

FEATURES

- ▶ Reinforced Insulation rated for 300VAC Working Voltage
- ▶ Ultra high I/O-isolation 8000VDC
- ▶ Low Ripple and Noise
- ▶ Low Leakage Current
- ▶ Low Isolation Capacitance
- ▶ Operating Temp. Range -40°C to +85°C
- ▶ 3 Years Product Warranty



Model Selection Guide

Model Number	Input Voltage (Range)	Output Voltage	Output Current		Input Current		Reflected Ripple Current	Max. Capacitive Load	Efficiency (typ.)
			Max.	Min.	@Max. Load	@No Load			@Max. Load
	VDC	VDC	mA	mA	mA(typ.)	mA(typ.)	mA(typ.)	μF	%
MIR401	5	5	300	0	400	50	30	470	75
MIR403	(4.5 ~ 5.5)	15	100	0	400	50	30	470	75

Input Specifications

Parameter	Min.	Typ.	Max.	Unit
Input Surge Voltage (1 sec. max.)	-0.7	---	7	VDC
Start-Up Voltage	4.5	5	5.5	
Short Circuit Input Power	---	---	1000	mW
Input Filter	LC Filter			
Internal Power Dissipation	---	---	1000	mW

Output Specifications

Parameter	Conditions	Min.	Typ.	Max.	Unit	
Output Voltage Accuracy		---	±2.0	±4.0	%	
Output Voltage Balance	Dual Output, Balanced Loads	---	±0.5	±2.0	%	
Line Regulation	For Vin Change of 1%	---	±1.2	±1.5	%	
Load Regulation	Io=20% to 100%	5V Output	---	±7.0	±10	%
		15V Output	---	±4.0	±6.0	%
Ripple & Noise (20MHz)		---	30	40	mV _{P-P}	
Ripple & Noise (20MHz)	Over Line, Load & Temp.	---	---	50	mV _{P-P}	
Ripple & Noise (20MHz)		---	---	15	mV rms	
Temperature Coefficient		---	±0.01	±0.02	%/°C	
Short Circuit Protection		Continuous				

General Specifications

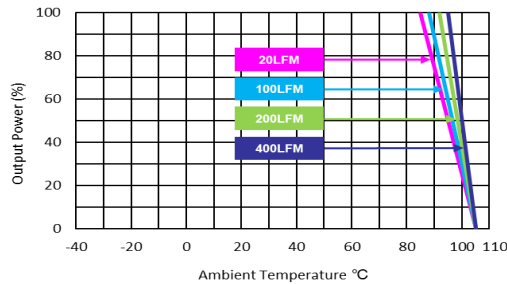
Parameter	Conditions	Min.	Typ.	Max.	Unit
I/O Isolation Voltage (rated)	60 Seconds	8000	---	---	VDC
Leakage Current	240VAC, 60Hz	---	---	2	μA
I/O Isolation Resistance	500 VDC	10	---	---	GΩ
I/O Isolation Capacitance	100kHz, 1V	---	10	15	pF
Switching Frequency		50	---	100	kHz
MTBF (calculated)	MIL-HDBK-217F@25°C, Ground Benign	2,000,000	---	---	Hours

Input Fuse

5V Input Models
1000mA Slow-Blow Type

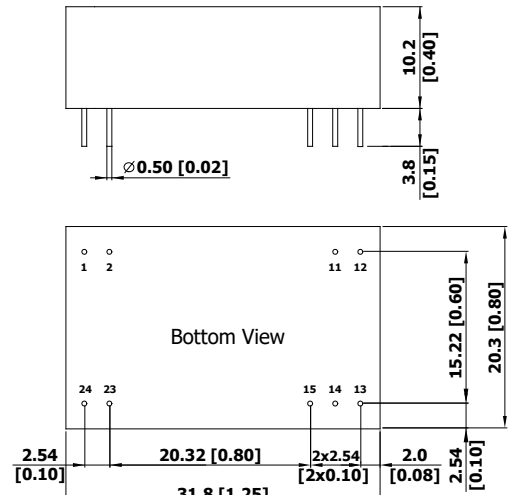
Environmental Specifications

Parameter	Conditions	Min.	Max.	Unit
Operating Temperature Range (without Derating)	Ambient	-40	+85	°C
Case Temperature		---	+95	°C
Storage Temperature Range		-55	+125	°C
Humidity (non condensing)		---	95	% rel. H
Cooling	Free-Air convection			
Lead Temperature (1.5mm from case for 10Sec.)		---	260	°C

Power Derating Curve

Notes

- Specifications typical at Ta=+25°C, resistive load, nominal input voltage and rated output current unless otherwise noted.
- Ripple & Noise measurement bandwidth is 0-20 MHz.
- All DC-DC converters should be externally fused at the front end for protection.
- Operation under no-load conditions will not damage these modules; however, they may not meet all specifications listed.
- Other input and output voltage may be available, please contact MINMAX.
- Specifications subject to change without notice.

