FEATURES

- **Package Size 1.0”x1.0”x0.4”**
- **Ultra-wide 4:1 Input Range**
- **High Efficiency up to 87%**
- **Operating Temp. Range -40°C to +80°C**
- **I/O-isolation Voltage 1500VDC**
- **Remote On/Off Control**
- **Input Filter complies to EN55022,Class A & FCC,Level A**
- **Shielded Metal Case with Isolated Baseplate**
- **CSA/UL/IEC/EN 60950-1 Safety Approval**
- **3 Years Product Warranty**

NEW

PRODUCT OVERVIEW

The MINMAX MJWI10 series are cost optimized dc-dc converter modules offering 10W output power in a 1”x1”x0.4” shielded metal package with industry standard pinout. All models provide ultra-wide 4:1 input voltage range and tight output voltage regulation.

State-of-the-art circuit topology provides a high efficiency up to 87% which allows an operating temperature range of -40°C to +80°C. Further features include remote On/Off, overload protection and conducted EMI compliance to EN55022, class A.

Typical applications for these converters are battery operated equipment, instrumentation, distributed power architectures in communication and industrial electronics and other space critical applications.

Model Selection Guide

Model Number	Input Voltage (Range)	Output Voltage	Output Current	Input Current		Max. capacitive Load	Efficiency (typ.)
			Max.	@Max. Load	@No Load		@Max. Load
	VDC	VDC	mA	mA(typ.)	mA(typ.)	μF	%
MJWI10-24S033	24 (9 ~ 36)	3.3	2200	352	30	560	86
MJWI10-24S05		5	2000	496		560	84
MJWI10-24S051		5.1	2000	506		560	84
MJWI10-24S12		12	830	483		150	86
MJWI10-24S15		15	660	474		150	87
MJWI10-24S24		24	410	477		68	86
MJWI10-24D05		±5	±1000	496		220#	84
MJWI10-24D12		±12	±410	477		100#	86
MJWI10-24D15		±15	±330	474		100#	87
MJWI10-48S033	48 (18 ~ 75)	3.3	2200	180	20	560	85
MJWI10-48S05		5	2000	248		560	84
MJWI10-48S051		5.1	2000	253		560	84
MJWI10-48S12		12	830	241		150	86
MJWI10-48S15		15	660	237		150	87
MJWI10-48S24		24	410	238		68	86
MJWI10-48D05		±5	±1000	248		220#	84
MJWI10-48D12		±12	±410	238		100#	86
MJWI10-48D15		±15	±330	237		100#	87

For each output

Input Specifications

Parameter	Model	Min.	Typ.	Max.	Unit
Input Surge Voltage (1 sec. max.)	24V Input Models	-0.7	---	50	VDC
	48V Input Models	-0.7	---	100	
Start-Up Threshold Voltage	24V Input Models	---	---	9	
	48V Input Models	---	---	18	
Under Voltage Shutdown	24V Input Models	---	---	8.5	
	48V Input Models	---	---	17	
Reverse Polarity Input Current	All Models	---	---	1.5	A
Short Circuit Input Power		---	2500	---	mW
Internal Power Dissipation		---	---	5000	mW
Conducted EMI		Compliance to EN 55022,class A and FCC part 15,class A			

Output Specifications

Parameter	Conditions	Min.	Typ.	Max.	Unit
Output Voltage Setting Accuracy	At 50% Load and Nominal Vin	---	---	±2.0	%Vnom.
Output Voltage Balance	Dual Output, Balanced Loads	---	±1.0	±2.0	%
Line Regulation	Vin=Min. to Max.	---	±0.3	±1.0	%
Load Regulation	Io=0% to 100%	---	±0.5	---	%
Min.Load	No minimum Load Requirement				
Ripple & Noise (20MHz)	25% Load Step Change	---	60	100	mV_{p-p}
Transient Recovery Time		---	300	600	µsec
Transient Response Deviation		---	±3	±6	%
Temperature Coefficient		---	±0.01	±0.02	%/℃
Over Load Protection	Foldback	110	150	---	%
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	---	---	1500	pF
Switching Frequency		---	450	---	KHz
MTBF(calculated)	MIL-HDBK-217F@25℃, Ground Benign	350,000	---	---	Hours
Safety Approvals	UL/cUL 60950-1 recognition(CSA certificate), IEC/EN 60950-1(CB-scheme)				

