

**FEATURES**

- ▶ Compact SIP-6 Package
- ▶ Small Footprint: 17 x 11 mm (0.67"x0.43")
- ▶ Wide 2:1 Input Range
- ▶ Fully regulated Outputs
- ▶ Low Ripple and Noise
- ▶ Operating Temp. Range -40°C to +85°C
- ▶ I/O-isolation Voltage 1500VDC
- ▶ Continuous Short-circuit Protection
- ▶ Fully RoHS compliant
- ▶ CSA/UL/IEC/EN 60950-1 (Approval pending)
- ▶ 3 Years Product Warranty



**PRODUCT OVERVIEW**

The MAW01 series is a range of isolated 1W dc/dc-converter modules featuring fully regulated output and wide 2:1 input voltage ranges. This product comes in a very small SIP-6 package occupying only 1.2cm<sup>2</sup> (0.2 square inch) on the PCB.

A high efficiency allow operating an operating temperature range of -40°C to +85°C without Derating.

The very compact dimensions makes these converters an ideal solution for many space critical applications in battery powered instrumentations.

**Model Selection Guide**

Model Number	Input Voltage (Range) VDC	Output Voltage VDC	Output Current		Input Current		Max. capacitive Load µF	Reflected Ripple current mA (typ.)	Efficiency (typ.) @Max. Load %
			Max. mA	@Max. Load mA(typ.)	@No Load mA(typ.)				
MAW01-05S05	5 (4.5 ~ 9)	5	200	263	40	1680	80	76	
MAW01-05S12		12	83	259		820		77	
MAW01-05S15		15	67	254		680		79	
MAW01-05S24		24	42	265		470		76	
MAW01-05D12		±12	±42	262		470#		77	
MAW01-05D15		±15	±33	254		330#		78	
MAW01-12S05		12 (9 ~ 18)	5	200		108		20	1680
MAW01-12S12	12		83	108	820	77			
MAW01-12S15	15		67	105	680	80			
MAW01-12S24	24		42	109	470	77			
MAW01-12D12	±12		±42	106	470#	79			
MAW01-12D15	±15		±33	106	330#	78			
MAW01-24S05	24 (18 ~ 36)		5	200	54	10	1680		30
MAW01-24S12		12	83	52	820		80		
MAW01-24S15		15	67	52	680		80		
MAW01-24S24		24	42	55	470		77		
MAW01-24D12		±12	±42	53	470#		80		
MAW01-24D15		±15	±33	52	330#		80		
MAW01-48S05		48 (36 ~ 75)	5	200	27		7	1680	
MAW01-48S12	12		83	27	820	78			
MAW01-48S15	15		67	27	680	78			
MAW01-48S24	24		42	28	470	76			
MAW01-48D12	±12		±42	27	470#	79			
MAW01-48D15	±15		±33	26	330#	79			

# For each output



**Input Specifications**

Parameter	Model	Min.	Typ.	Max.	Unit
Input Surge Voltage (1 sec. max.)	5V Input Models	-0.7	---	15	VDC
	12V Input Models	-0.7	---	25	
	24V Input Models	-0.7	---	50	
	48V Input Models	-0.7	---	100	
Start-Up Threshold Voltage	5V Input Models	---	---	4.5	
	12V Input Models	---	---	9	
	24V Input Models	---	---	18	
	48V Input Models	---	---	36	
Internal Filter Type	All Models	Capacitor			

**Output Specifications**

Parameter	Conditions	Min.	Typ.	Max.	Unit	
Output Voltage Setting Accuracy	At 50% Load and Nominal Vin	---	---	±1.0	%Vnom.	
Line Regulation	Vin=Min. to Max.	---	---	±0.2	%	
Load Regulation	No Load to Full Load	Single Output Models	---	---	±1.0	%
		Dual Output Models	---	---	±1.0	%
	10% to 90% Load	Single Output Models	---	---	±0.5	%
		Dual Output Models	---	---	±0.8	%
Min.Load	No minimum Load Requirement					
Ripple & Noise (20MHz)		---	50	---	mV <sub>P-P</sub>	
Transient Recovery Time	25% Load Step Change	---	250	---	µsec	
Temperature Coefficient		---	---	±0.02	%/°C	
Short Circuit Protection	Continuous					

**General Specifications**

Parameter	Conditions	Min.	Typ.	Max.	Unit
I/O Isolation Voltage (rated)	60 Seconds	1500	---	---	VDC
I/O Isolation Resistance	500 VDC	1000	---	---	MΩ
I/O Isolation Capacitance	100KHz, 1V	---	---	50	pF
Switching Frequency		---	220	---	KHz
MTBF(calculated)	MIL-HDBK-217F@25°C, Ground Benign	2,800,000	---	---	Hours
Safety Approvals(pending)	CSA 60950-1 recognition, IEC/EN 60950-1(CB-scheme)				

