

# Customize Thermal Simulations with WEBENCH WebTHERM PCB Editor

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[WebTHERM™ software](#) has been available since 2001 for WEBENCH® power supply designs. What started as a single-layer simulator for a limited number of parts now supports over 550 designs, including boards up to six layers.

The tool starts off with a fixed board size and shape, typically based on the known good power supply evaluation board layout. But folks on TI's WEBENCH team realize that many of you prefer to see thermal data based on your specific board-design constraints. So now, you can use the new WEBENCH WebTHERM printed circuit board (PCB) thermal editor and simulator to create and test out thermal results for your design. This feature allows you to explore the thermal results for layout alternatives and get it right the first time for faster time to market.

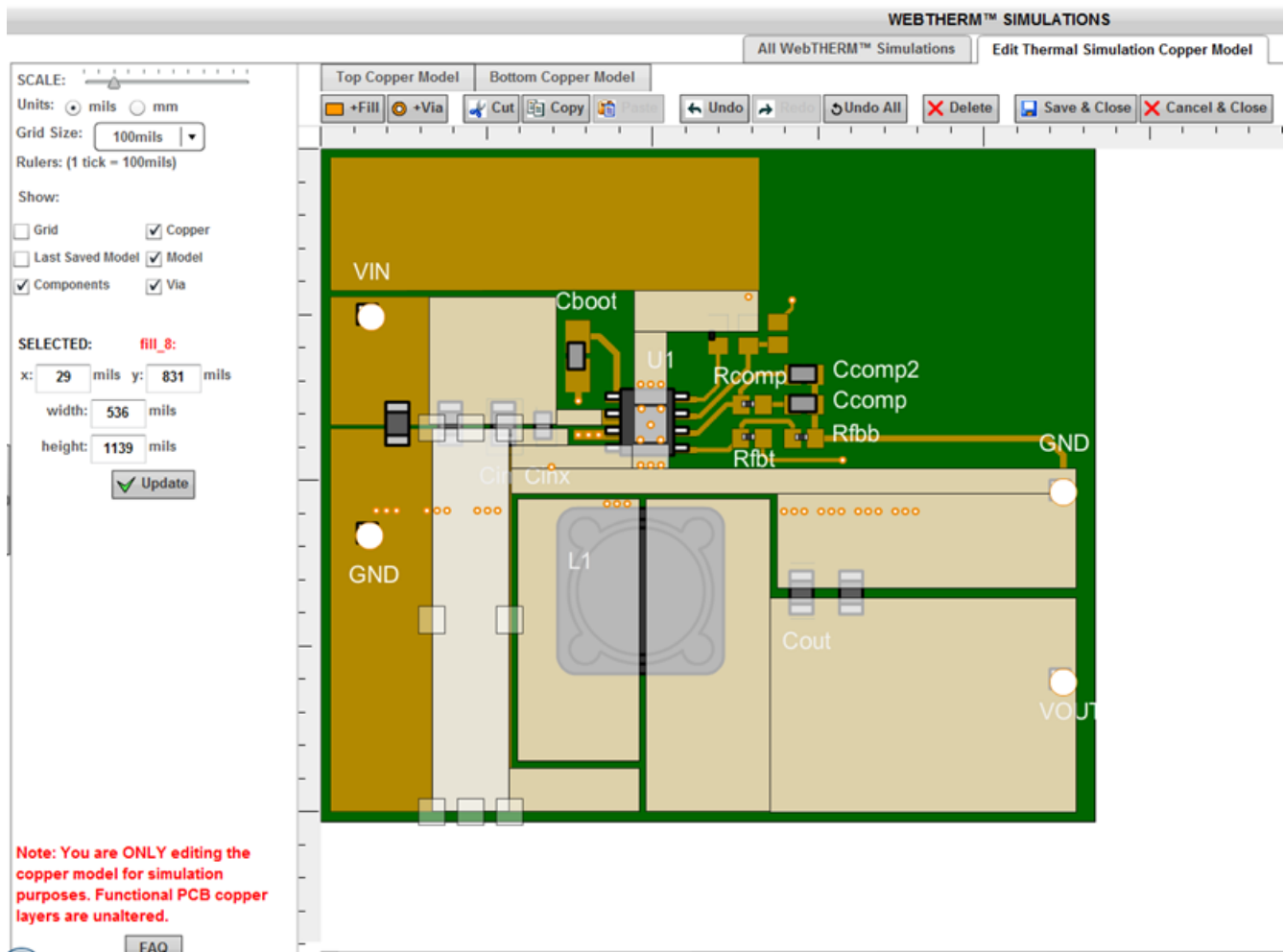
The physical starting point for a given WEBENCH power design is usually the integrated circuit's (IC) evaluation PCB, which is a known good layout for both thermal characteristics and noise. It's matched with your uniquely created design values and selected components from your WEBENCH design. The WebTHERM thermal simulator's basic capabilities allow you to change the copper weight, board orientation, top and bottom ambient temperature, input voltage, load current, edge boundary conditions, and airflow.