Input Fuse

24V Input Models	48V Input Models
2000mA Slow-Blow Type	1000mA Slow-Blow Type

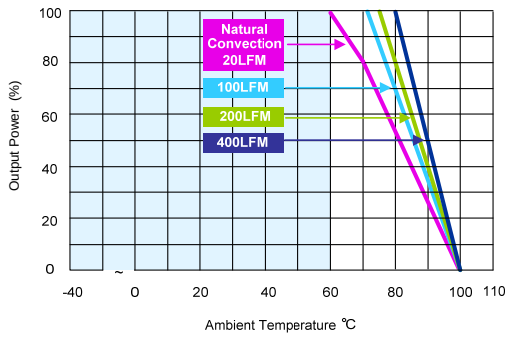
Remote On/Off Control

Parameter	Conditions	Min.	Typ.	Max.	Unit
Converter On	2.5V ~ 50V or Open Circuit				
Converter Off	0~1.0V or Short Circuit (Pin 2 and Pin 6)				
Control Input Current (on)	Vctrl = 5V	---	---	500	µA
Control Input Current (off)	Vctrl = 0V	---	---	-500	µA
Control Common	Referenced to Negative Input				
Standby Input Current		---	---	10	mA

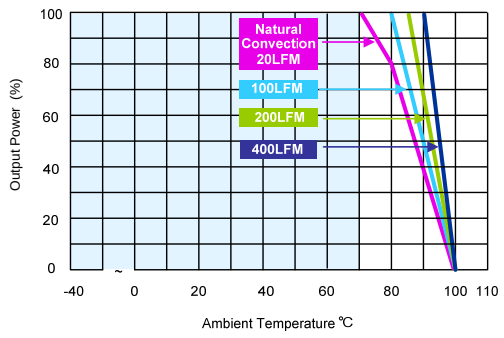
Environmental Specifications

Parameter	Conditions	Min.	Max.	Unit
Operating Ambient Temperature Range (See Power Derating Curve)	Natural Convection	-40	+80	℃
Case Temperature		---	+100	℃
Storage Temperature Range		-50	+125	℃
Humidity (non condensing)		---	95	% rel. H
Cooling	Free-Air convection			
RFI	Six-Sided Shielded, Metal Case			
Lead Temperature (1.5mm from case for 10Sec.)		---	260	℃

Power Derating Curve



Derating Curve without Heatsink



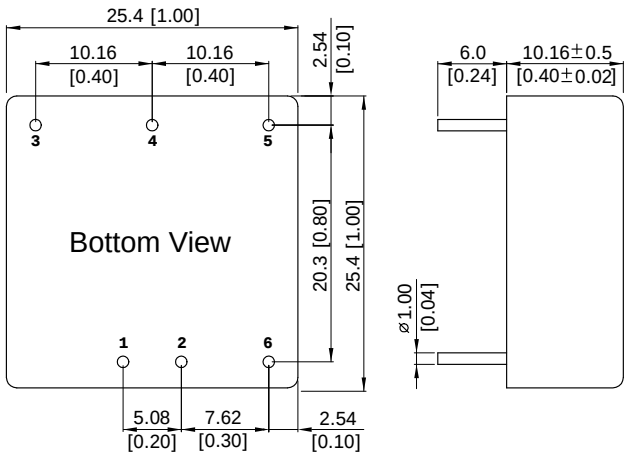
Derating Curve with Heatsink

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 Ripple & Noise measurement bandwidth is 0-20 MHz.
4 All DC/DC converters should be externally fused at the front end for protection.
5 Other input and output voltage may be available, please contact factory.
6 To order the converter with heatsink, please add a **suffix -HS** (e.g. MJWI10-24S05-HS) to order code.
7 That "natural convection" is about 20LFM but is not equal to still air (0 LFM)
8 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	+Vout	+Vout
4	No Pin	Common
5	-Vout	-Vout
6	Remote On/Off	Remote On/Off

