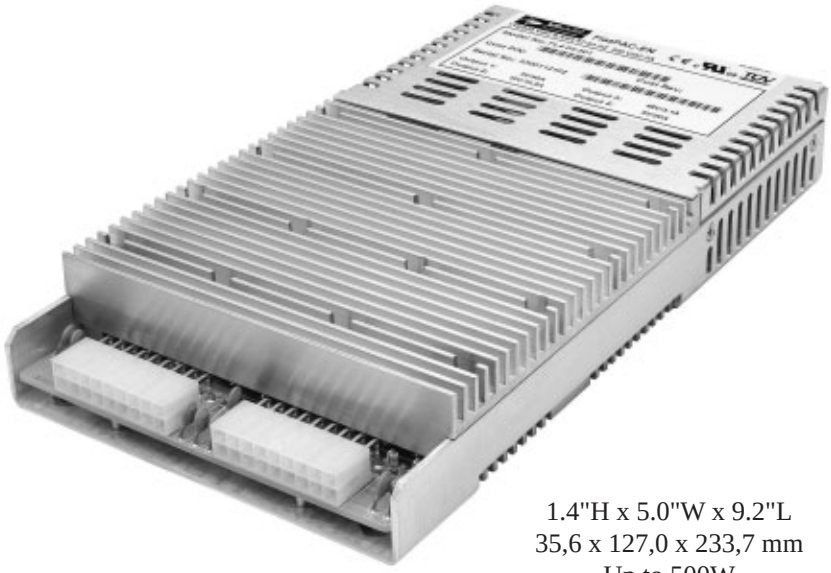
Data Sheet
FlatPAC-EN™
EN Compliant, Autoranging Switcher

Features

- EN 61000-3-2 harmonic current compliance
- Low profile package (1.4"/35,6mm)
- Output power to 500W (425W for EN compliance)
- Up to 4 user specifiable outputs
- "Autosense" feature
- Compliant to EN 55022, Class A, EN 55022, Class B (may require optional in-line filter), EN 61000-4-4 and EN 61000-4-5
- Rugged: Meets MIL-STD-810E for vibration
- Drop-in upgrade to our “2up” FlatPAC
- RS-232 microcontroller interface
- Safety agency approvals: TÜV, cULus, CE



1.4"H x 5.0"W x 9.2"L
35,6 x 127,0 x 233,7 mm
Up to 500W
1 to 4 Outputs

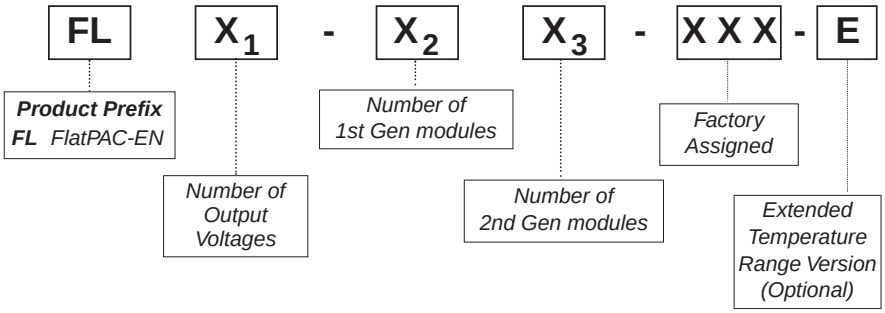
Overview

With a power density greater than 7W/in^3, Westcor’s FlatPAC-EN is an ultra low profile, compact, EN compliant autoranging AC-DC switcher. It is capable of providing up to 500 Watts from up to 4 isolated outputs.

For maximum versatility and flexibility, the FlatPAC-EN can be configured with standard Vicor DC-DC converter modules - full, half and quarter brick sizes. These modules cover the entire range of outputs from 1 to 100Vdc and 25 to 500 Watts, as well as an array of non-standard voltages. The optimum FlatPAC-EN solution can be factory configured based on your exact voltage and power requirements.

