Military COTS 28V_{IN} Filter

M-FIAM7B

Example Model Number **M-FIAM7BM21**



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 [b]
- Transient protection: MIL-STD-1275A/B/D, MIL-STD-704A-F and DO-160E
- Environments: MIL-STD-810, MIL-STD-202
- Environmental stress screening
- Low-profile mounting options
- Output power up to 400W
- Mini-sized package
- Inrush current limiting

Product Highlights

The M-FIAM7B is a DC front-end module that provides EMI filtering and transient protection. The M-FIAM7B enables designers using Vicor 28V DC-DC VI Chip and VI Brick® modules to meet conducted emission/ conducted susceptibility per MIL-STD-461E; and input transients per MIL-STD-1275A/B/D, MIL-STD-704A-F and DO-160E. The M-FIAM7B accepts an input voltage of 14 – 50V_{DC} and delivers output power up to 400W.

M-FIAM7B 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

- 28V Input DC-DC VI Chip® or VI Brick modules

Note: This product is not compatible with Maxi, Mini, Micro DC-DC converters.

Absolute Maximum Rating

Parameter	Rating	Unit	Notes
+IN to –IN	50	V_{DC}	Continuous
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-FIAM7BM21)

Temperature	Environment	MTBF	Unit
25°C	Ground Benign: G.B.	4,041	1,000Hrs
50°C	Naval Sheltered: N.S.	727	1,000Hrs
65°C	Airborne Inhabited Cargo: A.I.C.	570	1,000Hrs

Part Numbering

M-FIAM7B **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* [a]
N = *Long ModuMate* [a]
F = *Short RoHS*
G = *Long RoHS*
K = *Extra Long RoHS* [c]

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

[a] Compatible with SurfMate and InMate socketing system
[b] 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.
[c] Not intended for socket or Surfmate mounting

Note: Product images may not highlight current product markings.

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	50	V_{DC}	Continuous
Inrush limiting			0.007	A/µF	See Figure 4
Transient immunity			100	V_{DC}	50ms per MIL-STD-1275A/B/D, continuous operation (see Figure 3)
			250	V_{DC}	70µs per MIL-STD-1275B, continuous operation
			70	V_{DC}	20ms per MIL-STD-704A, continuous operation
			80	V_{DC}	100ms per DO-160E, Section 16, Power Input, Category Z 50ms per MIL-STD-704A, continuous operation

Output Specifications

Parameter	Min	Typ	Max	Unit	Notes
Output current			25	A	Over continuous input and temp. range
Output power			400	W	Transient compliance over temp. range (see Figure 7)
Efficiency	96	98		%	
Internal voltage drop		0.5	0.7	V	@ 25A, 100°C baseplate
External capacitance					See Figure 8
	330		3300	µF	63V

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)	4.0		5.50	V_{DC}	100kΩ internal pull-up resistor
EMI GRD		earth			Not electrically connected to baseplate

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 (see note), CS114, CS115, CS116	With suggested Reverse Polarity Protection

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	
Agency Approvals				CE UKCA	Electrical equipment (safety) regulations

Specifications (Cont.)

Typical at T_{BP} = 25°C, nominal line and 75% load, unless otherwise specified.

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.

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	vicorpower.com	vicorpower.com

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

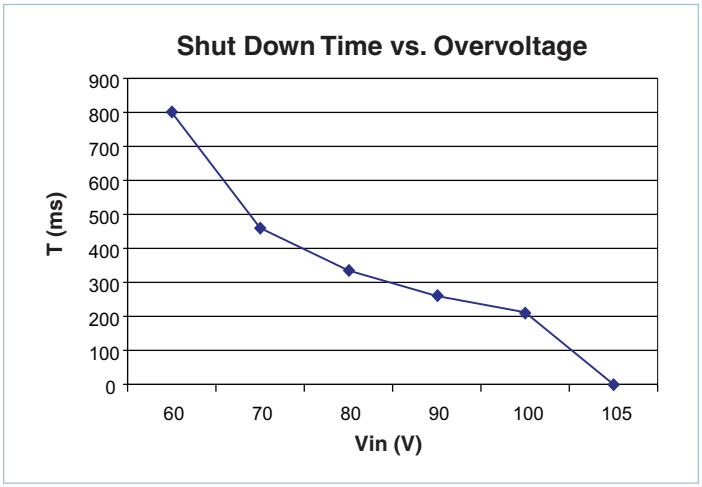


Figure 1 — *T = time period before overvoltage protection. V_{IN} = input voltage (switching up from 28V_{DC})*

