



# Data Sheet

## FIAM™

### Filter Input Attenuator Module



#### Features

- RoHS Compliant (with F or G pin style)
- EMI filtering-Class B
- Transient protection
- Low profile mounting options
- 10 and 20 Ampere versions
- UL, CSA, EN compliance
- Mini-size package
- Inrush current limiting

#### Product Highlights

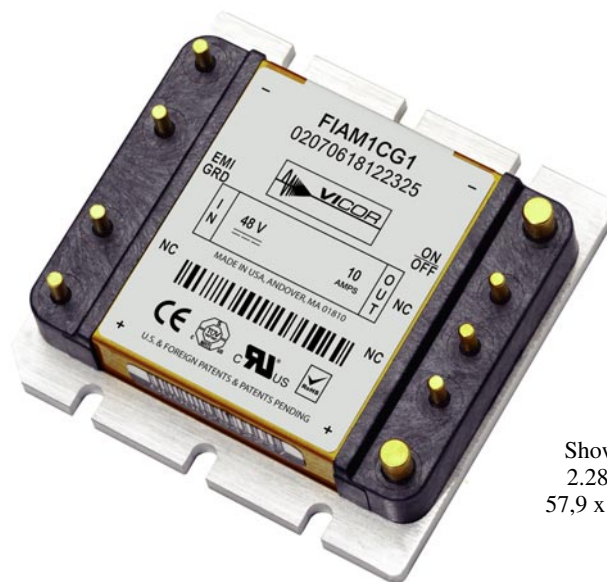
The FIAM is a DC front-end module providing transient protection, inrush current limiting and Class B EMI filtering in a Mini-size package. The FIAM enables designers using Vicor 48 Vin Mini, Micro, or Maxi DC-DC converters to meet the transient immunity and EMI requirements of Bellcore, FCC, ETSI and European Norms and protect system hardware from inrush current. The FIAM accepts an input voltage of 36 – 76 Vdc, is available in 10 or 20 A versions and provides reverse polarity protection and remote on/off control.

Internally, the FIAM employs a transient suppressor diode directly across the input. Refer to Figure 1. This is followed by a passive EMI filter that provides attenuation of both common mode and differential mode conducted emissions. Surge protection and inrush current limiting is accomplished by a MOS FET in series with the positive rail whose gate is driven by the charge pump/control circuit. During normal operation the FET is fully enhanced; essentially a closed switch. The charge pump limits the time rate of change of gate bias voltage at startup, or in the event of a voltage surge at the input. During this condition, the source terminal of the FET follows the gate, offset by the gate threshold voltage. A transient event at the input, or drain terminal of the FET is therefore attenuated and absorbed by the FET, which during this condition is in the source follower mode. As a result, the transient is virtually non-existent at the output of the FIAM. In addition, upon application of power, the controlled voltage ramp up, limits the rate at which the output capacitor is charged, thereby limiting inrush current.

FIAM 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

- Mini, Micro, Maxi 48 V Input DC-DC converters



Shown 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	80	Vdc	Continuous
	100	V	100 ms
+Out to -Out	75	Vdc	Continuous
Mounting torque	5(0.57)	in-lbs	6 each, #4-40 or M3
Operating temperature	-40 to +100	°C	T and H -Grade
Storage temperature	-55 to +125	°C	H-Grade
Pin soldering temperature	500 (260)	°F(°C)	<5 sec; wave solder
	750 (390)	°F(°C)	<7 sec; hand solder

#### Thermal Resistance

Parameter	Min	Typ	Max	Unit
Baseplate to sink flat, greased surface thermal pad (P/N 20264)		0.16		°C/Watt
		0.14		°C/Watt
Baseplate to ambient Free Convection 1000 LFM		8.0		°C/Watt
		1.9		°C/Watt

#### Part Numbering

<b>FIAM</b>	<b>1</b>	<b>C</b>	<b>1</b>	<b>1</b>
Product	Type 1 = 10 A 2 = 20 A	Product Grade Temperatures (°C) Grade    Operating    Storage C    = -20 to +100    -40 to 125 T    = -40 to +100    -40 to 125 H    = -40 to +100    -55 to 125	Pin Style 1 = Short 2 = Long S = Short ModuMate N = Long ModuMate F = Short RoHS G = Long RoHS	Baseplate 1 = Slotted 2 = Threaded 3 = Thru-hole

