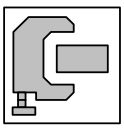
MAU400 Series

1W, Ultra-High Isolation SIP, Single & Dual Output DC/DC Converters

Key Features

- *Efficiency up to 75%*
- *6000VDC Isolation*
- *MTBF > 2,000,000 Hours*
- *Low Cost*
- *Input 5 and 12VDC*
- *Output 5, 12, 15, ±5, ±12 and ±15VDC*
- *Temperature Performance −25℃ to +70℃*
- *UL 94V−0 Package Material*
- *Internal SMD Construction*
- *Industry Standard Pinout*
- *UL60950−1, UL60601−1 Safety Approval*


Low Profile

Low Cost

I/O Isolation

Minmax's MAU400 1W DC/DC's are specially designed to provide ultra-high levels of isolation 6000VDC in a miniature SIP package.

The series consists of 12 models with input voltages of 5V and 12VDC which offers standard output voltages of 5V, 12V, 15VDC in both single and dual output configurations.

The MAU400 series is an excellent selection for a variety of applications including distributed power systems, mixed analog/digital subsystems, portable test equipments, local power networks and battery backed systems.

Absolute Maximum Ratings

Parameter		Min.	Max.	Unit
Input Surge Voltage (1000 mS)	5VDC Input Models	−0.7	9	VDC
	12VDC Input Models	−0.7	18	VDC
Lead Temperature (1.5mm from case for 10 Sec.)		−−−	260	℃
Internal Power Dissipation		−−−	650	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	−25	+70	℃
Operating Temperature	Case	−25	+90	℃
Storage Temperature		−40	+125	℃
Humidity		−−−	95	%
Cooling	Free−Air Convection			

Model Selection Guide

Model Number	Input Voltage	Output Voltage	Output Current		Input Current		Load Regulation	Efficiency
			Max.	Min.	@Max. Load	@No Load		@Max. Load
	VDC	VDC	mA	mA	mA (Typ.)	mA (Typ.)	% (Max.)	% (Typ.)
MAU401	5 (4.5 ~ 5.5)	5	200	4	303	55	10	66
MAU402		12	80	2	291		8	66
MAU403		15	65	1	295		8	66
MAU404		±5	±100	±2	303		10	66
MAU405		±12	±40	±1	267		8	72
MAU406		±15	±35	±1	287		8	73
MAU411	12 (10.8 ~ 13.2)	5	200	4	126	30	10	66
MAU412		12	80	2	121		8	66
MAU413		15	65	1	123		8	66
MAU414		±5	±100	±2	126		10	66
MAU415		±12	±40	±1	108		8	74
MAU416		±15	±35	±1	117		8	75

Capacitive Load

Models by Vout	5V	12V	15V	±5V #	±12V #	±15V #	Unit
Maximum Capacitive Load	680	680	680	220	220	220	uF

 # For each output

Input Fuse Selection Guide

5V Input Models	12V Input Models
500mA Slow − Blow Type	200mA Slow − Blow Type

Input Specifications

Parameter	Model	Min.	Typ.	Max.	Unit
Input Voltage Range	5V Input Models	4.5	5	5.5	VDC
	12V Input Models	10.8	12	13.2	
Reverse Polarity Input Current	All Models	−−−	−−−	0.3	A
Input Filter		Internal Capacitor			

Output Specifications

Parameter	Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy		---	±1.0	±3.0	%
Output Voltage Balance	Dual Output, Balanced Loads	---	±0.1	±1.0	%
Line Regulation	For Vin Change of 10%	---	±1.2	±1.5	%
Load Regulation	Io=20% to 100%	See Model Selection Guide			%
Ripple & Noise (20MHz)		---	100	150	mV P-P
Ripple & Noise (20MHz)	Over Line, Load & Temp.	---	---	200	mV P-P
Ripple & Noise (20MHz)		---	---	15	mV rms
Temperature Coefficient		---	±0.01	±0.02	%/°C
Output Short Circuit	0.5 Second Max.				

General Specifications

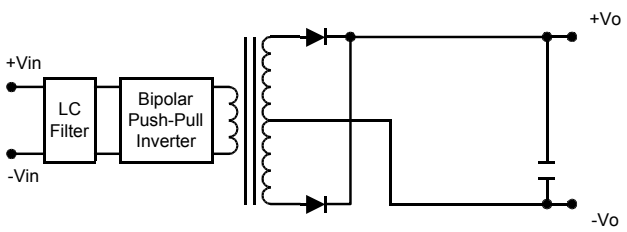
Parameter	Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage Rated	60 Seconds	6000	---	---	VDC
Isolation Voltage Test	Flash Tested for 1 Second	6600	---	---	VDC
Isolation Resistance	500VDC	10	---	---	GΩ
Isolation Capacitance	100KHz,1V	---	15	20	pF
Switching Frequency		50	80	100	KHz
MTBF	MIL-HDBK-217F @ 25°C, Ground Benign	2000	---	---	K Hours

