Simulation Tool Speeds Evaluation And Selection Of Intermediate Bus Converters

Vicor's IBC Power Simulation tool promises to speed up the process of evaluating and selecting intermediate bus converters (IBCs) based on the company's IBC modules. Instead of relying solely on hardware-based evaluations to determine which module provides the desired bus converter performance, designers can use this free tool to select suitable modules and then simulate the electrical and thermal performance of those products under their application's operating conditions. Vicor heralds this tool as an industry first in providing online simulation capability for intermediate bus converters.

"Vicor's new IBC Power Simulation tool is designed to put essential information at power engineers' fingertips to enable them to visualize and solve their real-world power system design challenges," says Tom Curatolo, global director of Applications Engineering at Vicor. "By providing power engineers with the ability to quickly and easily select, simulate and optimize the intermediate stage of an Intermediate Bus architecture power system, we're equipping them to accelerate design cycles and achieve competitive advantages afforded by greater efficiency, density, and functionality."

Vicor's IBC Power Simulation tool provides advanced simulation capabilities that enable designers to define and optimize electrical and thermal operating parameters and view the resulting data graphically on screen. The combination of electrical and thermal simulation capabilities allows designers to account for system interdependencies that affect IBC power capability based upon essential variables including input voltage range, load conditions, ambient temperature, and airflow. Variables defining external input and output filter elements can be adjusted to minimize input and output ripple and optimize dynamic performance while minimizing the total footprint allocated to IBCs within dense system boards.

The types of simulation that can be run using this tool include:

- Thermal
- Steady state
- Vin start-up
- Vin step
- Load step
- EN start-up and
- EN shutdown

The online IBC Power Simulation tool reduces time-consuming manual evaluation/bench processes and streamlines design and development cycles. The ability to track changes across simulations with different parametric settings provides comparative insight, speeding up design optimization.

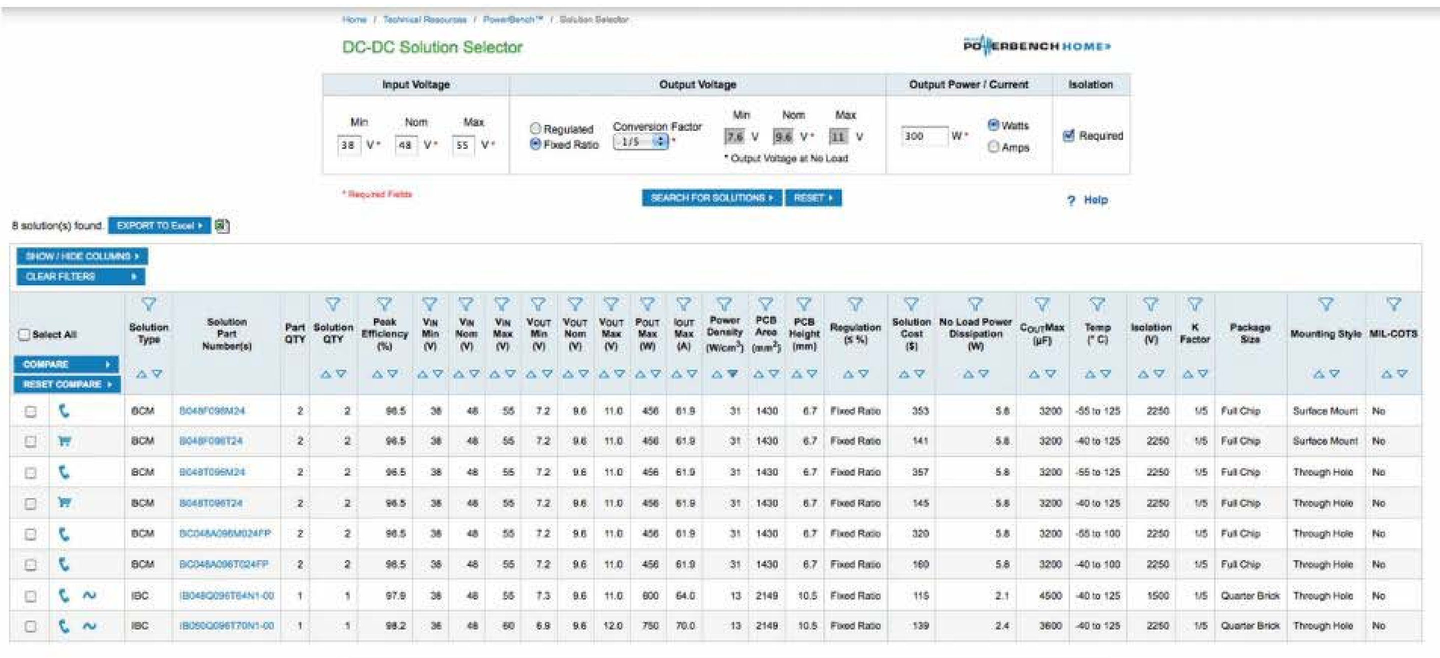
Users begin by entering their basic input and output requirements in Vicor's DC-DC Solution Selector, which then produces a tabular listing of suitable IBC modules (Fig. 1.) The solutions table is interactive, allowing users to sort results according to various design criteria. After reviewing the results, users select a particular IBC to simulate. Doing so calls up the simulation tool, which presents a set of simulation options and a reference design for the selected IBC (Fig. 2.)

