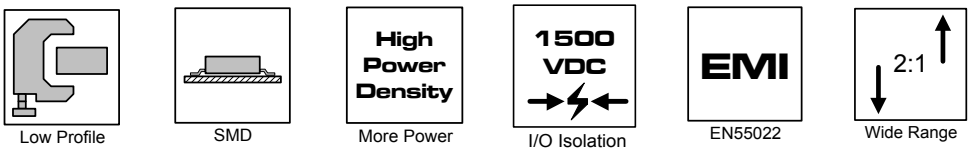
MSKW1000 Series

6~7.5Watts 2:1Wide Input Range SMD DC/DC Converters

Key Features

- *High Efficiency up to 89%*
- *High Power Density*
- *2:1 Input Range*
- *I / O Isolation 1500VDC*
- *SMT Technology*
- *Industry Standard Pinout*
- *Short Circuit Protection*
- *EMI Complies With EN55022 Class A*
- *MTBF > 1,000,000 Hours*



Minmax's MSKW1000 Series can withstand lead temperature up to +230°C. It is compatible with virtually all contemporary pick−and−place and solder−reflow processes.

The series consists of 21 models with input voltage ranges of 9−18VDC, 18−36VDC and 36−75VDC and provide precisely regulated output voltages of 3.3V, 5V, 12V, 15V, ±5V, ±12V and ±15V.

The −40°C to +60°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 7.5W and a typical full−load efficiency of 89%, continuous short circuit, built−in filtering for both input and output minimizes the need for external filtering.

Absolute Maximum Ratings

Parameter		Min.	Max.	Unit
Input Surge Voltage (1000 mS)	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		−−−	2,500	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	+60	℃
Operating Temperature	Case	−40	+90	℃
Storage Temperature		−40	+125	℃
Humidity		−−−	95	%
Cooling	Free−Air Convection			
Conducted EMI	EN55022 Class A			

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.)
MSKW1021	12 (9 ~ 18)	3.3	1200	90	417	25	35	79
MSKW1022		5	1200	60	595			84
MSKW1023		12	625	32	718			87
MSKW1024		15	500	25	710			88
MSKW1025		±5	±500	±25	496			84
MSKW1026		±12	±312	±15.5	717			87
MSKW1027		±15	±250	±12.5	710			88
MSKW1031	24 (18 ~ 36)	3.3	1200	90	206	10	20	80
MSKW1032		5	1200	60	294			85
MSKW1033		12	625	32	355			88
MSKW1034		15	500	25	355			88
MSKW1035		±5	±500	±25	245			85
MSKW1036		±12	±312	±15.5	355			88
MSKW1037		±15	±250	±12.5	351			89
MSKW1041	48 (36 ~ 75)	3.3	1200	90	103	8	15	80
MSKW1042		5	1200	60	147			85
MSKW1043		12	625	32	178			88
MSKW1044		15	500	25	178			88
MSKW1045		±5	±500	±25	123			85
MSKW1046		±12	±312	±15.5	178			88
MSKW1047		±15	±250	±12.5	178			88

Capacitive Load

Models by Vout	3.3V	5V	12V	15V	±5V #	±12V #	±15V #	Unit
Maximum Capacitive Load	680	1500	100	100	680	100	100	uF

 # For each output

Input Fuse Selection Guide

12V Input Models	24V Input Models	48V Input Models
1500mA Slow − Blow Type	700mA Slow − Blow Type	350mA Slow − Blow Type

Input Specifications

Parameter	Model	Min.	Typ.	Max.	Unit
Start Voltage	12V Input Models	7.5	8	9	VDC
	24V Input Models	14	16	18	
	48V Input Models	30	33	36	
Under Voltage Shutdown	12V Input Models	6.5	7	8	
	24V Input Models	13	15	17	
	48V Input Models	28	31	34	
Reverse Polarity Input Current	All Models	---	---	1	A
Short Circuit Input Power		---	1000	3000	mW
Input Filter		Pi Filter			

