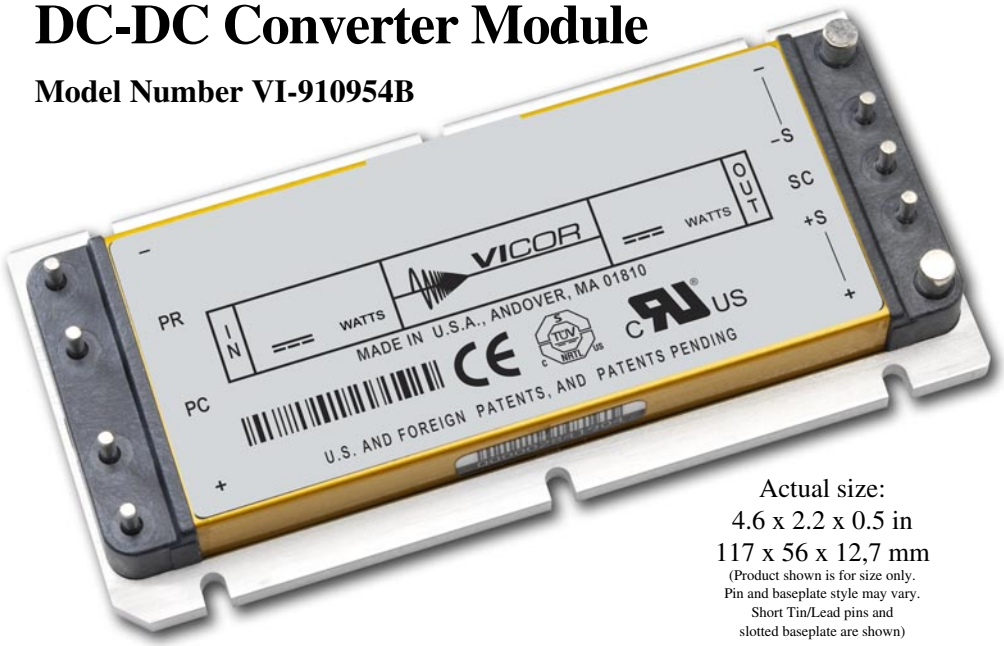
37 Vin / 13.4 Vout / 200 Watts DC-DC Converter Module

Model Number VI-910954B



Actual size:
4.6 x 2.2 x 0.5 in
117 x 56 x 12,7 mm
(Product shown is for size only. Pin and baseplate style may vary. Short Tin/Lead pins and slotted baseplate are shown)

Features

- DC input range: 27 - 56 V
- Input surge withstand: 105 V for 100 ms
- DC output: 13.4 V
- Programmable output: 10 to 110%
- Regulation: ±0.2% no load to full load
- Efficiency: 88.5%
- Maximum operating temperature: 100°C at full load
- Height above board: 0.43 in. (10,9 mm)
- Parallelable, with N+M fault tolerance
- Low noise ZCS/ZVS architecture
- Pin style: Long Modumate (Gold)
- Baseplate: Slotted

Product Overview

This DC-DC converter module uses 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.

This converter is manufactured in a state-of-the-art automated manufacturing facility on a short-cycle-time robotic line having a capacity of one module every ten seconds. In-line process controls are designed to achieve low defect rates and consistent quality. A comprehensive CIM system controls the dispatching, assembly and testing of each module, enabling small lots to be manufactured as efficiently as hundreds-of-thousands of units.