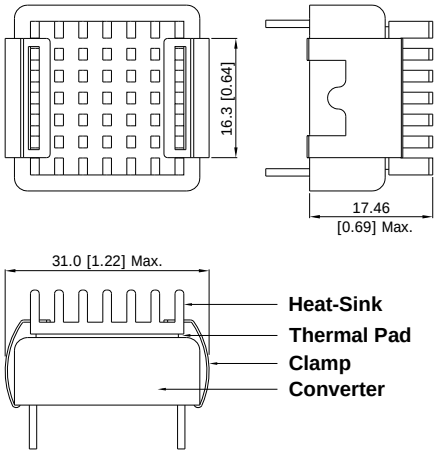
- All dimensions in mm (inches)
- Tolerance: X.X±0.25 (X.XX±0.01)
  X.XX±0.13 (X.XXX±0.005)
- Pin diameter ∅ 1.0 ±0.05 (0.04±0.002)

Physical Characteristics

Case Size	:	25.4x25.4x10.16mm (1.0x1.0x0.4 inches)
Case Material	:	Aluminium Alloy, Black Anodized Coating
Base Material	:	FR4 PCB (flammability to UL 94V-0 rated)
Pin Material	:	Copper Alloy with Gold Plate Over Nickel Subplate
Weight	:	15g

Heatsink (Option –HS)

Mechanical Dimensions



Heatsink Material: Aluminum

Finish: Anodic treatment (black)

Weight: 2g

▶ The advantages of adding a heatsink are:

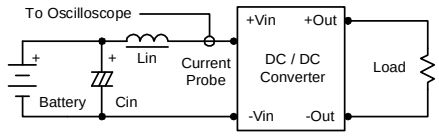
1.To help heat dissipation and increase the stability and reliability of DC/DC converters at high operating temperature atmosphere.

2.To upgrade the operating temperature of DC/DC converters, please refer to Derating Curve.

Test Setup

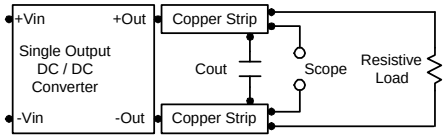
Input Reflected-Ripple Current Test Setup

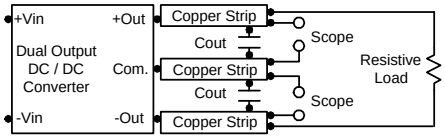
Input reflected-ripple current is measured with a inductor Lin (4.7μH) and Cin (220μF, ESR < 1.0Ω at 100 KHz) to simulate source impedance. Capacitor Cin, offsets possible battery impedance. Current ripple is measured at the input terminals of the module, measurement bandwidth is 0-500 KHz.



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

Remote On/Off

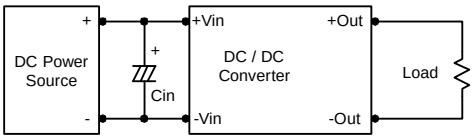
Positive logic remote on/off turns the module on during a logic high voltage on the remote on/off pin, and off during a logic low. To turn the power module on and off, the user must supply a switch to control the voltage between the on/off terminal and the -Vin terminal.
The switch can be an open collector or equivalent. A logic low is 0V to 1V. A logic high is 2.5V to 50V. The maximum sink current at on/off terminal during a logic low is -500μA. The maximum allowable leakage current of the switch at on/off terminal (2.5 to 50V) is 500μA.

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.

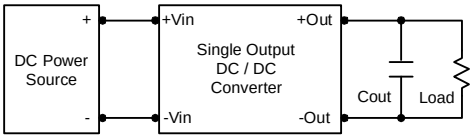
Input Source Impedance

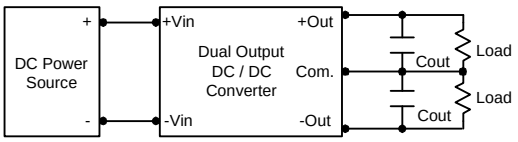
The power module should be connected to a low ac-impedance input source. Highly inductive source impedances can affect the stability of the power module.
In applications where power is supplied over long lines and output loading is high, it may be necessary to use a capacitor at the input to ensure startup.
Capacitor mounted close to the power module helps ensure stability of the unit, it is recommended to use a good quality low Equivalent Series Resistance (ESR < 1.0Ω at 100 KHz) capacitor of a 6.8μF 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 4.7μF capacitors at the output.





Maximum Capacitive Load

The MJWI10 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.

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 100℃. The derating curves are determined from measurements obtained in a test setup.