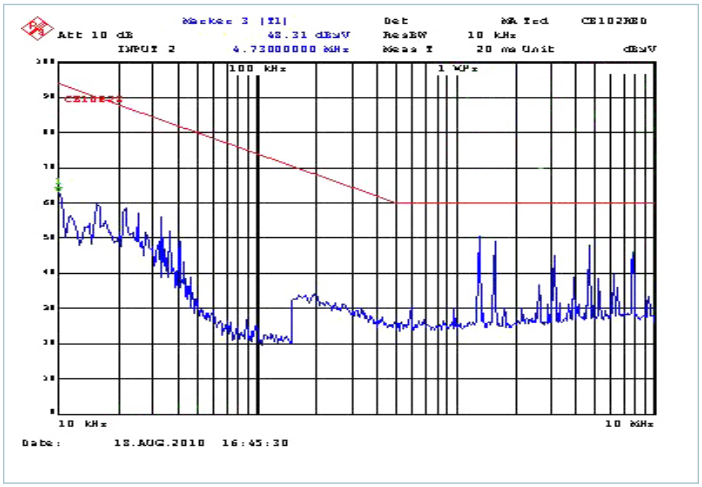


Figure 2 — *MIL-STD-461F, CE102; M-FIAM7B and three MIL-COTS PRMs and three MIL-COTS VTMs, 350W*

