Thermal Module

FOR THERMAL ANALYSIS OF SEMICONDUCTOR DEVICES

The Thermal Module is an add-on module to the PSIM software. It provides a quick way of estimating conduction and switching losses of semiconductor devices (diodes, IGBT, and MOSFET).

Loss calculation is an important aspect in power converter design. Traditionally, users rely on the physical device models from the device manufacturers or software vendors. But the model of a particular device that is of interest may not be always available. With the Thermal Module, users can easily add devices of any manufacturers into a database. These devices can then be selected in PSIM schematics, and their conduction/switching losses can be calculated in the simulation.

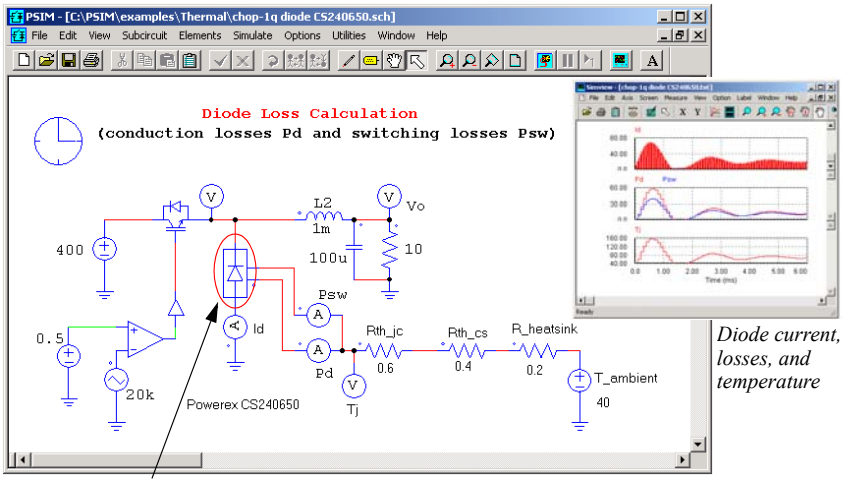
One major advantage of the Thermal Module is that it is very easy to use. New devices can be easily added into the database. Utilities are provided to capture the curve of a characteristic directly from the device datasheet image. Also, the Database Manager provides convenient ways to navigate through the database and search or sort devices.

Another advantage of the Thermal Module is that the loss calculation is done in such a way that it does not compromise the fast simulation speed of PSIM.

With the calculated losses, users can then implement the thermal equivalent circuit, and perform the thermal analysis to calculate the device temperature raise.

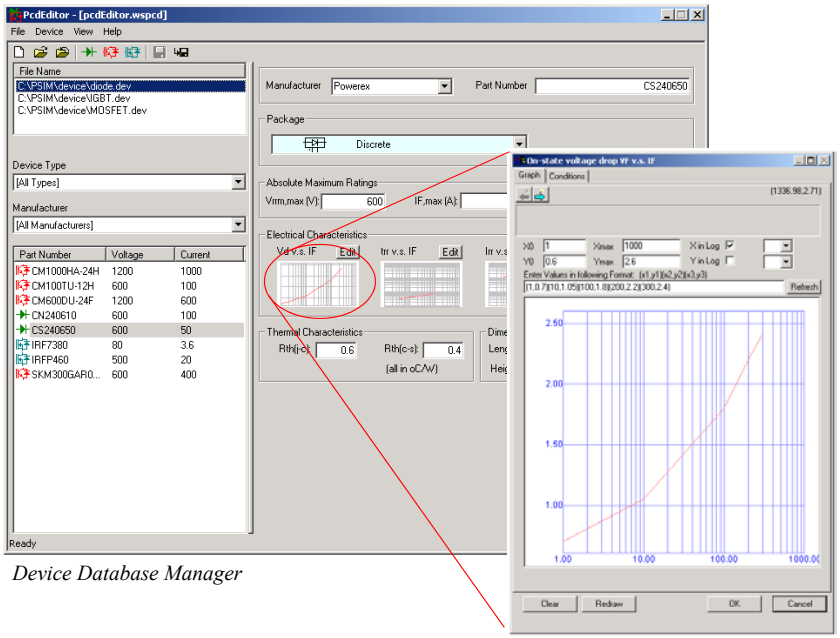
As an illustration, the example on the right shows the loss calculation of a Powerex discrete diode. The diode conduction losses and switching losses are calculated separately. With the thermal equivalent circuit, the heatsink, case, and junction temperatures are calculated. The waveforms show the diode currents, conduction losses and switching losses, and the junction temperature. The Device Database Manager and the diode forward conduction characteristics are also shown.

The Thermal Module is ideal for quick loss estimation, and for comparing different operating conditions and comparing devices of different manufacturers.



Diode current, losses, and temperature

Diode from database



Device Database Manager

Diode Forward Conduction Characteristics

KEY FEATURES:

- *Easy to use. New devices can be easily added to the database.*
- *Fast simulation*