Micro Family
24V Input

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

DC-DC Converter Module

Features & Benefits

- DC input range: 18 – 36V
- Isolated output
- Operation to 16V at 75% power after startup
- Input surge withstand: 50V for 100ms
- DC output: 3.3 – 48V
- 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 91W per cubic inch
- Height above board: 0.43in. (10,9mm)
- 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 and aerospace.

For details on proper operation please refer to the:
Design Guide & Applications Manual for Maxi, Mini, Micro Family.

Absolute Maximum Ratings

Parameter	Rating	Unit	Notes
+In to -In voltage	-0.5 to +53	V_{DC}	
PC to -In voltage	-0.5 to +7.0	V_{DC}	
PR to -In voltage	-0.5 to +7.0	V_{DC}	
SC to -Out voltage	-0.5 to +1.5	V_{DC}	
Isolation voltage			
in to out	3000	V_{RMS}	Test voltage
in to base	1500	V_{RMS}	Test voltage
out to base	500	V_{RMS}	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   24C   B

Product Type	Output Voltage	Product Grade Temperatures (°C)			Output Power		Pin Style	Finish	Baseplate
V = Standard	**3V3** = 3.3V	Grade	Operating	Storage	V_{OUT}	P_{OUT}	**Blank:** Short	Tin/Lead	**Blank:** Slotted
S = Enhanced efficiency (avail. ≤12 Vout only)	**5** = 5V	**E** =	– 10 to +100	– 20 to +125	3.3V	75W, 50W	**L:** Long	Tin/Lead	**2:** Threaded
	8 = 8V	**C** =	– 20 to +100	– 40 to +125	5V	125W, 100W, 50W	**S:** Short ModuMate	Gold	**3:** Through-hole
	12 = 12V	**T** =	– 40 to +100	– 40 to +125	8V	100W	**N:** Long ModuMate	Gold	
	15 = 15V	**H** =	– 40 to +100	– 55 to +125	12V	150W, 100W, 50W	**F:** Short RoHS	Gold	
	24 = 24V	**M** =	– 55 to +100	– 65 to +125	15V	150W, 100W, 50W	**G:** Long RoHS	Gold	
	28 = 28V				24V	150W,100W, 50W	**K:** Extra Long RoHS	Gold	
	36 = 36V				28V	150W, 100W, 50W			
	48 = 48V				36V	100W, 50W			
					48V	150W, 100W, 50W			

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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	V_{DC}	
Input surge withstand			50	V_{DC}	<100ms
Undervoltage turn-on		17.5	17.9	V_{DC}	
Undervoltage turn-off	14.8	15.3		V_{DC}	Modules will operate to $16V_{IN}$ after startup at >17.9V. Below 18V, available power is reduced to 75% of max rating.
Overvoltage turn-off/on	36.3	37.8	39.6	V_{DC}	
Disabled input current			4.0	mA	PC pin low

MODULE OUTPUT SPECIFICATIONS

Parameter	Min	Typ	Max	Unit	Notes
Output voltage setpoint			±1	% V_{OUT} 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					
3.3V			-0.5 to 4.7	V_{DC}	Externally applied
5V			-0.5 to 7.0	V_{DC}	Externally applied
8V			-0.5 to 10.9	V_{DC}	Externally applied
12V			-0.5 to 16.1	V_{DC}	Externally applied
15V			-0.5 to 20.0	V_{DC}	Externally applied
24V			-0.5 to 31.7	V_{DC}	Externally applied
28V			-0.5 to 36.9	V_{DC}	Externally applied
36V			-0.5 to 47.1	V_{DC}	Externally applied
48V			-0.5 to 62.9	V_{DC}	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

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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	V_{DC}	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	V_{DC}	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	V_{DC}	Referenced to –Sense
SC resistance	990	1000	1010	Ω	
SC capacitance		0.033		µF	
SC module alarm		0		V_{DC}	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			V_{RMS}	Complies with reinforced insulation requirements
Isolation test voltage (in to base)*	1500			V_{RMS}	Complies with basic insulation requirements
Isolation test voltage (out to base)*	500			V_{RMS}	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 >100C.
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.