Absolute Maximum Ratings

Parameter	Rating	Unit	Notes
+In to –In voltage	-0.5 to + 110	Vdc	
+In to –In voltage	105	Vdc	<100 ms
PC to –In voltage	-0.5 to +7	Vdc	
PR to –In voltage	-0.5 to 7	Vdc	
+Out to –Out voltage	-0.5 to +17.92	Vdc	
+Sense to –Out voltage	-0.5 to +17.92	Vdc	
–Sense to –Out voltage	1.0	Vdc	
SC to –Out voltage	-0.5 to +1.5	Vdc	
Isolation voltage			
in to out	3000	Vrms	Test voltage
in to base	1550	Vrms	Test voltage
out to base	500	Vrms	Test voltage
Storage temperature	-40 to +125	°C	
Operating temperature	-40 to +100	°C	Baseplate
Pin soldering temperature	500 (260)	°F (°C)	<5 sec; wave solder
Pin soldering temperature	750 (390)	°F (°C)	<7 sec; hand solder
Mounting torque	5 (0.57)	in-lbs (N-m)	6 each, # 4-40 or M3

Thermal Resistance and Capacity

Parameter	Min	Typ	Max	Unit
Baseplate to sink; flat, greased surface		0.08		°C/Watt
Baseplate to sink; thermal pad (P/N 20263)		0.07		°C/Watt
Baseplate to ambient		4.9		°C/Watt
Baseplate to ambient; 1000 LFM		1.1		°C/Watt
Thermal capacity		165		Watt-sec/°C

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 OPERATING SPECIFICATIONS

Parameter	Min	Typ	Max	Unit	Notes
Operating input voltage	27	37	56	Vdc	
Input surge withstand			105	Vdc	<100 ms
Output voltage setpoint	13.26	13.4	13.54	Vdc	Nominal input; full load; 25°C
Output OVP setpoint	15.4	16	16.6	Vdc	25°C; recycle input voltage to restart (100 ms off)
Output power			200	Watts	At 100°C baseplate temperature
Efficiency	86.7	88.5		%	Nominal input; 75% of full load; 25°C

■ MODULE INPUT SPECIFICATIONS

Parameter	Min	Typ	Max	Unit	Notes
Undervoltage turn-on		26.2	26.8	Vdc	
Undervoltage turn-off	22.1	22.9		Vdc	
Overvoltage turn-off/on	56.5	58.8	61.6	Vdc	
Dissipation, standby		4.8	5.6	Watts	No load

■ MODULE OUTPUT SPECIFICATIONS

Parameter	Min	Typ	Max	Unit	Notes
Line regulation		±0.02	±0.2	%	Low line to high line; full load
Load regulation		±0.02	±0.2	%	No load to full load; nominal input
Temperature regulation		±0.002	±0.005	% / °C	-20 to 100°C
Ripple and noise, p-p		145	182	mV	Nominal input; full load; 25°C; 20 MHz bandwidth
Load current	0		14.9	Amps	
Current limit	15.1	17.1	20.2	Amps	Output voltage 95% of nominal
Short circuit current	10.4	17.1	20.2	Amps	Output voltage <250 mV
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.

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.

■ MODULE CONTROL SPECIFICATIONS

Parameter	Min	Typ	Max	Unit	Notes
PRIMARY SIDE (PC = Primary Control; PR = Parallel)					
PC bias voltage	5.50	5.75	6.10	Vdc	PC current = 1.0 mA
current limit	1.5	2.1	3	mA	PC voltage = 5.5 V
PC module disable	2.3	2.6	2.9	Vdc	Must be able to sink ≥4 mA. See Fig. 1
PC module enable delay		4	7	ms	
PC module alarm			0.5	Vavg	UV, OV, OT, module fault. See Figs. 2 and 4
PC resistance	0.9	1.0	1.1	MΩ	See Fig. 2
PR emitter amplitude	5.7	5.9	6.1	Volts	PR load >30 ohms, < 30 pF
PR emitter current	150			mA	
PR receiver impedance	375	500	625	ohms	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	ohms	
SC capacitance		0.033		µF	
SC module alarm		0		Vdc	With open trim; referenced to –Sense. See Fig. 6

