



# Military COTS 28V<sub>IN</sub> Filter

## M-FIAM5B

Example Model Number **M-FIAM5BM21**

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 power up to 560W
- Output current up to 20A
- Mini-sized package
- Inrush current limiting

### Product Highlights

The M-FIAM5B is a DC front-end module that provides EMI filtering and transient protection. The M-FIAM5B enables designers using Vicor Maxi, Mini, Micro Series 24V DC-DC converters to meet conducted emission / conducted susceptibility per MIL-STD-461E; and input transients per MIL-STD-704E/F. The M-FIAM5B accepts an input voltage of 14 – 36V<sub>DC</sub> and delivers output current up to 20A.

M-FIAM5B 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 24V Input DC-DC converters
- 24V Input VIPAC Arrays™

### Absolute Maximum Rating

Parameter	Rating	Unit	Notes
+IN to -IN	36	V <sub>DC</sub>	Continuous
	50	V <sub>DC</sub>	12.5ms, See Figure 3
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

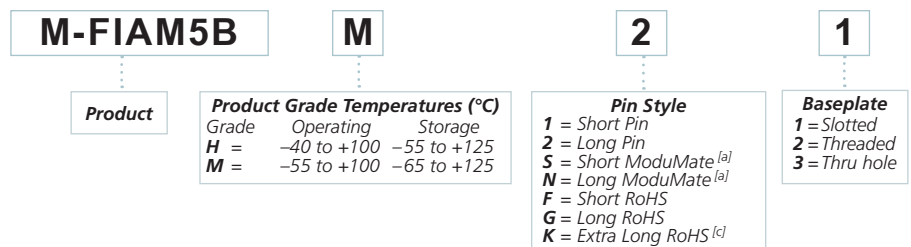
### Thermal Resistance and Capacity

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-FIAM5BM21)

Temperature	Environment	MTBF	Unit
25°C	Ground Benign: G.B.	2,533	1,000Hrs
50°C	Naval Sheltered: N.S.	456	1,000Hrs
65°C	Airborne Inhabited Cargo: A.I.C.	375	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. As such, external components in addition to those listed herein may be required in specific instances to gain full compliance to the standards specified.

<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	14	28	36	$V_{DC}$	Continuous
Inrush limiting			0.007	A/ $\mu\text{F}$	
Transient immunity			50	$V_{DC}$	12.5ms per MIL-STD-704E/F, continuous operation Test conditions AA and FF normal overvoltage transients per MIL-HDBK-704

### Output Specifications

Parameter	Min	Typ	Max	Unit	Notes
Output current			20	A	
Output power			560	W	
Efficiency	96	98		%	
Internal voltage drop		0.5	0.7	$V_{DC}$	@ 20A, 100°C baseplate
External capacitance					See Figure 6 on page 5
	330		1000	$\mu\text{F}$	50V

### 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	

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### General Specifications

Parameter	Min	Typ	Max	Unit	Notes
Weight			3.3 [94]	Ounces [grams]	
Warranty			2	Years	

## Specifications (Cont.)

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

### 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, 1,3,5ft. 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.

