Data Sheet
MI-J00
DC-DC Converters
10 to 50 Watts

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^3
- 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

Converter Selection Chart

MI-J [•] [•] [••] [••]

Semi-custom modules available, consult factory.

[•] Input Voltage

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

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

[•] Output Voltage

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

[••] 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 = 10 W	**A** = —
Z = 25 W	**Z** = 5 A
Y = 50 W	**Y** = 10 A

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		$30+20\,\mathrm{Log}\left(\frac{Vin}{Vout}\right)$		dB	120 Hz, nominal line
		$20+20\,\mathrm{Log}\left(\frac{Vin}{Vout}\right)$		dB	2400 Hz, 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	$\%I_{NOM}$	Automatic restart
Short circuit current	105		130	$\%I_{NOM}$	

[a] 10 V, 12 V and 15 V 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		-	
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	

CONVERTER SPECIFICATIONS (cont.)

■ DIELECTRIC WITHSTAND CHARACTERISTICS

Parameter	Min	Typ	Max	Units	Test Conditions
Input to output	3,000			V_{RMS}	Baseplate earthed
Output to baseplate	500			V_{RMS}	
Input to baseplate	1,500			V_{RMS}	
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	

■ PRODUCT GRADE SPECIFICATIONS

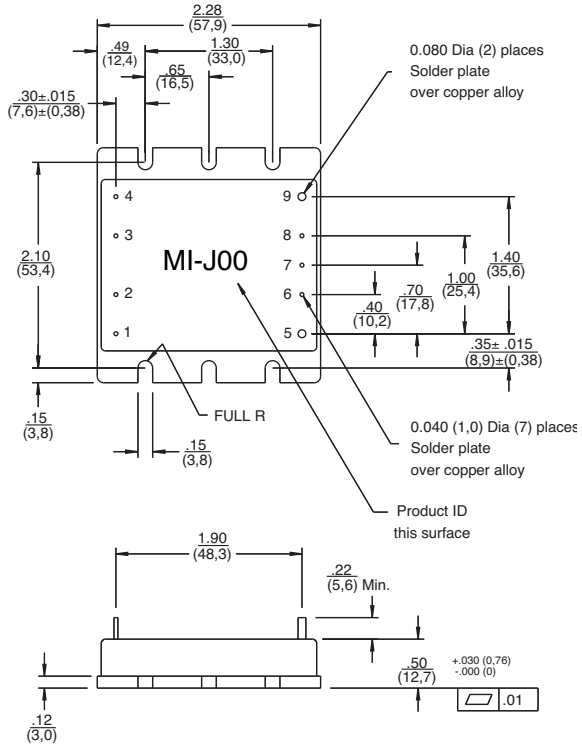
Parameter	I-Grade	M-Grade
Storage temperature	-55°C to +125°C	-65°C to +125°C
Operating temperature (baseplate)	-40°C to +100°C	-55°C to +100°C
Power cycling burn-in	12 hours, 29 cycles	96 hours, 213 cycles
Temperature cycled with power off 17°C per minute rate of change	12 cycles -65°C to +100°C	12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

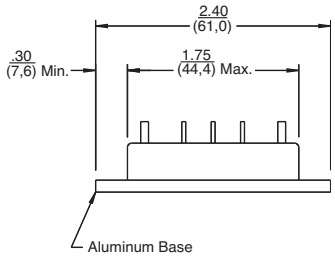
■ ENVIRONMENTAL QUALIFICATIONS

Parameter	Qualification
Altitude	MIL-STD-810D, Method 500.2, Procedure III, explosive decompression (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 g^2/Hz, 2000 Hz @ 0.002 g^2/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



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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