



# Data Sheet

## FIAM™



### Filter Input Attenuator Module

#### Features

- RoHS Compliant (with F or G pin style)
- EMI filtering-Class B<sup>(1)</sup>
- Transient protection
- Low profile mounting options
- 10 and 20 Ampere versions
- UL, CSA, EN compliance
- Mini-size package
- Inrush current limiting

#### Product Highlights

The FIAM is a DC front-end module providing transient protection, inrush current limiting and Class B EMI filtering in a Mini-size package. The FIAM enables designers using Vicor 48 Vin Mini, Micro, or Maxi DC-DC converters to meet the transient immunity and EMI requirements of Bellcore, FCC, ETSI and European Norms and protect system hardware from inrush current. The FIAM accepts an input voltage of 36 – 76 Vdc, is available in 10 or 20 A versions and provides reverse polarity protection and remote on/off control.

Internally, the FIAM employs a transient suppressor diode directly across the input. Refer to Figure 1. This is followed by a passive EMI filter that provides attenuation of both common mode and differential mode conducted emissions. Surge protection and inrush current limiting is accomplished by a MOS FET in series with the positive rail whose gate is driven by the charge pump/control circuit. During normal operation the FET is fully enhanced; essentially a closed switch. The charge pump limits the time rate of change of gate bias voltage at startup, or in the event of a voltage surge at the input. During this condition, the source terminal of the FET follows the gate, offset by the gate threshold voltage. A transient event at the input, or drain terminal of the FET is therefore attenuated and absorbed by the FET, which during this condition is in the source follower mode. As a result, the transient is virtually non-existent at the output of the FIAM. In addition, upon application of power, the controlled voltage ramp up, limits the rate at which the output capacitor is charged, thereby limiting inrush current.

FIAM 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 48 V Input DC-DC converters



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

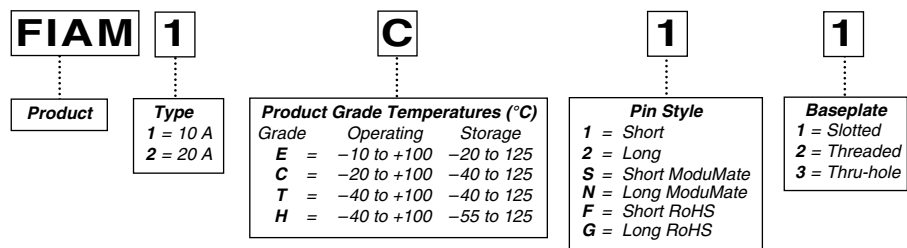
#### Absolute Maximum Rating

Parameter	Rating	Unit	Notes
+In to -In	80	Vdc	Continuous
	100	V	100 ms
+Out to -Out	75	Vdc	Continuous
Mounting torque	5(0.57)	in-lbs	6 each, #4-40 or M3
Operating temperature	- 40 to +100	°C	T and H -Grade
Storage temperature	- 55 to +125	°C	H-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



## 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	36	48	76	Vdc	Continuous
Inrush limiting			0.014	A/ $\mu\text{F}$	Capacitor C1. Fig 6

### ■ OUTPUT SPECIFICATIONS

Parameter	Min	Typ	Max	Unit	Notes
Output current					
FIAM1xxx			10	A	
FIAM2xxx			20	A	
Efficiency	96.0	97.5			Internal voltage drop is 1.4 max. @ 20 A, 100 °C baseplate
External capacitance					See illustration on page 3, Fig 6.
FIAM1xxx	10		150	$\mu\text{F}$	100 V
FIAM2xxx	100		330	$\mu\text{F}$	100 V

### ■ 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

### ■ ELECTROMAGNETIC COMPATIBILITY

Parameter	Min	Typ	Max	Unit	Notes
Transient immunity					
Bellcore TR-NWT-000499			200	V	1 $\mu\text{sec}$ duration
ETS 300 386-1 Class 2			200	V	5.0 $\mu\text{sec}$ rise time, 50 $\mu\text{sec}$ duration surge
			250	V	1 – 100 nsec burst