■ MODULE GENERAL SPECIFICATIONS

Parameter	Min	Typ	Max	Unit	Notes
Remote sense (total drop)			0.5	Vdc	0.25 V per leg (senses must be closed)
Isolation voltage (in to out)	3000			Vrms	Complies with reinforced insulation requirements
Isolation voltage (in to base)	1550			Vrms	Complies with basic insulation requirements
Isolation voltage (out to base)	500			Vrms	Complies with operational insulation requirements
Isolation resistance (in to out)		10		megohms	
Weight		7.3 (210)	8 (227)	ounces (grams)	
Temperature limiting	100	115		°C	See figs. 2 and 4,
Agency approvals		cULus, TÜV, CE			UL60950-1, EN60950-1, CSA60950-1, IEC 60950-1 With appropriate fuse in series with the +Input

CONTROL FUNCTIONS - PC PIN

Module Enable/Disable

The module may be disabled by pulling PC below 2.3 V with respect to the –Input. This may be done with an open collector transistor, relay, or optocoupler. Multiple converters may be disabled with a single transistor or relay either directly or via "OR'ing" diodes. See Figure 1.

Primary Auxiliary Supply

At 5.7 V, PC can source up to 1.5 mA. In the example shown in Figure 3, 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, overtemperature) 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 2 and 4.

