



# Data Sheet

## VI-200, VE-200

### DC-DC Converters

#### 50 to 200 Watts



#### Features

- RoHS compliant (VE-200)
- Up to 50 W/in<sup>3</sup>
- cULus, cTUVus
- Up to 90% efficiency
- Size: 4.6" x 2.4" x 0.5" (116,8 x 61,0 x 12,7mm)
- Remote sense and current limit
- OVP, thermal shutdown
- Logic disable
- Wide range output adjust
- Compatible power booster modules
- ZCS power architecture
- Low noise FM control
- CE Marked

#### Product Highlights

The VI-200 family, with over 12 million units shipped, is Vicor's broad series of "zero-current-switching" component-level DC-DC converters.

Operating at frequencies up to 2 MHz, VI-200 family converters offer exceptional power density, efficiency, noise performance, reliability and ease of use. Booster modules (VI-Bxx) provide a simple, cost-effective, off-the-shelf solution for higher power output requirements. One or more boosters may be used to create synchronous arrays capable of supplying several kilowatts of output power.

The flexibility of Vicor's power components is also available in half-size, half-power VI-J00 MiniMods.

#### Packaging Options

SlimMods™, high power density, flangeless devices and FinMods™, featuring integral finned heatsinks.

**SlimMod:** Option suffix: - S

Example: VI - 2XX - XX - S

**FinMod:** Option suffix: - F1, - F2, -F3 or -F4

Examples:

VI - 2XX - XX -F1, 0.25" fins, longitudinal

VI - 2XX - XX -F2, 0.50" fins, longitudinal

VI - 2XX - XX -F3, 0.25" fins, transverse

VI - 2XX - XX -F4, 0.50" fins, transverse

**BusMod:** Option suffix: -B1

**MegaMod:** VI - LXX - XX

#### Converter Selection Chart



[a] E for RoHS compliant

#### Input Voltage

| Nominal              | Input Range Full Power | Max Power [b] | Low Line 75% Max Power | Transient [c] |
|----------------------|------------------------|---------------|------------------------|---------------|
| <b>0</b> = 12 V      | 10 – 20 V              | (1)           | n/a                    | 22 V          |
| <b>V</b> = 24 V      | 10 – 36 V              | (7)           | n/a                    | n/a           |
| <b>1</b> = 24 V      | 21 – 32 V              | (4)           | 18                     | 36 V          |
| <b>W</b> = 24 V      | 18 – 36 V              | (2)           | n/a                    | n/a           |
| <b>2</b> = 36 V      | 21 – 56 V              | (3)           | 18                     | 60 V          |
| <b>3</b> = 48 V      | 42 – 60 V              | (4)           | 36                     | 72 V          |
| <b>N</b> = 48 V      | 36 – 76 V              | (4)           | n/a                    | n/a           |
| <b>4</b> = 72 V      | 55 – 100 V             | (4)           | 45                     | 110 V         |
| <b>T</b> = 110 V     | 66 – 160 V             | (2)           | n/a                    | n/a           |
| <b>5</b> = 150 V     | 100 – 200 V            | (5)           | 85                     | 215 V         |
| <b>6</b> = 300 V     | 200 – 400 V            | (4)           | 170                    | 425 V         |
| <b>7</b> = 150/300 V | 100 – 375 V            | (6)           | 90                     | n/a           |

| [b] Maximum Power | 5 V Outputs | >5 V Outputs | <5 V Outputs |
|-------------------|-------------|--------------|--------------|
| (1)               | 75 W        | 75 W         | 15 A         |
| (2)               | 150 W       | 150 W        | 30 A         |
| (3)               | 100 W       | 100 W        | 20 A         |
| (4)               | 200 W       | 200 W        | 40 A         |
| (5)               | 150 W       | 200 W        | 40 A         |
| (6)               | 75 W        | 100 W        | 20 A         |
| (7)               | 50 W        | 75 W [d]     | 15 A         |

[c] Transient voltage for 1 second.

[d] X, V, and T outputs are 50 W max.

