FEATURES

NEW

- Smallest Encapsulated 10W Converter
- Industrial Standard DIP-16 Package
- Ultra-wide 4:1 Input Voltage Range
- Fully Regulated Output Voltage
- I/O Isolation 1500VDC
- Operating Ambient Temp. Range -40℃ to +88℃
- 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 & FCC Level A Approved
- UL/cUL/IEC/EN 62368-1 (60950-1) Safety Approval & CE Marking (Pending)

PRODUCT OVERVIEW

The MDWI10 Series is the latest generation of high performance DC-DC converter modules setting a new standard concerning power density 65W/in^3. The product offers a full 10Watt isolated DC-DC converter within an small encapsulated DIP-16 package which occupied only 0.5in^2 of PCB space. There are 16 models available for 24 & 48VDC with ultra-wide 4:1 input voltage range. Further features included under-voltage protection, overload protection, short circuit protection, very low no load power consumption, no min. load requirement, fast start-up time and conducted EMI class A approved as well.
An high efficiency allows operating temperatures range of -40℃ to 88℃. All models have been qualified per the CB scheme with safety approvals to UL/cUL/IEC/EN 62368-1(60950-1).
These DC-DC Converters offer an economical solution for many critical application in battery-powered equipment, instrumentation, distributed power architectures in communication, industrial electronics, energy facilities where PCB space is limited and offer designers the opportunity to reduce overall PCB layout area.

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	%
MDWI10-24S033	24 (9 ~ 36)	3.3	2700	464	10	2600	80
MDWI10-24S05		5	2000	502		1300	83
MDWI10-24S051		5.1	2000	512		1300	83
MDWI10-24S12		12	833	479		560	87
MDWI10-24S15		15	666	473		560	88
MDWI10-24S24		24	416	473		200	88
MDWI10-24D12		±12	±416	478		390#	87
MDWI10-24D15		±15	±333	478		200#	87
MDWI10-48S033	48 (18 ~ 75)	3.3	2700	232	7	2600	80
MDWI10-48S05		5	2000	251		1300	83
MDWI10-48S051		5.1	2000	256		1300	83
MDWI10-48S12		12	833	239		560	87
MDWI10-48S15		15	666	237		560	88
MDWI10-48S24		24	416	236		200	88
MDWI10-48D12		±12	±416	239		390#	87
MDWI10-48D15		±15	±333	239		200#	87

For each output

Input Specifications

Parameter	Conditions / 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	---	
Start Up Time (Power On)	Nominal Vin and Constant Resistive Load	---	30	---	ms
Input Filter	All Models	Internal Pi Type			

Output Specifications

Parameter	Conditions		Min.	Typ.	Max.	Unit
Output Voltage Setting Accuracy			---	---	±1.0	%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%		---	---	±1.0	%
Load Cross Regulation (Dual Output Models)	Asymmetrical Load 25/100% Full Load		---	---	±5.0	%
Minimum Load	No minimum Load Requirement					
Ripple & Noise	0-20 MHz Bandwidth	3.3, 5V, 5.1V Output	---	60	---	mV P-P
		Other Output	---	80	---	mV P-P
Transient Recovery Time	25% Load Step Change		---	---	500	µsec
Transient Response Deviation			---	±3	±5	%
Temperature Coefficient			---	±0.01	±0.02	%/°C
Over Load Protection	Hiccup		---	160	---	%
Short Circuit Protection	Hiccup Mode 0.3 Hz typ., Automatic Recovery					

General Specifications

Parameter	Conditions	Min.	Typ.	Max.	Unit
I/O Isolation Voltage	60 Seconds	1500	---	---	VDC
	1 Second	1800	---	---	VDC
Isolation Voltage Input/Output to case		1000	---	---	VDC
I/O Isolation Resistance	500 VDC	1000	---	---	MΩ
I/O Isolation Capacitance	100KHz, 1V	---	---	1500	pF
Switching Frequency		---	420	---	kHz
MTBF (calculated)	MIL-HDBK-217F@25°C, Ground Benign	2,538,785	---	---	Hours
Safety Approvals (Pending)	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)				

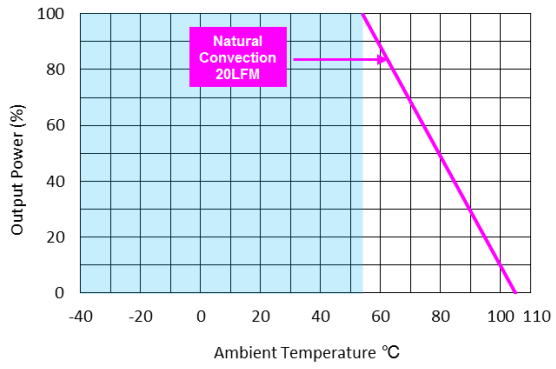
Environmental Specifications

Parameter	Conditions	Min.	Max.	Unit
Operating Ambient Temperature Range (See Power Derating Curve)	Natural Convection	-40	+88	°C
Case Temperature		---	+105	°C
Storage Temperature Range		-50	+125	°C
Humidity (non condensing)		---	95	% rel. H
Cooling	Natural Convection			
Lead Temperature (1.5mm from case for 10Sec.)		---	260	°C