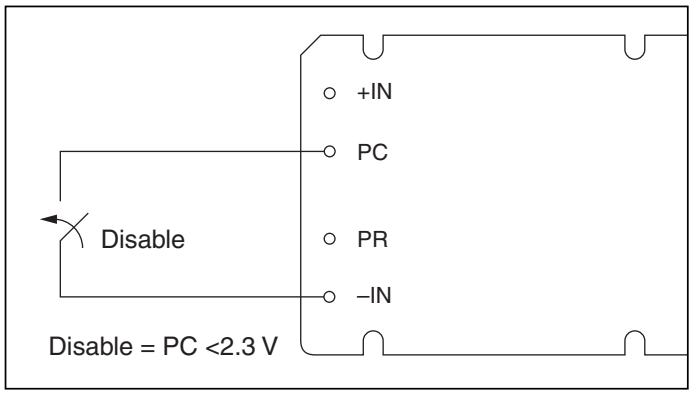


***Figure 1**—Module enable/disable.*

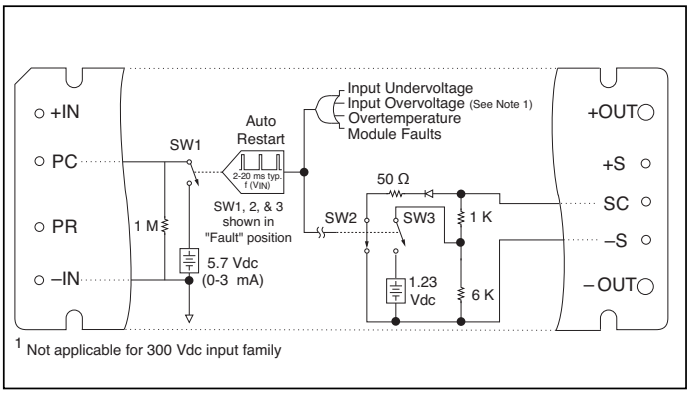


***Figure 2**—PC/SC module alarm logic.*

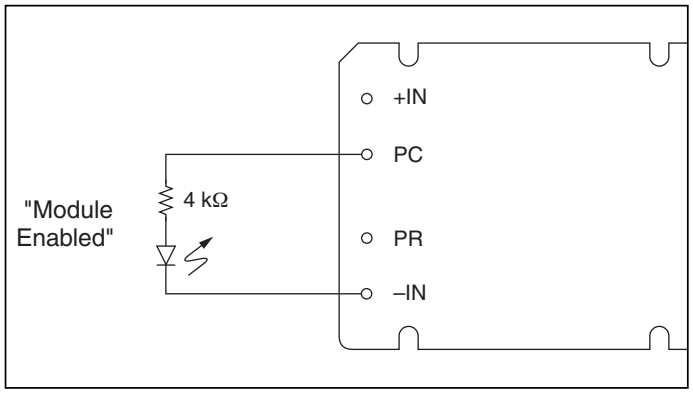


***Figure 3**—LED on-state indicator.*

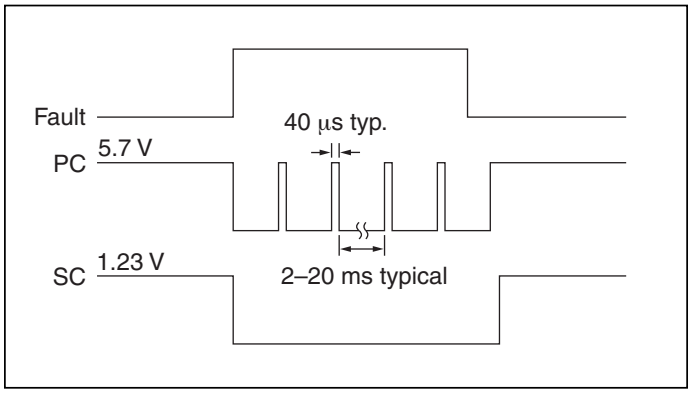


***Figure 4**—PC/SC module alarm timing.*

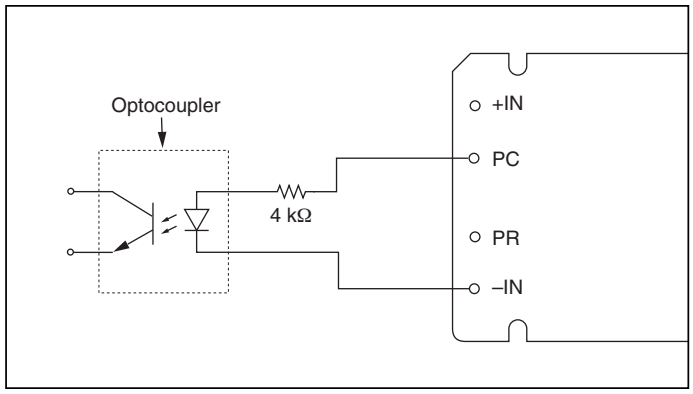


***Figure 5**—Isolated on-state indicator.*

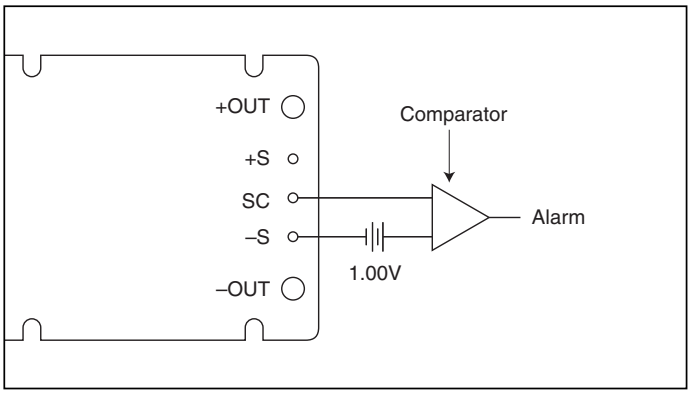


***Figure 6**—Secondary side on-state indicator.*

CONTROL FUNCTIONS - SC PIN

Output Voltage Programming

The output voltage of the converter can be adjusted or programmed via fixed resistors, potentiometers or voltage DACs. See Figures 7 and 8.

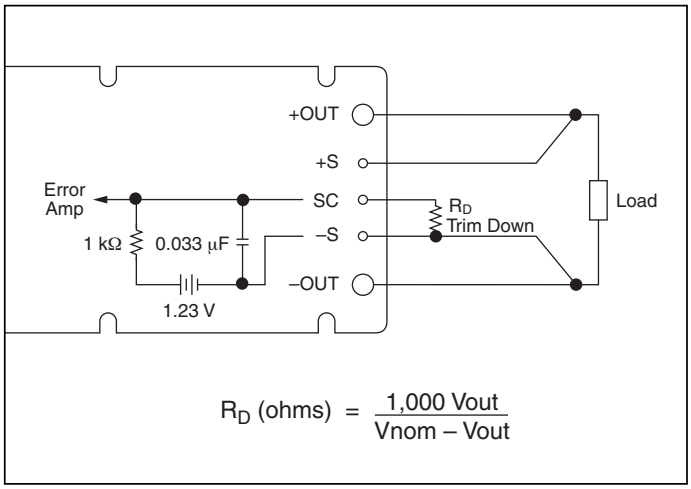


Figure 7—Output voltage trim down circuit.