Users can change the various external component values, I/O conditions, and (in some simulations) the ambient temperature in the reference design and then simulate the effects of these changes. It's possible to select values that exceed the specified operating conditions of the IBC, which permits simulation of fault conditions. Running the simulation produces waveforms that users can then manipulate in oscilloscope-like fashion to see results on different time or amplitude scales, or to measure desired parameters by positioning of cursors (Fig. 3.) Waveforms can be stored and then compared with waveforms generated by subsequent simulations of a given reference design. When questions arise about particular simulation features, users can access a help screen within the tool.

Another convenient feature is that users do not have to log in use the DC-DC Solution Selector or to run simulations. However, they will have to log in to save their simulations using the My Designs feature, which makes it easier to rerun those simulations in the future.

Although you won't be able to try out Vicor's IBC Power Simulation tool until Tuesday, January 31, when the tool is formally introduced, you can view a demo now at http://vimeo.com/35675841. Then, on Tuesday, the tool will be accessible via the PowerBench online design center in combination with Vicor's new online DC-DC Solution Selector tool.

As previously stated, the selection and simulation capabilities initially offered only apply to Vicor's IBC modules (see the table). However, in the future, both tools will be expanded to include Vicor's full portfolio of high-performance power conversion and management products. At the upcoming APEC 2012 in Orlando, Florida, Vicor will host demonstrations of the IBC Power Simulation tool on February 6-8, 2012 at booth #100 in the exhibition.



Solution Type	Solution Part Number(s)	Part QTY	Solution QTY	Peak Efficiency (%)	VIN Min (V)	VIN Nom (V)	VIN Max (V)	VOUT Min (V)	VOUT Nom (V)	VOUT Max (V)	POUT Max (W)	IOUT Max (A)	Power Density (W/cm³)	PCB Area (mm²)	PCB Height (mm)	Regulation (± %)	Solution Cost ($)	No Load Power Dissipation (W)	COUTMax (µF)	Temp (° C)	Isolation (V)	K Factor	Package Size	Mounting Style	MIL-COTS
BCM	B048F096M24	2	2	96.5	38	48	55	7.2	9.6	11.0	456	61.9	31	1430	6.7	Fixed Ratio	353	5.8	3200	-55 to 125	2250	1/5	Full Chip	Surface Mount	No
BCM	B048F096T24	2	2	96.5	38	48	55	7.2	9.6	11.0	456	61.9	31	1430	6.7	Fixed Ratio	141	5.8	3200	-40 to 125	2250	1/5	Full Chip	Surface Mount	No
BCM	B048T096M24	2	2	96.5	38	48	55	7.2	9.6	11.0	456	61.9	31	1430	6.7	Fixed Ratio	357	5.8	3200	-55 to 125	2250	1/5	Full Chip	Through Hole	No
BCM	B048T096T24	2	2	96.5	38	48	55	7.2	9.6	11.0	456	61.9	31	1430	6.7	Fixed Ratio	145	5.8	3200	-40 to 125	2250	1/5	Full Chip	Through Hole	No
BCM	BC048A096M024FP	2	2	96.5	38	48	55	7.2	9.6	11.0	456	61.9	31	1430	6.7	Fixed Ratio	320	5.8	3200	-55 to 100	2250	1/5	Full Chip	Through Hole	No
BCM	BC048A096T024FP	2	2	96.5	38	48	55	7.2	9.6	11.0	456	61.9	31	1430	6.7	Fixed Ratio	160	5.8	3200	-40 to 100	2250	1/5	Full Chip	Through Hole	No
IBC	IB048Q096T64N1-00	1	1	97.9	38	48	55	7.3	9.6	11.0	600	64.0	13	2149	10.5	Fixed Ratio	115	2.1	4500	-40 to 125	1500	1/5	Quarter Brick	Through Hole	No
IBC	IB050Q096T70N1-00	1	1	98.2	36	48	60	6.9	9.6	12.0	750	70.0	13	2149	10.5	Fixed Ratio	139	2.4	3600	-40 to 125	2250	1/5	Quarter Brick	Through Hole	No