## 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	36	48	76	Vdc	Continuous
Inrush limiting			0.014	A/ $\mu\text{F}$	Capacitor C1. Fig 6

### ■ OUTPUT SPECIFICATIONS

Parameter	Min	Typ	Max	Unit	Notes
Output current					
FIAM1xxx			10	A	
FIAM2xxx			20	A	
Efficiency	96.0	97.5			Internal voltage drop is 1.4 max. @ 20 A, 100 °C baseplate
External capacitance					See illustration on page 3, Fig 6.
FIAM1xxx	10		150	$\mu\text{F}$	100 V
FIAM2xxx	100		330	$\mu\text{F}$	100 V

### ■ CONTROL PIN SPECIFICATIONS

Parameter	Min	Typ	Max	Unit	Notes
ON / OFF control					
Enable (ON)	0.0		1.0		Referenced to $-V_{out}$
Disable (OFF)	3.5		5.0	Vdc	100k $\Omega$ internal pull-up resistor

### ■ ELECTROMAGNETIC COMPATIBILITY

Parameter	Min	Typ	Max	Unit	Notes
Transient immunity					
Bellcore TR-NWT-000499			200	V	1 $\mu\text{sec}$ duration
ETS 300 386-1 Class 2			200	V	5.0 $\mu\text{sec}$ rise time, 50 $\mu\text{sec}$ duration surge
			250	V	1 – 100 nsec burst

### ■ SAFETY SPECIFICATIONS

Parameter	Min	Typ	Max	Unit	Notes
Dielectric withstand (I/O to baseplate)		1,500		V <sub>RMS</sub>	
		2,121		Vdc	

Specifications (Cont.)

■ AGENCY APPROVALS

Safety Standards	Markings	Notes
UL1950, CSA 22.2-950, EN60950		
Conducted Emission (Figures 2&3)		
Bellcore GR-001089-Core		Issue 2
EN55022		Level B; When used with Vicor Mini, Maxi, Micro 48 Vin DC-DC converter
FCC Part 15		Level B

■ GENERAL SPECIFICATIONS

Parameter	Min	Typ	Max	Unit	Remarks
Reverse polarity protection					No damage to module, external fuse required
Weight		3.1 (88)	4 (113)	ounces (grams)	
Warranty			2	years	

