

Actual size:
2.28 x 1.45 x 0.5 in
57,9 x 36,8 x 12,7 mm

# Micro Family
## 24V Input

## DC-DC Converter Module

### Features

- DC input range: 18 - 36 V
- Isolated output
- Operation to 16 V at 75% power after startup
- Input surge withstand: 50 V for 100 ms
- DC output: 3.3 – 48 V
- Programmable output: 10 to 110%
- Regulation: ±0.4% no load to full load
- Efficiency: Up to 89%
- Maximum operating temp: 100 °C, full load
- Power density: up to 60 W per cubic inch
- Height above board: 0.43 in. (10,9 mm)
- Parallelable, with N+M fault tolerance
- Low noise ZCS/ZVS architecture
- RoHS Compliant (with F or G pin option)

### Product Overview

These DC-DC converter modules use advanced power processing, control and packaging technologies to provide the performance, flexibility, reliability and cost effectiveness of a mature power component. High frequency ZCS/ZVS switching provides high power density with low noise and high efficiency.

### Applications

Industrial and process control, distributed power, medical, ATE, communications, defense, aerospace.

For details on proper operation please refer to:

Design Guide & Applications Manual for Maxi, Mini, Micro Family.

### Absolute Maximum Ratings

| Parameter | Rating | Unit | Notes |
|---|---|---|---|
| +In to -In voltage | -0.5 to +53 | Vdc | |
| PC to -In voltage | -0.5 to +7.0 | Vdc | |
| PR to -In voltage | -0.5 to +7.0 | Vdc | |
| SC to -Out voltage | -0.5 to +1.5 | Vdc | |
| Isolation voltage | | | |
| in to out | 3000 | Vrms | Test voltage |
| in to base | 1500 | Vrms | Test voltage |
| out to base | 500 | Vrms | Test voltage |
| Operating Temperature | -55 to +100 | °C | M-Grade |
| Storage Temperature | -65 to +125 | °C | M-Grade |
| Pin soldering temperature | 500 (260) | °F (°C) | <5 sec; wave solder |
| | 750 (390) | °F (°C) | <7 sec; hand solder |
| Mounting torque | 5 (0.57) | in-lbs (N-m) | 6 each |

### Part Numbering

e.g. V24C12T100BL2

**V24C** [ ] [ ] [ ] **B** [ ] [ ]

**Output Voltage**

| | |
|---|---|
| **3 V 3** | = 3.3 V |
| **5** | = 5 V |
| **8** | = 8 V |
| **12** | = 12 V |
| **15** | = 15 V |
| **24** | = 24 V |
| **28** | = 28 V |
| **36** | = 36 V |
| **48** | = 48 V |

**Product Grade Temperatures (°C)**

| Grade | | Operating | Storage |
|---|---|---|---|
| **E** | = | – 10 to +100 | – 20 to +125 |
| **C** | = | – 20 to +100 | – 40 to +125 |
| **T** | = | – 40 to +100 | – 40 to +125 |
| **H** | = | – 40 to +100 | – 55 to +125 |
| **M** | = | – 55 to +100 | – 65 to +125 |

**Output Power**

| Vout | Pout |
|---|---|
| 3.3 V | **75** W, **50** W |
| 5 V | **125** W, **100** W, **50** W |
| 8 V | **100** W |
| 12 V | **150** W, **100** W, **50** W |
| 15 V | **150** W, **100** W, **50** W |
| 24 V | **150** W,**100** W, **50** W |
| 28 V | **150** W, **100** W, **50** W |
| 36 V | **100** W, **50** W |
| 48 V | **150** W, **100** W, **50** W |

| **Pin Style** | **Finish** |
|---|---|
| **Blank:** Short | Tin/Lead |
| **L:** Long | Tin/Lead |
| **S:** Short ModuMate | Gold |
| **N:** Long ModuMate | Gold |
| **F:** Short RoHS | Gold |
| **G:** Long RoHS | Gold |

**Baseplate**

| | |
|---|---|
| **Blank:** | Slotted |
| **2:** | Threaded |
| **3:** | Through-hole |

# MODULE FAMILY ELECTRICAL CHARACTERISTICS

Electrical characteristics apply over the full operating range of input voltage, output load (resistive) and baseplate temperature, unless otherwise specified. All temperatures refer to the operating temperature at the center of the baseplate.

## ■ MODULE INPUT SPECIFICATIONS

| Parameter | Min | Typ | Max | Unit | Notes |
|---|---|---|---|---|---|
| Operating input voltage | 18 | 24 | 36 | Vdc | |
| Input surge withstand | | | 50 | Vdc | <100 ms |
| Undervoltage turn-on | | 17.5 | 17.9 | Vdc | |
| Undervoltage turn-off | 14.8 | 15.3 | | Vdc | Modules will operate to 16 Vin after startup at >17.9 V. Below 18 V, available power is reduced to 75% of max rating. |
| Overvoltage turn-off/on | 36.3 | 37.8 | 39.6 | Vdc | |
| Disabled input current | | | 4.0 | mA | PC pin low |

## ■ MODULE OUTPUT SPECIFICATIONS

| Parameter | Min | Typ | Max | Unit | Notes |
|---|---|---|---|---|---|
| Output voltage setpoint | | | ±1 | % Vout nom. | Nominal input; full load; 25 °C |
| Line regulation | | ±0.02 | ±0.20 | % | Low line to high line; full load |
| Temperature regulation | | ±0.002 | ±0.005 | % / °C | Over operating temperature range |
| Power sharing accuracy | | ±2 | ±5 | % | 10 to 100% of full load |
| Programming range | 10 | | 110 | % | Of nominal output voltage. For trimming below 90% of nominal, a minimum load of 10% of maximum rated power may be required. |
| **+Out to –Out — Absolute Maximum Ratings** | | | | | |
| 3.3 V | | | | -0.5 to 4.7 | Vdc Externally applied |
| 5 V | | | | -0.5 to 7.0 | Vdc Externally applied |
| 8 V | | | | -0.5 to 10.9 | Vdc Externally applied |
| 12 V | | | | -0.5 to 16.1 | Vdc Externally applied |
| 15 V | | | | -0.5 to 20.0 | Vdc Externally applied |
| 24 V | | | | -0.5 to 31.7 | Vdc Externally applied |
| 28 V | | | | -0.5 to 36.9 | Vdc Externally applied |
| 36 V | | | | -0.5 to 47.1 | Vdc Externally applied |
| 48 V | | | | -0.5 to 62.9 | Vdc Externally applied |

***Note:*** For important information relative to applications where the converter modules are subject to continuous dynamic loading, contact Vicor applications engineering at 800-927-9474.

