

VI BRICK® AC Front End Evaluation Board

November 2012



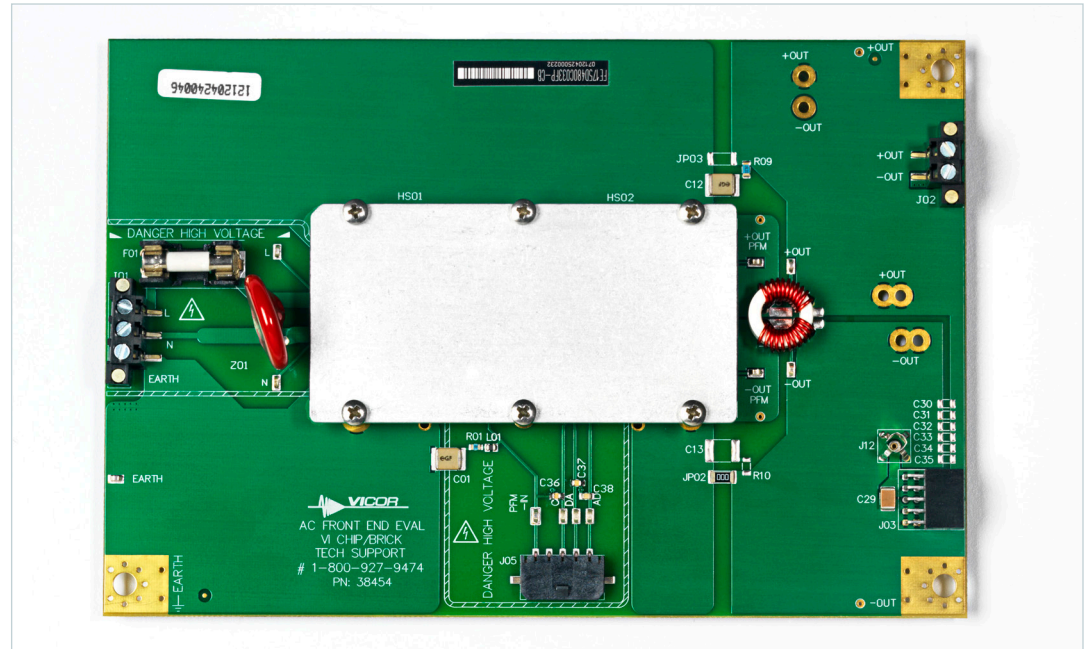
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Features

- > Oscilloscope probe jack for output voltage and ripple measurements
- > Simple to use
- > Ring lug, screw terminal, and solder connection options
- > Replaceable fuse (5A, 216 Littelfuse recommended)

⚠ IMPORTANT NOTICE:

Please read this user guide before operating evaluation board.



Introduction

The VI BRICK AC Front End Evaluation Board offers a convenient means to evaluate the performance of Vicor’s VI BRICK AC Front End module and has been optimized for user convenience. Refer to the table below for operating conditions and limits.

