

FEATURES

- ▶ 50-w/in³ High Power Density
- ▶ 1" x 1" x 0.4" Shielded Metal Package
- ▶ 4:1 Ultra-Wide Input Range
- ▶ Excellent Efficiency up to 90%
- ▶ Single Output Current up to 4.5A
- ▶ I/O Isolation Voltage 1500VDC
- ▶ Remote On/Off Control
- ▶ Over Voltage Protection
- ▶ Complies with EN55022 Class A
- ▶ 3-Year Product Warranty



PRODUCT OVERVIEW

MINMAX's MJWI20 series, comprising 12 different models, specially addressing mobile equipment, instrumentation, distributed power architectures in communication and industrial electronics. Packing up to 20W of power into a 1x 1x 0.4 inch package, with efficiency as high as 90%, the MJWI20 has ultra-wide 4:1 input voltage range and a tight output voltage regulation. Other features include over temperature and short circuit protection, over voltage protection, remote on/off, six-sided shielded case, and EN55022 Class A.

Model Selection Guide

Model Number	Input Voltage	Output Voltage	Output Current		Input Current		Reflected Ripple Current	Over Voltage Protection	Capacitive Load	Efficiency
			Max.	Min.	@Max. Load	@No Load				
			mA	mA	mA(Typ.)	mA(Typ.)				
MJWI20-24S033	24 (9 ~ 36)	3.3	4500	0	1390	80	50	3.9	10300	89
MJWI20-24S05		5	4000	0	1852	90				
MJWI20-24S12		12	1670	0	1877	40				
MJWI20-24S15		15	1340	0	1882	40				
MJWI20-24D12		±12	±835	±60	1877	40				
MJWI20-24D15		±15	±670	±50	1882	40				
MJWI20-48S033	48 (18 ~ 75)	3.3	4500	0	695	40	30	3.9	10300	89
MJWI20-48S05		5	4000	0	926	45				
MJWI20-48S12		12	1670	0	938	25				
MJWI20-48S15		15	1340	0	930	25				
MJWI20-48D12		±12	±835	±60	938	25				
MJWI20-48D15		±15	±670	±50	941	25				

For each output

Absolute Maximum Ratings

Parameter	Model	Min.	Max.	Unit
Input Surge Voltage (1 sec. max.)	24VDC Input Models	-0.7	50	VDC
	48VDC Input Models	-0.7	100	VDC
Lead Temperature (1.5mm from case for 10Sec.)		---	260	°C

Exceeding the absolute maximum ratings of the unit could cause damage. These are not continuous operating ratings.

Input Specifications

Parameter	Model	Min.	Typ.	Max.	Unit
Start Voltage	24V Input Models	---	---	9	VDC
	48V Input Models	---	---	18	
Input Filter	All Models	LC Filter			

Output Specifications

Parameter	Conditions	Min.	Typ.	Max.	Unit		
Output Voltage Accuracy		---	---	±1.0	%		
Output Voltage Balance	Dual Output, Balanced Loads	---	---	±2.0	%		
Line Regulation	Vin=Min. to Max.	Single Output	---	---	±0.2	%	
		Dual Output	---	---	±0.5	%	
Load Regulation	Min. Load to Full Load	Single Output	3.3V & 5V	---	---	±0.5	%
			12V & 15V	---	---	±0.2	%
		Dual Output	---	---	±1.0	%	
Ripple & Noise (20MHz)	3.3V & 5V Models	---	75	---	mV P-P		
Ripple & Noise (20MHz)	12V & 15V Models	---	100	---	mV P-P		
Ripple & Noise (20MHz)	Dual Output Models	---	100	---	mV P-P		
Over Power Protection		---	150	---	%		
Transient Recovery Time	25% Load Step Change	---	300	---	uS		
Temperature Coefficient		---	---	±0.02	%/°C		
Output Short Circuit	Hiccup Automatic Recovery						

General Specifications

Parameter	Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage Rated	60 Seconds	1500	---	---	VDC
Isolation Test Voltage	Flash Tested For 1 Second	1650	---	---	VDC
Isolation Resistance	500 VDC	1000	---	---	MΩ
Isolation Capacitance	100KHz, 1V	---	---	1500	pF
Switching Frequency		---	330	---	KHz
MTBF(Calculated)	MIL-HDBK-217F@25°C, Ground Benign	346	-----	-----	K Hours