Notes:

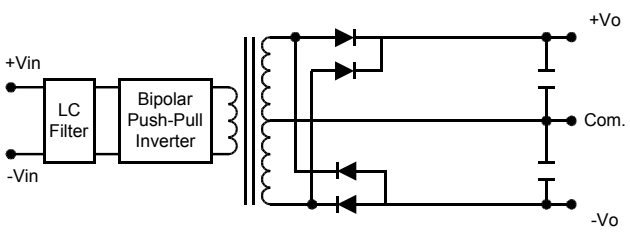
1. Specifications typical at Ta=+25°C, resistive load, nominal input voltage, rated output current unless otherwise noted.
2. Ripple & Noise measurement bandwidth is 0-20 MHz.
3. These power converters require a minimum output loading to maintain specified regulation.
4. Operation under no-load conditions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

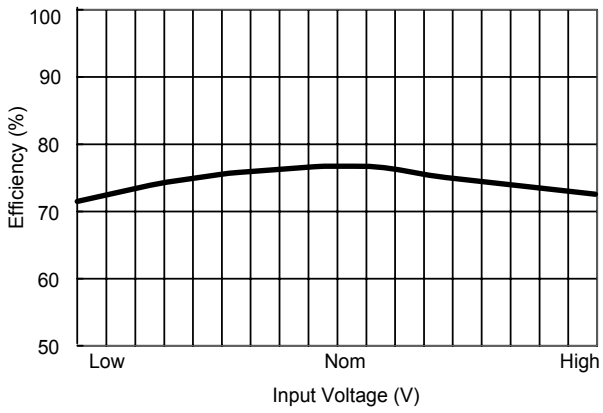
Block Diagram

Single Output

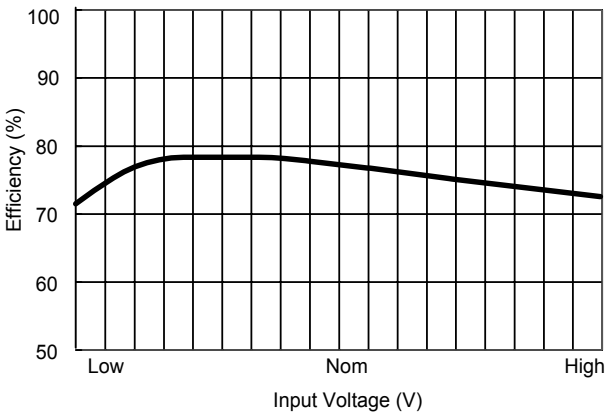


Dual Output





Efficiency vs Input Voltage (Single Output)



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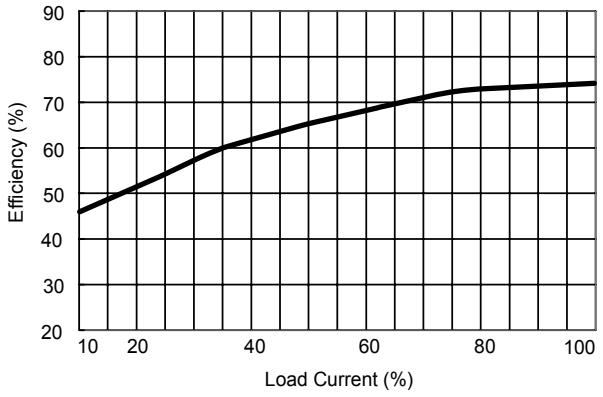
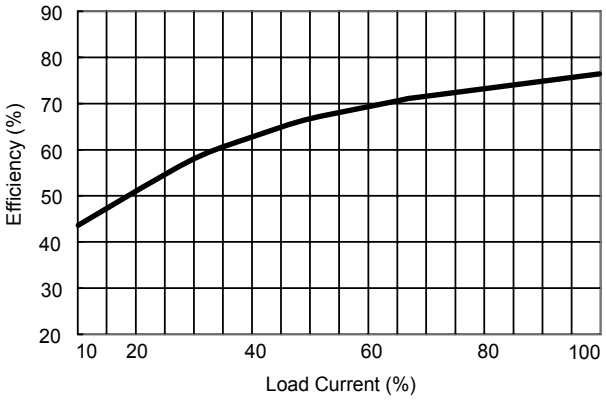


Efficiency vs Output Load (Single Output)