After customizing these parameters, you can edit the thermal simulation copper model (see [Figure 1](#)) by:

- Moving, adding, deleting and resizing the copper-fill model on any available board layer.
- Moving, adding, deleting and resizing thermal vias.

Additional editing features include:

- Cut/copy/paste.
- Undo/redo edits.
- Customizable grid and ruler that lets you:
  - Change sizes.
  - Toggle between imperial (mils) and SI metric (mm) units.
- Selectable elements/layer display.
- Online help.



**Figure 1. Main Editing Interface Showing Resized Copper Elements in WEBENCH WebTHERM PCB Thermal Editor and Simulator.**

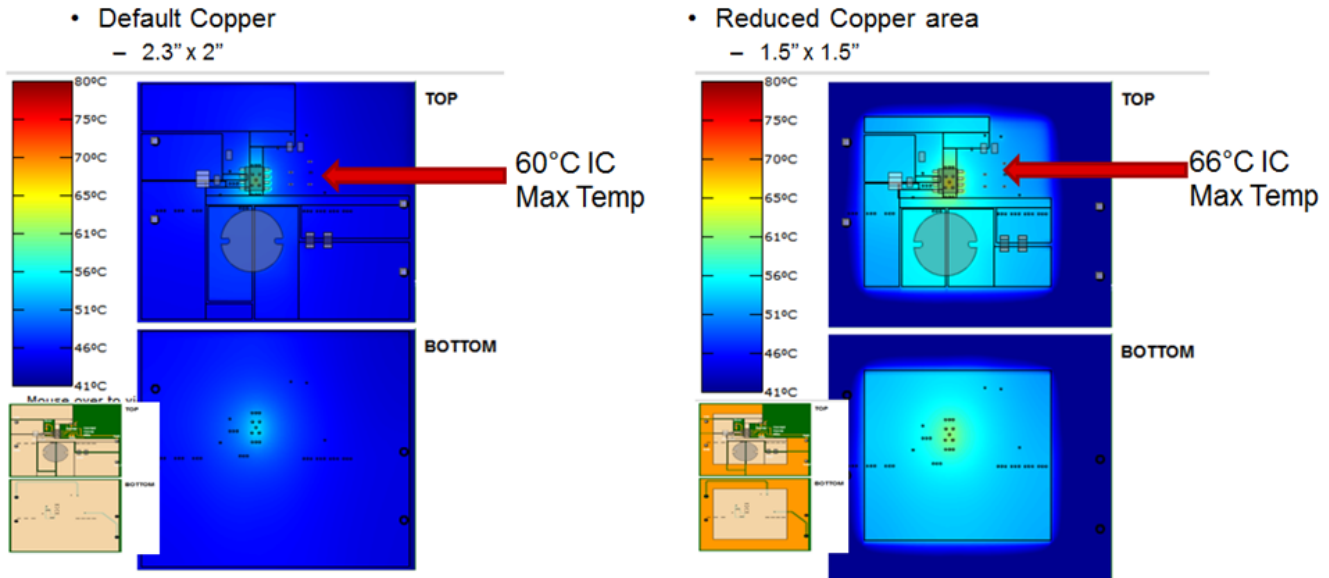
You can retain edits from one simulation to the next (using any simulation as a starting point) or start over anytime. The new simulation results page (with sortable columns – see [Figure 2](#)) allows you to compare results between different simulations more easily. In addition, you can generate a detailed report for any thermal simulation you choose.