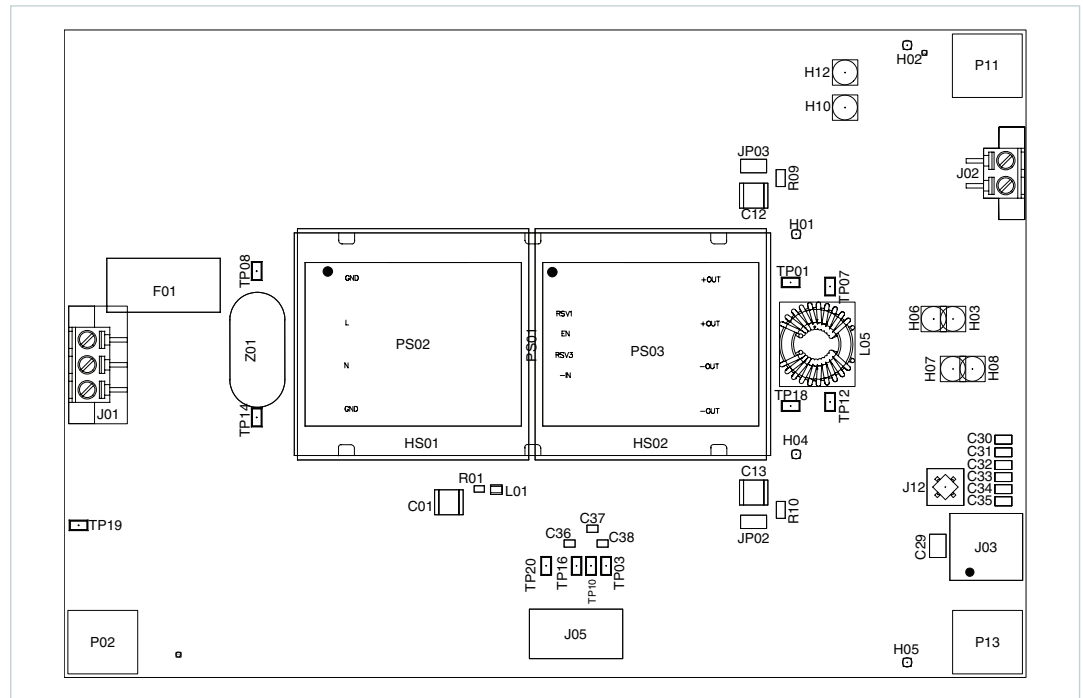
This product contains an input line filter. It is important to remember the response of the AC line filter is dependent upon the wiring connected to the evaluation board. Care should be exercised to minimize stray source impedances in order to fully exercise the features of the converter.

Figure 1

VI BRICK AC Front End

Evaluation Board layout and dimensional drawing, component side.

(Click on drawing to view larger.)



Basic Specifications and Operating Limits

Please use the following table for operating limits:

Table 1
Operating Limits

Description	Specification	Notes
Input Range	85 – 264 Vac	Universal input
Output voltage	48 Vdc	Partially Regulated, SELV
Output Power	330 W Over entire input range	
Operating temperature	-40 to 100 °C	Case temperature
Output capacitance	6,000 to 12,000µF	63V rating
Power Factor	>0.95	

Please refer to Figure 1 for locations of the input and output connections as viewed from the component side. Wires may be soldered directly to the pads instead of ring lugs if desired to minimize circuit impedances.

DANGER! HIGH VOLTAGE!  **DANGER! HOT SURFACE!**

The VI BRICK AC Front End Evaluation Board contains exposed hazardous voltages. These voltages are within the area marked by the hashed line on the board.

The VI BRICK AC Front End Evaluation Board may be operated at surface temperatures which may pose a thermal hazard to the operator. Because of the thermal and voltage hazards, be careful not to touch any exposed surface unless the power is disconnected and the evaluation board has been given sufficient time to cool. The evaluation board is not intended for use in end item equipment.

Set Up

The Customer Evaluation Board should be set up as follows:

Note: Care should be taken to avoid reversing polarities if connecting to the opposite (solder) side of the board.

AC Input Connections (J01)  **DANGER! HIGH VOLTAGE!**

J01, the screw terminal connector, is for connection of AC input to the AC-DC converter evaluation board. The interconnect leads should be appropriate for the current and voltage supplied to the board.

For single phase power, connect LINE to the pin marked L, NEUTRAL to the pin marked N and earth ground to the pin marked EARTH. Corresponding wires in an IEC cable are brown, blue, and yellow with a green stripe.

The board can be used with three phase power. Connect LINE1 to L and LINE2 to N. Earth ground should still be connected to the EARTH terminal of J1.

+OUT, -OUT

There are several connections available on the VI BRICK AC Front End Evaluation Board. Table 1 lists the available connectors and their current rating. Do not exceed the rating of the connector or the module.

Table 2
Output Connector Ratings

Connector	Rating	Recommended Connection
J02	10 A	Hold-up capacitor
J03	12 A (3 A/contact)	Mating PRM and BCM eval boards
Ring Lugs	100 A	General Purpose
H03 (+OUT) & H07 (-OUT)	12 A	Hold-up capacitor

Output bulk (electrolytic) capacitance must be attached across the output of the VI BRICK AC Front End Evaluation Board. Refer to table 1 from previous page for the appropriate range of output capacitance.