**Input Fuse**

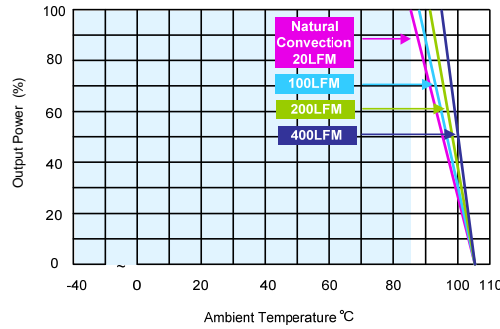
5V Input Models	12V Input Models	24V Input Models	48V Input Models
500mA Slow-Blow Type	250mA Slow-Blow Type	120mA Slow-Blow Type	60mA Slow-Blow Type

**Environmental Specifications**

Parameter	Conditions	Min.	Max.	Unit
Operating Ambient Temperature Range (See Power Derating Curve)	Natural Convection	-40	+85	°C
Case Temperature		---	+105	°C
Storage Temperature		-55	+125	°C
Humidity (non condensing)		---	95	% rel. H
Lead Temperature (1.5mm from case for 10Sec.)		---	260	°C

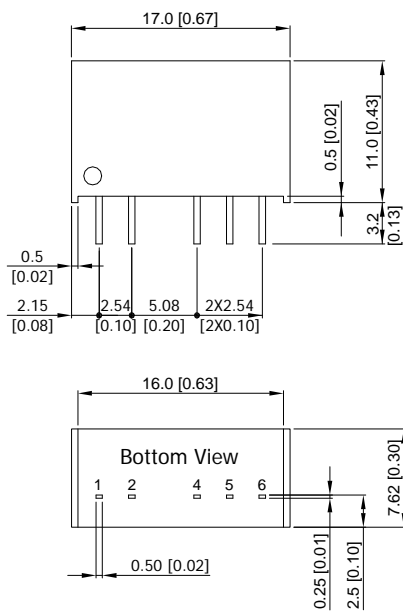


**Power Derating Curve**



**Package Specifications**

**Mechanical Dimensions**



**Pin Connections**

Pin	Single Output	Dual Output
1	-Vin	-Vin
2	+Vin	+Vin
4	+Vout	+Vout
5	No Pin	Common
6	-Vout	-Vout

- ▶ All dimensions in mm (inches)
- ▶ Tolerance: X.X±0.5 (X.XX±0.02)  
X.XX±0.25 (X.XXX±0.01)
- ▶ Pins ±0.05(±0.002)

**Physical Characteristics**

Case Size : 17.0x7.62x11.0mm (0.67x0.30x0.43 inches)

Case Material : Non-Conductive Black Plastic (flammability to UL 94V-0 rated)

Pin Material : Alloy 42

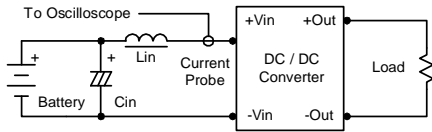
Weight : 12.9g



### Test Setup

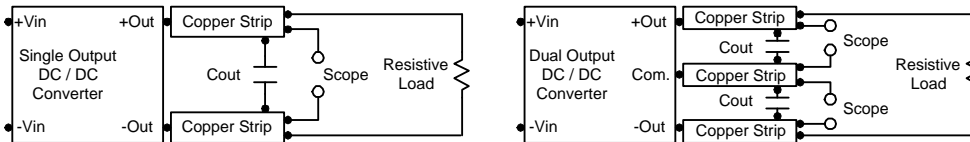
#### Input Reflected-Ripple Current Test Setup

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.



### Technical Notes

#### Maximum Capacitive Load

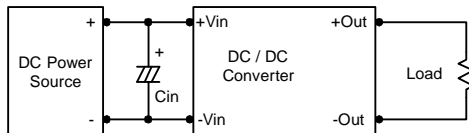
The MAW01 series has limitation of maximum connected capacitance at the output. The power module may be operated in current limiting mode during start-up, affecting the ramp-up and the startup time. The maximum capacitance can be found in the data sheet.

#### 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.

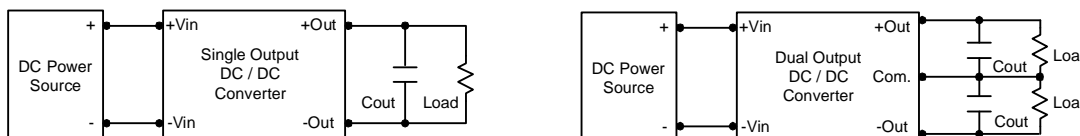
#### Input Source Impedance

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 commended to use a good quality low Equivalent Series Resistance (ESR < 1.0 $\Omega$  at 100 KHz) capacitor of a 8.2 $\mu$ F for the 5V input device, a 3.3 $\mu$ F for the 12V input devices and a 1.5 $\mu$ F 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 3.3 $\mu$ 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 105 $^{\circ}$ C. The derating curves are determined from measurements obtained in a test setup.