Fig. 1. Vicor's DC-DC Solution Selector quickly locates the IBC modules that meet the basic input and output requirements for the customer's application. Results are presented in an interactive table that allows users to sort the results according to various design criteria. (Note that users must select "Fixed Ratio" output voltage to search for the IBC modules. Selecting "Regulated" output voltage brings up V-I Chip solutions (VTM and PRM pairs) that are not currently supported by the IBC Power Simulation Tool.)

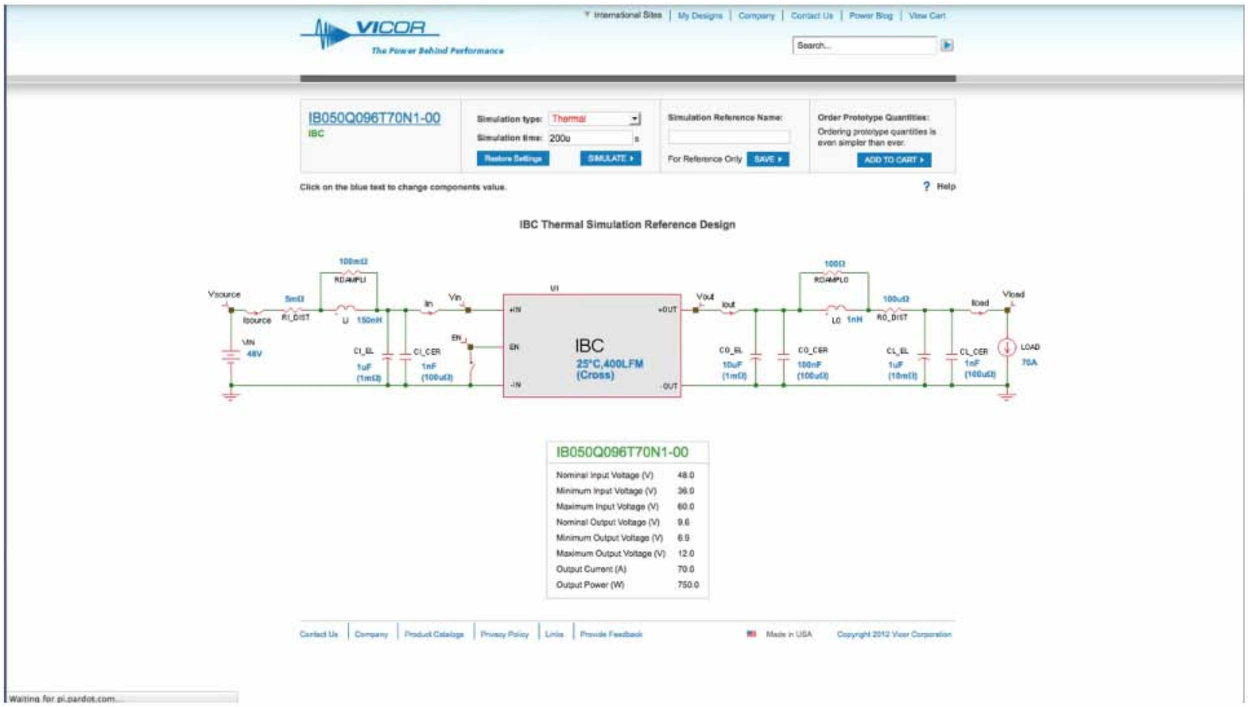


Fig. 2. For a selected IBC, users can specify the type of simulation they want to run on an IBC reference design generated by the tool. Users can alter the value of parameters shown in blue and run simulations to see their effects.

