DESCRIPTION
THERMAL MODEL FOR
PKB4216CPIHS

FLEX INC.

Contents

General

The model is an estimation for the thermal behavior of PKB4216CPIHS, which is a through hole pin design. This model is calibrated against a reference data which is the thermal verification tests.

The model is intended for steady-state thermal simulations.

Model Description

The model is a readymade Flotherm 11.1 model. It was created by importing a CAD model in STEP format through the MCAD bridge. Components that are not contributing to the heat transfer, have been removed from the geometry. The model consists of the four major components:

3D CAD Geometry

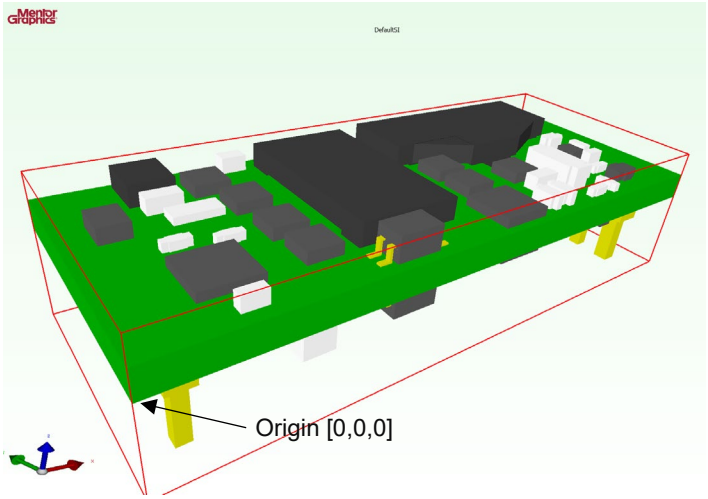

Figure 1. 3D geometry of the model

3D geometry is created by importing a CAD model in STEP format through the MCAD bridge. Components that are not contributing to the heat transfer have been removed from the geometry. The PCBs have been simplified to a bulk geometry where the copper layers and vias have been taken into consideration by assigning anisotropic material properties to the PCBs domains.

Origin has been placed so that [0,0,0] is in the lower left corner of the PCB.

Unit in file: [mm]

Domains of power loss distribution

There are several sources for power loss. The heat sources are temperature dependent, and it is built by non-Linear source feature based on results from the thermal verification report. An example of this source (primary MOSFETs loss figure) is plotted in Figure 2 (c).

