

MI-J00™

Military DC-DC Converters 10 to 50W

Product Highlights

The MI-J00 family of miniaturized DC-DC converters is designed for military applications utilizing distributed power architectures. Based on Vicor's 1st Generation family of zero-current/zero-voltage switching, component-level, DC-DC converters, the MI-J00 family offers state-of-the-art performance in terms of power density, efficiency, noise, ease of use, and reliability.

The MI-J00 family is designed to exceed all steady-state, transient and under/overvoltage requirements of MIL-STD-704D/E for both 28Vdc input (MI-J20) and 270Vdc input (MI-J60), and the worst case envelope of DOD-STD-1399A for 155Vdc input.

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 military power systems.

All units are manufactured in ISO 9001-registered facilities. Full epoxy encapsulation in Vicor's industry standard package enables the MI-J00 family units to meet MIL-STD-810 environmental testing requirements for humidity, fungus, salt fog, explosive atmosphere, acceleration, vibration, and shock. (See page 32.)

Features

- ✦ Inputs:
 - 28Vdc per MIL-STD-704D/E
 - 155Vdc per MIL-STD-1399A
 - 270Vdc per MIL-STD-704D/E
- ✦ Single output: 2 – 48Vdc
- ✦ Up to 23W/in³
- ✦ MIL-STD-810 environments
- ✦ Up to 90% efficiency
- ✦ Remote sense
- ✦ Current limit
- ✦ ZVS/ZCS power architecture
- ✦ Low noise FM control
- ✦ Size: 2.28" x 2.4" x 0.5" (57,9 x 61,0 x 12,7mm)

Converter Specifications

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

PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
Input Characteristics					
Input voltage range	See input voltage chart				
No load power dissipation	1.35	2.0		Watts	
Output Characteristics					
Set point accuracy	0.5	1.0		% Vnom	
Load/line regulation	0.05	0.2		% Vnom	LL to HL, 10% to FL
	0.2	0.5		% Vnom	LL to HL, NL to 10%
Output temperature drift	0.01	0.02		%/°C	
Output noise - pp	1.0	1.5		% Vnom	} Whichever is greater 20MHz BW
	100	150		mV	
Output voltage trimming ⁽¹⁾	50		110	% Vnom	
Remote sense compensation	0.5			Vdc	
OVP set point		N/A			
Current limit	105		125	% Inom	Auto restart
Short circuit current	105		130	% Inom	
Control Pin Characteristics					
Gate-in high threshold		6		Vdc	
Gate-in low threshold	0.65			Vdc	
Gate-in low current			6	mA	
Isolation Characteristics					
Isolation (input to output)	3,000			Vrms	
Isolation (output to baseplate)	500			Vrms	
Isolation (input to baseplate)	1,500			Vrms	
Input/output capacitance		50	75	pF	
Environmental (MIL-STD-810)					
Altitude - method 500.2	70,000			feet	Procedure II
Humidity - method 507.2	86/240			%/hours	Procedure 1, cycle 1
Acceleration - method 513.3	9			g's	Procedure 2
Vibration - method 514.3	20			g's	Procedure 1, category 6
Shock - method 516.3	40			g's	Procedure 1
Reliability (MIL-HDBK-217F)					
25°C Ground Benign: G.B.		2,871,050		hours	
50°C Naval Sheltered: N.S.		667,568		hours	
65°C Airborne Inhabited Cargo: A.I.C.		559,855		hours	
Thermal Characteristics					
Efficiency		80-90		%	
Baseplate to sink		0.14		°C/W	With thermal pads
Thermal shutdown		N/A			
Baseplate operating temperature			+100	°C	See product grade
Storage temperature			+125	°C	See product grade
Mechanical Specifications					
Weight		3.0 (85)		ounces (grams)	

⁽¹⁾ 10V, 12V, and 15V outputs, standard trim range ±10%. Consult factory for wider trim range.

Configuration Chart

MI-J

Semi-custom modules available:
Consult factory.

- (1) 16V operation at 75% load.
- (2) These units rated at 75% load from 125-150Vin:
MI-J6Z-xY
MI-J6Y-xY
MI-J60-xY

28Vdc input per MIL-STD 704D/E
155Vdc input per DOD-STD-1399A
270Vdc input per MIL-STD-704D/E

Input Voltage		
Nominal	Range	Transient
2 = 28V	18 – 50V ⁽¹⁾	60V
5 = 155V	100 – 210V	230V
6 = 270V	125 – 400V ⁽²⁾	475V
7 = 165V	100 – 310V	

Output Voltage		
Z = 2V	T = 6.5V	N = 18.5V
Y = 3.3V	R = 7.5V	3 = 24V
0 = 5V	M = 10V	L = 28V
X = 5.2V	1 = 12V	J = 36V
W = 5.5V	P = 13.8V	K = 40V
V = 5.8V	2 = 15V	4 = 48V

Product Grade	Operating Temp.
I	= -40°C to +100°C
M	= -55°C to +100°C

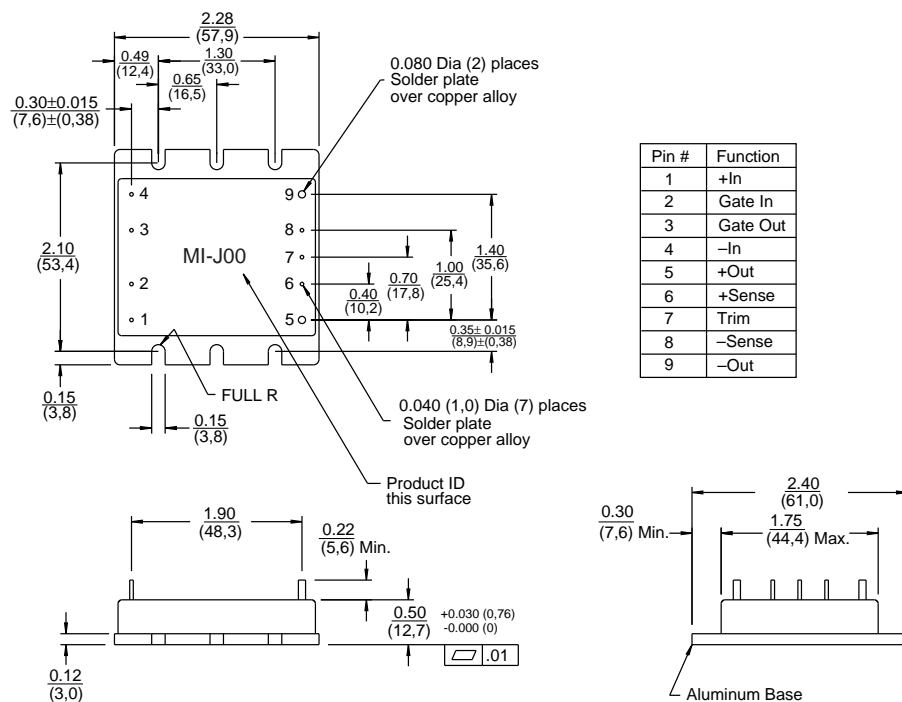
Output Power/Current	
	≥5V <5V
A =	10W —
Z =	25W 5A
Y =	50W 10A

Product Grade Specifications

PARAMETER	PRODUCT GRADE	
	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, 25 cycles	96 hours, 200 cycles
Temperature cycled with power off	48 hours, 12-16 cycles -55°C to +100°C	48 hours, 12-16 cycles -65°C to +100°C
Test data supplied at these temperatures*	-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

*Test data available for review or download from vicorpower.com

Mechanical Drawing



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