For conducted EMI, the FlatPAC-EN conforms with FCC Class A and B, and EN 55022, Class A and B. Some configurations may require our optional external in-line filter to meet EN 55022 Class B. Further, besides meeting the cULus, TÜV and CE safety agency approvals, the FlatPAC-EN complies with harmonic current limits per EN 61000-3-2, Electrical Fast Transient/Burst per EN 61000-4-4 and Surge Immunity per EN 61000-4-5. For harmonic current compliance to EN 61000-3-2, do not exceed input current of 3.33 A rms at 230Vac, 50 Hz.

Part Numbering



Autosense Feature*

This is a new feature implemented in all converter slots in the FlatPAC-EN. 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 outputs utilizing Maxi or Mini size converters.

DC Output Selections

The tables below show a sampling of some of the most popular standard outputs that can be configured into the FlatPAC-EN.

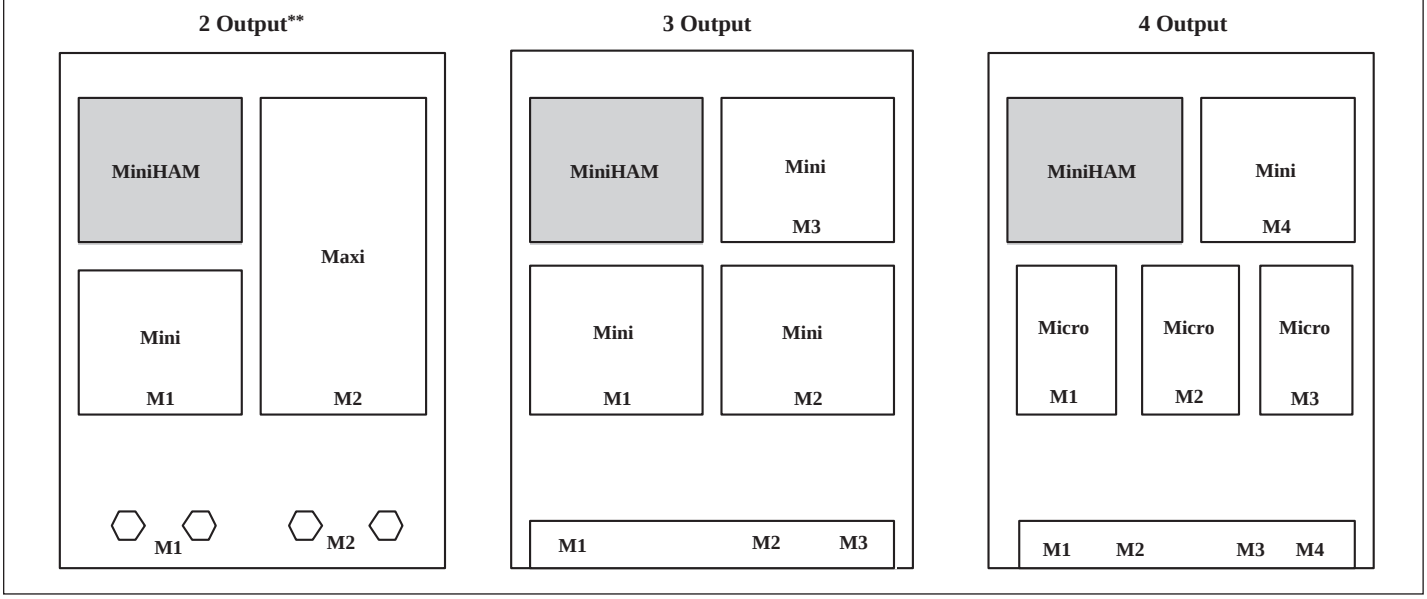
Output Voltage	Available Power (W) per Package Size						
	Maxi			Mini			Micro
	2nd Gen	1st Gen		2nd Gen	1st Gen		2nd Gen
2Vdc	160	80	60	100	40	30	50
3.3Vdc	264	132	99	150	66	50	75
5Vdc	400	200	150	200	100	75	100
12Vdc	500	200	150	250	100	75	150
15Vdc	500	200	150	250	100	75	150
24Vdc	500	200	150	250	100	75	150
28Vdc	500	200	150	250	100	75	150
48Vdc	500	200	150	250	100	75	150

