



Actual Size:  
2.28 x 2.4 x 0.5in  
57,9 x 61,0 x 12,7mm



## Input Attenuator Modules

### Features & Benefits

- Inputs: 24, 48 and 300V<sub>DC</sub>
- High surge withstand:
  - Bellcore
  - British Telecom BTR 2511
  - IEC-60801-5
- EMI/RFI specifications:
  - Bellcore TR-TSY-000513
  - British Telecom BTR 2511
  - FCC Level "A"
  - EN55022 Level "B"
- cULus, CTÜVus
- 97% efficiency
- Logic disable
- Expansion output for arrays
- Size: 2.28" x 2.4" x 0.5"  
(57,9 x 61,0 x 12,7)
- CE Marked
- RoHS Compliant (VE-IAM)

### Product Highlights

The Input Attenuator Module (VI-IAM) is a component-level, DC input front end filter designed to occupy minimum board space while providing maximum protection for today's sophisticated electrical systems. The VI-IAM, in combination with Vicor 24, 48 and 300V<sub>DC</sub> input modules, provides a highly efficient, high density power system with outputs from 1 to 95V<sub>DC</sub> and power expandable from 25 to 800W. Your system will benefit from the small size, efficiency and inherent reliability of Vicor's component-level converters, while meeting the toughest demands of Telecommunications and Industrial power applications.

This combination provides compliance with the transient requirements of Bellcore, British Telecom and IEC standards, and meets the EMI/RFI specifications of Bellcore, British Telecom and FCC Part 15, Subpart B and EN55022.

### Compatible Products

- VI-200, VE-200, VI-J00, VE-J00  
(Inputs: 1, W, 3, N and 6)
- Mega Modules
- (Inputs: 1, W, 3, N and 6)

For additional information see Section 14 of the [VI-200 & VI-J00 Design Guide](#).

### Input Characteristics

| Parameter                            | Min | Typ | Max  | Units             | Notes                              |
|--------------------------------------|-----|-----|------|-------------------|------------------------------------|
| <b>24V<sub>DC</sub> modules</b>      |     |     |      |                   |                                    |
| Steady state input                   | 21  | 24  | 32   | V <sub>DC</sub>   | –A11– models                       |
| Input spike limit                    |     |     | 300  | V <sub>DC</sub>   | Per BTNR2571 issue 4               |
|                                      |     |     | 2500 | V <sub>DCPK</sub> | Ringwave 0.5µs rise 100kHz         |
| Input surge limit                    |     |     | 100  | V <sub>DC</sub>   | Figure 1                           |
| Overvoltage shut down <sup>[a]</sup> | 34  |     | 38   | V <sub>DC</sub>   | 100ms, automatic recovery          |
| Recommended fuse                     |     |     | 20   | Amps              | 32V ACG-20                         |
| <b>24V<sub>DC</sub> modules</b>      |     |     |      |                   |                                    |
| Steady state input                   | 18  | 24  | 36   | V <sub>DC</sub>   | –AWW– models                       |
| Input spike limit                    |     |     | 300  | V <sub>DC</sub>   | Per BTNR2571 issue 4               |
|                                      |     |     | 2500 | V <sub>DCPK</sub> | Ringwave 0.5µs rise 100kHz         |
| Input surge limit                    |     |     | 100  | V <sub>DC</sub>   | Figure 1                           |
| Overvoltage shut down <sup>[a]</sup> | 37  |     | 42   | V <sub>DC</sub>   | 100ms, automatic recovery          |
| Recommended fuse                     |     |     | 20   | Amps              | 36V ACG-20                         |
| <b>48V<sub>DC</sub> modules</b>      |     |     |      |                   |                                    |
| Steady state input                   | 42  |     | 60   | V <sub>DC</sub>   | –A33– models                       |
| Input spike limit                    |     |     | 300  | V <sub>DC</sub>   | Per BTNR2571 issue 4               |
|                                      |     |     | 2500 | V <sub>DCPK</sub> | Ringwave 0.5µs rise 100kHz         |
| Input surge limit                    |     |     | 160  | V <sub>DC</sub>   | Figure 1                           |
| Overvoltage shut down <sup>[a]</sup> | 62  |     | 67   | V <sub>DC</sub>   | 100ms, automatic recovery          |
| Recommended fuse                     |     |     | 20   | Amps              | 60V 3AB-20                         |
| <b>48V<sub>DC</sub> modules</b>      |     |     |      |                   |                                    |
| Steady state input                   | 36  |     | 76   | V <sub>DC</sub>   | –ANN– models                       |
| Input spike limit                    |     |     | 300  | V <sub>DC</sub>   | Per BTNR2571 issue 4               |
|                                      |     |     | 2500 | V <sub>DCPK</sub> | Ringwave 0.5µs rise 100kHz         |
| Input surge limit                    |     |     | 276  | V <sub>DC</sub>   | Figure 1                           |
| Overvoltage shut down <sup>[a]</sup> | 77  |     | 83   | V <sub>DC</sub>   | 100ms, automatic recovery          |
| Recommended fuse                     |     |     | 20   | Amps              | 80V 3AB-20                         |
| <b>300V<sub>DC</sub> modules</b>     |     |     |      |                   |                                    |
| Steady state input                   | 200 |     | 400  | V <sub>DC</sub>   | –A66– models                       |
| Input spike limit                    |     |     | 1000 | V <sub>DC</sub>   | DM, 2 Joule, IAW IEC-801-5         |
|                                      |     |     | 2000 | V <sub>DC</sub>   | CM, 2 Joule, IAW IEC-801-5         |
| Input surge limit                    |     |     | 800  | V <sub>DC</sub>   | Figure 1                           |
| Overvoltage shut down <sup>[a]</sup> | 402 |     | 424  | V <sub>DC</sub>   | 100ms, automatic recovery          |
| Recommended fuse                     |     |     | 5    | Amps              | 250V Bussman PC-Tron               |
| <b>All models</b>                    |     |     |      |                   |                                    |
| No load power dissipation            |     | 0.5 | 1.5  | Watts             |                                    |
| Inrush current                       |     | 110 | 125  | % I <sub>IN</sub> | Steady state, I <sub>IN</sub> 10ms |