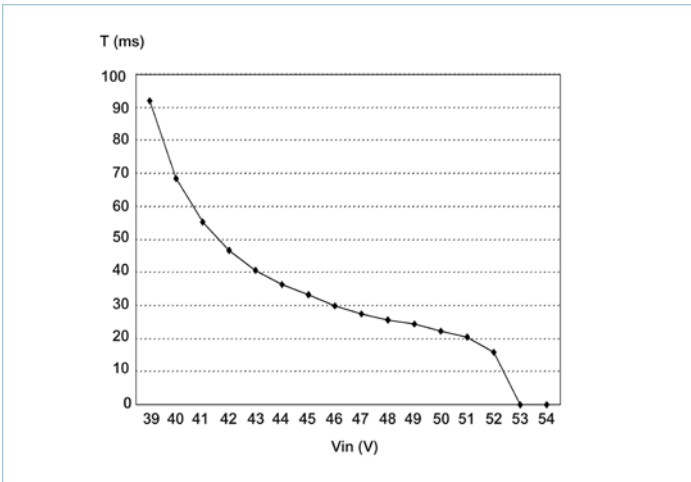


Figure 1 — Shut-down time of M-FIAM5B vs. overvoltage

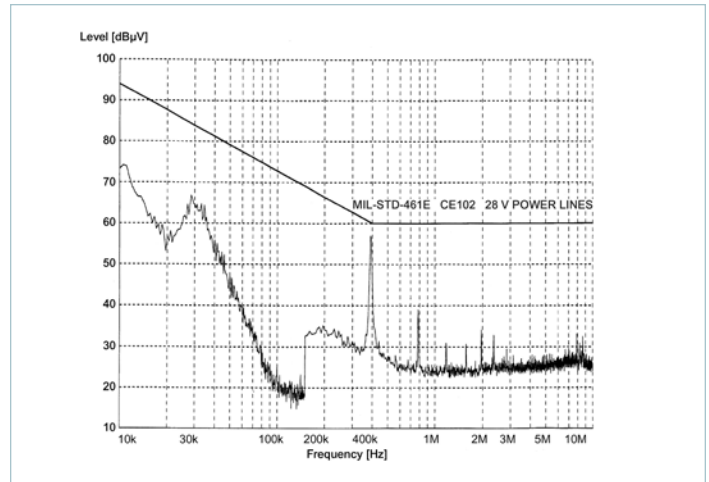


Figure 2 — Conducted noise; M-FIAM5B and Model V24A12M400B DC-DC converter operating at 28V<sub>DC</sub>, 400W

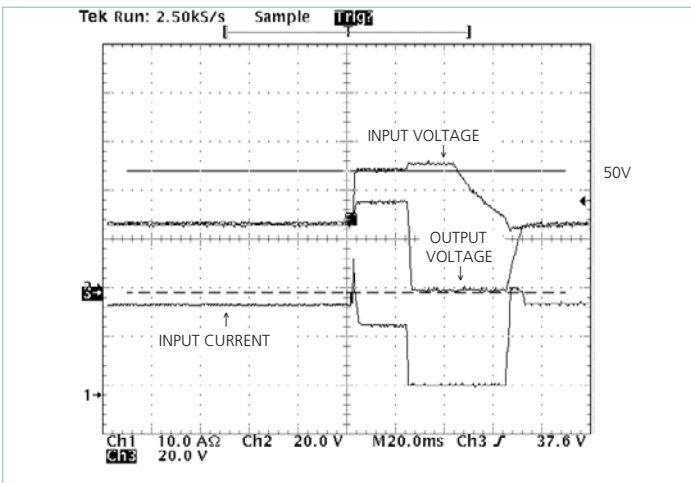


Figure 3 — Transient immunity: M-FIAM5B output response to an input transient

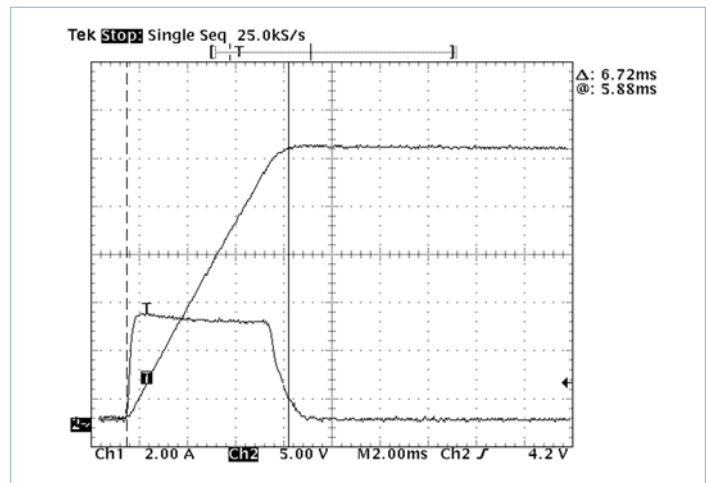


Figure 4 — Inrush limiting: inrush current with 1000µF external capacitance, (C1 in Figure 6)

