ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

**Artisan Technology Group**
(217) 352-9330 | sales@artisantg.com | artisantg.com

**Full-service, independent repair center**
with experienced engineers and technicians on staff.

**We buy your excess, underutilized, and idle equipment**
along with credit for buybacks and trade-ins.

**Custom engineering**
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

**Expert team | Trust guarantee | 100% satisfaction**

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Find the *Vicor FlatPAC VI-MUL-CQ* at our website: *Click HERE*

# Data Sheet
# *FlatPAC*™
## 50 to 600 Watts Autoranging AC-DC Switchers



## Features

- RoHS compliant (VE versions)
- Microcontroller architecture
- Inputs: 115/230 Vac autoranging
- Meets FCC Part 15, EN55022, Class B conducted emissions
- 80 – 90% efficiency
- Any output: 1 to 95 Vdc
- Module enable/disable (except LU series)
- UL, TÜV, CE marked
- Remote sense and current limit
- BUS OK and AC OK (except LU series)
- 40 ms ride-through time
- OVP and thermal shutdown
- 1 output; up to 200 W
- 1 or 2 outputs; up to 400 W
- 1, 2, or 3 outputs; up to 600 W

## Product Highlights

If you're looking for the convenience of a complete, low profile, agency-approved switching power supply, look no further. The FlatPAC combines Vicor's workhorse VI-200 family of DC-DC converters with a modular package and front-end subassembly to provide from 50 to 600 W of output power from one to three outputs.

A flat plate heat sink for use in conduction cooled applications may be specified as an alternate to the standard finned version by adding "CC" to the end of the model number.

Vicor's FlatPAC is also available with a current controlled output using BatMod converter modules of 12, 24, or 48 Vdc outputs. This option is specified by appending "BM" or "BC" (for conduction cooled versions) to the end of the FlatPAC model number.

**Mixing VI-200 and BatMods in a single FlatPAC is not permissible.**

The FlatPAC's contemporary design allows us to configure your order quickly and provide rapid turnaround on standard models. It is truly a complete power solution, enabling you to spend more time designing your system and less time worrying about how to power it.

## Configuration Chart

**Typical Model: VI-RU** 0 1 1 - E U U U - ⁝ ⁝

| Input | Output | Input Characteristics |
|---|---|---|
| 115/230 Vac | **1:** 5 Vdc at 200 W<br>**2:** 12 Vdc at 200 W<br>**3:** 12 Vdc at 200 W | **90–132/180–264 Vac**<br>**U** = Autoranging |

Substitute VE– for VI– for RoHS compliant versions

| Configuration | Total Power | # of Converters | Dimensions |
|---|---|---|---|
| **Single Output** | | | |
| VI-LU ⁘ | 50 – 200 W | 1 | 9.25" x 2.5" x 1.37" (234,8 x 124,5 x 34,8 mm) |
| VI-MU ⁘ | 200 – 400 W | 2 | 9.25" x 4.9" x 1.37" (234,8 x 124,5 x 34,8 mm) |
| VI-NU ⁘ | 300 – 600 W | 3 | 9.25" x 7.3" x 1.37" (234,8 x 185,4 x 34,8 mm) |
| **Dual Output** | | | |
| VI-PU ⁘ | 100 – 400 W | 2 | 9.25" x 4.9" x 1.37" (234,8 x 124,5 x 34,8 mm) |
| VI-QU ⁘ | 150 – 600 W | 3 | 9.25" x 7.3" x 1.37" (234,8 x 185,4 x 34,8 mm) |
| **Triple Output** | | | |
| VI-RU ⁘ | 150 – 600 W | 3 | 9.25" x 7.3" 1.37" (234,8 x 185,4 x 34,8 mm) |