FlatPAC-EN Configurations

Vicor's DC–DC converter modules are used to populate the FlatPAC-EN. There are several configurations available depending on module size, power limitation and location of the MiniHAM*. The two-output FlatPAC-EN contains 1 Maxi and 1 Mini. The three-output FlatPAC-EN contains 3 Minis. The four output FlatPAC-EN contains 1 Mini and 3 Micros. See below.

FlatPAC-EN Configurations

Maximum Total Output Power = 500W (425W for EN61000-3-2 Compliance)



Note: The FlatPAC-EN is limited to a maximum output power of 500W regardless of the module capability. For example, if three Mini modules are used, the maximum output power for the FlatPAC-EN is still 500W irrespective of the maximum output power of the modules. For EN 61000-3-2 harmonic current compliance, input current of 3.33 A rms should not be exceeded.

* The MiniHAM is a passive harmonic attenuator specifically designed for EN compliance. Unlike active PFC solutions, the MiniHAM generates no EMI, greatly simplifying and reducing system noise filtering requirements. It is also considerably smaller and more efficient than active alternatives and improves the unit's MTBF. It will provide harmonic current compliance at 230Vac input at up to 425W of output power.

** For a single output configuration either M1 or M2 is used.

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 FlatPAC-EN Design Guide available online at (vicorpower.com).

■ INPUT CHARACTERISTICS

Parameter	Typ	Units	Notes
AC Input			
Voltage	90-132/180-264	Vac	Derates to 260W @ 90Vac, 400W @ 180Vac
Frequency	47-63	Hz	
DC Input	250-380	Vdc	
Line Regulation	0.2	%	From low line to high line
Inrush Current			
@ 115Vac	8	A rms	
@ 230Vac	8	A rms	
Ride Through Time			
@ 115Vac	12/15	ms	
@ 230Vac	16/18	ms	
@ Load	500/400	W	
Conducted EMI/RFI	FCC Class A, EN 55022 Class A		
	FCC Class B, EN 55022 Class B		EN 55022 Class B may need external optional in-line filter
Power Factor	> 0.70		>75% load
Harmonic Current Limits	EN 61000-3-2/A14		Input current of 3.33A rms max. at 230Vac, 50Hz
Transient Burst Immunity	EN 61000-4-4		
Surge Immunity	EN 61000-4-5		
Voltage Dips	EN 61000-4-11		Criteria B
Dielectric Withstand			
Primary to Chassis GND	1,500	Vrms	
Primary to Secondary	3,000	Vrms	
Secondary to Chassis GND	500	Vrms	

OUTPUT CHARACTERISTICS

Parameter	Typ	Units	Notes
Setpoint Accuracy	0.5	%	Of Vnom
Load Regulation	0.2	%	No Load to full load
Temperature Regulation	0.005	%/°C	-20°C to +65°C
Long Term Drift	0.02	%/khr	
Output Ripple & Noise			
≤10Vout	100	mV	20MHz band width
>10Vout	1.0	%	20MHz band width
Voltage Trim Range			
1st Gen Modules	50-110	%Vout	±10% on 10 – 15 Vout
2nd Gen Modules	10-110	%Vout	Preload may be required
Remote Sense Compensation	0.5	Vdc	Autosense (See page 1)
OVP Set Point	125	%Vout	Not available on 1st Gen Minis
Current Limit	115	%Imax	Autorecovery

