



# Military COTS 270 Vin Filter

## M-FIAM3

Model Number **M-FIAM3M21\***

### Input Attenuator Module

#### Features

- EMI filtering-MIL-STD-461E<sup>[1]</sup>
- Transient protection-MIL-STD-704E/F
- Environments-MIL-STD-810, MIL-STD-202
- Environmental stress screening
- Low profile mounting options
- Output current up to 3 A
- Mini sized package
- Inrush current limiting

#### Product Highlights

The M-FIAM3 is a DC front-end module that provides EMI filtering and transient protection. The M-FIAM3 enables designers using Vicor's Maxi, Mini, Micro Series 300 V DC-DC converters to meet conducted emission/ conducted susceptibility per MIL-STD-461E; and input transients per MIL-STD-704E/F. The M-FIAM3 accepts an input voltage of 180 – 375 Vdc and delivers output current up to 3 A.

M-FIAM3 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

- Maxi, Mini, Micro Series 300 V Input DC-DC converters

<sup>[1]</sup>EMI performance is subject to a wide variety of external influences such as PCB construction, circuit layout etc. External components in addition to those listed herein may be required in specific instances to gain full compliance to the standards specified at various line and load conditions.



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	375	Vdc	Continuous
	400	Vdc	100 ms
Mounting torque	5 (0.57)	in-lbs	6 each, #4-40 or M3
Pin Soldering temperature	500 (260)	°F (°C)	<5 sec; wave solder
	750 (390)	°F (°C)	<7 sec; hand solder

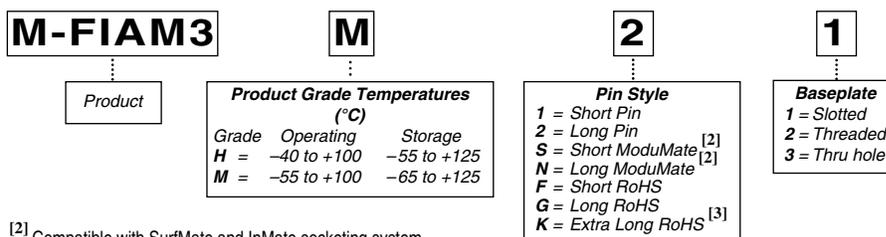
#### Thermal Resistance and Capacity

Parameter	Min	Typ	Max	Unit
Baseplate to sink				
flat, greased surface		0.16		°C/Watt
with thermal pad (P/N 20264)		0.1		°C/Watt
Baseplate to ambient				
Free convection		7.9		°C/Watt
1000 LFM		2.2		°C/Watt

#### MTBF per MIL-HDBK-217F (M-FIAM3M21)

Temperature	Environment	MTBF	Unit
25°C	Ground Benign: G.B.	13,291	1,000 Hrs
50°C	Naval Sheltered: N.S.	2,392	1,000 Hrs
65°C	Airborne Inhabited Cargo: A.I.C.	1,874	1,000 Hrs

#### Part Numbering



<sup>[2]</sup> Compatible with SurfMate and InMate socketing system

<sup>[3]</sup> Not intended for socket or Surfmate mounting

## 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	180	270	375	Vdc	Continuous
Inrush limiting			0.018	A/ $\mu\text{F}$	
Transient immunity					Exceeds limits of MIL-STD-704E/F

### OUTPUT SPECIFICATIONS

Parameter	Min	Typ	Max	Unit	Notes
Output current			3	A	
Efficiency	96	98		%	
Internal voltage drop		3.0	5.0		@3 A, 100°C baseplate
External capacitance	10		22	$\mu\text{F}$	See Figure 5 on page 4. 400 V

### CONTROL PIN SPECIFICATIONS

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

### SAFETY SPECIFICATIONS

Parameter	Min	Typ	Max	Unit	Notes
Dielectric withstand		1,500	Vrms		Input/Output to Base
		2,121	Vdc		Input/Output to Base

### EMI

Standard	Test Procedure	Notes
MIL-STD-461E		
Conducted emissions:	CE101, CE102	
Conducted susceptibility:	CS101, CS114, CS115, CS116	

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## SPECIFICATIONS (CONT.)

### ■ GENERAL SPECIFICATIONS

Parameter	Min	Typ	Max	Unit	Notes
Weight		3.3 (94)		Ounces (grams)	
Warranty			2	Years	

### ■ 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>	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>	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.

