FEATURES

- ▶ Compact SIP-8 Package
- ▶ Wide 2 : 1 Input Voltage Range
- ▶ Fully Regulated Output Voltage
- ▶ I/O Isolation 1600 VDC
- ▶ Operating Ambient Temp. Range -40℃ to +85℃
- ▶ Overload and Short Circuit Protection
- ▶ Remote On/Off Control
- ▶ UL/cUL/IEC/EN 62368(60950-1) Safety Approval

UL 62368-1 CSA 60950-1 CB Scheme

PRODUCT OVERVIEW

The MINMAX MCW03 series is a range of isolated 3W DC-DC converter modules featuring fully regulated output and wide 2:1 input voltage ranges.
The product comes in a SIP-8 package with a very small footprint occupying only 2.0 cm² (0.3 square in.) on the PCB.
An excellent efficiency allows an operating temperature range of -40°C to +85°C. Further features include remote On/Off control and over load protection.
The very compact dimensions of these DC-DC converters make them an ideal solution for many space critical applications in battery-powered equipment and instrumentation.

Model Selection Guide

Model Number	Input Voltage (Range)	Output Voltage	Output Current		Input Current		Max. capacitive Load	Efficiency (typ.)
			Max.	Min.	@Max. Load	@No Load		@Max. Load
	VDC	VDC	mA	mA	mA(typ.)	mA(typ.)	µF	%
MCW03-05S033	5 (4.5 ~ 9)	3.3	700	175	651	70	1760	71
MCW03-05S05		5	600	150	822		1000	73
MCW03-05S12		12	250	63	759		170	79
MCW03-05S15		15	200	50	759		110	79
MCW03-05D05		±5	±300	±75	811		470 #	74
MCW03-05D12		±12	±125	±31	759		100 #	79
MCW03-05D15		±15	±100	±25	759		47 #	79
MCW03-12S033	12 (9 ~ 18)	3.3	700	175	257	20	1760	75
MCW03-12S05		5	600	150	321		1000	78
MCW03-12S12		12	250	63	301		170	83
MCW03-12S15		15	200	50	301		110	83
MCW03-12D05		±5	±300	±75	316		470 #	79
MCW03-12D12		±12	±125	±31	301		100 #	83
MCW03-12D15		±15	±100	±25	301		47 #	83
MCW03-24S033	24 (18 ~ 36)	3.3	700	175	128	10	1760	75
MCW03-24S05		5	600	150	160		1000	78
MCW03-24S12		12	250	63	151		170	83
MCW03-24S15		15	200	50	151		110	83
MCW03-24D05		±5	±300	±75	156		470 #	80
MCW03-24D12		±12	±125	±31	151		100 #	83
MCW03-24D15		±15	±100	±25	151		47 #	83
MCW03-48S033	48 (36 ~ 75)	3.3	700	175	64	8	1760	75
MCW03-48S05		5	600	150	80		1000	78
MCW03-48S12		12	250	63	75		170	83
MCW03-48S15		15	200	50	75		110	83
MCW03-48D05		±5	±300	±75	78		470 #	80
MCW03-48D12		±12	±125	±31	75		100 #	83
MCW03-48D15		±15	±100	±25	75		47 #	83

For each output

Input Specifications

Parameter	Model	Min.	Typ.	Max.	Unit
Input Surge Voltage (1 sec. max.)	5V Input Models	-0.7	---	11	VDC
	12V Input Models	-0.7	---	25	VDC
	24V Input Models	-0.7	---	50	VDC
	48V Input Models	-0.7	---	100	VDC
Start-Up Threshold Voltage	5V Input Models	3	4	4.5	VDC
	12V Input Models	4.5	7	9	VDC
	24V Input Models	8	12	18	VDC
	48V Input Models	16	24	36	VDC
Under Voltage Shutdown	5V Input Models	---	3.5	4	VDC
	12V Input Models	---	6.5	8.5	VDC
	24V Input Models	---	11	17	VDC
	48V Input Models	---	22	34	VDC
Short Circuit Input Power	All Models	---	---	2500	mW
Input Filter	All Models	Internal Capacitor			

Remote On/Off Control

Parameter	Conditions	Min.	Typ.	Max.	Unit
Converter On	Under 0.6 VDC or Open Circuit				
Converter Off	2.7 to 15 VDC				
Standby Input Current	Nominal Vin	---	---	3	mA
Control Input Current (on)	Vin = 0V	---	---	1	mA
Control Input Current (off)	Vin = 5.0V	---	---	1	mA
Control Common	Referenced to Negative Input				

Output Specifications

Parameter	Conditions	Min.	Typ.	Max.	Unit
Output Voltage Setting Accuracy		---	---	±1.0	%Vnom.
Output Voltage Balance	Dual Output, Balanced Loads	---	±0.5	±2.0	%
Line Regulation	Vin=Min. to Max. @Full Load	---	±0.3	±0.5	%
Load Regulation	Io=25% to 100%	---	±0.5	±1.0	%
Ripple & Noise	0-20 MHz Bandwidth	---	50	75	mV P-P
Transient Recovery Time	25% Load Step Change	---	300	500	μsec
Transient Response Deviation	25% Load Step Change	---	±3	±5	%
Temperature Coefficient		---	---	±0.02	%/℃
Over Load Protection	Foldback	110	140	---	%
Short Circuit Protection	Continuous, Automatic Recovery				