ENVIRONMENTAL CHARACTERISTICS

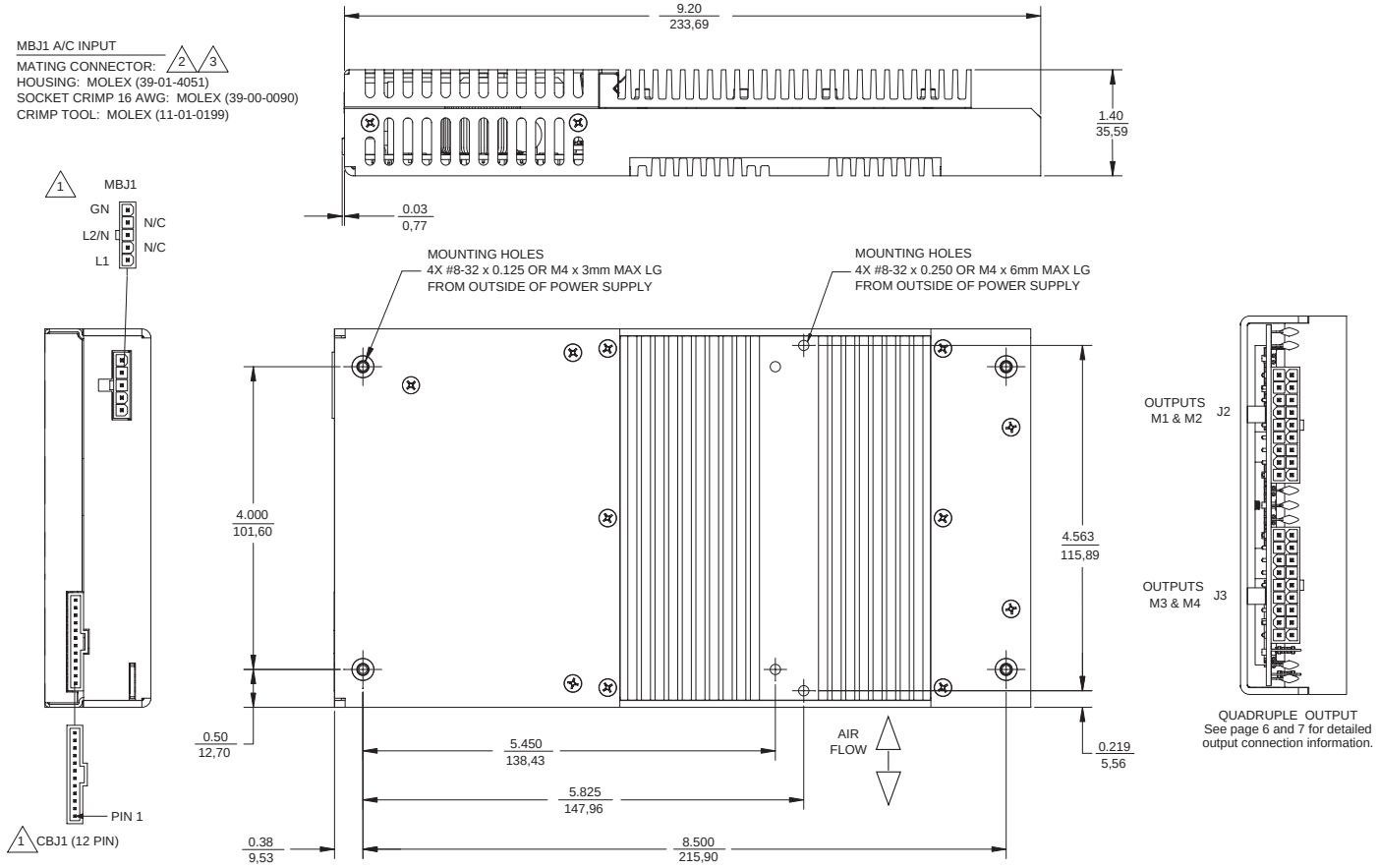
Parameter	Typ	Units	Notes
Storage Temperature	-20 to +100	°C	Standard version
	-40 to +100	°C	Extended range option*
Operating Temperature(standard and extended)*			
Ambient Air	-20 to +70	°C	See derating curves in Design Guide
Case Temperature	-20 to +90	°C	75° for 1st Gen Maxi modules
Vibration	see note		MIL-STD-810E, Category 10 Minimum Integrity Test
Safety Approvals	cULus, TÜV, CE		

*Extended temperature range option includes module burn-in and temperature cycling.