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MODULE SPECIFIC OPERATING SPECIFICATIONS

3.3V$_{OUT}$, 75W (e.g. S24C3V3C75BL, V24C3V3C75BL)

Parameter	Min	Typ	Max	Unit	Notes
Efficiency					
S24C3V3C75BL (enhanced efficiency)	84.6	86.2		%	Nominal input; full load; 25°C
V24C3V3C75BL (standard efficiency)	80.0	81.6			
Ripple and noise		140	175	mV	p-p; Nominal input; full load; 20MHz bandwidth
Output OVP setpoint	4.14	4.3	4.46	Volts	25°C; recycle input voltage or PC to restart (>100ms 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 <250mV

3.3V$_{OUT}$, 50W (e.g. S24C3V3C50BL, V24C3V3C50BL)

Parameter	Min	Typ	Max	Unit	Notes
Efficiency					
S24C3V3C50BL (enhanced efficiency)	82.6	84.0		%	Nominal input; full load; 25°C
V24C3V3C50BL (standard efficiency)	75.0	79.2			
Ripple and noise		240	300	mV	p-p; Nominal input; full load; 20MHz bandwidth
Output OVP setpoint	4.14	4.3	4.46	Volts	25°C; recycle input voltage or PC to restart (>100ms 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 <250mV

5V$_{OUT}$, 125W (e.g. S24C5C125BL, V24C5C125BL)

Parameter	Min	Typ	Max	Unit	Notes
Efficiency					
S24C5C125BL (enhanced efficiency)	85.0	86.5		%	Nominal input; full load; 25°C
V24C5C125BL (standard efficiency)	83.0	84.5			
Ripple and noise		150	188	mV	p-p Nominal input full load 20MHz bandwidth
Output OVP setpoint	6.0	6.25	6.5	Volts	25°C; recycle input voltage or PC to restart (>100ms 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 <250mV

5V$_{OUT}$, 100W (e.g. S24C5C100BL, V24C5C100BL)

Parameter	Min	Typ	Max	Unit	Notes
Efficiency					
S24C5C100BL (enhanced efficiency)	85.9	87.4		%	Nominal input; full load; 25°C
V24C5C100BL (standard efficiency)	84.0	85.7			
Ripple and noise		100	125	mV	p-p; Nominal input; full load; 20MHz bandwidth
Output OVP setpoint	6.03	6.25	6.47	Volts	25°C; recycle input voltage or PC to restart (>100ms 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 <250mV

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MODULE SPECIFIC OPERATING SPECIFICATIONS (CONT.)

5V$_{OUT}$, 50W (e.g. S24C5C50BL, V24C5C50BL)

Parameter	Min	Typ	Max	Unit	Notes
Efficiency					
S24C5C50BL (enhanced efficiency)	86.5	87.8		%	Nominal input; full load; 25°C
V24C5C50BL (standard efficiency)	83.0	84.5			
Ripple and noise		80	100	mV	p-p; Nominal input; full load; 20MHz bandwidth
Output OVP setpoint	6.03	6.25	6.47	Volts	25°C; recycle input voltage or PC to restart (>100ms 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 <250mV

8V$_{OUT}$, 100W (e.g. S24C8C100BL, V24C8C100BL)

Parameter	Min	Typ	Max	Unit	Notes
Efficiency					
S24C8C100BL (enhanced efficiency)	86.0	89.0		%	Nominal input; full load; 25°C
V24C8C100BL (standard efficiency)	85.0	86.4			
Ripple and noise		145	182	mV	p-p; Nominal input; full load; 20MHz bandwidth
Output OVP setpoint	9.36	9.7	10.1	Volts	25°C; recycle input voltage or PC to restart (>100ms 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 <250mV

