



Input Attenuator Module

Features & Benefits

- EMI filtering-MIL-STD-461E^[1]
- Transient protection-MIL-STD-704A/E/F, MIL-STD-1275A/B/D
- Environments-MIL-STD-810, MIL-STD-202
- Environmental stress screening
- Output power up to 500W
- Output current up to 18A
- Inrush current limiting
- Cold plate mounting

Product Highlights

The MVA-FIAM9 is a DC front-end module that provides EMI filtering and transient protection. The MVA-FIAM9 enables designers using Vicor’s Maxi, Mini, Micro Series 24V & Maxi Series 28V DC-DC converters or VIPAC Arrays™ to meet conducted emission / conducted susceptibility per MIL-STD-461E; and input transients per MIL-STD-704A/E/F and MIL-STD-1275A/B/D. The MVA-FIAM9 accepts an input voltage of 10 – 36V_{DC} and delivers output power up to 500W.

MVA-FIAM9 is mounted on a 4.69” x 3.62” coldplate with a height of 0.81” and convenient input and output connectors.

^[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.

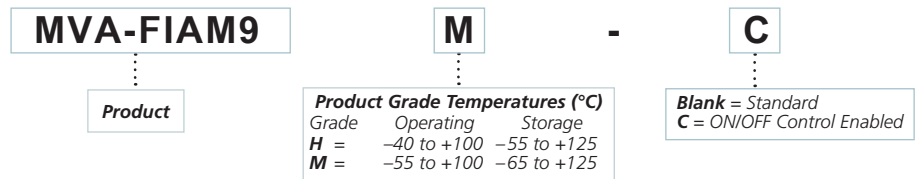
Absolute Maximum Rating

Parameter	Rating	Unit	Notes
+IN to -IN	36	V _{DC}	Continuous
	100	V _{DC}	50ms, See Fig.1
	250	V _{DC}	70µs

MTBF per MIL-HDBK-217F (MVA-FIAM9M)

Temperature	Environment	MTBF	Unit
25°C	Ground Benign: G.B.	3,379	1,000Hrs
50°C	Naval Sheltered: N.S.	608	1,000Hrs
65°C	Airborne Inhabited Cargo: A.I.C.	476	1,000Hrs

Part Numbering



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	10	28	36	V_{DC}	Continuous
Inrush limiting			0.007	A/ μF	
Transient immunity			100	V_{DC}	50ms per MIL-STD-1275A/B/D, continuous operation
			250	V_{DC}	70 μs per MIL-STD-1275A/B/D, continuous operation
			70	V_{DC}	20ms per MIL-STD-704A, continuous operation
			50	V_{DC}	12.5ms per MIL-STD-704E/F, continuous operation

OUTPUT SPECIFICATIONS

Parameter	Min	Typ	Max	Unit	Notes
Output power			500	W	
Output current			18	A	
Efficiency	96	97		%	
Internal voltage drop		0.85	1.5	V	500W, 25 $^{\circ}\text{C}$ baseplate
External capacitance					See Figure 5 on page 4
	330		1000	μF	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 Ω 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	When using with V28 series converters a 27 μH inductor is needed between the filter and converter for compliance below 30% of rated power.
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			0.7 (318)	Lbs (grams)	
Warranty			2	Years	

Specifications (Cont.)

MODULE ENVIRONMENTAL QUALIFICATION

Altitude	MIL-STD-810F, Method 500.4, Procedure I & II, 40,000ft. and 70,000ft. 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 5.6Grms 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.
Shock	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.
Acceleration	MIL-STD-810F, Method 513.5, Procedure II, table 513.5-II, Operational, 2-7g, 6 directions.
Humidity	MIL-STD-810F, Method 507.4.
Solder Test	MIL-STD-202G, Method 208H, 8 hour aging.

MODULE 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.

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.

