MSDW1000 Series

2W, Wide Input Range SMD, Single & Dual Output DC/DC Converters

Key Features

- *Efficiency up to 81%*
- *1500VDC Isolation*
- *MTBF > 1,000,000 Hours*
- *2:1 Wide Input Range*
- *Low Cost*
- *Low Ripple and Noise*
- *Temperature Performance −40°C to +71°C*
- *Complies with EN55022 Class A*
- *UL 94V−0 Package Material*
- *Internal SMD Construction*

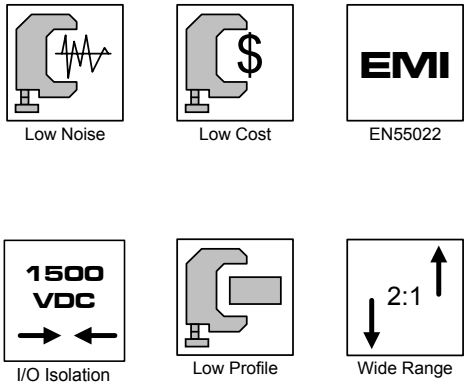


Minmax's MSDW1000 2W DC/DC's are in "gull−wing" SMT package and meet 245°C/10sec in solder−reflow for lead free process.

The series consists of 28 models that operate over input voltage ranges of 4.5−9VDC, 9−18VDC, 18−36VDC and 36−75VDC which provide precisely regulated output voltages of 3.3V, 5V, 12V, 15V, ±5V, ±12V and ±15VDC.

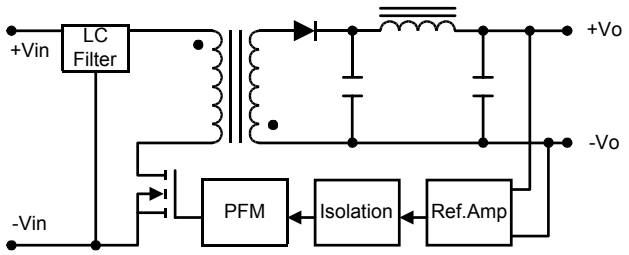
The −40°C to +71°C operating temperature range makes it ideal for data communication equipments, mobile battery driven equipments, distributed power systems, telecommunication equipments, mixed analog/digital subsystems, process/machine control equipments, computer peripheral systems and industrial robot systems.

The modules have a maximum power rating of 2W and a typical full−load efficiency of 81%, continuous short circuit, 30mV output ripple, EN55022 Class A conducted noise compliance minimize design−in time, *cost* and eliminate the need for external filtering.

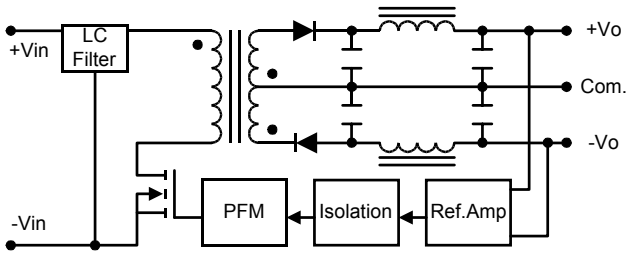


Block Diagram

Single Output



Dual Output



Model Selection Guide

Model Number	Input Voltage	Output Voltage	Output Current		Input Current		Reflected Ripple Current	Efficiency
			Max.	Min.	@Max. Load	@No Load		@Max. Load
	VDC	VDC	mA	mA	mA (Typ.)	mA (Typ.)	mA (Typ.)	% (Typ.)
MSDW1011	5 (4.5 ~ 9)	3.3	500	125	471	40	100	70
MSDW1012		5	400	100	548			73
MSDW1013		12	167	42	534			75
MSDW1014		15	134	33	582			73
MSDW1015		±5	±200	±50	667			64
MSDW1016		±12	±83	±21	615			69
MSDW1017		±15	±67	±17	598			71
MSDW1021	12 (9 ~ 18)	3.3	500	125	184	20	25	73
MSDW1022		5	400	100	217			77
MSDW1023		12	167	42	209			80
MSDW1024		15	134	33	220			80
MSDW1025		±5	±200	±50	242			73
MSDW1026		±12	±83	±21	224			78
MSDW1027		±15	±67	±17	226			78
MSDW1031	24 (18 ~ 36)	3.3	500	125	96	10	15	72
MSDW1032		5	400	100	109			77
MSDW1033		12	167	42	109			80
MSDW1034		15	134	33	108			81
MSDW1035		±5	±200	±50	119			74
MSDW1036		±12	±83	±21	112			78
MSDW1037		±15	±67	±17	110			80
MSDW1041	48 (36 ~ 75)	3.3	500	125	49	8	10	71
MSDW1042		5	400	100	57			73
MSDW1043		12	167	42	53			79
MSDW1044		15	134	33	55			79
MSDW1045		±5	±200	±50	62			71
MSDW1046		±12	±83	±21	57			77
MSDW1047		±15	±67	±17	57			77