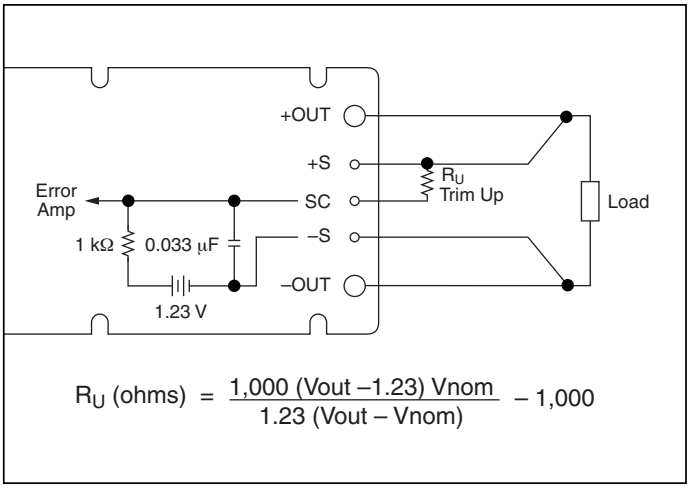
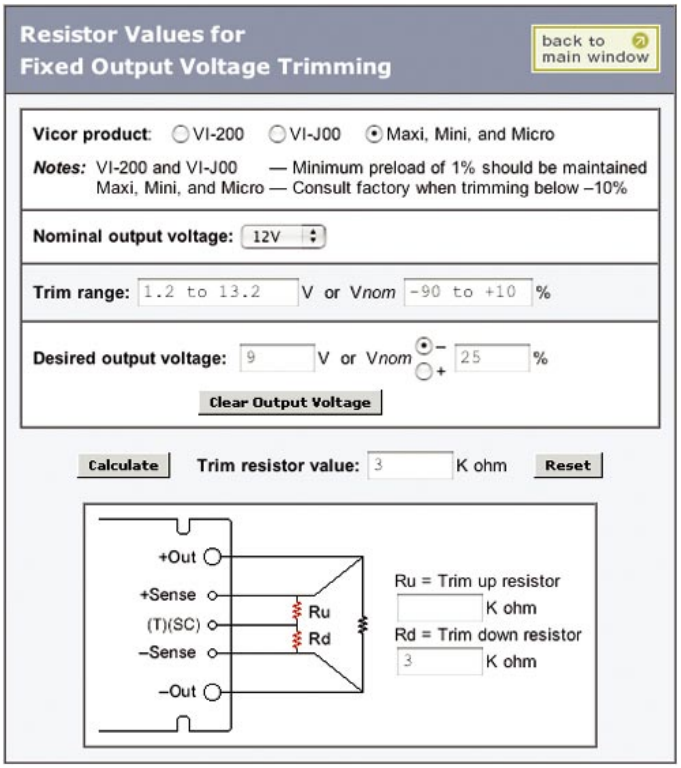


Figure 8—Output voltage trim up circuit.

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 to the –Sense pin.



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 to the +Sense pin.
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: vicorpower.com/tools.

Resistor values can be calculated for fixed trim up, fixed trim down and for variable trim up or down.

In addition to trimming information, the web site and the Applications Manual also include design tips, applications circuits, EMC suggestions, thermal design guidelines and PDF data sheets for all available Vicor products.

CONTROL FUNCTIONS - PR PIN

Parallel Operation

The PR pin supports paralleling for increased power with N+1 (N+M) redundancy and phased array capability. 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:

DC coupled single-wire interface. All PR pins are directly connected to one another. This interface supports current sharing but is not fault tolerant. Minus In pins must be tied to the same electric potential. See Figure 9.

