

Rugged AC-DC Switchers for Demanding Environments

Family Features

- Near unity power factor
- EN61000-3-2 harmonic current compliance
- Low profile package
- Output power to 1,500 W
- Up to 6 user specifiable outputs
- Universal AC input
- Power density up to 11 W/in³
- Integral cooling fans
- Autosense
- MIL-STD-810G for vibration and shock
- MIL-STD 704 and 1399 for overvoltage and transients
- -40°C operation available
- Optional conformal coating

Overview

The MI versions of the PFC MicroS, PFC Micro and PFC Mini are new members of the LoPAC family specifically designed for demanding environments such as military and heavy industry. Available as a one, two or three slot package, respectively, each LoPAC slot can be configured with standard Vicor DC-DC converter modules enabling up to six user specifiable isolated outputs in a package only 1.72" (43,6 mm) high with a power density of 11 W/in³.

For maximum versatility and flexibility, the LoPAC can be configured with VI-26x (full brick), VI-J6x (half brick) or Maxi, Mini, Micro V375 Series full, half and quarter brick modules. These modules cover the entire range of outputs from 1 to 100 Vdc and 25 to 600 Watts. The optimum solution can be factory configured based on your exact voltage and power requirements.

The LoPACs are designed to meet MIL-STD-810G for shock and vibration, MIL-STD-704 and 1399 for transients and overvoltage, and have optional -40°C operational temp rating and conformal coating. The supplies are compliant with all EN61000-6-1 for conducted and radiated immunity, as well as EN61000-3-2 for harmonic currents emissions and EN61000-3-3 for voltage flicker .



PFC Mini MI
 12.20" x 6.00" x 1.72"
 309,9 x 152,4 x 43,6 mm
 Up to 1,500 W
 1 to 6 Outputs



PFC Micro MI
 10.40" x 5.06" x 1.86"
 264,1 x 128,5 x 47,3 mm
 Up to 800 W
 1 to 6 Outputs



PFC MicroS MI
 7.95" x 5.06" x 1.86"
 201,9 x 128,5 x 47,3 mm
 Up to 600 W
 1 to 3 Outputs

DC Output Selections

The versatility of the LoPAC series is due, in large part, to the wide array of Vicor modules available to be configured into the different package formats. Slots can be populated with VI-200, VI-J00 or Maxi, Mini, Micro modules in full, half or quarter brick sizes. Vicor's full VI-26x, VI-J6x and V375 standard product matrices are available to choose from.

In addition, the full range of non-standard voltages and powers from 1 to 100 Vdc and 10 to 600 W is also available for inclusion. The table below is just a sampling of some of the most popular standard outputs that can be configured into LoPAC slots.

Output Voltage	Available Power (W) per Package Size						
	Maxi	VI-200		Mini	VI-J00		Micro
2 Vdc	160	80	60	100	40	30	50
3.3Vdc	264	132	99	150	66	50	75
5Vdc	400	200	150	200	100	75	100
12Vdc	600	200	150	300	100	75	150
15Vdc	600	200	150	300	100	75	150
24Vdc	600	200	150	300	100	75	150
28Vdc	600	200	150	300	100	75	150
48Vdc	600	200	150	300	100	75	150

LoPAC Slot Configurations

The DC-DC converter modules are used to populate each LoPAC converter slot. Each slot can be configured in different ways depending on module sizes and power limitations.

The following table summarizes the available slot configurations for each of the three LoPAC packages.

