Military COTS 28 Vin Filter

M-FIAM5B

Model Number **M-FIAM5BM21***

Input Attenuator Module

Features

- EMI filtering-MIL-STD-461E[1]
- Transient protection-MIL-STD-704E/F
- Environments-MIL-STD-810, MIL-STD-202
- Environmental stress screening
- Low profile mounting options
- Output power up to 560 W
- Output current up to 20 A
- 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's Maxi, Mini, Micro Series 24 V 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 – 36 Vdc and delivers output current up to 20 A.

M-FIAM5B 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 onboard or inboard for height critical applications.

Compatible Products

- Maxi, Mini, Micro Series 24 V Input DC-DC converters
- 24 V Input VIPAC Arrays

[1]*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.*

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	36	Vdc	Continuous
	50	Vdc	12.5 ms, See Fig.3
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-FIAM5BM21)

Temperature	Environment	MTBF	Unit
25°C	Ground Benign: G.B.	2,533	1,000 Hrs
50°C	Naval Sheltered: N.S.	456	1,000 Hrs
65°C	Airborne Inhabited Cargo: A.I.C.	375	1,000 Hrs

Part Numbering

M-FIAM5B **M** **2** **1**

Product

Product Grade Temperatures (°C)

Grade	Operating	Storage
H =	*–40 to +100*	*–55 to +125*
M =	*–55 to +100*	*–65 to +125*

Pin Style
1 = *Short Pin*
2 = *Long Pin*
S = *Short ModuMate* [1]
N = *Long ModuMate* [1]
F = *Short RoHS*
G = *Long RoHS*
K = *Extra Long RoHS* [3]

Baseplate
1 = *Slotted*
2 = *Threaded*
3 = *Through hole*

[2] Compatible with SurfMate and InMate socketing system
[3] Not intended for socket or Surfmate mounting

SPECIFICATIONS

(typical at T_{BP} = 25°C, nominal line and 75% load, unless otherwise specified)

INPUT SPECIFICATIONS

Parameter	Min	Typ	Max	Unit	Notes
Input voltage	14	28	36	Vdc	Continuous
Inrush limiting			0.007	A/µF	
Transient immunity			50	Vdc	12.5 ms 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	Vdc	@20 A, 100°C baseplate
External capacitance					See Figure 6 on page 5
	330		1000	µF	50 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 kΩ 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	

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.

GENERAL SPECIFICATIONS

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

SPECIFICATIONS (CONT.)

■ ENVIRONMENTAL QUALIFICATION

Altitude
MIL-STD-810F, Method 500.4, Procedure I & II, 40,000 ft. and 70,000 ft. Operational.

Explosive Atmosphere
MIL-STD-810F, Method 511.4, Procedure I, Operational.

Vibration
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.

Shock
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.

Acceleration
MIL-STD-810F, Method 513.5, Procedure II, table 513.5-II, Operational, 2-7 g, 6 directions.

Humidity
MIL-STD-810F, Method 507.4.

Solder Test
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	vicorpower.com	vicorpower.com