<sup>[a]</sup> The VI-IAM disables downstream converters and clamps the converter input voltage at a safe level.

## Model Selection Chart

| Model Number        | Nominal Input Voltage | Input Range              | Compatible DC-DC Converter | Converter |
|---------------------|-----------------------|--------------------------|----------------------------|-----------|
| VI-A11-CU/VE-A11-CU | 24V <sub>DC</sub>     | 21 – 32V <sub>DC</sub>   | VI-21x-Cx and VI-J1x-Cx    | C-grade   |
| VI-AWW-CU/VE-AWW-CU | 24V <sub>DC</sub>     | 18 – 36V <sub>DC</sub>   | VI-2Wx-Cx and VI-JWx-Cx    | C-grade   |
| VI-A33-CQ/VE-A33-CQ | 48V <sub>DC</sub>     | 42 – 60V <sub>DC</sub>   | VI-23x-Cx and VI-J3x-Cx    | C-grade   |
| VI-ANN-CQ/VE-ANN-CQ | 48V <sub>DC</sub>     | 36 – 76V <sub>DC</sub>   | VI-2Nx-Cx and VI-JNx-Cx    | C-grade   |
| VI-A66-CQ/VE-A66-CQ | 300V <sub>DC</sub>    | 200 – 400V <sub>DC</sub> | VI-26x-Cx and VI-J6x-Cx    | C-grade   |

Note: For alternative product grades change the “C” in the part number to “E”, “I”, or “M”.

## Specifications

(typical at T<sub>BP</sub> = 25°C, nominal line and 75% load, unless otherwise specified)

### OUTPUT CHARACTERISTICS

| Parameter                | Min   | Typ | Max  | Units           | Test Conditions/Notes  |
|--------------------------|-------|-----|------|-----------------|--|
| Clamp voltage            |       |     |      |                 |  |
| 24V <sub>DC</sub> input  | 36.0  |     | 44.0 | V <sub>DC</sub> | –A11– models   |
|                          | 40.5  |     | 50.0 | V <sub>DC</sub> | –AWW– models   |
| 48V <sub>DC</sub> input  | 62.0  |     | 71   | V <sub>DC</sub> | –A33– models   |
|                          | 80.0  |     | 90.0 | V <sub>DC</sub> | –ANN– models   |
| 300V <sub>DC</sub> input | 400   |     | 435  | V <sub>DC</sub> | –A66– models   |
| Output power             |       |     |      |                 |  |
| 24V models               |       |     | 250  | Watts           | Output of IAM  |
| 48V models               |       |     | 510  | Watts           | Output of IAM  |
| 300V models              |       |     | 510  | Watts           | Output of IAM  |
| Internal voltage drop    |       |     |      |                 |  |
| 24V <sub>DC</sub>        | 0.6   |     | 0.85 | V <sub>DC</sub> |  |
| 48V <sub>DC</sub>        | 0.6   |     | 0.95 | V <sub>DC</sub> |  |
| 300V <sub>DC</sub>       | 1.7   |     | 3.5  | V <sub>DC</sub> |  |
| Overload protection      |       |     |      |                 |  |
| 24V <sub>DC</sub> input  | –AWW– | 20  |      | Amps            | Foldback threshold; auto recovery with latched shut down after 2ms |
|                          | –A11– | 15  |      | Amps            |  |
| 48V <sub>DC</sub> input  | –ANN– | 20  |      | Amps            |  |
|                          | –A33– | 15  |      | Amps            |  |
| 300V <sub>DC</sub> input | –A66– | 4   |      | Amps            |  |