Model Type	# Slots	Maximum Output Power		Modules per Slot
		Total		
		@ 230 Vac	@ 115 Vac	
PFC Mini MI	3	1,500 W	800 W	1 Full or 2 Half
PFC Micro MI	2	800 W	500 W	1 Full or 2 Half or 3 Quarter
PFC Micro MIS	1	600 W	500 W	1 Full or 2 Half or 3 Quarter

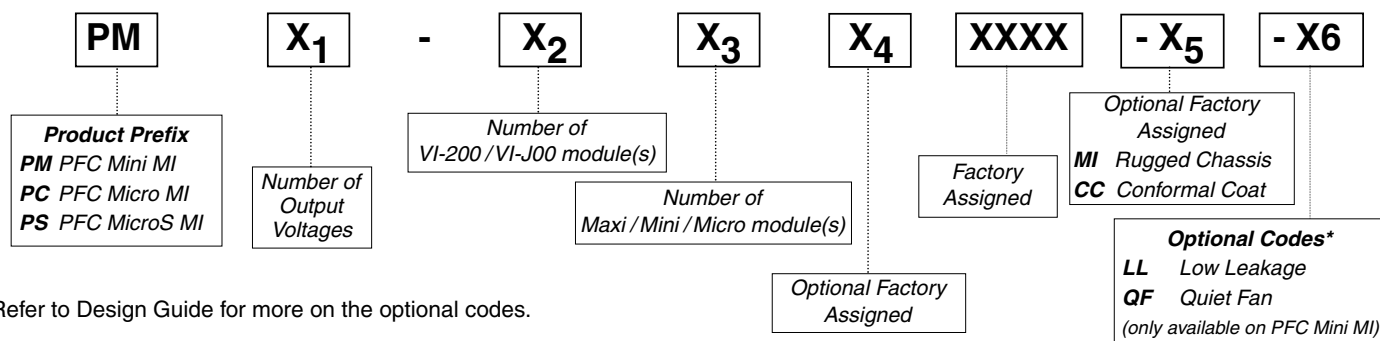
Autosense Feature*

This feature is implemented in all converter slots in the LoPAC family. If remote sense connections are not needed or are inadvertently not made, no local sense connections are necessary. Simply connect the output(s) to the load and the

converter(s) will automatically operate in the local sense mode. If remote sense connections are made, the unit will operate in remote sense mode.

*Applies to converter slots utilizing Maxi or Mini size converters.

Part Numbering



* Refer to Design Guide for more on the optional codes.

Performance Specifications

The following are typical performance specifications at room ambient temperature, nominal line voltage (115/230Vac) and 75% load on all outputs, unless specified otherwise. For detail

specifications, consult the Design Guide for the LoPAC configuration of interest. This is available on our website (vicorpower.com).

INPUT CHARACTERISTICS

Parameter	PFC Mini MI	PFC Micro MI	PFC MicroS MI	Units	Notes
AC Input					
Voltage		85 – 264		Vac	
Frequency		47 – 500		Hz	
DC Input	100 – 380		100 – 300	Vdc	
Line Regulation		0.4		%	From low line to high line
Inrush Current					
@ 115 Vac	8.5		7	A pk	
@ 230 Vac	17		14	A pk	
Ride Through Time		>20		ms	
@ load	1,200		500	W	
Conducted EMI/RFI	FCC Class A EN55022 Class A		FCC Class A EN55022 Class A (<i>consult factory</i>)		Certain configurations meet FCC & EN Class B
Power Factor		>0.98			>75% load
Harmonic Current Limits		EN61000-3-2/A14			Class A
Transient Burst Immunity	EN61000-4-4		EN61000-4-4		Level 3, Performance Criteria B
Surge Immunity		EN61000-4-5			Installation Class 3, Performance Criteria B
Dielectric Withstand					
Primary to Chassis GND		2,121		Vdc	
Primary to Secondary		4,242		Vdc	
Secondary to Chassis GND		750		Vdc	
Transients and Overvoltage		MIL-STD 704 and 1399			