### ⁘ Output Voltage

| | | | | | |
|---|---|---|---|---|---|
| **Z** = 2 V | **W** = 5.5 V | **M** = 10 V | **N** = 18.5 V | **K** = 40 V | **D** = 85 V |
| **Y** = 3.3 V | **V** = 5.8 V | **1** = 12 V | **3** = 24 V | **4** = 48 V | **B** = 95 V |
| **0** = 5 V | **T** = 6.5 V | **P** = 13.8 V | **L** = 28 V | **H** = 52 V | |
| **X** = 5.2 V | **R** = 7.5 V | **2** = 15 V | **J** = 36 V | **F** = 72 V | |

### ⁘ Product Grade Temps. °C

| Grade | Operating | Storage |
|---|---|---|
| **E** = | 0 to +85 | –20 to +100 |
| **C** = | 0 to +85 | –20 to +100 |
| **I** = | –30 to +85 | –55 to +100 |

Temperatures apply to product case.

### ⁘ Output Power/Current

| VOUT ≥5 V | VOUT < 5 V |
|---|---|
| **Y** = 50 W | **Y** = 10 A |
| **X** = 75 W | **X** = 15 A |
| **W** = 100 W | **W** = 20 A |
| **V** = 150 W | **V** = 30 A |
| **U** = 200 W | **U** = 40 A |

### ⁘ Output Power/Current

| VOUT ≥5 V | VOUT < 5 V |
|---|---|
| **W** = 100 W | **W** = 20 A |
| **V** = 150 W | **V** = 30 A |
| **U** = 200 W | **U** = 40 A |
| **S** = 300 W | **S** = 60 A |
| **Q** = 400 W | **Q** = 80 A |

### ⁘ Output Power/Current

| VOUT ≥5 V | VOUT < 5 V |
|---|---|
| **S** = 300 W | **S** = 60 A |
| **P** = 450 W | **P** = 90 A |
| **M** = 600 W | **M** = 120 A |

### ⁘ Options

**BC** = BatMod/Conduction Cooled **BM** = BatMod **CC** = Conduction Cooled



**Set your site on VICOR at vicorpower.com**

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

## SPECIFICATIONS

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

### ■ INPUT SPECIFICATIONS

| Parameter | Min | Typ | Max | Unit | Notes |
|---|---|---|---|---|---|
| AC line input | | | | | |
| Autoranging | | 90 – 132/180 – 264 | | Vac | |
| Line frequency | | 47 – 63 | | Hz | (C-Grade and E-Grade) |
| | | 47 – 440 | | Hz | (I-Grade) |
| Inrush current: 115 Vac operation: | | | | | |
| 1 converter | | 16 | | A | @ peak line |
| 2 converters | | 23 | | A | @ peak line |
| 3 converters | | 39 | | A | @ peak line |
| Inrush current: 230 Vac operation | | | | | |
| 1 converter | | 32 | | A | @ peak line |
| 2 converters | | 47 | | A | @ peak line |
| 3 converters | | 78 | | A | @ peak line |
| Ride-through time (full load) | | | | | |
| 90/180 Vac low line | | 5 | | ms | minimum |
| 115/230 Vac nominal line | | 40 | | ms | minimum |
| AC fail warning time | | 5 | | ms | minimum (low line, full load) |
| AC and BUS OK (2 and 3 converter models only) | | | | | |
| Off state – Vce | | | 70 | V | |
| On state – Vcesat | | | 0.4 | V | @ 1 mA (1.5 mA max.) |
| Module disable (2 and 3 converter models only, optically isolated LED input) | | | | | |
| Continuous forward current | | 1 – 30 | | mA | |
| Forward voltage | | | 1.65 | V | @ 30 mA |
| Dielectric withstand | | | | | |
| Primary to chassis GND | | 2,121 | | Vdc | |
| Primary to secondary | | 4,242 | | Vdc | |
| Secondary to chassis GND | | 707 | | Vdc | |