The load should be connected to +OUT and –OUT terminals of the evaluation board with short leads of suitable gauge to carry the output current and minimize losses. A sufficient number of terminal connections should be used to ensure that no terminal sees more than its maximum rated current. The evaluation board can be connected directly to the application for which the module is intended. However the interconnect impedances between the evaluation board and the application can greatly affect the transient response. For applications where transient response is critical, the user should consider mounting the VI BRICK AC Front End module directly to the target application PCB. Test points TP12 (–OUT) and TP07 (+OUT) can be used to monitor the output and are located on the PCB adjacent to the output terminals of the AC Front End module.

Earth Connections

There are several earth connections available on the board. Earth must be connected via a low impedance connection in order for the internal line filter to function. These earth connections also provide a safety ground for the baseplate of the module.

Earth may optionally be connected to either of the VI BRICK AC Front End outputs in order to provide a positive or negative voltage rail with respect to earth.

Output Voltage Measurement Jack (J12)

This connector is provided to make accurate measurements of the output ripple voltage of the VI BRICK AC Front End. Many types of scope probes may be directly connected to this point if the probe is equipped with a removable plastic sheath.

To avoid creating ground loops when making measurements of the output or input voltage, these measurements should be made separately.

Figure 2

VI BRICK AC Front End

Output capacitor (C29) can be added to reduce switching frequency voltage ripple at the probe.
(Click on drawing to view larger.)