### ■ 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.

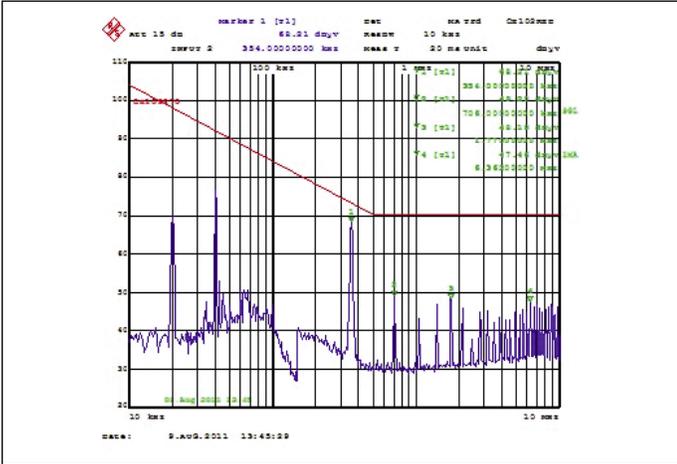


Figure 1 – Conducted noise; M-FIAM3 and V300A48C500BG DC-DC converter operating at 270 Vdc input at 450 W.

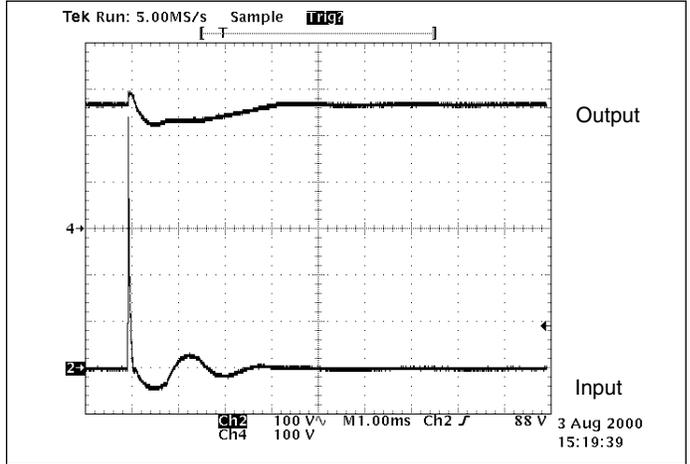


Figure 2 – Transient Immunity; M-FIAM3 output response to an input transient.

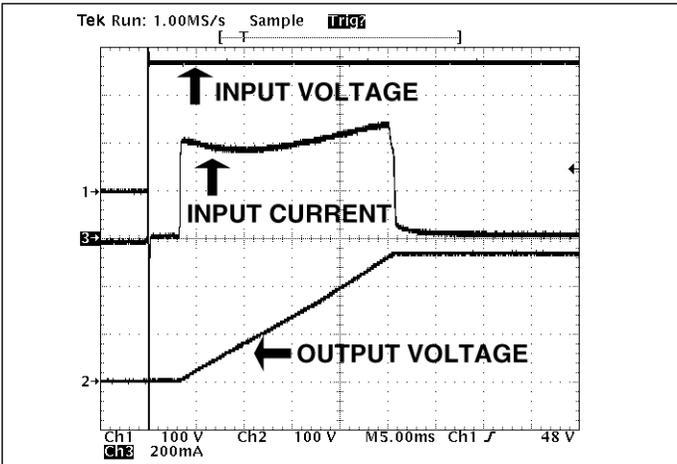


Figure 3–Inrush Limiting; Inrush current with 22  $\mu$ F external capacitance, (C1 in Figure 5)