Package Specifications

Mechanical Dimensions		Pin Connections																															
 <p>Top View Dimensions: Case width: 31.8 [1.25] Case height: 10.2 [0.40] Lead diameter: $\varnothing 0.50$ [0.02] Lead length: 3.8 [0.15]</p> <p>Bottom View Dimensions: Pin 1 to 2: 2.54 [0.10] Pin 11 to 12: 2.54 [0.10] Pin 13 to 14: 2.54 [0.10] Pin 15 to 16: 2.54 [0.10] Pin 23 to 24: 2.54 [0.10] Pin 1 to 11: 20.32 [0.80] Pin 11 to 13: 2.0 [0.08] Pin 13 to 15: 2.0 [0.08] Pin 15 to 23: 15.22 [0.60] Pin 23 to 24: 2.0 [0.08]</p>		<table border="1"> <thead> <tr> <th>Pin</th> <th>Single Output</th> <th>Dual Output</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>+Vin</td> <td>+Vin</td> </tr> <tr> <td>2</td> <td>+Vin</td> <td>+Vin</td> </tr> <tr> <td>11</td> <td>+Vout</td> <td>+Vout</td> </tr> <tr> <td>12</td> <td>+Vout</td> <td>+Vout</td> </tr> <tr> <td>13</td> <td>-Vout</td> <td>Common</td> </tr> <tr> <td>14</td> <td>-Vout</td> <td>Common</td> </tr> <tr> <td>15</td> <td>No Pin</td> <td>-Vout</td> </tr> <tr> <td>23</td> <td>-Vin</td> <td>-Vin</td> </tr> <tr> <td>24</td> <td>-Vin</td> <td>-Vin</td> </tr> </tbody> </table> <p> ▶ 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) ▶ Pin tolerance: ±0.05 (0.002) </p>		Pin	Single Output	Dual Output	1	+Vin	+Vin	2	+Vin	+Vin	11	+Vout	+Vout	12	+Vout	+Vout	13	-Vout	Common	14	-Vout	Common	15	No Pin	-Vout	23	-Vin	-Vin	24	-Vin	-Vin
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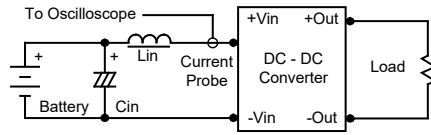
Physical Characteristics

Case Size	: 31.8x20.3x10.2 mm (1.25x0.80x0.40 inches)
Case Material	: Non-Conductive Black Plastic (flammability to UL 94V-0 rated)
Weight	: 12g

Test Setup

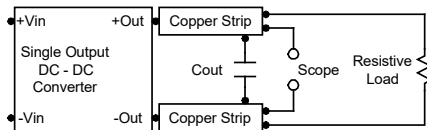
Input Reflected-Ripple Current Test Setup

Input reflected-ripple current is measured with an inductor L_{in} (4.7 μ H) and C_{in} (220 μ F, ESR < 1.0 Ω 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} 0.33 μ 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.



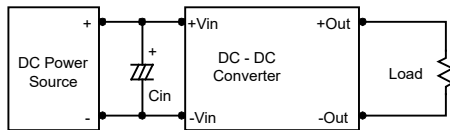
Technical Notes

Maximum Capacitive Load

The MIR400 series has a 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. For optimum performance we recommend 470 μ F capacitive load for single outputs. The maximum capacitance can be found in the data sheet.

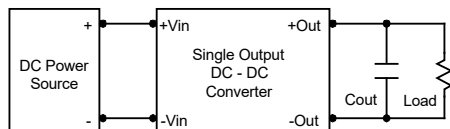
Input Source Impedance

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.



Output Ripple Reduction

A good quality low ESR 1.5 μ F capacitor connected as close as possible to the load is recommended.



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 95°C. The derating curves are determined from measurements obtained in a test setup.

