FEATURES

- DIP-24 Plastic Package
- Ultra-wide 4:1 Input Range
- High Efficiency up to 84%
- Operating Temp. Range -40°C to +85°C
- Overload Protection
- I/O-isolation 1500VDC (opt. 3000VDC)
- Input Filter meets EN 55022,class A and FCC, level A
- 3 Years Product Warranty

NEW

RoHS Compliant

PRODUCT OVERVIEW

The MINMAX MIWI06 series is a new range of high performance dc-dc converter modules with 6W output power, featuring ultra-wide 4:1 input voltage ranges and tight output voltage regulation. The product comes in a DIP-24 package with industry standard footprint.
Excellent efficiency allows an operation temperature range of -40°C to +85°C . Standard features include overload protection.
Typical applications for these cost optimized converters are battery powered equipment, instrumentation, datacom and industrial electronics.

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.)	uF	%
MIWI06-24S033	24 (9 ~ 36)	3.3	1200	214	20	20	470	77
MIWI06-24S05		5	1200	313			470	80
MIWI06-24S12		12	500	298			100	84
MIWI06-24S15		15	400	298			100	84
MIWI06-24S24		24	250	298			47	84
MIWI06-24D05		±5	±500	260			100#	80
MIWI06-24D12		±12	±250	298			100#	84
MIWI06-24D15		±15	±200	298			100#	84
MIWI06-48S033	48 (18 ~ 75)	3.3	1200	107	10	15	470	77
MIWI06-48S05		5	1200	156			470	80
MIWI06-48S12		12	500	149			100	84
MIWI06-48S15		15	400	149			100	84
MIWI06-48S24		24	250	149			47	84
MIWI06-48D05		±5	±500	130			100#	80
MIWI06-48D12		±12	±250	149			100#	84
MIWI06-48D15		±15	±200	149			100#	84

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 Voltage	24V Input Models	7	8	9	
	48V Input Models	14	16	18	
Under Voltage Shutdown	24V Input Models	---	---	8.5	
	48V Input Models	---	---	16	
Short Circuit Input Power	All Models	---	---	3000	mW
Internal Power Dissipation		---	---	2500	mW
Conducted EMI		Compliance to EN 55022,class A and FCC part 15,class A			

Output Specifications

Parameter	Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy		---	±1.0	±2.0	%
Output Voltage Balance	Dual Output, Balanced Loads	---	±1.0	±2.0	%
Line Regulation	Vin=Min. to Max.	---	±0.1	±0.5	%
Load Regulation	Io=0% to 100%	---	±0.6	±1.2	%
Min.Load	No minimum Load Requirement				
Ripple & Noise (20MHz)		---	50	80	mV P-P
Ripple & Noise (20MHz)	Over Line, Load & Temp.	---	---	100	mV P-P
Transient Recovery Time	25% Load Step Change	---	300	600	uS
Transient Response Deviation		---	±3	---	%
Temperature Coefficient		---	±0.01	±0.02	%/℃
Over Load Protection	Foldback	110	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 (note 6)	3000	---	---	VDC
I/O Isolation Resistance	500 VDC		1000	---	---	MΩ
I/O Isolation Capacitance	100KHz, 1V		---	1000	---	pF
Switching Frequency			---	330	---	KHz
MTBF (calculated)	MIL-HDBK-217F@25℃, Ground Benign		800,000	---	---	Hours
Safety Approvals(pending)	UL/cUL 60950-1 recognition(CSA certificate), IEC/EN 60950-1(CB-scheme)					

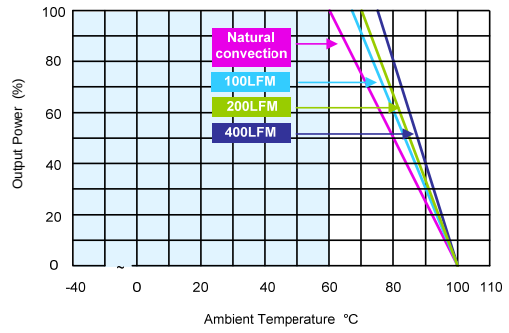
Input Fuse

24V Input Models	48V Input Models
1500mA Slow-Blow Type	800mA Slow-Blow Type

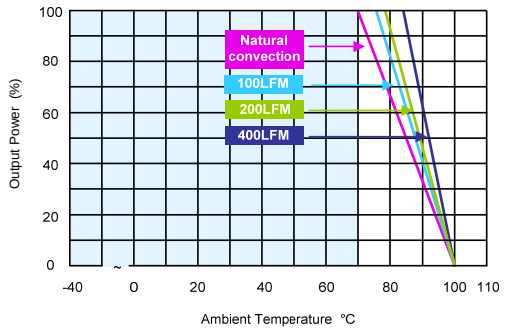
Environmental Specifications

Parameter	Conditions	Min.	Max.	Unit
Operating Temperature Range (with Derating)	Ambient	-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	℃