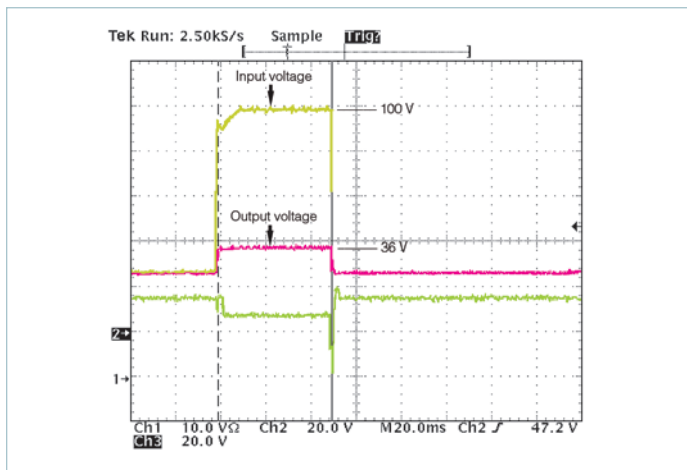


Figure 1 — Transient Immunity: MVA-FIAM9 output response to an input transient

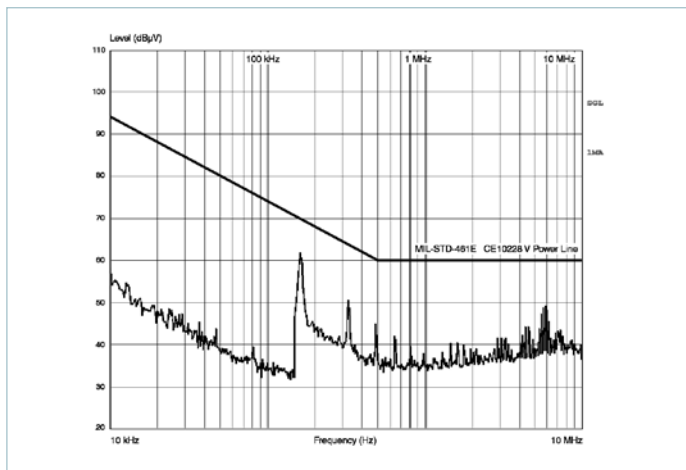


Figure 2 — Conducted Noise; MVA-FIAM9 and model V28A12M200B DC-DC converter operating at 28V_{DC} 200W

