LoPAC™ COTS Family

PFC Mini™ MI, PFC Micro™ MI, PFC MicroS™ MI

Rugged AC-DC Switchers for Demanding Environments

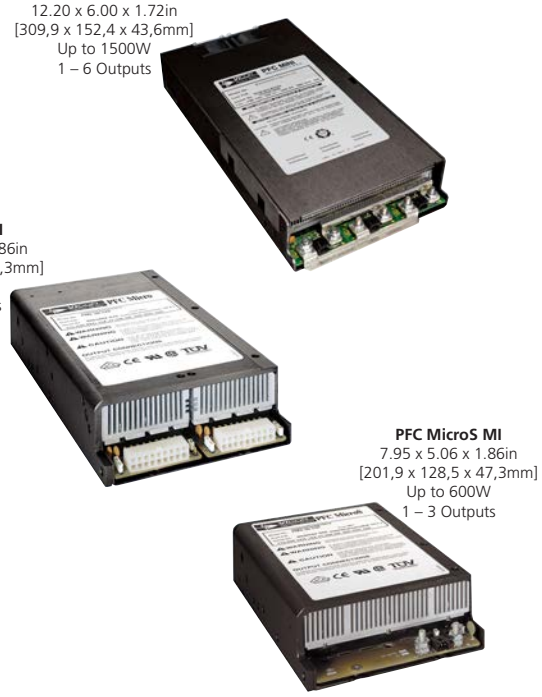
Features & Benefits

- Near-unity power factor
- EN61000-3-2 harmonic current compliance
- Low-profile package
- Output power to 1,500W
- Up to six user-specifiable outputs
- Universal AC input
- Power density up to 11W/in^3
- 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

PFC Mini MI
12.20 x 6.00 x 1.72in
[309,9 x 152,4 x 43,6mm]
Up to 1500W
1 – 6 Outputs

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

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



Product Description

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 1.72in (43,6mm) high with a power density of 11W/in^3.

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 100V$_{DC}$ and 25 to 600Watts. 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-current emissions and EN61000-3-3 for voltage flicker.

Part Numbering

PM	X_1	-	X_2	X_3	X_4	XXXX	$-X_5$	-X6
	Number of Output Voltages			*Number of Maxi, Mini or Micro Modules*			***Optional Factory Assigned*** ***MI*** = *Rugged Chassis* ***CC*** = *Conformal Coat*	
Product Prefix ***PM*** = *PFC Mini MI* ***PC*** = *PFC Micro MI* ***PS*** = *PFC MicroS MI*			*Number of VI-200™/VI-J00™ Modules*		*Optional Factory Assigned*	*Factory Assigned*		***Optional Codes***[a] ***LL*** = *Low Leakage* ***QF*** = *Quiet Fan* *(only available on PFC Mini)*

[a] Refer to Design Guide for more on the optional codes.

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. The Vicor 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 100V_{DC} and 10 to 600W 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 (V_{DC})	Available Power (W) per Package Size						
	Full Brick			Half Brick			Quarter Brick
	Maxi	VI-200		Mini	VI-J00		Micro
2	160	80	60	100	40	30	50
3.3	264	132	99	150	66	50	75
5	400	200	150	200	100	75	100
12	600	200	150	300	100	75	150
15	600	200	150	300	100	75	150
24	600	200	150	300	100	75	150
28	600	200	150	300	100	75	150
48	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	Number of Slots	Maximum Output Power		Modules per Slot
		Total		
		at 230V_{AC}	at 115V_{AC}	
PFC Mini MI	3	1,500W	800W	1 full or 2 half
PFC Micro MI	2	800W	500W	1 full or 2 half or 3 quarter
PFC MicroS MI	1	600W	500W	1 full or 2 half or 3 quarter

Autosense Feature [b]

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.

[b] Applies to converter slots utilizing Maxi or Mini size converters.

Performance Specifications

The following are typical performance specifications at room ambient temperature, nominal line voltage (115 / 230V_{AC}) 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 at vicorpower.com.