Input Fuse Selection Guide

24V Input Models	48V Input Models
5000mA Slow-Blow Type	2500mA Slow-Blow Type

Remote On/Off Control

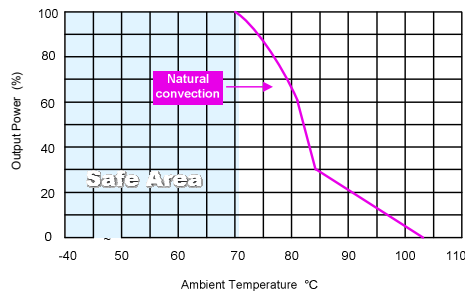
Parameter	Conditions	Min.	Typ.	Max.	Unit
DC/DC On	3.5V ~ 12V or Open Circuit				
DC/DC Off	0V ~ 1.2V or Short Circuit				
Control Input Current (on)	Vctrl = 5.0V	---	---	0.5	mA
Control Input Current (off)	Vctrl = 0V	---	---	-0.5	mA
Control Common	Referenced to Negative Input				
Standby Input Current	Supply Off & Nominal Vin	---	10	---	mA

Output Voltage Trim

Parameter	Conditions	Min.	Typ.	Max.	Unit
Trim Up / Down Range	% of nominal output voltage	±10	---	---	%

Environmental Specifications

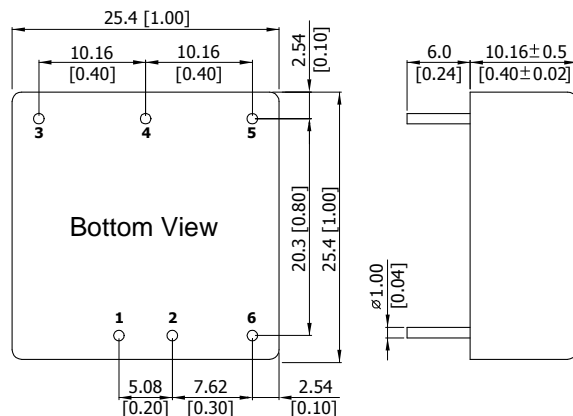
Parameter	Conditions	Min.	Max.	Unit
Operating Temperature with derating	Ambient	-40	+85	°C
Case Temperature		-40	+105	°C
Storage Temperature		-50	+125	°C
Humidity (non condensing)		---	95	% rel. H
Cooling	Free-Air convection			
RFI	Six-Sided Shielded, Metal Case			
Conducted EMI (Note 6)	EN55022 Class A			

Derating Curve


(MJWI20-48S05)

Notes

- 1 Specifications typical at Ta=+25°C, resistive load, nominal input voltage, 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 20 MHz, measured with a 1uF M/C and a 10uF T/C.
- 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 The MJWI20 series can meet EN55022 Class A with parallel an external capacitor to the input pins. Please refer to Test Configurations on the last page.
- 7 Specifications 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	Trim	Common
5	-Vout	-Vout
6	Remote On/Off	Remote On/Off

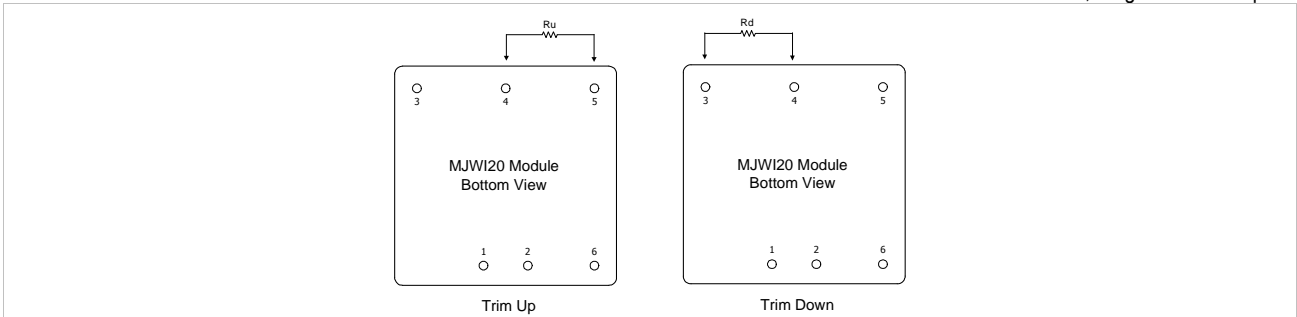
- ▶ All dimensions in mm (inches)
- ▶ Tolerance: X.X±0.25 (X.XX±0.01)
X.XX±0.13 (X.XXX±0.005)
- ▶ Pin pitch tolerance: ±0.25 (0.01)