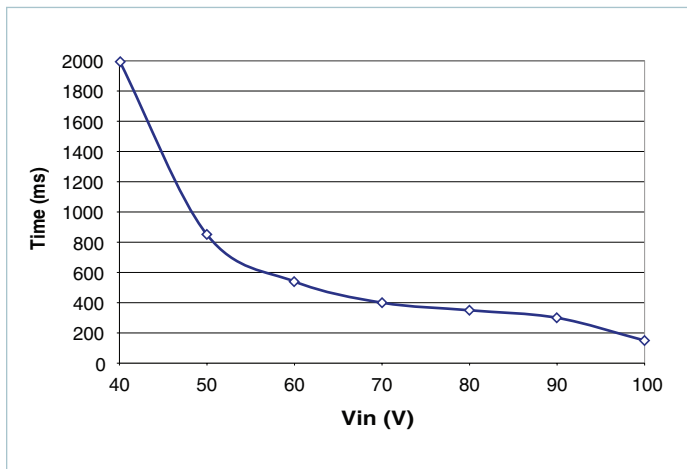


Figure 3 — Shut down time of MVA-FIAM9 vs. Overvoltage

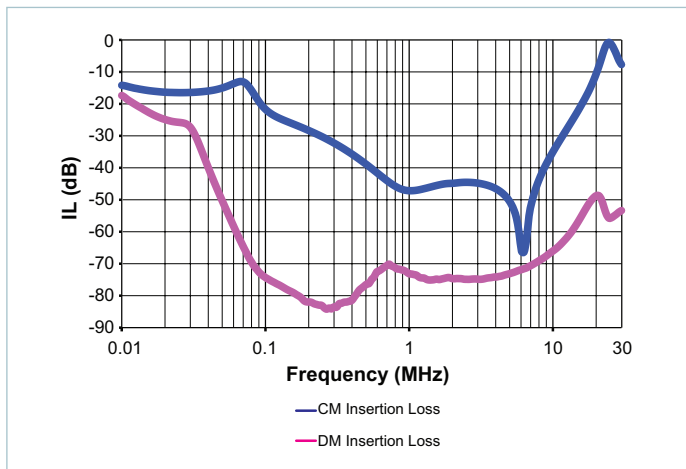


Figure 4 — MVA-FIAM9 insertion loss

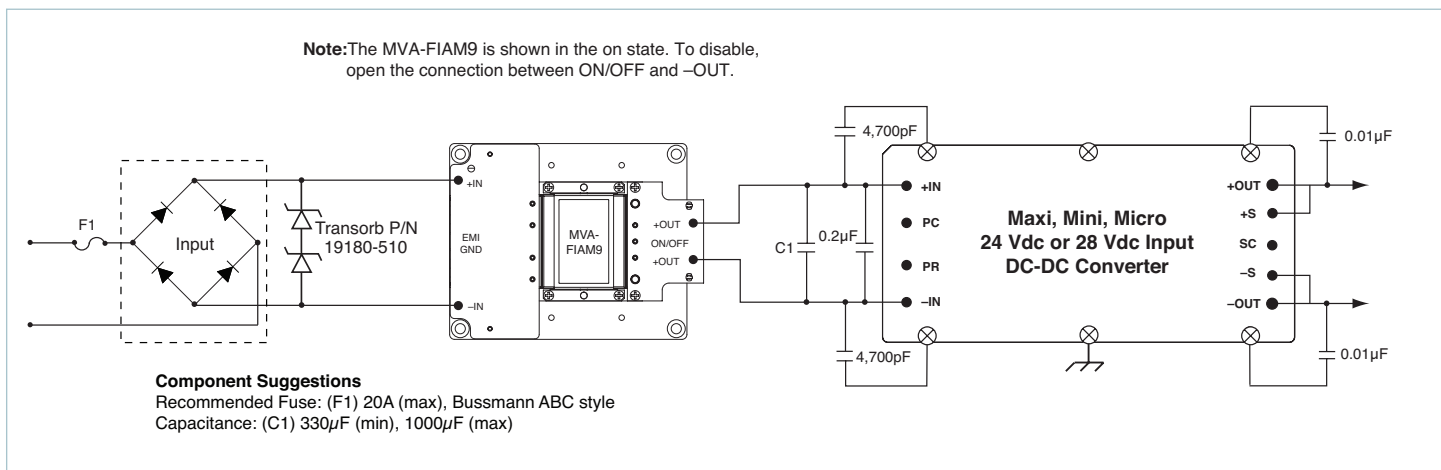
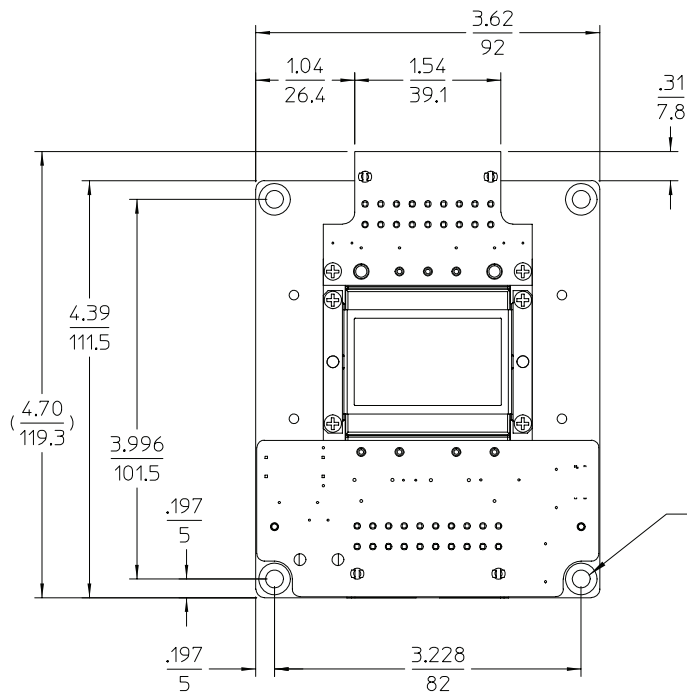
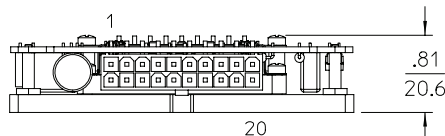


Figure 5 — Transient, Surge Protection and Recommended Reverse Polarity Protection.

INCHES
MM



TOLERANCES: $\frac{.XX}{MM} = \frac{.02}{.5}$ $\frac{.XXX}{MM} = \frac{.010}{.25}$



1										10
11										20

1										9
10										18

Input Connector

Pin #	Function
1 – 4	-VIN
5 – 7	+VIN
8	NC
9	PE protective earth
10	PE protective earth
11 – 13	-VIN
14 – 17	+VIN
18	NC
19	PE protective earth
20	PE protective earth

Output Connector

Pin #	Function	Pin #	Function
1	+VOUT	10	+VOUT
2	+VOUT	11	+VOUT
3	+VOUT	12	+VOUT
4	N/C	13	NC
5	N/C	14	NC
6	N/C	15	On / Off
7	-VOUT	16	-VOUT
8	-VOUT	17	-VOUT
9	-VOUT	18	-VOUT

Input Mating Connector	Vicor P/N
Housing	24795
Pin	24796
Kit	24828

Output Mating Connector	Vicor P/N
Housing	25050
Pin	24796
Kit	25067

Note: The MVA-FIAM9H and MVA-FIAM9M are delivered with the On / Off control already configured as On using a 0Ω resistor on the underside of the output connector board. The MVA-FIAM9H-C and MVA-FIAM9M-C are delivered without the 0Ω resistor installed, allowing for user control of the On / Off functionality.

Figure 6 — MVA-FIAM9 Outline and Pinouts

Vicor's comprehensive line of power solutions includes high density AC-DC and DC-DC modules and accessory components, fully configurable AC-DC and DC-DC power supplies, and complete custom power systems.

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Visit http://www.vicorpower.com/mil-cots_dc-dc/mil-cots_m-fiam_filter_input_attenuator_module for the latest product information.

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