Absolute Maximum Ratings

Parameter		Min.	Max.	Unit
Input Surge Voltage (1000 mS)	5VDC Input Models	−0.7	11	VDC
	12VDC Input Models	−0.7	25	VDC
	24VDC Input Models	−0.7	50	VDC
	48VDC Input Models	−0.7	100	VDC
Lead Temperature (1.5mm from case for 10 Sec.)		−−−	260	℃
Internal Power Dissipation		−−−	1,800	mW

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	Ambient	−40	+71	℃
Operating Temperature	Case	−40	+90	℃
Storage Temperature		−40	+125	℃
Humidity		−−−	95	%
Cooling	Free−Air Convection			
Conducted EMI	EN55022 Class A			

Notes :

1. Specifications typical at Ta=+25℃, 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 on the front end for protection.
7. Other input and output voltage may be available, please contact factory.
8. Specifications subject to change without notice.

Input Specifications

Parameter	Model	Min.	Typ.	Max.	Unit
Start Voltage	5V Input Models	3.5	4	4.5	VDC
	12V Input Models	4.5	7	9	
	24V Input Models	8	12	18	
	48V Input Models	16	24	36	
Under Voltage Shutdown	5V Input Models	---	3.5	4	
	12V Input Models	---	6.5	8.5	
	24V Input Models	---	11	17	
	48V Input Models	---	22	34	
Reverse Polarity Input Current	All Models	---	---	1	A
Short Circuit Input Power		---	---	1500	mW
Input Filter		Pi Filter			

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.	---	±0.3	±0.5	%
Load Regulation	Io=25% to 100%	---	±0.5	±0.75	%
Ripple & Noise (20MHz)		---	30	50	mV P-P
Ripple & Noise (20MHz)	Over Line, Load & Temp.	---	---	75	mV P-P
Ripple & Noise (20MHz)		---	---	15	mV rms
Over Power Protection		120	---	---	%
Transient Recovery Time	25% Load Step Change	---	100	300	uS
Transient Response Deviation		---	±3	±5	%
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	---	250	420	pF
Switching Frequency		---	300	---	KHz
MTBF	MIL-HDBK-217F @ 25°C, Ground Benign	1000	---	---	K Hours