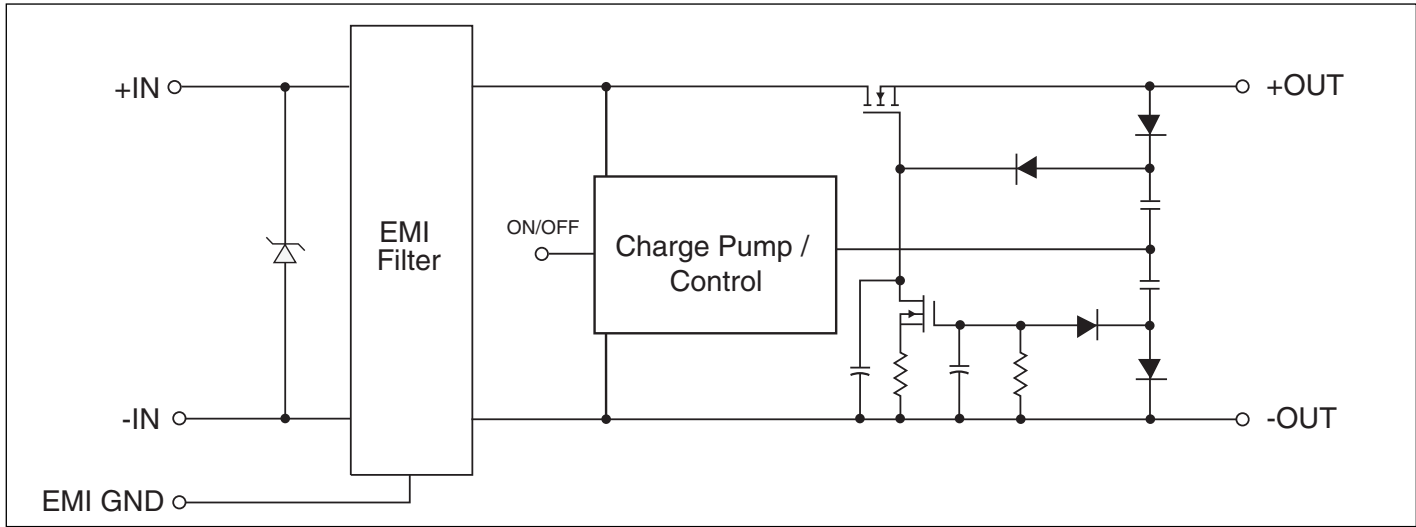


Figure 1 — FIAM Block Diagram

## Conducted Noise

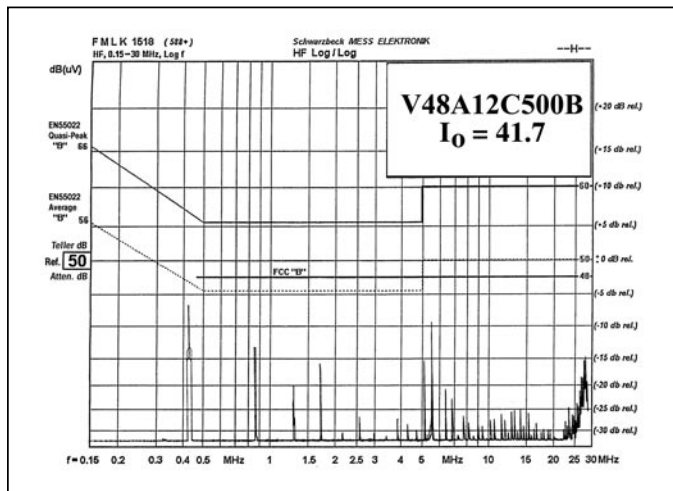


Figure 2 — FIAM and Model V48A12C500 DC-DC converter.

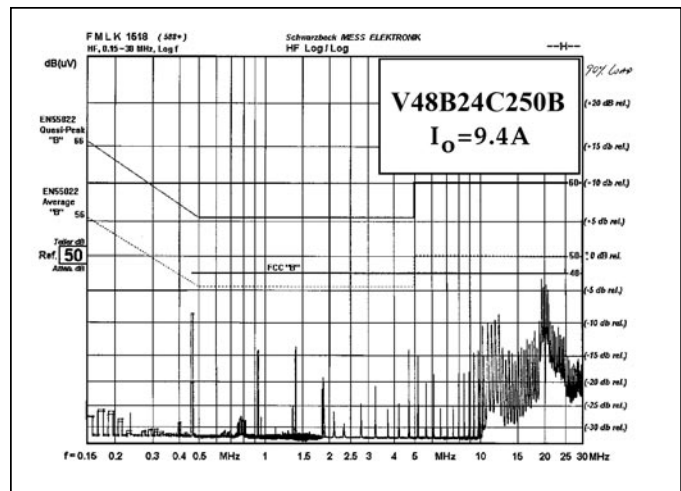


Figure 3 — FIAM and Model V48B24C250 DC-DC converter.

## Inrush Limiting

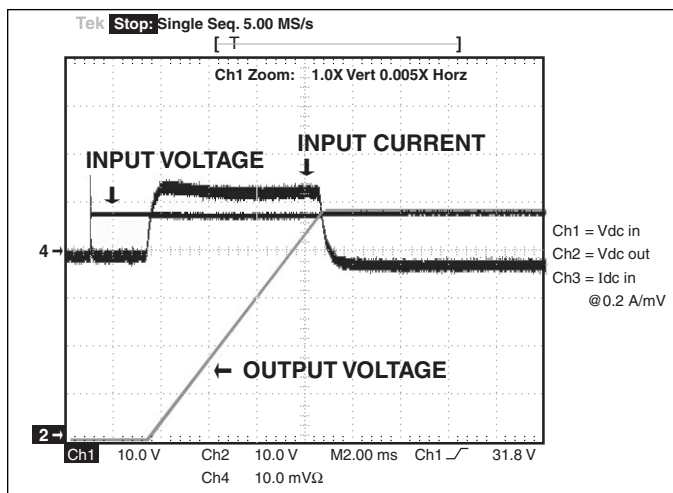


Figure 4 — Inrush Limiting: Inrush current with 330  $\mu$ F external capacitance.