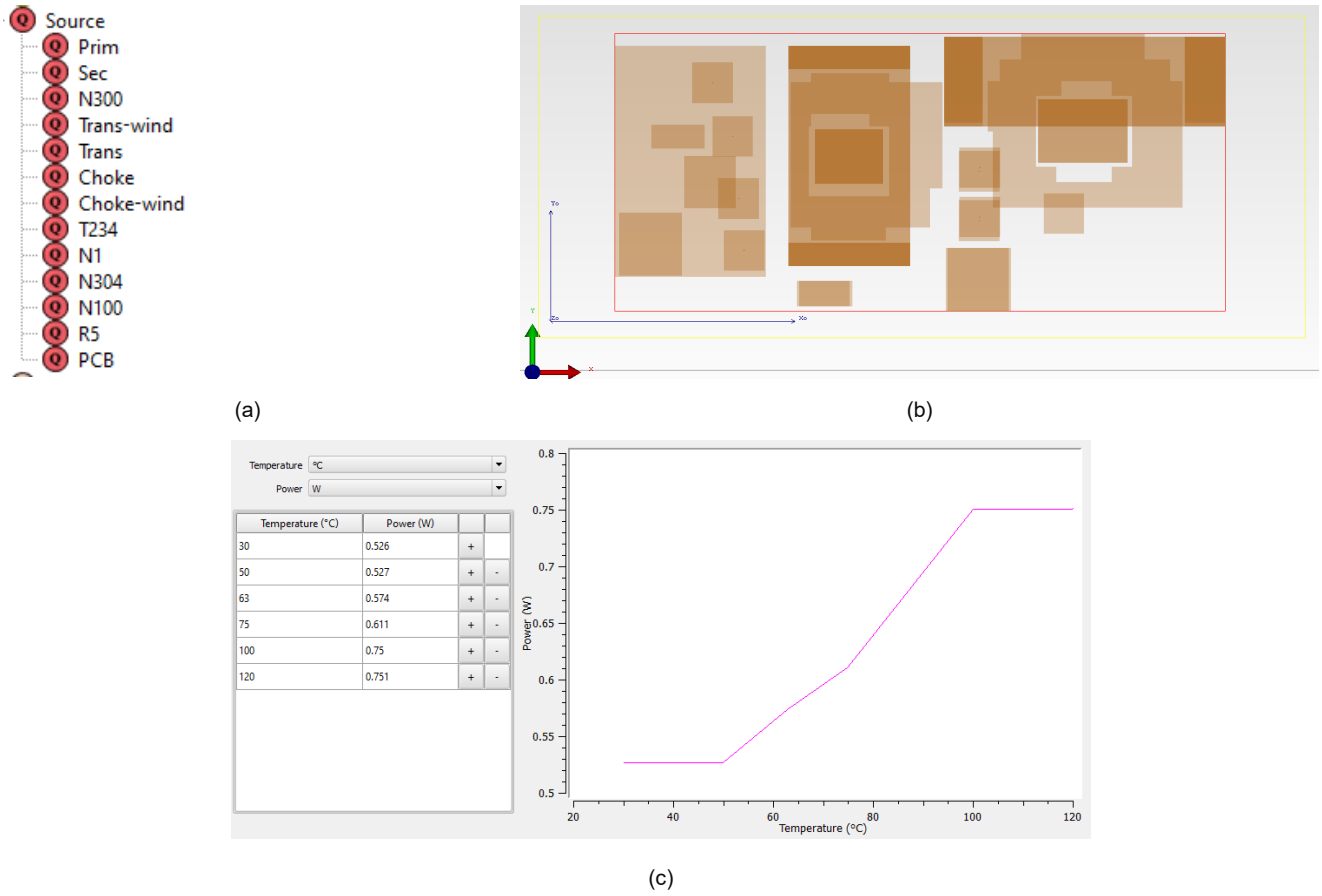

Figure 2: Power loss setting: (a) list of heat sources, (b) heat sources distribution from top view, and (c) hear source tmeprature dependency graph for primary mosfets.

Domains of material data

There are several material domains. The heat conductivity for each of them is given either as isotropic, or anisotropic values in x-,y-, and z-direction (x,y,z) per the following list.

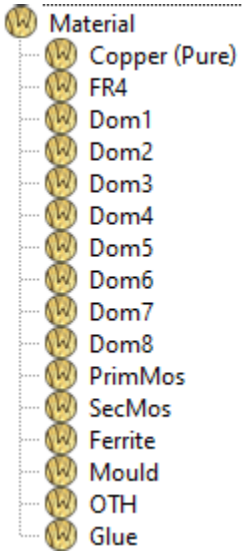

Figure 3. Domains of material data

Note. The given heat conductivities are only intended to model the temperature distribution of the module in this application. The values should not be treated as physically true or transferable to other applications.

Monitor points

The model comes with predefined monitor points. These monitor points are shown here

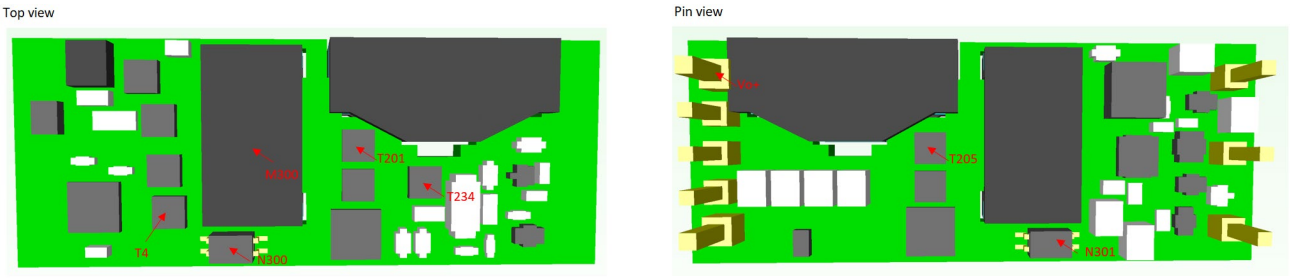

Figure 4. Monitor points in the model.