Input Characteristics

Parameter	PFC Mini MI	PFC Micro MI	PFC MicroS MI	Units	Notes
AC Input					
Voltage	85 – 264			V_{AC}	
Frequency	47 – 500			Hz	
DC Input	100 – 380	100 – 300		V_{DC}	
Line Regulation	0.4			%	From low line to high line
Inrush Current					
@ 115V_{AC}	8.5	7		A_{PK}	
@ 230V_{AC}	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 (consult factory)			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			V_{DC}	
Primary to Secondary	4,242			V_{DC}	
Secondary to Chassis GND	750			V_{DC}	
Transients and Overvoltage	MIL-STD 704 and 1399				

Performance Specifications (Cont.)

The following are typical performance specifications at room ambient temperature, nominal line voltage (115 / 230V_{AC}) 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 at vicorpower.com.

Output Characteristics

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

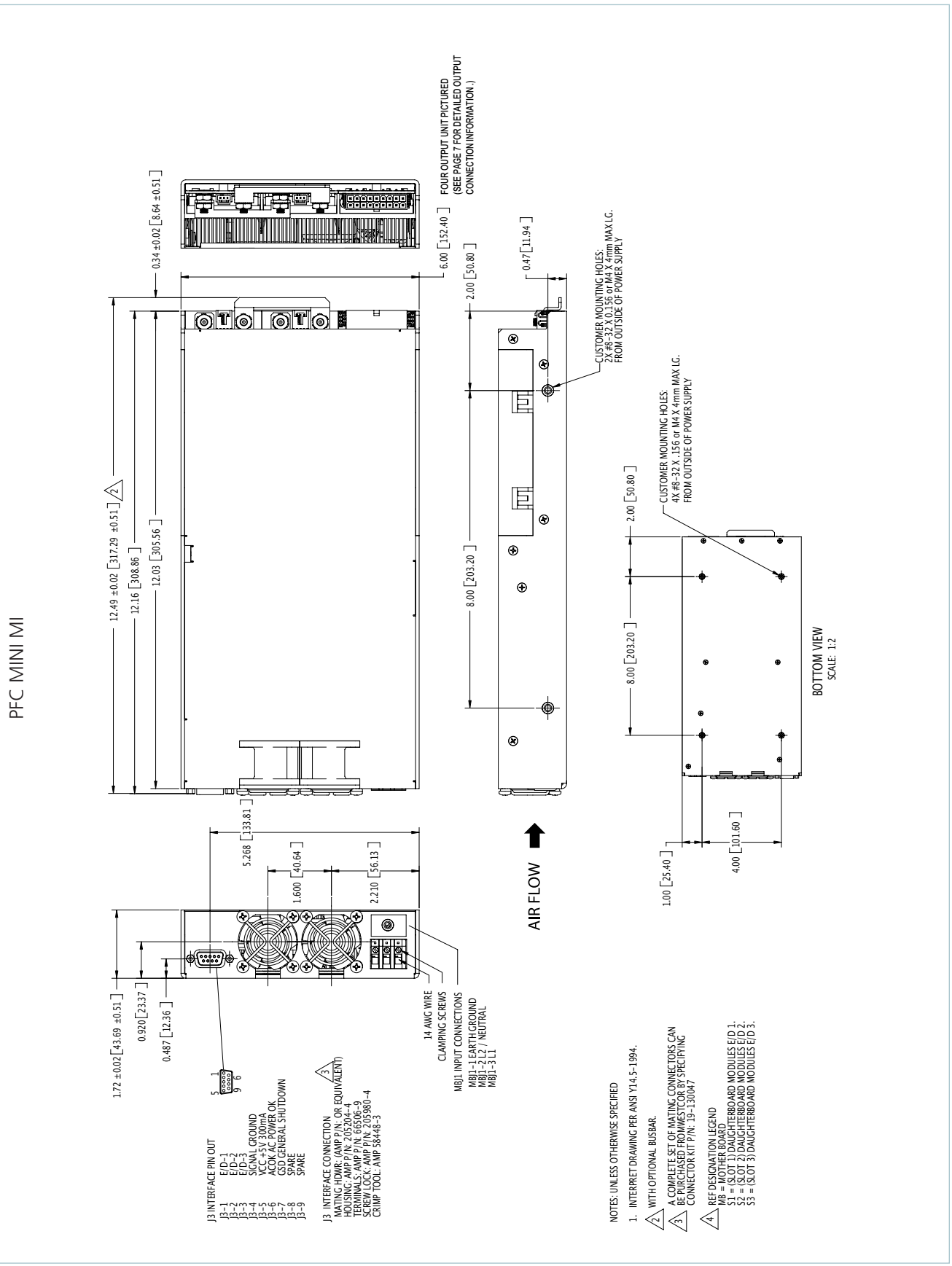
Environmental Characteristics

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				
Safety Approvals	CE Marked, cTÜVus				Not applicable to –40°C operating model