Output Specifications

Parameter	Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy		---	±0.5	±1.0	%
Output Voltage Balance	Dual Output, Balanced Loads	---	±0.5	±2.0	%
Line Regulation	Vin=Min. to Max.	---	±0.1	±0.3	%
Load Regulation	Io=20% to 100%	---	±0.3	±1.0	%
Ripple & Noise (20MHz)		---	50	85	mV P-P
Ripple & Noise (20MHz)	Over Line,Load & Temp	---	---	100	mV P-P
Ripple & Noise (20MHz)		---	---	15	mV rms.
Over Power Protection		115	140	165	%
Transient Recovery Time	25% Load Step Change	---	250	500	uS
Transient Response Deviation		---	±2	±6	%
Temperature Coefficient		---	±0.01	±0.02	%/°C
Output Short Circuit	Continuous				

General Specifications

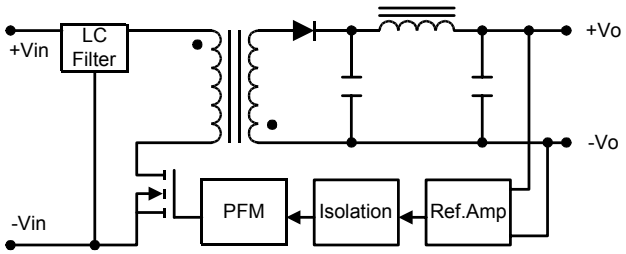
Parameter	Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage Rated	60 Seconds	1500	---	---	VDC
Isolation Voltage Test	Flash Tested for 1 Second	1650	---	---	VDC
Isolation Resistance	500VDC	1000	---	---	MΩ
Isolation Capacitance	100KHz,1V	---	650	750	pF
Switching Frequency		200	260	350	KHz
MTBF	MIL-HDBK-217F @ 25°C, Ground Benign	1000	---	---	K Hours

Notes:

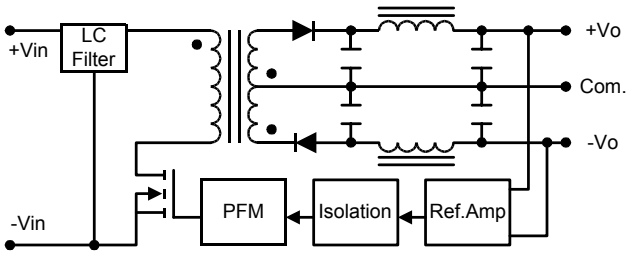
1. Specifications typical at Ta=+25°C, resistive load, nominal input voltage, rated output current unless otherwise noted.
2. Transient recovery time is measured to within 1% error band for a step change in output load of 75% to 100%.
3. Ripple & Noise measurement bandwidth is 0-20 MHz.
4. These power 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.
9. It is not recommended to use water-washing process on SMT units.