## ■ Thermal Resistance and Capacity

| Parameter | Min | Typ | Max | Unit |
|---|---|---|---|---|
| Baseplate to sink; flat, greased surface | | 0.24 | | °C/Watt |
| Baseplate to sink; thermal pad (P/N 20265) | | 0.21 | | °C/Watt |
| Baseplate to ambient | | 10.9 | | °C/Watt |
| Baseplate to ambient; 1000 LFM | | 2.8 | | °C/Watt |
| Thermal capacity | | 48 | | Watt-sec/°C |

## MODULE FAMILY ELECTRICAL CHARACTERISTICS (CONT.)

### MODULE CONTROL SPECIFICATIONS

| Parameter | Min | Typ | Max | Unit | Notes |
|---|---|---|---|---|---|
| **PRIMARY SIDE** (PC = Primary Control; PR = Parallel) | | | | | |
| PC bias voltage | 5.50 | 5.75 | 6.00 | Vdc | PC current = 1.0 mA |
| current limit | 1.5 | 2.1 | 3.0 | mA | PC voltage = 5.5 V |
| PC module disable | 2.3 | 2.6 | 2.9 | Vdc | Switch must be able to sink ≥4 mA. See Fig. 2 |
| PC module enable delay | | 4 | 7 | ms | |
| PC module alarm | | | 0.5 | Vavg | UV, OV, OT, module fault. See Figs. 3 and 5 |
| PC resistance | 0.9 | 1.0 | 1.1 | MΩ | See Fig. 3, converter off or fault mode |
| PR emitter amplitude | 5.7 | 5.9 | 6.1 | Volts | PR load >30 Ω, <30 pF |
| PR emitter current | 150 | | | mA | |
| PR receiver impedance | 375 | 500 | 625 | Ω | 25 °C |
| PR receiver threshold | 2.4 | 2.5 | 2.6 | Volts | Minimum pulse width: 20 ns |
| PR drive capability | | | 12 | modules | Without PR buffer amplifier |
| **SECONDARY SIDE** (SC = Secondary Control) | | | | | |
| SC bandgap voltage | 1.21 | 1.23 | 1.25 | Vdc | Referenced to –Sense |
| SC resistance | 990 | 1000 | 1010 | Ω | |
| SC capacitance | | 0.033 | | µF | |
| SC module alarm | | 0 | | Vdc | With open trim; referenced to –Sense. See Fig. 7 |

### MODULE GENERAL SPECIFICATIONS

| Parameter | Min | Typ | Max | Unit | Notes |
|---|---|---|---|---|---|
| Isolation test voltage (in to out)* | 3000 | | | Vrms | Complies with reinforced insulation requirements |
| Isolation test voltage (in to base)* | 1500 | | | Vrms | Complies with basic insulation requirements |
| Isolation test voltage (out to base)* | 500 | | | Vrms | Complies with operational insulation requirements |
| Isolation resistance | | 10 | | MΩ | in to out, in to baseplate, out to baseplate |
| Weight (E, C, T grade) | 1.9 (52.8) | 2.1 (59.3) | 2.3 (65.8) | ounces (grams) | |
| Weight (H, M grade) | 2.1 (58.7) | 2.3 (65.2) | 2.5 (71.7) | ounces (grams) | |
| Temperature limiting | 100 | 115 | | °C | See Figs. 3 and 5. Do not operate coverter >100 C. |
| Agency approvals | | cURus, cTÜVus, CE | | | UL60950-1, EN60950-1, CSA60950-1, IEC60950-1. With appropriate fuse in series with the +Input |

** Isolation test voltage, 1 minute or less.*

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

## MODULE SPECIFIC OPERATING SPECIFICATIONS

### 3.3 Vout, 75 W (e.g. V24C3V3C75BL)

| Parameter | Min | Typ | Max | Unit | Notes |
|---|---|---|---|---|---|
| Efficiency | 78.0 | 79.0 | | % | Nominal input; full load; 25°C |
| Ripple and noise | | 140 | 175 | mV | p-p; Nominal input; full load; 20 MHz bandwidth |
| Output OVP setpoint | 4.14 | 4.3 | 4.46 | Volts | 25 °C; recycle input voltage or PC to restart (>100 ms off) |
| Dissipation, standby | | 4 | 6 | Watts | No load |
| Load regulation | | ±0.02 | ±0.4 | % | No load to full load; nominal input |
| Load current | 0 | | 22.72 | Amps | |
| Current limit | 23.1 | 26.1 | 30.7 | Amps | Output voltage 95% of nominal |
| Short circuit current | 15.8 | 26.1 | 30.7 | Amps | Output voltage <250 mV |

### 3.3 Vout, 50 W (e.g. V24C3V3C50BL)

| Parameter | Min | Typ | Max | Unit | Notes |
|---|---|---|---|---|---|
| Efficiency | 75.0 | 79.2 | | % | Nominal input; full load; 25 °C |
| Ripple and noise | | 240 | 300 | mV | p-p; Nominal input; full load; 20 MHz bandwidth |
| Output OVP setpoint | 4.14 | 4.3 | 4.46 | Volts | 25 °C; recycle input voltage or PC to restart (>100 ms off) |
| Dissipation, standby | | 1.6 | 3 | Watts | No load |
| Load regulation | | ±0.02 | ±0.2 | % | No load to full load; nominal input |
| Load current | 0 | | 15.15 | Amps | |
| Current limit | 15.5 | 17.5 | 20.6 | Amps | Output voltage 95% of nominal |
| Short circuit current | 10.6 | 17.5 | 20.6 | Amps | Output voltage <250 mV |

### 5 Vout, 125 W (e.g. V24C5C125BL)

| Parameter | Min | Typ | Max | Unit | Notes |
|---|---|---|---|---|---|
| Efficiency | 82.6 | 84.1 | | % | Nominal input full load 25 °C |
| Ripple and noise | | 150 | 188 | mV | p-p Nominal input full load 20 MHz bandwidth |
| Output OVP setpoint | 6.0 | 6.25 | 6.5 | Volts | 25 °C; recycle input voltage or PC to restart (>100 ms off) |
| Dissipation, standby | | 4.3 | 5.3 | Watts | No load |
| Load regulation | | ±0.02 | ±0.2 | % | No load to full load nominal input |
| Load current | 0.0 | | 25.0 | Amps | |
| Current limit | 25.5 | 28.8 | 33.8 | Amps | Output voltage 95% of nominal |
| Short circuit current | 17.5 | 28.8 | 33.8 | Amps | Output voltage <250 mV |

### 5 Vout, 100 W (e.g. V24C5C100BL)

| Parameter | Min | Typ | Max | Unit | Notes |
|---|---|---|---|---|---|
| Efficiency | 83.0 | 84.0 | | % | Nominal input; full load; 25 °C |
| Ripple and noise | | 100 | 125 | mV | p-p; Nominal input; full load; 20 MHz bandwidth |
| Output OVP setpoint | 6.03 | 6.25 | 6.47 | Volts | 25 °C; recycle input voltage or PC to restart (>100 ms off) |
| Dissipation, standby | | 3.2 | 4.8 | Watts | No load |
| Load regulation | | ±0.02 | ±0.2 | % | No load to full load; nominal input |
| Load current | 0 | | 20 | Amps | |
| Current limit | 20.4 | 23 | 27 | Amps | Output voltage 95% of nominal |
| Short circuit current | 2 | 23 | 27 | Amps | Output voltage <250 mV |