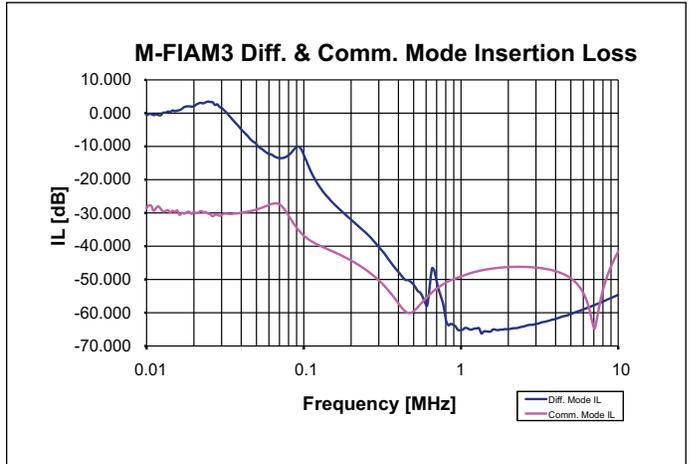


Figure 4–Insertion Loss Curve

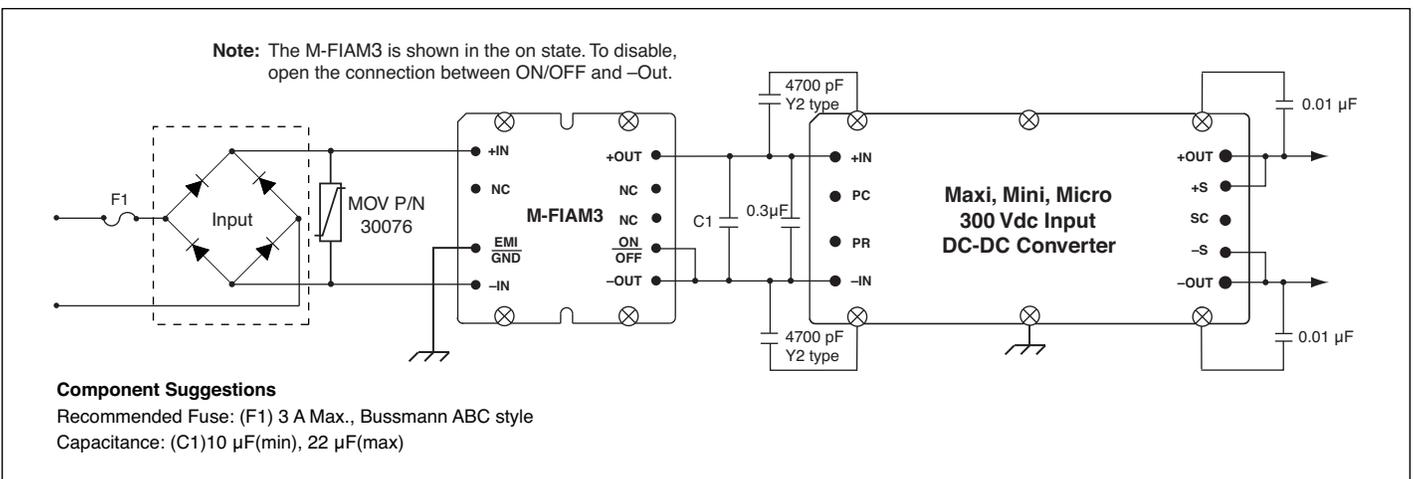


Figure 5 – Basic connection diagram with Transient, Surge Protection and Recommended Reverse Polarity Protection.

