



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 115/230 Vac | Output 1: 5 Vdc at 200 W 2: 12 Vdc at 200 W 3: 12 Vdc at 200 W | Input Characteristics 90–132/180–264 Vac 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" x 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

| V _{OUT} ≥ 5 V | V _{OUT} < 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

| V _{OUT} ≥ 5 V | V _{OUT} < 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

| V _{OUT} ≥ 5 V | V _{OUT} < 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 |
|-------------------------------|-------------|------------------------|

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

| Parameter | E-Grade | | | C-, I-Grade | | | Unit | Notes |
|--------------------------------------|---------|------|--------|-------------|-------|--------|------------------|--------------------------------|
| | Min | Typ | Max | Min | Typ | Max | | |
| Set point accuracy | | 1% | 2% | | 0.5% | 1% | V _{NOM} | |
| Load/line regulation | | | 0.5% | | 0.05% | 0.2% | V _{NOM} | LL to HL, 10% to Full Load |
| | | | 1% | | 0.2% | 0.5% | V _{NOM} | 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% | V _{NOM} | Recycle power |
| Current limit | 105% | | 135% | 105% | | 125% | I _{NOM} | Automatic restart |
| Short circuit current ² | 20% | | 140% | 20% | | 130% | I _{NOM} | |

SPECIFICATIONS (CONT.)

■ THERMAL CHARACTERISTICS

| Parameter | E-Grade | | | C-, I- Grade | | | Units | Test Conditions |
|------------------------|---------|----------|-----|--------------|----------|-----|-------|-----------------------------------|
| | Min | Typ | Max | Min | Typ | Max | | |
| 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

| Parameter | E-Grade | | | C-, I- Grade | | | Units | Test Conditions |
|---------------------|---------|---------------|-----|--------------|---------------|-----|-------------------|-----------------|
| | Min | Typ | Max | Min | Typ | Max | | |
| 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.

THERMAL CURVES

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

5 V Output



10 to 48 V Output



APPLICATION CIRCUITS



| 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

MECHANICAL DRAWINGS

Inputs

- 1 MOD DIS-
 - 2 MOD DIS+
 - 3 AC OK-
 - 4 AC OK+
 - 5 BUS OK-
 - 6 BUS OK+
 - 7 AC IN L1
 - 8 AC IN L2/N
 - 9 CHASSIS GND
- Input connector,
Amp P/N 644488-6;
mating connector,
MTA-100 IDC Series
- 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



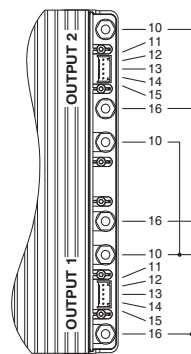
PU SERIES



NU SERIES



QU SERIES



RU SERIES



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



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

Телефон: 8 (812) 309 58 32 (многоканальный)

Факс: 8 (812) 320-02-42

Электронная почта: org@eplast1.ru

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.