### ■ SAFETY SPECIFICATIONS

Parameter	Min	Typ	Max	Unit	Notes
Dielectric withstand (I/O to baseplate)		1,500		$V_{RMS}$	
		2,121		Vdc	

## Specifications (Cont.)

### ■ AGENCY APPROVALS

Safety Standards	Markings	Notes
UL1950, CSA 22.2-950, EN60950		
Conducted Emission (Figures 2&3) <sup>(1)</sup>		
Bellcore GR-001089-Core		Issue 2
EN55022		Level B; When used with Vicor Mini, Maxi, Micro 48 Vin DC-DC converter
FCC Part 15		Level B

### ■ GENERAL SPECIFICATIONS

Parameter	Min	Typ	Max	Unit	Remarks
Reverse polarity protection					No damage to module, external fuse required
Weight		3.1 (88)	4 (113)	ounces (grams)	
Warranty			2	years	

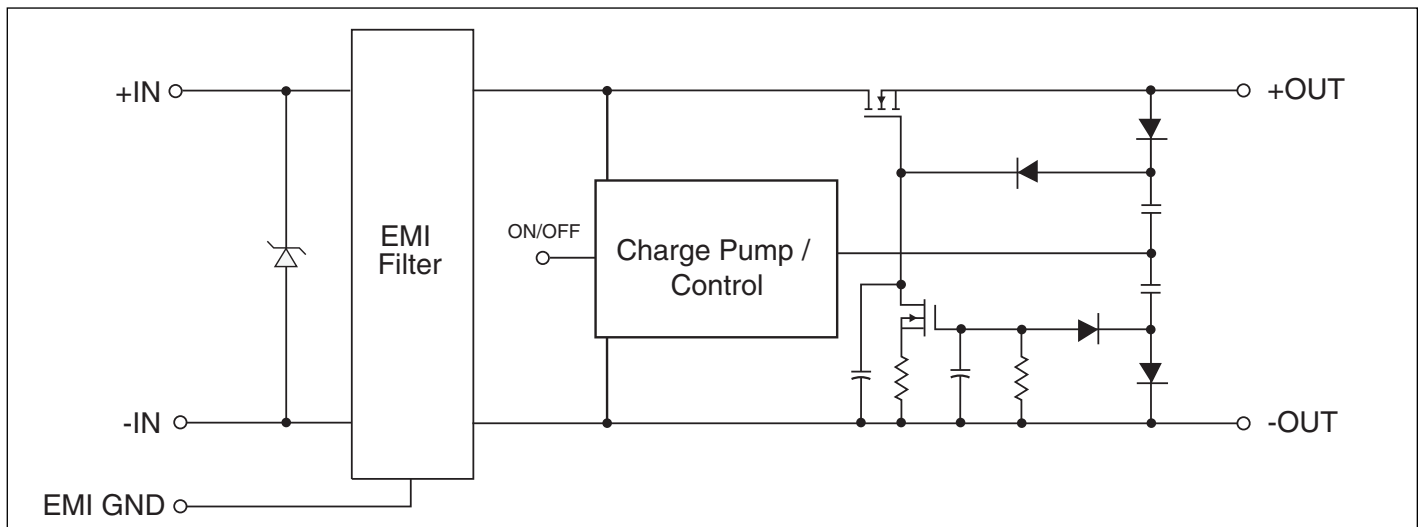


Figure 1 — FIAM Block Diagram

<sup>(1)</sup>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.

## Conducted Noise

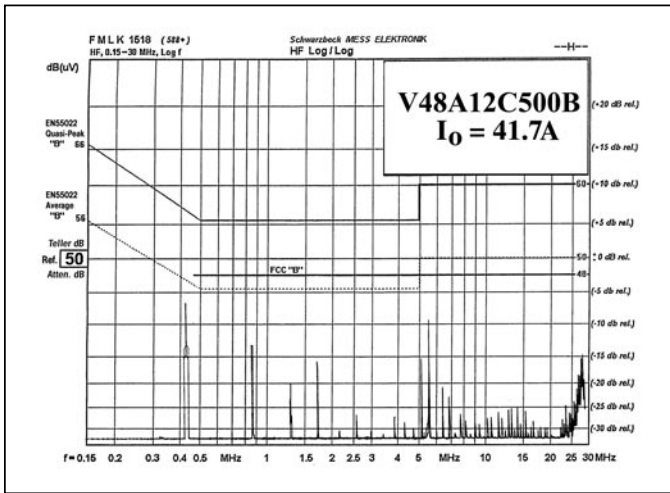


Figure 2 — FIAM and Model V48A12C500 DC-DC converter.