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

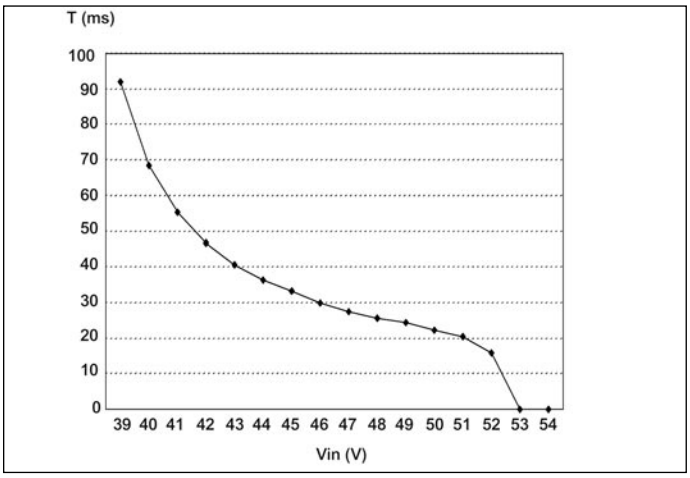

Figure 1 *— Shut Down Time of M-FIAM5B vs. Overvoltage*

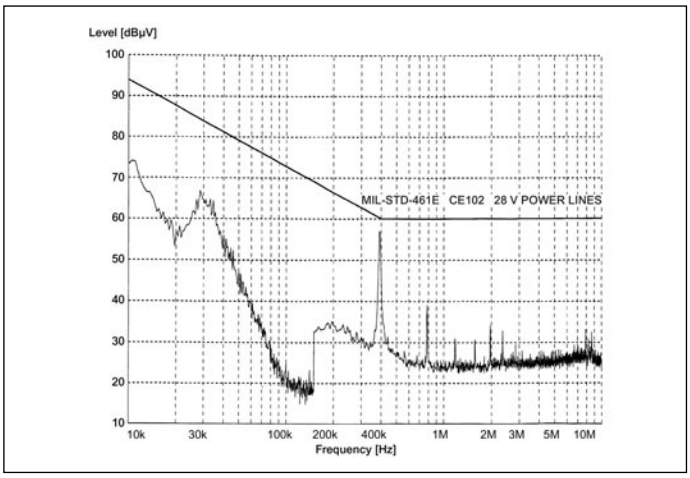

Figure 2 *— Conducted Noise; M-FIAM5B and Model V24A12M400B DC-DC converter operating at 28 Vdc, 400 W.*

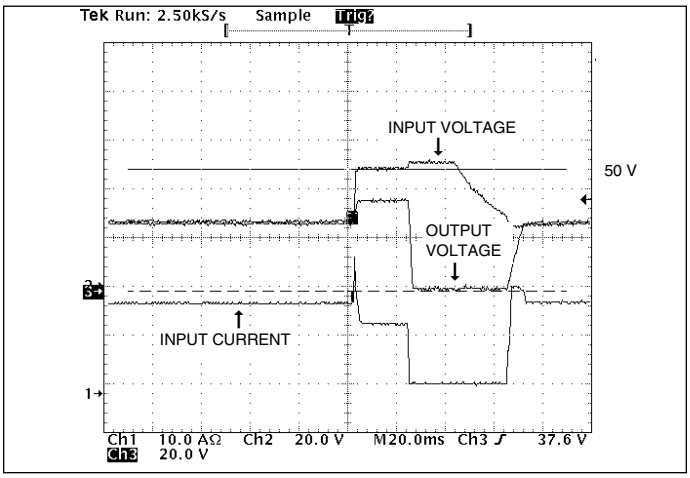

Figure 3 *— Transient Immunity: M-FIAM5B output response to an input transient.*

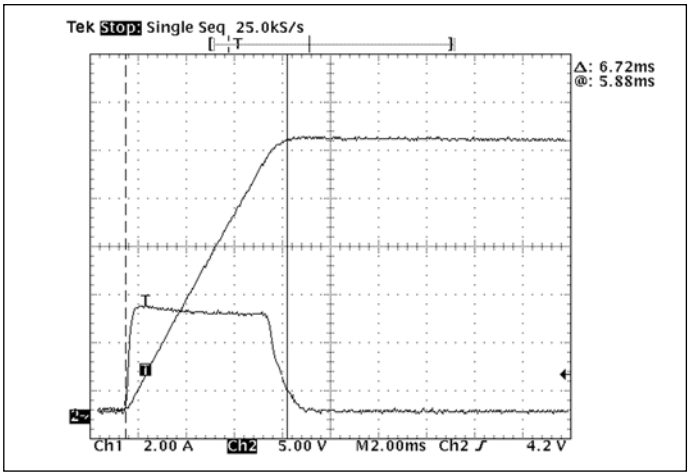

Figure 4*— Inrush Limiting: Inrush current with 1000 µF external capacitance, (C1 in Figure 6)*