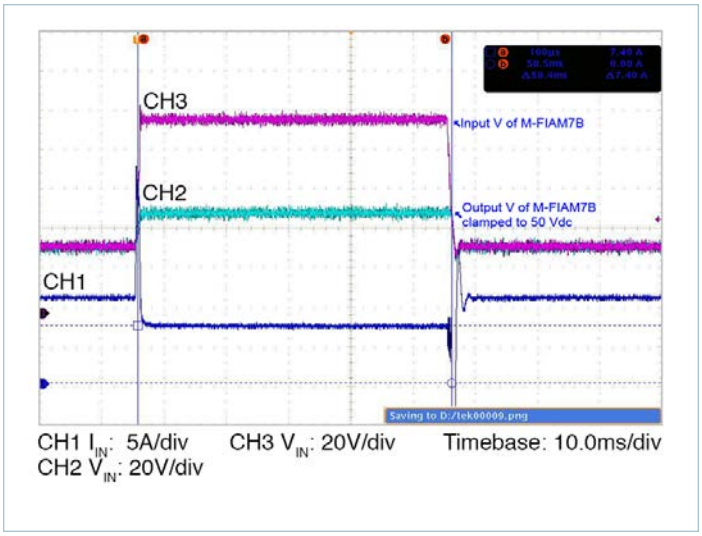


Figure 3 — *Transient immunity; M-FIAM7B output response to an input transient*

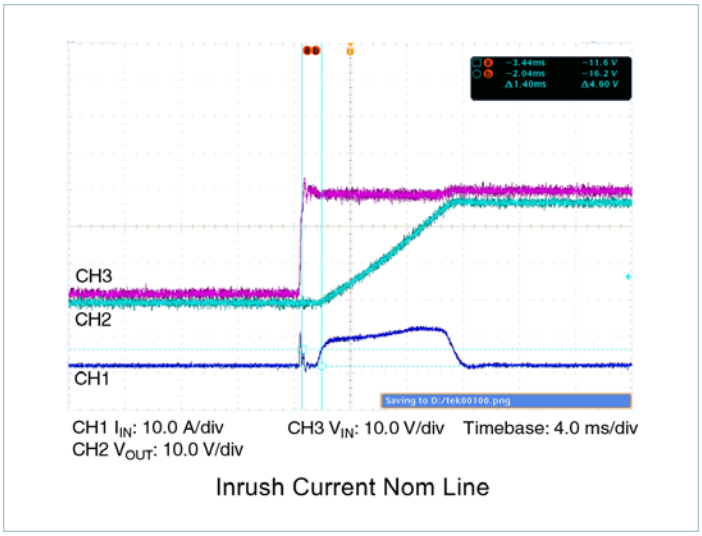


Figure 4 — *Inrush limiting; inrush current with 3300µF external capacitance*

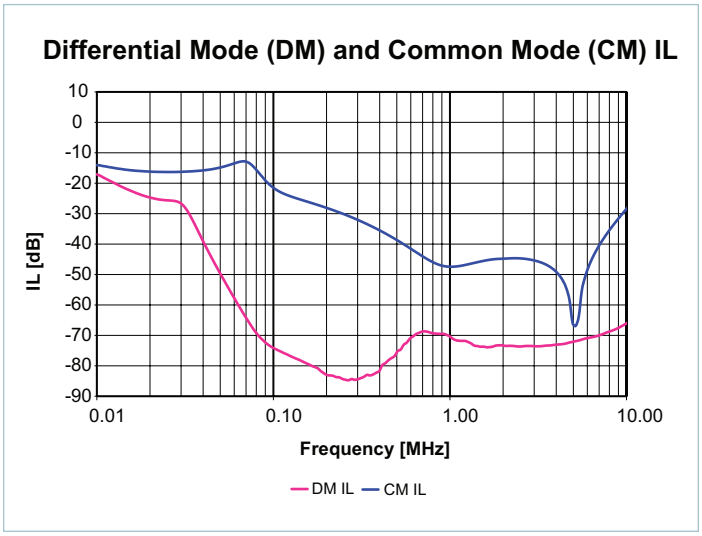


Figure 5 — *Insertion loss curve*

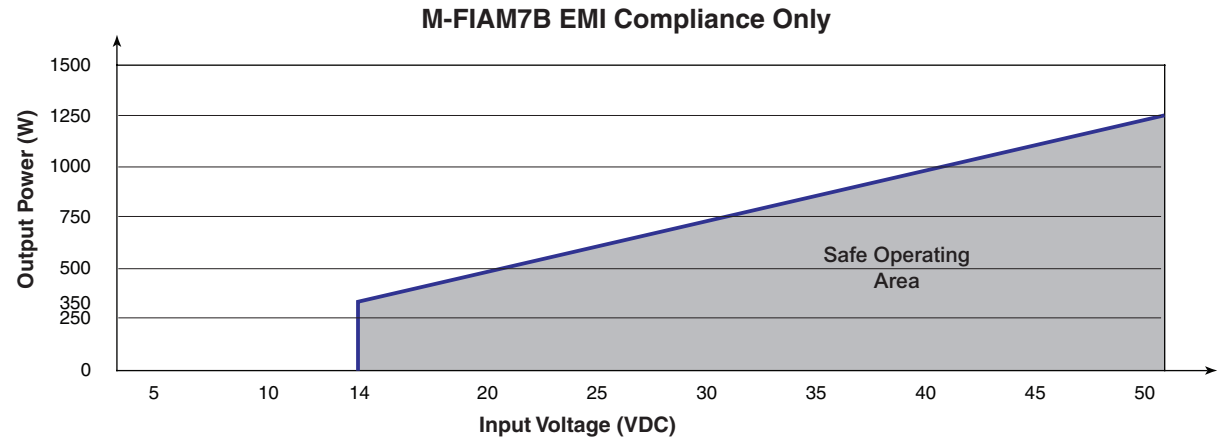