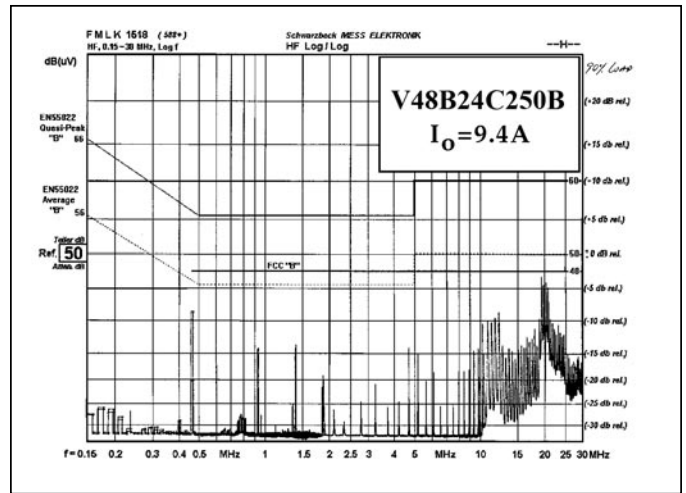


Figure 3 — FIAM and Model V48B24C250 DC-DC converter.

## Inrush Limiting

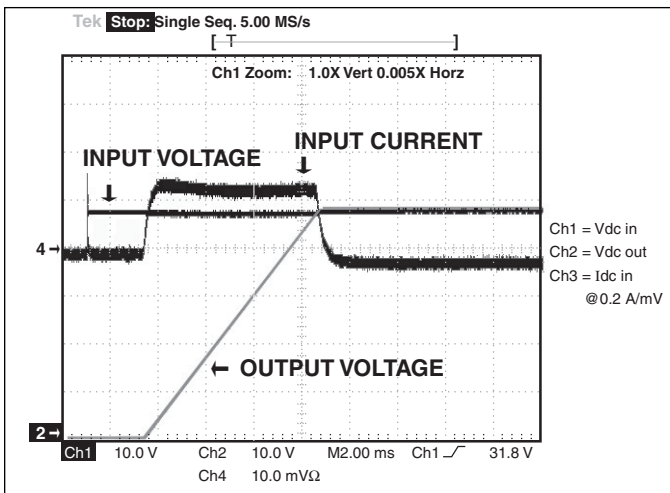


Figure 4 — Inrush Limiting: Inrush current with 330  $\mu$ F external capacitance.

## Transient Immunity

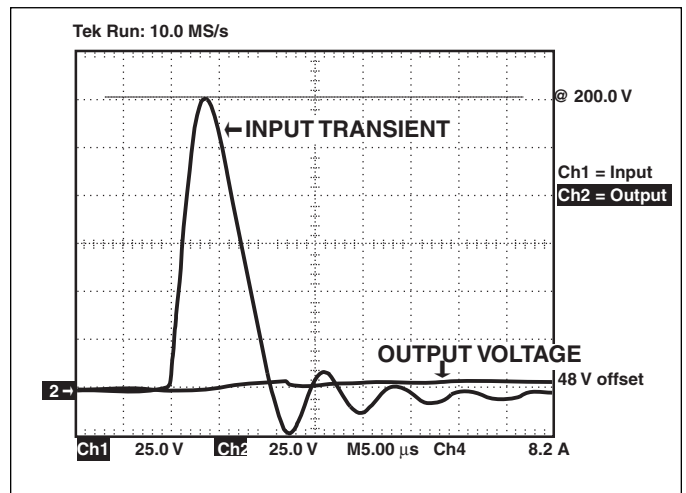


Figure 5 — Transient Immunity: FIAM output response to an input transient.