MECHANICAL DRAWINGS

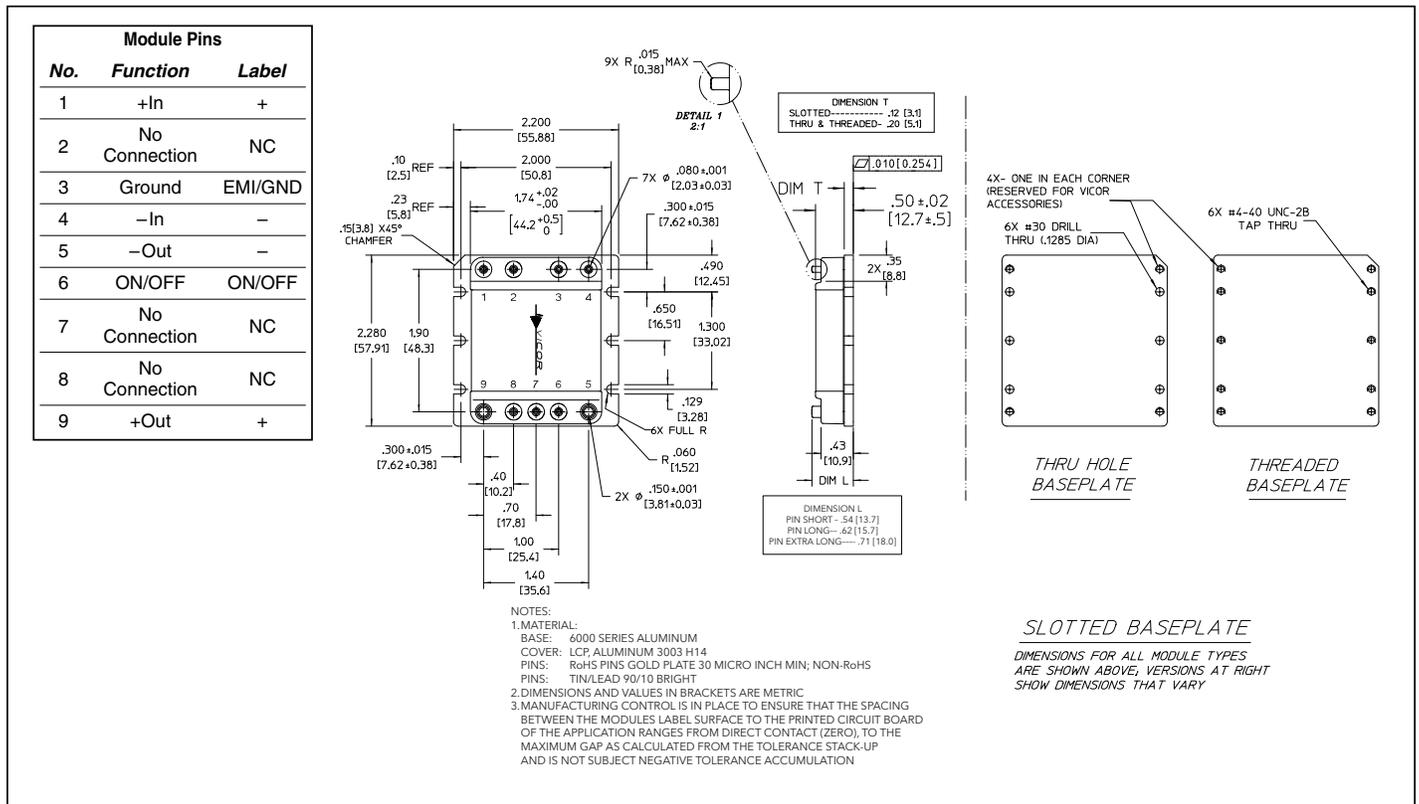


Figure 6 – Mechanical diagram

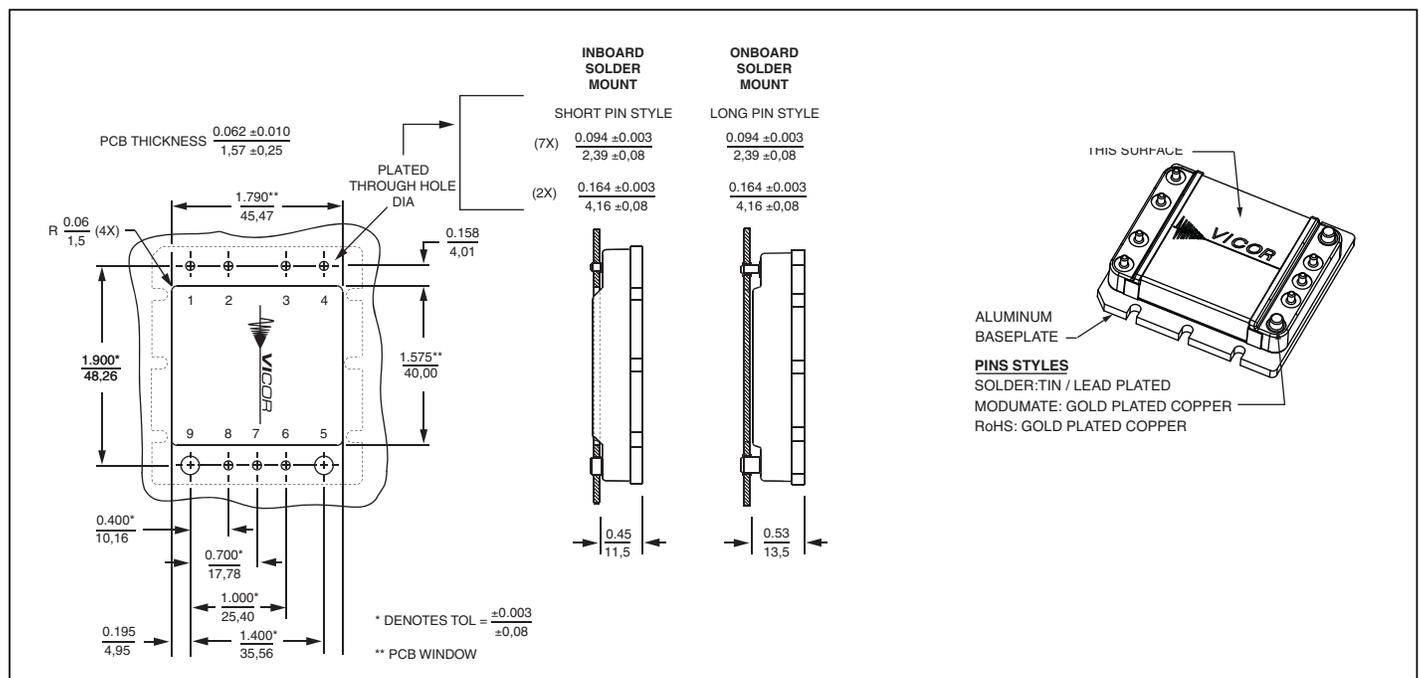


Figure 7 – PCB Mounting Specifications

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