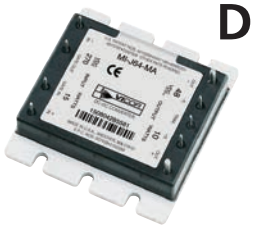
DC-DC Converters
MI-J00



10 to 50 Watts

Features & Benefits

- Inputs:
  28VDC per MIL-STD-704D/E/F
  155VDC per MIL-STD-1399A
  270VDC per MIL-STD-704D/E/F
- Single output: 2 – 48VDC
- Up to 23 W/in³
- 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 12,7mm)

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 the steady-state input voltage requirements of MIL-STD-704D/E/F for the 28VDC (MI-J2X) and 270VDC input (MI-J6X). The 155VDC input (MI-J5X) meets MIL-STD-1399A. When used with the MI-IAM input attenuator module, the 28V or 270V input MI-J00 converter meets the transient and spike requirements of MIL-STD-704, MIL STD-1275, and DO-160. Please refer to the MI-IAM data sheet for details.

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

Converter Selection Chart

MI-J ▫ ▫ ▫ ▫

Semi-custom modules available, consult factory.

Input Voltage

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

[a] Transient voltage for 1 second.
[b] 16V operation at 75% load.
[c] These units rated at 75% load from 125 – 150VIN: MI-J6Z-xY, MI-J6Y-xY, MI-J60-xY

Output Voltage

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

Product Grade Temperatures (°C)

Operating	Storage
I = –40 to +100	**I** = –55 to +125
M = –55 to +100	**M** = –65 to +125

Output Power/Current Vout

≥ 5 V	<5 V
A = 10W	**A** = —
Z = 25W	**Z** = 5A
Y = 50W	**Y** = 10A

Converter Specifications

(Typical at T_{BP} =25°C, nominal line and 75% load, unless otherwise specified)

INPUT SPECIFICATIONS

Parameter	Min	Typ	Max	Units	Test Conditions
Inrush charge		60×10^{-6}	100×10^{-6}	Coulombs	Nominal line
Input reflected ripple current – pp		10%		I_{IN}	Nominal line, full load
Input ripple rejection		$30+20\,\text{Log}\left(\frac{V_{IN}}{V_{OUT}}\right)$		dB	120Hz, nominal line
		$20+20\,\text{Log}\left(\frac{V_{IN}}{V_{OUT}}\right)$		dB	2400Hz, nominal line
No load power dissipation		1.35	2	Watts	

OUTPUT CHARACTERISTICS

Parameter	Min	Typ	Max	Units	Test Conditions
Setpoint accuracy		0.5	1	$\%V_{NOM}$	
Load/line regulation		0.05	0.2	$\%V_{NOM}$	LL to HL, 10% to Full Load
		0.2	0.5	$\%V_{NOM}$	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	
Output ripple – pp		100	150	mV	Whichever is greater 20 MHz bandwidth
		1.0	1.5	$\%V_{NOM}$	
Trim range [a]	50		110	$\%V_{NOM}$	
Total remote sense compensation	0.5			Volts	
Current limit	105		125	%INOM	Automatic restart
Short circuit current	105		130	%INOM	

[a] 10V to 15V outputs, standard trim range ±10%. Consult factory for wider trim range.

CONTROL PIN SPECIFICATIONS

Parameter	Min	Typ	Max	Units	Test Conditions
Gate out impedance		50		Ω	
Gate in impedance		1000		Ω	
Gate in high threshold			6	Volts	Use open collector
Gate in low threshold	0.65			Volts	
Gate in low current			6	mA	

Converter Specifications (Cont.)

DIELECTRIC WITHSTAND CHARACTERISTICS

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

ENVIRONMENTAL – MIL-STD-810D

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

Converter Specifications (Cont.)

PRODUCT GRADE SPECIFICATIONS

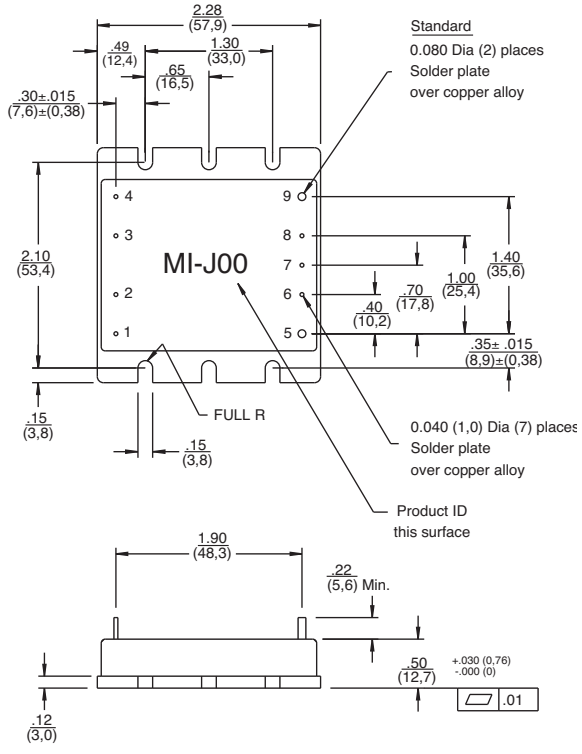
Parameter	I-Grade	M-Grade
Storage temperature	-55°C to +125°C	-65°C to +125°C
Operating temperature (baseplate)	-40°C to +100°C	-55°C to +100°C
Power cycling burn-in	12 hours, 29 cycles	96 hours, 213 cycles
Temperature cycled with power off 17°C per minute rate of change	12 cycles -65°C to +100°C	12 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

[a] Test data available for review or download from vicorpower.com

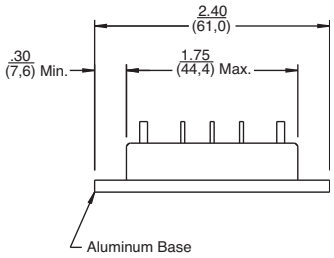
ENVIRONMENTAL QUALIFICATIONS

Parameter	Qualification
Altitude	MIL-STD-810D, Method 500.2, Procedure III, explosive decompression (40K 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, 20g
	MIL-STD-810D, Method 514.3 random: 10 – 300Hz @ 0.02g^2/Hz, 2000Hz @ 0.002g^2/Hz, 3.9 total G rms 3 hrs/axis. Sine: 30Hz @ 20 g, 60Hz @ 10 g, 90Hz @ 6.6 g, 120Hz @ 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, 40g
	MIL-STD-202F, Method 213B, 18 pulses, 60g, 9 msec
	MIL-STD-202F, Method 213B, 75g, 11ms 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, 9g for 1 minute along 3 mutually perpendicular axes
Humidity	MIL-STD-810D, Method 507.2, Procedure I, cycle I, 240hrs, 88% relative humidity
Solder Test	MIL-STD-202, Method 208, 8hr. aging
Fungus	MIL-STD-810C, Method 508.1
Salt-Fog	MIL-STD-810C, Method 509.1

Mechanical Drawing



Pin #	Function
1	+In
2	Gate In
3	Gate Out
4	-In
5	+Out
6	+Sense
7	Trim
8	–Sense
9	–Out



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

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