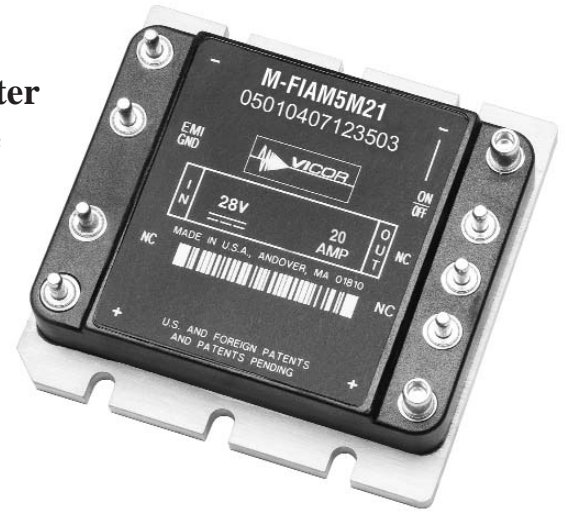




M-FIAM5

Military COTS 28Vin Filter Input Attenuator Module



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

Features

- EMI filtering-MIL-STD-461E
- Transient protection-MIL-STD-704E¹
- Environments-MIL-STD-810, MIL-STD-202
- Environmental stress screening
- Low profile mounting options
- Output current up to 20 Amps
- Mini sized package
- Inrush current limiting
- Reverse polarity protection

Product Highlights

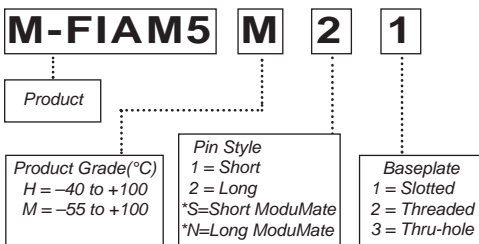
The M-FIAM5 is a DC front-end module that provides EMI filtering and transient protection. The M-FIAM5 enables designers using Vicor 2nd Generation 24V DC-DC converters to meet conducted emission/ conducted susceptibility per MIL-STD-461E; and input transients per MIL-STD-704E¹. The M-FIAM5 accepts an input voltage of 18-36Vdc and delivers output current up to 20 Amps.

M-FIAM5 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

- 2nd Generation 24V Input DC-DC converters

Part Number Format



^{*}Compatible with SurfMate and InMate socketing system.

Thermal Resistance

| Parameter | Typ |
|--|-------------|
| Baseplate to sink; flat, greased surface | 0.16°C/Watt |
| Baseplate to sink; thermal pad (P/N 20264) | 0.1°C/Watt |
| Baseplate to ambient | 7.9°C/Watt |
| Baseplate to sink; 1000 LFM | 2.2°C/Watt |

Absolute Maximum Rating

| Parameter | Rating | Unit | Notes |
|-------------------------------|-------------|--------|---------------------|
| +In to -In | 36 | Vdc | Continuous |
| +In to -In | 50 | Vdc | 100ms |
| Mounting torque | 5(0.57) | in-lbs | 6 each, #4-40 or M3 |
| Pin Soldering temperature | 500 (260) | °F(°C) | <5 sec; wave solder |
| Pin Soldering temperature | 750 (390) | °F(°C) | <7 sec; hand solder |
| Operating temperature H-Grade | -40 to +100 | °C | Baseplate |
| Storage temperature H-Grade | -55 to +125 | °C | |
| Operating temperature M-Grade | -55 to +100 | °C | Baseplate |
| Storage temperature M-Grade | -65 to +125 | °C | |

Specifications

(typical at TBP = 25°C, nominal line, 75% load, unless otherwise specified)

| Parameter | Min | Typ | Max | Remarks |
|---------------------------|----------------------------|-----------|-----------|---------------------------------|
| Input voltage | 18Vdc | 28Vdc | 36Vdc | Continuous |
| Output current | | | 20A | |
| Inrush limiting | | | 0.007A/μF | |
| Transient immunity | MIL-STD-704E | | | See footnote 1 |
| EMI:MIL-STD-461E | | | | |
| Conducted emissions: | CE101, CE102 | | | |
| Conducted susceptibility: | CS101, CS114, CS115, CS116 | | | |
| Dielectric withstand | | 1,500Vrms | | Input/Output to Base |
| | | 2,121Vdc | | Input/Output to Base |
| Efficiency | 96% | 98% | | |
| Internal voltage drop | | 0.5 | 1.0 | @20A, 100°C baseplate |
| ON/OFF control | | | | |
| Enable (ON) | 0.0Vdc | | 1.0Vdc | Referenced to -Vout. |
| Disable (OFF) | 3.5Vdc | | 5.0Vdc | 100kΩ internal pull-up resistor |
| External capacitance | | 330μF | 1000μF | See illustration C1 on page 3. |
| | | | 50V | |
| Weight | | 3.3 (94) | | Ounces (grams) |
| Warranty | | | 2 | Years |