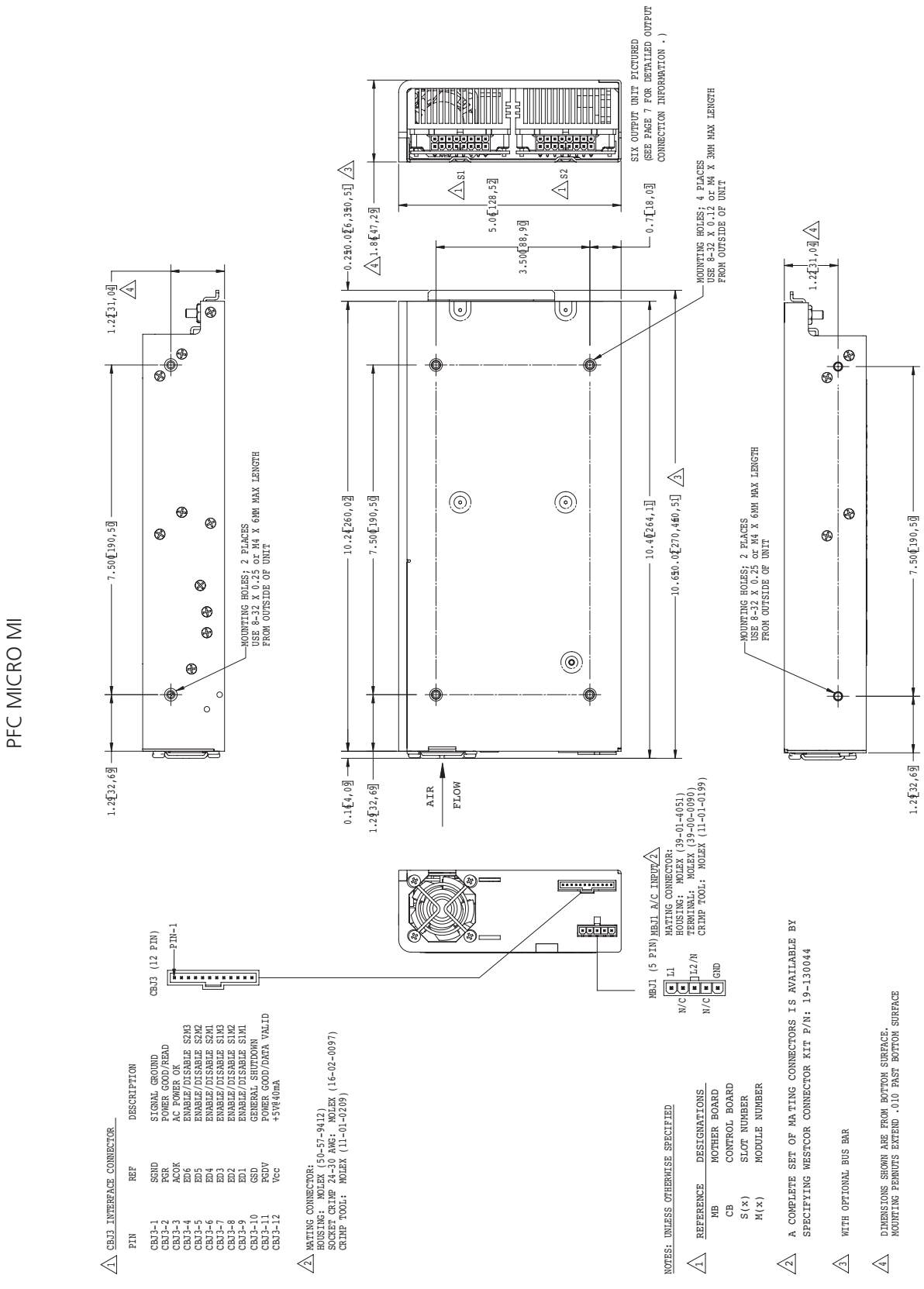
Mechanical Characteristics

Parameter	PFC Mini MI	PFC Micro MI	PFC MicroS MI	Units	Notes
Weight	5.5 [2,5]	5.2 [2,4]	3.1 [1,4]	lbs [kg]	
Overall Dimensions	12.20 x 6.00 x 1.72 [309,9 x 152,4 x 43,6]	10.40 x 5.06 x 1.86 [264,1 x 128,5 x 47,3]	7.95 x 5.06 x 1.86 [201,9 x 128,5 x 47,3]	in [mm]	L x W x H