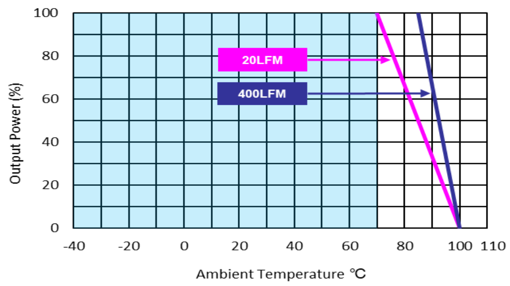
General Specifications

Parameter	Conditions	Min.	Typ.	Max.	Unit
I/O Isolation Voltage	60 Seconds	1600	---	---	VDC
	1 Second	1920	---	---	VDC
I/O Isolation Resistance	500 VDC	1000	---	---	MΩ
I/O Isolation Capacitance	100kHz, 1V	---	60	200	pF
Switching Frequency		---	300	---	kHz
MTBF (calculated)	MIL-HDBK-217F@25℃, Ground Benign		1,000,000		Hours
Safety Approvals	UL/cUL 60950-1 recognition (CSA certificate), IEC/EN 60950-1(CB-report)				
	UL/cUL 62368-1 recognition (UL certificate), IEC/EN 62368-1 (CB-report)				

Environmental Specifications

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

Power Derating Curve

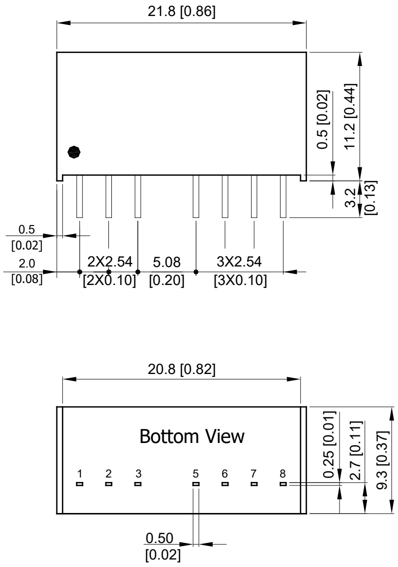


Notes

1. Specifications typical at Ta=+25℃, resistive load, nominal input voltage and 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. These power converters require a minimum output loading to maintain specified regulation, operation under no-load conditions will not damage these modules; however, they may not meet all specifications listed.
4. We recommend to protect the converter by a slow blow fuse in the input supply line.
5. Other input and output voltage may be available, please contact factory.
6. Specifications are subject to change without notice.

Package Specifications

Mechanical Dimensions



Pin Connections

Pin	Single Output	Dual Output
1	-Vin	-Vin
2	+Vin	+Vin
3	Remote On/Off	Remote On/Off
5	NC	NC
6	+Vout	+Vout
7	-Vout	Common
8	NC	-Vout

NC: No Connection

- All dimensions in mm (inches)
- Tolerance: X.X±0.5 (X.XX±0.02)
  X.XX±0.25 (X.XXX±0.01)
- Pins ±0.1(±0.004)

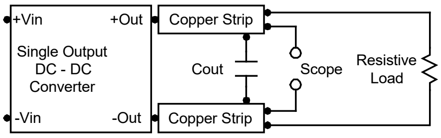
Physical Characteristics

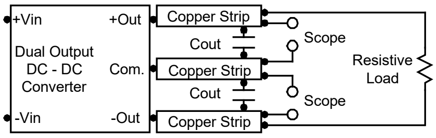
Case Size	:	21.8x9.3x11.2 mm (0.86x0.37x0.44 inches)
Case Material	:	Non-Conductive Black Plastic (flammability to UL 94V-0 rated)
Pin Material	:	Alloy 42
Weight	:	4.8g

Test Setup

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

Remote On/Off

Negative logic remote on/off turns the module off during a logic high voltage on the remote on/off pin, and on during a logic low. To turn the power module on and off, the user must supply a switch to control the voltage between the on/off terminal and the -Vin terminal. The switch can be an open collector or equivalent.
A logic high is 2.7V to 15V. A logic low is under 0.6 VDC or open circuit, drops down to 0VDC by 2mV/°C. The maximum sink current at on/off terminal during a logic low is 1 mA. The maximum allowable leakage current of the switch at on/off terminal= (under 0.6VDC or open circuit) is 1mA.

Maximum Capacitive Load

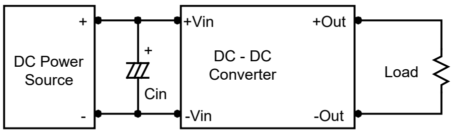
The MCW03 series has limitation of maximum connected capacitance at the output. The power module may be operated in current limiting mode during start-up, affecting the ramp-up and the startup time. The maximum capacitance can be found in the data sheet.

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.

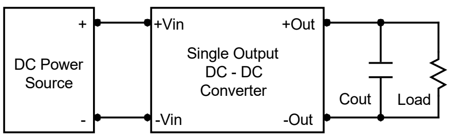
Input Source Impedance

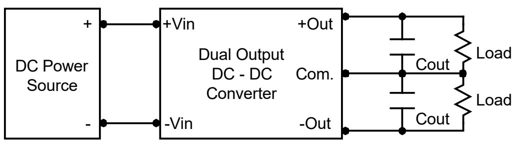
The power module should be connected to a low ac-impedance input source. Highly inductive source impedances can affect the stability of the power module. In applications where power is supplied over long lines and output loading is high, it may be necessary to use a capacitor at the input to ensure startup.
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 < 1.0Ω 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.