12V$_{OUT}$, 150W (e.g. S24C12C150BL, V24C12C150BL)

Parameter	Min	Typ	Max	Unit	Notes
Efficiency					
S24C12C150BL (enhanced efficiency)	88.0	89.5		%	Nominal input; full load; 25°C
V24C12C150BL (standard efficiency)	87.5	88.8			
Ripple and noise		170	212	mV	p-p Nominal input full load 20MHz bandwidth
Output OVP setpoint	13.8	14.3	14.8	Volts	25°C; recycle input voltage or PC to restart (>100ms 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 <250mV

12V$_{OUT}$, 100W (e.g. S24C12C100BL, V24C12C100BL)

Parameter	Min	Typ	Max	Unit	Notes
Efficiency					
S24C12C100BL (enhanced efficiency)	88.7	90.2		%	Nominal input; full load; 25°C
V24C12C100BL (standard efficiency)	87.0	88.4			
Ripple and noise		209	262	mV	p-p; Nominal input; full load; 20MHz bandwidth
Output OVP setpoint	13.7	14.3	14.9	Volts	25°C; recycle input voltage or PC to restart (>100ms 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 <250mV

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MODULE SPECIFIC OPERATING SPECIFICATIONS (CONT.)

12V_OUT, 50W (e.g. S24C12C50BL, V24C12C50BL)

Parameter	Min	Typ	Max	Unit	Notes
Efficiency					
S24C12C50BL (enhanced efficiency)	87.8	89.2		%	Nominal input; full load; 25°C
V24C12C50BL (standard efficiency)	87.5	88.5			
Ripple and noise		80	100	mV	p-p; Nominal input; full load; 20MHz bandwidth
Output OVP setpoint	13.7	14.3	14.9	Volts	25°C; recycle input voltage or PC to restart (>100ms 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

15V_OUT, 150W (e.g. V24C15C150BL)

Parameter	Min	Typ	Max	Unit	Notes
Efficiency	88.0	89.6		%	Nominal input full load 25°C
Ripple and noise		152.0	190.0	mV	p-p Nominal input full load 20MHz bandwidth
Output OVP setpoint	17.1	17.8	18.4	Volts	25°C; recycle input voltage or PC to restart (>100ms 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 <250mV

15V_OUT, 100W (e.g. V24C15C100BL)

Parameter	Min	Typ	Max	Unit	Notes
Efficiency	89.0	90.0		%	Nominal input; full load; 25°C
Ripple and noise		100	125	mV	p-p; Nominal input; full load; 20MHz bandwidth
Output OVP setpoint	17.1	17.8	18.5	Volts	25°C; recycle input voltage or PC to restart (>100ms 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 <250mV

15V_OUT, 50W (e.g. V24C15C50BL)

Parameter	Min	Typ	Max	Unit	Notes
Efficiency	88.0	89.4		%	Nominal input; full load; 25°C
Ripple and noise		160	200	mV	p-p; Nominal input; full load; 20MHz bandwidth
Output OVP setpoint	17.1	17.8	18.5	Volts	25°C; recycle input voltage or PC to restart (>100ms 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

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MODULE SPECIFIC OPERATING SPECIFICATIONS (CONT.)

24V$_{OUT}$, 150W (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; 20MHz bandwidth
Output OVP setpoint	27.1	28.1	29.1	Volts	25°C; recycle input voltage or PC to restart (>100ms 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 <250mV

24V$_{OUT}$, 100W (e.g. V24C24C100BL)

Parameter	Min	Typ	Max	Unit	Notes
Efficiency	87.0	88.6		%	Nominal input; full load; 25°C
Ripple and noise		70	88	mV	p-p; Nominal input; full load; 20MHz bandwidth
Output OVP setpoint	27.1	28.1	29.1	Volts	25°C; recycle input voltage or PC to restart (>100ms 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 <250mV

24V$_{OUT}$, 50W (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; 20MHz bandwidth
Output OVP setpoint	27.1	28.1	29.1	Volts	25°C; recycle input voltage or PC to restart (>100ms 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

28V$_{OUT}$, 150W (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; 20MHz bandwidth
Output OVP setpoint	31.6	32.7	33.8	Volts	25°C; recycle input voltage or PC to restart (>100ms 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 <250mV

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MODULE SPECIFIC OPERATING SPECIFICATIONS (CONT.)