MECHANICAL CHARACTERISTICS

Parameter	Typ	Units	Notes
Weight	3.4	lbs	
	1.5	kg	
Overall Dimensions	9.2 x 5.0 x 1.4	in	L x W x H
	233,7 x 127,0 x 35,6	mm	L x W x H

Mechanical Diagram



PIN	REF	DESCRIPTION
CBJ1	SGND	SIGNAL GROUND
CBJ2	N/C	N/C
CBJ3	ACOK	AC POWER OK
CBJ4	TX	TRANSMIT 4
CBJ5	RX	RECEIVE 4
CBJ6	E/D-4	ENABLE/DISABLE
CBJ7	E/D-3	ENABLE/DISABLE
CBJ8	E/D-2	ENABLE/DISABLE
CBJ9	E/D-1	ENABLE/DISABLE
CBJ10	GSD	GENERAL SHUTDOWN
CBJ11	N/C	N/C
CBJ12	+5VS	+5V @ 300mA

CBJ1 E/D INTERFACE CONNECTOR

MATING CONNECTOR: 2 3
HOUSING: MOLEX (50-57-9412)
SOCKET CRIMP 24-30 AWG: MOLEX (16-02-0097)
CRIMP TOOL: MOLEX (11-01-0209)

NOTES: UNLESS OTHERWISE SPECIFIED

1

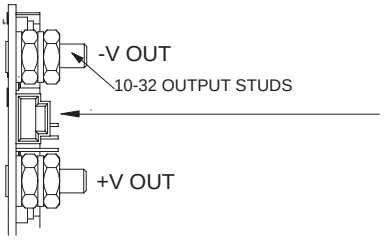
REFERENCE	DESIGNATION
MB	MOTHER BOARD
CB	CONTROL BOARD

2 CONNECTOR PART NUMBERS SPECIFIED ARE MOLEX OR EQUIVALENT

3 A COMPLETE SET OF MATING CONNECTORS CAN BE PURCHASED FROM WESTCOR BY SPECIFYING CONNECTOR KIT P/N 19-130044

4 CBJ4 AND CBJ5 ARE PART OF THE RS-232 MICROCONTROLLER FUNCTIONS. SEE FLATPAC-EN DESIGN GUIDE (AVAILABLE ONLINE AT VICORPOWER.COM) FOR DETAILED INFORMATION.

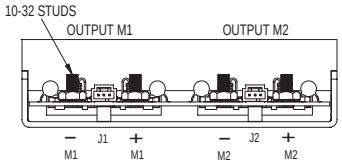
A. SINGLE OR DUAL OUTPUT



J1/J2 SENSE/TRIM PIN CONNECTOR

1	TRIM
2	+ SENSE
3	- SENSE

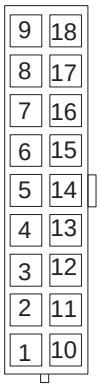
MATING CONNECTOR:
HOUSING: MOLEX P/N 50-57-9403
TERMINALS: MOLEX P/N 16-02-0103
USE CRIMP TOOL: MOLEX P/N 11-01-0208



SINGLE OR DUAL OUTPUT

B. TRIPLE OUTPUT
Output M1 (Using 1 Mini)

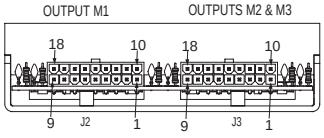
J2



J2 (18 PIN OUTPUT, SENSE AND TRIM PIN CONNECTOR)

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

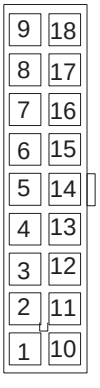
MATING CONNECTOR:
18 PIN HOUSING: MOLEX (39-01-2180)
TERMINAL FEM CRIMP 18-24 AWG: MOLEX (39-00-0039)
USE CRIMP TOOL: MOLEX (11-01-0197)