## Transient Immunity

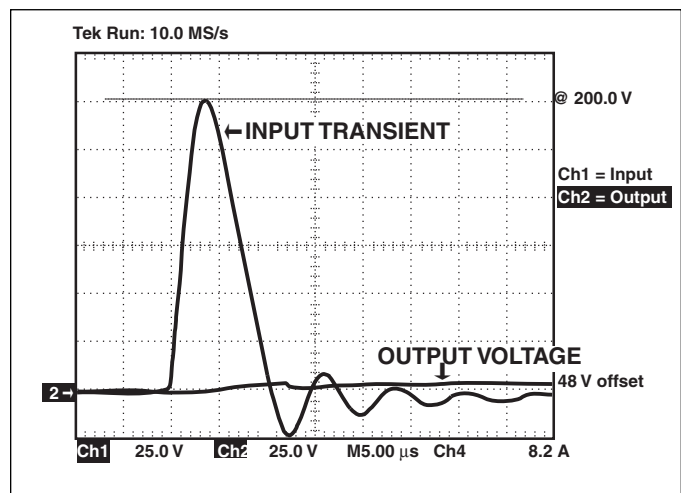


Figure 5 — Transient Immunity: FIAM output response to an input transient.

## Transient and Surge Protection

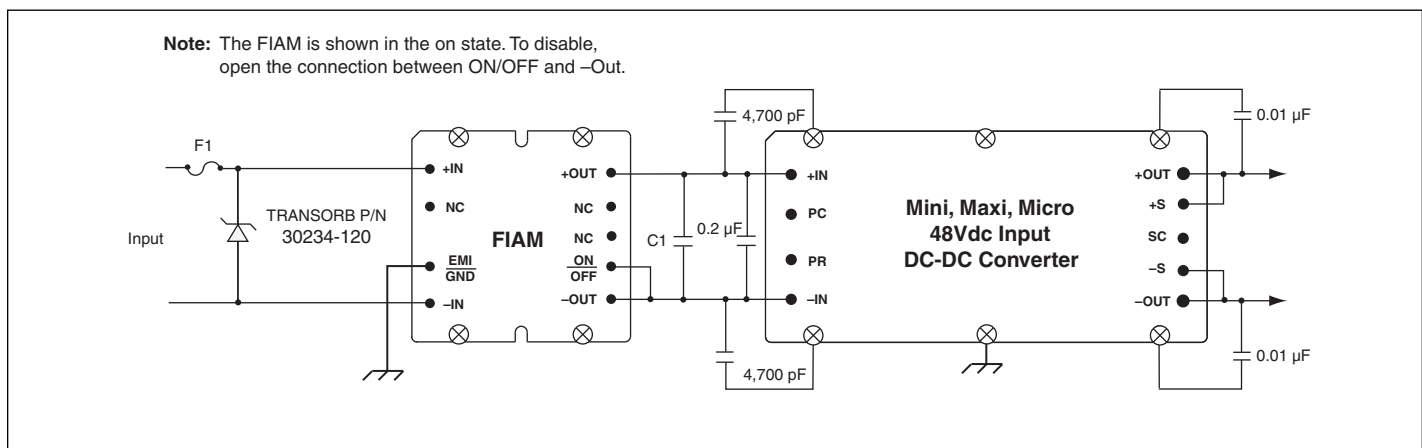
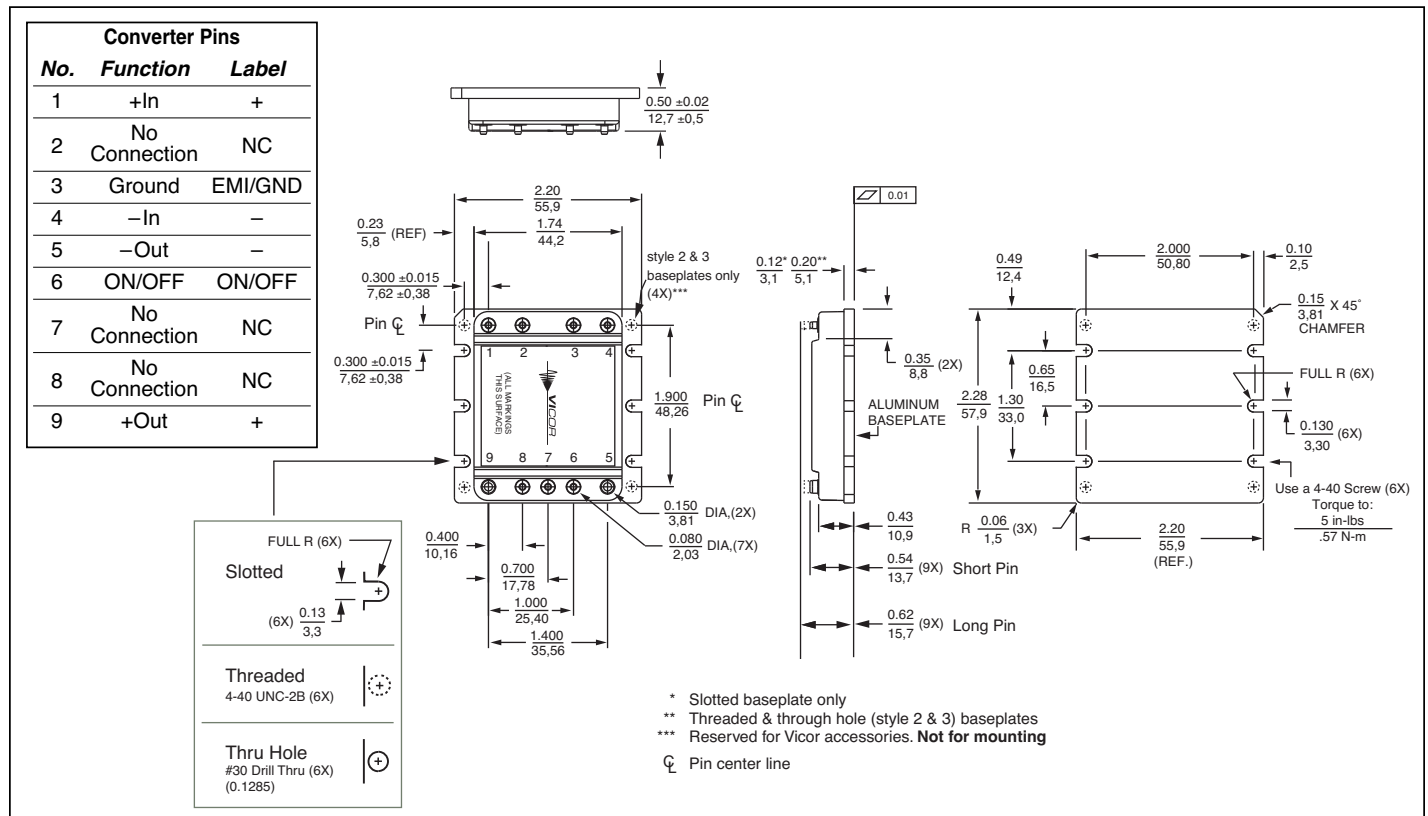
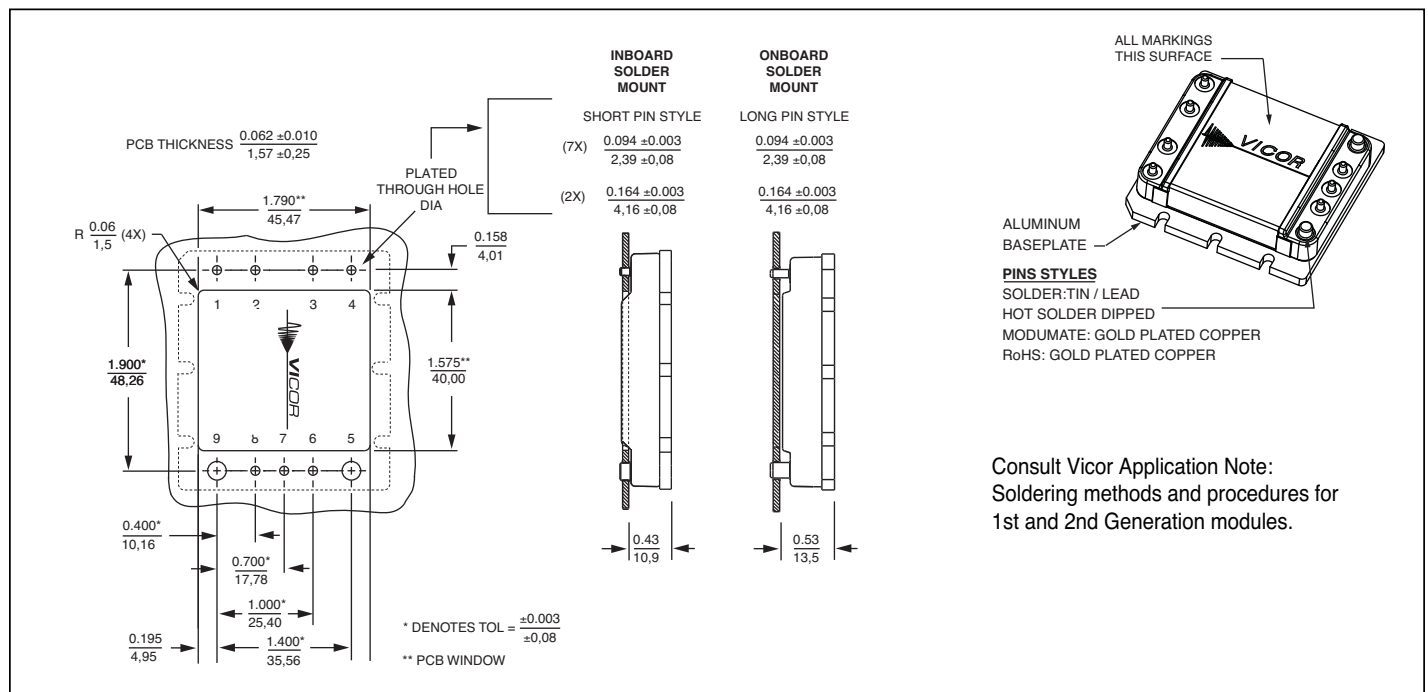