28V$_{OUT}$, 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; 20MHz bandwidth
Output OVP setpoint	31.5	32.7	33.9	Volts	25°C; recycle input voltage or PC to restart (>100ms 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 <250mV

28V$_{OUT}$, 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; 20MHz bandwidth
Output OVP setpoint	31.5	32.7	33.9	Volts	25°C; recycle input voltage or PC to restart (>100ms 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

36V$_{OUT}$, 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; 20MHz bandwidth
Output OVP setpoint	40.4	41.9	43.4	Volts	25°C; recycle input voltage or PC to restart (>100ms 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 <250mV

36V$_{OUT}$, 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; 20MHz bandwidth
Output OVP setpoint	40.4	41.9	43.4	Volts	25°C; recycle input voltage or PC to restart (>100ms 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 <250mV

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MODULE SPECIFIC OPERATING SPECIFICATIONS (CONT.)

48V$_{OUT}$, 150 W (e.g. V24C48C150BL)

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 20MHz bandwidth
Output OVP setpoint	53.8	55.7	57.6	Volts	25°C; recycle input voltage or PC to restart (>100ms 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 <250mV

48V$_{OUT}$, 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; 20MHz bandwidth
Output OVP setpoint	53.7	55.7	57.7	Volts	25°C; recycle input voltage or PC to restart (>100ms 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 <250mV

48V$_{OUT}$, 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; 20MHz bandwidth
Output OVP setpoint	53.7	55.7	57.7	Volts	25°C; recycle input voltage or PC to restart (>100ms 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	1.66	Amps	Output voltage <250mV

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Basic Module Operation
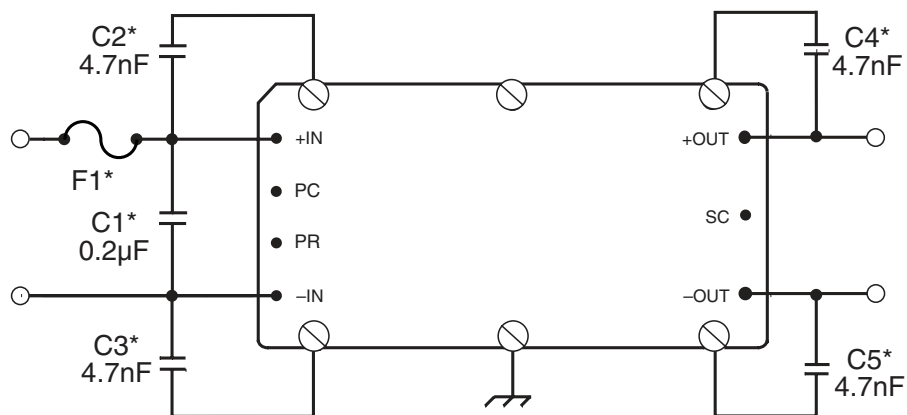
For C1 – C5, keep leads and connections short.

