balance	Dual Output, Balanced Loads	---	±0.5	±2.0	%
Line Regulation	Vin=Min. to Max.	---	±0.3	±1.0	%
Load Regulation	Io=0% to 100%	---	±0.3	±1.0	%
Min.Load	No minimum Load Requirement				
Ripple & Noise	0-20MHz Bandwidth	---	---	70	mV_{P-P}
Transient Recovery Time	25% Load Step Change	---	200	500	µsec
Transient Response Deviation		---	±3	±5	%
Temperature Coefficient		---	±0.01	±0.02	%/℃
Over Load Protection	Foldback	120	150	---	%
Short Circuit Protection	Continuous				

General Specifications

Parameter	Conditions		Min.	Typ.	Max.	Unit
I/O Isolation Voltage (rated)	60 Seconds	Standard	1500	---	---	VDC
		Suffix H (6)	3000	---	---	VDC
I/O Isolation Resistance	500 VDC		1000	---	---	MΩ
I/O Isolation Capacitance	100KHz, 1V		---	---	300	pF
Switching Frequency			90	---	---	KHz
MTBF (calculated)	MIL-HDBK-217F@25℃, Ground Benign		1,000,000			Hours
Safety Approvals (Pending)	UL/cUL 60950-1 recognition(CSA certificate), IEC/EN 60950-1					

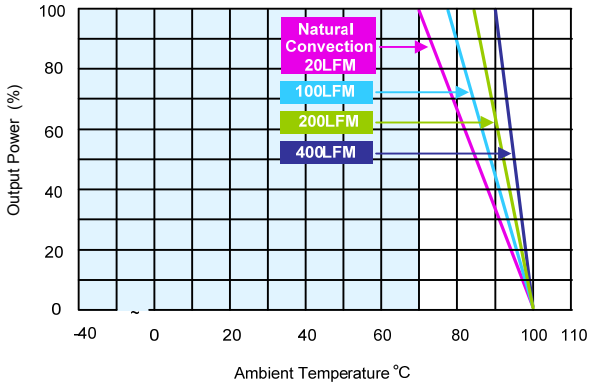
Environmental Specifications

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

EMC Specifications

Parameter	Standards & Level	Performance
Conducted EMI	Compliance to EN 55022 and FCC part 15	Class A
ESD	EN61000-4-2 air ± 8KV , Contact ± 6KV	Perf. Criteria A
Radiated immunity	EN61000-4-3 10V/m	Perf. Criteria A
Fast transient (5)	EN61000-4-4 ± 2KV	Perf. Criteria A
Surge (5)	EN61000-4-5 ±1KV	Perf. Criteria A
Conducted immunity	EN61000-4-6 10V/m	Perf. Criteria A

Power Derating Curve

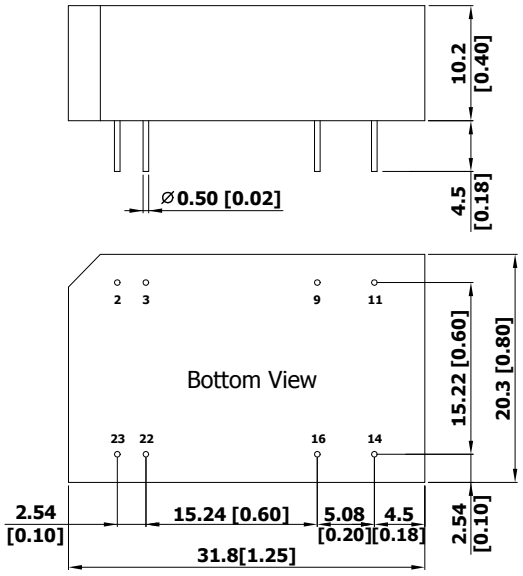


Notes

1 Specifications typical at Ta=+25°C, 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 We recommend to protect the converter by a slow blow fuse in the input supply line.
4 Other input and output voltage may be available, please contact factory.
5 To meet EN61000-4-4 & EN61000-4-5 an external capacitor across the input pins is required. Suggested capacitor: CHEMI-CON KY 200μF/100V
6 To order the converter at 3KVDC isolation, please add a **suffix H** (e.g. MIWI03-24S05H) to order code.
7 That "natural convection" is about 20LFM but is not equal to still air (0 LFM).
8 Specifications are subject to change without notice.

Package Specifications

Mechanical Dimensions



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

- All dimensions in mm (inches)
- Tolerance: X.X±0.5 (X.XX±0.02)
  X.XX±0.25 (X.XXX±0.01)
- Pin diameter ⌀ 0.5 ±0.05 (0.02±0.002)

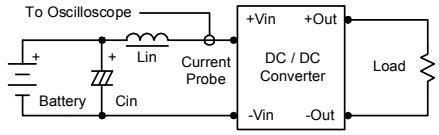
Physical Characteristics

Case Size	:	31.8x20.3x10.2mm (1.25x0.80x0.40 inches)
Case Material	:	Non-Conductive Black Plastic (flammability to UL 94V-0 rated)
Pin Material	:	Copper Alloy with Gold Plate Over Nickel Subplate
Weight	:	12.8g

Test Setup

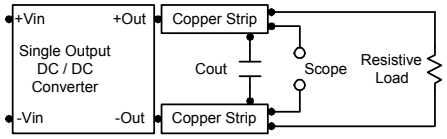
Input Reflected-Ripple Current Test Setup

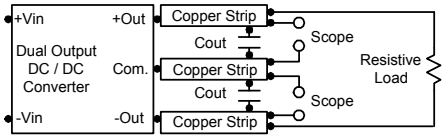
Input reflected-ripple current is measured with a inductor Lin (4.7μH) and Cin (220μF, ESR < 1.0Ω at 100 KHz) to simulate source impedance.
Capacitor Cin, offsets possible battery impedance. Current ripple is measured at the input terminals of the module, measurement bandwidth is 0-500 KHz.



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.





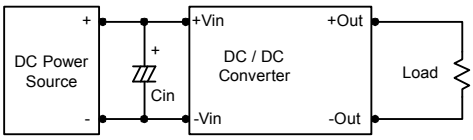
Technical Notes

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.

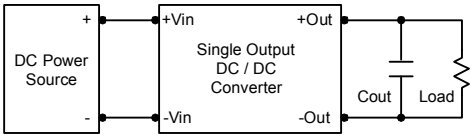
Input Source Impedance

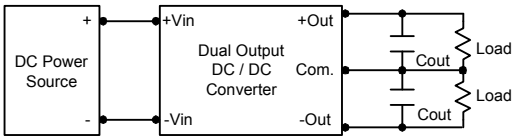
The power module should be connected to a low ac-impedance input source. Highly inductive source impedances can affect the stability of the power module.
In applications where power is supplied over long lines and output loading is high, it may be necessary to use a capacitor at the input to ensure startup.
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 MIWI03 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.