### ■ OUTPUT SPECIFICATIONS

| | E-Grade | | | C-, I-Grade | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Min** | **Typ** | **Max** | **Min** | **Typ** | **Max** | **Unit** | **Notes** |
| Set point accuracy | | 1% | 2% | | 0.5% | 1% | VNOM | |
| Load/line regulation | | | 0.5% | | 0.05% | 0.2% | VNOM | LL to HL, 10% to Full Load |
| | | | 1% | | 0.2% | 0.5% | VNOM | LL to HL, No Load to full load |
| Output temperature drift | | 0.02 | | | 0.01 | 0.02 | %/°C | Over rated temperature |
| Long term drift | | 0.02 | | | 0.02 | | %/1 k hours | |
| Output ripple | | | | | | | | |
| 2 V | | | 150 mV | | 60 mV | 100 mV | p-p | 20 MHz bandwidth |
| 5 V | | | 5% | | 2% | 3% | p-p | 20 MHz bandwidth |
| 10 – 48 V | | | 3% | | 0.75% | 1.5% | p-p | 20 MHz bandwidth |
| Output voltage trimming[1] | 50% | | 110% | 50% | | 110% | | |
| Total remote sense compensation | 0.5 | | | 0.5 | | | Volts | 0.25 V max. neg. leg |
| OVP set point | | 125% | | 115% | 125% | 135% | VNOM | Recycle power |
| Current limit | 105% | | 135% | 105% | | 125% | INOM | Automatic restart |
| Short circuit current[2] | 20% | | 140% | 20% | | 130% | INOM | |



**Set your site on VICOR at vicorpower.com**

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

## SPECIFICATIONS (CONT.)

### ■ THERMAL CHARACTERISTICS

| | E-Grade | | | C-, I- Grade | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Min** | **Typ** | **Max** | **Min** | **Typ** | **Max** | **Units** | **Test Conditions** |
| Efficiency | | 78 – 88% | | | 80 – 90% | | | @5 V and higher |
| Shut down temp. — case | 90 | 95 | 105 | 90 | 95 | 105 | °C | Cool and recycle power to restart |
| Operating temp. — case | | | 85 | | | 85 | °C | See Thermal Curves |

### ■ MECHANICAL SPECIFICATIONS

| | E-Grade | | | C-, I- Grade | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Min** | **Typ** | **Max** | **Min** | **Typ** | **Max** | **Units** | **Test Conditions** |
| Weight[3] | | 22.4 (652) | | | 22.4 (652) | | Ounces (Grams) | |

### ■ AGENCY APPROVALS

| Safety Standards | Markings | Notes |
|---|---|---|
| UL1604, UL60950-1 | cURus | |
| UL / CSA / EN / IEC 60950-1 | cTÜVus, CE Mark | Low Voltage Directive (73/23/EEC) |

### ■ EMI / EMC Characteristics (Performed on selected samples representative of the U Series FlatPac product family.)

| Parameter | Notes |
|---|---|
| Conducted emissions, LISN | EN 55022 and FCC R&R, Part 15, Subpart B, Class B |
| Radiated emissions, 10 meters | EN 55022; 1998 and FCC R&R, Part 15, Subpart B, Class A |
| Electrostatic discharge | IEC 61000-4-2: 1995, Level 4; ±8 kV Contact, ± 15 kV Air Discharge |
| RF radiated immunity, E-field | IEC 61000-4-3: 1997; 80 MHz to 1.0 GHz, 3 V/M, CW |
| Electrical fast transients/burst | EN 61000-4-4: 1995, Level 3; ±2 kV, |
| Surge immunity | EN 61000-4-5: 1996 Class 3; ±2 kV Line to Ground, ±1 kV Line to Line |
| RF conducted immunity | IEC 61000-4-6: 1996, class 3, 10 Vrms, 150 kHz to 80 MHz |
| Power frequency magnetic field immunity | IEC 61000-4-8: 1994, 30 to 300 A/M, 50Hz |
| Voltage dips and interrupts | IEC 61000-4-11: 1994 |

[1] 10 V, 12 V and 15 V outputs, trim range ± 10%. Consult factory for wider trim range.
[2] Output voltages of 5 V or less incorporate foldback current limiting, outputs greater than 5 V incorporate straight line current limiting.
[3] For MU, PU series, multiply value by 2; for NU, QU, RU series, multiply value by 3.