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. See Figure 10.

Technical Information

For additional technical information contained in the *Design Guide and Applications Manual for Maxi, Mini, Micro Family DC-DC Converters and Accessory Modules*, click on the link below:

http://www.vicorpower.com/mmmguide

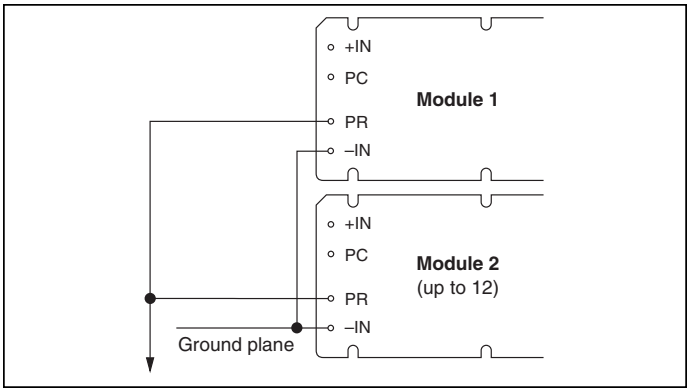


***Figure 9**—DC coupled single-wire interface.*

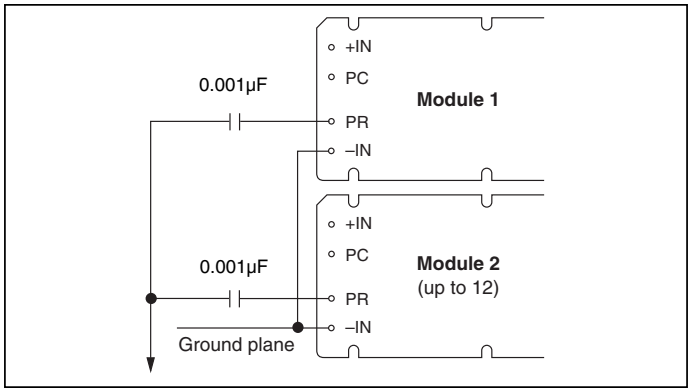


***Figure 10**—AC coupled single-wire interface.*

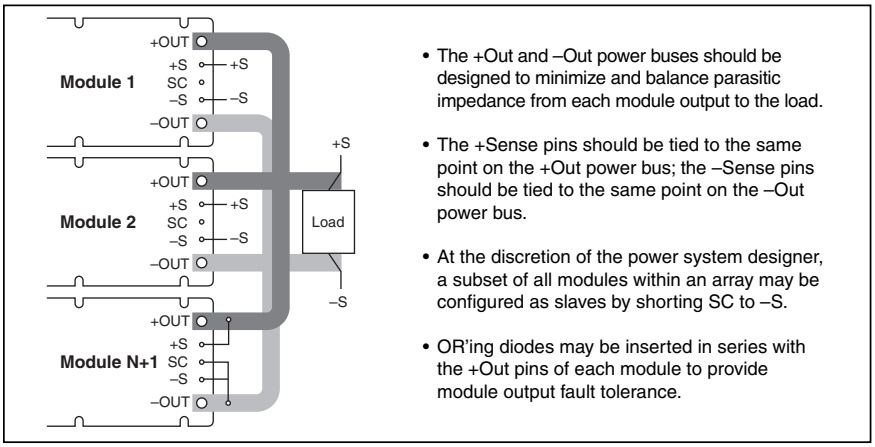