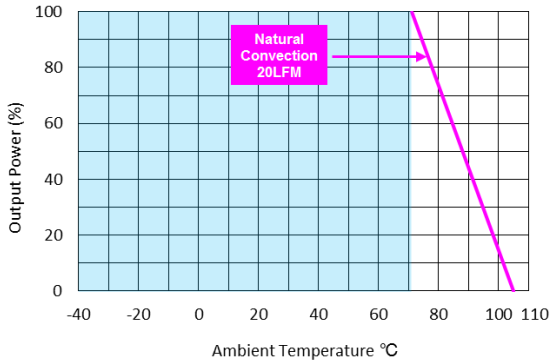
EMC Specifications

Parameter	Standards & Level		Performance
EMI	Conduction	EN 55032, FCC part 15	Class A
EMS	EN 55024		
	ESD	EN 61000-4-2 Air ± 8kV , Contact ± 6kV	A
	Radiated immunity	EN 61000-4-3 20V/m	A
	Fast transient (6)	EN 61000-4-4 ±2kV	A
	Surge (6)	EN 61000-4-5 ±2kV	A
	Conducted immunity	EN 61000-4-6 10Vrms	A
	PFMF	EN 61000-4-8 30A/m	A

Power Derating Curve



MDWI10-24S033、MDWI10-24S05、MDWI10-24S051
MDWI10-48S033、MDWI10-48S05、MDWI10-48S051



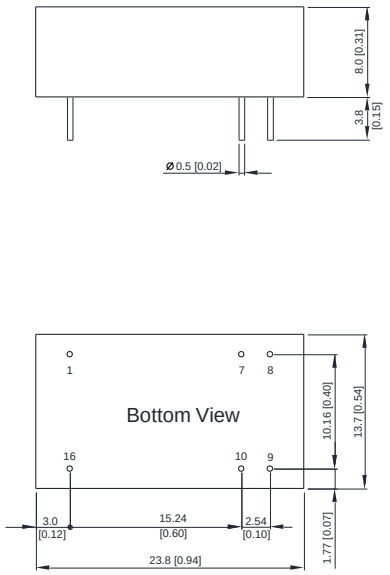
MDWI10-24S12、MDWI10-24S15、MDWI10-24S24
MDWI10-48S12、MDWI10-48S15、MDWI10-48S24
MDWI10-24D12、MDWI10-24D15、MDWI10-48D12、MDWI10-48D15

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 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 That “natural convection” is about 20LFM but is not equal to still air (0 LFM).
6 To meet EN 61000-4-4 & EN 61000-4-5 an external filter requested, please contact MINMAX.
7 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)

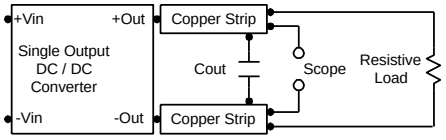
Physical Characteristics

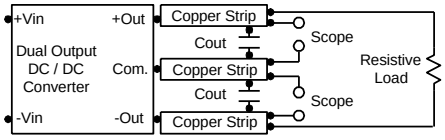
Case Size	:	23.8x13.7x8.0 mm (0.94x0.54x0.31 inches)
Case Material	:	Aluminium Alloy, Black Anodized Coating
Pin Material	:	Tinned Copper
Weight	:	6.5g

Test Setup

Peak-to-Peak Output Noise Measurement Test

Refer to the output specifications or add 4.7μF capacitor if the output specifications undefine Cout. 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.





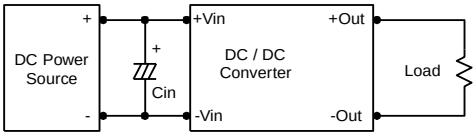
Technical Notes

Overload Protection

To provide hiccup mode protection in a fault (output overload) condition, the unit is equipped with internal current limiting circuitry and can endure overload for an unlimited duration.

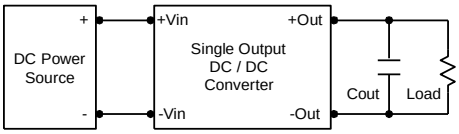
Input Source Impedance

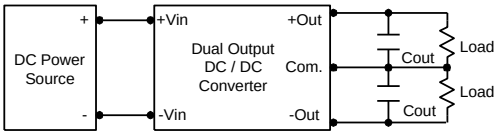
The power module should be connected to a low ac-impedance input source. Highly inductive source impedances can affect the stability of the power module. In applications where power is supplied over long lines and output loading is high, it may be necessary to use a capacitor on the input to insure startup. By using a good quality low Equivalent Series Resistance (ESR < 1.0Ω at 100 kHz) capacitor of a 2.2μF for the 24V and 48V input 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 3.3μF capacitors at the output.





Maximum Capacitive Load

The MDWI10 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. Connect capacitors at the point of load for best performance. 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℃. The derating curves are determined from measurements obtained in a test setup.