FEATURES

- ▶ **Smallest Encapsulated 6W Converter**
- ▶ **Industrial Standard DIP-16 Package**
- ▶ **Ultra-wide 4:1 Input Voltage Range**
- ▶ **Fully Regulated Output Voltage**
- ▶ **I/O Isolation 1500 VDC**
- ▶ **Operating Temp. Range -40℃ to +90℃**
- ▶ **Low No Load Power Consumption**
- ▶ **No Min. Load Requirement**
- ▶ **Under-voltage, Overload and Short Circuit Protection**
- ▶ **Shielded Metal Case with Insulated Baseplate**
- ▶ **Conducted EMI EN 55032 Class A Approved**
- ▶ **UL/cUL/IEC/EN 62368-1(60950-1) Safety Approval & CE Marking**

PRODUCT OVERVIEW

The MINMAX MDWI06 series is a generation of high power density in DC-DC converter modules. The product offers a full 6W isolated DC-DC converter within an encapsulated DIP-16 package which occupies only 0.5 in^2 of PCB space. There are 14 models available for 24, 48VDC with wide 4:1 input voltage range. Further features include under-voltage protection, overload protection, short circuit protection and no min. load requirement as well. An high efficiency allows operating temperatures range of -40℃ to +90℃. These DC-DC converters offer a better solution for critical space applications like battery-powered equipment, instrumentation, distributed power architectures in communication, industrial electronics, energy facilities and others.

Model Selection Guide

Model Number	Input Voltage (Range)	Output Voltage	Output Current	Input Current		Max. capacitive Load	Efficiency (typ.)
			Max.	@Max. Load	@No Load		@Max. Load
	VDC	VDC	mA	mA(typ.)	mA(typ.)	μF	%
MDWI06-24S033	24 (9 ~ 36)	3.3	1500	264	8	680	78
MDWI06-24S05		5	1200	305		680	82
MDWI06-24S12		12	500	291		330	86
MDWI06-24S15		15	400	291		330	86
MDWI06-24S24		24	250	287		150	87
MDWI06-24D12		±12	±250	291		150#	86
MDWI06-24D15		±15	±200	287		150#	87
MDWI06-48S033	48 (18 ~ 75)	3.3	1500	132	6	680	78
MDWI06-48S05		5	1200	152		680	82
MDWI06-48S12		12	500	145		330	86
MDWI06-48S15		15	400	145		330	86
MDWI06-48S24		24	250	144		150	87
MDWI06-48D12		±12	±250	144		150#	87
MDWI06-48D15		±15	±200	144		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	---	---	9	
	48V Input Models	---	---	18	
Under Voltage Shutdown	24V Input Models	---	8	---	
	48V Input Models	---	16	---	
Input Filter	All Models	Internal Pi Type			

Output Specifications

Parameter	Conditions	Min.	Typ.	Max.	Unit
Output Voltage Setting Accuracy		---	---	±2.0	%Vnom.
Output Voltage Balance	Dual Output, Balanced Loads	---	±1.0	±2.0	%
Line Regulation	Vin=Min. to Max. @Full Load	---	±0.2	±0.8	%
Load Regulation	Io=0% to 100%	---	±0.5	±1.0	%
Minimum Load	No minimum Load Requirement				
Ripple & Noise	0-20 MHz Bandwidth	---	---	55	mV P-P
Transient Recovery Time	25% Load Step Change	---	---	500	µsec
Transient Response Deviation		---	±3	±5	%
Temperature Coefficient		---	±0.01	±0.02	%/℃
Over Load Protection	Hiccup	---	150	---	%
Short Circuit Protection	Hiccup Mode 0.5 Hz typ., 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	---	500	---	pF
Switching Frequency		---	370	---	kHz
MTBF (calculated)	MIL-HDBK-217F@25℃, Ground Benign	2,951,470	---	---	Hours
Safety Approvals	UL/cUL 60950-1 recognition(UL certificate), IEC/EN 60950-1(CB-report)				
	UL/cUL 62368-1 recognition(UL certificate), IEC/EN 62368-1(CB-report)				