***Figure 11**—N+1 module array output connections.*

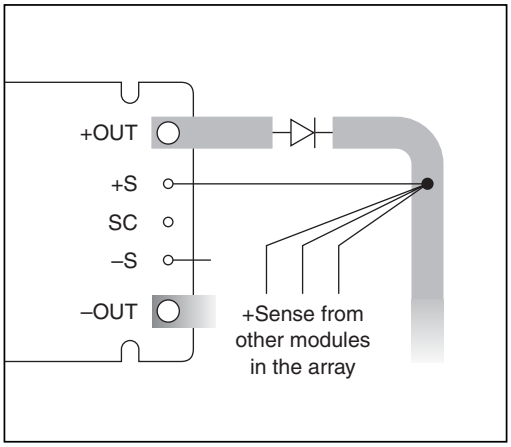


***Figure 12**—OR'ing diodes connections.*

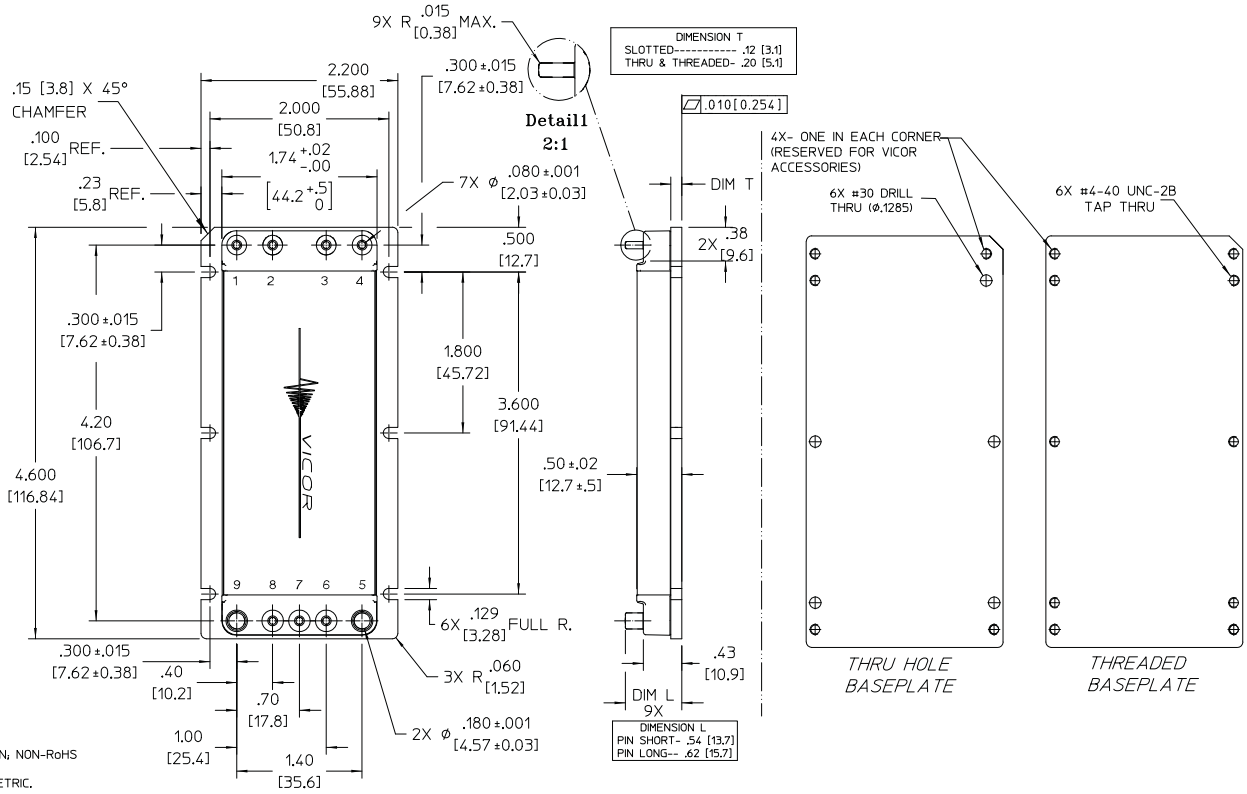
PIN STYLES

Description	Notes
Short Tin/Lead	Requires in-board, mounting
Long Tin/Lead	On-board mounting for 0.065" boards
Short ModuMate	SurfMate or in-board socket mounting
Long ModuMate	On-board socket mounting
Short RoHS	Select for RoHS compliant in-board solder, socket, or SurfMate mounting
Long RoHS	Select for RoHS compliant on-board solder or socket mounting