Figure 6 — *M-FIAM7B EMI compliance only*

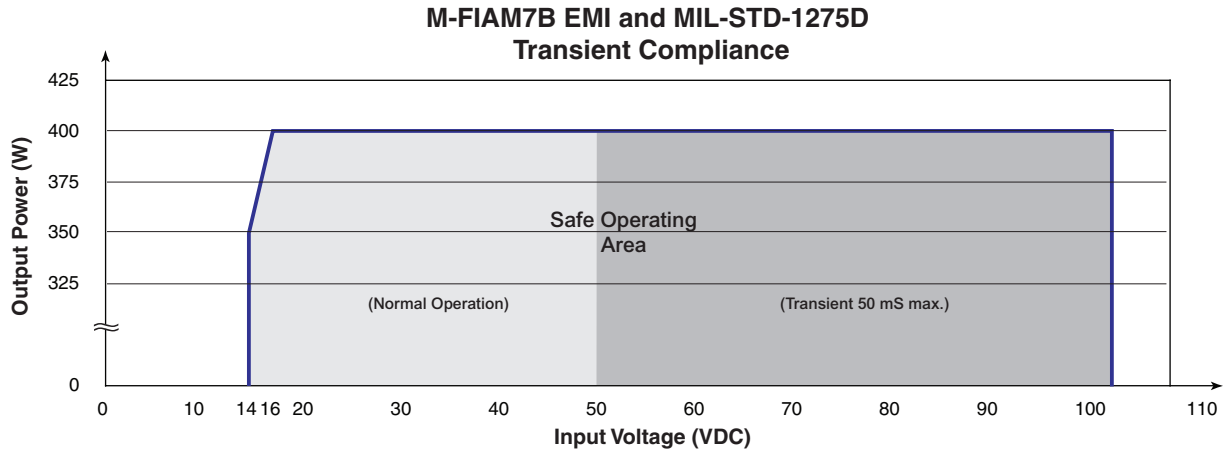


Figure 7 — *M-FIAM7B EMI and MIL-STD-1275D transient compliance*

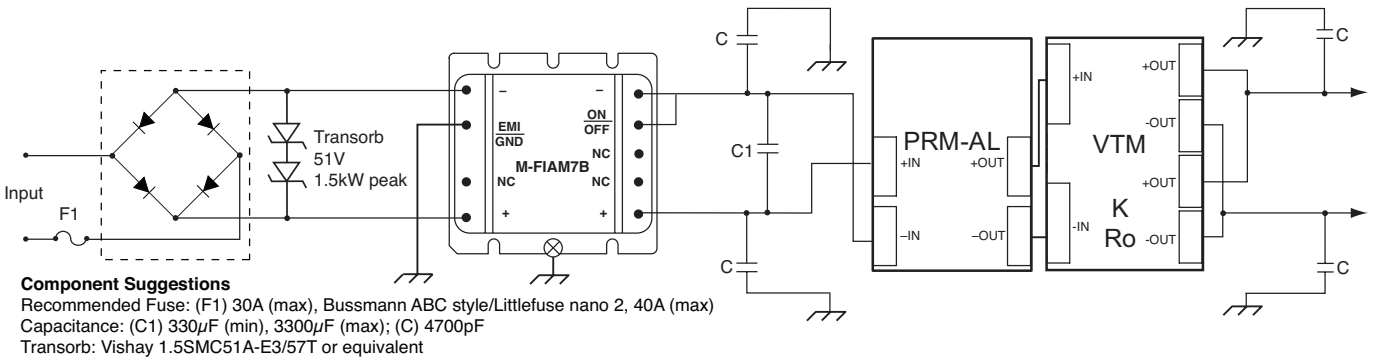


Figure 8 — *Basic connection diagram with suggested transient, surge protection and reverse-polarity protection (R.P.P)*

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.

