



**FIAM™**  
**72 V Input**

Actual size:  
2.28 x 2.2 x 0.5 in  
57,9 x 55,9 x 12,7 mm



## Filter Input Attenuator Module

### Features

- RoHS Compliant (with F or G pin style)
- EMI filtering-EN50121-3-2\*
- Transient protection-EN50155, EN50121-3-2
- Low profile mounting options
- 500 W output power
- 60950-1 compliance
- Mini-size package
- Inrush current limiting

### Product Highlights

The FIAM072 is a DC front-end module designed for rail applications providing transient protection, inrush current limiting and EMI filtering (EN50121-3-2) in a Mini-size package. The FIAM enables designers using Vicor 72 Vin Mini, Micro, or Maxi or VI/VE-200 and VI/VE-J00 (4 input) DC-DC converters to meet the transient immunity and EMI requirements required for the rail industry and protect system hardware from inrush current. The FIAM072 accepts an input voltage of 43 – 110 Vdc and provide up to 500 W of output power and remote on/off control.

The FIAM072 is housed in an industry standard "half brick" module measuring 2.28" x 2.2" x 0.5" and depending upon model selected, may be mounted on-board or in-board for height critical applications.

### Compatible Products

- Mini, Micro, Maxi 72 V Input DC-DC converters
- VI / VE-200, VI / VE-J00 ("4" input)

*\*EMI performance is subject to a wide variety of external influences such as PCB construction, circuit layout etc. As such, external components in addition to those listed herein may be required in specific instances to gain full compliance to the standards specified.*

### Absolute Maximum Rating

Parameter	Rating	Unit	Notes
+In to –In	110	Vdc	Continuous
	252	V	20 ms
+Out to –Out	110	Vdc	Continuous
Mounting torque	5(0.57)	in-lbs	6 each, #4-40 or M3
Operating temperature	– 55 to +100	°C	M -Grade
Storage temperature	– 65 to +125	°C	M -Grade
Pin soldering temperature	500 (260)	°F(°C)	<5 sec; wave solder
	750 (390)	°F(°C)	<7 sec; hand solder

### Thermal Resistance

Parameter	Min	Typ	Max	Unit
Baseplate to sink flat, greased surface		0.16		°C/Watt
		0.14		°C/Watt
Baseplate to ambient Free Convection		8.0		°C/Watt
		1.9		°C/Watt

### Part Numbering

<b>FIAM</b>	<b>072</b>	<b>C</b>	<b>1</b>	<b>1</b>
Product	72 Vin Nominal	Product Grade Temperatures (°C)	Pin Style	Baseplate
		Grade Operating Storage	1 = Short	1 = Slotted
		E = –10 to +100 –20 to 125	2 = Long	2 = Threaded
		C = –20 to +100 –40 to 125	S = Short ModuMate	3 = Thru-hole
		T = –40 to +100 –40 to 125	N = Long ModuMate	
		H = –40 to +100 –55 to 125	F = Short RoHS	
		M = –55 to +100 –65 to 125	G = Long RoHS	

## Specifications

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

### ■ INPUT SPECIFICATIONS

Parameter	Min	Typ	Max	Unit	Notes
Input voltage	43	72	110	Vdc	Continuous
Inrush limiting			0.05	A/ $\mu$ F	
Transient immunity			115	Vdc	Consistent with 100 ms per NF F 01-510
			112.5	Vdc	Consistent with 1 s per RIA 12
			252	Vdc	Consistent with 20 ms per RIA 12

### ■ OUTPUT SPECIFICATIONS

Parameter	Min	Typ	Max	Unit	Notes
Output power			500	W	Output power derates linearly below 50 Vin to 400 W @ 43 Vin
Efficiency		98		%	
Internal Voltage Drop			1.5	V	500 W at 25° baseplate
External capacitance			150	$\mu$ F	

### ■ CONTROL PIN SPECIFICATIONS

Parameter	Min	Typ	Max	Unit	Notes
ON / OFF control					
Enable (ON)	0.0		1.0		Referenced to $-V_{out}$
Disable (OFF)	3.5		5.0	Vdc	100k $\Omega$ internal pull-up resistor

### ■ EMI

Standard	Notes
EN50121-3-2	150 kHz to 500 kHz - 99 dB $\mu$ V quasi-peak 500 kHz to 30 MHz - 93 dB $\mu$ V quasi-peak

EMI performance is subject to a wide variety of external influences such as PCB construction, circuit layout etc. As such, external components in addition to those listed herein may be required in specific instances to gain full compliance to the standards specified.

