Power System Designer User Guide

VICOR

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Introduction

Vicor has developed a proven approach for timely, low-resource, low-risk and high-performance power system design tool unlike any other tool available today. This approach is called the Power Component Design Methodology (PCDM). This methodology provides the means to stitch together Vicor power components to meet the exacting demands for a power system design.

The difference with this methodology is that it covers all of the components needed to build a high-performance power system from the Power Source (AC and high-power DC) to the point-of-load. This methodology uses proven power components that are engineered to interface with each other, thus reducing the complexities of power system design.

The Power System Designer is a web-based tool for generating power systems fast – up to 75% faster than traditional methods. The Power System Designer is the embodiment of the power component design methodology.

Power System Designer Tool

The design engineer enters their design specifications into the tool and the tool provides recommended designs based on key figures of merit:

- System efficiency
- Power footprint
- Cost
- Component count
- Recommended best fit

This is much more than a product selection tool. The PSD provides a design environment that enables the designer to evaluate the complete power system designed (source to Pol), then modify it.

This tool saves time by taking the place of sifting through data sheets, performing hundreds of calculations on the overall system performance and pulls together thousands of data points that draws a block diagram of the recommended power system in a matter of seconds (optimized around 5 critical figures of merit). In addition, it provides a drawn-to-scale representation of the system along with a bill of materials.

How to use the Power System Designer

Your approach to using the tool is the same as it would be to use any other web-based tool. You answer a few questions and the tool provides recommended solutions.

To get started, you need to know:

1. for use <u>only</u> in the following browsers:
2. your power source (AC or DC),
3. the voltage levels of your input (either a nominal value or a min and max),
4. number of outputs and
5. for each output you will need to know:

    a. current / power,

    b. regulation requirements and

    c. isolation requirements.

Once determined, you enter them on the website:

http://sapps.vicorpower.com/SolutionSelector/web/psdInit.do

The system will then recommend up to five designs based on:

1. component count,
2. price,
3. smallest footprint,
4. highest efficiency and
5. recommended best fit.

See Figure 4 on Page 7.

Help Tool

If you need any assistance while using the Power System Designer, please click on the help tool located on the left side of the screen.

Figure 1
Help Tool
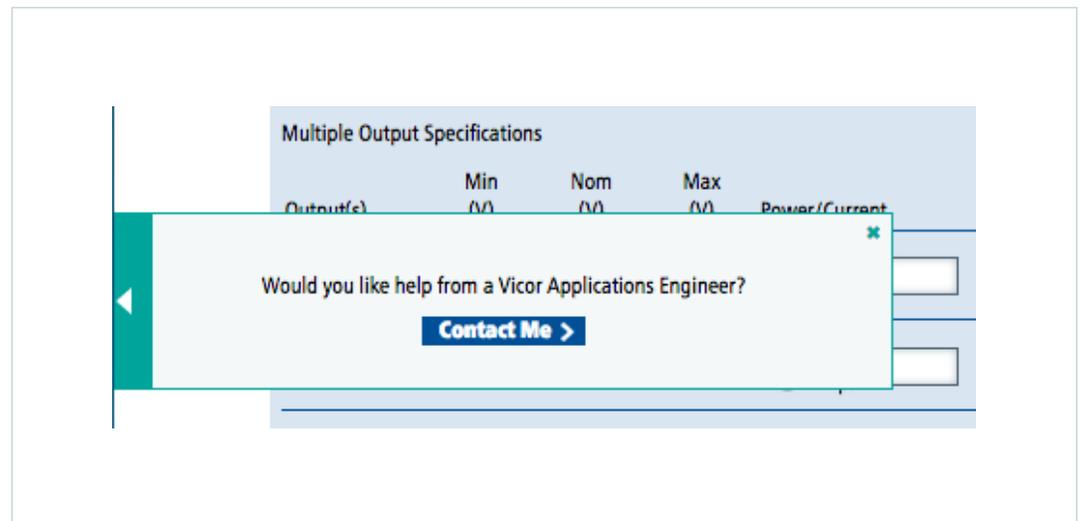
The Results

The results, otherwise known as the Hub, is where the user views the design parameters of their power design. The Hub delivers:

1. up to five solutions based on figures of merit,
2. a view of the design,
3. analysis for each output of the power chain and
4. a bill of materials.