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	+

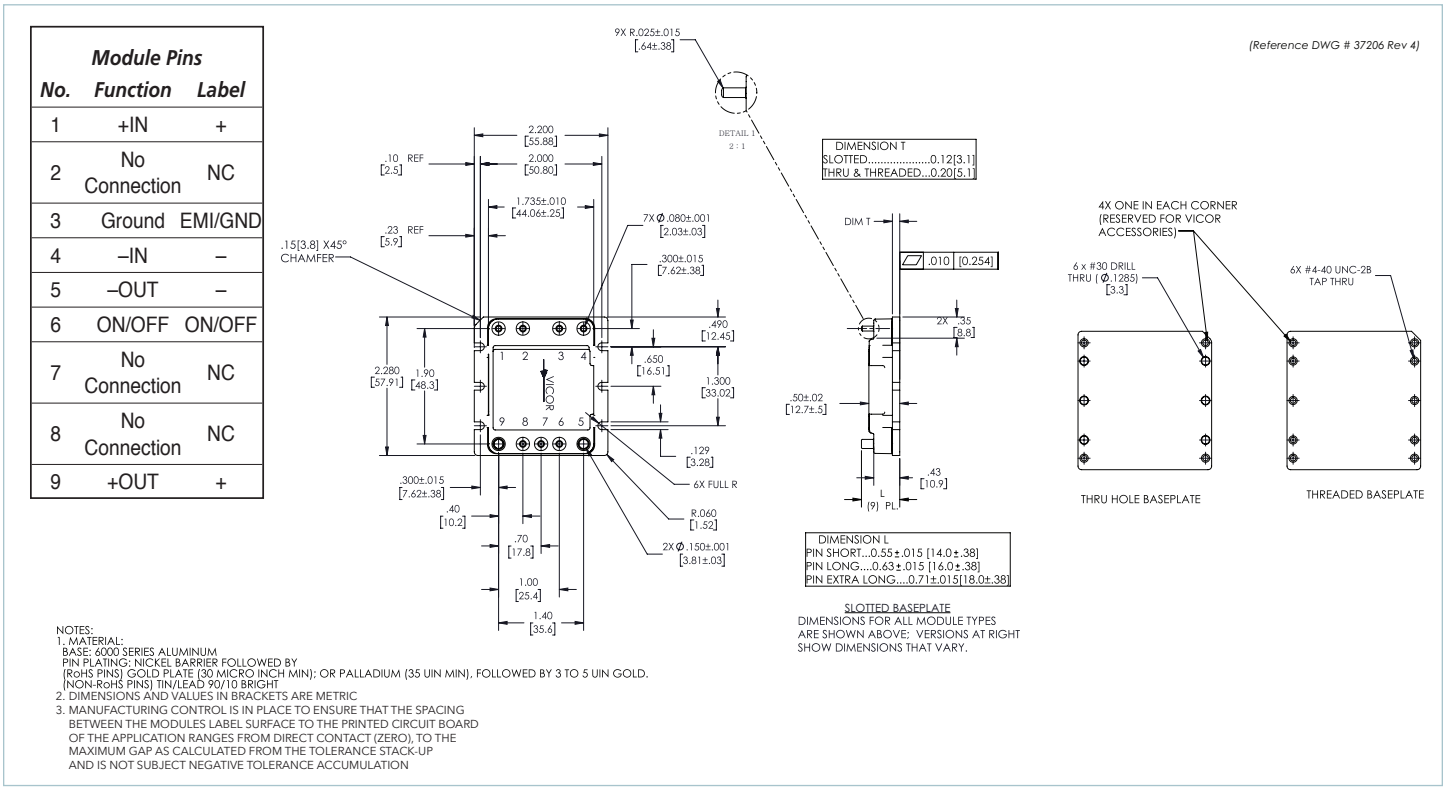


Figure 9 — *Mechanical diagram*

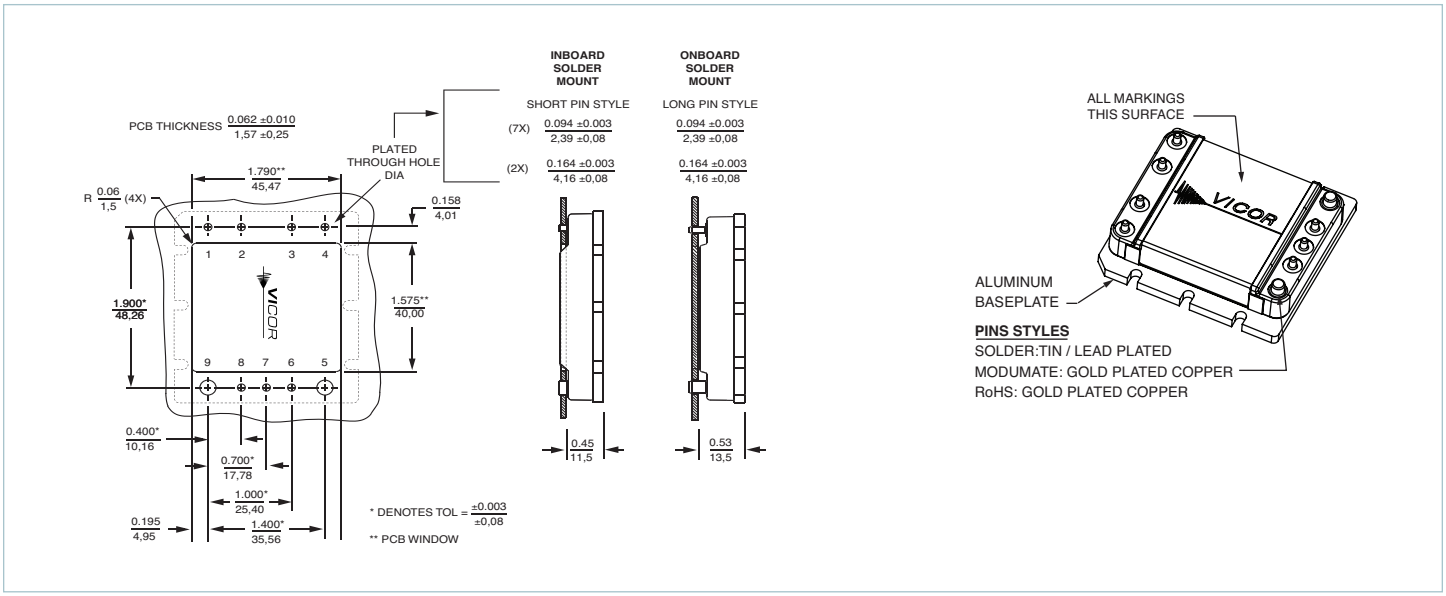


Figure 10 — *PCB mounting specifications*

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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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