### 5 Vout, 50 W (e.g. V24C5C50BL)

| Parameter | Min | Typ | Max | Unit | Notes |
|---|---|---|---|---|---|
| Efficiency | 83.0 | 84.5 | | % | Nominal input; full load; 25 °C |
| Ripple and noise | | 80 | 100 | mV | p-p; Nominal input; full load; 20 MHz bandwidth |
| Output OVP setpoint | 6.03 | 6.25 | 6.47 | Volts | 25 °C; recycle input voltage or PC to restart (>100 ms off) |
| Dissipation, standby | | 1.3 | 2.1 | Watts | No load |
| Load regulation | | ±0.02 | ±0.2 | % | No load to full load; nominal input |
| Load current | 0 | | 10 | Amps | |
| Current limit | 10.2 | 11.5 | 13.5 | Amps | Output voltage 95% of nominal |
| Short circuit current | 2 | 11.5 | 13.5 | Amps | Output voltage <250 mV |

## ■ MODULE SPECIFIC OPERATING SPECIFICATIONS (CONT.)

### 8 Vout, 100 W (e.g. V24C8C100BL)

| Parameter | Min | Typ | Max | Unit | Notes |
|---|---|---|---|---|---|
| Efficiency | 84.3 | 86.0 | | % | Nominal input; full load; 25 °C |
| Ripple and noise | | 145 | 182 | mV | p-p; Nominal input; full load; 20 MHz bandwidth |
| Output OVP setpoint | 9.36 | 9.7 | 10.1 | Volts | 25 °C; recycle input voltage or PC to restart (>100 ms off) |
| Dissipation, standby | | 3 | 3.4 | Watts | No load |
| Load regulation | | ±0.02 | ±0.2 | % | No load to full load; nominal input |
| Load current | 0 | | 12.5 | Amps | |
| Current limit | 12.7 | 14.4 | 16.9 | Amps | Output voltage 95% of nominal |
| Short circuit current | 8.75 | 14.4 | 16.9 | Amps | Output voltage <250 mV |

### 12 Vout, 150 W (e.g. V24C12C150BL)

| Parameter | Min | Typ | Max | Unit | Notes |
|---|---|---|---|---|---|
| Efficiency | 86.9 | 88.4 | | % | Nominal input full load 25 °C |
| Ripple and noise | | 170 | 212 | mV | p-p Nominal input full load 20 MHz bandwidth |
| Output OVP setpoint | 13.8 | 14.3 | 14.8 | Volts | 25 °C; recycle input voltage or PC to restart (>100 ms off) |
| Dissipation, standby | | 3.7 | 4.5 | Watts | No load |
| Load regulation | | ±0.02 | ±0.2 | % | No load to full load nominal input |
| Load current | 0 | | 12.5 | Amps | |
| Current limit | 12.8 | 14.4 | 16.9 | Amps | Output voltage 95% of nominal |
| Short circuit current | 8.8 | 14.4 | 16.9 | Amps | Output voltage <250 mV |

### 12 Vout, 100 W (e.g. V24C12C100BL)

| Parameter | Min | Typ | Max | Unit | Notes |
|---|---|---|---|---|---|
| Efficiency | 83.8 | 85.8 | | % | Nominal input; full load; 25 °C |
| Ripple and noise | | 209 | 262 | mV | p-p; Nominal input; full load; 20 MHz bandwidth |
| Output OVP setpoint | 13.7 | 14.3 | 14.9 | Volts | 25 °C; recycle input voltage or PC to restart (>100 ms off) |
| Dissipation, standby | | 4.4 | 6.1 | Watts | No load |
| Load regulation | | ±0.02 | ±0.2 | % | No load to full load; nominal input |
| Load current | 0 | | 8.33 | Amps | |
| Current limit | 8.5 | 9.59 | 10.9 | Amps | Output voltage 95% of nominal |
| Short circuit current | 1.09 | 9.59 | 10.9 | Amps | Output voltage <250 mV |

### 12 Vout, 50 W (e.g. V24C12C50BL)

| Parameter | Min | Typ | Max | Unit | Notes |
|---|---|---|---|---|---|
| Efficiency | 87.0 | 88.1 | | % | Nominal input; full load; 25 °C |
| Ripple and noise | | 80 | 100 | mV | p-p; Nominal input; full load; 20 MHz bandwidth |
| Output OVP setpoint | 13.7 | 14.3 | 14.9 | Volts | 25 °C; recycle input voltage or PC to restart (>100 ms off) |
| Dissipation, standby | | 1.8 | 2.6 | Watts | No load |
| Load regulation | | ±0.02 | ±0.2 | % | No load to full load; nominal input |
| Load current | 0 | | 4.17 | Amps | |
| Current limit | 4.25 | 4.8 | 5.63 | Amps | Output voltage 95% of nominal |
| Short circuit current | 2.91 | 4.8 | 5.63 | Amps | Output voltage <250mV |

### 15 Vout, 150 W (e.g. V24C15C150BL)

| Parameter | Min | Typ | Max | Unit | Notes |
|---|---|---|---|---|---|
| Efficiency | 87.8 | 89.3 | | % | Nominal input full load 25 °C |
| Ripple and noise | | 152.0 | 190.0 | mV | p-p Nominal input full load 20 MHz bandwidth |
| Output OVP setpoint | 17.1 | 17.8 | 18.4 | Volts | 25 °C; recycle input voltage or PC to restart (>100 ms off) |
| Dissipation, standby | | 3.9 | 5.0 | Watts | No load |
| Load regulation | | ±0.02 | ±0.2 | % | No load to full load nominal input |
| Load current | 0.0 | | 10.0 | Amps | |
| Current limit | 10.2 | 11.5 | 13.5 | Amps | Output voltage 95% of nominal |
| Short circuit current | 7.0 | 11.5 | 13.5 | Amps | Output voltage <250 mV |

## ■ MODULE SPECIFIC OPERATING SPECIFICATIONS (CONT.)

### 15 Vout, 100 W (e.g. V24C15C100BL)

| Parameter | Min | Typ | Max | Unit | Notes |
|---|---|---|---|---|---|
| Efficiency | 88.0 | 89.0 | | % | Nominal input; full load; 25 °C |
| Ripple and noise | | 100 | 125 | mV | p-p; Nominal input; full load; 20 MHz bandwidth |
| Output OVP setpoint | 17.1 | 17.8 | 18.5 | Volts | 25 °C; recycle input voltage or PC to restart (>100 ms off) |
| Dissipation, standby | | 4.6 | 7 | Watts | No load |
| Load regulation | | ±0.02 | ±0.2 | % | No load to full load; nominal input |
| Load current | 0 | | 6.67 | Amps | |
| Current limit | 6.8 | 7.67 | 8.67 | Amps | Output voltage 95% of nominal |
| Short circuit current | 4.66 | 7.67 | 8.67 | Amps | Output voltage <250 mV |

### 15 Vout, 50 W (e.g. V24C15C50BL)

| Parameter | Min | Typ | Max | Unit | Notes |
|---|---|---|---|---|---|
| Efficiency | 87.5 | 88.5 | | % | Nominal input; full load; 25 °C |
| Ripple and noise | | 160 | 200 | mV | p-p; Nominal input; full load; 20 MHz bandwidth |
| Output OVP setpoint | 17.1 | 17.8 | 18.5 | Volts | 25 °C; recycle input voltage or PC to restart (>100 ms off) |
| Dissipation, standby | | 1.8 | 2.6 | Watts | No load |
| Load regulation | | ±0.02 | ±0.2 | % | No load to full load; nominal input |
| Load current | 0 | | 3.33 | Amps | |
| Current limit | 3.39 | 3.83 | 4.5 | Amps | Output voltage 95% of nominal |
| Short circuit current | 2.33 | 3.83 | 4.5 | Amps | Output voltage <250mV |