Power Derating Curve



(3.3 & 5V Output Models)



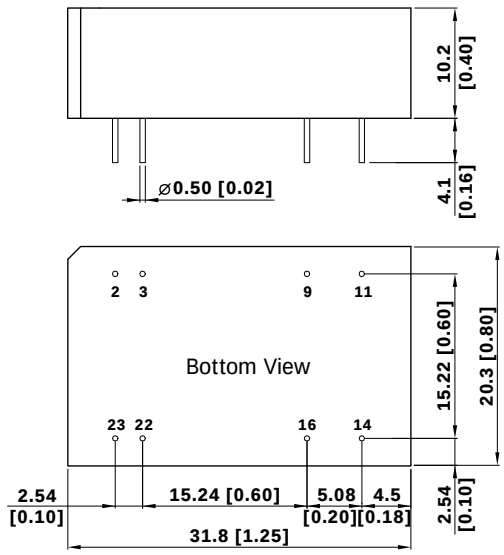
(Other Output Models)

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 Ripple & Noise measurement bandwidth is 0-20MHz.
4 All DC/DC converters should be externally fused at the front end for protection.
5 Other input and output voltage may be available, please contact factory.
6 To order the converter at 3KVDC isolation, please add a **suffix H** (e.g. MIWI06-24S05H) to order code.
7 That "natural convection" is about 20LFM but is not equal to still air (0 LFM).
8 Specifications 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±0.25 (X.XX±0.01)
  X.XX±0.13 (X.XXX±0.005)
- Pin diameter ∅ 0.5 ±0.05 (0.02±0.002)

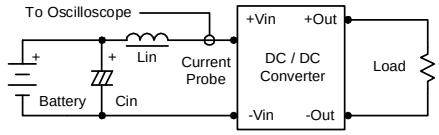
Physical Characteristics

Case Size	:	31.8x20.3x10.2mm (1.25x0.80x0.40 Inches)
Case Material	:	Non-Conductive Black Plastic (flammability to UL 94V-0 rated)
Weight	:	12.7g

Test Configurations

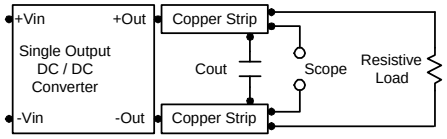
Input Reflected-Ripple Current Test Setup

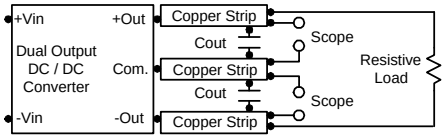
Input reflected-ripple current is measured with a inductor Lin (4.7uH) and Cin (220uF, ESR < 1.0Ω at 100 KHz) to simulate source impedance.
Capacitor Cin, offsets possible battery impedance. Current ripple is measured at the input terminals of the module, measurement bandwidth is 0-500 KHz.



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.





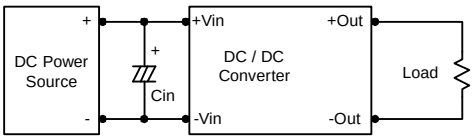
Design & Feature Considerations

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.

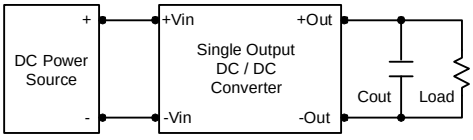
Input Source Impedance

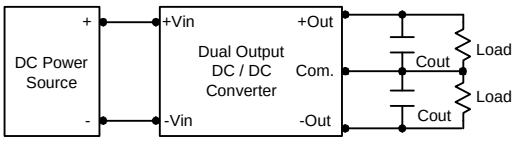
The power module should be connected to a low ac-impedance input source. Highly inductive source impedances can affect the stability of the power module.
In applications where power is supplied over long lines and output loading is high, it may be necessary to use a capacitor at the input to ensure startup.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





Maximum Capacitive Load

The MIWI06 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℃.
The derating curves are determined from measurements obtained in a test setup.