DESCRIPTION THERMAL MODEL FOR PMU 8318

FLEX INC.

Contents

General

The model is an estimation for the thermal behavior of PMU 8318.

The model is intended for steady-state thermal simulations.

Model Description

The model is a readymade Flotherm 11.1 model. The model consists of three major components:

3D CAD Geometry

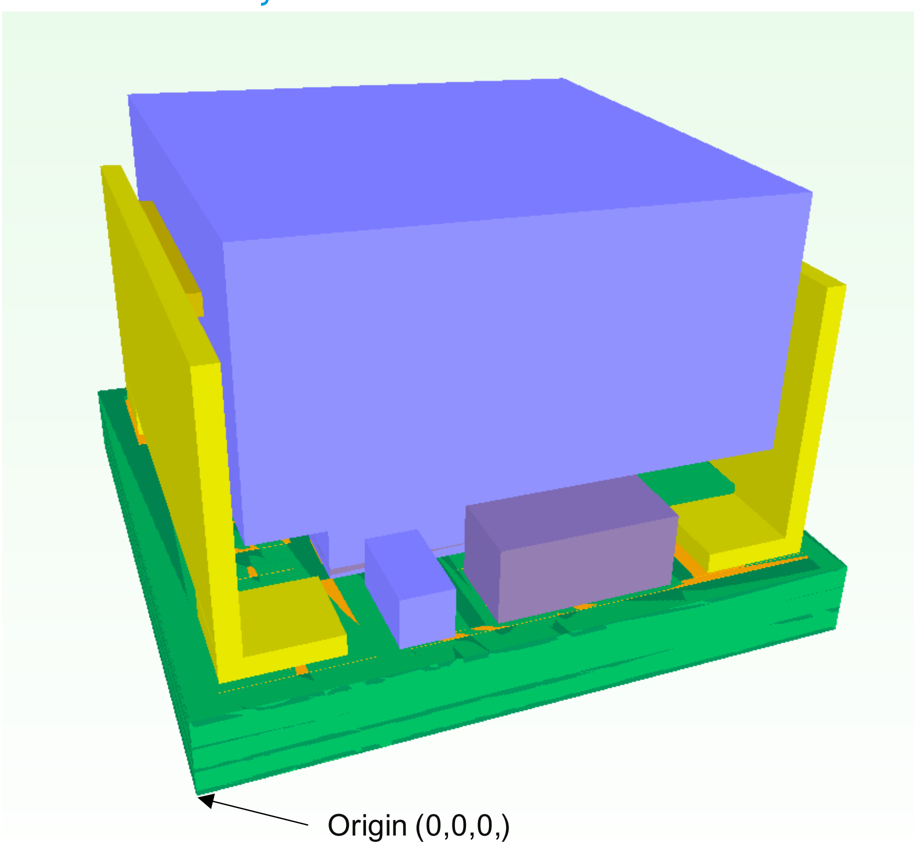


Figure 1 Model origin in lower left corner of PCB and axis orientation.

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

Unit in file: [mm]

In the geometry most components are maintained per original design but have been simplified in FloMCAD to cuboids. The PCB has been imported through FloEDA: Two outer layer copper and two inner layers. The vias in the PCB have also been imported through FloEDA and are used in the dielectric layers.

Domains of power loss distribution

There are several sources for power loss. The power loss for each of them, at certain module total power, are given in *Appendix 1 - Power Loss Distribution.*

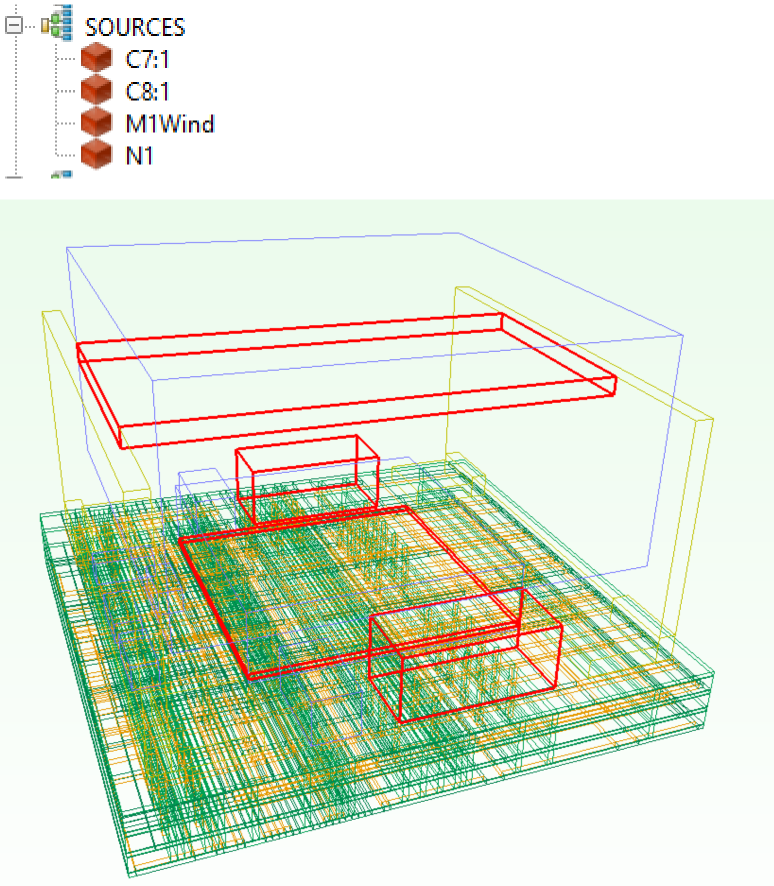


Figure 2: Heat Sources

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.