OUTPUT CHARACTERISTICS

Parameter	PFC Mini MI	PFC Micro MI	PFC MicroS MI	Units	Notes
Setpoint Accuracy (Standard)		1 % (Standard) 2% (Special)			% of Vnom
Load Regulation		0.05		%	10% to full load
Temperature Regulation		0.2		%	No load to full load
Long Term Drift		0.005		%/°C	-40°C to 65°C
Output Ripple & Noise		0.02		%/khr	
≤10Vout		100		mV	20 MHz bandwidth
>10Vout		1.0		% Vout	20 MHz bandwidth
Voltage Trim Range					
VI-200/VI-J00 Slots		50 – 110		% Vout	±10% on 10 – 15 Vout
Maxi, Mini, Micro Slots		10 – 110		% Vout	Preload may be required
Remote Sense Compensation		0.5		Vdc	Autosense (See page 2)
OVP Set Point		125		% Vout	Not available on VI-J00 modules
Current Limit		115		% Imax	Auto recovery

ENVIRONMENTAL CHARACTERISTICS

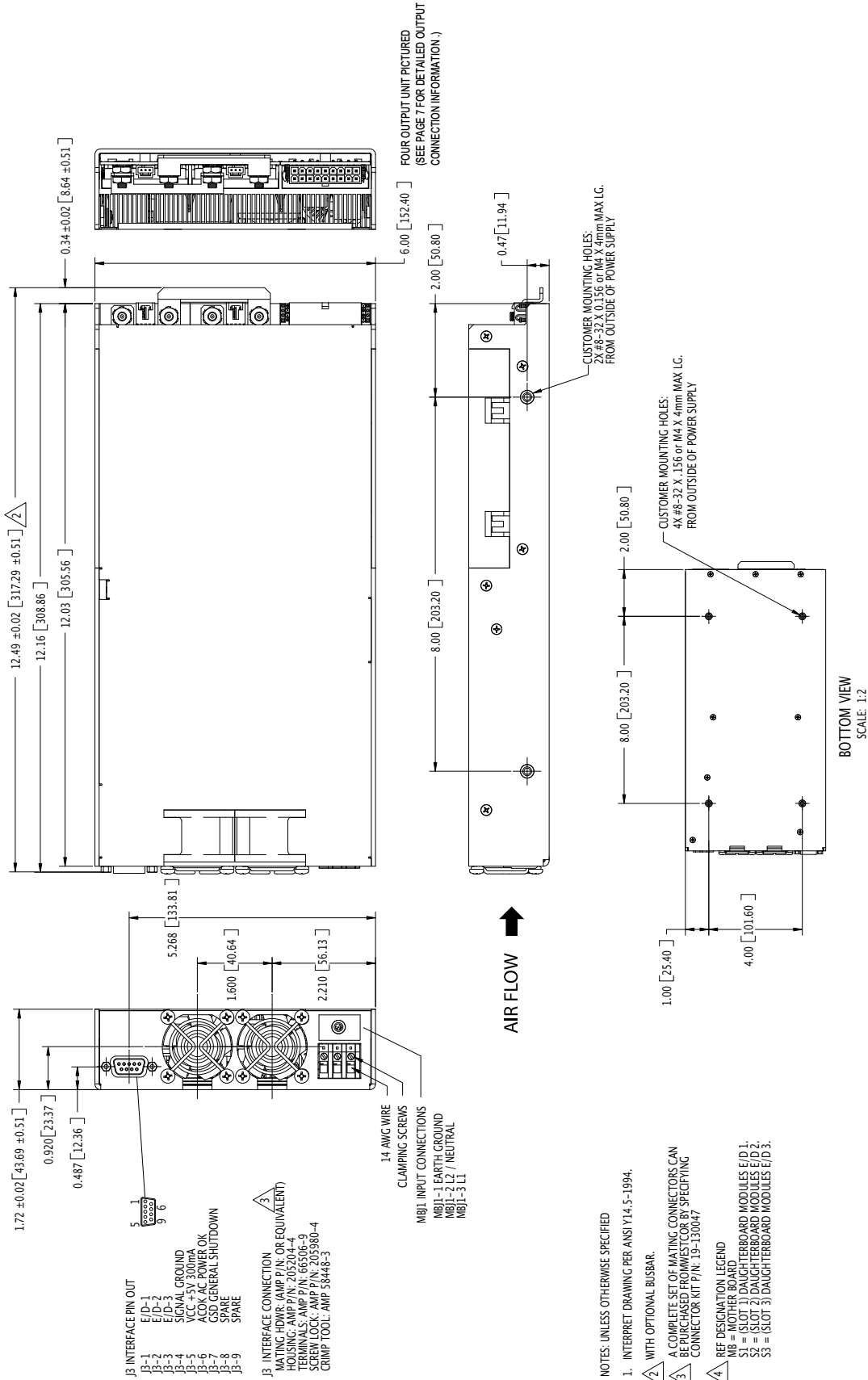
Parameter	PFC Mini MI	PFC Micro MI	PFC MicroS MI	Units	Notes
Storage Temperature		-40 to +85		°C	
Operating Temperature					
Full Rated Power		-40 to +45		°C	
50% Rated Power		-40 to +65		°C	
Vibration		MIL-STD-810E, Category 10, Minimum integrity test (PFC Mini MI only)			
Safety Approvals		CE Marked, cTUVus			Not applicable to -40°C operating model