### 24 Vout, 150 W (e.g. V24C24C150BL)

| Parameter | Min | Typ | Max | Unit | Notes |
|---|---|---|---|---|---|
| Efficiency | 87.3 | 88.3 | | % | Nominal input; full load; 25 °C |
| Ripple and noise | | 100 | 150 | mV | p-p; Nominal input; full load; 20 MHz bandwidth |
| Output OVP setpoint | 27.1 | 28.1 | 29.1 | Volts | 25 °C; recycle input voltage or PC to restart (>100 ms off) |
| Dissipation, standby | | 4.0 | 5.0 | Watts | No load |
| Load regulation | | ±0.02 | ±0.2 | % | No load to full load; nominal input |
| Load current | 0.0 | | 6.3 | Amps | |
| Current limit | 6.4 | 7.2 | 8.4 | Amps | Output voltage 95% of nominal |
| Short circuit current | 4.4 | 7.2 | 8.4 | Amps | Output voltage <250 mV |

### 24 Vout, 100 W (e.g. V24C24C100BL)

| Parameter | Min | Typ | Max | Unit | Notes |
|---|---|---|---|---|---|
| Efficiency | 87.0 | 88.0 | | % | Nominal input; full load; 25 °C |
| Ripple and noise | | 70 | 88 | mV | p-p; Nominal input; full load; 20 MHz bandwidth |
| Output OVP setpoint | 27.1 | 28.1 | 29.1 | Volts | 25 °C; recycle input voltage or PC to restart (>100 ms off) |
| Dissipation, standby | | 3.6 | 5.4 | Watts | No load |
| Load regulation | | ±0.02 | ±0.2 | % | No load to full load; nominal input |
| Load current | 0 | | 4.17 | Amps | |
| Current limit | 4.25 | 4.8 | 5.67 | Amps | Output voltage 95% of nominal |
| Short circuit current | 2.91 | 4.8 | 5.42 | Amps | Output voltage <250 mV |

### 24 Vout, 50 W (e.g. V24C24C50BL)

| Parameter | Min | Typ | Max | Unit | Notes |
|---|---|---|---|---|---|
| Efficiency | 87.0 | 88.6 | | % | Nominal input; full load; 25 °C |
| Ripple and noise | | 80 | 100 | mV | p-p; Nominal input; full load; 20 MHz bandwidth |
| Output OVP setpoint | 27.1 | 28.1 | 29.1 | Volts | 25 °C; recycle input voltage or PC to restart (>100 ms off) |
| Dissipation, standby | | 2 | 3 | Watts | No load |
| Load regulation | | ±0.02 | ±0.2 | % | No load to full load; nominal input |
| Load current | 0 | | 2.08 | Amps | |
| Current limit | 2.12 | 2.39 | 2.81 | Amps | Output voltage 95% of nominal |
| Short circuit current | 1.45 | 2.39 | 2.81 | Amps | Output voltage <250mV |

## ■ MODULE SPECIFIC OPERATING SPECIFICATIONS (CONT.)

### 28 Vout, 150 W (e.g. V24C28C150BL)

| Parameter | Min | Typ | Max | Unit | Notes |
|---|---|---|---|---|---|
| Efficiency | 88.0 | 89.0 | | % | Nominal input; full load; 25 °C |
| Ripple and noise | | 100 | 150 | mV | p-p; Nominal input; full load; 20 MHz bandwidth |
| Output OVP setpoint | 31.6 | 32.7 | 33.8 | Volts | 25 °C; recycle input voltage or PC to restart (>100 ms off) |
| Dissipation, standby | | 4.2 | 6.2 | Watts | No load |
| Load regulation | | ±0.02 | ±0.2 | % | No load to full load; nominal input |
| Load current | 0 | | 5.4 | Amps | |
| Current limit | 5.5 | 6.2 | 7.2 | Amps | Output voltage 95% of nominal |
| Short circuit current | 3.8 | 6.2 | 7.2 | Amps | Output voltage <250 mV |

### 28 Vout, 100 W (e.g. V24C28C100BL)

| Parameter | Min | Typ | Max | Unit | Notes |
|---|---|---|---|---|---|
| Efficiency | 88.0 | 89.0 | | % | Nominal input; full load; 25 °C |
| Ripple and noise | | 85 | 107 | mV | p-p; Nominal input; full load; 20 MHz bandwidth |
| Output OVP setpoint | 31.5 | 32.7 | 33.9 | Volts | 25 °C; recycle input voltage or PC to restart (>100 ms off) |
| Dissipation, standby | | 3.3 | 5 | Watts | No load |
| Load regulation | | ±0.02 | ±0.2 | % | No load to full load; nominal input |
| Load current | 0 | | 3.57 | Amps | |
| Current limit | 3.64 | 4.12 | 5 | Amps | Output voltage 95% of nominal |
| Short circuit current | 0.5 | 4.12 | 5 | Amps | Output voltage <250 mV |

### 28 Vout, 50 W (e.g. V24C28C50BL)

| Parameter | Min | Typ | Max | Unit | Notes |
|---|---|---|---|---|---|
| Efficiency | 87.5 | 89.0 | | % | Nominal input; full load; 25 °C |
| Ripple and noise | | 80 | 100 | mV | p-p; Nominal input; full load; 20 MHz bandwidth |
| Output OVP setpoint | 31.5 | 32.7 | 33.9 | Volts | 25 °C; recycle input voltage or PC to restart (>100 ms off) |
| Dissipation, standby | | 1.8 | 2.7 | Watts | No load |
| Load regulation | | ±0.02 | ±0.2 | % | No load to full load; nominal input |
| Load current | 0 | | 1.78 | Amps | |
| Current limit | 1.82 | 2.06 | 2.42 | Amps | Output voltage 95% of nominal |
| Short circuit current | 1.25 | 2.06 | 2.42 | Amps | Output voltage <250mV |

### 36 Vout, 100 W (e.g. V24C36C100BL)

| Parameter | Min | Typ | Max | Unit | Notes |
|---|---|---|---|---|---|
| Efficiency | 86.0 | 87.1 | | % | Nominal input; full load; 25 °C |
| Ripple and noise | | 32 | 40 | mV | p-p; Nominal input; full load; 20 MHz bandwidth |
| Output OVP setpoint | 40.4 | 41.9 | 43.4 | Volts | 25 °C; recycle input voltage or PC to restart (>100 ms off) |
| Dissipation, standby | | 3.7 | 4.3 | Watts | No load |
| Load regulation | | ±0.02 | ±0.2 | % | No load to full load; nominal input |
| Load current | 0 | | 2.78 | Amps | |
| Current limit | 2.83 | 3.2 | 3.76 | Amps | Output voltage 95% of nominal |
| Short circuit current | 1.94 | 3.2 | 3.76 | Amps | Output voltage <250 mV |