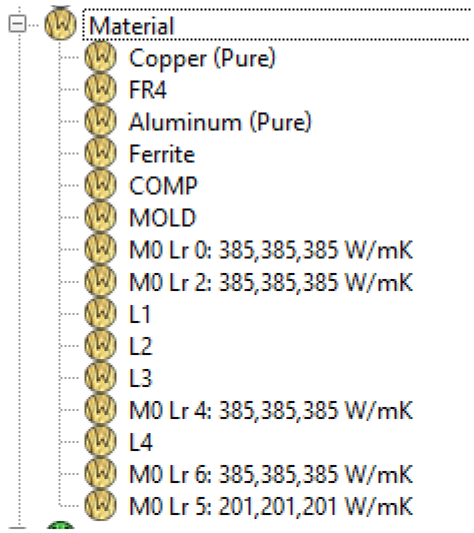


Figure 3. Domains of material data

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:

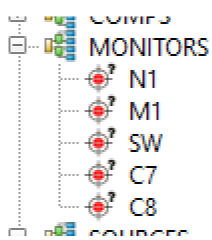


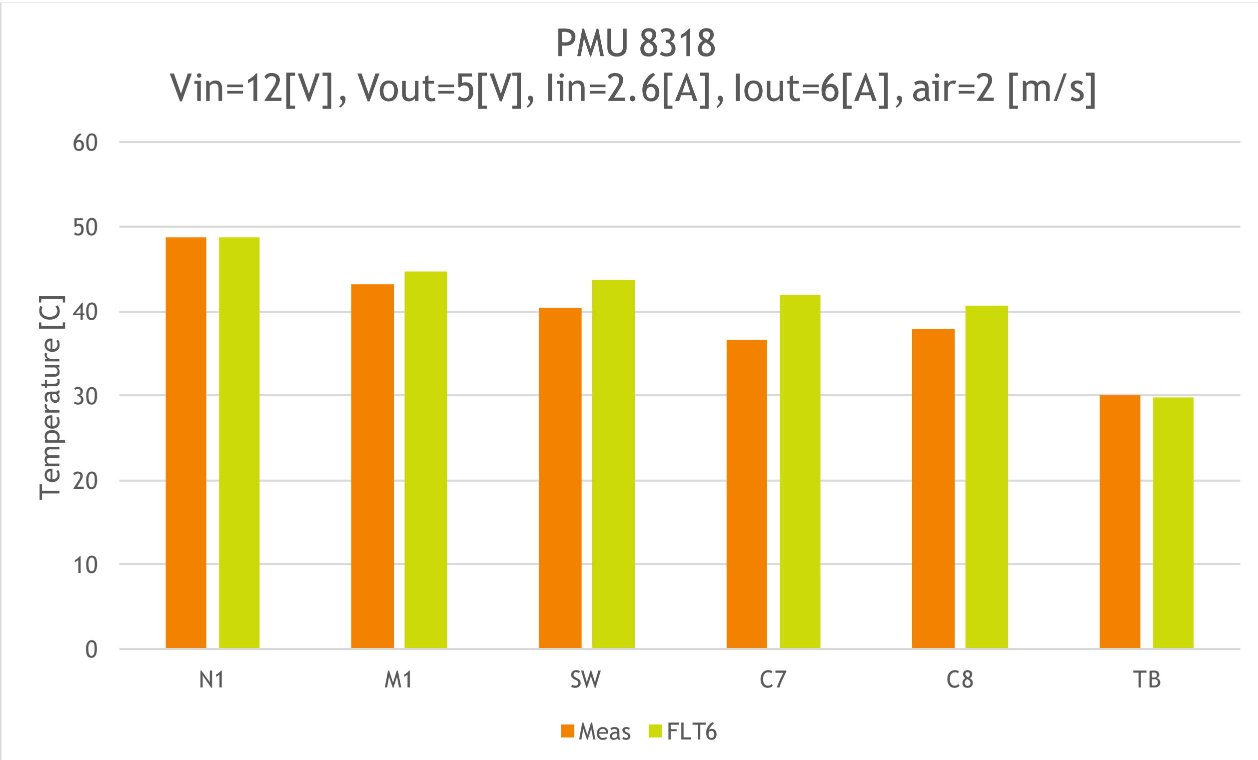
Figure 4. Probe points.