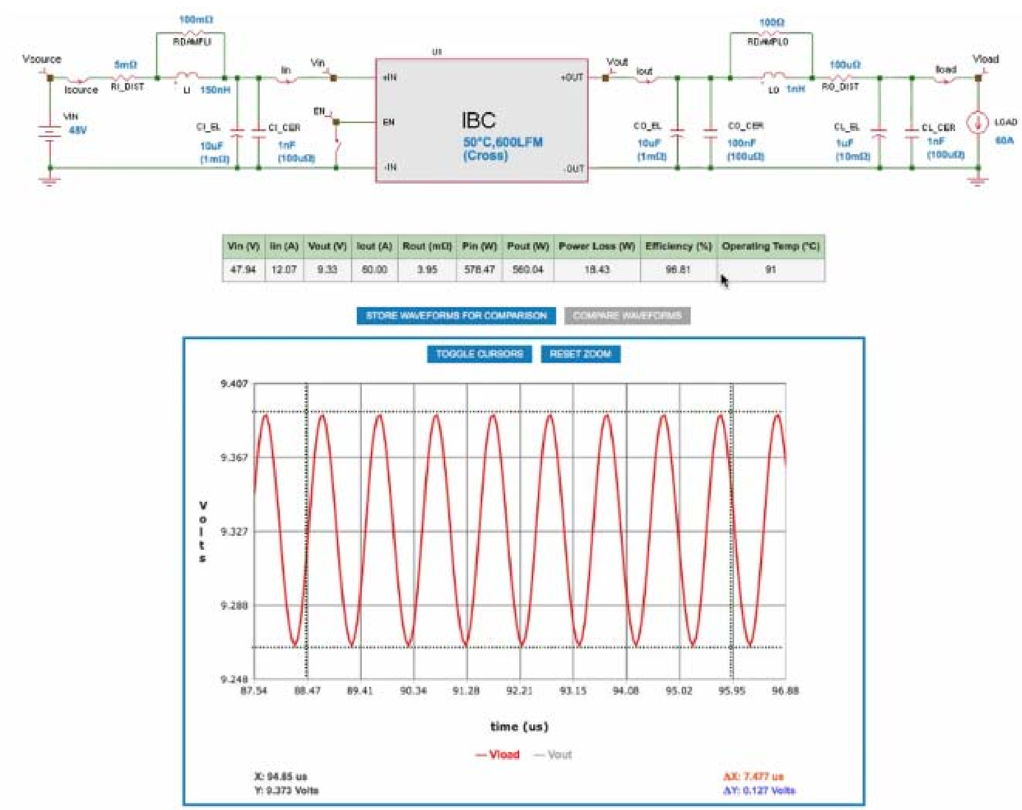


Fig. 3. A table displays steady-state electrical and thermal results of simulation, while key waveforms are displayed below.

Table. Intermediate bus converter modules that can be simulated using Vicor's IBC Power Simulation tool.

Output voltage (nominal)	**300 W (1/8 Brick)**	**500 W (1/8 Brick)**	**650 W (1/4 Brick)**	**750 W (1/4 Brick)**
9.6 V	IB048E096T40N1-00	IB048E096T48N1-00	IB048Q096T64N1-00	IB050Q096T70N1-00
	IB050E096T40N1-00	IB050E096T48N1-00		IB054Q096T70N1-00
12 V	IB048E120T32N1-00	IB048E120T40N1-00	IB048Q120T53N1-00	
	IB050E120T32N1-00	IB050E120T40N1-00	IB050Q120T53N1-00	
			IB054Q120T53N1-00	