### 36 Vout, 50 W (e.g. V24C36C50BL)

| Parameter | Min | Typ | Max | Unit | Notes |
|---|---|---|---|---|---|
| Efficiency | 84.0 | 84.9 | | % | Nominal input; full load; 25 °C |
| Ripple and noise | | 27 | 34 | mV | p-p; Nominal input; full load; 20 MHz bandwidth |
| Output OVP setpoint | 40.4 | 41.9 | 43.4 | Volts | 25 °C; recycle input voltage or PC to restart (>100 ms off) |
| Dissipation, standby | | 1.8 | 2.3 | Watts | No load |
| Load regulation | | ±0.02 | ±0.2 | % | No load to full load; nominal input |
| Load current | 0 | | 1.39 | Amps | |
| Current limit | 1.41 | 1.6 | 1.88 | Amps | Output voltage 95% of nominal |
| Short circuit current | 0.97 | 1.6 | 1.88 | Amps | Output voltage <250 mV |

## ■ MODULE SPECIFIC OPERATING SPECIFICATIONS (CONT.)

### 48 Vout, 150 W (e.g. V24C28C150BL)

| Parameter | Min | Typ | Max | Unit | Notes |
|---|---|---|---|---|---|
| Efficiency | 87.9 | 88.9 | | % | Nominal input full load 25 °C |
| Ripple and noise | | 100 | 150 | mV | p-p Nominal input full load 20 MHz bandwidth |
| Output OVP setpoint | 53.8 | 55.7 | 57.6 | Volts | 25 °C; recycle input voltage or PC to restart (>100 ms off) |
| Dissipation, standby | | 3.7 | 5.7 | Watts | No load |
| Load regulation | | ±0.02 | ±0.2 | % | No load to full load nominal input |
| Load current | 0.0 | | 3.1 | Amps | |
| Current limit | 3.2 | 3.8 | 4.2 | Amps | Output voltage 95% of nominal |
| Short circuit current | 2.2 | 3.8 | 4.2 | Amps | Output voltage <250 mV |

### 48 Vout, 100 W (e.g. V24C48C100BL)

| Parameter | Min | Typ | Max | Unit | Notes |
|---|---|---|---|---|---|
| Efficiency | 86.2 | 87.7 | | % | Nominal input; full load; 25 °C |
| Ripple and noise | | 100 | 125 | mV | p-p; Nominal input; full load; 20 MHz bandwidth |
| Output OVP setpoint | 53.7 | 55.7 | 57.7 | Volts | 25 °C; recycle input voltage or PC to restart (>100 ms off) |
| Dissipation, standby | | 3 | 5 | Watts | No load |
| Load regulation | | ±0.02 | ±0.2 | % | No load to full load; nominal input |
| Load current | 0 | | 2.08 | Amps | |
| Current limit | 2.12 | 2.4 | 2.81 | Amps | Output voltage 95% of nominal |
| Short circuit current | 1.46 | 2.4 | 2.81 | Amps | Output voltage <250 mV |

### 48 Vout, 50 W (e.g. V24C48C50BL)

| Parameter | Min | Typ | Max | Unit | Notes |
|---|---|---|---|---|---|
| Efficiency | 86.0 | 87.2 | | % | Nominal input; full load; 25 °C |
| Ripple and noise | | 120 | 150 | mV | p-p; Nominal input; full load; 20 MHz bandwidth |
| Output OVP setpoint | 53.7 | 55.7 | 57.7 | Volts | 25 °C; recycle input voltage or PC to restart (>100 ms off) |
| Dissipation, standby | | 2.1 | 3 | Watts | No load |
| Load regulation | | ±0.02 | ±0.2 | % | No load to full load; nominal input |
| Load current | 0 | | 1.04 | Amps | |
| Current limit | 1.06 | 1.2 | 1.41 | Amps | Output voltage 95% of nominal |
| Short circuit current | 0.72 | 1.2 | 1.41 | Amps | Output voltage <250 mV |

## BASIC MODULE OPERATION

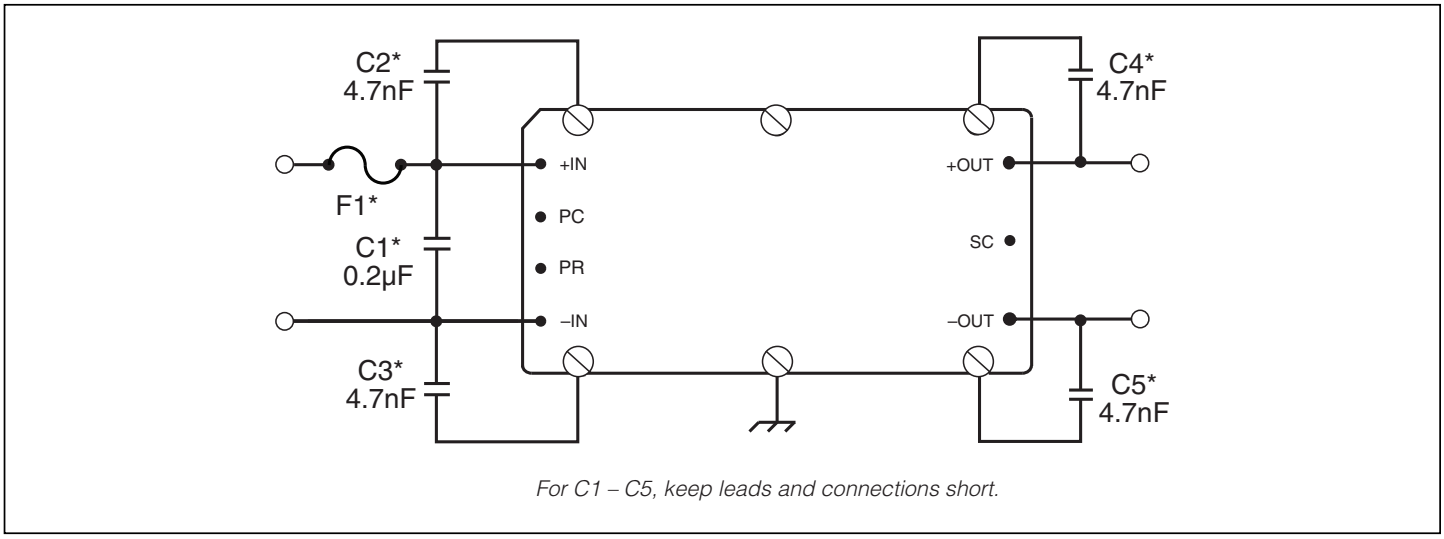



***Figure 1*** *— Basic module operation requires fusing, grounding, bypassing capacitors.*
** See Maxi, Mini, Micro Design Guide.*

### Comprehensive Online Application Information




The Design Guide and Applications Manual includes:

- Application circuits
- Design requirements
- EMC considerations
- Current sharing in power arrays
- Thermal performance information
- Recommended soldering methods
- Accessory modules – filtering, rectification, front-ends
- Mounting options

...and more.

**CLICK HERE TO VIEW DESIGN GUIDE**

*Also at vicorpower.com*

- PowerBench online configurators
- Over 20 Application Notes
- Online calculators – thermal, trimming, hold-up
- PDF data sheets for ALL Vicor products

## PRIMARY CONTROL - PC PIN

### Module Enable/Disable

The module may be disabled by pulling PC to 0 V (2.3 V max) with respect to the –Input. This may be done with an open collector transistor, relay, or optocoupler. Converters may be disabled with a single transistor or relay either directly or via "OR'ing" diodes for 2 or more converters. See Figure 2.