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

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Primary Control - PC PIN

Module Enable/Disable

The module may be disabled by pulling PC to 0V (2.3V 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 5.7V @ 1.5mA. 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*

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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.
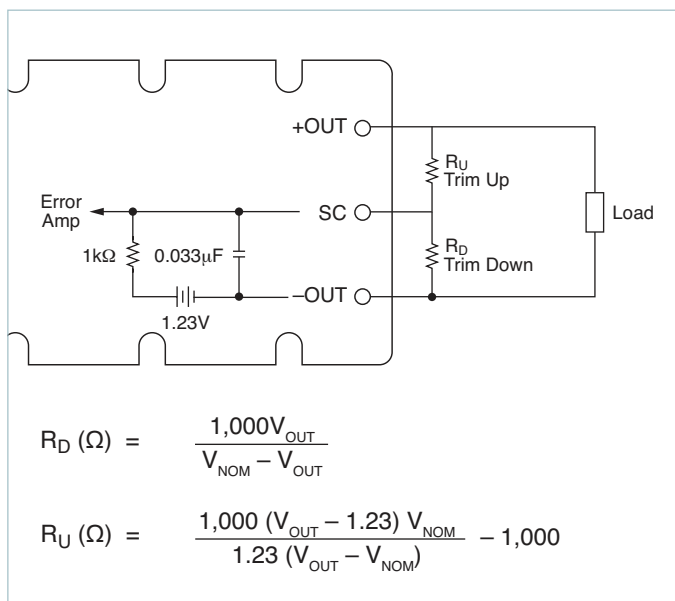

$$R_D\ (\Omega)\ =\ \frac{1,000 V_{OUT}}{V_{NOM} - V_{OUT}}$$

$$R_U\ (\Omega)\ =\ \frac{1,000\ (V_{OUT} - 1.23)\ V_{NOM}}{1.23\ (V_{OUT} - V_{NOM})}\ -\ 1,000$$

Figure 8 — Output voltage trim down and trim up circuit

Trim Down

1. This converter is <u>not</u> 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 -S 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 +S 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 0.001µF (500V) 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

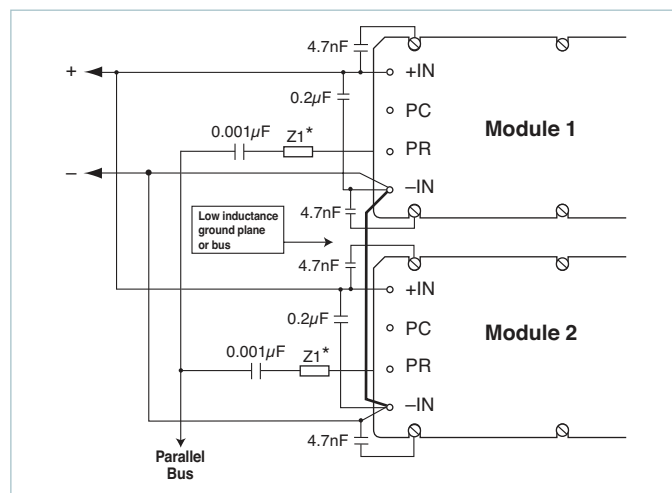Design Guide & Applications Manual for Maxi, Mini, Micro Family.

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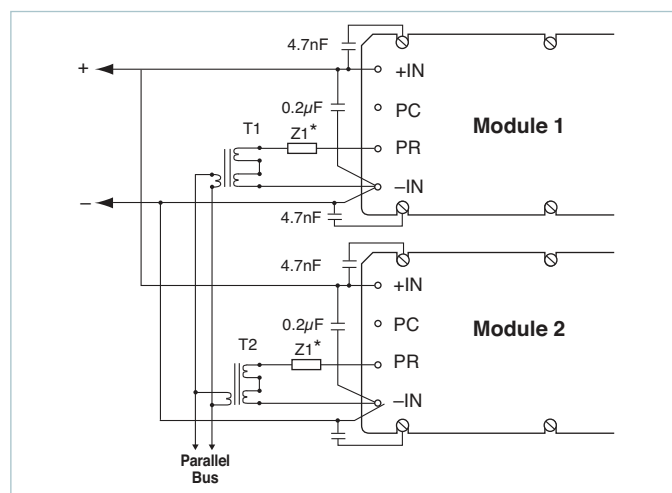** See Maxi, Mini, Micro Design Guide*

Figure 10 — Transformer-coupled interface

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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 design-er, a subset of all mod-ules within an array may be configured as slaves by connecting SC to –Out.