Mechanical Drawing, PFC Mini MI



Mechanical Drawing, PFC Micro MI



⚠1 CBJ3 INTERFACE CONNECTOR

PIN	REF	DESCRIPTION
CBJ3-1	SGND	SIGNAL GROUND
CBJ3-2	PGD	POWER GOOD/READ
CBJ3-3	ACOK	AC POWER OK
CBJ3-4	ED6	ENABLE/DISABLE S2M3
CBJ3-5	ED5	ENABLE/DISABLE S2M2
CBJ3-6	ED4	ENABLE/DISABLE S2M1
CBJ3-7	ED3	ENABLE/DISABLE S1M3
CBJ3-8	ED2	ENABLE/DISABLE S1M2
CBJ3-9	ED1	ENABLE/DISABLE S1M1
CBJ3-10	GSD	GENERAL SHUTDOWN
CBJ3-11	PGDV	POWER GOOD/DATA VALID
CBJ3-12	Vcc	+5V@40mA

⚠2 MATING CONNECTOR:
HOUSING: MOLEX (50-57-9412)
SOCKET CRIMP 24-30 AWG: MOLEX (16-02-0097)
CRIMP TOOL: MOLEX (11-01-0209)

⚠2 MBJ1 A/C INPUT
MATING CONNECTOR:
HOUSING: MOLEX (39-01-4051)
TERMINAL: MOLEX (39-00-0090)
CRIMP TOOL: MOLEX (11-01-0199)

NOTES: UNLESS OTHERWISE SPECIFIED

⚠1

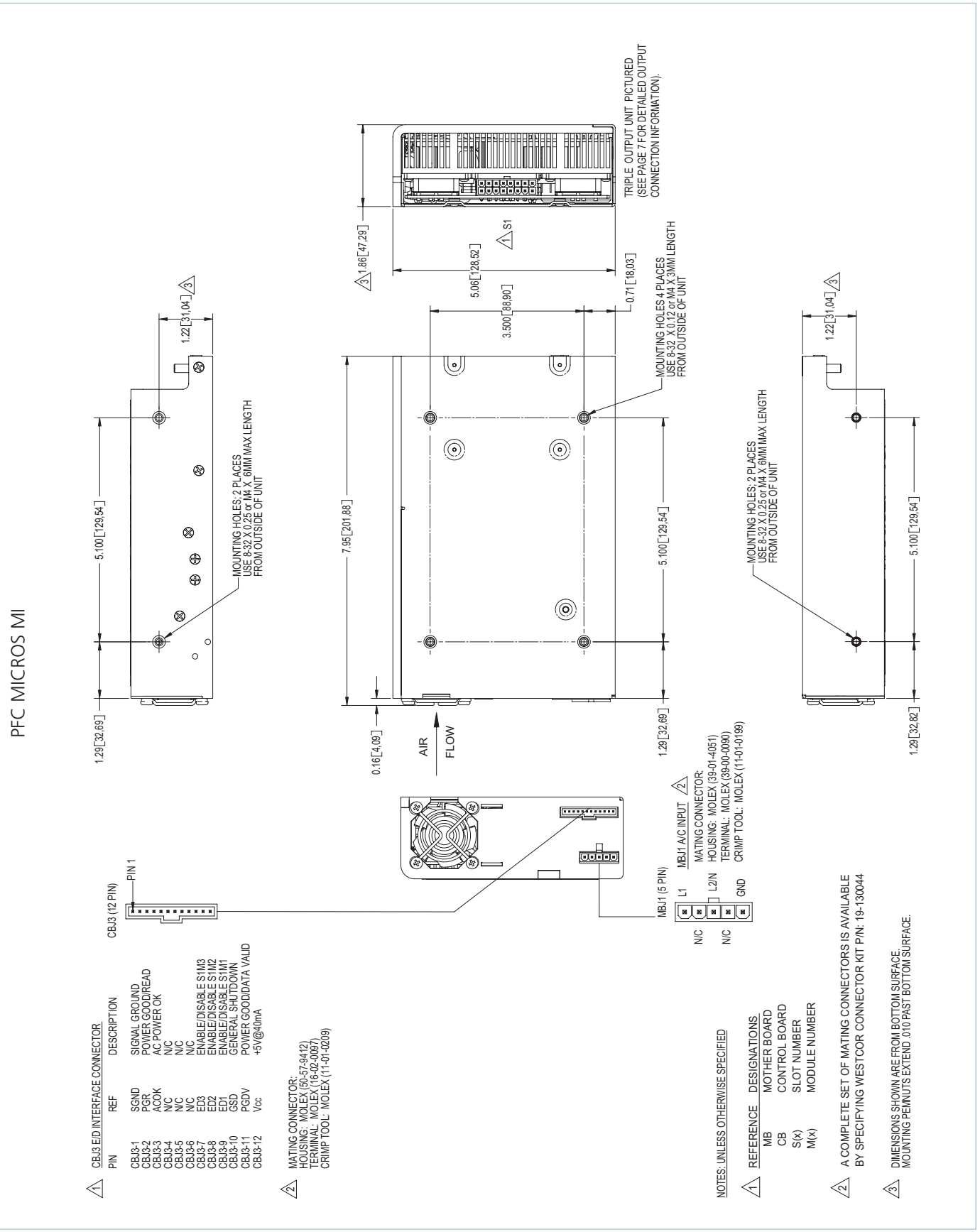
REFERENCE	DESIGNATIONS
MB	MOTHER BOARD
CB	CONTROL BOARD
S(x)	SLOT NUMBER
M(x)	MODULE NUMBER