### Primary Auxiliary Supply

During normal operation only, the PC Pin can source 5.7 V @ 1.5 mA. In the example shown in Figure 4, PC powers a module enabled LED.

### Module Alarm

The module contains "watchdog" circuitry which monitors input voltage, operating temperature and internal operating parameters. In the event that any of these parameters are outside of their allowable operating range, the module will shut down and PC will go low. PC will periodically go high and the module will check to see if the fault (as an example, Input Undervoltage) has cleared. If the fault has not been cleared, PC will go low again and the cycle will restart. The SC pin will go low in the event of a fault and return to its normal state after the fault has been cleared. See Figures 3 and 5.

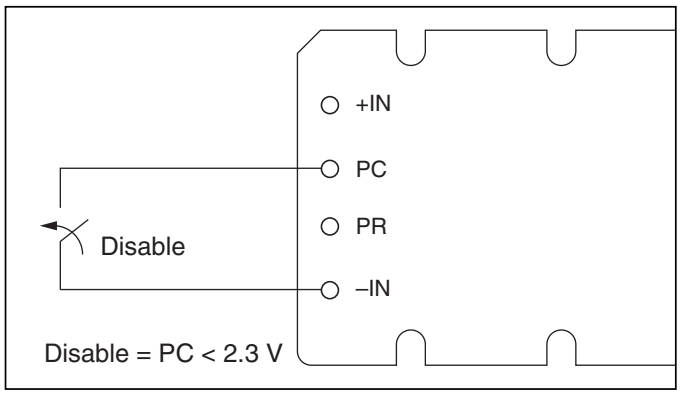



***Figure 2*** *— Module enable/disable.*

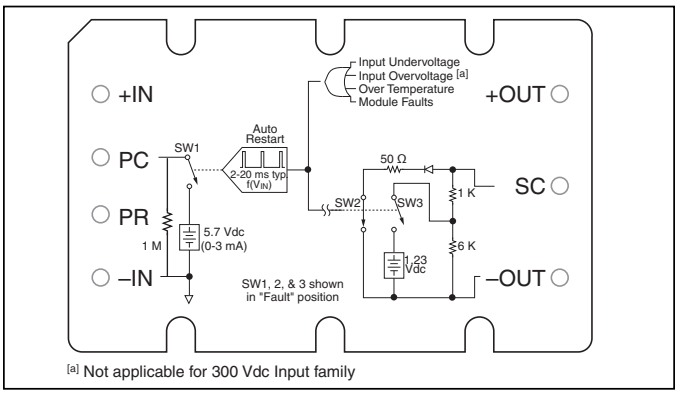



***Figure 3*** *— PC/SC module alarm logic.*

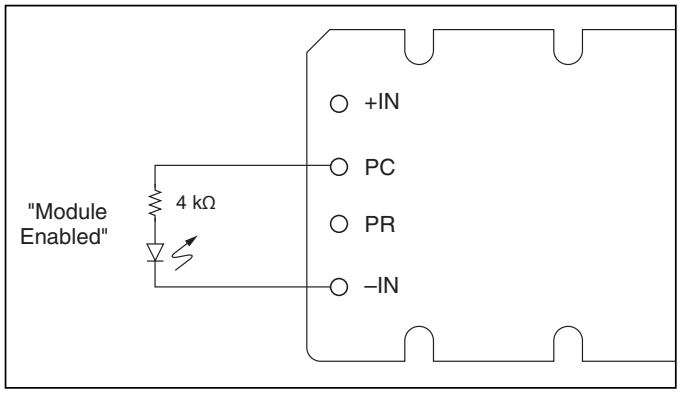



***Figure 4*** *— LED on-state indicator.*

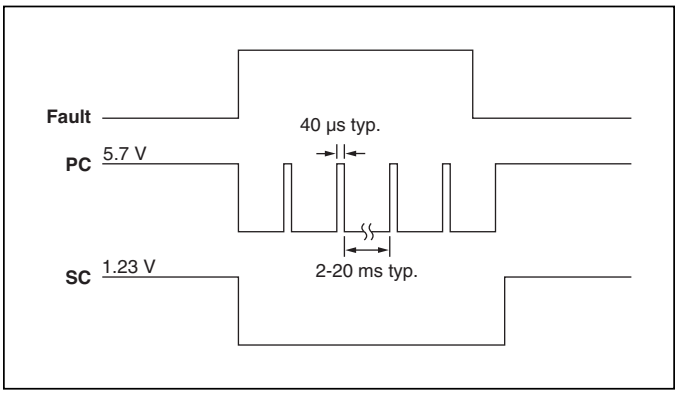



***Figure 5*** *—PC/SC module alarm timing.*

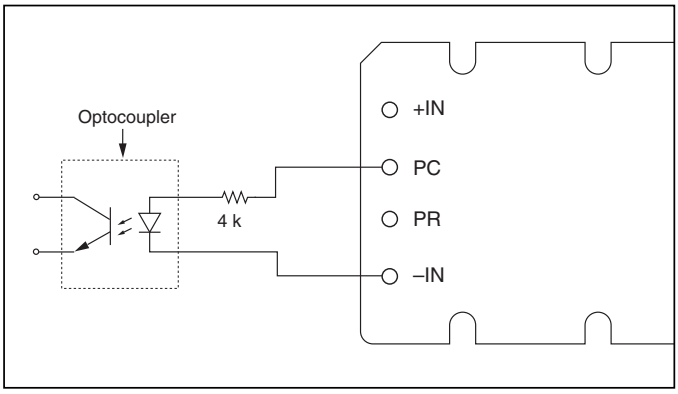



***Figure 6*** *—Isolated on-state indicator.*

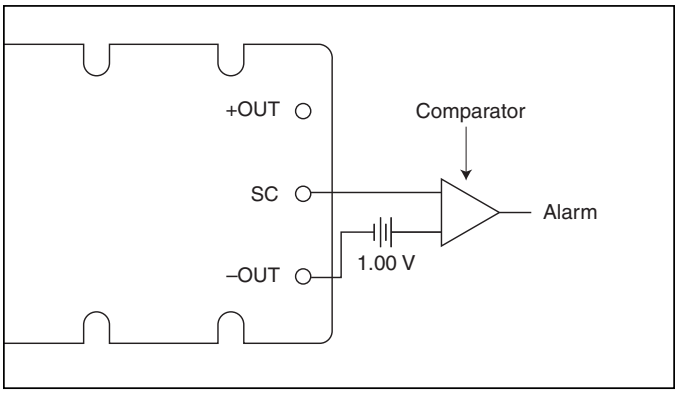



***Figure 7*** *— Secondary side on-state indicator.*

## SECONDARY CONTROL - SC PIN

### Output Voltage Programming

The output voltage of the converter can be adjusted or programmed via fixed resistors, potentiometers or voltage DACs. See Figure 8.