¹ MIL-STD-704E Compliance requires an external circuit. See addendum A

MTBF per MIL-HDBK-217F

| Temp | Environment | MTBF | Unit |
|------|---------------------------------|-----------|------|
| 25°C | Ground Benign:G.B. | 3,334,295 | Hrs |
| 50°C | Naval Sheltered:N.S. | 786,893 | Hrs |
| 65°C | Airborne Inhabited Cargo:A.I.C. | 650,187 | Hrs |

Environmental Qualification

| |
|---|
| Altitude MIL-STD-810C, Method 500.2, 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 grams 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 grams for 1 hour per axis. |
| Shock MIL-STD-810-F, Method 516.5, Procedure I, Functional Shock, 40 G's. MIL-S-901D, Lightweight Hammer Shock, 3 impacts/axis, 1,3,5 ft. MIL-STD-202F, Method 213B, 60 G's, 9ms half sine. MIL-STD-202F, Method 213B, 75 G's, 11ms Saw Tooth Shock. |
| Acceleration MIL-STD-810F, Method 513.5, Procedure II, table 513.5-II, Operational, 2-7 G's, 6 directions. |
| Humidity MIL-STD-810F, Method 507.4, Procedure I, Cycle I, 240 hrs, 95% RH. |
| Solder Test MIL-STD-202F, Method 208, 8 hour aging. |

Environmental Stress Screening

| | H Grade | M Grade |
|--------------------------------------|------------------------------|------------------------------|
| Operating Temp. | -40°C to +100°C | -55°C to +100°C |
| Storage Temp. | -55°C to +125°C | -65°C to +125°C |
| Temp. Cycling:* | 12 cycles -65°C to +100°C | 12 cycles -65°C to +100°C |
| Ambient Test @ 25°C | Yes | Yes |
| Power Cycling | 12 hours, | 24 hours, |
| Burn-In: | 28 cycles | 56 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.

Conducted Noise

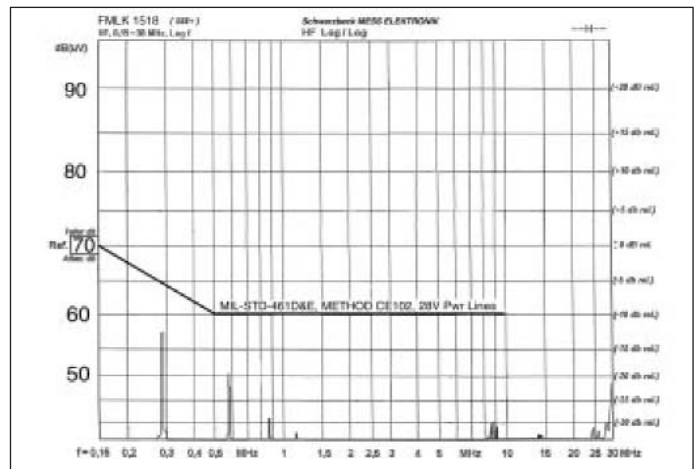


Figure 1– M-FIAM5 and Model V24A12M400A DC-DC converter operating at 28Vdc, 400W.

Transient Immunity

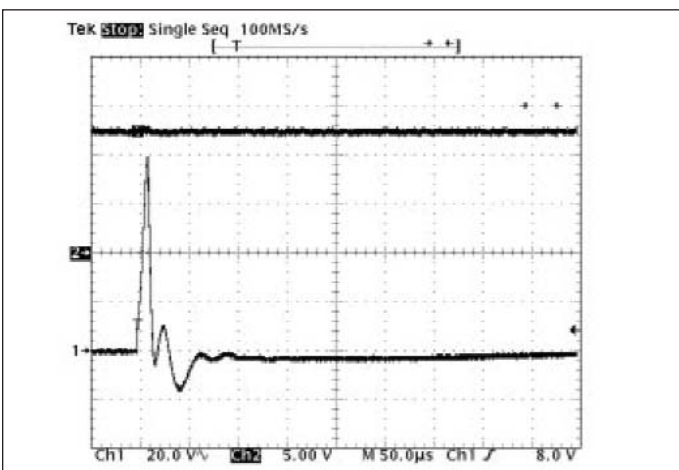


Figure 2 – Transient Immunity: M-FIAM5 output response to an input transient.

