

FEATURES

- ▶ Compact DIP-24 Package
- ▶ Ultra-wide 4:1 Input Range
- ▶ High Efficiency up to 87%
- ▶ Operating Temp.Range -40° to +85°C
- ▶ Low Standby Power Consumption
- ▶ No Minimum Load Requirement
- ▶ Remote On/Off Control
- ▶ Internal EMI-filter meets EN55022 and FCC,Class A
- ▶ I/O-Isolation 1500VDC
- ▶ Shielded Metal Case with isolated Baseplate
- ▶ 3 Years Product Warranty



PRODUCT OVERVIEW

The MINMAX MIWI10 series is a new range of cost-optimized 10W dc/dc converter modules with ultra-wide 4:1 input ranges and tightly regulated output voltages. The converters come in a shielded metal package in the standard DIP-24 format.

By state-of-the-art circuit topology a high efficiency could be achieved allowing allowing an operating temperature up to +70°C at full load.

Further features include remote ON/OFF, overload protection and internal EMI-filter meeting EN55022, class A and FCC, level A.

These converters modules will find a wide range of applications like battery operated instrumentation, distributed power architectures in Communication equipment and in industrial electronics.

Model Selection Guide

Model Number	Input Voltage (Range) VDC	Output Voltage VDC	Output Current Max. mA	Input Current		Reflected Ripple Current mA(typ.)	Max. capacitive Load μF	Efficiency (typ.) @Max. Load			
				@Max. Load mA(typ.)	@No Load mA(typ.)						
				%							
MIWI10-24S033	24 (9 ~ 36)	3.3	2700	432	30	40	1000	86			
MIWI10-24S05		5	2000	490				85			
MIWI10-24S051		5.1	2000	500				85			
MIWI10-24S12		12	833	479			470	87			
MIWI10-24S15		15	666	478			330	87			
MIWI10-24S24		24	416	478			150	87			
MIWI10-24D12		±12	±416	478			220#	87			
MIWI10-24D15		±15	±333	478			150#	87			
MIWI10-48S033		48 (18 ~ 75)	3.3	2700			216	20	30	1000	86
MIWI10-48S05			5	2000			245				85
MIWI10-48S051	5.1		2000	250	85						
MIWI10-48S12	12		833	239	470	87					
MIWI10-48S15	15		666	236	330	87					
MIWI10-48S24	24		416	244	150	87					
MIWI10-48D12	±12		±416	244	220#	87					
MIWI10-48D15	±15		±333	244	150#	87					

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	7	8	9	
	48V Input Models	14	16	18	
Under Voltage Shutdown	24V Input Models	---	---	8.5	
	48V Input Models	---	---	17	
Short Circuit Input Power	All Models	---	---	3000	mW
Internal Power Dissipation		---	---	2500	mW

Output Specifications

Parameter	Conditions	Min.	Typ.	Max.	Unit
Output Voltage Setting Accuracy		---	±1	±2	%Vom.
Output Voltage Balance	Dual Output, Balanced Loads	---	±1	±2.0	%
Line Regulation	Vin=Min. to Max.	---	±0.5	±1.0	%
Load Regulation	Io=0% to 100%	---	±0.5	±1.2	%
Min.Load	No minimum Load Requirement				
Ripple & Noise	0-20 MHz Bandwidth	---	---	100	mV _{P-P}
Transient Recovery Time	25% Load Step Change	---	300	600	μsec
Transient Response Deviation		---	±3	±5	%
Temperature Coefficient		---	±0.01	±0.02	%/°C
Over Load Protection	Foldback	110	150	---	%
Short Circuit Protection	--- (Hiccup Automatic Recovery)				

General Specifications

Parameter	Conditions	Min.	Typ.	Max.	Unit
I/O Isolation Voltage (rated)	60 Seconds	1500	---	---	VDC
I/O Isolation Resistance	500 VDC	1000	---	---	MΩ
I/O Isolation Capacitance	100KHz, 1V	---	1000	1500	pF
Switching Frequency		---	330	---	KHz
MTBF (calculated)	MIL-HDBK-217F@25°C, Ground Benign	1,000,000			Hours
Safety Approvals (pending)	UL/cUL 60950-1 recognition(CSA certificate), IEC/EN 60950-1(CB-scheme)				

Remote On/Off Control

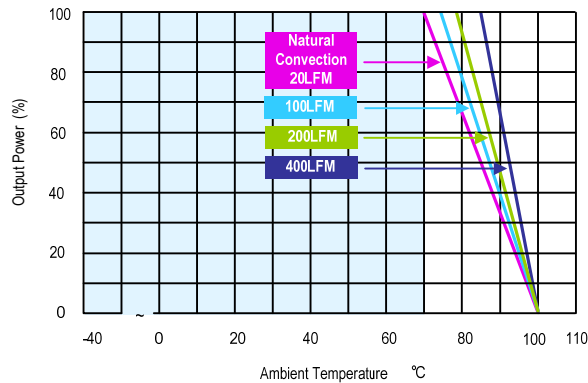
Parameter	Conditions	Min.	Typ.	Max.	Unit
Converter On	3.5V ~ 12V or Open Circuit				
Converter Off	0~1.2V or Short Circuit (Pin 1 and Pin 2)				
Control Input Current (on)	Vctrl = 5V	---	---	500	μA
Control Input Current (off)	Vctrl = 0V	---	---	-500	μA
Control Common	Referenced to Negative Input				
Standby Input Current		---	---	10	mA