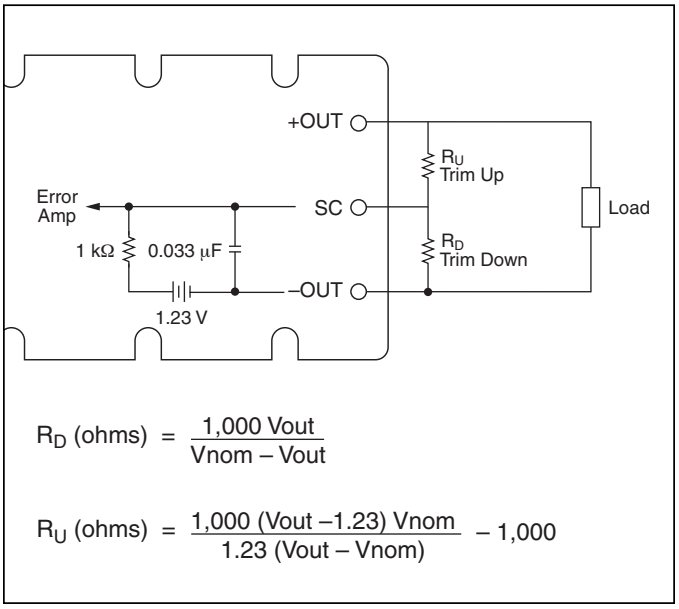



***Figure 8*** *— Output voltage trim down and trim up circuit.*

### Trim Down

1. This converter is not a constant power device – it has a constant current limit. Hence, available output power is reduced by the same percentage that output voltage is trimmed down. Do not exceed maximum rated output current.
2. The trim down resistor must be connected between the SC and pins. Do not bypass the SC pin directly with a capacitor.

### Trim Up

1. The converter is rated for a maximum delivered power. To ensure that maximum rated power is not exceeded, reduce maximum output current by the same percentage increase in output voltage.
2. The trim up resistor must be connected between the SC and pins. Do not bypass the SC pin directly with a capacitor.
3. Do not trim the converter above maximum trim range (typically +10%) or the output over voltage protection circuitry may be activated.

**Trim resistor values calculated automatically:**
On-line calculators for trim resistor values are available on the vicor website at:
asp.vicorpower.com/calculators/calculators.asp?calc=1
Resistor values can be calculated for fixed trim up, fixed trim down and for variable trim up or down.

## PARALLEL BUS - PR PIN

### Parallel Operation

The PR pin supports paralleling for increased power with N+1 (N+M) redundancy. Modules of the same input voltage, output voltage, and power level will current share if all PR pins are suitably interfaced.

Compatible interface architectures include the following:

*AC coupled single-wire interface.* All PR pins are connected to a single communication bus through 0.001 µF (500 V) capacitors. This interface supports current sharing and is fault tolerant except for the communication bus. Up to three converters may be paralleled by this method. See Figure 9.

*Transformer coupled interface.* For paralleling four or more converters a transformer coupled interface is required. See Figure 10.

For details on parallel operation please refer to the

Design Guide & Applications Manual for Maxi, Mini, Micro Family.

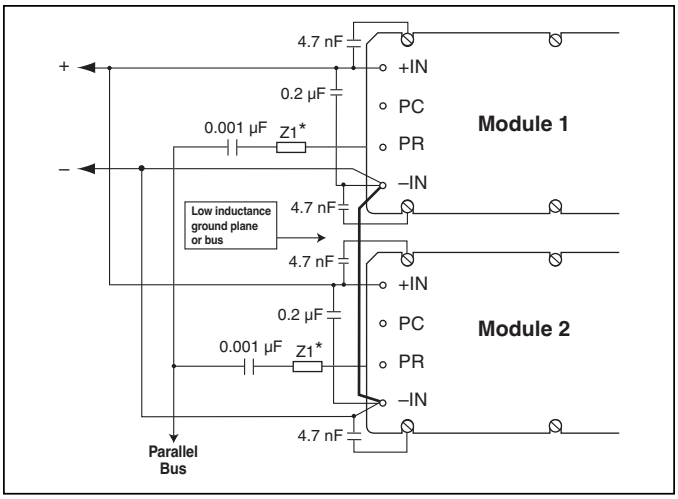



***Figure 9*** *— AC coupled single-wire interface.*
** See Maxi, Mini, Micro Design Guide.*

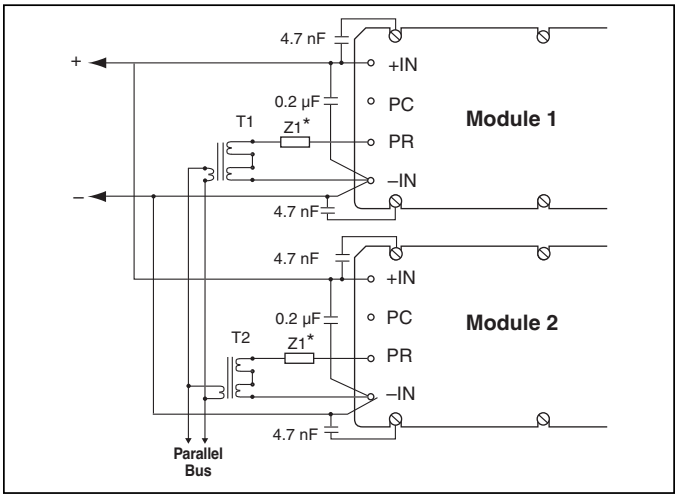
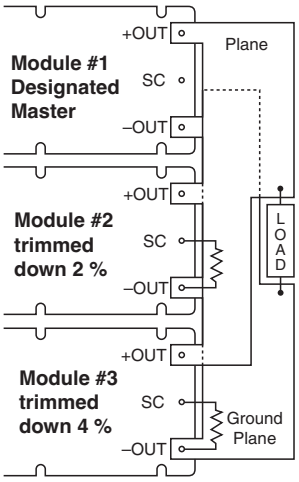


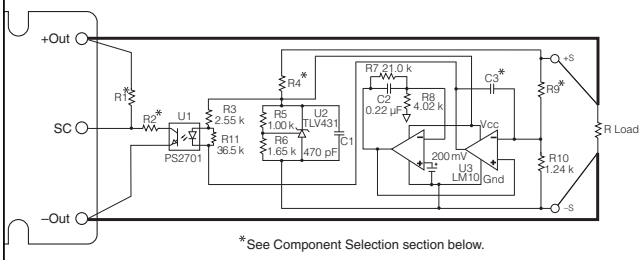

***Figure 10*** *— Transformer-coupled interface.*

## PARALLEL BUS / VOLTAGE DROP COMPENSATION




- The +Out and –Out power buses should be designed to minimize and balance parasitic impedance from each module output to the load.
- At the discretion of the power system designer, a subset of all modules within an array may be configured as slaves by connecting SC to –Out.
- Do not use output OR'ing diodes with MicroMods.

***Figure 11*** *— N+1 module array output connections.*




*See Component Selection section below.

- This module is designed for point of load regulation, where remote sensing is not required. Active voltage drop compensator, as shown here, may be used in applications with significant distribution losses.

Please consult with the Micro Family Isolated Remote Sense Application Note for additional information.