## Transient and Surge Protection

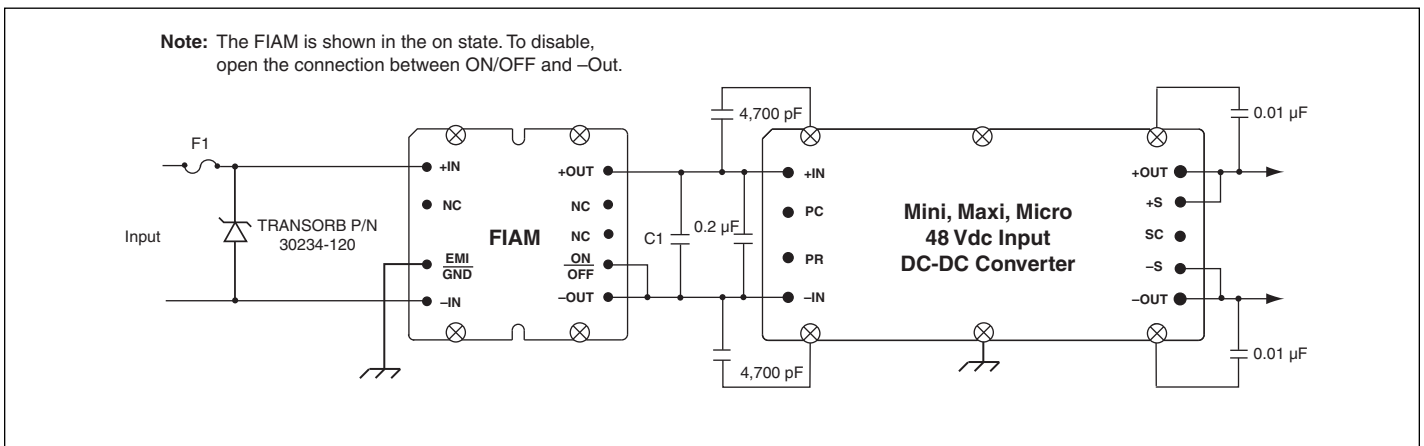
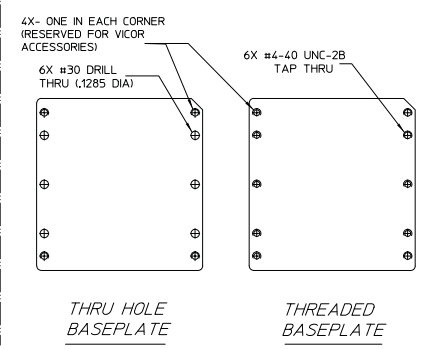
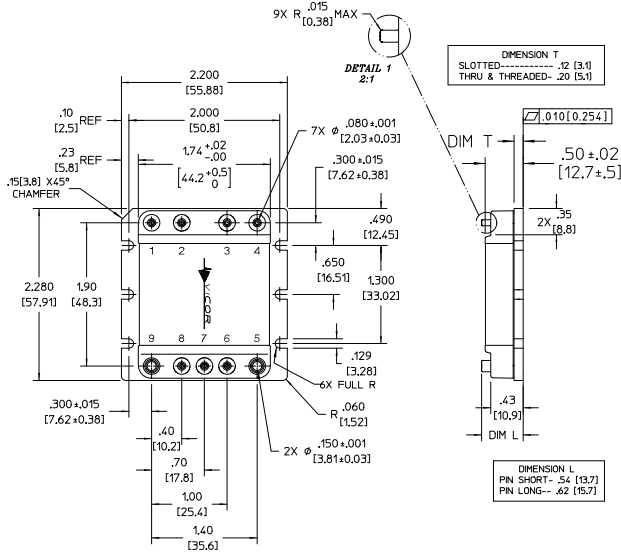