### ■ IMMUNITY

Parameter	Typ. Value	Units	Notes
EN50121-3-2 (Table 7.3 Surges)	$\pm 2,000$	Vdc	Waveform – 1.2 / 50 $\mu$ s, 42 $\Omega$ , 0.5 $\mu$ F, line to ground
	$\pm 1,000$	Vdc	Waveform – 1.2 / 50 $\mu$ s, 42 $\Omega$ , 0.5 $\mu$ F, line to line Performance Criteria B - no damage to the product but a temporary change in the intended DC voltage is acceptable as long as it self-recovers without user intervention.
EN50121-3-2 (Table 7.2 Fast Transients)	$\pm 2,000$	Vdc	5/50 ns, 5 kHz Performance Criteria A - no damage to the product and no change to the intended DC voltage level for a duration greater than 1.0 $\mu$ sec.
EN50121-3-2 (Table 7.1 RF Common Mode)			0.15 to 80 MHz, 10 Vrms, 80% AM, 1 kHz Performance Criteria A - no damage to the product and no change to the intended DC voltage level greater than +/- 5%.

### ■ SAFETY SPECIFICATIONS

Parameter	Min	Typ	Max	Unit	Notes
Dielectric withstand (I/O to baseplate)		1,000		Vrms	
		1,414		Vdc	

## Specifications (Cont.)

### ■ AGENCY APPROVALS

Safety Standards	Markings	Notes
UL60950-1, CSA60950-1, EN60950-1, IEC60950-1 EN60950-1	cTUVus CE	Pending Low Voltage Directive

### ■ GENERAL SPECIFICATIONS

Parameter	Min	Typ	Max	Unit	Remarks
Weight		3.1 (88)	4 (113)	ounces (grams)	
Warranty			2	years	

### ■ MODULE ENVIRONMENTAL QUALIFICATION

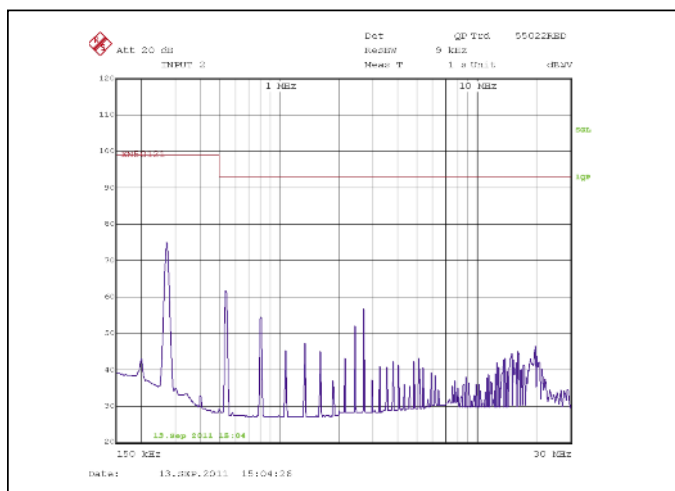
<b>Altitude</b> MIL-STD-810F, Method 500.4, Procedure I & II, 40,000 ft. and 70,000 ft. Operational.
<b>Explosive Atmosphere</b> MIL-STD-810F, Method 511.4, Procedure I, Operational.
<b>Vibration</b> EN 61373, Random Vibration: Category <0.3Kg, Freq range: 5-150Hz @ 5grms, 5hrs per axis. MIL-STD-810F, Method 514.5, Procedure I, Category 14, Sine and Random vibration per Table 514.5C for Helicopter AH-6J Main Rotor with overall level of 5.6 G rms for 4 hours per axis. MIL-STD-810F, Method 514.5C, General Minimum Integrity Curve per Figure 514.5C-17 with overall level of 7.7 G rms for 1 hour per axis.
<b>Shock</b> EN 61373, Shock: Long. / Trans. / Vert. Axis, peak acceleration: 5g / 2g / 1g, Duration: 50 ms/ 20 ms. MIL-STD-810F, Method 516.5, Procedure I, Functional Shock, 40 g. MIL-S-901D, Lightweight Hammer Shock, 3 impacts/axis, 1,3,5 ft. MIL-STD-202F, Method 213B, 60 g, 9 ms half sine. MIL-STD-202F, Method 213B, 75 g, 11 ms Saw Tooth Shock.
<b>Acceleration</b> MIL-STD-810F, Method 513.5, Procedure II, table 513.5-II, Operational, 2-7 g, 6 directions.
<b>Humidity</b> MIL-STD-810F, Method 507.4.
<b>Solder Test</b> MIL-STD-202G, Method 208H, 8 hour aging.

