



# Military COTS 270V<sub>IN</sub> Filter

## M-FIAM3

Example Model Number **M-FIAM3M21**

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

## Input Attenuator Module

### Features & Benefits

- EMI filtering: MIL-STD-461E <sup>[b]</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 3A
- 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 Maxi, Mini, Micro Series 300V 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 – 375V<sub>DC</sub> and delivers output current up to 3A.

M-FIAM3 is housed in an industry-standard “half-brick” module measuring 2.28 x 2.2 x 0.5in and depending upon model selected, may be mounted onboard or inboard for height-critical applications.

### Compatible Products

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

### Absolute Maximum Rating

Parameter	Rating	Unit	Notes
+IN to -IN	375	V <sub>DC</sub>	Continuous
	400	V <sub>DC</sub>	100ms
Mounting torque	5 [0.57]	in·lbs [N·m]	6 each, #4-40 or M3
Pin Soldering temperature	500 [260]	°F [°C]	<5sec; wave solder
	750 [390]	°F [°C]	<7sec; 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
1000LFM		2.2		°C/Watt

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

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

### Part Numbering



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

<sup>[b]</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.

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

Note: Product images may not highlight current product markings.

## 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	$V_{DC}$	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	V	@ 3A, 100°C baseplate
External capacitance	10		22	$\mu\text{F}$	See Figure 5 on page 4. 400V

### Control Pin Specifications

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

### Safety Specifications

Parameter	Min	Typ	Max	Unit	Notes
Dielectric withstand	1,500			$V_{RMS}$	Input/Output to Base
	2,121			$V_{DC}$	Input/Output to Base

### EMI

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

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.

## Specifications (Cont.)

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

### 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, 40,000ft. and 70,000ft. 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 5.6Grms for 4 hours per axis. MIL-STD-810F, Method 514.5C, General Minimum Integrity Curve per Figure 514.5C-17 with overall level of 7.7Grms for 1 hour per axis.
<b>Shock</b>	MIL-STD-810F, Method 516.5, Procedure I, Functional Shock, 40g. MIL-S-901D, Lightweight Hammer Shock, 3 impacts/axis, 1,3,5 ft. MIL-STD-202F, Method 213B, 60g, 9ms half sine. MIL-STD-202F, Method 213B, 75g, 11ms Saw Tooth Shock.
<b>Acceleration</b>	MIL-STD-810F, Method 513.5, Procedure II, table 513.5-II, Operational, 2-7g, 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 to +100°C	-55 to +100°C
Storage temperature	-55 to +125°C	-65 to +125°C
Temperature cycling*	12 cycles -65 to +100°C	12 cycles -65 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 and +100°C	-55 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.

## 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.



Figure 1 — Conducted noise; M-FIAM3 and V300A48C500BG DC-DC converter operating at 270V<sub>DC</sub> input at 450W



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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