- Do not use output OR'ing diodes with MicroMods.
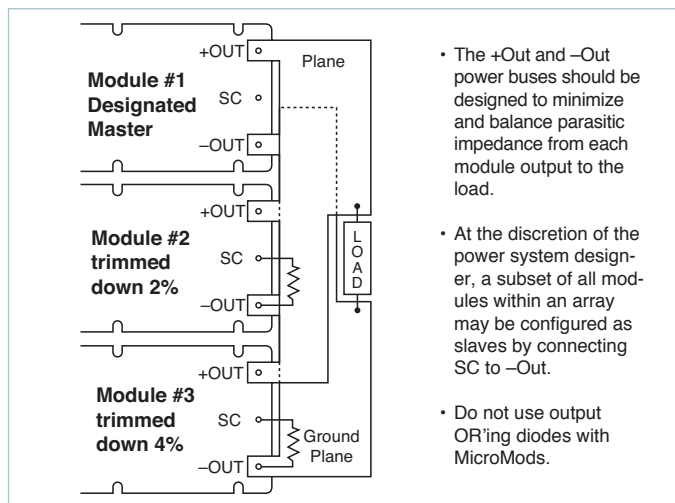
Figure 11 — *N+1 module array output connections*

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.
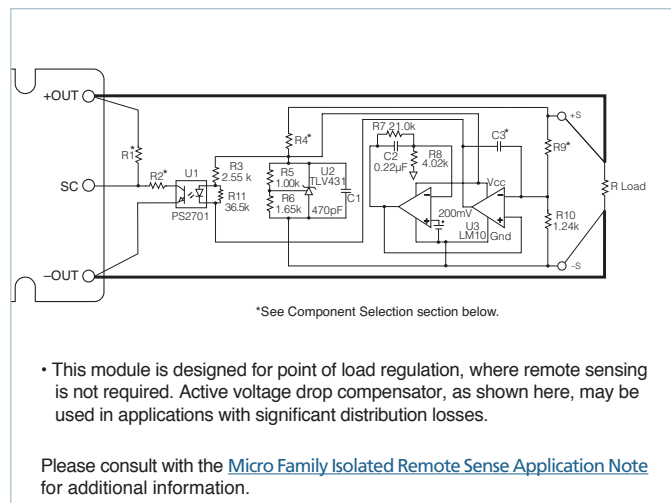
Figure 12 — *Voltage drop compensation*

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
K	Extra Long RoHS	Gold	Select for RoHS compliance on-board mounting for thicker PCBs (not intended for socket or Surfmate mounting)

*   Pin style designator follows the "B" after the output power and precedes the baseplate designator.

