MAU400 Series

1 Watt Ultra High In/Out Isolation SIP DC/DC Converters

Single and Dual Outputs

Key Features

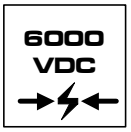
- *I/O Isolation 6000VDC*
- *Miniature Package*
- *Efficiency up to 75%*
- *SMT Technology*
- *Lost Cost*
- *MTBF > 2,000,000 Hours*

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

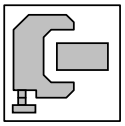
The series consists of 12 models with input voltages of 5V and 12V, and offers standard output voltages of 5V, 12V, 15V in both single and dual output configurations.

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

Low Cost

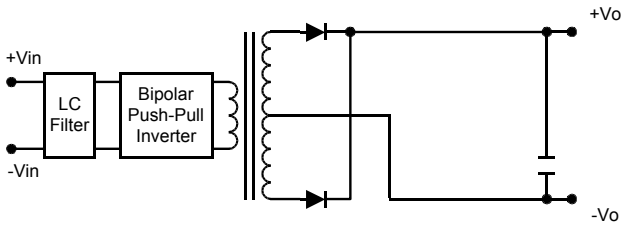


I/O Isolation

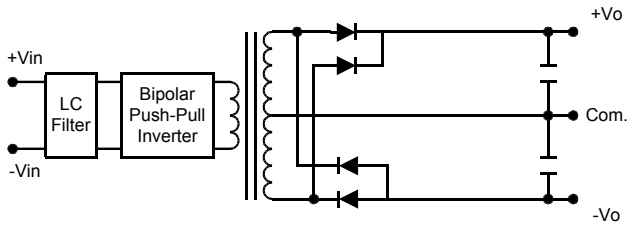

Low Profile

Block Diagram

Single Output



Dual Output



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

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 these values can damage the module. 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			

Note :

1. Specifications typical at Ta=+25℃, 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 devices; however they may not meet all listed specifications.
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.

MAU400 Series

Input Specifications

Parameter	Model	Min.	Typ.	Max.	Unit
Start Voltage	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 Balance Load	---	±0.1	±1.0	%
Line Regulation	For Vin Change 1%	---	±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)		---	---	5	mV rms.
Over Load		120	---	---	%
Temperature Coefficient		---	±0.01	±0.02	%/℃
Output Short Circuit	0.5 Second Max.				

General Specifications

Parameter	Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage	60 Seconds	6000	---	---	VDC
Isolation Test Voltage	Flash Tested for 1 Second	6600	---	---	VDC
Isolation Resistance	500VDC	10	---	---	GΩ
Isolation Capacitance	100KHz,1V	---	80	120	pF
Switching Frequency		50	80	100	KHz
MTBF	MIL-HDBK-217F @ 25℃, Ground Benign	2000	---	---	K Hours

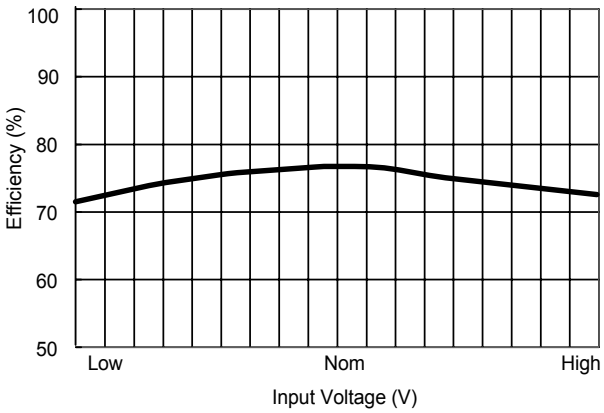
Capacitive Load

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

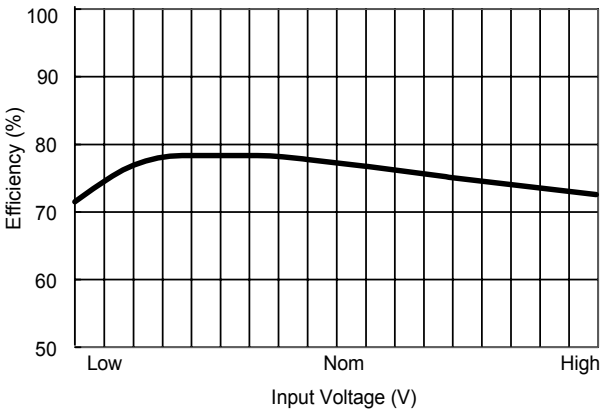
Note: # For each output .