Inrush Limiting

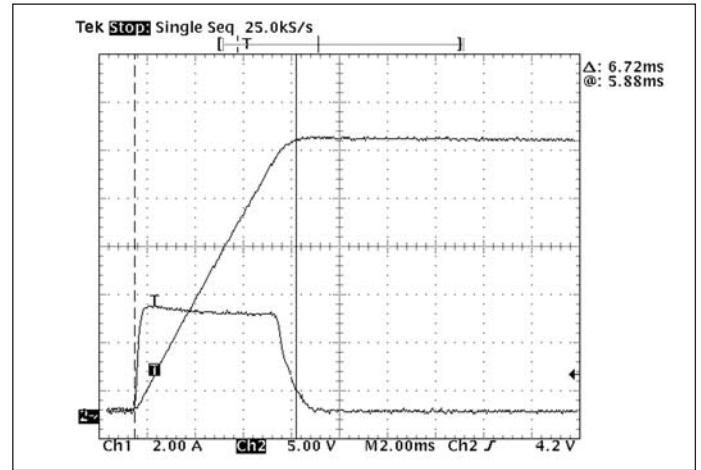
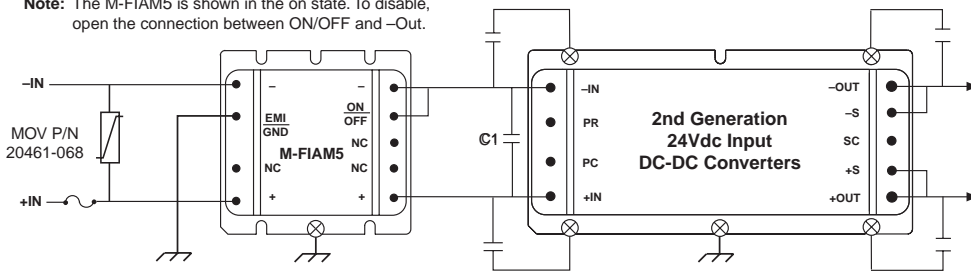


Figure 3– Inrush Limiting: Inrush current with 1000μF external capacitance.

Transient and Surge Protection

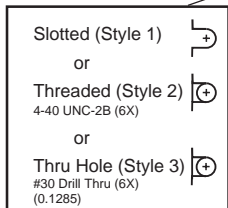
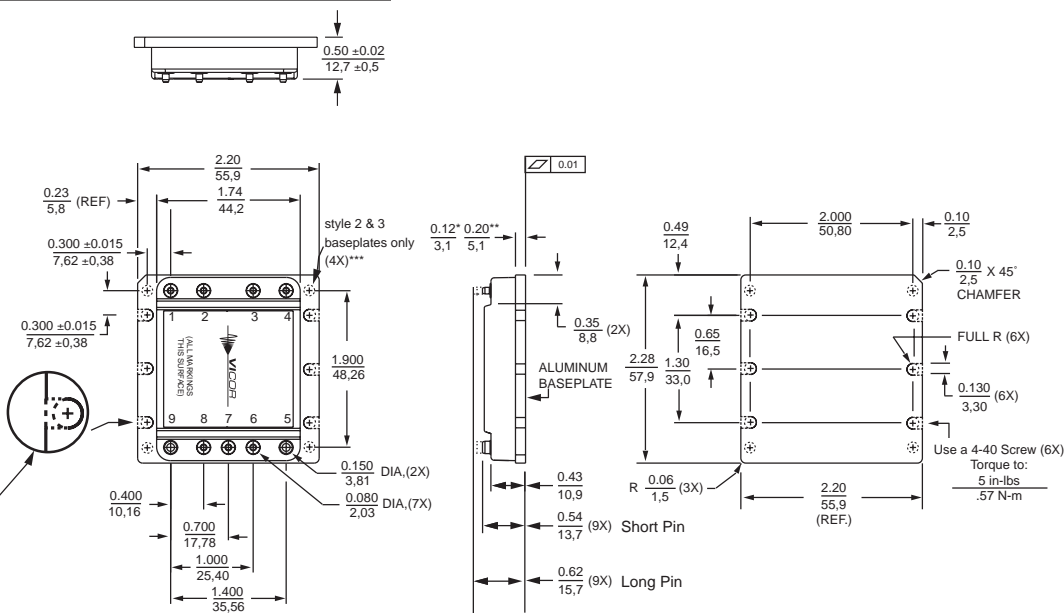
Note: The M-FIAM5 is shown in the on state. To disable, open the connection between ON/OFF and -Out.



