FEATURES

- **Industrial Standard SIP-6 Package**
- **Wide 2 : 1 Input Voltage Range**
- **Fully Regulated Output Voltage**
- **I/O Isolation 1500VDC**
- **Operating Ambient Temp. Range -40℃ to +95℃**
- **No Min. Load Requirement**
- **Overload and Short Circuit Protection**
- **UL/cUL/IEC/EN 60950-1 Safety Approval**

CSA 60950-1 CB Scheme

CONFLICT FREE Minerals Policy REACH COMPLIANT 3 YEAR WARRANTY RoHS Compliant

PRODUCT OVERVIEW

The MINMAX 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 1.2cm² (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)	Output Voltage	Output Current	Input Current		Max. capacitive Load	Reflected Ripple current	Efficiency (typ.)
			Max.	@Max. Load	@No Load			@Max. Load
	VDC	VDC	mA	mA(typ.)	mA(typ.)	μF	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	40	77
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	77
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	20	77
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	
Under Voltage Shutdown	5V Input Models	---	---	4	
	12V Input Models	---	---	8.5	
	24V Input Models	---	---	17.5	
	48V Input Models	---	---	35.5	
Input Filter	All Models	Internal Capacitor			

Output Specifications

Parameter	Conditions		Min.	Typ.	Max.	Unit
Output Voltage Setting Accuracy			---	---	±1.0	%Vnom.
Output Voltage Balance	Dual Output, Balanced Loads		---	---	±1.0	%
Line Regulation	Vin=Min. to Max. @Full Load		---	---	±0.2	%
Load Regulation	Io=0% to 100%	Single Output Models	---	---	±1.0	%
		Dual Output Models	---	---	±1.0	%
	Io=10% to 90%	Single Output Models	---	---	±0.5	%
		Dual Output Models	---	---	±0.8	%
Minimum Load	No minimum Load Requirement					
Ripple & Noise	0-20 MHz Bandwidth		---	---	110	mV_{P-P}
Transient Recovery Time	25% Load Step Change		---	250	---	µsec
Transient Response Deviation			---	±3	±5	%
Temperature Coefficient			---	---	±0.02	%/°C
Over Load Protection	Foldback		---	130	---	%
Short Circuit Protection	Continuous, Automatic Recovery					

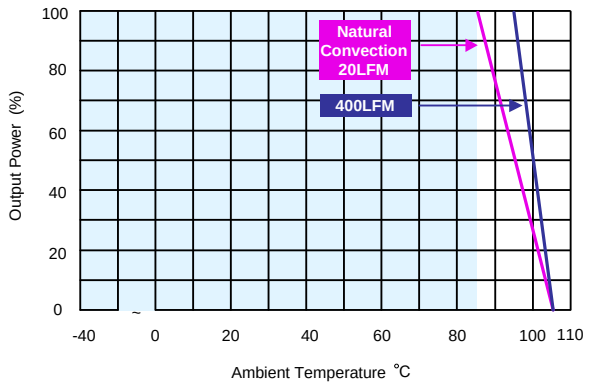
General Specifications

Parameter	Conditions	Min.	Typ.	Max.	Unit
I/O Isolation Voltage	60 Seconds	1500	---	---	VDC
	1 second	1800	---	---	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	UL/cUL 60950-1 recognition (CSA certificate), IEC/EN 60950-1(CB-report)				

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
Cooling	Natural Convection			
Lead Temperature (1.5mm from case for 10Sec.)		---	260	°C

Power Derating Curve



Notes

1 Specifications typical at Ta=+25℃, resistive load, nominal input voltage, rated output current unless otherwise noted.

2 We recommend to protect the converter by a slow blow fuse in the input supply line.

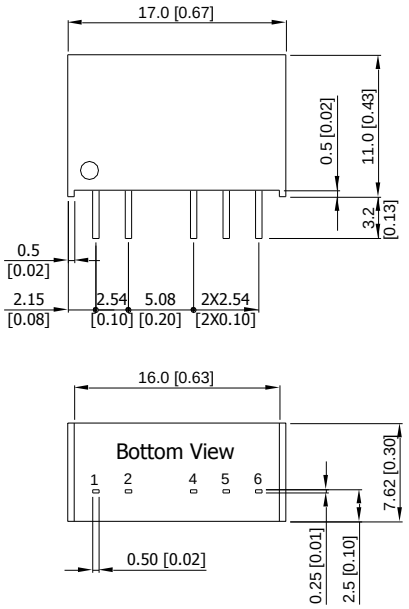
3 Other input and output voltage may be available, please contact factory.

4 That “natural convection” is about 20LFM but is not equal to still air (0 LFM).

5 Specifications are subject to change without notice.

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)

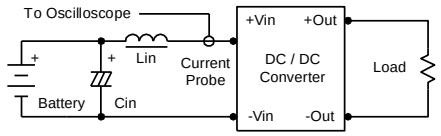
Physical Characteristics

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

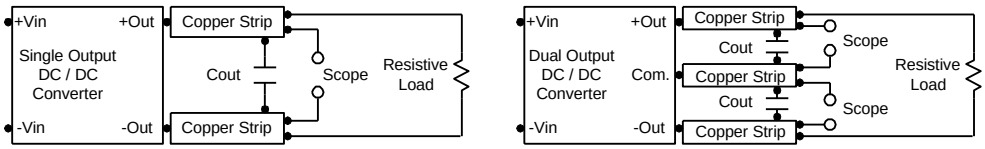
Input Reflected-Ripple Current Test Setup

Input reflected-ripple current is measured with a inductor Lin (4.7μH) and Cin (220μF, 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 0.47μF 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.



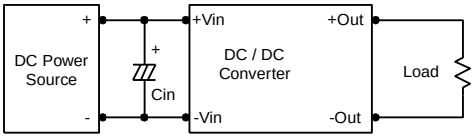
Technical Notes

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.

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 < 1.0Ω at 100 KHz) capacitor of a 8.2μF for the 5V input device, a 3.3μF for the 12V input devices and a 1.5μF 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 3.3μF 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°C. The derating curves are determined from measurements obtained in a test setup.