Capacitive Load

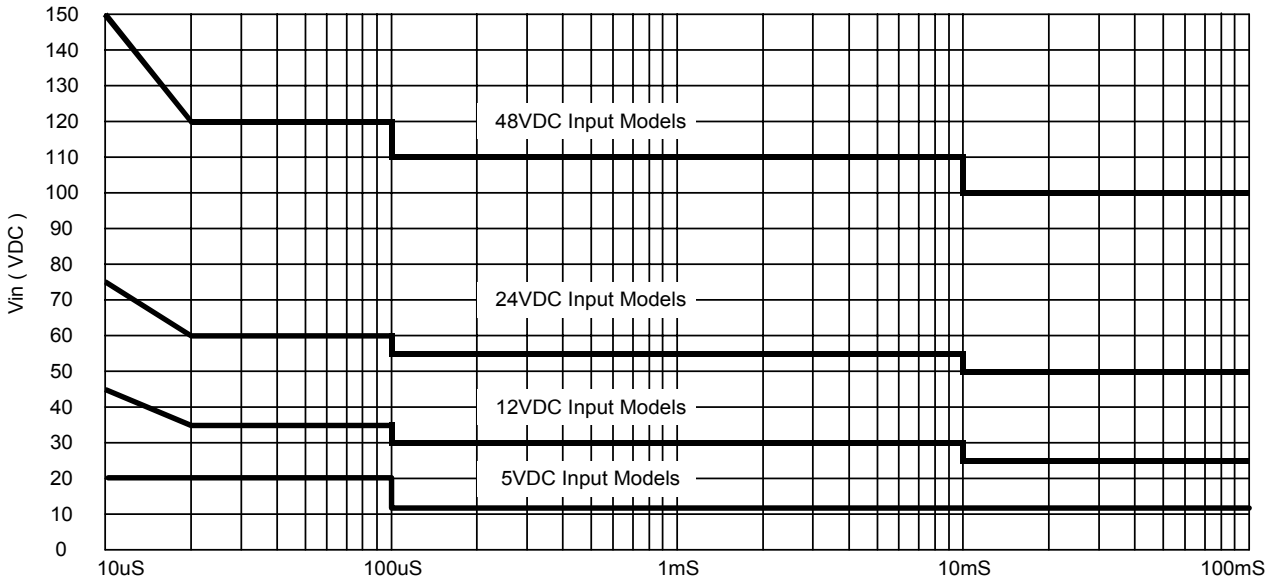
Models by Vout	3.3V	5V	12V	15V	±5V #	±12V #	±15V #	Unit
Maximum Capacitive Load	2200	1000	170	110	470	100	47	uF

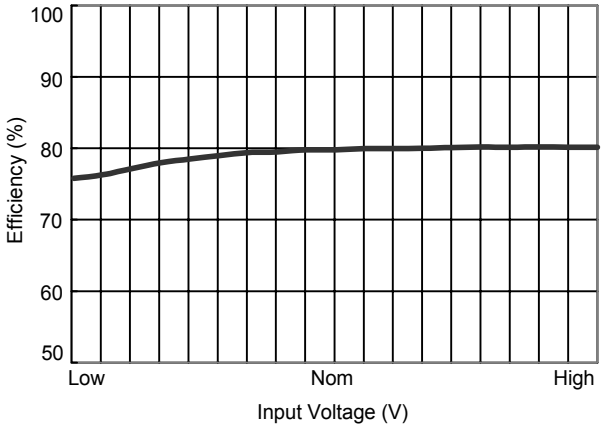
 # For each output

Input Fuse Selection Guide

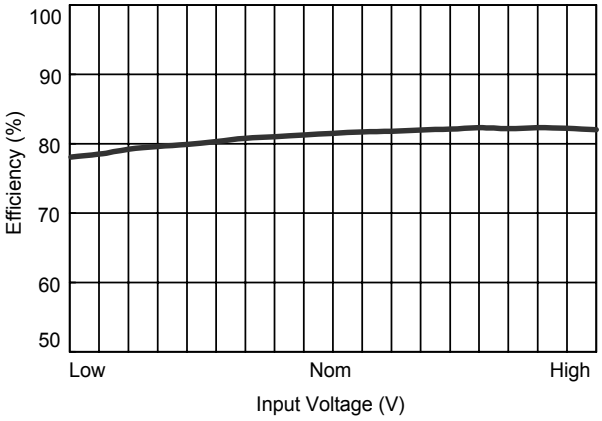
5V Input Models	12V Input Models	24V Input Models	48V Input Models
1000mA Slow − Blow Type	500mA Slow − Blow Type	250mA Slow − Blow Type	120mA Slow − Blow Type