Figure 6 — Typical Connection Diagram

# Mechanical Diagram

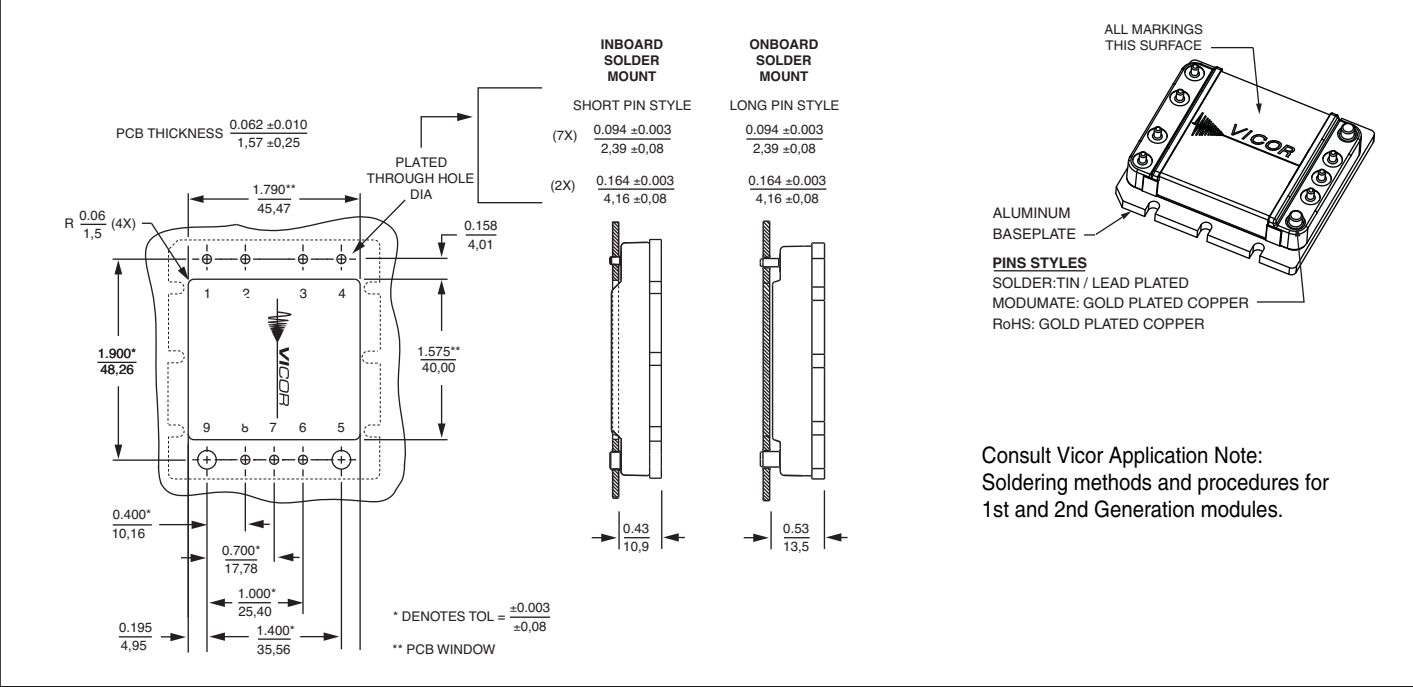
Converter Pins		
No.	Function	Label
1	+In	+
2	No Connection	NC
3	Ground	EMI/GND
4	-In	-
5	-Out	-
6	ON/OFF	ON/OFF
7	No Connection	NC
8	No Connection	NC
9	+Out	+



NOTES:  
 1. MATERIAL:  
 BASE: 6000 SERIES ALUMINUM  
 COVER: LCP, ALUMINUM 3003 H14  
 PINS: RoHS PINS GOLD PLATE 30 MICRO INCH MIN, NON-RoHS PINS TIN/LEAD 90/10 BRIGHT.  
 2. DIMENSIONS AND VALUES IN BRACKETS ARE METRIC.

**SLOTTED BASEPLATE**  
 DIMENSIONS FOR ALL MODULE TYPES ARE SHOWN ABOVE; VERSIONS AT RIGHT SHOW DIMENSIONS THAT VARY

# PCB Mounting Specifications



Consult Vicor Application Note:  
 Soldering methods and procedures for  
 1st and 2nd Generation modules.

## **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.

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