Capacitance (C1)
330µF(min), 1000µF(max)
Recommended Fuse:
20A Max., F03A Type

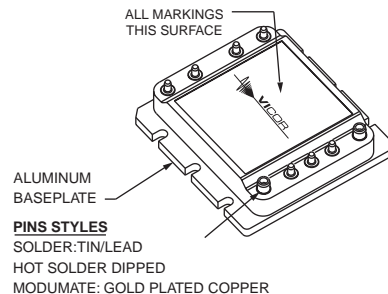
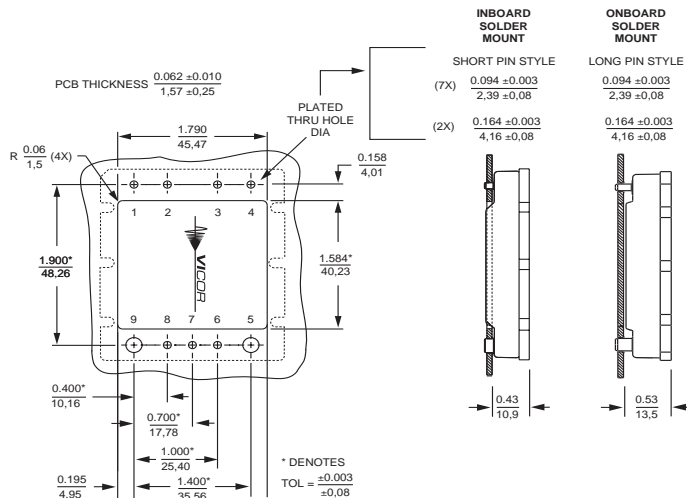
Mechanical Diagram

| 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 | + |



* Style 1 baseplate only
** Style 2 & 3 baseplates
*** Reserved for Vicor accessories
Not for mounting

PCB Mounting Specifications



Addendum A

MIL-STD-704E Transient / Overvoltage Protection

The standard (COTS) 24V input 2nd Generation Converter Modules may be used in Military 28 volt applications. The M-FIAM5 provides compliance to MIL-STD-461E conducted emissions and susceptibility standards. Additional circuitry, as illustrated in the accompanying schematic (see Fig. 1), provides compliance to the MIL-STD-704E transient overvoltage specification. The 24V input modules employ undervoltage and overvoltage protection. These converters, shut down if the input falls below 18V or rises to 36V or above. 18V is consistent with the MIL-STD-704E specification, but the standard also requires uninterrupted performance in the event of an input voltage transient to 50V for a period of 12.5 millisc. The above referenced circuit clamps the input voltage, in the event that it exceeds 32V, as illustrated in figure 2. This performance prevents the converter from shutting down, thus meeting the transient overvoltage specification of MIL- STD-704E.