⚠2 A COMPLETE SET OF MATING CONNECTORS IS AVAILABLE BY SPECIFYING WESTCOR CONNECTOR KIT P/N: 19-130044

⚠3 WITH OPTIONAL BUS BAR

⚠4 DIMENSIONS SHOWN ARE FROM BOTTOM SURFACE.
MOUNTING PEMNUTS EXTEND .010 PAST BOTTOM SURFACE

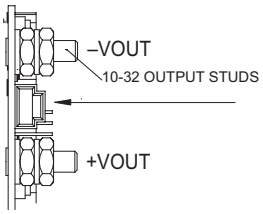
Mechanical Drawing, PFC MicroS MI



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

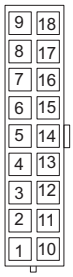
MATING CONNECTOR:
HOUSING: MOLEX (50-57-9403)
TERMINAL FEMALE CRIMP 22-24 AWG: MOLEX (16-02-0103)
USE CRIMP TOOL: MOLEX (11-01-0208)

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)

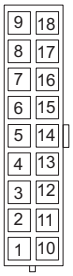


PIN	DESCRIPTION	PIN	DESCRIPTION
1	+ VOUT M2	10	+ VOUT M2
2	– VOUT M2	11	+ VOUT M2
3	– VOUT M2	12	– VOUT M2
4	+ SENSE M2	13	+ SENSE M1
5	– SENSE M2	14	TRIM M2
6	TRIM M1	15	– SENSE M1
7	+ VOUT M1	16	+ VOUT M1
8	+ VOUT M1	17	– VOUT M1
9	– VOUT M1	18	– VOUT M1

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

PFC Mini MI 18 Pin Housing

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



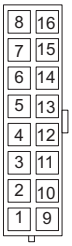
PIN	DESCRIPTION	PIN	DESCRIPTION
1	+ VOUT M1	10	+ VOUT M1
2	– VOUT M1	11	+ VOUT M1
3	– VOUT M1	12	– VOUT M1
4	+ SENSE M1	13	+ SENSE M2
5	– SENSE M1	14	TRIM M1
6	TRIM M2	15	– SENSE M2
7	+ VOUT M2	16	+ VOUT M2
8	+ VOUT M2	17	– VOUT M2
9	– VOUT M2	18	– VOUT M2

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 PFC MicroS MI 18 Pin Housing

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



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

LoPAC Accessories

The following accessories are available for the LoPAC:

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.

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