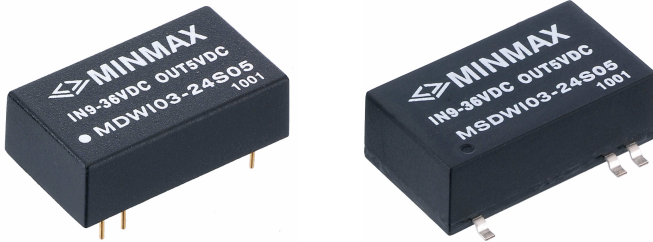


# MDWI03/MSDWI03 Series

3W, Ultra-Wide Input Range DIP, SMD Single & Dual Output DC/DC Converters



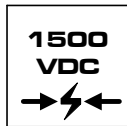
## Key Features



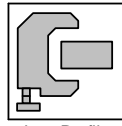
- Efficiency up to 80%
- 1500VDC Isolation
- 4:1 Wide Input Range
- Temperature Performance  $-40^{\circ}\text{C}$  to  $+60^{\circ}\text{C}$
- Internal SMD Construction
- Remote On/Off Control
- Complies With EN55022 Class A



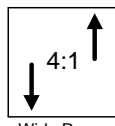
EN55022



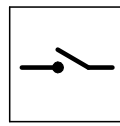
I/O Isolation



Low Profile



Wide Range



Remote on/off

Minimax's MDWI03 series power modules are in mini-DIP DC/DC converters that operate over input voltage ranges of 9–36VDC and 18–75VDC which provide precisely regulated output voltages of 3.3V, 5V, 12V, 15V, 24V,  $\pm 5\text{V}$ ,  $\pm 12\text{V}$  and  $\pm 15\text{VDC}$ . Pin compatible with the MDW1000 series, the MDWI03 offers a power rating up to 3W and a typical full-load efficiency of 80%, continuous short circuit, remote on/off control, EN55022 Class A conducted noise compliance minimize design-in time, cost and eliminate the need for external filtering.

The MDWI03 series is an excellent selection for data communication equipment, mobile battery driven equipment, distributed power system, telecommunication equipment, mixed analog/digital subsystem, process/machine control equipment, computer peripheral equipment and industrial robot system.

## Absolute Maximum Ratings

Parameter	Min.	Max.	Unit	
Input Surge Voltage ( 1000 mS )	24VDC Input Models	-0.7	50	VDC
	48VDC Input Models	-0.7	100	VDC
Lead Temperature (1.5mm from case for 10 Sec.)	---	260	$^{\circ}\text{C}$	

Exceeding the absolute maximum ratings of the unit could cause damage. These are not continuous operating ratings.

## Environmental Specifications

Parameter	Conditions	Min.	Max.	Unit
Operating Temperature(MDWI03)	Ambient	-40	+65	$^{\circ}\text{C}$
Operating Temperature(MSDWI03)	Ambient	-40	+60	$^{\circ}\text{C}$
Operating Temperature	Case	-40	+105	$^{\circ}\text{C}$
Storage Temperature		-40	125	$^{\circ}\text{C}$
Humidity		---	95	%
Cooling	Free-Air Convection			
Conducted EMI	EN55022 Class A			

# MDWIO3 /MSDWIO3 Series

## Model Selection Guide

Model Number		Input Voltage	Output Voltage	Output Current		Input Current		Efficiency
DIP Package	SMD Package			Max.	Min.	@Max. Load	@No Load	@Max. Load
		VDC	VDC	mA	mA	mA (Typ.)	mA (Typ.)	% (Typ.)
MDWIO3-24S033	MSDWIO3-24S033	24 ( 9 ~ 36 )	3.3	600	90	110	30	75
MDWIO3-24S05	MSDWIO3-24S05		5	600	90	160		78
MDWIO3-24S12	MSDWIO3-24S12		12	250	38	156		80
MDWIO3-24S15	MSDWIO3-24S15		15	200	30	156		80
MDWIO3-24S24	MSDWIO3-24S24		24	125	19	156		80
MDWIO3-24D05	MSDWIO3-24D05		±5	±300	±45	162		77
MDWIO3-24D12	MSDWIO3-24D12		±12	±125	±19	156		80
MDWIO3-24D15	MSDWIO3-24D15		±15	±100	±15	156		80
MDWIO3-48S033	MSDWIO3-48S033	48 ( 18 ~ 75 )	3.3	600	90	55	20	75
MDWIO3-48S05	MSDWIO3-48S05		5	600	90	80		78
MDWIO3-48S12	MSDWIO3-48S12		12	250	38	78		80
MDWIO3-48S15	MSDWIO3-48S15		15	200	30	78		80
MDWIO3-48S24	MSDWIO3-48S24		24	125	19	78		80
MDWIO3-48D05	MSDWIO3-48D05		±5	±300	±45	81		77
MDWIO3-48D12	MSDWIO3-48D12		±12	±125	±19	78		80
MDWIO3-48D15	MSDWIO3-48D15		±15	±100	±15	78		80

## Capacitive Load

Models by Vout	3.3V	5V	12V	15V	24V	±5V #	±12V #	±15V #	Unit
Maximum Capacitive Load	220	220	47	47	47	47	47	47	uF

# For each output

## Input Specifications

Parameter	Model	Min.	Typ.	Max.	Unit
Start Voltage	24V Input Models	4.5	6	8.5	VDC
	48V Input Models	8.5	12	17	
Under Voltage Shutdown	24V Input Models	---	---	8	
	48V Input Models	---	---	16	
Reverse Polarity Input Current	All Models	---	---	1	A
Short Circuit Input Power		---	---	2000	mW
Input Filter		Pi Filter			

# MDWIO3/MSDWIO3 Series

## 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.	---	±0.5	±1.0	%
Load Regulation	Io=15% to 100%	---	±0.5	±1.2	%
Ripple & Noise (20MHz)		---	60	100	mV P-P
Ripple & Noise (20MHz)	Over Line, Load & Temp.	---	---	150	mV P-P
Over Power Protection		110	---	---	%
Transient Recovery Time	25% Load Step Change	---	300	600	µS
Transient Response Deviation		---	±3	---	%
Temperature Coefficient		---	±0.01	±0.02	%/°C
Output Short Circuit	Continuous				

## General Specifications

Parameter	Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage Rated	60 Seconds	1500	---	---	VDC
Isolation Voltage Test	Flash Tested for 1 Second	1650	---	---	VDC
Isolation Resistance	500VDC	1000	---	---	MΩ
Isolation Capacitance	100KHz, 1V	---	350	500	pF
Switching Frequency		---	350	---	KHz
MTBF	MIL-HDBK-217F @ 25°C, Ground Benign	300	---	---	K Hours

## Remote On/Off Control

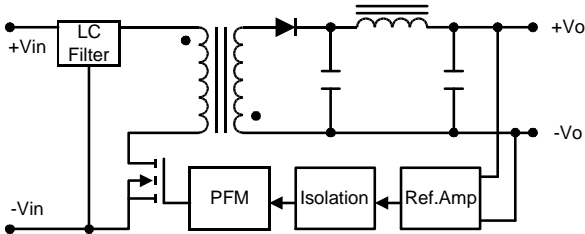
Parameter	Conditions	Min.	Typ.	Max.	Unit
DC/DC On	2.5 ~ 5.5 VDC or Open Circuit				
DC/DC off	-0.7 ~ 0.8 VDC				
Control Input Current ( on )	Vctrl=Min. to Max.	---	---	-400	µA
Control Input Current ( off )	Vctrl=Min. to Max.	---	---	-400	µA
Control Common	Referenced to Negative Input				
Standby Input Current		---	---	5	mA

### Notes :

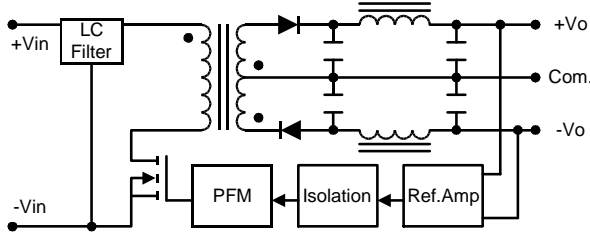
1. Specifications typical at Ta=+25°C, resistive load, nominal input voltage, rated output current unless otherwise noted.
2. Transient recovery time is measured to within 1% error band for a step change in output load of 75% to 100%.
3. Ripple & Noise measurement bandwidth is 0-20 MHz.
4. These power converters require a minimum output loading to maintain specified regulation.
5. Operation under no-load conditions will not damage these modules; however, they may not meet all specifications listed.
6. All DC/DC converters should be externally fused at the front end for protection.
7. Other input and output voltage may be available, please contact factory.
8. Specifications subject to change without notice.

### Block Diagram

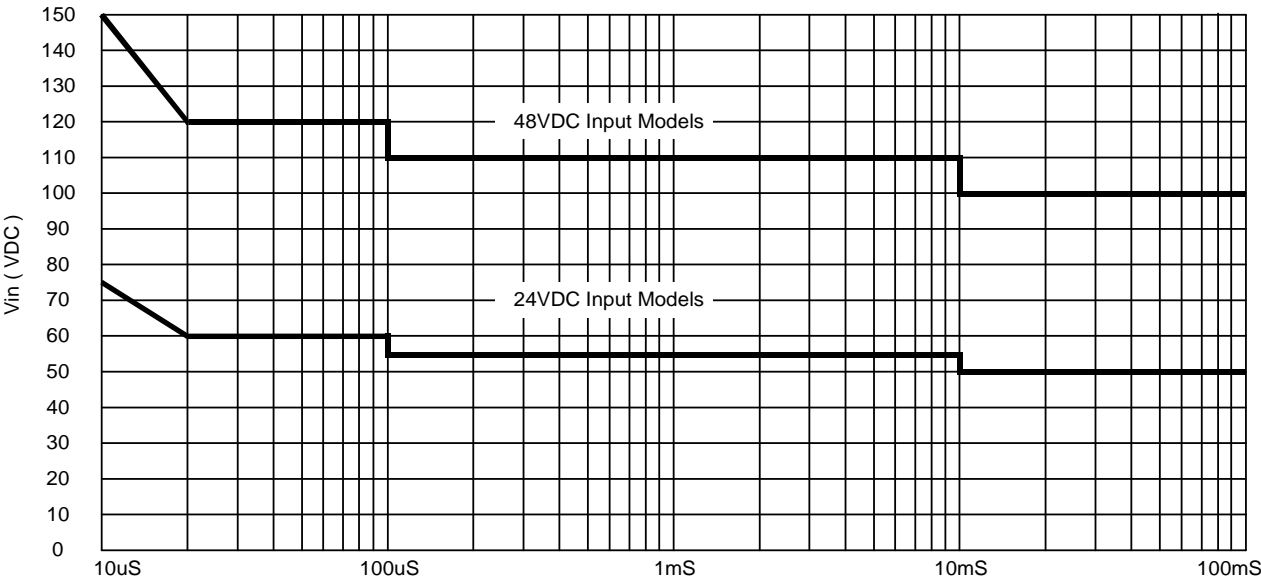
#### Single Output



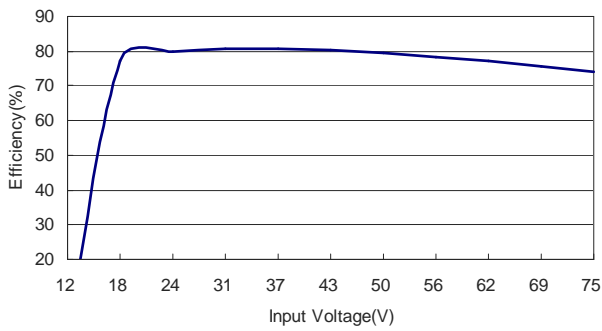
#### Dual Output



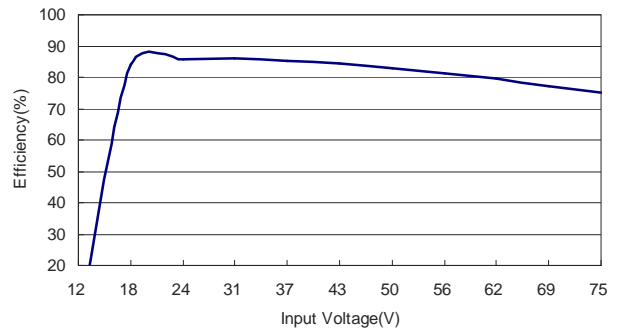
### Input Voltage Transient Rating



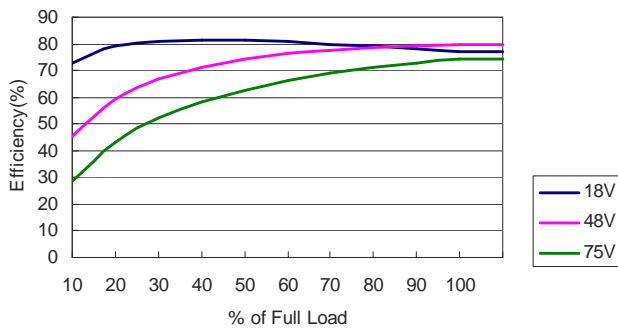
# MDWI03/MSDWI03 Series



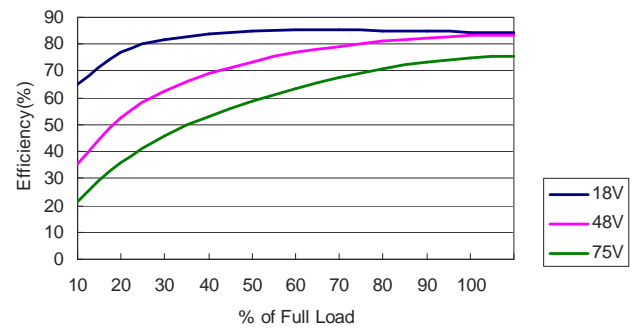
Efficiency vs Input Voltage ( MDWI03-48S05 )



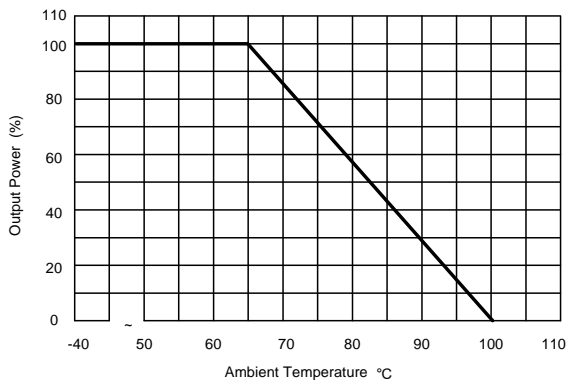
Efficiency vs Input Voltage ( MDWI03-48D15 )



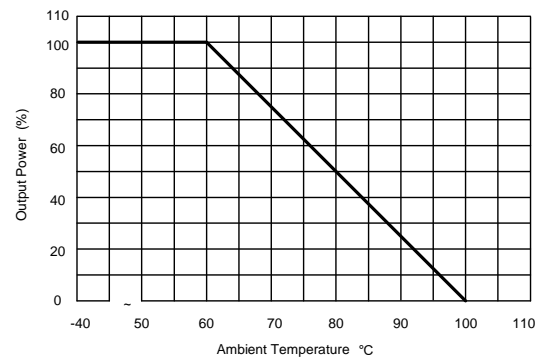
Efficiency vs Output Load ( MDWI03-48S05 )



Efficiency vs Output Load ( MDWI03-48D15 )



MDWI03 Series Derating Curve



MSDWI03 Series Derating Curve

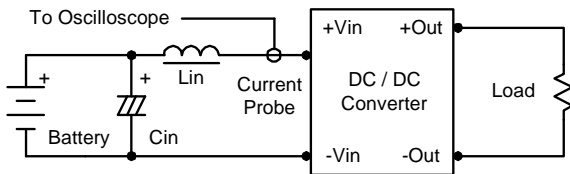
## Test Configurations

### Input Reflected-Ripple Current Test Setup

Input reflected-ripple current is measured with an inductor  $L_{in}$  (4.7 $\mu$ H) and  $C_{in}$  (220 $\mu$ F, ESR < 1.0 $\Omega$  at 100 KHz) to simulate source impedance.

Capacitor  $C_{in}$ , offsets possible battery impedance.

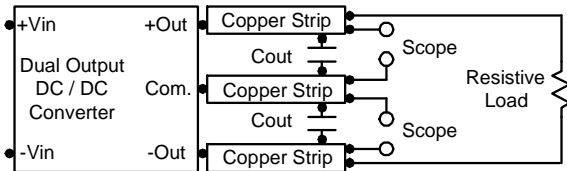
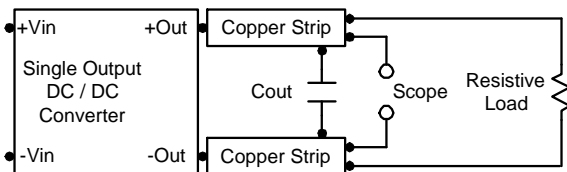
Current ripple is measured at the input terminals of the module, measurement bandwidth is 0–500 KHz.



### Peak-to-Peak Output Noise Measurement Test

Use a  $C_{out}$  0.47 $\mu$ 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.



## Design & Feature Considerations

### Remote On/Off

Positive logic remote on/off turns the module on during a logic high voltage on the remote on/off pin, and off during a logic low.

To turn the power module on and off, the user must supply a switch to control the voltage between the on/off terminal and the  $-V_{in}$  terminal.

The switch can be an open collector or equivalent.

A logic low is  $-0.7$ V to  $0.8$ V.

A logic high is  $2.5$ V to  $5.5$ V.

The maximum sink current of the switch at on/off terminal during a logic low is  $-300$   $\mu$ A.

The maximum sink current of the switch at on/off terminal during a logic high is  $-200$   $\mu$ A or open.

### Maximum Capacitive Load

The MDW103/MSDW103 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.

### Overcurrent Protection

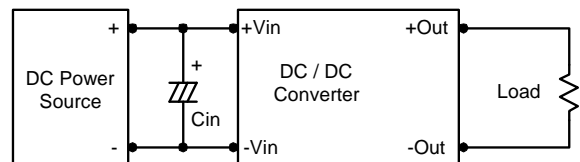
To provide protection in a fault (output overload) condition, the unit is equipped with internal current limiting circuitry and can endure current limiting for an unlimited duration. At the point of current-limit inception, the unit shifts from voltage control to current control. The unit operates normally 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 $\Omega$  at 100 KHz) capacitor of a 4.7 $\mu$ F for the 24V input devices and a 2.2 $\mu$ F for the 48V devices.

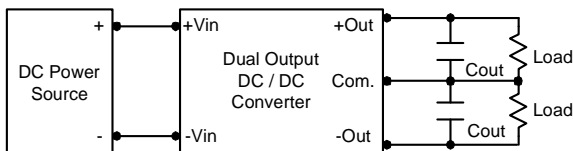
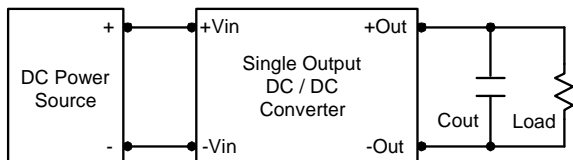


# MDW103/MSDW103 Series

## 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.

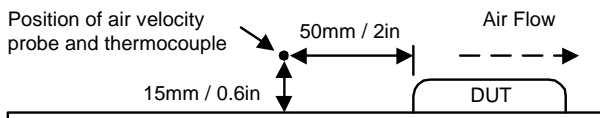
To reduce output ripple, it is recommended to use 3.3 $\mu$ F capacitors at the output.



## Thermal Considerations

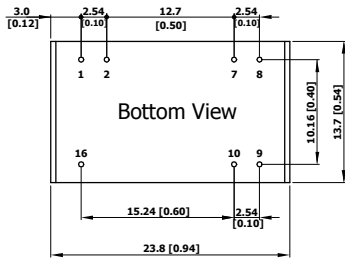
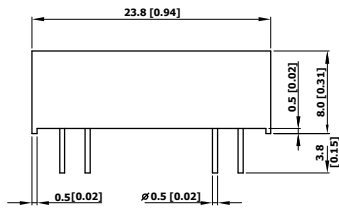
Many conditions affect the thermal performance of the power module, such as orientation, airflow over the module and board spacing. To avoid exceeding the maximum temperature rating of the components inside the power module, the case temperature must be kept below 90°C.

The derating curves are determined from measurements obtained in an experimental apparatus.

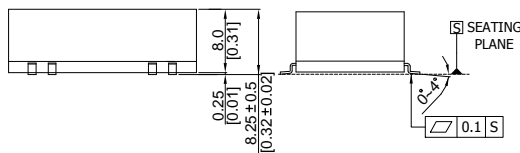
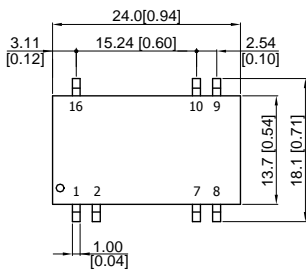


## Mechanical Dimensions

### DIP Package



### SMD Package



## Physical Characteristics

<b>Case Size</b>	:	23.8×13.7×8.0mm
	:	0.94×0.54×0.31 inches
<b>Case Material</b>	:	Non-Conductive Black Plastic
<b>Weight</b>	:	5.4g

<b>Case Size</b>	:	24.0×13.7×8.0mm
	:	0.94×0.54×0.31 inches

**Case Material** : Non-Conductive Black Plastic

**Weight** : 4.2g

## Pin Connections

Pin	Single Output	Dual Output
1	-Vin	-Vin
2	Remote On/Off	Remote On/Off
7	NC	NC
8	NC	Common
9	+Vout	+Vout
10	-Vout	-Vout
16	+Vin	+Vin

NC: No Connection

Tolerance	Millimeters	Inches
	X.X±0.25	X.XX±0.01
	X.XX±0.13	X.XXX±0.005
Pin	±0.05	±0.002