ID	Name	Board	Status	Run Date	Vin	Iout	Tamb	Cu Wei	Highest Temp	Max Temp	Power Dissipation
4	DesignID: 2859, TP554336A		Completed	Aug 10, 2015 11:44 AM	20V	2A	30°C	3 OZ	59.6°C	Cin: 44.6°C Cout: 43.7°C IC - Top: 58.6°C L1: 44.7°C PCB - Bottom: 51.6°C PCB - Top: 59.6°C	Cin: 789uW Cout: 41.0uW IC - Top: 0.87W L1: 0.11W
3	DesignID: 2859, TP554336A		Completed	Aug 10, 2015 11:44 AM	20V	2A	30°C	2 OZ	64.3°C	Cin: 45.7°C Cout: 45.1°C IC - Top: 62.4°C L1: 46.7°C PCB - Bottom: 56.1°C PCB - Top: 64.3°C	Cin: 789uW Cout: 41.0uW IC - Top: 0.87W L1: 0.11W
2	DesignID: 2859, TP554336A		Completed	Aug 10, 2015 11:43 AM	28V	3A	30°C	2 OZ	105°C	Cin: 62.7°C Cout: 59.4°C IC - Top: 101°C L1: 63.0°C PCB - Bottom: 86.0°C PCB - Top: 105°C	Cin: 1.42mW Cout: 52.0uW IC - Top: 1.92W L1: 0.25W
1	DesignID: 2859, TP554336A		Completed	Aug 10, 2015 11:41 AM	28V	3A	30°C	2 OZ	103°C	Cin: 61.3°C Cout: 58.0°C IC - Top: 100°C L1: 61.5°C PCB - Bottom: 84.4°C PCB - Top: 103°C	Cin: 1.42mW Cout: 52.0uW IC - Top: 1.92W L1: 0.25W

**Figure 2. Table of Simulation Results Allows Side-by-side Comparison of Different Simulation Runs.**

Figure 3 below represents a real-life example showing how to use the editing tool. You only have 1.5 by 1.5 inches of board area allocated to the power supply and all components must be less than 85°C. You create a WEBENCH design and it's a great match for your power supply electrical specifications.

You run a WebTHERM simulation and the initial known good board layout shows a maximum component temperature of 60°C, which is good, but the size of 2.3 by 2 inches is too large. You would like to retain the overall routing of the evaluation board PCB because of noise issues. So you try reducing the area by shrinking the edges of the copper to be within the 1.5-by-1.5-inch requirement while still maintaining the same overall routing. Then you run another thermal simulation. The temperature rises from 60°C on the original layout to 66°C on the new layout. This is well within your desired spec of 85°C, so you go with this design.



**Figure 3. Results before (Left) and after Editing (Right) Show That the Temperature Is within the 85°C Specification with a Smaller Copper Area.**

The new WEBENCH WebTHERM PCB thermal editor and simulator give you the ability to customize your thermal simulation to suit your needs. This means improved upfront learning and optimization of designs before you commit to an actual prototype, saving time and resources. Starting with an optimized power supply design with a known good board layout that has been populated with components to fit your electrical needs – and then having the capability to adjust the board design thermal model to meet your thermal requirements – introduces a unique and powerful capability to decrease design iterations.

### Additional Resources

- Start a power supply design with [WEBENCH Design and Simulation Tools](#).
- Learn more about [WEBENCH Online Thermal Simulation](#).
- Watch a [video](#) to learn how to use the WebTHERM® Thermal Simulator to identify and correct thermal problems.

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