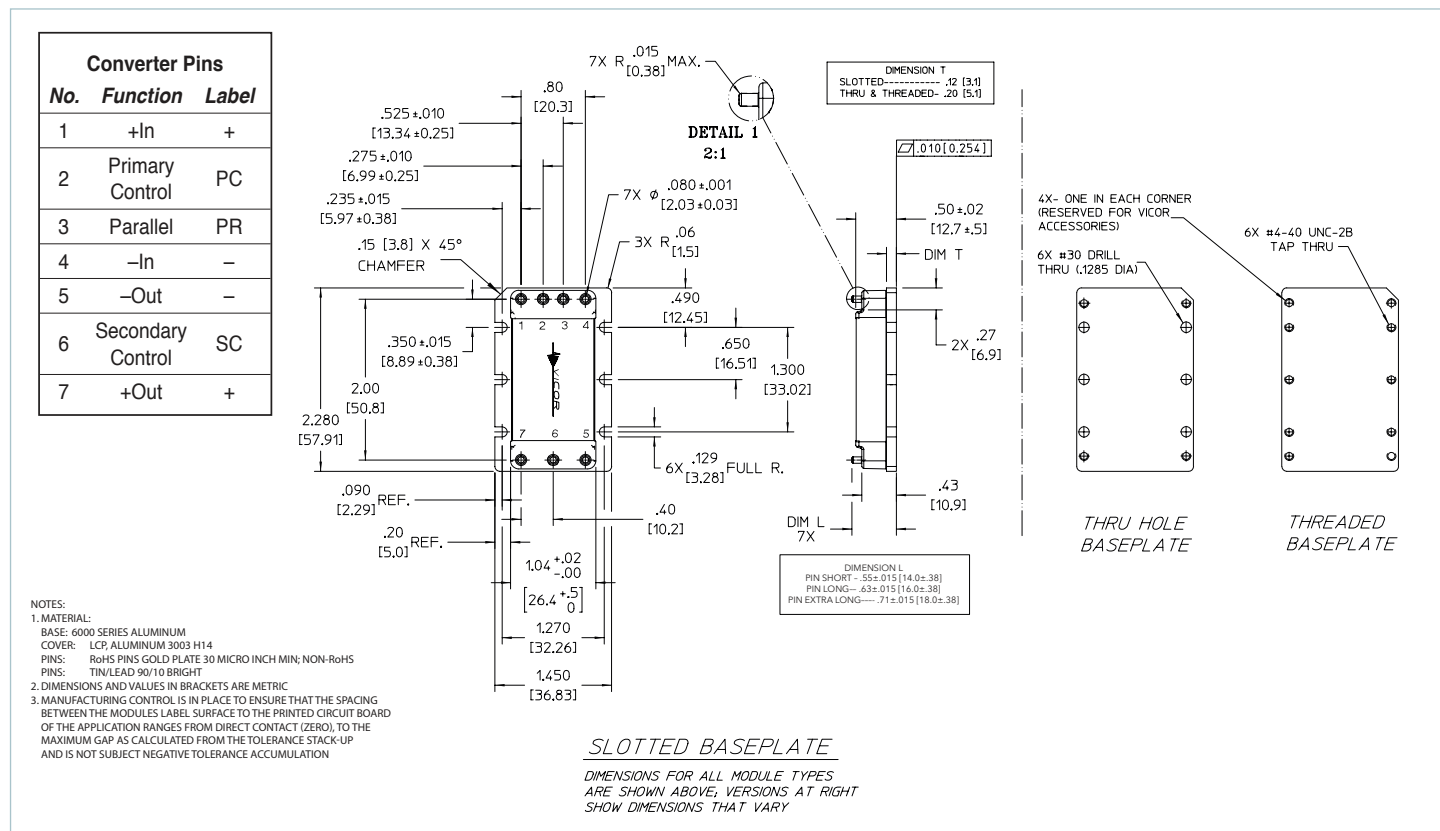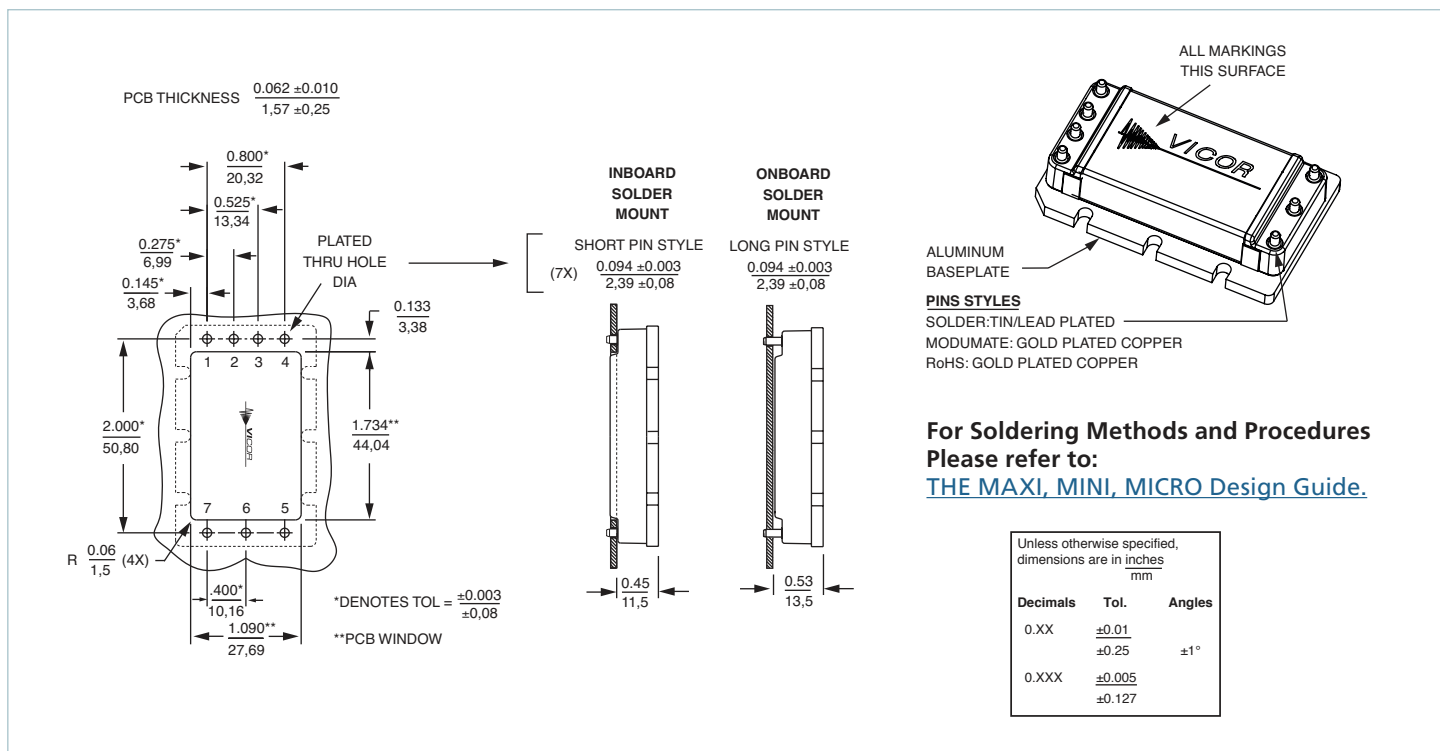   Ex. V24C12T100BN2 — Long ModuMate Pins

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	+

NOTES:
1. MATERIAL:
   BASE: 6000 SERIES ALUMINUM
   COVER: LCP, ALUMINUM 3003 H14
   PINS: RoHS PINS GOLD PLATE 30 MICRO INCH MIN; NON-RoHS
   PINS: TIN/LEAD 90/10 BRIGHT
2. DIMENSIONS AND VALUES IN BRACKETS ARE METRIC
3. MANUFACTURING CONTROL IS IN PLACE TO ENSURE THAT THE SPACING
   BETWEEN THE MODULES LABEL SURFACE TO THE PRINTED CIRCUIT BOARD
   OF THE APPLICATION RANGES FROM DIRECT CONTACT (ZERO), TO THE
   MAXIMUM GAP AS CALCULATED FROM THE TOLERANCE STACK-UP
   AND IS NOT SUBJECT NEGATIVE TOLERANCE ACCUMULATION

SLOTTED BASEPLATE

DIMENSIONS FOR ALL MODULE TYPES ARE SHOWN ABOVE; VERSIONS AT RIGHT SHOW DIMENSIONS THAT VARY

Figure 13 — *Module outline*

Figure 14 — *PCB mounting specifications*

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