The user may explore each design to better understand the best fit for their design along with evaluating each element of the power chain. After analyzing each power chain, the user may select a solution and open a "White Board" for further evaluation and design. A final step is the creation of a bill of materials for easy ordering of the design.

About the Whiteboard Tool

The whiteboard tool provides a workspace to architect and analyze the power efficiency of your design requirements. The Vicor whiteboard is a web based design tool that allows users to architect and analyze power system designs which are built using Vicor high-density, high-efficiency power components. Users can set the operating conditions for each component of the power design to match the intended application and perform efficiency and loss analysis of individual components, as well as the full power system.

Supported Components

The following component families are supporting using the Power System Designer:

1. PFM: Isolated AC-DC Converter with PFC
2. AIM: AC Input Front-end
3. ZVS Isolated DC-DC Converter
4. DCM: DC-DC Converter Module
5. BCM: Bus Converter Module
6. IBC: Intermediate Bus Converter
7. VTM: Current Multiplier
8. PRM: Buck-Boost Regulator
9. ZVS Buck Step-Down Regulator
10. ZVS Buck-Boost Regulator
11. NBM: Non-Isolated, Fixed-Ratio Converter Module

Details about each of these products can either be found on the whiteboard or on the website.

Customer References

"I like the system overall. It is a handy tool to use in system design."
Dragon Products

"It's a good tool for your product. A great way to get the ball rolling."
Northrop Grumman

"Makes life easier, especially for a systems engineer who does not have time to delve into details."
Honeybee Robotics

"The power system designer tool allowed me, a chemical engineer, to configure a mil-spec DC-DC converter in less than five minutes. Amazing!"
Solid State Cooling Systems

"Very nice interface. Easy to use. Overall, a good tool to use for quick design."
General Atomics Aeronautical

Example Implementation

Note: Recommended browsers for the Vicor PSD & whiteboard applications are Chrome and Internet Explorer (version 9 and up).

Follow these step by step instructions:

We are going to design a power system that takes 120 Volts AC and delivers four outputs of 12V / 9A, 5V / 10W, 3.3V / 4.0A and 1V / 15W.

Go to www.vicorpower.com

1. Enter the following parameters onto the PowerBench widget on the website:

    a. Supply: AC

    b. Nom : 120VAC

    c. Regulated Checked

    d. Nom : 12V

    e. Amps Checked

    f. 9

    g. Output Return –OUT1

    h. Click Add Output

    i. Regulated Checked

    j. Nom: 5

    k. Amps Checked

    l. 10

Figure 2
PSD Tool
(1a – 1l)

m. Select "**Add Output**" (this takes you to a new page)

n. Enter the last two output values:

   i. Nom(V): 3.3

   ii. Amps Checked

   iii. 4

   iv. Regulated Checked

   v. Output Return –OUT1

   vi. Select "Add Output"

   vii. Nom(V): 1

   ix. Watts Checked

   x. 15

   xi. Regulated Checked

   xii. Output Return –OUT1

2. Click "**Search for a System**" in the lower right corner.

3. You will be presented with 3 options:

4. Select "**Solution 1**"

5. Review your options and trade offs:

Figure 5
PSD Tool
(5 – 6)

6. Select "**Analyze**" to view the Vicor whiteboard.
(A new page will open with the whiteboard. If you have pop-up blocker on, please turn it off for www.vicorpower.com).