***Figure 12*** *— Voltage drop compensation.*

### ■ PIN STYLES*

| Designator | Description | Finish | Notes |
|---|---|---|---|
| (None) | Short | Tin/Lead | Requires in-board, mounting |
| L | Long | Tin/Lead | On-board mounting for 0.065" boards |
| S | Short ModuMate | Gold | SurfMate or in-board socket mounting |
| N | Long ModuMate | Gold | On-board socket mounting |
| F | Short RoHS | Gold | Select for RoHS compliant in-board solder, socket, or SurfMate mounting |
| G | Long RoHS | Gold | Select for RoHS compliant on-board solder or socket mounting |

* Pin style designator follows the "B" after the output power and precedes the baseplate designator.
Ex. V24C12T100B**N**2 — Long ModuMate Pins

## MECHANICAL DRAWINGS

| Converter Pins | | |
|---|---|---|
| **No.** | **Function** | **Label** |
| 1 | +In | + |
| 2 | Primary Control | PC |
| 3 | Parallel | PR |
| 4 | –In | – |
| 5 | –Out | – |
| 6 | Secondary Control | SC |
| 7 | +Out | + |

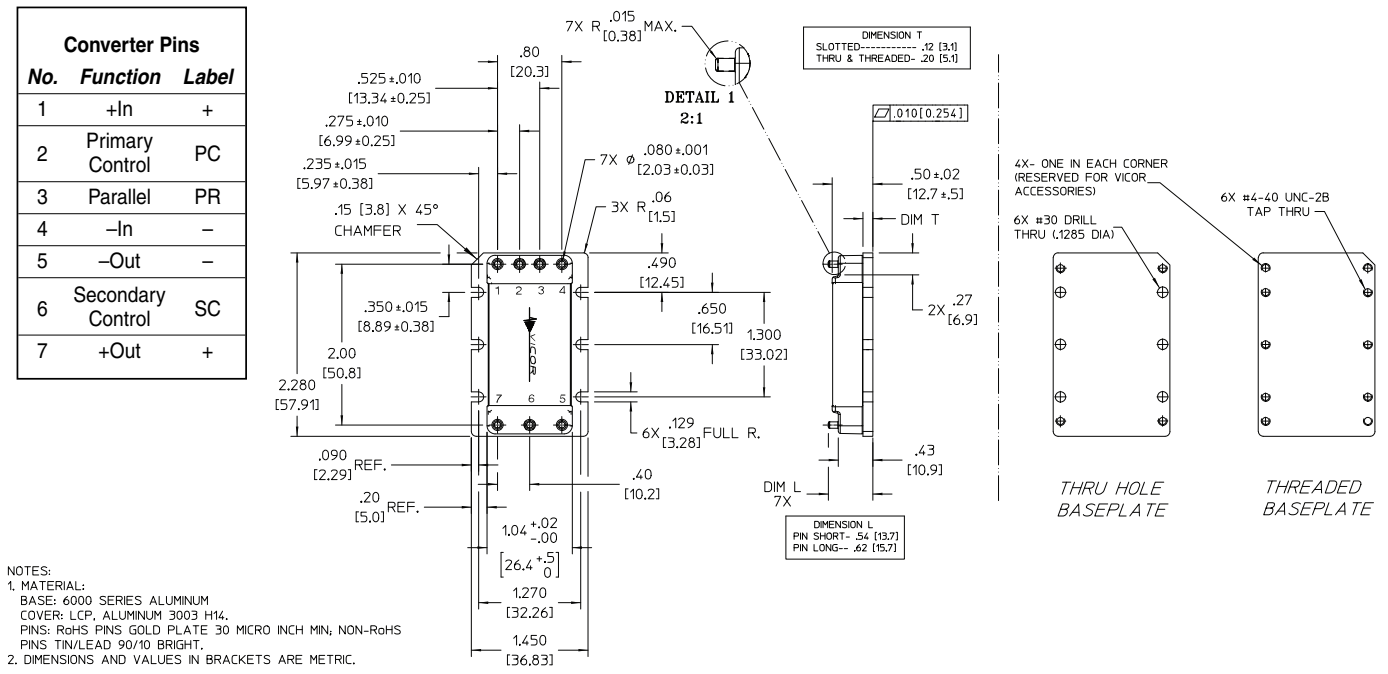



***Figure 13*** *— Module outline*

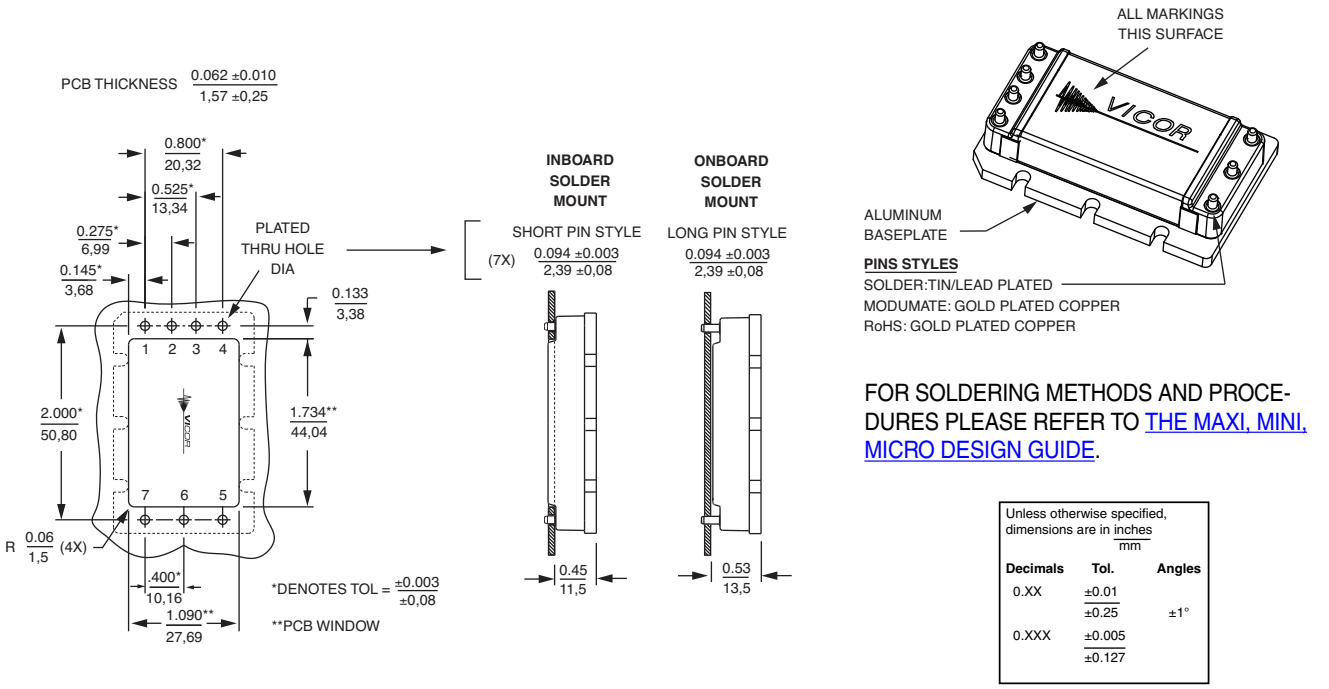



***Figure 14*** *— PCB mounting specifications*

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