### ■ MODULE ENVIRONMENTAL STRESS SCREENING

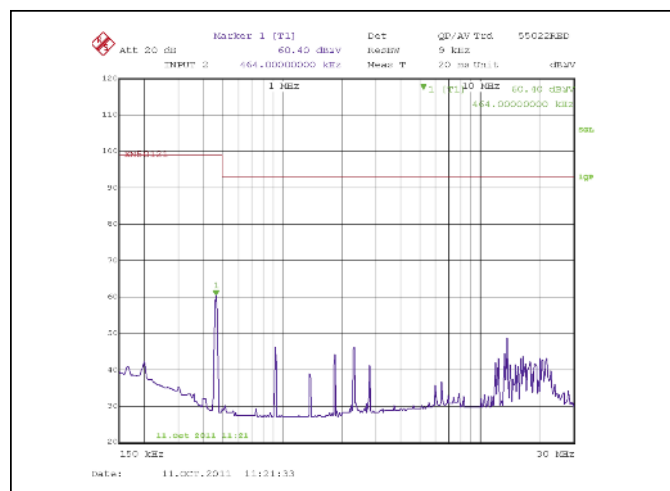
Parameter	H-Grade	M-Grade
Operating temperature	-40°C to +100°C	-55°C to +100°C
Storage temperature	-55°C to +125°C	-65°C to +125°C
Temperature cycling*	12 cycles -65°C to +100°C	12 cycles -65°C to +100°C
Ambient test @ 25°C	Yes	Yes
Power cycling burn-in	12 hours, 29 cycles	24 hours, 58 cycles
Functional and parametric ATE tests	-40°C and +100°C	-55°C and +100°C
Hi-Pot test	Yes	Yes
Visual inspection	Yes	Yes
Test data	<a href="http://vicorpower.com">vicorpower.com</a>	<a href="http://vicorpower.com">vicorpower.com</a>

\*Temperature cycled with power off, 17°C per minute rate of change.

## Conducted Noise

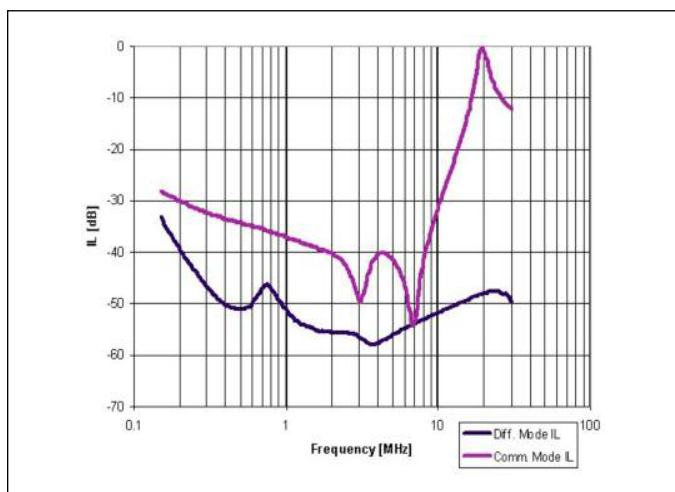


**Figure 1** — Conducted Noise (EN50121-3-2); FIAM72M21 and model V72A24C400BL DC-DC converter operating at 72 Vdc, 375 W.



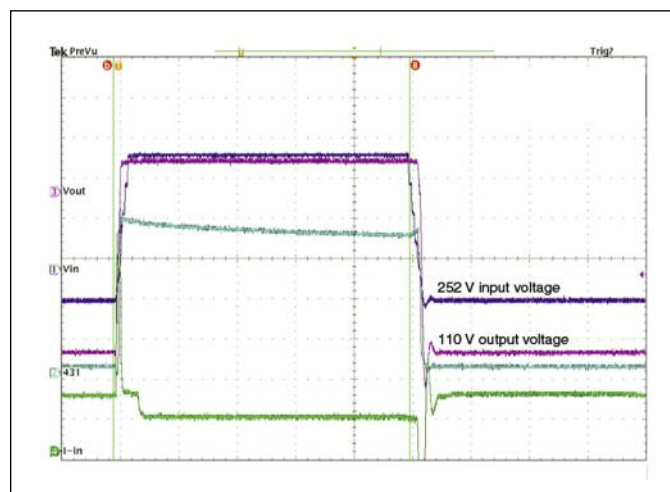
**Figure 2** — Conducted Noise (EN50121-3-2); FIAM72M21 and model VE-243-EU + VI-B43-CU DC-DC converters operating at 72 Vdc, 375 W.

## Insertion Loss



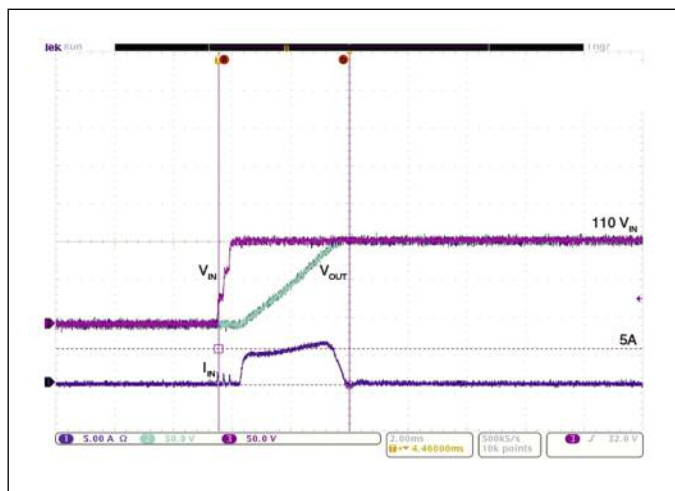
**Figure 3** — Insertion loss curve.

## Transient Immunity



**Figure 4** — Transient Immunity: FIAM output response to an input transient.

## Inrush Limiting



**Figure 5** — Inrush current. (150  $\mu$ F external capacitance)



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