MECHANICAL CHARACTERISTICS

Parameter	PFC Mini MI	PFC Micro MI	PFC MicroS MI	Units	Notes
Weight	5.5	5.2	3.1	lbs	
	2.5	2.4	1.4	kg	
Overall Dimensions	12.20 x 6.00 x 1.72	10.40 x 5.06 x 1.867.95 x 5.06 x 1.86		in	L x W x H
	309,9 x 152,4 x 43,6	264,1 x 128,5 x 47,3201,9 x 128,5 x 47,3		mm	

Mechanical Drawing, PFC Mini MI

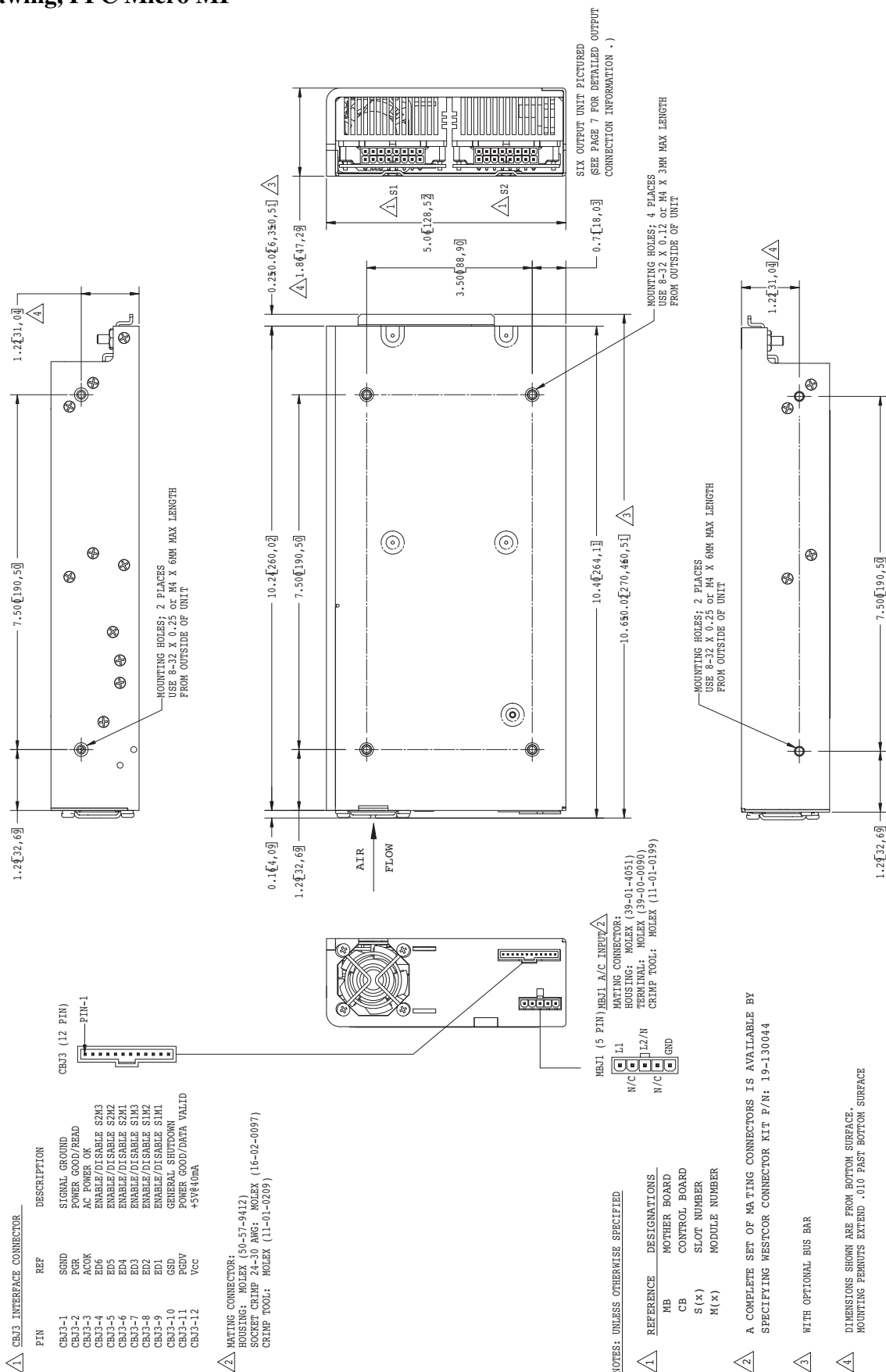
PFC MINI MI



Mechanical Drawing, PFC Micro MI

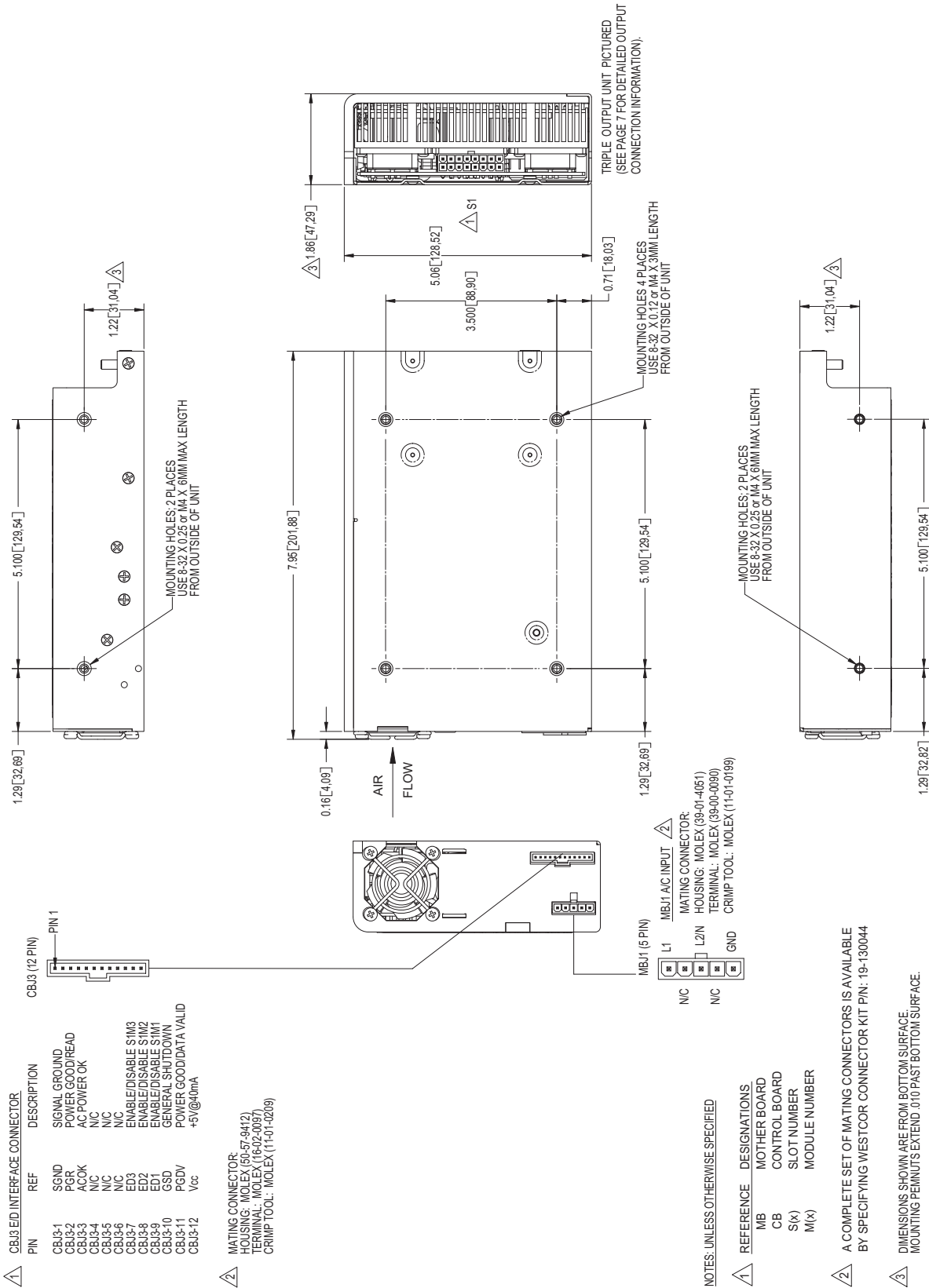