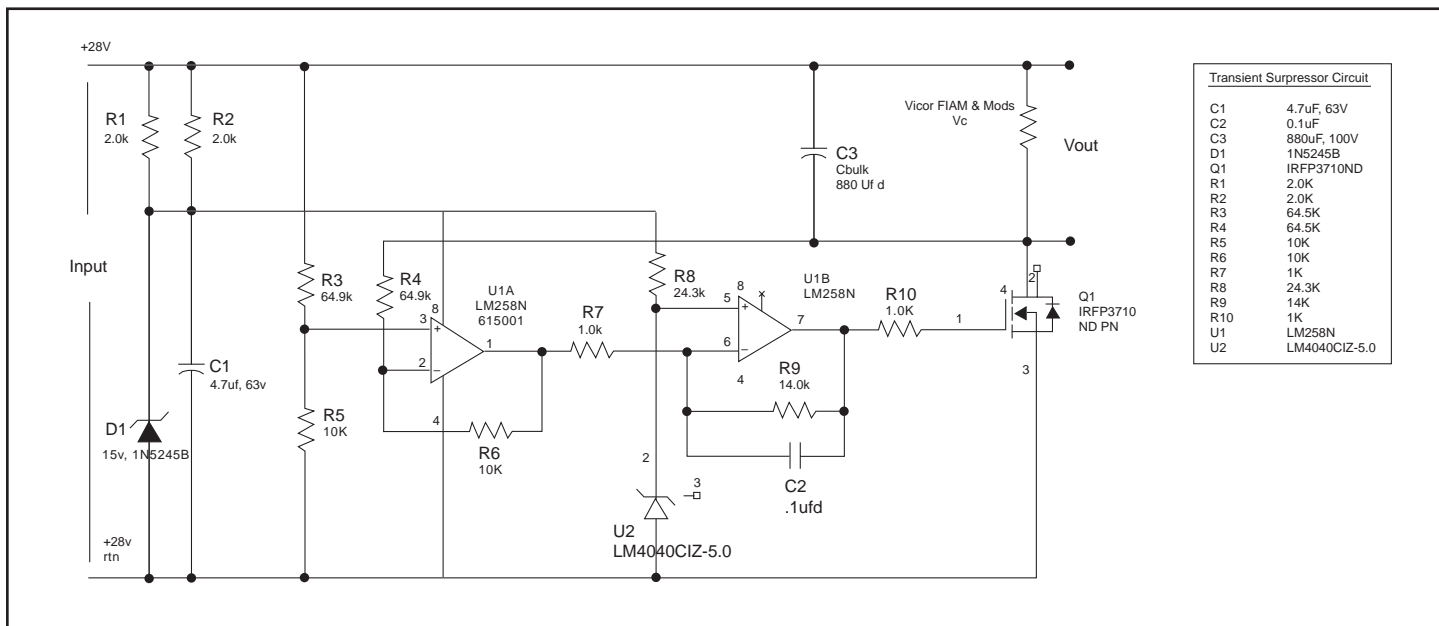


Figure 1– Transient / Overvoltage protection circuit.

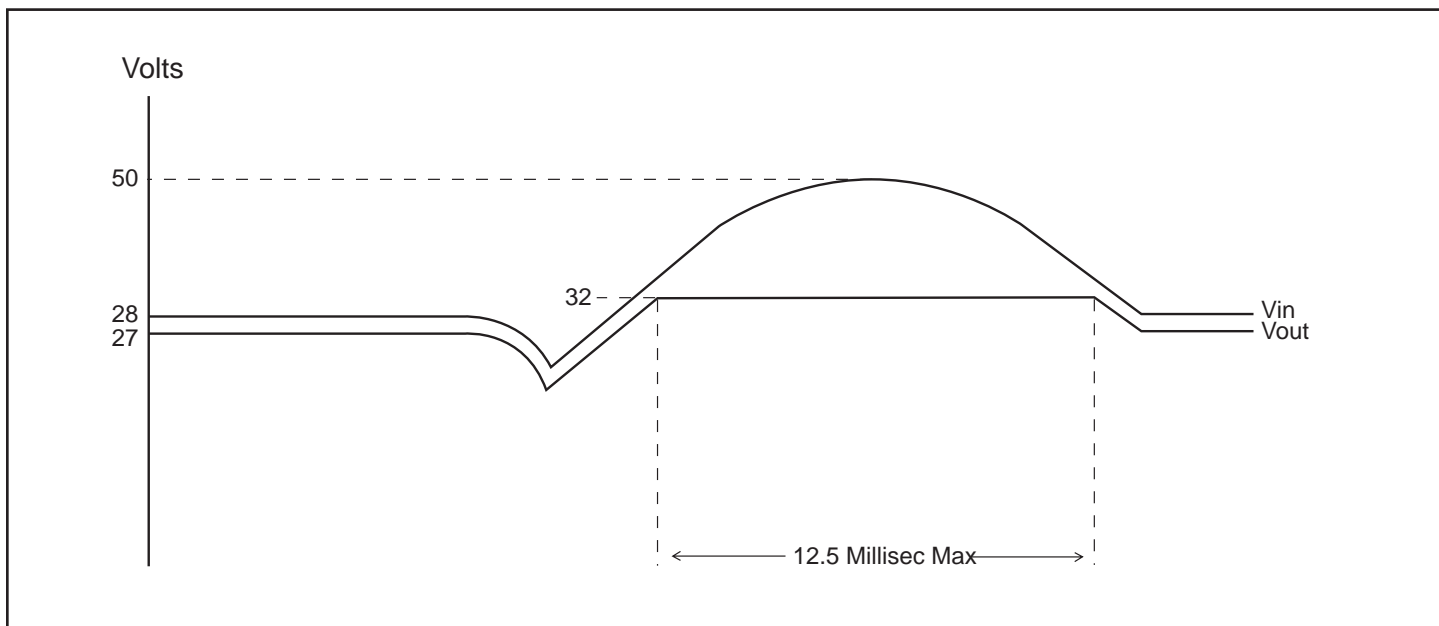


Figure 2– Overvoltage clamping

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