Block Diagram

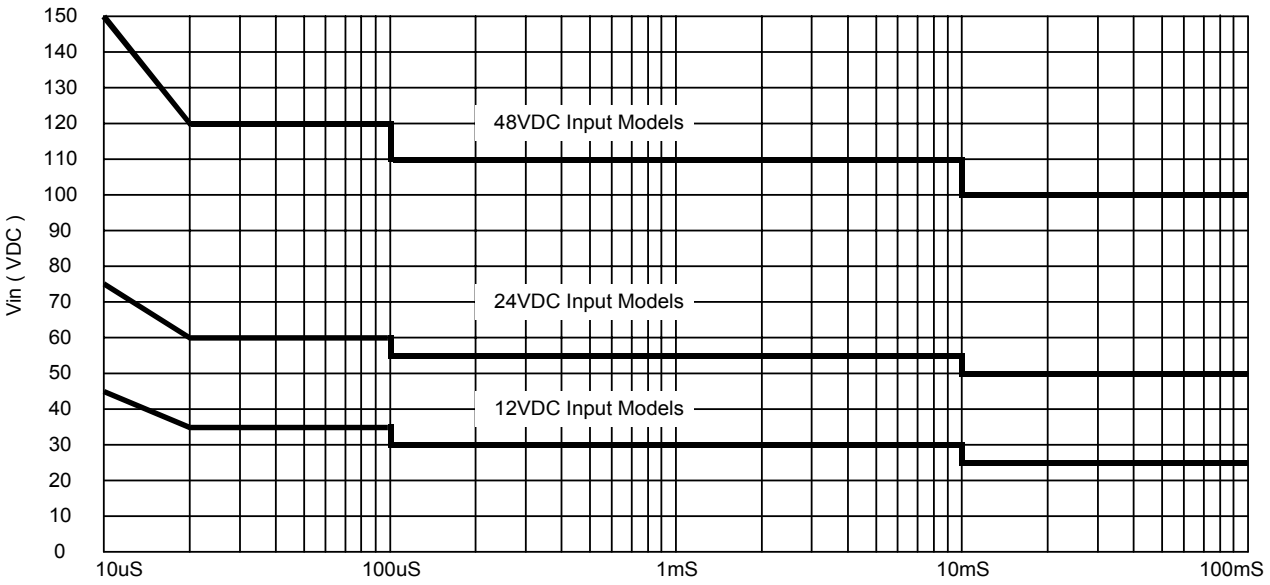
Single Output

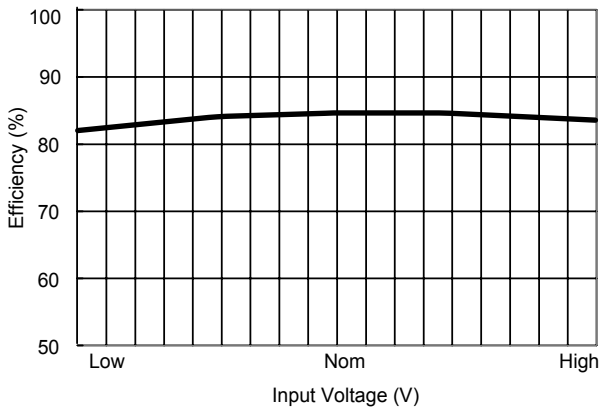


Dual Output

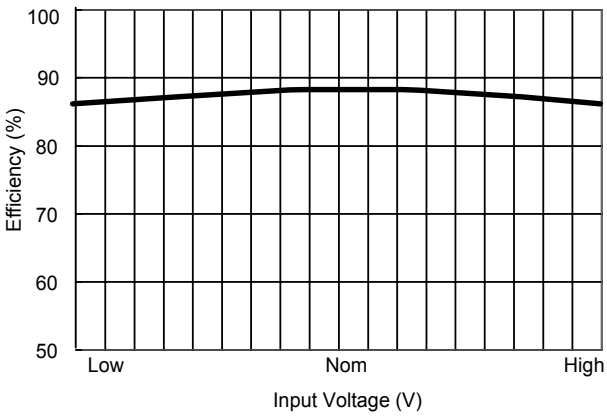


Input Voltage Transient Rating

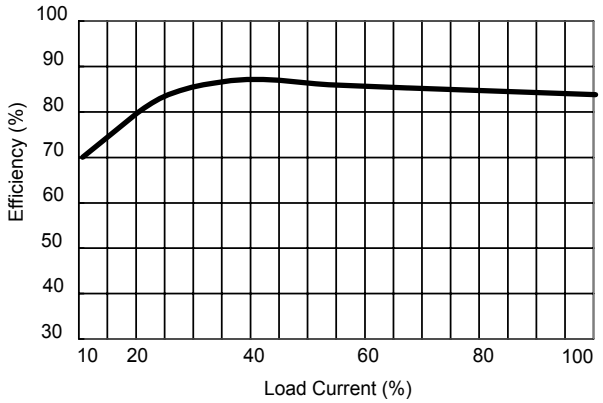




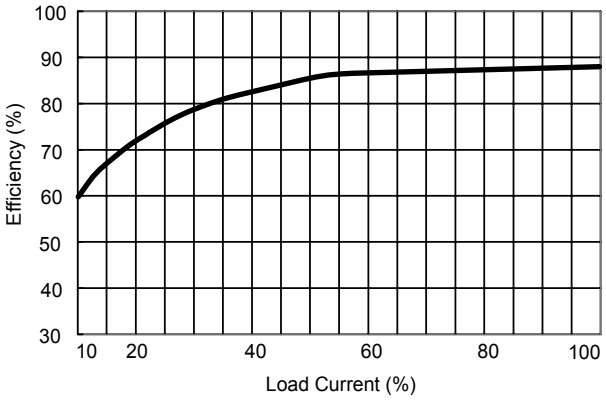
Efficiency vs Input Voltage (Single Output)



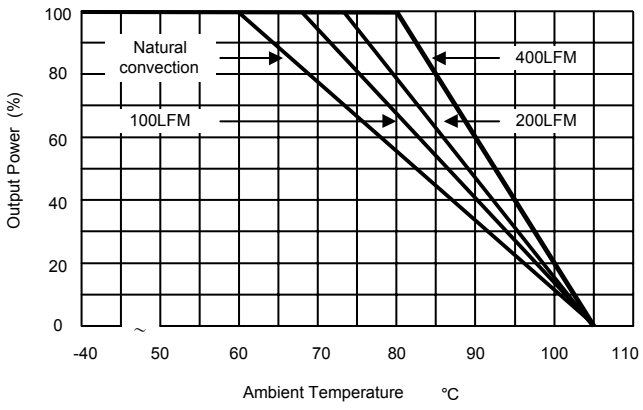
Efficiency vs Input Voltage (Dual Output)



Efficiency vs Output Load (Single Output)



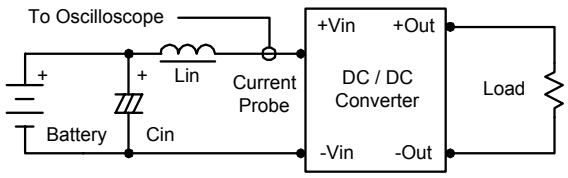
Efficiency vs Output Load (Dual Output)



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 simulate source impedance.

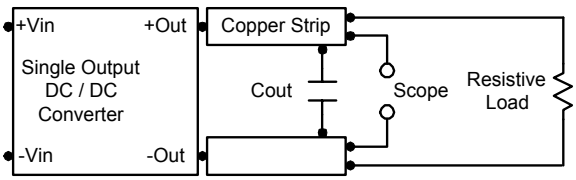
Capacitor Cin, offsets possible battery impedance.

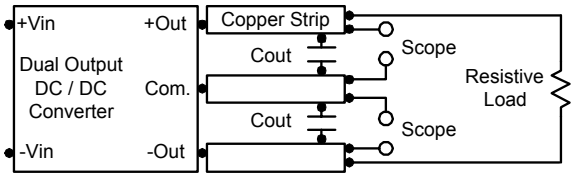
Current ripple is measured at the input terminals of the module, measurement bandwidth is 0−500 KHz.

Peak-to-Peak Output Noise Measurement Test

Use a 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 MSKW1000 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.

For optimum performance we recommend 680uF maximum capacitive load for 3.3V and ±5V outputs, 1500uF for 5V outputs and 100uF for 12V, 15V, ±12V, ±15V outputs.

The maximum capacitance can be found in the datasheet.