Input Fuse Selection Guide

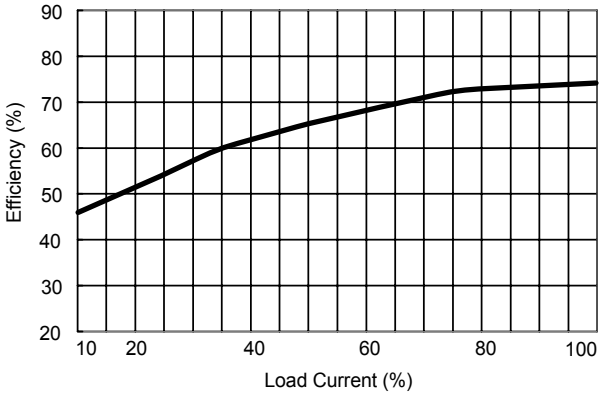
5V Input Models	12V Input Models
500mA Slow - Blow Type	200mA Slow - Blow Type



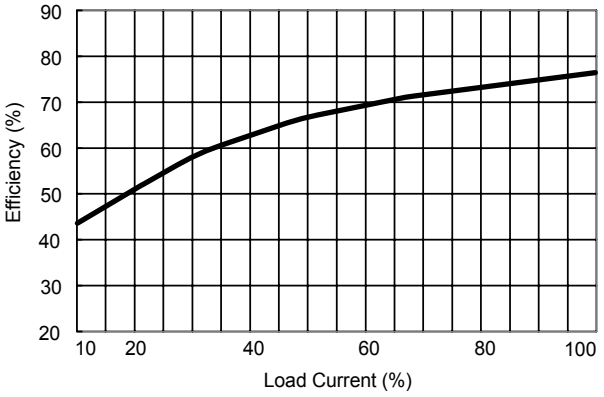
Efficiency vs Input Voltage (Single Output)



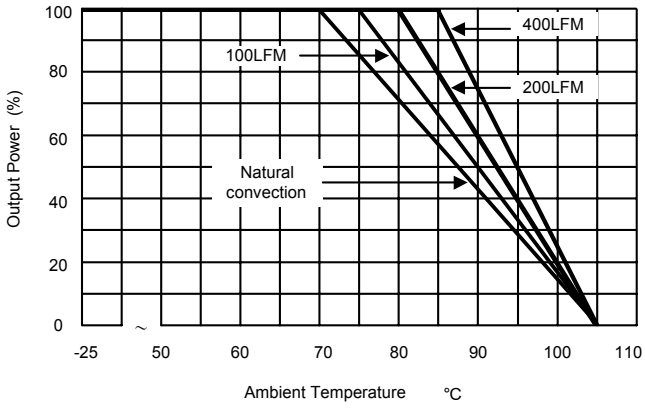
Efficiency vs Input Voltage (Dual Output)



Efficiency vs Output Load (Single Output)



Efficiency vs Output Load (Dual Output)

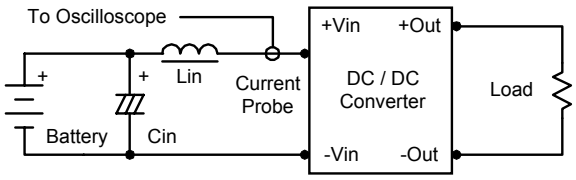


Derating Curve

MAU400 Series

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.

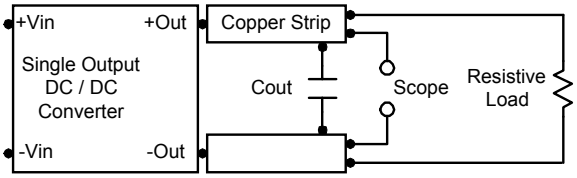
Capacitor Cin, offsets possible battery impedance.

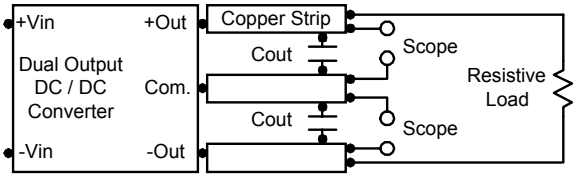
Current ripple is measured at the input terminals of the module, measurement bandwidth is 0−500 KHz.

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.

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.

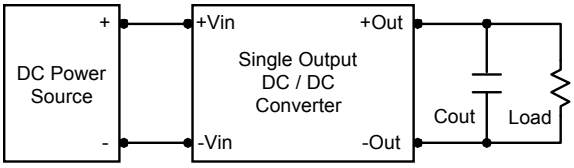
In applications where power is supplied over long lines and output loading is high, it may be necessary to use a capacitor at the input to ensure startup.