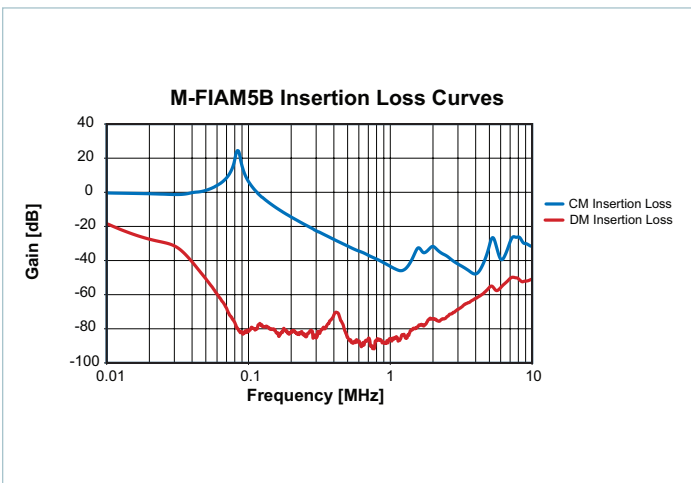
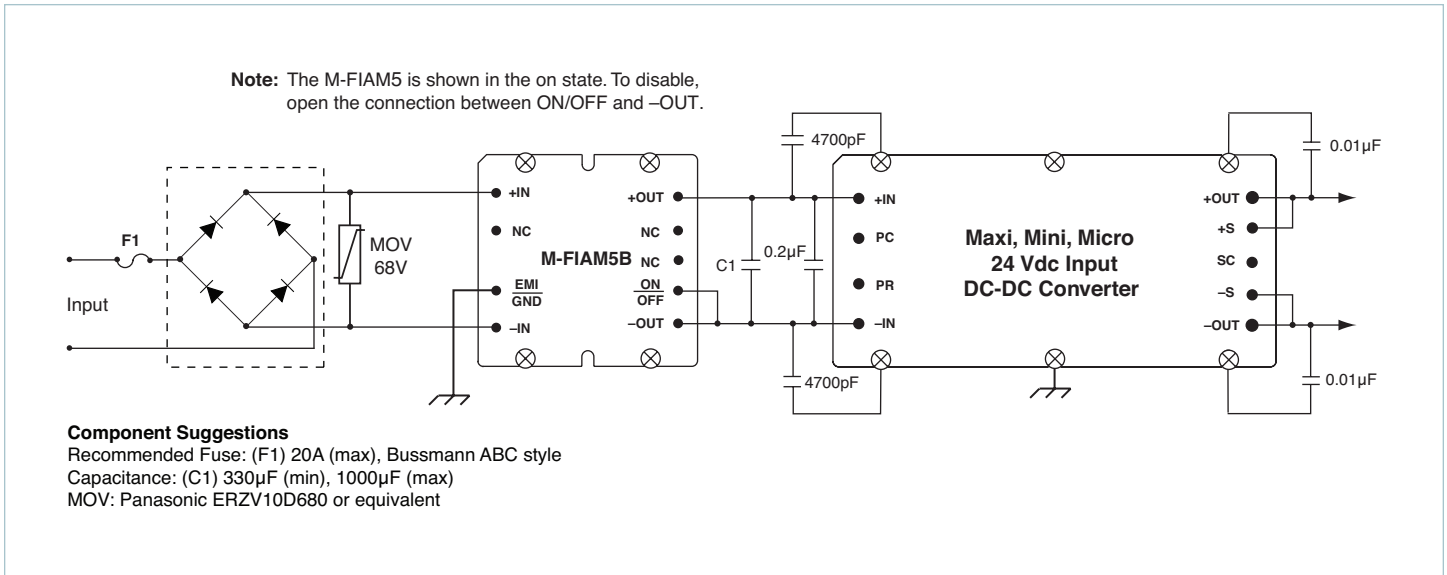


Figure 5 — Insertion loss



**Figure 6** — Basic connection diagram with suggested transient, surge protection and recommended reverse-polarity protection.