#### Output Voltage

|                   |                   |
|-------------------|-------------------|
| <b>Z</b> = 2.0 V  | <b>2</b> = 15 V   |
| <b>Y</b> = 3.3 V  | <b>N</b> = 18.5 V |
| <b>0</b> = 5.0 V  | <b>3</b> = 24 V   |
| <b>X</b> = 5.2 V  | <b>L</b> = 28 V   |
| <b>W</b> = 5.5 V  | <b>J</b> = 36 V   |
| <b>V</b> = 5.8 V  | <b>K</b> = 40 V   |
| <b>T</b> = 6.5 V  | <b>4</b> = 48 V   |
| <b>R</b> = 7.5 V  | <b>H</b> = 52 V   |
| <b>M</b> = 10 V   | <b>F</b> = 72 V   |
| <b>1</b> = 12 V   | <b>D</b> = 85 V   |
| <b>P</b> = 13.8 V | <b>B</b> = 95 V   |

#### Product Grade Temperatures (°C)

| Operating             | Storage                |
|-----------------------|------------------------|
| <b>E</b> = -10 to +85 | <b>E</b> = -20 to +100 |
| <b>C</b> = -25 to +85 | <b>C</b> = -40 to +100 |
| <b>I</b> = -40 to +85 | <b>I</b> = -55 to +100 |
| <b>M</b> = -55 to +85 | <b>M</b> = -65 to +100 |

Overtemperature shutdown 95°C typical (recycle power to restart)

#### Output Power/Current Vout

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

For additional output power use "Boosters".  
Change (VI-2xx-xx) to (VI-Bxx-xx)

## CONVERTER SPECIFICATIONS

(typical at  $T_{BP} = 25^{\circ}\text{C}$ , nominal line and 75% load, unless otherwise specified)

### INPUT SPECIFICATIONS

| Parameter                           | VI-200 E-Grade |   |     | VI-200 C-, I-, M-Grade                                  |                      |                      | Units    | Test Conditions         |
|-------------------------------------|----------------|---|-----|---|----------------------|----------------------|----------|-------------------------|
|                                     | Min            | Typ   | Max | Min   | Typ                  | Max                  |          |                         |
| Inrush charge                       |                | $120 \times 10^{-6}$                                    |     |   | $120 \times 10^{-6}$ | $200 \times 10^{-6}$ | Coulombs | Nominal line            |
| Input reflected ripple current – pp |                | 10%   |     |   | 10%                  |                      | $I_{IN}$ | Nominal line, full load |
| Input ripple rejection              |                | $25 + 20 \text{Log}\left(\frac{V_{in}}{V_{out}}\right)$ |     | $30 + 20 \text{Log}\left(\frac{V_{in}}{V_{out}}\right)$ |                      |                      | dB       | 120 Hz, nominal line    |
|                                     |                |   |     | $20 + 20 \text{Log}\left(\frac{V_{in}}{V_{out}}\right)$ |                      |                      |          | 2400 Hz, nominal line   |
| No load power dissipation           |                | 1.35  | 2   |   | 1.35                 | 2                    | Watts    |                         |

### OUTPUT CHARACTERISTICS

| Parameter                            | VI-200 E-Grade |                     |      | VI-200 C-, I-, M-Grade |                     |      | Units                  | Test Conditions            |  |  |  |           |                  |
|--------------------------------------|----------------|---------------------|------|------------------------|---------------------|------|------------------------|----------------------------|--|--|--|-----------|------------------|
|                                      | Min            | Typ                 | Max  | Min                    | Typ                 | Max  |                        |                            |  |  |  |           |                  |
| Setpoint 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 |  |  |  |           |                  |
| Load/line regulation                 |                |                     | 1%   |                        | 0.2%                | 0.5% | $V_{NOM}$              | LL to HL, No Load to 10%   |  |  |  |           |                  |
| Output temperature drift             |                | 0.02                |      |                        | 0.01                | 0.02 | % / $^{\circ}\text{C}$ | Over rated temp.           |  |  |  |           |                  |
| Long term drift                      |                | 0.02                |      |                        | 0.02                |      | %/1K hours             |                            |  |  |  |           |                  |
| Output ripple – pp:                  |                |                     | 150  |                        | 60                  | 100  | mV                     | 20 MHz bandwidth           |  |  |  |           |                  |
|                                      |                |                     |      |                        |                     |      |                        | 2 V, 3.3 V                 |  |  |  | $V_{NOM}$ | 20 MHz bandwidth |
|                                      |                |                     |      |                        |                     |      |                        | 5 V                        |  |  |  | $V_{NOM}$ | 20 MHz bandwidth |
|                                      |                |                     | 3%   |                        | 0.75%               | 1.5% | $V_{NOM}$              | 20 MHz bandwidth           |  |  |  |           |                  |
| Trim range <sup>[a]</sup>            | 50%            |                     | 110% | 50%                    |                     | 110% | $V_{NOM}$              |                            |  |  |  |           |                  |
| Total remote sense compensation      | 0.5            |                     |      | 0.5                    |                     |      | Volts                  | 0.25 V max. neg. leg       |  |  |  |           |                  |
| OVP set point                        |                | 125% <sup>[b]</sup> |      | 115%                   | 125% <sup>[b]</sup> | 135% | $V_{NOM}$              | Recycle power              |  |  |  |           |                  |
| Current limit                        | 105%           |                     | 135% | 105%                   |                     | 125% | $I_{NOM}$              | Automatic restart          |  |  |  |           |                  |
| Short circuit current <sup>[c]</sup> | 20%            |                     | 140% | 20%                    |                     | 130% | $I_{NOM}$              |                            |  |  |  |           |                  |

