

THERMAL MODULE

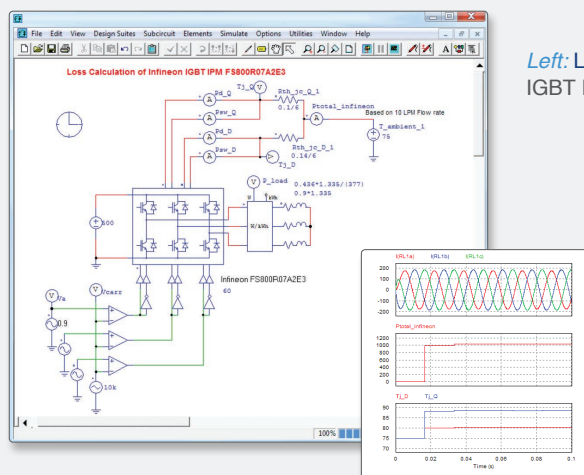
For quick power loss calculation

Quick power loss calculation from manufacturer datasheet

Power loss calculation is an important aspect in power converter design. Traditionally, users rely on detailed physical device models from device manufacturers or software vendors. But the model of a particular device model of interest may not be available. Even if such a model is available, the complexity of the model often slows down simulation and results in a long simulation time.

With the Thermal Module, users can add devices of any manufacturer into a database in minutes using an easy-to-use Device Database Editor. These devices can then be used in the PSIM schematic and their power losses calculated in the simulation.

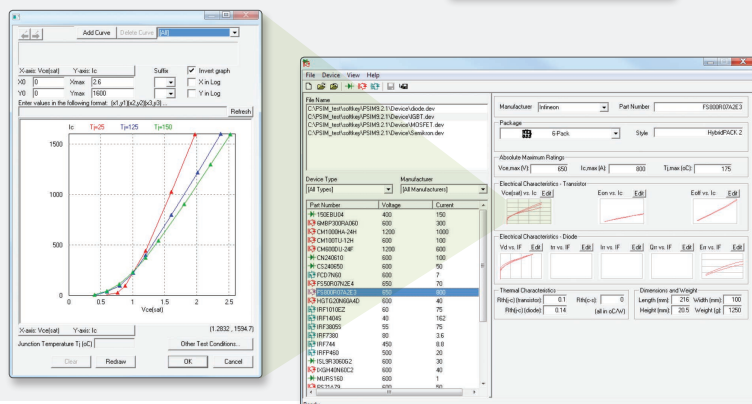
The Thermal Module provides a very quick way of estimating conduction and switching losses of semiconductor devices (diodes, IGBT, and MOSFET). One major advantage of the Thermal Module is that the loss calculation is done in such a way that it does not slow down the simulation. Also, the Database Editor provides a convenient way to add new devices and manage existing devices. In addition, utility tools are provided to capture device characteristics curves directly from device datasheet images.



Left: Loss calculation of IGBT IPM based inverter

FEATURES AND BENEFITS

- Easy-to-use Database Editor
- New devices easily added to database
- Quick power loss calculation with no impact on simulation speed



Left: Device Database Editor interface



MODCOUPLER MODULES

For co-simulation with ModelSim for VHDL and Verilog support

Quick VHDL and Verilog code validation for FPGA implementation

The ModCoupler-VHDL Module and ModCoupler-Verilog Module provide the link for co-simulation between PSIM and ModelSim for VHDL and Verilog code support.

Due to its speed and flexibility, FPGA has been increasingly used in digital control implementation in power electronics. For the design of such a system, a simulation environment is essential in order to validate the controller implemented in VHDL or Verilog code and make sure that the digital and analog parts of the circuit work together properly. The simulation of both analog and digital circuits is a difficult task, involving the simultaneous usage of

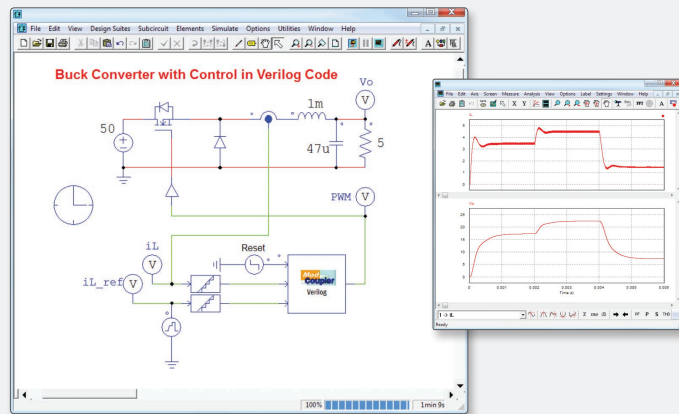
an analog and a digital simulator, or a mixed signal simulator.

With the ModCoupler Modules, the power circuit can be implemented in PSIM, and the control circuit in VHDL or Verilog code which can then be simulated by ModelSim for hardware implementation in FPGA.

The co-simulation has proven to be very effective in the design of digital controllers implemented in FPGA for power converters, as it allows users to fully test and debug the control algorithm and VHDL/Verilog code in the easy-to-use simulation environment instead of on the actual hardware.

FEATURES AND BENEFITS

- Simple interface
- Capability to support VHDL and Verilog code for FPGA implementation
- Easy design validation and debugging in simulation environment



Above: Buck converter with control implemented in Verilog code

Right: ModelSim interface