Figure 6 —

## Mechanical Diagram



## PCB Mounting Specifications



## Warranty

Vicor products are guaranteed for two years from date of shipment against defects in material or workmanship when in normal use and service. This warranty does not extend to products subjected to misuse, accident, or improper application or maintenance. Vicor shall not be liable for collateral or consequential damage. This warranty is extended to the original purchaser only.

EXCEPT FOR THE FOREGOING EXPRESS WARRANTY, VICOR MAKES NO WARRANTY, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Vicor will repair or replace defective products in accordance with its own best judgement. For service under this warranty, the buyer must contact Vicor to obtain a Return Material Authorization (RMA) number and shipping instructions. Products returned without prior authorization will be returned to the buyer. The buyer will pay all charges incurred in returning the product to the factory. Vicor will pay all reshipment charges if the product was defective within the terms of this warranty.

Information published by Vicor has been carefully checked and is believed to be accurate; however, no responsibility is assumed for inaccuracies. Vicor reserves the right to make changes to any products without further notice to improve reliability, function, or design. Vicor does not assume any liability arising out of the application or use of any product or circuit; neither does it convey any license under its patent rights nor the rights of others. Vicor general policy does not recommend the use of its components in life support applications wherein a failure or malfunction may directly threaten life or injury. Per Vicor Terms and Conditions of Sale, the user of Vicor components in life support applications assumes all risks of such use and indemnifies Vicor against all damages.

## **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.**

Information furnished by Vicor is believed to be accurate and reliable. However, no responsibility is assumed by Vicor for its use. Vicor components are not designed to be used in applications, such as life support systems, wherein a failure or malfunction could result in injury or death. All sales are subject to Vicor's Terms and Conditions of Sale, which are available upon request.

**Specifications are subject to change without notice.**

## Intellectual Property Notice

Vicor and its subsidiaries own Intellectual Property (including issued U.S. and Foreign Patents and pending patent applications) relating to the products described in this data sheet. Interested parties should contact Vicor's Intellectual Property Department.

**Vicor Corporation**  
25 Frontage Road  
Andover, MA, USA 01810  
Tel: 800-735-6200  
Fax: 978-475-6715

### email

Customer Service: [custserv@vicorpower.com](mailto:custserv@vicorpower.com)  
Technical Support: [apps@vicorpower.com](mailto:apps@vicorpower.com)