FEATURES

- Industrial Standard DIP-24 Package
- Fully Regulated Output Voltage
- Ultra-high I/O Isolation 6000VDC with Reinforced Insulation, rate for 300Vrms Working Voltage
- Common Mode Transient Immunity: 15KV/μs
- Qualified for IGBT and High Isolation Applications
- Operating Ambient Temp. Range -40℃ to +80℃
- No Min. Load Requirement
- Short Circuit Protection
- Designed-in Conducted EMI meets EN 55022 Class A & FCC Level A
- UL/cUL/IEC/EN 60950-1 Safety Approval & CE Marking

PRODUCT OVERVIEW

The MINMAX MIDER03-HI series is a new range of isolated 3W DC-DC converter modules in DIP-24 package which feature a regulated output and Ultra-high I/O Isolation voltage rated for 6000VDC with reinforced insulation. A very high common mode transient immunity with 15KV/μs qualifies these product for IGBT driver applications. Further features include short circuit protection and no min. load requirement and EN 55022 class A compliant as well. There are 15 Models available for 5, 12, and 24VDC input. These converters offer a cost-effective solution for wind turbine, solar panel, transporation systems, industrial control equipments and some IGBT driver applications where a very high I/O-isolation is required.

Model Selection Guide

Model Number	Input Voltage	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	%
MIDER03-05S05HI	5 ±10%	5	600	1017	130	470	59
MIDER03-05S12HI		12	250	984			61
MIDER03-05S15HI		15	200	960			62
MIDER03-05D12HI		±12	±125	1000		220 #	60
MIDER03-05D15HI		±15	±100	1000			60
MIDER03-12S05HI	12 ±10%	5	600	424	60	470	59
MIDER03-12S12HI		12	250	410			61
MIDER03-12S15HI		15	200	400			62
MIDER03-12D12HI		±12	±125	420		220 #	60
MIDER03-12D15HI		±15	±100	420			60
MIDER03-24S05HI	24 ±10%	5	600	212	40	470	59
MIDER03-24S12HI		12	250	198			63
MIDER03-24S15HI		15	200	195			64
MIDER03-24D12HI		±12	±125	210		220 #	60
MIDER03-24D15HI		±15	±100	210			60

For each output

Input Specifications

Parameter	Model	Min.	Max.	Unit
Input Voltage Range	5V Input Models	4.5	5.5	VDC
	12V Input Models	10.8	13.2	
	24V Input Models	21.6	26.4	
Input Surge Voltage (1 sec. max.)	5V Input Models	-0.7	7.5	
	12V Input Models	-0.7	15	
	24V Input Models	-0.7	30	
Short Circuit Input Power	All Models	---	2500	mW
Input Filter		Internal Pi Type		
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		---	---	±4.0	%Vnom.
Output Voltage Balance	Dual Output, Balanced Loads	---	±2.0	±4.0	%
Line Regulation	Vin=Min. to Max. @Full Load	---	±0.3	±0.5	%
Load Regulation	Io=10% to 100%	---	±0.5	±1.0	%
Minimum Load	No minimum Load Requirement				
Ripple & Noise	0-20 MHz Bandwidth	---	---	50	mV P-P
Temperature Coefficient		---	±0.01	±0.02	%/℃
Short Circuit Protection	Continuous, Automatic Recovery				

Isolation, Safety Standards

Parameter	Conditions	Min.	Typ.	Max.	Unit
I/O Isolation Voltage	60 Seconds Reinforced insulation, rated for 300Vrms working voltage	3000	---	---	VACrms
	Tested for 1 second	6000	---	---	VDC
I/O Isolation Resistance	500 VDC	10	---	---	GΩ
I/O Isolation Capacitance	100KHz, 1V	---	20	---	pF
Common Mode Transient Immunity		15	---	---	KV/μs
Safety Approvals	UL/cUL 60950-1 recognition(UL certificate), IEC/EN 60950-1(CB-report)				

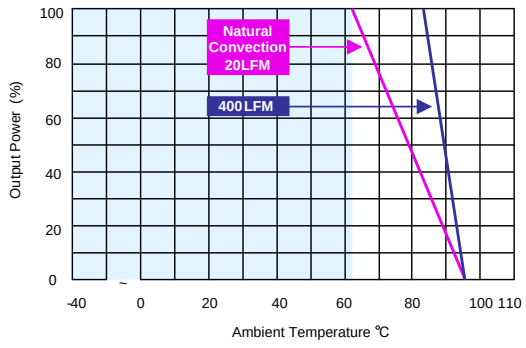
General Specifications

Parameter	Conditions	Min.	Typ.	Max.	Unit
Switching Frequency		25	60	---	KHz
MTBF(calculated)	MIL-HDBK-217F@25℃, Ground Benign		1,000,000		Hours