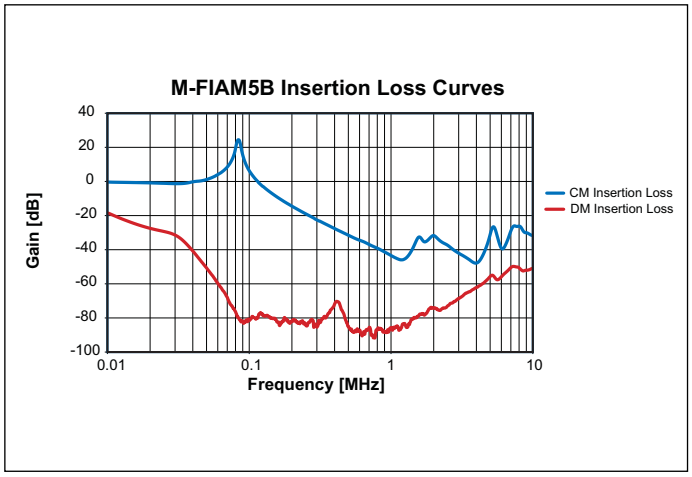

Figure 5 *— Insertion Loss*

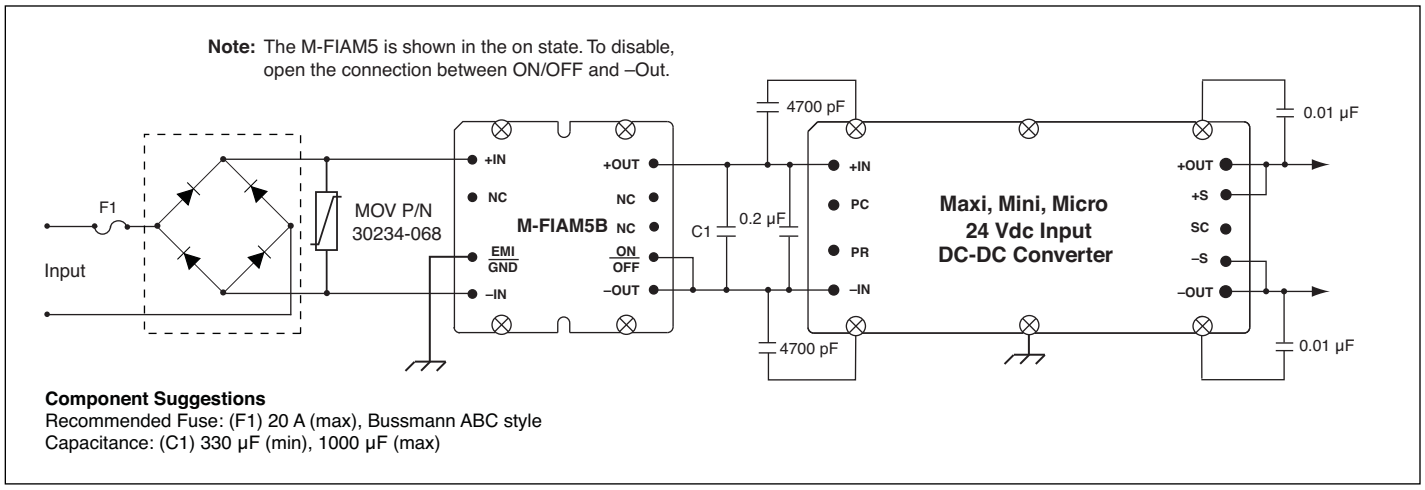

Figure 6*— Basic connection diagram with suggested Transient, Surge Protection and Recommended Reverse Polarity Protection.*