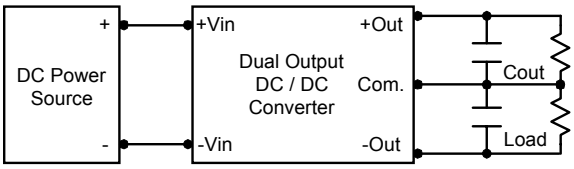
Capacitor mounted close to the power module helps ensure stability of the unit, it is recommended to use a good quality low Equivalent Series Resistance (ESR < 1.0Ω at 100 KHz) capacitor of a 2.2uF for the 5V input devices, a 1.0uF for the 12V input devices.

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.

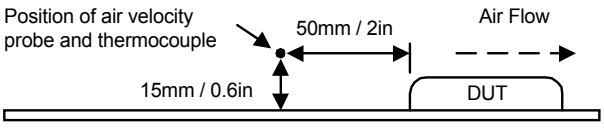


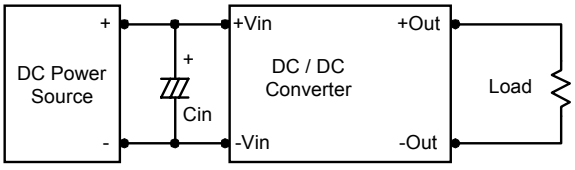


Thermal Considerations

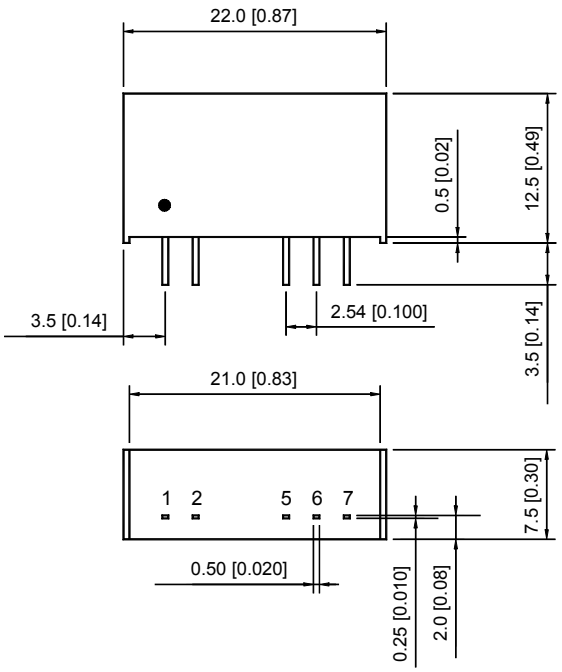
Many conditions affect the thermal performance of the power module, such as orientation, airflow over the module and board spacing. To avoid exceeding the maximum temperature rating of the components inside the power module, the case temperature must be kept below 90°C.

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





Mechanical Data

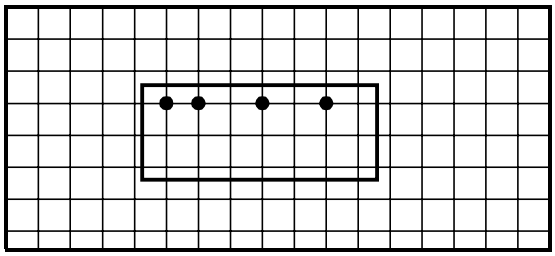


Tolerance	Millimeters	Inches
	.X±0.25	.XX±0.01
	.XX±0.25	.XXX±0.01
Pin	±0.05	±0.002

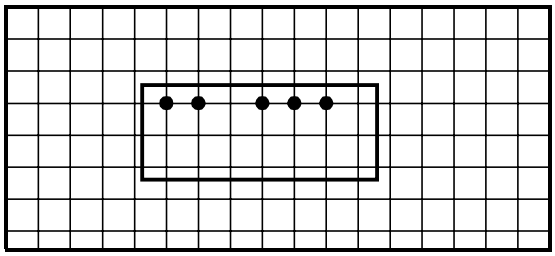
Connecting Pin Patterns

Top View (2.54 mm / 0.1 inch grids)

Single Output



Dual Output



Pin Connections

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

Physical Characteristics

Case Size : 22.0X7.5X12.5 mm
1.31×0.81×0.4 inches

Case Material : Non−Conductive Black Plastic

Weight : 3.9g

Units are encapsulated in a low thermal resistance molding compound which has excellent chemical resistance and electrical properties in high humidity environment and over a wide operating temperature range.
The encapsulant and outer shell of the unit have UL94V−0 ratings. The leads are tin plated for better soldering.