Environmental Specifications

Parameter	Conditions	Min.	Max.	Unit
Operating Ambient Temperature Range (See Power Derating Curve)	Natural Convection	-40	+75	℃
Case Temperature		---	+95	℃
Storage Temperature Range		-50	+125	℃
Humidity (non condensing)		---	95	% rel. H
Cooling	Natural Convection			
Lead Temperature (1.5mm from case for 10Sec.)		---	260	℃

Power Derating Curve

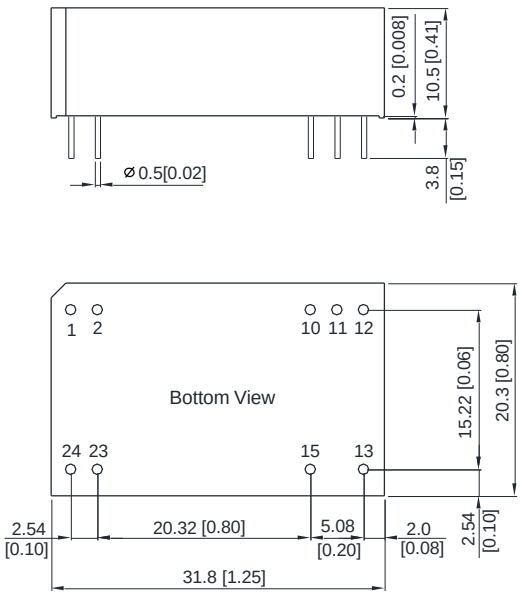


Notes

1 Specifications typical at Ta=+25°C, resistive load, nominal input voltage and 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
10	No Pin	Common
11	No Pin	Common
12	-Vout	No Pin
13	+Vout	-Vout
15	No Pin	+Vout
23	-Vin	-Vin
24	-Vin	-Vin

▶ 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)

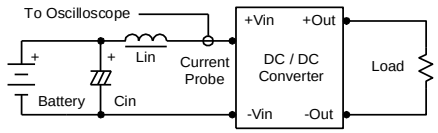
Physical Characteristics

Case Size	:	31.8x20.3x10.5 mm (1.25x0.80x0.41 inches)
Case Material	:	Non-Conductive Black Plastic (flammability to UL 94V-0 rated)
Pin Material	:	Copper Alloy with Gold Plate Over Nickel Subplate
Weight	:	12.4g

Test Setup

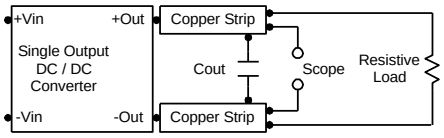
Input Reflected-Ripple Current Test Setup

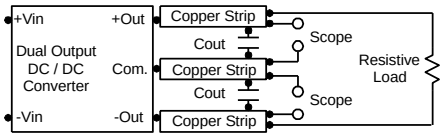
Input reflected-ripple current is measured with a inductor Lin (4.7μH) and Cin (220μF, ESR < 1.0Ω at 100 KHz) to simulate source impedance.
Capacitor Cin, offsets possible battery impedance.
Current ripple is measured at the input terminals of the module, measurement bandwidth is 0-500 KHz.



Peak-to-Peak Output Noise Measurement Test

Use a Cout 0.33μF 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.





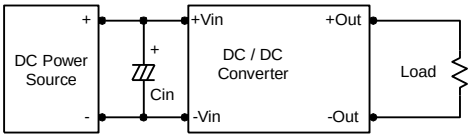
Technical Notes

Maximum Capacitive Load

The MIDER03-HI 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. For optimum performance we recommend 220μF maximum capacitive load for dual outputs and 470μF capacitive load for single outputs. The maximum capacitance can be found in the data sheet.

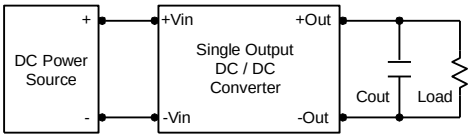
Input Source Impedance

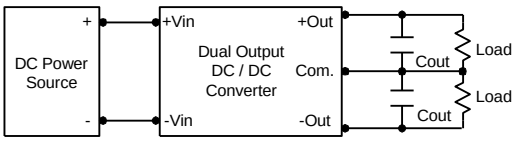
The power module should be connected to a low ac-impedance input source. Highly inductive source impedances can affect the stability of the power module.
In applications where power is supplied over long lines and output loading is high, it may be necessary to use a capacitor at the input to ensure startup.
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 4.7μF for the 5V input devices and a 2.2μF for the 12V and 24V 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 1.5μF 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 95°C. The derating curves are determined from measurements obtained in a test setup.