PFC MICRO MI

PFC MICRO



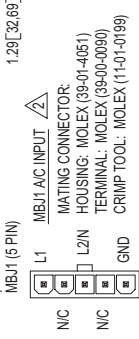
Mechanical Drawing, PFC Micro MIS

PFC MICROS MI



PIN	REF	DESCRIPTION
CBU3-1	SGND	SIGNAL GROUND
CBU3-2	PGR	POWER GOOD/READ
CBU3-3	ACOK	AC POWER OK
CBU3-4	NC	NC
CBU3-5	NC	NC
CBU3-6	NC	NC
CBU3-7	ED3	ENABLE/DISABLE S1M3
CBU3-8	ED2	ENABLE/DISABLE S1M2
CBU3-9	ED1	ENABLE/DISABLE S1M1
CBU3-10	GSD	GENERAL SHUTDOWN
CBU3-11	PgDv	POWER GOOD/DATA VALID
CBU3-12	Vcc	+5V@40mA

MATING CONNECTOR:
 HOUSING: MOLEX (50-57-9412)
 TERMINAL: MOLEX (16-02-0097)
 CRIMP TOOL: MOLEX (11-01-0209)



NOTES: UNLESS OTHERWISE SPECIFIED

- △ REFERENCE DESIGNATIONS:
 MB MOTHER BOARD
 CB CONTROL BOARD
 S(x) SLOT NUMBER
 M(x) MODULE NUMBER

△ A COMPLETE SET OF MATING CONNECTORS IS AVAILABLE BY SPECIFYING WESTCOR CONNECTOR KIT PIN: 19-130044

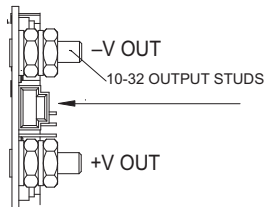
△ DIMENSIONS SHOWN ARE FROM BOTTOM SURFACE. MOUNTING PEGMUTS EXTEND .010 PAST BOTTOM SURFACE.