7. Review the recommended power design:
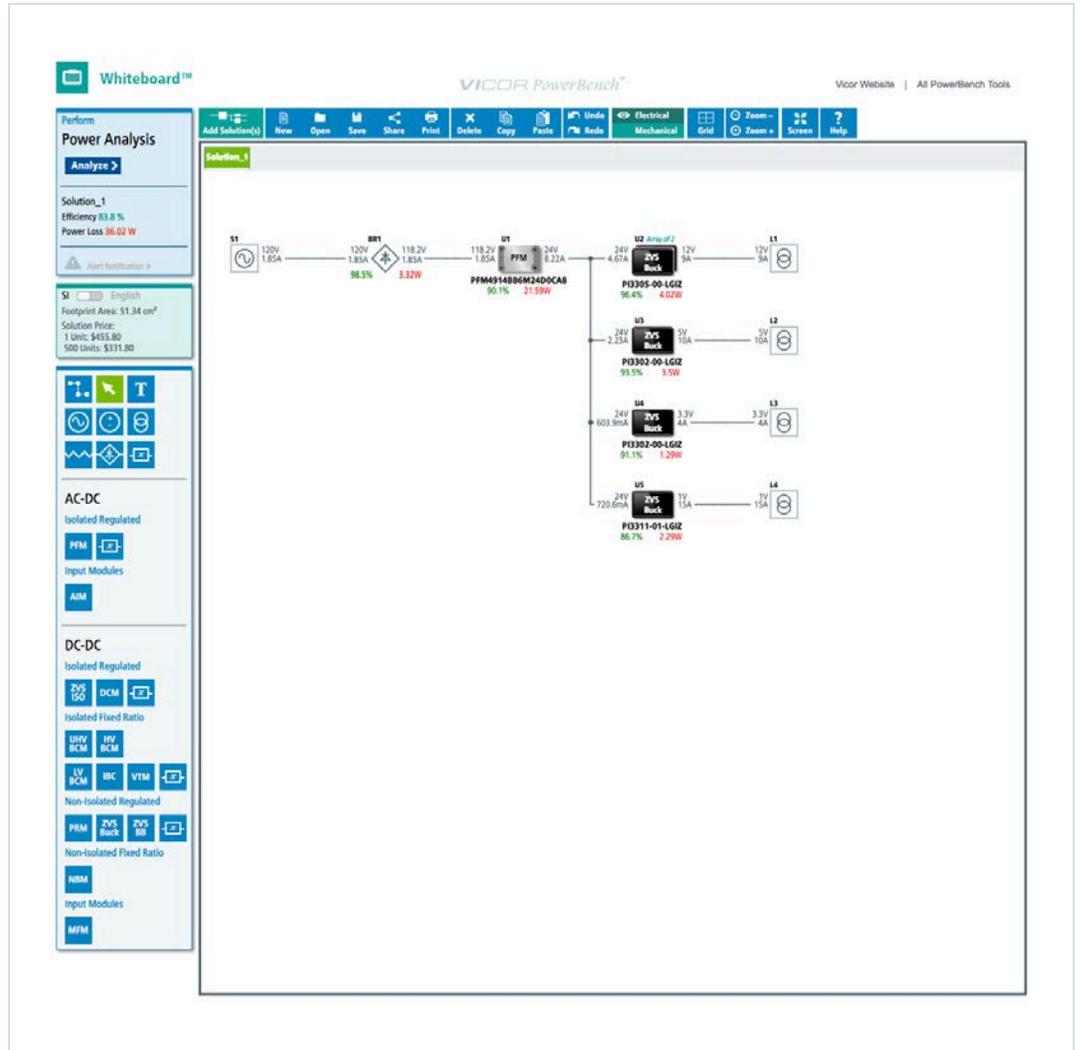
8. Select "**Mechanical**" view to look at the layout:
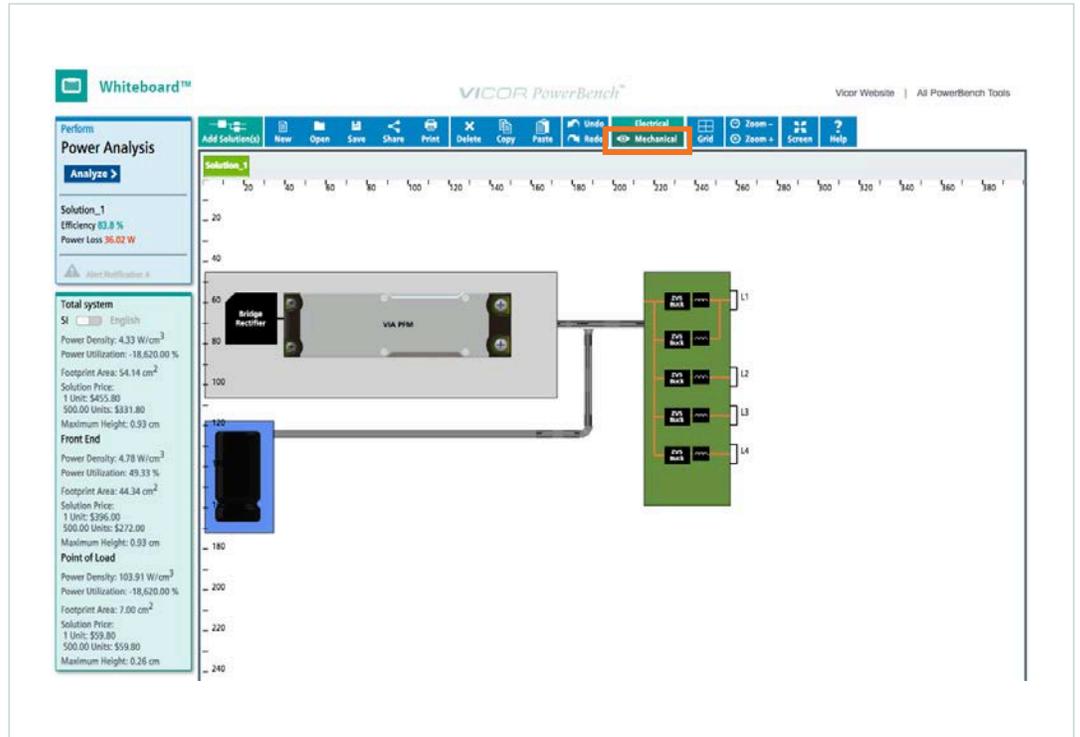
9. Go back to the Hub page:
(select the window on your browser that contains the Hub page)