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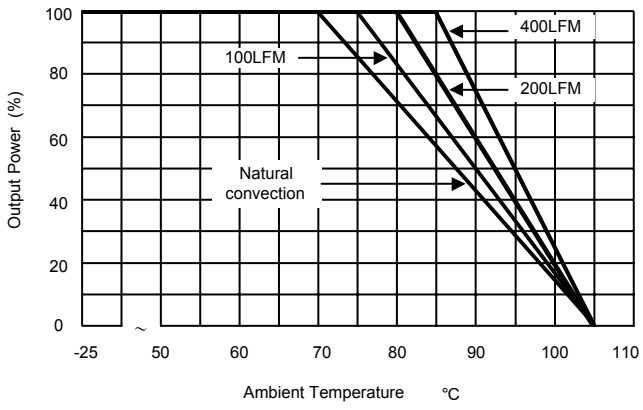


Derating Curve

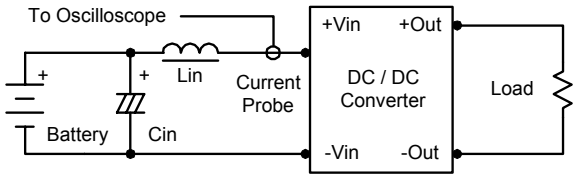
Test Configurations

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.

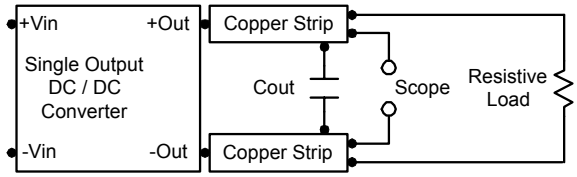
Current ripple is measured at the input terminals of the module, measurement bandwidth is 0−500 KHz.

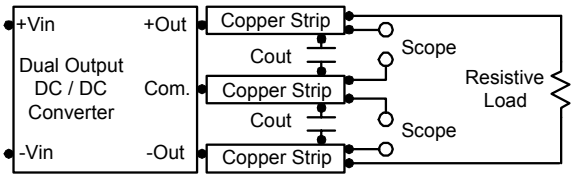


Peak-to-Peak Output Noise Measurement Test

Use a Cout 0.33uF 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 MAU400 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 220uF maximum capacitive load for dual outputs and 680uF capacitive load for single outputs.

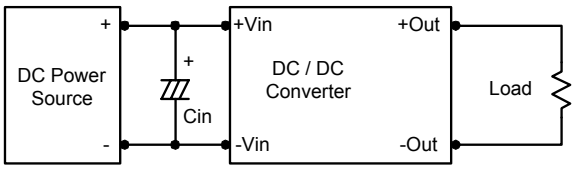
The maximum capacitance can be found in the data sheet.

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.

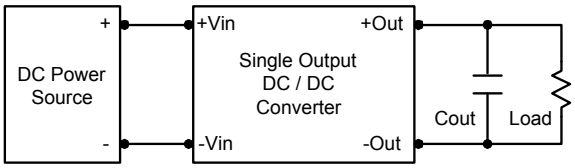
Capacitor mounted close to the power module helps ensure stability of the unit, it is recommended to use a good quality low Equivalent Series Resistance (ESR < 1.0Ω at 100 KHz) capacitor of a 2.2uF for the 5V input devices, a 1.0uF for the 12V input devices.

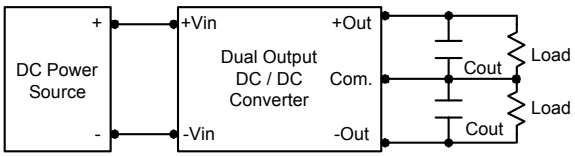


Output Ripple Reduction

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 1.5uF capacitors at the output.

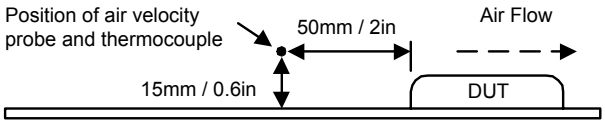




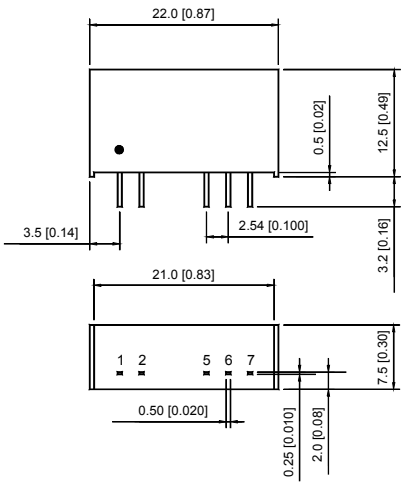
Thermal Considerations

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



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

Physical Characteristics

Case Size	:	22.0X7.5X12.5 mm 0.87×0.30×0.49 inches
Case Material	:	Non−Conductive Black Plastic
Weight	:	3.9g

Pin Connections

Pin	Single Output	Dual Output
1	+Vin	+Vin
2	−Vin	−Vin
5	−Vout	−Vout
6	No Pin	Common
7	+Vout	+Vout