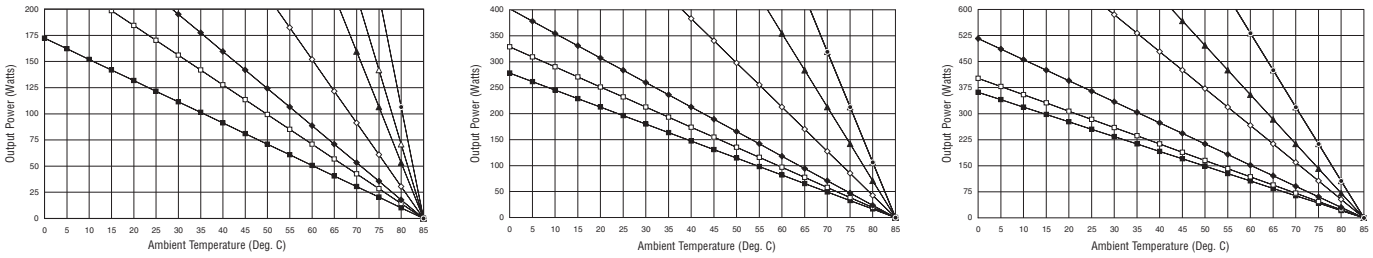


**Set your site on VICOR at vicorpower.com**
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

## THERMAL CURVES

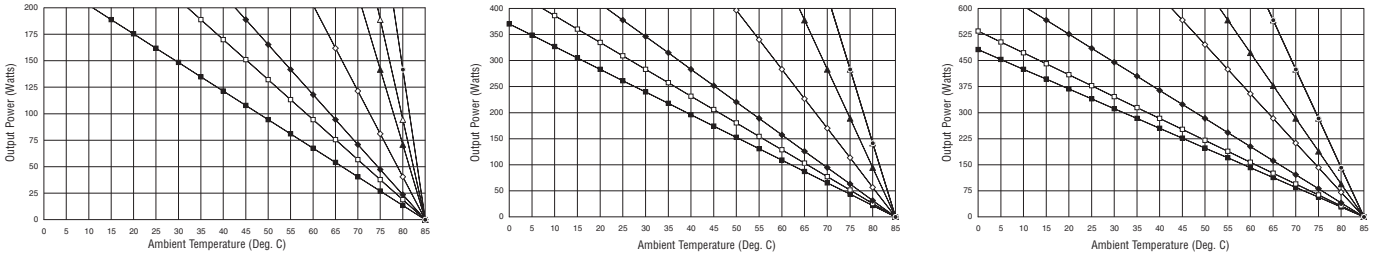
FREE AIR — 50 LFM — 100 LFM — 250 LFM — 500 LFM — 750 LFM — 1000 LFM