Environmental Specifications

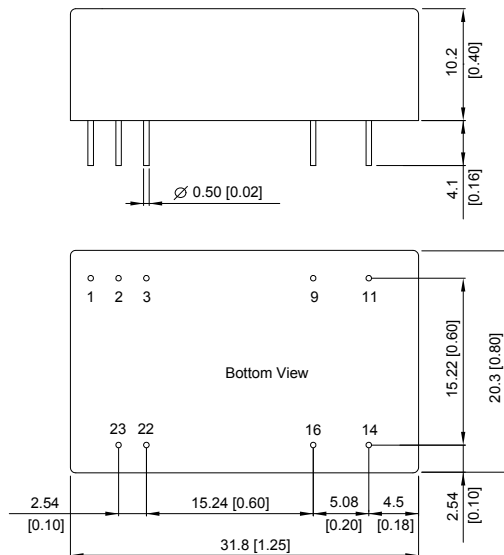
Parameter	Conditions	Min.	Max.	Unit
Operating Ambient Temperature Range (See Power Derating Curve)	Natural Convection	-40	+85	°C
Case Temperature		---	+100	°C
Storage Temperature Range		-50	+125	°C
Humidity (non condensing)		---	95	% rel. H
Cooling	Free-Air convection			
Lead Temperature (1.5mm from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

EMC Specifications

Parameter	Standards & Level	Performance
Conducted EMI	Compliance to EN 55022,class A and FCC, part 15,level A	
ESD	EN61000-4-2 air ± 8KV , Contact ± 6KV	Perf. Criteria A
Radiated immunity	EN61000-4-3 10V/m	Perf. Criteria A
Fast transient (S)	EN61000-4-4 ± 2KV	Perf. Criteria A
Surge (S)	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 fast blow fuse in the input supply line.
- 4 Other input and output voltages 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 220µF/100V
- 6 That "natural convection" is about 20LFM but is not equal to still air (0 LFM).
- 7 Specifications are subject to change without notice.

Package Specifications
Mechanical Dimensions

Pin Connections

Pin	Single Output	Dual Output
1	Remote On/Off	Remote On/Off
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 $\varnothing 0.5 \pm 0.05$ (0.02±0.002)

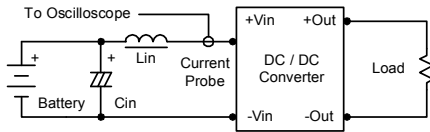
Physical Characteristics

Case Size	: 31.8x20.3x10.2mm (1.25x0.80x0.40 inches)
Case Material	: Metal with Non-Conductive Baseplate
Pin Material	: Copper Alloy with Gold Plate Over Nickel Subplate
Weight	: 17.3g

Test Setup

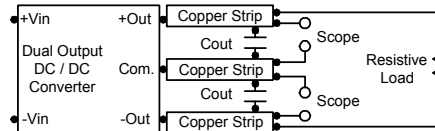
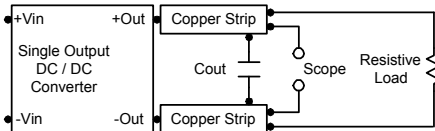
Input Reflected-Ripple Current Test Setup

Input reflected-ripple current is measured with an inductor L_{in} (4.7 μ H) and C_{in} (220 μ F, ESR < 1.0 Ω at 100 KHz) to simulate source impedance. Capacitor C_{in} , 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 C_{out} 0.47 μ F 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

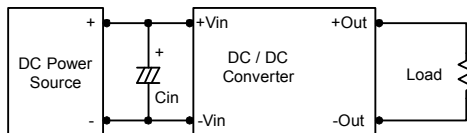
To provide protection in a fault (output overload) condition, the unit is equipped with internal current limiting circuitry and can endure current limiting for an unlimited duration. At the point of current-limit inception, the unit shifts from voltage control to current control. The unit operates normally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

Overvoltage Protection

The output overvoltage clamp consists of control circuitry, which is independent of the primary regulation loop, that monitors the voltage on the output terminals. The control loop of the clamp has a higher voltage set point than the primary loop. This provides a redundant voltage control that reduces the risk of output overvoltage.

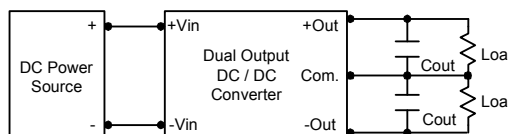
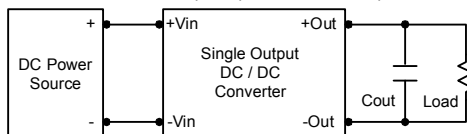
Input Source Impedance

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. By using a good quality low Equivalent Series Resistance (ESR < 1.0 Ω at 100 kHz) capacitor of a 12 μ F for the 12V, 4.7 μ F for the 24V input devices and a 2.2 μ F 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 to use 3.3 μ F capacitors at the output.



Maximum Capacitive Load

The MIWI10 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. 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 $^{\circ}$ C.

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