## Specifications (Cont.)

## ISOLATION CHARACTERISTICS

| Parameter      | Min | Typ   | Max | Units            | Test Conditions |
|----------------|-----|-------|-----|------------------|-----------------|
| Input to base  |     | 1,500 |     | V <sub>RMS</sub> | 1 minute        |
| Output to base |     | 1,500 |     | V <sub>RMS</sub> | 1 minute        |

## THERMAL CHARACTERISTICS

| Parameter                        | Min | Typ  | 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 | Typ      | Max | Units          | Test Conditions |
|-----------|-----|----------|-----|----------------|-----------------|
| Weight    |     | 3.0 (85) |     | ounces (grams) |                 |

## PRODUCT GRADE SPECIFICATIONS

| Parameter                   | E               | C               | I               | M               |
|-----------------------------|-----------------|-----------------|-----------------|-----------------|
| Storage Temp. (Baseplate)   | -20°C to +105°C | -40°C to +105°C | -55°C to +105°C | -65°C to +105°C |
| Operating Temp. (Baseplate) | -10°C to +100°C | -25°C to +100°C | -40°C to +100°C | -55°C to +100°C |

## EMI CHARACTERISTICS

|                               |   |
|-------------------------------|---|
| EMI/RFI (conducted emissions) | Meets Bellcore TR-TSY-000513, Issue 2, Rev. 1 (24 and 48V Input);<br>British Telecom BTR 2511, Issue 2 (24 and 48V Input);<br>FCC Part 15, Class A, EN55022 Class B |
|-------------------------------|---|

## TRANSIENT PROTECTION

|  |   |
|--|---|
|  | Meets Bellcore TA-TSY-001003, Issue 1, 9/89<br>British Telecom BTR 2511, IEC61000-4-5 Level 2 (VI-A66 only) |
|--|---|



**Figure 1** — Safe operating area based on input voltage of IAM (1% duty cycle max.,  $Z_s=0.5\Omega$ , for short duration transient capability refer to specifications.)



**Figure 2** — Block diagram of Input Attenuator Module (IAM)



**Figure 3** — Typical connection diagram. For recommended fuse (F2) see VI-200 / VI-J00 application manual.

| Input Voltage | Recommended Fuse          |
|---------------|---------------------------|
| 24V           | 20A / 32V (AGC-20)        |
| 24V "W"       | 20A / 36V (AGC-20)        |
| 48V           | 20A / 60V (3AB-20)        |
| 48V "N"       | 20A / 80V (3AB-20)        |
| 300V          | 5A / 250V Bussman PC-Tron |

**Table 1** — Recommended F1 fusing based on input voltage (see Figure 3)

| Input Voltage                   | Maximum Capacitance <sup>[a]</sup> |
|---------------------------------|------------------------------------|
| 24V <sub>DC</sub> (21 – 32V)    | 470μF                              |
| 24V <sub>DC</sub> (18 – 36V)    | 470μF                              |
| 48V <sub>DC</sub> (42 – 60V)    | 220μF                              |
| 48V <sub>DC</sub> (36 – 76V)    | 120μF                              |
| 300V <sub>DC</sub> (200 – 400V) | 27μF                               |

<sup>[a]</sup> Capacitance should be distributed across the input of each DC-DC converter. (C1, Figure 3)

**Table 2** — Recommended distributed capacitance on input of DC-DC converter(s)

**Storage**

Vicor products, when not installed in customer units, should be stored in ESD safe packaging in accordance with ANSI/ESD S20.20, "Protection of Electrical and Electronic Parts, Assemblies and Equipment" and should be maintained in a temperature controlled factory/warehouse environment not exposed to outside elements controlled between the temperature ranges of 15°C and 38°C. Humidity shall not be condensing, no minimum humidity when stored in an ESD compliant package.

MECHANICAL DRAWING



| Pin # | Function |
|-------|----------|
| 1     | +IN      |
| 2     | +IN      |
| 3     | -IN      |
| 4     | -IN      |
| 5     | +OUT     |
| 6     | Gate IN  |
| 7     | Parallel |
| 8     | Gate OUT |
| 9     | -OUT     |

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

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