TRIPLE OUTPUT

Outputs M2 and M3 (Using 2 Minis)

J3

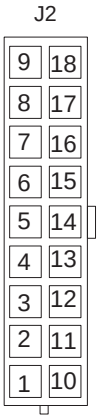


J3 (18 PIN OUTPUT, SENSE AND TRIM PIN CONNECTOR)

PIN	DESCRIPTION	PIN	DESCRIPTION
1	+V OUT M3	10	+V OUT M3
2	-V OUT M3	11	+V OUT M3
3	-V OUT M3	12	-V OUT M3
4	+ SENSE M3	13	+ SENSE M2
5	- SENSE M3	14	TRIM M3
6	TRIM M2	15	- SENSE M2
7	+V OUT M2	16	+V OUT M2
8	+V OUT M2	17	- V OUT M2
9	-V OUT M2	18	- V OUT M2

FLATPAC-EN OUTPUT CONNECTORS (continued)

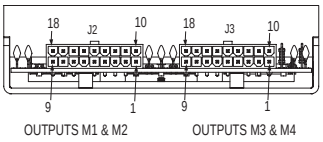
C. QUADRUPLE OUTPUT
Outputs M1 and M2 (Using 2 Micros)



J2 (18 PIN OUTPUT, SENSE AND TRIM PIN CONNECTOR)

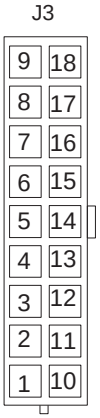
PIN	DESCRIPTION	PIN	DESCRIPTION
1	+V OUT M2	10	+V OUT M2
2	-V OUT M2	11	+V OUT M2
3	-V OUT M2	12	-V OUT M2
4	+V OUT M2	13	+ V OUT M1
5	- V OUT M2	14	TRIM M2
6	TRIM M1	15	- V OUT M1
7	+V OUT M1	16	+V OUT M1
8	+V OUT M1	17	- V OUT M1
9	-V OUT M1	18	- V OUT M1

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



QUADRUPLE OUTPUT

Outputs M3 and M4 (Using 1 Micro and 1 Mini)



J3 (18 PIN OUTPUT, SENSE AND TRIM PIN CONNECTOR)

PIN	DESCRIPTION	PIN	DESCRIPTION
1	+V OUT M4	10	+V OUT M4
2	-V OUT M4	11	+V OUT M4
3	-V OUT M4	12	-V OUT M4
4	+ SENSE M4	13	+ V OUT M3
5	- SENSE M4	14	TRIM M4
6	TRIM M3	15	- V OUT M3
7	+V OUT M3	16	+V OUT M3
8	+V OUT M3	17	- V OUT M3
9	-V OUT M3	18	- V OUT M3

Note: Additional technical information including temperature derating curves, installation instructions, mounting holes, in-line filter, RS-232 microcontroller features covered in the FlatPAC-EN Design Guide available online at vicorpower.com.

FLATPAC-EN ACCESSORIES

The following accessories are available for the FlatPAC-EN:

Connector Kits

FlatPAC-EN	19-130044

Current Share Boards

Used for increased output power or redundancy

FlatPAC-ENs with 1st Gen Modules	CSB01
FlatPAC-ENs with 2nd Gen Modules	CSB02

In-line Filter

In-line Filter	IF1232

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.

The latest data is available on the Vicor website at vicorpower.com.

Westcor, a division of Vicor, designs and builds configurable power supplies incorporating Vicor's high density DC-DC converters and accessory components. Westcor's product line includes:

- **PFC Mini**
- **PFC Micro**
- **PFC MicroS**
- **Autoranging MegaPAC**
- **Mini MegaPAC**
- **PFC MegaPAC**
- **PFC MegaPAC-EL (/Low Noise)**
- **3 Phase/4kW MegaPAC**
- **3 Phase/4kW MegaPAC-EL (Low Noise)**
- **ConverterPACs**
- **FlatPAC-EN**

See Design Guides for detailed information about all Westcor products. They can be downloaded in PDF format from the website.

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