### 5 V Output



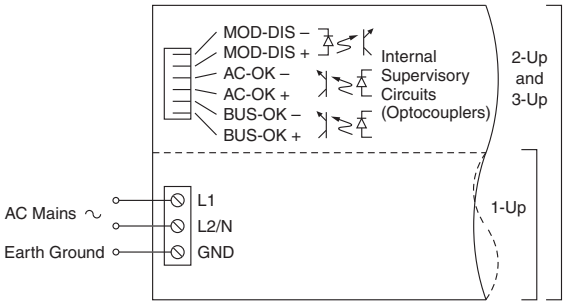

**LU Series** **MU, PU Series** **NU, QU, RU Series**

### 10 to 48 V Output

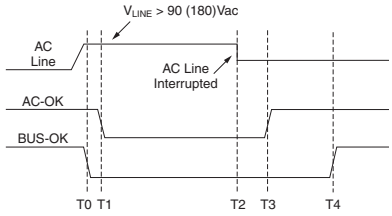



**LU Series** **MU, PU Series** **NU, QU, RU Series**

## APPLICATION CIRCUITS



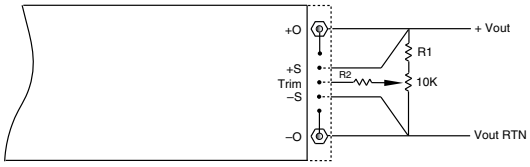

**AC Mains Connections**




**Conditions:** Full Load 90 (180)Vac, AC Line

| Time Interval | Min | Typ | Max | Units | Notes |
|---|---|---|---|---|---|
| T0-T1 | 0 | 0.1 | 1.0 | ms | |
| T2-T3 | 0 | 40 | – | ms | Ride-through time |
| T2-T4 | 5 | – | – | ms | Hold-up time |
| T3-T4 | 5 | – | – | ms | AC fail warning time |

**Power Up and Power Down Sequencing**




**Resistor Values for Trimming Standard Output Voltages**

| Nom. Output Voltage | 5 V | 12 V | 15 V | 24 V | 28 V | 48 V | Trim Range |
|---|---|---|---|---|---|---|---|
| R1(kΩ) | 0.953 | 15.8 | 22.1 | 41.2 | 48.7 | 90.9 | +10%, -10% |
| R2(kΩ) | 90 | 90 | 90 | 90 | 90 | 90 | |

**Output Trimming**



**Set your site on VICOR at vicorpower.com**

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# MECHANICAL DRAWINGS

**Inputs**

1 MOD DIS–
2 MOD DIS+
3 AC OK–
4 AC OK+
5 BUS OK–
6 BUS OK+

Input connector, Amp P/N 644488-6; mating connector, MTA-100 IDC Series

7 AC IN L1
8 AC IN L2/N
9 CHASSIS GND

Terminals for #16-12 AWG wire

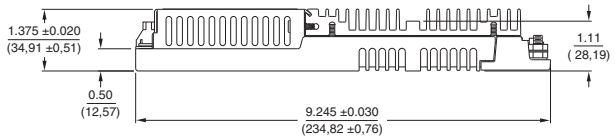
**Outputs**

10 +OUT (#10-32 Stud)
11 +OUT
12 +SENSE ($V_{TRIM}$*)
13 TRIM ($I_{TRIM}$*)
14 –SENSE ($I_{MON}$*)
15 –OUT
16 –OUT (#10-32 Stud)

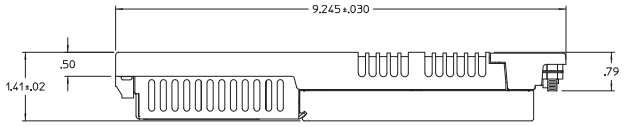
Output connector, Amp P/N 644486-5; mating connector, MTA-100 IDC Series

*On FlatPACs with BatMODs only.