Physical Characteristics

Case Size	: 25.4X25.4X10.16mm (1.0X1.0X0.4 Inches)
Case Material	: Metal With Non-Conductive Baseplate (flammability to UL 94V-0 rated)
Weight	: 15g

External Output Trimming

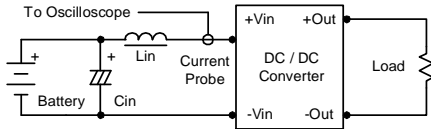
Output can be externally trimmed by using the method shown below



Test Configurations

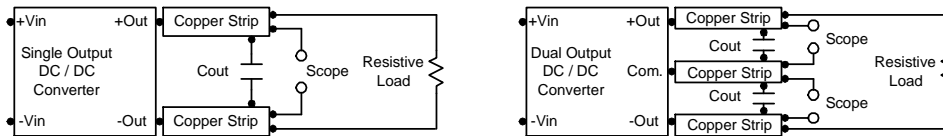
Input Reflected-Ripple Current Test Setup

Input reflected-ripple current is measured with an inductor L_{in} (4.7uH) and C_{in} (220uF, ESR < 1.0Ω 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 1uF ceramic capacitor and a 10uF tantalum 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

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 1.2V. A logic high is 3.5V to 12V. The maximum sink current at the on/off terminal (Pin 6) during a logic low is -500uA. The maximum allowable leakage current of a switch connected to the on/off terminal (Pin 6) at logic high (3.5V to 12V) is 10mA.

Overcurrent Protection

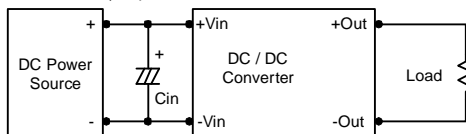
To provide hiccup mode protection in a fault (output overload) condition, the unit is equipped with internal current limiting circuitry and can endure overload for an unlimited duration.

Overvoltage Protection

The output overvoltage clamp consists of control circuitry, which is independent of the primary regulation loop, that monitors the voltage on the output terminals. The control loop of the clamp has a higher voltage set point than the primary loop. This provides a redundant voltage control that reduces the risk of output overvoltage. The OVP level can be found in the output data.

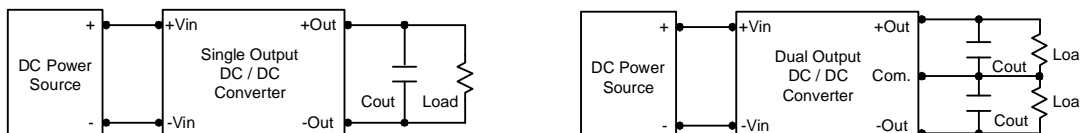
Input Source Impedance

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 < 1.0 Ω at 100 KHz) capacitor of a 10uF 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 4.7uF capacitors at the output.

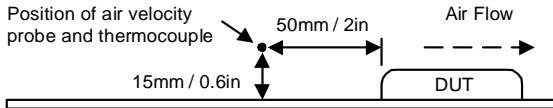


Maximum Capacitive Load

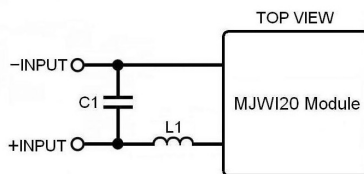
The MJWI20 series has limitation of maximum connected capacitance at the output. The power module may be operated in current limiting mode during start-up, affecting the ramp-up and the startup time. The maximum capacitance can be found in the data sheet.

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 90°C. The derating curves are determined from measurements obtained in an experimental apparatus.


Electromagnetic Emission EN 55022 Class A

Conducted and radiated emissions EN55022 Class A



Model	Component	Value
MJWI20-24XXX	C1	3.3uF/50V 1210 X7R MLCC
	L1	SMTDR54-6R5M-JT8
MJWI20-48XXX	C1	2.2uF/100V 1210 X7R MLCC
	L1	SMTDR54-120M-JT8