

#### Features

- Inputs: 28 Vdc per MIL-STD-704D/E/F 155 Vdc per MIL-STD-1399A 270 Vdc per MIL-STD-704D/E/F
- Single output: 2 48 Vdc
- Up to 23 W/in<sup>3</sup>
- MIL-STD-810 environments
- Up to 90% efficiency
- Remote sense
- Current limit
- ZCS power architecture
- Low noise FM control
- Size: 2.28" x 2.4" x 0.5" (57,9 x 61,0 x 12,7 mm)

# **Product Highlights**

The MI-J00 family of DC-DC converters is designed for applications utilizing distributed power architectures. Based on Vicor's VI-200 / VI-J00 family of zero-current switching, component-level DC-DC converters, the MI-J00 family offers exceptional performance in terms of power density, efficiency, noise, ease of use, and reliability.

The MI-J00 family meets all steady-state, transient and under/overvoltage requirements of MIL-STD-704D/E/F for both 28 Vdc input (MI-J2X) and 270 Vdc input (MI-J6X), and the worst case envelope of MIL-STD-1399A for 155 Vdc input (MI-J5X).

The output voltage can be externally trimmed or programmed from 50% to 110% of nominal output. Current limiting, remote sense, and an inhibit pin all combine to offer a high degree of protection, versatility, and reliability for power systems.

Fully encapsulated in Vicor's industry standard package, the MI-J00 family meets MIL-STD-810 environmental testing requirements for humidity, fungus, salt-fog, explosive atmosphere, acceleration, vibration, and shock.

# **Packaging Options**

Standard: Slotted baseplate

SlimMod: Flangeless baseplate, option suffix: - S Example: MI - JXX - XX - S

FinMod: Finned heat sink, option suffix: - F1, -F2, -F3 and - F4

Examples: MI - JXX - XX -F1, 0.25" fins, longitudinal MI - JXX - XX -F2, 0.50" fins, longitudinal MI - JXX - XX -F3, 0.25" fins, transverse MI - JXX - XX -F4, 0.50" fins, transverse Data Sheet *MI-J00* DC-DC Converters 10 to 50 Watts



# **Converter Selection Chart**

MI-J	•	•••
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Semi-custom modules available, consult factory.

## Input Voltage

Nominal	Range	Transient <sup>[a]</sup>	Notes
<b>2</b> = 28 V	18 – 50 V <sup>[b]</sup>	60 V	28 Vdc input per MIL-STD 704D/E/F
<b>5</b> = 155 V	100 – 210 V	230 V	155 Vdc input per MIL-STD-1399A
<b>6</b> = 270 V	125 – 400 V <sup>[c]</sup>	475 V	270 Vdc input per MIL-STD-704D/E/F
<b>7</b> = 165 V	100 – 310 V	n/a	

<sup>[a]</sup> Transient voltage for 1 second.

<sup>[b]</sup> 16 V operation at 75% load.

<sup>[c]</sup> These units rated at 75% load from 125 – 150 Vin: MI-J6Z-xY, MI-J6Y-xY, MI-J60-xY

• Output Vol	ltage
<b>Z</b> = 2.0 V	<b>1</b> = 12 V
<b>Y</b> = 3.3 V	<b>P</b> = 13.8 V
<b>0</b> = 5.0 V	<b>2</b> = 15 V
<b>X</b> = 5.2 V	<b>N</b> = 18.5 V
<b>W</b> = 5.5 V	<b>3</b> = 24 V
<b>V</b> = 5.8 V	L = 28 V
T = 6.5 V	<b>J</b> = 36 V
<b>R</b> = 7.5 V	<b>K</b> = 40 V
<b>M</b> = 10 V	<b>4</b> = 48 V

•• Product Grade Temperatures (°C					
Operating	Storage				
I = -40  to  +100	I = −55 to +125				
<b>M</b> = −55 to +100	<b>M</b> = −65 to +125				