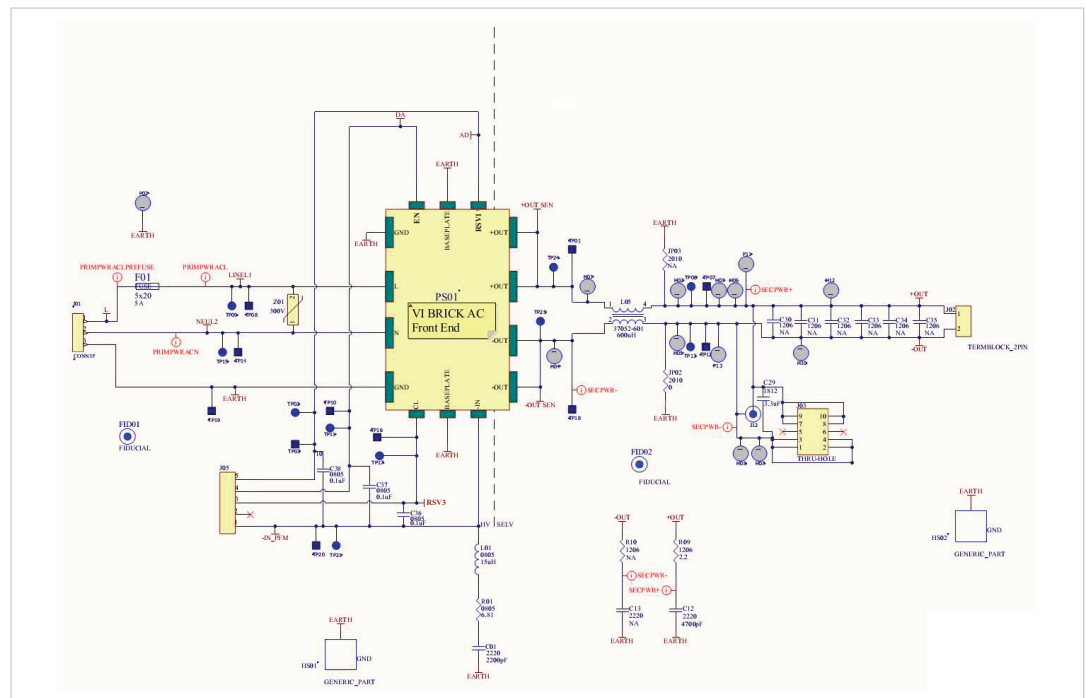


Table 3
Bill of Materials

Ref. Desc.	Description	Digi-Key Manufacturer	Digi-Key Part #	Future Manufacturer	Future Part #
C01	CAP X7R 2200pF 10% 250V 2220	Murata	490-3480-2-ND	Murata	GA355QR7GF222KW01L
C12	CAPY X7R 4700pF 10% 250V 2220	Murata	490-3482-2-ND	Murata	GA355DR7GF472KW01L
C13 C29 C30 C31 C32 C33 C34 C35	NOT APPLIED	NOT APPLIED	NOT APPLIED	NOT APPLIED	NOT APPLIED
C36 C37 C38	CAP X7R .1uF 10% 25V 0805	Murata	490-1673-2-ND	Murata	GRM21BR71E104KA01L
F01	FUSE HOLDER, SMD, 5x20	Wickmann	F4546-ND	Schurter	31.8225
H03 & H07	CAP ALEL 6800uF 20% 63V 25X50	Kemet	493-1135-ND	Nichicon	UVZ1J682MRD
J01	CON 3CKT TERM BLK SMD	No Stock	No Stock	Weco	140-A-126-SMD/03
J02	CON 2 CKT TERM BLK SMD	No Stock	No Stock	Weco	140-A-126-SMD/02
J03	CONN 10POS 90DEG THRUHOLE FEMALE 0.1SPC	Sullins Electronics	55519-ND	Sullins Electronics	PPTC052LJBN-RC
J05	CONN 5POS SINGLE ROW RIGHT ANGLE	Molex	WM1893-ND	TE Connectivity	1445057-5
JP02	RES 0 OHM 3/4W 5% 2010	Vishay Dale	541-0.0WTR-ND	Vishay Dale	CRCW20100000Z0EF
JP03	NOT APPLIED	NOT APPLIED	NOT APPLIED	NOT APPLIED	NOT APPLIED
L01	IND 15.0uH 10% 5mA 0805	Stocked by Mouser, part#: MLF2012C150KT			
L05	IND COM MODE 600uH 30% 10A	Stocked by Vicor, part#: 37052-601			
PS01	Model Specific	Vicor	Model Specific	Vicor	Model Specific
R01	RES 6.81 OHM 1/8W 1% 0805	Vishay Dale	541-6.81CCTRND	Vishay Dale	CRCW08056R81FKEA
R09	RES 2.2 OHM 1/4W 1% 1206	Vishay Dale	541-2.20FFTRND	Vishay Dale	CRCW12062R20FKEA
R10	NOT APPLIED	NOT APPLIED	NOT APPLIED	NOT APPLIED	NOT APPLIED
Z01	VAR MOV, 300V 10KA 20mm DIA RADIAL	Littelfuse	TMOV20RP30 OEL2T7-ND	Littelfuse	TMOV20RP300E

Input Current Measurement

A current probe can be passed around either input lead connected to the VI BRICK AC Front End Evaluation Board. Note that an input capacitor on the evaluation board is downstream of this measurement point.

Enable (EN) DANGER! HIGH VOLTAGE!

The EN pin can be used to disable the VI BRICK AC Front End module. Connecting EN to the -IN-PFM pin will disable the module. This will also clear any latching output OVP fault if one has occurred. Note that the EN pin is referenced to the primary (hazardous voltage) side of the converter. Warning: The EN Pin, or the -IN PFM Pin must not be connected to line or output of the VIBRICK AC Front End.

Efficiency Measurement

As the VI BRICK AC Front End module can deliver and consume large currents, the effect of the PCB must be considered when making an efficiency measurement. Be certain to accurately measure the voltage using test points TP08 (LINE1), TP14 (LINE2/NEUTRAL), TP18 (-OUT), and TP01 (+OUT). Using these test points will more closely represent the efficiency of the VI BRICK AC Front End module.

Hardware

The hardware kit provided with the evaluation board includes the following:

- > (10) #10 internal tooth lock washers
- > (10) #10 external tooth lock washers
- > (10) #10-32 screws
- > (4) Rubber feet
- > (10) #10-32 hex nuts
- > (4) F-F standoffs
- > (8) M3 x 5 mm screws

Ring lugs are also recommended for making output connections.

Thermals

For most lab environments a fan blowing across the evaluation board is recommended. See VI BRICK Thermal Management Application Note at:

vicorpower.com/documents/application_notes/AN_Vibrick%20%20thermManage.pdf

or contact Vicor Applications Engineering for assistance (800) 927-9474.

Ordering Information

The evaluation board is specified by replacing the “-00” suffix with “-CB” on the VI BRICK AC Front End model number (FE175D480C033FP-CB).

The Power Behind Performance