Model Calibration

The model has been calibrated to give temperatures as similar as the results from the wind-tunnel thermal test in a case of 48V input, 30V output, output current of 6.67A, 2m/s, and 4m/s airspeed.

Flotherm simulation temperatures are within ± 5 [℃] compared to real data (see Figure 5.).

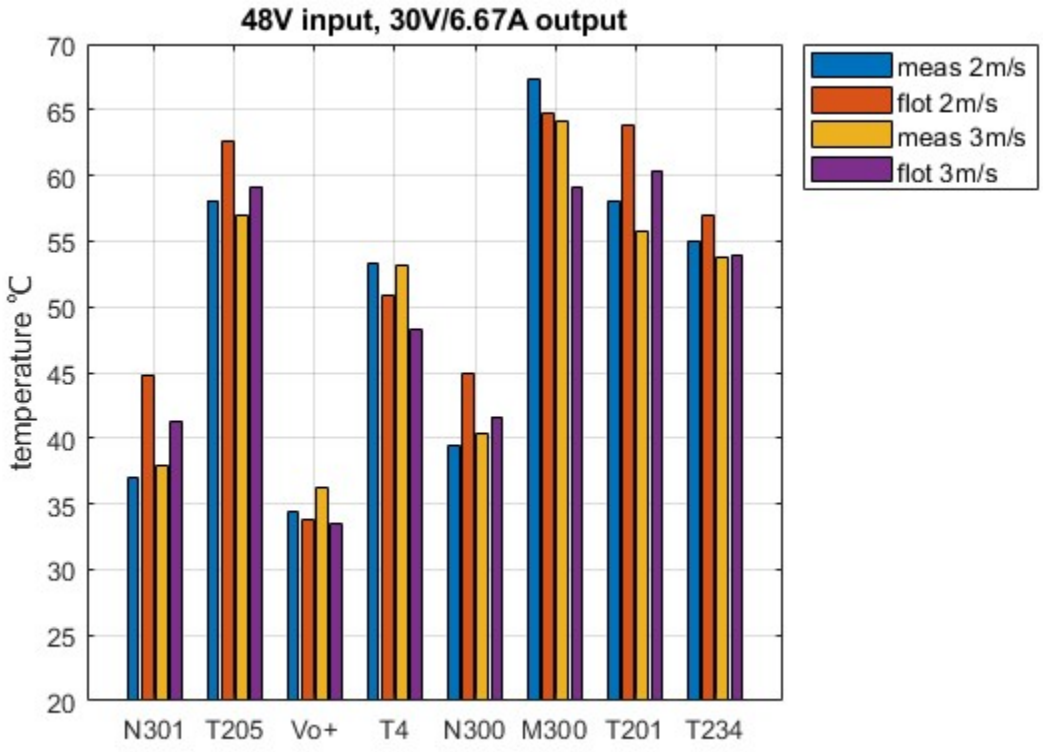

Figure 5: Model calibration result: meas – measured data, flot – Flotherm simulation results.

Model Usage

Import the *.pdml file into the desired project.

If the model is rotated, make sure that the orientation of the orthotropic materials properties are preserved (also rotated).

Do not change the order of power sources and geometry objects, as this can change the power and material settings.

The module temperatures can be monitored in predefined monitor points.

Additional Information

Model has been constructed with SI units.

Disclaimer

The model and model documentation described herein are provided for the sole purpose of facilitating thermal modeling of a structure where the referenced product is included. It should not and cannot be interpreted neither as a detailed description of the product itself, nor as a statement of the product's performance.

The model has been constructed on a best effort basis, but we cannot accept liability for any discrepancy between model predictions and actual values.

Revision history

A	2023-09-07	New Document