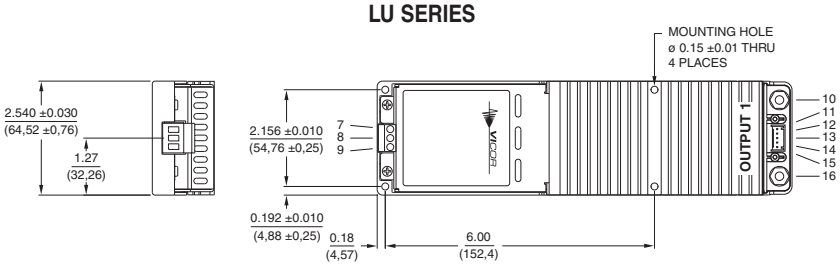
## STANDARD MODELS



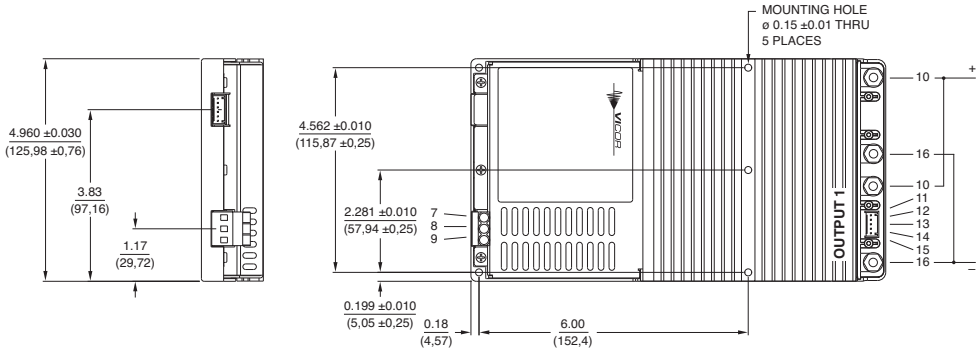

## CONDUCTION COOLED MODELS "–CC"



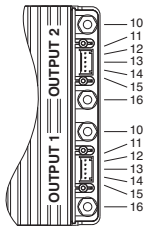

## LU SERIES



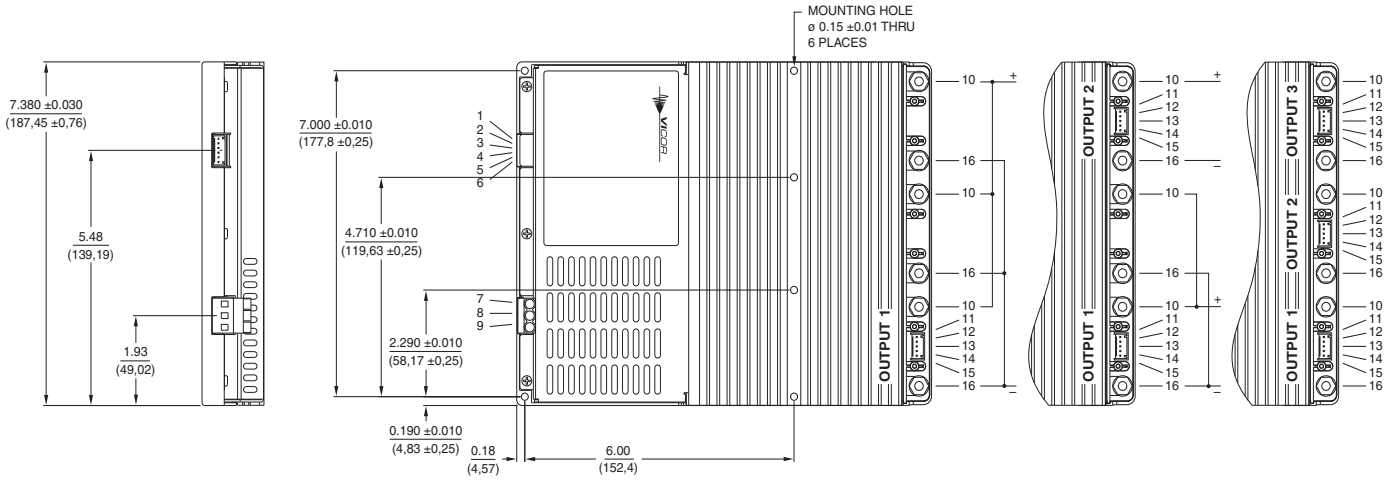

## MU SERIES




## PU SERIES




## NU SERIES




## QU SERIES




## RU SERIES






**Set your site on VICOR at vicorpower.com**

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

## 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
Technical Support: apps@vicorpower.com



***Set your site on VICOR at vicorpower.com***

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

**Artisan Technology Group** is an independent supplier of quality pre-owned equipment

## Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

## We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

## Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP