

Features

- Inputs: 28 Vdc and 270 Vdc
- MIL-STD-461C/D/E EMI compliance
- MIL-STD-810 environments
- MIL-STD-704A-F, MIL-STD-1275A/B/D and DO-160E transients and spikes
- Reverse polarity protection
- Output power: Up to 200 W from any combination of MI-200 or MI-J00 modules
- Expansion port for additional power
- Short circuit protected
- Size: 2.28" x 2.4" x 0.5" (57,9 x 61,0 x 12,7 mm)

Product Highlights

The MI-IAM is an accessory product to Vicor's MI-Series of DC-DC converters that provides EMI filtering and transient protection. Designed for use with all 28 V and 270 V input MI-200 or MI-J00 converters, the MI-IAM can drive any number of modules with output loads to 200 W.

The MI-IAM meets the conducted emissions specifications of MIL-STD-461C/D/E and offers complete input transient, surge, and spike protection to the most severe levels of MIL-STD-1275, MIL-STD-704 and DO-160. Reverse polarity protection and overvoltage lockout provide additional safeguards against potentially damaging line conditions. High power arrays can be configured using the expansion port capability of the MI-IAM.

Compatible Products

• MI-200, MI-J00 (Inputs: 2 and 6)

• Mega Modules (Inputs: 2 and 6)

Packaging Options

Standard: Slotted baseplate

 $\pmb{SlimMod:} \ \ Flangeless \ baseplate, \ option \ suffix: \textbf{-} \ \pmb{S}$

Example: MI - AXX - XX - S

FinMod: Finned heat sink, option suffix:

- F1, - F2, -F3 or -F4

Examples:

MI - AXX - XX -F1, 0.25" fins, longitudinal MI - AXX - XX -F2, 0.50" fins, longitudinal MI - AXX - XX -F3, 0.25" fins, transverse MI - AXX - XX -F4, 0.50" fins, transverse

Data Sheet
MI-IAM TM

Input Attenuator Modules

MI-IAM Specifications

(Typical at TBP = 25°C, nominal line, 75% load, unless otherwise specified)

Input Characteristics

| Parameter | Min | Тур | Max | Units | Notes |
|-----------------------------|------|-----|-----|-------|-------------------------------------|
| 28 Vdc modules | | | | | |
| Steady state input | 16 | 28 | 50 | Vdc | |
| Input spike limit | -600 | | 600 | Vdc | 10 μs, 50 Ω per MIL-STD-704A |
| iliput spike iiliit | -250 | | 250 | Vdc | 70 μs, 15 mJ per MIL-STD-1275A/B/D |
| Input surge limit | | | 100 | Vdc | 50 ms, 0.5 Ω per MIL-STD-1275A/B/D |
| input surge iiriit | | | 80 | Vdc | 100 ms per DO-160E, Sec. 16, Cat. Z |
| Overvoltage shut down[a] | 50 | | | Vdc | 100 ms, automatic recovery |
| Reverse polarity protection | | | | | Shunt diode: input fuse required |
| Recommended fuse | | | 20 | Amps | F03A type |
| 270 Vdc modules | | | | | |
| Steady state input | 125 | 270 | 400 | Vdc | |
| Input spike limit | | | 800 | Vdc | 10 μs, 50 Ω |
| input spike iiiiit | -600 | | 600 | Vdc | 100 μs, 15 mJ |
| Input surge limit | | | 500 | Vdc | 100 ms, 0.5 Ω |
| Overvoltage shut down [a] | 400 | | | Vdc | 100 ms, automatic recovery |
| Reverse polarity protection | | | | | Shunt diode: input fuse required |
| Recommended fuse | | | 4 | Amps | F03A type |
| All models | | | | | |
| No load power dissipation | | 0.5 | 1.5 | Watts | |
| Inrush current | | 110 | 125 | % IIN | Steady state, lin 10 ms |

[[]a] The MI-IAM disables downstream converters and clamps the converter input voltage at a safe level.

Output Characteristics

| Parameter | Min | Тур | Max | Units | Test Conditions |
|-----------------------|-----|------|-----|-------|------------------------------------|
| Clamp voltage | | | | | |
| 28 Vdc input | | | 60 | Vdc | |
| 270 Vdc input | | | 420 | Vdc | |
| Output power | | | | 250 | Watts |
| Internal voltage drop | | | | | |
| 28 Vdc | | 0.6 | | Vdc | |
| 270 Vdc | | 0.85 | | Vdc | |
| Overload protection | | | | | |
| 28 Vdc input | | | 20 | Amps | Foldback threshold; auto recovery |
| 270 Vdc input | | | 4 | Amps | with latched shut down after 10 ms |

Isolation Characteristics

| Parameter | Min | Тур | Max | Units | Notes |
|----------------|-----|-------|-----|-------|----------|
| Input to base | | 1,500 | | Vrms | 1 minute |
| Output to base | | 1,500 | | Vrms | 1 minute |

EMI Characteristics MIL-STD-461

| Parameter | | Notes |
|--------------------------|----------------------------|----------------|
| Input power leads | | |
| Conducted emissions | CE01, CE03, CE07 | MIL-STD-461C |
| Conducted emissions | CE101, CE102 | MIL-STD-461D/E |
| Conducted auggentibility | CS01, CS02, CS06, | MIL-STD-461C |
| Conducted susceptibility | CS101, CS114, CS115, CS116 | MIL-STD-461D/E |

Model Selection Chart

| Model Number | Nominal Input Voltage | Input Range | Compatible MI-Series | Converter |
|--------------|-----------------------|---------------|-------------------------|-----------|
| MI-A22-MU | 28 Vdc | 16 - 50 Vdc | MI-22x-Mx and MI-J2x-Mx | M-grade |
| MI-A66-MU | 270 Vdc | 125 - 400 Vdc | MI-26x-Mx and MI-J6x-Mx | M-grade |
| MI-A22-IU | 28 Vdc | 16 - 50 Vdc | MI-22x-Ix and MI-J2x-Ix | I-grade |
| MI-A66-IU | 270 Vdc | 125 - 400 Vdc | MI-26x-Ix and MI-J6x-Ix | I-grade |

Vicor Corp. Tel: 800-735-6200, 978-470-2900 Fax: 978-475-6715

MI-IAM Input Attenuator Modules

Rev. 1.1

Page 1 of 5

SPECIFICATIONS

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

■ 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-A22-MU)

| Parameter | Min | Тур | Max | Units | Test Conditions |
|---------------------------------------|-----|-------|-----|-------------|-----------------|
| 25°C Ground Benign: G.B. | | 5,637 | | 1,000 hours | |
| 50°C Naval Sheltered: N.S. | | 1,014 | | 1,000 hours | |
| 65°C Airborne Inhabited Cargo: A.I.C. | | 795 | | 1,000 hours | |

■ THERMAL CHARACTERISTICS

| Parameter | Min | Тур | Max | Units | Test Conditions |
|----------------------------------|-----|------|-----|---------|----------------------------------|
| Efficiency | | 97 | | % | |
| Baseplate to sink | | 0.14 | | °C/Watt | |
| Operating temperature, baseplate | | | 100 | °C | See product grade specifications |
| Storage temperature | | | 125 | °C | See product grade specifications |

■ MECHANICAL SPECIFICATIONS

| Parameter | Min | Тур | Max | Units | Test Conditions |
|-----------|-----|----------|-----|----------------|-----------------|
| Weight | | 3.0 (85) | | 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 |

 $[\]ensuremath{^{[a]}}$ Test data available for review or download from vicorpower.com

Vicor Corp. Tel: 800-735-6200, 978-470-2900 Fax: 978-475-6715

MI-IAM Input Attenuator Modules

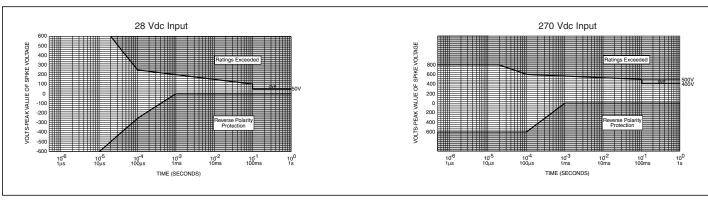
Rev. 1.1

Page 2 of 5

■ ENVIRONMENTAL QUALIFICATIONS

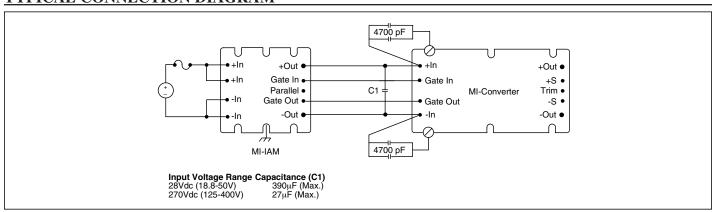
| Parameter | Qualification | | | | |
|----------------------|---|--|--|--|--|
| A lata | MIL-STD-810D, Method 500.2, Procedure III, explosive decompression (40 K ft.). | | | | |
| Altitude | MIL-STD-810D, Method 500.2, Procedure II, 40,000 ft., 1000 – 1500 ft./min. to 70,000 ft., unit functioning | | | | |
| Explosive Atmosphere | MIL-STD-810C, Method 511.1, Procedure I | | | | |
| | MIL-STD-810D, Method 514.3, Procedure I, category 6, helicopter, 20 g | | | | |
| Vibration | 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 | | | | |
| | MIL-STD-810D, Method 516.3, Procedure I, functional shock, 40 g | | | | |
| Charle | MIL-STD-202F, Method 213B, 18 pulses, 60 g, 9 msec | | | | |
| Shock | 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 | | | | |

SAFE OPERATING AREA [a]



[[]a] Refer to Input Characteristics

TYPICAL CONNECTION DIAGRAM

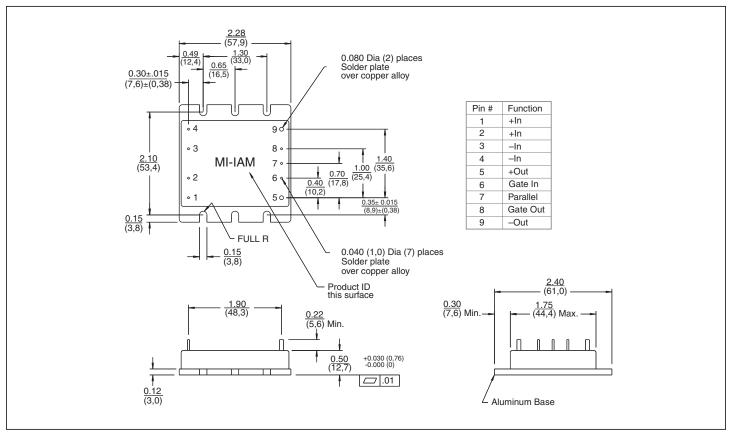


Vicor Corp. Tel: 800-735-6200, 978-470-2900 Fax: 978-475-6715

MI-IAM Input Attenuator Modules

Rev. 1.1

Page 3 of 5



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

Warranty

Vicor products are guaranteed for two years from date of shipment against defects in material or workmanship when in normal use and service. This warranty does not extend to products subjected to misuse, accident, or improper application or maintenance. Vicor shall not be liable for collateral or consequential damage. This warranty is extended to the original purchaser only.

EXCEPT FOR THE FOREGOING EXPRESS WARRANTY, VICOR MAKES NO WARRANTY, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Vicor will repair or replace defective products in accordance with its own best judgement. For service under this warranty, the buyer must contact Vicor to obtain a Return Material Authorization (RMA) number and shipping instructions. Products returned without prior authorization will be returned to the buyer. The buyer will pay all charges incurred in returning the product to the factory. Vicor will pay all reshipment charges if the product was defective within the terms of this warranty.

Information published by Vicor has been carefully checked and is believed to be accurate; however, no responsibility is assumed for inaccuracies. Vicor reserves the right to make changes to any products without further notice to improve reliability, function, or design. Vicor does not assume any liability arising out of the application or use of any product or circuit; neither does it convey any license under its patent rights nor the rights of others. Vicor general policy does not recommend the use of its components in life support applications wherein a failure or malfunction may directly threaten life or injury. Per Vicor Terms and Conditions of Sale, the user of Vicor components in life support applications assumes all risks of such use and indemnifies Vicor against all damages.

Vicor s comprehensive line of power solutions includes high density AC-DC and DC-DC modules and accessory components, fully configurable AC-DC and DC-DC power supplies, and complete custom power systems.

Information furnished by Vicor is believed to be accurate and reliable. However, no responsibility is assumed by Vicor for its use. Vicor components are not designed to be used in applications, such as life support systems, wherein a failure or malfunction could result in injury or death. All sales are subject to Vicor's Terms and Conditions of Sale, which are available upon request.

Specifications are subject to change without notice.

Intellectual Property Notice

Vicor and its subsidiaries own Intellectual Property (including issued U.S. and Foreign Patents and pending patent applications) relating to the products described in this data sheet. Interested parties should contact Vicor's Intellectual Property Department.

Vicor Corporation

25 Frontage Road Andover, MA, USA 01810 Tel: 800-735-6200 Fax: 978-475-6715

email

Customer Service: custserv@vicorpower.com Technical Support: apps@vicorpower.com