Overcurrent Protection

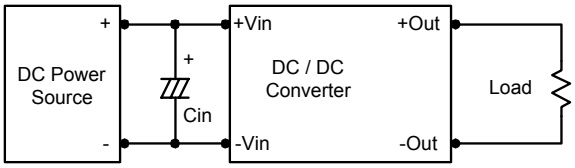
To provide protection in a fault (output overload) condition, the unit is equipped with internal current limiting circuitry and can endure current limiting for an unlimited duration. At the point of current−limit inception, the unit shifts from voltage control to current control. The unit operates normally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

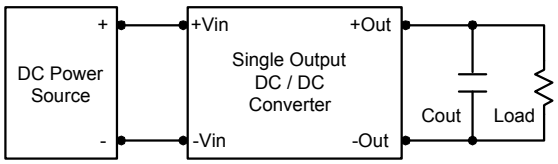
Capacitor mounted close to the power module helps ensure stability of the unit, it is recommended to use a good quality low Equivalent Series Resistance (ESR < 1.0Ω at 100 KHz) capacitor of a 4.7uF for the 12V input devices and a 2.2uF for the 24V and 48V devices.

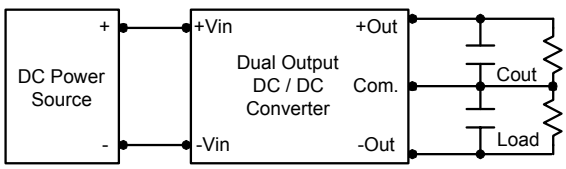


Output Ripple Reduction

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 3.3uF capacitors at the output.

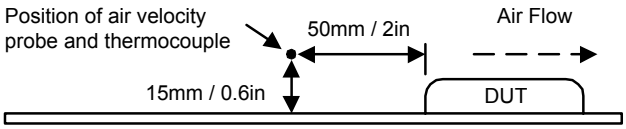




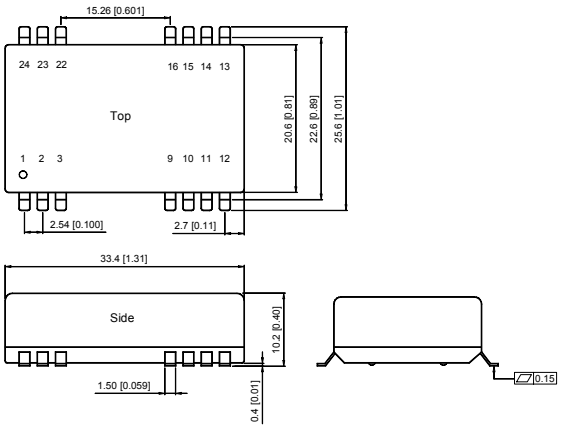
Thermal Considerations

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.

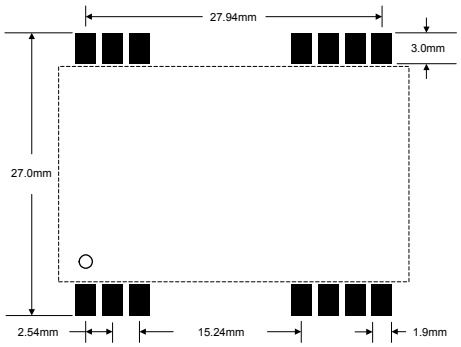


Mechanical Dimensions



Connecting Pin Patterns

Top View (2.54 mm / 0.1 inch grids)



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

Pin Connections

Pin	Single Output	Dual Output
1	+Vin	+Vin
2	−Vin	−Vin
3	−Vin	−Vin
9	NC	NC
10	NC	Common
11	−Vout	−Vout
12	−Vout	−Vout
13	+Vout	−Vout
14	+Vout	+Vout
15	+Vout	+Vout
16	−Vout	Common
22	+Vin	+Vin
23	+Vin	+Vin
24	−Vin	−Vin

NC: No Connection

Physical Characteristics

Case Size	:	33.4×20.6×10.2 mm 1.31×0.81×0.4 inches
Case Material	:	Non−Conductive Black Plastic
Weight	:	14g
Flammability	:	UL94V−0

The MSKW1000 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.