<b>Output Powe</b>	r/Current Vout				
>5V <5V					

25 V	<5 V
<b>A</b> = 10 W	A = -
<b>Z</b> = 25 W	<b>Z</b> = 5 A
<b>Y</b> = 50 W	<b>Y</b> = 10 A

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# **CONVERTER SPECIFICATIONS**

(typical at  $T_{BP} = 25^{\circ}C$ , nominal line and 75% load, unless otherwise specified)

#### ■ INPUT SPECIFICATIONS

Parameter	Min	Тур	Max	Units	Test Conditions
Inrush charge		60 x 10 <sup>-6</sup>	100 x 10 <sup>-6</sup>	Coulombs	Nominal line
Input reflected ripple current – pp		10%		lin	Nominal line, full load
		$30+20 \operatorname{Log}\left(\frac{\operatorname{Vin}}{\operatorname{Vout}}\right)$		dB	120 Hz, nominal line
Input ripple rejection		$20 + 20 \text{Log}\left(\frac{\text{Vin}}{\text{Vout}}\right)$		dB	2400 Hz, nominal line
No load power dissipation		1.35	2	Watts	

#### OUTPUT CHARACTERISTICS

Parameter	Min	Тур	Max	Units	Test Conditions
Setpoint accuracy		0.5	1	%Vnom	
		0.05	0.2	%Vnom	LL to HL, 10% to Full Load
Load/line regulation		0.2	0.5	%V <sub>NOM</sub>	LL to HL, No Load to 10%
Output temperature drift		0.01	0.02	% / °C	Over rated temperature
Long term drift		0.02		%/1K hours	
		100	150	mV	Whichever is greater
Output ripple – pp		1.0	1.5	%Улом	20 MHz bandwidth
Trim range <sup>[a]</sup>	50		110	%Улом	
Total remote sense compensation	0.5			Volts	
Current limit	105		125	%Ілом	Automatic restart
Short circuit current	105		130	%Ілом	

<sup>[a]</sup> 10 V, 12 V and 15 V outputs, standard trim range ±10%. Consult factory for wider trim range.

#### ■ CONTROL PIN SPECIFICATIONS

Parameter	Min	Тур	Мах	Units	Test Conditions
Gate out impedance		50		-	
Gate in impedance		1000		-	
Gate in high threshold			6	Volts	Use open collector
Gate in low threshold	0.65			Volts	
Gate in low current			6	mA	

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## **CONVERTER SPECIFICATIONS (cont.)**

#### ■ DIELECTRIC WITHSTAND CHARACTERISTICS

Parameter	Min	Тур	Мах	Units	Test Conditions
Input to output	3,000			VRMS	Baseplate earthed
Output to baseplate	500			VRMS	
Input to baseplate	1,500			VRMS	
Input to output capacitance		50	75	pF	

#### THERMAL CHARACTERISTICS

Parameter	Min	Тур	Max	Units	Test Conditions
Efficiency		80 - 90%			
Baseplate to sink		0.14		°C/Watt	With thermal pads

#### ENVIRONMENTAL – MIL-STD-810D

Parameter	Min	Тур	Max	Units	Test Conditions
Altitude - method 500.2	70,000			feet	Procedure II
Humidity - method 507.2	88/240			%/hours	Procedure I, cycle 1
Acceleration - method 513.3	9			g	Procedure II
Vibration - method 514.3	20			g	Procedure I, category 6
Shock - method 516.3	40			g	Procedure I

#### RELIABILITY - MIL-HDBK-217F (MI-J2L-MY)

Parameter	Min	Тур	Мах	Units	Test Conditions
25°C Ground Benign: G.B.		3,732		1,000 hours	
50°C Naval Sheltered: N.S.		672		1,000 hours	
65°C Airborne Inhabited Cargo: A.I.C.		526		1,000 hours	

#### MECHANICAL SPECIFICATIONS

Parameter	Min	Тур	Max	Units	Test Conditions	
Weight	3.5 101	3.7 107	3.8 109	Ounces Grams		

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#### ■ PRODUCT GRADE SPECIFICATIONS