<sup>[a]</sup> 10 V, 12 V, 15 V outputs, and V input range (10 – 36 V) standard trim range  $\pm 10\%$ . Consult factory for wider trim range.  
3.3 V output trim range 2.20 to 3.63 V, 95 V output  $-50 + 0\%$  trim range.

<sup>[b]</sup> 131% nominal for booster modules.

<sup>[c]</sup> Output voltages of 3.3 V or 5 V incorporate foldback current limiting; all other outputs provide constant current limiting.

### CONTROL PIN SPECIFICATIONS

| Parameter                    | VI-200 E-Grade |      |      | VI-200 C-, I-, M-Grade |      |      | Units | Test Conditions    |
|------------------------------|----------------|------|------|------------------------|------|------|-------|--------------------|
|                              | Min            | Typ  | Max  | Min                    | Typ  | Max  |       |                    |
| Gate out impedance           |                | 50   |      |                        | 50   |      | Ohms  |                    |
| Gate in impedance            |                | 1000 |      |                        | 1000 |      | Ohms  |                    |
| Gate in open circuit voltage |                | 6    |      |                        | 6    |      | Volts | Use open collector |
| Gate in low threshold        | 0.65           |      |      | 0.65                   |      |      | Volts |                    |
| Gate in low current          |                |      | 6    |                        |      | 6    | mA    |                    |
| Power sharing accuracy       | 0.95           |      | 1.05 | 0.95                   |      | 1.05 |       |                    |

## CONVERTER SPECIFICATIONS (cont.)

### ■ DIELECTRIC WITHSTAND CHARACTERISTICS

| Parameter           | VI-200 E-Grade |     |     | VI-200 C-, I-, M-Grade |     |     | Units            | Test Conditions   |
|---------------------|----------------|-----|-----|------------------------|-----|-----|------------------|-------------------|
|                     | Min            | Typ | Max | Min                    | Typ | Max |                  |                   |
| Input to output     | 3,000          |     |     | 3,000                  |     |     | V <sub>RMS</sub> | Baseplate earthed |
| Output to baseplate | 500            |     |     | 500                    |     |     | V <sub>RMS</sub> |                   |
| Input to baseplate  | 1,500          |     |     | 1,500                  |     |     | V <sub>RMS</sub> |                   |

### ■ THERMAL CHARACTERISTICS

| Parameter   | VI-200 E-Grade |          |     | VI-200 C-, I-, M-Grade |          |     | Units   | Test Conditions                   |
|---|----------------|----------|-----|------------------------|----------|-----|---------|-----------------------------------|
|   | Min            | Typ      | Max | Min                    | Typ      | Max |         |                                   |
| Efficiency  |                | 78 – 88% |     |                        | 80 – 90% |     |         |                                   |
| Baseplate to sink thermal impedance               |                | 0.07     |     |                        | 0.07     |     | °C/Watt | With Vicor P/N 20266              |
| Thermal shutdown <sup>[d]</sup><br>(Drivers only) | 90             | 95       | 105 | 90                     | 95       | 105 | °C      | Cool and recycle power to restart |

<sup>[d]</sup> No overtemp protection in booster modules.

### ■ MECHANICAL SPECIFICATIONS

| Parameter | VI-200 E-, C-Grade |              |              | VI-200 I-, M-Grade |              |              | Units             | Test Conditions |
|-----------|--------------------|--------------|--------------|--------------------|--------------|--------------|-------------------|-----------------|
|           | Min                | Typ          | Max          | Min                | Typ          | Max          |                   |                 |
| Weight    | 6.2<br>(176)       | 6.3<br>(178) | 6.4<br>(181) | 7.2<br>(205)       | 7.3<br>(208) | 7.4<br>(210) | Ounces<br>(Grams) |                 |

# MECHANICAL DRAWING



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