Input Voltage Transient Rating

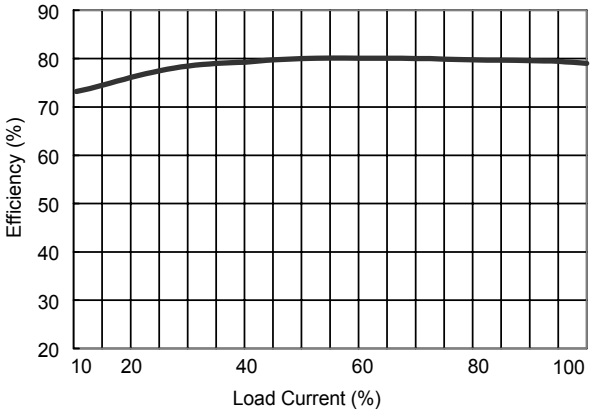




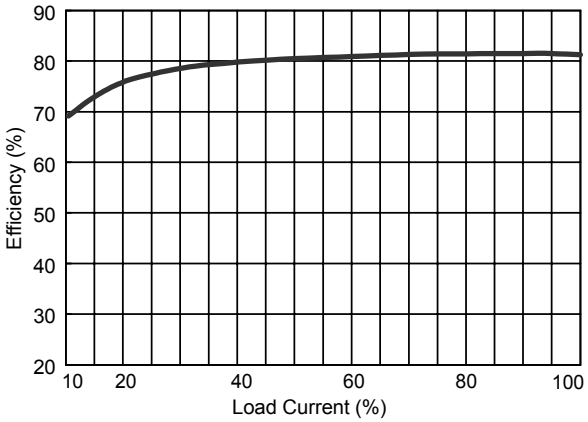
Efficiency vs Input Voltage (Single Output)



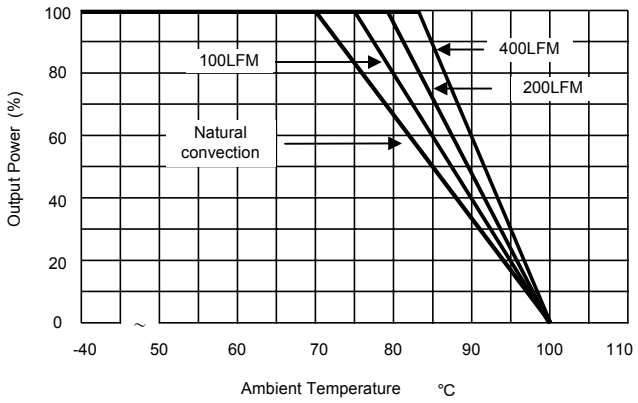
Efficiency vs Input Voltage (Dual Output)



Efficiency vs Output Load (Single Output)



Efficiency vs Output Load (Dual Output)



Derating Curve

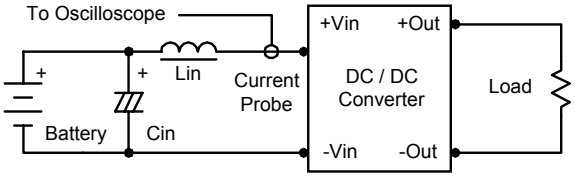
Test Configurations

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 simulated source impedance.

Capacitor Cin, offsets possible battery impedance.

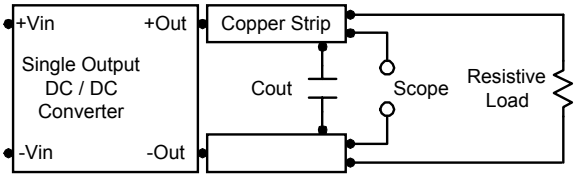
Current ripple is measured at the input terminals of the module, measurement bandwidth is 0−500KHz.

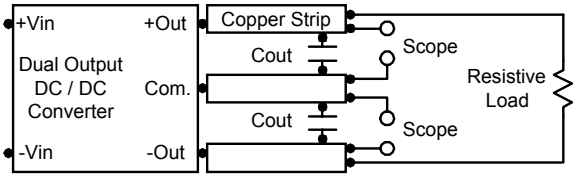


Peak-to-Peak Output Noise Measurement Test

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

Maximum Capacitive Load

The MSDW1000 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.

Overcurrent Protection

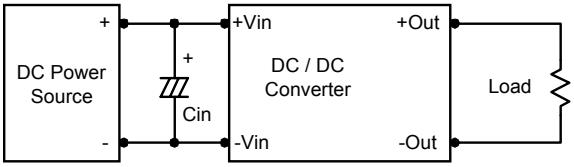
To provide protection in a fault (output overload) condition, the unit is equipped with internal current limiting circuitry and can endure current limiting for an unlimited duration. At the point of current−limit inception, the unit shifts from voltage control to current control. The unit operates normally 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 on the input to insure startup.

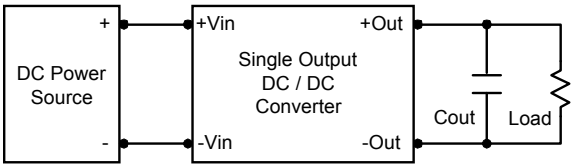
By using a good quality low Equivalent Series Resistance (ESR < 1.0Ω at 100 kHz) capacitor of a 8.2uF for the 5V input devices, a 3.3uF for the 12V input devices and a 1.5uF for the 24V and 48V devices, capacitor mounted close to the power module helps ensure stability of the unit.

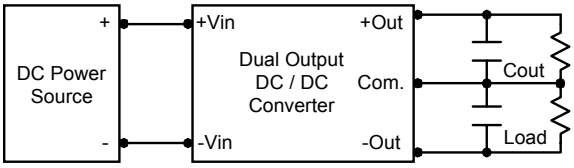


Output Ripple Reduction

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 that 3.3uF capacitors are used on output.

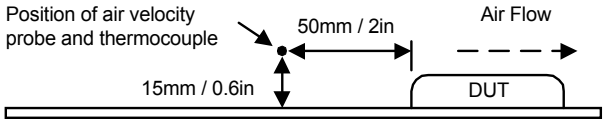




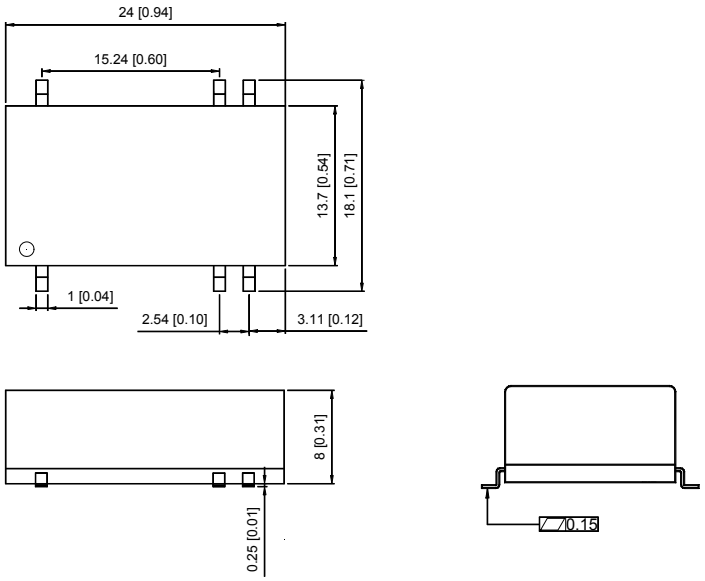
Thermal Considerations

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 were determined from measurements obtained in an experimental apparatus.

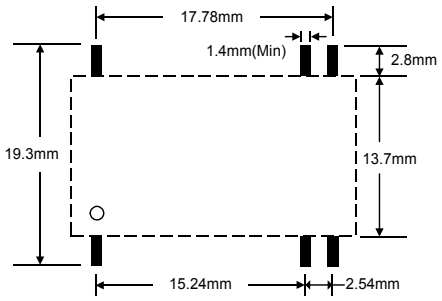


Mechanical Dimensions



Connecting Pin Patterns

Top View (2.54 mm / 0.1 inch grids)



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

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

Physical Characteristics

Case Size : 24.0×13.7×8.0 mm
0.94×0.54×0.31 inches

Case Material : Non−Conductive Black Plastic

Weight : 3.75g

Flammability : UL94V−0

The MSDW1000 converter is encapsulated in a low thermal resistance molding compound that has excellent resistance/electrical characteristics over a wide temperature range or in high humidity environments.
The encapsulant and unit case are both rated to UL 94V−0 flammability specifications.
Leads are tin plated for improved solderability.