MECHANICAL DRAWINGS

MODULE OUTLINE

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

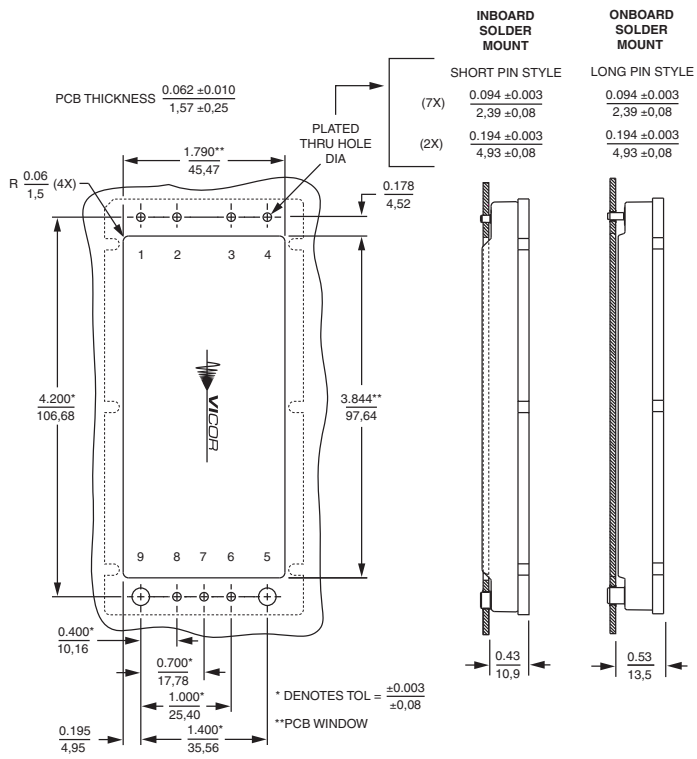


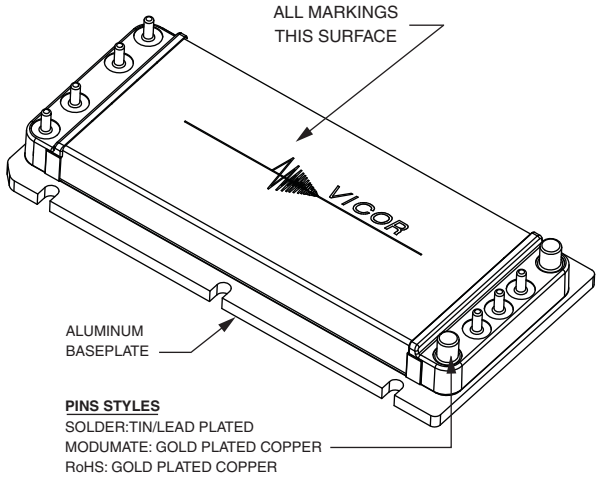
NOTES:
1. MATERIAL:
   BASE: 6000 SERIES ALUMINUM
   PINS: RoHS PINS GOLD PLATE 30 MICRO INCH MIN, NON-RoHS
   PINS TIN/LEAD 90/10 BRIGHT.
2. DIMENSIONS AND VALUES IN BRACKETS ARE METRIC.

SLOTTED BASEPLATE

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

PCB MOUNTING SPECIFICATIONS





PINS STYLES
SOLDER:TIN/LEAD PLATED
MODUMATE: GOLD PLATED COPPER
RoHS: GOLD PLATED COPPER

Unless otherwise specified, dimensions are in inches / mm

Decimals	Tol.	Angles
0.XX	±0.01 / ±0,25	±1°
0.XXX	±0.005 / ±0,127	

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.

Specifications are subject to change without notice.

VICOR

Component Solutions
for Your Power System

Vicor Corporation
25 Frontage Road
Andover, MA, USA 01810
Tel: 800-735-6200
Fax: 978-475-6715

Email
Vicor Express: vicorexp@vicr.com
Technical Support: apps@vicr.com