Output Connections for the PFC Mini MI, PFC Micro MI and PFC MicroS MI

A. OUTPUT STUDS - SINGLE OUTPUT

(when populated with Full Brick modules)

PFC Mini MI, PFC Micro MI and PFC MicroS MI



SxJ2 REMOTE SENSE/TRIM PIN CONNECTOR

3	- REMOTE SENSE
2	+ REMOTE SENSE
1	TRIM

MATING CONNECTOR:
 HOUSING: MOLEX (50-57-9403)
 TERMINAL FEMALE CRIMP 22-24 AWG: MOLEX (16-02-0103)
 USE CRIMP TOOL: MOLEX (11-01-0208)

B. MOLEX CONNECTOR - SINGLE OR DUAL OUTPUT

(when populated with Half Brick modules)

PFC Micro MI 18 Pin Housing

SxJ1 (18 PIN OUTPUT, REMOTE SENSE AND TRIM PIN CONNECTOR)

PIN	DESCRIPTION	PIN	DESCRIPTION
9	18	1	+ V OUT M2
8	17	2	- V OUT M2
7	16	3	- V OUT M2
6	15	4	+ SENSE M2
5	14	5	- SENSE M2
4	13	6	TRIM M1
3	12	7	+ V OUT M1
2	11	8	+ V OUT M1
1	10	9	- V OUT M1
		10	+ V OUT M2
		11	+ V OUT M2
		12	- V OUT M2
		13	+ SENSE M1
		14	TRIM M2
		15	- SENSE M1
		16	+ V OUT M1
		17	- V OUT M1
		18	- V OUT M1

PFC Mini MI 18 Pin Housing

SxJ1 (18 PIN OUTPUT, REMOTE SENSE AND TRIM PIN CONNECTOR)

PIN	DESCRIPTION	PIN	DESCRIPTION
9	18	1	+ V OUT M1
8	17	2	- V OUT M1
7	16	3	- V OUT M1
6	15	4	+ SENSE M1
5	14	5	- SENSE M1
4	13	6	TRIM M2
3	12	7	+ V OUT M2
2	11	8	+ V OUT M2
1	10	9	- V OUT M2
		10	+ V OUT M1
		11	+ V OUT M1
		12	- V OUT M1
		13	+ SENSE M2
		14	TRIM M1
		15	- SENSE M2
		16	+ V OUT M2
		17	- V OUT M2
		18	- V OUT M2

*PFC MicroS dual output slot configuration uses the type A stud connection for both outputs.
 3-pin connector designators are S1J1 and S1J2.

MATING CONNECTOR:
 18 PIN HOUSING: MOLEX (39-01-2180)
 TERMINAL FEMALE CRIMP 18-24 AWG: MOLEX 39-00-0039)
 USE CRIMP TOOL: MOLEX (11-01-0197)

C. MOLEX CONNECTOR - SINGLE, DUAL OR TRIPLE OUTPUT

(when populated with Quarter Brick modules)

PFC Micro MI and PFC MicroS MI

SxJ1 (16 PIN OUTPUT, REMOTE SENSE AND TRIM PIN CONNECTOR)

PIN	DESCRIPTION	PIN	DESCRIPTION
8	16	9	+V OUT M3
7	15	10	-V OUT M3
6	14	11	N/C
5	13	12	+V OUT M2
4	12	13	-V OUT M2
3	11	14	TRIM M1
2	10	15	+V OUT M1
1	9	16	-V OUT M1

MATING CONNECTOR:
 16 PIN HOUSING: MOLEX (39-01-2160)
 TERMINAL FEMALE CRIMP 18-24 AWG: MOLEX (39-00-0039)
 USE CRIMP TOOL: MOLEX (11-01-0197)

The following accessories are available for the LoPAC units:

Connector Kits

A complete set of mating hardware for all combinations of input & output connections

PFC Micro MI & PFC MicroS MI 19-130044
 PFC Mini MI 19-130047

Current Share Boards

Used for current sharing between identical LoPAC Models for increased output power or redundancy

LoPACs with VI-200/VI-J00 Modules CSB01
 LoPACs with Maxi, Mini, Micro Modules CSB02

Vicor's comprehensive line of power solutions includes high density AC-DC and DC-DC modules and accessory components, fully configurable AC-DC and DC-DC power supplies, and complete custom power systems.