Model Calibration

The model has been calibrated to give temperatures as similar as possible compared to thermal verification document 3/102 65-BMR 668 8318/2C for Vin=12[V], Vout=5[V], Iin=2.6[A], Iout=6[A], 0.1 and 2 [m/s]. The calibration was done using power loss settings per Appendix 1 - Power Loss Distribution.

Calibration data: air direction=pos x, Tamb=22.8[C], spacing 15[mm], board 254x254x1 [mm^3], board thermal conductivity adjusted to get board temperature close to measured value.

Simulation temperatures are within ±2.6 [C] compared to measured values.



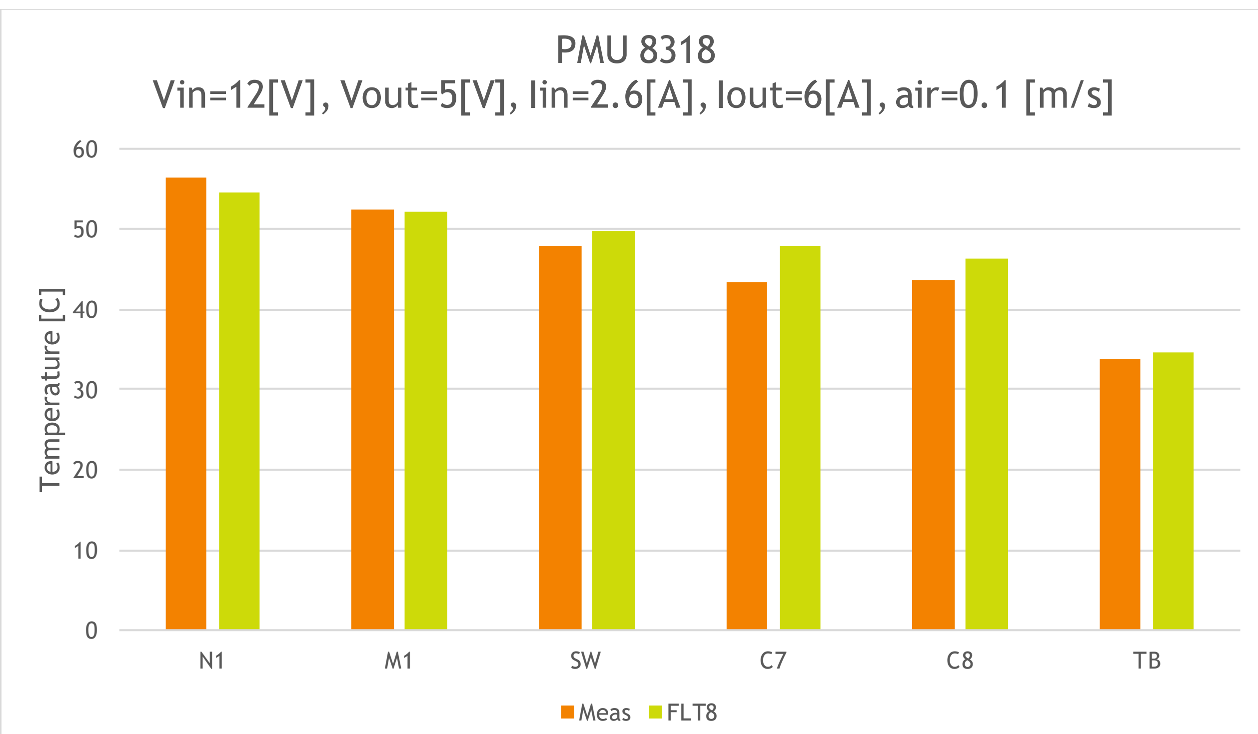


Figure 5: Model calibration result.

Model Usage

Import the *.pdml file into the desired project.

Adjust the dissipated power by altering the thermal sources per Figure 2, according to Appendix 1 - Power Loss Distribution. Default settings are for Vin=12[V], Vout=5[V], Iin=2.6[A], Iout=6[A]

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.

Make sure the layer patches in the TVA170102->Layers->Diel are well connected to your mesh, as these patches represent the vias and therefore are critical to the heat conduction in z-direction.

Additional Information

Model has been constructed with SI units.

Reference

BMR6688318_2A.pdml

Disclaimer

Revision history

A 2021-03-12 New document

Contact us

If you have any further questions, you are welcome to contact one of our technical engineers under pm.support@flex.com.

Appendix 1 - Power Loss Distribution

Power loss distribution examples for PMU 8318 (BMR 668 8318/2).

Condition: Vin=12[V], Vout=1[V], Iin=2[A], Iout=20[A], T≈50[C]

Domain	Number of domains	Power loss per domain [W]	Power loss per volume [mW/mm^3]	Subtotal [W]
N1	1	1.2	-	1.2
M1Wind	1	0.5	-	0.5
C7C8	2	0.0023	-	0.0045
Total [W]				1.7045