Mechanical Drawings

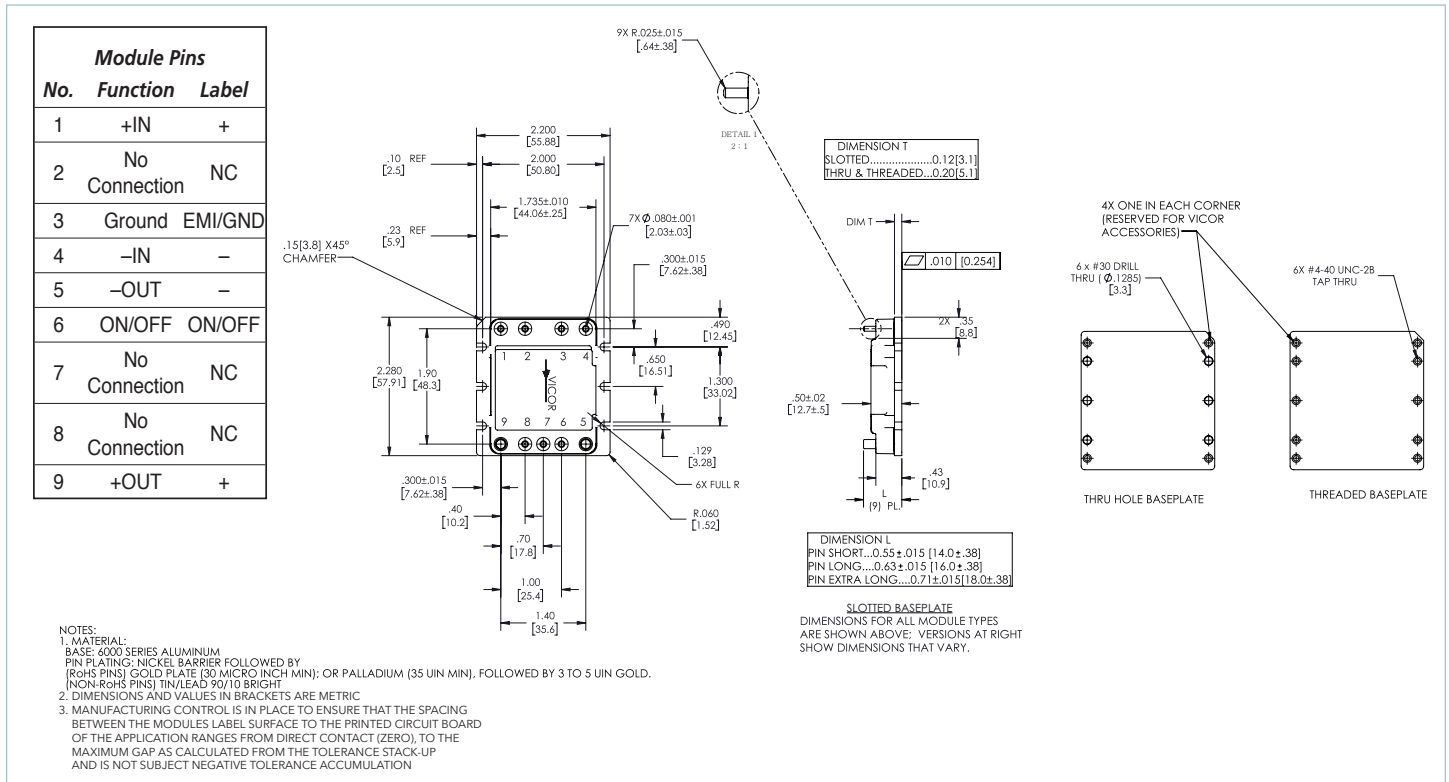


Figure 7 — Mechanical diagram

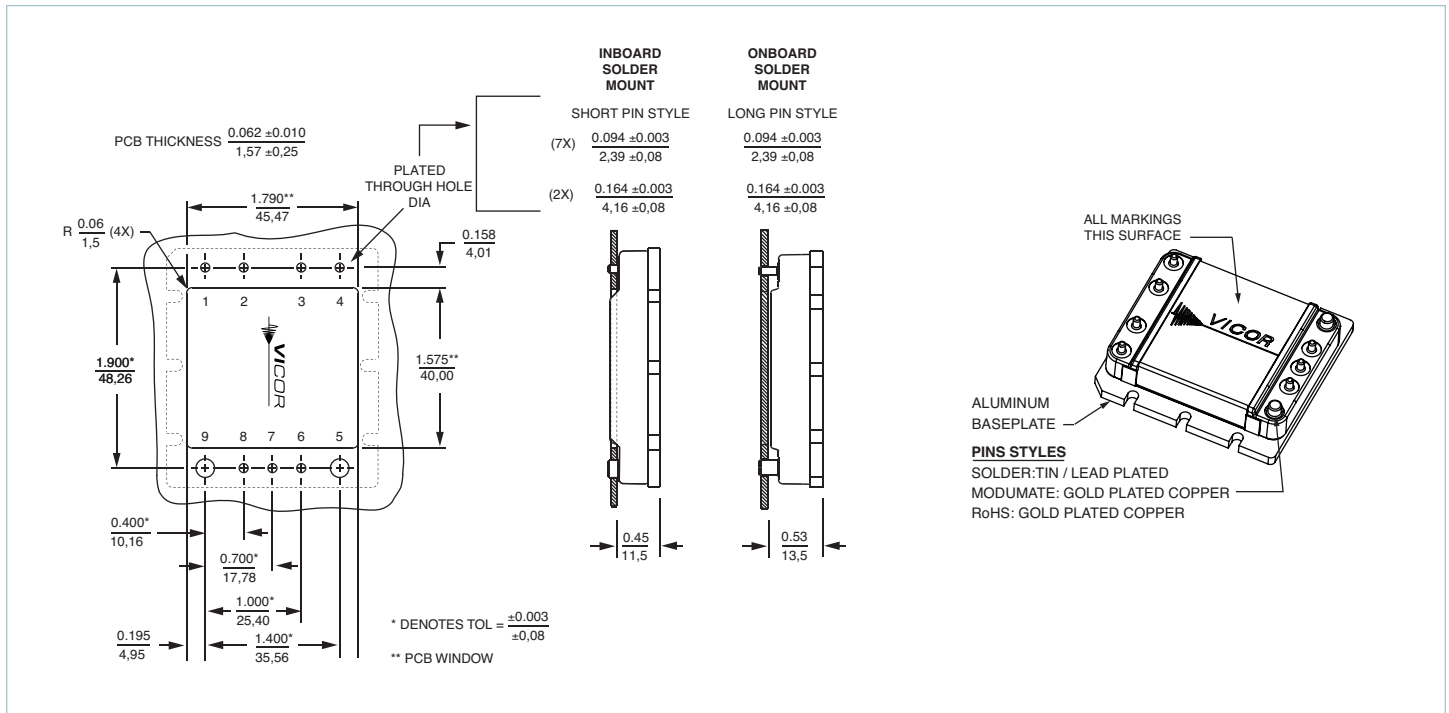


Figure 8 — PCB mounting specifications.

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