Information furnished by Vicor is believed to be accurate and reliable. However, no responsibility is assumed by Vicor for its use. Vicor makes no representations or warranties with respect to the accuracy or completeness of the contents of this publication. Vicor reserves the right to make changes to any products, specifications, and product descriptions at any time without notice. Information published by Vicor has been checked and is believed to be accurate at the time it was printed; however, Vicor assumes no responsibility for inaccuracies. Testing and other quality controls are used to the extent Vicor deems necessary to support Vicor's product warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

Specifications are subject to change without notice.

Vicor's Standard Terms and Conditions

All sales are subject to Vicor's Standard Terms and Conditions of Sale, which are available on Vicor's webpage or upon request.

Product Warranty

In Vicor's standard terms and conditions of sale, Vicor warrants that its products are free from non-conformity to its Standard Specifications (the "Express Limited Warranty"). This warranty is extended only to the original Buyer for the period expiring two (2) years after the date of shipment and is not transferable.

UNLESS OTHERWISE EXPRESSLY STATED IN A WRITTEN SALES AGREEMENT SIGNED BY A DULY AUTHORIZED VICOR SIGNATORY, VICOR DISCLAIMS ALL REPRESENTATIONS, LIABILITIES, AND WARRANTIES OF ANY KIND (WHETHER ARISING BY IMPLICATION OR BY OPERATION OF LAW) WITH RESPECT TO THE PRODUCTS, INCLUDING, WITHOUT LIMITATION, ANY WARRANTIES OR REPRESENTATIONS AS TO MERCHANTABILITY, FITNESS FOR PARTICULAR PURPOSE, INFRINGEMENT OF ANY PATENT, COPYRIGHT, OR OTHER INTELLECTUAL PROPERTY RIGHT, OR ANY OTHER MATTER.

This warranty does not extend to products subjected to misuse, accident, or improper application, maintenance, or storage. Vicor shall not be liable for collateral or consequential damage. Vicor disclaims any and all liability arising out of the application or use of any product or circuit and assumes no liability for applications assistance or buyer product design. Buyers are responsible for their products and applications using Vicor products and components. Prior to using or distributing any products that include Vicor components, buyers should provide adequate design, testing and operating safeguards.

Vicor will repair or replace defective products in accordance with its own best judgment. For service under this warranty, the buyer must contact Vicor to obtain a Return Material Authorization (RMA) number and shipping instructions. Products returned without prior authorization will be returned to the buyer. The buyer will pay all charges incurred in returning the product to the factory. Vicor will pay all reshipment charges if the product was defective within the terms of this warranty.

Life Support Policy

VICOR'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS PRIOR WRITTEN APPROVAL OF THE CHIEF EXECUTIVE OFFICER AND GENERAL COUNSEL OF VICOR CORPORATION. As used herein, life support devices or systems are devices which (a) are intended for surgical implant into the body, or (b) support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in a significant injury to the user. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system or to affect its safety or effectiveness. Per Vicor Terms and Conditions of Sale, the user of Vicor products and components in life support applications assumes all risks of such use and indemnifies Vicor against all liability and damages.

Intellectual Property Notice

Vicor and its subsidiaries own Intellectual Property (including issued U.S. and Foreign Patents and pending patent applications) relating to the products described in this data sheet. No license, whether express, implied, or arising by estoppel or otherwise, to any intellectual property rights is granted by this document. Interested parties should contact Vicor's Intellectual Property Department.

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

email

Customer Service: custserv@vicorpower.com
Technical Support: apps@vicorpower.com