MECHANICAL DRAWINGS

Module 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	+

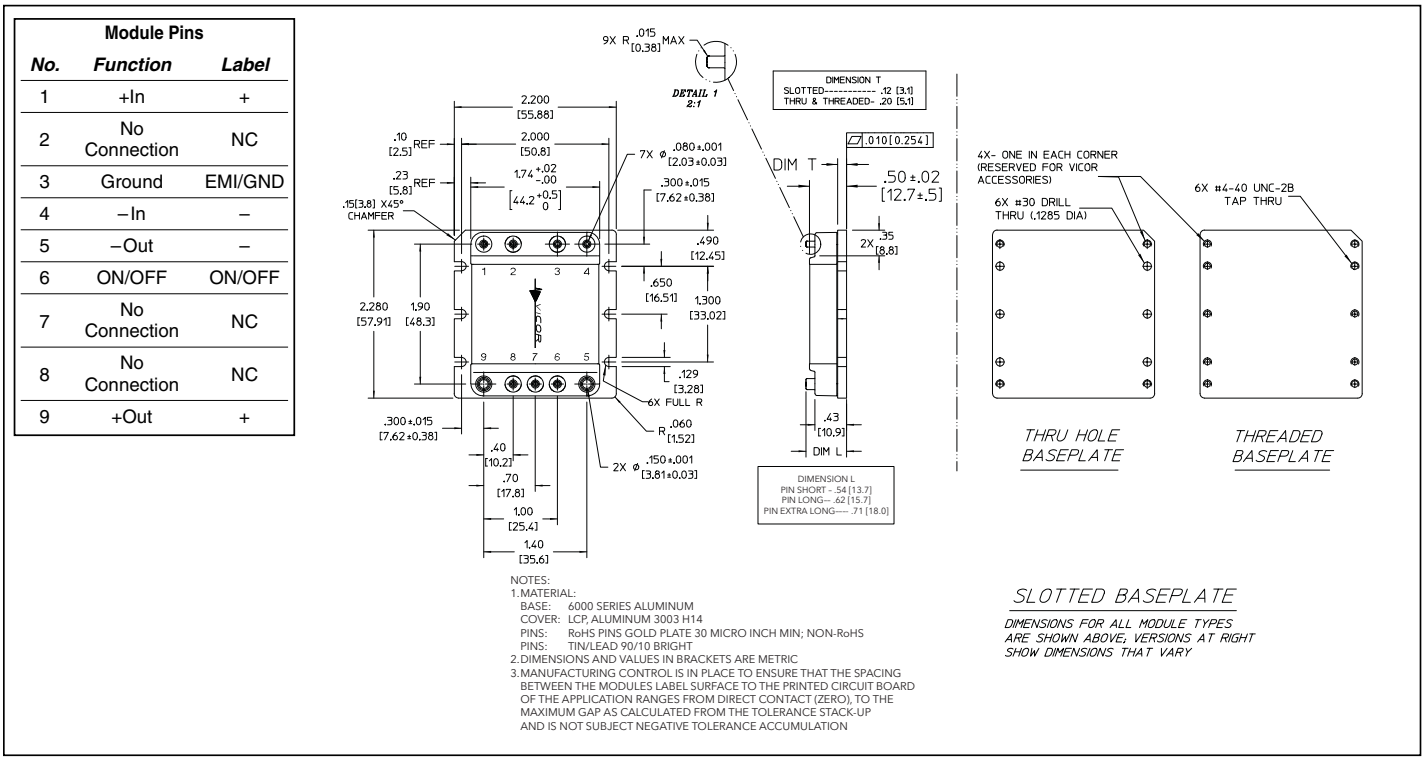

Figure 7 *— Mechanical diagram*

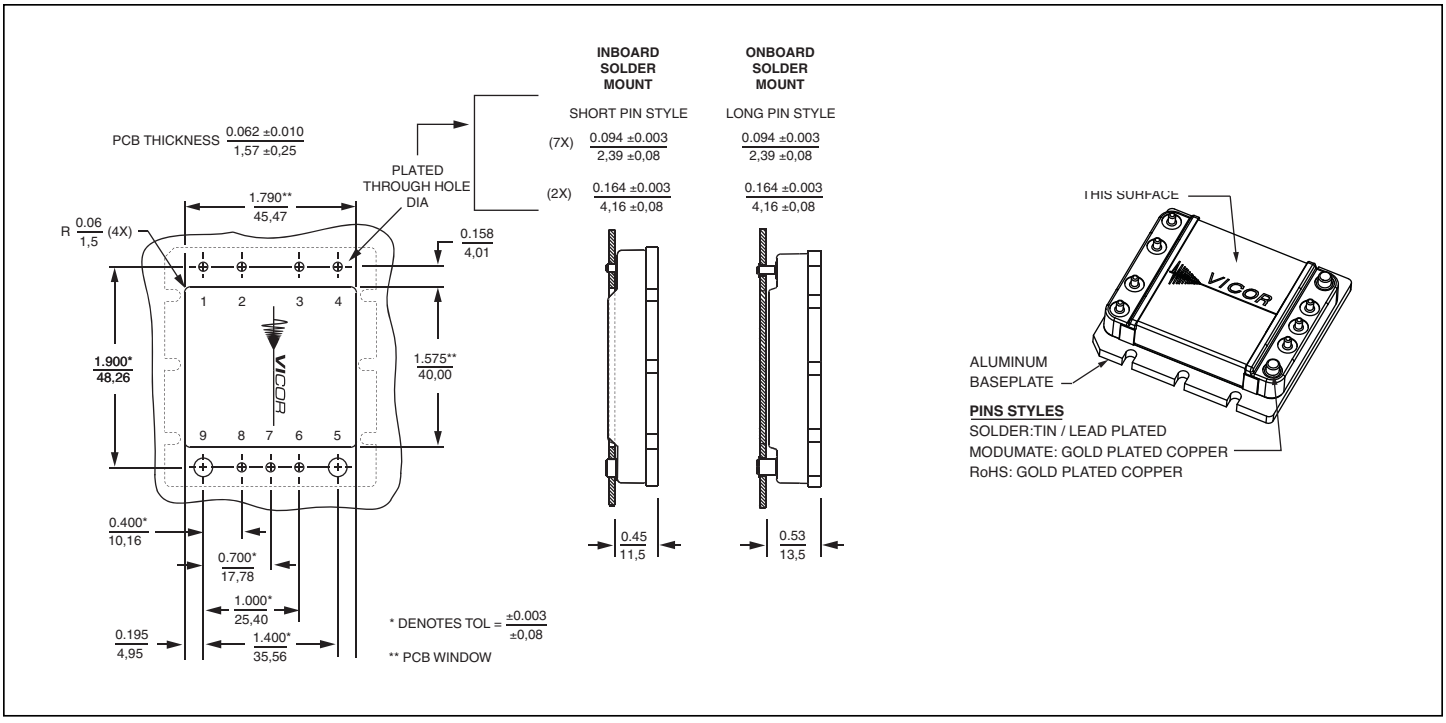

Figure 8 *— PCB Mounting Specifications.*

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