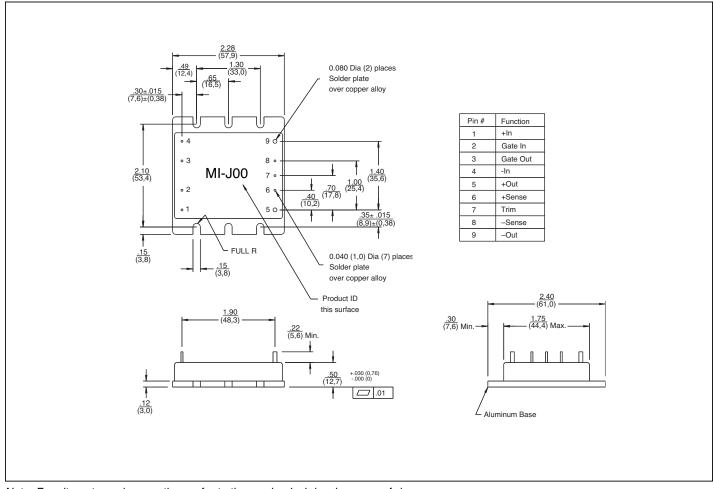
Parameter	I-Grade	M-Grade	
Storage temperature	-55°C to +125°C	-65°C to +125°C	
Operating temperature (baseplate)	-40°C to +100°C	-55°C to +100°C	
Power cycling burn-in	12 hours, 29 cycles	96 hours, 213 cycles	
Temperature cycled with power off 17°C per minute rate of change	12 cycles -65°C to +100°C	12 cycles -65°C to +100°C	
Test data supplied at these temperatures [a]	-40°C, +80°C	-55°C, +80°C	
Warranty	2 years	2 years	
Environmental compliance	MIL-STD-810	MIL-STD-810	
Derating	NAVMAT P-4855-1A	NAVMAT P-4855-1A	

<sup>[a]</sup> Test data available for review or download from vicorpower.com

#### ENVIRONMENTAL QUALIFICATIONS

Parameter	Qualification			
Altitude	MIL-STD-810D, Method 500.2, Procedure III, explosive decompression (40 K ft.).			
	MIL-STD-810D, Method 500.2, Procedure II, 40,000 ft., 1000 – 1500 ft./min. to 70,000 ft., unit functioning			
Explosive Atmosphere	MIL-STD-810C, Method 511.1, Procedure I			
Vibration	MIL-STD-810D, Method 514.3, Procedure I, category 6, helicopter, 20 g			
	MIL-STD-810D, Method 514.3 random: 10 – 300 Hz @ 0.02 g²/Hz, 2000 Hz @ 0.002 g²/Hz, 3.9 total G rms 3 hrs/axis. Sine: 30 Hz @ 20 g, 60 Hz @ 10 g, 90 Hz @ 6.6 g, 120 Hz @ 5.0 g, 16.0 total G rms, 3 axes			
	MIL-STD-810E, Method 514.4, Table 514.4-VII, ±6 db/octave, 7.7 G rms, 1hr/axis			
Shock	MIL-STD-810D, Method 516.3, Procedure I, functional shock, 40 g			
	MIL-STD-202F, Method 213B, 18 pulses, 60 g, 9 msec			
	MIL-STD-202F, Method 213B, 75 g, 11 ms saw tooth shock			
	MIL-STD-202F, Method 207A, 3 impacts / axis, 1, 3, 5 feet			
Acceleration	MIL-STD-810D, Method 513.3, Procedure II Operational test, 9 g for 1 minute along 3 mutually perpendicular axes			
Humidity	MIL-STD-810D, Method 507.2, Procedure I, cycle I, 240 hrs, 88% relative humidity			
Solder Test	MIL-STD-202, Method 208, 8 hr. aging			
Fungus	MIL-STD-810C, Method 508.1			
Salt-Fog	MIL-STD-810C, Method 509.1			

## **MECHANICAL DRAWING**



Note: For alternate package options refer to the mechanical drawing page of vicorpower.com

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