Figure 8
PSD Tool
(9 – 10)

10. Looking further on this page, review the bill of materials for either design. Note that Solution 2 shows one less component, but a higher BOM than Solution 1. Also note that this page includes documentation, specifications and sample / volume pricing. Please verify because results can change as you modify inputs and/or preferences.

11. From there, a user can select their part(s) by clicking "**Purchase Selected Parts**" and then purchase the design through the Vicor E-Commerce System.

12. At this point you are good to add this design to the cart or export the design to an excel file that can be mailed to your purchasing department to order.

13. Congratulations, you've finished your power system design.

Conclusion

The PSD embodies the Power Component Design Methodology and the innovative approach to power that Vicor is known for.

The Power System Designer expedites and optimizes the creation of high-performance power designs, dramatically reducing time to market for customers. If you have any questions using the tool or this guide, please email technical support: apps@vicorpower.com.

Addendum

Single Product Search Using the "Solution Selector Tool"

"**Search for Solutions**" delivers a single product search results and is the first radial button to the tool. The Vicor version provides a coupling of products that meet your custom needs. Here, the user may filter by "**Form Factor**", "**Mounting Style**" and "**Temperature**". It enables an engineer to see all the options for those who like seeing every possible option for a power system design.

Figure A.1
Solution Selector Tool

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