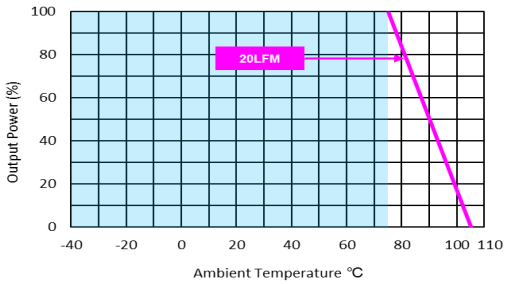
EMC Specifications

Parameter	Standards & Level			Performance
EMI	Conduction	EN 55032	Without external components	Class A
	Radiation		With external components	
EMS	EN 55024			
	ESD	EN 61000-4-2 Air ± 8kV, Contact ± 6kV		A
	Radiated immunity	EN 61000-4-3 10V/m		A
	Fast transient (5)	EN 61000-4-4 ±2kV		A
	Surge (5)	EN 61000-4-5 ±1kV		A
	Conducted immunity	EN 61000-4-6 10Vrms		A
	PFMF	EN 61000-4-8 100A/m, 1000A/m(1sec.)		A

Environmental Specifications

Parameter	Min.	Max.	Unit
Operating Ambient Temperature Range (See Power Derating Curve)	-40	+90	℃
Case Temperature	---	+105	℃
Storage Temperature Range	-50	+125	℃
Humidity (non condensing)	---	95	% rel. H
Lead Temperature (1.5mm from case for 10Sec.)	---	260	℃

Power Derating Curve

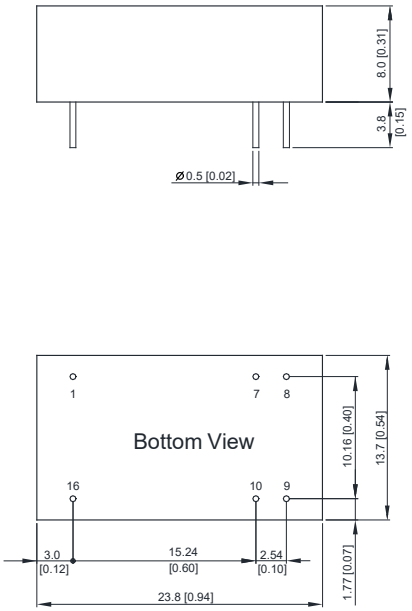


Notes

1 Specifications typical at Ta=+25°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 MINMAX.
5 To meet EN 61000-4-4 & EN 61000-4-5 an external capacitor across the input pins is required, please contact MINMAX.
6 Specifications are subject to change without notice.

Package Specifications

Mechanical Dimensions



Pin Connections

Pin	Single Output	Dual Output
1	-Vin	-Vin
7	NC	NC
8	NC	Common
9	+Vout	+Vout
10	-Vout	-Vout
16	+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)

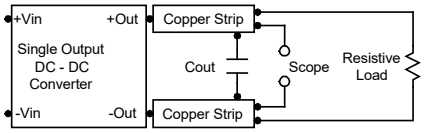
Physical Characteristics

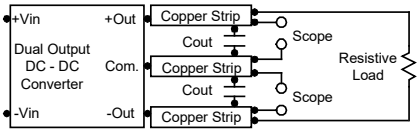
Case Size	:	23.8x13.7x8.0 mm (0.94x0.54x0.31 inches)
Case Material	:	Aluminium Alloy, Black Anodized Coating
Pin Material	:	Copper Alloy with Tin Plate Over Nickel Subplate
Weight	:	6.1g

Test Setup

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.





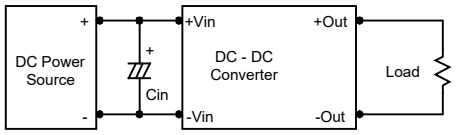
Technical Notes

Overload 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.

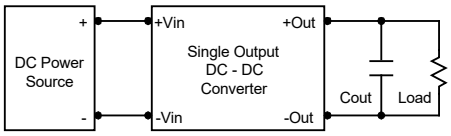
Input Source Impedance

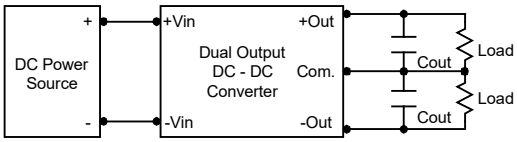
The power module should be connected to a low ac-impedance input source. Highly inductive source impedances can affect the stability of the power module. In applications where power is supplied over long lines and output loading is high, it may be necessary to use a capacitor at the input to ensure startup. 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 2.2μF for the 24V and 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 MDWI06 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 105°C.
The derating curves are determined from measurements obtained in a test setup.